AIR TRAILS

Pictorial

AUGUST 1949

25 CENTS

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AIR TRAILS Pictorial

AUGUST, 1949 • VOL. XXXII, NO. 5

Subject of this month's cover is the McDonnell Penetration Fighter, XF-88 "Voodoo." It is a large aircraft for a single-seater, but its purpose of long-range escort into enemy territory calls for an ample fuel supply for the thirsty jet engines. Despite its size and bulk the XF-88 can fly at speeds over 600 mph.

THE READERS WRITE:

Kenney to the Defense

Sirs:

In the May issue of Air Trails you printed a letter from a reader who was apparently displeased with your first prize selection for the Airmen of Vision design competition in the March issue. As a personal friend of Nick Stasinos, who submitted the winning design, I would like to offer a few words in his behalf.

In the first place, Mr. Stasinos submitted his winning design in June, 1948, more than half a year before Chance Vought released any description whatsoever of the ultra-secret F7U-1. The striking resemblance between the two designs should be enough to convince anyone that Mr. Stasinos is truly an Airman of Vision.

Mr. Hurst, in his letter, further states that the design was a "whittled-down version" of a design featured in the book, "Rockets and Jets," by Herbert Zim. I fail to see the resemblance. Aren't you imagining things, Mr. Hurst?

Nick Stasinos was not only an unusually apt student, but he is also an artist of considerable merit. Since his graduation from school he has taken an engineering position with Hughes Aircraft, Inc. I, for one, would like to commend Air Trails for its excellent and unbiased selection of Airmen of Vision.

DAVID A. KENNEY
Northrop Aero. Institute
Hawthorne, Calif.

A "Jenny's" Five-Hour Flight

Sirs:

Not to be too technical, but as an old "Jenny" pilot I was interested in an article in your March issue by Douglas J. Ingells ("How Good Are America's Aerial Spies?"), which stated: "But for five hours he kept up the picture-taking until all the film was exposed."

If this high-powered "Jenny" averaged 300 ft.-per-min. climb, we can

(*Continued on page 9*)

Letters to the Editors
All communications to the Air Trails editorial offices should be sent to Air Trails, Box 489, Elizabeth, N. J.

IN THIS ISSUE:

DEPARTMENTS

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7/8" - 25¢, 1-1/8" - 30¢, 1-3/8" .30
1-7/8" - 45¢ 2-3/8" .60
Sponge Rubber, Wood Hub (pr)
2" - 40¢, 2½" - 50¢, 3½" .60
Trealer Pneu. (pr) 1¼" or 1½" .40
1¾", 2" - 50¢; 2¼", 2½" - 60¢; 2¾" 1.00
3" - 1.25; 3½" - 1.50; 4½" 1.75
Tail Wheels 7/8" - 10¢; 1-1/8" .15
Sparky Tail Wheel Assembly .25

BATTERY BOXES

Metal, side by side, penlite .40
Medium - 40¢; regular .50
4-pencell .60
Plastic, end-to-end pen., med. .40
Plastic, for 6 penlites 1.25
Paper .25

FLIGHT TIMERS

Austin metal 1.50
Hillcrest plastic 1.25
Arden plastic 1.85
Stutter-off Valve .75

MISCELLANEOUS

No. 70 oil, 3 oz. - 25¢; pint .60
Presto Disc Starter .25
Coil Holder .15
"Spinit" Starter 5.00
Metal Pump Can 75¢ & 1.50
Tiger Fuel Pump .69
Fuel Line Filter .35
Motor Cover .25
Glo-Stop Watch 12.50
Midget Screw Driver .10
Metal Motor Mounts, Sm-30¢ Lg .50

.006, .008, .010, .012, .014, .016 dia. 2-52' lines .50
.010, .012, .014, .016, .018, .020 dia. 2-70' lines .65
[illegible] control lines
.008, .011, .014 2-70' .85
2-150' 1.00
Stranded .015 .021 .55 .75
70' 1.00; 100' 1.95; 200' 2.75
Reely Contr. - 7.50; cable 8.50
Reely Reels 12.50
[illegible] Contr. Handle (pistolgrip) 2.50

3 Ready-to-run Leaders

FREE PREMIUMS INCLUDED

THOR B $9.95

Everything you want in your engine A REAL POWER PLANT !! .29 displ., 1/6 horsepower, weight 6 ounces. Class B

IN KIT FORM $6.95

GENIE 29 $6.95

BOYS! Here is the engine you've always wanted. An engine that's been acclaimed the "easiest starting gas engine". .29 displ., 1/6 horsepower, weight [illegible] ozs., Class B. Good for glo-plug.

RAM $6.75

With features that step-up power, give longer life with lighter weight. Class B, .292 displ., 1/6 h.p. 6800 rpm. weight 4½ ozs.

DUAL RAM INCL. GLO PLUG $6.95

Neoprene Tubing, per foot .30
Transparent .15
Gasket Paper .25
Plug Wrench, 3-way - 15¢; 4-way .15
Socket Plug Wrench, 4-way .30
Universal Needle Valve .50
Flexible .75
Needle Valve Exten. flexible .35
Log Book .10
Extension Shaft 4½" 2.00
Bolts & nuts, ¼", 1" 1½", 12/ .25
P-E Fuel Shut-off Valve 1.00
Plastic Fuselage 10" set of 2 .30
Tissue (most colors) 20"x24" .05
Silkspan, light 18"x24" (white) .05
heavy 24x36" (white) .10
Red, Blue, Yellow 24"x20" .10
Silk per yard 1.50
Blow Torch 3.25
Cement (tubes) 10¢ & .25
Wood Stripper .25
Landing Gear J-bolts, 4 for .25
Landing Gear washers 3/32", 1/8", 12 for .05
Plastics Bar .15
Fillet Fill .35 Fill-It .45
Wheel Collar & Hub, pr. .25
Copper Tubing 1/8" OD, per ft. .20
Brass Tubing 1/16", 3/32", 1/8" .25
Sheet Aluminum (sq. ft.) .019" .35
.020" - 55¢; .032" - 75¢; .064" 1.25
Plywood (6"x12") 1/32" .20
1/16" - 25¢; 1/8" - 30¢; 1/4" .35
Masking Tape 1/4"x3 ft. .10
3/4"x30 ft. .29
Sandpaper, assorted pack .10
Soldering Set 2.25

U-CONTROL ACCESSORIES

Pistol Plastic Handle .75
PYLON control lines
Flexible 2-52' 1.50; 2-70' 1.95

Build-it Control Handle 1.95
Control-it Elev. Contr. Unit 1.95
[illegible] Control Handle .25
Metal Handles 1.00 & 1.25
[illegible] Control Reel 1.00 & 1.25
[illegible] Plastic Control Handle .65
Simplex Handle & Reel 1.25
Metal Flight Reel 1.00 & 1.25
Reel, Handle, Crank kit 1.25
Stunt Bellcrank & Fittings, horn .25
[illegible] Bellcrank .25
Elevator control horn .25
Horns (bellcr.) ½" - 15¢, 4" .15
Speed Indicator Tables .10
Elevator hinges 4 for .10
Swivels, small 15¢; large .20
Adjustable Push Rod set .25
Take-off Dolly kit 1.00

GAS MODEL BOATS

Chris-Craft Cruiser 30" C-D 3.50
Speedy Yacht 26" B-C-D 5.50
Baron 25" B-C-D 3.50
Chris-Craft Runabout 25" BCD 5.50
Chris-Craft Express 25" BCD 5.50
Vinyard 25" BCD 5.50
Jones Electric Drive Unit for 6 above ships 4.00
Marine Drive unit for 6 above 2.75
Buckeye prefab. 12" A-B-C 4.95
Cabin Cruiser 17" ABC 2.95
16 DIFFERENT GAS POWERED BOATS LISTED IN OUR CATALOG

THIMBLEDROME & ACCESSORIES

Thimbledrome Race Car 4.95
Champion car ready to run with Cox Engine 21.50 & 19.50
No. 15 or .099 Engine only 9.95
No. 199 Engine only 10.95
ALSO ALL COX UNITS

Scoop! Scoop! Scoop!

with every purchase of a **PHANTOM P-30** engine at **$13.95**

You can have, without extra charge, your choice of any U-Control or Free-Flight Kit listed, selling for $5.00 or less. All free items for engine and plane also included.

Glo or Ignition — 1/5 hp...295 displ. Class B, 8,500 rpm.

TOTAL RETAIL VALUE OF $29.45
NOW ONLY $13.95

NEW!

24 PAGE 2-COLOR CATALOG

The NEW America's Hobby Center giant 2-color 24 page (each 8½" x 11") Summer Catalog - 19 is just off the press! Over 50,000 items that every modeler needs are listed and illustrated. There's a whole page of Pee-Wee engines, planes and accessories, 5 pages of models for gas engines (over 150 U-Control Kits, over 50 Free-Flight models!), there's a whole page showing all the gas engines, page after page of accessories, supplies, etc., etc. For the non-gas modeler there's gliders, rubber jobs, ships and powered boats and ALL the latest race cars, plus special articles on plane and engine selection, flying, wiring, trouble-shooting, control-line tips, launching, etc., etc.

REVISED FOUR TIMES PER YEAR!!

In order to keep the AHC catalog current, it is completely revised FOUR TIMES PER YEAR . . . to insure inclusion of all the latest in model kits, engines and supplies AT THE LATEST, LOWEST PRICES! Once you order from AHC you get a new catalog FREE with every order, a copy of each latest catalog as it is printed. SEND 10¢ FOR YOURS TODAY!! If you haven't a dime, send for our FREE catalog.

WE SELL TO DEALERS TOO!

DEALERS! Did you know that Mod-Ad Agency, Inc., the wholesale division of America's Hobby Center, Inc., is one of the fastest growing jobbers in the business? We know your problems because we have your problems! Write for sample catalog, ready for your imprint and our famous 9-point program the reasons why more dealers are doing business with us.

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AMERICA'S HOBBY CENTER, Inc. - New York, Chicago, San Francisco

SPECIAL! BARGAIN!

Complete FLYING OUTFITS

WORTH TWICE OUR COMBINATION PRICE!

IT ISN'T OFTEN that you get the chance to buy, at less than half price, a U-Control Plane, Engine and All-Accessory Outfit with your own choice of 24 well-known **FACTORY ASSEMBLED** ignition or glo engine. Everything carries the famous America's Hobby Center guarantee.

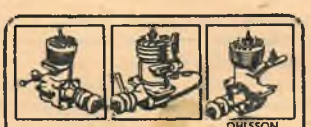
Even if you are a beginner, you won't have trouble building and flying any of these flying outfits, full-size plans of an easy to-build and fly plane, every accessory you will need, complete instructions, etc., etc. If you are an old-timer at building and flying model planes we don't have to tell you what these bargain outfits are really worth.

Thousands of these complete units have already been sold. They have met with enthusiastic reception because they represent a value unheard of before in the modeling field. The price is so low that we cannot sell to dealers. You really save from $10 to $12 by buying the complete, packaged unit - everything is engineered by experts for a perfect flying combination.

Your own choice of 24 well-known **factory assembled** engines, all guaranteed by the manufacturer and America's Hobby Center.

JUDCO Ignition or glo | GENIE Ignition or glo | RAM Ignition or glo

YOUR CHOICE $10.00



McCOY 19 GLO | THOR Ignition | OHLSSON 19 or 23 Ign. or glo

YOUR CHOICE $12.50

McCOY 19 Ign. Ball bearing & rotary valve | OHLSSON Ign. 19 or 23 Rotary valve

YOUR CHOICE $13.50

ARDEN .099 Ball bearing Ign. or glo. | OHLSSON 99 Ignition or glo | PHANTOM Ignition or glo | SPORTSMAN 99 Ball bearing & rotary valve

YOUR CHOICE $15.00

Plus

BUZZ "8" Ignition or glo

$8.50

Plus

TRAIL BLAZER Model Plane

TRAIL BLAZER Model Plane with carved lower fuselage-half, fully formed aluminum upper half. Balsa sheet wing, no tissue used. Balsa tail surfaces, plywood engine mount. Schematic drawings with step-by-step plans. Rubber wheels, detail paint schemes.

Plus not 75, not 100 but **ALL** **ACCESSORIES including:**

●PLUS: Correct size finished propeller ● 3-way plug wrench ● Presto Engine starter with handle and cord ● Speed indicator tables ● Log Book ● Motor cover ● Spark or glo plug with gasket ● Complete engine instructions ● 24 page Gas Engine Theory Manual ● Engine adjustment chart ● Metal fuel tank and gas line ● Metal Battery box ● Wilco Quality Coil ● 12" Hi-tension lead wire and end clips ● 18" insulated ignition wire ● Ignition slide switch ● Coil holder and mount ● Everlast condenser ● SAE # 70 Oil ● 4 ignition wiring lugs ● Spark plug guage set ● 2 plane identification tags ● 72 Insignias ● 72 page book on Control-liners, How to build and fly them ● Cement ● Sandpaper ● "Pro" all-metal knife and blade ● Metal bellcrank with bolt, nut and washer ● Elevator horn ● Elevator hinges ● Lead-in wire ● Push-rod wire ● U-Control handle ● 100 feet U-Control stainless steel wire and reel ● Membership in Modelcrafters of America ● 24 page giant 2-color catalog ● Postage ● Packing ● Insurance.

Ignition parts not needed with glo engines not included.

YOU WON'T GET OTHER BARGAINS LIKE THESE!

Complete RACE CAR OUTFITS

COMPLETE OUTFIT AT ABOUT 2/3RDS THE ACTUAL COST IF ITEMS WERE PURCHASED SEPARATELY!!

Everyone is racing the new Thimbledrome race car, the little 10" model that cannot be beaten for realism, craftmanship, speed and lasting pleasure. Speeds from 15 to 70 miles per hour. You can race this car in a schoolyard or any small, level space.

THIMBLEDROME RACE CAR

Your own choice

with BUZZ ENGINE only $10.50

with OHLSSON ENGINE only $15.50

Plus all accessories

Your choice of two well-known engines, ready to run ● Glo plug for new, ignitionless engine operation ● Metal fuel tank ● Neoprene gas line ● Complete engine instructions ● Battery connecting wire ● Mounting bolts ● Mounting nuts ● Motor cover ● Pamphlet on glo fuels ● Plug wrench ● Thimbledrome race car complete includes rubber race tires ● Complete instructions for installing and running engine ● Motor mounting bracket ● Flywheel ● Yoke ● Tether cord ● Membership in Modelcrafters of America ● Postage ● Packing ● Insurance ● Full A. H. C. Guaranty ● 24 Page Giant Catalog.

Everything you will need except a 1½ volt battery, fuel and a small file for cutting away parts of the body to install the engine. In addition, mounting and motor shaft holes must be drilled.

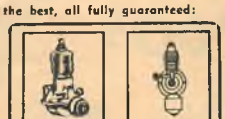
Scoop! Complete PEE-WEE FLYING OUTFITS

These are the new pint-size glo engines that are so tiny (1 to 1½ ounces) but develop plenty of power for free-flight or U-control flying.

Your own choice

of 3 of the best, all fully guaranteed:

CUB $7.95



SPITFIRE | INFANT $9.95

Plus your choice of planes:

All planes prefabricated, easy to build and fly

Powerhouse free-flight | Circle King 30" U-control | Puddle Jumper 19" U-control

Plus all accessories

You get the same accessories listed in our other flying outfits (excluding those not needed in a glo engine, of course). Everything needed to build and fly planes shown except fuel and starting battery.

Complete CO-2 FLYING OUTFITS

For the younger set, their Fathers and big brothers, there's nothing like the thrill of CO2 flying. You don't need much space for free-flights (100 feet square on windless days!), and less than a twenty foot circle for tethered flying.

THERE'S NOTHING TO LEARN AND PLENTY OF FUN!

CAMPUS BEE OR BUZZ CO2 Engine **$6.45**

(includes refillable tank, capsule charging unit). Costs only 2c per flight to run. Plus Cavacraft Stinson, Berkeley Profile Powerhouse or 19" Puddle Jumper. Kits are completely precut and shaped, ready to assemble).

O.K. CO2 Engine **$6.95**

(largest CO2 engine made) with the famous contest-winning 33" Powerhouse kit, (Most CO2 contests during 1948 were won with this matched combination of plane and engine) or 19" Puddle Jumper.

CAMPUS A-100 **$7.95**

(Smallest CO2 engine made, includes refillable tank!. Costs only 1c per flight to run. Choice of Cavacraft Aeronca kit with Cava-Cut parts, completely precut and ready to assemble or the World War I fighter biplane, the S.E.5.

Plus all accessories

CO2 Engine, ready to run ● CO2 Capsule holder ● 2 CO2 Capsules ● Correct propeller ● Complete Engine instructions ● Complete suitable airplane ● Landing gear ● Wheels ● Complete plane plans ● Cement (if needed) ● Flight log ● Insignia ● Identification tags ● Packing ● Postage ● Insurance ● Membership in Modelcrafters of America ● 24 pg. Giant model Catalog ● Full A.H.C. Guarantee.

NOTHING ELSE TO BUY!!

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Do you know about our Special Services Division of America's Hobby Center? Created to handle the problems of ordering through A. P. O or F. P. O., this department will insure your receiving your order promptly. As one of the largest American companies dealing in modeling equipment, we ship a very large amount of merchandise to Servicemen throughout the world. We understand their problems and we give extremely fast service. The Special Services Dept. makes sure that the material we ship is what is ordered; that nothing is missing; that it is carefully wrapped. This eliminates the necessity of returns or delays. Write today for our

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Send remittance in full (we prepay packing and insurance) or send $1 and we ship collect C. O. D. same day for balance. Address your order to us at your nearest branch office.

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A GENERATION OF FAIR DEALING GUARANTEES YOUR SATISFACTION

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America's Hobby Center is the country's LARGEST motor and gas model headquarters "where your interests come first"

1949 LARGEST MODEL & SUPPLY FIRM IN AMERICA

NOW!! BUZZ GLO ENGINES.....

.....have been produced by popular demand! BUZZ Engines have been used in every type of model flying, U-Control, Free-Flight, Radio Control, and now the same high-quality engines are available as Glo-Engines. These engines are the simple, dependable BUZZ engines that in the past year have been time and field-tested by over 20,000 modelers! You'll enjoy more hours of flying per dollar investment with BUZZ Engines!

Rising Costs...

have been offset by the tremendous demand for BUZZ ENGINES. That's the only reason we are able to continue to offer you these Ignition BUZZ Engines at only $4.95! Note we have been able to reduce the price of the "60" it, too, is only $4.95!

GLO BUZZ 19, 29 & 35 $4.95 EACH

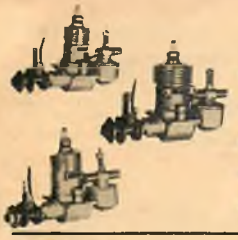
The interchangeable Class A, B and C Buzz Engines in glo-plug operation! The BUZZ 19, 29 & 35 Engines lead the field in low-cost FLYING FUN! Thousands of modelers all over the world depend on the rugged construction and easy starting of BUZZ Engines every day for their FUN in FLYING. Can be interchanged on the field so you can fly the same model in Class A, B or C the crankcase mounting holes are identical.

NOW! EACH ENGINE ON THIS PAGE..... $4.95 ASSEMBLED & TESTED

GLO BUZZ "60" $4.95

for large Class D models in Free-Flight or U-Control or as a simple way to avoid ignition interference for radio-controlled flying! Wherever you have a lot of airplane to haul skyward, use this power-packed "60". It's the engine that generated power for the field-command radio sets with the Army during the last War. A flip will start it and you'll have continuous smooth power for every flight.

The BUZZ 19, 29 & 35 EACH $4.95



Thousands of modelers all over the world have depended on these ruggedly-constructed, easy to start BUZZ A, B & C Engines. They've changed engines on the field and have flown the same model in all three events, not once, but repeatedly, contest after contest. Four screws to change and your plane flies in a different class... the crankcase mounting flanges and screw holes are identical in all three engines.

THE "GLO-WEE" NEW!

Just as we go to press, the factory superintendent advises us that the new GLO-WEE will be ready for shipment by the time you read this. Completely field tested, this new "Pee-Wee" size engine is ready to haul any of the new 18 to 24 inch span models skyward. Its steel piston and cylinder are power-packed. You'll have many hours of fun with this economical engine not only is the original price low, but the fuel consumption is practically microscopic! You can fly to your heart's content on a can of glo fuel.

Use the BUZZ "60"

for the same dependable, easy starting smooth power that thousands of modelers have been enjoying since this engine was first offered a year ago. This is the engine that powered field-command radio sets during the last War.

Use the Buzz 60 for your large Class D Free-Flight or Controline model. Each engine is factory tested and will provide you with smooth, dependable power that will avoid crack-ups and disappointments in contest or sport flying.

NOW! $4.95

BUZZ CO2 ONLY $4.95

The BUZZ CO-2 Engine is the first 3/16" bore & stroke engine on the market. Thousands have been sold and thousands of modelers have enjoyed the dependable power and economical operation of this intermediate-size engine. The refillable tank allows five flights per CO-2 Capsule less than 2¢ per flight! Engine is complete with refillable tank connected to engine and a capsule tank-charging unit that is die-cast.

ONLY $4.95

Some facts about BUZZ Engines.....

SPECIFICATIONS:

	19	29	35	60	CO-2
Displ.	.199	.299	.350	.610	——
Bore	.660	.812	.880	1.000	3 16
Stroke	.562	.562	.562	.777	3 16
Horsepower	1/7	1/6	1/5	1/4	——
RPM	7,500	8,000	8,500	9,000	variable
Prop	8"	10"	11"	12"	5½
Weight	4	4½	4¾	9	¾

The BUZZ Engines are manufactured by a company that for years has been the world's largest maker of automobile replacement pistons and other precision gasoline engine parts. Thousands of gas engines and parts were made during the war by this company for the War Dept. for use in walkie-talkies, field generating sets, etc., etc. Since the war, thousands of gas engines have been made for scooters, lawn mower and other industrial uses. When we say unconditionally that the BUZZ engine is well engineered and well constructed will give you plenty of good service, this is no idle boast, but a fact!

ACCESSORY UNITS

For IGNITION Engines...only $2.49

Spark Plug ● Gasket ● Wire Quality Coil ● Hi-Tension Lead Wire ● End Clips ● Eveready Condenser ● Correct Size finished Propeller ● Ignition Slide Switch ● 3-Way Plug Wrench ● 4 Wiring lugs ● 4 Mounting Bolts & Nuts ● Presto Engine Starter, with cord & handle ● Spark Plug Gauge Set ● Motor Cover ● 24 Page Gas Engine Theory Manual ● Log Book ● Engine Adjustment Chart ● S. A. E. No. 70 Oil ● Coil Holder and Mount ● Metal Fuel Tank ● Gas Line ● Metal Fender Battery Box ● Insulated Ignition Wire

For GLO Engines...only $1.49

Glo Plug ● Gasket ● Insulated Ignition Wire ● Correct Size Propeller ● 3-Way Plug Wrench ● Mounting Bolts & Nuts ● Presto Engine Starter, with cord & handle ● Motor Cover ● Log Book ● 24 Page Engine Theory Manual ● Fuel Tank ● Gas Line

For CO-2 Engines...65c

Correct Propeller ● Motor Cover ● Lubricating Oil ● 2 CO2 Cartridges

AT NO INCREASE IN PRICE!

BUZZ IGNITION ENGINES

Order today!

HOW TO ORDER

Send remittance in full (we prepay packing and insure) or send $1 and we ship collect C. O. D. same day for balance. Address your order to us at your nearest branch office.

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(Continued from page 4)

safely assume this would require a 34-minute climb. With five hours more at 10,000 ft.-plus (2-mile altitude), a 10-minute descent at 1,000 ft.-per-min. (fast, eh?), the flight can be roughly calculated as 5¾ hours, or 350 miles. Probably a record flight, eh? Well shut my mouth!

BYRON BAKER

Flushing, L. I., N. Y.

● A five-hour flight in a "Jenny" does sound far-fetched, but it's not impossible. At full throttle the OX-5 consumed .60 lbs. of fuel per horsepower-hour, or, when the OX developed its full 90 horses, 54 lbs. of gas per hour. Translated into gallons, based on 6 lbs. per gallon weight, this makes for a consumption of 9 gallons an hour. Now flying at a reduced throttle, say 75% power, total consumption for five hours will be 33.75 gallons. Climb will require more power, descent less, so it will average out to around 37 gallons. Average speed, including climb, will be in the neighborhood of 60 mph, total linear distance covered about 300 miles. For your information, the non-stop distance record for "Jennys" is between 315 and 320 miles. So the flight described in Mr. Ingell's article was quite possible.

Lycoming and Piper Clipper

Sirs:

In your June '49 issue of Air Trails on page 32 you show a photograph of the Piper PA-16 Clipper . . . The airplane has for a power plant the Lycoming 0-235-C1 engine of 115 hp, and not the engine you listed in the caption.

ANDREW PEDDIE
Lycoming Corp.

Williamsport, Pa.

● Our error. Standard power plant on the Piper Clipper is a Lycoming, not a Continental. See story in this issue, "We Fly the Piper Clipper."

"Record Review"

Sirs:

While reading the April 1949 issue of Air Trails, I executed a "double take" when I read "Record Review" on page 70. You credit a Mr. Robbers of Oakland with holding the outdoor Class B Hand Launched Glider record (18:17.0). In the depths of my mind I recalled a contest . . . at which Andy Petersen (then Thermal Thumbers Club president) set a new Class B record. I immediately set out to investigate. I found that my memory wasn't so bad. AMA records credit Andy with the record, having a three-flight total of 19:32.8 minutes.

DALE WRIGHT

North Hollywood, Calif.

● Mr. Wright should realize that official National AMA records are upped frequently. Mr. Petersen bettered Mr. Robbers' mark while "Record Review" was "in the works."

"Science and Modeling"

Sirs:

I have been using information from Air Trails in composing my Physics term paper on the Development of the Airplane, and by searching through the 36 editions I have saved during the past 3 years, have found many interesting facts concerning the subject.

Air Trails has always been my favorite magazine—at first for the model news and plans, which are swell, and now for the aviation data and news. I think you have a wonderful magazine—well divided between the scientific side of full scale aviation and the practical, informative side of model craft. . . .

TOLFORD YOUNG

Westbrook, Me.

Model Matters

Sirs:

Let's have more plans like the Aeronca C-3. I'm going to build it directly from the plans in your magazine and have a snazzy-looking shelf model. I, too, favor the old types, especially those that made historic flights.

NEWTON MCLEOD

West Peru, Me.

Air Progress

Sirs:

I am a reader of your wonderful magazine, and I especially like Air Progress. It is one of the best parts of your book. Some time I wish you would give us The Hawker Story, because Hawker makes about the best fighter planes, I think.

DONALD A. DWAN

New York, N. Y.

Showcase

See your hobby shop for the items shown here. Both the price and specifications subject to change.

Some Saucer→

If you're looking for a really different type of model the Leche Flying Saucer should fill the bill. It's produced by Leche Model Engineering Co. (Opelika, Ala.) for $2.95. Takes class A or B engines. Has symmetrical airfoil. 198 sq. in. of wing area. Designer says unique wing gives a smooth flat glide after the engine cuts out. Construction simple.

←Famous Brand

Phillips Petroleum Co. (Bartlesville, Okla.), producers of the Phillips 66 brand of automotive and aviation gas, also puts up the Phillips 66 Model Motor Blend. The fuel is described as a balanced blend for fast starts at high or low temperatures. Tests of 2½ hours showed that Phillips 66 is a clear-burning fuel leaving all engine parts clean.

Ready-to-Sail→

A model racing yacht with hull and keel molded of high-impact phenolic plastic and cabin and deck of colorful polystyrene plastic is new ready-to-sail item by Reuhl Products Inc. (2609 Monroe St., Madison, Wis.). Over-all length, 21 inches; beam, 5⅛ inches; height, 26 inches; area of nylon sails, 188 sq. inches; weight, 1 lb., 6 ounces. Equipped with automatic steering gear.

First Ford "A" (Below)

Did you know Henry Ford built a Model "A" before he built the famous Model "T"? Scranton Hobby Center (315 Adams Ave., Scranton, 10. Pa.) has $2.50 kit for building the 1903 model "A" which was Ford's first production car. Wicker baskets on sides were used to store the linen duster, gauntlet gloves, lunch, tools and the inevitable spare inner tubes.

Showcase

Try your nearest hobby shop for items presented here. Write the manufacturer if you can't find it.

Latest Dope→

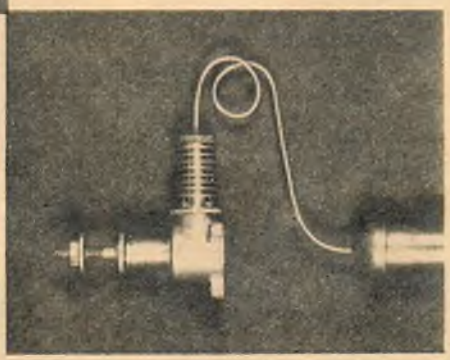
Jim Fahey's "U. S. Air Force Aircraft, 1947-1949" is valuable supplement to his "U. S. Army Aircraft, 1908-1946." Both together from Ships and Aircraft, (2033 Rhode Island Ave., N.E., Washington 18, D.C.) cost $1.25. Supplement alone is 35¢. Book contains mine of information and lists over 2000 planes, has 440 illustrations. Used by writers and airmen.

←Deal in Decals

Something to look for at your dealer's is Hobby Decal Specialists (393 Smith St., Perth Amboy, N. J.) numeral decals. You'll find 1, 2 and 3 inch numerals in black and yellow. Each number is individually perforated making it easy to get just the numbers you want in exactly the quantity you want. Outfit is also making popular letters in decal form.

Bee CO_2→

The new Campus Bee with bore and stroke of 3/16 inch is latest Campus Industries (1100 Adams Ave., Philadelphia 24, Pa.) offering in CO_2 engine field. Sells for $4.95 with refillable tank and CO_2 cartridge holder. Most modelers get 4 to 6 flights per cartridge. Engine will power models from 18 to 30 inches in span; said to be ideal for the prefab kit models.



Paul's Prop (above)

Available at dealers and distributed by B. Paul (NE corner, 6th and Market Sts., Philadelphia 6, Pa.) are the new 25¢ "Proper Props". They come in 8 inch diameter 6 inch pitch, 8/8, 9/6, 9/8, 10/6, 10/8, 11/6, 11/8. These sport props are finished and lacquered. B. (for Bernie) Paul is old-time scale model builder who was active in early days of PMAA.

Showcase

See your hobby shop for the items shown here. Both the price and specifications subject to change.

Test Block→

Self-contained unit ready to start your ignition engine. Includes coil and condenser completely encased in special ignition chamber, plus all fittings. Made by Wright Mfg. Co. (Box 128, Brooklyn 10, N. Y.), sells for $5.95. Die-cast base is finished in baked wrinkle enamel. "Deluxe" kit originally cost $9.50. Boon to the boys with limited bench facilities.

←Cruiser Down the River

Patterned after the famous PT's is this Elco Sport Cruiser put out in kit form by Marine Model Co., Inc. (Halesite, L. I., N. Y.) which retails for $4.95. Kit is numbered 1111 and makes into racing boat 15 inches long with 5-inch beam. Carved balsa hull with hollowed cockpit. Die-cut mahogany cabin; 17 finished fittings. Takes DC. CO_2 or sm. A motors.

Rpm Detective→

Fowler Vibra-Tak is precision-built pocket tachometer which shows instantly the rpm of any model engine. Sells for $2. Made by Verdell Instrument Sales Co. (Box 212, Burbank, Calif.) of high-stress aluminum. Has knurled indicator and deep-etched markings. Permits comparative tests with various props and fuels. Useful engine trouble-shooter.

←Let's Get Started

A new approach to the atomic-age problem of how to start the new, powerful model engines is Cyclo-start which is marketed by Downs Mfg. Co. (14 Grant Ave., Islip, N. Y.) Attaches easily to your bike; with power you can put into back wheel by turning pedal, the starter turns an engine over fast and just as long as you desire. Costs $5 postpaid.

Veco's V-700→

Henry Engineering Co. (Burbank, Calif.) adds new V-700 Superfinish to its Veco Products line. This is a hot-fuel-proof liquid with gloss finish. Can be applied with brush or spray gun, dries quickly. Concern also has new item in its Veco control horn which is a natural mate to the Veco bellcrank. Horn is fitted to slim rod with bent ends for stab action.

TOP-NOTCH FLIGHT LEADER AND ITS SENSATIONAL LITTLE "WING MAN"

TESTORS

TC-2 Trainer

TESTORS

BABY TC-2

CONTROL LINE MODEL AIRPLANE KITS

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ASSEMBLY TIME LESS THAN 2 HOURS

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You'll find these Testor models unparalleled for quality and value. Be sure to include the TC-2 Trainer and Baby TC-2 in your plans for near-future building and flying.

TC-2

- Wing Span.....31" — Fuselage.....26"
- Rated for Class B Engines
- Suitable for advanced training with Class C Engines

BABY TC-2

- Wing Span.....18" — Fuselage.....16"
- Rated for glow-plug infant engines (.020 to .099 cu. in. disp.)
- Can be flown indoors by locking controls in neutral.

TESTOR CHEMICAL COMPANY (WOODWORKING DIVISION) ROCKFORD, ILL.

● Consolidated-Vultee B-36D: The mammoth Air Force bomber has been equipped, in addition to its six 3,000-hp reciprocating engines, with four J-35 turbojet power plants at wing tips, giving it a considerable increase in speed, altitude and load capacity.

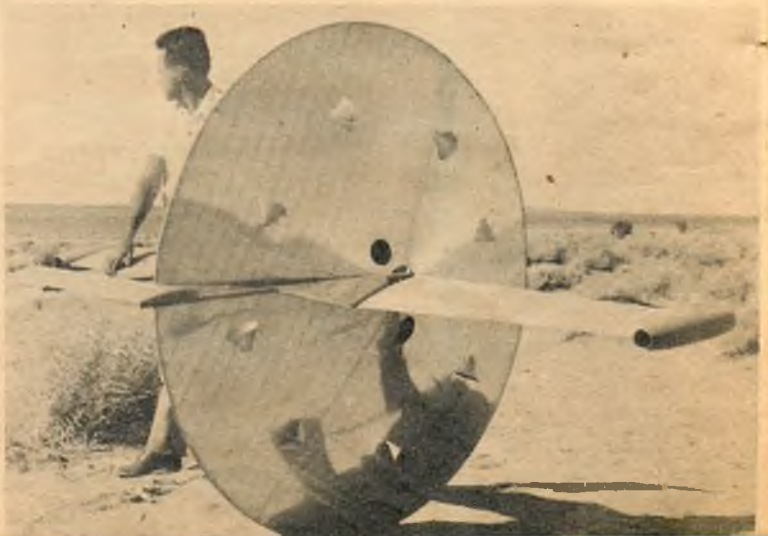
Development Highlights

● French sailplane Fouga CM 8-R-13, with auxiliary Turbomeca jet engine developing a 198-lb. thrust. Maximum speed, 161 mph.

● Lockheed F-90: Air Force's latest penetration fighter, powered by two Westinghouse J-34 jet engines of 3,000-lbs. thrust each. Wing span is approximately 40 ft., fuselage length 55 ft. Wings have 35° sweepback, and are extremely thin. Speed over 650 mph.

● British experimental jet fighter the Hawker P.1052, is the development of the earlier P.1040. Powered by the latest Rolls Royce Nene engine developing over 5,000 lbs. thrust. Plane has double entry wing root air intakes and double exhaust nozzles.

● This "flying disk" is the real thing. Designed by Roy Wolford, former Air Force pilot, now an engineer for Hughes Aircraft, this gadget is for use as aerial target. It consists of a single aluminum disk stabilized by stubby wings and tail surfaces. Cups on side of disk catch air and cause it to rotate. It can be towed at much higher speeds than the conventional sleeve target. Tubes on end of wings are smoke pots to mark course of target. Next time you report seeing a flying disk, don't get excited—this may be it.



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In a huddle on their design for the rudder of a student project aircraft, these Northrop students study their assembly drawings—a scene they will repeat many times during their careers.

Wing-top classroom—an example of how engineering instruction at Northrop comes vividly to life in an actual aviation industry environment.

All-wing glider designed by Northrop engineering students—a typical training project for practical design and production experience.

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Air Notes

AVIATION TODAY AND TOMORROW

Channel Wing Progress Report

In June, 1948, Air Trails reported a revolutionary personal plane development, the Custer channel wing plane, which its designers say promises sensational safety and utility through use of a U-shaped airfoil channel that provides tremendous lift even without a straight wing. The channels are said to make possible back yard take-offs of only 15 feet and landings almost as slow as a helicopter.

No such plane is yet on the market, but there have been hundreds of inquiries about it, including, according to the builders, orders for channel wing ships by the dozens, even from foreign countries.

Definite plans for a channel ship are well under way. W. R. Custer, the plane's designer, and National Aircraft Corporation, in Hagerstown, Maryland, which is developing it, will make no predictions at present, however, as to when a channel wing plane will be available to the public. Test work with the channel wing ships has been most satisfactory, they report. The present experimental plane, NAC-2, has made approximately 150 successful test hops. This plane is built without wings, flaps, ailerons, or brakes, to demonstrate the terrific lift of Custer channels with flight control by power only. The finished ship for public consumption will not be minus these elements, however, and will, according to Mr. Custer, "very much resemble the one on the front cover of the June 1948 issue of Air Trails."

Atlantic Anniversary

It has been 30 years since the first crossing of the Atlantic Ocean by air, and on Sunday, May 8, the U. S. Navy appropriately observed this anniversary by sending a modern search patrol plane to retrace the route of the old NC-4 seaplane which made the initial oceanic crossing from May 9 to May 31, 1919.

Chosen for the memorial mission was a plane quite as famous as its distinguished predecessor—the Lockheed P2V Neptune "Truculent-Turtle," holder of the world's non-stop distance record, a total of 11,236 miles flown from Perth, Australia, to Columbus, Ohio, in 55 hours and 17 minutes, in September, 1946. Commander Thomas Davies, who set the distance record, also piloted the "Turtle" on the memorial flight. Along as an honored guest was Admiral A. C. Read (ret.), who, as a lieutenant commander in 1919, piloted the NC-4 on its historic trip.

Airports Needed

The national airport plan for 1949 lists 4,977 locations at which CAA believes airports should be constructed or improved with Federal aid. A sign of the times is the inclusion of 63 new heliports and improvement of two old ones.

Speeds Of Tomorrow

The Curtiss-Wright rocket power plant for the Air Force's Bell X-2 plane is in the final stages of development, and the plane should be ready for initial flight testing early next year. Successor to the X-1 in a series of sonic research ships, the X-2 is designed for higher speeds than its predecessor and may hit Mach 2 before the year is over.

Another supersonic research plane, the Douglas D-558-2 Skyrocket, has been accepted by the Navy and has begun research flights that may push beyond Mach 1.5. Any way you look at it, "miles per hour" is too slow a term for the speeds of the future.

Ceiling Almost Zero

Planes of both the Air Force and commercial airlines may soon be landing safely when the ceiling is as low as 100 feet, by use of a new flight instrument called the Zero Reader. The Reader, developed by the Sperry Gyroscope Corporation, has a simple two-element indicator with crossed pointers to tell precisely how to move the controls to steer right or left or go up or down in order to hit the ILS beam with minimum of error.

The practical performance of the instrument has been demonstrated in hundreds of flights by Air Force and commercial pilots. The USAF All-Weather Flying Division is now completing preliminary evaluations prior to delivery of three models.

More Meets For Midgets

Thousands of air race fans may get their chance this year to see the famous 190-cubic-inch Goodyear class midget racers in action. Under a special agreement with the National Aeronautic Association, the Professional Race Pilots Association is promoting and sanctioning midget races throughout the country. Three have already been held on the West Coast. As many as a dozen may be staged before the year is over. The contests are drawing many of the same pilots and planes as the Goodyear and Continental Trophy Races which made these "hot rods of the air" so popular.

Marine Airlift

More than 12,000 Organized Marine Corps Reservists will fly to their summer training bases this year via a special Marine Corps airlift. It will be the first time Marine aviation has transported ground reserves. The airlift will cut travel time for Marines from inland cities and increase the actual number of training days available. It will also provide indoctrination in air movement for ground reserves. All unit equipment except vehicles is scheduled to be moved by aircraft. The airborne Marines will be part of the 28,000 Reservists taking training periods.

Rotary Record

The official world speed record for helicopters has been added to the list of major international records held by the United States. A Sikorsky S-52-1 set the new mark of 129.616 miles per hour over a three-kilometer speed course in Cleveland, topping by more than 5 miles an hour the record set a year ago by a British Fairey Gyrodyne. Other U.S. 'copters have reported even faster unofficial times.

'Copter Newcomers

Kaman Aircraft's K-190 helicopter has received CAA certification and is now on the market. It is an intermeshing rotor aircraft with servo-controlled rotors. Kaman's market plans are even more novel than its 'copter. A leasing arrangement will permit operators to employ helicopters without large investments in equipment. They can simply lease from Kaman a tailor-made package ready for operation—a helicopter complete with pilot, mechanic, gas, oil, insurance, etc.

Another newcomer on the rotary scene is the Bell 47D1 three-passenger general purpose helicopter. It is the fourth model produced by Bell, has a 40 percent payload increase over its predecessors, can fly higher and will be priced lower.

Thousand-Hour Milestone

A British engine and four American planes were recently reported on almost the same day to have passed an important service milestone. By coincidence, in each case it was 1,000 hours.

The British engine is a standard de Havilland Mark II jet which successfully completed 1,000 hours of officially observed trial on a test bed in the severest combat conditions. Dismantled for inspection at 500 hours, the engine required only 10 percent new parts. Other maintenance during the test totaled less than 60 hours. The test proves, said de Havilland, that in just eight years this type of centrifugal turbine has surpassed all piston engine achievement in the matter of durability.

The American thousand-hour mark was passed by four F-80 Shooting Stars, which became the first jet airplanes on record to attain this service mark. The Shooting Star was the Air Force's first operational jet fighter; the first delivery was made in February 1945, and more than 1,000 are now in service.

Growing Guard

Steadily growing Air National Guard recently was authorized an additional allotment of 4,324 men, which enabled it to reach a strength of 45,512 by the end of fiscal 1949. There are 514 ANG units distributed among the 48 states, Hawaii, Puerto Rico, and the District of Columbia.

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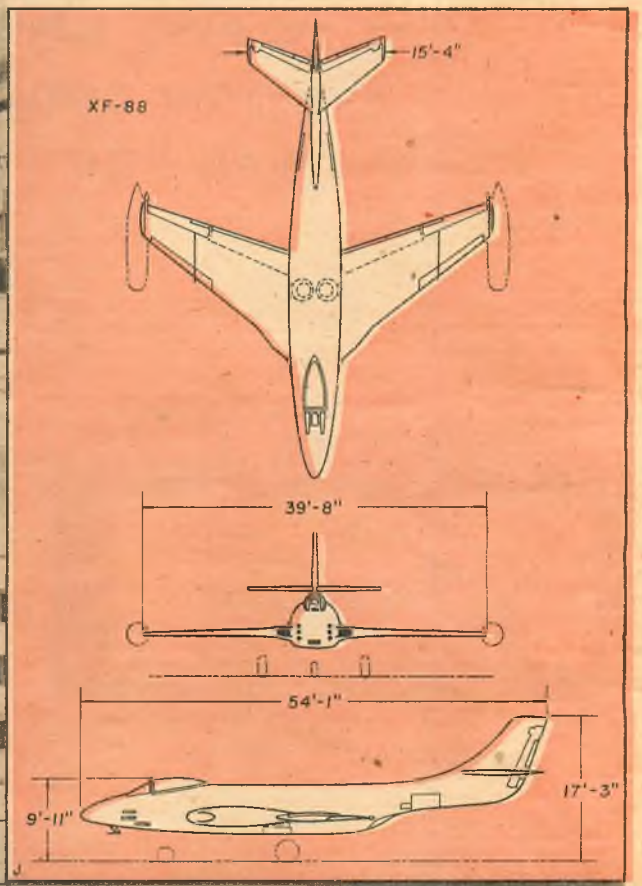
My Age..... *I am*.....*am not*.....*a Veteran*

Penetration Fighter

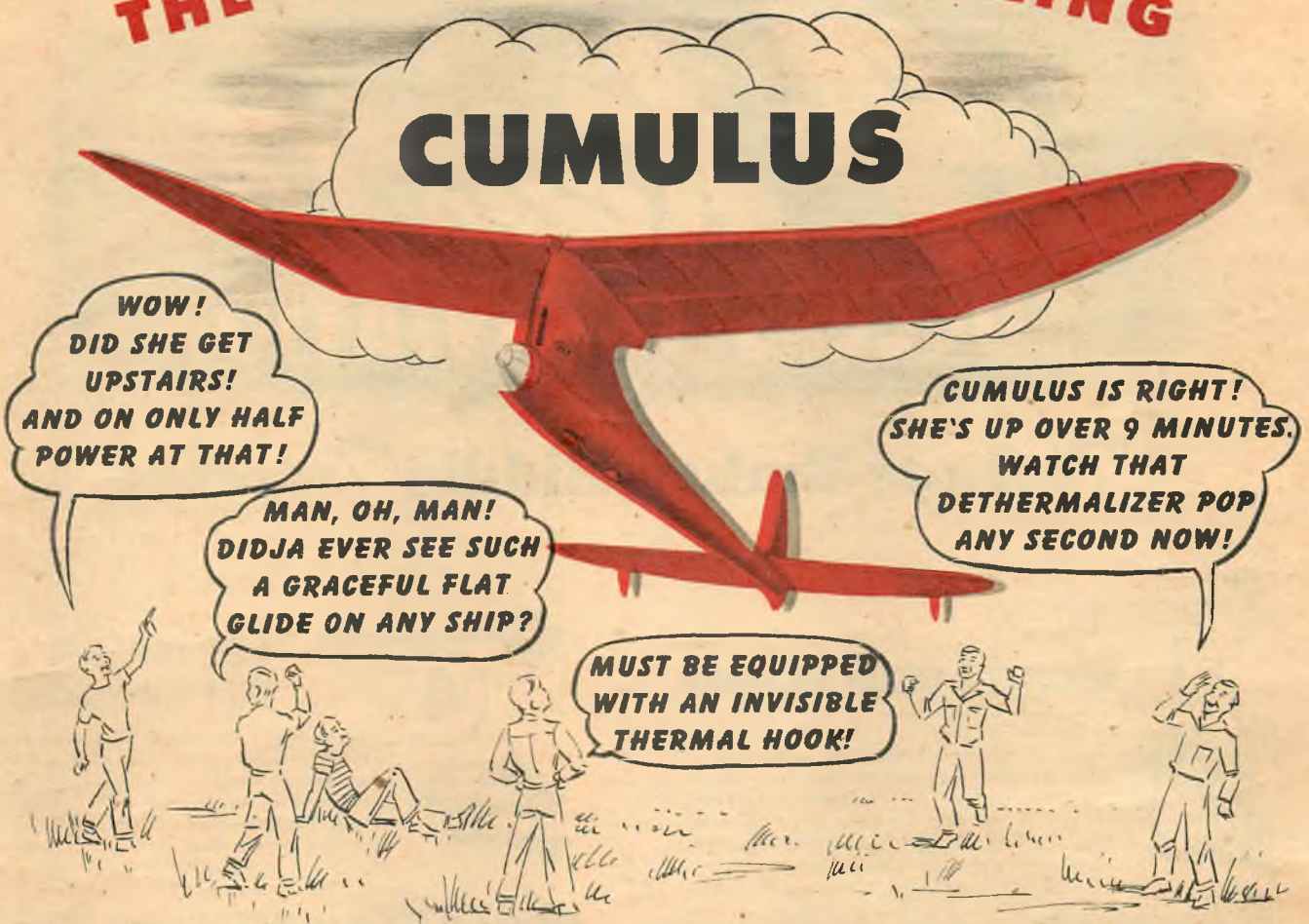
Swift and deadly, the McDonnell XF-88 was designed to operate deep in enemy territory, a task for which it was designated a Penetration Fighter. Obvious implication is that its range is greater than any other jet fighter's. It can also serve as either fighter bomber or bomber escort. When in service, it will bear the name of "Voodoo."



● The two Westinghouse J-34 jet engines of the XF-88 are located close together, reducing to a minimum the yaw during single-engine operation. Air intakes are in wing roots. Note in lower right photo moveable panels at rear of fuselage which act as dive brakes. Reaches sonic speeds; wt., 15,000 lbs.

THE POSITIVELY AMAZING

CUMULUS



Fellas

TAKE MY WORD FOR THIS!

Many of the old timers remember 10 years ago when I designed the now famous Zipper which startled the gas model world with its revolutionary flying. . . . Now here is my CUMULUS . . . a really modern free-flight that takes advanatge of all the advancements in streamlining . . . wing and fuselage design . . . engine performance, etc., which have taken place during the last ten years. Yes, The CUMULUS will give you thrills today like the old timers got from my designs a decade ago. . . . Get one and start collecting trophies for yourself!

CARL GOLDBERG

HERE'S HOW TO WIN CONTESTS AND INFLUENCE THERMALS!

Here is the CUMULUS! A slender beauty that typifies truly modern free-flight design. The CUMULUS embodies all the advancements which have accumulated during the last ten years. . . . All the improvements in streamlining, wing design, and engine power to give you thrilling performance with stability! Analyze these new features point for point with us and you'll see what we mean; for instance:

WING DESIGN: CUMULUS wing has straight taper with elliptical tip, high performance wing section with leading edge sheeted for greater efficiency and strength. Wing positively keyed in position, assures perfect alignment on every flight. Detaches on heavy impact . . . saves damage. Delivers a jet-like climb, yet glides as flat as a sailplane!

FUSELAGE DESIGN: Last word in streamlining and cowling. Fully sheeted for strength and rigidity. Proper duct cooling for engine efficiency. Complete power unit instantly detachable. Simplified single wheel take-off gear, retracts instantly when air-borne; no drag in flight.

TAIL DESIGN: New spar construction for greater rigidity to eliminate warping. Positive keying for perfect alignment. Detaches on heavy impact. Dethermalizer releases trailing edge and CUMULUS "mushes" in lightly.

DETHERMALIZER: New, simplified, tested, and foolproof. Works like magic to bring your CUMULUS down when you want.

Besides all of these performance features, the CUMULUS kit is complete with typical American Hobby high quality material and those well-known "Easy to follow" full size plans, with plenty of step by step pictures and instructions, at your dealer soon!

SPECIFICATIONS: Span 54" Length 35" Weight (less engine) 16 oz. Wing area 3 sq. ft.

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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

AIR TRAILS
AUGUST, 1949

THE ROADABLE AIRPLANE

Certainty or Absurdity?

By ALEXIS DAWYDOFF

● Projected roadable airplane design by Henry Clark. The entire aircraft component is carried by the vehicle, securely latched to the roof.

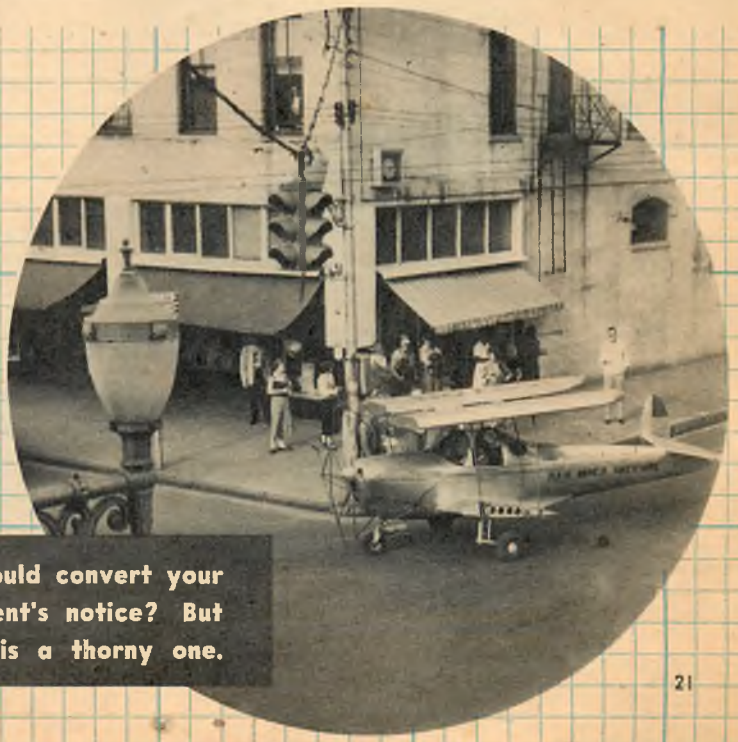
● Arriving at the airport, tail is unfolded and locked into place. Wings and struts are then fastened to fuselage and plane is ready to fly.

● Clark's roadable is a two-control airplane, leaving floor clear for clutch and brake pedals. Instead of flaps, it has spoilers atop wing.

SOME years ago, Jim Ray, at that time test pilot for Pitcairn Autogiro, was flying the company's small PA-36 on a cross-country trip. The weather became worse as the trip progressed, until it finally "closed in" completely. Undaunted, Ray set the giro down on a highway, folded its rotors and, engaging the rear wheel through a special transmission, drove to his destination. The PA-36 was a roadable autogiro, the only one of its kind. It now rests in the Smithsonian Institution.

Will all the roadable aircraft which have been produced, and those under development, become museum pieces? Will they become monuments to man's unsuccessful attempts to weld air travel with ground travel as door-to-door transportation? Will some of the problems be licked and the roadable airplane or the flying auto become practical? These are the questions which interest the aviation world.

The airplane of today does not have 100% utility as personal transportation from the point of view of the lay public. A transient pilot landing at an airport must scratch for a ride into town, and as airports are rarely located close to cities the process of reaching one's final destination is often involved and expensive. How simple it would be if one had an airplane that, upon pressing a button or turning a crank, would magically transform itself into an automobile, taking its owner to his business ap-



Wouldn't it be grand if you could convert your plane into an auto at a moment's notice? But the roadable designer's road is a thorny one.

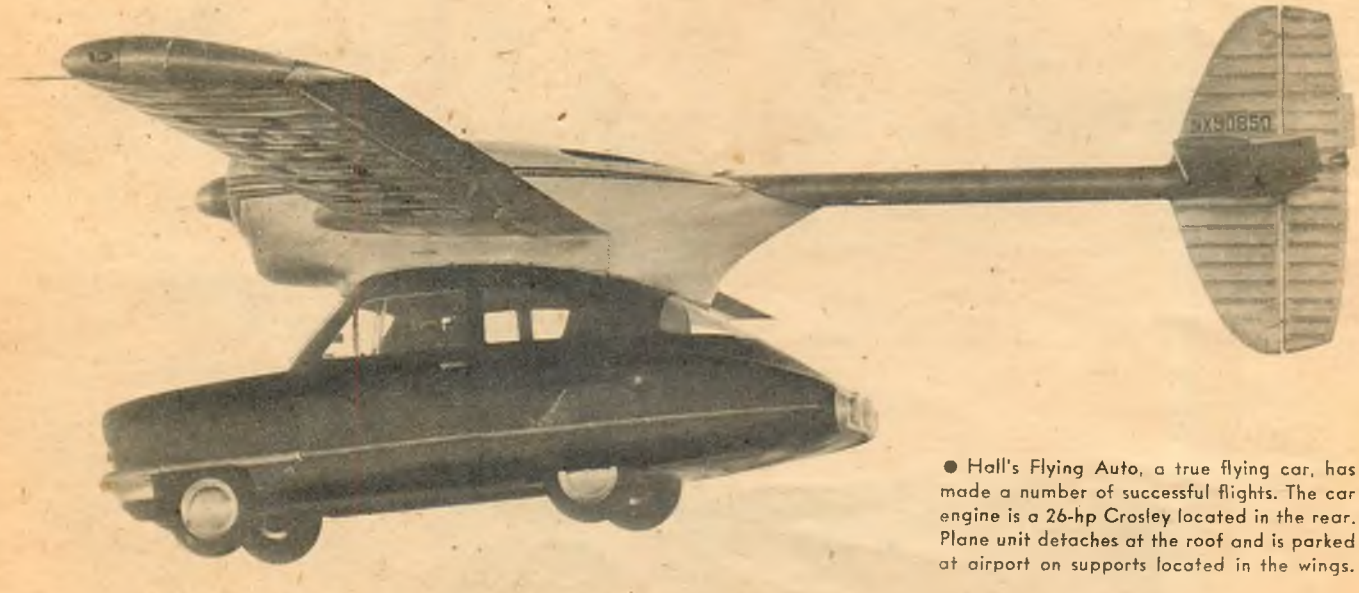
● The Fulton Airphibian has progressed far enough so that limited production is possible in near future. Craft performs well as car and plane. Has been widely flown here and in Britain. As auto, has front wheel drive.

pointment some ten miles from the airport! Men have worked for years to accomplish this ideal, and numerous examples of their labors are in existence at the present time.

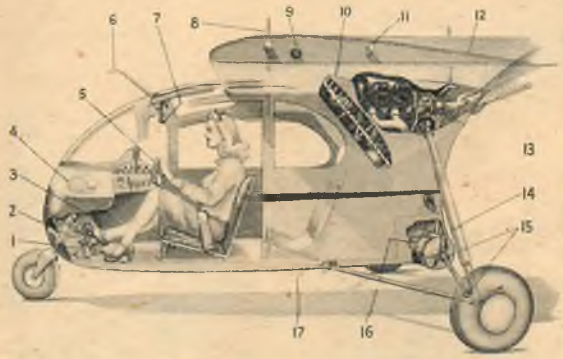
As far back as the early thirties, Waldo Waterman designed and built a few roadable Arrowbiles. This craft was a true flying wing of sweptback planform from which it earned its name. The wings were detachable. A 100-hp Studebaker engine operated both the propeller and the running gear. William B. Stout, famous designer of the immortal Ford tri-motor, is another believer in roadable airplanes who was working on the idea in that era—and is still preaching it.

There is a school of thought in the industry which does not consider the roadable plane as practical, claiming it to be neither fish nor fowl. "You cannot successfully combine an automobile and an airplane," they say, "and retain the good features of both." And it is true you cannot take an automobile, hang it under the airplane and fly away with it. Neither can you take an airplane, hook its engine to the landing gear, fold the wings and drive merrily down the highway. Both must be revised, redesigned and re-engineered in order that the blending may be a happy one.

And here, right away, the following question comes up: Which is best—a roadable airplane or a flying automobile? The term "roadable airplane" has been applied to all ground-air vehicles. Actually they are divided into two categories, the *flying automobile*, in which the car is the main unit and the airplane part is buttoned on to it (*Continued on page* 87)



● Hall's Flying Auto, a true flying car, has made a number of successful flights. The car engine is a 26-hp Crosley located in the rear. Plane unit detaches at the roof and is parked at airport on supports located in the wings.



● Cutaway view of Clark's roadable: 1—clutch, 2—accelerator, 3—foot brake, 4 headlights, 5—control wheel (ground and air), 6—pitot tube, 7—hand throttle, 8—wing support peg, 9—aileron push rod, 10—air duct, 11—wing lock fitting, 12—zippered gap flap, 13—prop shaft uncoupling and drive unit, 14—lower drive unit, 15—universal joint, 16—clutch housing, 17—strut bolt.

● Taylor's Aerocar: Tail and wings form trailer. Trailer wheels built into leading edge of wing at root. Car unit has already been built and tested, proved very satisfactory.

● William Chana, Consolidated-Vultee engineer, designed this flying auto which can be converted into pusher plane, canard or helicopter, using same car. 'Copter not shown.

"... it would be wonderful to run out the door, put wings on my auto, and fly ..."

"SEVERAL times in the last many years, I have criticized magazines for their handling of the story of an airplane which is strictly a publicity gag, a sales promotion, an out-and-out fraud, or which might be an honest effort of some inventor but never goes further than the prototype at the very most. . . .

"Beech, Ryan, Cessna, and all of them have some pretty fine engineers—probably as good as any—and they can't build those radical performing airplanes.

"The latest thing that came out is the flying automobile, and of course there has been a lot of publicity. The people in the companies that are building the flying automobiles are very sold on them—to the point where that is all they can see. They think they are going to put them out in quantities of 40,000 a year, and all that stuff. . . .

"All you would have to do in investigating it is go and watch it fly, see the room it requires to take off, the room to land, and how hard it is to fly, and then you would know [that it's a long way off].

"Air Trails . . . published a piece on the flying auto, and . . . you handled it very well. You gave the publicity that it was supposed to get, and published the pictures of it, but you didn't say that it was coming out in the morning and was going to revolutionize all the business, and so forth.

"Actually, and of course this is my own personal opinion, looking at those pictures, you can see that it will be a . . . job to fly that particular airplane under some conditions. From the standpoint of an idea only, it would be wonderful if I could run out the door here, put wings on my automobile and fly where I want to go, and probably some day we can do that. But at the present time there just isn't anything that will take the place of a good automobile and a good airplane. . . . you couldn't much beat a Plymouth or a Ford for your own use around the field, but that will cost you about $2,000; . . . a good, light airplane, such as the Cessna or something of that type, will cost about $3,500 . . . so the combination right there of an automobile and a plane, and one isn't packing the other, and you aren't trying to make something do for both that never will work out, costs a total of about $5,000 or $6,000.

"Now to build a combined article that will do both jobs equally well, is going to be a . . . job, and to sell it at a price that the public can afford will be another . . . job. With all the luck in the world wished to those who are building these flying automobiles, we have our fingers crossed.

"We in the aviation business naturally need publicity to help us sell our various articles. That is why there is advertising by the companies. We are after publicity all the time. We don't want that to affect other people. We want to exist on our own efforts. We [are for] advertising by good legitimate companies, of something that they definitely are going to have to sell, not something they are planning way ahead of time and at a price you can't build it for . . ."

—LESLIE H. BOWMAN, President
General Aeronautics, Inc., Fort Worth, Texas

We Fly The PIPER CLIPPER

By WILLIAM WINTER

Small in size and price but a big boy where value is concerned

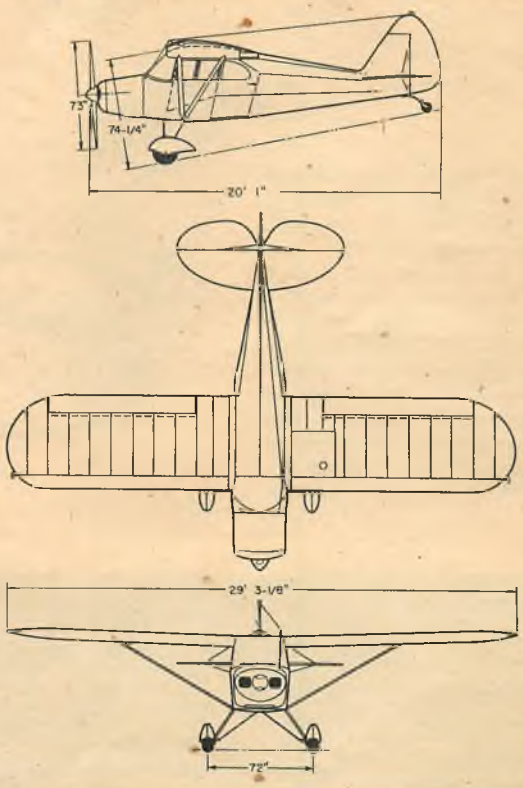
WHEN the "we fly" series was begun several years ago, the main idea was to report the reactions of a typical student or new private pilot to the various new lightplanes then coming on the market. As you have found, your impressions on stepping from the friendly Cub, or Champion, or Cessna, in which you earned your right to fly, into a generally similar but strange airplane, were pretty vivid. All lightplanes seemed so different.

But on continuing to fly other makes of ships, those strong impressions faded before a growing conviction that all lightplanes are alike. Experienced pilots sometimes tell you this and, rather reluctantly, you find it is true. Differences between a machine like the Ercoupe and the three-control craft only point up the rule. Having got a little smug about this in-the-rut manufacturing of aircraft that, from a superficial pilot point of view, generally vary only in the degree of performance, you run into a machine like the Piper PA-16, or Clipper, a four-place, $2,995 airplane with an engine rated at 115-hp at take-off. Then you discover that designers are not limited to a mechanical approach, that lightplane design is not necessarily cut-and-dried, that there are more ways than one of skinning a cat. For the PA-16 is a different airplane. One has only to compare it with that other Piper four-place, the Family Cruiser, to see that the two differ as night from day in their methods of fulfilling a job.

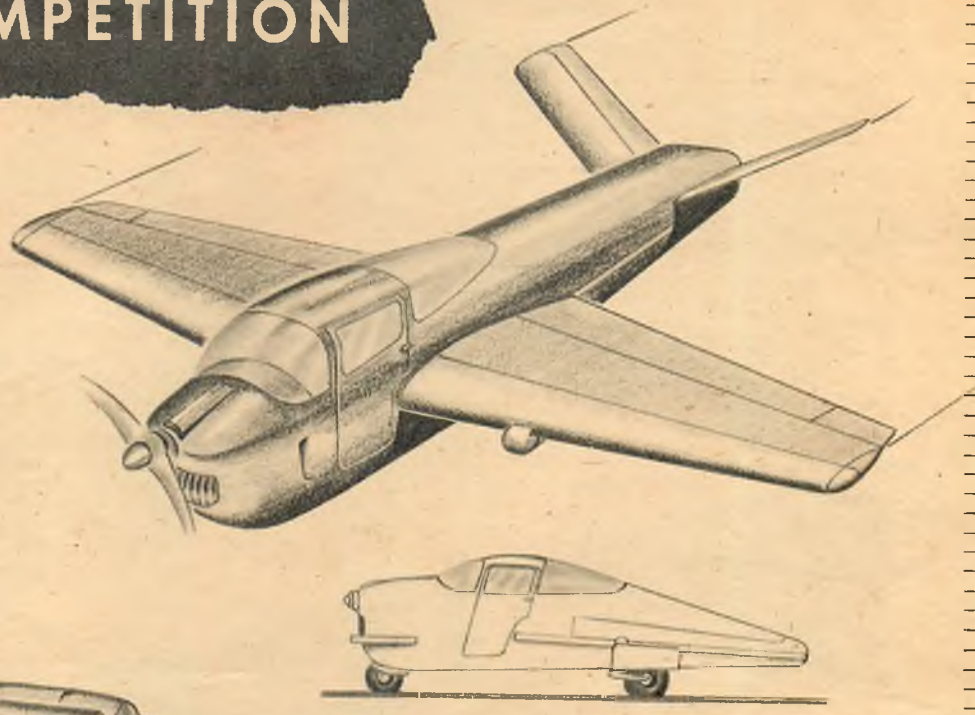
Frankly, this new four-place creation of Piper's has impressed us profoundly. It taught us a good deal about airplanes. This isn't just the enthusiasm of flying a nice air-

plane for the first time. Rather it is a sobering thought that reporting on an airplane like this one is a genuine responsibility of getting across what the designers tried to do, and what the manufacturer has accomplished. For it is to be expected that anyone would be skeptical of a lightplane with less than a 30-foot wing, and slightly more than 100 horsepower, that purported to cart four people around in practical fashion. Yet, if the formula is strange and new, the answer cannot be denied. Misgivings fly out the window when you get airborne in the Clipper.

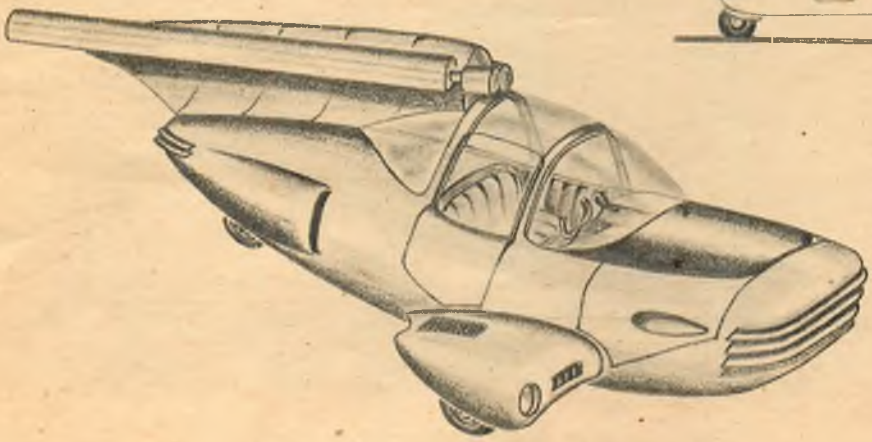
Add up the facts yourself. The Piper PA-16 Clipper is a four-place, steel-tube-and-fabric airplane. It spans a little over 29 feet, with the same wing as the little side-by-side Vagabond, from which it is directly evolved. It is not a bigger Vagabond, as you would first suppose; it is the same basic Vagabond, cleverly refined and developed in appearance and performance. It has no wing flaps, a fact that confuses at first. Small wing, four people, no flaps? Besides it has only 115 take-off horsepower in its Lycoming engine, despite these conditions. But it (*Continued on page* 75)



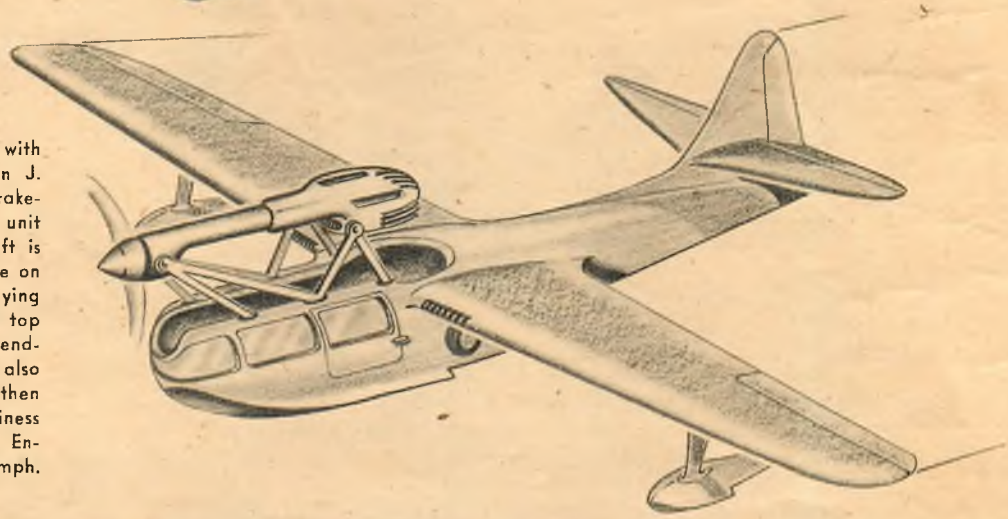
Airmen of Vision
DESIGN COMPETITION



● First prize: a roadable airplane by R. G. Naugle of Dayton, Ohio. A two-place all-metal monoplane powered by a 100-hp Lycoming which is used only for flying. An auxiliary 26-hp Crosley engine in forward keel of fuselage drives the dual nose wheels as a roadable craft. All main surfaces and propeller are retractable. Wings swing to the rear and are stowed in fuselage. Propeller blades are hinged at hub and can be folded inside engine cowl. Span, 22' 10".



● Second prize: a design by Stanton D. Dunn of Jeffersonville, Ind., for a roadable helicopter. For ground driving the counter-rotating rotors are folded backwards against vertical fin. Power plant is located in the rear, drives both the wheels or the rotors. For road work the craft has an automatic clutch and gearshift. Length, 15 ft.



● Third prize: an amphibian with retractable engine by Roman J. Szalek of Lasalle, Ill. For take-off or landing, the engine unit containing propeller and shaft is raised to allow prop-clearance on either land or water. In flying position the unit is flush with top of fuselage, the propeller extending forward. Wing tip floats also retract and the amphibian then compares favorably in cleanliness of design with a landplane. Engine, 185 hp. Top speed, 160 mph.

Air Trails has opened its columns to those who are interested in presenting plans for aircraft of the future.

Rules governing the competition are:

1. Three-view sketches of the proposed aircraft will be required. These should be not less than 8½ x 11 inches for the entire three views.
2. Sketches of the complete airplane in three-quarter front and rear position should be included.
3. Photos of a model of proposed design may be included.
4. Information on power plant(s), estimated performance, dimensions, and explanations of any unusual features are required. Data as to age, occupation or schooling is welcome.
5. Entries will not be returned and for that reason those participating should retain copies of all material submitted.
6. The editors regret they cannot enter into correspondence concerning designs submitted.
7. Designs may be of any type: commercial aircraft, military planes (fighters, bombers, troop transports), planes for the private flyer and single-place sporting craft.
8. Mail entries to Airmen of Vision, c/o Air Trails, P. O. Box 489, Elizabeth, N. J.
9. The entry each month judged by the editors as the most practical or of the greatest significance will receive an award of $25. Awards of $5 will go to runners-up.

Civil Air Patrol Newsletter

News and highlights of Senior and Cadet activities from Coast to Coast. Cadet membership is open to boys and girls 15, 16 and 17 years old.

● An Air Trails Exclusive: President Truman at CAP Presidential Dinner congratulates Gen. Beau for excellent job Patrol is doing.

THE Civil Air Patrol, auxiliary of the U. S. Air Force, expects to enroll approximately 100,000 cadets aged 15, 16 and 17 in its pre-flight training program which will be introduced into many secondary schools throughout the nation this fall, it was announced recently at the Patrol's annual conference. The ultimate aim of this educational program is to create a continuing body of air cadets whose interest in aviation will carry them into the aircraft industry as scientists, executives, mechanical and maintenance experts, and as navigators and pilots.

The experimental stage of teaching this new science in secondary schools has been successfully passed, as many schools have already adopted the CAP program and are giving credit to students toward their high school diplomas for the study of air science.

Already some 30,000 air-minded youth have enrolled in this program—about 23,000 boys and 7,000 girls.

● (Above) Gen. Vandenberg, Chief of Staff of USAF, delivering major address at CAP Dinner. Left, Donald Dawson, Administrative Assistant to the President; right, Representative J. P. Priest.

● (Below) C. Douglas Taylor, honorary president of the Air Cadet League of Canada, one of many dignitaries.

● (Below) Air Vice Marshal C. R. Slemon, RCAF, and Col. D. Harold Byrd, vice-chairman of CAP National Executive Board. (Right) D. Alex Ross, pres., Canada's ACL.

● (Right) Air Marshal Robert S. Leckie, wartime chief of RCAF, talks over old times with Gen. Carl A. Spaatz, ch'm'n, CAP Exec. Bd.

Civil Air Patrol *Newsletter*

(CONTINUED)

Squadron of the Month

How does a Civil Air Patrol Squadron earn the title of "Squadron of the Month"? The Charleston, W. Va., Squadron is a good example of what a group can do in a comparatively short time by hard work, enthusiasm and a little ingenuity.

In less than a year the Charleston Squadron has grown from a handful of members to the largest and most active in the W. Va. Wing with not only plenty of Seniors, but more than 100 Cadets.

Here are the ingredients: first, get aviation enthusiasts and an idea together. Find a suitable place for large meetings, classwork and equipment. Donations of wallboard and the sale of aerial photos helped raise the money for lumber and other accessories, and willing hands transformed the third floor of the Court House Annex into a real headquarters.

Next, set up a good snack bar with women and girl CAPers turning out succulent hamburgers and bar-b-q's. Comb the city for good instructors and have real classes to provide Seniors and Cadets with aviation training.

Find a good artist and offer art classes —everyone wants to do a bit of dabbing now and then. Plan social activities for both Seniors and Cadets to keep group interest keen. Breakfast flights at an airport, picnics, a military ball, and a social hour following hard classwork all help to keep members interested and continually attracts new ones.

Don't neglect community service. Search-and-rescue missions, cooperation in plans for air defense and disaster work spell good relations with the public and gain their solid support for CAP activities and prestige.

Even a local weekly newspaper column is obtainable, and a good PIO officer can thus keep local CAP activities in the news.

Yes, the Charleston Squadron does all these things and more. It's the 'growingest' Squadron in West Virginia, perhaps in the nation, and deserves to be the "Squadron of the Month."

Shot At Statler Hotel

The photo above was made during the Presidential Dinner of the Civil Air Patrol held at the Statler Hotel in Washington, D. C. It shows only a portion of the large group that attended.

Reading from right to left, those standing at the head table are: Harold C. Stuart, Office of Secretary of Air Force; Col. Sidney D. Grubbs, CO of Hq. Command, Bolling Field; Air Commodore H. E. Nowell, Joint Chiefs of Staff, RAF; Major Gen. William E. Kepner, CO of Air Proving Ground Command; Air Vice Marshal C. R. Flemon, Air Staff, RCAF; Lt. Gen. Elwood R. Quesada, Special Assistant, Chief of Staff, USAF; C. Douglas Taylor, honorary pres., Air Cadet League of Canada; Lt. Gen. Ennis C. Whitehead, CO of Continental Air Command; Col. Hatton W. Summers, CAP; Gen. Hoyt S. Vandenberg, Chief of Staff, USAF; Hon. J. Percy Priest, House of Representatives; Major Gen. Lucas V. Beau, National Commander, CAP; Donald Dawson, Administrative Assistant to the President; Gen. Carl A. Spaatz, chairman, CAP National Executive Board; Hon. Sam Rayburn, Speaker of the House of Representatives; Gen. Joseph T. McNarney, Commanding General, Air Materiel Command; D. Alex Ross, president, Air Cadet League of Canada; Eugene M. Zukert, Assistant Secretary of USAF; Air Marshal Robert S. Leckie, RCAF (ret.), adviser to Air Cadet League of Canada; Lt. Gen. Idwal H. Edwards, Deputy Chief of Staff of Personnel, USAF; Air Commodore R. C. Gordon, RCAF, Canadian Air Attache; Major Gen. Lawrence S. Kuter, Commander, Military Air Transport Service; Major Gen. Robert W. Harper, Commanding General, Air Transport Command; Col. Charles I. Carpenter, Chief of Chaplains, USAF.

Idaho Wing Reorganized

Idaho Wing CAP has undergone a reorganization and announced a membership drive and activity program that seems bound to place it high among the 51 CAP Wings.

Lt. Col. Wilson Kellogg, Wing CO announces that the manning table of personnel is well along to achievement, and the Wing Staff will meet not less than each 60 days.

First accent in the reorganization plan is a tremendous recruiting drive for Cadets, with a goal of 500 Cadets by the end of the year. In addition, Cadets will be encouraged to gain flying time and experience through local fixed-base operators.

Montana Steps Up Recruiting

Montana Wing CAP isn't intending to let Idaho or any other western state outdistance it in its expanded program to boost Cadet membership, and has set a goal of at least 500 Cadets in the next six months.

Col. R. A. Kullberg, Wing CO, in a message to all Montana units, declared "it is desirable that the Montana Wing create and maintain as large a Cadet Corps as possible." Their goal is at least 500 Cadets in the next six months.

Cadet of the Month

"How does one become a Cadet of the Month?" It's easy, says Cadet Cpl. John Douches of Scranton, Pa., Squadron 23, Civil Air Patrol.

On September 21, 1948, the Squadron put into effect a merit system. Since that time Cpl. Douches acquired 131 merits, not a single demerit of any kind, and never missed a meeting. In addition he serves as head of the Radio News Department of Squadron 23's sprightly monthly paper, "Prop Wash," and takes part in nearly every Cadet activity of the Squadron.

Five Nations Exchange Cadets

National Headquarters CAP has announced that a total of 122 Cadets from the United States, England, Canada, France and Switzerland will be exchanged this summer as a part of CAP's international program.

Twenty-five from England, five from both France and Switzerland, and 26 from Canada, will come to the United States for a two weeks' glimpse of the country. The foreign Cadets will see air operations in various regions, receive instructions in American methods, and between times have time for dancing, dining, athletics and sightseeing.

The French Cadets will be based at Bloomington, Ill., the Swiss in Texas, while the British and Canadians will stop at air bases all the way from New York to California.

The American Cadets, selected from the 51 Wings, will be distributed over Canada and the three European nations.

Cadets at Air Force Bases

Several thousand CAP Cadets are this summer attending two-week encampments at a dozen or more Air Force Bases throughout the nation, it was learned at National CAP Headquarters.

The two-week period is enabling Cadets, boys and girls, to obtain practical experience in aircraft maintenance as part of a working AF unit.

From Reveille at 0530 o'clock until Taps at 2030, Cadets go through a vigorous routine. Drill, weather reporting, Morse code and radio telephone, map reading, first aid, aircraft maintenance, flight training in observing, indoctrination lectures, target range, training films, and usually a dance at the end of the week are some of the many scheduled activities.

Although there are separate encampments for the girl Cadets, they receive virtually the same training with an occasional glimpse into Air Base hospital procedures.

PRESIDENT LAUDS PATROL

CAP NOTES

Biggest little Squadron in Northeastern U. S. is the reputation of the Portsmouth, N. H., CAP Squadron, oldest in the State, and boasting one of the most active programs in the entire area . . . Douglas County, Nebraska, CAP communications personnel have worked out cooperative plans with Red Cross for disaster work . . . Blair, Neb., Squadron is being reactivated, largely due to demands by former Cadets.

Stamford, Conn., Squadron reports sizable increase in Cadet membership . . . The comparatively new Canaan Flight commanded by Lt. J. G. Stillson is setting something of a Connecticut record in CAP activities . . . CAP uniforms will not be changed until after complete issue of new AF uniforms to all its personnel, and it is thus assumed that changes in present CAP uniforms will not be made until after 1951.

Norwalk, Conn., Flight has been reactivated and first project is a model plane group . . . Seven of the 40 New Haven, Conn., Squadron Cadets have been promoted . . . National Capital Wing has procured CAP insignia decals for use on private autos . . . New Mexico State legislature recently appropriated $5,000 yearly for that State's CAP activities, to be spent under direction of State Wing CO.

Webster Grove, Mo., Squadron claims honors for a "first" known as "Operation Birdseed." During a blizzard last winter, working with a local humane society, the Squadron is credited with saving lives of many birds by scattering birdseed . . . Youngstown, O., Squadron is settled in its new home, with most of remodeling done by Squadron members. In the same Squadron M/Sgt. Mike Hoza and T/Sgt. Sammy Dellarco were promoted to Warrant Officers.

Tells Members at Dinner to Keep Up Their Good Work

Urged by the President of the United States to "keep up your good work" at its fourth annual Presidential Dinner, the Civil Air Patrol set its goal on the objective of giving the nation's air education its greatest impetus to date.

President Harry S. Truman addressed his plea for continued good work to one of official Washington's outstanding banquets of the year. More than 700 filled the dining rooms. The audience consisted of U. S. Senators and Representatives, high ranking Canadian Government and military officials, Gen. Hoyt S. Vandenberg and a large group of the USAF's highest officers, the National Executive Board of CAP headed by Gen. Carl A. Spaatz, Wing Commanders, their deputies and liaison officers and Selected Cadets from nearly every CAP Wing.

The President's brief talk indicated that he was well aware of CAP's mission and the fine job that it had accomplished throughout the nation. His advocacy of continued good work climaxed a three-day annual conference between the National CAP staff, Secretary of the Air Force W. Stuart Symington and high USAF officers, the National Executive Board, Wing Commanders, their deputies and liaison officers.

In his annual report to Congress, made at the Presidential Dinner, Maj. Gen. Lucas V. Beau, National CAP Commander, detailed the achievements of the organization during the past year. At the same time he visualized the coming year's objective, an enrollment beginning this fall of 100,000 Cadets in pre-flight training to be introduced into hundreds of secondary schools throughout the nation

(Continued on page 60)

Will Britannia Rule

(LONDON—Three years of silence on the de Havilland, the world's first jet airliner, has been broken . . . production of sixteen D.H. Comets has been started directly from the design stage, which will represent a substantial saving on the project . . .)

BRITAIN is preparing for war. It will be total air war, with the world the enemy, technicians of lab and plant the soldiers, and yet untested airliners the weapons. If she wins, England will be queen of the international skyways. Soon she will take the offensive.

From her arsenal will come such winged leviathans as the 100-passenger, 5,000-mile Brabazons; the equally huge ten-turbine-driven Saunders-Roe Princess flying boats with their double-decked hulls; and fast turboprop and jet designs calculated to surpass America's Constellation and Stratocruiser. With scant preparation for this approaching air war, the United States, more than any other nation, faces costly battles and possible defeat in the struggle for markets for our planes and for the cream of the over-ocean trade.

The world's greatest flying boats, the high-hulled Princesses, now taking shape at Cowes, in the Isle of Wight, will be champions of the southerly routes to the fine harbors of eastern Latin America and to Buenos Aires. The first monster 150-ton Brabazon, probably the most costly airplane ever built, with better than $40,000,000 so far put into its development, soon will receive its much-awaited tests. And even now, the world's first turbine-driven transports are being preened for service to most of the capitals of Europe.

● Vickers Viking, a medium-range 24-passenger transport used by number of European airlines and King of England.

● Tudor VIII, jet-propelled airliner powered by four Rolls Royce Nene engines. Still in experimental stage. In trials has reached speed over 400 mph.

The Skyways?

BY "ARGUS"

The crucial test will come by 1953 when the fleet de Havilland 106 four-jet airliners will whisk the Union Jack five miles above the Atlantic at 500 mph. In seven hours the traveler can span an ocean that balked Columbus for three long months. On whistling wings other Comets, their jet exhausts rumbling like distant blow torches, will speed down the length of Africa.

Behind this desperate thrust to re-establish herself aeronautically in the "sun that never sets on the British flag," is a paper master plan incredible in its scope and daring. When Britain's Labor government nationalized the air transport industry, stating what kind of planes should be built, who should build them, and who should buy them, it quickly found itself hanging onto the tail of a fire-snorting bull. For, however desperate the need, transports have never been produced directly from the drafting tables. Given a two-year cushion for development, there are headaches. Even the lowliest Briton knows from the clamor in the press how goes the struggle for commercial air supremacy. When the government finally wrote off the much-heralded Tudor —an interim, stop-gap type concocted from bomber wings and tails and new fuselages—England's civil air war had reached the Dunkerque stage.

The £11,000,000 Tudor debacle was frightening. At the final design conference in 1946, 357 modifications were found necessary, 342 of them dictated by British Overseas Airways. In 110 days' time, the Tudor II ran afoul of 120 modifications. When finally tested on an African run, the Tudor, said BOAC, buffeted badly in rough weather and during the approach to and climb away from tropical airfields. It also had a (*Continued on page* 83)

● Saunders-Roe SR-45 "Princess." Three are at present under construction. Wing span is 220 ft.

● Vickers-Armstrong Viscount 700, still under construction. Powered by four turboprop engines.

● Bristol Brabazon, largest airliner in world; now near completion. Span 230 ft., length 177 ft.

● Handley Page Hastings, military transport version of airliner Hermes. 25 Hermes IV's ordered.

● Avro Tudor II, an unhappy design which has now been relegated to freight carrying. Tudor I was a converted Lancaster

● Airspeed Ambassador, a 40-passenger medium-range airliner. Has pressurized cabin, fine single-engine performance.

● Vickers-Armstrong Nene-Viking was the first jet-driven commercial airplane to fly. Standard Viking airliner, modified for jet engines.

AIR TRAILS Solo Club

THE Solo Club, formed to foster the exchange of ideas and preach the benefits of private flying, is never more effective than when its members take over our monthly hangar sessions. This meeting should prove one of the most valuable. It's an exclusively member-operated gathering.

"I have not been a member of this club for very long," says N. R. Charon, "and have not taken much interest in it. However, while in Athens, Greece, I managed to purchase this month's Air Trails and decided there may be more to the club than I thought."

Charon is part of the Helicopter Detachment, V-3 Division, U.S.S. Philippine Sea. Three years ago he joined the Naval Air Corps as a potential mechanic and, after a year and one-half intensive training got his rating. Then, deciding many things remained to be learned, he figured the best bet was to acquire a pilot's viewpoint. Now a private pilot, Charon has some comments to put before the meeting.

"How many private flyers really know what they are doing when they fly?" asks Charon. "Before I ever soloed an airplane all I was told was that the stick does this and the pedals do that. Well, I learned to fly by this system and I bet most of you did too. Doesn't a little knowledge lead to curiosity? And when a pilot becomes curious, doesn't he experiment? And frequently due to a lack of thorough knowledge of the theory of flight, he gets into trouble.

"Now I believe that the CAA should require all student pilots to have a thorough knowledge of the theory of flight. I believe this would eliminate much so-called stunt flying. Eliminate stunt flying and you reduce the rate of accidents. I have watched pilots with hundreds of hours killed because of this lack of knowledge."

(*Continued on page* 70)

HOW TO BECOME A SOLO CLUB MEMBER

This club is open only to those who have actually soloed a heavier-than-air craft, either powered or motorless. It does not matter where or when the flight was made. Applicants must furnish the membership committee with a satisfactory proof of their qualification for acceptance. There are no dues. Once a member, always a member.

To obtain sterling silver Solo Club wings and life membership card, send coupon, with 75¢, to Solo Club Membership Committee, Air Trails Pictorial, Box 489, Elizabeth, N. J.

Proof of qualifications as a Solo Club Member:

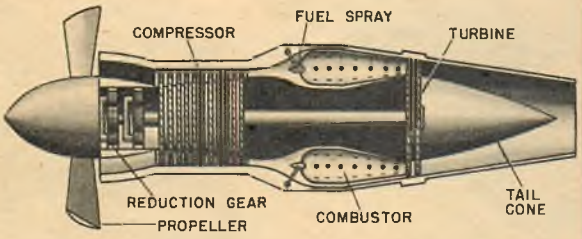
1. CAA Airman Certificate, number and rating.....
2. F.A.I. license and number.....
3. Evidence of: Service in Army, Navy air forces, either as a rated pilot or having received flight training including solo time (attach).

Applicant ..... Age.....

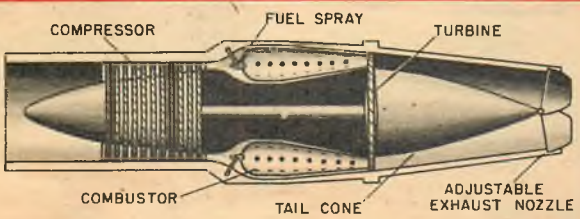
Street..... City or Town.....State.....

NORTHROP X-4 *An Air Trails Air-Pix* **by Alfred Owles**

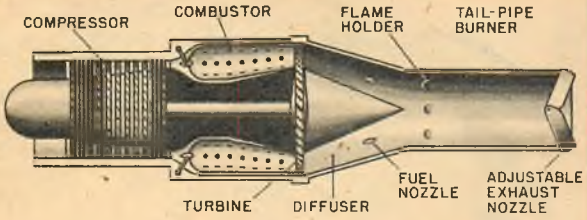
POWER to burn



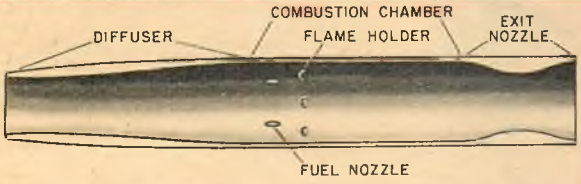
● Turboprop: capable of developing in excess of 10,000 hp.



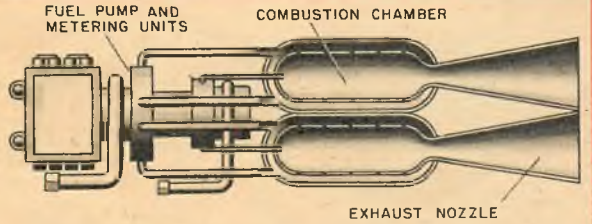
● Turbojet: most efficient when wide open at high altitude.



● Afterburner: raises jet temperature, lifts turbojet thrust.



● Ramjet: needs 400-mph speed to produce effective thrust.



● Rocket: power unlimited; doesn't depend upon air density.

How fast and how high you can fly depends on what type of power plant you are using

By RICHARD C. EARLY

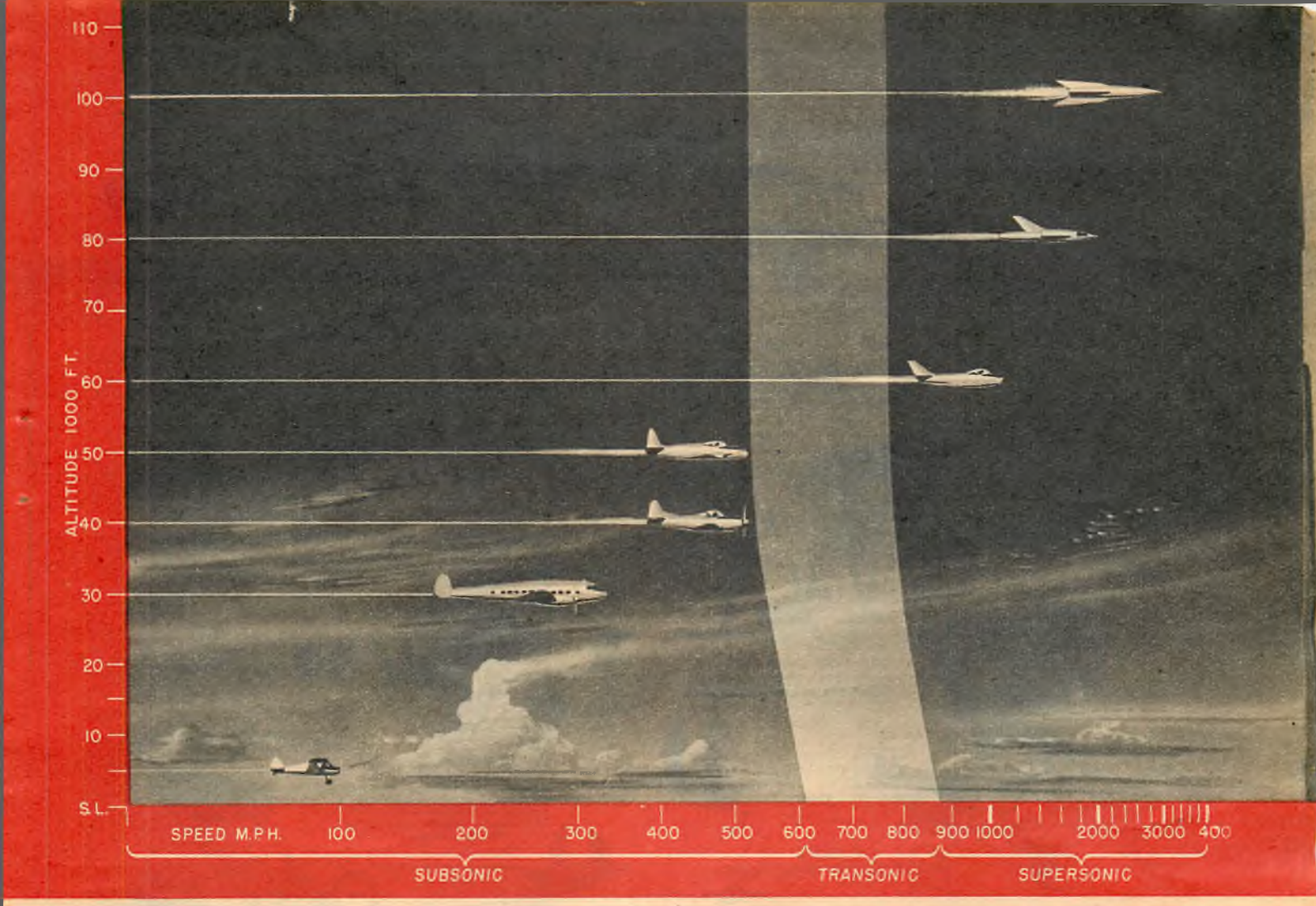
NOW that the sturdy Bell X-1 has for quite a spell been poking its inquisitive finger through the so-called wall of sound without burning up, as early prophets predicted, or shaking to pieces, as more modern engineers feared, the supersonic air age has indubitably arrived. The X-1, as every Sunday-supplement reader now knows, is a fairly ordinary looking airplane without even a supersonic sweep to its wings. Its rocket power plant, on the other hand, is more in keeping with Buck Rogers tradition.

This contrast of plane and power keynotes the entire supersonic picture. Today's layman takes any faster-than-sound airplane for granted. It may have sweptback wings or it may be delta-shaped like a paper dart. But what of the power plant? It would be no surprise to the experts if the average citizen figured you put a match to the rocket motor like a Fourth of July skyrocket.

Will the supersonic speedsters have to be rocket-propelled? How fast can the jets fly? What about the ear-splitting ramjet, or "flying stove pipe?" What's its value? How long and how far can these fuel-thirsty jets run on the fuel they can tote along? Does anyone know the answers?

Taking the last question first, the answer is *yes*. But the rest of the answers, if you guess, will win you no prizes at a quiz show. Imagine the full range of speeds from present-day transports to future rocket-powered passenger-carrying craft as a spectrum, just like the light spectrum, or a rainbow. In place of colors further imagine that the range of performance of each type of power plant appears on our spectrum as a band. Then, starting at the lower end, will be the familiar piston engine, the compound engine, and, working up through the middle section, the turbo-jet, turbo-ramjet, ramjet, and rocket.

In the engineer's jargon there is a simple way for locating each power plant on the spectrum. At some ideal combination of speed, fuel consumption, and range, each power plant will occupy a point where it reigns supreme. The engineer lays down two conditions: 1—the percentage of the initial gross weight of the airplane that remains as fuel and payload after the weight of the power plant has been deducted and, 2—the rate per mile that fuel is consumed per ton of



gross weight. The ratio of the first condition to the second determines the maximum range, or the point on the spectrum where the power plant in question is king pin. It will be noticed, later, that it matters little how atrocious the jets and rockets stack up at low speeds. When it comes to high speeds they are the most efficient means of doing a job, and not, as commonly supposed, a collection of aeronautical freaks good only for probing the speed of sound. It is all a matter of how fast you want to fly, say the scientists. If you want to fly fast enough, the noisy ramjet or the rocket may be the most economical way to do it.

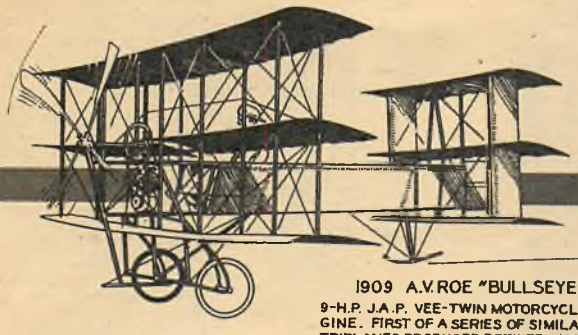
Thinking in terms of the familiar subsonic world, we still are unaccustomed to the facts of the supersonic air age. At supersonic speeds, the cruising range grows quickly with increased flight velocities, reversing what we know of conventional planes and engines. A ramjet-powered fighter—if anyone could fight at such speeds!—might fly close to 4,000 mph before the snowballing drag of the airplane would overwhelm the increasing thrust of the accelerating power plant. For at those speeds you can translate pounds of thrust into horsepower and end up with six figures! At today's speeds the compound engine—one in which the surplus power of the turbo-driven supercharger is fed back into the engine by gearing—has the greatest range. It is a tough customer to beat down at the 200-mph-plus band of the spectrum. But as speeds begin to jump we must find power plants that give more and more specific thrust for their weight and for the frontal area of their required cowlings. Here is one reason why the ramjet—light and slim for its thrust—is far up on the spectrum while the big, bulky, and heavy-for-its-power air-cooled radial is at the bottom. Beyond the speed of sound a slim figure and brute power are essential. Much, much more power is required than we can imagine when we continue to think of present airplanes limited by their nature to an occasional thrust at the speed of sound.

A highly interesting report compiled by the staff of the NACA Flight Propulsion Research Laboratory in Cleveland, gives an exciting glimpse into the future of power plants and their ability to do a practical job at speeds starting on this side of the speed of sound and extending beyond it until only the sky seems the limit.

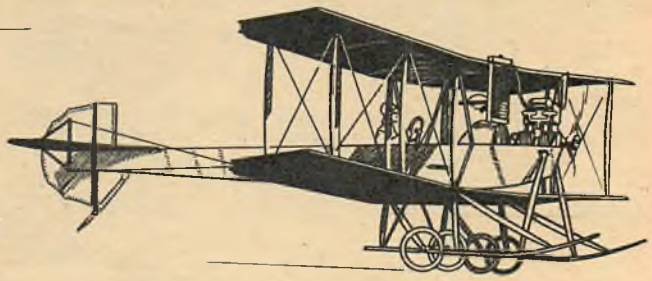
Moving upward from the low end of the spectrum where the piston engines and turboprop-jets are more or less limited by the effects of compressibility on their propellers, and into the stranger mid-section of the spectrum where the real excitement starts, we find the poorly understood turbojet. Here is a power plant with unsuspected possibilities. Here is a fertile field for the aeronautical Ripleys.

But how on earth can you compare such radically different power plants without actually having flesh-and-blood airplanes to put them in? To greatly oversimplify the convincing explanation of the researchers, the starting point is the assumed gross weight of the airplane for the power (*Continued on page 77*)

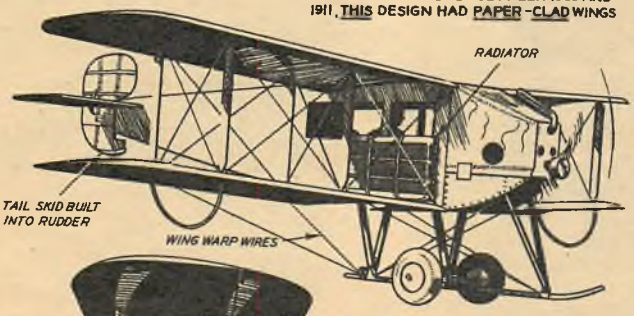
Air Progress

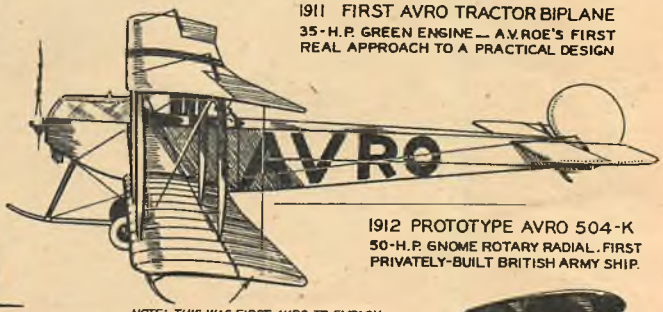


1909 A.V. ROE "BULLSEYE"
9-H.P. J.A.P. VEE-TWIN MOTORCYCLE ENGINE. FIRST OF A SERIES OF SIMILAR ROE TRIPLANES PRODUCED BETWEEN 1909 AND 1911. THIS DESIGN HAD PAPER-CLAD WINGS

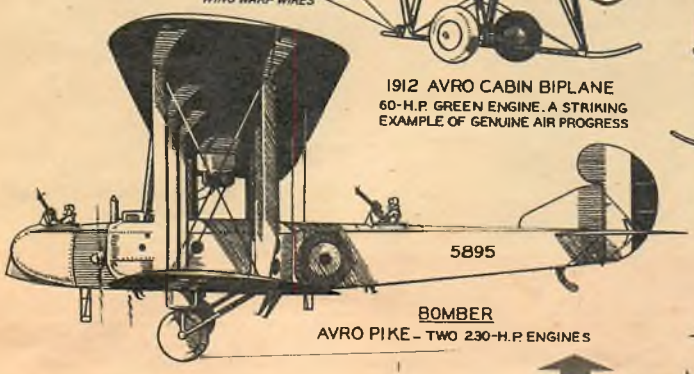


1911 FIRST AVRO TRACTOR BIPLANE
35-H.P. GREEN ENGINE — A.V. ROE'S FIRST REAL APPROACH TO A PRACTICAL DESIGN





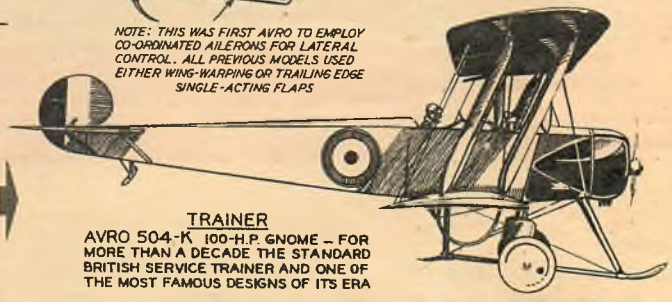
1912 PROTOTYPE AVRO 504-K
50-H.P. GNOME ROTARY RADIAL. FIRST PRIVATELY-BUILT BRITISH ARMY SHIP.



1912 AVRO CABIN BIPLANE
60-H.P. GREEN ENGINE. A STRIKING EXAMPLE OF GENUINE AIR PROGRESS

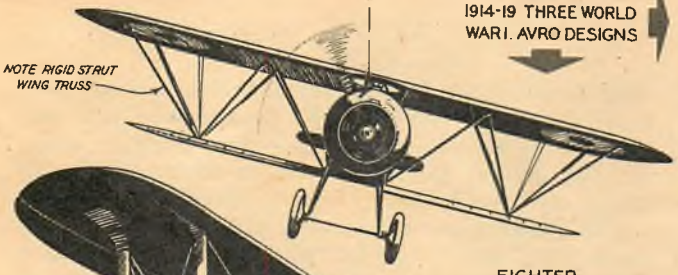
BOMBER
AVRO PIKE – TWO 230-H.P. ENGINES

1914-19 THREE WORLD WAR I. AVRO DESIGNS



NOTE: THIS WAS FIRST AVRO TO EMPLOY CO-ORDINATED AILERONS FOR LATERAL CONTROL. ALL PREVIOUS MODELS USED EITHER WING-WARPING OR TRAILING EDGE SINGLE-ACTING FLAPS

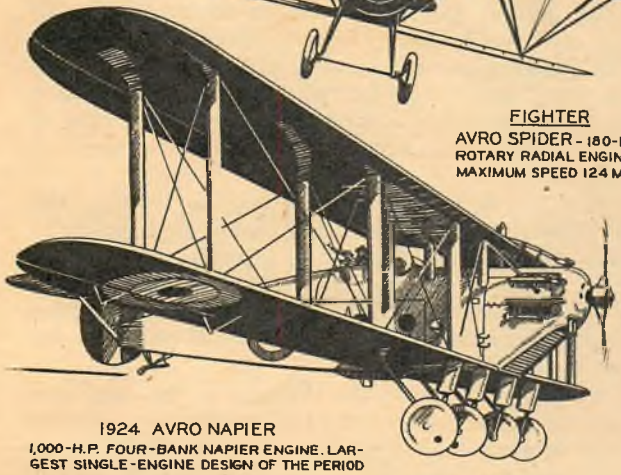
TRAINER
AVRO 504-K 100-H.P. GNOME – FOR MORE THAN A DECADE THE STANDARD BRITISH SERVICE TRAINER AND ONE OF THE MOST FAMOUS DESIGNS OF ITS ERA



The world-famed Avro company derives its name from a contraction of its original title—A. V. Roe and Company. Although Sir Alliot Verdon Roe left the firm many years ago to found the Saunders-Roe Company, producers of the famed Saro flying boat, and although Avro today is a subsidiary of the huge Hawker-Siddeley group, it still operates under its historic name and still has its main plant at Manchester, England, where the first Avro biplanes were built.

Roe himself was one of the earliest pioneer designer-builders and a self-taught pilot. His first design was a crude box-kite pusher biplane which achieved a few short hops. Most famous of the early Avro designs was the fabulous 504-K trainer which, with minor modifications, remained the standard R.F.C. and R.A.F. trainer from 1914 until 1932.

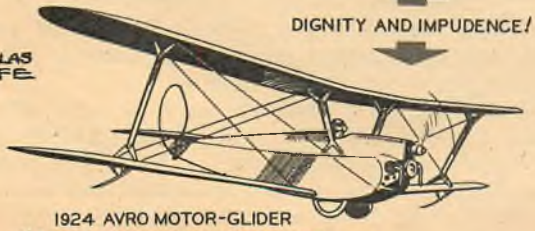
FIGHTER
AVRO SPIDER – 180-H.P. ROTARY RADIAL ENGINE – MAXIMUM SPEED 124 M.P.H.



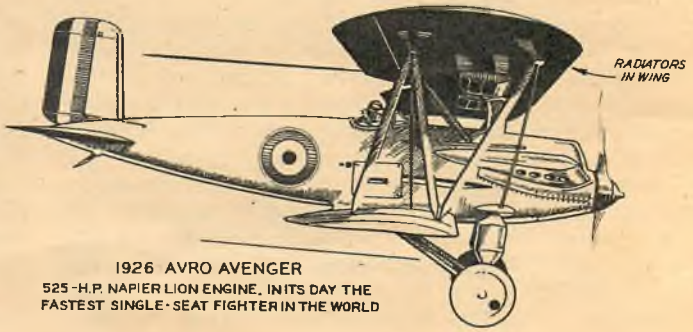
1924 AVRO NAPIER
1,000-H.P. FOUR-BANK NAPIER ENGINE. LARGEST SINGLE-ENGINE DESIGN OF THE PERIOD

DIGNITY AND IMPUDENCE!

DOUGLAS ROLFE



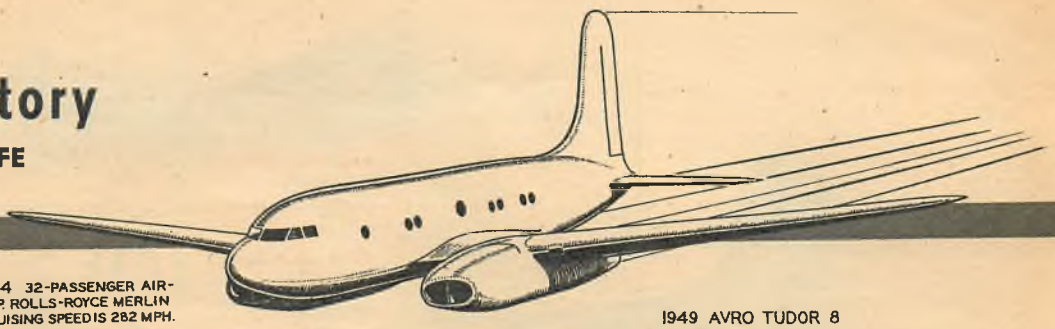
1924 AVRO MOTOR-GLIDER
3½-H.P. CONVERTED MOTORCYCLE ENGINE



1926 AVRO AVENGER
525-H.P. NAPIER LION ENGINE. IN ITS DAY THE FASTEST SINGLE-SEAT FIGHTER IN THE WORLD

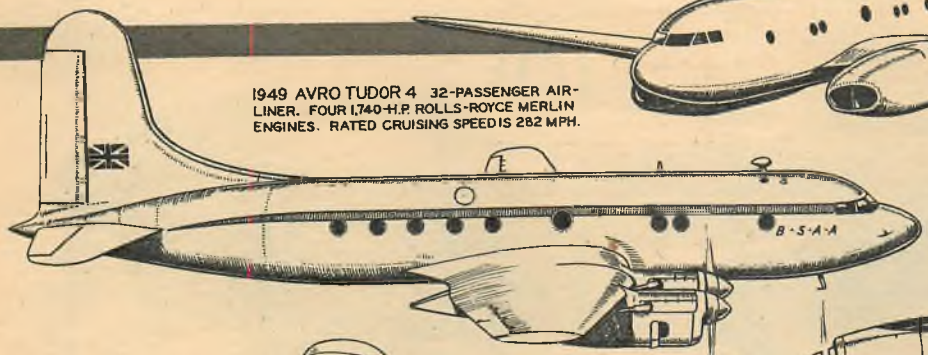
The AVRO Story

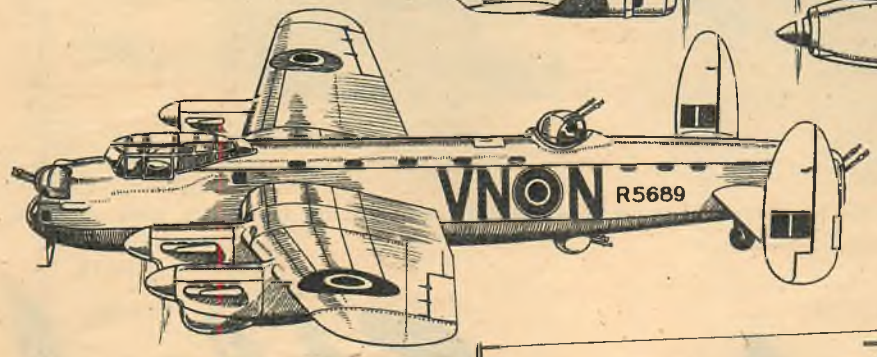
By DOUGLAS ROLFE



1949 AVRO TUDOR 4 32-PASSENGER AIR-LINER. FOUR 1,740-H.P. ROLLS-ROYCE MERLIN ENGINES. RATED CRUISING SPEED IS 282 MPH.

1949 AVRO TUDOR 8
WORLD'S FIRST ALL-JET AIRLINER TO ACTUALLY FLY. IT IS POWERED WITH 4 ROLLS-ROYCE NENE JET ENGINES MOUNTED IN PAIRS AND CRUISES AT 350 M.P.H.

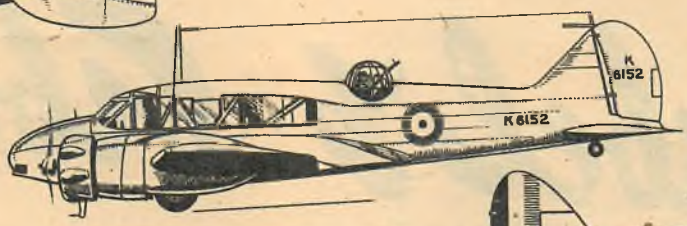




1949 AVRO ATHENA WITH 1,000-H.P. TURBINE-PROPELLER POWER PLANT THE ATHENA IS LATEST R.A.F. NON-JET ADVANCED 3-SEAT TRAINER. IT AFFORDS AN INTERESTING COMPARISON WITH AVRO'S FIRST R.A.F. TRAINER 504-K

1939-45 THREE WORLD WAR 2 AVRO DESIGNS

1942 AVRO LANCASTER I
FAMED FOR ITS GREAT (9-10 TON) BOMB CAPACITY THIS WAS BEST BRITISH HEAVY OF WORLD WAR 2. WITH FOUR 1,280-H.P. ROLLS-ROYCE ENGINES TOP SPEED WAS 300 MPH WITH FULL LOAD AND CREW OF 7.



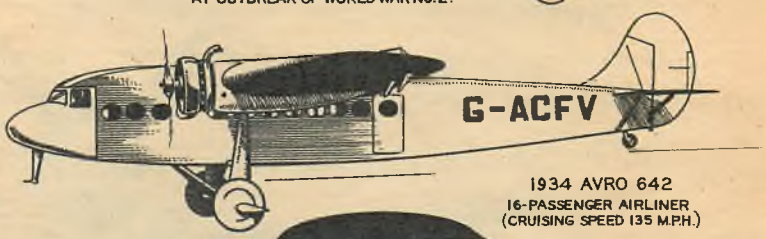
AVRO ANSON THIS MEDIUM BOMBER AND COASTAL RECONNAISSANCE PLANE, DESIGNED IN 1935, IS STILL IN SERVICE.

1932-39 AVRO 626
STANDARD R.A.F. GENERAL TRAINER AT OUTBREAK OF WORLD WAR NO. 2.

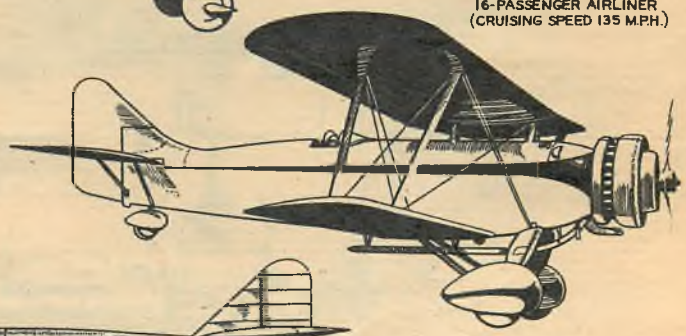
when it was superseded by yet another Avro Design.

Limited space prevents showing more than a few of the innumerable Avro types which have appeared over the years. The ships shown here serve to give an idea of the wide range this famous airplane firm has covered during the more than 35 years of its existence. The incredible contrast between the little 1909 triplane and the huge 1949 jet-powered airliner is striking proof of Avro's place in the history of air progress.

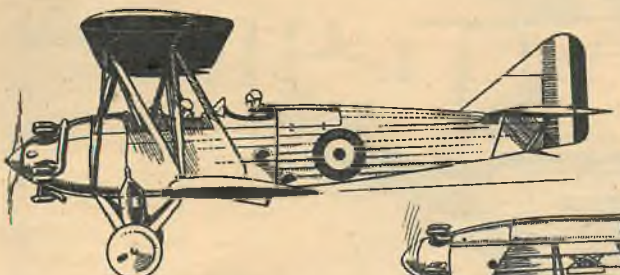
Besides the Tudor 8 jet airliner there is yet another Avro jet transport design in the pre-production stage at the Canadian branch of this firm. As early as 1936 Sir A. V. Roe was predicting jet propulsion. He estimated then that it would take about 30 years to produce jet-powered aircraft. It required, instead, a mere ten years to do the job!



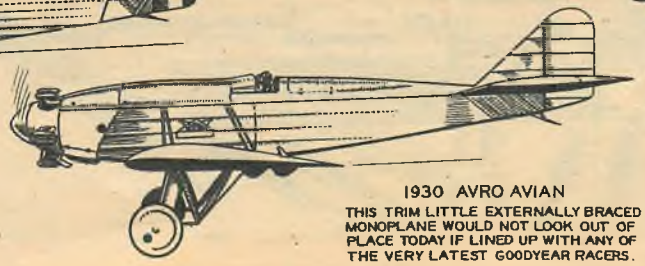
1934 AVRO 642
16-PASSENGER AIRLINER (CRUISING SPEED 135 M.P.H.)



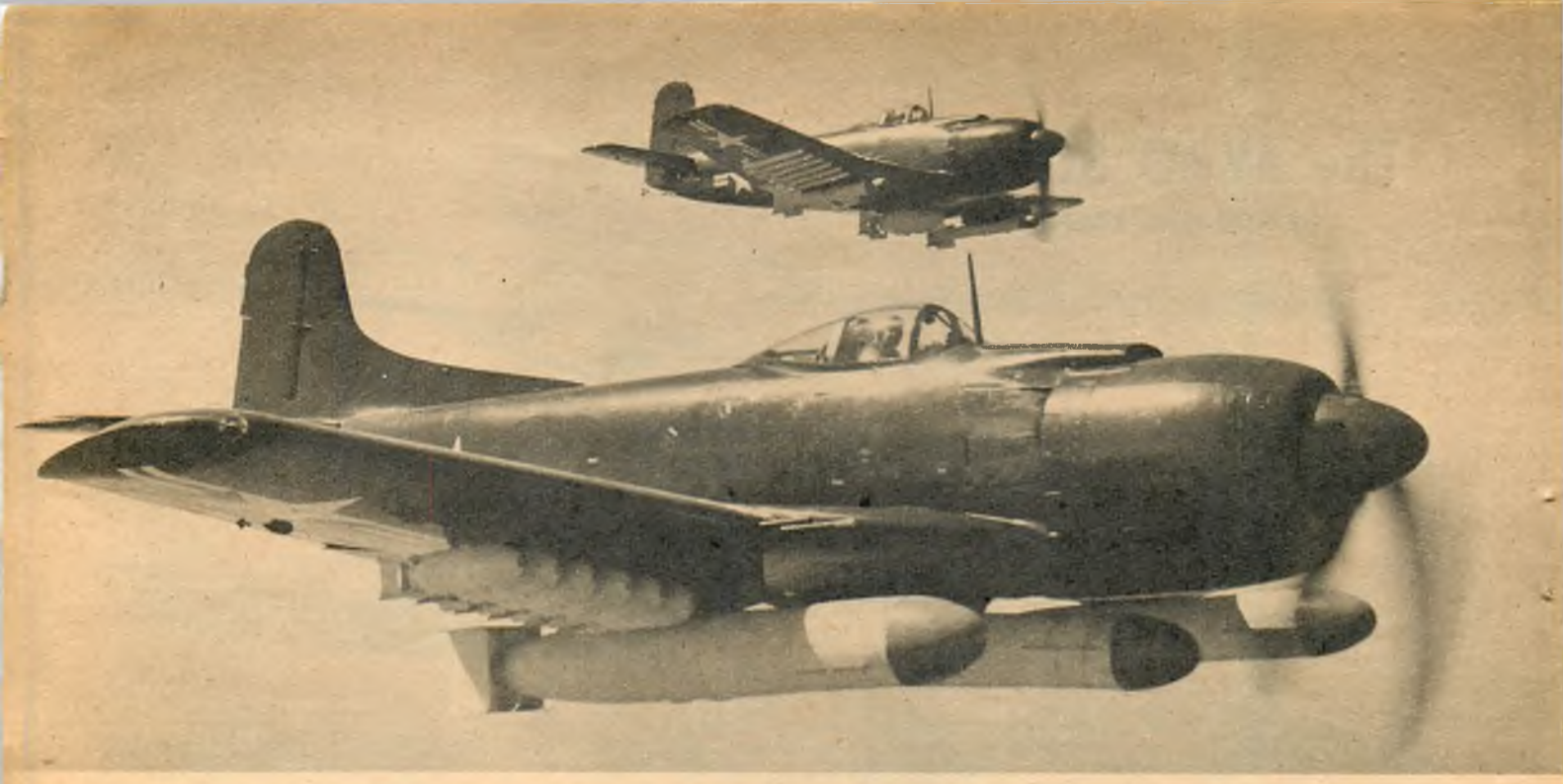
1932 AVRO MAILPLANE
(CRUISING SPEED WAS 176 M.P.H)



1930 AVRO TRAINER REPLACED THE FABULOUS MODEL 504-K AND WAS PROTOTYPE OF THE LATER TYPE 626.



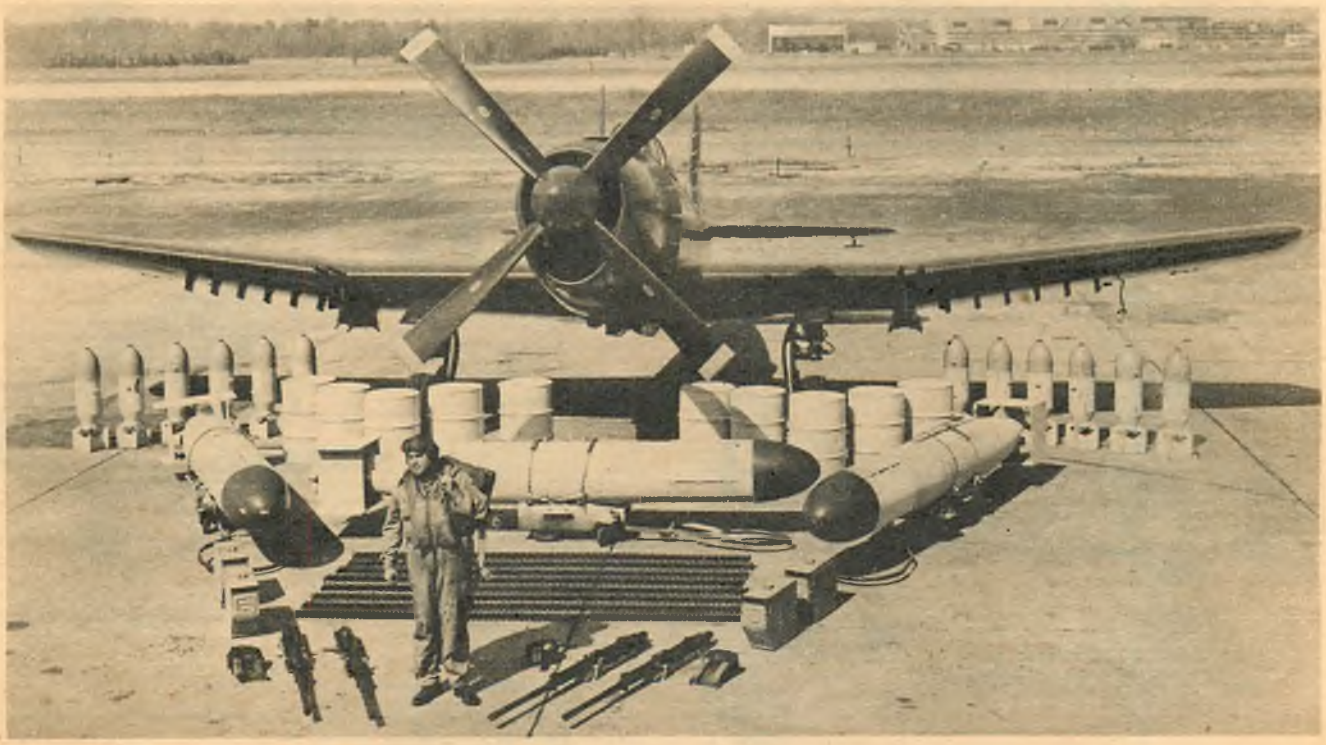
1930 AVRO AVIAN
THIS TRIM LITTLE EXTERNALLY BRACED MONOPLANE WOULD NOT LOOK OUT OF PLACE TODAY IF LINED UP WITH ANY OF THE VERY LATEST GOODYEAR RACERS.



● A variety of armament can be carried by the AM-1. Lower plane has three torpedoes, six bombs; upper, a 2000-lb. bomb, 14 rockets.

Mabel's Able!

● Spread out in front of the AM-1 Mauler is the world's record load carried by a single-engine plane, consisting of gasoline (10 drums' worth), three torpedoes weighing 2,000 lbs. each, twelve 250-lb. bombs, four 20-mm cannon and 800 rounds of ammunition.



● O. E." Pat" Tibbs, Glenn L. Martin Co.'s Director of Flight, who flew the Mauler with a 10,689-lb. load. Tibbs has over 6,000 hours.

● F. E. Christofferson, Martin test pilot, who flew the other AM-1 with 9,000-lb. payload. His hand is on a 1,000-lb. "Tiny Tim" rocket.

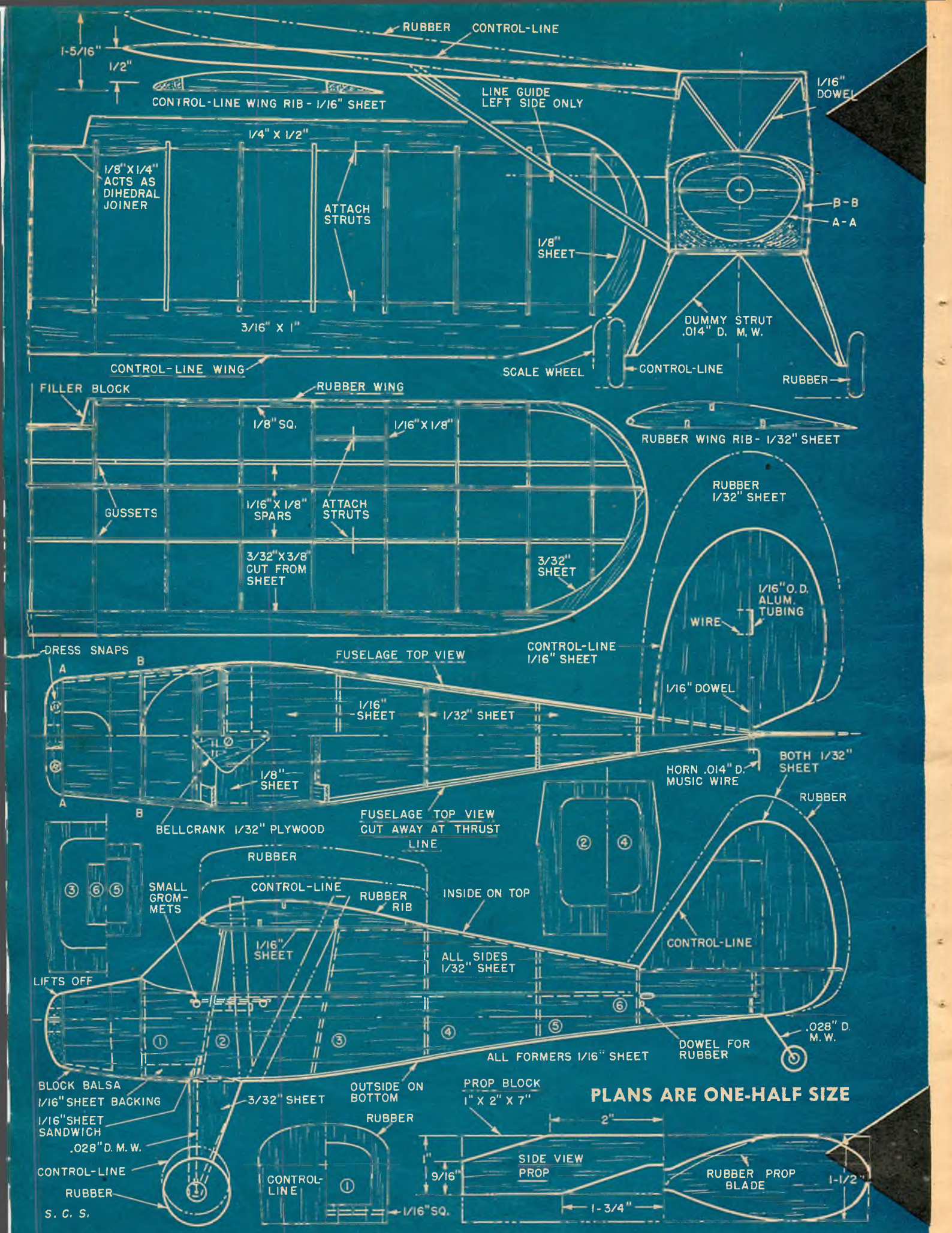
This Navy's Sunday punch is capable of sinking a large battleship

DURING World War II many an airplane surprised its creators by carrying loads higher than it had been designed for. There is the story about a Navy torpedo-bomber designed for a crew of three which took off from a small Pacific island carrying nine passengers and all their duffel gear! And this was no isolated example, either.

Some of our bombers had on-the-spot modifications made which transformed them into porcupines bristling with guns and rockets. So equipped, they carried sufficient destructive power to make short shrift of heavily armed enemy destroyers and light cruisers.

The lesson we learned from this has been applied to our postwar designs. Hit (*Continued on page* 69)

● For stowage on carrier, Able Mabel's wings fold. Modelers are referred to U-control plans of ship that appeared in October '48 issue.



• **Full-size plans for building Vagabond as a rubber- or Infant-powered plane on Plan 849.**

T-56 rubber job made from these plans

3 Vagabonds

By JERRY REISS

WHILE many clever "compromise" airplanes have been worked out both in full scale and in miniature, designers of both know that such ships seldom match the single purpose machine in its specialty. In our field particularly, the development of such power plants as CO_2 engines and baby gas engines, has led to all manner of combination deals with two or even three of these basic methods of propulsion.

It is not possible usually to prepare an original design expressly for each type of power plant without having wide variations, particularly in size, that result in as many entirely different layouts as there are power plants. Yet the Piper Vagabond is one airplane that is suited to designing for various power plants without radical departures for each power plant. It has large wing area and general proportions that make for a good sport U-control. By taking liberties with the tail area it can be made into a stunt scale model. With a light wing and some dihedral it performs very well as a rubber-powered flying scale airplane. This version should fly free-flight, too, with the Infant. The small rubber- or Infant-powered Vagabond was scaled up 50% for U-control with engines of .199 to .29 displacement. Our local hobby shop says these are popular engines so why not give their owners a break? We'd just love to say engines of from .09 to .45, and so on, but frankly our Ohlsson 23 with hot fuel makes all the rumpus our fragile nerves can stand! You may be a real hot-rock flyer who can cope with a faster job.

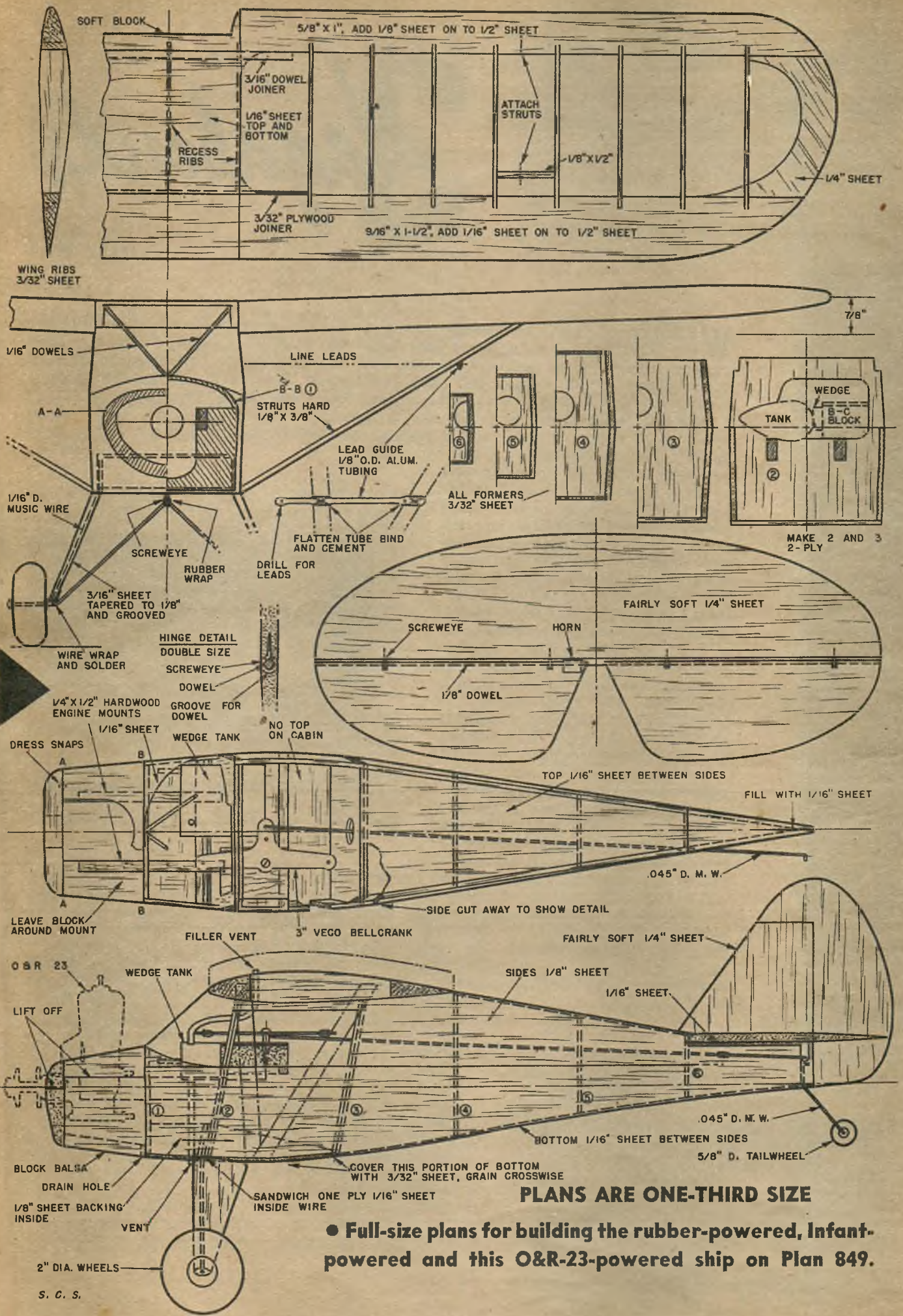
O&R 23 U-control plans on next page

One important feature of this three-in-one deal is the duplication of construction to the greatest practical degree in all ships. The fuselage is identical in both little models; the materials are heavier in the bigger ship, with a few points beefed up to stand the greater abuse. The big ship varies from its little K&B brother in that a semi-stunt airfoil is employed, and its tail area has been increased for quick, positive control. Excepting a slight increase in landing gear length, the Infant job is exact scale. If you increase its tail area 50%, using a non-stunt airfoil, the big ship will be exact scale, too. The rubber job uses a light built-up wing with added dihedral and oversize tail area for stability. At any rate, they are three entirely different yet closely related Vagabonds, which will compete strongly against specialized airplanes. Also, since completion of the plans, the Baby Spitfire at .045 and the Herkimer Cub .049 have become available; presumably these power plants would turn the Infant sport job into a hot performer. Use of a stunt airfoil and larger flippers should make stunting easy and practical.

As for construction, let's first consider the fuselage. The two small models employ 1/32" sheet sides, and 1/16" sheet bulkheads; the (*Continued on page* 90)

Here is Infant-powered c.l. Vagabond

THREE VAGABONDS

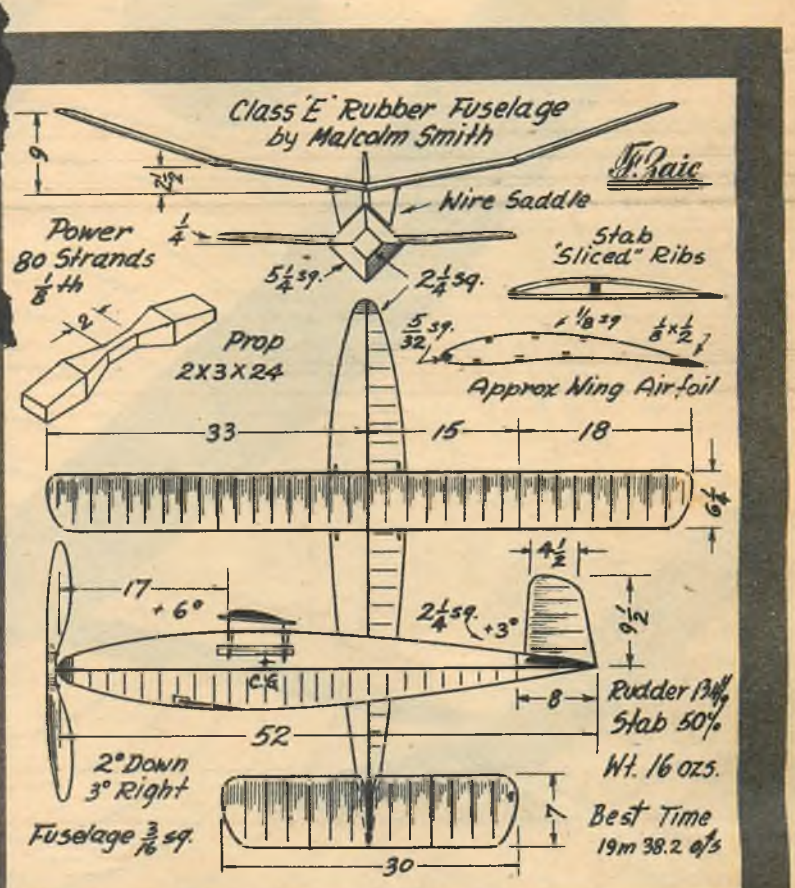


PLANS ARE ONE-THIRD SIZE

• Full-size plans for building the rubber-powered, Infant-powered and this O&R-23-powered ship on Plan 849.

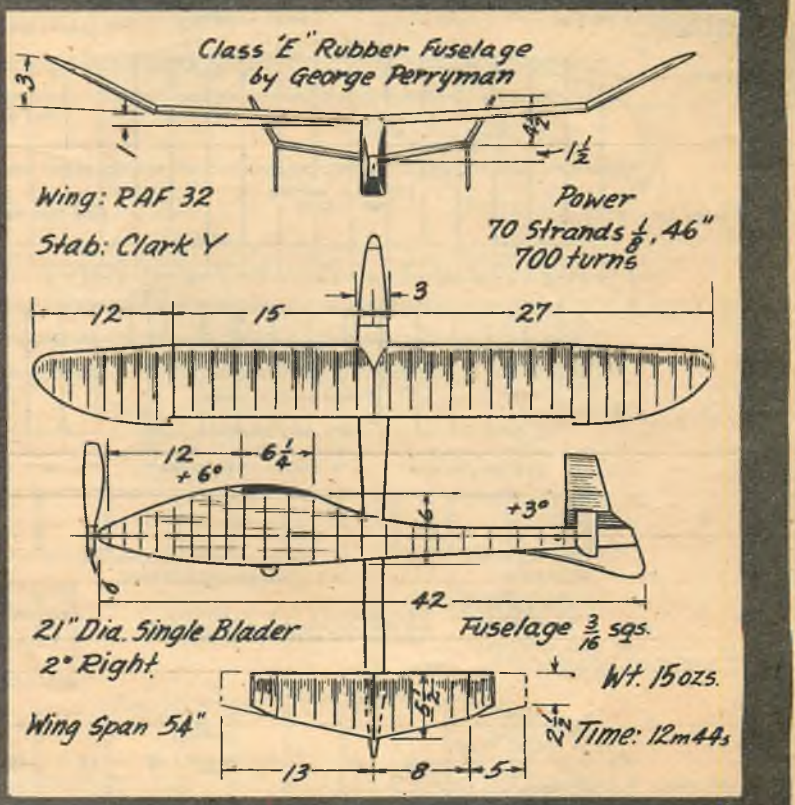
DRAWINGS by FRANK ZAIC

RECORD REVIEW



Mal Smith did over 19 minutes with this big Class E plane.

Malcolm Smith of Minneapolis, Minn., established a national record which included an out-of-sight flight of 19:38.2. The wing features an aspect ratio of 11:1; stab is 50% of wing; rudder is 13.4%. Balsa longerons of 3/16" in fuselage; single-wheel retracting gear folds forward. Has flown on both 80 strands of 1/8" rubber and 40 strands of 1/4". 650 turns are cranked in.

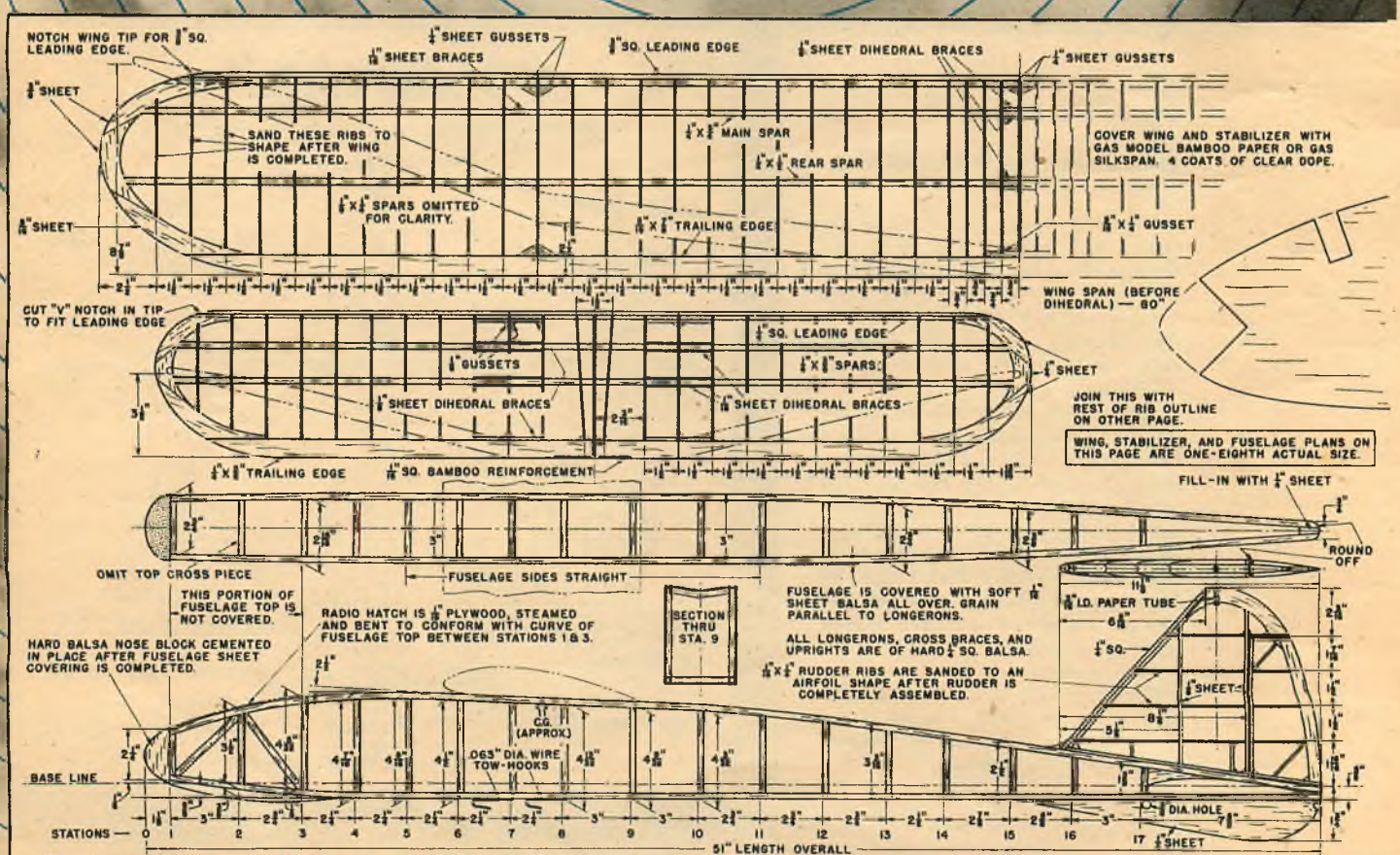


Georgia's George Perryman held 3 records with this ship.

George Perryman, noted model designer and contest flyer from La Grange, Ga., has held three national endurance records with the big Class E job shown here. Each time the rules were changed or his record bettered, he'd take out his old favorite and set a new mark.

Last record was established at the Southern Championship Meet at Montgomery, Ala. Vital statistics are: wing area, 320 square inches; stab area, 110 square inches; no downthrust. Note the square tip he uses on his single-bladed folder. Mr. Perryman is addicted to polyhedral stabilizers which he uses on his rubber models, free-flight gas jobs and all his gliders—including towline and hand-launched.

One of the best known flyers in the southeast, George has a distinguished contest record, made in many of the largest Eastern meets and at National and regional competitions.


NOTCH WING TIP FOR 1/8" SQ. LEADING EDGE.
1/4" SHEET GUSSETS
1/4" SHEET BRACES
1/8" SQ. LEADING EDGE
1/4" SHEET DIHEDRAL BRACES
1/4" SHEET GUSSETS
1/4" SHEET
SAND THESE RIBS TO SHAPE AFTER WING IS COMPLETED.
1/4" X 1/2" MAIN SPAR
1/4" X 1/2" REAR SPAR
COVER WING AND STABILIZER WITH GAS MODEL BAMBOO PAPER OR GAS SILKSPAN. 4 COATS OF CLEAR DOPE.
1/4" X 1/2" SPARS OMITTED FOR CLARITY.
1/16" X 1/8" TRAILING EDGE
1/16" SHEET
1/8" X 1/2" GUSSET
WING SPAN (BEFORE DIHEDRAL) — 80"
CUT "V" NOTCH IN TIP TO FIT LEADING EDGE
1/8" SQ. LEADING EDGE
1/4" GUSSETS
1/4" X 1/8" SPARS
1/16" SHEET
1/4" SHEET DIHEDRAL BRACES
1/4" SHEET DIHEDRAL BRACES
JOIN THIS WITH REST OF RIB OUTLINE ON OTHER PAGE.
WING, STABILIZER, AND FUSELAGE PLANS ON THIS PAGE ARE ONE-EIGHTH ACTUAL SIZE.
1/16" X 1/8" TRAILING EDGE
1/16" SQ. BAMBOO REINFORCEMENT
FILL-IN WITH 1/16" SHEET
ROUND OFF
OMIT TOP CROSS PIECE
FUSELAGE SIDES STRAIGHT
THIS PORTION OF FUSELAGE TOP IS NOT COVERED.
RADIO HATCH IS 1/16" PLYWOOD, STEAMED AND BENT TO CONFORM WITH CURVE OF FUSELAGE TOP BETWEEN STATIONS 1 & 3.
SECTION THRU STA. 9
FUSELAGE IS COVERED WITH SOFT 1/16" SHEET BALSA ALL OVER. GRAIN PARALLEL TO LONGERONS.
ALL LONGERONS, CROSS BRACES, AND UPRIGHTS ARE OF HARD 1/16 SQ. BALSA.
1/16" X 1/2" RUDDER RIBS ARE SANDED TO AN AIRFOIL SHAPE AFTER RUDDER IS COMPLETELY ASSEMBLED.
I.D. PAPER TUBE
1/16" SQ.
1/16" SHEET
HARD BALSA NOSE BLOCK CEMENTED IN PLACE AFTER FUSELAGE SHEET COVERING IS COMPLETED.
C.G. (APPROX.)
.063" DIA. WIRE TOW-HOOKS
BASE LINE
1/16" DIA. HOLE
STATIONS — 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
1/16" SHEET
51" LENGTH OVERALL

Thermal Sniffer

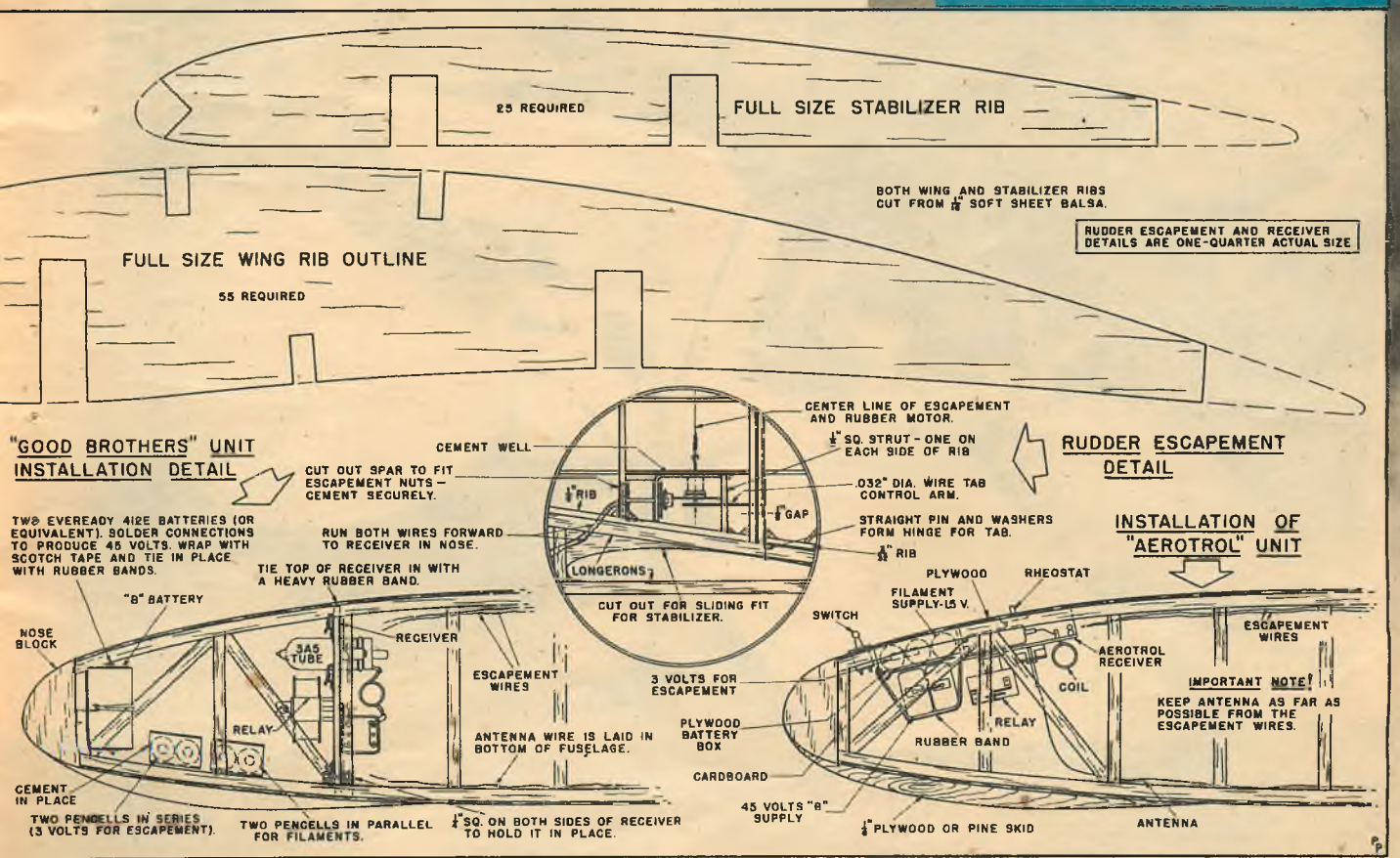
If you want to get started on radio-control here's the best way—this t.l. glider won many meets.

By CHESTER LANZO

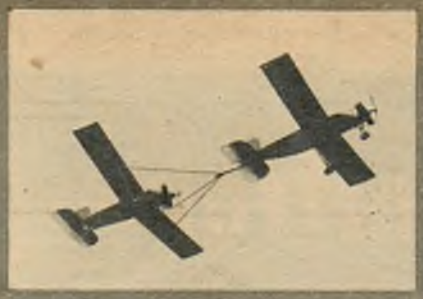
RADIO-CONTROLLED model flying was, in the beginning, a challenging but exasperating hobby. A great many problems had to be worked out which the present R. C. flyer can now take for granted. Even though the radio equipment functioned perfectly, early gas engines were hard starting and balky things to deal with. Also, the problem of the number of controls to do a fair job of flying presented itself. Some thought that as many as three controls were necessary (rudder, elevator and ailerons). Fortunately this proved not to be true. Another stickler was finding the radio frequency most suitable for short range reception and transmission. These problems and many other complications made a truly successful R.C. flight a rare occasion indeed. At one time a modeling humorist said, "a successful R.C. flight is one in which the R.C. job crashed at a spot (*Continued on page* 64)

● Designer-author Chet Lanzo won the first radio-control event at '37 Nationals in Detroit.

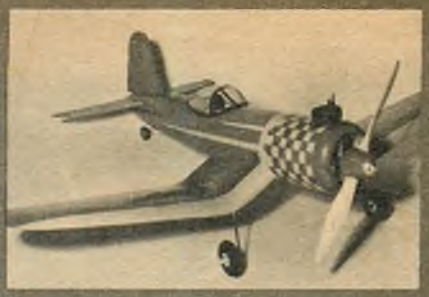
● Simple installation of escapement is evident from this shot of the rudder. Note stab dihedral.



● L. W. Bennett's P-47 built while he was member of Kaneohe Bay Control Liners club which was open to USAF personnel stationed in Pacific.



● Two c.l. models are put through their paces at Wright Field in tow tests made to investigate various stability problems in air-to-air refueling.

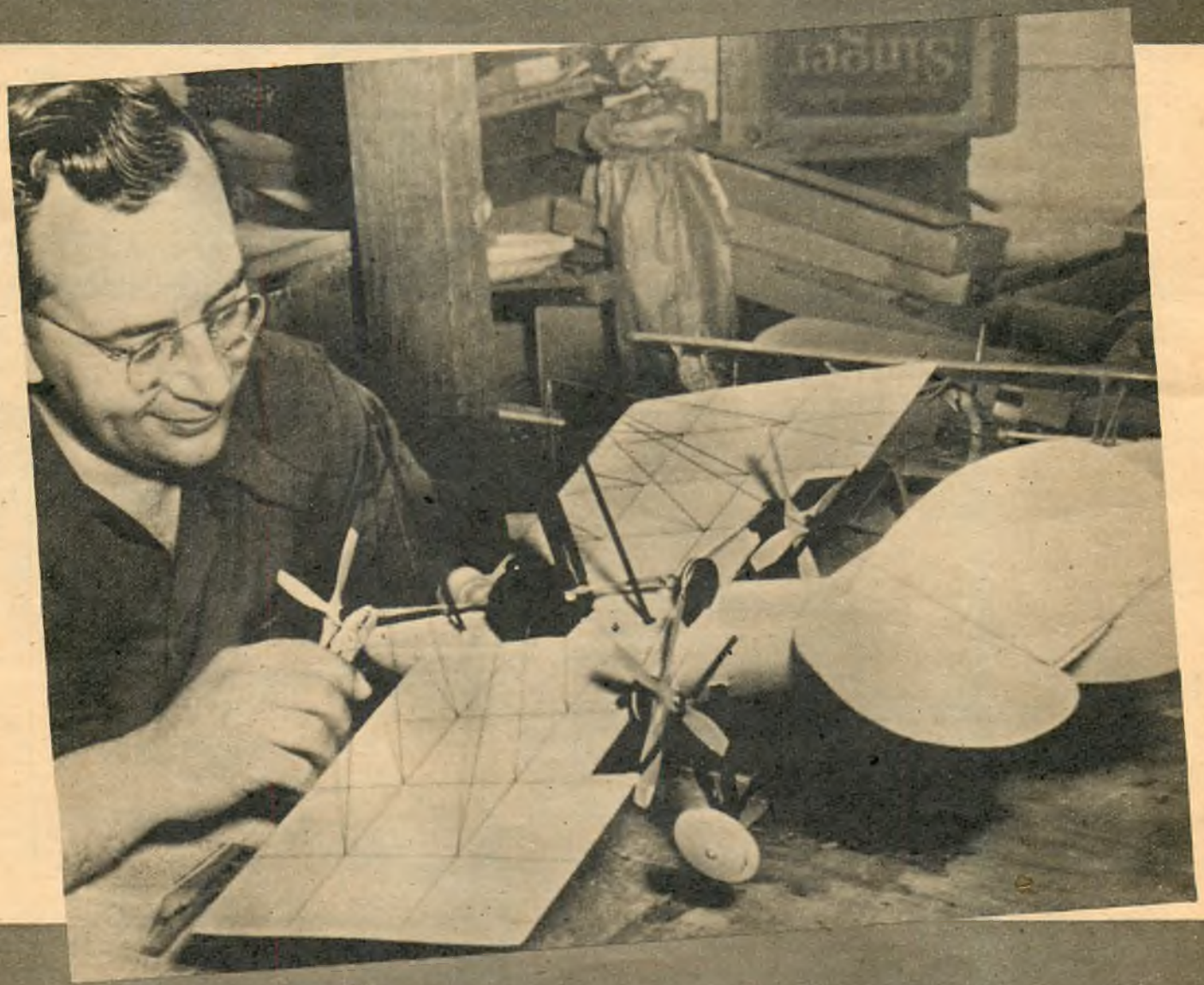


● Vought Corsair built by Leonard A. Savastio, Bethlehem, Pa. Powered by K&B Torp. Except wing tips, 30" model is planked with 1/16"

● Genial Don Foote, Oakland, Calif., with big "Foote's Soarer," his new free-flight design developed for new Academy competition rules.

● Philadelphia's Edward V. Hess, Jr., designed this Class D free-flight for Ohlsson 60 ignition flying. Weighs 68 oz.; span, 90; area, 990.

● Argentina to Italy to the U.S.: Adriano Castellani of Cremona, Italy, sends this fine shot of diesel-powered Bleriot from Buenos Aires.



● PROVIDENCE, R. I.—Model of Russian plane won't fly, claims Jerry Morvillo, 1948 Rhode Island model champ, shown working on his scale job of plane Reds said was first in world to fly (21 years before Wrights!). Guy who "invented" the thing was "Cossack fraud," says Morvillo.

• Lt. Richard J. Clark, stationed at Great Falls AFB, Mont., built this 3/16"-to-the-foot scale model of F-86. Has 6½" span. Note detail.

• Rune Lekare and Harry Lanneryd of Djura, Sweden, with Bantam-powered c.l. models designed by T. Nissulk. Semi-scale popular there.

• Charles Schlosser, Phoenix, Ariz., MAC, and his twin O&R 23 glow plug powered control-line stunt model. Members say model is tops in stunt.

• Canadian Corner: John Sydor, RCAF, built this original Queen Bee 29-powered speedster. Extension shaft, aluminum wings, shocks in gear.

• From AT plans, J. Pearson-Evans, Dun Laoghaire, Ireland, made this Fokker triplane with British Amco .87 diesel. Good U-controller.

• Williamsport GMC (Penna.) members are hoping for great things from "Gordy" Thomas, and his gauze-covered Cl. A Speedwagon above.

Model Matters

DOPE CAN

CONDUCTED BY VAL A. LUCE

THOSE of us who have watched the experts in action at a contest with mingled wonderment and awe at their skill in being able to hook a thermal while the common herd, of which we are one, just launch and pray, are and will be impressed to learn that it's been done at last with a gas job. "It" in this case refers to an official 30-minute total, and said "it" was done by Denny Davis of San Diego on April 10 at Bakersfield, Calif.

A veteran of the contest wars, Denny builds and flies just about everything flyable in outdoor free-flight—his first place in Open Hand-Launched Glider at the '48 Nats is an indication. After flying kit jobs for quite a while, Denny began to get a few original notions as to what a contest gas job should look like. As a result, a progressive series of model designs started pouring out of the Davis workshop, and it was thought by many who saw the terrific "San Diegan" in '47 that Denny had hit his peak. However, near perfection wasn't good enough and besides, Denny had learned lots more about design in flying the "San Diegan," so an improved design—naturally called the "San De Hogan"—was born.

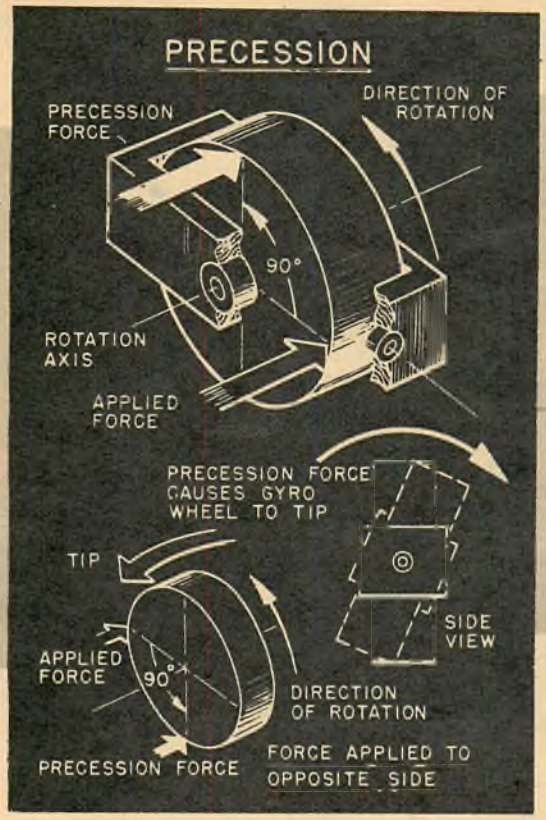
Davis proved that the ship really has something by winning first place in Class C Open at Detroit with it last year. It showed at that time that it was capable of hitting the 30-minute "dream" total. There are no frills on the model; efficiency is the keynote of the design. Denny's contention that fancy streamlining is not necessary seems to be borne out by the fact that the model has the most breathtaking climb ever—"guesstimates" range from 900 to 1,100 feet in 20 seconds with R.O.G., yet!—thus practically guaranteeing a thermal flight every time.

That good model designers think alike is shown by the fact that the "San De Hogan" features an airfoil with no undercamber, an item that Frank Ehling stressed in the design of the "Super Phoenix." We're sure that the airfoil used is the principal reason for the job's being so quick, since Bill Tyler, Hewitt Phillips, or both—or two other fellows—told us once that the drag of the wing represents practically all of the drag of the model. In spite of the use of a screaming K&B .32 Torp, the model takes it all with only 546.9 sq. in. of wing area. Stabilizer area is large; a check shows its area to be 263.4 sq. in. Climb is to the right, with the left glide circle obtained by means of a free-floating trim tab installed on the trailing edge of the left wing panel at the outer dihedral break. All in all, the model represents everything that, in our humble opinion, a free-flight gas job ought to be.

All of which brings up a very important point. Davis' 30-minute performance and that of Charlie Pottol of Oakland, Calif., in Open Class E Towline, while being honored and acclaimed as national records, deserve something a little more extra-special in the way of recognition, a contention with which we feel sure no modeler will argue. For this reason, it is here and now proposed that a "30-Minute Club" be instituted, with Pottol and Davis being (*Continued on page* 73)

NEWS, VIEWS, AND PHOTOS FROM MODEL BUILDERS THROUGHOUT WORLD

• Payment of $2 to $5 is made on or before publication for photos of unusual interest sent exclusively to AT. Since no photos can be returned, be sure to send glossy prints (at least 4" x 5") and retain negatives.



This, we believe, is the most significant article ever to be published about free-flight model adjustment.

meet the CULPRIT

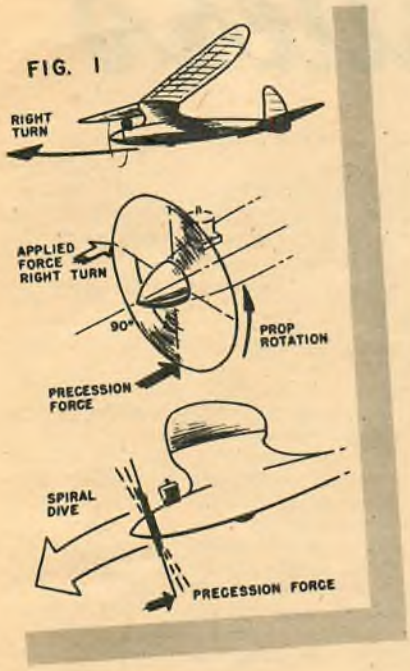
By SIDNEY NOVEMBER

JUST as full scale aviation is beset by problems due to rapid progress, so, too, is model aviation. Since the introduction of new and more powerful engines, new problems of design and adjustment have arisen in the model field. A number of free-flight ships of shoulder wing and pylon type, powered by the big "60's," exhibit all manner of undesirable acrobatics when the engines are opened up.

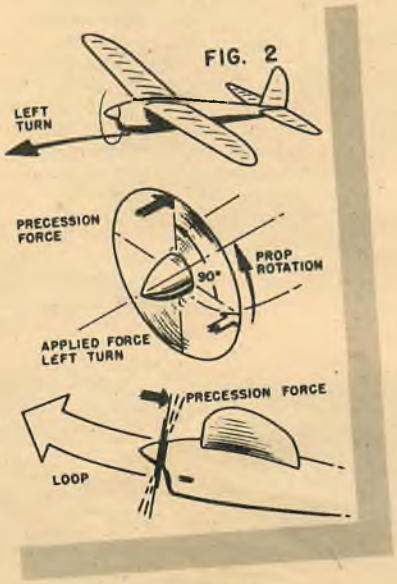
Some modelers, having decided that the engines were too powerful, tried to slow them down by using a gasoline mixture fuel and "clubs" for propellers. They would have fared better by using a conventional engine instead of a racing one. Others used wing areas of 1,000 square inches or more to slow up the ships.

A few of the more hardy builders have used maximum engine power while still retaining a clean ship with very fast rate of climb. These boys soon met with some of the most spectacular crack-ups in the model field. Ships which went straight up with a slight right turn under low power would spin in to the right as soon as full power was applied. Models which climbed in a long left turn under low power would loop under full power. Not every model, but a goodly number.

The culprit responsible for these unexpected antics was soon identified as "gyroscopic effect." (*Continued on page* 95)



● Author November and his QED model described here.



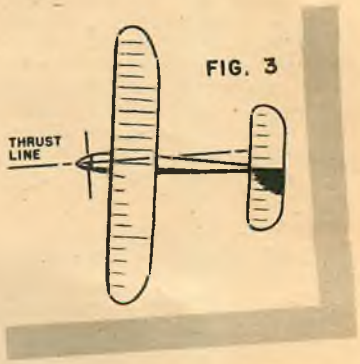
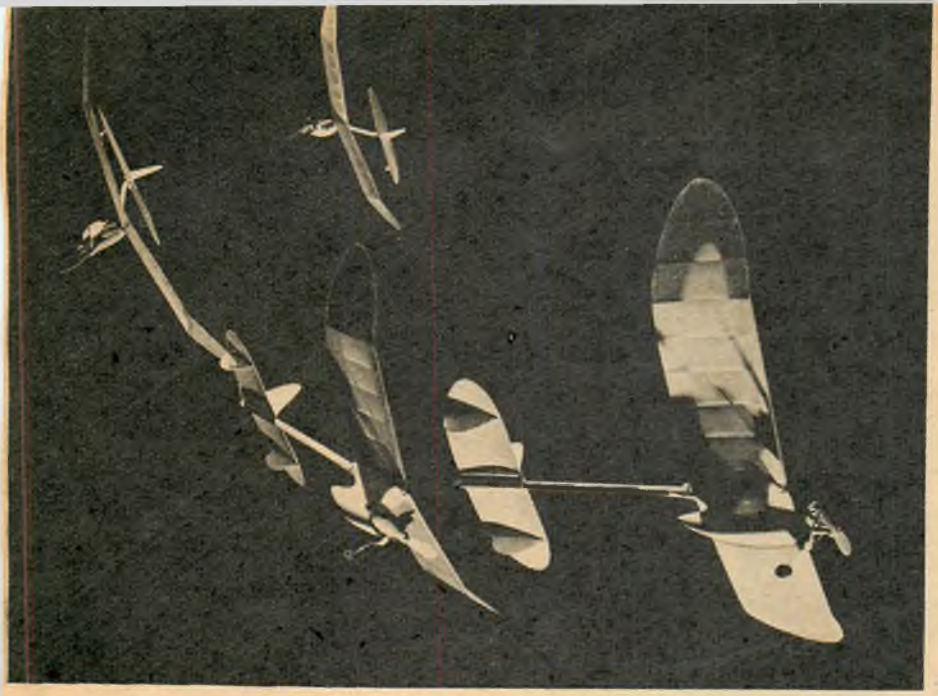



FIG. 4
VERTICAL LOOPS
FIG. 5
OBLIQUE LOOPS
ENGINE CUTS
RIGHT CIRCLE GLIDE
LEFT SPIRAL CLIMB
FIG. 6



Baby Boomer

By AUBREY KOCHMAN

Good looks and performance combine in this Infant or Cub powered free-flighter

IF you want a ship to put behind the new Herkimer Cub or K&B Infant engine that will give contest performance and is not the usual run-of-the-mill pylon job, try the Baby Boomer. Its fast, tight, spiraling climb and flat glide put it in the winners' circle whenever it is flown.

If you look closely you may note the resemblance to the Baby Bowlus sailplane, for it was from this design that the original Boomer was built back in 1938. Since that time at least ten Boomers have been built and all had the same general characteristics: easy to build, easy to adjust, and (we regret to say) easy to lose.

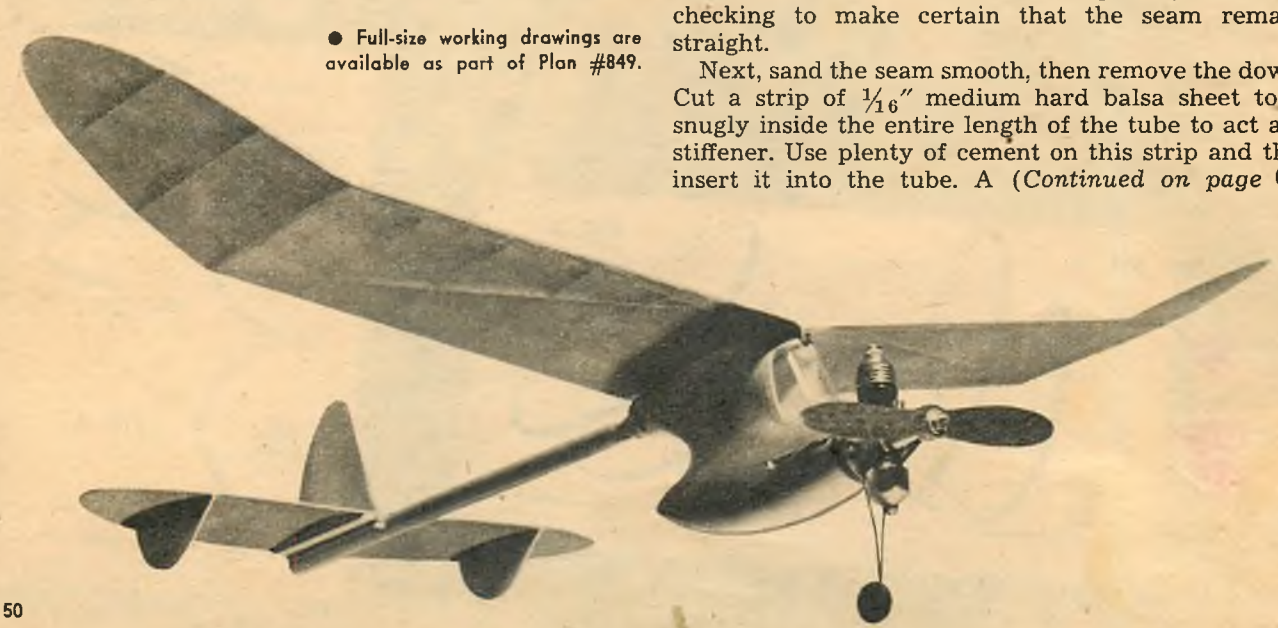
When flying the Baby Boomer take weather conditions into consideration and limit the engine run accordingly. The Infant will run about eight seconds on the fuel in the fuel line from the tank end just before launching. If you use an average size eye dropper to fill the tank, you will find that one dropperful of fuel will give a run of about 25 seconds.

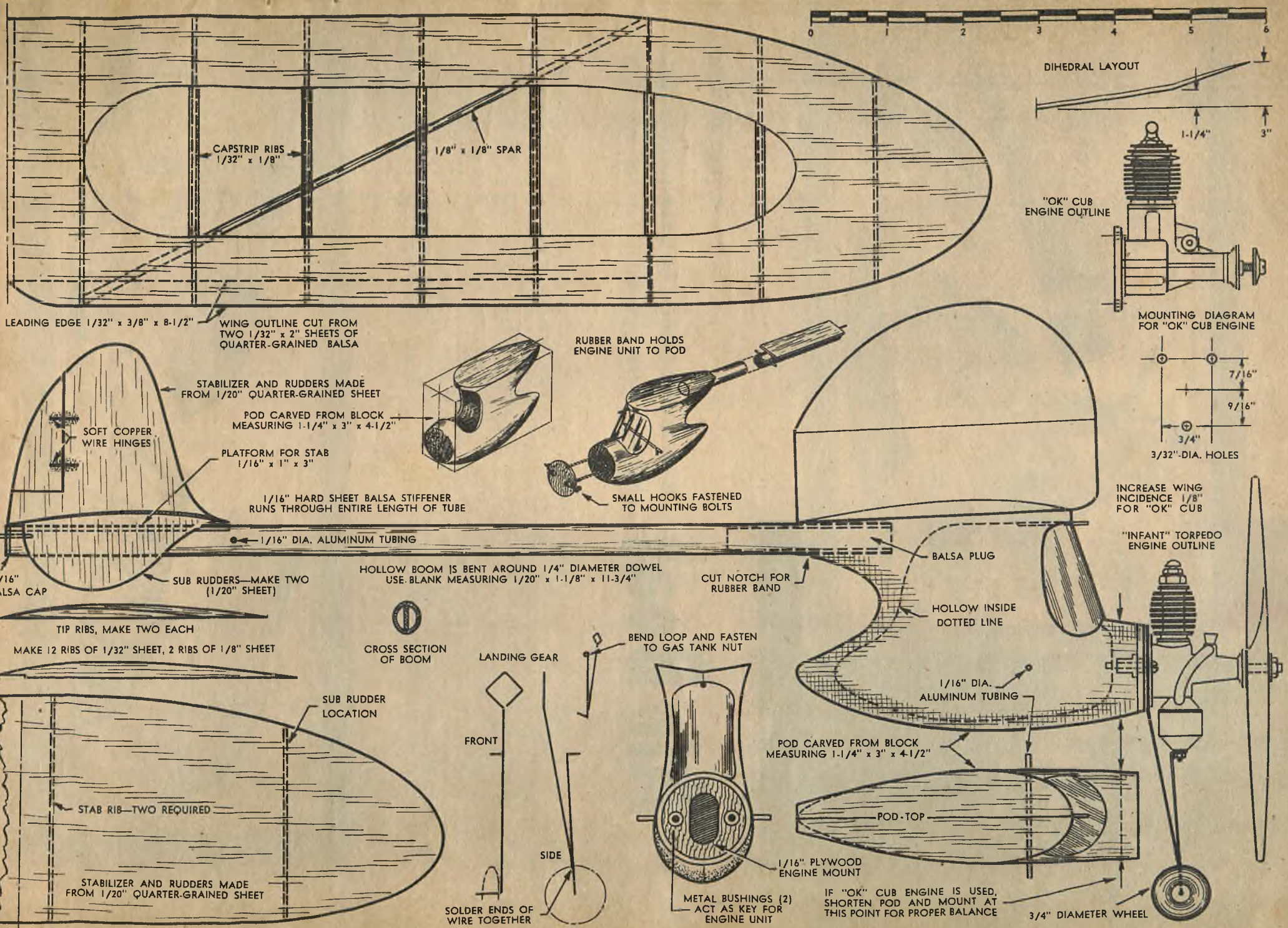
● Full-size working drawings are available as part of Plan #849.

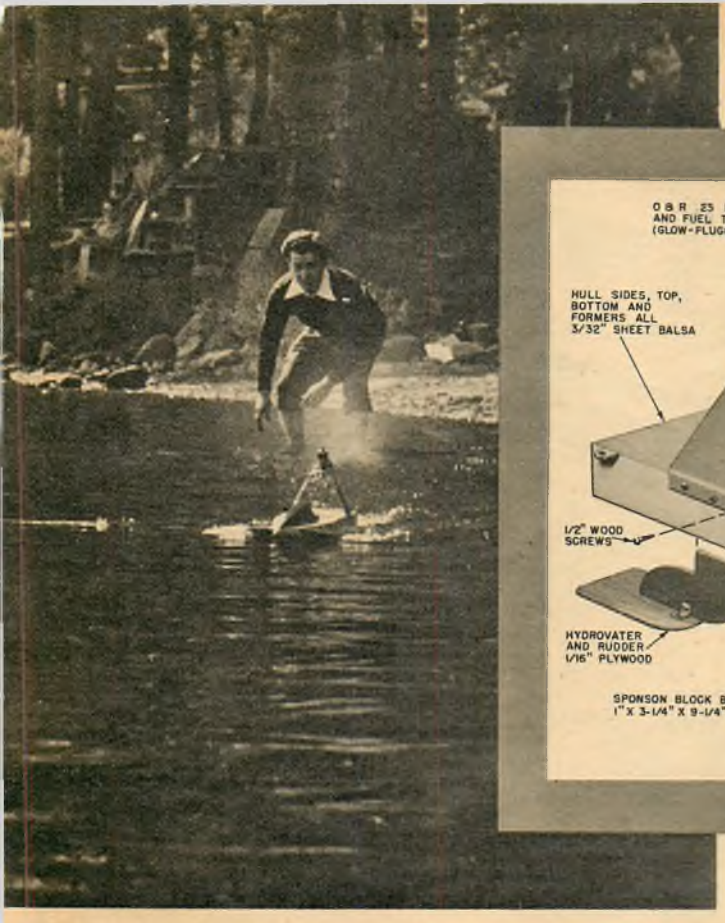
In selecting your wood for construction of the Boomer, bear in mind that the flying weight, with an Infant, should not exceed two and one half ounces. For powering with a Cub we recommend $\frac{1}{20}$" sheet balsa for the wing instead of $\frac{1}{32}$", and a solid boom of the hardest balsa available. If you can secure some light tubing, that might well be substituted for the balsa on the boom.

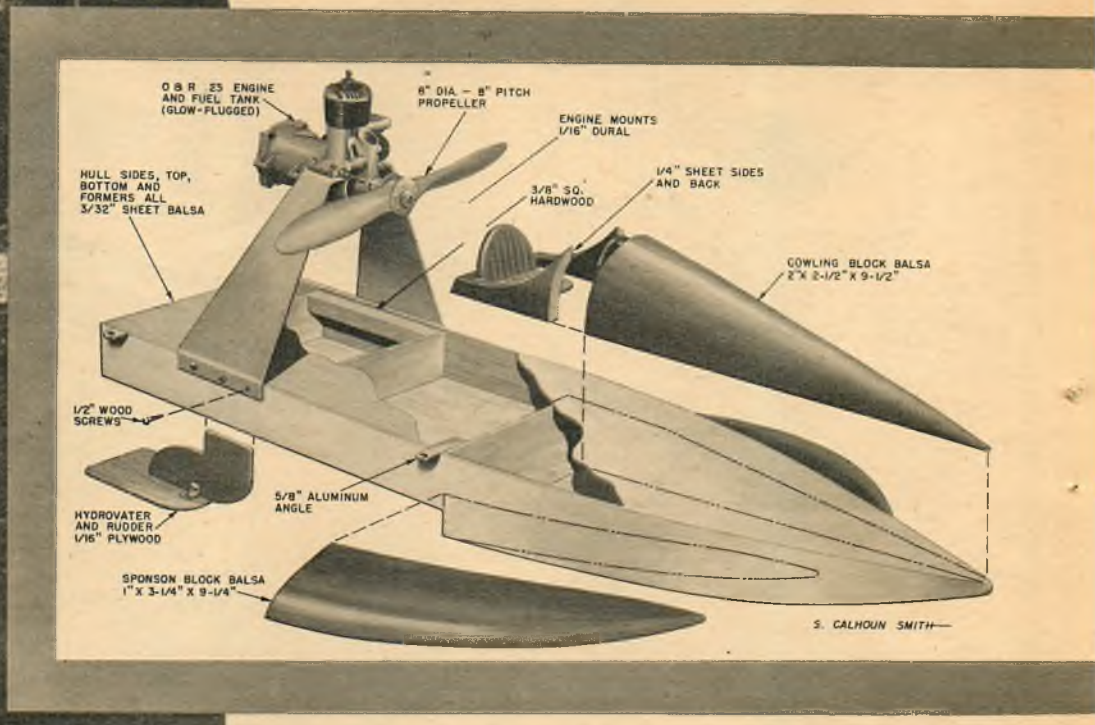
With the exception of the boom, the construction is about the simplest, and a warp-free structure should result. Actually the Infant boom shouldn't present any problem if care is taken in selecting a sheet of $\frac{1}{20}$" soft straight-grained balsa and a straight $\frac{1}{4}$" dowel. Cut the sheet to the size indicated on the plan and soak it in hot water for at least five minutes. Then lay the dowel in the center of the sheet and gradually bend the balsa around it. Strips of tissue wrapped around the balsa will hold it in shape until dry. If done correctly, the seam should run perfectly straight throughout the length of the tube. When dry, remove the tissue and cement the tube together, constantly checking to make certain that the seam remains straight.

Next, sand the seam smooth, then remove the dowel. Cut a strip of $\frac{1}{16}$" medium hard balsa sheet to fit snugly inside the entire length of the tube to act as a stiffener. Use plenty of cement on this strip and then insert it into the tube. A (*Continued on page* 69)




0 1 2 3 4 5 6
DIHEDRAL LAYOUT
1-1/4"
3"
CAPSTRIP RIBS 1/32" x 1/8"
1/8" x 1/8" SPAR
"OK" CUB ENGINE OUTLINE
LEADING EDGE 1/32" x 3/8" x 8-1/2"
WING OUTLINE CUT FROM TWO 1/32" x 2" SHEETS OF QUARTER-GRAINED BALSA
MOUNTING DIAGRAM FOR "OK" CUB ENGINE
7/16"
9/16"
3/4"
3/32"-DIA. HOLES
STABILIZER AND RUDDERS MADE FROM 1/20" QUARTER-GRAINED SHEET
POD CARVED FROM BLOCK MEASURING 1-1/4" x 3" x 4-1/2"
RUBBER BAND HOLDS ENGINE UNIT TO POD
SOFT COPPER WIRE HINGES
PLATFORM FOR STAB 1/16" x 1" x 3"
1/16" HARD SHEET BALSA STIFFENER RUNS THROUGH ENTIRE LENGTH OF TUBE
SMALL HOOKS FASTENED TO MOUNTING BOLTS
INCREASE WING INCIDENCE 1/8" FOR "OK" CUB
"INFANT" TORPEDO ENGINE OUTLINE
1/16" DIA. ALUMINUM TUBING
BALSA PLUG
1/16" BALSA CAP
SUB RUDDERS—MAKE TWO (1/20" SHEET)
HOLLOW BOOM IS BENT AROUND 1/4" DIAMETER DOWEL USE BLANK MEASURING 1/20" x 1-1/8" x 11-3/4"
CUT NOTCH FOR RUBBER BAND
HOLLOW INSIDE DOTTED LINE
TIP RIBS, MAKE TWO EACH
MAKE 12 RIBS OF 1/32" SHEET, 2 RIBS OF 1/8" SHEET
CROSS SECTION OF BOOM
LANDING GEAR
BEND LOOP AND FASTEN TO GAS TANK NUT
1/16" DIA. ALUMINUM TUBING
SUB RUDDER LOCATION
FRONT
POD CARVED FROM BLOCK MEASURING 1-1/4" x 3" x 4-1/2"
POD-TOP
STAB RIB—TWO REQUIRED
SIDE
1/16" PLYWOOD ENGINE MOUNT
STABILIZER AND RUDDERS MADE FROM 1/20" QUARTER-GRAINED SHEET
SOLDER ENDS OF WIRE TOGETHER
METAL BUSHINGS (2) ACT AS KEY FOR ENGINE UNIT
IF "OK" CUB ENGINE IS USED, SHORTEN POD AND MOUNT AT THIS POINT FOR PROPER BALANCE
3/4" DIAMETER WHEEL





By **CRISTO RUSSO**

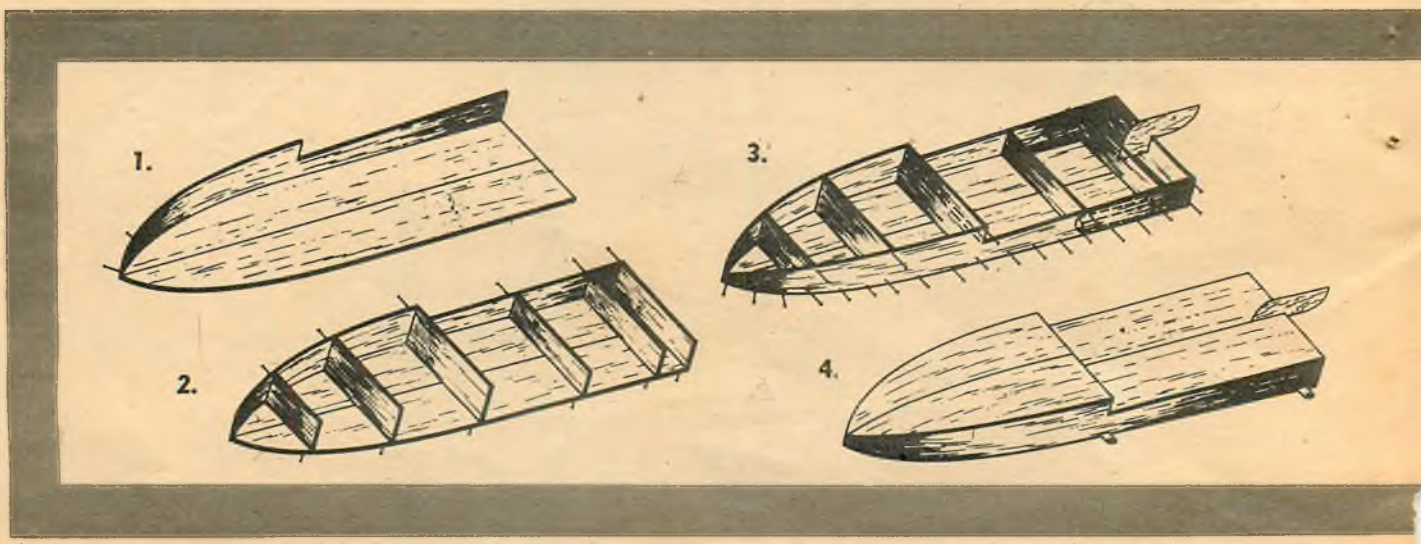
Air Boat

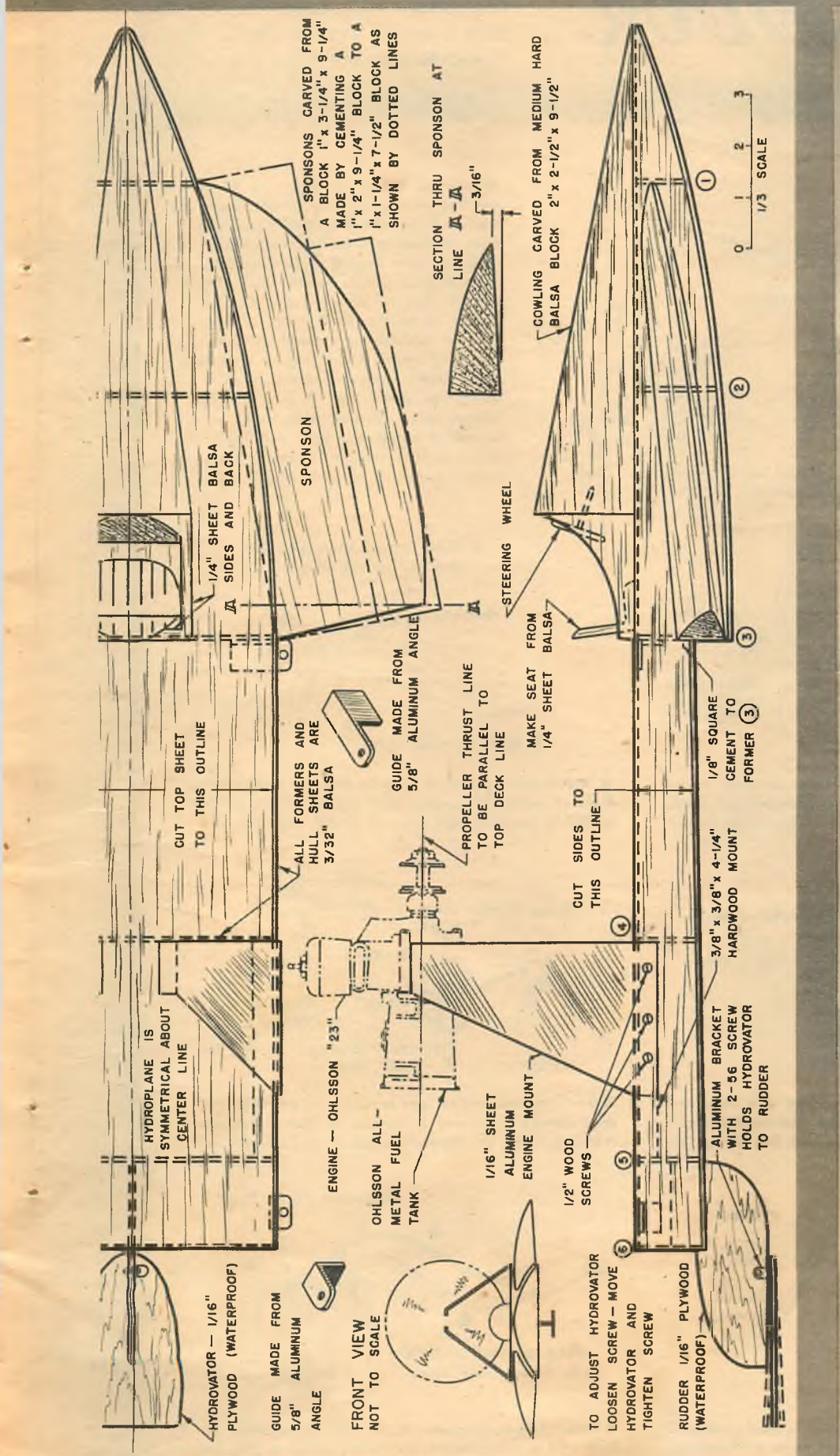
Is the wind too strong for Sunday flying? Build this fast water speedster for fun and frolic

HOW many times have you planned on a solid weekend of flying only to get out to the field and sit around most of the day waiting for the wind to die down? On such occasions about all that most of us can do is drag that dream ship out of the car and satisfy ourselves by running up the engine. What has this to do with building a boat, you say? Well, if you live anywhere near a lake and care to investigate on one of these windy days, you'll discover that the water isn't rough at all. This revelation led me to look into the power boat picture in my neighborhood.

The New York City power boat boys were running their models every Sunday morning at Kissena Park in Flushing, L. I., so I figured I'd take a look. I found a good turn-out there, with engines screaming—and I mean screaming, since most of them were either hopped-up McCoys or Hornets or homemade monsters of 15 to 30 c.c. displacement.

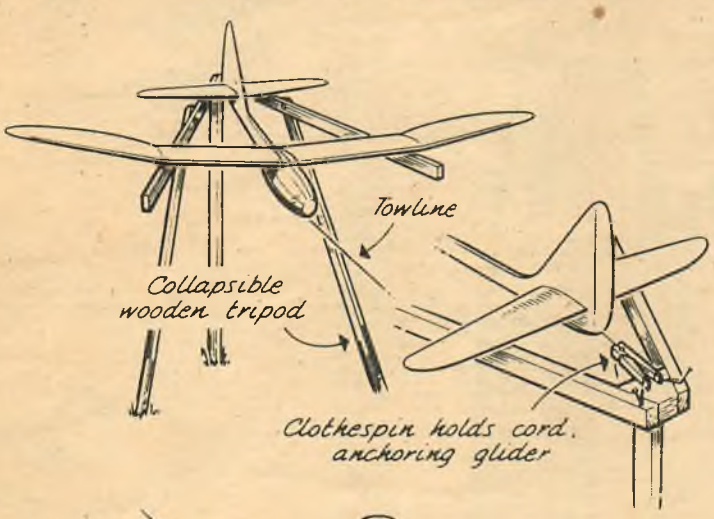
Talking with these fellows made me realize that the big standard power boat (*Continued on page* 80)




SPONSONS CARVED FROM A BLOCK 1" x 3-1/4" x 9-1/4" MADE BY CEMENTING A 1" x 2" x 9-1/4" BLOCK TO A 1" x 1-1/4" x 7-1/2" BLOCK AS SHOWN BY DOTTED LINES
SECTION THRU SPONSON AT LINE A-A
3/16"
COWLING CARVED FROM MEDIUM HARD BALSA BLOCK 2" x 2-1/2" x 9-1/2"
0 1 2 3
1/3 SCALE
1/4" SHEET BALSA SIDES AND BACK
SPONSON
STEERING WHEEL
MAKE SEAT FROM 1/4" SHEET BALSA
1/8" SQUARE CEMENT TO FORMER (3)
CUT TOP SHEET TO THIS OUTLINE
ALL FORMERS AND HULL SHEETS ARE 3/32" BALSA
GUIDE MADE FROM 5/8" ALUMINUM ANGLE
PROPELLER THRUST LINE TO BE PARALLEL TO TOP DECK LINE
CUT SIDES TO THIS OUTLINE
HYDROPLANE IS SYMMETRICAL ABOUT CENTER LINE
ENGINE — OHLSSON "23"
OHLSSON ALL-METAL FUEL TANK
1/16" SHEET ALUMINUM ENGINE MOUNT
1/2" WOOD SCREWS
3/8" x 3/8" x 4-1/4" HARDWOOD MOUNT
ALUMINUM BRACKET WITH 2-56 SCREW HOLDS HYDROVATOR TO RUDDER
HYDROVATOR — 1/16" PLYWOOD (WATERPROOF)
GUIDE MADE FROM 5/8" ALUMINUM ANGLE
FRONT VIEW NOT TO SCALE
TO ADJUST HYDROVATOR LOOSEN SCREW — MOVE HYDROVATOR AND TIGHTEN SCREW
RUDDER 1/16" PLYWOOD (WATERPROOF)

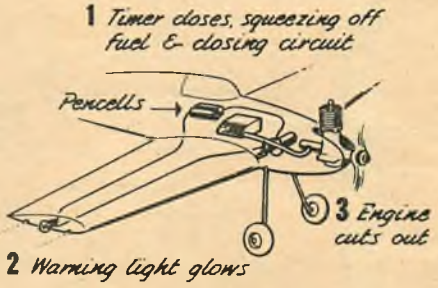
Sketch Book

HAVE YOU DEVELOPED SOMETHING NEW IN CONSTRUCTION, CONTROL, OR FLYING THAT MIGHT INTEREST OTHER MODELERS? SEND A ROUGH SKETCH—WE'LL REDRAW IT AND PAY $2 FOR EACH ONE ACCEPTED

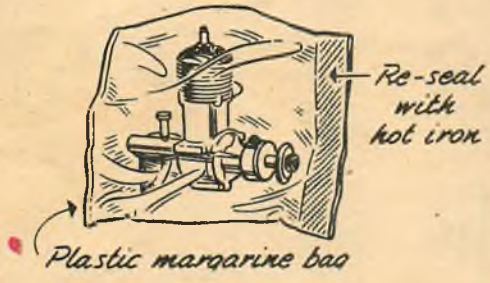


● Ever go out to fly a towline glider and find you were lacking an experienced man to launch the job? Nothing can be more maddening. Then, too, you've probably seen some hapless modeler attempting with poor success to show the "little woman" how to launch a t.l. job. Ray Elmore, El Monte, Calif., says you can fly your towliner by yourself using this launching tripod. Glider rests on arms of tripod and is held by waxed string in spring-type clothes pin. Tug on towline releases glider. If wind shifts tripod can be moved easily. Use bolts and thumbscrews to hold the affair together, taper each leg end of tripod to sharp point.

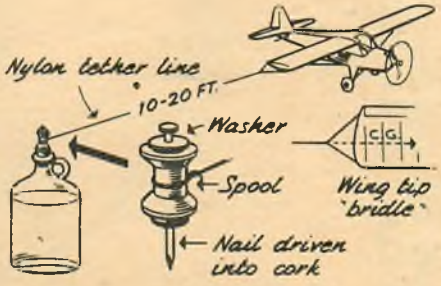
● When applying dope as adhesive for covering, try using a medicine dropper instead of conventional brush, suggests W. E. Farthing, Blanch, N. C. Rinse with thinner.



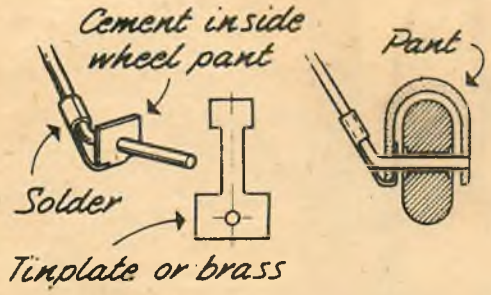
● Watch warning bulb in wing tip to avoid embarrassing flight attitudes when engine cuts. Engine runs few seconds on fuel in line after light glows. P. Royall, Bay City, Mich.



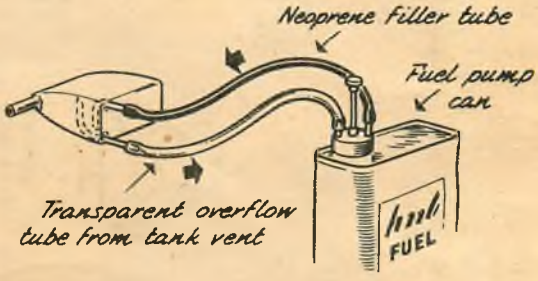
● Used plastic margarine bags, washed with soap and hot water, make ideal containers for dust-moisture-proof storage of engines, says Herman Hadsall, Des Moines, Ia.



● Small models, midget gas or CO_2 can be flown tethered indoors. One way is method of Robert McKone, Hartford, Conn. Use water-filled jug. Short lines work well.



● Keep your pants on with these metal brackets designed by Ray Denton, Baltimore, Md., soldered to strut and cemented inside wheel fairings. May be bent for alignment.



● Robert Sieben, Kenmore, N. Y., adds transparent tube from vent to pump, avoids spattering model, wasting fuel when tank runs over. Tank is full when transparent line fills.

COMET'S RIDIN' HIGH in the MODEL SKY!

● EVERY PART COMPLETELY PREFABRICATED and FINISHED!

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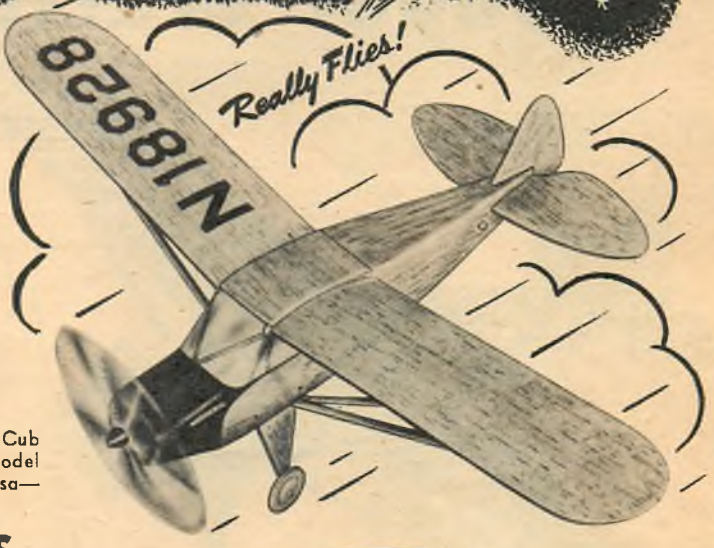

Model shown—Piper Cub Kit No. F-1. Each model 15" wingspan; all balsa—no tissue.

COMET'S STRUCT-O-SPEED MODELS

Comet has revolutionized model airplane building with these sensational "STRUCT-O-SPEED" models! There's never been anything so simple—quick—accurate! Anyone can now build models that are professional in appearance and performance—in only a fraction of the time required by older methods! And these models really FLY! All parts die-cut; kits include propeller, wheels, rubber motor, formed landing gear and prop shaft, simple plan!

6 MODELS

- F-1—Piper Cub
- F-2—Taylorcraft
- F-3—Aeronca
- F-4—Stinson Voyager
- F-5—Cessna
- F-6—Fokker D-VIII

What a Hit with Model Builders! PIPER CUB Control Model

New!

The Nth DEGREE of PRE-FABRICATION

One of the great new Comet models that have put Comet far ahead of the field in design and value—and made it the preferred line of America's model builders! This new Comet triumph completely dominates the medium price range—a quality kit with a big wingspan—and so completely prefabricated that builders are delighted with the simplicity and ease with which it is put together! And it's just as sensational in performance! Setting sales records everywhere—and creating a new standard of value!

$2.95

35½" Wingspan, Kit No. T-15

COMET MODEL HOBBYCRAFT, INC.

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Model of the Month

Super Cruiser

Comet's new Cub control-line kit is firm's big entry in the prefabricated model field

TIME, tide, and the consumers' changing tastes wait for no man—in the model industry. If they did, the kit producer's life would be a comparatively happy one. As it is—brother!

It isn't so much the fact that new kits keep coming out like fireflies in July, for that is a tangible factor which lets a man know where he stands. What is far more difficult to analyze is the matter of price. Some people believe you can decide on a kit, put in it everything the heart desires, then tag it for whatever price an honest profit requires. Now there are a few such kits but they never will be commonplace because of *you*. You want quality, true, but you want quality at a price. Where one modeler wants tops in quality and doesn't give a hang what it costs him, at least a dozen will seek quality at a cost they can afford. Price and quality are delicately balanced factors, always compromised by the customer's own compromise between his desire and his pocket book.

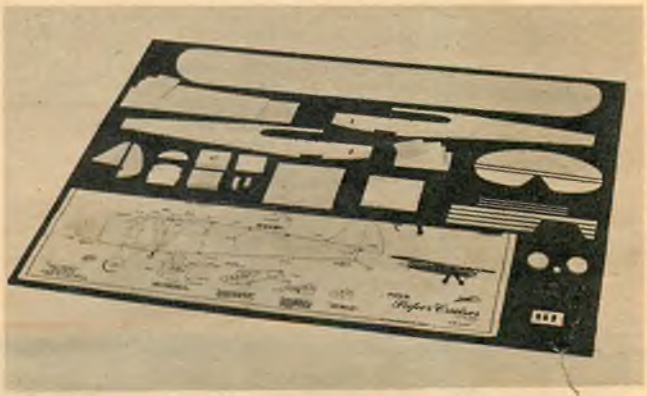
When the war ended, the flood of new kits—and of new manufacturers—was like a great wind rushing into a low pressure area. Demand had been immense but production had been limited by the more important aspects of the wartime economy. Now the lid was off. Nothing like it had ever been seen before, probably never will be seen again in our industry. But where many were called, few were chosen. While it was inevitable that the wild rush would have plenty of casualties, the old rule of price-quality brought plenty of the inexperienced to grief. Those who knew the ropes pulled out the stops for quality with the strong now fighting it out with prefabrication—prefabrication to a fabulous degree; prefabs that put the model airplane industry on a quality footing with the toy business.

And now a new round begins. This time it is Comet the trade boys are watching. And one reason for this watching is the Piper Cub Super Cruiser, control-line scale model, by the big Chicago firm.

Two-ninety-five is an extraordinary price for any control-line scale model that spans 35½ inches as does this Piper. It isn't feasible to compare the Comet Cub precisely with all other scale designs; each is a particular blend of quality and price. However, in making the most of production, Comet's specific balance of what-you-pay against what-you-get is what the trade is watching.

What Comet gives you in their Piper kit is a one-piece wing, already shaped to the proper planform and airfoil shape, requiring the builder only to finish tapering the tips; die-cut fuselage side pieces; die-cut tail surfaces; hardwood wheels; a one-piece formed metal landing gear; bulkheads; formers; and the blocks, sheets, strips and hardware necessary to complete the airplane.

Designed by Fred Schlienz and Veto Gerofalo, with plans by Walter Eckert, the kit is intended for Class A, B, and small C engines. A unique feature is the attachment of the landing gear, which screws to a ⅜″ thick plywood block which fits into pre-cut notches in the side frame. For flight in clockwise circles, the bellcrank attaches out toward the tip of the right wing with the push (*Continued on page* 81)



● Photo gives idea of how thoroughly prefabricated is this kit.

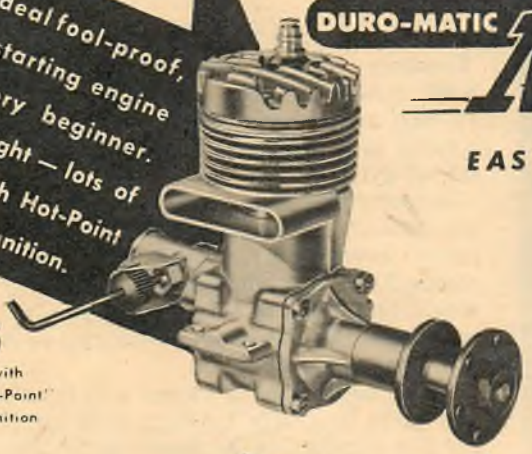
AT YOUR HOBBY SHOP

Look at all 3

DURO-MATIC McCOY "19"

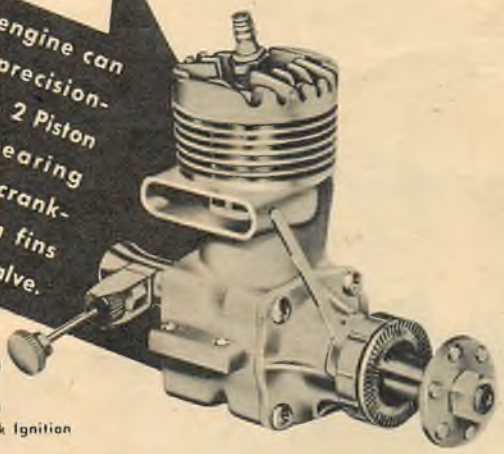
EASY TO START — EASY TO RUN

The ideal fool-proof, easy starting engine for every beginner. Light weight — lots of power, with Hot-Point glow plug ignition.



$9.95 with "Hot-Point" Ignition

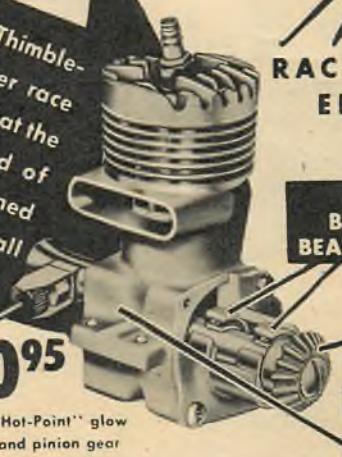
No other engine can match this precision-made McCoy. 2 Piston rings, ball bearing special alloy crank-shaft, aluminum fins and disc rotary valve.



$10.95 with Spark Ignition

New RACING CAR ENGINE

A MUST FOR Thimble-drome and other race car owners. Thrill at the power and speed of this specially designed McCoy, with DUAL ball bearing crankshaft.



$10.95 with "Hot-Point" glow plug and pinion gear

Checkered Flag Line

DURO-MATIC PRODUCTS CO.

HOLLYWOOD 38, CALIFORNIA

Pylon Flying

By FRANK EHLING

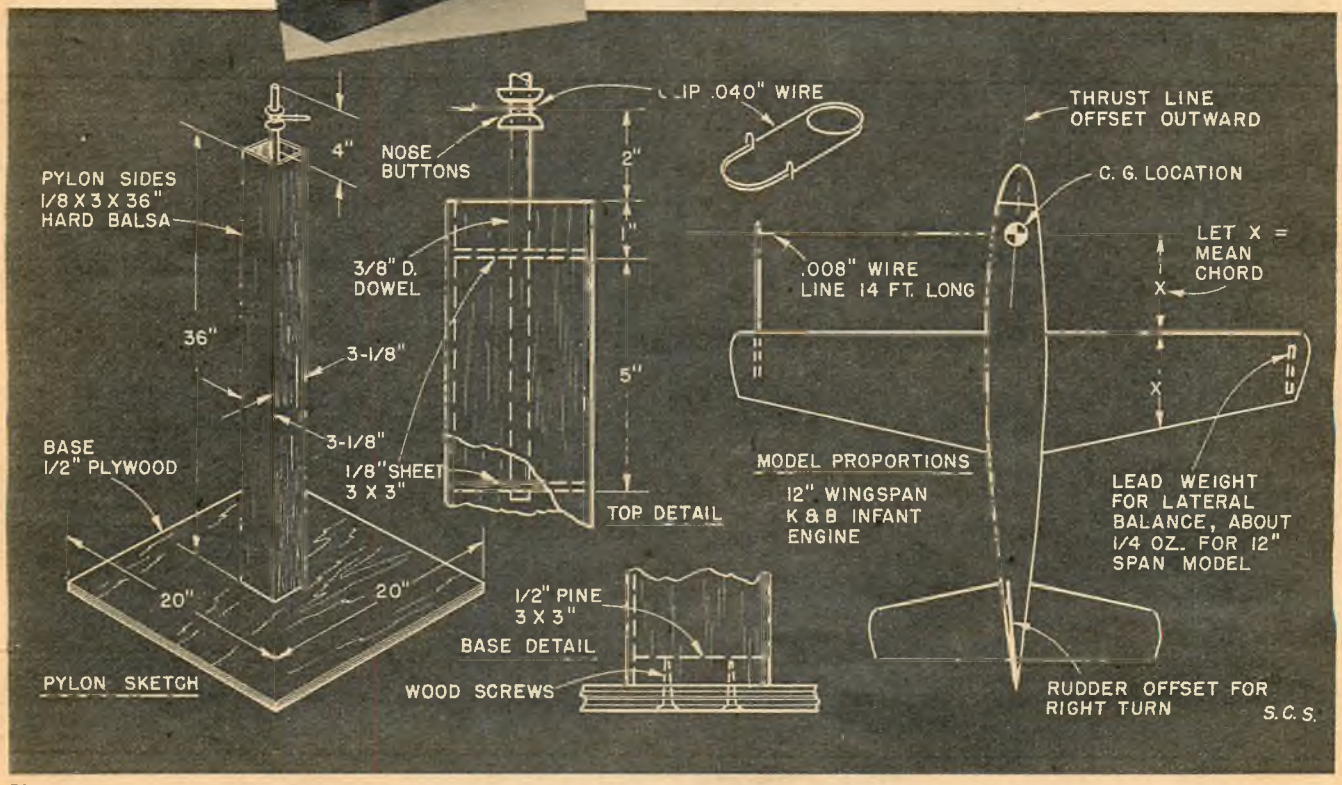
Try racing your miniature Goodyear ships in exciting club competitions

TRUE back yard flying is now possible since the appearance of such small glow plug engines as the K&B Infant and the Herkimer Cub. Flights by a 12-inch model powered by one of these engines are limited only by the size of your yard, or the local school gym.

Indoor pylon flying has long been a part of modeling activity in England. Their R.T.P. (round-the-pylon) events are just as much a part of their indoor competitions as our hand-launched gliders. While single-line flying is not new in this country, too many unsuccessful experiments with this system have discouraged most modelers.

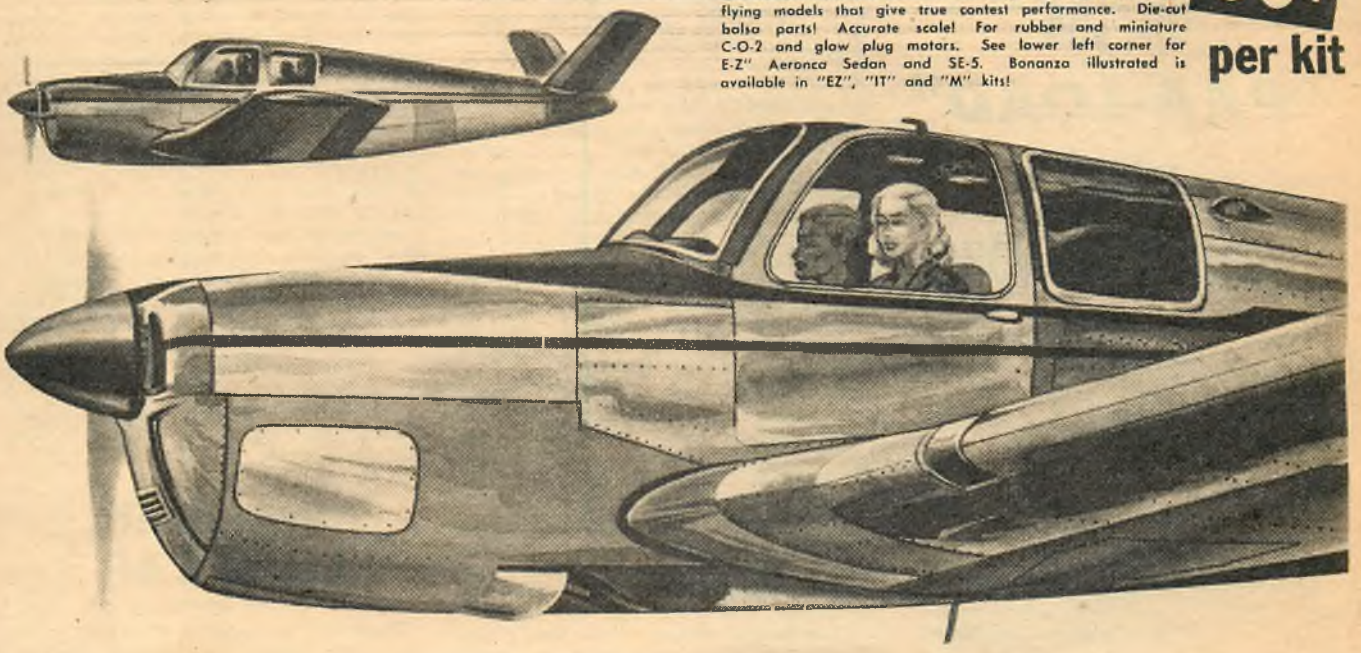
To be sure that the model will take off, fly around and glide to a safe landing, it is important to have the line attached to the model as far ahead as possible. While the line has to be ahead of the center of lift, the center of gravity must also be well forward, so that the wing and stabilizer act as a weather vane. The thrust of the propeller will pull the model straight and as speed builds up, the model will level out and fly at the height that the line is attached to the pylon. The length of the line depends (*Continued on page* 60)

● The real secret to successful R.T.P (round-the-pylon) flying is in the balance of the model and line attachment as shown here. Read how you and your modeler friends can race many planes using only one engine.

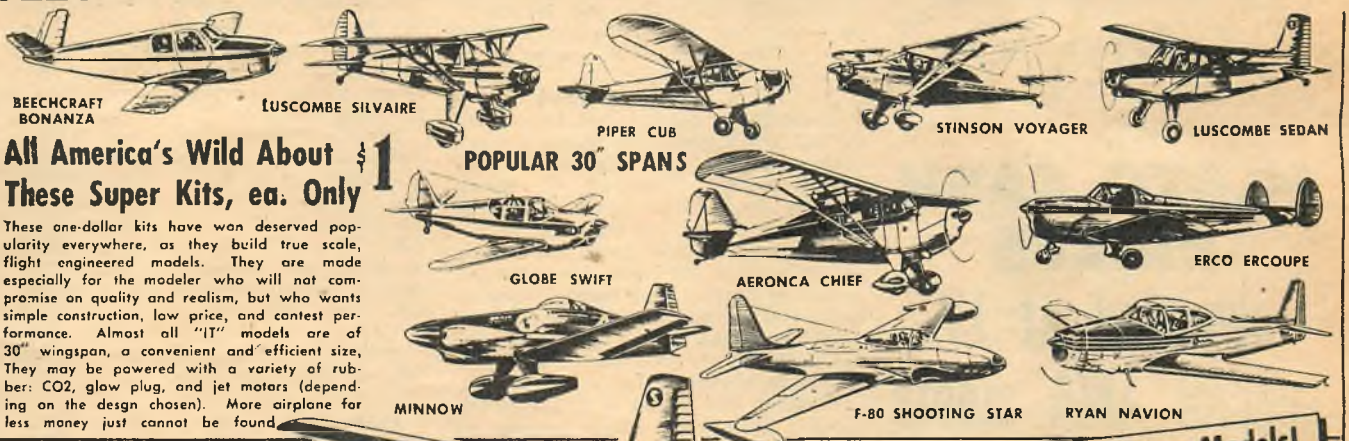


Nothing Like Them In All Model Aircraft History . . . and each only 50¢ per kit

Cleveland's new E-Z kits are the only scale "pre-fab" type flying models that give true contest performance. Die-cut balsa parts! Accurate scale! For rubber and miniature C-O-2 and glow plug motors. See lower left corner for E-Z" Aeronca Sedan and SE-5. Bonanza illustrated is available in "EZ", "IT" and "M" kits!



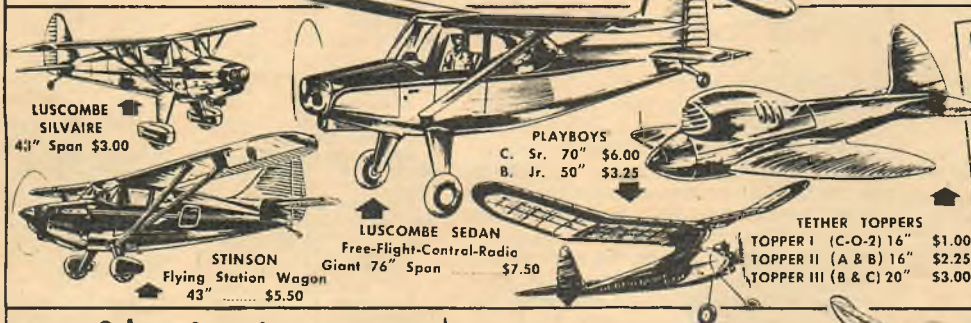
CLEVELAND LEADS THE WORLD IN MODEL DESIGN & VALUES!



All America's Wild About These Super Kits, ea. Only $1

These one-dollar kits have won deserved popularity everywhere, as they build true scale, flight engineered models. They are made especially for the modeler who will not compromise on quality and realism, but who wants simple construction, low price, and contest performance. Almost all "IT" models are of 30" wingspan, a convenient and efficient size, They may be powered with a variety of rubber: CO2, glow plug, and jet motors (depending on the desgn chosen). More airplane for less money just cannot be found.

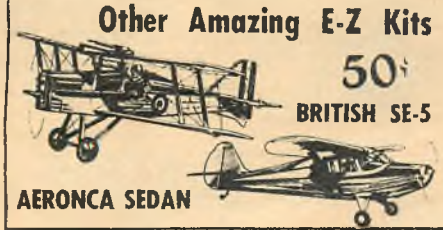
POPULAR 30" SPANS



Boy! What Gas Models!

Quick pictures of famous C-D gas models: Playboys—Efficient proven pylon design, plus easy building and ruggedness.
Toppers—Speed and sport control kits with classy lines, fine streamlining.
Stinson Flying Station Wagon—A 43" span scale free flight or control model of a famous four place personal and executive airplane.
Luscombe Sedan—Huge 76" span, is a very simply built model. A triple threat—for control line, free flight, and radio control.
Luscombe Silvaire — Scale, 43" span gassie F-F or C-L, with sleek lines.

Other Amazing E-Z Kits 50¢



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Build these for your miniature glow plug motor now!

HOW TO ORDER: SEE YOUR LOCAL HOBBY DEALER FIRST. HE HAS THESE MODELS AND OTHER CLEVELAND DESIGNS AS WELL. If you are then unable to get C-D's, do not accept substitutes or imitations, but order direct, including 25c for packing-postage. Minimum order $1.00. No C.O.D.'s. Special Delivery in U.S.A. is 25c extra. (Ohio residents: add 3% sales tax). Military men stationed outside continental U.S., Possessions, Canadian and all foreign customers, add 20% for special handling, etc. in addition to 25c packing-postage charge.

SEND 5c or (2) 3c STAMPS FOR VERY LATEST ILLUSTRATED CATALOG

CLEVELAND MODEL & SUPPLY CO. 4515H2 Lorain Ave., Cleveland 2, Ohio. World's Finest Models, Since 1919

Pylon Flying

(*Continued from page 58*)

upon the height of the pylon. Generally, the longer the lines, the higher the pylon should be.

The proper C. G. and line location on the model should be at least a chord length ahead of the leading edge of the wing. A line guide should be placed on the wing tip. This can be a length of dowel with a hole drilled in the tip for the line, so that the line passes out from the model at right angles to the fore-and-aft axis. Check the diagram for proper C.G. and line location. The rudder should be offset to turn the nose of the model outward from the flight circle. This will keep the line tight in all phases of the flight. It is also wise to weight the outboard wing with a bit of lead, so that the model will balance laterally and fly level. If these simple rules of C.G. and line location are followed, your model will fly right the first time and will turn in plenty of repeat performances.

Skeptics who wish to prove this to themselves can take an old crate, lock the elevator in neutral, re-balance the model, attach line and wing guide as described, and try it out. If you care to admire the scenery while flying, the model will keep right on flying as if you were paying full attention to it. We have flown in windy weather outdoors using this system and the model performed for all the world as if it were in the hands of an expert yo-yo artist.

The pylon can be finished off as elaborately as desired, but time spent at this won't make the model fly any better. If you want realism for your own miniature Cleveland Air Races, you can decorate the pylon with large checker board squares and flags.

The pylon is built from four sheets of ⅛" x 3" x 36" balsa cemented together as shown. The bottom block of hardwood is cemented in place to receive the wood screws that hold the pylon to the plywood base. The base should be heavy so that it will not tip over when the model is flying at top speed. Otherwise, some method of anchoring the base to the floor may have to be used.

The top of the pylon is strengthened by two ⅛" sheet balsa bulkheads. These are drilled to take a 10" length of ¼" or ⅜" diameter dowel. A nose button from a rubber kit is drilled out and cemented securely on the portion of the dowel projecting above the pylon as shown on the plan. Bend the flying hook to the shape shown and slide over the dowel. Check the hook to see that it revolves freely, otherwise your engine will waste power dragging the hook around the dowel. With the hook in place, a washer should be cemented onto the dowel above it to keep the hook in place. This completes the pylon construction. Paint and trim to your personal liking.

Set up the flying line with the model balanced as shown on the plan. This is the important part of pylon flying and cannot be repeated often enough. If you don't do it, you are in for one spectacular flight! We flew our first model with the line in the wrong place —with a fifteen-foot pylon and twelve-foot line we thought we were safe. A series of vertical loops soon ended in a bad case of model-meets-pylon!

So with everything in its proper place, fire up and tune her in for peak rpm. And stand back, because the race is on. Whether you are in your own backyard or out at the local flying spot, you will find pylon flying a rare treat. This is one way that speed racing will put a premium on airplane design rather than on souped-up engines.

An additional and interesting fillip to pylon flying is for all the members of your club to build different models, but fly with the same power pod: engine, prop and streamlined cowling. This is done by making a cowling-block in which the motor is mounted. Each club member builds his own ship and flats off the front of the fuselage to take the power pod. The pod can be attached by hooks and rubber bands or oversize (dress type) snaps.

Then everybody is on a really equal footing and there is no doubt that the best ship wins!

President Lauds CAP

(*Continued from page 29*)

Those attending the conference heard how their efforts have brought formal recognition to the need for aviation in schools alongside history and mathematics; how the American Association of School Administrators has established a Council for Aviation, largely as a result of CAP, to advise schools wishing to incorporate aviation in teaching schedules.

The CAP officials also heard that the Cadet program's objective has been and is "to blend theoretical instruction with the practical, with, of course, fun and excitement on the side." National CAP officials related that enrollment in CAP so far in 1949 had already equalled the total of new members in 1948, presaging CAP's greatest year since its inception in 1941.

Following is the official and complete list of Wing attendance at the CAP Presidential Dinner:

Alabama: Lt. Col. Wm. S. Donovan; Maj. Charles A. Ridings; Cadet Billy Evans.
Arizona: Capt. Jack L. Tueller; Lt. Col. Bob Goldwater; Lt. Col. Irvine B. Watts; Cadet Capt. Jimmy Crispelle; 2nd Lt. Charles G. Shewberth; Col. J. M. Morris; Capt. Timothy J. Flanagan.
Arkansas: Col. Rex P. Hayes; Capt. Phillip G. Back; Capt. Hiram I. Anderson; Cadet (1st Sgt.) Evans.
California: Col. Howard B. Freeman; Cadet Major John Paul Youts; Major Oscar Treland.
Colorado: Major William C. Sullivan; Capt. James O. Lindberg; Lt. Col. Delmas H. Corey; Cadet Eli Schackett.
Connecticut: Col. Nancy H. Tier; Capt. R. Blake Russell; Maj. Claude H. Cummings; Cadet Ronald W. Lambert.
Delaware: Col. Walter A. Caskie; Lt. Col. Lawrence A. Gerlach; Capt. Walter B. Mullikin; Cadet Edwin A. Bollinger.
Florida: Col. Eric Ravndal; Lt. Col. Joseph Moody; Capt. John Ulfers; Cadet Carl L. Browning, Jr.
Georgia: Col. Jesse L. Dobbins; Lt. Col. Thomas H. Daniel; Capt. Hazil L. Holley; Cadet Don F. Sewell.
Idaho: Col. Leverett Davis; Maj. David J. Noace; Capt. K. Wayne Claybaugh; Capt. Merritt Shotwell Cadet Lewis F. Abrams.
Illinois: Lt. Col. Charles Richardson, Jr.; Major Lloyd C. Reckner; Capt. Harold C. Dailey.
Indiana: Lt. Col. Walter B. Smith; Capt. Merle L. Denney; Capt. Ralph N. Smith; Cadet Larry F. Dillman.

Top Performance!

"OK" CUB

ONLY

$5.95

INCLUDING GLOW PLUG

Develops up to 15,000 RPM!

HOBBYISTS—here's the small displacement glow plug engine you've been waiting for! It's easy on your pocket—a cinch to install—a snap to start.

This new "O.K." CUB is a "natural" for free-flight and control-line flying. Its small frontal area offers low wind resistance. No limitations in installation, either—you can use radial or lug mounting.

SPECIFICATIONS	
Displacement	.049
Bore	.390
Stroke	.415
Weight	1½ oz.
RPM	Up to 15,000 using a 5½" low pitch prop.

Higher power on a weight-ratio basis results from the unique and patented port design which provides radial fuel injection, higher turbulence and more effective scavenging.

Like all "O.K." engines, the new CUB gives you all the qualities of a full-scale engine: easy starting, reliability, wearability, long range and economical speed. All built in by "O.K.'s" skilled engineers.

Look over the "O.K." CUB at your dealer's. Examine its sturdy construction . . . heft it . . . you'll agree it's a honey!

OK

The *Only* Complete MINIATURE ENGINE LINE

An Engine for Every Class
A Model for Every Purse

NEW!

The Improved 1950 Models are Here! Now at your dealer's—the new advanced Hot Head, Super 29 and Super 60. Redesigned with ebonized cylinders and gold anodized cylinder heads. Smoother performance! Higher output!

Class A "O.K." BANTAM

—an improved 1950 model of the record smashing engine, designed by Ben Shereshaw, noted model engine designer. Wt. 3¼ oz. RPM 2,500 to 11,600. Complete with spark plug and tank for only **$11.95**

Class A "O.K." BANTAM

—GLOW PLUG MODEL. Features all the championship performance and construction details that won world-wide fame for its brother spark plug model. Complete with plug, less tank.....**$9.95**

Class B "O.K." SUPER 29

—with high-compression head, rotary valve and ram induction. Complete with spark plug and tank, an outstanding bargain at only.....**$11.95**

Class B "O.K." HOT HEAD

—extra rugged for the extra stresses of pre-ignition firing. Will exceed spark ignition speed when "O.K." Hot Head Fuel is used. Wt. 7 oz. Complete with plug less tank, only **$9.95**

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—aluminum crankcase for lightness. Large size ball-bearing and new domed cylinder head for smooth performance. With 3-position timer located at rear for easy access. Complete with spark plug and tank.....**$11.95**

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—GLOW PLUG MODEL. With steel cylinder, hardened crankshaft and hardened and lapped piston for long wear. Complete with plug, less tank. You can't beat this value at only...**$9.95**

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—an experimental engine for large models and radio-controlled ships. Wt. with tank 23 ozs. RPM 1,000-6,000. Complete, less coil..... **$49.00**

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—fat spark, low battery drain. Models for A to D Class engines. Complete with lead..... **$1.75**

In coil pack with lead and matched condenser..... **$1.95**

Twin Coil with leads and matched condenser.....**$5.00**

"O.K." CO 2

—the basic trainer in the compressed gas class. No gasoline, battery, timer, coil or spark needed. Wt. bare ¾ oz. RPM 3,000-7,000. Complete, ready to run.....**$4.95**

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EXPORT: 120 Wall St., New York 5, N.Y. (All cables: Concordia, N.Y.)

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Kentucky: Lt. Col. Harry T. Moss; Capt. R. B. Swift, Jr.; Cadet (M/Sgt) Johnny Price.

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Mississippi: Lt. Col. Frank E. Hope; Major Malcolm A. McNall Jr.; Cadet Ray O'Neal.

Missouri: Col. Frank F. Tracy; Lt. Col. Kirk McFarland; Lt. Col. H. C. Oltman; Major John J. Watkins; Cadet Lester A. Heman.

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FOR BALSA OR HARDWOOD ... FOR METAL TO WOOD... METAL TO METAL... FAST DRYING

PLANKING AND SHEET COVERING CEMENT

MEDIUM FAST DRYING TO PERMIT EFFECTIVE CEMENTING OF EXTRA LONG SHEETS AND STRIPS

TESTOR CHEMICAL COMPANY
ROCKFORD, ILLINOIS

Thermal Sniffer

(*Continued from page 45*)

other than where it would have without radio guidance."

At the present time there are R.C. units on the market that are a marvel for lightness, strength and reliability. I have used both the Aerotrol and the Good Brothers' unit in the R.C. glider and found them to work satisfactorily.

The Good Brothers' unit consists of a one-tube super regenerative circuit and operates in the 6-meter band. A type 3A5 tube is used. This is one of the new lightweight high-frequency miniatures. The receiver is fixed tuned but may be retuned if necessary. The relay used in the receiver is a sensitive polarized type developed especially for R.C. work. The relay is fast acting and is unaffected by vibration. Silver contacts are employed to handle the current necessary for control surface motion. The escapement mechanism supplies the motive power to operate and control the position of the rudder. Impulses from the sensitive relay closes an electro-magnet and allows a ratchet assembly to rotate. Five positions may be selected in a sequence operation.

Here are the specifications of the Good Brothers' receiver: Frequency range: 50-54 megacycles. Weight: 4½ ounces. Size: 4" x 1-7/16" x 2¾" height over-all. Tube: 3A5. Batteries: 45 volts for plate supply, 1.5 volts for filaments. Relay sensitivity: 200 micro-amperes. Escapement: ¾ ounces, 2¼" x 1⅛" x 1" over-all height, 3-volt batteries required. Transmitter: 4-watt power input, 5" x 6" x 9" height, 2-mile range.

The Aerotrol unit may be used in the glider also. The Aerotrol receiver employs an RK-61 gas-filled triode in a super-regenerative fixed tuned circuit. A small sensitive magnetic relay which operates on .3-milliamps plate current change is permanently adjusted for best operation. The set also operates in the 6-meter band. The Aerotrol escapement is a self-neutralizing actuator. This means that it will always return to neutral.

Specifications of the Aerotrol receiver: Size: 1-7/14" x 1¾" x 2-3/8". Weight: 1.9 ounces. Tube: RK-61 (new version). Power required: 1½ volts and 45 volts. Flying weight with batteries and two Eveready 412E's: 5 ounces. Escapement: 4 ounces, ¾" x ⅞" x 1¾" in size, 2 to 4.5 volts power. Transmitter: 5 ounces, 1½" x 2" x 4¼" in size, 50-54 megacycles frequency, 2.3-mile range, 1½ volts and 135 volts power required, folded dipole antenna.

This model was designed with the purpose of eliminating all the unnecessary frills, expense, and hocus pocus usually connected with radio-controlled craft. Henry Ford said, "You never have trouble with the parts you leave off." The same holds true to a great extent with a radio-controlled model. This glider was designed to be rugged and efficient so as to be able to compete against other contest gliders in towline.

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to build, towline glider. There is no greater test of skill for the expert than slope-soaring or spot-landing this craft. Five-position rudder control is used, because after much experience it was found to give the most practical method of all-around control with a minimum of equipment.

When properly trimmed, the stability of the ship is surprising. The model will not drop its nose into a spiral dive until at least one complete circle in either direction is finished. The model is unique in the fact that two distinct types of flying may be selected. By moving the wing back from the center of gravity about 1 or 2 inches the model becomes very fast and snappy, and many maneuvers may be performed at fairly high speeds. By moving the wing forward from the center of gravity, the craft soars slowly and easily, a performance which is suitable for duration contest work.

Radio-equipped models are acceptable by the Academy for duration competition with non-radio-controlled craft in any of their sanctioned contests. This is not generally known. The advantages of radio-controlled craft in competition with conventional craft becomes obvious with experience.

The body of the glider is extremely simple to construct, being of the strong box type. The conventional method of building the two sides first, one on top of the other is used. After completing the two sides, place them upside down on a drawing board and glue in all the cross-pieces of equal length.

Next bring the tail end together and finish up the remaining cross-pieces. The nose block is then added and the remaining cross-pieces are glued in place. Be sure to allow a space on the front top for the removable radio hatch. The wing dihedral joint fits into the "V" trough on top of the fuselage.

Sand the body thoroughly, making sure there are no bits of glue or wood protruding. The body is now ready for sheeting. The whole body except for the radio opening in the top front is covered with a soft grade of 1/16" balsa wood with grain running from nose to tail. Apply plenty of glue and work fast. Hold sheeting in place with pins about every half inch.

The opening for the elevator can be cut out next. Use an elevator rib for a template. Make it a loose fit to allow the tail dihedral to slide through.

After planking, the body is sanded again, then covered with Japanese tissue. Apply to the body three coats of clear dope and two of red. After the removable radio hatch is cut to shape it is steamed to fit the contour of the body. Because there is no motor vibration, the mounting of the radio does not constitute a problem. Just be sure all batteries are forward of the radio receiver. Otherwise the batteries will beat the radio to pieces in a hard landing.

The two tow hooks may be mounted in place now. Use plenty of glue and crinoline. Spread the strain of the towline hooks over as great an area as possible. The pull on these may exceed twenty-five pounds on a windy day. The belly skid made from hardwood may be added to the bottom of the fuselage. This prevents small rocks from crushing the body on a hard landing.

The elevator is of very simple construction. Begin by cutting out all the necessary ribs. The two tip ribs are

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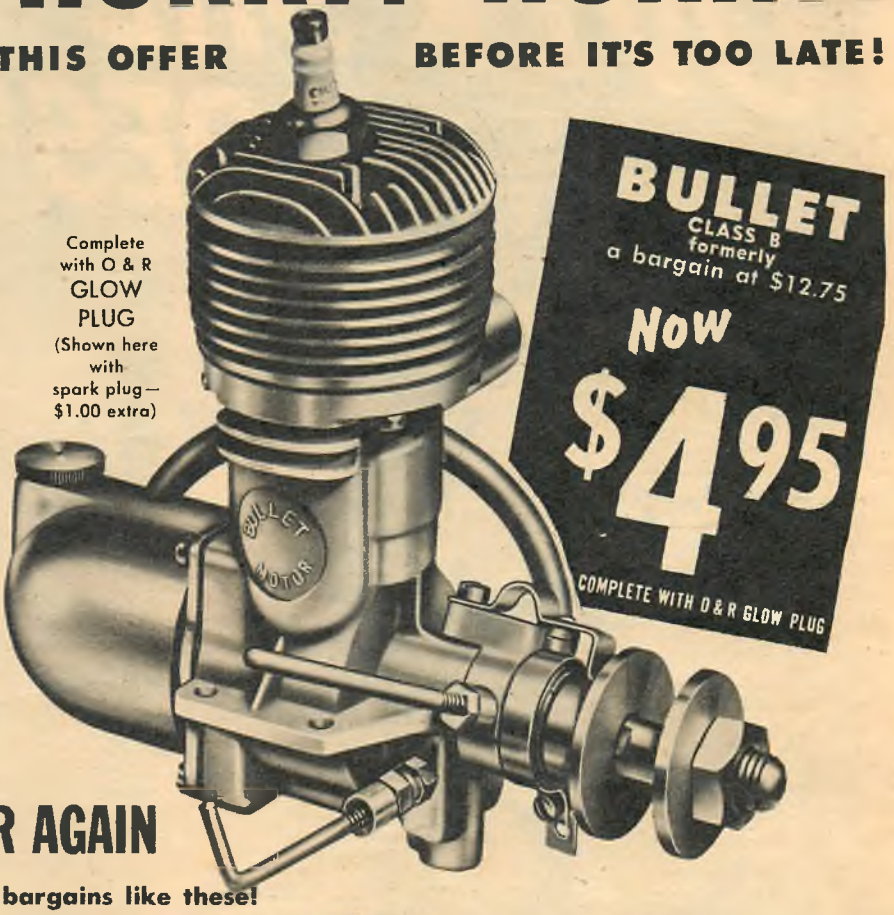

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the same except that the trailing edge ends are cut to fit and sanded to shape when the tail is completed. Start the tail by gluing all the ribs except the two tip ribs in between the leading and trailing edges. Then add the tips. Trim the tip ribs to fit. Crack the leading and trailing edges at the dihedral joints and glue to the proper angle. Finally add the spars and brace all joints well with gussets. Cover with Jap tissue or light gas model bamboo. Apply three coats of clear dope.

The rudder and tab are built separately. First glue the rudder tip to the leading edge. Pin this to the drawing and then add the two main spars. Next add the ribs and bracing. After the assembly is dried, sand to shape with a large sandpaper block. The rudder flap is built by first placing the front spar and the curved trailing edge on the drawing and then placing 1/16" x ¼" balsa rectangles between them. After drying, sand to a streamline shape. Upon gluing the paper tube in the rudder tip for the escapement rubber motive power, you are ready to add the common pin pivots for the flap. The pins pivot in small washers glued onto the rudder. Glue the music wire rudder flap arm to the flap, seeing that the unit works freely. After gluing in the escapement between the rudder ribs, you are ready for covering. Use light bamboo paper and three coats of dope. Then the rudder may be glued to the body. Take precautions to see that the rudder is perpendicular to the body.

After cutting out all wing ribs, place them between the leading and trailing edges and glue well. Construct the center sections first. Remove the center section from the plans and cut the leading and trailing edges to the proper angle for the dihedral. Then place all the spars into the rib slots that receive them. The outboard sections are completed without spars and are added to the wing center section. The smaller tip ribs are sanded down to shape from the standard size rib. After gluing in the proper dihedral angle on the tips, the spars may be added to complete the wing. Sand the wing well and cover with light gas model bamboo paper. Water-spray the wing to remove all wrinkles in the paper covering and then apply four coats of clear dope.

There are no tricks involved in flying this glider. Slide the elevator through the slot provided for it and tie down with rubber bands. Next tie on the wing with about six loops of ⅛" flat. Balance the model at about 50% from the leading edge.

The ship should be flown before installing the radio. Substitute a weight for the radio when test hopping. Test the ship well before flying under radio control. After about ten good flights, the ship will be ready for the radio installation. The glider is adjusted to fly in a straight line so that it may be turned to right or left easily. The glide should be flat and with no stalling tendency. A stall will prove to be disastrous if the ship gets out of control.

The towline may be any length up to 1,000 feet, but the best length seems to be about 300 feet. A final word of caution: don't try any maneuvering with the ship on the line when towing.

Mabel's Able

(*Continued from page 39*)

'em with everything you've got! That is exactly what the Martin AM-1 was designed to do. This heavy slugger, which acts as a torpedo-plane, bomber and mine layer, started its career by taking off with a destructive payload of 9,000 lbs. Several months later it broke its own record by lifting 10,689 lbs. of torpedoes, bombs, cannon and ammunition. The total gross weight of Able Mabel (as the AM-1 has been dubbed by the men of the fleet) was 29,332 lbs., or 4,000 lbs. more than the gross weight of the Douglas DC-3 airliner. This was the heaviest load ever carried by a single-engine plane.

Baby Boomer

(*Continued from page 50*)

short length of aluminum tube or dowel is cemented to the stiffener at one end of the tube and another passes through the tube three inches from the end. A 1/16" sheet balsa cap finishes off this end of the boom. A solid balsa plug is fitted to the other end of the boom as shown on the plan.

The pod is carved from the softest balsa you can find. Lightly cement the two blocks together and carve the outside shape. Next split the blocks apart and hollow out the insides as shown. Cut a groove in each half where the boom enters the pod, using the cut-and-try method until the boom fits perfectly and is centered in the pod. Use plenty of cement when putting the pod and boom together. Check to make sure that they line up on the top and side view.

The rudder, stabilizer and sub rudders are cut from a sheet of 1/16" quarter-grained balsa. The two stabilizer ribs are cemented to the under-surface of the stabilizer one inch apart and then covered with 1/32" sheet. The rudder and sub rudders are next cemented in place as shown.

To build the wing, select two 2" sheets of 1/32" quarter-grained balsa and cement them together to form a 4" sheet. Now cut the sheet to the outline shape of half the wing and cut out the center of the panel as shown. Using this half as a template, cut out the other half of the wing. Cement the ribs in place using pins to keep the sheet from springing away from the ribs. Add the ⅛" square spar and the 1/32" strip leading edge. Complete the other half of the wing in the same manner and cement the halves together at the proper dihedral angle.

Sheet between the first two ribs in each panel where the wing rests on the pod. Cut through the tips and then re-cement at their proper dihedral angle. Cap strip the ribs with 1/32" x ⅛" balsa on the upper surface only and then cover the entire wing with rubber model Silkspan or light tissue. Add two drops of castor oil to an ounce of clear dope and apply two coats to the wing. The addition of the castor oil will prevent the wing from warping and will keep the tissue more flexible. Check to see that the wing rests on the pod without wobbling. If it does wobble, add pieces of soft balsa to the edge of the pod until the wing seats correctly. Rubber-band the wing into the pod and, using the wing as a guide, cement the stabilizer platform to the

boom. Check to make certain that it is horizontal.

The firewall is cut from 1/16" plywood. Before mounting the engine, bend two small hooks from 1/32" music wire and slip these on to the bolts before they pass through the engine. Now mount the engine to the plywood with two 3-48 bolts, leaving about one half inch protruding through the rear of the plywood to act as keys. Two bushings are cemented into the pod as shown on the plan to receive these two bolts.

The landing gear is bent from 1/32" music wire and is attached to the engine only, by using the tank nut. The other end of the gear is simply wedged between the pod and the plywood firewall when the engine unit is rubber-banded to the pod. This mounting arrangement proved itself foolproof on hard landings, as it allowed the gear to give without damaging anything.

Cover the tail surfaces, pod, and boom with lightweight Silkspan or colored tissue, apply two coats of dope, then give the pod and boom one coat of hot fuel proofer.

After trying several different props, the one that worked out the best was carved from a piece of mahogany 3/16" x 5/8" x 5¼" much in the manner suggested by the engine manufacturer except that the block is not tapered at the tips as seen on the side view. The original model flies to the right under power and to the left in the glide. For your model to fly the same way, no other adjustments except a little left rudder will be necessary—if you have built a model free from warps.

Solo Club

(*Continued from page* 32)

If we didn't have knowledge of members experimenting just as Charon describes—like the chap who almost took off the wings falling out of inverted flight without an instructor, we probably would not pay too much attention to this gripe. Actually, Charon highlights so many points that we hardly know where to begin.

Many older pilots remember how they learned their stunting. They went up in their Wacos and Eaglerocks, and all the rest of the stick-and-wire crates, and experimented. Earlier pilots figured out a way of recovering from the deadly "tail spin." Today there is so little legitimate excuse for stunting that numerous ships are not even being licensed for spins. And if a man wants to stunt he is a fool if he doesn't pay some instructor to show him the tricks. But the ugly truth is that stunting contributes very heavily to the death list.

Every character who buzzes the girl friend's house or flies low and slow in a dangerous manner, is stunting. That these people continue to stunt, or buzz, or fly low, is in part due to a glaring lack of knowledge of the theory of flight. And whatever theory of flight may be picked up falls short of protecting the pilot's life. Secondary stalls, stalls out of turns, high-speed stalls, spins out the bottom, aileron spins, and all the rest of the vague killers definitely are not understood or even known to exist by a number of new pilots.

M. Schassberger, Toledo, Ohio, comes through with information on clubs as requested in previous meetings. Just

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recently a private, and new SC'er, Schassberger describes a club setup operating at the Franklin Airport, Toledo. John Aiken has a club that could easily be imitated by small operators. A Piper dealer, Aiken uses Cubs and reserves a Vagabond for club use. New members pay an initiation fee of $15, and fly at the rate of $4 an hour. Monthly dues are $3. When the Vagabond is going full blast, Aiken fills the breach with J-3's.

Thanks, member Schassberger, for the info. Headquarters has written the Franklin Airport for further facts. Other club leads now under investigation include two in the Pacific Northwest and one in Arizona. Details will go on the teletype as fast as they come into Headquarters.

Why does Headquarters ask contributing members to state their Solo Club membership number? Listen here. "Seeing some of the membership numbers printed in the column, I looked at my card," says P. O Armstrong, High Point, North Carolina, "and was surprised to see that it was number 250. I thought I had better get busy and write. I still have the little silver wings and wear them along with my discharge 'duck.'

"Here is something which I have been thinking of in connection with making available for the little guy who just wants to fly, some of the small, low-powered ships popular in 1940, '41, and for a few years before," goes on Armstrong. "I am speaking of the C-2, C-3. the J-2, the Curtiss-Wright Playboy and a few single seaters that I cannot now recall. Also there were larger ships such as Rearwin 90's, Curtiss Robins, some Waco biplanes, and Travelaires. If old automobiles are advertised, why not old planes? Many of these old reliables are sitting idle throughout the country and many of them are in good condition.

"I am a photographer," continues Armstrong, "and can take just as good a picture from behind a 37- or 45-hp motor as I can from behind a 165 of a Stinson Station Wagon. I can see as much, shoot as many spot landings, and so on, with a 40-hp job as I can with a higher horsepower airplane."

Armstrong thinks the SC could list such airplanes to encourage sales. Values run from $75 to, maybe, $300, in his opinion. While Headquarters is unable to spread its fire this thin, various used-plane papers do exist. Whether or not these older ships are mentioned, we cannot say offhand. However, what Armstrong says about them lurking in the backs of large city hangars, and around out-of-the-way airports throughout the land is quite true. Take time on your next cross-country to prowl around strange airports. You'll run across many a ship unknown to the present generation. Thanks, P. O Armstrong, for an interesting idea.

Now the chair acknowledges Herbert C. Naylor, 331st Air Repair Squadron, Elmendorf Field, Alaska.

"Flying up here, as I have already found, is very much different from 'state-side' flying," begins Naylor. "Air currents act differently and, oftentimes, fool the green flyer. The mountain currents here are unlike mountain currents in the States. At present, most of the private planes are on skis but when this is printed, warm weather will have

arrived and we'll be back on wheels.

"One thing I like about the Solo Club is the fact that, being a widely known association, it offers the average pilot the chance to have his personal opinion brought into the open. I'll be glad to report incidents of flying that sometimes arise here in the Arctic and will drum up a few new members who, in the interest of flying, would readily join."

Deputy Chief of Staff, Lieut. General I. H. Edwards, USAF, supplies this latest information on the Aviation Cadet program. Starting in April, new classes were to begin every six weeks, or eight times a year. In the first class alone there were 600 cadets. Applicants should be between 20 and 26½ years of age, have two years of college or pass an equivalent exam, and may be married or single. Application blanks may be obtained at local U. S. Army or U. S. Air Force Recruiting stations, or any Air Force Base. Final exams are given at some 60 bases by an examining board. If accepted you get $35,000 worth of instruction, covering a year of flight, academic, and military training. You get paid $75 a month, with free meals, uniforms, equipment, quarters. Training is given on the T-6 (wartime AT-6), the new T-28, the F-51 and F-80. Twin-engine training includes the T-28 and the B-25. Graduates receive commissions as second lieutenants in the Air Force Reserve, outstanding grads a regular commission. All grads have a chance to compete for regular commissions tendered each year. Total monthly pay for graduates is $336 single, $372 if married.

Now in bringing to a close this interesting meeting, Headquarters wants to remind the membership that your membership number is requested with correspondence, that pilots with unusual experience and background tell us about themselves when they apply for membership, that everybody is invited to send in snapshots of themselves and ships. All gripes are cheerfully accepted. C. A. V. U.!

Dope Can

(*Continued from page 47*)

members #1 and #2, respectively. Obviously, the membership will be a certain select few, and since it's an honorary organization entirely, there should be no dues. Suggested insignia: a winged hourglass with half the sand run out and a big, fat "30." All clubs need sponsors—so how about it, Air Trails (look, we're pointing our finger!)—how about giving these and future super-experts the recognition they deserve?

(Okay, call off the dogs, Luce. Air Trails will be very happy to recognize thirty-minute totals with a special certificate which will go out to anyone setting a new national record that is certified by the A.M.A.—a record that consists of three flights each of ten minutes or more duration.—EDITOR.)

Eastern Indoor Model Builders will be interested to know that five indoor A.M.A.-sanctioned record trials are planned during one Sunday in June, July, August, September at Lakehurst Naval Air Station, Lakehurst, N. J. Contact Jessie Bieberman, 21 Dartmouth Road, Cynwood, Pa., for information and dates.

Flyingest Model in his 16 years of building, writes Charles R. Wood of AT's "Nimbus I." His letter gives us a complete description of a beautiful 53-minute flight made, of all times and places, in February near Seattle, Wash. Only modification, and one which he strongly recommends, is the addition of 25% more rudder area on top, making it higher and slimmer. Well, what are you waiting for—build it!

In There Swinging is Jerry Brofman who takes advantage of our offer to defend his

"Cosmic Rave" design against the comments of Don James. Readers will remember that Don's letter, which started the whole thing, was mentioned in a recent issue. Jerry agrees with Don that lowering the C.G. would increase the ship's stability, but adds that doing so would decrease maneuverability, thus adversely affecting pull-out and tight glide circle. His letter closes with a question as to whether or not Don has built and flown the "Rave"; to which we can say with certainty that he hasn't. Jerry has been building models for quite a while, and ought to know by this time that Don will build and fly a low C.L.A. job when Jerry shows up at the field with a high pylon pencil bomber. Ain't it wunnerful, fellas, that in spite of what the most rabid supporters say on either side of the question, all of 'em fly?

Crepe Hangers: That's what the "Cowtown Sahibs" of Fort Worth, Texas, are! It seems, though, that the crepe is paper, a strip 10 feet long hung on the tail of a control-line job. Two flyers occupy a circle at a time, the idea being to prop-chop the other guy's streamer to shreds. Originally flown with beat-up heaps, the event has caught on—with flyers and spectators alike—to the point where special ships are designed for the event. Although some models have been flown at 110 mph, best maneuvering speed seems to be about 90. Space limitations forbid giving the rules here, so interested parties should write Herbert A. Swafford, 145 Coventry Pl., Ft. Worth, Texas, for 'em.

Sad News from June Dyer, who says she won't be able to make it to Olathe, in spite of the fact that she's got a shiny new '49 job in place of the old Hudson. June sent along the latest issue of the "Aeroneer," in which she did her usual bang-up job of dishing out the West Coast news. In it are reported the "San Francisco Vultures" 7th Annual Indoor Contest, the Bakersfield Control-Line Meet and the Bakersfield 11th Annual Free-Flight Contest. In looking over the winners of the first mentioned, we see that *Ronald* Atwood got himself a nifty 8:14.4 in Junior H.L. Stick . . . Hmmmmm! If he gives lessons we hereby apply. Ced Galloway had things his own way, as usual, in Flying Scale at the Bakersfield Control-Line Meet and the free-fighters at Bakersfield really showed 'em how, what with Denny Davis' tee-riffic 30 minutes, about which you've already read, Fred Morgan's 24:51.2 in Jr. Class B and Fred Ginder's 22:12.0 for a new national Senior "D" mark. We also see a report of the "Los Angeles Aero Modellers" Rubber Contest, where Dick Schumacher ("The Hat, the Shirt and the Squat") won the Wakefield Type Event with a creditable 13:31.4.

Yay, Team! Foregoing outburst is for the Wolfpack of North Carolina State of course, since Richard Morenus writes us from there, but is particularly meant for Team Racing contests, the first of which in N.C. he reports. In spite of high winds, the contest was a definite success and wasn't over before plans were being made for the next one. Finals winner was D. C. May of New Bern, with Tommy Baker second and Morenus third. In support of the foregoing, the latest issue of "Slip Stream" shows the "Prop Twisters" in Greensboro are all hopped up about the event, too.

Familiar Names appear in the sheaf of news clippings sent by the Kiwanis Aero Club of Doylestown, Pa. Bill Lehman, Leroy Fox, Frank Stanton and Clarence Wells are only a few of them. Vast amount of interest in modeling is proven by the fact that an account of a movie show at a Bristol "Aeromodelers" meeting hit the front page of the "Intelligencer."

Exchange Does It Again: This time in Bangor, Maine, sponsoring the "Hedgehoppers." "Thanks a trillion," says "Torque," club publication. This is another opportunity for us to thank Exchange for the wonderful help it is giving to the activity and to remind those clubs who are looking for sponsorship that they need look no further than their local Exchange Club.

Betcha that the two dozen clubs listed as members of the Indiana Association of Model Airplane Clubs in the second issue of the IAMAC Bulletin are now more—the organization, spark plugged by Frank Nekimken, is doing a swell job in all respects. Even if the group did nothing but straighten out the state contest schedule, its existence would be justified; however, the Association's unanimous decision to be composed of AMA Chartered Clubs or Chapters and to run only AMA sanctioned contests is a strong indication that it is destined to be with us for a long time. What's *your* state doing?

We Fly the Piper Clipper

(*Continued from page 25*)

does a man-size job of performing. Moreover, it is exceptionally roomy, even in back, being wider across the cabin than the Stinson. The manufacturer's figures tell a story. With fixed-pitch prop, gross load, under standard sea level conditions, it has a top of 125, a cruise of 112, stalling speed of 50, service ceiling of 13,000 feet, rate of climb of 600 feet per minute, and a gas consumption of 6.2 gallons an hour. With one person, the ship must climb better than 1,000 feet per minute. Oh, manufacturer's figures, you say!

Now it will be recalled that in an earlier report on the Vagabond we waxed enthusiastic. Since then the Vagabond has had fitted dual controls and shock absorbers to a gear that originally depended on its somewhat outsized tires to soften the bounces. When Piper got around to boosting power in the Vagabond, the engineers found that the cost of making it into a four-place was less than $200 higher than the proposed souped-up two-place. The combination of the 115-hp Lycoming and the basic 65-hp Vagabond design, resulted in characteristics that were both unique and valuable. The PA-16 definitely has a personality apart from any other lightplane we have flown. This is not a blanket statement that the PA-16 is necessarily a superior craft all around, for airplanes cannot be compared indiscriminately. It does have unexpected capabilities beyond the prime considerations of performance figures.

The PA-16 carries the heaviest load, percentagewise, of any lightplane ever built, or almost 100% of its empty weight. Weighing 850 pounds, it will lift a gross of 1,650, for a useful load of 800 pounds. Its permissible c.g. travel is the greatest of any lightplane ever licensed, allowing certification of varying combinations of load—such as four people without starter or generator out front, or two people in front with starter and generator weight figured in. The rear seat can be removed in one minute's time, allowing an impressive cargo space, and a cargo weight equal to two passengers plus as much gasoline weight as the operator might dispense with. If, for instance, the 18-gallon wing tank was empty, more than 100 pounds could be safely added to the two-passenger weight. Since the seat really folds away, it can be replaced in about the same time as it was removed. Being equipped with starter and generator, the PA-16 simplifies cross-country, as we rent-a-plane pilots know it. Another important aspect, as Ted Herbert, of Safair, at Teterboro, N. J., pointed out, was that the elimination of two line boys during the busy season would reduce the costs of operation.

The PA-16 is unusual in that it has two wide doors, one on the right side forward, the other on the left side at the rear. Carrying the structure around a two-door opening on such a small airplane would add too much weight, in Piper's opinion. Access to the front seats is not too difficult, though getting the left leg past the far side stick takes a little maneuvering. But perhaps these are picayune criticisms of any airplane. Getting into the rear is simply a matter of sitting down and pulling your legs in

after you. There is enough leg room in the back for the lanky person to place his feet directly before him. Like the Vagabond, the front seating allows plenty of leg room.

There is a gas tank selector switch on the face of the fuselage tank and the procedure is to run off the wing tank first, then switch to the fuselage tank, which is important when four people, or equivalent in cargo, are being carried. All seats are soft and comfortable, being air foam with a leather type cover. On the deluxe job, which includes the pants, special paint, and so on—for an added $100—the cabin is upholstered.

There's the push-pull throttle in the middle, toe brakes on the left pedals only and the trim is a neat crank in the cabin roof. The starter button, incidentally, is unique in that it is located on the bottom of a small box in front of the left seat. Not awkward to use, it prevents accidental movement of the starter. A mixture control also is useful in shutting off the engine. Having thus examined the PA-16, discussion that evening revolved on its probable ability to get off with load, or how it would approach with full load, especially due to the lack of flaps and the small size.

As would be expected from its Vagabond heritage, taxiing the Clipper is a pleasure. The toe brakes work nicely and visibility over the nose makes S-ing unnecessary for a view of the taxi strip. First flight was a check-out with three people and almost a full load of gas. The ship moved out in a spritely enough way on take-off, to highlight two shortcomings in technique. First, it is necessary to anticipate torque when the tail comes up. The swing is not great, but if not anticipated, makes it easy to overcontrol in correcting. The rudder is lively but not too sensitive. And then you tend to hold the ship on too long once the tail gets up, pounding lightly two or three times before getting into the air. Climb is on the steep side with the nose pulled way up. Best climb is 75 mph. If trim is not used, you are reluctant to exert the necessary back pressure to hold up the nose, and you climb at 80 mph or more. Trim is one of the highlights of flying this airplane and without it the ship will not behave satisfactorily, particularly on the approach, where the stick load gives the kind of feeling that ordinarily signifies an approach to a stall.

On the following day, with a wind of 15-20 mph, two of us flew the PA-16. Again holding the machine on the ground very briefly through two or three slight bounces, the take-off required eight seconds. The ship is capable of getting off in much less time when given its head. With the excess speed on take-off, the Clipper repeatedly climbed to over 500 feet in approximately 30 seconds.

This sharp climb raises another technical point. On the Lycoming engine a new type "cross over" exhaust is employed, which causes the exhaust gases from one cylinder to "pull along" the gases from the next cylinder firing. Although there is little difference at cruising and top speeds, this exhaust system is exceptionally efficient under the load of the climb, partially accounting for the excellent performance Piper gets out of the Clipper in this respect.

Power stalls revealed at least one extraordinary characteristic not encountered previously in this series.

Should the airplane be slowed down very gradually, near the 50 mph stall speed, you unexpectedly find the stick full back, and cannot complete the stall. The ship does absolutely nothing. No buffeting, no stall, no falling off. It just sinks. There is full control, excepting more elevator. When executing a normal stall with a sufficiently fast back movement of the stick, you find yourself holding right rudder against torque to retain the heading, and then, if no attempt is made at recovery, when the stall occurs, the ship will roll a little to the right, slightly dropping that wing due to the rudder.

But by far the most unusual characteristics are found on the approach. You don't miss the flaps and there is no immediate or apparent reason why they would be needed. As a matter of fact, there isn't much room left over on that small wing from the long, powerful ailerons. By varying the glide speed, there is a tremendous control over the glide path, both as to rate of descent and angle. The first tendency is to flare out high, probably due to the visibility over the nose in a rather steep descent. The stall warning sounds continuously when you do so giving unmistakable warning that the airplane is slowed down uncomfortably. Knowing that a margin of at least five miles an hour remains before the actual stall you may choose to brave the warning when close to the runway, but the drop onto the ground is a solid one.

While the PA-16 does not have the long flat glide of the other Pipers, excepting the Vagabond, its peculiar approach abilities certainly help in hitting a spot, while permitting a wide latitude for correction of either overshooting or undershooting. Its steep approach is more like aiming at a target than like guessing how far some flat gliding machine is apt to go. The tendency in a forced landing, they say, is to overshoot, because the high approach allows drastic corrections whereas the low approach hopelessly commits the pilot. On many machines it is difficult for many of us to lose altitude by slipping without picking up troublesome air speed on recovery. Not only does the PA-16 seem to lose altitude very fast in a slip but it has small disposition to float, as compared with the bigger winged Pipers. These are things that complete familiarity with the airplane would disclose. Variations of approach and landing obviously are almost infinite. It did seem to us that the precise moment of flareout, in connection with any given glide speed, was a bit hard to judge, and that the flareout required more than the usual judgment in making it right.

For the moment at least, the Clipper is one of private flying's good buys. The price tag of $2,995 for a four-place machine is sensational. It is lower, in fact, than the cost of some two-place jobs. The PA-16 should not be compared too sternly with all other four-place aircraft, though the tendency may be to do so, because their probable average cost of more than $5,000 gives them inherent advantages. For example, with four people, the PA-16's range is reduced to 2½ hours, the same, roughly, as some trainers. But one can't sneer at this valiant little four-placer, even if it is likely to endear itself more to the operator than to the business firm or wealthy pilot who have the kind of money that purchases robust performance and range.

Power to Burn

(*Continued from page* 35)

plant in question. Gross weight consists, of course, of engine weight, fuel weight, structural weight, and payload. Structural weight has been assumed to be 40% of the gross. A lift-drag ratio of 18 was also assumed, as was a wing loading of 80 pounds to the square foot. You can begin to see how the pieces of the puzzle fall together. Knowing the airplane characteristics, and engine performance, load and range possibilities were found. The elaborate, bulky NACA report leaves no doubt that there are no loose ends. Since the present-day airplane, like the F-80, is a far cry from the transonic machine like the Skystreak, or the true supersonic speedster with its stumpy, probably angled back surfaces, the NACA engineers projected imaginary basic airplanes for both subsonic and supersonic conditions, even allowing for the generous fuselages required in some cases to house the big fuel tanks. For the supersonic machines, a lift-to-drag ratio of 7 was assumed. Now let's digress for just a moment to consider some odd but important jet facts.

At a speed of 340 mph, the efficiency of the turbojet is a poor 37%, whereas the propeller is 85% efficient. As compressibility sets in at high subsonic speeds, prop efficiency falls off sharply but the jet efficiency begins to go up and up. So at "low" speeds the jet always will be handicapped but at "high" speeds it is a horse of a different color. You often have heard it said that at 375 mph, one pound of thrust is the equivalent of one horsepower. What

this rule-of-thumb statement does not make clear is that above 375 mph a pound of thrust may equal considerably more than one horsepower. At, say, 1,500 mph, a typical turbojet might develop as much as 8,000 hp per square foot of nacelle frontal area. In this NACA study, the nacelle frontal areas were assumed to be 12.5 square feet. In other words at better than twice the speed of sound the turbojet would be capable of approximately 100,000 horsepower. This, incidentally, affords an inkling of how much drag is kicked up at such air speeds, for when drag equals thrust, an airplane can fly no faster.

Another strange-as-it-seems aspect of the turbojet, with its frantically whirling compressor and turbine, is that at some sufficiently high air speed so much air is rammed into the power plant that the compressor actually has no work to do. The turbojet begins to function like a ramjet. Another peculiarity of this interesting engine is that variations in speed below the speed of sound have comparatively little effect on thrust, but beyond the speed of sound thrust literally skyrockets as the plane travels faster and faster. And, despite popular opinion to the contrary, the jet engine loses efficiency with increasing altitudes. No one yet has figured out how to supercharge a gas turbine!

But doesn't the turbojet burn lots of fuel? And isn't it necessarily short-ranged? The answer is yes and no, well qualified with ifs, ands, and buts. Jets do burn more fuel. But the thing to watch is the rate with which that fuel is consumed per ton mile. Because a jet grows more and more efficient as the plane flies faster, its rate of fuel consumption per ton mile grows smaller and smaller—unlike the piston engine which burns more fuel when "pushed." For our mythical subsonic turbojet-powered airplane, best economy and maximum range come at 550 mph. At this speed the range is 5,740 miles. At higher speeds compressibility sets in, drag is increased, and range falls off.

With the same power plant, our supersonic airplane will fly its farthest, 1,330 miles, at a high rather than low altitude of 50,000 feet, at a cool 1,500 mph. While this range is only 25% of the range of the same engine in the subsonic plane, the turbojet is superior to propeller engines, including the turbine, at all speeds above 550 mph. Beyond the speed of sound the turbojet is most efficient when flown wide open at high altitude. If this seems to contradict statements that the efficiency of the jet always falls off at high altitude, it does not, in fact, do so. Airplane speeds are greatest due to less drag where the air is thin.

By the simple addition of afterburning, which means that the exhaust gases of the turbine are further heated and expanded in the tail pipe, we inch forward another band on our engine spectrum. For when afterburning is used, the engine ceases to be a turbojet! It has become a turbo-ramjet. The portion of this power plant aft of the turbine is truly a ramjet, being nothing more than a flying stove pipe. Its intake, however, is the exhaust from the turbojet section in front of it. The reason for this hybrid is simple. With present knowledge of metallurgy, turbine wheels are limited to temperatures of about 1,500 degrees. Since afterburning obviously cannot harm the turbine, it is possible

o boost the temperature of the jet to some 4,000 degrees.

And like the turbojet, the turbo-ramjet becomes increasingly efficient as speeds begin to climb. It is also less efficient at high altitudes. At 50,000 feet, for example, thrust is only 20% what it is at sea level. Whereas our hypothetical turbojet puts out the equivalent of 100,000 horsepower at 1,500 mph, the turbo-ramjet is capable of 125,000 horsepower at 1,800 mph. At low speeds the addition of the thirsty ramjet, or afterburning section, to the turbojet, doubles the fuel consumption. But once the hybrid gets going fast enough to really put its shoulder to the wheel, it uses only slightly more, or 1¼ times the fuel of the slower, less-powerful turbojet. On the test block an engine like this might develop only three pounds of thrust per pound of its own weight but, barreling along at 1,800 mph, 23 pounds is the more accurate figure! Compare that with an efficient piston engine which might develop one horsepower per pound of weight.

If we should place the turbo-ramjet in our subsonic airplane, it would prove only 75% as good range-wise as the turbojet. Maximum range would be 3,800 miles at 550 mph at 30,000 feet. This, the NACA says, limits the turbo-ramjet, at subsonic speeds, to a short duration thrust augmentation device. But the more fuel-hungry and inefficient these powerful jet and rocket jobs are at low speeds, the better you can expect them to perform at speeds far beyond the speed of sound. Observe what happens when we switch our turbo-ramjet to the supersonic plane.

Range pops up to 1,900 miles at 1,800 mph at 50,000 feet. At such a speed, maximum range is 60% greater than it would be with the turbojet. And at this point the turbo-ramjet, too, begins to function like a straight ramjet, its idly spinning compressor doing nothing more than generating added drag, like the propeller on a fighter in a terminal velocity dive!

The "flying stove pipe" brings us close to the top end of the spectrum. As its name implies, this amazing gadget is simply a scientifically shaped "pipe" open at both ends. Approximately 40% of its length at the front end is called the diffuser section, through which the flow of air is expanded and fed into the combustion or flame holder section that comprises the middle portion of the ramjet. The exit nozzle is a short, open-ended section at the rear. Not able to contend with other power plants, except where engine cost and weight are low and fuel cost doesn't matter (as on a guided missile or pilotless aircraft of the buzz-bomb type), this amazingly simple power plant could propel our supersonic airplane 2,000 mph at 100,000 feet, for its greatest range of 2,000 miles. Up to this speed and altitude range steadily increases. At still greater speeds, the tremendous drag of the airplane begins to balance the increasing thrust of the ramjet. In other words, the ramjet becomes more powerful the faster it flies, but the power it needs to overcome the drag of the plane must be

greater still. So at 3,800 mph range would be down to 500 miles at an altitude of 100,000 feet. A poor performer at subsonic speeds, the ramjet is king of the jets at high supersonic speeds. But this is nothing compared with the fireworks at the top of the spectrum.

To go from here to there in nothing flat, take a rocket. As with all the other power plants, the NACA has worked out an appropriate airplane, but using nothing less than a V-2 for a power plant! This liquid bi-fuel rocket has a sea-level thrust of 60,000 pounds. At its best, or most economical speed and range, the V-2-powered aircraft would have four and one-half times as many horses as the ramjet. It would take a 365,000-pound airplane to do it, but it is theoretically possible to zip along at 2,000 mph at 50,000 feet with a V-2 in the tail of the fuselage. And as if this isn't enough, the engineers have calculated such combinations as a 440,000-pound airplane capable of 1,000 mph at 50,000 feet, and a 482,000-pound whopper at 100,000 feet. At the most favorable combination of altitude (100,000 feet) and speed (a mere 5,000 mph!) maximum range becomes 1,387 miles.

NACA, logically enough, labels the liquid-fuel rocket as most suitable—as a power plant for airplanes, rather than a pure rocket—for high-speed, short-ranges where low engine weight, compactness, and simplicity of engines are at a premium, and propellant consumption is a secondary consideration. Without wings, like the wartime V-2, this rocket is highly adaptable to artillery-type projectiles, auxiliary power for aircraft, pilotless planes, and missiles.

What the power plant spectrum seems to suggest is that the supersonic air age is not as mysterious as we try to make it—at least where power is concerned. There's power to burn!

Air Boat

(*Continued from page* 52)

models are not for the average builder. The cost of outfitting a boat for competitive racing is quite high—unless, of course, you have a complete machine shop and are capable of making ball bearing struts, stainless steel props, special fly wheels, universals, and the like. Well, I don't have the machines or the know-how to make these parts. Okay, I said, so I won't race in competition, but I can still have a whale of a lot of fun running a boat when it's too windy to do any flying.

With the help of these power boat boys—who, incidentally, are a swell bunch—I finally worked out a design for a boat that would eliminate expense and yet do more than just putt around. As it worked out, this final design proved faster than even the experts figured. With the boat properly adjusted by means of the "hydrovator," and using an Ohlsson 23 glow plug engine, it has done up to 30 mph, which isn't exactly slow when you're traveling through water. Incidentally, when adjusting with the hydravator, take it easy, as it is quite effective and therefore sensitive. Too much positive angle will cause the nose to dig in, while too much negative angle will cause the model to literally take off.

The plans are pretty much self-explanatory and the construction is the simplest possible. Bear in mind that

the hull should be absolutely water tight, so don't spare the cement. Shellac the inside before final assembly.

Begin construction by cutting out the top view from 3/32" sheet balsa. The top sheet should be cut 3/16" narrower than the full 6" width shown on the top view. Next cut out the two sides, also from 3/32" sheet. The hull is built upside down so pin the top down to your board (sketch #1). Cement one side to the top, using plenty of pins to keep the side from springing. Glue the formers in their proper location and then the other side (sketches #2 and #3).

Add the hardwood engine mount pieces, the aluminum guides and the plywood rudder to which the hydrovator will be later attached. Remove this much from the board and give the inside a good heavy coat of shellac. Add the bottom sheeting and sand all the surfaces. Be careful not to round the corners of the bottom edges.

The sponsons, or stabilizers, must be carved identically and cemented to the hull as indicated on the plan side view. The sponsons and top cowling should be carved from fairly hard balsa in order to add some weight to the nose. The motor mount is cut and formed from 1/16" sheet aluminum and held to the hull with three ½" wood screws. The cockpit, seat and steering wheel will add a touch of realism.

Give the hull a few coats of wood filler. Sand smooth and then apply your favorite color. Whether you use dope or enamel, make sure you hot-fuel-proof the entire hull with any of the proofers available at your favorite hobby shop, or use a coat of Duco "clear." The latter can be applied very smoothly with a lint-free cloth. Simply wipe the Duco on in even strokes.

To rig the bridle correctly, attach it to the guides, hold the hull by the bridle and balance it with the nose slightly down. If when running the boat, the nose pulls out too much, re-adjust the bridle by again balancing the boat and raising the nose slightly. The reverse is true if it keeps running into the circle.

Make your first run with the engine running at about half speed. Watch the attitude of the model, making adjustments with the hydrovator and bridle until it is riding true and level. When you are satisfied with the way it is riding, rev up the engine a little more and then make the necessary adjustments as before until the engine is wide open. Then watch her fly—er—I mean, go.

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Super Cruiser

(*Continued from page* 56)

rod passing through a curved piece of tubing at the wing-fuselage junction. Two metal lugs are glued to the upper fuselage corner to carry the push rod back to the control horn.

The idea for the Cub Super Cruiser goes back several years when Sam Goldenberg, Comet's general manager, got to thinking about boys without tools or know-how to build many of the kits then the vogue.

"I had brought out some kits from the old Comet company's 25-cent line which had punched out sides, and when the idea was turned over to our design department for development into a simple scale U-control kit, it was a simple matter to make a prefabricated for $2.95 with the facilities at our disposal," Sam explains. "We have, of course, since designed and brought out some numbers in the very popularly priced 25-cent line and these are prefabricated also. But the $2.95 class provides more opportunity to do a bigger and better job."

Most unique feature of their Piper, in Sam's opinion, is the die-cut sides which have the proper holes and notches to guarantee alignment when the formers are inserted. The gear and one-piece wing are other stand-out features. A minor but nevertheless unique detail is the use of four pieces of 1/16" dowel which fit through holes provided in the sheet-balsa sides, between wing and tail. These dowels serve as cross-pieces to prevent inward crushing of the fuselage.

Begun 20 years ago by two boys who

were afterwards joined by a third party, the Comet firm has since grown to the world's largest model airplane kit manufacturer. Since before the war, Comet occupied a good sized factory building at 129 West 29th Street, Chicago, with employees running into several hundreds. Only Megow in Philadelphia operated on an equal scale at the time. Only recently Comet bought up the Megow firm and is continuing the Megow line under that name, as well as expanding the regular Comet business. In the past, Comet was famous for such gas model kits as the Clipper, Mercury, Zipper, Sailplane and Interceptor, and some of these even today remain dominant performers in the free-flight contest model category. Older builders whose memories are not too rusty will recall things like the scale Curtiss Robin gassie and other real early birds of a day when the gas engine was hardly more than a novelty.

Comet, however, isn't wasting time talking about the past, preferring to look forward to the future. "We have always brought out new numbers, new ideas in kits," recalls Goldenberg, "and some of the designs made years ago are still good, such as the free-flight models. Here at Comet we are looking forward to the future rather than the past."

Although Comet is primarily a producer of kits, the firm occasionally gets into sidelines. Do you recall the Comet 35 engine, still remembered as a pretty hot free-flight engine? Already producing a line of boat kits, in addition to the airplane line, the company shortly will enter the highly competitive model railroad field. Comet cement long ago was accepted by modelers as one of the better cements and now there is Comet dope and the Comet "Hot Fuel Proofer." One facet of the Comet sales formula is to provide a maximum number of items for the dealer to sell. Manufacturers know from long experience that you don't sell one kit, or one item—it is usually better to sell a "line."

The Comet "line," as the above suggests, is a large, varied one. You might say that a large manufacturer like Comet gets into everything; just as it is wise for the average dealer today to supplement his model airplane line with boats, trains and handicrafts, so must the manufacturer broaden his approach to production. Comet's line extends all the way from ten-cent flying models, through solid models, to control-line and free-flight models. Demand for these many items is maintained by a judicious policy of backing up their play with plenty of strong advertisements. This, too, is another trick of the veteran manufacturer who knows that you can't hide your light under a bushel and expect to do business.

Goldenberg is a firm believer in talking it up. If the first step is the production of a wide assortment of items, then the second is creating a demand on the part of the dealer for the products made by any firm. Of course, it isn't quite as automatic or as simple as that. There still is *you*. The combination of quality-price you demand is always a theoretical question. In his Piper Cub Super Cruiser, Sam Goldenberg is looking for you.

Will Britannia Rule the Skyways?

(*Continued from page 31*)

pronounced "swing" on take-off and a bad bounce on landing. BOAC refused the Tudors. Ultimately, the loss without trace of two Tudors on the Bermuda run of British South American Airways compelled abandonment of dozens of these four-engined machines as passenger carriers. The Tudors will end their days ingloriously as freighters.

Backfiring with a report that was heard around the air world when the Tudor flopped, possibly yet to go off with a louder report when the many-eggs-in-one-basket Brabazon rolls out of its special assembly shed onto its special runway, the Brabazon plan is an amazing paper scheme for building commercial air power virtually from nothing. But it is a plan that John Bull means to see through, come hell or high water.

Curiously enough, it was the flood of Nazi Junkers into Crete that first highlighted the British weakness in transport. Pressed to the wall during the Battle of Britain, she had concentrated on precious bombers and fighters. After Crete, England latched onto the first good transport available, the American Douglas C-47, or DC-3 as the airlines knew it, and this became the workhorse Dakota. After VJ Day her prospects of overhauling the Dutch, the French, the Scandinavians, the Belgians, and the Americans, all using mostly late model American transports for routes probing the far corners of the globe, were appallingly bad. Britain faced a cruel dilemma. If she built competitive transports, they probably would be obsolete before they could fly. If she concentrated on the future she might never overcome the handicap of time. Her decision was gallant.

From the bits and pieces of wartime leftovers we will build a stop-gap transport fleet, and be damned to the cost of operation, said John Bull. And we'll rush onto the boards the kind of airplanes we should need in the future. And, of course, we'll "fly British." While bombs were still bursting over England, a government committee under the presidency of Lord Brabazon had been appointed to outline the required types of aircraft, to suggest their builders, and to study the conversion of war types for interim service while newer machines were being prepared.

As early as 1943 four interim types had been recommended, two being landplanes, and two flying boats. Immediate action was urged on five new craft. A second committee, speedily formed to establish the specifications of the proposed designs, added two more, making seven new machines in all. Six of these were piston-engined craft and it was fortunate that the spectacular success of Frank Whittle's gas turbine occurred when it did. This time the list pinned down every conceivable type from huge flying boat down to the smallest helicopter, and added still another seven types.

Pièce de résistance of the final plan is the Bristol 167, or Brabazon, a 284,000-pound goliath with a 5,000-mile cruising range, at 350 mph at 35,000 feet. Seventy-two passengers will be carried by night, or 100 by day, and a possible 244 for short hauls. Begun with Bristol Centaurus piston engines, the first plane will be for test only. Three later machines will be fitted with eight Bristol Proteus turbines driving counter-rotating propellers. Already flying is a fine medium-range machine, the Airspeed Ambassador, a three-wheeled, 34-40 passenger job capable of cruising at 240 mph for 1,000 miles on its two 2,500-hp Centaurus engines. Later on it will be equipped with four 1,500-hp turbines with propellers. Yet another four turboprop design is the Armstrong Whitworth Apollo. For trunk routes and the Atlantic will be two promising machines, a 95,000-pound Bristol to cruise at 300-350 mph for better than 3,000 miles, and a 90,000-pound jet airliner capable of 500 mph.

When the Brabazon list accordioned out for the "come-latelies" that would plug the various gaps in the first estimate, at least two startling designs came to light. Probably the first airplane in the world to feature sand pit, nursery, and toys, the 220-foot Saunders-Roe flying boat, is intended to carry 100 night passengers within its "figure-eight" two-storied hull. Range will be 5,000 miles at 250-300 mph,* which allows for 90-mile headwinds on the westward crossing, plus ample reserves needed for its turbine power plants which are certain to consume huge quantities of fuel when close to the surface. Eight of the turbines will be paired, as on the Brabazon, to drive counter-rotating props, with two single turbines further out on the

wings. What may well prove to be Britain's outstanding airliner is the Bristol 175, or Super-Constellation-type, now revealed in technical papers.

Cold type hardly suggests the kind of obstacle-lined booby-trapped course that awaits any single transport during its development. What can happen to a complex plan for a flock of such airplanes was illustrated by the Tudor. Nor are these the only difficulties. Soon after the war, Britain divided her imagined air world into three parts, apportioning routes both good and bad among three groups of operators. All the kings' men had less trouble with the reconstruction of Humpty Dumpty than her government now has in rebuilding the kind of air transport she demands.

First of the three corporations formed by the nationalization of 1946, is British Overseas Airways (BOAC), operating from the UK to the New World and, via the Mediterranean, to Africa, India, and Australia. Next was British European Airways (BEAC) for the continental service and, finally, British South American Airways (BSAAC).

This, then, was the setting for Phase One of the master plan. The many lines had been consolidated into three groups, each operating in its own exclusive bailiwick; the planes of the future were on the boards; and the useful war types and various other interim hybrids were ready to go. But, within a year, the operators ran $40,000,000 in the red, and the deficit doubled within two years. The Tudor went sour. Canadian-built DC-4M "Canadairs," Rolls-Royce powered, and British-instrumented, were being bought. High critics feared more face was being lost by the policy of "flying British," at least in this interim stage, than would be lost by using proved foreign equipment. In the House of Commons one wit remarked, "If everyone who flew BOAC last year had been paid fifty pounds not to travel, the country would have been better off financially."

In BOAC'S case, as weird a collection of airplanes as the world has seen was assembled under the interim policy. Some 120 separate types saw service, and Dakotas, Lancastrians (converted Lancaster bombers), and Yorks (Lancaster wings and tails on box-car bodies) did heavy duty. Experts agreed that 50 good airplanes could have done the same job. BOAC shelled out one million pounds to convert military crews, another million went down the drain in her flying boat service, and the Lancastrian airplane alone cost her a third million, simply because it had but 57% of the revenue-

producing capacity of an ideal machine. Then came the Tudor disaster.

Tudor I handled but 12 passengers with berths, or 24 by day, whereas the Constellation accommodated 43 day passengers on long hauls. By chopping the Tudor in half, and popping another section into the middle, the 32-40 passenger long-nosed Tudor II resulted. This version had insufficient range to fly the Atlantic safely against headwinds and was unsuited for airfields south of Nairobi, in Africa, and east of Singapore. After the mysterious loss of the Bermuda-bound Star Tiger, and the arrival there of another Tudor apparently with insufficient gas to circle the field, the Tudor was "dropped as a matter of prudence." More recently, the Star Ariel, another Tudor IV, presumably a modification, disappeared under the same circumstances. This time defeat was conceded. Unlike the American Airlines DC-6 that reached the ground aflame to save its crew and passengers, and to provide the clew that permitted modification, the Tudors were lost forever under the Atlantic.

From this Dunkerque, Britain is now recovering. Her airlines systems were revised with much pruning of wood and, if Parliament approves, BSAAC and BOAC will combine. The warwearies and other ill conceived interim types have been well weeded out. By year's end, BOAC alone had hoped to operate the first of six Stratocruisers (four more recently were taken over from Sweden), 11 Constellations, some of her 22 Canadairs and 25 Hermes IV's, besides 15 Tudor IV freighters.

Oddly enough, what failed on the Tudor succeeded with the Hermes, which traces its ancestry back to the Halifax bomber. Now considered the fastest airliner in great Britain, this 40-passenger tricycle geared craft cruises at 300 mph with a maximum range of 3,500 miles. It is fully pressurized and has Bristol Hercules piston engines.

By 1953, seven of the Saunders-Roe boats will be delivered, their 380-mph cruise permitting a 26-hour schedule between England and the Argentine. Resembling the Constellation, save for its single tail, the 300-350 mph Bristol 175 will fit in between the big Saunders-Roe boats and the "bread-and-butter" smaller transports. Payload will include 30 night or 60-70 day passengers at a still-air range of 2,500 miles.

Early defeats have not lessened the British threat to American transport supremacy. In the vital fields of turboprop and jet development Britain

forges on ahead while the U. S. carries on secure for the time with her Lockheeds, Douglases, and Boeings. Britain's Vickers Viscount and Viscount 700 will carry 32 to 43 passengers to the Continent on turbine-driven propellers. The AW 55 Apollo, using four Mamba turbines, will feature thermal or hot wing de-icing and Fowler-type flaps, similar to those on the Constellation. Because of its thin high-speed wings, the Apollo has a landing gear that folds sideways, fighter fashion. Jet pipes protrude from the trailing edge of its wing. Cruising eight miles high, this 92-foot machine will move four tons of payload at 345 mph up to 1,500 miles.

Sure shadows of things soon to come are the experimental Nene-turbine-powered Viking (a smallish post-war transport converted) and the jet Tudor VIII. Not for service, these ships are providing the answers for high-speed public transport in the only way they can be learned—by doing. In Canada the Avro C-102 jet transport for short ranges and high speeds nears completion. About to fly at home is the first of the sixteen Comets, low swept-wing, four-jet jobs that will carry 36 passengers in reclining chairs at 500 mph.

British industry is boldly pressing its big advantage—government financing. She is pioneering without competition beyond familiar frontiers. She is looking for the planes of tomorrow—today.

(NEW YORK—*Unless American aircraft manufacturers begin building jet transports before the end of the year, the British dream of recapturing world air transport markets in the fifties may well come true. . . .*)

Roadable Airplane

(Continued from page 22)

when the owner wants to go flying, and the *roadable airplane* which is primarily a flying machine, roadability serving only to extend the utility of the craft. In many cases the flying auto has two engines, one for driving and the other for flying, while in the roadable plane one power plant, an aircraft engine, serves both purposes.

Good examples of the first are Hall's Flying Auto, Taylor's Aerocar, and the proposed machine by William Chana which has three flying configurations, including helicopter. The Airphibian, designed by Robert E. Fulton, can be considered more of a roadable airplane, as it has only one engine to operate both the propeller and the wheels. However, it leaves the majority of its aircraft structure, wings and the rear fuselage section at the airport and once unhooked from its flying components looks like a snappy little convertible, though the wheels do retain a resemblance to airplane landing gear, and the front end is definitely airplane.

Taylor's Aerocar sheds its wings and its rear fuselage section which carries the long shaft and the pusher propeller. Tail and wings fold into a compact trailer complete with its own wheels, and are hooked to the car unit. The Aerocar is powered by a 100-hp engine which drives both the propeller and the wheels. Hall's craft consists of a neat streamlined four-place automobile powered by a 26-hp Crosley engine, and

an airplane component the power plant of which develops 190 hp.

A typical roadable airplane is exemplified by the Clark design on which both the wings and the tail fold on top of the fuselage and are carried on the road. In Valdosta, Ga., Wismer Holland rigged up his Ercoupe to carry the wings above the fuselage on special supports, and put a guard around the propeller, making it a true roadable airplane—the propeller drives the plane on the ground and in the air.

Two other examples are shown in the Airmen of Vision section of this issue. The winning job was designed by Richard G. Naugle, well known aircraft engineer who before the war designed and produced an all-metal lightplane, the "Mercury." Naugle's roadable machine has folding wing and tail which stow inside the fuselage, and a 26-hp engine which drives the craft on the road. Another Airmen of Vision entry this month features a roadable helicopter with folding rotors.

At the present writing the Hall, Taylor and Fulton machines are the only ones far enough advanced and tested to serve as criteria for future development of this type of vehicle. Both the flying auto and the roadable airplanes have many problems to overcome before they can become generally acceptable. In the flying automobile the greatest problem is weight and balance. Inasmuch as the main unit is an automobile, there is the question of making the car light and roomy, and yet sturdy enough to be able to withstand the rigors of driving, as it will be used more as an automobile than a plane cabin. If standard automotive methods of construction are employed the car's structure will be too heavy to fly; if aircraft methods alone are followed it will be too fragile for road work. Running gear of the car must be designed with an eye to both landing loads as aircraft and road shock as automobile.

Then there are problems of balance. The center of gravity of the automobile must be in correct place for roadability, and when the car is hooked to the flying component CG location of the airplane cannot be disrupted, or else longitudinal stability will suffer making the craft unsafe to fly.

There are also controls to be considered, for both automobile and airplane. Locking and coupling devices have to be simple, positive and preferably semi-automatic, eliminating bolts, nuts and cotter pins which can easily be forgotten by an absent minded owner and lead to disaster.

All this, unless mass-produced, like automobiles, is expensive, requiring considerable engineering and testing which in turn means a considerable outlay of cash. It is doubtful, therefore, that a flying auto can be purchased for a reasonable price in the near future. Its cost at the present time will probably run close to the combined price of an expensive car and a four-place airplane. The flying auto powered by a single engine will be less expensive. Taylor hopes to market his Aerocar for $3,000 or slightly more.

The roadable airplane, in order to be useful as ground transportation, must assume certain aspects of the automobile and still remain primarily an airplane. That is a tall order. As an automobile it cannot be too light, must have the basic comforts of a car, should not be long-legged so that passengers do not have to stretch to get into the cabin. Folding aircraft components such as wing and tail, if carried by it when on the road, must be so secured and located that they cannot be damaged by wind and contact with obstacles. The entire structure must be strong, since bumping against objects is apt to damage and weaken it. Because the engine does the road work *and* flies the plane, special wheel transmission must be designed together with a de-clutching device. Aircraft engines are air-cooled, and a suitable cooling system must therefore be provided, as the power plant is apt to overheat while driving. Wear on the engine will be considerably increased and the 100-hour checks required by the CAA will have to be made more often.

The roadable airplane is definitely not for long drives over the ground. Like an auxiliary powered sailboat, its roadability is only to get you to town, or home, after landing. But the flying auto, with a separate engine to drive the car unit, can be used for ground travel.

A number of problems affecting these craft are gradually being worked out. The idea is far from being absurd, otherwise serious men and competent engineers like Hall, Taylor, Fulton, Stout and others would not be wasting their time and money on it. Whether it is a certainty, we would not want to prophesy. It will depend primarily on the price, simplicity, safety, and ease of operation. Until all these things are achieved, there will be mighty few roadable airplanes or flying automobiles on the road or in the sky. That there will be some, we are sure.

Three Vagabonds

(*Continued from page 41*)

big job uses ⅛" sheet sides and bulkheads, with the two bulkheads beneath the wing being laminated from double thicknesses to give rigidity and resistance to crack-ups. Note that the scale fuselage tapers slightly from the window line up to the top of the cabin, and down to the bottom of the cabin. For the big airplane it is necessary, therefore, to use two separate pieces of sheet for each side, one above the window line, and the other below. One sheet is used on both small ships, the taper being achieved by creasing the thin wood along the window line. In making the O&R job, assemble the bottom side sheet to the bulkheads, then the upper side pieces, and finally add the top and bottom sections. Since there is a rascally bend on all models between formers 1 and 3, follow this procedure. Assemble the fuselage from bulkhead 3 back to the tail. This portion of the fuselage has a straight taper to the rudder post. When dry wrap a rubber band around the front to pull the sides into position, then glue in bulkhead 1, followed by 2. Bulkhead plans are provided for all airplanes. Note that the rubber job is quite light in this respect while the bulkheads for the big control-liner are simply holed for the push rod. Another point is that the little twins have a sheet balsa cabin roof cemented to the tops of bulkheads 2, 3, and 4; the big ship is left open at the top.

The 23 is mounted on ¼" x ½" hardwood bearers which enter the fuselage back to bulkhead 2. The bearers also glue into notches cut in the rather solid lower cowl block. For the Ohlsson job the large Veco bellcrank is mounted on a balsa block (faced on top with plywood), which glues to former 2, one motor bearer, and to a special 3/16"-square cross-piece that extends across the cabin. The Infant bellcrank is cut from 1/32" plywood and mounts on a piece of sheet balsa that lays flat across the cabin, being notched at either end to fit around the sides of bulkhead 2. Nose construction varies with all three airplanes.

On both control jobs the nose is cut from a soft block; on the rubber job it is built up from pieces of ¼" sheet balsa (though a block can be hollowed out if preferred) with the familiar nose-plug arrangement for winder use. The drawings show not only these variations but the basic method of making all three

noses. Note that the top and front of the big airplane's nose attach as a removable unit by means of dress snaps. It pulls off to the front for engine removal, although the prop must be removed first. The top of the Infant cowl block is attached with snaps and pulls straight up for removal without bothering the propeller. The Infant is mounted by means of two 2-56 machine screws holding it to a circular piece of 1/32" plywood which, in turn, is glued to the solid face of the inside of the nose block. Hot fuel proofer must be used with both control ships.

The landing gear design is the sandwich type with a one-piece music wire axle. This sandwich cements to the front of bulkhead 2, with its edges glued to the insides of the fuselage sides. The gusseting for each ship is visible on the side views. Although scale-type wheels may be used on both little jobs they should be made from balsa for lightness. Weight must be watched with a hawk's eye on the Infant job for it is a "maximum sized" airplane. The struts are streamlined from sheet balsa, gouged out with the sharp end of a wire to take the axles. It is advisable to wrap these struts with thread or with silk to prevent the axle springing out on a hard landing. Be sure to get the gear in place and all other internal details installed on the little ships before closing in the cabin! Once closed, you are locked out for good.

All the airplanes use sheet balsa throughout the tail construction. The small twins employ 1/32" sheet for lightness (rubber) and 1/16" sheet for strength (control) in their stabs, and both use 1/32" sheet in the rudder. Sheet balsa will be tough and will not warp if coated with a mixture of clear dope and castor oil. Use about a half teaspoonful of oil to one large (two ounce) bottle of dope.

The big job uses rather soft ¼" thick sheet for both stab and rudder, the latter because of the impact in turnovers. On the suggestion of the hobby dealer a unique hinge consisting of 3/16" dowel and ordinary screw-eyes was tried successfully. The dowel glues into a groove gouged into the leading edge of the flippers, the four screw-eyes go into the stab. Cut out around the heads of the screw-eyes to permit movement of the flippers. This system works smoothly and easily. Hinges for the Infant model were rolled from thin shim brass, with .010" music wire engaging the tubes. The tubes attach to

the stab, the wire to the flippers. In all cases, the stabilizers glue direct to the step in the fuselage top and the rudders glue down on the stabilizers.

The rubber-model wing is entirely built up with a 3/32" square leading edge, 1/16" x ⅛" spars, and a trailing edge cut from 3/32" sheet to a width of ⅜". Ribs are 1/32" sheet and covering is Japanese or American tissue, water-sprayed and given one coat of clear dope. Build the wing in one piece then, for dihedral. Remove the center section top spar, install the dihedral with blocks supporting the panels, and replace the spar pieces previously removed. Of course the bottom spars crack at the dihedral break (it may be necessary to score them with a razor blade first). These breaks are covered with cement. The finished wing glues to the top of the fuselage and is supported by streamlined balsa struts (from ⅛" x ¼") that glue to fuselage and wing. Scrape away the paper where the glue joints are made.

The K&B wing is the usual one-piece control-line deal. The leading edge is ¼" x ½" and the trailing edge 3/16" x1". Use soft but firm wood. Avoid rock hard stock because this is the heaviest part of the airplane. Ribs are 1/16" sheet fitted into notches cut in both edges. A slight amount of dihedral is used for scale effect and this does not detract from performance. Crease the spars at the dihedral break and cement the cracks after the tips have been suitably elevated. Two pieces of 3/32" dowel serve as joiners but these are not essential.

The big ship's wing is made in the same manner, using ¾" x 1" leading edge and a ½" x 1½" trailing edge, with ribs of 3/32" sheet. These are odd edge sizes, true, so it may be necessary to glue them up from, say, a ½" plus a ¼" thick piece for the leading edge, or from several thicknesses of sheet balsa for either or both edges. The tips are ¼" sheet. The center section is covered top and bottom with 1/16" sheet balsa. Cover with heavy Silkspan or with silk. Wet cover for best results. The paper will take several coats of dope, silk at least five before the pores are filled. Glue the wing to the fuselage top and add the ⅛" x ⅜" supporting struts.

Note that the lead guides on both control ships are made from aluminum tubing, flattened at the point of contact with the struts, and where the wires go through. Small holes are drilled in the flat spots for the leads and the guides are then cemented to the wing struts. Bind the joints with thread and fill in for extra strength. Grommets take the leads through the fuselage sides on the little model. Cut slots in the celluloid on the big ship to keep the leads from binding where they pass through the windows, although grommets might be installed here, too, with a little care.

The sheet balsa sides of all models are filled with Testor's sanding filler and then sanded with wet and dry sandpaper. This gives a smooth foundation for painting. The big airplane may be given a coat of this filler over its entire surface, paper and all. For lightness, the rubber job should not be painted, although colored tissue may be used on the wings and for trimming. The K&B job was left unpainted but it could be given two coats of thinned down chrome yellow dope. Finished weight will run between 3½ and 4 ounces so painting this ship is a borderline affair—take it easy! The big ship may be painted to your heart's content. Use as many as five coats of colored dope if necessary. One full-strength coat, followed by a half-and-half coat over the filler should be sufficient, however.

The rubber model requires solder ballast in the nose. About 1½" should be plenty for balance. Don't hand glide over a hard surface, for first test glides may stall abruptly. Wind in a couple of dozen turns and let the ship run along the ground unassisted. Add five turns at a time until it takes off. Correct stalls with weight until balance is obtained. Power is 4-6 strands of T-56 ⅛" flat rubber. Five strands are ideal if you want to bother. Torque takes the ship into a slight left climbing turn, followed by a straight flight, and a slight right glide. Slight right rudder holds against torque and produces this glide.

The K&B job operates on 20-foot .008" lines. Glow Flite fuel was used. The ship flies like a goat which, of course, it is. The new Herkimer Cub and Baby Spitfire should make it into a real stunter. The big Vagabond requires no special notes. Just fly it. The original was tested on 50-foot .012" lines. The pivot point is ⅛" behind the c.g., so if you wish a different setup move the bellcrank more to the rear.

Contest Calendar

Contest directors are invited to send listings of meets to Contest Calendar, c/o Air Trails, Box 489, Elizabeth, N. J. Such announcements must be received at least 90 days before contest date.

To secure more information on a contest, write to the individual listed. His or her city and state address is same as location of meet unless otherwise noted. Where different city is listed in address, the state is the same.

Air Trails makes every effort to check listings. It should be noted, however, that contests carried in this Calendar are subject to change without notice.

July 9-10—Bismarck, N. D., A. J. May, RFD 2.
July 10—Crossville, Tenn., Roy A. Stone.
July 10—Indianapolis, Ind., Frank Nekimken, c/o American Legion Nat. Hq.
July 10—Windsor, Ontario, Canada, J. W. Graves, 1555 Church.
July 10—Huntington, W. Va., Dr. Jules McCracken, Box 82, Milton.
July 10—Green Bay, Wisc., R. J. Lawrence, c/o Stone Motor Co.
July 10—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
July 10—Mamaroneck, N. Y., Wm. Yale, 12 Ann St., White Plains.
July 10—Schenectady, N. Y., A. Pickney, *RD* 4, Vley Rd., Box 210.
July 14-17—Toledo, Ohio, Mid-west Soaring Contest.
July 16-17—Laurel, Miss., E. H. Ross, 537 Fifth St.
July 16-17—Ellensburg, Wash., Soaring Contest.
July 16-17—Knoxville, Tenn., H. D. Powers, Briar-Cliff Rd., Fountain City.
July 17—Aurora, Ill., Hart Betts, 7 Fox Promenade.
July 17—Watertown, N. Y., William D. Tracey, 270 Mullin St.
July 17—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
July 17—Terre Haute, Ind., write Frank Nekimken, c/o American Legion Nat. Hq., Indianapolis.
July 18—Chanute AFB, Ill., Lt. Harry G. Vogler, Jr., Hq., 3499th Mobile Trn. Group.
July 24—Portsmouth, W. Va., Dr. Jules McCracken, Box 82, Milton.
July 24—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
July 24—Elgin, Ill., R. W. Muchow, 102 N. Spring St.
July 24—Mishawaka, Ind., Richard Ramsbey, 713 N. Main St.
July 26-31—Olathe, Kan., National Championship Meet, Jess Hall, American Legion.
July 29-31—England, International Lord Wakefield Meet.
July 31—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
July 31—Fresno, Calif., record trials, Ocie Randall, 716 Waterman Ave.
July 31——New Rochelle, N. Y., R. V. Cearfoss, 347 North Ave.
Aug. (date pending)——Butte, Mont., L. L. Richens, 9 S. Montana St.
Aug. (date pending)—Essex, Conn., Chas. Hoelck, 25 Dennison Ave., Mystic.
Aug. 6-7—Adelanto, Calif., Soaring regatta (5th heat), El Mirage Field.
Aug. 7—Prescott, Ariz., Dale H. Liljegren, 1116 Paar St.
Aug. 7—Beckley, W. Va., Dr. Jules McCracken, Box 82, Milton.
Aug. 7—Cleveland, O., John W. Grega, 10422 Gay Ave.
Aug. 7—Oceana, Va., A. K. Anderson, 436 Penna. Ave., Norfolk.
Aug. 7—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Aug. 7-14—Grand Prairie, Texas, Southwestern Soaring Contest.
Aug. 14—Chicago, Ill., R. C. Brown, 2818 E. 79th St.
Aug. 14—Salem, Ore., E. J. Roth, 2080 Market St.
Aug. 14—Lancaster, Pa., P. J. Liller, 567 Pershing Ave.
Aug. 14—Dubuque, Ia., C. W. Witter, 2081 Garfield Ave.
Aug. 14—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Aug. 20-21—Battle Creek, Mich., Keith Vincent, 25 Haskell Ave.
Aug. 21—Grand Island, Neb., W. H. Parmenter, 1634 K Lincoln.
Aug. 21—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Aug. 21—Valley Stream, L. I., Bernard Liquorman, 2154 E. 34th St., Brooklyn 10, N. Y.
Aug. 22-29—Third Annual Plymouth International meet. Contact your local Plymouth dealer for entry blank and rules.
Aug. 28—Mishawaka, Ind., Richard Ramsbey, 713 N. Main St.
Aug. 28—Long Island, N. Y., Donald Martin, 23 Slatterie Ave., Valley Stream, L. I.
Aug. 28—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Aug. 28—Long Island, N. Y., E. V. Roff, 56 Stuart Ave., Malverne, L. I.
Sept. (date pending)—West Chester, Pa., H. J. Aldsworth, 302 S. High.
Sept. 3-5—Adelanto, Calif., Soaring regatta (6th heat), El Mirage Field.
Sept. 4—Indianapolis, Ind., L. V. Brown, 5506 N. Illinois St.
Sept. 4—Jacksonville, Fla., M. W. Myers, 1807 E. 27th.
Sept. 4—Decatur, Ill., Fred Bascom, 806 W. Elm.
Sept. 4—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Sept. 5—Far Hills, N. J., Harold J. Dobbs.
Sept. 6—Cleveland, Ohio, Federation Aeronautique Internationale Model Commission Meeting.
Sept. 11—Rochester, N. Y., Ray C. Edmunds, 675 South Ave.
Sept. 11—Trenton, N. J., M. G. Michlik, 237 E. State St.
Sept. 11—Pittsburgh, Pa., *Box 4439, Pittsburgh 5.*
Sept. 18—Chanute AFB, Ill., Lt. Harry G. Vogler, Jr., Hq. 3499th Mobile Trn. Group.
Sept. 18—Royal Oak, Mich., J. R. Kates, 604 S. Edison Ave.
Sept. 18—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Sept. 25—Pittsburgh, Pa., Box 4439, Pittsburgh 5.
Oct. 1-2—Adelanto, Calif., Soaring regatta (7th heat, El Mirage Field.
Oct. 29-30—Adelanto, Calif. Soaring regatta (8th heat). El Mirage Field.

AIR TRAILS Hobby Shop Directory

Model Builders! Here's a listing of the nation's leading hobby shops. You'll want to file it away—and when you're in the neighborhood, drop in and browse around. They're expecting you.

CALIFORNIA—LOS ANGELES

Nationally advertised model planes, boats, trains, kits and supplies. Mon.-Wed.-Fri. Evenings till 9.

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If it's used with a model engine—we sell it.

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COMPLETE MODERN STOCK
Planes, Engines, Ships, Trains, Racers, Tools, Supplies. Everything needed.
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Supplying the Atlanta area from the most complete model stock in South Fulton County.

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Meet the Culprit

(*Continued from page* 48)

Dozens of articles about gyroscopic action have been written—articles which serve only to confuse the modeler. *Precession* is the proper term which describes the change in direction due to the reaction of an applied force to the gyroscope wheel. This force is the one most affecting a model's flight under power. The rotating engine parts and the propeller are in effect a gyroscope.

Recognizing this, I went about designing a ship accordingly, to satisfy myself as to the effect of precession on high-powered free-flight models. Let us examine this "precession" force. As you probably know, the gyroscope is nothing more than a balanced wheel mounted universally in gimbal rings and having three angular degrees of freedom. It has two characteristics: Gyroscopic Inertia and Precession. The first is the gyro's ability to remain in the same plane and position while the wheel is spinning rapidly, the other is a property of resisting a force applied about an axis at right angles to its axis of rotation. Thus if we apply pressure at a point on the rim of a spinning gyro wheel, this point will not move in response to the push, but a point 90° beyond, in the direction of the wheel's rotation, will move away instead. (See main illustration.) This tilting would continue in the instrument indefinitely, were there not contained within it a spring and bumper which limit precession to a small degree and allow it to return to neutral position.

Get these principles fixed in your mind. Remember the illustration, since it will help you to understand precession in your racing engine powered free-flight job. With these facts in mind I will endeavor to show how these principles affect the flight of your model.

Precession in models: In Figure 1 we have a model adjusted for normal right turn under power. In racing engines we have massive, fully circular, counterbalanced crankshafts. This, plus the high rpm of the prop, creates gyroscopic action. The right turn can be considered as a force acting on the edge of the prop circle (rim of the gyro wheel). Following the rule of precession, this force will cause the prop arc (and the model itself) to tilt forward, as shown in Figure 1. The model will assume, therefore, a diving right turn. At this point a word of advice to the shoulder wing boys: Don't gloat—the same will happen to your ship if it is flown to the right under power. What would happen if the ship were trimmed for left turn under power? In Figure 2 we have such a model, adjusted for a normal left turn under power. When maximum power is applied, the precession acts in the opposite di-

AIR TRAILS

ADVERTISERS' INDEX

August 1949

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this August, 1949, index.

rection from that previously shown. We note that the ship develops a strong nosing-up tendency which may result in a loop.

Need for better understanding: Because of the safety factor alone, model builders should seek to understand better these high-powered ships. One particular model I have observed looped and dived into the ground. Another did two consecutive loops before splattering itself all over the field. I also wish to point out that in order to obtain controlled flight with high-powered racing engines, it is not necessary to build oversized, clumsy ships, awkward to handle and almost impossible to transport.

Taking into consideration the principles discussed here. I conceived a method of designing and adjusting models for this type of power, and as results proved highly gratifying, I shall describe here the adjustment for free-flight models powered by racing engines.

From Figures 1 and 2, we may conclude that it is safer to fly all types of models to the left, under power, though the pylon boys may still want to stick to their right turns. However, one pylon job observed by me, powered by a racing engine, climbed very successfully to the left.

Favoring a high-thrust, low-drag model, I proceeded to design and build a job with 750 square inches of wing area, powered by an inverted McCoy 60 with 4° left thrust built in. The first day out, I tried to fly the ship to the right in order to prove that right turns were safe only under lower power conditions. After a satisfactory low-power test flight, I decided to open up the engine and see what would happen. Advancing the spark and making sure that the timer would cut in seven seconds, I launched my model. Immediately the ship began to spiral in to the right. The engine cut at about twenty feet altitude and the model came in with only a hard bounce. With straight thrust and right rudder the same thing happened. Next I flew with left rudder and straight thrust. Low power flights were good, but when I advanced the spark, three consecutive loops resulted.

Having satisfied my fellow-flyers, I put back the four degrees left thrust, with left rudder for glide, and made a test flight under low power. The ship was chasing its tail in a tight turn looking as if it would spiral in. Before I opened up the engine for the following flight I was greeted with loud cries: "You are going to spin in!" However, my friends were to be disappointed. Under full power, the model went up in a tight spiral. When the engine quit, it dipped slightly and proceeded to glide to the left. The ship clocked three minutes and twenty seconds in calm air. Every succeeding flight was exactly the same.

One thing I disliked was the slight dip when the power cut. So I decided to use my pet adjustment—that of flying left under power and gliding to the right. The engine was given 2° more left thrust (6° altogether) and the rudder tab set for right gliding turn. Test flights were satisfactory, but too steep under power. A half loop and half roll in climb resulted. I gradually increased side thrust until I had a total of 8°. At this point the model really spir-

up to the left. When the engine cut there was no dip and the ship entered a glide to the right. On fourteen seconds engine run, I was averaging four minutes and ten seconds. The ship performed in the same manner consistently. Later I put a Hornet into it and the results were identical. The Hornet revved 12,000 rpm with a 13-8 Rite-Pitch propeller. This adjustment enabled me to go through a successful contest season, collecting lots of hardware and merchandise.

Analysis: Let us discuss the adjustment as shown in Figures 1 and 3. I strongly advise against the use of right thrust. For left thrust, pylon and conventional low-thrust-line ships apply only enough down-thrust to line up satisfactorily other force arrangements of the ships. In other words, no more than normal amount of down-thrust is used with conventional engines. On high-thrust-line ships, only left thrust should be used. Left thrust in a left banking ship is, relatively speaking, down-thrust. Look at Figure 3, which illustrates a model in a vertical left bank. Remember, precession forces are always present. A ship adjusted with little or no left thrust describes a flight path as illustrated in Figure 4. It loops, and the plane of the loops is vertical or nearly so. The model will probably crack up after one or two loops. I saw an example of this, where a McCoy 49 job went up in a long arc, reached about 200 feet, and went over on its back; completing the loop it hit the ground with its nose.

The flight path followed by the ship in Figure 5 is that of a model with more left thrust than in Figure 4, but not sufficient for good power flights. It is looping not perpendicularly but obliquely. Therefore, if more left thrust were applied, the loop would be eliminated. A perfectly adjusted model will climb steadily and swiftly to the left until the engines cut, and with rudder set for right turn will assume a gliding turn to the right. This is shown in Figure 6.

My own ship, described earlier, was named "Q.E.D." (in Latin, *Quou Erat Demonstrandum*, meaning "Which was to be proved"). It won or placed in every contest I entered. It was lost out of sight on the second official flight at a Skyscraper Contest, where it won the Charles Sciara Memorial Trophy.

Model aviation will advance only through better understanding of basic design and adjustment fundamentals. And we can get greater enjoyment from our hobby through more thorough testing and experimentation.

The Last Word

Latest Word on the Roadables: As we were toddling off to the printer with this issue, Molt Taylor (see lead article) sent along the following pic of his Aerocar. Said Molt, "We have the bugs well worked out of the automobile and are now hard at work on the wings and tail. We feel that the car *is* about equal to any of the light automobiles and it sure will get out and leave them at a 'go' sign. Weight is within our allowance, so we have little fear about the flight characteristics."

Keep your eye on Air Trails (KYE-OAT!) for the latest news on roadables.

Hold Your Horses: Air Trails receives so many excellent contributions to its Airmen of Vision, Record Review and Sketch Book departments that it may be quite some time before we get around to publishing yours. Messrs, Dawydoff, Zaic and Thomas who handle those sections for us (respectively) request that you not get alarmed if your super contribution is not rushed right into print. If it's really top-notch, you can expect we'll present it eventually.

* * *

Wot's doing in September? Now that's a *good* question! First of all the cover: a memorable picture of a mythical Thompson Trophy Race with the Laird Solution (1930 winner) racing against the Pesco Special (1938-39 winner) and Johnson's F-51 (last year's winner). And the lead article is "The Aerial Hot Rods, the History of the Thompson Trophy Race." With those super AT photos and sketches.

Doug Rolfe's Air Progress drawings are devoted to the history of the Stinson planes. Another must for your historical scrapbook. There's a fine story on Roy Marquardt, well-known old-timer in modeling circles, now the leading ramjet engine designer and manufacturer, done by Don Downie. And you'll learn a lot about your aviation career in "There's No Place in Aviation for the Untrained."

Big deal for model builders will i AT's pictorial roundup of post-w model engines. You'll get all the specs plus interesting info on leading motors in easy, readable form. To go with the "We Fly the Midget Mustang" yarn, we've corraled Calhoun Smith and have his outstanding plans for building a U-control scale model of the Long-Schweizer Midget Mustang. A hot flyer!

More, you ask? Absotively . . . take the flying scale rubber-powered Macchi, for instance. Cristo Russo comes up with a fine set of drawings. And for the circle-burners there's the World War I Roland, one of Germany's cleanest, yet least-publicized biplane fighters. Even has a pylon.

Plus plenty more. —THE EDITORS