

RESEARCHER

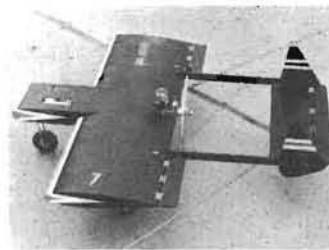
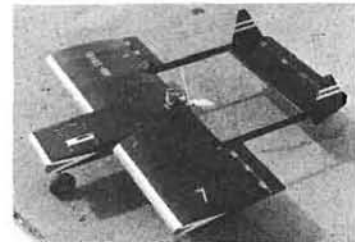
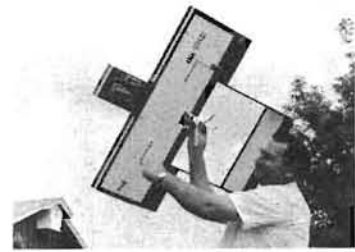
The Researcher No. 7 design is the direct result of two years of intensive study, testing and building the six "Researchers" that preceded it. Each one of the ships, No. 1 through No. 6, all contributed to the configuration, structural design, and equipment placement in ship No. 7.

Ships No. 1 and No. 2 had a 70 inch wingspan and angled booms that positioned the stabilizer above the thrust line. Both had a semi-symmetrical airfoil. These two features caused the planes to climb at higher airspeeds with a nominal roll rate. Both planes weighed in excess of ten pounds. Ship No. 2 utilized rudders but they were ineffective.

Ship No. 3 approximated ship No. 7's configuration but utilized a semi-symmetrical airfoil with a 48 inch span and 38 inch length. The booms and horizontal stab were centerlined as was the thrust line. Its airspeed capabilities were far better than ships No. 1 and 2. The roll rate, pitch rate, and rate of vertical climb were almost double that of the previous planes, while the slow flight capabilities were almost unbelievably slow without any tendency to inadvertently snap.

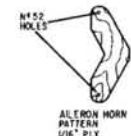
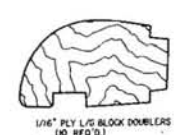
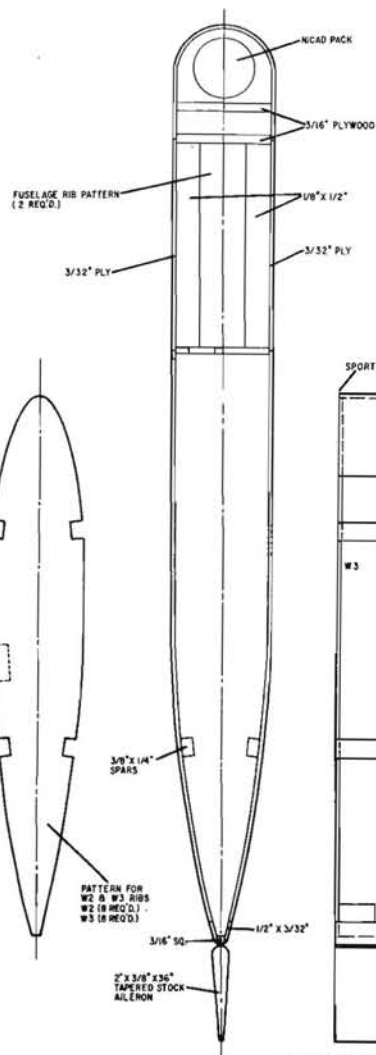
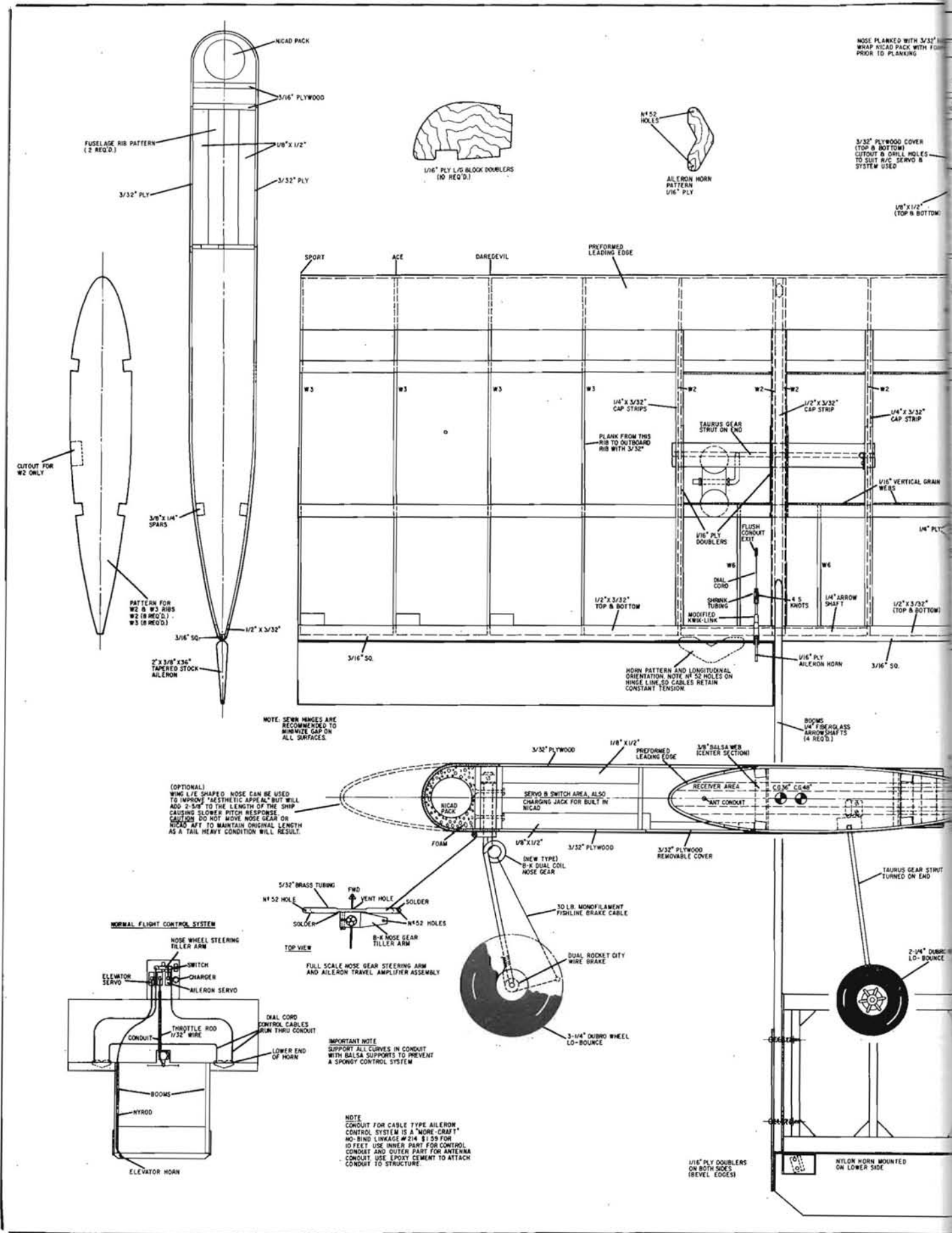
Ship No. 4 was a departure from the previous three in order to examine the possibilities of even a shorter wingspan. No. 4 was a flying wing type with a 36 inch span, 24 inch chord length and a 4 inch chord depth. It was a pusher, like the rest, but had a symmetrical airfoil and no booms. The prop ran in an opening in the wing with the stab in line behind the propeller. This plane had absolute stability with a slow roll and pitch rate. It flew as well inverted as it did right side up. Large fins at the ends of the wing gave good directional stability, but due to the slow roll and pitch rate, ship No. 5 became necessary.

Ship No. 5, I decided, would have all the features I thought necessary for a truly high performance R/C airplane. A symmetrical 36 inch span, 14 inch chord length and 2 inch chord depth wing was used with a 36 inch O.A.L. Flaps opposite the elevator and the rudder with large upper and lower centerline fins were employed in an attempt to increase the pitch and yaw



by ralph sawyer

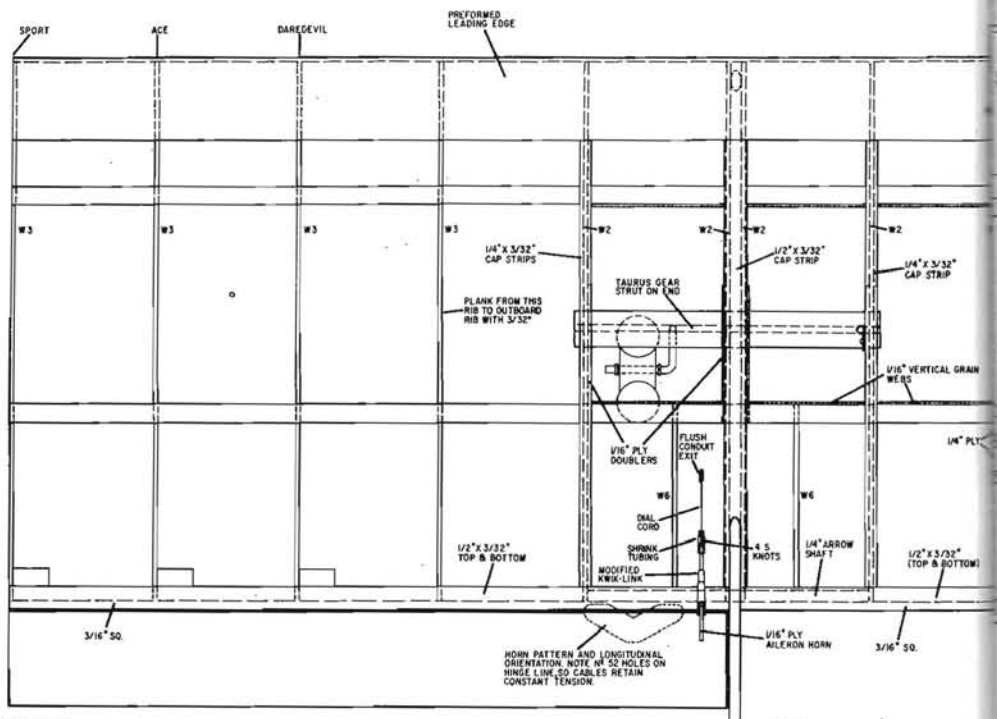
SEVEN



NOSE PLANKED WITH 3/32\"/>

3/32\"/>

1/8\"/>



CUTOUT FOR W2 ONLY

3/8\"/>

PATTERN FOR W2 & W3 RIBS (W2 (8 REQ'D) - W3 (8 REQ'D))

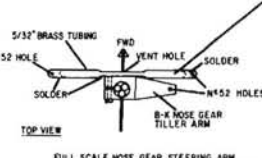
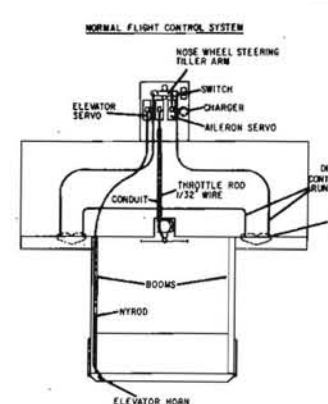
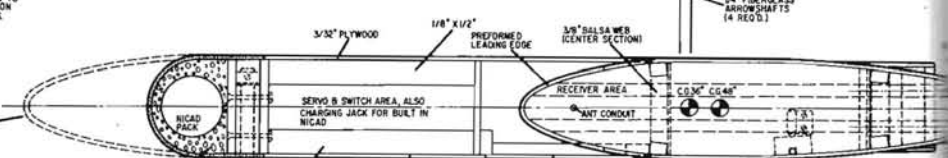
3/16\"/>

1/2\"/>

NOTE: SEWN HINGES ARE RECOMMENDED TO MINIMIZE GAP ON ALL SURFACES.

(OPTIONAL) WING LIFE SHAPED NOSE CAN BE USED TO IMPROVE "AESTHETIC APPEAL" BUT WILL ADD 2-5/8\"/>

CAUTION: DO NOT MOVE NOSE GEAR OR NICAD AFT TO MAINTAIN ORIGINAL LENGTH AS A TAIL HEAVY CONDITION WILL RESULT.

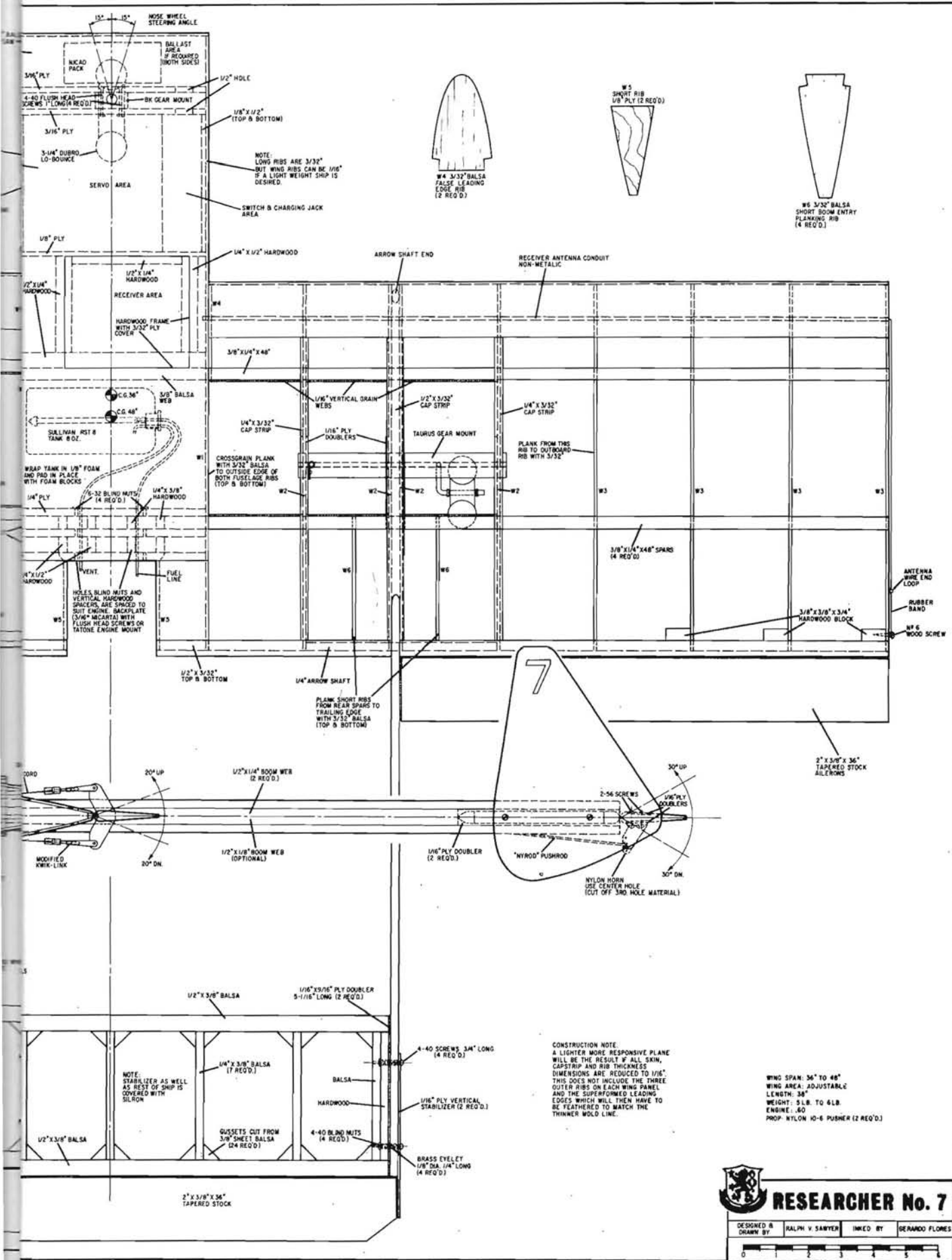


IMPORTANT NOTE: SUPPORT ALL CURVES IN CONDUIT WITH Balsa SUPPORTS TO PREVENT A SPONGY CONTROL SYSTEM

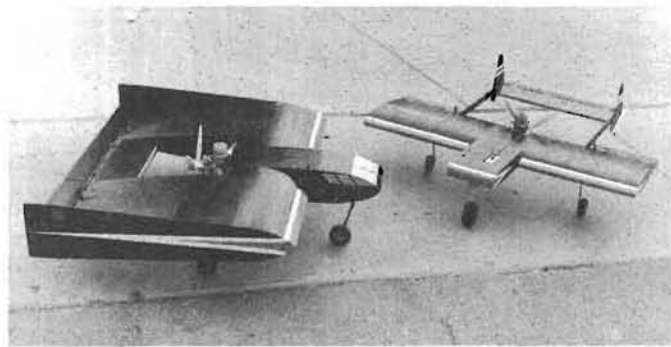
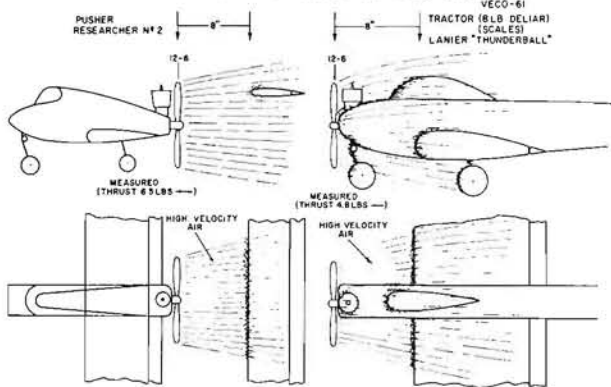
NOTE: CONDUIT FOR CABLE TYPE AILERON CONTROL SYSTEM IS A "MORE-CRAFT" NO-BIND LINKAGE #214 \$1.99 FOR 10 FEET. USE INNER PART FOR CONTROL CONDUIT AND OUTER PART FOR ANTENNA CONDUIT. USE EPOXY CEMENT TO ATTACH CONDUIT TO STRUCTURE.

1/16\"/>

NYLON HORN MOUNTED ON LOWER SIDE



PROPELLER BLAST VS. STRUCTURE DRAG EFFECT
COMPARISON - SAME ENGINE & SCALES USED IN BOTH CASES, ALSO SAME FUEL
VECO-61



Researcher Seven pictured alongside Researcher Ten (to be presented in a future issue of RCM).

rates. A short in my transmitter antenna lead ended this test on the first flight, too soon to evaluate the merits of the above mentioned features.

Ship No. 6 was almost a duplicate of No. 3 with the following exceptions: a thick symmetrical airfoil and large rudders were used with an attempt made at making the booms lighter and the nose wider. The roll and pitch rate of this plane was rather slow and the rudders were ineffective, causing only a little adverse yaw. This plane, like all of the "Researchers", had wide main gear, nose wheel steering and brakes which made ground handling a pleasure. Armed with the previously mentioned performance characteristics and functional advantages which will be brought out later in this article, Researcher No. 7 was built and test flown in the following sequence:

CONSTRUCTION

A 12" x 48" piece of plywood, 1/2" thick, covered with a 1/2" thick piece of Celotex makes an ideal portable jig and building board for this plane. In this manner, you can work on the coffee table, kitchen table, or card table, and pick it up and put it away while the plane is in the construction stage if necessary. Construction proceeds as follows:

Cover the workboard with Saran Wrap, install six 3" pieces of masking tape across the two 1/4 x 1/2 boom webs in equal distances from one end to the other, and pin the webs to the workboard, making sure they are pinned straight with the sticky side of the tape facing up.

Lay the arrowshafts down on the tape, touching the web full length. Roll the arrowshafts away from the web 90 degrees and run a heavy bead of epoxy cement along the full length of the tops of the arrowshafts. Then, roll one arrowshaft in next to the web and press the tape down against the

top of the web. Roll the other arrowshaft in against the other side of the web and press the tape down on top of the first tape strap. Once again, sight down the broom assembly and make sure it is perfectly straight. If a bow is left in them at this point the bow will be permanent when the epoxy sets up. Centerline one of the wing ribs on one end of both booms and mark and cut the end of the booms to coincide with the nose of the rib. This will insure a snug fit in the leading edge and give proper wing-boom alignment when the booms are installed. Cut the aft ends of booms to the correct length and you have just completed a major portion of the model's construction.

Now block up the two lower 1/4" x 3/8" x 48" spars so that the ribs will clear the board. Angle the blocks to allow the spars to contour to the ribs and use enough blocks to rigidly support the spars. Glue all ribs to the lower spars and check to make sure they are vertical to the board and lined up on the print. Lay a straight edge across the fuselage ribs near the front and assure that the straight edge is parallel to the board. Install upper spars and double check the nose rib alignment. Install the preformed leading edges and 3/16" sq. trailing edges. Check the trailing edges and see if they meet at the center of the engine cutout. This will verify the trailing edge alignment. Install the lower trailing edge 1/2" x 3/32" capstrips and allow the entire assembly to dry.

Boom installation: Use a saw and remove the trailing edge material between the boom ribs on both wing panels. The booms should be sanded smooth prior to installation. Slide the booms in the slot until the boom nose bottoms out in the leading edge. This should be a snug fit. Lay a straight edge on the aft ends of the booms. The straight edge should be parallel with the top spar (this is the most critical alignment during construction). If the

straight edge does not parallel the top spar, shift the tail end of the boom until proper alignment is obtained. If you have installed the boom ribs straight on the plans, the distance between the booms at the trailing edge of the wing and at the aft end of the booms will be the same. After assuring that the lower spars are down tight against the blocks, and that the booms line up properly, slide out the booms and coat the boom rib and boom contact areas with epoxy glue, slide the booms back into place and check alignment again. You will note that the booms just barely slide between the two rear spars. Coat the spar and booms in this area with epoxy cement. After the epoxy is set up, drill a 1/4" hole through the center of the boom web where the 3/16" sq. and the lower 1/2" x 3/32" trailing edge capstrip form a corner. You will have four 6 to 7 inch pieces of arrowshaft left over from the boom construction, so slide a 6" piece through the 1/4" hole and epoxy the arrowshaft to the boom web and trailing edge. Install the upper trailing edge cap strips, forward and rear spar webs, and false leading edge ribs on the fuselage sides. Install the two plywood forward fuselage formers after installing the blind nuts for the nosegear and making the 1/2" holes. Make the rectangular cutout in the aft former. Install these three formers with epoxy glue. Screw the nosegear mount block in place with the gear installed.

Wrap your battery pack in thin foam and tape loosely with masking tape. Pack the ends of the pack with thick foam to fill up the nose cavity. Cover the nose and pack with a piece of the super formed leading edge after routing the battery plug through the 1/2" holes in the forward formers. Plank the top of the fuselage from the nose to the wing trailing edge. Now lift the structure from the workboard.

(continued on page 62)

now packaged **STRAIGHT...**
in a Slim-Pak • with all hardware!

NYROD[®]

ORIGINAL COIL-PAK (now with NYRODapter)
available in 30" or 48" lengths



PLAINFIELD, ILL. 60544



RESEARCHER SEVEN

(continued from page 24)

Install the main landing gear as shown on the plans and plank the wing panels both top and bottom as shown. Install the rib capstrips at this time as well as all framing shown on the bottom of the fuselage in the servo and receiver compartments.

The fuel tank installation is left to the builder's choice insofar as type, size, and orientation, but here are the reasons for the installation as shown: The Sullivan RST-8 tank will just fit between the front spars and engine blind nut mount plate and conform to the mold line of the airfoil if thin foam

is used for packing. 8 ounces of fuel is more than enough fuel even with a .60 engine since most of your flying will be done at reduced throttle. This plane does a lot of flying in a short time! The tank is mounted cross ship due to the required location of the spars. I have flown ships No. 7, 8 and 9 through many flights with this type of fuel system and have not experienced one airborne engine failure. This is simply because this plane has no rudders and almost no side area to cause lateral "G" loads. So much for tank theory at this point. After the fuel tank is set up and pressure checked for leaks with the fuel and vent hoses installed, wrap the tank with one layer of very thin foam and masking tape. Place the tank in the wing and route the lines out through the holes in the engine mount and fill all open areas with blocks of foam. Check to see if any lines are kinked, then plank the bottom of the fuselage from the nose to the trailing edge of the wing. Be careful with the pins in the tank area

and don't poke a hole in the tank!

Before the upper and lower servo compartment plywood covers are installed, make the required cutouts and holes for your equipment. I install a 5/32" brass tube, 3" long, and flattened slightly on the ends, on the front side of the B&K nosegear arm by soldering the round tube directly to the flat front side of the arm. Then drill No. 52 holes, 2 3/4 inches apart, in the flattened ends of the tube after filling both ends with solder. Chamfer the edges on these holes to protect the nylon pins of the NyLinks used here for aileron control. (Note - this nosegear modification is made prior to installation, if this is desired. A small hole in the center of the tube will prevent solder bubbles.)

The horizontal stabilizer is framed in the conventional manner except that the 4-40 blind nuts are installed in the hardwood end ribs prior to installation. Install the 1/16" plywood plates on the inboard sides of the booms after drilling No. 33 holes



FRESHMAN A.R.F.

Span: 56", L. 38"
W. Area: 500 Sq."
Eng.: .19 to .40
Clark Y Air Foil

Moulded A B S Fuselage, (assembled) Foam Wings, Moulded Tips, Covering Materials, Illust. Inst. (Rapidly growing in popularity for its inherent STABILITY and its EXCEPTIONALLY impact resistant construction. STANDARD KIT: \$19.95 DELUXE KIT: with factory covered wings, \$22.95

Aerovac Products

DER "MIDDLE" STICK

Fuselage: Moulded A B S (assembled) Foam Wings Moulded Tips, Covering Materials. Illustrated Instructions. Span: 54" L. 40", Wing Area, 480 Sq." (Its rather HOMELY but a great preformer at a MODERATE price)
STANDARD KIT: \$22.95
DELUXE KIT: with factory covered wings. \$25.95

ORDER INFORMATION

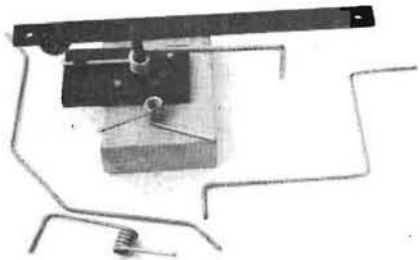
Send--Cash, Check or Money Order. 50% deposit on C.O.D.'S. All orders shipped postage collect. Specify, Bus, Parcel Post or Air Mail.

DEALERS

Regular discounts on Pre-paid Orders. All orders shipped POSTAGE COLLECT.

AVAILABLE SOON BY AEROVAC--two LIVELY ones: (1) The QUICK FLY 3-T an A.R.F. 'dream plane' and (2) the EL AVION, a hot competitive model. These will be offered in various stages of construction.

MAIL TO: AEROVAC
1845 East Yale Street
Phoenix, Ariz. 85006



BENT OUT OF SHAPE?

Don't Be! Midland Pacific's Coil and Wire Bender assures absolute accurate forming of music wire up to 3/16" diameter. A positive lock holds the wire firmly in place until released. New model will form joggle, or "S-hooks" for control linkages. Coil nose gears can be formed instantly with this rugged unit that carries the R/C Modeler Magazine "Tested, Approved, and Recommended" seal. Price is \$12.95. The ultimate in coil and wire benders!

MIDLAND PACIFIC, INC.,

P. O. Box 1861, Billings, Montana

(406) 252-6895

shown. Use epoxy cement to install these plates. When the plates are dry, drill the No. 33 holes through the balsa boom webs using the plywood plate holes as a template. Ream the holes in the balsa webs to accept 1/8" O.D. brass eyelets, 1/4" long, and force the eyelets into the balsa webs with a little glue on them. The eyelets will transport the load of the 4-40 screws to the plywood plates without crushing the balsa web and deforming the 1/16" vertical stabilizers. Cut (2) vertical stabilizers from 1/16" plywood as shown on the plans and drill them with No. 33 holes as shown. After sanding the horizontal stabilizer to shape, install the horizontal and vertical stabilizers with four 4-40 screws 3/4" long. The horizontal stabilizer should be parallel with the wing and the vertical stabs should be absolutely vertical. This is a trial fit on the tail assembly and a little sanding or filing may be required. Shims may be required to make the vertical stabs. Stand straight, but under NO circumstances sand into the arrowshafts or do anything to weaken them - except for the hole required for the NyRod exit.

After you have installed your favorite control system, or tried mine

as shown on the blueprint control sketches, you are ready to finish the plane. After sanding the entire plane to shape, cover it with Siron. If you want a responsive plane, **keep it light**. About 3 heavy coats of clear dope and one heavy coat of sprayed on color does fine for me, but if you must have a finish that looks like a piano, keep in mind that this plane should balance close to 25% from the leading edge. Even if you have put the battery pack in the nose and installed your radio equipment as far forward as possible, an excess of dope can force you to put lead in the nose to arrive at the proper C.G. Any excess weight will detract drastically from the vertical performance of this, or any, airplane. I repeat "Keep It Light!"

As you have probably already noticed, the Researcher No. 7 is strictly a functional design with no attempt made to simulate any full size plane nor does it have all the features of the present pattern type R/C plane. It has been refined to its present configuration to provide the accomplished R/C pilot with a plane that will not limit the pilot. If the pilot has the skill and nerve, this plane will do his bidding. This is not a beginner's plane but the 48" version can easily be flown by the

experienced flyer, while the 36" version has to be flown every second to stay ahead of it! The plane has NO inherent stability but has good directional stability and will **go where you aim it**. Some of the advantages of this design are as follows:

- 1) Clean airplane. (No oily mess to wipe down.)
 - 2) Small size makes transport and storage easy.
 - 3) No aileron servo disconnect required. (One piece airplane.)
 - 4) Engine torque cancellation.
 - 5) Positive fuel pressure during nose-up attitudes.
 - 6) Positive vertical performance.
 - 7) Better glow plug operation during idle. (No prop blast to cool it.)
 - 8) No high velocity air to suck fuel out of full tank vents.
 - 9) More thrust (25%) from the engine. (See pusher-tractor comparison.)
 - 10) Less vibration amplitude due to engine installation in wing (mass damping).
 - 11) Low cost and simple construction.
 - 12) Quick roll and pitch response.
- While these are only some of the major advantages, you will no doubt discover some yourself after you

"COBRA", TRIPLE THREAT!

Modelers are telling us that this is a mighty fine aircraft which they enjoy greatly. They also tell us that it is the most versatile that they have ever had. With a "Cobra" they are entering more events at a meet than ever before which makes contesting more fun and easier!

1. This is a first class pattern aircraft fully capable of top points in the NEW AMA pattern event.
2. It is one of the few which fits Formula II racing and IT IS WINNING for all those who fly it.
3. The "Cobra" is also eligible for open pylon and IS WINNING there too.

Where else can you get so much for so little effort than with this fine design and quality kit? The "Cobra" kit is of the QUICK BUILD type including finished machined parts ready for glue and complete hardware. New to model assembly is the exclusive Leading-Trailing edge wing jigs and preformed fuselage planking. You have to see it to love it!

Complete Dmecco Catalogue available... 25c postage

THE NEW R/C SCALE "COBRA"

Real Looking plus Winning Performance!



DELUXE KIT ONLY
\$ 34.95

deBOLT MODEL ENGINEERING CO

3833 HARLEM ROAD
BUFFALO, N. Y. 14215 U.S.A.

"CANADA"

Canadian Distributor and Service Center for

Micro Avionics Radio Equipment

XL-IC 4D \$410.00 XL-IC 6D \$440.00

(Ready-To-Fly)

P-51 Semi-scale

.19 powered 44" span \$49.95

Flea Fly

.19 powered 39" span \$49.95

(P-51 and Flea Fly Fiberglass Fuselage and Balsa wood covered Foam Wing)

Fiberglass Fuselages & Foam Wings for Sweek, Firebird, Jetfire .. \$39.00

Lil Toot — Fuselage \$30.00

New Releases

Old Tiger Goodyear

Fiberglass Fuselage — Foam Wing — all accessories including wheels and wheel/pants \$49.95

Also Available

Fox Engines, Plugs and Duke's Fuels, K&B Engines, Veco Engines, Midwest Balsa Wood

For Information Contact

TYG-AIRE ENTERPRISES

13122 129 St., Edmonton 44, Alberta, Canada
Phone Area Code 403 — 454-6954

WIN WITH WARNER

NOW AT NEW LOW PRICES

NEW ITEMS

\$1.25 FIBERGLASS CLOTH:
2.5 oz/sq yd, 28" x 38", .004" thick
\$1.85 FIBERGLASS TAPE:
6 oz/sq yd, 6" wide x 60" long, .007" thick
\$15.45 Warner Jig-It — A fuselage Jig.

NEW WINGS

\$6.45 RCM TRAINER \$6.45 SUPER RCM TRAINER
\$8.45 PROFESSOR
\$6.95 NEW ERA
\$7.95 RCM X-Perf \$6.95 New Era I

SEE THEM AT YOUR DEALERS TODAY

Cores come ready to be covered.

Including:

Precut dihedral angles • Bellcrank or Servo cut-outs • Landing gear cut-outs and mounts where applicable • Control line wings drilled for lead-out; no breaks in surface • Fiberglass reinforcing cloth • Instructions.


CONTROL LINE FOAM WING CORES

\$6.45 MAGICIAN \$7.45 NOBLER
6.45 RINGMASTER 7.45 SKYLARK

RADIO CONTROL FOAM WING CORES

\$6.45 Tauri \$8.95 Aristo-Cat
6.45 Tri Squire 8.95 Patriot II
6.95 Falcon 56 8.95 Zeus Mark IV
6.95 Sky Squire 9.95 Cherokee
7.45 Instructor 9.95 Regular Taurus
7.45 Jenny 9.95 Swept Taurus
8.45 P-Shooter 10.45 Kwik Fli II
8.45 Sr. Falcon 11.45 Candy

Wholesaler and dealer inquiries invited.

warnar industries, inc.
 259 hosack st.
columbus, ohio 43207

commence flying the Researcher No. 7.

FLYING

After setting all control surfaces to neutral, start the engine and adjust mixture to allow full RPM and good clean throttle bursts from a moderate idle. This mixture setting will be leaner than you are used to, but remember that the fuel pressure goes POSITIVE on pull-ups and the engine will not sag like it normally does. Taxi the plane to the downwind end of the runway, line up, and advance the throttle to 50%. You will find nose wheel steering very effective for directional control until lift off. After the plane has accelerated down the runway about 75 feet, slowly advance the throttle to maximum. On the average R/C runway, with the pilot at about center, the plane will be ready to fly as it comes in front of you. Apply enough elevator to rotate the plane and it will leave the ground at an angle proportionate to the amount of elevator applied. Climb steeply, about 45 degrees to 150 feet altitude, push the nose over to level, and throttle back to about 50%. By this time the plane will be getting small, so roll the plane 80 degrees to 90 degrees, apply some up-elevator, and it will be coming back at you. Roll out and bring the plane overhead. Advance to maximum throttle and point the nose straight up. Apply maximum roll control and watch the plane roll rapidly as it goes straight up. Stop the roll, push the plane over to level, and throttle back to 50%. You will immediately notice that to prevent excessive speed build-up, you have to use the throttle constantly. If you have chosen the 36" version, you will notice that the roll rate in fast level flight is VERY fast and it will take practice to always stop the roll right side up. The rolls are axial and are too fast for elevator application if full roll rate is commanded. At 50% throttle you will find that the loops are small and if you apply more than 50% elevator control the plane will high speed stall and roll out of the loop. At higher speeds and throttle settings the controls are capable of over-controlling, but at extremely slow flight you will find these large area, high deflection angle controls are still adequate. With the plane at about 150 feet, pull the plane into a circle around you and retard the throttle to about 25% - keep the plane angled so you are looking down the wing, then slowly let it come down, with each rotation, to about 50 feet. Advance

the throttle just enough to keep the plane at this altitude and you will be flying it control-line fashion. Do not let the plane slow down too much at this point until you have a few flights and know just how SLOWLY your plane will fly and what it will do when it DOES stall. My 36" model, in a left circle, will roll to the right when this type of stall occurs but normal control returns the instant throttle is applied. Aileron control ceases at about 8 MPH on my plane but elevator control is effective regardless of airspeed as long as the engine is running.

After you have flown long enough to get the feel of the plane, throttle back to 25% and get in the runway pattern. As the plane goes past you on the downwind leg, throttle back to 20%, make the crosswind turn, but hold the nose up. As the plane comes into the final leg, pull the engine back to full idle and ease off on the back-stick pressure a little at the same time. That 4-blade prop will be just like a big speed brake as the engine idles, so keep the nose SLIGHTLY down until the plane is about 2-3 feet from the ground. Now ease back on the stick, pick up a low wing if you have one, and the plane will touch down and roll 10 or 15 feet to a stop. You will note that landing speed was very low and spot landings will be a snap. I hope, as you taxi the plane into the pit area, that you feel the excitement and joy as I did when I taxied this Researcher No. 7 in from the first flight. At last a plane that has more capabilities than most pilots possess. With stunt and a speed range capability that is truly different from anything you have seen in the past. If you cut the wings down less than 36" you will be doing research of your own! This Researcher project is still wide open for further development, especially in the yaw control area, and that will be another story. In the meantime, if you really want a change of pace, try a Researcher No. 7 and you may permanently retire that "look-alike" type you have been flying.

Above all else, enjoy yourself and many happy landings!

THE TARMAN

(continued from page 16)

Titebond glue. Install bulkheads F4, F5, and F6. Be sure you install these bulkheads directly over the plans, checking with a right angle to make sure you have both the sides and