#623

Built from plans found in the 1933 *Flying Manual* republished by the Experimental Aircraft Association, this RC quarter-scale old-timer with an O.S. .40 four-stroke is a perfect synthesis of realistic sight and sound as it putt-putts gracefully through the air.

OFTENTIMES, the sound a machine makes implies a certain speed. The high-pitched scream of an unmuffled dirt motorbike or a Grand Prix race car creates the illusion of traveling faster than a street machine at the same visual speed. That's why the high-pitched, though well-muffled, sound of a two-cycle engine has always seemed to me to be appropriate for maximum-performance models such as Pattern or sport aerobatics airplanes and Pylon Racers.

When I got my first four-cycle engine a few years ago, an O.S. .40, it was the sound, even more than the engine's other good qualities, that really affected me. Hearing that O.S. reminded me of the days when airplanes like Piper Cubs, Taylorcrafts, and Aeronca Chiefs were flown with 40- to 65-horsepower Continental flat-four engines off grass flying fields. These graceful, low-powered machines embodied a design goal of flying one or two people with the greatest possible safety and performance per dollar of cost; not everyone could afford a Staggerwing Beech. As for why the O.S. evoked images of the earlier, full-size airplanes, possibly it's because the higher rpm of the .40's single cylinder exhausts at nearly the same frequency as the slower-turning four-cylinder airplane engine. At any rate, my model four-cycle engine seemed destined to be used in a graceful, slow-flying airplane that would putt-putt around like an old Piper Cub. My first idea was to build an antique like the original Berkeley Buccaneer or the Miss America.

■ Bill Weaver

Henderson

Then, it occurred to me: Why not make a seven-to eight-foot-span model of an old lightplane or home-built, while using the same type of construction, the same flying weight and wing loading as the antique models? It would be the perfect synthesis—an airplane appropriate to the four-cycle sound that would also look real.

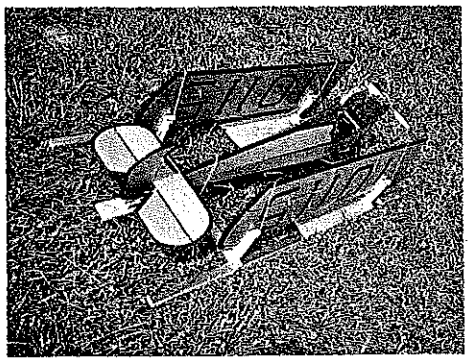
That decided, I scanned back in my mind over the lightplanes and home-builts I liked, and remembered Les Long's Henderson Longster.

This was an elegant little 1933 home-built that combined the design elements of an Aeronca C-2 and the original Henderson-powered Heath Parasol to create an airplane more graceful than either. In those days the only inexpensive engines suitable for home-builts were either Ford Model A and T conversions or motorcycle engines.

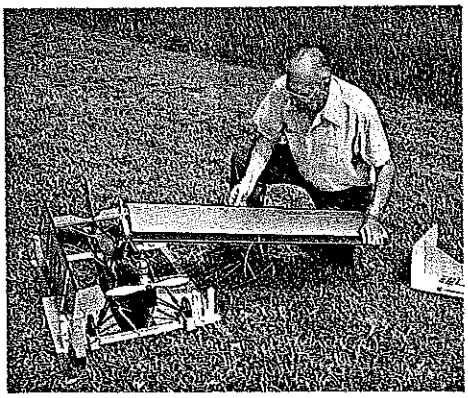
Some years ago the Experimental Aircraft Association republished the 1929 through 1933 series of *Flying Manuals*. I discovered them during a visit to the bookstore of the National Air and Space Museum in Washington, DC, and bought the whole series. These annuals gathered plans of home-builts published or flown during a

Big Picture: "The Summer of '33." At a hay field somewhere in Oregon, airplane builder Les Long waits for a flying buddy to crank his Henderson engine. Above: Displayed here by its designer/builder, Bill Weaver, this quarter-size replica of an old-time homebuilt Henderson Longster has a 7½-ft. wingspan and weighs one ounce less than six pounds. It looks, flies, and sounds just like the original plane.

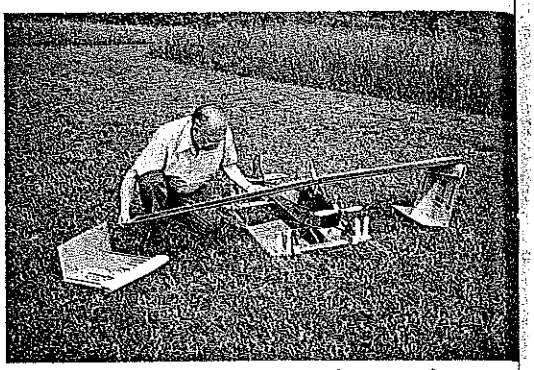
n Longster



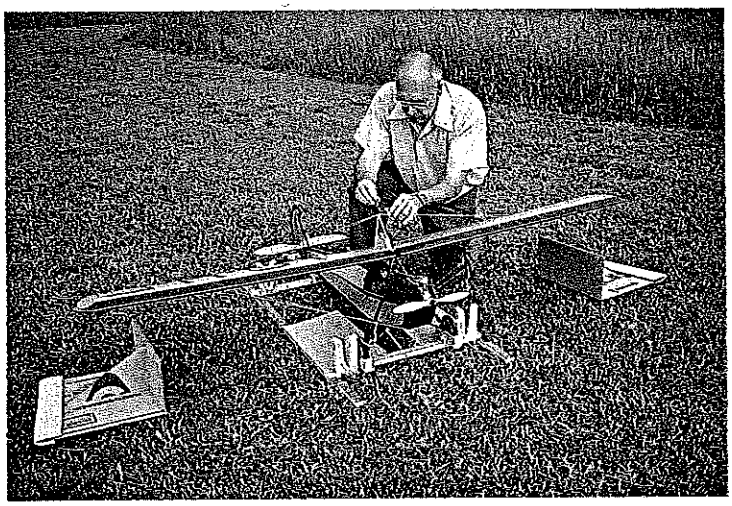
A scrap wood and corrugated board carrying frame is the solution for transporting and setting up a wire-braced monoplane. Model is held in place on the frame by rubberbands, and it can be handled and stored vertically.

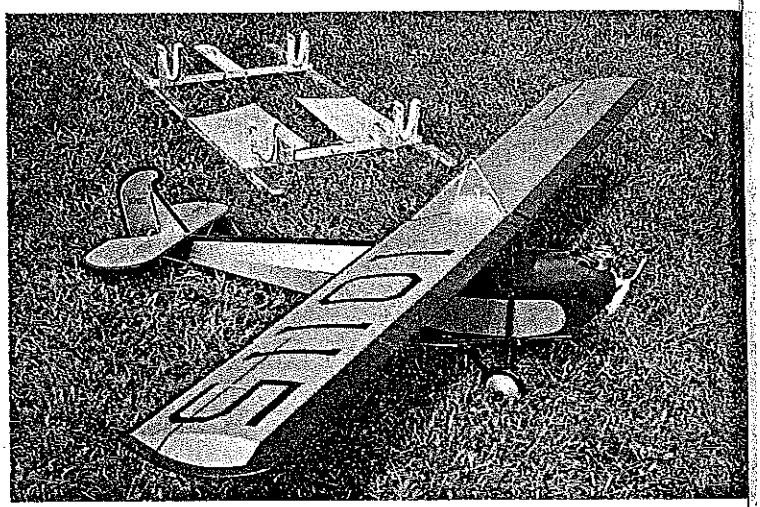


The first step in setup. One wing is removed from the cradle. Stub dowels in the wing are slipped into matching holes in the wing mount, and the wing tip is propped up with a padded support with the flying wires slack.



Second step. Attach and prop up the second wing on its support. Wing wires are normally kept attached to wings and fuselage. Wings can be detached from the fuselage by removing six bolts at the fuselage wire fittings.



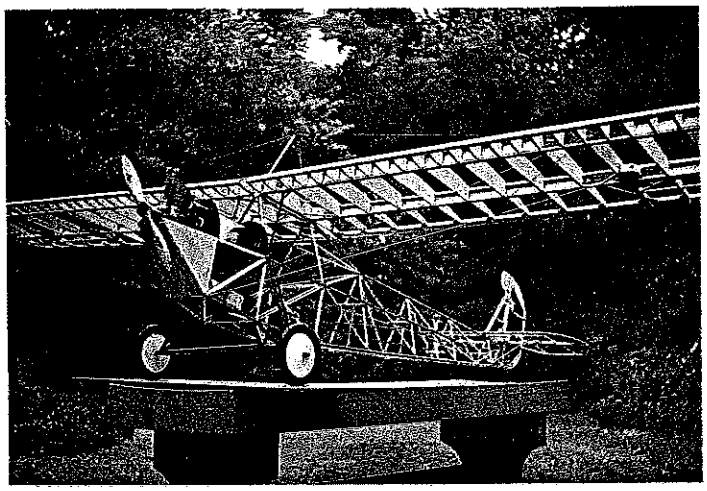


Left: Last step. Landing wire fittings are snapped together behind the pylon and slipped up to the top, tightening all wires like stringing a bow. A screw is inserted through the fitting and into the pylon. Right: Off the frame and ready to fly. The fully assembled plane can be left sitting on the frame so the engine can be run without a helper. The radio and engine can be serviced with the model on the frame and wings in cradles.

particular year. They're a wonderful source of detail drawings for Scale modeling purposes. Luckily, the 1933 *Flying Manual* included working drawings for the full-size Longster, and my prototype model is scaled from the plans, dimensions, photos, and text found in its pages.

Except that it uses model airplane materials, this quarter-scale model exactly duplicates the structure of the full-size Longster. The only other deviations from the full-scale airplane are in the balsa blocks that enclose the hinges, the model engine mounting, the method of attaching the wings at the center section, and the provisions for the RC equipment.

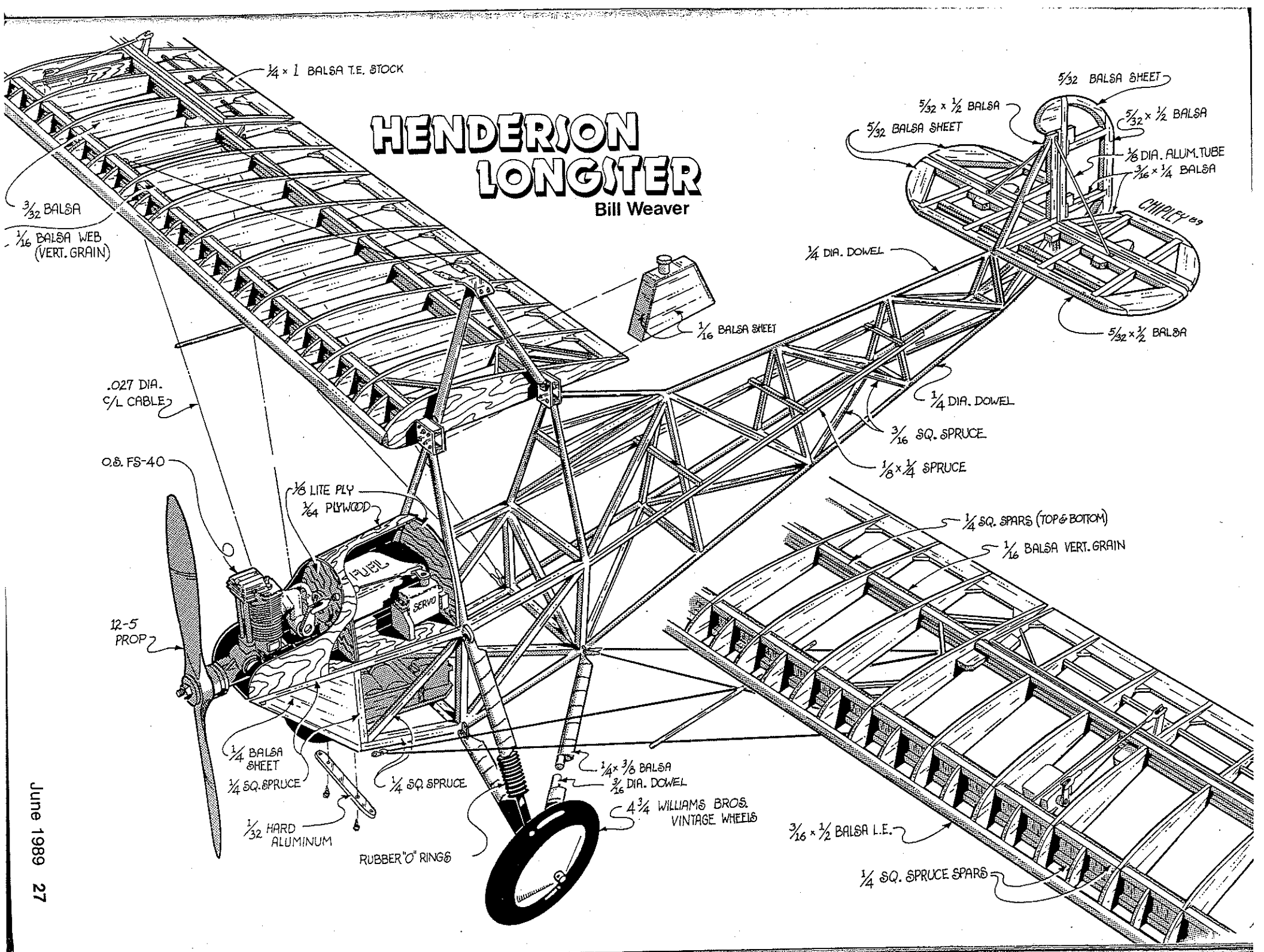
As with many home-builts, the scale structure is very like that of the old Free Flight gasoline-powered models—my Longster weighs 6 lb. with pilot and has a 12.5-oz./sq.-ft. wing loading. At this weight and wing loading the O.S. .40 flies the model very well. The smooth takeoffs from grass and efficient climbouts exemplify the low power requirement by an airplane flying on a lightly loaded wing. Old Les was smart enough to know that with such a long sailplane-like wing he could take off and fly safely with only a 26-hp Henderson four-cylinder motorcycle engine. With the O.S. .40 giving it approximately the same power loading as Les' Longster, the model accurately demonstrates how the full-size plane



Left: The quarter-scale pilot looks realistic on the ground and in the air. The O.S. Max .40 four-cycle engine is scale in height. Because of the plane's light wing loading, the relatively small engine powers this large model very well. Right: Model is to exact scale and duplicates all parts shown on the plans of the full-size airplane. Fuselage is constructed of birch dowels and spruce. The wing and tail are constructed of balsa.

HENDERSION LONGITER

Bill Weaver



flew.

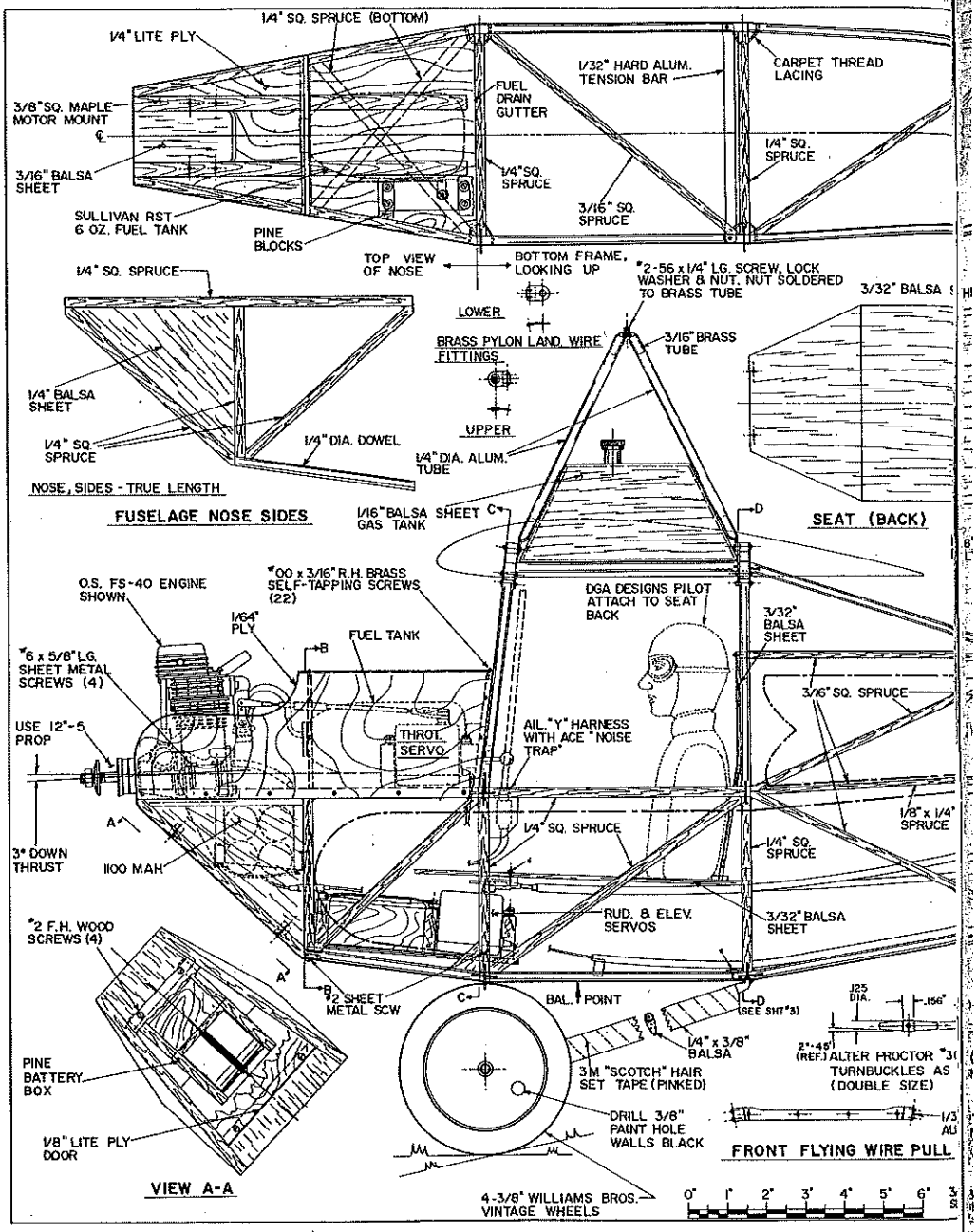
The Longster is a slow, stable flier that will make deliberate scalelike loops, rolls, and slips. With the center-of-gravity as shown, the plane will hold a true spin for two revolutions before diving out. The model's only disadvantage is that, unlike the full-size plane, it won't stand up to winds greater than 15 mph (the scale equivalent of 60 mph).

While the Longster is exactly to scale, because it replicates a very simple airplane it can't be expected to rival the world-class Scale models of fighter aircraft, trimotor transports, and their ilk that are so beautifully crafted for Scale contests today. Rather, this is an everyday sport flier intended as an expression of my respect and liking for the Henderson Longster original.

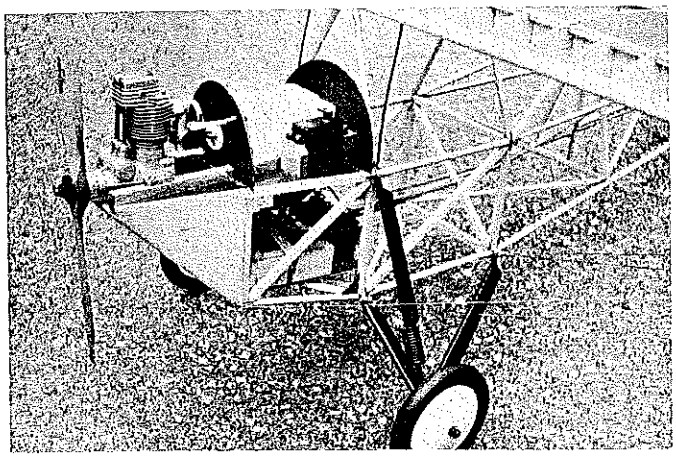
Most of the challenges encountered in sport flying a Scale model have been solved with this design. Transporting and setting up a wire-braced monoplane presented the most obvious problem. My simple solution is a carrying and storage frame.

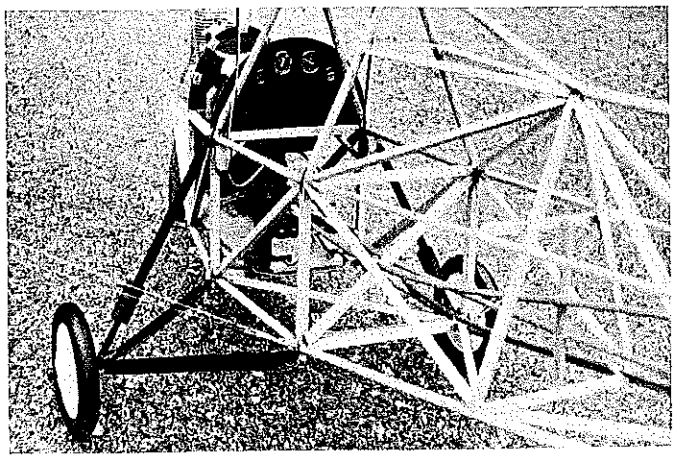
The wings have stub dowels that plug into the wing mounts, while the upper landing wire fittings at the center section pylon are in two pieces that fit together. Upon arriving at the field I set the airplane in its carrier on the ground, take one wing at a time from its cradle, and plug it into the center section. Propping up the wing tip with one of two corrugated-board supports, I bring the landing wire fittings together just behind the pylon, slide the fitting to the top of the pylon, and install a screw. Camming the landing wires over the pylon tightens up the whole system. It's like stringing a bow, except for the effort required.

The entire operation takes only a minute—less time than to attach a lot of rubberbands. Reverse the operation to remove the wings. The lower flying wires remain attached but are allowed to sag down and rest on two corrugated-board pieces on each side of the frame beside the cockpit area. The wing can be removed, if necessary, by taking out the three screws that attach the flying wires to the fuselage on either side.

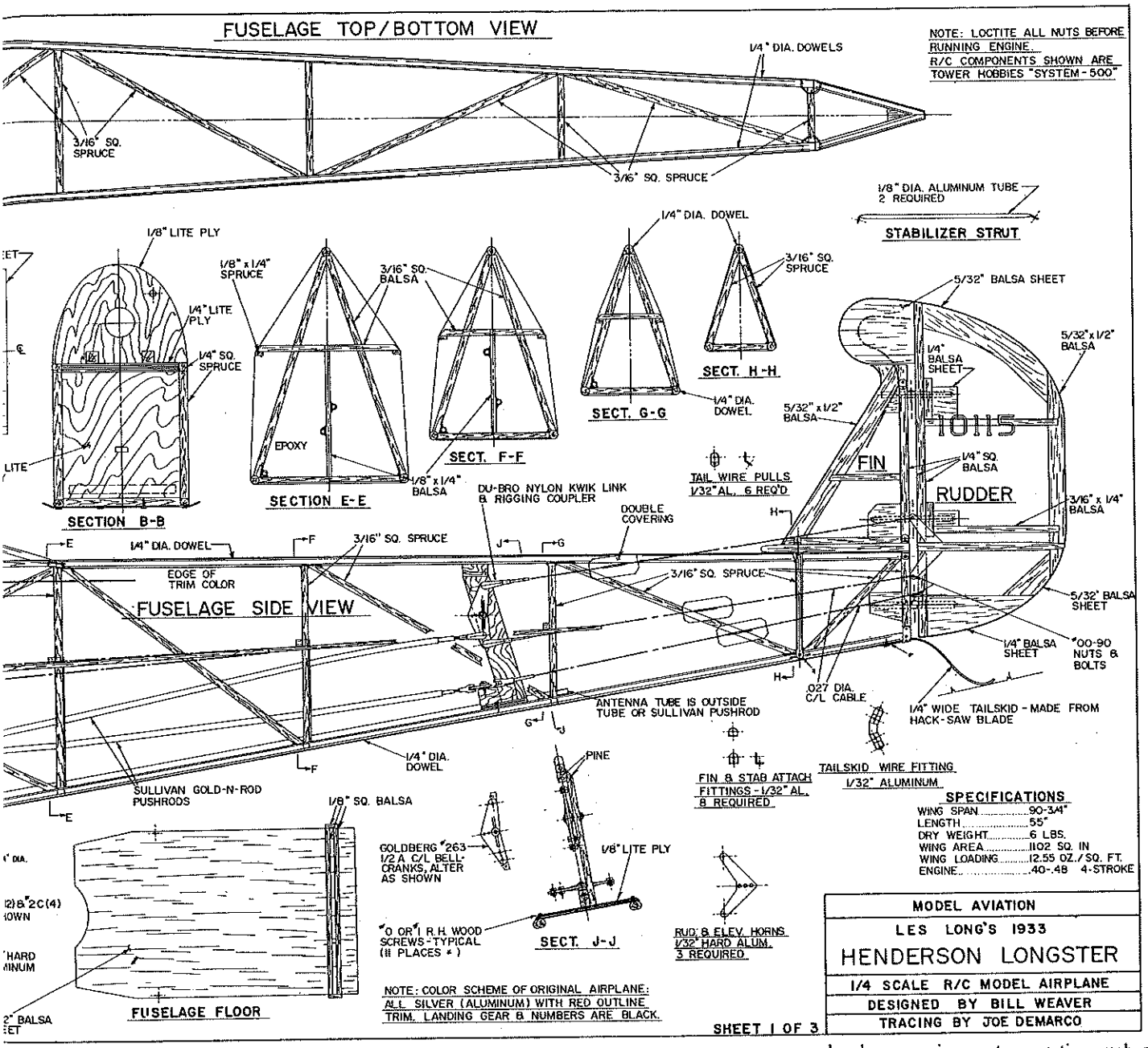


Because my design for the model carrier was dictated by the scrap lumber I had available, no plans are included for that item. With only the photo to guide you visually, you're pretty much in open territory. In my carrier, though, the wing cradles are lined



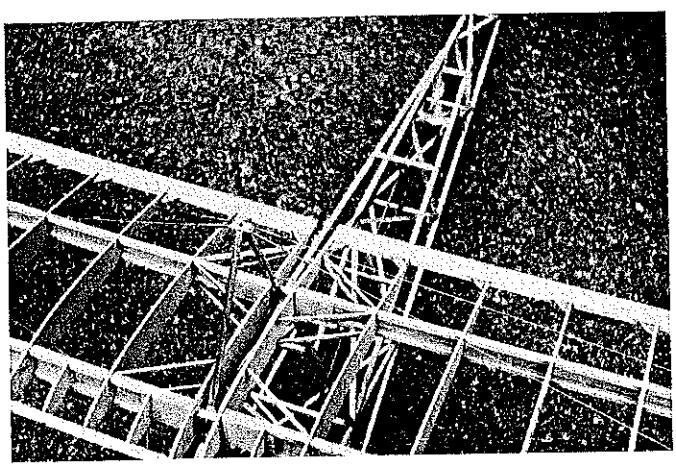


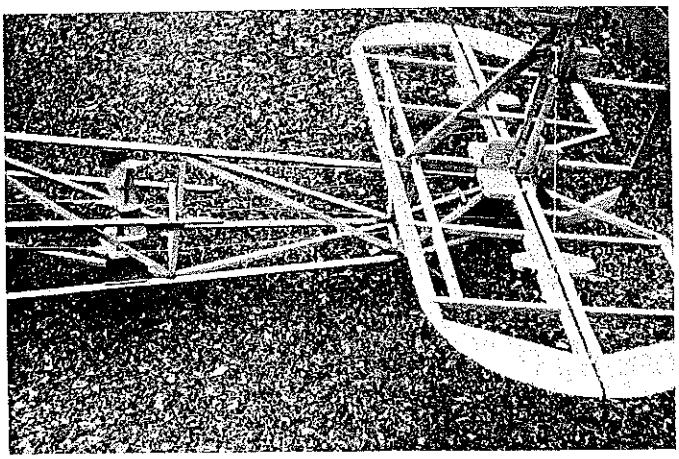
Left: The engine, fuel tank, and throttle servo installation. The 1/64 plywood cowl can be removed for access. The brass tube landing gear is scale. Rubber shock discs are "O" rings CyA-glued into the stack. Right: The receiver-servo tray can be removed through the cockpit by removing two screws. Wing servo leads connect just below the cockpit edge and are at the location of the aileron cables of the original plane.



with plastic foam. Also, to allow the airplane to be carried and stored vertically, I used hooks and rubberbands at the wings, landing gear, and in front of the tail.

Since the frame extends beyond the airplane on all sides, it saves a lot of hangar rash when carrying or transporting such a large model. The carrier also comes in handy to hold the model while you run the





Left: Details of the pylon and landing wire fittings. All the hardware (small bolts, turnbuckles, tubes, etc.) is to scale and can be purchased at almost any model shop. All the brace wires are made from Control Line cable. Right: The tail control surfaces are actuated by pushrods to CL-type bellcranks. Short cables from the bellcranks run to scale control horns and exit the fuselage covering at the correct scale locations.

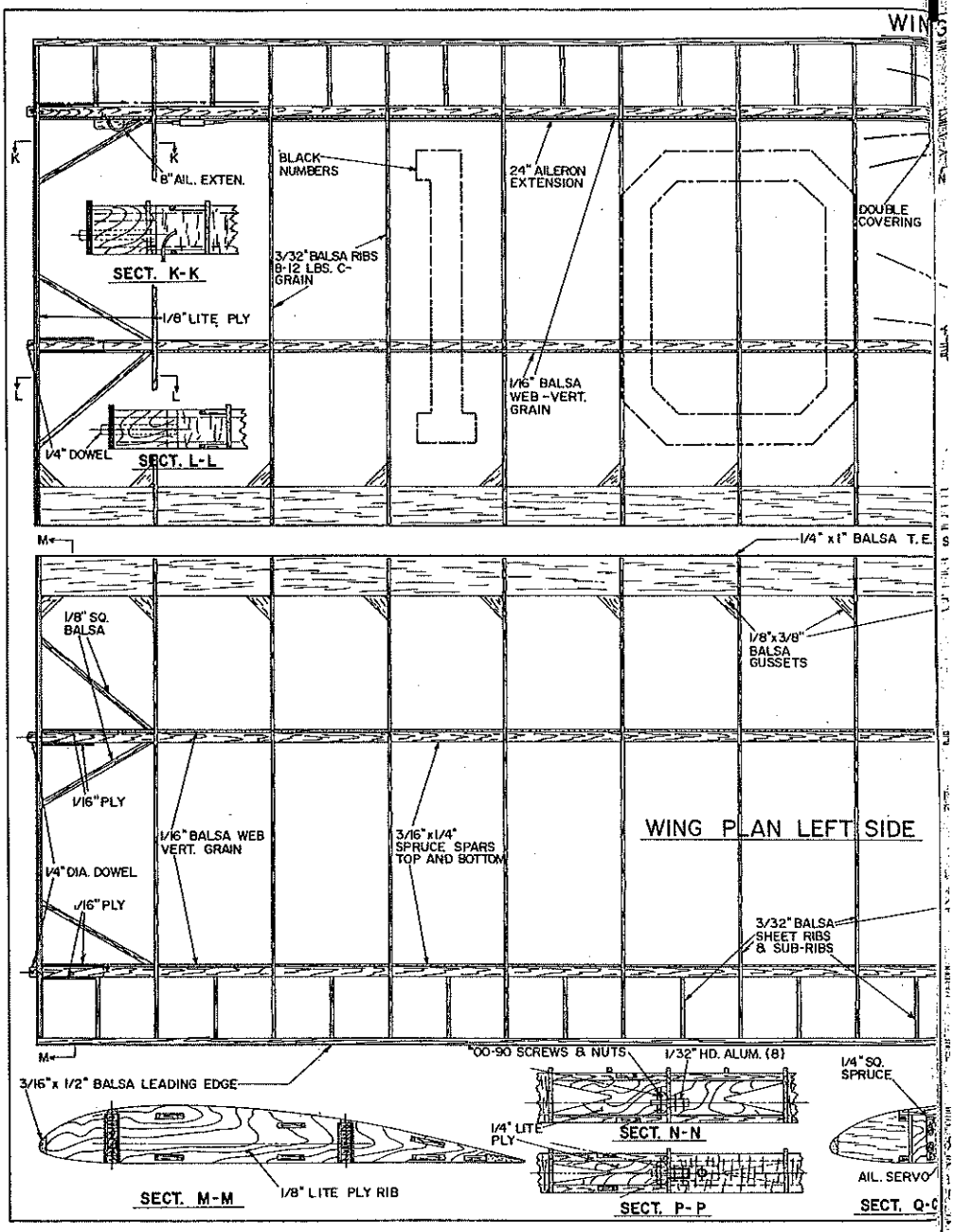
engine. Additionally, it makes easier work of repair and service. With the model on the frame, one can reach the engine and tank by removing the cowl, for instance, or access the receiver-servo tray by removing the seat back and false floor (four screws) and the two screws holding the tray. The radio batteries can be reached through a hatch in the nose under the engine.

Suitable engines are the O.S. .40, O.S. .40 or .48 Surpass, or the Saito .40 or .45. The Longster is designed around engines in this power and weight range. Don't let anyone talk you into substituting a .60 or larger engine. The model doesn't need the power, would be out of scale, and the extra weight would throw it out of balance. The surplus power would destroy the whole concept.

The structure is sufficiently light and strong as designed. One of the first test flights proved the model even stronger than expected. Having climbed to about 20-ft. altitude after takeoff, the airplane, probably due to some still-unexplained radio trouble, suddenly dived into the ground without stalling. Though it hit the ground very hard and the wings flew off, the carnage was a lot less than it might have been. The landing wires had sheared off the attach screws at the spars, the right rear landing gear leg had buckled, both prop blades were broken off, and the balsa was dented and scratched behind the prop. There was no other structural damage and no shattered or punctured covering. The mishap was clear evidence that the wear-and-tear of everyday sport flying won't intimidate this model.

Construction

I'll limit myself to rather general descriptions of the construction procedures used. At the same time I want to share the underlying rationale and express some of my philosophy about building. There should be enough interesting detail to satisfy those craftsman types who like to build as well as fly.



Wing, aileron, and tail. Since they're made primarily of balsa, the wing and tail can be completed most rapidly using cyanoacrylate (CyA) adhesives. If you're allergic to CyA, white glue will work just as well. *(Editor: Anyone with an allergy to ordinary CyA should try Hot Stuff's UFO.)*

After drilling the balsa for the fitting-screw holes, apply a drop of thin CyA to each side of the holes, removing the hardened fibers by reaming with the original drill. This produces a nice, hard-walled hole to take the screw bearing-loads. The 00-90 and 0-80 screws are the scale equivalents of the 3/16- and 1/4-in. bolts used in the original.

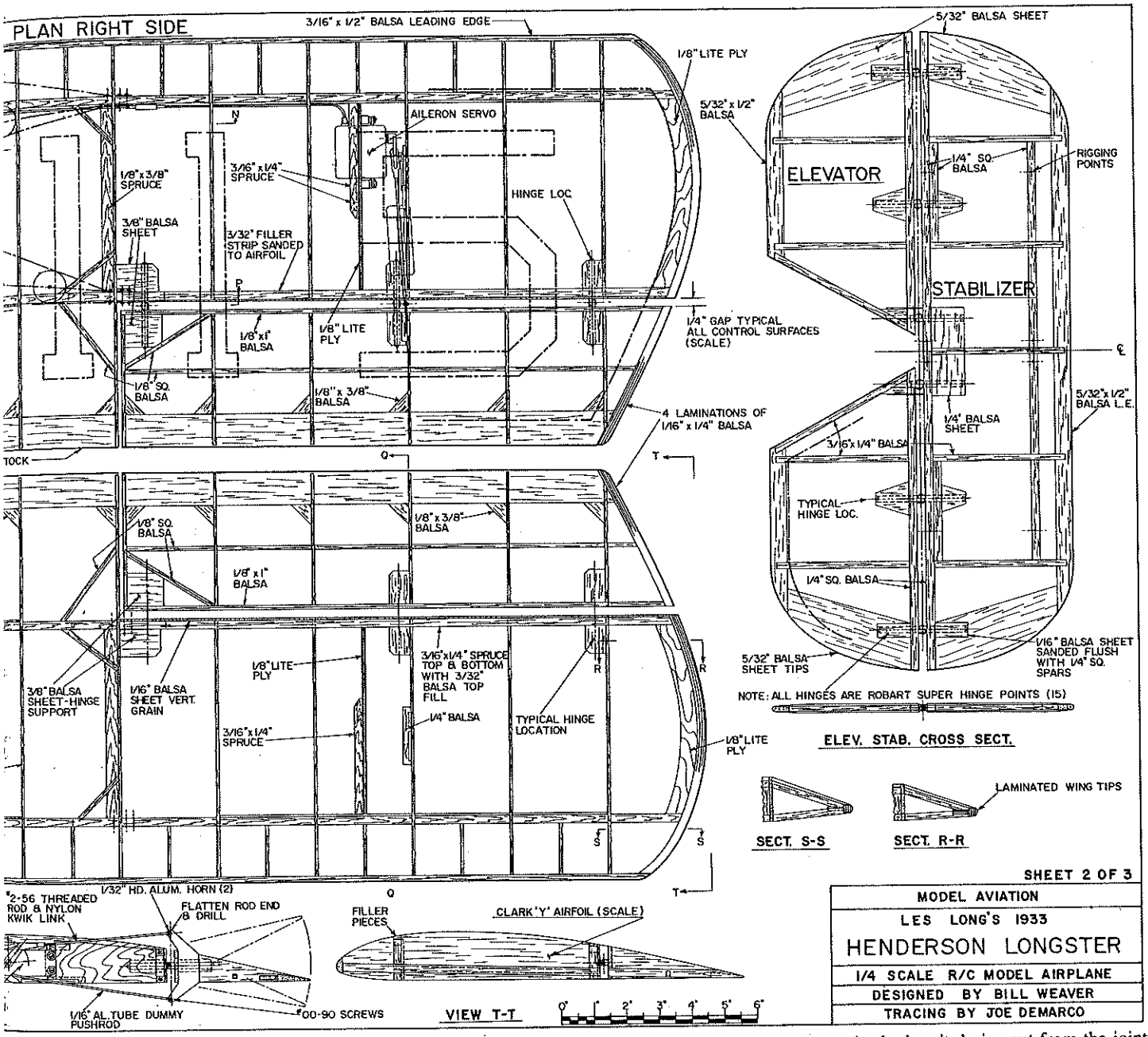
The working brace wires put the maximum bending loads at the wire attach points rather than at the center as with a cantilevered wing. The flight loads are distributed at several points along the wing spars. The 70-lb.-test cables assure that the wing can support any flight load it will encounter.

Locating the aileron servos in the wing makes it simple to provide travel differential. If you run a 2-56 tap through the servo nylon Qwik-Link, the pushrod can be more easily turned from outside the wing covering to adjust aileron neutral. The location of the servo wires that run down to the connectors in the cockpit duplicates that of the aileron control wires in the full-scale ship.

Fuselage. A central problem in reproducing a welded steel tube fuselage frame in wood is that the crossmembers, longerons, and diagonals that form the beamlike trusswork will be subjected to either tension or compression loads, depending on which way the structure is loaded or twisted. Since the structure is welded into a unit, it's unlikely that one of the tube members will fail in tension. However, the structure can buckle under compression.

In a wood frame structure, the joints between the members and at the longeron breaks depend on the strength of the glue to take the tension loads. In balsa structures the glue joints under tension will be no stronger than the soft, porous wood of which they're made. However, after doing some testing with pieces of dowel and spruce I was unimpressed with the strength of hardwood glue joints. Since Ambroid proved just slightly better than CyA or white glues, it was chosen for this project. All glue tests involved applying several coats to form fillets at the joints.

I was especially concerned about the area forward and under the wings where the flight loads from the wing wires, the engine thrust loads, and the landing loads are trying to pull the joints apart. Lacing these joints together with strong carpet thread provided a happy, lightweight solution. After the fuselage was completely glued, I used a 1/16-diameter drill in a pin vise to hand drill holes at the joints. I connected them on the covering sides with grooves cut by an X-Acto knife so that they would pass under the landing gear disc fittings without showing through the covering.



For the job of lacing, a good trick (also useful wherever you need to put thread through holes, as in wing rigging on a Rubber Scale model) is to soak the thread end—in this case about one inch long—in CyA glue, then give it a shot of kicker. *Presto!* You now have a "needle" with which to guide the thread, making the work much easier. Finish off with glue.

A metal tie bar runs across the bottom of the wing at the rear flying wires to carry the tension loads. The tension of the fabric covering behind the wing holds the crossmembers and diagonals in their glue-fillet sockets. Note that the diagonals are cut to fit against the longerons, rather than against the uprights, to provide more gluing surface.

When viewed in cross section, the fuselage metamorphoses from a rectangular shape at the cockpit to a triangular tail. It's an interesting structure to build.

When constructing the small fuselage sides at the cockpit box, the landing gear disc fittings must be slid over the dowel longerons before the uprights are added. The slots that allow the crosspieces and uprights to straddle and trap the discs can be cut with a hacksaw or band saw. To build the sides flat on the plan, I cut slots in the plan and grooves in the Homosote top of my building board at the disc locations. After building the sides, I filled the Homosote grooves with spackling compound.

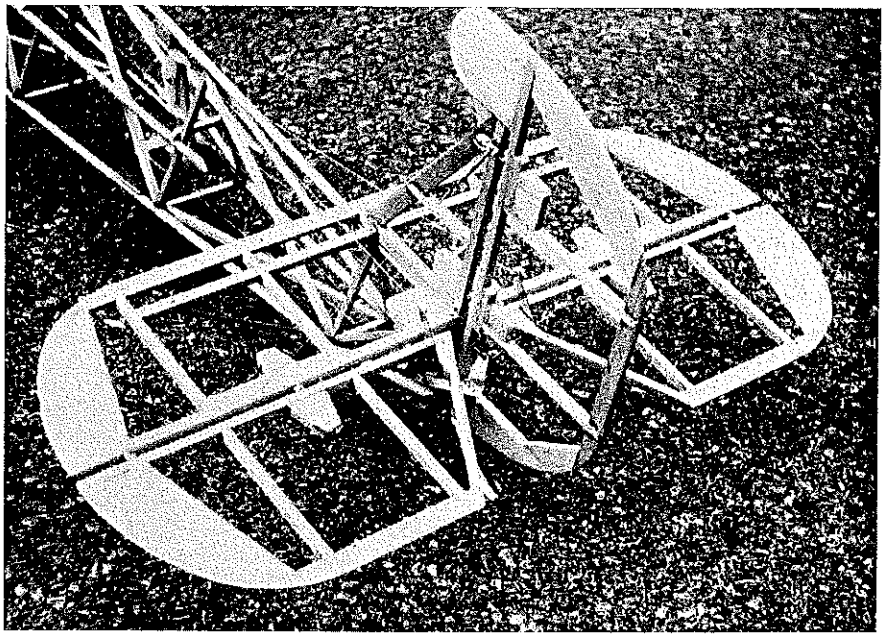
I assembled the fuselage structure by tacking it with thin CyA, followed, after drying, by several coats of Ambroid. Thick CyA, or whatever you think best, may be substituted for the Ambroid if desired.

The engine fuel tank is adhered with GE Silicone II Household Glue and Seal purchased from the hardware store. This product was also used to seal around the hole for the engine servo lead as it passes through the engine mount plywood. Sealing this hole keeps oil spray and leaked fuel out of the airplane by confining spillover to the area above the engine mount plywood and in front of the dash. Any tank leakage will be noticed when it drains out from the joint at the bottom of the cowl, and the drainage prevents the fuel from reaching the engine control servo.

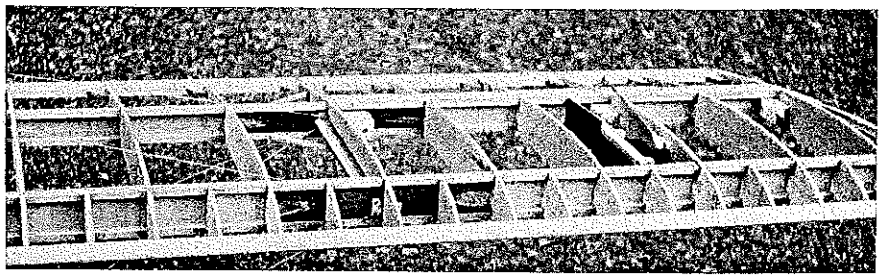
The exterior, or oil side, of the engine and tank area was oil-proofed by giving the surfaces a coat of six-minute epoxy thinned slightly with alcohol. The inside of the cowl was also coated with epoxy. This allows you to do a lot of flying without fear of the model's becoming oil soaked. Clear Hobbypoxy or urethane varnish could be used in place of the epoxy.

Landing gear. The landing gear parts are built and assembled on the fuselage while the latter is blocked up in flying position and square with the building surface. The stock size 3/16- and 1/4-in.-dia. brass tubing is exactly to scale for the 3/4- and 1-in.-dia., 1/16-in.-wall steel tubes used on the original airplane.

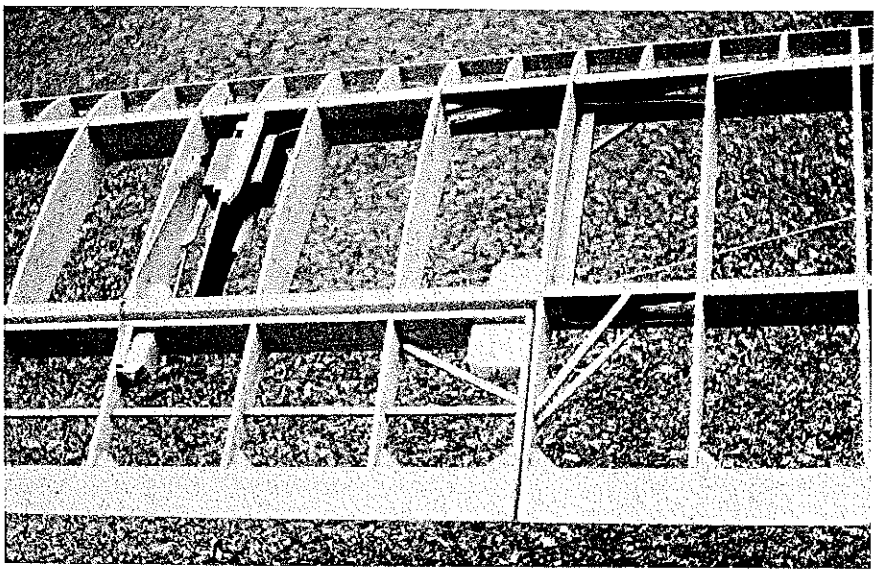
The 3/16-in. dowel inserts in the rear leg—always the first landing gear component to



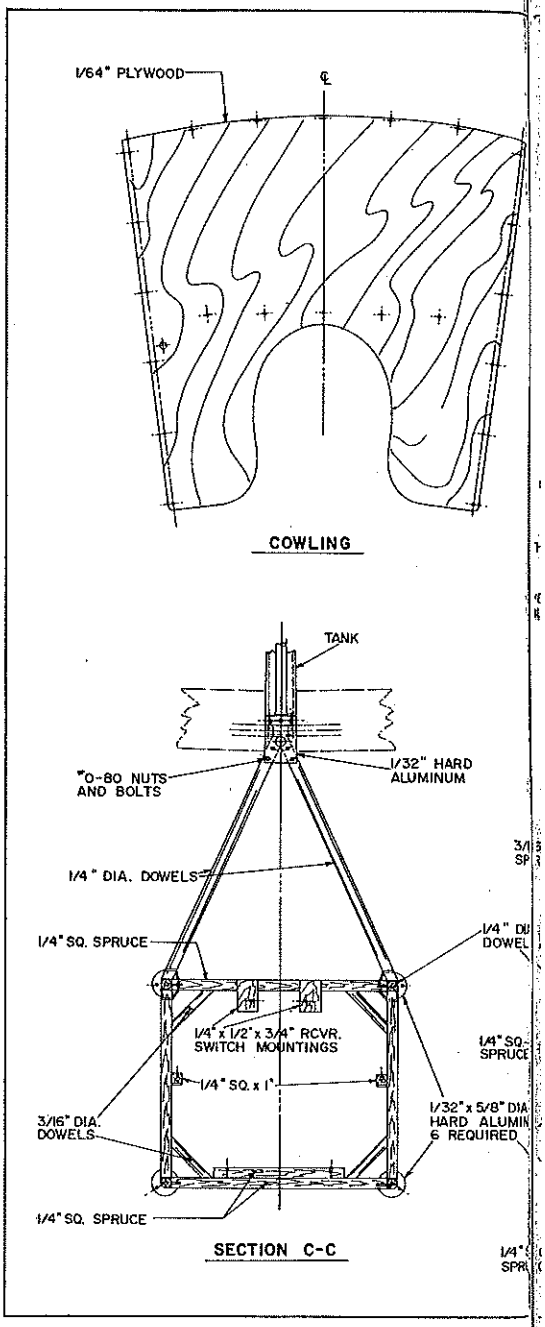
Non-scale structure blocks at the control surface hinge locations are for Robart Hinge Points which give scale appearance and gap. The blocks do not show after the model is covered.



The wing structure is to scale except for the solid ribs. The wing wire fittings and spar reinforcements are to scale. The original airplane had simple, efficient model-like construction.



The old-time barn door ailerons are actuated by servos mounted in the wing to allow differential travel. This makes aileron-only turns possible, enhancing realistic flight characteristics.



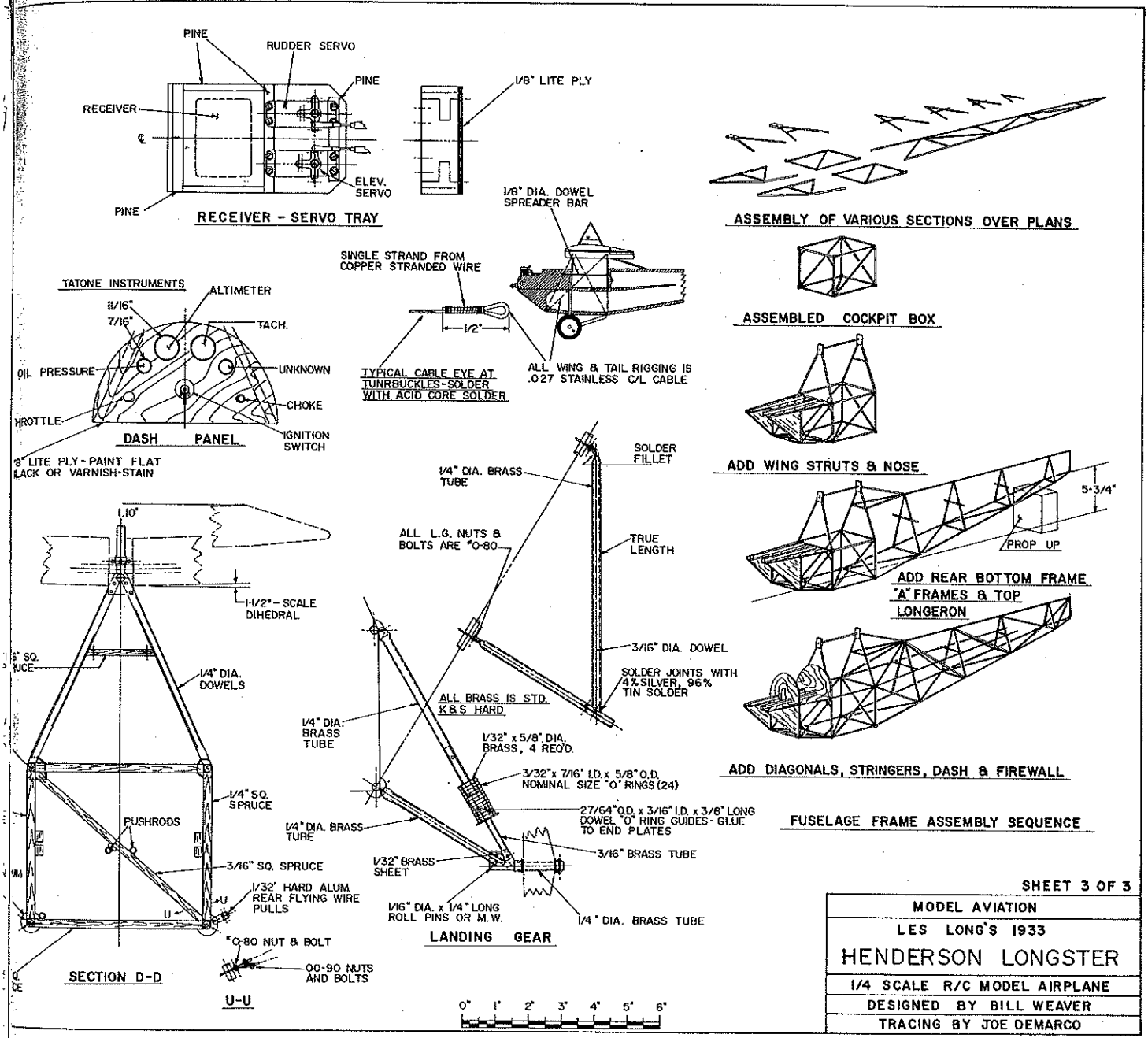
fail on impact—have been added to the plan since the previously mentioned crash to help prevent buckling on a hard landing. Attach the doweling with a few drops of thin CyA allowed to run down the tube.

A 3/16-in. dowel, with slots in each end to clear the 1/32 brass plate, is used as a spreader bar to align the short 1/4-in. tubing axles and to provide the proper tread during soldering.

Assemble the shock strut while the fuselage is still accurately blocked, but don't add the lower shock-disc plate or extend the hole for the travel-limiting screw into the 3/16-in. lower portion just yet. When everything checks out OK, the lower portion is locked in place by squeezing the upper portion slightly with a 'C' clamp, and the travel-limiting screw holes are transferred from the 1/4-in. tube through the 3/16-in. one. Use a small rat-tailed file to elongate this hole about 1/4 in. in the 3/16-in. tube.

Reassemble the shock strut with the rubber shock-disc stack and the lower brass disc plate. Solder this disc in place while exerting enough pressure against the rubber to take out any play. Made from 'O' rings, the shock discs are stacked and squared on a 7/16-in.-dia. rod. Holding this rod horizontally, apply a drop of thin CyA glue at each joint between the 'O' rings. The adhesive will wick around the entire joint and bond the 'O' rings into a tube that can be assembled to the shock strut. While these rings have much less contact area than the flat rubber discs on the original airplane, they are quite stiff and probably only function during a hard landing.

Both the outer and inner wheel-retaining collars may either be turned on a lathe from aluminum or brass or assembled with solder from pieces of brass tube and washers. The same applies to the landing-wire pylon fit-



tings. The Proctor turnbuckles may be used as is, without the more scalelike taper, if a metalworking lathe or amateur machinist friend is not available. I used Loctite to hold the inner wheel collars in place and at the joints on the pylon between the aluminum tubes and the brass tube top-fitting.

Assembly and rigging. The rigging and control wires are .027-in.-dia. stainless steel Control Line cables. Being softer than music wire, the cables are rather easy to form into the eyes shown on the drawing. Make the eyes to fit the 00-90 screws or the turnbuckle eyes. Tinning stainless steel requires an acid-core solder. When you finish soldering, wash the wires in water to remove the acid flux residue.

Prior to covering, the model should be otherwise completed, rigged, and have the RC equipment installed. It's easier to reach and assemble these components without the covering. Loctite the rigging wire attach bolts at the spars before covering. You'll need to cut relief grooves in parts of the structure to clear the rigging wires and control wires as they're installed. Some of the wires will run through a wing rib.

Rigging the airplane requires a large surface that is absolutely flat. Assemble the tail surfaces to the fuselage first. With the airplane sitting on its wheels, adjust the wires and turnbuckles until the vertical and horizontal surfaces are true, then Loctite the turnbuckles. Here's where all your toil in getting the landing gear and fuselage alignment exactly right will pay off.

Finally, make the stabilizer struts to fit your airplane, then tighten the elevator and rudder control cables just enough to take out the slack. At .027-in. diameter, this cable has no elasticity and will transfer tension loads to the bellcrank pivots, producing high friction for the servos to overcome.

To rig the wing, prop up the rear of the fuselage until the top of the rear razorback, and hence the bottom of the wing, is parallel to the floor. Make two wing props from corrugated paperboard. Their tops should be about 1.10 in. higher than the distance from the lower surface of the wing to the ground line at the wheel, as shown on the fuselage side view drawing. Attach turnbuckles to the fuselage and pylon fittings, and set at half-travel. Plug the wings into the center section, and prop them up.

Drape a thread, weighted at each end, over the tip ribs at the high point, and adjust the props until you have 1.10 in. of dihedral measured at the ⅛-in. root rib. Positioning the pylon vertically, tape a temporary brace from the pylon to one of the wing spars. Feed each wing wire through its turnbuckle eye, bend back, and tape. Unwind the turnbuckles, and remove the wings. Form eyes at the cable bends, and solder.

Reassemble the wings, and adjust the top turnbuckles to achieve the final wing alignment and dihedral. Tighten all the lower

turnbuckles just enough to take out the slack. At this point you should be able to sense the tightness in the top wires when they are plucked. That's because each pair of top wires now has four semislack wires pulling against it. Adjust the top and bottom rear spar wires to give 1/16 washout at the tip ribs.

Hold the wire eye ends when adjusting the turnbuckles. This prevents the cables from winding up due to thread friction, which would not only throw the two thread engagements off balance but predispose the cable to unwinding and loosening of the wire at the first jar. When you're happy with the adjustment, put Loctite on both threads of each turnbuckle.

Bind the 1/8-in. spreader bars to the wires with thread, cement them, and paint them silver. Position the bars at the intersection of the 'X' brace wires to keep them from touching and causing radio noise.

This fixed wing rigging can be folded or removed without worry. It will return to its proper position when replaced just as if solid struts had been used.

Covering. Use fabric such as Coverite or Sig Koverall. Both as to texture and finish, the plastic films would clash with the character of this airplane. The silver Permagloss Coverite used on the prototype is unfortunately no longer being made. White Super Coverite finished with a spray can of whatever silver model paint you prefer is probably your best alternative.

I used Aerogloss Stearman red for trim. The numbers were cut from black Coverite Graphic Trim Sheets, slid into place on soapy water, and rubbed down. While Coverite bonds well to itself, it needs extra adhesive where it contacts wood. Use Balsarite or Sig Stix-it on the wood surfaces.

Don't cover the rear fuselage bottom until the control wire openings are located in the side covering and the wires threaded through. Refer to the plans for the location of the holes for the landing wires in the wing top covering. Thread the landing wires through the loose covering before ironing it into place. Errors can be corrected by the double-covering patches which are slid over the wires and ironed down after final assembly.

The attach points for the 'X' brace wires are at the two triangular openings on the bottom of the wing, inboard of the spars. The Pyralin doors that covered the wire attach points on the full-size Longster are simulated on the model by thin, transparent plastic with notches to clear the wires.

Balance the model at the point shown on the drawing on a ½- or ⅝-in.-dia. dowel or rod. You probably have about ¼ in. latitude fore or aft of the indicated point, but any greater deviation may cause trouble. Differences in engine weight, RC equipment, covering and finish, etc. could contribute to excess weight at the nose or tail. Compensate by substituting 800 or 500 mAh

Continued on page 156

Safety/Preston

Continued from page 153

field with the *wrong antenna* for the transmitter which he was planning to use. When he got to the field he selected the frequency pin that corresponded to the channel markers on the antenna, and turned on his transmitter. This caused another flier's model to be rekitted. However, my friend was not aware at this time that he was the cause of the crash.

A short while later, my friend lost his own model when another flier turned on a transmitter on the same frequency as my friend's transmitter. Again, nobody could figure out the cause of the crash. It wasn't until my friend returned home and was putting his equipment away in the workshop that he discovered that his transmitter's frequency did not match the channel markers on the antenna!

Well, that was an expensive error, and one that could happen to any of us if we have more than one transmitter of the same brand but different frequencies.

Another in-flight fire: Judging by some photos of a ⅓-scale Pogo that were sent to me by Greene, NY modeler Frank Williams, he was very lucky that an in-flight fire did not result in an explosion. Frank gave the photos and a short explanatory note to John Worth while attending the recent WRAM show.

The model was powered by a Zenoah G-38, which has its muffler secured on the rear of the cylinder by two bolts. Apparently, one or both of the bolts became loose during flight and allowed the hot exhaust gas to impinge directly onto the firewall.

One of the photos is included with this month's column and shows a hole burned through the firewall and a very melted gas tank, which also appears to have a hole burned in it. Frank's note said that the model kept on flying, and he landed without being aware of what was happening. It wasn't until he attempted to refuel the model that he discovered that it had been on fire.

Two other photos (which I haven't included) show charring inside the fuselage and on the wing saddle.

After looking at these pictures, I am extremely surprised that the fire did not cause the model to explode. Frank believes that the foam wrapped around the tank prevented air from getting to the gasoline it contained. Maybe. But what about the air that was already in the tank?

I would say that Frank was born under a lucky star! He has subsequently mounted a metal plate behind the muffler and has locked the latter's attaching bolts.

Longster/Weaver

Continued from page 34

batteries for the 1,100 mAh ones shown, if the model is nose-heavy, or by adding lead before installing the batteries if tail-heavy. The small-scale tail surfaces require this forward center-of-gravity location for good stability and control.

Miscellaneous. Paint the false floor and seat back black, followed by an application of Sig Flat-Coat. Make the gas tank of 1/16 sheet balsa, cover with tissue, and apply a few coats of Sig Lite-Coat. A plastic cap from a large toothpaste tube did service as my gas cap. Spray the tank assembly silver, and glue it to the dowel crosspiece it sits upon at a convenient point during the wing assembly. Though the tank is trapped by the wings and pylon, the glue prevents it from falling off when the wings are removed.

The pilot is a quarter-scale full-body figure made from a DGA Designs kit. As construction of the model progressed, however, and it became apparent that the wing limited one's view into the cockpit, the pilot was cut off at the waist and elbows and the false floor was made. That's a help in keeping the flying weight down, since the truncated pilot weighs only 2 oz. Acrylic paints were used to touch up the pilot's face, while all the rubber parts (face, helmet, etc.) were given two coats of Sig Flat-Coat to protect against engine oil spray.

No windshield is indicated in the original plans or photos. Quite possibly, at a cruising speed of 60 to 65 mph the wind was useful as an airspeed indicator and for judging turn coordination.

The corrugated board props, intended for supporting the wings while making and rigging the wing wires, can also be used with the carrying frame when attaching or detaching the wings. This requires cutting off the tops to match the bottom surface of the wing when the model is resting on the frame with the wing at 0° dihedral angle. The lower wires can remain slack until the upper wires are stretched over the pylon, so 0° dihedral is about right and will allow for uneven flying field surfaces.

This model calls for materials in rela-

tively uncommon sizes. If the 1/32 hard aluminum sheet (landing gear stock), the small 00-90 and 0-80 hex screws and nuts, the small 00, 1, and 2 wood screws (and practically everything else!) are not available from your hobby shop, not to worry. They can be ordered from that "National Treasure for Scratch Builders," Sig Manufacturing Company.

You'll also need small nut-drivers and screwdrivers. I use the 21-piece tool set sold by Polk's Model Craft Hobbies and Micro-Mark, as shown in their ads. These are fine little tools for Scale model builders, at a very reasonable price.

Whether the sound of the Longster's model four-cycle engine conjures memories of favorite full-size airplanes *you* have known or flown—or merely sounds, to you, like a model four-cycle engine—with its steady flying habits this hybrid of a lightplane/antique is sure to please. Just remember that when the winds blow, the Longster had better not go!

Radio Technique/Myers

Continued from page 39

jects the 23-channel problem AND the two adjacent-channel problems that exist for the wideband SC455 receiver. That's why Bob Aberle chose to identify a dual-conversion, narrow-band receiver as "the 1991 receiver."

Note that none of the above refers to AM or FM. There's no difference between them as far as interference of this type is concerned.

Larry Sribnick has done it again! Larry is a friend of mine, and his firm (SR Batteries, Inc., Box 287, Bellport, NY 11713; phone 516/286-0079; FAX 516/286-0901) is now marketing a tool kit that consists of a screwdriver-type handle, a ratchet handle, and an assortment of ¼-in.-hex-shaft tool bits that will also fit an electric screwdriver. The whole shebang comes in a snap-locked, bright yellow plastic case and sells for $26.95 (plus $3 shipping and handling).

The tool bits fit No. 1 and 2 Phillips-head screws, and 3/16, ¼, and 3/8-in. slotted screws. There are 12 sizes of English hex keys (.050 in. through 5/16 in.), six sizes of metric hex keys (1.5mm through 5mm), and an adapter for ¼-in.-square-drive sockets. All of the components are hardened and blackened to resist rust, except for the ratchet handle (stainless steel) and the screwdriver handle (plastic).

All tool bits have spring-loaded balls to lock them in place. An added setscrew in the socket of the screwdriver handle insures that you won't be losing tool bits inside the model. This is the perfect item for your tool kit so that you can handle things like wheel collars, engine mount bolts, etc.

When I got my set, I immdediately filed two tabs off the screwdriver shaft so I can slip the ratchet handle thereon in case I need to give a little extra urge to stuck screws. Should I happen to damage a tool bit, replacements are available ($1 each) from SR Batteries.

RC Battle/Good

Continued from page 45

approved the five new 72 MHz channels in a close, 3-to-2 decision (two Commissioners were absent). Even more disconcerting, the dissenting Commissioners opined that RC ". . . appears to be an essentially trivial use which does not warrant allocation of spectrum space." Caustic words!

The hairbreadth voting coupled with the disparaging minority opinion might have undercut our optimism about the course of future battles with the FCC, except for Courtney's shrewd analysis. Our counsel explained that the Commissioner's votes divided sharply according to their respective years of service. The three in favor of the AMA proposal had served for 12, 15, and 21 years, respectively, while the two who voted against it had only one and three years of respective tenure. It was a cautionary experience, and one that, in Courtney's view, confirmed the importance of continually educating public officials about our RC hobby. We would do well to heed that reminder.

RC Old-Timers/Mathews

Continued from page 49

"The original ignition wiring which remained consisted of mid-Thirties-type automotive accessory wire which had totally deteriorated so that the insulation cracked at a touch. This was replaced, but the unique double-pole, double-throw knife-blade switch was disassembled, cleaned of corrosion, buffed, and installed (although it's not used) in its original location.

"Although the laminated balsa wheels were removed and sanded, and the 'tire' area repainted,