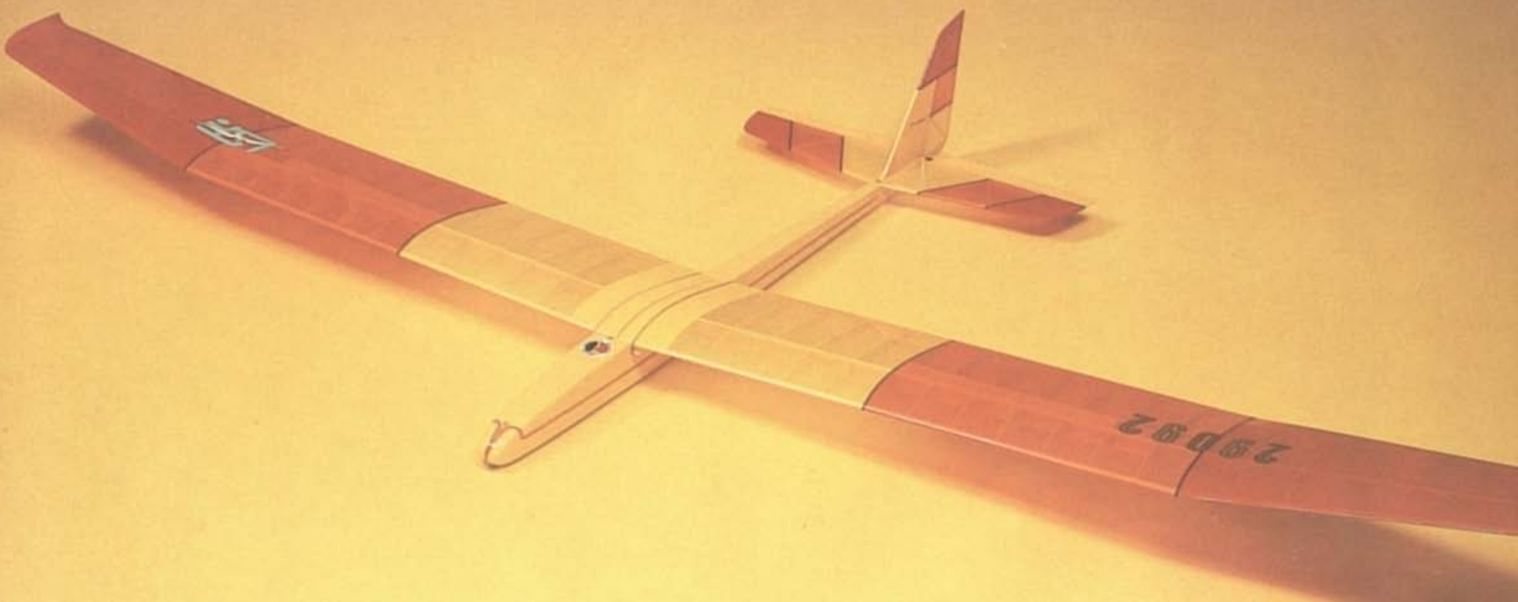
OLYMPIC II



Since its introduction in 1967, the Olympic has become the single most popular sailplane design in the world. Now the Olympic II . . . and a new dimension in soaring. **By Lee Renaud**

Editors Preface:

The Olympic sailplane has established itself as one of the nation's most popular R/C sailplanes. Although designed as a trainer, the long list of contest wins proves that the design has been very competitive in Standard Class contests. Many sailplane fliers learned to fly with an Olympic, then went on to become contest threats. When Lee decided to develop a replacement for this classic sailplane, we asked him to write this construction article.

The design was laid out over a year ago and prototypes have been flying in several parts of the country as part of an extensive test program. The basic design has been proven and flown under all weather conditions, and refined to the final configuration presented in this article. The result is a brand new airplane which shares no parts from the original, and which flies and handles even better than the Olympic.

The Aquila sailplane, published in the May 1975 issue of RCM, has been one of our most popular selling plans. The design has been very successful in its first contest season and is being flown by many of the country's top pilots. The Olympic II is a more functional ship, designed for easy building for the less experienced modeler. It's not as pretty as the Aquila, but flies just as well, if not better in weak lift. We've flown all of Lee's designs, including the Olympic, and rate the new Olympic II as the best yet. If you are a raw beginner who has never flown a sailplane, or a contest pilot looking for a competitive Standard Class ship, the Olympic II will fill the bill.

Due to the extreme length of the highly detailed step-by-step construction article, we were unable to present this portion of the text in this issue. However, the complete article, including the construction sequence will accompany each set of plans ordered for the Olympic II.

Try it, you'll like it!

Don Dewey

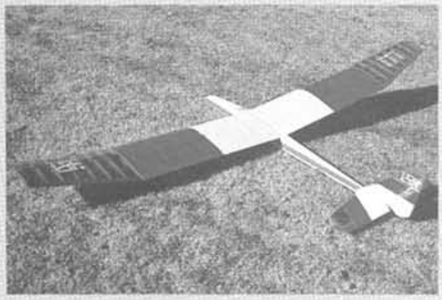
The original Olympic sailplane was designed in 1967 and first flown early in 1969. The design evolved from Frank Zaic's original Thermic 100, which dates back to 1940! In fact, the Olympic uses the center panels from the 100 with a straight tapered tip design replacing the original "Wolf" outline. The long tail moment, large stab with restricted elevator, and polyhedral wings were incorporated to provide a very stable design, which would be forgiving and easy to fly. Remember that this was before sailplane flying became popular and that I had never seen an R/C sailplane fly, only pictures in the magazines. Free-flight experience heavily influenced the layout, including the undercambered wing and short nose moment. It may be of interest that this was a completely Eastern design, as I was living in Connecticut at the time.

The Olympic has been a very popular and successful design and many sailplane enthusiasts caught their first thermal with this ship. When we considered a new design to replace the Olympic, we wanted to retain the easy handling qualities of the original, plus incorporate an easier building ship with better performance. We have learned a few things about sailplanes over the past nine years and feel that the Olympic II is a worthy successor to the original. If you liked the original ship, we know that you'll like the new one even more. If you are new to the sport, and want to get started with a large sailplane with competition potential, this ship is the way to go.

Primary design goals were to achieve a low sink rate with good penetration for gusty conditions, with a simple quick-building airframe. To provide the maximum opportunity to search for thermals, the design must gain maximum launch height and circle tightly in weak lift. Positive control response with hands-off stability was a must to allow the inexperienced flier to ride marginal lift. In addition, the structure should be rugged enough to survive poor landings and easily repairable in the event of poorer landings. Finally, and most important in our opinion, was that the design must be tolerant of errors in building and trimming and could be duplicated by the "average" modeler. A skilled pilot can achieve excellent results with an average design; the average pilot needs an excellent design.

The design of any R/C sailplane begins with the wing, as this is the most important design element. Wing span, aspect ratio, planform, and airfoil are the primary factors which influence flight performance. The tail group provides stability and control, while the fuselage houses the radio equipment and ties everything together. We believe that the Standard Class provides the best trade-off between size and performance, especially when you consider cost of materials and the time to build the model. Thus, the wing span is established at just under 100 inches. For ease in transport and assembly, a two-piece wing is almost a necessity unless you own a van. With the span fixed, we can now examine the rest of the wing design.

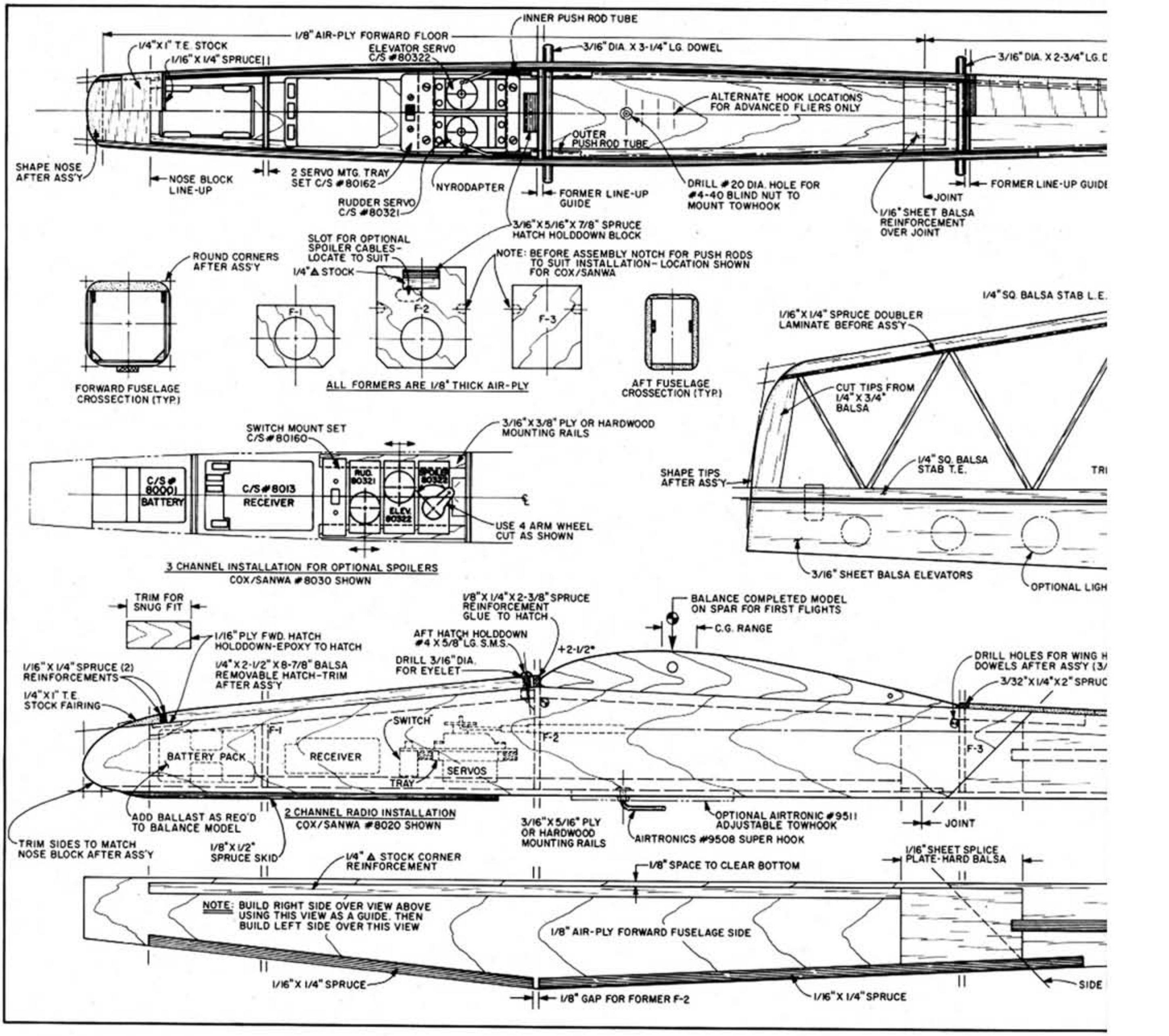
While theory dictates that higher aspect ratios will provide greater theoretical efficiency, model airplanes don't read books. We think that wing area and higher Reynolds Numbers are more important in improving performance. One other factor is that lower aspect ratio wings can be built lighter for equivalent strength. We have found very little advantage in aspect ratios higher than 15:1, while 10:1 is the lower limit for anything resembling a full scale sailplane. We selected 11:1 because we wanted over 900 square inches of wing area



OLYMPIC II
Designed By: Lee Renaud

TYPE AIRCRAFT
R/C Sailplane
WINGSPAN
100 Inches
WING CHORD
10" Center Panels
TOTAL WING AREA
920 Square Inches
WING LOCATION
Top of Fuselage
AIRFOIL
Flat Bottom — 10% Thick
WING PLANFORM
Constant Chord
POLYHEDRAL
5' Center — 8' Tip
O.A. FUSELAGE LENGTH
48.5 Inches
RADIO COMPARTMENT AREA
(L) 9" X (W) 2" X (H) 2¼"
STABILIZER SPAN
24½ Inches
STABILIZER CHORD (incl. elevator)
5.92" (Avg.)
STABILIZER AREA
145 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
10 Inches
VERTICAL FIN WIDTH (incl. rudder)
6.25 Inches (Avg.)
REC. ENGINE SIZE
NA
FUEL TANK SIZE
NA
LANDING GEAR
NA
REC. NO. OF CHANNELS
Two — Three
CONTROL FUNCTIONS
Rudder, Elevator
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply, Spruce
Wing	Balsa, Ply, Spruce
Empennage	Balsa and Spruce
Weight Ready-To-Fly	38 Ounces
Wing Loading	5.95 Oz./Sq. Ft.



to keep the wing loading low.

The wing planform is a constant chord center section with double tapered tip panels. This outline approximates the efficiency of a fully elliptical outline, but is a lot easier to build. This layout also works well for the polydihedral, as it provides a natural structural break. The original Olympic featured polyhedral in an era of Vee-dihedral wings, and the tight flat turns which polyhedral permits are also a characteristic of the Olympic II. The bent wings may not look as elegant, but they sure pay off when you are trying to center a thermal.

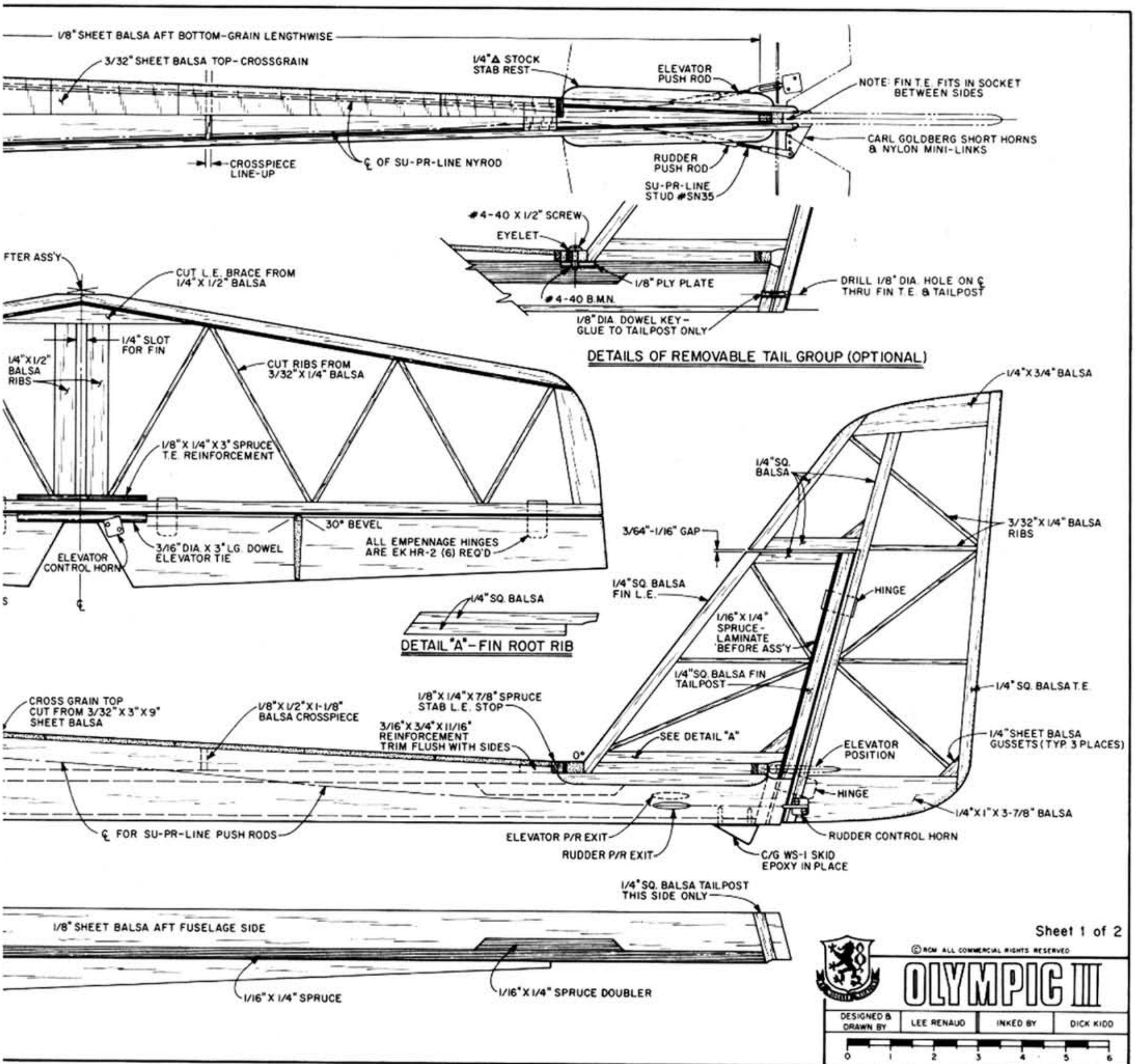
Several features from the Aquila wing design have been incorporated into this design. These include the airfoil section and anti-vortex tips. The oversized center section spars and I-beam shear webs, combined with the .218" diameter music wire joiner, provide a very strong and rigid wing. The tip section spars are reduced in size and the shear webs omitted to reduce the roll axis Moment of Inertia. The simple structural design is very easy to build and has enough strength to withstand over-eager winch launches even when heavily ballasted.

The fuselage is a simple slab-sided box with the forward end constructed of lightweight 1/8" poplar plywood, with the tail cone of 1/8" balsa. Longitudinal spruce stringers help to distribute stress and tie the structure together. The roomy radio compartment is closed with a sheet balsa removable hatch, with additional equipment space available under the wing. There is plenty of room for a thermal sensor and ballast, which is easily accessible by removing the wing. The functional design provides a very rugged structure which will stand up to rough landings without damage.

The empennage design is straightforward with anti-warp structure and separate control surfaces. The slight drag penalty incurred over an all-flying surface is offset by the easy handling and simpler set-up that conventional surfaces provide. Note that the tail group is glued to the fuselage for simplicity and positive location. Details of incorporating a removable empennage are shown on the plans for greater ease of transportation. If you are not concerned about the size of a packing crate, then we suggest you glue the tail group on.

Details for optional lift spoilers are also shown on the plan, for those who wish to add an extra dimension of control. The installation is quite simple and adds about two ounces of weight to the model. We like the extra security that the spoilers provide when the model is just a speck in the sky, or when landing in restricted areas, but the spoilers are really a luxury. Certainly the novice flier does not need another gadget, and two channel radio systems are much less expensive. The choice is yours, and it really is a matter of personal preference!

Flying the Olympic II is a real treat. This is the easiest handling sailplane that we have



(2) PLAN NO. 643

ever flown, with no quirks or special techniques required for long duration flights. Turn response is excellent and large open circles or very tight turns are a cinch. Elevator response is also excellent and trim control very effective. It is easier to fly than the original Olympic, with two significant bonuses: 1.) the windy weather penetration and performance is vastly superior, and 2.) the sink rate is much better.

Overall flight performance is superb, with truly remarkable light air performance. In weak or marginal lift conditions, the Olympic II will hang in and float around when other ships are landing. In calm air, with up trim on the transmitter, the ship will float around nose high without stalling with the best sink rate we've seen. It's also excellent in windy turbulent conditions, particularly when you add ballast under the balance point. Gordon Pearson flew one of the prototype ships in the 1976 Detroit Sno-Fly, with 16 ounces of ballast and could fly upwind despite 25-30 mph winds.

Launch characteristics are also excellent and altitude gained on a Heavy Duty Hi-Start or six volt winch rates with the best. With an aft hook position, the climb is straight and true and the additional height gained will be a pleasant surprise.

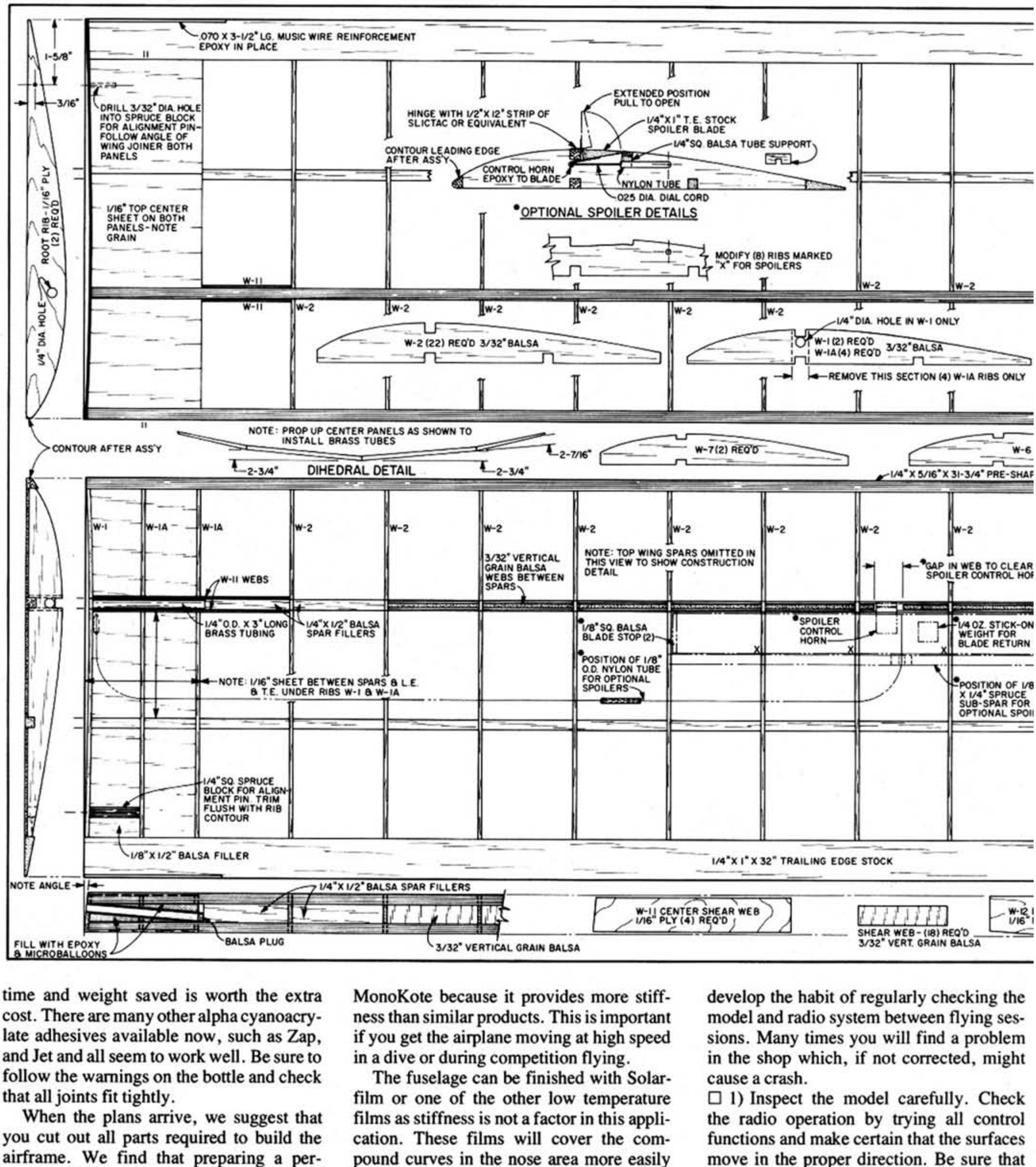
If you are looking for an R/C sailplane that is quick and easy to build; easy to fly, even for a novice, and with contest winning flight performance, the Olympic II fills the bill. Clear off your workbench and order a set of full-sized plans from RCM. While you're waiting, we suggest you study the reduced plans to help you understand how to assemble the model. While you are waiting for the plans, we also suggest that you prepare a bill of materials from the magazine plans and visit your friendly hobby shop to pick up the wood and hardware required.

PRE-CONSTRUCTION NOTES

In addition to the materials required to build the airplane, you will need a flat work surface at least 11" wide and 48" long, into which you can push pins. A sheet of Celotex, or similar composition board material, works well. Whatever you use, be sure that it is straight and unwarped.

A few simple tools will also be needed. These include a model knife and/or a supply of single edge razor blades, a razor saw, pliers, a small hammer and a hand drill and drills. You will also need hardwood sanding blocks and assorted grades of sandpaper, a small block or razor plane, a supply of straight or tee-pins and masking tape.

The types of adhesives used are a matter of personal choice, but we don't recommend normal model airplane cement. For general construction, we suggest the use of aliphatic resin glue such as Wilhold, Bridi, or Titebond. Slow drying epoxy such as Hobbypoxy II or Sig will be required and 5-minute epoxy will be useful. We built the prototypes with Hot Stuff and feel that the



time and weight saved is worth the extra cost. There are many other alpha cyanoacrylate adhesives available now, such as Zap, and Jet and all seem to work well. Be sure to follow the warnings on the bottle and check that all joints fit tightly.

When the plans arrive, we suggest that you cut out all parts required to build the airframe. We find that preparing a personalized kit in this matter reduces overall assembly time and gets the model completed quickly.

Be sure to cover the plans with Handi-Wrap or similar material before starting construction so that the structure does not become glued to the plans.

COVERING

We suggest that you finish the model with one of the iron-on plastic film coverings, as they provide a good looking finish with minimum weight. For the wings and the tail group, we recommend that you use Super MonoKote because it provides more stiffness than similar products. This is important if you get the airplane moving at high speed in a dive or during competition flying.

The fuselage can be finished with Solarfilm or one of the other low temperature films as stiffness is not a factor in this application. These films will cover the compound curves in the nose area more easily than MonoKote. There is no need to fiberglass the fuselage, as the structure is very strong and does not require additional reinforcement.

Use bright, high visibility colors such as orange, yellow, or red, so that you will be able to see the model when it is high above. Trim to suit your individual taste and add your AMA number and LSF decal.

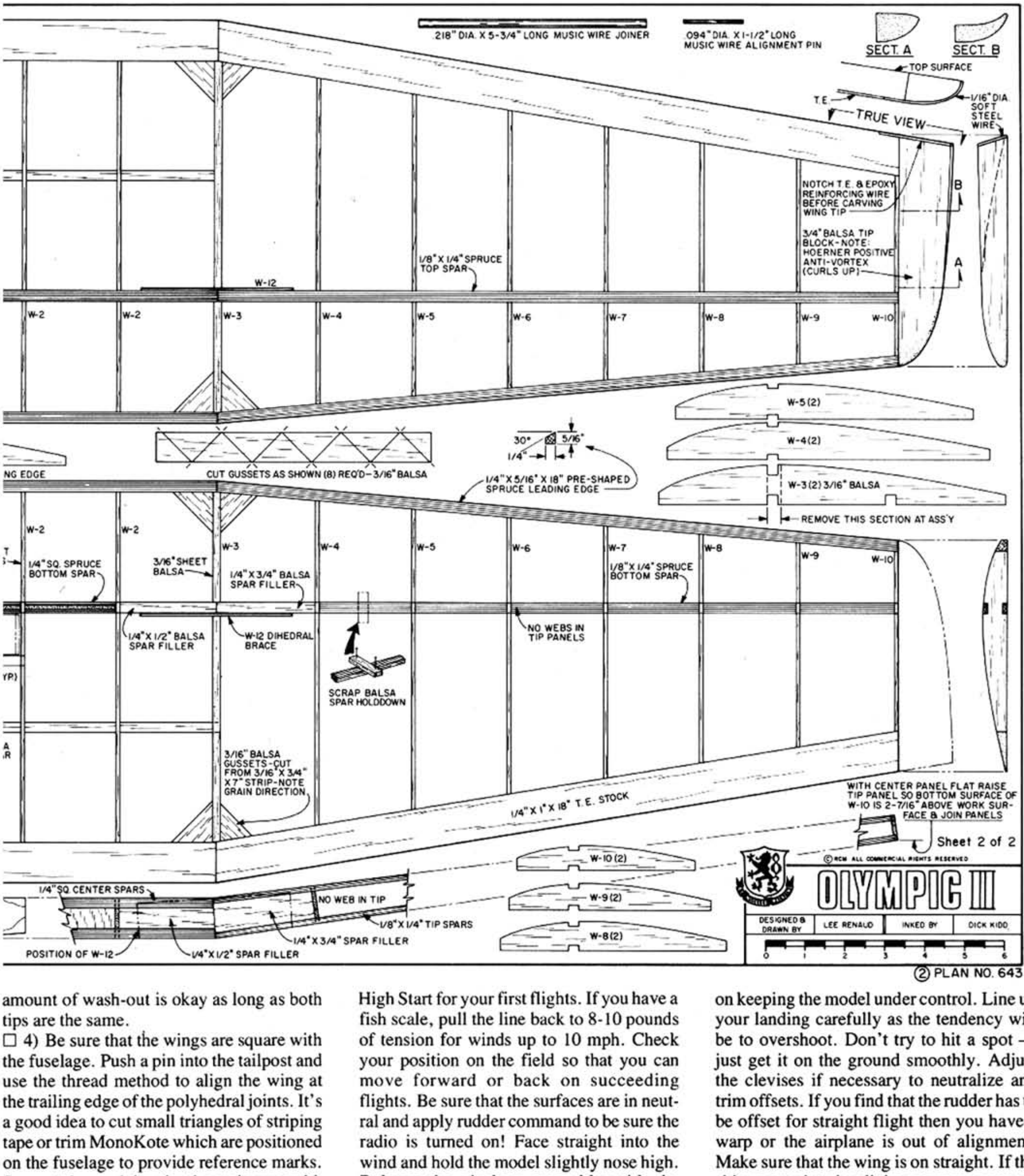
PRE-FLIGHT CHECKS

Before you go out to the flying field we suggest that you run through the following pre-flight check list. It is a good idea to develop the habit of regularly checking the model and radio system between flying sessions. Many times you will find a problem in the shop which, if not corrected, might cause a crash.

☐ 1) Inspect the model carefully. Check the radio operation by trying all control functions and make certain that the surfaces move in the proper direction. Be sure that the rudder and elevator surfaces are neutral when the transmitter trims are set at neutral. Adjust clevises if required.

☐ 2) Check that the servos are firmly mounted and that the receiver and battery pack are secure. Make sure that the nose trim ballast is firmly mounted and cannot shift forward **or** backward. A strong launch can shift things toward the tail.

☐ 3) Check all flying surfaces carefully for warps. Remove any warps present by reheating the film covering. Be sure that the tip panels are not washed-in (leading edge higher than trailing edge at the tip). A small



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amount of wash-out is okay as long as both tips are the same.

☐ 4) Be sure that the wings are square with the fuselage. Push a pin into the tailpost and use the thread method to align the wing at the trailing edge of the polyhedral joints. It's a good idea to cut small triangles of striping tape or trim MonoKote which are positioned on the fuselage to provide reference marks. Support the model under the main spar with your fingertips and be sure the fuselage hangs level. This is slightly nose heavy trim which is safer for the first few flights.

☐ 5) Check your batteries, both in the transmitter and airplane. If you are using dry batteries be sure they are fresh; if Nicads, that they are fully charged. Remember that more radio failures occur from defective or improperly charged batteries than any other cause. Don't be a statistic!

FLYING THE OLYMPIC II

We suggest that you use a Heavy Duty High Start for your first flights. If you have a fish scale, pull the line back to 8-10 pounds of tension for winds up to 10 mph. Check your position on the field so that you can move forward or back on succeeding flights. Be sure that the surfaces are in neutral and apply rudder command to be sure the radio is turned on! Face straight into the wind and hold the model slightly nose high. Release the airplane smoothly with the wings level. Don't worry about how high your launch is but concentrate on keeping the ship straight into the wind. Use a pulse of down elevator if you have trouble releasing from the line at the top of the launch.

When the ship releases fly straight and correct any turning tendencies with rudder trim. Make a slow turn and check the glide angle. Use up trim to flatten the glide path or down trim if the model tends to stall. Try making large smooth turns in both directions to get the feel of the controls. Don't worry about finding lift — just concentrate on keeping the model under control. Line up your landing carefully as the tendency will be to overshoot. Don't try to hit a spot — just get it on the ground smoothly. Adjust the clevises if necessary to neutralize any trim offsets. If you find that the rudder has to be offset for straight flight then you have a warp or the airplane is out of alignment. Make sure that the wing is on straight. If the ship seemed to be diving remove some of the nose weight. Now you are ready for another flight.

If the climb was poor on your first flight stretch back the Hi-Start a few more feet and add a slight amount of up trim. You can steepen the launch climb by adding up stick but don't overdo it, as you may stall the ship on the line. Back off on the up elevator if the model starts weaving back and forth. Try a few tight turns by applying rudder and holding a little up elevator. Point the nose into the wind and pull up stick to check the stall

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...... characteristics. Because of the sharp leading edge radius, the stall will be sharp, but the ship should not drop a wing. Concentrate on flying smoothly and plan your flight path so that you are ahead of the sailplane. If you find some lift, circle a few times and watch the climb. If you have installed the optional spoiler this is a good time to check them out. Point the nose into the wind and apply half the stick travel, feeding in up elevator to counteract the nose down tendency. Watch your altitude carefully and retract the spoilers while you are still high enough to set up the landing approach. Perhaps you would like to try the spoilers on this landing. Pop them up halfway and leave them out during the final approach controlling the rate of descent with elevator control. Experiment on later flights with more spoiler throw, starting at altitude as with full throw they are very effective and will bring the airplane down in a hurry. Leaving the spoilers up during landings will help to stabilize the ship in gusty weather and we suggest that you use them routinely.

In light air conditions, trim the model so that the fuselage is in a nose high altitude, also try removing more of the nose weight. Experiment until the sink rate is minimum and the glide fairly slow, which will give maximum duration in calm conditions. For windy weather and increased penetration add some nose weight and remove the up trim. Adding 3-4 ounces of ballast right behind F-2 will help smooth the ship out and increase penetration during gusty conditions. In stronger winds 12-20 ounces of ballast may be required. We have flown the ship with 32 ounces of ballast in 20-25 mph winds with excellent results and no significant decrease in sink rate. Of course the ship will fly faster when you add ballast and control response will be quicker. Don't be afraid to experiment as the ship will easily carry plenty of extra weight. For two minute precision tasks add 8-16 ounces of ballast in front of the C.G. to help smooth out the control response and stabilize the glide path.

Good luck with your Olympic II. We hope that you enjoy the ship as much as we do and that you always fly in green air. □