

Astro-Hog

by FRED DUNN

Ailerons and the low wing—out-of-this-world maneuverability—an airplane to top anything so far in multi RC. Plans on next two pages.



Fred Dunn with Ray Downs' Astro-Hog—orange and blue with silver trim. Note open cockpit.

Going by in the background, Bob Dunham's Astro. Good pilots do four-point rolls—so help us!

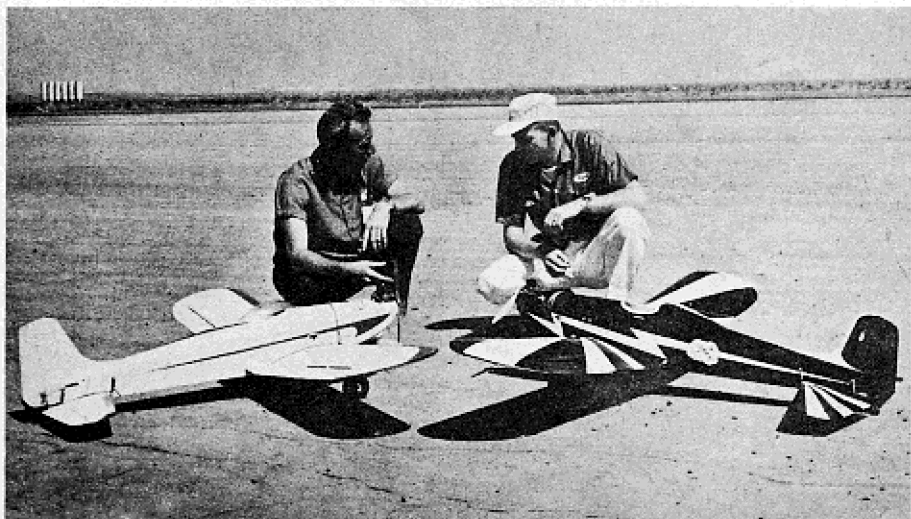


Astro-Hog sanctuary in Southern Cal. L to R—Stan Calmage, Howard Bonner ('56 Champ), Bob

Dunham ('57 Champ), Bob Smith, Ray Downs. Astro-Hog modeling's closest approach full scale.

At Turlock, Cal., where both took firsts: Bob Dunham, left; Bob Dunn, right and the original

Astro. Not designed for rudder-only, plane would require more dihedral—as per article.



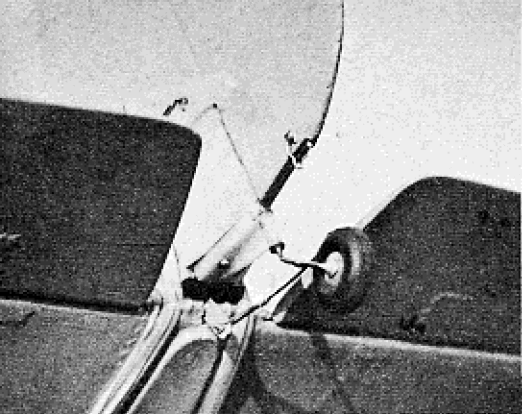
► A low-winger for radio-control? What's the deal? Well, give-a-listen fellows for some interesting clues from one of the most gratifying RC projects this modeler has ever had the pleasure of exploiting.

First off, I do not wish to discredit the faithful high-wingers which have been the RC pioneers. They will continue to provide the basic foundation upon which we build a wealth of knowledge and experience. I am happy, however, to see the low-winger appear on the scene and assume a rightful position among our top radio-controlled winning models.

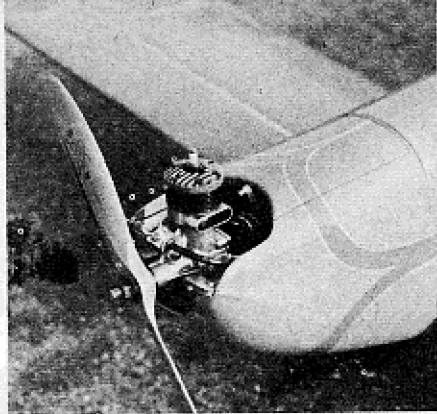
In my opinion, one of the most inspiring developments that sparks the imagination of a designer, was the introduction of multi-channel radio equipment and the recently new adaptations featuring simultaneous control. In addition, we now have electro-mechanical servo devices which have achieved a new high in outstanding performance and dependability. To top it off, we are now able to obtain some new and unique glow-engines, which have been developed especially for RC.

Throttles are now becoming standard equipment on some of these engines and have been designed to provide us with a complete range of power settings. We no longer need consume our flying time fighting acute problems with this equipment, but can get right to work designing, building, and flying models capable of getting the most out of it. The Astro does just that.

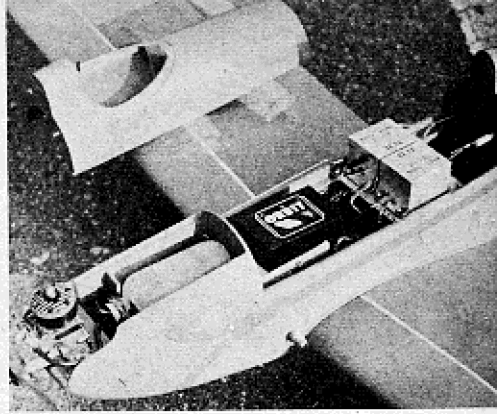
My first attempt at flying a low-winger was made in the Spring of last year. The design was a combination of PT-19 and P-51. Ailerons were omitted, since I felt that any good design should be able to fly through normal attitudes without them, and I planned to add them later. This was a mistake! Eight attempts, eight landings, all of them fatal. All interested persons watching the flights, bowed their heads and slowly (Continued on next two pages)



Tail wheel brake works from up-elevator as on Smog Hog. Horn, wheel mount, Bonner nylon pts.



New K & B .35 with built-in throttle, special RC engine. Fox, Veco, also have .35 Specials.



Plastic bottle tank, receiver, servos, readily accessible by removing deck. Rolls like crazy.

ASTRO-HOG—continued

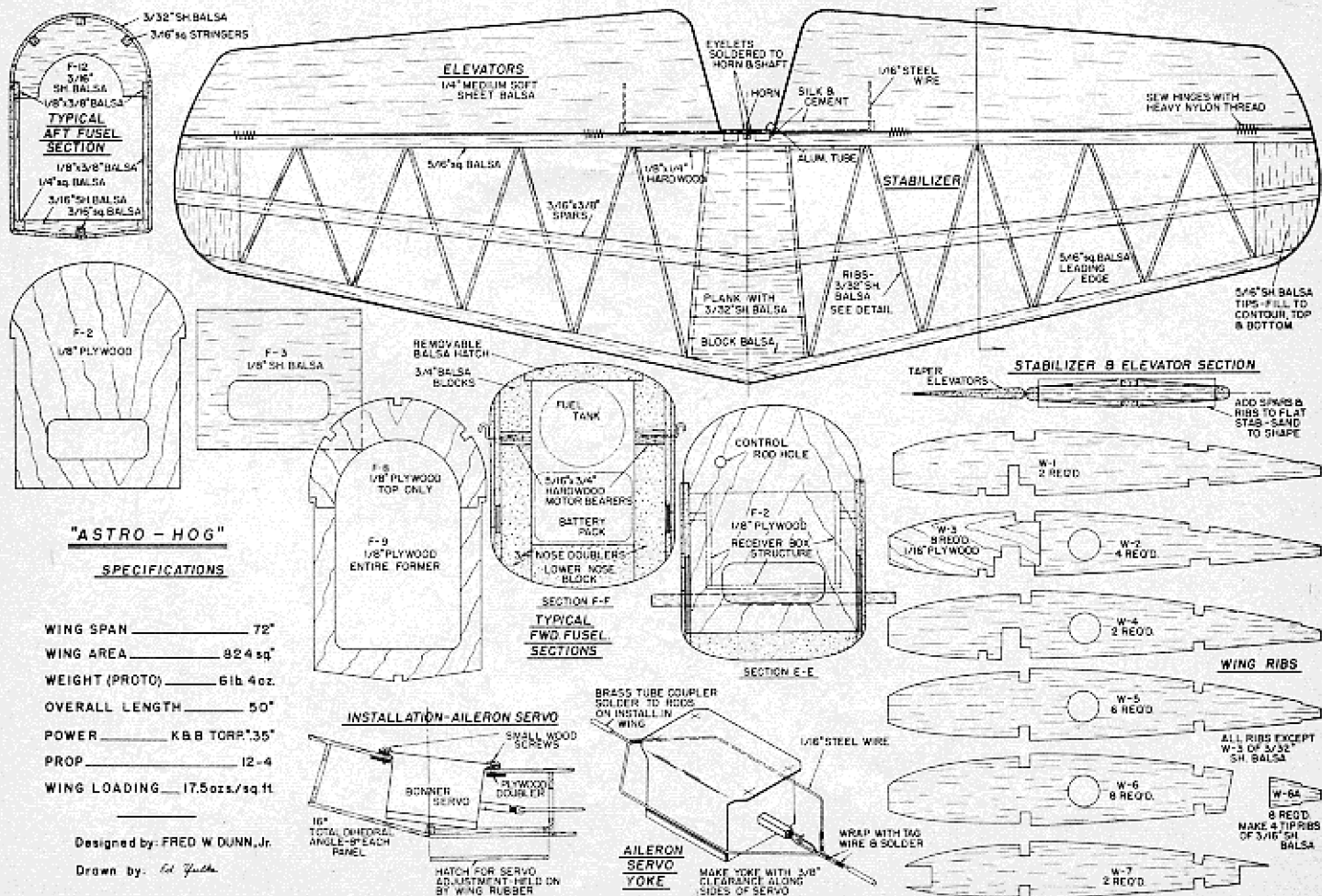
walked away, reaffirmed in their convictions that the low-wingers were doomed and would never be suitable for use in R.C. Reports from other sectors indicated much the same results with the exception of some favorable comments regarding Hollinger's PT-19. Not easily discouraged, I sat down and gave it some concentrated thought.

Since I was unable to attend the '57 Nats, I decided to make good use of the time while the gang was out in Philadelphia, cutting capers in the Eastern skies. I told them I would have something interesting when they returned and went to work burning the midnight oil.

Actually, I decided, my first design had been so scientific it wasn't worth a hoot in a windstorm. This new ship must be more fundamental and should incorporate some of the good features found in existing designs. I followed some

themes of the world renowned Smog-Hog, and decided to stick with the good ole' N.A.C.A. 2415 Airfoil. Ailerons were a must this time—my first ship might have been saved had I been able to control roll. Soon, I discovered I was creating a low-wing version of the Smog-Hog, with a few exceptions, of course.

The new ship was completed in time for the Larks, Flying Circus Meet, and made its debut on Sunday, Aug. 17, 1957. The entire Larks Club was in attendance and many anxiously awaited the maiden flight. A mid-day break in the events provided the right opportunity for a first attempt and since I was not a seasoned flier, I thought the ole' master himself, Howard Bonner, should do the honors. Howard made a complete ground-check and then made some taxi tests. The ship seemed to handle well and showed excellent ground stability. Howard gave me a nod and "Away we Go!" The Astro (Continued on page 46)



Astro-Hog

(Continued from page 16)

made a smooth hands-off T.O. and climbed gracefully. The next several minutes were filled with some very pleasant surprises. It actually flew! Howard, put the ship through its paces and then lost power after which he maneuvered in for a safe and very realistic landing. Everyone indicated approval by a welcomed round of applause. By the end of the day, at least six individuals had flown the ship including; Bob Dunham, '57 National Champion; Dean Kenny; and Ray Downs. I went home feeling that the low-winger had been properly introduced and highly endorsed.

Two weeks later, Bob Dunham was flying an Astro, then along came H. Bonner, with his beauty, followed by many more. The Astro, made its first contest appearance in Sept. '57 at Turlock, Calif., and walked off with 1st Place in Multi-Advanced after Dunham rang up 239.6 points. Since then, the Astro has enjoyed victory at every major meet entered, the latest (at time of writing) being the contest in Albuquerque, New Mexico, where Dunham demonstrated the ship's ability to win out even in high-elevation country.

I have been swamped with requests for data and design specs. I'll never know how the word spread so fast, but now I fully realize how eager many others have been to see a new look in RC model aircraft design. Let's take a peek at some of the interesting features of the low-winger as revealed by the Astro-Hog.

Our Astros, thus far, have been equipped exclusively with multi-channel radio gear. No regard has been given to other control systems due to the fact that multi equipment is in prominent use in the Western

States. Other systems may prove to be adequate, but will require much development on the part of the user since any alternate methods will present problems which are foreign to the author.

Assume then, that we are concerned with a plane which is controllable about the three axes of flight which involves, pitch, roll, and yaw. Pitch is controlled by the elevators, roll by the ailerons, and yaw by the rudder. We are also installing a throttle-control switch and will be able to vary the magnitude of thrust, which is our propelling force. So far, we have satisfied the conditions and should be able to make a plane fly by the accepted and long established theories of flight. Now, let's see how the low-winger fits into this picture.

We have learned that high-wingers offer excellent stability characteristics; however, it is our desire to create aircraft capable of performing many complex maneuvers such as, slow-rolls, four-point rolls, inverted flight, etc. In order to achieve this, we must make some sacrifice in the normal stability found in many of the conventional designs and compensate for the loss by making use of the additional controls now available.

In the low-winger, we yield lateral stability, but only because we are controlling it by utilizing the ailerons. At the same time, we lower the center of lift, and now it requires less aileron air-loading to produce a high rate of roll. Does this do the trick? Wait until you give your first aileron command to the Astro! You will have the answer in a matter of seconds. Incidentally, Bob Dunham, has been getting some four-point rolls that are out-of-this-world. This man will bear watching again at the '58 Nats!

How about rudder response? Heretofore, rudder was used exclusively to make turns of all denominations and when used in the high-winger, it has been depended upon to generate enough force to allow the plane to roll and thereby set up conditions which would simulate a true roll. The maneuver, however, takes on the characteristic of a barrel-roll, rather than a true roll around the longitudinal axis of the plane. The low-winger responds much differently.

Due to the lower center-of-lift, coupled with a reduction in lateral area, a rudder command, when applied to the model, will produce a strong yawing force which is very detachable in flight. Some fliers call this Fish-tailing; the net result is sometimes called Dutch-roll. It takes a slightly longer time before a wing tip drops and sets up a good turning attitude. Does this present a serious problem? Definitely, no. On the contrary, this is to be expected and can be of great advantage when used at the proper times, such as in a precision wing-over. How then, do you make a smooth turn? By aileron only. A few short pulses and the plane will bank to any desired degree. If properly trimmed, the Astro will fly several complete turns hands-off. When you want to recover, use the same technique and then look at the smile on the judge's face.

You will soon discover the turn can be steepened by using a few taps on the rudder, or you may shallow-out in the same manner, but it is my guess you will begin to ignore the rudder and start to live with those ailerons. It's a new experience and I believe it will have a definite effect on RC flying habits in the future.

How about the rest of the aerobatic maneuvers? You name it, the Astro is right at home up there in the wild blue yonder

and is aerodynamically sound and structurally capable of withstanding any normal abuse. We have pushed the Astro, all the way, and have had no in-flight failures due to structural deficiency. Many a rough landing has proven the landing-gears and related installations will weather the storm.

Outside loops are a cinch. A full-down and hold elevator command will produce a well-rounded maneuver. The loop can be tightened by shifting the CG aft about a quarter of an inch, but don't overdo it or some of the other stunts may begin to offer trouble. Inside loops are much tighter if command is held, but can be opened up by pulsing.

True spins can be a work of art with the Astro. Just as in a real ship, apply some up-elevator to produce a stall, then cram on up-elevator and full rudder and hold (good ole' simultaneous control). The Astro will enter the spin quite rapidly and gyrates at a constant rate while held in. Spin recovery is fast and she drops out with no hesitation after the controls are neutralized. A few taps of up-elevator will bring the nose up to level position; now, just for kicks, hit full-on aileron and watch her do one nice victory roll on the way back up. This is real flying!

For inverted flight, just roll to inverted position and tap on a few short blasts of down-elevator to maintain nose attitude, hit another down and hold for a second, then roll out with those trusty ailerons.

All of the other maneuvers are usually known to all and are easily accomplished using combinations of the controls available. After you have gained confidence in the ship's ability, you will no doubt discover the added thrills which can be had by playing around with the throttle during some of your aerobatics. This is something

many fliers seem to overlook, and yet it can add some real spice to your sport flying and makes a big impression on the spectators. Just another touch of realism.

We have had some fine comments in regard to the apparent ease in making landings with the Astro. The plane has proven to be very dependable at low power settings. In slow-flight and during normal glide, she holds a heading very well and has a reasonable rate of descent. Here again, I must emphasize how vital the ailerons become. I find this is one of the best times to use combinations of aileron and rudder, and an occasional tap on up-elevator. With the Astro, you will enjoy making landings and thrive on its rapid responses. When making a let-down and rounding out for the touch-down, a few short taps of up, up, up, will be required just prior to making contact with the ground. At this point, the plane becomes very stable and will maintain a heading due to its strong weathervaning characteristic. This is very beneficial for touch-and-go landings.

When taxiing in high winds, the weathervaning habits of the Astro, can give trouble. I suggest following a normal prototype procedure. Always come to a full stop before making a turn from upwind to downwind. Apply only enough power to "creep" around the turn, then chop the throttle back to "idle" and continue slowly to destination. Try some down-elevator when traveling with a tailwind. This will add pressure to the tail wheel and make for better steering.

Now for a word or two about building the Astro. I prefer not to elaborate on this subject since I am a firm believer in the old axiom; "A picture is worth a thousand words." When building any model, I find

it most useful to apply a maximum amount of common sense and good judgement. In recent months I have noticed many new ships showing up with that certain added touch of workmanship, or maybe a clever new gadget, or a fresh approach to an old problem. The number of flights per crack-up seems to be on the increase and many fellows are putting more effort into their ships. The results are usually rewarding.

It will be wise to select the best woods available for your Astro-Hog. I suggest some uniform grain, medium weight balsa for all basic structures and light balsa for the planked and blocked areas. For all areas requiring curved planking, I recommend you first make a paper pattern developed right from the spots involved. I use a translucent paper such as drawing vellum. You can see through and mark off the proper outlines with pencil. The pattern allows you to cut a sheet of wood to the correct shape without loss of costly materials as a result of trial and error. Sheet balsa will form easily by wetting the outside surface. The wood will have a tendency to curve away from the moistened surface and can be easily hand-formed to fit the curved areas of the fuselage, or wing leading-edge. A slow-drying cement is very helpful when used in these trouble spots; it will provide more time for pinning and wrapping with rubber-bands.

The plans illustrate the exact configuration used on the original Astro, and no modifications are necessary unless you desire to probe the unknown a little. Total gross weight should not exceed seven lbs. Most Astros, will weigh-in at about six lbs. ten ounces, at birth. You will probably take on an ounce or two after making a few repairs.

I hope the following run-down will be found informative and useful in answering some of the questions which have been asked.

Q.—How come the name, "Astro-Hog"?

A.—Astronomically speaking, "The Sky's the Limit"—the word, Hog, has been used to acknowledge design credits to the Smog-Hog, by Howard Bonner.

Q.—What props do you recommend?

A.—This will vary with the engine used, geographical location, and many other factors, but for general use we find 11-6 and 12-5 work well with engines of .35 cu. in. displacement.

Q.—Is the Astro-Hog suited for Rudder-only operation?

A.—Frankly, no; however, I do believe it can be made to fly well using rudder-only by increasing the dihedral angle to at least ten degrees per half-span. This would increase the amount of built-in lateral stability and add some needed rolling force. The plane would have a lighter wing-loading due to the savings in weight as compared to a Multi installation and you might have a winner once you found the proper trim settings.

Q.—How come no engine downthrust?

A.—Actually, the Astro, has four degrees of downthrust built in. It is not apparent at first glance due to the fact that the engine mounts are installed normal to the horizontal construction lines. This means you are able to use this four degrees, but do not have to shim-up the engine to get it. Some Astros are using about five degrees of right-thrust. This may vary from ship to ship.

Q.—Does the ship have good wind penetration?

A.—Yes, it is more than usually found in most ships. This too is a requirement for competitive flying where high winds are the rule rather than the exception.

Q.—Can she perform knife-edge flight?

A.—We have gotten a reasonable facsimile, but have not yet perfected this maneuver; it's a rough one to get with any ship.

Q.—Do you have any last minute modifications or have you discovered any new improvements you may pass along to others who anticipate building the Astro?

A.—I can answer this question best by saying, the Astro-Hog is now a proven design, and is passed on to you who will pick up and go on from here. Yes, I have made several new discoveries and am in the process of proving their worth. I am confident that lots of you will make many new discoveries and you will likewise pass them on to others. This is progress.