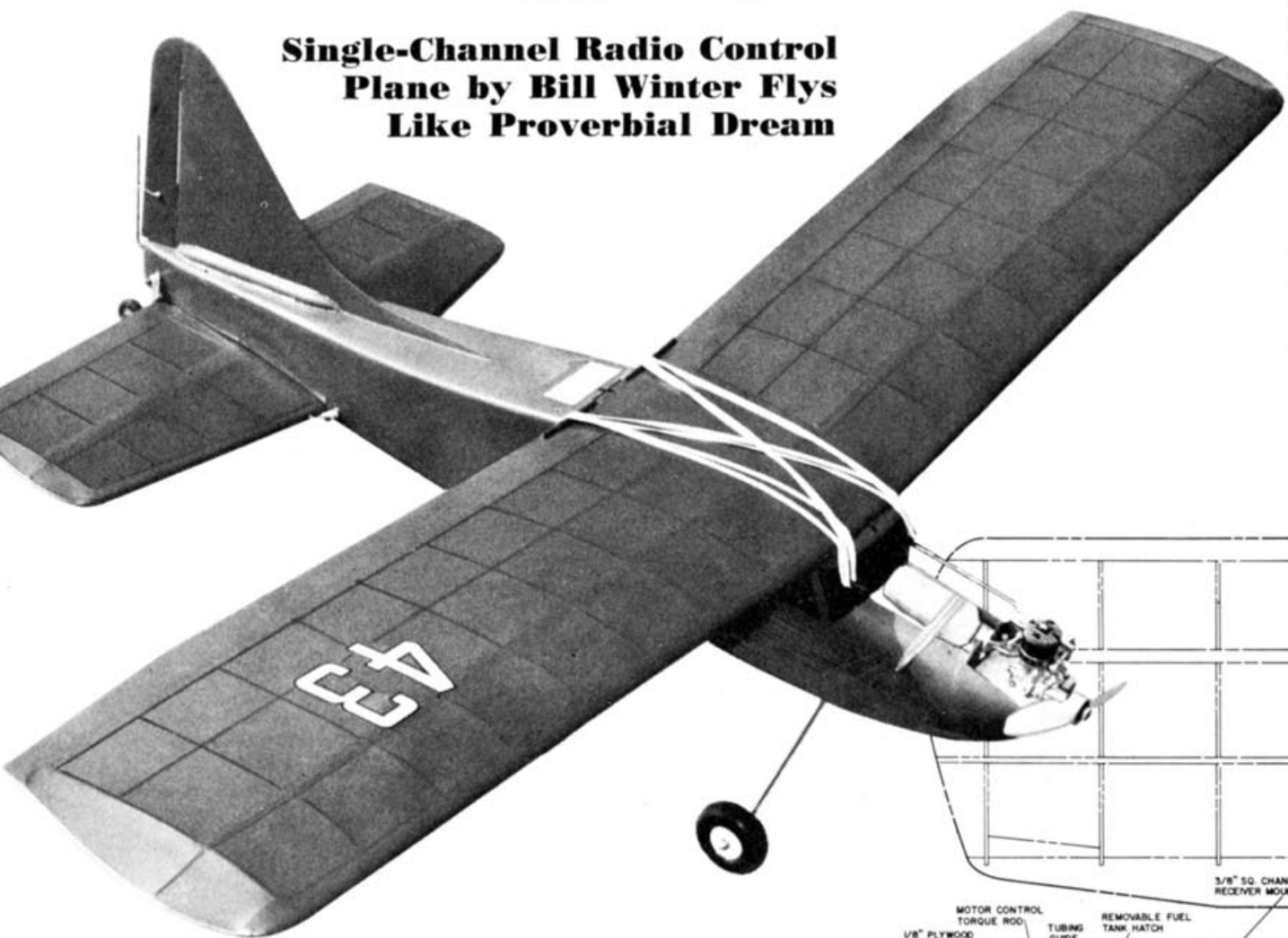


# KRACKERJAC

**Single-Channel Radio Control Plane by Bill Winter Flies Like Proverbial Dream**



■ Versatility is the keynote in Krackerjac's design. For single-channel operation with rudder-only or rudder-and-throttle control, it is adaptable to training, sport, or more advanced flying. Its special airfoil affords excellent performance in the wind.

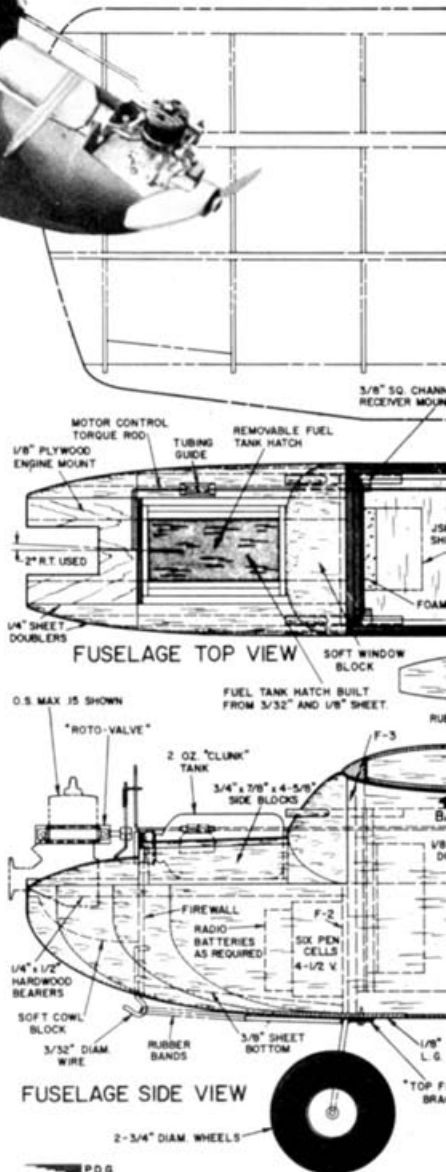
Exhaustive flight testing of four airplanes with various engines in the .09 and .15 categories permits precise recommendations on power and trimming for performance matched to the operator's particular skill and demands.

In the .15 airplane this objective is not easily attained. A typical .15-powered machine spans in the neighborhood of 48 to 54 inches and has a high if not troublesome rate of climb which can be disastrous in the wind. However, its performance wins contests in skilled hands. Unfortunately, many of us do not have experience to cope with difficult fast-action situations. For training, a .15-powered airplane should span about 60 inches (none exist!), but, of course, it would be unsuitable for people who wish to burn up the sky.

Plans for Krackerjac show a "de-rated" version for safe sport flying. For the experienced pilot who prefers a

hotted-up affair, simple changes are outlined here. In brief, the "tame" configuration calls for one of the lower powered 15's, a center of gravity location closer to the leading edge than is normal, with a larger decalage—angular difference between wing and tail—than is common practice.

If this version is built and no throttle is fitted it is essential to avoid powerful engines. It is recommended, though not imperative, that a two-position throttle be installed. Plans illustrate a Cobb Hobby three-position motor control escapement with a torque rod to an old-style Roto-Valve throttle. We also tested a vertically mounted Bonner SN escapement with a push-pull linkage to the new-style Roto-Valve throttle on the K&B .15 (the previous one!). If the K&B is used, the radio installation will have to be on the right side to clear the motor-control push-rod. Ideal results will be obtained by setting this throttle to give high and medium power, rather than high and low motor. The beginner and sport flier is not particularly interested in power approaches and touch-and-go landings which can beat up an airplane so easily. By using cruise throttle rather



than low motor, the flier can obtain smooth turns and docile maneuvers after a climb to altitude on high motor.

To obtain the desired CG position, a generous battery pack is located in the nose and is accessible through the opening between the motor mounting-plate bearers directly beneath the "clunk tank" holder. Like a U-control job with forward CG, the ship is less sensitive about its spanwise axis and tends to fly in a groove. In combination with the convex undercambered airfoil, this setup enhances ability to fly in the wind, reducing pitch-ups and improving penetration.

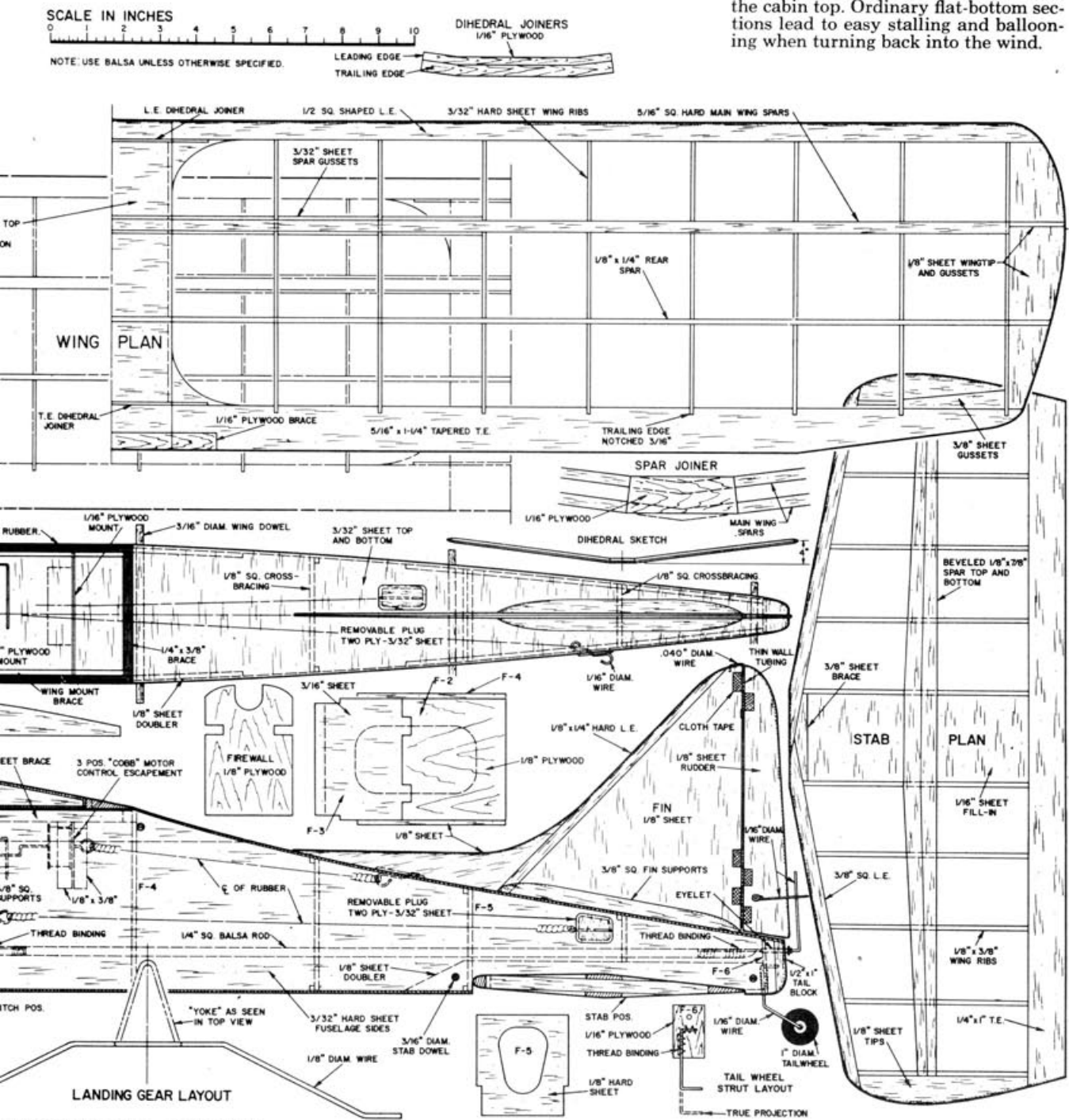
Six pen cells were used on the Vari-Comp escapement for 4½ volts, with increased spring tension for less marginal operation via one-quarter inch wide rubber which was stretch-wound for extra turns. For 3-volt operation use four pencils. To check escapement

operation wind the rubber fully and key the escapement a few dozen times to make sure it pulls in and drops out. If you vary spring tension vary the voltage (by rheostat) when making the check to make sure pull-in occurs at anything above 3½ volts (with 4½-volt operation) and discard batteries when they drop below 3¼ volts. Actually, all escapements (like relays) should be checked for drop-out and pull-in regardless of voltage employed.

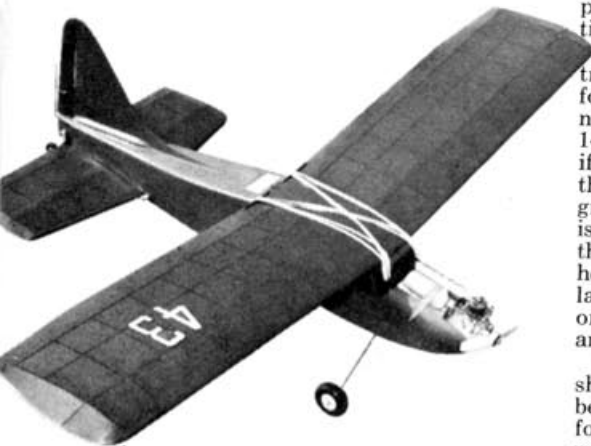
Most of our flying was done with the Citizen-Ship JSH superhet receiver which has more range than you should require. Available for five spots from 26.995 to 27.255 mc, we used the 27.195 unit in the immediate vicinity of a radio-controlled traffic light transmitter without interference; being so close in frequency to the dreaded lights, we also had good separation from other "usual" interference sources. Since this

receiver's sole requirement is a small 9-volt battery, lead ballast was added to the nose to preserve the CG position. A Marcy receiver employed in one model required a U-30 B battery and two pencils. (One of our offspring put the model in a tall tree and when it was recovered 24 hours later flying was resumed without battery replacement!) The point is to use battery and ballast combinations according to the needs of your equipment to hold the CG position specified on the plans—this only for the "de-rated" version of the airplane.

A combination of flat bottom and undercamber was utilized in the airfoil to improve stability by reduction of chordwise center of pressure travel and to improve penetration. The under surface curves up to the rather high leading edge from the near mid-chord point, but the aft portion is flat bottomed to make construction easy and to facilitate accurate alignment with the cabin top. Ordinary flat-bottom sections lead to easy stalling and ballooning when turning back into the wind.



# Radio Control KRACKERJAC by Bill Winter



Now what can the skilled flier do to get unrestricted performance? First, of course, he can step up the power. Our own test flights in this phase of operations were made with the Max .15 and the three-position throttle. High power is used for climbs to altitude, cruise for pattern work and sport flying, and low motor when required. This motor-control escapement was mounted horizontally across the cabin with a torque rod linkage to a rotary motion Roto-Valve throttle. And, of course, there are engines which have coupled exhaust and intake throttles built in.

Also, the center of gravity can be shifted rearward by decreasing battery weight in the nose and/or by removing ballast. This calls for decreasing decalage, which is done by removing incidence from the stabilizer. Rudder movement for abrupt maneuvering can be increased by the use of the adjustable rudder yoke.

Since this is not a "balloony" air-

plane it consumes altitude rapidly for spiraling. Nor will it tend to loop as it comes out of the spiral recovery. Flat trim and good penetration for trouble-free flying in the wind do not go hand in hand with a loop-prone setup. It is better to trim any airplane which does not have elevator control, for a compromise combination of the two conditions.

Like other airplanes with symmetrical or convex undercambered airfoils, Krackerjac prefers a slightly nose-high launch. Like, say, the Cessna 140, it will climb out at a steady angle if the tail is down just a little, as if the tail were raised half-way on a ground takeoff. A straight launch that is required for flat-bottom airfoil ships that are not underpowered or too heavy, will be followed by a dip after launch to pick up still more speed in order to attain the nose up climb out angle.

Windy weather approach turns should be made close in as altitude will be lost while the rudder is held for a forced turn. Ideally, the flier should position his flying so that an overhead approach can be executed. The ship passes overhead down wind, swinging wide to the side from the overhead point to begin the 180 back into the wind for landing. If not enough altitude is available the downwind leg should be wide of the pilot, turning into a long, close-in crosswind leg from which the turn into the final approach can be made whenever the situation looks good. Naturally, if there is little or no wind, the "crosswind" leg can be moved farther out.

Krackerjac can be trimmed for a slow glide, which helps downwind turning, without danger of dropping a wing tip and hitting the ground, thanks to the combination of the airfoil and tip section that results from raking forward the trailing edge near the wing tip (this was a feature of the Rudderbug).

It will be found that Krackerjac has the ability to go where you want it in a high wind and this is a "must."

The ship has been flown with an .09. Number 1 airplane was intended for .09 to .15 operation. Because of the low

power of the .09 a lightweight battery pack was used with a more rearward CG location. The result was an ideal .09 trainer on which it was practically impossible to get into trouble, but the .15 engine made the craft too hot for the average flier. If you don't insist on thunder and lightning, try this setup with an .09 that has high torque—the Webra Diesel for instance—and forget the throttle. High torque permits an adequate prop diameter—an extra inch can be counted upon.

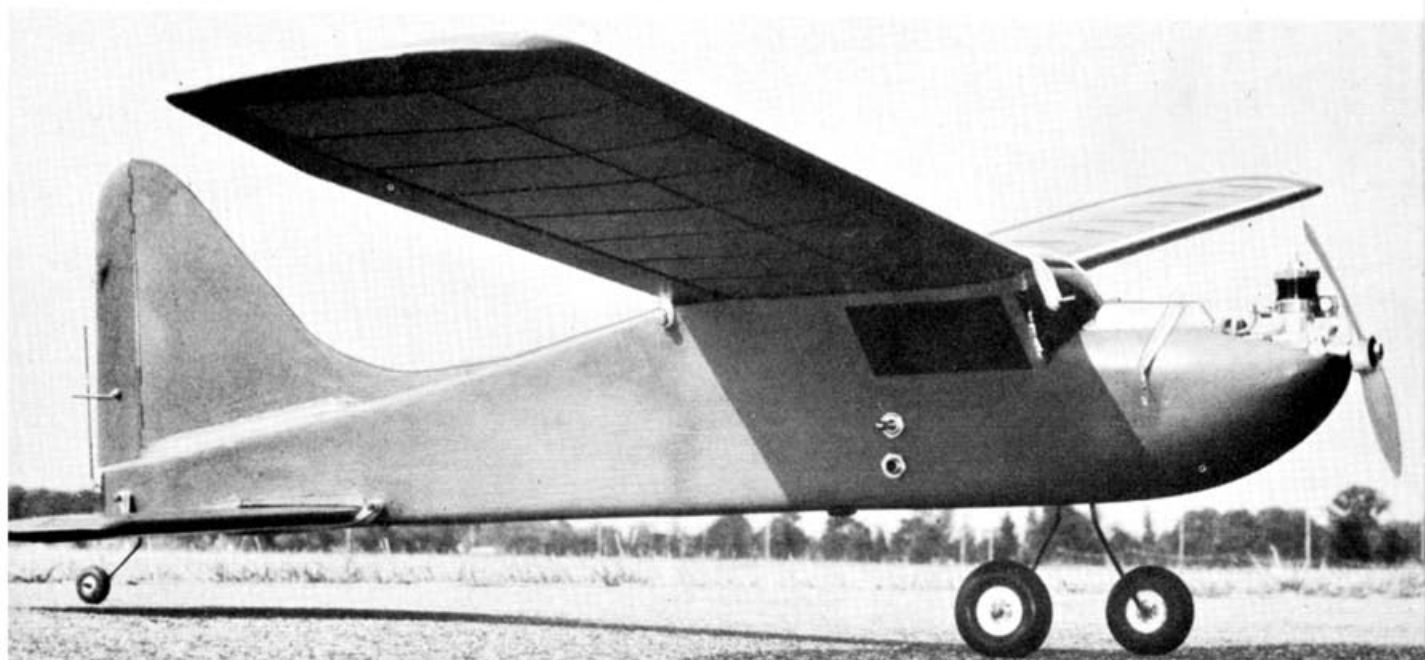
■ **CONSTRUCTION** . . . Because any modeler who tackles an R/C project has probably built other types of airplanes, general building notes, rather than step-by-step instructions, are given.

**Fuselage:** This design eliminates the bending of sides toward the nose, automatically insuring thrust-line accuracy and great nose strength. Forward of the back-cabin bulkhead, the sides are parallel as assembled, all the way to the nose. Materials used for the sides, the side doublers and the various nose doublers and patterns, can be picked off the plan. After the basic fuselage work is done, use a coarse sanding board to bring the nose to contour. As you sand away the excess material each lamination becomes visible, like contour lines on a map, and for an exact duplication of sides use these contour lines as a guide.

The top nose opening is wide enough to drop in the taped battery pack (some bearer material can be carved away) which is held tightly in place by wedging in a couple of small pieces of foam rubber. A cover tray for the two smallest clunk tanks is shown. Satisfactory short flights result from a one-ounce tank on the K&B .15, very long runs from anything larger.

Wing-hold-down dowels reinforce the top cabin runners at the critical top-corner joints. Use a small drill or a heavy piece of music wire to start the holes, then enlarge the holes with progressively larger sizes of drills. If all dowels are left uncemented they can be removed during covering, and cemented in place after painting. The  $\frac{1}{8}$ " ply motor mount plate is held down by four 4-40 screws that thread into blind nuts beneath the hardened bearers. Incidentally, for engines other than the K&B, the exhaust stack probably will be on the other side, so throttle and radio installation should be moved to the opposite sides of the cabin.

**Tail Surfaces:** The stabilizer is a popular type with cross pieces between leading and trailing edges, followed by the top spar of  $\frac{1}{8}$ " sheet, and then the similar bottom spar.



**BILL OF MATERIALS**  
(Balsa unless otherwise specified)

Eight pieces 3/32 x 3 x 36" for fuselage sides, top and bottom, side doublers, wing ribs, wing and stabilizer center-section sheeting, stab tips, wing spar joiners; 1/8 x 3 x 36" for rear cabin bulkhead, fin and rudder, wing tips; 3/16 x 4 x 6" for front cabin bulkhead; 1/4 x 3 x 36" for nose doublers, incidental pieces; 1/8" sq. x 36" for fuselage reinforcement cross pieces; 1/8 x 3/8 x 36" for stabilizer cross pieces; 3/8" sq. x 36" for stabilizer leading edge, fin fillets; (two) 1/8 x 7/8 x 24" for stabilizer top and bottom spars; (four) 5/16" sq. x 36" for wing spars; (two) 1/8 x 1/4 x 36" for aft wing spars; 1/4" sq. x 24" for torque rod; (two) 1/8 x 7/8 x 24" for stabilizer top and bottom spars; 1/4 x 1 x 24" triangle stock for stabilizer trailing edge; (two) 5/16 x 1-1/4 x 36" triangle stock for wing trailing edge; (two) 1/2" wide, shaped leading-edge stock for wing leading edge.

One piece 1-1/2 x 4 x 2-1/2" for windshield block; 1 x 1 x 14" for top nose blocks; 4 x 2-1/2 x 1/2" for aft bottom nose block; 2-1/2 x 2-1/2 x 2-1/2" for forward, bottom nose block.

Also, one piece 1/4 x 1/2 x 14" maple (etc.) for motor plate mounts; 3/16" x 24" dowel; 1/4 x 5" dowel; 2-1/2 x 2-1/2 x 1/8" ply for motor mount plate; 2-1/2 x 4 x 1/8" ply for firewall.

Music wire: 1/8" 1/16", 1/32" as required; two Top Flite landing gear mounting brackets; 1 pair 2-1/4" diameter lightweight wheels; 1 standard tail wheel; 1 set of blind nuts and four 4-40 mounting screws with washers; (four) 3-48 screws for mounting engine, with eight washers and four lock nuts.

Dope, cement as required; 2 yards colorfast, lightweight silk; 1 package Bonner hook-up wire; switches, plugs, sockets, jacks, escapements, etc., to suit installation.

Use a large sanding board to get the accurate cross section.

The fin requires care. The original was 3/32" thick but to insure against warpage and turn-over damage, anything up to 3/16" thick sheet balsa can be used, provided the wood is light and soft. The harder grade leading edge provides rigidity and protection—the material size here should match the thickness of sheet balsa.

Do not cover the fin with silk unless the wood is more than 1/8" thick. Coat the wood with well plasticized dope—say, ten drops of castor oil to the ounce—and sand lightly after each of the first two coats has dried. After each coat has dried enough not to stick to a surface, place the fin flat on the bench and weight it down for an hour or so. When the surface is finished keep it under weights until ready for installation. The fillet blocks that attach the fin to the fuselage provide all the stiffness that will be needed.

**Landing Gear:** The plans show a 1/8" music wire gear with rubber shock absorption. Somewhat more expensive but easy to install is the deBolt-type sheet metal gear which comes in a variety of sizes. Simply install a couple of through-the-fuselage dowels to hold the rubber bands which allow the gear to knock off.

**Wings:** In assembling the panels, block up the leading edge the required distance from the bench surface. The trailing edge rakes forward slightly at the tip, after the manner of the old Rudder Bug. When the wing is ready for sanding, invert it and, with a large sanding board, shape the two tip ribs, trailing edge and tip to match the trailing edge at that point. The additional convex undercamber imparted to the aft portion of the section at the tip, will suggest slightly a streamlined airfoil.

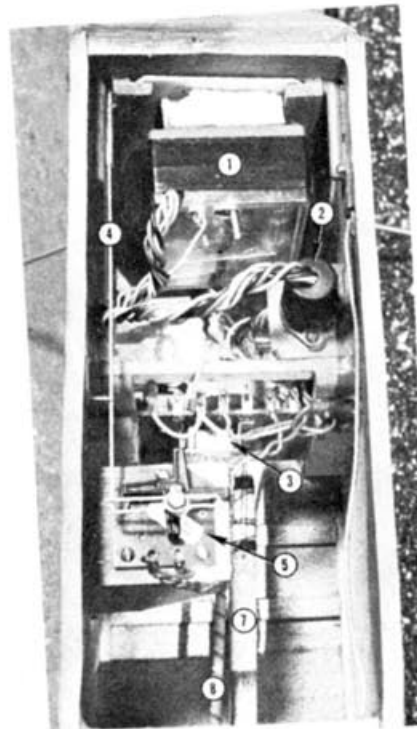
**Thoroughly tested Krackerjac has been built by number of Long Island flyers. Full size drawings are part of Hobby Helpers Group Plan #AMA-620. Design also due out in kit form.**

The result is the same as wash-out at the tips but requires no warping, or built-in warps. This feature helps prevent those twisting stall recoveries close to the ground that always take more altitude than a stall in which the nose falls straight through. The beginner who is slow in killing the stall by turn, or who momentarily loses mastery over the machine, will benefit from this help.

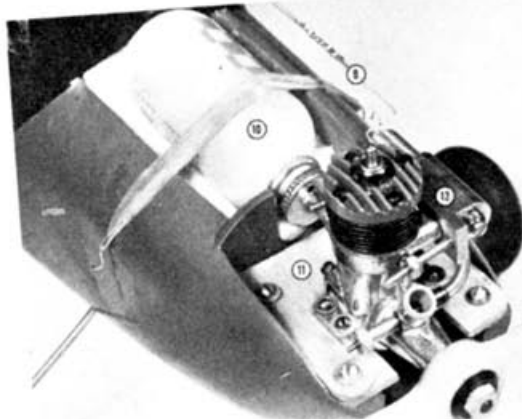
**Covering:** Avoid silk that feels stiff or which has open weave that requires extra coats of dope to fill. Be sure you have color-fast silk or wet covering may give some weird blushing. Four coats of clear dope, plus two of colored (three if a thin color like Cub yellow) should suffice. Sprayed colored dope will be far lighter than brushed-on colors. Heavy color doping practically guarantees tail-heaviness.

**Radio Installation:** For single-channel with escapement and an escapement engine control, the installation shown is compact and effective. The receiver is contact-cemented to a block of foam which in turn is attached in the same fashion to a rectangular piece of 1/32 or 1/16" ply. This ply mount slides up and down in channels to make the receiver easily removable and tuned. The escapement is forward enough in the cabin to be accessible, and rubber is easily installed and replaced. Other single-channel installations, such as pulse, can be even easier to install. With the battery pack in the nose, the extra-length wire cable passes through a hole in the front cabin bulkhead—many multi jobs have this feature.

If you are willing to risk the need of more nose ballast, the batteries can be placed in



Cabin interior shows optional motor control for push-pull throttles using SNT-type escapement: 1) Shock-mounted receiver on removable slide; 2) Bonner Receiver cable plug in; 3) Throttle Vari-Comp escapement; 4) Rubber for to-control escapement; 5) Bonner SN motor-control escapement; 6) Rubber for torque-rod; 7) Rubber for Vari-Comp K&B .15 installation with push-pull Roto-Valve exhaust restrictor throttle; 8) Wire pushrod for throttle; 9) Engine 10) 2-oz. "clunk" tank; 11) Engine mounted on removable plywood plate; 12) Roto-Valve throttle held against exhaust stack by clamp around cylinder.



the cabin, forward of the receiver, in a standard box. Some builders provide two sliding trays, one for batteries, another for the receiver. Others favor one sturdy tray with the box on the front face, receiver on the back . . . or the box itself can serve as tray for the receiver, the whole being held to the bulkhead with rubber bands (foam protection for receiver required in all cases).

**Flying:** The airplane should balance where shown. If there are warps, they must be removed. No airplane can be flown properly with warps; in fact, an "innocent" warp can overpower your control, causing a dive-in or spiral dive beyond recovery. A model of this size can be hand glided. Trim for a fast glide that touches down two-points, never three—a hot wheel landing in other words.

Use a one-ounce tank until the ship is trimmed and flying dependably. If the model is badly out of trim use any free-flight adjustments you are familiar with; just get it flying and then work toward final adjustments. Use shims for stabilizer incidence to give the desired glide, and correct turning tendencies by off-setting the movable rudder. Eventually, use thrust line adjustments to get precise power-flight trim, and stabilizer and rudder adjustments only to keep a straight, rather fast glide.

The original was flown in winds up to 25 mph on the ground so its penetration, as here set up, is plenty good for sport flying.

