If you think every RC trainer looks like a flying box, here's one that'll change your mind. This two-stroke-powered RC ship is inexpensive to build and docile and quick in the air.

■Design: Ed Ross
■Text: Larry Kruse

IF YOU'RE ready to move up from a slab-sided trainer to something that looks more like an airplane, this little model may be the answer. Most trainers look like a box with wings; designer Ed Ross wanted to try something more interesting. What he came up with is a basic trainer that captures the spirit of a whole generation of big military trainers such as the Vultee BT-13 and the North American T-6.

Sized for two-stroke engines in the .20 range, the BT—for *basic trainer*—is an outstanding flier: light and quick, yet docile and forgiving. Anyone who can handle a trainer will have no trouble slowing this airplane down. The BT combines the stability you expect from a trainer with a reserve of power when you need it.

This is a compact model; chances are you can fit it in the trunk of the car without removing the wings. Even better, you won't have to spend a year in your workshop to build it. The BT is an unusual, fun airplane—a trainer that looks like semiscale but isn't. I've enjoyed building and flying it.

Construction

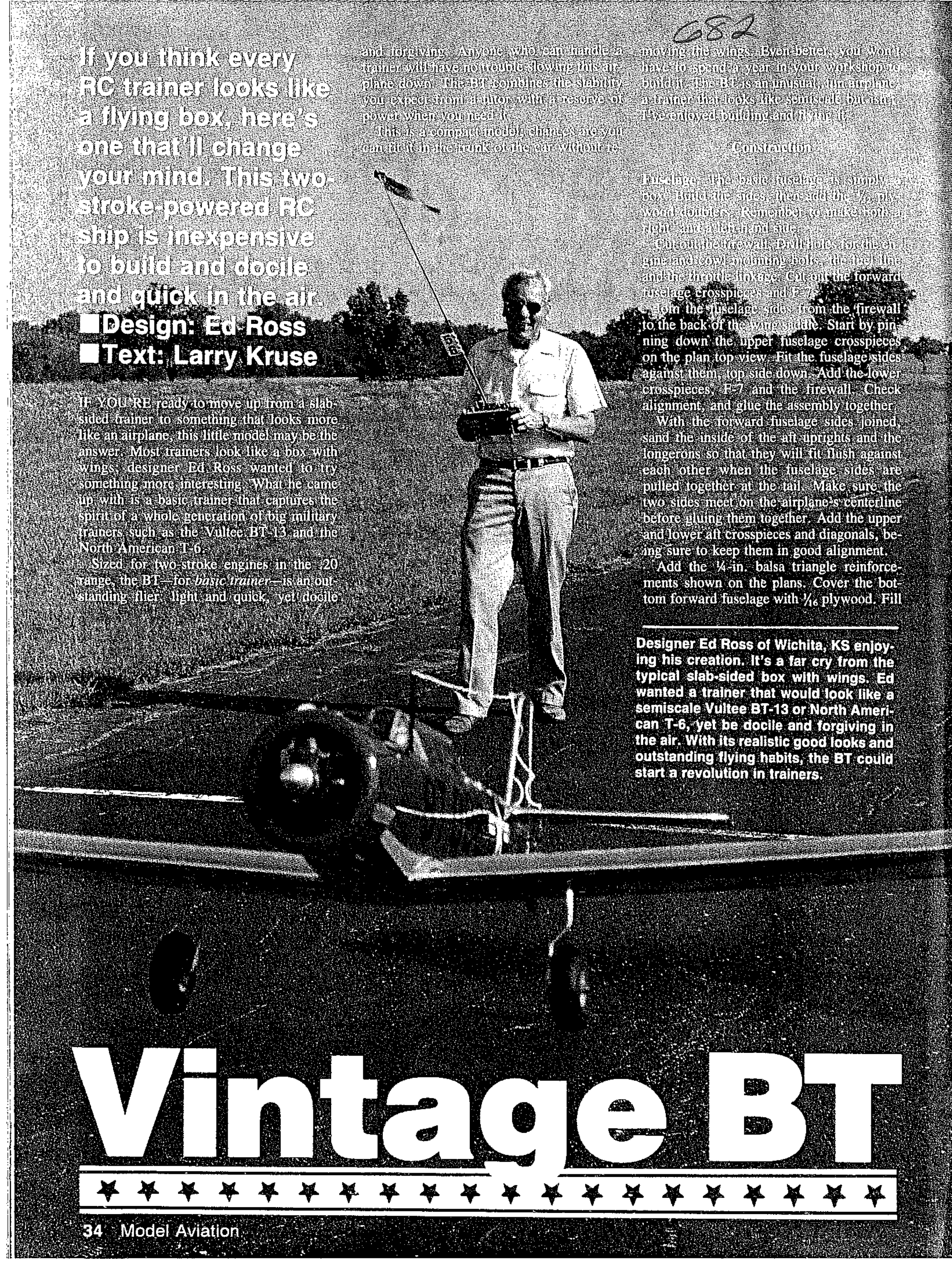
Fuselage: The basic fuselage is simply a box. Build the sides, then add the $^1/_{64}$ plywood doublers. Remember to make both a right- and a left-hand side.

Cut out the firewall. Drill holes for the engine and cowl mounting bolts, the fuel line and the throttle linkage. Cut out the forward fuselage crosspieces and F-7.

Join the fuselage sides from the firewall to the back of the wing saddle. Start by pinning down the upper fuselage crosspieces on the plan top view. Fit the fuselage sides against them, top side down. Add the lower crosspieces, F-7 and the firewall. Check alignment, and glue the assembly together.

With the forward fuselage sides joined, sand the inside of the aft uprights and the longerons so that they will fit flush against each other when the fuselage sides are pulled together at the tail. Make sure the two sides meet on the airplane's centerline before gluing them together. Add the upper and lower aft crosspieces and diagonals, being sure to keep them in good alignment.

Add the ¼-in. balsa triangle reinforcements shown on the plans. Cover the bottom forward fuselage with $^1/_{16}$ plywood. Fill



Designer Ed Ross of Wichita, KS enjoying his creation. It's a far cry from the typical slab-sided box with wings. Ed wanted a trainer that would look like a semiscale Vultee BT-13 or North American T-6, yet be docile and forgiving in the air. With its realistic good looks and outstanding flying habits, the BT could start a revolution in trainers.

Vintage BT

The BT in three-quarter view. Those sleek, attractive lines evoke a whole generation of vintage military trainers without duplicating a particular airplane. The model's wide landing gear stance gives it exceptional ground-handling characteristics, especially for a tail-dragger. Rock-steady yet light and nimble, this ship is a pleasure to fly. And as a new flier gains confidence he can add power and really make it move.

in the upper aft portion from the last upper crosspiece to the rear with 1/8-in. sheet balsa. Add the servo rails and wing mounting bolt blocks to the inside of the fuselage. Cut out the lower aft portion of both lower fuselage longerons, then install a piece of 1/16 ply for the tail wheel mount.

This is a good time to choose your control linkage. I used Sullivan Gold-N-Rods for the rudder and elevator in the prototype. Install the outer portions of the Gold-N-Rods. Secure them firmly where they exit the fuselage at the rear, and add a cross support in the middle of the fuse. Leave the front ends loose for the time being. For the throttle, I used a cable inside an inner portion of Gold-N-Rod. Secure the throttle where it passes through the firewall, leaving the aft portion free for now.

Fill in the cockpit floor with 1/8-in. sheet balsa. Cut out all the formers. Install F-1 through F-4, then F-8 through F-11, making sure they are vertical and properly aligned with the upper crosspieces. Add the 1/8-in.-sq. balsa stringers. Cover the top forward fuselage with 1/16 sheet balsa.

Install two pieces of 1/8-in.-sq. balsa along the sides of the cockpit, then insert F-5 and F-6 between them. Add the 1/8-in. balsa stringers, and cover with 1/16 balsa sheet. Make and install the rollover bar.

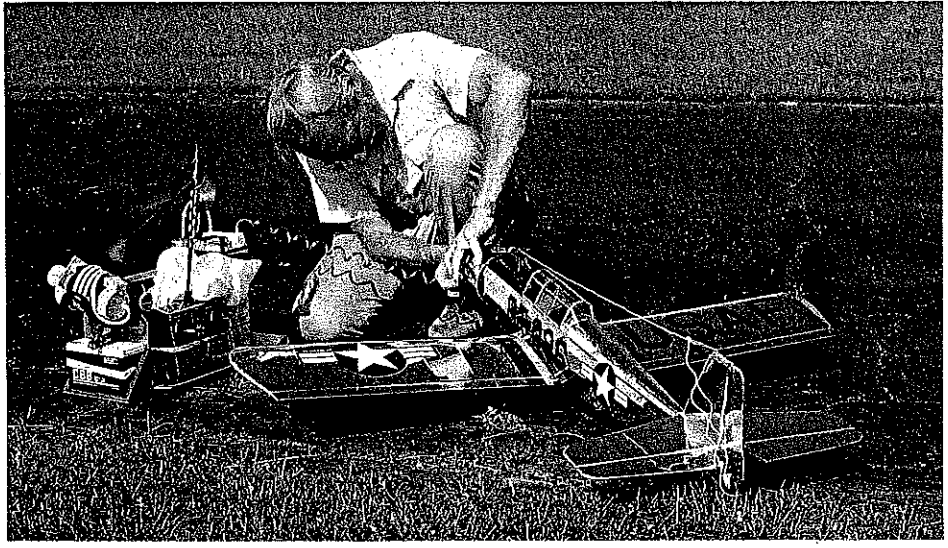
Make the canopy frame. The four canopy hoops, C-1 through C-4, are a lamination of 1/16 plywood and 1/16 balsa. Cut out the plywood parts first, then glue 1/16 sheet balsa to the ply and trim the balsa to match its shape. Cut or file notches in the hoops for the spruce frame members that run fore and aft.

Install the hoops, checking that they're vertical and square, then notch and install the straight, 1/8-in-sq. spruce frame members. Add the short, 1/8-in.-sq. spruce sticks that form the edges of the windshield and the rear panel of the canopy. These will have to be removed to cover the fuselage, but it's easier to locate them properly before the covering is in place.

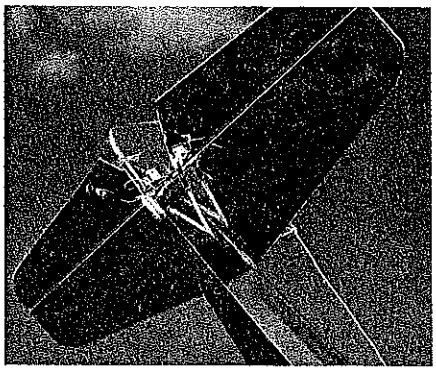
The two stringers, one on each side of the fuselage, are installed next (they resemble formers). First glue two pieces of 1/8 x 1/2-in. sheet balsa to the fuselage sides, flush with the forward edge of the firewall, then glue on the 1/8 x 3/8 stringer supports. The latter should be only about 1 1/8 in. long—just the distance between the 3/16 x 1/8-in. balsa stringers.

Glue on the stringers, positioning their wide side horizontally for maximum width. Begin at the front, and glue them over the stringer supports until you reach the trailing edge of the wing. Aft of the trailing edge, glue the stringers to the fuselage uprights and diagonals until you reach the front of the last open

Ed Ross poses with his BT. Chrome Super MonoKote and stick-on insignia from Major Decals give the little .20-powered ship a military realism that belies its trainer heritage.



Ed fuels his airplane for its maiden voyage. The BT is compact enough to fit in the trunk of most cars with its wings on. Note the bold, realistic military markings.



Is that four Sullivan Gold-N-Rods exiting the fuselage? It just looks that way because of the double reflection from the Super Mono-Kote. In reality only one pushrod is used for the elevator. Notice that the tail wheel is shock-mounted to the rudder to relieve servo strain while the ship is on the ground.

bay. At that point you'll have to taper and trim the stringers before gluing them to the forward face of the last fuselage diagonal.

Install 3/16 by ½-in. balsa blocks between, above and below the stringers, flush with the forward face of the firewall. Carve and sand the blocks to blend into the fuselage former on top and the flat fuselage bottom below.

The mast-type radio antenna is made by epoxying an inner Gold-N-Rod section to a piece of 1/16 plywood. After the parts are joined, paint the exposed upper portion with Hobby Poxy Formula II. Avoid gluing the hole shut. Sand everything smooth, and dry fit the antenna in place. Don't glue it in until after you've covered the fuselage.

Engine cowling. Begin by cutting out the two ⅛-in. plywood rings. These are identical except that the rear one has tabs on the inside for the cowl mounting bolts. Notch the rings for the spruce stringers. Glue the rings and stringers together, and allow to dry. Sand the stringers on the outside to match the curve of the rings. Skin the cowl with 1/32 sheet ply. When the glue is dry, trim the ply flush with the cowl rings and add the balsa to the forward ring. Sand the balsa to a radius, then cut holes for the engine cylinder head, needle valve and muffler, if you're using one.

Tail surfaces. Construction here consists of a 1/16 sheet balsa core with ⅛-in. balsa framework on each side. It's a warp resistant, light

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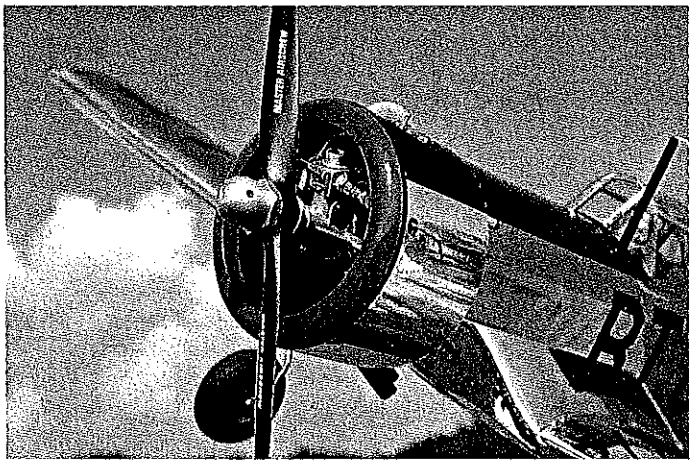
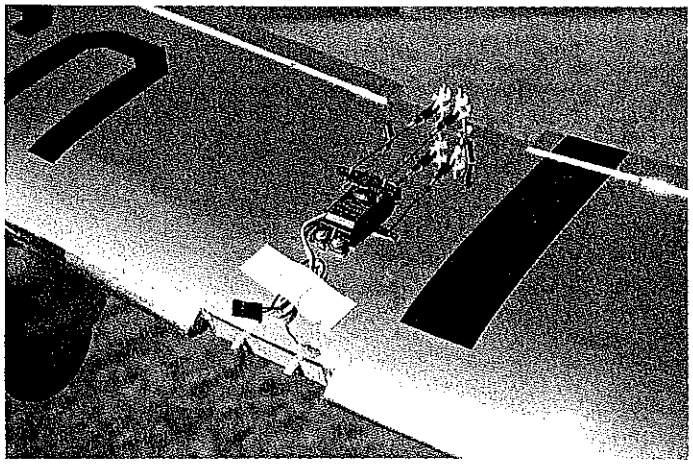
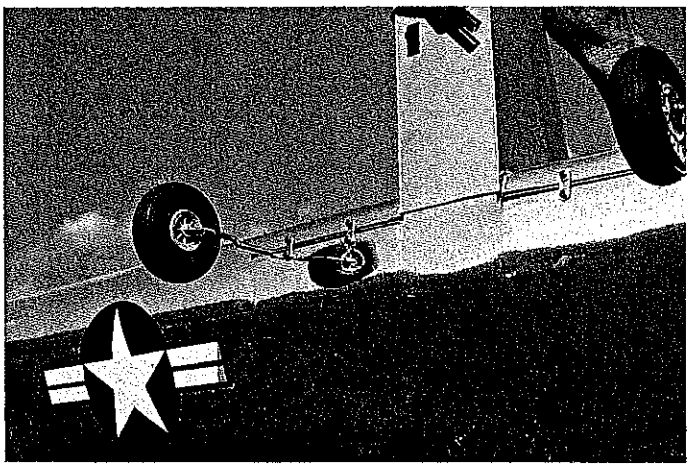
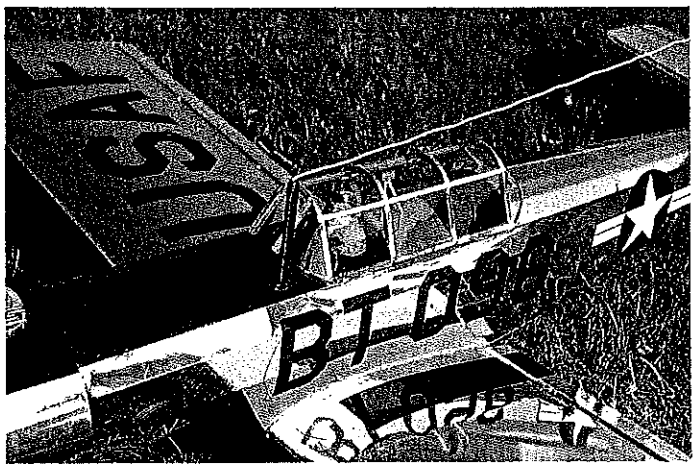


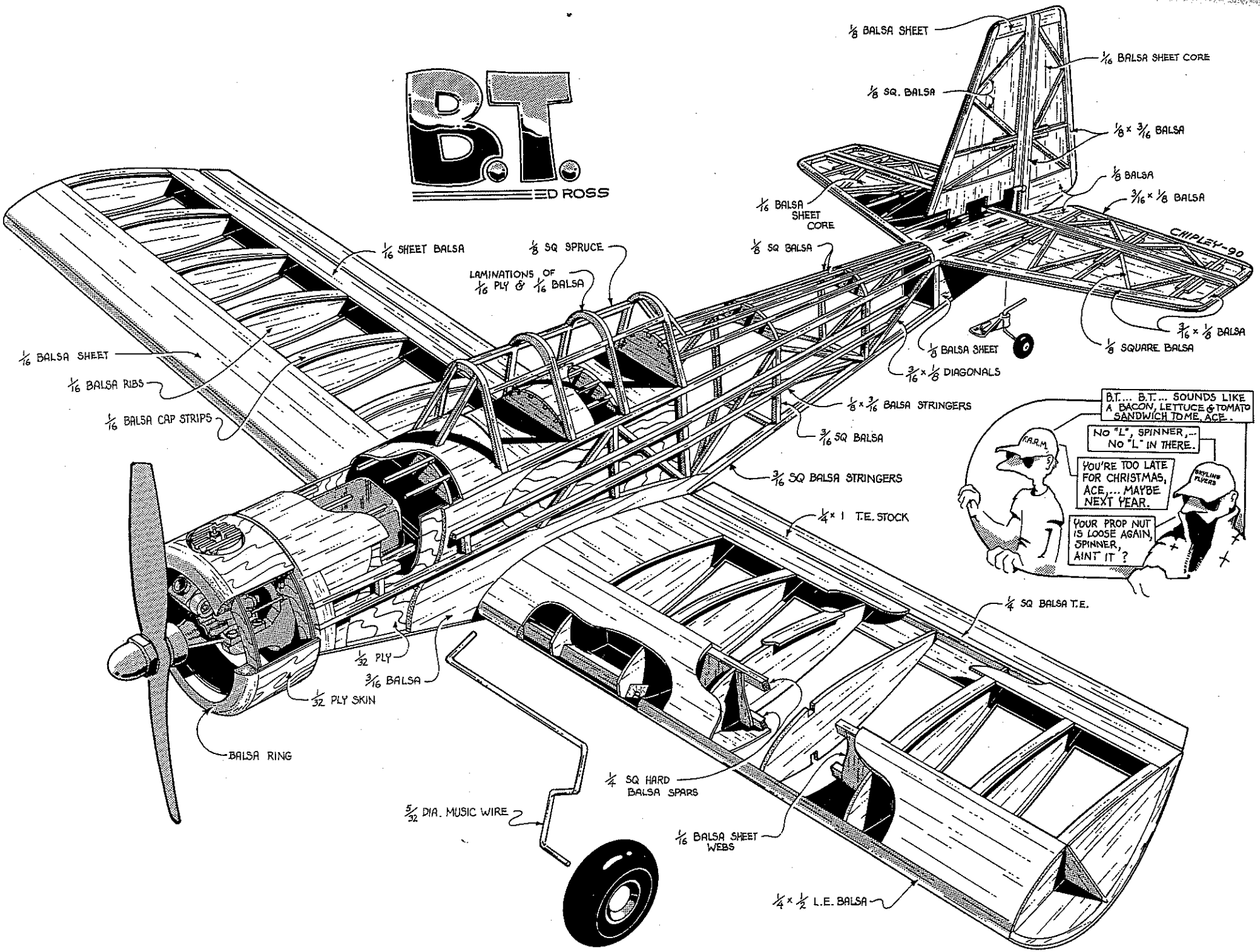


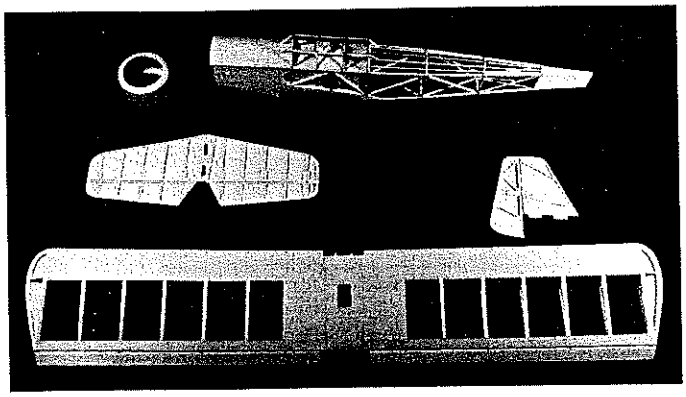
Left: The balsa-and-plywood cowl allows easy access to and proper cooling of the engine. Right: The ailerons are run from a single servo mounted in the wing. Aileron servo rails lie buried under the center section planking, which is then cut away for access and mounting.

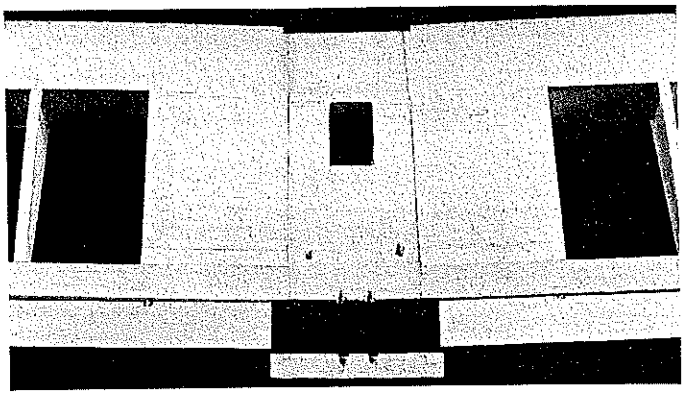




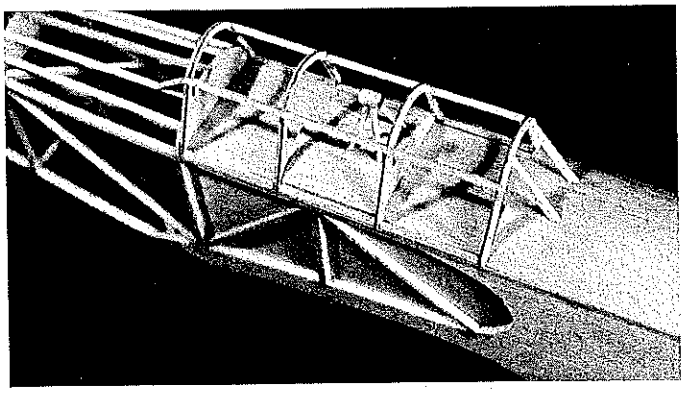
Left: The wide-track landing gear is mounted externally and held in place with two straps per side, a rugged setup that's tolerant of less than perfect landings. Right: A little creative detailing can add a lot of eye appeal and realism. The canopy is made from four plywood/balsa laminations with thin sheet plastic pieces covering each section. The functional radio antenna mast lends a nice scale effect.

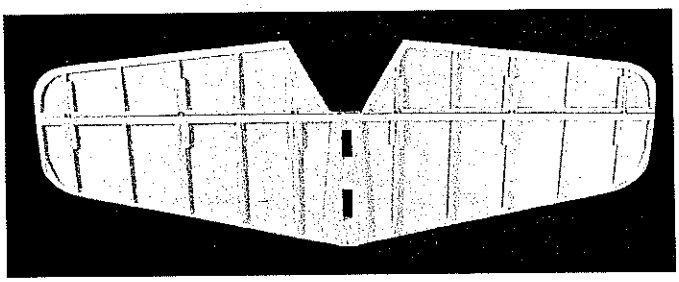

B.T.
ED ROSS
1/8 BALSA SHEET
1/16 BALSA SHEET CORE
1/8 SQ. BALSA
1/8 x 3/16 BALSA
1/8 BALSA
3/16 x 1/8 BALSA
1/16 BALSA SHEET CORE
CHIPLEY-90
1/16 SHEET BALSA
1/8 SQ SPRUCE
LAMINATIONS OF 1/16 PLY & 1/16 BALSA
1/8 SQ BALSA
1/16 BALSA SHEET
1/16 BALSA RIBS
1/16 BALSA CAP STRIPS
1/8 BALSA SHEET
3/16 x 1/8 DIAGONALS
1/8 SQUARE BALSA
1/8 x 3/16 BALSA STRINGERS
3/16 SQ BALSA
3/16 SQ BALSA STRINGERS
1/4 x 1 T.E. STOCK
B.T.... B.T.... SOUNDS LIKE A BACON, LETTUCE & TOMATO SANDWICH TO ME, ACE.
NO "L", SPINNER,... NO "L" IN THERE.
YOU'RE TOO LATE FOR CHRISTMAS, ACE,... MAYBE NEXT YEAR.
YOUR PROP NUT IS LOOSE AGAIN, SPINNER, AIN'T IT?
T.A.R.M.
SKYLINE FLYERS
1/4 SQ BALSA T.E.
1/32 PLY
3/16 BALSA
1/32 PLY SKIN
BALSA RING
1/4 SQ HARD BALSA SPARS
5/32 DIA. MUSIC WIRE
1/16 BALSA SHEET WEBS
1/4 x 1/2 L.E. BALSA





Left: The BT components ready for covering. Everything is light but well stressed. An economical use of balsa, ply and spruce creates durability without excess weight. Right: Here the wing center section has been fully sheeted and the access hole for the aileron servo has been cut. The bolt hole locations will be faced with plywood to prevent wear. This model doesn't require a year in the workshop to build.





Left: The canopy is made from four hoops of 1/16 balsa/ply laminates. Spruce crosspieces are notched into the frame. Simple details like the rollover pylon in the center add realism. Above: The tail surfaces are 1/16 sheet balsa cores with 1/8-in.-sq. balsa framework on each side—a light and warp-resistant configuration.

but thick configuration, with a totally built-up appearance. Another advantage is that it's easy to keep track of the centerline of the surface as you round off the edges, since you can see the 1/16 sheet in the center.

Edge glue 1/16 balsa sheets together until you have enough for all the parts. Trace the outlines of the tail surfaces onto the sheets with the wood grain parallel to the longest dimension. Cut out the parts. Push pins through them to mark the location of the framing. This ensures that the framing will be in the same place on both sides, since you can simply glue it over the pin holes.

It's easiest to frame one side completely, then turn the part over and do the other side. Begin with the outer pieces, then add the inner diagonal and straight parts. The two tabs that fit on the bottom of the vertical stabilizer and extend through the horizontal stab provide needed strength. Be sure to include them.

When you've finished the framing, round off all the edges and taper the rudder and elevators to an airfoil shape. Join the two elevator pieces with wire, and notch the front of the rudder to clear it. Also notch the leading edges of the control surfaces for the hinges.

Wing and landing gear. Cut out all the 1/16 balsa ribs (R-4). Make a template from 1/16 plywood to speed up the job. If you work carefully, you won't have to sand the ribs at all after cutting them out with the template.

The inboard root ribs, R-1 and R-2, are—literally—a little tougher. Cut them out of 1/8-in. plywood, and glue the two pieces together with R-2 on the outboard side. Be sure to make both a left- and a right-hand rib. Cut 1/16 notches for the ribs in the leading and trailing edges.

Begin assembling the wing. Pin a piece of hard 1/4-in.-sq. balsa over the spar location on the plans. Position all the ribs, then position and securely brace the leading and trailing edges. Check that everything is square before gluing.

Add the upper spar. Make up and install the 1/32 plywood doublers for the inboard wing ribs (R-3). After the doublers are in place, cut openings for the landing gear block in the two inboard wing ribs on each side.

Prepare and install the landing gear block. I minimized preparation by using Sig preformed blocks, though I did install blind nuts for machine screws to secure the landing gear mounting straps. Make sure the groove in the block lines up with the slot in R-1, then glue the landing gear block into the wing. Cut out some triangular pieces of scrap balsa to fit between each rib and fill the area between the front of the landing gear block and the back of the wing leading edge. Glue these pieces in place to secure the landing gear block to the leading edge.

Make and install the wing spar shear webs. Those that fit from the root rib to the outboard end of the landing gear block are made of 1/32 plywood and installed on both sides of the spars. Outboard of the landing gear, the webs are 1/16 balsa and installed only on one side of the spars. While shear webs are typically installed with the wood grain vertical, I think they're stronger with the grain horizontal. Take your pick.

Set the completed wing aside. Build the second panel the same way.

Begin joining the wings together. The dihedral brace, W-2, fits between the root ribs in each wing. The brace tilts the ribs to provide 1½ in. of dihedral in each wing, measured at the last outboard wing rib. It is also designed to position the root ribs directly under the fuselage sides when the wing is complete. This strengthens the root rib that anchors the end of the landing gear.

Cut out W-1, two W-2s and W-3. Mark them with the wing centerline. Use the centerline on W-2 to mark the spars, then cut them exactly on the wing centerline. Use W-3 to mark and cut the trailing edges the same way.

Block up and brace the wing panels so that the spars and trailing edges meet on the centerline and the leading and trailing edges form a straight line from wing tip to wing tip. Make sure the distance between the root ribs at the spar matches the width of the fuselage at the wing saddle. When everything looks satisfactory, glue the spars and trailing edges together.

Add W-3 across the front of the trailing edges and one W-2 across the back of the spars between the root ribs. Fit the tops of the spars and trailing edges with V-shaped pieces of 1/4-in. balsa to bring them flush with the tops of W-2 and W-3. Fit more balsa on top of the lower wing spar joint for additional strength. Add the other W-2 and W-1, with holes for the 1/8-in. dowels predrilled.

Remove the assembled wings from the work surface. Sand the bottoms of the lower spars and trailing edges flush with the bottoms of W-2 and W-3. Fill in the areas behind W-1 and forward of W-3 either with pieces of thick sheet balsa or with blocks; this provides support for the wing mounting dowels and bolts. Add the dowels, checking that they will engage the holes in F-7 with

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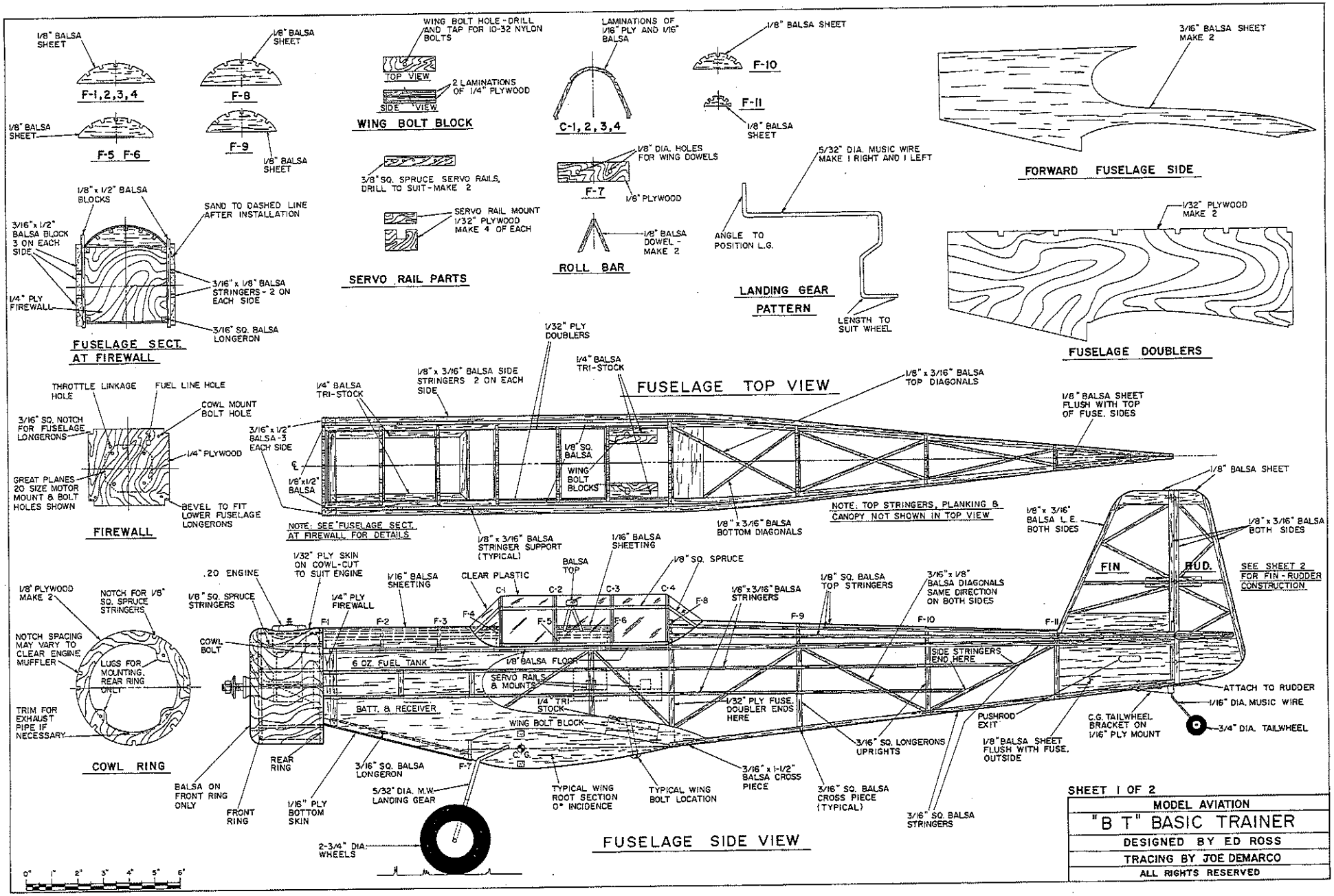

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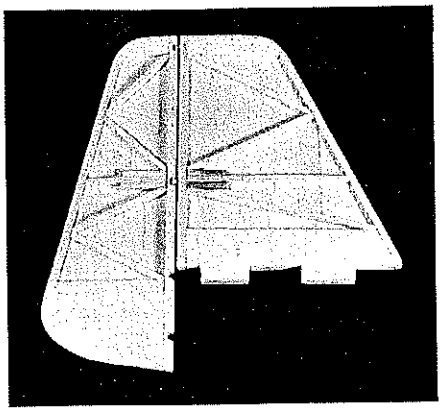
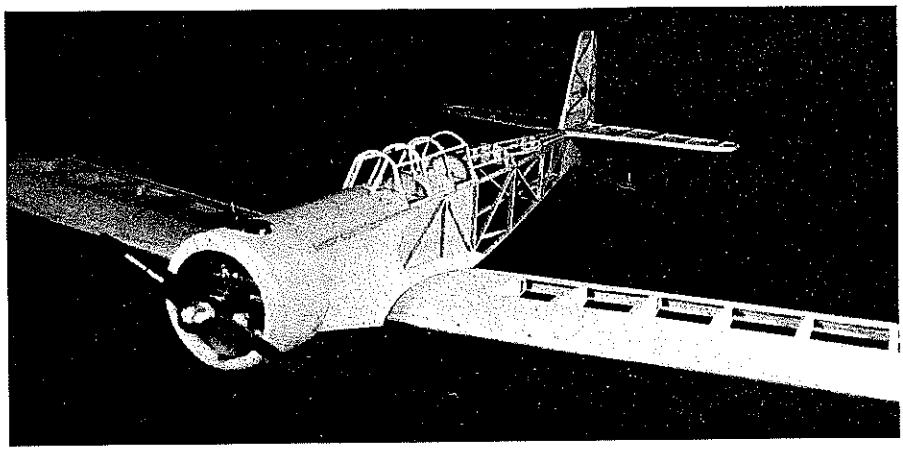
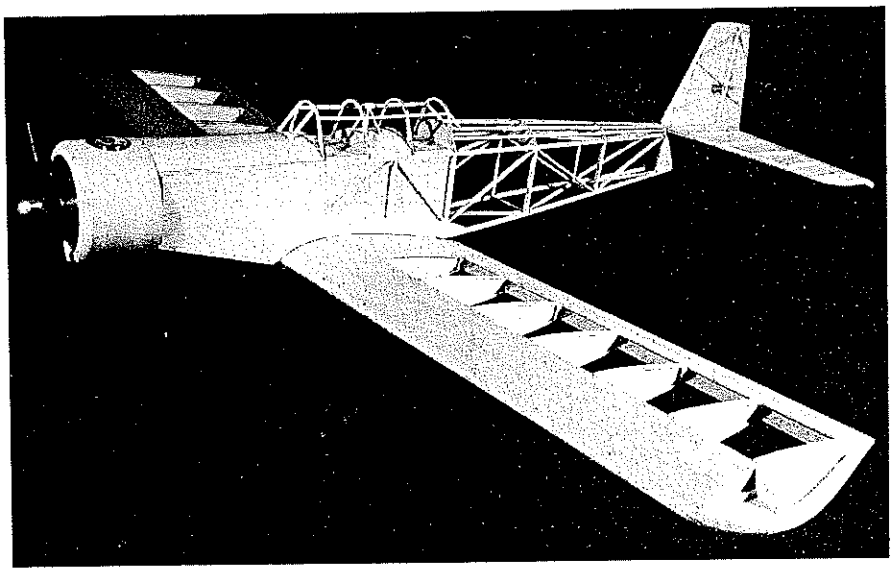
Full-Size Plans Available . . . See Page 204



The 1/16 sheet core tail surfaces are thick enough to look completely built-up, yet they're light and warp resistant. With the 1/16 sheet in the middle, the builder can keep track of the surface centerline as he rounds off the edges. This helps a great deal in simplifying construction.



The finished model in its bare bones. Notice the nice fit of the engine and cowl. The 1/16 sheet core tail surfaces are warp free and realistic-looking when covered.



Framed up and ready to cover, the BT shows off its rugged sheeted wing and light but strong box-type fuselage. Chrome Super MonoKote covering was chosen for its heavy metal look.

See plan on page 46

the wing in its final position. Add the aileron servo rails and balsa hinge supports at each hinge point.

Carefully taper the trailing edge surfaces to continue the line formed by the ribs. Try not to sand the ribs themselves while you're doing this. Add the wing planking and the rib cap strips. Plank the center section first, remembering to cut an access hole for the aileron servo. Plank around the landing gear blocks in the bottom of the wing so that the blocks themselves form the outer surface of the wing. Add some pieces of 1/8-in.-sq. balsa around the exposed edges of the blocks as an anchor site for the planking, should you need it.

Make and install the wing tips. Glue them on the centerline of the outboard ribs; add the 1/8-in. balsa triangles on top and bottom. Undercut the triangles a bit to be sure the covering material doesn't touch them.

I used 1/4 x 1-in. tapered aileron stock. If you prefer, make the ailerons of 1/4-in. sheet balsa and taper them yourself. Drill holes for the hinges, make up the aileron linkage, and dry fit the parts.

Mark the inboard edges of the ailerons on the trailing edges. Remove the ailerons and linkage, then spot glue 1/2-in.-wide balsa blocks across the trailing edge between the inboard edges of the ailerons. Carve and sand the blocks to their final shape. Cut them off and hollow them out to clear the aileron linkage. With the aileron linkage in place, dry fit the blocks to check for binding. Make any necessary adjustments, and set the blocks aside.

With the wing on the fuselage, locate the holes for the wing mounting bolts by pushing a big T-headed pin through the wing to the wing bolt blocks inside the fuselage. These holes should be perpendicular to the lower wing surface and centered in the wing bolt blocks.

Drill the holes. Begin with a small drill and continue with progressively larger ones, making the last pass with a No. 21 size. Remove the wing and run a 10-32 tap through the holes in the wing bolt blocks. Tap the holes, soak them with thin CyA (cyanoacrylate glue) on the inside to harden the wood, and run the tap back through to clean up the threads. Try not to glue the tap into the holes.

Remove the lower wing skin around the bolt holes, replacing it with pieces of 1/16 plywood to support the bolt heads. Drill holes from the top of the wing through the ply pieces. Sand everything smooth, shaping the leading edge and rounding off the edges of the wing tips.

I decided that the wing center section didn't need fiberglassing. If the wings fall off, I may change my mind. If you'd like to add fiberglass, go ahead.

Make the landing gear. Bending wire isn't fun, but at least this gear requires no soldering. I used a Higley wire bender in a vice to shape the gear and a Dremel cutting wheel to cut the wire. Remember to make both a left- and a right-hand side.

You'll have to trim the wing a bit to fit the landing gear properly. For example, the joint between the groove in the landing gear block and the slot in the root wing rib will have to be rounded off, since 5/32 piano wire won't make sharp 90-degree bends. You'll also have to run a drill up the slot in R-1 to enlarge it a bit.

To make the tail wheel steerable, I cut down the back of a Goldberg tail wheel bracket and ran the wire aft under the rudder. Temporarily mount the tail wheel bracket to the plywood plate at the fuselage rear. Install it permanently after the fuselage is covered.

Covering and finishing. I chose chrome Super MonoKote covering for its iron airplane look, though it's also easy to see. Major Decals stick-on insignia were used on the wing and fuselage. The other markings were cut from MonoKote Trim Sheets. I sprayed the adhesive backing with window cleaner to make the markings less sticky during positioning.

Before installing the ailerons, add a strip of MonoKote about an inch wide along the wing trailing edge, from the inboard edge of the aileron to the wing tip. With the ailerons and linkage in place, cover the outboard ends of the blocks that fit between the ailerons across the trailing edge, and glue them in place. Check that the ailerons have full range of movement before covering the rest of the wing.

I used Aerogloss dope on the inside of the

Continued on page 163

requires RC throttle spray bar

Allbon/DC

32. Allbon Bambi: Good condition, good running; tank
33. Allbon Bambi: Good condition, fair running; no tank
34. Allbon Bambi. Complete except for compression screw; no tank or prop; not run
35. Original Allbon Dart No. 185: Good condition and running
36. DC Dart (red head): Good condition and running; no tank
37. DC Dart Complete set of parts: (two crankshafts); not assembled; no tank

AM (Allen Mercury)

38. AM10 (green head): Good condition except for one slightly broken lug; Good running with fuel tank
39. AM15 (blue head): Good condition and running
40. AM25 (red head): Fair condition; good running
41. AM35 (black head): fair condition and good running with silencer

JB

42. JB15 Atom: Excellent condition; running

MVVS

43. MVVS 1.5cc: Excellent condition; fairly modern

Jenna

44. Jenna 15 (?) front horizontal intake: Good condition; running

ME

45. ME Heron: original manufacture, dismantled with spare crankcase

Frog

46. Frog 100 Series II No. 19.716 (or 91461): Good
47. Frog 180 No. (6417): Good
48. Frog 180 No. 7.024: Fair, not run, requires prop driver repairs
49. Frog 100 Mk 3 No. H12285 red head: Good; boxed
50. Frog 100 gold head: Good condition
51. Frog 149 No. 1522 Vibramatic: boxed with instructions
52. Frog 150 blue head No. F19704
53. Frog 150 MkII plain round head: Good, boxed with instructions
54. Frog 249 BB modified No. 5948: Good
55. Frog 349 plain bearing, RC throttle, exhaust manifold: Very Good condition; running
56. Frog 349 plain bearing, RC throttle, exhaust manifold: Very good condition; running

Mills

57. Mills .75 Mkl (Mills 1.3cc style crankcase) No. 33643 w/cut-out: Very Good condition
58. Mills .75 No. 75955: Excellent, boxed
59. Mills .75 No. 59364 w/cut-out: Excellent
60. Mills .75 No. 64524: Excellent
61. Mills .75 No. 70745: Excellent
62. Mills .75 No. 66841 w/o tank: Good
63. Mills .75 No. 71173 w/o tank: Good
64. Mills .75 No. 68698 w/o tank: Fair; runs well
65. Indian Mills 1.3cc: Like new
66. Mills 1.3cc Mk 1 No. 0784: Excellent condition
67. Mills 1.3cc Mk 2 No. 22787: Excellent, boxed with instructions and cutout
68. Mills 1.3cc Mk 2 No. 36043: Excellent, boxed
69. Mills 1.3cc Mk 2 No. 19388: Very Good
70. Mills 1.3cc Mk 2 No. 22787: Very Good
71. Mills 1.3cc Mk 2 no number: Good
72. Mills 1.3cc Mk 2 No. 25229: Good, no tank
73. Mills 1.3cc Mk 2 No. 33779: Good
74. Mills .75: Not run; parts complete except for spray bar

74a. Mills 1.3cc Mk 2 complete: Two cylinders; not run

75. Mills 2.4cc No. 4577: Excellent condition
76. Mills 2.4cc No. 4587: Excellent condition

Spark Ignition

77. Ohlsson 60 complete w/tank, contact breakers: Excellent condition

Glo Engines

78. Frog 049 No. 984 w/instructions and guarantees: Boxed; unrun
79. Eta 29 Glo No. 0429025: Excellent condition
80. Early O.S. 29 No. 21381 complete with tank and KLG plug: Pre 'ma' circa approx 1956
81. Frog 160 red glow No. RG4097: Fair condition, not run, requires reworked prop driver
82. Three Frog No. 300 glo engines: One converted to RC, one w/broken lug, and one with excessive big end wear
83. Original Champion glo plug in box
84. Two no-ignition coils: One Bank London Ltd., and one condenser

When responding to advertisers, mention that you read about them in *Model Aviation*.

BT Vintage Trainer/Ross

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cockpit—clear to seal the wood, black on the floor and instrument panels, and olive drab on everything else. I painted the inside of the cowl black, then finished it and the firewall with Hobby Poxy Formula II.

I made the canopy by gluing thin plastic sheeting over the framework with Wilhold R/C-56—three pieces at the front and rear and one between each of the canopy hoops. All the canopy seams except the one at the bottom of the windshield are covered with ⅛-in.-wide strips of chrome MonoKote trim film. I used black trim tape for the seam at the bottom of the windshield.

Install the antenna mast from inside the fuselage, paint it black, and fuelproof it with clear polyurethane.

Final assembly and flying. Wrap a 6-oz. Sullivan fuel tank in foam rubber. Install the tank as high and as far forward in the fuselage as possible. Wrap the radio receiver and batteries in foam rubber, and install them below the fuel tank. Install the servos; secure the ends of the rudder and elevator pushrods. Set the control throws for about ½ in. either side of center on the rudder and elevator; and about ¼ in. on the ailerons. Check the center-of-gravity, adding weight if necessary until it matches that shown on the plans.

Test run the engine to make sure the throt-

tle servo will open the throttle completely and will stop the engine with the throttle closed and full low-throttle trim. Removing and replacing the fuel line on the carburetor for refueling is difficult with the cowling in place. A pair of eyebrow tweezers (they look like small, skinny pliers) will make it easy.

Being a natural coward, I used a test pilot, Jim Todd, for the first flights. He had no real problems. The BT tracked straight as an arrow on takeoff and required only a bit of right rudder trim to fly hands-off as long as we liked. At half throttle it was as gentle and stable as any trainer, but adding power made it really move out. Even slowed down on final approach, the model was steady as a rock, tracking straight ahead to make wheel landings a breeze. Jim and I agreed that the BT also displayed exceptionally good ground handling characteristics—especially for a tail-dragger.

Build one and I'm sure you'll agree. □

SAFE FLYING IS NO ACCIDENT

RC Electrics/Kopski

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tor. This is a good example of less than best, in my opinion, 'cause it protects only the motor and leaves most of the system wiring unprotected. Of course, that's a lot better than wiring I've seen with *no* fuse!

A simple guideline is to locate as much of your system *after* the fuse as possible. This is analogous to residential electrification. The power lines to your residence are fault-protected *right at the electric service entrance*. In effect, your entire household is wired *after* the main fuses. An updated photo sequence showing how to install a fuse will appear in a future column. In the meantime, please see the March 1988 issue of *Model Aviation*.

The arming switch is second in importance only to the fuse. I always install the arming switch right after the fuse so that it's electrically located in the positive power line—although, again, it can just as correctly be installed in the negative line. Indeed, the fuse and the arming switch can be in separate lines.

The arming switch *does not* turn on the motor. Rather, as the name implies, it's the switch that *allows* the motor to be turned on *by some other means*. The latter could be a servo-driven on/off switch, a radio-controlled electronic on/off switch, or an electronic motor speed control. When the arming switch is on, the system is in ready state; when it's off, the motor can't be turned on. This prevents accidental or unintentional turn-on.

To understand the importance of the arming switch in preventing accidental turn-on, imagine that your motor didn't have one. You're ready to fly, so you turn on your transmitter and then your receiver as usual just before takeoff. Suppose at the same time that the throttle control stick on the transmitter is somewhat advanced—but you don't realize it. With some control schemes, this would mean that the motor could come on—with gusto—just as you turn on your receiver. If your hands or arms, or maybe some clothing, happened to be in the way of the propeller, they'd find that prop pretty unforgiving.

If you need further convincing, take a look at a most personal photo on page 14 of the July 1990 *MA*. Folks, *please* use an arming switch—and make sure it's turned off until you're ready to take off!

Here are my arming switch rules:

- The arming switch is the *last* thing turned on before launch.
- The arming switch is the *first* thing turned off after landing.

This is easiest and safest to do, of course, if the arming switch is located on some safe, easy-to-reach surface of the model where a spinning prop can't bite.

Most of my models use the Radio Shack catalog #275-1546 double-pole, double-throw (DPDT) miniature toggle switch as the arming switch. *Double pole* (DP) means that the switch contains two separate electrical switches activated by the same switch lever. *Double throw* (DT) means that the switches close (to a different contact) in each of the two possible switch lever positions. (This is also known as an on/on switch.)

For each of the two independent switches in this DPDT device, the internal moving switch contact closes on one fixed contact with the lever in one direction. Flipping the lever (toggle) the other way causes the internal moving contact to open from the first fixed contact and close on an-