VANGUARD!

You can fly this scaled-down British fighter by direct elevator control. Speed dashes, power dives, and zooms!

wall thickness shown in the fuselage cross sections both halves should be permanently cemented together and allowed to dry.

To install the motor mounts and make possible installation of the wiring and control systems, the upper portion of the fuselage is cut away as shown on the drawings. After this section is cut away, cementing of the motor mounts to suit your particular engine is greatly simplified.

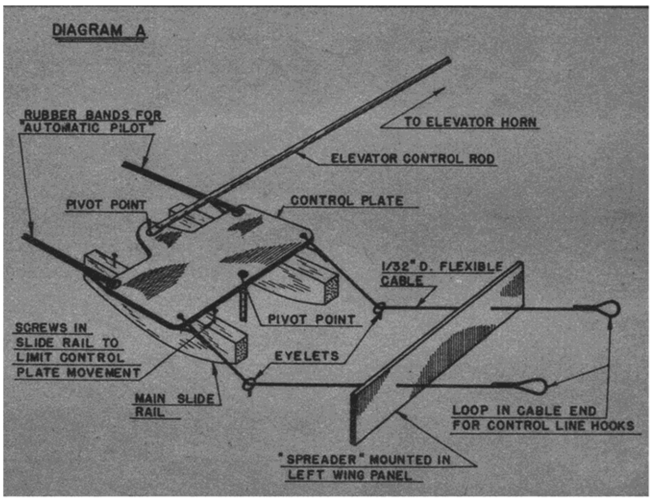
The stabilizer is made in one section and cemented to the fuselage at zero degrees incidence. Cut from 1/8″ sheet balsa the main spar, which tapers from 1/4″ at the center to 1/8″ at the tip, and cement rectangular sections of 1/16″ sheet balsa to represent the ribs. Each rectangular section rib tapers to fit the spar. The center rib is 3/8″ deep while the extreme end rib is 3/16″ deep. After the 1/8 x 3/16″ leading edge is cemented to the center of each rectangular rib section, the corners are trimmed and sandpapered until the desired symmetrical section results.

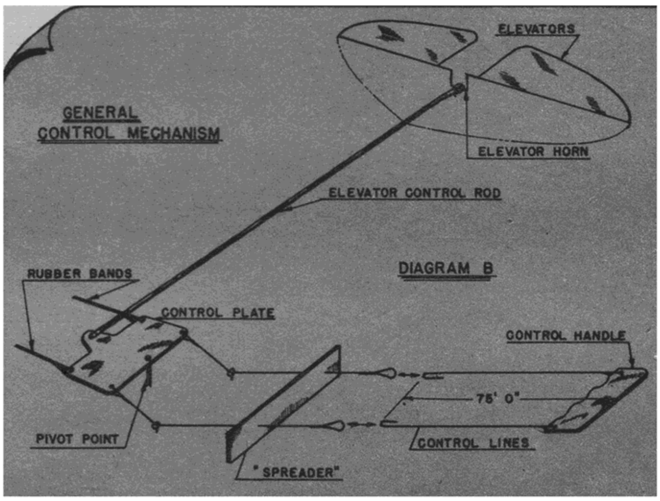
The elevators should next be carved from 3/16″ sheet balsa and carefully mounted in place. The tip elevator hinge of each half consists of a section of .035 wire fitting into a 3/8″ length of 1/16″ O. D. aluminum tubing which is embedded into the stabilizer tip. For the center stabilizer hinge effect we employ a single section of .035 piano wire bent in such a form that it also acts as the control horn as shown in the drawing. For a bearing, drill and cement a small piece of .035 sheet aluminum tubing to the inside of both center ribs as shown. To mount the stabilizer, the rear portion of the fuselage is cut away where indicated.

The rudder is extremely simple because it is carved from a stiff sheet of 3/16″ sheet, tapering to 1/16″ at the tip and having a symmetrical airfoil. The trimming tab is built into place and has a hinge consisting of a section of .035 sheet aluminum. The rudder is cemented in place *after* the stabilizer and control mechanism are installed.

In making the wing, first cut all the ribs from 1/16″ stiff sheet balsa and cement in place along the spars, which are cut from 1/8″ sheet to fit the rib notches. Add the 3/16″ sheet leading and trailing edges and cement both wing halves together, care being taken so each tip has the required 3″ dihedral. Reinforce the center section by cementing sheets of hard 1/8″ sheet to the sides of each spar.

Before the wing is cemented to the fuselage, the landing gear, which is bent from 1/16″ steel wire, is securely cemented into place along the front wing spar. After the gear is in place, cover the bottom of the wing where indicated with 1/16″ sheet balsa and cement the wing to the fuselage. To insure a *(Turn to page 64)*





smooth joint between the wing and fuselage, cut away the bottom of the fuselage to fit the wing spars, and, after the rib bottom blends into the fuselage bottom contour, cement the wing into place at zero degrees incidence.

The control mechanism we employ is very similar to that used by Jim Walker on his U-control Fireball model. The control plate is cut from $^1/_{16}''$ sheet aluminum and mounted on a $^1/_{16}''$ piano-wire pivot point which in turn is securely anchored to the main (center) wing spar. To smoothen the movement of the control plate, two "slide rails" on which the control plate rests are cut from hard ¼" sheet balsa and cemented in position where shown. After the ⅛"-diameter elevator control rod is attached to the arm of the control plate, loop a 2" length of ⅛" flat rubber from hole A to the opposite fuselage wall and a similar length from hole B to the fuselage wall opposite. The tension of both rubber bands should be rather slight but *equal*. This acts as an "automatic pilot" because it will automatically return the control plate to the neutral position should the control lines become slack.

To both holes labeled C and D we attach a 12" length of flexible cable $^1/_{32}''$ in diameter which passes through the ⅛" brass bushings cemented to the sheet-covered section of the wing bottom. The cable attached to both ends of the control plate passes through the bushings, through the piano-wire "spreader" located on wing rib 4 of the left panel, and then is hooked to the .010 piano-wire control lines. Thus, when the front wire is pulled the control-plate arm moves forward, causing the elevators to move down. When the rear wire is pulled, the movement is opposite and the elevators move up. To control the angular movement of the elevators, a wood screw or pin is inserted in the main slide rail to limit the movement of the control plate. To set the elevators for the "testing" and "maneuver" positions, as indicated on the drawings, the trial-and-error method is used. Thus, if you want the testing elevator position, you set the elevators at the correct angle and insert a wood screw or pin in the main "slide rail" which prevents the control plate from moving any farther.

After the control mechanism is installed, the ignition system should be permanently mounted in place. The coil rests on the rear of the motor mounts and the batteries are set in the fuselage to balance the model. Since nearly all motors and coils do not have the same weight, the pen-lite batteries should be mounted so the model balances at a point one third back from the wing leading edge, measured at the average chord point. To act as a battery-box mount, cement a section of ¼" sheet to the underside of the removable fuselage section. This not only reinforces the section, but makes it easy to bolt the pen-lite battery case into place.

COMPLETION AND FLYING

After the ignition and control systems are *tested*, the model should be covered—and if you like the appearance of the original job in its English attire, cover the surfaces with white Silkspan and apply two coats of "sand and spinach" dope. Incidentally, if you have never camouflaged a model before you're in for a swell time, because all lines should be irregular—just as when you're trying to paint straight ones!

For the first test hop, turn the rudder tab about ⅜" to the right and slant the thrust line about 4 degrees in the same direction. These adjustments will insure the model turning "against the circle," which is absolutely necessary since the lines should always be taut. The control lines consist of two 75-foot lengths of .010 steel piano wire attached to a pine control handle, the dimensions of which are shown on the plans. On the first test flight the engine should be run at half throttle, and not until you can easily handle climbing and diving maneuvers should the engine be run at full speed. If a slight breeze exists while test-hopping your ship, take off *with the wind*, since climbing against the wind will, in most cases, slacken the control lines. After you've added twenty or thirty minutes to your log book you're ready for stunting—and then you'll know why control-line flying is destined to become the greatest phase of gas modeling!

Editor's Note—Constructional details of the "U-control" type of control used in this Vultee Vanguard are intended for the individual builder only. Commercial use of this control system is patented by the American Junior Aircraft Co. Both "Pilot This Vanguard!" and "Lightning on a Leash" were prepared with the co-operation and permission of American Junior and Victor Stanzel & Co., who patented "G-Line" flying.