

by D. D. FOSS

SPACE CONTROL MODIFICATION

● Do you find your Space Control receiver too large and prone to damage? Here is a modification which reduces the length from $7\frac{5}{8}$ inches to 5 inches, the width from $3\frac{1}{4}$ inches to 3 inches, and the overall volume including servos by more than 18 cubic inches. The overall height and weight remain the same, and the servos are mounted on $\frac{1}{8}$ inch thick hard aluminum, which affords excellent protection for the circuit board and forms the top and ends of the case. The main advantage is that it is now virtually impossible to damage the circuit board—which was so vulnerable to cracking when the servos were thrown forward in a crash. It also removes the possibility of the aluminum shafts of the servos being bent in a crash, as the receiver is packed in styrofoam. From a weight standpoint, it allows much more of the receiver to be placed ahead of the CG of the aircraft. All wiring is inside the case—however, the servos and circuitry can be completely removed for servicing in a matter of seconds. Finally, the whole operation can be accomplished by the average modeler

—who needs to know nothing about electronics.

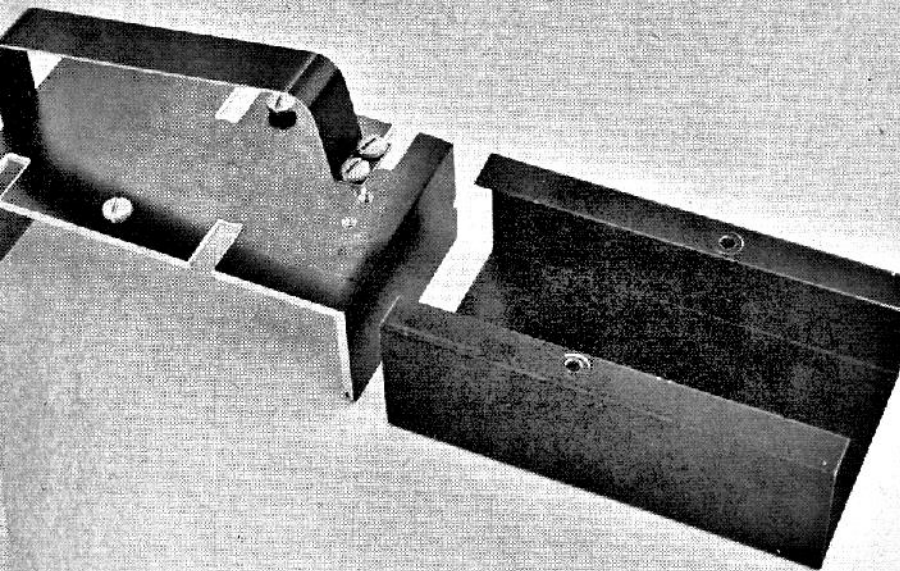
As far as construction is concerned, it is suggested that the case be made first. The materials are very easy to obtain from almost any aluminum fabricator's shop. The case is $2\frac{7}{8}$ inches wide and is cut from a piece of 5 inch by $1\frac{1}{4}$ inch standard 50 S aluminum rectangular tubing, with $\frac{1}{8}$ inch wall thickness. The top is then cut off this piece, leaving a channel whose outside dimensions are $1\frac{1}{2}$ inches high by 5 inches long and $2\frac{7}{8}$ inches wide. It is a simple matter to cut the slots in from the edge of the case. (See sketch).

The edges of these slots should be well rounded so they will not cut into the wires to the servos. The cover of the case is made from No. 3 anodizing quality 18 gauge aluminum sheet. The cover slides on over the end of the case and is held in place by $\frac{1}{2}$ inch flanges, which also cover the slots, so that the wires to the servos are barely visible. Two screws were put through these flanges into the case to prevent the cover from sliding. (See photo). One would

have been enough, and its position is immaterial.

Now form the $\frac{3}{4}$ inch wide aluminum strap over the servos, using the same sheet material as for the cover. It was found the best way was to sand a block of wood to the same contour as the three servos, in their correct positions. Then after forming a right angle bend in the strap, $\frac{3}{8}$ inches from one end and starting from this end, bend the strap over the top of the wooden block. The strap can then be riveted to the end of the case, taking care to leave about $\frac{1}{8}$ inch clearance, so that it can be tightened down onto the servos with two screws. (See photo). This completes the case except for drilling and tapping the holes for the strap tightening screws. These are not shown on our sketch, as their position will vary slightly from one assembly to another, and must be positioned at the time of construction.

At this stage, a new terminal board must be prepared. (See sketch). This terminal board replaces the wiring which will be cut off when the existing board is trimmed. As a double check, it is



suggested you study your own circuit board and cross check it with that portion of the circuit board shown in the sketch. These should be the same. Take printed circuit board stock and cut the terminal board $4\frac{3}{8}$ inches long by $1\frac{1}{2}$ inches wide. Make nine straight terminals on it, equally spaced, each $\frac{1}{8}$ inch wide, to which the wires from the servos, power pack, and receiver can be joined at the appropriate spots. It might be found easier to cut the "lands" with a sharp knife, instead of etching. Before soldering these wires to the terminal board, drill holes in the board and bring the wires in from the back. This will give more strength to each joint and will greatly facilitate your holding the wires in place while soldering.

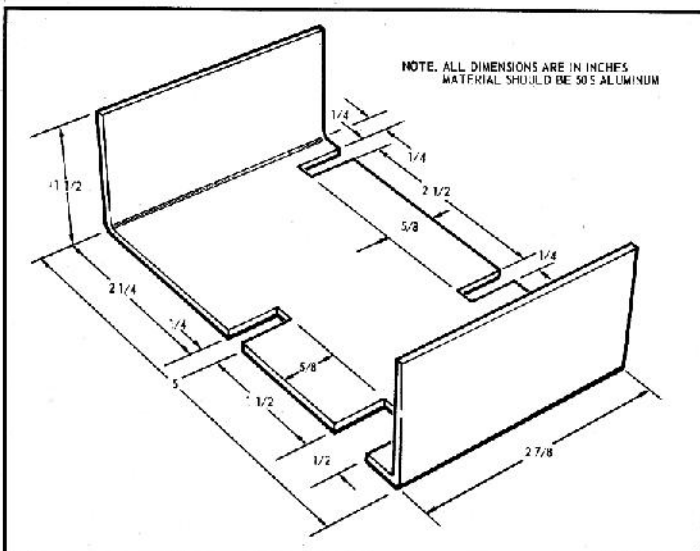
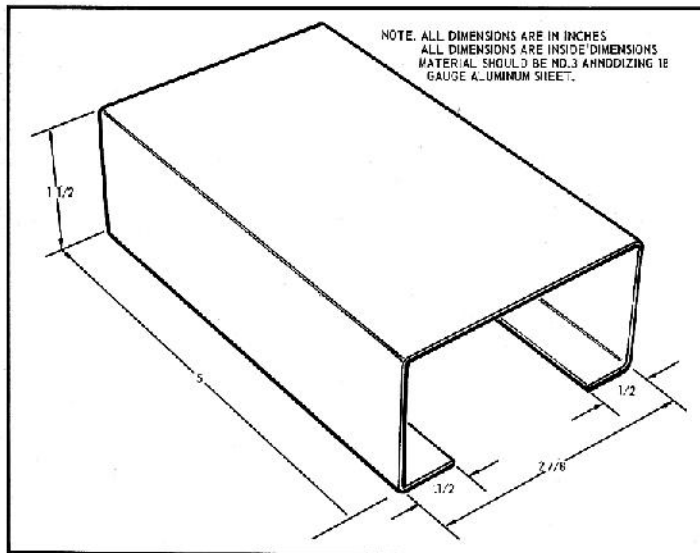
The wires and plugs for the aileron-servo and power pack can now be cut from the existing circuit board and soldered to the new terminal board. Note that the purple wire from the power pack is soldered to the red wire terminal. Care should be taken to make the wires from the servos exactly the right length—that is, long enough to allow the servos to be removed from the case, and short enough so that the wires do not have to fold inside the case. To do this, place the servos in position on the case and bend the lead-in wires through their respective slots in the case, up under the terminal board and through the correct holes ready for soldering in position. Before soldering, however, recheck that these wires are just long enough to allow the servos to be removed; then solder. The seven wires to go to the receiver should be kept in their corresponding colors, that is, one blue for each of the four servos, and one red, one orange, and one green. They can now be soldered to the terminal board. (See sketch).

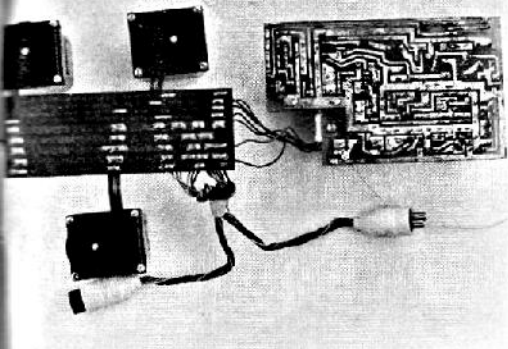
At the rudder-servo end of the receiver circuit board, note that the wires coming out of two large capacitors on the back of the board will be cut when the board is cut, unless they are moved. Both these wires must be unsoldered and resoldered to the same "land" nearer the center of the board. (See Diagram). Holes will have to be drilled to do this.

The circuit board can now be cut. (See sketch). Care must be taken to make the saw cuts to the outer sides of the dotted lines, so that they can be trimmed right down to the lines with sand paper.

Care must also be taken when these cuts are being made, as the circuit board cannot be secured in a vice. It must therefore be hand-held very securely, preferably by another person.

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A hack saw will probably be found best to make the cuts. After the ends have been cut and trimmed, the sides can be trimmed in the same manner, leaving the new board $4\frac{3}{4}$ inches long by $2\frac{7}{8}$ inches wide.

All that remains now is to solder the receiver wires from the terminal board to the receiver circuit board. Here again it is suggested that holes be drilled through the board for strength and to facilitate soldering. It is shown in the sketch where each hole was placed in the circuit board—however, the position on the "land" is relatively unimportant. What is important is to ensure that the wires go to the correct "lands" on the receiver circuit board. (See diagram.) Also note that when the motor servo end of the receiver circuit board was cut off, the green wire "land" was cut; this must therefore be rejoined (see diagram), with a green wire.

The modification is now finished, and the unit should operate the same as it did previously. The set illustrated had absolutely no interaction, and operated perfectly, as it had before the modification was attempted. Before installing it in the new case, however, the back of the receiver circuit board and the top of the terminal board should be insulated with tape. The terminal board is mounted right up against the $\frac{1}{8}$ inch thick aluminum case. The receiver circuit board is immediately under this; mounted with the circuit board itself next to the terminal board, with the components under the circuit board pointing toward the cover of the receiver. A piece of 1 inch foam rubber between the components of the circuit board and the cover holds everything in place. Note that one corner of the circuit board was cut out to make room for the knots tied in the aileron and power-pack leads

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so that they would not pull through the case and out of the terminal board in a crash. This portion of the board had nothing on it except the serial number.

Some Space Control owners may not wish to have their servos mounted in this manner, and it is therefore pointed out that Orbit connectors could easily be put on each servo and the strap over the servos deleted, so that the servos could be mounted individually. In this case, it might be better to bring the servo wires out of one end of the case.

