“Compensator” came into being as a result of an attempt to design an R/C Pattern airplane which would enhance my chances of becoming more successful in aerobatic competition. True to its name, the “Compensator” appears to demonstrate an amazing ability to minimize changes in heading which are normally experienced when flying in cross-wind conditions. Very seldom in Florida do we fly in calm air; thus, this compensating characteristic is a decided ‘‘plus” factor.

Since I have very little experience in the area of Pattern airplane design, or in the field of aerodynamics, the design of the Compensator is a compilation of various ideas, comments and observations which have resulted in a Pattern plane capable of properly executing both the AMA and FAT patterns. It is also very adept in the performance of “snap” and knife edge maneuvers.

The number of flyers who reach the position of competing successfully at the Nats without some help and encouragement along the way is very few and I am no exception. All of the better known Pattern flyers with whom I have had the pleasure of coming in contact have been quick to impart little “jewels’’ of knowledge and lend a helping hand: for this, I am grateful.

The one individual to whom I am most grateful and who spent many long hours coaching me not only at the flying field but in ‘‘skull practice’’ sessions, was the late Jim Kirkland. The short period of time during which I had the pleasure of knowing and flying with Mr. Kirkland will be an experience I will never forget.

In late August. 1971. at a small contest in Pensacola, Florida, I was flying a Kirkland designed “Intruder” and was obviously not executing the slow roll properly. After a couple of flights, Mr. Kirkland, who was also at the contest, walked over and proceeded to tell me what I was doing wrong and the corrective measures necessary to improve the roll. That was the beginning of our friendship.

The following spring and summer I spent several weekends practicing with him, and as a result my flying skills improved tremendously. I am sure that having had the opportunity to fly with a person of his skill and knowledge accelerated my progress tremendously.

At the end of the 1972 contest season, I made a comparative analysis of all scores received that year on individual maneuvers to try and determine those that needed the most attention. This analysis precipitated the idea of designing the Compensator.

After experimenting and observing the performance of several different wings, a root section of 16% and a tip section of 14% were chosen. It is my opinion that sections greater than this create too much drag; however, the extremely fast airfoils, while being impressive from a speed standpoint, appear somewhat jerky in some maneuvers and make it difficult to slow the airplane down for accurate spot landings. The Compensator wing leading edge has a constant radius, which was a design trait of Mr. Kirkland. This feature tends to eliminate tip stall during the landing maneuver and keeps the airplane from falling off on a wing tip during the spin entry.

The Compensator wing is well within FAI regulations and readily permits nice nose high landings. Both of my current Compensators weigh in at 7 3/4-8 lbs. dry, which seems to be an optimum weight providing a good .60 is used up front. I use an equal taper in both the leading and trailing edges of the Compensator wing, which to date has proved quite successful.

After having flown the “Intruder” for two years and being familiar with the

diamond stab and the resultant elevator response, I used this stab configuration on the Compensator. The flight characteristics of the diamond stab are well known, and as Mr. Kirkland once said, “The diamond stab seems to hold the airplane off the ground as long as possible and then a little longer during the landing maneuver.”

A great deal of thought and effort was put into the fuselage design of the Compensator. The distribution of lateral area has proven quite important in the execution of all maneuvers, especially the rolls. The advice of
Jim Whitley regarding distribution of fuselage area proved helpful. In view of the unusual shapes encountered in measuring lateral area, a polar planimeter was utilized, thus obtaining accurate measurements. This extra attention given to lateral area has proven to be well worth the effort since the rolling maneuvers can be executed with very little rudder necessary.

Construction of any Pattern airplane should he simple yet strong. Simple, to facilitate ease and fast construction, yet strong enough to withstand the varying forces of aerobatics. Reinforcing the construction up to a point makes good sense; however, reinforcing beyond that point only adds unnecessary weight. The basic building techniques used in the Compensator are similar to those found in most of today’s Pattern airplanes.

CONSTRUCTION

Wing: Begin by cutting two cores using templates and dimensions as shown on the plans. While the foam cutter is still hot and you are in the mood, you might go ahead and cut the horizontal stabilizer cores and set them aside for future use. Glue trailing edge balsa to wing cores using epoxy glue. Cutouts are now made for retracts, etc. Wing skins are made from 1/16” soft balsa. Soft balsa is very definitely dictated in the area of the leading edge to prevent breaking the skin when rolled around the core. Sand the cores and vacuum to remove loose dust prior to applying glue.

Wing skins are bonded to the cores using Southern R/C Products’ ‘Southern Sorghum.’’ This contact glue is virtually fool proof, easy to handle and provides a good bond between the balsa and foam, Cores are now glued together with epoxy, taking care to insure perfect alignment. Wing construction is completed by installing wing tips, aileron linkages and aileron fill material. Ailerons are tack-glued to wing and san to shape. F-2A and dowels are not installed until fuselage is built.

Fuselage: Use templates on the plans to cut out formers, doublers and sides. The sides are assembled complete with doublers, longerons, stiffeners and triangular stock. Be sure to build a right and left side. Formers are built as shown; install blind mounting nuts in F-1 to accommodate motor mount and retract unit of your choice. Glue fuselage sides and formers together, an operation best accomplished using a jig of your choice since an accurately built fuselage is a necessity. Before removing the basic fuselage from the jig, add spruce and balsa cross members and bottom sheeting rearward of the wing. When all glue joints have set, remove from jig and add maple block for wing mounting bolts.

At this point, sand leading edge of wing to receive F-2A. Temporarily fasten F-2A to F-2 using short pieces of dowel; apply glue to F-2A and align wing in fuselage wing saddle. When this glue has hardened, remove wing, which now has F-2A attached, drill into wing through holes in F-2A and install dowels. Wing is now placed in fuselage, re-aligned properly and an electric drill used to drill through wing and into maple block to accommodate the nylon wing mounting bolts. Tap maple block for ¼”-20 bolts and

enlarge holes in wing to facilitate free movement of bolts. Glue 1/16" plywood plate to wing and reinforce center section of wing with 3" fiberglass cloth.

Assuming the horizontal stab construction has been completed during the interim periods of waiting for glue to dry, the stab is now glued to fuselage. Here again care should be exercised to guarantee proper alignment of stab as it relates to wing and fuselage. Add triangular stock bracing at formers F-1, F-2, F-4 as well as plywood tank floor. Tack glue top block in place and carve to shape. Remove block, hollow inside, as indicated, and permanently glue to fuselage.

Glue vertical fin in place along with fuselage "pan" construction on bottom of wing. Half-inch balsa bottom in nose wheel well is carved to shape and cut-out made for nose wheel in retracted position. Nose blocking and canopy complete the construction, with the exception of fillets which are built during the finishing operation.

FINISH

The finishing method used on the Compensator is silk, dope and acrylic lacquer. I have found that the following gives me a fast durable finish. One will note that a wood canopy has been used to eliminate the problems and work of an acetate canopy.

Upon completion of construction, sand the entire airplane with #400 sandpaper. Then apply two or three coats of clear dope sanding between coats with #400 sandpaper. This is done primarily to seal the wood from moisture used in wet sanding. The entire airplane is then covered with silk, including control surfaces. The silked airplane is then doped to fill the grain in the silk. Again, sand between coats with #400 sandpaper. Several coats of dope are needed to completely fill the silk. At this point the canopy and fillets are applied. We have found Epoxolite to be a satisfactory material to use for wing fillets, etc.

Experience has proven that the adherence of dope over the Epoxolite leaves a great deal to he desired; therefore, we don't apply any Epoxolite to any areas until the last coats of dope has been applied. After all fillets have been sanded and shaped, apply acrylic lacquer primer. Primer should be sanded wet with #400 sandpaper. Primer as well as the acrylic lacquer should be plasticized. I have had very good results using Southern R/C Products' ''Flexall.'' After primer coats have been applied and sanded smooth, color coats are then sprayed and allowed to dry for a minimum of 24 hours. The entire model is either wet sanded with #600 sandpaper or compounded. Thoroughly clean the airplane and apply decals. Due to the inability of acrylic lacquer to withstand fuels it is necessary to protect the finish. I have found that a coat of clear "Super Poxy" sprayed over the entire airplane results in an almost indestructible finish. To date I have experienced no problems with this method.

FLIGHT TEST

If the airplane is built accurately, free of warps, etc., little flight trim will be needed. Throws for control surfaces are shown on the plans. Surfaces should be placed in neutral prior to the first flight. After flying adjust the surfaces for straight and level flight.