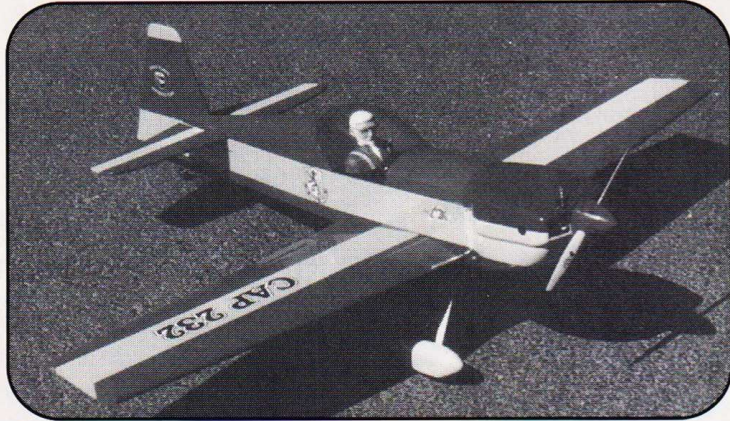
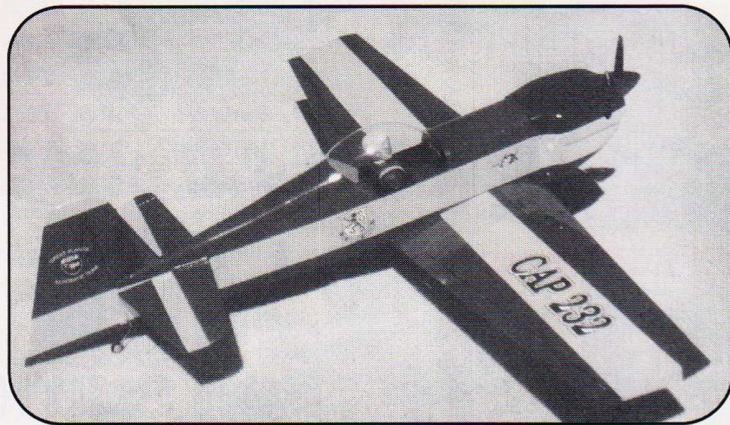




# PRODUCT REVIEW



## CAP 232 Great Planes By Darrel Stebbins



According to a recent opinion survey of International Aerobatic Club members, the French CAP 231/232 is among the current aerobatic planes considered capable of successful competition in the "Unlimited" category, and is rated by them at nine out of a possible ten for flight handling. CAP 232's were flown to First Place finishes in both Men's and Women's divisions in the 1995 10th Annual European Aerobatics Championships. Should make a wonderful R/C model, right? Well, Great Planes Model Manufacturing Company has produced a reasonably priced, well-designed



### SPECIFICATIONS

Name ..... CAP 232  
 Aircraft Type ..... Aerobatic  
 Mfg. By ..... Great Planes Model Mfg. Co.  
 P.O. Box 788  
 Urbana, IL 61801, (800) 682-8948  
 Mfg. Sug. Retail Price ..... \$179.99  
 Available From ..... Retail Outlets  
 Wingspan ..... 58 Inches  
 Wing Chord ..... 10-3/8 Inches (Avg.)  
 Total Wing Area ..... 594 Sq. In.  
 Fuselage Length ..... 52 Inches  
 Stabilizer Span ..... 22-1/8 Inches  
 Total Stab Area ..... 110-1/2 Sq. In.  
 Mfg. Rec. Engine Range ..... 40-.46 2-Stroke  
 ..... 52-70 4-Stroke  
 Rec. Fuel Tank Size ..... 10 Oz.  
 Rec. No. of Channels ..... 4  
 Rec. Control Functions ..... Rud., Elev., Throt., Ail.  
 Basic Materials Used In Construction  
 Fuselage ..... Balsa & Lite Ply  
 Wing ..... Balsa & Basswood Spars  
 Tail Surfaces ..... Balsa  
 Building Instructions on Plan Sheets ... Yes (2 sheets)  
 Instruction Manual ..... Yes (45 pages)  
 Construction Photos ..... Yes

### RCM PROTOTYPE

Radio Used ..... JR XP642  
 Engine Make & Disp. .... SuperTigre G51  
 Tank Size Used ..... 10 Oz.  
 Weight, Ready to Fly ..... 96 Oz. (6 Lbs.)  
 Wing Loading ..... 23.3 Oz./Sq. Ft.

### SUMMARY

#### WE LIKED THE:

Ease of construction, instruction manual, and flight performance.

#### WE DIDN'T LIKE THE:

3-piece ABS plastic cowl.

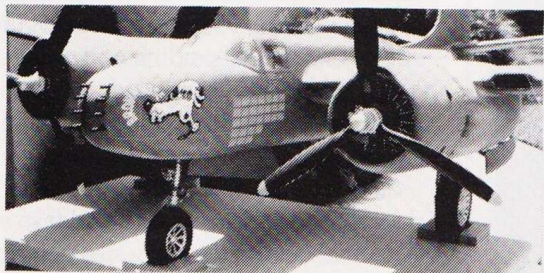
.40 size model of this great airplane, and it lives up to the reputation of its big brother.

Great Planes designers have produced a CAP 232 model with a 58" wingspan (almost exactly 1/5 scale) which is a convenient size for sport flying, and just right for MinilMAC competition. Weight is listed at 4.75-5.25 lbs., for a 18-20 oz./sq. ft. wing loading. The designers have taken exceptional measures to ensure a light airplane, including lots of lightening holes in most of the lite ply fuselage framework and in the wing ribs. Balsa was apparently selected for light weight, too. Doublers have been kept to a minimum. The plane is designed to fly, not to survive crashes.

The kit box is well-packed 6-1/2" x 10-1/2" x 39-1/2", with full-color illustrations, construction photos, and product information on the front, sides, and ends. Upon opening the box, you find "sub-packs" of parts, and some "loose in box" items that do not lend themselves to bundling, e.g., the instruction book, ABS cowl parts, engine mounts, canopy, and the like. The sub-packs are identified as: die-cut plywood, die-cut A-2, sheathing, sticks, wood parts, small sticks, shaped sticks, frame sticks, plastic and hardware. You will also find (oh happy day!) a comprehensive CAP 232 parts list, with every part listed; every stick, every former, every balsa sheet, even every washer. Boxes

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BOEING B-29	141"	58.00
BOEING B-29	169"	72.00
P51-D MUSTANG	112"	62.00

## Constellation



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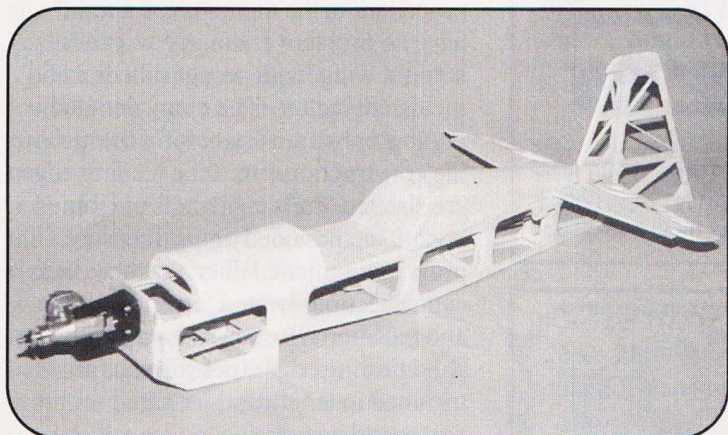
## Dornier DO 335



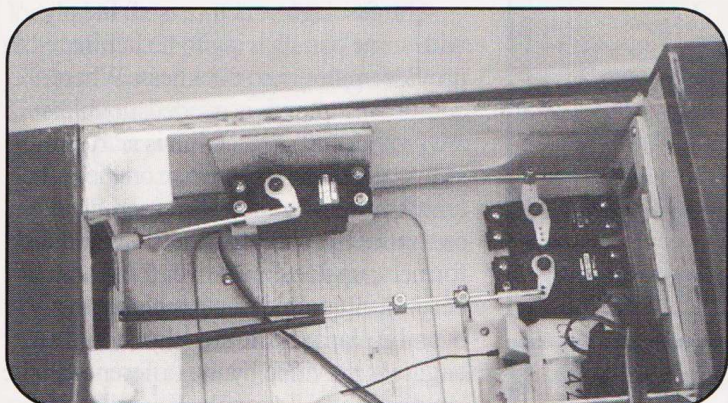
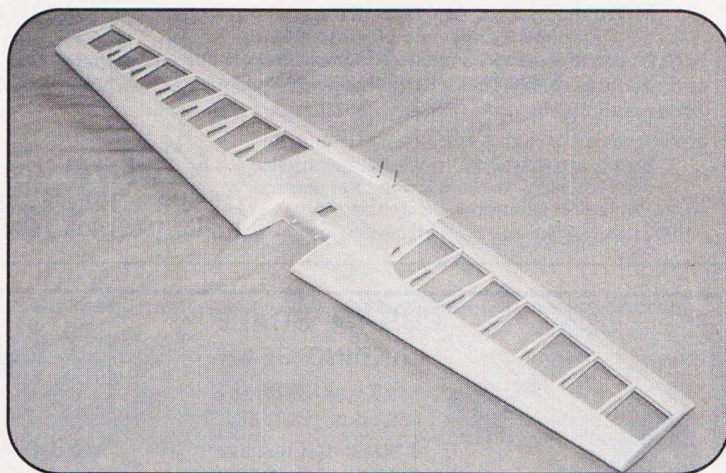
Wingspan 98.8" L. 99.2" 7 shts. \$62.00

Glas, plastic, accessories, & wood kits available Catalog \$2.00 included w/ plan

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CESSNA T-50 BOBCAT	100"	55.00
BLACK WIDOW P61 - B	99"	57.00
MESSERSCHMITT 110	89"	42.00
MESSERSCHMITT 110	118"	58.00
HENSCHEL 129 twin	93"	47.00
HENSCHEL 129 twin	111"	58.00
FOCKE WULF 190A - 8	90"	57.00
HOWARD DGA15	95"	47.00
EMB TUCANO	86"	47.00
GRUMMAN F6F Hellcat	86"	57.00
KAWASAKI Ki 61 Tony	86"	52.00
KAWASAKI Ki 61 Tony	100"	52.00
AT-6 TEXAN 1/6 Scale	84"	32.00
HEINKEL 51A biplane	90"	37.00
HAWKER SEA FURY	86"	47.00
LAVOCHKIN LA - 7 Russian	81"	47.00
NAKAJIMA Ki 84 FRANK	88"	47.00
CURTIS R3C2 RACER	88"	55.00
REARWIN SPEEDSTER	96"	35.00



Lightweight built-up construction used throughout.



LEFT: Rudder servo location was moved forward to achieve C.G. without adding additional weight. RIGHT: The three-piece cowl required considerable work to provide a satisfactory finish.



have been provided so you can check off each item, as you work your way down the list while unpacking the kit. You will know before you start building, that every part is there.

### Construction:

There are two sheets of plans, rolled — not folded, well-drawn and reasonably comprehensive. Great Planes is becoming known for its well-written construction manuals and this one is outstanding. In addition to lots of construction photographs, explanatory drawings, and well-written construction instructions, there are numerous "Expert Tips," "Hints," and "Notes" included to smooth the way for less experienced builders. Other features include "Engine Safety Precautions," an excerpt from the

AMA Safety Code, and other useful bits of information. It's a good idea to read through the entire manual before starting construction and, although you need not follow the building sequence exactly, it does present the construction process in an orderly and logical manner.

Construction materials throughout the kit are of good quality, apparently selected to avoid excess weight. I was able to use the provided wood in all components — although the wing trailing edge sheeting was a bit too soft — I broke it in a couple of places just in handling and covering the wings. Both the balsa and the lite ply die-cut parts were exceptionally clean and true, with very little sanding required to true up the edges.

### Tail Surfaces:

To ease you into the project smoothly, the first assembly presented is the horizontal stab. Throughout the manual, you are instructed to use cyanoacrylate glues. Since I am allergic to CA's (except for the "odorless" variety), I chose to use the aliphatic resin type of wood glue. There is no sacrifice in strength by going to the aliphatic resins and, by properly scheduling your work, there is really no problem in foregoing the "Instant" curing of the CA's.

The horizontal stab is a conventional stick-built assembly, sheeted with 1/16" balsa. The elevators are also stick-built, with die-cut laminated balance tabs attached to the outboard ends. The elevators are not joined, being actuated by

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dual pushrods. The vertical fin and the rudder are also stick-built, with a laminated balance tab at the top of the rudder. Other than careful fitting of the sticks, and proper sanding of the assemblies when completed, special skills are not required.

**Wings:**

The wing is constructed in two panels, upside down over the plans. Attached tabs on the wing ribs determine the alignment and attitude of the sections. The main spars are of basswood and were without any warps or bows. The assembly is a little tricky but, if you carefully follow the step-by-step procedure in the manual, you should have no problem ending up with a straight wing, with proper dihedral and incidence built in. The many detailed photographs are very helpful throughout the construction. Once the leading edges are sheeted, the wing panels are joined. Again, the provided jigs will ensure proper alignment. When you have the center section sheeted top and bottom and the aileron torque rods installed, the solid trailing edge stock ailerons are trimmed to length and prepared for the torque rod installation.

**Fuselage:**

The fuselage structure is all lite ply, with some parts having to be laminated to provide appropriate thickness. Where additional strength is needed, doublers are provided. Construction is started by gluing the doublers in place on the full-length fuselage sides. The assembly continues by pinning these sides and the formers, upside down, over the plans. Be very careful to spot the panels correctly over the plans, as the side thrust for the engine is provided by the difference in the length of the side panels. You will also notice that up-thrust is built into the side panels too. Yes, up-thrust.

By following the manual's construction sequence, all the holes, doublers, and blind nuts will be in place on the formers when you are ready to actually assemble the fuselage. The formers are accurately located by the tab-and-slot design of the parts, as are the top and bottom lite ply panels. When the structural side, top and bottom panels, and the formers have all been glued in place, the wing is mated to the fuselage. This is a critical step and sufficient time and attention should be allocated to make sure you get this right. The construction photos and detailed instructions will keep you on the proper path. It's not especially difficult -- just make sure you do it right.

The front deck formers are then installed and the 3/32" sheet balsa covering is dampened, bent, and glued in

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place, again following the instructions. The photos and text describe the method in detail.

The stabilizer is installed on the fuselage next and carefully aligned. Once the stab is in place, the turtledeck is built, using lite ply formers, balsa stringers, and 3/32" sheet balsa which is also dampened, bent, and glued in place. One of the few errors in the manual occurs in the dimensions given for cutting the balsa sheets for these pieces. (Build The Turtledeck, #6). The dimension given as 14" should be 15-1/16", the 4-3/8" dimension should be 5-3/16", and the 17" dimension should be 17-7/8".

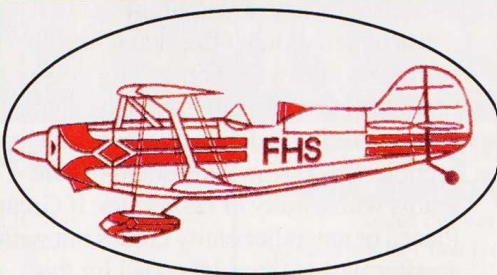
### Installing Accessories:

The manual gives detailed installations, accompanied by good photographs, for installing the engine, tank, servos, and pushrods. The only problem I had here was the installation of the rear-mounted servo to actuate the rudder. It was easy to install and worked well — but, when it came to balancing my model, my C.G. was about 5/8" behind the indicated correct location. (A very few of the earliest production models got out showing an incorrect location for the C.G. — it should be located at the rear edge of Former F-3. Your plans and manual should show the correct location.) Since my plane's finished total weight was already 12 ounces over what the box said it should be, I didn't want to add any weight to the nose. The logical solution was to move the servo forward into the compartment over the wing. This was easily accomplished and the C.G. landed in exactly the right position. You may not have to resort to this — but, it is an option, if you should need it.

I chose to deviate from the plans in only one other respect — I added an additional doubler to each side of the tank compartment — a shortened copy of the lite ply fuselage doubler between F1-C and F-3, to provide additional strength and bearing surface for the landing gear mount.

Well, there was one other thing — neither the plans nor the manual directs you to install a floor and backrest cover in the cockpit. There is plenty of 3/32" sheet balsa to do this. And you need the floor there to install a pilot, so just go ahead and do it. I used a Williams Bros. pilot bust, modified with microballoons and epoxy, with artists' acrylic paint to dress him up.

I had to spend more time cutting, trimming, preparing, assembling, gluing and re-gluing, reinforcing, filling, sanding, and painting the ABS plastic



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cowl than on any other part of the construction. I didn't like that. They do warn you, after a fashion, telling you to "fill the seams and imperfections in the cowl" as described in the Wheel Pants' section; which says you should fill the seams with a putty or resin filler. If Great Planes or any other entity comes out with an aftermarket fiberglass cowl for this CAP 232, save your pennies and buy it.

The canopy fit well. I chose to use tiny screws to attach it to the plane and will eventually glue and tape the edges down.

I used the suggested Du-Bro 12 oz. tank, and Du-Bro 2-1/2" main wheels and 1" tail wheel.

### Covering:

Great Planes suggests using Top Flite MonoKote Film to cover the 232. Since I generally use MonoKote anyway, I was pleased to follow their recommendations. For the color scheme, I chose the yellow, blue, and red scheme shown as an alternate on the kit box. I did have a problem with Top Flite LustreKote paint system recommended — not with the paint, which was fine. The colors were the problem — the yellow and blue didn't even come close to matching the MonoKote. I finally used the LustreKote primer and the LustreKote Red, and used other brands of paint for the yellow and blue. However, due to mixing the paint brands, I wound up with a nice crackle finish on the red. This is not the fault of the LustreKote, which warns you that it is not compatible with other brands of paint — it was my fault for not checking for color match before I finally decided on that particular color scheme.

### Engine:

The manual recommends a 2-stroke O.S. .46FX or Super Tigre GS-45, or a 4-stroke O.S. .70 Surpass. For the O.S. .46, Great Planes suggests using a Slimline #3218 Pitts Muffler for an in-cowl installation. I chose to use a Super Tigre G-51, since I had a brand new one on hand (reasoning that the slightly larger displacement would not adversely affect the performance), and an in-cowl Pitts type muffler. The Super Tigre provides more than enough power for the vertical IMAC sequence maneuvers.

### Radio:

Almost any good 4-channel radio can fly this plane, although dual rates, end-point adjustment, and exponential rates will make life a little easier for you. I chose to install my JR XP642. This is really an exceptional "sport class" computer radio and offers all the features you could wish for to handle the 1/5 scale CAP 232. The standard-sized

servos seem to be adequate for the CAP.

### Flying:

With my courageous test pilot, Dave Legard, I headed for the field on a hot but quiet afternoon to check out the CAP. We fiddled with the new engine a bit, then decided to see just how well the plane was designed and how well I had built it. Dave taxied it around for a minute or two, then advanced the throttle and headed down the runway. Picked up speed, gently lifted off, moderate climb, and then a left turn to gain some altitude and get headed back down the far side of the strip. Dave reported one click of down trim and one click of left aileron trim was all it needed for straight and level flight. Another 180° turn and it was high enough to try a roll — no problem, nice and axial, with just a nudge of elevator. Big loop, pulled straight through. Another big loop, with full up elevator applied at the top -- it did not snap. Slowed to stall speed -- straight ahead, no wing drop or snap. Humpty-bump for reversal maneuver, then a couple of stall turns. Three axial rolls, again with only a touch of elevator required. Inverted flight needed only a tiny bit of down elevator. This is a good, responsive, predictable, and smooth flier. How about a snap? Wild but could be stopped nicely on point after a little practice. Now for the landing — set up the glide slope with the throttle, flared at two feet, let the speed bleed off, gently dropped in on all three. Very successful first flight.

I had set up the throws exactly as called for in the manual, with the "aerobatic" dimensions on the dual rates. The C.G., dry, was right on the mark. It had paid off to follow the instructions. Additional flights to get used to the plane confirmed what we had learned on the first flight. This one is a keeper.

### Conclusions:

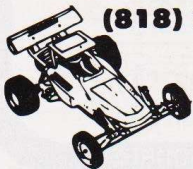
Although you surely couldn't classify the Great Planes CAP 232 as a trainer, it might make a good first low-wing airplane if set up as the manual directs. When you go to the more extreme settings, it has the aerobatic capabilities to qualify as a good small IMAC plane, especially so if the MinilMAC class ever becomes popular.

As far as the construction is concerned, the manual, photographs, and plans are very helpful, and if you have built a couple of .40-.60 sport planes, you will have no great difficulty building a good, straight airplane from this kit. The package is well put together, is quite complete, and I believe it is a good value for the advertised price.



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