PHOTOGRAPHY: PAVEL BOSAK

There's never been another plane like it. Pavel Bosak pays tribute to the 50 year young DC-3 with his small "space saving" version.

DC-3 Dakota

By Pavel Bosak

Pay tribute to history by building this space saving version of a classic twin.

This model uses two .10 to .15 size engines and flies quite well. It's not an aerobatic aircraft as Pavel found out. Despite repeated attempts to spin it, the aircraft just kept plodding along.

Off and on, over the years, I would periodically get the urge to build a model of the DC-3. Better known as the *Dakota* in my part of the world (Czechoslvakia), this plane has probably attracted the modeling interests of many hobbyists. Both its design and its rich long history worked their magic on me and I even got around to doodling two versions of a DC-3 and even began some construction. Unfortunately, I didn't finish it, having gotten sidetracked by several larger size projects. When I finally got back to the DC-3, I was in the mood for a smaller model and the fact that two .10ci engines were just "sitting" around my workshop unused brought me to this design, a model with a 57 inch wingspan and an area of 575 square inches. That's the history of this "space saver", semi-scale *Dakota*.

Birth of a legend

The history of the real DC-3 is very simple and logical. After its predecessor, the DC-2, had been successfully introduced into airline service, American Airlines officials went to Douglas Aircraft and related their need for a newer transport which could be equipped with beds for night flights. The DST, or Douglas Sleeper Transport, was born, and what was to become known as the DC-3. Its basic design followed that of the DC-2 pretty closely but the new plane's fuselage was roomier, its wing span longer, and the wing area greater. Even the tail surfaces were larger and the landing gear more robust. The 14 seats in the roomy passenger cabin could be converted into seven upper and seven lower beds.

Six months after the prototype's maiden flight (December 17, 1935), American Airlines began operation of the DST in June, 1936 subsequently followed by United Airlines in January 1937, and TWA in June 1937. In the same year, Douglas came up with a more economical version of the DST, which was essentially the DC-3 with three

lines of seven seats for a grand total of 21 passengers altogether.

The DC-3 was a real sensation not only in the U.S. but throughout the world of air transport. Its operating expenses were lower by half in comparison to the economical DC-2. It doesn't often happen that so many important technological and operational elements happily mesh in the design of one aircraft.

An Army version of the DC-3 was ordered by the Army Air Force in 1940. Its construction was strengthened for heavier cargo, it had two large cargo doors, and it had attach points for an exterior cargo pack. The military derivative of the DC-3 was called the C-47. During WW II it was nicknamed the *Skytrain* and the C-53 (a C-47 with a smaller door and used for troop transport) was dubbed the *Skytrooper.* Britain received 1900 of the miltary DC-3's which they called the *Dakota.* Soon, much of the world adopted the British nickname and, after the war, used all of the many DC-3 variants in civil transport. Their quality and durability was attested to by the fact that some of them are still heavily used today.

Construction

Wing. Building my version of the DC-3 is not complicated and can be readily managed by any modeler who already has the experience of a few projects behind him. Begin with the outer wing panels by preparing ribs W1-W15 and the rear wing spar W16, and the center wing section spars, W17 and W18. To spare you the extra effort of cutting each of the wing ribs separately, let me suggest a method I use and call "rasp interpolation".

Using the plan, cut a root rib (W5) and a tip rib (W15) from 1/16 plywood and then place eleven rectangular rib blanks of 3/32 balsa - slightly larger than W5 - between these two ribs. Then sand this stack to the bevel created by the two outer plywood ribs. Cut the notch for the W16 rear wing spar and the ribs for one wing panel are ready. For the other panel, simply repeat the process.

For the center section ribs, use the same method but use the W1 rib for both templates instead. Ribs W4 and W3 need to be doubled with 1/16 ply since they support the engine mount and landing gear. The entire wing center section can be built as one piece. The Fuselage Side View on the plan shows the arrangement of the main (two W17's, one top and one bottom, and W18) spar and the rear spar. Make sure that when you cut the wing center section spars that you double the length indicated on the plan.

Start first by constructing the W17/W18 bottom main spar. When finished, lay this assembly down on the plan along with the rear wing spar, W16, each in its respective position, and align and glue the wing ribs W1,2,3, and 4 to the spars. Add the 1/16 ply doubler plates to W3 and W4 *before* you put the top W17 spar in place. W19 can be glued on next. It serves a double duty as a leading edge spar and as the "inner" leading edge.

While still on the subject of the wing center section, it's the proper time to mention the alignment and fit of the motor mount. The template for the 1/4 ply plate was drawn to suit my particular engine, an MVVS 1.5 D R/C, one probably unavailable to you in the States. So, you'll have to cut it out to suit whichever engine you choose. Each motor mount plate is glued between the ply doublers on W3 and W4 and rests on the top of W19, the inner leading edge/spar. The rear of the mount plate must be tied to the upper main spar, W17. There's about a 1/16 gap between the top of the plate and the bottom of the spar which needs to be bridged with a filler piece of balsa. When you align the plate, make sure each of the two plates has a 2° downthrust angle with reference to the wing chord line.

Holding his DC-3, the author shows the size of the aircraft. Although he covered his with modelspan (akin to silkspan) and painted it with dope, any heat shrinkable plastic film could substitute as effectively.

Be certain to add the hardwood blocks for the landing gear to the bottom of the ply motor plate, the 1/16 ply dihedral wing braces, and the 3/8 inch diameter dowel for holding the wing on. The rear of this dowel rests on the top of the bottom main spar W18 piece. The forward part of it rests in a notch you'll have to cut out of W19, the inner leading edge/spar. When you get to the point of sheeting the bottom of the center section, a filler piece of wood will be glued to the dowel and to the bottom wing sheeting.

Before finally buttoning up the center section with the sheeting, make provision for the throttle linkage and aileron pushrods. Also align and glue the rear ply nacelle former, N2, to the motor mount plate. This former butts to the inner leading edge/spar. When you do sheet the center section with its 3/32 skin, start with the bottom sheeting first so that you can add the 1/16 ply doubler at the center trailing edge for the holddown reinforcement.

The respective wing panels build quickly. Lay down the rear spar, W16, and the leading edge spar, W19, on the plans and then glue the individual ribs in place. The wing tips are cut from soft, 5/8 inch thick balsa sheet and will be added after the leading edge and sheeting has been added. To add the ailerons, follow the outline shown on the plans and carefully cut the individual control surfaces. W21 is the aileron hinging surface and it's butt glued to the rear of the wing.

Fuselage. The best way to get started on the fuselage is by first framing out and sheeting the tail structures (stabilizer and fin). Once that's done, construction of the fuselage itself begins with evenly blocking up the 3/16 balsa cabin floor. It serves as a jig for formers F2 to F7. Slide each of the formers on the cabin floor in their respective position, making sure they're square. Now you can add the 3/16 balsa side frames, F1, the two 1/16 ply wing doublers, and the nose block which, of course, you already hollowed.

Carefully tie the fuselage side frames together at the end so that you can now add

the stabilizer and the fin. It's necessary to do this now so that you can easily finish sheeting the rest of the fuselage. After they're properly aligned and glued, you can add the tail wheel former, F8, gluing it to the side frames and the bottom of the stabilizer.

The forward and aft tapers of the fuselage cylinder don't present any easy way of finishing the sheeting on the fuselage. I used and recommend 1/2 inch wide, 3/16 thick balsa planks for the top and bottom sheeting. Today's water thin cyanoacrylate glues at least help speed up the entire process and should not make it too time consuming. When adding the individual strips, alternate the application from side to side so there's no danger of warping the structure.

At this point you're free to add as much detail as you wish. You can paint the cabin and cockpit windows on later, or you can cut out their respective positions and put in the thin clear plastic windows. If you want to, you can also add a cockpit with pilot figures. That's all up to you. What you must do, though, is cut away the fuselage sheeting around the wing saddle and the cabin floor from F4 to F5 to make your radio compartment.

Forming the engine cowls can be easy as finding the bottoms of some plastic soft drink bottles. If that's a problem, they can be easily shaped by laminating some thick balsa sheet "rings" of proper diameter.

Getting it in the air

Here in Czechoslovakia, modelers use a covering that's called modelspan. My DC-3 is covered with it and six coats of lacquer went on top of that. However, it's your choice of covering and finishing. Just keep it reasonably light. As far as paint schemes are concerned, the DC-3's 50 year service history has provided literally thousands to choose from.

You have probably heard your share of twin engine horror stories. Well, I'm happy to report that this little DC-3 gives you time to react with the appropriate rudder input if an engine conks out. It's not the instant snap roll to doom. In flight, the plane will turn either way with an engine out but mine could not stay airborne. If you use a stronger engine with yours, that might not be the case.

Please don't expect the *Dakota* to be a "fun fly" airplane as you would call it. The real plane could not perform aerobatics and that has carried over to this model. I did try to spin the plane, but it wouldn't do it. Perhaps the most dangerous part of flying this airplane is the classic case of an engine out just as you lift off.

That's the story of my little DC-3, the *Dakota*. I hope you enjoy it as much as I did mine and I'd like to hear from you with the results of your own project. My apologies if anything has not been clearly explained. Just write to me, in care of the magazine, and I'll gladly answer any questions. Good luck, or as we say here: "Cheevio".

The wing center section and engine nacelles are built as a single unit and the outer wing panels added to that. Planes's done in C-47 markings.