ARIZONA
Model Aircrafters

Siemens Schuckert D-III

Assembly Directions

In the late spring of 1918 a new fighter plane appeared on the scene. It had a rate of climb and maneuverability, which was unparalleled through the end of the war. The Siemens Schuckert was universally described as the ultimate fighter of WW1. With such stellar performance and rave reviews, why have you never heard of it then? Its chief advantage was also its Achilles heel. The SSW D-III was powered by a unique, revolutionary rotary engine of eleven cylinders. The Siemens Halske rotary engine was rated at 160 H.P and maintained its performance at high altitude due to a high compression ratio. Also unique to this engine was the fact that while the propeller rotated in the conventional direction, the engine itself rotated in the opposite direction. This was done to minimize the torque effects of such a high output rotary. This engine's development issues were to limit the use of this exceptional fighter to the very end of the war. Even still, the Siemens Schuckert D-III was to be used by aces such as Ernst Udet and Georg Von Hantelman. I had wanted to build something different than the Fokkers and SE5s and Camels that are more commonly seen. When I came across the SSW D-III I knew I had found my plane. There are a variety of color schemes available and I highly recommend the Windsocks Data File on this aircraft for ideas. The model is challenging to build but there is nothing, which the average modeler can't tackle with a little patience and persistence. Those that carry the project through will be rewarded with a plane that has no bad flying habits and is accurate enough to have won the WW1 class at the WRAM show. Let's get started building!

Horizontal Stabilizer

This is a good place to begin. The horizontal stabilizer is fairly simple to build with a couple of twists to facilitate the final assembly of the aircraft. It is built up over the spar on the plans and then assembled back onto the spar after it has been inserted through the fuselage. Let's begin by cutting the Spruce ¼" square center spar to length and pin it into position over the plans. Build the outline of the stab around the spar from ¼" x 3/ 8" balsa taking great care to not glue any of it to the spar. Add the ¼" square cross pieces, again taking care not to glue them to the spar. Finally, sheet the two halves (joined by the trailing edge) on top with 3/32" balsa sheet, again taking care to not glue it to the spar. Remove the spar from the stab and wait until assembled on the plane to sheet the bottom.

Elevator

Begin by stripping 6 pieces of 1/16" x 3/8" x 48" balsa to form the laminated outline. These strips should be soaked in a tub of water for about two hours. During this time you can begin pinning the inner outline of the elevator. The pins should be placed every ¼" or so to maintain an accurate outline. Once you have removed the strips from the water, coat them with carpenter's glue to create a 3/8" thick 6 layer deep laminate. A hint to help make this successful is to carefully align all 6 pieces after gluing as if it was a solid piece. Next, beginning at one end, lay the laminate (multi side up) about 1" past the beginning of the elevator. Carefully work the pieces as a group around your outline pins while placing pins around the outside to hold the pieces in position. Once the whole shape has been pinned in place, forget you ever saw it for about 24 hours minimum. After this procedure, completing the elevator is a simple task. Glue in the ¼" x 3/8" cross pieces followed by the ¼" x 3/8" front and rear supports. Add the 3/8 square leading edge reinforcements and you are done.

Vertical stabilizer

This simple part. Construct the frame with ¼ x 3/8 and install the ¼ square cross piece. Sheet this part with 3/32" balsa and you are done.

Rudder

Begin by stripping 6 pieces of 1/16" x 3/8" x 36" balsa to form the laminated outline. These strips should be soaked in a tub of water for about two hours. During this time you

can begin pinning the inner outline of the rudder. The pins should be placed every ¼" on the straights with 1/8" spacing on the tight radiuses. Once you have removed the strips from the water, coat them with carpenter's glue to create a 3/8" thick 6 layer deep laminate. Again, begin at one end and begin working the laminate around the outline. When you come to the tight radii, maintain a tight pressure in holding the laminate together, this will minimize the breakage within the individual pieces (Some fractures are acceptable and unavoidable). Once the outline is completed, again let it dry for a minimum of 24 hours. The completion of the rudder is now a straight foreword affair.

Fuselage

Begin the fuselage by constructing the forward box from parts FP1, FP2, the two ¼" sides, and temporary formers Fxx. Take care to ensure that the temp formers Fxx are located on the center line as indicated on the plans. Install the balsa formers to their appropriate plywood formers. The balsa formers are ¼ semi-circles with two upper and lower parts per hoop. The formers are all designed to slide snuggly onto a piece of ¾" I.D. copper tubing. Mark the former locations onto the piece of tubing and slide the formers into their correct locations. Install the eight ¼" square stringers in their slots alternating from side to side, all the while checking to maintain a 90 degree angle between the former and the jig tube. Trim them to an angled joint at the tail as shown on the plans. Reinforce the area where the horizontal stabilizer spar will pass through using ¼" balsa and then trim the hole for the spar through the stringer. Next sheet the wing saddle using 1/8" sheet balsa. The saddle will use FP2 to maintain its correct angle. Now complete boxing in the saddle by using scrap 1/8" balsa to tie the saddle into FP9 and FP10. Repeat this procedure on both sides. Our next step is to cap the 3/8" x ¾"x 12", 3/16" grooved blocks with 1/8" plywood. Once this is done lay the blocks in their correct locations against FP1 and FP2. Mark the angle of the formers on the blocks and trim them. Epoxy them in place reinforcing them on the outside of the box with ½" triangle stock. Retain the trimmed ends, as we will now use them for the front landing gear leg mounts. Mark the location of the front landing gear mount onto the outside of the box and a 90-degree line on former FP1. Hold the blocks in place and draw a line using FP1 as a template. Now epoxy both blocks to the box and FP1 using 30-minute epoxy. Once this

has set, epoxy in the two per side ¼" plywood reinforcements FPxx as shown on the plans. Now we are ready to start sheeting the fuselage. The first step is to sheet the sides and top from the front of the cockpit to the tail, leaving the bottom open for now. If you are building this plane for contest work, you will want to panel it according to your three views or pictures, otherwise panel it as is convenient. A little water and ammonia sprayed through a Windex bottle really helps curl the sheeting to fit the formers. If you will be staining the wood, take great care to minimize the glue, which gets onto the outside surface of the wood as it can create light spots. At this time you may remove the fuselage from its jig tube. Finally it's beginning to look like something. While the fuselage is in this state, reopen the tail spar holes and insure that the stab spar is parallel with the lower wing seat. DO NOT INSTALL THE SPAR AT THIS TIME. Our next step is to install the tiller and it's internal linkage for the rudder. I did this by holding the fin on the fuselage a little forward of it's actual location and the drilling a 5/32" hole through the top sheeting, upper and lower stringer taking care that the hole is vertical and parallel to the trailing edge of the fin. Slide a small piece of 1/8" I.D. brass tubing through the top and bottom of the fuselage as shown. Drop in a piece of 1/8" music wire and epoxy the tubing in place. Install the tiller from the top through the brass control arm and then solder the arm in place. At this time install your rudder push rod and the guide tubes for the elevator pull-pull controls. I also put in a guide tube for the receiver antenna. Once these tubes are installed and the rudder is working satisfactorily, install pieces of ¼" sheeting between the last two formers on both sides of the bottom stringer. Leave this a little above the stringer and then sand it to the contour of the formers, this will provide additional support to your tail skid/fin. Now complete the sheeting of the bottom of the fuselage. Once the fuselage is sanded, it's time to install the tail surfaces.

Horizontal/Vertical Stabilizer Installation

We will begin with the horizontal stabilizer. Begin by sliding the spar through the fuselage. Set the horizontal stabilizer onto it and with any luck you have a close fit (I didn't). If it doesn't fit, don't panic as the situation can be easily rectified. If your fit is too tight, carefully sand away the material on the insides symmetrically until the stab sits on its spar without binding. If it's to loose, symmetrically build up the inside of the "V"

until it is a close fit. If you are going to stain it, don't worry, as fillets will cover the joint. Once you are satisfied with the fit, CA the stab in place. Now that you have a plane of reference, epoxy the vertical stab and skid fin into place. Now comes the tricky part. Strip some soft 1/16" balsa to a width of 1/2". Cut it to length (I would recommend starting with the subfin as it will be least visible) with a slight radius on the end, which will be placed towards the leading edge of the surface. Moisten the underside with water/ammonia and work the piece until it curls. Once it is curled, carefully apply glue (I used CA) to the side, which will face the fuselage. Work the fillet into place with your finger and hold until the glue sets. Now only seven more to go. Sand the fillets to your satisfaction and now you are ready to build the wings!

Wing Construction

The construction of the wings is rather straightforward so I will cover only those areas that require special attention. First, a word of warning, if you use the scale torque tube aileron controls, handles the ribs very carefully until the wing is cap stripped (Arizona Model Aircrafters has laser cut ribs available). We will begin with the bottom wing. First make your 3/8" x ¼" spruce spars, making the scarf joint as long as you can. Block your spars up at least 3/8" above the plans (alternating scarf joints, one to each panel) and install your ribs. Now glue in place the 3/8" square balsa leading edge. Install the 1/8" x 1-¼" balsa trailing edge and you can remove the lower wing from the plans. Cut a piece of 1/8" thick balsa to fit and glue it in as the center section leading edge. Next cut to length and install the 9/16" x 7/16" center section trailing edge. This should now be sanded at an angle until the wing fits snugly in its saddle in the fuselage. Our next task is to install the wing tips. These are made as a laminate from two pieces of 1/8" lite ply as shown. In order to make mine more scale-like, I bent them to represent the airfoil shape as the glue dried. This really enhances the appearance of the finished model. Now install the ¼" sheet trailing edge to the aileron area. These should be cut 1/8" taller than the rear edge of the rib to allow for the cap strips. One important note, make sure you groove the trailing edge of this piece so that you can slide in and out your 9/32" diameter aluminum torque tube guides. Your next task is to cut to shape and install your wing bolt blocks. Now sheet the center section out to the second full size rib and return the wing to its

saddle. Drill, tap and bolt down the wing. Now drill the holes for the wing dowels through the front of the fuselage, through the front spar, and into the wing mount blocks. Install the dowels and refit the wing. If you are satisfied at this time, cap strip the wing with 1/16" x ¼" balsa and set it aside for now. The top wing is very similar to the bottom; I will only touch on a couple of special notes. First and most importantly, DO NOT INSTALL OR DRILL THE CABANE STRUT MOUNTS UNTIL YOU TRIAL FIT THE WING! Once the wing is built and cap stripped, set it upon its cabane struts on the fuselage with the lower wing installed. If everything appears in order, install the cabane mount plates as shown on the plans (above the cap strips). If things do not line up, find out why. It is my opinion that at this time it will be easier for you to adapt your wing to the struts rather than the opposite. Now with your cabane mounts installed, lay the wing in its correct position taking great care that the leading edge is parallel with that of the lower wing. Once you are satisfied with the top wing's location, mark through the strut mount the location of the hole. Drill through the mount plate at that location and install a blind nut for an 8-32 bolt. Return the wing to its struts and bolt it in place with the one bolt. Once you are again satisfied that the leading edges of both wings are parallel. Mark the location of the three remaining bolts. Install the final blind nuts and bolt the wing in place. Check the incidence of the wings. If both wings have the same incidence, (+/- ½ degree) use balsa to build up the cabane mount plates to the cap strips. If the wings have different incidences, shim the top wing until it is correct. On my model I left the front strut flush to the plywood mount while building up the rear flush with cap strip to correct an incidence issue. This method provides a better-finished appearance than jacking the wing up above the strut. Now that everything is together, this is an excellent time to check the fit of your interplane struts. These are a laminate of 3/32" balsa, 1/8" lite ply, and another layer of 3/32" balsa sanded to a streamlined shape. Once they have been adequately fit in place (do not drill any mount holes at this time), let's look at the ailerons. There are only a couple of noteworthy points as the ailerons are pretty straightforward. The most important note is that when trial fitting the aileron, you will find a curved gap out by the aero counter balance (dog-ear shaped extension). This needs to be filled. I glued a piece of 1/8" balsa slightly longer than the gap and blended it using sandpaper. The second item is to build up the leading edge at the hinge points (use a

piece of ¼” scrap) and do the same at the point where the torque rod enters it. Please ensure that your hinges are installed upon the centerline of the torque tube. Now groove the aileron so it is clear of the torque rod guide. All that remains is to make the torque rods. These are pieces of ¼” diameter brass tubing cut to length. Plug the end about ½” deep using a slightly sanded piece of ¼” hardwood dowel. Drill and tap one end 4-40 as shown on the plans. Slide the torque tube to its full depth and install a piece of threaded rod through the bottom of the wing. Tape the piece of threaded rod so that it is centered in its opening, now mark align on the exposed end which will go straight into the center of the aileron. Remove the torque rod and drill and tap a 4-40 hole 1/8” in from the end using the line you drew as a guide. Reinstall the torque rod and the aileron. Press the aileron firmly against the torque rod and this will leave an imprint where to drill your aileron for the threaded rod. Repeat this procedure for the other three torque tubes. The wings are now ready for covering. I used Arizona Model Aircrafters lozenge five-color fabric as it provides the scale appearance I desired. There are a couple of paint schemes that do not require lozenge (Ernst Udet’s plane was almost all red) and I recommend contacting Dan-San Abbott for more information.

Fuselage Revisited

At this time, we are going to add the lower wing fillets. At first glance these appear daunting but are in reality quite simple to produce. First, select the softest sheet of 3/32” balsa you have and cut out two sets of top and bottoms for the fillets. Now stand the fuselage on its nose with the lower wing installed. Spray the inside (side which goes against the fuselage) of one of the top fillet pieces with a mixture of water and ammonia. Start to work the piece into a tight radius. Respray as you see fit and the piece will curl right up. Now, put it in place against the lower wing and the fuselage. It should extend out on the wing to about 1/8” shy of where the sheeting ends and the tail of the fillet should line up with the bottom panel line on the fuselage. BE PAITENT! If you break one, don’t despair as I broke one on my first try. Once you have it where you want it. Tape and pin it in place and do the other side. Let these dry over night or longer. When dry, remove your tape and pins. You now have a molded balsa fillet! Glue this (TO THE FUSELAGE ONLY!) in place and add the two internal fill pieces and wet and add the

bottom cap. Once this assembly has dried, add a filler piece to the fillet where it butts against the wing. Add another piece of filler to reinforce the front of the fillet and you are done with the wooden part. Form the nose of the fillet out of litho plate using the pattern provided. This will take patience. An alternative would be for you to make this piece from fiberglass.

It is now time to install the firewall. This will vary according to the engine that you use. The plans show the installation of a Brison 2.4. It will be worth your while to get all your holes marked and drilled prior to gluing the firewall in place. Whatever you do, try and rotate the engine so you will not have a hard interference between the carburetor and the landing gear blocks. To get this placed correctly (with the Brison), set the firewall 1" back into the box and epoxy it in place and install triangle stock for extra strength. Cut away the former F1 until the engine sits flush against the firewall and then box the area where the carb sits using scrap balsa. If you are building the late version shown on the plans with the cut away cowl, you will have access to the carb for priming and choking. I made my cowl out of fiberglass using blue Dow Board foam. I cut out enough rings to provide the correct thickness, and then glued these together. Next I epoxied a piece of ½" diameter wood dowel in the center. Take care to ensure that the dowel is truly centered and vertical. Next I cut the cowl roughly to shape on my bandsaw. Then I chucked the dowel in my drill press and shaped it using 80 grit sandpaper. I found it worked best to use a long wide strip and allow only the paper (no backing) to contact the foam. Once satisfied with the overall shape and diameter of the cowl, apply 3 layers of Bondo Automotive fiberglass cloth (I cut up one whole package into 4" x 6" strips and kept applying them with a min. of ½ " overlap until gone) using epoxy resin and when set, apply a coat of finishing resin. Chip out the foam you can and the rest can be removed with lacquer thinner. Trim the opening to shape and add the cowl ring and the cowling is ready to install. For those of you who feel that this sounds too much like work, a spun aluminum cowl is now available from Arizona Model Aircrafters. Install the cowl with 6 evenly spaced mounting blocks and we can move on to some detail work.

Guns and Access Panels

It is now time to start dressing up the SSW! I constructed my guns from Arizona Model Aircrafter kits. Once these are complete, the next task is to build their mounts and shell chutes. This is pretty straightforward. The guns base mount (M1) gets screwed to the rear cabane strut mount. Once this is done glue M2 and M3 together as shown on the plans. Trial fit these to M1 and check that the gun will rest upon it at the correct height. If all looks right, glue on the guns. If not, trim or shim the mount as required. Next construct the chutes as shown from the C1, C2 and C3 parts. These are then sheeted using 3/32" balsa. Paint the guns and chutes to suit and then install them. Let's next make the top access panels. I began by cutting a cardboard template that extended over the sheeting on both sides by about 1/8". Next notch this template to clear the cabane struts. The front panel should extend about ¼" past the rear of the shell chutes. Once this is trimmed to fit around the guns and chutes and has been trial fit set it aside. Next trim small rectangles to cover from behind the shell chutes back to the cockpit. These also need a slot for the rear cabane struts and you will need to cut a hole to fit the torque rod for the upper wing's ailerons. Trial fit this to both sides. If required, make separate right and left side templates. Finally cut the small rectangle that fits between the guns back to the cockpit. Now, cut all of these pieces out of litho plate or prime and paint the cardboard. I installed mine with #0 screws. Finally cut out the side access hatches from some aluminum (I used roof flashing). These should be formed to the contour of the fuselage. Mine opened on the left-hand side of the fuselage to provide access to the Dubro remote fueler and the engine kill switch. These were hinged with ground down hinge points.

Scoops and Louvers

One of the features of the Siemens Schuckert D-III which gives it it's character, are its air intake scoop and the louvered panel, which exhausted hot air out the bottom. I chose to make these from aluminum and this was the first time I attempted to do this. The following techniques were developed through much trial and error and should allow you to duplicate these parts without too much fuss. Get a piece of 2 x 4 and cut off a piece about 4" long. Sketch out the scoop top view on the block, and extend the front out about

½", but be sure to mark where the scoop ends. Next drill a 3/8" hole through the block at the tail end and at the extended front corners. Cut out the shape of the scoop using either a jigsaw or a hacksaw blade. Take a piece of litho plate which is about ½" longer and 1-1/2" wider than the scoop and lay it over the cutout and line up the piece at the marks you made where the scoop ends. Sand a slight radius onto the end of a 6" piece of 3/8" hard wood dowel. Begin rubbing this in small circles and back and forth while applying a downward force beginning at the pointed end of the scoop while holding the litho in the correct position. You will note that the litho will start to stretch and form. Start moving forward evenly till you reach the edge of the sheet, you now have a scoop! After a couple of trys, this will become simple. Once you have two scoops that you are happy with, it is time to attempt the louvered panel. Begin by cutting off another foot from your piece of 2 x 4. Set it on edge and trace the outline of the front of the fuselage on it (radius) for 6" beginning at one end. Cut this out and mark a line down the center of the piece. Centered in your cutout, lay out the 1/2" x 3-1/8" scoop dimension. Drill through at the appropriate point using a 1/2" diameter drill, and cut out the rest so that you have a slot 1/2" wide with a radius at each end. I would recommend trying a sample before tackling the entire panel. Cut a piece of the litho that is slightly larger than the groove and start rubbing with your dowel till it is about 3/16" deep. You will also notice that the surrounding material is now the same diameter as the fuselage. Carefully score the peak of the hump and trim it back around the base. You have now made a louver! Remember when making the panel that the louvers face backwards. Cut a piece of litho which covers the front nose section extending about 1/8" up past where the landing gear mounts, back to the edge of the wing opening on both sides. Lay out the louvers on the centerline of the piece so that the two rows are 1-3/8" apart on the centerline. Each louver should be 1.25" apart beginning 5/8" (on center) from the rear edge of the cowl. Lay these out until there are two rows of five louvers. The reason you made your fixture oversize is so now you can line up each louver on its centerline. Repeat the above procedure to reproduce the louvers in the panel. Now drill two ¼" diameter holes in the appropriate location for the landing gear legs. I installed this panel with five #0 screws on each side.

Dummy Engine

Begin the dummy engine by cutting out the pieces that make up the crankcase and the cam box. Glue these together and screw them to the cowl ring, which supported the real engine. Cut away pieces until the dummy crankcase clears the engine. I was able to do this and still keep all eleven cylinders visible from the front. Once this fits comfortably, prime and paint it. Next, assemble eleven Williams Brothers ¼ scale Gnome Cylinders but leave their heads and valve train off, as it is not correct for this model. Cut 11 plywood disks and drill holes in the location shown on the plans for the rocker arm perches. Build up the valve area using left over pieces of the ¼" bass wood spars creating ¼" x ¼" x ¼" (slightly rounded after installation) valve holders. Drill through these on the center of the valve bump 3/32". I used small nails and #0 springs (from Ace Hardware) for my valves and springs. 7 or 8 of these cylinders can now be installed complete on your dummy crankcase. Cut the others to clear your engine installation. Next, cut and drill out 22 rocker arms from 1/8" basswood as shown on the plan. These can be painted once sanded. Now assemble the rocker perch post from brass tubing or wood dowel. Slide two rockers on each and check one set with the inside of your cowl. The rocker arms should be at roughly the same angle as the cowl is above them. Once satisfied, glue in place and repeat for the other 10 sets. Install valve push rods made from 3/32" aluminum tube and you're all set.

Final Assembly and Rigging

You are now rapidly approaching the completion of this project! It is now time to make the strut and wire fittings. Cut them from 1/32" brass using the templates shown on the plans. I would recommend not drilling the holes in the strut fittings until after they are bent to their U shape. Once they are bent insert a piece of wood into the fitting and drill through. This way your holes will line up. One last thing I like to do is to solder a 4-40 nut on the side of the strut fitting which will face the fuselage. This helps speed the assembly of the plane at the field. Debur and paint your fittings to suit your documentation. I used aluminum high temperature engine paint, which I baked on, in my oven. This has held up real well. You can now bolt all the fittings together. Sandwich the

flying wire brackets under the strut fittings. Next, assemble the model together. Due to the thin wing section, chances are real good that your wings will have some warps in them; mine did anyway! Either brace the wings in an unwarped, unsagged position or get a helper to hold the wings true. While in this position, insert the struts in their fittings and mark through the fittings onto the strut. Remove the strut and drill through a clearance hole for a 4-40 bolt. Reinstall the strut and bolt it in place. Repeat on the other side. The wings should now be set in a relatively unwarped fashion, you will probably note a bit of droop (anhedral) at the tips however. This must be removed with the rigging. I use 80-pound test, coated, fishing leader for my wires and small diameter aluminum tubes which I crush and CA to swage the wires. Begin rigging the plane by installing the landing (strut bottom to cabane) wires. This will remove the droop. You can use either turnbuckles or Dubro 2-56 rigging couplers and clevises as adjusters on the detachable end of the wires. Once all four landing wires are installed, next install the flying (strut top to fillet base) wires and finally the drag (cowl to lower strut) wires. At this time check the balance of the model. It should balance slightly nose down at a point 6-3/8" back from the leading edge of the top wing. If it is only level and you don't have the spinner and propeller installed, your O.K. If the plane doesn't balance, ADD LEAD OR YOU WILL CRASH! Install your fuel tank and any remaining radio componentry, and at this point fit the spinner (Arizona's Albatross spinner is just the right size) to your propeller. It's now time to fly!

Flying the SSW D-III

Even though the control surfaces look huge, set your control throws to their maximum limits. I have two inches of travel up and down (4" total) on the elevator, 40 degrees of travel in each direction on the rudder, and the maximum travel I could get without binding on the ailerons. Do not reduce these! My first flight took place on a cool spring day with about a 10 mph wind coming across the runway at 45 degrees. I planned to do a couple of taxing runs up and down the runway but the plane broke ground in 10 feet at half throttle. I was now flying. The plane tracked into the wind at a slight climb hands off. I was a bit startled when I tried to turn as it took half rudder and full aileron to get the plane to turn (I had initially set the throws conservatively due to four ailerons and a huge

elevator) and with the breeze it was not comfortable. I circled around and made my landing approach. With the highly undercambered scale airfoil, when you cut the throttle, the plane descends rather steeply. I ran out of elevator on the flair and eventually the plane ended up on its nose. No harm though, not even the propeller was damaged. I dialed in more throw on the ailerons and the elevator (as stated above) and subsequently the plane flys like a dream! Videos of the first flight and one after adjustment can be viewed at my club's website, www.ncrcc.org. I hope you enjoy your Siemens Schuckert as much as I'm enjoying mine.

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Dan-San Abbott
1800 Stone Cress Court
Ceres, CA 95307

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10 Long View
Berkhamsted, Herts HP4 1BY, UK

RN Pearson
1332 Summit Ave
Prince Rupert, BC
V8J3W7
Canada