



ALL OUTDOOR PHOTOS BY HARRY SUTHERLAND

# CURTISS A-12 'SHRIKE'

By CHARLIE SMITH . . . Our plane on this month's cover may be built as an R/C or U/C model . . . or you can do like the author, and kill two events with one bird! It converts either way in just minutes.

• What to build next? Isn't that always the problem? My wife and I were driving back from contests in Phoenix late January ... in which I didn't place. Placing is not all that important, but somewhere close!

The U/C Bristol "Brisfit" and the old R/C P51 just didn't have it anymore. I like to fly both U/C and R/C scale. This year I wouldn't have time to build both another U/C and R/C.

What about one plane that could be built and flown both ways?

That's an idea.

O.K. What?

We stopped at the hobby shop in Grand Junction and picked up some Profile Publications . . . the Shrike (No. 128) included.

After looking them over, and plan books by Wylam (They are something else for the scale builder), I like Shrike was it. Odd, but good looking, a classic of its time. All metal, low wing, designed specifically for the attack role. Wing span 44', powered by a Wright RY1820 — 21 radial engine of 670 horsepower, it was the first plane to be used by the Army Air Corp with full span, automatic leading edge slots. It carried the mail, was in service at Hickam Airfield, Hawaii in 1940, and in China. It carried 4 machine guns in the wheel fairings (spats) and a single 30 caliber for the observer. The Shrike was probably the least recognized plane to train pilots in WW II.

The Shrike is a low wing tail dragger, with good moments, plenty of wing, and lots of detail. Also, at 1-1/2 inch scale there is plenty of room for U/C and R/C gear. It is flown U/C with all radio gear aboard, except the receiver, and R/C with the bellcrank assembly and wing line guide removed.

By the way, the Shrike flies well both ways.

## CONSTRUCTION:

This will be broken down into fuselage, stab, fin, wing, engine, pilot, wheel fairings, hatch, and wind screen. For further details, there's a general discussion at the end of the article. Build in any order you like.

## FUSELAGE:

Trace the bulkheads on the appropriate material and cut and sand to shape.

Bulkheads No. 1 and No. 3 have a 1/16 plywood doubler as shown. Epoxy these together. Make up two crutches of 1/8 x 1/2 spruce as shown. Note the step and spacer at the rear end. Cut engine bearers and assemble to bulkheads No. 1 and 2. Epoxy this assembly.

Check for squareness ... no down thrust or right thrust. Mark the crutch assemblies with bulkhead locations. Epoxy crutch to No. 1 and No. 2 bulkhead assembly. When dry, assemble bulkheads Nos. 4, 5, 9, 10 and 12. Check that these are 90° to the crutch and straight in the top view. When dry, install the balance of the bulkheads. Install 1/16 balsa sheeting between bulkheads 1 and 2, 2 and 4, 5 and 8. Install 1/4 sq. stringers as shown, also bellcrank rails and stab blocks. Now skin the frame with 3/32 balsa sheets. In tight contours, plank with 1/2 x 3/32 inch strips. Do not cover the bottom rear so as to install the push rods later. Fit wing into fuselage.



The 'Shrike' with some select company- Note Noal Hess' Boeing F4B-4 in background. Prototype Shrike was Army Air Corps' first all metal plane. Model has 66 inch wingspan.



Dummy engine is entirely built up from scratch (Sorry about that, Williams Bros! At least he used your wheels). Webra 60 R/C engine.



Remaining cylinders are attached to shaped balsa cowl. Engine is almost completely hidden. Baba skin throughout.

Trim as necessary so that the wing is 90° in both axis of fuselage. Hold in place so that stab can be installed, check for squareness. Glue and let dry. Install fin on centerline of thrust and 90° to stab. You know, with all this gluing and checking it's time for a beer. It's rough, but doesn't look too bad. Take a picture. As a matter of fact, take pictures all through construction.

Remove wing. Now fit and hinge the rudder and elevators. Install servo rails and servo tray assembly. I used "Gold- N-Rod" push rods for these controls.

Install the push rod tubes using silicone cement to hold the tubes as they pass through each bulkhead. Make up the tail wheel assembly and bolt to bulkhead No. 11 Run a separate push rod assembly from the tail wheel tiller forward to the servo tray. Both the tail wheel and rudder are attached directly to the rudder servo arm. When complete, skin the bottom.

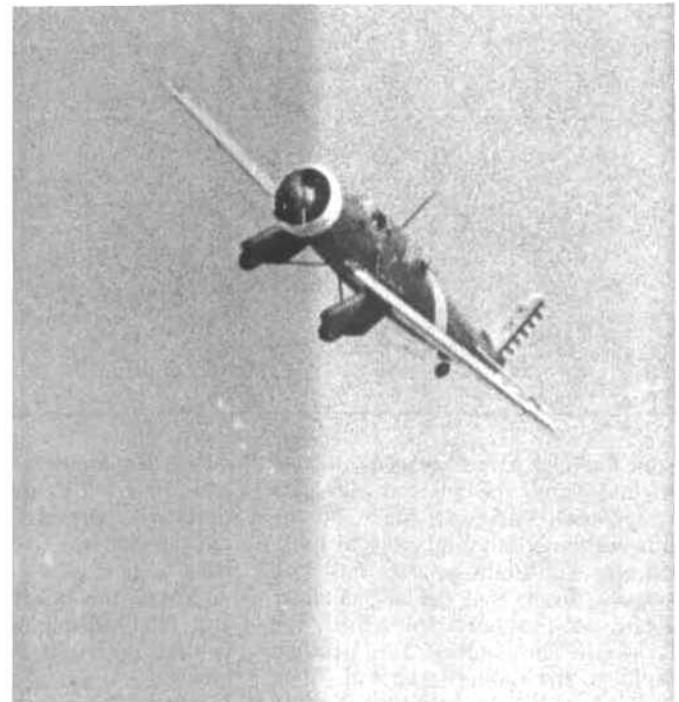
Remove servos and tray, sand the assembly lightly, and fill in the bumps.



Charlie Smith and his dual purpose 'Shrike.' Note lead-out wires . and guide plate near lei: wing tip. Flying prop just about clears ring cowl. Radio gear remains aboard for U/C flights.



Charlie starts a takeoff. Note the right main and tail wheels are off the ground. Rudder and ailerons trimmed right for U/C.



The 'Shrike' is an impressive piece of machinery while in flight, Charlie says it flies well either way radio or ukie controlled.

Install 1/4 inch balsa doublers in wing saddle area, and 3/8 x 1/2 hardwood rails for wing tie downs. Replace wing and drill and tap rails for No. 10-32 nylon screws for wing bolts.

Install the headrest in die cockpit and fillet. Install the hardwood block behind bulkhead No. 4. Epoxy the plexiglass stationary canopy in place. Install the gun platform. Now turn the model upside down, and with wing installed, build fuselage wing fairing with partial bulkheads Nos. 3,4,5 & 6. Sheet with 3/32 bails.) strips. When dry, disassemble the wing from the fuselage: Finish sanding the wing, ailerons, flaps and elevators. Assemble the bellcrank unit and install. Note: The lead-out wires go through eyelets mounted in the skin of the fuselage. See detail:

Apply two coats of thinned clear dope. Sand lightly between coats. I covered these parts with silkspan, with two coats of clear dope, sanding very lightly between. They were pinned with K&B primer coat. Sand with 240 wet sandpaper. When the wing was at this stage, it was assembled to the fuselage with a piece of Saran Wrap in the wing saddle area.

The fillet was made of Sig "Epoxolite." Take your time and form the fillet from the leading edge to the trailing edge. A small balsa shape was glued to the fuselage, both sides, and the Epoxolite faired to this shape. While the Epoxolite is still soft, smooth it out. With a pan of water nearby, wet your finger and smooth out die fillet, wipe finger clean, rewet, arid smooth some more. Let dry overnight. Epoxolite dries very hard, so take your time on the smoothing job. Avoid much sanding! Install oil cooler fairing, tail wheel fairing and carb. intake.

Fill cracks in the planking, the area of the stationary canopy, and the fin and stab area. Sand the fuselage, paper as the wing was done, and prime.

#### **STAB:**

Build the stab using 1/4 x 1/2 balsa for die outline. The center is 1/4 inch sheet. Use 1/8 x 1/4 balsa for interior bracing. Sheet with 1/32 top and bottom and sand to shape.

#### **FIN:**

Build the fin using 1/4 x 1/2 balsa for the outline and 1/4 square for the interior ribs. Cover with 1/32 balsa sheeting. Sand to shape.

#### **WING:**

Use the rib template to make 24 ribs of 3/32 balsa. Make two ribs from 1/4 inch spruce for station No. 3. Make four 3/32 ply ribs for No. 1 and No. 2 station. Make landing gear channel blocks of 3/8 x 1/2 hardwood. Note vertical support block. Make a left aileron spar of 1/4 inch balsa, noting that it tapers up as it goes to the tip block. Make a right spar which is opposite. Assemble the two wing panels. Since the ribs are not quite flat bottom, place 1/16 inch shims under each wing spar in at least four places. Spars are 1/4 x 1/2 inch spruce, flap spar is 1/4 x 3/8 inch balsa, and leading edge is made up of two pieces, 1/4 X 1/2 and 1/4 x 3/4 balsa.

Trim ribs Nos. 1, 2 and 3 to accept 1/16

plywood splice and landing gear block. Epoxy the assembly in this area. Make up trailing edge block and glue to No. 1 and No. 2 ribs. Also note hardwood block for wing bolts. Cut and shape per plan to fill this area between ribs No. 1 and No. 2. Install aileron bellcrank plate as shown, and glue 1/8 sq. under plate for support. Install bellcrank and 1/16 music wire push rods to center section. Install spruce blocks between ribs in the cross hatched area. This is where the flying wires attach. Skin the top of the wing frames with 1/16 inch hard balsa. When dry remove these frame assemblies and install flaps and ailerons temporarily. Join the two panels, epoxying two wing splices as shown. Block up both assemblies for 2 inch dihedral. When dry remove and install two 1/4 dowels shown and sheet the bottom of the wing. Install wing tip blocks. Shape the tip blocks and leading edge of the wing and sand to final shape. Bend a left and right landing gear and install. Use four metal plates 1/4 X 1/2 in size to hold gear in slots ... 2 wood screws per plate.

Install that good 60 R/C with No. 8 X 3/4 inch long panhead sheet metal screws. The main reason that bulkhead No. 1 is balsa is to make it easy to cut out for engine clearance. Install push rod to the servo tray for R/C configuration.

#### **EXHAUST COLLECTOR RING:**

The collector ring is made by butt gluing 1/2 inch balsa sheets together, making a 7 inch square plate. With a compass, draw two circles to size, see detail. Cut to the outer line ... roughly. Mount the disc on an arbor so that you can use a hand drill for a lathe. File and sand the outer contour of the ring, then carefully file and sand to the inner line from both sides, being careful not to cut all the way through. With about 1/16 inch wall left, form the inner contour. When this is completed, remove from drill and cut the ring loose. Sand round. Lay the ring over detail and cut where indicated. Using blocks, form balance of exhaust assembly. Shape and sand and glue to ring. When dry, smooth out joints and install three plywood clips. Drill holes first for mounting screws. Locate on fuselage and install screws. Trim oil cooler fairing for 1/16 inch clearance all around. Install engine and trim ring so that no interference occurs. Remove exhaust ring, prime, and paint.

#### **ENGINE AND COWL:**

Build crankcase as shown and install mounting flange per detail. With engine installed and controls hooked up, fit case over engine and bearers. Careful trimming will allow the case to fit against No. 1 bulkhead. Mark the bulkhead through holes in flanges. Remove the case and engine and drill and install 440 blind nuts. Make six cylinders from 7/8 inch dia. wood dowel, each 1 inch long. Epoxy as per drawing. Make eight cylinder heads per detail from blocks of soft balsa, just take your time and it will get done. Make sixteen valve covers. Sand to shape and glue to cylinder heads, glue the assembly to cylinders. Paint the crankcase aluminum, cylinders dull black, valve covers aluminum. Cut sixteen 1/8 inch dia. brass tubing valve push rods. Cut collars from 3/16 inch dia. brass

tubing and mount on rods. Insert rods in holes of case and flush with valve collars. Epoxy. If you care to make plugs and ignition harness, good ... it adds a lot of detail. Use soft wire. Don't worry about those 2 extra cylinders ... We'll use them.

Make drag ring next. Mold it in fiberglass or build it up like I did, whichever you consider your cake. When completed, split as shown and wrap around engine. If it won't close, trim valve covers as necessary.

Now set engine assembly on a flat surface with the cowl ring around it. Tack glue the cowl to the engine valve covers, using epoxy in 2 or 3 places, and making sure that they are concentric to each other and that the split is in the proper location. Do not glue cowl to cylinder just above the split. Lay in the remaining two cylinder heads and glue to cowl. When dry, remove from the board and glue the remaining cylinders to the cowl. Now install your 60 R/C with needle valve and hook up. Reinstall the engine assembly. In order to do this, the cowl has to be opened up to go over the needle valve. Push assembly flush against the bulkhead. Install 440 flange bolts, close cowl. Fit cowl clip in place, mark hole location on bulkhead. Glue the clip to the cowl with epoxy and let dry. Remove engine cow! assembly and add gussets to dip and glue solidly. Drill bulkhead for 440 blind nut and install. Paint the inside of die cowl dull black.

#### **PILOT:**

The pilot is made from a Williams Bros. 1-1/2 inch scale WWI pilot. Cut the head off with a hot X-acto knife.

(Don't let anyone see you do this. They may think you're nuts!) Trim the parts to remove all the neck. Make a "gimbal" as shown in the detail. The center bearing must move freely on the 1/16 pins that are soldered to the 5/16 inch dia. ring. Drill a 1/16 hole in the center of the bearing. Solder two 1/8 dia. X 1/8 inch long pieces of tubing to the 5/16 dia. ring, 90° to the center bearing. Use a 1/16 drill to clean out any solder that might have gotten inside. Cut and bend a soft piece of 1/16 wire and install through hole in center bearing. Solder in place as shown. Glue the head on bent end of wire with silicone cement: and let dry. Epoxy lead weight to other end of the 1/16 wire. Check that the weight is large enough to pivot the head on the "gimbal." Mount the gimbal head assembly with 1/16 wire pins.

Drill 1/16 hole in the collar just so the gimbal can not be seen. Epoxy pins in place. Now make a simple body as shown in the detail and glue pilot assembly to it with silicone cement. Paint assembly, using dull black. Paint as per Williams Bros, instructions. Epoxy a plywood tab and mount with small wood screws. Lubricate gimbal with Vaseline or use a silicone spray so it moves freely.

#### **WHEEL FAIRINGS:**

Study this detail and make a right and left assembly. The left assembly is shown. Make two sets of bulkheads of 1/4 inch balsa. Glue these to the front block and trailing block, noting the slant of the top bulkhead. Glue the 1/16 skin on next, running the grain 90° to the bulkhead at



All rigging is permanently attached to the wing, unbolts at fuselage when broken down for transporting. Right trim is put in by radio before ukie flights. Roberts control for U/C.



Prototype was still in use at beginning of WW II. Had short use as trainer.

section B-B.

The bottom former is hardwood, as it is the support block. Glue these in place. Trim the wheel contour and add a 1/32 inch plywood doubler with an 1/8 inch overhang. This both stiffens this area and will support the wheel cover assembly. Make the wheel cover assemblies . . . balsa blocks in the front and 1/16 inch plywood sheet for sides. Note the three attach points. The front point is a 1/32 plywood clip. Use 1/8 inch dia. tubing for guns. The lower gun fairing is soft balsa. Carve to shape and glue in place. Slip the wheel fairings over the landing gears. Install the wheels and check for wheel clearance. When all is clear, glue the fairings to the wing. Make fillets of Epoxolite.

#### HATCHES & WIND SCREEN:

These were made of 1/16 inch plexiglass. Make the wind screen from template. Leaving the paper on, mark the bend lines on the paper backing. Heat the plexiglass with a torch at the bend lines and bend to fit the cockpit. Install on the fuselage and epoxy.

The canopies were made over forms of the radius shown. Trim and install the stationary canopy to the rear cockpit. install a 1/8 sq. spruce rail along the edge of the cockpit from No. 5 to No. 8 bulkhead. Make up the moveable canopy per detail. Four clips hold the canopy to the rails. The wind deflector is .020 inch aluminum sheet cut per detail and epoxied to the canopy.

#### MACHINE GUN:

The observer's gun is a 1918 M-1 machine gun. There's nothing special about this assembly. The body is spruce 3/16 inch dowel and balsa block for ammo container. The sights are tubing of different sizes. The cross hairs in the main sight are pins. Holes were drilled in the brass rings and pins installed and soldered. The post is 5/32 inch tubing and a collar is used so the assembly will not fall out in flight. Paint dull black.

#### STRUTS:

Assemble the fuselage and wing and make the strut assemblies shown. Struts are shown true length. Sand them to streamline shape. Set them on your model and trim to the wing contour and fuselage shape. Mount 1/8 inch dowels through the strut at the wing contact point.

Drill into rib No. 3 on the spar location, just 1/4 inch deep. Now we have the fuselage location. Glue a plywood doubler inside the cockpit opposite the point. Drill for a 4-40 screw through strut, fuselage skin, and plywood doubler. Mount a 440 blind nut in fuselage. Make Epoxolite fairings at the 3 points. Sand to a streamline shape and install the single struts from the wheel fairings to the fuselage fairing on the wing.

#### FLYING WIRES:

Make up flying wires to the point stated. These are made from .020 music wire. Make eight small spruce blocks 1/16 X 1/4 x 1/2 inch long. Trim them to a streamline shape. Make two spruce blocks for the wheel fairings 1/16 x 3/8 X 1/2 inch long. Make spruce blocks 1/4 x 1/2 x inch long for mounting at station No. 4. Make the bottom assemblies first. Determine the angle the wire will intersect the wing from the wheel fairings, then chamfer the block to this angle. Epoxy the blocks to the wheel fairings at the proper angle. Drill the .030 dia. holes with a pin vise in each wing block 3/16 inch apart, and drill two holes .040 dia. in the wheel fairing blocks 3/16 inches apart. Make the spreader dowels as shown. Drill .020 holes to slip wires through. Measure and cut wires to length. Epoxy wires into wing blocks only. Set assemblies aside. Build a fairing of Epoxolite on the wheel fairing blocks.

Make up the top assemblies the same way, but don't epoxy the wires to the fuselage blocks. The model is completed before the final assembly to these wire details. When the model is completed, epoxy the bottom wire assemblies to the wheel fairing blocks. Pin and epoxy wing blocks in place. Mount the wing in the fuselage and block up plane at the wing tips. Pin and glue top wing blocks in place. When dry, epoxy wire into fuselage blocks. Holding wires tight, drill for 440 bolts, Install 440 blind nuts. With Saran Wrap on the fuselage, make epoxolite fairings on the fuselage blocks. When dry, sand to streamline shape and paint, touch up wing blocks with yellow paint.

#### PAINT:

At this point we have quite a lot done. Pick out the A-12 from the profile that you wish to copy. I did the old No. 17 of the 13th Attack Sqdn., 3rd Attack Group, 1935. Pactra Cub yellow works quite well.

The olive drab is on the green side, so this should be mixed, 2 parts Stinson Green, 4 parts Cub Yellow, 1 part Stearman Red. This is pretty close. Use dull gray for the collector ring, cowl white and cockpits aluminum.

#### GENERAL DISCUSSION:

These details were added last; refer to drawing for location: Make the radio mast from 1/8 x 3/8 straight grained spruce. It is 5-3/4 inches long and tapered to 1/8 inch at the top. Sand to streamline shape. I drilled a 1/16 inch dia. hole up the mast about 1-1/2 inches and drilled an intersecting 1/16 hole from the rear. This is to get the radio receiver antenna to the outside. Install as shown and epoxy in place.

The instrument panel is only reference. I did not have this information, nor for the radio in the observer's position. The instrument panel is 1/16 plywood painted dull brown. The instruments are Tatone . . . 7/16 inch for bank & turn, compass, altimeter, airspeed, fuel. Oil pressure, and oil temperature are 3/8 inch instruments. One aluminum panel has three green and three red pin heads for lights. Another horizontal panel of aluminum is for five switches.

The scale radio is made of aluminum sheet bent to shape. The dials were drawn on stiff paper and glued in place. The tuning knobs are rivets cut short and cemented in place. The grids are made from pieces of screen. The one on the top was for cooling, the one on the front was a ground speaker. The head phones are made of 2 narrow brass strips soldered to 3/16 dia. washers. The head phone cups are large blobs of black silicone cement. The coil of wire from the head phone to the radio is formed by wrapping a length of coated wire on a nail. Cockpit vent is made of aluminum painted O.D.. Inspection door is of aluminum, painted red. The observer's step is made from 1/16 wire, and the pilot's gun sight is made of 1/8 tubing. Running lights are 1/4 inch dress pins with balsa fairings. Stars on the wings, bar and stripes on the rudder, "U.S. Army" painted black on bottom of wing (See "F/F Scale" this month). Wing walks painted dull black. Now it is a couple of cases of beer later; five. or was it ten bandaids . . .

I'm pretty wild with a model knife, and it is finished.

**FLYING:**

U-Control: The model was flown U/C first. Make sure the balance is on the front line. The radio servos and battery were left in the plane. The aileron servo was set with an 1/8 inch deflection for a right turn. The rudder servo was set 1/4 inch for a right turn. As a matter of fact, I pinned it. The tail wheel was set to get a slight right track. Note: That was why separate push rods were used. The throttle rod was the one used for U/C. The elevator link was installed and attached to the elevator push rod with a 5/32 collar. The flap link was attached.

Adjust the engine for good high speed and good idle. Do not attempt to fly the model until these can be done with little effort on the 3 wire handle. Also pick a good day with very little wind for the first flight. Taxi the plane two or three laps to make sure the tail wheel is set correctly, because without tension on these lines at slow speed engine control, you will get in trouble. Now fly it!

**RADIO CONTROL:**

Take out the U/C plate and remove the line guide on the wing. Install the R/C throttle push rod. Install the receiver. Set up all servos and adjust the rudder and tail wheel to neutral. Balance the plane as shown on the plan. Again make sure of the engine high speed and idle adjustment. Try it on a good day with little wind. Run some medium speed ground tests to get the feel of the rudder and how quickly the tail comes up. The tail has to come up before flying speed is reached. Now fly it. I live just outside of Aspen, Colorado, and our flying field is at 7500' elevation, so take-offs and landings are hot.