

# INDICATOR

## Building Instructions

The original Indicator was designed by Jim Haught, managing editor of Model Aviation Magazine. Because of manufacturing techniques and economic considerations, we had to make slight changes along the way however, maintaining the integrity of Jim's design as much as possible.

The Indicator is an all balsa, built up 1/2A trainer that is exciting to see in flight. It is a gentle, forgiving airplane for the beginner without the expense of one of those fancy high priced trainers. It is designed expressly for the beginner teaching him/her to build and fly, and take pride in what he/she has done and can accomplish. We have tried to make the instructions and plans as clear as possible. Please look them over before starting your Indicator. Become familiar with what you are going to do before you start gluing things together. It will ensure a better end product.

The construction overview on each of the major assemblies will give you the over all details if you don't want to take the time to read the step by step. However, the step by step does have some important details. If you are a beginner read all the step by step instructions. An experienced builder should have no trouble with construction.

### GENERAL NOTES

The following is a list of tools and materials required to build the Indicator up to the point of covering and finishing: Building board, wax paper, single edge razor or number X-Acto knife and holder, straight pins, Glue (white glue, Titebond or Elmer's Carpenter Glue which is cheaper but will take longer to cure) or Cynoacrylate adhesive, (CA) (which is more expensive but will allow you to build faster.), use both adhesives sparingly, 5 min. epoxy, and 100 grit , 220 grit sandpaper with sanding block and stick, a small square, razor plane, razor saw, and a pencil for marking.

If you don't have a building board, we suggest you purchase a 2' x 4' ceiling tile at one of the home builder's store. You can then cut it to a size to accommodate your needs or leave it as purchased. Be sure to lay it on a flat surface when building.

There are many CA's available on the market We recommend Posi-Cure, medium viscosity cynoacrylate and kicker, available from Sheldon's Hobbies, 2135 Old Oakland Rd., San Jose, CA 95131. phone 408-943-0872. Check with you local Hobby Shop for it and others.

All of the parts on the sheet wood are laser cut. They are very easy to remove by cutting the micro-joints that retain them. Do not try to pop them out but instead cut each micro-joint until the part falls free. In very few cases the laser may not have cut all the way through. Simply free the part by cutting over the line with a razor or X-Acto knife. Lightly scrape the surfaces that are mated (to be glued) with a razor or fine sandpaper to remove the charred dust.

## TAIL CONSTRUCTION

### *Construction Overview*

*The elevator parts are pinned down on the plans and joined with a 1/8" dowel using epoxy. The stab trailing edge is pinned down, S1, and both S2's are pinned down and glued in place. The leading edge is fitted at the center, pinned down and glued completing the perimeter of the stab. Vertical and diagonal bracing are added to complete the stab. The fin is constructed in the same way.*

1. Let's start with something simple like the elevator and stab. Assuming you have a board to build on and the necessary tools, as described above, begin by organizing the parts as shown on the plans. **S1, S2, S3, S4, S5, and E1**. Locate the **1/8" x 1/4" x 24"** leading edge stick. Now find the **1/8" x 1/2" x 24"** trailing edge stick, the two **1/16" x 1/8" x 18"** vertical and diagonal bracing sticks and the **1/8" x 6"** wood dowel joiner. A portion of each stick will be used on the fin. We have allowed sufficient material however, measure carefully and make good fitting glue joints.

(picture no. 1)

2. Spread the plans out on the building board. Place a piece of wax paper over the stab and elevator details. Pin down both the **E1** elevators noting careful alignment. Cut the **1/8" dowel** to the length shown on the plans. Using a small amount of 5 min. epoxy, glue the dowel in place. Make sure it is down against the board and back into the notches. Use two pins to brace it in place.

(picture no. 2)

3. Cut the **1/8" x 1/2"** trailing edge stick to length slightly longer than shown on the plans and pin down to the board. Locate **S1** and the two **S2's** and glue in place where located on the plans. Pin them down flat. Next, cut the **1/8" x 1/4"** leading edge to length, fit at the center line and glue in place. The perimeter of the stab is now complete.

(picture no. 3)

4. Carefully cut and fit the vertical and diagonal braces from the **1/16" x 1/8"** stick. Make good tight joints. Good tight fits promote stronger glue joints. Now trim off the ends of the stab flush with **S2**.

(picture no. 4)

4. Build the fin using **S3, S4**, and the rest of the **1/16" x 1/8"**, **1/8" x 1/4"**, **1/8" x 1/2"** left over from the stab construction. Follow the steps as described above using wax paper and pinning down the parts to the board.

(picture no. 5)

5. The tail section is now complete. Put aside for final sanding and covering. We'll talk about that later.

## WING CONSTRUCTION

### *Construction Overview*

*The main spar is pinned down over the plans on one wing panel. Ribs R11 through R4 are glued to the spar. The trailing edge sheet is positioned under the ribs and glued in place. Ribs R1, R1A, R2, R2A, R3, and R3A are glued in place with a 1/16" thick shim near the leading edge. R1, and R1A are set at a 95 degree angle with the gage provided. The leading edge, top spar, and top trailing edge sheet is added. The root end of the wing is sheeted over the three end ribs on the top side. The bottom side is sheeted in the same manner leaving the sheeting off the ahead of the main spar. The wing tip is squared off and T1 added. Build the other wing panel. D1, dihedral brace is fitted into both wing slots. The wings are joined using epoxy. Center section sheeting is added ahead of the main spar.*

(picture 1)

1. Building the wing is very straight forward. Spread the plans out over the building board and lay down wax paper over the panel you decide to start with. Locate one of the **1/4" sq. spars** and pin it down over the plans. Make sure it is straight by aligning one edge along one side of the spar drawn on the plans. Now organize the rest of the parts, one set of wing ribs **R11** through **R1**, the **1/4" x 1/2" leading edge**, the other **1/4" sq. spar**, the **two 1/16" x 1" trailing edge** sheets, and **T1**, the wing tip.

(picture 2)

2. Began by gluing **R11**, the tip rib, in first and work towards the wing root. Use a small block, that is square, to maintain perpendicularly as you glue in each rib. Or, you may use the **square end of the dihedral gage** furnished. Do not glue in the three end ribs at this time. Locate one **1/16" x 1"** trailing edge sheet and slide it under the ribs and into the notches as shown. Align and pin down each rib end to make good contact with the trailing edge sheet. Now apply glue to all the rib ends. Note: If you decide to use white glue, a small syringe will allow easier placement and better control over the quantity of glue used.

(picture 3)

3. Glue in **R3A, R2A**. The forward end of each rib notch should rest on the spar. When aligned, glue and pin in place. Find a scrap piece of **1/16" sheet** ( there should be some available from the rib sheet) and pin down near the leading edge. This will shim the ribs in position until the leading edge is glued in place. Now glue in **R3** and **R2**. **Be careful not to get excessive glue between the ribs and on the spar.** The dihedral brace, **D1** must be able to slide between the ribs and spars. Finally glue in **R1A** and **R1**. Align using the dihedral gage. Keep each rib in line with each other and flush with the end line on the plans. The gage tips the top of the ribs back 5 degrees.

picture 4)

4. Apply glue to the nose of each rib and pin down the **1/4" x 1/2" leading edge** in place. likewise, apply glue to the notches in the ribs and insert the **1/4" sq. spar**. Finally, glue on the **1/16" x 1" top sheet** of the trailing edge. The ends can be trimmed later.

(picture 5)

5. Next, cover the three root ribs on the top side of the wing with **1/16" sheet**. Locate one of the **1/16" x 3"** sheets and cut four 3" lengths from it. Make sure the ends are square. Glue one against the spar and flush with **R3**. Hold it in place with pins. Next, using a full piece, trim off, fit, and glue it in the area left at the trailing edge. Save the scrap piece to be used on the other side. With a whole piece, trim, fit and glue in between the spar and leading edge. Hold it in place until the glue is cured with pins.

(picture 6)

6. Turn the wing over and sheet the bottom of the center section using a whole piece against the wing spar. Fill in the rest near the trailing edge with the scrap piece left over from the top side. Do not sheet the forward section until the wing panels are joined. Trim off the ends pieces at the wing tip and sand them flush with the rib, **R11**. Glue on **T1**, aligning it with the end rib. Trim off the end pieces at the root ribs and sand flush with **R1A** and **R1**. **Note: these ribs have been tilted in 5 degrees at the top.** The angle must be accurate to accommodate the dihedral brace **D1**. **Do it carefully.** Now build the other wing panel as described in steps 1 through 6. **Take care not to build two wing panels the same. You will need a LH and a RH.**

(picture 7)

7. Locate **D1**, the dihedral brace. It will slide into the space left between the three root ribs, up to **R4**, between the spars on each wing panel. Assuming you were not sloppy with the glue, when attaching the ribs to the spars, **D1** will fit very snug. The sheeting was left off the forward section on the bottom of each panel to help you fit **D1**. It will be necessary to sand the edges, top and bottom, to dry fit it. Fit it on both wing panels. **Do not glue the panels together at this time.**

Once **D1** will slide in each wing slot easily, Dry fit it in one wing panel. Now slip on the other wing panel and check to see how the panels mate. It may be necessary to remove some material from each end of **D1** before the wing panels will meet. It may also be necessary to correct the rib angle on each panel to assure a good close fit.

Before mating the panels it is a good idea to do some more work on them while they are apart. Note the lower trailing edge sheet extends beyond the upper sheet. Plane the lower edge flush with the upper. A small razor plane, properly adjusted, will do just fine here. Then, use a long sanding stick to sand it straight. Now do the other panel.

The leading edge must be shaped to an airfoil configuration. Look at **T1** on the wing tip and the side view on the plans. It will give you an idea how the leading edge should be

shaped. Here again use the razor plane and take off as much wood as possible maintaining the shape at the tip. **Care must be taken not to break any of the ribs when shaping.** Use a long sanding stick to sand the entire leading edge straight. Now do the other panel.

Mix up some 5 min. epoxy. Spread some on the edges on one side of **D1** only. Insert **D1** into one of the panels. Next, spread a film of epoxy (don't overdo it) on the end root rib of the panel and on the edges of **D1** protruding. Insert this in the other panel and press firmly together. **Align the two panels and pin to hold in place.** A small clamp may be used to hold the two **R1's** together, on the bottom side.

(picture 8)

8. Once the epoxy has cured, the rest of the center section sheeting can be installed. Using the **1/16" x 3"** sheet, cut off two pieces 3" long. Make sure the ends are square. Cut, fit, and glue these pieces in place to finish the sheeting.

(picture 9)

9. Rough sand the entire wing preparing it for final sanding and covering. It is a good idea to check over all the glue joints. You may have missed some and now is a good time to do it.

## FUSELAGE CONSTRUCTION

### *Construction Overview*

*The forward and aft section of the fuselage sides can be joined with either CA or epoxy. Former F2 and F3 are glued in one side and set square and perpendicular. The other side is glued to former's F2 and F3. The fuselage sides are scored on the aft edge of F3 and the forward edge of F2. The fuselage is then pinned down to the top view on the plans to assure symmetry and the tail end is pulled together with F6 installed. Former's F4 and F5 are installed. 3/16" sq. wing seat framing is added to the center section of the fuselage. The fuselage is turned over and Lg1 and B1 are glued in place. 1/16" sheeting is installed from Lg1 to the tail. F1 firewall and H1 are glued in place. The tail skid assembly is made up and installed. The rudder and elevator push rods are then glued in place positioning B2 and B3 supports. 1/4" tri-stock is added to F1 and LG1 on the inside for reinforcement. 1/16" sheet is added to the top, aft of the wing. H2 hatch cover is made up with the retaining tongue*

(picture 1)

1. Organize the parts necessary to build the fuselage. The laser cut parts are: **FS1A, FS1B, F1, F2, F3, F4, F5, F6, LG1, B1, B2, B3, H1, H2.** You will also need, **1/16" x 3" x 24" sheet, 3/16" sq. x 24"** and a short piece of **1/4" sq.** for the tail post.

(picture 2 )

2. Begin by joining the fuselage sides, **FS1A** and **FS1B**, together using either CA or epoxy. Epoxy will give you more time for alignment. Lay down a small piece of wax paper on the building board. Scrape the mating surfaces to be joined with a razor to get rid of the charred dust. Apply 5 minute epoxy to the mating surfaces and push together. Pin them down to hold them in place until the epoxy cures.

(Picture 3)

3. Locate former's **F2** and **F3**, scrape the mating edges, and glue each into the slot provided for it. Install with the former number up. **Use a square on both former's to ensure perpendicularly with the side.** This is an important step so do it carefully. Next, install a **3/16" sq.** wing seat between the former's using CA.

(picture 4)

4. Next, carefully glue on the other side. Use the square again and check the former's to be sure they are square. When cured, cut and fit in the rest of the **3/16" sq.** balsa on the wing seat. The servo rails are installed next. Locate the **1/4" sq. x 6"** hardwood stick. Push one end of the stick through the forward square hole until flush with the opposite side. Mark and cut off. Now cut another the same length. You will note the aft hole is larger than necessary. If you intend to use standard servos, glue the rail to the back side of the hole. If you intend to use mini servos, glue the rail to the forward edge of the hole. Don't worry about the open hole. It will be hid by the covering.

(picture 5)

5. Next, it is necessary to score the fuselage sides. for a sharp bend. The idea here is to promote a sharp break in the sides front and back between the center section. Using a square draw a line on each side along the aft edge of **F3** and the forward edge of **F2**. **With a razor saw, cut approx. 1/3 way into the side on each line.** Now bend the side inward until you hear the balsa cracking. **Bo not break it off!** Take care at this point because you can overdo it. Next pin the fuselage down to the plans over the top view. Support the tail end with a block. Bring the two sides together and glue in **F6**. Sight down the tail end to make sure of symmetry with the plans. Bulkheads **F4** and **F5** can be installed at this time. Slip them in the slots provided and glue in place. Now, re-glue the scored lines on either side of the fuselage.

(picture 6)

6. Turn the fuselage over and glue in **LG1**. Pin **B1** in place with the back edge squarely against **LG1**. Now bring the sides together adding more pins toward the front. Slip **F1** between the sides, to gage the distance required, using tape to hold it in place. Remove **B1**, apply glue to the edges, and re-pin back in place. **Do not glue F1 in at this time.**

(picture 7)

7. Complete the bottom of the fuselage by adding pieces of **1/16" sheet balsa** cross grain. Measure each piece, cut and lay them edge to edge to the tail. Now glue them in place and hold each down with pins or masking tape. Do not glue in the last little piece at the very end. When cured, sand off flush with the fuselage sides.

(picture 8)

8. Locate Former **F1** and **H2**. Mix up some 5 minute epoxy and glue in the **F1** firewall. Note: The holes in **F1** are for mounting The Cox Killer Bee engine, as shown on the plans. If you intend to use a different engine, provisions for mounting it are easier to do before installing **F1**. With the left over epoxy install **H2** flush with the forward edge of **F1**. Pin or tape in place. Next, install the **3/16" sq.** cross braces ahead of **F2** and aft of **F3**. Do not let them interfere with the wing dowel holes. Use CA or white glue.

(picture 9)

9. Install the provisions for the tail skid. Find a scrap piece of **1/4" sq. balsa**. Cut length to fit flush with top and bottom of fuselage side at tail end. Now drill a **1/8"** hole down through the middle of the **1/4" sq.** piece. Cut off a piece of yellow push rod sheath (as used in step 11) the length of the **1/4" sq.** tail post and CA into hole. The tail skid is made from a piece of 2-56 push rod (Du-Bro no. 172). Cut approx. **3/16"** from the threaded end and form the skid as shown on the plans. Now epoxy the tail post assembly in place against **F6**. When cured, finish sheeting the bottom with a small piece of **1/16"** sheet. The location of the tail skid hole can be located from the top side by running a **1/16"** drill bit down through the hole in the tail post.

(picture 10)

10. Locate the **1/4" x 18" tri-stock**. Cut off four pieces, as shown on the plans, to reinforce the **F1** firewall on either side and **LG1** landing gear mount on both sides.. Use epoxy and pin in place. When cured drill out the landing gear dowel retainers with a **3/16"** drill bit.

(picture 11)

11. Installing the rudder and elevator pushrods is an easy task once we have shown you how. Temporarily mount the servos on the rails with the output wheels and E-Z connectors installed using the holes in **B2** brace to gage the space needed between the connectors. Looking at the aft end of the fuselage at **F5**, note the **1/8"** wide slots on either side. The forward and aft edges of these slots must be tapered so that the push rod outer sheath can pass through at a shallower angle. Use a round **1/8"** diameter file or long drill bit to accomplish this.

We recommend, and have shown on the plans, pushrods using Sullivan's flexible cable type #514. All the parts necessary to build each push rod, including the clevis, are included. Begin by cutting two lengths of the yellow outer sheath **15-1/2"** long. Cut two lengths of the cable **20"** long. Cutting the cable can best be done with a Dremel cut-off wheel while holding the cable in a vise. Be careful and wear eye protection.

Insert the outer sheath through the slot at **F4** up to **F3**. Note how the sheathing crosses over to the opposite side. Locate **B3** and thread both sheath's through the **1/8"** holes.

Pull both sheathing up to **F2** and thread them through the 1/8" holes in **B2**. Now pull them approximately 1-3/8" beyond **F2**. Install a cable in each sheath and through the E-Z connector on each servo wheel. Once accomplished, adjust **B2** and **B3** on each former so the sheathing falls in a gentle slope toward the exit at **F5**. When satisfied, CA the **B2**, **B3** and sheathing in place. Also CA the sheathing where it crosses over near the tail. Remove the cables and servos until final assembly.

(picture 12)

12. With the pushrods installed, sheet the top with **1/16" sheet** as you did on the bottom side. Start at the wing trailing edge position and work toward the back. Temporarily pin on the stab. Fit the last piece of sheeting, to be installed, with the stab leading edge.

(picture 13)

13. Locate **H1** and **H3** the hatch cover and tab. Glue on the tab, **H3**, as shown on the plans. This is used to retain the hatch cover at the forward end. A small rubber band can be used to retain it at the wing leading edge making it easy to remove.

14. Locate the **3/16" x 16" dowel** and cut of four pieces **3-5/8" long**. Round all the ends slightly to eliminate the sharp edges. Trial fit them in the holes but do not glue them in until the fuselage covering is complete. This completes the fuselage construction.

## **SANDING AND COVERING**

Now that all the major assemblies have been constructed, it's time to get them ready for covering. They say a covering job is no better than the structure under it, and it's true. If you have lumps and bumps in the airframe, they will show through. So spend a little time here.

We recommend using 100 grit for rough sanding and 220 for finish sanding. Make sure the sandpaper is mounted securely to the block and sand the flat pieces like the stab, elevator, fin, and rudder. Round off the edges and make them smooth. The fuselage can also be sanded because of its flat surfaces. Use a tack rag to get rid of all the dust before covering.

The wing will be a little harder to sand. Here we recommend a long sanding stick to true up the leading and trailing edges to keep them straight and smooth. Pay special attention when sanding near the ribs. **They are fragile and easily broken.** If broken, glue them back together with thin CA.

In the interest of keeping the model as light as possible, we recommend covering the entire model with any of the popular film iron-on coverings available at most hobby shops. Apply the covering in accordance with the manufacturers instruction, included with the covering. Practice on a small piece first, and then develop a technique you feel most comfortable with to get the best results. Take your time.

## LANDING GEAR ASSY ASSEMBLY

(picture 14)

1. The landing gear is pre-formed and ready to be rubber banded on to the fuselage. However the wheels need to be installed on each strut. Using a #4 x 3/4 bolt, pass it through the axle hole in the wheel. Install a #4 hex nut on the opposite side. Insert the bolt/wheel assembly into the hole in the strut and install a nut. Hold the nut on the outside of the strut (next to the wheel) while tightening the nut on the inside. A drop of thin CA on the nut will keep it from turning off. Now install the other wheel as described above.
2. Although the landing gear on the Indicator is functional, most of the time the airplane will be hand launched. Unless you have a smooth hard surface it will not ROG (rise off the ground) in high grass.

## FINAL ASSEMBLY

(picture 15)

1. Once the covering is complete it is time to put things together. First mount the control horns on the elevator and rudder using the hardware supplied with them. Note how the rudder control horn is modified to allow maximum travel. The plastic can be easily cut with a blade or jig saw to shape it as shown. Mount them where shown on the plans.
2. Next, you will need to hinge the control surfaces (rudder and elevator). There are several types of hinges available however we recommend using hinges made from the film covering material. You have the material on hand to make them, so why not.

Cut 1/2" squares of covering the same color as used on the tail surfaces. Taking two squares, with the glue sides facing each other, overlap each about 3/32" and iron them together. You now have one hinge. It will take 18 of these to hinge the tail surfaces.

Iron on the hinges on one surface only by starting at one end and alternating sides as each is ironed on. It takes two hinge assemblies to make one hinge at one location. Make sure the joint falls at the surface thickness along the hinge line. Take your time and work carefully.

It is now time to join the surfaces. Example: joining the elevator to the stab. Assuming you installed the hinges on the elevator, align it with the stab and tape in place making sure the hinge flaps are in proper orientation. That is; the hinge flaps on the top side of the elevator iron to the bottom of the stab. The hinge flaps on the bottom side of the elevator iron to the top side of the stab. Space the hinges as shown on the plans.

3. Measure the stab overall length finding the center. Draw a center line perpendicular to the stab trailing edge at the center of the stab. Offset a line 1/16" on either side of the center line. Now carefully cut away the covering with a sharp blade inside the two lines. Apply glue to the bottom edge of the fin and position it on the bare spot making sure it is square with the stab and the base is perpendicular to the trailing edge.

4. Temporarily pin the tail to the fuselage making sure of alignment. Turning the fuselage over trace the configuration of the fuselage tail end on the stab. Remove the tail and cut away the covering between the two lines. Apply glue to the fuselage top sides edges and pin tail in place. Check alignment by pinning a straight piece of wood to the wing seat or by setting the fuselage on a flat surface and measuring equal distance to each tip.

5. Locate the push rod cable you cut off. (fuselage construction, step 11, second paragraph). Low temperature solder a 2-56 coupler on the end of each cable. Screw a clevis on the end of the coupler of each cable. About half way on to the threads is fine. Install the two servos back on the rails. Insert both cables into the sheathing, for rudder and elevator, and up to and through the E-Z connector on the servo wheels. Hookup both clevis to their respective control horns. With the battery connected to the receiver, plug in both servos, center the trim levers to center the servos. Move the control surfaces to neutral and tighten the screws on the E-Z connectors. Trim off the excess cable. Any further adjustment can be made at the E-Z connectors on the servo wheels.

6. Wrap the radio receiver in foam to protect it from vibration and crash damage. Locate the receiver switch on the side just aft of **F2**. Preferably down low to allow as much room as possible for the receiver. Wrap the batteries in foam and place them just aft of the fuel tank but ahead of **F2**.

(picture 16)

7. Assemble the fuel tank (not supplied with kit) as called for in the manufacturers instructions. You will need one line to the carburetor. and one for the tank vent. Route the carburetor line through the hole in the front of the firewall turning down and looping upward into the carburetor fitting. A short vent line can be routed through the opposite hole provided in **F2**. The fuel tank can be filled by removing the fuel line from the carburetor. Use this line to fill the tank until it overflows through the vent line. Mount the engine with four #4 screws in the holes provided for it.

## **FLYING THE INDICATOR**

Now that your Indicator is ready to fly it's time to check over some things to ensure some longevity in your model.

1. Attach the wing with rubber bands. No more than six #64 size rubber bands are required. You want the wing to be held firmly in place yet, not so firm that it will not come off or slide in case of a crash. So, don't pile on the rubber bands. Do not re-use old rubber bands.

2. Check the center of gravity (CG) balance again. A tail heavy airplane is very unstable and hard to control. A sure way to crash in the hands of an inexperienced pilot. A nose heavy condition is easier to control.

3. Check the control surface travel. Make sure it is as stated on the plans. This is a good starting place.

4. Run the engine and become acquainted with its starting characteristics. Little 1/2A engines can be difficult to start. It is good advice to follow the manufacturers starting instructions. When reaching the flying field you want to be ready.
5. Give the radio a good range check to be sure it is functioning properly. This is very important.
6. Check all the control clevis and hardware to be sure they are secure. After spending all this time building you don't want to loose your airplane because a simple little fitting wasn't secured.
7. When launching the Indicator, **make sure the airborne radio is turned on.** This is easy to do in your excited condition to fly. It has been done, many times.
8. Hopefully by now you are ready. But not just yet. **If you are inexperienced seek help from someone you know who has flown and you can trust.** It's not quite that easy. First time pilots have a tendency to over control and can get into trouble quickly. Don't let your first flight be a disappointment. We know you will be thrilled with your first flight and hope that it was most successful. From now on - Happy Fly'in!

### **Material List for Indicator**

#### **Wing**

- (2) 1/4" x 1/2" x 24" balsa (leading edge)
- (4) 1/4" sq. x 24" balsa (spars)
- (4) 1/16" x 1" x 24" sheet (trailing edge)
- (2) 1/16" x 3" x 24" sheet (center sec. sheeting and fuselage sheeting)
- (1) 1/16 X 3" X 12" sheet ( more fuselage sheeting)
- (2) T1 laser cut (wing tips)
- (2) sheet #2 laser cut (ribs)
- (1) sheet #3 laser cut (ribs)
- (1) D1 laser cut (dihedral brace)

#### **Tail**

- (1) S1 laser cut
- (2) S2 laser cut
- (2) S3 laser cut
- (1) S4 laser cut
- (1) S5 laser cut
- (1) 1/8" x 1/4" x 24" balsa (stab and fin leading edge)

- (1) 1/8 x 1/2" x 24" balsa (stab and fin trailing edge)
- (2) 1/16" x 1/8" x 18" balsa (stab and fin ribs)
- (1) 1/8" dowel x 6" (elevator joiner)

## **FUSELAGE**

- (2) FS1A laser cut (forward fuselage side)
- (2) FS1B laser cut (aft fuselage side)
- (1) F1 laser cut (1/8" ply firewall)
- (1) F2 laser cut (bulkhead)
- (1) F3 laser cut (bulkhead)
- (1) F4 laser cut (bulkhead)
- (1) F5 laser cut (bulkhead)
- (1) F6 laser cut (bulkhead)
- (1) H1 laser cut (forward hatch)
- (1) H2 laser cut (top nose piece)
- (1) H3 laser cut (laser cut (hatch tab)
- (1) B1 laser cut ( forward bottom)
- (1) B2 laser cut (pushrod support)
- (1) B3 laser cut (pushrod support)
- (1) LG1 laser cut 1/8" ply (landing gear support)
- (1) 3/16" sq. x 24" balsa (wing seat and cross braces)
- (1) 1/4" tri-stock x 18" (firewall, landing gear, and fin support)
- (1) 3/16" dowel x 16" (wing and landing gear retainer)
- (1) 1/4" sq. hardwood x 6" (servo rails)

## **MATERIAL AND HARDWARE NEEDED TO COMPLETE THE INDICATOR**

1. Standard radio with 500 mah battery pack
2. Engine: .049 - .051 cu./in. (original used Cox Killer Bee)
3. Prop: 6 x 3 gray thimble drone (for best performance)
4. Covering/trim: One roll (iron on film covering)
5. Fuel Tank: Sullivan 1oz #SS-1
6. Fuel line: One foot of medium size
7. Engine mounting: four #4 x 1/2" screws or Du-Bro no. #126 mtg. bolt set
8. Control horn: Du-Bro # 107
9. Hinges: film covering per instructions or Du-Bro #537 Kwik Hinge
10. pushrods: Sullivan #508 Flexible Cable
11. Wheel axles: (2) #4 x 3/4" bolt with 2-hex nuts
12. Wheels: Du-Bro # 1.75L
13. Wing saddle: Du-Bro #163 Tape ( one-pack)