

FUSELAGE CONSTRUCTION:

THE FUSELAGE BOTTOM AND FUSELAGE FORMERS ARE DIE-CUT. CAREFULLY POSITION EACH FORMER AS SHOWN IN THE SIDE AND TOP VIEWS, AND CEMENT EACH IN PLACE.

STEP 1

NOTE THAT THE DIE-CUT BOTTOM EXTENDS ONLY AS FAR AS THE FORMER LOCATED AT THE ROTOR MAST.

STEP 2

THE ROTOR MAST MUST NOW BE ASSEMBLED AS DETAILED IN THE EXPLODED SKETCH ON THE MAIN PLAN. SOLDER TOGETHER AS INSTRUCTED ON PLAN.

STEP 3

ATTACH THE ROTOR MAST ASSEMBLY TO THE 1/8" DIE-CUT SHEET ROTOR MAST BRACE AS DETAILED, AND CEMENT IN FORMER SLOT.

STEP 4

THE FUSELAGE SIDES ARE DIE-CUT. CEMENT THE 1/8" DIE-CUT SHEET NOSE REINFORCEMENTS IN PLACE, WITH ONE FACE FLUSH WITH THE 1/20" DIE-CUT FUSELAGE SIDES. MAKE ONE RIGHT AND ONE LEFT.

STEP 5

BEVEL THE EDGES OF THE SHEET SIDES SLIGHTLY, TO COMPENSATE FOR THE TRIANGULAR CROSS-SECTION. THE CROSS-SECTIONAL VIEWS WILL GIVE YOU THE PROPER ANGLE. USE SPECIAL CARE WHEN YOU BEVEL THE EDGES AROUND THE ROTOR MAST BRACE.

STEP 6

THE FUSELAGE SIDES ARE NOW CEMENTED IN PLACE. IT IS ADVISABLE TO CEMENT BOTH SIDES IN PLACE AT THE SAME TIME, TO PREVENT STRUCTURE FROM WARPING.

STEP 7

THE DROGUE TAIL PARTS ARE DIE-CUT OF COURSE, AND SHOULD BE ASSEMBLED AT THIS TIME. SEE SIDE AND TOP FUSELAGE PLAN VIEWS. CEMENT IT IN PLACE, ALIGNING CAREFULLY FROM THE FRONT.

STEP 8

WAIT UNTIL THE STRUCTURE IS THOROUGHLY DRY BEFORE THE REMAINING TWO FORMERS ARE INSERTED. NOTE THAT THE CABIN FORMER IS IN TWO SECTIONS, THE SMALLER OF WHICH IS INSTALLED AFTER THE GEAR WIRE IS IN PLACE. A PIECE OF 1/20" SHEETING IS INCLUDED FOR THE CROSS-GRAINED FORWARD BOTTOM PLANKING. TRIM OFF EXCESS AFTER IT HAS BEEN CEMENTED IN PLACE. THIS WILL GIVE YOU THE NEATEST JOB. IF THE SHEET FEELS A LITTLE STIFF, MOISTEN SLIGHTLY TO NEGOTIATE CURVATURE.

STEP 9

PIERCE THE 1/8" SHEET NOSE REINFORCEMENTS WITH THE LANDING GEAR WIRE, AND CEMENT IT TO THE BASE OF THE CABIN FORMER, THEREBY WEDGING THE GEAR IN PLACE. NOW CEMENT THE TWO DIE-CUT BALSA RECTANGLES WHICH MEASURE 1/2" X 1-1/2" ON EITHER SIDE OF THE CABIN FORMER, SANDWICHING THE GEAR WIRE. SEE CROSS-SECTIONAL VIEW.

STEP 10

THE RATAN STRIPS ARE INCLUDED TO REINFORCE THE CELLULOID JOINT. INSTALL IT AS SHOWN, OR CEMENT IT TO THE DIE-CUT CELLULOID BEFORE INSTALLATION IF YOU PREFER. THERE IS A SLIGHT ALLOWANCE FOR TRIMMING ON THE CELLULOID. OVERLAP 1/8" ON BALSA.

ROTOR SUPPORT ARM INSTALLATION

ROTOR HEAD CAP AS VIEWED FROM UNDERNEATH.

VENT

ENGINE MOUNTING HOLES

FUEL LINE HOLE

REMOVE FUEL LINE FROM ROTOR HEAD CAP TO FILL TANK. THIS WILL PREVENT FUEL FROM BEING THROWN FROM THE TANK AS IT ROTATES.

ROTOR SUPPORT ARM RETAINING WASHER IS STAMPED TO PREVENT ROTOR SUPPORT ARM MOVEMENT.

SLIP SPEED NUT IN PLACE OVER ROTOR SUPPORT ARM RETAINING WASHER.

FIXED PITCH BLADE

BALANCED PIVOTING ROTOR BLADE

.049 CUB INSTALLATION

TANK FUEL-LINE AND FILLER

BEND THE ROTOR SUPPORT ARMS UPWARD SLIGHTLY TO ADD A LITTLE DIHEDRAL TO THE ROTOR BLADES.

NOTE ONLY THESE TWO ROTOR SUPPORT ARMS HAVE SOLDER COILS.

ROTOR LAYOUT

IF UNDUE VIBRATION IS DETECTED AND EVERYTHING SEEMS TO BE IN PROPER ALIGNMENT, ADD OR SUBTRACT A LITTLE SOLDER. THE EXACT AMOUNT IS NOT CRITICAL AS ROTATIONAL SPEED IS LOW.

.051 ATWOOD INSTALLATION

.045 TO .074 ENGINE

CRANKCASE BACKPLATE OR TANK

ENGINE MOUNTING BOLTS

BLADE RETAINING BOLT

SPEED NUT

ENGINE MOUNTING NUTS

BLADE HOLDER

BLADE RETAINING NUT

BLADE BALANCE POINT

BLADE BALANCE PRESSED INTO ROTOR BLADE.

BLADE BALANCE

TWO BLADE BALANCES ARE INCLUDED. THEY ARE FORMED, BENT AND WEIGHTED READY TO INSTALL. SEE ROTOR DETAIL.

THE BLADE BALANCES SHOULD BE BENT AT THIS ANGLE, AS SEEN FROM THE SIDE.

PRESS BLADE BALANCES TOGETHER TO GRIP WOOD. PRY OPEN TO REMOVE.

ASSEMBLED ROTOR

ROTOR BLADES MAY BE REPLACED ON THE FIELD. BRING ALONG A SPARE IN CASE OF DAMAGE. AS ROTATIONAL SPEED IS VERY LOW, IT IS NOT NECESSARY TO AIRFOIL OR DOPE THEM FOR EMERGENCY USE.

NOTE HOW THE ROTOR SUPPORT ARM ACTS AS A STOP FOR THE ROTOR BLADES WHICH HAVE THE BLADE BALANCES. YOUR ROTOR BLADES SHOULD PIVOT FREELY AND REST AT THIS ANGLE. IN OPERATION, THEY WILL SEEK THEIR OWN PITCH.

BEND BLADE PITCH STOP TO ANGLE INDICATED.

BLADE PITCH

THE ROTOR BLADES WITHOUT THE BLADE BALANCES ARE OF FIXED PITCH. SOLDER BLADE HOLDER TO ROTOR SUPPORT ARM AT BLADE PITCH SHOWN.

IF YOUR MODEL Tries TO NOSE-DOWN TOO MUCH, TAKE A SMALL PIECE OF SHEET AND ADD IT TO THE DROGUE, THEREBY INCREASING DRAG. SHAVE OFF A SMALL PIECE IF IT APPEARS TAIL HEAVY IN FLIGHT.

MAST ASSEMBLY

ROTOR HEAD CAP

ROTOR SUPPORT ARM

BLADE HOLDER BOLT

BLADE HOLDER

1/2" EYELET

PRONGED METAL BRACKET

ROTOR MAST

1/2" EYELET

PRONGED METAL BRACKET

SMALL EYELET

SOLDER TO ROTOR MAST

CROSS SECTIONS

SEC. A

SEC. B

SEC. C

DROGUE TAIL

SLIDE ROTOR HEAD TIGHTLY INTO CAP. SOLDER AT CAP SEAM AND AT MAST HOLE. IT IS NOW A LEAKPROOF FUEL TANK. THE CAP IS VENTED AND DRILLED FOR THE FUEL LINE. FILL TANK THROUGH FUEL LINE OPENING.

NO BLADE BALANCE ON THIS FIXED PITCH BLADE.

IF YOUR ENGINE IS NOT IN THE BEST CONDITION, STAY AWAY FROM COLORED DOPE. A LITTLE TRIM ON A CLEAR DOPE FINISH WILL SAVE A LOT OF WEIGHT AND GIVE YOU MORE RESERVE POWER.

.049 WASP INSTALLATION

BEND ROTOR SUPPORT ARMS SLIGHTLY TO ADD A LITTLE DIHEDRAL. ABOUT 1/4" IS SUFFICIENT.

THE DESCENT ON THE FREE-WHEELING ROTOR IS COMPARABLE TO THAT OF A DETHERMALIZED FREE-FLIGHT. IT WILL LAND VERY GENTLY, YET IT IS NOT IN DANGER OF BEING LOST IN THERMAL WEATHER. THIS IS QUITE AN ADVANTAGE, AS THERE ARE MANY TIMES WHEN IT IS TOO RISKY TO FLY A HOT FREE-FLIGHT, SO A "CLOUD-COPTER" WILL SUPPLEMENT YOUR FLYING ACTIVITY.

RATAN STRIPS REINFORCE CABIN CORNERS

PRESS PRONGED BRACKETS INTO ROTOR MAST BRACE AND COAT WITH CEMENT.

NOTE RATAN CELLULOID REINFORCEMENT. SEE STEP 10 OF FUSELAGE CONSTRUCTION.

SEC. A

SEC. B

SEC. C

CELLULOID

COLORED DOPE CABIN TRIM

BEVEL EDGES OF FUSELAGE SIDE SHEETING TO MAKE NEAT JOINTS AT THESE POSITIONS.

1/2" X 3/16" X 1-1/2" DIE-CUT NOSE CROSS-PIECE

RETAINING WASHERS HOLD WHEELS IN POSITION

IF YOU INSTALL A .074 ENGINE IN YOUR MODEL, HOLD BACK ON THE POWER A BIT FOR TEST FLIGHTS. ALL .049 ENGINES SHOULD BE RUNNING AT TOP SPEED FOR TEST FLIGHTS.

LESS POWER CAN BE USED AFTER YOU HAVE TRIMMED THE MODEL FOR FLIGHT AND GAINED EXPERIENCE IN HANDLING IT. IT WILL HOVER AT ABOUT 2/3 NORMAL .049 POWER.

AS THIS MODEL WILL DESCEND VERTICALLY AFTER THE POWER CUTS, IT IS NOT AT ALL NECESSARY TO HAVE A SMOOTH FLYING FIELD IN THE USUAL SENSE OF THE WORD. FLY IT ANYPLACE WHERE IT IS NOT IN DANGER OF BEING HUNG UP OUT OF REACH.

FUSELAGE SIDE VIEW

CAUTION: AS THIS HELICOPTER WILL TEND TO CLIMB VERTICALLY AND SPIRAL IN SMALL CIRCLES DIRECTLY OVERHEAD IN CALM WEATHER, A VERY LONG MOTOR RUN CAN BE USED TO REACH 1000 FEET ALTITUDE OR MORE, AND STILL LAND ON A FAIRLY SMALL FIELD. FOR THIS REASON WE HAVE MADE THE ROTOR HEAD TANK LARGE IN CAPACITY. LIMIT YOUR FUEL IN BREEZY WEATHER, AND FOR TRIAL FLIGHTS WITH YOUR ENGINE. WITH A HOT ENGINE, AND A FULL TANK, YOU MIGHT GO OUT OF SIGHT UNDER POWER.

FUSELAGE TOP VIEW

USE FUEL PROOF DOPES WHEN FINISHING YOUR MODEL.

BUILDING INSTRUCTIONS:

The CLOUD-COPTER "D" was designed for Berkeley by Roy L. Clough Jr. who is considered as the authority on model helicopters. Mr. Clough has built dozens of successful model helicopters. This model is the simplest of all his designs. In addition, Berkeley has further simplified the design and building by incorporating newly designed fittings and rotor mast.

Begin construction by following the Fuselage Construction steps shown on the opposite side of this plan.

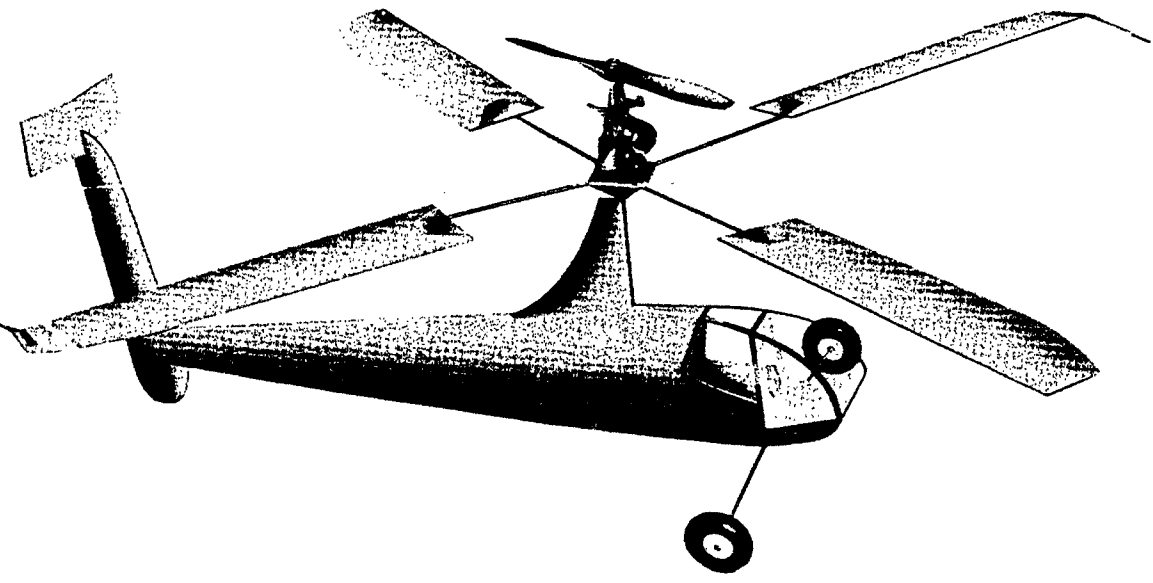
In building the rotor mast, follow the exploded drawing details, making sure that the blade holders are on your rotor support arms before assembly. Be sure to check the engine installation at this point. If you do not use one of the engines shown on the plans, it may be necessary to improvise and modify the rotor mast a bit to fit your engine.

In all cases, when installing different engines, try to keep the center of gravity as low as possible.

The rotor blades are pre-cut to shape and should be installed without any further shaping. Just round off the edges with sandpaper. Install the blade balance loosely on each tip as required and check the balance point. Squeeze tight at the blade with a pliers when the correct balance point is found.

The model should be doped with a fuel-proof clear dope. If color is desired, add aniline dye to the clear dope. Pigmented colored dope adds excessive weight.

Lightly lubricate rotor moving parts with heavy oil or vaseline.



FLYING INSTRUCTIONS:

Your Cloud-Copter "D" should be thoroughly checked over before flying. Make sure all moving parts are thoroughly lubricated, aligned and not binding in any way. Select a calm day for the first flights as you would with a regular free-flight.

The accompanying drawing illustrates propeller and main rotor rotation. Bear in mind that the two pivoting rotor blades seek their own pitch in the air, and therefore cannot function if they're least bit stiff. Likewise, if the rotor mast does not revolve freely, the friction will cause the fuselage to rotate with it in a clockwise direction. Lubricate thoroughly and often.

Measure out the desired amount of fuel, fill your tank, and start your engine in any position you find comfortable. Full power (.049) is advisable for test flights, as errors in trim are less pronounced when the model is in a climbing attitude, rather than hovering.

ROTOR ROTATES IN A CLOCKWISE DIRECTION.

ENGINES' PROPELLER ROTATES COUNTER-CLOCKWISE (NORMAL)

ENGINE (AFFIXED TO ROTOR MAST) ROTATES OPPOSITE TO ITS OWN PROP, THEREBY DRIVING ROTOR.

WHEN THE ENGINE CUTS OUT, THE MAIN ROTOR WILL CONTINUE TO SPIN IN THE SAME DIRECTION. THE MODEL WILL THEN DESCEND ON THE FREE-WHEELING ROTOR.

Hold at shoulder height, nose into wind. Make sure rotor blades are right side up. (Pivoting blades sometimes flip upside down from wind, before they are set in motion. As rotational speed increases, they will automatically right themselves.) Do not launch until rotor is operating at top speed, at which time the model will rise from your hand in vertical or forward flight. Never chuck or toss model into air. R.O.G. unassisted in calm weather only.

Proper alignment and a smooth running engine are a must. If erratic flight is detected start trouble-shooting at this point. Switch fuels, square off prop tips and airfoil rotor blades for peak performance.

These factors alter flight trim and may be used as possible adjustments. C.G. too far forward causes dive, too far aft it causes a stall. Do not alter materially from position shown. Slow R.P.M. to hover, but watch model carefully for need of further trim. Add slight dihedral to vanes or rotor blades if sideslip is detected. Adjust blade pitch of fixed pitch rotor blades to improve climb. Trim blade balances and solder cylinder head ballast. Add a bit of area to drogue if dive is noticed and C.G. is accurate. Reduce if it appears tail heavy. Locate engine as close as possible to main rotor. Do not alter basic fuselage shape.

All this may seem strange, but you will find this model as easy or easier to adjust and fly as any regular free-flight. Damage almost never is more serious than a cracked rotor blade, and they are replaced instantly on the field. Duration is limited by fuel allotment only.

"1/2A" FREE-FLIGHT HELICOPTER

CLOUD COPTER "D"  
with Fixed Drogue Tail  
For .045 to .074 Engines 26" Rotor Span

DESIGNED BY: ROY L. CLOUGH JR.  
DRAWN BY: DON MCGOVERN  
KIT ENGINEERED BY: BILL EFFINGER

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