CLOUD NINER

A neat looking, great flying, .60-.65 powered sport flier with old-timer appeal!

By John Hunton and Bill Winter

Photos by Bernie Stuecker

Designer Bill Winter with the Hunton built Cloud Niner which has flaps as well as flaperons.

CLOUD NINER MK II

Designed By:
William J. Winter
TYPE AIRCRAFT
Sport
WINGSPAN
71 Inches
WING CHORD
13 Inches
TOTAL WING AREA
900 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Partial Flat Bottom
WING PLANFORM
Constant Chord w/Tapered Tips
DIHEDRAL EACH TIP
1 Inch (at break)
OVERALL FUSELAGE LENGTH
49¼ Inches
RADIO COMPARTMENT SIZE
(L) 7⅝" x (W) 3-5/16" x (H) 3½"
STABILIZER SPAN
28 Inches
STABILIZER CHORD (incl. elev.)
7⅞ Inches
STABILIZER AREA
212 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Center of Fuselage
VERTICAL FIN HEIGHT
10 Inches
VERTICAL FIN WIDTH (incl. rud.)
7½ Inches (Avg.)
REC. ENGINE RANGE
.60-.65 (K&B Sporster .65)
FUEL TANK SIZE
10 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
6
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
Flaperon, Split Flap

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa & Spruce
Wt. Ready To Fly	120 Ozs. (7 Lbs. 8 Ozs.)
Wing Loading	19.2 Oz./Sq. Ft.

PART 2

The basic Krackerjac design began with discussions with Hal deBolt back in the early 1950s. These discussions led to two basically similar designs, the deBolt Live Wire series and Winter's Krackerjac. Both have high nose and low rear fuselage side areas to improve inherent turn characteristics. Both designs were kitted in various forms over the years. From the beginning, Bill Winter departed from the typical flat bottom airfoil for better penetration and inverted characteristics. Hal deBolt went full symmetrical in his Over and Under, the first kit capable of 360 degree steering when inverted. The basic Krackerjac has been improved over the years to simplify construction and tweak performance. This latest Krackerjac iteration, the Cloud Niner, adds new dimensions to sport flight with large ailerons which can be drooped (flaperons) for higher lift, and also split flaps for short field take-off and landing capability. Two contemporary products are featured with the design in this article, the economical K&B Sportster .65 for power, and a modern Airtronics expanded capability transmitter.

CONSTRUCTION

(Editors Note: Due to the length of the construction sequence on the Cloud Niner, it is not being reproduced in this article. The complete construction article will be furnished when ordering the full size plans.)

Flying Cloud Niner:

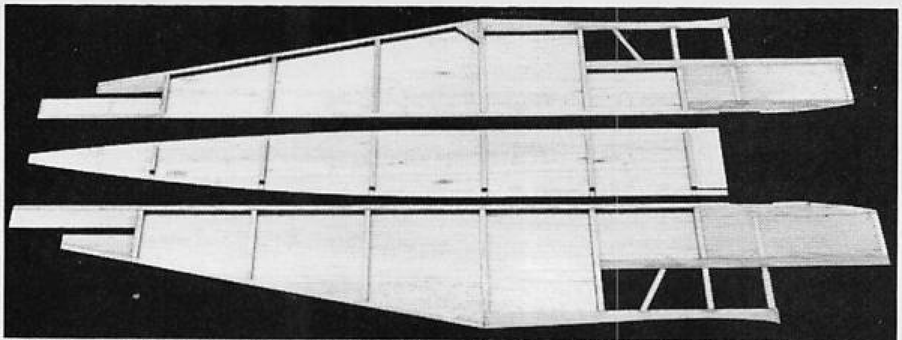
Taking off and landing the Cloud Niner reminds one of the movie "Air America" in which the Pilatus Porter takes off in unimaginably short distances and lands on a postage stamp field. In addition to the pleasure of just experiencing the low speed end of flight with this stall-stable, high lift model, however, are the fun-fly capabilities. A typical timed take-off and landing series goes like this: Take off with full up, turn as soon as you break ground, chop power mid-way on downwind, turn in to land, land on wheels (possible because of good prop clearance) and go again. On the ground, another set-up and you now have flaps that go **up** on command for inverted flight or inverted loops, which count twice the score at Northern Virginia R/C fun-fly events. Don't try this unless you have plenty of altitude. Cloud Niner is a very good, stable platform for the Limbo. All of this and it looks realistic.

There is another way to fly Cloud Niner — Bill Winter's way. Most every weekend we typical RC'ers go out to the field and fly. We fly in an element called air which is full of currents that move in all directions, including upward. To 99% of us these currents are distractions from our intended flight path. To the 1% who care what is going on, like Winter and glider pilots, these currents are there to be explored and used. All of Winter's designs are capable of "soaring" (as are other lightly wing loaded models such as Goldberg's Eagle). The concept is this: Put on half flaps to increase lift and to align the fuselage with the wind at low speeds. Set the throttle to just above idle, enough to fly the Cloud Niner at best

Cloud Niner on the NVRC field with it all hanging out. The drooped ailerons (flaperons) are very effective for getting off quicker and climbing at a steeper angle. In flight, with all flaps down, very short radius loops and turns are possible, and very slow flight velocities. In a breeze it will seemingly just hang there.

Cloud Niner with all flaps cleaned up and ready to go. This should be considered the basic mode for your initial test flights. If you follow the flight test guide given in the article you will do initial flights configured like this, then experiment with flaps later, after you are trimmed out.

Cloud Niner breaking ground (from a standing start) in a few feet with all flaps down. Experiment in the air to get used to trim changes and handling before you try a full-up take-off like this.

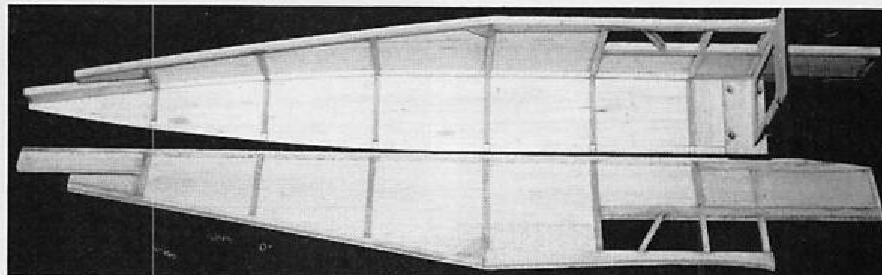


Fuselage sides and bottom are finished as far as possible, including a coat or two of fuelproof dope inside, before assembly. Sheet stock joint should be sanded with a flat sanding block on both sides before assembling the super structure to it.

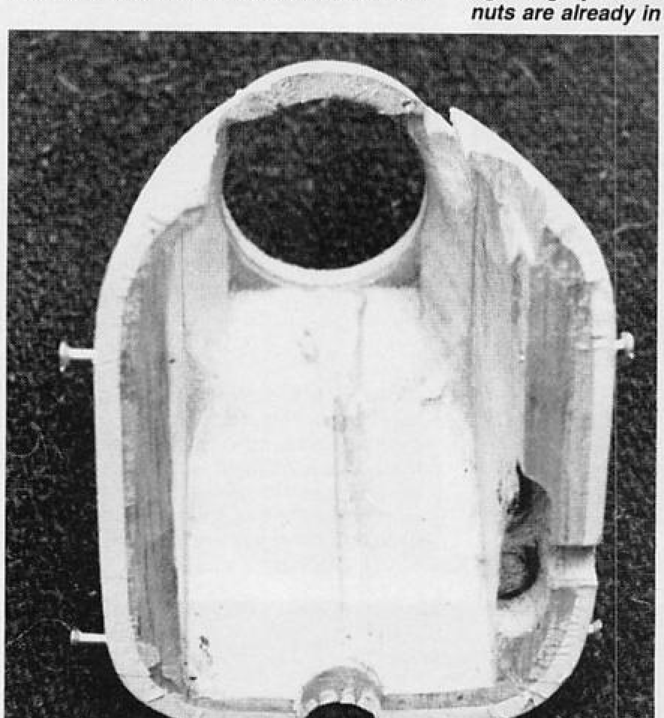
lift to drag ratio (comfortably over stall), and maintain altitude in calm air. Now go look for lift. Winter flies in large, loose circles, trims the model to perfection, then lets it find the lift itself. Bill says that the properly trimmed model will turn into lift by itself, but I think Bill clues on additional fine points and techniques, he has been doing it since the mid-50s.

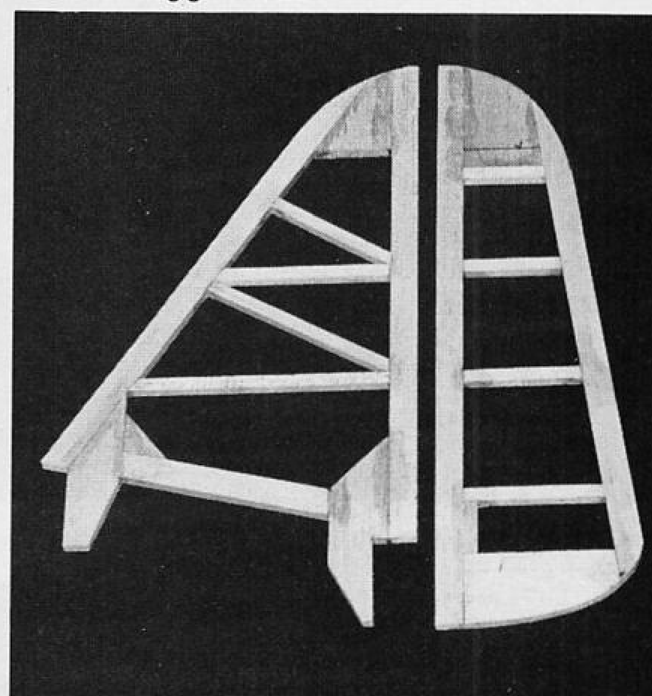
Try it. Sometime you will find a boomer and may even be able to rise to a cloud base. This is a real thrill. Cloud Niner is not a specialized sailplane, but by soaring you can extend a flight to a very long time. You are exploring and using the air. There is an art to thermaling just as there is an art to sailing on the sea. Thermaling effectively is a high form of art, one that takes developed skill and experience to do. The Cloud Niner may be the model to soar with the real thermal experts, the Eagles and the Hawks.

Bill says that the Cloud Niner is just a model with a big wing, an extended low speed range, and it has good aerobatic capabilities. I say that Cloud Niner is a completely honest flier that does things other models cannot do. It does them for me, and it can do them for you.

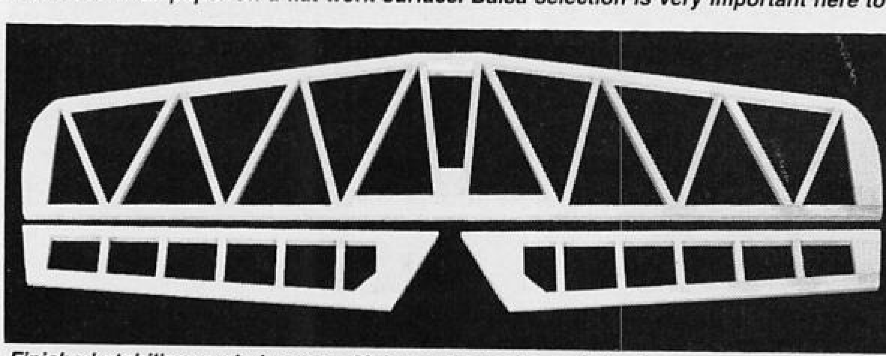


Fuselage sides are assembled to the bottom using the plywood cabin former to insure a right angle joint. Use a small triangle for the rear fuselage alignment. Note that the blind nuts are already in place in the landing gear mount.





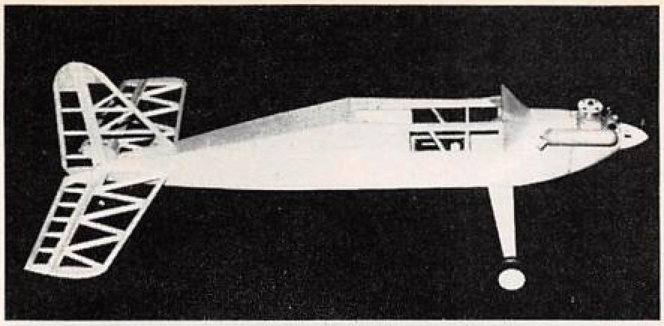
LEFT: Interior of cowling. Not much hollowing required. Unique feature of K&B engine is that the upper cylinder comes completely off making it easy to fit-up cowling. Half round drain hole shown on bottom. RIGHT: Empennage assembly is straightforward. Pin parts down over wax paper on a flat work surface. Balsa selection is very important here to keep suitable strength/weight ratio.

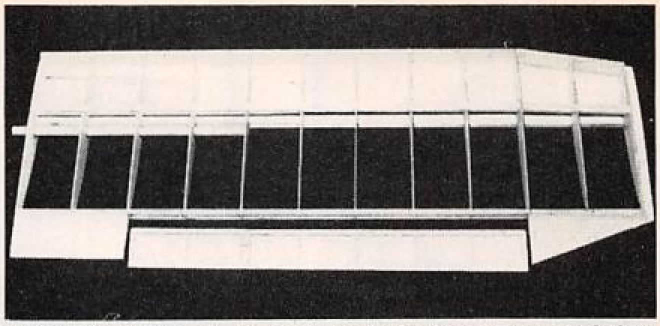


Finished stabilizer and elevators. Main spar must be rock hard.

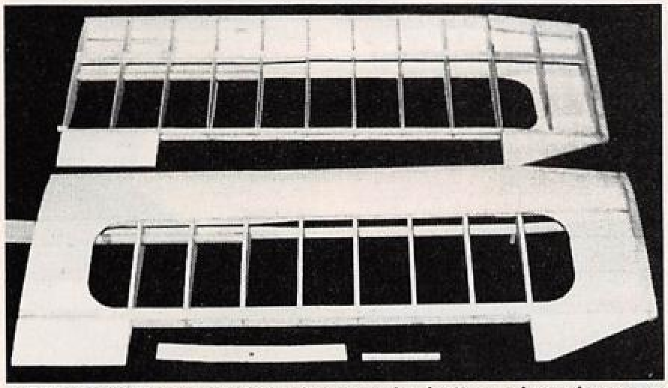
Cloud Niner
Flight Test Procedures:

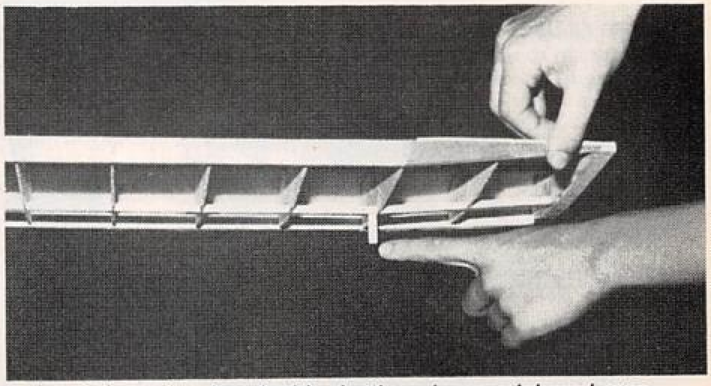
The following test procedure was used for the prototype. We wanted to test the model thoroughly in all aspects so there would be no surprises either to us or to you. If you are inexperienced, it would be best for someone experienced to take the model up for the first time and trim it. Then you should follow the procedure outlined here to get used to this model in a controlled fashion rather than succumb to pressures at the field to "just fly





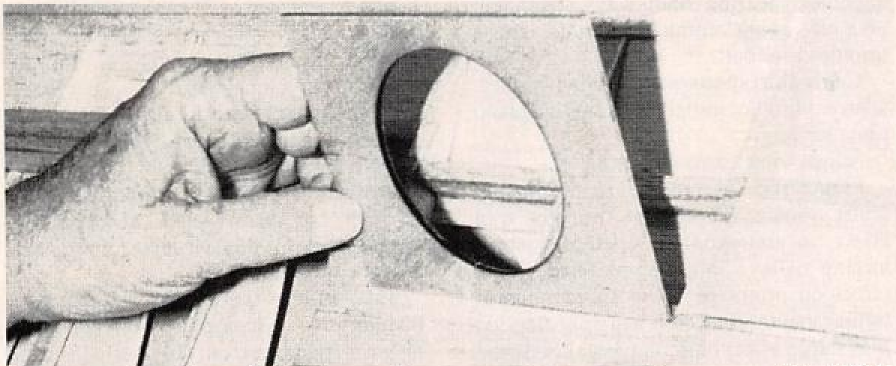
LEFT: Completed fuselage frame. Construction is simple, light. Note low tail, raised nose to produce desired turn characteristics. RIGHT: Bottom view of a partially completed wing panel. Completing the "D" tube with the bottom sheeting and spar webs gives the wing strong torsional rigidity.





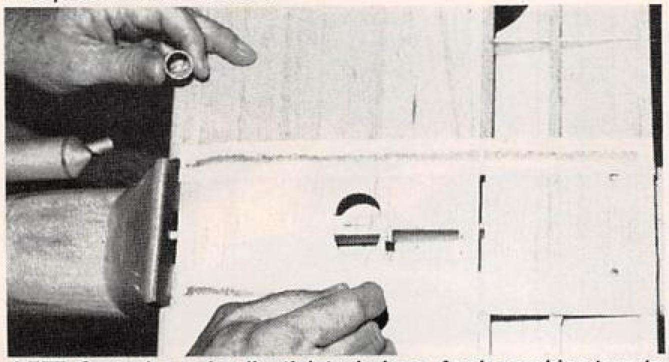
LEFT: Partially completed wing panels, bottom view above and top view below, showing double depth main spar inboard area. RIGHT: Detail of temporary dihedral support which has been tack glued onto the bottom of the main spar.

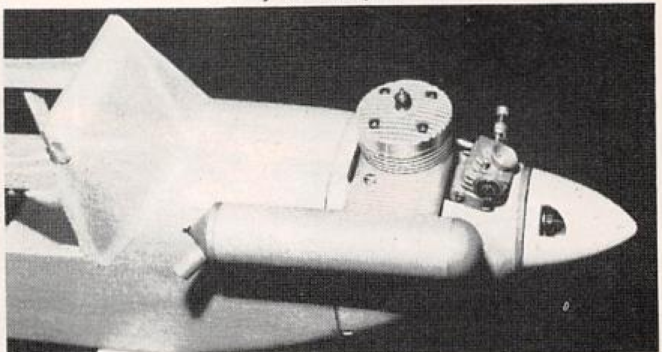
Wing center section plywood joiner extends two bays from root rib. Join over plan for best alignment using tip dihedral supports for proper dihedral angle, then fill in center section ribs and sheet parts.



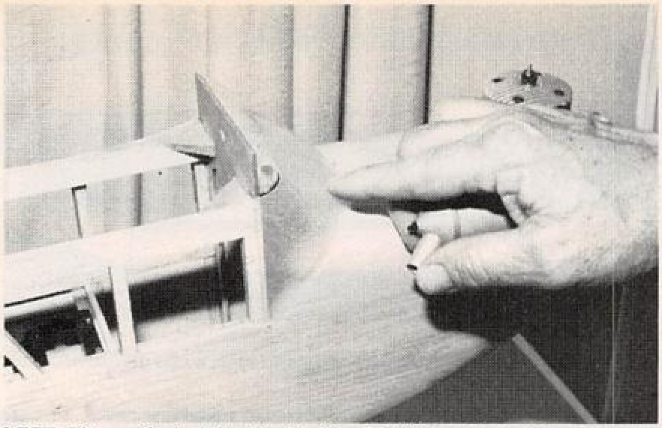
Split flap seems huge, but because of generous wing area and consequent high lift to drag ratio, it is desirable to slow the model down for short landings on small strips. Fuelproof inner structure.

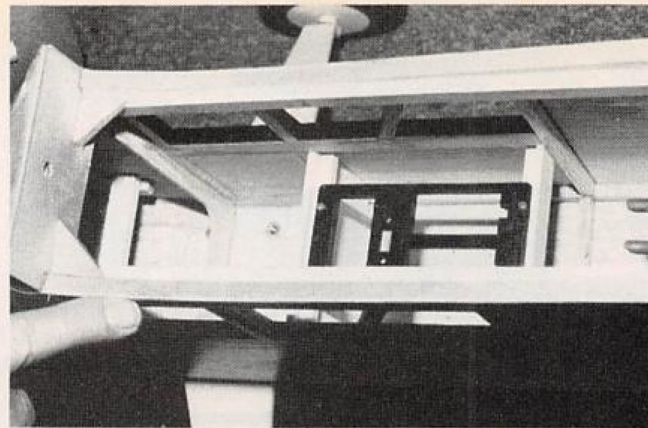
A plywood template is used to shape important leading edge accurately. Rub lipstick onto the template, then run it down the leading edge. Sand off lipstick streaks. Repeat several times to create a very true shape.



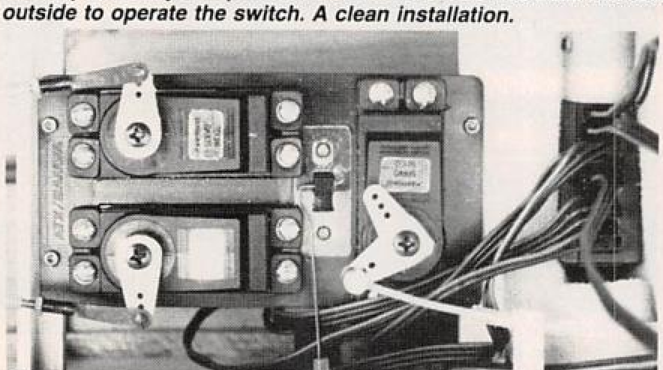


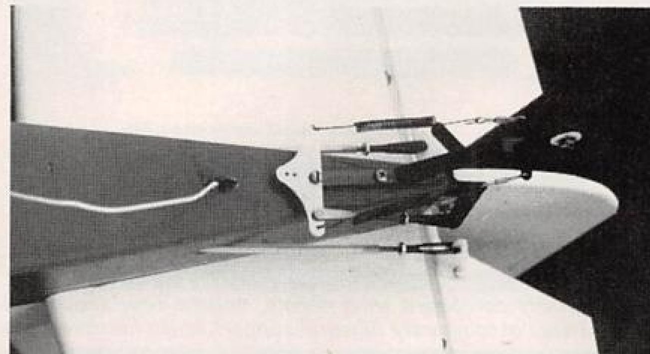
LEFT: Seat wing using lipstick technique. Apply masking tape to bottom of wing as shown. Apply lipstick to the tape. Seat wing, then remove. Sand away places where lipstick shows. Repeat until you get an accurate and firm wing seat. RIGHT: Close fit of cowl is shown. Standard K&B muffler is very effective. A 14 x 6 Master Airscrew prop is recommended for the K&B .65 Sportster on this airplane.





LEFT: Fit-up of windshield which is CA'd into place. "Shrinky-Dink" material was used. It is available in frosted or clear. RIGHT: Shot of R/C tray in roomy compartment. Standard Airtronics mount is shown. Works well. Mount switch at standard location, then run wire to outside to operate the switch. A clean installation.





LEFT: Complete R/C installation shown. Note switch wire. Install a balsa plank hold-down for the receiver and battery for inverted flight. It is necessary, believe me. RIGHT: Detail of tail wheel. Tail wheel is actuated from horn on rudder through a small Perfect bellcrank. Works fine. Note stress relieving springs of the stock CS tail wheel assembly.

Bill Winter examining completed framework of Cloud Niner. Construction is relatively simple using sheets of minimal small parts. Result is lightweight structure for best performance.

it'' and miss some capabilities.

Airframe preparation: Check C.G. empty; check throws; check control directions; check range.

First flight test: Flaps off; taxi tests, adequate steering both ways, trimmed; take-off, gentle climb to altitude, cruise throttle, trim out.

Control responses: Elevator, rudder, aileron, throttle; initial ground-to-air photo runs; landing.

Adjust trims (zero out all biases).

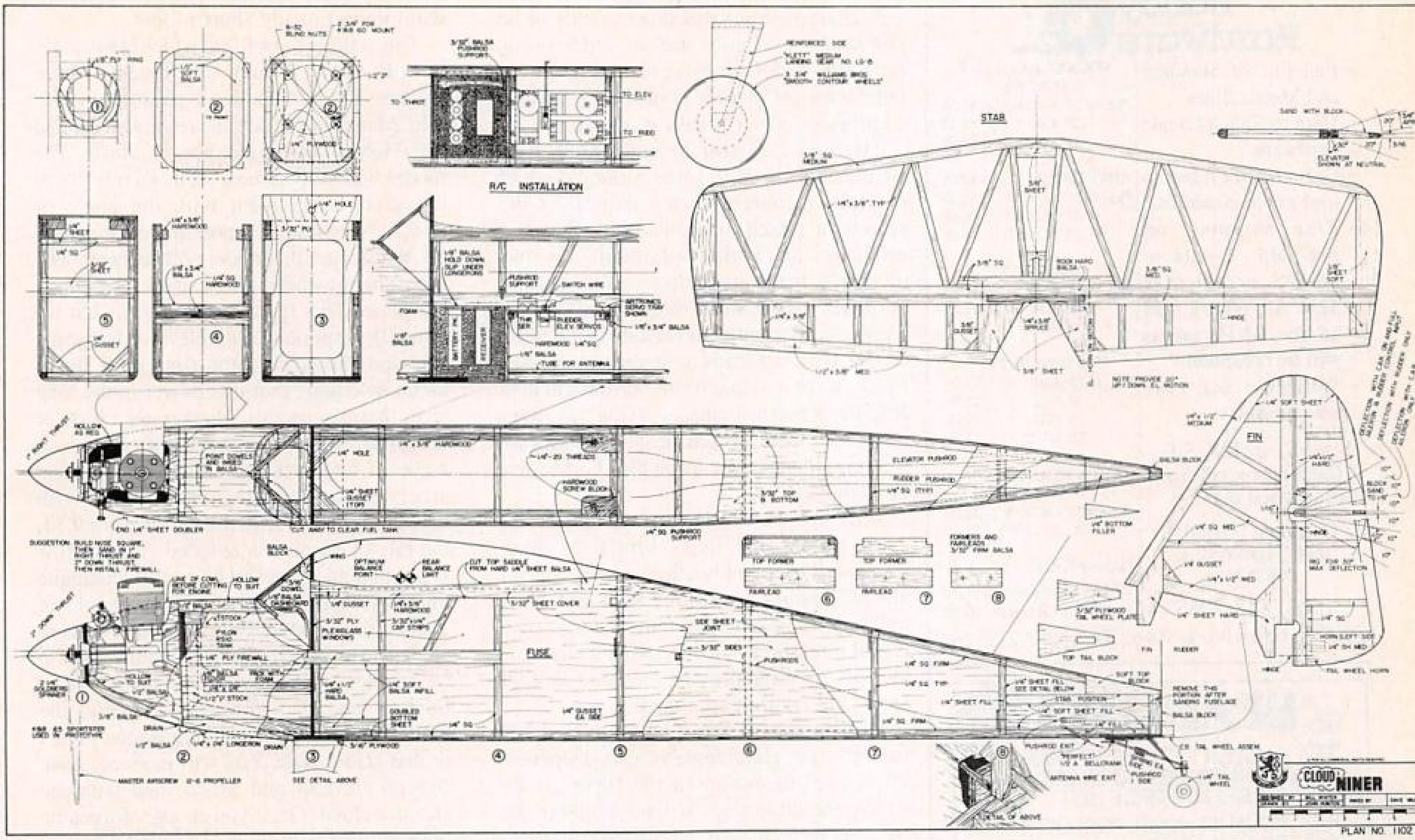
Flap tests: Take off, climb to altitude, cruise throttle. Flaperon vs. trim (no trim effect on prototype); low speed control; turning radius. Split flap vs. trim (large effect on prototype); low speed control; turning radius. Flaperon and split flap vs. trim (large effect on prototype); low speed control; turning radius; flaperon landing; split flap landing; flaperon and split flap landing.

Air tests: Flaps off — turn rate (see loop rate); loop rate (3.0 sec. loop rate); roll rate (2.1 sec. roll rate, better with C.A.R.); inverted flight (do not use flaperons or split flaps); V max (calculated at 88 mph); V min (calculated at 21 mph); climb angle (approximately 45 degrees); descent angle (very shallow). Flaperons on — turn rate (see loop rate); loop rate (2.9 sec. per loop); roll rate (better track with flaps off); V min (calculated at 18 mph); climb angle (improved); descent angle (shorter landing). Flaperons and Flaps — V min (calculated at 15 mph, but seems much slower); climb angle (too slow); descent angle (30 degrees, best for short landing).

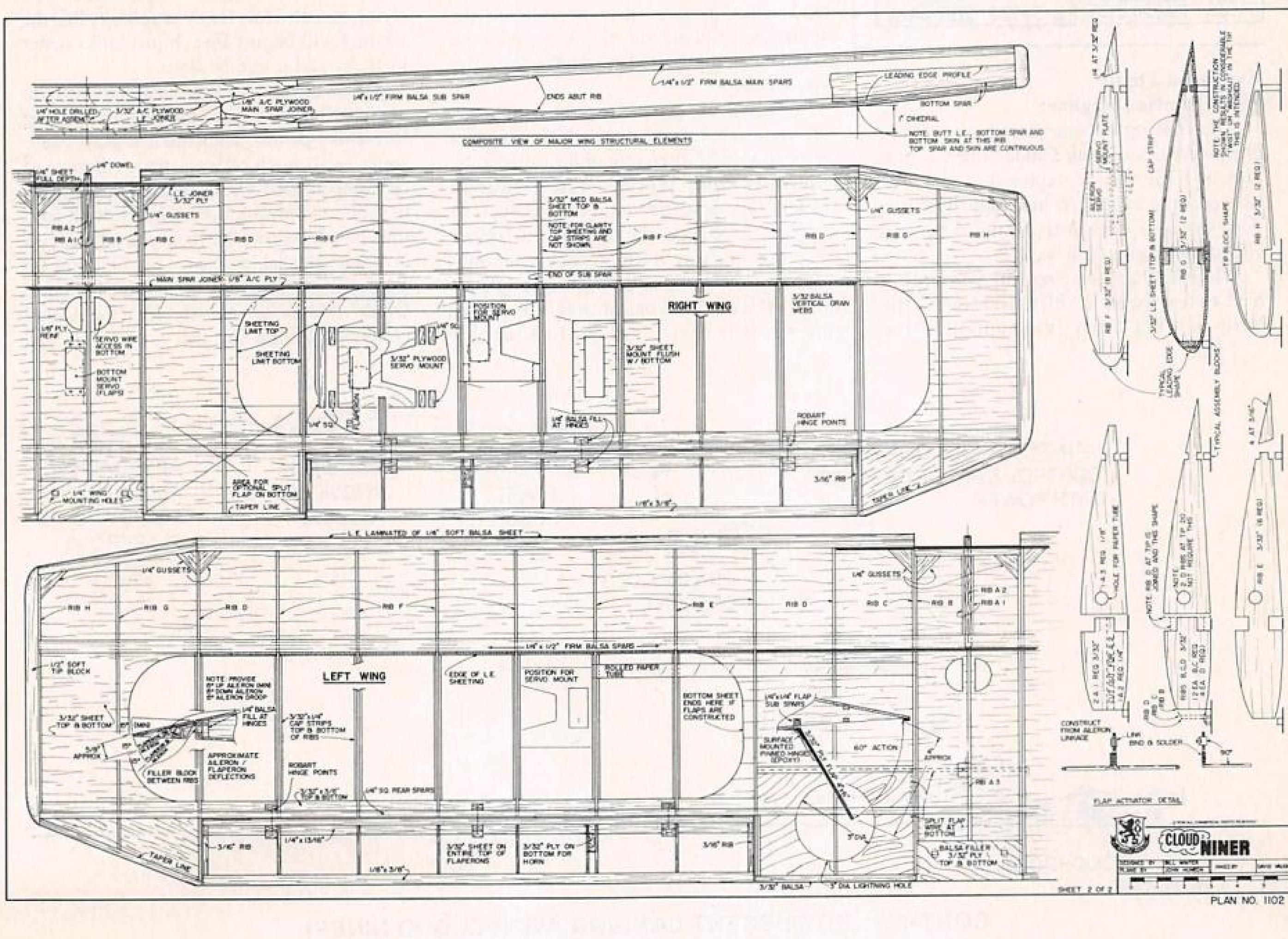
Take-off tests (no wind, 85° to 87°, high humidity) — distance flaps off (21 feet); distance flaperons on (19 feet); distance flaperons and split flaps (14 feet). (These tests were done on a grass field.)

Completed framework on its feet, ready to cover. Thick wing dominates the scene, creates good lift, and enables very good low speed characteristics.

FULL SIZE PLANS AVAILABLE SEE PAGE 240



PLAN NO. 1102 ②



PLAN NO. 1102 ②

Expanded Flight In an Unusual Regime:

After having become used to the flight characteristics of your Cloud Niner, a new area of flight can be explored — the area between maximum L/D and stall. It takes a very special model to fly in this area, and Cloud Niner can do it well.

With all flaps hanging out you do not have to fear the stall with Cloud Niner. The built-in wing twist (washout) and the additional effected twist from flap deployment combine to produce such good stall characteristics that there is little or no potential for wingtip stall or sudden drop (stall can be forced by accelerating into it, but the loss of altitude is negligible and the addition of power breaks it immediately).

The best L/D (lift to drag) ratio of an airplane is usually some velocity which provides a margin above stall. It is this velocity at which an airplane will glide most efficiently and glide the farthest. It is true, therefore, that if the velocity of an airplane is higher than that for the best L/D, it will glide less efficiently and at a steeper descent angle. This fact leads to landing techniques for typical high drag trainer or intermediate R/C models consisting of flying to a point over the field, regardless of airspeed, rotating, then letting speed bleed off to stall and land.

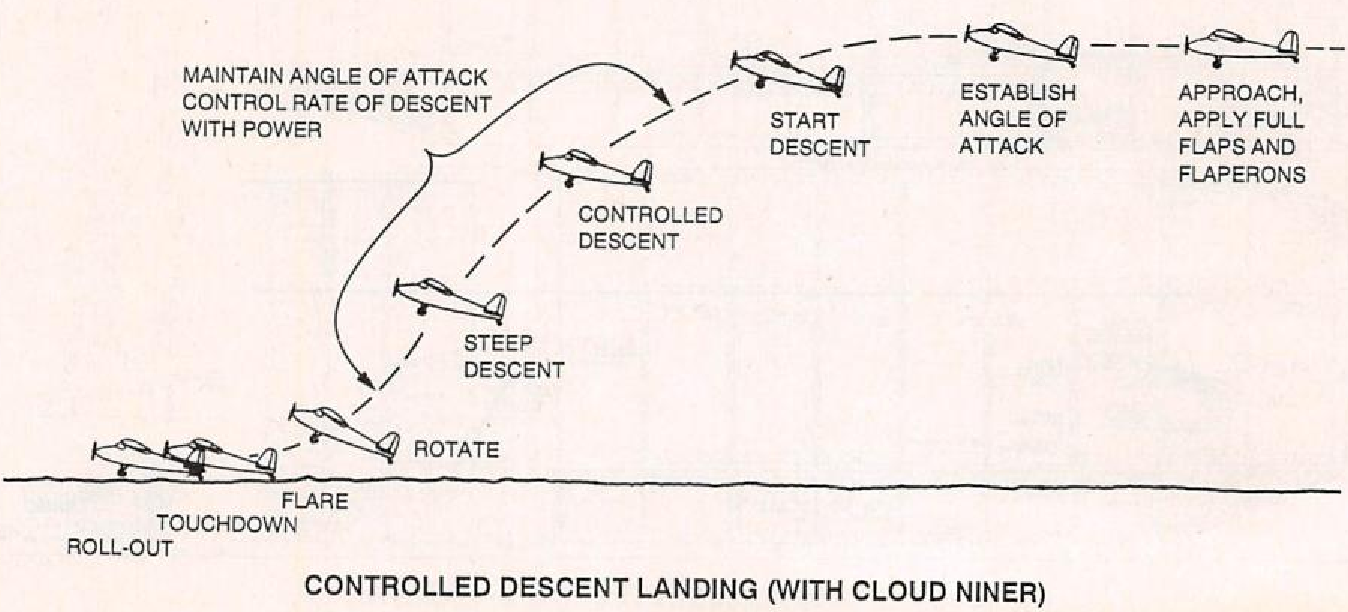
Although the Cloud Niner is a high wing cabin model and looks similar to many trainers, it is not a high drag model, and the above landing technique will not work unless you have a very long runway. This was the reason for using the split flaps; to increase drag and provide for a steeper glide angle and landing approach.

If an airplane is flown below its best L/D velocity, the glide angle is also steepened. The closer to minimum the flight is, the steeper the glide angle will be. Flight in this area can be related to "controlled descent" approaches used in private aviation for landing a seaplane on glassy water, or a landplane at night; it also equates to carrier type landings.

In full scale airplanes the pilot has reference to indicated airspeed. If a constant airspeed is held, then rate of descent can be controlled with power; more power to flatten the descent, and less power to steepen it. Since there is no airspeed reference in today's R/C models, the only reference we have is attitude or angle of attack. If we hold a constant angle of attack, one which is below maxium L/D yet still above stall, very steep descents are possible and very slow landing speeds will result, with proportionally short rollout.

This is the area of flight which is fun to fly in with Cloud Niner. Experiment first at altitude. Fly into the wind, reduce power to idle. Maintain altitude and let airspeed bleed off. Hold a positive angle of attack. The model will slow to near stall, then begin to descend. Experiment with the angle of attack. Note that the more the nose is held up, the steeper the model will descend. The more shallow the angle of attack, the longer the glide. This seems opposite to what we normally experience, up elevator for going up, and down elevator for going down (acknowledging that it is power in the long term that determines whether we climb or descend). When you have established an angle of attack that produces a good and steep descent angle, experiment with adjusting power. Any time power is added, the rate of descent is reduced. This is how you will land when you bring this technique into the landing pattern. Set the angle of attack, then use power to adjust descent angle and to flare for landing. It may seem to be another contradiction to add power to flare to land, but it works. Actually, the model is not really "hanging on the prop" or that near a stall. You will probably have enough elevator and lift to flare with the elevator alone. Or, if you choose, forget the flare and just let it fly in. The model will be flying at such a low forward velocity that the landing will be just fine. It just looks better to flare, and it can be done.

You will have to pay close attention to angle of attack when approaching landing like this, power adjustments may cause some small pitch changes that will have to be compensated for. Using this controlled descent technique, the model will land unbelievably slow. We recommend that you do not try this technique for the first time on a gusty day or with any other typical model. Other models do not fly like the Cloud Niner. Build one and see. □



CONTROLLED DESCENT LANDING (WITH CLOUD NINER)