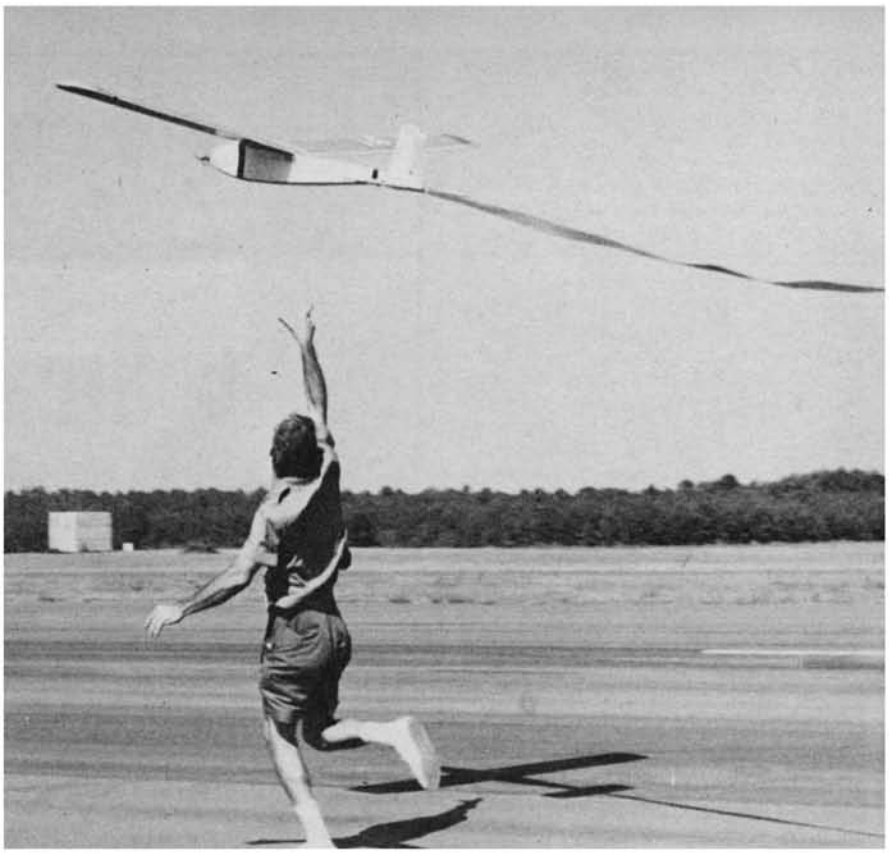
27,000 Feet It's Catbird Country!

by Maynard Hill

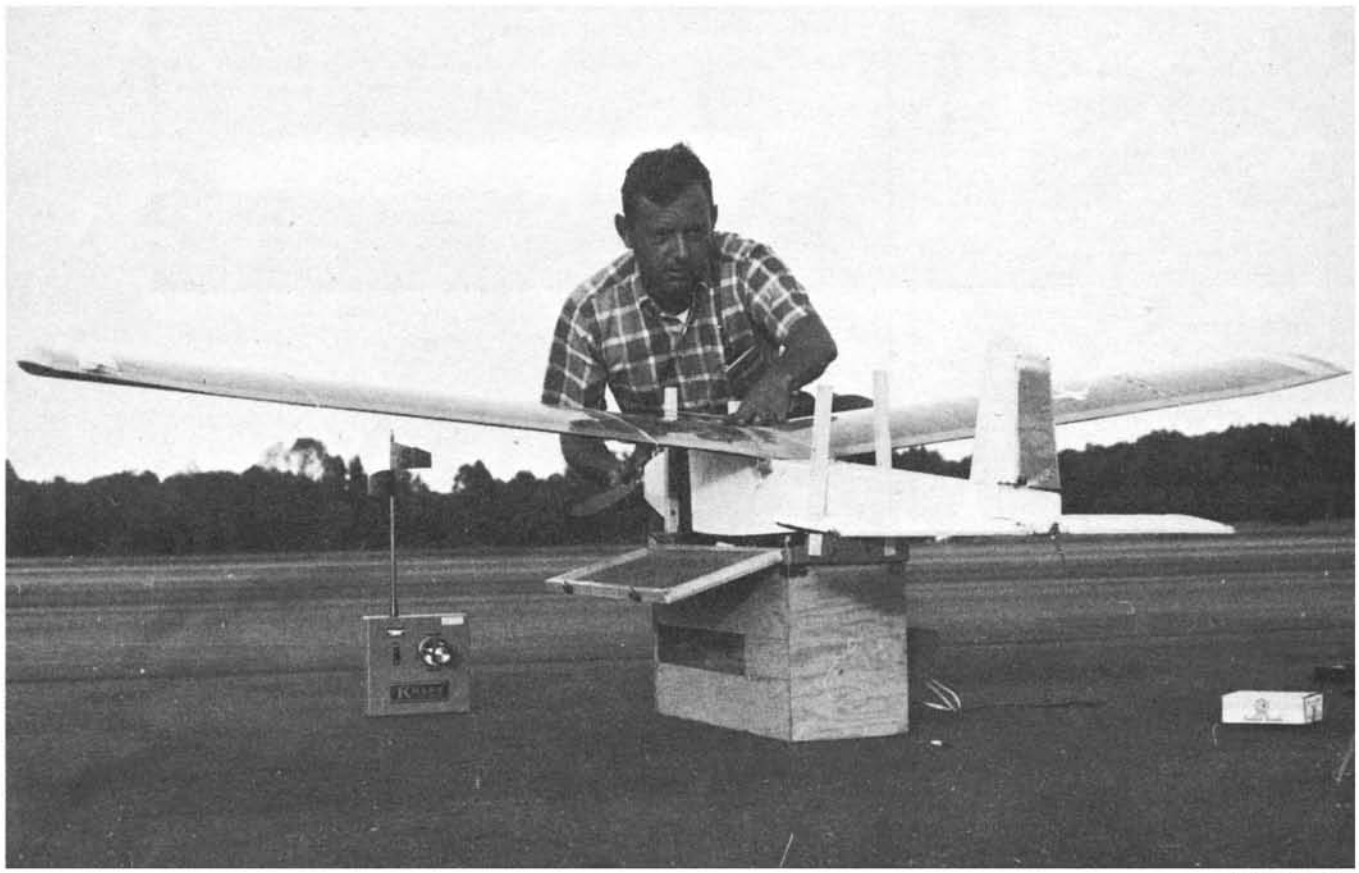
The World FAI Altitude Record falls again as Maynard boosts his "Catbird" into the 35 degrees below zero air of 27,000 feet. A gripping documentary of the flight and the behind the scenes tensions involved. And, It's a New World Record — Almost," wherein Dr. Walt Good has a bad day. Read on to the end and shed a tear.



Up, up and away! John Spalding launches Maynard's "Catbird" on 27,000 foot record hop. Streamer on the tail is metallized Mylar for radar enhancement. It also helps stabilize the aircraft to provide a steady target for the optical tracker. The aircraft is a steady, stable ship.

It's a New World Record — Almost!

A personal report by Walt Good



The Kraft radio system drove the "Catbird" to the new World FAI Altitude Record of 27,000 feet, performing without difficulty. Maynard set to go.

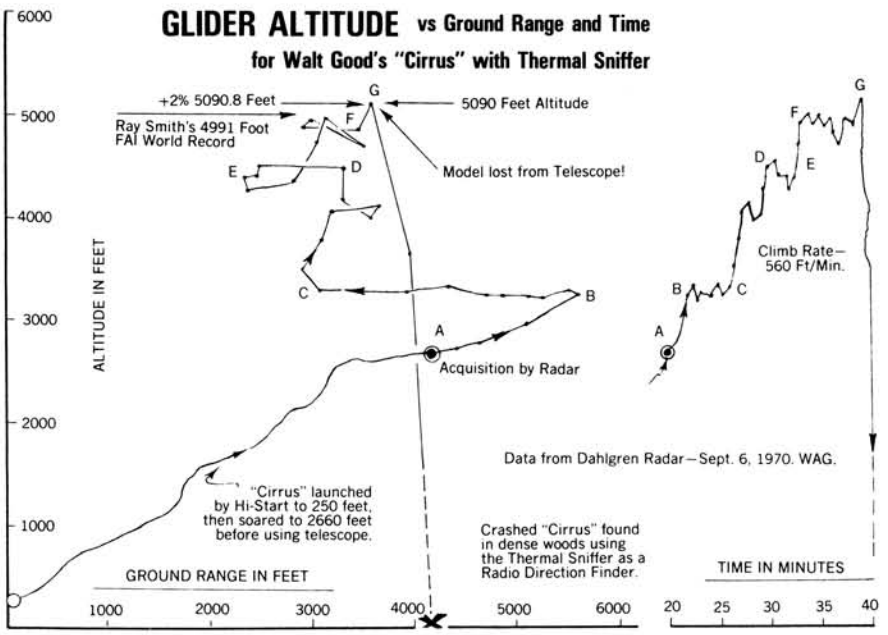
What does it feel like to be steering a radio controlled airplane when it's 27,000 feet above you? Wow! That's the best way I know to say it. Just plain wow! 27,000 feet is 8,201 meters, 5.15 miles, and no matter how you slice it, it's a great place to have flown to and from.

But just plain "wow" isn't very descriptive. To sense the exhilaration, you'd need some insight into the myriad of technical, human and environmental aspects that have to be just right to put it up there. It's one of those things where the model builder, the pilot and the working crew have to think and do a lot of things 100% accurately and effectively, and, after it's been done you realize that you had to have 100% good luck besides. I can honestly say that when my airplane was 27,000 feet above the Dahlgren Naval Weapons Laboratory on September 6,1970, I didn't feel very good. I had a cramp in my rib cage muscles, I needed to go to the bathroom, my heart was pumping heavily, my nose itched, my eyes hurt, my adrenaline was overflowing, and I was worried about Bill Watson's eyes. I was also concerned about the temperature of that Kraft receiver sitting inside its little box of insulation with minus 35℉ air breezing by outside; were the batteries getting too cold, will I get turned tail on in a glitch? If that happened, the aircraft would disappear in the optics, and if it turned tail on for more than two or three seconds, we'd likely lose it permanently from sight. That's been "goodbye Charlie" in the past. I'm sure the Potomac River crabs are still feasting on two birds I dumped in that broad river back in 1964 and 1965.

If the aircraft actually becomes lost from the optics, we have an established procedure to follow. The radar repeatedly announces azimuth and elevation readings. Then the optical tracker crew tries to point the tracker to the same angles as announced by the radar. (The optics are not electrically slaved to the radar. They are separately driven by an operator.) There's a 10 to 15 second lag in getting the tracker pointed on the radar readings. The big trouble with this procedure is that 99 times out of 100, the airplane has moved to a new point in the sky that's outside the field of view (2 degrees) of the optics. So no airplane is found. It's literally like looking for a needle in a haystack. If the model was upwind when it was lost, there may be 5 or 6 minutes of time to play with to try to relocate the airplane. But at the end of that, the radar is likely to be reporting that the aircraft is nearing the boundaries of the Navy's real estate at Dahlgren. At that point, safety considerations demand that we must say a final goodbye and jam full down elevator into the model. This puts it into a vertical dive and locks it there, for the receiver's fitted with a fail safe (no signal condition) that also applies full down elevator. If we're lucky, the radar will track the bird to the ground and tell us about where to go to pick up the pieces. In my past experiences, the valuable pieces sank and the floatable pieces drifted down the Potomac River before we could get a boat to the estimated crash site! So nothing was returned from our effort. Our motto since then has been "Crash on land, please!"

But, as luck would have it, things went much better on Sept. 6. We had had a long

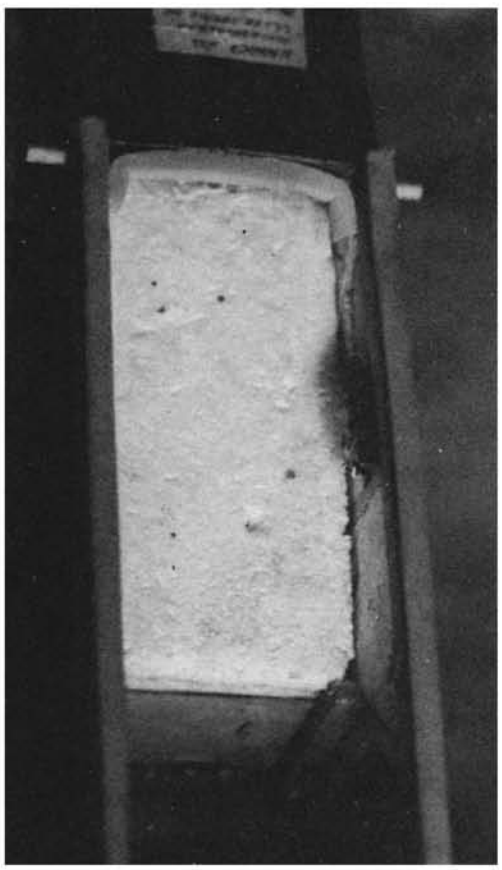
The close-up view of the optical tracking set-up. Pilot Walt Good sits under the hood at top, tracker operator down below behind the Questar telescope. Tom Rankin assists with 7 power binoculars. Walt exceeded the old record, but lost the model. At high altitudes, fate plays nasty games.



long climb to 27,000 feet. In fact, it took about 43 minutes. I've since deciphered that I had set the needle valve too lean on takeoff and the climb rate was only about 1/2 as fast as it could have been. While I was using fuel more slowly than normal, it did run out of fuel, but only after a very fatiguing effort by the whole crew.

One of the reasons for my past successes at high flying has been that I have a fast climbing model that keeps the flight time and the strain on the tracker to a minimum. This has really paid off, as this is the fifth time I've claimed an altitude record, and it's the 11th flight I've made that exceeded the existing record. (Our practice has been to claim only the highest flight of the session, so there have been other record flights left unclaimed.) The success this time is owed primarily to Bill Watson, who operated the optical tracker for over one hour. If you can imagine aiming a gun at a moving target for 1 hour and never drifting away from hitting it, regardless of when the gun went off, then you have some idea of how tough this job is. We used to think

Left to right: Walt Good, Don Clark, Carlton Middlebrook and Carlton Jr. with pieces of Walt's "Cirrus" retrieved from dense woods after a 5,000 foot spiral dive. Walt and Don used the Thermal Sniffer as a Direction Finder, otherwise they probably would never have found the glider. The Glider Altitude Record is a tough one to set, but Walt will swing it someday, we're sure! Walt won the Glider event at the Nats in 1970 and also was East Coast R/C Society Seasonal Champion after winning four meets this summer. A tree broke the fall. (Big help!)



The "All Warm" box in Maynard's altitude ship. All equipment is installed inside the foam insulated box and a resistance heater is turned on at 15,000 feet to keep it warm in spite of -35 degree Farenheit weather outside. Good idea for winter flying. Details will be reported in Channel Chatter next month.

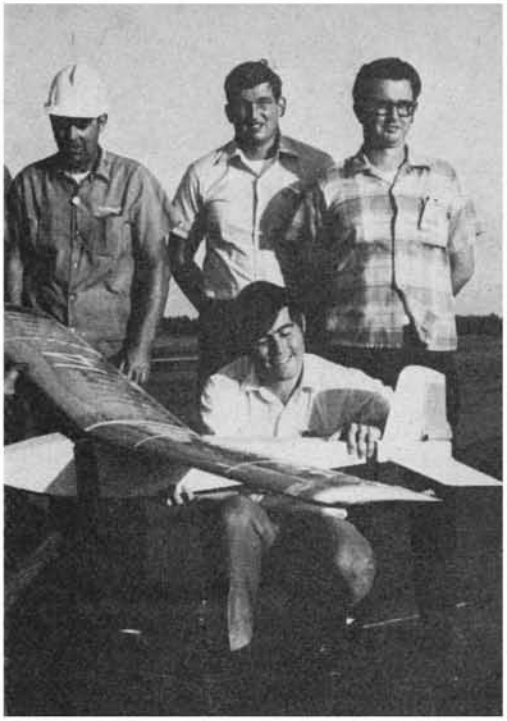
that 45 minutes was the upper limit that one person could take at this hard job. Bill Watson deserves a lot of credit for sticking it out with real guts and patience.

So there we were with the radar operators, Ernie Combs and Larry Pierson shouting over the radio every half minute; "Altitude 22,800 (the old record was 22,960 feet); Altitude 23,200, Altitude 23,700, Altitude 24,100", etc. The tension was really building up during this last five minutes of the climb while we were above the old record. Soon the radar was reporting 26,400, then 26,700 and, shortly after an announced 27,100, the engine stopped. Both Bill Watson and I knew this instantly for we could see the nose drop sharply from a climbing flight that had been smooth as silk up to that point. Now the tension really came on, because we knew we had to get that thing landed within 500 meters of where we launched in order to be able to claim the record. It's a long, long dive down! From past experience we've learned that we shouldn't dive too steep and fast or it gets very difficult to keep the telescopes on it. Yet the tracker operator is already tired and if we take it too slow, eye fatigue might set in. If so, then there goes the ball game. We've found that about a 30 degree dive made transverse to the tracker is the easiest to follow. But this covers a lot of sky, so about every two minutes or so we have to level out and make a slow 180° turn. During the 180° turn above 20,000 feet, the model momentarily disappears from view, while its small cross-section is exposed "tail on." We do the turns as quickly as possible and giggle a little joyfully after each reappearance. Finally after 15 minutes of diving, some naked eye observer shouts the good news! "I see it! It's a speck in the sky, but I see it." After 3 or 4 more minutes the really good word comes through. "OK Maynard, you can see it well enough to steer it now." My fears subside and my spirits start to rise at about this point when I can crawl out of the tracker and stretch that rib cramp. After another 3 or 4 minutes, we had touched the ground at 10 meters from the takeoff point. The crew whoops a cheer of joy at having done it successfully and I suddenly feel higher than the airplane was about 20 minutes ago!

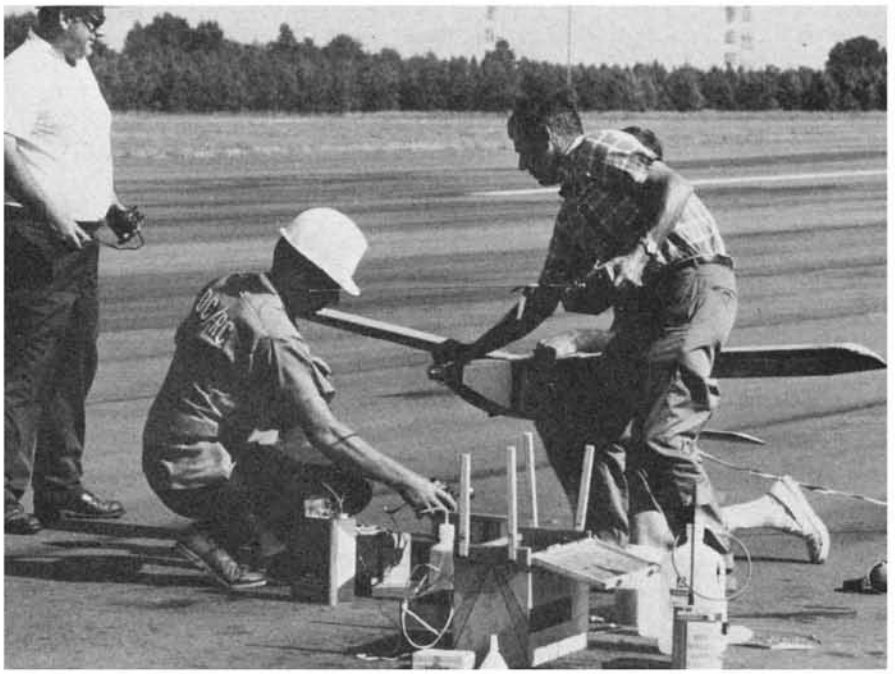
I think I've had a million pleasures and excitements from my hobby, but somehow, none is greater than a successful flight up through those long tubes to a place where nobody else has ever put an R/C model. One look at the beaming faces of the flight crew in a photo here proves that they also feel pretty high too! They should indeed, for this is truly a team operation in which everybody's role is important and necessary.

On the technical side, the airplane (called *"Catbird"* because it has been used in some experiments on Clear Air Turbulence done at the Applied Physics Laboratory of The Johns Hopkins University), uses a Standard Super Tigre .60 and weighs 5-1/4 pounds empty. It carries a 1 quart (32 ounces fuel tank that was only filled to the 3/4 mark for this flight (Stupid pilot decision! We might have gotten to 30K if I'd filled it! But then, if I'd set the needle valve right, it was supposed to get to 32K on three quarters of a tank.) (Now there's a really stupid pilot. Two mistakes in one flight, and just a little bit ago he said everything has to be 100% right.) The wingspan is 8 feet and the chord 13-1/2 inches. The wing and tail are covered with translucent yellow MonoKote that is sprayed with black paint on the bottom. The black paint is very important for visibility.

The radar receiver and servos were a standard Kraft digital set that's 2-1/2 years old and which has been used to set five world records (four altitude and one duration). This set has now logged about two hours of flight above 18,000 feet and has yet to glitch with the setup employed. The setup involves an insulated box of styrofoam to contain the radio. This box has a heater



We did it! Smiles show the pleasure of having put a successful effort together. Left to right, standing: Dr. John Symborski and John Spalding, the Contest Directors; Jack Spalding, Radio Communicator; George Pickerel and Wayne Simpson, Pit Crew; Larry Pierson and Ernie Combs, NWL Radar Operators. Kneeling in front: Maynard Hill, Pilot and Bill Watson on the Optical Tracker. It's what friends are for, thanks much!



Photos by Bob Denny

Maynard's second mistake! The first was that he didn't fill the tank, the second is seen here as he screws the needle valve too lean. Except for these errors, he might have made the 30,000 foot mark as excellent visibility and wind conditions prevailed. Left to right: George Pickerel, Wayne Simpson and Maynard. John Spalding holding model behind Maynard.

in it which switches on at 15,000 feet. At 27K feet, the temperature outside reaches -35° F! The other special feature of the set-up is that Ben Givens has rigged the Kraft yellow box with a co-ax fitting and also a switch to throw the RF into a Yagi beam antenna mounted on the optical tracker. This results in a signal about 12 times stronger than the normal whip, which in turn, provides an increase in theoretical range by a factor of 3.5. At our peak altitude, we were at 11,120 yards slant range. That's 33,400 feet or 6.31 miles. This says that the normal range of this Kraft set is at least 1.8 miles, which is further than any human being can see naked eyed. (Actually, we have flown to 4-1/4 miles on the whip, so what it really says is that we've bought a real margin of safety with the beam antenna.) In any event, it's obvious that this equipment has plenty of range to spare when in normal use.

We also learned a bit of the technical aspects of visibility and haze during this trial. The record flight started at 5:24 p.m. with the sun low in the sky and to our backs. At 27K both Bill Watson (he had a 40 power Questar telescope) and I (I had 33 power binoculars) could see the black stripe of tape that went around the white fuselage at the leading edge of the wing. We could see the wing, tail and fuselage. The altitude of the airplane was quite obvious, except during those tail-on turns. For most of the flight, the white fuselage was held so that it glistened in the sun and this helped trememdously. The following day we tried again at 10 a.m. and got to about 21,000 feet when both Bill and I turned chicken simultaneously. With the sun high in the sky and a little haze, it actually went nearly invisible, even when we held its planform at broadside to the optics. We tried again at about 3 p.m., but the same situation developed at 23,000 feet. Both these flights were very fast climbers and they proved that I now knew how to set the needle valve! But they also proved that a low sun, clear skies and wind transverse to the sun's azimuth are three valuable and necessary ingredients to a record.

I cannot give enough praise and thanks to the DCRC Club and the Dahlgren Club members who helped in this effort. Also, the tireless and enthusiastic work of Ernie Combs and Larry Pierson in the radar van is sincerely appreciated. We gave Ernie and Larry some flying lessons after the flight and now I'm dreadfully afraid that they'll be competing rather than driving the radar next year! Maybe I'll learn how to drive a radar? Wunderbar!

Around here we give you the good news first. Now for the bad news. Read on and learn about the misfortune that beset Walt Good during a record glider flight. This is an especially painful story because the same thing happened to him in 1964 when he nearly set a new power altitude record by flying to 14,600 feet when the record stood at 13,328 feet. But don't feel too sad for Walt. I predict he'll hang in there and really whomp that glider record sometime soon.

IT'S A NEW WORLD RECORD— ALMOST!!

A personal report by Walt Good— September '70

There were just a few faint cumulus clouds high in the blue sky over Dahlgren, Virginia at the annual R/C Record Trials sponsored by the DC/RC with John Spalding as CD.

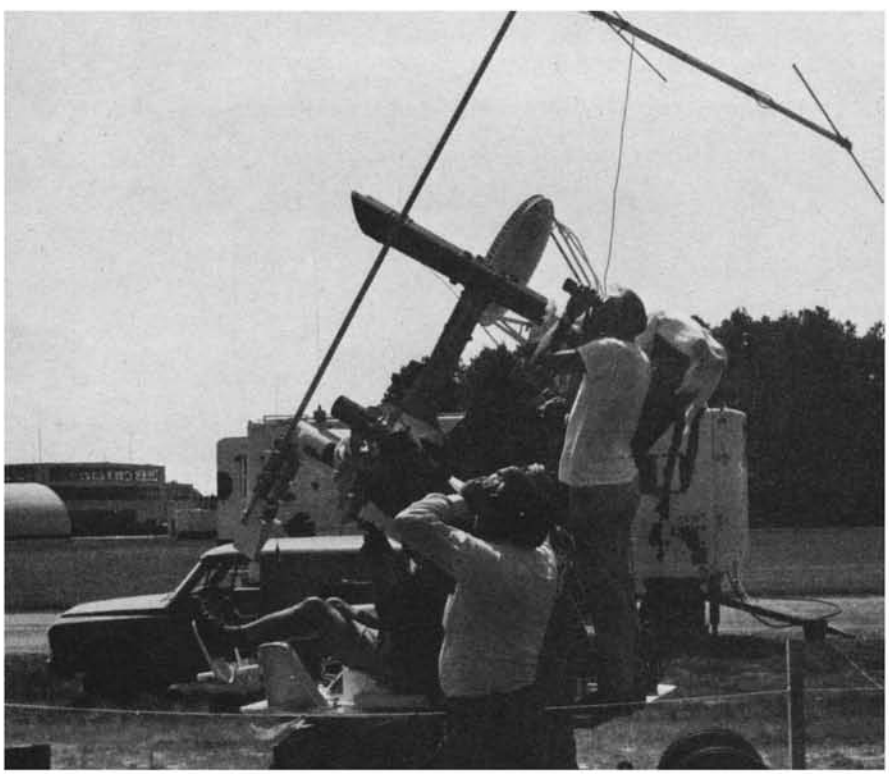
My plan was to make an attempt to beat Ray Smith's Glider Altitude World Record of 4991 feet by using a seasoned *"Cirrus"* which weighed a shade over 3 lbs. with the Kraft KP4 using two KPS9 Servos and a 500 mah battery pack. This combination has a flight capacity of about 5 hours and excellent range, so there was no concern about flight time. Also aboard was a 2 oz. "Thermal Sniffer" which had flown all season and was very helpful in recognizing the thermal lift. It was expected (as was demonstrated by Ray Smith) that the Sniffer would be most helpful at altitude where the eyeball recognition of a thermal would be questionable.

A few tows with a 300 meter Hi-Start yielded a 30 minute flight to about 1000 feet and two short "sinker" flights of a few minutes each; all signs of thermal activity. It was time to get serious, so some radar chaff was scotch-taped to the body to give the Dahlgren radar a good signal. Then a check with CD Spalding who said *if* you get high enough we'll activate the optical tracker and the radar. Maynard Hill had just come down from a short power hop but postponed a serious try, because a few high cumulus were moving in.

The very first tow was almost an abort because a light momentary crosswind swept the *"Cirrus"* to one side and gave barely 250 feet of altitude at the release. However, that cross puff must have signaled a thermal because the *"Cirrus"* was at 1000 feet in less than 10 minutes. While holding the soarer in circle in the thermal I started to amble toward the tracking machine. By this time the altitude was over 1500 feet and increasing. Carlton Middlebrook activated the tracking system and attempted to acquire the glider in the tele-

Smoking the "Piece Pipe". Maynard tried again for the Speed Record and cut a deep hole in the macadam runway. Parts spewed out in all directions after the crash at about 200 mph. Pit Crew George Pickerel and Wayne Simpson mourn the loss. Maynard's airplane had an OPS with Tuned Pipe and it really moved. The theory is the crash resulted from a high speed pass low to the runway. The reflected signal causes a pulse of signal strength that developed elevator glitches. This is not a problem at 60 to 70 mph, but at 200 plus, the AGC circuit of the receiver could not cope with it. We learn something new each year. Breaking the Speed Record is a slow and difficult task. Test them far from the contest crowds.

Tom Rankin assists in tracking Walt Good's Soaring Glider by standing on electrically driven binocular mount. Pilot sits behind the long binoculars and Optical Tracker sits below him, aiming the Tracker like a machine gun. Maynard's Yagi beam antenna is seen at the top of the photo. It works well.



scope. For some reason the acquisition was coming slowly and I found the glider had climbed to 2000 feet and was well downwind. I hated to let go of that thermal! I began to worry a bit because I was straining to see the glider against the blue sky. This was relieved a little by steering it in front of a white cloud to give a contrasting background. In addition, DC/RC member Johnson grabbed his binoculars and started coaching me on the model's altitude so I wouldn't get too confused. At this point I was seeing a speck which would appear only twice per circle! Fortunately, Carlton hollered that both the optical tracker and the radar had established "track" so now I could breathe easier. At this point the *"Cirrus"* was at 2660 feet altitude and almost 5000 feet away in slant range. See point (A) on the diagram.

Having now climbed aboard the tracker and viewing the model through 33 power binoculars, the model filled almost half of the field of view so the flying became very easy. The Thermal Sniffer was squealing a high pitch, meaning the ship was climbing (from point (A) to point (B)). By now the height was 3200 feet, so it was safe, and desirable, to fly upwind because the slant range was almost 7000 feet—and downwind. For the next five minutes we held an upwind course (from (B) to (C)) which gained no altitude but placed the *"Cirrus"* a half mile closer to the pilot. The hope was to get upwind of the radar, if possible, but that was never to happen. At (C) the Sniffer squealed again and for the next few minutes the rate of climb was up to 560 feet per minute, reaching 4500 feet at point (D). Again Tom Rankin coached us on an upwind stretch to point (E) where another thermal lifted the *"Cirrus"* to 4900 feet at point (F). Now we were close to Ray Smith's record of 4991 feet. The thermal pushed again with the aircraft jumping quickly to point (G) at 5090 feet - a new record?! But then came the bad news.

The telescope shuddered and the *"Cirrus"* disappeared from the field of view. Luckily the radar was still tracking, so maybe we could get the elevation and azimuth angles from them and reacquire the model to view. While Rankin and Middlebrook were doing this I tried to hold the stick in the last position of up elevator and slight left turn to maintain the thermal circle. Strangely, I heard absolutely no tone from the sniffer which means rapid descent. This wouldn't have been so strange if I had known the radar was measuring a descent rate of almost 3000 feet per minute, at which point, they too lost the model from the radar (at point (H)). The *"Cirrus"* must have worked itself into a steep spiral dive without the benefit of a pilot and descended rapidly to earth or water.

At first I was convinced that the model had dived into the Potomic River which was only a mile away. So we mentally adjusted to the loss of the glider and went for lunch! In this type of record trial the pilot must convince himself that the chance of losing the model is at least 50% and perhaps higher.

After lunch Carlton Middlebrook checked the radar information and the local maps and concluded that the *"Cirrus"* may have come down on land. "In that case," said Don Clark, "why don't we use the Sniffer receivers to help locate the model—a la radio di-

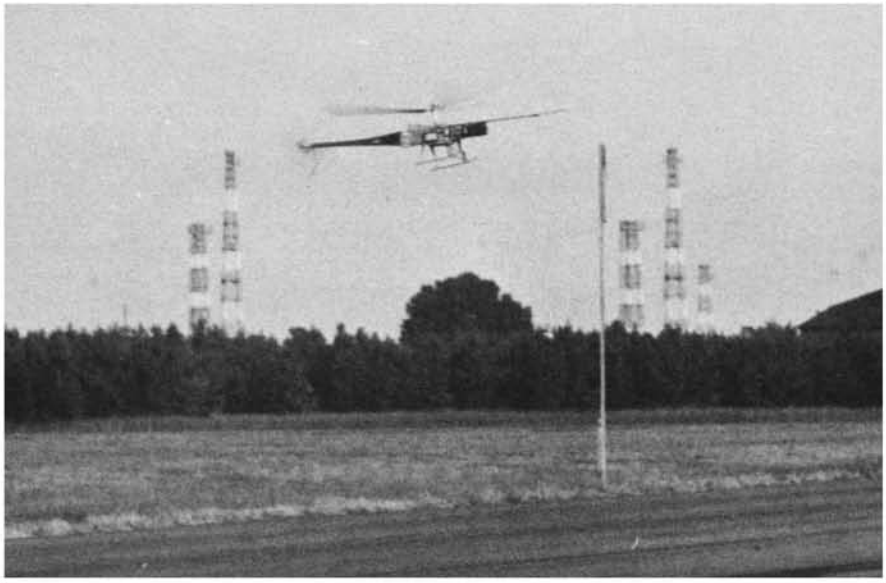
rection finder?" First, we drove to the nearest spot available by road and listened to the Sniffer frequency of 147 mc. What a wonderful sound! By swinging the receiver in a circle it was possible to find the direction of the signal, but this doesn't tell you whether the emitter is in front or back. One way was open and the other way was densely wooded, so we tried the open way first. The signal then almost disappeared, thus that was the wrong way, so we turned around and thrust into the thick woods. Now the signal was getting louder. Every twenty feet we would stop to take a new direction reading and then proceed. About five hundred feet into the woods the receiver was screaming loudly, but was giving a confusing indication of direction. We must have been very close to the downed model, but seeing nothing we proceeded straight ahead. After a few minutes it was obvious the signal was weakening, so we turned about and started to retrace our steps toward the loud spot. Meanwhile, Don Clark with another receiver had been searching from another angle and just then shouted, "I see it!" There was the *"Cirrus"* hanging nose-down about 15 feet high in a small tree. One wing panel was missing as well as one tail panel. All the surfaces were bashed, but the body and equipment were in perfect condition. Even the canopy was intact. All the missing parts and a clutter of balsa fragments were strewn around the base of the tree. Apparently the model spiraled straight down and clattered through sixty feet of branches before coming to rest.

Was it a record flight? No, because the model must land within 1600 feet of the take-off spot and this "landing" was about 4000 feet away. Secondly, the altitude must exceed the old record by 2% which means that a height of 5090.8 feet was needed and the radar read only 5090 feet! Or 0.8 feet too low! Fortunately, the CD didn't have to face the interpretation of the rules on this point because of the landing distance. However, it might still have been a record *if* the model had crashed (or landed) within 1600 feet and *if* it had soared to 5091 feet.

A few more *if's* are in order. The conditions of a 7000 feet cloud base would have permitted thermal flight to that altitude if the scope had stayed on target. This should have been feasible since the same tracker stayed on Hill's power plane to 27,000 feet on the same day! But the power plane can be flown much more gently than the glider, which must be circled in a thermal and hence the glider is a more difficult tracking job for the operator.

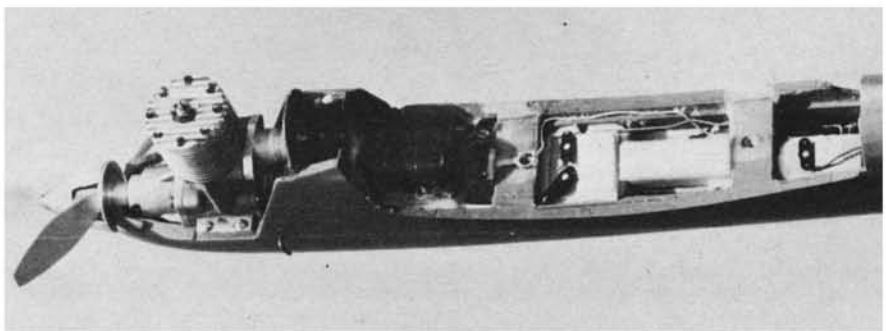
What were the lessons learned? There were several. The glider should have been trimmed to permit "blind flying" safely instead of dropping off into a spiral dive when out of view. This could have been done, but it wasn't. The model should have been flown more quickly to the upwind side of the start point. It appears that the pilot's judgment (mine) was warped by the whistles of the Thermal Sniffer indicating strong rising air. Further, the Thermal Sniffer was found to be very useful as a "lost plane finder" which now gives it a double role.

All in all it was lots of fun, even though we ended up with a broken plane and not a broken record! But we'll be ready again – and next time we'll try harder!!!! ⊂



Up it goes! Years of effort lie behind success. John Burkham's helicopter really flew this time! John has worked long and hard on the project and is now able to lift off and fly. It reached 25 to 30 feet of altitude at Dahlgren. Some control problems remain as model typically went into a shallow spiral dive whenever it gained high forward speed. He'll lick it.

John Burkham works on the intricate mechanism of his helicopter. He uses full scale principles of a wobble plate to develop cyclic pitch. Difficult and delicate machine work is involved, serious building.



Inside story on the Super Tortoise speed ship. Front to rear: the OPS engine with rear outlet for pipe; batteries (on top of fuel tank); front wing tie-down, including antenna connection; aileron and elevator servos side by side; receiver; aft wing tie-down, followed by elevator servo. Very little space left over in this design of minimal frontal area.