takes. An experienced airman does not have to be told he is off altitude or airspeed. He can read instruments. He needs to be told **why** he is off, why his handling of the new machine is not yet up to acceptable standards. Browbeating was too often passed off as "instruction" in the past.

Personality problems between student and instructor are less likely to be tolerated in a modern training school. Students are more likely to be assigned to one man for the duration than passed around among whatever instructors are available. The training itself has been tailored to make the various exercises as much like routine line flying as possible. Six months checks for captains, and annual copilot and engineer checks, are actually called "training" periods. Make no mistake about it, a pilot must meet the same requirements he met to get his rating, but it is recognized that he has not done a steep turn, stall or flown his ship with two engines shut down in the meantime. He is given ample review on all topics, encouraged to ask questions and review any maneuver or procedure of special interest.

Emergency or Malfunction?

He will spend two or three days beforehand reading his manual, but no longer to rememorize long lists of checklist items. The man who retired on DC-7's would not believe the 747's checklist. Aside from an engine or other fire (which can be handled with not more than four immediate actions) most emergencies are dealt with by reading the appropriate procedure from the book. One line has even eliminated the word **Emergency** from its 747 handbook and checklist; all malfunctions, fires and failures call for the use of "irregular procedures," a further hint of the new philosophy. The checklist for normal flight has been streamlined in many cases to a degree never dreamed of fifteen years back. The pilots fortunate enough to use them are no longer reminded to adjust seats, set clocks and altimeters and check radios. The first item on one 747 list, for example, is "Cockpit Preparation," to which each crew member responds, "Complete," meaning he has done everything necessary to set up his section of the cockpit. The old complaint was, "We are required to read to each other the stuff we do every day, but recall from memory the emergency items we use once in five years." No more.

Any historian who gives himself to a study of the life and times of airline pilots will have to find the reasons behind this happy evolution. Whatever they are, the job is a bit less frustrating, and more rewarding, because of them.

♦ ♦ ♦

Better than the solace of the sea.

A Matter of Love

By
Robert N. Buck

IT IS SUGARBUSH, Vermont, in May. On the roof of the tower-like administration building, in the sun, sit about 75 people. Twenty eight of them are glider pilots engaged in the Region One soaring contest. Big Jim Herman, contest director, is revealing the task for the day.

"For speed," he says, "Sugarbush, Lebanon, Belvidere Mountain and back to Sugarbush. One hundred and seventy miles."

I look from our high vantage point at the mountains and valleys of New England spread out for miles around me. They are outlined sharply in crystal clear air. And to those mountains and valleys we'll be flying. I look up at the sky, all blue, not a single cloud. It is a beautiful day, but I know that it is going to be an interesting one because there are no pretty white cumulus to mark the thermals. It's a dry thermal day and they'll be where you find them.

I reflect a little on what a conservative airline pilot is doing about to fly such a task, particularly against gung-ho younger men. But I know why. It is a matter of love. I love this kind of flying with shameless passion. Not for the competition, though it has a certain zest, but I'm too conservative to push hard enough to make good time. I mostly want to finish the task, get around that lopsided triangle, and not be too slow. But the love is for flight alone, working with nature, carefully trying to use the air above which looks still, but is a sea in motion, to use it and the currents in it caused by the sun and land and mountains.

The love is for the glider too. It is beautiful and as beautifully efficient. Its wings stretch almost 50 feet, but the cockpit is small and I just fit which makes me immovable enough to seem a part of the glider. Truly, you fly.

NOW I am at the start line ready to get in. My parachute is strapped on and I put my hands on the white skin of the fiber-glass fuselage to brace myself as I climb in the cockpit. It feels smooth and flawless and a feeling not unlike a caress passes between man and machine.

In the reclining seat, canopy on, we're hooked to the tow plane. Wings held level, a wiggle of the rudder and the tow plane moves, we roll. The busy, somewhat frantic preparation for the day is over, everything is stowed and in its proper place. Hat and sunglasses because the canopy, which allows you to see all over and feel right out in the sky, doesn't keep out the sun and you cook. Map in the side pocket, knee pad and pencil, thermos and iced tea behind my neck with a tube from it over my shoulder and hanging on my chest. Under my left armpit is my computer. It's big, 8½ inches in diameter, the usual numbers on one side with some variations. On the other side a map of the home airport and territory 30 miles around it. The map has an overlay of altitude lines plus rates of lift in thermals and wind curves. With it I can figure how much altitude is needed to get home on final glide plus other things. Attached to the canopy, aimed toward the left wing tip, are two Instamatic cameras with which I'll take pictures of the turn points, if I reach them, to prove to Jim Herman that I've been there.

Air rushes around me noisily as the tow plane pulls us into the sky. I retract my gear and then fly to keep in position behind him and at the same time make little adjustments to the equipment around me, and I write down the time off, 12:03.

At 2000 feet I pull the yellow release knob – that's as high as the tow plane is allowed to tow me in a contest. The rope squiggles toward the tow plane and it dives away. The wind noise subsides and I turn toward the mountain where there should be a thermal.

I HAVEN'T started the task yet. I go through a start gate to do that. It is an invisible line that stretches across the field and through the building roof where we sat for briefing. I must cross it not above 3300 feet. They'll check my time and altitude by a sort of theodolite from the ground.

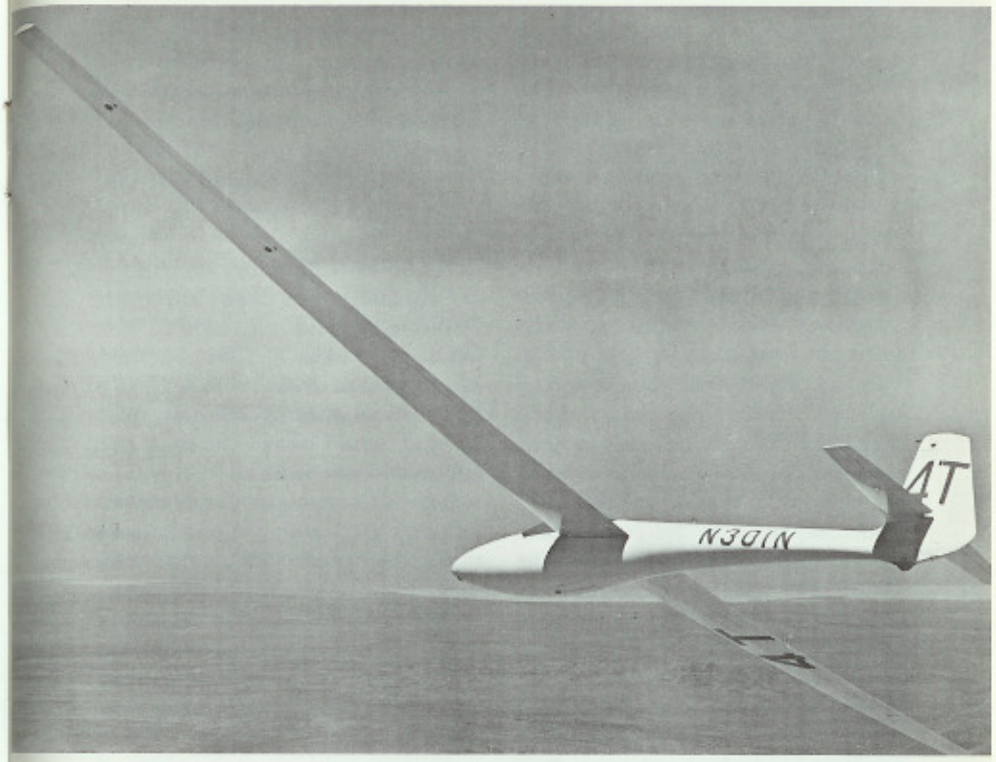
What I want to do now is climb above 3300 feet and then arrange my flight to dive toward the start line and cross it just under 3300 feet and going flat out. It isn't easy. You're either too high or too low and go through the gate four or five hundred feet under, which is a waste of altitude and time.

Today it goes fast. Before I get to the mountain I feel the surge of a thermal. My variometers – I have two, one pressure and the other electric – show up and peg out at 800 feet per minute, a real wild thermal. I wrap up in a left turn and my climb is so fast I can see the ground drop away with each turn. It doesn't take long to get to 4000 feet.

A glance at the airport to the south shows me in about the right position for a pass. I peel out of the turn and go for the gate. Nose down, airspeed up to 110 knots, altitude dropping away. A mile out I call them on the radio – 123.3 MHz, battery powered. "Sugarbush gate, Romeo Bravo one mile out." My racing numbers are RB, painted on the rudder and under one wing.

My dive continues and it looks like I'll be too high. I hit bumps hard at V_{ne} with only 6.8 pounds wing loading. Maybe I will have to pull out and go around, but just before the gate there's some sinking air and I lose altitude quickly. I go through at 3200 feet, not bad, and much lucky.

"Good start, Romeo Bravo," the gate calls me. I'm legal.



Photograph by George Uveges

The LIBELLE, by Glas Flugel near Stuttgart, is the first all-fiberglas (except fittings) aircraft to be licensed. Wing span is 50 ft. and 160 lbs. of water ballast can be carried in the leading edge of the wings to increase cruise from 70 to 77 mph at max L/D. When they have lift problems ballast is dumped.

"Thanks."

And I pull up and zoom letting my speed drop off to 65 knots. Now it's time to settle to the job.

BETWEEN me and Lebanon, N.H., 44 miles away, is a mountain range just under 3000 feet above sea level, and then hilly country with valleys that wind irregularly following the streams at their bottom. Small towns are in the valleys, roads and an occasional railroad. There are fields, green meadows down in the valleys, that look inviting for landing, but really aren't because Vermont fields have rocks, big rocks hidden in the grass. There are freshly plowed fields, the crops not yet showing, and although the landing would be a jarringly short one and the sailplane gets dirty, you don't hit rocks. Plowed fields are your first landing choice, after an airport, of course, but they are far between.

In quiet flight I go toward the mountain range which is only a few miles from the airport, toward a road that goes over the mountain to Roxbury, where there's always a thermal.

I'm not disappointed and I turn into it. The lift is good and I grind around watching the variometers and looking out too because there are others. Sam Francis, contest leader, has just released from tow and seeing me circling knows there's a thermal to help him get altitude before going through the gate. He slides in under me and I look down on his graceful, long wing Cirrus. He's about 300 feet below and I can see him in the cockpit.

Because I was circling left and the first in the thermal, he turns left too so there will not be any conflict. He cannot zoom through my altitude, and I'm not interested in diving through his, so even if it looks close it isn't. Three hundred feet is a lot. Sometimes there's only 50 feet separating us, but our "rules of the road" make it safe and collisions rarely occur.

I notice Sam's gear is still down. I'm sure he'll pull it up as he goes through his mental check list, but I pick up the mike and say,

"Gear, Sam."

"Thanks," comes back quickly and on the next turn when I see his belly it's sleek, white and unbroken.

Soaring competition has a great gentle comradeship that transcends trying to beat each other and even in the heat of battle soaring pilots are quick to help each other. Sam would do the same for me – if I were leading.

WATCHING the variometer during a turn you see more lift on one side of the circle than another, so you try to move over to the maximum lift. Doing it is a matter of briefly unbanking to widen the turn in the direction of the lift.

You bank steeply, 45° or more. When unbanking you level up to, perhaps, 20° for a second or two, then back to the steep bank. Once the lift is strong and equal all around the circle you tighten up, sometimes as steep as 65°, to keep glued in the hot core of the thermal.

A piece of string is fastened on the outside of my canopy. It's a yaw string and I think the Wright Brothers used one too. If I fly with slip or skid the string is off center. You work hard to keep it centered and the turn perfect.

You work hard on airspeed too. I thermal at 48 knots, but the irregularities of lift around the thermal make your speed change. In sink, it sinks, and in a blustery draft upward the airspeed wants to rush toward 50 and 60. The more even your airspeed the more even your turn. Also, very importantly, if the speed is high your turn radius will be wider and you don't want that. You want to keep the turn radius small to stay inside the thermal. So it's a constant juggling act. Airspeed, I find, is kept best by watching my altitude on the horizon as a reference point.

So good flying in a thermal is a busy, highly concentrated job. You work. Many times thermals are irregular. You may get 200 feet per minute climb on one side and 500 FPM on the other, and if it's uneven you never can find the strong lift center as hard as you work. Sometimes, in this effort, you turn the wrong way, or not cleverly, and you fly out of the thermal and lose it. You cuss and feel stupid.

A THERMAL over the road takes me to 6000 feet before it weakens and I reach the haze layer. That's 3000 feet over the tree-covered mountains below. I can see past the mountains out on course to the rolling land. I head for Lebanon. Sam has gone already, but he's going back to the gate for his start.

I begin my glide at 65 knots. The glider comes down very slowly. I'm close to the haze level and up there, often, there seems to be slight lift all over. It feels as though you can

go on forever.

My map is out and I'm watching where I should go. Navigation is by map reading and you hardly ever look at the compass. My son Rob, who is better at this than I am, flew an entire eight-day contest in Marfa, Texas and kept our "stick on the canopy" compass in the side pocket through the meet. He said it obstructed his view. Glider pilots are sharp at map reading.

The country below is rough. The slopes of the mountain range are heavily wooded. A small, tight valley runs through it with a few little hilly fields you con yourself into thinking you could get in. But my altitude is good for way past this area.

Now we sink, but only a few hundred feet per minute. I push the speed up to get through the sink quickly, up to 80 knots.

Because you cannot "see" the thermals by clouds marking them, you can miss them on this kind of day, so you're not anxious to pass too many and possibly get low. The name of the game is "get high and stay high." I decide I'll take the first thermal I find after I'm down to 4500 feet.

SO I GLIDE through 1500 feet of altitude loss, increasing speed in sink and zooming when I fly through an area of lift. Your glide path isn't a steady attitude glide, but rather an up and down roller coaster kind of flight path.

From my 1500 feet I get almost 9 miles. I come into a usable thermal. I feel it coming because just before the thermal the air gets choppy and the sink increases. The variometers show about 600 FPM down and I rush along at 85 knots to get through this sink quickly. It's a little scary because theory says lift will follow down, but the altimeter is unwinding at an alarming rate and you hope theory and lift get to you before the ground does. Out west, in big strong areas of 1500 FPM lift, you can run into "waterfalls" of sink and get low and have to land before lift comes.

As I rush along I'm triggered to catch the first signs of lift, and soon it comes. The variometers pulse a little and start up and I feel a surge in my body as the acceleration works on me. I start a zoom and then turn. The trick is to zoom and turn so the zoom pulls the airspeed down to 48 knots, my circle speed, at the same moment you have bank established and, hopefully, are in the thermal. You also get a free altitude boost from the zoom.

On the first turn or two you try to read the thermal profile and get in the center of it. Good glider pilots do it in a turn or two. It takes me more. You practice thermal entry and centering a lot and it's eternally fascinating because you never can see that thermal.

Now it's careful flying, juggling bank to center, keep that string in

the middle, and it always seems to want to slide off to the right for me and I have to push rudder to center it. I would swear my rudder pedals aren't even, but I've checked them and they are. And you work to keep the speed where you want it.

DURING my turning I see another glider coming my way. He has spotted me and my thermal and soon pulls in close under me. It's Bernie Carris in a Kestrel. He's chief pilot for Schweizer Aircraft Company and checked me out in gliders and he also taught my son to fly at age 15. There's none better than Bernie, as pilot or man.

I watch how he thermals and try to learn and move into the thermal with him as he centers it. We keep our respective distance except he gains on me. The thermal peters out at 5200 feet.

The haze level is lower because we're over lower ground. It was 6000 feet over the mountains, but now, over ground 1500 MSL, it's only 5200. As the day's heating goes on the thermals and haze level will rise. Late in the day it will come down again and the thermal strength will lessen and you'd better not pass up many thermals if you want to get home!

We head on course and Bernie goes ahead of me. His ship, with 17 meters span, is superior to my 15 meter and he can go faster at the same glide angle, and he's a better pilot too.

WE'RE following a river valley that winds toward Lebanon which is in the Connecticut River valley. I do not exactly fly over the valley, but over the hills next to it because the hills will be a better thermal source. Valleys generally have sink over them.

But now it feels a little more nervous. The lower haze level and lower country gives me the feeling that I should go carefully. The day is young, about 13:15 on the clock which is 12:15 sun time because of daylight saving. Maximum temperature and thermals will not occur until about four in the afternoon.

Ahead I see a white flash of wings circling, someone working a thermal. When I get there it's Bernie. Now I enter his thermal below him. The thermal begins to die at 5000 feet and I leave it. Bernie is gone. I can't see him anywhere. This happens in soaring contests. You work with certain sailplanes

for an hour or so, then separate and maybe never see them again that day, or else pick them up much later. But Bernie was gone and I was alone.

I decided to work the high ground on the southeast side of the valley and while I didn't get any big thermals, the sink was low and by pulling up in 200 FPM lift and stopping to thermal briefly I got just north of Lebanon with 4200 feet.

I was still over hills. Ahead I could see the Connecticut River valley and some smoky haze by the city. The airport runways were visible in the distance and it all looked still and stable.

I had to get over the airport, take my pictures and get out, but it looked, as we say, like death. The lift would be sparse, the haze level even lower. I decided to try to get high enough to get it, shoot the pictures and get out back to the hills in one glide if need be.

I looked for a thermal over the last hills about 5 miles from the airport. At a conservative 25 to 1 glide ratio I'd need about 2100 feet to make it.

I found a thermal, not a good one, 200 FPM, bursts to 400 FPM, it was chopped up and under good conditions I'd have left it and looked for better, but this was the last chance before the flat valley so I stuck with it and worked hard. 4800 feet was the end. That meant in and out with 2700 feet remaining when I got out, with luck. 2700 feet would be 1500 feet or so above the ground, and that's lower than you like to go thermal hunting.

I HEADED for the airport. Sixty knots, string centered, careful, careful. It was flat, not a bump, no lift. The airport seemed to crawl toward me. But it's almost miraculous the way these high performance ships hang in the sky. The altitude loss was small and I was making my 25 to 1 easily. Finally I was abreast the field where the runways cross. A steep turn with the wing tip aimed at the intersection, push the camera buttons, hear them click, level up and head back to the hills. 3500 feet now, I was getting more than 30 to 1. I'd be over 2000 feet over the hills. Looking down at a sand pit south of the airport, way below, I saw a glider trying to work lift. He wasn't having much luck.

If lift is good a circling glider keeps circling, but if you see him circle a few times and then level up, fly for awhile, circle again, and repeat the scattered, here and there pattern, you know he isn't finding it. And this one wasn't. Later I heard he landed at Lebanon.

I kept for the hills, slowly losing altitude. Now I got itchy. There hadn't been a smitch of lift and the ground looked close. There had better be a thermal when I got there.

Then I saw a glider circling over the hills. I headed toward it with a great sense of relief, and under him found a weak thermal, not good at all, but it was up!

The glider was CW and as we worked I could see his gear was down . . it was gear-down day. I called him, but he didn't answer, probably had his radio off as we often do so the chatter will not distract us while we're working.

AT 4500 feet I went on course northward. CW headed toward Lebanon. Phew, I was glad Lebanon was behind me.

Near Royalton I found a good one and got to 6000 feet. I felt good, relaxed and hopes way up. I ate an apricot, a reward to myself for getting in and out of Lebanon. I flew happy, picking up speed, nose down, then nose up in a zoom through lifting air.

But finally I realized the down was more than the up and the altimeter kept a steady downward trend and I didn't find any thermals worth working. At 4000 feet I was getting very interested in a thermal. At 3500 I was unhappy and studying each hillside. I flew to the sunny side, but nothing. I tried the shadow side, nothing. Now it was 3000 — where was a thermal?

I looked for a landing field. Even though I still hoped for a thermal it was time to line up a place to land. There was a big plowed field with one lone tree in it, but I could miss the tree. It was the only decent field around.

The trouble as you get low is that your radius of action to look for a thermal is limited as you want to stay within gliding distance of that field. Beyond there weren't any good fields, just the forest of the mountain range I was headed toward, so I couldn't go on.

MY ALTITUDE was 2500 feet sea level, about 1200 to 1500 above the ground. I headed for a small hill west of the plowed field. It didn't have much growth on it so might be hotter and give off a thermal, but nothing. I was 2100 feet MSL and really sizing up the plowed field, studying how I'd set up my pattern for landing, but I still had one eye on the variometers and the one I was watching moved sluggishly toward 100 FPM.

I circled, not steeply, but carefully. The lift dropped to zero, then up again to 100 feet. I worked, so carefully, but it was almost nothing. I made a lot of circles, the altimeter didn't budge. I tapped it and the hand jumped 30 feet. I'd gained a little, but thermals like this rarely work out. They are just little bubbles that die.

I was disappointed, frustrated and a little tense too. The easy out was to land in that plowed field and relax. But then, I thought, why give up? I was still in the air and not coming down. At least I was holding my own.

I made myself relax and sit back. "Keep the damned string centered and fly!" I told myself sternly.

More circles, tap the altimeter again, another 30 feet. I couldn't afford to search for better lift. I had to take this until I had more working altitude to explore from.

More turns, 30 more feet, and then the lift went to 200 on one side of the thermal. I dared a little maneuvering to shift over. I got 200 feet all the way around. The altimeter crept to 3000 feet, then 3500. I searched now, wandered around the turn and, zap, 400 feet per minute. It wasn't just a bubble – someone had sent me a thermal. I tightened the turn, 4000. . . .4500. . . .5000! I was back in business.

NOW TOWARD the friendly mountain range. As I leveled up and started on course I caught the plowed field and lonesome tree out of the corner of one eye. "Not today, baby, not today."

The mountains gave lift. The tree-covered, rocky mountains gave me a thermal to 7500 feet.

The course, 80 miles Lebanon-Belvidere, was along the valley up to Stowe and north. To the east the Worcester mountains form a range the length of the valley. It was a free ride. As I flew the top of the ridges, getting lift, I was fat and cruising.

But the ridge ends and then you cross about 14 miles of lower country to a mine on Belvidere mountain, the next picture point.

I wanted the same thing as Lebanon, a good hunk of altitude to run from the mountains to the mine and back. And I got it, 8500 feet on a strong thermal. I set a straight glide for the mountain with a mine on it.

Not far south I saw a glider coming toward me. He'd been in and taken his picture and was headed home. We came closer and passed. It was Bernie! Where had he been all day? There was recognition and we rocked wings.

The turn was easy, a steep bank over the mine, click-click, and out. There was a thermal right near the mine and I made a few turns in it to help that jump back to the Worcesters. And the mountains were still doing their work. I got a thermal to 8000 feet.

I WONDERED if I could make it home in one glide. Out came the trusty calculator. Sugarbush about 30 miles away. Lift was averaging 400 FPM, maybe a 5-knot headwind. The calculator said 6000 feet to get there. Sugarbush is 1470 feet; plus the 6000, is 7470. Tack on 500 feet for a cushion, that's 7970. It's close figuring because a calculator has a number of ifs in it. It's based on even ups and downs, but what if you get an extra large area of sink, and it's possible. But this looks good. Let's go!

I started down the spine of the mountain. Fly straight, accurately and keep checking with the calculator, keep working the top of the ridge. Fly and think and decide. Sometimes I feel that more decisions are made in the glider in a few hours than I make in six months of airline flying.

Now it is beautiful. The joy of being like this is almost overpowering. The mountains and valleys, fields, forests and pretty New England towns are below. I quietly spook through the sky unheard and unseen unless someone happens to look up and catch a flash of white in the blue sky.

I have time to look at all this and enjoy it. I study the long wings. They are motionless as they take the air, use it, and send it downward. There is no vibration, and only a slight rustle of wind noise. It is smooth, so very smooth.

MY ALTITUDE creeps down and Sugarbush is still not visible ahead. The calculator says my fuel, which is altitude, is enough, but I wonder. I'm 4200 feet as the river at Waterbury goes under me. I check again and the calculator says that's what I need. It's close, close enough so it feels chancy to pass up any thermals, but I do. I know the gung-ho younger guys would be making this final glide with less altitude, but I'm conservative.

This time you must cross the finish line below 1000 feet. Most everyone dives across a lot lower, like something under 100 feet, and right on red line.

I'm itchy now and I can see the field in the distance. It doesn't seem I'll ever make it with this altitude. Eleven miles out I feel a thermal and turn in it, just a turn or two to put a few more feet in the bank. And then I look toward the field and for the first time in over four hours I say to myself, "You've got it made. It's in the bag." I feel a little sissy – I really didn't need that last thermal.

The nose goes down, the speed up to 80 knots. As I pass Waitsfield I know I have altitude to burn so I shove it over more, right up to the peg. I pick up the mike and say the sweetest words a soaring pilot can say at the end of a day.

"Romeo Bravo, one mile out!"

"Roger, Romeo Bravo."

The field comes closer and I cross the end of it bouncing and jarring through little bumps at high speed. I rush by the finish line next to the building looking up at the people on the roof who wave at me.

"Good finish, Romeo Bravo," they call, and you gently pull back and zoom. The rush and jarring subsides and you float softly on down wind. The gear goes down, spoilers out, a squeak and you're on.

There are feelings and emotions, but it is a matter of love which, like all love, can really never be told with words. ♦