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Corrections: Credit for the Summer, 1976 issue cover photograph should have gone to Garry Hudson, a Harris Hill Soaring Corporation member. In addition, Gren Seibels name was inadvertently misspelled on page 15 of that issue. We regret both errors.

On the cover: One of Bob Symons' wave cloud photographs now on display in the National Soaring Museum. See page 4.

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Exploring Clear Air Turbulance

A Rocky Ride On The Sierra Wave

by V. M. Saudek

Editors Note: This is an edited version of a paper presented during the museum's 1975 Spring Symposium. Photographs are courtesy of Victor Saudek and are by Bob Symons and George Uveges.



It is difficult to imagine what might be considered significant about the use of sailplanes as scientist-guided atmospheric probes in the future. Soon the skies probably will be so thoroughly understood that our descendants may be interested more in the human background such as the motivations which brought about the involvement of a few dedicated soaring people in these programs. Accordingly, this paper concentrates on personalities and happenings.

Many members of the Southern California Soaring Association (SCSA) felt that we had a special understanding of winds and turbulence that was not available to most non-flying and many flying scholars. We hardly could have imagined just how much was to be learned. We may not now appreciate how much more can be learned.

Altimeter error was one of the possible hazards to air navigation that we were extremely interested in resolving. Of all the mysteries we had hoped to explore, this one was the most curious.

Rather than making a deliberate airborne search for the error, if it exists, a careful mathematical analysis of altimetry was made at UCLA, and published. It shows that the temperature structure of the local atmosphere can give, on occasions, $\pm$ feet or so for unknown periods of time. An original letter is one of the gifts to the NSM being made by the Southern California Soaring Association: Bob Symons' replay to the writer's letter of November 18, 1949, on that subject.

John Robinson has prepared a paper we have heard which included the flights made during the holiday seasons 1947-'58, '48-'49 and '49-'50 at Bishop, California where the SCSA and AGCSC pilots were guests of the Symons, Ross and Deibert families between those Christmas' and New Years'. Their hospitality, parties, and friendships still are among the warmest and most exciting in memory.

Out of the earliest of these vacation-expeditions came the realization that mountain lee (stationary) "waves" in the atmosphere were unknown to many practicing meteorologists.

Missionary instincts and the scientific curiosity of the pilots who soared them were aroused and the subject was discussed occasionally at meetings with the Los Angeles Branch of the American Meteorological Society during those years. At these meetings we first met a young UCLA undergraduate, Harold Klieforth, who became prominent in this field. He later soared (in 1952) with Edgar to 44,254 feet — still the world record for multiplace sailplanes.

Sometime during this period it was proposed from within the Southern California Soaring Association that we try to initiate a lee wave research project.

A review of the "THERMALS" of those days shows that, in September of 1948, a sketch had been published describing a 90 foot span single place sailplane with a pressurized cabin. This was stimulated by German and French efforts, dating from during WW II (German) and, after the war, by Breguet, in France.

The project idea was considered thoughtfully, worked on and discussed at the monthly Board Meetings and in depth at the SCSA General Meetings. Dr. Klemperer usually attended and kept a sense of perspective as well as giving encouragement. He was the dominant inspirational influence and, as things progressed, the steady, knowledgeable, accessible, calm leader. He also translated items and reports of European activities in wave soaring.

Simultaneously, other events took place of which we learned later: A B-29 former bomber, used for research by the Office of Naval Research (ONR) out of China Lake, California, had been on a routine, constant-altitude run from west to east across the High Sierras and then the Owens Valley at 30,000 feet with a strong tail wind. As it crossed the escarpment of the Sierras it sank swiftly while climbing at full power. A moment later it was rising — while diving — and so, up and down, across the valley, it was abused by enormous successive waves. The aircraft commander asked the



Ready: Wolfgang Klemperer (right) and Vic Saudek in one of the Pratt Reads used during the project. Helping them is Ken Briegleb at age 11 or 12.

meteorologist on duty for information about this condition. Sometime later the meteorologist (probably Nelson Williams) apparently equated this with the Moatzagotl condition (lenticular cloud forms) of standing waves soared on and explored in the eastern parts of Germany (now Poland) by Wolf Hirth and Dr. J. P. Kuettner in the mid-1930s.

Two gliders were requested by the people at the Naval Ordnance Test Station. These arrived early in 1949 in box cars at China Lake, California, from Wright-Patterson AFC. Now what to do with them? Drs. Renzetti and Warner at China Lake, who knew of Dr. Klemperer's interest in gliding, invited him to look at them. I was one of the SCSA party that was shown a sad heap of scrambled plywood from which we could recognize details of a Weihe and of a Grunau Baby. Klep explained that, if they wanted help, the SCSA could provide more suitable sailplanes and excellent pilots.

It was on this visit that we first heard of a Captain Hutchinson of the ONR who was interested in lee wave phenomena. We were told that he would be the person to contact if the ONR were to become active in this project. Apparently he was moving from continent-to-continent, at the moment no one knew where to reach him.

From time-to-time the SCSA's Honorary President, Dr. Klemperer, had been given leave of his job at Douglas Aircraft Company and made "visits to Europe." Since Klemp's death, in 1965, I have learned that he was an active General in the U.S. Army Intelligence.

When Klemp left for one such trip in 1949, I drove him to the airport and carried his two heavy briefcases onto the TWA Constellation. In one briefcase he had all of the information gathered, up to that time, on the ideas of the SCSA's exploration of the Sierra waves. However, without Captain Hutchinson's blessing it probably would never come about.

Klemperer told of the following events sometime later: Severe storms over northern Europe had diverted his transatlantic flight to the Azores. When the pilot advised the passengers that they were about to land, Klemp put away the work he had been doing, folded up his tray table and, looking out the window, said aloud: "Ha! lenticular clouds." The man next to him asked: "What do you know about lenticular clouds?" As it turned out, that man, sitting next to Klemp, was Captain Hutchinson.

They made arrangements to meet several times in Europe

(Continued on Page 6)



A good day: Parker, Robinson and Edgar.

and, on their return, in Washington. There, they visited Admiral Reichelderfer, of the U.S. Weather Bureau, and tried to interest him in their ideas of investigating waves by using sailplanes.

Apparently Reichelderfer thought that this might be doing such explorations the hard way. Why not use power planes? Klemp suggested they all meet at Harris Hill the next day, as a National Soaring Contest was in progress. Klemp would see them there later in the day. They would see sailplanes in action and, afterward, discuss the project. It was agreed.

During that 16th U.S. Nationals, Klemp drove up here and asked at the Administration Building information window for the meteorologists who were observing the soaring contest. His attention was directed to a knot of men nearby — but none of them was familiar. Klemp explained that he was looking for persons who were interested in the use of sailplanes for exploring mountain lee waves. Yes, Dr. Klemperer, these men had that same interest. So, bemused, Klemp went over and introduced himself. He met at that moment — Dr. Joachim P. Kuettner of the USAF C. R. C., G. R. D. (U.S. Air Force Cambridge Research Center, Geophysics Research Directorate) who was there trying to convince the Air Force people with him that they should use sailplanes for research of standing waves in the atmosphere! Within a few more moments the USWB meteorologists were found.

The essentials of this change meeting with Klemp were confirmed with Kuettner in January of this year (1975).

Klemp returned to Los Angeles later in the summer of 1950. On a hot Saturday afternoon he phoned some SCSA people, including me, asking us to come to his home since Captain Hutchinson had just called to say that he was in town and would like to discuss the project. With that incentive it was easy to abandon the lawn mower and go.

At Klemp's home we learned that, coincidentally, Dr. Kuettner and other project-interested (Navy) people had phoned Klemperer and asked to meet with him on this subject! As the meeting developed it was suggested that the University of California at Los Angeles Department of Meteorology be asked to direct the program, as a contract could be arranged through the business office of the University. Accordingly, Professors Bjerknes and Holmboe were contacted. Since Holmboe lived nearby he joined the meeting.

Soon the outlines of a rather complicated project began to take form. Within weeks a proposal was submitted and, a month or so later, it was accepted.

UCLA had the prime responsibility and the Southern California Soaring Association would, as subcontractor to

the University, conduct all flight operations and provide all of the aircraft and pilots, both power and glider. The Air Force Cambridge Research Center was the sponsor and proposed Dr. J. P. Kuettner as Project Scientist for field work.

The U.S. Navy agreed to supply tracking equipment, some personnel and much logistic support.

THE MOUNTAIN WAVE PROJECT

The Air Force became the major project influence while the Office of Naval Research fulfilled more of a supporting role. In addition, the U.S. Weather Bureau, Washington, D.C. office, sent some researchers from time to time. Synoptic forecasts were obtained from Los Angeles' air weather service and the facilities of the station at Bishop Airport were at our service.

The leadership given to this project was outstanding. Of the research personnel, Dr. Kuettner, as Project Scientist, was not well known in this country as a pilot at that time, but he soon demonstrated to the SCSA team that he is an experienced and competent airman. He had done original theoretical atmospheric wave analyses in Germany.

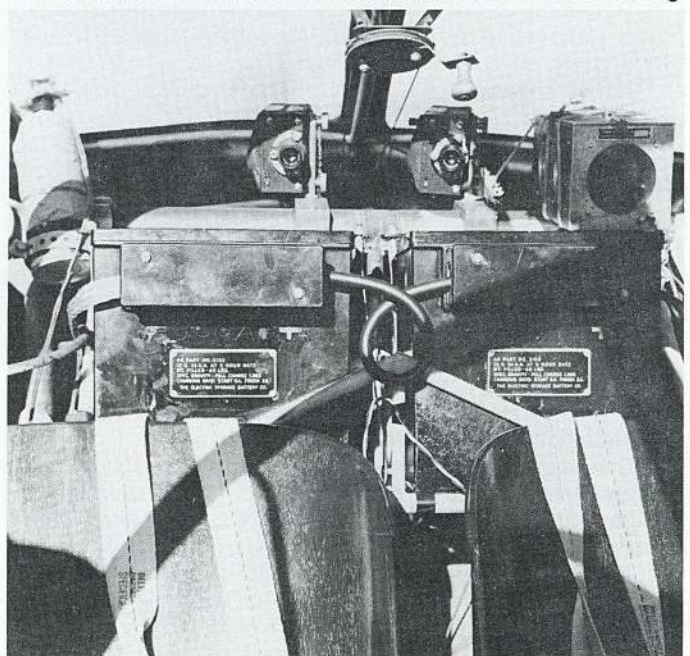
Dr. Klemperer was one of the world pioneers in aviation. His was the first three Gull soaring badge ever issued, which was a source of great satisfaction to him. As a scientist, meteorologist, engineer, leader and diplomat he was outstanding. He had occasion to use his talents extensively in these projects.

As lee wave theoreticians UCLA brought to this country, Professors Hoiland and Queney, from Norway and France respectively. Professor Holmboe appointed undergraduate and graduate students and staff people, such as Edinger, Klieforth, Knox, Wurtele and others, as a team to select and to deploy ground based instrumentation appropriately matched to those in the sailplanes. These were used to evolve useful mathematical models from the findings of the airborne and ground-based explorers.

About the time that the SCSA was listing candidates to be the pilots and support crew, the man who was everyone's first choice as Director of Field Operations, Paul Tuntland, was killed in an accident. This tragedy was a blow to all who knew Paul and was cause for concern about the project's viability by the University and, possibly, the Air Force.

Paul's close friend, Ed Minghelli, volunteered to help put the sailplanes in condition. He was surprised that he would be paid for his efforts.

The team which did the air work was of outstanding



Equipment: batteries, thermophile (outside air temperature), cameras and barograph ready to go.

quality: Ray Parker as Chief of Field Operations; John Robinson, Chief Pilot; Larry Edgar as the man who kept the machinery going: tow planes, cameras, instruments.

To an unusual degree the talents of these people were interchangeable. Each could fly tow planes or sailplanes. Each was able to instrument, to maintain, to operate the radios and other equipment, and each became knowledgeable, responsible, resourceful and dependable explorers of meteorological conditions. Without men of this calibre and character there would have been no project. They were supported by Betsy Woodward (now Betsy Proudfit) and Richard Eldredge who did principally ground-based work, though both were rated pilots and occasionally flew.

We had to buy the sailplanes. Two Pratt Reads were selected from the stack at Herman Stiglmeier's Glider Farm. These Navy surplus, two-place, side-by-side, training gliders had very few hours on them, but after seven inactive years, showed they had received little tender care.

Minghelli found a small, wood-frame vacant building near his home at Baldwin Park, east of Los Angeles. It was rented, insured, the pews moved (or used) and the gliders were stripped, reinforced, repaired, doors enlarged, formed plexiglass canopies made (and specially mounted to withstand shrinking in low temperatures).

New instrument panels were fitted out for photographic recording by modified (1.8 and 0.9 seconds/frame) 16mm gun-sight-aiming point (GSAP) surplus fighter plane cameras. These cameras were mounted to the main spar carry-through structure between the pilots' heads. Just as the rent money/lease ran out, the gliders were moved to the "Bunkhouse" at El Mirage by trailer, finished off, then test flown.

On January 21, 1951, Gus Briegleb towed them, one-at-a-

time, to Inyokern, California at the southern end of the Sierra Nevada Range, quite near the Naval Ordnance Test Center at China Lake, because there was no hangar at Bishop (which lies about 120 miles to the north also in the Owens Valley. During the spring and summer of 1951, George Deibert bought a surplus hangar located at Tonopah, Nevada, and reerected it at Bishop so that the second season would see the project based there).

The Korean War was on, and trying to put oxygen systems in the P. R.'s was made difficult because we had no priority. Slowly pressure demand systems, good for 45,000 feet, maximum, were pieced together from U.S. Navy and Bob Symons' stores. Electricity to run the gyros, cameras, etc., was supplied by two heavy wet-cells mounted to the main spar carry-through by brackets welded by John Robinson. Finally, a Navy fluorescent fire orange paint was applied to the undersurfaces of the sailplanes.

The objectives of the period from January to May of 1951 were to try out the organizations — to work out the problems in the operation of the sailplanes, to establish the workability of tracking them by cine theodolites and radar at high altitudes in actual wave conditions, using radios for coordination.

In the first field operations days, before we flew, there was great anxiety by the ground-based participating agencies. Suddenly they realized that their prestige was on the line. Much money and many people's time had been invested in the proposition that, under intimidating weather conditions and above the rough-piled icy granite of the Sierra Nevada Massif, at a specified time of day, one or two gliders would be on-station, only because we said they would be there. It did not sound so difficult over maps in the offices of the Univer-

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The Pratt Read before rebuilding.

Suited up: Ray Parker, who served as chief of field operations, and John Robinson, chief pilot, with a Pratt Read. Notice the radar reflecting patterns on the fuselage.



sity, but here — with the dust-choked wind howling about the awful emptiness of the cold desert in winter — someone could be and might be overly optimistic.

Further, the Navy had to withdraw its promise to do the tracking, because of the war. The University could not help, so the membership list of the SCSA was reviewed and some semi-skilled engineers, housewives and pilots were called for weekend duty. The Navy turned the three theodolites



The Pratt Read's oxygen installation.

(Askaniyas and Mitchells, which had differences in operation) over to Dr. Klemperer and, after a day of instructions and explanations, tracking began.

It worked well enough to prove the operation would be successful. It further showed that if Ray, John and Larry said that they would be soaring in a given wave at 30,000 feet over Independence, California at 10:00 hours with all the gear operational, they were there, and often had to wait there for the others on the ground to get up to speed. The UCLA, USAF and USN people were impressed and relieved.

A friend of the SCSA, who was a radar expert, Homer Sargent, took a "surveyed" Navy radar van from the NOTS junk yard and got it operational. The Pratt Reads are mostly of wood and the radar return was limited initially to about 60,000 feet slant range. This was not enough unless the gliders were almost immediately overhead. Klemperer suggested that Bill Ivans be asked to fly his 1-23 with us — surely Schweizer's aluminum would reflect.

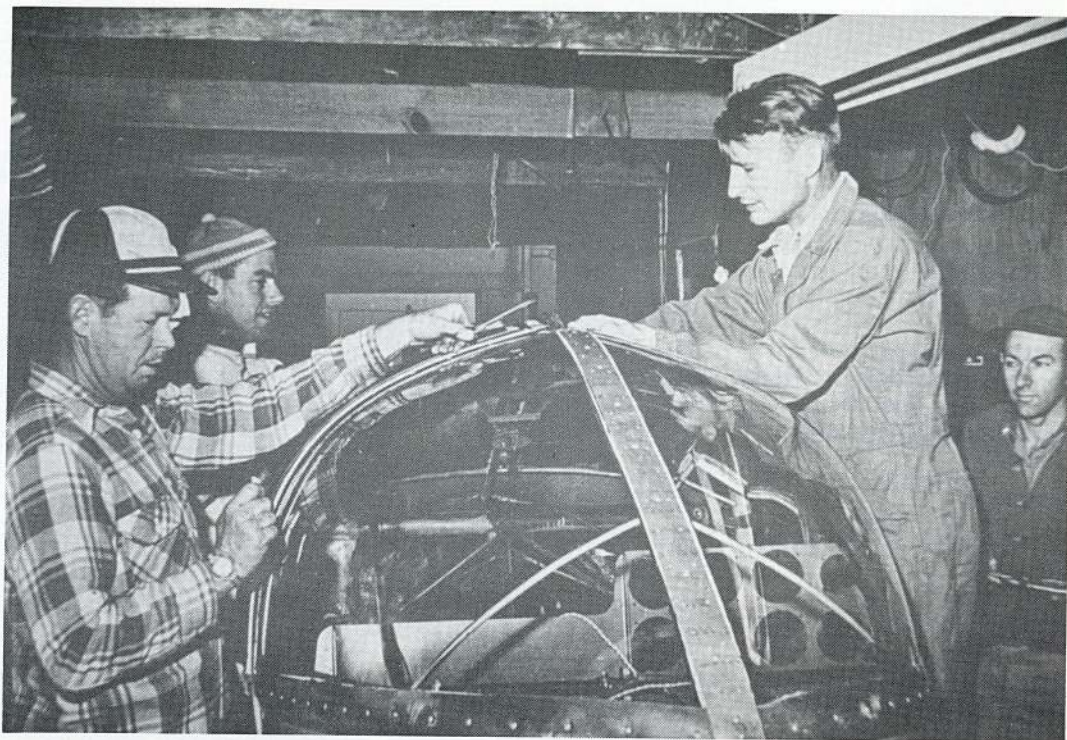
Meanwhile we learned that Bob Symons' P. R. used aluminum foil to reduce heat radiation from the cockpit. We pasted strips of aluminum foil in patterned arrays on the SCSA's Pratt Reads, then repeatedly flew the various mix of sailplanes abreast into the radar scan. At a signal, one of the sailplanes continued on course while the other turned right or left to see which craft would hold the radar locked-on. Surprisingly, it was usually the SCSA's ships that held radar lock!

Not all of the 150 (more or less) members of the SCSA were enthusiastic about the Mountain Wave Project. As much as possible the available work was "spread around", but inevitably, some never were chosen — there simply wasn't that much work or money available and typically the best qualified were used as judged by their known capabilities. Some of those not chosen became resentful and a few SCSA meetings were uncomfortable.

The SCSA's project office was in my home. Dorothy Rowberg, who had been Dr. Klemperer's secretary, did the typing at Los Angeles and kept files. Legal advice was given by attorney David A. Matlin, then treasurer of the SCSA. Accounting was handled by a friend of Matlin's.

These SCSA "centers" were scattered widely through Los Angeles, the distances ranging to about 15 to 30 miles. Communication was by a project phone in the dining room. The SCSA people were in the prime of life and had good track records in that they had held or then held good, responsible jobs. The University, oriented toward using people with

Workers: Robinson, Parker, Edgar and Briegleb rebuilding the Pratt Read.



scholastic reputations (either made or in the making), were somewhat dubious about the SCSA's less rigorous view of this requirement, but did not interfere. Professor Holmboe, as project director, had made it clear at the outset that he was a "frugal man" — and he proved it.

The pilots shared ground maintenance and flying tasks. They were paid about as much as co-pilots on major airlines were getting in those days — no princely sum.

Financing was a continuous and major problem. The SCSA, as a loose association of glider pilots and clubs, was able, only over the signature of member Dwight Whiting, a Union Oil Company director, to borrow from a loan company, \$3,000.00 at the then usurious rate of 13%. As more and more activities were added in the field, the cash flow got to be up to \$3,000.00/week.

We had to have a check every Friday without fail. One Friday the check did not come so I anxiously drove to the Business Office of the University, arriving 10 minutes before their closing time. Some minutes later the check was traced to a little white-haired old lady in the basement — who refused to give it up. Yes, the paper work is in order, she said, "But those Glider Pilots are being paid more than I am." She obviously was upset.

"Ma'm, if you fell out of your chair, how far would you fall?"

"Well, to the floor, I suspect."

"Those glider pilots, ma'm, if they fell out of their chairs would fall 40,000 feet."

The check got to the bank on time.

The situation in the field was risky. Now occasional yarns are told about the way "many" aircraft, including P-51 Mustangs, were "used up" in these projects and that several people were killed. Let us set the record straight:

No P-51's were used in these projects.

No project personnel were killed.

One Pratt Read was destroyed in the air. Larry Edgar, who was the only one on board, survived.

One Pratt Read made a landing on a dry lake in the Saline Valley, the only off-field glider landing made. The nose skid was cracked on a stone in that incident. All project aircraft and pilots were safely landed at Field Headquarters before dark on that and every other day (with the exception of Larry's jump). One towplane that had a balky engine was not

flown home. Kuettner made a "down-wind dash", using waves.

Yet many will recall the loss of Karl-Erik Ovgard, of Sweden, in mid-December, 1951, in the tremendous wave flown by him and the Project (SCSA) Pilots. Karl-Erik, as a visitor to this country, was not eligible to be employed either by the University or by the SCSA. Since we knew that he was in desperate financial straits we did purchase from him motion picture footage and photographs that he took of the sky conditions and ground activities. He wanted to fly, to photograph waves and to set records. Accordingly, he rented a Pratt Read owned by Bob Symons and John McDonald and, after being instructed to put his oxygen regulator on "100%" at 30,000 feet, he was towed off.

For several anxiety-filled days after that wave a blizzard raged in the mountains and drifted into the Owens Valley. When the weather cleared, Karl-Erik was found dead near Manzanar in the crushed, wingless fuselage of Symons' Pratt Read. He had taken photographs during that flight. One of the last was of his instrument panel, which showed the altimeter at 33,000 feet (10km), the oxygen tank pressure at zero and the regulator set on "normal" instead of 100%. He did not know that he was breathing only ambient air.

The rate-of-climb shows that he was rising at 700 feet/minute (3.5 m/s). The barogram, though badly smeared seemed to show a maximum of about 37,000 feet before he presumably fell forward (no shoulder straps). I was told that the tip of one of the wings was found high in the Inyo Mountains, about 20 miles down wind some years later. Karl-Erik left his widow and baby son in Sweden.

The time-lapse motion picture footage of December 18, 1951, in the Project "Phase II" Film, is of the wave in which Karl-Erik met his death. He took it in the morning, before he made his flight. He was so excited that he neglected to remove the yellow filter from the lens of his camera, hence that sequence has a most dramatic appearance.

Phase II, especially early in 1952, was a season of prolific accomplishments. By that time the teams had worked together enough to know their capabilities and we began to think about Phase II; to dream of actually designing stratosailplanes and flying them to altitudes on the order of 70,000 feet.

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Participants: (back row) Robinson, Edgar, Klemperer, and Kuettner. (front row) Parker, Eldredge and Saudek.



Costs to the Air Force of the Mountain Wave Projects represented a major share of the funds available to the Cambridge Research Center. Clearly, the stratosailplanes at \$280,000.00 and their use into the 1955-1960 period would have meant a gross jump in expenditures. We heard many objections — few (probably none) were from active project researchers.

Some have said the U-2 spy plane's development caused that idea to be abandoned in 1953, but by May, 1952, the Mountain Wave Project's flight activities had ended. The Pratt Reads were put into storage, first at Ontario, California, then at El Mirage.

Data reduction by the SCSA continued for about another year under direction of Betsy Woodward and Richard C. Eldredge. Report III, summarizes the activities and describes the calibration of sailplanes and of flight instruments. This, and a revision of Report II, the stratosailplane proposal were finished by October 31, 1952. Betsy and Dick worked for and at UCLA — except when producing the Mountain Wave Film, Phase II, now in the NSM Film Library.

THE JETSTREAM PROJECT

"The exploration and utilization of the Jet Stream by Sailplanes", a paper written by Dr. J. P. Kuettner, is not dated, but appears to refer to the period late 1954 or early 1955. This suggests he was beginning another sailplane expedition; and so he did, by using well instrumented B-47 and B-29 meteorological research aircraft. These aircraft have high wing loadings and lack the ability to measure fine movements in the atmosphere as accurately as sailplanes.

One of the objectives of using a sailplane in conjunction with the B-47 was to improve the accuracy of the instruments by providing a known datum point, a reference which was fixed in space at high altitude. Let the sailplane fly to 40,000 feet and adjust forward speed and sink to essentially zero with respect to the ground. That done, let the B-47 lock onto it as it cruises up wind and down wind, the instruments noting both the up and down currents and the sailplane's position exactly — and voila! it is calibrated!

Lyle Maxey, Larry Edgar and Betsy Woodward did the flying for the SCSA. The SCSA provided a Pratt Read, now equipped with 16 man hours of oxygen and new radios. In 1955, Frank Kern modified the Schweizer 2-25 for high altitude soaring. There was some hope that a situation would

arise that would permit the sailplanes to zip off down wind in a jet stream for 8 hours or so to extend Kuettner's 1952 flight (in a TG3) of 410 miles — in less than four hours — to really impressive numbers.

This program, for which the Air Force obtained the services of UCLA, SCSA and Bob Symons and his associates, was a much smaller effort than the Mountain Wave Projects. However, it was approached in the same manner: one season to try it out (1954) and then go full scale (1955). Many new ground based instruments were tried out in these years.

While the B-47 jetted past the Pratt Read, an instrumented B-29 rumbled east then west across the Sierras from 30,000 feet on down. Once, against Larry Edgar's recommendation, it made a down wind pass at 18,000 feet. As it passed the crest of the mountain range it was dropped into a wildly boiling rotor over the Owens Valley. Windows were knocked out of its flexing fuselage and it was forced into the defiles of the Alabama Hills, through which it retreated to a safe landing at China Lake.

The 2-25, flown mostly by Kuettner, made many high flights — up to 42,000 feet. Some of his experiences illustrate that such altitudes hold many dangers. A review of his articles in **Soaring** should convince anyone of the extreme hazards and special training and equipment required to survive various kinds of emergencies. Betsy, who could fill almost any niche in this kind of work — photography, data reduction, flying sailplanes, instrumentation, maintenance, illustration, report writing, etc., flew, in 1955, to 39,393 feet, solo, in the P.R. Her record still stands.

The variety of conditions flown and observed began to fascinate the scientists as the influence of the jet stream on waves, and of the more-than-coincidental occurrences of tornadoes in the mid-west two or three days after most waves, became more apparent.

Meteorologists became more familiar with various kinds of waves and their life histories which even now are not described in the popular literature available to soaring pilots. Until 1954, the cross-section models of waves showed a sequence of rounded peaks and troughs down wind, and this is probably the still popular concept. The idea of "pressure jump waves" had been considered in UCLA mathematical models earlier. It was believed to be analogous to the well-

(Continued on Page 15)

The President Speaks

NSM Combines Old and New

by Bernald S. Smith

This is my first opportunity to greet those who support the National Soaring Museum. It is an honor to serve you.

A museum may be less than a living thing to many who think of it as a dusty gathering place of memorabilia. It may be rejected by those who dismiss the past in their desire to 'be with it' regarding the future. The word 'museum' is old, coming from Greek classical antiquity meaning a place sacred to the Muses: **mouseion**.

However, beginning in 280 BC and continuing for nearly seven hundred years, the Mouseion of Alexandria, established by Ptolemy I, was a great institution of literary and scientific studies, virtually a university of the Hellenistic world. The NSM Trustees, in their consummate wisdom, are moved to create just such an exciting, vital entity. (We already have the Cibola 2-32 project for scientific study).

Collecting, preserving and presenting artifacts, as practiced by Ptolemy, are important objectives for NSM. Yes, there will be 'things of the past' on display. For, if nothing else, man's greatest failure may be his inability to learn from the past.

— Plus ça change, plus c'est la même chose —

You have read previously of the marvelous plans for NSM. It is a grand project that takes time and is moving ahead well. Where do people fit in? Without people, a museum is nothing. But, how do we relate to something so far away? Because this is the National Soaring Museum, most of us are geographically far away, just as most of us are far away from our national government or even our state government. How often can we expect to actually visit a National Soaring Museum that is so far away?

And therein is the answer to membership. For in your membership, the National Soaring Museum exists wherever its members reside. We must appeal to the strong, continuing support of you all: first by becoming a member; then by continuing that membership support each year; by upgrading to a higher category of membership whenever possible, and finally, spreading the word and actually enlisting others as NSM members.

A museum has got to be a sort of ego kick for its members. It's not something you can get your hands on, like the controls of a sailplane. The joy will be the realization that you're participating in the creation of a soaring 'mouseion' that will serve not just the ruminations of a few old-timers, but stir potentially hundreds of thousands of visitors into an awakening interest about that thrill of atmospheric energy extraction we call soaring.

Although it's different, certainly it can be as great as the joy of actually manipulating the craft to use solar energy. Thus, each of you will surely be proud to say: 'That's my National Soaring Museum!'

I stand in awe of the tremendously talented Board of Trustees whom I now join. They and the dedicated staff are charged to create this great soaring institution, but each of you are the ones who really count in putting it all together. Thank you for your continuing support.

Wave Camp Proceeds To Soaring Museum

Black Forest Gliderport in Colorado Springs, Colo. will donate to the National Soaring Museum 10% of all flying revenue generated by its Wave camp from February 7-12, 1977 (the week immediately following the SSA Convention in Tucson).

The museum has planned a number of special events at Colorado Springs for that week, including films, guest speakers and socializing.

Those interested in attending this Wave camp may make reservations by contacting:

Wave Flights, Inc.
9990 Gliderport Rd.
Colorado Springs, CO 80908
(303) 495-4144

From the Director

Lack of Space Limits Displays

by William D. English

The heart of any museum is its collection of significant artifacts. In the National Soaring Museum's case, the heart of its collection are several significant and beautiful aircraft.

The Arnot-Herring Glider, a Goppingen Minimoa, a HU-17, a primary glider, a Schweizer 1-23, and several other aircraft form the backbone of the museum's collection. In addition, the museum has promises of many more ships from several sources as soon as it has facilities for adequate protection and display.

Individually, these aircraft represent distinct and important design philosophies. Collectively, they are a fine and unique group that can be envied by any aviation museum.

Because of our present lack of space, these aircraft are in storage and not available for viewing by the general public. With a few exceptions, no restoration work on these aircraft has been done so they are not ready for public display.

This is a situation we intend to rectify in the near future.

At their most recent meeting, the museum trustees discussed the situation and decided the museum needs to develop space now for the restoration and exhibit of sailplanes so that when our permanent facility on Harris Hill is built our aircraft and exhibits also will be ready.

While specific plans for the development of this extra space have not been completed, it is clear that when it is available the museum will be much better able to serve the soaring community as its National Museum and showcase for the general public than has been the case.

On another subject, the Cibola Committee, under the leadership of A. J. Smith, has made important progress in developing a research program for utilizing the museum's 2-32. We anticipate that in the next few months this aircraft will be engaged in studies that may have an impact on sailplane design and handling characteristics.

I would like to thank the museum membership for its generous support of museum activities during the past year. Without this support, the museum could not continue to expand its activities or sustain its present program.

I hope that we can count on the continued support of our membership — Without it the museum will need to reduce the level of services offered.

With the continued support of the membership, the museum can maintain and accelerate its progress and provide the soaring community with a valuable institution.

In Appreciation

The National Soaring Museum thanks the membership for the support and encouragement it has given the museum during the past year. Without this support the museum could not serve the soaring community.

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The Sierra Wave

(Continued from Page 10)

known hydraulic pressure jump, where most of the energy comes out in the first big surge, and there are no more big undulations down wind. These "Jump" conditions can be local, perhaps temporary, anomalies in an otherwise extensive classical wave flow. Or they can be the major, or entire, wave activity along the lee slope of a range.

Further, it is now known that they can exist in two distinct categories: The first, and more common, is the "Pressure Jump" with cloud base at mountain-peak elevation. The second, later in the day, is the less frequent "Heated Pressure Jump", with cloud base at twice mountain top altitude. Both can be lethal for any aircraft. There are still other recognized kinds of wave forms that can and have killed pilots. I suspect that there are many others not yet recognized.

The last wave flown in the Sierra Wave Projects (the 25th and 26th flights to 39,000 feet or higher) was a "Pressure Jump" variety. Kuettner threaded his way through small clouds at 14,000 and reported "fantastic" turbulence. Sustained +4 g accelerations ending in wrenching, high-speed stalls occurred repeatedly. Larry Edgar's tale is more terrifying. After hearing Kuettner's warning, he headed toward the leading edge of the extensive lenticular cloud at 14,000 feet and, as he was engulfed by a small cloudlet, the Pratt Read was torn apart, subjected to about +16 g's acceleration. Larry took 20 g's for at least 0.4 seconds according to medical specialists.

CONCLUSIONS

Two years ago, a student of meteorology at UCLA stated: "I just can't believe that only twenty years ago waves and mountain meteorology were almost unknown." He was born in 1951.

Was it worth the zealous efforts, risks and dollars? If there has been only one airliner which was saved from these destructive forces by weather reports about waves, or by knowledge of how to avoid them, or to recognize them — and stay out of the danger zones — then it has been worthwhile.

The fact that such aeronavigational hazards have destroyed airliners since these projects brought waves to the attention of weathermen and pilots is not due to any lack of effort by the Air Force Cambridge Research Center. A total of 42,000 copies of their document: AFCRA Technical Report 53-56, No. 35, "Flight Aspects of the Mountain Wave" by Kuettner and Jenkins (1953) were distributed. Every American owned airline and ATR and military pilot in this country (in 1953) was given a copy. Many further studies have delineated problems for specific areas, especially near Denver, Colorado.

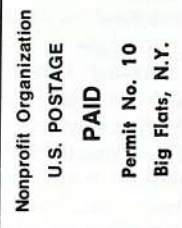
Kuettner, who soared a wave in 1937 in Silesia, climbed to the brow of a lenticular cloud at 23,000 feet—without oxygen in a Grunau Baby—has continued this research at the National Oceanographic and Atmospheric Agency. His report at Alpine, Texas, in 1970, described vertical sectioning of waves by airplanes from near-mountain-top-height to above 70,000 feet. And, yes, the stratosailplane presumably could have made that altitude 15 years sooner.

I am satisfied that the effort was worthwhile and worked very well.

Use Your Film Library

Letters

Late Invite Explained



Dear Sir:

Enclosed is my check for my Family renewal for a very worthwhile museum. I am hoping it grows and the building project takes shape and gets out of the ground before long.

I have a complaint which I am making in hope that you take it as a constructive complaint.

I received my invitation for the Striedieck dinner to be held on Oct. 30, 1976. I received the letter on Oct. 28, 1976. By the time I would of sent the letter back the dinner would of been over. I feel that the invitation should of been mailed in time even for slow mail to reach the members.

If the intent of the dinner was just for the Eastern area and the Board of Directors I feel the museum should not of sponsored the dinner and used funds of the museum for mail and invitation.

It would of been a most interesting dinner to attend and I am very sorry I didn't have time to make arrangements to attend.

Sincerely yours,
Dick McNattin
Champagne, Ill.

Editors Note: Invitations to the Striedieck dinner were mailed the last week in September. Museum personnel apparently overestimated the U.S. Postal Service's speed. Unfortunately Mr. McNattin is not the only member who received his notice too late to attend. We are sorry.

WWII Glider Pilots to Meet

Dear Sirs:

I would appreciate very much if you could find room to add a note in a future edition of the magazine about the **National Reunion** of the "National World War II Glider Pilots Association," for 1977. It will be held at the Hilton Inn, Albuquerque, New Mexico, on 22, 23 and 24 September, 1977.

I have the honor of serving as the reunion chairman, and I expect around 400 WWII combat glider pilots, who flew the famous Waco CG4A, Horsa and other WWII Gliders. And, of course, we all flew sailplanes in training. Counting wives and guests, I expect around 800 people to attend this reunion. I would be most happy to furnish you with any additional information that you might be interested in.

Thank you very much.

Sincerely,
Jack C. Riddle
Major USAF Ret.
New Mexico State Commander
National WWII Glider Pilots Assoc.

P.S. This reunion will be our Seventh (7th) consecutive National Annual Get-Together.

National Soaring Museum
Harris Hill, R.D. 1,
Elmira, N. Y. 14903