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By Leonard Reiffel

Why is it that the wax tablets we call our memories so often capture and hold little moments, while the great events in which those little moments are embedded melt away with the heat of time? I have a few little memories about a great event that I want to try and share with you now. They seem to me like the last few grains of sand that remain in my hand from a time when I had a handful. Perhaps I squeezed the sand too hard and it ran out between my fingers. I don't know. Whatever the reason, my recollections of the Summer of 1962 have, over the intervening years, receded far back into my mind. I'm left with just a few bits and pieces. Let me set them before you while I still can. Perhaps in the process, through the chemical magic of the brain, more of the texture of that summer will come back to me.

It's not that I don't think about those times often. I do. But when I do, somehow my mind settles on just a few scenes that at the time were almost inconsequential, or at least so they seemed.

I remember, perhaps most vividly of all, one evening at dusk when we rode by jeep back to the little village of Seetaga. Our mission was to attempt the repair of a corroded and weather-beaten little portable radio of German make, the greatest and proudest possession of the village chief. We had been to Seetaga before and we returned now like knights in shining armor—or at least so we were received by the villagers.

The real reason I was returning was not at all because I was trying to be a hero to the little group of Samoans who lived in that tiny village—two hours by jeep west of Pago Pago. I knew the real reason I had come back in all my heroic altruism was to see a woman named MaryAnn and debate with myself, once again, how, if in any way, I should recognize her existence and, indeed, her availability.

When we arrived at the village in our caravan of jeeps, we were greeted, as we had been before, with the shouts and smiles of the little children in the encampment. Seetaga is a small village on the coast of Tutuila in American Samoa. Back in 1962 the tourists had not yet found American Samoa and certainly not Seetaga. What evidence we saw of the Western World was largely in the last names of some of the young men and women of the villages. An amazing number of these younger people, whose features were suggestive of a mixture of Caucasian and Samoan blood, were named Thompson. The Marines had been in American Samoa during World War II, along with many other branches of the service. Apparently the name that the Marines chose to use when they were in what they felt might be compromising situations was Thompson. And so one finds today that many of the handsomest natives, by our standards at least, proudly bear that name. But all that is from another time.

When we arrived in Seetaga, it was about dusk. The falis, the thatched roofs on poles that constitute the houses of Samoa, were filled with families. There were probably no more than 10 or 12 falis in Seetaga arranged in a rough semi-circle and facing the sea and the sunset. In an earlier visit I had been asked whether perhaps (since it was known that we were working with strange electrical machinery) I might be able to make the village radio play again. And I had promised that I would come back when the crush of fast-moving events that had brought us to Samoa in the first place was over.

I now intended to make good on my word. The caravan I brought into the village that evening included our best electronics technician. We dismounted from the jeeps and, surrounded by laughing children of all sizes from two to 12, moved as a group over to the biggest fali in the village. The natives knew why I had come. And as I took off my shoes to mount the stair to the grass-matted floor of the fali, the little German portable appeared as if from nowhere.

There was no equipment with which to work except the little that we had brought from our own encampment which was back toward Pago

Pago, about an hour's drive over muddy ruts and slippery curves, all hanging on the edge of the steep slope toward the sea and overgrown with foliage ready to slap the faces of the unwary.

I set the radio down on the floor of the fale and opened the cover. The one oil lantern of the house was hastily brought up and placed on the floor beside me to improve the light. Ed Voirol, the technician, and I got down on our hands and knees, laid our cheeks close to the floor, and stared at the inside of the radio. The salt sea air had done its work thoroughly. Corrosion had taken the radio beyond any hope of repair.

We worked perhaps a half hour on our futile task. Darkness closed in around us. All we could see outside the circle of light from the lantern were the shifting bare feet of the Samoans. After a time and several hopeful tries at turning the radio on, Ed looked at me and I looked at him in the yellowish glow, and we both knew that we must tell the natives the truth... that their radio would never work again.

We straightened up. Only then did I realize that my back was aching and my eyes had been blinded by the bright glow of the lantern flame. As I peered into the receding darkness beyond the lantern, I realized that the entire village had been gathered to watch the two palangis from America fix their radio. As my eyes adjusted to the dark, more and more pairs of bright brown eyes gazed hopefully back at me. There were two or three rows of children and behind them lingered the more sophisticated adults. But in all those eyes, there was a look of friendliness and hope, accented perhaps by the warm glow of the lantern, that I shall never forget.

As we were driving to the village, I had admitted to myself the mixed reasons for my visit and my intention to assess, once again, the woman called MaryAnn. I had met MaryAnn on the occasion of our first visit to Seetaga. We had had a break in the preparations we were making in our own camp at an abandoned airstrip, and we had decided to use it to explore the island of Tutuila. We took off arbitrarily down the two ruts in the red mud that constituted the road beyond the airstrip and had come, after a time, to her village.

On our first visit, it was not dusk, but mid-day. The sun was brightly shining and palm trees and white clouds stood out against the blue sky. As we entered the village, as happens always when strangers, especially white strangers in jeeps come to one of these remote settlements, children appeared out of the jungle as if from nowhere and we stopped to converse, as best we could, in sign language and broken English and thoroughly shattered Samoan about ourselves and about those simple things that strangers use to try to bridge the gulf of language and culture.

We were able to get across somehow that our group had come to their island on a scientific mission. We were part of a great torrent of men and materiel that had poured into the Pacific that spring and summer as part of what was known as Joint Task Force 8. J-T-F-8 was the group assigned responsibility for carrying out the 1962 United States nuclear testing program, and our particular concern was to be the massive high altitude nuclear explosions that later were to rock the Pacific. In Samoa, we were seemingly a long way from the main events. The great Thor rockets destined to launch the weapons into the high stratosphere were positioned on Johnston Island thousands of miles to the north. But we had come to Tutuila and American Samoa because it represented the closest civilized place to what is known as the conjugate point.

In a high altitude explosion, the nuclear effects can be very widespread. We did not know precisely how widespread. Electrically charged radiation, mainly very high speed electrons and charged radioactive fragments from the bomb itself, can be trapped in the earth's magnetic field. A great toroidal radiation belt surrounding the earth can be created by the injection of such charged particles coming from a nuclear burst above the atmosphere.

Think a moment about the shape of the earth's magnetic field—it's a bit like that of a bar magnet. The lines of magnetic force leave the atmosphere in the northern hemisphere, sweep out into space, and come down again into the atmosphere at the so-called conjugate point in the southern hemisphere. A nuclear burst in the north could have perhaps half its radiation and energy channeled by the earth's magnetic field and

carried far out into space and then returned to the earth. According to the theory, being at the conjugate point of a nuclear explosion would be almost equivalent to being right at the explosion itself.

Our task was to send skyhook balloons, huge plastic bags 75 feet or more across when fully inflated, up into the high stratosphere. According to the plan, these skyhook balloons would reach altitudes of over 100,000 feet and drift west to the conjugate point where they would be directly exposed to the incoming radiation from the bombs shot off over Johnston Island. It was, and still is, essential to the understanding of nuclear weapons and how they might be used in the space age to know precisely what fraction of the nuclear energy can be trapped by the earth's magnetic field and thus create radiation barriers in space or widespread communications blackouts. Our balloon-borne radiation instruments had to be above the atmosphere because the radiation cannot penetrate through the shielding atmosphere to the ground.

Now, of course, we did not try to explain all of these technical details to our hosts on American Samoa. Instead, we stood there in the tropical sunlight on our first visit to Seetaga and exchanged pleasantries as more and more of the villagers gathered around our jeeps parked at the beach.

As we stood with our new-found Samoan friends in the fresh breezes off the Pacific at Seetaga, I noticed that in one of the more distant falis there was a woman who had not come out to join the rest of the group. Apparently, the matai of the village noticed me glancing in her direction, for he immediately turned to several of the village elders who were standing next to him and began an animated conversation which I could not follow. By then they had understood that I was the matai, or leader, of the American balloon expedition to their island, and I presumed that we were about to be invited to dinner, or that some similar courtesy was being planned.

Two of the elders departed from our little group and walked quickly over to the fali where the woman was busy working on the Samoan

equivalent of housekeeping. They returned with her in a few minutes and she stood with the rest of the villagers. My colleagues and I smiled a greeting to this new addition to our audience and then turned aside to discuss the probable time for departure so that we might see somewhat more of the island before returning to camp.

During these moments, perhaps I smiled once again at the woman whom I came later to know was named MaryAnn. MaryAnn was, I suppose, in her late 20's or early 30's, and she had that delightfully liquid walk of the South Pacific, expertly accented by her clothing which consisted of nothing more than a red-flowered lava-lava, in essence a bedsheet wrapped around her body at the level of the armpits and ending slightly below the knees. Her hair was long and straight and black, and her figure was ample. Her skin had somehow escaped the scarring that life in the microbe and disease-infested jungles had brought to most of the natives—even the youngest.

I had always felt that Gauguin's paintings of the women of the South Seas were distorted. It was not until I arrived in Samoa that I realized the square-footed, thick-ankled figures by Gauguin were quite realistic. Indeed, MaryAnn and the other women of the village could have stepped out of his most famous paintings. I certainly was not particularly taken with MaryAnn. My tastes, perhaps because I had not been away from the United States for very long, still leaned very much toward the willowy blondes and brunettes that we here admire so much.

The chief made a few further remarks to the village elders standing on either side of MaryAnn. They whispered something to her and, without another word, she turned and left our little group and strode toward the center of the village green, some 50 feet away, where a lone palm tree stood. Attached to that palm tree was perhaps the only obvious evidence of the white man's invasion of the back country of Samoa. World War II military engineers and missionaries had combined forces to bring fresh water from the Samoan mountains to these little village outputs. A single one-inch waterpipe snaked its way down the hills and through the jungle

and then out into the clearing that was Seetaga. It ended tied to that lone palm tree about eight feet above the ground, and water—cold and clear—poured forth from it continuously.

MaryAnn walked over to the tree which served as watering place, laundry, and bath for the entire village. With one sweep of her arms and before the entire population of the village, she dropped away her lava-lava and began to wash. She reached up to a little shelf that had been built into the tree and retrieved what we later came to realize was a most precious possession of the village—a bar of soap. And there before all of us, she bathed, in the natural and unashamed way that a child might bathe at the seashore. With her hair sleek and fresh and her lava-lava back in place, but pressed more tightly than before to her still-wet body, she turned to rejoin us. We, in the meantime, had been trying very hard to maintain our composure. We had all been working very steadily since we landed on Samoa and we had not really been exposed to the people nor to the social customs of the islands. All of this was, therefore, quite new to us.

MaryAnn pressed through the crowd of children nearest to our jeeps. I was leaning on a fender trying to be nonchalant. She stood before me and said something in Samoan while looking directly into my eyes. I don't know what she said. I simply smiled again. When I smiled, the children began to giggle excitedly and it was only then, and with the help of a muttered comment from one of my colleagues, that I realized the chief had just presented me with a Samoan bride—ready for the bridal chamber. The realization came with some force. I could feel the color rising in my cheeks. I was nudged from both sides by my scientist friends who were beginning to savor what to them, as spectators, must have been a delightful situation. I confess to a feeling of panic. I elected to beat a strategic retreat. Suddenly, I decided, it had become very late in the afternoon. We had many things to do back at the camp. We could not possibly afford to risk the success of our mission with any Shangri-La-like dalliance in the palm jungles around Seetaga. With as much authority as my voice could

muster under the circumstances, I announced that we had best be getting back to camp because, after all, we had so many things to do. Unsuccessfully avoiding a slightly pleading tone, I ordered my entourage back into the jeeps and to home.

MaryAnn was probably quite confused by this unaccustomed reticence. Social life in Samoa, after all, was not designed according to the puritan ethic. In fact, I later learned that the gravest insult to a woman in Samoa is to bed with her without staying the night in order to breakfast with the family in the morning. But this worldly wisdom was not something I possessed that sunny afternoon in Seetaga.

As our jeeps turned to drive back down the rutted road to our camp, the chief made clear that he would like to have us back. I must say that the look on MaryAnn's face made it clear that she would like to have us back, too. I don't know whether or not it was to give us a convenient excuse, but the chief then mentioned that he would also deeply appreciate it if, as scientific experts, we could return someday to repair the village radio. Relieved by this convenient way to save face and escape politely (although why I wanted to escape I do not to this day fully understand), I readily promised that we would indeed return to repair the radio. With that, I stamped so hard on the jeep's accelerator that I managed to kill the engine.

We failed to repair the radio on our return visit, as you now know. Late in the evening of that second stay at Seetaga, MaryAnn and I walked across the now-dark village green under some of the brightest stars and the darkest sky I had ever seen. That evening, she had gradually revealed a surprising mastery of English and also a considerable and deep understanding of life. As scientists and natives in groups of two's and three's walked toward the jeeps, she murmured very quietly to me. Her murmured question was a simple one: Would I not stay that night? After all, it was so far back to camp. I stood a moment in silence by the jeep before I answered, and then said, "No, I really have to get back to make sure the equipment is ready to go in the morning." The first nuclear test

in the Fish Bowl high altitude series was due to be set off over at Johnston Island the next night. . . . I never saw MaryAnn again.

The next morning, back at camp, we began our preparations for the explosion of a shot code-named Blue Gill. One problem had been gnawing at the back of my mind: For every shot we wanted to have two balloons in the air, one right at the conjugate point and one, say, a hundred miles or so to the east, so we could get some idea of the spatial extent of the radiation streaming into the upper atmosphere. We had been launching small weather balloons periodically to check the upper air winds so that we would know how rapidly our balloons would move west from Samoa to the conjugate point area. The winds were very low compared to what we had expected. Since at Samoa we were 300 miles or more too far east and since the winds were blowing only 25 to 35 miles per hour at the altitudes in which we were interested, it was painfully clear that we would have to launch our precious payloads, of which we had only eight or ten, well in advance of the rocket launching at Johnston Island. The grim fact was we would have to launch at least ten hours before H-hour, if we were to be at the right position at shot time.

This made us very vulnerable to last-minute problems at Johnston Island. Bad weather, problems with the launch vehicle, or any one of a hundred other difficulties could stop the mission before the explosion took place but after we had committed our payloads.

We had come to the island of Samoa full of confidence and quite certain, in spite of the hectic nature of our preparations, that we could accomplish our basic scientific objectives. Several days after the originally scheduled date for the Blue Gill test, our plans lay in disarray. All of our careful assessments and experimental designs had been shattered to bits by the vagaries of rockets, Johnston Island weather, and malevolent upper altitude winds. Twice we had launched our balloons in anticipation of the explosion and twice we had wasted our precious payloads. We were on the verge of total disaster. We had spent almost 50 per cent

of our balloon supply and had sent half of our lovingly constructed radiation detectors high into the sky and then into the ocean without getting a scrap of data. The explosions had simply not occurred. In the lull that followed a rocket failure at Johnston Island, we assessed our situation. There was no time to build more equipment, no time to get more balloons. Something desperate had to be done if we were going to insure that we could get our precious data from the re-scheduled tests.

Amid the ruin of our carefully contrived schemes, the balloon-launching expert, Otto Winzen, whom I had brought with us to try to cover any possible contingency, looked up ruefully and remarked on how different it had been for him on previous scientific balloon launches which he usually carried out from the deck of an aircraft carrier. The great plastic bubbles could be laid out on the deck prior to inflation. The carrier could steam with the wind and match its speed. Then, as helium was pumped into the plastic bag, it would rise off the carrier in a great vertical mushroom that could be quietly and calmly released at will.

"If only we had an aircraft carrier," Otto said ruefully, "we could launch right under the conjugate point and at the last minute!"

I replied lightly, "let's try!"

Otto laughed. The entire Joint Task Force 8 commitment hardly included any extra aircraft carriers. One does not simply requisition one out of the storeroom. Nevertheless, I dashed to my jeep parked off the deserted runway and decided to make a run into Pago Pago. It's Pago Pago, as written on the map, but the town's name is pronounced "Pango Pango" in Samoa where G's often sound like NG's.

Why in the midst of all the Holmes and Narver communication equipment at our abandoned airbase did I want to go back to Pago Pago? Simply because of the fact that while we were fully supported by a Signal Corps message group connected by classified radio links to headquarters of Joint Task Force 8 at Johnston Island, and thence to the Mainland via Hawaii, every message had to be laboriously encrypted because the Signal men could only handle classified material routinely. At that the codes were

so complicated that the Signal Corps usually had to decode a message two or three times to get it right. The speed with which we could get an unclassified, and therefore non-routine, message to the Mainland was roughly comparable to what might be achieved by sending it in a bottle thrown overboard. Indeed our entire program was greatly expedited by the presence of one wizened up old man who lived in Pago Pago. His name: Paul Hodges.

Paul was a ham radio operator. He lived in a small cottage opposite the hospital in Pago Pago. A Samoan woman—possibly his wife—lived with him, patiently padding around the house while Paul spent all his waking hours at his radio transmitter surrounded by ash trays of cigarette butts and coils of wire and dusty old electronics chasses. Paul, from his little outpost in the Pacific, could speak to the whole world. In 1962, his call letters, K6CQV/KS6, became famous among hams all over the world because of the strange traffic he was handling. By means of 'phone patches, Paul could put us in touch with anyone and everyone—including our homes and families—at almost a moment's notice....if the signal conditions were right. We would stroll into Paul's little cottage and ask him to connect us to Chicago. He would then raise any ham operator in the continental United States, or perhaps Hawaii, and request a 'phone patch. The cooperating ham would make a long distance telephone call collect to the number we were trying to reach and connect his transmitter and receiver to the 'phone. It was like having our own private worldwide Bell system, and it was almost toll-free.

Through Paul Hodges and with a sense of real desperation, I tried to convince the powers-that-be in Washington that we needed access to a ship if we were going to get our data. The simple fact was that no Navy ship was available, and even if it were, there wasn't time for it to steam down to the southern hemisphere to work with us. Furthermore, the Task Force had bigger troubles with mis-firing rockets, plus the fact that the atomic testing moratorium was being negotiated with the Russians at that very moment and the President had put a deadline on completing the tests.

I'm afraid my salesmanship did not come across very well over static-filled ham radio. I decided I had to get back to the United States if I was going to do any good at all—and preferably to higher echelons.

I turned on my heel and, with a shouted "thanks" to Paul Hodges, dashed back to the camp to grab my beat-up but very handy and lightweight suitcase. I hopped on the next shuttle airplane that J-T-F-8 ran between the South Pacific and Hawaii and streaked for home. Forty-eight hours later, dead-tired and suffering a bit from the shock of being hurled from the primordial jungle of the South Seas back into my apartment in Chicago with hardly time enough to breathe, I settled down at my bedroom telephone. It was 3 A.M. and, again, I took up my attempt to get a ship.

Before I left Samoa I had instructed my colleagues to see what might be done in locating a smaller ship—perhaps a tanker—that we might commandeer or rent for the duration of the series. And I asked them to keep in touch with me by means of the Paul Hodges pony express. Back in Chicago, I soon found I was meeting the same brick wall of impossibility that I had encountered in Samoa. We had had only ten days to go before the next attempt at a nuclear shot when I left for the States. Now we had only eight days.

I was lying on my bed in my bedroom trying to remember what it felt like to sleep when the 'phone rang. It was some nameless stranger who was really a great friend. He was a ham, he explained, and he had been asked to patch in from American Samoa to my number. On the other end of the line my excited compatriots told me they had found the ship. "What ship?" I asked them.

"The Manu'a Tele."

"I've never heard of it. How big a ship is it?"

"Well, it's not much of a ship, but it's a ship."

"How big is it?"

"Well, it's a little copra boat. But it's got diesel engines and Otto thinks we just might be able to launch from it if it can go as fast as the wind happens to be blowing at the time."

"What's its top speed?" I asked.

"Eleven knots," they told me.

Eleven knots is not much of a wind in the Pacific.

"Well, let's go with it," I said. "Let's rent it. Who owns it?"

"The chief of a village at the other end of Tutuila."

The chief was quite willing to let us use his ship for our special and peculiar purposes. The only problem was that the Manu'a Tele, in addition to being a copra boat, was the sole communications link with the outside world for a whole group of Manu'a Islands. If we were to take that ship, we would completely cut off those islands. First, we would have to promise to help to get another ship out of drydock and into operating condition as soon as possible, and, second, we would need to get the permission of the Governor of Samoa, Governor Lee, who was, at the moment, in the United States attending a governors conference.

I thought for a moment and then said, "What the hell—go ahead! I'll talk to Governor Lee, somehow. And we'll get the other ship out of drydock somehow. You start installing the equipment aboard the Manu'a Tele."

I said all these things without really having any authority to do so, but courage, I guess, is truly born of desperation. I then called the Washington test directors and explained what I had done. There was a long silence at the other end of the 'phone and then a resigned "Okay, go ahead, we'll cover you somehow."

With another flurry of 'phone calls, I was able to get certain extra gear we needed flown out to the islands. Freighter aircraft began moving through Sacramento, California, and down from Alaska as I spent the next 24 hours sitting in my bedroom alternately talking quietly to Washington and shouting at the top of my lungs (sometimes at three or four in the morning when the atmospheric conditions were right) on 'phone patches to Samoa.

When I thought that everything I could do to get the ship outfitted for the job had been done, I threw a couple of shirts back into my trusty

suitcase and began the whirlwind trip back to the South Seas. I think I was in the United States a total of four days and I had about four days left before shot time when I started my return journey.

By the time I arrived at Tutuila, the Manu'a Tele was docked in Pago Pago harbor, almost in the shadow of the Rainmaker Hotel, made famous by Somerset Maugham's novel Rain. When I came upon it, I was crestfallen. It was the oldest, rustiest, most scabrous-looking vessel I had ever seen. It didn't look like it could last ten minutes in a five-foot sea. Yet it was all we had, and my colleagues, apparently oblivious to what they were really going to expect out of the old hulk, were busy installing electronics and generators and helium tanks and all the other paraphernalia that my wild telephone calls had brought in on top of them. We had precisely 24 hours to install the equivalent of the equipment that had taken us two weeks to install at the airstrip. We tore open packing crates with our bare hands. People ripped their fingernails in desperate attempts to get things open because there weren't enough tools and crowbars to go around. Somehow it all got aboard.

I sit here now writing this so many years later, so many thousands of miles and experiences away, and I remember most clearly a red baseball cap that I somehow came into possession of as chief of this insane expedition out into the middle of the Pacific Ocean. As we sailed from shore, I put the cap on my head and somebody stuck a cigar in my mouth. We were off! It was the beginning of July and heaven only knew what kind of an adventure we were headed into.

We didn't get very far beyond the opening of Pago Pago harbor when the rolling of the ship told me emphatically that I had best get rid of my cigar. For the next few days, I was never to be quite secure without a horizon clearly in view.

Memories are streaming back now. I remember the little room in which we ate. It was a combination of galley, recreation room, captain's quarters, and dining area. The cook used to put a wet tablecloth on the

little table because, as all old sailors apparently know, a wet tablecloth doesn't slide off the table and, furthermore, if it's wrinkled a bit, it holds the dishes very well, too.

When eating in that galley I always had to position myself in such a way as to be able to look out the door and see the horizon. Without that visual cue, a dark green nausea would begin to creep up from my toes toward the back of my head.

I remember many other things about the Manu'a Tele. Perhaps its proudest features, and certainly the only things that looked like they had been painted in the last decade, were two red and white outhouses which were built out over the stern of the vessel. They were thoroughly air-conditioned. One had only walk in and look down through the holes in the seat to see the turbulent wake of the Manu'a Tele's twin screws.

As chief of the expedition, they gave me a little cabin, probably only about six and a half feet long, but a cabin. There was a double bunk, and I offered Otto Winzen, the balloon expert, his choice. He picked the upper bunk but stayed in it only one night. He never got used to sleeping with several thousand roaches. He also got so seasick that he spent the rest of the voyage sleeping under a pile of palm mats out on the deck, struggling to get enough air to stay alive.

It's strange what a shower of long-forgotten scenes are coming back to me now... I remember a native, Ma'iloto I think his name was. We nicknamed him Sparks, who was the radio operator. He walked around as his ancestors had, in a red lava-lava and stripped to the waist. Yet he had a remarkably deft touch with the old transmitter—vintage Marconi—we used to pick up the radio signals from Joint Task Force 8 headquarters. J-T-F-8 blanketed the Pacific with timing signals that would ultimately be used to tell all participants in these far-flung experiments when the precise zero hour for a nuclear burst would arrive. The code name for the transmitter was April Weather. When it wasn't broadcasting time tones, a recording was played to allow all participants to be sure their receiving equipment was in good order. That recording played endlessly through the

hours we spent steaming west from Samoa. I recall now its monotonous "This is April Weather broadcasting for purposes of identification and equipment adjustment. This is April Weather broadcasting for purposes of identification and equipment adjustment. . . ."

After a time, we began to parody April Weather, making believe it said "This is April Weather broadcasting for purposes of mortification and equipment destruction"—a wry joke in the light of our past and notable lack of success.

Each mile west we sailed allowed us to delay the launching of our precious balloons for a moment more. In actual fact, since the Manu'a Tele could make only a scant ten knots in the kind of sea we were plowing through, I calculated we would not arrive at the shot conjugate point in time for H-hour. But we could launch as late as possible this way and not be so much at the mercy of the winds, so it made sense to us to plow onward as rapidly as we could.

At twelve hours before the scheduled shot time, April Weather switched its monotonous speech dramatically. It was a difference of just a few words, but it meant everything to thousands of men and scientists around the Pacific. At H minus 12 hours, April Weather came on with "This is April Weather on an operational countdown. The first time tone will be at H minus 12 hours. There are five minutes to H minus 12 hours. . . ." And so the final countdown began for Starfish Prime—1.5 megatons of nuclear fury to be unleashed 240 miles above the Pacific.

At least we thought it was the final countdown. It was not more than a few hours further into the final procedures that April Weather announced a cancellation. I thanked the gods that rule such matters that we had chosen to go with the Manu'a Tele. If we had not done so, we would have already launched our balloons and their payloads.

Since we now had time to pick and choose an ideal launching site, I elected to start our launches from the lee side of an extinct volcano which sticks up out of the ocean very near the conjugate point. It is called Niua Fo'ou, and is also known as Tin Can Island. We arrived at Niua Fo'ou and made our preparations for the re-scheduled Starfish Prime shot. At H

minus six hours—H-hour was at 2200—April Weather sounded confident and certain. The barometer was steady at 31 inches. I called the team together at 1620 hours and we went over the entire operation. We planned to inflate the big gas bubble on the front deck between the flagpole at the bow of the ship and the wheelhouse. The ship would have to match the speed of the wind almost exactly to keep the fragile plastic from blowing either forward or to the rear and tearing against the ship's superstructure. To help protect the bubble, we arranged to have six lava-lava clad crewmen stand in a circle around the bouncing balloon and fend it off with their outstretched hands.

Everything was going beautifully. The preliminary wind data from one of our small weather balloons was decoded. It was just the right kind of a day to get the information we needed. The radiation counters, the balloon-borne altimeters and the tracking equipment at the aft end of the ship all were in readiness. At 1725 hours, we were crouched in the shelter of Niua Fo'ou. In a few minutes we would begin our sprint out from the island to match the wind during the launch set for 1830 hours. We got underway at 1810. The two old diesels rumbled to life and off we went at full speed—at least full speed for the Manu'a Tele.

We had an eight knot wind so the ship was able to keep up very nicely. The balloon strained into the air. Later it was to swell to enormous size, but now it was a controllable bubble of helium tied down by a halter of thin polyethylene.

And then it happened. Sparks came running toward me waving his arms. "Come quick, come quick, April Weather," he cried, "April Weather."

I got to the radio shack just in time to hear the monotonous and emotionless voice of April Weather saying "This is April Weather. This is April Weather. The operation is cancelled for today. This is April Weather. The operation is cancelled for today. Starfish Prime will be re-schedule July 7 at 0900 Zebra time."

Sick to my stomach, I stumbled back over the deck, bounced against a sharp nozzle on one of the helium tanks, and tore open my thigh. I limped on toward my momentarily happy crew and gave them the news.

The crew had put out an all-out effort, and it had gone for nothing. We were now down to two balloons and two instrumentation packages, hundreds of miles at sea and with a shot coming in just two days.

Since we were as ready as we were going to get for the July 7th shot, and since we had proved the launch technique worked, I tried to forget our troubles by taking the next day off to explore Niua Fo'ou. We came back to the ship late in the evening before the shot feeling just a little better.

At H minus 12 hours, once again, we started into our pre-launch preparation. The shot was scheduled for 2200 hours (10 P. M.) local time. At 1400, six hours before launch, we got a special weather check through the radio system that hinted that tonight would be different, that the weather at Johnston Island would not be likely to cause a cancellation again. It was now clearing and it looked like we could go all the way. Weather reports out of Suva and Nukalofa also sounded much better. At our own island of Niua Fo'ou, the sky was red and the wind was fresh. It was by no means the calm quiet sea that we had successfully conquered two days before.

Encouraged by the weather reports and other information coming in by radio from Johnston Island, I decided we might try to launch our next-to-last instrument package at four hours before shot time. It would take two hours for the instruments to reach ceiling altitude—about 115,000 or perhaps 120,000 feet—and we could use a couple of hours of pre-shot data for background radiation calibration. Besides, the wind was freshening and I was beginning to be concerned that the launch would prove to be much more difficult than our make-shift arrangements had made it appear previously.

Once again, the old Manu'a Tele left the shelter of the lee side of Niua Fo'ou. It raced the wind across the ocean in the fading daylight. I watched anxiously as the black smoke spewed out of the stack. I was waiting to see it rise straight up signaling that the wind and the ship had matched speeds, but it continued to peel sharply forward over the bow. We needed more speed than we had.

In the meantime, at the bow of the ship, balloon preparations were continuing. Otto Winzen squatted on the deck with a pressure hose in his hand feeding helium into the plastic bubble which was rising above him. The balloon leaned ominously forward, even though it was still only a few feet in diameter.

Fortunately the wheelhouse itself served as a small wind screen in these early stages of the inflation of the balloon. I plunged over to the engine room hatch and screamed down to the native engineers below, "We've got to have more speed," I pleaded. They looked up at me and shrugged. We were making eleven knots. There was no more speed.

Otto stopped filling the balloon. He knew that if he went any further the balloon would be ripped to shreds unless the wind could be abated over the deck. Because we had partly filled the balloon there was no chance to stop and start over again. We were locked in. We couldn't turn the ship in any direction because if we did the wind would whip the balloon around and tear it to shreds. We had to continue to steam straight ahead, straight downwind, farther and farther from Niua Fo'ou...farther and farther from the calm waters we needed if our tracking equipment could work properly, even if we did get the balloon off...farther and farther from any chance of success.

I turned to the captain and asked him pleadingly, "Perhaps the wind might die out at sunset? Does that ever happen out here?"

"Sometimes," he replied. "Sometimes."

"Sometimes had better be tonight," I said.

Back toward the balloon I dashed in the warm windy night. On and on through the waves we plunged, unable to turn, unable to stop, unable to do anything but wait. I began to feel sick. My stomach rolled and I had to

swallow hard to gain control. All that work, all those months were about to go down the drain.

The countdown and announcements by April Weather continued toward H-hour. We continued our desperate run downwind for an hour and a half, waiting, hoping for the wind to die, which it simply refused to do.

Meanwhile, four Americans and six natives stood in the howling night wind around the bobbing, tossing helium bubble. It was a weird ceremonial circle! The brown and white arms were outstretched as if in some sort of Pagan prayer to a wild translucent spirit.

At Johnston Island, a dozen tiny instrument rockets were on final checkout and the big Thor was in its final countdown.

At H minus two hours and 50 minutes, we were still trapped. I looked around at the tangle of rigging which would shred the balloon if we let go of it now.

"Dammit, Otto," I shouted at Winzen, "Let's get a welding torch and cut everything down to the deck."

"There isn't time," he pointed out, "and besides, we haven't got a welding torch."

I looked at my watch. It was H minus 2:40. I was sick. My stomach rolled with every wave. My thigh ached miserably, and the remorseless pressure of the countdown was mounting higher and higher.

There had to be some way. At H minus 2:35, I stared out at the 15-foot bow staff, a thin pole standing straight up like a palm tree. Like a palm tree! The thought hit me like a sledge hammer. I screamed at Pou Pelete.

"Pelete, let's get a native to climb that damn bow staff and hold the payload from there. Maybe we can get the balloon to clear that way."

"What?" said Pelete.

"You heard me. Get your best palm tree climber and put him on the top of that damn flagpole."

Perhaps I didn't realize what I was saying. The balloon payload weighed 40 pounds and I was asking a man to hang on a four-inch pole 15 feet up in the air over a tossing sea right at the sharp prow of the ship. Perhaps no one else realized what I was asking either because a heavily-muscled, half-naked Samoan pounded up to me from the engine room.

"This is Faia. He's strong as a bull and climbs tree better than a monkey."

I took one look at him and pointed to the flagpole. Up he went and up went the instrument package. We began to pour additional gas into the balloon.

Otto climbed up on top of the pitching wheelhouse and held the bottom of the bubble in his folded arms. It was blowing forward from him at about 45 degrees and now was almost 30 feet high struggling to be free. The wind was whistling over the deck still, but we had to launch right now if we were going to launch at all.

I looked at the deckhand at the dark top of the flagpole. Perspiration was pouring down into his eyes. His arm, outstretched with the payload, was beginning to quiver. I knew he couldn't last more than a few more seconds.

"Launch," I screamed, "Launch."

Otto opened his arms, the balloon ripped forward in the wind, shouting and snapping as it left. It swung forward, narrowly missing the flagpole, but then gained altitude to clear the ship. The payload line snapped taut, and with all my strength I cried, "Let go, let go," to the man on the flagpole.

He opened his hand and the payload swung away. It dipped ominously toward the waves and then shot upward into the sky. The payload and balloon were away safely! We shouted with relief and triumph.

It was pitch dark now. We were miles from Niuva Fo'ou. The ship slewed about and began to race for home. Now the ship's speed added to the wind speed and the wind across the deck approached 35 knots. It was a nightmare...a dark howling nightmare. There were two hours and 15 minutes until shot time, and we had to make the quiet water of Niuva Fo'ou

if we were going to have a chance of getting any data. The tracking equipment simply couldn't operate on the wildly pitching deck.

For the hundredth time I picked my way past the sharp ends of the helium tanks and up the ladder toward the radio room where our recording equipment was mounted. For the hundredth time I smelled the cloying stench of the recorders.

For almost two hours we fought the sea and the wind back to Niua Fo'ou.

At H minus 15 minutes we reached calmer waters. Our GMD receiving antennas locked into automatic tracking on the balloon now approaching the 100,000-foot level. April Weather came on continuously. It was 15 seconds to H minus 10 minutes. The rocket was set to lift off 10 minutes ahead of the shot, streak out into space and then fire the bomb on the way down toward the earth.

April Weather shouted to the whole Pacific, "We have lift off! Lift off! The trajectory is very good. It is on course and all systems are go. Ten seconds to H minus nine minutes."

The whole Pacific was about to become a great experimental laboratory. At H minus 4 minutes and 30 seconds, the rocket reached apogee and began its descent. It was H minus four.

I ordered ship's lights out and everybody onto the deck, hoping that we might see something even though we were thousands of miles from the shot. I climbed to the top of the wheelhouse. The native crew gathered in the calm, dark silence at the rail.

The voice of April Weather announced the approach of H minus one minute. I closed my eyes. It was going to happen. It was too late even for an abort. It was going to happen.

THIRTY SECONDS TO H MINUS ZERO.

The Manu'a Tele splashed gently against the swell. Otherwise there was only silence. I looked upward. I suddenly felt alone, terribly, terribly alone—the dark endless ocean below me, the black endless sky above me. Stars—an infinity of silent, burning stars—reached across

incomprehensible distances into nothingness.

FIFTEEN SECONDS. My hands tightened on the ship's rail—my back muscles stiffened. How bright would it be? I wondered in these last seconds.

FIVE SECONDS.... FOUR....anything?.... THREE.... TWO.... ONE.... ZERO.

A thin white beam stabbed two thousand miles across the dark void and thundered soundlessly down into the soft and waiting atmosphere. From horizon to horizon a great hammerblow of radiation fell across the world.

My eyes flickered in the blinding flash and then widened on an alien planet. Torn and shattered atoms were everywhere overhead. A megaton of pure energy—bestial, fearsome—was loosed upon the earth and roamed in the tortured air above us. The sky was green—hot lime green—angry... foreign... malevolent and agonized. It glowed grimly, fading slowly and reluctantly as if something were withdrawing, returning to the radium hell from which it had come. After a time—a long moment—I was a human being again standing in the ghostly twilight. My boggled brain began to function. I filled my lungs with air and looked around, no longer feeling like a dumb animal cowering in the first fateful instant of creation.

I watched silently as the green twilight deepened. Now I could perceive a thick blood-red arc overlain with bright yellow-white ribbons, the great magnetic field of the earth made visible—a sight no man had seen before. The raging energy retreated further, dissipating, ebbing. Now there was only the great red band, miles across and high in the tenuous outer reaches of the atmosphere. It glowed brilliantly against the night. I looked around the ship. I knew data had been streaming into the recorders, I could almost feel it. The crackling radio static of the countdown was gone—April Weather had done its work. I cocked my head toward the cabin and heard the chirping signals from our balloon. I breathed deeply and arched my back. All over the Pacific, greedy instruments were sucking the sky dry of its terrible new secrets. I looked around at the crew.

Spellbound natives and scientists still stood open-mouthed, gaping with wonder.

Minutes passed. The great red band evaporated slowly until there was just one huge, dull red coal remaining, shimmering near the southern horizon. Then, finally, it, too, disappeared and there was only the dark ocean and the black sky and the stars—an infinity of silent, ever-burning stars.