

got the big radar set perking the way he wanted it, while the nav unfolded his black-and-white strip chart. There wasn't room to accommodate large, unabridged maps on the navigator's small worktable, and the nearly blank, accordion-folded strips, displaying little more than a course line drawn across empty squares of latitude and longitude, also ensured the least amount of sensitive data was carried aloft.

An Arc Light navigator usually made a bit of a fuss about arranging his charts and tools just so—yellow checklist to desk left, so it almost rubbed up against the radar navigator's right forearm when the RN had hold of his tracking handle; three or four presharpened #2 lead pencils jammed into tiny receptacles sewn on the upper left arm of his flight suit; a compact rechargeable Sanyo flashlight stowed in a zippered pocket beneath the pencils; the aforementioned strip chart laid flat across the narrow table; flight log sheet positioned table right, partially covering the chart; and plotter, dividers, and the indispensable MB-4 circular slide rule at stage front.

Before leaving the immediate vicinity of Guam and the Marianas, the Blue Three RN used his radar to give the navigator one last good set of GPI fix coordinates, which the young man both recorded on his chart and installed in the Doppler-driven lat/long counters. By using that final known land position as an "anchor," the nav had a good starting point for tracking the Buf's progress to the Point Golf air refueling rendezvous above the Philippines. He would have only celestial navigation to actually "fix" the aircraft's position over the water (the accuracy of the counters slowly deteriorated without regular fix updates).

Interestingly, in the B-52, the electronic warfare officer made the actual heavenly observations. It made good sense to do it that way; the EWO was a rated navigator, had the time to assist the busy nav, and was physically close to the Periscopic Sextant, a basic sextant modified with a long-necked periscope that was inserted through a special port in the top of the fuselage (eliminating the need for a drag-inducing observation dome). The navigator did the pre-computations and radioed up the preliminaries; the E-Dub found the bodies, did the two-minute shoot on each, and then radioed down the readings to the navigator, who converted those numbers to a fix on the black and white chart. This buddy system worked quite effectively, though SAC's division of labor rankled the Black Hole right-seater a little; not only did the EWO get all the fun while he was stuck with the dirty work, the upper-decker eventually became the better celestial navigator.

From a practical standpoint, it was not necessary for all three navigation

starting DR from accurate
terrestrial fix (using radar)

"counters" maintained DR

teams in an Arc Light bomber cell to engage in full-scale celestial position finding—they were, after all, only one or two miles apart. The primary responsibility for the cell's navigation, which at this point in the mission boiled down to being on the correct heading and exactly on time, fell to the leader, though his work was continually monitored by the two navigators behind him. If the lead nav did run into trouble, say in the event there were unforecasted heavy winds, or navigation system malfunctions, or airplane mechanical glitches, or even a brain short circuit (it happened), the Black Holers were allowed to use the ship-to-ship command radios to discuss their problems. In the real world, however, that didn't happen too often, at least in terms of a direct and frank exchange—and for a very human reason. Navigators may confess to one another that they are temporarily disoriented, but would rather be burned at the stake than broadcast that compromising detail to the rest of the planet. If a situation did develop, more subtle methods were used to handle it.

"Blue One nav, this is Blue Two nav. Hey, that's a hell of a south wind, isn't it?"

A few seconds on the old Seiko would tick by while the Blue One nav digested the transmission.

"Two nav, this is One nav, roger." Sometimes the lead magellan would forget to unkey his mike and you would catch him nervously clearing his throat. "Yeah, sure is," the fellow would then suddenly say in a stronger voice, the light bulb finally coming on. "I've been evaluating it for a while now."

Liar, liar, pants on fire. He'd been sitting there fat, dumb, and happy—maybe not bothering to get that one extra celestial fix and for sure not knowing his counters and Doppler had gone haywire. His equipment and DR showed him on course, but the winds had blown the cell well to the north.

"Roger, roger, One, this is Two again. Thought you'd like to match our counter readings with yours before finalizing the alter heading."

"Yeah, you must have read our minds. We were just thinking it'd be a good idea to get a cross-check. Ready to copy." Numbnuts One would now find out where his cell was.

Another, rather tentative voice might chime in about this time. "Uhh, Blue One, this is Blue Three nav . . . yeah, uh, Two's counter readings are pretty close to mine, within a few miles." A Gold Star for the rookie.

With the other two ships reporting coordinates that close to each other, the lead nav could be fairly assured they were correct. Based on the radioed data, he would furiously compute a new heading to the next point, maybe adding an airspeed adjustment to compensate for having been wandering all over the

sky. The cell pilots would be expecting a correction, by virtue of having overheard the entire exchange between the three navigators.

"Blue Cell, this is Blue One." By unspoken agreement, the lead pilot had taken back his command radio. "Stand by for alter heading due to heavy winds."

"Two."

"Three."

All six Black Holers would be hoping the lead aircraft commander had bought the double shuffle; nobody wanted the Blue One nav to look bad, especially in front of the man he worked for. Everyone knew their own turn in the "wherein hellami" barrel would eventually come.

A couple of minutes later, with his cell now properly forewarned, the leader radioed the official order.

"Blue Cell, this is Blue One. Turn left ten degrees, new heading 280 degrees magnetic. Maintain 440 knots true." The lead nav had determined the little bit of time he had lost could be made up with some maneuvering work just before the air refueling—better that way than screwing around with the more complicated and less fuel-efficient throttle jockeying.

"Two."

"Three."

And then the human voices quieted, and for a long time all that could be heard in Blue cell's crew compartments were humming black boxes, whining gyros, the whistling slipstream, and screaming engines. The aluminum-wrap skin that separated the men from the stratosphere and J-57s was surprisingly thin—if the aircrews hadn't had on helmets or headsets, earplugs would have been necessary to protect their hearing. Trapped as they were in the lower compartment, the navigator-bombardiers were subject to an even more intense level of sensory overload. For it was down in the cockpit's underbelly that the Buf's heavy scent settled and ripened; where sickening kerosene smells, engine-heated cabin air, vague suggestions of overwarm wiring, greasy-metallic odors thrown off by black-box electronic glow, and the ever-delightful fragrance emanating from the relief tank all blended together into one devastating bouquet. Such peculiar charms were further augmented by a claustrophobic lack of space, spatial disorientation caused by fuselage oscillations, cumulative psychological wear and tear encouraged by lack of windows,³ and the constant, stomach-churning turbulence. The combined experience had long ago convinced other rated Air Force officers, indeed other Buf crew, that only brain-dead lunatics with cast-iron digestion could or would put up with the Stratofortress Black Hole.

The Buf's radar navigator and navigator took perverse pride in that reputation. As repulsive as the lower compartment could be, it was to them a special place. The Black Hole was their office, their control room, their sanctum sanctorum; the central nervous system of a highly complicated war machine that could be effectively operated by only a handful of human beings. Strategic Air Command's operating doctrine had recognized this from the very beginning; if something didn't work for them, that is if there was anything that hindered the Black Hole's ability to successfully bomb the assigned target, then it simply didn't work for anybody. While the pilot was the ship's commander, the man charged with the ultimate responsibility for the aircraft and its objectives, it was the navigator-bombardiers who were key to a successful B-52 strike.

After a thousand miles of empty ocean had passed under Blue Three's wings, the advisory over-the-shoulder radar navigator, who since takeoff had been sitting quietly at the instructor navigator's position near the bulkhead door to the bomb bay, stepped up to the nav, pulled the right side of the rook's headset to one side, and started yelling into his ear. Although it was very difficult to understand the fellow because of the terrible racket inside the nonsoundproofed compartment, the young navigator nodded, getting the message. He keyed his floor mike switch.

"Radar, I show us two hundred nautical miles east of Point Escarpada."

Having been attentive during the premission specialty briefing, the RN caught the action cue. "Roger, nav. Be advised, Blue One and Two are stable at our twelve o'clock, and I am switching out of station keeping mode into full scan mapping."

In addition to all its other features, the B-52 bombing and navigation system radar provided for a formation flying format that eliminated ground clutter and painted only nearby aircraft. While the lead RN in Blue One kept his radar in the full scan mapping and weather-avoidance format throughout the mission, Two and Three were better served by using the "station keeping" mode, enabling them to maintain constant contact with the other aircraft. This was particularly important at night and/or in the soup, when the bombers might inadvertently get too close to one another.

At this point in the flight, however, with a land feature once again approaching (the radar set had a maximum mapping range of two hundred nautical miles), the Blue Three bomb/nav team would be anxious to update the hours-old running dead-reckoning position showing on the nav's counters with their own hard radar fix.

"I'm painting Escarpada," the radar nav said, "coming up on the zero-six-

still taking advantage of the opportunity for a fix based on observing a terrestrial landmark

eight degree radial at one-niner-five nautical miles . . . ready, ready, NOW!"

It was a rare Arc Light RN who didn't take advantage of Point Escarpada, a nicely contrasting land/water feature located on the northeast tip of Luzon, the Philippines. The extreme distance had ruled out using the radar crosshairs to get a GPI fix, but, as discussed earlier, an aircraft's position could also be determined by taking a radar range and bearing off a known point.

Less than a minute after the RN said NOW, the nav had plotted the range and bearing, penciled in a fix triangle symbol over the pinhole his dividers made on the white strip chart, and noted the time next to it. After picking the new fix's latitude and longitude off the chart, he twirled the knobs on the control panel in front of him and updated his counters.

All three of Blue cell's nav/bomb teams would be working Escarpada over, as well as computing new ETAs and headings to the Arc Light air refueling "timing triangle," a preplanned dogleg that supplied the necessary means for the bombers to arrive at the Point Golf refueling rendezvous exactly on schedule. Depending on whether the B-52s were early or late, they could either cut off or extend the dogleg accordingly. This timing triangle procedure had been so named because all the optional course lines on the chart (dotted lines as opposed to the normally solid) appeared as a series of triangles.

It was crucial the B-52s arrived at 20 degrees 20 minutes North Latitude and 122 degrees 50 minutes East Longitude (i.e., Point Golf) precisely on schedule—and we are talking here plus or minus seconds. Cell lead navigators became nervous if they missed hitting it by more than a quarter of a minute. Why so uptight? Because at that assigned moment three KC-135 tankers would come screaming out of the north, whistle past the point on a predesignated heading, and be gone in an eye blink. Everybody was going 600 miles an hour, and if the weather was bad, or it was a murky night, or the rendezvous radar wasn't working properly, and then a fellow compounded the problem through poor rendezvous timing resulting in the cell missing their tanks—well, young man, you just done screwed the pooch.

The life-giving KC-135s were lovely to behold when they appeared over that imaginary X in the ocean just east of the Batan Islands.⁴ Oddly enough, the shared joy of Strato tankers and Strato fortressess coming together in the air was somewhat at odds with the rather arms-length, diffident relationship the two types of crews had on the ground. As a matter-of-fact, face-to-face exchanges between "bomber pukes" and "tanker toads," either professional or social, were relatively rare—the bulk of the bomber-servicing tanker squadrons were based on Kadena AFB, Okinawa, while most of the BuFs lived at