

THE

PAO

WHALE...

A-3

SKYWARRIOR

INITIAL CONCEPT, RESEARCH, DESIGN, AND  
DEVELOPMENT OF THE A-3 SKYWARRIOR (A3D)  
MANUFACTURED BY DOUGLAS AIRCRAFT.

In 1948 the Navy was conducting armament trials aboard the USS SAIPAN with the Skyraider. I was onboard with Bob Canaday and two others from the company, Harry Cornish and Joe Barfoot. CDR. Tommy Thomas, so helpful in the Skyraider program, was also there since he was heading the VA class desk in BuAer. Along with the ship's skipper, Captain, later Admiral, Ted Frederick, and XO, CDR. Lloyd McAlpine, we discussed various facets of operations. Tommy was wearing an extra 'hat' as project officer for the new VAX (H) program.

An amiable young pilot named Zirkel was selected to test the Skyraider at increasing loads, beginning with a 1,000 pound bomb and increasing it until some part, probably the landing gear or wing, showed signs of failure. Zirkel made landing after landing with ever-increasing loads, each followed by a thorough inspection.

He landed repeatedly with three 2,000 pound bombs aboard in an airplane which was originally intended to carry far less. "Zirkel in the circle," as we had come to call him, finally finished his assigned task. He came up to the ship's CO and said, "Jesus Christ Captain, if you want to bust up these airplanes you've got to get someone else. My ass won't take it anymore."

I guess I must have felt the same way. Tommy Thomas was quick to remind me that I had gone below to the ready room during the tests as I could no longer stand seeing the AD take such abuse. But, as the design progressed, we kept adding margins. We figured that if it was possible to overload the airplane the Navy would. It did.

The incident was only a momentary flare-up. We didn't know it at the time of course, but the loads this pilot was landing with hardly compared with those we were soon contemplating for a bigger plane. The subject of a jet-driven, long range, heavy attack bomber with nuclear capabilities came up during that brief deployment aboard the SAIPAN. To my knowledge it signaled the first major conceptual discussion of such a plane.

Meanwhile, a host of studies had been initiated by government and industry to evaluate turbojet and turboprop technology. There were politics to be contended with however.

While there was a natural postwar reduction in armaments, the militarists were developing new strategies to cope with what would ultimately be defined as the cold war. The specter of a nuclear holocaust was ever-present in varying degrees. People readjusted to peacetime, but there was to be a concomitant emphasis on readying for the distinct possibility of future conflict.

It was also natural for each of the military services to assert their importance in the budding strategic arsenal. Leaders in each service saw their numbers decreasing and struggled to maintain a positive, meaningful mission. At the bottom of the issue was the fear of a planet-shaking war with the Soviet Union. Simply put, the Army had its case for a strong ground force and land missiles, while the Air Force believed that the nations security lay in the long-range bombers. The Navy envisioned an armada of large fast carriers, with jet powered planes to help keep the peace.

Generally, the Navy's point of view was that the United States should not rely on a single weapons system. It believed in a defense force with multiple punches. The carrier constituted one of those punches of course. As could be expected, interservice bickering reached major proportions.

Meanwhile, the Navy had North American 'AJ' Savages for the heavy-attack role. These planes had three engines; two props, and a jet in the tail. They were slated for operations from carriers by 1949. BuAer was shopping around for a successor for the nuclear, long-range mission.

The Lockheed P2V-3C, with Tom Davies and John T. 'Chick' Hayward (both later Admirals), spearheading much of the work, was being considered. Although the Neptune was primarily designed for land based submarine patrols, the modified plane was successfully launched from MIDWAY-class ships with help from JATO. It was also intended that the aircraft land aboard carriers, but it ultimately had to be recovered ashore.

A research company called RAND had been formed and was, at the time, a subsidiary of Douglas Aircraft. It was involved in defining the basic requirements of a heavy attack bomber, and its experts came up with some basic figures. The plane should have a 2,000 mile radius, they reported, and be capable of carrying a 10,000 pound bomb. Further, it would weigh well in excess of 100,000 pounds! Other studies corroborated this high unprecedented weight. In fact estimates varied. A letter from the CNO to the Chief of BuAer in early 1948 said that gross weight could range anywhere from 62,000 to 200,000 pounds!!

Ship designers were already working on the super carrier concept. The *USS UNITED STATES* was on the drawing boards as a behemoth, 1,000 feet long, displacing 65,000 tons. She and her successors, it was believed, would augment and eventually replace the CVBs in the MIDWAY-class and other flattops.

I was not so sure. Mr. Truman was President, and one of his top advisors was General Eisenhower, who I felt was not favorably disposed to the big carrier. I had scouted around Air Force headquarters, done some reading, some telephoning, AND some surmising.

Secretary of Defense, Louis Johnson, and the Air Force Chief of Staff, General Hoyt Vandenberg, were not advocates of the carrier either. I just couldn't envision the super-flattop surviving the immense political pressure against it. At least at that time.

In any case I believed that the attack bomber would have to weigh far less than 100,000 pounds if it was to operate from MIDWAY-size ships with their 68,000 pound deck landing limit. Studies are absolutely necessary as a prelude to development of any aircraft. I endorsed virtually all of those made in support of the bomber projects. There were some studies I questioned. Permit me to digress.

I happened into the Rand think-tank headquarters one day. I had been told that the members of its staff had an astronomical assortment of academic degrees. I wandered into a room where two gentlemen in beards and clam-digger shorts were seated. They were sitting, or rather slumping, at a table. One was tossing a coin repeatedly onto the table. As it landed he would call heads or tails while his associate made a mark on a pad of paper. Not wanting to interrupt, I retreated. Later I asked a friend what the two scientists were doing.

"Well," he said, "to put it simply, they're making a mathematical study. It measures the probability of a coin turning up heads or tails over an extended period of time."

I accepted this with polite silence. My friend went on. "You see, after say, 5,000 flips of the coin, we'll have amplifying data on the element of chance as it is applied to--."

His voice trailed off, and I let it do so. To me nothing seemed more useless and wasteful as that coin-flipping experiment. I admit it made me wonder about Rand's predictions concerning the size of the aircraft in question.

I went to Washington to visit BuAer after the trip on the SAIPAN. I had seen the CNO's memo regarding the weight parameters for the bomber and was aware that other company representatives had been in and out of Navy offices getting a feel for what the final requirement figures would be. Somewhere along the line BuAer had settled on a starting weight of 100,000 pounds.

Although a group of officials leaned toward turboprop engines to satisfy propulsion needs, the basic hope was for jets. On the list of acceptable powerplants were the Westinghouse J40, Pratt and Whitney J57, and the Wright J65. Near the end of 1948 the following companies submitted bids for the new bomber: Douglas El Segundo, Curtiss-Wright, Martin, Consolidated, Farchild, and Republic. Those companies declining were: North American, Grumman, Vought, Bell, and Lockheed.

North American seemed to reflect the views of those not wanting to bid. They felt the plane simply could not be built for the mission assigned at 100,000 pounds. The competition was eventually reduced to Douglas and Curtiss-Wright.

We (Douglas) began with the 100,000 pound figure at El Segundo but, convinced of the political situation's course, we determined to whittle away until a 68,000 pound design was achieved. Included in that figure were 10,000 pounds for the bomb. I tried vainly to get specifics on the atomic weapon; I was convinced that state-of-the-art technology could produce a much smaller one than was anticipated. But whenever I asked a Navy acquaintance for more details, I was quickly advised to stop my probing. Essentially, we were told that the weapon would have to be stowed in a bomb bay because certain mechanical operations had to be performed on it by one of the crew members while en-route to the target.

When I felt we had a viable concept, I called on my "Murphys Law" friend, Captain Joseph Murphy. My visit was unofficial in nature and took place before bids officially were submitted. Murphy, a robust, stout, and likable officer, was in charge of BuAer's aircraft division at the time. I was hoping to convince him that such a machine could be developed to operate from the CVBs.

In Murphy's office I spread the drawings on his desk and watched as he examined them. After a moment or two he looked up at me, traces of anger in his face.

"Oh no!" he growled, shaking his head, "not you."

I was wide-eyed, stunned.

"I thought you were an honest engineer, Ed," he said pointedly. "You know good and well you can't produce an airplane of that capability for that weight."

Not knowing what to say I remained silent, anger building in my own mind.

"I had hoped you wouldn't lie about the weight, just to get the business," he said.

Those were fighting words and I was instantly mad as hell. In defense of Murphy I'm sure he was as frustrated about the new bomber and all its ramifications as many of us in the industry were. But if nothing else, in my lifetime dealings with the Navy, or anyone else for that matter, I have been honest. I was offended but didn't feel a rejoinder would serve any purpose.

"OK Murph," I said, gathering up my drawings, "if you're not that interested I won't bother you." He knew I wasn't kidding. I could see him hesitating a thought.

"Just leave the drawings here," he muttered hurriedly, "and I'll have them checked over anyway."

We stared at each other without words for a few seconds. Was Murph bluffing me? Why did he want to hold onto the drawings if I was lying-- pulling a trick on the Navy just to win a contract?

"All right," I said coldly, "I'll leave them." I departed the building and went back to the hotel to wait out the affair.

Next day I got a call from Art Raymond, Douglas's vice-president and my boss, from California.

"What have you been telling the Navy?" he asked calmly.

I explained yesterday's confrontation. "Why do you want to know?" I asked.

"Well," Ray said, "I just got a call from General Vandenberg in Washington." He advised me, and I'll quote, 'to get that engineer the hell out of town. He's offering an unrealistic proposal to the Navy and he should know better.'

I was amazed that the General, who was the Air Force's Chief of Staff, had been cut in on our concept. In an ironic way I was flattered.

"OK Ray," I said, "Should I pack my bags?"

I could see him smiling at the other end of the line. "Not necessarily," he said. We chatted a little longer then hung up. I didn't pack my bags.

A day passed, and I returned to the W building. As I was walking along the corridor a gentleman ran up to me. It was Ivan Driggs, one of BuAers top engineers.

"Ed," he said huffing, catching his breath, " I want to apologize."

"For what?" I asked.

"You must have heard the things I said about you regarding your design proposal."

"Well," I said, "I know Captain Murphy was displeased, and I suppose there are a few others around here who think I'm crazy."

"I want you to know," he said, "that we have checked your figures. You're not crazy. I told Murphy that you have a good chance of coming up with a 68,000 pound plane. In other words, your concept looks valid!"

Which was no surprise to me. But Driggs uplifted my spirits. Shortly after this hallway conversation, official proposals were submitted.

A.B. Metsger, who had then headed the fighter desk, shed more light on these events in a letter later to me....

'The affair that crinkles the laugh lines about my eyes, though, is the conception of your A3D. As a fighter man, I could not produce a credible escort for slow, low-altitude cruising, propeller attack flights. Mild extrapolation of contemporary designs suggested a long-range, heavy-attack airplane with jets was at least marginally possible. Jet performance would make this escortable. Great!! So following quite proper procedure I referred the question to BuAers Design Research Director, a propeller doctrinaire. He completed a study and stated his finding: "Impossible". Expecting this, I had placed the same question in the hands of good Ed Heinemann, who also came up with a judgement. And a picture of the airplane he soon built as the A3D. So Ed, I took your data to our good Design Research friend, slyly asked if you had made a mistake. He said, "No, Ed used different assumptions!!"

Both El Segundo and Curtiss had to make monthly progress reports to BuAer over the next six-month period. As these milestones progressed, our basic design and weight stayed the same while Curtiss scrubbed theirs down to 68,000 pounds. I had seen their concept and doubted its validity, but no matter.

One day after a long discussion on the bomber, Tommy Thomas and I were walking down the long corridor of the W building when we were joined by a member of the Curtiss company. Much to my surprise, Tommy handed a copy of my report to the Curtiss representative.

"What are you doing to me?" I said, startled, "it's not right your passing on our stuff like that."

Tommy smiled in that disarming way of his. "Ah hell, Ed, " he said, "no harm done." Perhaps there had been some mutual exchanges of data, but I was still a little uptight at the openness of the gesture. Nevertheless, Tommy, with his winning personality and that cigar jammed in his mouth soothed the feathers. I realized later that this procedure of trading off information on each other's progress was a method used to spur on the competition and therefore achieve greater results.

Through the rest of the year and into 1949 I made many visits to BuAer. It is out of context to mention here, but I once calculated that I have crossed the United States more than 700 times, one way on business matters. I believed it important to maintain the lines of communication, face to face, and to call on the key players involved, while keeping a close ear tuned to the nuances of BuAer thinking. It was tiring but worth the effort.

In April 1949, even though the construction of the *USS UNITED STATES*, the super carrier, was underway, Secretary Johnson canceled it. He had President Truman's backing. This was a heavy blow to the Navy, one from which it would recover only after the Korean War once again demonstrated the carrier's value. I was not gleeful over this event. But I was most pleased, if not a little smug, about the fact that the plane we were working on was designed for *MIDWAY*-class ships.

By July, Curtiss was eliminated from the competition, and we signed a contract to continue and build three test articles -- two flight and one static. The plane was designated the A3D SKYWARRIOR. Harry Nichols was the project engineer.





Extensive wind tunnel test were conducted in a painstaking effort to determine aspect ratio and wing sweep. I had some debates with Art Raymond on this issue. He preferred a higher aspect ratio than I, and was especially concerned with achieving the 1,500 mile combat radius the Navy wanted. A compromise of sorts was reached and a 6.75 aspect ratio was chosen. In the last analysis, this figure was higher than that in most Navy planes, but not as great as that used in Air Force aircraft designed for the long-range mission. Incidentally, both the vertical stabilizer and the wings folded for space saving aboard ship.

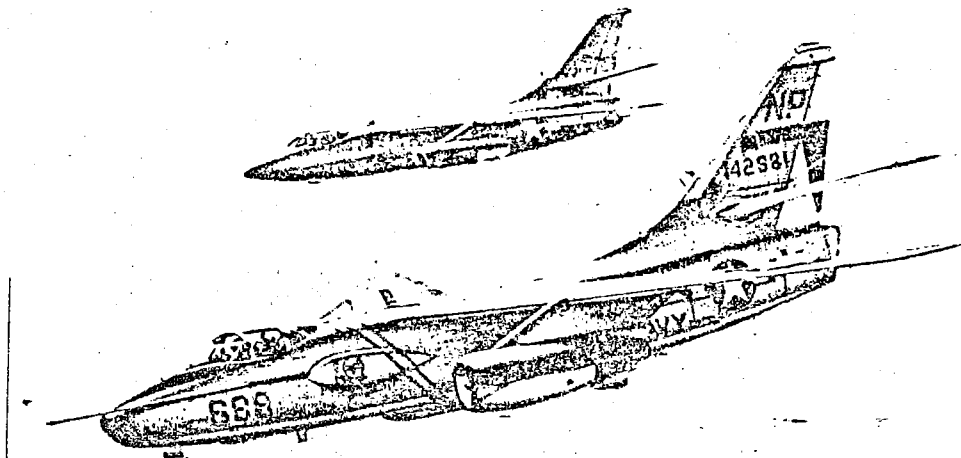
Placement of the engine nacelles was somewhat controversial. The ground servicing considerations figured prominently in the decision. Tests indicated that minimum high-speed drag could be achieved with the nacelles raised so that their top edge would be coincident with the wings upper surface, or by moving the nacelles forward.

We reasoned that moving the nacelles forward would improve the drag situation but cost us a substantial increase in structural weight. And furthermore, raising them up would defeat the ground servicing idea that we had. Pre-production studies also revealed an annoying flutter problem in the wing, which occupied our attention for some time.

Two investigations were conducted, a preliminary flutter analysis with the analog computer owned by CalTech and a test program with a flutter model to supplement and check the analog analysis. We examined no less than 1,000 flutter situations. It was alarming to discover them occurring below maximum design speed, and this threw us into no little turmoil. Wind tunnel and other tests continued and modifications to the wing were effected, including placement of the nacelles as they now appear on the SKYWARRIOR. We learned also that flutter was especially noticeable at normal speeds with the J40 nacelles attached. Additional modifications were made, but fortuitously, the J40 was replaced by the J57 after flight tests, and it enhanced stability at all speeds and altitudes.

An innovation of sorts was the way we handled the two auxiliary drive units. Located in the fuselage, they were driven by high-pressure air and powered the electrical and hydraulic systems. In past practice these accessories were mounted on the engine itself.

We decided on wings swept back thirty-six degrees, intersecting the fuselage at its top. The engines were contained in nacelles hung from pylons on either wing, low enough to permit servicing without platforms.

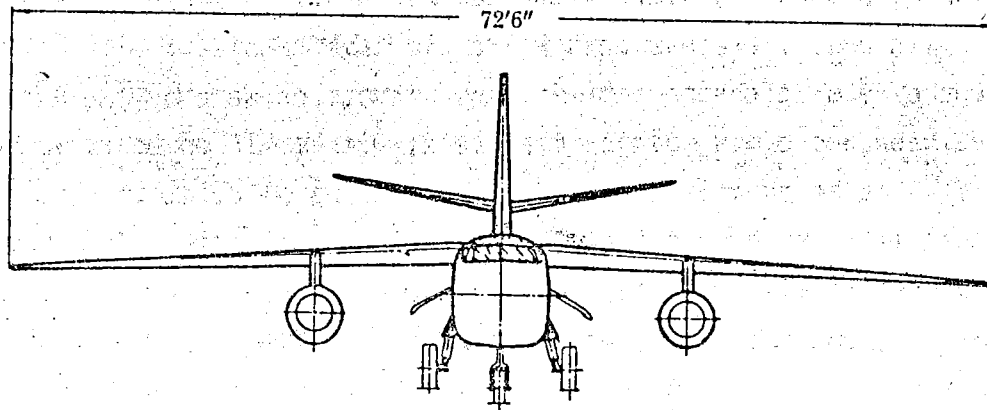
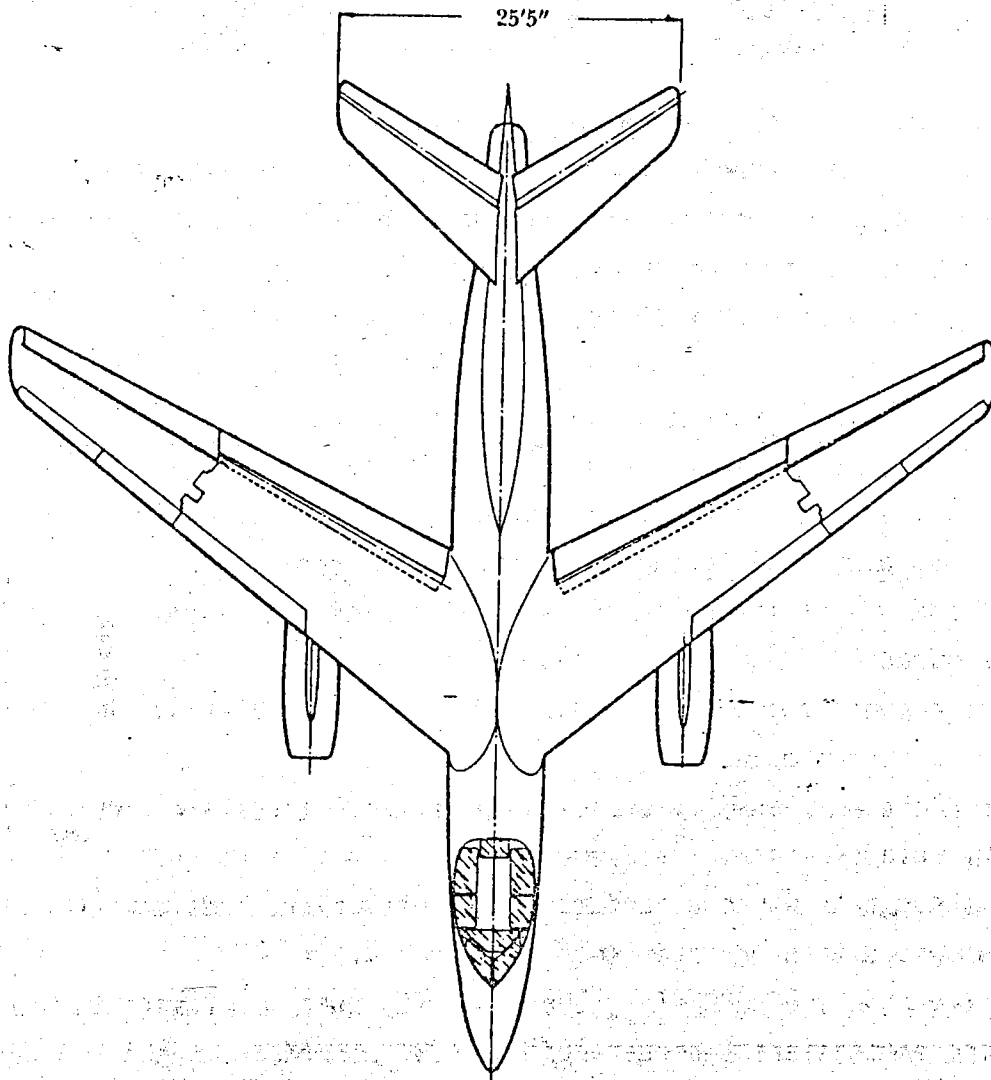


This R.G. Smith rendition shows XA3D on wing of KA-3B.

The bombing radar antenna and associated electronic gear were located in the nose. The pressurized cockpit was configured for a bombardier-navigator in the right seat and a navigator-turret operator positioned back-to-back with the pilot, who flew the plane from the left-front station. The Navy insisted on having a turret gun with 20-millimeter cannons in the tail, remotely controlled from the cockpit. I fought against this, feeling that the weight and cost didn't warrant its installation. The turrets were later removed from all A3D aircraft, as it turned out.

We calculated that each pound added in equipment cost a total of 6.4 pounds due to the growth factor. That is, we would have to make wing and tail areas bigger to accommodate the extra weight while trying to retain the performance requirements. We weren't about to do that.

Emergency crew escape was made through a channel or chute routed to the bottom of the fuselage, similar to the F3D system. Ejection seats for multiple member air crews were ruled out because of the complexity involved and the rather close placement of the flyers in the cockpit. Furthermore, ejection seats were not yet considered that reliable.



Basic Douglas engineering drawing of the A3D SKYWARRIOR as it would ultimately appear when in full production.

We had an episode which pointed out how easy it is to make a mistake even if a large number of experts are trying not to. In 1949 we had just completed a mock-up and had it inspected when Captain Hayward came to EL Segundo to look at it with an assistant, CDR. Bill Romberger. An entourage of Douglas and other Navy representatives stood by as Chick studied the display. He made some complimentary remarks as he walked around the mock-up exterior, which puffed us up a bit, then climbed into the cockpit.

He sat there silently for a moment, touching the controls, switches and dials. Then he went motionless. With words that came forth like rifle shots, he said, "Who in the hell designed this cockpit?"

There was an interlude of silence after which I blurted, "What do you mean, Chick?"

"The engine controls," he said, "they're on the left side. They've got to be in the middle."

Since the A3D had only one set of flight controls and we hoped to achieve standardization, they were placed on the left side. The mock-up board thought this was a good idea but not to Chick. This difference in opinion was due to an experience he once had.

"I was on the *FORRESTAL*," he began, "flying an AJ Savage with John Floberg, the Assistant Secretary of the Navy aboard. We had just launched when fuel boost pressure failed in one of the engines and it lost power. Floberg, who was in the right seat, had to help manipulate the engine controls while I worked like hell to keep us out of the drink. The engine finally quit on us. There was no way I could have handled the throttles and fly the bird at the same time if those throttles were on the left. We would have been one big splash in the ocean, with a VIP on board, no less."

Chick was another in the line of legendary Naval aviators with a mind and personality as superb as his ability to fly an airplane. In short spoke about flying, people interested in flying listened.

We had a commercial telephone installed in the cockpit at the time, and Chick was on the line to BuAer in Washington within minutes explaining the need to change the engine control arrangement. We moved them to the middle of the cockpit accordingly. This incident illustrated rather dramatically the ongoing need to remember the operator in any new aircraft design. Relying on theory is all well and good, but the aircrews demand top concern.

"Otto," I said, after a quick examination of the sketch, " with a bomb this size we could build an aircraft weighing no more than 50,000 pounds!"

I detected a momentary expression of alarm on Otto's face. The moment passed, however, and the conversation turned to other things.

A week later two strangers showed up at my office and asked to talk to me in private. They identified themselves as representatives of the government from Washington D.C. I closed the door, taken aback. What did they want from me?

Thus began an intensive grilling. I was asked all kinds of questions. Where did I get my knowledge of nuclear weapons? Specifically how did I learn that a weapon could be thirty -two inches in diameter? On and on it went for what seemed like hours. I found out later, but was unaware at the time, that the government was perfecting a weapon of the same size I had casually drawn for Otto. Supposedly Otto had mentioned this to someone else and Uncle Sam reacted without delay to check me out.

The questions finally stopped. The gentlemen seemed skeptical about my responses, and after I bid them goodbye I eased back in my chair wondering when I'd be visited again. Apparently any dossier that existed on Ed Heinemann was perused, and it cleared me of any wrongdoing.

Ironically, Douglas El Segundo was destined to actually build the TX5 and TX7 nuclear bombs. It happened that the Sandia Corporation was selected by the government for this purpose, but being new, their factory in Albuquerque was not up to speed for the entire manufacturing process. Therefore, El Segundo received a contract for the task.

This came about when the word got around the I had a 'Q' clearance, which allowed me to have access to some classified nuclear information and meant that I received a thorough check-out by investigators and proved trustworthy.

Two of my men also had such clearances, engineers Vearle Crosley and Russell Cox. Elmer Wheaton, a Douglas engineer who was in charge of missiles at Santa Monica, working on a Bell project called me one day, and after exchanging pleasantries asked, "Can you meet me at the Los Angeles Airport? I'd like you to meet someone who has to catch a nine PM plane to go back east. We'd like to talk to you about business for a few minutes."

The Navy and Douglas reached an agreement on one underlying issue which contributed dramatically to what I would call the comparatively smooth and orderly progress made on the SKYWARRIOR. Traditionally the buyer adds components to an aircraft as missions are modified or added by strategic planners. A domino effect may ensue and ultimately lead to necessary additions in some form or another to the basic plane. Douglas and the Navy stipulated that if this occurred, say a ten pound black box was added to the structure, fuel capacity would be reduced a like amount. We could therefore remain within our weight, size, and structural parameters. The effect of each change on cost and performance was also very carefully recorded.

I recall a day during the preliminary design stage when Otto Glasser stopped by at the El Segundo plant. A colonel, later general, in the Air Force, he was involved with aircraft development and was most curious about our bomber. When he visited me, he was assigned to a weapons project in Albuquerque.

We talked about the SKYWARRIOR and the atomic bomb it would carry, presumably the "Fat Man", as we called it, which was five feet in diameter.

"You know Otto," I said, "it's too bad that we have to design this aircraft around a bomb of such size."

"What do you mean?" he asked.

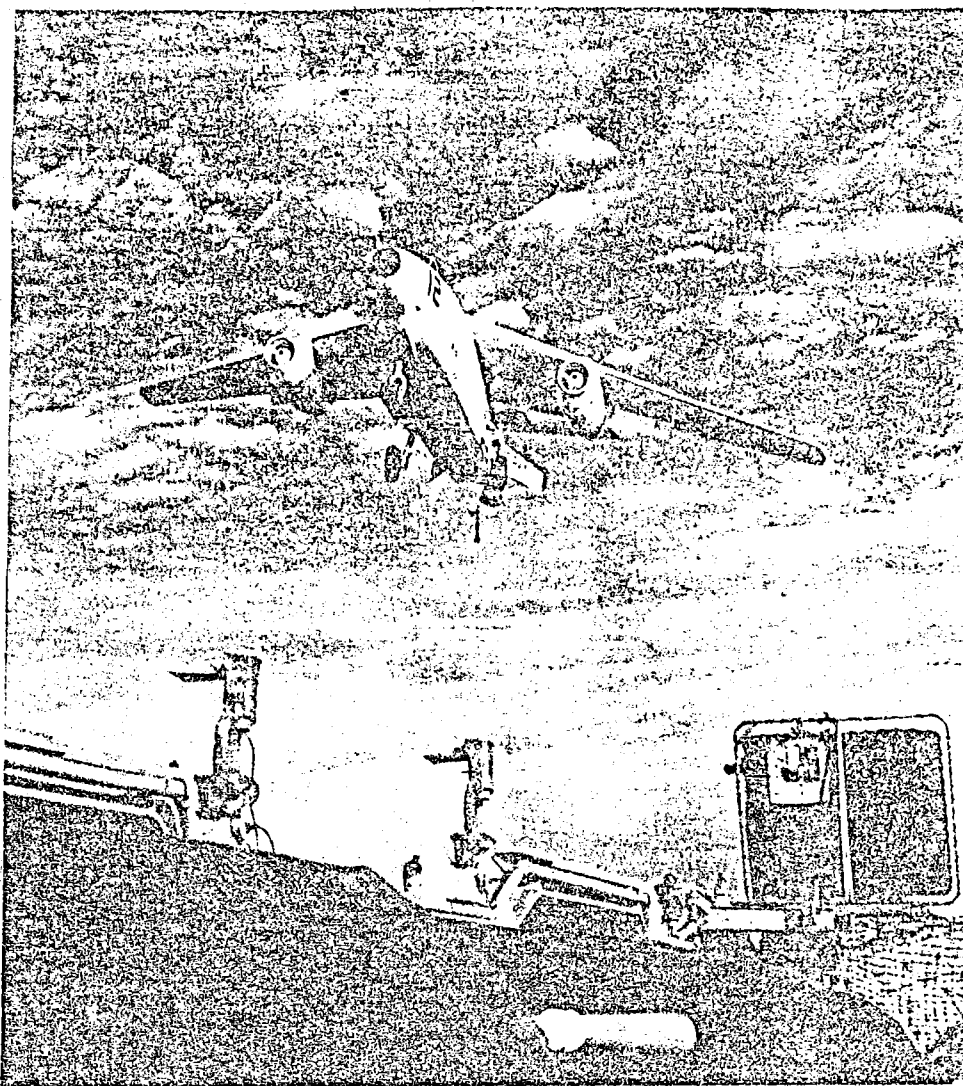
"Well," I went on, "the dimensions we're dealing with now are five feet by five feet by 183 inches, not exactly a diminutive weapon."

He eyed me curiously but said nothing.

"It would seem to me," I continued, "that the experts should have been able to come up with a smaller bomb equally effective as what we're using today."

Otto said, "If you did have a smaller weapon, how much weight could you save?" I had a feeling Otto knew what the next generation of super-bombs would look like. It was no more than an instinctive reaction on my part.

I picked up a compass and arbitrarily set it at thirty-two inches, which happened to be the diameter of the wheel for the F3D I was studying, a drawing which was on my desk. I drew the circle and sketched in an aerodynamic, bomb-like shape around it. I placed it on a drawing of the A3D and with light pencil strokes, "shrunk" the planes shape accordingly.



A Whale waves off during approach to the USS *Lexington* in 1959. Although originall 68,000-pounds, the bomber was later cleared for carrier operations at 84,000 pounds.

Surprised, but curious and willing, I agreed. At the airport Wheaton and the other man, who was from Bell Laboratories assisting Sandia in the subject project briefed me.

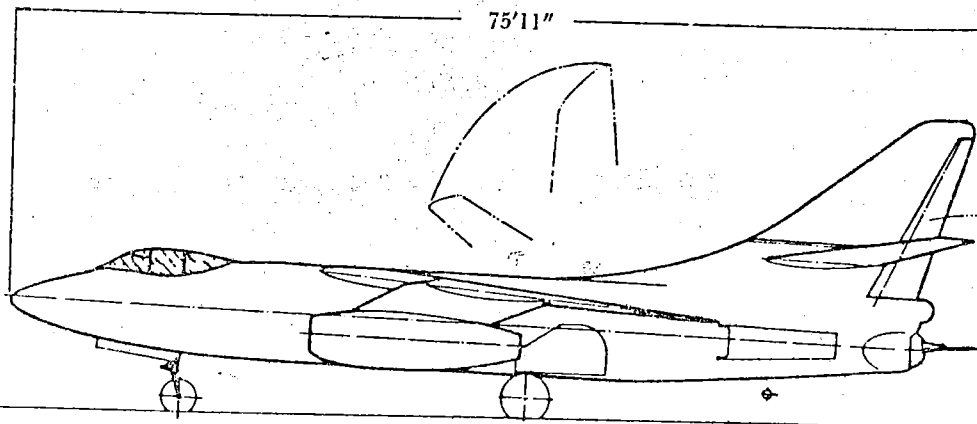
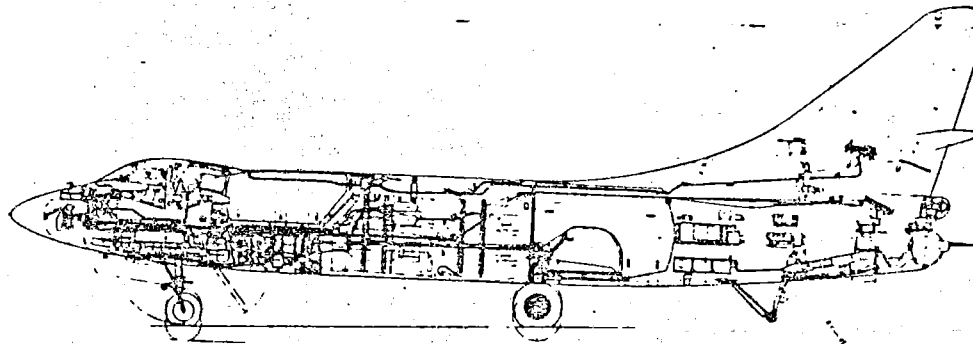
"What we're suggesting," Elmer said, "is that you set up shop to build airborne atomic weapons for an interim period, until Sandia gets established and can take over the task."

As you can imagine there were considerable deliberations in order before we went ahead with such an operation. But we did proceed and were assigned to construct the inner and outer casings of the bombs as well as the control boxes. Sandia would manufacture the explosive charge and nuclear elements. We used a warehouse on the El Segundo grounds for the project. It was located near the railroad tracks which passed through the factory complex and had been used for shipping operations during World War II.

# U.S. Navy High Altitude Attack

## Model A3D-1

Power plant	2 P. & W. J57-P-1
Maximum thrust at sea level	9,500 lb.
Gross weight	70,000 lb.
Combat weight	52,170 lb.
Fuel	4,485 gal.
Maximum speed at sea level	537 kt.
Maximum speed at 35,000 ft.	514 kt.
Rate of climb at sea level	5,360 fpm
Service ceiling	41,900 ft.
Time to climb to 30,000 ft.	11.1 min.
Combat range at 471 kt.	2,080 n. mi.
Endurance for combat range	4.96 hrs.
Stalling speed, power off	99.1 kt.
Take-off distance, deck—calm	4,400 ft.
deck—25 kt.	2,965 ft.
50 ft. obstacle	6,090 ft.
Armament	8,580-lb. bomb loa Twin 20-mm. guns



Initial specifications, general performance results,  
equipment layout and overall length of the . . .

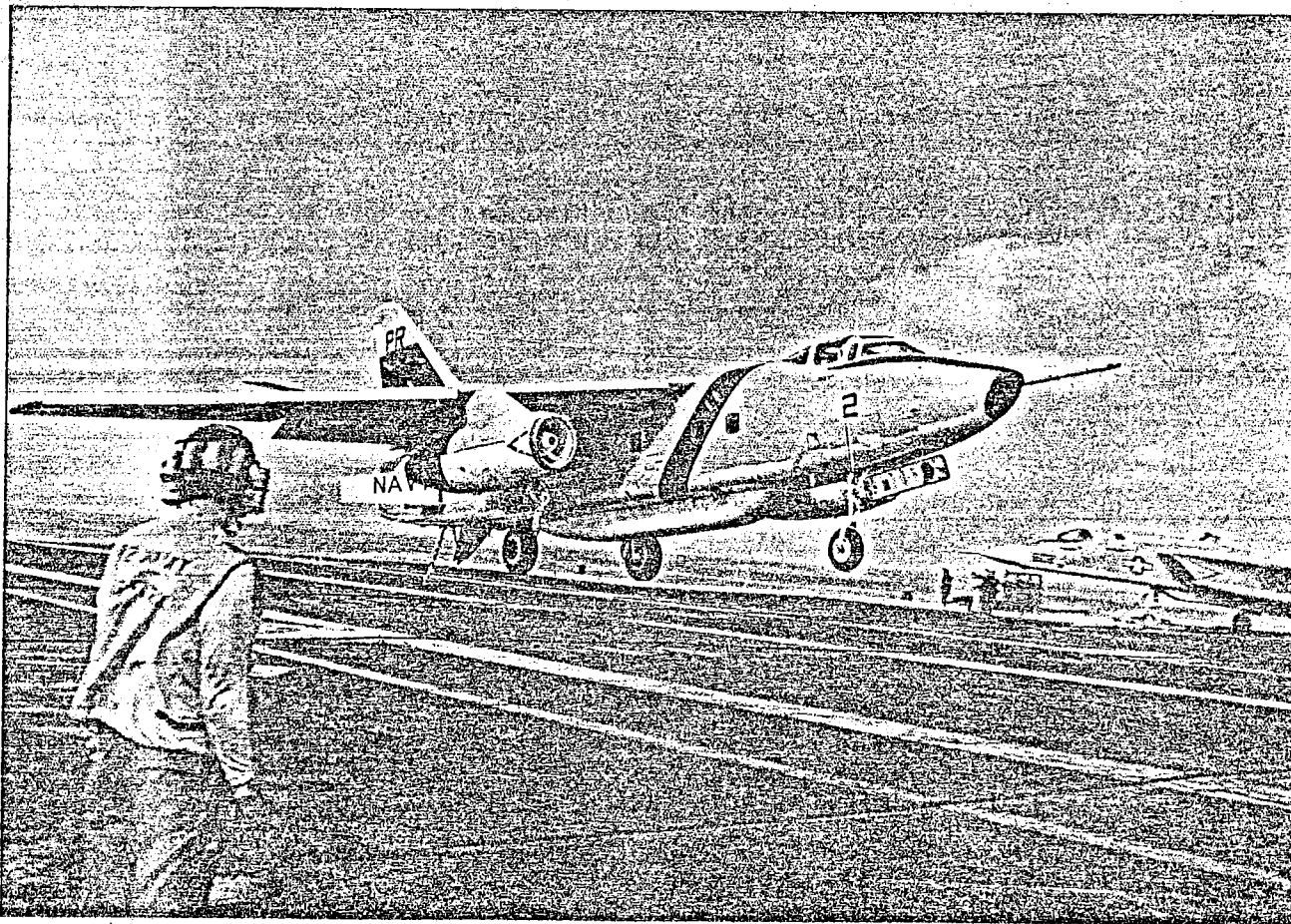
A3D SKYWARRIOR



Miles soon noticed the impressive R.G. Smith painting, which Chick had posted on the wall. When Hayward was called out of his office for a few minutes, Miles had his potographer take a picture of the painting. A few days later I was waiting with Marvin for a plane to take us out to Edwards Air Force Base in the desert for some aviation event. We were in the parking lot at Burbank's airport where Miles opened the trunk of his car.

"Take a look at this," he said, holding up a reproduction of the SKYWARRIOR painting. My jaw dropped. "I'm going to run a story and this picture in the Times next week. Great photo, isn't it?"

It was a great picture all right. And running it in the Los Angeles Times would make it greater indeed. From that moment and throughout the thirty minute ride to Edwards, I pleaded, cajoled, and mildly threatened Marvin. "Run that picture and you'll get me in trouble, Hayward in trouble, and a certain respected aviation writer in trouble! Premature revelation of the SKYWARRIOR," I argued, "would raise all kinds of hell for us."



EA3B SKYWARRIOR of VQ 1 trapping aboard the USS Kitty Hawk (CV63)

It was located in front of a large structure at the far end of the property and was a suitable spot for the highly classified endeavor. Over a hundred carefully chosen workers were affiliated with the project.

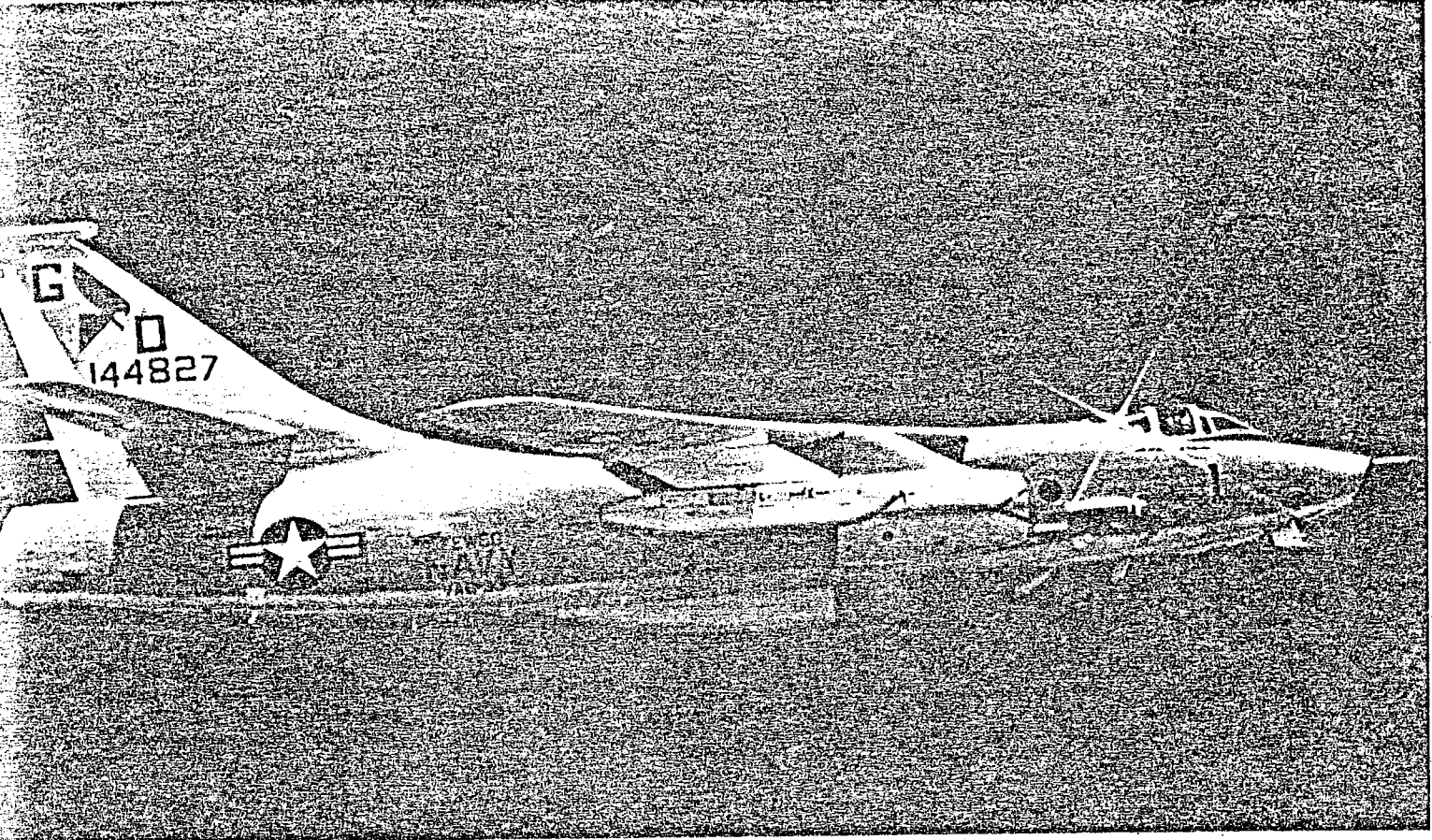
When I ran into Otto Glasser in 1970 he recalled the episode of the thirty-two inch wheel, which invoked some mutual laughter. "Ed," he told me, "you have a remarkable sixth sense coupled with a generous dose of extrasensory perception."

I called it dumb luck!

The SKYWARRIOR made its maiden flight on 28 October 1952, and one of the first things we learned was that the J40 was not powerful enough for the aircraft. It failed to live up to expectations. It took many more months to do so, but the J57 was ultimately installed. Its worthwhile to mention that during World War II, Westinghouse, builders of the J40, and General Electric were permitted to work on gas turbines, gaining untold valuable experience in the field. They had both been steam turbine builders. Pratt and Whitney and the Curtiss-Wright Company were principal suppliers of the piston engines for our war machines and had been restricted from engaging in jet-engine work. Even so, Pratt and Whitney came through with the J57.

An offshoot of the Chick Hayward episode during the mock-up of the SKYWARRIOR, concerning placement of the controls, darn near caused a public relations diaster before the plane flew for the first time. Right after the incident, I invited Chick up to my office and showed him an oil painting that R.G. Smith had done of the plane. He admired it so much I gave it to him, but cautioned, "Remember, we cannot release too many details on the plane because of the nuclear mission involved, so please be careful with that canvas." I certainly didn't have to advise Chick about security regulations, but I instinctively did so. In the 1940s and 1950s especially, anything that had to do with atomic matters was cloaked in secrecy.

Chick went back to his heavy-attack duties at NAS Moffet Field near San Francisco and some time later was visited by Marvin Miles, the respected aviation editor of the 'Los Angeles Times.' Miles discussed various Naval aircraft activities with Chick for a forthcoming feature in the paper. Since he was considered a sort of dean of the Los Angeles writers' fraternity, he was more than welcome.



ERA3B SKYWARRIOR of VAQ 33 . . .

Our public relations man, Chet Miller, was a tremendous help to us. He knew how to deal with the growing media interest in aviation. Even though his knowledge of aerodynamics was limited, Chet had a natural touch with members of the press and got us an abundant number of column inches in newspapers and magazines. His expertise was instrumental in polishing our image at El Segundo.

The briefings were well received and fortified my relationships with the media, which, I'm pleased to say, have been most favorable through the years. More importantly, these presentations benefited the Navy as well as the company and industry at large.

We had an excellent printing shop at El Segundo, which produced a variety of forms, brochures, and posters for internal as well as external use. I reviewed virtually all of these before their distribution and was usually pleased with the shops efforts---except for the color blue. It seemed too pale and washed out. One day a chart came to my attention, its background a dull blue. I drafted a short memo to the print shop. "Could you please put some 'guts' into this blue?", I wrote. I clipped it to the poster and had it sent back.

Good reporter that he was, Marvin was bent on doing the story. I tried another attack. "Look Marv," I said, "lets do this. You kill the story for now, and I'll see to it that you are the first reporter to get complete information on the plane. I'll toss in a ride in the A30."

"I don't know," he pondered, "but I'll think about it."

For several days I expected to see that R.G. Smith rendition on the front page of the Times. Happily it didn't appear. Marvin had decided to go along with me. Later an official news release was made on the SKYWARRIOR, and I met with Marvin and saw that he got the complete story first. We even rigged an extra seat in the SKYWARRIOR, and Marvin rode along with me and a two-man crew all the way to 40,000 feet on an extended demonstration flight.

The day after the hop an entire picture page of the Times was devoted to the SKYWARRIOR. Marvin got his by-lined exclusive, the SKYWARRIOR was beautifully displayed, and there was even a photo of Marvin and me aloft and smiling, enjoying the wonderful world of flight.

In a way the development of a shroud of secrecy on aircraft and weapons in the postwar years worked in my favor, as I was frequently invited to talk to the Los Angeles and San Francisco aviation writers on the subject of aeronautical advancements. Although I was not a born natural speaker, I enjoyed these excursions.

Jet technology, high-altitude flight, and the increasing speeds of aircraft were viewed as sensitive subjects by government officials. We were on a new threshold of learning. The restrictions placed on us then would seem ludicrous today. However, I reasoned that pertinent and stimulating information on this new age in aviation could be transmitted without jeopardizing security.

I had charts made which depicted the various layers of our earth's atmosphere. These were simple in nature, usually executed in color, which exhibited the altitudes in order: earth's troposphere, stratosphere, and beyond. I would discuss general characteristics of these levels and, in layman's terms, explain the problems and advantages associated with high-altitude flight. I would toss in explanations of wing lift and drag factors in thinner air as well as reasons why jet engines, under certain conditions, were more efficient than their piston-powered cousins. Charts such as this are common today, but to my knowledge, we were the first to come up with them.

The stress figures I'd seen convinced me that BuAer had a case. We finally got some heads together, and El Segundo offered to build a rig consisting of landing gear and a package of cradle mounted weights, that were equivalent to 84,000 pounds. An ESSEX-size ship was in the Puget Sound Naval Shipyard in Bremerton, Washington, and with some reluctance, BuShips consented to let us make drop tests on its flight deck.

Well, we made the tests and we cracked the deck of the carrier, but only after a large number of drops. The damage involved a sprung deck section near the fantail. It was reinforced with stiffeners and ultimately, the 84,000 pound SKYWARRIOR was approved for operations aboard carriers.

This monkey-wrench approach resulted in the SKYWARRIOR being fully certified for operations from another class of carrier, thereby increasing its operational value considerably. I would not call the process a classic example of sophisticated engineering, but it sure saved a lot of dollars.

What began as a heavy attack, nuclear bomber, served in a broad spectrum of roles, including: Tanker, High-Speed Personnel Carrier, Mine-Laying, Photoreconnaissance, Radar-Navigation Trainer, a combination of Tanker-Electronic Countermeasures, Electronic Countermeasures only, and VIP Transport. In addition to the versions listed above, it has been used as a medivac transport, cargo hauler, mail hauler to carriers and as a test-bed aircraft for testing new Naval projects and weapons. The plane earned accolades in Southeast Asia functioning in photoreconnaissance, as a tanker, and as a platform for the ECM mission. Somewhere along the line, presumably because of its bulk, it became known as "THE WHALE"

One plane, called AURORA, was modified for weather and hurricane surveillance and was later configured to a VIP transport operating out of Andrews Air Force Base. Many Naval leaders flew in this bird, including one of my favorite non-aviators, Admiral Arleigh '31 Knot' Burke, when he was C N O. The Air Force, incidentally, flew a derivative of the Navy SKYWARRIOR, the B-66 Destroyer, about 200 of which were built at Douglas's Long Beach and Tulsa plants.

In 1972, hosted by Rear Admiral Harry Train, I visited the Sixth Fleet in the Mediterranean with NRAC, the Naval Research Advisory Committee, of which I was a member.

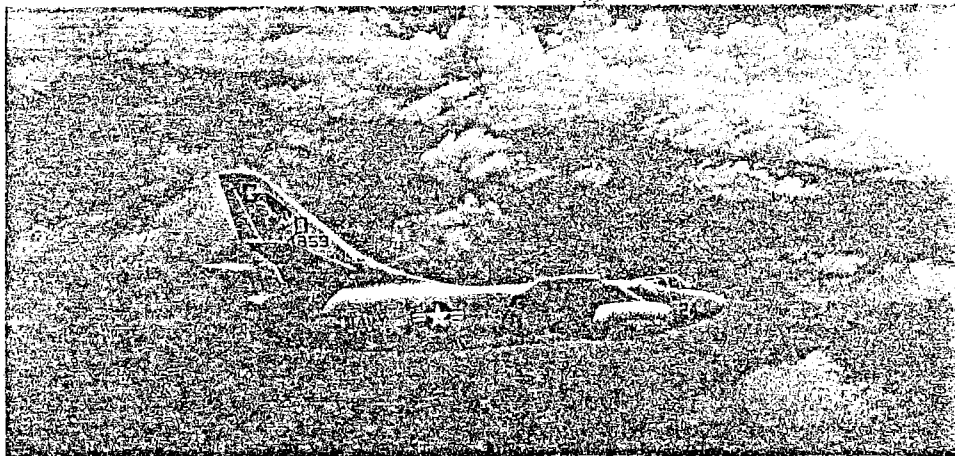
I'm not sure exactly what transpired when the printers saw my memo, but a new blue soon began to appear on Douglas El Segundo graphics. It was bright and bold and reminded me of the deep blue of the Pacific at mid-ocean. I really liked it.

A visitor happened into the print shop one day and saw a jar on the shelf labeled HEINEMANN BLUE. He told me about it, and I checked with the printing people. They had taken my memo to heart. I believe I'm the only aircraft designer to have a shade of printers ink named after him.

The SKYWARRIOR reached the fleet in March 1956 and remained in full production through 1960. A total of 281 were built in seven various versions, and at this writing, many continue to fly. In 1959, a tanker version made three catapult shots on the USS INDEPENDENCE with a take-off speed of 143 knots at a gross-weight of 84,000 pounds. This set a record for carrier-based aircraft.

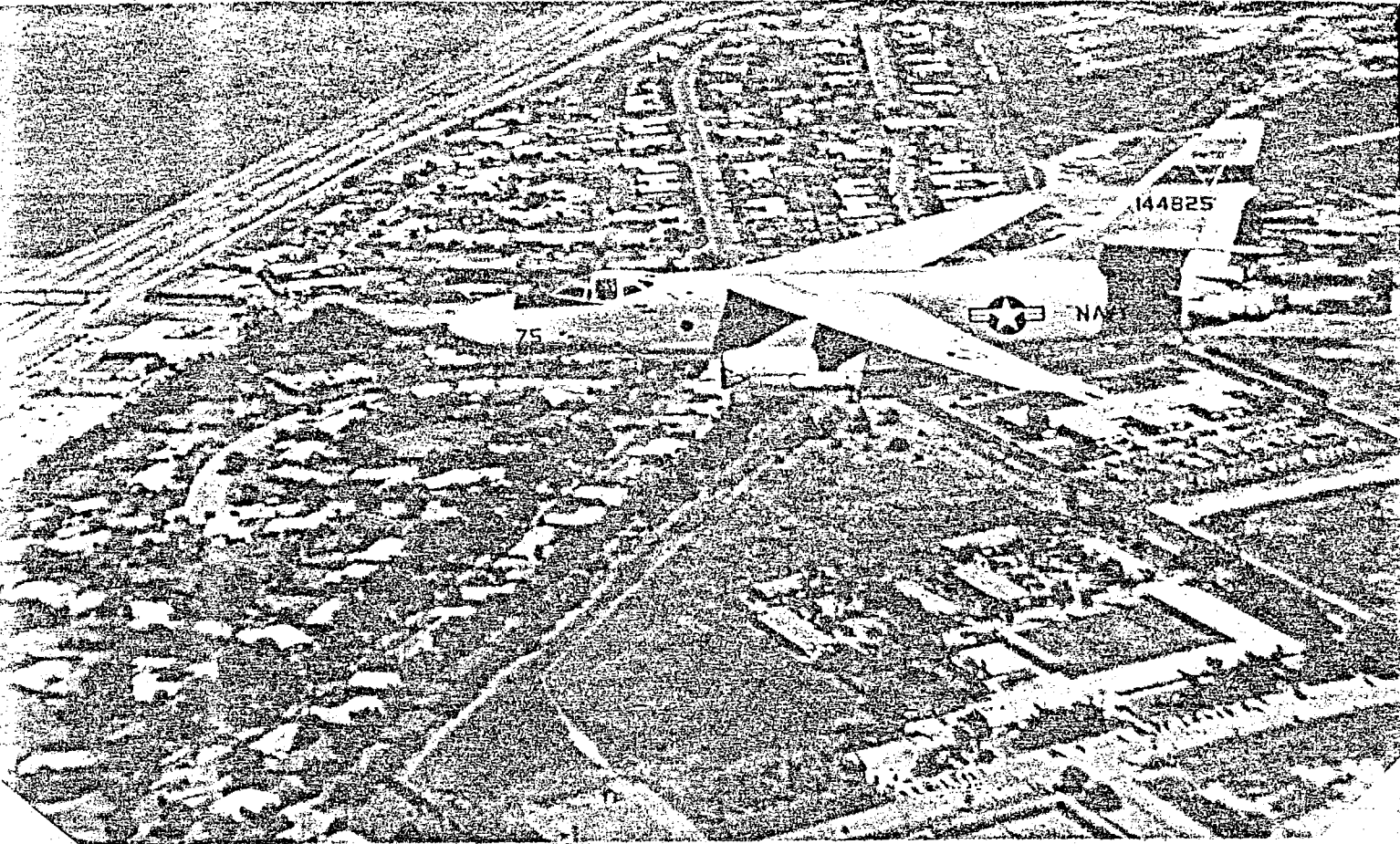
As was the case with many planes before it, the SKYWARRIOR was destined to gain weight. In a way it is a credit to the soundness of the basic design that it was able to accommodate additional equipment and accomplish new missions. At the same time, a robust debate stirred some dust between BuAer and BuShips. It was centered on the SKYWARRIOR and its landing impact effects on flight decks.

BuShips told BuAer that a 68,000 pound aircraft slamming down on its flattops was the limit. BuAer, with El Segundos support, told BuShips its carriers could handle an 84,000 pound plane. BuShips at the time wouldn't budge from its position, and BuAer kept pressing the issue. It wanted more equipment on its bomber to enhance its capabilities. On top of this, BuAer envisioned operating the SKYWARRIOR from ESSEX-class carriers! This thought really shook the surface Navy types.



TA3B SKYWARRIOR of VAQ 33 used to train pilots and navigators.





NRA3B SKYWARRIOR assigned to NAS PT MUGU.

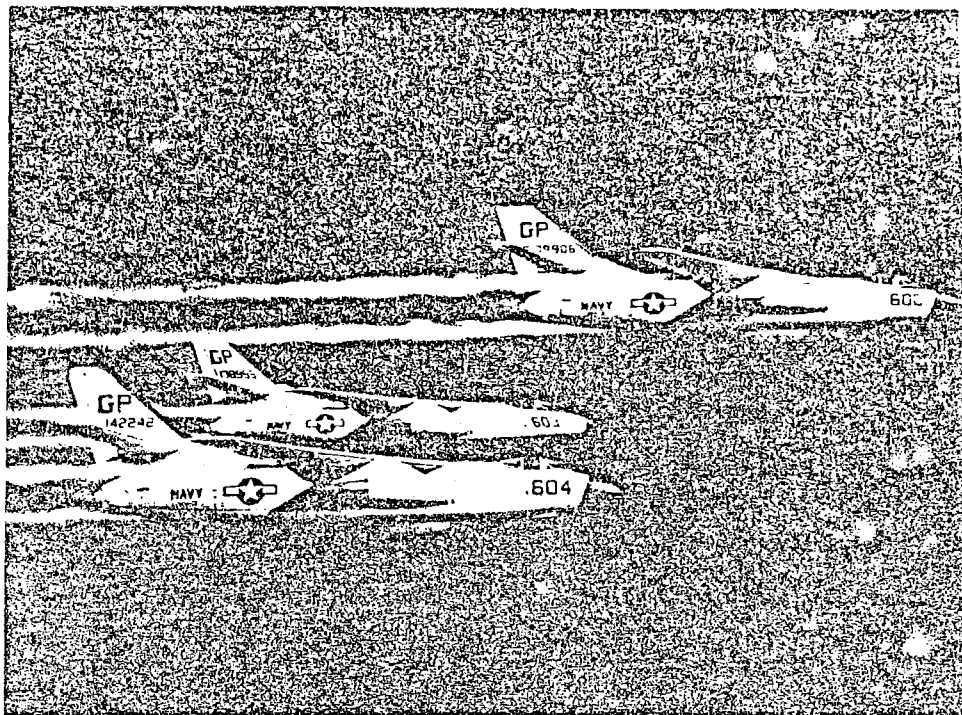
Commander D.W. Cox set a record in March 1957 when he flew from Los Angeles to New York and back to Los Angeles in nine hours, thirty minutes and forty-five seconds. In the same month a SKYWARRIOR raced from Burbank, California, to Miami in three hours, thirty-nine minutes and twenty-four seconds. In June 1957, a pair of SKYWARRIORS and two F8U Crusaders flew non-stop from a West Coast carrier, across the United States and landed on an East Coast flattop, scoring a first for jet aircraft.

During the Vietnam conflict, later in its life span, the SKYWARRIOR scored an unusual type of achievement with its role in wet-wing operations. Yankee Station aircraft which had sustained fuel-cell damage would 'plug-in' to the tanker. The A3 would then lead the stricken plane all the way back to the carrier where the beleaguered aircraft would disengage and make its final approach. Many pilots and aircrews were saved from going into the drink with this procedure.

I won't try to list all the people who were instrumental to the SKYWARRIOR'S success. There are just too many. But I must laud a few. Commander Tommy Thomas, with his special skills in getting people to act when needed was vital to the steady progress we enjoyed in developing the aircraft.

Touring the flight deck on the *USS KENNEDY*, one of the scientists pointed to an EKA3B, the tanker-electronic countermeasure type *SKYWARRIOR*. "What airplane is that?" he asked. "It seems to be one of the more modern ones here."

I laughed. "That, sir, is a *SKYWARRIOR*. We started work on it in 1948."

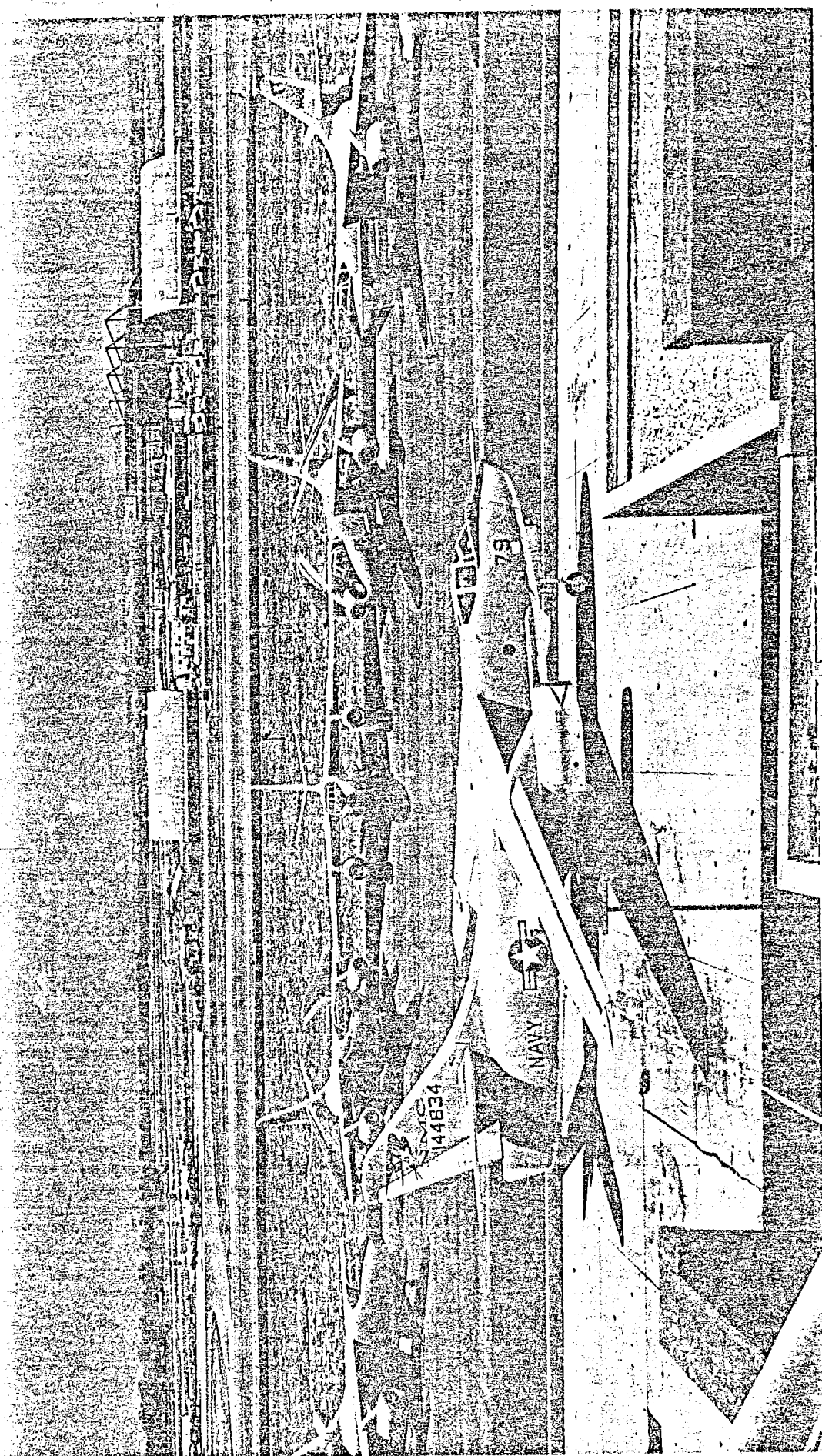


VAH-13 Skywarriors off the California coast.

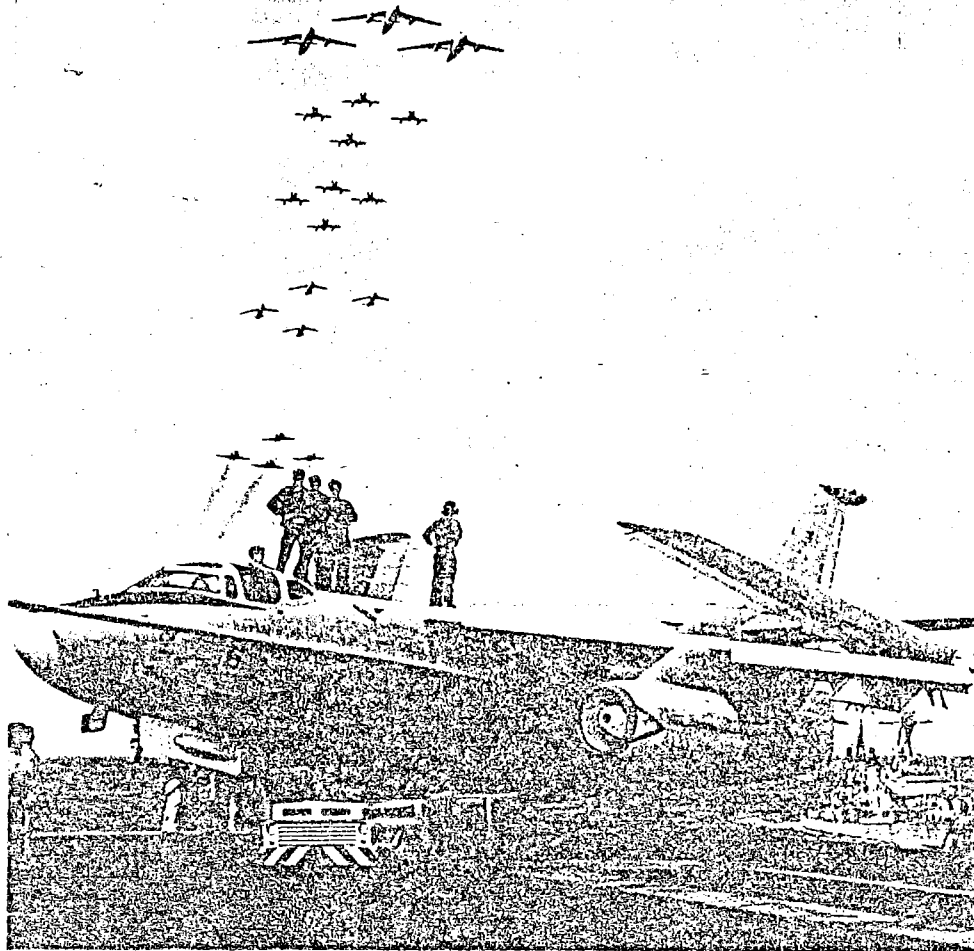
I also recall a conversation in 1973 with a recognized expert in international warfare matters. I had asked him what the Soviets feared most since World War II. His unequivocal answer was, "The United States Navy's carrier fleet, but most importantly, the planes on those carriers." I once visited Captain Vincent DePoix, first Skipper of the nuclear carrier *ENTERPRISE*, aboard his ship. He shared similar thoughts with me. I was proud that the *SKYWARRIOR* was one of those planes.

The A3D, later redesignated the A-3, has enjoyed many highlights. How well I remember Admiral James D. 'Jig Dog' Ramage showing me pictures he had taken from an A3D when, as a Captain, he headed Heavy Attack Wing One based in Florida in the late 1950's. He had made a run to Dallas and back, and the pictures were of buildings in Dallas which served as a simulated target, quite a remarkable feat at the time.





NA and NRA3B SKYWARRIORS . . . NAS PT MUGU



Skywarriors lead Skyhawks and F-1 Phantoms during fly-by.

Naval officers who were of significant help included program managers Dave Staley and Ed Winters and civilian Bob Francis. Others who provided valuable service were Emerson Fawkes, Joe Murphy, Walter Diehl, Bill Frisbie and George Spangenberg. Angus Jacks, who had extensive experience in BuAer as well as at Douglas Aircraft, was a key player in working up the most difficult 'P' and 'Q' versions of the SKYWARRIOR.

The ubiquitous Leo Devlin was a major figure as was K.E. Van Every, head of the aerodynamics department, and the SKYWARRIORS project engineer, Harry Nichols. R.G. Smith was most important to us and is deserving of special praise.

If nothing else, the SKYWARRIOR program proved that there are occasions when what the majority say is impossible can be made possible. Those in the minority must be prepared to prove their case, of course.

We feel that we did that with the SKYWARRIOR.