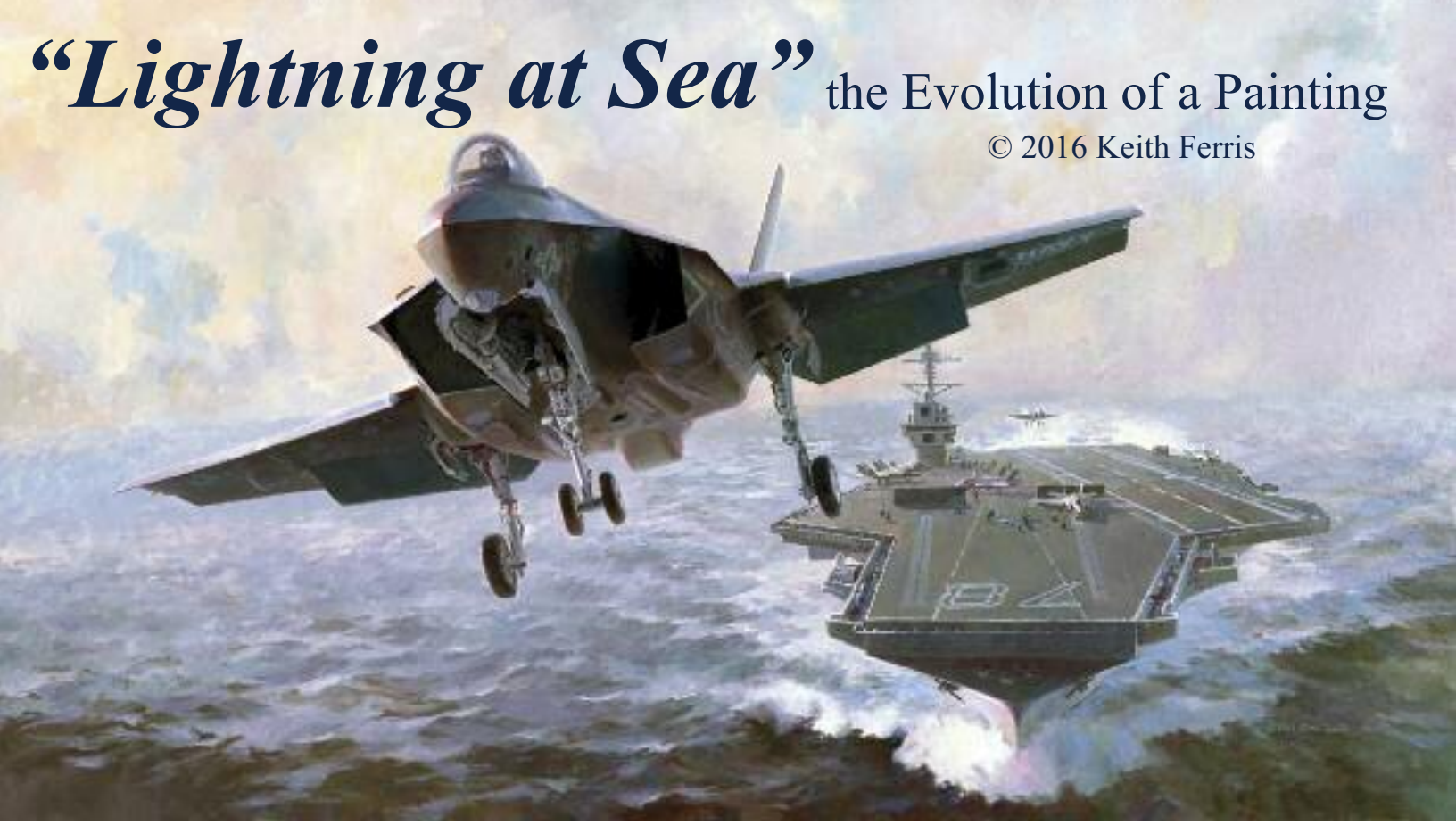
"Lightning at Sea" the Evolution of a Painting



It was almost a year ago that my Pratt & Whitney clients visited to discuss the creation of the third and final of our three-painting F-35 Strike Fighter series. I had previously completed paintings of the Pratt & Whitney powered Air Force CTOL (Conventional Take-off and Landing) F-35A and STOVL (Short Take-off Vertical Landing) Marine F-35B. The Air Force F-35A painting had depicted the aircraft engaged in strafe training on the Hill Air Force Base "Eagle" Ranges in Utah while the Marine F-35B painting had featured that aircraft's unique VSTOL (Vertical Landing and Short Take-off) capabilities during expeditionary operational training underway below on Camp Pendleton's 1850 foot Red Beach Landing Strip.

I was now looking forward to this third painting which would take us to sea with the Navy's first stealth fighter, the Pratt & Whitney powered F-35C.

This assignment was to present the perfect opportunity to demonstrate six individual attributes:

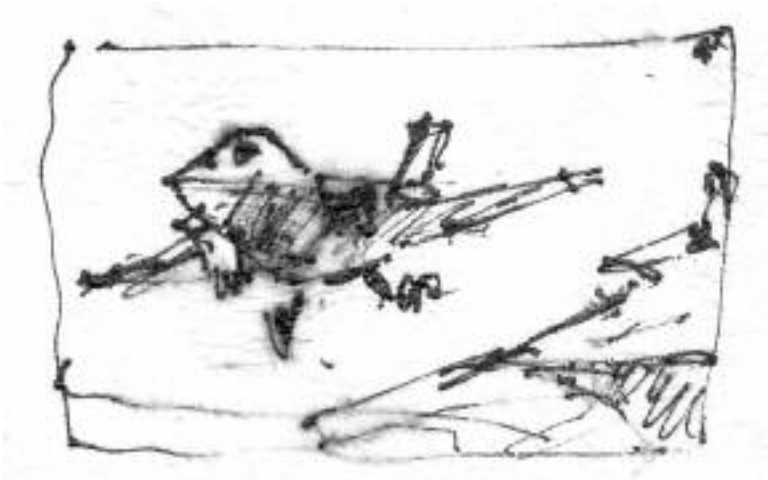
Flight • Action • Excitement • Water • Ship • Airplane

I remembered tackling a similar challenge 50 years earlier with the first of my multi-year Chandler Evans series. That painting was among the first to depict the then brand new Vought A-7 for which many of the aircraft's details were yet to be made public.

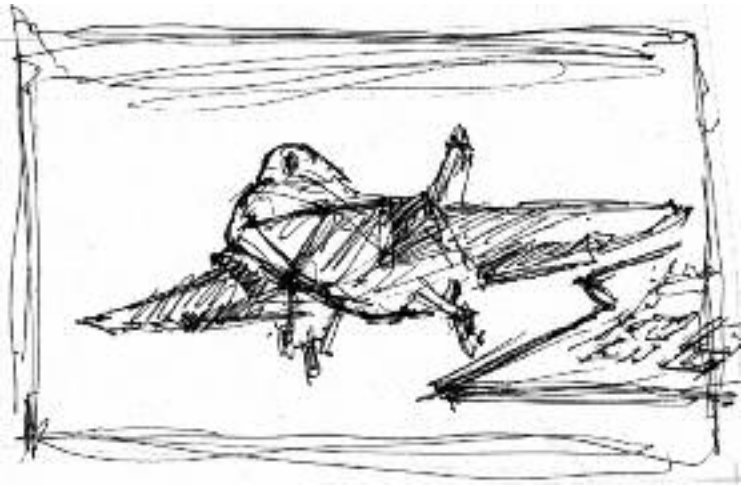
The "Flight" attribute had been achieved with the rising of the aircraft. "Action" was introduced with the exaggerated "Clearing Turn" so shortly after launch. "Excitement" was added by the proximity of the menacing, thrashing water below and the "Ship" requirement was fulfilled by the small portion shown in the painting. (I can certainly see many improvements I would make on this one today)

The Pratt & Whitney folks agreed with this approach while offering the suggestion that aircraft launch from the forward starboard catapult with enough "Ship" to identify her as the new USS Gerald R. Ford, CVN 78.

The tiny "napkin sketch" created at lunch set the general direction of the assignment. It had the desired feeling of "Flight", "Action" and even a bit of suspense. (It reminded us of the first flight of a fledgling bird.) To minimize the ship's competing with the aircraft for attention in the painting, the intent was to show just enough of the ship to identify it by its number.



As we further explored this concept with "memory drawing" sketches on newsprint in the studio, I felt it important we include both intakes to emphasize the unique width/volume of that massive fuselage. It also would be important to show more of the aircraft from wingtip to wingtip with lowered flaps, drooped ailerons assuring that at least one of the two canted vertical stabilizers be visible. It was also important to emphasize the pilot up there in that sunlit cockpit beginning his clearing turn.



Obviously cropped too closely this sketch was beginning to show more of the far intake but still not enough to emphasize the width of that fuselage. However this view was perfect for showing the stealthy shapes characteristic of the underside of the aircraft which the two earlier paintings could not. As we moved the viewer further to our left, we were able to show more of the intake and increase the bank angle to enhance the "Action" in the painting. The "Excitement" attribute would be enhanced by more water below and the ship's bow plunging through the sea.

My Pratt friends approved the concept and, being satisfied that I would be able to pull it all together, they left the rest of the process to me. As I turned the aircraft more towards us it began to dawn on me that this painting might have to involve far more than just a small portion of the ship.

Before going any further it was time to review CRITICAL FACTS about this project.

Why was the painting being commissioned in the first place? What would be its *PRIMARY PURPOSE?* How was it going to be used?

The *primary purpose* of painting was to be its May 2016 presentation to the Navy by Pratt & Whitney at the annual Pensacola Naval Aviation Symposium. As with the two earlier Pratt & Whitney F-35 paintings, this suggested a large fine art oil painting this time destined to be on public display on walls of the National Museum of Naval Aviation. These facts also suggested the appropriate materials to be used.

The *presentation date* having been set, completion by mid-April would leave time for photography, framing and shipping in time for arrival for the Pensacola presentation.

Larger paintings allow creation of maximum three-dimensional quality in a work. Viewers become part of the scene actually experiencing the event. For this painting, I would stretch and prepare a 56 inch wide canvas. The vertical dimension would await establishment of the final composition.

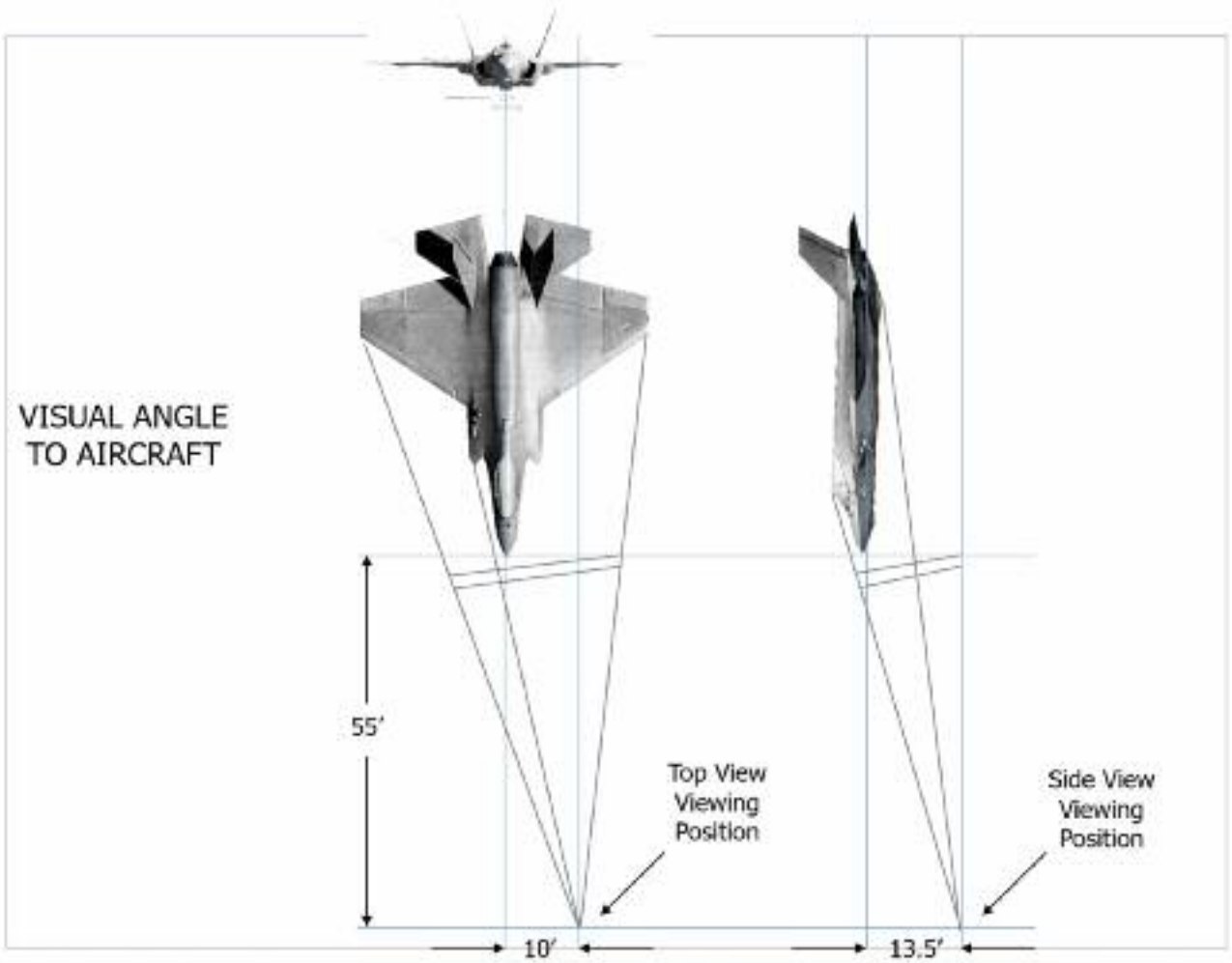
Secondary uses of the painting were to be: (1) a signed and numbered limited edition of fine art prints for presentation purposes (2) an open edition of posters for distribution to the naval aviation community. It would also be available for licensed Pratt & Whitney exhibit special events display and advertising.

The appropriate view of the aircraft having been established, I would begin the process by locating the exact *Viewing Position* relative to both canvas and actual aircraft needed to achieve the desired view to be created on our "Window on the World" represented by the stretched canvas.

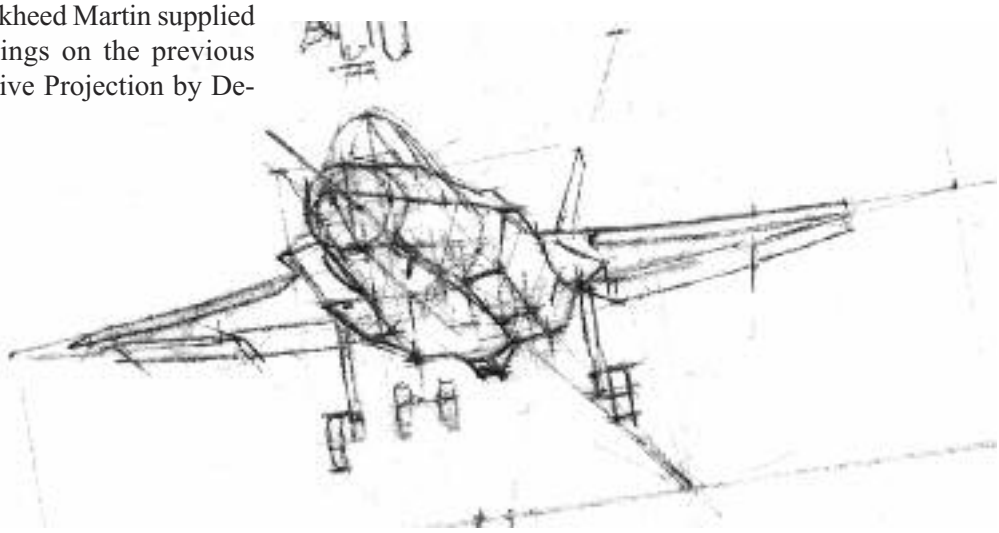
To achieve maximum 3-D quality and accuracy of all elements in the painting, I would be using Perspective Projection by Descriptive Geometry throughout to include drawing, relative sizes and location of all elements in the painting.

I decided the optimal viewing distance for the 56" wide canvas to be about six feet from the painting.

With our canvas placed six feet from the eye with the 43-foot wingspan of the actual aircraft appearing 40 inches wide on canvas, the distance from eye to the actual aircraft turned out to be 55 feet. Moving the viewer left, right, and up and down, I settled on a viewing position 55 feet forward of the nose, 10 feet left of centerline and 13.5 feet below the horizontal reference plane.

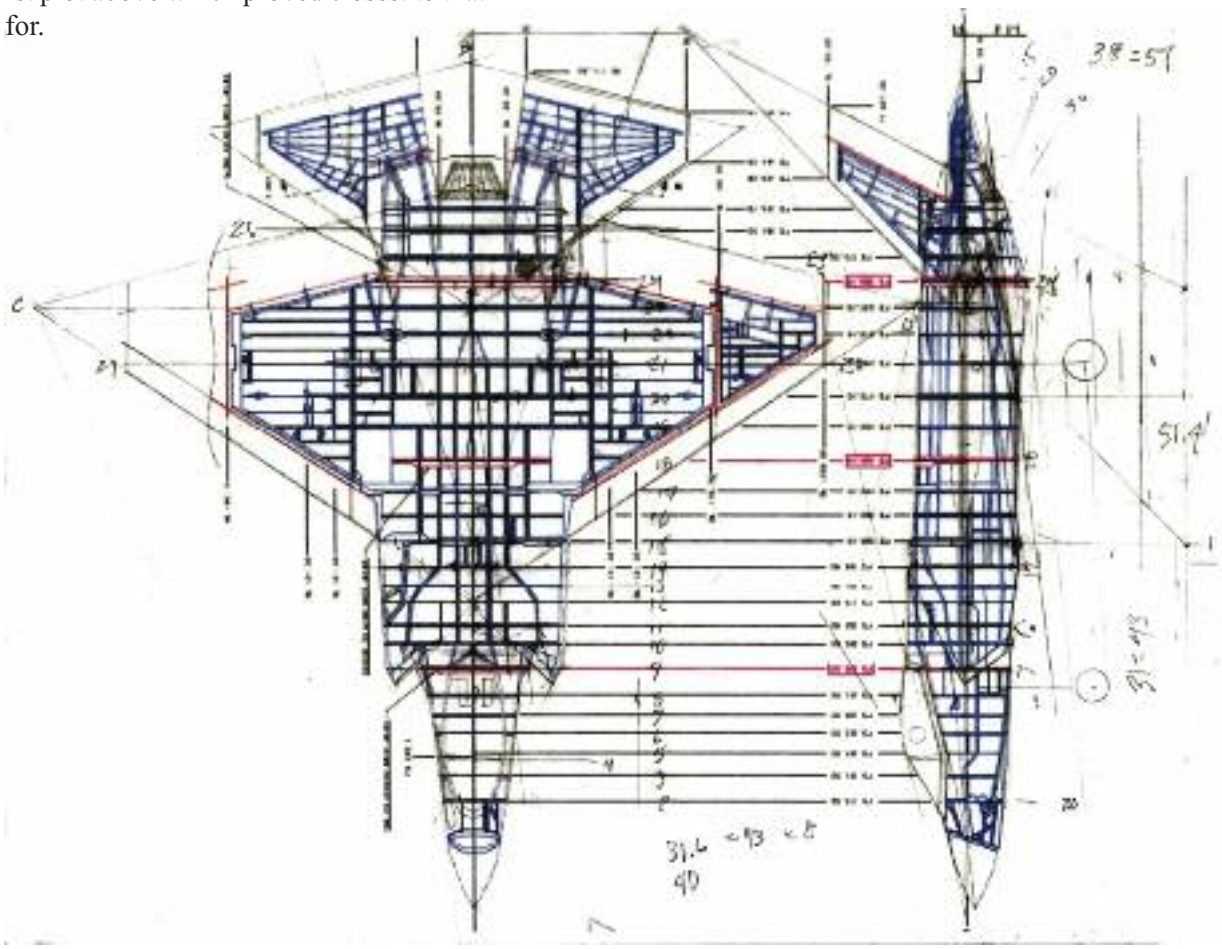


In search of the most informative view of the aircraft, I had first used the less detailed Lockheed Martin supplied tonal general arrangement drawings on the previous page to create the quick Perspective Projection by Descriptive Geometry below.

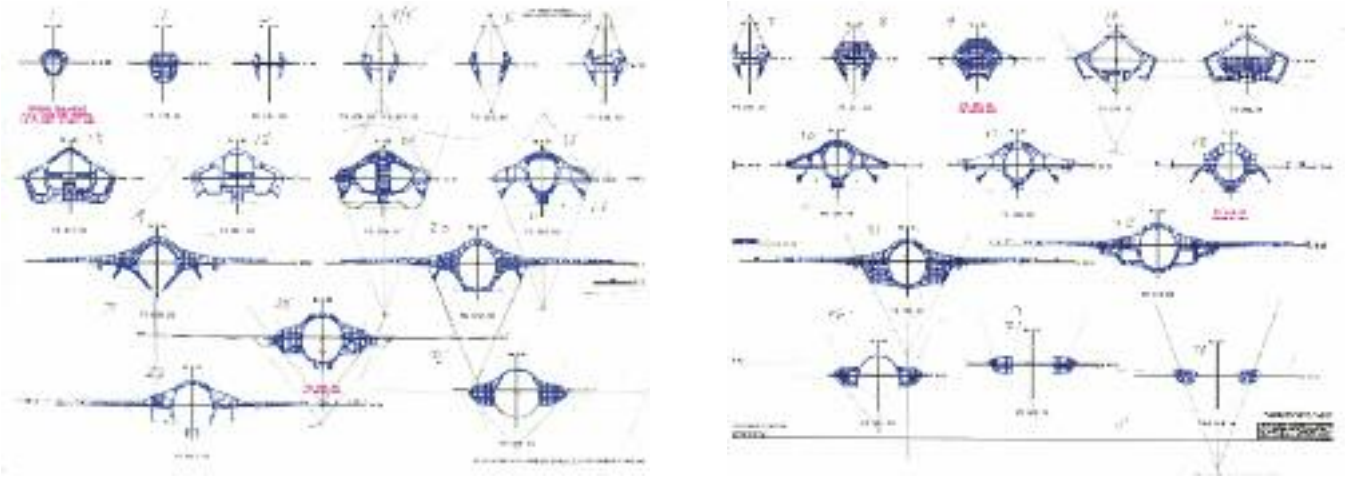


I then tried several quick plots with slightly different viewing positions, even moving a little closer to the aircraft and more to our right. The resulting longer, slightly larger nose blocked the far intake masking the "girth" of the fuselage. As often turns out to be the case, I returned to the first plot above which proved closest to that I was looking for.

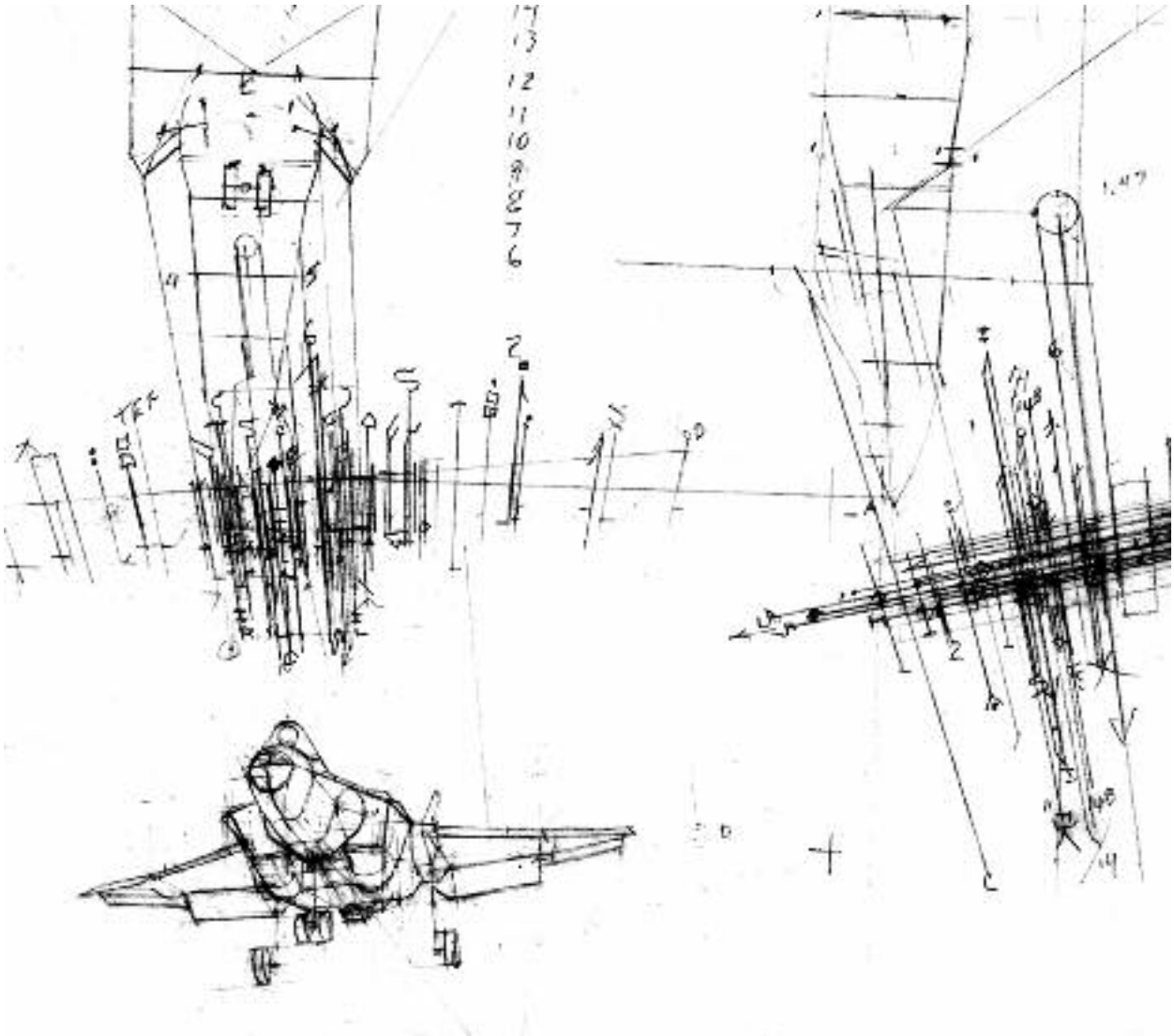
At this time I switched to detailed *Structural Station Diagrams and Cross Sectional Frame Drawings* provided by Lockheed Martin. These would allow a much more accurate drawing.



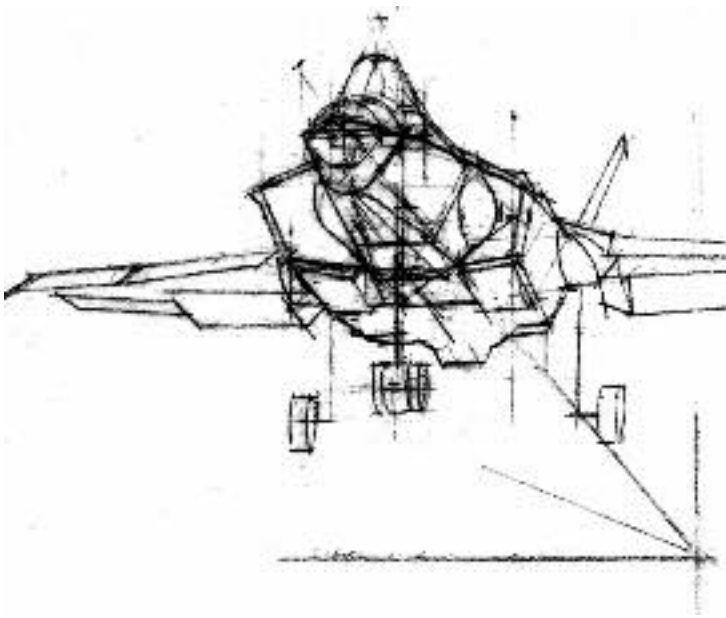
Structural Station Diagrams - Top and Side.



Cross Sectional Frames for each station.

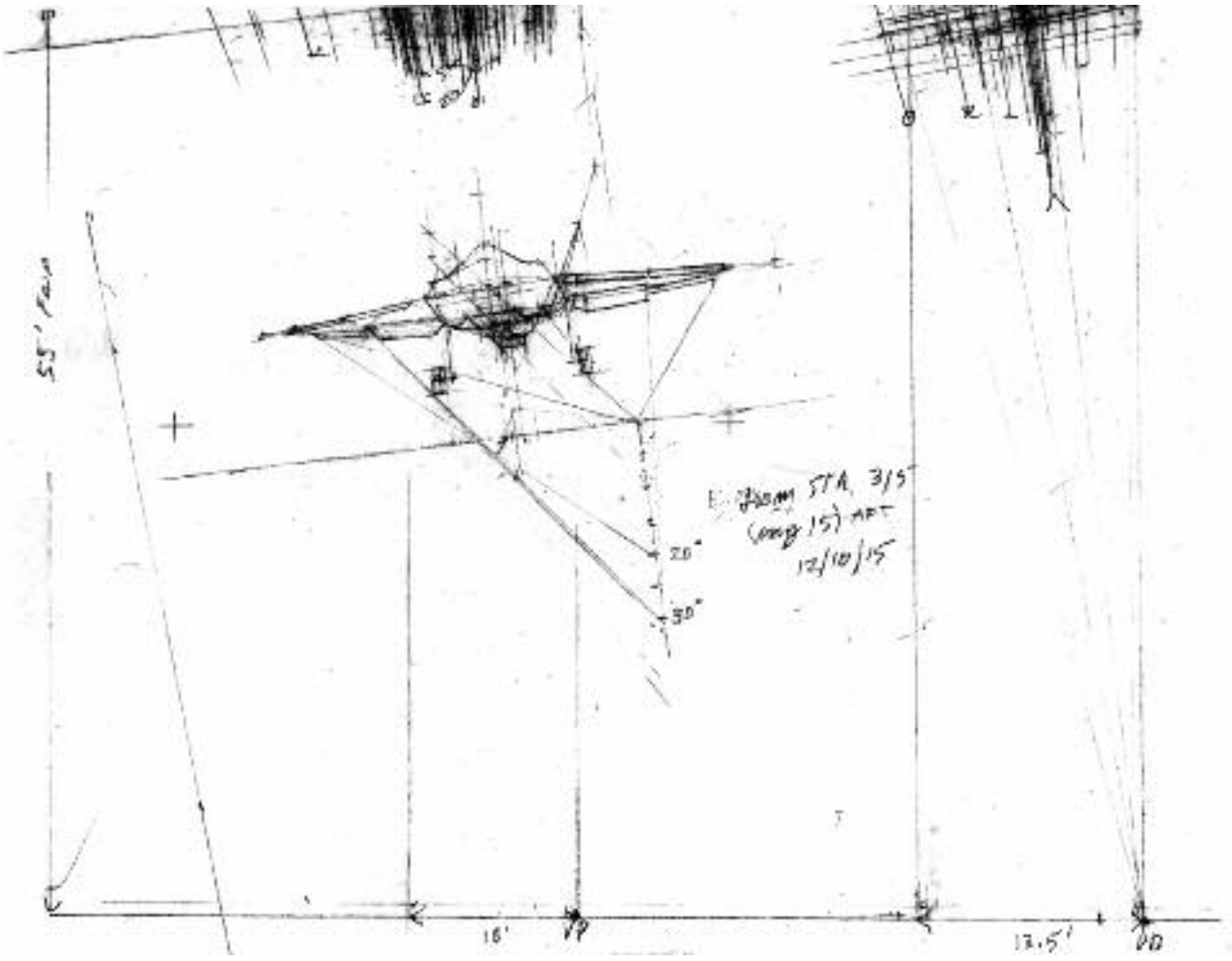


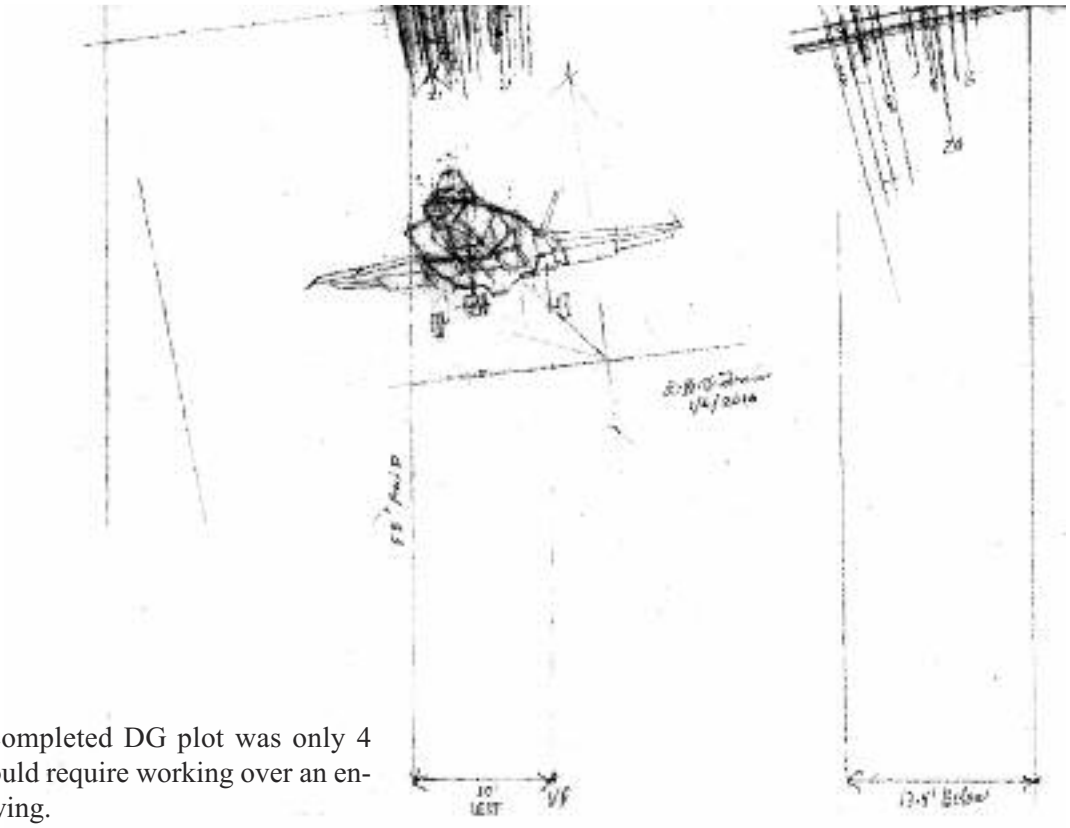
I began with a viewing position correct for distance and azimuth but a bit too low as seen here. The nose gear unfortunately touched the bottom of the fuselage and pitch angle is higher than I wanted.



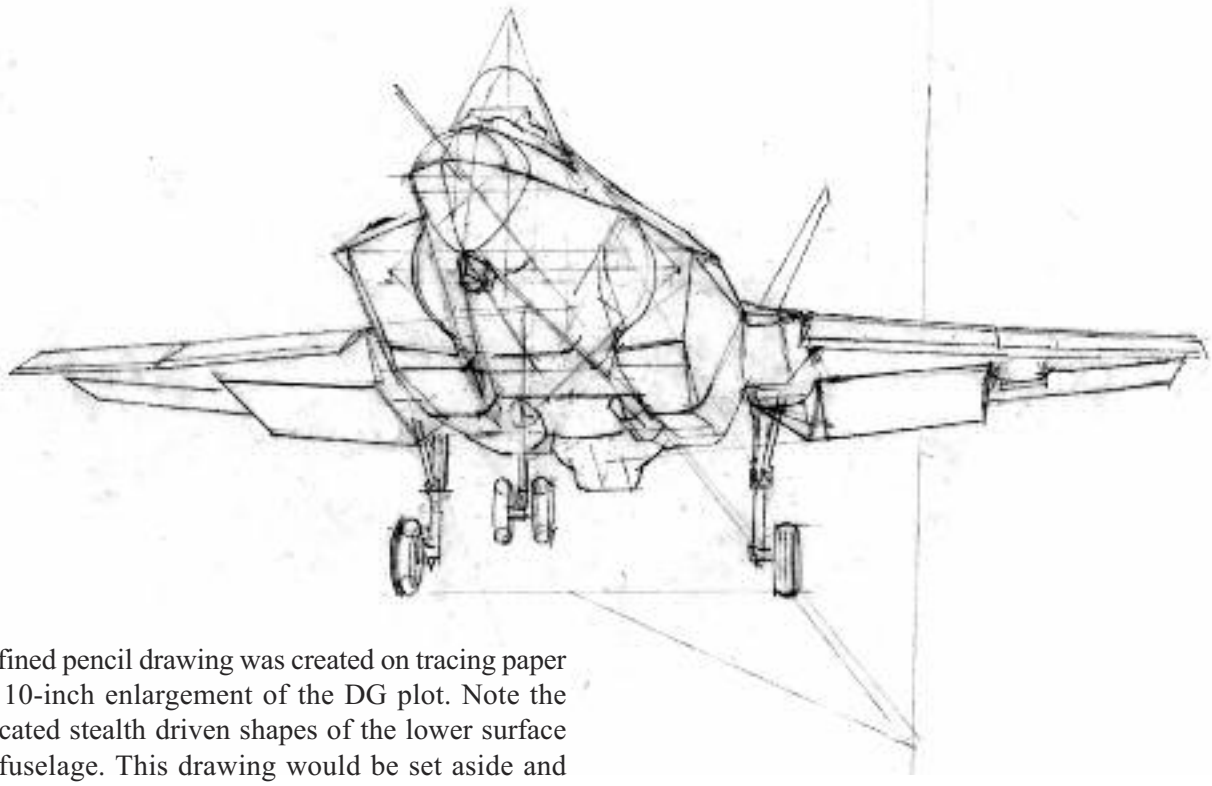
Raising the viewing position slightly and moving the viewing position slightly to our left showed both intakes more clearly and lowered the nose a bit. The nose gear was now well clear of the fuselage while remaining above the level of the main gear below. I could now settle down for the precise detailed DG plot from the now established correct viewing position. Note that we were being driven closer to a frontal view of the aircraft which was to seriously alter our concept for the painting.

Working from aft forward, I plotted key stations. This stage shows progress to station 315. (Note the vanishing points for various flap settings below the aircraft.) This method allows us to maintain the stealthy cross sections as we work our way forward step by step. At this point, with Christmas fast approaching, I set the effort aside for a couple of weeks.





The wingspan of the completed DG plot was only 4 inches. Refinements would require working over an enlarged copy of this drawing.



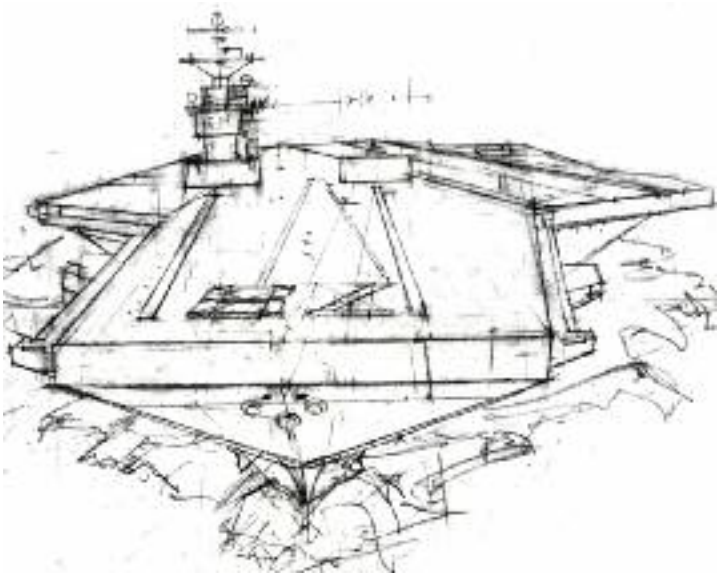
This refined pencil drawing was created on tracing paper over a 10-inch enlargement of the DG plot. Note the complicated stealth driven shapes of the lower surface of the fuselage. This drawing would be set aside and later projected and completed on the gessoed stretched canvas.

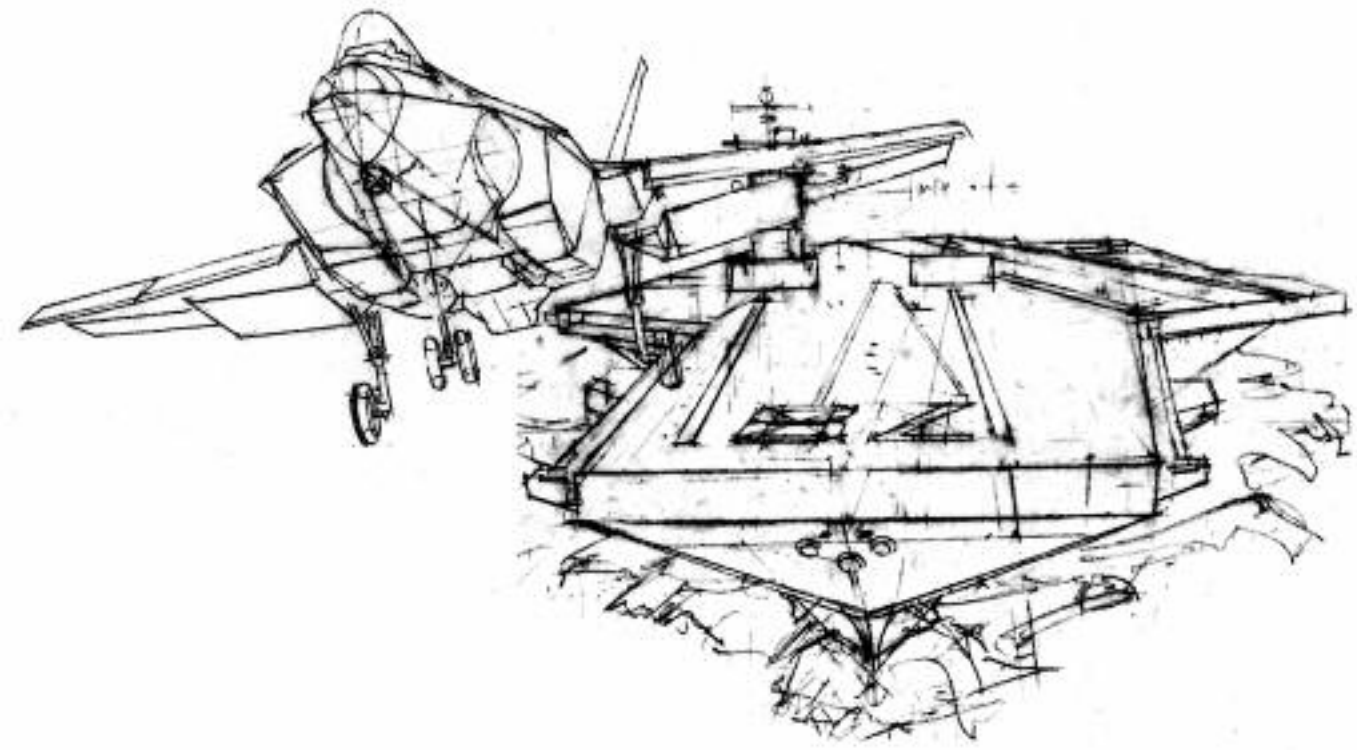
Note the slight bend in the wings on plots and drawings. Most real live aircraft flex in flight and seldom share the rigid static appearance of aircraft models. I recognized while studying video of launches that this was also true of the F-35C.

It was now time to tackle the ship portion of the composition.

After study of general arrangement drawings of CVN 78 found on the internet and the geometry of the flight path of our F-35C after launch, it was evident that the entire ship was going to be included in our composition. This was obviously going to require more information than planned.

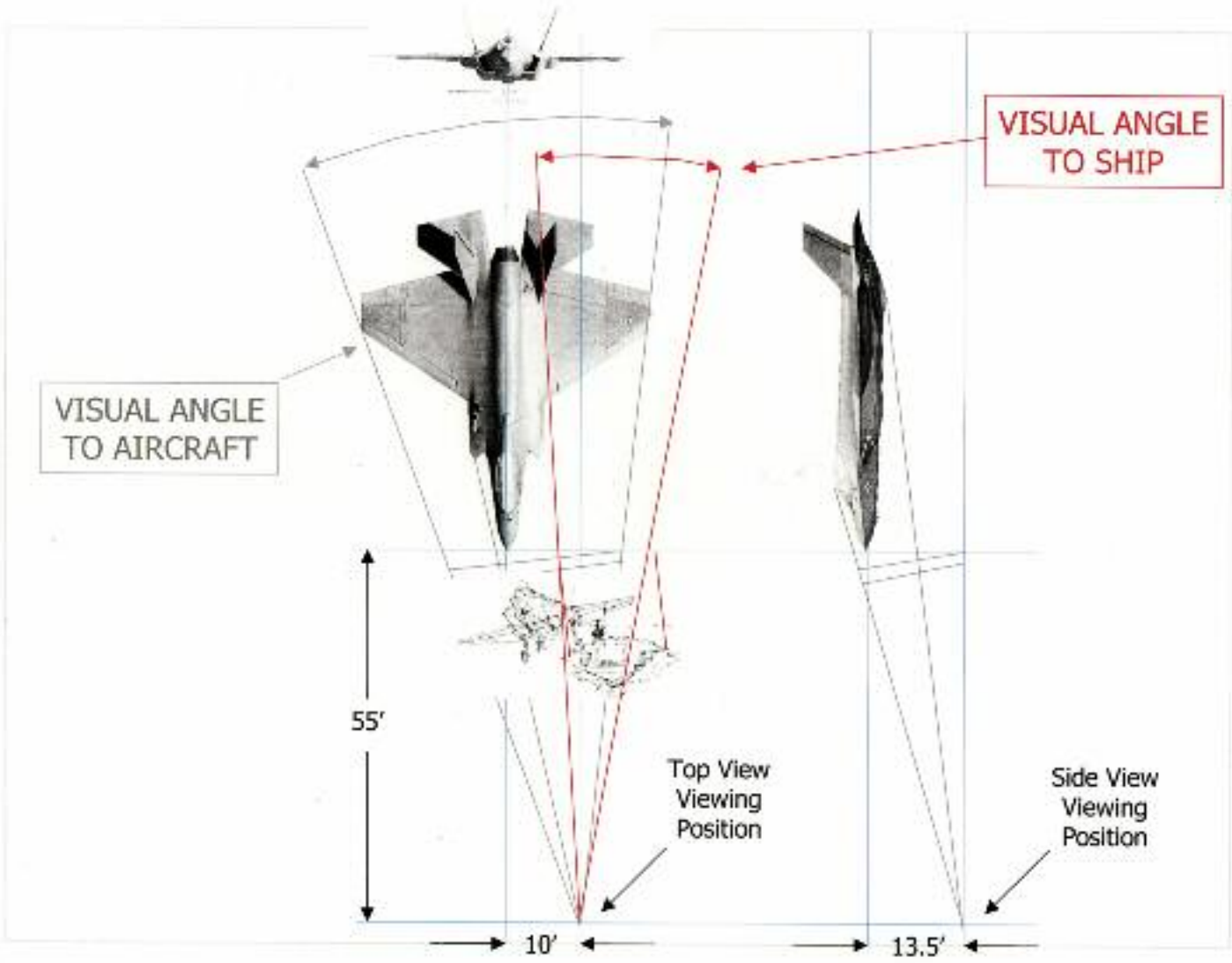
Unfortunately, I did not stop at this point to work out a new composition including both ship and aircraft. Hoping to retain the excitement of the closeness of the water as in the earlier painting, I explored a descriptive geometry plot of the ship from a position only 200 feet forward of its bow.





This provided a dramatic view of the ship. However once combined with the DG plot of the aircraft from the shared viewing position, I found the relative sizes of ship and aircraft to be too similar.

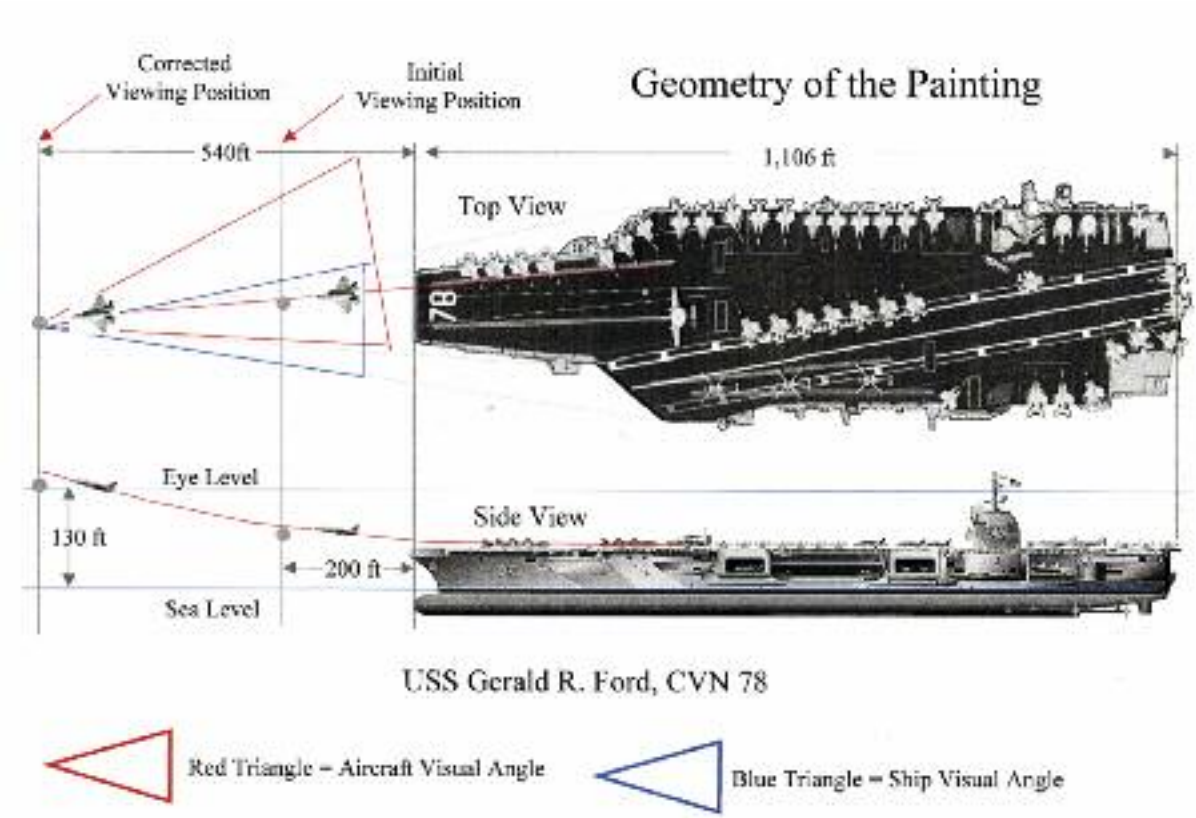
Had I first determined the proper relationship of aircraft size to ship size with a compositional sketch I could have simply placed top views of aircraft and ship within the resulting visual angles from that single viewing position to achieve the proper aircraft to ship size relationship.

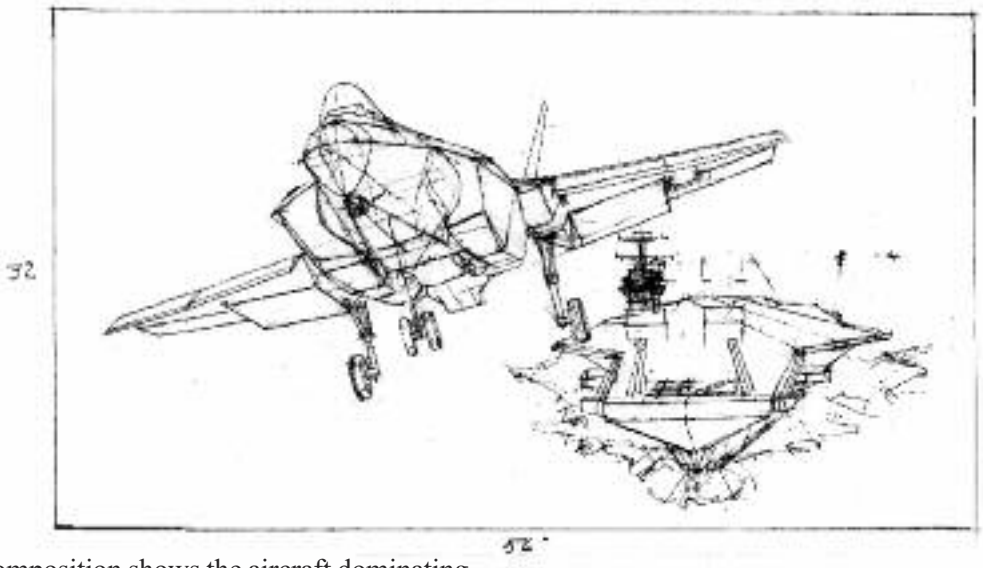


Placing tracing paper over the compositional sketch representing the final composition, I would have dropped vertical lines at wingtips of aircraft and extremities of the ship in the sketch to determine their relative sizes in the painting.

The heavier black line above the sketch equals the span of the aircraft and the red line, the width of the ship. The wingspan of the aircraft on the 56" wide canvas being 40 inches, the width of the ship in proportion to the wingspan now turned out to be 21 inches. Lines drawn from our viewing position of a little over six feet from the canvas to aircraft wingtips and extremities of the ship provide two visual angles from the same viewing point. I could now simply place the plan view drawings of aircraft and ship within their visual angles.

We already knew the selected viewing position for the F-35 to be 55 feet forward of the aircraft.. With the ship fitting its own visual angle we now could determine the viewing position for the ship to be 540 feet forward of the bow. (I show both the 540-foot and too close 200-foot distances from the ship in the diagram below.)





The resulting composition shows the aircraft dominating the image with plenty of ship to tell the story. The enhanced three-dimensional quality is already evident in the drawing.

The only way to achieve this 3D effect is to draw both aircraft and ship from their common viewing position in space.

The three dimensional effect will be further enhanced by careful control of color and tonal value as they shift from nose of aircraft to aft end of the ship and on to infinity during the painting process.

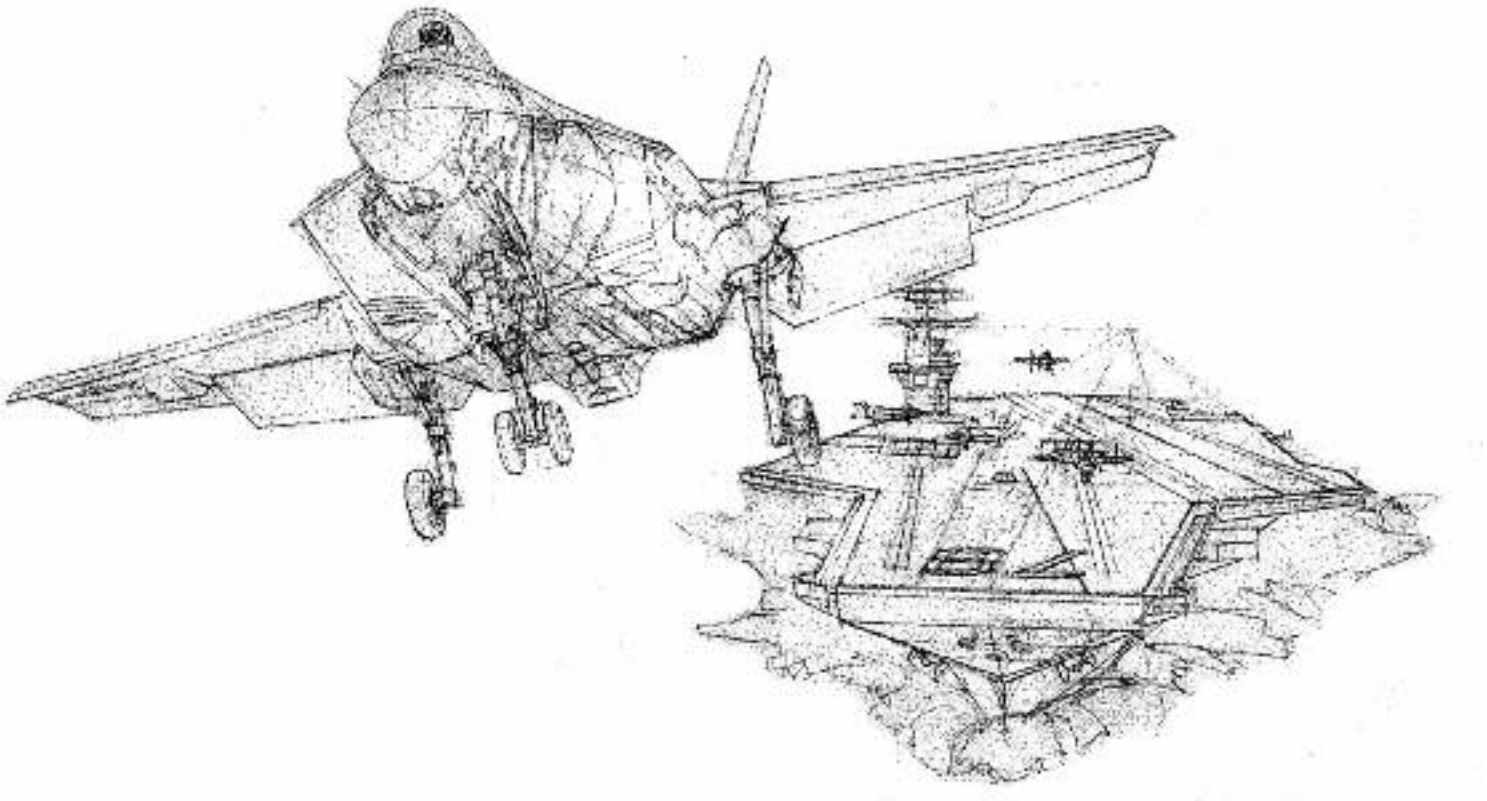
Before reaching that stage however a large amount of serious drawing of aircraft, ship and shipboard activities was required.

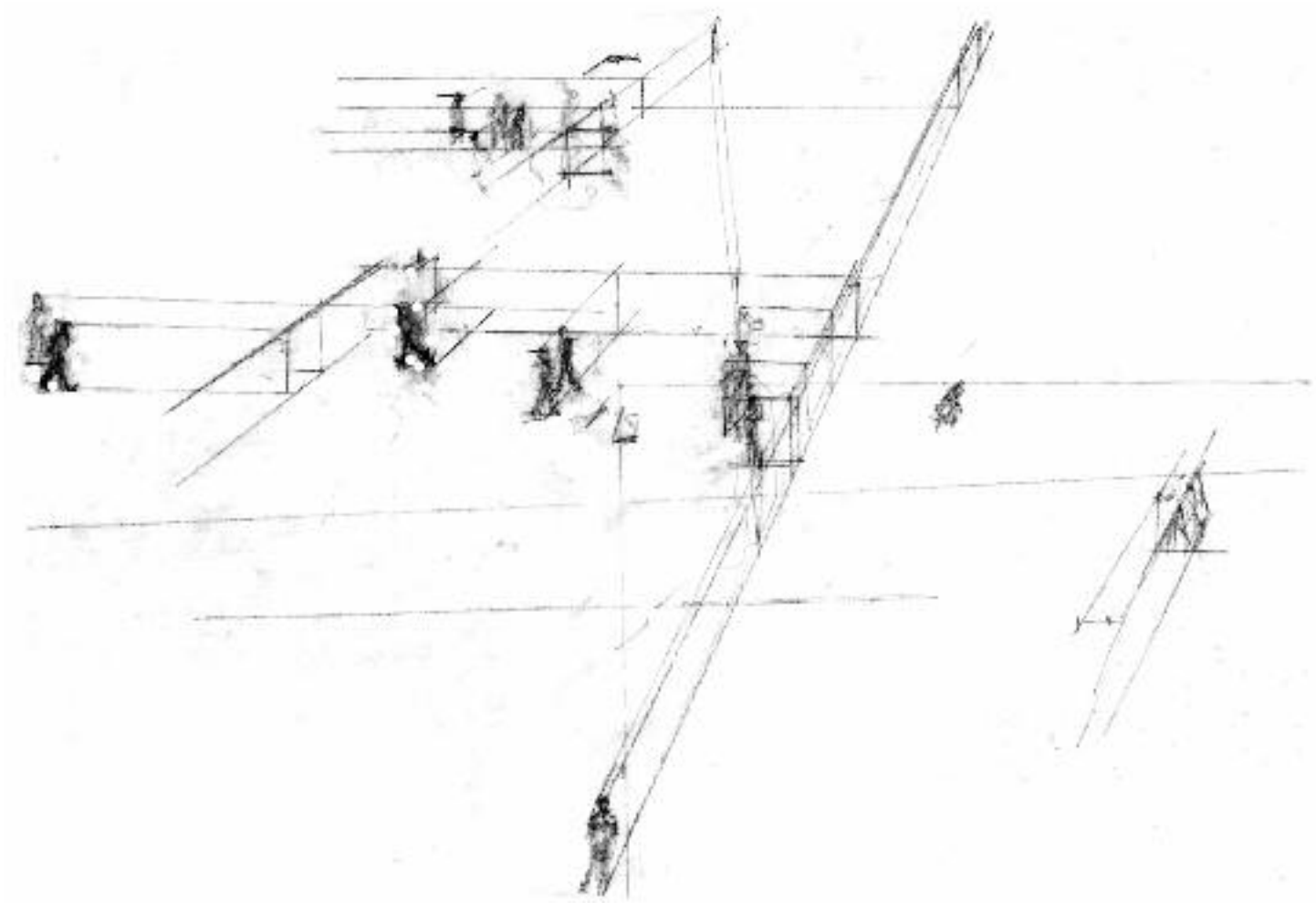
I closely studied aircraft photography for those details usually known only to those who work with an aircraft on a daily basis. These range from the aircraft's stealth characteristics, its many stealth affected panels, marking details and this time that complicated landing gear and "gaping" exposed nose gear well. Plenty of F-35 video and photography is available on the internet from both Lockheed Martin and the Navy. Photographer friends met during International Society of Aviation Photographers events and provided helpful photography at the request of PAX River Navy Public Affairs. This photography made possible the detailing of that otherwise hidden nose gear well interior.

The full size partially complete drawing on canvas is seen before I received the nose gear well detail. At this point, there is much deck activity to complete. The F-35 wingspan on canvas is its full 40 inches.

With the entire ship now involved in the composition, I was going to have to understand and depict deck crew members in action during the launch identifying their functions by shirt color. Careful spotting and movement of aircraft on deck acted to guide the eye around the ship, a welcome addition to the compositional plan.

Viewing many internet videos of F-35C carrier test operations allowed me to time aircraft and deck crew motion. I was then able to determine distance each moved per second during launch activities. Video watching was time consuming but valuable in understanding activities I was to record in the painting.





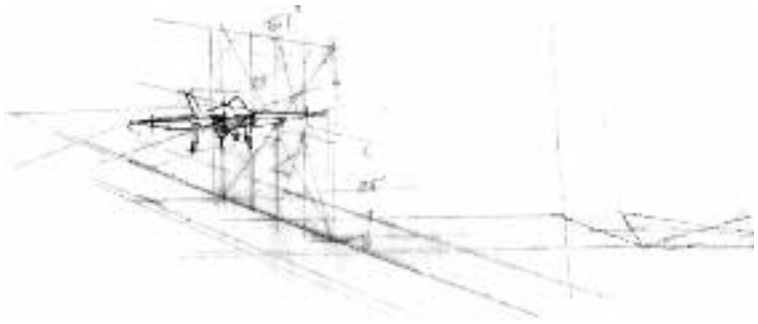
In addition to our launching F-35C, I decided to include an F-35 ready to launch on the port forward catapult, another taxiing into position for the just vacated starboard catapult, an uneven number, (three) parked F-35s facing inboard forward of the island and, in the distance, another parked F-35 faces forward, port side aft. Rounding out the action, I included another F-35 just above and aft of the flight deck on final approach to its "Trap". This all serves to guide the eye aboard, bring the eye forward, inboard to the launch activity, and on to our just launched aircraft. This entire action takes place in only four or five seconds, not enough time to retract that intricate landing gear. As a result, the landing gear and the nose gear well became a prominent element in the painting.

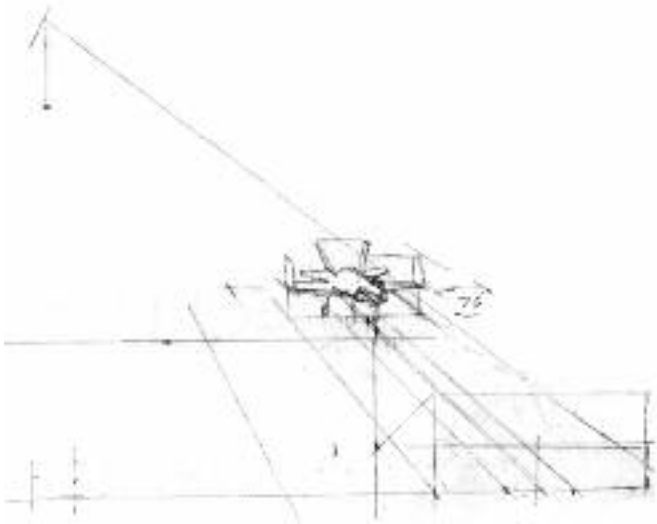
Days of detailed drawing followed as I created aircraft and crewmembers at varying distances in scale from the distant landing F-35 taxiing and parked F-35s to engaged flight deck crew as we moved forward.

Accurate scale for the flight deck crew was achieved by temporarily placing a 6 ft crewmember to scale at the bow at the centerline of the flight deck. Taking deck level and that 6 ft height back in perspective to the ship's vanishing point provided the 6 ft height in scale at any point along the deck from the bow to the aft end of the flight deck. At any point I could move left or right and be assured of the proper 6 ft. height at that distance from the viewer. The aircraft drawings were created by analysis of three view drawings of aircraft in scale to the width of the ship along the deck. As has been my practice throughout my career, to determine proper scale at various distances within the painting I applied my engineers' scale and "trusty," now 70-year-old Texas Aggie Aero Engineering slide rule. Remember those?

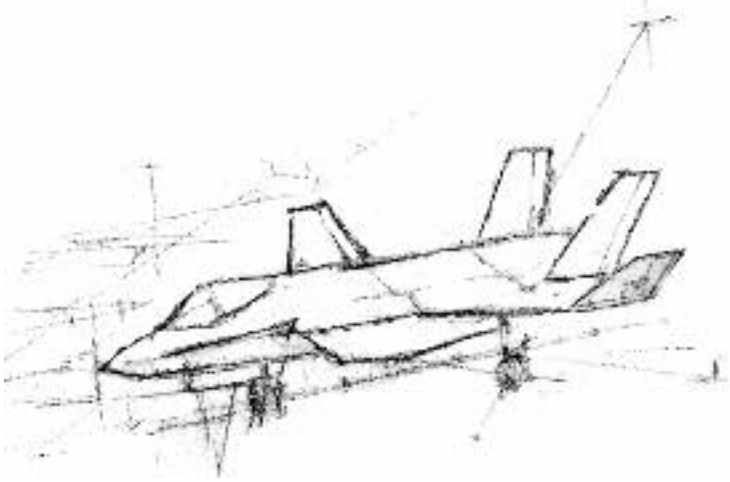
This shows the drawing process for the landing aircraft 25 feet above and 51 feet aft of the flight deck as determined from a side view portion of airborne videos of landing F-35s during carrier landing trials.

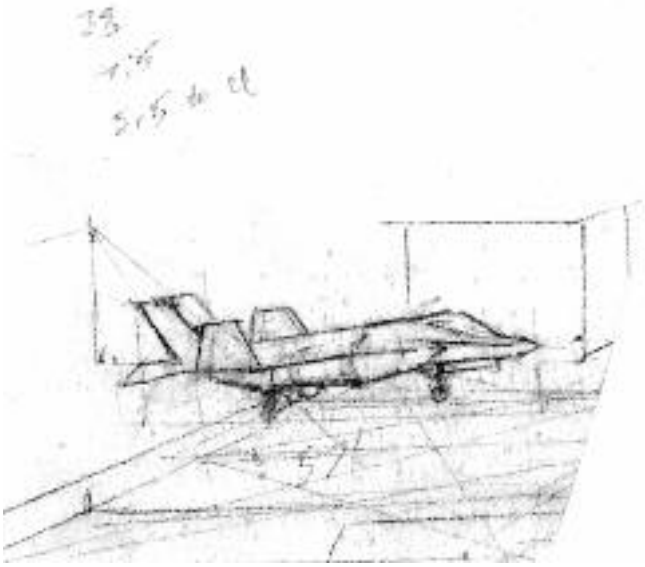
For the rest of the aircraft, knowing the width of the flight deck, we were able to scale sizes at selected points on the deck. (Remember our good old "Spatial Relationships" sessions during several forums?)



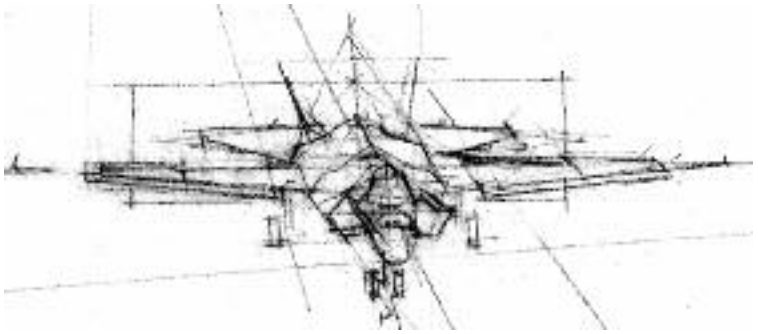


To left, F-35C parked aft, port side. To right, the F-35C is moving to the forward starboard catapult.





One of three F-35Cs parked forward of Island to left and right, the F-35C on the forward port catapult.



With the drawing complete and on canvas, it was time to tackle the background.

The key to the success of a painting will lie in our selection of a background. The sole purpose of the background is to provide context for the painting answering the "What-Where-When" questions for the viewer. The background must support the subject of the painting while offering minimum *competition* for attention.

The fact that the two main elements of the painting provided such a complicated mass of detail called for as simple as possible a background with a minimal amount of competing detail. The background needed only to set the mood, the time of day, weather and its location at sea.

This being the story of a *beginning*, it made sense to set the scene in early morning. This was not a place for detailed cloudscape patterns. Instead, it called for a background simply establishing the light source and mood using texture and color in the sky to provide directional support for the composition. Since both aircraft and ship would be predominantly gray, this also called for an abstract, colorful sky with those colors reflected in both aircraft and water below. The water was to be in motion and also handled as simply as possible, avoiding photographic detail that tends to stop the action. Lighting and directional patterns must enhance the action of ship and aircraft while not detracting or completing with them.

Keeping these requirements in mind I collected art and photography exhibiting lighting, color temperature and mood characteristics I was looking for. I filed these on my computer to toggle through as I worked.

My simple palette would consist of my usual three-primary colors, using Gamblin oils and oil based Shiva Signature Titanium White to be applied to my Liquitex acrylic Gesso prepared canvas.

I decided that the light source would be to our left, low in the sky, to silhouette the dark massive F-35 shape against warm backlighting with cooler reflected light from above and to the right carrying the form.

This is in line with the classic Andrew Loomis teaching "maximum three dimensional affect in a painting is achieved by placing a dark and a light subject against a *medium* background."

The painting began in the sun establishing the light source for the painting.

Moving across the canvas from left to right, the monitor displaying helpful images to the left.

Once the background was blocked in and covered, it was time to tackle the ship. CVN 78 was to be bathed in the early morning light, relying on medium and dark values of the ship to be contrasted against the lighter background of distant water which in turn was reflecting values and color of the sky above. All of this was achieved by analysis of surrounding light sources and deciding how these would affect values and local color of both aircraft and ship.

I began the ship moving carefully forward, continuously changing values and saturation of color to create the three-dimensional effect.

The placement of the horizon at this point became critical. Throughout my whole career, I had been dealing with aircraft at altitude where the vanishing point of aircraft converges in perspective at the horizon within its horizontal reference plane. Working at lower altitudes, I was surprised to find that the ship's vanishing point converging on the horizontal reference plane does not lie on the sea's horizon. I had forgotten that I was now dealing with the curvature of the earth.

Our eye level for the painting is only 130 feet above sea level. Sea level is not a flat surface but a cylindrical surface dropping away from the ship's horizontal reference plane. Seen from our altitude of 130 feet, the sea's horizon is only 13 nautical miles away. This places the vanishing point of the ship well above the sea's horizon in our painting. Study of low-level photography of carriers at sea coming toward confirms this. Carriers seem to be diving a bit in that photography.

This diagram explains the phenomenon perfectly.

Now to begin painting the launching F-35C.

I started with the aircraft parts closest to the light source which were the wing and cockpit.

The nose and intakes will exhibit both the darkest and lightest areas in the painting. I began with the warmth of the sun on the nose, moving right to the reflected cool from upper right and warmer reflected light emanating from below to the right. Note the simplicity of internal details of cockpit seen through glass and the distance the control of saturation of color and tonal values set the cockpit details back from the nose.

Proceeding across the aircraft from left to right you can see the sources of reflected light influencing the form of the aircraft. The water below is being saved for last in pulling it all together.

The final painting (next page) is seen with water and values adjusted. As usual, I had a check list of 30 or 40 items to finish or correct before delivery. That landing gear and nose gear well indeed became a major part of the painting.

This turned out to be a complicated, educational and most enjoyable effort. The inclusion of the ship and all its details created a much more impressive and informative painting than the portrait of the aircraft.

I believe the painting includes all of our planned attributes:

Flight • Action • Excitement • Water • Ship • Airplane

My failure to create a final compositional sketch once it became obvious that I was dealing with the entire ship forced a lot of extra but useful effort providing the opportunity to revisit old lessons.

"Lightning at Sea" included important lessons that I hope may be helpful for our members as well.

The painting was completed on time and presented by Pratt & Whitney to the Navy in a ceremony during the May 2016 Naval Aviation Symposium in Pensacola. Accepting the painting was Commander, Naval Air Forces Vice Admiral Mike Shoemaker.

I would like to thank our Pratt & Whitney friends for our now over 56 years of artistic opportunity, partnership and support.

"Lightning at Sea," the most recent example of that partnership is now on permanent display in that wonderful National Museum of Naval Aviation in Pensacola.

Lightning at Sea by Kei

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