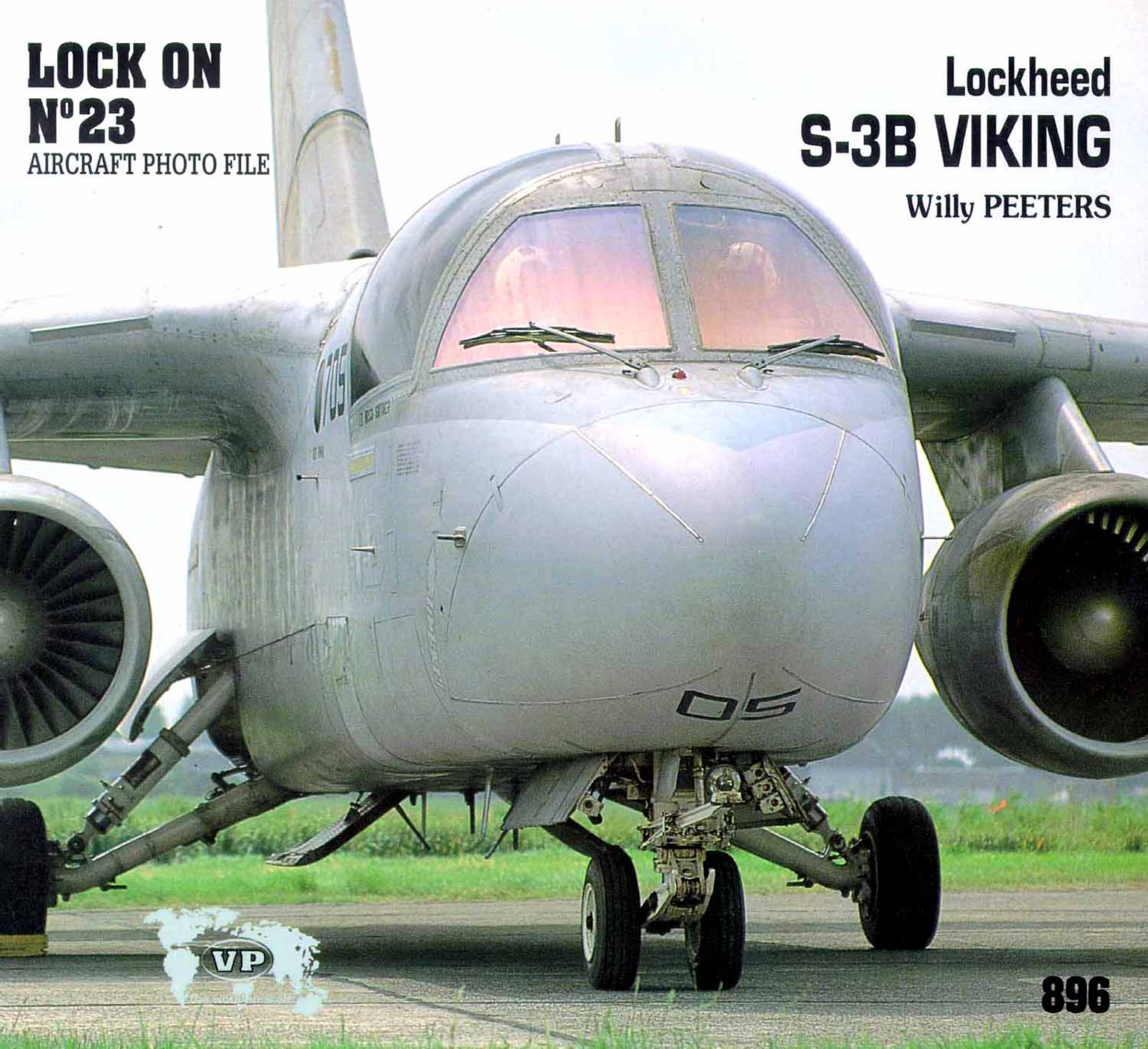
LOCK ON
N°23
AIRCRAFT PHOTO FILE

Lockheed
S-3B VIKING

Willy PEETERS



VP

896

S-3B VIKING
VS-28 "Gamblers"
USS Forrestal, US NAVY

VP
the world in scale

Cover: S-3B Crew of VS-30 "DIAMONDCUTTERS" (callsign DYMON) performing post-flight check-ups after a hop from the USS SARATOGA, somewhere in the Atlantic, to Koksijde Air Base, Belgium as part of a five-ship formation of US Navy aircraft attending the annual air show. For many spectators this was the first time to see US Navy aircraft at close range.

Title Page: A very weathered S-3B VIKING of VS-28 "GAMBLERS" (note the "deck of cards" unit insignia on the forward vertical tail) is being readied for its upcoming launch from the outer left catapult. Color scheme is the older white/gray scheme now obsolete with almost all US Navy aircraft.

Page 3 : Parked at right of Cat 1, just ahead of the USS FORRESTAL's island is this S-3B 160602 of the same unit but this time in the low-viz all-gray livery which, although very effective against visual identification, is very ineffective in concealing the heavy weathering typifying carrier-borne aircraft. This unit was disbanded soon after the FORRESTAL's withdrawal from active service in 1992 when this photo was taken.

Published in Belgium by
VERLINDEN PUBLICATIONS nv
Ondernemersstraat 4
KMO-Zone Mallekot
B-2500 LIER/BELGIUM

Published and distributed in the United States by
VLS CORPORATION
811, Lone Star Drive
Lone Star Industrial Park
O'Fallon, Mo 63366
USA.
Tel. (314) 281-5700.
Fax (314) 281-5750.

Project Manager & Chief Editor	: François VERLINDEN
US Editor	: Bob LETTERMAN
Text & Research	: Willy PEETERS
Layout	: Willy PEETERS
Photogravure	: SCANBO/Beerzel Belgium
Printed by	: Drukkerij DE PEUTER nv. /Herentals Belgium

ACKNOWLEDGMENTS

My trip to the USS FORRESTAL in August 1992 (its final cruise as an active combat carrier) has already provided material for several books in this series. It was clear then that the S-3B Viking could not be left out, especially because little has been written about it and until now a book that shows it in such detail has not existed.
Again, I have to thank the following people for their assistance in making this Lock On possible. Commander QUIGLY, Lt FALLON and Lt O'SHAUGHNISSY of US Navy Sixth Fleet, Italy; CPT P.C. BISHOP and Lt PAPP of US Navy HQ /London.
Aboard the ship we (myself and my friend Ronny MEURIS) were welcomed by Rear Admiral Walter J. DAVIS, Jr Commander Carrier Group Six and the skipper Captain Robert S. COLE. I want to thank them for a warm welcome.
Lt. John F. KIRBY, Personal Affairs Officer aboard the ship had the shootings carefully planned within the limited time frame. His assistance and that of "Stevie", (our guardian angel on the flight deck with operations in progress) was greatly appreciated.
A great "thanks" is also due to Peter MIDDELBURG and Lt. NEVINS at Tel Aviv for arranging the hop to the seaborne carrier and to the COD crew who got us there (and back again) safely.

The Viking at Koksijde airbase could only be photographed in such detail thanks to the willingness of the crew who showed me around rather than heading straight for their well-deserved refreshments in the bar after a long hop from the carrier.
So, my sincere gratitude to Lt "Dirt" DE AMBRA , Lt "Skueky" CARLIN, Au2 "Nerd" NICHOLAS and Au2 "Noodle" BONNELI.
Finally, a well deserved "thank you" to the Belgian Air Force VS1/IRP people and their chief Lt Col. EMONTS-GAST and last but not least Lt Col Alex PEELAERS, Koksijde base commander.

Willy PEETERS

Readers are invited to send in slides and/or clear color photographs on military subjects which may be used in future LOCK ON publications. Additional information on military aircraft of any kind is also welcomed. Material used will be paid for upon publication and unused material will be returned upon request. Original slides and photographs will be handled with extreme care.
Clearly state name and address when sending in your material.

INTRODUCTION

Although lacking the sleek lines and sofisticated looks of its carrier stablemate the F-14 Tomcat, the Lockheed-built S-3B VIKING anti-submarine platform can be considered an equaly important element of the carrier air wing.

Designed to outclass its predecessor, the Grumman S-2 Tracker, in the Anti-Submarine Warfare (ASW) role, the S-3 prototype made its maiden flight on 21 January 1972, now some 21 years ago. Its operational debut in late 1975 aboard the USS JOHN F. KENNEDY marked a new era in ASW warfare mainly because of its onboard advanced digital computer, manufactured by UNIVAC and improved detection systems. Performance and reliability of the S-3A was far better than with the S-2 Tracker with a final boost resulting in the development of the updated S-3B, incorporating enhanced radar and acoustic processing, advanced electronics, upgraded sonobuoy system and the possibility to carry the AGM-84 Harpoon air-to-surface anti-ship missile. It is not clear if to date all S-3A's have been upgraded to S-3B standards but it is certain as many as 140 Vikings will finally be treated under the Weapon System Improvement Program (WSIP).

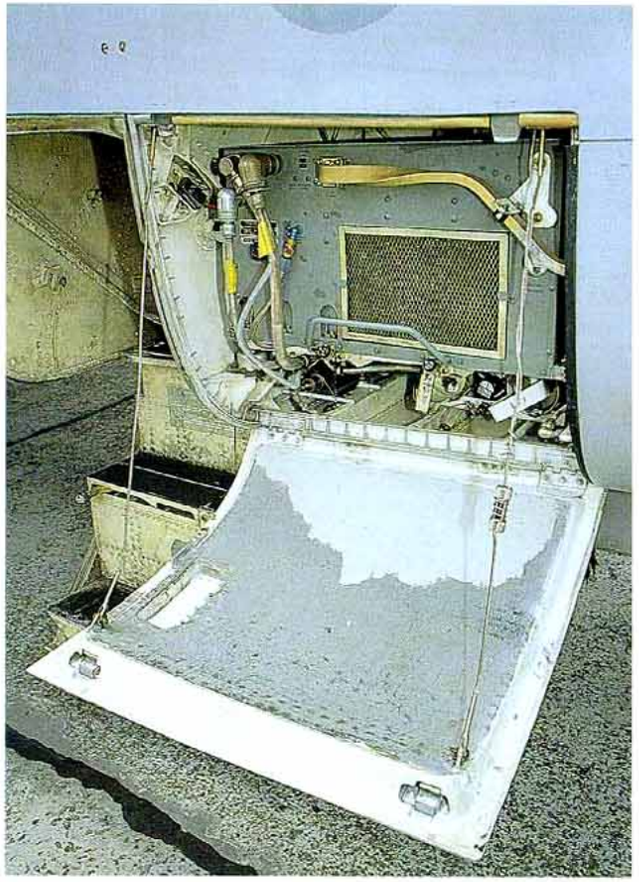
The recent Gulf War proved that the Viking could perform beyond its primary mission of sub hunting when it was deployed in various supportive missions such as mine detecting, sea surveillance, combat air patrol over land (with Rockeye cluster bombs or Zuni rockets as warload), inflight refueling, scout reconnaissance and even occasional bombing raids assists.

Although at its best when hunting submarines, the S-3 Viking is a remarkably versatile aircraft with still a prosperous future ahead.

(Above) Characteristic frontal view of the Viking nose section with the peculiar shaped radome cover (this one probably from another aircraft as indicated by the disrupted anti-glare panel), and the split windscreen. Also note the windshield wipers.

(Above right & far right) Avionics related to the Texas Instruments APS-137 (V)1 search radar in the nose radome, incorporating ISAR (Inverse Synthetic Aperture Radar) for detecting surface subs can be found in the bay just aft of the radome on the starboard side.

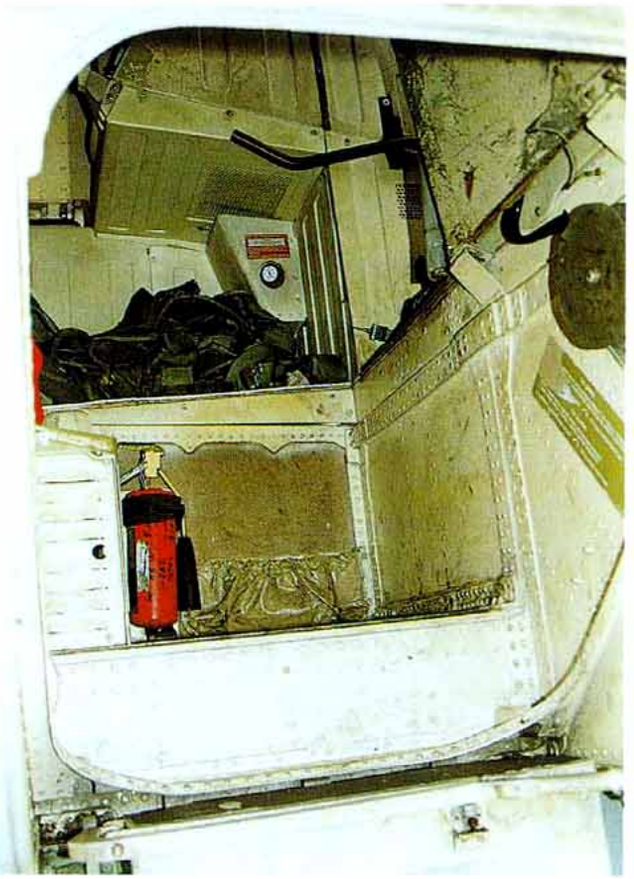
(Right) A wide-angle view on the starboard nose section clearly showing the bulky canopy with low-intensity light strip below it, the small observation window for the crew in the aft compartment and the open boarding step in the bottom edge of the fuselage. Also note the UHF/IFF (forward) and VHF (aft) blade antennas on top.



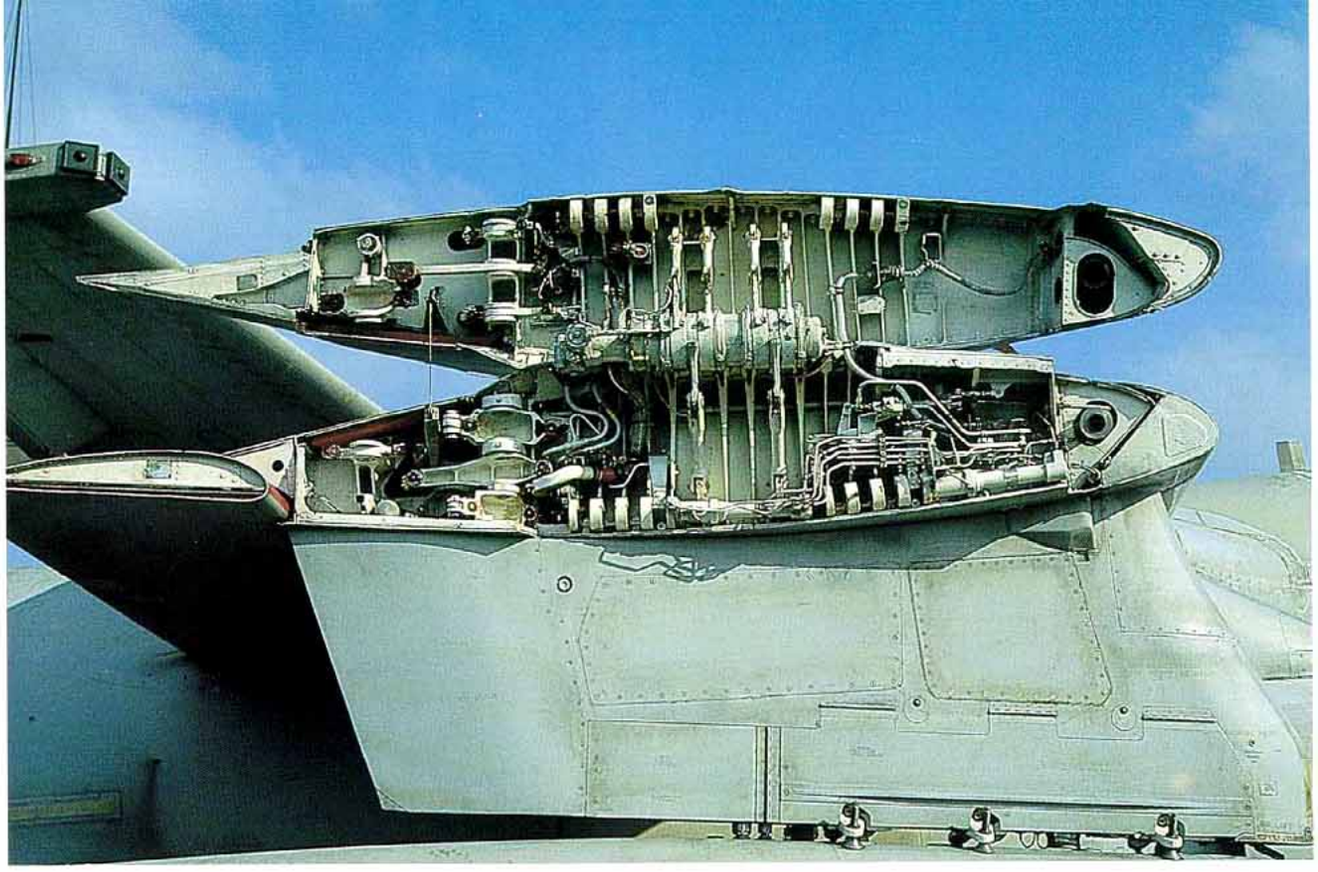
More "easy to reach" avionics are located in the housing just in front of the crew entrance. The bay hatch is hanging from two cables instead of being "strutted" and the hatch inside has a gray layer of paint over the white.

(Bottom, far left) The liquid oxygen bottles for the crew have been enclosed in a compartment immediately aft of the cabin gate, again within reaching distance from ground level.

(Bottom, left & right) One of the main reasons why corpulant airmen are not flying the S-3B Viking is the narrow boarding hatch which is quite difficult to pass through. Note the anti-skid stepping platforms and the hatch locking handle in the second step. The second photo is looking up to the "Senso" or sensor operator's console and the pilot's and co-pilot's cabin entrance at right.

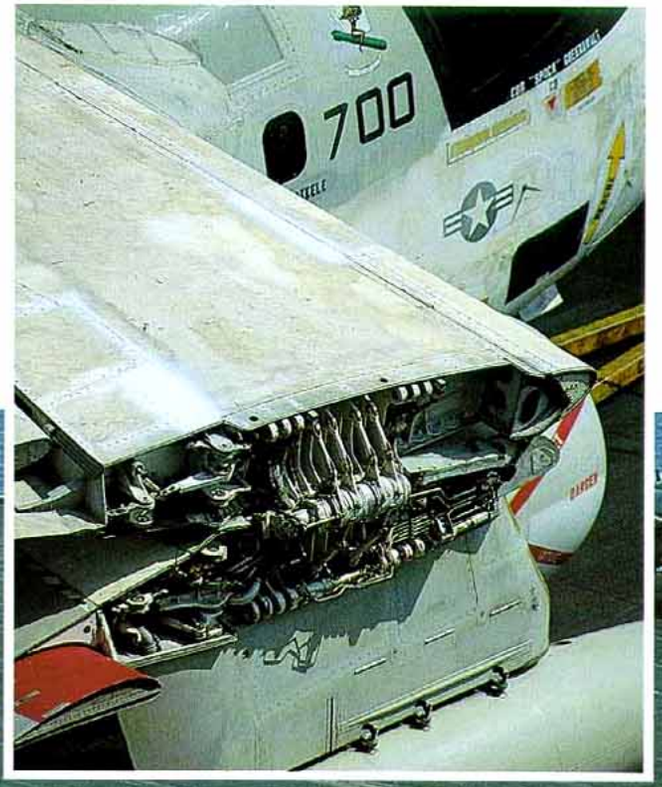


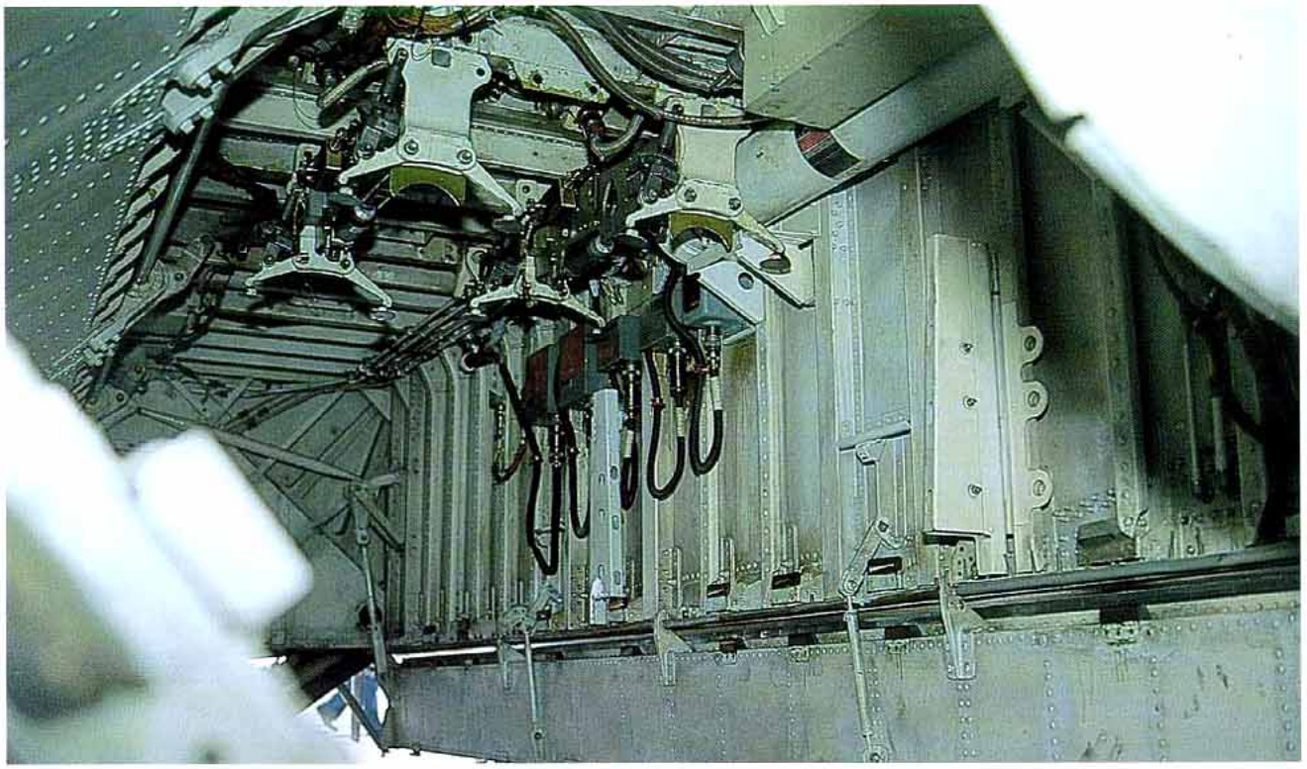
(Photo Luc VAN DEN ENDE)




705
VS 30

The S-3B Viking is powered by two wing-mounted General Electric TF34-GE-2 turbofan engines with a high-bypass ratio. Economy of operation was the primary design requirement when developing the engine; the "speed" factor being equally important to enable the Viking to reach the surveillance area in the shortest possible time frame.
With a ferry range exceeding 3,400 miles (5470 km) and a combat range of over 1,087 miles (1750km), crew fatigue is the decisive factor in regard to mission endurance. Although mid-air refueling is possible, most Vikings on anti-submarine mission carry two 300-US gallon (1136 liters) fuel tanks externally on the underwing pylons.The S-3B variant is able to carry 2 AGM-84 Harpoon air-to-surface missiles on these same pylons when performing anti-shipping duties.
Like all carrier-borne aircraft, the Viking has split wings, of which the outer parts fold up and inwards, reducing stowage space. The folding mechanism is shown here in detail.

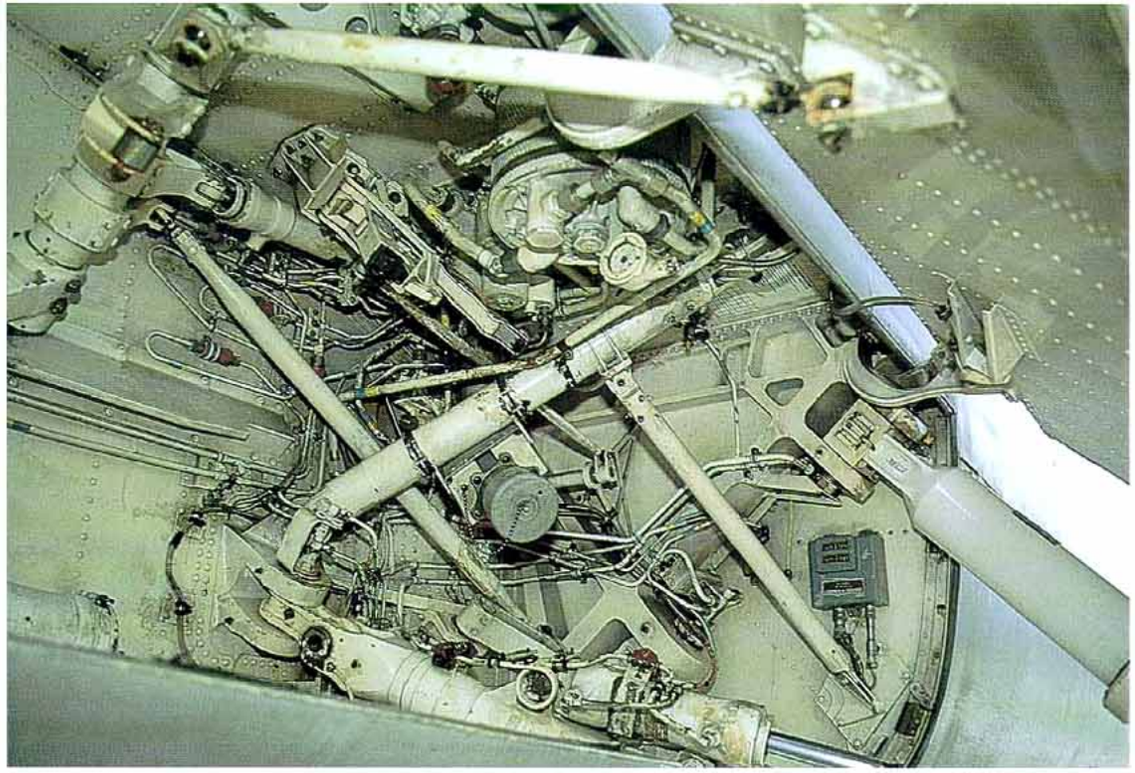


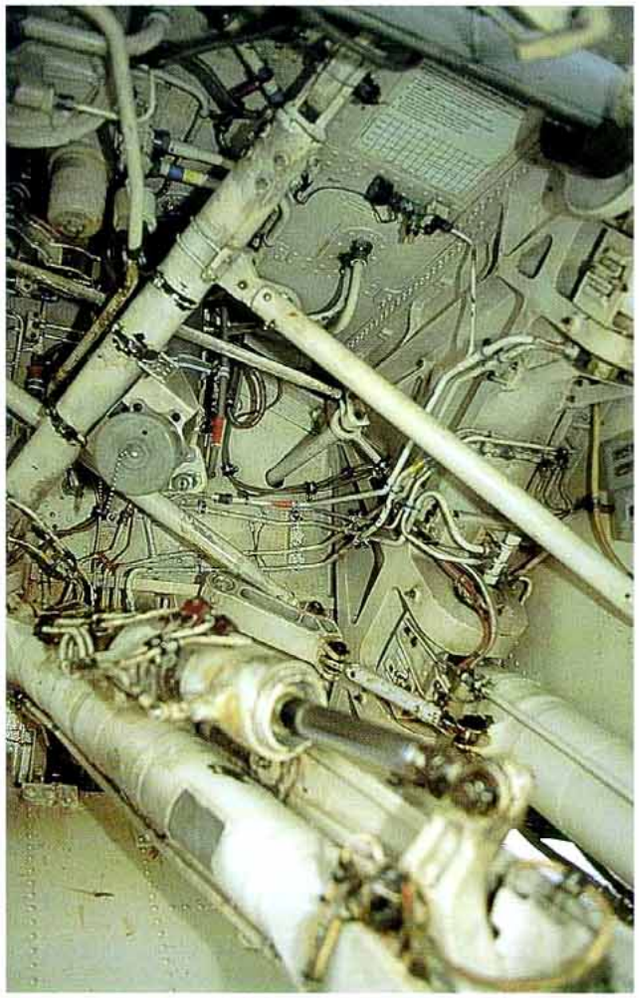


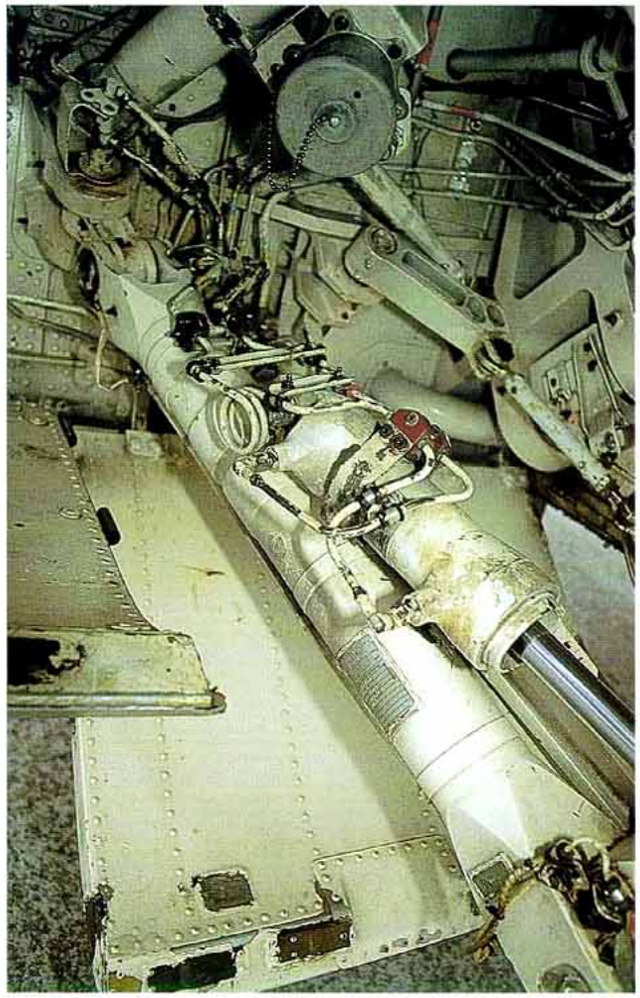
(Top, left) Offensive stores, like torpedoes, depth charges, bombs or mines can be housed in a ventral bomb bay which can hold up to 2,000lb (900 kg) of ordnance on TER-7 Triple Ejector Racks.

(Below) The main gear mechanism, located at the lower fuselage edge, is a tricycle type with a single-wheel main unit and is hydraulically retracted into the fuselage bay. Note the extreme width of the main tires in the photos below.
Apparently visible in the bottom right photo is the inboard heavy-duty disc brake and connecting brake fluid lines.

The main gear doors retract mechanically through a series of linkage arms, activated by the main gear strut. Note the various hoses and connectors of the hydraulic system and the main gear strut attachments.







The small gray rectangular hatch aft of the single point refueling connector houses an ECM panel, covered here but clearly visible in the large photo on the next page, also showing the foldable steps on the aft fuselage. Note the low-voltage formation light strip and the flap deflector indicators.

The Viking's single point refueling connector is located just aft of the starboard main gear housing.

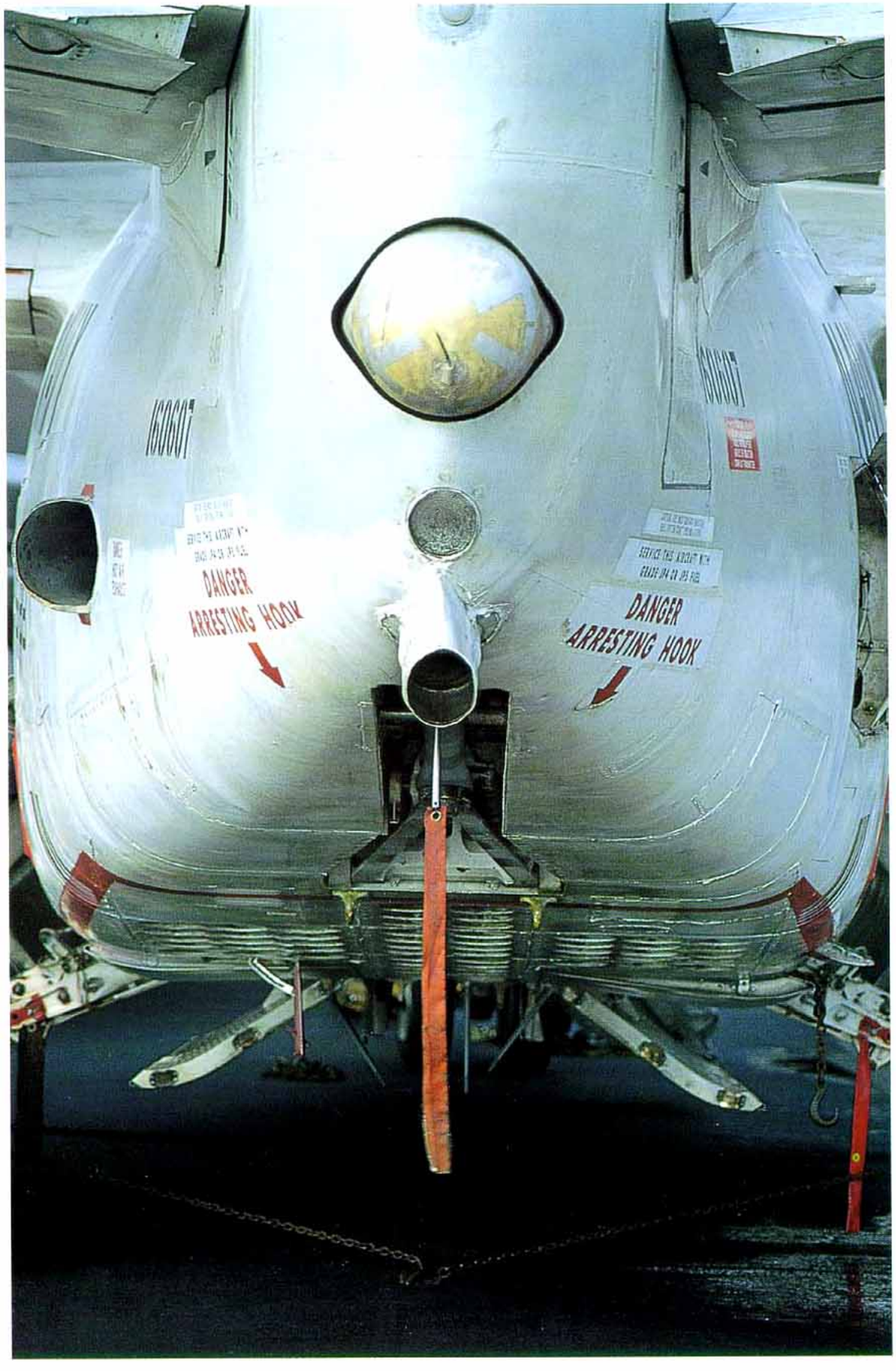
The Viking has two avionics bays in the aft top fuselage section, the starboard bay holds some avionics mounted in racks. Note the arrestor hook manual retraction pushbutton aft of the bay.

(Top, left) The same bay viewed from the front. Note the rubber seal along the edge of the bay and the gloss white bay color.

(Top, middle) In addition to its folding wings the S-3B Viking is able to disconnect and swing the upper vertical tail section to a lower elevation for improved clearance when being lifted below-deck on one of the carrier's elevators.

(Top, right) Underside detail of the starboard horizontal tailplane, aft is to the left.

(Left) Fuel vent (upper) and fuel dump (lower) lines have been positioned at the utmost rear of the fuselage, below the retractable MAD boom (Magnetic Anomaly Detector) which is seen here in stowed position. On top of it can be seen the rear navigation light. Note the horizontal tailplane root fairing

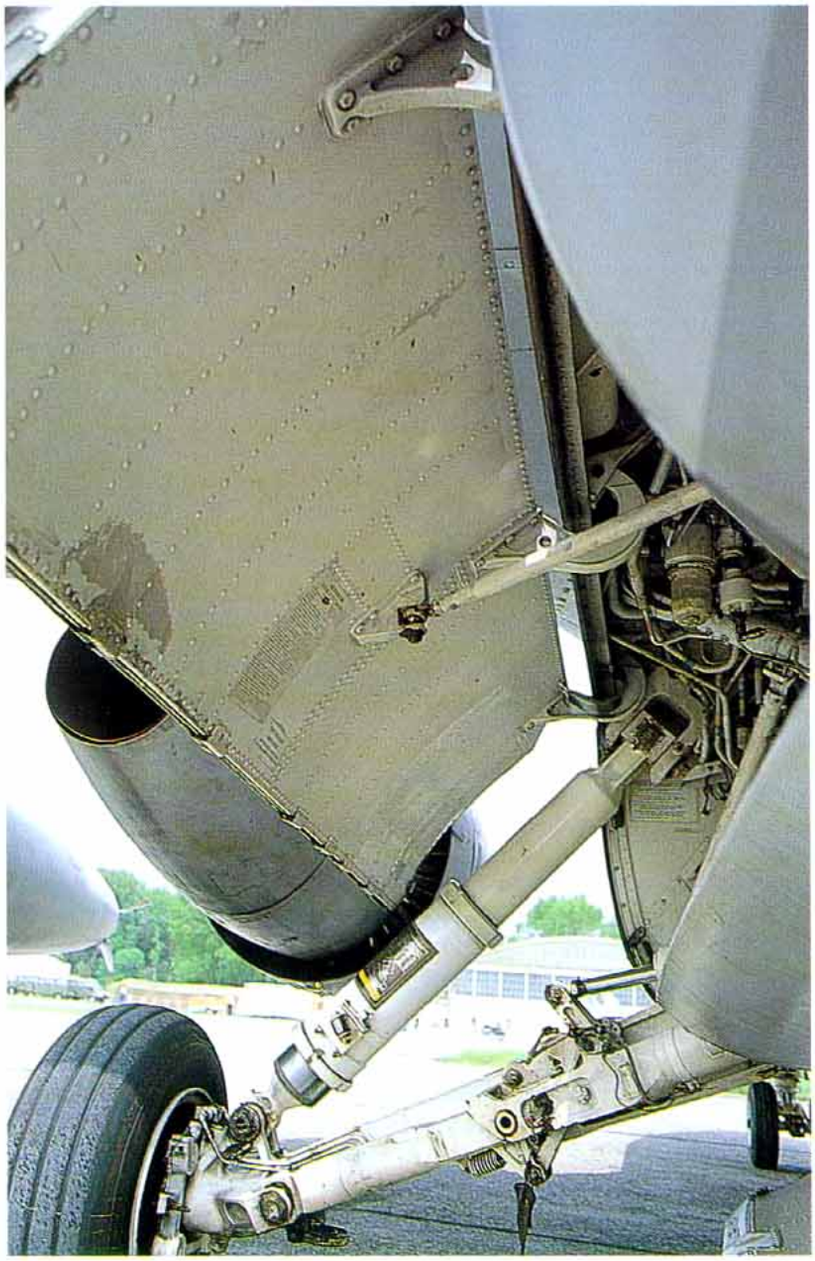


(Above) A closer look on the folded top section of the vertical tail shows the segmented low voltage formation light strips and the red anti-collision beacon on top of the tail. This S-3B (see type designation below the tail/fuselage fairing) still has the Light Gull Gray over White color scheme with danger areas and some markings in bright red. Compare with the low-viz markings of the same area in the left photo on the next page.

(Left) A full rear view on the tail clearly showing the fuselage cross section and the position of the bottom main gear doors in the distance. Noteworthy is the shape of the MAD boom opening.
Apparent in all pictures on the S-3B Viking is the unpolished, sometimes even rough appearance of panel joint lines and surface panels.

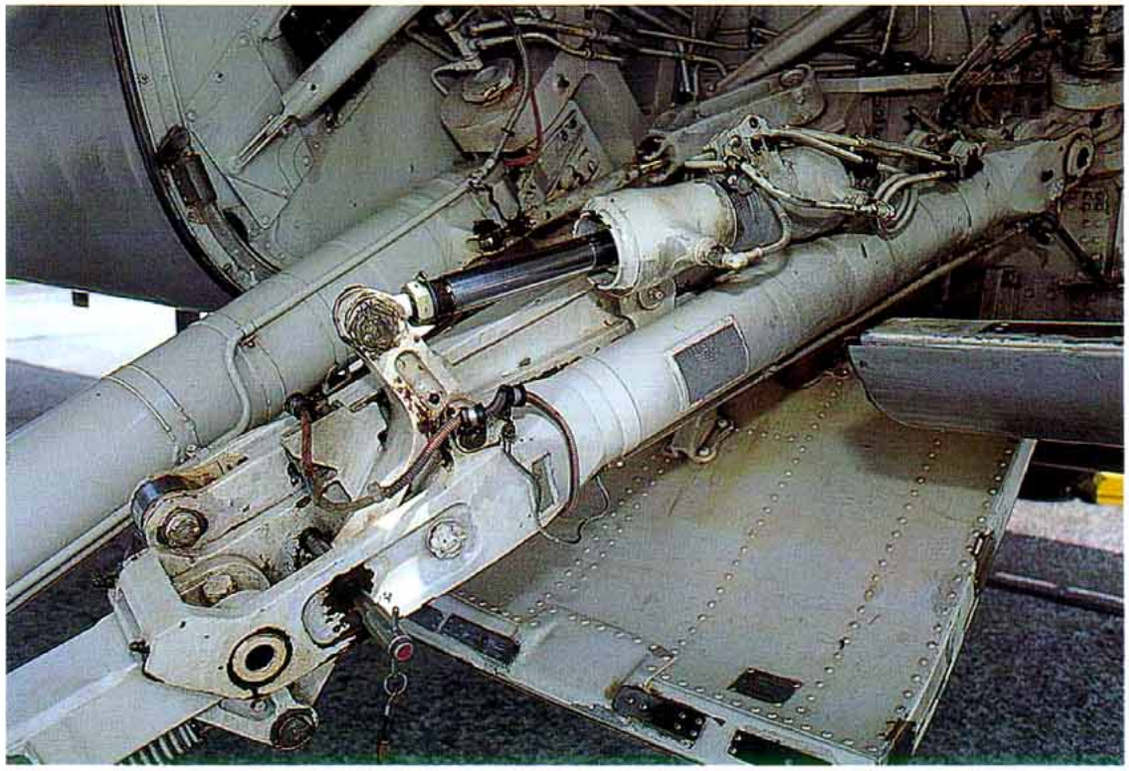
(Above) The tail upright and locked revealing hinge line detail and hinges. The intake in the vertical tail leading edge is the ECS intake, where ECS stands for (Air Research Environmental Control System), housing slightly forward in the upper fuselage section. The blister below the horizontal tailplane is the ECS outlet. The small rectangular panel in the upper tail section is the sonobuoy reference and RCVR antenna.

(Right) While being directed to the exact hook-up postion, this S-3B Viking on board the USS FORRESTAL is slowly unfolding its wings, being monitored by two "side controllers". They will give the "thumbs up" signal when the wings are down and locked. Note the wings do not unfold to the same degree but that the starboard wing is closer to completing the folding sequence.



Close-up of the rear fuselage area on the port side clearly showing the shape of the avionics bay hatch and the exhaust louvers just below it. The bay on this side is used to stow engine covers and related equipment. Note the black and white walkway markings on the folded wings.

Because the left and right wheel well are almost identical in shape and size the photos shown here concentrate on the leg struts and folding assemblies. When the gear is retracted the lower main door section folds downward giving clearance to the gear leg assembly to fold rearwards into the bay. The main leg pushes the second linkage arm seen in the top left photo, forcing rotation of this linkage assembly upon which the doors are pulled shut.
Note the dihedral of the lower forward section of the wheel door when the aircraft is on the ground.

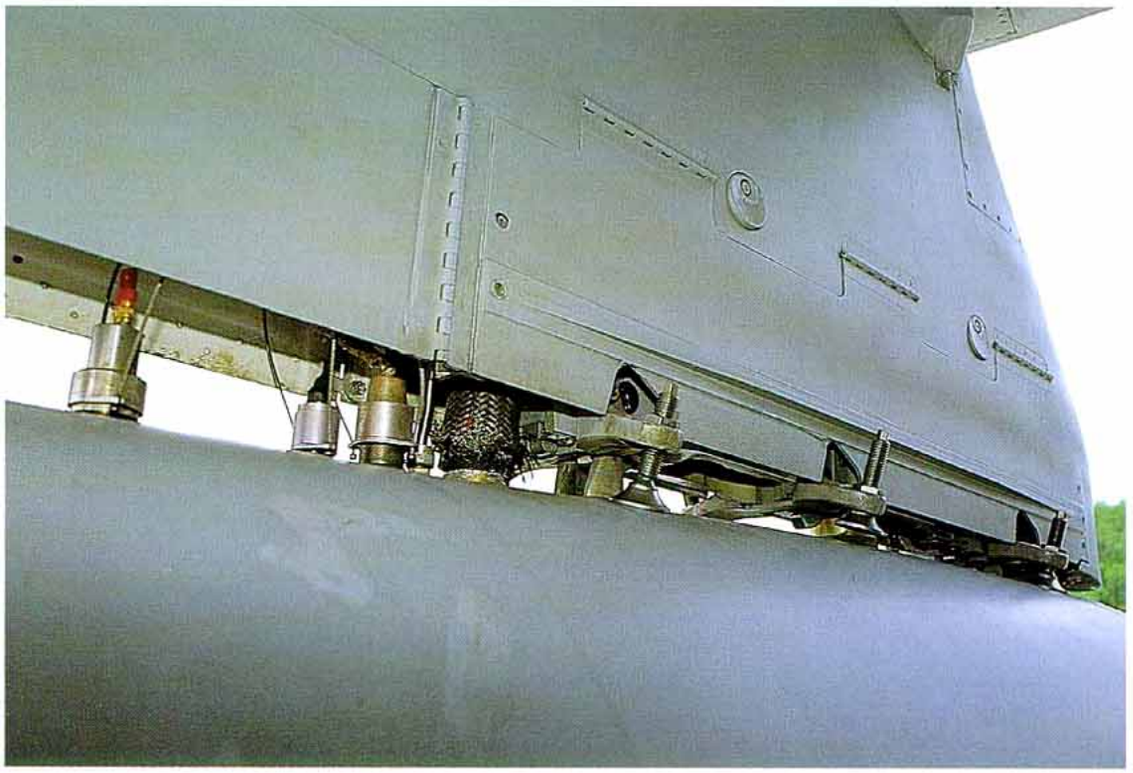


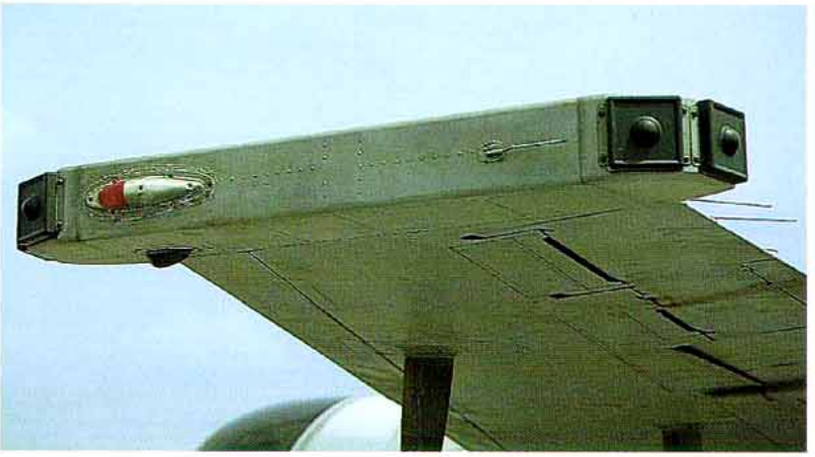
(Right) Proposals had been made to configure some Vikings into tanker aircraft and although the Navy decided against these variants, the S-3 Viking can be used as a "buddy" refueling platform. It is then configured with one 300 US gal external fuel tank on the starboard pylon and a D-704 "buddy" refueling pod on the port wing pylon. The red and green light are fuel flow indicators for the thirsty recipient.

(Below) Very close look at the inside wheel hub assembly and disc brake. Note the tie-down shackle below the gear leg.

A massive wing pylon of considerable height spans almost the entire wing cord while the refueling pod is mounted with a slight aft dihedral to the pylon's lower edge. Study shape and size of pylon and related inspection hatches.

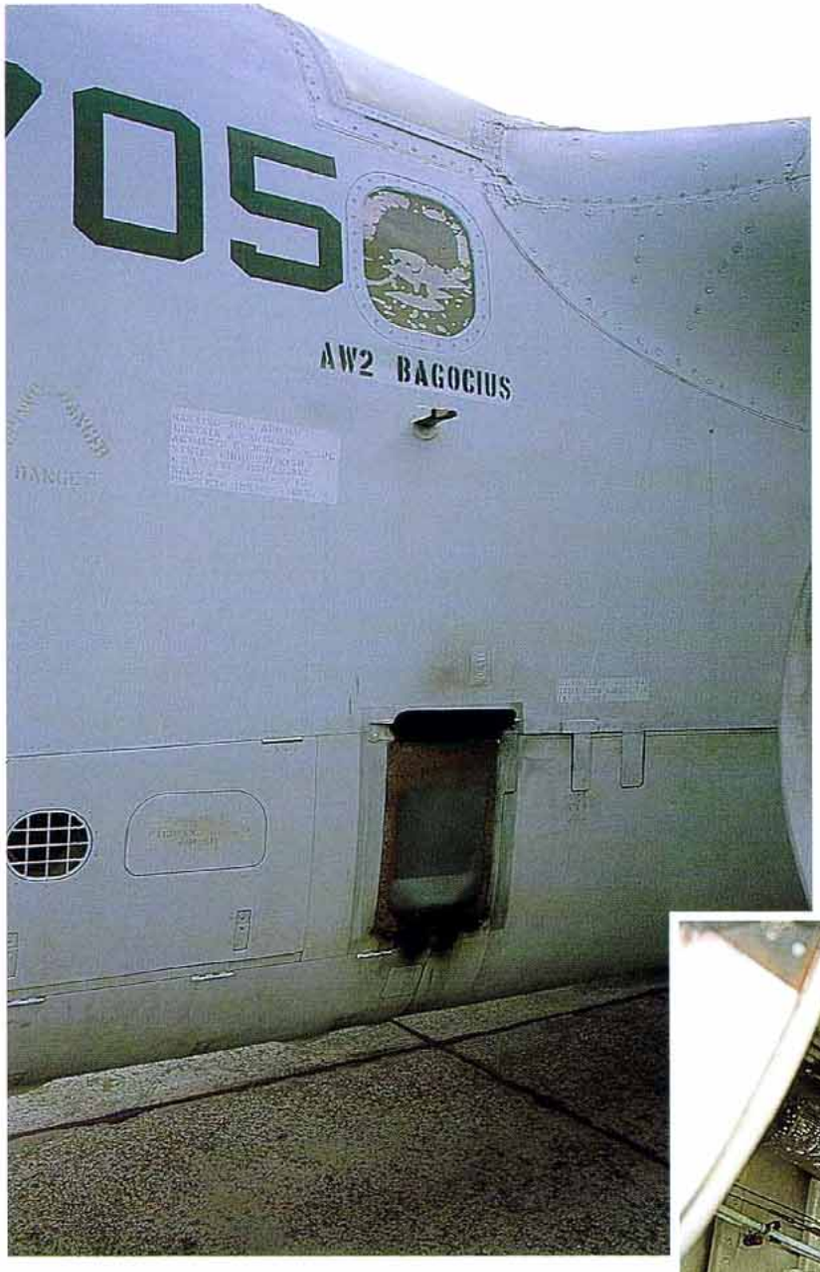
The Viking has an ESM (Electronic Support Measures) pod installed on each wingtip, the port one shown here. It features external ESM system antennas (black squares), a static discharger and the wingtip navigation light. Note the aerials below the wing.





(Left) Detail shot of the pylon inside and various hoses and cables to control proper functioning of the refeuling pod. Note the middle positioning screws of the attachment rack are not engaged.

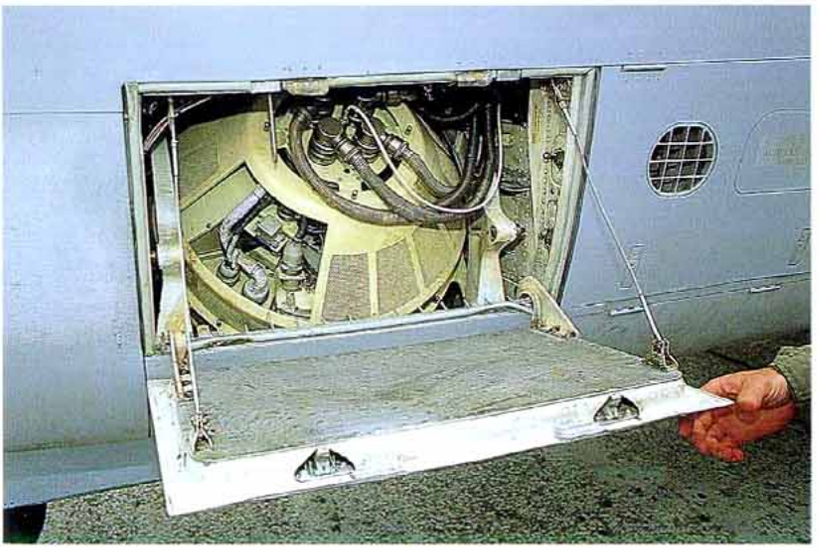
S-3B VIKING
VS-28 "Gamblers"
USS Forrestal, US NAVY
(Photo by Willy PEETERS)



Just forward of the wing root can be seen the sensor operator's observation window of which the protective layer has almost completely vanished. Note the sensor probe just below it. The heavy stained panel is the APU exhaust which is located immediately in front of the weapons bay. Also note the rough textured wing root joint.

To reach the APU (Auxiliary Power Unit) a shallow rectangular panel on the lower fuselage edge can be opened. Note the heavy stains in the aft part of the bay. Also note bottom fuselage detail.

This S-3B had a single inert practice bomb installed on the outer rack inside the bay which has a split bay door.

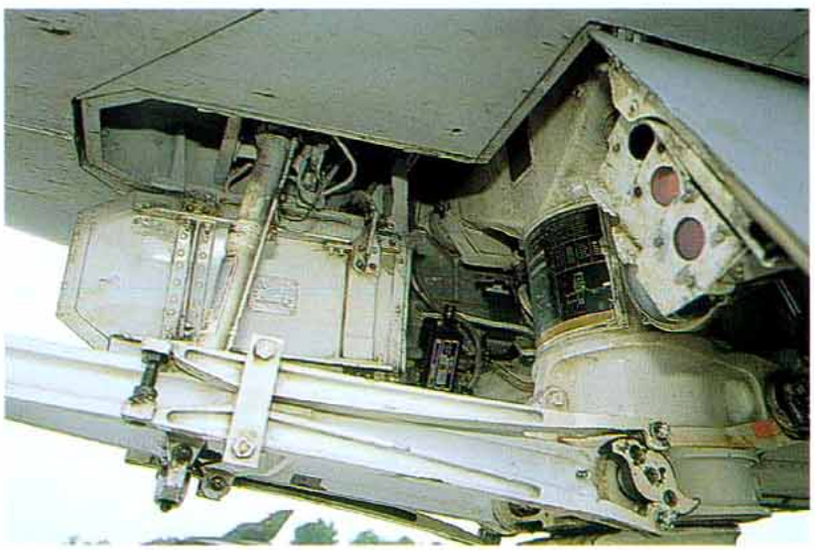


Side view study of the complete port nose section. The S-3B Viking actually is a fairly large aircraft (compare with the pilot behind the tinted cockpit perspex). Several features are noteworthy like the position of the low voltage position light strip, the forward position of the windscreen wipers, the small national insignia in low-viz colors, the small rescue panel and sensor probe aft of the radome and the far forward position of the nose landing gear strut with launch shuttle bar in the up position. Purists should note the exhaust stains of the APU on the inside of the port engine pod and the patched-up paintwork.

The small panel below the national insignia houses the sensor unit seen here with control and feed lines connected.

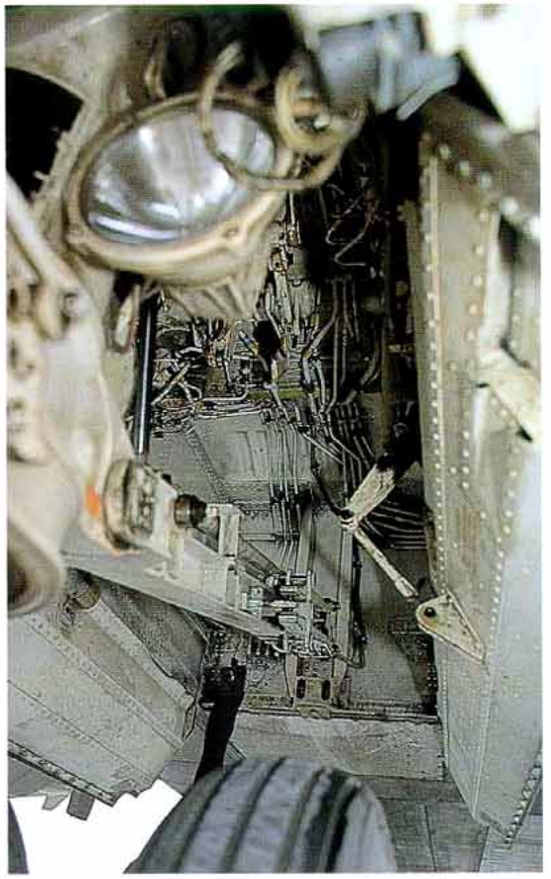
With crew helmets stowed on the instrument panel cover, single wheel chock installed and remove before flight tags pinned, this S-3B VIKING is awaiting spectators on a sunny saturday in July. The small rectangular panel on top of the front windscreen covers the inflight refueling probe which can be extended in flight to be hooked up to a tanker aircraft. Clearly visible in this picture is the stall warning vane on the wing leading edge inboard of the engine pod.

The distinctively shaped nose radome is not hinged to the fuselage but is connected to the forward pressure bulkhead by means of two brackets enabling the radome to be pulled some distance from the fuselage for ease of maintenance. Three "quick-release" fasteners on each side of the radome allow fast access to the Texas Instruments APS-137(V)1 search radar, incorporating ISAR (Inverse Synthetic Aperture Radar) technology for locking surfaced submarines.
The low sun illuminates the pilot's McDonnell Douglas Escapac 1-E ejection seat headrest and ejection seat guide rails as well as the canopy fragmentation device on top of the headrest.

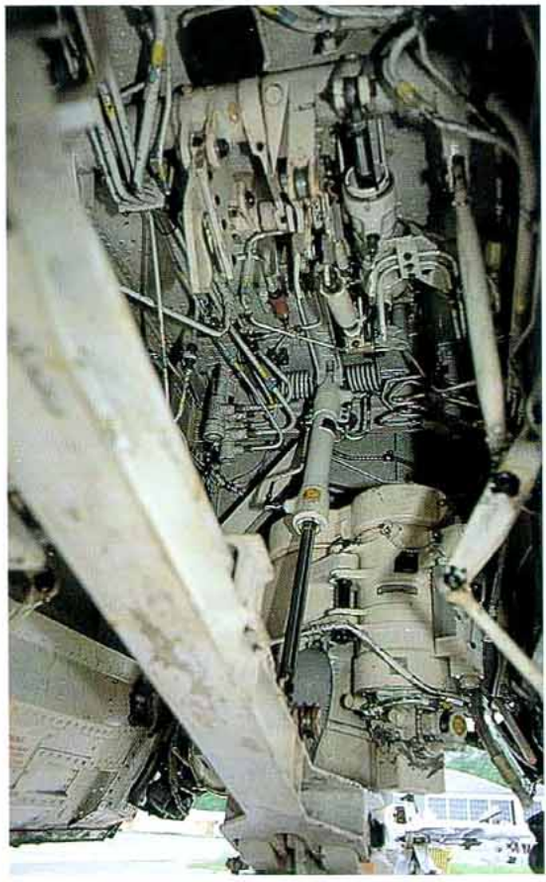


Close-up of the dual wheel nose landing gear with the launch bar protruding forward. The location of the launch bar downlink push rod called for a seperate gear door. Note the approach lights inside the port nose gear door.

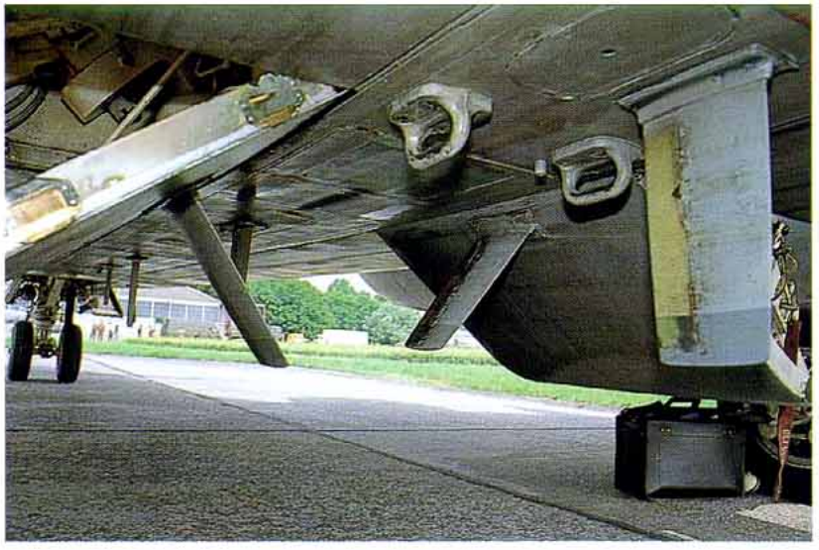
An important detail can be seen in the photo above showing the dual nose wheel assembly from the rear. The purple-colored device attached to the strut fork is the receiving end of the launch holdback rod. The broken-off "pin" remains attached inside during flight and recovery and can be retrieved once the aircraft is safely parked.



Inside nose well detail revealing single retracting arm attached to the rear well bulkhead inside two upright guiding rails. Most of the well roof is taken by by-pass lines and accumulators marked in different colors. Note the single taxi/landing light mounted to the left of the gear leg. Also note the location of the safety pin preventing the rear split arm to fold, probably resulting in a nose wheel collapse.



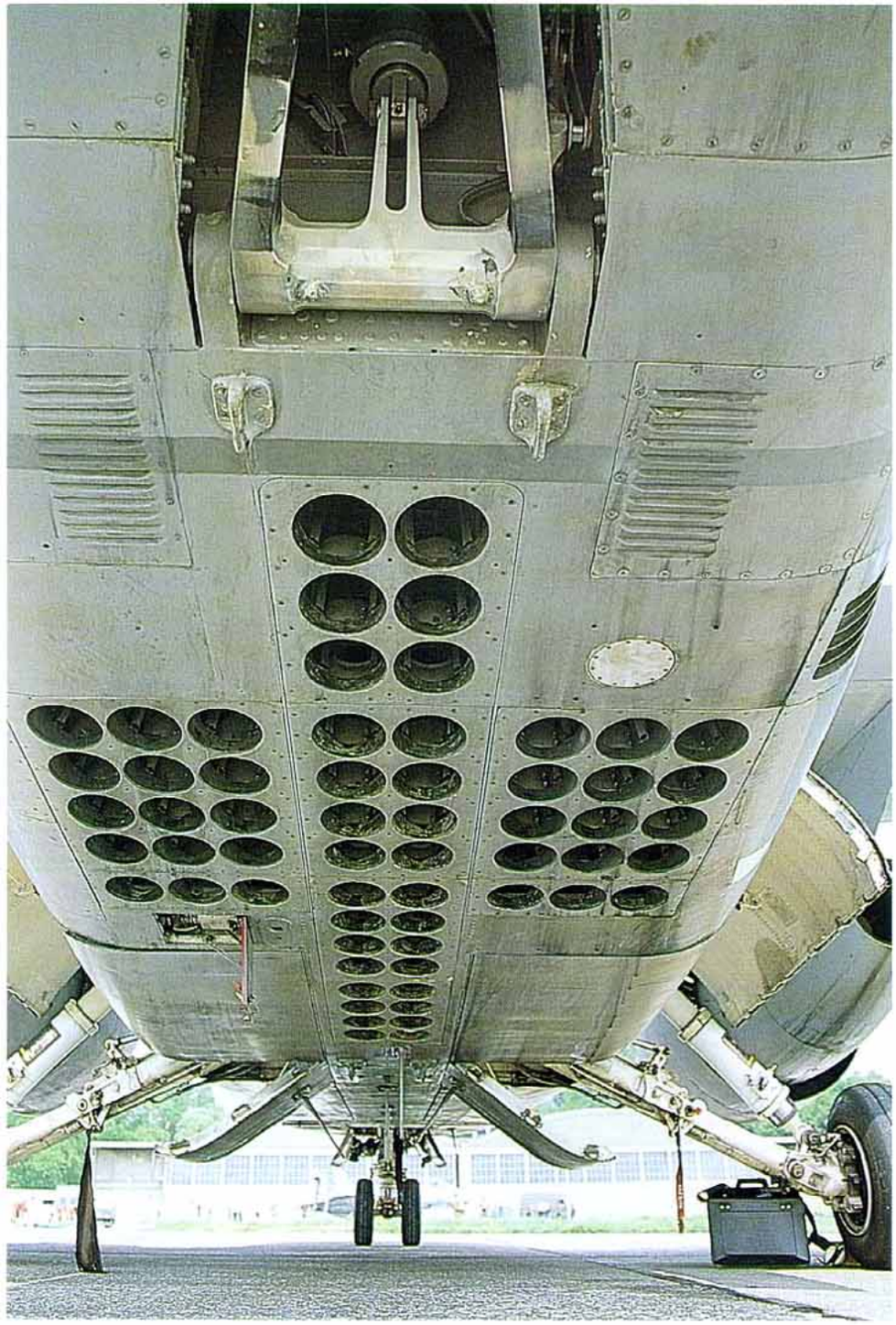
The S-3B is the much improved variant of the S-3A featuring enhanced acoustic and radar processing capabilities, expanded ESM coverage and a tuned-up sonobuoy system. The type is made compatible with the new AGM-84 Harpoon air-to-surface anti-ship attack missile of which two are used in the Anti-shipping role.
On such a mission it would also carry 4 Mk46 torpedoes inside the weapons bay.
Anti-submarine warfare (ASW) requires a different load of offensive weapons such as 4 Mk54 depth charges inside the weapon bay and as much as 60 pre-loaded sonobuoys in belly tubes. With a ASW mission endurance of more than three hours the Viking hauls two 300 gal external fuel tanks on the wing pylons. Maximum flight endurance of the Viking is an estimated 7.5 hours depending on weather conditions.

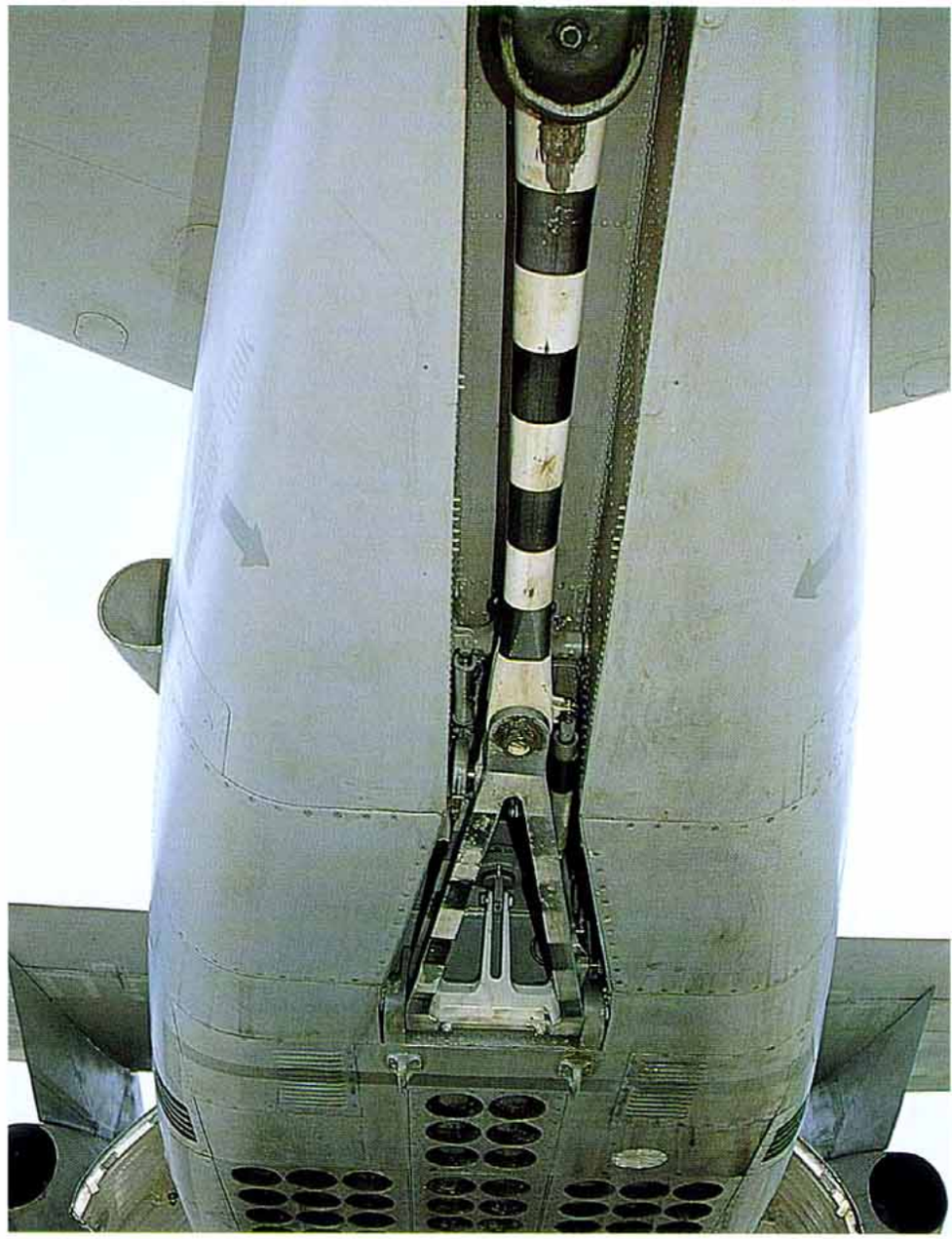


(Above) Belly detail just aft of the nose gear housing with hot air louvers and inspection panels including one with a small drain pipe at right. In the top corner of the picture is the split cover over the Texas Instruments forward-looking infrared (FLIR) scanner which can be extended in flight. Note the difference in weathering between skin panels and inspection hatches.

(Top left) A number of blade aerials are belly-mounted while two are even located on the forward wheel bay hatches. Two tie-down brackets have been secured between the wheel bays.

A small control panel is installed in front of the left set of sonobuoy chutes which is painted bright red inside. The small yellow pushbutton indicates carrier aircraft paintshops do not always "stick to the book" when it comes to maintaining the aircraft and improvisition is needed to keep them flying. Rather an odd-looking paintjob than a rusty panel or inspection hatch.

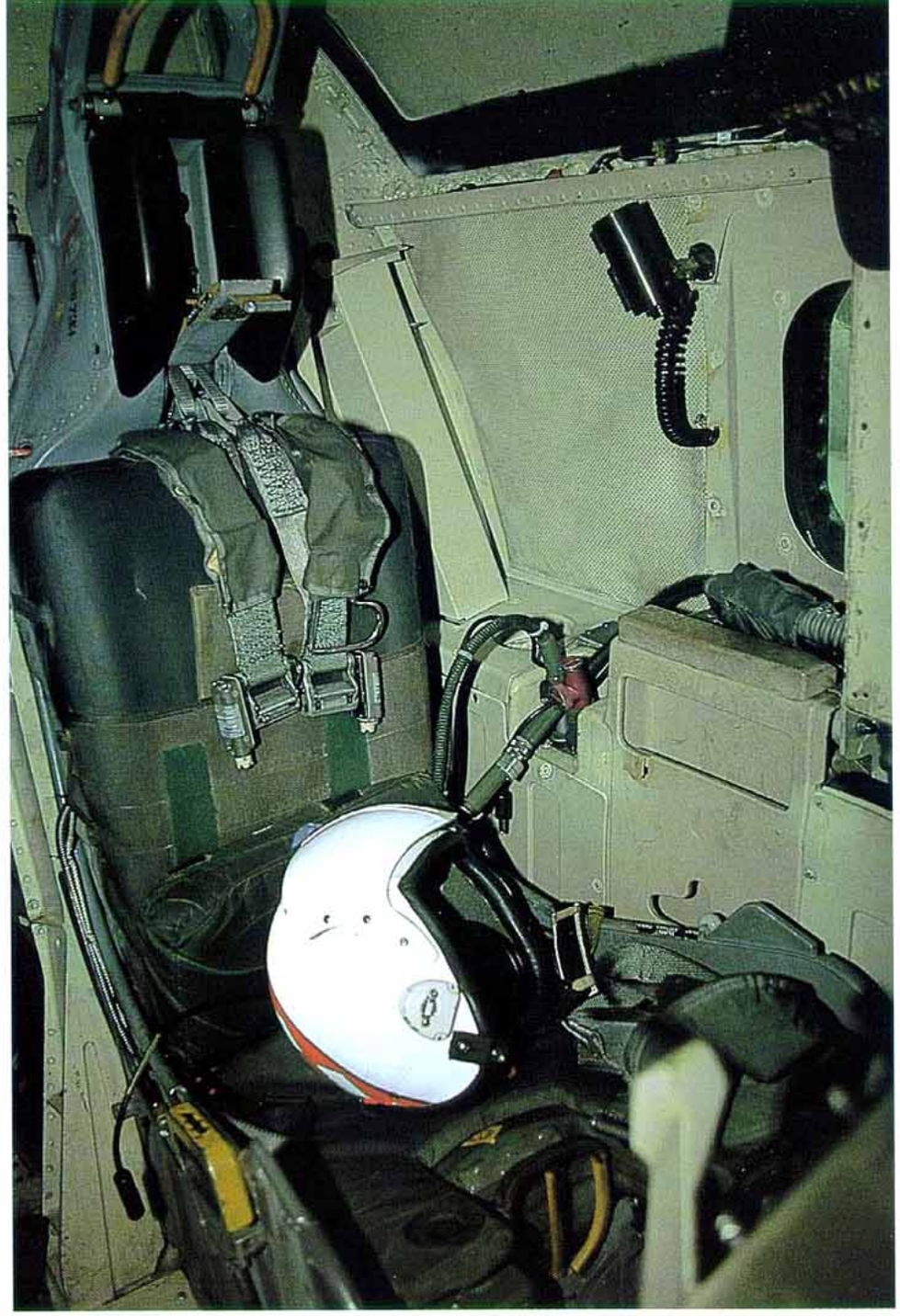




As mentioned earlier, 60 sonobuoys can be loaded into belly tubes which all have a slight rearward angle for rapid clearance when launched. Arranged into a central section of 30 launch tubes and two side sections of 15 launch tubes each they take most of the aft belly surface. To the rear are two more tie-down eyes and the arrestor hook housing with black and white arrestor hook which is forced down by a single pushrod.

(Photo Luc VAN DEN ENDE)

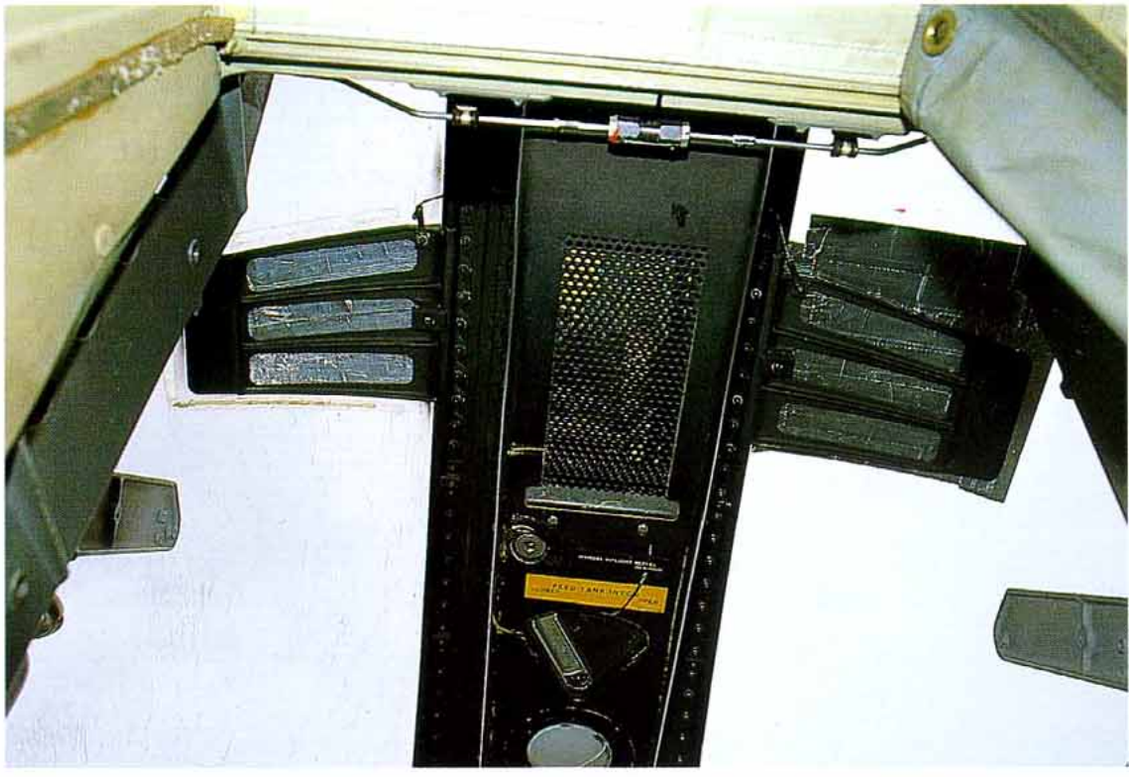
The first compartment you reach when forcing yourself through the narrow entrance is the TACCO or tactical co-ordinator station. His console resembles the one on the left which is partly shown in the bottom right picture on page 5. The McDonnell Douglas Escapac seat seen in the background is quite similar to the one found in the A-7 Corsair which is no longer in active Navy duty.

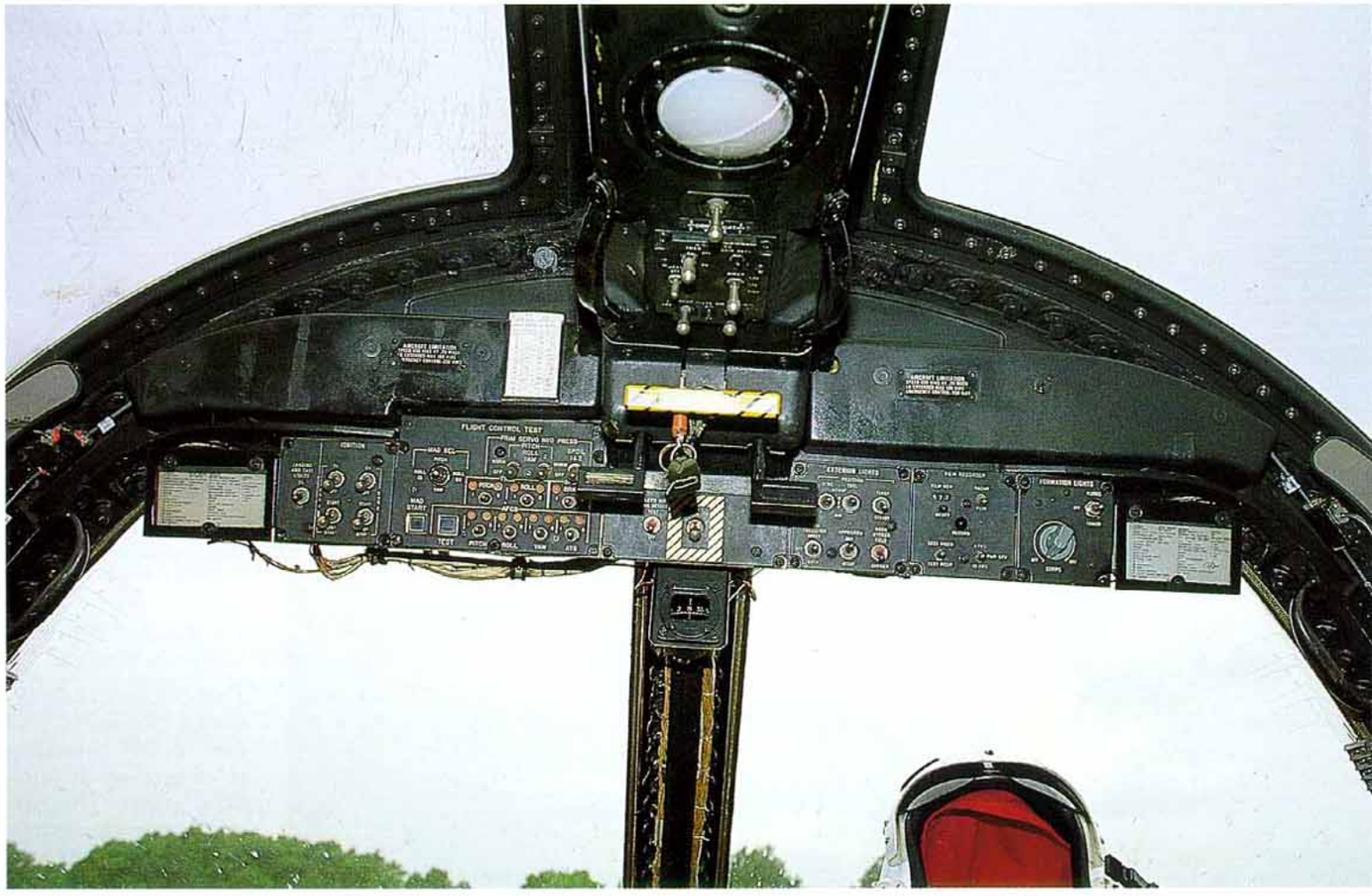


The SENSO or sensor operator's seat on the port side of the aircraft facing forward. Barely visible on the right is the small square observation window. Oxygen hose and G-suit connection can be seen on the side console which holds no further instruments. A door in between the seats give way to the mid-fuselage compartment comprising the Univac digital computer and related mission avionics.

The cockpit area is dominated by the presence of the center console with most of the navigation instruments and stores control panels. The main instrument panel is of analog design which somewhat confirms its late 70's origin. The upgrading to S-3B standards did not involve major changes in instrument layout, like the inclusion of CRT's. Note the co-pilot's throttle quadrant at left of his seat on the center console.

The overhead control panel holds from left to right, a checklist placard, ignition panel with taxi and landing light switch, a flight control test panel, center spar with stand-by compass, exterior lighting panel, film recorder panel, formation lights panel and another checklist. Note the handholds on the side spar and the window-incorporated antennas on either side of the front windscreen.
The overhead console covers the retractable refueling boom and most switches and levers to operate inflight refueling. Both photos were taken from between the Tacco's and Senso's seat.

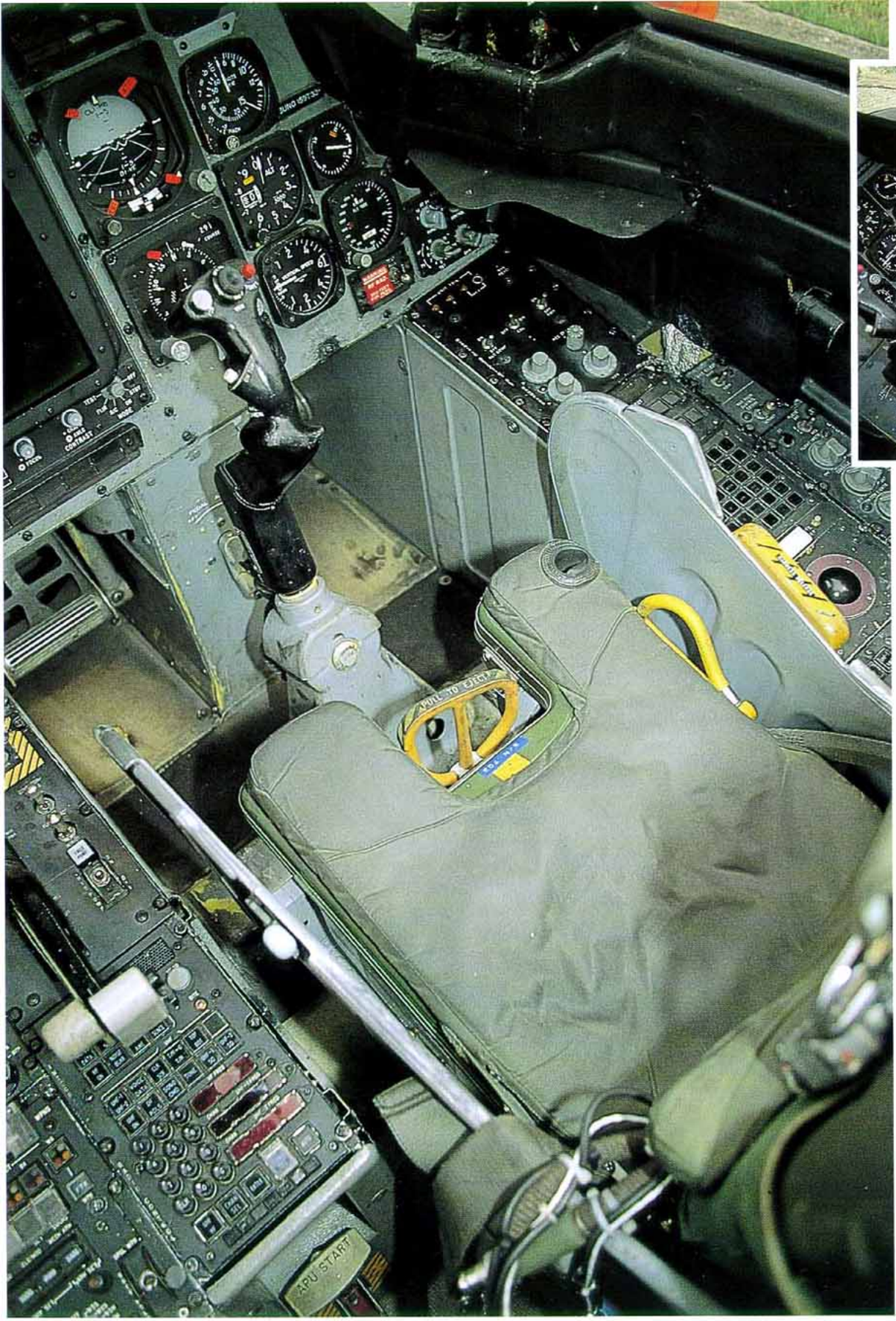




Pilot's console with central control column and major flight instruments. Note two rear view mirrors are attached to the cockpit side frame and the many scratches in the cockpit glass.

Pilot's side console with mostly lighting control panels and auto-pilot control panel. Note two small console lights on the side wall and one larger instrument panel light on the window sill.

Co-pilot's station with most of the same flight instruments as on the pilot's panel but with fairly larger display screen and additional caution panel. Note the radar operation control panel at the bottom of the extreme right side of the console. Also note the pedal adjustment handle behind the control stick.



Similar control panels as shown on page 32 can be found on the co-pilot's side console and side wall, including the single instrument panel light. Note the main instrument panel is painted light gray, the same color as the seat and the side console walls, but that the cockpit side wall and interior cockpit framing have been given a matt black coating.

S-3B Viking 704 moments after clearing the bow of the USS FORRESTAL on one of its final missions from this carrier which soon thereafter completed its active duty carrier mission, replacing the USS LEXINGTON as a testbed for rookie navy pilots. VS-28 disbanded soon thereafter. Note the aircraft designation in white clearly visible against the bright red flap interior surfaces, enabling the ship captain and other observers on the island to check which aircraft is taking to the skies. Note the upper wing spoilers/speedbrakes partially engaged. Also note the extensive weathering of the upper surface and walkways.

What goes up, must eventually come down. The same aircraft aiming for one of the deck cables which will bring it to a full stop in seconds, completing another tour. Note the LSO officers at right, anxiously monitoring the pilot's efforts to make a perfect trap.