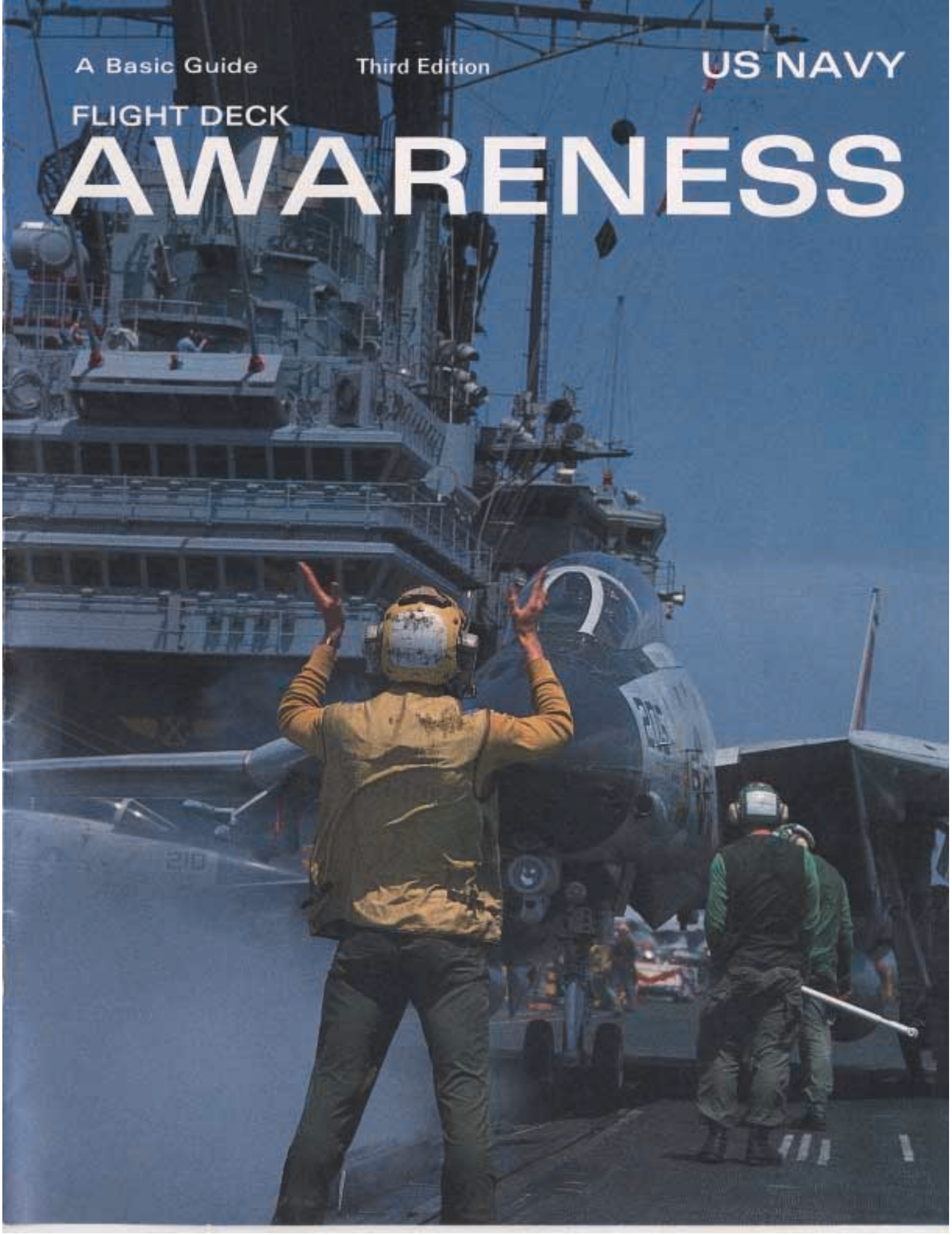
A Basic Guide

Third Edition

US NAVY

FLIGHT DECK AWARENESS



FOREWORD

This book will increase your hazard awareness and add to your previous training.

The sole purpose of today's professional sailor is combat readiness. To respond quickly and decisively is the key to your profession. Every man injured or maimed in the performance of his duties reduces our ability to fight and is a needless waste of our most precious asset, people. Stay aware of potential hazards that you may encounter in doing your job, and know what precautions to use. The best way to do this is to follow proven shipboard safety practices.

Adapted from a manual published by USS *Midway*, where it was compiled and edited by LCdr. Steve Gummer, VF 161. Photographic acknowledgements — Cover photo by Lans Stout, courtesy of Air Force Magazine, back cover by Lt. Joseph E. Higgins, McDonnell Douglas Corp. via D. Timm, John Williams. Special thanks to NAS Oceana and CV-66 photo labs for their expert assistance without which this project would not be possible.

The Workplace. . .

An aircraft carrier's flight deck is a million accidents waiting to happen. A plane crashing and touching off a fireball is just one of the dangers. A sailor can be standing on the wrong patch of the deck and be blown overboard by the blast from a jet engine yards away. Or he can make the mistake of getting close to a jet engine's intake and be sucked into it. Or he can be doing everything right and get his legs cut off as one of the arresting wires breaks and snaps down the deck like a whip. Or he can zig instead of zag and get run over by a plane taxiing to its parking space, or be struck down by a tractor zipping across the flight deck on one of its thousand-a-day errands.

From *Supercarrier* by George C. Wilson

The People. . .

The Air Boss

The "Boss" directs all aspects of flight deck operations from Primary Flight Control, the carrier's control tower. He maintains radio contact with all aircraft; phone contact with the Landing Signal Officer (LSO), Air Operations, bridge and flight deck control; he directs all takeoffs, landings and aircraft deck movement and associated evolutions. The "Boss" uses the 5MC (flight deck announcing system) as well as the "Mouse" (a two-way radio system in some cranial helmets) to direct and coordinate operations on the flight deck.

Yellow Jerseys

Flight Deck Officer — He plans, directs, and oversees all aircraft handling evolutions on the flight deck, including parking and security. He is directly responsible for clearing flight crashes and extinguishing flight deck fires. He supervises all flight deck aircraft directors, plane handlers, ground support equipment operators, aircraft elevators operators, and crash/salvage personnel.

Flight Deck Chief — He "calls the deck" during flight operations. "Call the deck" means making split-second decisions when sorting and prioritizing aircraft on their way to the catapults and positioning the aircraft after landing. *He is the central figure on the flight deck.*

Aircraft Handling Officer (ACHO) — The "Handler" controls all movement of aircraft on the flight deck and hangar deck from Flight Deck Control. He also maintains a running maintenance status of every aircraft on board, its weapon systems and coordinates with the weapons, intermediate maintenance, supply, air operations and strike operations officers. Because of limited space on the flight deck and hangar deck, he also coordinates all space allocation between other departments and the use of the aircraft elevators.

Aircraft Crash and Salvage Officer (Air Bos'n) — The Bos'n supervises the flight deck personnel assigned to the crash, fire and rescue team. They handle aircraft emergencies during flight and general quarters. The Bos'n trains assigned personnel and maintains the equipment. These LDOs are highly experienced in all phases of flight-deck operations. They provide invaluable assistance to the Aircraft Handling Officer and Flight Deck Officer during launch and recovery of aircraft, and during aircraft handling.

Catapult Officer — The "Shooter" is responsible for the entire catapult crew, weight verification and catapult Capacity Selector Valve (CSV) settings. He checks each aircraft before it launches for proper flight configuration, salutes the pilot and signals the deck edge to "fire" the catapult. On Nimitz-class carriers, the shooter sits in a "bubble" next to the catapults, and the man on the deck is an enlisted safety observer. He wears a green helmet.

Arresting Gear Officer — The "Hook" ensures that the proper weight is set in the arresting gear engines for each type aircraft (each has a unique maximum trap weight) prior to its landing. He is also responsible for the overall safety of the arresting gear crew and stands on the starboard side across from the landing signal officer. He wears a green helmet.

Plane Directors — They provide visual signals to cockpit crews in guiding aircraft movements.

White Jerseys

Safety Officer and Crew — They are responsible for the overall safety of flight operations; they make sure that all activities are in accordance with established safety procedures.

Air Transport Officer — The "ATO" coordinates and executes the loading, unloading and movement of all air cargo and passengers.

Landing Signal Officer — The "LSO" ensures each aircraft remains within safe parameters during landing approach through radio communication and light signals. He is stationed port side aft and initiates the wave-off of aircraft that are outside the safe landing envelope.

Medical — They provide immediate medical assistance and treatment to any flight deck personnel casualties. They can be distinguished by a large red cross on the front and back of their jerseys.

Squadron Plane Inspectors — They're identified by the black and white checkerboard pattern on the front and back of their jerseys with appropriate squadron designator and green helmet. They are responsible for physical safety and inspection of aircraft.

Blue Jerseys

Aircraft Handling Crew and Chockmen — The "Blue Shirts" are responsible for handling and securing all aircraft with wheel chocks and chains. They also operate the handling equipment, including tractors and aircraft starting units on the flight deck.

Elevator Operators — The "EOs" operate the carrier's aircraft elevators, which move aircraft to and from the flight deck and hangar deck. They wear white helmets.

Red Jerseys

Crash and Salvage — The flight deck "fire department" is responsible for fighting aircraft fires and the rescue of personnel on the flight deck. They operate all mobile firefighting and crash/salvage equipment.

Ordnance Officer — He is responsible for the safe movement, handling and loading of aircraft ordnance. His jersey has a black stripe and "Safety" on the front and back.

Explosive Ordnance Disposal Officer & Crew — They dispose of, disarm and neutralize defective ordnance. Their jerseys have "EOD" on the front and back.

Ordnance Handlers — The "B-B Stackers" move, load and unload ordnance on the aircraft. Their jerseys have black stripes and their squadron designator on the front and back.

Purple Jerseys

Aviation Fuels Crew — Known as "grapes" because of the color of their jerseys. They fuel and defuel aircraft from fueling stations located strategically around the flight and hangar deck. The "grapes" also supply automotive gasoline, lubricating oil to the catapults and fuel to the jet engine test cell.

Green Jerseys

Catapults and Arresting Gear

Center Deck Operator — He communicates with catapult control, relaying aircraft type, gross weight and side number; assists in selection of capacity selector valve (CSV) setting.

Deck Edge Operator — He actually "fires" the catapult on command of the Catapult Officer and is located on the side of each catapult in the catwalk.

Bow Safety Man — He ensures the forward portion of the ship is clear of FOD and personnel before and during launches. He switches launch hardware between the "shuttle" for nosegear launch bar aircraft and the "spreader" for bridle equipped aircraft.

Top Side Safety Petty Officer — He monitors and supervises the catapult hook up procedure for both bridle and nose tow launched aircraft, prior to each launch.

Weight Board Operator — He verifies the aircraft gross weight with the aircrew as a final check before launch (each plane requires a different catapult setting based on weight.)

Jet Blast Deflector Operator — He raises and lowers the jet blast deflectors for each aircraft, allowing it to taxi into launch position for takeoff. The JBD prevents jet blast danger to personnel and aircraft aft of the launch area.

The Arresting Gear Crew

Deck Edge Operator — He retracts the arresting gear wire after recovery of each aircraft and is stationed in the catwalk.

Hook Runners — They ensure the wire remains in the landing area during retraction by using a five-foot steel bar.

Deck Checkers — They ensure the landing area is FOD-free, the wire is in proper position for aircraft recovery, and all personnel are clear of landing area.

Maintenance Crew — They maintain the aircraft. Their jerseys are marked with a squadron designator and black stripe on the front and back.

Helicopter LSE (Landing Signalman, Enlisted) — He directs the safe takeoff and landing of all helicopters with visual hand signals. He wears a red helmet.

Photographers — They photograph and videotape flight operations for documentation and media requests.

Brown Jerseys

Plane Captains — They ensure aircraft are properly inspected and serviced before and after each flight. They are responsible for the cleanliness and general condition of aircraft. They also supervise ground starting procedures. Their jerseys are marked with their squadron designator on the front and back.

FOD (Foreign Object Damage) Walkdowns - These are held before, during and after flight operations. Squadron, airwing, and ship's company air department personnel all participate by forming a line across the width of the flight deck and slowly walking from bow to stern. The purpose is to search out loose objects on deck that if ingested into aircraft engines would result in costly repairs (up to $100,000). Serious personnel injuries have also resulted from FOD being propelled by jet blast. FOD is always a major safety concern on all aircraft carriers.

DECK EDGE FIRE FIGHTING SYMBOLS

"Fire on the Flight Deck!"

. . . Those sobering words and your immediate response will make the difference between extensive or light damage to the ship and possible injury or death of a shipmate. Keep this fact in mind. You may be the first one on the scene. Will you be prepared? The fire fighting agent symbols illustrated below are painted on the flight deck edge wheel stop coaming at various locations. Additional fire fighting apparatus symbols will also be found on the island structure. Study the symbols, walk the flight deck. Become familiar with the location, operating procedures and intended purpose of all flight deck fire fighting equipment.

FIRE FIGHTING AGENTS

Purple K Powder Stowage Marking

A 12-inch-wide red stripe is painted up and over the deck edge wheel stop coaming with a white 3-inch-high "PKP" painted in the center of the stripe. At locations where coaming is not installed, stowage location is marked by a white 18-inch diameter circle painted on the flight deck. A red 5-inch-high "PKP" designation is centered in the circle.

Saltwater Station Marking

An 18-inch-wide red stripe is painted up and over the deck edge wheel stop coaming with a 3-inch-high yellow letter "W" painted in the center. At locations where coaming is not installed, the station is marked by a red triangle, 18 inches per side, painted on the flight deck. A yellow "W" is centered inside the triangle.

CO_2 Bottle Stowage Marking

A 12-inch-wide red stripe is painted up and over the deck edge wheel stop coaming. A white 3-inch "CO_2" designation is painted in the center of the stripe. At locations where coaming is not installed, the deck edge is marked with a white-18-inch diameter circle with a red-5-inch high "CO_2" designation centered in the circle.

AFFF Station Marking

An 18-inch-wide green stripe is painted up and over the deck edge wheel stop coaming with a white 3-inch-high "AFFF" painted in the center of the stripe. At locations where coaming is not installed, stowage location is marked by a green 18-inch square painted on the flight deck with white "AFFF" letters painted in the center of the square.

AFFF is the primary extinguishing agent for aircraft fires on all Navy air-capable ships. Operation of a typical flight deck AFFF station is a simple procedure.

First — locate the activation button and the telephone (both are painted green).

Second — make sure that the firefighting crew has pulled all the fire hose out of the storage box.

Third — depress the button. This will activate the system and charge the hose. Note: Hard non-collapsible hoses may be charged while on the hose reel.

Fourth — get on the telephone. This is your communication system with the pumping station that is supplying agent to the AFFF station, and with damage control central. Notify the pumping station if there are problems or to secure the AFFF station.

Note: You do not have to use the telephone to have the hose turned on.

FIRE FIGHTING SYMBOLS

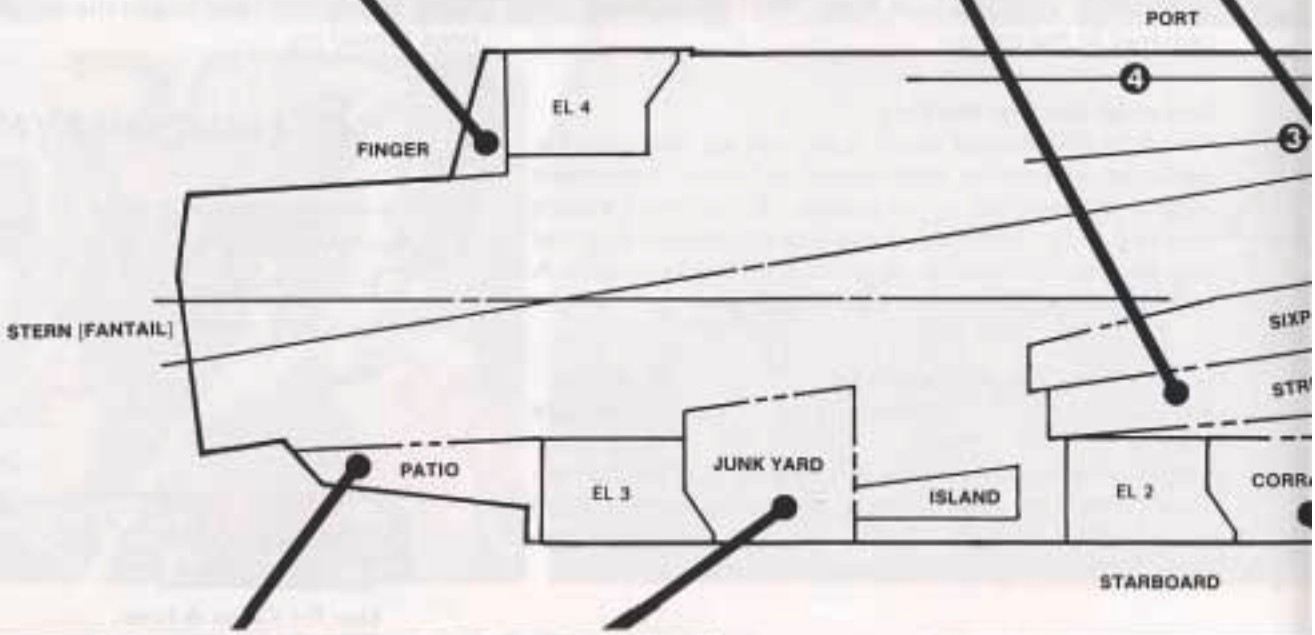
Use for Class A and B fires.

Use for Class A fires.

Use for Class A, B and C fires.

Use for Class A and B fires.

NAVY


PORT
4
3
EL 4
FINGER
STERN (FANTAIL)
SIXP
STR
PATIO
EL 3
JUNK YARD
ISLAND
EL 2
CORR
STARBOARD

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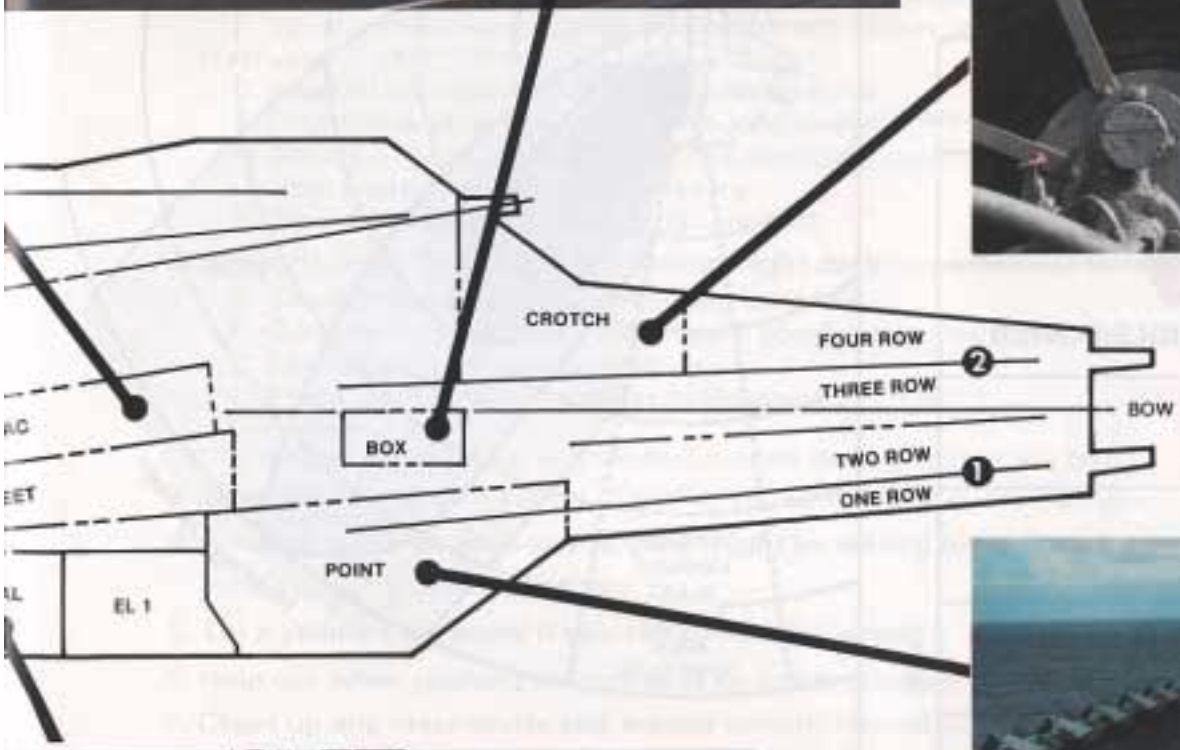
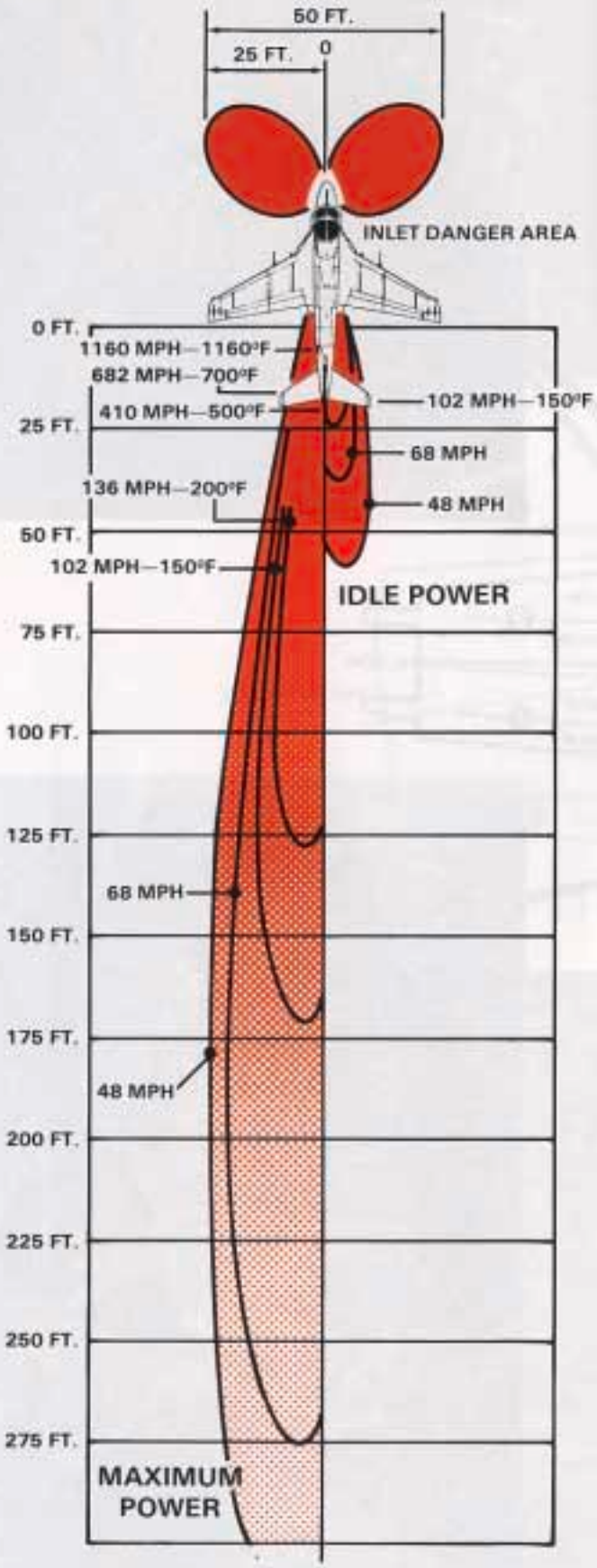
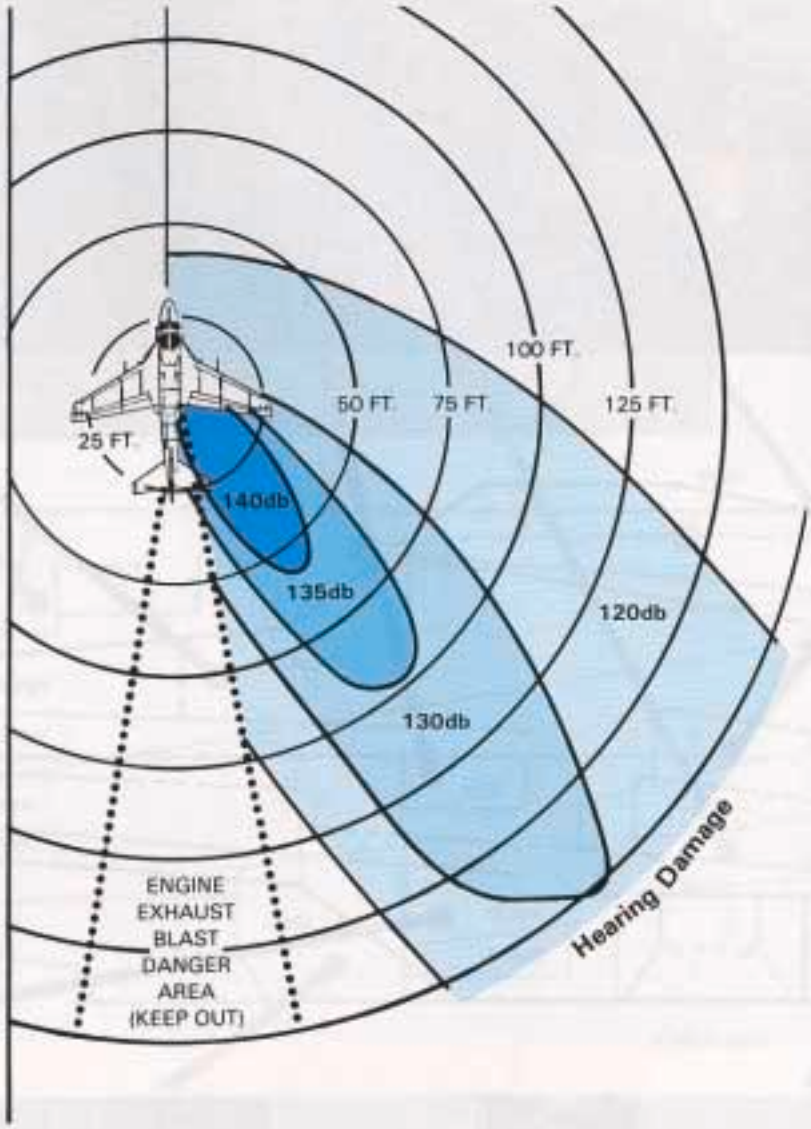
511


CROTCH
FOUR ROW
THREE ROW
BOW
BOX
TWO ROW
ONE ROW
POINT
EL 1

JET BLAST AND NOISE CHARTS

The following charts of a **non-afterburner equipped aircraft** clearly show the danger areas to avoid. Typical examples for jet blast: At 150 feet (one-half the length of a football field) you will encounter a jet exhaust blast of approximately 100 mph when the engines are in full power settings. At 100 feet, 136 mph, temperature 150 degrees Fahrenheit. **All figures will easily double for afterburner aircraft.**





Note

Noise danger areas are symmetrical about engine centerlines during dual engine operation at maximum power.

Caution

If engines are run up in front of a blast deflector, sound is reflected to side resulting in a distortion of pattern as illustrated above.

A FEW BASICS...

Rules to Live By
Or
The Do's and Don'ts of
Flight Deck Safety

DO:

1. **Have the complete and proper flight deck gear.** This includes;
   A. **Cranial helmet with reflective tape** — minimum 3-by-6-inch white strip on front shell and minimum 6-by-6-inch white strip on back shell.
   B. **Goggles** — clear visor for servicing aircraft.
   C. **Float coat** — good material condition, CO_2 cartridges tightly installed and retainer cap, toggle initiator shear wired, strobe light with fresh battery, whistle, and water dye marker attached to vest.
   D. **Flight deck boots** — steel toe, non-slip soles.
   E. **Flight deck jersey** — color coded, long sleeve.
   F. **Gloves** — good condition. (not mandatory but recommended)
   G. **Foul weather gear** — as necessary.
   H. **Sound attenuators** — ear plugs are best.
2. **Properly wear flight deck gear during flight deck operations as follows:**
   A. **Cranial helmet** — on and securely fastened.
   B. **Goggles** — down over eyes. Ensure goggles attached to cranial. (tinted lenses for day only)
   C. **Float coat** — On and buckled up.
   D. **Flight deck jersey** — sleeves rolled down.
   E. **Gloves** — on.
   F. **Sound attenuators** — good seal around ears. (earplugs are best)
3. **Keep your head on a swivel.** It's what you can't see that will hurt you.
4. **Keep your eye on anyone you think might be setting himself up for an accident.**
   Help avoid that potential danger.
5. **Let a yellow shirt know if you see something wrong.**
6. **Help out when pushing aircraft back by hand. (caution-watch wheels, sharp edges and ordnance)**
7. **Clean up any mess under and around aircraft immediately.**
   This will help stop foreign object damage (FOD) and skid-proof the deck.
8. **Take part in all flight deck drills and FOD walkdowns.**
9. **Seek out a yellow shirt and ask for assistance if you are unsure of a situation.**
10. **Extend your arm in front of your body when closely walking in front of a jet intake or behind a jet exhaust if you are unsure if the aircraft is running. This is especially important at night.**
11. **Assume an aircraft has its engines turning if you see a man in the cockpit.**
12. **Avoid movable surfaces of aircraft while the engines are turning.**
13. **Always enter the flight deck via the island when possible.**
14. **Know your absolute limits. Fatigue is deadly!**
15. **Stand clear of catapult and landing area Safe Parking Lines when respective operations are in progress.**

Above All Else...Stay Alert!

DO NOT:

1. Do not come on deck during flight operations without wearing proper flight deck gear.
2. Do not wear jewelry such as neck chains or wrist bracelets while on flight deck or in work center.
3. Do not have sleeves or goggles up during flight operations.
4. Do not walk close to aircraft with engines turning. Stay at least 25 feet away from all intakes and propellers. Avoid jet exhaust by at least 150 feet when possible.
5. Never walk under propellers even though not turning. Always walk around.
6. Do not work on or pass beneath a moving aircraft.
7. Never place yourself to the outboard side of aircraft taxiing or being towed to or from the bow.
8. Never come up on flight deck via the bow catwalks during launch operations. Use the island structure.
9. Never come up on flight deck via port catwalks during recovery operations. Use island structure.
10. Never turn your back to the landing area during recovery.
11. Do not cross behind jet blast deflectors while aircraft are at high power settings being readied for catapult launch.
12. Do not sit anywhere on the flight deck during flight operations.
13. If blown down by jet exhausts, grab a padeye or any immovable object and hold on. Do not try to stand up.
14. Do not walk in front of aircraft while arming or de-arming forward firing ordnance.
15. Do not place yourself near arresting gear wires during aircraft recovery, or when gear maintenance is being performed.
16. Never start an aircraft that has a fueling hose attached.
17. Do not leave power cables lying on deck. Always stow them properly.
18. Do not stand in front of mobile fire fighting equipment.
19. Never cross elevator stanchions while they are in the raised position.
20. Do not feel you are Superman. The "It can't happen to me" syndrome has been clearly disproven over the years.
21. Do not stand in front of a jet starting unit's (huffer) exhaust.
22. Do not loiter on the flight deck. If you do not have work to do, stay below.

The Review

1. List the required proper flight deck gear:

a. _____
b. _____
c. _____
d. _____
e. _____
f. _____

2. A Blue Shirt on the flight deck is responsible for:

a. Fueling aircraft
b. Directing taxiing aircraft
c. Handling and tying down aircraft
d. Checking aircraft prior to launch
e. Aircraft ordnance

3. A PKP bottle is easily located by looking for the following symbol painted on the wheel stop coaming of the flight deck:

a. Red triangle
b. A 12 inch wide red stripe with the letters "PKP" centered on the stripe
c. A blue 12-inch stripe with red "PKP" letters inside
d. Small red circles 6 inches in diameter

4. A saltwater fire fighting hose is located by the following symbol painted on the wheel stop coaming:

a. A 12-inch green stripe
b. Yellow triangle
c. 18-inch red stripe with a yellow "W"
d. 12-inch red stripe with a yellow "W"

5. White shirts on the flight deck are responsible for:

a. Overall safety of flight operations
b. Aircraft refueling
c. Plane directing
d. Aircraft ordnance

6. Which items listed below are classified as FOD (Foreign Object Damage) materials:

a. Screws
b. Safety/shear wire
c. Ball point pen
d. A glove
e. All four are examples of FOD

7. A Brown shirt on the flight deck is attached to

_____

a. V-1 Division
b. V-2 Division
c. Medical department
d. A squadron

8. A Green Jersey is associated with

_____

a. The Catapult Crew
b. The Arresting Gear Crew
c. Crash and Salvage
d. (a) and (b)

9. If blown down on the flight deck from jet-blast, you should do which of the following:

a. Try to stand up and move out of the jet-blast
b. Grab a padeye and hold on
c. Do nothing and roll down the deck until the jet blast force lessens, then stand up.

10. The best agent to fight an aircraft electrical fire is:

a. PKP
b. Saltwater
c. CO_2
d. AFFF

11. "AFFF" Firefighting apparatus is located by looking for the following symbol painted on the deck edge wheel stop coaming:

a. Red stripe
b. Yellow stripe with white letters "AFFF"
c. Green stripe with white letters "AFFF"
d. AFFF stations are located only in hangar bays.

12. The float coat integrity checks include:

a. Two CO_2 cartridges (weighed and dated) securely installed
b. CO_2 cartridge initiator shear wired
c. Two bladders, check inflation by oral inflation
d. Whistle, water dye attached
e. Operational strobe light
f. All answers are correct

13. One should avoid all jet intakes by _____ feet.

a. 10
b. 15
c. 20
d. 25

14. Turning your back on the landing area while recovering aircraft is a safe procedure. *True* or *False*.

15. Never crossing over aircraft elevator stanchions when they are in a raised position is a safe procedure to be followed. *True* or *False*.

16. At night, when walking around aircraft, it is necessary to extend the arm when crossing behind aircraft to check for jet-blast. *True* or *False*.

17. CO_2 bottle storage is easily located by looking for the following symbol painted on the deck edge wheel stop coaming:

a. Orange stripe 12inches long
b. A sqare, red and yellow checkerboard design emblem
c. 12-inch red stripe with "CO_2" centered in stripe.
d. A green stripe with "CO_2" centered in the stripe.

18. The Air Boss, more commonly referred to as the "Boss," directs all aspects of flight deck operations from primary flight control. *True* or *False*.

19. Medical personnel wear white shirts. They are easily identifiable by:

a. Green cross on the front and back of their shirts
b. Red cross on the front and back of their shirts
c. The word "Corpsman" written on the front of their shirts
d. The word "Medical" written on the back of their shirts

20. The flight deck may be hazardous but the risks are vastly minimized by adhering to basic safety and proven common sense procedures. *True* or *False*

FLIGHT DECK FAMILIARIZATION

Indoctrination

The purpose of this form is to ensure all personnel who are required to work on the flight deck during flight operations are thoroughly indoctrinated on the inherent dangers of flight deck operations.

All newly assigned personnel will fulfill the requirements of this form before being allowed to work on the flight deck during flight operations without supervision.

It is the responsibility of the Work Center Supervisor to ensure personnel are familiarized and indoctrinated in accordance with the provisions of this form prior to assignment to duties *without supervision* on the flight deck during flight operations.

Item 6 can be completed at any time during the familiarization/indoctrination.

Name_____ Rate_____
Last First

SSN _____ W/C _____

You are assigned as a trainee under the supervision of _____

At no time during the familiarization/indoctrination shall you go on the flight deck during flight operations unless under supervision.

_____
Trainee Signature/Date

1. Indoctrination/brief by a QA and a Maintenance Department Safety Petty Officer.

_____
Signature Date

_____
Signature Date

2. Assignment to the flight deck during daylight flight operations under supervision for two days.

_____
Signature Date

_____
Signature Date

3. Observe two evolutions of night operations from the 09 level of the island structure. This shall include a minimum of two launches and two recoveries for each night.

_____
Signature Date

_____
Signature Date

4. Assignment to the flight deck during flight operations under direct supervision for four days of night and day operations. This shall include a minimum of two day and two night launches and recoveries for each day of operations.

Signature Date

Signature Date

Signature Date

Signature Date

5. Brief by Crash and Salvage on flight deck firefighting equipment and steam smothering system.

Signature Date

6. Final brief by Work Center Supervisor.

Signature Date

This individual has successfully and satisfactorily completed the requirements for performing maintenance on the flight deck during flight operations without direct supervision.

Signature & Title Date

You are qualified to perform maintenance functions on the flight deck during flight quarters. You shall at all times observe all flight deck safety precautions.

Division/Branch Officer Date

Maintenance Officer/Dept. Head Date

To be filed in member's training jacket

. . . and finally, there is danger.

Constant awareness of danger on the flight deck is your best protection. Sometimes danger is spectacular and requires instant action to save the life of a shipmate. Teamwork by all hands prevented this mishap from turning into tragedy. No one was hurt, but everyone learned the meaning of flight deck awareness.

Questions or comments regarding this guide or other flight deck procedures may be referred to: Naval Safety Center, NAS Norfolk, VA 23511-5796, Attn: Code 114.

These dramatic photos were taken by AMHAN Ronald Joslin, VA 37.

U.S. NAVAL SAFETY CENTER

READINESS THROUGH SAFETY

Prepared By
Media and Education Support Department
Naval Safety Center