

NAVAIR 00-80T-120

CVN FLIGHT/HANGAR DECK NATOPS MANUAL

THIS MANUAL SUPERSEDES NAVAIR 00-80T-120 DATED
1 APRIL 2008



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NAVAL AIR SYSTEMS COMMAND.



DEPARTMENT OF THE NAVY

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15 December 2010

LETTER OF PROMULGATION

1. The Naval Air Training and Operating Procedures Standardization (NATOPS) Program is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft mishap rate. Standardization, based on professional knowledge and experience, provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative, but rather to aid the Commanding Officer in increasing the unit's combat potential without reducing command prestige or responsibility.
2. This manual standardizes ground and flight procedures but does not include tactical doctrine. Compliance with the stipulated manual requirements and procedures is mandatory except as authorized herein. In order to remain effective, NATOPS must be dynamic and stimulate rather than suppress individual thinking. Since aviation is a continuing, progressive profession, it is both desirable and necessary that new ideas and new techniques be expeditiously evaluated and incorporated if proven to be sound. To this end, Commanding Officers of aviation units are authorized to modify procedures contained herein, in accordance with the waiver provisions established by OPNAV Instruction 3710.7, for the purpose of assessing new ideas prior to initiating recommendations for permanent changes. This manual is prepared and kept current by the users in order to achieve maximum readiness and safety in the most efficient and economical manner. Should conflict exist between the training and operating procedures found in this manual and those found in other publications, this manual will govern.
3. Checklists and other pertinent extracts from this publication necessary to normal operations and training should be made and carried for use in naval aircraft.
4. Per NAVAIRINST 13034.1 series, this flight clearance product provides NAVAIR airworthiness certification subsequent to design engineering review. It does not authorize aircraft system modification, nor does it satisfy NAVAIR requirements for configuration management. Refer to OPNAVINST 4790.2 series for policy guidance on configuration management and modification authority.

Approved

A handwritten signature in black ink, appearing to read "R. L. MAHR", is written over the printed name.

R. L. MAHR
 Rear Admiral, United States Navy
 By direction of
 Commander, Naval Air Systems Command

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The following Interim Changes have been cancelled or previously incorporated into this manual.

INTERIM CHANGE NUMBER(S)	REMARKS/PURPOSE
1 thru 8	Previously Incorporated

The following Interim Changes have been incorporated into this Change/Revision.

INTERIM CHANGE NUMBER(S)	REMARKS/PURPOSE
9	Helo Special Safety Precautions
10	GS and Contract Personnel Training and Catapult Checks/Launch Procedures
11	Catapult Launch Procedures/Checks
12	EA-6B Tailhook/APPENDIX J Flight/Hangar Deck Training Syllabus
13	FA-18E/F & EA-18G Handling Procedures
14	A/C Tensioning & Launch Procedures
15	Catapult Spotting Procedures
16	TSPO Launch Bar Warning

Interim Changes Outstanding — To be maintained by the custodian of this manual.

INTERIM CHANGE NUMBER	ORIGINATOR/DATE (or DATE/TIME GROUP)	PAGES AFFECTED	REMARKS/PURPOSE

LIST OF EFFECTIVE PAGES

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LIST OF ABBREVIATIONS AND ACRONYMS

A

ACHO. Aircraft Handling Officer.

ADDO. Air Department Duty Officer.

ADTT. Air department training team.

AESS. Aircraft electrical service station.

AFFF. Aqueous film-forming foam.

AFOSS. Aviation Fuels Operational Sequencing System.

A/G. Arresting gear.

AGDC. Arresting gear display computer.

AGO. Arresting Gear Officer.

AHM. Aircraft handling mishap.

ALB. Aircraft launching bulletin.

ALBAR. Adjustable length towbar.

ALRE. Aircraft Launch and Recovery Equipment.

ALREMO. Aircraft Launch and Recovery Equipment Maintenance Officer.

ALREMP. Aircraft Launch and Recovery Equipment Maintenance Program.

APU. Auxiliary power unit.

ARC. Advanced recovery control.

ASAC. Anti Submarine Air Controller.

ATO. Air Transfer Officer.

AWIS. Aircraft weight indicating system.

B

BRC. Base recovery course.

C

CAG. Carrier Air Wing; Carrier Air Wing Commander.

CAGMO. Carrier Air Wing Maintenance Officer.

CARQUALS. Carrier qualifications.

CATCC. Carrier Air Traffic Control Center.

CCA. Carrier-controlled approach.

CCP. Central charging panel.

CDP. Cross-deck pendant.

CONREP. Connected replenishment.

CQ. Carrier qualifications.

CROV. Constant run-out valve.

CRT. Combat rated thrust.

CSMP. Consolidated Ship's Maintenance Plan.

CSV. Capacity selector valve.

CVN. Aircraft carrier (nuclear-powered).

CVW. Carrier Air Wing.

E

EEBD. Emergency escape breathing device.

EMCON. Emission control.

EOSS. Engineering operational sequencing system.

ETR. Estimated time of repair.

F

FCF. Functional check flight.

FDC. Flight deck control.

FDCS. Flight deck communication system.

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FDO. Flight Deck Officer.

FOD. Foreign object damage.

FSII. Fuel system icing inhibitor.

G

GQ. General quarters.

GSE. Ground support equipment.

H

HDO. Hangar Deck Officer.

HERO. Hazards of electromagnetic radiation to ordnance.

HFP. Heptafluoropropane.

HUD. Heads-up display.

I

ICCS. Integrated catapult control system.

IFLOLS. Improved Fresnel Lens Optical Landing System.

ILARTS. Integrated launch and recovery television system.

IMC. Instrument meteorological conditions.

ITALD. Improved tactical air launch decoy.

ITL. Intent to launch.

IWO. Integrity Watch Officer.

J

JBD. Jet blast deflector.

L

LOX. Liquid oxygen.

LSE. Landing Signalman Enlisted.

LSO. Landing Signal Officer.

M

MFFV. Mobile firefighting vehicle.

MIM. Maintenance instruction manual.

MOVLAS. Manually Operated Visual Landing Aid System.

MRT. Military rated thrust.

N

NACHO. Night Aircraft Handling Officer.

NATIP. Naval aviation technical information product.

NATOPS. Naval Air Training and Operating Procedures Standardization.

NAVSSSES. Naval Sea Systems Engineering Station.

NAWC. Naval Air Warfare Center.

NFO. Naval Flight Officer.

NGL. Nose gear launch.

NSN. National Stock Number.

NVG. Night vision goggles.

NWU. Navy working uniform.

O

OCE. Officer conducting exercise.

OHO. Ordnance Handling Officer.

OOD. Officer of the deck.

OSS. Operational Sequencing System.

P

PASE. Preloaded Accessory Suspension Equipment.

PDL. Passdown log.

PKP. Purple K powder (firefighting agent).

PMS. Planned Maintenance System.

T

P/N. Part number.

TLI. Tank level indicator.

PQS. Personnel qualification standard(s).

TOD. Tail over deck.

PriFly. Primary flight control.

TSPO. Topside Safety Petty Officer.

Q

TYCOM. Type Commander.

QA. Quality assurance.

U

R

UI. Under instruction.

RATS. Reduced arrestment thrust system.

UNREP. Underway replenishment.

RCI. Retract control indicator.

V

RRHB. Repeatable release hold-back bar.

VERTREP. Vertical replenishment.

S

VFR. Visual flight rules.

SAR. Search and rescue.

VLA. Visual landing aids.

SOP. Standard operating procedure.

VMC. Visual meteorological conditions.

SOPV. Solenoid-operated pilot valve.

W

SOX. Low pressure sodium floodlights.

WOD. Wind over deck.

GLOSSARY

A

Air Department. The department on board a CVN responsible for conducting flight operations aboard and in the immediate vicinity of the ship.

aircraft handling mishap (AHM). A mishap in which any damage to an aircraft occurs while the aircraft is embarked or is being hoisted on/off an aircraft carrier.

Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP). A program that provides an integrated system for performing maintenance and related support functions on ship's installed aircraft launching and recovery systems.

Aircraft Launching Bulletin. A document that gives the approved launching accessories for each aircraft, optimum pilot technique during the launch, and trim and power settings for launching.

Aircraft Weight Indicating System (AWIS). System that displays arresting gear engine weight settings.

Aviation Fuels Operational Sequencing System (AFOSS). The actual diagrams, and operating procedures for the Aviation Fuels System.

B

base recovery course (BRC). The ship's magnetic heading during flight operations.

C

Carrier Air Traffic Control Center (CATCC). CATCC comprises two interdependent work centers — Air Operations (Air Ops) and Carrier Controlled Approach (CCA). It is the centralized agency responsible for keeping the status of all air operations and control of all airborne aircraft under the Operations Officer's cognizance, except those being controlled by CDC and the Air Officer.

carrier-controlled approach (CCA). A radar tracking unit used in conjunction with a "talker" who establishes an approach path (similar to the ground control approach).

Case I departure and approach. Departure/approach utilized when flights are not anticipated to encounter instrument conditions at any time during departure/rendezvous or descent, break, and final approach. A ceiling of 3,000 feet and 5 NM visibility within carrier control zone is required.

Case II departure and approach. Departure/approach utilized when flights may encounter instrument conditions during departure/rendezvous or descent, but a ceiling of 1,000 feet and 5 NM visibility exist at the ship.

Case III departure and approach. Departure/approach utilized when conditions do not meet those required for Case II, or for flight operations between 1/2 hour after sunset and 1/2 hour before sunrise, except as modified by the OTC or the ship's Commanding Officer.

central charging panel (CCP). Panel used to control and monitor catapult hydraulic and pneumatic systems.

clear deck forward. A series of visual checks that include bow/angle safety light green, safe shot line is clear, aircraft canopies closed, no personnel in the catwalks and on top of the aircraft.

combat rated thrust (CRT). Afterburner.

concurrent operations. Sequential launch and recovery of fixed wing and rotary wing aircraft in the same cycle.

Consolidated Ship's Maintenance Plan (CSMP). Plan to provide shipboard maintenance managers with a consolidated listing of deferred maintenance to identify the material condition of the ship.

cross-deck pendant (CDP). Pendant that transfers the load of the aircraft to the arresting gear purchase cables.

D

deckedge mode. Mode of catapult operations from catapult deckedge control station.

F

Flight Deck Control (FDC). The nerve center of the flight deck coordinating all aircraft movement, fueling, and maintenance requirements for embarked air wing.

Fly 1. Located on the forward third of the flight deck. Catapults 1 and 2 are located in this area.

Fly 2. Located in the middle third of the flight deck; this is a very busy area during flight operations where both jet and propeller aircraft are constantly moving to various locations around the flight deck.

Fly 3. The aft one-third of the flight deck; this area is very busy during recovery. The cross-deck pendants, LSO platform, and AGO station are located in the area.

G

groove. Position of aircraft during recovery as it approaches short final 3/4 of a mile from the ship.

H

HANGFIRE. Emergency condition in which the catapult does not fire within 10 seconds after the FIRE button is pushed.

hazards of electromagnetic radiation to ordnance (HERO). Condition set aboard ship to preclude operation of equipment emitting electromagnetic radiation, thereby preventing detonation of ordnance.

heads-up display (HUD). HUD console is designed to provide the Landing Signal Officer (LSO) with a consolidated display of important aircraft and recovery deck status and trend information.

I

Improved Fresnel Lens Optical Landing System (IFLOLS). A visual landing aid system that displays glide path and trend information to a fixed wing pilot approaching the flight deck. This system presents a display that is visible at a range of 1.0 nautical mile.

Integrated Catapult Control System (ICCS). System that controls the operation of two adjacent catapults. This system can be retracted into the deck when not in use.

Integrated Launch and Recovery Television System (ILARTS). System that simultaneously monitors and records aircraft recoveries and launches aboard aircraft carriers, during both day and night operations. This system also provides the LSO with information on the lineup of aircraft during recovery and is used as debriefing medium for pilots and for detailed accident analysis.

ITL. Intent to Launch.

M

Manually Operated Visual Landing Aid System (MOVLAS). A backup system, should the FLOLS/IFLOLS become inoperable.

military rated thrust (MRT). Non-afterburner.

mobile firefighting vehicle (MFFV). Low-profile mobile firefighting vehicle designed for fire protection aboard aircraft carriers.

N

night vision goggles (NVGs). Afford pilots, aircrews, and flight deck crews improved night visual acuity.

no-load. Preoperational check of catapult launching systems that includes mechanical, electrical, and hydraulic systems.

O

Operational Sequencing System (OSS). The actual diagrams, operating procedures for ship's individual systems.

P

PASE. Preloaded Accessory Suspension Equipment.

“pickle” switch. Device used by Arresting Gear Officer (AGO) to activate clear deck /foul deck light.

Primary Flight Control (PriFly). Interior island space above the flight deck from which the Air Officer supervises and directs the launch, recovery, and shipboard handling of aircraft.

R

ramp. Position of aircraft during recovery as it reaches the fantail.

Reduced Arrestment Thrust System (RATS). System that reduces thrust of an aircraft upon arrestment.

S

SOX. Overhead low-pressure sodium floodlights.

SPN44. Radar system used to determine aircraft approach speed.

STRIKEDOWN. The movement of ammunition, explosives and/or aircraft from a pre-staged location on the flight deck to a location below decks.

SUSPEND. Stopping the catapult/aborting a launch prior to the FIRE button being depressed.

PREFACE

SCOPE

NATOPS manuals are issued by the authority of the Chief of Naval Operations and under the direction of the Commander, Naval Air Systems Command in conjunction with the Naval Air Training and Operating Procedures Standardization (NATOPS) program. NATOPS publications provide the best available operating instructions for most circumstances. However, no manual can cover every situation or be a substitute for sound judgment; operational situations may require modification of the procedures contained therein. Read these publications from cover to cover. It is your responsibility to have a complete knowledge of their contents.

Note

See Chapter 1 for more information on the scope and purpose of this manual, and for any special requirements or procedures that compliment those contained in this preface.

DETERMINING THE CURRENT VERSION OF THIS PUBLICATION

The current versions of NATOPS publications are listed in the NATOPS Status Report which is available online at <https://mynatec.navair.navy.mil>. Upon receiving a copy of a NATOPS, consult the NATOPS Status Report to determine its current configuration (through the latest revision, change, and interim change). Before using this publication, users shall ensure that they have the current version of it.

OBTAINING COPIES OF THIS PUBLICATION

One-Time Orders. Copies of this publication and the current changes thereto may be ordered from the Naval Logistics Library (NLL) using NLL Pub 2003, which is available online at <https://www.navsup.navy.mil/navsup>, or procured through the supply system in accordance with NAVSUP P-409 (MILSTRIP/MILSTRAP). This manual is also available in pdf format and may be viewed on, and downloaded from, the NATEC or Airworthiness websites, <https://mynatec.navair.navy.mil> or <https://airworthiness.navair.mil>, respectively.

Note

- When the current revision of a publication is ordered through NLL or NAVSUP, copies of all active changes to the publication will be forwarded along with it. The printed changes to a revision need not be ordered in addition to ordering the revision.
- An order for a publication that exceeds the maximum order quantity posted on the NLL website will be filled not to exceed the maximum order quantity. Additional orders will be required in order for an activity to receive more than the posted maximum order quantity of a publication.
- Interim changes to NATOPS publications are not stocked within the NLL or NAVSUP systems and must be obtained separately. Active interim changes to NATOPS publications are published in electronic media only and most are available online at <https://mynatec.navair.navy.mil> and <https://airworthiness.navair.navy.mil> for viewing and downloading.

Automatic Distribution. NATEC automatically sends copies of new revisions and changes to users whose NAVAIR publication requirements are maintained within its Automatic Distribution Requirements List (ADRL) database. Detailed procedures for establishing and maintaining an ADRL account are contained in NAVAIR technical manual 00-25-100 work package (WP) 017-00, which is available online at <https://mynatec.navair.navy.mil>.

Note

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- To avoid the gross cost and delivery inefficiencies that have resulted from excessive or insufficient distributions, the NATOPS Program Manager has been granted authority to adjust the automatic distribution quantities of NATOPS publications. Units requiring large or unusual distribution quantities of NATOPS publications should confirm them with the NATOPS Program Manager in advance of distribution to ensure that the quantities they will receive will be acceptable.

KEEPING THIS PUBLICATION CURRENT

To be effective, NATOPS publications must be kept current through an active manual change program. Corrections, additions to, deletions from, and suggestions for improvement of contents should be submitted as NATOPS change recommendations as soon as possible after discovery. Suggestions for improvement should avoid vague and generalized language and shall be worded as specifically as possible. Detailed standards for NATOPS publications are found in MIL-DTL-85025B(AS), which is available online at <https://airworthiness.navair.navy.mil>. Change recommendations may be submitted by anyone in accordance with OPNAVINST 3710.7-series. All users are encouraged to contribute to the currency, accuracy, and usefulness of this and other NATOPS publications by submitting timely change recommendations for these publications.

SUBMITTING CHANGE RECOMMENDATIONS

Types of Change Recommendations. Change recommendations should be submitted as URGENT, PRIORITY or ROUTINE. *Urgent and priority change recommendations are changes that cannot be allowed to wait for implementation until after the next review conference.* These usually involve safety-of-flight matters. Some PRIORITY change recommendations may be upgraded to URGENT by NATOPS Program Manager, Program Class Desk, or NAVAIR (AIR-4.0P) following receipt and initial review.

Submitting Change Recommendations to NATOPS Publications. While each type of change recommendation is processed and approved differently, the preferred means of submitting all of them is through the Airworthiness Issues Resolution System (AIRS) which may be accessed online at <https://airworthiness.navair.navy.mil>, or on SIPRNET at <https://natops.navair.navy.smil.mil> for classified or otherwise sensitive change recommendations. AIRS provides the fastest and most efficient means of processing and resolving NATOPS change recommendations. It expedites distribution of the URGENT and PRIORITY change recommendations to those who need to act on them and compiles the ROUTINE change recommendations into their respective review conference agenda packages.

In the event that a worldwide web connection to AIRS is not available, PRIORITY or URGENT change recommendations may be submitted via Naval message in accordance with NATOPS General Flight and Operating Instruction (OPNAVINST 3710.7-series). When AIRS is not accessible, ROUTINE change recommendations may be submitted on a NATOPS/Tactical Change Recommendation (Form OPNAV 3710/6), a copy of which is contained within the preface

of this manual. The completed change recommendations forms for changes to this manual should be sent by U.S. Mail to the NATOPS Program Manager of this publication at:

Commander Naval Air Force
Code N73
OIC Aircraft Handling Team
P.O. Box 357051
San Diego, CA 92135

Change recommendations of an URGENT nature (safety of flight, etc.) should be submitted directly to the Model Manager. The Model Manager will liaison with the advisory group and act accordingly. NATOPS Advisory Group member in the chain of command by priority message. The Advisory Group members for this publication are the following:

COMNAVAIRPAC (Code N73/N40C1)
(Model Manager)
COMNAVAIRLANT (Code N73/N40C1)
NAVAIRSYSCOM (4.0P/PMA251)
Naval Safety Center (11)
NAVSEA (PMS 312)

Submitting Change Recommendations to OEM publications. Submit your change recommendations to designated OEM publications through AIRS in the same manner as those to the NATOPS publications. Both routine change recommendations and urgent change recommendations will be forwarded immediately to the NATOPS Program Manager and the cognizant manufacturer.

Change Recommendations for Afloat Systems and Procedures

Submit routine change recommendations concerning afloat systems and procedures (aviation and air capable ships) to this manual's NATOPS Program Manager (address above). Send an information copy to the afloat fuel systems life-cycle manager at:

Message PLAD: NAVSURFWARCEN SHIPSYSENGSTA PHILADELPHIA PA//9234//

Address:

Life Cycle Manager
Naval Surface Warfare Center, Ship Systems Engineering Station (NSWCCD-SSES)
Code 9234
5001 South Broad Street
Philadelphia, PA 19112

Telephone:

Cml 215-897-7948

E-mail:

timothy.donnelly@navy.mil

ISSUING UPDATES TO NATOPS PUBLICATIONS

Interim Changes. Approved NATOPS urgent and priority change recommendations are issued via Naval messages and may involve making pen-and-ink entries and/or replacing pages. Copies of interim change messages and their

NAVAIR 00-80T-120

replacement pages are posted on the NATEC website at <https://www.mynatec.navair.navy.mil>, <https://airworthiness.navair.navy.mil>, or <https://airworthiness.navair.navy.smil.mil> for viewing and downloading. Interim change replacement pages are always issued in electronic format and are not distributed in paper format except under unusual circumstances. Following the incorporation of an interim change into this publication, its entry shall be recorded on the Interim Change Summary page within this publication.

Revisions, Changes and Errata. Routine change recommendations are compiled into a conference agenda and held for review at the next NATOPS review conference for this publication. Change recommendations approved by the review conference are published by the NATOPS Model Manager in a review conference report and then incorporated into a revision or change to this manual, copies of which are mailed on paper and/or electronic media to users that have a listed requirement for it in the NATEC ADRL system database. Copies of most unclassified publications are also posted on the NATEC and Airworthiness websites. When printing errors are found in publications, errata may also be prepared and posted and/or distributed in electronic or paper form in the same manner as for revisions and changes. After incorporating a change or errata into this publication, you should page check and record its entry on the Record of Changes page within this publication.

CHANGE SYMBOLS

Revised text is indicated by a black vertical line in the outer margin of the page, like the one printed next to this paragraph. The change symbol shows where there has been a change. The change might be material added or information restated. A change symbol in the margin by the chapter number and title indicates a new or completely revised chapter. Change symbols are not normally used to mark the locations of deleted information.

SPECIAL TERMINOLOGY IN NATOPS PUBLICATIONS

The following special terminology and meanings apply to the contents of this and other NATOPS publications:

Note

The meanings of these terms as used in OEM publications may be different from those as shown below.

Warnings, Cautions, and Notes. The following definitions apply to WARNINGS, CAUTIONS, and Notes:

WARNING

An operating procedure, practice, or condition, etc., that may result in injury or death, if not carefully observed or followed.

CAUTION

An operating procedure, practice, or condition, etc., that may result in damage to equipment if not carefully observed or followed.

Note

An operating procedure, practice, or condition, etc., that is essential to emphasize.

Requirement for compliance:

“**Shall**” is used only when application of a procedure is mandatory.

“**Should**” is used only when application of a procedure is recommended.

“**May**” and “**need not**” are used only when application of a procedure is optional.

“**Will**” is used only to indicate futurity, and never to indicate any degree of requirement for applicability of a procedure.

Requirement for landing aircraft:

Land immediately is self-explanatory. (Applicable to helicopters and other VTOL aircraft.)

Land as soon as possible means land at the first landing site at which a safe landing may be made.

Land as soon as practical means extended flight is not recommended. The landing and duration of flight is at the discretion of the pilot in command.

CHANGE RECOMMENDATIONS

NATOPS/TACTICAL CHANGE RECOMMENDATION
 OPNAV 3710/6 (4-90) S/N 0107-LF-009-7900

DATE _____

TO BE FILLED IN BY ORIGINATOR AND FORWARDED TO MODEL MANAGER

FROM (Originator)		Unit			
TO (Model Manager)		Unit			
Complete Name of Manual/Checklist	Revision Date	Change Date	Section/Chapter	Page	Paragraph

Recommendation (Be specific.)

CHECK IF CONTINUED ON BACK

Justification

Signature	Rank	Title
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Address of Unit or Command

TO BE FILLED IN BY MODEL MANAGER (Return to Originator)

FROM	DATE
------	------

TO

REFERENCE

(a) Your Change Recommendation Dated _____

Your change recommendation dated _____ is acknowledged. It will be held for action of the review conference planned for _____ to be held at _____

Your change recommendation is reclassified URGENT and forwarded for approval to _____ by my DTG _____

/S/ _____ MODEL MANAGER	_____ AIRCRAFT
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CHAPTER 1

Introduction

1.1 PURPOSE

This manual provides organizational relationships, responsibilities, requirements and procedures for aircraft and related support operations aboard CVN ships. Areas of operations addressed include:

1. Control and monitoring of aircraft aboard and in the ship's VFR launch, recovery and starboard holding patterns.
2. Movement and placement of aircraft on the flight deck, on aircraft elevators, and on the hangar deck.
3. Launch and recovery of aircraft.
4. Aircraft crash and salvage, fire fighting, and rescue.
5. Fueling, loading, and maintenance of aircraft.
6. Aircraft security, both during and after flight quarters.

1.2 MISSION

The primary mission of the Air Department is to safely and expeditiously execute the air plan. Through rapid launch and recovery evolutions, flight deck crews respot to facilitate refueling and aircraft maintenance in preparation for the next launch. Maintaining qualified operators, in sufficient numbers, to accomplish these and other missions including crash and salvage operations, equipment repairs, and all postflight quarters night requirements are included.

1.3 SCOPE

The responsibilities, requirements and procedures contained in this manual apply to all persons who work on or transit the flight and hangar decks of CVN ships. These include:

1. Air department personnel, V-1 to V-5 divisions.
2. Air Wing and squadron personnel, including aircrews; LSOs; aircraft handling personnel; aircraft maintenance, servicing, and repair personnel; weapons loading and arming personnel; and mission support personnel.
3. Ship's company personnel, including aviation ordnance and weapons personnel, members of working parties, and other personnel transiting the flight and hangar deck areas during the course of daily operations.
4. Civil Service and contract personnel, including aircraft maintenance, servicing, repair, weapons loading and arming personnel, and any support personnel.

All persons who work or venture onto the aircraft elevators, flight deck, and/or hangar deck shall be familiar with the general safety precautions and procedures contained in this manual. In addition, Air Department, Air Wing, squadron, and ship's company personnel with responsibilities for the operation and support of aircraft should be thoroughly familiar with the detailed requirements and procedures pertinent to their own responsibilities contained within this and the "Other Relevant Publications" listed below.

1.4 ORGANIZATION OF THIS PUBLICATION

Information and procedures for handling, launching, recovering, fueling, operational support, and security of aircraft aboard ship are presented in the chapters of this manual. Flight and hangar deck general safety, aircraft security and flight quarters checklists, a standard launch and recovery briefing outline, an NVG training syllabus, fuel sample and equipment report logs, and a maintenance spot request sheet are attached as appendices to this manual. The publications listed below complement this manual and shall be referred to for more detailed information about the subjects they address.

1.5 OTHER RELEVANT PUBLICATIONS

The following publications complement the information contained within this NATOPS manual and should be referred to whenever additional information about their subjects is needed:

NAVAIR 00-80R-14 — NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual. Contains detailed requirements and procedures for rescue and firefighting personnel.

NAVAIR 00-80R-14-1 — NATOPS U.S. Navy Aircraft Emergency Rescue Information Manual. Contains detailed information and procedures for individual T/M/S aircraft, onboard equipment and hazards for use by rescue, firefighting, and crash and salvage personnel.

NAVAIR 00-80R-19 — NATOPS U.S. Navy Aircraft Crash and Salvage Operations Manual (Afloat). Contains detailed information and procedures for the handling and disposition of aircraft that cannot be taxied, towed, or moved normally.

NAVAIR 00-80T-104 — NATOPS Landing Signals Officer (LSO) Manual. Contains detailed information and procedures on use of OLA equipment and control of aircraft for LSOs.

NAVAIR 00-80T-105 — CV NATOPS Manual. Contains detailed information and procedures for support and control of aircraft for use by aircrews, and tower (PriFly) personnel.

NAVAIR 00-80T-109 — Aircraft Refueling NATOPS Manual. Contains detailed information and procedures for handling of aviation fuels from delivery to CVN through dispensing into aircraft.

NAVAIR 00-80T-113 — Aircraft Signals NATOPS Manual. Contains standard hand, wand, light, and beacon signals for control, communication and use among aircraft; tower (PriFly); aircraft launch, recovery and handling personnel; and ground support personnel.

NAVAIR 00-80T-121 — Chemical, Biological, Radiological, and Nuclear Defense NATOPS Manual. Contains detailed information and procedures for protecting aircrews and decontaminating aircraft, aircrew and support personnel exposed to chemical, biological, radiological and nuclear agents.

COMNAVAIRFORINST 3500.20 series — Aircraft Carrier Training and Readiness Manual. Contains readiness standards and training requirements for Atlantic and Pacific Fleet aircraft carriers.

1.6 RESPONSIBILITIES FOR THIS PUBLICATION

Responsibilities for the contents and currency of this manual are assigned below. NATOPS Program relationships, responsibilities and procedures to be followed are contained in OPNAVINST 3710.7 series. Assigned personnel shall carry out their duties as specified therein.

1.6.1 NATOPS Advisory Group

NATOPS Advisory Group members assist the NATOPS Program Administrator in determining NATOPS policy and are responsible to COMNAVAIRFOR for ensuring its effective implementation within their commands. The following are members of the NATOPS Advisory Group for this manual:

Advisory Group Member	Representative(s)
Commander, Naval Air Forces	COMNAVAIRFOR (N73/N455)
Commander Naval Air Forces, Atlantic	COMNAVAIRLANT (N73/N40C1)
Commander, Naval Air Forces Pacific	COMNAVAIRPAC (N73/N40C1)
Commander, Naval Air Systems Command	COMNAVAIRSYSCOM (AIR 4.0P/PMA251)
Commander, Naval Safety Center	COMNAVSAFECEN (11)
Commander, Naval Sea Systems Command	NAVSEA (PMS 312)

1.6.2 NATOPS Cognizant Command

COMNAVAIRFOR is assigned as the NATOPS Cognizant Command responsible for the contents and maintenance of this manual.

1.6.3 NATOPS Model Manager

The NATOPS Model Manager, as listed in the Preface of this publication and the NATOPS Status Report, is responsible for the currency of this manual.

1.6.4 NATOPS Program Manager

The NATOPS Program Manager of this manual is responsible to the NATOPS Model Manager for carrying out specific administrative duties and acting as the NATOPS Model Manager's single point-of-contact for all NATOPS-related issues. Assignment of and contact information for the NATOPS Program Manager is contained in the NATOPS Status Report on the Airworthiness website, <https://airworthiness.navair.navy.mil>.

1.7 SHIP'S DUTIES AND RESPONSIBILITIES

The titles, duties and responsibilities for key flight and hangar deck personnel responsible for the handling and support of aircraft onboard CVN ships are as follows:

1.7.1 Air Officer

The Air Officer is directly responsible for all operational, training, administrative, watch, and equipment repair functions within the Air Department. He is further responsible for determining the case launch and/or recovery, the visual control of all aircraft operating in the carrier control zone, carrier control zone clearing authority and all other duties specified in NAVAIR 00-80T-105 (CV NATOPS) related to air operations.

1.7.2 Assistant Air Officer

The Assistant Air Officer aids the Air Officer in ensuring that the plans, orders, and instructions of the Air Officer are carried out. He acts as Assistant Department Head. He also functions as the Air Department Training Coordinator.

1.7.3 Primary Flight Arresting Gear Controller

The member of the recovery crew stationed in Primary Flight Control (PriFly) who shall ensure all stations are properly manned prior to recovery operations. He informs the Arresting Gear Engine Operators of the required weight setting for the recovery and monitors the proper setting on the crosscheck systems. He checks and reports proper gear and lens settings directly to the Air Officer during recovery operations.

1.7.4 Improved Fresnel Lens Console Operator

The member of the recovery crew stationed in PriFly who shall make the proper lens settings and monitor the lens system for proper operation during the recovery.

1.7.5 Aircraft Handling Officer

The Aircraft Handling Officer, under the Air Officer as the principal assistant ensures the ship is capable of meeting all mission requirements related to flight and hangar deck air operations, and in many instances, other departmental requirements as well. He regulates the number of aircraft on the flight and hangar deck to execute all evolutions including cyclic operations, carrier qualifications, vertical and conventional replenishment, and alert postures. He serves as the Team Leader of the Air Department Training Team and monitors the Air Wing Watch Coordinator in training personnel for the Aircraft Integrity Watch.

1.7.6 Night Aircraft Handling Officer (NACHO)

The Night Aircraft Handling Officer is the Aircraft Handling Officers' designated representative and is responsible for the respot of aircraft and equipment maintenance, elevator traffic, alongside or vertical replenishment evolutions, and the execution of Aircraft Handling Officer's night orders.

1.7.7 Flight Deck Officer

The Flight Deck Officer is responsible for the safe and efficient movement of aircraft on the flight deck, aircraft security and flight deck cleanliness. The Flight Deck Officer is responsible for the training and administration of V-1 Division as well as the overall material condition of all divisional spaces both internal and external. Shall be responsible to the ACHO in ensuring the execution of the flight plan.

1.7.8 Assistant Flight Deck Officer

Assistant Flight Deck Officer is responsible to the Flight Deck Officer for administrative and training responsibilities related to V-1 Division.

1.7.9 Aircraft Crash and Salvage Officer (Air Boatswain)

The Aircraft Crash and Salvage Officer is responsible to the ACHO for supervising Crash and Salvage personnel and fire parties in handling aircraft emergencies during flight and general quarters, and for ensuring the readiness of assigned personnel, firefighting, and salvage equipment. He is also responsible for the overall training of Air Department and Air Wing personnel in aircraft firefighting and crash and salvage operations.

1.7.10 Catapult and Arresting Gear Officer (V-2 Division Officer)

The Catapult and Arresting Gear Officer is responsible for the safe and efficient operation of the ship's Aircraft Launch and Recovery Equipment (ALRE). The Catapult and Arresting Gear Officer is responsible to the Air Officer via the ACHO for the operation, maintenance, and readiness of the launching and recovery systems. He is overall responsible for the operation and upkeep of the catapults, arresting gear, and visual landing aids.

The Catapult and Arresting Gear Officer is responsible for the overall training of V-2 Division and the training of prospective Catapult and Arresting Gear Officers. He shall ensure that a complete, comprehensive, and vigorous training program is implemented.

In addition he shall:

1. Ensure that a complete up-to-date file of all applicable aircraft launch and recovery bulletins is maintained. Ensure that current launch and recovery bulletins are maintained at appropriate launch and recovery watch stations. Review and update list of launch and recovery bulletins in effect upon receipt of quarterly 0-11 bulletin.
2. Ensure that necessary operational reports and logs are maintained and submitted in accordance with current directives.
3. Ensure that all predeployment procedures, found in [Chapter 3](#), are carried out.
4. Ensure that all launch and recovery procedures are standard and in accordance with this manual and in compliance with all safety precautions and directives.

1.7.11 Assistant Catapult and Arresting Gear Officers (Branch Officer)

The V-2 Division is normally divided into three main operational branches with assistant Catapult and Arresting Gear Officers serving as branch heads. These are the Bow Catapult Officer, Waist Catapult Officer, and the Arresting Gear Officer.

The V-2 Division Branch Officers are responsible to the Catapult and Arresting Gear Officer for the maintenance and readiness of the equipment under their cognizance. In addition, they are responsible for the training of their units' crews. They shall ensure that a complete and comprehensive training program is carried out and that all personnel responsible for operating any portion of the units' equipment are completely familiar with their assigned tasks. Furthermore, they shall ensure that only PQS qualified and designated personnel are assigned to operate launch/recovery stations.

In addition they shall ensure:

1. That the pre- and post-operational checks are properly conducted in accordance with the Planned Maintenance System (PMS), and Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP).
2. That all safety precautions are posted and personnel are familiar with and comply with these precautions.
3. That all personnel are familiar with firefighting and damage control procedures.
4. That a current file of Aircraft Launch/Recovery Bulletins is maintained and updated for use at all applicable stations.
5. That all personnel are familiar with the appropriate portions of this manual and NAVAIR operating manuals.
6. That a record of all launch/recovery information is maintained and that reports and records are prepared in accordance with the Aircraft Launch and Recovery Equipment Maintenance Program (ALREMP) OPNAVINST 4790.15 for submission by the Catapult and Arresting Gear Officer.

1.7.11.1 Catapult Officer (Launching Officer)

The Catapult Officer (Launching Officer) is directly responsible to the Air Officer via the ACHO for the safe and efficient operation of the launch equipment, and for the performance of the crew during launch operations. He has the ultimate responsibility for safety in the launching of all aircraft from the catapults. He shall be thoroughly familiar with the applicable Aircraft Launching Bulletins, Deck Gear Accessories Bulletins, and CV NATOPS Manual NAVAIR 00-80T-105. In addition, he shall be thoroughly familiar with this manual and shall ensure that all launch procedures are conducted in accordance with this manual and applicable NAVAIR operating instructions. The Launching Officer shall ensure strict compliance with all operational safety precautions.

The Catapult Officer (Launching Officer) shall be a commissioned officer, properly trained and fully qualified to perform this function. Detailed duties and responsibilities are in appropriate sections of this manual.

1.7.11.1.1 Catapult Crew

During launch operations, the Catapult Crew is responsible to the Catapult Officer for the safe and efficient actions required of their stations. They shall be thoroughly familiar and comply with the applicable operating procedures and safety precautions contained in this manual and NAVAIR operating instructions.

1.7.12 Catapult Safety Observer (ICCS)

The direct representative of the Launching Officer who is responsible for ensuring proper launching procedures and safety precautions.

1.7.13 Topside Safety Petty Officer (TSPO)

Ensures proper installation of holdbacks, repeatable release assemblies, and the mandatory seating of aircraft launch bar within the shuttle spreader. The TSPO shall be the last man to exit from underneath the aircraft.

NAVAIR 00-80T-120

1.7.14 Holdback Man

Properly installs holdbacks and repeatable release assemblies. Properly installs tension bars, holdback assemblies, and verifies correct positioning.

1.7.14.1 Arresting Gear Officer (Recovery Officer)

The Arresting Gear Officer (Recovery Officer) is responsible to the Air Officer via the ACHO for the safe and efficient operation of the recovery equipment and crew during recovery operations. He shall be thoroughly familiar with installed recovery equipment, the applicable Aircraft Recovery Bulletins and the CV NATOPS, and the applicable portions of this manual and shall maintain a complete file of the current Aircraft Recovery Bulletins, CV NATOPS, and NAVAIR operating instructions. The Arresting Gear Officer shall ensure strict compliance with all operational safety precautions.

The Arresting Gear Officer (Recovery Officer) shall be a commissioned officer, properly trained and fully qualified to perform this function. Detailed duties and responsibilities are in appropriate sections of this manual.

1.7.14.1.1 Arresting Gear Crew

During recovery operations, the Arresting Gear Crew is responsible to the AGO for the safe and efficient actions required of their stations. They shall be thoroughly familiar with, and comply with, the applicable operating procedures and safety precautions contained in this manual and NAVAIR operating instructions.

1.7.15 Aircraft Launch and Recovery Equipment (ALRE) Maintenance Officer

The ALRE Maintenance Officer, under the direction of the Catapult and Arresting Gear Officer, is responsible for the proper maintenance operations and upkeep of assigned ALRE equipment, in accordance with OPNAVINST 4790.15 series and NAVAIR Technical Manuals. The ALRE Maintenance Officer or designated representative shall inform the Air Boss/ACHO on the current status of all ALRE equipment.

1.7.15.1 Visual Landing Aids Crew

During air operations, the Visual Landing Aids Crew is responsible directly to the Aircraft Launch and Recovery Equipment (ALRE) Maintenance Officer for the safe and efficient operation of the VLA equipment.

1.7.16 Hangar Deck Officer (V-3 Division Officer)

The Hangar Deck Officer is responsible to the ACHO for the safe, efficient movement of aircraft and overall maintenance of the hangar deck, training of personnel, readiness of damage control and aircraft handling support equipment.

1.7.17 Aviation Fuels Officer (V-4 Division Officer)

The Aviation Fuels Officer is responsible for administrative functions and training of all aviation fuels personnel.

1.7.18 Aviation Fuels Maintenance Officer

The Aviation Fuels Maintenance Officer is responsible for the overall operation and maintenance of the aviation fuels system and its associated equipment, fueling and de-fueling of embarked aircraft, the catapult lubricating oil system, and the Automotive Gas (MOGAS) stowage system. The Aviation Fuels Maintenance Officer is the assistant V-4 Division Officer. The Aviation Fuels Maintenance Officer or designated representative shall inform the Air Boss/ACHO on the current status of all aviation fuels equipment.

1.7.19 Carrier Air Wing Maintenance Officer

The Carrier Air Wing Maintenance Officer (CAGMO) exercises overall supervision of the air wing maintenance representatives in flight deck control, squadron flight deck coordinators, aircraft maintainers, troubleshooters, and plane captains. He shall coordinate with the ACHO for all aircraft maintenance and spotting requests.

1.7.20 Carrier Air Wing Ordnance Officer (CAG Gunner)

The Carrier Air Wing Ordnance Officer (CAG Gunner) exercises overall supervision of the air wing arming/de-arming crew and squadron aviation ordnance officers and their ordnance crews.

1.7.21 Air Gunner

The Air Gunner exercises overall supervision of the flight deck ordnance crew and the issue/disposition of all ordnance on the flight deck/bomb farm area.

1.7.22 Air Transfer Officer

The Air Transfer Officer (ATO) is responsible to the Air Boss, Air Operations Officer, and the ACHO for the safe and orderly flow of passengers, mail, and cargo.

1.7.23 PriFly Squadron Representative

Squadrons shall provide qualified PriFly representatives for all Case I and II launches and recoveries. Squadron representatives shall be fully familiar with all aspects of aircraft emergencies and shall be authorized to recommend appropriate corrective action in the event of aircraft emergencies. Squadron representatives shall be present in Primary prior to commencement of the scheduled launch/recovery sequence, and have current NATOPS manuals for type aircraft immediately available.

1.7.24 Landing Signal Officer (LSO)

The senior air wing LSO shall control the number, qualifications, and scheduling of air wing LSOs. The duty LSO(s) shall keep PriFly informed of their location and phone number at all times during their period of duty. PriFly in turn shall locate and inform the duty LSO when he is needed on the platform for other than scheduled/prescribed recoveries.

The LSO controls the brilliance of the optical landing system lights, with PriFly as backup control. The LSO shall monitor wind-over-deck, deck lighting, including floodlights and other items affecting recovery of aircraft, and shall advise PriFly of any discrepancies or recommendations. The number of personnel on the LSO platform should be limited to six, with additional personnel as designated by the Senior LSO during carrier qualification evolutions. All personnel on the LSO platform shall be in the appropriate flight deck uniform per [Chapter 3](#) of this NATOPS Manual. LSO specific responsibilities are delineated in the LSO NATOPS Manual (NAVAIR 00-80T-104).

1.8 YOUR RESPONSIBILITIES

The role of an aircraft carrier is to operate aircraft in support of naval operations. And, since aircraft operations are inherently dangerous, the flight and hangar decks of aircraft carriers are two of the most dangerous places aboard an aircraft carrier.

1.8.1 Watch Out For Yourself

If your work is on the flight or hangar deck or in related spaces, your inherent responsibility is to maintain a situational awareness of the dangers and risks that surround you and to avoid unnecessary exposure to them.

1.8.2 Watch Out For Others

The convenient access provided to flight and hangar decks and related spaces allow unwary personnel easy access into harms way. When those not familiar with flight and hangar deck operations transit or wander into these areas, ask them to leave the area immediately, or escort them via a safe route to a space from which they can be properly directed or led to their destinations.

1.8.3 Continuing Review Of Practices

This manual provides the best available operating instructions for most circumstances. However, no manual can cover every situation or be a substitute for sound judgment. Operational situations can easily generate real hazards and severe consequences can result when mishaps occur. Personnel shall be continually alert for existing and potential hazards and shall exercise the best practices of risk management during aircraft operations.

CHAPTER 2

Security of Aircraft and Equipment

2.1 GENERAL

Conditions of heavy weather or ship maneuvers that may cause deck pitch or roll, high winds, or heavy seas may be encountered at any time. Aircraft that are not expected to be moved and all aircraft/weapons handling equipment that are left unattended shall be properly secured prior to leaving port and at all times while at sea. Failure to properly secure all aircraft, gear, and equipment may result in damage to aircraft or equipment, or injury to personnel.

2.2 RESPONSIBILITY FOR SECURITY

Responsibility for the security of embarked aircraft and equipment rests with the Air Officer. In discharging this responsibility, the Air Officer is aided by the Aircraft Handling Officer. The Aircraft Handling Officer provides direct oversight for aircraft/equipment security issues and modifies aircraft tiedown requirements based on weather and sea state conditions. He is aided by the Flight and Hangar Deck Officers. These officers ensure security of aircraft and equipment is maintained at all times by conducting frequent inspections of all assigned areas. During heavy weather conditions, more frequent inspections shall be conducted. Further, these officers will ensure Daily Secure Checklists ([Appendix A](#)) are completed as required. They will be keenly aware of FOD/LIQUID FOD at all times and maintain the strictest conditions of cleanliness.

The Officer On The Deck (OOD) shall notify Air Officer and Aircraft Handling Officer of unexpected or unusually heavy weather conditions that may affect aircraft security. The ship's Meteorological Officer shall provide daily weather forecasts to the Aircraft Handling Officer when underway and to the Integrity Watch Officer when in port/at anchor when aircraft are embarked.

The Air Wing Maintenance Officer (CAGMO) shall assist the Aircraft Handling Officer by ensuring that the squadrons/detachments comply with the provisions of this chapter.

2.3 AIRCRAFT INTEGRITY WATCH

2.3.1 General

At all times when aircraft are embarked (except when the ship is at flight quarters or general quarters) the Aircraft Integrity Watch shall be posted upon the completion of flight operations or at the discretion of the Aircraft Handling Officer.

2.3.2 Basic Function

The Aircraft Integrity Watch shall be responsible to the Aircraft Handling Officer when flight operations are secure at sea, and to the Officer of the Deck (OOD) while in port or at anchor for the security of all aircraft and equipment on the flight and hangar decks.

2.3.3 Composition

The Aircraft Integrity Watch comprises:

WATCH OR DUTY REQ	PERS REQ	PROVIDED BY
Integrity Watch Officer (IWO)/Night Handler	1	Air Wing/Air Department
Integrity Watch Petty Officer (IWPO)	1	Air Wing
Flight Deck Security Patrol	2	Air Wing
Hangar Deck Security Patrol	2	Air Wing
Integrity Watch Messenger	1	V-1 Division
Catapult Steam Watch	2*	V-2 Division
Conflagration Watches	2/3**	V-3 Division
PriFly Security Watch	1	Air Office
* When Catapult is Hot.		
** One watch per bay.		

2.3.4 Equipment

1. Air Department and CAG shall provide their own integrity watch gear to all watchstanders.
2. While on watch, each roving security patrol shall wear a properly configured white flotation (life) vest. It shall be stenciled front and rear with large black letters "IW." Survival equipment (flotation vest, cranial, etc.) shall be provided for the IWO and IWPO to don in the course of their routine flight deck inspections. IW team members shall not venture onto the flight deck without properly maintained survival equipment.
3. The flight and hangar deck integrity watch, and catapult steam watches shall be equipped with flashlights. Foul weather gear shall be provided for watches exposed to the elements during inclement weather.
4. An Integrity Watch Officer's Logbook, Pass Down Logbook (PDL), night order log, equipment accountability log, and instruction/reference binder and publications shall be provided by the ACHO.

2.3.5 Training

The Air Wing Watch Coordinator shall coordinate the formal training of the Integrity Watchstanders. All IW team members shall receive training/briefings prior to standing watches. This training shall be per current PQS Series (NAVEDTRA 43475 Series) and shall include, but is not limited to, the following items:

1. Watch organization and responsibility.
2. Chain of command, reports, inspections, logs, etc.
3. Aircraft and equipment security (e.g., tiedowns, chocks, configuration).
4. Deck cleanliness (e.g., leaks, spillage, washing).
5. Firefighting/damage control (e.g., steam smothering, AFFF and saltwater hoses, mobile equipment, fixed firefighting system).
6. Heavy/adverse weather precautions/safeguards.
7. Aircraft maintenance support (e.g., turn-ups, configuration changes, moves).
8. Elevator operations.

9. Special evolutions (e.g., visiting, picnics, sporting events).
10. Communications equipment/methods.
11. Safety considerations.
12. Other (whip antennae, points of contact, etc.).

2.3.6 Guidelines

The following guidelines shall govern the conduct and functioning of Integrity Watchstanders.

1. All watchstanders shall be familiar with tiedown requirements, turn-up requirements, and any other specific governing factors that deal with the situation at hand. All pertinent instructions and publications shall be consulted before undertaking or approving a nonstandard or unfamiliar evolution.
2. The usage, purpose, and functioning of all available communications equipment shall be thoroughly understood by all members of the watch team. Specifics shall be covered during the mandatory ACHO briefing given prior to qualification for watchstanding.
3. Maintenance and enforcement of superb deck cleanliness, FOD-free environment, security of aircraft and equipment, and safety of all hands are primary responsibilities of Integrity Watches.
4. Watches shall be stood in a professional, military manner. Complete attention to the job at hand is required; therefore, no reading materials shall be permitted at the watch station during the course of the watch.
5. Appropriate logs shall be maintained in an accurate and traditional manner.
6. Information passed to Flight Deck Control, such as air plan changes, or changes to alert status, shall be entered in the PDL and the ACHO immediately notified.
7. Integrity watchstanders are a crucial link in the ship's security network. Watches shall challenge all personnel in civilian clothes who are not recognized and have no visitor badges or are unescorted.

2.3.7 Integrity Watch Stations

2.3.7.1 Integrity Watch Officer (IWO)

The Integrity Watch Officer shall be a PQS qualified officer (NAVEDTRA 43475 Series) from an embarked squadron. He shall relieve the Aircraft Handling Officer (ACHO) or his representative upon entering port, anchoring or at the ACHO's discretion. The Integrity Watch Officer reports to the Officer of the Deck (OOD) for the security of aircraft and equipment while in port or at anchor.

Note

When at sea the ACHO may designate an Air Department representative as the IWO.

2.3.7.2 Integrity Watch Petty Officer

The Integrity Watch Petty Officer shall be PQS qualified (NAVEDTRA 43475 Series) and shall be responsible for the supervision of the Aircraft Integrity Watch Team. He will receive reports from all watches hourly (fifteen minutes prior to the hour), and notify the IWO of the condition of the watch.

2.3.7.3 Flight and Hangar Deck Security Patrols

These watches shall be PQS qualified (NAVEDTRA 43475 Series) and will be responsible for the physical security of all aircraft and equipment on the flight and hangar decks. They will pay particular attention to tiedown chain requirements, intake and exhaust covers, open canopies, hydraulic/fuel leaks, catapult troughs (for possible fire), and FOD/Liquid FOD. They will report these conditions to the Integrity Watch Petty Officer hourly (15 minutes prior to the hour). Patrols will work as two man teams.

2.3.7.4 Integrity Watch Messenger

Personnel from V-1 Division shall stand Integrity Watch Messenger. He will be available to the IWO and IWPO to perform such duties as may be assigned and must be PQS qualified as a Flight/Hangar Deck Phone Talker (NAVEDTRA 43426-1 Series).

1. Be available to the Integrity Watch Officer to perform such duties as the watch officer may assign.
2. In the absence of the IWO and IWPO, remain in flight deck control to handle communications.

2.3.7.5 Aviation Fuels Security Watch

The Aviation Fuels Security Watch shall be stood by V-4 Division personnel under the supervision of the Duty AVFUELS Petty Officer and in accordance with [Chapter 8](#) of this NATOPS Manual.

2.3.7.6 Catapult Steam Watch

The catapult steam watches shall be stood by V-2 Division personnel, qualified in accordance with NAVEDTRA 43426-5 series PQS (one watch for bow and one watch for waist catapults). These watches shall be stood in accordance with [Chapter 4](#) of this NATOPS manual.

2.3.7.7 Conflagration Station Watch

Each conflagration watch shall be stood by PQS qualified (NAVEDTRA 43426-1 series) personnel from V-3 Division. Conflag watches will make their reports to one designated conflag station, and that station will report the security condition of the Hangar Bay to the Integrity Watch Petty Officer fifteen minutes before the hour.

2.3.7.8 PriFly Security Watch

The PriFly Security Watch shall be stood by fully PQS-qualified personnel (NAVEDTRA 43426-2 Series) from V0/V5 Division who shall be responsible to the IWO. Watch duties include the following:

1. Reporting completion of watch turnover or assumption of the watch to the IWO.
2. Making hourly reports 15 minutes prior to the hour to the IWO.
3. Permitting no unauthorized personnel in PriFly.
4. Maintaining a visual watch with particular emphasis on security, safety, and fire potential.
5. Being thoroughly familiar with the operation procedures pertaining to all controls, systems, and circuits located within PriFly.
6. Being prepared to provide proper and timely use of remotely controlled installed AFFF systems as needed.
7. Operating flight deck lighting and communication systems as directed.

2.3.8 Other Responsibilities

2.3.8.1 The Aircraft Handling Officer (ACHO)

The ACHO is responsible to the Air Officer for the overall training of Air Department personnel with regard to the Integrity Watch duties. He, or his direct representative, shall review the Integrity Watch Log daily and shall take action as required to correct any problem areas or discrepancies noted therein. He also shall assist in the training of air wing personnel by providing a brief in all areas of Integrity Watch procedures, responsibilities, and equipment. When not embarked afloat, the Air Wing Watch Coordinator may delegate this brief to a qualified airwing watchstander.

2.3.8.2 Air Wing Watch Coordinator

An Air Wing Watch Coordinator shall be assigned by the Air Wing Commander and shall be directly responsible for the coordination of training and assignment of qualified Integrity Watch personnel from the air wing. The Watch Coordinator shall maintain close liaison with the Aircraft Handling Officer in matters relating to the Integrity Watch.

The Air Wing Watch Coordinator is responsible for establishing a schedule of training lectures for all air wing watch personnel requiring indoctrination/qualification in watch procedures and responsibilities.

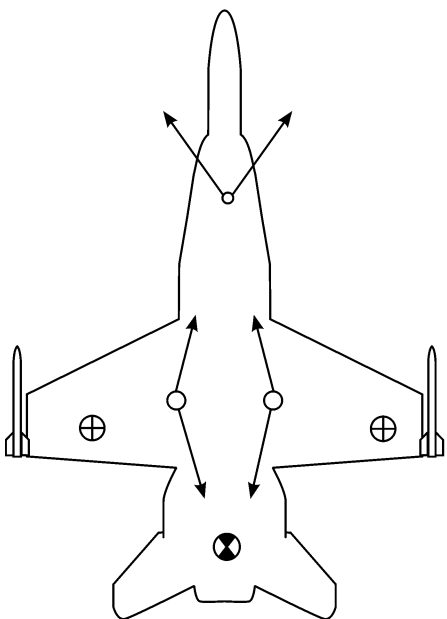
2.4 AIRCRAFT SECURITY

1. Aircraft shall be tied down as directed by the ACHO or his representative. Chains shall be maintained in good condition, and any damaged or incomplete chain assemblies shall not be used.
2. Tiedowns shall be arranged to provide an even restraint in all directions and against twisting movements. (See [Figure 2-1](#), Tiedown Restraint.) If the required number of tiedown points cannot be established due to the availability of padeyes, then the existing tiedowns may be doubled to give the required total if adequate directional distribution can be maintained. Doubling may be accomplished by utilizing the first hook to oversize chain link of the second tiedown assembly. Use of two tensioning devices is not acceptable.
3. Tiedowns shall be installed only on approved padeyes and approved aircraft attachment points. Tiedowns shall not chafe against hydraulic or electrical lines, or against the aircraft skin. They shall not be attached to scuppers, coaming, elevators, holdback cleats, or catapults. The proper way to install the tiedown is shown in [Figure 2-2](#).
4. Tiedown requirements are divided into four categories as defined by the following:
 - a. Initial Tiedown. This condition of aircraft security exists immediately prior to aircraft movement from spot and immediately after aircraft is parked. With the ACHO's approval, aircraft scheduled for "launch" on any given cyclic or CARQUALS events, with the exception of "spare" aircraft, shall be on initial tiedowns. Initial tiedowns installation after recovery or re-spot is the responsibility of the plane handling crew. As a minimum, initial tiedowns are required for all refueling operations.
 - b. Intermediate Tiedown. This condition of aircraft security shall exist during flight quarters. Aircraft that are not scheduled for launch on any given cyclic or CARQUALS events shall be on intermediate tiedowns. Intermediate tiedown installation is the responsibility of the plane captain.
 - c. Permanent Tiedown. This condition of aircraft security is required when not at flight quarters or when the aircraft is not expected to fly or be re-spotted. Aircraft parked on the hangar bay shall be on permanent tiedowns.
 - d. Heavy Weather Tiedown. This condition of aircraft security is required upon the determination of the Aircraft Handling Officer.

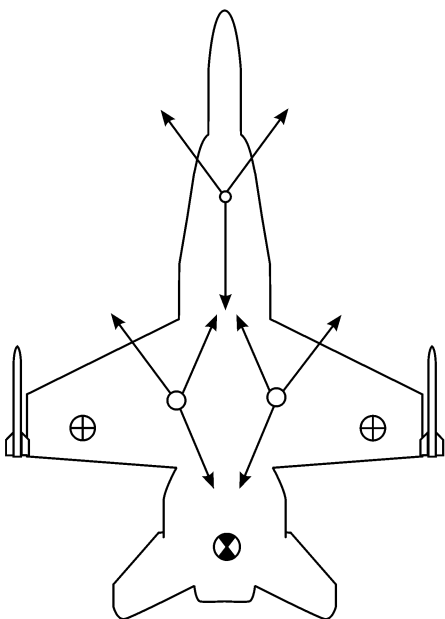
F/A-18
A-D

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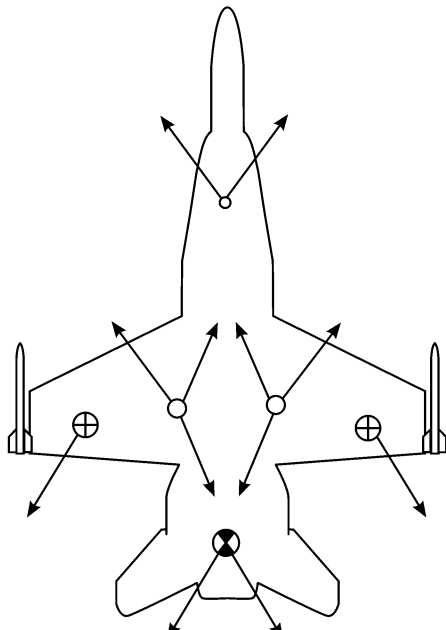
- OPTIONAL
- ⊕ WING TIEDOWN
- ⊗ AFT FUSELAGE TIEDOWN
- ⌘ MID FUSELAGE TIEDOWN



INITIAL (6 PT)



INTERMEDIATE (9 PT)



PERMANENT (12 PT)

Figure 2-1. Tiedown Restraint (Sheet 1 of 8)

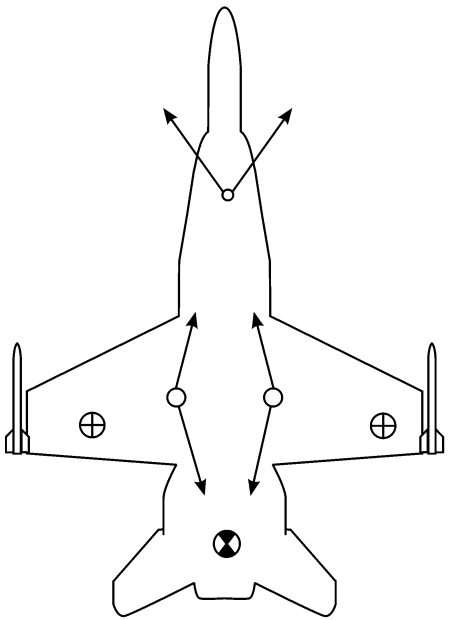
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----- OPTIONAL

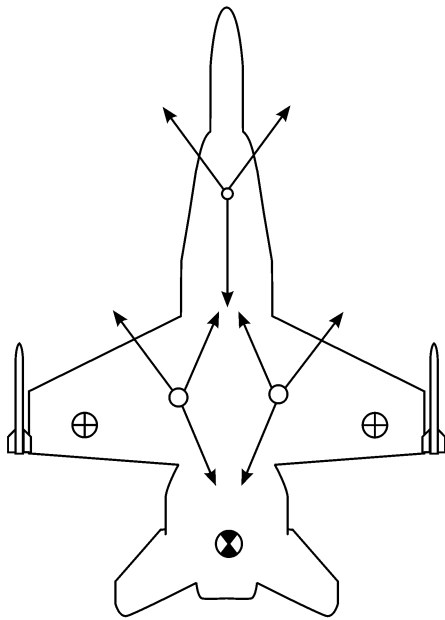
⊕ WING TIEDOWN

⊗ AFT FUSELAGE TIEDOWN

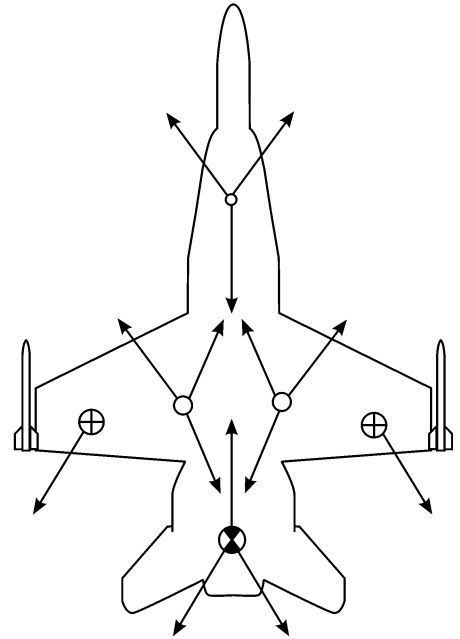
⌘ MID FUSELAGE TIEDOWN



INITIAL (6 PT)



INTERMEDIATE (9 PT)



PERMANENT (14 PT)

Figure 2-1. Tiedown Restraint (Sheet 2)

E-2

NOTES

----- OPTIONAL

⊗ AFT FUSELAGE TIEDOWN

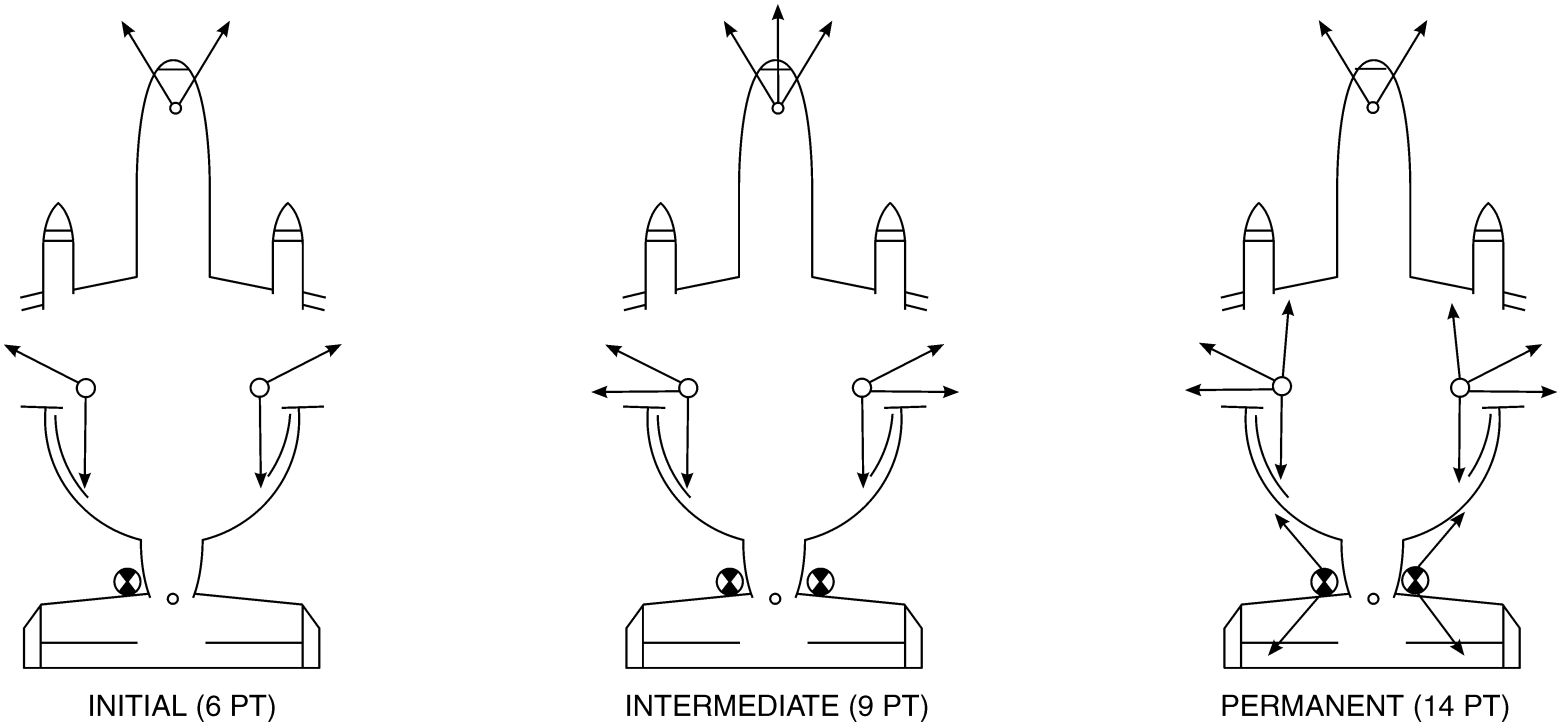


Figure 2-1. Tiedown Restraint (Sheet 3)

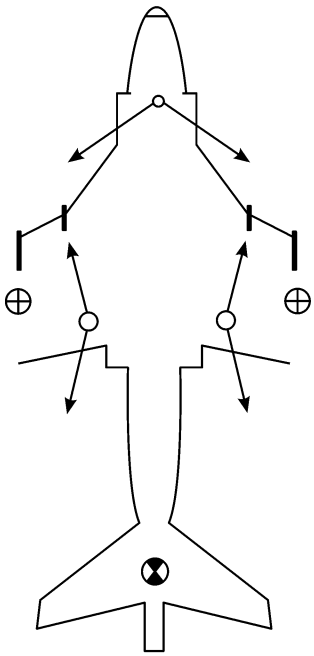
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----- OPTIONAL

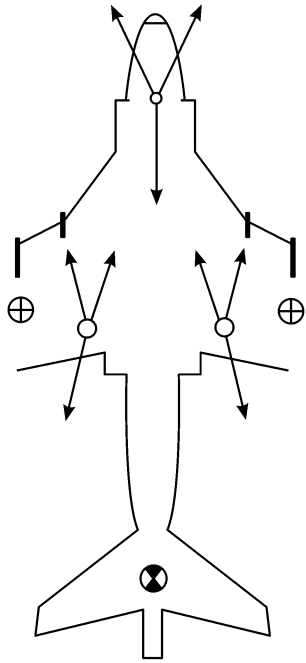
⊕ WING TIEDOWN

⊗ AFT FUSELAGE TIEDOWN

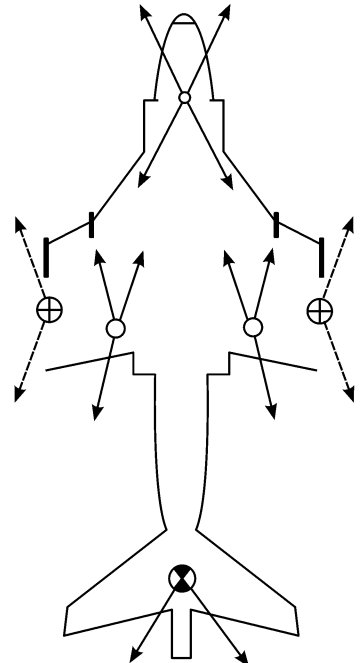
○ WING FOLD RING ATTACHMENT FITTING



INITIAL (6 PT)



INTERMEDIATE (9 PT)



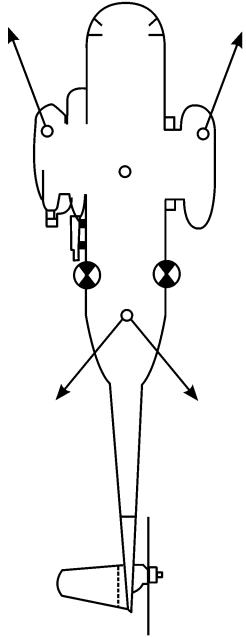
PERMANENT (12 PT)

Figure 2-1. Tiedown Restraint (Sheet 4)

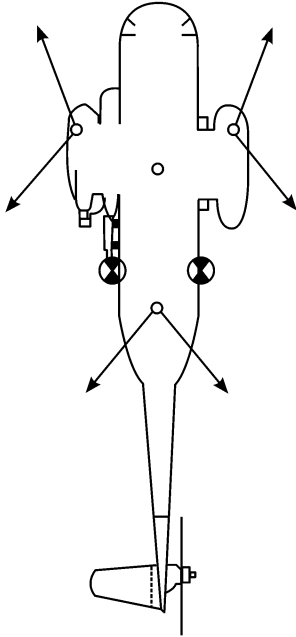
H-3

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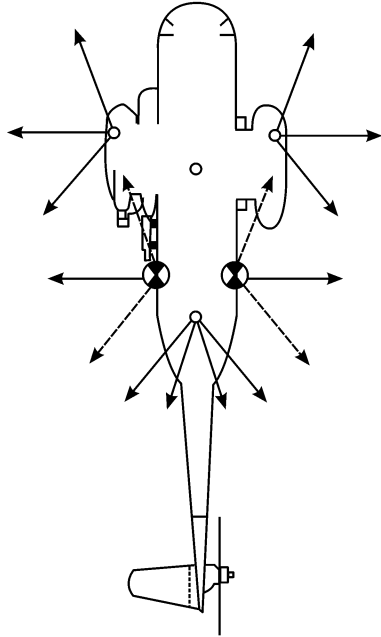
- OPTIONAL
- ⊗ AFT FUSELAGE TIEDOWN



INITIAL (4 PT)



INTERMEDIATE (6 PT)



PERMANENT (12 PT)

Figure 2-1. Tiedown Restraint (Sheet 5)

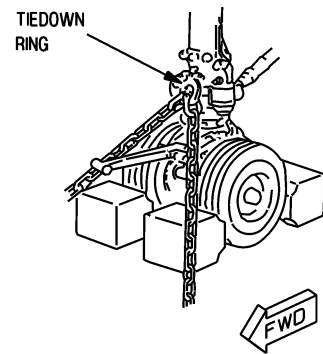
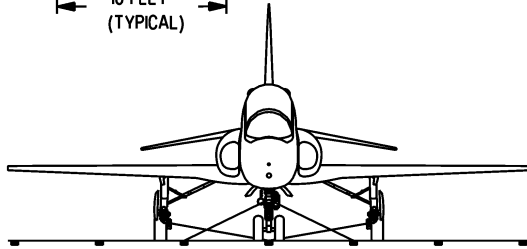
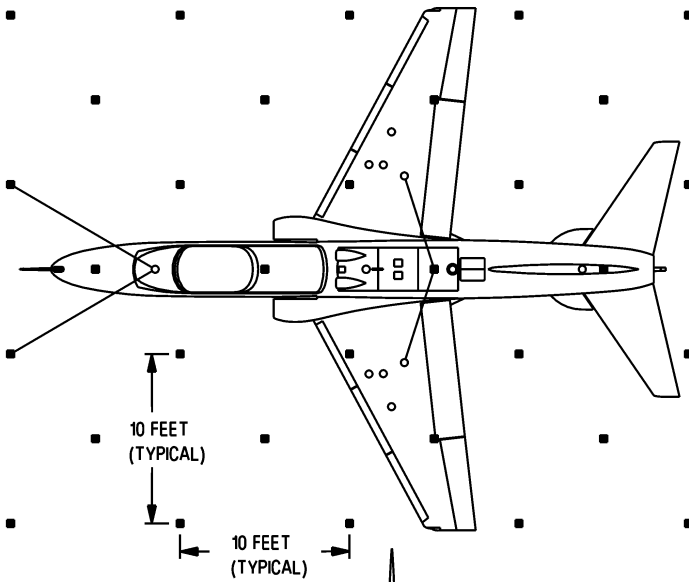
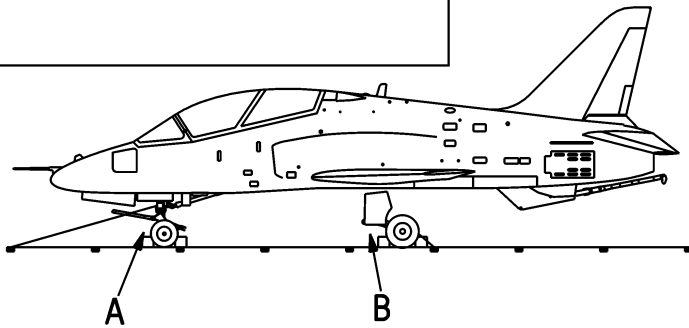
NOTES

TIEDOWN CHAIN OR EQUIVALENT
10,000-POUND WORKING LOAD.

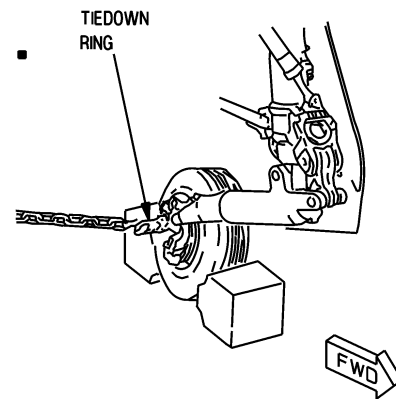
LEGEND

- AIRCRAFT FITTING
- DECK FITTING

T-45
INITIAL



DETAIL A



DETAIL B

Figure 2-1. Tiedown Restraint (Sheet 6)

NOTES

1. NOSE GEAR FORWARD TIEDOWN CHAIN NOT REQUIRED WHEN GROSS WEIGHT IS LESS THAN 15,600 POUNDS AND AIRCRAFT IS SPOTTED IN FORE AND AFT DIRECTION ON CARRIER.
2. MAXIMUM CARRIER GROSS WEIGHT 20,600 POUNDS FOR MODERATE WEATHER TIEDOWN.
3. MAXIMUM CARRIER GROSS WEIGHT 15,600 POUNDS FOR HEAVY WEATHER TIEDOWN.
4. TIEDOWN CHAIN OR EQUIVALENT 10,000-POUND WORKING LOAD.

LEGEND

- AIRCRAFT FITTING
- DECK FITTING

**T-45
PERMANENT
AND
MODERATE/
HEAVY
WEATHER**

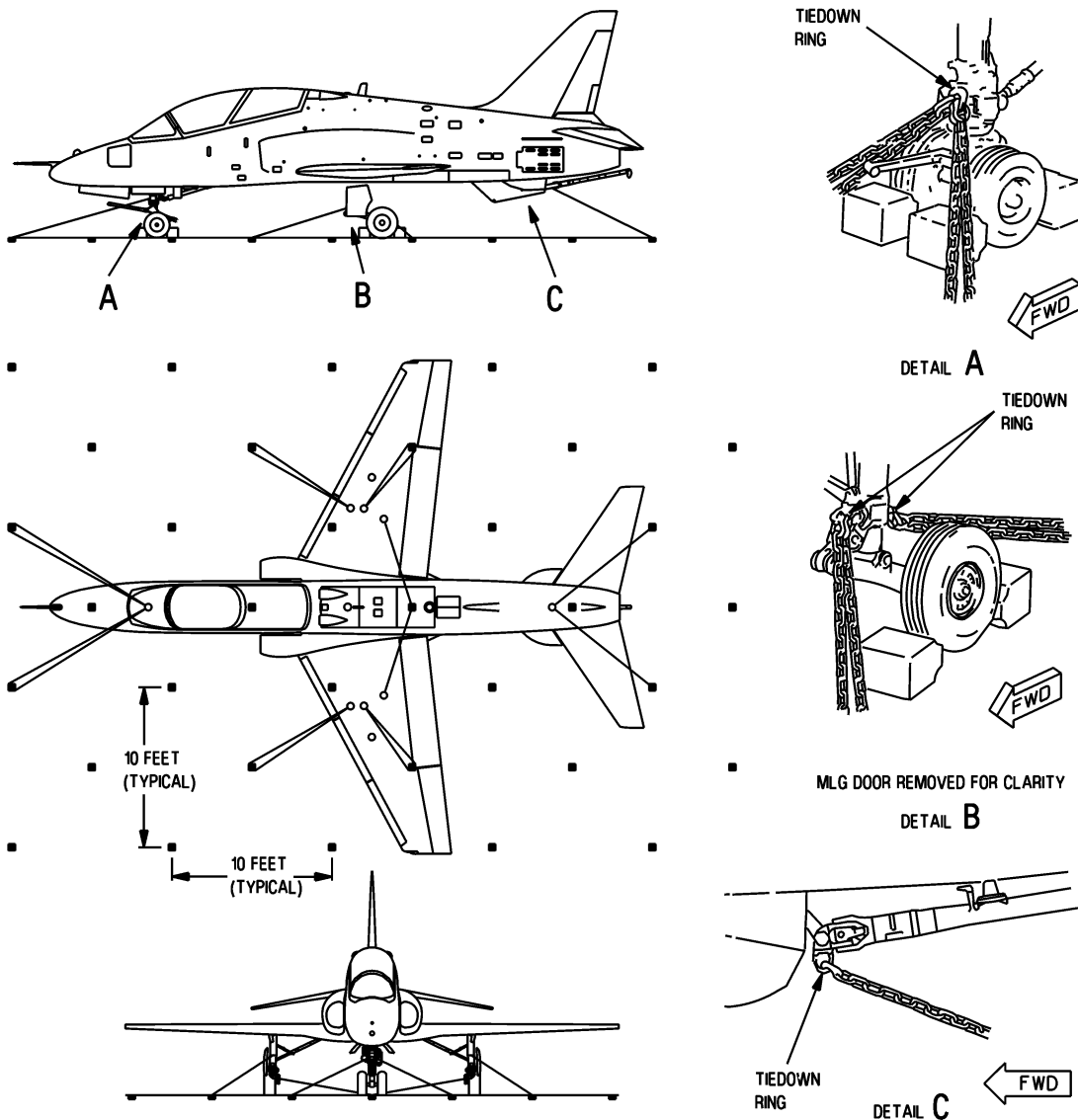
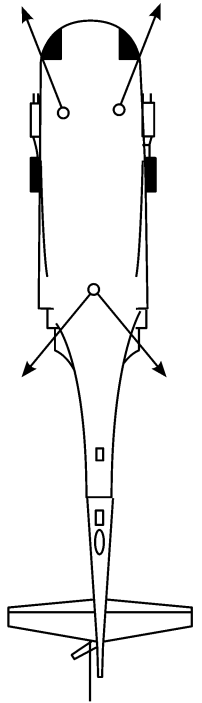


Figure 2-1. Tiedown Restraint (Sheet 7)

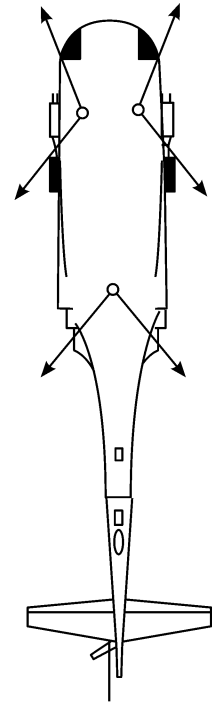
NOTES

----- OPTIONAL

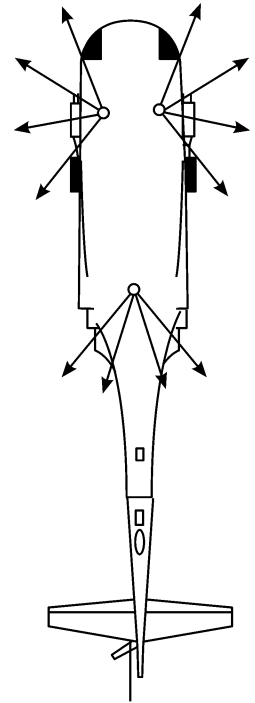
⊗ AFT FUSELAGE TIEDOWN



INITIAL (4 PT)



INTERMEDIATE (6 PT)



PERMANENT (12 PT)

Figure 2-1. Tiedown Restraint (Sheet 8)

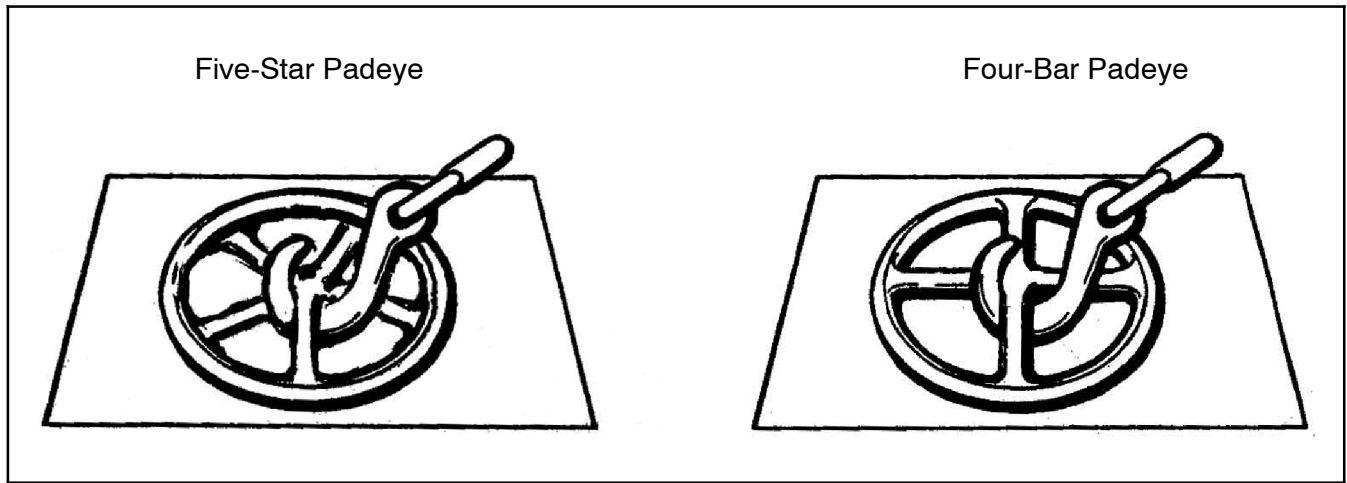


Figure 2-2. Tiedown Installation

2.5 TIEDOWN REQUIREMENTS

The following tiedown conditions are provided as a minimum guide for safe handling operations of shipboard aircraft and may be increased as conditions necessitate.

AIRCRAFT TYPE	SECURITY CONDITIONS			
	INITIAL	INTERMEDIATE	PERMANENT	HEAVY WEATHER
E-2*, C-2*, EA-6, F/A-18	6	9	12/14*	18/20*
AV-8, T-45, H-3, H-46, H-53, H-60	4	6	12	16

2.6 EQUIPMENT SECURITY

Aircraft handling/crash and salvage mobile equipment shall be parked with a minimum of two tiedowns (one forward/one aft), rear wheel chocked, and parking brake set. Crash cranes shall be parked and secured with a minimum of 13 tiedowns.

All rolling stock (e.g., air-conditioners, nitrogen carts, weapon carts) shall have parking brake set and a minimum of two tiedowns tending fore/aft. When not at flight quarters, mobile equipment shall be “packed” fore-and-aft with the vehicles at each end secured with two tiedowns. All vehicles shall have one rear wheel chocked and parking brake set.

2.7 AIRCRAFT JACKING TIEDOWN SECURITY

The following procedures are required for shipboard aircraft jacking:

1. The ACHO or his representative shall approve jacking aircraft for maintenance.
2. Squadron personnel shall refer to the Maintenance Instruction Manual for procedures during jacking operations.
3. When underway, the ACHO shall coordinate jacking of aircraft with the OOD.

2.8 HEAVY WEATHER AIRCRAFT SPOTTING

When a heavy weather spot requirement has been determined by the Commanding Officer, the ACHO shall ensure the following:

1. A maximum number of aircraft shall be spotted on the hangar deck in such a manner to permit access to fire stations at all times.
2. Remaining aircraft on the flight deck shall be spotted fore-and-aft as far from deck edge and the fantail as possible and no farther forward than the bow JBDs.
3. The bow catapult JBDs shall be raised to assist in decreasing wind over deck.
4. Chocks shall be secured to wheels with 21-thread (or greater) manila line to prevent them from working free.
5. Maximum tiedowns shall be applied and parking brakes shall be set.
6. Deflating of struts and/or tires shall be accomplished as directed.
7. Fuel load adjustments shall be made as directed.
8. Aircraft integrity watches shall be doubled to function as two-man teams (buddy system).

Note

During heavy weather, aircraft integrity watches shall not venture onto the flight deck without permission from the ACHO or his representative.

CHAPTER 3

Preparations for Flight Operations

3.1 TRAINING REQUIREMENTS

The Air Wing Commander shall coordinate all squadron predeployment training requirements with the ship. Squadron commanders shall ensure that all personnel complete the lecture syllabus outlined below prior to initial deployment. This applies equally to those squadrons/detachments that embark/operate for short-term workups, CQ, transits, etc. These lectures need not be repeated before every deployment; however, squadron commanders are responsible for providing refresher training as required for the safety of personnel and equipment. Ship's company personnel shall assist in this training; however, when this is not feasible, the most qualified squadron personnel shall be utilized.

Note

The Air Wing Commander shall coordinate Civil Service and contract personnel providing support to his Air Wing. Civil Service and contract personnel not assigned to an Air Wing Commander shall coordinate training with the cognizant CVN hosting department.

The Air Officer shall ensure that, in addition to the formal training required by type commanders, air department personnel receive training as necessary to acquaint them with the peculiarities of the specific aircraft models being deployed. Particular emphasis shall be placed on special aircraft handling requirements, flightcrew rescue procedures, specific aircraft firefighting procedures, and aircraft salvage procedures. In addition, crash and salvage personnel shall conduct a face-to-face briefing with squadron aircrew personnel, communicating what they expect during an emergency egress.

Note

- All personnel, including Civil Service and contract, assigned any flight deck duties shall first complete Flight Deck Familiarization PQS (NAVEDTRA 43426-0 Series [Deck Familiarization PQS]). Only personnel designated in writing by the Commanding Officer/Air Wing Commander may be assigned to monitor and sign any PQS watch station as being completed. This is in accordance with NAVEDTRA 43100.1 Series PQS Unit Coordinators guide.
- All personnel shall pass the required annual flight deck physical (Civil Service and Contract personnel shall meet the medical requirements contained in the military annual flight deck physical). Written verification of completed PQS (NAVEDTRA 43426-0 Series [Deck Familiarization PQS]) training is required for all personnel via training jacket or completion of PQS form contained in the NAVEDTRA 43426-0 Series [Deck Familiarization PQS].
- A PQS-qualified person shall be within an "arms length" of any under instruction (UI) personnel when accomplishing a given task.

Civil Service and contract personnel will be considered Flight Deck "current" when they have operated in a PQS "qualified" status on a CVN Flight Deck within the previous 12 months.

3.2 PREDEPLOYMENT

3.2.1 General

Prior to getting underway, whether it be for an extended cruise or an operating period just off-shore, certain preparations are required to ensure success. The following areas shall be reviewed in advance of every deployment.

3.2.1.1 Personnel Qualifications

Ensure that all personnel are properly qualified and that ongoing, comprehensive long- and short-range training programs are provided. This program shall be planned to train and qualify current operators, and also to provide cross-training and additional operators.

3.2.1.2 Safety Brief

Air Department Division Officers shall be responsible for ensuring that all division personnel receive thorough flight/hangar and below-deck safety briefs prior to each deployment, and again after any 1-week-long in-port period.

3.2.1.3 Aircraft to Be Embarked

Ensure that a NATOPS Manual and Pocket Checklist for each type aircraft are available, and that pertinent portions are reviewed by all Catapult and Arresting Gear Officers. Determine and make accommodations for any aircraft service changes applicable to deploying aircraft that could effect launch/recovery parameters.

Squadron commanders shall submit to the ship via naval message prior to deployment a complete list of aircraft being embarked. The naval message shall include; side numbers, PALS addresses, basic weights, certification that all aircraft are FOD free, verification that all aircraft hoisting points/access panels are readily accessible and functional, and any peculiarities in configuration that will affect handling, ordnance loading, or mission capability.

From each deploying squadron, obtain and review pertinent portions of squadron doctrine, SOP, air wing TACNOTES, and air operations manual that refer to aircraft launch or recovery techniques or procedures.

3.2.1.4 Launch/Recovery Bulletins

Catapult and Arresting Officers shall review applicable bulletins quarterly and ensure updated information are disseminated to respective operators.

3.2.1.5 Spare Parts and Accessories

The Air Officer or designated representative shall review the planned operating schedule and usage records to ensure that adequate parts, material, equipment and accessories are onboard to support flight deck operations.

3.2.1.6 Squadron Brief

The Ship's Operations Department is required to provide a Carrier Control Approach (CCA) brief to each deploying unit prior to departure. It is recommended that the required Air Department brief, including launch and recovery procedures, be given in conjunction with this brief. [Appendix B](#) is a recommended outline for a launch and recovery brief. Details are covered elsewhere in this manual.

3.3 GENERAL REQUIREMENTS FOR FLIGHT QUARTERS

Flight Quarters entails the manning of stations required for the efficient and safe conduct of flight operations. The ship shall be prepared to launch, recover, arm, fuel, and service aircraft, and at the same time be prepared to handle aircraft crashes, fight aircraft or fuel fires, and render aid and assistance to injured personnel.

WARNING

Flight deck personnel shall not consume intoxicating beverages within 12 hours of flight deck evolutions/operations.

Note

Commanders shall make available 8 hours for sleep during every 24-hour period. Schedules will be made with due consideration for watch standing, collateral duties, training, and off-duty activities.

Flight Quarters is a condition of readiness in which Air Department, Air Wing, Weapons Department, Operations Department, Engineering Department, Combat Systems, and Medical Department personnel man specific equipment and stations in support of flight operations. Flight Quarters stations for Air Department and Air Wing personnel are the same as the General Quarters stations as prescribed in the ship's Battle Bill, except that battle circuit phone talkers and hangar deck and fuels repair parties shall not be fully manned during flight quarters unless specifically ordered by the Air Officer. Flight Quarters may be treated as a separate evolution; however, when General Quarters is sounded, all Flight Quarters stations shall be manned.

3.4 INITIATION OF FLIGHT QUARTERS

Flight Quarters stations shall be manned when directed. Flight Quarters is normally initiated over all circuits of the 1MC; an officer in the Air Department (usually the ACHO) shall request the Officer of the Deck (OOD) to sound one of the Flight Quarters conditions. The same procedures shall be utilized to secure from flight quarters as are used for manning.

3.4.1 Type of Flight Quarters

For efficiency of operations and to free personnel for other duties, Flight Quarters conditions may be modified.

3.4.1.1 Flight Quarters

Flight Quarters is the condition in which normal fixed wing and helicopter flight operations are conducted.

3.4.1.2 Flight Quarters for Respot

This is a condition set for the movement of aircraft about the ship.

3.4.1.3 Helicopter Flight Quarters

This is a condition set to operate helicopters.

3.4.2 Manning Flight Quarters Stations

When any form of Flight Quarters is called away, required personnel shall man their stations immediately. They shall expeditiously perform functional tests and/or complete checkoff lists on equipment, and report via the appropriate chain of command when the station is manned and ready, indicating the current status of existing equipment discrepancies. All Air Department Divisions shall complete a Flight Quarters Checkoff list. A sample checkoff list is included as [Appendix C](#). Completed checkoff lists shall be submitted to the Air Officer via the ACHO prior to the commencement of flight operations.

3.4.2.1 Preliminary Procedures — Air Officer

When flight quarters is sounded, the Air Officer shall ensure the following:

1. Procedures prescribed in applicable bulletins and instructions for inspection and preparation for operation of aircraft launch and recovery equipment, aviation fuels system, aircraft elevators/doors, and crash/salvage and firefighting equipment are meticulously followed.

Note

- When air department equipment becomes inoperable, the Air Officer, shall inform the Commanding Officer and shall furnish an estimated time of repair (ETR).
 - Critical ALRE, aviation fuels systems, aircraft elevator, flight deck lighting, crash and salvage crane/20K forklift, flight deck mobile firefighting vehicles (MFFV), and AFFF/saltwater CMWWD zones adjacent to each other shall not be taken out of service without the Commanding Officer's permission.
 - A decision to conduct flight operations when discrepancies are known to exist in any of the above equipment shall be made only by the Commanding Officer.
2. A FOD walkdown shall be conducted prior to flight operations (minimum 1 day/1 night).
 3. The following flight quarters stations shall be manned and all equipment required during flight operations shall be on-hand, inspected, and the pre-operational checklist completed. Any equipment, e.g., whip antennas, flag/jack staffs, flight deck rails, that might interfere with flight operations, shall be stowed and secured:
 - a. Air Department.
 - (1) Primary Flight Control.
 - (2) Flight Deck Control and Flight Deck.
 - (3) Hangar Deck Control and Hangar Bays.
 - (4) V-2 Maintenance Office and all Aircraft Launch and Recovery Equipment.
 - (5) V-4 Maintenance Office and Flight/Below Deck Aviation Fuels Systems.
 - (6) Crash, Salvage and Rescue Equipment.
 - b. Other Departments. Man stations as required.

Note

The Air Boss shall ensure the following stations are properly manned during aircraft launch, recovery, re-spot, engine turns, weapons loading, APU starts, and refueling evolutions in accordance with NAVAIR 00-80R-14:

- MFFV(s) shall include an operator and two rescue personnel during any of the above listed evolutions.
 - During recovery, a line crew consisting of a crash and salvage supervisor and two crewmembers shall be stationed at a predesignated area for immediate response and to provide equipment at the scene of a crashed or disabled aircraft.
4. Crewmembers not assigned stations during actual launch/recovery evolutions shall be assigned responsibilities to provide designated equipment in the event of an on-deck emergency.
 5. The mobile crash crane and forklift shall be started and warmed up at the commencement of each recovery phase of flight operations and remain running throughout the recovery.

3.4.2.2 Manning and Starting Aircraft

Flight crews shall man their aircraft as directed. When ordered to man, they shall proceed to their aircraft via designated route and conduct preflight inspections as expeditiously as safety permits.

In a pending emergency, the Air Officer shall notify flight and hangar deck personnel by use of the 3MC and 5MC announcing systems and flight warning alarm. The crash alarm shall be sounded to notify flight deck personnel of an actual on-deck aircraft mishap.

Note

The flight warning and crash alarms shall be used only for the purposes described above.

3.5 PLANE GUARD HELICOPTER/DESTROYER

A plane guard helicopter/destroyer shall be provided per existing directives. The plane guard helicopter/destroyer shall monitor land/launch frequency; radio contact (if Emission Control [EMCON] condition permits) shall be established prior to launch/recovery to ensure that vital information can be passed to the helicopter/destroyer immediately, if required.

3.6 ALERT CONDITIONS

Alert conditions shall be set as called for by the Carrier Strike Group Commander or as published in the Air Plan. Conditions of readiness and the requirements for each condition shall be as specified in NAVAIR 00-80T-105.

3.7 HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE (HERO)

Conditions shall be set as required by the flight deck ordnance crew. The Officer of the Deck (OOD) shall have the word passed over all 1MC circuits when HERO is set or relaxed; HERO beacon shall be illuminated when applicable.

3.8 FLIGHT/HANGAR DECK LIGHTING

All installed flight deck, landing area, and runway lights shall be maintained in an operable condition and checked for proper operation and security of deck fixtures daily at least 1 hour prior to sunset and prior to any night or IMC recoveries. These lighting systems, including runway edge, centerline, and athwartship lights; landing area lights; vertical bar drop lights; and sequenced flashing centerline lights shall be utilized for all night or IMC recoveries. This requirement may be waived by the carrier Commanding Officer if operational circumstances so dictate. Visual landing aids General Service Bulletin No. 8 (current revision) shall be consulted for specific ship lighting configuration and orientation.

Minimum intensity floodlighting consistent with safety shall normally be used on the flight deck between sunset and sunrise for all flight deck evolutions during flight quarters. Carriers having sodium vapor and/or flight deck floodlighting shall, when the tactical situation permits, have the SOX or white floodlights turned on for launches, recoveries, and re-spots. Circumstances that preclude the use of SOX or white floodlights shall be evaluated as to necessity for lack of illumination, as reduced efficiency on the flight deck, increased crunch potential, increased bolter/waveoff rate, and decreased recovery rate are to be expected. Safety aspects of the entire flight deck evolution and the risk associated with non-use of SOX or white lighting shall receive due consideration in arriving at a decision to restrict use.

White lights may be used in the hangar deck to enhance aircraft maintenance and handling efficiency and safety. When restrictive lighting measures are in effect on the flight deck, due regard shall be taken to ensure masking of the white hangar bay lights. These conditions include, but are not limited to, darken ship and transit of restricted or high traffic density waters. Consideration shall be given to closing hangar bay doors if conditions so warrant. Aircraft running lights shall remain extinguished between the hours of sunset and sunrise except as required during launch and recovery operations.

3.9 AIR PLAN

In order for Strike Operations to prepare an air plan that is within the capabilities of the air wing and all supporting activities, the following shall be reported on a regular basis:

1. The status of all embarked aircraft. This report shall be delivered to the Bridge, Carrier Strike Group Commander, Flag Operations, Air Operations, and the Air Department. The report shall include expected changes in status and test flight requirements for the following day.
2. An up-to-date ordnance load plan.

NAVAIR 00-80T-120

The air plan shall be distributed on the evening before the scheduled operations. When the air plan is delayed, the Strike Operations Officer shall provide advance information to allow preparations for the first launch. As a minimum, a rough air plan shall be hand-delivered to Flight Deck Control, PriFly, Air Operations, Ordnance Handling Officer (OHO), and Air Wing Weapons Officer (CAG Gunner) and Maintenance representative.

3.10 ORDNANCE LOAD PLAN

No changes shall be made to the ordnance load plan without approval by the Strike Operations Officer. The Air Wing Weapons Officer or his designated representative shall visually inspect each aircraft for proper ordnance load as per the Air Plan. Discrepancies shall be brought to the attention to the Aircraft Handling Officer immediately.

3.11 FLIGHT DECK UNIFORMS

3.11.1 Wearing of Flight Deck Uniforms

Control and issue of flight deck clothing (see [Appendix H, Figure H-1](#)) shall be enforced by the Air Officer and Carrier Air Wing Commander (CAG) for all personnel working on the flight deck.

A complete flight deck uniform shall consist of TYCOM approved flight deck trousers, flight deck jersey, flotation device, steel-toe boots, leather gloves, helmet with goggles and jersey corresponding in color to that of their respective detail and with their billet title on the jersey and flotation vest. Coveralls and the Navy Working Uniform (NWU) are not authorized to be worn on the flight deck at any time while flight deck operations are being conducted. Personnel assigned specific duties shall wear the appropriate flight deck gear per [Figure H-1](#).

3.11.2 Special Clothing

The Supply Officer shall procure, store, and issue special clothing per current allowances and standard accounting procedures.

Special clothing shall be drawn from the Supply Officer for the Air Department and Air Wing personnel, as prescribed by ship's instructions. It shall be reissued to individuals on an allowance/need basis via the Division Officer, who accounts to the Air Officer and Carrier Air Wing Commander by means of sub-custody receipts.

Special clothing shall be worn only when prescribed by the Air Officer or CAG.

3.12 AIR-TO-SHIP COMMUNICATIONS

Minimum of two (2) Air-to-Ship Radio communication devices, one for the Air Boss and one for the Mini-Boss, with connections for two headsets/handsets each. At a minimum, the communication devices shall provide access to CATCC Final A and Final B UHF Radio Circuit Transceivers and two Dedicated/Backup Air-to-Ship UHF transceivers. The Dedicated/Backup transceivers shall be capable of selecting required frequency channels from primary flight control.

CHAPTER 4

Catapult Launching Procedures

4.1 GENERAL

This section is to be used in conjunction with Aircraft Launching Bulletins, NAVAIR and COMNAVAIRFOR directives.

4.1.1 Operational Safety Warnings

4.1.1.1 General

1. The launching of today's high-performance aircraft is a complex and demanding operation involving various inherent dangers. Personnel engaged in the operation of the launch equipment shall be thoroughly trained and qualified for the launch operation. The procedures and safety precautions contained in this manual shall be complied with. Disregard for these procedures, cautions, or safety warnings may create hazards more dangerous than those previously mentioned.
2. Safety is an all hands concern; as such, all hands shall be thoroughly familiar with this manual and applicable instructions, procedures, and safety precautions. Further, all hands shall also insist on strict adherence to established safety precautions by all others not having direct access to this manual.
3. Personnel having reason to suspect the safe operational/material readiness condition of the launch equipment, deck gear accessories, the aircraft, or the aircraft hook-up shall immediately cause the launch to be suspended by either suspending the catapult themselves, or by informing the catapult officer or other personnel capable of suspending the catapult.
4. Prior to operational actuation of launch/recovery equipment, an inspection of equipment shall be made to locate any possible misplaced tools, rags, machine parts, etc., that would interfere with proper functioning of equipment.
5. During launching operations, the voice communication system shall be used only for essential communications, to ensure that signals between operators are not misunderstood.
6. During any type of launching, live steam escapes from the track and brake areas. As this steam can cause scalding of exposed areas of the body, personnel in the area shall avoid contact with it. When the catapult is in operating status, exposed metallic parts, such as track covers, launching and exhaust valves, and steam supply piping, may be hot enough to burn exposed areas of the body on contact. Therefore, operating personnel with duties in these areas shall be equipped with required protective clothing.
7. Hearing protection shall be worn in all areas of high noise level.
8. Personnel who work in areas where there is a danger of contact with "live" steam or hot metallic surfaces shall wear appropriate protective clothing to prevent burns.
9. All loose gear and tools shall be kept clear of all equipment.
10. Operational/maintenance equipment pressures shall be maintained at predetermined settings.
11. All catapult, arresting gear, and VLA spaces are RESTRICTED areas; unauthorized personnel shall not be allowed in these spaces at any time. RESTRICTED signs shall be posted.

Note

The catapult shall not be operated when the Launching Officer and the Monitor/Deckedge Operator are under instruction at the same time.

4.1.1.2 Flight Deck

The following precautions shall be observed:

1. During launch operations, no personnel other than those required by applicable operating instructions shall be on the flight deck, catwalks, sponsons, or in the launch area without the expressed permission of the Air Officer. It shall be the responsibility of the Catapult Officers, Flight Deck Officer, and Flight Deck Supervisors to ensure compliance.
2. All personnel who are required to be on the deck in the launch area and who do not have a specifically assigned station shall remain in a safe area.
3. Any person who observes any unusual condition during the launch, such as objects falling from or striking the aircraft, shall immediately inform the Catapult Officer.
4. Personnel required to be in the catwalks shall duck below flight deck level during actual aircraft launch.
5. No one shall enter the launch area to effect repairs, or for any other reason, until positive clearance has been obtained from the Catapult Officer.
6. During night operations, the pre-launch check of catapult components or aircraft launching intervals shall not be speeded up. Sufficient time shall be taken to double-check each step to prevent possible accidents due to faulty hook-ups, misinterpreted signals, and other causes.
7. The shuttle or grab shall not be advanced or retracted along the track until the Catapult Officer is present at his station, and the track slot and surrounding areas have been inspected and found to be clear.
8. After tension is taken on an aircraft having a launch bar selector switch, the pilot shall not place the launch bar selector switch in the OFF, ABORT, or RETRACTED position until he has advanced the aircraft's throttles in accordance with the specific aircraft's NATOPS manual.
9. When the catapult is in use, no one shall go in front of the shuttle or forward of an aircraft that is ready to be launched. No one except authorized operating personnel shall be permitted in catwalks or on the flight deck forward of the catapult battery position.
10. Personnel shall not go under the aircraft until the aircraft is throttled back.
11. During emergency situations when moving or towing the shuttle or aircraft, crewmen shall stand clear.
12. The catapult crew shall remain clear of the aircraft during arming operations.

4.1.1.3 Fire Prevention in Catapult Spaces

High-pressure fluids, high temperatures, and close proximity to flight deck combustibles greatly increase the possibility of fire in the steam catapult system. Combustible and flammable liquids or materials shall be kept away from the heated catapult parts to reduce the possibility of fire and explosion. Adequate ventilation shall be provided below deck to prevent the buildup of explosive gases. After every fire and before resumption of flight operations, a thorough inspection of the affected portion of the catapult and associated equipment shall be made. In addition, the entire crew shall be made aware of the hazards to safe flight operations and of other potential dangers, should there be a recurrence of the same type of fire in the future. To minimize the causes of fire and the extent of fire damage, particular attention shall be continually paid to the following precautions:

1. Training of all personnel in the proper firefighting procedures.
2. Procurement, proper stowage, and ready availability of effective firefighting equipment.
3. Periodic checkouts of automatic and semiautomatic steam smothering systems to ensure proper operation.

Note

At each catapult steam smothering valve location, valve enclosure boxes shall be painted with 1-inch black and white alternating stripes. Deck and wheel stop coaming shall be in accordance with VLA General Service Bulletin No. 8.

4. All spaces kept in a clean condition, especially the trough. Clean up any spillage immediately.

5. Bow catapult slot seals shall be installed prior to any fixed wing refueling/defueling evolutions. Waist catapult slot seals shall be installed immediately after securing from flight operations.
6. Slot seals shall be removed prior to launching or recovering a helicopter.
7. Repair of lagging breaks in excessively high temperature areas.
8. A qualified Catapult Steam Watch shall be posted during non-operating hours have been thoroughly indoctrinated in the proper procedure for reporting and containing a fire until competent assistance arrives.

4.1.2 Aircraft Launching Bulletins

These bulletins include special instructions to the flight deck crew, the pilot and the Catapult Officer. It is imperative that all Catapult Officers and pilots be completely familiar with all applicable bulletins. Aircraft Launching Bulletins are issued by the Naval Air Warfare Center to provide launching data for catapult and aircraft, required aircraft launching accessories, list of effective bulletins, etc.

Aircraft launching data are prepared to set forth uniform instructions for launching within the performance capability of the aircraft and the catapults. The minimum take-off airspeed for launching, as listed in the Aircraft Launching Bulletins is determined by the Aircraft Test Directorate (Carrier Suitability Branch) of the Naval Air Warfare Center, while conducting the carrier suitability portion of the Board of Inspection and Survey (BIS) trials. This minimum take-off airspeed may be limited by aerodynamic stall; thrust available for acceleration after launch; loss of aileron, elevator, or rudder control; time required to rotate to a flying attitude after launch; control effectiveness and pitching rates in an accelerated stall; overly stringent pilot techniques required; or stick forces or movement beyond limits in event of an aircraft systems failure. These data, which establish the minimum conditions that shall exist prior to the launch and upon which the launching bulletins are based, enable the Operational Commanders to know the ultimate capability of the launching equipment.

Thus, a measure of the safety involved in launches made above minimum conditions can be effected. To ensure additional safety, operations should be conducted above the minimum conditions. Ten to 15 knots in excess of minimum take-off airspeed is optimum for bow-launched aircraft. Fifteen knots is recommended for waist aircraft. Launch charts shall be prepared and aircraft may be launched within this range without any special clearance. However, should operational requirements that require launching under 10 knots excess exist, the Commanding Officer shall authorize each launch, and the pilot shall be advised of the anticipated excess.

The Aircraft Launching Bulletins contain the governing instructions for launching specified aircraft from specified catapults. An Aircraft Launching Bulletin does not authorize aircraft launching, but delineates the conditions under which the aircraft can be launched when authorization has been received. Authority to launch and restrictions for launching the aircraft are contained in the applicable NATOPS Flight Manuals. Compliance with the provisions of both the Aircraft Launching Bulletins and the NATOPS Flight Manuals is mandatory for safety of operations. An activity shall consult both documents prior to commencing aircraft launches.

4.1.2.1 Bulletin Identification Number

Aircraft Launching Bulletins are assigned identification code numbers that indicate equipment applicability and subject matter. The number preceding the dash indicates the catapult type or catapult type and ship if the catapult on one ship differs in performance from a catapult of the same type on another ship. For example, the 31 Series Bulletins pertain to the C-13-2 catapults on USS ABRAHAM LINCOLN (CVN 72). The 24 Series pertain to the C-13-1 catapults on USS DWIGHT D. EISENHOWER (CVN 69).

When the number zero precedes the dash, the bulletin is applicable to all steam catapults. The numbers following the dash identify the subject matter as follows:

1. 0-10 Aircraft Launching Bulletin. This bulletin outlines the basic content of the various bulletins, how they were prepared, and specific instructions in their use.
2. 0-11 Aircraft Launching Bulletin. This bulletin is issued quarterly and is a list of bulletins in effect, superseded or canceled. Interim bulletin revisions that are promulgated by message or speedletter are also listed in this bulletin. The 0-11 bulletin should be carefully reviewed in order to maintain a complete up-to-date file of all applicable aircraft launching/recovery bulletins. As changes and revisions are received, applicable information shall be promptly disseminated.

3. 0-12 Aircraft Launching Bulletin. This bulletin is a list of aircraft launching accessories required for all aircraft. Information also includes National Stock Number (NSN), Part Number (P/N), usage limitations, color codes, and the effective Catapult Deck Gear and Accessories Service Bulletin for each aircraft type. Changes that arise prior to revision of the 0-12 Bulletin will be indicated in the 0-11 Bulletin.
4. 0-15 Aircraft Launching Bulletin. This bulletin provides crosswind limitations for both catapult and deck launches for each aircraft. Additional crosswind information includes trim settings, excess end speed requirements, and a discussion of off-center spotting.
5. 0-56 and Subsequent Zero Dash Aircraft Launching Bulletins. These bulletins contain special instructions for launching specific aircraft, which include special instructions to the Launching Officer, flight deck crew and pilot, launch precautions, corrections for minimum wind-over-the-deck, trim settings, off-center spotting limitations, and other safety precautions. The number following the dash indicates the specific aircraft type. For example, the 0-69 series bulletins pertain to the TA-4F/J aircraft; the 0-71 series bulletins pertain to F/A-18 E/F aircraft, etc.
6. 9-56, 12-56, etc., and Subsequent Aircraft Launching Bulletins. These bulletins contain wind-over-the-deck data for launching specific aircraft from specific catapults onboard specific aircraft carriers. Remember, the number preceding the dash indicates the specific carrier(s). The number following the dash indicates the specific aircraft type. For example, the 24-71 Bulletin applies to the F/A-18 E/F plus series aircraft launched from the C-13-1 catapult onboard the USS DWIGHT D. EISENHOWER (CVN 69); the 32-67 Bulletin applies to the F/A-18 aircraft launched from the C-13-2 catapults onboard the USS ABRAHAM LINCOLN. From these examples the 71 indicates F/A-18 E/F and 67 indicated F/A-18 aircraft.

4.1.2.2 Bulletin Revision Identification

Revisions of aircraft launching bulletins are identified by a revision letter following the bulletin number and by a new date corresponding to the date of the revision. The first revision of a bulletin is identified by the letter A; subsequent revisions follow in alphabetical order (e.g., 24-67H of October 2004, 24-71B of 07 November 2006, etc.). The portion of the text affected by the current revision is indicated with an asterisk. Revision identification is the same for all bulletins except the 0-11 Bulletin. The first issue of each year is identified with the basic number 0-11-07 and each subsequent quarterly revision has a suffix number added to the basic number (e.g., 0-11-07-1 of 01 January 2007, 0-11-07-2 of 01 March 2007, etc.).

4.1.2.3 War Emergency Bulletins

Aircraft launching bulletins that have a Q prefix in their numbers are designed as War Emergency Bulletins. Such bulletins authorize launching aircraft at higher gross weights or capacity selector valve (CSV) settings than are currently permitted by the NATOPS Flight Manual and by the Aircraft Launching Bulletins. Routine carrier launches, launches under simulated war emergency conditions, and training launches shall be made under the authorization and restrictions delineated in the NATOPS Flight Manual and by the Aircraft Launching Bulletins.



Use of War Emergency Bulletins may cause the aircraft catapulting strength design limit to be exceeded by as much as 15 percent. An aircraft logbook entry is required as specified in the applicable Bulletin.

4.1.3 Launch Bulletins

WARNING

The information presented in the minimum required Wind-over-the-deck charts in the current launch bulletins is easy to use. Aircraft launching bulletins shall not be converted to “quickie” or “pocket” launch charts.

The following parameters shall be considered in the preparation of launch charts:

1. Wind-Over-the-Deck.
 - a. WOD requirements for launch and recovery are determined from Aircraft Launch and Recovery Bulletins. The Air Officer shall advise the bridge 30 minutes prior to launch time of minimum WOD to provide 15 knots excess for the most critical aircraft.
 - b. Wind required for helicopter operations shall be per individual helicopter NATOPS manuals.
 - c. The wind-over-the-deck range should include the normal operating winds, plus low winds for those aircraft that would conceivably be launched under these conditions.
 - d. Winds shall be indicated in 2-knot increments.
2. Weight Range. The weight range should cover the minimum through the maximum weights for carrier operations including carrier qualification weights.
3. Density Altitude.
 - a. Obtain from meteorology the current density altitude and correction from the current 0-11 ALB.
4. Excess Endspeed.
 - a. Ten to 15 knots is the minimum endspeed excess range. The actual programmed excess, within this range, shall be determined by the Commanding Officer after consideration of all factors involved (e.g., aircraft strength, stability, pilot experience level, operating conditions, etc.).

WARNING

Aircraft launchings at high excess endspeeds impose limitations as critical as those imposed by launches made at or near minimum conditions.

- b. Whenever possible, aircraft excess endspeeds shall fall within the 10- to 15-knot limitations. Excesses within these limitations are not only considered optimum, but will provide a consistency to the Air Wing pilots and result in improved Air Wing proficiency and safety.

4.2 AIRCRAFT LAUNCHING FAMILIARIZATION

Every Catapult Officer shall know, or have readily available, a considerable amount of information pertaining to each type of aircraft to be launched. Much of this information is taken directly from the Aircraft Launching Bulletin Zero Dash Series (e.g., required trim/flap settings, maximum off-center spotting distances, maximum permissible excess airspeeds, and other special instructions). In addition, every Launching Officer shall be intimately familiar with the peculiarities and idiosyncrasies of each aircraft type.

Either an experienced Catapult Officer/Catapult Safety Observer, or qualified squadron personnel shall give a pre-launching familiarization inspection of each aircraft. Items to be covered should include position of wing locks,

flap and trim positions and indications, access doors that are most commonly used, ejection seat pins and location of arming indicators, and other such pertinent information.

This chapter, in conjunction with the aircraft launching bulletins should give all necessary information pertaining to the aircraft to be launched. Refer to the Aircraft Launching Bulletin No. 0-15 for crosswind limits, and use the specific aircraft Zero Dash Bulletins for spotting limits, trim, nose wheel cock limits, and other information.

4.2.1 EA-6B

4.2.1.1 Pre-Launch

1. Nose wheel steering is limited. A tag lock disengages the steering when the nose wheel is turned past 56° from the center position. Sharp turns shall be avoided. To prevent damage to the nose gear, the launch bar shall not be in the locked “up” position after the trail bar is attached to the aircraft.
2. The aircraft is very difficult to push back due to the high engine RPM at idle. Care should be taken not to over run the “Wye” area.
3. The location of the intakes in relation to the nose strut makes this aircraft one of the most dangerous in the fleet. If it becomes necessary to take the plane off the catapult, the Launching Officer/Catapult Safety Observer shall take positive control of the buffer aft and the pushback evolution.
4. The launch bar has a tendency to come up prior to tensioning (See E-2/C-2 pre-launch).



Ensure the launch bar is clear of the shuttle before allowing the buffer aft sequence to commence. However, the launch bar shall not be locked in the up position. Buffering with the launch bar locked may damage the nose gear mechanism.

5. There are several model, external stores, engine, and trim combinations. Make certain the proper launch bulletin and launch charts are used.
6. Wing flaps and slats cannot be extended unless the wings are spread. EA-6B aircraft are susceptible to wing damage when wings are folded. When spotted aft of the JBDs with aircraft on the catapult turning up, the EA-6B wings shall be spread.

4.2.1.2 Functional Check Flight (FCF) Engine Tests on the Catapult

Note

- Only the FCF engine checks are allowed utilizing the catapult. The FCF engine checks should only be performed when the aircraft has “intent to fly”. All other engine maintenance checks shall be performed in the approved designated areas.
 - Follow the normal launching and hook-up procedures and safety checks, with the additions as outlined in steps 1. thru 10., when the FCF engine test is to be performed.
1. Prior to the aircraft taxiing into the approach tracks, the piston assembly shall be maneuvered forward into the water brakes. When the aircraft is ready, signal LOWER LAUNCH BAR in the wye plate area and install the holdback bar. The appropriate holdback bar installation checks shall be followed. Taxi the aircraft through the approach tracks until the buffer hook is fully bottomed forward. Ensure the release element in the holdback bar is properly seated.

WARNING

Because the aircraft's nose gear is not anchored by the spreader, the topside petty officer shall stand at a safe distance (clear of the catapult safe shot line) and observe the aircraft's wheels for sliding sideways during engine testing.

2. Signal to the aircraft to turn up engines to MRT power. Both engines shall be turned-up simultaneously to reduce the risk of the aircraft sliding sideways. Engine turn-up shall be at a constant rate to avoid damage to the buffer hook assembly.
3. During this time, the engines will be tested in accordance with the applicable EA-6B NATOPS.
4. At MRT power, there shall be a 90-second restriction on the duration of these checks. If checks are not complete within the 90-second period, both engines shall be powered down to IDLE and the JBD allowed to cool for 30-seconds. After the JBD cool-down, both engines shall be turned up simultaneously to continue the FCF checks. This process shall be repeated until the FCF checks are completed.
5. At the completion of the checks, aircraft engines shall be powered down to IDLE, and a JBD cool-down period for a minimum of 30 seconds shall occur prior to aircraft hookup to the spreader.

CAUTION

If it is suspected that the aircraft's wheels slid sideways during the test, the aircraft shall be suspended from the catapult and the holdback bar removed from service to undergo an inspection in accordance with MIP 5871/RLA MRC R-16 NOTE 6. The release element shall be discarded.

6. At the completion of the checks, the Topside Side Petty Officer shall MANUALLY RAISE the launch bar before the piston assembly is maneuvered aft.
7. The holdback bar shall be inspected to verify that the release element is still properly seated.
8. Once the piston assembly has been maneuvered aft, normal hook-up procedures shall be followed.
9. The FCF check, by itself, is not to be counted against the holdback bar service life. If the aircraft is launched following a FCF check, the holdback bar shall have one cycle counted against its service life. If the aircraft did not launch, no cycles shall be counted on the holdback bar. If the aircraft did not launch, remove the release element and inspect it in accordance with step 6.
10. Any successive launches shall follow the latest launching bulletin for JBD cool-down periods and restrictions.

4.2.1.3 Launch

1. The catapult grip locks the nose strut. Pilots should be briefed to ensure the use of the catapult grip for the entire catapult stroke. Catapult grip is visible to the Launching Officer when the aircraft is on the starboard catapult.
2. The pilot is seated in the port side of the cockpit. The Launching Officer shall vary his position accordingly to ensure all his signals may be seen by the pilot.
3. Avoid standing in a position where the wing tip passes overhead. Aircraft is equipped with wing-tip speed brakes, which may be inadvertently actuated on stroke.

4.2.2 T-45

Refer to F/A-18, [paragraph 4.2.4.1](#) for pre-launch and launch procedures.

WARNING

T-45 aircraft requires a higher engine thrust to achieve a full NGL buffer stroke. During this process, TSPO shall maintain situational awareness and conscious effort to avoid jet intake areas. Once the RRHB engages the buffer hooks, the TSPO and UI (if applicable) shall assume crouching position away from the intake and remain crouched until tension is taken, exercising extreme caution while exiting from under the aircraft.

4.2.3 E-2/C-2

4.2.3.1 Pre-Launch

1. The launch bar has a tendency to come up once the aircraft is in the holdback and prior to tension. Maintaining slight thrust keeps tension on the system, preventing the launch bar from coming up, and the requirement for hands or feet to be in the area during tensioning is eliminated. The launch bar shall not be in the locked-up position after the holdback has been attached to the aircraft.
2. After the trail bar has been removed, ensure the launch bar is locked up prior to backing aircraft on the catapult.
3. On the C-2 aircraft, ensure main gear struts are extended prior to taking tension.

WARNING

The pilot of C-2 aircraft shall receive the anticipated end airspeed and flap setting from the Catapult Officer.

4. The E-2/C-2 pilot, upon receipt of the tension-up signal, shall place the power levers at FLT IDLE and apply 2,500 to 3,500 IHP. The Catapult Officer/Catapult Safety Observer then receives the aircraft from the director and ensures that the Topside Safety Petty Officer is clear of the aircraft and has given the GO signal. The Catapult Officer then gives the turn-up signal to the aircraft, at which time, the pilot places the power levers at MAXIMUM POWER.

WARNING

T-56 engine RPM decay or flameout can result from ingestion of turbojet exhaust. E-2/C-2 aircraft shall not be launched from the waist catapults when turbojet aircraft are spotted on or along the No. 2 catapult, or along the foul deck line forward of the waist catapults with the aircraft exhaust blowing to the port side. This includes aircraft in the de-arm area blowing turbojet exhaust to port. These restrictions apply only to exhaust from turbojet aircraft.

4.2.3.2 Launch

Ensure the areas around the prop arcs are clear of any objects, which may be drawn into the prop arc during engine turn-up or during catapult stroke.

4.2.4 F/A-18 Series (A thru G)

4.2.4.1 Pre-Launch

1. The launch bar is controlled from the cockpit. Always have the nose wheel aligned, fore and aft with the aircraft, before giving the launch-bar down signal. Normally a 4-second delay follows completion of control wipeout before the pilot gives his final salute.
2. The launch bar control shall be in the up position prior to launching. There is no external indication when the launch bar control has been selected to the up position.

WARNING

All visual launch bar mispositioning procedures/cues shall still be closely followed during each aircraft tensioning sequence for all aircraft types. Mispositioning of the aircraft launch bar may result in the launch bar separating from the shuttle spreader during the launch.

3. The Aircraft Director shall pass control to the Launching Officer/Catapult Safety Observer after the Topside Petty Officer has cleared the aircraft.

4.2.4.2 Functional Check Flight (FCF) Engine Tests on the Catapult

Note

- Only the FCF engine checks are allowed utilizing the catapult. The FCF engine checks should only be performed when the aircraft has “intent to fly”. All other engine maintenance checks shall be performed in the approved designated areas.
 - Follow the normal launching and hook-up procedures and safety checks, with the additions as outlined in steps 1. thru 12., when the FCF engine test is to be performed.
1. Prior to the aircraft taxiing into the approach tracks, the piston assembly shall be maneuvered forward into the water brakes. When the aircraft is ready, signal LOWER LAUNCH BAR in the wye plate area and install the holdback bar. The appropriate holdback bar reset indicator checks shall be followed. Taxi the aircraft through the approach tracks until the buffer hook is fully bottomed forward. Verify that the “candy stripe” area on the collet head of the holdback bar is completely covered.

WARNING

Because the aircraft’s nose gear is not anchored by the spreader, the Topside Petty Officer shall stand at a safe distance (clear of the catapult safe shot line) and observe the aircraft’s wheels for sliding sideways during engine testing.

2. Signal to the aircraft to turn up engines to MRT power. Both engines shall be turned-up simultaneously to reduce the risk of the aircraft sliding sideways. Engine turn-up shall be at a constant rate to avoid damage to the buffer hook assembly.
3. During this time, the engines will be tested in accordance with the applicable F/A-18 NATOPS.

4. At MRT power, there shall be a 30-second restriction on the duration of these checks. If checks are not complete within the 30-second period, both engines shall be powered down to IDLE and the JBD allowed to cool for 30-seconds. After the JBD cool-down, both engines shall be turned-up simultaneously to continue the FCF checks. This process shall be repeated until the FCF checks are completed.
5. At the completion of the checks, aircraft engines shall be powered down to IDLE, and a JBD cool-down period for a minimum of 30 seconds shall occur prior to aircraft hookup to the spreader.



- The use of CRT power is prohibited during the FCF engine checks. The use of CRT power could damage the JBD.
 - If it is suspected any of the aircraft's wheels slid left or right during the test, the aircraft shall be suspended from the catapult and the holdback bar removed from service. The holdback bar shall be sent to the AIMD for a 100-shot inspection in accordance with PMS.
6. At the completion of the checks, the RAISE LAUNCH BAR signal shall be given. The piston assembly shall then be maneuvered aft.
 7. Inspect the holdback bar to verify that the "candy stripe" reset indicator on the collet head is completely covered.
 8. Once the piston assembly has been maneuvered aft, normal hook-up procedures shall be followed.
 9. The FCF check, by itself, is not to be counted against the holdback bar service life. If the aircraft is launched following a FCF check, the holdback bar shall have one cycle counted against its service life. If the aircraft did not launch, no cycles shall be counted on the holdback bar.
 10. Any successive launches shall follow the latest launching bulletin for JBD cool-down periods and restrictions.

4.3 PREPARATION FOR LAUNCH

4.3.1 Pre-Operational Inspection

1. The ALREMO or his designated representative shall ensure that the catapults and associated launch equipment pre-operational inspections and no-loads are conducted and completed in accordance with the current NAVAIR operational manuals and PMS requirements.
2. The Catapult and Arresting Gear Officer shall inform the Aircraft Handling Officer and the Air Officer that subject inspections are completed in accordance with OPNAVINST 4790.15 series.

4.3.2 No-Loads

1. No-loads shall be fired in accordance with current PMS:
 - a. In conjunction with preoperational inspections.
 - b. After repairs have been completed on the catapult control system.
 - c. Upon completion of repairs following a hangfire, two no-loads shall be fired.
 - d. As required by NAVAIR pubs following maintenance of hydraulic system and steam operated pressure switches.

2. A qualified no-load launching officer shall be on deck or in the ICCS and shall be responsible for enforcing safety precautions during no-loads firing.

WARNING

As in all phases of catapult operations, the catapult shall not be fired unless every precautionary step has been taken to ensure a maximum margin of safety. Catapults shall not be fired between any of the landing gear of any single aircraft, under drop tanks or ordnance. Extreme care shall be taken if no-loads are fired in the vicinity of any aircraft (including helicopters on the waist).

3. If the catapult track is clear of aircraft and its entire length clearly visible, the following procedures shall apply:
 - a. All members of the crew not actually engaged in firing the catapult shall man a safety line running the length of the catapult track to prevent injury to unsuspecting personnel. Catapult personnel manning shot line shall stand a safe distance from catapult track.

Note

Catapult no-load firing may be required prior to launching an aircraft. At the Catapult Officer's discretion, no-loads safety line may not be required as long as the catapult is properly manned and the deck is ready for the pending launch.

- b. The words, "STAND CLEAR OF NUMBER ___ CATAPULT ON THE BOW/WAIST WHILE FIRING NO-LOADS" shall be passed over the 5MC prior to each shot. A no-load shall not be fired until such warning has been given over the 5MC.
- c. The individual actually giving the "fire" signals calls out, "WATCH THE TRACK" prior to each shot. This phrase shall be repeated down the line for the complete length of the catapult with the acknowledgement of a thumbs-up given by all personnel standing the full length of the catapult track.

WARNING

The spreader shall be removed while firing no-loads in port or at anchorage.

- d. No one shall be permitted to approach the catapult or step across the track while the shuttle is in "battery" position.
- e. Check for a clear deck forward.
- f. All personnel not in V-2 Division shall be removed from the area of the catapult track and catwalks. Plane captains and squadron maintenance personnel shall be cleared away from and off of aircraft spotted in the vicinity of the catapult.
- g. No aircraft shall be moved in the area of the catapult being tested.
- h. Personnel shall be stationed in the catwalk, near access ladders and light lockers, to prevent unsuspecting personnel from coming into the firing area.
- i. If the flight deck noise level is such that the human voice is inadequate to maintain positive safe control, a sound megaphone or other means of communication shall be used.

4.3.3 Determination of Gross Weights

It is essential that the Catapult Officer know the correct gross weight of every aircraft being launched. In order to minimize any chance of error, the gross weight shall be computed by squadron line personnel/pilot, and shall be checked by the Catapult Officer against information available on the status board in Flight Deck Control.

4.3.3.1 Weight Chits

1. No later than 45 minutes prior to a launch, each squadron shall furnish the Catapult Officer with a weight chit listing the computed weight of each aircraft scheduled.
2. Weight chits shall be locally prepared and shall contain the following information:
 - a. Squadron.
 - b. Date.
 - c. Launch event number or time of scheduled launch.
 - d. Aircraft side number.
 - e. Basic weight.
 - f. Fuel weight.
 - g. Ordnance/external store weight.
 - h. Gross weight.
 - i. Signature of person filling out chit.
 - j. Flap setting for E-2/C-2.
 - k. CRT/MRT for FA/18.
 1. Asymmetric loading over 950 pounds for S-3 aircraft.
 - m. FCF aircraft.
3. **Figure 4-1** presents an example of an acceptable weight chit.

4.3.3.2 Basic Weight

1. The basic weight shall be the weight of a mission-ready aircraft with crew minus the weight of fuel onboard and ordnance/external stores.
2. The Air Wing Maintenance Officer shall be responsible for maintaining the basic weight of each aircraft on a status board in Flight Deck Control. Each change to the basic weight shall be reflected on the status board so that correct and current information is available to the Catapult Officer.
3. The Catapult Officer shall compare the basic weight on the weight chit to that on the status board. Any difference between the two shall be resolved prior to launching the aircraft.

4.3.3.3 Fuel Weight

1. The Aviation Fuels Officer (V-4) shall maintain a current fuel status board in Flight Deck Control. The status board shall display the side number of all aircraft onboard and the fuel status of each.
2. The Catapult Officer shall compare the fuel weight on the weight chit to that on the status board. Any difference between the two shall be resolved prior to launching the aircraft.

DATE	SQUADRON	EVENT #	TIME
SIDE NO			
BASIC WT			
FUEL			
ORD/EXT			
GROSS WT			
OTHER			
SIGNATURE			

Figure 4-1. Sample Acceptable Weight Chit

4.3.3.4 Ordnance/External Stores

1. Ordnance/external stores weight shall include all ordnance, external tanks, buddy stores, and all other items not included in basic weight.
2. The Catapult Officer shall compare the ordnance/external stores weight on the weight chit to that on ordnance status board maintained by the Air Wing Ordnance Officer or to ordnance chits submitted by squadron ordnance personnel. Any differences shall be resolved prior to launching the aircraft.

4.3.4 Pre-Launch Procedures

The following procedures shall be adhered to; however, the timeframes provided are recommendations only and may be modified to suit individual carriers and situations.

1. Preparations for the launch should commence approximately 45 minutes prior to the scheduled launch time. At this time, the following actions shall take place:
 - a. Squadron representatives shall deliver completed weight chits to Flight Deck Control.
 - b. Catapult Officer(s) shall report to Flight Deck Control and shall:
 - (1) Ascertain side numbers of all aircraft on launch.
 - (2) Verify the aircraft weight chits by comparing listed weights with status boards, and by checking addition.
 - (3) Make a list of gross weights to be used by the Weight Board Operator.
 - (4) Obtain from meteorology the current density altitude.
 - (5) Determine the maximum and minimum wind-over-deck (WOD) requirements and crosswind limits and inform the Air Officer of same.
 - (6) Attend the flight deck brief to obtain the anticipated launch sequence and any other situational requirements.
 - (7) Ensure Catapult Deck Edge Operator has an unobstructed line-of-sight (forward and aft) of catapult launching area.
2. Thirty minutes prior to the launch, the launch crews shall man their stations, conduct a voice communication system check, and perform any other pre-launch actions that may be required of their stations. In particular:
 - a. Catapult Safety Observer/Topside Safety Petty Officer shall:
 - (1) Ensure slot seals are removed and properly stowed.
 - (2) Ensure all slot buttons are removed and accounted for.

- (3) Inspect the catapult track after all obstructions and all slot seals are removed and inspect for FOD and/or loose gear. Completion of inspection shall be reported to the launching officer.
 - (4) Inspect and ensure that there is an adequate supply of deck gear and accessories.
 - b. Catapult Console Operator/Central Charging Panel Operator shall verify the steam plant lineup and inform the Centerdeck Operator/ICCS Monitor for relay to the Catapult Officer.
 - c. Centerdeck Operator/ICCS Monitor shall ensure availability of proper launch charts and equipment including an extra set of Catapult Officer wands at night.
3. Upon completion of the flight deck brief in Flight Deck Control, the Catapult Officer shall:
- a. Inspect the catapults.
 - b. Give Weight Board Operator the side numbers and gross weights of all aircraft to be launched, and inform Centerdeck Operator/ICCS Monitor as to what temperature launch charts shall be used.
 - c. Brief the topside crew on the anticipated number and sequence of aircraft to be launched, and on special procedures or circumstances that are anticipated.
 - d. Ensure all stations are manned.

4.3.4.1 Catapult Inspections

Each Launch Officer/Catapult Safety Observer shall ensure that each of the following is performed on the catapults. Precise sequence and method of accomplishment are left to the individual. Catapult inspections should be completed not later than 5 minutes prior to the launch.

1. Bow Catapults.
 - a. Inspect jet blast deflector panels for signs of leaks and distortion.



- Jet blast deflectors shall be raised or lowered only after it has been positively determined that there are no obstructions in the raising or lowering arc of the JBD panels. If clearance cannot be positively determined by visual inspection, take the necessary actions to have obstruction removed prior to raising or lowering JBD panels.
 - Jet engine exhausts directed at the jet blast deflectors without cooling water running through the panels can result in thermal expansion inducing warping and cracking that result in leaks. The cooling water should be running through the water-cooled jet blast deflector panels prior to launch.
- b. Ensure holdback units are in good condition in accordance with PMS cards, and that sufficient numbers of accessories are present for launch requirements.
 - c. Inspect nose gear launch equipment for FOD, security and leaks.
 - d. Ensure all deck accessories are properly stowed and that a sufficient number are present for launch requirements.



Prop tip vortices created by the E-2/C-2 and other prop aircraft can draw objects up into the prop arc. Ensure a clear area of at least 10 feet is maintained around prop arcs.

- e. After receiving positive confirmation on catapult track inspection from the Catapult Safety Observer/Top-side Petty Officer, the Launching Officer shall walk the catapult track and surrounding areas looking for proper stowage of slot seals, FOD, and/or loose gear.

WARNING

During night operations, the track shall be walked after the area is clear of all aircraft, including helicopters and squadron personnel.

- f. Ensure all whip and/or fan antennas are down and locked.
- g. Check spreader pin, side plates, set screw (turtleback pin, spring, and setscrew) for security. For three-piece shuttle spreaders, a horizontal paint marking/strip in contrasting color, approximately 2 1/4" × 1/4" in dimension, shall be stenciled across sideplate screws to provide quick visual indication of backing-out or loosening of screw(s).
- h. Check catapult elongation (when launching/recovery operations permit).
- i. Check safety nets for FOD and personnel.
- j. Check centerdeck equipment and launch charts, and verify anemometer readings with Primary Flight Control.
- k. Ensure AESS hatches are closed and secured.

WARNING

Under no circumstances shall the Launching Officer participate in the removal of protective devices from the catapult track (slot seals or slot buttons). The Launching Officer's primary function prior to launch is as a final inspector. Participation in the removal of such items compromises the final inspector's role.

- l. Ensure that all catapult track slot seals have been removed and properly stowed.
 - m. When launching Catapult No.1 utilizing deckedge mode, ensure the high point area are clear of unnecessary personnel and gear to allow unobstructed view between catapult shooter, deckedge operator, and associated catapult status indicator lighting during launching evolution.
 - n. Completion of the proper preflight inspection shall be reported to the tower via flight deck communication system or by phone/messenger if EMCON is in effect.
2. Waist Catapults. The inspection procedure for the waist catapults is essentially the same as that for the bow catapults. There are some important differences and inherent dangers that pertain to the waist catapults.
- a. Walking the waist catapult tracks can become very hazardous because aircraft, abeam the island and/or on the tracks themselves are starting, and their heat and jet blast present a potential personnel injury hazard.
 - b. The area around the waist catapults is more susceptible to FOD. This FOD quickly becomes a missile hazard during the launch; therefore, it is extremely important to be continuously on the lookout for FOD or FOD-producing situations.
 - c. All slot buttons shall be accounted for prior to movement of shuttle. A minimum of 12 is required on all ships.

4.4 LAUNCH PROCEDURES (SEQUENCE OF EVENTS FOR NORMAL OPERATIONS)

Note

Aircraft handling signals are contained in the Aircraft Signals NATOPS Manual, NAVAIR 00-80T-113. These signals shall be given in a positive, clear, and precise manner.

4.4.1 Commencing Launch Cycle

1. The Air Officer shall direct the Catapult Officers, Flight Deck Officer, and other flight deck personnel to commence preparations for the launch when aircraft starts are called away.
2. At this time, tiedown chains and chocks shall be removed, Aircraft are taxied to the catapults and shuttles retracted upon signal from the Catapult Officer.

WARNING

- Aircraft tiedown rings shall be checked to be in the proper flush/retracted position.
- Shuttles shall not remain in battery for more than 5 minutes. Condensation in launch cylinders may cause a slow shot. If shuttle is in battery for more than 5 minutes, it shall be advanced and retracted again prior to launching aircraft.

4.4.2 Confirming Aircraft Gross Weight

As each aircraft approaches the catapult, the Weight Board Operator shall show the pilot/NFO the computed gross weight of the aircraft. The pilot/NFO shall verify and confirm the gross weight by giving a thumbs-up signal (day) or a circular motion with a flashlight (night). A thumbs-down or negative signal shall not be used to indicate disagreement with the weight. If the pilot/NFO does not agree with the gross weight, he shall signal as follows:

1. Day.
 - a. To raise gross weight, hold hand flat with palm up and slowly move in a vertical direction, emphasizing the upward motion.
 - b. To lower gross weight, hold hand flat with palm down and slowly move in a horizontal direction.
2. Night.
 - a. To raise gross weight, slowly move flashlight in a vertical direction, emphasizing the upward motion.
 - b. To lower gross weight, slowly move flashlight in a horizontal direction.

Note

- The weight board shall be changed in 500- or 1,000-pound increments in accordance with applicable launch bulletins.
 - For F/A-18 E/F/G aircraft, weight requirements may need to be changed in 100-pound increments. In order to accomplish this, pilot/NFO shall use above procedures utilizing “rapid” movements of signals.
3. When more than two corrective steps are required on the weight board or any difficulty is experienced in confirming the gross weight, the aircraft shall not be launched until positive determination can be made by the Air Officer and confirmed by the pilot and Catapult Officer.

4. Once the weight of the aircraft is confirmed by the pilot/NFO, the Weight Board Operator shall show the weight board to the Catapult Officer, Centerdeck Operator, and Deckedge Operator (JBD Operator for ICCS).
 - a. The Centerdeck Operator, Deckedge Operator, or JBD Operator shall in turn relay this weight to the Console Operator/CCP Operator and Recorder.
 - b. The Console Operator/CCP Operator shall use this weight in confirming the Catapult Officer's desired CSV setting using applicable launch charts.
5. The Weight Board Operator shall display the weight board to the Catapult Officer until he receives a positive acknowledgement that the weight has been noted.

Note

- One weight board is required per catapult. Once the aircraft weight is confirmed, the weight board operator shall not change the weight displayed until the aircraft is off the catapult.
- When acquiring weight confirmation from the pilot, the weight board operator should be positioned next to the aircraft director, remaining within the pilot's field of view.

4.4.3 Determining CSV Setting

1. After retracting the shuttle and while the aircraft is being spotted on the catapult, the Catapult Officer shall determine the proper CSV setting. Factors to be considered are the following:
 - a. Wind over the deck.
 - b. Proper launch chart for aircraft, configuration, and temperature.
 - c. Cylinder-elongation correction (per ALB).
 - d. Density altitude correction (per ALB).
2. Use of preheat/trough heat is recommended to maintain proper catapult cylinder elongation in accordance with applicable ALB. Once the CSV setting has been determined, the Catapult Officer shall ensure that the setting is entered in the CSV command selector and that the setting matches the Console/CCP Operator's position readout.

WARNING

(Deckedge Mode.) The Console/CCP Operator, upon receiving type aircraft, weight, and wind over deck, shall independently verify desired command CSV setting prior to depressing the CSV setting pushbutton. Under no circumstance shall the position indicator match the command readout until absolutely verified that desired command setting is correct for type aircraft. If there is any doubt, the Console Operator shall not depress the CSV pushbutton; instead shall SUSPEND, until resolution of the CSV disagreement is corrected.

3. The Commanding Officer shall make the decision to launch aircraft if the following situation exists:
 - a. Catapult CSV operating in the defeat interlock mode.
 - b. When the catapult will be fired from the below decks emergency panel.
 - c. When aircraft will be launched with less than 10 knots excess. The pilot shall also be notified of the intended excess.
 - d. When Jet Blast Deflectors cannot be raised.

4. (Non-ICCS) The Console Operator, using his launch charts and launch information relayed via voice communication system, shall verify the CSV setting over the voice communication system prior to pushing CSV setting pushbutton.
 - a. The Console Operator shall verify the position and mechanical CSV reading match prior to selecting First Ready.
5. (ICCS Deckedge Mode) The CCP Operator, using his launch charts and launch information relayed via voice communication system, shall verify the desired CSV setting over the phones and then verify the matching of the position and mechanical CSV readings.

Note

The Deckedge Operator shall not give the Cat Ready signal until the CSV match is verified by the CCP Operator.

6. Once the CSV setting has been verified, the Console/CCP Operator shall ensure steam pressure is maintained until the catapult is fired. If, for any reason, he is unable to maintain proper steam pressure prior to firing the catapult, he shall suspend at once.
7. The Console/CCP Operator shall monitor the water level (wet receivers), hydraulic pressure, and steam pressure. He shall suspend if they are out of operating limits.

4.4.4 Ordnance Arming

When an aircraft carrying ordnance requires arming, the aircraft shall be taxied into the arming area. Aircraft shall be stopped prior to positioning the launch bar over the shuttle; JBD's shall be in the raised position and aircraft properly configured for flight. The director shall ensure that all personnel are clear and then shall direct the aircrew's attention to the Ordnance Safety Petty Officer for arming. Additional information is provided in [Chapter 11](#).

WARNING

- Aircraft shall not have launch bar over the shuttle until the aircraft is armed and properly configured for flight.
- If the launch is suspended after forward firing weapons have been armed, ensure that those weapons are de-armed prior to a pushback/breakdown of the aircraft, or when the area in front of the aircraft cannot remain clear until the launch.

4.4.5 Crosswind Launch

Crosswind launches shall be conducted in accordance with Aircraft Launching Bulletin No. 0-15 series.

4.4.6 Waist Catapult Launch Restrictions

1. Waist catapult launches shall be conducted in accordance with Aircraft Launching Bulletin No. 0-16 series.
 - a. Copies of GO/NO GO charts shall be provided at the following stations:
 - (1) Centerdecks.
 - (2) Catapult 2, 3, and 4 deckedges.
 - (3) Primary Flight Control.
 - (4) Flight Deck Control/V-1 Division.

- (5) Bow/Angle Safety Observer.
- (6) Bow/waist ICCS Launching Officers.
- (7) Bow/waist ICCS Monitor.

2. Operating Procedures.

- a. It is essential that all personnel concerned have a general knowledge of these restrictions and have GO/NO GO charts readily available for reference during launch operations.
- b. Prior to each launch series, the Catapult Officer/Catapult Safety Observer shall sight down the catapult launch/shot lines to ensure no personnel or equipment obstruct shot lines. Waist Catapult Bow/Angle Safety shall not give thumbs-up or green light without ensuring compliance with applicable GO/NO GO charts.
- c. Launch bar shall not be in throat of shuttle any time deck is fouled.
- d. During night operations, the Bow Catapult Officer shall inform the Waist Catapult Officer of a foul deck situation.
- e. The Air Officer shall monitor and, if necessary, SUSPEND the applicable catapult(s) whenever a foul deck situation arises during launch operations.

4.5 LAUNCHING AIRCRAFT (CONVENTIONAL/ICCS DECKEDGE MODE)

4.5.1 Taxiing/Spotting Aircraft on Catapults

- 1. When positioning an aircraft on the catapult, the Director shall be acutely aware of the activities of the catapult crew, and shall control the aircraft's speed and movement in such a way that personnel safety will not be jeopardized.
 - a. Pilots shall guard against the tendency to use excessive power, which invariably results in roughness and poor control and makes accurate catapult spotting difficult.
 - b. As the aircraft approaches the catapult, the Director shall signal the pilot to lower flaps.
 - c. Jet Blast Deflectors shall be raised as appropriate when the tail of the aircraft is clear of the arc of JBDs.

WARNING

- If a JBD cannot be raised, the Commanding Officer's approval is required for continued catapult operation.
- Personnel shall not work or transit immediately behind a JBD with aircraft at launch power on the catapult.
- During simultaneous recovery and Catapult No. 2 operations, deck-edge mode, the Catapult No. 2 Deckedge Operator and JBD Operator (if applicable) are authorized to man the deckedge station for operations and shall not be considered fouling the landing area. The Deckedge Operator and JBD Operator shall be aware and alert during recovery operations.



Often aircraft on catapult No. 4 block the view of the No. 3 JBD Operator. All JBD Operators/Safety Observers shall ensure aircraft clearance is sufficient prior to raising or lowering a JBD. Catapult No. 3 requires a JBD Safety Observer at all times. Bow catapults utilizing JBD deckedge control boxes require one JBD Safety Observer per catapult. JBD Safety Observers shall be positioned on the side of the JBD farthest away from JBD Operator.

2. As the aircraft is positioned on the catapult, the squadron Plane Checkers shall inspect the aircraft to ensure it is properly configured and ready for flight.



Aircraft shall not be taxied across the shuttle or reach a position where the launch bar can engage the spreader until the aircraft is ready for flight in all respects. This includes gross weight confirmed, wings spread and locked, flaps set, ordnance armed, green beacon, CSV set, and the catapult in first ready/cat ready.

3. The Director shall stop the aircraft at the lead-in track wye area.
 - a. He shall then signal the pilot to Disengage Steering by touching the end of his nose with his forefinger and then sweeping his arm downward in the direction of intended aircraft movement.
4. The Holdback Operator shall inspect the RRHB for proper reset indications prior to installation on each aircraft.
5. The Holdback Operator shall install the holdback bar and check the tension bar/release unit for the proper seating position (not cocked).



An incorrectly installed holdback bar may cause premature release during tensioning or when full thrust of the aircraft is applied.

6. The Director shall then give the Lower Launch Bar signal to the pilot upon direction of the TSPO.



Holdback bars and/or launch bars shall not be installed/lowered before the aircraft reaches the lead-in wye area. Excessive wear or burring may occur as the bars pass over the nonskid, or the bars may hang up in the track. If an imbalance of the bar occurs, equipment damage or personnel injury may result.

7. As the aircraft is taxied forward, the TSPO shall ensure the launch bar is properly positioned and the buffer slider is in its full aft position.

WARNING

To avoid possibility of premature tension bar failure, do not actuate “BUFFER FWD” or “BUFFER AFT” pushbuttons during the aircraft buffer stroke.

CAUTION

Aircraft taxi speed shall not exceed 4 mph while approaching the buffer.

8. Prior to taxiing aircraft over the shuttle (launch bar on top of shuttle), the TSPO shall re-verify positive reset indication of RRHB. Positive RRHB reset is only established when the following conditions exist:
 - a. Strain release rod groove is completely visible.
 - b. Spring retainer groove is partially covered by housing.
 - c. Painted stripe area is completely covered from view.

Note

TSPO shall indicate to Catapult Shooter/Safety Observer that the RRHB has been inspected by providing a thumb’s up signal during the day and vertically raised white stubby wand at night.

9. The Director shall direct the pilot to taxi slowly over the shuttle spreader upon TSPO signal.
10. If aircraft strut(s) must be extended, the Director shall signal the pilot to extend struts.

4.5.2 Tensioning Aircraft

1. Two minutes prior to the launch, the Catapult Officer shall signal to the pilots, directors, and catapult crews, “TWO MINUTES” by pointing to his wrist and extending two fingers.
 - a. Deckedge Operators shall pass the word to their respective crews via voice communication system.
 - b. From that time until the end of the launch, strict voice communication system discipline shall be maintained.
2. Upon receiving the 2-minute warning, the Console Operator/CCP shall check all operating indications.
 - a. When satisfied all conditions are normal and, if applicable, select FIRST/CAT READY.
 - b. Pass the word “FIRST READY/CAT READY.”
3. The Deckedge Operator, upon observing the FIRST READY/CAT READY light and hearing the word passed, shall give the FIRST READY/CAT READY signal, one hand raised high over head with forefinger extended, to all topside personnel.
4. The Catapult Officer shall signal the TSPO to tension the aircraft.

WARNING

When launching from the waist catapults, the GO/NO-GO chart shall be consulted prior to tensioning each aircraft. Catapult officers shall not attempt to memorize criteria. Aircraft on waist catapults shall not be put in tension as long as no-go situation exists.

5. Prior to taking tension, the TSPO shall ensure:
 - a. Aircraft is properly configured for flight.
 - b. Catapult is in FIRST READY/CAT READY.
 - c. JBDs are raised and personnel are properly positioned.
 - d. Only the Topside Petty Officer and UI (if applicable) are under the aircraft prior to taking tension.
 - e. Check for a clear deck forward.

WARNING

Aircraft tiedown rings shall not be used as a handle while placing aircraft in tension.

Note

For Case III launches, the Catapult Officer shall maintain absolute control of the launch sequence; therefore, aircraft shall NOT be tensioned except upon signal from the Catapult Officer.

- f. Ensure bow/angle lights are green.

Note

If bow/angle lights are inoperable a visual confirmation of a clear deck is defined as thumbs up (day) or green wand (night) by the safety operator.

6. Once all requirements are met, the TSPO shall signal to the Director to TAKE TENSION by sweeping one arm and pointing forefinger (day), white stubby flashlight (night), in forward direction of launch and held until tension is taken.
7. The Director, upon observing the TAKE TENSION signal from the TSPO, shall signal the pilot to HOLD BRAKES.
8. The Director shall check forward and aft of the shot line, ensure that JBDs are raised, and all personnel (director included) in the vicinity of the launching aircraft are laterally clear, then signal the pilot to RELEASE BRAKES and Deckedge Operator to TAKE TENSION.

CAUTION

Aircraft directly behind the JBD shall be positioned and properly configured for military-rated power of the launching aircraft.

- a. He shall hold the tension signal until passing control to the Catapult Officer.
- b. The Deckedge Operator shall depress BRIDLE TENSION on the Director's tension signal.
9. As the Deckedge Operator presses BRIDLE TENSION, he shall verbally relay the message to the Console/CCP Operator via the voice communication system, saying the words "TAKING TENSION"; these shall be the last words passed until after the aircraft is launched.
10. Immediately after taking tension, the Deckedge Operator shall return the FIRST READY/CAT READY signal.
11. After tension is taken, the TSPO shall inspect the launch bar seating in the spreader, and inspect the seating of the tension bar/repeatable release element prior to exiting from under the aircraft, and giving the Catapult Officer a thumbs up.

WARNING

It is mandatory to positively determine that the aircraft launch bar is properly seated in the nose gear launch shuttle spreader as shown after tension is taken (see [Figure 4-2](#)). Mispositioning of the aircraft launch bar can result in the launch bar separating from the shuttle spreader during launch. F/A-18 aircraft shall not be launched with improper or missing launch bar paint schemes.

12. If all is satisfactory, the TSPO shall exit from under the aircraft, giving a thumbs-up signal (day) or holding a steady white stubby wand (night) vertical.
 - a. The signal shall be held until the aircraft is launched.
 - b. If anything is wrong, the TSPO shall exit from under aircraft immediately and give the suspend signal.

4.5.3 Launch

1. As the ship approaches the launch course, the Air Officer shall monitor the wind velocity.
 - a. Upon receiving permission from the bridge to launch aircraft, Air Officer shall make a final check to ensure the relative wind is within the envelope prescribed in the applicable launching bulletin. This shall be accomplished before changing the rotating beacon(s) from red/amber to green, thereby clearing the Catapult Officer to begin launching.
2. The Centerdeck Operator shall closely monitor the anemometer, ensuring it is within operating limits as established by the Catapult Officer.
 - a. If all indications are within limits, the Centerdeck Operator shall signal by holding a thumbs up (day) or steady white stubby wand (night) vertical.
 - b. If not, he shall give the suspend signal.
3. Prior to taking control of the aircraft, the Catapult Officer shall:
 - a. Observe a green rotating beacon.
 - b. Check the wind and crosswind conditions.
 - c. Verify CSV setting.
 - d. Check off-center distance and aircraft alignment.
 - e. Check nose wheel cock.
 - f. Observe deck pitch.
 - g. Ensure JBDs are raised and all personnel are clear of aircraft, jet exhaust, or prop wash.
 - h. Check wing and tail locks.
 - i. Check appropriate flap, slat, and trim settings.
 - j. Ensure applicable canopies closed and locked.
 - k. Ensure landing gear, ejection seat, and ordnance safety pins are removed.
 - l. Ensure access panels are secured.
 - m. Observe thumbs up (day) or steady vertical white stubby wand (night) from TSPO.

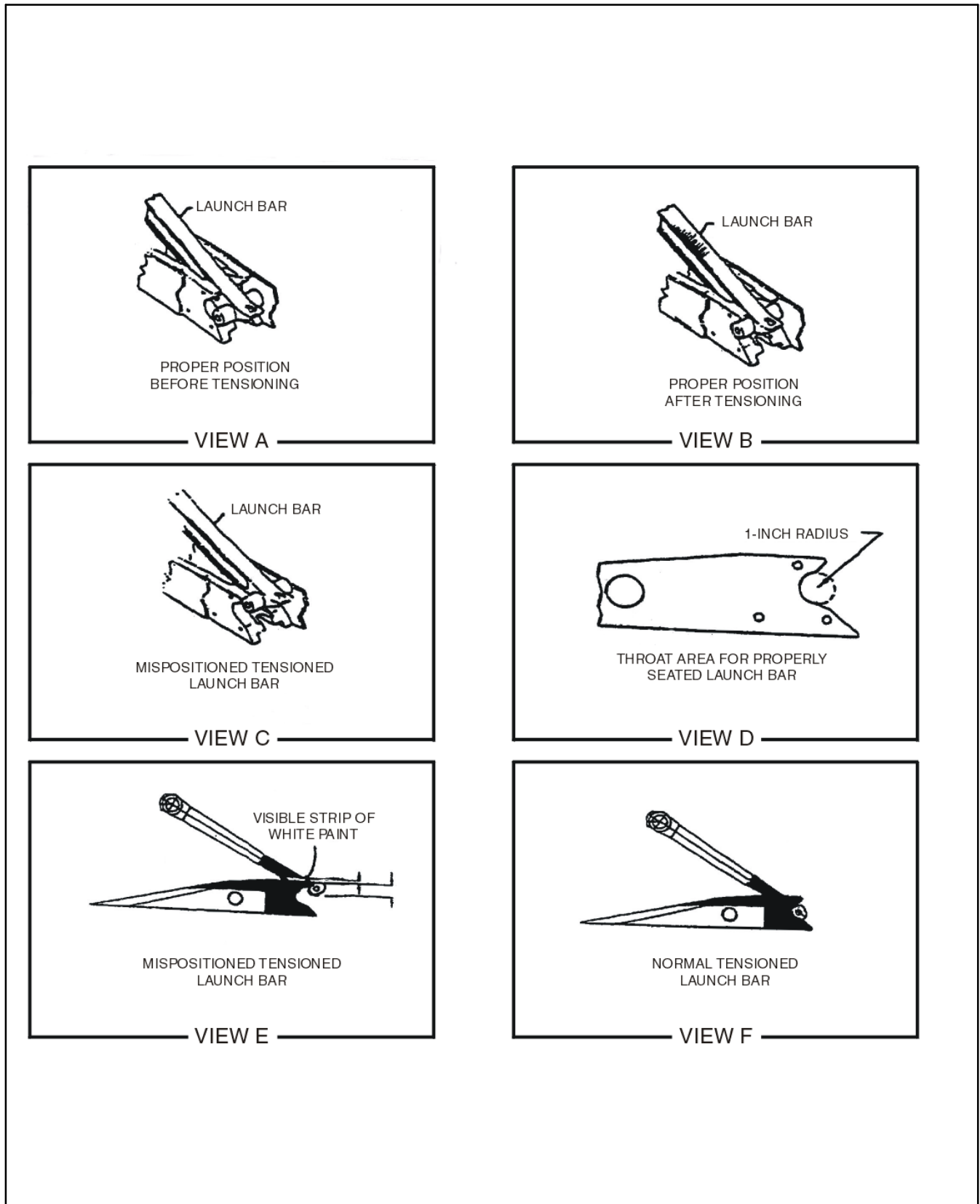


Figure 4-2. Proper Positioning After Tensioning

4. When all these conditions have been met and the Catapult Officer considers the aircraft and catapult ready for launch, he shall accept control of the aircraft from the Director.

WARNING

The Director shall not pass control of the aircraft until all personnel are clear of the aircraft.

5. Once the Catapult Officer has control of the aircraft, he shall give the FINAL TURNUP signal.
6. The pilot, upon seeing the FINAL TURNUP signal, shall apply full military power as prescribed in the applicable NATOPS flight manual. Pilots shall keep their feet off the brakes.

WARNING

In the event of a suspend, the Catapult Officer shall not signal the pilot to throttle back until he has positively determined that the catapult shuttle is forward of the launch bar. If the launch bar cannot be raised without sending personnel under the turned-up aircraft, an emergency condition exists. The Catapult Officer shall positively determine that the catapult is in a SAFE condition, then give pilot the THROTTLE BACK signal to permit safe removal of the aircraft.

7. The Deckedge Operator, upon observing the FINAL TURNUP signal, immediately presses the STANDBY/MIL PWR pushbutton.
 - a. As soon as the STANDBY/MIL PWR light comes on at the deckedge control panel, he holds two fingers overhead.

Note

When catapults are being operated as interlocked pairs, the first catapult to reach STANDBY/MIL PWR shall be fired or suspended before the other catapult can attain STANDBY/MIL PWR.

8. For non-ICCS ships, the Console Operator, observing the STANDBY light on, immediately checks all gauges and lights, and shall verify the position of the CSV by comparing the position readout on the console with the mechanical counter on the CSV. If everything is satisfactory, he places the catapult in FINAL READY.

WARNING

Silence shall be maintained on voice communication system from the time the taking tension is passed until the launch has been completed, or if a suspend or hangfire occurs, in order that signals between stations are not misinterpreted.

9. For non-ICCS ships, when the catapult is in FINAL READY and the Deckedge Operator observed the FINAL READY (red) light, he signals the catapult is in FINAL READY by raising both arms overhead with hands open. This action also prevents him from inadvertently depressing the FIRE pushbutton.

WARNING

The Deckedge Operator shall not lower his hands for any reason other than to depress the FIRE or SUSPEND pushbutton.

10. For non-ICCS ships, if the launch is to be made at Combat Rated Thrust (CRT), the Catapult Officer, upon observing that the catapult is in FINAL READY, shall give the CRT/AFTERBURNER signal.
11. For ICCS ships using Deckedge Mode, when the CCP Operator observes the military power light on, he shall check all gauges and lights.

WARNING

Silence shall be maintained on the voice communication system from the time BRIDLE TENSION pushbutton is pressed until launch is completed or a suspend/hangfire occurs.

12. For ICCS ships using Deckedge Mode, if CRT is required, the Catapult Officer gives the CRT signal.
 - a. The Deckedge Operator then shall press the combat power pushbutton.
13. For ICCS ships using Deckedge Mode, after the Catapult Officer salutes the pilot, the Deckedge Operator shall depress the FINAL READY pushbutton.
 - a. After observing the final ready light, the Deckedge Operator shall give the final ready signal.

WARNING

The Deckedge Operator shall not lower his hands for any reason other than to depress the FIRE or SUSPEND pushbuttons.

14. The squadron Plane Checkers shall position themselves so they may observe the lighting of the afterburners and normal nozzle action.
 - a. The Plane Checkers shall withhold giving the thumbs up (day) or steady vertical blue stubby wand (night) signal until all conditions are normal.
 - b. Should an afterburner fail to ignite, the Plane Checker shall give the SUSPEND signal.

15. With the aircraft at take-off power, the pilot shall make his final checks. If everything is satisfactory, he shall position his head against the seat headrest and shall indicate he is ready by turning his head slightly toward the Catapult Officer and by executing a right- or left-hand salute.
- a. If, for any reason, the pilot desires to abort the launch, he shall so indicate by transmitting "SUSPEND, SUSPEND CATAPULT NO. _____," and by shaking his head negatively (day) and not turning on the navigation lights (night).
 - b. In such cases the Catapult Officer shall SUSPEND.

WARNING

- Once the aircraft is tensioned on the catapult and turned up to take-off power, the pilot shall not adjust his visor nor make any other movement that might be mistaken for a salute until he is ready to be launched.
 - The Air Officer shall not rely on changing rotating beacons from GREEN to RED to suspend the launch, but shall activate the SUSPEND pushbutton.
16. Upon receiving the pilot's salute (day) or navigation lights on (night), but before giving the signal to FIRE, the Catapult Officer shall return the salute (day) or extend a green wand overhead (night) and:
- a. Check for a green rotating beacon.
 - b. Make a final scan of the aircraft.
 - c. Check the position of the flight controls.
 - d. Ensure the aircraft sounds normal at take-off power.
 - e. Ensure the catapult is still in final ready.
 - f. Check the Centerdeck Operator for a thumbs up (day) or steady white stubby wand (night) held vertically, indicating wind is within limits.
 - g. Check squadron Plane Checkers for a thumbs up (day) or steady blue stubby wand (night) held vertically.
 - h. Check TSPO for a thumbs up (day) or steady white stubby wand (night) held vertically.
 - i. If the deck is pitching, the launch shall be timed and the fire signal given so that the deck will be level, pitching up, or at the top of the pitch cycle at the completion of the catapult power stroke.
 - j. Check for airborne aircraft traffic (waveoff, bolter, etc.) to preclude the possibility of collision between the airborne and the launching aircraft.
 - k. Check Bow/Angle Observer for GO signal.

WARNING

Timing will vary with the cycle of the deck, and type of aircraft. Deckedge Operators and pilots shall be briefed to not change procedures in an attempt to time the shot themselves.

17. When the Catapult Officer determines the catapult, aircraft, and pilot are ready in every respect, he shall give the signal to FIRE the catapult by sweeping his raised hand down in the direction of the launch, touching the deck, and returning his hand to the horizontal position in the direction of launch.

WARNING

- The Catapult Officer and all personnel in the vicinity of the launching aircraft shall remain clear or in the crouched position and laterally clear until the signaled aircraft has passed their position or until the Catapult Officer has executed a SUSPEND/HANGFIRE and the catapult is safe.
 - All personnel except centerdeck operator in the vicinity of launching aircraft shall remain in a position prohibiting the aircraft wing from passing over them during an aircraft launch.
18. The deck edge operator, upon observing the catapult officer touch the deck and returning his hand to the horizontal position in the direction of the launch shall check the deck, aircraft, and catwalk (forward and aft) noting the safeties (bow/angle) signal, thumbs up (day) or green wand/light (night), then lower hand and depress the fire push button.

WARNING

The Deckedge Operator shall not anticipate the FIRE signal, as the Catapult Officer or topside personnel may initiate a SUSPEND at any time prior to the Deckedge Operator depressing the FIRE pushbutton.

19. If any deficiency in aircraft hook-up is noted by the Deckedge Operator or if the deck and catwalk forward areas are not clear, he shall not FIRE but SUSPEND and notify the Catapult Officer of the deficiency.
 - a. Anytime the Deckedge Operator suspends, he shall signal SUSPEND by crossing arms (day) or holding red wand vertical overhead (night), to the Catapult Officer.

WARNING

- The Catapult Officer, after touching the deck, shall monitor the pilot for any signs of a SUSPEND. At night, he shall monitor the navigation lights ensuring they remain on.
- It is extremely important that all personnel stationed in the catwalk remain as low as possible and attempt to hug the inboard catwalk bulkhead when the catapult is fired. This position will offer the most protection from the jet blast and potential objects that may fall off the aircraft.

4.5.4 Launch Complete

WARNING

During normal operations, never press the LAUNCH COMPLETE pushbutton following a SUSPEND. Except for no-load launches and in cases where it is known positively that a launch is complete, the LAUNCH COMPLETE pushbutton shall be pressed only with permission of the Catapult Officer.

1. After ensuring the launch is complete, the Console/CCP Operator shall prepare for the next launch.
 - a. The Deckedge Operator, after ensuring the track is clear, shall retract the shuttle.
2. Subsequent aircraft shall be spotted and tensioned as rapidly and safely as possible.

4.6 LAUNCHING AIRCRAFT (ICCS)

4.6.1 Taxiing/Spotting Aircraft on Catapults

1. When positioning an aircraft on the catapult, the Director shall be acutely aware of the activities of the catapult crew, and shall control the aircraft's speed and movement in such a way that personnel safety will not be jeopardized.
 - a. Pilots shall guard against the tendency to use excessive power, which invariably results in roughness and poor control and makes accurate catapult spotting difficult.
 - b. As the aircraft approaches the catapult, the Director shall signal the pilot to lower flaps.
 - c. Jet Blast Deflectors shall be raised as appropriate when the tail of the aircraft is clear.

WARNING

- If a JBD cannot be raised, the Commanding Officer shall authorize the catapult's use.
- Personnel shall not work or transit immediately behind a JBD with aircraft at launch power on the catapult.

CAUTION

Often aircraft on Catapult No. 4 block the view of the Catapult No. 3 JBD Operator. All JBD Safety Observers/Operators shall ensure aircraft clearance is sufficient prior to raising or lowering a JBD.

2. As the aircraft is positioned on the catapult, the squadron Plane Checkers shall inspect the aircraft to ensure it is properly configured and ready for flight.

WARNING

Under normal operating conditions, aircraft shall not be taxied to a position where the launch bar can engage the spreader until the aircraft is ready for flight in all respects. This includes gross weight confirmed, wings spread and locked, flaps set, ordnance armed, green beacon, CSV set, and the catapult in first ready/cat ready.

3. The Director shall stop the aircraft at the lead-in track wye area. He shall then signal the pilot to Disengage Steering by touching the end of his nose with his forefinger and then sweeping his arm downward in the direction of intended aircraft movement.
 - a. The Holdback Operator shall inspect the RRHB for proper reset indications prior to installation on each aircraft.
 - b. The Holdback Operator shall install the holdback bar and check the tension bar/release unit for the proper seating position (not cocked).
4. The Director shall then give the Lower Launch Bar signal to the pilot upon direction of the TSPO.

WARNING

Holdback bars and/or release units should not be installed/lowered before the aircraft reaches the lead-in wye area. Excessive wear or burring may occur.

5. As the aircraft is taxied forward, the TSPO shall ensure the launch bar is properly positioned and that the buffer slider is in its full aft position.

WARNING

To avoid the possibility of premature tension bar failure, do not actuate “BUFFER FWD” or “BUFFER AFT” pushbuttons during the aircraft buffer stroke.

CAUTION

Aircraft taxi speed shall not exceed 4 mph while approaching the buffer.

6. Prior to taxiing aircraft over the shuttle (launch bar on top of shuttle), the TSPO shall re-verify positive reset indication of RRHB. Positive RRHB reset is only established when the following conditions exist:
 - a. Strain release rod groove is completely visible.
 - b. Spring retainer groove is partially covered by housing.
 - c. Painted stripe area is completely covered from view.

Note

TSPO shall indicate to Catapult Shooter/Safety Observer that the RRHB has been inspected by providing a thumb's up signal during the day and vertically raised white stubby wand at night.

7. The Director shall direct the pilot to taxi slowly over the shuttle spreader upon TSPO signal.

WARNING

An incorrectly installed holdback bar can cause premature disengagement during tensioning or when full thrust of the aircraft is applied.

4.6.2 Tensioning Aircraft

WARNING

- When the Catapult Officer observes the aircraft type, weight, and side number, he determines the capacity selector valve setting desired. He shall relay this information to the CCP Operator for confirmation via the ICCS monitor, who shall check the applicable Launching Bulletin. If the setting desired by the Catapult Officer is correct, the CCP Operator shall press the CSV setting pushbutton. If a mismatch occurs with the command setting and any remote readout, the Catapult Officer/CCP Operator shall suspend and down the catapult until the malfunction is corrected.
 - Operation of the catapult in the defeat interlock mode shall be accomplished only with the Commanding Officer's permission. If the defeat interlock mode is used, instructions delineated in the applicable catapult operations manual (NAVAIR 51-15 ABB Series) shall be followed.
1. If the Monitor observes a red malfunction or status light, or the catapult area fouled, he shall press the suspend pushbutton and notify the Catapult Officer.
 2. The CCP Operator shall continually check his panels and ensure that all lights and readouts indicate a "go" condition. If a "no-go" condition exists, he shall press the suspend pushbutton and notify the Monitor.
 3. When all conditions are satisfactory prior to tensioning aircraft, the green CAT RDY light at the Catapult Officer's Console and white lights at the CCP and Monitor's station shall be illuminated. If the CAT RDY lights are not illuminated, the cause shall be investigated and corrected.

WARNING

If the cat ready condition is lost even momentarily, the catapult officer, monitor or CCP operator shall suspend the catapult and determine the cause. When the condition causing the loss of cat ready has been corrected, the suspend shall be removed. At no time shall the catapult officer place the catapult in tension without first reconfirming the CSV setting and ensuring a cat ready condition exists.

4. Prior to signaling the Catapult Safety Observer to initiate the hook-up, the Catapult Officer shall ensure:
 - a. The CSV is set in accordance with the appropriate launching bulletin.
 - b. Check for a clear deck forward.
 - c. Wind over the deck and crosswinds are within limits and in accordance with applicable launch bulletins.
 - d. Green rotating beacon.
 - e. In CAT RDY.
 - f. Aircraft configured for flight.
 - g. The "catapults interlocked" light is illuminated unless intentionally operating in the "catapults not interlocked" mode.

- h. GO/NO GO charts are reviewed.
- i. When all conditions are satisfactory, the Catapult Officer shall signal the Catapult Safety Observer to hook up the aircraft.

Note

For Case III launches, the Catapult Officer shall maintain absolute control of the launch sequence, and aircraft shall not be tensioned except upon the Catapult Officer's signal.

- 5. After receiving the hook-up signal from the Catapult Officer, and prior to signaling the TSPO to initiate hook-up, the Catapult Safety Observer shall ensure that:
 - a. Check for a clear deck forward.
 - b. JBDs are raised and aircraft immediately aft of the JBD are configured to sustain turbulence from launching aircraft.
 - c. Aircraft is properly configured for flight.
 - d. Aircraft is properly armed (if applicable).
 - e. Green rotating beacon.
 - f. The TSPO is giving thumbs up (day) or steady white stubby wand (night) indicating ready for hook-up.
- 6. When all conditions are satisfactory, the Catapult Safety Observer shall give the hook-up signal to the TSPO.
- 7. When the TSPO receives the hook-up signal from the Catapult Safety Observer, he shall ensure the following prior to signaling tension:
 - a. In case of nose gear launch aircraft, ensure the holdback is properly seated in the buffer hooks and the aircraft has fully engaged the nose gear launch unit.
 - b. JBDs are raised and personnel properly positioned.
 - c. Check for a clear deck forward.
 - d. Squadron Plane Checkers are clear from under the aircraft.
 - e. Catapult deckedge red suspend light not illuminated.

WARNING

Aircraft tiedown rings shall not be used as handles while placing an aircraft in tension.

- 8. The TSPO shall then give the tension signal by sweeping one arm and pointing forefinger (day), white stubby flashlight (night), in forward direction of launch to the Catapult Safety Observer and Director and held until tension is taken.
- 9. After receiving the tension signal from the TSPO, the Director shall:
 - a. Check forward and aft ensuring all personnel (director included) in the vicinity of the launching aircraft are laterally clear and aircraft are clear of the catapult "safe shot line."
 - b. Ensure JBDs are raised and personnel properly positioned.

- c. Signal the pilot to release brakes followed by the tension signal.
 - d. Once TSPO has exited, pass control of the aircraft to the Catapult Safety Observer.
10. After receiving the tension signal from the Director, the Catapult Officer shall depress the tension pushbutton, paying particular attention to proper engagement of the shuttle and launch bar, as the shuttle strokes forward. After tension is taken, the TSPO shall perform the following:
- a. For nose tow aircraft: After tension is taken, the TSPO shall inspect the seating of the launch bar in the spreader, and inspect the seating of the tension bar/repeatable release element prior to exiting from under the aircraft. Give the Catapult Safety Observer a thumbs up (day) or steady white stubby wand (night) held vertically if all conditions are satisfactory.

WARNING

It is mandatory that it be positively determined that the aircraft launch bar is properly seated in the nose gear launch shuttle spreader as shown in [Figure 4-2](#) after tension is taken. Mispositioning of the aircraft launch bar can result in the launch bar prematurely separating from the shuttle spreader during the launch. F/A-18 aircraft shall not be launched with improper or missing launch bar paint schemes.

- 11. Before tensioning, the CCP Operator shall verify the position of the CSV by comparing the digital readout on the CCP with the mechanical counter on the CSV.
 - a. After ensuring both readouts match, the CCP Operator shall repeat the CSV settings to the Monitor over the voice communication system.
 - b. The Monitor shall advise the Catapult Officer of the CSV setting.
- 12. The CCP Operator shall verify the Catapult Officer's CSV setting by referring to the appropriate launch chart, and the wind indicator. If the CCP Operator disagrees with the CSV setting selected by the Catapult Officer, he shall suspend.

WARNING

Independent computations of CSV settings by CCP Operators cross-check CSV settings by Catapult Officers; therefore, it is essential that CCP Operators be fully trained on launch bulletin usage and CSV computation.

4.6.3 Launch

- 1. After observing the TSPO exiting from under the aircraft, giving a thumbs-up (day) or steady white stubby wand (night) signal, the Catapult Officer shall depress the military power pushbutton and, if applicable, the combat power pushbutton.
- 2. The pilot shall apply full take-off power and, if applicable, afterburner when the deck signal lights are illuminated and/or after Catapult Safety Observer's signal.

Note

The military and combat power deck lights are located on the ICCS for catapults No. 1, 3 and 4. The military and combat power deck lights for catapult No. 2 are located on the forward deck edge left of the battery position. The two lights are installed such that the light beam from each light can be seen by the pilot of the aircraft being launched. The green military power light is continuously on during military power and the combat power light (amber) is continuously on during combat power. When the catapult's final ready is reached, the military and combat power lights both flash.

3. The squadron Plane Checkers shall position themselves so they may observe the lighting of the afterburners and normal nozzle action. They shall withhold giving the thumbs-up (day) or steady blue stubby wand (night) signal until all conditions are normal. Should an afterburner fail to ignite, the Plane Checker shall give the SUSPEND signal.
4. With the aircraft at take-off power, the pilot shall make his final checks. If everything is satisfactory, he shall position his head against the seat headrest and shall indicate he is ready by turning his head slightly toward the Catapult Safety Observer and by executing a right- or left-hand salute.
 - a. If, for any reason, the pilot desires to abort the launch, he shall so indicate by transmitting "SUSPEND, SUSPEND CATAPULT NO.____," and by shaking his head negatively (day) and not turning on the navigation lights (night), in which case the Catapult Officer shall SUSPEND.

WARNING

- Once the aircraft is tensioned on the catapult and turned up to take-off power, the pilot shall not adjust his visor nor make any other movement that might be mistaken for a salute until he is ready to be launched.
 - The Air Officer shall not rely on changing rotating beacons from GREEN to RED to suspend the launch, but shall activate the SUSPEND pushbutton.
 - If there is any doubt in the mind of the Catapult Safety Observer, TSPO, Director, Plane Checker, or any topside crewman as to satisfactory hookup, aircraft configuration, or proper catapult condition, he shall give the SUSPEND signal — crossed arms overhead (day) or horizontal wand movement (night). Below deck personnel shall depress their SUSPEND buttons and/or state "SUSPEND" over the voice communication system.
5. The Catapult Safety Observer, after observing the pilot's salute (day) or navigation lights (night), shall return the salute (day) and shall:
 - a. Immediately assume a crouched position, and ensure all personnel in the immediate catapult area are in a crouched position.
 - b. Ensure the aircraft is properly configured for flight, paying particular attention to flap/slat setting, open panels, safety pins, wing locks, and stabilizer position.
 - c. Check for a green rotating beacon.
 - d. Check for a clear deck forward.
 - e. Ensure the catapult deckedge red suspend light is not illuminated.
 - f. Ensure the aircraft sounds normal at take-off power.

- g. Check squadron Plane Checkers for thumbs up (day) or steady blue stubby wand (night) held vertically.
 - h. Check TSPO for a thumbs up (day) or steady white stubby wand (night) held vertically.
 - i. Ensure Bow/Angle Safety Observers are displaying green light/thumbs up (day) or green light/wand (night).
 - j. Check for airborne aircraft traffic (wave-off, bolter, etc.) to preclude the possibility of collision between the airborne and the launching aircraft.
6. If all conditions are satisfactory, the Catapult Safety Observer shall go down on one knee and give a thumbs up (day) or vertical green wand (night) to the Catapult Officer.
 7. The Catapult Officer, upon observing the pilot's salute (day) or navigation lights illuminated (night) and the Catapult Safety Observer in a crouched position, shall depress the final ready pushbutton and begin a final scan.

WARNING

(ICCS; all modes of operation.) If at any time after launch bar is in the spreader there is a need to make a CSV setting change, the catapult shall be suspended and launch bar raised. The verification process shall be completed again. Any time there is a disagreement between any stations on the correct CSV setting, the catapult shall be suspended until resolution of the disagreement.

8. The CCP Operator, after observing the final ready light illuminated, shall conduct a final scan of the CCP, paying particular attention to ensure the launch valve clock timers have reset to zero. If there is an indication of any malfunction, the CCP Operator shall immediately suspend the catapult.
9. The Monitor, after observing the final ready light illuminated, shall conduct a final scan of his control console, checking for malfunction lights or red status lights, and shall announce to the Catapult Officer the steam pressure and "CLEAR FORWARD." If there is any indication of a malfunction, the catapult shall immediately be suspended.
10. If all conditions are "go," the Catapult Officer shall complete his final scan and shall include the following:
 - a. Check for a clear deck forward.
 - b. Monitor's console for malfunction indications.
 - c. Green rotating beacon/green "GO" light on Catapult Officer's console.
 - d. Green steam pressure "GO" light on Catapult Officer's console.
 - e. Wind and crosswind components.
 - f. Verify green CSV match light.
 - g. Observe Catapult Safety Observer, TSPO, and squadron Plane Checkers giving thumbs up or appropriate night signal.
 - h. Observe aircraft properly configured for flight.
 - i. Observe pilot is properly positioned for launch.
 - j. Check deck pitch.
11. If all conditions are satisfactory, the Catapult Officer shall depress the fire pushbutton.

4.6.4 Launch Complete



During normal operations, never press the LAUNCH COMPLETE pushbutton following a SUSPEND. Except for no-load launches and in cases where it is known positively that a launch is complete, the LAUNCH COMPLETE pushbutton shall be pressed only with the permission of the Catapult Officer.

1. After ensuring the launch is complete, the CCP shall take such actions as necessary to initiate the next launch.
2. The Monitor Operator shall retract the shuttle after ensuring the track is clear.
3. Subsequent aircraft shall be spotted and tensioned as rapidly and safely as possible.

4.7 NIGHT/CASE III OPERATIONS

1. Night/Case III procedures are essentially the same as those for normal day operations with one exception; a minimum departure (launch) interval of 30 seconds shall be utilized between aircraft.
2. The Catapult Officers shall have sufficient view of the other set of catapults so that they may control the launch interval or the Air Officer may maintain complete control. In any case, the Air Officer shall monitor the launch to ensure that the bow and waist catapults do not launch simultaneously, and provide coordinating assistance should any unusual circumstances, such as aircraft or catapult becoming inoperative, arise.
3. The types of wands to be used during launching operations are as follows:

Catapult Officer/ Catapult Safety Observer	1 red and 1 green standard
Topside Petty Officer	1 white stubby
Director	2 amber standard
Plane Checker	1 blue stubby
Centerdeck Operator	1 white stubby
Deckedge Operator	1 red standard
Ordnance Safety	2 red standard (banded)
JBD Safety	1 white stubby
Bow/Angle Safety Observer	1 red and 1 green standard
Weight Board	1 white stubby

Note

The Centerdeck Operator shall maintain an extra set of Catapult Officer's wands. Standard denotes full length cones and stubby denotes a modified cone providing 3 inches of cone. Any suitable battery and switch housing are authorized if the cone is brightly lighted. Banded denotes two 3/4-inch bands spaced equidistant from the cone.

4.8 DECK LAUNCHING

1. If a deck launch is preceded by a catapult launch, it is the responsibility of the Catapult Launching Officer to ensure that all personnel and equipment are clear, and that no loose gear is adrift on the deck area to be used

(axial/angle). The Catapult Launching Officer shall then give the Deck Launching Officer the “CLEAR DECK” signal.

- a. The Air Officer shall announce on the 5MC “STAND CLEAR OF THE ANGLE/BOW WHILE DECK LAUNCHING AIRCRAFT.”
 - b. The Air Officer shall not turn the rotating beacon from red to green until the warning is given.
2. When a deck launch is not preceded by a catapult launch, it is the responsibility of the Deck Launching Officer to ensure all the aforementioned are accomplished prior to launch.
 3. Before clearing the Launching Officer to commence launching aircraft, the Air Officer shall verify the previously determined deck run required.
 - a. The Director, when positioning the aircraft for launch, shall ensure that the nose wheel is aligned, wings are spread and locked, and flaps are set as required before passing control to the Launching Officer. The aircraft shall be aligned as accurately as possible with the launch lineup line (landing area centerline when launching down the angle deck).
 - b. The Director shall then taxi the aircraft into position, and the squadron’s aircraft inspector shall check the aircraft for loose or missing panels/doors, leaks, and other visible discrepancies. If he is satisfied and the aircraft is ready for launch, he shall so signify by giving the Launching Officer the “THUMBS UP” signal.
 4. The Launching Officer shall:
 - a. Ensure the area behind the aircraft is clear of personnel, equipment, and loose gear.
 - b. Check for a green rotating beacon and a clear deck forward before signaling for the pilot to add power for takeoff.
 5. When signaled to do so, the pilot shall smoothly but expeditiously add power and complete final cockpit checks. He shall, in the case of a single-piloted aircraft, indicate his readiness for launch by an exaggerated nod of the head in the daytime or by turning navigation lights on steady at night. In dual-piloted aircraft, readiness to launch shall be signaled by a salute from the pilot, relayed by the copilot if the Launching Officer is on the starboard side of the aircraft.
 6. As power is being applied for launch, the Launching Officer shall check the aircraft’s configuration and inspect it for leaks or other visible discrepancies. After receiving a “THUMBS UP” from the aircraft inspector and a salute from the pilot(s), the Launching Officer shall again check for a clear deck forward. He shall ensure that the deck and catwalks are clear of personnel before giving the pilot the signal to launch.
 7. After receiving the launch signal, the pilot shall release his brakes and execute a takeoff in accordance with the applicable aircraft NATOPS flight manual.

4.9 CARRIER QUALIFICATIONS

During CARQUAL operations, the pilot shall transmit aircraft side number, fuel weight, and gross weight during a two-way radio check. The same transmission is required not only for the initial launch but also after hot refueling and after a pilot switch. The Air Officer shall ensure that the aircraft side number and gross weight are passed to the Catapult Officer.

WARNING

- The Launching Officer shall closely scan recovering aircraft to avoid simultaneously launching and recovering aircraft.
- During CARQUAL operations, a close monitoring of aircraft gross weights is mandatory by the Air Officer, the Catapult Officer, pilots, and squadron representatives.

4.10 POST-LAUNCH PROCEDURES

4.10.1 Pilot Debrief

It is extremely important to maintain a flow of information between the pilots and the Catapult Officers. When pilots make procedural errors, they should be aware of their errors so a complete understanding of flight deck procedures is maintained. Catapult Officers shall keep in mind that each pilot is an individual and each has his own level of proficiency. At times, the Catapult Officer shall become an instructor of flight deck procedures. Everyone connected with the launch should know what everyone else is doing and the reason why. The predeployment brief and post-launch debriefs are necessary to ensure the pilots do know what is going on around them and to correct any misunderstanding they might have about procedures and the functions of flight deck personnel.

Some of the common errors that should be covered in debriefs are:

1. Reducing power on a SUSPEND signal rather than waiting for a THROTTLE BACK signal from the Catapult Officer/Catapult Safety Observer.
2. Not recognizing other than normal night signals; in particular, THROTTLE BACK signal at night.
3. Raising a hand to his head to adjust visor, set clock, or make actions that might be misinterpreted as a salute while in tension and at full power.
4. Not understanding the weight board procedures, using improper signals when trying to lower or raise weight, and/or not having a flashlight at night to give the proper signals (this goes for RIOs, BNs, and other crewmen as well).
5. Not knowing the weight of the aircraft prior to arriving at the catapult.
6. Not completing his take-off list (checklists, under normal circumstances, shall be completed prior to crossing the shuttle).
7. Saluting before the Catapult Officer/Catapult Safety Observer has control of the aircraft (although not unsafe, does lead to confusion between pilot and Catapult Officer).
8. Rough or rapid taxi procedures.

4.10.2 Catapult Crew Debrief

While not always necessary or required after every launch, post-launch debriefs by the Catapult Officer should be held with the catapult crews periodically, and shall be held whenever a situation during a launch needs clarification. These debriefs may pertain to the topside crew, the below deck crew, or the entire catapult crew.

The best possible results may be realized when there is a continuing flow of information and ideas among the Catapult Officer, supervisory personnel, and the catapult crew. Debriefs that correct errors and compliment the crew on outstanding performance can do wonders for crew morale and enhance the smoothness and efficiency of subsequent launches.

4.10.3 Shot Log Review

After each day's operations, the ALRE Maintenance Officer shall review the shot log. The catapult will rarely fail without giving fair warning. By reviewing the shot log daily, the ALRE Maintenance Officer may be able to detect a possible malfunction before it occurs. Items to be checked and compared include:

1. Launch valve timer readings.
2. End-speeds above and below predicted (excess).
3. Steam temperatures and pressures (before and after shot).

Note

Upon completion of each cycle launch, the Catapult Officer shall review shot logs.

4.11 EMERGENCY ACTIONS AND PROCEDURES

Safety is paramount when conducting emergency procedures. Proper procedures coupled with common sense will enable catapult crews to handle any emergency. This manual does not discuss all emergencies, nor are they in-depth. The reader should refer to appropriate NAVAIR Operation Manuals for a thorough discussion of emergency procedures. Drill scenarios and periodicity requirements are outlined in Appendix II of COMNAVAIRFORINST 3500.20 series. ■

4.11.1 Aborting the Launch

1. At any time, up to and including FINAL READY, firing of the catapult can be prevented and the launch aborted. The Deckedge Operator, Console/CCP Operator, Monitor, PriFly, Water Brake Operator, and Catapult Officer (ICCS) all have SUSPEND switches, which when activated, break the interlock complete circuit and prevent the launch.
2. Any person, other than those having access to a SUSPEND switch, who detects a cause for aborting the launch shall signal the Catapult Officer/Catapult Safety Observer and/or the Deckedge Operator/Monitor by crossing his arms high overhead (day) or waving a wand back and forth horizontally (night) to indicate a SUSPEND situation exists.
3. The Deckedge/Monitor Operator does not have to receive the SUSPEND signal from the Catapult Officer/Catapult Safety Observer in order to actuate his SUSPEND switch. He shall do so immediately upon observing a SUSPEND signal from anyone on deck, or if he detects any condition that would be reason to abort the launch.
4. The pilot can abort the launch at any time prior to being tensioned by refusing to taxi onto the catapult, and/or using hand signals to indicate his desire not to go. At night, he shall notify PriFly who shall relay his problems to the Catapult Officer/Director.
5. Once the aircraft is tensioned, the pilot shall indicate his desire to abort by shaking his head negatively (day) and by not turning on his lights (night), and by transmitting the words "SUSPEND, SUSPEND, CATAPULT NO. _____." The Catapult Officer, after taking control of the aircraft and upon observing the aircraft turning up to full power, shall wait a reasonable length of time and then initiate a SUSPEND if PriFly has not already done so.
6. Any time a SUSPEND is initiated, it shall be carried out to completion. This includes untensioning of the aircraft, reduction of aircraft power back to idle, and moving the shuttle forward of the launch bar; it does not necessarily include removal of the aircraft from the catapult.

WARNING

In the event of a SUSPEND, the Catapult Officer/Catapult Safety Observer shall not signal the pilot to throttle back until he has positively determined that the catapult is safe/suspended and the shuttle is forward of the launch bar. If the launch bar cannot be raised without sending personnel under the aircraft, the Catapult Officer shall ensure the catapult is safe/suspended, then give pilot the THROTTLE BACK signal. With direct control of the aircraft, the Catapult Officer shall then send personnel to lift the launch bar and signal SHUTTLE FORWARD with caution.

4.11.2 SUSPEND (Conventional/Deckedge Mode)

4.11.2.1 Signals and Procedures

1. Any time prior to the FIRE pushbutton being depressed, the catapult may be stopped and the launch aborted, by initiating a catapult SUSPEND. The Catapult Officer, upon observing a SUSPEND condition or being notified of a catapult SUSPEND situation, shall give the SUSPEND signal.

Any flight deck crewman who detects any reason for aborting the launch may suspend the catapult launch by immediately giving the SUSPEND signal.

2. Any time a SUSPEND is initiated, it shall be carried out to completion. This includes untensioning of the aircraft, moving the shuttle forward of the launch bar, and reducing the aircraft power to idle.
3. The Deckedge Operator, upon observing any SUSPEND signal, shall immediately actuate the SUSPEND switch followed by giving the SUSPEND signal.

WARNING

When the SUSPEND signal is given, the pilot shall remain ready to be launched, and he shall not retard his throttle until so directed by the Catapult Officer. At no time after full power turn-up shall the signal to retard throttle be given to the pilot until the catapult is SAFE.

Note

In the event another station suspends the catapult, the Deckedge Operator shall give the SUSPEND signal to notify the Catapult Officer of the SUSPEND condition.

4. The Catapult Officer, after noting the return of his SUSPEND signal, shall signal the Deckedge Operator to UNTENSION (SHUTTLE AFT) the aircraft.
5. The Deckedge Operator shall immediately depress shuttle/maneuver aft causing tension to be relaxed and the shuttle to move aft.
6. If the Water Brake Operator initiated the SUSPEND, the Console/CCP Operator shall actuate his suspend switch and then direct the Water Brake Operator to remove his SUSPEND prior to the Deckedge/Monitor Operator depressing the maneuver aft pushbutton.
 - a. In case of electrical failure, the Deckedge Operator shall direct the Retraction Engine Operator to depress the manual override on the maneuvering valve.
7. As the shuttle moves aft, the launch bar normally will raise automatically as it disengages the throat of the shuttle. With the launch bar in the raised position, the Catapult Officer shall give the SHUTTLE FORWARD signal to the Deckedge Operator.
8. Once the shuttle is forward of the launch bar, the Catapult Officer shall give the THROTTLE BACK signal to the pilot.

WARNING

- Catapult crewmen shall not approach the aircraft until the shuttle is forward of the launch bar, and the pilot has retarded his throttle to idle, except when an emergency condition exists.
- In the event of a SUSPEND, the Catapult Officer shall not signal the pilot to throttle back until he has positively determined that the catapult is suspended and the shuttle is forward of the launch bar. If the launch bar cannot be raised without sending personnel under the aircraft, the Catapult Officer shall ensure the catapult is suspended and then give the THROTTLE BACK signal. With direct control of the aircraft, the Catapult Officer shall then send personnel to lift the launch bar and signal SHUTTLE FORWARD with caution.

Note

If failure of the bridle tensioner prevents normal movement of the shuttle past the raised launch bar, the Catapult Officer shall throttle back the aircraft, and instruct applicable watch stations to position their SUSPEND switches off, and instruct the Deckedge Operator to MANEUVER FORWARD. After the shuttle is maneuvered forward, the SUSPEND switches shall be reactivated, if applicable.

9. When the catapult is safe, the cause of the SUSPEND shall be determined prior to resuming catapult operations.
10. With the aircraft at idle power, control shall be passed to the Director to either resume the launch, or to remove the aircraft from the catapult.

4.11.2.2 Procedures Under Emergency Conditions**Note**

Emergency conditions are construed to apply to aircraft that do not have the capability to, or are unable to, raise the launch bar automatically.

1. If the shuttle is moved aft and the launch bar does not automatically raise, the Catapult Officer, after ensuring the catapult is properly suspended, shall signal the pilot to THROTTLE BACK.
 - a. When the aircraft is at idle power, the launch bar shall be raised manually by the TSPO and held until the shuttle is moved forward of the launch bar.

WARNING

The TSPO, holding the launch bar in the raised position, shall keep hands clear of the shuttle as it is maneuvered forward. In the event the launch bar begins to slip, any attempt by the TSPO to recover the launch bar may result in serious injury. Ensure both hands are clear of the shuttle and visible to the Catapult Officer and Deck Edge Operator prior to reattempting to raise the launch bar.

2. For nose tow aircraft, if the grab latch fails or any malfunction preventing the shuttle to SHUTTLE/MANEUVER AFT, the Catapult Officer, after ensuring the catapult is safe/suspended, may:
 - a. Throttle back the aircraft.
 - b. Off brakes.
 - c. Buffer aft for 4 to 10 inches.
 - d. Taxi aircraft forward.
 - e. Raise launch bar.
 - f. Shuttle forward.

CAUTION

Do not allow the NGL unit to buffer too far aft causing buffer hook retraction with the trail bar still attached.

4.11.2.3 Removing Aircraft from Catapults

1. Prior to buffering aft, ensure the aircraft is de-armed and the JBD is lowered.



Reverse taxi of an E2/C2 to relieve tension on the trail bar may result in damage to the catapult and/or aircraft.

Note

In the event BUFFER AFT is inoperative, E2/C2 aircraft shall be shutdown and a tractor and tow bar utilized to relieve trail bar tension.

2. Once the shuttle is forward, the control is passed to the Director.
3. In order to remove the aircraft from the buffer unit when buffering aft, the Director, upon a signal from the Catapult Officer, shall signal OFF BRAKES.
 - a. The Catapult Officer shall then signal the Deckedge Operator to BUFFER AFT by holding both arms at waist level and pointing forefingers (day), wands (night), in the aft direction.
4. After the aircraft moves approximately 4 to 10 inches, the Catapult Officer signals the pilot via the Director to HOLD BRAKES.
5. The Catapult Officer shall then give the BUFFER FWD signal by holding both arms at waist level and pointing forefingers (day), wands (night) in the forward direction to the Deckedge Operator who presses the BUFFER FWD pushbutton to allow slack in the holdback bar/release element.
 - a. The catapult crew then may disconnect the holdback bar/release element.
 - b. After the holdback bar/release element is removed, the Catapult Officer signals the Deckedge Operator to BUFFER AFT to lower the buffer hooks.
 - c. When the catapult crew is clear, the Catapult Officer passes control back to the Director, and then the aircraft may be taxied/towed forward and clear of the catapult.
6. The hand signal sequence required to complete removing an aircraft is as presented in [Figure 4-3](#).

4.11.3 SUSPEND (ICCS)

4.11.3.1 Signals and Procedures

1. Any time prior to the FIRE pushbutton being depressed, the launch may be aborted by initiating a catapult SUSPEND. The Catapult Officer, upon observing a SUSPEND condition or being notified of a catapult SUSPEND situation, shall initiate the SUSPEND procedure by immediately depressing the catapult SUSPEND pushbutton. Any flight deck crewman who detects any reason for aborting the launch may suspend the catapult launch by immediately giving the SUSPEND signal.
2. Any time a SUSPEND is initiated, it shall be carried out to completion. This includes untensioning of the aircraft, reduction of aircraft power to idle, and moving the shuttle forward of the launch bar.
3. The Catapult Safety Observer shall, upon observing a SUSPEND signal, or the flashing red deckedge SUSPEND light, give the SUSPEND signal immediately followed by the SHUTTLE AFT/UNTENSION signal.
4. Upon observing the SHUTTLE AFT/UNTENSION signal, the Catapult Officer shall depress the MANEUVER AFT pushbutton.

<p align="center">NOSETOW (T-45, S-3, F/A-18)</p>	<p align="center">NOSETOW (EA-6B, E-2, C-2)</p>
<p>Suspend</p> <p>Shuttle Aft/Untension</p> <p>Raise Launch Bar²</p> <p>Shuttle Forward</p> <p>Throttle Back</p> <p>Off Brakes</p> <p>Buffer Aft</p> <p>Hold Brakes</p> <p>Buffer Forward</p> <p>Buffer Aft</p> <p>Pass Control¹</p>	<p>Suspend</p> <p>Shuttle Aft/Untension</p> <p>Throttle Back</p> <p>Raise Launch Bar</p> <div data-bbox="1029 527 1256 604" style="border: 2px solid black; padding: 5px; text-align: center; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p>When raising launch bar by hand, exercise extreme care to avoid hand injuries.</p> <p>Shuttle Forward</p> <p>Off Brakes</p> <p>Buffer Aft³</p> <p>Hold Brakes</p> <p>Buffer Forward</p> <p>Buffer Aft</p> <p>Pass Control¹</p>
<p>NOTES:</p> <p>¹ The Director shall taxi the aircraft clear of the NGL guide track after the holdback bar/release element has been removed.</p> <p>² If the launch bar does not raise automatically, the catapult shall be properly suspended and the throttle retarded so the TSPO can raise and hold the launch bar up until the shuttle is maneuvered forward of the launch bar. The launch bar shall be lowered for the buffer sequence.</p> <p>³ Buffering aft of E-2/C-2/EA-6B aircraft with the launch bar in the locked-up position will damage the aircraft nose gear assembly.</p>	

Figure 4-3. Hand Signal Sequence for Aircraft Removal

5. If the Water Brake Operator initiated the SUSPEND, the Catapult Officer shall actuate his suspend switch and then direct the Water Brake Operator to remove his SUSPEND prior to depressing the MANEUVER AFT pushbutton.
 - a. In case of electrical failure, the Catapult Officer shall direct the CCP/Retraction Engine Operator to depress the manual override on the maneuvering valve.
6. For nose tow aircraft, the Catapult Safety Observer, after observing the shuttle move aft, shall give the RAISE LAUNCH BAR signal to the pilots of all aircraft capable of raising launch bars.
7. When the aircraft launch bar is clear of the shuttle, the Catapult Safety Observer shall give the SHUTTLE FORWARD signal to the Catapult Officer.

WARNING

- Under normal conditions, the catapult crew shall not approach the aircraft until the launch bar is free and the pilot has returned to idle power.
 - If the launch bar fails to disengage from the shuttle, the Catapult Safety Observer shall positively determine that the catapult is in a safe condition before giving the THROTTLE BACK signal.
8. Once the shuttle is forward of the launch bar the Catapult Safety Observer shall give the THROTTLE BACK signal to the pilot.

WARNING

In the event of a SUSPEND, the Catapult Safety Observer shall not signal the pilot to THROTTLE BACK until he has positively determined that the catapult is suspended and the shuttle is forward of the launch bar. If the launch bar cannot be raised without sending personnel under the aircraft, the Catapult Safety Observer shall ensure the catapult is suspended, then give the THROTTLE BACK signal. With direct control of the aircraft, the Catapult Safety Observer shall then send the TSPO to lift the launch bar and signal SHUTTLE FORWARD with caution.

Note

If failure of the bridle tensioner prevents normal movement of the shuttle past the raised launch bar, the Catapult Officer shall direct the Catapult Safety Observer to THROTTLE BACK the aircraft, and instruct applicable watch stations to position their SUSPEND switches off, and press MANEUVER FORWARD. After the shuttle is maneuvered forward, the SUSPEND switches shall be reactivated.

9. When the catapult is safe, the cause of the SUSPEND shall be determined prior to resuming catapult operation.
10. With the aircraft at idle power, control shall be passed to the Director to either resume the launch, or to remove the aircraft from the catapult.

4.11.3.2 Procedures Under Emergency Conditions

Note

Emergency conditions are construed to apply to aircraft that do not have the capability to, or are unable to, raise the launch bar automatically.

1. If the shuttle is moved aft and the launch bar does not automatically raise, the Catapult Safety Observer, after ensuring the catapult is properly suspended, shall signal the pilot to THROTTLE BACK. When the aircraft is at idle power, the launch bar shall be raised manually by the TSPO and held until the shuttle is moved forward of the launch bar.

WARNING

The TSPO, holding the launch bar in the raised position, shall keep hands clear of the shuttle as it is maneuvered forward. In the event the launch bar begins to slip, any attempt by the TSPO to recover the launch bar may result in serious injury. Ensure both hands are clear of the shuttle and visible to the Catapult Officer or Catapult Safety Observer and Deck Edge Operator prior to reattempting to raise the launch bar.

2. For nose tow aircraft, if the grab latch fails or any malfunction prevents the shuttle from MANEUVERING AFT, the Catapult Officer and Catapult Safety Observer, after ensuring the catapult is safe/suspended, may:
 - a. Throttle back the aircraft.
 - b. OFF brakes.
 - c. Buffer aft for 4 to 10 inches.
 - d. Taxi aircraft forward.
 - e. Raise launch bar.
 - f. Shuttle forward.

CAUTION

Do not allow the NGL unit to buffer too far aft causing buffer hook retraction with the holdback bar still attached.

4.11.3.3 Removing Aircraft from Catapults

CAUTION

- Prior to buffering aft, ensure the aircraft is de-armed and the JBD is lowered.
- Pilots of E-2/C-2 aircraft shall be briefed not to attempt to move aft by reversing engine thrust, as damage to the holdback bar or aircraft may result. Backing is permitted by reversing engine thrust only after removal of the trail bar. If BUFFER AFT is inoperative, using extreme caution, the aircraft may be taxied in reverse only as far as required to relieve tension on holdback bar.

1. Once the shuttle is forward, the control is passed to the Director.
2. In order to remove the aircraft from the buffer unit when buffering aft, the Director, upon signal from the Catapult Safety Observer, shall signal OFF BRAKES.
 - a. The Catapult Safety Observer shall then signal the Monitor to BUFFER AFT by holding both arms at waist level and pointing forefingers (day), wands (night), in the aft direction.
3. After the aircraft moves approximately 4 to 10 inches, the Catapult Safety Observer signals the pilot via the Director to HOLD BRAKES.
4. The Catapult Safety Observer shall then give the BUFFER FWD signal by holding both arms at waist level and pointing forefingers (day), wands (night), in the forward direction to the Monitor who presses the BUFFER FWD pushbutton to allow slack in the holdback bar/release element. The catapult crew may then disconnect the holdback bar. After the holdback bar is removed, the Catapult Safety Observer signals the Monitor to BUFFER AFT to lower the buffer hooks. When the catapult crew is clear, the aircraft may then be taxied forward and clear of the catapult.
5. The sequence required to remove an aircraft is as presented in **Figure 4-3**.

4.11.4 Hangfire (Conventional/Deckedge Mode)

In the event that the catapult does not fire within 10 seconds after the FIRE pushbutton is pressed, a hangfire exists.

1. The Catapult Officer shall signal SUSPEND followed by HANGFIRE to the Deckedge Operator.
2. The Deckedge Operator, upon observing these signals, shall immediately:
 - a. SUSPEND the catapult.
 - b. Inform the Console/CCP Operator that a hangfire exists by saying over the voice communication system only, "ROTATE THE EMERGENCY CUTOUT VALVE, ROTATE THE EMERGENCY CUTOUT VALVE."
3. The Console/CCP Operator shall perform the following:

WARNING

The Console/CCP Operator shall activate his SUSPEND switch at the control console to ensure the catapult has been suspended prior to initiating the following procedure.

- a. Remove the cotter pin, unscrew the stop screw, and rotate the handle of the launching valve cutout valve to the EMERGENCY position.
- b. Untension the aircraft using the following procedures:
 - (1) If electrical power is ON, depress the MANEUVER AFT pushbutton on the control console for 15 seconds.
 - (2) If electrical power is OFF, inform the Retraction Engine Operator of the power failure. The Retraction Engine Operator shall depress the MANUAL OVERRIDE pushbutton for 15 seconds on the maneuver aft valve to maneuver the shuttle aft.
4. Once the Console/CCP Operator has reported procedures complete and the catapult is safe, the Deckedge Operator shall return the HANGFIRE signal to the Catapult Officer.
5. Once the Deckedge Operator returns the HANGFIRE signal, the Catapult Officer shall proceed with normal SUSPEND procedures.

6. Once the shuttle is forward of the aircraft launch bar, the Catapult Officer shall set in the CSV setting 020 to prevent catapult damage should inadvertent firing occur.

Note

After above conditions are met the Catapult officer shall instruct applicable watch stations to position their suspend switches OFF and instruct deck edge operator to advance shuttle to full forward position prior to any trouble shooting/corrective actions are taken.

7. The Console/CCP Operator shall not rotate the emergency cutout valve from the EMERGENCY position until specifically directed to do so by the ALRE Maintenance Officer.
8. After any hangfire, the catapult shall be placed in a down status until the specific cause of the hangfire is identified and corrective action is taken.
9. After the discrepancy causing the hangfire is discovered and corrected, two no-loads shall be fired before the catapult resumes operations.

4.11.5 Hangfire (ICCS)

If the catapult does not fire within 10 seconds after the FIRE pushbutton has been pressed, a hangfire exists.

1. The Catapult Officer shall:
 - a. Press the SUSPEND pushbutton.
 - b. Communicate the hangfire condition to the Catapult Safety Observer via the voice communication system and giving the HANGFIRE signal. The Catapult Safety Observer shall give the HANGFIRE signal in crouched position until the catapult is declared safe.
 - c. Pass to the CCP Operator or via ICCS Monitor, over voice communication system, "ROTATE EMERGENCY CUTOUT VALVE, ROTATE EMERGENCY CUTOUT VALVE."

WARNING

The CCP Operator shall depress his SUSPEND pushbutton at the charging panel to ensure the catapult is suspended.

2. The CCP Operator shall:
 - a. Remove the cotter pin, unscrew the stop screw, and rotate the handle of the launching valve cutout valve to the EMERGENCY position.
 - b. Depress the MANEUVER AFT pushbutton for 15 seconds.
 - c. If there is an electrical failure, the CCP Operator shall direct the Retraction Engine Operator to depress the MANUAL OVERRIDE pushbutton on the maneuvering valve at the retraction engine for 15 seconds.
 - d. Report procedures complete and the catapult is safe to the Catapult Officer via the Monitor over voice communication system.
3. Once the catapult is safe, the Catapult Officer shall transmit over the voice communication system to the Catapult Safety Observer "CATAPULT NO. ____ SAFE" and shall give a thumbs-up signal (day) and red wand held vertically (night), giving permission to continue with normal SUSPEND procedures.

WARNING

The Catapult Safety Observer shall, prior to giving the THROTTLE BACK signal and continuing normal SUSPEND procedures, positively ensure he receives the proper signals and/or communications that the catapult is safe.

4. Once the shuttle is forward of the aircraft launch bar, the Catapult Officer shall set in the CSV setting 020 to prevent catapult damage should inadvertent firing occur.

Note

After above conditions are met the Catapult officer shall instruct applicable watch stations to position their suspend switches OFF and instruct ICCS operator to advance shuttle to full forward position prior to any trouble shooting/corrective actions are taken.

5. The CCP Operator shall not rotate the emergency cutout valve from the EMERGENCY position until specifically directed to do so by the ALRE Maintenance Officer.
6. After any hangfire, the catapult shall be placed in a down status until the specific cause of the hangfire is identified and corrective action taken.
7. After the discrepancy causing the hangfire is discovered and corrected, two no-loads shall be fired before the catapult resumes operations.

4.11.5.1 MOB-S-4-CV Hangfire on Catapult Drill

1. Purpose. To train and evaluate personnel in the proper procedures to be used when the catapult does not fire within 10 seconds of initiating this action.
2. Requirement. This exercise shall not be conducted using aircraft, and is to be accomplished during no-load firing only.
3. Procedures.
 - a. OCE (Officer Conducting the Exercise).
 - (1) With permission and assistance of the ALRE Maintenance Officer, initiate a hangfire situation by creating an acceptable mechanical, electrical, or hydraulic malfunction that will prevent the catapult from firing.
 - (2) A less realistic, but acceptable method is to notify the Catapult Officer that a hangfire exists prior to reaching the firing sequence during daily no-loads.
 - b. Catapult Officer. Upon notification from the OCE, or failure of the catapult to fire 10 seconds after the order has been given, initiate authorized hangfire procedures.
 - c. Catapult Crew. Once the Catapult Officer has initiated the hangfire exercise, the crew shall place the catapult in a safe condition following proper hangfire procedures.

Note

Simulated drills, in some situations, do not fully examine the operator's knowledge and ability to execute proper emergency procedures. Therefore, each operator should be questioned on all aspects of his functions in this particular emergency.

4. Evaluation. Refer to COMNAVAIRFOR INSTRUCTION 3500.20 for evaluation sheet.

4.11.6 Emergency Lowering Jet Blast Deflector (JBD)

1. In the event aircraft are airborne and a JBD is fouling the landing area, emergency lowering procedures shall be carried out expeditiously. Material shall be available at all times; personnel shall be thoroughly trained to recognize the type of failure and be able to take corrective action.
2. Emergency lowering of a JBD will require a minimum of eight crewmen as follows:
 - a. TSPO (overall in charge).
 - b. Topside JBD Phone Talker.
 - c. Below Decks Phone Talker/Valve Operator (depending on location, this may require an additional crewman).
 - d. Two crewmen to install emergency lower push bar.
 - e. Two safety observers (station at the port and starboard sides of the JBD panels).
 - f. Tractor driver.



Ensure voice communication is established between the Topside Phone Talker and the Below Decks Phone Talker/Valve Operator prior to the emergency lowering of the JBD.

3. Procedures for ELECTRICAL FAILURE are:
 - a. Turn electrical power switch OFF.
 - b. Attempt manual operation of the solenoid operated pilot valve (SOPV) by inserting a 3/16-in diameter rod into the hole of solenoid "B" or by depressing the pushbutton on the solenoid until the panel is completely lowered.
 - c. In the event electrical failure procedures do not lower the panel, follow procedures outlined for a complete hydraulic failure.
4. Procedures for a complete HYDRAULIC FAILURE are:
 - a. Position personnel at required stations.
 - b. Secure hydraulic pressure.
 - c. Open bypass valve.
 - d. Commence pushing struts over-center.

WARNING

- Once the emergency lower push bar is installed, all hands shall stand back at a safe distance from JBD and around tractor. As JBD begins to lower, the emergency lower push bar shall be dragged out of JBD pit by tractor utilizing reverse gear.
- The TSPO shall brief the Tractor Driver on all commands and signals prior to commencing the emergency procedure. The Tractor Driver shall not anticipate commands from the TSPO (e.g., applying force, braking, or backing out).

- e. Once the strut is over-center, the JBD panel will fall under its own weight until it is flush with the deck.

WARNING

The Topside Phone Talker shall stay alert at all times in case of an unsafe condition for suspending, at which time he shall direct the Below Decks Phone Talker/Valve Operator to secure the bypass valve.

4.11.6.1 MOB-S-03-CV Jet Blast Deflector Emergency Drill

1. Purpose. To train and evaluate catapult personnel in the emergency lowering of the jet blast deflectors.
2. Requirements.
 - a. Raise all jet blast deflector panels on a catapult that will affect the landing area.
 - b. Simulate complete hydraulic and/or electrical failure of raised panels.
3. Procedures.
 - a. OCE (Officer Conducting the Exercise). Inform the Air Officer that the jet blast deflector panels have suffered a hydraulic/electrical failure and that landings are expected momentarily.
 - b. Catapult Crew. Line up hydraulic system for manual operation and manually lower the jet blast deflector panels.
4. Evaluation. Refer to COMNAVAIRFORINST 3500.20 series for evaluation sheet.

CHAPTER 5

Recovery Procedures

5.1 OPERATIONAL SAFETY PRECAUTIONS

5.1.1 General

The recovery of today's modern aircraft, with their high gross weights and airspeeds, is a complex and demanding operation involving various inherent dangers. Personnel engaged in the operation of the recovery equipment shall be thoroughly trained and initiated in the recovery process. The procedures and safety precautions contained in this manual shall be complied with. Disregard for these procedures and the fundamentals of caution and safety will create hazards far in excess of the previously mentioned inherent dangers.

Safety is an all hands concern; as such, all hands shall be thoroughly familiar with this manual, its procedures and safety precautions. Further, all hands shall also insist on strict adherence to established safety practices by personnel not having access to this manual.

WARNING

Any arresting gear personnel having reason to suspect the readiness or sound operating condition of any arresting gear engine, deck pendant, purchase cable, or associated equipment shall immediately cause the deck to be fouled by informing the arresting gear officer or the recovery equipment controller in PriFly.

5.1.2 Topside

The most important step in reducing flight deck injuries is the elimination of unnecessary personnel from the flight deck during recovery operations. This is difficult to accomplish because there are many well-motivated but non-essential personnel who sincerely believe their presence is justified on the flight deck. The first step in any injury prevention program must be the elimination of those non-essential personnel and unauthorized personnel from the recovery area. Therefore, while aircraft are being recovered, no personnel, other than those required by this manual, shall be on the flight deck, or in catwalks or sponsons along the landing area without the expressed permission of the Air Officer. The landing area is defined as that portion of the ship, from the fantail to the forward end of the angled deck. This area includes the safe parking area near the island. It shall be the responsibility of the Arresting Gear Officer and the Flight Deck Officer to ensure safety compliance within the Fly 3 and Fly 2 areas, respectively.

In addition to the basic safety precautions used during operational procedures, the following special safety precautions shall be observed:

1. All topside personnel shall be in the proper flight deck uniform.
2. Personnel shall not stand in or otherwise block entrances to the island structure, or exits leading from the catwalks.
3. Avoid crowding of personnel or material in the catwalk areas near the deck edge control station.
4. During recovery operations, with the exception of the LSO and his assistants, no personnel shall be permitted in the port catwalk without authorization from the Air Officer.
5. Personnel shall not turn their backs on aircraft landing or taxiing out of gear; they shall stay alert and in a position that allows quick and agile movement.

6. Personnel required to be in the catwalks shall duck below the flight deck or behind cable shields during the aircraft's touch down and rollout.
7. Hook Runners, Gear Puller, and other personnel in the rollout area shall not enter the landing area until the aircraft has completely stopped.
8. No one shall enter the landing area to effect equipment repairs, or for any other reason, until the deck is "fouled" and until positive clearance has been obtained from the Arresting Gear Officer. If crossing the landing area is absolutely necessary during flight operations, the following procedures shall be followed:
 - a. Personnel shall stay clear of the foul line; and shall check the aircraft in the pattern.
 - b. If the pattern is clear, the individual shall get the Arresting Gear Officer's attention and indicate desire to cross by pointing across the deck.
 - c. The Arresting Gear Officer shall check the pattern. If the pattern is not clear, no response will be seen from him. The Arresting Gear Officer is busy and will continue with his duties.
 - d. If pattern is clear, the arresting gear officer will point at the individual and then swing arm in a horizontal motion to point to the other side of the landing area. A red wand will be used to point with at night.
 - e. After receiving clearance, the individual shall run straight across the deck, staying at least 10 feet aft of the No. 1 wire. This will prevent tripping over the wire supports or being struck by the No. 1 wire during the wire retraction.

WARNING

If the arresting gear crew is required to enter the landing area during aircraft recovery, a safety man shall be stationed forward of the crew, facing aft with arms crossed over head; at night the safety man shall have a red wand held vertical, to ensure crew safety and observe approaching aircraft.

9. The Deckedge Operator shall stand well clear of the retract lever while personnel are on deck and all purchase cables are not fully retracted.
10. Purchase cables shall never be fed back through the flight deck sheave by hand. The arresting engine shall retract purchase cables.

To minimize the possibility of an aircraft landing on a fouled deck, the following procedures are mandatory:

1. The lens, and at night the landing area lights, shall never be turned on without the expressed permission of the Air Officer.
2. Except for the purpose of conducting tests, neither the lens nor the landing area lights will be turned on until the LSO has manned the platform.
3. The wave-off lights shall be continuously activated any time the lens or landing area lights is turned on and the LSO is not on the platform.
4. Practice CCA approaches, using visual landing aids, shall be permitted only when the LSO is on the platform. He shall wave off each aircraft at 1/2 mile or greater.
5. To avoid unnecessary delay in recovering the first aircraft, the lens and/or landing area lights may be turned on a short time before the ship is completely ready to commence recoveries, but wave-off lights shall be continuously activated until an LSO is on station. The LSO shall wave off approaching aircraft at a distance of 1/2 mile or greater if he has not received the "clear deck" signal.
6. During instrument recoveries, PriFly will keep CATCC advised as to the status of the deck and provide the estimated time the deck will be clear. CATCC will keep PriFly advised as to the position of the nearest aircraft.

7. Combat and CATCC shall keep PriFly informed of any aircraft known or suspected to have radio failure.
8. PriFly will notify the Arresting Gear Officer and Flight Deck Officer of any aircraft with problems that will affect recovery (lights, electrical problems, fuel, hydraulic, control, flaps, etc.).

5.1.3 Below Decks

The primary safety factor in the operations of the arresting gear engine is constant attention to inspection and operation. Engine operators shall stay constantly alert during recovery operations.

In addition to the inherent safety precautions used during operational procedures, the following special safety precautions shall be observed:

1. All below deck personnel should be in complete uniform, including long-sleeve shirt.
2. All unauthorized personnel shall remain clear of all arresting gear engine rooms. Engine rooms shall NOT be used as passageways by any personnel during recovery operations.
3. All personnel shall keep hands and bodies clear of the engine when operating or when engagement is imminent. Safety guards, shields, cages, etc., shall be in place.
4. Engine and sheave damper operators shall make "GROOVE" and "RAMP" calls loud and clear at all times.
5. In the event all equipment is not ready to land aircraft when "GROOVE" is passed over voice communication system, respond with "FOUL DECK, FOUL DECK."
6. All doors to engine rooms shall remain open during recovery operations to facilitate emergency egress if required.

5.2 NORMAL OPERATIONS

5.2.1 Preparations for Recovery

The Arresting Gear Officer shall be on deck for all recoveries. On deck is construed to mean a position in the starboard catwalk or on the flight deck, from which the entire landing area may be viewed. The Arresting Gear Officer shall:

1. Inspect the landing area for loose gear.
2. Ensure that all after deckedge antennas are positioned as required.
3. Check the condition of crossdeck pendants, barrel fittings, and wire supports; and ensure retractable sheaves are in the raised position.
4. Ensure that all aircraft and mobile equipment parked on the flight deck are inside the safe-parking line.
5. Ensure that hook runners and the deckedge operator are on station.
6. Ensure that the ready barricade, including deck ramps, is in a ready status (ready jet barricade lanyards attached to barricade hatch hooks) with a clear route to the area and that a tractor with driver is standing by.
7. Ensure that waist catapult slot buttons are installed in accordance with current bulletins.
8. Notify PriFly when the deck is ready.
9. Ensure that the Arresting Gear Officer's deck status light "pickle" switch is connected and functioning.

Thirty minutes prior to each scheduled recovery, or immediately upon the word being passed to prepare to recover aircraft, all stations shall be manned expeditiously, and the following preparatory actions taken.

1. The Primary Flight Arresting Gear Controller in PriFly shall:
 - a. Ensure that all Arresting Gear Engine, Sheave Damper Operators, Deckedge Operator, LSO Spotter/Talker, ILARTS and Lens Operator have manned their stations and are monitoring the appropriate voice communication systems.

- b. Report to the Air Officer the existing arresting gear engine and lens settings.
 - c. (For ships with arresting gear service change 440 installed) Perform pre-operational system checks in accordance with current maintenance requirement cards. Verify which Arresting Gear Engine Operator has been designated as the alternate master if operations cannot continue in the primary mode. Once verified, he shall inform the Air Officer and the Arresting Gear Officer, via the Arresting Gear Deckedge Operator.
2. The Lens, ILARTS, and SPN-44 Operators shall ensure that their respective equipment is turned on and operating. The lens operator shall turn on the lens ONLY when directed by the Air Officer.

WARNING

Except for the purpose of conducting tests, the lens shall not be turned on until the LSO has manned the platform. The wave-off lights shall be continuously activated any time the lens is turned on and the LSO platform is not manned and ready.

3. The Waist Catapult Officer/Catapult Safety Observer shall ensure:
- a. Launching accessories are clear of the landing area.
 - b. Catapult No. 3 and No. 4 shuttle(s) are aft with Catapult No. 3 grab latch disengaged, and the appropriate shuttle spreader cover installed.
 - c. The centerdeck console hatch (and any other hatches in the waist catapult area) are closed and dogged.
 - d. Jet blast deflectors are lowered completely and hydraulics secured.
 - e. Catapult track slot seals are removed and catapult slot buttons installed. A minimum of 12 buttons is required on all ships.

WARNING

Ensure catapult shuttle is retracted prior to installing track slot buttons.

- f. Waist catapult safety light turned off.
 - g. For ships so equipped, Deckedge ICCS is fully lowered and reports “WAIST BUBBLE DOWN AND LOCKED” to AGO via voice communication.
 - h. In the event the recovery immediately follows a launch, the Waist Catapult Officer or Catapult Safety Observer shall signal the Arresting Gear Officer with a raised arm extended overhead (day) or with a green wand (night) signifying the above actions have been completed.
 - i. If the recovery is not preceded by a launch, the Arresting Gear Officer shall ensure that the above actions have been completed.
4. The LSO Spotter/Talker.
- a. Prepare the platform for the recovery as previously directed by the senior wing LSO.
 - b. Establish voice communications with all recovery stations or CATCC as determined by LSO.
 - c. Turn on deck status lights, and check both primary and secondary light operation.

- d. Ensure that the following distress equipment is available:
 - (1) Battery-powered floating marker (one).
 - (2) Life preserver ring (one).
 - (3) Very pistol with adequate supply of shells.
 - (4) Search and rescue sonobuoy.
5. The LSO Heads-Up Display Platform Operator shall:
 - a. Prepare the platform for recovery.
 - b. Establish voice communications with all recovery stations.
 - c. Ensure deck status lights are on.
 - d. Ensure that emergency deck status signal devices are on hand (red and green paddles for day, red and green wands for night operations).
6. The Arresting Gear Deckedge Operator shall:
 - a. Establish voice communications with all recovery stations.
 - b. Energize the sheave damper indicator lights, and ensure that all battery position lights operate and indicate battery.
 - c. Raise retractable sheaves, ensuring that indicator lights function properly and that all sheaves indicate up.
 - d. Ensure that a set of red and green flags or paddles (day)/wands (night) are on hand for use by the Arresting Gear Officer.
 - e. Report to the Arresting Gear Officer when all stations are manned and ready.
 - f. Ensure required recovery bulletins are available for emergency use.
 - g. (For ships with arresting gear service change 440 installed) Ensure that the AGO Deck Edge display is powered on and functioning.

Note

In the event of deck launches, the Deckedge Operator shall be on station and retractable sheaves shall be up.

7. The Arresting Gear Topside Petty Officer shall assist the Arresting Gear Officer with his pre-recovery inspections as directed. Prior to each recovery cycle he shall:
 - a. Ensure that all topside personnel are on station with their necessary tools and equipment and reports directly to the Arresting Gear Deckedge Operator.
 - b. Ensure that all necessary tools are available. These should include, but are not limited to:
 - (1) Tools necessary to remove/replace deck pendants.
 - (2) Tools necessary to remove/install wire supports.
 - (3) Tractor hook (for pulling out purchase cable).
 - (4) Barricade air guns and associated parts/tools (spare hoses, fittings, etc.).
 - (5) Manual tool for barricade winches.

- c. Ensure that adequate spare equipment is on deck including:
 - (1) Four cross-deck pendants with ends cleaned for CVN-65 through CVN-75, and three cross-deck pendants for CVN-76 and above with ends cleaned. Two of which shall remain uncrated, on deck and ready for immediate installation.
 - (2) Wire support parts.
 - (3) Clevis pins and nuts.
 - (4) Pickle Switch (AGO deck status lights).
 - d. Ensure that the Arresting Gear Officer's deck status light "pickle" switch is connected and functioning.
 - e. Ensure the barricade hatch is open, and a tractor is in position to pull out the barricade.
 - f. Ensure retractable deck sheaves are raised to required height.
8. The Sheave Damper Operator shall:
- a. Inspect all sheave damper installations per current maintenance requirement cards.
 - b. Ensure all cages are in place and properly secured.
 - c. Report to the Arresting Gear Talker via voice communication system when all sheave dampers have been inspected and equipment is ready to recover aircraft.
9. The Arresting Gear Engine Operators shall:
- a. Establish voice communications with all recovery stations.
 - b. Ensure all unauthorized personnel are clear of engine spaces.
 - c. Inspect engine in accordance with current maintenance requirement cards.
 - d. Report to the Deckedge Operator when above checks have been completed and their engines are ready to recover aircraft.
 - e. (For ships with arresting gear service change 440 installed) Ensure that the CROV Motor Drive switch is in the AUTOMATIC position and the Engine Online/Offline switch is in the ONLINE position for all online arresting gear engines when operating in primary mode.
10. The LSO shall:
- a. Prepare for recovery in accordance with LSO NATOPS Manual.
 - b. Report to the Air Officer when "MANNED AND READY."
11. The Air Officer shall complete the Recovery Checklist, which includes the following:
- a. Determine Case recovery and time (confirm first ramp time with CATTC and bridge).
 - b. Obtain expected Base Recovery Course (BRC), altimeter setting, and weather.
 - c. Conduct Radio Check: Recovery Channels, frequencies, and tactical calls.
 - d. Announce 15-minute notice (5MC) "MAN ALL RECOVERY STATIONS."
 - e. Ensure red rotating beacon "on" aft.
 - f. Determine aircraft recovery status:
 - (1) Numbers.
 - (2) Type.

- (3) Fuel.
- (4) Unexpended ordnance.
- (5) Other pertinent information and record on status board for accuracy.
- g. PriFly Arresting Gear controller reports all recovery stations manned:
 - (1) Arresting Gear.
 - (2) ILARTS/Lens.
 - (3) LSO Spotter/Talker.
- h. Recovery Officer (AGO) shall ensure:
 - (1) Recovery area is clear of personnel, loose gear, aircraft, and mobile equipment.
 - (2) Deck hatches, deckedge antennas, JBDS, and waist catapult ICCS lowered.
 - (3) Waist Catapult shuttles positioned aft, covers in place.
 - (4) Wire supports, retractable sheaves raised, and CDPs in battery.
 - (5) Barricade hatch open.
 - (6) Tractor positioned at the barricade hatch.
 - (7) Deck status light raised and operational.
 - (8) Ascertains all recovery stations are manned and ready via the Arresting Gear Deckedge Operator.
 - (9) Report directly to the Air Officer via voice communication upon satisfying all above requirements. AGO shall report recovery stations manning status followed by the recovery equipment current configuration. The report shall be as applicable (i.e. "GEAR MANNED AND READY... HIGH WIRE IS ___ WITH ___ TRAPS... WITH TWO STBD RETRACTABLE SHEAVE IN BYPASS MODE... AND NUMBER ONE WIRE OFFLINE..." etc.)
- i. LSO reports, "MANNED AND READY."
- j. Clearance from bridge to land aircraft.
- k. Lens and deck lighting "ON" for recovery (notify LSO, "PADDLES/TOWER, LENS ON, YOU HAVE CONTROL").
 - l. Check wind (Crosswind/speed).
- m. Green rotating beacon "ON" aft.
- n. Announce "LAND AIRCRAFT" ON 5MC.

5.2.2 Approach

Prior to the LSO receiving a "CLEAR DECK" from the Arresting Gear Officer, the following sequence of events shall be strictly adhered to for the first and all subsequent landings:

1. The Air Officer shall determine the aircraft type to be recovered and direct the arresting gear and lens to be set. He shall verbally acknowledge aircraft weight and lens setting calls as reported to him (e.g., "ROGER, GEAR...LENS SET...THREE SIX ZERO HORNET"). He shall verify the setting by observing the Air Officer display.

2. With the Crosscheck System in Primary Mode operation, the Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered, shall perform the following:
 - a. Enter the aircraft type into the Arresting Gear PriFly Operator flat panel. Inform the Arresting Gear Engine Operator to verify the setting required for the next aircraft using only the first three digits and aircraft type (e.g., “VERIFY SETTING THREE SIX ZERO, HORNET”). Monitor the Arresting Gear PriFly Operator flat panel to ensure all online engines indicate the correct weight setting (within ± 200 pounds) and indicate a battery condition.
 - b. He shall monitor the arresting gear voice communications system for any reports from the Engine Operator or Sheave Damper Operators of any improper settings or irregular conditions.
 - c. When the Arresting Gear PriFly Operator flat panel indicates that all online engines are properly set and in battery, and IFLOLS is properly set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type. (e.g., “ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET”).
3. The Arresting Gear Engine Operators shall report settings in sequence, engine numbers one through four (followed by barricade if applicable). If an engine is out of service, the report for that engine shall be omitted in the reporting sequence. The report shall be “ENGINE ONE SET THREE SIX ZERO, HORNET ... ENGINE TWO SET THREE SIX ZERO, HORNET,” etc.
 - a. Engine Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.
4. With the Crosscheck System in Primary Mode operation, Arresting Gear Engine Operators will sequentially report their engine is set. (e.g., “ONE SET THREE SIX ZERO, TWO SET THREE SIX ZERO, THREE SET THREE SIX ZERO, FOUR SET THREE SIX ZERO, HORNET”). If an engine is out of service, the report for that engine shall be omitted in the reporting sequence.
 - a. They shall verify that the CROV linear scale indicates the correct weight setting prior to reporting, “ENGINE SET.” Should the linear scale disagree with the LED weight setting digital readout by more than 500 pounds, a foul deck condition exists and the Engine Operator shall declare, “FOUL DECK! FOUL DECK!”
 - b. Engine Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.
5. The Deckedge Operator shall:
 - a. Monitor the sheave damper indicator lights.
 - b. Monitor the retractable sheave indicator lights.
 - c. Ensure the landing area is clear (within his field of view).
 - d. Ensure all deck pendants are fully retracted and taut.
 - e. Ensure all engines are in battery (received over voice communication system from engine operators).
 - f. Monitor engine weight settings. It is imperative that the Arresting Gear Officer know the exact weight setting of the arresting gear engines so he can ensure the engines are set for the type aircraft to land.
 - g. Keep the engine operators informed on the status of the recovery by reporting the following aircraft positions: GROOVE/RAMP. He shall call “GROOVE” on the voice communication system as the aircraft approaches short final, and call “RAMP” as it reaches the fantail.
 - h. He shall monitor the AGO Deckedge display for correct weight settings and engine battery status. He shall monitor the arresting gear voice communications system. When the Primary Flight Arresting Gear Controller reports that all online engines are properly set and in battery, he shall provide verbal confirmation to the Arresting Gear Officer. (e.g., “ALL ENGINES SET THREE SIX ZERO, HORNET”).

6. The Sheave Damper Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.



When the word “GROOVE” is passed over the voice communication system, all non-essential communications shall cease until after the aircraft touches down. Anyone not ready to land aircraft at that time shall immediately respond with “FOUL DECK, FOUL DECK.”

7. The Improved Fresnel Lens Primary Flight Lens Console Operator shall make the appropriate lens setting and continuously monitor the lens system during recoveries and shall report any malfunction immediately to the Air Officer.

Note

The PriFly Controller shall energize the appropriate aircraft indicator button when the lens and arresting gear are set properly, thus lighting the Air Officer’s indicator light. The light shall be turned OFF following each arrested landing, bolter, touch and go, or wave-off.

8. The Arresting Gear Officer, upon receiving clearance to “LAND AIRCRAFT” from the Air Officer, and upon observing the aft GREEN rotating beacon, shall ensure the following conditions exist prior to providing a “clear deck” signal to the LSO:
- a. A “CLEAR DECK FORWARD” signal has been received from the Gear Puller. The signal is given by sweeping one arm from vertically overhead to the horizontal position and returning overhead (day), or by using the same signal with an AMBER wand (night).
 - (1) This signal shall be acknowledged from the Recovery Officer by repeating the signal using his arm (day) and RED wand (night).

Note

The “foul deck” signal from the Gear Puller to the Arresting Gear Officer is indicated by arms crossed overhead with fists clenched (day), or crossed AMBER wands held overhead (night).

- b. All deck pendants appear fully retracted and taut.
- c. Observe the Deckedge Operator’s signal, indicating that all conditions for recovery have been completed.
- d. Ensure the Deckedge Operator indicates engines are set.
- e. All retractable sheaves are raised and wire supports are in place.



During simultaneous recovery and catapult No. 2 operations, deckedge mode, the cat No. 2 Deckedge Operator and JBD Operator (if applicable) are authorized to man the deckedge station for operations and shall not be considered fouling the landing area. The Deckedge Operator and JBD Operator shall be aware and alert during recovery operations.

- f. The catwalks, flight deck, and other hazardous areas are clear of unauthorized personnel.
- g. Visually and positively identify aircraft to be recovered.

WARNING

- The utmost attention to every detail is required during night or reduced visibility flight operations. Presently, certain aircraft have similar features that hinder the rapid, positive identification of approaching aircraft. Consequently, the entire recovery team shall be alert to preclude a mismatch between landing aircraft and the arresting gear settings. The final assurance to prevent this mismatch shall rest with the Arresting Gear Officer.
 - The Arresting Gear Officer shall NOT, under any circumstances, provide a “CLEAR DECK” until the aircraft has been positively identified visually or via the Air Officer.
- h. When satisfied that all the above requirements have been met, the Arresting Gear Officer shall change the deck status light from RED to GREEN, remaining alert for any malfunctions of the equipment or violations of the safe parking line. The deck will be declared “FOUL” by switching the deck status light to RED after each arrested landing, bolter, touch and go, or wave-off, and it will remain so until completion of the above procedures.

Note

While the final check for compatibility of the landing aircraft and the arresting engine settings are made by the Arresting Gear Officer, cross-checks by other personnel are critical. The A/G PriFly Controller, Lens Console Operator, LSO Spotter/Talker, Deckedge Operator, and Topside Petty Officer should also be trained in aircraft recognition under all conditions. This becomes even more imperative during night or reduced visibility operations and when EMCON conditions are in effect. All visual and aural characteristics (aircraft lighting, flight characteristics, engine sounds, etc.) shall be used in making the final determination. If a positive determination cannot be made, a low pass by the ship shall be requested to positively identify the aircraft.

9. The LSO Spotter/Talker.
- a. When visual confirmation of aircraft type and configuration (gear, flaps, and hook down) has been made, he shall notify the LSO (e.g., “HORNET, ALL DOWN”).
 - b. He shall also notify the LSO of type aircraft, arresting engines set, weight setting, and clear or foul deck, whichever is appropriate, depending on the light indication in the deck status light box. (e.g., “GEAR SET, THREE SIX ZERO, HORNET, CLEAR DECK”).
 - c. If the red light is on, the “FOUL DECK, FOUL DECK” call is repeated continuously until the green light comes on. One “CLEAR DECK” call is then made, and the spotter/talker shall monitor the light status until the aircraft has passed the ramp for any change in deck status.
10. The Integrated Launch and Recovery Television System Operator shall ensure coverage of each aircraft approach and arrestment. Additionally, any abnormal situation (crash, fire, aircraft in catwalk, etc.) shall be duly recorded. To attain coverage for detailed tape analysis, the following camera sequence shall be utilized:
- a. Island camera for initial approach.
 - b. Centerline camera for final approach, touchdown, and until nose wheel blocks the view or reaches the centerline camera in use.
 - c. Island camera for roll out, ensuring that aircraft side number and the pendant engaged is shown.

11. If arresting gear service change 440 is installed, the Air Officer shall determine the aircraft type to be recovered and direct the arresting gear and lens to be set. He shall verbally acknowledge aircraft weight and lens setting calls as reported to him (e.g., “ROGER, GEAR...LENS SET...THREE SIX ZERO HORNET”). He shall verify the setting by observing the Air Officer’s cross check display screen.
12. In the primary mode of operations, the Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered, shall perform the following:

Enter the aircraft type into the Primary Flight Arresting Gear Controller flat panel touch screen display. Inform the engine operator to verify the setting required for the next aircraft using only the first three digits and aircraft type (e.g., “VERIFY SETTING THREE SIX ZERO, HORNET”) monitor the Primary Flight Arresting Gear Controller flat panel touch screen display to ensure all engines, that are on line, indicate the correct weight setting (within ± 200 pounds) and indicate a battery condition. He shall monitor the arresting gear voice communications system for any reports from the engine room or sheave damper operators of any improper settings or irregular conditions. When the Primary Arresting Gear Controller flat panel touch screen display indicates that all on line engines are properly set, and in battery, and IFLOLs is properly set, the Primary Arresting Gear Controller shall report verbally to the air officer the number of engines set, settings, lens status, and aircraft type (e.g., “ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET”).

WARNING

When an engine is being put on-line, all required maintenance procedures shall be satisfactorily completed and documented. Sound powered phone communication shall be established with the engine room operator and sheave damper operator, and all retractable sheaves shall be visually inspected to ensure they are at the proper height.

Note

- In all three modes of operation, primary mode, alternate master mode, and fully manual mode, engine operators will sequentially report their engine is set (e.g., “ONE SET THREE SIX ZERO, TWO SET THREE SIX ZERO, THREE SET THREE SIX ZERO, FOUR SET THREE SIX ZERO, HORNET”). They shall verify CROV mechanical pointers/liner scale for correct weight settings prior to reporting “ENGINE SET.” Should mechanical pointers/liner scales disagree with electrical/electronic devices, a foul deck condition exists and the engine operator shall declare, “FOUL DECK!”
- When an engine is taken off-line (CDP removed), the Air Officer and Primary Flight Arresting Gear Controller shall visually verify that the CDP is removed and then shall enter this on his primary Arresting Gear Controller flat panel touch screen by touching the “ENABLE” pushbutton on the main screen and then touching the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured with three wires.) Pushbuttons at the left side of the screen. He shall then verbally confirm that the engine room operator has set the engine on-line/off-line switch on the cross check engine room electronics enclosure to the off-line position. When an engine is being brought back on-line (CDP re-installed and engine fully operational), the Primary Flight Arresting Gear Controller shall verify with the Air Officer that the engine is being brought back on-line. He shall verbally confirm that the engine room electronics enclosure switch has been turned to the on-line position by the engine room operator for the affected engine. The Primary Flight Arresting Gear Controller shall enter this on his Primary Flight Arresting Gear Controller flat plat touch screen by touching the “ENABLE” pushbutton and then touching the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured with three wires) pushbutton.

13. If a failure occurs that precludes setting engine CROVs in the primary mode of operation, the Primary Flight Arresting Gear Controller (upon obtaining permission from Air Officer) shall notify the designated alternate master engine operator to position the CROV motor drive switch on the engine electronic enclosure to the manual position. All other engines will leave their respective switches in the automatic position. The Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered shall inform the alternate master engine operator of the setting required for the next aircraft using only the first three digits and the aircraft type (e.g., “SET ALL ENGINES THREE SIX ZERO, HORNET”). The alternate master engine operator shall set the weight setting for his engine to the proper weight. All other on-line engines will automatically be set to the same engine weight setting (± 200 pounds). If the weight setting is to remain the same for the next aircraft, the phraseology shall be, “CHECK SETTING THREE SIX ZERO, HORNET.” Primary Flight Arresting Gear Controller shall monitor the arresting gear voice communications system for any reports from the engine room or sheave damper operators of any improper settings or irregular conditions. When all engine operators have reported the correct weight setting, and the correct lens angle has been set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, lens status, and aircraft type (e.g., “ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET”).

WARNING

- If the Primary Flight Arresting Gear Controller depresses “ENABLE” and then depresses “BATTERY” for a given engine, a “FORCED BATTERY” condition exists within the cross check system. Should this condition be employed, safety features of the re-designed arresting gear cross check system are now defeated, therefore, use of “FORCED BATTERY” may only be used with the permission of the Air Officer.
 - In Alternate Master Mode, the primary flight arresting gear controller panel is de-energized, consequently, the forced battery capability is lost. In this operating mode, an error message can be by-passed by actuating the A/G SHV UP test by-pass switch in the Landing Area Status and Signal System by-pass panel. If operations necessitate operating in this condition, ALRE Maintenance Officer concurrence is required. Actuating the AGO pickle switch will then light the green lights for a clear deck check indication.
 - In extreme circumstances, the arresting gear can be operated in the DEGRADED FULLY MANUAL MODE. To accomplish this, all crosscheck power must be de-energized. In this mode of operation, all engine settings must be two-person verified. No remote monitoring of weight settings can be accomplished. DEGRADED FULLY MANUAL MODE may only be used with the permission of the Commanding Officer.
14. To operate in DEGRADED FULLY MANUAL MODE, the Primary Flight Arresting Gear Controller will direct each engine operator to switch the CROV motor drive switch on each engine’s electronic enclosure to the manual position. He will, upon ascertaining the type of aircraft to be recovered, inform the engine operators of the setting required for the next aircraft using only the first three digits and the aircraft type (e.g., “SET ALL ENGINES THREE SIX ZERO, HORNET”). Each engine operator shall set the weight setting for their engine to the proper weight (± 500 pounds). If the weight setting is to remain the same for the next aircraft, the phraseology shall be, “CHECK SETTING THREE SIX ZERO, HORNET.” He shall monitor the arresting gear voice communications system for any reports from the engine room or sheave damper operators of any improper settings or irregular conditions. When all engine operators have had an additional qualified engine operator verify the proper weight setting and have reported the correct weight setting as verified, and the correct lens angle has been set, the Primary Flight Arresting Gear Controller

shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type (e.g., “ALL FOUR GEAR VERIFIED...LENS...SET THREE SIX ZERO, HORNET”).

Note

ILARTS tapes shall normally be retained at least 48 hours before erasing/over-recording. In the event there is any deviation from a normal arrested landing, ILARTS tapes shall be retained in accordance with the Report of Deviation from Normal Arrested Landing found in COMNAVAIRFORINST 13800 Series. In the event of an aircraft mishap of sufficient severity as defined in OPNAVINST 3750.6, the ILARTS tape shall immediately be made available to the senior member of the Aircraft Mishap Board for the duration of the investigation. During recording of mishaps and aircraft emergencies, camera signals to the ship’s entertainment system shall be secured. This will prevent unauthorized copying of the TV signal, but still allows ILARTS monitors to be available during the mishap.

5.2.3 Landing

During night recovery operations, only those signal wands prescribed below shall be used by recovery personnel:

Arresting Gear Officer	1 RED and 1 GREEN standard
Arresting Gear Deckedge	1 GREEN stubby and 1 RED standard
Arresting Gear Hook Runner	1 RED standard wand
Arresting Gear TSPO	1 RED and 1 GREEN standard
A/G Deck checker	1 WHITE stubby
Gear Puller	2 AMBER standard
LSO Talker	1 RED and 1 GREEN standard
A/G safety	1 RED standard
VLA safety	1 RED standard

During the landing, roll-out, and clearing of the arresting gear the following sequence of events shall take place:

1. The Arresting Gear Officer shall change the deck status light from GREEN to RED as the aircraft touches down.



All personnel shall seek as much protection possible as the aircraft approaches and lands. Personnel in the catwalks and at the deckedge control station shall duck behind cable shields or below flight deck level.

Note

After the aircraft completes its arrestment and roll-out, it shall be permitted to roll back a few feet to permit the pendant to fall free of the hook.

2. The Hook Runner shall enter the landing area, as necessary, to ensure that the hook and aircraft are clear of the pendant prior to the aircraft being taxied forward and/or the pendant being retracted.

3. The Gear Puller (Director) shall position himself so as to be clearly visible to the pilot.

WARNING

The Hook Runner and Gear Puller shall not enter the landing area until the aircraft has come to a complete stop.

4. The Hook Runner shall give the “WIRE CLEAR” signal to the Gear Puller by making a vertical motion with his arm (day) or RED standard wand pointed at the Gear Puller (night) when the aircraft and/or hook is clear of the pendant.

CAUTION

Signaling the pilot to raise the tailhook while the arresting wire is still engaged may result in damage to EA-6B tailhook system components per corresponding platform NATOPS caution.

5. The Gear Puller will then give the pilot the signal to raise the hook, followed by the signal to hold brakes. After the aircraft has stopped and is clear of the cable, the Gear Puller will give the pilot the “off brakes” signal, and taxi the aircraft clear of the landing area.
6. In the event the pendant does not disengage from the hook, the following actions shall be taken:
 - a. The Hook Runner shall give the “HOOK DOWN” signal to the Gear Puller, which the Gear Puller shall relay to the pilot. “Release brakes” signal to the pilot shall then follow.
 - b. As soon as the hook is observed down, the Hook Runner shall give the “PULL BACK” signal to the Gear Puller and Deckedge Operator. The Gear Puller shall relay this signal to the pilot.

CAUTION

Retraction during the tailhook “up” cycle may cause extensive damage to the aircraft tailhook mechanism. Ensure tailhooks are in the full-down position.

- c. The Deckedge Operator shall carefully retract the gear momentarily, causing the aircraft to slowly roll back, creating the necessary slack for hook disengagement.
- d. The Hook Runner will signal “HOOK-UP” to the Gear Puller who will relay the signal to the pilot followed by the signal to “HOLD BRAKES.”
- e. After the aircraft has stopped its rollback, the Gear Puller will signal “OFF BRAKES,” and then taxi aircraft clear of the landing area.

CAUTION

Attempting to use the arresting engine wire retract cycle to tow a recovered aircraft aft can cause cable slack or ram slap resulting in damage to arresting gear components. Additionally, the tail hook mechanism can be damaged if it is towed underneath any crossdeck pendant.

7. The Hook Runner shall signal the Deckedge Operator to “RETRACT” only when the following have been completed:
 - a. Hook raised.
 - b. Sufficient clearance exists between the hook point and CDP such that an inadvertently lowered hook will not engage the CDP.

Note

The Hook Runner shall ensure his signal to retract has been received by the Deckedge Operator prior to leaving the landing area.

8. The Deckedge Operator, upon receiving the “RETRACT” signal and ensuring there are no obstructions in the cable bite, shall retract the cable.

WARNING

The Deckedge Operator shall NOT retract until he has received a positive signal to do so. He shall also be alert to immediately stop cable retraction if someone comes into the bite of the cable or the cable falls into the catapult track slots.

CAUTION

The speed of retraction is governed by the distance the retract control lever is pulled away from the deckedge bulkhead. Always start retraction slowly increase speed, then ease lever toward bulkhead to slow retraction near the end of the cycle. If retraction is stopped at any time before completion, slack may build up in the system. Therefore, resume retraction very slowly to rid cable system of all slack. When slack is eliminated and cable system is tensioned, resume normal retraction.

9. The Arresting Gear Officer, Topside Petty Officer, and Deckedge Operator shall observe the deck for FOD and broken wire supports during retraction.
10. The Arresting Gear Engine Operator of the engine having engagement shall:
 - a. Relay to PriFly, the information necessary for completing the recovery log.
 - b. Report “BATTERY” when the engine is fully retracted and anchor dampers are extended.
 - c. Ensure temperature, pressure, fluid level, and engine battery positions are within normal operating limits.
 - d. (For ships with arresting gear service change 440 installed) Upon completion of engine retraction, ensure that no errors are displayed on the Crosscheck Engine Electronics Enclosure.
11. The Sheave Damper Operators shall inspect the sheave dampers having engagement in accordance with pre-recovery procedures.
12. The Primary Flight Arresting Gear Controller shall watch the aircraft touchdown point and assist in reporting off-center hits and engaging speeds to the Arresting Gear Officer via voice communication system when an engagement exceeds the limits listed in current recovery directives.

5.2.4 Post Recovery

It is extremely important to maintain a flow of information among the pilots and the Arresting Gear Officers. When pilots make procedural errors, they should be made aware of their errors, so a complete understanding of flight deck procedures is maintained. Arresting Gear Officers shall keep in mind that each pilot is an individual, and each has his own level of proficiency. At times the Arresting Gear Officer shall become an instructor on flight deck procedures. Everyone connected with the recovery should know what everyone else is doing, and the reason why. Periodic debriefs are necessary to ensure pilots know what is going on around them, and to resolve any misunderstanding they might have about procedures and functions of flight deck personnel.

Some of the common errors that should be covered in debriefs are:

1. Not recognizing night signals.
2. Not taxiing clear of the landing area in a safe but timely manner.
3. Not understanding procedures when a CDP is hung-up in the aircraft hook/landing gear.
4. Not remaining at full power until the aircraft comes to a full stop.

5.2.4.1 Arresting Gear Crew Debrief

While not always necessary or required after every recovery, post-recovery debriefs by the Arresting Gear Officer shall be held with the Arresting Gear Crew whenever a situation cycle that needs clarification occurs during a recovery. These debriefs may pertain to the topside crew, the below-deck crew, or the entire arresting gear crew.

The best possible results may be realized when there is a continuous flow of information and ideas among the Arresting Gear Officer, supervisory personnel, and the Arresting Gear crew. Debriefs reviewing potential errors or compliments on the crew's outstanding performance can do wonders for crew morale and enhance the smoothness and efficiency of the next event.

5.3 EMERGENCY ACTIONS, PROCEDURES, AND ASSOCIATED DRILLS

5.3.1 General

Due to the necessarily rapid tempo of recovery operations, all hands shall be ready to react immediately to any emergency situation in order to minimize foul deck time. Adequately trained personnel shall be readily available to assist the arresting gear topside crew in any emergency action.

To ensure proficiency and equipment readiness, drills shall be held as often as possible. At the very least, prior to getting underway, weekly at sea, or as operations dictates. All drills shall be initiated by the Air Officer who shall take into consideration the Aircraft Handling Officer's, Catapult and Arresting Gear Officer's, and LSO's recommendations and drill compatibility with ongoing air operations (e.g., deck pendant change drill at end of a recovery when pendant needs to be changed due to maximum engagements; MOVLAS drill to conform with LSO's requirement for MOVLAS recoveries).

Drill grades are outlined in FXP-4 publications.

5.3.2 Removal of Engine from Service During Recovery Operations

Taking an engine "off the line" (removing deck pendant), or taking the time necessary to correct a malfunction, is ultimately the Air Officer's decision. However, the Arresting Gear Officer shall be prepared to provide rapid and knowledgeable decisions and make recommendations as to the course of action to be taken. The Arresting Gear Officer shall exercise judgment in recommending removal of arresting engines from service and the changing of crossdeck pendants. All arresting gear personnel shall immediately report any malfunction or condition requiring the "downing" of equipment to the Arresting Gear Officer, who shall advise the Air Officer of the required action.

Due to the remote location of the Arresting Gear Officer, it is imperative that engine room personnel and Sheave Damper operators provide immediate and accurate information concerning below deck emergencies to the AGO via the Deckedge Operator.

WARNING

In the event of an emergency, all unaffected stations shall maintain voice communication system silence.

The following conditions and malfunctions will necessitate the removal of an engine from operation if timely corrections or explanations cannot be made:

WARNING

If any doubt exists as to the readiness of the arresting gear engine or associated equipment, the engine shall remain "off the line" until careful and unhurried analysis and corrective action are made without sacrificing any margin of safety.

1. Engine.

- a. Pressures, temperature, or fluid level not within operating limits.
- b. Unexplained smoking of sheave assemblies.
- c. Crosshead to crosshead stop clearance less than 1 inch.
- d. Crosshead to crosshead stop clearance changes more than 1/2-inch from post-op to pre-op.
- e. Fluid indicator not indicating battery.
- f. Excessive and/or unexplained ram overtravel. The following are factors that might contribute to ram overtravel and should be closely monitored:

Note

Refer to applicable NAVAIR manuals for further amplification.

- (1) Excessive aircraft gross weight.
- (2) Excessive aircraft engaging speed.
- (3) Large increase of aircraft thrust applied just prior to and/or during the arrested run-out.
- (4) Improper torque of CRO valve.
- (5) Improper CRO valve setting.

CAUTION

Careful monitoring of (1) and (2) above, with attention to accuracy of speed indicator readiness and actual aircraft weights, is imperative. Errors in these areas can be significant factors in arresting gear over-travel. Also, engagement with afterburners operating will almost always produce ram over-travel. As an additional precaution, control valve cam torque should be kept as close as possible to the maximum limit.

- g. Unpredicted, extremely short run-out.
- h. Anchor damper not in battery.

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- i. Constant run-out valve weight setting malfunction.
 - j. (For ships with arresting gear service change 440 installed) The Crosscheck Engine Electronics Enclosure indicates “RETRACTING” after the Deckedge Operator releases the retract lever.
2. Sheave Dampers.
 - a. Pressures and fluid levels not within operating limits.
 - b. Fluid leaks in damper cylinder, accumulator, or associated piping.
 - c. Purchase cable not routed correctly.
 - d. Crosshead not in battery.
 - e. Excessive and/or unexplained smoking of crosshead or fairlead sheaves.
 3. Topside.
 - a. Deck pendant or purchase cable does not meet specifications as outlined in applicable NAVAIR manuals or PMS cards.

Note

The Topside Petty Officer shall make inspections as necessary in accordance with applicable NAVAIR manuals or PMS cards.

- b. Excessive or unexplained smoking of sheaves.
- c. Inability to raise retractable deck sheave to full-up position.

WARNING

Even though complete failure of the purchase cable may be prevented as a result of the modification of pan and flight deck cutout, any arrestment completed with the retractable sheave DOWN will damage the purchase cable enough to require cable replacement. It is imperative that no arrestment ever be made with the retractable sheave in the DOWN position.

- d. Purchase cable deck pendant inspection or replacement criteria. Proper preplanning should eliminate this requirement during recovery operations.
- e. Inability to retract. In the case of a broken retract cable, retraction can be effected from the retract valve in the engine room.

5.3.2.1 Sequence of Events for Removal of an Engine from Service During Operations

For any condition or malfunction requiring the removal of an arresting gear engine from service, the following procedures shall be used:

1. The Arresting Gear Officer shall be notified immediately by voice communication system and/or hand signal, e.g., “FOUL DECK, FOUL DECK, NUMBER (ENGINE NUMBER) IS DOWN.” All stations except the sending stations shall remain silent. The hand signal for a foul deck shall be arms crossed overhead with fists clenched.
2. Upon receiving a “FOUL DECK, FOUL DECK” the Arresting Gear Officer shall:
 - a. Notify the LSO via the deck status light that the deck is fouled.
 - b. Evaluate the existing conditions and notify the Air Officer of the appropriate action and estimated time of repair.

Note

The Primary Flight Arresting Gear Controller shall relay to the Air Officer the initial report and/or any amplifying information as it is passed to the Arresting Gear Officer over the voice communication system.

3. The Air Officer shall “close” the deck for recovery until the malfunction has been corrected or the engine has been removed from service, and the normal operations reestablished.
4. Air officer shall announce via 5MC, “FOUL DECK, FOUL DECK, STRIP THE NUMBER ___ WIRE.”



If possible, increase illumination of the landing area when altering recovery configuration.

5. The Arresting Gear Officer, if necessary, shall direct that:
 - a. The deck pendant be removed.
 - b. When an engine is taken offline (CDP removed), the Air Officer and Primary Flight Arresting Gear Controller shall visually verify that the CDP is removed. The Primary Flight Arresting Gear Controller shall place the downed engine “OFFLINE” at the Crosscheck Arresting Gear Pri-fly Operator flat panel. This is accomplished by touching the “ENABLE” button on the main screen and then touching the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured with three wires) button at the top, left side of the screen. The Primary Flight Arresting Gear Controller shall verbally direct the Arresting Gear Engine Operator to set the Engine Online/Offline switch to the “OFFLINE” position and the CROV Motor Drive switch to the “MANUAL” position on the Crosscheck Engine Electronics Enclosure.

WARNING

No one shall enter the landing area until positive clearance has been obtained from the Arresting Gear Officer.

Note

For those ships with Arresting Gear Service Change 417A installed, the absence of an engine setting on the AWIS panel for any engine provides confirmation that an engine’s breaker is OFF and that the AWIS has been bypassed.

6. During the removal of a deck pendant or when a situation that requires personnel in the landing area exists, all personnel should work facing aft and be continually alert and ready to clear the landing area.
 - a. The Topside Petty Officer or other cognizant person shall stand forward of personnel in the landing area, facing aft, giving the proper foul deck signal and observing aircraft in the pattern.
 - (1) Should an aircraft approach and fail to wave off, it shall be his responsibility to notify those personnel in time to clear the deck.
 - (2) All personnel shall be aware of the shortest route away from the landing area for that situation.
 - b. Deckedge Operator shall stand well clear of the retract lever while personnel are removing the deck pendant.
 - c. The retract cable shall be disconnected at the retract valve if the deck pendant is to be removed for a prolonged period.

7. AGO shall notify air officer “Arresting gear manned and ready with ____ wires installed and/or removed,” after confirming the same.
8. Prior to commencing recovery operations, the air officer shall announce over the 5MC the status of the arresting gear equipment. (“The ____ wire is stripped. Wires ____, ____, and ____ are online.”)



Failure to ensure all recovery personnel are aware of the arresting gear configuration change can result in engagement of an improperly configured arresting gear engine.

Note

In cases requiring a “functional test,” the engine will not be returned to service during recovery operations unless a complete pre-operational inspection has been completed.

5.3.3 Returning of Engine to Service During Recovery Operations

To return an engine to service, the following procedures shall be used:

1. The ALRE Maintenance Officer shall determine that the condition or malfunction causing removal of the engine from service has been corrected.
2. The ALRE Maintenance Officer shall advise the Air Officer that the engine is ready to be returned to service.
3. If the deck is open, the Air Officer shall close the deck for recovery.



Prior to returning an engine to service, all required maintenance procedures should be satisfactorily completed and documented. Sound powered phone communication shall be established with the Arresting Gear Engine Operator and Sheave Damper Operator, and retractable sheaves will be visually inspected to ensure they are at the proper height.

4. Air Officer shall announce via 5MC, “Foul Deck, Foul Deck, Reinstall the number ____ wire.”



If possible, increase illumination of the landing area when altering recovery configuration.

5. When an engine is brought back online (CDP re-installed and engine fully operational), the Primary Flight Arresting Gear Controller shall verify with the Air Officer that the downed engine is to be returned to service. He shall verbally direct the Arresting Gear Engine Operator to set the Engine Online/Offline switch to the “ONLINE” position and the CROV Motor Drive switch to the “AUTOMATIC” position on the Crosscheck Engine Electronics Enclosure. The Primary Flight Arresting Gear Controller shall place the engine “ONLINE” at the Arresting Gear Pri-fly Operator flat panel. This is accomplished by touching the “ENABLE” button on the main screen and then touching the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured

with three wires.) button at the top, left side of the screen. The Primary Flight Arresting Gear Controller shall notify all arresting gear operating stations that the engine has been returned to service via the arresting gear voice communications system.

6. The Arresting Gear Deckedge Operator shall monitor the arresting gear voice communications system. When notified by the Primary Flight Arresting Gear Controller that the engine has been returned to service, he shall inform the Arresting Gear Officer.
7. The Arresting Gear Officer shall monitor the AGO Deckedge display to verify that the engine has been returned to service. After ensuring that all conditions are met for a normal recovery, the Arresting Gear Officer shall:
 - a. Notify the Air Officer.
 - b. Institute the normal operations sequence.
 - c. Notify the LSO by changing the deck status light to GREEN after the Air Officer opens the deck and the arresting gear engines are ready for recovery.

WARNING

After the decision has been made to put an engine back in service and before a clear deck signal is initiated, the Arresting Gear Officer will ensure that the weight setting for that engine is correct for the approaching aircraft.

5.3.4 Changing Cross-Deck Pendant (CDP)

Refer to applicable NAVAIR manuals.

5.3.4.1 Emergency Procedures

There are some situations that may require changing the CDP during recovery. The procedures are as follows:

1. Air Officer shall announce via 5MC, "FOUL DECK, FOUL DECK, CHANGE NUMBER ____ WIRE."
2. AGO shall notify LSO that the deck is fouled via a red deck status light.
3. Once the CDP has sufficient slack, the topside crew shall change the CDP.

WARNING

- The Topside Petty Officer or other cognizant personnel shall stand forward of the topside crew, facing aft and giving the FOUL DECK signal while observing aircraft in the pattern. Should an aircraft approach and fail to wave off, it shall be his responsibility to notify the topside crew in time to clear the deck.
 - The Deckedge Operator shall stand well clear of the retract lever while topside crew is changing the deck pendant.
4. After the CDP has been changed, the Deckedge Operator shall retract the wire only upon the Topside Petty Officer's signal.
 5. The topside crew shall check for FOD prior to resuming recovery operations.

5.3.4.2 MOB-S-01-CV Cross-Deck Pendant Change Exercise

Note

It is recommended that completely changing the CDP be practiced as opposed to swapping ends.

NAVAIR 00-80T-120

5.3.4.2.1 Purpose

To train arresting gear personnel to re-rig cross-deck pendants.

5.3.4.2.2 Requirement

Half of these exercises shall be conducted during darkness.

5.3.4.2.3 Procedures

- a. When directed, re-rig cross-deck pendant.
- b. One-minute standby will be given prior to commencing re-rigging of the cross-deck pendant.
- c. Timing stops when the pendant is ready in all respects for aircraft engagement.

5.3.4.2.4 Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.3.5 Deck Status Light Failure

1. In the event of a failure of the deck status light system, the Recovery Team shall immediately shift to the emergency back-up system. The LSO HUD Platform Operator shall break out emergency deck status signal devices. These shall consist of RED and GREEN paddles or flags for day and a set of RED and GREEN wands at night.

Note

Signaling devices shall be of sufficient size or intensity and be so displayed so as to be clearly visible to the Arresting Gear Officer, LSO, and PriFly.

2. The Recovery Officer shall signal "CLEAR DECK" by raising a GREEN flag vertically overhead during the day or at night holding a GREEN wand overhead. LSO HUD Platform Operator shall display the same signal until the Arresting Gear Officer changes the signal.
3. The "FOUL DECK" signal shall be given by raising a RED flag vertically overhead during the day or a RED wand held overhead at night. The LSO HUD Platform Operator shall display the same signal until the Arresting Gear Officer changes the signal.
4. The LSO HUD Platform Operator shall continually be alert for changes of the Arresting Gear Officer's signals and shall NOT display a "CLEAR DECK" until he has received a positive "CLEAR DECK" signal from the Arresting Gear Officer.
5. The LSO HUD Platform Operator shall continuously display the "CLEAR DECK" signal as displayed by the Arresting Gear Officer.
6. In the absence of any signal from the Arresting Gear Officer, the LSO HUD Platform Operator shall immediately foul the deck.

5.3.5.1 MOB-S-02-CV Deck Status Light Failure Exercise

5.3.5.1.1 Purpose

To train and evaluate Air Department personnel in flight operations with a deck status light failure.

5.3.5.1.2 Requirement

Half of these exercises are to be conducted during darkness.

5.3.5.1.3 Procedures

1. OCE (Officer Conducting Exercise). With the Air Officer's concurrence, the OCE shall initiate this exercise by securing the flight deck status light power switch at the LSO platform just prior to or during a recovery.
2. Arresting Gear Officer. Upon loss of the deck status light, immediately shift to emergency signal devices.
3. LSO HUD Platform Operator. LSO HUD Platform Operator immediately shifts to emergency signal devices and repeats all signals from the Arresting Gear Officer until power is restored.

5.3.5.1.4 Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.3.6 Voice Communication System Failure

1. Provisions shall be made to ensure the continuation of necessary communications in the event of a voice communication system failure. Individual carriers shall devise their own system and procedures compatible with their installations.
2. Any emergency procedure will necessarily cause significant delays in meeting all requirements for a clear deck. To preclude or minimize foul deck waveoffs, the Air Officer shall cause the landing interval to be extended accordingly and shall make every effort to recover aircraft by type, in sequence.

5.3.7 Constant Run-Out Control Valve Weight Setting Malfunctions

In the event of any malfunction of the constant run-out control valve weight setting unit, the engine shall normally be taken out of service. If, in the opinion of the Air Officer, removal of the engine from service is not feasible, weight settings shall be made manually. If settings must be made manually, the Air Officer shall make every effort to recover aircraft by type, in sequence, to minimize weight-setting delays.

Note

(For ships without arresting gear service change 440) If deckedge Dixon meters are out of limits, an additional qualified Engine Operator shall also verify proper weight setting at engine.

5.3.8 Rigging the Barricade

5.3.8.1 General Rigging

General rigging of the barricade is an all hands evolution under supervision of the Arresting Gear Officer. Experienced arresting gear personnel shall be assigned specific key duties. Other topside personnel, such as catapult, flight deck, and squadron personnel, shall be trained to assist as necessary. These personnel should be assigned specific duties, e.g., "blue shirts" break out and rig deck ramps, "yellow shirts" supervise installation and ensure security of deck ramps, etc.

Since barricade arrestments are emergency situations, barricade-rigging operations shall be correct, efficient, and timely.

Note

The barricade shall be rigged in accordance with detailed instructions outlined in current NAVAIR operations/maintenance/overhaul manual.

5.3.8.2 Procedures

In the event the decision is made to rig the barricade, the following procedures shall take place:

1. The Air Officer shall announce on the 5MC, "STAND BY TO RIG THE BARRICADE," and provide as much information as available to the AGO over the flight deck communications system or other voice communication system. Any safety information (e.g., one aircraft to go, remain clear of the foul line) shall be passed at this time.

2. Crash and Salvage shall position mobile crash equipment forward and Bow Catapults shall raise JBDs as applicable.

WARNING

To keep personnel clear of the landing area and minimize the possibility of injuries, the Air Officer shall normally pass the above word after the last normal recovery aircraft has landed. If this is not feasible, he shall pass the word as late in the recovery as possible, and inform personnel to proceed with caution.

3. All available personnel shall assemble at assigned pre-rig stations, breaking out the barricade, deck ramps, air guns, and other necessary tools and equipment. Care shall be taken not to foul the deck during this period.
4. The Air Officer will announce the type aircraft, the weight, and its landing configuration.
5. The Arresting Gear Officer, with the use of the appropriate Bulletins, shall report to the Air Officer with information concerning the removal of deck pendants, barricade and engine settings, required wind over deck, recommended approach speed, lens setting, and configuration. Requirements shall be cross-checked and verified by the Air Officer before the deck is open.
6. When the last normal recovery has been completed and the engaged pendant retracted, the Air Officer shall pass the word to remove cross-deck pendants as necessary. After cross-deck pendants are clear the word will be passed, "RIG THE BARRICADE."

CAUTION

C-2/E-2 double barricade webbing shall be marked for easy identification and shall be used for C-2/E-2 aircraft only.

7. Disengage both barricade stanchion latches.
8. Install and lock deck ramps in proper position. Deck ramps shall be numbered in sequence corresponding to positions on the flight deck, numbering from port to starboard.
9. As soon as the webbing is spread and the upper tensioning pendants are connected, tension will be taken by the use of the barricade air guns. Barricade stanchions shall be raised approximately 6 inches prior to taking tension with the air guns. If air pressure is lost, tension may be taken by hand with a ratchet wrench or a special NAWC tool.

Note

To aid in obtaining the proper height of the barricade, a mark should be made on the upper load strap tensioning pendants, which, when lined up with the sheave on the stanchion, indicates a proper tension for proper height.

10. After proper tensioning is assured on both load straps, the lower load straps shall be tucked under the deck ramps.
11. When personnel are clear of both the stanchions and from within the webbing assembly, the Officer or Petty Officer in Charge of the barricade rig shall signal for the stanchions to be raised.

Note

Failure to install ramps may permit the wind over the deck to raise the lower load straps off the deck and interfere with proper engagement. Also, lack of ramps may result in damage to the lower load straps if the engaging aircraft has damaged landing gear.

12. When U-shackle and links have been connected to the clevis end socket assemblies of the purchase cable, the Officer or Petty Officer in Charge of the barricade rig shall signal retract after ensuring:
 - a. Parallel pendant is clear of load straps and aft of deck ramps.
 - b. Extension loops, ring type couplings, and U-shackle and link are positioned on proper side of webbing.
 - c. All personnel are clear.

Note

The Deckedge Operator shall retract slowly to prevent the parallel pendant from fouling on deck ramps.

5.3.8.3 Post-Rig Inspection

The Arresting Gear Officer shall inspect the barricade rig for the following:

1. Check hookup of all four tension pendant release assemblies to ensure proper seating of hooks.
2. Ensure deck winches are properly locked to deck (if applicable).
3. Check purchase cables and parallels pendant for alignment to sheave throat. Ensure clevis pin installation, anchor nuts tight, and setscrew for proper installation and security.
4. Ensure deck ramps are secure and locked, and lower load strap is forward of and tucked under the ramp.
5. Ensure barricade is raised to a sufficient height. The minimum height shall be 20 feet at mid-span for jet barricade and 21 feet mid-span for E-2/C-2 barricade.

5.3.8.4 Post-Rig Procedures

The Arresting Gear Officer shall inform the Air Officer that the rig is ready and present a GREEN status light when:

1. The barricade is properly rigged.
2. Deck pendants are removed as required for aircraft type and configuration.
3. Ensure the proper weight setting is made on the barricade engine. Weight settings shall be made in accordance with applicable recovery bulletins.
4. Ensure proper weight setting is made on all pendant engines, as time may prohibit removal of pendants as planned.
5. Retractable sheaves of all engines in service are raised.
6. Ensure all loose tools, personnel, and any detached deck pendants are clear of the landing area.

5.3.8.5 Post-Engagement Procedures

1. To prepare the deck for further recoveries after a barricade engagement, the purchase cable shall be disconnected from the barricade and retracted. If necessary, the webbing shall be cut away from the aircraft and the deck inspected thoroughly for FOD.
2. After engagement by an aircraft, used webbing, pendants, and associated hardware installed between purchase cable terminals shall be discarded.

5.3.8.6 MOB-D-19-CV Rigging Barricade (CVN) Drill

Note

Time is important; however, emphasis shall be placed on the proper rigging of the barricade to ensure that all component parts are ready for the engagement.

5.3.8.6.1 Purpose

Train flight deck personnel in rigging barricades.

5.3.8.6.2 Requirements

One half of these exercises shall be conducted during night periods.

5.3.8.6.3 Procedures

Five minute “STANDBY” will be given prior to commencing the rigging of the barricade. Timing starts when the signal is given to “RIG THE BARRICADE.” Timing stops when barricade is ready in all respects for an aircraft engagement and deck status light is in the green.

5.3.8.6.4 Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheets.

5.3.9 Rigging the MOVLAS

5.3.9.1 General

The rigging of the MOVLAS shall be performed by qualified VLA personnel and assisted, as necessary, by the V-2 personnel under the supervision of a qualified Arresting Gear Officer.

5.3.9.2 Procedures

1. When the decision is made to rig the MOVLAS, the Air Officer shall pass the word over the 5MC, “RIG THE MOVLAS, STATION ____.”

Note

- MOVLAS stations shall be designated as follows:
 - Station 1 — source light box only on lens platform.
 - Station 2 — portable frame port side.
 - Station 3 — portable frame starboard side.

The necessary components shall be broken out and rigged per ship’s installation.

- MOVLAS Station 3 portable components shall be stored within the ship’s structure on the starboard side to preclude damage in the event of aircraft crash or fire on the flight deck landing area or in the catwalks.
2. The perforated covers in the center panel shall be locked open for day, and closed for night operations.
 3. When the MOVLAS is installed and the cannon plugs are connected to the appropriate power source, the LSO shall check for proper operation.
 4. When the LSO is satisfied with the operation, he shall so indicate to the Arresting Gear Officer by giving a “thumbs up,” and the Arresting Gear Officer shall initiate normal recovery procedures.

5.3.9.3 MOB-S-23-CV — Manually Operated Visual Landing Aids System (MOVLAS) Drill

Note

Time is important; however, emphasis shall be placed on personnel safety and proper installation of the system.

5.3.9.3.1 Purpose

Train Air Department personnel in rigging the MOVLAS.

5.3.9.3.2 Requirements

One exercise shall be conducted at each MOVLAS location.

5.3.9.3.3 Procedures

One-minute standby shall be given prior to commencing the rigging of the MOVLAS. Timing stops when the MOVLAS is ready in all respects.

5.3.9.3.4 Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.3.10 Crosscheck System Sensor Malfunctions (For Ships with Arresting Gear Service Change 440 Installed)**5.3.10.1 Primary Mode Operation**

After the Primary Flight Arresting Gear Controller has initiated an aircraft weight setting and an engine continues to indicate NOT READY on the Arresting Gear Pri-fly Operator flat panel, an error condition in the Crosscheck system is present. When operating in Primary Mode the Crosscheck System is equipped with a Forced Battery function to override a faulty system error. The following procedure shall be used to implement a Forced Battery condition:



The Arresting Gear Engine Operator should always exercise safety first. If any doubt exists concerning the safe operation of the arresting gear, the Engine Operator shall call "FOUL DECK". The engine shall be removed from service. The ALRE Maintenance Officer shall then determine engine status for return to service.

Note

- The Forced Battery function may only be used with the permission of the Air Officer.
- The qualified operators noted below can visually confirm the battery status of the arresting gear systems indicated:

Arresting Gear Engine Operator.

— Arresting Gear Engine Accumulator Fluid Level.

— CROV Aircraft Weight Setting.

— CROV Cam Battery Index.

— Anchor Dampers.

Sheave Damper Operator.

— Sheave Dampers.

Arresting Gear Topside Petty Officer.

— Retractable Sheaves.

1. The Primary Flight Arresting Gear Controller shall establish voice communication with the Arresting Gear Engine Operator of the malfunctioning engine to ascertain the problem.
2. The Arresting Gear Engine Operator shall check the Crosscheck Engine Electronics Enclosure to determine the system malfunction.
3. The Engine Operator shall:
 - a. Determine if all errors indicated on the Engine Electronics Enclosure are the result of faulty sensors.
 - b. Determine if the arresting gear can be operated safely through direct visual confirmation of battery conditions.
4. If any doubt exists concerning the safe operation of the arresting gear, the Arresting Gear Engine Operator shall call "FOUL DECK". The engine shall be removed from service.
5. If it can be determined that the arresting gear engine is safe for recovery, the Arresting Gear Engine Operator shall verbally relay error status displayed on the Engine Electronics Enclosure to the Primary Flight Arresting Gear Controller and the Arresting Gear Officer via the Deckedge Operator. The Arresting Gear Engine Operator shall provide a recommendation to initiate Forced Battery.
6. The Primary Flight Arresting Gear Controller shall inform the Air Boss of the situation. He shall state the displayed engine error status and whether the arresting gear engine is safe for recovery.
7. If the engine is safe for recovery, the Primary Flight Arresting Gear Controller shall request permission from the Air Boss to initiate Forced Battery.
8. Upon receipt of permission from the Air Boss, the Primary Flight Arresting Gear Controller shall depress the ENABLE button, then the BATTERY button, then the ENGINE STATUS button of the engine in question. A Forced Battery condition will now exist for that engine. This will show as an AMBER indication for that engine on the Arresting Gear Pri-fly Operator flat panel, the Air Boss display and the AGO Deckedge display.

Note

When the Crosscheck System is reset for the next aircraft recovery, the Forced Battery condition will be cleared. If an error is still present for a given engine, the Forced Battery initiation procedure must be repeated.

5.3.10.2 Alternate Master Mode Operation

Note

The Alternate Master Mode of operation should only be used as a result of an Arresting Gear Pri-fly Operator flat panel failure or a total loss of serial communication to the flat panel.

During operation in the Alternate Master Mode, if a BATTERY condition cannot be obtained for a particular engine, a FOUL deck condition will exist in the Crosscheck System and red FOUL deck lights will be displayed on the Landing Area Status and Signal (LASS) System. A green CLEAR deck condition can be obtained on the Landing Area Status and Signal (LASS) System by holding the A/G SHV UP test by-pass switch in the By-pass panel in the ON position and then actuating the AGO pickle switch.

WARNING

In this operating mode, use of the bypass feature will not produce a CLEAR deck condition in the Crosscheck System. The Air Boss display and the AGO Deckedge display will still indicate a FOUL deck condition and the engine in question will indicate NOT READY. Therefore, permission from the Air Boss, as well as ALRE Maintenance Officer concurrence, is required if operations are necessitated in this condition.

Note

The qualified operators noted below can visually confirm the battery status of the arresting gear systems indicated:

Arresting Gear Engine Operator.

- Arresting Gear Engine Accumulator Fluid Level.
- CROV Aircraft Weight Setting.
- CROV Cam Battery Index.
- Anchor Dampers.

Sheave Damper Operator.

- Sheave Dampers.

Arresting Gear Topside Petty Officer.

- Retractable Sheaves.

The following procedure can be implemented to obtain a green CLEAR deck indication on Landing Area Status and Signal (LASS) System:



The Arresting Gear Engine Operator should always exercise safety first. If any doubt exists concerning the safe operation of the arresting gear, the Arresting Gear Engine Operator shall call “FOUL DECK”. The engine shall be removed from service. The ALRE Maintenance Officer shall then determine engine status for return to service.

1. The Arresting Gear Engine Operator for the engine in question shall check the Crosscheck Engine Electronics Enclosure to determine the system malfunction.
2. The Arresting Gear Engine Operator shall:
 - a. Determine if all errors indicated on the Engine Electronics Enclosure are the result of faulty sensors.
 - b. Determine if the arresting gear can be operated safely through direct visual confirmation of battery conditions.
3. If any doubt exists concerning the safe operation of the arresting gear, the Arresting Gear Engine Operator shall call “FOUL DECK”. The engine shall be removed from service.
4. If it can be determined that the arresting gear engine is safe for recovery, the Arresting Gear Engine Operator shall verbally relay error status displayed on the Engine Electronics Enclosure to the Primary Flight Arresting Gear Controller and the Arresting Gear Officer via the Deckedge Operator. The Arresting Gear Engine Operator shall provide a recommendation to initiate the bypass feature.
5. The Primary Flight Arresting Gear Controller shall inform the Air Boss of the situation. He shall state the displayed engine error status and whether the arresting gear engine is safe for recovery.
6. If the engine is safe for recovery, the Primary Flight Arresting Gear Controller shall request permission from the Air Boss in concert with the ALRE Maintenance Officer to initiate bypass.

7. Upon receipt of concurrence from the ALRE Maintenance Officer to proceed, the Arresting Gear Deckedge Operator as directed by the Arresting Gear Officer shall hold the A/G SHV UP test by-pass switch in the By-pass panel in the ON position.
8. The Arresting Gear Officer can then initiate a green CLEAR deck indication on the LASS system by actuating the AGO pickle switch.

Note

Release of either the A/G SHV UP test by-pass switch or the AGO pickle switch at any time during aircraft approach will produce a red FOUL deck indication on the LASS system.

5.3.11 Crosscheck System Degraded Modes of Operation (For Ships with Arresting Gear Service Change 440 Installed)

5.3.11.1 Alternate Master Mode Operation



The Alternate Master Mode of operation should only be used as a result of an Arresting Gear PriFly Operator flat panel failure or a total loss of serial communication to the flat panel. To operate in this mode of operation, the Arresting Gear PriFly Operator flat panel must be de-energized. Consequently, the following features of the Crosscheck System are lost: Forced Battery function, automated recovery log data generation, aircraft type indication to the Air Boss, Arresting Gear Officer and LSO, wind system interface, and the crosscheck of the IFLOLS and Arresting Gear settings.

1. If a failure occurs that precludes setting arresting gear engine CRO valves in the Primary Mode of operation, the Primary Flight Arresting Gear Controller shall obtain permission from Air Officer to operate in Alternate Master Mode. He shall verbally direct the designated Master Arresting Gear Engine Operator to place the CROV Motor Drive switch on the Engine Electronics Enclosure in the "MANUAL" position. All other online engines will leave their CROV Motor Drive switches in the "AUTOMATIC" position.
2. The Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered, shall inform the Master Arresting Gear Engine Operator of the setting required for the next aircraft using only the first three digits and the aircraft type (e.g., "SET ALL ENGINES THREE SIX ZERO, HORNET").
3. The Master Arresting Gear Engine Operator shall set the aircraft weight for his engine to the commanded weight. All other online engines will automatically set to the same engine weight setting (± 200 pounds).
4. Arresting Gear Engine Operators will sequentially report their engine is set. (e.g., "ONE SET, THREE SIX ZERO, HORNET; TWO SET, THREE SIX ZERO, HORNET; THREE SET, THREE SIX ZERO, HORNET; FOUR SET, THREE SIX ZERO, HORNET"). If an engine is out of service, the report for that engine shall be omitted in the reporting sequence.
5. He shall monitor the arresting gear voice communications system for any reports from the Arresting Gear Engine Operators, Sheave Damper Operators or Deckedge Operator of any improper settings or irregular conditions.
6. When all Arresting Gear Engine Operators have reported the correct weight setting, and the correct lens angle has been set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, lens status, and aircraft type (e.g., "ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET").
7. If the weight setting is to remain the same for the next aircraft, the Primary Flight Arresting Gear Controller shall use the phraseology, "CHECK SETTING THREE SIX ZERO, HORNET".

5.3.11.2 Degraded Fully Manual Mode Operation

WARNING

In extreme circumstances, the arresting gear can be operated in the Degraded Fully Manual Mode. To accomplish this, all Crosscheck System power sources must be de-energized. In this mode of operation, all engine settings must be two-person verified by qualified engine operators. No remote monitoring of weight settings can be accomplished. Degraded Fully Manual Mode may only be used with the permission of the Commanding Officer.

Note

- If weight settings must be made manually using the CROV motor unit handwheel, the Air Officer shall make every effort to recover aircraft by type, in sequence, to minimize weight setting delays.
 - In this mode of operation, an additional qualified Arresting Gear Engine Operator must be stationed at each online arresting gear engine. He shall verify the proper weight setting. He shall report the weight setting as verified to the Primary Flight Arresting Gear Controller.
1. The Primary Flight Arresting Gear Controller shall, upon ascertaining the type of aircraft to be recovered, inform the Arresting Gear Engine Operators of the setting required for the next aircraft using only the first three digits and the aircraft type (e.g., “SET ALL ENGINES THREE SIX ZERO, HORNET”).
 2. Each Arresting Gear Engine Operator shall set the weight setting for their engine to the proper weight (± 500 pounds) using the CROV motor unit weight selector switch or the manual CROV motor unit handwheel.
 3. The Primary Flight Arresting Gear Controller shall monitor the arresting gear voice communications system for any reports from the Arresting Gear Engine Operators, Sheave Damper Operators or Deckedge Operator of any improper settings or irregular conditions.
 4. When an additional qualified Arresting Gear Engine Operator has verified the proper weight setting, all Arresting Gear Engine Operators will sequentially report their engine is set. (e.g., “ONE SET, THREE SIX ZERO, HORNET; TWO SET, THREE SIX ZERO, HORNET; THREE SET, THREE SIX ZERO, HORNET; FOUR SET, THREE SIX ZERO, HORNET”). The additional qualified Arresting Gear Engine Operator shall verbally repeat the weight setting over the arresting gear voice communication system. If an engine is out of service, the report for that engine shall be omitted in the reporting sequence.
 5. When all Arresting Gear Engine Operators have reported the correct weight setting and an additional qualified Arresting Gear Engine Operator has verified the proper weight setting, and the correct lens angle has been set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type. (e.g., “ALL FOUR GEAR VERIFIED...LENS...SET THREE SIX ZERO, HORNET”).
 6. If the weight setting is to remain the same for the next aircraft, the Primary Flight Arresting Gear Controller shall use the phraseology, “CHECK SETTING THREE SIX ZERO, HORNET”.

5.4 NORMAL OPERATIONS WITH THE ADVANCED RECOVERY CONTROL (ARC) SYSTEM INSTALLED

5.4.1 Preparations for Recovery with the Advanced Recovery Control (ARC) System Installed

The Arresting Gear Officer shall be on deck for all recoveries. On deck is construed to mean a position in the starboard catwalk or on the flight deck, from which the entire landing area may be viewed. The Arresting Gear Officer shall:

1. Inspect the landing area for loose gear.
2. Ensure that all after deckedge antennas are positioned as required.

3. Check the condition of crossdeck pendants, barrel fittings, and wire supports; and ensure retractable sheaves are in the raised and proper height position.
4. Ensure that all aircraft and mobile equipment parked on the flight deck are inside the safe-parking line.
5. Ensure that hook runners and the deckedge operator are on station.
6. Ensure that the ready barricade, including deck ramps, is in a ready status (ready jet barricade lanyards attached to barricade hatch hooks) with a clear route to the area and that a tractor turned on and driver is standing by.
7. Ensure that waist catapult slot buttons are installed in accordance with current bulletins.
8. Notify PriFly when the deck is ready.
9. Ensure that the Arresting Gear Officer's deck status light "pickle" switch is connected and functioning.

Thirty minutes prior to each scheduled recovery, or immediately upon the word being passed to prepare to recover aircraft, all stations shall be manned expeditiously, and the following preparatory actions taken.

1. The Primary Flight Arresting Gear Controller in PriFly shall:
 - a. Ensure that all Arresting Gear Engine Operators, Sheave Damper Operators, Deckedge Operator, LSO Spotter/Talker, ILARTS and Lens Operator have manned their stations and are monitoring the appropriate voice communication systems.
 - b. After all engine operators and ARC Display control have given-up arrestment control, set engines for the first expected aircraft.
 - c. Verify which Arresting Gear Engine Operator has been designated as the alternate master for arrestment control if operations cannot continue in the primary mode and Arrestment Degraded Mode 1 is chosen. Once verified, shall inform the Air Officer and the Arresting Gear Officer, via the Arresting Gear Deckedge Operator.
 - d. Report to the Air Officer the existing arresting gear engine and lens settings.
2. The Lens, ILARTS, and SPN-41/46 Operators shall ensure that their respective equipment is turned on and operating. The lens operator shall turn on the lens ONLY when directed by the Air Officer.

WARNING

Except for the purpose of conducting tests, the lens shall not be turned on until the LSO has manned the platform. The wave-off lights shall be continuously activated any time the lens is turned on and the LSO platform is not manned and ready.

3. The Waist Catapult Officer/Catapult Safety Observer shall ensure:
 - a. Launching accessories are clear of the landing area.
 - b. Catapult No. 3 and No. 4 shuttle(s) are aft with Catapult No. 3 grab latch disengaged, and the appropriate shuttle spreader cover installed.
 - c. The centerdeck console hatch (and any other hatches in the waist catapult area) are closed and dogged.
 - d. Jet blast deflectors are lowered completely and hydraulics secured.
 - e. Catapult track slot seals are removed and catapult slot buttons installed. A minimum of 12 buttons is required on all ships.

WARNING

Ensure catapult shuttle is retracted prior to installing track slot buttons.

- f. Waist catapult hook-up and suspend lights turned off.
 - g. For ships so equipped, Deckedge ICCS is fully lowered and reports “WAIST BUBBLE DOWN AND LOCKED” to AGO via voice communication.
 - h. In the event the recovery immediately follows a launch, the Waist Catapult Officer or Catapult Safety Observer shall signal the Arresting Gear Officer with a raised arm extended overhead (day) or with a green wand (night) signifying the above actions have been completed.
 - i. If the recovery is not preceded by a launch, the Arresting Gear Officer shall ensure that the above actions have been completed.
4. The LSO Spotter/Talker.
- a. Prepare the platform for the recovery as previously directed by the senior wing LSO.
 - b. Establish voice communications with all recovery stations or CATCC as determined by LSO.
 - c. Turn on deck status lights, and check both primary and secondary light operation.
 - d. Ensure that the following distress equipment is available:
 - (1) Battery-powered floating marker (one).
 - (2) Life preserver ring (one).
 - (3) Very pistol with adequate supply of shells.
 - (4) Search and rescue sonobuoy.
5. The LSO Heads-Up Display Platform Operator shall:
- a. Prepare the platform for recovery.
 - b. Establish voice communications with all recovery stations.
 - c. Ensure deck status lights are on.
 - d. Ensure that emergency deck status signal devices are on hand (red and green paddles for day, red and green wands for night operations).
6. The Arresting Gear Deckedge Operator shall:
- a. Establish voice communications with all recovery stations.
 - b. Energize the sheave damper indicator lights, and ensure that all battery position lights operate and indicate battery.
 - c. Raise retractable sheaves, ensuring that indicator lights function properly and that all sheaves indicate up.
 - d. Ensure that a set of red and green flags or paddles (day)/wands (night) are on hand for use by the Arresting Gear Officer.
 - e. Report to the Arresting Gear Officer when all stations are manned and ready.
 - f. Ensure required recovery bulletins are available for emergency use.

- g. Ensure that the AGO Deck Edge display is powered on and functioning.
- h. Ensure Retract Control Indicator (RCI) is powered and functioning.

Note

In the event of deck launches, the Deckedge Operator shall be on station and retractable sheaves shall be up.

- 7. The Arresting Gear Topside Petty Officer shall assist the Arresting Gear Officer with his pre-recovery inspections as directed. Prior to each recovery cycle he shall:
 - a. Ensure that all topside personnel are on station with their necessary tools and equipment and reports directly to the Arresting Gear Deckedge Operator.
 - b. Ensure that all necessary tools are available. These should include, but are not limited to:
 - (1) Tools necessary to remove/replace deck pendants.
 - (2) Tools necessary to remove/install wire supports.
 - (3) Tractor hook (for pulling out purchase cable).
 - (4) Barricade air guns and associated parts/tools (spare hoses, fittings, etc.).
 - (5) Manual tool for barricade winches.
 - c. Ensure that adequate spare equipment is on deck including:
 - (1) As a minimum, four cross-deck pendants with ends cleaned for CVN-65 through CVN-75, and three cross-deck pendants for CVN-76 and above with ends cleaned. Two CDPs shall remain uncrated, on deck and ready for immediate installation.
 - (2) Wire support parts.
 - (3) Clevis pins and nuts.
 - (4) Pickle Switch (AGO deck status lights).
 - d. Ensure that the Arresting Gear Officer's deck status light "pickle" switch is connected and functioning.
 - e. Ensure the barricade hatch is open, and a tractor is in position to pull out the barricade.
 - f. Ensure retractable deck sheaves are raised to required height.
- 8. The Sheave Damper Operator shall:
 - a. Inspect all sheave damper installations per current maintenance requirement cards.
 - b. Ensure all cages are in place and properly secured.
 - c. Report to the Arresting Gear Deckedge Operator via voice communication system when all sheave dampers have been inspected and equipment is ready to recover aircraft.
- 9. Each Arresting Gear Engine Operator shall:
 - a. Establish voice communications with all recovery stations.
 - b. Ensure all unauthorized personnel are clear of engine spaces.
 - c. Inspect engine in accordance with current maintenance requirement cards.

- d. Ensure that the Engine Display indicates:
- (1) CDP Status is “ON LINE”.
 - (2) Engine configuration is “PENDANT”.
 - (3) Engine mode is “OPERATIONAL”.
 - (4) “SHIP POWER” is available (indicator is green).
 - (5) Arrestment location is “SYSTEM”.
 - (6) Retract location is “REMOTE”.
 - (7) Retract status is “RETRACTED”.
- e. Report to the Deckedge Operator when above checks have been completed and engine are ready for recovery operations.



Upon recovery of final aircraft and periods of idle stand down (e.g. between recovery events) secure HPU (FSIB circuit breaker #3) and lock AGDC Panel.

10. The LSO shall:
- a. Prepare for recovery in accordance with CV NATOPS Manual.
 - b. Report to the Air Officer when “MANNED AND READY.”
11. The Air Officer shall complete the Recovery Checklist, which includes the following:
- a. Determine Case recovery and time (confirm first ramp time with CATTC and bridge).
 - b. Obtain expected Base Recovery Course (BRC), altimeter setting, and weather.
 - c. Conduct Radio Check: Recovery Channels, frequencies, and tactical calls.
 - d. Announce 15-minute notice (5MC) “MAN ALL RECOVERY STATIONS.”
 - e. Ensure red rotating beacon “on” aft.
 - f. Determine aircraft recovery status:
 - (1) Numbers.
 - (2) Type.
 - (3) Fuel.
 - (4) Unexpended ordnance.
 - (5) Other pertinent information and record on status board for accuracy.
 - g. PriFly Arresting Gear controller reports all recovery stations manned:
 - (1) Arresting Gear.
 - (2) ILARTS/Lens.
 - (3) LSO Spotter/Talker.

h. Arresting Gear Officer (AGO) shall ensure:

- (1) Recovery area is clear of personnel, loose gear, aircraft, and mobile equipment.
- (2) Deck hatches, decked antennas, JBDS, and waist catapult ICCS lowered.
- (3) Waist Catapult shuttles positioned aft, covers in place.
- (4) Wire supports, retractable sheaves raised to proper height, and CDPs in battery.
- (5) Barricade hatch open.
- (6) Tractor positioned at the barricade hatch.
- (7) Deck status light raised and operational.
- (8) Ascertains all recovery stations are manned and ready via the Arresting Gear Decked Operator.
- (9) Report directly to the Air Officer via voice communication upon satisfying all above requirements.

AGO shall report recovery stations manning status followed by the recovery equipment current configuration. The report shall be as applicable (i.e., “GEAR MANNED AND READY... HIGH WIRE IS ___ WITH ___ TRAPS... WITH TWO STBD RETRACTABLE SHEAVE IN BYPASS MODE... AND NUMBER ONE WIRE OFFLINE...” etc.)

i. LSO reports, “MANNED AND READY.”

j. Clearance from bridge to land aircraft.

k. Lens and deck lighting “ON” for recovery (notify LSO, “PADDLES/TOWER, LENS ON, YOU HAVE CONTROL”).

l. Check wind (Crosswind/speed).

m. Green rotating beacon “ON” aft.

n. Announce “LAND AIRCRAFT” ON 5MC.

5.4.2 Approach with the Advanced Recovery Control (ARC) System Installed

Prior to the LSO receiving a “CLEAR DECK” from the Arresting Gear Officer, the following sequence of events shall be strictly adhered to for the first and all subsequent landings:

1. The Air Officer shall determine the aircraft type to be recovered and direct the arresting gear and lens to be set. He shall verbally acknowledge aircraft weight and lens setting calls as reported to him (e.g., “ROGER, GEAR...LENS SET...THREE SIX ZERO HORNET”). He shall verify the setting by observing the Air Officer display.

WARNING

The ARC system is constantly monitoring various parameters. Any ARC fault will prevent the arming of an engine and subsequently attaining a “CLEAR DECK”. If a fault occurs, resolution time could be short or lengthy depending on the troubleshooting and corrective action required. As soon as a fault occurs, any approaching aircraft shall be waved-off. The Air Officer may then decide whether to take the affected engine off-line prior to troubleshooting the fault. ARC System is equipped with a Forced Ready/Battery function to override non-critical system faults. Forced Ready conditions shall only be authorized by the Air Officer and with ALRE M.O. concurrence. Procedures for Force Ready and Force Battery are outlined in [paragraph 5.6.3.9](#).

Note

Lens settings are not repeated/reported during MOVLAS operations.

2. The Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered, shall perform the following:
 - a. Enter the aircraft type into the Arresting Gear PriFly Operator flat panel. Inform the Arresting Gear Engine Operator engines are being set for the next aircraft using only the first three digits and aircraft type (e.g., "SETTING THREE SIX ZERO, HORNET"). Monitor the Arresting Gear PriFly Operator flat panel to ensure all online engines indicate the correct weight setting and indicate a battery condition.
 - b. He shall monitor the arresting gear voice communications system for any reports from the Engine Operator or Sheave Damper Operators of any improper settings or irregular conditions.
 - c. When the Arresting Gear PriFly Operator flat panel indicates that all online engines are properly set and in battery, and IFLOLS is properly set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type. (e.g., "ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET").
 - d. If any fault occurs, as indicated on the Primary Arresting Gear Panel, he shall immediately notify the Air Officer.
3. Arresting Gear Engine Operators shall:
 - a. Monitor the Engine Display indicates the correct aircraft type and weight setting, and indicates no faults. If a foul deck condition exists, the Engine Operator shall declare, "FOUL DECK! FOUL DECK!".
 - b. If a fault occurs after engine is set, they shall immediately notify the Primary Flight Arresting Gear Controller.
 - c. Engine Operators shall repeat calls ("GROOVE, RAMP") from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.
4. The Deckedge Operator shall:
 - a. Monitor the sheave damper indicator lights.
 - b. Monitor the retractable sheave indicator lights.
 - c. Ensure the landing area is clear (within his field of view).
 - d. Ensure all deck pendants are fully retracted and taut.



If the retract valve is opened (e.g., to vent engines or tighten CDP's) when a "CLEAR" deck exists, the deck status indicators will change to "FOUL" until the retract valve is closed. Every attempt should be made to vent engine or tighten the CDP's prior to attaining a clear-deck status.

- e. Ensure all engines are retracted and no faults exist indicated on the RCI (or received over voice communication system from engine operators).
- f. If a fault occurs after engine is set, he shall immediately notify the Primary Flight Arresting Gear Controller.
- g. Monitor the AGO Deckedge display for correct weight settings and engine status.

WARNING

It is imperative that the Arresting Gear Officer know the exact weight setting of the arresting gear engines so he can ensure the engines are set for the type aircraft to land.

- h. Keep the engine operators informed on the status of the recovery by reporting the following aircraft positions: GROOVE/RAMP. He shall call “GROOVE” on the voice communication system as the aircraft approaches short final, and call “RAMP” as it reaches the fantail.
 - i. Monitor the arresting gear voice communications system.
5. The Sheave Damper Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.

CAUTION

When the word “GROOVE” is passed over the voice communication system, all non-essential communications shall cease until after the aircraft touches down. Anyone not ready to land aircraft at that time shall immediately respond with “FOUL DECK, FOUL DECK.”

6. The Fresnel Lens Primary Flight Lens Console Operator shall make the appropriate lens setting and continuously monitor the lens system during recoveries and shall report any malfunction immediately to the Air Officer.
7. The Arresting Gear Officer, upon receiving clearance to “LAND AIRCRAFT” from the Air Officer, and upon observing the aft GREEN rotating beacon, shall ensure the following conditions exist prior to providing a “CLEAR DECK” signal to the LSO:
- a. A “CLEAR DECK FORWARD” signal has been received from the Gear Puller. The signal is given by sweeping one arm from vertically overhead to the horizontal position and returning overhead (day), or by using the same signal with an AMBER wand (night).
- (1) This signal shall be acknowledged from the AGO by repeating the signal using his arm (day) and RED wand (night).

Note

The “FOUL DECK” signal from the Gear Puller to the Arresting Gear Officer is indicated by arms crossed overhead with fists clenched (day), or crossed AMBER wands held overhead (night).

- b. All deck pendants appear fully retracted and taut.
- c. Observe the Deckedge Operator’s signal, indicating that all conditions for recovery have been completed.
- d. Ensure the AGO Deckedge Display indicates engines are set.

- e. All retractable sheaves are raised and wire supports are in place.

WARNING

During simultaneous recovery and catapult No. 2 operations, deckedge mode, the catapult No. 2 Deckedge Operator (if applicable) are authorized to man the deckedge station for operations and shall not be considered fouling the landing area. The Deckedge Operator shall be aware and alert during recovery operations.

- f. The catwalks, flight deck, and other hazardous areas are clear of unauthorized personnel.
- g. Visually and positively identify aircraft to be recovered.

WARNING

- The utmost attention to every detail is required during night or reduced visibility flight operations. Presently, certain aircraft have similar features that hinder the rapid, positive identification of approaching aircraft. Consequently, the entire recovery team shall be alert to preclude a mismatch between landing aircraft and the arresting gear settings. The final assurance to prevent this mismatch shall rest with the Arresting Gear Officer.
 - The Arresting Gear Officer shall NOT, under any circumstances, provide a "CLEAR DECK" until the aircraft has been positively identified visually or via the Air Officer.
- h. When satisfied that all the above requirements have been met, the Arresting Gear Officer shall change the deck status light from RED to GREEN, remaining alert for any malfunctions of the equipment or violations of the safe parking line. The deck will be declared "FOUL" by switching the deck status light to RED after each arrested landing, bolter, touch and go, or wave-off, and it will remain so until completion of the above procedures.

Note

While the final check for compatibility of the landing aircraft and the arresting engine settings are made by the Arresting Gear Officer, cross-checks by other personnel are critical. The A/G PriFly Controller, Lens Console Operator, LSO Spotter/Talker, Deckedge Operator, and Topside Petty Officer should also be trained in aircraft recognition under all conditions. This becomes even more imperative during night or reduced visibility operations and when EMCON conditions are in effect. All visual and aural characteristics (aircraft lighting, flight characteristics, engine sounds, etc.) shall be used in making the final determination. If a positive determination cannot be made, a low pass by the ship shall be requested to positively identify the aircraft.

8. The LSO Spotter/Talker.
- a. When visual confirmation of aircraft type and configuration (gear, flaps, and hook down) has been made, he shall notify the LSO (e.g., "HORNET, ALL DOWN.").

- b. He shall also notify the LSO of type aircraft, arresting engines set, weight setting, and clear or foul deck, whichever is appropriate, depending on the light indication in the deck status light box. (e.g., “GEAR SET, THREE SIX ZERO, HORNET, CLEAR DECK.”).
 - c. If the red light is on, the “FOUL DECK, FOUL DECK” call is repeated continuously until the green light comes on. One “CLEAR DECK” call is then made, and the spotter/talker shall monitor the light status until the aircraft has passed the ramp for any change in deck status.
9. The Integrated Launch and Recovery Television System Operator shall ensure coverage of each aircraft approach and arrestment. Additionally, any abnormal situation (crash, fire, aircraft in catwalk, etc.) shall be duly recorded. To attain coverage for detailed tape analysis, the following camera sequence shall be utilized:
- a. Island camera for initial approach.
 - b. Centerline camera for final approach, touchdown, and until nose wheel blocks the view or reaches the centerline camera in use.
 - c. Island camera for roll out, ensuring that aircraft side number and the pendant engaged is shown.

Note

ILARTS tapes shall normally be retained at least 48 hours before erasing/over-recording. In the event there is any deviation from a normal arrested landing, ILARTS tapes shall be retained in accordance with the Report of Deviation from Normal Arrested Landing found in COMNAVAIRFORINST 13800 Series. In the event of an aircraft mishap of sufficient severity as defined in OPNAVINST 3750.6, the ILARTS tape shall immediately be made available to the senior member of the Aircraft Mishap Board for the duration of the investigation. During recording of mishaps and aircraft emergencies, camera signals to the ship's entertainment system shall be secured. This will prevent unauthorized copying of the TV signal, but still allows ILARTS monitors to be available during the mishap.

5.4.3 Landing with the Advanced Recovery Control (ARC) System Installed

During the landing, roll-out, and clearing of the arresting gear the following sequence of events shall take place:

1. The Arresting Gear Officer shall release the deck status light “pickle” switch as the aircraft touches down.

WARNING

- All personnel shall seek as much protection possible as the aircraft approaches and lands. Personnel in the catwalks and at the deckedge control station shall duck behind cable shields or below flight deck level.
- The Hook Runner and Gear Puller shall not enter the landing area until the aircraft has come to a complete stop.

Note

After the aircraft completes its arrestment and roll-out, it shall be permitted to roll back a few feet to permit the pendant to fall free of the hook.

2. The Hook Runner shall enter the landing area, as necessary, to ensure that the hook and aircraft are clear of the pendant prior to the aircraft being taxied forward and/or the pendant being retracted.

3. The Gear Puller (Director) shall position himself so as to be clearly visible to the pilot.

WARNING

The Hook Runner and Gear Puller shall not enter the landing area until the aircraft has come to a complete stop.

4. The Hook Runner shall give the “WIRE CLEAR” signal to the Gear Puller by making a vertical motion with his arm (day) or RED standard wand pointed at the Gear Puller (night) when the aircraft and/or hook is clear of the pendant.
5. The Gear Puller will then give the pilot the signal to raise the hook, followed by the signal to hold brakes. After the aircraft has stopped and is clear of the cable, the Gear Puller will give the pilot the “off brakes” signal, and taxi the aircraft clear of the landing area.
6. In the event the pendant does not disengage from the hook, the following actions shall be taken:
 - a. The Hook Runner shall give the “HOOK DOWN” signal to the Gear Puller, which the Gear Puller shall relay to the pilot. “Release brakes” signal to the pilot shall then follow.
 - b. As soon as the hook is observed down, the Hook Runner shall give the “PULL BACK” signal to the Gear Puller and Deckedge Operator. The Gear Puller shall relay this signal to the pilot.

CAUTION

Retraction during the tailhook “up” cycle may cause extensive damage to the aircraft tailhook mechanism. Ensure tailhooks are in the full-down position.

- c. The Deckedge Operator shall carefully retract the gear momentarily, causing the aircraft to slowly roll back, creating the necessary slack for hook disengagement.
- d. The Hook Runner will signal “HOOK-UP” to the Gear Puller who will relay the signal to the pilot followed by the signal to “HOLD BRAKES.”
- e. After the aircraft has stopped its rollback, the Gear Puller will signal “OFF BRAKES,” and then taxi aircraft clear of the landing area.

CAUTION

Attempting to use the arresting engine wire retract cycle to tow a recovered aircraft aft can cause cable slack or ram slap resulting in damage to arresting gear components. Additionally, the tail hook mechanism can be damaged if it is towed underneath any crossdeck pendant.

7. The Hook Runner shall signal the Deckedge Operator to “RETRACT” only when the following have been completed:
 - a. Hook raised.
 - b. Entire aircraft is forward of the CDP.

WARNING

The Deckedge Operator shall NOT retract until he has received a positive signal to do so. He shall also be alert to immediately stop cable retraction if someone comes into the bite of the cable or the cable falls into the catapult track slots.

CAUTION

The speed of retraction is governed by the position of the RCI retract control lever. Always start retraction slowly, increase speed, then ease lever to normal position to slow retraction near the end of the cycle. If retraction is stopped at any time before completion, slack may build up in the system. Therefore, resume retraction very slowly to rid cable system of all slack. When slack is eliminated and cable system is tensioned, resume normal retraction.

Note

The Hook Runner shall ensure his signal to retract has been received by the Deckedge Operator prior to leaving the landing area.

8. The Deckedge Operator, upon receiving the “RETRACT” signal and ensuring there are no obstructions in the cable bite, shall retract the cable.
9. The Arresting Gear Officer, Topside Petty Officer, and Deckedge Operator shall observe the deck for FOD and broken wire supports during recovery operations.
10. The Arresting Gear Engine Operator of the engine having engagement shall:
 - a. Ensure temperature, pressure, fluid level, and engine battery positions are within normal operating limits.
 - b. Upon completion of engine retraction, ensure that no FAULTS are displayed on the Engine Display.
 - c. Report “BATTERY” when the engine is fully retracted and anchor dampers are extended.
11. The Sheave Damper Operators shall inspect the sheave dampers having engagement in accordance with pre-recovery procedures.
12. The Primary Flight Arresting Gear Controller shall watch the aircraft touchdown point and assist in reporting off-center hits and engaging speeds to the Arresting Gear Officer via voice communication system when an engagement exceeds the limits listed in current recovery directives.

5.5 POST RECOVERY

It is extremely important to maintain a flow of information among the pilots and the Arresting Gear Officers. When pilots make procedural errors, they should be made aware of their errors, so a complete understanding of flight deck procedures is maintained. Arresting Gear Officers shall keep in mind that each pilot is an individual, and each has his own level of proficiency. At times the Arresting Gear Officer shall become an instructor on flight deck procedures. Everyone connected with the recovery should know what everyone else is doing, and the reason why. Periodic debriefs are necessary to ensure pilots know what is going on around them, and to resolve any misunderstanding they might have about procedures and functions of flight deck personnel.

Some of the common errors that should be covered in debriefs are:

1. Not recognizing night signals.
2. Not taxiing clear of the landing area in a safe but timely manner.
3. Not understanding procedures when a CDP is hung-up in the aircraft hook/landing gear.
4. Not remaining at full power until the aircraft comes to a full stop.

5.5.1 Arresting Gear Crew Debrief

While not always necessary or required after every recovery, post-recovery debriefs by the Arresting Gear Officer shall be held with the Arresting Gear Crew whenever a situation arises that needs clarification during a recovery. These debriefs may pertain to the topside crew, the below-deck crew, or the entire arresting gear crew.

The best possible results may be realized when there is a continuous flow of information and ideas among the Arresting Gear Officer, supervisory personnel, and the Arresting Gear crew. Debriefs reviewing potential errors or compliments on the crew's outstanding performance can do wonders for crew morale and enhance the smoothness and efficiency of the next event.

5.6 EMERGENCY PROCEDURES

5.6.1 General

Due to the necessarily rapid tempo of recovery operations, all hands shall be ready to react immediately to any emergency situation in order to minimize foul deck time. Adequately trained personnel shall be readily available to assist the arresting gear topside crew in any emergency action.

To ensure proficiency and equipment readiness, drills shall be held as often as possible. At the very least, prior to getting underway, weekly at sea, or as operations dictates. All drills shall be initiated by the Air Officer who shall take into consideration the Aircraft Handling Officer's, Catapult and Arresting Gear Officer's, and LSO's recommendations and drill compatibility with ongoing air operations (e.g., deck pendant change drill at end of a recovery when pendant needs to be changed due to maximum engagements; MOVLAS drill to conform with LSO's requirement for MOVLAS recoveries).

Mobility (MOB) exercises and periodicities are outlined in Appendix I of COMNAVAIRFORINST 3500.20 series. ■

5.6.2 Removal of Engine from Service During Recovery Operations

Taking an engine "off the line" (removing deck pendant), or taking the time necessary to correct a malfunction, is ultimately the Air Officer's decision. However, the Arresting Gear Officer shall be prepared to provide rapid and knowledgeable decisions and make recommendations as to the course of action to be taken. The Arresting Gear Officer shall exercise judgment in recommending removal of arresting engines from service and the changing of crossdeck pendants. All arresting gear personnel shall immediately report any malfunction or condition requiring the "downing" of equipment to the Arresting Gear Officer, who shall advise the Air Officer of the required action.

Due to the remote location of the Arresting Gear Officer, it is imperative that engine room personnel and Sheave Damper operators provide immediate and accurate information concerning below deck emergencies to the AGO via the Deckedge Operator.

WARNING

In the event of an emergency, all unaffected stations shall maintain voice communication system silence.

The following conditions and malfunctions will necessitate the removal of an engine from operation if timely corrections or explanations cannot be made:

WARNING

If any doubt exists as to the readiness of the arresting gear engine or associated equipment, the engine shall remain “off the line” until careful and unhurried analysis and corrective action are made without sacrificing any margin of safety.

1. Engine.

- a. Pressures, temperature, or fluid level not within operating limits.
- b. Unexplained smoking of sheave assemblies.
- c. Crosshead to crosshead stop clearance less than 1 inch.
- d. Crosshead to crosshead stop clearance changes more than 1/2-inch from post-op to pre-op.
- e. Fluid indicator not indicating battery.
- f. Excessive and/or unexplained ram overtravel.

Note

Refer to applicable NAVAIR manuals for further amplification.

- g. Unpredicted, extremely short run-out.
- h. Anchor damper not in battery.
- i. The ARC system indicates an unexplainable fault.

Note

The ARC system in primary mode is designed to prevent a “CLEAR DECK” when faults or other conditions (e.g., retract valve indicates open, engine not retracted, no weight setting has been commanded, etc.) exists.

- j. Retract Valve actuator not working.
- k. A failsafe arrestment.

2. Sheave Dampers.

- a. Pressures and fluid levels not within operating limits.
- b. Fluid leaks in damper cylinder, accumulator, or associated piping.
- c. Purchase cable not routed correctly.
- d. Crosshead not in battery.
- e. Excessive and/or unexplained smoking of crosshead or fairlead sheaves.

3. Topside.

- a. Deck pendant or purchase cable does not meet specifications as outlined in applicable NAVAIR manuals or PMS cards.

Note

The Topside Petty Officer shall make inspections as necessary in accordance with applicable NAVAIR manuals or PMS cards.

- b. Excessive or unexplained smoking of sheaves.
- c. Inability to raise retractable deck sheave to full-up position.


WARNING

Even though complete failure of the purchase cable may be prevented as a result of the modification of pan and flight deck cutout, any arrestment completed with the retractable sheave DOWN will damage the purchase cable enough to require cable replacement. It is imperative that no arrestment ever be made with the retractable sheave in the DOWN position.

- d. Purchase cable deck pendant inspection or replacement criteria. Proper preplanning should eliminate this requirement during recovery operations.

5.6.3 Emergency Procedures for Ships with ARC Installed**5.6.3.1 Sequence of Events for Removal of an Engine from Service During Operations with ARC Installed**

For any condition or malfunction requiring the removal of an arresting gear engine from service, the following procedures shall be used:

1. The Arresting Gear Officer shall be notified immediately by voice communication system and/or hand signal, e.g., “FOUL DECK, FOUL DECK, ON _____ (Engine 1, 2, Sheave damper, etc.)”. All stations except the sending stations shall remain silent. The hand signal for a foul deck shall be arms crossed overhead with fists clenched.
2. Upon receiving a “FOUL DECK, FOUL DECK” the Arresting Gear Officer shall:
 - a. Notify the LSO via the deck status light that the deck is fouled.
 - b. Evaluate the existing conditions and notify the Air Officer of the appropriate action and estimated time of repair.

Note

The Primary Flight Arresting Gear Controller shall relay to the Air Officer the initial report and/or any amplifying information as it is passed to the Arresting Gear Officer over the voice communication system.

3. The Air Officer shall “close” the deck for recovery until the malfunction has been corrected or the engine has been removed from service, and the normal operations reestablished.
4. If the malfunction warrants removal of the CDP, the Air officer shall announce via 5MC, “FOUL DECK, FOUL DECK, STRIP THE NUMBER ___ WIRE.”


CAUTION

If possible, increase illumination of the landing area when altering recovery configuration.

5. The Arresting Gear Officer, if necessary shall direct that the deck pendant be removed.
6. The Arresting Gear Primary Flight Controller shall direct the engine operator to:
 - a. Take Arrestment Control by selecting TAKE CONTROL.
 - b. Change the operational mode by selecting MAINTENANCE.
7. Once the engine is in MAINTENANCE Mode, and engine is isolated, the Engine Operator shall report the “ENGINE IS READY TO BE PULLED” over sound powered phone communication.

WARNING

No one shall enter the landing area until positive clearance has been obtained from the Arresting Gear Officer.

8. During the removal of a deck pendant or when a situation that requires personnel in the landing area exists, all personnel should work facing aft and be continually alert and ready to clear the landing area.
 - a. The Topside Petty Officer or other cognizant person shall stand forward of personnel in the landing area, facing aft, giving the proper foul deck signal and observing aircraft in the pattern.
 - (1) Topside crew shall pull-out engine to obtain CDP slack upon Deckedge Operator’s signal.
 - (2) Once the CDP has sufficient slack, the topside crew shall remove the CDP.
 - (3) Should an aircraft approach and fail to wave off, it shall be his responsibility to notify those personnel in time to clear the deck.
 - (4) All personnel shall be aware of the shortest route away from the landing area for that situation.
 - b. Deckedge Operator shall stand well clear of the RCI while personnel are removing the deck pendant.
9. After removal of the CDP, the Engine Operator shall change the retract source selection switch on the AG CONTROLLER to the LOCAL position.

WARNING

- Failure to place the retraction control into LOCAL position may cause inadvertent Retraction Control Valve motion from the RCI resulting in personnel injury.
 - Failure to ensure all recovery personnel are aware of the arresting gear configuration change can result in engagement of an improperly configured arresting gear engine.
10. The Air Officer, AGO, and Primary Flight Arresting Gear Controller shall visually verify that the CDP is removed.
 11. The Primary Flight Arresting Gear Controller shall change the CDP status of the downed engine to “OFFLINE” at the Arresting Gear PriFly Operator flat panel. This is accomplished by touching the “ENABLE” button on the main screen and then touching the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured with three wires) button at the top, left side of the screen.
 12. The Engine Operator shall verify CDP STATUS is “OFFLINE” on the AGDC Panel.

13. AGO shall notify Air Officer of arresting gear status and condition of each wire. (Ex: "Gear manned and ready. Wires 1 and 3 online, and Wire 2 offline. New high wire is Wire 1 with ___ traps remaining".)
14. Prior to commencing recovery operations, the Air Officer shall announce over the 5MC the status of the arresting gear equipment. ("The ___ wire is stripped. Wires ___, ___, and ___ are online.")

5.6.3.2 Returning an Engine to Service During Recovery Operations with ARC Installed

Note

In cases requiring a "functional test," the engine will not be returned to service during recovery operations unless a complete pre-operational inspection has been completed.

To return an engine to service, the following procedures shall be used:

1. The ALRE Maintenance Officer shall determine that the condition or malfunction causing removal of the engine from service has been corrected.
2. The ALRE Maintenance Officer shall advise the Air Officer that the engine is ready to be returned to service.
3. If the deck is open, the Air Officer shall close the deck for recovery.

WARNING

Prior to returning an engine to service, all required maintenance procedures should be satisfactorily completed and documented. Sound powered phone communication shall be established with the Arresting Gear Engine Operator and Sheave Damper Operators, and retractable sheaves will be visually inspected to ensure they are at the proper height.

4. The Arresting Gear Primary Flight Controller shall verify with the Air Officer that the downed engine is to be returned to service.
5. Air Officer shall announce via 5MC, "Foul Deck, Foul Deck, Reinstall the number ___ wire."

CAUTION

If possible, increase illumination of the landing area when altering recovery configuration.

6. During the reinstallation of a deck pendant or when a situation that requires personnel in the landing area exists, all personnel should work facing aft and be continually alert and ready to clear the landing area.
 - a. The Topside Petty Officer or other cognizant person shall stand forward of personnel in the landing area, facing aft, giving the proper foul deck signal and observing aircraft in the pattern.
 - (1) Topside crew shall reinstall the CDP.
 - (2) Should an aircraft approach and fail to wave off, it shall be his responsibility to notify those personnel in time to clear the deck.
 - (3) All personnel shall be aware of the shortest route away from the landing area for that situation.
 - b. Deckedge Operator shall stand well clear of the RCI while personnel are reinstalling the deck pendant.

7. When an engine is brought back online (CDP re-installed), the Primary Flight Arresting Gear Controller shall perform following actions in immediate succession:

WARNING

When an ARC-equipped engine is brought back on line, it must be immediately set for the next expected aircraft. Failure to do this may cause the engine to be completely unresponsive during an arrestment and result in loss of aircraft.

- a. Verbally direct the Arresting Gear Engine Operator to change the OP MODE to OP, GIVE Control to Prifly and change the retract control to REMOTE.
 - b. Receive confirmation from the Arresting Gear Engine Operator.
 - c. Touch the “ENABLE” pushbutton on the Primary Flight Arresting Gear Controller flat panel and then touch the appropriate P1, P2, P3 or P4 (P1, P2, P3 and P3A for ships configured with three wires) pushbutton.
 - d. The Engine Operator shall verify CDP STATUS is “ONLINE” on the AGDC Panel.
 - e. Inform the Arresting Gear Deckedge Operator that the engine is ready for retract.
 - f. Once engine is fully retracted select ENABLE and then “RESET.”
 - g. Enter the current or next expected aircraft type by selecting ENABLE and then A/C Selection pushbutton.
 - h. Verify flat panel indicates all online engines are properly set, in battery, and no faults are indicated.
 - i. Notify all arresting gear operating stations that the engine has been returned to service via the arresting gear voice communications system.
8. The Arresting Gear Deckedge Operator shall monitor the arresting gear voice communications system. When notified by the Primary Flight Arresting Gear Controller that the engine has been returned to service, he shall inform the Arresting Gear Officer.
 9. The Arresting Gear Officer shall monitor the AGO Deckedge display to verify that the engine has been returned to service. After ensuring that all conditions are met for a normal recovery, the Arresting Gear Officer shall:
 - a. Notify the Air Officer.
 - b. Institute the normal operations sequence.

WARNING

After the decision has been made to put an engine back in service and before a clear deck signal is initiated, the Arresting Gear Officer will ensure that the weight setting for that engine is correct for the approaching aircraft.

5.6.3.3 Procedures to Change CDP with ARC Installed

There are some situations that may require changing the CDP during recovery. The procedures vary depending on whether engine has been fully retracted.

5.6.3.3.1 Changing CDP Immediately After an Arrestment with ARC Installed

1. Air Officer shall announce via 5MC, “FOUL DECK, FOUL DECK, CHANGE NUMBER ____ WIRE.” before arresting engine is fully retracted.
2. AGO shall notify LSO that the deck is fouled via a red deck status light.
3. Once the CDP has reached a position that allows sufficient slack for CDP replacement, gently stop the retraction. The topside crew shall change the CDP.

WARNING

- The Topside Petty Officer or other cognizant personnel shall stand forward of the topside crew, facing aft and giving the FOUL DECK signal while observing aircraft in the pattern. Should an aircraft approach and fail to wave off, it shall be his responsibility to notify the topside crew in time to clear the deck.
 - Isolate engine to prevent unintended retract.
 - The Deckedge Operator shall stand well clear of the RCI while topside crew is changing the deck pendant.
4. After the CDP has been changed, the Deckedge Operator shall retract the wire only upon the Topside Petty Officer’s signal.
 5. Primary Flight Arresting Gear Controller shall immediately set for the next expected aircraft type.
 6. The topside crew shall check for FOD prior to resuming recovery operations.

5.6.3.3.2 Changing CDP with ARC Installed and Engine Fully Retracted

1. Air Officer shall announce via 5MC, “FOUL DECK, FOUL DECK, CHANGE NUMBER ____ WIRE.”
2. AGO shall notify LSO that the deck is fouled via a red deck status light.
3. The Arresting Gear Primary Flight Controller shall direct the engine operator to:
 - a. Take Arrestment Control.
 - b. Change from the operational mode to MAINTENANCE MODE.
4. Once the engine is in MAINTENANCE Mode, and engine is isolated, the Engine Operator shall report the “ENGINE IS READY TO BE PULLED”.
5. Topside crew shall pull-out engine to obtain CDP slack upon Deckedge Operator’s signal.
6. Once the CDP has sufficient slack, the topside crew shall change the CDP.

WARNING

- The Topside Petty Officer or other cognizant personnel shall stand forward of the topside crew, facing aft and giving the FOUL DECK signal while observing aircraft in the pattern. Should an aircraft approach and fail to wave off, it shall be his responsibility to notify the topside crew in time to clear the deck.
- Isolate engine to prevent unintended retract.
- The Deckedge Operator shall stand well clear of the RCI while topside crew is changing the deck pendant.

7. After the CDP has been changed, the Deckedge Operator shall retract the wire only upon the Topside Petty Officer's signal.
8. When an engine is brought back online (CDP re-installed and engine fully retracted), the Primary Flight Arresting Gear Controller shall perform following actions in immediate sequence:
 - a. Verbally direct the Arresting Gear Engine Operator to change from MAINT MODE to the OP MODE and GIVE Control to Prifly.
 - b. On the Arresting Gear PriFly Operator flat panel select ENABLE and then RESET. Enter the next expected aircraft type by selecting ENABLE and then A/C Selection pushbutton.
 - c. Verify flat panel indicates all online engines are properly set, in battery, and no faults are indicated.
 - d. The Primary Flight Arresting Gear Controller shall notify all arresting gear operating stations that the engine has been returned to service via the arresting gear voice communications system.

WARNING

When an ARC-equipped arresting engine transitions from Maintenance mode to Operational mode, it must have an aircraft type set in order to be responsive. When an arresting engine is changed to "OPERATIONAL" mode an aircraft type must be selected even if an arrestment is not imminent.

- e. Execute the normal recovery sequence.
9. The topside crew shall check for FOD prior to resuming recovery operations.

5.6.3.4 MOB-S-01-CV Cross-Deck Pendant Change Exercise

Note

It is recommended that completely changing the CDP be practiced as opposed to swapping ends.

5.6.3.4.1 Purpose

To train arresting gear personnel to re-install cross-deck pendants.

5.6.3.4.2 Requirement

Half of these exercises shall be conducted during darkness.

5.6.3.4.3 Procedures

1. When directed, re-install cross-deck pendant.
2. One-minute standby will be given prior to commencing re-installation of the cross-deck pendant.
3. Timing stops when the pendant is ready in all respects for aircraft engagement.

5.6.3.4.4 Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.6.3.5 Rigging the Barricade

5.6.3.5.1 General Rigging

General rigging of the barricade is an all hands evolution under supervision of the Arresting Gear Officer. Experienced arresting gear personnel shall be assigned specific key duties. Other topside personnel, such as catapult, flight deck, and squadron personnel, shall be trained to assist as necessary. These personnel should be assigned specific duties, e.g., “blue shirts” break out and rig deck ramps, “yellow shirts” supervise installation and ensure security of deck ramps, etc.

Since barricade arrestments are emergency situations, barricade-rigging operations shall be correct, efficient, and timely.

Note

The barricade shall be rigged in accordance with detailed instructions outlined in current NAVAIR operations/maintenance/overhaul manual.

5.6.3.5.2 Procedures

In the event the decision is made to rig the barricade, the following procedures shall take place:

1. The Air Officer shall announce on the 5MC, “STAND BY TO RIG THE BARRICADE,” and provide as much information as available to the AGO over the flight deck communications system or other voice communication system. Any safety information (e.g., one aircraft to go, remain clear of the foul line) shall be passed at this time.
2. Crash and Salvage shall position mobile crash equipment forward and Bow Catapults shall raise JBDs as applicable.

WARNING

To keep personnel clear of the landing area and minimize the possibility of injuries, the Air Officer shall normally pass the above word after the last normal recovery aircraft has landed. If this is not feasible, he shall pass the word as late in the recovery as possible, and inform personnel to proceed with caution.

3. All available personnel shall assemble at assigned stations, break out the barricade, deck ramps, air guns, and other necessary tools and equipment. Care shall be taken not to foul the deck during this period.
4. The Air Officer will announce the type aircraft, the weight, and its landing configuration.
5. The Arresting Gear Officer, with the use of the appropriate Bulletins, shall report to the Air Officer with information concerning the removal of deck pendants, barricade and engine settings, required wind over deck, recommended approach speed, lens setting, and configuration. Requirements shall be cross-checked and verified by the Air Officer before the deck is open.
6. When the last normal recovery has been completed and the engaged pendant retracted, the Air Officer shall pass the word to remove cross-deck pendants as necessary. After cross-deck pendants are clear the word will be passed, “RIG THE BARRICADE.”

CAUTION

C-2/E-2 double barricade webbing shall be marked for easy identification and shall be used for C-2/E-2 aircraft only.

7. Install and lock deck ramps in proper position. Deck ramps shall be numbered in sequence corresponding to positions on the flight deck, numbering from port to starboard.
8. Disengage both barricade stanchion latches.
9. As soon as the webbing is spread and the upper tensioning pendants are connected, tension will be taken by the use of the barricade air guns. Barricade stanchions shall be raised approximately 6 inches prior to taking tension with the air guns. If air pressure is lost, tension may be taken by hand with a ratchet wrench or a special NAWC tool.

Note

To aid in obtaining the proper height of the barricade, a mark should be made on the upper load strap tensioning pendants, which, when lined up with the sheave on the stanchion, indicates a proper tension for proper height.

10. After proper tensioning is assured on both load straps, the lower load straps shall be tucked under the deck ramps.
11. When personnel are clear of both the stanchions and from within the webbing assembly, the Officer or Petty Officer in Charge of the barricade rig shall signal for the stanchions to be raised.

Note

Failure to install ramps may permit the wind over the deck to raise the lower load straps off the deck and interfere with proper engagement. Also, lack of ramps may result in damage to the lower load straps if the engaging aircraft has damaged landing gear.

12. When U-shackle and links have been connected to the clevis end socket assemblies of the purchase cable, the Officer or Petty Officer in Charge of the barricade rig shall signal retract after ensuring:
 - a. Parallel pendant is clear of load straps and aft of deck ramps.
 - b. Extension loops, ring type couplings, and U-shackle and link are positioned on proper side of webbing.
 - c. All personnel are clear.

Note

The Deckedge Operator shall retract slowly to prevent the parallel pendant from fouling on deck ramps.

5.6.3.5.3 Post-Rig Inspection

The Arresting Gear Officer shall inspect the barricade rig for the following:

1. Check hookup of all four tension pendant release assemblies to ensure proper seating of hooks.
2. Ensure deck winches are properly locked to deck (if applicable).
3. Check purchase cables and parallels pendant for alignment to sheave throat. Ensure clevis pin installation, anchor nuts tight, and setscrew for proper installation and security.
4. Ensure deck ramps are secure and locked, and lower load strap is forward of and tucked under the ramp.
5. Ensure barricade is raised to a sufficient height. The minimum height shall be 20 feet at mid-span for jet barricade and 21 feet mid-span for E-2/C-2 barricade.

5.6.3.5.4 Post-Rig Procedures

The Arresting Gear Officer shall inform the Air Officer that the rig is ready and present a GREEN status light when:

1. The barricade is properly rigged.
2. Deck pendants are removed as required for aircraft type and configuration.
3. Ensure the proper weight setting is made on the barricade engine. Weight settings shall be made in accordance with applicable recovery bulletins.
4. Ensure proper weight setting is made on all pendant engines, as time may prohibit removal of pendants as planned.
5. Retractable sheaves of all engines in service are raised.
6. Ensure all loose tools, personnel, and any detached deck pendants are clear of the landing area.

5.6.3.5.5 Post-Engagement Procedures

1. To prepare the deck for further recoveries after a barricade engagement, the purchase cable shall be disconnected from the barricade and retracted. If necessary, the webbing shall be cut away from the aircraft and the deck inspected thoroughly for FOD.
2. After engagement by an aircraft, used webbing, pendants, and associated hardware installed between purchase cable terminals shall be discarded.

5.6.3.5.6 MOB-D-19-CV Rigging Barricade (CVN) Drill

Note

Time is important; however, emphasis shall be placed on the proper rigging of the barricade to ensure that all components are ready for the engagement.

a. Purpose

Train flight deck personnel in rigging barricades.

b. Requirements

One half of these exercises shall be conducted during night periods.

c. Procedures

Five minute "STANDBY" will be given prior to commencing the rigging of the barricade. Timing starts when the signal is given to "RIG THE BARRICADE." Timing stops when barricade is ready in all respects for an aircraft engagement and deck status light is in the green.

d. Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheets.

5.6.3.6 Deck Status Light Failure

1. In the event of a failure of the deck status light system, the Recovery Team shall immediately shift to the emergency back-up system. The LSO HUD Platform Operator shall break out emergency deck status signal devices. These shall consist of RED and GREEN paddles or flags for day and a set of RED and GREEN wands at night.

Note

Signaling devices shall be of sufficient size or intensity and be so displayed so as to be clearly visible to the Arresting Gear Officer, LSO, and PriFly.

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2. The AGO shall signal "CLEAR DECK" by raising a GREEN flag vertically overhead during the day or at night holding a GREEN wand overhead. LSO HUD Platform Operator shall display the same signal until the Arresting Gear Officer changes the signal.
3. The "FOUL DECK" signal shall be given by raising a RED flag vertically overhead during the day or a RED wand held overhead at night. The LSO HUD Platform Operator shall display the same signal until the Arresting Gear Officer changes the signal.
4. The LSO HUD Platform Operator shall continually be alert for changes of the Arresting Gear Officer's signals and shall NOT display a "CLEAR DECK" until he has received a positive "CLEAR DECK" signal from the Arresting Gear Officer.
5. The LSO HUD Platform Operator shall continuously display the "CLEAR DECK" signal as displayed by the Arresting Gear Officer.
6. In the absence of any signal from the Arresting Gear Officer, the LSO HUD Platform Operator shall immediately foul the deck.

5.6.3.6.1 MOB-S-02-CV Deck Status Light Failure Exercise

a. Purpose

To train and evaluate Air Department personnel in flight operations with a deck status light failure.

b. Requirement

Half of these exercises are to be conducted during darkness.

c. Procedures

1. OCE (Officer Conducting Exercise). With the Air Officer's concurrence, the OCE shall initiate this exercise by securing the flight deck status light power switch at the LSO platform just prior to or during a recovery.
2. Arresting Gear Officer. Upon loss of the deck status light, immediately shift to emergency signal devices.
3. LSO HUD Platform Operator. LSO HUD Platform Operator immediately shifts to emergency signal devices and repeats all signals from the Arresting Gear Officer until power is restored.

d. Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.6.3.7 Voice Communication System Failure

1. Provisions shall be made to ensure the continuation of necessary communications in the event of a voice communication system failure. Individual carriers shall devise their own system and procedures compatible with their installations.
2. Any emergency procedure will necessarily cause significant delays in meeting all requirements for a clear deck. To preclude or minimize foul deck waveoffs, the Air Officer shall cause the landing interval to be extended accordingly and shall make every effort to recover aircraft by type, in sequence.

5.6.3.8 Rigging the MOVLAS

5.6.3.8.1 General

The rigging of the MOVLAS shall be performed by qualified VLA personnel and assisted, as necessary, by the V-2 personnel under the supervision of a qualified Arresting Gear Officer.

5.6.3.8.2 Procedures

1. When the decision is made to rig the MOVLAS, the Air Officer shall pass the word over the 5MC, "RIG THE MOVLAS, STATION ____."

Note

- MOVLAS stations shall be designated as follows:
 - Station 1 - source light box only on lens platform.
 - Station 2 - portable frame port side.
 - Station 3 - portable frame starboard side.

The necessary components shall be broken out and rigged per ship's installation.

- The MOVLAS Station 3 portable components shall be stored within the ship's structure on starboard side to preclude damage from aircraft crash or fire on the flight deck or in the catwalks.
2. The perforated covers in the center panel shall be locked open for day, and closed for night operations.
 3. When the MOVLAS is installed and the cannon plugs are connected to the appropriate power source, the LSO shall check for proper operation.
 4. When the LSO is satisfied with the operation, he shall so indicate to the Arresting Gear Officer by giving a "thumbs up," and the Arresting Gear Officer shall initiate normal recovery procedures.

5.6.3.8.3 MOB-S-23-CV — Manually Operated Visual Landing Aids System (MOVLAS) Drill**Note**

Time is important; however, emphasis shall be placed on personnel safety and proper rigging of the system.

a. Purpose

Train Air Department personnel in rigging the MOVLAS.

b. Requirements

One exercise shall be conducted at each MOVLAS location.

c. Procedures

One-minute standby shall be given prior to commencing the rigging of the MOVLAS. Timing stops when the MOVLAS is ready in all respects.

d. Evaluation

Refer to COMNAVAIRFORINST 3500.20 Series for evaluation sheet.

5.6.3.9 ARC System Sensor Malfunctions and Faults**5.6.3.9.1 Procedures**

After the Primary Flight Arresting Gear Controller has initiated an aircraft weight setting and an engine continues to indicate NOT READY on the Arresting Gear PriFly operator and Engine Flat panel, an error condition in the ARC System is present. The ARC System is equipped with a Forced Ready/Battery functions to override a faulty system error. The following procedures shall be used to implement a Forced Ready/Battery conditions.



The Arresting Gear Primary Flight Controller and Engine Operator shall always exercise safety first. If any doubt exists concerning the safe operation of the arresting gear, they shall call "FOUL DECK". The Engine shall be removed from service. The ALRE Maintenance Officer shall then determine engine status for return to service.

5.6.3.9.2 Forced Battery Procedure

Anchor and Sheave dampers must be in their battery positions to attain a “CLEAR” deck. If anchor and/or sheave dampers can be verified to be in battery position by a second qualified engine operator, permission to FORCE BATTERY the engine to attain a “CLEAR” deck shall be requested from Prifly. An engine operator may only Force Battery with express permission from the Air Officer.

1. The Primary Flight Arresting Gear Controller shall establish voice communication with the Arresting Gear Engine Operator of the malfunctioning engine to ascertain the problem.
2. The Arresting Gear Engine Operator shall:
 - a. Check the AGDC panel to determine the system malfunction and if the errors indicated are the result of faulty sensors.
 - b. Determine if the arresting gear can be operated safely through direct visual confirmation of battery condition. (E.g. Anchor Damper fully stroked out and Sheave Dampers are fully stroked in).
 - c. If any doubt exists concerning the safe operation, the Arresting Gear Operator shall call “FOUL DECK”. Recommends removal of engine from service.
 - d. If it is determined that the Arresting Gear engine is safe for recovery, with below decks Petty Officer or a second qualified engine operator concurrence, shall provide recommendation to Primary and AGO via Deckedge Operator to initiate Forced Battery.
3. The Arresting Gear Officer shall:
 - a. Make the appropriate recommendation to the Air Officer and state whether the Arresting Gear engine is safe for recovery.
4. The primary Flight Arresting gear controller shall:
 - a. If the engine is safe for recovery, shall request permission from the Air Boss to initiate Forced Battery.
 - b. Upon receipt of permission from the Air Boss, shall direct the affected engine operator to acknowledge the fault and initiate Forced Ready condition. This will show as an AMBER indication for that engine on the Arresting Gear PriFly Operator flat panel, the Air Boss display and the AGO Deckedge display.

Note

- When ARC system is reset for the next aircraft recovery, the Forced Battery condition will be cleared. If the error is still present, the Forced Battery initiation procedure must be repeated.
- The qualified operators noted below can visually confirm the battery status of the arresting gear systems as indicated:

Arresting Gear Engine Operator/Engine Room P.O./Sheave Damper P.O./AGPO.

— Anchor Dampers.

— Sheave Dampers.

5.6.3.9.3 Forced Ready Procedure

The ARC system is constantly monitoring various parameters. Any ARC system fault will prevent the arming of an engine and subsequently attaining a “CLEAR DECK”. If a fault occurs, resolution time could be short or lengthy depending on the troubleshooting and corrective action required. As soon as a fault occurs, any approaching aircraft shall be waved-off. The Air Officer may then decide to take the affected engine off-line prior to troubleshooting the fault. “Forced Ready conditions shall only be authorized by the Air Officer.”



The Arresting Gear and Primary Flight Controller and Engine Operator shall always exercise safety first. If any doubt exists concerning the safe operation of the arresting gear, they shall call “FOUL DECK”. The Engine shall be removed from service. The ALRE Maintenance Officer shall then determine engine status for return to service.

1. The Primary Flight Arresting Gear Controller shall establish voice communication with the Arresting Gear Engine Operator of the malfunctioning engine to ascertain the problem.
2. The Arresting Gear Engine Operator shall:
 - a. If any doubt exists concerning the safe operation, shall call “FOUL DECK” over sound powered communication.
 - b. Check the AGDC panel to determine the system malfunction and relay information to ALRE M.O./Chief.
 - c. If it is determined that the Arresting Gear engine is safe for recovery, with ALRE M.O./Chief concurrence, shall relay recommendation to Primary and AGO via Deckedge Operator to initiate Forced Ready.
3. The ALRE Maintenance Officer/Chief shall:
 - a. Determine if the arresting gear can be operated safely by ascertaining the severity of the system fault.
 - b. Inform the Air Boss and state whether the Arresting Gear engine is safe for recovery.
 - c. Provide recommendation to proceed with Forced Ready condition.
4. The primary Flight Arresting gear controller shall:
 - a. If the engine is safe for recovery, shall request permission from the Air Boss to initiate Forced Ready.
 - b. Upon receipt of permission from the Air Boss, shall direct the affected engine operator to acknowledge the fault and initiate Forced Ready condition. An AMBER indication for that engine will be displayed on the Arresting Gear PriFly Operator flat panel, the Air Boss display and the AGO Deckedge display.

Note

When ARC system is reset for the next aircraft recovery, the Forced Ready condition will be cleared. The Forced Ready initiation procedure and approval process must be repeated until such time that the Maintenance Officer verifies that the fault no longer exists and grants authorization to clear the fault.

5.6.3.10 Degraded Mode Operations with the Advanced Recovery Control (ARC) System Installed

ARC-equipped arresting gear provides various degraded arrestment (setting the engine) and retract modes. Degraded retract modes are addressed in [paragraph 5.6.3.11](#).

The ARC degraded arrestment modes are presented in [Figure 5-1](#).

5.6.3.10.1 Degraded Arrestment Mode 1

Degraded Arrestment Mode 1 shall be initiated if the Arresting Gear PriFly Operator Flat Panel is inoperative.

DEGRADED MODE	INOPERATIVE DEVICES	DEVICES THAT MUST BE SWITCHED OFF	ARRESTING ENGINE SETTING BY
1	Arresting Gear PriFly Operator Flat Panel.	Arresting Gear PriFly Operator Flat Panel.	Arresting Gear PriFly Operator verbally directs one engine operator to set all engines. Deckedge and Airboss Displays Operational and accurate.
2	ARC Distribution Hub. Ship Interface Computer Circuit Card in ARCDH inoperable.	Arresting Gear PriFly Operator Flat Panel. Air Officer Display. AGO Deckedge Display. Distribution Hub.	Arresting Gear PriFly Operator verbally directs all engine operators to locally set their engines. Note This degraded mode also forces operator into Retraction Degraded Mode 2.

Figure 5-1. ARC Degraded Arrestment Modes

5.6.3.10.2 Steps to Initiate Degraded Arrestment Mode 1

1. The Air Officer shall direct the Arresting Gear Primary Flight Controller transfer arrestment control to the engine previously identified alternate master (e.g., “TRANSFER ARRESTMENT CONTROL TO ENGINE _____”).
2. The Arresting Gear Primary Flight Controller shall:
 - a. Direct Alternate Master to take arrestment control of all engines (e.g., “ARRESTMENT CONTROL SHIFTING TO ENGINE _____. ENGINE _____, TAKE CONTROL AS ALTERNATE BUS MASTER”).
 - b. Turn off Arresting Gear PriFly Operator Flat Panel.
3. The Arresting Gear Chief or LPO (upon hearing the announcement that operations are transferring to the alternate master) shall assign a second qualified engine operator to the designated alternate master engine or to provide two-person verification of each weight setting.
4. The engine operator previously identified as the alternate master (upon direction from Arresting Gear Primary Flight Controller) shall:
 - a. Acknowledge command to take control (e.g., “ENGINE _____ TAKING ARRESTMENT CONTROL”).
 - b. Select SYSTEM MAIN Graphical User Interface (GUI).
 - c. Take Arrestment Control.
 - d. Select ALTERNATE BUS MASTER. Select ENABLE.
 - e. Select SYSTEM MAIN GUI.
 - f. Verify ARRESTMENT CONTROL indicates the Alternate Master for all online engines (e.g., AGDC1 if Alternate Master is Engine One, AGDC2 if Alternate Master is Engine Two, etc. AGDC: Arresting Gear Display Computer).
 - g. Report status to Arresting Gear Primary Flight Controller when the above is completed. (e.g., “ENGINE _____ HAS ARRESTMENT CONTROL.”)
5. Arresting Gear Primary Flight Controller shall report to Air Officer the existing degraded mode.

5.6.3.10.3 Approach with the Advanced Recovery Control (ARC) System Installed and Operating in Degraded Mode 1

Prior to the LSO receiving a “CLEAR DECK” from the Arresting Gear Officer, the following sequence of events shall be strictly adhered to for the first and all subsequent landings:

1. The Air Officer shall determine the aircraft type to be recovered and direct the arresting gear and lens to be set. He shall verbally acknowledge aircraft weight and lens setting calls as reported to him (e.g., “ROGER, GEAR...LENS SET...THREE SIX ZERO HORNET.”) He shall verify the setting by observing the Air Officer display.

WARNING

The ARC system is constantly monitoring various parameters. Any ARC fault will prevent the arming of an engine and subsequently attaining a “CLEAR DECK”. If a fault occurs, resolution time could be short or lengthy depending on the troubleshooting and corrective action required. As soon as a fault occurs, any approaching aircraft shall be waved-off. The Air Officer may then decide whether to take the affected engine off-line or troubleshoot the fault based on the operational situation.

Note

Lens settings are not repeated/reported during MOVLAS operations.

2. The Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered (from Air Officer), shall:
 - a. Direct the Alternate Master to set for the next aircraft using only the first three digits and aircraft type (e.g., “SET ALL ENGINES THREE SIX ZERO, HORNET.”).
 - b. He shall then monitor the engine weight settings using the arresting gear voice communication system.
 - c. He shall monitor the correct lens setting set by the Fresnel Lens Console Operator.
 - d. When the Alternate Bus Master has reported the correct weight setting and the correct lens angle has been set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type. (e.g., “ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET”).

Note

Lens settings are not repeated/reported during MOVLAS operations.

3. The Alternate Master shall:
 - a. Enter the aircraft type as directed by the Primary Flight Arresting Gear Controller by selecting the aircraft type.
 - b. Obtain verbal concurrence from the Below-deck Petty Officer that the aircraft selected is correct.
 - c. Report to Primary Flight Arresting Gear Controller that engines are set to the commanded aircraft (e.g., “GEAR SET THREE SIX ZERO, HORNET. VERIFIED”).
 - d. Verify all online engines indicate ARMED.
 - e. If a fault occurs after engine is set, the Alternate Master shall call “FOUL DECK”.

4. The Arresting Gear Engine Operator shall:
 - a. Repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.
 - b. If a fault occurs after an engine is set, they shall immediately notify the Primary Flight Arresting Gear Controller.
5. The Deckedge Operator shall:
 - a. Monitor the sheave damper indicator lights.
 - b. Monitor the retractable sheave indicator lights.
 - c. Ensure the landing area is clear (within his field of view).
 - d. Ensure all deck pendants are fully retracted and taut.



If the retract valve is opened (e.g., to vent engines or tighten CDPs) when a “CLEAR” deck exists, the deck status indicators will change to “FOUL” until the retract valve is closed. Every attempt should be made to vent engine or tighten the CDPs prior to attaining a clear-deck status.

- e. Ensure all engines are retracted and no faults exist indicated on the RCI (or received over voice communication system from engine operators).
- f. If a fault occurs after engine is set, he shall immediately notify the Primary Flight Arresting Gear Controller.
- g. Monitor the AGO deckedge display for correct weight settings and engine status.



It is imperative that the Arresting Gear Officer know the exact weight setting of the arresting gear engines so he can ensure the engines are set for the type aircraft to land.

- h. Keep the engine operators informed on the status of the recovery by reporting the following aircraft positions: GROOVE/RAMP. “GROOVE” shall be called on the voice communication system as the aircraft approaches short final, and call “RAMP” as it reaches the fantail.
 - i. Monitor the arresting gear voice communications system.
6. The Sheave Damper Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.



When the word “GROOVE” is passed over the voice communication system, all non-essential communications shall cease until after the aircraft touches down. Anyone not ready to land aircraft at that time shall immediately respond with “FOUL DECK, FOUL DECK.”

7. The Fresnel Lens Primary Flight Lens Console Operator shall make the appropriate lens setting and continuously monitor the lens system during recoveries and shall report any malfunction immediately to the Air Officer.
8. The Arresting Gear Officer, upon receiving clearance to “LAND AIRCRAFT” from the Air Officer, and upon observing the aft GREEN rotating beacon, shall ensure the following conditions exist prior to providing a “clear deck” signal to the LSO:
 - a. A “CLEAR DECK FORWARD” signal has been received from the Gear Puller. The signal is given by sweeping one arm from vertically overhead to the horizontal position and returning overhead (day), or by using the same signal with an AMBER wand (night).
 - (1) This signal shall be acknowledged from the AGO by repeating the signal using his arm (day) and RED wand (night).

Note

The “foul deck” signal from the Gear Puller to the Arresting Gear Officer is indicated by arms crossed overhead with fists clenched (day), or crossed AMBER wands held overhead (night).

- b. All deck pendants appear fully retracted and taut.
- c. Observe the Deckedge Operator’s signal, indicating that all conditions for recovery have been completed.
- d. Ensure the AGO Deckedge Display indicates engines are set.
- e. All retractable sheaves are raised and wire supports are in place.

WARNING

During simultaneous recovery and catapult No. 2 operations, deckedge mode, the cat No. 2 Deckedge Operator (if applicable) are authorized to man the deckedge station for operations and shall not be considered fouling the landing area. The Deckedge Operator shall be aware and alert during recovery operations.

- f. The catwalks, flight deck, and other hazardous areas are clear of unauthorized personnel.
- g. Visually and positively identify aircraft to be recovered.

WARNING

- The utmost attention to every detail is required during night or reduced visibility flight operations. Presently, certain aircraft have similar features that hinder the rapid, positive identification of approaching aircraft. Consequently, the entire recovery team shall be alert to preclude a mismatch between landing aircraft and the arresting gear settings. The final assurance to prevent this mismatch shall rest with the Arresting Gear Officer.
- The Arresting Gear Officer shall NOT, under any circumstances, provide a “CLEAR DECK” until the aircraft has been positively identified visually or via the Air Officer.

- h. When satisfied that all the above requirements have been met, the Arresting Gear Officer shall change the deck status light from RED to GREEN, remaining alert for any malfunctions of the equipment or violations of the safe parking line. The deck will be declared "FOUL" by switching the deck status light to RED after each arrested landing, bolter, touch and go, or wave-off, and it will remain so until completion of the above procedures.

Note

While the final check for compatibility of the landing aircraft and the arresting engine settings are made by the Arresting Gear Officer, cross-checks by other personnel are critical. The A/G PriFly Controller, Lens Console Operator, LSO Spotter/Talker, Deckedge Operator, and Topside Petty Officer should also be trained in aircraft recognition under all conditions. This becomes even more imperative during night or reduced visibility operations and when EMCON conditions are in effect. All visual and aural characteristics (aircraft lighting, flight characteristics, engine sounds, etc.) shall be used in making the final determination. If a positive determination cannot be made, a low pass by the ship shall be requested to positively identify the aircraft.

9. The LSO Spotter/Talker.

- a. When visual confirmation of aircraft type and configuration (gear, flaps, and hook down) has been made, he shall notify the LSO (e.g., "HORNET, ALL DOWN").
- b. He shall also notify the LSO of type aircraft, arresting engines set, weight setting, and clear or foul deck, whichever is appropriate, depending on the light indication in the deck status light box (e.g., "GEAR SET, THREE SIX ZERO, HORNET, CLEAR DECK").
- c. If the red light is on, the "FOUL DECK, FOUL DECK" call is repeated continuously until the green light comes on. One "CLEAR DECK" call is then made, and the spotter/talker shall monitor the light status until the aircraft has passed the ramp for any change in deck status.

10. The Integrated Launch and Recovery Television System Operator shall ensure coverage of each aircraft approach and arrestment. Additionally, any abnormal situation (crash, fire, aircraft in catwalk, etc.) shall be duly recorded. To attain coverage for detailed tape analysis, the following camera sequence shall be utilized:

- a. Island camera for initial approach.
- b. Centerline camera for final approach, touchdown, and until nose wheel blocks the view or reaches the centerline camera in use.
- c. Island camera for roll out, ensuring that aircraft side number and the pendant engaged is shown.

Note

ILARTS tapes shall normally be retained at least 48 hours before erasing/over-recording. In the event there is any deviation from a normal arrested landing, ILARTS tapes shall be retained in accordance with the Report of Deviation from Normal Arrested Landing found in COMNAVAIRFORINST 13800 Series. In the event of an aircraft mishap of sufficient severity as defined in OPNAVINST 3750.6, the ILARTS tape shall immediately be made available to the senior member of the Aircraft Mishap Board for the duration of the investigation. During recording of mishaps and aircraft emergencies, camera signals to the ship's entertainment system shall be secured. This will prevent unauthorized copying of the TV signal, but still allows ILARTS monitors to be available during the mishap.

5.6.3.10.4 Degraded Arrestment Mode 2

Degraded Arrestment Mode 2 shall be initiated if the ARC Distribution Hub is inoperative. In this mode of operation, all engine settings must be two-person verified. No remote monitoring of weight settings can be accomplished. Degraded Arrestment Mode 2 may only be used with the permission of the Commanding Officer.

a. Steps to Initiate Degraded Arrestment Mode 2

1. The Air Officer shall direct the Arresting Gear Primary Flight Controller transfer arrestment control to each engine (e.g., “INITIATE ARRESTMENT DEGRADED MODE 2. TRANSFER ARRESTMENT CONTROL TO EACH ENGINE”).
2. The Arresting Gear Primary Flight Controller shall:
 - a. Direct all engines to take control of their engines (e.g., “ARRESTMENT CONTROL SHIFTING TO ENGINES. ALL ENGINES, TAKE ARRESTMENT CONTROL”).
 - b. Turn off Arresting Gear PriFly Operator Flat Panel and Air Boss Display.
 - c. Direct Deckedge Operator to turn off the deckedge display.
3. Below-deck petty officer shall turn off ARC Distribution Hub.
4. Each engine operator (upon direction from Arresting Gear Primary Flight Controller) shall:
 - a. Take Arrestment Control.
 - b. Shift Retract Source switch on the AG Control Cabinet to the “LOCAL” position.
 - c. Verify arrestment location indicates ENGINE and retraction location indicates ENGINE on AGDC Panel.
 - d. Sequentially report Arrestment Control status to Arresting Gear Primary Flight Controller when the above is completed. If an engine is out of service, the report for that engine shall be omitted in the reporting sequence. The report shall be “ENGINE ONE IN LOCAL CONTROL, ENGINE TWO IN LOCAL CONTROL, ENGINE FOUR IN LOCAL CONTROL, ...” etc.

WARNING

No remote monitoring of weight setting can be accomplished. Degraded Arrestment Mode 2 may only be used with the permission of the Commanding Officer.

- e. Report to Arresting Gear Primary Flight Controller when second qualified engine operator arrives to provide two-person verification of engine settings.

Note

When operating in Degraded Arrestment Mode 2, an additional qualified engine operator is required at each engine to provide two-person verification of engine setting.

5. The Deckedge Operator shall turn off the deckedge display.
6. The Arresting Gear Primary Flight Controller shall report to the Air Officer the system is in Degraded Mode 2 Local Engine Control.

b. Approach with the Advanced Recovery Control (ARC) System Installed and Operating in Degraded Mode 2

Prior to the LSO receiving a “CLEAR DECK” from the Arresting Gear Officer, the following sequence of events shall be strictly adhered to for the first and all subsequent landings:

1. The Air Officer shall determine aircraft type to be recovered. He shall verbally acknowledge aircraft weight and lens setting calls as reported to him (e.g., “ROGER, GEAR ... LENS SET ... THREE SIX ZERO, HORNET”).

WARNING

The ARC system is constantly monitoring various parameters. Any ARC fault will prevent the arming of an engine and subsequently attaining a “CLEAR DECK”. If a fault occurs, resolution time could be short or lengthy depending on the troubleshooting and corrective action required. As soon as a fault occurs, any approaching aircraft shall be waved-off. The Air Officer may then decide whether to take the affected engine off-line or troubleshoot the fault based on the operational situation.

2. The Primary Flight Arresting Gear Controller, upon ascertaining the type of aircraft to be recovered (from Air Officer), shall inform the engine operators of the setting required for the next aircraft using only the first three digits and aircraft type (e.g., “SET ALL ENGINES THREE SIX ZERO, HORNET”).

Note

When operating in Degraded Arrestment Mode 2, an additional qualified engine operator is required at each engine to provide two-person verification of engine setting.

- a. When all engine operators have reported the correct weight setting and the correct lens angle has been set, the Primary Flight Arresting Gear Controller shall report verbally to the Air Officer the number of engines set, settings, lens status, and aircraft type (e.g., “ALL FOUR GEAR...LENS...SET THREE SIX ZERO, HORNET”).

Note

Lens settings are not repeated/reported during MOVLAS operations.

- b. He shall immediately notify the Air Officer of any ARC faults as reported to him.
3. The Arresting Gear Engine Operators shall:
 - a. Set the aircraft and weight setting relayed by the Primary Flight Arresting Gear Controller.
 - b. After verification of another qualified engine operator of the aircraft type and weight setting, report settings in sequence, engine numbers one through four (followed by barricade if applicable). If an engine is out of service, the report for that engine shall be omitted in the reporting sequence. The report shall be “ENGINE ONE SET THREE SIX ZERO, HORNET VERIFIED... ENGINE TWO SET THREE SIX ZERO, HORNET VERIFIED”, etc.
 - c. Engine Operators shall repeat calls (“GROOVE, RAMP”) from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.
 - d. If any fault occurs, he shall immediately call “FOUL DECK”.

4. The Deckedge Operator shall:
 - a. Monitor the sheave damper indicator lights.
 - b. Monitor the retractable sheave indicator lights.
 - c. Ensure the landing area is clear (within his field of view).
 - d. Ensure all deck pendants are fully retracted and taut.
 - e. Ensure all engines are in battery (received over voice communication system from engine operators).
 - f. Monitor engine weight settings via voice communications.

WARNING

It is imperative that the Arresting Gear Officer know the exact weight setting of the arresting gear engines so he can ensure the engines are set for the type aircraft to land.

- g. After all engines have reported the correct weight setting, provide verbal confirmation to the Arresting Gear Officer, "ALL ENGINES SET THREE SIX ZERO, HORNET VERIFIED."
 - h. Keep the engine operators informed on the status of the recovery by reporting the following aircraft positions: GROOVE/RAMP. "GROOVE" shall be called on the voice communication system as the aircraft approaches short final, and call "RAMP" as it reaches the fantail.
5. The Sheave Damper Operators shall repeat calls ("GROOVE, RAMP") from the Deckedge Operator to alert personnel in their spaces of an impending arrestment.

CAUTION

When the word "GROOVE" is passed over the voice communication system, all non-essential communications shall cease until after the aircraft touches down. Anyone not ready to land aircraft at that time shall immediately respond with "FOUL DECK, FOUL DECK."

6. The Fresnel Lens Primary Flight Lens Console Operator shall make the appropriate lens setting and continuously monitor the lens system during recoveries and shall report any malfunction immediately to the Air Officer.
7. The Arresting Gear Officer, upon receiving clearance to "LAND AIRCRAFT" from the Air Officer, and upon observing the aft GREEN rotating beacon, shall ensure the following conditions exist prior to providing a "clear deck" signal to the LSO:
 - a. A "CLEAR DECK FORWARD" signal has been received from the Gear Puller. The signal is given by sweeping one arm from vertically overhead to the horizontal position and returning overhead (day), or by using the same signal with an AMBER wand (night).
 - (1) This signal shall be acknowledged from the AGO by repeating the signal using his arm (day) and RED wand (night).

Note

The "foul deck" signal from the Gear Puller to the Arresting Gear Officer is indicated by arms crossed overhead with fists clenched (day), or crossed AMBER wands held overhead (night).

- b. All deck pendants appear fully retracted and taut.
- c. Observe the Deckedge Operator's signal, indicating that all conditions for recovery have been completed.
- d. All retractable sheaves are raised and wire supports are in place.

WARNING

During simultaneous recovery and catapult No. 2 operations, deckedge mode, the cat No. 2 Deckedge Operator and JBD Operator (if applicable) are authorized to man the deckedge station for operations and shall not be considered fouling the landing area. The Deckedge Operator and JBD Operator shall be aware and alert during recovery operations.

- e. The catwalks, flight deck, and other hazardous areas are clear of unauthorized personnel.
- f. Visually and positively identify aircraft to be recovered.

WARNING

- The utmost attention to every detail is required during night or reduced visibility flight operations. Presently, certain aircraft have similar features that hinder the rapid, positive identification of approaching aircraft. Consequently, the entire recovery team shall be alert to preclude a mismatch between landing aircraft and the arresting gear settings. The final assurance to prevent this mismatch shall rest with the Arresting Gear Officer.
 - The Arresting Gear Officer shall NOT, under any circumstances, provide a "CLEAR DECK" until the aircraft has been positively identified visually or via the Air Officer.
- g. When satisfied that all the above requirements have been met, the Arresting Gear Officer shall change the deck status light from RED to GREEN, remaining alert for any malfunctions of the equipment or violations of the safe parking line. The deck will be declared "FOUL" by switching the deck status light to RED after each arrested landing, bolter, touch and go, or wave-off, and it will remain so until completion of the above procedures.

Note

While the final check for compatibility of the landing aircraft and the arresting engine settings are made by the Arresting Gear Officer, cross-checks by other personnel are critical. The A/G PriFly Controller, Lens Console Operator, LSO Spotter/Talker, Deckedge Operator, and Topside Petty Officer should also be trained in aircraft recognition under all conditions. This becomes even more imperative during night or reduced visibility operations and when EMCON conditions are in effect. All visual and aural characteristics (aircraft lighting, flight characteristics, engine sounds, etc.) shall be used in making the final determination. If a positive determination cannot be made, a low pass by the ship shall be requested to positively identify the aircraft.

8. The LSO Spotter/Talker.
 - a. When visual confirmation of aircraft type and configuration (gear, flaps, and hook down) has been made, he shall notify the LSO (e.g., “HORNET, ALL DOWN”).
 - b. He shall also notify the LSO of type aircraft, arresting engines set, weight setting, and clear or foul deck, whichever is appropriate, depending on the light indication in the deck status light box (e.g., “GEAR SET, THREE SIX ZERO, HORNET, CLEAR DECK”).
 - c. If the red light is on, the “FOUL DECK, FOUL DECK” call is repeated continuously until the green light comes on. One “CLEAR DECK” call is then made, and the spotter/talker shall monitor the light status until the aircraft has passed the ramp for any change in deck status.
9. The Integrated Launch and Recovery Television System Operator shall ensure coverage of each aircraft approach and arrestment. Additionally, any abnormal situation (crash, fire, aircraft in catwalk, etc.) shall be duly recorded. To attain coverage for detailed tape analysis, the following camera sequence shall be utilized:
 - a. Island camera for initial approach.
 - b. Centerline camera for final approach, touchdown, and until nose wheel blocks the view or reaches the centerline camera in use.
 - c. Island camera for roll out, ensuring that aircraft side number and the pendant engaged is shown.

Note

ILARTS tapes shall normally be retained at least 48 hours before erasing/over-recording. In the event there is any deviation from a normal arrested landing, ILARTS tapes shall be retained in accordance with the Report of Deviation from Normal Arrested Landing found in COMNAVAIRFORINST 13800 Series. In the event of an aircraft mishap of sufficient severity as defined in OPNAVINST 3750.6, the ILARTS tape shall immediately be made available to the senior member of the Aircraft Mishap Board for the duration of the investigation. During recording of mishaps and aircraft emergencies, camera signals to the ship’s entertainment system shall be secured. This will prevent unauthorized copying of the TV signal, but still allows ILARTS monitors to be available during the mishap.

5.6.3.11 Degraded Retract Mode Operations with the Advanced Recovery Control (ARC) System Installed

ARC-equipped arresting gear provides degraded retract modes. The ARC degraded arrestment modes are presented in [Figure 5-2](#).

DEGRADED MODE	OPERATION IMPACT	INOPERATIVE DEVICES	DEVICES THAT MUST BE SWITCHED OFF	RETRACT CONTROLLED BY
1	Can not retract from deckedge.	Retract Control Indicator.	None	Arresting Gear PriFly Operator from Arresting Gear Flat Panel & ARC Half-panel.
2	Can not retract from deckedge or PriFly.	Retract Control Indicator. Half Panel or Arresting Gear PriFly Operator Flat Panel.	None	Each Individual Engine Operator from AGDC Display Panel & AGC RCV Interlock switch.

Figure 5-2. Degraded Retract Modes

5.6.3.11.1 Degraded Retract Mode 1

Degraded Arrestment Mode 1 shall be initiated if the Retract Control Indicator (RCI) is inoperative.

a. Steps to Initiate Degraded Retract Mode 1

1. The Air Officer shall direct the Arresting Gear Primary Flight Controller transfer retract control to Primary Flight Control (e.g., “TRANSFER RETRACT CONTROL TO PRIFLY”).
2. The Arresting Gear Primary Flight Controller shall:
 - a. Announce transfer of retract control over sound power phones (e.g., “RETRACT CONTROL TRANSFERING TO PRIFLY”).
 - b. Turn the ARC Half-panel retract selector switch to ARC Display (PriFly).
3. The Arresting Gear Primary Flight Controller shall select each online engine button on the Half Panel and verify that the “RETRACT” and “VENT” buttons appear on the PriFly Controller Flat Panel.
4. The Arresting Gear Primary Flight Controller shall report to the Air Officer that retract location is in PriFly.

b. Landing with the Advanced Recovery Control (ARC) System Installed and Operating in Degraded Retract Mode 1

During the landing, roll-out, and clearing of the arresting gear the following sequence of events shall take place:

1. The Arresting Gear Officer shall release the deck status light “pickle” switch as the aircraft touches down.



All personnel shall seek as much protection possible as the aircraft approaches and lands. Personnel in the catwalks and at the deck edge control station shall duck behind cable shields or below flight deck level.

Note

After the aircraft completes its arrestment and roll-out, it shall be permitted to roll back a few feet to permit the pendant to fall free of the hook.

2. The Hook Runner shall enter the landing area, as necessary, to ensure that the hook and aircraft are clear of the pendant prior to the aircraft being taxied forward and/or the pendant being retracted.
3. The Gear Puller (Director) shall position himself so as to be clearly visible to the pilot.



The Hook Runner and Gear Puller shall not enter the landing area until the aircraft has come to a complete stop.

4. The Hook Runner shall give the “WIRE CLEAR” signal to the Gear Puller by making a vertical motion with his arm (day) or RED standard wand pointed at the Gear Puller (night) when the aircraft and/or hook is clear of the pendant.
5. The Gear Puller will then give the pilot the signal to raise the hook, followed by the signal to hold brakes. After the aircraft has stopped and is clear of the cable, the Gear Puller will give the pilot the “off brakes” signal, and taxi the aircraft clear of the landing area.

6. In the event the pendant does not disengage from the hook, the following actions shall be taken:
- The Hook Runner shall give the "HOOK DOWN" signal to the Gear Puller, which the Gear Puller shall relay to the pilot. "Release brakes" signal to the pilot shall then follow.
 - As soon as the hook is observed down, the Hook Runner shall give the "PULL BACK" signal to the Gear Puller and Deckedge Operator. The Gear Puller shall relay this signal to the pilot.



Retraction during the tailhook "up" cycle may cause extensive damage to the aircraft tailhook mechanism. Ensure tailhooks are in the full-down position.

- The Deckedge Operator shall verbally direct the Arresting Gear PriFly Controller to retract the gear momentarily as follows, "PULL-BACK."



Due to Arresting Gear PriFly controller physical location, visibility of the forward landing area may be restricted. During this process, sound powered phones communication discipline shall be maintained. A "clear and concise" voice signal shall be given by the Deckedge Operator.

- The Arresting Gear PriFly Controller shall:
 - Press and maintain the retract-enable pushbutton of the ARC Half-panel for the trapped engine. This will cause the RETRACT button to appear on the PriFly Flat Panel.
 - Momentarily press the flat panel RETRACT button to open the retract valve causing the aircraft to slowly roll back and creating the necessary slack for hook disengagement.
- The Hook Runner will signal "HOOK-UP" to the Gear Puller who will relay the signal to the pilot followed by the signal to "HOLD BRAKES."
- After the aircraft has stopped its rollback, the Gear Puller will signal "OFF BRAKES," and then taxi aircraft clear of the landing area.



Attempting to use the arresting engine wire retract cycle to tow a recovered aircraft aft can cause cable slack or ram slap resulting in damage to arresting gear components. Additionally, the tail hook mechanism can be damaged if it is towed underneath any crossdeck pendant.

- The Hook Runner shall signal the Deckedge Operator to "RETRACT" only when the following have been completed:
 - Hook raised.
 - Entire aircraft is forward of the CDP.

Note

The Hook Runner shall ensure his signal to retract has been received by the Deckedge Operator prior to leaving the landing area.

8. The Deckedge Operator, upon receiving the “RETRACT” signal and ensuring there are no obstructions in the cable bite, shall verbally direct the Arresting Gear PriFly Controller to retract the gear as follows, “RETRACT Engine ____.” If the retract must be stopped, the Deckedge Operator shall call “STOP RETRACT”.

WARNING

The Arresting Gear PriFly Controller shall NOT retract until he has received a positive confirmation from the deckedge operator. He shall also be alert to immediately stop cable retraction if someone comes into the bite of the cable, the cable falls into the catapult track slots, or he hears “STOP RETRACT”. Retraction is stopped by removing ones finger from the “RETRACT” button.

CAUTION

The speed of retraction is not controlled in Degraded Retract Modes. If retraction is stopped at any time before completion, slack may build up in the system. Therefore, resume retraction only after engine and sheave damper operators have inspected cable slack. Slack can be removed by pressing the enable pushbutton on the ARC Half-panel for the trapped engine and a momentary presses of the RETRACT button on the Arresting Gear PriFly Controller Panel.

- a. The Arresting Gear PriFly Controller shall:
 - (1) Press and maintain the retract-enable pushbutton of the ARC Half-panel for the trapped engine. This will cause the RETRACT button to appear on the Arresting Gear Flat Panel.
 - (2) Press and maintain the flat panel RETRACT button to open the retract valve causing the engine to retract the CDP.
9. The Arresting Gear Officer, Topside Petty Officer, and Deckedge Operator shall observe the deck for FOD and broken wire supports during recovery operations.
10. The Arresting Gear Engine Operator of the engine having engagement shall:
 - a. Relay to PriFly, the information necessary for completing the recovery log.
 - b. Ensure temperature, pressure, fluid level, and engine battery positions are within normal operating limits.
 - c. Upon completion of engine retraction, ensure that no FAULTS are displayed.
 - d. Report “BATTERY” when the engine is fully retracted and anchor dampers are extended.
11. The Sheave Damper Operators shall inspect the sheave dampers having engagement in accordance with pre-recovery procedures.
12. The Primary Flight Arresting Gear Controller shall watch the aircraft touchdown point and assist in reporting off-center hits and engaging speeds to the Arresting Gear Officer via voice communication system when an engagement exceeds the limits listed in current recovery directives.

5.6.3.11.2 Degraded Retract Mode 2

Degraded Retract Mode 2 shall be initiated if the ARC Distribution Hub is inoperative. Degraded Arrestment Mode 2 shall be initiated if the RCI and Half Panel or Arresting Gear PriFly Operator Flat Panel are inoperative.

a. Steps to Initiate Degraded Retract Mode 2

1. The Air Officer shall:
 - a. Direct the Arresting Gear Primary Flight Controller transfer retract control to the individual engines (e.g., “TRANSFER RETRACT CONTROL TO ENGINES”).
 - b. Secure the Air Officer’s Display.
2. The Arresting Gear Primary Flight Controller shall:
 - a. Announce transfer of retract control (e.g., “RETRACT CONTROL TRANSFERRING TO ENGINES”).
 - b. Direct engine operators to take retract control (e.g., “ALL ENGINES TAKE RETRACT CONTROL”).
 - c. Direct Below-decks Petty Officer to secure the ARC Distribution Hub.
 - d. Direct the Deckedge Operator to secure the Deckedge Operator’s display.
 - e. Direct Engine Operators to confirm indicated retract control at Engine Display (e.g., “ALL ENGINES CONFIRM RETRACT CONTROL LOCATION INDICATES ENGINE”).
3. The Arresting Gear Engine Operators shall report retract control location as indicated on the Engine Display in sequence. If an engine is out of service, the report for that engine shall be omitted in the reporting sequence. Example: The report shall be “ENGINE ONE RETRACT CONTROL ENGINE, ... ENGINE TWO RETRACT CONTROL ENGINE,” etc.).
4. The Arresting Gear Primary Flight Controller shall report to the Air Officer that engines have retract control from Engine Display.

b. Landing with the Advanced Recovery Control (ARC) System Installed and Operating in Degraded Retract Mode 2

During the landing, roll-out, and clearing of the arresting gear the following sequence of events shall take place:

1. The Arresting Gear Officer shall release the deck status light “pickle” switch as the aircraft touches down.

WARNING

- All personnel shall seek as much protection possible as the aircraft approaches and lands. Personnel in the catwalks and at the deckedge control station shall duck behind cable shields or below flight deck level.
- The Hook Runner and Gear Puller shall not enter the landing area until the aircraft has come to a complete stop.

Note

After the aircraft completes its arrestment and roll-out, it shall be permitted to roll back a few feet to permit the pendant to fall free of the hook.

2. The Hook Runner shall enter the landing area, as necessary, to ensure that the hook and aircraft are clear of the pendant prior to the aircraft being taxied forward and/or the pendant being retracted.
3. The Gear Puller (Director) shall position himself so as to be clearly visible to the pilot.
4. The Hook Runner shall give the “WIRE CLEAR” signal to the Gear Puller by making a vertical motion with his arm (day) or RED standard wand pointed at the Gear Puller (night) when the aircraft and/or hook is clear of the pendant.

5. The Gear Puller will then give the pilot the signal to raise the hook, followed by the signal to hold brakes. After the aircraft has stopped and is clear of the cable, the Gear Puller will give the pilot the “off brakes” signal, and taxi the aircraft clear of the landing area.
6. In the event the pendant does not disengage from the hook, the following actions shall be taken:
 - a. The Hook Runner shall give the “HOOK DOWN” signal to the Gear Puller, which the Gear Puller shall relay to the pilot. “Release brakes” signal to the pilot shall then follow.
 - b. As soon as the hook is observed down, the Hook Runner shall give the “PULL BACK” signal to the Gear Puller and Deckedge Operator. The Gear Puller shall relay this signal to the pilot.



Retraction during the tailhook “up” cycle may cause extensive damage to the aircraft tailhook mechanism. Ensure tailhooks are in the full-down position.

- c. As much as possible, the Arresting Gear PriFly Controller shall position himself to maximize visibility of the landing area and act as a safety observer.
- d. The Deckedge Operator shall verbally direct the appropriate engine operator to retract the gear momentarily as follows, “ENGINE ___, PULL-BACK.”



Engine Operator will solely rely on voice communication signal during this process. Sound powered phones communication discipline shall be maintained. A “clear and concise” voice signal shall be given by the Deckedge Operator.

- e. The Engine Operator receiving the command shall:
 - (1) Shift the RCV Interlock switch on the Arresting Gear Control Box to “UNLOCK” position. This will cause the RETRACT button to appear on the Engine Display.
 - (2) Momentarily press the flat panel RETRACT button to open the retract valve causing the aircraft to slowly roll back and creating the necessary slack for hook disengagement.
- f. The Hook Runner will signal “HOOK-UP” to the Gear Puller who will relay the signal to the pilot followed by the signal to “HOLD BRAKES.”
- g. After the aircraft has stopped its rollback, the Gear Puller will signal “OFF BRAKES,” and then taxi aircraft clear of the landing area.



Attempting to use the arresting engine wire retract cycle to tow a recovered aircraft aft can cause cable slack or ram slap resulting in damage to arresting gear components. Additionally, the tail hook mechanism can be damaged if it is towed underneath any crossdeck pendant.

7. The Hook Runner shall signal the Deckedge Operator to “RETRACT” only when the following have been completed:
 - a. Hook raised.
 - b. Entire aircraft is forward of the CDP.

Note

The Hook Runner shall ensure his signal to retract has been received by the Deckedge Operator prior to leaving the landing area.

8. The Deckedge Operator, upon receiving the “RETRACT” signal and ensuring there are no obstructions in the cable bite, shall verbally direct the appropriate engine operator to retract the gear as follows, “ENGINE ____, RETRACT.” If the retract must be stopped, the Deckedge or PriFly Operator shall call “STOP RETRACT”.

WARNING

The engine operator shall NOT retract until he has received a positive confirmation from the deckedge operator. He shall also be alert to immediately stop cable retraction if someone comes into the bite of the cable or the cable falls into the catapult track slots.

CAUTION

The speed of retraction is not controlled in Degraded Retract Modes. If retraction is stopped at any time before completion, slack may build up in the system. Therefore, resume retraction only after engine and sheave damper operators have inspected cable slack. Slack can be removed by shifting the RCV Interlock switch to “UNLOCK” and a momentary press of the RETRACT button on the engine display.

9. The Arresting Gear Officer, Topside Petty Officer, and Deckedge Operator shall observe the deck for FOD and broken wire supports during recovery operations.
10. The Arresting Gear Engine Operator of the engine having engagement shall:
 - a. Relay to PriFly, the information necessary for completing the recovery log.
 - b. Ensure temperature, pressure, fluid level, and engine battery positions are within normal operating limits.
 - c. Upon completion of engine retraction, ensure that no FAULTS are displayed.
 - d. Report “BATTERY” when the engine is fully retracted and anchor dampers are extended.
11. The Sheave Damper Operators shall inspect the sheave dampers having engagement in accordance with pre-recovery procedures.
12. The Primary Flight Arresting Gear Controller shall watch the aircraft touchdown point and assist in reporting off-center hits and engaging speeds to the Arresting Gear Officer via voice communication system when an engagement exceeds the limits listed in current recovery directives.

CHAPTER 6

Helicopter Operations

6.1 GENERAL

Concurrent operations are defined as sequential in-the-cycle-launch and recovery of fixed wing and rotary wing aircraft, alternating in the same cycle.

6.1.1 Helicopter Launch Procedures

Helicopter start and spread sequence, rotor engagement and launch shall be in accordance with appropriate aircraft NATOPS procedures and shall only occur after the proper signal from a qualified LSE and under positive control of PriFly.

WARNING

- Because of the rotor wash and wing-tip vortices produced by CH-53E and MH-53E helicopters, land/launch operations shall not be conducted upwind of any unsecured area. Because of this severe hazard, consideration shall be given to conducting CH-53E and MH-53E operations from afterdeck spots only.
- Helicopters landing directly behind engaged tail rotor aircraft shall not conduct cross-cockpit landings for LSE safety.

Note

- To reduce UHF transmissions or during EMCON, rotary beacon signals for helicopter operations are found in Figure 3-1 of the Aircraft Signals NATOPS Manual (NAVAIR 00-80T-113).
- During EMCON, concurrent operations may lead to misinterpretation of the rotating beacon signals.

For all launches, the air officer shall ensure the relative wind is within the envelope prescribed in the applicable NATOPS flight manual. For night and IMC launches, the nose of the helicopter shall be oriented to the centerline of the angle or axial deck and within the visual parameters established in the respective aircraft NATOPS flight manual. Before launch, with the ship steady on launch course, PriFly shall order tiedowns removed. The LSE shall then signal for removal of the tiedowns, ensuring the pilot sees the signal.

WARNING

Tiedowns shall not be removed from a helicopter until the pilot has signified he is ready to launch, and the LSE has received permission from PriFly.

Note

Minimum wind over deck requirements change with outside air temperature. Check applicable NATOPS flight manual.

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The plane captains or plane handlers after removing tiedowns and chocks shall hold the tiedowns up for the pilot and LSE to see and then clear the area. As tiedowns are being removed, PriFly shall broadcast the relative wind direction and velocity and then activate the appropriate signals (see Figure 3-1 of Aircraft Signals NATOPS Manual [NAVAIR 00-80T-113]). Before launching a helicopter, the LSE shall ensure the following:

1. All tiedowns have been removed.
2. The area affected by the helicopter downwash is clear of unnecessary personnel and the area over which the helicopter will pass is clear.
3. Airborne aircraft are well clear. The pilot shall not commence takeoff until he has received the launch signal from the LSE and has turned on anticollision light(s).
4. Confirm launching signal/approval from PriFly.
5. Required hover tests following maintenance may require extra clearance area for maneuvering.

The departing helicopter, if SAR capable, shall report red light to the controlling agency (e.g., tower, departure, ASAC) upon launch (EMCON permitting). When there is a significant change in the red light or red light is reached, a radio call to the controlling agency shall be made.

Unless otherwise directed, helicopters shall take departure to port and shall not cross the bow within 5 miles or the stern within 3 miles without specific clearance from the tower.

6.1.2 Helicopter Safety Precautions

The following safety precautions applicable to helicopter operations shall be observed.

1. Personnel shall not be permitted to approach or depart a helicopter while its rotors are being engaged or disengaged.
2. Personnel required to be in the area of helicopters engaging or disengaging rotors shall either stand next to the fuselage or well outside the rotor area.
3. Helicopters shall not be taxied on the flight deck.
4. Helicopters shall not be towed or pushed with rotors engaged.
5. Launch/recovery of helicopters while the ship is in a turn shall be attempted only when authorized by the carrier commanding officer or his designated representative. Anticipated wind parameters and ship's heel shall be communicated to the helicopter aircraft commander prior to execution.
6. A helicopter shall never be flown over another aircraft on launch.
7. Only spots that afford visual reference to the deck shall be used for night helicopter launches.
8. Helicopter rotors should not be engaged/disengaged while the ship is in a turn. Engagement/disengagement attempts while in a turn shall be approved by the carrier commanding officer or his designated representative. Anticipated wind parameters and ship's heel shall be communicated to the helicopter aircraft commander prior to execution.
9. Helicopter shall not be landed or launched where their engine performances or stability could be affected by turning jet engines.
10. The area in front of helicopters with forward firing ordnance shall be clear of personnel and equipment. Helicopters with forward firing ordnance shall not launch/recover on spot 7.
11. Helicopter Operations on spot 8 shall not be conducted when fixed wing aircraft operations are being conducted on catapults 3 and 4.
12. Hot refueling operations shall not be conducted on spot 8.

13. Helicopters with hung ordnance shall not recover on spot 8.
14. Helicopter landings/takeoffs to Spot 8 shall not be conducted when fixed wing aircraft recoveries are being conducted.
15. The LSO platform shall be lowered and clear of personnel for helo takeoffs and landings on Spot 8.
16. Safety boundaries around spot 7 and 8 shall be clear of unnecessary personnel and equipment when helicopter operations are being conducted.

WARNING

Spot 7 and 8 presents a safety hazard due to their location on a movable platform. The Aircraft Handling Officer or his representative shall ensure that the aircraft elevator has been secured in accordance with EOSS short term secure procedures, stanchions lowered and locks are properly engaged to prevent inadvertent dropping of the aircraft elevator platform.

CAUTION

Prior to conducting helicopter spot 7 and 8 operations, the forward and aft areas shall be inspected to ensure equipment is properly secured and clear of unnecessary personnel.

Due to the helicopter's close proximity to the deck edge and rotor arc extra consideration shall be given to mitigate hazard associated with egress and firefighting.

WARNING

In crosswind conditions relative to the axial deck, the indicated winds often vary from those winds actually experienced at flight deck level. Jet exhaust/prop turbulence can adversely affect flight deck level winds. These variances can affect velocity, turbulence, and direction of actual winds that are critical to safe launch of aircraft and shall receive consideration prior to granting takeoff clearances.

6.1.3 Rescue Helicopter Launching Criteria

It is impossible to set specific criteria for launching helicopters under all emergency rescue conditions. Each situation is different, and all factors shall be considered to determine if the risk involved is warranted at the time. To provide guidelines, the following list of factors shall be considered.

1. Present weather — Temperature, wind, sea state, etc.
2. Urgency of emergency — Definite, suspected, live, dead, etc.
3. Other rescue vehicles in area — Helicopters, ships, etc.
4. Maneuvers of carrier — Turning, pitching, downwind, etc.
5. Location of helicopter — Bow, stern, elevator, etc.

6. Location of victim(s) in relation to ship.
7. Status of flight deck — Launching, recovering, standby, etc.
8. On night launch, the pilot needs a visual reference and the relative wind on the nose of aircraft.
9. Night adaptation of pilot and crew, if applicable.
10. Warm-up of electronic gear.
11. Capabilities of individual pilot.

This list is not to be considered all-inclusive nor preclude the possibility of other present, variable factors that may affect the advisability of launching under adverse conditions.

6.2 RESCUE HELICOPTER INFORMATION

The following information shall be passed to rescue helicopters by PriFly or other controlling agency as soon as available:

1. Type of mishap (e.g., man overboard, ejection, etc.).
2. Magnetic bearing and distance to emergency area.
3. Surface wind direction and velocity.
4. Ejection altitude if applicable.
5. Number of persons requiring rescue and condition, if known; readback is required.
6. Radio frequency for radar vectors if required; radio frequency and call sign of pathfinder aircraft if utilized; and radio frequency and call sign of the SAR on-scene commander, if applicable.
7. Additional information as necessary. (Use of the SAR frequency shall be limited exclusively to passing information necessary to the rescue helicopter pilot.)

WARNING

Rescue swimmers shall not enter the water during night/IMC simulated rescue operations in an open ocean environment.

6.3 LAUNCHING CONDITION AIRCRAFT

6.3.1 Condition I

The aircraft shall be spotted for immediate launch. It shall be headed into the relative wind, with rotor blades spread, starting equipment plugged in, and a LSE, starting crewman, plane captain, and required plane handlers standing by. Unless otherwise directed by the aircraft handling officer, at least four tiedowns shall be attached to the aircraft. The flightcrew shall be ready for launch in all respects, with all personnel equipment attached and adjusted as in flight. When the air officer passes the word to stand by to launch the Condition I helicopter(s), engines shall be started without further instructions; however, rotor engagement and launch shall be positively controlled by PriFly.

6.3.2 Condition II

The same conditions apply as for Condition I, except that flightcrews shall stand by in the ready rooms.

6.3.3 Condition III

Main rotor blades may be folded, and the aircraft need not be in position for immediate launch; however, it shall be parked so as to allow direct access to a suitable launch spot. A towbar shall be attached to the aircraft and a specific

LSE, tractor driver, handling crew, and starting crewman shall be designated and assigned to each helicopter. These personnel shall be thoroughly briefed so that when the order is given to prepare to launch, the aircraft can be safely and expeditiously moved into position and readied for launch. Flightcrews shall be briefed for the launch and be standing by in a designated location.

6.3.4 Condition IV

This is similar to Condition III except that minor maintenance may be performed on the aircraft if no delay in launch is involved.

6.4 RECOVERING HELICOPTERS

6.4.1 Recovery Procedures

Normally, helicopters will be recovered after all fixed-wing aircraft. Helicopters recovering after night plane guard duties shall be provided positioning information by CATCC in order to expeditiously intercept the glideslope and effect a landing following recovery of the last fixed-wing aircraft. When a flight of helicopters is being recovered under VMC, the leader of the flight shall plan to be at the ramp within a minimum safe interval after the last fixed-wing aircraft has landed. The helicopter that is the farthest advanced on the inbound radial and has not turned to parallel the ship's course shall be considered No. 1 in the landing pattern and shall expeditiously effect a landing following recovery of the last fixed-wing aircraft. The helicopter cleared No. 1 to land shall be assigned a landing spot farthest forward into the wind. Subsequent helicopters shall be cleared to land in sequence behind the No. 1 helicopter. In the event the last fixed-wing aircraft waves off, all helicopters shall return to the Delta pattern. Prior to issuing landing clearance, the air officer shall ensure the helicopter may land within the relative wind envelope prescribed in the respective aircraft NATOPS flight manual, and the tower shall transmit relative wind direction, speed, and landing spot(s). For landings not oriented to the angle or axial centerline (day VMC only), the air officer shall ensure an adequate waveoff path is available to the helicopter.

WARNING

Because of the rotor wash and wing-tip vortices produced by CH-53E and MH-53E helicopters, land/launch operations shall not be conducted upwind of any unsecured area. Because of this severe hazard, consideration shall be given to conducting CH-53E and MH-53E operations from afterdeck spots only.

Note

Rotating beacon light signals for helicopter operations are located in Figure 3-1 of the Aircraft Signals NATOPS Manual (NAVAIR 00-80T-113).

On IMC recoveries, the approach shall be flown as directed by CATCC until the pilot acquires visual contact with the optical landing aids, at which time the pilot shall "call the ball." Control shall then be assumed by the air officer, who shall issue final landing clearance. In the event of a waveoff, the pilot shall parallel the final bearing course and report to CATCC for control. At night, navigation lights shall be steady, bright and anticollision lights on until established on the final bearing, at which time the position lights shall be placed on dim and steady. The forward anticollision light shall be turned off when the meatball is in sight.

When the word is passed to stand by to land helicopters, the LSE shall take a position clearly visible to the pilot. The tower shall obtain a "gear down" report from the pilot before issuing final landing clearance. As the helicopter approaches, the LSE shall ensure that the landing gear is down, the rotating beacon that controls his area of the flight deck is green or amber, as appropriate, and that the landing area is clear of personnel, equipment, and loose gear.

Except in unusual circumstances, helicopters shall be landed only on marked spots visible to the pilot during the final approach.

Except for the “waveoff” and “hold” signals, the LSE signals should be accepted as advisory, and the pilot has full responsibility for the proper and safe operation of the aircraft. At night when two or more helicopters are landing, the navigation light shall remain STEADY/DIM and the tail anticollision light shall remain ON until touchdown. After landing and before disengagement, chocks shall be placed on the main wheels and the initial aircraft tiedowns shall be attached by the deck crew. A hold signal shall be given by the LSE while tiedowns are being attached to indicate that an unsafe takeoff condition exists. Navigation lights shall be switched to FLASHING DIM (day: FLASHING BRIGHT) until the rotors have been disengaged and are fully stopped. The LSE shall then signal for the aircraft lights to be turned OFF. When helicopters are recovered immediately ahead of fixed-wing aircraft, pilots shall shut down and disengage as expeditiously as feasible. They shall remain in their aircraft until towed clear of the fixed-wing landing area. An amber or red light shall be ON whenever rotors are engaged on deck.

6.4.2 Special Safety Precautions

WARNING

- Inverted “T” helicopter spots 2 through 6 do not provide adequate clearance for all combinations of helicopters. If any spot 1 through 6 is occupied by an H-46, H-47, or H-53, the spots immediately forward and aft shall remain vacant.
- Helicopters landing directly behind engaged tail rotor aircraft shall not conduct cross-cockpit landings for LSE safety.

The following precautions shall be observed when recovering helicopters.

1. Except in case of emergency, pilots shall not stop engines or fold rotor blades without proper clearance from the LSE.
2. Helicopters shall not be recovered while the ship is in a turn.
3. Personnel required to be in the area of helicopters disengaging rotors shall stand next to the fuselage or well outside the rotor arc.
4. A helicopter shall not be flown over another aircraft when landing.
5. Helicopters shall never be towed or pushed while rotors are engaged.
6. The waveoff and hold signals are mandatory and shall be executed immediately.
7. Night and IMC helicopter recoveries shall be conducted to the angled deck, from astern, utilizing the OLS, with the wind oriented to the centerline of the angle deck, and within the parameters set forth in the respective aircraft NATOPS flight manual. During night VMC recoveries on CVs equipped with operating white floodlights and when the after portion of the flight deck is not clear, helicopters may make an approach using the OLS and centerline of the angle deck. Upon approaching the fantail and when the deck and LSE have been visually acquired, the helicopter shall then slide over, fly up the port side to the landing spot, and slide into a landing.
8. Helicopters shall not cross within 5 miles of a ship’s bow and within 3 miles of a ship’s stern without specific approval of the air officer. A vertical replenishment helicopter may request and be granted continuous use of an established flightpath.
9. The air officer or his representative shall pass over the 5 MC, “STAND WELL CLEAR OF HELO NUMBER __ WHILE ENGAGING/DISENGAGING ROTORS.”

6.4.3 Special Procedures for Carrier Qualification Landing

When feasible, two landing spots shall be utilized for CARQUAL landings. The pattern shall be a left-hand racetrack on the port side of the ship. Pattern spacing shall be adjusted to permit one aircraft to be launched prior to another being landed. When the pilot acquires the meatball, he shall report his side number, “BALL,” and “GEAR DOWN.”

Night CARQUALS shall be under CCA control. Advisory control may be specified by the ship's commanding officer when weather permits.

The pilot in the right seat shall be in control of the aircraft unless the tower is informed to the contrary. When changing pilots, the aircraft shall be chocked and have initial tiedowns attached.

6.5 EMERGENCY LANDING

As much deck space as possible shall be made available for emergency helicopter landings. If time permits, the senior helicopter squadron or unit officer on board shall take station in the tower or in CATCC, and the air officer shall determine the optimum relative wind and request the bridge to maneuver the ship as necessary. In clearing a helicopter for an emergency landing, PriFly will ordinarily designate an area of the flight deck rather than a specific landing spot. Once the aircraft is on final approach, it is imperative that the ship hold a steady course.

During an emergency landing, the LSE, if immediately available, shall stand at the upwind edge of the designated landing area. His signals are advisory in nature, except for the waveoff and hold signals, which are mandatory. He shall give a waveoff only in case of a foul deck or if instructed by the tower to do so.

6.6 NIGHT VISION GOGGLE OPERATIONS

The use of NVGs affords pilots, aircrews, and flight deck crews improved night visual acuity. Operating with NVGs provides for increased operational capabilities over unaided, night shipboard flight operations. However, inherent NVG limitations (field of view, depth perception, and environmental interference) require comprehensive training awareness, and strict compliance with established procedures to ensure safe and effective NVG shipboard flight operations. [Appendix D](#) of this manual contains the NVG Training Syllabus for ship's personnel; NAVEDTRA 43436-series (NVG Training Syllabus For Shipboard Personnel PQS For LSE and NVG) contains Personal Qualification Standards for completing LSE and NVG PQS.

Prior to conducting initial NVG operations, ships and aviation units shall conduct a face-to-face brief consisting of the following:

1. Aviation unit SOP.
2. Ship's SOP.
3. Ship and aircraft lighting configuration.
4. Emergency procedures (including NVG failure procedures).
5. Type and number of aircraft involved.
6. Number of pilots requiring initial training/currency.
7. Radio frequencies/call signs.
8. Inclement weather procedures.
9. Non-NVG equipped aircraft operating areas.

Briefings shall be repeated after 90 days of non-NVG operations between a ship and squadron.

The recommended distribution of NVGs during flight operations is listed below:

1. Bridge: one set.
2. Primary Flight Control: two sets.
3. Flight Deck CPO/LPO/Fly PO's: one set each.
4. Flight Deck Officer: one set.

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5. Crash and Salvage Officer, Crash CPO, or Crash LPO: one set.
6. LSEs: one set per spot.

NVGs used on the flight deck shall allow free hand/arm movement by the LSE.

Maintaining flight deck safety is a major concern when using NVGs for shipboard operations.

WARNING

Eye protection shall be worn in conjunction with NVGs.

Ship's lighting and light discipline are critical to NVG performance and safe conduct of NVG flight operations. Lighting configurations and intensities will vary with ambient conditions and aircrew/flight deck personnel proficiency and preference. All unnecessary lighting, external or visible from the landing pattern, shall be secured during NVG operations. Hangar doors shall be closed while conducting NVG operations.

Note

Ships shall make 1MC announcements every 30 minutes during NVG operations to remind personnel of required light discipline.

NAVAIR-approved, NVG-compatible blue flight deck lighting allows for a minimum amount of interference to NVGs, yet ensures adequate lighting on the flight deck for the flight deck crew. When lack of blue lighting exists, ship's lighting shall be used at the minimum safe intensity. Ships modified with approved NAVAIR NVG-compatible blue flight deck lighting are not required to change overhead flood lights settings to launch/recover unaided aircraft. However, deck lighting levels shall be adjusted to provide the unaided aircraft with sufficient lighting for safe launch/recovery references.

Lighting profiles will vary with ambient conditions and aircrew/flight deck personnel proficiency/preference.

WARNING

For flight deck personnel using generation II/III NVGs (AN/PVS6), NVG-compatible lighting may not provide adequate lighting for movement of aircraft and equipment under some ambient lighting conditions.

The following shipboard operations may require additional deck lighting to augment NVG-compatible blue lights, if installed, under some ambient light conditions:

1. Chocking and chaining of aircraft.
2. Fueling operations.
3. Ordnance operations (arming/de-arming or loading/downloading).
4. Troop movement.
5. Aircrew changes (hotseats).
6. Aircraft movement.
7. Vehicle movement.
8. Equipment movement.

These operations are prohibited on “blacked out” flight decks.

Standard LSE signaling wands will cause significant NVG washout and effectively blind the aircrews. LSE wands shall be modified with approved NVG-compatible blue filters available through the Navy stock system. If not available, wands with regular blue filters installed, covered with black tape with 1/8-inch of tip exposed can be used as an alternative.

To prevent possible NVG interference from support equipment vehicles, all tow tractor, MFFV, and forklift lights shall remain off during NVG operations. To further maintain NVG integrity, vehicle brake lights shall be covered during NVG operations.

Bridge, Primary Flight Control, and Flight Deck Control — All unnecessary lighting shall be secured. Indicator lights shall be taped over or secured to eliminate glare. If lighting is required inside these spaces, compatible blue filtered flashlights or very dim internal lighting on critical instruments shall be used.



Red lights in the vicinity of missile launchers, SRBOC launchers, and CIWS mounts may cause interference during NVG operations.

If the ship is required to conduct the recovery of an unaided aircraft during NVG operations, the pattern NVG aircraft shall be held on deck or placed in a pattern as directed by the Air Boss. The flight deck lighting shall be raised to normal intensity and the unaided aircraft recovered. Mixed helicopter types in a NVG landing pattern are authorized.



No landing shall be made forward of an adjacent occupied spot. NVG's inherent depth perception and LSE tendencies preclude this operation.

During NVG cargo operations, the USN MK 105 pendant shall be used, if possible, to minimize hover altitude. The MK 92 pendant is authorized for NVG use. Chemical lights shall be used to mark hookup points (pendant and load). They shall be securely attached to minimize FOD potential. Flight Deck lighting shall be at the maximum intensity practicable given the NVG compatibility and aircrew/flight deck crew comfort level/proficiency.

NVG Helicopter Rope Suspension Training (HRST) operations are authorized given the same lighting concerns as cargo operations. The intended point of landing for personnel exiting the aircraft shall be clearly visible.

Ordnance operations are authorized after the completion of stage two training. Ordnance operations shall be conducted in accordance with published shipboard procedures. The flight deck shall be illuminated sufficiently to conduct loading/downloading and arming/de-arming without NVGs.

Emergencies during NVG operations — Aircraft emergencies shall be handled in accordance with the applicable aircraft NATOPS manual. Ship/flight deck emergencies shall be handled in accordance with the ship's SOP and as briefed with aircrews.

CHAPTER 7**Aircraft Handling****7.1 GENERAL**

Aircraft handling is a general term that describes any movement of aircraft or associated handling/support equipment aboard an aircraft carrier. All aircraft handling on the flight or hangar deck shall be controlled and authorized by the ACHO or designated representative.

7.2 RESPONSIBILITIES**7.2.1 Aircraft Handling Officer**

The Aircraft Handling Officer shall perform the following:

1. Plan and coordinate aircraft moves to ensure accomplishment of flight operations as scheduled in the air plan, and to facilitate aircraft maintenance requirements.
2. Work closely with the Air Wing maintenance representative and assign aircraft side number to each event specified on the air plan. If there is a change of aircraft side number, notify PriFly.
3. Brief all key flight and hangar deck personnel on the following:
 - a. Start and launching sequence.
 - b. Disposition of downed and spare aircraft.
 - c. Aircraft to be towed or taxied forward after the launch.
 - d. Recovery spot (when a recovery is scheduled to follow a launch).
 - e. Emergency pull-forward.
 - f. Flight deck safety.
 - g. Any special evolutions or requirements.
4. Incorporate a Liquid FOD Instruction with the embarked AIRWING.

7.2.2 Flight Deck Officer, Assistant Flight Deck Officer, or Flight Deck Chief

The Flight Deck Officer, Assistant Flight Deck Officer, or Flight Deck Chief shall inspect the flight deck prior to each evolution to ensure the following:

1. Propellers, tailpipes, and helicopter rotors have sufficient clearance.
2. Each aircraft can be safely taxied from its spot.
3. Deckedge antennas are properly positioned and the jackstaff, flagstaff, and bow/angle/stern rails have been removed and stowed.
4. All aircraft handling support equipment, when not in use, shall be properly secured with chocks and tiedowns.
5. No gear is adrift on the flight deck/catwalks, and all padeyes and scuppers are thoroughly cleaned.

6. Hydraulic/oil/fuels spills are thoroughly scrubbed, cleaned, and vacuumed.
7. All aircraft are clear of the “safe park launch lines” on the waist and bow catapults.

7.2.3 Hangar Deck Officer and Hangar Deck Chief

The Hangar Deck Officer and Hangar Deck Chief shall inspect the hangar bays on a daily basis to ensure the following:

1. No gear is adrift on the hangar bays/aircraft elevator wells, and all padeyes are thoroughly cleaned and vacuumed.
2. Hydraulic/oil/fuels spills are thoroughly scrubbed, cleaned, and vacuumed.
3. All aircraft handling support equipment, when not in use, shall be properly secured with chocks and tiedowns.

7.2.4 Aviation Fuels Maintenance Officer

The Aviation Fuels Maintenance Officer or designated representative shall ensure that all aircraft have been fueled according to the air plan.

7.3 FLIGHT DECK SAFETY

7.3.1 General

The entire flight deck is an extremely dangerous area during flight operations. High wind; high noise level; and the hazards of fire, whirling propellers, and jet blasts make it imperative that all personnel take all possible precautions to enhance safety.



WARNING

RESTRICTED AREA. The flight deck is a restricted area during flight operations. Personnel shall not be on the flight deck, in the gallery walkways or on ladders leading to the flight deck unless directly involved in flight deck operations. All personnel assigned a flight deck billet shall be qualified in accordance with NAVEDTRA 43426-0 series.

7.3.2 General Precautions

1. Pilots and crews returning from flights shall remain in full flight gear with visors down and clear the flight deck immediately. Flight crews shall not congregate on the deck to watch further operations.
2. All personnel shall exercise the utmost diligence in keeping clear of propellers, jet intakes and tailpipes, and helicopter rotor blades and tail rotors.



WARNING

- The hazards associated with flight deck operations can be intensified by lack of rest. Supervisors shall continually monitor personnel for signs of fatigue during all phases of flight deck operations.
- The powder that forms in jet tailpipes (resembles sulfur) is harmful. Any person coming into contact with this powder shall wash it off immediately.

3. Keep clear of the barricade and adjacent danger area during landings. Keep clear of arresting gear wires. Never step in the bight of a cable.
4. All personnel on the flight deck shall wear complete flight deck uniforms during flight operations. A complete flight deck uniform shall consist of TYCOM approved flight deck trousers, flight deck jersey, flotation device, steel-toe boots, leather gloves, helmet with goggles and jersey corresponding in color to that of their respective detail and with their billet title on the jersey and flotation vest.
5. Between the hours of sunset to sunrise, a MK1 life vest shall be required on the flight deck and catwalks.
6. Plane Handlers shall use extreme caution in reaching their stations when engines are turning. They shall approach planes from the sides, and while alongside the wheels, shall crouch on the deck in such a manner as to maintain secure footing against sudden blasts.
7. All personnel shall keep loose gear to a minimum on the flight deck and hangar deck.
8. Flight deck personnel shall not carry rags, papers, magazines, key chains, or other loose gear in their pockets or about their person while on the flight deck.
9. No smoking or chewing tobacco shall be permitted at any time on the flight deck, hangar deck, or catwalks.
10. Extra caution shall be exercised when training new and inexperienced personnel to work on the flight deck. Newly assigned, inexperienced flight deck personnel shall observe a minimum of 3 days and 3 nights of flight deck operations from a location other than the flight deck prior to participating in any on-deck watch station. A person experienced in flight deck operations and safety shall be personally assigned to each new arrival to escort and monitor him while on the flight deck. A minimum of 3 days and 3 nights of flight deck operations escorted shall be completed prior to working the flight deck unescorted.
11. All personnel working on top of aircraft shall wear cranials with chinstraps secure.
12. All personnel who work on the flight and hangar decks shall be annually screened for flight deck physicals by the medical department. The Medical Officer shall implement an effective system for monitoring and reporting the physical qualification status of flight/hangar deck and Air Wing personnel. Any personnel failing eye acuity tests shall not be assigned to work at a critical flight deck billet or hangar deck billet.

7.4 AIRCRAFT HANDLING MOVEMENT AND SAFETY PRECAUTIONS

7.4.1 General

All personnel responsible for moving aircraft shall exercise the utmost care to avoid aircraft handling mishaps. Personnel assisting in the movement of aircraft shall be alert to advise the responsible aircraft director of a situation that may cause a handling mishap. The OOD shall ensure all ship turns are passed to Flight Deck Control and the ship's horn is sounded with sufficient lead time.

WARNING

Failure to provide sufficient lead time may result in uncontrolled aircraft movement resulting in personnel injuries.

7.4.2 Replenishment At Sea (UNREP) Aircraft Spotting

Prior to UNREP, aircraft that are parked from the "high point" (aft of Navigation Pole) to aft of aircraft elevator No. 3 shall be spotted a minimum of tail over deck plus 10 feet (TOD plus 10 feet). Aircraft aft of elevator No. 3 shall be TOD. The TOD plus 10 feet aircraft spotting shall be accomplished 1 hour prior to UNREP.

When operational commitments dictate that a high state of readiness be maintained during UNREP, the Commanding Officer may grant a waiver in the case of the TOD plus 10 feet requirement to a minimum of TOD.

7.4.3 Aircraft Movement

In preparing to move an aircraft, the Director shall ensure that he has the proper number of personnel to make the move, to include:

- Director.
- Tractor Driver.
- Plane Captain.
- Two Plane Handlers (Chock Walkers).
- Two Wing Safeties (when required).
- Tail Safety (when required).

Note

When an aircraft is being taxied or towed anywhere on the flight deck in close proximity (within 5 feet) to any obstruction, Wing Safeties and Tail Safety shall be used.

1. A qualified plane captain/brake rider shall man the cockpit and shall check the aircraft braking system to ensure adequate pressure for safe movement. The aircraft director shall also visually verify aircraft brake pressure, and that the cockpit is open when applicable, so that the plane captain can hear all audible signals.
2. Plane captains and plane handlers are jointly responsible for removing tiedowns upon signal from the director. Removal of chocks is a plane handler's responsibility. Before having the chocks and tiedowns removed, the director shall call for "brakes" and receive visual or verbal confirmation from the person in the cockpit that the brakes are being held.

Note

Movement of no-brake aircraft shall be approved by the ACHO. When an aircraft with inoperative brakes must be respotted, the cockpit shall be unmanned, plane handlers in position to chock the main wheels instantly if ordered, and additional safeties posted on the outboard sides with tiedown chain attached to the aircraft outboard tiedown point with hook point in hand to secure the aircraft instantly as directed.

3. All personnel involved in aircraft movement shall be properly positioned.
4. All chocks, tiedowns, power cables, and other servicing/securing devices shall be removed prior to moving the aircraft. With the exception of no brake aircraft, tiedowns shall not be hanging from the aircraft.
5. If weapons loading/downloading is in progress, verify with the ordnance crew leader that the aircraft is safe to move.
6. Directors and aircraft handling teams shall be equipped with whistles, which they shall hold in their mouths during aircraft movement. The whistles and hand signals shall be used to signal for brakes and chocks.
7. The controlling director shall maintain visual contact with the brake rider at all times. When this is not possible a second director shall be positioned to relay signals.
8. During periods of high winds, heavy seas or when the deck is unsteady, plane handlers shall closely tend each main wheel. Brake riders shall apply partial brakes as necessary to prevent excess speed from building up. Caution shall be exercised to ensure brake pressure remains built up during the move. When these conditions prevail, aircraft shall be moved by hand only in cases of extreme urgency.

Note

The above shall not be construed to require any individual to place their personal safety in jeopardy. This is particularly applicable at night or during periods of heavy weather.

9. Tractor drivers shall not move an aircraft except under the positive control of a director. If a director's signal is not completely understood, the driver shall stop and await further instructions.
10. Sudden stops by tractors towing aircraft shall be avoided except in an emergency.
11. Personnel shall not ride on tractors except in the driver's seat.
12. Movement shall be slow enough to permit a safe stop to be made within the space available and in no case faster than the plane handlers can walk.
13. An aircraft's tailwheel shall be unlocked only on a signal from the director.
14. When an aircraft towbar has to be repositioned to permit a better path of movement prior to an aircraft reaching its interim or final spot, the aircraft shall be chocked and initial tiedowns installed prior to disconnecting the towbar.
15. As an aircraft nears its parking spot, it shall be slowed to a speed that will permit an immediate stop. Directors and safety observers are responsible for maintaining safe clearance for the tractor when maneuvering in close quarters.
16. Prior to backing aircraft to deckedge spots, plane handlers shall be positioned to enable them to chock the main wheels instantly.

WARNING

Proper position to walk chocks is abreast the main wheel with adjustable block toward the aft end of the aircraft. At no time shall the chock walker place himself in the direction of the aircraft wheel's travel, either forward or aft of the mainmount. Plane handlers shall walk chocks on the outboard side of the mainmounts. Plane handlers shall not carry tiedown chains while walking chocks.

17. When the signal for brakes is given, the pilot/brake rider in the cockpit shall immediately apply full brakes. Care shall be exercised to apply brakes simultaneously, particularly when the aircraft is being moved by hand. The brake signal is a sharp blast on the whistle, accompanied by the standard visual signal.
18. The main wheels shall be chocked as soon as the aircraft stops, and the director shall remain with the aircraft until the handling crew has completed the initial tiedowns.

CAUTION

Chocks and initial tiedowns shall be installed prior to disconnecting or repositioning the towbar.

19. Reverse tow of properly configured aircraft is authorized when using locally established procedures.

CAUTION

Splitting or fouling the aircraft elevator, JBD, or the barricade stanchions with aircraft or support equipment shall be approved by the ACHO or his designated representative in flight deck control. When an aircraft is parked "on top" of the elevator or adjacent to the elevator, installation of tiedowns shall not split the elevator.

7.4.4 Handling Precautions (Launch)

During launch sequence, unnecessary personnel shall not be on the flight deck or in the catwalks.

7.4.4.1 Aircraft Handling Signals

Standard taxi signals are delineated in the Aircraft Signal NATOPS NAVAIR 00-80T-113. These signals shall be given in a positive, clear, and precise manner.

7.4.4.2 Engine Start

1. Engines shall be started only on signal and under the positive control of PriFly. Prior to the starting evolution, the Plane Captain shall remove the towbar. The Plane Captain shall assist the pilot as necessary with preflight checks.
2. The plane directors shall monitor the aircraft start sequence throughout the warmup and checkout period. Control is assumed by the plane captain for preflight checks only. The plane captain shall not cause any tiedown chains to be removed or wings to spread without specific clearance from a flight deck director.

WARNING

Prior to engine start, ensure all nonessential gear has been removed from the flight deck, and essential aircraft and flight deck equipment are properly secured. Unsecured equipment present a FOD and missile hazard to aircraft and personnel.

Note

The mechanical latching of weapons on aircraft racks/launchers shall be completed before the engine(s) on the aircraft is/are started for launch.

3. All personnel shall follow the prescribed procedures when operating aircraft and aircraft starting units. All unsafe starting conditions shall immediately be called to the attention of supervisory personnel. Supervisors shall ensure that all starting units are positioned correctly, and that exhaust is not directed on aircraft, ordnance, weapons equipment, GSE equipment, or personnel.

WARNING

Hot exhaust from aircraft starting units is a serious hazard when operating in close proximity to other aircraft, aircraft components, fuels, weapons, equipment, and personnel.

CAUTION

Loss of mission capabilities may result when sustained direct/reflective exhaust is placed on the ship's Belknap Pole or the equipment attached.

4. Aircraft engine power shall not be advanced past 10 percent rpm above idle for turbojet engines without specific clearance from a flight deck director. The pilot shall request clearance to turn up by giving his plane captain/coordinator the "one-finger turn up" signal. The coordinator shall make the request to the airwing coordinator stationed in flight deck control, who will request permission from the ACHO. The ACHO shall

direct a director to check chocks and tiedowns and ensure that the area behind the aircraft is clear and report back to the ACHO. Upon a director reporting the aircraft has been cleared the ACHO shall notify the flight deck crew via 5MC of aircraft coming up on power.

WARNING

Clearance for turnup shall not be given by anyone other than a flight deck director.

5. While an engine is turning up at high power, the plane captain/coordinator shall continuously check the area behind the aircraft. The pilot shall frequently look at the plane captain/coordinator to ensure that the "all clear" signal is still being given. After completing all post-start checks, the pilot shall signal the plane captain/coordinator, indicating the status of the aircraft. The plane captain/coordinator shall relay the signal to the flight deck director that the aircraft is ready to proceed to the catapult.

7.4.4.3 Taxi for Launch

1. Before ordering removal of chocks and tiedowns, the director shall signal for the pilot to hold brakes, and the pilot shall acknowledge this signal by an affirmative nod of the head in the daytime, and by a flashlight at night. The flight deck supervisor shall control the rate at which aircraft are moved toward the catapult(s) or deck launch spot, ensuring a steady flow of traffic while avoiding unnecessary crowding. All taxi signals shall be answered promptly and accurately unless the pilot considers there is a dangerous situation existing or developing, in which case he shall stop.

WARNING

- Serious injury or death may occur if E-2/C-2 aircraft are improperly approached while propellers are turning. Approach and exit shall be made at 90° to the mainmount and aft of propellers.
 - A director shall not leave an aircraft unattended after chocks and tiedowns have been removed. All movement of aircraft shall be under the positive control of a plane director.
2. If a pilot loses sight of his director, he shall stop immediately. The director shall stay in view of the pilot at all times and strive to remain stationary while controlling aircraft. If it is necessary to change his position while controlling an aircraft, the director shall signal the pilot to hold brakes while moving expeditiously to the new position, then resume movement of the aircraft.
 3. Control of a taxiing aircraft shall not be passed from one director to another until the receiving director signals, by extending one arm vertically that he is ready to accept control. A director shall not give signals to a pilot who is already under the control of another director except to avert an accident.

CAUTION

- The controlling plane director shall ensure that aircraft with wings folded or canopy open are not spotted, towed or taxied immediately behind a jet blast deflector when another aircraft is at high power setting on the catapult.
- Launching fixed wing aircraft from catapult No. 1 with a helicopter in the vicinity of aircraft elevator #1 exposes the helicopter to a high level of turbulence which may cause significant damage to the helicopter.

7.4.4.4 Catapult Spotting

1. The director, in positioning the aircraft for launch, shall ensure that the nosewheel is aligned, wings are spread and locked, flaps are set, and it is properly configured for launch.

WARNING

- In positioning an aircraft on or off the catapult, the director shall be acutely aware of the activities of the catapult and adjacent catapult crewmen and aircraft inspectors to ensure control of the aircraft's exhaust and movement is such that personnel safety will not be jeopardized.
- Personnel shall not transit underneath a moving aircraft.
- Aircraft shall not have nose tow launch bar over shuttle spreader until the aircraft is armed and properly configured for flight.
- Jet Blast Deflectors (JBDs) shall be raised or lowered only after it has been positively determined that there are no obstructions in the raising or lowering arc of the JBD.

CAUTION

Excessive power may result in lack of control aircraft and damage to equipment.

Note

- During waist catapult launch operations while catapult 4 is loaded, the Aircraft Director shall hold aircraft to be loaded on Catapult 3 aft of the Jet Blast Deflector (JBD 3) until the aircraft on Catapult 4 is launched. In the event the aircraft on the Catapult 4 has to be launched with an aircraft spotted on Catapult 3, Commanding Officer approval shall be required and extreme caution shall be exercised by the launching crew.
- While aircraft are in tension, voice communication shall only be used in emergency situations.

2. The holdback bar shall be installed with the aircraft stopped prior to taxiing into the catapult NGL approach ramp.

When an aircraft is at high power on the catapult, the controlling aircraft director shall be aware of and observe the following when spotting aircraft:

1. Aircraft with wings folded (except C-2/E-2) or aircraft with an open canopy shall not be taxied, spotted, or towed behind a JBD.
2. Wing fold/spread cycles shall not be initiated when aircraft is close behind JBD.

3. Care shall be exercised with positioning aircraft that are particularly sensitive to hot jet exhaust gas ingestion, e.g., C-2/E-2. In all cases, the angle of the catapult approach behind the JBD shall be such as to prevent these situations to the maximum practicable extent, with particular attention paid to conditions of slick decks and/or high winds.
4. After receiving the tension signal from the topside petty officer, the director, while giving the “hold” brake signals, shall perform the following:
 - a. Check the catapult area forward and aft, ensure that the jet blast deflectors are raised, and that all personnel (except catapult launching crew) are clear of the catapult “shot” line.
 - b. Signal the pilot to release his brakes, and give a tension signal to the Deckedge Operator and the Catapult Officer (ICCS-equipped).
 - c. After the aircraft is tensioned on the catapult and the topside petty officer (TSPO) has exited, the director shall pass control of the aircraft to the Catapult Officer/Catapult Safety Observer.
 - d. The pilot in turn shall apply military (MRT) or combat (CRT) power to the aircraft upon signal from the Catapult Officer or deck signal lights via the Catapult Safety Observer.

WARNING

Personnel shall not work or transit immediately behind JBDs with aircraft at launch power on the catapult.

Note

The Aircraft Director shall pass control to the Launching Officer/Catapult Safety Observer after the Topside Petty Officer has cleared the aircraft.

5. Any person who observes any unusual condition during the launch, such as objects falling from or striking the aircraft, shall immediately make the facts known to the launching officer, director, or catapult safety observer by giving the SUSPEND signal.

7.4.5 Re-Spot Forward

The pace of the re-spot forward depends upon how soon the recovery is expected to begin. All preparations shall be made for an immediate re-spot forward in the event of emergency. Tow bars shall be attached to all aircraft on the flight deck unless otherwise directed by ACHO. Pre-launch briefing shall cover the re-spot forward procedures to include tow and taxi aircraft in detail so that it can be performed expeditiously, safely, and with a minimum of confusion in an emergency.

7.4.6 Recovery

WARNING

T-56 engine RPM decay or flameout can result from ingestion of turbojet exhaust. E-2/C-2 aircraft shall not be recovered (including touch and go) when turbojet aircraft are spotted on or along the No. 2 catapult (4 Row) or along the foul deck line forward of the waist catapults with the turbojet exhaust blowing to the port side. This includes aircraft in the de-arm area blowing turbojet exhaust to port. These restrictions apply only to exhaust from turbojet aircraft.

1. While aircraft are being recovered, no unnecessary personnel shall be in the catwalks or on the flight deck.
2. When the aircraft completes its rollout, it shall be allowed to roll back a few feet to permit the deck pendant to fall free of the hook. Pullbacks shall be utilized as required by aircraft and arresting gear type.
3. The director shall give the pilot the signal to raise the hook. If the aircraft is hung in the arresting gear, the TAILHOOK DOWN signal shall be given by the hook runner and repeated by the director.
4. In directing aircraft clear of the landing area, the director shall give the fold wings and close flaps signal when required and pass control to the next director.
5. During day flight operations, pilots experiencing a brake failure while on deck shall inform Primary via radio and drop their tailhook. At night, in addition to the above, the navigation lights shall be turned on. The handling crews, as directed by the controlling aircraft director and the flight deck supervisor, shall execute appropriate emergency procedures.

WARNING

The towing of C-2/E-2 with the engines running is prohibited; the towing of other aircraft with engines running is hazardous and shall be avoided whenever possible.

Note

A “hot chocks” crew (two Crash and Salvage crewman with chocks and a tractor driver with hot tractor and tow bar) shall be located for immediate access to the landing area.

6. Aircraft handling crews shall stand by in designated areas during recoveries and act as plane handlers while aircraft are being taxied and parked. They shall put on the initial tiedowns, assisted by the plane captain where possible. The plane captain shall add sufficient tiedowns to bring the total number to the intermediate requirement or the requirement of the ACHO.

CAUTION

Tiedowns and chocks shall not be removed prior to attachment of the towbar to the tractor.

7. Landing aircraft may experience hydraulic system failures, which often result in loss of nose gear steering, inability to fold wings or raise tailhook, and loss of brakes. Loss of these systems presents the possibility of the aircraft rolling overboard if it is disengaged from the cross-deck pendant. In order to expedite clearing the landing area and prevent loss of the aircraft, the following procedures are recommended:
 - a. When aircraft lands, keep engines turning and cross-deck pendant engaged to tailhook in order to keep nose wheel in fore and aft position and to ensure the aircraft does not roll free and become uncontrollable.
 - b. Insert chocks on both main mounts.
 - c. Install aircraft pins or down locks.
 - d. De-arm aircraft as required.
 - e. Attach tractor and towbar to aircraft, secure engine(s).
 - f. Remove chocks.

- g. Disengage cross-deck pendant from aircraft arresting hook.
 - h. For combined hydraulic failure, utilize the tail-hook dolly or tail hook strap.
 - i. Tow aircraft clear of the landing area.
8. E2/C2 aircraft may experience propeller pitch malfunctions (i.e., pitch lock). This condition presents the possibility of the aircraft not being able to reverse props, excessive prop wash, and/or normal disengagement from the cross-deck pendant. In the event of excessive prop wash, the following procedures are recommended:

WARNING

Due to excessive prop wash, serious personnel injury may result.

- a. Hold retract/hold brakes.
- b. Hook up tractor and tow bar.
- c. Fold wings.
- d. Shut down engines.
- e. Chock wheels/insert down locks.
- f. Remove chocks.
- g. Disengage cross-deck pendant from aircraft arresting hook.
- h. Utilize the tail-hook dolly or tail hook strap.
- i. Tow aircraft clear of the landing area.

7.4.7 Parking

1. Aircraft often are parked in close proximity to the deck edge, other aircraft, or a part of the ship's structure; both directors and pilots shall exercise extreme care in giving and answering signals. Although the pilot is responsible for the control of his aircraft, it is the director's responsibility to ensure that an intended parking spot is clear and offers sufficient space. In many cases, the pilot is forced to rely entirely upon the judgment of the director in maneuvering an aircraft in close quarters.

WARNING

When parking aircraft, an access route shall be maintained to allow MFFV the ability to respond to any emergency. When deck multiple, operational tasking, alert posture, etc., preclude establishing an access route to the scene of an emergency, a 1 1/2-inch AFFF hose shall be manned and positioned upwind of any aircraft refueling or conducting of a maintenance turn.

2. A director controlling aircraft movement into final spot shall ensure he is strategically located to view the area of least clearance to other aircraft or structures. In addition, when the moving aircraft has other aircraft or structures in close proximity (5 feet or less) on the opposing side or tail, a safety or safety(s) shall be positioned in order to relay safe clearance to the controlling director.

3. Pilots shall not shut down engine(s) and shall remain in the aircraft until chocks are in place, and the initial tiedowns have been attached and downlocks have been installed.

WARNING

Serious injury or death may occur if E-2/C-2 aircraft are improperly approached while propellers are turning. Approach and exit shall be made at 90° to the mainmount and aft of propellers. Plane handlers shall never approach turning aircraft without signal from the aircraft director.

4. Except in an emergency, pilots shall not secure their engines until receiving clearance from the director. After leaving their aircraft, flight crews shall immediately clear the flight deck via the most expeditious route.

7.4.8 Downed Aircraft

Downed aircraft shall be handled in accordance with the pre-launch briefing. Except in cases of emergency, they shall be shut down only on a signal from a director. Pilots shall remain in downed aircraft until the plane captain is on hand and ready to man the cockpit.

7.4.9 Standby Aircraft (Spares)

Spare aircraft, if not launched, shall normally be kept turning until it becomes apparent that they are no longer needed or until other operational considerations require that they be shut down. Pilots shall not secure engines until directed by the Aircraft Director.

7.5 AIRCRAFT ELEVATORS

7.5.1 General

Operation of the aircraft elevators shall be under the cognizance of the Aircraft Handling Officer. The Flight Deck Officer/Hangar Deck Officer shall be responsible in his respective areas for ensuring all operators and aircraft directors are qualified.

CAUTION

Operating the aircraft elevators in manual or emergency mode, bypasses the built-in safety features and could result in aircraft or equipment damage. The Commanding Officer's permission shall be required to run any elevator in manual or emergency mode.

7.5.2 Manning Requirements

Aircraft elevators shall be manned as follows (per aircraft elevator):

Flight Deck — one qualified director and one qualified operator.

Hangar Deck — one qualified director and one qualified operator.

Pumproom — one qualified operator.

Pier — one qualified pier safety (when pier side).

7.5.3 Elevator Limitations

Aircraft elevator platform load capacities shall not exceed the allowable capacity tested and approved for each ship.

7.5.4 Operational Procedures

Standard operational procedures for aircraft elevators shall be as follows:

1. Each day prior to elevator operations, qualified operators shall:
 - a. Visually inspect the elevator platform, stanchions, deckedge lights, lock bars, and safety nets, and report any discrepancies to the ACHO.
 - b. Establish communications among control stations, elevator pump rooms, and flight/hangar deck control as directed by ACHO.
 - c. Functionally check the hangar deck elevator doors.
 - d. Report the status of the aircraft elevators and doors to the ACHO.
2. Prior to operating the elevator, the ACHO shall gain permission from the OOD.
3. Elevators shall not be operated while the ship is in a turn heeling toward the side on which the elevator is located. If the elevator is at hangar bay level, it shall be raised as soon as possible.

Note

When computing elevator load weight, ensure the addition of ordnance and GSE equipment.

4. Directors shall ensure that equipment on the elevator is properly secured.
 - a. All aircraft handling support equipment and rolling stock shall be parked fore and aft with a minimum of one chock, hand brake set, and two tiedowns tending in a fore and aft position.
 - b. All aircraft shall be secured with a minimum of intermediate tiedowns, chocked, and aircraft brakes set (if applicable).
5. Elevators shall not be lowered during heavy weather, except as directed by the ACHO or higher authority.

WARNING

Extreme caution shall be exercised when operating deckedge aircraft elevators during periods of high winds and/or heavy seas.

6. The aircraft director shall visually determine the position of elevator locks after signaling the operator to withdraw or insert them.
7. When sending aircraft to the hangar deck, flight deck directors shall do the following:
 - a. Position the aircraft on the elevator so it can be towed directly into the hangar bay without repositioning.
 - b. Ensure that aircraft brake pressure level is pumped up as applicable.
 - c. Ensure that all personnel riding the elevator wear approved flight deck life preservers and stand on the inboard half of the elevator.

WARNING

Riders shall not be permitted on the elevators at night except in cases of emergency and authorized by the Commanding Officer.

8. Before signaling the elevator to be raised or lowered, the director shall check stanchion/cable clearance and ensure no tiedown chains are attached to the platform from aircraft or equipment parked adjacent to the elevator.
9. The elevator operator shall then sound the warning horn, check to ensure all personnel are clear, and raise the stanchion/cable.
10. As soon as the stanchion/cable is up, the director shall signal for the elevator platform to be raised or lowered. The warning horn shall be sounded three times prior to elevator movement and continuously throughout the elevator cycle.



Directors shall ensure they are visible to the elevator operator at all times. Communications shall be established among flight/hangar deck deckedge operators, pump room operators, and flight deck control prior to elevator operation.

11. If the stanchions are inoperative, personnel shall be stationed near the elevator to warn approaching personnel, and a temporary safety line shall be rigged as quickly as possible prior to lowering/raising the elevator.



Extreme caution shall be exercised when operating aircraft elevators when stanchions are inoperative.

12. After the stanchions have been raised or the warning given, no person shall attempt to board or leave the elevator platform.



While underway, personnel shall not cross the elevator doors safety markings without an approved floatation device.

13. A 5MC/3MC announcement shall be made prior to operating elevators.

7.5.5 Procedures When Not at Flight Quarters

The Air Department Duty Officer, via Command Duty Officer, shall grant permission for aircraft elevator movement in port. Hangar deck personnel shall check the area under the elevator for obstructions.

7.6 AIRCRAFT HANDLING ACCESSORIES

7.6.1 Self-Powered Equipment

The Flight Deck Officer, the V-2 Division Officer, and Hangar Deck Officer are responsible for ensuring that all aircraft handling support and crash and salvage equipment that are used on the flight deck are in satisfactory operating condition.

1. All equipment shall have a daily “pre-operational” inspection completed by designated driver/operator prior to being operated.
2. Tractor drivers shall not operate a tractor with defective brakes or steering. Discrepancies shall immediately be reported to competent authority.

7.6.2 Other Equipment

In addition to self-powered equipment, several important handling accessories are required for the safe and efficient handling of equipment.

Note

Defective towbars, chocks, and tiedowns shall be immediately taken out of service and turned in for repair. Towbars, chocks, and tiedowns not in use shall be neatly stowed in designated storage spaces.

7.6.2.1 Aircraft Wheel Chock

1. The Universal Wheel Chock is used aboard aircraft carriers. It is adjustable to fit main landing gear wheels up to 45 inches in diameter.
2. The chock shall be inserted with the adjustable block toward the after end of the aircraft.

7.6.2.2 Tiedown Assemblies

1. The TD-1A and TD-1B tiedown assemblies are composed of a chain assembly and a lock mechanism, each having a hook at one end. The two separate assemblies are joined to form an integral unit by inserting any one of the chain lengths into the locking device.
2. The tiedown assembly, when properly assembled, has a 10,000-pound working load capacity. It is possible to install the chain so that the load is off-center. In this position, the working load is reduced to approximately 6,000 pounds.
3. The assembly shall be retensioned periodically.
4. If the required number of tiedown points cannot be established due to unavailability of padeyes, tiedown assemblies may be doubled utilizing hook to oversized chain link of second tiedown assembly. Use of both tensioning devices is not acceptable when doubling tiedown assemblies.
5. All tiedowns shall be installed in all padeyes with hookup. **Figure 2-2** shows the correct installation of the TD-1A/TD-1B tiedown assembly.

7.6.2.3 Aircraft Towbars

1. The Adjustable Length Towbar (ALBAR), Model NT-4, is used aboard aircraft carriers and is designed to provide for the nose tow of aircraft employing four different sizes of nose wheel axle tow holes. Additionally, the ALBAR is designed for towing aircraft provided with fuselage and landing gear tow rings.
2. The ALBAR is made of aluminum alloy and can handle aircraft with a maximum gross weight of 90,000 pounds.

7.7 FLIGHT DECK COMMUNICATIONS SYSTEM (FDCS)

The FDCS provides communication among fixed stations and as many mobile headsets and handsets as available.

7.8 SPECIAL AIRCRAFT HANDLING CHARACTERISTICS

7.8.1 H-60 Aircraft

7.8.1.1 General

1. When locking/unlocking the tail wheel locking pin, the towbar attached shall not be moved more than 2 feet to either side of centerline, as any more than that will snap the locking pin.



Damage to data link and VHF/UHF/TACAN antennas may occur while verifying tail wheel locking pin disengagement and alignment of tow bar.

2. Care shall be exercised while handling the tail wheel and related components. A weak design point, it is not stressed for excessive sideward or downward pressure and cannot withstand repeated abrupt stops/rapid starts.
3. When spotting/landing an H-60, it shall be positioned far enough from the deck edge to allow blade-walkers to remain outboard of the blades during the folding or spreading cycle.
4. The Auxiliary Power Unit (APU) is referred to as the No. 3 engine. The noise level is hazardous within 5 feet of the exhaust port when the unit is operating. The APU shall be started prior to shutting down; this enables the pilot to monitor engine instruments when the final engine is shut down.
5. The aircraft is self-starting; however, if the APU is down, the aircraft can be started with a “huffer.” The H-60 has a crossbleed capability for starting the second engine.
6. Electrical/battery power shall be maintained on the H-60 when folding the tail pylon. Failure to do so can result in uncontrolled tail rotor wind milling.
7. An ALBAR towbar (longer than a standard towbar) shall be used when towing the aircraft on the flight deck.
8. The tailwheel strut shall be extended prior to sending aircraft to the hangar deck to allow enough clearance to attach spotting dolly.



When the tail wheel is raised, reduced clearance of the radome may produce minimal deck clearance, increasing the possibility of the radome contacting the deck/or objects.

Note

Blade spread for all helicopters on the hangar deck shall be performed only with a hydraulic cart/electrical power.

7.8.2 EA-6B Aircraft

7.8.2.1 General

1. The EA-6B aircraft has special antennas requiring additional care in spotting. The arc of swing of the horizontal stabilizer is deceiving and requires extremely slow left and right movements of the nose to prevent rapid opposite movement of the tail.
2. The extendable equipment platform (“bird cage”) and boarding ladder shall be stowed before towing due to minimum deck clearance and possible contact with mobile handling equipment.
3. In order to accomplish electronics maintenance in the “bird cage” area, the aircraft shall be spotted in such a manner that the hatch will swing over the deck when opened.
4. Launch aircraft shall be spotted near a 115-volt, three-phase, 400-Hz electrical power source.
5. Crossover bleed starts require additional caution due to the high engine rpm (75 percent) required on the running engine in order to provide the necessary air for engine start.
6. The canopy is of the clamshell design and shall not be operated with winds in excess of 60 knots.
7. The landing gear of an EA-6B shall not be pinned until one of the two engines is shut down. This is due to the unique over-center locking mechanism on the landing gear.
8. Jury struts shall be installed when the wings are full of fuel and when the aircraft is raised or lowered on an elevator. This is to prevent damage to the wing fold mechanism.
9. The EA-6B is equipped with nose wheel steering, but a tog lock disengages the steering when the nose wheel is turned past 56° from the center position. Additional power and differential braking are required to re-center the nose wheel and to re-engage the tog lock. When high power settings are prohibited, a towbar shall be attached to manually center nose wheel.

7.8.2.2 Maintenance/Serviceing

1. The wings shall be spread for hot refueling due to the close proximity of wing dump lines to hot engine exhaust when wings are folded. The only exception is during CQ evolutions. At CQ fuel weight, if the wings are folded for hot refueling, the wing tanks shall remain empty.

7.8.3 F/A-18A/B/C/D Aircraft

7.8.3.1 General

1. Two 28-volt, lead acid batteries provide internal electrical power (dc). These batteries provide power for canopy operation and APU starting. The batteries are located behind doors 10L and 10R (10L&R).
2. Canopy operations and external power can be applied through door 9. The F/A-18 A/B/C/D, will accept three-phase, 400-Hz ac power.
3. When external fuel stores are installed, the SD-1/SD-2 spotting dolly's rotation is restricted.

WARNING

- Aircraft with wing station drop tanks present a hazardous situation for plane handlers. Plane handlers shall be positioned outboard of the drop tanks during aircraft movement.
 - Route all refueling hose parallel to the A/C fwd of main landing gear to prevent inadvertent exposure to APU exhaust.
4. In the event that emergency forward towing is required, e.g., locked brakes, the towbar shall be supplemented with chains or cables attached from the tractor to tiedown rings on the main landing gear to avoid exceeding design limitations of the nose wheel strut.
 5. Tail towing can be accomplished, utilizing the NT-4 towbar. Make sure the tow pins are in the normal tow position, spread the towbar tubes apart, and attach to the tiedown fittings on the rear of the main landing gear.

WARNING

Rearward towing shall not be attempted if nose strut is 11 inches or higher, this will cause A/C to rock back onto tail. (All models of F/A-18).

CAUTION

When towing rearward with the aircraft in a tail-heavy condition (gun and/or radar removed and low fuel state), sudden stops may cause aircraft to rock backwards.

7.8.3.2 Brake System

Make sure emergency brake accumulator pressure gauge indicates green and/or 2000–3000 PSI before towing.

7.8.3.3 Starting Requirements

The on-board batteries provide electrical power. External power can also be applied. Air can be used from any standard unit that provides 5:1 or 3.6:1 air pressure. The external air connector on the aircraft is located in the right-hand wheel well.



During crossbleed starts the operating engine advances to 80 percent, increasing Jet Blast and FOD ingestion potential.

7.8.4 F/A-18E/F and EA-18G Aircraft

7.8.4.1 General

1. The F/A-18E/F and EA-18G stands approximately 2 1/2 inches higher than the F/A-18C/D statically. Both the F/A-18E/F and EA-18G are approximately equal in height, length and span.
2. Two 28-volt, lead acid batteries provide internal electrical power (DC). These batteries provide power for canopy operation and APU starting. The batteries are located behind doors 10L and 10R (10L&R).
3. External power can be applied through door 8. Both the F/A-18 E/F and EA-18G airframes will accept three-phase, 400-Hz ac power.

7.8.4.2 Brake System

The emergency/park brake handle, located on the L/H vertical console controls parking brakes. Make sure emergency brake accumulator pressure gauge indicates green before towing.

7.8.4.3 Starting Requirements

The on-board batteries provide electrical power. External power also can be applied. Air can be used from any standard unit that provides 5:1 or 3.6:1 air pressure. The external air connector on the aircraft is located in the right-hand wheel well. Crossbleed starts can be done by advancing the operating engine to 80 percent and select to start the opposite engine.

7.8.4.4 Handling

1. When external fuel stores are installed, the SD-1/SD-2 spotting dolly's rotation is restricted.



- Aircraft with wing station drop tanks present a hazardous situation for plane handlers. All plane handlers shall be positioned outboard of the drop tanks during aircraft movement.
 - While hot refueling, stand clear of the STBD intake, due to the downward exhaust route and APU location.
2. Plane handlers shall take care when installing tiedowns due to the position of the upper plaining link.

CAUTION

Aircraft push-back with hand placement on the APG-79 radome, ALQ-218 radomes, or ALQ-99 pods (radome, RATs, etc.) can result in significant airframe damage. Push-back using the APG-79 or ALQ-218 radomes, and/or ALQ-99 pods, is prohibited.

3. The boarding ladder is lowered with the electrical activation switch that can be found inside door 8, along with canopy release switch and external power receptacle. The boarding ladder is raised and lowered with the use of hydraulic pressure. The activation switch can be found under door 8, along with the canopy release switch and external power receptacle.
4. In the event that emergency forward towing is required, e.g., locked brakes, the towbar shall be supplemented with chains or cables attached from the tractor to tiedown rings on the main landing gear to avoid exceeding design limitations of the nose wheel strut.
5. Tail towing can be accomplished using the NT-4 towbar. Make sure the tow pins are in the normal tow position, spread the towbar tubes apart, and attach to the tiedown fittings on the rear of the main landing gear.

CAUTION

When towing rearward with the aircraft in a tail-heavy condition (gun and/or radar removed and low fuel state), sudden stops may cause aircraft to rock backward.

Note

- The EA-18G Launch Bar and Linkage displays the markings “E/F USE ONLY.” the EA-18G utilizes this Launch Bar and Linkage, and is fully authorized for CVN use as installed.
- The EA-18G is authorized to utilize all ground support equipment that displays the markings “E/F USE ONLY.”

7.8.5 E-2/C-2 Aircraft

7.8.5.1 General

1. Extreme caution shall be used while working in the area near E-2/C-2 propellers. There is not enough room between propeller and fuselage for personnel to pass.

WARNING

Serious injury or death may occur if E-2/C-2 aircraft are improperly approached while propellers are turning. Approach and exit shall be made at 90° to the mainmount and aft of propellers. Plane handlers shall never approach turning aircraft without signal from the aircraft director.

2. The brakes shall be pumped up prior to moving the E-2/C-2 aircraft. When pumped to the “full” position, 12 applications are available through the rudder pedals and 3 through the emergency brake handle. A handle in the cockpit recharges the system.

3. Launch E-2 aircraft shall be spotted near two 115-volt, three-phase, 400-Hz electrical power outlets and shall also be accessible to a SINS outlet.
4. Due to the large sail area with the wings folded, the E-2/C-2 may slide sideways when taxied 90° to a wind of 30 knots or more. Caution, therefore, shall be used when pulling E-2s from spot or when taxiing them crosswind upon clearing the arresting gear. E-2/C-2 aircraft shall not be towed with propellers turning.

WARNING

T-56 engine RPM decay or flameout can result from ingestion of turbojet exhaust. E-2/C-2 aircraft shall not be recovered (including touch and go) when turbojet aircraft are spotted on or along the No. 2 catapult (4 Row) or along the foul deck line forward of the waist catapults with the turbojet exhaust blowing to the port side. This includes aircraft in the de-arm area blowing turbojet exhaust to port. These restrictions apply only to exhaust from turbojet aircraft.

Note

Commanding Officer's approval is required for E-2/C-2 movements with winds in excess of 40 knots.

5. When towing or backing the C-2, ensure the tail ramp is in the up position.
6. The E-2/C-2 may be backed into a final spot under its own power. Limited "backing" also is permitted on clear decks. Emergency stops shall be avoided when backing since propeller thrust shall be used to stop aircraft; use of brakes will cause aircraft to swerve or rock back on its tail. The same can occur when backing E-2s by tractor. Due caution shall be observed.
7. A maximum power steering range of 63° either side of center is available.
8. In case of a flat tire in the landing area, it is desirable that the E-2/C-2 be towed clear vice taxied. Flat nose or main gear tires restrict maneuverability.
9. E-2/C-2 aircraft shall not be fueled with STBD engine turning.
10. When starting the C-2 with a ground turbine cart, ensure the cart, personnel, and support equipment are positioned clear of both prop arcs. Either the port or starboard engine may be started with ground turbine cart attached to either engine nacelle.
11. C-2 aircraft shall be spotted for ease of loading/unloading in case of need for emergency egress.
12. With crew and/or passengers on board, the C-2 shall not be spotted on the flight deck with the tail over the side.
13. When securing E-2/C-2 aircraft, install four TD-1A/B chains to the mainmounts, secure both engines, then install two nose TD-1A chains or appropriate chain to achieve required tiedown condition.

7.8.5.2 Maintenance/Serviceing

High-power turnup requires 18-point tiedowns and a high-power hold back chain.

7.8.6 H-3 Aircraft

7.8.6.1 General

1. When locking/unlocking the tail wheel locking pin, the towbar attached shall not be moved more than 2 feet to either side of centerline, as any more than that will snap the locking pin.
2. Care shall be exercised while handling the tail wheel and its related components. A weak design point, it is not stressed for excessive sideward or downward pressures and cannot withstand repeated abrupt stops/rapid starts. The low operating pressure of the tail wheel tire is such that the seal at the rim could break in a turn and the tire would deflate and subsequently roll off the rim.
3. With tail pylon folded, flight deck winds could cause the tail rotor system to rotate rapidly if lock-pin should disengage. Flight deck personnel shall not attempt to stop rotation, but shall remain clear of the tail rotor and shall contact the squadron line personnel immediately.
4. When spotting/landing an H-3, it shall be positioned far enough from the deck edge to allow blade walkers to remain outboard of the blades during the folding or spreading cycle.

7.8.6.2 Maintenance/Serviceing

Passenger shall not be permitted to embark/disembark aircraft during hot refueling.

7.8.7 H-46 Aircraft

7.8.7.1 General

1. The brake system is an independent hydraulic system much like that of an automobile. There is no means of “pumping the system up” other than mechanically bleeding the system. There is no limit to the number of times the system may be used.
2. Prior to towing, ensure that the nose wheel locking pin is fully withdrawn. The pin can be visually checked clear on the strut.
3. While the nose strut is stressed for normal towing, rough treatment, including abrupt starts and stops, rapidly destroys the seal and results in nose strut change.
4. For engagement/disengagement or while the rotors are turning, the high points tiedowns (on the stub wing) shall not be used. Use of these fittings can result in destruction of the aircraft. Also, the nose gear tiedown, if utilized, shall be slack.

7.8.7.2 Maintenance/Serviceing

A qualified squadron crewman shall assist in refueling to ensure that the high level shutoffs are checked properly.

7.8.8 H-53 Aircraft

7.8.8.1 General

1. Each main landing gear is equipped with a hydraulic assist power brake system. The aircraft is also equipped with a parking brake.
2. APU shall be operating to provide hydraulic power for brakes. Ear protection shall be worn if the APU is operating.
3. If the aircraft is to be moved to re-spot, ensure all cowlings are latched shut and the tail rotor blades are secured. Aircraft cowling is made of fiberglass and may rip off if exposed to high or gusty winds or jet blast.
4. After landing, chock and chain runners shall remain clear until aircrew have inserted pins in main landing gear and/or fuel drop tanks.

7.8.8.2 Maintenance/Serviceing

If it is necessary to engage the rotors while the helicopter is tied down, it is mandatory that the tiedown chains be loose.

7.9 DECK MULTIPLE AND DENSITY

7.9.1 General

Aircraft Deck Multiple NAEC-ENG-7604 (Aircraft Deck Multiple) contains data for aircraft carrier multiple and density computations. Maximum density figures from Table 3 of the publication are used as the baseline and may be modified only by the TYCOM. The FA-18 aircraft is normally used as the “unity” aircraft with an equivalent value of one.

7.9.1.1 Calculation of CVN/CVW Multiple

The CVN/CVW multiple shall be calculated in accordance with COMNAVAIRFORINST 3100.5 series.

7.10 HANGAR DECK

7.10.1 General

The hangar deck is used primarily to park aircraft for either short- or long-term maintenance. Any departments or squadrons requesting to use or temporarily stow gear in the hangar deck shall ask permission from the ACHO. The Hangar Deck Officer and Hangar Deck Chief shall closely monitor and manage the whole hangar deck.

7.10.2 Safety Precautions

Care shall be taken in spotting aircraft so that overlapping wing and tail surfaces are not forced together during fueling/defueling operations. Extreme care shall be taken when moving aircraft, weapons, and supply support equipment on the hangar deck to prevent aircraft damage.

7.10.3 Conflagration Stations

As a minimum, one conflagration station per bay containing aircraft shall be manned. Conflagration stations shall be manned as directed for all other evolutions.

7.10.4 Firefighting Procedures

Hangar deck firefighting teams shall be organized and trained per the Aircraft Crash/Salvage and Rescue NATOPS (NAVAIR 00-80R-14 [Acft Emergency Rescue Info Manual]) and COMNAVAIRFORINST 5400.27 series.

7.10.5 Major Ordnance Handling Evolutions

During major ordnance handling evolutions, the Hangar Deck Officer shall ensure that all conflagration stations are manned and that fixed firefighting hoses are pre-positioned as required.

7.10.6 Petroleum Replenishment Evolutions

During petroleum replenishment evolutions the Hangar Deck Officer shall ensure that all conflagration stations are manned and that fixed firefighting hoses are pre-positioned as directed.

7.11 AIRCRAFT HANDLING MISHAPS

7.11.1 General

Any damage to an embarked naval aircraft, no matter how slight, shall be immediately reported to the ACHO and other cognizant persons in the chain of command. The circumstances surrounding the incident shall be thoroughly investigated and required reports submitted. The aircraft shall not be flown until it has been inspected and declared to be in an up status by authorized squadron personnel. Records of each aircraft handling mishap shall be kept by the ACHO for 1 year and copies distributed to responsible divisions.

7.11.2 Definitions

To standardize and clarify Aircraft Handling Mishap (AHM) reporting, the following definitions shall apply. These definitions amplify OPNAVINST 3750.6, and in no way alter the intent or meaning of that instruction.

7.11.2.1 Aircraft Handling Mishap

This is a mishap in which damage to an aircraft occurs while the aircraft is embarked on or is being hoisted on/off an aircraft carrier. The damage should be associated with normal aircraft handling practices such as towing, taxiing, use or functioning of launch/recovery equipment, aviation fueling evolutions, or aircraft/weapons/crash and salvage support equipment operations. Mishaps caused by non-Air Department personnel, involving non-Air Department equipment, or otherwise not directly attributable to an Air Department causal factor shall also be categorized as a crunch and reported per existing directives. An aircraft handling mishap is a special category of mishap in addition to those delineated in OPNAVINST 3750.6.

7.11.2.2 Reportable/Non-Reportable

The current version of OPNAVINST 3750.6 shall be used in establishing damage criteria, which in turn determine whether a crunch is or is not reportable. All damage, however slight, shall be reported, investigated, and recorded. Formal reports are required only when damage dollar cost/man-hours for repair/injury are equal to or greater than the specified criteria. Mishaps of lesser severity shall be informally reported on the command's crunch report form and retained for education and reference purposes. A copy of this report shall be forwarded to the type commander for teaching purposes only.

7.11.2.3 Reports/Records

Reports are normally originated by the aircraft reporting custodian. Reports of aircraft handling mishaps (AHM) shall be sequentially numbered by calendar year in the same manner as naval aircraft mishaps, e.g., USS ESSEX AHM 01-80. This number shall be included in the remarks section of the originator's (normally aircraft reporting custodian) mishap report. No special report is required.

7.11.2.4 Measure of Effectiveness

Given variables in deck geometry, aircraft density, tempo of operations, environment, equipment type and age, personnel experience, aircraft type, and a myriad of other factors, it is impossible to arrive at a formula that equitably measures crunch rate and permits comparison of efficiency. Nonetheless, crunch rate has historically been and will continue to be an effectiveness measure. In this regard, aircraft handling mishap frequency shall be compared to total embarked flight hours (e.g., one crunch per 1,500 hours) as are other types of aircraft mishaps. An additional method of comparison is aircraft moves per crunch where a move is a launch, recovery, or movement by hand, tow, or taxi. This method is somewhat less precise due to difficulty encountered in "counting" moves, but is valid to a large degree. Either method is satisfactory; however, utilization of both is preferred.

7.11.3 Safety Awareness

It is essential that a continual, ongoing program of safety awareness occur to protect precious, limited aircraft assets. Education of all Air Department personnel is required in a conscious effort to operate at a near zero crunch rate. Involvement of supervisory and management personnel at all levels is mandatory.

7.11.4 Crunch Report Format

The content of a ship's crunch report shall be per [Appendix E](#). A copy of the report shall be forwarded to TYCOM COMNAVAIRLANT/COMNAVAIRPAC Code (N73).

CHAPTER 8

Aviation Fuels System

8.1 GENERAL

The Aviation Fuels Division (V-4) provides clean, clear and bright aviation fuel to aircraft and de-fueling services in support of flight operations and aircraft maintenance. V-4 Division provides additional services by fueling ships, boats, aircraft handling/salvage support equipment, ground support equipment (GSE), jet test cell and emergency diesel generators. The division also provides catapult lubricating oil to catapults and automotive gas (MOGAS) to all authorized gasoline-operated equipment.

8.2 DESCRIPTION OF THE AVIATION FUELS SYSTEM

While all aviation fuels systems contain basically the same components, there are differences in size, capacities, number of pumps, and physical layout. For more detailed descriptions, consult the current ship's Aviation Fuels Operational Sequencing System (AFOSS) and technical manuals (Ships Information Books) for ship's individual systems.

8.2.1 JP-5 System

It consists of storage tanks (forward, mid and aft) interconnected by transfer main(s), service tanks (forward, mid and aft), pumphooms, filter rooms, fill connections, piping, aircraft service stations, independent defuel mains, and portable transfer/defuel/spill carts.

8.2.2 Catapult Lubricating Oil System

Engineering operational sequencing system (EOSS) shall be used by all catapult lubrication oil system operators to operate the catapult lubrication oil system. EOSS shall be utilized as a training aid, and all qualified watch standers shall be familiar with its content.

The Aviation Fuels Maintenance Officer shall be responsible for keeping EOSS Manuals correct and current. Feedback reports shall be sent to NAVSSES (copy to TYCOM) to request changes or corrections as required.

8.2.3 Aviation Fuels Operational Sequencing System (AFOSS)

AFOSS shall be used by all fuel system operators to operate the aviation fuels system. AFOSS shall be utilized as a training aid and all qualified watch standers shall be familiar with its content.

The Aviation Fuels Maintenance Officer shall be responsible for keeping AFOSS Manuals correct and current. Feedback reports shall be sent to NAVSSES (copy to TYCOM) to request changes or corrections as required.

8.3 SAFETY PRECAUTIONS

Personnel involved in any operation using aviation fuels shall observe the following rules:

1. Aviation fuels shall not be handled in open containers; standard approved safety cans shall be utilized.
2. Waste or rags soaked in aviation fuels shall not be left about the decks.
3. Smoking is prohibited in any compartment where aviation fuels are present.
4. No open flames or lights shall be introduced into any compartment or space where fumes from aviation fuels are present.
5. Matches or cigarette lighters shall not be introduced into any compartment containing aviation fuels.

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6. Transferring of JP-5 that will result in change to the ship's trim shall not be made without notifying Damage Control Central.
7. JP-5 shall not be discharged overboard without permission of the Commanding Officer.
8. Every precaution against accidental overboard discharge of JP-5 shall be taken when receiving JP-5. Overboard discharge watches shall be stationed as per AFOSS to observe all overboard discharge ports.
9. Any JP-5 spilled on deck shall immediately be cleaned up.
10. When fueling or de-fueling aircraft a PQS-qualified member of the Aviation Fuels Division shall be present to ensure all operations are conducted per applicable instructions.
11. The Aviation Fuels Officer is responsible to see that all personnel comply with existing instructions and directives, that all necessary safety precautions are strictly adhered to, and that all communications are established and operable prior to operation of the system.
12. No operation of the JP-5 fuel systems in port involving the possibility of overboard discharge shall be started without the permission of the Commanding Officer.
13. No tank or void shall be entered until it has been certified gas-free and safe to enter by the Commanding Officer or his designated representative. A second person shall remain outside for safety, and contact shall be maintained at all times. When removing manhole covers, a new gasket shall be installed each time. Keep all covers to manholes on JP-5/lube oil tanks fastened securely.
14. If JP-5 is spilled or escapes in an enclosed space, ventilate the area immediately by approved methods, using an air-driven, explosion-proof blower. If considerable vapors are present, empty the space of all personnel, and ventilate the area thoroughly. Only trained, qualified personnel wearing proper breathing apparatus may enter a space filled with JP-5 vapors. Refer to NSTM 074 Volume 3 (Gas Free Engineering) for authorized breathing apparatus.
15. All fuel system valves shall be kept closed when not in use and be classified in accordance with NSTM 079 Volume II. All valves with the potential for fuel being sent overboard shall be locked closed when not in use. Additionally, a warning placard OPNAVINST 5090.1 (Environmental and Natural Resources Program Manual) shall be posted next to valves having overboard discharge capability.
16. No JP-5 shall be issued for any purpose other than fueling aircraft or ship's equipment without the permission of the Aviation Fuels Officer or higher authority.
17. No aircraft shall be fueled while work is being performed on the aircraft. Exceptions can be made as operational requirements dictate and as approved only by the Commanding Officer as specified in the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109 (Aircraft Refueling NATOPS Manual).
18. When handling JP-5 at a fuel dock, all available sources of ignition on the ship and pier shall be removed. These sources include open flames, all vehicles and boats, steam and air jets, spray painting, sand blasting, and grinding. Electrical equipment in the vicinity shall be shut off, and the smoking lamp controlled.
19. Before attempting to fuel aircraft, attach grounding wire connection to discharge static electricity. Use the following sequence: 1) attach ground wire to deck and the other end to aircraft; 2) remove filling connection dust cover and connect nozzle. Filler caps are to be replaced prior to removing ground wires.

Note

Single-point pressure fueling shall be used for all aircraft.

20. Portable fire extinguisher (PKP) or AFFF hose station shall be manned when refueling/de-fueling on the hangar deck.
21. To prevent electrical arcing, light bulbs in fuel spaces shall not be replaced with the electrical current on.

22. No aircraft shall be fueled while on jacks.
23. Emergency Escape Breathing Devices (EEBDs) shall be provided for each manned space (number of EEBDs required is subject to maximum manning level per space, i.e., one per person).
24. An approved eye wash station shall be provided in each JP-5 pump room, filter room, and quality surveillance laboratory in accordance with OPNAVINST 5100.19 series.
25. Simultaneous fueling, loading, and downloading of weapons to include preloaded IMERS/ITERS and "PASE" weapons and installation of fuzes and arming wires is authorized with the following warnings adhered to:

WARNING

- Loading/downloading and oxygen servicing, other than converter replacement at the aircraft, shall be conducted as separate evolutions.
 - Refueling hoses shall not be connected to an aircraft which is undergoing loading/downloading of specific forward firing weapons (i.e. AIM-9, AIM-7) that require electrical connections to make contact during the loading/downloading evolution. Refueling hoses shall never be positioned under weapons being loaded/downloaded.
 - No electrical connections between the aircraft and weapons or removal/installation of impulse cartridge shall be accomplished while fueling of the aircraft is in progress.
 - When electrical storms are within a 5-nautical mile radius of the ship, all refueling/defueling evolutions shall cease until the condition clears the 5-mile radius.
26. JP-5 becomes highly flammable under conditions of spraying or wicking. Particular care shall always be exercised when a fine spray might develop from leaks in JP-5 pressure lines and where rags or clothing may become fuel-soaked and thereby act as a wick.
 27. No GSE equipment or boats shall be refueled while engines are running.
 28. A duty below deck crew shall consist of a minimum of five personnel, Pump Room Supervisor, Console Operator, Pump Room Operator, Filter Operator, and Sounder/Sample Runner. Platforms that have service filters located in the pump room can utilize two qualified Pump Room Operators in place of a designated Filter Operator.
 29. Aircraft containing fuel other than JP-5 shall not be parked on the hangar deck without the Commanding Officer's approval, which may be given only when operational necessity dictates such a decision. As little as a 2.5-percent mixture of JP-4, JP-8, or commercial equivalents in JP-5 greatly reduces the flash point below 140 °F. Every effort, such as draining, flushing, utilizing the aircraft to aircraft transfer cart, or refueling multiple times if necessary shall be made in order to raise the flash point to 140 °F.
 - a. When operational necessity dictates placing an aircraft containing fuel with a flash point between 120 °F and 140 °F, on the hangar deck, operational procedures shall be per Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109.
 - (1) To reduce the extremely dangerous vapor hazard, aircraft shall be refueled with JP-5 prior to being placed on the hangar deck.
 - (2) All hangar bay sprinkling groups located in the hangar bay in which the aircraft are parked shall be operable.
 - (3) All CONFLAG stations located in the hangar bay with the affected aircraft shall be manned.
 - (4) Hot work shall not be conducted in the hangar bay or in close proximity to the hangar bay containing the affected aircraft.

8.4 SAFE HANDLING OF AVIATION FUELS

8.4.1 Safe Handling Practices

1. Frequent training shall be held in firefighting procedures with emphasis on aviation fuel system causalities and pump room fires.
2. Personnel shall be instructed in the characteristics of aviation fuels and in the precautions required to prevent personnel injury by exposure to aviation fuels and fuel vapors.
3. JP-5 vapors are toxic. Extreme care shall be exercised to avoid spilling JP-5 on the body. Any spills shall be washed off immediately with soap and water, and if spilled on clothing the clothing shall be immediately removed and thoroughly washed before wearing again. Ensure that all personnel subjected to fuel vapors are rotated out of the space frequently to prevent injury.
4. Prior to and during fuel replenishment, fuel transfer, or aircraft fueling operations, planning and supervision of the operation for the purpose of coordinating safe procedures shall include the following per AFOSS:
 - a. Approximate time the operation will commence and its probable duration.
 - b. Sentries and control and communication personnel, manning their stations with standing orders.
 - c. When removing/opening radar tank level indicator (TLI) units or sounding tube caps from the sounding tubes, care shall be taken to prevent injury in case there is excessive pressure in the tube. Prior to reinstallation, check all gaskets or seals. Identify and report any abnormal deficiencies associated with component.
 - d. Firefighting teams consisting of the following minimum equipment: two (manned) AFFF hoses and three CO2/PKP bottles per sponson.
 - e. A qualified Quality Surveillance Sentry to test for contamination of fuel being taken aboard.
 - f. Special personnel and equipment on station with emphasis on:
 - (1) Safety.
 - (2) Firefighting.
 - (3) Putting out the smoking lamp.
 - (4) Securing machinery (particularly if at the pier).
 - (5) Proper closing of hatches.
 - (6) AFOSS Station Manuals issued.
5. Attention is particularly directed to the danger of excessive pressure in the ship's aviation fuels system, which could result in damage to tanks. This is emphasized to point out that:
 - a. It is entirely possible to obtain pressures in the aviation fuel tanks sufficiently high to cause deformation even though all valves are properly set.
 - b. Damage to aviation fuel systems due to higher than the designed pressures cannot be tolerated, and precautions for avoiding it shall be established.
 - c. When the integrity of the JP-5 system is open, ensure red tag procedures are strictly adhered to and double valve protection is met.

WARNING

The fill and transfer main maximum design pressure is 40 psi at the filling connection. Maximum filling rate shall not exceed 500 gallons per minute, for each open tank to be filled. (Example: 10 tanks open at any one time would permit a flow rate of 5,000 gallons per minute).

Note

A log shall be set up to record the following information:

- Pumping rate and pressure obtained from the delivering agency prior to the start of fueling and continuing thereafter at frequent intervals until fueling is completed.
 - Liquid level and meter reading along with fuel receiving station pressure, taken concurrently with a continuous computation maintained for total gallons taken aboard, based on rates of pumping in gallons per minute and duration in minutes.
6. Impress upon personnel the necessity for strict compliance with existing safety precautions. Immediate and positive action shall be taken in any case resulting from improper handling of aviation fuels. Instruction in casualty procedures is a necessary part of safety, and personnel shall be thoroughly indoctrinated in all phases of casualty control.
 7. A program for the indoctrination in and introduction of personnel to all phases of aviation fuel handling shall be conducted in accordance with Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109.
 - a. Review of safety precautions, firefighting principles, and equipment.
 - b. Review of the particular ship's aviation fuels system, piping, valves, gauges, limiting pressure, tank capacity, etc.
 - c. AFFF/HALON/HFP Flooding systems for JP-5 spaces, steam smothering valves for catapults, ventilation alarms and indicators, flame arresters, etc.
 - d. Entry into enclosed JP-5 tanks.
 - (1) Obtain proper authorization prior to entry.
 - (2) Equipment needed and proper use.
 - (a) Emergency apparatus (in accordance with NSTM Chapter 074).
 - (b) Safety lines and harness.
 - (3) Proper methods for ventilation of space.
 - (4) Personnel protection equipment.
 - (5) Rescue and lifesaving methods needed to assist personnel suffering from asphyxia.

8.5 OPERATION OF THE JP-5 SYSTEM

All operations involving the JP-5 system shall be conducted by qualified operators per the AVFUELS (Afloat) PQS. Trainees may operate the system, but only under the direct supervision of a qualified operator. All operations of the Aviation Fuel (AVFUEL) system shall be performed in strict accordance with AFOSS.

8.5.1 Filling the JP-5 Tanks

1. The filling sequence of the JP-5 stowage tanks shall be consistent with the ship's trim.

Note

Prior to receiving JP-5, check all transfer main valves to ensure valves are in the desired position (open/closed) in accordance with the current Ships Aviation Fuels Operational Sequencing System (AFOSS) Manual. A check of the sound-powered phone circuit (4JG) shall be made prior to receiving fuel.

2. JP-5 shall normally be received from two or three starboard side filling connections when underway. Portside connections are normally provided and are generally used in port when refueling from a barge.

3. Per AFOSS, all tanks shall be stripped off to low suction prior to replenishment and service tanks topped off prior to taking on fuel. Contaminated settling tanks (reclamation tanks) shall be empty prior to receiving fuel.
4. When ready to receive, order the tanker to start pumping minimum pressure. Have men stationed at liquid level gauges and sounders on the overflow tanks of the tank groups receiving fuel. As tanks fill, open additional tanks and continue with gauge readings and soundings until replenishment is complete.
5. Overflow tanks shall be filled last, as per AFOSS.
6. Securing. Upon completion of the refueling operation, accurate soundings of all tanks shall be taken.

WARNING

Do not secure last tank to be filled until tanker has ceased pumping.

8.5.2 Filtering, Settling, Sounding, Stripping, and Use of Service Tanks

8.5.2.1 Filtering

Foreign matter and water are difficult to remove from JP-5. Therefore, all fuel entering the service tanks shall be purified using an approved purification and filterization system. All fuel being delivered to aircraft shall be filtered with the service filters.

8.5.2.2 Settling

Every effort shall be made to allow maximum settling time. Ships equipped with a reclamation system shall direct all stripping into reclamation tanks.

8.5.2.3 Soundings

Tank soundings shall be taken frequently to determine the quantity of fuel in each tank per AFOSS. Ships should utilize installed radar tank level indicators (TLI) as the primary means of determining levels. Conduct manual soundings when accuracy of a TLI is in question.

8.5.2.4 Stripping

Stripping of tanks shall be accomplished per AFOSS/PMS.

8.5.2.5 Use of Service Tanks

Aircraft shall be fueled from service tanks only. In anticipation of fueling aircraft from a service tank, fuel from a storage tank shall be purified/filtered, and transferred to the service tank in advance to allow a maximum settling time prior to stripping the service tank. Fuel shall never be transferred into a service tank in use, since transferring will cause agitation of the settled fuel.

CAUTION

Recirculating valves shall be opened prior to starting the service pump. A caution sign shall be posted next to each pump controller stating, "Ensure recirculating valves are opened prior to starting this pump." Recirculating valves may be closed when off-loading JP-5 per AFOSS.

8.5.3 Fueling and Defueling

8.5.3.1 Fueling Aircraft

After stripping and sampling requirements have been met, the desired service tank shall be lined up for fueling aircraft, suction is taken on the tank, and fuel is pumped up through the filter to the refueling stations by the JP-5 service pumps. When pressure reaches the desired aviation fuel station, the station shall be operated in accordance with AFOSS then the fueling operation can begin.

1. Aircraft are normally fueled as soon as possible after recovery. It is the responsibility of each plane captain to notify the air wing maintenance coordinator in flight deck control if it becomes apparent that the fueling crew has missed his aircraft. It is also the plane captain's responsibility to request that his aircraft be topped off as necessary after a maintenance turnup.
2. Prior to the recovery, fueling crews shall be standing by or near their assigned stations to break out fuel hoses and begin fueling aircraft. Aircraft shall be properly grounded before fueling and all ground wires removed after fueling is complete.

WARNING

When electrical storms are within a 5-mile radius of the ship, all exposed refueling evolutions shall cease.

8.5.3.2 Hose Evacuation

Upon completion of fueling operation, place the quick disconnect (QD) in the off position, which will put the CLA-VAL in the defuel mode, evacuating the refueling hose. Restow hose upon completion of refueling operation.

8.5.3.3 Defueling Aircraft (CLA-VAL System)

Defueling of aircraft is accomplished by utilizing designated de-fueling hose reels at various refueling service stations, and transferring the fuel from the aircraft to the de-fueling main and back to the designated storage tank.

WARNING

Under no circumstances shall an aircraft containing JP-4 or JP-8 be de-fueled into the ship's fuel system. Fuel from aircraft shall not be de-fueled into ship tanks unless samples from all low point drains test 140 °F flash point (or above) and meet all other requirements for acceptance.

Note

Defuel shall not be conducted without an approved defuel chit.

8.5.3.4 Secure

Upon completion of fueling operation, secure station per AFOSS.

8.6 CATAPULT LUBE OIL SYSTEM

The Catapult Lube Oil System is a separate, independent system composed of pump(s), valves, and piping arranged to supply ready service tanks in catapult spaces. For more detailed descriptions, consult the current ship's Operational Sequencing System (OSS) and technical manuals for ship's individual systems.

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A catapult lube oil tank can be filled by a starboard fuel connection and by a flush deck type fill connection, suitable for attaching a funnel of the type used when filling from barrels, is provided on the hangar deck. The stowage tank can be provided with steam heating coils, overflow, sampling connections, a tank level indicating system, and thermometers.

8.6.1 Operation

Operating the Catapult Lube Oil System shall be per ship's Operational Sequencing System (OSS).

8.7 AIRCRAFT FUELING PROCEDURES

8.7.1 Fuel Loads

Requirements are published in the Air Plan. The Air Operations Officer shall authorize changes in published fuel loads.

1. Fuels Control Petty Officer relays fuel requirements to fueling crew leaders and fuel crewmen on the 4JG sound powered phones and/or flight deck communication circuits.
2. The AVFUELS Control Talker maintains aircraft fuel loads on the AVFUELS status sheet. The status sheet includes the type of aircraft, side number, start and final fuel load. The fueling crew leaders report to the AVFUELS Control Talker when fuel requirements have been met.
3. A fueling crew shall consist of a crew leader manning the 4JG at the fueling station, and a minimum of one nozzle operator per hose in use. A PQS-qualified fuels flight deck supervisor shall be available on deck to coordinate fueling operations and also acts as a safety petty officer.
4. Aircraft are refueled per the Air Plan. The Fuels Control Talker maintains accountability for fuel billing by recording on the fuel checker card the amount of fuel on board prior to fueling, after fueling, and the amount issued.

8.7.2 Fueling Stations

1. After the service pumps are started and piping is pressurized, turn on the de-fuel pump.
2. Open fueling station supply valves per AFOSS.
3. Connect ground wire from ship to aircraft.
4. Remove refueling adapter cap, connect nozzle to aircraft, place the toggle switch to the "on" position and commence the fueling operation.



Only single-point pressure refueling is authorized. Do not use over-wing nozzles to fill drop tanks, except when operational necessity dictates.

5. Upon completion of fueling and de-fueling aircraft, close fueling station per AFOSS.
6. JP-5 refueling/de-fueling in port may be accomplished with the approval of the commanding officer or his designated representative.

8.7.3 Hot Refueling

1. Hot refueling of jet aircraft, helicopters, and turboprop aircraft shall be accomplished with the permission of the Commanding Officer or his duly authorized representative, usually the Air Officer or ACHO. In instances where hot refueling and a pilot switch are being conducted, the new pilot shall already have been informed of intended fuel load by his ready room. Aircraft shall be chocked and have the initial (four-point/six-point) tiedown applied.

2. Only aircraft with single-point pressure refueling capabilities may be “hot” refueled (with engines running). Procedures for each model aircraft in the Aircraft Refueling Handbook (MIL-HDKB 844 [AS]) shall be followed. The engine with the propeller or intake nearest the aircraft-fueling receptacle shall be secured. Engines of an aircraft shall not be started while a fueling hose is connected to the aircraft.

WARNING

- Servicing the AV-8B’s water injection system/tank is NOT authorized during hot refueling.
- Aircraft shall not be hot refueled if it fails precheck. Failure of the precheck indicates a malfunction in the aircraft’s fuel system, which can result in a fuel spill and fire.
- Aircraft canopy and helicopter side doors (if installed) shall remain closed during the entire refueling evolution. Aircraft refueling operations shall be secured if canopy is opened.
- Crew changes and hot seating shall not be conducted during hot refueling.
- Exceptions:
 - Rear cargo doors and/or doors on opposite side of aircraft from the refueling adapter may be open, provided the refueling hose is positioned so that it is unlikely fuel sprays from nozzle/adapter malfunction or hose rupture will enter aircraft passenger/cargo/cockpit compartment(s).
 - The AV-8B aircraft may be hot refueled with the canopy open at the pilot’s discretion when high temperatures and humidity dictate, since the aircraft’s environmental control system does not operate with weight-on-wheels.
- The engine with the propeller or intake nearest the aircraft fueling receptacle shall be secured. Deviations are permitted only when specific aircraft NATOPS states to leave both engines running.

Note

- The F-18 Hornet is the only aircraft that can be “hot” refueled with both engines running.
- Aircraft with dual intake/single engine (e.g., T-45) shall install an intake safety cage on fuel connection side prior to hot refueling.
- Bow catapults slots seals shall be installed prior to fixed wing refueling/defueling evolutions.
- Waist catapults slot seals shall be installed immediately after flight operations. Slot seals are not required to be installed when flight quarters is set. Shuttles may be positioned forward or aft on the waist while refueling during flight quarters. Every safety precaution shall be observed due to complexity of refueling operations in the vicinity of the waist catapults.
- During helicopter hot refueling evolutions, fuel samples shall not be taken for testing prior to flight.

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3. While “hot” refueling, qualified squadron member shall watch his fuel quantity gauge and control the amount of fuel loaded aboard by signaling to the fueling crew when to stop the refueling.
4. Qualified squadron personnel are responsible for the proper alignment of fuel system switches in the cockpit, and thereby control the refueling process.

8.7.4 Fuel Spills

1. V-4 Division is responsible for cleaning up fuel spilled from faulty nozzles and ruptured hoses.
2. Squadron personnel are responsible for cleaning up fuel spills resulting from aircraft.
3. FOD Spill Team shall respond to major fuel spills on the flight deck.
4. All fuel spills shall be reported to Flight Deck Control.

Note

All spills shall be swabbed up immediately. The squadron concerned shall make the initial effort to prevent and clean up fuel spills caused by aircraft. Aviation fuels personnel shall augment and supervise the cleanup of spills and shall ensure that no hazardous condition exists as a result of the spill. In a major fuel spill, crash and salvage personnel, with the assistance of reflash watch and FOD cleanup crew shall respond to the containment and cleanup of the spill.

8.8 AVIATION FUELS QUALITY CONTROL AND SAMPLING PROCEDURES

8.8.1 Introduction

To ensure the high standards of aviation fuels delivered to aircraft and verify the accuracy of the portable fuel testing equipment, the facilities of the Petroleum Testing Laboratories shall be used per the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109.

8.8.2 Sampling Procedures

Samples shall be taken and tested per the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109 AFOSS, and current PMS requirements.

8.8.3 Shipping Samples

Aviation fuel sampling and shipping containers conforming to MIL-K-23714 (Kits Sampling Kits For Aviation Fuels; Reusable) shall be used and dispatched by the most expeditious method. Prior to extended deployment, samples shall be delivered directly to the shore-based lab by special courier in accordance with Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109, AFOSS, and current PMS requirements.

8.8.4 Test Result Action

If onboard lab results do not meet deterioration use limits as delineated in the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109, stop delivery of fuel to aircraft from suspected segment until the problem is corrected.

1. Resample suspected fueling point outlets. Deliver these samples to the quality assurance laboratory for immediate analysis. Resamples of initial contamination point shall include the marking RESAMPLE.
2. Refueling may continue from suspect fueling points if onboard resamples meet deterioration use limits.
3. If resampling confirms the existence of unacceptable fuel, isolate contaminated section until problem is corrected.

8.8.5 Record of Test Results

All aviation fuels quality surveillance logs shall be maintained per [Appendix F, Figure F-1](#) of this manual or [Appendix A, Figures A-1 through A-7](#), of the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109. Quality surveillance log sheet sample serial numbers shall be dated as Julian date and sequential number of the samples that have been run for that day.

8.8.6 Quality Surveillance Personnel

The Quality Surveillance Personnel shall be PQS-qualified. Their specific duties include, but are not limited to, the following:

1. Inspect and test all fuel being received onboard.
2. Inspect and test fuel during delivery to aircraft.
3. Inspect and test fuel prior to aircraft de-fueling.
4. Train fuel-handling personnel in quality control procedures.
5. Perform maintenance on associated equipment.
6. Maintain records of lab samples and daily checks.
7. Maintain a sampling chart in the quality surveillance laboratory, which readily identifies all service stations and the date and time sampled. In no case shall a refueling station go unsampled for longer than 24 hours while underway.

8.8.7 Log Books

V-4 Division JP-5 filter sample/pressure drop log and the equipment running logs shall utilize individual sheets in accordance with **Figure F-1** and **Figure F-3** of this manual or Appendix A, Figure A-7 and A-8, of the Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109. Each log sheet shall be reviewed by the supervisor, CPO, and Maintenance Officer every day and kept in V-4 division files for 1 year.

8.9 REPLENISHMENT, DISPOSITION, AND ACCOUNTABILITY OF AVIATION FUELS

8.9.1 General

Aviation fuels replenishment, disposition, and accountability require that close attention to established procedures shall be followed during every evolution.

8.9.2 Fueling, De-Fueling, and Internal Fuel Transfers

In port evolutions should be accomplished during daylight normal working hours by PQS-qualified fuels personnel.

1. The replenishment bill shall make provisions for:
 - a. Direct communications to topside watches and fuel transfer stations.
 - b. Use of check-off list and procedures for fuel system line-up and operation in accordance with AFOSS. Double checking of all fueling system valves is absolutely essential.
 - c. Ensuring that each member of the fueling detail is PQS qualified for watch station assigned.
 - d. Continuous sounding of tanks or gauge readings.
 - e. Precautionary measures to minimize the danger of fuel spills (blocked scuppers, drains and sufficient response materials).
 - f. Certification to the Commanding Officer, Command Duty Officer, or Officer of the Deck and the fuel supplier that the ship is ready in all respects to commence refueling operations.
2. Prior to receiving fuel, the fuel supplier shall provide: fuel grade, flash point, water and sediment readings and that fueling equipment has been tested and is in proper working condition.
3. Permission is required from the Senior Officer Present Afloat (SOPA) for aviation fuel handling evolutions in port after sunset. An information copy of such requests shall be directed to the Commander of the Naval Base.

8.9.3 Disposition

1. JP-5 shall not be discharged from shipboard systems into national/international water except in emergency conditions.
2. JP-5 stripping shall be discharged to designated contaminated tanks for consolidation and reclamation as JP-5 storage for future purification.
3. Preparation for JP-5 tank cleaning requires the maximum of advance planning and fuel consolidation to ensure conservation of fuel and environmental protection.
4. JP-5 stock depletion in preparation for shipyard availability requires consideration for readiness requirements and tank cleaning requirements prior to entering the shipyard.
 - a. JP-5 shall be consolidated within minimum number of tanks.
 - b. Tanks not emptied shall be filled to operating capacity.
 - c. In the event hot work is to be performed on or near JP-5 tanks, all JP-5 from the affected section(s) shall be off-loaded, and tanks shall be certified gas-free prior to entry.
5. Instructions for disposition of aviation fuels that fail to meet the deterioration use limits specified by Naval Air Systems Command (NAVAIRSYSCOM) are listed in NAVAIR 00-80T-109, Aircraft Refueling NATOPS.

8.9.4 Accountability

8.9.4.1 Receipt

Cognizant custodians of subject materials shall submit a written memorandum to the ship's Supply Officer immediately after each delivery stating the quantity received at a specific temperature. Receipts of petroleum products shall be governed by the following general regulations.

8.9.4.1.1 Receipts from Naval Activities

In as much as the quantity of fuel received from other Naval activities ashore and afloat shall be determined on the basis of the gauges of the issuing activity, the officer having cognizance of the fuel to be received shall examine the tanks of the receiving activity both before and after fueling to ensure that the ship has obtained the full amount ordered. In cases where it is impractical to check the gauges of the issuing activity, such as during replenishment at sea, the quantity invoiced shall be accepted as correct, unless known discrepancies are resolved with the issuing ship. Receipt of fuel from Naval sources shall be accepted as conforming to Navy specifications for the invoiced product. An analysis shall be furnished to the ship for all bulk fuels received. Samples shall be taken continuously during receipt.

8.9.4.1.2 Receipts from Commercial Sources

Shall meet specifications as outlined in NAVAIR 00-80T-109, Aircraft Refueling NATOPS Manual, MIL-HNBK-844(AS), and AFOSS.

8.9.4.2 Issues

The Aviation Fuels Officer shall submit fuel reports to each squadron and the Ship's Supply Officer at least bimonthly for the amount of aviation fuels issued to each organization.

8.9.4.3 Surveys

The Air Officer shall ensure that surveys are prepared after each replenishment of aviation fuel, if required, to account for shortages among invoiced quantities received. Survey or losses resulting from issue, stripping, or contamination shall be made monthly, as required, per TYCOM instructions.

1. Surveys resulting from differences in delivering activities' soundings shall be made as follows:
 - a. Reverify gallons required prior to underway replenishment (UNREP).
 - b. Re-sound all tanks and compare with soundings taken immediately after UNREP.

- c. Where questionable difference exists, contact issuing ship, explain nature of difference, and request corrected figure.
 - d. In cases where UNREP differences exceed 3 percent of transfer quantity, and if actions in steps a. and c. above do not reconcile differences, report the following data (as a minimum) to TYCOM via Naval message with TYCOM and issuing ship as info addressees.
 - (1) Subj: JP-5 UNREP difference.
 - (2) Date of UNREP.
 - (3) UNREP ship.
 - (4) Gallons received.
 - (5) Percentages of quantity difference in relation to total JP-5 onboard after UNREP.
 - (6) Dollar value of difference and document number of associated survey.
 - (7) Extenuating circumstances if applicable.
2. Surveys resulting from normal stripping, tank cleaning, or casualties to the aviation fuels systems shall be submitted per current directives. All surveys submitted shall include a condensed statement under the cause section as to how the fuel loss occurred.

8.10 AVIATION FUELS SECURITY WATCH

8.10.1 Basic Function

The Aviation Fuels Security Watch shall be stood by qualified V-4 Division personnel under the supervision of the Duty AVFUELS Petty Officer (AVFUELS POOW). All watchstanders shall be PQS-qualified under the AVFUELS (Afloat) PQS. This one-person watch shall be posted as prescribed below and maintain communication with AVFUELS POOW using a two-way radio. AVFUELS watch stander under instruction (UI) shall be assigned under the supervision of a PQS-qualified watch stander. The watch shall be posted and properly relieved by the Duty AVFUELS POOW. The Aviation Fuels Officer/Maintenance Officer is responsible for setting the aviation fuels watch. Logs shall be reviewed daily and maintained for a period of one year.

Note

V-4 Divisions not outfitted with two-way radios shall continue to make two-person rounds every 2 hours.

8.10.2 Fuels Watch

1. In port, during normal working hours, system not under pressure. Duty Section Supervisor shall make one round and report condition to the LCPO.
2. In port, during nonworking hours, system not under pressure. AVFUELS Watch Roving patrols shall inspect pump and filter rooms, flight and hangar deck fueling stations and MOGAS stowage area (when carried onboard) making one round every 2 hours and report to the AVFUELS POOW. If filter(s) has been drained, eliminate it from the watch.
3. At anchor, with system pressurized. AVFUELS Watch roving patrols shall inspect flight and hangar deck fueling stations, pump and filter rooms, and MOGAS stowage area (when carried onboard), one round every 2 hours, and report to the AVFUELS POOW. If systems are drained back, refer to [paragraph 8.10.2](#) steps 1. and 2.
4. Underway, at flight quarters. Below deck supervisor or his assistant shall inspect hangar bay fueling stations and MOGAS stowage area (when carried onboard) and unmanned below deck spaces twice per day/night shift and report conditions to the LCPO/AVFUELS Maintenance Chief.
5. Underway, not at flight quarters. Flight Deck AVFUELS Supervisor or assistant shall inspect flight and hangar deck fueling stations and MOGAS stowage area (when carried onboard) twice per day/night shift. Below Decks Supervisor or assistant shall inspect unmanned below deck spaces twice per day/night shift. Both supervisors shall report conditions to the LCPO/AVFUELS Maintenance CPO.

8.10.3 Duties, Responsibilities, and Authority

The Roving Aviation Fuels Security Watches shall:

1. Inspect each space or station on his post for the following:
 - a. Security of valves.
 - b. Leaks.
 - c. Gear adrift.
 - d. Unauthorized personnel.
 - e. Proper ventilation.
 - f. Lighting.
 - g. Excessive liquid in the bilge of each pump room.
 - h. Unauthorized smoking, open flames, or unauthorized welding in or around the aviation fuels system without proper authority and firefighting equipment.
2. Report the conditions of the AVFUELS system at the completion of each round to:
 - a. The OOD, if the ship is in port with no air wing embarked.
 - b. The Integrity Watch Officer, in Flight Deck Control, when the air wing is embarked.
3. Report all fires to the OOD immediately, giving class of fire, compartment number and name of space, frame number, reporter's name, and the number from which he is calling.

Note

In the event of a fire, the AVFUELS Petty Officer shall ensure that the aviation fuels system is secured and shall inform the on-scene leader of the affected areas and system components in the fire area.

4. Report to the Duty AVFUELS Petty Officer if any discrepancy is noted.
5. Perform such other duties as may be assigned.

8.11 ELECTRICAL CONTINUITY

The electrical continuity system provides a grounding path for fueling, defueling, and acts as an emergency shut off in the event of hose rupture. No aircraft shall be refueled without continuity unless approved by the Commanding Officer.

Note

If permission is granted by the Commanding Officer to refuel without electrical continuity, the station and nozzle operator shall maintain eye contact with each other and the aircraft being refueled. This method shall be utilized during emergency situations only. If continuity cannot be restored, TYCOM shall be notified.

8.11.1 Equipment

Maintenance of the electrical continuity system shall be shared by V-4 and E Divisions and be accomplished strictly per PMS and NAVSEA technical manuals.

8.12 MOGAS PROCEDURES

8.12.1 Stowage

MOGAS containers shall be stowed on the weather deck and located so that they can be readily jettisoned overboard. Upon return of the landing forces, some portable containers will have varying amounts of MOGAS or MOGAS plus oil mixtures remaining. These partially filled containers shall be consolidated or refilled as mission planning requires. Dedicated drums marked "MOGAS" and "MOGAS PLUS OIL MIXTURE" can be used for consolidation and/or reissue. When necessary, partially filled bladders may be stowed in approved 55-gallon rigid drums and the drums stowed on jettisonable racks until replenished or redeployed. A jettison locker shall be used to store bladders or safety cans that have previously contained MOGAS.

WARNING

- MOGAS is highly volatile even at low temperatures. The vapors are a fire hazard at all times. The flash point for the vapors is approximately -45°F .
- Deck stowage of safety cans and bladders that have contained MOGAS are not authorized at any time.
- All bladders and safety cans shall be inspected for leaks prior to placement into HAZMAT drums or lockers. Leaking or unsafe containers shall not be placed in HAZMAT drums or lockers.

8.12.2 Handling

The following precautions shall be adhered to in handling MOGAS:

1. No open flames, smoking, or hot work shall be permitted when handling gasoline or in gasoline hazard areas.
2. A warning plate shall be installed in a conspicuous place or placed near the access to possible gasoline hazard areas, inscribed in red letters 1-inch high: WARNING: GASOLINE HAZARD AREA. Smoking; use of naked lights, matches, or lighters; use of tools that may produce sparks; wearing of clothing or shoes with exposed metal attachments; and any other actions that could lead to ignition of gasoline vapors are not permitted.
3. Ventilation shall be sufficient to prevent accumulation of fumes.
4. Systems shall be grounded to prevent sparks from build-up of electric charges.
5. Only personnel trained in gasoline handling procedures shall be assigned to the issuing and handling of gasoline.

CAUTION

Because of the extremely hazardous nature of gasoline, it shall be used only when there is no suitable alternative to meet operational requirements. Only the minimum required amount (based on the expected usage rate for each deployment) shall be carried aboard ship.

CHAPTER 9

Cleanliness of Decks/FOD Prevention

9.1 GENERAL

The cleanliness of the flight deck, catwalks, scuppers, and hangar deck, and the prevention of foreign object damage (FOD) to aircraft engine shall be an all hands' responsibility. FOD is a principal cause of aircraft engine failure or damage that necessitates costly and time-consuming repairs and reduces operational readiness and combat effectiveness. Flight or hangar decks that are saturated or slippery due to POL spills can result in an aircraft sliding out of control and being damaged. In extreme cases, FOD and fluid spills can lead to the destruction of an aircraft and result in injury or death to personnel. A successful program that combats FOD and fluid spills requires active all hands participation in their prevention, timely reporting, and a thorough cleanup.

9.2 RESPONSIBILITIES

Cleanliness and FOD prevention shall be a joint responsibility of the Air Department, the embarked Air Wing, and all other departments/units that utilize any portion of the flight and/or hangar deck. Specific duties are delineated below.

9.2.1 Aircraft Handling Officer (ACHO)

The ACHO shall be assigned as FOD Prevention Officer. His duties are to perform the following:

1. Implement a vigorous FOD prevention and cleanliness program through all hands education and involvement, enforce high standards of flight and hangar deck cleanliness, and ensure that all possible measures for FOD prevention are taken.
2. Make recommendations to proper authority as to means of improving this program.
3. In collaboration with the Air Wing maintenance officer, assign a FOD supervisor.
4. Schedule a daily FOD walkdown while in port. Upon leaving port, two FOD walkdowns shall be completed prior to the first launch.
5. Ensure FOD Instruction is established and signed by the ships CO and the CVW Commander (CAG).

9.2.2 Flight Deck Officer (FDO)

The Flight Deck Officer shall assist the ACHO in the performance of his duties. Additionally, he shall be tasked with overall flight deck cleanliness. His duties shall include the following:

1. Ensure that padeyes, scuppers, safety nets, catwalks, and all other FOD retaining areas of the flight deck are cleaned regularly.
2. Develop an aggressive program of scrubbing the flight deck. The entire flight deck shall be scrubbed at a minimum of every 10 days while underway.
3. Ensure all support equipment and power hatches are opened and inspected during FOD walkdowns.
4. Advise the ACHO that an aircraft is not ready to be re-spotted due to FOD/fluid spills in the immediate vicinity of the aircraft.
5. Monitor the condition of the flight deck non-skid and effect required repair.
6. Make recommendations to the ACHO as to means for improving the program.

9.2.3 Hangar Deck Officer (HDO)

The Hangar Deck Officer shall assist the ACHO in the performance of his duties. Additionally, the HDO shall be tasked with overall hangar deck cleanliness. His duties are to perform the following:

1. Develop an aggressive program of scrubbing the hangar deck. The entire hangar deck shall be scrubbed at a minimum of every 10 days while underway.
2. Ensure that padeyes and all other FOD-retaining areas of the hangar deck are cleaned regularly.
3. Advise the ACHO that an aircraft is not ready to be re-spotted due to FOD/fluid spills in immediate vicinity of the aircraft.
4. Monitor the condition of the hangar deck non-skid and effect required repair.
5. Make recommendations to the ACHO as to means for improving the program.

9.2.4 Aviation Fuels Maintenance Officer

The Aviation Fuels Maintenance Officer shall provide the FOD team with two fuel spill carts.

9.2.5 Catapult and Arresting Gear Officer

The Catapult and Arresting Gear Officer shall ensure that the jet blast deflectors and barricade stanchions are raised during FOD walkdowns.

9.2.6 Air Wing Commander

The Air Wing Commander, through squadron commanding officers, officers in charge, and Air Wing Maintenance Officer, shall:

1. Implement and supervise FOD and spill prevention training programs for Air Wing personnel stressing such points as:
 - a. Active participation of all hands, including supervisory personnel for all FOD walkdowns.
 - b. Wearing proper flight deck uniform during flight operations and ensuring proper marking, stowage, and security of hand tools and large gear.
 - c. Policing the area around all aircraft to ensure that rags, safety wire, tools, and loose parts are accounted for and removed following maintenance or prior to any engine turn-up.
 - d. The necessity of preventing spills of petroleum-based fluids and grease on the flight or hangar decks.
2. Ensure that drip pans are utilized whenever maintenance requires a hydraulic jenny and/or could result in fluid spillage.
3. Provide an Air Wing Spill Tiger Team to immediately respond to clean up large spills.
4. Prior to embarkation, assign individual squadrons/detachments specific areas of responsibility for policing the flight deck, hangar deck, and catwalk areas.
5. Publish a monthly FOD walkdown list of the squadron responsible for supervising the daily FOD walkdowns.
6. Ensure that prior to an aircraft reported as up and ready for movement, the area around the aircraft is clean and free of any FOD or fluid spills.
7. Ensure that adequate numbers of personnel, particularly supervisory personnel, participate in FOD walkdowns.
8. Ensure that petroleum-based fluids are not dumped into the flight deck scuppers.

9.2.7 All Hands

1. Eating, drinking, chewing tobacco, and smoking are prohibited at all times on the flight deck, catwalks, hangar deck, and exposed areas in the island structure.
2. The wearing of hats or other loose articles of clothing is prohibited in the vicinity of operating aircraft engines. This particularly applies during aircraft engine turnups in port and to personnel viewing flight operations from exposed areas on the island structure.
3. No individual shall carry rags, papers, magazines, or other loose gear on his person on the flight deck during flight operations. FOD security pouches shall be worn to accommodate essential items required for flight operations that may be susceptible to falling on the flight deck.

9.2.8 All Departments

1. Ensure that areas assigned to or utilized by them on either the flight or hangar decks are maintained in a clean, "FOD free" condition as discussed herein. Specific areas of concern are fasteners, safety wire, tools and loose parts adrift on ground support equipment or boats, and trash or debris left on the deck and elevators after UNREPs, CONREPs, or VERTREPs.
2. Provide participants for FOD walkdowns.
3. Ensure that any large item received or transferred is plainly marked with the name of the recipient/sender.
4. Items that require/need stowage on hangar deck are coordinated with the Aircraft Handling Officer.

9.3 FOD PREVENTION METHODS

Many methods of FOD prevention that combine to greatly reduce FOD potential exist. Among these required methods are:

1. FOD walkdowns.
2. Clean maintenance.
3. FOD bags/containers/pouches.
4. Flight deck scrubber/sweepers.
5. Air/electric-driven vacuum cleaners/magnetic brooms.
6. Tool control.
7. Intake and exhaust covers.
8. Taping/covering aircraft accesses during long-term maintenance/long down time.
9. All hands education.
10. Command emphasis.
11. Enforcement methods.
12. Incentive programs.

9.4 CLEANLINESS ENHANCEMENT

The decks and associated areas must be kept as neat and clean as possible to provide an impressive appearance, to promote general health and attractiveness, and most importantly, to provide an acceptable level of safety and operational effectiveness, particularly when the criticality of aircraft movement and maintenance is considered. Likewise, equipment, tools, and maintenance-related items must be properly stowed and secured to reduce FOD

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hazard, to maintain material condition, to prevent loss and associated replacement expense, and to provide the desired level of safety and operational effectiveness. It is essential that users of the areas participate and cooperate in the overall effort to maintain an optimum state of cleanliness and security. Many methods exist, that when combined, greatly reduce deck slickness and POL buildup. Required methods are:

1. Clean maintenance practices.
2. Use of drip pans, fuel buckets during engine shutdown, etc.
3. Immediate cleanup of all fluid spills.
4. FOD walkdowns.
5. Scrubbers, sweepers, vacuums, etc.
6. Command emphasis and all hands education.
7. Stowage of power cables, hoses, support equipment, etc.

The ACHO shall assign specific areas of responsibility (AOR) on the flight and hangar decks to embarked squadrons and ships divisions/departments. The CAGMO or his representatives shall have a daily signoff sheet.

CHAPTER 10

Aircraft Maintenance

10.1 AIRCRAFT SERVICE FACILITIES

10.1.1 General

Personnel involved in aircraft servicing and maintenance shall be thoroughly familiar with the operating instructions and safety precautions when utilizing fixed service facilities and mobile support equipment to preclude injury and equipment damage.

10.1.2 Power Outlets

10.1.2.1 Location

A master status board in flight and hangar deck control shall be maintained by the Air Wing representative to provide availability and location of power outlets.

10.1.2.2 Responsibility

1. Maintenance and preservation of cable trunks, adequacy of cables, preservation of housing and fittings, and availability of service shall be per ship's standard organization and regulation manual.
2. The user shall report discrepancies or malfunctions of power outlets to flight or hangar deck control for coordination of repair.
3. The Chief Engineer shall provide a daily operational status report of all flight/hangar deck aircraft electrical servicing stations (AESS).

10.1.2.3 Safety Procedures

1. Plane captains and/or maintenance personnel shall ensure that the power is off prior to connecting or disconnecting power cables.
2. Ship's deckedge power shall be energized prior to turning on aircraft battery switches to avoid the possibility of causing reverse polarity in the ships 60-Hz motor generator power supply.
3. When inserting or removing the plug into receptacle of aircraft, avoid wrenching, twisting, or jamming movement. Such action may cause the aircraft receptacle pins to break and/or cause damage to the cable head. Do not pull on cable to remove — always grasp plug.

10.1.2.4 400-Hz AC Power/28-Volt DC Power

These installed cables are the primary service power. The following general procedures apply for use:

1. Remove the cable from its stowage area, ensuring sufficient slack to prevent tension on the plug. Ensure power is in the OFF position.
2. Cockpit shall be manned by a qualified individual prior to energizing power to ensure aircraft switches are in proper position.
3. At completion of use, de-energize power, remove cable, and properly stow.



When not in use or inoperable/no power source, cables shall not be left unattended nor left plugged into the aircraft.

10.1.3 Low-Pressure Air

Low-pressure air (125 psi maximum), is available from various outlets on the flight and hangar decks. This air supply is for use, as required, for spray painting, grinding, and general cleaning operations.

10.1.4 High Pressure Air

1. High pressure air (3,000 PSI) is available from various outlets on the flight and hangar decks.

WARNING

Serious injury may result from misuse of high-pressure air.

2. Only qualified personnel shall utilize the high-pressure air system using approved hose and fittings.
3. High-pressure air shall not be connected to any unit unless an approved, calibrated pressure regulator is included between the pressure source and the unit being charged/utilized.

10.1.5 Liquid Oxygen (LOX)

10.1.5.1 General

All aircraft that operate in a high altitude environment are provided with an oxygen supply system for life support of crewmembers. LOX is a light blue liquid that flows like water and is extremely cold.

WARNING

- LOX forms a combustible and explosive mixture when it comes in contact with flammable or combustible materials, such as wood, cloth, oil, and gasoline.
- Only qualified, licensed personnel shall operate LOX handling equipment. Personnel shall wear the following protective clothing to prevent skin and eye injury:
 - Face shield.
 - Coveralls (white).
 - Gloves (approved).
 - Safety shoes.

10.1.5.2 Safety Precautions

1. The work area and equipment shall be kept free of oil, grease, or any readily combustible material and marked in accordance with current visual landing aids bulletins.
2. Tools and clothing shall be free of oil and grease.
3. Smoking, open flames, or sparks shall not be permitted in the LOX-handling area.
4. When transferring LOX, adequate ventilation shall be provided to avoid an oxygen-rich atmosphere.

WARNING

Care shall be exercised to prevent storage and/or close proximity of LOX, fuel, and weapons at all times.

Note

LOX spillage on deck areas shall be avoided. In case of accidental spillage, the area shall be thoroughly ventilated. Drainage of LOX shall be caught in a clean drain pan and allowed to evaporate in an open area.

10.2 MOBILE SUPPORT EQUIPMENT**10.2.1 General**

Support equipment is important to the assigned mission of aircraft carriers. Many types of support equipment are required for handling, servicing, and maintaining aircraft. Air Department personnel are principal operators of the support equipment discussed herein and perform such servicing and pre-operational inspections as may be required.

10.2.2 Licensing Procedures

All personnel required to operate and/or maintain GSE equipment shall be properly licensed per COMNAVAIRFORINST 4790.2 series, The Naval Aviation Maintenance Program (NAMP).

1. Aviation Support Equipment Operator's Identification Card, OPNAV Form 4790/12, shall be required for personnel to operate a specific equipment onboard. If the equipment is self-propelled and driven as an automotive vehicle, the operator shall be required to possess a valid U.S. Government Motor Vehicle Operator's Identification Card (SF-46), in addition to a GSE operator's license.
2. Equipment listed on the GSE operator's license shall be specific as to model and type of equipment for which qualified.
3. Maintenance personnel shall not operate mobile equipment unless they possess a valid operators permit for the equipment used and first obtain clearance from AIMD to use the specific equipment. Arrangements for shipboard permits shall be made through the Aircraft Intermediate Maintenance Officer. Maintenance personnel shall not operate tow vehicles.
4. A page 4 entry shall be made in the trainee's service record upon satisfactory completion of a GSE licensing training course.
5. Commanding Officers of COMNAVAIRPAC/COMNAVAIRLANT ships shall establish and implement a GSE licensing training program within AIMD for ship/air wing personnel.

10.2.3 Safety Precautions

1. Operators shall ensure the path of intended movement is free of all obstructions prior to movement.
2. Vehicles shall be operated at moderate speeds commensurate with deck conditions.
3. Operators of tow tractors shall check towed aircraft frequently to ensure towbar security.
4. It is the driver's responsibility to follow the director/safety(s) directions. If in doubt, stop.
5. Air start hose on the tow tractor (A/S3A-31A) shall be a minimum of 28 feet in length and shall contain no more than one splice.
6. When exercising arresting gear engines, at least two tow tractors and a connecting bar shall be utilized.

10.2.4 Reporting Discrepancies in Aircraft Support Equipment

All equipment discrepancies discovered by users shall be reported to Flight Deck Control or air wing maintenance immediately. This report shall be made in person whenever possible. The CARAIRWING maintenance representative shall notify the proper maintenance work center, keeping the ACHO routinely informed of the discrepancy and progress made in correcting it.

10.3 AIR WING MAINTENANCE SUPPORT

10.3.1 General

One of the primary tasks of the Air Department is to provide needed support to the aircraft maintenance effort of the embarked air wing. Both the Air Department and air wing personnel shall work closely together to enhance the development of a smooth running Air Department/Air Wing team.

10.3.2 Aircraft Maintenance

Aircraft movements for a given operating schedule are normally planned well in advance of a flight deck evolution. In planning aircraft movements, spots, etc., the Aircraft Handling Officer (ACHO) shall know approximately how long it will take to repair various common discrepancies on a particular aircraft and what type of spot is required. All this requires a timely and constant exchange of information among the Aircraft Handling Officer, CARAIRWING maintenance representative, and squadron maintenance personnel. It is essential for the ACHO to have knowledge of aircraft maintenance and/or to have access to personnel who can advise him of aircraft maintenance requirements.

1. The ACHO shall familiarize himself with the status of all aircraft onboard, keeping current by quick exchange of information with the CARAIRWING maintenance representatives and the squadron maintenance representatives. Using the maintenance spot request sheets (see [Appendix G](#)), the ACHO can integrate required maintenance with operations.
2. In order to function most efficiently under all circumstances, the following are applicable:
 - a. Flight Deck Control shall be the nerve center for all planned/unplanned maintenance within the air wing. The squadrons shall keep Flight Deck Control (FDC) informed and aware of all maintenance associated problems as they occur, via the CARAIRWING representative. Herein, an accurate and timely status of each aircraft shall be maintained on the status board by maintenance representatives of each squadron, along with configuration and controlling discrepancies.
 - b. Whenever the status of an aircraft changes, the maintenance representative of the squadron concerned shall immediately report this information to the ACHO, via the air wing maintenance representative. Representatives shall be prepared to furnish such information as the ACHO may require for proper planning upon request. Failure to keep FDC informed of aircraft status changes, maintenance requirements, etc., will have a deleterious impact on the squadrons' ability to conduct maintenance, launch alert aircraft, or perform other deck-related functions. The ACHO shall know as soon as a squadron maintenance representative does.
3. All maintenance requests, requests for specific aircraft sortie assignments, and aircraft status changes shall be routed from the designated squadron maintenance chief through the Air Wing representative for consideration by the Aircraft Handling Officer.
4. All maintenance requests shall be submitted to the Air Wing representative prior to the last two recoveries of the day or night flight operations.

10.3.3 Aircraft Turn-Ups



Loss of mission capabilities may result when sustained direct/reflective exhaust is placed on the ship's Belknap Pole or the equipment attached.

10.3.3.1 General

All requests for maintenance turn-ups of aircraft shall be submitted to the Air Wing representative and approved by the Aircraft Handling Officer, or after flight quarters, by his designated NACHO. During the following periods, or under the following conditions, aircraft shall not turn up unless specifically authorized by the Commanding Officer, CDO, or OOD:

1. When Special Sea and Anchor Detail has been set.
2. During special weapons loading.
3. While at anchor or alongside a pier.
4. During underway refueling, replenishment, or rearming.
5. At such times where a high noise level will interfere with the safe operation of the ship.

10.3.3.2 Aircraft Turn-Up Classification

1. Low Power. Any aircraft turn-ups for maintenance shall be approved by the ACHO or designated representative.
2. High Power. Any aircraft turn-up exceeding 80 percent shall be considered a high power turn and shall be accomplished on the flight deck with high power chain and approved by the ACHO or designated representative.

10.3.3.3 Aircraft Security Requirements During Turn-Up

The following aircraft security requirements shall be arranged to provide an even restraint in opposite directions:

1. The parking brake (if applicable) shall be set, and the main mounts shall be chocked.
2. High Power. Aircraft shall be at permanent tiedowns and connected to a high-thrust tiedown chain that shall be secured to a normal padeye or high-thrust padeye.
3. Afterburner. Aircraft shall be at permanent tiedowns and connected to the applicable aircraft high-thrust tiedown chain that shall be secured to a high-thrust padeye.

10.3.3.4 Safety Precautions

In the interest of aviation safety and to ensure positive control over aircraft during maintenance turn-ups, the following additional precautions shall be taken prior to granting permission for maintenance turn-ups:

1. An Officer, CPO, or Petty Officer qualified as a turn-up supervisor shall be on the scene and in positive control of the turn-up evolution. Supervisors shall be designated in writing by the Commanding Officer/Officer in Charge of the squadron or unit concerned and shall be responsible for ensuring that all safety precautions are observed.
2. Intake screens shall be installed on jet aircraft.
3. A FOD walkdown shall be conducted in vicinity of the aircraft, with personnel paying particular attention to adjacent aircraft/equipment security and potential FOD that may be on/near such equipment.
4. Personnel in the vicinity of the turn-up shall wear proper ear/eye protection.
5. Jet high-power and afterburner turn-ups shall be permitted only with the tailpipe extended outboard toward the flight deck edge or elevator edge. Jet low-power turn-ups shall be spotted to avoid catwalks whenever possible. Propeller aircraft may be turned up on their spot; however, the supervisor shall carefully check the area of the aircraft for security and clearance.
6. Permission for conducting maintenance turn-ups shall not be granted when the noise level or jet blast/propwash will interfere with the safe conduct of other operations, such as vertical replenishment.
7. A qualified director shall ensure that the area around the aircraft is clear and that the spot is clear in all respects for the conduct of turn-ups.

10.3.3.5 Hangar Deck Procedures

The following additional procedures shall apply when conducting aircraft maintenance turn-ups on the hangar deck.

1. Afterburner or high-power turn-ups shall not be permitted. Low-power turns shall be authorized only if all safety requirements are met.
2. The ACHO or designated representative shall conduct a visual inspection of the overhead and bulkheads prior to conducting a low-power turn.
3. All turn-ups shall be made with the aircraft tailpipe or exhaust pointed outboard through the elevator wells.
4. Portside turns shall be restricted during fixed-wing recoveries to minimize noise in the vicinity of the LSO platform.
5. A 3MC warning announcement shall be made prior to aircraft start.

Note

- The FA/18 series and H-60 (APU operational test) are the only aircraft currently equipped to afford practical application of these procedures. No other type aircraft APU turns are authorized on the hangar deck.
- When deemed an operational necessity E-2/C-2 low-power turns in the hangar bay may be conducted at the discretion of the ACHO.
- Position the aircraft so the APU exhaust is directed overboard.
- Ensure cross-ventilation is provided.
- Follow all precautions listed in this instruction for aircraft turns in the hangar bay.

10.3.4 Immobilization of Aircraft

No aircraft shall be immobilized without specific permission from the ACHO or his representative. Flight Deck Control shall be immediately informed when the aircraft becomes mobile again.

10.3.5 Aircraft Jacking

The following procedures shall be adhered to when raising or lowering an aircraft on jacks.

1. Permission for jacking aircraft shall be obtained from the OOD via the ACHO.
2. Consideration shall be given to sea state, winds over deck, and ship's maneuvering.
3. Aircraft jacking shall be accomplished in accordance with the aircraft MIM.

WARNING

Aircraft shall not be jacked in the landing area while fixed-wing aircraft are airborne.

Note

The ACHO, without permission from the OOD, may approve request for single-point jacking.

4. Once the aircraft is on jacks, it shall be tied down with permanent tiedown chains specified for that type aircraft in a manner that will preclude the aircraft from shifting.

10.3.6 Additional Requirements

1. Any aircraft condition that can interfere with aircraft handling and flight operations shall be cleared through the ACHO, e.g., jacking, seat pulls, no brakes, wingspread.
2. Plane captains shall be available and at or near their aircraft from flight quarters to flight quarters.
3. At time of start engines, plane captains and maintenance personnel shall ensure that power cables, SINS cables (if required), and air hoses are hooked up or immediately available. Hook-ups shall not occur prior to 45 minutes before launch. Sharing and proper utilization of starting equipment shall be controlled and sequenced by the air wing maintenance representative. Aircraft on or near the catapults shall start first with aircraft requiring the most time to prepare for launch to follow in a logical order.
4. The ACHO shall have final approval for assigning GO and ALERT aircraft to each event specified on the air plan.
5. Arming/de-arming shall occur per air wing/squadron/type aircraft and weapon normal procedures. Minimum time shall be expended in the accomplishment of these evolutions; however, safety remains paramount.
6. Aircraft gross weight chits shall be properly completed and submitted to flight deck control 45 minutes prior to launch.
7. Only those personnel whose flight quarters duties require, and whose presence is absolutely essential, shall be permitted on the flight deck or in the catwalk during launch and recovery operations.

CHAPTER 11

Weapons Handling Procedures

11.1 WEAPON HANDLING PROCEDURES

Airborne weapon handling evolutions introduce a degree of risk in carrier operations that requires careful planning and preparation. The necessity to train for and to conduct combat operations requires the acceptance of certain risks that cannot be avoided in the handling of explosive weapons. Commanding officers shall continually weigh the requirement to perform each weapon evolution against the additional risk that is being interjected and accept only those evolutions in which the need clearly outweighs the risk. The Air Gunner/CVW Ordnance Officer shall ensure adequate ordnance supervision is maintained during all flight deck ordnance handling evolutions.

WARNING

Prior to the execution of any drill, specific consideration shall be given to ensure that the drill (scheduled or unscheduled) will not compromise ordnance handling safety.

Note

- During all ordnance handling evolutions above the second deck, compliance with the AFFF system and mobile firefighting equipment information in NAVAIR 00-80R-14 is mandatory.
- During ammunition replenishments, the application of electrical power for aircraft maintenance is authorized, provided electrical power is applied in accordance with the existing model MIMs and electrical power cables do not obstruct the movement of ammunition.
- Announced drills shall not be conducted during ammunition replenishment.

11.1.1 Weapon Definitions

1. Airborne stores — Tanks (fuel and spray), pods (refueling, photo, ECM, and so forth), nonexpendable training weapons, targets, and all similar items intended for carriage internally or externally by aircraft, including the racks, launchers, adapters, and detachable pylons used for such carriage. This definition applies to items that are not normally separated from the aircraft in flight.
2. Airborne weapons — All missiles, rockets, bombs, mines, torpedoes, pyrotechnics, ammunition, guns and gun pods, and all similar items intended for carriage internally or externally by aircraft. This definition applies to items that are normally separated from the aircraft in flight.
3. Arming — An operation whereby a weapon is changed from a safe condition to a state of readiness for initiation.
4. Arming area — That area where forward firing ordnance is changed from a safe condition to a state of readiness. All arming evolutions required to be accomplished in the arming area by the aircraft store loading manual/checklist shall be performed in this area. Before arming commences and until aircraft launch, the area in front of and behind the aircraft (forward of the raised JBD) shall remain clear.
5. Dearming area — That area where forward firing ordnance is changed from a state of readiness to a safe condition. All dearming evolutions required to be conducted in the dearming area by the individual store loading manual/checklist will be conducted in this area. The area ahead of and behind the aircraft must be kept clear until safing is completed. When taxiing aircraft from the landing area to the dearming area, care must be taken to minimize exposure of the armed forward firing ordnance to personnel and equipment.

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6. Downloading — An operation that removes airborne weapons/stores from an aircraft.
7. Hung weapons — Those weapons or airborne stores on an aircraft that the pilot has attempted to drop or fire in flight but could not be fired or dropped because of a malfunction of the weapon, rack/ launcher, or aircraft release and control system.
8. Intent To Launch (ITL) — Applies to weapons such as Harpoon, SLAM, JSOW, or ITALD for which the aircraft has initiated an electronic Intent To Launch signal, and whose launch has been aborted by the aircrew or failed prior to the separation of the weapon from the aircraft.
9. Loading (rearming) — An operation that installs airborne weapons/stores on or in an aircraft.
10. PASE — Pre-loaded Accessory Suspension Equipment.
11. Rearming area — That area where an operation is conducted that replenishes prescribed airborne weapons in/on an aircraft or where final dearming is accomplished following recovery and engine shutdown or following ground abort. Only loading, downloading, arming, and dearming authorized to be conducted in the rearming area by the individual store loading manual may be conducted in this area. All weapons handled or loaded in the rearm area shall be safe and remain safe.
12. Safing (dearming) — An operation whereby a weapon is changed from the state of readiness for initiation to a safe condition.
13. Strikedown — The movement of ammunition, explosives and/or aircraft from a pre-staged location on the flight deck to a location below decks.
14. Unexpended weapons — Weapons that have not been subjected to attempts to fire or drop. They are presumed to be in a normal operating condition and can be fired or jettisoned if necessary.

11.1.2 Weapon Movement

The presence of airborne weapons outside of designated magazines greatly increases the danger to the carrier should a fire or explosion occur. The greater the quantities of weapons involved, the greater the risk. To minimize this risk, only that quantity of weapons required to sustain operations shall be transferred to the hangar or flight deck.

With exception to actual loading evolutions, weapons on skids/trucks shall be positioned fore and aft and continuously attended.

Airborne weapons shall be positioned in such areas as to be readily available to afford adequate time for safe aircraft loading. Staging areas for assembled weapons shall be restricted to those areas that:

1. Are convenient to jettison locations.
2. Have at least two clear routes of access.
3. Are covered by sprinkler system or manned fire hoses.
4. Are located as far as practicable from fueling stations and LOX carts.
5. Are manned and have provisions for physically securing weapons.

The priorities that shall be utilized in locating staging areas for weapons include the following:

1. Flight deck outboard of island.
2. Hangar deck.
3. Sponsons.

Staging areas shall be used for ready service only, not for protracted stowage nor for extending the total weapons stowage capacity of the ship. All weapons in staging areas shall be on mobile trucks/skids.

All ordnance jettison ramps will be exercised daily prior to flight operations involving ordnance. Jettison ramps in the ordnance staging area will be rigged at all times that ordnance is present. All other ramps will be rigged when required as determined by the Air Gunner.

The aircraft elevators may be used to supplement and expedite transfer of weapons from the hangar deck to the flight deck. Coordination between the ordnance handling officer and the aircraft handling officer is necessary.

11.1.3 Weapon Loading/Downloading

Guidance for weapon loading/striekdown/downloading is provided in [Appendix I](#).

Compliance with the weapon requirements contained in the ordnance load plan demands close coordination between the aircraft handling group, ship's ordnance group, and air wing ordnance personnel. The Air Gunner shall maintain a status board that confirms type, quantity, and location of all weapons on the flight deck and/or aircraft. It is of particular importance that the aircraft handling officer be apprised of any peculiarities in configuration or status that may make certain aircraft unassignable for particular types of weapon loading.

The aircraft handling officer shall designate the aircraft to be loaded after coordination with squadron maintenance representatives. He shall provide ordnance personnel with the planned deck spot as early as possible to afford adequate time for required configurations and the performance of aircraft release and control system checks.

Simultaneous fueling, loading, and downloading of weapons to include preloaded IMERS/ITERS and "PASE" weapons and installation of fuzes and arming wires is authorized with the following warnings adhered to:

WARNING

- Loading/downloading and oxygen servicing, other than converter replacement at the aircraft, shall be conducted as separate evolutions.
- Refueling hoses shall not be connected to an aircraft which is undergoing loading/downloading of specific forward firing weapons (i.e. AIM-9, AIM-7) that require electrical connections to make contact during the loading/downloading evolution. Refueling hoses shall never be positioned under weapons being loaded/downloaded.
- No electrical connections between the aircraft and weapons or removal/installation of impulse cartridge shall be accomplished while fueling of the aircraft is in progress.
- When electrical storms are within a 5-nautical mile radius of the ship, all exposed ordnance evolutions shall cease until the condition clears the 5-mile radius. Ordnance handling shall be limited to the dearming of recovering aircraft during atmospheric disturbance.

When required, electrical power may be applied during the aircraft loading/downloading evolution but will be held to a minimum consistent with operational commitments. Electrical power to the armament or weapon release and control circuitry shall not be applied while weapons are being loaded/downloaded.

The flight deck is always the preferred area to load aircraft. Loading is permitted while recovery of aircraft is in progress. However, all efforts shall be made to ensure the movement of ordnance does not impede the safe and efficient recovery and movement of aircraft. In any event, only the minimum quantity of weapons required shall be moved toward the bow during recovery operations.

Note

The preferred area to load AGM-114 Hellfire is spot 3 or 4.

Properly equipped EOD/weapons personnel shall be stationed in flight deck control to provide technical assistance and weapon disposal. The Air Gunner/Air Wing Ordnance Officer shall maintain a status board/ADMACS/ISIS that confirms type, quantity, and location of all weapons on the flight deck and/or aircraft. Additionally, weapon cookoff times shall be conspicuously posted in plain view of the aircraft handling officer.

Loading limited amounts of weapons on the hangar deck may be authorized by the commanding officer when the operational necessity so dictates the acceptance of the additional risk of fire with fuel and explosives in a confined area. Authorization for loading on the hangar deck shall be limited to those aircraft scheduled for the next launch or on an alert condition, and is restricted to the particular weapons indicated in [Appendix I](#).

WARNING

- Personnel shall not approach an aircraft to perform weapons system checks while the engine(s) is turning until cleared to do so by the ordnance arming supervisor. The ordnance arming supervisor shall be positioned in full view of the pilot and shall have the pilot's attention.
- When electrical storms are within a 5-nautical mile radius of the ship, ammunition and explosives operations in exposed locations shall be halted. Exception: if aircraft recovery operations are in progress during storm conditions, dearming of forward firing weapons on recovered aircraft will continue until recovery operations are complete. Ammunition or explosives with exposed electro explosive devices (EEDs) shall then be struck below decks. Ordnance testing is not authorized in any ship location when electrical storms are within 5 nautical miles of the ship. Operations shall not resume until the storms are outside the 5-nautical mile radius. Loading or offloading ammunition or explosives during high winds or rain is at the discretion of the Commanding Officer.

Note

- The mechanical latching on aircraft racks/launchers shall be completed before the engine(s) on that aircraft is started for launch.
- Inert conventional weapons and captive air-launched missiles shall be loaded/downloaded and armed/dearmed in the same manner as live weapons.

11.1.4 Arming

Weapons/bomb racks/launcher arming functions to be performed after engine turnup are defined in the individual store loading manual/checklists. Final arming of forward firing weapons shall be conducted in the arming area just prior to launch.

All evolutions authorized in the rearming area may be accomplished after engine turnup and prior to taxi. Those evolutions authorized to be accomplished only in the arming area shall be conducted as follows:

1. The Air Gunner or a designated Air Wing Ordnance Coordinator shall supervise all arming evolutions.
2. Assigned Air Wing Arming Coordinators shall be positioned on the bow and waist catapults during launch to oversee all aircraft final arming.
3. The CVW Ordnance Officer shall assign arming crews.

4. Each arming crew shall be supervised by a safety coordinator who will coordinate actual arming with aircraft crew director.
5. Aircraft arming shall be conducted only when the aircraft is at a complete stop, the area in front of the aircraft is clear and remains clear, and only after the director has turned the aircraft over to the arming crew safety coordinator.
6. Actual arming may take place at any time after the following conditions are met: The aircraft is forward of the raised JBD, Flaps are in the takeoff position, the nose launch bar is resting on the top of the shuttle, and all personnel are clear of the missile path.

WARNING

Arming crews shall use extreme caution when exiting an armed aircraft to avoid exposure to exhaust end of missiles, gun barrels, and aircraft intake/exhaust. Exit paths for each type aircraft will be formalized by the Air Gunner/CVW Ordnance Officer to provide the least hazard to arming crewmembers.

Note

For CVN (Nimitz class) ships, on catapult two, lowering of the port outboard JBD panel upon completion of the arming evolution is authorized when required to prevent fouling the deck during simultaneous aircraft recovery operations.

7. Arming signals shall be in accordance with Chapter 5 of the Aircraft Signals NATOPS Manual (NAVAIR 00-80T-113).

11.1.5 Intent to Launch Weapons

Harpoon/SLAM/JSOW/ITALD is an automatic launch sequence that has been initiated and subsequently been aborted by the aircrew prior to weapon separation from the aircraft. A Harpoon/SLAM/JSOW/ITALD shall be considered as a hung weapon whenever a Harpoon/SLAM/JSOW/ITALD signal has been sent to the missile and it has then either failed to release or its release has been aborted prior to separation of the weapon from the aircraft.

If a JSOW Intent To Launch (ITL) is verified, wait 3 hours before proceeding with unloading. After 3 hours, disconnect weapon adapter cable. If weapon must be downloaded prior to 3 hours elapsed time from ITL, wrap cargo strap or aircraft tiedown chain around weapon and wings approximately 3 inches aft of adapter cable receptacle.

WARNING

- Initiation of the ITL signal activates a battery within Harpoon/SLAM. With battery power available within the missile, electrical shorts occurring during aircraft recovery and/or while disconnecting the missile umbilical from the aircraft may actuate the missile engine/pyrotechnics. Battery voltage will remain sufficiently high to allow engine start for up to 35 minutes following ITL and to fire missile launch squibs within Harpoon/SLAM for up to 2.5 hours following ITL.
- If an ITALD ITL is verified, do not remove launch adapter umbilical connector from weapon if possible ITL exists. Move aircraft to safe area, download missile and move missile to safe area until 2.5 hours have elapsed from time of ITL. Remain clear of aft end of missile.

Ships/squadrons shall prepare and publish Harpoon/SLAM/JSOW/ITALD abort/failure procedures as standard operating procedures that shall be used by aircrew, aircraft handling, and maintenance personnel whenever Harpoon/SLAM/JSOW/ITALD abort/failure situations occur.

11.1.6 Hung/Unexpended Weapons

Flight leaders shall advise the ship as early as possible of the amount, type, and when applicable, the Harpoon/SLAM/JSOW/ITALD abort/failure elapsed time of hung or unexpended weapons in the flight. Guidance as to whether or not to recover an aircraft with hung/unexpended weapons is provided in [Appendix I](#).

The pilot shall advise the ship in marshal when hung or unexpended weapons exist on aircraft. He shall give marshal a Harpoon/SLAM/JSOW/ITALD abort/failure time for all Harpoon/SLAM/JSOW/ITALD. When calling the ball, he shall advise that he has hung, unexpended, or Harpoon/SLAM/JSOW/ITALD weapons on board. For these reports, unexpended weapons do not include those weapons that are routinely returned aboard (such as air-to-air missiles). Only the last (most recent) Harpoon/SLAM/JSOW/ITALD abort/failure time should be reported to marshal when more than one Harpoon/SLAM/JSOW/ITALD weapon is present on the aircraft.

The Air Officer shall announce over the flight deck announcing system when the approaching aircraft has hung or unexpended weapons, stating the aircraft model and type of weapon(s) and when applicable, the Harpoon/SLAM/JSOW/ITALD abort/failure elapsed time.



WARNING

When aircraft are landed with hung weapons, only required personnel shall remain in the vicinity of the landing area. All other personnel shall take cover.



CAUTION

In order to minimize operational impact and potential damage to ordnance (i.e., Sidewinder uncaged and/or missile not securely held by launcher detent lugs) during initial aircraft carrier qualifications fly-aboard with training missile(s) shall be restricted to “touch and go,” “trap cat trap” followed by dearming procedures in designated dearming area. Aircraft shall immediately shutdown to accommodate weapon(s) download prior to next event.

11.1.7 Dearming

All dearming evolutions will be conducted in accordance with the individual aircraft store loading manual/checklist. When dearming is required before engine shutdown, all required dearming procedures will be accomplished in the dearming area. All further safing evolutions that are authorized to be conducted after engine shutdown may be accomplished after taxi to the shutdown spot and must be accomplished before respotting to the hangar deck. All dearming required to be accomplished in the dearming area will be accomplished as follows:



WARNING

The area immediately in front of an aircraft with forward firing ordnance must be clear and remain clear until dearming is completed. Sweeping of personnel/equipment by armed aircraft must be minimal.

1. The Air Gunner or a designated Air Wing Ordnance Coordinator shall supervise all dearming evolutions. He shall ensure coordination exists between the directors and dearming crew. He shall indicate to the director those aircraft that require safing before taxi to the recovery spot.

WARNING

Dearming crews shall use extreme care when approaching an armed aircraft to avoid exposure to exhaust end of missiles, gun barrels, and aircraft intake/exhaust. Entry paths for each type aircraft will be formalized by the CVW Ordnance Officer to assure the least hazard to arming crewmembers.

2. Aircraft dearming shall be conducted as soon as practicable after taxiing clear of the landing area or, if necessary, in the landing area at the discretion of the air officer. Dearming shall be conducted only when the aircraft is at a complete stop, the area in front of the aircraft is clear and remains clear, and only after the director has turned the aircraft over to the dearming crew coordinator.
3. If more than one HH-60 to be de-armed with AGM-114 Hellfire, the second aircraft will not be permitted to land until the first aircraft is de-armed.

Note

Flight deck helo spot 4 will be primary de-arming and spot 3 will be secondary de-arming area.

4. The Air Gunner or designated Air Wing Ordnance Coordinator supervising dearming shall ensure sufficient safety personnel are positioned to keep the area in front of the aircraft clear.
5. Dearming signals shall be in accordance with Chapter 5 of the Aircraft Signals NATOPS Manual (NAVAIR 00-80T-113).

Aircraft landing with hung weapon(s) and/or forward firing weapon(s) shall be safed as soon as practicable after taxiing clear of the landing area or, if necessary, in the landing area at the discretion of the air officer. They shall be stopped with a clear area ahead when forward firing weapons are involved and safed in accordance with NAVAIR weapons/stores loading checklist and/or EOD emergency procedures, if applicable, prior to being taxied into the recovery spot. Aircraft safing signals shall be in accordance with Chapter 5 of the Aircraft Signals NATOPS Manual (NAVAIR 00-80T-113).

For the Harpoon/SLAM/JSOW weapon, aircraft respot is prohibited until the after-landing or ground-abort portion of the aircraft store loading manual has been complied with. A 3-foot wide by 8-foot long clear zone shall be established behind the missile; this clear area and the area beneath the missile shall be maintained clear for a 2.5-hour period following Harpoon or SLAM and a 3 hour period following JSOW.

Aircraft landing with unexpended weapon(s) shall have weapon(s) safed in accordance with NAVAIR weapons/stores loading checklists and in all cases prior to commencement of any postflight checks or refueling of the aircraft.

WARNING

Downloading of aircraft shall not commence until that aircraft's engine(s) is shut down.

11.1.8 Maintenance on Loaded Aircraft

Maintenance shall not be conducted on aircraft loaded with weapons; however, routine servicing and minor maintenance that would ready the aircraft for the next launch may be conducted with the following restrictions.

1. Weapons shall be safed to the maximum degree as specified in the NAVAIR weapons/store loading checklists.
2. When the weapon loaded placard/sign required by the individual aircraft store/weapon loading manual checklist is in place, the maintenance or servicing of loaded aircraft that requires application of electrical power is limited to the following:
 - a. Refueling.
 - b. Replacement and checkout of communication and navigation equipment.
 - c. Replacement and checkout of engine performance and flight instruments.
 - d. Engine turnup for checkout.
 - e. Flight control and hydraulic system checks.
3. Maintenance requiring the application of electrical power to the armament or weapon release and control circuitry shall not be performed while weapon(s) are loaded or are being loaded/downloaded.
4. An aircraft requiring extensive troubleshooting, engine removal, complete jacking, etc., is not considered readily available for flight and shall be downloaded prior to commencement of the required maintenance.

Downloading includes removal of all impulse cartridges from ejector racks/breeches and all rounds of ammunition from feed chutes/feed mechanisms of internal guns.

11.1.9 Abort/Strikedown

The flight deck is always the preferred area for downloading weapon(s). If it is required to strike below loaded aircraft, weapon(s) shall be immediately downloaded from aircraft after reaching the hangar deck unless that aircraft includes the following:

1. Readily available for flight and scheduled for the next launch.
2. In an alert condition.
3. Requiring only such maintenance or servicing as previously permitted on aircraft loaded with weapon(s).

In any abort/strikedown situation, the abort/afterlanding procedures for the particular weapons that are prescribed in the NAVAIR weapon/store loading checklists/SRCs shall be accomplished before the aircraft is moved to the hangar deck.

WARNING

- Bomb rack ejector/jettison cartridges shall be removed from all aircraft stations prior to or immediately after strikedown of the aircraft to the hangar deck. Ejector/jettison cartridges may remain in the BRU-9/10/11 ejector bomb rack provided the rack is electrically disconnected and either the mechanical safety pin is installed or the in-flight operable bomb rack lock (IFOBRL) mechanism is locked (as applicable).
- Certain weapons are specifically excluded from the provisions of this section. Refer to [Appendix I](#) for a listing of those weapons that may not be struck below while loaded on an aircraft.

For a Harpoon/SLAM/JSOW abort/failure, respot of the aircraft is prohibited during peacetime operations until 2.5 hours have elapsed for Harpoon/SLAM and 3 hours for JSOW. Under combat/emergency conditions and after 35 minutes from Harpoon/SLAM/JSOW, download prior to completion of the 2.5-hour for Harpoon/SLAM and 3 hours for JSOW waiting period is authorized providing the missile is moved to a safe area of the flight deck with the nose-oriented outboard over the deck edge. A safety watch shall be assigned to maintain the safe zone clear. Harpoon/SLAM/JSOW weapons shall not be staged in the normal weapon staging areas, but shall be placed in a separate designated area that meets weapon staging area criteria and is in the immediate vicinity of a jettison ramp. After 2.5 hours for Harpoon/SLAM and 3 hours for JSOW has elapsed, strikedown of a weapon and return to storage is authorized.

11.1.10 Emergency Procedures

In case of fire or danger of fire near weapons, the weapons shall be moved to a safe area or jettisoned as the situation dictates.

1. Armed aircraft returning to the ship with an emergency shall be de-armed immediately after landing in the landing area prior to the aircraft being towed.
2. Aircraft returning with suspected gun jam shall be de-armed in the de-arming area and parked in a designated area with aircraft pointing over the water in a safe position for further troubleshooting.

APPENDIX A

Daily Secure Checklist and Log

(This log shall be filled out each day and provided by the FDO to the ACHO as required in [Chapter 2](#))

DATE _____

BAYS/FLYS: All aircraft are in final spot, chocked, and tied down with at least intermediate chains. All chocks, towbars, and loose gear are secured and tied down. All unused power cables and air hoses have been stowed by the Air Wing (if not, inform the ACHO).

BAY/FLY #1: In addition, the following have been checked: Jack staff, bow rails, hand rails, antennas, catwalks, and bomb jet ramps. ELEVATOR 1 IS/IS NOT SPLIT.

TIME /SIGNATURE /TEL #

BAY/FLY #2: In addition, the following have been checked: Handrails, catwalks, antennas, and bomb jet ramps. ELEVATOR 2 IS/IS NOT SPLIT.

TIME /SIGNATURE /TEL #

BAY/FLY #3: In addition, the following have been checked: Handrails, catwalks, stern lines, antennas, and bomb jet ramps. ELEVATOR 3/4 IS/IS NOT SPLIT.

TIME /SIGNATURE /TEL #

FUELS: All fuel hoses and equipment are properly stowed, fuel stations swabbed dry, and fuel watch set.

TIME /SIGNATURE /TEL #

TRACTORS: All tractors and equipment are secured and chocked in line, nose to tail, fore and aft, with at least one chain on each end.

TIME /SIGNATURE /TEL #

CRASH & SALVAGE: Mobile equipment is secured, chocked, and chained fore and aft (crash dollies, CVCC, forklift, MFFV, etc.)

TIME /SIGNATURE /TEL #

SQUADRONS: All GSE equipment is tied down and chocked (jennies, jacks, work stands, screens, LOX carts, etc.). All power cables and air hoses not in use are secured. The flight deck areas assigned are clean and secure. The area under and around my aircraft is clean, neat, and free of fluid spills.

TIME /SIGNATURE /TEL #

WEAPONS: All ordnance and ordnance handling equipment (MERS, TERS, and HLU-196 bomb hoist), as well as all bomb elevator stanchions, etc., are properly secured.

TIME /SIGNATURE /TEL #

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NAME/TELEPHONE	SQUADRONS	TIEDOWNS	
		PERMANENT	HEAVY WEATHER
_____ / _____	F-18 E/F()	14	20
_____ / _____	F-18 E/F()	14	20
_____ / _____	F-18 E/F()	14	20
_____ / _____	EA-18 G()	14	20
_____ / _____	F-18 A/D()	12	18
_____ / _____	F-18 A/D()	12	18
_____ / _____	EA-6 ()	12	18
_____ / _____	H-60 ()	12	16
_____ / _____	H-60 ()	12	16
_____ / _____	E-2 ()	14	20
_____ / _____	C-2 ()	14	20
_____ / _____	OTHER ()		

APPENDIX B**Squadron Launch and Recovery Brief**

(For Air Department briefing referred to in [Chapter 3](#))

B.1 INTRODUCTION

1. Air Department:
 - a. Organization.
 - b. All Division areas of responsibility.
 - c. Catapult spotter's dual responsibility to the V-1 Division and catapult officers during operations.
2. All Air Department key players J-DIAL phone numbers.

B.2 AIR BOS'N BRIEF

3. Flight deck uniforms.
4. Hook point inspection message.
5. Flight deck indoctrination.
6. Aircraft firefighting.
7. Procedures for personnel crossing the landing area during flight operations.
 - a. If crossing the landing area is absolutely necessary during flight operations the Arresting Gear Officer is the only one who can authorize your crossing.
 - (1) Stay clear of the foul line; check the aircraft in the pattern.
 - (2) If the pattern is clear, get the Arresting Gear Officer's attention, and indicate your desires by pointing across the deck.
 - (3) The Arresting Gear Officer shall check the pattern. If the pattern is not clear, you will see no response from him. The Arresting Gear Officer is busy and will continue with his duties.

WARNING

Ensure you do not confuse the "clear deck" signal with the "clear to cross" signal.

- (4) If the pattern is clear, he will point at you and, with a circular motion, point to the other side of the landing area. A red wand shall be used to point at night.
- (5) After receiving clearance, run straight across the deck. Stay at least 10 feet aft of the No. 1 wire. This will prevent tripping over the wire supports or being struck by the No. 1 wire during the wire retraction.

B.3 DIRECTOR BRIEF

1. Hand signals.

B.4 CATAPULTS

1. Installation:
 - a. Type.
 - b. Description.
 - c. Basic operation.
 - d. Capabilities and limitations.
2. Preparation for launch:
 - a. Procedures for establishing gross weights.
 - b. Procedures for determining CSV setting.
 - c. Review flap, trim tab settings, and stabilator positions for applicable aircraft.
3. Pilot procedures (launching) — Review paragraph 4., “Special Instructions to the Pilot,” in all applicable Zero-Dash Aircraft Launching Bulletins.
 - a. Taxiing to catapult:
 - (1) Concentrate on following the director closely, especially at night.
 - (2) Reaction time is most important for a good shot.
 - (3) Do not allow spotter to bring you up too fast; if in doubt, STOP.
 - (4) Approaching catapult, the Weight Checker shows gross weight:
 - (a) Review signals (day and night):
 - 1) Gross weight correct.
 - 2) Raise gross weight.
 - 3) Lower gross weight.
 - (b) Maximum changes allowable and procedures to verify changes if in excess of maximum.
 - b. Approach to, spotting on, and launch from catapult — review following applicable signals (day and night):
 - (1) Come ahead.
 - (2) Slow.
 - (3) Stop.
 - (4) Turn (fine correction).
 - (5) Nose wheel steering:
 - (a) Engage.
 - (b) Disengage.
 - (6) Tiller bar (if required):
 - (a) Insert.
 - (b) Remove.

- (7) Launch bar down.
- (8) Nose strut extension or lowering.
- (9) Main mount extension — (C-2) (after launch bar is lowered).
- (10) Ease into holdback.
- (11) Pushback:
 - (a) Reasons — anytime aircraft is in holdback and:
 - 1) Engages tension bar too hard.
 - 2) Off spot.
 - 3) Holdback man misses hook-up.
 - 4) Aircraft down.
 - 5) Catapult down.
 - (b) Procedures — follow director's signals, normally:
 - 1) Pushback.
 - 2) Stop.
 - 3) Reverse thrust — (C-2), (E-2).
- (12) Catapult in first ready/cat ready — Deck Edge Operator to Launch Officer/ICCS Officer to Catapult Safety Observer.
- (13) Hook-up.
- (14) Tension:
 - (a) BRAKES OFF.
 - (b) Power in accordance with aircraft NATOPS and Launch Bulletin.
 - (c) Raise aircraft launch bar (for applicable aircraft).
- (15) Director pass aircraft to Launch Officer/Catapult Safety Observer.
- (16) Power in accordance with aircraft NATOPS and Launch Bulletin:
 - (a) Check aircraft.
 - (b) Observe location of squadron maintenance and ordnance checkers.
- (17) Two finger turn up to 100 percent (One finger for E-2/C-2).
- (18) Burner (Open palm of hand held above head):
 - (a) CRT (Combat Rate of Thrust) if required.
- (19) Salute. Ensure sufficient time is allowed after saluting for the pilot to place his hand on the control stick.
- (20) Launch — If the deck is pitching, the launch cycle is timed and the fire signal given so that the deck shall be level, pitching up, or at the top of the pitch cycle at the completion of the catapult power stroke.

c. Clearing turns:

- (1) Only during day VFR launches.
 - (a) To the right off bow catapults.
 - (b) To the left off waist catapults.

d. Emergency Procedures — Review applicable signals (day and night):

- (1) Suspend.
 - (a) What.
 - (b) Why.
 - 1) Catapult/hook-up malfunction.
 - 2) Improper launch bar paint scheme.
 - 3) Pilot/aircraft malfunction.

Day — pilot shake head negatively “NO”.

Night — do not turn on lights, or if lights are on turn off.

Transmit, “SUSPEND, SUSPEND CATAPULT #___.” Primary shall attempt to suspend the catapult. (If your lights have already been turned on, it may be too late to suspend the launch.)

- (c) Be prepared to be launched.

WARNING

The difference between the SUSPEND signal and the EMERGENCY STOP signal shall be fully understood by the air wing pilots. The SUSPEND signal is arms crossed overhead with HANDS OPEN. The EMERGENCY STOP signal is arms crossed overhead with FISTS CLENCHED. At night, a single RED wand held vertically overhead indicates the SUSPEND signal; RED and GREEN wands crossed overhead indicates the EMERGENCY STOP signal. This difference shall be explained in order that the pilots fully understand that the Catapult Officer/Catapult Safety Observer shall be able to indicate “ON” or “OFF” brakes (i.e., OFF brakes during a SUSPEND; ON brakes for a premature launch, T-bar breakage, holdback malfunction, etc.).

- (d) Catapult Officer or Catapult Safety Observer shall give the suspend signal followed by the shuttle aft signal.
- (e) When shuttle moves aft, the launch bar will raise, or a signal shall be given to raise the launch bar; the shuttle shall then be moved FWD to clear the launch bar.
- (f) Throttle back only on signal from Catapult Officer or Catapult Safety Observer. (day and night signal.)
- (g) Catapult Officer/Catapult Safety Observer shall turn control of the aircraft back to the director after catapult shuttle is free of the aircraft.

- (2) Hangfire:
 - (a) What.
 - (b) Why.
 - (c) Pilot procedures remain the same as those for “suspend.”
- (3) Removing aircraft from catapult:
 - (a) Buffer signals.
 - (b) Pushback.
- e. Catapult Endspped:
 - (1) Minimum endspped (10 to 15 knots excess).
 - (2) Pilot advised when excess.
 - (a) Less than 10 knots.
 - (b) More than 20 knots.
 - (3) Endspped determination.
 - (a) DESI.
 - (b) Wind over the deck.

B.5 IMPROVED FRESNEL LENS OPTICAL LANDING SYSTEM (IFLOLS)

A complete lens brief is given by LSO; however, the following is a list of points to cover:

- 1. Ship Installation:
 - a. Stabilization.
 - (1) Line.
 - (2) Inertial.
- 2. Hook to ramp clearance.
- 3. Hook touchdown point.
- 4. Report difficulties/lens problem to V-2.

B.6 ARRESTING GEAR

- 1. Installation:
 - a. Type.
 - b. Description.
 - c. Basic operation.
 - d. Capabilities and limitations.
 - e. Off center engagements.

- f. Deck pendants:
 - (1) Target wire.
 - (2) Pendant locations.
- 2. Pilot procedures (arresting):
 - a. Upon arrestment.
 - (1) Power on (except for reciprocating engine aircraft).
 - (2) Speed brakes in.
 - (3) Power off — as soon as arrestment assured.
 - (4) ACCEPT ROLLBACK (turbo prop use reverse thrust).
 - (5) Look for gear puller.
 - (6) Hook “up” signal.
 - (7) Flaps up, and fold wings.
 - b. If hung up in gear — pull back:
 - (1) Follow director’s signals. If in doubt, STOP. Do not act on own initiative, request clarification (UHF).
 - (a) Hook “down” (mandatory for pull back).
 - (b) Off brakes.
 - (c) Pull back (turbo props use reverse thrust).
 - (d) Hook “up”.
 - (2) Do not ride brakes during pull back or hook will remain engaged.
 - c. Clearing arresting gear:
 - (1) Follow director’s signals.
 - (2) Clear gear expeditiously but SAFELY.
 - (3) “No brakes” signal — hook DOWN — Notify primary; turn on navigation lights at night.
- 3. Procedures for personnel crossing the landing area during flight operations.
 - a. If crossing the landing area is absolutely necessary during flight operations the Arresting Gear Officer is the only one who can authorize your crossing.
 - (1) Stay clear of the foul line; check the aircraft in the pattern.
 - (2) If the pattern is clear, get the Arresting Gear Officer’s attention, and indicate your desires by pointing across the deck.
 - (3) The Arresting Gear Officer shall check the pattern. If the pattern is not clear, you will see no response from him. The Arresting Gear Officer is busy and will continue with his duties.

WARNING

Ensure you do not confuse the “clear deck” signal with the “clear to cross” signal.

- (4) If the pattern is clear, he will point at you and, with a circular motion, point to the other side of the landing area. A red wand shall be used to point at night.
 - (5) After receiving clearance, run straight across the deck. Stay at least 10 feet aft of the No. 1 wire. This will prevent tripping over the wire supports or being struck by the No. 1 wire during the wire retraction.
- b. Do not run any carts, trucks, huffers, aircraft, etc., across a purchase cable. Purchase cables are expensive and time-consuming to replace.

B.7 BARRICADE

1. Description:
 - a. Endless reeve — line up most important — on center with no deviation.
 - b. Stanchions.
 - (1) Height.
 - (2) Location.
 - (3) Webbing assembly.
2. Maximum weight, engaging speed, and recommended approach speed as indicated in Aircraft Recovery Bulletin 12 series.
3. Pilot procedures:
 - a. Jettison ordnance and dispose of external stores or as NATOPS prescribes.
 - b. Execute normal pass.
 - c. Anticipate losing “ball” in close momentarily due to port stanchion (you will be committed by this time).
 - d. When arrested (no bolters here).
 - (1) Secure power.
 - (2) Exit aircraft.

B.8 INTEGRATED LAUNCH AND RECOVERY TELEVISION SYSTEM — ILARTS

1. Camera installation and coverage:
 - a. Centerline.
 - b. Island.
 - c. Catapult surveillance camera.
2. Utilization:
 - a. Playback.
 - (1) Starts 10 minutes after recovery.
 - (2) Played twice if time permits.
 - b. If you missed the playback of your approach or desire additional ILARTS playbacks, arrangements with the V-2 Division Officer can be made.
 - (1) Do not handicap the operator in his performance of his duties by calling ILARTS room.
 - (2) Coordinate with the V-2 Division Officer for playback after flight operations.

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B.9 SUMMATION

1. All bulletins on file in V-2 office.
2. Come visit us — free tours of spaces and machinery upon request.
3. From time to time, bulletins that are applicable to individual type aircraft are issued. These shall be made subject of memorandums to squadrons and CAG LSO as appropriate.
4. In general, examination of the catapult and arresting gear logs is not permitted. Any time you would like information concerning any catapult launch or arrestment, coordinate with the Catapult and Arresting Gear Officer.

B.10 AVIATION FUELS

1. Fuel load check cards shall be tallied daily and accounting will be monitored in the V-4 office.
2. Aircraft de-fueling shall be requested by an authorized representative of the squadron's Commanding Officer completing and submitting an Aircraft Defuel Certificate chit to Aircraft Handling Officer in accordance with Aircraft Refueling NATOPS manual NAVAIR 00-80T-109.

B.11 QUESTION AND ANSWER PERIOD

APPENDIX C

Flight Quarters Checklist

TIME _____ DATE _____

1. EMBARKED AIRCRAFT

Aircraft Onboard Helos Up
 Multiple Density

2. LAUNCH AND RECOVERY EQUIPMENT

Catapults	ONE	TWO	THREE	FOUR
JBDs	ONE	TWO	THREE	FOUR
A-Gear	ONE	TWO	THREE	FOUR
Barricade				
Deck Status Lights	Lens			
Plat	MOVLAS			
Remarks:				

3. AVIATION FUELS

Flight Deck Stations DOWN/ETR
 Hangar Deck Stations DOWN/ETR
 Filters/Purifiers/Pumps/Console DOWN/ETR
 Remarks:

4. FLIGHT DECK

Whip Antenna	UP/DOWN			
Stern Rails	UP/DOWN			
Bow Rails	UP/DOWN			
Jack Staff	UP/DOWN			
Aircraft Elevators	ONE	TWO	THREE	FOUR
Elevator Stanchions	ONE	TWO	THREE	FOUR
Deck Edge Power Stations Down				
Combat Power Stations Down				
Rotary Beacons	FWD	MID	AFT	
Remarks:				

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5. HANGAR DECK

Divisional Doors	UP/DOWN			
Elevator Doors	ONE	TWO	THREE	FOUR
Elevator Stanchions	ONE	TWO	THREE	FOUR
Aircraft Electrical Power Stations Down				
Conflag Stations Down				
Remarks:				

6. MOBILE EQUIPMENT (Numbers)

Assigned		Assigned	
Tow Tractor A/S32A-31A	UP/DOWN	6K Forklift	UP/DOWN
Tractor & huffer A/S32A-31A & MSU-200	UP/DOWN	MEPP-3	UP/DOWN
Spotting Dolly A/S32A-32	UP/DOWN	P-25	UP/DOWN
Scrubber	UP/DOWN	CVCC	UP/DOWN
20K Forklift	UP/DOWN		
Remarks:			

7. COMMUNICATIONS

SRC-47/HYDRA Headsets Assigned	UP/DOWN			
19 MC	21 MC	51 MC	58 MC	
1 JG	2 JG	4 JG	6 JG	9 JG
Remarks:				

8. FIREFIGHTING EQUIPMENT

Steam smothering stations	UP/DOWN
Fire stations flight deck	UP/DOWN
Fire stations hangar deck	UP/DOWN
FOD walkdown complete time	UP/DOWN
LSO platform inventory complete	YES/NO
Remarks:	

Submitted by:

ACHO

APPENDIX D

NVG Training Syllabus for Ship's Personnel

(For use by ship as required in [Chapter 6](#).)

D.1 INTRODUCTION

A methodical, building-block approach to training and qualification of ship's personnel for operations with NVGs is essential. Ship's personnel involved in flight operations (air officers, flight deck supervisors, LSEs, etc.) shall receive training orientation prior to conducting NVG operations. Remaining flight deck personnel shall attend NVG training coordinated through the ISIC with instructions according to TYCOM guidance. Approved LSE schools instructed by Helicopter Combat Support Eight and Helicopter Combat Support Three provide required classroom instruction.

Note

Whenever possible, initial stage 3 and 4 training shall be conducted in 0.0022 lux or greater in accordance with Solar/Lunar Almanac Program (SLAP).

D.2 STAGE ONE: NVG FAMILIARIZATION/CLASSROOM

Formal classroom instruction shall consist of the following:

1. NVG introduction.
2. Night/NVG physiology.
3. Environmental considerations and lighting requirements.
4. Aircrew tendencies on NVGs.
5. LSE signals and procedures (NVG and unaided).
6. Emergency procedures.

A static flight deck NVG orientation shall be conducted for ship and flight deck personnel covering the following:

1. Lighting profiles/LSE wands.
2. LSEs with and without wands.
3. Procedural review by all supervisors.
4. Flight deck safety brief.

D.3 STAGE TWO: SINGLE SPOT OPERATIONS/NVG LSE INITIAL QUALIFICATIONS

For qualification as an NVG LSE, all prerequisites (classroom and static deck) shall be complete. The LSE shall direct five vertical takeoffs and landings and five touch and gos from the landing pattern while under the supervision of a qualified NVG LSE. This shall be accomplished under a high light level of 0.0022 lux or greater. Final qualification and designation shall be determined by the ship's Commanding Officer.

Note

Operating aircraft from adjacent spots is not authorized during stage two training.

D.4 STAGE THREE: MULTISPOT OPERATIONS

Stages one and two shall be completed prior to commencing stage three. Multispot operations consist of two or more landing spots. The LSE shall direct six takeoffs and landings from the pattern while aircraft are operating from adjacent spots.

D.5 STAGE FOUR: MULTIWAVE LAUNCH/RECOVERY OPERATIONS

Stages one, two, and three shall be completed prior to commencing stage four. Multiwave launch and recovery operations consist of a mix of aircraft in multiple waves operating from all spots.

D.6 MAINTAINING NVG LSE QUALIFICATION

Each NVG LSE shall attend 1 hour of classroom instruction or practical training on the NVGs after every 90 days of non-NVG operations. NVG LSE training shall be logged and maintained in the individual's LSE training record. The training shall consist of, but not be limited to, the following subjects:

1. Lighting requirements.
2. LSE signals.
3. Aircrew tendencies.
4. Emergency procedures.

D.7 SHIP QUALIFICATIONS

The ship's Commanding Officer shall make a final determination of the ship's ability to support NVG operations and report completion of qualifications to the ship's ISIC. Ships shall maintain a minimum of five LSEs and two safety observers NVG qualified through stage four in order to maintain qualification.

APPENDIX E

Crunch Report

(For use as required in [Chapter 7](#))

U.S.S. _____

Crunch Report No. _____

Date _____

From: Division Officer

ROUTING INSTRUCTIONS*
ORDER DATE OUT INITIAL

To: Commanding Officer

- Via:
- (1) Aircraft Handling Officer
 - (2) Ship's Safety Officer
 - (3) Air Officer
 - (4) CO, _____
 - (5) CO, _____
 - (6) Commander, CVW-____
 - (7) Ships Safety Officer
 - (8) Forward copy of report to TYCOM COMNAVAIRLANT/COMNAVAIRPAC Code (N73)

*EACH ADDEE SHALL ROUTE WITHIN 3 DAYS.

Subj: Aircraft Handling Mishap

- 1. Date/time of mishap
- 2. Location of mishap
- 3. Weather condition
- 4. Deck conditions
 - a. Deck wet or dry
 - b. Condition of non-skid
 - c. Deck cleanliness
- 5. Description of mishap

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6. Aircraft/equipment involved/damaged

7. Personnel involved (name, rate, service number, training qualifications):

- a. Director
- b. Plane Handlers
- c. Tractor Driver/Equipment Operator
- d. Plane Captain
- e. Pilot
- f. Other

8. Witnesses (name, rate, service number):

9. Causal Factors

10. Division Officer's Investigation/Recommendations/Corrective Action:

COMMENTS AND RECOMMENDATIONS

11. ACHO

12. Ship's Safety Officer

13. Air Boss

14. CO, _____

15. CO, _____

16. Commander, CAG-__

17. Commanding Officer

RETURN TO

FOR FILING

APPENDIX F

Fuel Sample and Equipment Logs

F.1 FUELS SAMPLE AND EQUIPMENT LOGS

Figures F-1 through F-3 are provided to support fuel samples processing requirements for shipboard operations contained in Chapter 8. Figure F-1, Shipboard Fuel Sample Log, is used as a record of the results of JP-5 fuel sample tests. Figure F-2 is a fuel Filter Sample/Pressure Drop Log, and Figure F-3 is an Equipment Running Log used to document operation of fuels system equipment.

APPENDIX H

Flight Deck Uniforms

PERSONNEL (NOTE 9)	HELMET	JERSEY/ FLOATATION VEST	SYMBOLS, FRONT AND BACK
Aircraft handling crew and chock men	Blue	Blue	Crew number
Aircraft handling officers and plane directors	Yellow (Notes 1-5 as needed)	Yellow	Billet title — crew number
Arresting gear crew	Green	Green	A
Aviation fuel crew	Purple	Purple	
Cargo handling personnel	White	Green	“Supply”/“POSTAL” as appropriate
Catapult and arresting gear officers	Green	Yellow	Billet title
Catapult crew	Green	Green	C
Catapult/AG QA	Green	White	ALRE QA
Catapult safety observer (ICCS)	Green	(Note 6)	Billet title
Catapult Steam Watch	None	Green/white	CAT STEAM WATCH
Crash and salvage crews	Red	Red	Crash/Salvage
Elevator operators	White	Blue	E
Explosive ordnance disposal	Red	Red	“EOD” in black
GSE troubleshooter	Green	Green	“GSE”
Helicopter LSE	Red	Green	H
Helicopter plane captain	Red	Brown	H
Hook runner	Green	Green	A
IW watch	White	White	IW stenciled on the back of the vest
JBD safety observer	Green	Green/White	JBD Safety
Landing signal officer	None	White	LSO
Leading petty officers:			
Line	Green	Brown	Squadron designator and “Line CPO”
Maintenance	Green	Green	Squadron designator plus “Maint. CPO”
Quality assurance	Brown	White	Squadron designator and “QA”
Squadron plane inspector	Green	White	Black and white checkerboard pattern and squadron designator
LOX crew	White	White	LOX
Maintenance crews	Green	Green	Black stripe and squadron designator
Medical	White	White	Red Cross
Messengers and telephone talkers	White	Blue	T
Ordnance	Red	Red	3-inch black stripe and squadron designator/ship’s billet title
Ordnance CAG Arm/De-arm	Red/Red	Red/Red	3-inch black stripe and the letters “CA” in 6-inch white reflective material

Figure H-1. Flight Deck Uniforms (Sheet 1 of 2)

PERSONNEL (NOTE 9)	HELMET	JERSEY/ FLOATATION VEST	SYMBOLS, FRONT AND BACK
Ordnance QA	White	(Note 8)	Squadron designator and "ORDNANCE QA/SAFETY"
Photographers	Green	Green	P
Plane captains	Brown	Brown	Squadron designator
Safety	White	White	"SAFETY"
Supply VERTREP coordinator	White	Green	"SUPPLY COORDINATOR"
Topside Petty Officer	Green	Green	A on back
Tractor driver	Blue	Blue	Tractor
Tractor King	Blue	(Note 7)	TK
Transfer officer	White	White	"TRANSFER OFFICER"

NOTES:

1. Personnel in charge of a detail, such as ordnance and maintenance, shall wear a complete flight deck uniform that consists of TYCOM approved flight deck trousers, flight deck jersey, flotation device, steel-toe boots, leather gloves, helmet with goggles and jersey corresponding in color to that of their respective detail and with their billet title on the jersey and flotation vest.
2. Helmets for all personnel shall be marked with a 6-inch square (or equivalent) of white reflective tape on the back shell and a 3-inch by 6-inch (or equivalent) of white reflective tape on the front shell. Landing signal officers are not required to wear helmets or sound attenuators when engaged in aircraft control. Helmets shall have a 2-inch piece of velcro on the left side of the front shell and velcro on the survival light.
3. Three reflective international orange stripes, 1-inch wide, evenly spaced, running fore and aft on top of the white reflective tape.
 - a. All air department officers.
 - b. Air department Chief Petty Officers and Leading Petty Officers.
 - c. EOD team members.
 - d. All ordnance officers and gunners.
 - e. Ordnance handling officer and gunner.
 - f. Arresting Gear Topside Petty Officer.
4. Helmets for all personnel who have not completed flight deck observer qualification shall be marked (front and rear) with a "T" using 1-inch wide blue reflective tape over the existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).
5. Helmets for all aircraft directors under instruction shall be marked (front and rear) with a "U/I" using 1-inch wide blue reflective tape evenly spaced over the existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).
6. ICCS green jersey/yellow flotation vest.
7. Yellow jersey/blue flotation vest.
8. White jersey/red flotation vest.
9. Only authorized, all leather, steel-toe boots shall be worn on the flight deck.
10. LOX boots shall only be worn by personnel directly assigned in the handling of liquid oxygen.
11. All personnel shall wear all leather gloves.
12. Only authorized foul weather jacket shall be worn on the flight deck.
13. All signal wands/flashlights shall be secured with heat shrink/duct tape to prevent cone separation.

Figure H-1. Flight Deck Uniforms (Sheet 2)

APPENDIX I

Weapons Loading/Strikedown/ Downloading and Recovery Guide

WEAPON	HANGAR DECK		RECOVERY	
	LOAD	STRIKEDOWN/ DOWNLOAD	UNEXPENDED	HUNG
General Purpose Bombs / PGM's	YES (1) (3)	YES (1) (3)	YES (1)	YES (1)
GBU-24 B/B; E/B	YES (1) (3)	YES (1) (3)	NO (5)	NO (5)
JSOW: AGM-154 (series)	YES (3)	YES (3)	YES (8) (9)	YES (8) (9)
Rocket Launchers: 2.75 Mod 4/5.0	NO	NO	YES	NO
Practice Bombs: MK-76/BDU-48/BDU-33	YES (3)	YES (3)	YES	YES
Aircraft Parachute Flare (LUU-2B/B)	YES (3) (6)	YES (3) (6)	YES	YES
20mm Aircraft Guns	YES (4) (7)	YES (4) (7)	YES	YES
GAU-16: .50 Cal / M240: 7.62MM	YES (7)	YES (7)	YES	YES
Rockeye: CBU-100/Leaflet Bomb/PDU-5	YES (1) (3)	YES (1) (3)	YES	YES
Sidewinder: AIM-9 (series)	NO (2)	NO (2)	YES	YES
Sparrow: AIM-7 (series)	NO (2)	NO (2)	YES	YES
Maverick: AGM-65 (series)	NO (2)	NO (2)	YES	YES
Harpoon/SLAM: AGM-84 (series)	NO (2)	NO (2) (9)	YES (8) (10)	YES (8) (10)
Harm: AGM-88 (series)	NO (2)	NO (2)	YES	YES
Hellfire: AGM-114 (series)	NO (2)	NO (2)	YES	YES
Mines: MK-62/63	YES (1) (3)	YES (1) (3)	YES	YES
Torpedoes: MK-46/50/54	YES (1) (3)	YES (1) (3)	YES	YES
Marine Location Marker: MK-25/MK-58	YES (3)	YES (3)	YES	YES
JAU-22/B Cartridge	NO (3)	NO (3)	YES	YES
Decoy Flares (All)	NO	NO	YES	YES
Chaff (w/cartridges)	NO (3)	NO (3)	YES	YES
TALD	YES (3)	YES (3)	YES	YES
I-TALD	NO (2)	NO (2)	YES (8) (9)	YES (8) (9)

NOTES:

1. All applicable arming wires/safety clips/extractors/swivels intact.
2. Air-launched missiles shall not normally be loaded on the hangar deck except when operational necessity so dictate. Commanding officers may authorize loading of missiles on the hangar deck only up to the point of mechanical attachment of the weapon to the launcher/rack in accordance with the procedures prescribed in the appropriate NAVAIR weapon/store loading checklist.
3. Ejector rack/jettison cartridges and/or nose fuzes shall not be installed on the hangar deck.
4. The M61A1 gun ammunition is exempt from downloading requirements for up aircraft temporarily spotted in hangar decks and aircraft undergoing limited maintenance as defined in this manual; that is, turnaround maintenance, providing compliance with all gun dearm procedures of the applicable airborne weapon/store loading manual and associated checklists have been accomplished.

5. Guidance provided herein is subject to individual aircraft tactical manual (NATIP) limitations. In case of conflict between this guidance and a specific aircraft NATIP, the NATIP shall take precedence.
6. The M61A1/2 gun may be exempted from complete downloading when operations dictate that aircraft considered up and readily available for flight be temporarily spotted in the hangar deck (not to exceed 7 days); and/or for aircraft undergoing minor maintenance or servicing as defined in [Chapter 11, paragraph 11.1.8](#) of this manual, provided the following conditions are met:
 - a. All gun de-arm procedures of the applicable airborne weapon/stores loading manual and checklists have been accomplished.
 - b. Ammunition shall be cycled into the drum clear of feed chutes and feed mechanisms of the gun system. If the quantity of rounds in the system exceeds the capacity of the ammunition drum, a minimum number of rounds may be present in the return chute completely clear of the gun.
 - c. The aircraft gun access door shall be labeled with the upload date, quantity and type of ammunition loaded (i.e., 01JAN00/500 RDS/20MM HEI).
7. Strikedown of aircraft with jammed 20MM/GAU-16/M240 guns is prohibited.
8. If an Intent To Launch (ITL) signal has been initiated for Harpoon/SLAM/JSOW/ITALD weapons, the weapon shall be treated as a hung weapon during recovery, downloading, and strikedown.
9. An aircraft with ITL weapon(s) shall not be removed from the flight deck to the hangar deck until all ITL weapon(s) have been downloaded.
10. When operationally feasible, aircraft shall be kept airborne for 35 minutes following an ITL abort/failure. Re-spot of an ITL aircraft is prohibited during peacetime operations until 2.5 hours for Harpoon/SLAM and 3 hours for JSOW have elapsed from initial ITL abort/failure. Download prior to completion of the 2.5 hours for Harpoon/SLAM and 3 hours for JSOW waiting period is authorized provided that the missile is moved to a safe area on the flight deck with the nose oriented outboard over the deckedge.

WARNING

- Initiation of the ITL signal activates a battery within the Harpoon/SLAM weapon. Battery power available within the missile creates a potentially hazardous situation during aircraft recovery and/or while disconnecting the missile/weapon umbilical from the aircraft as electrical shorts can occur during these times, which may actuate the missile engine/pyrotechnics. Battery voltage will remain sufficiently high enough to allow engine start for up to 35 minutes following ITL and to fire missile launch squibs within Harpoon/SLAM for up to 2.5 hours following ITL.
- If an ITALD ITL is verified, do not remove launch adapter umbilical connector from weapon. Move aircraft to safe area, download missile, and move missile to safe area until 2.5 hours have elapsed from time of ITL. Remain clear of aft end of missile.

APPENDIX J

Flight/Hanger Deck Training Syllabus

The ACHO shall ensure that all personnel assigned to the Air Department receive continuous training outlined in [Appendix J](#). Divisions shall ensure that all subjects are accomplished within six months of reporting onboard and annually thereafter. Training shall be logged in RADMIN and training jackets.

J.1 SHIP'S DUTIES AND RESPONSIBILITIES (ALL AIR DEPARTMENT)

1. Air Officer.
2. Aircraft Handling Officer.
3. Flight Deck Officer.
4. Aircraft Crash/Salvage Officer (Air Bos'n).
5. Catapult Officer's.
6. Catapult Crew.
 - a. Catapult Safety Observer.
 - b. Topside Safety Petty Officer.
 - c. Holdback Operator.
7. Arresting Gear Officer (AGO).
8. Hangar Deck Officer.
9. Aviation Fuels Officer.
10. Landing Signal Officer (LSO).

J.2 SECURITY OF AIRCRAFT AND EQUIPMENT (ALL AIR DEPARTMENT)

1. Responsibility for Security.
2. Integrity Watch.
3. Training.
4. Integrity Watch Stations.
 - a. Integrity Watch Officer.
 - b. Integrity Watch Petty Officer.
 - c. Flight/Hangar Deck Security Patrol.
 - d. Integrity Watch Messenger.
 - e. Aviation Fuels Security Watch.
 - f. Catapult Steam Watch.
 - g. Conflagration Station Watch.
 - h. Pri-Fly Security Watch.
5. Aircraft Security.

■ **J.3 PREPARATIONS FOR FLIGHT OPERATIONS (ALL AIR DEPARTMENT)**

1. Training Requirements.
 - a. Naval Safety Center Flight Deck Safety Video.
2. Requirement for Flight Quarters.
3. Alert Conditions.
4. Hazards of Electromagnetic Radiation Ordnance (HERO).
5. Flight Deck Uniforms.
 - a. Wearing of Flight/Hangar Deck Uniforms.
 - b. Special Clothing.

■ **J.4 CATAPULT LAUNCHING PROCEDURES (V-1, V-2)**

1. Aircraft Launching Procedures.
 - a. EA-6B.
 - b. T-45.
 - c. E-2/C-2.
 - d. F/A-18.
2. Launching Aircraft (Deckedge Mode).
 - a. Taxing/Spotting Aircraft on Catapults.
 - b. Tensioning Aircraft.
 - c. Launch.
 - d. Launch Complete.
3. Launching Aircraft (ICCS).
 - a. Taxing/Spotting Aircraft on Catapults.
 - b. Tensioning Aircraft.
 - c. Launch.
 - d. Launch Complete.
4. Night/Case III Operations.
5. Deck Launching.
6. Emergency Actions and Procedures.
 - a. Aborting the Launch.
 - b. SUSPEND (Deckedge Mode).
 - c. SUSPEND (ICCS).
 - d. HANGFIRE (Deckedge Mode).
 - e. HANGFIRE (ICCS).
 - f. Emergency Lowering Jet Blast Deflectors (JBD).

J.5 RECOVERY PROCEDURES (V-1, V-2)

1. Operational Safety Precautions.
 - a. General.
 - b. Topside.
 - c. Landing.
2. Emergency Procedures.
 - a. General.

J.6 HELICOPTER OPERATIONS (V-1, V-5)

1. Helicopter Launch Procedures.
2. Helicopter Safety Precautions.
3. Rescue Helicopter Launching Criteria.
4. Recovering Helicopters.
5. Recovering Procedures.
6. Special Safety Precautions.
7. Emergency Landing.

J.7 AIRCRAFT HANDLING (ALL AIR DEPARTMENT)

1. General.
2. Responsibilities.
 - a. Aircraft Handling Officer.
 - b. Flight Deck Officer.
 - c. Assistant Flight Deck Officer.
 - d. Flight Deck Chief.
 - e. Aviation Fuels Maintenance Officer.
3. Flight Deck Safety.
 - a. General.
 - b. General Precautions.
4. Aircraft Handling Movement and Safety Precautions.
 - a. General.
 - b. Replenishment At Sea (UNREP) Aircraft Spotting.
 - c. Aircraft Movement.
 - d. Handling Precautions (Launch).
 - e. Re-Spot Forward.

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- f. Recovery.
 - g. Parking.
 - h. Downed Aircraft.
 - i. Standby Aircraft (Spares).
5. Aircraft Elevators.
- a. General.
 - b. Manning Requirements.
 - c. Elevator Limitations.
 - d. Operational Procedures.
 - e. Procedures When Not at Flight Quarters.
6. Aircraft Handling Accessories.
- a. Self-Powered Equipment.
 - b. Other Equipment.
7. Flight Deck Communications Systems (FDCS).
8. Special Aircraft Handling Characteristics.
- a. H-60 Aircraft.
 - b. EA-6B Aircraft.
 - c. F/A-18A/B/C/D.
 - d. F/A-18E/F/G Aircraft.
 - e. E-2/C-2 Aircraft.
 - f. H-3 Aircraft.
 - g. H-46 Aircraft.
 - h. H-53 Aircraft.
9. Deck Multiple and Density.
- a. General.
10. Hanger Deck.
- a. General.
 - b. Safety Precautions.
 - c. Conflagration Stations.
 - d. Firefighting Procedures.
 - e. Major Ordnance Evolutions.
 - f. Petroleum Replenishment Evolutions.

11. Aircraft Handling Mishaps.
 - a. General.
 - b. Definitions.
 - c. Safety Awareness.
 - d. Crunch Report Format.

J.8 AIRCRAFT MAINTENANCE (V-1, V-2, V-3)

1. Mobile Support Equipment.
 - a. General.
 - b. Licensing Procedures.
 - c. Safety Precautions.
 - d. Reporting Discrepancies in Aircraft Support Equipment.
2. Air Wing Maintenance Support.
 - a. General.
 - b. Aircraft Maintenance.
 - c. Aircraft Turn-ups.
 - d. Immobilization of Aircraft.
 - e. Aircraft Jacking.
 - f. Additional Requirements.

J.9 WEAPONS HANDLING PROCEDURES (ALL AIR DEPARTMENT)

1. Arming.
2. Hung/Unexpended Weapons.
3. Dearming.
4. Maintenance on Loaded Aircraft.
5. Emergency Procedures.

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