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 OPNAVINST 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.

M.J. McCABE
Rear Admiral, U.S. Navy
Director, Air Warfare
The following Interim Changes have been cancelled or previously incorporated into this manual.

<table>
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<tr>
<th>INTERIM CHANGE NUMBER(S)</th>
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The following Interim Changes have been incorporated into this Change/Revision.

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<tr>
<td>15</td>
<td>Defines an aided Case III Recovery Pattern for AV-8B Aircraft</td>
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<tr>
<td>16</td>
<td>Corrects an error to the inner boundary radius of Sectors 1 through 4 in Figure 3-2</td>
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<td>17</td>
<td>Assigns operational control of the Navy HELO SAR detachment to the commanding officer of the ship</td>
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<tr>
<td>18</td>
<td>Corrects typographic error in Figure D-4 to include LHD Class Ships, and expands application of AH-1T/W Engage/Disengage Wind Envelope in Figure D-13 to include LHD and LHA Class Ships</td>
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<tr>
<td>19</td>
<td>Modifies Case I/Case I (Aided) capability to allow returning AV-8B Aircraft to descend in VMC directly to Case I/Case I (Aided) overhead break pattern</td>
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Interim Changes Outstanding — To be maintained by the custodian of this manual.

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MSGID/GENADMIN/COMNAVAIRSYSCOM/4.0P/

SUBJ/LHA-LHD NATOPS PUBLICATION INTERIM CHANGE FOR LAUNCH AND RECOVERY /ENVELOPES ON LHA-LHD CLASS SHIPS //

REF/A/EML/CNSL/23MAY2004//
REF/B/EML/NAVAIR/12APR2004/
REF/C/DOC/NAVAIR 00-80T-106/01NOV2002//

NARR/REF A, AN EMAIL, IS CNSL (LHA/LHD COG CMD) CONCURRENCE WITH THIS MESSAGE.
REF B, AN EMAIL URGENT CHANGE RECOMMENDATION FROM MR. SEAN COLLIER NAVAIR ROTARY WING SHIP SUITABILITY, 4.11.3.2.
REF C IS LHA/LHD NATOPS MANUAL (NM).//

RMKS/1. THIS MESSAGE IS ISSUED IN RESPONSE TO REFS A AND B. THIS MESSAGE ISSUES INTERIM CHANGE (IC) NUMBER 20 TO REF C.
2. SUMMARY. THIS MESSAGE IS A CORRECTED COPY THAT REVISES REPLACEMENT PAGE NUMBERS IN PARA NO. 3 BELOW, ADDS NEW PARA NO. 3.L AND RENUMBERS FOLLOWING PARA. THESE CHANGES TO THE LHA/LHD NATOPS MANUAL (NM) ARE FOR REVISED JSHIP HELO (INCLUDING H-60 AIRCRAFT) SHIPBOARD LAUNCH AND RECOVERY ENVELOPES ONBOARD LHA AND LHD CLASS SHIPS. NEW AND REPLACEMENT PAGES CONTAINING THESE CHANGES FOR DOWNLOADING AND INSERTION INTO REF C WILL BE ATTACHED TO THIS INTERIM CHANGE MSG WHEN IT IS POSTED ON THE NATEC AND NATOPS WEBSITES (SEE LAST PARA BELOW).
3. CHANGE REF C (LHA/LHD NM), AS FOLLOWS:
A. CHAPTER 5, 5.6.5 ADDITIONAL SAFETY PRECAUTIONS:
   (1) DELETE: PAGES 5-37 AND 5-38.
   (2) ADD: INSERT NEW REPLACEMENT PAGES 5-37 AND 5-38,
       INSERT NEW CAUTION FOLLOWING WARNING:
       CAUTION
       H-60 OPERATIONS CONDUCTED WITH A LONGITUDINAL CG AFT OF
       STATION 360 MAY RESULT IN NOSE UP ATTITUDES EXCEEDING
       10 DEG DURING APPROACH AND OR HOVER RESTRICTING THE PILOT'S
FIELD OF VIEW AND VISUAL CUES TO THE FLIGHT DECK. LOST SIGHT OF THE FLIGHT DECK AND OR LSE MAY REQUIRE THE PILOT TO EXECUTE A WAVEOFF.

B. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
   (1) DELETE: PARAGRAPHS 5 THROUGH 7 AND NOTE, PAGE D-1 AND D-2.
   5. ARE VALID FOR ALL NATOPS APPROVED AIRCRAFT GW AND CG CONDITIONS
   6. ARE VALID FOR ALL NATOPS APPROVED Aircraft
   LOADING CONFIGURATIONS
   7. WILL ALLOW HIGE/HOGE IF AVAILABLE TORQUE EXCEEDS NATOPS PREDICTED ZERO WIND HOGE TORQUE.

   NOTE
   CONSIDERABLE DIFFERENCE MAY EXIST BETWEEN THE FLIGHT DECK WINDS AND THOSE MEASURED BY MAST-MOUNTED ANEMOMETERS. FOR MOST SHIPS, AIRCRAFT NATOPS ZERO WIND HOGE TORQUE IS OFTEN THE BEST APPROXIMATION TO SHIPBOARD HOVER TORQUE REQUIREMENTS FOR ALL WIND CONDITIONS; ADDITIONAL TORQUE (5 TO 10 PERCENT) MAY BE REQUIRED TO APPROACH AND ACCELERATE OR TO DEPART THE FLIGHT DECK VICINITY. IN THIS APPENDIX, ENVELOPE REGIONS EXHIBITING EXCESSIVE HOVER TORQUE REQUIREMENTS ARE DESIGNATED BY AN APPROPRIATE CAUTION.

   (2) ADD: INSERT NEW REPLACEMENT PAGES D-1 AND D-2, INSERT NEW PARAGRAPH 5 AS FOLLOWS:
   5. ARE VALID FOR ALL APPROVED AIRCRAFT LOADING CONFIGURATIONS, GW, AND CG CONDITIONS IAW APPLICABLE OPERATORS/NATOPS MANUALS PROVIDED POWER AVAILABLE EXCEEDS POWER REQUIRED TO HOVER OUT OF GROUND EFFECT.

   WARNING
   FAILURE TO PLAN FOR AN ADEQUATE POWER MARGIN MAY RESULT IN NR DROOP AND LOSS OF TAIL ROTOR AUTHORITY.

   NOTE
   AIRCRAFT NATOPS ZERO WIND HOGE TORQUE IS OFTEN THE BEST APPROXIMATION TO SHIPBOARD HOVER TORQUE REQUIREMENTS FOR ALL WIND CONDITIONS, HOWEVER, ADDITIONAL POWER MARGIN (5 TO 10 PERCENT TORQUE) MAY BE REQUIRED TO APPROACH, OVERCOME TURBULENCE, ACCELERATE OR DEPART THE FLIGHT DECK VICINITY. SHIPBOARD POWER AVAILABLE IS BASED UPON THE CONTINGENCY POWER RATING FOR NAVALHAWK SERIES AIRCRAFT, AND THE 10-MIN (DECU)/ 30-MIN (ECU) POWER RATINGS FOR BLACKHAWK SERIES AIRCRAFT.

C. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
   (1) DELETE: N/A.
   (2) ADD: INSERT NEW PAGE NUMBERED D-40A, FIGURE D-29A.

D. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
   (1) DELETE: PAGE D-48.
   (2) ADD: INSERT NEW PAGE NUMBERED D-48, CONTAINING FIGURE D-36A.
   OH-58D LAUNCH/RECOVERY ENVELOPES - LHA CLASS SHIPS - SPOTS 1, 2, 4, AND 5.

E. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
   (1) DELETE: N/A.
   (2) ADD: INSERT NEW PAGE NUMBERED D-48A, FIGURE D-36B.
   H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHA CLASS SHIPS - SPOT 2.

F. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-37, PAGE D-48.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-48B, FIGURE D-37.

G. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-38, PAGE D-49.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-49, FIGURE D-38.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHA CLASS SHIPS - SPOT 5.

H. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-39, PAGE D-50.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-50, FIGURE D-39.

I. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-40, PAGE D-51.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-51, FIGURE D-40.

J. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: PAGE D-52.
(2) ADD: INSERT NEW PAGE NUMBERED D-52, FIGURE D-40A.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHA CLASS SHIPS - SPOT 8.

K. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: N/A.
(2) ADD: INSERT NEW PAGE NUMBERED D-52A, FIGURE D-40B. AH-64A/D LAUNCH/RECOVERY ENVELOPES - LHA CLASS SHIPS - SPOTS 1, 2, 4, AND 5.

L. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-41, PAGE D-50.
(2) ADD: INSERT NEW PAGE NUMBERED D-52B, FIGURE D-41. UH-1N ENGAGE/DISENGAGE WIND LIMITS FOR - LHA/LHD CLASS SHIPS.

M. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-65, PAGE D-76.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-76, FIGURE D-65.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHD CLASS SHIPS - SPOT 2.

N. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-66, PAGE D-77.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-77, FIGURE D-66.

O. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-67, PAGE D-78.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-78, FIGURE D-67.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHD CLASS SHIPS - SPOT 5.

P. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-68, PAGE D-79.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-79, FIGURE D-68.

Q. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: PAGE D-80.
(2) ADD: INSERT NEW PAGE NUMBERED D-80, FIGURE D-68A.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHD CLASS
SHIPS - SPOT 7.

R. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: FIGURE D-69, PAGE D-80.
(2) ADD: INSERT NEW REPLACEMENT PAGE NUMBERED D-80A, FIGURE D-69.
H-60A/B/F/G/H/J/K/L/Q/R/S LAUNCH/RECOVERY ENVELOPES - LHD CLASS SHIPS - SPOT 8.

S. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: NA.
(2) ADD: INSERT NEW PAGE NUMBERED D-80B, FIGURE D-70.

T. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: NA.
(2) ADD: INSERT NEW PAGE NUMBERED D-80C, FIGURE D-71.
H-60A/B/F/G/H/J/K/L/Q/R/S UNAIDED LAUNCH/RECOVERY ENVELOPES - LHD CLASS SHIPS - SPOT 5.

U. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: NA.
(2) ADD: INSERT NEW PAGE NUMBERED D-80D, FIGURE D-72.

V. APPENDIX D, AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS:
(1) DELETE: NA.
(2) ADD: INSERT NEW PAGE NUMBERED D-80E, FIGURE D-73.

4. POINTS OF CONTACT:
A. LHA/LHD NATOPS PROGRAM MANAGER IS CDR BRIAN SNELL, CNSL (N420),
TEL DSN 836-3153 OR COMM (757) 836-3153,
EMAIL: JAMES.SNELL(AT)NAVY.MIL

B. NAVAIR POCS:
1. LCDR JR NASH, 4.0P NATOPS OFFICER, TEL DSN 995-2052, OR
COMM (301) 995-2052, EMAIL: JAMES.NASH(AT)NAVY.MIL

2. KRISTIN SWIFT, 4.0P NATOPS CHIEF ENGINEER, TEL DSN 995-4193
OR COMM (301) 995-4193, EMAIL: KRISTIN.SWIFT(AT)NAVY.MIL

5. THIS MESSAGE WILL BE POSTED ON THE NATEC WEBSITE,
WWW.NATEC.NAVY.MIL WITHIN 15 DAYS OF RELEASE. NEW NATOPS IC MESSAGES
MAY BE FOUND IN TWO PLACES ON THIS WEBSITE:
(1) IN THE NATOPS IC DATABASE FOUND UNDER THE TMAPS OPTION, AND
(2) IN THE AFFECTED PUBLICATION(S) JUST AFTER THE IC SUMMARY PAGE.
IF THE IC MESSAGE INCLUDES REPLACEMENT PAGES, THEY WILL BE
ADDITIONALLY PLACED WITHIN THE MANUAL AND REPLACED PAGES DELETED.
MESSAGES ARE NORMAL POSTED IN THE DATABASE BEFORE APPEARING IN THE
PUBLICATION. THIS MESSAGE WILL ALSO BE POSTED ON THE NATOPS WEBSITE,
NATOPS.NAVAIR.NAVY.MIL. IF UNABLE TO VIEW THIS MESSAGE ON EITHER THE
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TEAM AT (301) 342-3276, DSN 342-3276, OR BY EMAIL AT
NATOPS(AT)NAVAIR.NAVY.MIL.//
BT
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NNNN
1. Replacement pages for Interim Change 20 to the LHA/LHD NM, NAVAIR 00-80T-106 dated 01 Nov 2002, are attached as follows:

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SUMMARY OF APPLICABLE TECHNICAL DIRECTIVES

Information relating to the following recent technical directives has been incorporated into this manual.

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LHA/LHD NATOPS MANUAL

CONTENTS

CHAPTER 1 — PREDEPLOYMENT

1.1 COMMAND RELATIONSHIPS

1.1.1 Command Relationships Options for Amphibious Forces are Described in Joint Publication 3-02

1.1.2 Navy Aircraft Squadron Commander/ Detachment OIC

1.1.3 Ship’s Commanding Officer

1.1.4 Embarked Aircraft Squadron/Commanding Officer/Detachment Officer-In-Charge

1.1.5 Augmentation Support By Embarked Units

1.2 TRAINING REQUIREMENTS

1.2.1 Ship Responsibilities

1.2.2 Squadron/Detachment Responsibilities

1.2.3 Carrier Qualifications

1.3 PREDEPLOYMENT LECTURE SYLLABUS

1.3.1 Plane Captains/Crewchiefs

1.3.2 Maintenance Personnel

1.3.3 Flight Crewmen

1.3.4 Ordnance Personnel

1.3.5 AV-8 Phase I, II, III Training

1.3.6 All Personnel

CHAPTER 2 — PREPARING FOR FLIGHT OPERATIONS

2.1 AIR OPERATIONS

2.1.1 Air Planning Board

2.1.2 Air Plan

2.1.3 Flight Schedule

2.1.4 Mission Briefing

2.1.5 Functional Checkflights

2.1.6 Flight Plan

2.2 AQUEOUS FILM FORMING FOAM SYSTEM AND MOBILE FIREFIGHTING EQUIPMENT
### 2.3 PRELIMINARY PROCEDURES

- **2.3.1 Flight Quarters Stations**
- **2.3.2 Air Officer**
- **2.3.3 Vertical/Short Takeoff and Landing Signal Officer**
- **2.3.4 Flight Deck Supervisor**
- **2.3.5 Landing Signal Enlisted**
- **2.3.6 Vertical/Short Takeoff and Landing Launch Officer**

### 2.4 OPTICAL LANDING AIDS AND FLIGHT DECK/HANGAR DECK LIGHTING

### 2.5 FLIGHT DECK AUGMENTATION

### 2.6 BRIEFING OF FLIGHTCREWS

### 2.7 CARRIER QUALIFICATION PERIODS

- **2.7.1 Number and Type Aircraft**
- **2.7.2 Interval**
- **2.7.3 Case III Carrier Qualification Landings**
- **2.7.4 Carrier Qualification/Refresher Landing**
- **2.7.5 Aircraft Landings Required**
- **2.7.6 Divert Data**

### 2.8 PASSENGER/CARGO MOVEMENTS (HELICOPTER)

- **2.8.1 Night Overwater Passenger Transfer**
- **2.8.2 Combat Cargo Officer**

## Chapter 3 — Air Traffic Control Doctrine

### 3.1 ATC RESPONSIBILITIES

- **3.1.1 Operations Officer**
- **3.1.2 Air Operations**
- **3.1.3 Air Officer**
- **3.1.4 Combat Information Center Officer**
- **3.1.5 Tactical Air Officer**

### 3.2 AIRCRAFT CONTROL CRITERIA

- **3.2.1 Close Proximity Operations**
- **3.2.2 Electronic Control**
- **3.2.3 Electronic Emission Control**

### 3.3 CONTROL ZONE/CONTROL AREA LIMITATIONS

### 3.4 AIRCRAFT SEPARATION CRITERIA

- **3.4.1 Lateral Separation**
- **3.4.2 Vertical Separation**
3.5  COMMUNICATIONS CONTROL .................................................. 3-5
3.5.1 Control of Radio Circuits ................................................. 3-5
3.5.2 Voice Procedures .......................................................... 3-5
3.5.3 Recording of Radio Circuits ............................................. 3-5
3.5.4 Communications Security ............................................... 3-5

3.6  EMERGENCY CONTROL PROCEDURES ............................. 3-6
3.6.1 Initial Control Responsibility ............................................. 3-6
3.6.2 Basic Emergency Control Procedures ................................. 3-6
3.6.3 Crewmember Injury or Illness ........................................... 3-6
3.6.4 Ship System Casualty .................................................... 3-6

3.7  TRANSIENT AIRCRAFT .................................................... 3-7

3.8  LOST AIRCRAFT PROCEDURE ........................................... 3-7

CHAPTER 4 — LAUNCHING AIRCRAFT

4.1  OPERATIONAL PROCEDURES RESPONSIBILITIES ................. 4-1
4.1.1 General ........................................................................ 4-1
4.1.2 Time Schedule ............................................................ 4-1
4.1.3 Flight Quarters ............................................................. 4-1
4.1.4 Primary Flight Control .................................................. 4-1
4.1.5 Communications .......................................................... 4-1
4.1.6 Flight Deck Lighting and Optical Landing Aids .................... 4-1
4.1.7 Helicopter Readiness Conditions .................................... 4-1
4.1.8 V/STOL Readiness Conditions ....................................... 4-2
4.1.9 Responsibilities of Air Officer and Squadron Operations Duty Officer ................................................................. 4-2

4.2  FLIGHT DECK PROCEDURES ........................................... 4-3
4.2.1 Flight Deck Description ............................................... 4-3
4.2.2 General Flight Deck Safety ........................................... 4-3
4.2.3 Foreign Object Damage Hazard ..................................... 4-8
4.2.4 Helicopter Safety Precautions ...................................... 4-9
4.2.5 V/STOL Aircraft Safety Precautions ............................... 4-9

4.3  PREFLIGHT INSPECTIONS ............................................... 4-11

4.4  PRELAUNCH PROCEDURES ............................................ 4-11
4.4.1 Launch Responsibilities ................................................. 4-11
4.4.2 Launch Preparation ...................................................... 4-11
4.4.3 Wind and Deck Limitations ............................................. 4-12
4.4.4 APU/APP/GTS Start ............................................................. 4-12
4.4.5 Rotor Blade Spreading ..................................................... 4-12
4.4.6 Radio Check ................................................................. 4-12
4.4.7 Engine Starting ............................................................. 4-12
4.4.8 Engaging Rotors ........................................................... 4-13
4.4.9 Internal Cargo and Troops (Helicopter) .............................. 4-13
4.4.10 Downed Aircraft ......................................................... 4-13
4.5 LAUNCH PROCEDURES .................................................... 4-14
4.5.1 General Launch Procedures ............................................. 4-14
4.5.2 Ordnance Equipped Aircraft ............................................ 4-14
4.5.3 Helicopter Launch Procedures ........................................ 4-14
4.5.4 V/STOL Launch Procedures ........................................... 4-15
4.5.5 Night Launches ............................................................ 4-17
4.6 EMCON/ZIP-LIP LAUNCH PROCEDURES ......................... 4-17
4.6.1 General Procedures ...................................................... 4-17
4.6.2 Day Launch Procedures ................................................ 4-18
4.6.3 ZIP-LIP Procedures ...................................................... 4-18
4.6.4 Electronic Emission Control Night Launch Procedures ........... 4-18
4.7 EMERGENCY AFTER LAUNCH .......................................... 4-18
4.7.1 Visual Meteorological Conditions .................................... 4-18
4.7.2 Night/Instrument Meteorological Conditions ....................... 4-19
4.7.3 Lost Communications During Departure ............................ 4-19
4.7.4 Lost Communications Only During Departure (IMC) ............... 4-19
4.7.5 Lost Communications and DME During Departure (IMC) ........ 4-19
4.7.6 Lost Communications and NAVAIDS During Departure (IMC) .. 4-19
4.8 DEPARTURE PROCEDURES ............................................. 4-19
4.8.1 Helicopter Departure Procedures ................................... 4-19
4.8.2 Vertical/Short Takeoff and Landing Departure Procedures ...... 4-20
4.9 CONTROL OF DEPARTING AIRCRAFT .............................. 4-22
4.9.1 Departure Radials ....................................................... 4-23
4.9.2 IMC/Night Departure Voice Reports ................................ 4-23

CHAPTER 5 — RECOVERING AIRCRAFT

5.1 PREPARING FOR RECOVERY ........................................... 5-1
5.1.1 Ship Preparations ....................................................... 5-1
5.1.2 Bridge/PriFly Coordination .......................................... 5-1
5.1.3 Night Operations ....................................................... 5-1
5.1.4 Night Wind Limitations .............................................. 5-1
5.2 RECOVERING AIRCRAFT .............................................. 5-2
5.2.1 Arrival Procedures .................................................... 5-2
### 5.3 HELICOPTER APPROACH AND RECOVERY
- 5.3.1 Helicopter Case I Approach Procedures ........................................... 5-2
- 5.3.2 Helicopter Case II Approach Procedures ........................................... 5-7
- 5.3.3 Helicopter Case III Approach Procedures ........................................... 5-7

### 5.4 V/STOL APPROACH AND RECOVERY
- 5.4.1 V/STOL Case I Approach Procedures ............................................. 5-17
- 5.4.2 V/STOL Case II Approach Procedures ............................................. 5-18
- 5.4.3 V/STOL Case III Approach Procedures ............................................. 5-20

### 5.5 EMERGENCY PROCEDURES
- 5.5.1 Helicopter .......................................................................................... 5-25
- 5.5.2 V/STOL .............................................................................................. 5-29
- 5.5.3 Smokelight Approach ......................................................................... 5-32
- 5.5.4 Emergency Approach Procedures ..................................................... 5-32
- 5.5.5 Diverting Aircraft ................................................................................. 5-32

### 5.6 SPECIAL SAFETY PRECAUTIONS
- 5.6.1 Recovering With Ordnance ................................................................. 5-33
- 5.6.2 Helicopter Recovery Tiedown Procedures ............................................ 5-36
- 5.6.3 Personnel Debarkation ......................................................................... 5-36
- 5.6.4 Rotor Disengagement .......................................................................... 5-36
- 5.6.5 Additional Safety Precautions .............................................................. 5-37

### 5.7 EMCON/ZIP-LIP PROCEDURES
- 5.7.1 EMCON Procedures ............................................................................. 5-37
- 5.7.2 EMCON Recovery Procedures ............................................................ 5-37
- 5.7.3 ZIP-LIP Procedures ............................................................................. 5-38

## CHAPTER 6 — AIRCRAFT AND WEAPONS HANDLING PROCEDURES

### 6.1 GENERAL REQUIREMENTS ................................................................. 6-1
### 6.2 BRIEFING ........................................................................................... 6-1
### 6.3 MAINTENANCE LIAISON OFFICER .................................................... 6-1
### 6.4 EQUIPMENT .......................................................................................... 6-2
### 6.5 MOVEMENT OF AIRCRAFT ............................................................... 6-2
- 6.5.1 Plane Director Duties ........................................................................... 6-2
- 6.5.2 Brake Rider Duties ............................................................................... 6-3
- 6.5.3 Safety Precautions During Movement of Aircraft ............................... 6-4
- 6.5.4 Elevator Operation ............................................................................... 6-5
- 6.5.5 Report of Damage to Aircraft ................................................................ 6-6
- 6.5.6 Aircraft Security .................................................................................. 6-6
### 6.6 FUELING AND DEFUELING AIRCRAFT

- **Fueling and Defueling Procedures** .................................................. 6-7
- **Special Safety Precautions During Fueling/Defueling** ......................... 6-7
- **Hot Refueling Procedures** ................................................................. 6-8
- **Hot Refueling Safety Precautions (Helicopter)** .................................. 6-8
- **Pressure Refueling With Aircraft Shutdown** ........................................ 6-8

### 6.7 MEDICAL CASUALTY ON THE FLIGHT DECK (HELICOPTER) ................. 6-9

### 6.8 WEAPONS HANDLING PROCEDURES

- **Hazards of Electromagnetic Radiation to Ordnance/Radiation Hazards Safety Precautions** ................................................................. 6-9
- **Weapons Movement/Handling** ............................................................ 6-10
- **Weapons Assembly/Disassembly** ....................................................... 6-11
- **Weapons Loading/Downloading** .......................................................... 6-11
- **Arming** ............................................................................................... 6-13
- **Dearming** ............................................................................................ 6-13
- **Abort Strikedown** ................................................................................ 6-13
- **Maintenance On Loaded Aircraft** ......................................................... 6-13

### CHAPTER 7 — MISCELLANEOUS OPERATIONS

#### 7.1 PLANE GUARD AND SAR SUPPORT (HELICOPTER) ............................... 7-1

- **SAR Detachment Helicopter** ............................................................... 7-1
- **Safety Boat** .......................................................................................... 7-1
- **Plane Guard Ship** .................................................................................. 7-1
- **SAR Equipped Helicopter** ................................................................. 7-1
- **Control Authority** ................................................................................ 7-1
- **SAR Swimmers (Helicopters)** ............................................................. 7-1

#### 7.2 HELICOPTER EXTERNAL CARGO/VERTREP ................................. 7-2

- **General Description** ............................................................................. 7-2
- **Briefing** ................................................................................................ 7-2
- **Qualification** ......................................................................................... 7-3
- **Procedures** ........................................................................................... 7-3
- **Wind** ..................................................................................................... 7-3
- **Control** .................................................................................................. 7-3
- **Vertical Replenishment/External Lift Operating Areas** ...................... 7-3
- **Hookup** ................................................................................................. 7-5

#### 7.3 NIGHT VISION DEVICE OPERATIONS ............................................. 7-6

- **Authority for NVD Operations** ......................................................... 7-6
- **Night Vision Devices Requirements and Limitations** ......................... 7-6
- **NVD Training and Qualification** ......................................................... 7-7
- **Shipboard Lighting Requirements** ..................................................... 7-7
- **NVD Flight Operations Procedures** ................................................... 7-9
- **Emergencies During NVD Operations** ............................................. 7-10
APPENDIX A — AIRCRAFT HANDLING SIGNALS ............................... A-1
APPENDIX B — AIRCRAFT ARMING AND SAFING SIGNALS ............... B-1
APPENDIX C — WEAPONS LOADING/STRIKEDOWN/DOWNLOADING AND RECOVERY GUIDE .................................................. C-1
APPENDIX D — AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS ....... D-1
APPENDIX E — FLIGHT DECK CLOTHING ........................................ E-1
APPENDIX F — AV-8 TRAINING SYLLABUS FOR SHIP PERSONNEL
  F.1 PHASE I — SHIPBOARD ORIENTATION .................................... F-1
  F.2 PHASE II — GROUND TRAINING ............................................ F-1
  F.3 PHASE III — FINAL SHIPBOARD TRAINING .............................. F-2
APPENDIX G — AMERICAN MATRIX .................................................. G-1
APPENDIX H — NVD TRAINING SYLLABUS FOR SHIP’S PERSONNEL
  H.1 INTRODUCTION ........................................................................... H-1
  H.2 STAGE ONE: NVD FAMILIARIZATION/CLASS ROOM ...................... H-1
  H.3 STAGE TWO: SINGLE SPOT OPERATIONS/NVD LSE INITIAL QUALIFICATIONS ..................................................................... H-1
  H.4 STAGE THREE: MULTISPOT OPERATIONS .................................... H-2
  H.5 STAGE FOUR: MULTIWAVE LAUNCH/RECOVERY OPERATIONS ....... H-2
  H.6 MAINTAINING NVD LSE QUALIFICATION ................................... H-2
  H.7 SHIP QUALIFICATIONS ............................................................... H-2
APPENDIX I — SAMPLE LAUNCH CYCLE WITH ASSOCIATED RECOMMENDED COMMUNICATIONS ...................................................... I-1
APPENDIX J — JOINT SERVICE (USA/USAF) HELICOPTERS
  J.1 INTRODUCTION ........................................................................... J-1
  J.1.1 General .................................................................................... J-1
J.2
H-60 MODEL HELICOPTERS ................................................. J-1
J.2.1
Basic Capabilities & Characteristics .................................. J-1
J.2.2
H-60 Operational Considerations ....................................... J-13

J.3
H-47 MODEL HELICOPTERS ................................................. J-18
J.3.1
Basic Capabilities & Characteristics .................................. J-18
J.3.2
H-47 Operational Considerations ....................................... J-30

J.4
AH-64A/D SERIES HELICOPTERS ........................................ J-32
J.4.1
Basic Capabilities & Characteristics .................................. J-32
J.4.2
AH-64 Operational Considerations ..................................... J-33

J.5
OH-58D SERIES HELICOPTERS ............................................. J-38
J.5.1
Basic Capabilities & Characteristics .................................. J-38
J.5.2
OH-58D Operational Considerations ................................... J-39

J.6
AH/MH-6J SERIES HELICOPTERS ......................................... J-45
J.6.1
Basic Capabilities & Characteristics .................................. J-45
J.6.2
AH/MH-6J Operational Considerations ................................. J-48

J.7
MH-53J/M SERIES HELICOPTERS ......................................... J-49
J.7.1
Basic Capabilities & Characteristics .................................. J-49
J.7.2
MH-53J/M Operational Considerations ................................. J-53
LIST OF ILLUSTRATIONS

CHAPTER 3 — AIR TRAFFIC CONTROL DOCTRINE

Figure 3-1. Control Area and Control Zone Dimensions ............................................. 3-3
Figure 3-2. Sector Designation ......................................................................................... 3-4
Figure 3-3. Lost Communication Emergency Squawks ..................................................... 3-7
Figure 3-4. Basic Emergency Procedures for Communications/Navigational Equipment Failure . . . 3-8

CHAPTER 4 — LAUNCHING AIRCRAFT

Figure 4-1. LHA Typical Arrangement of Helicopter Spots and AV-8 Marking .................... 4-4
Figure 4-2. LHD Typical Arrangement of Helicopter Spots and AV-8 Marking .................... 4-5
Figure 4-3. Command and Display Signals ........................................................................ 4-6
Figure 4-4. Flag Hoist Signals .......................................................................................... 4-7
Figure 4-5. Helicopter Landing Spot Diagram (Typical) ..................................................... 4-7
Figure 4-6. Danger Areas to Flight Deck Personnel ......................................................... 4-10
Figure 4-7. Night Lighting Procedures ............................................................................. 4-18
Figure 4-8. Case III Departure Patterns ........................................................................... 4-21
Figure 4-9. Vertical/Short Takeoff and Landing Departure Altitudes ................................. 4-22

CHAPTER 5 — RECOVERING AIRCRAFT

Figure 5-1. Delta and Charlie Patterns for Helicopters .................................................. 5-3
Figure 5-2. Helicopter Night Case I Recovery Pattern ..................................................... 5-5
Figure 5-3. Helicopter Recovery Patterns for Starboard Side Spots .................................. 5-5
Figure 5-4. Legend — Instrument Approach Procedure Charts ......................................... 5-9
Figure 5-5. Approach Chart LHA/LHD NDB/TACAN Overhead (Helicopter) ...................... 5-10
Figure 5-6. Approach Chart LHA/LHD TACAN (Helicopter) ............................................ 5-12
Figure 5-7. Approach Chart for LHA/LHD Tacan Overhead (V/STOL) ............................ 5-13
Figure 5-8. Helicopter Emergency Marshal Patterns ....................................................... 5-14
Figure 5-9. VFR Relative Position Reporting .................................................................... 5-16
Figure 5-10. Delta and Charlie Patterns for V/STOL Operations .................................... 5-19
Figure 5-11. Vertical/Short Takeoff and Landing Emergency Marshal ............................... 5-22
Figure 5-12. Approach Chart for LHA/LHD TACAN (V/STOL) ..................................... 5-23
Figure 5-13. Optical Presentation of V/STOL OLS System and V/STOL Optical Landing System 5-24
Figure 5-14. Vertical Coverage of V/STOL Optical Landing System ............................... 5-26
Figure 5-15. Horizontal Coverage of V/STOL Optical Landing System ........................... 5-26
Figure 5-16. HPI Display Interpretation ............................................................................ 5-27
Figure 5-17. HAPI Vertical Presentation, Typical Installation ........................................... 5-28
Figure 5-18. Visual Signals During EMCON or Lost Communications ............................. 5-29
Figure 5-19. Emergency Signals to Ship From V/STOL Aircraft With Radio Failure ............... 5-31
Figure 5-20. Alpha Pattern for Recovery of Armed Helicopters ....................................... 5-35

CHAPTER 7 — MISCELLANEOUS OPERATIONS

Figure 7-1. Minimum SAR Requirements ................................................................. 7-2
Figure 7-2. LHA Day/Night VERTREP/External Lift Operating Areas ......................... 7-4
Figure 7-3. LHD Day/Night VERTREP/External Lift Operating Areas ......................... 7-5
Figure 7-4. Navigation Lights .............................................................................. 7-8
Figure 7-5. Visual Landing Aids ........................................................................... 7-8
Figure 7-6. Illumination ......................................................................................... 7-8

APPENDIX D — AIRCRAFT LAUNCH AND RECOVERY LIMITATIONS

Figure D-1. General Launch/Recovery Envelopes — LHA/LHD Class Ships — All Spots .......... D-3
Figure D-2. AH-1T/W General Launch/Recovery Envelopes for LHA/LHD Class Ships —
All Spots Except MIKE .................................................................................. D-4
Figure D-3. H-46 General Launch/Recovery Envelopes for LHA/LHD Class Ships — All Spots
Except MIKE .................................................................................................. D-5
Figure D-4. H-53E General Launch/Recovery Envelopes for LHA/LHD Class Ships — All Spots
Except MIKE .................................................................................................. D-6
Figure D-5. UH-1N Engage/Disengage Wind Limits for LHA/LHD Class Ships .................. D-7
Figure D-6. UH-1N Engage/Disengage Envelopes — LHA Class Ships — Spots 2, 4, 5, 6, and 7 .. D-8
Figure D-7. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spots 1 and 3 ........ D-9
Figure D-8. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 3 ................. D-10
Figure D-9. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 3A ............... D-11
Figure D-10. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spots 2, 4, 5, 6, 7 ... D-12
Figure D-11. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 8 ............... D-13
Figure D-12. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 9 ............... D-14
Figure D-13. AH-1T/W Engage/Disengage Envelopes — LHA/LHD Class Ships — Spots 1 thru 7 . D-15
Figure D-14. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships —
LHA Spots 1, 2, 4, 5, 6 ............................................................................... D-16
Figure D-15. AH-1T/W Day Launch/Recovery Envelopes — LHA Class Ships — Spots 3 and 3A .. D-17
Figure D-16. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — Spot 7 ............. D-18
Figure D-17. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — Spot 8 ............. D-19
Figure D-18. AH-1T/W DAY SCAS OFF Launch/Recovery Envelope — LHA Class Ships —
Spots 4 thru 7 ........................................................................................... D-20
Figure D-19. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships —
Spot 9 ....................................................................................................... D-21
Figure D-20. AH-1T/W Wind Envelope ...................................................................... D-22
Figure D-21. AH-1T/W Wind Limitations ................................................................. D-31
Figure D-22. SH-2F Engage/Disengage Envelopes — LHA Class Ships — All Spots ............ D-33
Figure D-23. SH-3A/D/G/H Engage/Disengage Envelopes — LHA Class Ships — All Spots .... D-34
Figure D-24. SH-3A/D/G/H Launch/Recovery Envelopes — LHA Class Ships — Spot 2 ...... D-35
Figure D-25. SH-3A/D/G/H Launch/Recovery Envelopes — LHA Class Ships — Spots 4 and 7 .. D-36
Figure D-26. H-46 Engage/Disengage Envelopes — LHA Class Ships — All Spots .......... D-37
Figure D-27. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spots 1, 3, and 9 . . . D-38
Figure D-28. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spots 2, 4, 5, 6, and 7 . . . . . D-39
Figure D-29. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spot 8 . . . . . . . . . . . . . . . . . . D-40
Figure D-30. H-53A/D/E Engage/Disengage Envelopes — LHA Class Ships — All Spots . . . . . . . . . . . . D-41
Figure D-31. H-53A/D Launch Recovery Envelopes — LHA Class Ships — Spot 2 . . . . . . . . . . . . . . . . . . D-42
Figure D-32. H-53A/D Launch Recovery Envelopes — LHA Class Ships — Spots 4, 5, 6, 7, 8, and 9 . . . . . . . . . . . . . . . . . . D-43
Figure D-33. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 1, 3, and 9 . . . . . . . . . . . . . . . . . . D-44
Figure D-34. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 2 and 4 . . . . . . . . . . . . . . . . . . D-45
Figure D-35. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 5 and 6 . . . . . . . . . . . . . . . . . . D-46
Figure D-36. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 7 and 8 . . . . . . . . . . . . . . . . . . D-47
Figure D-37. H-60B/F/H/J Launch/Recovery Envelopes — LHA Class Ships — Spot 4 . . . . . . . . . . . . . . . . . . D-48
Figure D-38. H-60B/F/H/J Launch/Recovery Envelopes — LHA Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . D-49
Figure D-39. H-60B/F/H/J Launch/Recovery Envelopes — LHA Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . D-50
Figure D-40. H-60B/F/H/J Launch/Recovery Envelopes — LHA Class Ships — Spot 7 . . . . . . . . . . . . . . . . . . D-51
Figure D-41. UH-1N Engage/Disengage Wind Limits for LHA/LHD Class Ships . . . . . . . . . . . . . . . . . . . . D-52
Figure D-42. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 1 . . . . . . . . . . . . . . . . . . . . D-53
Figure D-43. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 2 . . . . . . . . . . . . . . . . . . . . D-54
Figure D-44. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 4 . . . . . . . . . . . . . . . . . . . . D-55
Figure D-45. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . . . D-56
Figure D-46. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . . . D-57
Figure D-47. AH-1T/W Launch/Recovery Envelope — LHD Class Ships — Spot 1 . . . . . . . . . . . . . . . . . . . . D-58
Figure D-48. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 2 . . . . . . . . . . . . . . . . . . . . D-59
Figure D-49. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 4 . . . . . . . . . . . . . . . . . . . . D-60
Figure D-50. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . . . D-61
Figure D-51. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . . . D-62
Figure D-52. SH-2F Engage/Disengage Envelopes — LHD Class Ships — All Spots . . . . . . . . . . . . . . . . . . D-63
Figure D-53. SH-3A/D/G/H Engage/Disengage Envelopes — LHD Class Ships — All Spots . . . . . . . . . . . . . . . . . . D-64
Figure D-54. H-46 Engage/Disengage Envelopes — LHD Class Ships — Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9 . . . . . . . . . . . . . . . . . . D-65
Figure D-55. H-46 Launch Recovery Envelopes — LHD Class Ships — Spot 2 . . . . . . . . . . . . . . . . . . . . D-66
Figure D-56. H-46 Launch Recovery Envelopes — LHD Class Ships — Spot 4 . . . . . . . . . . . . . . . . . . . . D-67
Figure D-57. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . . . D-68
Figure D-58. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . . . D-69
Figure D-59. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 7 . . . . . . . . . . . . . . . . . . . . D-70
Figure D-60. H-53A/D/E Engage/Disengage Envelopes — LHD Class Ships — All Spots . . . . . . . . . . . . . . . . . . D-71
Figure D-61. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . . . D-72
Figure D-62. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . . . D-73
Figure D-63. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 7 . . . . . . . . . . . . . . . . . . . . D-74
Figure D-64. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 9 . . . . . . . . . . . . . . . . . . . . D-75
Figure D-65. H-60 B/F/H/J Launch/Recovery Envelopes — LHD Class Ships — Spot 2 . . . . . . . . . . . . . . . . . . D-76
Figure D-66. H-60 B/F/H/J Launch/Recovery Envelopes — LHD Class Ships — Spot 4 . . . . . . . . . . . . . . . . . . D-77
Figure D-67. H-60 B/F/H/J Launch/Recovery Envelopes — LHD Class Ships — Spot 5 . . . . . . . . . . . . . . . . . . D-78
Figure D-68. H-60 B/F/H/J Launch/Recovery Envelopes — LHD Class Ships — Spot 6 . . . . . . . . . . . . . . . . . . D-79
Figure D-69. H-60 B/F/H/J Launch/Recovery Envelopes — LHD Class Ships — Spot 8 . . . . . . . . . . . . . . . . . . D-80
APPENDIX J — JOINT SERVICE (USA/USAFC) HELICOPTERS

Figure J-1. UHH-60A/L/Q Dimensions ................................................... J-3
Figure J-2. U/HH-60A/L/Q Initial Tiedown Configurations (Recommended) ........................................ J-4
Figure J-3. MH-60K Dimensions ......................................................... J-7
Figure J-4. MH-60K Initial Tiedown Configuration (Recommended) .................................................. J-8
Figure J-5. MH-60L Dimensions ......................................................... J-10
Figure J-6. MH-60L Initial Tiedown Configurations (Recommended) .................................................. J-11
Figure J-7. HH-60G Dimensions ......................................................... J-13
Figure J-8. HH-60G Initial Tiedown Configurations (Recommended) .................................................. J-14
Figure J-9. CH-47D Dimensions ......................................................... J-20
Figure J-10. MH-47HD Dimensions .................................................... J-23
Figure J-11. CH-47D/MH-47D Rotor Engagement Envelopes ......................................................... J-24
Figure J-12. MH-47E Dimensions ......................................................... J-27
Figure J-13. MH-47E Rotor Engagement Envelopes ......................................................... J-28
Figure J-14. CH-47D MH-47D/MH-47E Initial Tiedown Configurations (Recommended) .................. J-29
Figure J-15. AH-64A Dimensions ......................................................... J-34
Figure J-16. AH-64D Dimensions ......................................................... J-35
Figure J-17. AH-64A/D Initial Tiedown Configuration (Recommended) ............................................. J-36
Figure J-18. OH-58D Dimensions — Standard Landing Gear ......................................................... J-40
Figure J-19. OH-58D Dimensions — Rapid Deployment Landing Gear ............................................. J-41
Figure J-20. OH-58D Initial Tiedown Configuration — Standard Landing Gear (Recommended) .... J-42
Figure J-21. OH-58D Initial Tiedown Configuration — Rapid Deployment Landing Gear (Recommended) ......................................................... J-43
Figure J-22. AH/MH-6J Dimensions ....................................................... J-46
Figure J-23. AH/MH-6J Initial Tiedown Configurations (Recommended) ............................................. J-47
Figure J-24. MH-53J/M Dimensions ....................................................... J-51
Figure J-25. MH-53J/M Initial Tiedown Configuration (Recommended) ............................................. J-52
BIBLIOGRAPHY

1. AFMAN Instrument Flight Manual


GLOSSARY

A

aided aircraft. An aircraft whose pilot(s) are using night vision devices.

airborne stores. Items intended for carriage internally or externally by aircraft, including racks, launchers, adapters, and detachable pylons, that are not normally separated from the aircraft in flight, such as tanks, pods, guns, nonexpendable training weapons, and targets.

airborne weapons. Items intended for carriage internally or externally by aircraft, that are normally separated from the aircraft in flight, such as missiles, rockets, bombs, mines, torpedos, pyrotechnics, and ammunition.

air capable ship. All ships other than CV/CVN or LPH/LHA/LHD from which aircraft can take off, be recovered, or routinely receive and transfer logistic support.

air operations. A section of the operations department that is responsible for coordinating all matters pertaining to flight operations, including the proper function of AATCC.

air taxi. Jetborne or hovering flight at very low speed between two points.

amphibious air traffic control center (AATCC). A centralized air control agency, responsible for maintaining status and tactical control of all aircraft not assigned to CIC/TACC. Also responsible for IMC approach and department control. Becomes the helicopter direction center for tactical control of the helicopters during an amphibious operation.

amphibious assault aviation ship. An LPH, LHA, or LHD.

amphibious task force commander (CATF). The Navy officer designated in the initiating directive as commander of an amphibious task force.

angels. Altitude in thousands of feet.

approach control. A control station in AATCC responsible for controlling air traffic within the control area except that controlled by final, departure, or marshal control. It also is responsible for providing close control for all CCA waveoff traffic until a radar handoff to another control station has been accomplished.

arming. An operation in which a weapon is changed from a safe condition to a state of readiness for initiation.

arming area. That area where 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 stores loading manual/checklist shall be performed in this area. Before arming commences and prior to aircraft launch, the area in front/behind and/or surrounding the aircraft shall remain clear.

aviation ordnance evolution. A shipboard ordnance evolution requiring the breakout, buildup, and staging of ordnance and the loading, arming, launching, recovering, and dearming of ordnance-carrying aircraft.

aviation ship. A CV or CVN.

B

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

bingo. An order to proceed and land at the field specified, utilized a bingo profile. Aircraft is considered to be in an emergency/fuel critical situation. Bearing, distance, and destination shall be provided.
braking stop. The most aft position of the nozzle control lever, which gives a component of reverse thrust on V/STOL aircraft.

buster. An order used by a ship controller to direct an aircraft to proceed at maximum speed.

captive ordnance. Practice, insert ordnance that is intended to be retained on the aircraft throughout the flight.

carrier controlled approach (CCA). (See precision approach.)

center. A collective radio call for AATCC prefixed by a ship’s code name that is used in the same manner as the shore-based counterpart.

Charlie. A signal for aircraft to land aboard the ship. A number suffix indicates time delay in minutes before landing may be anticipated.

Cherubs. Altitude in hundreds of feet.

Clara. A pilot transmission meaning he does NOT have the visual landing aid (meatball) in sight.

close control. The tactical control of aircraft by a designated control unit, whereby the aircraft receives orders affecting its movements. The pilot shall not deviate from instructions given him unless given clearance or unless unusual circumstances require him to take immediate action for the safety of the flight. In either case, the pilot shall inform the controller of the action taken. This type of control requires two-way radio communications and radar contact. The controller is responsible for the safety of the aircraft, and the pilot shall be informed whenever he is not held on the radarscope for periods in excess of 1 minute or five sweeps of the radar. The ultimate safety of the aircraft is the primary responsibility of the pilot.

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corrected hover weight. The thrust being used for takeoff or landing corrected for pressure, altitude, temperature, and individual engine characteristics of V/STOL aircraft.

cutback. Sudden and rapid reduction of engine speed as a result of JPT datum shift or dearming water switch during wet operations with V/STOL aircraft.

carryon area. The circular airspace with a radius of 50 nm around the ship that extends upward from the surface to unlimited altitude and is under the cognizance of AATCC.

carrier controlled approach (CCA). (See precision approach.)

center. A collective radio call for AATCC prefixed by a ship’s code name that is used in the same manner as the shore-based counterpart.

Charlie. A signal for aircraft to land aboard the ship. A number suffix indicates time delay in minutes before landing may be anticipated.

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corrected hover weight. The thrust being used for takeoff or landing corrected for pressure, altitude, temperature, and individual engine characteristics of V/STOL aircraft.

cutback. Sudden and rapid reduction of engine speed as a result of JPT datum shift or dearming water switch during wet operations with V/STOL aircraft.

carryon area. The circular airspace with a radius of 50 nm around the ship that extends upward from the surface to unlimited altitude and is under the cognizance of AATCC.
departure control. A control station in AATCC that is responsible for the orderly flow of departing traffic.

divert. An order for an aircraft to proceed and land at the field specified. This is a nonemergency situation.

downloading. An operation that removes airborne weapons/stores from an aircraft.

e. emergency expected approach time (EEAT). The future time, assigned prior to launch, at which an aircraft is cleared to depart inbound or penetrate from a preassigned fix under lost communications conditions.

emergency final bearing (EFB). A magnetic heading provided by AATCC to all flightcrews prior to launch to be used when executing emergency procedures for communications failure in IMC. The emergency marshal pattern shall be relative to the EFB and is the final bearing for the lost communications tacan approach.

e. emergency marshal. A marshal established by AATCC and assigned to each aircraft prior to launch. The emergency marshal consists of a radial, DME, altitude, and emergency expected approach time.

emission control (EMCON). Control of all electromagnetic radiations, including electronic communications, radar, and visual systems. During its imposition, no electronic emitting device within the designated bands shall be operated unless absolutely essential to the mission of the force.

expected approach time (EAT). The future time at which an aircraft is cleared to depart inbound from a prearranged fix. Aircraft shall depart and commence approach at assigned time if no further instructions are received.

F

Father. Tacan.

feet dry. Pilot to AATCC report indicating aircraft is passing over shore line proceeding over land.

feet wet. Pilot to AATCC report indicating aircraft is passing shore line proceeding over water.

final bearing. The magnetic bearing assigned by AATCC for final approach. It is an extension of the landing area centerline.

final control. A control station in AATCC responsible for controlling traffic in instrument meteorological conditions until pilot reports “VMC” or “meatball” or reaches approach minimums.

fleet area control and surveillance facility (FACSFAC). A U.S. Navy fixed, shore-based air traffic control facility. Designated to manage offshore and inland operating areas and other assigned airspace, including special use airspace. Provides joint-use scheduling and control of surface, subsurface, and airborne military platforms operating within and transiting to and from these areas. Administers services to support the coexistence of military government and nongovernment agencies consistent with national priorities.

flight level. Altitude expressed in hundreds of feet determined by setting 29.92 in the aircraft pressure altimeter; that is, FL 230 equals 23,000 feet in relation to the standard atmospheric pressure of 29.92.

G

ground resonance. A condition of geometric imbalance on helicopters caused by offset dynamic forces when the helicopter makes improper contact with the deck. If allowed to continue, destruction of the helicopter is imminent. Improper tiedowns aggravate the onset of ground resonance.
HERO safe ordnance. Any ordnance item that is sufficiently shielded or otherwise protected that all EEDs/CADs contained by the item are immune to adverse effects (safety or reliability) when the item is employed in its expected shipboard RF environments, provided that the general HERO requirements are observed.

HERO susceptible ordnance system. Any ordnance system proven (by tests) to contain EEDs/CADs that can be adversely affected by RF energy to the point that the safety and/or reliability of the system is in jeopardy when the system is employed in expected shipboard RF environments.

HERO unsafe ordnance. Any ordnance item is defined as being HERO unsafe when its external wiring is physically exposed; when tests are being conducted on the item that result in additional electrical connections to the item; when EEDs/CADs having exposed wire leads are present, handled, or loaded; when the item is being assembled/disassembled; or when the item is in a disassembled condition. Ordinance items that fall into the above classification may be exempted from being classified as HERO unsafe ordnance as the result of HERO tests conducted to determine specific susceptibility.

hover. A condition of flight in which all movement relative to a fixed reference point has ceased.

hover position indicator. Vertical and horizontal light pattern mounted on the Island to provide a hover location cue for the pilot.

hover stop. The position of the nozzle lever that vectors the thrust to the vertical position (81°) on AV-8 aircraft.

hung weapons. Those weapons or stores on an aircraft that the pilot has attempted to drop or fire but could not because of a malfunction of the weapon, rack/launcher, or aircraft release control system.

ICLF FAF. A checkpoint in a CCA located on the final bearing 5 miles from the ship through which all fixed wing aircraft will pass in level flight at an altitude of 1,200 feet in landing configuration.

inbound bearing. The magnetic bearing assigned by AATCC to pilots descending directly to the ship. It may be, but is not necessarily, the BRC.

inbound heading. The magnetic heading assigned by AATCC that will ensure interception of the BRC at a specific distance from the ship.

instrument carrier landing system (ICLS) approach. A precision approach which precise and continuous position error and range information from the ILM and TACAN is displayed in an aircraft enabling a manually-controlled precision approach to appropriate minimums.

instrument meteorological conditions (IMC). Meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, are less than the minimal specified for visual meteorological conditions.

jetborne flight. Very slow speed flight supported by engine thrust only for V/STOL aircraft.


landing force commander (CLF). The officer designated in the initiating directive to command the landing force.

loading (rearming). An operation that installs airborne weapons and stores on or in an aircraft and may include fuzing of bombs and stray voltage checks.

loading area. That area in which replenishment of airborne weapons or stores and other armament items
on or in an aircraft is conducted. When handling weapons in this area, all fuzes and initiators shall remain safe and all gun chambers clear.

**marshal.** A bearing, distance, and altitude fix designated by AATCC from which pilots shall orient holding and from which initial approach shall commence.

**marshal control.** A control station in AATCC that is responsible for the orderly flow of inbound traffic.

**meatball (or ball).** A pilot report indicating that the VLA is in sight, e.g., amber beam of stabilized glideslope indicator.

**medical evacuation (MEDEVAC).** Evacuation of dead, wounded, sick or otherwise incapacitated personnel by ship or air to an area or facility where appropriate medical aid can be obtained.

**mixed operations.** Simultaneous V/STOL and helicopter air operations.

**monitor control.** The monitoring of radar and radio channels for emergency transmissions.

**Mother.** Parent vessel (i.e., LHA/LPH/LHD).

**nonprecision approach.** Radar-controlled approach or an approach flown by reference to navigation aids in which glideslope information is not available.

**nonradar control.** A form of air traffic control in which the pilot flies according to a published procedure or as prescribed by the controlling agency. Traffic separation is provided by the controlling agency using frequent pilot position reports and modified separation criteria. This form of control is used in case of emergency, when all shipboard control radar is inoperative or, in the opinion of the AATCC officer, unsafe.

**O**

**operational necessity.** A mission associated with war or peacetime operations in which the consequences of an action justify accepting the risk of loss of aircraft and crew.

**ordnance handling.** The physical act of moving explosive devices manually or with powered equipment within the confines of the ship.

**P**

**parrot.** Military IFF/transponder.

**passenger/mail/cargo (PMC).** An administrative/logistics flight scheduled for transfer of personnel and/or material to/from the ship. PMC does not include lifts of combat troops for actual or training vertical assaults or withdrawals.

**pigeons.** Magnetic bearing and distance from an aircraft to a specific location.

**platform.** A reporting point 5,000 feet altitude in the approach pattern at which V/STOL aircraft reduce their rate of descent so as to arrive at 1,200 feet, 12 DME, and 250 knots.

**Pogo.** A term utilized by a controlling agency indicating return to last assigned frequency if no contact experienced on newly assigned frequency.

**Popeye.** A pilot term used to indicate that his aircraft has entered IMC.

**position and intended movement (PIM).** The reference position of the officer in tactical command at a given time, and a forecast of the course and speed expected to be made during future movement. Position and intended movement are established to assist the return of the aircraft, to aid outlying surface units (pickets, and so forth) in maintaining their stations and for rendezvous purposes.

**positive control.** The tactical control of aircraft by a designated control unit, whereby the aircraft receives orders affecting its flight that immediately transfers responsibility for the safe navigation of the aircraft to the agency issuing such orders.

29
precision approach. An approach in which azimuth and glideslope information are provided to the pilot (CCA).

primary flight (PriFly) control. The controlling agency that is responsible for aircraft traffic control within the control zone.

R

raspberry. A ship-to-shore HF radio net, used for flight following and administrative traffic concerning aircraft.

reaction controls. Variable exhaust ports at the extremities of the AV-8.

S

safing (dearming). An operation whereby a weapon is changed from the state of readiness for initiation to a safe condition.

semi jetborne flight. Flight where lift is provided by a combination of engine thrust and wing lift for V/STOL aircraft.

source. The amber ball associated with the V/STOL OLS to indicate glideslope in relation to the datums.

spin. A signal given to one or more V/STOL aircraft indicating a departure and reentry into the break. The command “spin” may be issued by either the air officer, LSO, or flight leader.

T

tactical air control center (TACC) (afloat). The TACC is the primary air control agency within the amphibious objective area of responsibility from which all air operations supporting the amphibious force are controlled. This control refers to all airborne operations not incidental to the actual launch or recovery of aircraft: instrument departure, approach, and marshal.

tactical direction. A form of nonradar control in which tactical information is passed to an aircraft by the controlling unit, but the aircraft commander is responsible for navigation and safety.

twelve nautical mile DME fix. A checkpoint in a CCA normally located on the final bearing, 12 miles from the ship. All V/STOL aircraft shall pass through the 12 nm DME fix in level flight at an altitude of 1,200 feet, 250 KIAS, and shall normally commence transition to the landing configuration.

three nautical mile DME fix. A checkpoint in a CCA on the final bearing 3 miles from the ship through which all helicopters shall pass in a landing configuration.

transition. The maneuver of changing from non-conventional flight, wholly and partially jetborne, to conventional flight, or vice versa for V/STOL aircraft.

trimback. Reduction of engine speed through JPTL action to hold constant JPTL at datum limit with V/STOL aircraft.

U

unaided aircraft. An aircraft whose pilots are not using night vision devices.

unexpended ordnance. Airborne ordnance that has not been subjected to attempts to fire or drop, and is presumed to be in normal operating condition and can be fired or jettisoned if necessary.

V

visual meteorological conditions (VMC). Weather conditions in which VFR applies, expressed in terms of visibility, ceiling height, and aircraft clearance from clouds along the flightpath. When these criteria do not exist, IMC prevails and IFR must be complied with.

V/STOL. An aircraft, other than a helicopter, whose characteristics of flight enable vertical and short takeoffs and landings.
V/STOL optical landing system. Provides visual glideslope and trend information during the final portion of a Case III approach.

VTOL. Vertical takeoff and landing.

Waveoff. An action to abort a landing, initiated by primary flight control, the LSO, LSE, or the pilot at his discretion. The response to a waveoff signal is mandatory.

Weather criteria requirements

Case I: V/STOL weather ceiling to be no lower than 3,000 feet and not less than 5-nm visibility (1,000-foot ceiling and 3-nm visibility for helicopters).

Case II: V/STOL weather ceiling to be no lower than 1,000 feet and not less than 5-nm visibility unless modified by ship’s commanding officer for special operations (500-foot ceiling and 1-nm visibility absolute minimum Case II for helicopters).

Case III: V/STOL weather ceiling below 1,000 feet or visibility below 5 nm or ceiling and visibility below Case II minimums set by ship’s commanding officer for special operations (below 500-foot ceiling or less than 1-nm visibility for helicopters).

ZIP-LIP. A condition that may be prescribed for flight operations during day or night VMC under which positive communications control is waived and radio transmissions are held to the minimum necessary for safety of flight.
LIST OF ACRONYMS AND ABBREVIATIONS

A

AATCC. Amphibious air traffic control center.
AFFF. Aqueous film forming foam.
AIMD. Aircraft intermediate maintenance department.
AMCM. Airborne mine countermeasures.
APP. Auxiliary power plant (H-53).
APU. Auxiliary power unit (H-46, H-60).
ATC. Air traffic control.

B

BRC. Base recovery course.

C

CAI. Close-in approach indicator.
CATF. Commander, amphibious task force.
CCA. Carrier controlled approach.
CCO. Combat cargo officer.
CIC. Combat information center.
CLF. Commander, landing force.
COMSEC. Communications security.
CQ. Carrier qualification.

D

DR. Dead reckoning.

E

EAT. Expected approach time.
EEAT. Expected estimated approach time.
EED. Electroexplosive device.
EEFI. Essential elements of friendly intelligence.
EFB. Emergency final bearing.
EMCON. Electronic emission control.
ETA. Estimated time of arrival.
ETE. Estimated time en route.

F

FACSFAC. Fleet area surveillance and control facility.
FAF. Final approach fix.
FCA. Floor of controlled airspace.
FCF. Functional checklist.
FCLP. Field carrier landing practice.
FOD. Foreign object damage.
FRAG. Fragmentary orders.

G

GAIL. Glide angle indicator light.
GTS. Gas turbine starter (V/STOL).

H

HAPI. Horizontal approach path indicator.
HERO. Hazards of electromagnetic radiation to ordnance.
HPI. Hover position indicator.
HRST. Helicopter rope suspension training.
HUD. Heads up display.

I

IMA. Intermediate maintenance activity.
IMC. Instrument meteorological conditions.
NAVIR 00-80T-106

J

JPT. Jet pipe temperature (V/STOL).

JPTL. Jet pipe temperature limiter (V/STOL).

L

LOI. Letter of instruction.

LSE. Landing signal enlisted.

LSO. Landing signal officer.

M

MAR. Marshal.

MIM. Maintenance instruction manual.

N

NAVAID. Navigational aid.

NSI. Night system instructor.

NVD. Night vision devices.

NWS. Nosewheel steering.

O

OCE. Officer conducting exercise.

ODO. Operations duty officer.

OIC. Officer in charge.

OLS. Optical landing system.

OOD. Officer of the deck.

OTC. Officer in tactical command.

ORIGINAL

P

PMC. Pax/mail/cargo.

PriFly. Primary flight control.

R

RADHAZ. Radiation hazards.

RPM limit. Fan speed limit (V/STOL).

RVL. Rolling vertical landing (V/STOL).

RVTO. Rolling vertical takeoff (V/STOL).

S

SAAHS. Stability augmentation attitude hold system.

SAR. Search and rescue.

SAS. Stability augmentation system.

SGSI. Stabilized glideslope indicator.

SIGINT. Signal intelligence.

SPINS. Special instructions.

SRC. Stores reliability card.

STO. Short takeoff (V/STOL).

T

TACC. Tactical air control center.

TAO. Tactical action officer.

TCA. Terminal control area.

TOW. Tail-over-water.

V

VERTREP. Vertical replenishment.

VLA. Visual landing aid.

VMC. Visual meteorological conditions.

V/STOL. Vertical/short takeoff and landing.

VTO. Vertical takeoff.

VTOL. Vertical takeoff and landing.

W

WOD. Wind over deck.
PREFACE

SCOPE

This NATOPS manual is issued by the authority of the Chief of Naval Operations and under the direction of Commander, Naval Air Systems Command in conjunction with the naval air training and operating procedures standardization (NATOPS) program. It provides the best available operating instructions for most circumstances, but no manual is a substitute for sound judgment. Operational necessity may require modification of the procedures contained herein. Read this manual from cover to cover. It’s your responsibility to have a complete knowledge of its contents.

HOW TO GET COPIES

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UPDATING THE MANUAL

To ensure that the manual contains the latest procedures and information, NATOPS review conferences are held in accordance with the current OPNAVINST 3710.

CHANGE RECOMMENDATIONS

Recommended changes to this manual or other NATOPS publications may be submitted by anyone in accordance with the current OPNAVINST 3710.

Routine change recommendations are submitted directly to the model manager on OPNAV 3710/6 (4-90) shown on the next page. When submitting routine changes ensure only one change recommendation is contained on each form. The address of the model manager of this manual is:

Commander, Naval Surface Force
U.S. Atlantic Fleet
1430 Mitscher Avenue
Norfolk, VA 23551-2494
Attn: Code N42A

Change recommendations of an URGENT nature (safety of flight, etc.) should be submitted directly to the NATOPS advisory group member in the chain of command by priority message.
Advisory group members are listed in the current OPNAVINST 3710. In addition, COMNAVSEASYSCOM, COMNAVSURFLANT, and COMNAVSURFPAC are designated as advisory group members for the LHA/LPH/LHD NATOPS manual.

YOUR RESPONSIBILITY

NATOPS manuals are kept current through an active manual change program. Any corrections, additions, or constructive suggestions for improvement of its content should be submitted by routine or urgent change recommendation, as appropriate, at once.

NATOPS MANUAL INTERIM CHANGES

Interim changes are changes or corrections to NATOPS manuals promulgated by CNO or COMNAV-AIRSYSCOM. Interim changes are issued either as printed pages or as naval messages. The interim change summary page is provided as a record of all interim changes. Upon receipt of a change or revision, the custodian of the manual should check the updated interim change summary to ascertain that all outstanding interim changes have been either incorporated or canceled; those not incorporated shall be recorded as outstanding in the section provided.

CHANGE SYMBOLS

Revised text is indicated by a black vertical line in either margin of the page, adjacent to the affected text, like the one printed next to this paragraph. The change symbol identifies the addition of either new information, a changed procedure, the correction of an error, or a rephrasing of the previous material.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to “WARNINGs,” “CAUTIONs,” and “Notes,” found throughout the manual.

WARNING

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

CAUTION

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

Note

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

WORDING

The concept of word usage and intended meaning which has been adhered to in preparing this manual is as follows:

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

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

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

“Will” has been used only to indicate futurity, never to indicate any degree of requirement for application of a procedure.
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FROM (originator) Unit

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Recommendation (be specific)

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Justification

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☐ 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

Predeployment

1.1 COMMAND RELATIONSHIPS

1.1.1 Command Relationships Options for Amphibious Forces are Described in Joint Publication 3-02. This instruction outlines the possible command and control relationships for an amphibious force. These include OPCON to TACRON, or supporting relationships. The rest of this section describes agreements that have been reached to clarify responsibilities.

1.1.2 Navy Aircraft Squadron Commander/ Detachment OIC. The commanding officer or officer in charge of Navy Helicopter SAR squadron/detachment shall report to the ship’s commanding officer.

1.1.2.1 Helicopter Detachment Personnel Attached to Amphibious Aviation Ships. Helicopter detachment personnel attached to amphibious aviation ships shall not be assigned additional collateral duties. The requirements of the helicopter to fly or to be immediately ready to fly around the clock puts the helicopter detachment personnel on a 24-hour call basis. The OIC must have sufficient flexibility to schedule meals, work, rest, and training periods to meet this commitment. Similarly, liberty for detachment personnel should be controlled in accordance with the ship’s policy by the detachment OIC, who is cognizant of the full workload of the detachment.

1.1.2.2 Detachment Support. Berthing for helicopter detachments aboard amphibious aviation ships should be as follows:

1. Officers — Embarked pilots shall be assigned staterooms commensurate with their rank.

2. Chief Petty Officers — CPO quarters.

3. Enlisted personnel — Should be berthed in a common compartment.

The ship’s administrative responsibility to the detachment includes officer and enlisted records, medical and dental records, pay records, and other administrative tasks essential to the function of the detachment.

1.1.3 Ship’s Commanding Officer. U.S. Navy regulations set forth the authority of the ship’s commanding officer with respect to the aircraft embarked in or operating from his ship. The commanding officer of the ship shall respect the identity and integrity of organizational embarked marine squadrons/detachments, and:

1. Shall have all orders given through the Marine chain of command insofar as practicable or as an emergency may dictate.

2. May require Marines, when in his opinion an emergency exists, to perform such duties as their special knowledge and skill enables them to perform.

3. Shall ensure that the aviation unit commander has knowledge of any degradation in aviation facilities, certification, or deficiencies in training and/or qualified flight quarter’s personnel.

4. Shall ensure the squadron/detachment has adequate opportunity to remain current in day/night shipboard land/launch operations.

5. Shall provide heavy weather protection of aircraft, including:

   a. Hangar space, when possible

   b. Compliance with applicable aircraft securing procedures as listed in NAVAIR 17-1-537, “Aircraft Handling and Securing Equipment.”

6. Shall provide IMA support through the AIMD.

1.1.3.1 Air Department Manning/Ship Support of Flight Operations. OPNAVINST C3501.104B (ROC/POE) delineates, “The ship can support 10 hours of flight operations per day when a Marine composite squadron or other aviation squadron of similar size is embarked.” When time for initial manning or final
respot is factored in, the total time can easily exceed 12 hours of operations. Flight operations that are not in support of an ongoing operation or contingency shall adhere to the scheduled 10-hour continuous flight operations from first launch to last recovery.

**Note**

This 10-hour restriction is not intended to preclude short-duration, single-spot operations. The air officer will determine whether such operations are feasible on a case-by-case basis.

### 1.1.4 Embarked Aircraft Squadron/Commanding Officer/Detachment Officer-In-Charge.

The squadron commanding officer/detachment officer-in-charge retains operational authority over, and ultimate responsibility for, aircraft employment and safety of flight operations during all embarked phases of the operation. The squadron commanding officer/detachment officer-in-charge may establish wind, pitch, and roll limitations more restrictive than those in Appendix D. This, however, shall not be construed as impairing the authority of the CLF, or the CATF, or the ship’s commanding officer.

To ensure efficient operations, the following shall be provided to or coordinated with the ship:

1. Information regarding pilot qualifications and limitations.
2. Complete list by bureau number of aircraft being deployed. The list shall include all aircraft side numbers, SIF codes, and any peculiarities in configuration that will affect handling, ordnance loading, or mission capability.
3. Aircraft limitations.
4. Scheduling of aircraft, pilots, and crewmen.
5. Pilot briefings.
7. Currency of pilot’s day/night shipboard qualifications.
8. Applicable heavy weather protective measures as listed in aircraft technical manuals and NAVAIR 17-1-537, “Aircraft Handling and Securing Equipment.”
9. Establish as required more restrictive wind, pitch, and roll limitations than listed in Appendix D, and notify ships commanding officer of their implementation.

### 1.1.5 Augmentation Support By Embarked Units

#### 1.1.5.1 Intermediate Maintenance Activity.

Augmentation shall be provided by the appropriate service organization in accordance with fleet directives.

#### 1.1.5.2 Integrity Watch.

All embarked units and detachments shall provide personnel to stand the aircraft integrity watch. The integrity watch officer/NCO may be filled by qualified E-5 and above personnel designated by the embarked squadron commanding officer or detachment officer in charge. Integrity watch duty assignments will be shared proportionally between all embarked units/detachments and based upon the relative size of each embarked unit/detachment.

This watch is set both underway and in port whenever there are aircraft aboard, and the ship is not at general quarters or flight quarters. The watch shall consist of one officer/NCO and as many enlisted personnel as may be required to ensure complete aircraft integrity. Integrity watch personnel shall be indoctrinated in equipment and procedures for flight deck/hangar deck firefighting. The air officer shall be responsible for the integrity watch.

#### 1.1.5.3 Primary Flight Control (PriFly).

The embarked unit shall provide personnel as advisors to PriFly during flight operations. The unit representative shall be fully qualified in at least one type embarked aircraft, be familiar with all unit policies, the day’s flight schedule/mission, and act as an information/communication link between PriFly and the embarked unit. The LSO/LSO under instruction shall not be used in this capacity during AV-8 operations. Training with PriFly for those selected representatives should be afforded and completed prior to embarkation.

### 1.2 TRAINING REQUIREMENTS

#### 1.2.1 Ship Responsibilities.

Maximum operational effectiveness and flight safety require extensive
training for both ship’s company and embarked personnel, especially in the areas of command and control, aircraft coordination, and flight deck procedures.

Fleet commanders shall establish, through their type commanders, training and readiness standards for ship and aircraft unit personnel, including predeployment training and coordinated training in primary and secondary missions. Readiness standards and exercises shall be established to ensure effective use of the ship and aircraft.

Shipboard personnel shall be trained in all appropriate areas outlined in this paragraph. Training shall be scheduled as required to meet ship commitments when requested by operational commanders. After initial qualification of shipboard personnel is attained, ships shall be considered current in helicopter/V/STOL operations until:

1. One year has elapsed since helicopter/V/STOL operations were last conducted.

2. More than a 50-percent turnover in aircraft handling personnel has occurred since helicopter/V/STOL operations were last conducted.

3. The air officer and assistant air officer are simultaneously transferred. (Either the air officer or assistant air officer must have operated helicopter/V/STOL aircraft or had appropriate training as contained in the following paragraph.

Air department personnel shall be trained in the areas listed below prior to conducting helicopter/V/STOL aircraft operations:

1. General operating characteristics of the specific aircraft.

2. Taxiing, towing, and tiedown requirements.

3. Aircraft firefighting, aircrew, and passenger rescue operations.

4. Aircraft personnel hazards and general safety.

5. Vertical takeoff, short takeoff, and vertical landing procedures (not required for helicopter operations).


7. Fueling and defueling procedures.

8. Aircraft salvage procedures.


10. Air-launched weapons safety briefing.

11. Aircraft elevator operation procedures.

In addition, air department personnel and personnel directly involved in V/STOL flight deck operations shall meet the training requirements set forth in NWP 63.

1.2.2 Squadron/Detachment Responsibilities.

The commanding officer/OIC shall coordinate applicable predeployment training requirements with the ship. The commanding officer/OIC shall ensure that all personnel complete FCLP, CQ, and the lecture syllabus outlined in paragraph 1.3 prior to initial deployment. These requirements need not be repeated before every deployment; however, the commanding officer/OIC is responsible for providing refresher training as required for the safety of personnel and equipment. Ship’s company personnel should assist in this training. If predeployment liaison is not possible, the predeployment lecture syllabus and CQ shall be completed as soon as possible after embarkation and prior to commencement of normal flight operations. The commanding officer/OIC shall also ensure that all personnel assigned duties on the hangar or flight decks attend an aircraft firefighting course in accordance with OPNAVINST 3541.1.

1.2.3 Carrier Qualifications

Note

The information contained in this paragraph is intended for use at the discretion of the ship’s commanding officer for special circumstances (i.e., qualification of aircraft of another service or country) and are considered minimum standards for all types. Individual aircraft NATOPS manuals specifying more stringent requirements shall take precedence.

Minimum requirements for initial helicopter LHA/LHD carrier qualification are 5-day and 5-night landings. (Two-day landings shall be accomplished prior to
and on the same clay as the night landings.) Qualifications are valid for 12 months. Minimum helicopter shipboard requalifications are 2-day and 2-night landings.

Minimum requirements for initial V/STOL carrier qualifications are 8-day and 8-night takeoffs and landings (2-day takeoffs and landings shall be accomplished prior to and on the same day as the night takeoffs and landings). Qualifications are valid for 6 months. Requirements after 6 months shall be 4-day and 4-night takeoffs and landings. Initial qualification requirements are necessary after 12 months.

1.3 PREDEPLOYMENT LECTURE SYLLABUS

1.3.1 Plane Captains/Crewchiefs

1. Aircraft handling procedures.
2. Care and use of flight deck personnel protective and communications equipment.
3. Responsibilities during launch and recovery.
4. Aircraft tiedown requirements and techniques.

1.3.2 Maintenance Personnel

1. Shipboard maintenance procedures.
2. Special shipboard safety precautions.
3. Care and use of flight deck personnel protective equipment and communications equipment.

1.3.3 Flight Crewmen

1. Launching procedures and signals.
2. Landing procedures and signals.
3. Aircraft control doctrine and procedures.
4. Emergency procedures peculiar to shipboard operations.
5. Special procedures for night and IFR.
6. Landing aids including stabilized glideslope indicator.

7. Communications.
10. Search and rescue procedures.

1.3.4 Ordnance Personnel

1. Shipboard weapons handling procedures.
2. Shipboard ordnance safety instructions.
3. Care and use of flight deck personnel protective and communications equipment.

1.3.5 AV-8 Phase I, II, III Training. AV-8 phase I, II, and III training for ship’s personnel is outlined in Appendix F.

1.3.6 All Personnel

1. Duties and responsibilities during flight quarters, general quarters, abandon ship, man overboard, and other general drills.
2. Firefighting and damage control shipboard indoctrination.
3. Duties and responsibilities during HERO and EMCON conditions.
4. General shipboard safety and electrical safety programs.
5. Watch standing peculiar to shipboard operations.
6. Flight deck and hangar deck safety.
7. Water survival and recovery procedures.
8. FOD indoctrination and prevention.
11. Hazards, procedures, duties, and responsibilities during NVD operations and procedures for shifting from normal lighting to NVD-compatible lighting and back.
CHAPTER 2

Preparing for Flight Operations

2.1 AIR OPERATIONS

2.1.1 Air Planning Board. Normally, ships do not have operational or tactical control of embarked aviation units; therefore the sequence for processing air requests and scheduling air operations requires close coordination and cooperation among those units involved. An Air Planning Board is usually convened no later than 24 hours prior to the execution of the next day’s air operations. The function of this board is to process and schedule all requests for air support. This board is co-chaired by the CATF Air Officer and CLF Air Officer and consisting of representatives from those units involved in the conduct of air operations to include embarked aviation units, ship’s air department, ship’s operations department, CATF/ship’s combat cargo officers and those units requesting air support. Each organization requesting air support must submit requests in a timely fashion to the Air Planning Board for review of supportability. The end product of this board is to produce a CATF/CLF coordinated air operations message that will serve as the source document for all air operations. The CATF shall release the air operations message to all ships/units involved in supporting air operations. Changes to air operations should be affected at the lowest level, but the CATF/CLF’s Air Officer should be informed of all changes. Significant changes to the air operations message should be properly routed through the CATF and CLF and then released as an amendment to the original message.

2.1.2 Air Plan. A ship’s air plan reflects the ship’s involvement in supporting air operations. The air plan is promulgated by the ship’s operations department and becomes an order of the ship’s commanding officer. The air plan shall contain as a minimum the following information:

1. Event number
2. Launch time
3. Recovery time
4. Number and model of aircraft
5. Mission
6. Call sign
7. Controlling agency
8. Circuit designators
9. Date
10. Sunrise, sunset, moonrise, moonset, phase, and percent illumination
11. Aircraft armament/ordnance loading
12. EFB

Additional notes may include the following data, if appropriate:

1. The ready deck schedule
2. Aircraft readiness conditions prescribed by the officer in tactical command
3. Flight identification procedures in effect
4. Readiness condition of standby aircraft
5. EMCON and HERO conditions
6. Any other information required, including restrictions or hazards to flight
7. Fuel load required

If mutually approved by the squadron/detachment and ship, the air plan may be expanded in scope to include normal flight scheduling information provided by the squadron/detachment, thereby eliminating the requirement for publishing a daily flight schedule. Where this scheduling method is used, the aircraft squadron commander/OIC shall maintain his inherent
authority and responsibility for scheduling assigned aircraft and crews.

2.1.3 Flight Schedule. Embarked aviation units will normally publish a flight schedule reflecting aircrew assignments, and times for launch and recovery. The flight schedule is promulgated by the squadron operations department and becomes an order of the squadron commander/detachment OIC.

Note
Distribution of the ship’s air plan and flight schedule is in accordance with ship/squadron requirements

2.1.4 Mission Briefing. A mission briefing shall be prepared by TACC for each helicopter performing a logistics mission. The mission briefing shall contain, at a minimum, the following information:

1. Order of ships to be visited
2. Ship name(s), hull number(s), call sign(s), NAVAID(s)
3. Expected bearing/distance to each ship
4. Pertinent radio frequencies
5. Number of passengers to be delivered/picked up with pickup and delivery points
6. Weight and description of cargo to be delivered/picked up
7. Ship certification/waiver status of ships to be visited.

2.1.5 Functional Checkflights. Functional checkflights shall be scheduled by the squadron operations officer through the ship’s air operations officer as soon as practicable after receiving the request. When feasible, such functional checkflights may be scheduled as part of routine multiple aircraft launches. When operations allow, a dedicated spot should be available for launch of nonscheduled functional checkflights. The availability of multiple deck spots and increased flight quarters for functional checkflights becomes increasingly important prior to amphibious operations.

WARNING

Ordnance shall not be loaded on aircraft scheduled for a FCF.

Auxiliary power plant starts, folding/unfolding of rotor blades, engine turnups, and movements of aircraft shall be coordinated between squadron/detachment personnel and the air department.

2.1.6 Flight Plan. Written authorization, either in the form of an air plan, daily flight schedule, or a local flight clearance, is a prerequisite for all flights. Unscheduled flights shall be kept to a minimum. The requirements for filing flight plans and advisories vary with each operating area and are contained in the “Foreign Clearance Guide,” flight planning documents, and fleet operating directives. Whenever possible, functional checkflights should be scheduled on the air plan.

As a rule, flights originating aboard ship and terminating at a shore station, proceeding over land, or penetrating an ADIZ require the filing of a written flight plan with the ship by the pilot in command/flight leader. When firm information concerning departure and arrival times is available, the ship shall send a message as soon as possible and prior to the ETA of the aircraft. Whenever possible, the ship shall establish voice communication with the destination airfield on administrative aviation frequencies (i.e., U.S. Air Force HF/SSB airways and command control stations, USN/USMC Raspberry nets, etc.).

The standard DD-175 military flight plan, ICAO, or DOD international flight plan shall be filed in accordance with the appropriate FLIP documents.

The ship shall send a departure message (immediate precedence) including aircraft type, aircraft bureau number, and actual time of departure. This procedure applies specifically to flights of such distance that radio communication between the ship and the aircraft will be lost before communications are established with the shore station. The ship from which the flight originated shall annotate the time and retain the original copy of the flight plan for 3 months. Upon completion of the flight, the pilot in command/flight leader shall close out his flight plan. This shall be accomplished by an IMMEDIATE message to ship.
Flight advisories shall be filed for flights within ADIZ boundaries for all aircraft that will land back on board ship and are not covered by a flight plan. Squadrons/detachments shall prepare necessary flight plans (DD-175/ICAO) and file them with AATCC as far in advance of scheduled launch times as possible. AATCC shall in turn file the flight plan/advisory with the appropriate agency via available radio or teletype facilities.

2.2 AQUEOUS FILM FORMING FOAM SYSTEM AND MOBILE FIREFIGHTING EQUIPMENT

The guidelines for manning and disposition of the AFFF system are outlined in NAVAIR 00-80R-14, “U.S. Navy Aircraft Firefighting and Rescue Manual.”

2.3 PRELIMINARY PROCEDURES

2.3.1 Flight Quarters Stations. Flight quarters stations shall be manned when directed and as prescribed in the ship’s watch quarter and station bill. Squadron personnel shall man aircraft as appropriate. Some evolutions may not require that all flight quarters stations be manned. On such occasions, specific instructions shall be issued at the time flight quarters are set (for example, “Flight quarters for resport”).

All personnel assigned working stations on the flight deck of hangar decks, aviation fuels, and ordnance spaces shall wear serviceable flight deck safety shoes or flight boots provided by parent command. Those personnel assigned flight quarters stations on of above the hangar shall wear jerseys as prescribed in Appendix E. Flight deck personnel shall wear the HPG-9A cranial impact helmet or equivalent. In addition, all personnel whose duties require them to work on the flight deck shall wear goggles, sound attenuators, flotation gear, dye marker, and adequately secured whistle and survival light. All personnel working on the hangar deck whose duties require them to work on deck edge elevators shall wear flotation gear, dye marker, and adequately secured whistle and survival light. During night flight operations, LSE/directors shall use signal wands or NVD compatible signal wands as appropriate. All other personnel shall exercise proper lighting discipline during night flight operations.

During flight quarters, individuals wearing improper clothing shall not be permitted on the flight deck without the express consent of the air officer.

One and one-half hours before scheduled flight operations, AATCC should be manned and the following checkoff list executed, commensurate with the EMCON plan in effect.

1. Check all communications equipment (internal and external), CCA radar equipment, gyro repeaters, wind speed/direction indicators, and NAVAIDs for proper operation and frequencies, and align clocks. Immediately report all discrepancies for appropriate action and advise the operations, tactical air, air, landing force air, and combat cargo officers if equipment failures will affect air operations.

2. Establish radio communications with shore activities as applicable.

3. Obtain weather for the operating area and shore stations within aircraft divert range. Advise meteorology of any special requirements for weather information during the day.

4. Update aircraft status board. Advise the operations, tactical air, landing force air, and combat cargo officers if aircraft availability will seriously limit scheduled air operations.

5. Obtain PIM and check its relation to flight advisory areas and other control areas. PIM shall be continuously monitored in AATCC.

6. Check message traffic for information that might affect the day’s operations.

7. Check the air plan for changes and notify stations concerned.

8. Check aircraft status information for completeness and accuracy.

9. Ensure embarked aviation unit flight schedules have been received.

10. Compile mission information for briefing of flightcrews.

2.3.2 Air Officer. When flight quarters are sounded, the air officer shall ensure that:

1. Procedures prescribed in applicable bulletins and instructions for inspection and preparation for
operation of the optical landing aids, elevators, aviation fuel system, and crash and firefighting equipment are followed. Discrepancies shall be reported to the bridge as soon as they are detected. A decision to conduct flight operations when discrepancies are known to exist in any of the above equipment shall be made only by the ship’s commanding officer.

2. A FOD walkdown is conducted prior to flight operations.

3. Communications equipment is tested.

4. All required stations are properly manned.

2.3.3 Vertical/Short Takeoff and Landing Signal Officer. The V/STOL LSO, under supervision of the air officer, is responsible for launch and recovery data, as well as the visual control of aircraft in the terminal phase of the approach immediately prior to landing. The primary responsibility for determining acceptable pilot performance in a carrier approach rests with the LSO. It is his responsibility to wave off aircraft that are not in an acceptable approach position to permit a safe landing. The LSO shall be a pilot who is qualified by the aircraft squadron. He shall be directly responsible to the air officer for the performance of his LSO duties aboard ship and shall keep the air officer informed of his whereabouts during flight quarters. The air officer and the assistant air officer shall be trained by the squadron to perform LSO duties in an emergency.

2.3.4 Flight Deck Supervisor. The flight deck supervisor shall be a qualified flight deck petty officer, leading petty officer, or chief petty officer. He shall report directly to the air officer for the performance of aircraft launch duties. The flight deck supervisor shall be thoroughly familiar with each type aircraft and be able to recognize proper and improper aircraft functioning just prior to launch.

2.3.5 Landing Signal Enlisted. The LSE under the supervision of the air officer is responsible for visually signaling to the helicopter, thus assisting the pilot in making a safe takeoff and/or approach and landing on the ship. He is responsible for directing the pilot to the desired deck spot and for ensuring general safety conditions of the flight deck area, to include control of the flight deck crew. He shall ensure that on signal, helicopters are safely started, engaged, armed, launched, recovered, dearmed (safed), and shutdown and that all tiedowns are removed prior to lift-off and secured after landing. His signals are advisory in nature, with the exception of waveoff and hold, which are mandatory.

2.3.6 Vertical/Short Takeoff and Landing Launch Officer. The V/STOL launch officer has been trained by aircraft squadron or qualified ship’s personnel and is designated in writing by the ship’s commanding officer. He shall report directly to the air officer for the performance of his launch duties. The launch officer shall be thoroughly familiar with the NATOPS flight manual and/or shipboard operating bulletin for the specific type of aircraft and be able to recognize proper and improper aircraft functioning just prior to launch.

2.4 OPTICAL LANDING AIDS AND FLIGHT DECK/HANGAR DECK LIGHTING

The air officer shall ensure that the following procedures are accomplished for the utilization of optical landing aids and flight deck/hangar deck lighting if required for operations.

1. When night operations are planned, flight deck lighting and optical landing aids will be checked for proper operation and physical integrity at least 1 hour before sunset.

2. For helicopter operations, the following flight deck lighting and optical landing aids are required as a minimum for night or IFR operations:

   a. Flight deck lighting

      (1) Spot pad lights (red and white)

      (2) Overhead floodlights (amber or blue)

      (3) Deck edge lights (blue)

      (4) Deck surface floodlights (white or red)

      (5) Homing beacon (white)

      (6) Rotary beacon signalling system (red, amber, green)

      (7) Low-pressure sodium floodlights (amber).
b. Optical landing aids

   (1) V/STOL OLS

   (2) Waveoff light system.

3. For V/STOL operations, the following flight deck lighting and optical landing aids are required as a minimum for night or IFR operations:

   a. Flight deck lighting

      (1) All helicopter night/IFR flight deck lighting with the exception of the spot pad lights

      (2) Tramline/STO lights (white)

      (3) Nozzle rotation lights (amber)

      (4) Forward port, port, starboard and athwartship edge lights (white)

      (5) Safe parking lights (red)

      (6) Vertical dropline lights (red).

   b. Optical landing aids

      (1) V/STOL OLS

      (2) Waveoff/cut light system

      (3) HPI

      (4) HAPI system.

4. All flight deck lighting and optical landing aids shall be utilized at minimum intensity consistent with safety.

5. Requirements for lighting during night or IFR operations may be waived by the LHA/LHD commanding officer.

6. Lighting other than amber/red lights may be used on the hangar deck to enhance aircraft maintenance, handling efficiency, and safety. When restrictive lighting measures are in effect on the flight deck, appropriate steps shall be taken to ensure masking of the other than amber/red hangar bay lights. Consideration shall be given to closure of hangar bay doors if conditions so warrant.

2.5 FLIGHT DECK AUGMENTATION

   The expeditious folding and spreading of rotor blades, initial breakdown and final position of tie-downs, rotor blade security, and other similar functions shall be accomplished by qualified personnel from the embarked aviation units.

2.6 BRIEFING OF FLIGHTCREWS

   It is the responsibility of squadron or unit commanders to ensure that all flightcrews have been properly briefed and have sufficient information to complete the assigned mission. Briefing checklists shall be used as required by applicable aircraft NATOPS flight manuals. Each briefing shall include EMCON procedures, if applicable, and procedures to be followed in the event of communication or navigational aids failure. AATCC shall provide the following briefing information prior to launch:

1. Launch and recovery times

2. PIM

3. NAVAIDs status and frequencies

4. Weather in the area of the ship

5. Weather at divert fields and en route, if available

6. Emergency data:

   a. Bearing and distance to nearest land

   b. Bearing and distance to nearest suitable landing field

   c. NAVAIDs, frequencies, and facilities at nearest field

   d. Ready deck call sign/hull number, frequencies, NAVAIDs, and range/bearing from ship at the time of launch

   e. Emergency base recovery course

   f. Emergency marshal fixes/altitudes/approach times.
7. Air traffic control data:
   a. Departure/rendezvous radials
   b. Departure frequency and IFF/SIF mode and code
   c. Special procedures for ZIP-LIP/EMCON/NVD conditions, if applicable.

8. Any restrictions or hazards to flight including ordnance restrictions, night, unaided/NVD operating areas and/or corridors

9. Pertinent information not included in the air plan.

2.7 CARRIER QUALIFICATION PERIODS

2.7.1 Number and Type Aircraft. The maximum number of aircraft in the CQ pattern is six, unless modified by the air officer. During initial qualification, mixed aircraft (helicopter and V/STOL) shall not occupy the same CQ pattern simultaneously.

2.7.2 Interval. The pilot is primarily responsible for maintenance of interval, especially during VMC. Both the air officer and LSO shall monitor the pattern and issue instructions to adjust interval as necessary.

2.7.3 Case III Carrier Qualification Landings. Case III landings should be conducted in accordance with Figure 5-5. AATCC positive control and single frequency control shall be maintained.

2.7.4 Carrier Qualification/Refresher Landing. During helicopter CQ, a responsible squadron representative shall be present in PriFly. During V/STOL night or IMC CQ, an additional responsible squadron representative, qualified in V/STOL operations, shall be present in AATCC. The squadron/ detachment will compute and provide to AATCC the fuel required for each model aircraft to reach the briefed divert. AATCC will update this information as the divers and distances change.

2.7.5 Aircraft Landings Required. The squadron shall keep the air officer apprised of the number of landings required for each aircraft.

2.7.6 Divert Data. The air operations officer shall provide the air officer with accurate divert data. Before and/or during CQ, he shall compute distance and bearing to divert field and coordination with the squadron representative in PriFly will update the fuel required for the model aircraft involved. Divert data shall be broadcast on the land/launch frequency by PriFly or AATCC as appropriate.

2.8 PASSENGER/CARGO MOVEMENTS (HELICOPTER)

2.8.1 Night Overwater Passenger Transfer. Night overwater helicopter passenger flights are prohibited except in operational necessity. This does not preclude troop movement in support of amphibious exercises.

Note
Troop movement includes all operationally required key personnel needed to plan and accomplish the assigned amphibious, special warfare and EOD missions as designated by the CATF/CLF/OTC (e.g., mission commanders, COs, etc.). This authorization does not include civilians or any military personnel assigned administrative missions or being moved as a matter of convenience.

2.8.2 Combat Cargo Officer. The CCO is responsible for the safe and orderly flow of troops, passengers, mail, and cargo. His duties include the following:

1. Shall contact AATCC no later than 1 hour prior to flight operations for an air plan brief.

2. Compile a complete troop or passenger manifest to include:
   a. Last name and initials
   b. Rank/rate
   c. Social security number
   d. Organization
   e. Destination
   f. Priority (if any).
3. Conduct troop or passenger preflight briefing to include:
   a. Flight deck precautions
   b. Primary and alternate routes to aircraft
   c. Personal survival equipment and its use
   d. Aircraft ditching and emergency egress stations.

4. Ensure that personnel transiting the flight deck do not cause a FOD hazard and are escorted with regard to personal safety. Ensure that passengers are provided approved hearing and eye protection as well as approved floatation devices. All personal protective gear shall be properly donned by passengers and worn at all times while on the flight deck.

5. Be familiar with load capacities/restrictions, survival equipment carried, and emergency escape procedures for all aircraft models expected on board for logistic purposes. Inspect cargo prior to loading to ensure it is embarked in accordance with existing instructions.

6. Deliver mission briefing cards to helicopter as directed by AATCC. Mission briefing card contents are delineated in paragraph 2.1.2 of this manual.
CHAPTER 3

Air Traffic Control Doctrine

3.1 ATC RESPONSIBILITIES

3.1.1 Operations Officer. The ship’s operations officer is responsible for the control of airborne aircraft, except when control is assigned to other authority. The control refers to all airborne operations not incidental to the actual launch or recovery of aircraft.

3.1.2 Air Operations. The air operations officer is responsible to the operations officer for coordination of all matters pertaining to flight operations, and for proper functioning of the AATCC.

3.1.3 Air Officer. The air officer is responsible for visual control of all aircraft operating in the control zone. Under Case I and II conditions, this responsibility may be extended beyond the control zone to include all aircraft that have been switched to air officer’s control frequency. For special operations such as bombing a sled or air demonstrations, the air officer may exercise control outside of the control zone. Additionally, he is the control zone clearing authority. Agencies desiring to operate aircraft within the control zone shall obtain the air officer’s approval prior to entry. This clearance shall include:

1. Operating instructions as required for avoiding other traffic.
2. Information concerning hazardous conditions.
3. Altitude and distance limitations to which aircraft may be operated.

3.1.4 Combat Information Center Officer. The CIC officer is responsible for mission control of aircraft assigned to him. This includes providing separation from other traffic operating in the vicinity of the ship and ensuring that mission controllers know the basic procedures for air traffic control. Additionally, he shall ensure that controllers know their responsibility for traffic advisories to aircraft operating in visual conditions and for safe separation of aircraft operating in instrument conditions. Upon request, the CIC officer shall provide information concerning areas of special operations, such as air-to-surface weapon drops and air-to-air missile shoots.

3.1.5 Tactical Air Officer. The tactical air officer controls and coordinates airborne tactical aircraft and helicopter operations with supporting arms and other air operations through the TACC (afloat).

3.2 AIRCRAFT CONTROL CRITERIA

Weather in the control zone is the most prominent factor affecting the degree of control necessary. The type of control to be employed during departures and recovery is determined by the air operations officer, unless otherwise specified by higher authority.

3.2.1 Close Proximity Operations. Amphibious Task Force Operations often require close proximity flight operations by two or more aviation, mine countermeasures support and/or amphibious aviation ships. When this occurs, CVs, LHAs, and LHDs should be assigned operating areas of sufficient size to preclude mutual interference. Operational constraints may at times require aviation and/or amphibious aviation ships to operate within 10 nm of one another, creating a conflict of overlapping control zones. To ensure operational safety and efficiency when such operations are anticipated, the OTC shall promulgate special instructions (spins) that delineate the limits of each ship’s airspace control, as well as the procedures to be used for VMC operations between contiguous control zones.

3.2.1.1 Planning

Detailed prior planning should be conducted to prescribe the responsibilities and procedures to be used during anticipated close proximity operations. Planning considerations should include, but are not limited to:

1. Meteorological conditions (IMC, VMC)
2. Type and number of aircraft (characteristics affecting control requirements)
3. Type, number, and disposition of ships

4. Type of operations planned (i.e., EMCON, well-deck operations, night VMC, VERTREP, refueling, etc.)

5. Communications (i.e., equipment frequency availability, etc.).

3.2.1.2 Operations. During concurrent flight operations (fixed wing or helicopter) by two or more LHA/LHDs or between LHA/LHD and CV/air-capable ship, each ship shall remain in its assigned operating area of order to reduce air traffic coordination problems. AATCC shall closely monitor and coordinate flight patterns to avoid mutual interference. Prelaunch procedures shall include exchange of air plans and notification by air-capable ships and acknowledgment by the LHA/LHD prior to any aircraft operations between contiguous control zones and/or within 10 nm of the LHA/LHD.

Note

Unscheduled launches or recoveries that are because of emergency or operational necessity are permissible, but shall be coordinated with the OTC as soon as possible because of the inherent danger of contiguous flight operations.

3.2.2 Electronic Control

3.2.2.1 Positive Control. This control shall be utilized under the following conditions:

1. Ceiling of 1,000 feet or less for V/STOL operations

2. Ceiling of 500 feet or less for helicopter operations

3. Forward flight visibility of less than 5 miles for V/STOL operations

4. Forward flight visibility of 1 mile or less for helicopter operations

5. All unaided flight operations between one-half hour after sunset and one-half hour before sunrise except as modified by the OTC or ship’s commanding officer

Note

Helicopter night touch and go pattern is excluded from close control, provided a visible horizon exists.

6. During mandatory letdown in thunderstorm areas

7. In other situations where supervisory personnel can anticipate weather phenomena that might cause difficulty to pilots.

3.2.2.2 Advisory Control. This control shall be utilized when the traffic density in an operating area requires a higher degree of control for safety of flight than required under visual flight rules. Advisory control is normally limited to VMC and is recommended for all operations in or adjacent to oceanic control areas or routes.

3.2.2.3 Monitor Control. This control shall be utilized only when aircraft are operating VMC outside controlled airspace and the responsibility for separation from other traffic can be safely assumed by the pilot.

3.2.2.4 Nonradar Control. This control shall be used when shipboard radar is inoperative or so degraded as to be inadequate to provide radar separation of air traffic under conditions normally requiring close control. The decision to attempt control of aircraft at night or in instrument flight conditions shall be made with careful consideration of factors such as:

1. Actual meteorological conditions

2. Degree of radar degradation

3. Expected duration of radar degradation

4. Fuel states/fuel available for delays

5. Divert field suitability/availability

6. Operational requirement

7. Departure/recovery in progress at the time a nonradar environment develops

8. Availability of other surface or airborne platforms to provide radar traffic separation and approach information.

3.2.3 Electronic Emission Control. The Operations Officer, or his representative will hold
detailed briefings prior to conducting operations under EMCON conditions. It may be necessary to develop special procedures for performing the following operations during various conditions:

1. Aircraft handling
2. Launch
3. Departure
4. Mission
5. Arrival
6. Recovery
7. Maintenance.

Detailed briefings covering responsibilities and procedures shall be conducted prior to operating under EMCON conditions. All flight crewmembers, controllers, and aircraft handling personnel shall attend such briefings and familiarize themselves with all procedures within their area of responsibility. Overhead messages shall include applicable EMCON instructions.

3.3 CONTROL ZONE/CONTROL AREA LIMITATIONS

The ship’s control zone/control area is depicted in Figure 3-1.

The operating procedures contained in this publication relating to ship’s control zones may not be recognized or honored by other than USN/USMC aircraft. Civil aircraft or aircraft of other services may enter or transit the control zone without clearance, radio contact, or regard for procedures set forth herein, and may only adhere to the basic requirements or FAR 91 (no closer than 500 feet to any vessel, and less for helicopters in uncontrolled airspace); others may not be aware of the ship’s presence or conduct of flight operations. Utmost vigilance/surveillance is required in areas near airways, airfields, controlled airspace, or special use airspace.

Figure 3-1. Control Area and Control Zone Dimensions
1. The control zone will not be effective in any portion of the area that extends into, under, or abuts control airspace airfields. The upper limit of the control zone must not penetrate the FCA, floor of a TCA, or other controlled airspace. Likewise, the lateral extent is not effective in any portion that extends into or abuts controlled airspace as defined in applicable FAA/ICAO aeronautical publications.

2. The control zone is not effective in an area that lies within a special use airspace (restricted area, MOA, and so forth) without authorization of the designated controlling agency.

3. The outer limit of the control zone shall not be established closer than 10 nm to any airway, controlled airspace, or special use airspace, unless approved by cognizant authority (controlling activity, scheduling activity, or FAA facility). Ships desiring to activate a control zone in fleet operating areas in uncontrolled airspace, underlying airways or controlled airspace, or adjacent to special use airspace, shall coordinate with and gain authorization/approval from the applicable FACS FAC, oparea coordinator, numbered fleet commander, or FAA facility.

4. The factors above shall be considered in relation to operations involving a ship’s control area.

The following sectors are provided to ensure lateral and vertical separation of aircraft during amphibious flight operations. AATCC will assign sectors as necessary. Pilots may also request a sector for training purposes. All sectors will be based on ships BRC (Figure 3-2).

### 3.4 AIRCRAFT SEPARATION CRITERIA

The following separation standards shall be utilized for aircraft under positive control. These restrictions do not apply to tactical maneuvers such as air intercept rendezvous and close ASW action.

#### 3.4.1 Lateral Separation

The following separation standards apply to aircraft controlled by designated air search radars.

![Sector Designation](image)

Figure 3-2. Sector Designation
1. Aircraft operating at 50 miles or more from the monitoring antenna shall be separated by a minimum of 5 miles.

2. Aircraft operating within 50 miles of the monitoring antenna, and not within 10 miles on a designated approach, shall be separated by a minimum of 3 miles.

3. Aircraft on a designated approach and inside of 10 Miles shall be separated by a minimum of 2 miles.

4. Aircraft established on final within 5 miles shall be separated by a minimum of 1-½ miles.

Aircraft provided positive separation via nonradar control, utilizing a published approach/departure, shall be separated by 2 minutes (5 miles separation when using DME).

3.4.2 Vertical Separation. Jet and turboprop aircraft operating at altitudes up to and including FL 290 shall be separated by 1,000 feet vertically. Aircraft operating at altitudes above FL 290 shall be separated by 2,000 feet vertically.

Helicopters shall be separated by 500 feet vertically. Helicopters shall be separated from fixed-wing aircraft by 1,000 feet vertically.

3.5 COMMUNICATIONS CONTROL

All aircraft shall be under positive communications control while operating at sea unless otherwise directed.

Pilots should not switch without clearance from the controlling agency. Communications procedures during ZIP-LIP/EMCON conditions shall be specified during preflight briefing.

3.5.1 Control of Radio Circuits. Control of radio circuits shall be exercised as follows:

1. AATCC
   a. Primary control of assigned ship-to-shore air traffic control and intratype administrative frequencies
   b. Primary control of assigned CCA frequencies
   c. Primary control of helicopter direction (tactical) frequencies
   d. Secondary control of aircraft guard frequencies
   e. Secondary control of land/launch frequencies
   f. Secondary control of air tactical frequencies.

2. CIC/TACC
   a. Primary control of all air tactical frequencies not otherwise assigned
   b. Primary control of aircraft guard frequencies
   c. Secondary control of ship-to-shore air traffic control and intratype administrative frequencies.

3. PriFly
   a. Primary control of land/launch frequencies
   b. Secondary control of aircraft guard frequencies
   c. Secondary control of departure control and final approach frequencies
   d. Secondary control of assigned ship-to-shore air traffic control and intratype administrative frequencies (where installed equipment permits).

3.5.2 Voice Procedures. Strict radio discipline is mandatory. Voice procedures shall be concise and should not vary from standard air control phraseology as set forth in ACP 165 and current OPNAVINST 3721.1 series. Squadron or ship call sign plus aircraft side number or alphanumeric daily changing call signs shall be used exclusively after the initial contact.

3.5.3 Recording of Radio Circuits. Radio circuits used for the control of air traffic shall be recorded continuously during hours of operation.

3.5.4 Communications Security. COMSEC is best accomplished by strict adherence to established principles of radio discipline. Additionally, secure voice radio equipment in naval aircraft and ships offer a significant COMSEC capability that should be
utilized to the greatest extent practicable. All units with COMSEC capability should develop tactical doctrine designed to deny SIGINT forces access to vital intelligence. Detailed functional descriptions of COMSEC equipment are found in pertinent classified documents. All personnel who have access to radio equipment must be briefed that certain restrictions exist on all radio transmissions to prevent disclosure of EEFIs to the enemy.

### 3.6 EMERGENCY CONTROL PROCEDURES

From a control standpoint, emergencies fall into five categories:

1. Communications failure
2. NAVAIDs failure
3. Aircraft systems failure
4. Crewmember injury or illness
5. Ship system casualty.

The ultimate resolution of an emergency involves a command decision based on the type of emergency and weather conditions in the recovery area. It is imperative that AATCC collect every pertinent detail that might aid in the evaluation of an emergency and keep the command and other interested agencies properly informed. This section provides basic procedures to be followed when communications and navigational equipment have failed. Emergencies, when navigational aids and/or communications are available, should be handled according to existing circumstances. Emergency procedures for aircraft system failures are covered in the appropriate NATOPS flight manual.

#### 3.6.1 Initial Control Responsibility

The initial control responsibility for an aircraft emergency rests with the agency exercising control of the aircraft when the emergency occurs. Aircraft in distress should not change radio frequencies if satisfactory radio contact is established, nor should controllers require frequency changes of aircraft in distress.

#### 3.6.2 Basic Emergency Control Procedures

Procedures for pilots to follow when experiencing communication and/or navigation equipment failure are listed in Figure 3-3. Lost communications emergency squawks are listed in Figure 3-4. Controlling agencies shall be familiar with and alert for conditions indicating communications or navigational failures and perform the following as appropriate:

1. Attempt to establish communications with and control of the aircraft.
2. Vector the aircraft as appropriate.

If unable to communicate with the aircraft:

1. Identify on radar and maintain a track.
2. Vector available aircraft to join if practical.
3. Clear all other aircraft from track of distressed aircraft.
4. Broadcast instructions and essential information in the blind.

#### 3.6.3 Crewmember Injury or Illness

In the event of crewmember injury or illness, communicate nature of injury/illness, assistance required, and intentions to controlling agency. Aircraft shall normally be handled as an emergency and vectored for immediate recovery. Ejection/ditching procedures shall be in accordance with aircraft NATOPS when divert or recovery is not possible.

#### 3.6.4 Ship System Casualty

Ship system casualty can result in complete shipboard communication equipment and navigational aid failure. Certain casualties may result in the inability to maneuver to BRC and provide optimum winds. Pilots shall be familiar with and alert for conditions indicating ship system casualty and perform the following as appropriate:

1. Attempt to establish communication and coordination with other aircraft.
2. Enter Charlie pattern and obey visual signals.
Mode III — An aircraft with radio difficulties (transmitter and/or receiver) should squawk Mode III Code 7600 or emergency Code 700 as appropriate.

Mode I — The following codes will amplify difficulties in conjunction with a Code 7600 or 7700. No receiver shall mean that the primary UHF, auxiliary receiver, and UHF/NHF Guard receiver are inoperative. If any receiver is operative, the controller is capable of controlling the aircraft utilizing IFF standby squawks and/or aircraft turns to acknowledge receipt of instructions.

Note
Below 2,500 feet, pilots must be aware of the dangers of changing IFF codes.

1. HEFOE Squawks

<table>
<thead>
<tr>
<th>Mode I</th>
<th>Mode III</th>
</tr>
</thead>
<tbody>
<tr>
<td>First digit</td>
<td>Second digit</td>
</tr>
<tr>
<td>O — ok</td>
<td>7700/7600</td>
</tr>
<tr>
<td>1 — Hydraulic</td>
<td>No Rec. Tacan ok</td>
</tr>
<tr>
<td>2 — Electrical</td>
<td>No Rec. ADF ok</td>
</tr>
<tr>
<td>3 — Fuel</td>
<td>Rec. ok. No NAVAID(s)</td>
</tr>
<tr>
<td>4 — O₂</td>
<td>Code, Code 7700</td>
</tr>
<tr>
<td>5 — Engine</td>
<td></td>
</tr>
</tbody>
</table>

2. Assistance Rewired Squawks

All 7 - Mode I squawks indicate no receiver and no NAVAID(s).

<table>
<thead>
<tr>
<th>Mode I</th>
<th>Mode III</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 — Desired tanker to join</td>
<td>Fuel on board</td>
</tr>
<tr>
<td>71 — Intend bingo</td>
<td>up to 7,000 lbs.</td>
</tr>
<tr>
<td>72 — Desired Aircraft to assist</td>
<td></td>
</tr>
</tbody>
</table>

3. Limited Communications Squawks

Requires a 1 minute cycling of Mode III from 7600/7700 to desired channel.

<table>
<thead>
<tr>
<th>Mode I</th>
<th>Mode III</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 — Aux. Rec. (ADF) channel</td>
<td>Channel usable</td>
</tr>
<tr>
<td>61 — No NAVAID(s). Rec. on channel</td>
<td>(0100-2000) and 2100 = Guard</td>
</tr>
<tr>
<td>62 — Tacan ok. Rec. on channel</td>
<td></td>
</tr>
</tbody>
</table>

Figure 3-3. Lost Communication Emergency Squawks

3. Execute divert procedures.

4. Execute ejection/ditching procedures in accordance with aircraft NATOPS flight manual.

3.7 TRANSIENT AIRCRAFT

The controlling agency shall advise the aircraft of BRC and/or all course changes.

Transient aircraft approaching the ship for landing shall contact AATCC at least 25 miles out or when “feet wet.”

3.8 LOST AIRCRAFT PROCEDURE

When the position of an aircraft is in doubt, the controller shall immediately commence the following procedure:

1. Attempt to obtain radio or radar contact. Utilize relay aircraft to attempt radio contact on circuit in use and guard frequencies. Continue to send information in the blind, and search all IFF modes. Commence communication search and monitor guard channels (243.0 and 40.50) for emergency aircraft calls.

2. Inform the OCE/OTC.

3. Keep estimate of aircraft’s fuel state.

4. Check weather and clear airspace for emergency marshal as required.

5. Check to determine if NAVAIDs are operable. If NAVAIDs are inoperable, alert the command for the possible use of other aids to lost aircraft such as search aircraft, black smoke, vertical search-lights, antiaircraft bursts, starshells, fire control tracking balloons, energized prebriefed sonobuoy channel, and other NAVAIDs.

6. If contact (communications or radar) cannot be regained before expiration of the aircraft’s last known fuel state, activate the command SAR plan.

Once contact is regained:

1. Check fuel state

2. Vector aircraft to ship or divert as appropriate

3. Vector aircraft for escort if necessary

4. Maintain regaining contact track of aircraft

5. If communications are unsatisfactory, utilize relay aircraft or have lost aircraft gain altitude if able.
<table>
<thead>
<tr>
<th>TYPE OF FAILURE</th>
<th>FLIGHT CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transmitter failure with or without receiver failure (navigation aids serviceable).</strong></td>
<td>&quot;VMC&quot;</td>
</tr>
<tr>
<td>1. Join up if possible.</td>
<td>1. Transition to VMC if possible and continue VMC.</td>
</tr>
<tr>
<td>a. Enter VMC landing pattern.</td>
<td>3. Squawk Mode III 7600, &quot;IDENT,&quot; and Mode I in accordance with Figure 3-1.</td>
</tr>
<tr>
<td>b. Use standard visual signals when in range of ship.</td>
<td>4. Watch for joinup.</td>
</tr>
<tr>
<td>c. Watch for light signals from ship.</td>
<td>5. Hold at emergency marshal until EEAT.</td>
</tr>
<tr>
<td>3. Squawk Mode III 7600, &quot;IDENT,&quot; and Mode I in accordance with Figure 3-1.</td>
<td>6. Commence approach at EEAT. Squawk in accordance with Figure 3-1.</td>
</tr>
<tr>
<td>4. If receiving, follow instructions.</td>
<td>7. If receiving, follow instructions.</td>
</tr>
<tr>
<td>5. Broadcast intentions periodically, whether or not transmitter is known to be operable.</td>
<td>8. Broadcast intentions periodically whether or not transmitter is known to be operable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Navigation aids and transmitter failures with or without receiver failure.</th>
<th>1. Perform same procedures as for communication failure, or</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. When position is unknown:</td>
<td>1. Transition to VMC if possible and maintain VMC.</td>
</tr>
<tr>
<td>b. Squawk in accordance with Figure 3-1 or EMERGENCY as required.</td>
<td>3. Squawk in accordance with Figure 3-1 or EMERGENCY as required.</td>
</tr>
<tr>
<td>c. Fly appropriate triangles in accordance with Flight Information Handbook.</td>
<td>4. Fly appropriate triangles in accordance with Flight Information Handbook.</td>
</tr>
<tr>
<td>d. Watch for joinup.</td>
<td>5. Watch for joinup.</td>
</tr>
<tr>
<td>3. If all above fails, bingo to nearest suitable field at appropriated fuel state.</td>
<td>6. If receiving, follow instructions.</td>
</tr>
<tr>
<td>7. Broadcast intentions periodically whether or not transmitter is known to be operable.</td>
<td></td>
</tr>
</tbody>
</table>

*All procedures are for single aircraft. When in company, VMC or IMC, remain in company and use hand signals between aircraft.*

Figure 3-4. Basic Emergency Procedures for Communications/Navigational Equipment Failure
CHAPTER 4

Launching Aircraft

4.1 OPERATIONAL PROCEDURES RESPONSIBILITIES

4.1.1 General. Positive communications shall be maintained among flight deck, AATCC, PriFly, and the bridge during all phases of flight operations to ensure that the OOD controls the ship so that wind and deck motion remain within the prescribed envelope. During all phases of air operations, the OOD shall inform PriFly and AATCC prior to changing BRC/speed and provide expected BRC/speed.

The ship must be maintained on a steady course and speed during rotor engagement or disengagement, taxiing, and launch or recovery operations. Deck tilt, centrifugal force, or rapidly changing wind direction or velocity affects the ability to control aircraft aerodynamically and may cause rollover. Permission must be obtained prior to the movement, engagement, disengagement, launch, or recovery of any aircraft. As the representative of the ship’s commanding officer, the OOD and the air officer have supervisory responsibility for safe operations at all times.

4.1.2 Time Schedule. All flight preparations shall be completed in sufficient time to permit pilots to conduct preflight inspections of their aircraft prior to scheduled launch time. Every effort shall be made to prevent delays in the launch cycle.

4.1.3 Flight Quarters. Flight quarters shall be set in time for all personnel to man stations and to complete preparations prior to flight operations. The following stations shall report to the OOD or air officer (as appropriate) when flight quarters are set:

1. PriFly
2. Hangar deck
3. Flight deck
4. Aviation fuels
5. AATCC
6. Rescue boat detail
7. Crash crew and firefighters
8. CIC
9. Medical crew

4.1.4 Primary Flight Control. PriFly provides recovery/launch and operational control of aircraft while on ship and within the ship’s control zone (see Figure 3-1). It interfaces with AATCC in control of airborne aircraft with the CCO in integrating assault elements with helicopters on the flight deck and, with Well Deck Control for deconfliction of flight and well deck operations. “On ship” control of aircraft includes spotting, maintenance, fueling/defueling, arming/dearming, movement, stowage, and handling of aircraft on the flight and hangar decks.

4.1.5 Communications. PriFly is equipped with numerous communications terminals, both internal and external. Internal communications systems link PriFly with other ship control spaces, and internal radio systems provide communications control of personnel on the flight deck. Additionally, PriFly controls the 5 MC (flight deck announcing system). Communications equipment provides PriFly with both radio and visual (Aldis lamp) links to aircraft under PriFly control. Refer to paragraph 3.5.1 for control of other communications nets.

4.1.6 Flight Deck Lighting and Optical Landing Aids. PriFly has control for optical landing aids and flight deck lighting.

4.1.7 Helicopter Readiness Conditions. Flightcrews assigned the following alert conditions shall be called away early enough to permit normal preflight inspection, start, warmup, and completion of the takeoff check by the time specified in the air plan for the alert condition to become effective. After the pilot declares the helicopter ready for flight, it shall be placed in the appropriate alert condition.

4.1.7.1 Condition I/Alert 5. The helicopter shall be spotted for immediate launch with rotor blades
spread, starting equipment plugged in, and the LSE and starting crewman and ordnance personnel ready for launch in all respects. When the word is passed to “Standby for launch,” engines shall be started without further instructions; however, rotor engagement and launch shall be positively controlled from PriFly. Aircraft should be airborne within 5 minutes of order to launch.

4.1.7.2 Condition II/Alert 15. The same conditions apply as for Condition I, except that flightcrews are not required to be in the helicopter, and rotor blades may be folded or tied down. Aircrews shall be on immediate call, if rotor blades are folded, the blades shall be run through a unfold/fold cycle to ensure operability. Aircraft should be airborne within 15 minutes of order to launch.

4.1.7.3 Condition III/Alert 30. Main rotor blades may be folded and the helicopter need not be in position for immediate launch; however, it must be parked so as to allow direct access to a suitable launch spot. A towbar shall be attached to the helicopter and a specific LSE, tractor driver, handling crew, and starting crewman shall be designated and assigned to each helicopter. These personnel must be thoroughly briefed, so that when the order is given to prepare to launch, the helicopter can be safely and expeditiously moved into position and readied for launch. Flightcrews shall be in the ready rooms or working spaces, in flight gear, and prebriefed for the launch. Aircraft should be airborne within 30 minutes of order to launch.

4.1.7.4 Condition IV/Alert 60. The condition of the helicopter is similar to Condition III, except that minor maintenance may be performed if no restoration delay is involved. The aircrew shall be designated and available. Aircraft should be airborne within 60 minutes of order to launch.

4.1.8 V/STOL Readiness Conditions. Pilots shall be called away early enough to permit a normal preflight inspection, start, warmup, and completion of takeoff checks for Conditions I and II, by the time specified in the air plan for the required readiness condition. The aircraft shall be placed in the appropriate readiness condition after the pilot declares it ready for flight. The four readiness conditions are discussed in the following paragraphs.

4.1.8.1 Condition I. The aircraft shall be spotted in the launch position or in a position that affords a clear route to the launch position. The aircraft shall be secured by the initial four-point tiedown, unless otherwise directed by the aircraft handling officer. Any necessary equipment shall be plugged in. A plane director, starting crewman, plane captain, required plane handlers, and ordnance personnel shall stand by the aircraft. The aircraft’s pilot shall be ready for flight in all respects, with parachutes, safety belts, shoulder harnesses, radio leads, and other personal equipment attached and adjusted as in flight. The launching crew shall be on station and alert. Launching accessories shall be on deck and ready for immediate use. When directed, the air officer shall pass the order over the flight deck announcing system to launch Condition I aircraft. Aircraft and flight deck crews shall, without awaiting further instructions, go through the normal start and prelaunch procedures. The LSO shall man the tower and the air officer shall have all recovery aids energized. As preparations are made for the launch, the air officer shall relay wind information to the launching officer and an initial vector, if available, to the pilot. He shall obtain permission from the bridge to launch. When all conditions are satisfactory, he shall turn on the green rotating beacon, clearing the launch officer to launch.

4.1.8.2 Condition II. All provisions for Condition I apply, except that flightcrews are not required in the aircraft. They shall, however, be on the flight deck near their aircraft or inside the island structure at the flight deck level.

4.1.8.3 Condition III. Flightcrews shall be in full flight gear, briefed, and standing by in the ready rooms or working spaces. Starting equipment shall be immediately available and flight deck and launching crews shall be standing by near the stations.

4.1.8.4 Condition IV. Similar to Condition III, except that minor maintenance may be performed on the aircraft if no delay in launch is involved.

4.1.9 Responsibilities of Air Officer and Squadron Operations Duty Officer

4.1.9.1 Air Officer. The air officer is responsible to the ship’s commanding officer for activities in support of flight operations on the flight deck and hangar deck. The air officer or a qualified assistant shall be in PriFly
during flight quarters to control all evolutions involving aircraft. The air officer shall confirm aircraft assignments with AATCC and the squadron maintenance controller/ liaison officer prior to respotting the flight/ hangar decks for launch. In addition to the ship’s air plan, the air officer shall also maintain an up-to-date copy of the squadron flight schedule in PriFly. During Case III/night operations, both PriFly positions shall be manned. One of these positions shall be manned by either the air officer or assistant air officer.

4.1.9.2 Squadron Operations Duty Officer. The squadron ODO is responsible to the squadron operations officer for the coordination and execution of the flight schedule. During flight quarters, he shall remain in the squadron ready room and monitor applicable communications circuits. He shall keep AATCC and PriFly (if necessary) notified of any changes that may affect launch or recovery operations.

4.2 FLIGHT DECK PROCEDURES

4.2.1 Flight Deck Description. The flight deck is marked with 10 spots for the LHA (see Figure 4-1) and nine spots for the LHD (see Figure 4-2). The flight deck is divided into two separate landing areas. When operating aircraft, the forward area consists of spots 1 through 5 for the LHA, and spots 1 through 5 for the LHD. The after area consists of spots 6 through 9 for the LHA, and spots 6 through 9 for the LHD. The two landing areas are controlled separately by rotary beacon lights or flags from PriFly (Figures 4-3 and 4-4). A typical landing spot is illustrated in Figure 4-5. In addition, each spot is assigned an LSE/director who wears a helmet equipped with a transmitter/receiver unit providing direct communication with PriFly and flight deck control.

Note
Safe parking line is only for AV-8 clearances during V/STOL operations.

4.2.2 General Flight Deck Safety. The ship’s commanding officer has responsibility at all times for the safety of embarked aircraft and personnel. The commanding officer/OIC of the aircraft squadron/ detachment and the pilots of individual aircraft are directly responsible for the safety of assigned aircraft and personnel.

Note
In questionable circumstances, the senior naval aviator present from the embarked squadron/detachment shall make the final determination concerning the safety of aircraft and aircrew.

The embarked squadron commanding officer, air officer, and the OIC of the aircraft squadron/detachment shall evaluate the hazards involved in all phases of shipboard flight operations and develop appropriate safety measures. All personnel shall be trained in safe operating procedures before flight operations commence and shall ensure that hazards and unsafe practices are reported to the air officer.

WARNING

The presence of high winds, high noise levels, fire hazards, flying objects, turning rotors, taxing aircraft, intake suction, and jet blast make safety consciousness imperative.

During flight operations, only those personnel whose presence is required shall be allowed on the flight deck. All others shall remain clear of the flight deck, catwalks, and gun tub areas. Personnel may view flight operations only from an area designated by the commanding officer.

Personnel assigned duties on the flight deck shall wear appropriate safety helmets, sound suppressors, safety goggles, flight deck safety shoes, longsleeve shirts/jerseys, and lifevest. Flight quarters clothing shall conform to the colors and symbols prescribed in Appendix E.

While flight operations are being conducted, personnel on exposed decks and catwalks shall remove all loose items of clothing and equipment, including hats, except for approved, properly fastened, safety helmets.

Personnel on the flight deck shall be trained to take cover immediately on command of the flight deck officer, air officer, or launch officer.
Figure 4-1. LHA Typical Arrangement of Helicopter Spots and AV-8 Marking

LHA HELICOPTER SPOTTING ARRANGEMENTS

<table>
<thead>
<tr>
<th>HELICOPTER SPOTTING ARRANGEMENTS</th>
<th>NO. 1</th>
<th>NO. 2</th>
<th>NO. 3</th>
<th>NO. 4</th>
<th>NO. 5</th>
<th>NO. 6</th>
<th>NO. 7</th>
<th>NO. 8</th>
</tr>
</thead>
</table>

NOTES:
1. THE HELICOPTER SPOTTING MATRIX IDENTIFIES VARIOUS U.S. NAVY/MARINE CORPS AIRCRAFT MIXES THAT SHOULD BE USED TO SATISFY MULTI-SPOT OPERATIONAL REQUIREMENTS. IT HAS BEEN DEVELOPED BASED ON AVAILABLE ROTOR CLEARANCES, AND DOES NOT CONSTITUTE AUTHORITY TO OPERATE. FURTHERMORE, IT IS THE RESPONSIBILITY OF THE AIR OFFICER TO DETERMINE WHAT ARRANGEMENT CAN BE UTILIZED FOR GIVEN ENVIRONMENTAL CONDITIONS.


3. SPOT 3A IS INTENDED FOR H-1 HELICOPTERS ONLY. IT SHOULD BE UTILIZED ONLY WHEN SPOT 3 IS VACANT OR OCCUPIED BY ANOTHER H-1 HELICOPTER. WHEN SPOT 3 IS OCCUPIED BY AN H-46 OR H-53 HELICOPTER, SPOT 3A SHOULD REMAIN VACANT.

4. NOMINAL ROTOR CLEARANCES FOR THE AIRCRAFT MIXES ADDRESSED IN THE MATRIX EQUAL OR EXCEED 15 FEET, WITH EXCEPTION TO THE FOLLOWING:
   a. H-46 ON SPOT 1 TO H-53 I ON SPOT 2: 14 FT
   b. H-46 ON SPOT 1 TO H-46 ON SPOT 2: 14 FT
   c. H-53A/D ON SPOT 1 TO H-53A/D ON SPOT 2: 14 FT
   d. H-53A/D ON SPOT 1 TO H-53A/D ON SPOT 3: 14 FT
   e. H-53 I ON SPOT 1 TO H-46 ON SPOT 3: 14 FT
   f. H-53 I ON SPOT 1 TO H-46 ON SPOT 3: 13 FT
   g. H-53 I ON SPOT 1 TO H-53 I ON SPOT 3: 13 FT
   h. H-46 ON SPOT 1 TO H-53 I ON SPOT 5: 12 FT
   i. H-46 ON SPOT 1 TO H-53 I ON SPOT 6: 12 FT
   j. H-46 ON SPOT 1 TO H-53 I ON SPOT 7: 11 FT
   k. H-46 ON SPOT 1 TO H-53 I ON SPOT 8: 12 FT
   l. H-46 ON SPOT 1 TO H-53 I ON SPOT 9: 11 FT

   THESE CLEARANCES ARE PUBLISHED FOR INFORMATION PURPOSES ONLY. THEY MAY VARY BETWEEN SHIPS, AND MAY BE REDUCED OR EXCEEDED DEPENDING UPON ACTUAL INDIVIDUAL SPOTTING CONDITIONS AND ISLAND APPENDAGES.

5. FOR THE CURRENT HELICOPTER SPOT/AV-8 MARKING ARRANGEMENTS ON EACH LHA CLASS SHIP, SEE THE SHIPBOARD AVIATION FACILITIES RESUME (NAVAL AIR ENGINEERING CENTER REPORT NAEC-ENG-75167).

6. THE SYMBOL ■ DENOTES FLIGHT CAUTION ITEM.
Figure 4-2. LHD Typical Arrangement of Helicopter Spots and AV-8 Marking
<table>
<thead>
<tr>
<th>Evolution</th>
<th>Command</th>
<th>Display</th>
<th>Meaning (Helo)</th>
<th>Meaning (AV-8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prepare to start engines</td>
<td>Check chocks, chains, tiedowns, fire bottles, and all loose gear about the flight decks. Helmets buckled, goggles down, start APP/GTS on LSE/director signals</td>
<td>Red signal in flight deck area</td>
<td>Verify starting wind limitations chocks and tiedowns in place. Boots removed and stowed. Secure all loose gear. Man fire extinguishers.</td>
<td>Intake blanks clear GTS wind limits met, chocks, tiedowns in place, loose gear secured. Man fire extinguishers.</td>
</tr>
<tr>
<td>2. Start engines</td>
<td>Start engines</td>
<td>Red signal in flight deck area</td>
<td>Authority for responsible flight deck personnel to signal for starting engines. Ship not ready for flight operations.</td>
<td></td>
</tr>
<tr>
<td>3. Engage/disengage rotors</td>
<td>Stand clear of rotors (20-second pause) engage/disengage rotors</td>
<td>Amber signal in flight deck area</td>
<td>Ship is ready for the pilot to engage rotor. Authority for responsible flight deck personnel to signal for engaging rotors when the immediate area is cleared. Ship not ready for flight operations.</td>
<td>Squadron personnel conduct poststart checks (i.e., controls) clear exhaust areas.</td>
</tr>
<tr>
<td>4. Removal of tiedowns</td>
<td>Remove all tiedowns</td>
<td>Not applicable</td>
<td>Remove tiedowns from aircraft and show to pilot, LSE points to tiedowns and shows one finger to the pilot for each tiedown removed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Note</strong></td>
<td><strong>Emcon (Red, Green, Red)</strong></td>
</tr>
<tr>
<td>5. Aircraft arm/dearm</td>
<td>Arm/dearm aircraft</td>
<td>Amber/Green</td>
<td>LSE turns aircraft over to arm/dearm supervisor.</td>
<td></td>
</tr>
<tr>
<td>6. Launch</td>
<td>Launch aircraft</td>
<td>Green signal in flight deck area</td>
<td>Ship is ready in all respects for flight operation. Authority for responsible flight deck personnel to launch aircraft when pilot is ready and tiedowns and chocks have been removed.</td>
<td></td>
</tr>
<tr>
<td>7. Aircraft approaching</td>
<td>Standby to recover aircraft, spot ________</td>
<td>Red signal in flight deck area</td>
<td>Prepare designated landing area to land aircraft. Ship not ready to recover aircraft.</td>
<td></td>
</tr>
<tr>
<td>8. Recover</td>
<td>Land aircraft</td>
<td>Green signal in flight deck area</td>
<td>Ship is ready in all respects to land aircraft.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Note</strong></td>
<td><strong>Flight deck rotating beacon signals are for PriFly control of flight deck operations only. These lights are not to be interpreted by pilots as clearance/denial for any evolution.</strong></td>
</tr>
</tbody>
</table>

Figure 4-3. Command and Display Signals
<table>
<thead>
<tr>
<th>Evolution</th>
<th>Flag Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting of flight quarters</td>
<td>HOTEL/FOXTROT flag at the dip (as appropriate)</td>
<td>Ship ready to conduct flight operations when wind conditions are suitable</td>
</tr>
<tr>
<td>Ready to conduct light operations</td>
<td>HOTEL/FOXTROT close up (as appropriate)</td>
<td>Ready to conduct or conducting flight operations</td>
</tr>
<tr>
<td>A delay or interruption of the evolution</td>
<td>HOTEL/FOXTROT at the dip (as appropriate)</td>
<td>Flight operations temporarily delayed</td>
</tr>
<tr>
<td>No flight operations being conducted</td>
<td>HOTEL/FOXTROT flag hauled down (as appropriate)</td>
<td>No flight operations being conducted</td>
</tr>
</tbody>
</table>

**Note**

HOTEL/FOXTROT flag is displayed just forward and above PriFly

Figure 4-4. Flag Hoist Signals

![Diagram of Helicopter Landing Spot](image)

Figure 4-5. Helicopter Landing Spot Diagram (Typical)
Personnel working near an aircraft shall observe the aircraft carefully for any signs of malfunction, such as smoke, oil, hydraulic leak, and immediately report such malfunctions to the nearest yellow shirt, flight deck officer, air officer, or launch officer.

Crewmembers, passengers, and troops returning from flight shall expeditiously clear the flight deck and the vicinity of the island structure exposed to flight operations. All passengers and troops shall be escorted to and from aircraft by qualified personnel.

Smoking is never permitted on the flight deck, hangar deck, catwalks, elevators, or weather decks. Matches and cigarette lighters shall never be used in compartments where fuel fumes may be present.

Dawn, dusk, and night operations increase the hazards to personnel on the flight decks, and greater vigilance is required during these periods.

When aircraft are serviced, especially at night, extreme care shall be taken to prevent overfilling of fuel tanks and spilling of oil or hydraulic fluid. Oil, grease, hydraulic fluid, and spilled fuel shall be removed from the flight deck immediately.

Care shall be used in approaching elevator openings, particularly on the windward side. No person shall attempt to get on or off an elevator once the elevator operator has raised the elevator stanchions. No one shall lean on the elevator guard rails at any across cargo elevator openings at all times when main hatches are open and cargo is not being moved into/out of the elevator.

Crash crew and/or organized fire parties are responsible for responding to aircraft crashes and fires. All other personnel shall remain clear of the area in which the fire or crash has occurred, unless specifically requested to assist in combating the fire or clearing the deck. In case of fire, all available personnel shall aid in handling hoses and personnel casualties. Special assistance shall normally be requested over the 5 MC or 1 MC.

Care shall be exercised in spotting or parking aircraft in the vicinity of energized antennas. Sufficient voltage may be induced in the airframe to create a safety hazard.

No aircraft shall be spotted so as to extend over a gun tub or missile launcher.

**CAUTION**

- HF transmissions may cause damage to nonorganic/joint service helicopter automatic blade fold systems including inadvertent activation of folding mechanisms. The ship’s HERO bill shall be reviewed prior to embarkation of nonorganic/joint service helicopters.
- No aircraft shall be closer than 30 feet to any gunmount during live fire exercises. Damage to aircraft skin, windows, and ramps may result from overpressurization.

**4.2.3 Foreign Object Damage Hazard.** All deck areas, and particularly the flight deck, shall be inspected prior to, and monitored throughout, flight operations to ensure that they are clear of foreign objects, such as rags, pieces of paper, line, caps, nuts, bolts, etc., that can be caught by air currents and subsequently cause damage to aircraft or injure personnel.

**WARNING**

- Liquid FOD, such as oil or hydraulic fluid, can cause the deck to become slippery, jeopardizing the safety of personnel working or moving aircraft on the flight deck and hangar deck. Measures to minimize liquid FOD, including the use of drip pans wherever practicable, should be taken at all times. Spills and leaks shall be cleaned immediately.
- Dumping of trash during flight operations creates a serious FOD hazard. Dumping of trash shall be secured prior to flight operations and not resumed until flight operations are completed.
4.2.4 Helicopter Safety Precautions

1. Personnel shall not approach or depart a helicopter while rotors are being engaged or disengaged.

2. Helicopters should not routinely be deck taxied on the flight deck.

3. Helicopters shall not be towed or pushed while rotors are engaged.

4. A helicopter shall not be flown over another aircraft on launch or recovery.

5. Only spots that afford visual reference to the deck shall be used for night helicopter launches.

6. Personnel required to be in the area of operating helicopters shall exercise extreme caution and observe the signals/directions of the LSE or combat cargo representative as appropriate.

7. Dual-engine helicopters shall not be intentionally hovered single engine over a deck spot. If topping checks cannot be performed in contact with the deck, they must be performed in flight at an appropriate altitude.

8. Any helicopter parked TOW should have cargo ramp (if so equipped) in full-up position.

9. The APU/APP shall be continuously monitored by a qualified person whenever it is in operation.

4.2.5 V/STOL Aircraft Safety Precautions.

V/STOL aircraft engines are extremely susceptible to FOD. Any debris in the vicinity of the aircraft can be ingested by the engine. Ingestion may cause the loss of an engine and possibly result in loss of the aircraft.

Personnel can be blinded by FOD propelled by aircraft jet blast.

Exhaust gases from V/STOL aircraft have tremendous speed and impact force. Special precautions shall be taken to remove or thoroughly secure all loose items, such as missile/gun director covers, deck drain covers, liferaft covers, or padeye covers, that are near the landing area or the approach path.

Taxiing sharp turns under heavy gross weights coupled with a rolling deck could pinch the outrigger tire to the point of deflation. This problem can be solved by pumping the brakes and momentarily straightening the turn to ease the strain on the outrigger and tire.

Figure 4-6 shows the danger areas to flight deck personnel for idle, STO, and VTOL conditions. Except in emergencies, the aircraft nozzles shall not be rotated downward unless the pilot is directed by the taxi director or the launch officer.

- During V/STOL operations, a large volume of high-velocity gas is emitted downward from the exhaust nozzles. This downwash strikes the flight deck and flows horizontally above the deck and creates dangerous conditions for flight deck crew. Personnel movement in this high-velocity blanket is impeded very little and is similar to walking in a swift stream of knee-deep water.

However, should a flight deck crewman fall, there is a high risk of being blown overboard.

- The jet efflux produced during vertical operations will exceed 200 °F (93 °C) at a distance of 25 feet from the center of the landing spot when the AV-8 is below 10 feet. Flight deck personnel shall remain clear of this area during takeoffs and landings. Additionally, flight deck personnel shall remain clear of the wing tips, nose, and tail area because of the jet blast danger from the reaction control ducts (there is no blast from the reaction control ducts with nozzles aft). The reaction control ducts also present a hazard with the engine off, in that they have sharp edges and retain heat after the aircraft is shutdown.

- The blast patterns of the AV-8 create a hazard not only to men and equipment on the deck but also to the aircraft itself. All FOD must be cleared from the flight deck and from all padeyes and catwalks prior to AV-8 operations. All equipment such as warning signs, hoses, hatches, etc., must be securely fastened down.
Figure 4-6. Danger Areas to Flight Deck Personnel

STO

PERSONNEL MUST AVOID THIS AREA DURING GROUND RUNNING AND SHORT TAKEOFFS

40 FT

170 FT

55 FT

TEMP DROPS TO
120 DEGREES F

VTOL

PERSONNEL SHOULD AVOID BEING OUT OF THE PILOT'S VIEW DURING VTO, VL, AND HOVER UNLESS THEY ARE ADJACENT TO A FIXED OBSTRUCTION KNOWN TO THE PILOT

50 FT

NOTE: DANGER AREAS ARE SHAD ED

IDLE (NOZZLES AFT)

THIS AREA MAY BE OCCUPIED WITH CAUTION FOR STARTING AND FOR ADJUSTMENTS WHEN GROUND IDLING ONLY
4.2.5.1 Burns. Personnel burns from the exhausts and ducts of the AV-8 aircraft are a hazard. The deck and other objects around the aircraft become extremely hot after only brief exposure to exhaust gases. Flight deck personnel shall be thoroughly briefed on these hazard areas and how to avoid them.

Launch officers shall wear gloves during all STO launches to prevent padeye burns to the hands.

4.3 PREFLIGHT INSPECTIONS

When aircraft are still packed awaiting deck spotting, preflight inspection shall be completed to the maximum extent possible. All preflights shall be completed 30 minutes prior to launch time and pilots shall be strapped in the aircraft with the prestart checklist completed as far as possible.

Maintenance on, or preflight of, any portion of an aircraft that extends beyond the ship’s deck edge is prohibited.

Completion of preflight on aircraft areas that are inaccessible (i.e., over deck edge) shall be accomplished after the aircraft is spotted. All aircrew and maintenance personnel shall wear a safety cranial or flight helmet when climbing upon a helicopter or V/STOL aircraft. Flotation gear shall be worn whenever the aircraft is on the flight deck.

4.4 PRELAUNCH PROCEDURES

4.4.1 Launch Responsibilities. The OOD shall set flight quarters in time for all personnel to man stations and complete preparations prior to flight.

Note

Starting, engagement, launch, and recovery wind envelopes shall be available for use by the OOD and air officer during flight operations.

Communications circuits shall be manned as appropriate.

The OOD shall ensure that the rescue boat is fully prepared and that the boat crew is detailed and available for launch.

The air officer shall ensure that obstructions such as weapons, antennas, cranes, flagstaffs, and lifelines are lowered, trained clear, or unrigged.

Antennas shall be deenergized prior to lowering or unrigging.

Prior to starting engines, the aircraft handling officer shall ensure a complete FOD walkdown is conducted of the flight deck and adjacent topside area.

The air officer shall clear the flight deck of all unnecessary personnel and shall require all flight deck personnel utilize appropriate flight deck clothing and equipment.

The flight deck officer shall ensure that mobile crash and firefighting equipment is manned and ready.

The OOD shall display HOTEL/FOXTROT at the dip and a red deck signal to PriFly (Figure 4-4).

The OOD shall maneuver the ship to obtain favorable wind conditions. This is intended to mean within the established wind limitations. However, whenever possible, optimum winds shall be provided. Wherever environmental conditions or ship motion dictates, these wind limitations shall be reduced to provide safe engine start, engagement/disengagement, launch, and recovery winds. Squadron/detachment commanding officer/OICs in charge shall ensure limitations more restrictive than that established by NATOPS are discussed and agreed upon with ship’s commanding officer.

4.4.2 Launch Preparation. When spotting an aircraft for launch, the LSE/director/crewchief/plane captain shall ensure that the parking brakes are set, wheels are chocked, tail or nosegear locked (as applicable), and safe rotor/wing clearance exists. Chains shall be attached in accordance with applicable NATOPS or maintenance instruction manuals.
CAUTION

Engine/GTS/APP/APU starts, blade spread, and rotor engagement shall not be accomplished in wind conditions exceeding individual aircraft NATOPS limitations.

Note

When positioning helicopters for launch, ensure that the helicopters are moved with no undue delay to prevent exceeding APP run time limitations during start and runup.

Whenever possible, aircraft should be spotted with first events on the bow in sequential flight order.

Relative wind direction and velocity shall be passed to the pilot by prearranged method (5 MC, hand signal, radio) prior to engine start, rotor blade spreading or engagement, and immediately prior to launch.

The LSE/director shall receive clearance from the air officer prior to starting engines or engaging rotors.

4.4.3 Wind and Deck Limitations. Safe aircraft operations require strict adherence to prescribed wind and deck limitations. Commanding officers may establish more restrictive limitations.

Note

For specific wind and deck limitations, see Appendix D or shipboard operating bulletin.

4.4.4 APU/APP/GTS Start. When aircraft are spotted on the flight deck, pilots shall proceed with the prestart procedures and signal the LSE/director when ready to start the APU/APP/GTS.

The LSE/director shall request clearance for APU/APP/GTS start from the air officer in PriFly via the flight deck supervisor. PriFly shall display a red rotating beacon and announce the following over the 5 MC: “Check chocks, tiedowns, fire bottles, and all loose gear about the flight deck, helmets buckled, goggles down, start APU/APP/GTS on LSE/director signal.”

The LSE/director shall relay the clearance to the pilot before APU/APP/GTS start can be initiated.

APU/APP/GTS starts may be requested while aircraft are in the parking area (slash). Radios shall be turned on and set to land/launch frequency as soon as practicable after APU/APP/GTS is started. Approved shipboard firefighting equipment with appropriate reach nozzles shall be manned for APU/APP/GTS or main engine starts.

4.4.5 Rotor Blade Spreading. All blade spreads shall be done under the supervision of a LSE director. The pilot shall request and must be granted clearance before blade spread can be attempted. Blades shall not be spread while the aircraft is under tow or being pushed. PriFly shall ensure relative winds are within aircraft limitations prior to blade spread. The maximum nonturbulent winds relative to the helicopter shall be less than 45 knots from any quadrant. For the H-2, maximum winds during nonturbulent conditions shall be less than 35 knots.

4.4.6 Radio Check. After APP/engine start, PriFly shall initiate a radio check. When several flights must respond, the order will normally be from bow to stern. Normally, an aircraft failing to complete a successful radio check shall not be launched. The air officer, with the concurrence of the squadron commanding officer, may authorize the launch of an aircraft without UHF radio only under the following conditions:

1. Escort aircraft is/are provided.
2. Two-way radio communications exist between aircraft in the flight.
3. VMC exists for planned route and duration of flight.

4.4.7 Engine Starting. When ready to start engines, the pilot shall request clearance from the LSE/director by raising his hand and displaying one or two fingers to indicate which engine he wishes to start. The LSE/director shall request clearance from PriFly via the flight deck supervisor. PriFly shall ensure that winds are within limits for start/engagements, display a red rotating beacon (amber for skid-configured helicopters), and then announce clearance for engine start over the 5 MC circuit. Upon signal from the LSE/director the pilot shall start engines.
A rotor brake failure shall be recognized as an emergency. Prior to disengagement with a known or suspected rotor brake failure, the ship shall provide optimum winds for shutdown and resulting wind-milling stop of the rotor system.

Certain Army and Air Force helicopters are not equipped with rotor brakes; rotor blades begin turning upon engine startup.

**Note**
The mechanical latching of weapons on aircraft racks/launcher shall be completed before the engine(s) on that aircraft is/are started for launch.

### 4.4.8 Engaging Rotors

When ready to engage rotors, the pilots shall give the LSE the ready-to-engage signal. The LSE shall relay this request to the flight deck supervisor, who in turn shall signal PriFly when spotted aircraft have indicated their readiness to engage.

Helicopters should not engage rotors while the ship is in a turn, except as approved by the ship’s commanding officer or his designated representative. Anticipated wind parameters and ship’s heel shall be communicated to the helicopter aircraft commander prior to execution of the turn.

The air officer shall ensure that proper wind conditions exist for engagement. If high winds exist, rotor engagements should commence with the downwind aircraft and work upwind.

- Personnel shall not walk under rotor blades until the blades have stopped or come up to full speed. Clearance shall be received from the LSE prior to passing under rotor blades.
- Personnel shall not pass under tailbooms or tail rotors of turning aircraft with the exception of loading/unloading evolutions on H-53s.

### 4.4.9 Internal Cargo and Troops (Helicopter)

Internal cargo normally moves to the flight deck staging areas via cargo elevators near the island, fixed vehicle ramps, or aircraft elevators. Loading is directed by the combat cargo officer. Internal loading will vary according to the type aircraft, type of cargo, and deck load. The combat cargo officer shall ensure that pilots are given notification of any changes to prebriefed cargo loads.

Troops are escorted by combat cargo personnel (white shirts) to the flight deck via designated troop debark stations/shelters as directed by the combat cargo officer. Clearance shall be requested from the LSE prior to loading/unloading troops while aircraft are turning.

### 4.4.10 Downed Aircraft

Disposition of downed aircraft shall be in accordance with the prelaunch briefing. Except in case of emergency, downed aircraft

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**WARNING**

- Reported winds as displayed in PriFly may vary greatly with existing winds over the deck.
- Extreme care shall be exercised when engaging/disengaging rotors if other aircraft are launching or recovering.
shall be shut down only on signal from the LSE/director. Pilots shall remain in downed aircraft until the crewchief/plane captain is on hand and ready to man the cockpit (not applicable to skid-configured helicopters).

A downed aircraft on deck shall be shut down expeditiously upon signal from the LSE/director. The maintenance officer or his representative shall inform the flight deck officer of the nature of the trouble and also give an estimate of the time needed for repair. If the maintenance required is to be for a long duration, the aircraft will normally be put into the pack or taken below to the hangar deck. If repairs can be accomplished on deck, and succeeding launches will not be delayed, the aircraft shall be launched to rejoin the flight when placed in an “UP” status by the maintenance officer.

4.5 LAUNCH PROCEDURES

4.5.1 General Launch Procedures. When all prelaunch checks are completed and the pilot is ready for launch, the pilot shall give the LSE/launch officer a thumbs-up signal and report his aircraft status, fuel state, and souls on board to PriFly. The LSE/director shall signal the flight deck supervisor and flight deck supervisor then notifies PriFly that all aircraft are ready for launch. PriFly shall request a green deck from the bridge. When the ship is on a steady course, the OOD shall order HOTEL/FOXTROT flag closeup, and give PriFly a green deck signal. The air officer shall ensure that proper wind conditions exist for the launch in accordance with Appendix D.

Launch of helicopters while the ship is in a turn should be attempted only when authorized by the ship’s commanding officer or his designated representative. Anticipated wind parameters and ship’s heel shall be communicated to the helicopter aircraft commander prior to the execution of the turn.

The air officer shall direct the flight deck supervisor to have chocks and tiedowns removed. The flight deck supervisor shall then direct the LSE/director to remove tiedowns and chocks. When removing tiedowns from helicopters, the tiedowns shall be removed aft to forward. The mainmount tiedowns shall be removed simultaneously. On signal from the LSE/director each chockman (blue shirt) shall remove all tiedowns and chocks from his side of the aircraft and then proceed to the LSE/director and face the pilots.

Tiedowns and chocks shall be carried within view of the pilots and shown to and acknowledged by the pilots. The LSE/Director shall point to the chocks and tiedowns removed, followed by the showing of one finger for each tiedown and chock removed to the pilot.

When PriFly is satisfied that all conditions are ready for safe launch, the deck condition light(s) shall be set to green and the launch commenced.

- Helicopters landing behind engaged tail rotor aircraft shall not conduct cross-cockpit takeoffs or landings for LSE safety.

- Rotor downwash created by the H-53E is greater than that produced by any other embarked helicopter. This downwash is sufficient to damage unsecured rotor blades and to blow aircraft chocks, tiedown chains, and towbars about the deck or overboard, and cause possible personnel injury or death.

Combination of relative winds and rotor downwash when landing a helicopter immediately adjacent to a spot occupied by a shutdown helicopter not folded or secured by rotorblade tiedowns may cause rotor system damage to the shutdown helicopter.

4.5.2 Ordnance Equipped Aircraft. When an aircraft carrying ordnance requires arming, the launch officer/LSE, after ensuring the aircraft is in the proper launch position and upon completion of the initial walkaround shall direct the pilot’s attention to the ordnance safety supervisor for arming. When the arming has been completed and the arming crew is clear, the ordnance safety supervisor shall signal the pilot with “thumbs up” and direct the pilot’s attention back to the launch officer/LSE.

4.5.3 Helicopter Launch Procedures. When green deck signal is given, the LSE shall recheck that the aircraft is clear of all tiedowns and the area
surrounding the aircraft is clear of equipment and personnel. He shall also check that all airborne aircraft are clear of the launch area, and only then shall give the takeoff signal to the helicopter. The pilot shall not commence takeoff until he receives this signal from the LSE and the winds for launch are received from PriFly.

4.5.4 V/STOL Launch Procedures

4.5.4.1 Preparation for Takeoff. After pretaxi checks are completed, PriFly shall direct each aircraft to check in with call sign, water quantity, fuel weight, and gross weight. PriFly shall then report the required winds to the bridge and report nozzle setting, trim setting, gross weight, and water on or off to the launch officer or flight deck control after verification by the LSO. The launch officer or flight deck control shall set up the tote board from the given information.

**CAUTION**

Pilots shall not be required to make sudden stops while backing as the tail of the aircraft may strike the deck.

When PriFly is satisfied that all conditions are ready for safe launch, the deck condition light(s) shall be set to green and the safe appropriate launch procedure commenced.

4.5.4.2 Vertical Takeoff. The following procedures shall be observed:

1. Launch officer will conduct operations as outlined in V/STOL Shipboard and Landing Signal Officer NATOPS Manual, NAVAIR 00-80T-111.

2. PriFly control:
   a. Shall not proceed with launch procedures unless positive communication with launch officer is verified.
   b. Shall continually monitor the launch area for fouled deck conditions and the aircraft for malfunctions. Abort the launch if unsafe conditions arise or upon recommendation from the LSO.

During **VTO**, the launch officer shall clear the area as soon as possible after he gives the launch signal.

**CAUTION**

Jet blast shall not be directed in the path of aircraft being launched or recovered.
Note

- When launching a mixed sequence of V/STOL aircraft and helicopters in VMC, allow sufficient time between launches to provide adequate separation.
- An AV-8 trained LSO shall be in primary flight control during all takeoffs and recoveries.
- No frequency changes on departure until level.

4.5.4.3 Short Takeoff

1. Launch officer:
   a. Point to tote board — ensure pilot concurrence
   b. Inspect aircraft — same as for VTO
   c. Final weapons arm (if applicable)
   d. One finger turnup — rpm to 60 percent, (nozzles at specified STO setting ±3°, flaps 62°) thumbs up, nozzles 10°/flaps 25°, thumbs up, clear deck
   e. Five finger signal — if water required
   f. Two finger turnup — pilot salutes
   g. Pause, clear deck, touch deck, GRAB PADEYE.

Note
The launch officer shall conduct his pre-launch inspection of the aircraft after it has been positioned at the final launch position.

2. PriFly control:
   a. Same as for VTO.
   b. Same as for VTO.

   c. A qualified aircraft director officer shall be stationed forward of the island and shall report “clear deck forward” prior to each STO launch.

   WARNING

- The launch officer shall time the launch so the aircraft leaves the bow on a rising deck.
- On an LHA, opening of any of the portside doors on the island at flight deck level fouls the deck and STO launch shall not be commenced.

4.5.4.4 Nose-to-Tail Procedures. Nose-to-tail launch procedures may be used to expedite launching of aircraft. All procedures remain the same as Case I and II procedures for each individual aircraft except for the following:

1. Each aircraft may be lined up and launched sequentially for every 50 foot mark.
2. All runups shall be done individually with one launch officer per aircraft starting from the last aircraft on the tramline.
3. Primary flight control shall not give a cleared to launch signal, nor shall any aircraft be launched, without a thumbs up from all the launch officers. This thumbs up verifies that aircraft runups are completed and the aircraft are ready to launch.
4. Time separation between aircraft launches shall be such that the controlling LSO has time to control each launch from the launch officer’s launch signal until that aircraft is safely airborne (minimum) of 10-second interval from the start of the takeoff roll).

CAUTION
Consideration shall be given to (1) the possibility of a brake failure with aircraft at runup rpm and in the close proximity (nose-to-tail) of other aircraft, and (2) the utilization of individual runups and individual STOs.
4.5.5 Night Launches

4.5.5.1 Night Helicopter Launches. Night launching procedures for helicopters are the same as for day with the following exceptions:

1. LSE shall use amber wands.

2. Flight deck personnel shall utilize goggles with clear lenses.

3. During prelaunch sequence, flight deck personnel, LSEs, and control tower personnel shall cycle all control knobs and switches on the VLA control panels to ensure each element is functioning properly. For those lights that may be obscured from the control panel operator’s vision, assistance shall be provided by an LSE to confirm that the switch and knob settings produce the appropriate indications.

4. SAR helicopter(s) and rescue boat(s) shall be equipped with night signalling devices during all night operations.

5. Pilots shall ensure that all aircraft light switches are positioned OFF prior to electrical system activation.

6. External aircraft light signals shall be utilized as outlined in night lighting procedures (Figure 4-8).

7. PriFly/OOD shall adhere to maximum relative wind velocity charts contained in Appendix D for night helicopter launches and recoveries.

8. Pilots should not initiate any radio frequency changes or heading changes prior to reaching 300 feet.

9. PriFly/AATCC shall not require a frequency change or heading change prior to reaching 300 feet unless required for safety reasons.

Note

- Night launches from spots that do not afford visual reference to the deck may be dangerous because of loss of visual cues at lift-off. Night launches from spot one are prohibited.

- Night launches from forward Starboard spots afford limited tower visibility. PriFly will be unable to provide assistance normally afforded to aircraft operating from other spots.

4.5.5.2 Night STO Procedures. The procedures for a night STO are the same for a day STO except for the following launch officer signal differences:

1. After the trim check, the launch officer shall hold an illuminated red and green wand at chest level and rotate the green wand in a horizontal circle for the one-finger runup. After the launch officer has confirmed the nozzle and flap programming, the green wand shall be flashed twice. The pilot shall then place the nozzles back to 10°. After the nozzles have been confirmed at 10°, the launch officer shall flash the green wand three times.

2. For a two-finger (dry) launch, the launch officer will rotate the green wand in a horizontal circle with the red wand not illuminated. For a five-finger (wet) launch, the green wand will be moved up and down with the red wand not illuminated.

3. When the pilot is ready to launch, the external lights will be turned on vice saluting.

4. The launch officer will touch the deck with the illuminated green wand when cleared to launch.

5. The suspend signal shall be given by crossing the illuminated red and green wands.

4.6 EMCON/ZIP-LIP LAUNCH PROCEDURES

4.6.1 General Procedures. When the use of radio is limited, operations may be conducted by use of other means of communication. Visual communications become extremely important, including the proper use of the ship’s flag command and display signals. Aircraft lighting, aldis lamp, blinker, and hand and arm signals become necessary to safely conduct flight operations. The above signals are explained in Figures 4-3, 4-7, and 5-11. Both aircraft and the controlling ship shall monitor the land/launch frequency. Radio transmission shall not be authorized unless required for safety of flight.
<table>
<thead>
<tr>
<th>HELICOPTER SIGNAL</th>
<th>HELICOPTER LIGHTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready to start APP</td>
<td>Red cockpit dome light on or red lens flashlight.</td>
</tr>
<tr>
<td>Ready to start engines</td>
<td>External navigation lights on STEADY DIM.</td>
</tr>
<tr>
<td>Ready to engage rotors</td>
<td>External navigation lights on FLASHING DIM.</td>
</tr>
<tr>
<td>Ready for takeoff</td>
<td>Anticollision lights on, navigation lights on STEADY BRIGHT.</td>
</tr>
<tr>
<td>After takeoff</td>
<td>Anticollision lights on, navigation lights on STEADY BRIGHT.</td>
</tr>
<tr>
<td>180° abeam position/right seat landing</td>
<td>Navigation lights on STEADY BRIGHT. Anticollision lights on.</td>
</tr>
<tr>
<td>180° abeam position/left seat landing</td>
<td>Navigation lights on FLASHING BRIGHT. Anticollision lights on.</td>
</tr>
<tr>
<td>After final landing, or when on deck for extended period</td>
<td>Anticollision lights off. Navigation lights on FLASHING DIM.</td>
</tr>
<tr>
<td>Ready for disengage rotor</td>
<td>Red dome light on or red flashlight. Navigation lights on FLASHING DIM.</td>
</tr>
</tbody>
</table>

Note
May be modified by PriFly to accommodate weather conditions and aircraft characteristics. Use day hand signals during NVD operations.

Figure 4-7. Night Lighting Procedures

All flight operations conducted under EMCON conditions shall be thoroughly briefed and coordinated between the squadron and ship’s controlling agencies. During EMCON conditions, increased emphasis shall be placed on conformance to safe operating procedures.

In addition to those command and display signals depicted in Figure 4-3 the following signal shall be utilized for tiedown removal prior to launch during EMCON: a momentary display of the green beacon (i.e., RED, GREEN, RED).

4.6.2 Day Launch Procedures. Day launch procedures during EMCON are conducted the same as normal operations except that visual signals are used to replace routine radio transmissions. Pilots shall ensure that all equipment that emits radio-electromagnetic energy is set in accordance with the EMCON conditions established by the ship’s commanding officer. The crew chief may be positioned by the LSE and relay wind direction and velocity to the pilots for engine start and rotor engagement.

4.6.3 ZIP-LIP Procedures. During ZIP-LIP operations, launch procedures shall be the same as during EMCON, utilizing appropriate hand, flag, and light signals unless radio communications are required for safety of flight.

4.6.4 Electronic Emission Control Night Launch Procedures. Night launch procedures during EMCON are conducted the same as normal night operations except that light signals are used to replace routine radio transmissions. All communications/navigation/flight equipment that is not essential for safe night operations shall be secured.

4.7 EMERGENCY AFTER LAUNCH

4.7.1 Visual Meteorological Conditions. If an emergency requires an immediate landing, the pilot shall prepare to jettison external stores/internal cargo and dump fuel as necessary to lower the aircraft gross weight below the maximum allowable landing weight. The pilot shall advise the tower of the nature of the emergency and his desires. The air officer shall inform the bridge of the situation, direct the preparation of the deck, and give the pilot an expected BRC and an estimated Charlie time. The expected Charlie time shall be based on the time required to clear the deck and get an acceptable WOD for the recovery. The pilot shall observe the progress of the turn into the wind and the preparation of the deck. He shall attempt to time his approach to avoid arriving at the deck too early.

ORIGIANL
4-18
CAUTION

H-53E AFCS failure or hydraulic failure requires winds on the bow with the deck spotted to allow a landing with the parking brake unlocked.

4.7.2 Night/Instrument Meteorological Conditions. Should an aircraft have an emergency during departure and require an immediate landing, the departure controller shall provide vectors until the aircraft is picked up by an approach or a final controller. Every effort shall be made to retain the aircraft on the departure frequency until safely aboard. PriFly shall be advised immediately of the emergency and the control frequency. Aircraft with emergencies that do not require immediate recovery shall continue normal departure procedures while the departure controller expeditiously acquires close control. Once acquired, close control and positive radar handoffs shall be employed until the emergency aircraft has been recovered or diverted.

4.7.3 Lost Communications During Departure

1. IFF/SIF squawk according to Figure 3-2.
2. If in VMC, remain visual and return to the ship for visual recovery.
3. If IMC or VMC on top, perform procedures in paragraphs 4.7.4, 4.7.5, and 4.7.6, as applicable.

4.7.4 Lost Communications Only During Departure (IMC). In the event of lost communications with good TACAN and DME, proceed as follows: continue climbout on assigned departure radial. Climb/descend to emergency marshal altitude, and proceed with emergency marshal instructions (Chapter 5, paragraph 5.3.3.9 or 5.4.3.11).

4.7.5 Lost Communications and DME During Departure (IMC). In event of lost communications and a loss of DME only, proceed as follows using a UHF-ADF or TACAN azimuth.

1. Continue briefed departure, utilizing DR to maintain appropriate arc until assigned departure radial is reached.
2. Continue outbound on departure radial climbing to emergency marshal altitude, reverse course, proceed inbound, and enter holding overhead in accordance with the TACAN/NDB overhead approach chart. Use prebriefed emergency BRC to determine relative radial.
3. Conserve fuel, monitor auxiliary receiver and guard, and be alert for joinup.
4. If joined by another aircraft, fly wing position to recovery.
5. If not joined, commence NDB approach at EEAT.

4.7.6 Lost Communications and NAVAIDS During Departure (IMC). In event of complete loss of communications/navigation capability, proceed as follows:

1. Continue prebriefed departure, utilizing DR to arc and intercept departure radial.
2. Climb on departure to last assigned altitude.
3. At altitude, utilize DR and hold, conserving fuel, and fly appropriate triangles in accordance with Flight Information Handbook.
4. Attempt contact with ship utilizing survival radio on guard (243.0). Comply with HDC instructions for radar approach. Once in the approach, no further communication from pilot to ship shall be required, except for further emergency or pertinent information.
5. If unable to contact ship, await joinup, and follow lead to recovery.
6. Upon reaching bingo fuel with no joinup, execute bingo procedures for divert field utilizing DR.
7. In absence of bingo/divert procedures, follow applicable ditching procedures for type aircraft.

4.8 DEPARTURE PROCEDURES

4.8.1 Helicopter Departure Procedures

4.8.1.1 Case I, Visual Meteorological Conditions Departure to Rendezvous. This departure may be used when IMC is not anticipated during departure and subsequent rendezvous. Helicopters shall clear the control zone at or below 300 feet or as directed by PriFly. Rendezvous shall be
accomplished at briefed points in accordance with squadron tactical doctrine.

4.8.1.2 Case II, Visual Meteorological Conditions to Visual Meteorological Conditions On Top. Weather at the ship shall not be less than 500-foot ceiling and 1-mile visibility. Helicopters shall depart via Case I departure and maintain flight integrity below the clouds. Weather conditions permitting, departure on assigned missions shall also comply with Case I procedure. If unable to maintain VMC, helicopters shall proceed in accordance with Case III departures.

4.8.1.3 Case III, Instrument Meteorological Conditions. Whenever weather conditions at the ship are below Case II minimums, or there is no visible horizon, or when directed by the commanding officer or OTC, helicopters shall launch at not less than 1-minute intervals, climb straight ahead to 500 feet, and intercept the 3-mile arc. They shall arc at 3 miles to intercept assigned departure radials. Upon reaching the assigned departure radial, turn outbound and commence climb to assigned altitude. Figure 4-8 illustrates Case III departures. Departure radials shall be separated by a minimum of 20°.

Note
Modifications to Case III procedures are not authorized.

1. Helicopters shall launch on the assigned departure frequency, vice land/launch, and monitor guard. PriFly shall monitor departure frequency once airborne.

2. Helicopters launching on tactical missions shall rendezvous as briefed, report KILO (aircraft mission readiness), and be switched to assigned tactical control agency.

3. Departing aircraft shall report the following:
   a. Airborne
   b. Arcing
   c. Established on departure radial
   d. POPEYE with altitude

4. Minimum separation for departure radials is 20°. Assignment depends upon:
   a. Aircraft mission
   b. Topographical features
   c. Reserved radials for emergency use
   d. Ships in formation
   e. Airspace restrictions (ADIZ, hot, warning, restricted, prohibited areas, etc.).

Note
Similar type aircraft may launch at 1-minute intervals. If radar contact can be established within 1 mile after takeoff, AATCC may clear the next aircraft to depart. During mixed operations, there shall be a 2-minute launch interval between the last helicopter and first V/STOL.

4.8.2 Vertical/Short Takeoff and Landing Departure Procedures

4.8.2.1 Case I, Visual Meteorological Conditions Departure to Rendezvous. After takeoff, aircraft proceed straight ahead on BRC, climb to 500 feet and 7 miles. Execute unrestricted climb in VMC beyond 7 miles. Rendezvous according to squadron tactical doctrine.

4.8.2.2 Case II, Visual Meteorological Conditions to Visual Meteorological Condition On Top. Weather conditions at the ship shall not be less than 1,000-foot ceiling and 5-nm visibility unless the ship’s commanding officer has authorized lower Case II V/STOL minimums for special operations.
Figure 4-8. Case III Departure Patterns

NOTE: DURING MIXED OPERATIONS, HELICOPTERS SHALL NOT CLimb ON ASSIGNED DEPARTURE RADIALS UNTIL 10 NM.
1. After takeoff, aircraft proceed straight ahead on BRC, climbing to 500 feet and 7 miles. At 7 nm, turn to intercept the 10-mile arc to intercept the assigned departure radial. The 500-foot limit is removed past 7 miles if climb can be continued in VMC. Aircraft shall maintain climb speed until on top in VMC.

2. Aircraft shall rendezvous between 20 and 50 nm from the ship on the left side of the departure radial. Squadron tactical doctrine may dictate other types of rendezvous. Flight leaders shall report at assigned altitudes, if not VMC on top. Altitudes shall normally be assigned in accordance with Figure 4-9.

3. Upon reaching assigned altitude, if still IMC, aircraft shall establish holding on the departure radial between 20 and 30 nm, at best fuel endurance airspeed, and report established in holding. Departure control shall issue clearance to proceed on mission, if operationally required, or continue holding until vectored to marshal for recovery.

4.8.2.3 Case III, Instrument Meteorological Conditions/Night. Whenever weather conditions at the ship are below Case II minimums and during night operations, with no visible horizon except during night CQ or when the tactical situation dictates, or when directed by the commanding officer/OTC, aircraft shall launch under Case III procedures. Aircraft shall launch on departure control frequency. Figure 4-8 illustrates Case III departures.

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>6,000 ft to FL180</th>
<th>FL 180 and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>Departure altitude</td>
<td>FL 220</td>
</tr>
<tr>
<td>Second</td>
<td>Departure altitude minus 1,000 ft</td>
<td>FL 210</td>
</tr>
<tr>
<td>Third</td>
<td>Departure altitude minus 2,000 ft</td>
<td>FL 200</td>
</tr>
<tr>
<td>Fourth</td>
<td>Departure altitude minus 3,000 ft</td>
<td>FL 190</td>
</tr>
</tbody>
</table>

**Note**
Aircraft under ship control shall fly flight levels when at or above 18,000 ft MSL.

Figure 4-9. Vertical/Short Takeoff and Landing Departure Altitudes
frequencies, and of other aircraft until control is accepted by CIC, TACC, or another controlling agency.

4. Before releasing aircraft to another controlling agency, give each pilot (or flight leader) any pertinent information, such as changes in composition of flight, changes in PIM, or changes in mission.

5. When transferring control of aircraft, give the new controlling agency the distance and bearing of the aircraft being transferred, and obtain acknowledgment of assumption of control.

6. File flight plans as necessary.

4.9.1 Departure Radials. Departure radials are based on the use of TACAN for providing lateral separation. The minimum standard separation of departure radials under instrument conditions is 20 degrees.

Assignment of departure radials is normally dependent on the following:

1. Mission of the aircraft
2. Number of ships in formation
3. Topographic features in the area
4. Radials reserved for emergency use.

Direct routing will be utilized as much as practical in order to lessen delay time in the execution of departures.

4.9.2 IMC/Night Departure Voice Reports. These reports will vary with weather, state of training, EMCON condition, and the type of operation. The following reports are commonly used for both fixed wing and helicopters:

1. Airborne
2. Arcing
3. Established on departure radial
4. Popeye with altitude

Note
When in IMC, POPEYE is a mandatory report for single aircraft upon reaching assigned departure altitude or FL 180 for V/STOL. This report alerts the departure controller that further instructions are required.

5. On top with altitude
6. KILO (mandatory).
CHAPTER 5

Recovering Aircraft

5.1 PREPARING FOR RECOVERY

5.1.1 Ship Preparations. The OOD shall ensure preparations for flight quarters are completed in accordance with Chapter 4. Safe aircraft recovery operations require strict adherence to NATOPS wind and deck limitations as depicted in Appendix D. Ship, embarked squadron commanding officers and detachment officers in charge may establish more restrictive limitations.

5.1.2 Bridge/PriFly Coordination. The air officer shall keep the bridge informed as to the readiness of the flight deck to land aircraft. When the deck is ready and the ship has steadied on the recovery course, the commanding officer or the OOD shall give PriFly clearance to recover aircraft. The air officer shall then announce on the 5 MC, “Standby to recover aircraft spots 1, 3, etc.”, and a green rotating beacon shall be displayed from PriFly, when appropriate.

Helicopters should not be recovered while the ship is in a turn, except when authorized by the ship’s commanding officer or his designated representative. Anticipated wind parameters and ship’s heel shall be communicated to the aircraft commander prior to execution of the turn.

5.1.3 Night Operations. Night operations are among the most critical for both pilots and flight deck crews. The tempo of operations shall be reduced as compared to day operations. Slow and careful handling of aircraft by pilots and deck crew is required to enhance safety. All personnel concerned shall be indoctrinated in night operation procedures. All V/STOL night Case III aided recovery procedures are outlined elsewhere in this manual.

Flight deck operations at night may cause some confusion between pilots/crews and directors. All signals must be clearly understood by everyone concerned. The following are required for flight operations:

1. The LSE shall be equipped with appropriate wands.
2. All flight deck personnel shall utilize clear lens goggles.
3. All optical landing aids and flight deck lighting shall be checked for proper operation prior to recovery operations.
4. During night/NVD operations proper light discipline shall be exercised.

5.1.4 Night Wind Limitations. The wind limitations depicted in Appendix D or the shipboard operating bulletin shall be complied with for all night recoveries. The ship’s embarked squadron commanding officers and detachment officers in charge may establish more restrictive limitations. The BRC shall be provided as early as possible to flight leaders/aircraft commanders to enable the flight to maneuver for proper entry into the designated pattern.

*WARNING*

- Change of ship direction during recovery could result in a hazardous situation and place the helicopter outside recovery wind/roll parameters.
- When conducting operations behind a turning tail rotor aircraft, factors of proper deck spotting, aircraft types and distance between spots should be considered before permitting cross cockpit takeoffs or landings to preclude potential injuries to flight deck personnel.

Maintenance on, or inspection of any portion of an aircraft that extends over the ship’s deck edge is prohibited.
5.2 RECOVERING AIRCRAFT

5.2.1 Arrival Procedures. Aircraft entering the ship’s control area, once released by mission controllers, shall switch to AATCC frequency for arrival instructions.

Aircraft or flight leaders shall check in with AATCC with the following information:

1. Call sign
2. Position (relative to ship or tacan fix)
3. Altitude
4. Fuel state (in hours and minutes for helicopter or pounds remaining for V/STOL) of the lowest aircraft in flight
5. Souls on board
6. Ordnance remaining (See paragraph 5.6.1, Recovery with Ordnance)
7. Other pertinent information.

The type and amount of information provided by AATCC will vary based upon Case recovery, environmental and operational conditions, EMCON condition, and other factors. AATCC will respond with the following:

1. Case recovery
2. BRC
3. Weather information and altimeter setting
4. Marshal instructions
5. Expected approach time (EAT)
6. Estimated recovery time
7. Time hack*
8. Other pertinent information
9. Set state for fuel (V/STOL only).

* Provided for Case II/III recoveries or upon request.

5.3 HELICOPTER APPROACH AND RECOVERY

5.3.1 Helicopter Case I Approach Procedures. Case I may be used when it is anticipated that aircraft will not encounter IMC at any time during descent, break, and pattern established on the port side of final approach. Weather minimums of 1,000 foot ceiling and 3 miles visibility are required in the control zone.

Note

- During mixed aircraft operations, helicopters shall enter starboard Delta pattern (Figure 5-1).
- During mixed aircraft operations, helicopter break altitude shall not exceed 300 feet.

Flights shall check in with AATCC as in paragraph 5.2.1. Pilots shall report “See you” when visual contact with the ship is gained VMC; AATCC shall switch aircraft to PriFly frequently by 5 nm (VMC). Unless otherwise directed by PriFly, flights shall proceed to and hold in the overhead Delta pattern and plan their descent and break to meet the designated recovery time and maintain an orderly flow of traffic into the Charlie pattern.

5.3.1.1 Helicopter Case I Holding. Case I holding for helicopters is performed in the overhead, port, or starboard Delta patterns as depicted in Figure 5-1.

1. The overhead Delta pattern is a VFR left-hand racetrack pattern established in the vicinity of the ship. It is oriented on the BRC and close aboard the starboard side at an optimum airspeed. During heavy traffic periods additional Delta patterns may be utilized as assigned by PriFly.

2. The starboard Delta pattern is a holding pattern established on the starboard side of the ship’s 045-110 relative bearing between 1 and 3 miles. It is a right-hand racetrack flown at 300 feet and 80 knots.

3. The port Delta pattern is a holding pattern established between the ship’s 225-315 relative bearing between 3 and 5 miles. It is a left-handed racetrack flown at 300 feet and 80 knots.
Figure 5-1. Delta and Charlie Patterns for Helicopters

1. **Delta Pattern**
   - 300 ft, 80 knots
   - Upwind leg 3 miles abeam, downwind 5 miles abeam, 300 ft oriented on the ship’s bow.
   - Port delta upwind leg.

2. **Charlie Pattern**
   - Commence descent to 300 ft for normal entry into Charlie pattern.
   - Direct entry to 300-foot Charlie pattern no further than one-fourth-mile abeam.

3. **Starboard Delta**
   - Upwind leg 1 mile abeam, outbound on the 045° relative bearing.
   - Downwind leg 3 miles abeam inbound on 110° relative bearing.

4. **110° Relative Bearing**
   - Normal entry into Delta pattern 1,000 ft, left turns or as directed by PRIFLY or HDC.

5. **Entry to Charlie Pattern**
   - From Starboard Delta, Delta is as directed by PRIFLY or HDC.

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5.3.1.2 Helicopter Charlie Pattern. The Charlie pattern is a left-hand racetrack pattern on the port side of the ship. The upwind leg parallels the BRC. All aircraft shall enter the Charlie pattern as depicted in Figures 5-1 through 5-3 unless otherwise directed by PriFly or AATCC. Landing interval shall be established or adjusted upwind so as not to extend the downwind leg.

5.3.1.3 Prep Charlie. Aircraft cleared to prep Charlie shall conform to normal Charlie pattern entry procedures and once established in the pattern, conform to the racetrack pattern depicted in Figures 5-1 through 5-3 until cleared by PriFly.

5.3.1.4 Helicopter Night Case I Recovery Pattern. The helicopter night Case I recovery pattern is a left-hand pattern on the port side of the ship. The pattern is extended downwind allowing for a complete turn to final prior to beginning descent. The straight-in final approach is flown using available visual landing aids such as V/STOL OLS and HAPI.

Note
The SGSI has been removed from all LHD & LHA class ships.

5.3.1.5 Standard Helicopter Landing Patterns. The Charlie Pattern is the standard Case I daytime helicopter landing pattern. Landing pattern for port spots is an approach starting not later than abreast the intended point of landing with a turn to intercept the 45° line at the 90° position. Landing a helicopter on a spot immediately in front of another helicopter should be avoided whenever possible.

WARNING
- When approaching a spot immediately in front of a spot occupied by another helicopter, the final portion of the approach on the 45° bearing should terminate at a point directly abreast the intended landing spot. From this point the final transition is flown by sliding sideways to a hover over the landing spot. Cross-cockpit landings should be avoided.
- Combination of relative winds and rotor downwash when landing a helicopter immediately adjacent to a spot occupied by a shutdown helicopter not folded or secured by rotor blade tiedowns may cause rotor system damage to the shutdown helicopter.

The Charlie pattern and the night Case I helicopter recovery pattern are the standard night Case I helicopter landing patterns. The air officer shall ensure that all airborne aircraft and the squadron duty officer are informed when changing from one night landing pattern to another. Simultaneous use of the Charlie and night Case I helicopter recovery patterns is prohibited.

The completion of the night Case I recovery pattern depends on the location of aircraft on the landing spots. If the landing spots aft of the assigned landing spot are clear, the helicopter may complete a straight-in approach over the stem and air taxi to the landing spot. When there are obstructions between the stem and the landing spot, the air officer shall direct the pilot to adjust his pattern to fly close aboard the port side and intercept the 45° lineup of the assigned landing spot.

5.3.1.6 Nonstandard Helicopter Landing Patterns. Nonstandard patterns are as follows:

Note
Landing patterns for starboard spots will vary depending on the position of aircraft spotted on the flight deck (Figure 5-3).

1. Cross-Deck — A cross-deck approach shall be flown the same as a standard landing pattern except the approach shall continue across the flight deck the assigned landing spot (Figure 5-3).
2. Helicopter Around Stern — Starboard spots may be utilized by entering the normal Charlie pattern,
Figure 5-2. Helicopter Night Case I Recovery Pattern

- Enter break up-wind of ship at 300 ft and 80 kts
- Wave off, climb to 300 ft parallel BRC, adhere to prifly instructions
- When cleared to Charlie commence descent to 300 ft
- Continue approach straight-in over stern or approx 100 yds astern of the ship adjust pattern as depicted to fly close aboard port side to intercept 45° line up as appropriate
- Normal delta pattern 1,000 ft
- Pattern entry from CCA or TACAN
- Commence level turn to arrive astern of ship approx 300 yds
- Call prifly abeam
- Normal delta pattern
Figure 5-3. Helicopter Recovery Patterns for Starboard Side Spots
calling abeam port quarters, descending to 200 feet by the astern position, continuing up the starboard side to intercept an approximate 45° angle to the spot and then straight in (Figure 5-3).

3. Helicopter Modified Straight-In — PriFly may approve a straight-in approach to the spot depending on traffic in the pattern.

5.3.1.7 Helicopter Recovery Procedures.  
Upon ready deck, PriFly will normally give a “Charlie” to the number of aircraft that there are spots available, giving consideration to low fuel state aircraft. In conjunction with “Charlie”, PriFly shall also broadcast the BRC, altimeter, and wind condition across the deck. Aircraft should plan the descent and flight break to the landing pattern as depicted in Figures 5-1 through 5-3. Care should be taken to orient the landing pattern on the recovery course specified when it differs from the ship’s heading. All pilots should take proper interval at the upwind break.

When “Charlie number” (i.e., “Charlie 5”) is given, aircraft shall enter the landing pattern for landing with the lead aircraft planning to be over the deck at the expiration of the number of minutes specified. When a flight of aircraft is being recovered in VMC, the leader of the flight should plan to be on deck with a minimum safe interval after the preceding aircraft has landed. A “Charlie” will be given with the anticipation that the first aircraft will be cleared to land upon arrival. When “Charlie” spot number is given, the aircraft is cleared to land. The pilot shall indicate gear down (if applicable) and seat position as appropriate. LSEs shall pick up landing helicopters at the 45° position in the approach turn of the Charlie pattern or at 100 yards astern in the helicopter night Case I recovery pattern.

**WARNING**

Rotor downwash created by the H-53E is greater than that produced by any other embarked helicopter. This downwash is sufficient to damage unsecured rotor blades and to blow aircraft chocks, tiedown chains, and towbars about the deck or overboard and cause possible personnel injury or death.

5.3.1.8 Waveoff. A waveoff shall be executed in the following situations:

1. Upon voice command from PriFly or loss of communication with PriFly.
2. Upon command from the LSE.
3. Anytime the pilot feels the approach cannot be safely completed.
4. Loss of visual contact with the LSE on final approach.

Pilots shall report “(aircraft identification), waving off” and parallel the BRC on the appropriate side of the ship and reenter the appropriate Case I pattern. Should reentry into the Case I pattern not be possible, the aircraft shall climb straight ahead and request instructions from PriFly.

5.3.2 Helicopter Case II Approach Procedures. Case II shall be utilized when IMC is encountered during descent, but at least a 500-foot ceiling and 1 mile visibility exists at the ship. During Case II, positive control shall be utilized until the flight leader/pilot reports the ship in sight. AATCC shall be fully manned and ready to assume control of Case III in the event weather deteriorates to below Case II minimums.

**Note**

Case II recoveries shall not be conducted concurrently with Case III departures. Case III approaches shall be used during marginal VMC.

5.3.3 Helicopter Case III Approach Procedures. Case III procedures shall be used whenever weather conditions at the ship are below Case II minima, or when no visible horizon exists, or when directed by the commanding officer or OTC. Case III formation recoveries are not authorized except when an aircraft experiencing difficulties is recovered on the wing of another aircraft. Formation flights by
dissimilar aircraft shall not be attempted except in extreme circumstances when no safer recovery method is available. A straight-in, single-frequency approach shall be provided in all cases. Precision radar shall be used whenever available. The procedures below are mandatory for all Case III helicopter recoveries.

5.3.3.1 Helicopter Marshal Patterns. Assignment of marshal is predicated on topographical features, ships in formation, operational restrictions, and aircraft capabilities. Marshal patterns shall be established clear of clouds if possible. A formation of two aircraft may be assigned the same altitude for purpose of section approach if one is experiencing communication or navigational equipment difficulties. Otherwise aircraft shall be separated by 500 feet. Expected approach times shall be issued in 2 minute intervals. All radials are relative to the BRC. All patterns are right, standard rate turns with 2 mile legs. Marshal airspeed shall be based on holding airspeeds in applicable aircraft NATOPS manuals.

1. TACAN marshal 1 — 180° radial at 7 miles, altitude as assigned.
2. TACAN marshal 2 — 270° radial at 7 miles, altitude as assigned.
3. TACAN marshal 3 — 090° radial at 7 miles, altitude as assigned.
4. Nondirectional beacon/TACAN overhead marshal. An overhead holding pattern on the 030° relative bearing, altitude as assigned (not less than 1,500 feet), 1 minute/2 nm racetrack pattern, left-hand turns.

TACAN marshal one and two shall not be utilized during mixed aircraft operations.

NDB/TACAN overhead marshal base altitude is 2,500 feet during mixed aircraft operations.

5.3.3.2 Approach Instructions (See Figures 5-4 and 5-5). ATCC shall issue the following information to each aircraft prior to approach clearance:

1. EAT
2. Final control frequency
3. Type approach and outbound bearing (overhead approach only)

Note
Assigned outbound bearing shall be continuously updated during overhead marshal recoveries to maintain a minimum 20° clockwise from the reciprocal of the final bearing.

4. Other pertinent information.

5.3.3.3 Departing Marshal. Pilots shall adjust patterns to depart marshal at assigned EAT. Deviations from EAT shall be reported immediately so that steps may be taken to alleviate conflicts. Descent from marshal shall be at 90 knots and no greater than 500 feet per minute to the final approach fix. Helicopters shall assume landing configuration prior to the FAF.

5.3.3.4 Radar Approaches

1. When precision radar (PAR) is available it shall be utilized to the maximum extent possible. Heading and glideslope information shall be provided in accordance with procedures in FAAH 7110.65.
2. When PAR is not available surveillance radar (ASR) approaches shall be conducted using FAAH 7110.65 procedures. Recommended altitudes shall be furnished each mile on final.
3. If communications are lost while being vectored in the CCA pattern or during final approach, aircraft shall comply with lost communications procedures for NDB/TACAN approaches listed in this chapter.
4. When nonradar instrument approaches are conducted for training or proficiency, PAR should be used for approach monitoring to the maximum extent possible.

5.3.3.5 Helicopter Landing Aids

Note
The SGSI has been removed from all LHD & LHA class ships.
Figure 5-4. Legend — Instrument Approach Procedure Charts
Figure 5-5. Approach Chart LHA/LHD NDB/TACAN Overhead (Helicopter)
5.3.3.5.1 SPN-41 Instrument Carrier Landing System (ICLS) Approach. A precision approach in which precise and continuous position information is displayed in an aircraft enabling a manually-controlled precision approach to appropriate minimums. It is an ILS-type system using ILM and TACAN/DME. It provides the pilot with a cockpit display of glideslope and lineup error signals. The information is not displayed in AATCC. Pilots may also use the ICLS for two additional purposes:

1. As an aid in positioning the aircraft for PAR radar acquisition and as an independent monitor of aircraft approach performance during PAR approached. The first use of the ICLS is made possible because of the large range at which error signals can be received in excess of 20 nm compared to approximately 10 nm for PAR.

2. When used as independent monitor during PAR approaches, the ICLS is referred to as the Independent Landing Monitor (ILM). That enable pilots to cross check controller voice transmissions.

The ICLS and PAR glideslope are aligned to the VSTOL/OLS glideslope.

3. The weather minimums are (400-1).

5.3.3.5.2 SPN-41 Instrument Carrier Landing System (ICLS) Approach. V/STOL aircraft shall pass through the ICLF FAF fix at 1,200 feet altitude, in the landing configuration, and commence slowing to approach speed. ILM information shall be used to intercept and fly centerline and glideslope; TACAN information shall be used for DME information until reaching ICLS minimum. ILM lineup may be used at achieve lineup early in the approach.

5.3.3.6 Missed Approach Procedures

1. Unless otherwise directed, missed approach procedures for NDB/TACAN approaches shall be in accordance with procedures published on the applicable approach chart.

2. Unless otherwise directed, aircraft on radar approaches shall turn right 90° off the final bearing, climbing to 1,000 feet and await further instructions or vectors to CCA final approach course.

5.3.3.7 Helicopter Delta Procedures. During Case II/III marshals and letdown, should a “Signal Delta” be issued, the procedures listed below shall apply. Minimum Delta issued shall be 6 minutes and even (2) minute intervals thereafter. When time permits, AATCC shall give the reason for Delta.

1. Aircraft still in holding shall continue holding and await a new EAT. Pilots shall acknowledge “Signal Delta.”

2. Aircraft that have already commenced approach shall continue on approach and await further instructions. Aircraft shall comply with speed and altitude restrictions for the appropriate approach, or with CCA control instructions.

3. Aircraft that lose communications subsequent to receiving “Signal Delta” shall continue holding and depart marshal 6 minutes (or other assigned Delta) from receipt of Delta. They shall maintain altitude until clear of marshal and proceed to assigned emergency marshal, holding until assigned EEAT, and then comply with emergency marshals procedures.

4. New EATs shall be issued as soon as possible. To prevent two aircraft from having the same EAT, new times shall be issued from the top of the stack (highest aircraft in holding) to the bottom.

5.3.3.8 Approach Minimums. Approach minimums are depicted in Figures 5-6, 5-7 and 5-8. Ships, embarked squadron commanding officers and detachment officers in charge may increase these minimums if required because of significant changes in operational capability such as decreased AATCC or embarked squadron proficiency. When a suitable divert field is available, aircraft shall not commence an approach if the reported weather at the ship is below minimums, unless the aircraft has sufficient fuel to proceed to the divert field in the event a missed approach is required.
Figure 5-6. Approach Chart LHA/LHD TACAN (Helicopter)
Figure 5-7. Approach Chart for LHA/LHD Tacan Overhead (V/STOL)
Figure 5-8. Helicopter Emergency Marshal Patterns (Sheet 1 of 2)
### MARSHAL ALTITUDES AND EMERGENCY EXPECTED APPROACH TIMES

<table>
<thead>
<tr>
<th>MARSHAL POINT</th>
<th>MARSHAL RADIAL (Rel Deg)</th>
<th>DME</th>
<th>ALT</th>
<th>EEAT (minutes past hour)</th>
<th>EEAT (minutes past hour)</th>
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<td>1500</td>
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<td>045</td>
<td>12</td>
<td>5000</td>
<td>28</td>
<td>58</td>
</tr>
</tbody>
</table>

### NOTES

1. Proceed outbound from ship and climb/descend to assigned emergency marshal altitude.
2. Proceed direct to assigned emergency marshal fix.
3. During mixed operations, helicopters shall cross EFB at 2,000 feet or above.
4. Hold inbound, right turns, 2-mile legs. Report established, state, souls on board.
5. At EEAT, depart fix inbound, descend to 500 feet. Report departing, state.
6. At 5 DME, arc clockwise to intercept 180 degree relative radial, proceed inbound.
7. At FAF (3 DME), begin final descent. Report FAF, state.
8. Watch for light from tower, land on LSE’s signal.

Figure 5-8. Helicopter Emergency Marshal Patterns (Sheet 2)
5.3.3.9 Helicopter Emergency Marshal. The purpose of emergency marshal is to provide an established procedure for aircraft returning with lost communications. Pilots shall be briefed on emergency marshal prior to initial takeoff. These procedures presume operational TACAN azimuth and DME. Aircraft with lost NAVAID and communication shall comply with lost NAVAID procedures below.

**WARNING**

TACAN marshal 3 conflicts with emergency marshal pattern. Aircraft entering either pattern shall be vigilant for the presence of other aircraft.

LHA/LHD operations are unique in that helicopter final recovery times cannot be predicted because of mission status and hot refueling. It is therefore necessary to establish emergency marshal procedures that will remain in effect throughout the aircraft’s event and does not require an update if the aircraft hot fuels. The patterns and procedures depicted in Figure 5-9 provide for the recovery of 24 individual helicopters experiencing lost communications during IMC.

Each aircraft on the ship’s air plan shall be assigned an emergency marshal point. Radial, DME, EEAT, and altitude are based on the marshal point assigned. The assigned point shall not be changed during the aircraft’s event except as requested by AATCC or the pilot and only with the expressed approval of both parties.

![Figure 5-9: VFR Relative Position Reporting](image)
The 24 emergency marshal points are positioned on three tacan radials and eight DME fixes at eight altitudes. The system provides lateral, vertical, and time separation. Radials are labeled “A” through “C,” are 45° apart, and are relative to the EFB.

A helicopter experiencing lost communications in IMC shall proceed outbound from the ship climbing or descending to the assigned emergency marshal altitude, then proceed directly to the assigned emergency marshal.

**WARNING**

During mixed operations helicopters shall cross the final bearing at or above 2,000 feet.

Helicopters shall squawk IFF code 7600. Holding pattern is a standard right-hand 2 nm racetrack with the outbound turn commencing over the assigned DME fix. Pilots shall maneuver to be at the assigned fix, at assigned altitude, at EEAT. At EEAT, commence descent to 500 feet and proceed inbound to the 5 DME arc. At the 5 DME arc, turn left arcing clockwise to the EFB. Proceed inbound on the EFB and commence descent to MDA at the FAF (3 DME) in accordance with Figure 5-8.

**Note**

Helicopter airspeed throughout the emergency marshal pattern is 90 knots except in holding when maximum fuel conservation airspeed shall be observed.

The emergency marshal pattern depicted in Figure 5-8 contains two sets of EEATS. When 16 or fewer aircraft are launched, the pattern repeats itself twice each hour. When more than 16 aircraft launch, the pattern repeats hourly.

**Note**

Emergency marshal patterns are designed for blue water operations. Close proximity to land masses or control zones may necessitate modification of emergency marshal procedures as exact conditions cannot be predicted. It is incumbent on the ship’s air operations officer to assign emergency marshal patterns that do not conflict with aircraft, existing obstructions, or other patterns in use.

### 5.4 V/STOL APPROACH AND RECOVERY

#### 5.4.1 V/STOL Case I Approach Procedures.

Case I/Case I (Aided) may be used during daylight and night aided operations when it is anticipated that aircraft will not encounter IMC at any time during descent, break, and final approach. Weather in the control zone must be 3,000 foot and 5 miles visibility.

Flights shall check in with AATCC as in paragraph 5.2.1. Pilots shall report “see you” when visual contact with the ship is gained. AATCC shall switch aircraft to PriFly at 5 miles. Unless otherwise directed, aircraft shall enter holding in accordance with ACE/squadron doctrine. They shall plan their descent to arrive at the initial point 3 miles astern at 800 feet, wings level, and parallel to the BRC. The flight leader shall report to PriFly when descending from Delta and when arriving at initial. Each flight shall execute a normal break, not more than 5 miles ahead of the ship.

**WARNING**

During certain conditions the AV-8B may be performance limited. The optimum wind direction and speed specifically calculated and requested by the LSO should be provided. Failure to provide requested optimum winds severely impacts aircraft performance, increases risk, limits pilots options and could significantly contribute to loss of aircraft and life.

**Note**

Emergency marshal patterns are designed for blue water operations. Close proximity to land masses or control zones may necessitate modification of emergency marshal procedures as exact conditions cannot be predicted. It is incumbent on the ship’s air operations officer to assign emergency marshal patterns that do not conflict with aircraft, existing obstructions, or other patterns in use.

### 5.4.1.1 V/STOL Case I Holding.

The standard V/STOL Case I overhead holding pattern is a left-hand pattern tangent to the BRC or expected BRC at the 3 o’clock position with a maximum diameter of 5 nm. Aircraft shall be established at assigned holding altitude 10 nm prior to entering the pattern. Entry shall be tangential with wings level. Minimum holding altitude shall be 2,000 feet with a minimum of 1,000 feet vertical separation between holding altitudes. All aircraft shall maintain prescribed separation and landing order while in the pattern and in descent.
5.4.1.2 Standard V/STOL Landing Pattern.
Departure from overhead Delta holding pattern for break entry shall be accomplished on the downwind and crosswind legs aft of the ship’s beam. Descent from the port holding pattern for the break is commenced by the lowest aircraft or flight in time to meet the Charlie time. Descent shall be planned to arrive at the initial at 800 feet, wings level, and parallel to the BRC.

The flight leader shall either execute a normal break or spin all or a portion of his flight into the orbit pattern, depending on the number of aircraft in the landing pattern. A spin shall normally be initiated at the bow. The spin pattern shall be flown at 1,200 feet within 3 nm of the ship. Unless modified by the air officer, a maximum of four aircraft should be in the landing pattern at one time. No aircraft shall break more than 4 miles ahead of the ship. Pilots should exercise care to avoid departing aircraft and aircraft in starboard holding.

Should “Signal Delta” be given after commencing descent from holding, aircraft shall climb or descend to the 1,200 foot orbit pattern unless specifically directed otherwise. Aircraft or flights directed to spin shall climb only on the upwind or crosswind leg. Aircraft reentering the break from the spin or orbit pattern have priority over aircraft entering from port holding.

Entry to the break shall be made at 800 feet wings level. From low approach, corrections to parallel the BRC shall not be attempted until a positive climb has been established. Climb to pattern altitude shall normally be is completed prior to downwind turn. Normally, interval shall be taken by other aircraft in the pattern. Flight leaders shall report the following:

Note
Normal V/STOL recovery is depicted in Figure 5-10.

5.4.1.3 V/STOL Nonstandard Landing Pattern.
The important considerations in landing V/STOL aircraft are that the landing be made into the relative wind with no wind burble, a clear deck, and some structure visible for pilot orientation. Therefore, landings can be made at any location that affords the above. Such flexibility allows for a variety of landing options such as bow to stem, right-to-left transitions, and 90° abeam approaches. The air officer should consult with the LSO to determine the desired pattern to be flown in nonstandard situations.

Refer to AV-8 V/STOL and LSO NATOPS NAV-AIR 00-80T-111 (current revision) for further description of patterns.

Note
A straight in approach, when directed, shall be initiated at a sufficient distance astern for the aircraft to be established positively on glideslope and airspeed at a minimum distance of 1 mile and altitude of 400 feet.

5.4.2 V/STOL Case II Approach Procedures.
These procedures may be utilized during daylight operations when it is anticipated that IMC will be encountered during descent, but weather at the ship is at least 1,000 foot ceiling and visibility is 5 miles.

Case II minimums may be modified by the ship’s commanding officer for special operations. During Case II, positive control shall be utilized until the flight leader/pilot reports the ship in sight. AATCC shall be fully manned and ready (when applicable) to assume control of Case III in the event weather deteriorates to below Case II minimums.

Case II recoveries shall not be conducted concurrently with Case III departures.

<table>
<thead>
<tr>
<th>Position</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descending from Delta</td>
<td>Commencing</td>
</tr>
<tr>
<td>3 miles astern</td>
<td>Initial</td>
</tr>
<tr>
<td>Entering orbit pattern</td>
<td>Spinning</td>
</tr>
</tbody>
</table>

Note
During Case II recoveries aircraft shall be marshaled as in Case III, or provided other positive control, until flight leaders/aircraft report “see you,” at which time normal Case I procedures are followed. Aircraft are vectored or conduct an instrument approach to arrive at 12 nm 1,200 feet wings level. If the first flight/aircraft is unable to gain visual contact at 12 nm, a controlled descent to 800 feet may be given. If aircraft fail to gain visual contact by 5 miles, they shall be vectored into the
Figure 5-10. Delta and Charlie Patterns for V/STOL Operations

- Level Left Break
- Delta Orbit Maximum 5 mile radius
- Climb to Delta ahead of ship on upwind or crosswind
- Descend from Delta aft of ship on downwind/crosswind
- Enter Delta Pattern Left Hand Turns Assigned Altitude (Minimum 2,000 FT)
- Direct Entry to Charlie Pattern at 800 FT
Case III waveoff pattern at 1,200 feet and provided a CCA approach. Subsequent aircraft shall be recovered Case III.

5.4.3 V/STOL Case III Approach Procedures. V/STOL Case III procedures shall be used for any of the following:

1. During all flight operations, aided or unaided, when weather is below Case II minimums
2. During mandatory letdown in thunderstorms
3. In other situations as deemed appropriate by supervisory personnel.

Positive control shall be provided by AATCC from letdown through final approach until control is assumed by the LSO. Case III formation recoveries are not authorized except when an aircraft experiencing difficulties is recovered on the wing of another aircraft. Formation flights by dissimilar aircraft shall not be attempted except in extreme circumstances when no safer recovery method is available. A straight-in, single-frequency approach shall be provided in all cases. Frequency/IFF changes are not authorized below 2,500 feet unless the aircraft is in level flight. Precision radar should be used whenever available.

5.4.3.1 V/STOL Case III Marshal Patterns. Assignment of marshal will be predicated on topographical features, ships in formation, operational restrictions, and aircraft capabilities. Marshal patterns will be clear of clouds (VMC) if at all possible.

Note
All bearings are relative to the BRC.

1. Tacan primary marshal, 180° radial at a distance of 1 mile for every 1,000 feet of altitude plus 15 (angles + 15). Base altitude shall not be less than 6,000 feet.

2. Tacan overhead marshal is an overhead holding pattern with the inbound leg 210° relative to the BRC, 2 minute racetrack, left-hand turns. The inbound leg passes over the holding fix (4 DME).

Marshal altitudes shall be separated by a minimum of 1,000 feet. Formation flights shall be limited to a maximum of four aircraft in VMC or two aircraft in IMC.

Marshal airspeed shall be based upon the NATOPS flight manual for aircraft configuration.

5.4.3.2 Marshal Instructions. AATCC shall ensure that the following information has been provided to all aircraft prior to approach clearance:

1. Case Recovery
2. Type approach and outbound bearing (overhead approach only)
3. Expected final bearing
4. Weather and altimeter
5. Marshal instructions
6. Expected approach time
7. Approach button
8. Time check.

To reduce radio traffic, items of general or collective interest may be transmitted as a “99” broadcast by AATCC.

5.4.3.3 Approach Instructions. AATCC shall issue the following information to each aircraft prior to approach clearance:

1. EAT
2. Final control frequency
3. Type approach and outbound bearing (overhead approach only)

Note
Assigned outbound bearing shall be continuously updated during overhead marshal recoveries to maintain a minimum 20° clockwise from the reciprocal of the final bearing.

4. Other pertinent information.

5.4.3.4 Departing Marshal

1. Aircraft shall be cleared to depart marshal (EAT) every 2 minutes, operational and/or weather conditions permitting.
2. Descent from marshal shall be at 250 knots, 4,000 to 6,000 feet per minute until platform
(5,000 feet). At platform the rate of descent shall be reduced to arrive at the 12 mile gate at 1,200 feet. Aircraft shall transition to the landing configuration at the 12 mile gate.

3. Aircraft on TACAN or radar approaches shall correct from the marshal radial to the final bearing at 20 miles. The pilot shall make a gradual correction when the final bearing is within 10° of the reciprocal of the marshal radial, or turn 30° when the final bearing is greater than 100. If the aircraft is not established on the final bearing by 12 miles, aircraft shall fly the 12 mile arc until intercepting the final bearing.

4. Pilots flying the TACAN overhead approach shall correct to the final bearing if it decreases, by flying 90° of penetration turn and arc to the new bearing. If it increases, fly the standard penetration turn and continue to intercept the new final bearing prior to the 12 nm gate.

5.4.3.5 Radar Approaches. Radar approach procedures are the same as for helicopters.

5.4.3.5.1 V/STOL Night Case III Aided Recovery Procedures

**WARNING**

V/STOL Night Case III Aided Recovery Procedures shall not be used simultaneously with V/STOL Night Case III Unaided Recovery Procedures.

The following procedures shall be used for all Night Case III Recoveries when night vision devices are employed:

1. If departing marshal through an overcast, the pilot shall comply with departing marshal instructions until VMC is reached. AATCC shall switch aircraft to prifly at 5 miles. At that time, the pilot shall report “Canceling IFR”, switch to prifly and proceed directly to the initial position.

2. The initial position is 800 feet, 3 nm astern.

3. The pilot shall fly up the starboard side of the ship for a level 800 feet break.

4. The abeam is 1.0 to 1.3 DME at 800 feet.

5. The 180 position is 1.5 to 1.7 DME at 800 feet.

6. The 90 position altitude is 650 feet.

7. From the 90 position, a descending turn should be used to arrive in the groove at 1.3 to 1.5 DME and 500–550 feet.

8. The pilot should intercept and fly a 3-degree glideslope to abeam the landing spot.

9. An offset approach shall be used for Night Case III Recoveries. The pilot shall decelerate along the port side of the ship, one plane-width from the deck edge.

5.4.3.6 Instrument Carrier Landing System (ICLS) Approach. V/STOL aircraft shall pass through the CLF FAF fix at 1,200 feet altitude, in the landing configuration, and commence slowing to approach speed. ILM information shall be used to intercept and fly centerline and glideslope; TACAN information shall be used for DME information until reaching ICLS minimum. ILM lineup may be used at achieve lineup early in the approach.

5.4.3.7 Approach Minimums. Approach minimums for V/STOL aircraft are listed in Figures 5-7, 5-10, 5-11, and 5-12. Ships, embarked squadron commanding officers and detachment officers in charge, may increase these minimums if required because of significant changes in operational capability such as decreased AATCC or embarked squadron proficiency. When a suitable divert field is available, aircraft shall not commence an approach if the reported weather at the ship is below minimums, unless the aircraft has sufficient fuel to proceed to the divert field in the event a missed approach is required.

5.4.3.8 Missed Approach Procedures

1. Unless otherwise directed, missed approach procedures for tacan approaches shall be in accordance with procedures published on the applicable approach chart.

2. Unless otherwise directed, aircraft on radar approaches shall climb straight ahead to
Figure 5-11. Vertical/Short Takeoff and Landing Emergency Marshal
Figure 5-12. Approach Chart for LHA/LHD TACAN (V/STOL)
5.4.3.9 V/STOL Delta Procedures. When required, a “Signal Delta” to all aircraft. When “Signal Delta” is received, pilots shall initiate the following actions:

1. Aircraft in holding shall continue holding and await a new EAT. Pilots shall acknowledge “Signal Delta.”

2. Aircraft that have already commenced approach, but are still above platform, shall level off at the next lower odd altitude and enter holding at the appropriate DME (angles + 15). The pattern used shall be the same as normal marshal. Aircraft shall report new holding to marshal control, acknowledge Delta, and await a new EAT.

3. Aircraft that have commenced and are at or below platform shall continue approach and await specific instructions prior to dumping fuel.

4. New EATS shall be assigned as soon as possible. If a pilot loses radio contact before a new EAT is received, he shall hold 6 minutes from the time Delta was received, then proceed to tacan emergency marshal and commence approach at EEAT.

5. Minimum Delta shall be 6 minutes and even (2 minute) intervals thereafter.

5.4.3.10 V/STOL Landing Aids. V/STOL optical landing aids required for night recoveries include the V/STOL OLS, HPI, WAVE-OFF/CUT lights.

5.4.3.10.1 V/STOL OLS. The V/STOL OLS provides glideslope and trend information to a pilot in an approach to a hover. The display is mounted above the deck on the aft end of the island structure. Pitch and roll stabilization compensates for as much as 3° of pitch and 14° of roll. Figure 5-13 illustrates relative V/STOL OLS indications.

When the indicator amber ball of light is lined up with the two green datum bars, the pilot is on the proper glideslope. The glideslope indication is set for 3° in order to bring the pilot to the ship’s ramp with his eye approximately 50 feet above the deck. The tramline is referred to for lineup.

Figure 5-13. Optical Presentation of V/STOL OLS System and V/STOL Optical Landing System
The indicator display is also light coded as indicated in V/STOL OLS vertical coverage illustration Figure 5-14. The light coding defines the upper and lower limits of the indicator display allowing the sensing of these limits by going from normal amber brightness to a brighter, non-flashing then flashing amber, when tending to go out of the top of the display or to a brighter non-flashing then flashing red when tending towards the bottom of the display.

Figure 5-15 illustrates the orientation of the 20° horizontal coverage of the indicator. The display is oriented so that the pilot will not be distracted by the V/STOL OLS indicator display as the aircraft crosses the ramp on the approach line. At this point the pilot will lose the V/STOL OLS indicator and transition to the HPI display for the final phase of recovery.

In the event the V/STOL OLS or V/STOL OLS fails and cannot be made operational when aircraft are airborne, the HAPI system shall be used as an emergency backup approach optical landing aid.

For additional information refer to LSO NATOPS NAVAIR 00-80T-111 (current revision).

5.4.3.10.2 HPI. The HPI is mounted on the aft end of the island below the V/STOL OLS. It consists of a vertical group of five lights and a horizontal group of three lights. A single red light is mounted 9 feet in front of the plane of the other lights. The apparent location of the red light relative to the other lights gives the pilot a location cue in the hover and through the vertical descent to a landing. In the final phase of recovery, the pilot lines up on the ship’s tramline and flies forward until the red light is centered in the display as shown in Figure 5-16. When this occurs the pilot is over the touchdown zone with his eye approximately 50 feet above deck. As the pilot descends vertically to a touchdown, the HPI provides a relative idea of the rate of closure with the deck as the red light apparently passes through the vertical white lights.

5.4.3.10.3 Waveoff and Cut Lights. Waveoff and cut lights are installed on both sides of the V/STOL OLS indicators for PriFly personnel to signal the following:

1. Waveoff (flashing red lights) — abort the approach.
2. Power call (flashing green lights) — too low, add power.
3. Cut call (steady green lights) — aircraft over landing spot.
4. Bingo (alternate flashing red and flashing green lights) — divert to alternate.

5.4.3.10.4 HAPI. Two pitch and roll stabilized HAPI lights may be mounted in the port catwalk. As illustrated in Figure 5-17, each HAPI provides a two color display that is a steady white or red light depending on whether the approaching pilot is above or below the basic angle setting of the unit. The pilot will maintain a proper approach within the prescribed corridor if the forward light is red and the aft light is white. If the pilot sees red over red, he is below the required approach corridor. If the pilot sees white over white, he is above the required approach corridor.

5.4.3.11 V/STOL Emergency Marshal. Emergency marshal for the AV-8 shall be on the 150 foot radial relative to the EFB at 1,000 foot interval commencing at 5,000 feet. DME shall be assigned angles plus 15 run. After commencing, proceed inbound on the 150° relative radial leveling off at 1,200 feet, turn to intercept the 12 nm arc. Arc on the 12 nm arc to intercept the EFB and execute the final portion of the tacan approach. Missed approach shall be in accordance with the tacan primary approach procedure. Entry into the holding pattern shall be at assigned emergency altitude.

Note
Emergency marshal patterns are designed for blue water operations. Close proximity to land masses or control zones may necessitate modification of emergency marshal procedures as exact conditions cannot be predicted. It is incumbent on the ship’s air operations officer to assign emergency marshal patterns that do not conflict with aircraft, existing obstructions, or other patterns in use.

5.5 EMERGENCY PROCEDURES

5.5.1 Helicopter

5.5.1.1 Lost Communications During Approach. Aircraft which lose communications shall squawk IFF/SIF in accordance with Figure 3-1.
Figure 5-14. Vertical Coverage of V/STOL Optical Landing System

Figure 5-15. Horizontal Coverage of V/STOL Optical Landing System
Figure 5-16. HPI Display Interpretation
Figure 5-17. HAPI Vertical Presentation, Typical Installation

1. If VMC aircraft shall remain VMC and continue approach utilizing VFR lost communication signals listed in Figures 5-18 and 5-19.

2. If IMC/night and only communications failure occurs continue approach utilizing instrument approach lost communication procedures. Attempt to contact the ship using survival radio, time and safe control of aircraft permitting. When visual contact with the ship is made, follow procedures listed in Figures 5-18 and 5-19. The ship shall respond with light signals as illustrated in Figures 5-18 and 5-19.

5.5.1.2 Complete Communications/Navigation Failure

1. Pilot of single aircraft may elect to continue approach by dead reckoning to MDA until at least 2 minutes past expected arrival time. Climb out on final bearing until VMC is achieved or at emergency marshal altitude if unable to maintain VMC. Fly appropriate triangular pattern (receive only, right-hand pattern; if no receive, left-hand pattern — “right receive, nothing left”) at altitude, conserve fuel, and expect joinup. Follow lead or, at pilot’s discretion, divert to divert field, fuel permitting. If below overcast, fly DR search pattern to locate ship. When visual contact with ship is made, follow procedures in Figures 5-18 and 5-19.

2. Pilot may elect to discontinue approach. Climb on the final bearing to VMC or emergency marshal altitude, using DR, and follow procedures listed above.

Note

An aircraft with navigation and/or communication equipment inoperative that is in the company of, or joined by, an escort aircraft with navigation or communication equipment in working order shall be handled as a single flight in the recovery procedure. The escort aircraft becomes the flight leader and shall normally communicate with the distressed aircraft in accordance with standard aircraft NATOPS procedures. The distressed aircraft shall assume a position on the starboard wing of the lead aircraft. When the lead aircraft has the ship in sight, he shall visually communicate a lead change. The distressed aircraft shall complete a visual approach to landing. The escort aircraft shall enter the Charlie pattern for landing (helicopter) or continue upwind until vectored to downwind by AATCC. If conditions preclude continued flight in the Charlie pattern, escort aircraft shall climb on the BRC to 1 run or 2 minutes and comply with missed approach instructions per applicable tacan approach procedure or as directed by AATCC.
FROM AIRCRAFT TO SHIP

<table>
<thead>
<tr>
<th>PILOT’S DESIRES OR INTENTIONS</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I require immediate landing.</td>
<td>Fly by or hover close aboard starboard quarter, remaining clear of other traffic, with gear DOWN and floodlight/landing light ON. With complete electrical failure, fire a red flare on a safe bearing away from the ship (helicopter only).</td>
</tr>
<tr>
<td>2. I desire to land but can wait for the next recovery or scheduled recovery time.</td>
<td>Fly by or hover on the starboard side, low and close aboard with navigation lights BRIGHT and FLASHING and anticollision lights ON. With complete electrical failure, fire a red flare on a safe bearing away from the ship (helicopter only).</td>
</tr>
<tr>
<td>3. I am proceeding to the divert field.</td>
<td>Fly up the starboard side of the ship, rocking wings with landing gear UP, navigation lights BRIGHT and STEADY and anticollision lights ON. If fuel state and the nature of the emergency permit, continue making passes until joined by a wingman. Upon reaching divert fuel state proceed alone, setting IFF to emergency when departing.</td>
</tr>
</tbody>
</table>

**Note**

1. At night, aircraft flying close aboard the port side of the ship without lights are considered to have an emergency requiring immediate landing.

---

**5.5.2 V/STOL**

**5.5.2.1 Landing Aids Malfunction (Night)**

1. Complete landing aid failure/damage
   a. CQ — Discontinue landings.
   b. Deployed — The use of a divert field, if available, should be considered. If none are available and aircraft fuel state does not permit delay:
      (1) Establish radio contact with each aircraft that is commencing approach.
      (2) Primary control is by radio talkdown (PRC-90, if necessary).
      (3) Radio transmission shall be the primary means of waveoff.

**5.5.2.2 V/STOL Communication Emergencies (General).** Visual communications to be used in the event of radio failure or during EMCON shall be in accordance with this manual and the AV-8 V/STOL and LSO NATOPS NAVAIR 00-80T-111 (current revision).

**Note**

The LSO shall acknowledge control of the approaching aircraft by illuminating the cut lights for 3 seconds at the normal ball acquisition point. Subsequent illumination of the cut lights indicates to the aircraft that a power addition is required. Immediate power response is mandatory.

**5.5.2.3 Communications Emergencies (Day/ Night Visual Meteorological Conditions)**

1. Loss of LSO radios
   a. CQ — Discontinue landings. HDC shall initiate delta or bingo instructions, as appropriate. If HDC unable, standard light signals shall apply for bingo or full stop.
   b. Deployed — Expect standard light signals from the LSO.
## FROM SHIP TO AIRCRAFT

<table>
<thead>
<tr>
<th>COMMAND/ADVISORY</th>
<th>OLS</th>
<th>Aldis Lamp</th>
<th>Blinker</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Add power — (Jets and turboprops only).</td>
<td>Flash cut lights.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Cleared to enter CHARLIE pattern.</td>
<td>N/A</td>
<td>Flashing Green</td>
<td>N/A</td>
</tr>
<tr>
<td>4. CHARLIE — Cleared to land aboard.</td>
<td>N/A</td>
<td>Steady Green light.</td>
<td>C — — — — — — — — — — — —</td>
</tr>
<tr>
<td>5. DELTA — Delay in landing. Enter DELTA pattern and maintain visual contact with the ship.</td>
<td>Flashing landing area lights.</td>
<td>Steady Red light.</td>
<td>D — — — — — — — — — — — —</td>
</tr>
<tr>
<td>6. Closed deck. Do not land.</td>
<td>Landing area lights off (night only).</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>7. Do not land. Ditch or bail out/eject in the vicinity of the ship.</td>
<td>N/A</td>
<td>Z — — — — — — — — — — — —</td>
<td>Z — — — — — — — — — — — —</td>
</tr>
<tr>
<td>8. LSO has control of the aircraft on final approach at approximately 1½ miles.</td>
<td>Steady (3 seconds) cut lights.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10. Lower flaps.</td>
<td>N/A</td>
<td>F — — — — — — — — — — — —</td>
<td>F — — — — — — — — — — — —</td>
</tr>
</tbody>
</table>

* Signal is given only when ordered by the air officer.

Figure 5-18. Visual Signals During EMCON or Lost Communications (Sheet 2)
**FROM AIRCRAFT TO SHIP**

<table>
<thead>
<tr>
<th>PILOT’S DESIRES OR INTENTIONS</th>
<th>SIGNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I desire immediate landing.</td>
<td>Fly up the port side of the ship, low and close, rocking wings, in a landing configuration. Navigation lights BRIGHT and STEADY with anticollision lights ON. If turning final in the VFR pattern or approaching final on a CCA, momentarily turn ON the taxi light, if available.</td>
</tr>
<tr>
<td>2. I desire to land but can wait for the next recovery.</td>
<td>Fly up the port side of the ship with landing gear UP, navigation lights BRIGHT and STEADY, and anticollision light OFF while abeam the ship.</td>
</tr>
<tr>
<td>3. I am proceeding to the bingo field.</td>
<td>Fly up the port side of the ship, rocking wings with landing gear UP, navigation lights BRIGHT and STEADY and anticollision lights ON. If fuel state and the nature of the emergency permit, continue making passes until joined by a wingman. Upon reaching divert fuel state proceed alone, setting IFF to emergency when departing.</td>
</tr>
</tbody>
</table>

**Note**

1. At night, aircraft flying close aboard the port side of the ship without lights are considered to have an emergency requiring immediate landing.

---

**Figure 5-19. Emergency Signals to Ship From V/STOL Aircraft With Radio Failure**

2. Loss of all ship radios

   a. CQ — Discontinue landings. Expect standard light signals for bingo of full stop.

   b. Deployed — If able, delta overhead the ship while waiting for the assigned Charlie time for day; if night, proceed to emergency marshal. Commence the emergency marshal tacan at the EEAT.

3. Loss of aircraft radios

   **Note**

   During the day, all NORDO aircraft shall turn on the landing light during the landing checks. All pilots shall expect to land on the standard landing spot or as prebriefed. If a different landing spot is required, an LSE will be on the deck pointing at the landing spot.

   a. CQ — Discontinue landings. Expect standard light signals for bingo or full stop.

      (1) If lost communication is experienced prior to the break during Case I/II recovery or the beginning of an approach Case III, the pilot should execute a waveoff and return to home base. If this is not practicable, the pilot should comply with the standard light signals once established on final.

   b. Deployed

      (1) Attempt contact using the standby radio. If unsuccessful, attempt contact on guard.

      (2) If the radios are inoperative, attempt contact on guard using the portable radio contained in the flight vest.

      (3) If contact cannot be established, squawk 7600 and the appropriate HEFOE squawk if required.
(4) Attempt to obtain VMC and remain VMC if possible.

(a) VFR — Remain VMC; if able, delta overhead ship while waiting for the assigned Charlie time.

1) Single ship — Enter the break in order to meet the assigned Charlie time.

2) Section — Both aircraft shall enter the break with the lost communication aircraft on the lead’s left wing. The lost communication aircraft shall break first for recovery. Standard light signals shall be provided by the LSO.

(b) IFR/Night

1) Single ship — Enter the emergency marshal pattern as assigned. Commence the emergency marshal tacan approach at the EEAT.

2) Section — Lead will position the NORDO aircraft on the right wing. The section will execute an approach and by appropriate hand and arm/light signals the section shall have all landing checks completed (including 50° nozzles) by 5 DME. When the ship/ball is in sight, lead aircraft shall pass the cleared-to-land signal and detach to the left. The lost communication aircraft shall fly a normal approach looking for standard light signals from the LSO. The lead pilot shall keep the lost communication aircraft in sight at all times. If the lost communication aircraft waves off, VMC shall be maintained until the lead pilot can rejoin and assume the lead. The signal for clearance to land is as follows:

a) Day — Lead shall pat the dash and pass the lead

b) Night — Lead shall flash the exterior lights off and on.

5.5.3 Smokelight Approach. This approach is used as a last resort when available equipment will not allow normal procedures to be utilized or when the ship cannot be visually acquired utilizing normal procedures and ditching is considered imminent. The ships and embarked squadron commanding officer, the detachment officer in charge and the pilot in command must have agreed to attempt the procedure. The aircraft is positioned 2 miles astern of the ship and proceeds inbound (180° relative bearing to the BRC). The aircraft descends at pilot’s discretion to a safe altitude (100 feet) and airspeed (40). Ship’s personnel drop smoke/matrix lights every 15 seconds (or other prearranged interval) and the pilot is kept informed of the number of smokelights in the water. The pilot at the controls follows the smokelights up the ship’s wake, adjusting his closure rate until he acquires the ship visually.

5.5.4 Emergency Approach Procedures. If emergency conditions exist or fuel state is insufficient to allow compliance with emergency marshal procedures, squawk appropriate IFF codes, climb/descend to 1,200 feet (AV-8) or 500 feet (helicopter) and proceed to intercept the EFB at 5 DME and proceed inbound. AATCC upon noting the arrival of an aircraft not under positive control, shall clear all aircraft from the anticipated route of flight of the distressed aircraft.

5.5.5 Diverting Aircraft

5.5.5.1 General. If weather conditions are below Case II or at night, a divert field or ship should be provided. The squadron commander and the ship’s air operations officer shall be jointly responsible for ensuring that aircraft performance data pertinent to diversion is available and understood by ATC personnel.
1. The decision to divert aircraft shall be made by the ship’s commanding officer.

2. The air operations officer at night and during IMC, and the air officer during VMC operations shall make appropriate recommendations to the commanding officer as to which aircraft should be or should not be diverted for flight safety.

3. The LSO shall make timely recommendations to the air officer regarding diversions based upon unsatisfactory pilot performance, landing conditions, or aircraft performance capability.

4. The pilot shall inform PriFly or AATCC when he has reached bingo state without diversion instructions.

5. The air operations officer shall, if practicable, determine the condition of NAVAIDS, communications, and lighting at the divert field prior to first night or IMC recovery.

5.5.5.2 Divert Planning Considerations

1. Aircraft fuel state

2. Range and bearing to divert field

3. Weather at the divert field, both current and forecast

4. Status and availability of the divert field for type aircraft

5. Navigation assistance available

6. Ordnance restrictions

7. Aircraft mechanical condition

8. Condition of flight deck

9. Tanker availability.

5.5.5.3 AATCC Responsibilities. AATCC shall be alerted when aircraft is approaching diversion state and shall be prepared to take control of the aircraft when the divert order is issued. The following actions shall be completed:

1. Advise pilot of name of, magnetic heading to, and distance to the divert field. Obtain a read back of divert instructions.

2. Advise pilot to check gear up.

3. Instruct pilot to shift to control frequency en route.

4. Provide pilot with the latest available en route weather and altimeter setting at divert field and position from which divert was made.

5. If operating outside an ADIZ boundary, provide the pilot with necessary ADIZ information and advise the appropriate GCI site of the diverting aircraft’s departure point, ADIZ penetration point, time of penetration, altitude, estimated time en route, destination, and any other pertinent information.

6. Maintain radar flight following and radio monitoring on the diverting aircraft for as long as possible and/or retain positive control responsibility for the aircraft until a positive transfer of control can be made to GCI, ARTCC, FACSFF, or other agency ashore.

7. File a divert flight plan with the appropriate controlling agency and ensure similar information is provided to the appropriate air defense agency should an ADIZ penetration be necessary.

8. Receive an arrival report for diverting aircraft.

5.5.5.4 Pilot Responsibility. Notify the ship by immediate precedence message upon landing.

5.6 SPECIAL SAFETY PRECAUTIONS

5.6.1 Recovering With Ordnance

Note

Appendix C is a list of weapons authorized for recovery.

5.6.1.1 In-Flight Procedures. Pilots shall accomplish the following prior to entering the ship’s control zone.

1. Determine if all ordnance has been expended upon completion of the firing mission. A visual
check between aircraft shall be made of all rocket launchers.

2. In the event of hung ordnance, every effort shall be made to fire/jettison as appropriate. Consideration should be given to diverting to a land base.

3. The ship shall be notified as soon as it becomes apparent that ordnance must be brought back. In no case shall hung or unexpended ordnance be brought into the ship’s control zone without clearance from AATCC or PriFly. Initial notification shall include the amount and type of hung/unexpended ordnance and, for hung ordnance, the time of last release attempt.

4. Properly safe all weapons systems.

5.6.1.1 V/STOL Ordnance Recovery

1. Clean or Unexpended Free Fall — Standard recovery as dictated by weather.

2. Hung Free Fall — Conduct a straight-in approach as dictated by weather. Avoid overflight of all surface vessels.

3. Hung, Unexpended, or Captive Forward Firing — Conduct a straight-in approach as dictated by weather. Winds permitting, the nose of the aircraft should be pointed away from the island during landing. If the LSO determines that the wind or other environmental conditions do not permit a landing with the nose pointed away from the island or other aircraft, then a standard recovery shall be made with the nose pointed down the tram line. In this case immediately after landing, the aircraft shall be pointed in a safe direction and dearmed. The time interval between landing aircraft should be increased to allow aircraft to be dearmed prior to the next aircraft landing. All nonessential personnel shall remain clear of the flight deck area during these evolutions.

5.6.1.2 Helicopter Ordnance Recovery

1. Clean or Unexpended Free Fall — Standard recovery as dictated by weather.

2. Hung Free Fall — Standard recovery as dictated by weather. Avoid overflight of all surface vessels.

3. Hung, Unexpended, or Captive Forward Firing — Standard Alpha pattern (Figure 5-20) recovery as dictated by weather. Winds permitting, the nose of the helicopter should be pointed away from the island during landing. The helicopter shall be landed with the nose pointed away from the island or other aircraft. All nonessential personnel shall remain clear of the flight deck area during these evolutions.

5.6.1.2 Shipboard Procedures

1. The bridge and other appropriate stations shall be notified.

2. Appropriate HERO condition shall be set.

3. Dearming crews shall standby on station.

4. Prior to jettisoning ordnance from the ship, approval must be granted by the ship’s commanding officer.

5.6.1.3 Air Officer Procedures

1. Clear landing spot for recovery.

2. Prior to recovery announce on the 5 MC: “Standby to recover (type aircraft) with hung ordnance on spot (spot number). Hung ordnance is (amount and type). All personnel remain well clear of the flight deck area.”

3. Ensure that ordnance safety supervisor and the squadron dearming team are on station prior to recovery.

4. As required, ensure all aircraft on the flight deck and in the landing pattern have secured HF and/or FM transmitters, IFF, tacan, and radar altimeters.
Figure 5-20. Alpha Pattern for Recovery of Armed Helicopters
All flight deck personnel, including LSEs, shall remain clear of the line of fire and/or danger area of an aircraft landing with hung ordnance. Only the minimum required personnel shall remain in the vicinity of the landing area. The pilot shall not leave the cockpit until all ordnance and weapons systems have been properly safed.

5.6.2 Helicopter Recovery Tiedown Procedures. Chocks and tiedowns shall be applied after landing upon signal from the LSE and with the concurrence of the aircraft commander, and shall remain attached until the aircraft is ready for launch. During short duration on-deck times, such as when rapidly loading troops or supplies, the aircraft may be chocked only. Tiedowns shall be installed in compliance with individual aircraft NATOPS flight manuals. Unless otherwise specified in aircraft NATOPS flight manuals, tiedowns shall be attached to mooring rings in the vicinity of the main landing gear first.

5.6.3 Personnel Debarkation. Pilots of ramp equipped helicopters shall not lower their ramps to discharge passengers until signaled by the LSE.

For troop offload the LSE will not signal for the ramp until CCO troop handlers are present and recoveries/launches on adjacent spots are complete. Troops are escorted by the CCO handlers to the troop shelters from the flight deck as directed by the CCO. Passengers shall be escorted to safe an area by flight deck, flight crew, or CCO personnel.

5.6.4 Rotor Disengagement. Prior to disengagement or rotor shutdown, the LSE shall ensure that the signal to disengage is received from the flight deck supervisor who in turn receives the signal from the air officer. The LSE shall ensure that wheels are chocked, rotors are clear of personnel, and that tiedowns are properly installed.

Note
Landing gear, external auxiliary fuel tank, and ordnance safety pins shall be inserted prior to rotor disengagement and/or engine shutdown.

Helicopters should not disengage rotors while the ship is in a turn except when authorized by the ship’s commanding officer or his designated representative. Anticipated wind parameters and ship’s heel shall be communicated to the aircraft commander prior to execution of the turn.

The pilot shall not disengage rotors until receipt of the signal from the LSE.

The air officer shall ensure that proper wind conditions exist for disengagement in accordance with applicable NATOPS manuals. If high wind conditions exist, rotor disengagements shall commence with the most forward aircraft and work aft.

Reported wind as displayed in PriFly may vary greatly with existing wind over deck. Extreme care shall be exercised when engaging/disengaging rotors if other aircraft are launching or recovering. Rotor engagement shall not be attempted unless the tiedown configuration is as stated in the aircraft NATOPS flight manual. Failure to comply with this requirement may induce ground resonance.
5.6.5 Additional Safety Procedures

**WARNING**

- The AV-8 safe parking line does not provide adequate rotor clearance for H-53 aircraft.

- After calling the ball on final from CCA or tacan, if no acknowledgement is received from the air officer (helicopters) or LSO (V/STOL), the pilot shall execute his own waveoff.

**CAUTION**

H-60 operations conducted with a longitudinal CG aft of station 360 may result in nose up attitudes exceeding $10^\circ$ during approach and/or hover restricting the pilot’s field of view and visual cues to the flight deck. Lost sight of the flight deck and/or LSE may require the pilot to execute a waveoff.

1. While aircraft are being recovered, no personnel other than those required by this instruction shall be in the catwalks, on the flight deck, on the elevators, in gun tubs or on gun platforms, without the express permission of the air officer.

2. Personnel shall not stand in or otherwise block entrances to the island structure or exits off the catwalks.

3. Personnel shall remain clear of all cargo elevator hatches and weapons mounts outlined by danger lines.

4. Personnel shall remain clear of all cargo elevator hatches and weapons mounts outlined by danger lines.

5. Personnel shall not turn their backs to landing aircraft.

6. No director shall give signals to a pilot who is being controlled by another director except in an attempt to avert an accident.

7. To minimize the possibility of an aircraft landing on a foul deck, landing spot/deck edge lights shall never be turned on without the express permission of the air officer.

8. During instrument recoveries, PriFly shall keep AATCC informed as to the status of the deck and provide estimated time the deck will be clear. AATCC shall keep PriFly advised as to the position of the newest aircraft.

9. CIC and AATC shall keep PriFly informed of any aircraft known or suspected of having radio failure.

10. During night operations, green and red wands shall be used only by the flight deck supervisor or launch officer.

11. The taking of flash pictures during flight operations is prohibited.

12. Night approaches to spot 1 (LHA, LHD) are not authorized.

13. Left seat landings on spot 2 (LHA) are not recommended.

14. Right seat landings on spot 1 are not recommended.

15. Right seat landings on spot 3 (LHA) are not recommended.

5.7 EMCON/ZIP-LIP PROCEDURES

**5.7.1 EMCON Procedures.** When the use of radio communications is limited, operations may be conducted by use of other means of communication. Visual communications become extremely important, including the proper use of ship’s aircraft lighting, flag command, and display signals. Aldis lamp, blinker, and hand and arm signals become necessary to safely conduct flight operations. The signals above are explained in Figures 4-3 and 5-19, and in Appendices A and B. Both aircraft and controlling ship shall monitor the land/launch frequency. Radio transmissions shall not be made unless required for safety of flight.

All flight operations conducted under EMCON conditions shall be thoroughly briefed and coordinated between the squadron and the ship’s controlling
agencies. During EMCON conditions, all concerned have increased responsibilities to conform to safe operating procedures.

5.7.2 EMCON Procedures

5.7.2.1 Helicopter EMCON Recovery Procedures. The ceiling shall be 500 feet above the highest normally prescribed Delta pattern, with a minimum of 3 nm (5 nm for V/STOL) visibility and a well defined horizon. Returning pilots shall plan to be in the Delta pattern prior to the schedules recovery time. They shall shift to an monitor PriFly frequency when the ship is in sight. Each aircraft shall have anticollision lights on, and position lights on bright when within 10 nm of the ship.

Once established in the Delta pattern, the position lights shall be set to flashing. The pilot shall receive a flashing green Aldis lamp signal at the abeam position in the Delta pattern. The pilot shall acknowledge by turning navigation lights to steady-bright leaving the anticollision lights on and descending to the Charlie pattern. At the abeam position, the aircraft shall receive a steady green Aldis lamp signal, conform to normal light procedures, and continue with the approach.

5.7.3 ZIP-LIP Procedures. During ZIP-LIP operations, recovery procedures shall be the same as during EMCON, utilizing appropriate hand, flag, and light signals unless radio communications are required for safety of flight.
CHAPTER 6

Aircraft and Weapons Handling Procedures

6.1 GENERAL REQUIREMENTS

All aircraft movement shall be controlled by designated aircraft directors. Aircraft shall be moved only with the express authority of the aircraft handling officer, flight deck officer, or hangar deck officer. Aircraft handling personnel shall report to higher authority any observed unsafe practices or any condition that may affect the safety of personnel or equipment.

When the ship is at flight quarters, the OOD shall ensure that all anticipated turns are passed to PriFly so they may be announced over the flight and hangar deck announcing systems as appropriate.

The aircraft handling officer shall begin a resop early enough to avoid unnecessary haste; however, when aircraft are airborne, the desirability of maintaining a ready deck for as long as possible should be a consideration. The tempo of aircraft movements shall be governed by the deck stability, prevailing winds, weather conditions, and nonskid conditions. Primary consideration shall be given to safety of personnel.

**WARNING**

During aircraft arming and dearming of ordnance, the area ahead/behind and/or surrounding the aircraft must be clear and remain clear until arming/dearming is complete.

Communications incident to aircraft handling shall be in accordance with the existing EMCON condition.

6.2 BRIEFING

Prior to any major resop, the aircraft handling officer shall brief the flight deck officer, hangar deck officer, and other key aircraft handling personnel. This briefing shall include expected wind and deck conditions, and any other information pertinent to safety.

6.3 MAINTENANCE LIAISON OFFICER

The maintenance liaison officer shall ensure that the aircraft handling officer is kept continuously apprised of aircraft status and maintenance requirements and shall maintain liaison between the air department and the squadron’s line and maintenance personnel. For this purpose, aircraft status and maintenance request boards shall be maintained in flight deck control. A squadron maintenance liaison officer or his representative should be on duty at all times during flight quarters or general quarters. His normal station is flight deck control; however, he shall be free to move about the flight deck and hangar deck as necessary to perform his duties. Changes in aircraft status shall be submitted to the squadron maintenance liaison officer and entered on the aircraft status board. Entries and changes to the maintenance request board shall be handled in the same manner. To assist the maintenance liaison officer in the performance of his duties, the squadron/detachment maintenance department shall provide an aircraft status report, including up aircraft, down aircraft, estimated time in maintenance, special maintenance requirements, and information of interest to the aircraft handling officer. It shall be updated:

1. Prior to scheduled flight quarters
2. As early as possible during general quarters and unscheduled flight quarters
3. As changes occur
4. To reflect status of recovered aircraft.

The maintenance liaison officer is responsible for the overall performance of crewchiefs, plane captains, and troubleshooters. He shall ensure that no aircraft is placed on jacks or is otherwise immobilized without permission from the aircraft handling officer. He shall also obtain permission for APP, engine, and rotor
maintenance turnups. Maintenance functions involving electronic emission shall be limited by existing EMCON conditions.

6.4 EQUIPMENT

The flight deck officer shall ensure that all tractors, spotting dollies, towbars, chocks, and other equipment used in the handling of aircraft on the flight deck are in satisfactory condition and are properly utilized. The hangar deck officer has a similar responsibility with regard to the equipment used on the hangar deck. All aviation support equipment operators shall be licensed in accordance with current directives. Tractor drivers shall under no circumstances operate a tractor with defective brakes or steering. Discrepancies shall be reported immediately to a competent authority. Defective towbars, chocks, wheels, and tiedowns shall be taken out of service and turned in for repair. Towbars, chocks, and tiedowns not in use shall be stowed in designated spaces.

Note

Ready hot suit men and ready fire unit operators shall not be utilized as tow tractor operators during aircraft start, launch, recovery, and resspot operations.

Specific requirements for crash and salvage crews and equipment operator requirements can be found in the “U.S. Navy Aircraft Firefighting and Rescue Manual” (NAVAIR 00-80R-14), and “U.S. Navy Aircraft Crash and Salvage Operations Manual” (NAVAIR 00-80R-19).

6.5 MOVEMENT OF AIRCRAFT

The minimum deck crew for movement of aircraft on the flight deck or hangar deck consists of two safety observers, a qualified plane director, two chock handlers or tiedown men, and, in the case of H-1 helicopters, one handler on the tailskid. The cockpit of the aircraft shall be manned by a pilot, plane captain, or qualified brake rider (does not apply to skid aircraft). Duties and safety rules for movement of aircraft on flight decks and hangar decks are provided in the following paragraphs.

WARNING

- When heavy weather conditions are forecast, as many aircraft as possible shall be moved to the hangar deck and all aircraft secured.

- Flotation gear with auto-inflator assemblies installed are not authorized in aircraft during moves or any other time when the aircraft is not secured to the deck.

6.5.1 Plane Director Duties. In preparing to move an aircraft (taxi, tow, by hand) the director shall ensure that:

1. The cockpit is manned by a qualified brake rider.

2. All unnecessary personnel are removed from the aircraft.

3. Only qualified personnel shall pump up the ground handling wheels for skid aircraft.

4. The towbar is securely attached to the aircraft and to the tractor, or, if the aircraft is to be moved by hand, that the towbar is properly tended by another director or specifically designated towbar man.

WARNING

- Towing of AV-8 aircraft with engine running is prohibited.

- Towing of helicopters with rotors engaged is prohibited.

- On AV-8 aircraft, the nosewheel steering accumulator shall be depressurized before attaching the towbar. The nosewheel is then free to caster ±179.

- When the flight deck is slick with moisture, hand pushing should not be attempted if the ship’s pitch exceeds 5° or roll exceeds 10°.
Movement of aircraft by hand pushing is inherently less safe than towing by a vehicle. Pushing should only be used as a last resort or because of operational necessity. As rolling and pitching of the ship increases, so does the danger of hand pushing.

When using A/C spotting dolly (AS32A-32), on CH-53E aircraft with the FLIR installed, the FLIR support boom must be placed in the stow position to prevent damage to the FLIR ball.

**Note**

AV-8 aircraft can be chocked without danger to personnel with the engine at idle and nozzles aft.

5. All chocks, tiedowns, power cables, and other servicing/securing devices are removed prior to moving the aircraft.

**WARNING**

All ordnance safety pins shall be installed in racks, launchers, and dispensers prior to movement.

**CAUTION**

- Tiedowns and chocks shall not be removed prior to attachment of the towbar to the tractor.

- When moving aircraft by hand, chocks and tiedowns shall not be removed until all positions are manned, brakes are checked firm, and deck pitch has been determined safe.

**Note**

Consideration should be given to starting the APP before moving H-53 helicopters. Pressurizing the utility hydraulic system with the APP will provide more positive braking action. Without the APP, both the tow tractor brakes and available H-53 braking may be insufficient to prevent the helicopter from rolling because of ship’s motion.

6. If weapons loading/downloading is in progress, receive assurance from the ordnance safety supervisor that the aircraft is safe to move insofar as weapons are concerned.

7. Adequate clearance exists to permit safe movement of aircraft.

8. Safety men are posted as required to ensure clearance if in close proximity to other aircraft, bulkheads, or obstructions.

9. The qualified brake rider signifies he has checked the aircraft brakes, that adequate braking pressure is available, and they appear to be in working order.

**WARNING**

On AV-8 aircraft, the brake accumulator shall be pressurized to a minimum of 2,000 psi using the hand pump before pushing or towing the aircraft.

10. All personnel except those necessary for the move are well clear of the aircraft.

**WARNING**

Working or passing beneath a moving aircraft is extremely hazardous and is prohibited.

**6.5.2 Brake Rider Duties.** For wheel brake equipped aircraft, the qualified brake rider shall:

1. Ensure that ejection seat safety pins are installed, and safety pins are in place in the landing
gear/auxiliary tanks as appropriate. For AV-8 aircraft, ensure that safety downlocks are in place on the outrigger landing gear.

2. Ensure the seat and rudder pedals are adjusted as required to ensure the ability to fully apply the brakes and see the director at the same time.

3. Ensure the windshield and side panels are clear of grease, cleaning compound, or any other film that might limit visibility.

4. Conditions permitting, open cockpit canopy, windows, or overhead hatches.

   **CAUTION**

   Deck winds over 40 knots require that cockpit canopies be closed, thus preventing audible signals from passing between the brake rider and the director.

5. Test the brake.

   **CAUTION**

   - Aircraft brakes should be tested twice, before chock removal and just after the aircraft begins to roll.
   - Aircraft parking brakes shall only be released on signal from the director.

6. Advise the director of any unusual condition or aircraft discrepancy that might make movement hazardous.

7. Utilize available safety equipment such as safety belts, shoulder harness, life preservers, and so forth.

**6.5.3 Safety Precautions During Movement of Aircraft.** Before having chocks and tiedowns removed, the director shall call for “Brakes” and receive visual or verbal confirmation from the man in the cockpit that the brakes are being held. The aircraft’s tailwheel/nosewheel shall be unlocked only on signal from the director. While aircraft are being moved:

1. Movement shall be slow enough to permit a safe stop to be made within the clear space available, and in no case faster than the chock handlers can walk.

2. The director shall ensure that he or another director is at all times plainly visible to the brake rider in the cockpit.

3. Safety observers shall be stationed as necessary to ensure safety clearance anytime an aircraft will pass in close proximity to another aircraft, bulkhead, or other obstruction. Only directors or personnel specifically designated by the flight deck officer or hangar deck officer shall act as safety observers. The safety observer and the director in control of the aircraft shall either have each other in sight at all times or have a second safety observer stationed in a position to relay signals.

   **CAUTION**

   The movement of aircraft shall not be attempted if sea state or the maneuvering of the ship produces excessive motion. Should a maneuver that would result in excessive deck motion be necessary while an aircraft is being moved, an announcement of the impending turn shall be made over the 1 MC, 3 MC, or 5 MC system in time to permit the application of chocks and tiedowns before the turn will commence.

   **Note**

   Nothing herein shall be construed to require any individual to place his personal safety in jeopardy. This is particularly applicable at night or during periods of heavy weather.

4. During periods of high winds or when the deck is unsteady, chock handlers shall closely tend each main wheel. The brake rider shall apply partial brakes as necessary to prevent excess speed from building up. When these conditions prevail, aircraft shall not be moved by hand except in case of extreme urgency.
5. Aircraft shall be moved by aircraft handling equipment unless deck space available does not allow safe maneuvering of the equipment and towed aircraft. When moving aircraft by hand, the aircraft should be moved against the movement of the deck. This requires that the aircraft always be pushed rather than allowing it to roll with the movement of the ship.

**WARNING**

Pushers shall not position themselves in front of aircraft wheels.

6. Tractor drivers shall not move an aircraft except under the control of a director. If a director’s signal is not completely understood, the driver should stop and await further instructions.

7. Sudden stops by tractors towing aircraft shall be avoided except in an emergency.

8. Directors, safety observers, and chock/tiedown handlers shall be equipped with whistles that they shall hold in their mouths while controlling aircraft movement.

9. When an aircraft with inoperative brakes must be respotted, the cockpit shall not be manned and chock handlers shall remain in position to chock the main wheels instantly if ordered. In addition, deck crewman shall be immediately available with tiedowns ready.

10. 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, since the tractor driver must watch the director and is often unable to check the clearance for himself.

11. Prior to backing aircraft to deck-edge spots, chock handlers shall be positioned so as to enable them to chock the main wheels instantly.

12. When an aircraft towbar has to be repositioned to permit a better path of movement prior to aircraft reaching interim or final spot, the aircraft should be chocked and initial tiedowns installed prior to disconnecting the towbar.

13. When moving skid-configured aircraft, a qualified plane captain or maintenance personnel shall closely monitor ground-handling wheel actuator handle.

14. When the signal for brakes is given, the brake rider shall immediately apply full brakes. Care must 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.

15. 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 four-point tiedown. The tractor shall then be unhitched and brake rider notified by the director that he may leave the cockpit. Where practicable, the towbar should remain attached to the aircraft. The crew chief/plane captain shall there upon inspect attached tiedowns for required number and proper installation.

16. In parking aircraft on the hangar deck, allow clearance for access to and operation of fog foam monitors and fire plugs, as well as for the operation of hangar bay doors. Do not park aircraft, yellow gear, or any item in a way that would prevent complete opening of engineering escape scuttles on hangar deck.

17. Personnel shall not ride on tractors except in the driver’s seat.

18. Chock handlers are not safety observers and safety observers are not chock handlers.

**WARNING**

When the word is passed to standby for a turn, exercise extreme caution while moving aircraft.

### 6.5.4 Elevator Operation

Elevator operation shall be coordinated with the maneuvering of the ship. Aircraft elevators shall be operated by qualified personnel only. A director shall supervise the elevator anytime...
it is being raised or lowered. He shall ensure that he is plainly visible to the elevator operator at all times. Elevators shall not be operated without two-way communications, either verbal or visual, between operators.

Directors should position the aircraft on the elevator so that it can be towed directly off without repositioning.

Tiedowns and chocks shall be set prior to elevator movement. Before signaling for the elevator to be raised or lowered, the director shall check the safety stanchions for proper clearance, then signal for the stanchions to be raised. The elevator operator shall then sound the warning horn; check to ensure that all personnel, aircraft, and equipment are clear; and raise the safety stanchions. As soon as the stanchions are up, the director shall signal for the elevator to be raised or lowered. Only under conditions of operational necessity shall an elevator be lowered when the safety stanchions are inoperative; under these circumstances, directors shall be stationed near the elevator to warn approaching personnel. If the safety stanchions on the hangar deck should fail, a temporary lifeline shall be rigged as quickly as possible. After the safety stanchions have been raised or the warning given, no person shall attempt to board or leave the elevator.

Elevators shall remain at hangar deck level for as short a time as possible. An elevator carrying an aircraft to the hangar deck shall not be lowered until it has been ascertained that a crew is standing by to remove the aircraft from the elevator as soon as it arrives at hangar deck level.

Extreme caution shall be exercised when operating deck edge aircraft elevators during periods of high winds and/or heavy seas.

**6.5.5 Report of Damage to Aircraft.** Any damage to an aircraft, no matter how slight, shall be immediately reported to the aircraft handling officer, flight deck officer, or hangar deck officer who shall immediately report the incident to the air officer and inform the squadron maintenance liaison representative. The aircraft shall not be flown until it has been inspected and declared to be in an “up” status by authorized squadron personnel.

The flight deck officer and hangar deck officer shall maintain a record showing director’s name, model aircraft, bureau number, and a brief summary of circumstances for occurrences in which aircraft are damaged, regardless of the extent of damage. Reports of these occurrences shall be made in accordance with OPNAVINST 3750.6 series.

**6.5.6 Aircraft Security.** Aircraft shall be tied down as directed by the aircraft handling officer or his representative. Unless otherwise specified, chain tiedowns shall be used exclusively. Tiedowns shall run from a proper tiedown fitting on the aircraft to a padeye on the deck without pressing against oleo struts, hydraulic lines, tires, or any other portion of the aircraft. When an aircraft is spotted adjacent to an elevator, tiedowns shall not be attached to the elevator or across the safety stanchions.

Tiedowns shall be removed only when signaled by an aircraft director. They shall be affixed to aircraft to preclude movement in any direction. This requires that they tend to oppose each other. They should be as equally distributed on the aircraft as possible.

**CAUTION**

Due to the large cross-section of the CH-53E, damage to the main rotor and tail rotor blades may occur from blade-to-blade or blade-to-fuselage contact when parked in the forward slash position with winds over the deck in excess of 45 knots.

Tiedown requirements are divided into three categories that under normal conditions may be defined by the following minimums.

**6.5.6.1 Initial (Four-Point) Tiedown.** This configuration is required for all aircraft prior to launch, upon recovery immediately after an aircraft is parked, or immediately preceding movement of an aircraft.

**6.5.6.2 Permanent (Eight-Point) Tiedown.** This is required when not at flight quarters or when the aircraft is not expected to be moved for respot. Permanent tiedowns are applied by the crewchief/plane captain.
6.5.6.3 Heavy Weather (Twelve-Point) Tiedowns. Required when an increase in aircraft security is required during high winds/sea state, ship’s maneuvers, or for prolonged periods of heavy maintenance.

Note
The aircraft handling officer may adjust the number of tiedowns required in each of the above categories when such action is indicated because of aircraft model. He shall order an increase in the number of tiedowns required when such action is indicated because of expected wind, sea state, or ship’s maneuvers.

6.5.6.4 AV-8 Tiedown. Presently configured AV-8 aircraft have four tiedown points, two on each outrigger (one inboard and one outboard). To secure the nosegear, the nosewheel must be positioned on the aircraft centerline. The standard TD-1A tiedown is inverted, the chains crossed to form an “X,” and the deck end of the tiedown attached to the aircraft (and vice versa). Tiedowns attached to AV-8 outriggers can be removed after engine start and attached before engine shutdown without danger to personnel.

Note
Permanent tiedown requires 10 tiedown chains for the AV-8.

6.6 FUELING AND DEFUELING AIRCRAFT

The air officer is responsible to the ship’s commanding officer for supervising and directing the receipt, stowage, and dispensing of aviation fuel as well as the maintenance and security of the aviation fuel system and the enforcement of safety precautions. An effective aviation fuel quality control program is a vital part of the aviation fuel system management.

The aviation fuel officer is responsible to the air officer for efficient and safe operation of the aviation fuel system and for the management of the aviation fuel quality control program. He is further responsible for ensuring strict compliance with all applicable technical directives concerning the inspection, maintenance, and operation of the aviation fuel system. For maintaining quality and limiting contamination of aircraft fuel,  NAVAIR 00-80T-109 applies.

6.6.1 Fueling and Defueling Procedures. Aircraft shall normally be fueled as soon as possible after recovery. Each crewchief/plane captain shall notify the aviation fuel petty officer or aviation fuel control talker in flight deck control if it becomes apparent that the fueling crew has missed his aircraft. The crewchief/plane captain shall also request that his aircraft be topped off as necessary after a maintenance turnup.

Aircraft shall be fueled in accordance with the direction from the Squadron maintenance liaison officer. In the event the squadron desires a fuel load other than that specified in the air plan, a request shall be made to air operations that the air plan be changed to show the fuel load desired. Requests for the defueling of aircraft for maintenance purposes shall be made to the aircraft handler via the maintenance liaison officer.

Fueling shall be conducted in a manner that will cause a minimum interference with aircraft resport. Prior to the recovery, fueling crews shall be standing in or near their stations to break out hoses and start fueling aircraft. Aircraft and fuel hoses shall be properly grounded before fueling and all ground wires removed after fueling is completed. The aviation fuel officer shall ensure that the appropriate smoking lamp condition is set before fueling or defueling.

The crewchief/plane captain shall ensure correct fuel load and security of the filler caps. The fuel control talker maintains the fuel status board in flight deck control. This board shall list each aircraft on board and show its exact fuel load.

6.6.2 Special Safety Precautions During Fueling/Defueling

1. Aviation fuel shall not be handled in open containers.

2. Waste or rags soaked in aviation fuel shall be properly disposed of as soon as possible and shall not be left about the deck.

3. No lights, except safety lights, shall be introduced into any compartment or space where aviation fuel or flammable fumes are present.

4. Transfer of aviation fuel shall not be made without notifying the engineering officer.

5. Aviation fuel shall not be discharged overboard without the permission of the ship’s commanding officer.
6. If aviation fuel is spilled on the deck, it shall immediately be swabbed and the incident reported to the aircraft handling officer.

7. Lighted cigarettes or exposed flames of any kind shall not be permitted in the vicinity of tanks, pipes, or containers carrying aviation fuel.

8. Fuel shall not be issued for any purpose other than fueling.

9. Personnel shall avoid breathing aviation fuel vapors over long periods.

10. If skin or clothing has come in contact with aviation fuel, personnel shall wash with soap and water as soon as possible.

11. Personnel handling fuel shall wear protective goggles to prevent eye injury.

12. All the measures prescribed for quality control of the fuel being transferred shall be complied with prior to fuel delivery.

13. The smoking lamp shall be out on the flight deck, hangar deck, and all weather decks because of the continuous presence of aviation fuel.

14. Fire protection shall be provided in accordance with NATOPS Aircraft Firefighting and Rescue Manual.

15. All personnel are to exercise extreme caution and be on the alert for dangerous situations that may occur.

16. Refueling shall be secured when any fuel spillage is noted and not continued until the spillage has stopped and the residue is cleaned up.

17. Only those members of the flightcrew and ship’s refueling crew considered necessary for the conduct of the fueling operation should be in the vicinity of the aircraft.

18. A ground wire shall be attached to the deck and then to the aircraft before the fueling nozzle is attached to the aircraft.

6.6.3 Hot Refueling Procedures. Aircraft equipped for pressure refueling may be hot refueled during training, operational, and combat situations. During hot refueling the LSE/director shall:

1. Position himself where he can see the pilots, fueling station operator, and nozzlemen.

2. Ensure that all refueling personnel, equipment, chocks, and tiedowns are clear before giving the taxi/launch signal to the pilot.

3. The AV-8B aircraft may be hot refueled with the canopy open at the pilot’s discretion.

4. Hot refueling on aircraft that require gravity refueling is not authorized.

6.6.4 Hot Refueling Safety Precautions (Helicopter). The procedures for hot refueling shall be in accordance with the NAVSHIPS technical manual and applicable aircraft NATOPS flight manuals. The aircraft shall be chocked and the initial tiedown applied. Tiedown crew shall remain clear of helicopter rotor arc in the vicinity of the aircraft during hot refueling operations. They shall remain immediately available for rapid breakdown should an emergency launch be required.

All personnel movements from one side of the aircraft to the other shall be via the nose. Under no circumstances should personnel work in close proximity to a tail rotor.

Any passengers on board the aircraft shall be debarked prior to commencement of hot refueling.

6.6.5 Pressure Refueling With Aircraft Shutdown. Pressure refueling with aircraft shutdown is the normal procedure. The aircraft shall be completely shut down and only the plane captain, refueling party, and fire party need to remain on station. Additional information on pressure refueling can be found in the applicable aircraft NATOPS flight manual.

**WARNING**

Oxygen servicing, other than converter replacement at the aircraft, and fueling shall be conducted as separate evolutions.
6.7 MEDICAL CASUALTY ON THE FLIGHT DECK (HELICOPTER)

Medical casualties brought aboard by aircraft shall be removed from the aircraft and handled in accordance with the ship’s casualty handing bill. The ship’s medical department shall be notified as far in advance as possible to allow medical personnel to meet incoming aircraft.

6.8 WEAPONS HANDLING PROCEDURES

Airborne weapons handling evolutions introduce a degree of risk 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 requirements to perform each weapons’ evolution against the additional risk that is being interjected, and accept only those evolutions in which the need clearly outweighs the risk.

Breakout and movement of ordnance for assembly requires preplanning and close coordination between weapons personnel and the air department so that ordnance will be assembled and delivered to the flight deck in sufficient time and quantity to meet the air plan. Backloading requires the same coordination, but timing becomes less critical.

The aviation ordnance officer is responsible for breakout of the aviation ordnance specified in the air plan. In conjunction with the squadron ordnance officer, he shall determine the times, quantities, and types of aviation ordnance that will be delivered to the assembly area so assembly and further movement may proceed in a safe and timely manner. The aviation ordnance officer is responsible for the movement of ordnance from the magazines to the assembly area, and from the assembly area to the flight deck. The air officer is responsible for the safe movement on the flight deck, utilizing crews supplied by the embarked squadron.

Ship’s aviation ordnance personnel shall be responsible for movement of ordnance from magazines to assembly areas. Embarked personnel may assist as necessary. Ship’s aviation ordnance personnel shall be required to assemble and move all weapons from the assembly area to staging areas. Embarked personnel shall move all weapons from staging areas to aircraft. Movement shall be via a direct and safe route.

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.

During underway ship refueling, the staging of ordnance in areas surrounding the refueling at-sea station is prohibited.

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.

When required, electrical power may be applied during the aircraft loading/downloading evolution, but should be held to a minimum consistent with operational requirements. Electrical power to the armament or weapon release and control circuitry shall not be applied while weapons are being loaded/downloaded.

An EOD representative shall be immediately available at the flight deck level during all launch and recovery operations when aircraft are carrying weapons/ordnance.

The EOD representative, the designated air gunner, and the designated squadron ordnance representative shall be equipped with an SRC-22 (or equivalent) communications set during launch and recovery operations.

6.8.1 Hazards of Electromagnetic Radiation to Ordnance/Radiation Hazards Safety Precautions. Modern radio and radar transmitting equipment produce high intensity RF fields. Such fields can cause premature actuation of sensitive EEDs contained in ordnance systems and biological injury to personnel working in the vicinity of these radiating elements. Sparks or arcs caused by high-intensity fields are a potential source of ignition for fuel-air mixtures. The most susceptible periods are during assembly, disassembly, loading, unloading, or testing in electromagnetic fields. The effect of premature operation of
these devices will vary with the function of the device initiated. The most likely effects are dudding, loss of reliability, or, in the case of rockets and flares, ignition of the propellant or illuminant. In several electromagnetic radiation environments, there is a low but finite probability of warhead detonation. It is necessary, therefore, to control the ship’s electromagnetic environment positively during the presence of HERO susceptible ordnance.

Prior to embarkation, pilots, aircrews, and squadron ordnance personnel shall familiarize themselves with the latest HERO conditions in NAVSEA OP 3565/NAVAIR 16-1-529 and with the ship’s HERO/EMCON bill. The “Radio Frequency Hazards to Ordnance, Personnel and Fuel Technical Manual,” prescribes detailed operating procedures and precautions for inclusion in the ship’s EMCON bill.

Prior to commencing operations involving HERO susceptible ordnance, the ship shall ensure the proper HERO condition is set. A visual display (blue HERO BEACON or Lima flag (yellow/black checked)) indicating the HERO condition in effect shall be prominently displayed so that assembly, flight deck, and hangar deck ordnance personnel can readily ascertain the HERO condition status at all times. The OOD shall make appropriate announcements over the ship’s general announcing system for the setting and cancellation of HERO EMCON conditions.

A HERO survey required by NAVSEA OP 3565/NAVAIR 16-1-529 shall be requested by the ship. Upon completion of the survey, the ship shall establish a HERO/EMCON bill.

6.8.2 Weapons Movement/Handling. The presence of airborne weapons outside of designated magazines greatly increases the danger to the ship 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. Breakout, assembly, and staging of live ordnance shall be performed only by certified ordnance handlers, so designated in writing by the commanding officer.

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 or unassembled weapons shall be restricted to areas that:

1. Are directly supported by jettison ramps on the flight deck or within 50 feet of jettison location on the hangar deck/sponson areas or supported by an operable weapons elevator below the hangar deck.

2. Have at least two clear routes for emergency movement that are maintained clear of obstructions.

3. Are covered by a water/deluge system, operable sprinkler system, or protected by dedicated manned firehoses.

4. Are located at least 10 feet from aircraft fueling stations and 20 feet from LOX facilities, converters, and carts.

5. Are continually manned by qualified and certified personnel for rapid jettison.

The following locations are authorized for staging areas:

1. Flight deck, hangar deck, and sponson that meet requirements of 1 through 5 above.

2. Handling/assembly areas outside magazines may be supported by operable elevators in lieu of jettison facilities.

Maximum weapon density in staging areas shall be limited to that quantity:

1. Flight deck — required for the next two events; includes a total of weapons loaded, in process of loading, or staged.

2. Hangar deck and sponsons — one event.

3. Handling areas — required for immediate strike up/down.

4. Assembly area — to sustain operations.
LUU 2B/B parachute flares and Marine location markers shall be stowed in jettisnable topside lockers or pyrotechnic ready service lockers when outside the confines of the magazine except for temporary staging.

Staging areas shall be used for ready service only, not for protracted stowage nor for extending the total weapon stowage capacity of the ship. All weapons in the staging area(s) shall be on MHE or AWSE.

All ordnance jettison ramps shall be fully functional and exercised daily prior to flight operations in accordance with applicable PMS. Jettison ramps in the staging areas shall be rigged and unobstructed at all times when ordnance is present. All other ramps shall be rigged when required as determined by the aviation ordnance officer. The aircraft elevators shall be used to supplement weapons elevators and expedite strike up of weapons during heavy ordnance operations. Coordination and thorough preplanning between the aviation ordnance officer and aircraft handling officer is essential to meet load/plan requirements and assure safety.

During all aviation ordnance evolutions, a certified ordnance safety supervisor shall be assigned from the ship to ensure compliance with safety standards. These safety supervisors shall be thoroughly familiar with this manual and other applicable directives. Safety supervisors have the authority and responsibility to immediately halt any evolution if, in their judgment, safety is being jeopardized. An evolution so halted shall not be continued until the matter is properly resolved.

Properly equipped EOD and a ship’s weapons representive shall be stationed accessibly to provide technical assistance to the aircraft handling officer in weapons and disposal. The weapons flight deck safety petty officer and senior embarked squadron ordnance representative shall maintain a status board that confirms the type, quantity, and location of all weapons on the flight deck and/or aircraft. Additionally, weapons cookoff data shall be conspicuously posted in plain view of the aircraft handling officer.

With exceptions of actual loading evolutions, weapons on skids/trucks shall be positioned fore and aft and continuously manned.

6.8.2.1 LHA Class Weapons Handling Restrictions. On LHA-1, class ship’s utilization of the bomb assembly area at the top of the vehicle ramp is not authorized for live ordnance without a bomb barrier installed.

6.8.3 Weapons Assembly/Disassembly. Because of the inherent dangers involved, the assembly and disassembly of aviation ordnance shall be closely controlled. All weapons unpacking, assembly, disassembly, loading, and unloading shall be done in accordance with NAVSEA OP 4, NAVSEA OP 3565/NAVAIR 16-1-529 and the appropriate checklists, SRCs, and technical manuals. Ordnance shall be assembled, disassembled, and loaded into launchers/magazines only by personnel properly certified. In accordance with OPNAVINST 8023.2 series, there shall be a safety supervisor present whenever ordnance is being assembled, loaded, unloaded, or disassembled. All assembly and disassembly shall normally be conducted in the ordnance assembly area.

The assembly area shall be maintained HERO safe whenever the ordnance is HERO susceptible. If HERO susceptible ordnance is moved outside the normal HERO safe assembly area, or if assembly must be done in a HERO unsafe area, the operations officer shall ensure that the appropriate HERO condition has first been set.

All rockets shall be unpacked, assembled, loaded into, and unloaded from launchers only in designated assembly areas.

Ships shall maintain NAVAIR technical manuals for each type aviation weapon on board.

All weapons systems maintenance shall be accomplished by squadron aviation ordnance technicians.

All personnel involved with unpacking, assembly, and disassembly shall be appropriately certified.

6.8.4 Weapons Loading/Downloading. Guidance for weapons loading/downloading is provided in Appendix C.

Compliance with weapons requirements contained in the air plan demands close coordination between the aircraft handling officer, ship’s aviation ordnance officer, squadron ordnance personnel, and the squadron maintenance liaison officer. The squadron ordnance
The officer is responsible for advising the squadron maintenance liaison officer, as early as possible, of any special requirements or considerations that apply to loading of selected aircraft. The squadron maintenance liaison officer shall ensure the aircraft handling officer is apprised of any peculiarities in special requirements, configuration, or status that may make certain aircraft unassignable for particular types of weapons loads.

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, preloaded TERs, and installation of fuzes and arming wires is authorized.

**WARNING**

- Loading/downloading and oxygen servicing, other than converter replacement at the aircraft, shall be conducted as separate evolutions.

- Loading of forward firing ordnance requiring simultaneous and/or prior electrical connections for loading is not authorized while fueling of that aircraft is in progress. No other electrical connections to weapons or removal/installation of impulse cartridges shall be accomplished while fueling of that aircraft is in progress. Fuel hoses shall not be positioned under weapons being loaded/downloaded.

- Aircraft to be loaded with rockets and/or missiles should be positioned so that accidental discharge will not endanger personnel, the ship, or other aircraft.

Helicopter “no-voltage” checks shall be made after normal rotor engagement when the electrical system is on aircraft power. The signal to commence “no-voltage” checks shall not be given until the copilot’s hands are in view of the flight deck ordnance safety supervisor and acknowledgment by the pilot is received. Any deviations from the above procedure shall be in accordance with the authorized weapons checklist concerned.

**Note**

The flight deck is always the preferred area to load/download aircraft.

Loading limited amounts of weapons on the hangar deck may be authorized by the ship’s commanding officer when the operational necessity 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 schedules for the next launch or on an alert condition, and is restricted to the particular weapons indicated in Appendix C.

**WARNING**

- Personnel shall not approach an aircraft to perform weapons system checks while the engine(s) is running 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.

- V/STOL aircraft shall not be taxied until pretaxi checks and required procedures prescribed in the appropriate NAVAIR weapons/stores loading checklist/SRCs have been completed. Helicopters shall not be taxied on the flight deck.

- Tube loading of 2.75-/5.00-inch rocket launchers installed on aircraft is prohibited.

**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.
6.8.5 Arming. Weapons arming shall be conducted in a designated arming area. When forward firing weapons are involved and the NAVAIR weapons/stores loading checklists/SRCs so require, the area ahead of the aircraft shall be clear and maintained clear until completion of the launch. Arming shall be conducted only while the aircraft is at a complete stop and control of that aircraft has been turned over to an arming crew supervisor. All arming signals shall be in accordance with Appendix B of this manual.

Arming of helicopters shall be conducted after pilot has signified he is ready for takeoff and after tiedown chains/chocks are removed.

Arming of V/STOL aircraft shall be conducted after the launch officer’s initial walkaround inspection and prior to commencing launch procedures.

Exit paths for each type of aircraft shall be formalized by the air gunner/ordnance officer or air boss to provide the least hazard to arming crewmembers.

6.8.6 Dearming. A designated aircraft dearming supervisor shall position himself on the flight deck during recovery operations to ensure coordination between the LSE/aircraft director and the dearming crew. He shall indicate to the LSE/director those aircraft that require safing before being moved or shut down.

V/STOL aircraft landing with hung weapons and/or forward firing weapons shall be safed as soon as practicable after landing. Helicopters shall be dearmed prior to installing chain tiedowns. They shall be safed in accordance with NAVAIR weapons/stores loading checklists/SRCs and/or EOD emergency procedures. Aircraft safing signals shall be in accordance with Appendix B of this manual.

Aircraft landing with unexpended weapons shall have weapons safed in accordance with NAVAIR weapons/stores loading checklists/SRCs and in all cases prior to commencement of any postflight checks or refueling of the aircraft.

Appendix C lists weapons authorized for recovery.

To avoid exposure to aircraft intake/exhaust, rotors, and exhaust end of missile/rocket motors, arming crews should use extreme caution when exiting an armed aircraft.

6.8.7 Abort Strikedown. The flight deck is always the preferred area for downloading weapons. If it is required to strike below loaded aircraft, weapons shall be immediately downloaded from aircraft after reaching the hangar deck unless that aircraft is:

1. Readily available for flight and scheduled for the next launch
2. In an alert condition
3. Requiring only such maintenance or servicing as permitted on aircraft loaded with weapons.

In an abort/strikedown situation, the abort/afterlanding procedures for the particular weapons that are prescribed in the NAVAIR weapons/stores loading checklists/SRCs shall be accomplished before the aircraft is moved to the hangar deck.

- 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.

- Certain weapons are specifically excluded from the provisions of this section. Refer to Appendix C for listing of those weapons that may not be struck below while loaded on an aircraft.

6.8.8 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/stores loading checklists/SRCs.

2. If a WARNING placard and/or control stick cover is displayed prominently in the cockpit, the maintenance or servicing of loaded aircraft that requires application of electrical power is limited to:
   a. Refueling
   b. Replacement and checkout of communication and navigation equipment
   c. Replacement and checkout of engine performance and flight instruments
   d. Engine turnup/rotor engagement 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 weapons are loaded or are being loaded/downloaded.

4. An aircraft requiring extensive troubleshooting, engine removal, complete jacking, and so forth, 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.
CHAPTER 7

Miscellaneous Operations

7.1 PLANE GUARD AND SAR SUPPORT (HELICOPTER)

7.1.1 SAR Detachment Helicopter. (For readiness conditions refer to Chapter 4, paragraph 4.1.7.) When at sea, the SAR detachment helicopter shall be maintained, during daylight hours and when operationally feasible, in Condition IV for SAR/MEDEVAC contingencies. A SAR crew shall be designated and promulgated in the air plan. The designated crew shall remain the duty SAR crew until properly relieved by another crew; brief and preflight complete. The helicopter may be utilized for local administrative, logistic, or training functions while in standby status. The embarked squadron/detachment should assume SAR/MEDEVAC standby whenever the ship’s SAR detachment helicopter is not operationally ready.

7.1.2 Safety Boat. Unless otherwise stated, a safety boat shall be ready during all flight operations and loaded with a crash kit containing the equipment delineated in NWP 62-1, “Surface Shipboard Damage Control.” The boat crew and handling detail shall be assigned and available to launch on order.

7.1.3 Plane Guard Ship. The plane guard ship shall maintain the rescue detail on deck during flight operations. The ship shall be positioned as requested by the OCE/CATF to rescue personnel either by boat or ship. The plane guard ship shall monitor the appropriate land/launch frequency during flight operations.

7.1.4 SAR Equipped Helicopter. As a minimum, a helicopter assigned a SAR mission shall be equipped as follows (Figure 7-1):

1. Operable hoist with rescue device
2. Operable search light (for night search)
3. Sufficient liferafts to support passenger rescue requirements.

Note
Helicopters performing night over-water hover operations shall be equipped with operable stabilization and automatic hover equipment, or have sufficient external reference, either natural or artificial, to enable the pilot to establish and maintain a stabilized hover.

7.1.5 Control Authority. A helicopter, when designated primary SAR, shall be under the operational control of the air officer during launches and recoveries. During Case II and III operations or advisory control, the base recovery course and all course changes shall be provided by AATCC using a frequency readily available to primary flight control. Controlling agency shall conduct a radio check with the SAR helicopter at least every 20 minutes under night/IMC and shall track its fuel state. Concurrent operations may be conducted as in paragraph 7.1.1 provided a responsive SAR capability is maintained during launch/recovery.

Note
When assigned the primary mission of search and rescue, during launch and recovery of aircraft, the SAR aircraft should remain within 10 nm of the ship and maintain 1 hour of fuel to splash to ensure a proper SAR posture. Any time either of these conditions are not met, the SAR aircrew shall notify the controlling agency of “limited SAR status.”

7.1.6 SAR Swimmers (Helicopters). SAR swimmers shall be equipped in accordance with OPNAVINST 3710.7.

When it becomes necessary for the embarked squadron/detachment to provide its own SAR, the SAR detachment shall furnish a qualified rescue swimmer provided the following conditions are met:

1. Approval of detachment OIC.
2. Assigned SAR aircraft has an operable external hoist.
Ship at Anchor | Ship Underway
---|---
**Troop Lift (2, 5)** | **Day** | **Night (1)** | **Day** | **Night (1)**
C or F | A or F | C or G; or E and H | (4) A; or E, and I
**Single Helicopter** | I; or G and H | I; or G and H | I; or G and H | I; or G and H
**Multihelo V/STOL (3)** | D or F | B or F | (4) D or G; or E and H | (4) B or E, G and H; or E and I

A. SAR equipped helicopter (automatic hover capability) airborne
B. SAR equipped helicopter (automatic hover capability) in Condition I standby or airborne
C. SAR equipped helicopter (nonautomatic hover capability) airborne
D. SAR equipped helicopter (nonautomatic hover capability) Condition II standby or airborne
E. Non-SAR equipped helicopter equipped with liferafts airborne (may conduct other missions in the immediate area)
F. Safety boat waterborne
G. Plane guard ship in position
H. Safety boat ready, crew assigned and available
I. Safety boat manned and ready.

Notes:
(1) “A” must be used when sea state precludes rescue by safety boat or ship.
(2) Troop lift is movement of combat-equipped troops over water.
(3) Multihelicopter evolutions are nontroop lift evolutions such as CQ.
(4) Options listed in order of desirability.
(5) Aircraft assigned primary SAR status shall not conduct troop transport unless relieved of SAR duties by a SAR capable aircraft.
(6) Plane guard ship is in position (per ATP-1C).

Figure 7-1. Minimum SAR Requirements

3. Face-to-face brief between the pilots, crewchief, and assigned SAR swimmer conducted prior to takeoff.

4. Consideration given to the assignment of detachment SAR hoist qualified crewman to assist in rescue hoisting operations.

7.2 HELICOPTER EXTERNAL CARGO/VERTREP

7.2.1 General Description. External cargo evolutions addressed in this section include Marine external lift and Navy VERTREP. Because VERTREP is a Navy evolution involving replenishment of ships at sea, VERTREP requirements (i.e., aircrew currency, training, and mission requirement) have not been equally applied to Marine external cargo lift operations. The following general procedures shall apply to all service helicopters operating to/from amphibious aviation ships. Detailed information concerning VERTREP/external lift can be found in individual aircraft NATOPS manual. The SAR boat if being used with a SAR Helicopter in lieu of a Doppler equipped hover aircraft should be able to communicate with SAR aircraft via radio.

7.2.2 Briefing. Prior to commencing VERTREP/external lift operations, aircrews shall receive a thorough briefing. This brief shall include as a minimum:

1. Ship’s operational procedures
2. Helicopter director/LSE signals
3. Traffic patterns
4. Communication procedures
5. Use of helicopter lights
6. Special safety precautions
7. Flight deck markings and obstruction clearances
8. Aircraft and cargo spotting
9. Emergency procedures
10. Cargo to be carried.

7.2.3 Qualification. Aircrews shall have completed required external lift training requirements prior to commencing shipboard operations. Day shipboard external cargo indoctrination (i.e., briefing, pickup, and drops) should be accomplished prior to night operations. Aircrews shall be current in CQ prior to commencing external lift operations. Flight deck and combat cargo personnel shall be trained and qualified in accordance with fleet requirements.

7.2.4 Procedures. Aircrew procedures shall be in accordance with applicable aircraft NATOPS procedures and this publication.

Hookup crew procedures shall be in accordance with aircraft NATOPS, NWP 14 series, and this publication. Flight deck personnel procedures and load preparation shall be in accordance with NWP 14 series and load placement on the flight deck shall be in the areas delineated in this chapter.

7.2.5 Wind. A relative wind of 330° to 030° and a steady velocity of 15 to 30 knots is considered optimum for pickup and delivery.

7.2.6 Control. All aircraft shall be under positive control of PriFly throughout pickup and delivery evolutions.

Two-way radio communications shall be maintained unless operating under EMCON conditions. Alternate signals shall be prebriefed for EMCON operations.

Standard traffic patterns as addressed in Part IV shall be utilized unless prior approval is authorized by PriFly.

VERTREP patterns depicted in other manuals are not authorized without clearance from PriFly.

7.2.7 Vertical Replenishment/External Lift Operating Areas

There are no VERTREP/external lift flight deck markings to provide adequate obstruction clearance. Therefore, all hands participating in a VERTREP/external lift operation must be particularly alert to ensure that adequate clearance is maintained between the aircraft and obstructions on and in the vicinity of the flight deck.

The fore and aft lineup lines of the helicopter landing spots on LHA and LHD flight decks represent optimum obstruction clearance and shall be utilized in the same manner as the tee line on air-capable ships. Therefore, the helicopter shall hover with its main and/or tall/aft rotor hub(s) over or outboard of these lines.

In order to provide sufficient obstruction clearance, VERTREP/external lift operations shall be restricted to the flight deck areas as discussed in the following paragraphs.

7.2.7.1 LHA. Day VERTREP/external lift operations shall be conducted in areas A, B, and C. See Figure 7-2 for aircraft authorized to operate in each area.

1. Night VERTREP/external lift operations shall only be conducted in areas A and C. See Figure 7-2 for aircraft authorized to operate in each area.

2. Area A — The area bounded by the port elevator, that portion of the deck from the elevator’s leading edge along or outboard of the fore and aft lineup lines aft to the horizontal baseline of spot 8 and then across the flight deck to the horizontal baseline of spot 9.
Figure 7-2. LHA Day/Night VERTREP/External Lift Operating Areas


AV-8 SAFE MARKING LINES

AREA A

12'10"

12'10"

13'0"

12'10"

12'10"

AV-8 FOOTAGE NUMBER

LIFERAILS & RAFTS 3'8" HIGH

FWD

PICKUP AND DELIVERY AREA FOR DAY ONLY VERTREP/EXTERNAL LIFT OPERATIONS WITH H-1, H-2, H-3, H-46, AND H-60 HELICOPTERS ONLY.

12'10"

BRIDGE LINES

AV-8 STOL LINES

AV-8 NOZZLE NOTATION LINE

AREA B

AREA C


27'4"

22'4"

21'2"

22'4"

21'2"

27'4"

Flight Caution Item
3. Area B — The area from the horizontal baseline of spot 4 aft to the leading edge of the port elevator on that portion of the deck along or outboard of the fore and aft lineup lines.

4. Area C — The area of the flight deck forward of the extended horizontal baseline of spot 4.

7.2.7.2 LHD. Day/night VERTREP/external lift operations shall be conducted in areas A, B, and C. See Figure 7-3 for aircraft authorized to operate in each area.

1. Night VERTREP/external lift operations shall only be conducted in areas A and C. See Figure 7-3 for aircraft authorized to operate in each area.

2. Area A — The area bounded by the port elevator, that portion of the deck from the elevator’s leading edge along or outboard of the fore and aft lineup lines aft to the extended horizontal baseline of spot 8 and then across the flight deck.

3. Area B — The area from the horizontal baseline of spot 4 aft to the leading edge of the port elevator on that portion of the deck along or outboard of the fore and aft lineup lines.

4. Area C — The area of the flight deck forward of the extended horizontal baseline of spot 4.

7.2.8 Hookup

1. The hookup teams are the only personnel on the flight deck permitted under the helicopter while it is hovering to pick up cargo. Their responsibilities include ensuring the load is rigged correctly, static electricity is discharged, and the pendant is placed on the helicopter cargo hook or handed to the aircrewman. Sufficient room shall be available for the hookup team to move about and always have an escape route. Load height, when feasible,
should be such that hookup can be accomplished without climbing on the load.

2. The hand-held static discharge device (grounding wand) should be used in order to prevent personnel injury. Supervisory personnel shall ensure that only trained groundcrew perform external load operations and that proper protective equipment (gloves, helmets, and boots) are worn at all times. In the case of the H-53E, contact with the external hook shall be continuously maintained because the H-53E rotor system can recharge to its full static discharge potential within 1 second. Groundcrewmen shall not pass under the rotor arc until the helicopter is in a steady hover. When working under the helicopter a proper bracing stance is required to maintain footing.

WARNING

- The H-53E has inherent potential for generating severe electrical shock because of its greater power/load lift capacity. During flight/hover, buildup of shock potential is essentially instantaneous once grounding is removed. The static discharge device (grounding wand) and insulated gloves, with a minimum of 20,000 volts protection, shall be used when working with the H-53E.

- Rotor downwash created by the H-53E helicopters is greater than that produced by any other embarked helicopter. This downwash is sufficient to damage unsecured rotor blades and to blow aircraft chocks, tiedown chains, and towbars about the deck or overboard, and cause possible personnel injury or death.

Note
Navy CH-46 VERTREP operations do not require the use of the static discharge device.

7.3 NIGHT VISION DEVICE OPERATIONS

The use of NVDs affords pilots, aircrews, and flight deck crews improved night visual acuity. Operating with NVDs provides for increased safety, comfort levels and operational capabilities over unaided, night shipboard flight operations. However, inherent NVD limitations (field of view, depth perception, and environmental interference) require comprehensive training, awareness, and strict compliance with established procedures to ensure safe and effective NVD shipboard flight operations.

7.3.1 Authority for NVD Operations. These procedures are applicable for all shipboard aviation NVD operations involving USN, USMC, USA, USAF, DEA, U.S. Customs and foreign services. All ship/units/personnel involved in or anticipating involvement in shipboard aviation operations using NVDs shall be familiar with/ensure compliance with these procedures. Participating units will also ensure compliance with all parent service directives pertaining to NVD operations. In the event of conflict, this manual will take precedence.

7.3.2 Night Vision Devices Requirements and Limitations. Maintaining flight deck safety is the major concern when using NVDs for shipboard operations.

WARNING

Eye protection in conjunction with NVDs shall be worn.

NVD operations will be conducted under the following conditions:

1. NVD operations shall be conducted using Case I and Case II procedures. NVDs may be used in determining the presence of a visible horizon.

2. Minimum illumination for NVD training operations is 0.0022 lux as determined by the USN/USMC approved Light Level Planning Calendar computer program. Training operations at less than 0.0022 lux may be conducted when aircrew shipboard NVD currency and proficiency requirements are met and with the approval of the operational commander. Forecast illumination levels may be degraded by cloud cover, humidity, dust, etc., that are not factored into the computer program output. Decisions to fly in conditions that are less than optimal must be tempered with sound judgment and decisions should be weighed on the side of caution. The Ship Operations
Department shall provide local illumination forecasts for each flight brief and as required for planning and operations.

3. The recommended distribution of NVDs during flight operations is listed below. Ships shall inspect NVD assets periodically and control assets as controlled equipage.
   a. Bridge: one set
   b. Primary flight control: two sets
   c. Flight deck supervisors/fly petty officers: one set each
   d. Flight deck officers: one set
   e. Crash and salvage supervisor: one set
   f. LSEs: one set per spot.

   If compatible, NVD will be mounted on the LSE’s cranial/helmet to allow free hand/arm movement and quick reconfiguration between aided/unaided operations.

7.3.3 NVD Training and Qualification. Shipboard NVD flight operations training, qualification, and currency requirements are outlined in Appendix H.

7.3.4 Shipboard Lighting Requirements

7.3.4.1 Ship’s Navigation and Structural Lighting. Ship’s lighting and light discipline are critical to NVD performance and safe conduct of NVD flight operations. Lighting configurations and intensities will vary with ambient conditions and aircrew/flight deck personnel proficiency and preference.

   CAUTION

Operating ship’s navigation lights on dim/off setting does not conform to nautical rules of the road. Close coordination will be necessary, both intraship and intership, when use of navigational lighting requires modification.

   WARNING

All unnecessary lighting, external or visible from the landing pattern, shall be secured during NVD operations. Hangar lights shall be off or appropriate hangar doors closed while conducting NVD operations. Ships with well decks shall ensure that stern gates and eyebrows are closed with handling room lights out when not conducting simultaneous well deck operations. When conducting simultaneous well deck operations, consideration must be given to minimizing well deck lighting because of the adverse effects of non-NVD compatible lighting. Ships should make 1MC announcements every 30 minutes during NVD operations to remind personnel of required light discipline. For example: “All hands are reminded that NVD operations are in progress. Maintain strict light discipline throughout the ship.”

Recommended shipboard lighting is shown in Figure 7-4.

Plane guard ships shall be notified by ship conducting NVD operations upon commencement/completion of NVD operations. Lighting will be adjusted as necessary, dependent on the plane guard ship’s position relative to the ship conducting NVD operations so as to eliminate any interference to the NVD aircraft.

7.3.4.2 Flight Deck Lighting. NAVAIR approved NVD compatible blue flight deck lighting allows for a minimum amount of interference to NVDs, yet ensures adequate lighting on the flight deck for the flight deck crew. When lack of blue lighting exists, ship’s lighting may be used at the minimum safe intensity.

The lighting profiles for ships conducting NVD operations (Figures 7-5 and 7-6) are provided as recommendations only. Actual lighting profiles will vary with ambient conditions and aircrew/flight deck personnel proficiency/preference.

For flight deck personnel using generation II NVDs (AN/PVS5 and AN/PVS7), NVD 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 NVD compatible blue lights, if installed, under some ambient light conditions. These operations are prohibited on “blacked out” flight decks.

1. Chocking and chaining of aircraft
2. Fueling operations
3. Ordnance operations (arming/dearming or loading/downloading)
4. Troop movement
5. Aircrew changes (hotseats)
6. Aircraft movement

Standard LSE and arming supervisor aircraft signaling wands will cause significant NVD washout and effectively blind the aircrews. The LSE and arming supervisor wands will be modified with approved NVD compatible blue filters available through the Navy stock system.
To prevent possible NVD interference from support equipment vehicles, all tow tractor, crash tractor, and forklift lights shall remain off during NVD operations. To further maintain NVD light integrity, vehicle brake lights shall be covered during NVD operations.

Ships modified with approved NAVAIR NVD compatible blue flight deck lighting are not required to change overhead flood light configurations 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.

7.3.4.3 Bridge, Primary Flight Control, and Flight Deck Control Lighting. All unnecessary lighting will be secured. Indicator lights will 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 will be used.

**CAUTION**

Red lights in the vicinity of missile launchers, SRBOC launchers and CIWS mounts may cause interference during NVD operations.

7.3.5 NVD Flight Operations Procedures.

Simultaneous mixed NVD-aided and unaided flight operations are prohibited in the control zone. The only exception to this is the conduct of flight operations with NVD-aided helicopters and non-NVD-aided AV-8B aircraft within the control zone.

**WARNING**

In-flight transition from aided to unaided flight may be disorienting. Sufficient time should be allowed for aircrew to adapt to the unaided flight regime, prior to recovery. Case III CCA should be utilized to the maximum extent possible.

The use of NVDs during flight operations is a unique environment that creates special problems. One of the basic tenets of VFR flying is “see and avoid.” The “see and avoid” concept places the onus for aircraft separation and obstacle avoidance upon the respective pilots. During NVD flight operations where not all aircraft are NVD equipped, the non-NVD pilots are placed at a distinct disadvantage — they cannot see the unlighted NVD-equipped aircraft. Therefore, the non-NVD-equipped aircraft cannot provide his own air traffic separation and obstacle clearance. They must rely upon air traffic controllers to provide air traffic separation and obstacle clearance as if on an IFR clearance within the control zone.

Ships shall promulgate organic procedures for the separation of aided and unaided aircraft. In addition, the ARG flight operations SPINS should include specific NVD-equipped aircraft return to force procedures, establish non-NVD aircraft operating areas, and return to force procedures for aircraft who have had an NVD failure.

**WARNING**

When landing forward (LHA spot 8, LHD spot 7) of an adjacent, occupied spot (LHA spot 9, LHD spot 8) caution should be exercised due to depth perception limitation associated with NVDs.

All shipboard patterns used during normal day/night operations are germane to NVD operations. The pilot on the side of the ship obstructions should be the pilot at the controls. Normally, cross cockpit landings or launches will not be conducted because of restricted visual cues. Exceptions will be to accomplish required training. Aircraft will secure anticollision lights and position lights while in the proximity of the ship. Prior to conducting initial NVD operations, ships and aviation units shall conduct a face to face brief consisting of the following at a minimum. Briefings will be repeated after 90 days of non-NVD operations between a ship and squadron.

1. Aviation unit SOP.
2. Ship’s helicopter operations bill.
3. Ship and aircraft lighting.
4. Emergency procedures (including NVD 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-NVD-equipped aircraft operating areas.

If the ship is required to conduct the recovery of an unaided aircraft during NVD operations, the pattern NVD aircraft shall be held on deck or placed in a marshal/delta pattern. The flight deck lighting will be raised to normal intensity and the unaided aircraft recovered. Mixed helicopter types in a NVD landing pattern is authorized.

During NVD cargo operation, the USN Mk 105 pendant should be used, if possible, to minimize hover altitude. The Mk 92 pendant is authorized for NVD use. Chemical lights should be used to mark hookup points (pendant and load). They shall be securely attached to minimize FOD potential. Flight deck lighting should be at the maximum intensity practicable given the NVD compatibility and aircrew/flight deck crew comfort level/proficiency.

NVD HRST operations are authorized given the same lighting concerns as cargo operations. The intended point of landing for personnel exiting the aircraft will 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/dearming without NVDs.

7.3.6 Emergencies During NVD 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/Helicopter Operations Bill and as briefed with aircrews. Night SAR will be conducted by surface craft or automatic hover capable aircraft only. Consideration should be given during actual night SAR to utilize aircrews equipped with NVDs to aid in the search.
All aircraft handling signals will be in accordance with the Navy NATOPS manual, “Aircraft Signals,” NAVAIR 00-80T-113.
APPENDIX B

Aircraft Arming and Safing Signals

All aircraft arming and safing signals will be in accordance with the Navy NATOPS manual, “Aircraft Signals,” NAVAIR 00-80T-113.
## APPENDIX C

### Weapons Loading/Strikedown/Downloading and Recovery Guide

<table>
<thead>
<tr>
<th>Weapon</th>
<th>Hangar Deck</th>
<th>Recovery (8)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Load</td>
<td>Strikedown/Download</td>
</tr>
<tr>
<td>General Purpose Bombs/LGB (all)</td>
<td>Yes (1) (5)</td>
<td>Yes (6)</td>
</tr>
<tr>
<td>2.75/5.0 Rocket Launchers (all)</td>
<td>No</td>
<td>No (3)</td>
</tr>
<tr>
<td>Aircraft Parachute Flare (LUU-2B/B)</td>
<td>Yes (11)</td>
<td>Yes (11)</td>
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<tr>
<td>Tube Loaded Flare Dispenser</td>
<td>Yes (11)</td>
<td>Yes (11)</td>
</tr>
<tr>
<td>25-mm guns/GAU-12 Gun Pod (7)</td>
<td>Yes</td>
<td>Yes (7) (12)</td>
</tr>
<tr>
<td>Rockeye II/APAM</td>
<td>Yes (5)</td>
<td>Yes (6)</td>
</tr>
<tr>
<td>Sidewinders (all)</td>
<td>No (4)</td>
<td>Yes</td>
</tr>
<tr>
<td>Maverick (all)</td>
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<td>Yes</td>
</tr>
<tr>
<td>Decoy Flare (all)</td>
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<td>No</td>
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<tr>
<td>Torpedos (all)</td>
<td>+Yes (5)</td>
<td>Yes (6)</td>
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<tr>
<td>SUS (Mk64)</td>
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</tr>
<tr>
<td>Marine Marker (all)</td>
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</tr>
<tr>
<td>Practice Bombs (all)</td>
<td>Yes (5)</td>
<td>Yes (6)</td>
</tr>
<tr>
<td>JAU-1B/JAU-22/B Cartridge</td>
<td>Yes</td>
<td>Yes (9)</td>
</tr>
<tr>
<td>TOW Missile</td>
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</tr>
<tr>
<td>7.62-mm Guns</td>
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<tr>
<td>.50 CAL Guns</td>
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<td>No</td>
</tr>
<tr>
<td>M118 Smoke Grenade Dispenser</td>
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</tr>
</tbody>
</table>

### Notes:

1. No mechanical nose fuzes shall be installed on the hangar deck.
2. Arming wires/safety clips intact.
3. LHAs with centerline elevators may lower aircraft to the hangar deck only if downloading on the flight deck will delay the launch. Hangar deck downloading shall be performed immediately after the aircraft is in spot and tied down.
4. Air-launched missiles shall not normally be loaded on the hangar deck except when operational commitments 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 Weapons/Stores Loading Checklists/SRCs.
5. Ejector cartridges shall not be installed on the hangar deck.
6. In the event of strikedown of a loaded aircraft to the hangar deck, the nose fuzes (as applicable) and ejector/jettison cartridges shall be removed immediately after the aircraft is in spot and tied down.
7. The GAU-12 gun pod is exempt from downloading requirements for up aircraft temporarily spotted in the hangar decks and aircraft undergoing limited maintenance, i.e., turnaround maintenance, providing compliance with all gun dearm procedures of the airborne weapons/stores loading manual, associated checklists and stores reliability card have been accomplished.
8. Guidance provided in this appendix is subject to individual aircraft tactical manual limitations.
9. Maintenance on Loaded Aircraft, paragraph 6.7.8 applies.
10. Impulse cartridges must be removed from LUU-2 and dispenser with LUU-2.
11. Strikedown/download of aircraft with jammed 20-mm/25-mm gun pods is prohibited.
APPENDIX D

Aircraft Launch and Recovery Limitations

The safe launch and recovery wind and ship motion limitation for the most common aircraft at all certified recovery spots aboard LHA and LHD class ships are presented in this appendix. For AV-8B Launch and Recovery Limitations, refer to the Shipboard Operating Bulletin. Figures D-2 through D-40 present envelopes for LHA class ships. D-41 through D-69 present envelopes for LHD class ships. Figure D-1 presents a general envelope to be used when no other envelopes are available.

Unless otherwise noted, the envelopes in this appendix:

1. Are based on steady state winds measured by windward mast-mounted anemometer
2. Are defined relative to the ship’s centerline
3. Are valid for a normal approach to the spot, with the helicopter aligned with the ship’s centerline at touchdown
4. Are valid for the PAC in either seat
5. Are valid for all approved aircraft loading configurations, GW, and cg conditions in accordance with applicable operators/NATOPS manuals provided power available exceeds power required to hover out of ground effect.

Failure to plan for an adequate power margin may result in NR droop and loss of tail rotor authority.

Note
Aircraft NATOPS zero wind HOGE torque is often the best approximation to shipboard hover torque requirements for all wind conditions, however, additional power margin (5 to 10 percent torque) may be required to approach, overcome turbulence, decelerate or depart the flight deck vicinity. Shipboard power available is based upon the contingency power rating for navalhawk series aircraft and the 10-min (DECU)/30-min (ECU) power ratings for blackhawk series aircraft.

CAUTION
Launch and recovery should be timed to coincide with quiescent periods of ship motions.

Note
Ship airwake turbulence, in conjunction with excessive ship motion, can increase the difficulty of flight operations. Sources of ship airwake turbulence are: (1) ship superstructure, (2) hull/deck protrusions, (3) stack exhaust gases, and (4) rotor wash/jet blast caused by takeoff and landing of adjacent aircraft.
The general wind envelope (Figure D-1) should be used for emergency conditions. Emergency limits are applicable to any single failure of the aircraft (ASE, hydraulic boost, or engine) or ship's visual landing aids.

Although some envelopes are restrictive, they are the only ones currently available. Commends/questions about them should be addressed to:

Commander
Naval Air Systems Command PMA-251
47123 Buse Road (Unit IPT)
Bldg. 2272, Suite 348
Patuxent River, MD 20670-1547
Comm: 301-757-7004
Fax: 301-757-6800
DSN: 757-7004
Figure D-1. General Launch/Recovery Envelopes — LHA/LHD Class Ships — All Spots

NOTES:

ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT
PORT OR STARBOARD
APPROACH ONLY.
Figure D-2. AH-1T/W General Launch/Recovery Envelopes for LHA/LHD Class Ships — All Spots Except MIKE

NOTES:
ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT
Figure D-3. H-46 General Launch/Recovery Envelopes for LHA/LHD Class Ships — All Spots Except MIKE

NOTES:
ENTIRE ENVELOPE - DAY
SHAD ED AREA - NIGHT
ENVELOPES NOT VALID FOR LHA SPOT 3A.
Figure D-4. H-53E General Launch/Recovery Envelopes for LHA/LHD Class Ships — All Spots Except MIKE
Figure D-5. UH-1N Engage/Disengage Wind Limits for LHA/LHD Class Ships

NOTES:
ENVELOPE VALID FOR
LHA SPOTS 2, 4, 5, 6, 7
LPH SPOTS 2, 3, 4, 5
LHD SPOTS 2, 4, 5, 6
MANUALLY HOLD ROTOR
BLADE AT 90°
POSITION FOR ENGAGEMENT
PULL AND HOLD ROTOR
BRAKE FOR DISENGAGEMENT
Figure D-6. UH-1N Engage/Disengage Envelopes — LHA Class Ships — Spots 2, 4, 5, 6, and 7

NOTES:

MANUALLY HOLD ROTOR BLADE AT 90 DEGREE POSITION FOR ENGAGEMENT.

PULL AND HOLD ROTOR BRAKE FOR DISENGAGEMENT.

ENVELOPE EXTRAPOLATED FROM LPH DATA.
Figure D-7. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spots 1 and 3

NOTES:
ENTIRE ENVELOPE - DAY ONLY

PORT
APPROACH

LHA-F039
Figure D-8. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 3

NOTES:
ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT

STARBOARD APPROACH
Figure D-9. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 3A
WARNING:
WINDS GREATER THAN 5 KNOTS FROM 070 DEGREES TO 140 DEGREES MAY INCREASE THE TORQUE REQUIRED TO HOVER BY AS MUCH AS 15 PERCENT ABOVE THE UH-1N NATOPS CALCULATED HOGE TORQUE.

NOTES:
ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT
ENVELOPE EXTRAPOLATED FROM LPH DATA.
Figure D-11. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 8
Figure D-12. UH-1N Launch/Recovery Envelopes — LHA Class Ships — Spot 9
Figure D-13. AH-1T/W Engage/Disengage Envelopes — LHA/LHD Class Ships — Spots 1 thru 7
Figure D-14. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — LHA Spots 1, 2, 4, 5, and 6

NOTES:

ENTIRE ENVELOPE - DAY SPOTS 1,2,4,5,6.

SHADED AREA - NIGHT SPOTS 4,5,6

FLIGHT OPERATIONS IN HATCHED AREA MAY REQUIRE LARGE, RAPID YAW AND ROLL CONTROL INPUTS. APPROACHES, LANDINGS, AND TAKEOFFS SHOULD BE SLOW AND PRECISE.
CAUTION:
RELATIVE WINDS MORE THAN 30 DEG STARBOARD OF THE BRC MAY CREATE INACCURATE AIRSPEED INDICATIONS DURING THE DOWNWIND TURN AND APPROACH.

NOTES:
ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT

FLIGHT OPERATIONS IN HATCHED AREA MAY REQUIRE LARGE, RAPID YAW AND ROLL CONTROL INPUTS. APPROACHES, LANDINGS, AND TAKEOFFS SHOULD BE SLOW AND PRECISE.

Figure D-15. AH-1T/W Day Launch/Recovery Envelopes — LHA Class Ships — Spots 3 and 3A
Figure D-16. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — Spot 7
Figure D-17. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — Spot 8

NOTES:
ENTIRE ENVELOPE - DAY
SHADOED AREA - NIGHT
ENVELOPE EXTRAPOLATED
FROM LPH DATA
Figure D-18. AH-1T/W DAY SCAS OFF Launch/Recovery Envelope — LHA Class Ships — Spots 4 thru 7

NOTES:

FLIGHT OPERATIONS IN HATCHED AREA MAY REQUIRE LARGE, RAPID YAW AND ROLL CONTROL INPUTS. APPROACHES, LANDINGS, AND TAKEOFFS SHOULD BE SLOW AND PRECISE.

ENTIRE ENVELOPE - DAY
CAUTION:

RELATIVE WINDS MORE THAN 30 DEG STARBOARD OF THE BRC MAY CREATE INACCURATE AIRSPEED INDICATIONS DURING THE DOWNWIND TURN AND APPROACH

NOTES:

ENTIRE ENVELOPE - DAY SHADED AREA - NIGHT

Figure D-19. AH-1T/W Launch/Recovery Envelopes — LHA Class Ships — Spot 9
Figure D-20. AH-1T/W Wind Envelope (Sheet 1 of 9)
Figure D-20. AH-1T/W Wind Envelope (Sheet 2)
Figure D-20. AH-1T/W Wind Envelope (Sheet 3)
Figure D-20. AH-1T/W Wind Envelope (Sheet 4)
Figure D-20. AH-1T/W Wind Envelope (Sheet 5)
Figure D-20. AH-1T/W Wind Envelope (Sheet 6)
Figure D-20. AH-1T/W Wind Envelope (Sheet 7)
Figure D-20. AH-1T/W Wind Envelope (Sheet 8)
Figure D-20. AH-1T/W Wind Envelope (Sheet 9)
STARTUP/SHUTDOWN WITH ROTOR BRAKE ENGAGED

SHIP HEADING

000°

SHIP ROLL 0-5°

APPLICABLE FOR:

LPH SPOTS 1-5
LHA/LHD SPOTS 1-7

Figure D-21. AH-1T/W Wind Limitations (Sheet 1 of 2)
Figure D-21. AH-1T/W Wind Limitations (Sheet 2)
Figure D-22. SH-2F Engage/Disengage Envelopes — LHA Class Ships — All Spots

NOTES:

WITH GUSTS OF 10 KT OR MORE, REDUCE MAXIMUM WINDS BY 10 KT IN ALL DIRECTIONS.

ROTOR ENGAGEMENT IN WIND VELOCITIES NEAR THE LIMITING VALUES SHOULD BE MADE RAPIDLY. HOLD CYCLIC STICK SLIGHTLY INTO WIND AND USE 75-80% NG FOR ENGAGEMENT.

ROTOR DISENGAGEMENT INTO WIND VELOCITIES NEAR THE LIMITING VALUES SHOULD BE MADE RAPIDLY. APPLY POSITIVE ROTOR BRAKE TO ENSURE STEADY DECELERATION OF ROTOR BLADES.
Figure D-23. SH-3A/D/G/H Engage/Disengage Envelopes — LHA Class Ships — All Spots

NOTES:
WITH GUSTS OF 10 KT OR MORE, REDUCE MAXIMUM WINDS BY 10 KT IN ALL DIRECTIONS.
Figure D-24. SH-3A/D/G/H Launch/Recovery Envelopes — LHA Class Ships — Spot 2
Figure D-25. SH-3A/D/G/H Launch/Recovery Envelopes — LHA Class Ships — Spots 4 and 7
Figure D-26. H-46 Engage/Disengage Envelopes — LHA Class Ships — All Spots

NOTES:

DO NOT ENGAGE ROTOR IF BLADES ARE FLAPPING PLUS/MINUS 1 FT.

ENTIRE ENVELOPE - Spots 2 (H-46E Only), 4, 5, 6, 7, 8

HATCHED AREA - 1, 2 (H-46D), 3 and 9

ENVELOPES NOT VALID SPOT 3A.
Figure D-27. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spots 1, 3, and 9

NOTES:

Entire Envelope - DAY Spots 1, 3, AND 9.

Shaded Area - NIGHT Spots 3 and 9.

STARBOARD APPROACH SPOTS 3 AND 9.

PORT APPROACH SPOT 1.
Figure D-28. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spots 2, 4, 5, 6, and 7
Figure D-29. H-46 Launch/Recovery Envelopes — LHA Class Ships — Spot 8

NOTES:

EXERCISE CAUTION WHEN EXECUTING DOWNWIND APPROACH. HIGH AIRCRAFT PITCH ATTITUDES MAY CAUSE PILOT TO LOSE SIGHT OF LSE WITH SUBSEQUENT WAVEOFF.

ENTIRE ENVELOPE – DAY
SHADED AREA – NIGHT
Figure D-29A. C/MH-47D/E/F Launch/Recovery Envelopes — LHA Class Ships — Spots 7, 8, and 9

Ensure sufficient power for zero wind Out of Ground Effect hover + 15%.

Notes:
- Entire Envelope – Day
- Shaded Envelope – Night NVG Aided
Figure D-30. H-53A/D/E Engage/Disengage Envelopes — LHA Class Ships — All Spots

NOTE:
This envelope is the ground based envelope. This envelope WAS NOT created using test data.
CAUTION

RECOVERIES ATTEMPTED IN THE PRESENCE OF TAILWINDS MAY REQUIRE EXTREME NOSE-HIGH APPROACH ATTITUDES.

NOTES:

ENTIRE ENVELOPE - DAY
SHADED ENVELOPE - NIGHT

Figure D-31. H-53A/D Launch Recovery Envelopes — LHA Class Ships — Spot 2
CAUTION

RECOVERIES ATTEMPTED IN THE PRESENCE OF TAILWINDS MAY REQUIRE EXTREME NOSE-HIGH APPROACH ATTITUDES.

NOTES:

ENTIRE ENVELOPE - DAY
SHADED AREA - NIGHT

PORT APPROACH SPOTS 4, 5, 6, 7, 8.
STARBOARD APPROACH SPOT 9.

Figure D-32. H-53A/D Launch Recovery Envelopes — LHA Class Ships — Spots 4, 5, 6, 7, 8, and 9
NOTES:

ENTIRE ENVELOPE - DAY SPOTS 1, 3, 9.

SHADED AREA - NIGHT SPOT 9.

PORT APPROACH SPOT 1.

STARBOARD APPROACH SPOTS 3, 9.

NIGHT OPERATIONS SPOTS 1 AND 3 NOT AUTHORIZED.
Figure D-34. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 2 and 4

NOTES:

ENTIRE ENVELOPE - DAY SPOTS 2, 4.

SHaded AREA - NIGHT SPOT 4.

NIGHT OPERATIONS TO SPOT 2 NOT RECOMMENDED.
Figure D-35. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 5 and 6
Figure D-36. H-53E Launch/Recovery Envelopes — LHA Class Ships — Spots 7 and 8
Figure D-36A. OH-85D Launch/Recovery Envelopes — LHA Class Ships — Spots 1, 2, 4, and 5

Ensure sufficient power for zero wind Out of Ground Effect hover + 15% when wind over deck speeds are less then 10 knots.
Figure D-36B. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 2

Notes:

- Entire Envelope – Day
- Shaded Envelope – Night NVG Aided
- Maximum Gross Weight 22,500 lb
Figure D-37. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 4

Notes:

- Entire Envelope – Day
- Shaded Envelope – Night NVG Aided
- Maximum Gross Weight 22,500 lb

Port Approach
Spot 4
LHA Class Ships
H-60A/B/F/G/H/J/K/L/Q/R/S
Figure D-38. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 5

Notes:
Entire Envelope – Day
Shaded Envelope – Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-39. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 6
Figure D-40. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 7

Notes:
Entire Envelope – Day
Shaded Envelope – Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-40A. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHA Class Ships — Spot 8

Notes:
Entire Envelope — Day and Night (NVG Aided)
Maximum Gross Weight 22,500 lb
Ensure sufficient power for zero wind Out of Ground Effect hover + 10% when wind over deck speeds are less then 10 knots.

Notes:
- Entire Envelope – Day Spots 1, 2, 4, & 5
- Shaded Envelope – Night PNVS/TADS Spots 2, 4, & 5

Figure D-40B. AH-64A/D Launch/Recovery Envelopes — LHA Class Ships — Spots 1, 2, 4, and 5
Figure D-41. UH-1N Engage/Disengage Wind Limits for LHA/LHD Class Ships

NOTES:
ENVELOPE VALID FOR LHA SPOTS 2, 4, 5, 6, 7 LPH SPOTS 2, 3, 4, 5 LHD SPOTS 2, 4, 5, 6
MANUALLY HOLD ROTOR BLADE AT 90° POSITION FOR ENGAGEMENT PULL AND HOLD ROTOR BRAKE FOR DISENGAGEMENT
Figure D-42. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 1
Figure D-44. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 4
Figure D-45. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 5
Figure D-46. UH-1N Launch/Recovery Envelopes — LHD Class Ships — Spot 6
Figure D-47. AH-1T/W Launch/Recovery Envelope — LHD Class Ships — Spot 1
NOTE:

Envelopes valid for all AH-1W gross weights, provided WOD and ambient conditions allow a 10% torque margin for relative winds of 140 deg to 170 deg above NATOPS Flight Manual HOGE torque requirements.

Figure D-48. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 2
NOTE:

Envelopes valid for all AH-1W gross weights, provided WOD and ambient conditions allow a 10% torque margin for relative winds of 140 deg to 170 deg above NATOPS Flight Manual HOGE torque requirements.

Figure D-49. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 4
Figure D-50. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 5

NOTE:
Envelopes valid for all AH-1W gross weights, provided WOD and ambient conditions allow a 10% torque margin for relative winds of 140 deg to 170 deg above NATOPS Flight Manual HOGE torque requirements.
NOTE:
Envelopes valid for all AH-1W gross weights, provided WOD and ambient conditions allow a 10% torque margin for relative winds of 140 deg to 170 deg above NATOPS Flight Manual HOGE torque requirements.

Figure D-51. AH-1T/W Launch/Recovery Envelopes — LHD Class Ships — Spot 6
Figure D-52. SH-2F Engage/Disengage Envelopes — LHD Class Ships — All Spots
NOTES:

WITH GUSTS OF 10 KT OR MORE, REDUCE MAXIMUM WINDS BY 10 KT IN ALL DIRECTIONS.

Figure D-53. SH-3A/D/G/H Engage/Disengage Envelopes — LHD Class Ships — All Spots
Figure D-54. H-46 Engage/Disengage Envelopes — LHD Class Ships — Spots 1, 2, 3, 4, 5, 6, 7, 8, and 9

NOTES:

Do not engage rotor if blades are flapping +/- 1 FT.

Entire Envelope: spots 2, 4, 5, 6, 7, 9.

Hatched Area: spots 1, 3, 8.
Figure D-55. H-46 Launch Recovery Envelopes — LHD Class Ships — Spot 2
Figure D-56. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 4
Figure D-57. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 5
Figure D-58. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 6
Figure D-59. H-46 Launch/Recovery Envelopes — LHD Class Ships — Spot 7
Figure D-60. H-53A/D/E Engage/Disengage Envelopes — LHD Class Ships — All Spots

NOTE:

This Envelope Is The Ground Based Envelope. This Envelope WAS NOT Created Using Test Data.
Figure D-61. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 5
Figure D-62. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 6
Figure D-63. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 7
Figure D-64. H-53E Launch/Recovery Envelopes — LHD Class Ships — Spot 9
Figure D-65. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 2

Notes:

Entire Envelope - Day

Shaded Area - Night NVG Aided

Maximum Gross Weight 22,500 lb
Figure D-66. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 4

Notes:
Entire Envelope - Day
Shaded Area - Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-67. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 5

Notes:

Entire Envelope - Day
Shaded Area - Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-68. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 6

Notes:
Entire Envelope - Day
Shaded Area - Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-68A. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 7

Notes:

Entire Envelope - Day
Shaded Area - Night NVG Aided
Maximum Gross Weight 22,500 lb
Figure D-69. H-60A/B/F/G/H/J/K/L/Q/R/S Launch/Recovery Envelopes — LHD Class Ships — Spot 8

Notes:
- Entire Envelope - Day
- Shaded Area - Night NVG Aided or Unaided
- Maximum Gross Weight 22,500 lb
Figure D-70. H-60A/B/F/G/H/J/K/L/Q/R/S Unaided Launch/Recovery Envelopes — LHD Class Ships — Spot 4

Notes:
Entire Envelope - Night Unaided
Maximum Gross Weight 22,500 lb
Figure D-71. H-60A/B/F/G/H/J/K/L/Q/R/S Unaided Launch/Recovery Envelopes — LHD Class Ships — Spot 5

Notes:
Entire Envelope - Night Unaided
Maximum Gross Weight 22,500 lb
Figure D-72. H-60A/B/F/G/H/J/K/L/Q/R/S Unaided Launch/Recovery Envelopes — LHD Class Ships — Spot 6

Notes:
Entire Envelope - Night Unaided
Maximum Gross Weight 22,500 lb
Figure D-73. H-60A/B/F/G/H/J/K/L/Q/R/S Unaided Launch/Recovery Envelopes — LHD Class Ships — Spot 7

Notes:
Entire Envelope - Night Unaided
Maximum Gross Weight 22,500 lb
APPENDIX E

Flight Deck Clothing

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Notes:

1. The life preserver, vest type, U.S. Navy, Mk 1, is designed for prolonged wear while engaged in flight deck activity and is available in colors identical to those listed above.

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 piece (or equivalent) on the front shell. Helmets shall have a 2-inch piece of velcro on the left shell and velcro on the survival light.

3. Combination cranial helmets for the following personnel shall be marked with three vertical reflective international orange stripes, 1-inch wide, evenly spaced, placed on top of white reflective tape:
   a. All officers
   b. Flight and hangar deck chief petty officer and leading petty officer
   c. Crash and salvage chief petty officer and leading petty officer
   d. EOD team members
   e. Squadron’s ordnance officer
   f. Ship’s air gunner.

4. The ordnance arming/safety supervisor at night shall have two red standard wands banded with two ¾-inch bands equally spaced on the cones.

5. Helmets for all ship’s personnel who have not completed the flight deck observer qualification shall be marked (front and rear) with a “T” using 1 inch wide blue reflective tape over existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).

6. Helmets for all LSEs and Aircraft Directors under instruction shall be marked (front and rear) with a “U/I” using 1-inch wide blue reflective tape evenly spaced over existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).

* Combination cranial.
APPENDIX F

AV-8 Training Syllabus for Ship Personnel

F.1 PHASE I — SHIPBOARD ORIENTATION

Ship’s personnel shall be familiar with the vertical takeoff and landing operations involving V/STOL aircraft prior to actually operating the aircraft. This training phase is required for all air department personnel and other ship’s company that will be directly involved in flight deck operations. This training shall be conducted by an Advanced/Training V/STOL LSO. The following topics are considered minimum requirements:

1. “Introduction to the AV-8” (movie) ........................ 0.5 hour
2. Aircraft description (lecture using NATOPS, diagrams, etc.) ........ 0.5 hour
3. Flight deck preparations (lecture) .......................... 0.5 hour
4. Taxi and LSO signals (lecture and demonstration) ............ 0.5 hour
5. Familiarization with V/STOL aircraft handling personnel and their responsibilities (lecture) ........ 0.5 hour
6. General safety considerations delineating specific hazards involved (lecture) .......................... 0.5 hour

Total 3.0 hours

F.2 PHASE II — GROUND TRAINING

This phase of training shipboard personnel is to be conducted at an air station by an Advanced/Training V/STOL LSO. It is to be presented to members of the ship’s air department and other members of the ship’s company that will be directly involved in V/STOL aircraft flight deck operations. This ground training will include lectures, demonstrations, and small group walkarounds. The following topics will be addressed as minimum requirements:

1. General familiarization with V/STOL aircraft (walkaround and lecture) ......................... 0.5 hour
2. Simulated deck handling evolution conducted on LHD, LPH, LHA deck configurations and markings laid out on ramp. This would include towing and tiedowns with the use of down locks, chains, and chock (lecture and demonstration) ........ 0.5 hour
3. Starting, shutdown, taxiing, and installation of pins (lecture and demonstration) ............... 0.5 hour
4. Fueling and defueling procedures (lecture and demonstration) ............... 0.5 hour
5. Hung ordnance procedures, including spotting aircraft for arming/dearming of air launched weapons (lecture and demonstration) .................. 0.5 hours
6. Firefighting procedures (lecture) ......................... 0.5 hour
7. Pilot rescue procedures (lecture and demonstration) ........ 0.5 hours (lecture) 0.5 hour (demonstration)
8. LSO and launch officer signals and procedures (lecture and demonstration) .................. 0.5 hour
9. Cockpit orientation — emergency and normal canopy release, ejection seat procedures, and throttle and battery switch location (lecture and static display) .................. 0.5 hour
F.3 PHASE III — FINAL SHIPBOARD TRAINING

This phase of training is to be conducted on board ship by an Advanced/Training V/STOL LSO (assisted by ship’s personnel and appropriate V/STOL personnel). Only members of the ship’s air department and members of the ship’s company directly involved in V/STOL aircraft flight deck operations are required to take part in this training phase. The following topics will be addressed as minimum requirements:

1. General familiarization with V/STOL in shipboard environment (lecture) 0.5 hour
2. Securing aircraft and associated equipment for heavy seas and normal conditions (lecture and demonstration) 1.0 hour
3. Flight deck preparation (lecture and demonstration) 0.5 hour
4. Fueling and defueling procedures (lecture and demonstration) 0.5 hour
5. Pilot rescue procedures (lecture) 0.5 hour
6. Crash and salvage procedures (lecture) 1.0 hour
7. Safe approach paths and LSO procedures (lecture and demonstration) 0.5 hour
8. Hazardous areas — hot spots, and so forth (lecture) 0.5 hour
9. Towing, starting, shutdowns and taxiing; use of chocks, chains, down locks; installation of pins (lecture and demonstration) 1.0 hour
10. Five actual takeoffs and landings (demonstration) 1.0 hour
11. AATCC training, V/STOL specific communications, terminology, flying speeds, and approach profiles (lecture) 1.0 hour

Total 8.0 hours
# American Matrix

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<td>H-1</td>
</tr>
</tbody>
</table>

**Notes:**

1. This matrix has been developed to provide information and guidance with regard to multispot interservice helicopter operations. It does not constitute authority to operate, nor does it imply certification of the aviation facility. Authorization to conduct specific interservice ship/helicopter operations must be granted by fleet commanders with consideration for interservice training and operational necessity.

2. The helicopter spotting arrangements address the maximum number of the same type of interservice helicopters that could operate at any one time. Additional spotting arrangements must be coordinated by operational commanders on a case-by-case basis. Furthermore, the spotting arrangements have been developed based on rotor clearances comparable to those addressed in Section IV for USN/USMC helicopters. In this regard, optimum rotor clearances are assured when the fore/aft centerline of each helicopter is in line with the fore/aft lines of each helicopter spot, and each helicopter is positioned at the same fore/aft location on each helicopter spot. The following fore/aft positioning is recommended:
   a. H-1, H-6, and H-58 helicopters: skid toe on the athwartship line
   b. H-53 and H-54 helicopters: nose wheel on the yellow nose wheel spot

3. LPH spotting arrangements 1, 3, and 5 through 11: spot 8 may be utilized in lieu of spot 7.
APPENDIX H

NVD Training Syllabus For Ship’s Personnel

H.1 INTRODUCTION

A methodical building block approach to training and qualification of ship’s personnel for operations with NVDs is essential. Ship’s personnel involved in flight operations (air officers, LSOs, flight deck supervisors, LSEs, etc.) shall receive training orientation prior to conducting NVD operations. Remaining flight deck personnel will attend NVD training coordinated through the ISIC with instructions according to TYCOM guidance. Classroom training can be scheduled through TYCOM (CNSP N42/CNSL N42) on an as needed basis. Approved LSE schools provide required classroom instruction. Additionally, USMC squadron NSIs can provide classroom training.

Note
Whenever possible, initial stage 3 and 4 training should be conducted in .0022 lux or greater.

H.2 STAGE ONE: NVD FAMILIARIZATION/CLASSROOM

Formal classroom instruction shall consist of the following:

1. NVD introduction
2. Night/NVD physiology
3. Environmental considerations and lighting requirements
4. Aircrew tendencies on NVDs
5. LSE signals and procedures (NVD and unaided)
6. Emergency procedures
7. A night lab with a certified instructor should be utilized whenever available.

A static flight deck NVD orientation will 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

H.3 STAGE TWO: SINGLE SPOT OPERATIONS/ NVD LSE INITIAL QUALIFICATIONS

For qualification as an NVD LSE, all prerequisites (classroom and static deck) must be complete. The LSE shall direct five vertical takeoffs and landings and five touch and go’s from the landing pattern while under the supervision of a qualified NVD LSE. This shall be accomplished under a high-light level of .0022 lux or greater. Final qualification and designation will be determined by the ship’s commanding officer. Ships requiring assistance of LSEs qualified in NVD operations for initial qualifications shall make requests through their ISIC. ISIC will coordinate with TYCOM as necessary.

Note
Operating aircraft from adjacent spots is not authorized during stage two training.
H.4 STAGE THREE: MULTISpot OPERATIONS

Multispot operations consist of two or more landing spots. The prerequisites are stages one and two completed. The LSE will direct six takeoffs and landings from the pattern while aircraft are operating from adjacent spots.

WARNING

No landing will be made forward of an adjacent occupied spot. NVD’s inherent depth perception and LSE tendencies preclude this operation.

H.5 STAGE FOUR: MULTIWAVE LAUNCH/RECOVERY OPERATIONS

Multiwave launch and recovery operations consist of a mix of aircraft in multiple waves operating from all spots. Stages one, two, and three must be complete.

WARNING

No landing will be made forward of an adjacent occupied spot. NVD’s inherent depth perception and LSE tendencies preclude this operation.

H.6 MAINTAINING NVD LSE QUALIFICATION

Each NVD LSE will attend 1 hour of classroom instruction or practical training on the NVDs after every 90 days of non-NVD operations. NVD LSE training will be logged and maintained in the individual LSE training record. The training should consist of but not be limited to the following subjects:

1. Lighting requirements
2. LSE signals
3. Aircrew tendencies
4. Emergency procedures.

H.7 SHIP QUALIFICATIONS

The ship’s commanding officer will make a final determination of ship’s ability to support NVD operations and report completion of stages of qualification to the ship’s ISIC. Ships must maintain a minimum of five LSEs and two safety observers NVD qualified through stage four in order to maintain qualification.
APPENDIX I

Sample Launch Cycle With Associated Recommended Communications

Flight Quarters — Called away 1.5 hours to 1 hour prior to launch

1. 1.5 hours to 1 hour prior to launch

5 MC: “On the flight deck, all hands on the bow for a FOD walkdown.” (with permission from Bridge)

1 MC: Primary will announce: “The following is a test of the A/C warning and crash alarms from Primary: _____________ test complete.”

2. 45 minutes to 30 minutes prior to launch

5 MC: “All unauthorized personnel clear the flight deck, catwalks, and troop walkways. All remaining personnel don the proper flight deck uniform: Helmets on and buckled, sleeves rolled down, goggles down, lifevests on and securely fastened.”

3. 20 minutes prior to launch

5 MC: “Check chocks, chains, fire bottles, and all loose gear about the deck. Plane captains and troubleshooters check your tool pouches for accountability. Stand clear of intakes, exhausts, and rotors. Clear to start APUs and spread spots _____________.”

4. Deck status light: *RED*

5 MC: “Clear to start engines spots _____________.”

5 MC: “Start all AV-8 aircraft.” (Proceed to step 8 if AV-8s are first)

5. Deck status light: *AMBER*

5 MC: “Engage spots _____________.”

Repeat until each is engaged.

6. Deck status light: *RED*

5 MC: “Load all go aircraft”

(Request “Green Deck” from Bridge)
7. Radio from PriFly: “99 aircraft, tower, radio check, in order, starting with spot ______________ aft.”

8. Radio from PriFly: “Tower reads all loud and clear. Prebriefed departures and recoveries remain the same (or state changes).”

“Relative wind is _____ at _____ knots.”

“True wind is _____ at _____ knots.”

“Altimeter is _______________.”

“Expected BRC is _______________.”

9. MOMS: “AV-8s are cleared No-Go-VTO.”

10. MOMS: “Taxi AV-8s in order, to ______________ foot mark.”

11. Deck status light: *GREEN*

HELOS

12. Radio from PriFly: “Cleared to launch on LSE signal.”

13. MOMS: “Launch A/C in order spots _______________.”

AV-8s


12. MOMS: “Launch the AV-8s in order.”

HELOS and AV-8s

14. Radio: “_____________ this is tower, Push (circuit net) No joy, POGO.”

5 MC: “Launch complete.”

15. Deck status light: *RED*
Sample Recovery Cycle With Associated Recommended Communications

Set Flight Quarters — 1 hour prior to recovery time

1. 45 minutes prior to recovery
   5 MC: “On the flight deck, all hands on the bow for a FOD walkdown.” (with permission from Bridge)

2. 15 minutes prior to recovery
   Deck status light: *RED*
   5 MC: “All unauthorized personnel clear the flight deck, catwalks, and troop walkways. All remaining personnel don the proper flight deck uniform: Helmets on and buckled, sleeves rolled down, goggles down, lifevests on and securely fastened.”

3. After ensuring Manned and Ready and having been granted permission for a Green deck from the Bridge
   5 MC: “On the flight deck, aircraft inbound, stand by to recover spot(s) _______________.”
   Deck status light: *GREEN*

4. After hand off from AATCC
   Radio from PriFly: “(A/C call) (and flight) cleared to break (or straight-in, etc.). Report the 180 or 1 mile final.”

5. A/C at the 180 (Day/VFR) or on a 1 mile final
   Radio from PriFly: Gear call and which seat landing.
   Radio from PriFly: “(A/C Call) Roger spot _______________.”
   5 MC: “(A/C (spot) (seat)).”

6. A/C on deck
   MOMS: “Hot pump, shut down, rearm, load serial, water, etc... as necessary.”

7. Recovery cycle complete
   5 MC: “Recovery complete.”
   5 MC: “Stand clear spot _______________ disengaging rotors.”
   Deck status light: *AMBER*
8. All A/C rotors disengaged
   Deck status light: *RED*

9. Upon concurrence from Bridge
   1 MC: “Secure from flight quarters.

   Set the Aircraft Integrity Watch.”
APPENDIX J

Joint Service (USA/USAF) Helicopters

J.1 INTRODUCTION

J.1.1 General

This section consists of general information pertaining to shipboard operations with current Army and Air Force helicopters. It is designed to provide flight and hangar deck personnel an initial frame of reference when operating with these aircraft, and should by no means be considered a complete discussion of the topic. It should also not be considered a substitute for joint planning.

This section is not intended to restrict operations, but rather only to provide guidance. The use of mandatory language has been purposely kept to a minimum.

Regardless of apparent exterior similarities, USA/USAF helicopters were not designed with the shipboard environment in mind, and differ significantly in key areas from their USN/USMC counterparts:

1. Most do not have rotor brakes. Rotor blades spend significantly more time at low RPM during start-up and coast down.
2. Many do not have rotor anti-flap restraints, further increasing the risk of flapping-induced damage while stationary or at low RPM.
3. Only the MH-53 has an automatic blade fold system. Folding H-47 aircraft is an extremely maintenance-intensive evolution. AH-64 aircraft have no provisions for folding rotor blades.
4. Blade fold systems are designed for aircraft transport only, and do not adequately protect the blades from damage from wind and/or rotor wash.
5. Aircraft tiedown points are not designed to meet shipboard requirements for strength, access and minimum numbers.
6. Most aircraft are not equipped with TACAN.
7. Many aircraft systems are susceptible to electromagnetic interference from shipboard transmitters.
8. Many USA/USAF helicopter weapons systems do not meet shipboard certification requirements.
9. AH/MH-6J and OH-58D helicopters, due to their light weight and skid-type landing gear, are susceptible to sliding due to deck motion, wind and rotor wash.
10. Most Army helicopters are not equipped with TACAN or UHF homing receivers, but are capable of HF homing. The use of shipboard continuous wave HF transmissions for aircraft navigation should be considered when operating with these aircraft. Prior coordination is required.

Operational requirements may preclude interfacing with assigned USA/USAF embarked units prior to conducting joint operations. However, it is highly recommended that ship personnel interface with embarked unit personnel as early as feasible prior to embarking joint helicopters to minimize problems at sea.

J.2 H-60 MODEL HELICOPTERS

J.2.1 Basic Capabilities & Characteristics.
All versions are based on the basic Army UH-60 Black Hawk helicopter, with 4-bladed main and tail rotors, 2 T700-GE-700/701C series engines with APU, non-retractable landing gear with 2 main wheels and a castering tailwheel, and 2 sliding cargo doors.

1. Crew

Crews consist of 2 pilots (minimum crew), plus a crew chief and/or mission specialists, and aerial gunner(s) as required.
J.2.1.1 UH-60A/L Utility Helicopter/UH-60Q/HH-60L MEDEVAC Helicopter

1. Shipboard Operations Capability
   a. No rotor brake (up to 8+ min rotor coast down)
   b. Manual blade fold (20-30 min under optimum conditions)
   c. Manual tail fold (lengthy maintenance action, impractical for operational use)
   d. Pressure refueling (except external tanks)
   e. No TACAN (UH-60A/L)
   f. TACAN (UH-60Q/HH-60L MEDEVAC Only)
   g. UHF
   h. APU.

2. Mission

   The “A” series is the basic Army utility helicopter used for tactical transport of troops, medical evacuation, cargo and reconnaissance. The “L” series is the same, but equipped with upgraded engines and transmission for improved performance, plus a higher capacity external cargo hook.

   The “Q” series is a UH-60A modified with extensive medical equipment and additional avionics and FLIR, used for medical evacuation, transport of medical teams and supplies, as well as provide support for combat search and rescue.

   Note

   The UH-60Q exists in extremely small numbers. The HH-60L is its replacement and has only begun production. HH-60L features may be different than stated in this document. All H-60 models can conduct medical evacuation missions and may even have a medical Red Cross insignia. H-60 aircraft conducting MEDEVAC missions are not necessarily a UH-60Q or HH-60L.

3. Mission Equipment
   a. External cargo hook
   b. External Stores Support System (ESSS) with 4 stores pylons for external fuel tanks
   c. Two window-mounted M60D 7.62 mm machine guns (UH-60A/L only)
   d. Volcano Multiple Mine Delivery System (UH-60A/L only)
   e. Forward Looking Infrared (FLIR) (UH-60Q/HH-60L MEDEVAC only)
   f. Medical Evacuation (MEDEVAC) System (UH-60Q/HH-60L MEDEVAC Only)
      (1) Litter lift system
      (2) Ambulatory patient configuration
      (3) Medical stations
      (4) Medical cabinets
      (5) Lighting systems
      (6) Provisions to support IV bags
      (7) Medical suction system
      (8) Oxygen delivery system
      (9) Outlets for 28VDC and 115VAC 60 cycle electrical power.

4. SAR Capability

   Some UH-60A/L helicopters are capable of fitting an electric hoist kit (only available to units with a dedicated SAR/MEDEVAC mission). Rafts may be carried.

   UH-60Q and HH-60L MEDEVAC helicopters are equipped with an electrically powered externally mounted hoist. Swimmers and/or rafts may also be carried.

5. Dimensions (see Figure J-1)
   a. Spread (rotors turning): 64’10”L / 53’8”W / 16’10”H
   b. Folded (no ext. tanks): 54’8”L / 14’4”W / 16’10”H
Figure J-1. UHH-60A/L/Q Dimensions
TIEDOWN FITTINGS ARE LOCATED ON THE MAIN LANDING GEAR DRAG BEAM, UPPER FORWARD FUSELAGE AND TAIL TRANSITION SEAM.

THESE RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.

Figure J-2. U/HH-60A/L/Q Initial Tiedown Configurations (Recommended)
c. Folded (ext. tanks): 54′8″L / 21′W / 16′10″H

d. Spot factor (LHA/LHD):
   5.19 (spread)
   1.60 (folded with ext. tanks)

6. Weight
   a. Empty (no fuel, no crew): 12,000 lbs.
   b. Operating (internal fuel, crew, no cargo): 15,000 lbs.
   c. Max gross on deck: 22,000 lbs.
   d. Max gross on deck (ferry only): 24,500 lbs.

7. Fuel/Quantity
   a. Primary fuel: JP-8
   c. Max internal: 360 gals / 2,450 lbs.
   d. Max external: 920 gals in 230 gal tanks / 6,250 lbs.
   e. Max total: 1,280 gals / 8,700 lbs.

8. Ordnance
   a. UH-60A/L: two M60D 7.62 mm machine guns, mounted in gunners’ windows on each side of the aircraft
   b. UH-60Q / HH-60L MEDEVAC: not armed
   c. Chaff / flares
   d. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, stores jettison, chaff/flare.

9. Internal Lift Capability
   a. UH-60A/L: maximum of 14 seats for crew and troops, up to 9,500 lbs. internal cargo, less than 300 lbs/ft² on cabin floor.
   b. UH-60Q / HH-60L MEDEVAC: 6 Litters and 3 seats for crew and patients or 9 seats in the ambulatory patient configuration.

10. External Lift Capability
    a. UH-60A and UH-60Q: 8,000 lbs.
    b. UH-60L and HH-60L: 9,000 lbs.

11. Comm/Nav Equipment
    a. UHF
    b. VHF (AM/FM)
    c. HF (not all)
    d. Have Quick/Have Quick II
    e. SINCGARS
    f. LF ADF
    g. VOR/ILS
    h. TACAN (UH-60Q / HH-60L MEDEVAC only)
    i. Doppler/GPS or INS
    j. VHF-FM Homing
    k. Personnel Locator System (UH-60Q / HH-60L MEDEVAC only).

J.2.1.2 MH-60K Assault Helicopter

1. Shipboard Operations Capability
   a. Rotor brake
   b. Manual blade fold (10–20 min under optimum conditions)
   c. Manual stabilator fold (10 min, impractical for daily use)
   d. Manual tail fold (lengthy maintenance action, impractical for operational use)
   e. Axle tiedown rings (outboard of main landing gear wheels)
   f. Pressure refueling (except external tanks)
   g. TACAN
2. Mission

The MH-60K Special Operations helicopter is used to insert special operations forces and cargo into hostile landing zones during day, night and adverse weather conditions over long distances.

3. Mission Equipment

a. Removable aerial refueling probe

b. External cargo hook

c. External Tank System (ETS) with 2 pylons for external fuel tanks

d. Two window-mounted M134 7.62 mm miniguns

e. Fast Rope Insertion/Extraction System (FRIES).

4. SAR Capability

An optional external hoist may be installed. Swimmers and/or rafts may also be carried.

5. Dimensions (see Figure J-3)

a. Spread (rotors turning): 64'10"L / 53'8"W / 16'10"H

b. Folded (w/ ext. tanks, no probe): 54'8"L / 17'11"W / 16'10"H

c. Folded (w/ ext. tanks, probe): 60'7"L / 17'11"W / 16'10"H

d. Spot factor (LHA/LHD):
   5.19 (spread)
   1.52 (folded w/ ext. tanks).

6. Weight

a. Empty (no fuel, no crew): 13,500 lbs.

b. Operating (internal fuel, crew, no cargo): 18,000 lbs.

c. Max gross on deck: 24,500 lbs.

7. Fuel/Quantity

a. Primary fuel: JP-8


c. Max internal: 360 gals / 2,450 lbs.

d. Max auxiliary internal: up to 340 gals / 2,300 lbs.

e. Max external: 460 gals (2 x 230 gal tanks) / 3,130 lbs.

f. Max total: 1,160 gals / 7,880 lbs.

8. Ordnance

a. Two M134 7.62 mm miniguns, mounted in gunners' windows on each side of the aircraft

b. Chaff / flares

c. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, external stores jettison, chaff/flare dispensers.

9. Internal Lift Capability

Maximum of 14 seats for crew and troops, up to 9,500 lbs. internal cargo, less than 300 lbs/ft² on cabin floor.

10. External Lift Capability

a. Up to 8,000 lbs.

11. Comm/Nav Equipment

a. SATCOM

b. UHF

c. VHF (AM/FM)

d. HF

e. Have Quick

f. Have Quick II

g. SINCGARS

h. TACAN
Figure J-3. MH-60K Dimensions
TIEDOWN FITTINGS ARE LOCATED ON THE MAIN LANDING GEAR AXLES, DRAG BEAM, FORWARD UPPER FUSELAGE, TAIL TRANSITION AREA AND FORWARD OF THE TAIL WHEEL.

INITIAL TIEDOWNS SHOULD BE INSTALLED ON THE MAIN LANDING GEAR AXLES.

THES RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.

Figure J-4. MH-60K Initial Tiedown Configuration (Recommended)
i. Doppler/GPS/INS
j. VOR/ILS
k. LF ADF
l. Personnel Locator System.

### J.2.1.3 MH-60L / MH-60L IDAP Assault Helicopter

1. Shipboard Operations Capability
   a. No rotor brake (up to 8+ min rotor coast down)
   b. Manual blade fold (10-20 min under optimum conditions)
   c. Manual stabilator fold (10 min, impractical for daily use)
   d. Manual tail fold (lengthy maintenance action, impractical for operational use)
   e. Axle tiedown rings (outboard of main landing gear wheels)
   f. Pressure refueling (except external tanks)
   g. TACAN
   h. UHF
   i. APU.

2. Mission
   The MH-60L is used to insert special operations forces and cargo into hostile landing zones during day, night and adverse weather conditions over long distances. The Integrated Defensive Armed Penetrator (IDAP) version provides extensive ordnance capabilities.

3. Mission Equipment
   a. Removable aerial refueling probe
   b. External cargo hook
   c. External Stores Support System (ESSS) with 4 stores pylons or External Fuel System (EFS) with 2 stores pylons for external fuel tanks and/or ordnance
d. Two window-mounted M134 7.62 mm miniguns
   e. Fast Rope Insertion/Extraction System (FRIES).

4. SAR Capability
   An optional external hoist may be installed. Swimmers and/or rafts may also be carried.

5. Dimensions (see Figure J-5)
   a. Spread (rotors turning):
      64'10"L / 53'8"W / 16' 10"H
   b. Folded (w/ ESSS, no probe):
      54'8"L / 20'2"W / 16'10"H
   c. Folded (w/ ESSS, probe):
      60'7"L / 20'2"W / 16'10"H
   d. Spot factor (LHA/LHD):
      5.19 (spread)
      1.55 (folded w/ ESSS).

6. Weight
   a. Empty (no fuel, no crew): 12,500 lbs.
   b. Operating (internal fuel, crew, no cargo): 16,000 lbs.
   c. Max gross on deck: 23,500 lbs.

7. Fuel / Quantity
   a. Primary fuel: JP-8
   c. Max main internal: 360 gals / 2,450 lbs.
   d. Max auxiliary internal: up to 958 gals / 6,510 lbs.
   e. Max external: 460 gals (2 x 230 gal tanks) / 3,130 lbs.
   f. Max total: 1,778 gals / 12,100 lbs.
Figure J-5. MH-60L Dimensions
TIEDOWN FITTINGS ARE LOCATED ON THE MAIN LANDING GEAR AXLES, DRAG BEAM, FORWARD UPPER FUSELAGE, TAIL TRANSITION AREA AND FORWARD OF THE TAIL WHEEL.

INITIAL TIEDOWNS SHOULD BE INSTALLED ON THE MAIN LANDING GEAR AXLES.

THese RECOMMENDED CONFIGURATIONS ARE BASED ON JSHP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.
8. Ordnance
   a. Base MH-60L: two M134 7.62 mm miniguns, mounted in gunners’ windows on each side of the aircraft.
   b. Chaff / flares
   c. MH-60L (IDAP) additional armament
      (1) HELLFIRE missiles
      (2) 30 mm cannon
      (3) 7.62 mm miniguns
      (4) 40 mm gun
      (5) 2.75” rockets
      (6) Air-to-Air Stinger (ATAS) missiles
      (7) Sidewinder missiles
      (8) SIDEARM
   d. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, external stores jettison, chaff/flare dispensers.

9. Internal Lift Capability
   Maximum of 14 seats for crew and troops, up to 9,500 lbs. internal cargo, less than 300 lbs/ft² on cabin floor.

10. External Lift Capability
    a. Maximum of 9,000 lbs.

11. Comm/Nav Equipment
    a. SATCOM
    b. UHF
    c. VHF (AM/FM)
    d. HF
    e. Have Quick
    f. Have Quick II
    g. SINCGARS
    h. TACAN
    i. Doppler/GPS
    j. VOR/ILS
    k. ADF
    l. Personnel Locator System.

J.2.1.4 HH-60G Assault Helicopter

1. Shipboard Operations Capability
   a. Rotor brake (airframe mod, not universally installed)
   b. Manual blade fold (10–20 min under optimum conditions)
   c. Manual tail fold (lengthy maintenance action, impractical for operational use)
   d. Pressure refueling
   e. TACAN
   f. UHF
   g. APU.

2. Mission
   The Air Force HH-60G helicopter is used to search, locate and recover combat aircrew members and is capable of other missions across the full spectrum of operations.

3. Mission Equipment
   a. Removable aerial refueling probe
   b. External cargo hook
   c. Fast Rope Insertion/Extraction System (FRIES)
   d. Two window-mounted GAU-2B/A 7.62 mm miniguns. Some aircraft may have .50 cal machine gun installed in aft cargo area.
4. SAR Capability

Full over-water SAR capability — external hoist, swimmer, rescue devices (swimmer carried only when designated as SAR aircraft).

5. Dimensions (see Figure J-7)
   a. Spread (rotors turning): 64’10”L / 53’8”W / 16’10”H
   b. Folded (no probe): 54’8”L / 14’4”W / 16’10”H
   c. Folded (w/ probe): 60’7”L / 14’4”W / 16’10”H
   d. Spot factor (LHA/LHD): 5.19 (spread) 1.52 (folded).

6. Weight
   a. Empty (no fuel, no crew): 14,500 lbs.
   b. Operating (fuel, crew, no cargo): 19,000 lbs.
   c. Max gross on deck: 22,000 lbs.

7. Fuel/Quantity
   a. Primary fuel: JP-8
   c. Max internal: 360 gals / 2,450 lbs.
   d. Max auxiliary internal: up to 370 gals / 2,520 lbs.
   e. Max total: 730 gals / 4,970 lbs.

8. Ordnance
   a. GAU-2B/A 7.62 mm miniguns mounted in gunners’ windows on each side of the aircraft. Some aircraft may have .50 cal machine gun installed in aft cargo area
   b. Two optional GAU-18/A .50 cal machine guns mounted in cabin window on each side of the aircraft
   c. Chaff / flares
   d. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, chaff/flare dispensers.

9. Internal Lift Capability

Maximum of 14 seats for crew and troops, up to 9,500 lbs. internal cargo, less than 300 lbs/ft² on cabin floor.

10. External Lift Capability

Not normally configured with cargo hook (hook capacity 8,000 lbs. when installed).

11. Comm/Nav Equipment
   a. SATCOM
   b. UHF
   c. VHF (AM/FM)
   d. HF
   e. Have Quick
   f. Have Quick II
   g. TACAN
   h. Doppler/INS/GPS
   i. VOR/ILS
   j. ADF
   k. Lightweight Airborne Recover System (LARS) (same as Army Personnel Locator System).

J.2.2 H-60 Operational Considerations

J.2.2.1 Navigation to Ship (UH-60A/L Only). Conventional Army UH-60A/L helicopters are not equipped with TACAN and may require escort and/or radar vectors to navigate to the ship.

J.2.2.2 ADF Steering to Ship. Army/Air Force H-60 helicopters are capable of receiving HF transmissions and using them for ADF steering to the ship. The
Figure J-7. HH-60G Dimensions
Figure J-8. HH-60G Initial Tiedown Configurations (Recommended)
NAVAIR 00-80T-106

The ship’s HF transmitter must be set for continuous-wave transmission of a single frequency signal between 2,000 to 2,199 kHz at a power level of approximately 50 watts. Ships should coordinate with units to provide a HF signal that will aid in navigation to the ship.

J.2.2.3 Chaining (UH-60A/L/Q, HH-60G, Some MH-60L)

WARNING

Army H-60 main landing gear tiedown rings are located on the lower part of the drag strut inboard of the wheels, requiring deck crew to reach around in front of the wheel to attach chains. Vigilance must be exercised when attaching chains to avoid rollover by the helicopter wheels.

Note

All MH-60K’s and some MH-60L’s also have tiedown rings on the main landing gear axle ends, similar to the Navy SH-60B/F.)

J.2.2.4 Chocking with Inboard-Mounted External Stores (UH-60A/L/Q, MH-60L)

WARNING

Inboard mounted external fuel tanks or stores on Army H-60 aircraft significantly impede access to the main wheels, exposing flight deck personnel to risk of injury in the event of inadvertent jettison or aircraft movement while chocking. Consideration should be given to safing the external stores jettison circuits prior to chocking, balanced with the need to expeditiously chock and chain the aircraft to prevent movement under severe deck motion conditions. Consideration should also be given to not carrying inboard mounted tanks or stores when severe deck motion conditions are likely to be encountered.

J.2.2.5 Blade Flapping During Rotor Coast Down & Start-up (UH-60A/L/Q, MH-60L, Some HH-60G)

WARNING

Most Army/Air Force H-60 helicopters are not equipped with rotor brakes; rotor blades begin turning upon engine startup. Extended rotor coast down times can be expected. These times can vary with relative wind speed and direction, and can exceed 8 minutes in winds as light as 20 knots. During rotor start and coast down, changing wind conditions, gusts, flight deck turbulence and rotor downwash from other helicopters can create excessive blade flapping and cause aircraft damage. Relative crosswinds that create strong updrafts at the ship’s deck edge are especially conducive to excessive blade flapping, and should be avoided. Non rotor brake-equipped H-60 helicopters are more susceptible to flapping than typical Navy helicopters. Extreme caution should be exercised when starting or shutting down these helicopters on board ship. The ship should treat start and shutdown of H-60 helicopters as if they had a rotor brake failure and be ready to provide optimum winds for the start or windmilling stop of the rotor system.

Note

Army H-60 helicopters, with the exception of the MH-60K, do not have rotor brakes. Air Force HH-60G helicopters are not universally equipped with rotor brakes.

J.2.2.6 Static Blade Flapping and Tiedown

CAUTION

Army/Air Force H-60 rotor blades are susceptible to static blade flapping, especially if blades are unrestrained and over the water in relative crosswinds that create strong updrafts at the ship’s deck edge.
Note
USA/USAF H-60 rotor blades cannot be folded quickly and should be tied down immediately after shutdown. Tiedown of H-60 blades requires pins to be inserted near the blade tips. If blades are hanging over the deck edge, their tiedown will be more difficult and time-consuming, requiring rotation of the blades. Ships should provide optimum wind conditions during shut down of H-60 helicopters until all blades are tied down.

J.2.2.7 Spotting During Blade Fold/Spread. Folding or spreading of USA/USAF H-60 main rotor blades requires the aircraft to be spotted with the blade arc over the deck. This is to allow crewmen to support the blades at their ends with a pole while walking the blades around to their folded or spread position. When spotted on LHA or LHD marked spots, H-60 rotor blades will extend over water.

J.2.2.8 Main Rotor Blade Fold/Spread

CAUTION
Unlike the Navy SH-60, folding or spreading of Army/Air Force H-60 main rotor blades is a manual operation. The effects of wind speed and direction, combined with ship motion, can adversely affect the ability of crewmen to control the blades. Crews must exercise extreme caution when folding or spreading blades in high wind/deck motion conditions.

Note
H-60 units have experienced increased difficulties physically controlling the rotor blades when folding or spreading in winds exceeding 30 knots, especially when gusting. The ship should be ready to provide optimum wind and deck motion conditions for folding of the USA/USAF UH-60 rotor system.

J.2.2.9 Time to Fold/Spread Rotors. Folding or spreading of USA/USAF H-60 main rotor blades is a manual operation, significantly affected by wind, ship motion conditions, material condition of the helicopter, and experience of the crew. Recorded fold times have ranged from as little as 10 minutes for an experienced crew to 80 minutes for an inexperienced crew. Recorded spread times have ranged from 10 minutes for an experienced crew to 58 minutes for an inexperienced crew. Time for manually folding and spreading main rotor blades should be taken into account for tactical planning.

J.2.2.10 Susceptibility to Damage with Rotors Folded

CAUTION
Unlike the Navy SH-60, the current Army/Air Force H-60 blade fold system is not designed to protect against winds. Helicopter launch/recovery operations adjacent to folded USA/USAF H-60 aircraft should not be conducted. The folded H-60 main rotor blades can contact each other causing damage. H-60 main rotor blades can also be damaged by high winds and/or ship motion in the folded configuration.

J.2.2.11 Tail Fold Limitations. Unlike the Navy SH-60, the Army/Air Force H-60 tail fold system is a maintenance operation designed for use during long term storage or logistic transportation, and is not intended for routine operational use. Do not expect Army/Air Force H-60 units to tail fold when aboard ship.

J.2.2.12 Stabilator Folding (MH-60K/L, HH-60G). Like the Navy SH-60, the Army MH-60K/L and Air Force HH-60G have a folding stabilator. The simple manual operation requires the use of a special tool to remove a pin on each side of the stabilator center section allowing the outboard sections of the stabilator to be folded up parallel to the vertical tail. Fixed support links are installed between the pins and stabilator to hold the stabilator section in the vertical position. Folding stabilators are not found on UH-60A/L/Q or HH-60L helicopters.
J.2.2.13 Handling — Tailwheel Locking Mechanism

CAUTION

When moving USA/USAF H-60 helicopters, the tailwheel locking mechanism should be disengaged prior to attaching the towbar. During towing, the manual H-60 tailwheel locking mechanism is susceptible to re-engaging, which could result in shearing of the lockpin. Tow crews should use a suitable device (grounding clamp, etc.) to hold the system’s mechanical stop in the unlocked position as the aircraft is towed.

J.2.2.14 Handling — Tailwheel Locking Mechanism Engagement

CAUTION

Manually rotating the tailwheel of Army and Air Force H-60 helicopters while the parking brake is set and then engaging the manual tail wheel locking system can result in binding and/or shearing of the lockpin. The parking brake should not be set when engaging the lockpin.

J.2.2.15 Compatibility with SD-2 Spotting Dolly. The SD-2 spotting dolly may be used to maneuver USA/USAF H-60 aircraft. Prior to raising or lowering the helicopter, the tail wheel must be aligned within 45° of the aircraft’s longitudinal axis. Once the tail wheel is raised, the SD-2 can operate up to ±90 degrees from the aircraft’s longitudinal axis.

CAUTION

When maneuvering USA/USAF H-60 aircraft with the SD-2, caution must be exercised to ensure that the rotational limits of the SD-2 lifting arms are not exceeded, causing damage to the aircraft or the SD-2.

J.2.2.16 Fuel Sampling

CAUTION

To take fuel samples from Army/Air Force H-60 helicopters, the gravity fuel port must be opened and remain open while taking the sample. The ship’s motion may cause fuel to spill from the open gravity fuel port. Proper precautions should be taken.

J.2.2.17 Refueling Extended Range Fuel System (ERFS) External Tanks (UH-60A/L/Q, MH-60L). Most Army H-60 external ERFS tanks can only be gravity refueled, which requires the aircraft to be shutdown when refueling aboard ship. Therefore, refueling operations for helicopters carrying external ERFS tanks require more time than refueling operations for Navy H-60 helicopters with external tanks. Recorded turnaround times for refueling of ERFS-equipped H-60 helicopters range from 25 to 28 minutes. If H-60 aircraft are configured with external tanks, extended turnaround times should be taken into consideration when performing operations planning.

J.2.2.18 Electromagnetic Vulnerability

WARNING

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.

J.3 H-47 MODEL HELICOPTERS

J.3.1 Basic Capabilities & Characteristics. The base Army H-47 Chinook model has 2 tandem counter-rotating 3-bladed rotors, 2 T55-L-712 or T55-GA-714A engines and an APU, four non-retractable landing gear with 2 twin-wheel forward
landing gear and 2 single-wheel full swivel aft landing
gear, a rear cargo ramp and forward cabin door and
window.

1. Crew

Minimum crew consists of 2 pilots and 1 flight
engineer. Typical crew includes an additional
crew chief and gunners, as required.

**J.3.1.1 CH-47D Chinook Helicopter**

1. Shipboard Operations Capability
   a. No rotor brake (up to 4+ min rotor coast
down)
   b. No blade fold (aircraft are capable, but
required support equipment is not available to
units)
   c. Strong rotor downwash (similar to H-53)
   d. Pressure refueling
   e. UHF
   f. APU.

2. Mission

The aircraft is a heavy assault helicopter used to
transport cargo, troops, and weapons during day,
night, visual, and instrument conditions.

3. Mission Equipment
   a. External cargo hooks: 3 (forward, center, aft)
   b. Optional defensive weapons: M60 7.62 mm
machine guns
   c. Cargo loading winch (hydraulically operated)
   d. Internal rescue hoist (operated through the
center hook hatch)
   e. Optional 2,320 gallon Forward Area Refuel-
ing Equipment (FARE) package for refueling
aircraft.

4. SAR Capability

The CH-47D has a limited overwater SAR capa-
bility. It is equipped with an internal rescue hoist,
and may carry rescue devices. A swimmer is not
carried.

5. Dimensions (see **Figure J-9**)

Spread (rotors turning): 98’11”L / 60’W / 18’11”H
   a. Folded (5 blades folded, 1 fwd):
      73’6”L / 15’11”W / 18’8”H
   b. Folded (6 blades folded):
      50’9”L / 15’11”W / 18’8”H
   c. Spot factor (LHA/LHD):
      12.5 (spread)
      1.73 (5 blades folded, 1 fwd)
      1.20 (6 blades folded).

6. Weight

   a. Empty (no fuel, no crew): 24,000-26,000 lbs.
   b. Operating (internal fuel, crew, no cargo):
      32,000 lbs.
   c. Max Gross on deck: 50,000 lbs.

7. Fuel / Quantity

   a. Primary fuel: JP-8
   c. Max internal: 1,028 gals / 7,000 lbs.
   d. Max auxiliary internal: up to 2,400 gals / 16,300 lbs.
   e. Max total: 3,428 gals / 23,300 lbs.

8. Ordnance

   a. Forward right cabin door: M60 7.62 mm
machine gun
   b. Forward left window: M60 7.62 mm machine
gun
   c. Rear ramp: provisions for a M60 7.62 mm
machine gun (typically not used)
NOTE:
1. THE ABOVE DIMENSIONS ARE BASED ON THE CYCLIC STICK AND DIRECTIONAL PEDALS BEING CENTERED AND THE THRUST CONTROL IN GROUND DETENT.
2. WITH THE FLIGHT CONTROLS OUT OF NEUTRAL, IT IS POSSIBLE FOR THE GROUND TO FORWARD ROTOR BLADE CLEARANCE TO BE 4 FEET 4 INCHES.
3. ALL DIMENSIONS ARE APPROXIMATE.
4. BLADE CHORD IS 32 INCHES.
5. BLADE LENGTH FROM TIP TO VERTICAL PIN.

Figure J-9. CH-47D Dimensions
d. Chaff / flares
e. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, chaff/flare dispensers.

9. Internal Lift Capability
a. Cargo area: 30'6"L (23'4"L w/guns) / 7'6"W / 6'6"H
b. Troop capacity: 33 troops (in seats)
c. Litter capacity: 24 litters
d. Pallets:
   3 USAF 463L (88" x 108")
   6 HCU-12/E or HCU-10/C pallets (54" x 88")
   8 to 10 warehouse wooden pallets (40" x 48")
e. Cargo weight: 18,000 lbs. (approximate).

10. External Lift Capability
The CH-47D has 3 cargo hooks. Each hook may be used separately or the forward and aft hook can be used in tandem. Tandem rigged loads will facilitate greater load stability and insure faster airspeeds during flight.

a. Forward hook: 17,000 lbs.
b. Center hook: 26,000 lbs.
c. Aft hook: 17,000 lbs.
d. Fwd and aft hook in tandem: 25,000 lbs.

**Note**
Figures are maximum hook rated loads and may not accurately reflect the true capability of the aircraft due to environmental conditions.

11. Comm/Nav Equipment
a. UHF
b. VHF (AM/FM)
c. HF
d. Have Quick / Have Quick II
e. SINCGARS
f. GPS
g. VOR/ILS
h. ADF
i. VHF-FM Homing.

**J.3.1.2 MH-47D Assault Helicopter**

1. Shipboard Operations Capability
   a. No rotor brake (up to 4+ min rotor coast down)
   b. Manual blade fold (30 min under optimum conditions)
   c. Strong rotor downwash (similar to H-53)
   d. Pressure refueling
e. TACAN
f. UHF
g. APU.

2. Mission
The MH-47D is a heavy assault helicopter used to insert special operations forces, cargo and equipment into hostile landing zones during day, night and adverse weather conditions over long distances.

3. Mission Equipment
   a. Aerial refueling probe (semi-permanent; not all equipped)
   b. Extensive avionics and navigation equipment
c. Weather avoidance / search radar
d. Forward Looking Infrared (FLIR)
c. External cargo hooks: 3 (forward, center, aft)

f. Optional defensive weapons: 7.62 mm miniguns or M60 machine guns

g. Cargo loading winch (hydraulically operated)

h. Internal rescue hoist (operated through the center hook hatch)

i. Fast Rope Insertion/Extraction System (FRIES)

j. Optional 2,320 gallon Forward Area Refueling Equipment (FARE) package for refueling aircraft.

4. SAR Capability

The MH-47D has a limited overwater SAR capability. It is equipped with an internal rescue hoist, and may carry rescue devices. A swimmer is not carried.

5. Dimensions (see Figure J-10)

a. Spread (rotors turning):

   98'10.7"L / 60’W / 18'11”H

b. Folded (5 blades folded, 1 fwd):

   73'6"L / 15'11”W / 18'8”H

c. Folded (6 blades folded, w/ probe):

   68'1”L / 15'11”W / 18'8”H

d. Folded (6 blades folded, no probe):

   51'9”L / 15'11”W / 18'8”H

e. Spot factor (LHA/LHD):

   12.50 (spread)
   1.78 (5 blade fold, 1 fwd)
   1.60 (6 blade fold, probe)
   1.20 (6 blade fold, no probe).

6. Weight

a. Empty (no fuel, no crew): 29,000 lbs.

b. Operating (internal fuel, crew, no cargo): 42,500 lbs.

c. Max gross on deck: 50,000 lbs. (waiver to 54K lbs.)

7. Fuel / Quantity

a. Primary fuel: JP-8


c. Max internal: 1,028 gals / 7,000 lbs.

d. Max auxiliary internal: up to 2,400 gals / 16,300 lbs.

e. Max total: 3,428 gals / 23,300 lbs.

8. Ordnance

a. Forward right cabin door: M134 7.62 mm minigun or M60 7.62 mm machine gun

b. Forward left window: M134 7.62 mm minigun or M60 7.62 mm machine gun

c. Rear ramp: M60 7.62 mm machine gun

d. May mount additional weapons at rear windows as required

e. Chaff / flares

f. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, chaff/flare dispensers.

9. Internal Lift Capability

a. Cargo area: 30'6”L (23'4”L w/guns) / 7'6”W / 6'6”H

b. Troop capacity: 33 troops (in seats)

c. Litter capacity: 24 litters

d. Pallets:

   3 USAF 463L (88” x 108”)
   6 HCU-12/E or HCU-10/C pallets (54” x 88”)
   8 to 10 warehouse wooden pallets (40” x 48”)

e. Cargo weight: 20,000 lbs. (approximate).

10. External Lift Capability

The MH-47D has 3 cargo hooks. Each hook may be used separately, or the forward and aft hook may be used in tandem. Tandem rigged loads will facilitate greater load stability and ensure faster airspeeds during flight.

a. Forward hook: 17,000 lbs.

b. Center hook: 26,000 lbs.
Figure J-10. MH-47HD Dimensions

NOTE:

1. THE ABOVE DIMENSIONS ARE BASED ON THE CYCLIC STICK AND DIRECTIONAL PEDALS BEING CENTERED AND THE THRUST CONTROL IN GROUND DETENT.
2. WITH THE FLIGHT CONTROLS OUT OF NEUTRAL, IT IS POSSIBLE FOR THE GROUND TO FORWARD ROTOR BLADE CLEARANCE TO BE 4 FEET 4 INCHES.
3. ALL DIMENSIONS ARE APPROXIMATE.
4. BLADE CHORD IS 32 INCHES.
5. BLADE LENGTH FROM TIP TO VERTICAL PIN.
Figure J-11. CH-47D / MH-47D Rotor Engagement Envelopes
c. Aft hook: 17,000 lbs.

d. Fwd and aft hook in tandem: 25,000 lbs.

**Note**
Figures are maximum hook rated loads and may not accurately reflect the true capability of the aircraft due to environmental conditions.

11. Comm/Nav Equipment

  a. SATCOM
  b. UHF
  c. VHF (AM/FM)
  d. HF
  e. Have Quick / Have Quick II
  f. SINCGARS
  g. TACAN
  h. GPS/INS
  i. VOR/ILS
  j. ADF
  k. Personnel Locator System.

**J.3.1.3 MH-47E Assault Helicopter**

1. Shipboard Operations Capability

   a. Rotor brake
   b. Manual blade fold (30 min under optimum conditions)
   c. Axle tiedown rings (outboard of each landing gear wheels)
   d. Strong rotor downwash (similar to H-53)
   e. Pressure refueling
   f. TACAN
   g. UHF
   h. APU.

2. Mission

   The MH-47E is a heavy assault helicopter used to insert special operations forces, cargo and equipment into hostile landing zones during day, night and adverse weather conditions over long distances.

3. Mission Equipment

   a. Aerial refueling probe (semi-permanent).
   b. Extensive avionics and navigation equipment:
      (1) Multi-mode radar
      (2) Forward Looking Infrared (FLIR)
      (3) SABRE radio ground communications
   c. External cargo hooks: 3 (forward, center, aft).
   d. Optional defensive weapons: 7.62 mm mini-guns or M60 machine gun
   e. Cargo loading winch (hydraulically operated)
   f. Internal rescue hoist (operated through the center hook hatch)
   g. Optional external rescue hoist
   h. Fast Rope Insertion/Extraction System (FRIES)
      i. Optional 2,320 gallon Forward Area Refueling Equipment (FARE) package for refueling aircraft.

4. SAR Capability

   The MH-47E has a limited overwater SAR capability. It is equipped with an internal rescue hoist, and may carry rescue devices. A swimmer is not carried.
5. Dimensions (see Figure J-12)
   a. Spread (rotors turning):
      \[99' L / 60' W / 18'11" H\]
   b. Folded (5 blades folded, 1 fwd):
      \[73'10" L / 15'11" W / 18'8" H\]
   c. Folded (6 blades folded, w/ probe):
      \[68'9" L / 15'11" W / 18'8" H\]
   d. Spot factor (LHA/LHD):
      \[12.50\text{ (spread)}\]
      \[2.07\text{ (5 blade fold, 1 fwd)}\]
      \[1.87\text{ (6 blade fold, probe)}\]

6. Weight
   a. Empty (no fuel, no crew): 29,000 lbs.
   b. Operating (internal fuel, crew, no cargo): 42,500 lbs.
   c. Max gross on deck: 54,000 lbs.

7. Fuel / Quantity
   a. Primary fuel: JP-8
   c. Max internal: 2,068 gals / 14,000 lbs.
   d. Max auxiliary internal: up to 2,475 gals / 16,800 lbs.
   e. Max total: 4,543 gals / 30,800 lbs.

8. Ordnance
   a. Forward right cabin door: M134 7.62 mm minigun or M60 7.62 mm machine gun
   b. Forward left window: M134 7.62 mm minigun or M60 7.62 mm machine gun
   c. Rear ramp: M60 7.62 mm machine gun
   d. May mount additional weapons at rear windows as required
   e. Chaff/flares
   f. CADs for engine fire extinguishers, cargo hook, rescue hoist cable cutter, chaff/flare dispensers.

9. Internal Lift Capability
   a. Cargo area: 30'6"L (23'4"L w/guns) / 7'6"W / 6'6"H
   b. Troop capacity: 44 troops (in seats)
   c. Litter capacity: 24 litters
   d. Pallets:
      \[3\text{ USAF 463L (88" x 108")}\]
      \[6\text{ HCU-12/E or HCU-10/C pallets (54" x 88")}\]
      \[8\text{ to 10 warehouse wooden pallets (40" x 48")}\]
   e. Cargo weight: 20,000 lbs. (approximate).

10. External Lift Capability
    The MH-47E has 3 cargo hooks, each hook may be used separately or the forward and aft hook can be used in tandem. Tandem rigged loads will facilitate greater load stability and insure faster airspeeds during flight.
    a. Forward hook: 17,000 lbs.
    b. Center hook: 26,000 lbs.
    c. Aft hook: 17,000 lbs.
    d. Fwd and aft hook in tandem: 25,000 lbs.

    **Note**
    Figures are maximum hook rated loads and may not accurately reflect the true capability of the aircraft due to environmental conditions.
Figure J-12. MH-47E Dimensions

NOTES:

1. THE ABOVE DIMENSIONS ARE BASED ON THE CYCLIC STICK AND YAW PEDALS CENTERED AND THE THRUST CONTROL AT THE DETENT.

2. WITH THE FLIGHT CONTROLS OUT OF NEUTRAL IT IS POSSIBLE FOR STATIC GROUND-TO-FORWARD-ROTOR-BLADE CLEARANCE TO BE 4 FEET 4 INCHES.
Figure J-13. MH-47E Rotor Engagement Envelopes
Figure J-14. CH-47D MH-47D / MH-47E Initial Tiedown Configurations (Recommended)
11. Comm/Nav Equipment
   a. SATCOM
   b. UHF
   c. VHF (AM/FM)
   d. HF
   e. Have Quick / Have Quick II
   f. SINCGARS
   g. TACAN
   h. GPS/INS
   i. VOR/ILS
   j. ADF
   k. Personnel Locator System.

J.3.2 H-47 Operational Considerations

J.3.2.1 Navigation to Ship. Conventional Army CH-47D helicopters are not equipped with TACAN and may require escort and/or radar vectors to navigate to the ship. MH-47D/E helicopters, operated by Army Special Operations Forces, are equipped with TACAN.

J.3.2.2 ADF Steering to Ship. All CH-47D and MH-47D/E helicopters are capable of receiving HF transmissions and using them for ADF steering to the ship. The ship’s HF transmitter must be set for continuous-wave transmission of a single frequency signal between 2,000 to 2,199 kHz at a power level of approximately 50 watts. Ships should coordinate with units to provide a HF signal that will aid in navigation to the ship.

J.3.2.3 Rotor Downwash

CH/MH-47D/E helicopters create strong downwash during hover, similar in magnitude to the CH-53 helicopter.

J.3.2.4 Blade Flapping During Coast Down & Start-up (H-47D Only)

WARNING

CH/MH-47D helicopters are not equipped with rotor brakes; rotor blades begin turning upon engine startup. Recorded rotor coast down times approach 4 minutes in winds as light as 20 knots. Changing wind conditions, gusts, flight deck turbulence and rotor downwash from other helicopters can create excessive blade flapping and cause aircraft damage. Relative crosswinds that create strong updrafts at the ship’s deck edge should be avoided. Extreme caution should be exercised when starting or shutting down these helicopters on board ship. The ship should treat start and shutdown of CH/MH-47D helicopters as if they had a rotor brake failure and be ready to provide optimum winds for the start or windmilling stop of the rotor system.

J.3.2.5 Static Blade Flapping and Tiedown

CAUTION

Unlike Navy helicopters, Army H-47 helicopters are not equipped with an anti-flap device to limit excessive upward flapping of static main rotor blades. These helicopters are susceptible to static blade flapping, especially if blades are unrestrained and over the water in relative crosswinds that create strong updrafts at the ship’s deck edge.

Note

Unlike Navy helicopters, H-47 rotor blades cannot be folded quickly and should be tied down immediately after shutdown. Tiedown of H-47 blades requires pins to be inserted near the blade tips. If blades are hanging over the deck edge, tiedown will be more difficult and time-consuming, requiring rotation of the blades. In high winds, securing blades by rope to the fuselage may not provide adequate prevention of flapping. Units may
choose to secure the blades to the flight deck padeyes, which may require respotting. Ships should provide optimum wind conditions during shut down of CH/MH-47D/E helicopters until the blades are tied down.

**J.3.2.6 Tiedown Fittings.** H-47 aircraft have four towing shackles, located near each main landing gear, which are used for chaining. Additionally, the helicopters have provisions for two removable aft jack point tiedown adapters, which are rings attached by a bolt to the jack pad area located on the lower side of each sponson, just forward of each rear landing gear. Analysis indicates that without use of the jack point tiedown adapters, there will be insufficient lateral strength in the towing shackles to properly restrain the aircraft during moderate or heavy weather, regardless of the number of chains applied. This finding highlights the need to configure H-47 helicopters with jack point tiedown adapters when embarking operationally aboard ship, and is consistent with the Army requirement to use jack point tiedown adapters when transporting the aircraft by vessel, truck or air.

**J.3.2.7 Handling**

**CAUTION**

When moving CH/MH-47D/E helicopters, a manually operated steering bar must be attached to the castering left rear wheel to keep it parallel to the right rear wheel. The left rear wheel must be kept parallel to the right rear wheel to prevent damage. Deck personnel should be trained in the proper use of the CH/MH-47D/E manually operated steering bar.

**Note**

Operation of the manual steering bar is cumbersome, requiring attention and coordination with the tractor/towbar when going backwards and reversing directions, especially when maneuvering in close quarters. Some units possess unique tandem towbars that connect the towbar and the steering bar to eliminate the need to hand-tend the second wheel. This system provides benefits when going backwards and reversing directions frequently, but does not allow for as much steering throw travel as the single bar system, and may not be preferable in all situations. Ships handling crews should expect difficulties when handling CH/MH-47D/E helicopters in close quarters aboard ship.

**J.3.2.8 Compatibility with SD-2 Spotting Dolly.** The SD-2 spotting dolly may be used to maneuver CH/MH-47D/E helicopters. The aircraft’s right rear tailwheel must be raised or lowered while aligned with the longitudinal axis of the aircraft. While the tail wheel is raised, the SD-2 can operate from 30° left and 90° right of the longitudinal axis.

**J.3.2.9 Locally-Procured Blade Fold System.** Army Special Operations Force (SOF) units have developed a limited number of manual blade fold kits that can be used on CH or MH-47D/E helicopters. CH-47 units typically do not possess blade fold equipment, but may in a contingency. To fold or spread requires 12 people. The aircraft must be spotted with rotor arc over the deck and APU running. After disconnecting hardware at the rotor head and installing servo blocks, each blade must be manually supported by four people using a pole and walked around to its folded position in a rack on the fuselage top. Units will require deck winds of less than 30 knots and minimum deck motion during folding or spreading, due to difficulties in controlling the blades. Although all 6 blades can be folded over the fuselage, the preferred method aboard ship is to fold 5 blades and leave one blade extended over the nose of the aircraft. Recorded times for highly experienced crews to fold or spread 5 blades vary from approximately 30 to 35 minutes; inexperienced crews will take significantly longer. The aircraft may or may not require a maintenance check flight afterwards.

**J.3.2.10 Fit on LHA Elevator.** A spread CH/MH-47D/E helicopter will not fit on either the port or aft LHA elevator. A single CH/MH-47D/E helicopter in the 5-blade fold configuration will fit on the port elevator but not on the aft elevator. To fit on the aft elevator requires the refueling probe (if installed) to be removed, the forward blade removed or folded, and the remaining five blades folded or removed.
J.3.2.11 **Fit on LHD Elevator.** A spread CH/MH-47D/E helicopter will not fit on a LHD elevator. One or two CH/MH-47D/E helicopters in the 5 blade fold configuration will fit on a LHD elevator (total weight must be below 75,000 lbs.).

J.3.2.12 **External Hydraulic Power Connections.** CH/MH-47D/E helicopters are equipped with quick-disconnect external hydraulic power fittings that will not fit Navy hydraulic support equipment fittings that are threaded. Adapters to mate H-47 and Navy fittings are not available through normal procurement channels, but can be made by fitting an H-47 female quick disconnect fitting and a Navy male threaded fitting to either end of a length of flexible hydraulic line.

J.3.2.13 **Cargo Loading/Offloading.** Clearance under the H-47 tail section is restricted. When loading and offloading cargo, clearance is further reduced by landing gear strut compression as the aircraft’s gross weight increases. 6,000 pound capacity forklifts may not fit under the tail at high aircraft gross weights. Fork extenders may be required when loading/offloading 463L pallets. Pallet loads may need to be restricted to accommodate the capacity of compatible shipboard forklifts. H-47 aircraft with the Helicopter Internal Cargo Handling System can be configured with ramp extenders with rollers that effectively increase the clearance under the tail and enable the use of larger forklifts and heavier pallets.

J.3.2.14 **Electromagnetic Vulnerability**

![CAUTION]

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.

J.4 **AH-64A/D SERIES HELICOPTERS**

J.4.1 **Basic Capabilities & Characteristics.** The Army AH-64 Apache attack helicopter has a two-place tandem cockpit, 4-bladed main and tail rotors, 2 T700-GE-701/701C series engines with APU, non-retractable landing gear with 2 main wheels and swiveling tailwheel, and wings to mount 4 stores pylons.

1. **Crew**
   
   Crews consist of 1 pilot and 1 copilot/gunner (CPG).

2. **Shipboard Operations Capability**
   
   a. Rotor brake
   
   b. No blade fold ability (blades must be removed)
   
   c. Pressure refueling (except external tanks)
   
   d. No TACAN
   
   e. UHF
   
   f. APU.

3. **Mission**
   
   The AH-64A series is the basic Apache attack helicopter utilized as an aerial weapons platform. The AH-64D is a remanufactured and upgraded version of the AH-64A and has improvements to the airframe which include increased electrical power, integrated information processing, improved cooling, expanded forward avionics bays, and a manpower and integration (MANPRINT) cockpit to improve crew performance. The “D” series can be configured with a mast mounted Longbow Fire Control Radar.

4. **Mission Equipment**
   
   a. Turret-mounted Target Acquisition Designator Sight (TADS) and Pilot Night Vision Sensor (PNVS)
   
   b. Turret mounted 30 mm chain gun
   
   c. Four wing-mounted stores pylons for ordnance or Extended Range Fuel System (ERFS) tanks.
5. SAR Capability

None. Optical sights and night vision systems offer limited search capabilities.

6. Dimensions (see Figures J-15 and J-16)

a. Spread (rotors turning): 57'8" L / 48' W / 15'3" H (18'7" H with fire control radar on main rotor mast or FM-AM antenna on tail pylon)

b. Main rotors removed: 49'1" L / 17'2" W (AH-64A); 16'4" W (AH-64D) / 15'3" H


7. Weight

a. Empty (no fuel, no crew):
   - AH-64A: 11,000 lbs.
   - AH-64D: 12,700 lbs.

b. Operating (internal fuel, crew):
   - AH-64A: 15,500 lbs.
   - AH-64D: 16,900 lbs.

c. Max gross on deck:
   - AH-64A: 21,000 lbs.
   - AH-64D: 23,000 lbs.

8. Fuel/Quantity

a. Primary fuel: JP-8


c. Max internal: 376 gals / 2,560 lbs.

d. Typical mission external: 230 gals / 1,560 lbs.

e. Max external: 920 gals / 6,260 lbs.

f. (4 x 230 gal tanks — ferry only)

g. Max total: 1,296 gals / 8,820 lbs.

9. Ordnance

a. 30 mm turret-mounted chain gun

b. 2.75" rockets
c. HELLFIRE missiles
d. RF HELLFIRE missiles (AH-64D only)
e. Chaff / flares

f. CADs for engine fire extinguishers, external stores jettison, chaff/flare dispensers.

10. Internal Lift Capability

None.

11. External Lift Capability

None.

12. Comm/Nav Equipment

a. UHF

b. VHF (AM/FM)

c. Have Quick / Have Quick II

d. SINCGARS
e. Embedded GPS-INS (EGI)

f. ADF.

J.4.2 AH-64 Operational Considerations

J.4.2.1 Navigation to Ship. AH-64A/D helicopters are not equipped with TACAN and may require escort and/or radar vectors to navigate to the ship.

J.4.2.2 ADF Steering to Ship. AH-64 helicopters are capable of receiving HF transmissions and using them for ADF steering to the ship. The ship’s HF transmitter must be set for continuous-wave transmission of a single frequency signal between 2,000 to 2,199 kHz at a power level of approximately 50 watts. Ships should coordinate with units to provide a HF signal that will aid in navigation to the ship.

J.4.2.3 Tiedown Fittings. The AH-64A/D permanent forward tiedown points consist of an integral lug located high on each landing gear strut, recessed behind an access panel. A removable forward fuselage tiedown fitting can be mounted on each landing gear cross tube immediately forward of the permanent lug. The removable fittings extend outboard beyond the side
Figure J-15. AH-64A Dimensions
Figure J-16. AH-64D Dimensions
Figure J-17. AH-64A/D Initial Tiedown Configuration (Recommended)

TIEDOWN FITTINGS ARE LOCATED ON THE TOP OF THE MAIN LANDING GEAR STRUTS AND BOTTOM OF THE TAIL FUSELAGE.

THESE RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.

WARNING

DUE TO THE CLOSE PROXIMITY OF THE TAIL ROTOR TO THE TAIL TIEDOWN FITTING, USE ONLY THE FORWARD FUSELAGE TIEDOWN FITTINGS FOR INITIAL TIEDOWN.
of the aircraft and allow for unrestricted access for chaining. The forward fuselage tiedown fittings are superior in strength to the permanent lugs in all directions. Use of the removable forward fuselage tiedown fitting provides adequate strength to restrain the AH-64A/D in all directions at all gross weights and weather conditions. This finding highlights the need to configure AH-64A/D helicopters with removable forward fuselage tiedown fittings when embarking operationally aboard ship.

J.4.2.4 Chaining with Rotors Turning

**WARNING**

The AH-64A/D tail rotor is in very close proximity to the aft fuselage tiedown fitting. The aft fuselage tiedown fitting should not be used or approached any time the rotor is turning. For initial tiedown configuration (four chains), attach two chains to each forward fuselage tiedown fitting or the mooring lug on each MLG trailing arm, if the forward fuselage tiedown fittings are not installed.

J.4.2.5 Chain Removal. The AH-64A/D has a pronounced tendency to roll on its landing gear in response to ship motion. This characteristic may manifest itself in alternately slack and tight forward tiedown chains. Chaining crews should wait until the chain slackens prior to removing the chain.

J.4.2.6 Static Blade Flapping and Tiedown

**CAUTION**

Army AH-64A/D helicopters are not equipped with an anti-flap device to limit excessive upward flapping of static main rotor blades. These helicopters are susceptible to static blade flapping, especially if blades are unrestrained and over the water in relative crosswinds that create strong updrafts at the ship’s deck edge.

J.4.2.7 Instability on Deck

**WARNING**

The AH-64A/D is more susceptible to rollover than other Navy and Army helicopters. Ship roll angles of as little as 8° may lead to rollover of an unchained AH-64A/D, resulting in damage to the helicopter and injury to personnel. Asymmetric loading will increase susceptibility. Extreme caution should be exercised when moving or operating the helicopter unchained, especially under unpredictable ship rolling conditions.

J.4.2.8 Compatibility with SD-2 Spotting Dolly. The SD-2 spotting dolly may be used to maneuver H-64 aircraft. Prior to raising or lowering the helicopter, the tail wheel must be aligned with the aircraft’s longitudinal axis. Once the tail wheel is raised approximately 9 inches, the SD-2 can operate up to ±90 degrees from the aircraft’s longitudinal axis.

When maneuvering AH-64 aircraft with the SD-2, caution must be exercised to ensure that the rotational limits of the SD-2 lifting arms are not exceeded, causing damage to the aircraft or the SD-2.

J.4.2.9 Refueling Procedures Training. During refueling operations, the fuel handlers must follow the refuel checklist on the inside panel of the refueling panel access door. A crucial step in the refuel process occurs after refueling is complete; the REFUEL VALVE switch must be turned to the CLOSED position, or fuel cannot be transferred between the two
fuel cells. An inability to transfer fuel causes a fuel imbalance and can exceed center of gravity limits with possibly catastrophic results. The AH-64A/D crew does not include a crew chief and normally neither pilot assists in refuel operations. Therefore, it is critical that the ship’s fuels personnel receive familiarization training on AH-64A/D refueling procedures and external cockpit switchology prior to the aircraft arriving onboard so they are prepared to safely refuel the aircraft.

J.4.2.10 Pressure Refueling. The recessed fuel panel of the AH-64A/D may cause interference with the older version of the Carter #64349 D-1 single point pressure refueling nozzle. This nozzle must be mounted with the flow control handle at the 8 o’clock position, to allow full travel of the handle.

J.4.2.11 Refueling of External Tanks. The external fuel tanks on the AH-64A/D can only be gravity refueled.

J.4.2.12 Electromagnetic Vulnerability

**WARNING**

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.

J.5 OH-58D SERIES HELICOPTERS

J.5.1 Basic Capabilities & Characteristics. The base Army OH-58D series helicopter has a 4-bladed main rotor and a 2-bladed tail rotor, one T703-AD-700A engine, and fixed landing skids. The aircraft operates in day/night VMC only.

1. Crew
   a. A crew consists of 1 pilot and 1 copilot/gunner (CPG).

2. Shipboard Operations Capability
   a. No rotor brake (2-8+ min rotor coast down)
   b. Single engine (travels over water in pairs)
   c. Manual main rotor blade fold (3-5 min under optimum conditions)
   d. Manual fold of horizontal stabilizer
   e. Closed circuit refueling (15 psi – not compatible with HIFR nozzle) or gravity refueling only
   f. No auxiliary fuel tanks
   g. Skid landing gear
   h. Can be configured with Rapid Deployment Landing Gear (improved tiedown points)
   i. No TACAN
   j. UHF
   k. No APU (battery start)
   l. Day/night VFR only (NVD-capable).

3. Mission
   The primary mission of the OH-58D series is to conduct close combat aerial reconnaissance, intelligence gathering, surveillance, and target acquisition, and is armed for self-defense and targets of opportunity.

4. Mission Equipment
   a. Main rotor Mast-Mounted Sight Subsystem (MMSS) containing:
      (1) Television Sensor (TVS)
      (2) Thermal Imaging Sensor (TIS)
      (3) Laser Rangefinder/Designator (LRF/D).
   b. Universal weapons pylons capable of mounting offensive weapons.
5. SAR Capability

None. Optical sights and night vision systems offer limited search capabilities.

6. Dimensions (see Figures J-18 and J-19)

a. Spread (rotors turning):
   41'2"L / 35"W / 12'11"H

b. Folded:
   33'7.2"L / 9'2"W / 12'11"H (folded stab)

c. Spot factor (LHA/LHD):
   2.18 (spread)
   0.57 (all blades folded).

7. Weight

a. Empty (no fuel, no crew): 3,600 lbs.

b. Operating (internal fuel, crew): 4,700 lbs.

c. Max Gross on deck: 5,200 lbs.

8. Fuel/Quantity

a. Primary fuel: JP-8


c. Max capacity: 110 gals / 750 lbs.

9. Ordnance

a. .50 cal machine gun

b. 2.75" rockets

c. Air-to-Air Stinger (ATAS) missiles

d. HELLFIRE missiles

e. CADs for external stores jettison.

10. Internal Lift Capability

None.

11. External Lift Capability

None.

12. Comm/Nav Equipment

a. UHF

b. VHF (AM/FM)

c. HF

d. Have Quick / Have Quick II

e. SINCGARS

f. Embedded GPS-INS (EGI).

J.5.2 OH-58D Operational Considerations

J.5.2.1 Navigation to Ship. Most OH-58D helicopters are not equipped with TACAN and may require escort and/or radar vectors to navigate to the ship.

J.5.2.2 Rotor Coast Down. OH-58D helicopters do not have rotor brakes. Recorded rotor coast down times vary from 2 minutes in 20 knot winds to almost 8 minutes in 30 knot winds.

J.5.2.3 Aircraft Tiedown Fittings. OH-58D helicopters are configured with one of two types of aircraft tiedown fittings. An aircraft with standard landing gear has three tiedown rings. Each ring is bolted to an aircraft jack point on the underside of the fuselage: one under each pilot’s seat, and a third next to the lower anti-collision light (see Figure J-20). An aircraft fitted with the rapid deployment landing gear has four additional tiedown lugs, one integral to the top of each landing gear strut (see Figure J-21). These lugs allow for unrestricted access for chaining and are superior in strength to the jack point tiedown rings in all directions. The jack point rings do not provide adequate strength to restrain the OH-58D in all directions at all gross weights and weather conditions. Aircraft configured with the rapid deployment landing gear are preferred for shipboard operations.
Figure J-18. OH-58D Dimensions — Standard Landing Gear
Figure J-19. OH-58D Dimensions — Rapid Deployment Landing Gear
TIEDOWN FITTINGS ARE ATTACHED TO THE FORWARD AND AFT JACKPOINTS.

THESE RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.

Figure J-20. OH-58D Initial Tiedown Configuration — Standard Landing Gear (Recommended)
Figure J-21. OH-58D Initial Tiedown Configuration — Rapid Deployment Landing Gear (Recommended)

TIEDOWN FITTINGS ARE LOCATED ON THE TOPS OF THE RAPID DEPLOYMENT LANDING GEAR STRUTS.

THESE RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.
The OH-58D is a lightweight helicopter and is very susceptible to damage from high winds and rotor wash. Downwash from an adjacent upwind spot has caused jack point tiedown rings to shear/separate from their mounts, allowing the OH-58D to slide toward the deck edge. Launches and recoveries to a spot immediately upwind or crosswind from an OH-58D (blades rotating, static, tied down or folded) should not be conducted except in case of an emergency.

J.5.2.4 Use of ALBAR/NT-4 Towbars.
OH-58D helicopters are configured with tow rings inboard on the landing gear skids. These rings will not mate with the ALBAR or NT-4 towbars configured for wheeled helicopters. It is possible to reconfigure the ALBAR or NT-4 towbar to mate with the OH-58D skid tow rings as follows:

1. Swap the left/right ALBAR/NT-4 foot assemblies.

2. Remove the ALBAR/NT-4 axle tow pins.

This reconfiguration will render the ALBAR/NT-4 towbar incapable of towing Navy wheeled aircraft.

J.5.2.5 Handling & Parking

The OH-58D will slide on its skids on a wet and/or moving deck. Whenever the aircraft is shut down, in addition to chains, ground handling wheels should be attached to the skids and chocks applied to the wheels.

J.5.2.6 Refueling

Shipboard HIFR (CCR) nozzles, such as the Wiggins and NATO High Capacity (NHC) nozzles, cannot be used to closed circuit refuel OH-58D helicopters. The 45 psi output of these nozzles could cause damage to the aircraft’s fuel systems, rupture tanks, and cause a fuel spill or fire.

Note
- If shipboard CCR operations are anticipated for OH-58D helicopters, an Army fuel nozzle must be either provided by the aircrews or included as part of the unit’s deployment packup equipment.
- When refueling OH-58D aircraft, personnel must visually ensure that the aircraft’s fuel receiver latch tool, attached to the fuel cap lanyard, is not lying in the fuel receptacle. The latch tool will prevent proper mating of the nozzle with the receptacle if it is not removed, which will preclude fuel flow.
Note
Prior to operations with OH-58D aircraft, fuel crews should familiarize themselves with OH-58D closed circuit refueling procedures and equipment.

J.5.2.7 Defueling. Suction defueling through the aircraft fuel filler port is the preferred method of shipboard defueling OH-58D aircraft. The inner diameter of the fuel filler port is too small to accommodate a section of rigid $1\frac{1}{2}''$ defuel hose. A defueling adapter with a flexible/collapsible $1\frac{1}{2}''$ or smaller gauge hose will be required.

J.5.2.8 Electromagnetic Vulnerability

**WARNING**

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.

J.6 AH/MH-6J SERIES HELICOPTERS

J.6.1 Basic Capabilities & Characteristics.
The AH/MH-6J Special Operations aircraft is a highly modified/militarized version of the commercial Boeing-McDonnell Douglas 500 series helicopter. The aircraft has a single Allison 250-C30 engine, a single 5-bladed main rotor with 2-bladed tail rotor, and oleo-dampened skid-type landing gear.

1. Crew
   A crew consists of 1 pilot and 1 copilot.

2. Shipboard Operations Capability
   a. Rotor brake
   b. Manual blade fold (2 min under optimum conditions)
   c. Gravity refueling
   d. Skid landing gear
   e. TACAN
   f. UHF
   g. No APU (battery start).

3. Mission
   The aircraft can be configured as a light attack (AH) or mission (MH) helicopter. In the light attack role, the aircraft can carry a variety of offensive weapons. The mission configuration (MH) is for the insertion/extraction of personnel and cargo.

4. Mission Equipment
   a. External Stores System for mounting of offensive weapons (AH-6J)
   b. Forward Looking Infrared (FLIR)
   c. SABRE radio ground communications
   d. External Personnel System (MH-6J)
   e. External Fast Rope System (MH-6J)

5. SAR Capability
   None. The aircraft may carry a caving ladder.

6. Dimensions (see Figure J-22)
   a. Spread (rotors turning):
      \[36'9''L / 27'4''W / 8'11''H\]
   b. Folded: \[22'7''L / 6'6''W/ 8'11''H\]
   c. Spot factor (LHA/LHD): \[1.31 \text{ (spread)}\]
      \[0.54 \text{ (folded).}\]

7. Weight
   a. Empty (no fuel, no crew): 2,150 lbs.
   b. Operating (fuel, crew, ordnance): 3,950 lbs.
   c. Max Gross on deck: 3,950 lbs.
Figure J-22. AH/MH-6J Dimensions

NOTES:
1. HELICOPTER ON GROUND
   (MAXIMUM COMPRESSED DIMENSION = 6.80)
2. ALL DIMENSIONS IN FEET
Figure J-23. AH/MH-6J Initial Tiedown Configurations (Recommended)

TIEDOWN FITTINGS ARE LOCATED ON THE FORWARD AND AFT CORNERS OF THE MK III/IV PLANK AT THE ENTRANCE TO THE CARGO COMPARTMENT.

THESE RECOMMENDED CONFIGURATIONS ARE BASED ON JSHIP ANALYSIS. THEY ARE NOT DIRECTIVE IN NATURE.
8. Fuel / Quantity
   a. Primary fuel: JP-8
   c. Max main tank: 62 gals / 422 lbs.
   d. Max auxiliary internal: up to 63 gals / 429 lbs.
   e. Max total: 125 gal / 851 lbs.

9. Ordnance (AH only)
   a. 7.62 mm machine gun
   b. 2.75” rocket launchers
   c. HELLFIRE missile system
   d. CADs for stores jettison system.

10. Internal Lift Capability
    a. Cargo area: height: 44” (approx.)
        width: 4’4” (approx.)
        depth: 30” (approx.)
        cube: 40 cubic ft.
    b. Troop capacity: 2 troops (AH)
         6 troops (MH)
    c. Litter capacity: none (AH)
         1 litter (MH)
    d. Cargo weight: 1,300 lbs. (AH)
         1,500 lbs. (MH).

11. External Lift Capability
    None.

12. Comm/Nav Equipment
    a. SATCOM
    b. UHF
    c. VHF (AM/FM)
    d. Have Quick / Have Quick II
    e. SINCgars
    f. TACAN
    g. GPS
    h. LORAN C.

J.6.2 AH/MH-6J Operational Considerations

J.6.2.1 Navigation to Ship. AH/MH-6J helicopters are equipped with TACAN.

J.6.2.2 Handling & Parking. The AH/MH-6J is skid-equipped and its towing point will not mate with the ALBAR or NT-4 towbar. Although an Army towbar exists, AH/MH-6J units routinely hand-push the aircraft as a matter of expediency.

**WARNING**

AH/MH-6J ground handling wheels do not have brakes. The aircraft should not be raised on its handling wheels until immediately prior to aircraft movement. Once raised, the aircraft should be treated as a wheeled aircraft without brakes. Braking of the aircraft by lowering it onto the skids cannot be accomplished immediately under all conditions. Chocks should be used on the ground handling wheels to the fullest possible extent during movement evolutions.

J.6.2.3 Refueling. AH/MH-6J helicopters are incapable of pressure refueling. Units are equipped with special gravity nozzles and adapters that can connect to the ship’s D-1 single-point refuel nozzle. These special nozzles provide a better fit (diameter and angle) than the Navy overwing nozzle. Gravity refueling will require the shutdown of the aircraft’s engine, resulting in a turnaround time of at least 6 minutes under optimum conditions.

J.6.2.4 Chaining. Certain AH/MH-6J ordnance/external stores configurations may partially or significantly restrict access to aircraft tiedown/mooring rings.
J.6.2.5 Blade Flapping Susceptibility

**CAUTION**

- Unlike Navy helicopters, Army H-6 helicopters are not equipped with an anti-flap device to limit excessive upward flapping of static main rotor blades. These helicopters are susceptible to static blade flapping, especially if blades are unrestrained and over the water in relative crosswinds that create strong updrafts at the ship’s deck edge.

- The AH/MH-6J is an extremely lightweight helicopter and is very susceptible to rotor blade flapping and damage (more than Navy helicopters), even with the rotor blades folded. Every consideration should be given to minimizing the aircraft’s exposure to high winds and rotor wash on the flight deck. Launches and recoveries to a spot immediately upwind or crosswind from an AH/MH-6J (blades unsecured, tied down, folded or rotating) should not be conducted except in case of an emergency.

J.6.2.6 Electromagnetic Vulnerability

**WARNING**

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.

J.7 MH-53J/M SERIES HELICOPTERS

J.7.1 Basic Capabilities & Characteristics.

The MH-53J/M is a CH-53D Sea Stallion airframe with upgraded engines and rotor blades, extensive additions to avionics, electronic countermeasures and defensive weapons. The aircraft has a single 6-bladed main rotor and 4-bladed tail rotor, two T64-GE-100 engines with an APU, two twin-wheel retractable main landing gear, a retractable full swivel nose landing gear, rear cargo ramp and forward cabin door and window.

1. Crew

   The typical crew consists of 2 pilots, 2 flight engineers and 2 gunners. Additional crew chiefs/gunners may be added as required.

2. Shipboard Operations Capability

   a. Rotor brake
   b. Automatic blade / tail fold (2 min under optimum conditions)
   c. Pressure refueling
   d. TACAN
   e. UHF
   f. APU
   g. Side mounted EW transmitters
   h. Strong rotor downwash.

3. Mission

   The MH-53J is a long range, heavy-lift multi-mission helicopter used to insert special operations forces, cargo and equipment into hostile areas during day, night and adverse weather conditions. The MH-53M is an MH-53J with avionics improvements. There are no exterior differences between the aircraft.

4. Mission Equipment

   a. Aerial refueling probe (semi-permanent)
   b. Enhanced Navigation System
   c. Forward Looking Radar:

      (1) Terrain following / avoidance
      (2) Ground mapping
      (3) Air to ground ranging
      (4) Limited weather information
d. Forward Looking Infrared (FLIR)

e. Extensive EW suite

f. External cargo hook

g. Optional defensive weapons — (3) 7.62 mm miniguns or .50 cal machine guns — one at each forward removable window and the ramp

h. External rescue hoist

i. Fast Rope system (2 off ramp, 1 from cabin door).

5. SAR Capability

Full over water SAR capability — doppler coupled hover, external hoist, swimmer, rescue devices (swimmer and rescue devices carried only when designated as SAR aircraft).

6. Dimensions (see Figure J-24)

a. Spread (rotors turning): 88’3”L / 72’3”W / 24’11”H

b. Folded (tail spread): 83’5”L / 23’W / 17’9”H

c. Folded (tail folded): 65’6”L / 23’W / 17’9”H

d. Spot factor (LHA/LHD): 10.0 (spread) 
2.35 (blade/tail folded, probe).

7. Weight

a. Empty (no fuel, no crew):
32,000 lbs.

b. Operating (no ext. fuel, crew, no cargo):
46,000 lbs.

c. Max gross on deck:
46,000 lbs. (normal operations)
50,000 lbs. (combat operations).

8. Fuel/Quantity

a. Primary fuel: JP-8


c. Max internal: 600 gals / 4,100 lbs.

d. Max external drop tanks: up to 1,300 gals / 8,800 lbs.

e. Max total: 1,900 gals / 12,900 lbs.

9. Ordnance

a. Forward right cabin door — 7.62 mm minigun or GAU-18/A .50 caliber machine gun

b. Forward left window — 7.62 mm minigun or GAU-18/A .50 caliber machine gun

c. Rear ramp — 7.62 mm minigun or GAU-18/A .50 caliber machine gun

d. Chaff / flares (side and belly mounted)

e. CADs for engine fire extinguishers, external stores jettison, rescue hoist, chaff/flare dispensers.

10. Internal Lift Capability

a. Cargo area: height: 6’5”
   width: 7’6”
   depth: 30’

   **Note**
   Avionics equipment racks at the forward third of the cabin may interfere with cargo loading.

b. Troop capacity: 27 troops (in seats)

c. Litter capacity: 14 litters

d. Cargo Weight: 9,000 lbs. (approximate).

11. External Lift Capability

a. External cargo hook capacity — 20,000 lbs.

   **Note**
   Figures are maximum hook rated loads and may not accurately reflect the true capability of the aircraft due to environmental conditions.

12. Comm/Nav Equipment

a. SATCOM

b. UHF
Figure J-24. MH-53J/M Dimensions
Figure J-25. MH-53J/M Initial Tiedown Configuration (Recommended)
c. VHF (AM/FM)

d. HF

e. Have Quick / Have Quick II

f. SINCgars

g. UHF-DF

h. TACAN

i. GPS/INS (provisions for internal shipboard alignment)

j. VOR/ILS

k. ADF

l. Lightweight Airborne Recover System (LARS) — personnel locator.

J.7.2 MH-53J/M Operational Considerations

J.7.2.1 Chaining to Aft Tiedown Rings with External Tanks Installed. The MH-53J/M is basically a modified CH-53D. As on the CH-53D, access to the MH-53J/M aft tiedown ring is very limited due to its location in the confined space between the sponson and the external fuel tank. The placement of more than one chain on the aft tiedown rings frequently results in at least one chain coming in contact with the sponson, dump tube or drop tank. This may cause minor rubbing of painted surfaces and is consistent with the procedures followed on Navy/Marine Corps CH-53D helicopters.

J.7.2.2 Electromagnetic Vulnerability (MH-53J/M)

WARNING

Various shipboard transmitters can adversely affect non-Navy helicopters. When conducting joint shipboard helicopter operations, consideration must be given to potential radiation hazards, electromagnetic interference, and electronic vulnerability effects so that applicable transmitter conditions can be set prior to the non-Navy helicopter(s) arrival aboard the ship.
# INDEX

<table>
<thead>
<tr>
<th>A</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AATCC responsibilities</td>
<td>5-33</td>
</tr>
<tr>
<td>Abort struckown</td>
<td>6-13</td>
</tr>
<tr>
<td>Additional safety precautions</td>
<td>5-37</td>
</tr>
<tr>
<td>ADF steering to ship</td>
<td>J-13, J-30, J-33</td>
</tr>
<tr>
<td>Advisory control</td>
<td>3-2</td>
</tr>
<tr>
<td>AH/MH-6J:</td>
<td></td>
</tr>
<tr>
<td>Operational considerations</td>
<td>J-48</td>
</tr>
<tr>
<td>Series helicopters</td>
<td>J-45</td>
</tr>
<tr>
<td>AH-64A/D:</td>
<td></td>
</tr>
<tr>
<td>Operational considerations</td>
<td>J-33</td>
</tr>
<tr>
<td>Series helicopters</td>
<td>J-32</td>
</tr>
<tr>
<td>Air:</td>
<td></td>
</tr>
<tr>
<td>Department manning/ship support of flight operations</td>
<td>1-1</td>
</tr>
<tr>
<td>Officer</td>
<td>2-3, 3-1, 4-2</td>
</tr>
<tr>
<td>Officer procedures</td>
<td>5-34</td>
</tr>
<tr>
<td>Plan</td>
<td>2-1</td>
</tr>
<tr>
<td>Planning board</td>
<td>2-1</td>
</tr>
<tr>
<td>Aircraft:</td>
<td></td>
</tr>
<tr>
<td>Control of departing</td>
<td>4-22</td>
</tr>
<tr>
<td>Diverting</td>
<td>5-32</td>
</tr>
<tr>
<td>Downed</td>
<td>4-13</td>
</tr>
<tr>
<td>Fueling and defueling</td>
<td>6-7</td>
</tr>
<tr>
<td>Landings required</td>
<td>2-6</td>
</tr>
<tr>
<td>Maintenance on loaded</td>
<td>6-13</td>
</tr>
<tr>
<td>Movement of</td>
<td>6-2</td>
</tr>
<tr>
<td>Number and type</td>
<td>2-6</td>
</tr>
<tr>
<td>Ordnance equipped</td>
<td>4-14</td>
</tr>
<tr>
<td>Recovering</td>
<td>5-2</td>
</tr>
<tr>
<td>Report of damage to</td>
<td>6-6</td>
</tr>
<tr>
<td>Security</td>
<td>6-6</td>
</tr>
<tr>
<td>Transient</td>
<td>3-7</td>
</tr>
<tr>
<td>Aircraft control criteria</td>
<td>3-1</td>
</tr>
<tr>
<td>Close proximity operations</td>
<td>3-1</td>
</tr>
<tr>
<td>Electronic control</td>
<td>3-2</td>
</tr>
<tr>
<td>Electronic emission control</td>
<td>3-2</td>
</tr>
</tbody>
</table>

| Aircraft separation criteria            | 3-4      |
| Lateral separation                      | 3-4      |
| Vertical separation                      | 3-5      |
| Air operations                           | 2-1, 3-1 |
| Air plan                                 | 2-1      |
| Air planning board                       | 2-1      |
| Flight plan                              | 2-2      |
| Flight schedule                          | 2-2      |
| Functional checkflights                  | 2-2      |
| Mission briefing                         | 2-2      |
| All personnel                            | 1-4      |

| Approach(es):                           |          |
| Instructions                             | 5-8, 5-20 |
| Lost communications during               | 5-25     |
| Minimums                                 | 5-11, 5-21 |
| Smokelight                               | 5-32     |
| SPN-41 instrument carrier landing system (ICLS) | 5-11 |
| Radar                                    | 5-8, 5-21 |
| APU/APP/GTS start                        | 4-12     |
| Aqueous film forming foam system and mobile firefighting equipment | 2-3 |

| Areas:                                  |          |
| Vertical replenishment/external lift operating | 7-3   |
| Arming                                   | 6-13     |
| Arrival procedures                       | 5-2      |
| ATC responsibilities                     | 3-1      |
| Air officer                              | 3-1      |
| Air operations                           | 3-1      |
| Combat information center officer         | 3-1      |
| Operations officer                       | 3-1      |
| Tactical air officer                     | 3-1      |
| Augmentation support by embarked units    | 1-2      |
| Authority for NVD operations             | 7-6      |

| AV-8:                                   |          |
| Phase I, II, III training                | 1-4      |
| Tiedown                                  | 6-7      |

Index-1
Basic capabilities & characteristics ........................................... J-1, J-18, J-32, J-38, J-45, J-49

Blade flapping:
- During rotor coast down & start-up (UH-60A/L/Q, MH-60L, some HH-60G) ................. J-16
- During coast down & start-up (H-47D only) ................. J-30
- Susceptibility ................................................. J-49

Brake rider duties ................................................. 6-3

Bridge:
- Primary flight control, and flight deck control lighting ............... 7-9
- Prifly coordination ............................................ 5-1

Briefing ................................................. 6-1, 7-2
- Of flightcrews ........................................... 2-5

Burns ................................................. 4-11

Cargo loading/offloading ................................................. J-32

Carrier:
- Aircraft landings required ........................................... 2-6
- Carrier qualification/refresher landing ........................................... 2-6
- Case III carrier qualification landings ........................................... 2-6
- Divert data ................................................. 2-6
- Interval ................................................. 2-6
- Number and type aircraft ........................................... 2-6
- Qualification periods ........................................... 2-6
- Qualification/refresher landing ........................................... 2-6
- Qualifications ................................................. 1-3

Case I, visual meteorological conditions
- departure to rendezvous ........................................... 4-19, 4-20

Case II, visual meteorological conditions
- to visual meteorological conditions on top ........................................... 4-20

Case III:
- Carrier qualification landings ........................................... 2-6
- Instrument meteorological conditions ........................................... 4-20
- Instrument meteorological conditions/night ........................................... 4-22

CH-47D CHINOOK helicopter ................................................. J-19

Chain(ing) ................................................. J-48
- Removal ................................................. J-37

To AFT tiedown rings with external tanks installed ........................................... J-53

UH-60A/L/Q, HH-60G, some MH-60L ........................................... J-16

With rotors turning ................................................. J-37

Characteristics, Basic capabilities & ........................................... J-1, J-18, J-32, J-38, J-45, J-49

Chocking with inboard-mounted external stores (UH-60A/L/Q, MH-60L) ........................................... J-16

Close proximity operations ................................................. 3-1

Combat:
- Cargo officer ........................................... 2-6
- Information center officer ........................................... 3-1

Command relationships ................................................. 1-1

Augmentation support by embarked units ........................................... 1-2

Command relationships options for amphibious forces are described in joint publication 3-02 ........................................... 1-1

Embarked aircraft squadron/commanding officer/detachment officer-in-charge ........................................... 1-2

Navy aircraft squadron commander/detachment OIC ........................................... 1-1

Options for amphibious forces are described in joint publication 3-02 ........................................... 1-1

Ship’s commanding officer ........................................... 1-1

Communications ................................................. 4-1

Emergency (day/night visual meteorological conditions) ........................................... 5-29

Security ................................................. 3-5

Communications control ................................................. 3-5

Communications security ................................................. 3-5

Control of radio circuits ................................................. 3-5

Recording of radio circuits ................................................. 3-5

Voice procedures ................................................. 3-5

Compatibility with SD-2
- spotting dolly ........................................... J-18, J-31, J-37

Complete communications/navigation failure ........................................... 5-28

Condition:
- I ................................................. 4-2
- I/Alert 5 ................................................. 4-1
- II ................................................. 4-2
- III ................................................. 4-2
- III/Alert 30 ................................................. 4-2
<table>
<thead>
<tr>
<th>Considerations:</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AH-64 operational</td>
<td>J-33</td>
</tr>
<tr>
<td>AH/MH-6J operational</td>
<td>J-48</td>
</tr>
<tr>
<td>Divert planning</td>
<td>5-33</td>
</tr>
<tr>
<td>H-60 operational</td>
<td>J-15</td>
</tr>
<tr>
<td>MH-53J/M operational</td>
<td>J-53</td>
</tr>
<tr>
<td>OH-58D operational</td>
<td>J-39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control</th>
<th>7-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisory</td>
<td>3-2</td>
</tr>
<tr>
<td>Authority</td>
<td>7-1</td>
</tr>
<tr>
<td>Communications</td>
<td>3-5</td>
</tr>
<tr>
<td>Departure radials</td>
<td>4-23</td>
</tr>
<tr>
<td>Electronic</td>
<td>3-2</td>
</tr>
<tr>
<td>Electronic emission</td>
<td>3-2</td>
</tr>
<tr>
<td>IMC/night departure voice reports</td>
<td>4-23</td>
</tr>
<tr>
<td>Monitor</td>
<td>3-2</td>
</tr>
<tr>
<td>Nonradar</td>
<td>3-2</td>
</tr>
<tr>
<td>Of departing aircraft</td>
<td>4-22</td>
</tr>
<tr>
<td>Positive</td>
<td>3-2</td>
</tr>
<tr>
<td>Primary flight</td>
<td>4-1</td>
</tr>
<tr>
<td>Radio circuits</td>
<td>3-5</td>
</tr>
<tr>
<td>Zone/control area limitations</td>
<td>3-3</td>
</tr>
</tbody>
</table>

| Crewmember injury or illness        | 3-6      |
| Criteria:                           |          |
| Aircraft control                    | 3-1      |
| Aircraft separation                 | 3-4      |

| Detachment support                  | 1-1      |
| Detour(ing):                        |          |
| Aircraft                             | 5-32     |
| Data                                | 2-6      |
| Planning considerations             | 5-33     |
| Downed aircraft                     | 4-13     |
| Duties:                             |          |
| Brake rider                         | 6-3      |
| Plane director                      | 6-2      |

| Electromagnetic vulnerability       | J-18, J-32, J-38, J-45, J-49 |
| MH-53J/M                            | J-49     |

| Electronic:                         |          |
| Control                             | 3-2      |
| Emission control                    | 3-2      |
| Emission control night launch procedures | 4-18   |
| Elevator operation                  | 6-5      |
| Embarked aircraft squadron/commanding officer/detachment officer-in-charge | 1-2 |

| EMCON:                              |          |
| Day launch procedures               | 4-18     |
| Electronic emission control night launch procedures | 4-18 |
| General procedures                  | 4-17     |
| Procedures                          | 5-37     |
| Recovery procedures                 | 5-38     |
| ZIP-LIP launch procedures           | 4-17, 4-18 |
| Emergencies during NVD operations   | 7-10     |
| Emergency:                          |          |
| After launch                        | 4-18     |
| Approach procedures                 | 5-32     |
| Basic emergency control procedures  | 3-6      |
| Control procedures                  | 3-6      |
| Crewmember injury or illness        | 3-6      |
| Diverting aircraft                  | 5-32     |
| Helicopter                          | 5-25     |
| Initial control responsibility      | 3-6      |
| Lost communications and DME during departure (IMC) | 4-19 |
| Lost communications and NAVAIDS during departure (IMC) | 4-19 |
| Lost communications during departure | 4-19    |

| Index-3                              |          |
| Page No.                             |          |
| D                                    |          |
| Day launch procedures                | 4-18     |
| Dearing                              | 6-13     |
| Defueling                            | J-45     |
| Departure:                           |          |
| Procedures                           | 4-19     |
| Helicopter departure procedures      | 4-19     |
| Radials                              | 4-23     |
| Vertical/short takeoff and landing departure procedures | 4-20 |
| Departing marshal                    | 5-8, 5-20 |
| Description:                         |          |
| Flight deck                          | 4-3      |
| General                              | 7-2      |

<p>| Original                              |          |</p>
<table>
<thead>
<tr>
<th>Page No.</th>
<th>Index-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost communications only during departure (IMC)</td>
<td>4-19</td>
</tr>
<tr>
<td>Night/instrument meteorological conditions</td>
<td>4-19</td>
</tr>
<tr>
<td>Procedures</td>
<td>5-25</td>
</tr>
<tr>
<td>Ship system casualty</td>
<td>3-6</td>
</tr>
<tr>
<td>Smokelight approach</td>
<td>5-32</td>
</tr>
<tr>
<td>Visual meteorological conditions</td>
<td>4-18</td>
</tr>
<tr>
<td>V/STOL</td>
<td>5-29</td>
</tr>
<tr>
<td>Engaging rotors</td>
<td>4-13</td>
</tr>
<tr>
<td>Engine starting</td>
<td>4-12</td>
</tr>
<tr>
<td>Equipment</td>
<td>6-2</td>
</tr>
<tr>
<td>External hydraulic power connections</td>
<td>J-32</td>
</tr>
</tbody>
</table>

**F**

<table>
<thead>
<tr>
<th>Page No.</th>
<th>Index-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure, Complete communications/navigation</td>
<td>5-28</td>
</tr>
<tr>
<td>Fit on LHA elevator</td>
<td>J-31, J-32</td>
</tr>
<tr>
<td>Flight:</td>
<td></td>
</tr>
<tr>
<td>Crewmen</td>
<td>1-4</td>
</tr>
<tr>
<td>Plan</td>
<td>2-2</td>
</tr>
<tr>
<td>Quarters</td>
<td>4-1</td>
</tr>
<tr>
<td>Quarters stations</td>
<td>2-3</td>
</tr>
<tr>
<td>Schedule</td>
<td>2-2</td>
</tr>
<tr>
<td>Flight deck:</td>
<td></td>
</tr>
<tr>
<td>Augmentation</td>
<td>2-5</td>
</tr>
<tr>
<td>Description</td>
<td>4-3</td>
</tr>
<tr>
<td>Foreign object damage hazard</td>
<td>4-8</td>
</tr>
<tr>
<td>General flight deck safety</td>
<td>4-3</td>
</tr>
<tr>
<td>Helicopter safety precautions</td>
<td>4-9</td>
</tr>
<tr>
<td>Lighting</td>
<td>7-7</td>
</tr>
<tr>
<td>Lighting and optical landing aids</td>
<td>4-1</td>
</tr>
<tr>
<td>Procedures</td>
<td>4-3</td>
</tr>
<tr>
<td>Supervisor</td>
<td>2-4</td>
</tr>
<tr>
<td>V/STOL aircraft safety precautions</td>
<td>4-9</td>
</tr>
<tr>
<td>Foreign object damage hazard</td>
<td>4-8</td>
</tr>
<tr>
<td>Fuel sampling</td>
<td>J-18</td>
</tr>
<tr>
<td>Fueling and defueling aircraft</td>
<td>6-7</td>
</tr>
<tr>
<td>Fueling and defueling procedures</td>
<td>6-7</td>
</tr>
<tr>
<td>Hot refueling procedures</td>
<td>6-8</td>
</tr>
<tr>
<td>Hot refueling safety precautions (helicopter)</td>
<td>6-8</td>
</tr>
<tr>
<td>Pressure refueling with aircraft shut down</td>
<td>6-8</td>
</tr>
<tr>
<td>Special safety precautions during fueling/defueling</td>
<td>6-7</td>
</tr>
<tr>
<td>Functional checkflights</td>
<td>2-2</td>
</tr>
</tbody>
</table>

**G**

<table>
<thead>
<tr>
<th>Page No.</th>
<th>Index-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>4-1, 5-32</td>
</tr>
<tr>
<td>Description</td>
<td>7-2</td>
</tr>
<tr>
<td>Flight deck safety</td>
<td>4-3</td>
</tr>
<tr>
<td>Launch procedures</td>
<td>4-14</td>
</tr>
<tr>
<td>Procedures</td>
<td>4-17</td>
</tr>
<tr>
<td>Requirements</td>
<td>6-1</td>
</tr>
</tbody>
</table>

**H**

<table>
<thead>
<tr>
<th>Page No.</th>
<th>Index-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-47:</td>
<td></td>
</tr>
<tr>
<td>Model helicopters</td>
<td>J-18</td>
</tr>
<tr>
<td>Operational considerations</td>
<td>J-30</td>
</tr>
<tr>
<td>HH-60G assault helicopter</td>
<td>J-12</td>
</tr>
<tr>
<td>H-60:</td>
<td></td>
</tr>
<tr>
<td>Model helicopters</td>
<td>J-1</td>
</tr>
<tr>
<td>Operational considerations</td>
<td>J-13</td>
</tr>
<tr>
<td>Handling</td>
<td>J-18</td>
</tr>
<tr>
<td>Tailwheel locking mechanism</td>
<td>J-18</td>
</tr>
<tr>
<td>Tailwheel locking mechanism engagement</td>
<td>J-18</td>
</tr>
<tr>
<td>Handling &amp; parking</td>
<td>J-44, J-48</td>
</tr>
<tr>
<td>HAPI</td>
<td>5-25</td>
</tr>
<tr>
<td>Hazards of electromagnetic radiation to ordnance/radiation hazards safety precautions</td>
<td>6-9</td>
</tr>
<tr>
<td>Heavy weather (twelve-point) tiedowns</td>
<td>6-7</td>
</tr>
<tr>
<td>Helicopter</td>
<td>5-25</td>
</tr>
<tr>
<td>Approach and recovery</td>
<td>5-2</td>
</tr>
<tr>
<td>Briefing</td>
<td>7-2</td>
</tr>
<tr>
<td>Case I approach procedures</td>
<td>5-2</td>
</tr>
<tr>
<td>Case I holding</td>
<td>5-2</td>
</tr>
<tr>
<td>Case II approach procedures</td>
<td>5-7</td>
</tr>
<tr>
<td>Case III approach procedures</td>
<td>5-7</td>
</tr>
<tr>
<td>Charlie pattern</td>
<td>5-4</td>
</tr>
<tr>
<td>Control</td>
<td>7-3</td>
</tr>
<tr>
<td>Delta procedures</td>
<td>5-11</td>
</tr>
<tr>
<td>Departure procedures</td>
<td>4-19</td>
</tr>
<tr>
<td>Detachment personnel attached to amphibious aviation ships</td>
<td>1-1</td>
</tr>
<tr>
<td>EMCON recovery procedures</td>
<td>5-37</td>
</tr>
<tr>
<td>Emergency marshal</td>
<td>5-16</td>
</tr>
<tr>
<td>External cargo/vertrep</td>
<td>7-2</td>
</tr>
<tr>
<td>General description</td>
<td>7-2</td>
</tr>
<tr>
<td>Hookup</td>
<td>7-5</td>
</tr>
<tr>
<td>Landing aids</td>
<td>5-8</td>
</tr>
</tbody>
</table>
Launch procedures ........................................ 4-14
Marshal patterns ........................................... 5-8
Night case I recovery pattern ............................... 5-4
Ordnance recovery ......................................... 5-34
Procedures ..................................................... 7-3
Qualification .................................................. 7-3
Readiness conditions ...................................... 4-1
Recovery procedures ...................................... 5-7
Recovery tiedown procedures .............................. 5-36
Safety precautions .......................................... 4-9
Vertical replenishment/external lift operating areas ...... 7-3
Wind ......................................................... 7-3
Hookup ....................................................... 7-5
Hot refueling:
Procedures .................................................. 6-8
Safety precautions (helicopter) ............................ 6-8
HPI .......................................................... 5-25

I
IMC/night departure voice reports ......................... 4-23
In-flight procedures ....................................... 5-33
Initial:
Control responsibility .................................... 3-6
Four-point tiedown .......................................... 6-6
Instability on deck .......................................... J-37
Instrument carrier landing system (ICLS) approach ... 5-21
Integrity watch ............................................... 1-2
Intermediate maintenance activity ....................... 1-2
Internal cargo and troops (helicopter) .................... 4-13
Interval ...................................................... 2-6
Introduction .................................................. J-1, H-1
Night vision devices requirements and limitations .... 7-6
NVD flight operations procedures ....................... 7-9
NVD training and qualification ............................ 7-7
Shipboard lighting requirements ........................ 7-7

L
Landing(s):
Aids malfunction (night) .................................. 5-29
Carrier qualification/refresher ............................ 2-6
Case III carrier qualification ............................. 2-6
Signal enlisted .............................................. 2-4
Lateral separation .......................................... 3-4
Launch:
General launch procedures .............................. 4-14
Helicopter launch procedures ............................ 4-14
Night launches ............................................. 4-17
Ordnance equipped aircraft .............................. 4-14
Preparation ................................................. 4-11
Procedures .................................................. 4-14
Responsibilities ............................................ 4-11
V/STOL launch procedures .............................. 4-15
LHA ......................................................... 7-3
Class weapons handling restrictions ..................... 6-11
LHD ........................................................ 7-5
Lights waveoff and cut .................................... 5-25
Limitations:
Night wind ................................................... 5-1
Tail fold ..................................................... J-17
Wind and deck ............................................. 4-12
Locally-procured blade fold system ...................... J-31
Lost aircraft procedure .................................. 3-7
Lost communications:
And DME during departure (IMC) ....................... 4-19
And NAVAIDS during departure (IMC) ................. 4-19
During approach .......................................... 5-25
During departure .......................................... 4-19
Only during departure (IMC) ............................ 4-19

M
Main rotor blade fold/spread ............................... J-17
Maintaining NVD LSE qualification ...................... H-2
Maintenance:
Liaison officer ............................................. 6-1
On Loaded aircraft ....................................... 6-13
Personnel .................................................... 1-4
Marshal instructions ....................................... 5-20
Medical casualty on the flight deck (helicopter) .... 6-9
MH-47D assault helicopter ............................... J-21
MH-47E assault helicopter ............................... J-25
MH-53J/M:
Operational considerations ............................. J-53
Series helicopters ......................................... J-49
MH-60K assault helicopter ............................... J-5
MH-60L/MH-60L IDAP assault helicopter .............................................. J-9
Missed approach procedures ......................................................... 5-11, 5-21
Mission briefing .................................................................................. 2-2
Monitor control ................................................................................... 3-2
Movement of aircraft ........................................................................ 6-2
Aircraft security .................................................................................. 6-6
Brake rider duties ................................................................................ 6-3
Elevator operation ............................................................................... 6-5
Plane director duties .......................................................................... 6-2
Report of damage to aircraft ............................................................... 6-6
Safety precautions during movement of aircraft ................................. 6-4

N

Navigation to ship
(UH-60A/L only) ............................................................................... J-13, J-33, J-30, J-39, J-48
Navy aircraft squadron commander/ detachment OIC ...................... 1-1
Night ..................................................................................................... 5-1
Helicopter launches ........................................................................... 4-17
Instrument meteorological conditions .............................................. 4-19
Launches ............................................................................................. 4-17
Operations .......................................................................................... 5-1
Overwater passenger transfer ............................................................ 2-6
STO procedures .................................................................................. 4-17
Vision device operations ................................................................... 7-6
Vision devices requirements and limitations ...................................... 7-6
Wind limitations .................................................................................. 5-1
Nonradar control ................................................................................ 3-2
Nonstandard helicopter landing patterns ........................................ 5-4
Nose-to-tail procedures ....................................................................... 4-16
Number and type aircraft .................................................................. 2-6
NVD:
Flight operations procedures .......................................................... 7-9
Training and qualification ................................................................... 7-7
OH-58D:
Operational considerations ............................................................... J-39
Series helicopters .............................................................................. J-38
Operational procedures responsibilities ........................................... 4-1
Communications ............................................................................... 4-1
Flight deck lighting and optical landing aids .................................... 4-1
Flight quarters ................................................................................... 4-1
General ............................................................................................... 4-1
Helicopter readiness conditions ......................................................... 4-1

Primary flight control ......................................................................... 4-1
Responsibilities of air officer and squadron operations duty officer .... 4-2
Time schedule ..................................................................................... 4-1
V/STOL readiness conditions ............................................................. 4-2
Operation(s) ......................................................................................... 3-2
Air ......................................................................................................... 2-1, 3-1
Air department manning/ship support of flight ................................ 1-1
Authority for NVD ............................................................................. 7-6
Close proximity .................................................................................. 3-1
Elevator ............................................................................................... 6-5
Emergencies during NVD ................................................................. 7-10
Night ..................................................................................................... 5-1
Night vision device ............................................................................. 7-6
Officer ................................................................................................. 3-1
Stage three: multispot ......................................................................... H-2
Stage four: multiwave launch/recovery .............................................. H-2

O

Optical landing aids and flight deck/hangar deck lighting ................. 2-4
Ordnance:
Equipped aircraft ............................................................................ 4-14
Personnel ............................................................................................ 1-4

P

Passenger/cargo movements (helicopter) ......................................... 2-6
Combat cargo officer .......................................................................... 2-6
Night overwater passenger transfer ................................................ 2-6
Permanent (eight-point) tiedown ......................................................... 6-6
Personnel debarkation ....................................................................... 5-36
Phase:
I — shipboard orientation ................................................................. F-1
II — ground training ......................................................................... F-1
III — final shipboard training .............................................................. F-2
Pilot responsibility ........................................................................... 5-33
Plane:
Captains/crewchiefs .......................................................................... 1-4
Control authority ............................................................................... 7-1
Director duties .................................................................................... 6-2
Guard and SAR support (helicopter) ............................................... 7-1
Guard ship .......................................................................................... 7-1
Safety boat .......................................................................................... 7-1
<table>
<thead>
<tr>
<th>Page No.</th>
<th>Procedure(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-3</td>
<td>Procedure(s)</td>
</tr>
<tr>
<td>5-34</td>
<td>Air officer</td>
</tr>
<tr>
<td>5-2</td>
<td>Arrival</td>
</tr>
<tr>
<td>3-6</td>
<td>Basic emergency control</td>
</tr>
<tr>
<td>4-18</td>
<td>Day launch</td>
</tr>
<tr>
<td>4-19</td>
<td>Departure</td>
</tr>
<tr>
<td>5-37</td>
<td>EMCON</td>
</tr>
<tr>
<td>5-37</td>
<td>EMCON recovery</td>
</tr>
<tr>
<td>5-37</td>
<td>EMCON/ZIP-LIP</td>
</tr>
<tr>
<td>4-17</td>
<td>EMCON/ZIP-LIP launch</td>
</tr>
<tr>
<td>5-25</td>
<td>Emergency</td>
</tr>
<tr>
<td>5-32</td>
<td>Emergency approach</td>
</tr>
<tr>
<td>3-6</td>
<td>Emergency control</td>
</tr>
<tr>
<td>4-3</td>
<td>Flight deck</td>
</tr>
<tr>
<td>6-7</td>
<td>Fueling and defueling</td>
</tr>
<tr>
<td>4-17</td>
<td>General</td>
</tr>
<tr>
<td>4-14</td>
<td>General launch</td>
</tr>
<tr>
<td>5-2</td>
<td>Helicopter case I approach</td>
</tr>
<tr>
<td>5-7</td>
<td>Helicopter case II approach</td>
</tr>
<tr>
<td>5-7</td>
<td>Helicopter case III approach</td>
</tr>
<tr>
<td>5-11</td>
<td>Helicopter delta</td>
</tr>
<tr>
<td>4-19</td>
<td>Helicopter departure</td>
</tr>
<tr>
<td>4-14</td>
<td>Helicopter launch</td>
</tr>
<tr>
<td>5-7</td>
<td>Helicopter recovery</td>
</tr>
<tr>
<td>6-8</td>
<td>Hot refueling</td>
</tr>
<tr>
<td>5-33</td>
<td>In-flight</td>
</tr>
<tr>
<td>4-14</td>
<td>Launch</td>
</tr>
<tr>
<td>3-7</td>
<td>Lost aircraft</td>
</tr>
<tr>
<td>5-11</td>
<td>Missed approach</td>
</tr>
<tr>
<td>4-17</td>
<td>Night STO</td>
</tr>
<tr>
<td>4-16</td>
<td>Nose-to-tail</td>
</tr>
<tr>
<td>7-9</td>
<td>NVD flight operations</td>
</tr>
<tr>
<td>4-11</td>
<td>Prelaunch</td>
</tr>
<tr>
<td>2-3</td>
<td>Preliminary</td>
</tr>
<tr>
<td>2-3</td>
<td>Preliminary procedures</td>
</tr>
<tr>
<td>5-1</td>
<td>Preparing for recovery</td>
</tr>
<tr>
<td>5-1</td>
<td>Preparing for recovery</td>
</tr>
<tr>
<td>5-1</td>
<td>Preparing for recovery</td>
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<td>Preparing for recovery</td>
</tr>
<tr>
<td>5-1</td>
<td>Preparing for recovery</td>
</tr>
<tr>
<td>5-4</td>
<td>Prep charlie</td>
</tr>
<tr>
<td>5-34</td>
<td>Shipboard</td>
</tr>
<tr>
<td>5-17</td>
<td>V/STOL case I approach</td>
</tr>
<tr>
<td>5-18</td>
<td>V/STOL case II approach</td>
</tr>
<tr>
<td>5-20</td>
<td>V/STOL case III approach</td>
</tr>
<tr>
<td>5-24</td>
<td>V/STOL delta</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
<tr>
<td>4-15</td>
<td>V/STOL launch</td>
</tr>
</tbody>
</table>

**Index-7**
Vertical/short takeoff and landing departure ................. 4-20
Voice ............................................. 3-5
Weapons handling .................................... 6-9
ZIP-LIP ............................................. 4-18, 5-37

Qualification ........................................ 7-3

Radar approaches ...................................... 5-8, 5-21
Radio check ............................................. 4-12
Recording of radio circuits ............................. 3-5

Recovering:
Aircraft ............................................. 5-2
Arrival procedures .................................... 5-2
With ordnance ........................................ 5-33

Refueling ............................................. J-44, J-48
Extended range fuel system (ERFS)
eexternal tanks (UH-60A/L/Q, MH-60L) ... J-18
Of external tanks ..................................... J-38
Procedures training ................................... J-37

Report of damage to aircraft ........................... 6-6

Requirements:
General ............................................. 6-1
Shipboard lighting .................................... 7-7
Training ............................................. 1-2

Responsibilities:
Air officer and squadron operations
duty officer .......................................... 4-2
AATCC ............................................. 5-33
ATC ............................................... 3-1
Launch ............................................. 4-11
Ship ................................................. 1-2
Squadron/detachment ................................. 1-3

Rotor:
Blade spreading ........................................ 4-12
Coast down .......................................... J-39
Disengagement ....................................... 5-36
Downwash ........................................... J-30

Safety:
Boat .................................................. 7-1
Precautions during movement of aircraft ............ 6-4

SAR:
Detachment helicopter ................................ 7-1
Equipped helicopter ................................... 7-1
Swimmers (helicopters) ............................... 7-1

Ship:
Preparations ......................................... 5-1
Qualifications ........................................ H-2
Responsibilities ..................................... 1-2
System casualty ...................................... 3-6

Shipboard:
Lighting requirements ............................... 7-7
Procedures .......................................... 5-34

Ship’s:
Commanding officer ................................ 1-1
Navigation and structural lighting ................. 7-7
Short takeoff ........................................ 4-16
Smokelight approach ................................. 5-32
Special safety precautions ........................... 5-33
Additional safety precautions ....................... 5-37
During fueling/defueling .............................. 6-7
Helicopter recovery tiedown procedures ............ 5-36
Personnel debarkation ............................... 5-36
Recovering with ordnance ............................ 5-33
Rotor disengagement ................................. 5-36

SPN-41 instrument carrier landing system
(ICLS) approach ..................................... 5-11

Spotting during blade fold/spread .................... J-17

Squadron:
Detachment responsibilities ......................... 1-3
Operations duty officer .............................. 4-3
Stabilator folding (MH-60K/L, HH-60G) .......... J-17

Stage:
Four: multiwave launch/recovery operations ....... H-2
One: NVD familiarization/classroom ............... H-1
Three: multispot operations ........................ H-2
Two: single spot operations/
NVD LSE initial qualifications ...................... H-1

Standard:
Helicopter landing patterns ........................ 5-4
V/STOL landing pattern ............................. 5-18
<table>
<thead>
<tr>
<th>Static blade flapping and tiedown</th>
<th>J-16, J-30, J-37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stations, Flight quarters</td>
<td>2-3</td>
</tr>
<tr>
<td>Susceptibility to damage with rotors folded</td>
<td>J-17</td>
</tr>
<tr>
<td>System, Locally-procured blade fold</td>
<td>J-31</td>
</tr>
</tbody>
</table>

**T**

<table>
<thead>
<tr>
<th>Tactical air officer</th>
<th>3-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tail fold limitations</td>
<td>J-17</td>
</tr>
</tbody>
</table>

Takeoff:

<table>
<thead>
<tr>
<th>Preparation for</th>
<th>4-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>4-16</td>
</tr>
<tr>
<td>Vertical</td>
<td>4-15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tanks, Refueling of external</th>
<th>J-38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tiedown fittings</td>
<td>J-31, J-33</td>
</tr>
</tbody>
</table>

**Time:**

<table>
<thead>
<tr>
<th>Schedule</th>
<th>4-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>To fold/spread rotors</td>
<td>J-17</td>
</tr>
</tbody>
</table>

Training requirements

<table>
<thead>
<tr>
<th>1-2</th>
</tr>
</thead>
</table>

Carrier qualifications

<table>
<thead>
<tr>
<th>1-3</th>
</tr>
</thead>
</table>

Ship responsibilities

<table>
<thead>
<tr>
<th>1-2</th>
</tr>
</thead>
</table>

Squadron/detachment responsibilities

<table>
<thead>
<tr>
<th>1-3</th>
</tr>
</thead>
</table>

Transient aircraft

<table>
<thead>
<tr>
<th>3-7</th>
</tr>
</thead>
</table>

**U**

<table>
<thead>
<tr>
<th>UH-60A/L UTILITY helicopter/ UH-60Q/HH-60L MEDEVAC helicopter</th>
<th>J-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of ALBAR/NT-4 towbars</td>
<td>J-44</td>
</tr>
</tbody>
</table>

**V**

<table>
<thead>
<tr>
<th>V/STOL</th>
<th>5-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft safety precautions</td>
<td>4-9</td>
</tr>
<tr>
<td>Approach and recovery</td>
<td>5-17</td>
</tr>
<tr>
<td>Case I approach procedures</td>
<td>5-17</td>
</tr>
<tr>
<td>Case I holding</td>
<td>5-17</td>
</tr>
<tr>
<td>Case II approach procedures</td>
<td>5-18</td>
</tr>
<tr>
<td>Case III approach procedures</td>
<td>5-20</td>
</tr>
<tr>
<td>Case III marshal patterns</td>
<td>5-20</td>
</tr>
<tr>
<td>Communication emergencies (general)</td>
<td>5-29</td>
</tr>
</tbody>
</table>

**W**

<table>
<thead>
<tr>
<th>Waveoff</th>
<th>5-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>And cut lights</td>
<td>5-25</td>
</tr>
</tbody>
</table>

Weapons:

<table>
<thead>
<tr>
<th>Abort strikedown</th>
<th>6-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arming</td>
<td>6-13</td>
</tr>
<tr>
<td>Assembly/disassembly</td>
<td>6-11</td>
</tr>
<tr>
<td>Dearming</td>
<td>6-13</td>
</tr>
<tr>
<td>Handling procedures</td>
<td>6-9</td>
</tr>
<tr>
<td>Hazards of electromagnetic radiation to ordnance/radiation hazards safety precautions</td>
<td>6-9</td>
</tr>
<tr>
<td>Loading/downloading</td>
<td>6-11</td>
</tr>
<tr>
<td>Maintenance on loaded aircraft</td>
<td>6-13</td>
</tr>
<tr>
<td>Movement/handling</td>
<td>6-10</td>
</tr>
<tr>
<td>Wind</td>
<td>7-3</td>
</tr>
<tr>
<td>Wind and deck limitations</td>
<td>4-12</td>
</tr>
</tbody>
</table>

**Z**

<p>| ZIP-LIP procedures | 4-18, 5-38 |</p>
<table>
<thead>
<tr>
<th>Effective Pages</th>
<th>Page Numbers</th>
<th>Effective Pages</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>1 (Reverse Blank)</td>
<td>Original</td>
<td>A-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>3 (Reverse Blank)</td>
<td>Original</td>
<td>B-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>5 (Reverse Blank)</td>
<td>Original</td>
<td>C-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>7 (Reverse Blank)</td>
<td>Original</td>
<td>D-1 thru D-80</td>
</tr>
<tr>
<td>Original</td>
<td>9 (Reverse Blank)</td>
<td>Original</td>
<td>E-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>11 thru 37 (Reverse Blank)</td>
<td>Original</td>
<td>F-1 thru F-2</td>
</tr>
<tr>
<td>Original</td>
<td>1-1 thru 1-4</td>
<td>Original</td>
<td>G-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>2 thru 2-7 (Reverse Blank)</td>
<td>Original</td>
<td>H-1 thru H-2</td>
</tr>
<tr>
<td>Original</td>
<td>3-1 thru 3-8</td>
<td>Original</td>
<td>I-1 thru I-4</td>
</tr>
<tr>
<td>Original</td>
<td>4 thru 4-23 (Reverse Blank)</td>
<td>Original</td>
<td>J-1 thru J-53 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>5-1 thru 5-38</td>
<td>Original</td>
<td>Index-1 thru Index-9 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>6-1 thru 6-14</td>
<td>Original</td>
<td>LEP-1 (Reverse Blank)</td>
</tr>
<tr>
<td>Original</td>
<td>7-1 thru 7-10</td>
<td>LEP-1 (LEP-2 blank)</td>
<td></td>
</tr>
</tbody>
</table>