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V/STOL SHIPBOARD AND LANDING SIGNAL OFFICER NATOPS MANUAL

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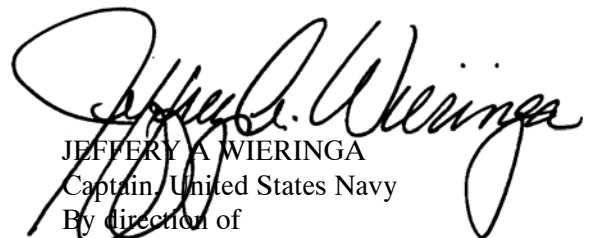


DEPARTMENT OF THE NAVY
NAVAL AIR SYSTEMS COMMAND
RADM WILLIAM A. MOFFETT BUILDING
47123 BUSE ROAD, BLDG 2272
PATUXENT RIVER, MD 20670-1547

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LETTER OF PROMULGATION

1. The Naval Air Training and Operating Procedures Standardization (NATOPS) Program is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft mishap rate. Standardization, based on professional knowledge and experience, provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative, but rather to aid the Commanding Officer in increasing the unit's combat potential without reducing command prestige or responsibility.
2. This manual standardizes ground and flight procedures but does not include tactical doctrine. Compliance with the stipulated manual requirements and procedures is mandatory except as authorized herein. In order to remain effective, NATOPS must be dynamic and stimulate rather than suppress individual thinking. Since aviation is a continuing, progressive profession, it is both desirable and necessary that new ideas and new techniques be expeditiously evaluated and incorporated if proven to be sound. To this end, Commanding Officers of aviation units are authorized to modify procedures contained herein, in accordance with the waiver provisions established by OPNAV Instruction 3710.7, for the purpose of assessing new ideas prior to initiating recommendations for permanent changes. This manual is prepared and kept current by the users in order to achieve maximum readiness and safety in the most efficient and economical manner. Should conflict exist between the training and operating procedures found in this manual and those found in other publications, this manual will govern.
3. Checklists and other pertinent extracts from this publication necessary to normal operations and training should be made and carried for use in naval aircraft.



JEFFERY A WIERINGA
Captain, United States Navy
By direction of
Commander, Naval Air Systems Command

V/STOL SHIPBOARD AND LANDING SIGNAL OFFICER NATOPS MANUAL

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GLOSSARY

A

Aided. Using NVG/NVDs.

Air Boss. The ship's air officer. Responsible to the ship's commanding officer for all launch and recovery operations, aircraft handling, and other associated responsibilities. Responsible for control of aircraft in the ship's control zone.

Angels. Altitude in thousands of feet. (e.g., 15,000 feet is "Angels 15.")

B

Ball. A term used by pilots to indicate the datum on the OLS is clearly visible and is being utilized to maintain the correct glideslope.

Bingo. An order to proceed and land at the field specified, utilizing a bingo profile. Aircraft is considered to be in an emergency/fuel critical situation. Bearing, distance, and destination shall be provided.

Blue water. Operations in which sufficient fuel is not available to conduct a bingo profile to the nearest suitable divert.

Boss. A term used when specifically addressing the Air Boss.

Buster. Set power at maximum continuous rating to expedite recovery.

C

Case 1. Weather 3,000 feet/5 nm or better.

Case 2. Weather at or above 1,000 feet/5 nm but less than 3,000 feet/5 nm.

Case 3. Weather below 1,000 feet/5 nm or night unaided recoveries.

Charlie. The time, usually given in minutes past the hour, at which the aircraft shall be crossing the deck edge during a recovery. Used for Case 1 recoveries only.

Center. A collective radio call for AOCC/HDC/AATCC prefixed by the ship's code name. "Center" is responsible for the control of aircraft in the ship's control area.

Clara. A term used by pilots to indicate the source on the OLS is not in sight.

Control area. A circular airspace with a radius of 50 nm around the ship that extends from the surface to unlimited altitude and is under the cognizance of Center.

Control zone. A circular airspace with a radius of 5 nm around the ship which extends from the surface to and including 2,500 feet unless otherwise designated for special operations. Under the cognizance of the Air Boss.

D

Delta. A pattern around the ship used to hold aircraft pending further clearance or assignment. Pilots shall hold as assigned at maximum conserve.

Divert. The nearest suitable divert airfield. Bingo fuel during green water operations is based on the divert.

E

Emergency expected approach time (EEAT). A time, assigned prior to launch, at which an aircraft is cleared to commence an approach from the emergency marshal pattern under lost communication conditions.

Emergency final bearing (EFB). A magnetic heading provided by Center to all flightcrews prior to launch; to be used when executing a lost communication TACAN approach in IMC. The

emergency marshal pattern shall be relative to the EFB.

Emergency marshal. A radial, DME, and altitude assigned to each aircraft prior to launch. The emergency marshal shall be utilized for holding if lost communication is experienced during IMC. The emergency marshal TACAN approach shall then be commenced at the EEAT.

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

Expected approach time (EAT). The future time that an aircraft is cleared to depart inbound from a prearranged fix. Aircraft shall depart and commence the approach at the assigned time if no further instructions are received or lost communication is experienced. An EAT shall be assigned anytime an aircraft is placed in marshal for a Case 2 or 3 recovery.

Expected Charlie time (ECT). The future time, usually given in minutes past the hour, that an aircraft shall be crossing the deck edge to land. An ECT shall be assigned anytime a change is made to a previously assigned Charlie time. Aircraft shall recover at the assigned ECT if no further instructions are received or lost communications is experienced.

F

Father. Ship's TACAN.

Feet dry. Pilot to Center report indicating aircraft is passing over the shore line proceeding over land.

Feet wet. Pilot to Center report indicating aircraft is passing over the shore line proceeding over water.

Final approach fix (FAF). Five DME on the BRC at 1,200 feet. This position is reported by the pilot to Center during a nonprecision instrument approach. The aircraft should be in the landing approach configuration by the FAF.

Final bearing. The magnetic bearing assigned by Center for final approach. It is an extension of the tramline.

Final control. A control station in Center responsible for controlling aircraft in Case 3 conditions until the pilot reports "see you" or "ball" or reaches approach minimums.

G

Gate. Twelve DME on the BRC at 1,200 feet. This position is reported by the pilot to Center during a Case 2 or 3 approach.

Green water. Operations in which sufficient fuel is available to conduct a bingo profile to the nearest suitable divert.

I

Inbound bearing. The magnetic bearing assigned by Center to pilots descending directly to the ship. It may be, but is not necessarily, the final bearing.

Inbound heading. The magnetic heading assigned by Center that will ensure interception of the final bearing at a specific distance from the ship.

Initial qualification (day/night). A pilot who has not completed a total of eight day or eight night shipboard takeoffs and landings, or has not completed a shipboard landing within 1 year.

M

Marshal. A bearing, distance, and altitude fix designated by Center from which pilots shall orient holding and from which an initial approach shall commence. The two standard marshal patterns are marshal overhead and marshal astern.

Mother. Parent vessel (i.e., LHD, LHA).

N

Needles. A term used to indicate that glideslope and azimuth information is being provided to the aircraft AWLS/ICLS system.

O

Offset. An approach in which the aircraft offsets to one side of the ship and then crosses over to the landing spot.

Over the stern. An approach in which the aircraft approaches the landing spot from directly astern the ship.

P

Paddles. A term used when specifically addressing the LSO via radio communications.

Parrot. Military IFF/transponder.

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

Platform. A reporting point at 5,000 feet while conducting an approach in which the rate of descent shall be reduced to comply with the “minute to live” rule.

Pogo. Return to the last assigned frequency if “no joy” on the newly assigned frequency.

Popeye. Aircraft is in IMC.

Position and intended movement (PIM). The reference position of the ship at a given time, and a forecast of the course and speed expected to be made during future movements. The PIM is used to assist the return of aircraft.

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 issuing such orders.

Primary flight control (PriFly). The controlling agency that is responsible for aircraft control within the ship’s control zone.

Procedural 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 AOCC/HDC/AATCC officer, flight is unsafe.

R

Report see me. A term used by Center to direct pilots to report “See you” when the ship is in sight.

S

See you. A term used by pilots to indicate the ship is in sight.

Set state. The targeted fuel state the aircraft shall have when crossing the deck to land.

Signal bingo. When given “signal bingo”, the pilot shall immediately conduct a bingo profile to the nearest suitable divert.

Signal Charlie. When given “signal Charlie”, the pilot shall proceed to the initial for a Case 1 recovery.

Spin it. A signal given to aircraft to depart, proceed to the initial, and reenter for the overhead.

T

Tramline. The centerline of the AV-8B landing and launch area.

U

Unaided. Not using NVG/NVDs.

List of Acronyms and Abbreviations

A

AATCC. Amphibious air traffic control center.

ACE. Aviation combat element.

ADLL. Angle deck launch line.

AHRS. Altitude heading reference system.

ALT STTG. Altitude setting.

AOCC. Air operations control center.

ASOB. Automated shipboard operating bulletin.

ASR. Air surveillance radar.

AWLS. All-weather landing system.

B

BRC. Base recovery course.

C

CAI. Close-in approach indicator.

CCA. Carrier controlled approach.

CIC. Combat Information Center.

CQ. Carrier qualification.

D

DDI. Digital display indicator.

DESG. Defense of the Expeditionary Strike Group.

DME. Distance measuring equipment.

E

EAT. Expected approach time.

ECT. Expected Charlie time.

EEAT. Emergency expected approach time.

EFB. Emergency final bearing.

EHSI. Electronic horizontal situation indicator.

EMCON. Emission control.

F

FAF. Final approach fix.

FCLP. Field carrier landing practice.

FDLL. Free deck launch line.

H

HAPI. Horizontal approach path indicator.

HDC. Helicopter direction center.

HEFOE. Hydraulic, electrical, fuel, oxygen, engine.

HPI. Hover position indicator.

I

ICLS. Instrument controlled landing systems.

IMC. Instrument meteorological conditions.

INS. Inertial navigation system.

J

JPT. Jet pipe temperature.

L

LSE. Landing signal enlisted.

LSO. Landing signal officer.

LSO UT. Landing signal officer under training.

M

MAG. Marine aircraft group.
MAGTF. Marine air-ground task force.
MVAR. Magnetic variation.

N

NORDO. No-radio aircraft.
nm. Nautical mile.
NVD/NVG. Night Vision Devices/Night Vision Goggles.

O

OAT. Outside air temperature.
ODO. Operations duty officer.
OIC. Officer in charge.
OLS. Optical landing system.

P

PAR. Precision approach radar.
PIM. Position and intended movement.
PIO. Pilot-induced oscillations.
PriFly. Primary flight.

R

RTB. Return to base.
RTF. Return to force.

S

SINS. Shipboard inertial navigation system.
SOB. Shipboard operating bulletin.
SOP. Standard operating procedure.
STO. Short takeoff.

T

THDG. True heading.

U

USMC. United States Marine Corps.

V

VFR. Visual flight rules.
VL. Vertical landing.
VLA. Visual landing aid.
VMC. Visual meteorological conditions.
VSTO/VTO. Vertical short takeoff/vertical takeoff.
V/STOL. Vertical short takeoff and landing.

W

WOD. Wind over deck.
WX. Weather.

PREFACE

SCOPE

The NATOPS Flight 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. This manual contains information on all aircraft systems, performance data, and operating procedures required for safe and effective operations. However, it is not a substitute for sound judgment. Compound emergencies, available facilities, adverse weather or terrain, or considerations affecting the lives and property of others may require modification of the procedures contained herein. Read this manual from cover to cover. It is your responsibility to have a complete knowledge of its contents.

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Commanding Officer
Marine Aircraft Group 14
2nd Marine Aircraft Wing, MCAS
Cherry Point, NC 28533-0064

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CHANGE SYMBOLS

Revised text is indicated by a black vertical line in either margin of the page, like the one printed next to this paragraph. The change symbol shows where there has been a change. The change might be material added or information restated. A change symbol in the margin by the chapter number and title indicates a new or completely revised chapter.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to WARNINGS, CAUTIONS, and Notes found throughout the manual.

WARNING

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

CAUTION

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

Note

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

WORDING

The concept of word usage and intended meaning adhered to in preparing this Manual is as follows:

1. Shall has been used only when application of a procedure is mandatory.
2. Should has been used only when application of a procedure is recommended.
3. May and need not have been used only when application of a procedure is optional.
4. Will has been used only to indicate futurity, never to indicate any degree of requirement for application of a procedure.

CHAPTER 1

Introduction

1.1 DESIGN

Chapters 1 through 13 provide standardized procedures for routine operations aboard all ships authorized for use by V/STOL aircraft and shore-based FCLP evolutions.

Chapter 14 provides standardized procedures for units conducting extended deployments aboard amphibious ships.

Chapters 15 through 24 provide standardized operating procedures, technical guidance, and a single source of V/STOL LSO policy and information.

1.2 GENERAL

This manual provides all V/STOL LSOs and pilots with standardized operating procedures, technical guidance, and a single source of LSO policy and information to all command levels. All pilots and LSOs shall be thoroughly familiar with the applicable contents of this manual, the LHA/LHD NATOPS manual (NAVAIR 00-80T-106), AV-8B shipboard operating bulletins, the AV-8B/TAV-8B NATOPS flight manual (A1-AV8BB-NFM-000), and any command standard operating procedures prior to the beginning of any FCLP/shipboard operations.

CHAPTER 2

Briefing and Debriefing Procedures

2.1 INTRODUCTION

This chapter provides standardized briefing and debriefing requirements for all V/STOL shipboard and shore-based FCLP evolutions.

2.2 REQUIREMENTS

2.2.1 Preshipboard/Field Carrier Landing Practice Briefing. The LSO shall ascertain that all pilots are thoroughly prepared in all respects for shipboard and FCLP operations. All pilots shall complete a preshipboard/CQ/FCLP/currency landing procedures brief within 10 days of shipboard/ FCLP operations. Prior to each day's evolution, an LSO shall administer a refresher brief to all pilots on applicable portions of paragraph 2.3 of this manual (this is intended to be a quick review).

2.3 PRESHIPBOARD BRIEFING

The following subjects shall be covered by the LSO in briefings for pilots prior to and, as deemed necessary, during shipboard operations:

1. Communication and communications discipline
 - a. TACAN channel.
 - b. Radio frequencies and colors, radio channelization.
 - c. **PIM**.
 - d. Other pertinent information.
2. Carrier configurations
 - a. Recovery systems
 - (1) LSO talkdown approaches, OLS, HPI, HAPI
 - (a) Systems design

- (b) Capabilities
 - (c) Limitations
 - (d) Special procedures.
- b. Deck configuration.
 - c. Deck lighting and control.
3. Carrier operating procedures
 - a. Launch and departure procedures (as applicable)
 - (1) Deck procedures, taxi/power considerations
 - (2) Launch procedures
 - (3) **Case 1/2/3** departure procedures
 - (4) **EMCON**.
 - b. Check-in and **marshal** procedures.
 - c. Approach procedures (as applicable)
 - (1) Case 1/2/3
 - (2) CCA, straight in/overhead TACAN
 - (3) **EMCON/ZIP LIP**
 - (4) Voice reports
 - (5) NORDO aircraft approaches
 - (6) Alternate.
 - d. VFR pattern
 - (1) Entry
 - (2) Break (interval)
 - (3) Downwind

- (4) Abeam position
- (5) Approach turn
- (6) Spin
- (7) Delta.
- e. Glideslope techniques
 - (1) Groove length
 - (2) Start position
 - (3) Hover stop position
 - (4) Altitude/airspeed/AOA control
 - (5) Lineup
 - (6) Glideslope error corrections
 - (7) Decel abeam distance
 - (8) Cross-technique
 - (9) Landing
 - (10) Effects of wind
 - (11) Effects of deck motion
 - (12) LSO calls (standard phraseology and responses).
- f. Waveoff
 - (1) Mandatory
 - (2) Own waveoff
 - (3) Technique.
- g. Night operations (specifics)
 - (1) Lack of depth perception
 - (2) Radar altimeter
 - (3) Instrument scan/scan transition
 - (4) Aircraft lighting
 - (5) Loss of lift (hover stop/40 kt).

- h. Bingo procedures
 - (1) Fuel state
 - (2) Profile.
- i. Emergency procedures
 - (1) LSO equipment malfunction
 - (2) Ship equipment malfunction
 - (3) Aircraft emergencies
 - (a) Brake failure
 - (b) Nose tire out of limits
 - (c) STO abort
 - (d) Rpm stagnation/loss of thrust
 - (e) NORDO (all phases)
 - (f) Other emergencies from Part V of the AV-8B/TAV-8B NATOPS flight manual (A1-AV8BB-NFM-000).
 - (g) Ejection
 - (h) SAR requirements and procedures.

2.4 SIMULATOR PROCEDURES BRIEFING

The LSO shall conduct a formal briefing with all pilots prior to simulator-syllabus flights covering the procedures and training objectives to be accomplished.

2.5 FIELD CARRIER LANDING PRACTICE BRIEFINGS

The following subjects shall be covered by the LSO in briefings prior to and, as deemed necessary, during FCLP training:

1. Takeoff and recovery times.
2. Weather briefing.
3. Alternate/bingo field.
4. Formation procedures.
5. Communications and communications discipline.

6. LSO talkdown approaches, OLS, HPI
 - a. Systems design, capabilities, and limitations
 - b. Special procedures
 - c. Alternate approach procedures.
7. General FCLP procedures
 - a. Course rules
 - b. Pattern, turns, and dimensions
 - c. Altitude/airspeed/AOA control
 - d. Lineup
 - e. Night specifics (field lighting, etc.)
 - f. Emergency procedures.
8. Specific FCLP procedures
 - a. Takeoff/entry
 - b. Climbout
 - c. Break (interval)
 - d. Upwind turn
 - e. Downwind leg
 - f. Landing checklist
 - g. Abeam position:
 - (1) Case 1/2 — “(Callsign), abeam, gear, (fuel state), wet or dry, (pilot’s name first pass only)”
 - (2) Case 3 — “(Callsign), abeam, (fuel state)”
 - h. Approach turn
 - i. Voice report (Case 3 straight in)
 - (1) Callsign
 - (2) Harrier (ball or Clara)
 - (3) Fuel state
 - (4) Wet or dry
 - j. Voice report (Night Case 1)
 - (1) Callsign
 - (2) Harrier ball, or Clara
 - k. Glideslope technique
 - (1) Groove length
 - (2) Start position
 - (3) Hover stop position
 - (4) Altitude/airspeed/AOA control
 - (5) Lineup
 - (6) Glideslope error correction
 - (7) Decel abeam distance
 - (8) Cross-technique
 - (9) Landing
 - (10) Effects of wind
 - (11) LSO calls (standard phraseology and response)
 - l. Waveoff
 - (1) Mandatory (including test/close-in waveoff)
 - (2) Own waveoff
 - (3) Techniques
 - m. Aircraft lighting (determined by local conditions)
 - n. Charlie procedures
 - o. Bingo procedures
 - (1) Fuel state
 - (2) Profile
 - p. Emergency procedures (see shipboard emergencies paragraph 2.3 (3i))
 - q. Debrief arrangements.

2.6 POSTSIMULATOR/POSTFLIGHT DEBRIEFING

The LSO shall debrief each pilot, as soon as practicable, following each simulator/FCLP or shipboard landings regarding procedures and landing performance during the period. The LSO should use this debriefing to discuss any significant trends in landing performance and recommend corrective action. The LSO should debrief each pilot, if practicable,

concerning their day landing performance prior to night shipboard landings.

2.7 PILOT LANDING TREND DEBRIEFS

The LSO shall periodically debrief each pilot concerning his landing trends. Debriefs should be annotated on the pilot's shipboard V/STOL trend analysis sheet and maintained in the pilot's Aircrew Performance Record.

CHAPTER 3

Field Carrier Landing Practice Procedures

3.1 INTRODUCTION

This chapter contains standardized procedures for the conduct of FCLPs.

3.2 FIELD CARRIER LANDING PRACTICE GENERAL PROCEDURES

3.2.1 Field Carrier Landing Practice. FCLP is defined as that phase of required flight training that precedes shipboard landing operations. It should simulate, as nearly as practicable, the conditions encountered during shipboard landing operations.

3.2.2 Personnel Requirements. A qualified LSO shall be on station for all FCLP operations. For night operations, the qualified LSO shall have an assistant (not necessarily an LSO) present whenever more than two aircraft are in the FCLP pattern.

3.2.3 Traffic Pattern Control Responsibilities. FCLPs conducted at non-tower-controlled facilities will be under the direct supervision of the senior LSO present. FCLPs conducted at tower-controlled facilities will be coordinated with the tower for patterns, communications, etc., and will at a minimum allow the LSO to have control of the aircraft from the start of the groove until landing.

3.2.4 Preflight Briefing. Pilots shall be briefed by a qualified LSO before each FCLP period in accordance with the AV-8B/TAV-8B NATOPS flight manual, Chapter 2 of this manual, and any local SOPs/directives.

3.2.5 Conduct of Field Carrier Landing Practice. The following equipment checks shall be made by the LSOs prior to FCLP operations:

1. FOD check/sweep/walk as appropriate.
2. Functional check of all visual landing aids (cut and waveoff lights, OLS, HPI, etc.), as required.

3. All lighting facilities for proper operations, if required.

4. Functional check of all radios.

5. Aldis lamp or spotlight, if required.

3.3 FIELD CARRIER LANDING PRACTICE SPECIFIC PROCEDURES

3.3.1 Operations. FCLP operations should utilize existing simulated LHA/LHD deck facilities but are not restricted to these sites. When FCLPs are conducted without the aid of simulated LHA/LHD sites, consideration shall be given to the degradation of training. The following guidelines should be followed when considering FCLP site selection:

1. Type of FCLP (day or night).
2. Experience level of FCLP pilots (number of shipboard landings).
3. Currency of pilots (initial/current/refresh qualifications).
 - a. A simulated LHA/LHD facility shall be utilized for all initial night qualifications. (On the recommendation of the squadron LSO, this requirement may be waived by the squadron/ detachment commander or a designated representative if an operational necessity exists).

WARNING

Consideration shall be given before waiving this guideline because of the difficulty of night shipboard operations.

- b. For refresher/currency night FCLPs, it is recommended that a simulated LHA/LHD facility be utilized. In the absence of a simulated LHA/LHD deck, a simulated CV

deck should be utilized in combination with a Fresnel lens. The lens shall be positioned such that a centered ball can be flown to a 60-foot hover at approximately spot 4 on the simulated CV deck. The following formula should be used in positioning the Fresnel lens:

$$\frac{60 \text{ feet}}{.0524} = 1,145 \text{ feet forward of hover point.}$$

- c. Initial day FCLPs shall have the same guideline as initial night FCLPs.
- d. Refresher/currency day FCLPs shall have the same guidelines as night refresher/currency FCLPs. Day FCLPs may also be conducted to a runway, pad, or other suitable facility.

Note

FCLP site selection shall be determined by operational necessity, pilot proficiency/ experience and level of qualification.

3.3.2 Standard Procedures. A pilot shall be launched by the standard launch officer hand and arm signals for at least one day period and one night period prior to corresponding initial CQ on the ship.

3.4 PILOT PERFORMANCE EVALUATION

3.4.1 Minimum Number of Field Carrier Landing Practice Periods. Chapters 17 and 18 establish the requirements for FCLPs prior to shipboard operations. The number of FCLP periods (and total number of landings) required to prepare a pilot for shipboard operations will vary with individual pilot skills, experience, and currency in aircraft. The squadron LSO should submit to the commanding officer, via the operations officer, a list of anticipated FCLP requirements for each pilot prior to commencing FCLP workups. These requirements should be adjusted as necessary according to individual performance. The squadron LSO is ultimately responsible for certifying to the commanding officer that an individual is prepared for shipboard flight operations.

3.4.2 Field Carrier Landing Practice Performance Records. All squadrons shall maintain records of pilot FCLP landings and performance on the shipboard V/STOL trend analysis sheet (Figure A-5). This analysis sheet shall be maintained in the pilot’s Aircrew Performance Record.

CHAPTER 4

General Flight Procedures

4.1 INTRODUCTION

This chapter provides standardized flight procedures to be utilized for all shipboard flight operations.

4.2 AIR TRAFFIC CONTROL AGENCIES

1. AOCC/HDC/AATCC — Approach and departure control shall be provided by AOCC/HDC/AATCC within the ship's **control area**. AOCC/HDC/AATCC shall be contacted using the ship's call sign followed by "Center."
2. **Primary flight control** — Control within the ship's **control zone** is coordinated by primary flight control. The primary flight control frequency is normally manned by both the **Air Boss** and **Paddles**. All transmissions for the Air Boss shall be directed to "Tower."
3. **Paddles** — Paddles is the controlling LSO for the launch and recovery of V/STOL aircraft aboard the ship. All transmissions for the LSO shall be directed to "Paddles."

4.3 CALL SIGN

All pilots shall utilize the squadron call sign plus the aircraft side number during all transmissions.

4.4 FREQUENCIES

All frequencies utilized by the ship are considered confidential and shall be referred to by color codes when using uncovered channels.

1. Tower is normally listed as land/launch.
2. Center is listed as HD 1, 2, and 3.

4.5 WET AND DRY CALLS

When making wet and dry calls, the following definitions apply:

1. Wet
 - a. Water check has been completed.
 - b. The water switch is armed.

Note

If the pilot feels sufficient water does not exist to complete the landing, the wet call shall be followed by the water amount (e.g., call sign, abeam, gear, fuel state, wet, 130).

2. Dry
 - a. There is no water aboard.

4.6 WAVEOFFS

Any waveoff initiated by the Tower, LSO or Ship's Captain is mandatory and shall be acknowledged by the pilot when comfortable. The pilot can initiate his own waveoff at any time if he feels the approach is unsafe. A pilot shall not select Hover Stop if aircraft weight exceeds vertical landing capability.

A waveoff may be initiated verbally, by use of the Waveoff lights located above the deck on the aft end of the island, or by use of the Aldis lamp.

If aircraft weight exceeds vertical landing capability, the pilot shall be told "Expect heavy waveoff" by the LSO at the abeam position or as soon as possible thereafter. If conservation of water is crucial, the LSO shall transmit "Check water off" after the "Expect heavy waveoff" call. The pilot will fly a normal pattern to include intercepting a 3-degree glideslope on the BRC. the LSO shall initiate the waveoff verbally by transmitting "Call sign, waveoff", or by use of the Waveoff Lights or Aldis lamp. If the pilot fails to receive a waveoff by the LSO, the pilot shall initiate his own waveoff without selecting Hover Stop.

For a Case 3 approach the LSO shall transmit “Expect heavy waveoff” and “Check water off” if required at the Ball call. The LSO shall waveoff the aircraft prior to a normal Hover Stop point on the approach. If the pilot fails to receive a waveoff by the LSO, the pilot shall initiate his own waveoff without selecting Hover Stop.

WARNING

Selection of Hover Stop and subsequent deceleration above VL performance may degrade waveoff capability to the point that the aircraft is unrecoverable.

The following procedures apply to waving off.

1. Add full power if not already selected.
2. Ensure a positive rate of climb. Initiate an accelerating transition maintaining a positive rate of climb.
3. Correct any yaw.
4. When possible, reduce power slightly, turn the water switch off and transmit “Call sign, waving off”. A slight cut to the port shall be executed to avoid over flight of the ship.
5. If a waveoff is executed from a hover the pilot should take a cut to the port to avoid over flight of other aircraft/personnel on the deck and the ship’s superstructure.

WARNING

Failure to take a cut to the port when waving off may cause serious injury or damage to aircraft/personnel on the deck.

4.7 MINIMUM FUEL ON DECK

Aircraft shall be on deck at or above the bingo fuel figure for green-water operations. The minimum fuel on deck shall be 800 pounds during blue-water operations and 500 pounds after a press-up.

Note

The pilot shall request an immediate recovery when the fuel state is approaching the minimum fuel on deck plus the fuel required for the recovery.

4.8 HOLDDOWN FUEL

Holddown fuel is that fuel state at which aircraft will hold on deck and not launch until refueling to adequate amounts. Holddown fuel will be dependent on weather, diverts, and operations and will be calculated by the controlling LSO and updated as necessary.

4.9 DIVERT

The divert refers to the nearest suitable divert field and not necessarily home field. For divert field requirements, see paragraph 18.2.1.

4.10 BINGO

The bingo fuel figure is based on a gear-up bingo profile to the nearest suitable divert and shall be calculated for all launches and recoveries. Consideration should be given to a dirty bingo, especially in the case of CQ evolutions.

Note

The bingo fuel figure should be raised for IMC or night operations.

4.11 SIGNAL BINGO

When given “Signal bingo,” the pilot shall immediately conduct a bingo profile in accordance with the AV-8B/TAV-8B NATOPS manual. If on Tower frequency, Paddles shall provide the bingo profile information.

4.12 SIGNAL RETURN TO BASE

When given “Signal RTB,” the pilot shall return to home base in accordance with the assigned departure instructions.

4.13 NVD AIRCRAFT LIGHTING

The following light packages are recommended for NVD operations around the ship.

1. Start/taxi:

External Lights Master Switch — NORM

Formation Lights — ON

Anti-collision Lights — OFF

Position Lights — OFF.

2. Takeoff/landing:

External Lights Master Switch — NVG/NVD

Formation Lights — ON

Anti-collision Lights — ON

Position Lights — DIM.

CHAPTER 5

Deck Markings

5.1 INTRODUCTION

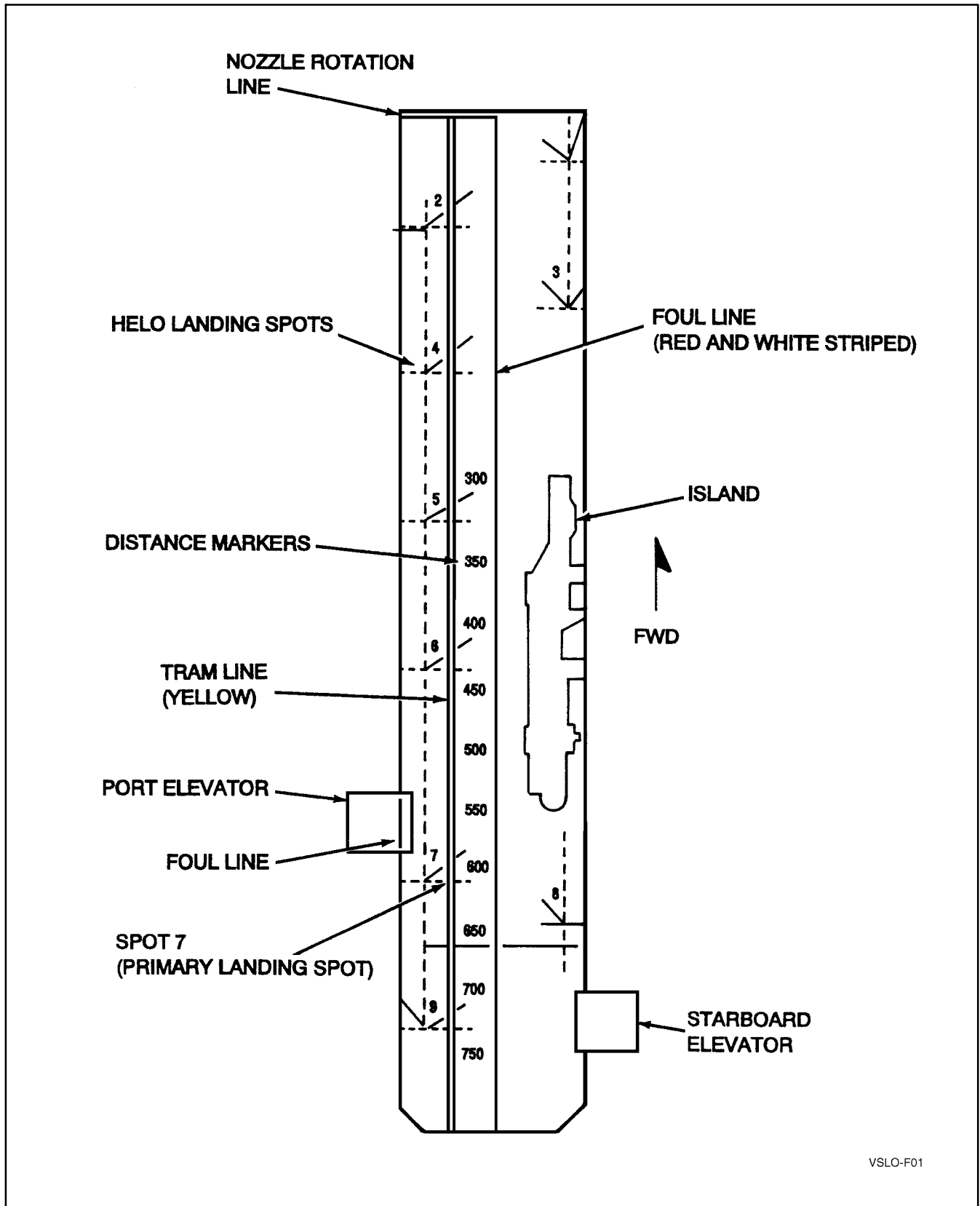
This chapter provides diagrams of the typical deck markings for all ships authorized for use in accordance with the AV-8B SOP.

5.2 DECK CONFIGURATIONS

1. LHD (Figure 5-1).
2. LHA (Figure 5-2).
3. LPD (Figure 5-3).
4. CV/CVN (Figure 5-4).

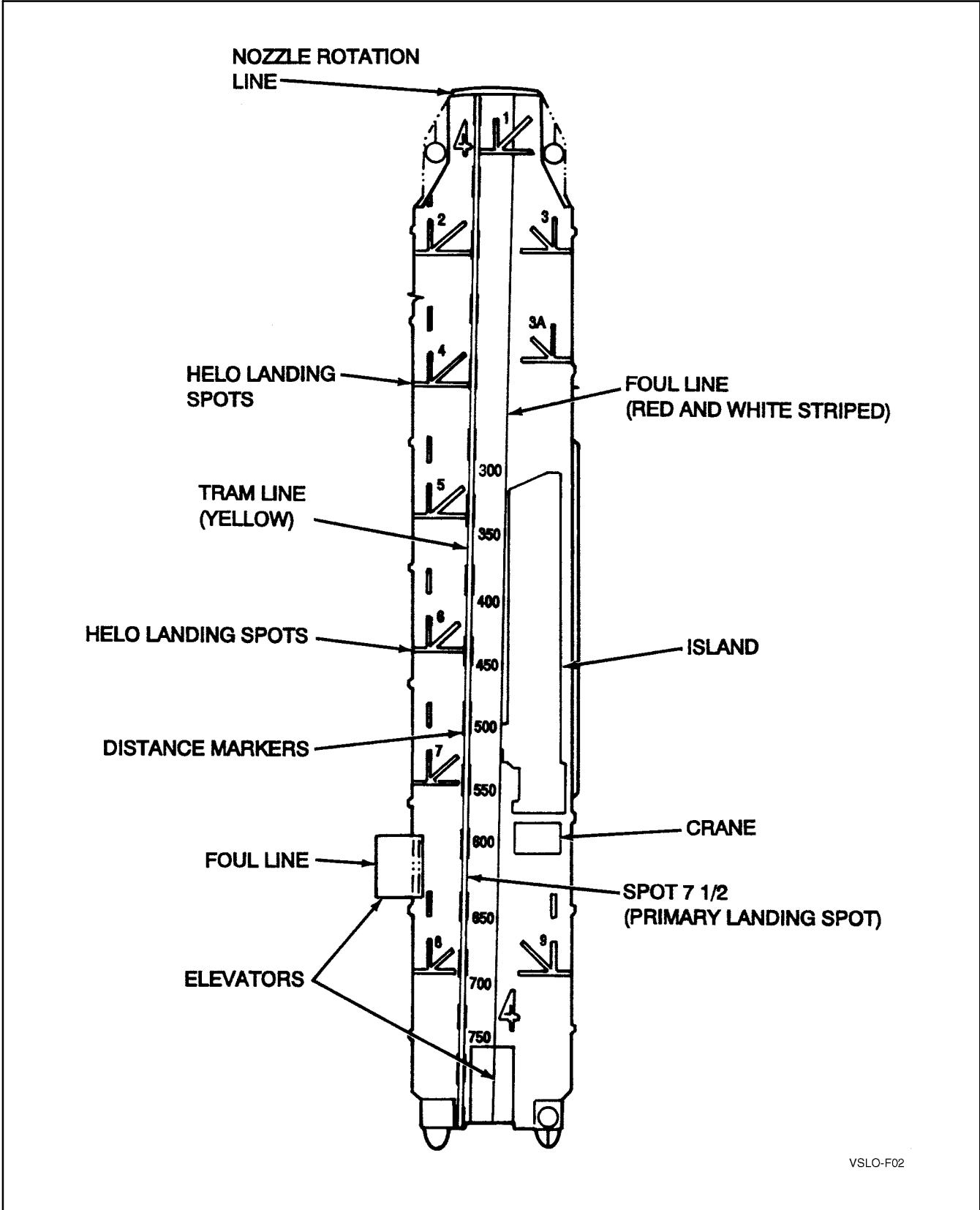
5.3 COMMAND AND DISPLAY SIGNALS

For command and display signals refer to NAVAIR 00-80T-106, LHA/LHD NATOPS manual, Appendix A, B, and E.



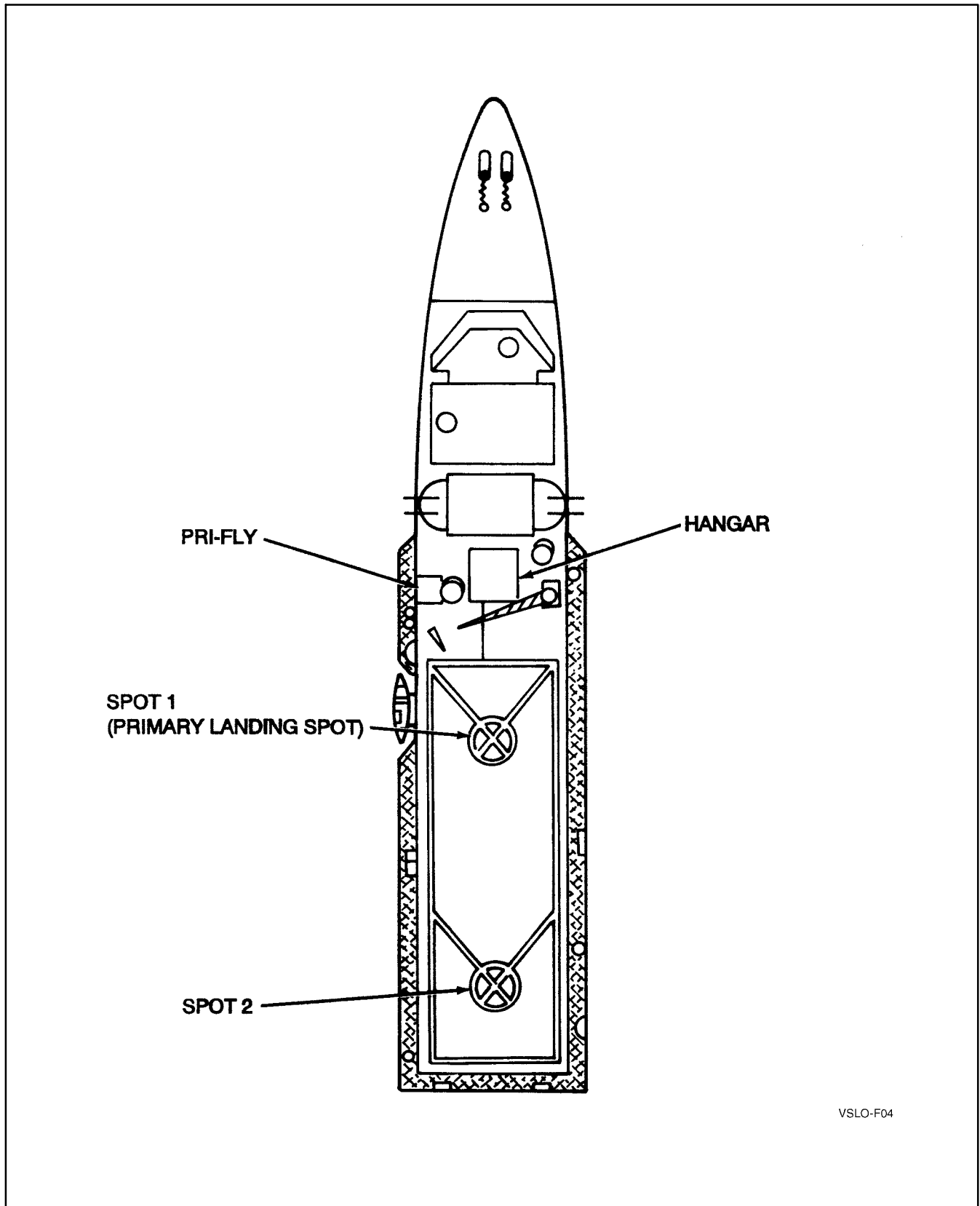
VSLO-F01

Figure 5-1. LHD Typical Deck Marking



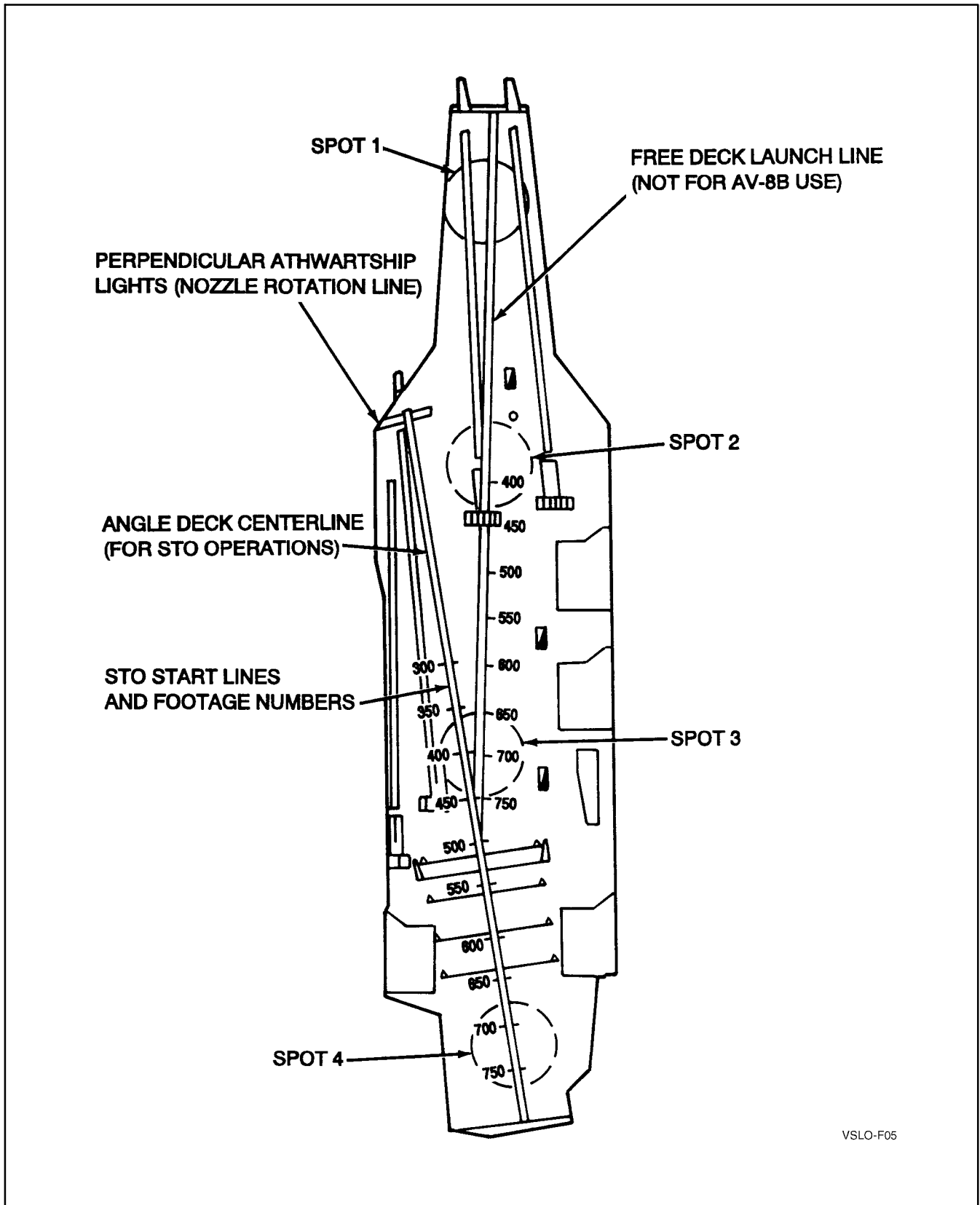
VSLO-F02

Figure 5-2. LHA Typical Deck Marking



VSLO-F04

Figure 5-3. LPD Typical Deck Marking



VSLO-F05

Figure 5-4. CV/CVN Typical Deck Marking

CHAPTER 6

Recovery Procedures

6.1 INTRODUCTION

This chapter provides general as well as specific recovery procedures for Case 1, 2, and 3 conditions.

6.2 GENERAL

The following procedures apply to all recoveries.

WARNING

Aircraft recovering aboard ship with fuel other than JP-5 shall notify the appropriate authority prior to recovery.

6.2.1 Initial Contact. When possible, all flights shall contact Center before entering the ship's control area. On initial contact, the flight lead shall pass the following information:

1. Call sign (use aircraft side number)
2. Position (off [Father](#))
3. Altitude (in [angels](#))
4. Lowest fuel state in pounds (e.g., 3.8 for 3,800 pounds)
5. Ordnance remaining.

Center shall respond:

1. Expected approach or Charlie time
2. Marshal or delta instructions, if required
3. Vectors, if required
4. Altimeter setting, wind, weather, and BRC

5. Time
6. Other pertinent information
7. Clearance into the control area
8. [Set state](#) and Bingo fuel.

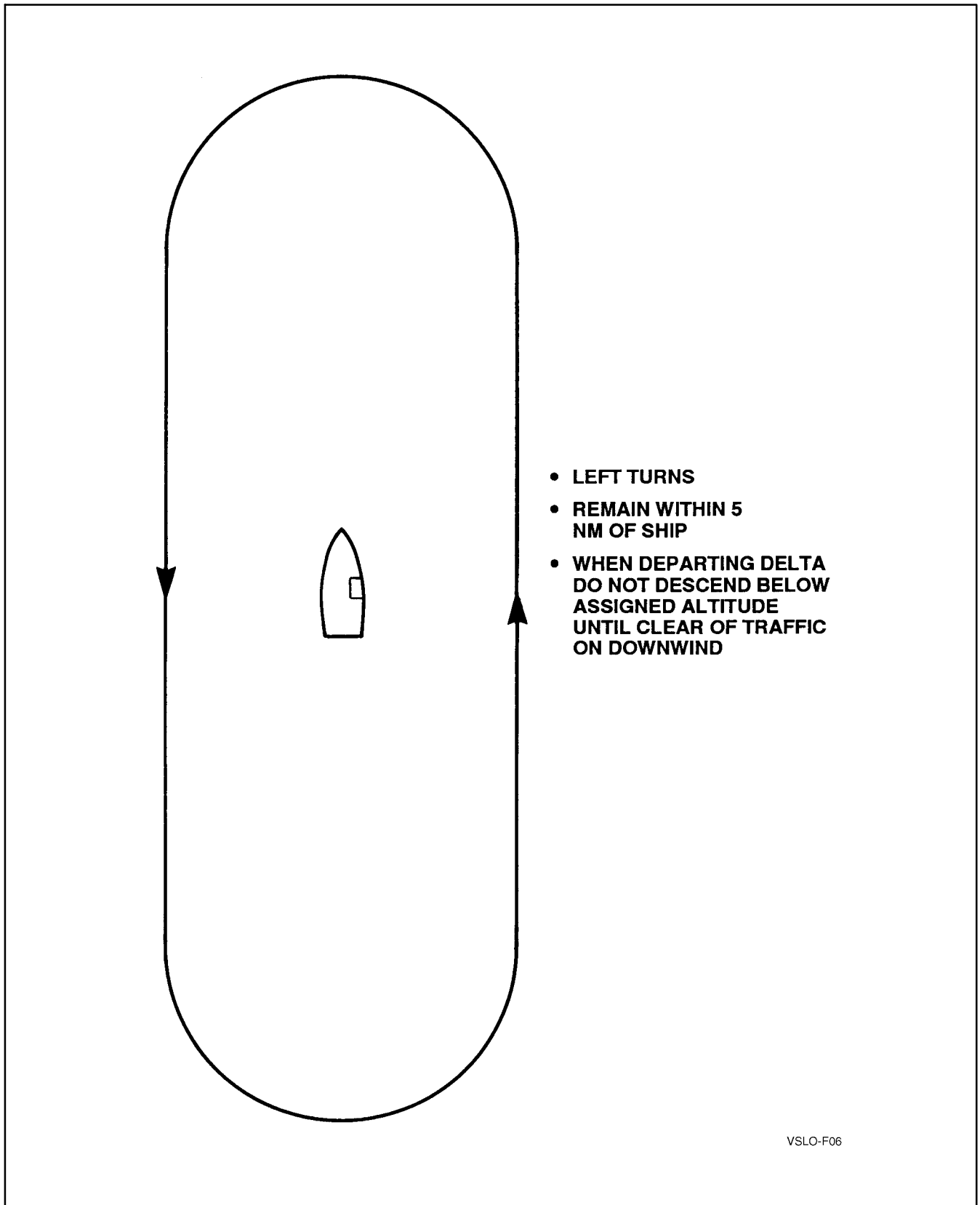
6.2.2 Delta. The delta pattern is a VFR pattern oriented overhead the ship with left-hand turns. All aircraft should remain within 5 DME of the ship while in delta. Center shall assign an altitude, [ECT](#) (if required), and set state to aircraft in delta. Any altitude may be assigned above [angels](#) 2. If the assigned altitude places the aircraft within Tower control zone, control of the aircraft shall be passed to Tower. Delta is the primary pattern for holding aircraft during Case 1 operations. The delta pattern is depicted in [Figure 6-1](#).

6.2.3 Departing Delta. Departure from the delta pattern shall be conducted on the downwind leg on the port side of the ship. The assigned altitude shall be maintained until the aircraft is clear of the traffic pattern.

6.2.4 Marshal. The two standard marshal patterns are as follows:

6.2.4.1 TACAN Primary Marshal. TACAN primary marshal shall be oriented on the 180 bearing relative to the BRC at a distance of 1 NM for every 1,000 feet of altitude plus 15 ([angels](#) + 15). The base altitude assigned shall not be less than 6,000 feet.

Example: If told to hold at [angels](#) 7 and the BRC is 050, your holding radial would be the 230 radial ($050 + 180 = 230$) and your holding fix/initial approach fix would be 22 NM ($7 + 15 = 22$). (See [Figure 6-2](#)). Holding legs should be no more than 10 NM from the holding/initial approach fix.



VSLO-F06

Figure 6-1. Delta Pattern

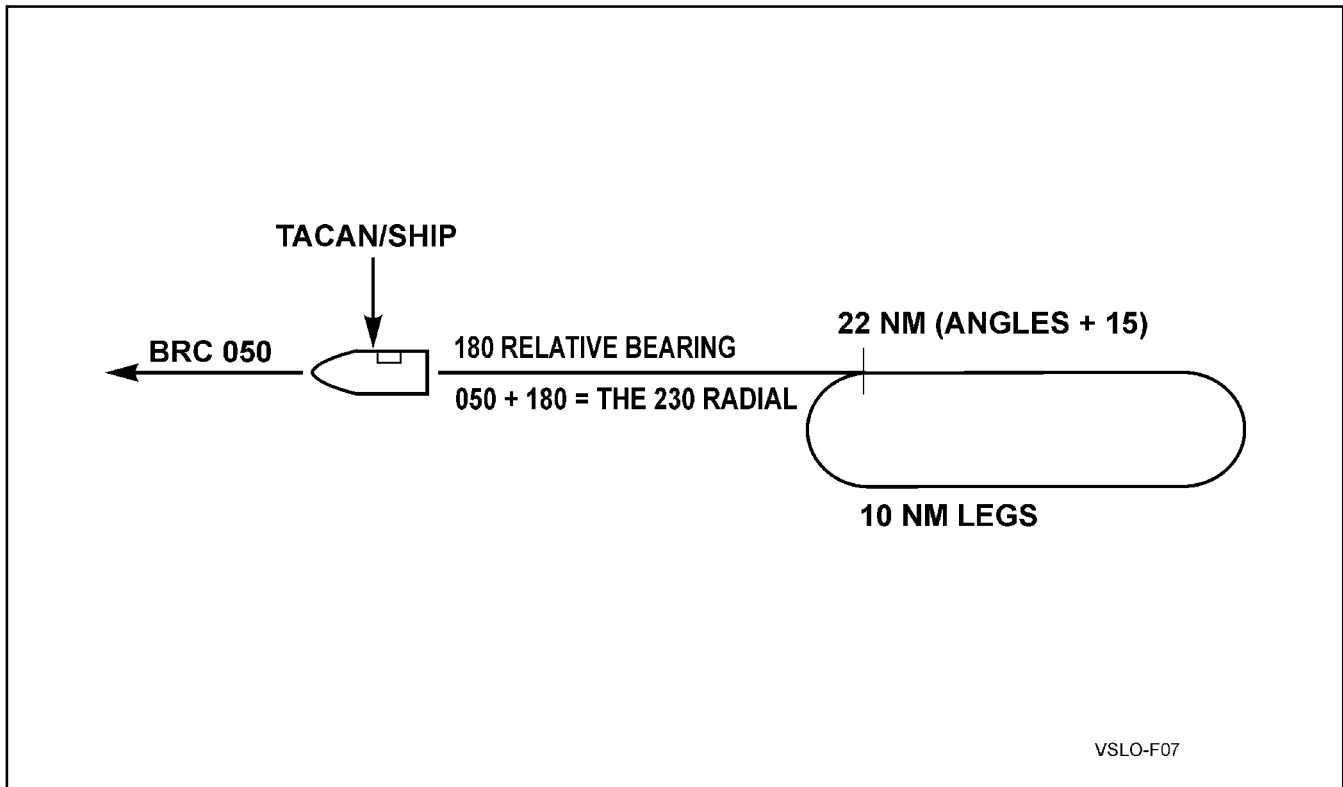


Figure 6-2. TACAN Primary Marshal

6.2.4.2 TACAN Overhead Marshal. TACAN overhead marshal is an overhead holding pattern with the inbound leg being 210° relative to the BRC. The holding pattern is a racetrack pattern, 10NM legs, left-hand turns, with the inbound leg passing over the holding/initial approach fix (4,DME). The base altitude assigned shall not be less than 6,000 feet. (See Figure 6-3)

Example: If told to hold in TACAN Overhead Marshal at angles 6 and the BRC is 050, your inbound holding heading would be 260° ($050 + 210 = 260$), and your holding radial would be the 080 radial ($050 + 030 = 080$). The holding/initial approach fix would be at the 080 radial at 4 DME, and your holding altitude would be 6,000 feet.

6.2.5 Departing Marshal.

1. Case 1 — Depart the marshal fix in order to make the assigned Charlie time.
2. Case 2 — An **EAT** shall be assigned by Center a minimum of 5 minutes prior to allow pilots sufficient time to adjust the aircraft gross fuel

weight. Aircraft should depart the marshal fix one at a time at the assigned EAT, with a minimum of 2 minutes between aircraft.

3. Case 3 — Same as Case 2.
4. When departing marshal, the following procedures shall be utilized:
 - a. Airspeed — 250 knots.
 - b. Speedbrake — optional.
 - c. Rate of descent — 4,000 to 6,000 fpm.
 - d. Report to center:

“Call sign, commencing, current altimeter.”

Note

The altimeter setting is transmitted by the pilot to ensure it has been received and entered.

- e. At 5,000 feet, the pilot shall transmit “**Platform**” and reduce the rate of descent to

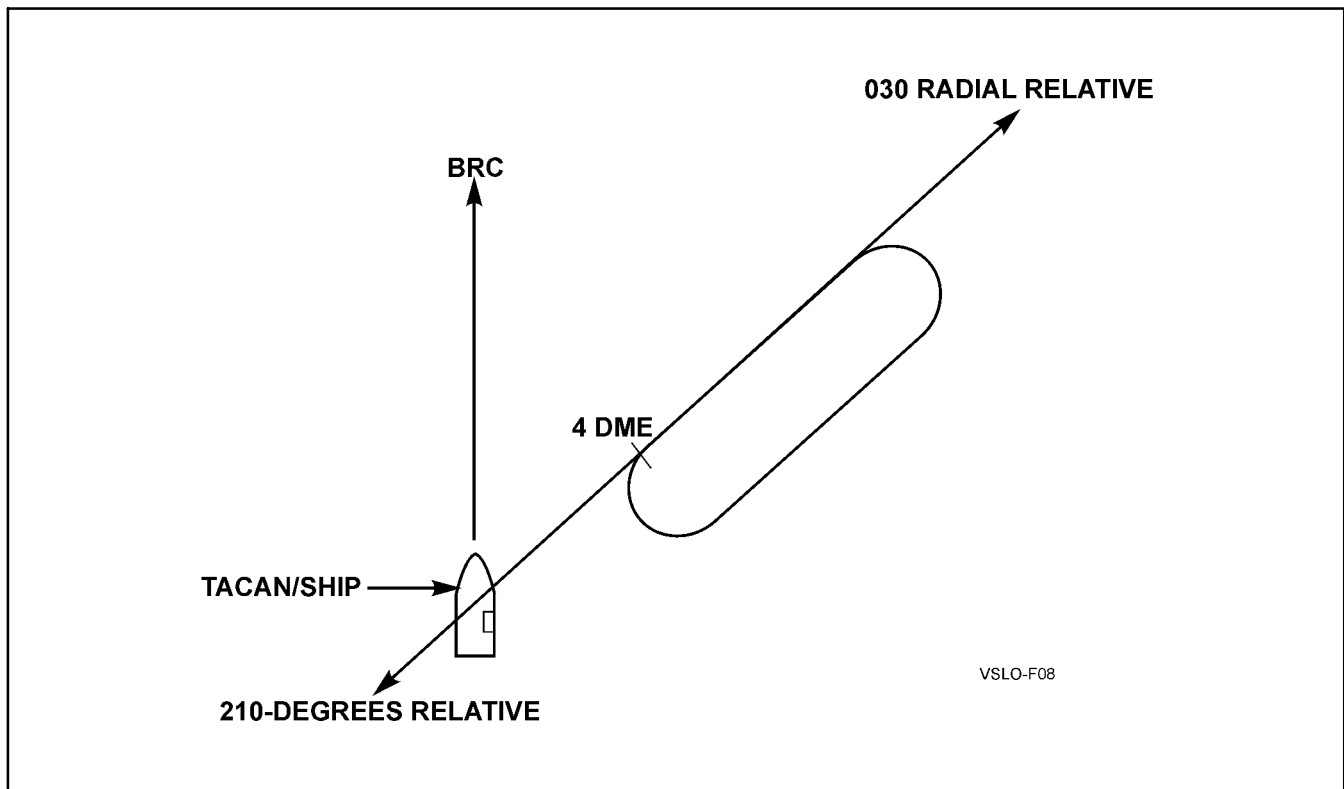


Figure 6-3. TACAN Overhead Marshal

comply with the “minute to live” rule to arrive at the 12-nm gate at 1,200 feet.

6.3 CASE 1 RECOVERY

6.3.1 Case 1 Defined. Case 1 recoveries are conducted when the weather is 3,000/5 or better. A VFR recovery is conducted to the overhead. Case 1 recoveries are the preferred recovery method for day and night VMC operations.

6.3.2 Day Case 1 Procedures. The Day Case 1 procedures are as follows:

1. If departing from marshal through an overcast, the pilot shall comply with the departing marshal instructions (paragraph 6.2.5) until VMC is reached. At that time, the pilot shall report “Canceling IFR” and proceed directly to the initial.
2. The pilot shall report “See you” when Mother is in sight.
3. The initial is at 800 feet, 3 nm astern. The pilot shall strive to be at the initial in order to meet the Charlie time and set state (from the initial to crossing the deck requires 2 to 3 minutes and 300 to 400 pounds). The initial shall be reported to Tower. Tower shall transmit “Winds are _____,” “Continue” or “Cleared to break.”
4. The pilot shall fly up the starboard side of the ship for a level 800-foot break. The break shall not be conducted unless cleared by Tower. Lead should break 10 seconds past the bow followed by 14-second intervals for each wingman. No aircraft shall extend more than 5 miles beyond the bow without approval from Tower. Maintaining a proper and uniform interval is very important in the CARQUAL pattern. Interval is primarily the responsibility of the pilots during VMC; however, both the Air Boss and the LSO shall monitor the pattern and issue instructions to adjust the interval as necessary.
5. Once wings level on downwind, the pilot shall descend to 600 feet and commence the landing checks.

6. The abeam position is .8 to 1.0 DME at 600 feet. Landing checks should be complete to include antiskid and external lights off, 50° to 60° nozzles, and 10 to 12 units. The pilot shall transmit “Call sign, abeam, gear, fuel state, wet or dry.” Tower or Paddles shall respond with “Expect spot ___” or “Expect heavy waveoff.” Winds will only be repeated from the break if they are significantly different. For a heavy waveoff, Paddles will transmit “Check water off ” if conservation of water is crucial.

WARNING

For all shipboard operations, the antiskid switch must be in NWS to preclude loss of brakes and unwanted nosewheel casting.

Note

- If the pilot feels sufficient water is not available for a landing that requires water, a water quantity call shall be included in the abeam call.
 - Do not transmit with another aircraft in the groove until that aircraft has landed.
7. The turn off the 180 should be an instrument-type turn of 20° to 25° angle of bank to arrive at the 90 at 400 to 450 feet and 10 to 12 units.
8. The altitude in the groove shall be 300 to 350 feet. The proper groove length is one-half to three-quarters nm. The timing for headwinds is as follows:
- a. Greater than 20 knots — Turn prior to abeam the intended landing spot.
 - b. Ten to 20 knots — Turn abeam the intended landing spot.
 - c. Less than 10 knots — Delay 2 to 4 seconds past abeam.
9. The pilot shall intercept and fly a 3° glideslope to abeam the landing spot. The OLS can be used to reference a 3° glideslope but is only giving valid information while within a 20° cone centered about the OLS itself. The pilot shall transmit

“Hover stop” after hover stop selection. Paddles shall reply with “Spot _____” or “Foul deck,” or “Expect heavy waveoff.”

10. An **offset** approach is typically used for Case 1 recoveries although over-the-stern approaches may be conducted when circumstances dictate. For offset approaches, the pilot shall decelerate down the port side of the ship one plane width from the edge of the ship.
11. The deceleration closure rate should allow the aircraft to be stopped in a controlled manner abeam the landing spot. Typically, Paddles will clear the pilot to cross early if the closure rate is under control. In this case, the pilot shall not cross until at a 45° position off the landing spot. Except for lost communication approaches, pilot shall not cross until Paddle transmits “Cleared to cross.”

Note

Use of braking stop during the declaration requires an additional 2- to 3-percent rpm and increases pilot workload. Pilots shall not rely on braking stop to salvage a poor pattern.

12. The altitude abeam the landing spot shall be as follows:
- a. LHD — 120 feet.
 - b. LHA — 120 feet.
 - c. CV/CVN — 120 feet.
 - d. LPD — 100 feet.
13. A level cross at 50 feet above the deck directly to the landing spot shall be conducted.

Note

The radar altimeter shall be used in the landing pattern. If the radar altimeter is inoperable, the pilot shall set the altimeter to read 70 feet on the deck of an LHD/LHA and 50 feet on an LPH.

14. Once cleared to land, the pilot shall strive to place his head over the intended landing spot. The aircraft shall normally be lined up on the **tramline** for landing; however, if the pilot is uncomfortable with the winds, the nose of the aircraft may be

aligned with the wind. In this case, the pilot shall strive to place the main gear of the aircraft on the tramline.

Note

The wind vane is an unreliable indicator during landing because of turbulence from the island.

15. When cleared to land, Paddles will call “Cleared to land” and “Idle” at touchdown.
16. “Check” calls shall be used by Paddles to position the aircraft over the landing spot. If given a check call, the pilot shall stabilize, move the aircraft 10 feet, and continue with the landing. If given a second check call, the aircraft shall be moved another 10 feet and the landing continued. On the third check call, the aircraft shall be moved until Paddles calls “Stabilized.”
17. Upon touchdown, reduce power to idle, apply the brakes, select nozzles aft and water switch off (if used), and follow the plane director’s signals.
18. After landing, movement of the aircraft shall be controlled by the taxi director (yellow shirt).
19. The Day Case 1 pattern is depicted in [Figure 6-4](#).

6.3.3 Night Case 1 Procedures. The Night Case 1 procedures are as follows:

1. If departing marshal through an overcast, the pilot shall comply with the departing marshal instructions (Paragraph 6.2.5) until VMC is reached. At that time, the pilot shall report “Canceling IFR” and proceed directly to the initial.
2. The pilot shall report “See you” when Mother is in sight.
3. The initial is 800 feet, 3 NM astern. The pilot shall strive to be at the initial in order to meet the Charlie time and set state (from the initial to crossing the deck edge requires approx. 4 minutes and 400–500 lbs fuel). The initial shall be reported to the Tower. Tower shall transmit “Winds are _____”, “Continue” or “Cleared to break”.

4. The pilot shall fly up the starboard side of the ship for a level 800 ft. break. The break shall not be conducted unless cleared by Tower and no earlier than 10 seconds past the bow. No aircraft shall extend more than five miles beyond the bow without prior approval from Tower. Interval is primarily the responsibility of the pilots during VMC; however, both the Air Boss and the LSO shall monitor the pattern and issue instructions to adjust as necessary.

Note

Single-ship and section breaks are authorized. Due to the slower deck handling procedures at night and to enhance pilot and LSO situational awareness, consideration should be given to single-ship recoveries with two minute intervals. For section recoveries, interval should be a minimum of 30 seconds.

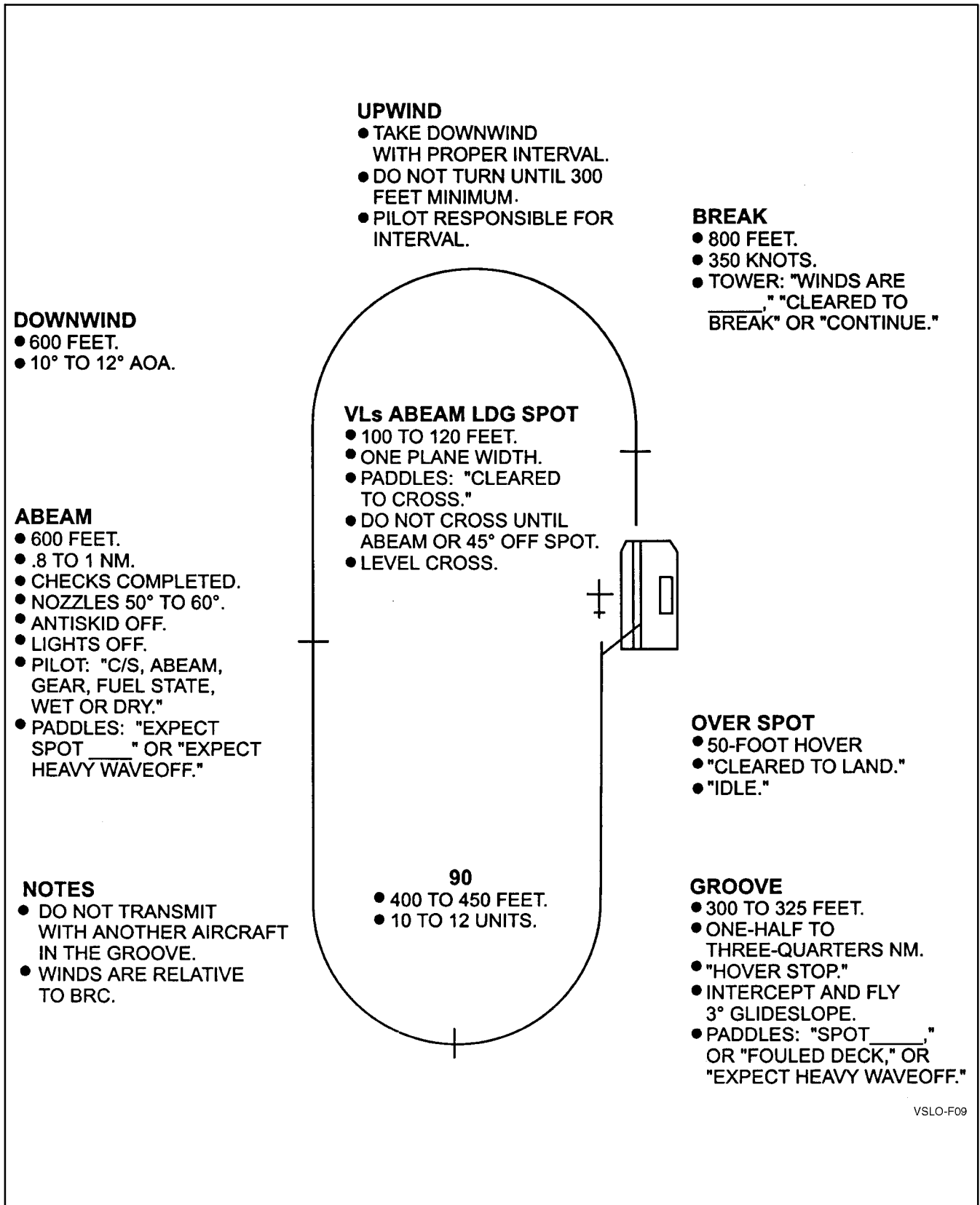
5. Once wings level on downwind the pilot shall commence the landing checks.
6. The abeam position is 1.0 to 1.3 DME at 800 feet. Landing checks should be complete to include antiskid off, 50–60 nozzles, and 10 to 12 units. The anti-collision light should be on, position lights dim, and the formation lights on with the external lights master switch in the NVG/NVD position. The pilot shall transmit “Callsign, abeam, gear, fuel state, wet or dry.” Tower or Paddles shall respond with “Expect spot _____” or “Expect heavy waveoff.” Winds will only be repeated from the break if they are significantly different. For a heavy waveoff, Paddles will transmit “Check water off” if conservation of water is crucial.

WARNING

For all shipboard operations, the anti-skid switch must be in NWS to preclude loss of brakes and unwanted nosewheel casting.

Note

- If the pilot feels sufficient water is not available for a landing that requires water, a water quantity call shall be included in the abeam call.



VSLO-F09

Figure 6-4. Day Case 1 Pattern

- Do not transmit with another aircraft in the grove until that aircraft has landed.

7. The 180 position is 1.5 to 1.7 DME at 800 feet and 10 to 12 units. The turn off the 180 should be an instrument type level turn of 20-25° angle of bank to arrive at the 90 at 650 feet. From the 90 the turn should be descending 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° glideslope to abeam the landing spot. The OLS can be used to reference a 3° glideslope but is only giving valid information within a 20° cone centered about the OLS itself. Once the source and datums are clearly visible, the pilot shall transmit “(Callsign), harrier Ball”. Paddles shall respond with “Roger Ball”. If the ball is not in sight by 400 feet, the pilot shall transmit “Clara”.

Note

Night Case 1 recoveries may not require the use of the OLS if it degrades visual interpretation of the landing environment.

9. An offset approach shall be used for Case 1 recoveries. The pilot shall decelerate down the port side of the ship one plane width from the edge of the ship.
10. Hover stop should be selected at .5 to .8 DME depending on the winds. The pilot shall transmit “Hover stop”. Paddles shall respond with “Spot _____” or “Fouled deck”. The deceleration closure rate should allow the aircraft to be stopped in a controlled manner abeam the landing spot. Typically, Paddles will clear the pilot to cross early if the closure rate is under control. In this case, the pilot shall not cross aft of the 60° bearing relative to the landing spot. Except for lost communication approaches, the pilot shall not cross until Paddles transmits “Cleared to cross”.



Crossing forward of the 45° bearing or overshooting the landing spot may result in increased pilot workload.

Note

Use of braking stop should be avoided.

11. The altitude abeam the landing spot shall be 120 feet for LHA/LHD operations.
12. Execute a level cross at 50 feet above the deck directly to the landing spot. The HPI and tramline should be referenced to place the aircraft in a proper hover position above the landing spot. Once over the landing spot, Paddles shall transmit “Cleared to land”. After touchdown, exterior lights shall be extinguished except for the formation lights in accordance with paragraph 4.13.



Closure and rates of descent are initially more difficult to discern and may cause late recognition of aircraft trends. use of NVG/NVDs by the LSO for aircraft in close is not recommended.

Note

Alternate landing spots may be used in an emergency or as necessary for general safety.

13. The Night Case 1 pattern is depicted in [Figure 6-5](#).

6.4 CASE 2 RECOVERY

6.4.1 Case 2 Defined. Case 2 recoveries are conducted when weather is 1,000/5 or better but less than 3,000/5. During a Case 2 recovery, an instrument approach is conducted in order to reach VMC underneath. Case 2 recoveries shall be conducted under procedural or positive radar control until VMC is obtained. Case 2 recoveries are conducted during the day or during NVD recoveries.

6.4.2 Case 2 Recovery Procedures. Close control shall be used by AATCC/HDC until the pilot reports “See you,” at which time, normal Case 1 procedures shall be followed. If the first flight is unable to gain and maintain visual contact with the ship at the 12-mile gate, a controlled descent to 800 feet daylight/1000 feet night aided shall be initiated at the gate. If less than Case 2 weather exists at 5 miles, the

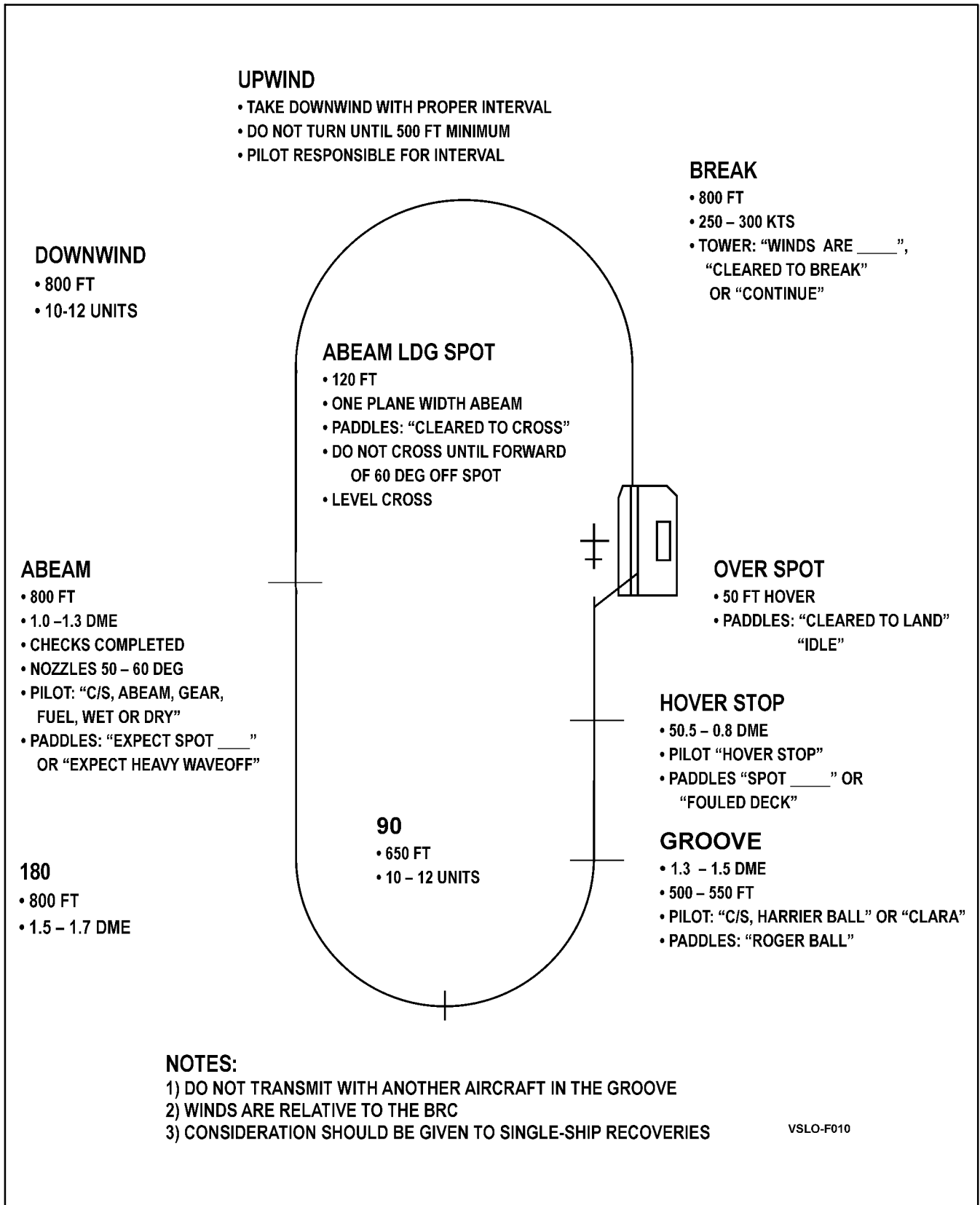


Figure 6-5. Night Case 1 Pattern (Aided)

first flight shall be vectored into the waveoff pattern and to Case 3 marshal. Subsequent aircraft shall be recovered as Case 3 approaches.

Note

During night aided operations consideration should be given to recovering as singles if the ceiling is less than 2000 feet.

6.5 CASE 3 RECOVERY

6.5.1 Case 3 Defined. Case 3 recoveries are conducted when the weather is less than 1,000/5 or during night **unaided** recoveries. A Case 3 recovery is an instrument approach to a full stop or low approach to enter the Case 1 CQ pattern. Case 3 recoveries shall be conducted under procedural or positive radar control until the pilot assumes visual control.

6.5.2 Case 3 Recovery Procedures. The standard Case 3 recovery should consist of a TACAN approach to a PAR or **needles** approach on final. The procedures for departing marshal as discussed in paragraph 6.2.5 shall be complied with. If the TACAN is unavailable, Center shall provide radar vectors to a PAR or needles approach.

Note

The pilot shall select the APU on for all Case 3 and night recoveries and set the radar altimeter to 400 feet.

1. The pilot shall arrive at the gate, which is defined as 1,200 feet at 12 DME astern on the BRC. If the BRC is not intercepted prior to 12 DME, the pilot shall arc at 12 DME until intercepting the BRC. The pilot shall transmit “Gate” and commence landing checks.
2. Frequency changes shall be made only during level flight. Prior to the FAF, Center shall switch the aircraft to the **final controller**/Paddles frequency.
3. The **FAF** is 1,200 feet at 5 DME on the BRC for all instrument approaches. Prior to the FAF, all landing checks shall be completed to include 50° nozzles and water checks. Except when conducting a PAR or ASR approach, the pilot shall transmit “Final approach fix, gear.” During

a PAR or ASR approach, the final controller will initiate the “Gear” call. At 2 DME, select 60° nozzles.

4. When conducting an instrument approach, the following altitudes are recommended:
 - a. 3 DME — 1,000 feet AGL.
 - b. 2 DME — 700 feet AGL.
 - c. 1 DME — 400 feet AGL.

WARNING

The pilot shall not fly below 400 feet until the ball is in sight during a night approach. If the ball is not in sight by 400 feet, the pilot shall transmit “Clara” and level off.

5. For aided Case 3 approaches, the decelerating transition shall be conducted parallel to the BRC, offset to port. The pilot shall not offset before the transition to the OLS (“Ball” call).

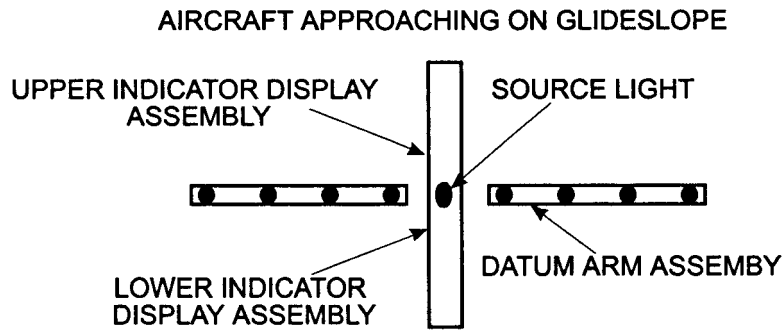
CAUTION

Interpretation of the OLS may be degraded when viewed aided. Under certain environmental conditions the LSO should consider Case 3 unaided recoveries.

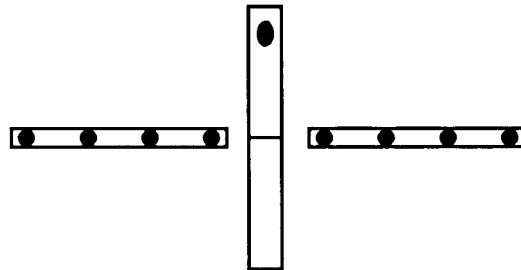
6.5.2.1 V/STOL Optical Landing System.

Visual glideslope and trend information during the final portion of the Case 3 approach is provided by the V/STOL OLS. The V/STOL OLS is mounted above the deck on the aft end of the island and is deployed aboard LHD and LHA class ships only. Pitch and roll stabilization compensates for as much as 3° of ship pitch and 14° of roll. **Figure 6-6** illustrates the V/STOL OLS display indications.

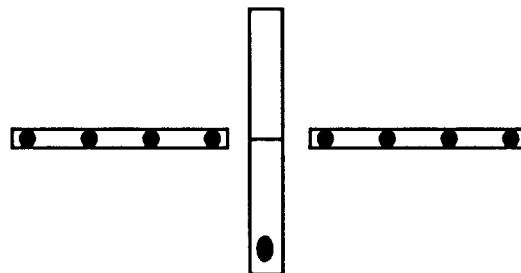
When the amber ball (referred to as the source) is lined up with the two green datum bars (referred to as the datums), the pilot is on the proper glideslope. The V/STOL OLS is set for a 3° glideslope to bring the pilot to the ship ramp at approximately 50 feet above the deck. The tramline will be referenced for lineup.



AIRCRAFT APPROACHING ABOVE GLIDESLOPE



AIRCRAFT APPROACHING BELOW GLIDESLOPE



VSLO-F010

Figure 6-6. V/STOL Optical Landing System Display

Figure 6-7 illustrates the orientation of the 20° horizontal coverage of the V/STOL OLS. The display is oriented so the pilot will lose the V/STOL OLS display at the ramp. At this point, the pilot shall transition to the HPI or take over visually.

The V/STOL OLS vertical indicator display is light coded as illustrated in Figures 6-8 and 6-9. The source will go from a normal amber brightness to a brighter amber, then to a flashing amber as the ball goes off the top, then to a nonflashing red, and then a flashing red as the ball goes off the bottom.

The ball shall not be flown until the source and the datums are clearly visible (1 to 2 nm). At this point, the pilot shall transmit, “Call sign, ball, fuel state, wet or dry.” After the ball call, Paddles will accept control of the recovery and shall respond with, “Roger ball, winds are _____, (ship’s speed).” The pilot shall ensure 60° nozzles have been selected at the ball call.

6.5.2.1.1 V/STOL Optical Landing System Failure. If the V/STOL OLS fails during night recoveries, consideration shall be given to diverting the aircraft. If diverting the aircraft is not possible, the pilot shall fly a Case 3 approach to 1 nm astern the ship. At this point, the LSO shall assume **positive control** and “talk” the pilot to a recovery at the standard landing spot.

6.5.2.2 Horizontal Approach Path Indicator. The two HAPI lights are pitch and roll stabilized and mounted in the port catwalk. As illustrated in Figure 6-10, each HAPI provides a two-color display that is a steady white light or red light depending on whether the approaching pilot is above or below the basic angle setting of the units. 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, the aircraft is below the required approach corridor. If the pilot sees white over white, the aircraft is above the required approach corridor.

Note

The HAPI should not be used as the primary reference for glideslope because of the larger tolerances on the glideslope associated with the system.

6.5.2.3 Hover Stop. Hover stop shall be selected at .5 to .8 DME depending on the winds. The pilot shall transmit “Hover stop.” Paddles shall respond with “Spot _____.”

Note

Use of braking stop during the deceleration requires an additional 2- to 3-percent rpm and increases pilot workload. Pilots shall not rely on braking stop to salvage a poor pattern.

6.5.2.4 Hover Position Indicator. The HPI is mounted on the aft end of the island below the 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 the recovery, the pilot lines up on the ship tramline and flies forward until the red light is centered in the display as shown in Figure 6-11. When this occurs, the pilot is over the touchdown zones with his eye approximately 50 feet over the 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.



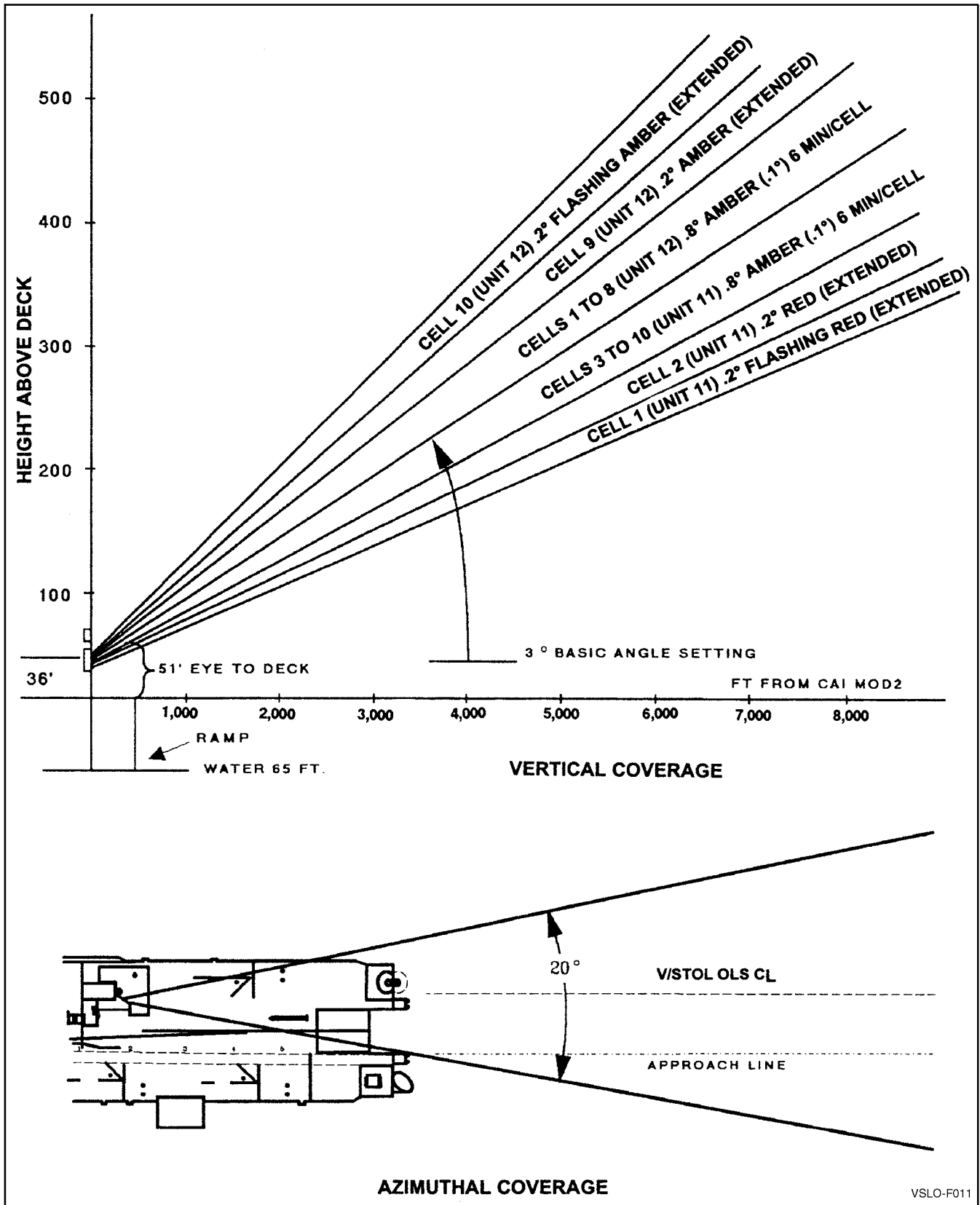
The HPI is not pitch or roll stabilized.

6.5.2.5 Primary Landing Spots — Night Approach. The primary landing spots for a night approach are as follows:

1. LHD — 7.
2. LHA — 7.5.

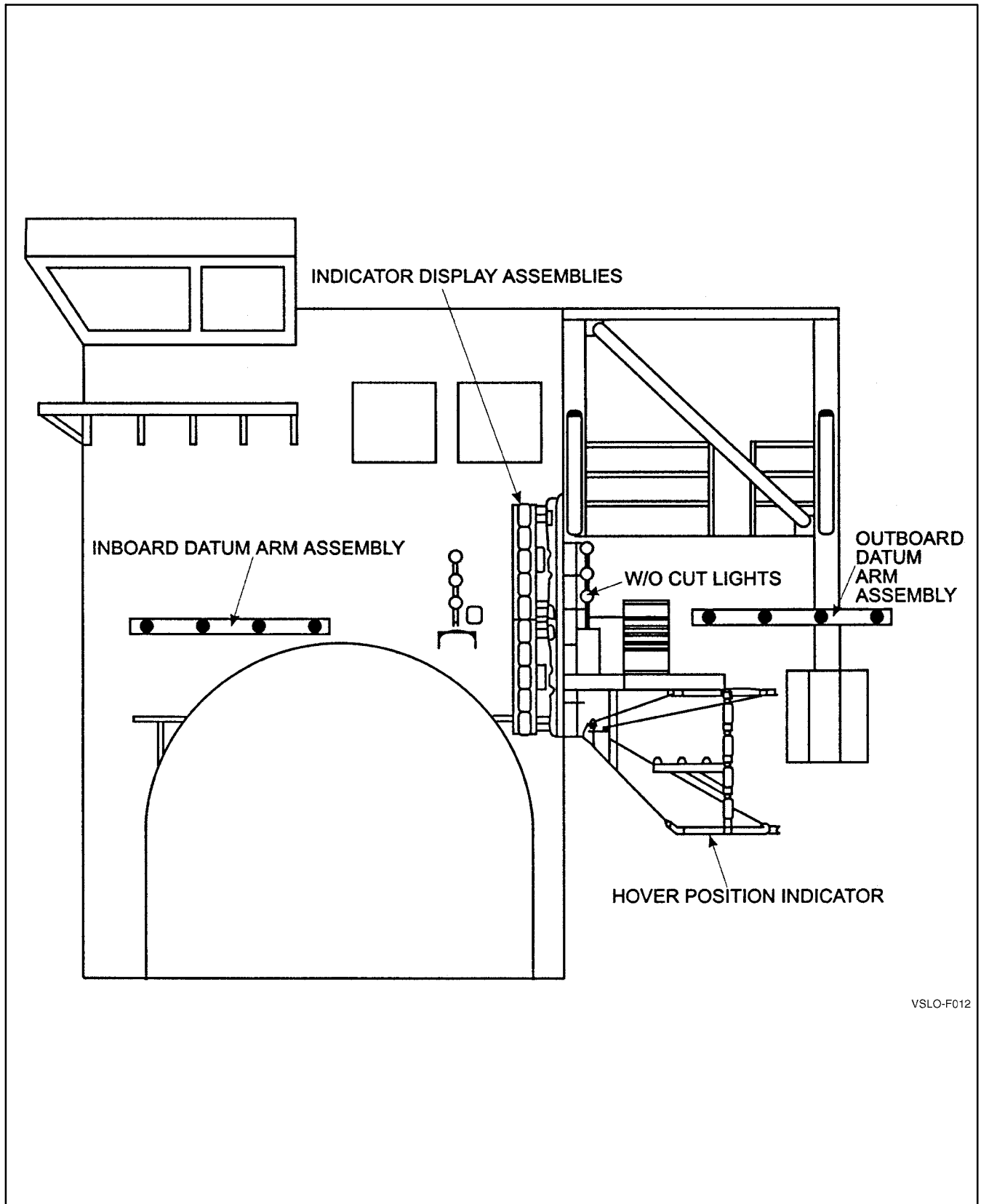
Once over the landing spot, Paddles shall transmit, “Cleared to land.” After touchdown, external lights shall be selected off at night.

An illustration of the standard Case 3 recovery is depicted in Figure 6-12.



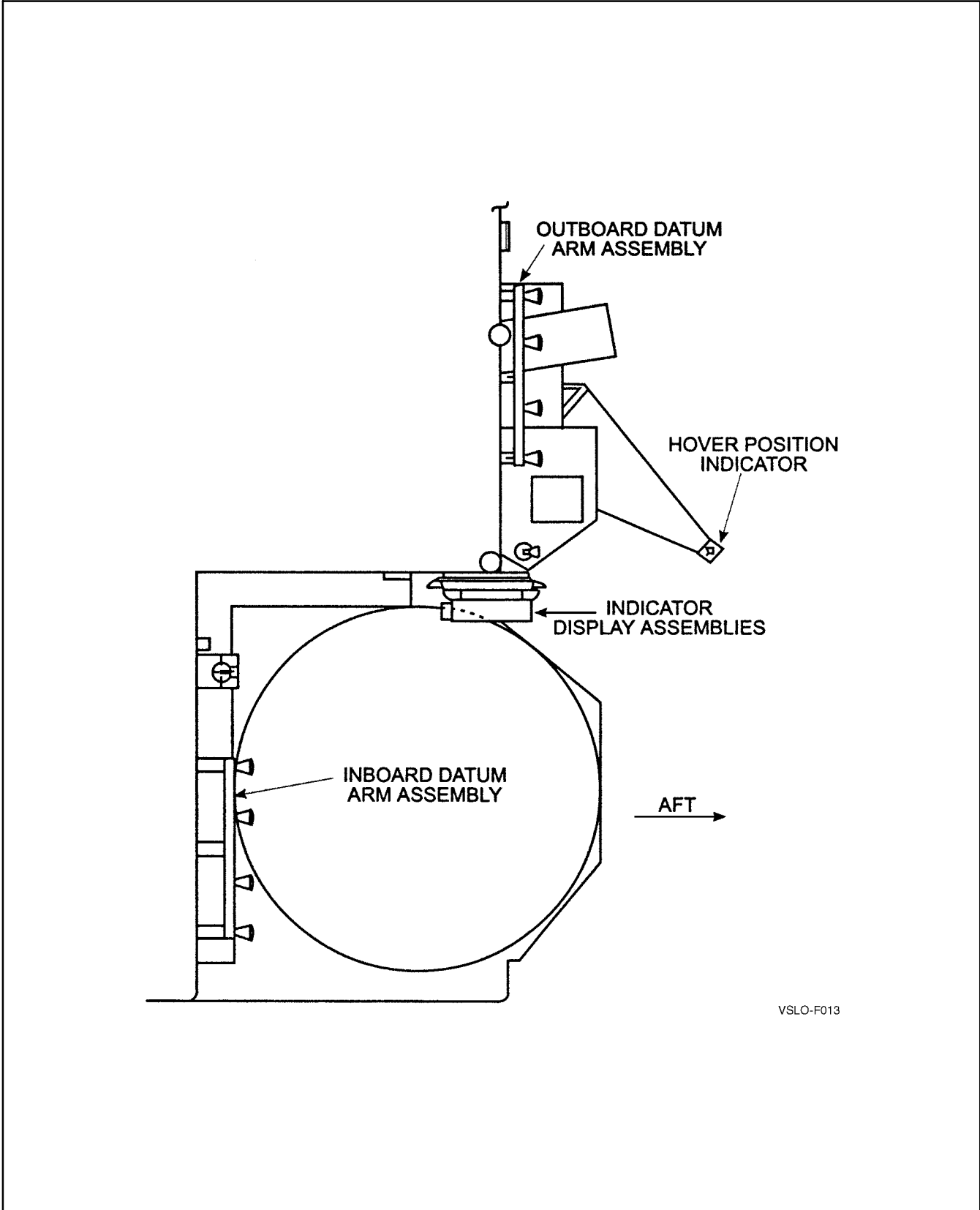
VSLO-F011

Figure 6-7. V/STOL Optical Landing System Vertical and Azimuthal Coverage



VSLO-F012

Figure 6-8. Elevation View of V/STOL Optical Landing System Mounted on LHA Class Ship



VSLO-F013

Figure 6-9. Plan View of V/STOL Optical Landing System Mounted on LHA Class Ship

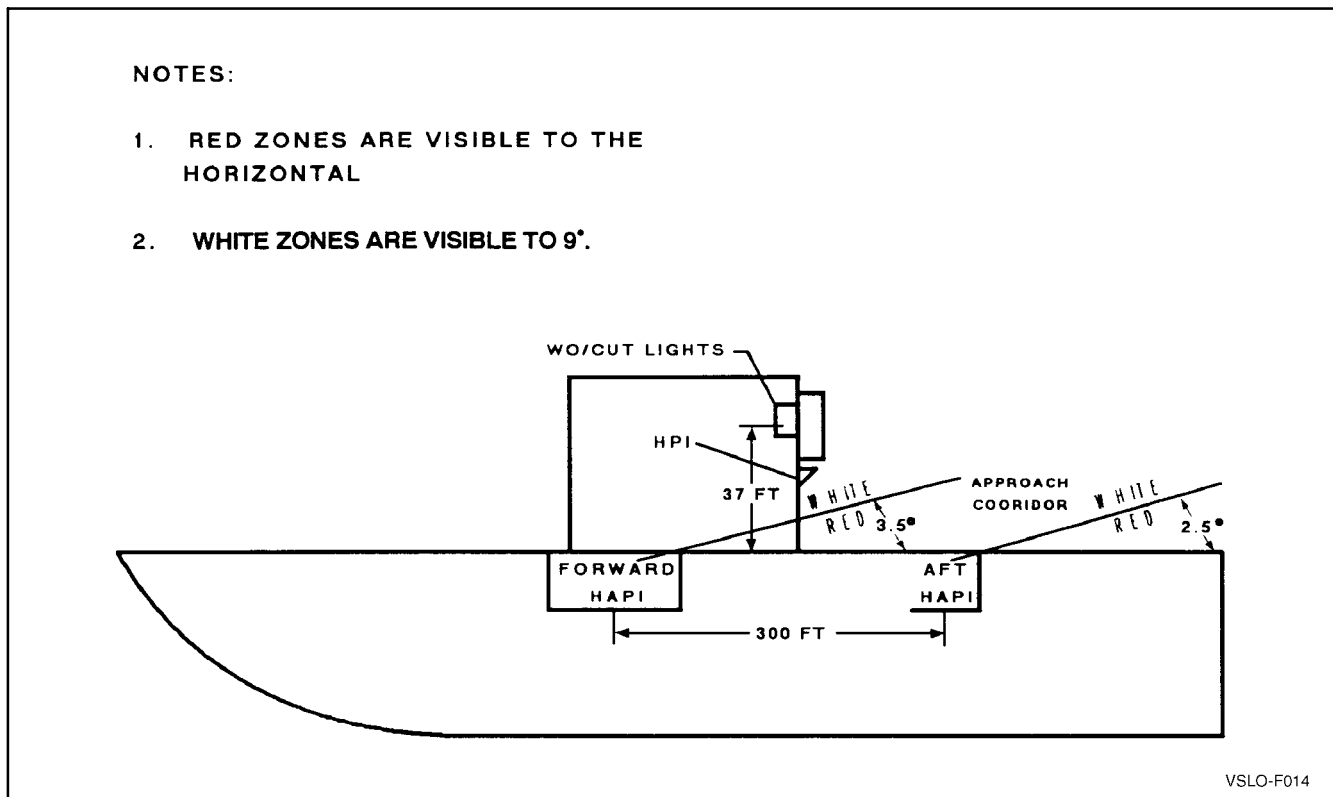


Figure 6-10. Horizontal Approach Path Indicator Vertical Presentation, Typical Installation

6.6 CASE 3 DAY RECOVERY PROCEDURES

The Case 3 recovery procedures covered in paragraph 6.5 shall be used for a Case 3 day recovery with the following exceptions:

1. An offset approach to the port side of the ship rather than [over the stern](#) may be used.
2. If a V/STOL OLS is not available, the pilot shall transmit “See you, fuel state, wet or dry” rather than the ball call once visual contact with the ship is made.

6.7 INSTRUMENT APPROACHES

The following instrument approaches may be utilized for Case 3 recoveries.

6.7.1 Precision Approach Radar/Air Surveillance Radar. The PAR and ASR approach procedures aboard ship are identical to the standard PAR/SAR approaches conducted at any naval or Marine Corps air station except for azimuth corrections on final that are given in degrees right or left vice an actual heading (e.g., “2° right” vice “Right to 2 2 5”).

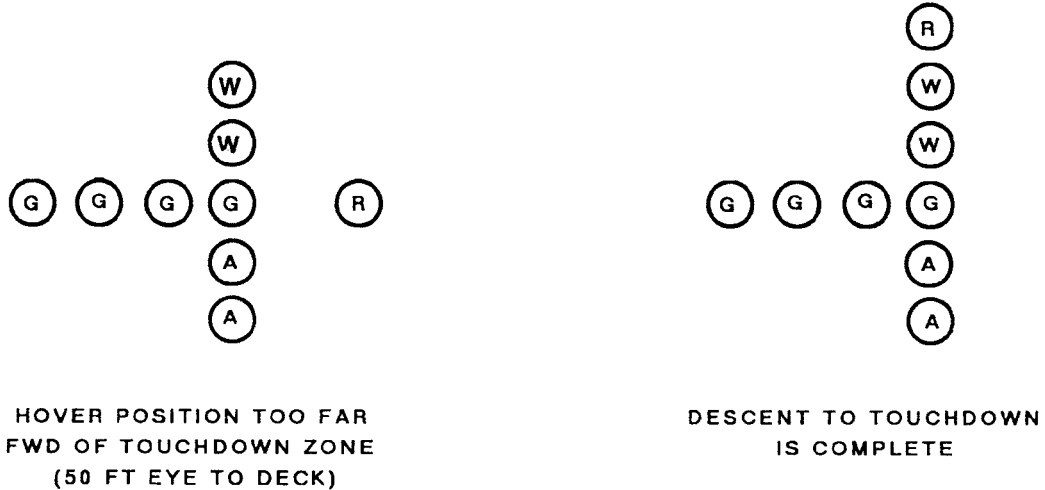
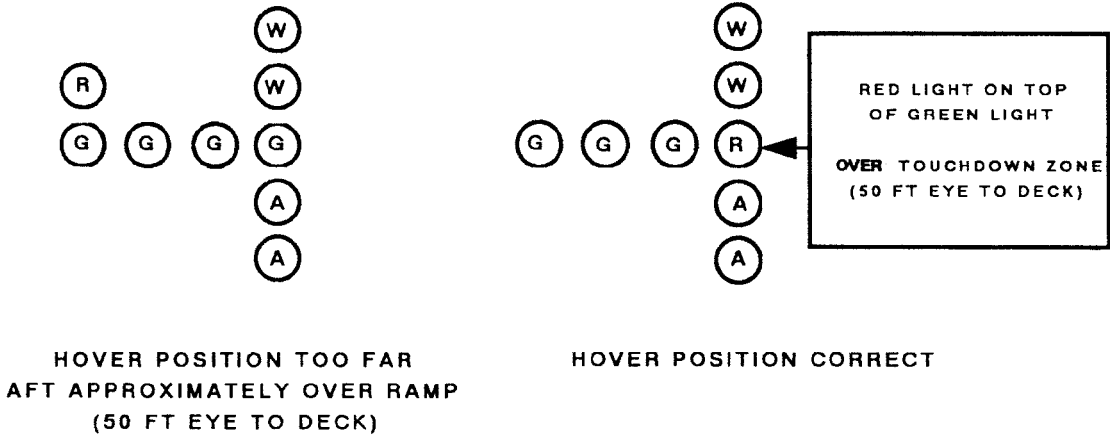
The PAR/ASR minimums are published on the TACAN approach plates.

6.7.2 TACAN. Three TACAN approaches are available:

1. Straight in — The approach plate is depicted in [Figure 6-13](#).
2. Overhead — The approach plate is depicted in [Figure 6-14](#).
3. Modified overhead — To be utilized only during shoreline restricted operations. The approach plate is depicted in [Figure 14-3](#).

6.7.3 Instrument Controlled Landing Systems. If an ICLS is available, the following procedures will be used:

1. Approaching the FAF, the pilot shall transmit “Needles” and the position of the needles relative to the aircraft (e.g., “Call sign, needles, up and right”).
2. If the final controller determines the ICLS information to be inaccurate, the pilot shall be told to “Disregard the needles” and continue with a PAR/ASR or TACAN approach.

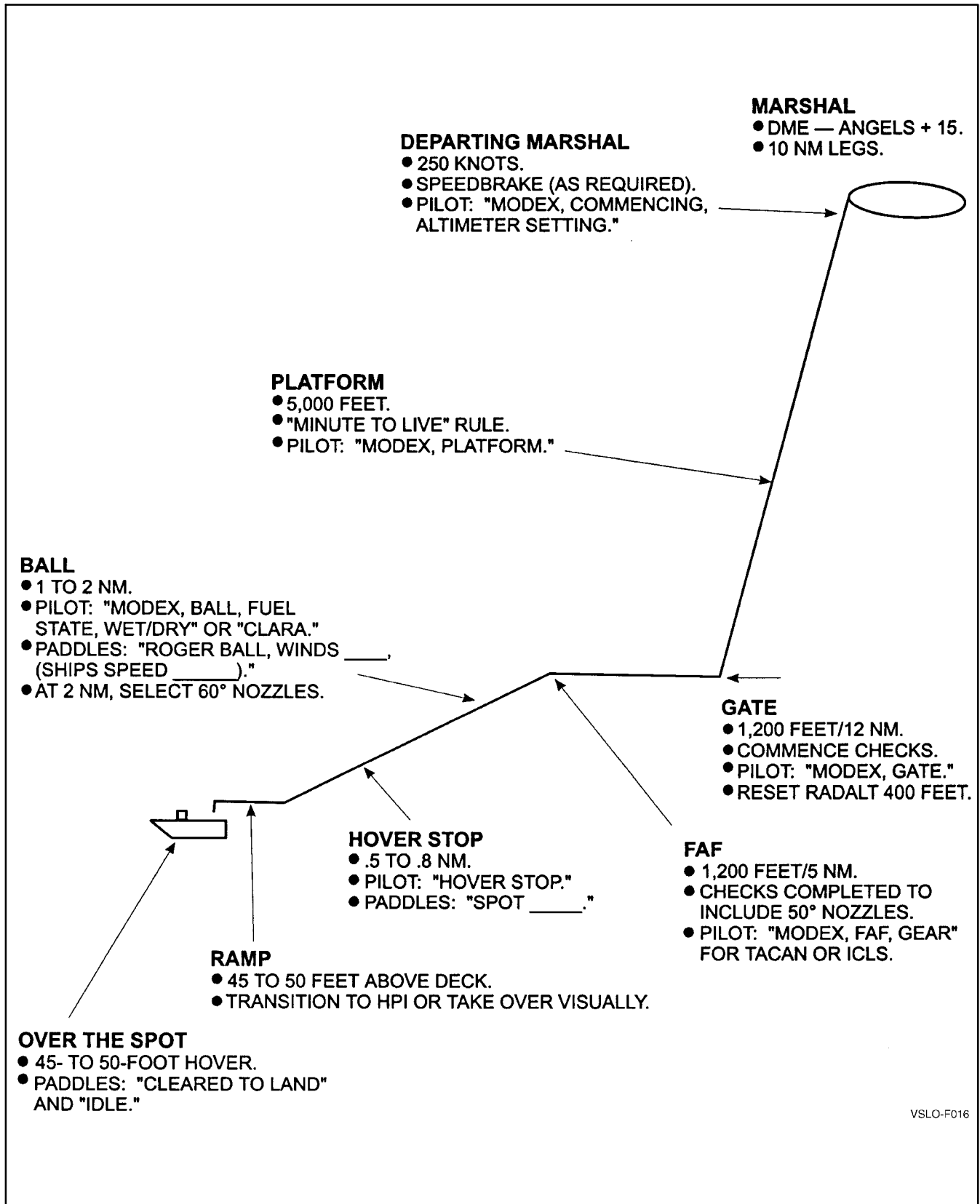


KEY

W	-	WHITE
G	-	GREEN
A	-	AMBER
R	-	RED

VSLO-F015

Figure 6-11. Hover Position Indicator Display



VSLO-F016

Figure 6-12. Case 3 Recovery

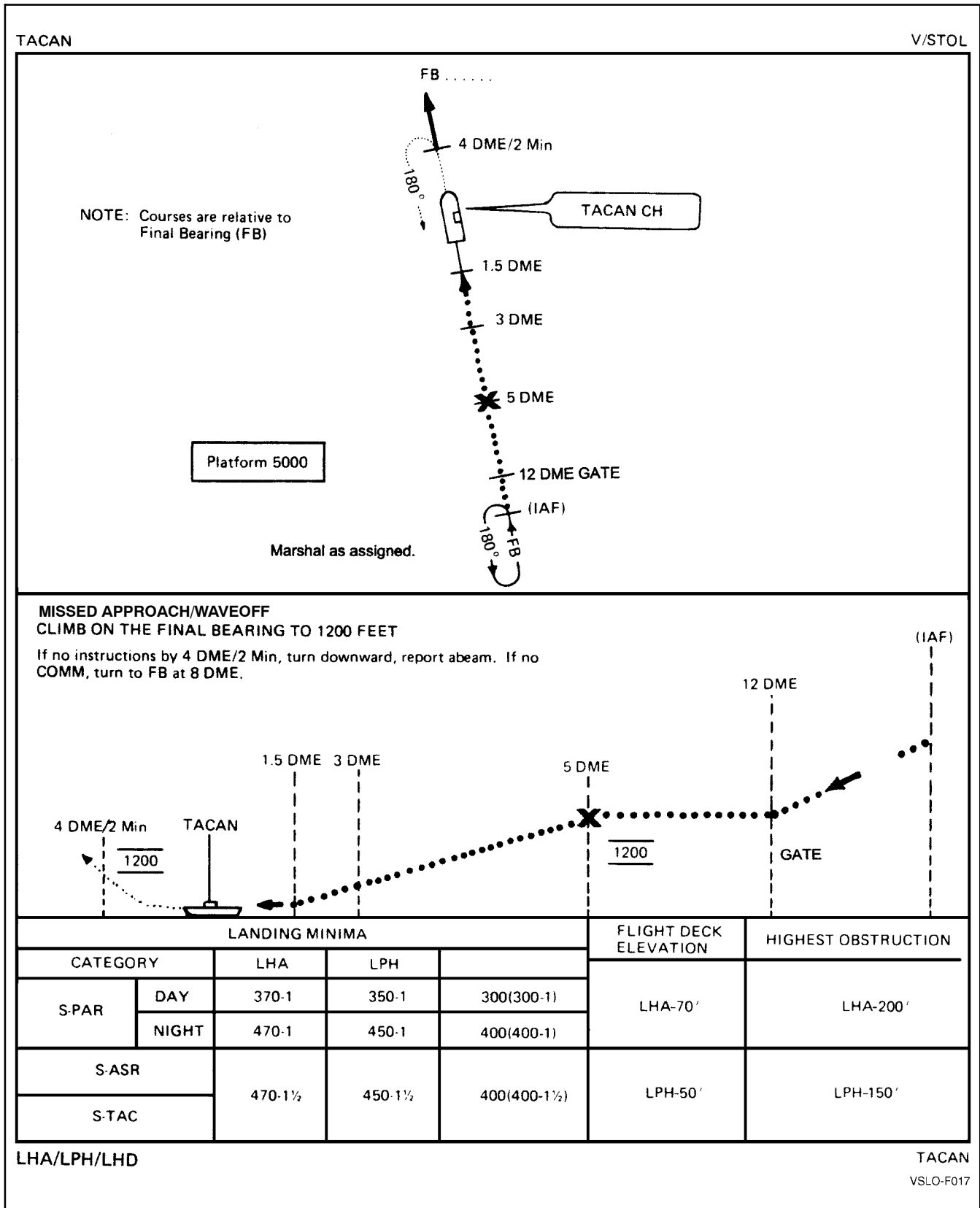


Figure 6-13. Straight-In TACAN

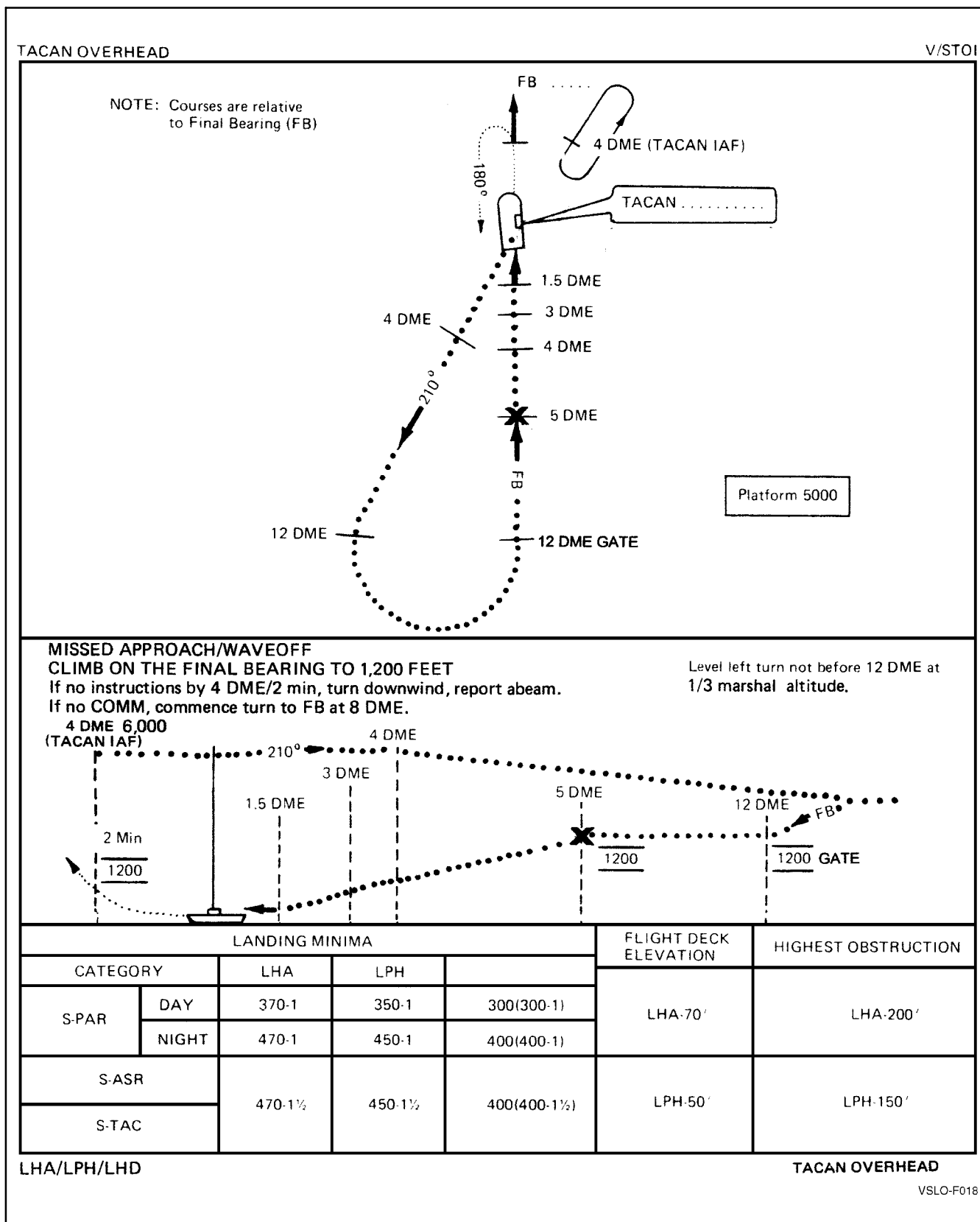


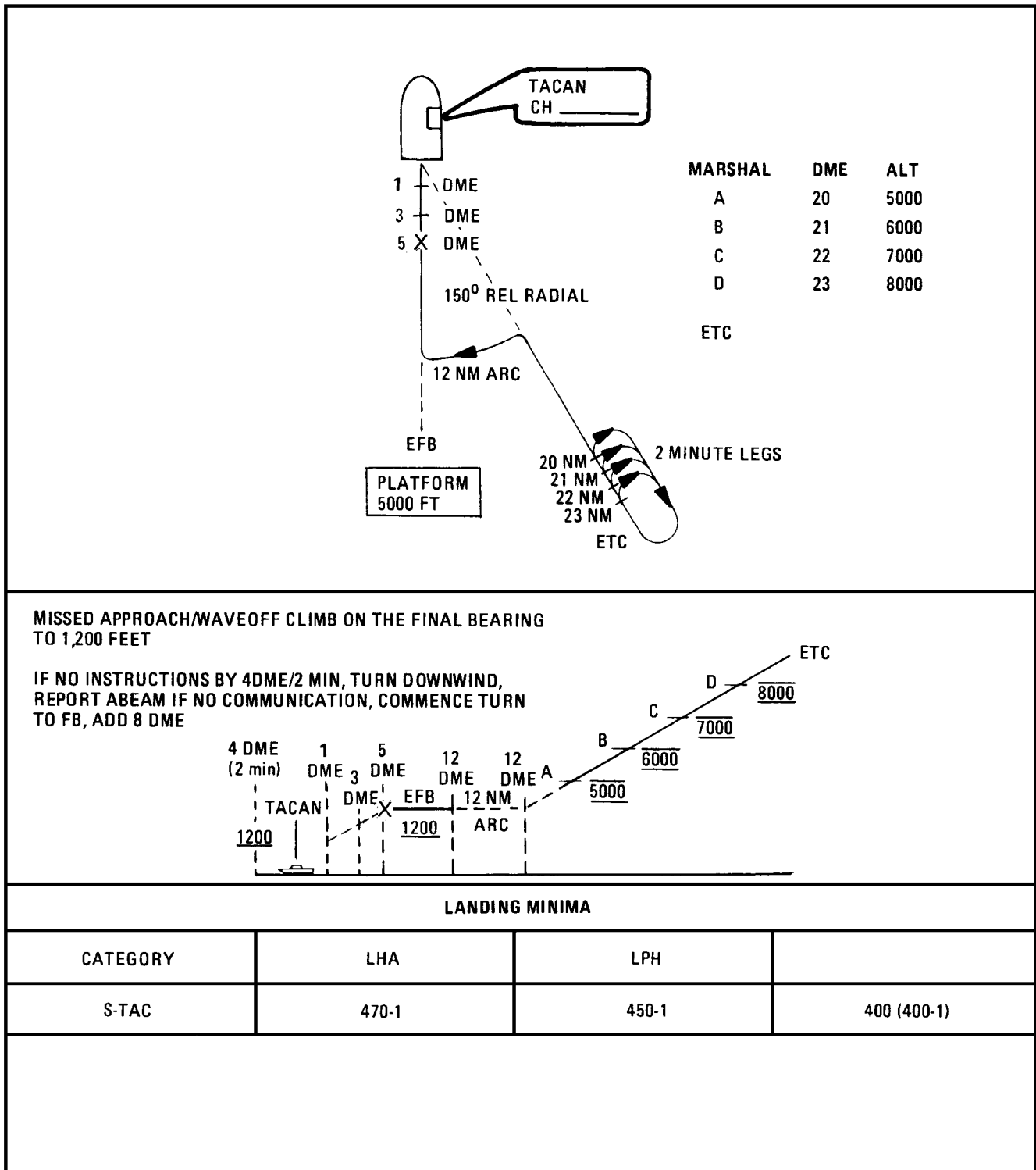
Figure 6-14. Overhead TACAN

3. Use of the “needles” approach is limited to weather minimums of 400 feet and 1 nm.
4. Until an approved SPIN-41/AWLS approach is published, the TACAN approach procedures and minima found in [Figures 6-13, 6-14, and 14-3](#)

will be used.

6.8 V/STOL EMERGENCY MARSHAL

Refer to [Figure 6-15](#) for V/STOL emergency marshal.



VSLO-F019

Figure 6-15. V/STOL Emergency Marshal

CHAPTER 7

Deck Procedures

7.1 RESPONSIBILITY

The Air Boss controls all movements on the deck. Any questions or problems with deck operations shall be directed to Tower.

7.2 DECK PROCEDURES

7.2.1 Preflight. Aircraft shall be preflighted in accordance with the AV-8B/TAV-8B NATOPS manual. Pilots shall be in full flight gear, sleeves rolled down, and helmet on with visor down. Portions of the aircraft extending off the flight deck shall be preflighted to the best extent possible.

7.2.2 Auxiliary Power Unit/Engine Start. APU or engine starts shall be requested and approved through Tower by a yellow shirt or via a radio call to Tower.

7.2.3 Poststart. All poststart checks shall be performed in accordance with the AV-8B/TAV-8B NATOPS manual except the antiskid, RPS, and caster checks, which are not conducted. Prior to moving the flaps, the pilot shall ensure no personnel are under the aircraft. When ready for breakdown, the pilot should transmit "Call sign, up and ready, fuel state, water quantity, external stores (if applicable)" to Tower.

7.2.4 Taxi. All taxiing shall be at a slow and controlled pace under positive control of a taxi director. All turns shall be full deflection on the rudder pedals.

7.2.5 Aircraft Configuration. Except when chocked and chained, the aircraft shall be configured in STOL flaps, canopy closed and locked, external lights off, and antiskid off. The pilot shall be strapped in with the seat armed and oxygen mask on.

7.2.6 Chocks and Chains. Before chocking and chaining an aircraft, the taxi director shall pass the chocks/chains signal to the pilot and wait for an acknowledgment before chocking/chaining. After the chocking/ chaining is complete and all personnel have exited from underneath the aircraft, the taxi director shall pass the chocks/chains signal followed by a thumbs up. The same procedures will be used during chock/chain removal except the chocks and chains will be displayed after removal. The pilot shall acknowledge this. Anytime the aircraft is chocked and chained, the pilot may safe the seat, open the canopy, and remove the oxygen mask while still strapped in.

7.2.7 Backing Up. Aircraft backing up under its own power is not preferred. If required the procedures are as follows:

1. Set 35-percent rpm (406/406A), 40-percent rpm (408).
2. Select braking stop.
3. Select idle once the aircraft is rolling.
4. Monitor maximum idle JPT.
5. Follow the taxi director signals by stepping on the rudder pedal to which the taxi director points.



Judicious use of braking is required to avoid striking the tail of the aircraft while backing.

7.2.8 Nose Tire Out of Limits. The following procedures apply if a tow bar is used to straighten a nose tire that has castered out of limits.

1. Parking brake — Set.

2. Antiskid switch — ON.

Deck personnel will attach the tow bar and straighten the nose tire. After the tow bar has been removed:

3. Antiskid switch — NWS.
4. Parking brake — Release.

Deck personnel will attach the tow bar and straighten the nose tire.



DO NOT engage nosewheel steering with a tow bar attached.

7.2.9 No-Go Vertical Takeoff. A no-go VTO is not required for any aircraft except as delineated in the AV-8B/TAV-8B NATOPS manual for functional checkflights. A no-go VTO may be performed at any position on the deck as long as sufficient clearance exists should the aircraft become airborne.



- The pilot shall be prepared to fly the aircraft during a no-go VTO. If the aircraft becomes airborne, stabilize and then land the aircraft.
- A no-go VTO shall not be performed if the ship is in a turn, the aircraft is in close proximity to other aircraft, or deck motion exceeds steady deck conditions.
- No-go VTOs will be performed in accordance with SOB.

Procedures:

1. Tote board (optional for no-go only).
2. Before takeoff checks — Completed.
3. Trim — 0, 0, and 2° nose down (0, 0, 1 TAV-8B).
4. Flaps — STOL.

5. Select references in case aircraft becomes airborne.
6. Launch officer shall check stabilizer trim and pass thumbs up if correct.
7. Launch officer one-finger runup.
 - a. Conduct engine acceleration check.
 - b. If wet, set water switch to takeoff and reset rpm.
 - c. Place nozzles to 50° and hold at 50°.
 - d. Conduct duct pressure, nozzle, and flap checks.
 - e. Launch officer will check flap and nozzle programming.
8. Launch officer thumbs up.
9. Launch officer will pass two fingers for dry and five fingers for wet launch. Check water on for five fingers but do not acknowledge or salute.
10. Launch will signal hover stop; place nozzles to hover stop.
11. Launch will give lift signal; apply full power, check for smooth acceleration, target rpm, and water flow (if used).
12. Throttle idle immediately after reaching maximum rpm.

7.2.10 Rolling/Pitching Deck. Extreme caution shall be used while taxiing on a rolling or pitching deck. Do not add excessive power while taxiing against the roll or pitch. Instead, wait for the deck to roll or pitch in the direction of travel and be prepared to apply the brakes.



Exceeding the steering limitation of 45° in either direction during periods of significant deck motion may cause the aircraft to enter an uncontrollable, free-castering condition.

7.2.11 Deck Handling Signals. All signals given above the waist are for pilots and below the waist are for deck personnel. All deck handling signals are illustrated in NAVAIR 00-80T-113, Navy Aircraft Signals NATOPS manual.

7.2.12 Flight Deck Jerseys. Colored flight deck jerseys are worn by all flight deck personnel to denote each individual job, responsibility, and assigned area.

1. Yellow — Aircraft directors/launch officers.
2. Blue — Aircraft handlers (chocks and chains).
3. Purple — Fuelers.
4. Green — Squadron maintenance.
5. White — Safety officer/combat cargo.
6. Red — Ordnance/crash crew.
7. Brown — Squadron plane captains.

CHAPTER 8

Launch and Departure Procedures

8.1 SHORT TAKEOFF PROCEDURES

8.1.1 Lineup. The aircraft shall be aligned in the middle of the tramline with the nose tire on the distance marker. Care shall be taken to ensure the nose tire is centered and fine steering is engaged. If the aircraft had been chocked and chained in the launch position, the aircraft shall be taxied ahead before launching to ensure the nosewheel is centered.

8.1.2 Tote Board. Once in the launch position, the tote board shall be displayed to the pilot. The pilot shall pass a thumbs up when the tote board information is acknowledged. The tote board shall contain the following information:

1. STO/VTO.
2. Distance.
3. Trim.
4. Nozzles.
5. Wet/dry.
6. Weight.

The trim setting will change with changes in the aircraft gross weight and the center of gravity. During CQ operations, the LSO will normally calculate an average trim setting to be used by all aircraft. The aileron and rudder trim shall always be set at 0.

8.1.3 Takeoff Checks. All takeoff checks will be completed to include entering 14 on the pitch carets, ensuring antiskid is off, and selecting radar altimeter. Night/IFR launches shall include but not be limited to: selecting APU on, "marking" the deck spot (if required), selecting HUD in the MPCD/DDI, and setting radar altimeter to 40 feet.

WARNING

With the Antiskid OFF and the NWS button pressed, hi-gain steering is commanded and may cause loss of aircraft control should the High Gain Lockout fail.

8.1.4 Day Short Takeoff Procedures.

1. After the tote board has been displayed, the launch officer shall check the stabilizer trim and pass a thumbs up if it is correct. The stabilizer trim shall be verified by the pilot to within .1°.
2. Launch officer one-finger runup
 - a. Conduct engine acceleration check.
 - b. If wet, set water switch to takeoff and reset rpm.
 - c. Place nozzles to STO stop and hold at the STO stop.
 - d. Conduct duct pressure, nozzle, and flap checks.
 - e. Launch officer will check flap and nozzle programming.
3. Launch officer thumbs up
 - a. Place nozzles to 10°.
4. Launch officer thumbs up.
5. Launch officer two fingers for dry and five fingers for wet launch
 - a. Acknowledge two fingers and five fingers by checking the water off or on and responding to the launch officer with a two- or five-finger signal.
6. Pilot shall salute when ready.

7. The launch officer will touch the deck when cleared to launch.
8. Apply full power on the launch signal and hold the brakes until the tires skid.
9. Note maximum rpm and water flow if required.
10. Guard the stick in the preset stabilator trim position throughout the deck run and nozzle rotation.
11. If the aircraft deviates from the tramline, do not attempt to correct back to the tramline immediately or PIO may occur. Instead, a correction should be made so the aircraft arrives at the nozzle rotation line with the nose tire on the tramline.
12. Rotate the nozzles briskly to the STO stop at the nozzle rotation line.

Note

There may be a slight pause depending on excess end speed before the aircraft rotates. This is because of the time delay from nozzle rotation until the flaps fully program. This is normal, and no pilot compensation is required.

13. At bow exit, expect a noseup rotation that will tend to increase in rate slightly as the target attitude is achieved. The proper attitude is achieved when the depressed attitude symbol (witch's hat) is maintained between the pitch carets and the 5° pitch bar. With the proper trim set, the aircraft will seek the proper attitude. A small forward stick check will be required to stop the pitch rate and maintain the exit attitude. The pilot shall maintain the witch's hat between the pitch carets and the 5° pitch bar. Do not pull the nose off the deck.



Checking the attitude at less optimum may result in a sink off the bow.

14. After a positive rate of climb is established, commence an accelerating transition.

8.1.5 Night Short Takeoff Procedures. The procedures for a night STO are the same as for a day STO (paragraph 8.1) 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. Pilot shall report "(Callsign), five fingers" to the LSO.
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.

8.1.5.1 NVD Short Takeoff Procedures. The procedures for a STO while using Night Vision Devices are identical to the night STO (paragraph 8.1.5) with the following exceptions:

1. The normal tote board lighting will preclude the pilot from reading the data with NVDs. The tote board data may be read unaided or Paddles may pass the launch information via radio.
2. Aircraft lighting in accordance with paragraph 4.13.

8.1.6 Nose-to-Tail Procedures. Nose-to-tail launch procedures may be used to expedite launching of aircraft. All procedures remain the same as Case 1 and 2 procedures for each individual aircraft except for the following:

1. Each aircraft may be lined up and launched sequentially from 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).



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.

8.1.7 Short Takeoff Abort. Depending on the launch distance, an abort decision during a STO must be made very early in the run. The chances of successful abort diminish rapidly after brake release.

8.2 VERTICAL TAKEOFF PROCEDURES

The launch procedures for a VTO are the same as those described in paragraph 7.2.9 (No-Go VTO).

1. Once airborne, the pilot shall climb to a minimum of 50 feet above the deck.
2. Once 50 feet has been reached, the pilot shall transition to the port side of a ship.
3. Once clear of the deck edge, the pilot shall commence an accelerating transition with a positive rate of climb.

8.3 DEPARTURES

When departing the ship's control zone, Tower shall pass the following information prior to launch:

1. "Signal RTB" and pigeons, if aircraft is to return to home field.
2. Altimeter setting.

3. Type departure — Case 1, 2, or 3.
4. Frequency change when airborne, if required.
5. Any special instructions from Center to include the assigned altitude and departure radial for Case 2 and 3 departures.

8.3.1 Case 1 Departure (Weather 3,000/5 or Better).

1. After takeoff, proceed straight ahead on the BRC climbing to a maximum of 500 feet. After 7 DME, an unrestricted climb may be conducted in VMC. An unrestricted climb off the bow may be conducted in VMC provided prior coordination with Tower and HDC has been conducted. Rendezvous in accordance with squadron SOPs.
2. Section/Division overhead rendezvous. With Tower/HDC's approval, aircraft are permitted to join their flights in Tower/HDC's airspace provided they can maintain VMC at or above 1,000'.

8.3.2 Case 2 Departure (Weather 1,000/5 or Better but Less Than 3,000/5).

1. After takeoff, proceed straight ahead on the BRC climbing to a maximum of 500 feet AGL. At 7 DME, the 500-foot restriction is lifted if a climb can be conducted in VMC or if instructed by Center to climb. The pilot shall intercept the 10 DME arc and fly to the departure radial.
2. Aircraft shall rendezvous between 20 and 50 DME from the ship on the left of the departure radial. The departure radial and altitude shall be assigned prior to launch. The departure radial will normally be 20° to 40° to the left of the BRC. Flight leaders shall report at assigned altitudes, if not VMC on top. Altitudes shall normally be assigned in accordance with [Figure 8-1](#).
3. If still IMC upon reaching altitude, the pilot shall establish holding on the departure radial between 20 and 30 DME and report established in holding. Center shall ensure altitude deconfliction between aircraft.
4. [Figure 8-2](#) depicts the Case 2 departure.

Aircraft	6,000 Feet to FL 180	FL 180 and Above
First	Departure altitude	FL 220
Second	Departure altitude minus 1,000 feet	FL 210
Third	Departure altitude minus 2,000 feet	FL 200
Fourth	Departure altitude minus 3,000 feet	FL 190

Note: Aircraft under ship control shall fly flight levels when at or above 18,00 feet MSL.

Figure 8-1. Vertical/Short Takeoff and Landing Departure Altitudes

8.3.3 Case 3 Departure (Weather Less Than 1,000/5 or Unaided at Night). All aircraft shall launch on Center's departure frequency. Frequency changes will not be made until the aircraft is wings level at a minimum of 2,500 feet except during night CQ.

1. After takeoff, conduct a 300-knot climb on the BRC to cross the 5 DME fix at 1,500 feet or above. Climb to the assigned altitude. Intercept the 10-DME arc and fly to the assigned departure radial.
2. Rendezvous in accordance with Case 2 procedures.
3. Figure 8-3 depicts the Case 3 departure.

Note

Aircraft shall launch at 1-minute intervals during Case 3. If radar contact is established within 1 mile after takeoff, Center may clear the next aircraft to depart.

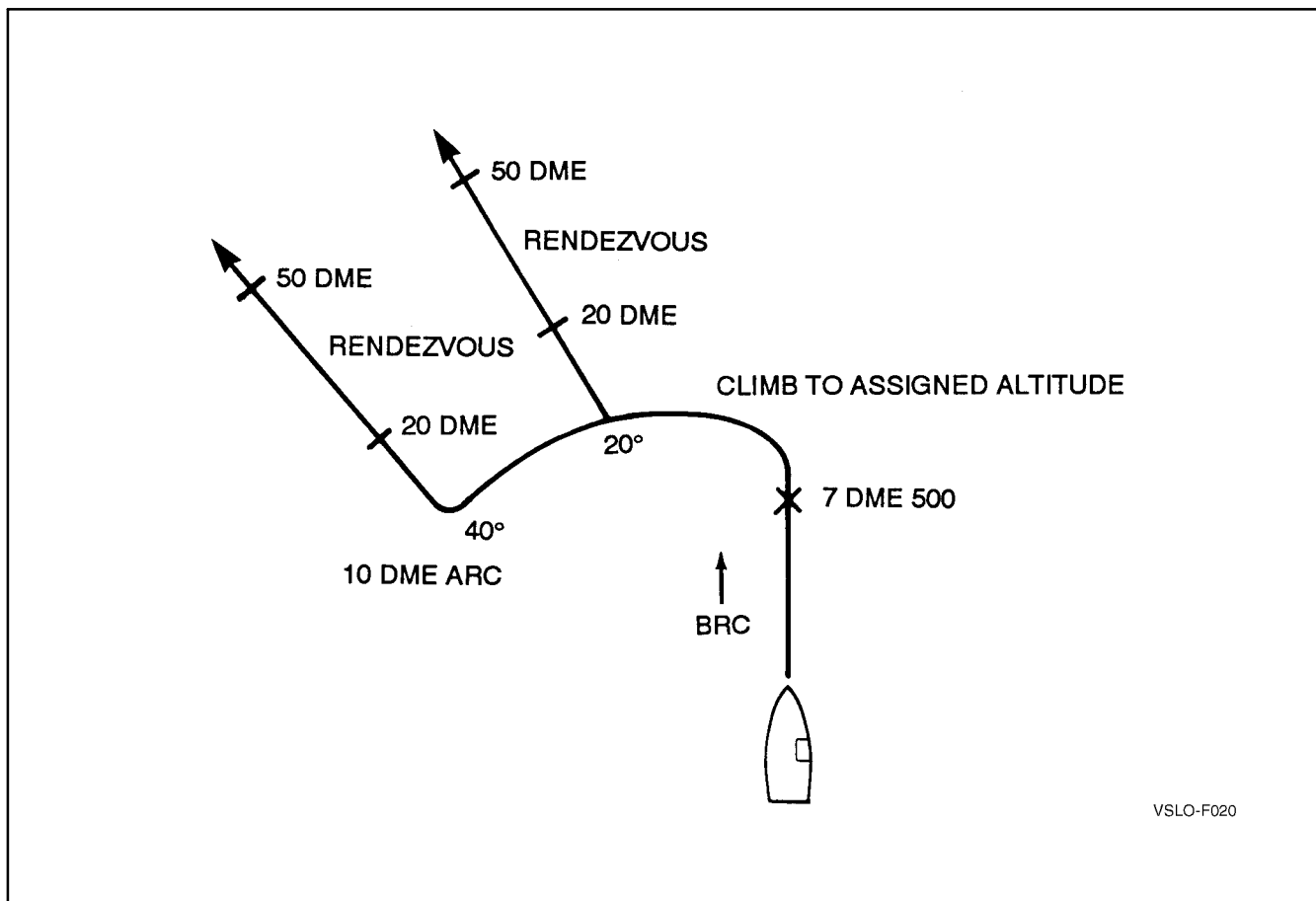


Figure 8-2. Case 2 Departure

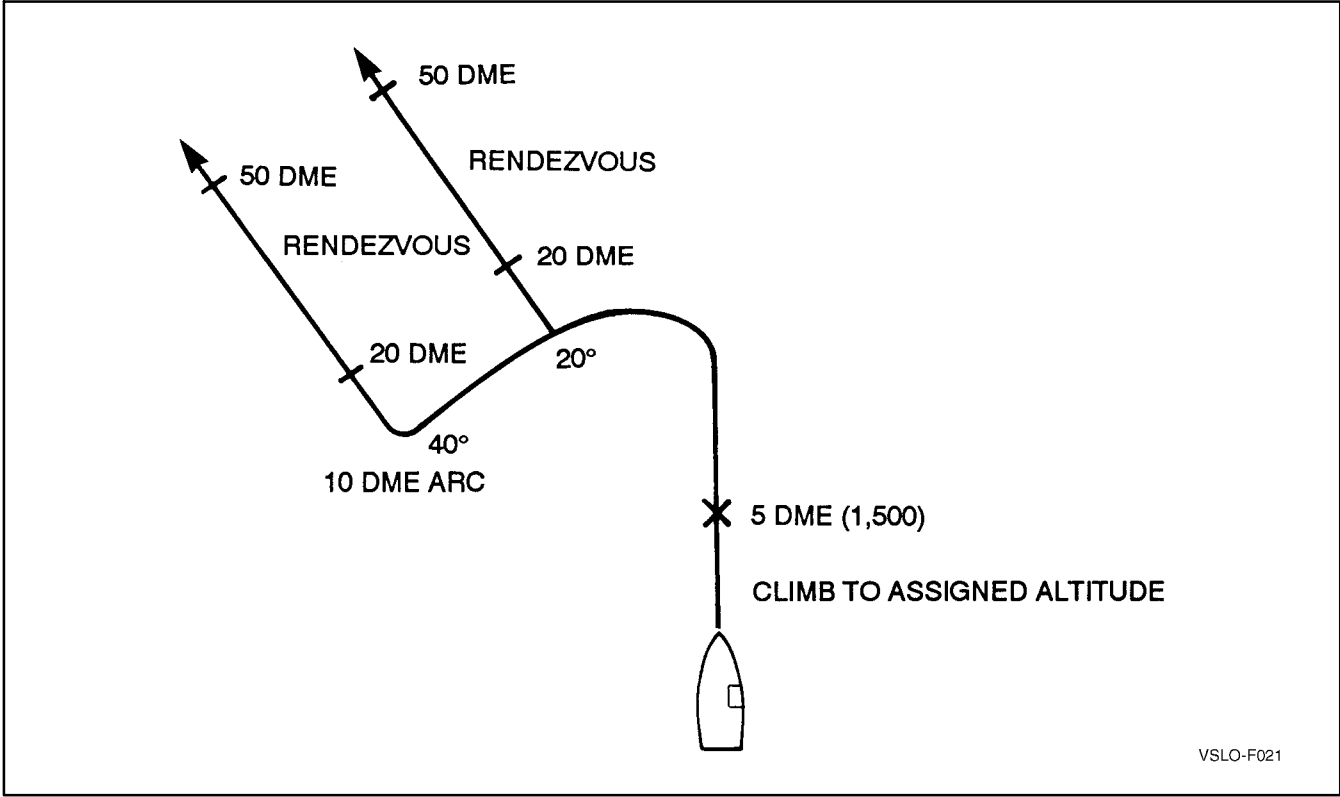


Figure 8-3. Case 3 Departure

CHAPTER 9

Carrier Qualification Patterns

9.1 INTRODUCTION

This chapter outlines procedures to be utilized for the day and night CQ patterns.

9.2 DAY CARRIER QUALIFICATION PATTERN

1. On takeoff climb to 600 feet — The pilot is responsible for the interval and will turn downwind on his own at a minimum of 300 feet.
2. The remainder of the day CQ pattern is provided in paragraph 6.3 (CASE 1 RECOVERY) and [Figure 6-4](#).

9.3 NIGHT CARRIER QUALIFICATION PATTERN

9.3.1 Night Case 1.

1. On takeoff climb to 800 feet — The pilot is responsible for the interval and will turn downwind on his own at a minimum of 500 feet.
2. The remainder of the Night Case 1 pattern is provided in paragraph 6.3.3 and [Figure 6-5](#).

9.3.2 Case 3. The night CQ pattern is designed to reduce the amount of fuel and time required to conduct multiple Case 3 approaches and recoveries.

1. All takeoffs will be conducted on the Paddles/final controller frequency.
2. After takeoff, climb straight ahead on the BRC to 1,200 feet and clean up. Switch to Center's

approach control frequency when level at 1,200 feet and report "Call sign, airborne."

3. At 2 DME, turn downwind using a 30° angle-of-bank turn.
4. Airspeed on downwind shall be 220 to 240 knots. The pilot should engage the AFC and reset RADALT to 400 feet.
5. The abeam position should be approximately 2 to 3 nm. The pilot shall transmit "Call sign, abeam, fuel state."

Note

Make the abeam call on the approach frequency and the Paddles/final controller frequency if both radios work.

6. If radar control is available, comply with the controller's instructions. Prior to 5 nm on final, 50° nozzles shall be selected.
7. If radar control is not available, the following procedures apply:
 - a. Turn base leg — 6 to 7 DME and commence landing checks.
 - b. After landing checks, reset the radar altimeter to 400 feet if not already done.
 - c. Prior to the FAF — Select 50° nozzles.
8. The remainder of the night CQ pattern shall be in compliance with paragraph 6.5 (CASE 3 RECOVERY).
9. An illustration of the night CQ pattern is depicted in [Figure 9-1](#).

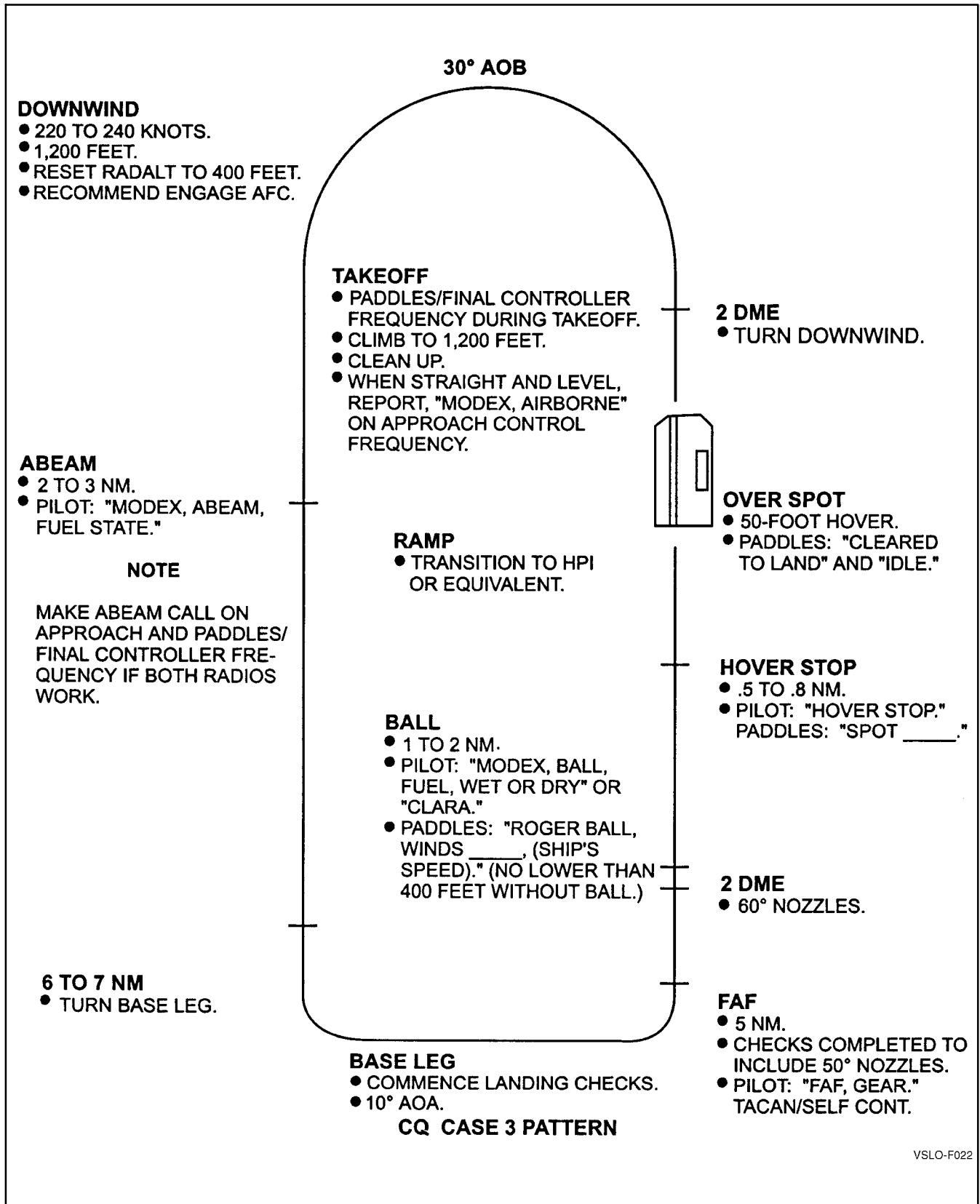


Figure 9-1. Night Carrier Qualification Pattern

CHAPTER 10

Alternate Approaches

10.1 ALTERNATE APPROACHES

Alternate approaches are to be utilized whenever the WOD does not allow a standard approach to a VL or when Paddles dictates. At the discretion of the controlling LSO, any approach may be modified in order to ensure safe recovery of aircraft.

Note

Cross-axial or bow-to-stern landings in Case 3 conditions should not be attempted because of lack of glideslope, horizon, and lineup information.

The three Alternate approaches are as follows:

10.1.1 Bow-to-Stern Recovery.

1. Normally used when a significant tailwind exists.
2. Fly down the starboard side of the ship at 800 feet on a heading opposite the BRC.
3. Break right past the stern.
4. Utilize the standard Case 1 procedures with a right-hand pattern.
5. The bow-to-stern recovery is depicted in [Figure 10-1](#).

10.1.2 Cross-Axial Port to Starboard.

1. Normally used when a significant starboard crosswind exists.

2. Conduct a standard Case 1 recovery.
3. Prior to the intended landing spot, turn to aim the nose directly at the landing spot. The aircraft flightpath should be perpendicular to the ship heading.
4. Strive to be at .5 nm at 300 feet. Intercept and fly a 3° glideslope.
5. When cleared to cross, position the aircraft so main gear touches down on the tramline.
6. The cross-axial port-to-starboard recovery is depicted in [Figure 10-2](#).



When conducting cross-axial approaches, forward references will not be available. The pilot must pay strict attention to the LSO for fore and aft corrections.

10.1.3 Cross-Axial Starboard to Port.

1. Normally used when a significant port crosswind exists.
2. Use the same procedures as a standard Case 1 recovery except fly down the port side of the ship for a right break.
3. The cross-axial starboard-to-port recovery is depicted in [Figure 10-3](#).

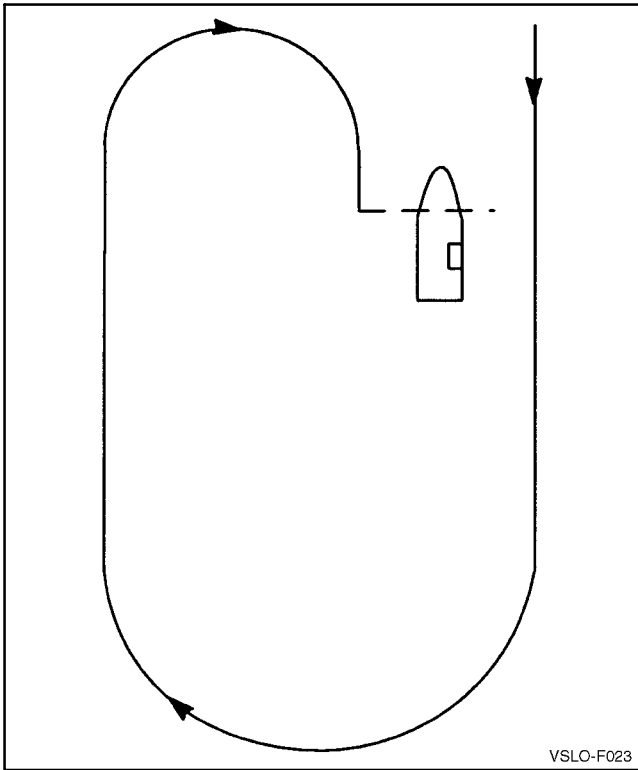


Figure 10-1. Bow-to-Stern Recovery

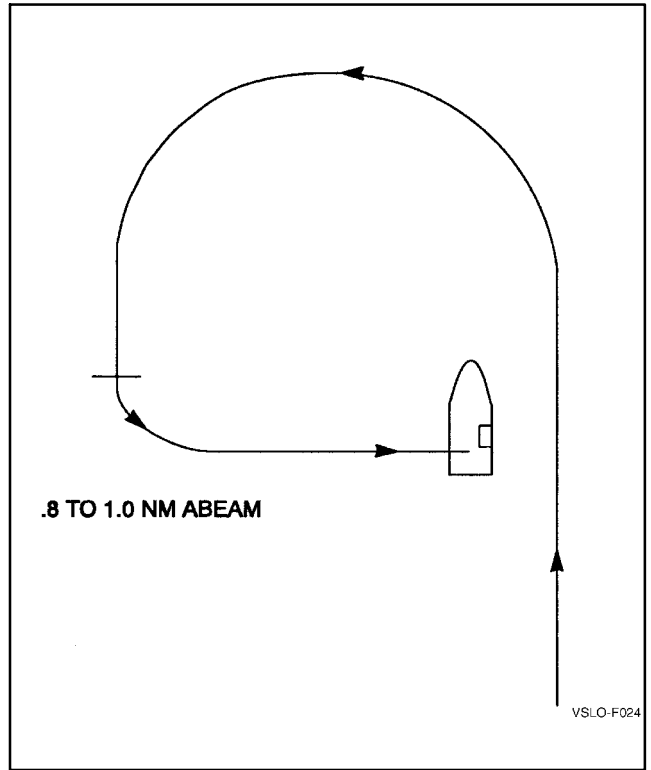


Figure 10-2. Cross-Axial Port to Starboard

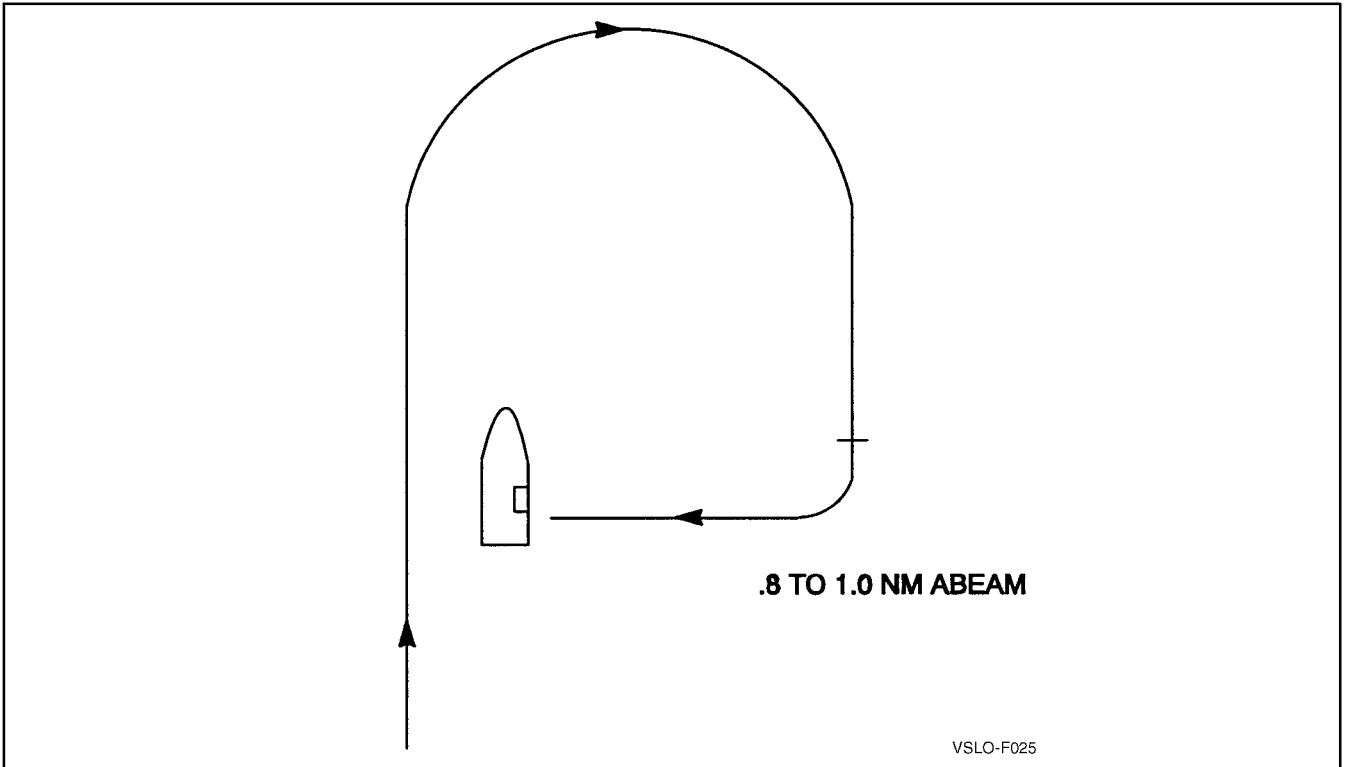


Figure 10-3. Cross-Axial Starboard to Port

CHAPTER 11

Emergency Procedures

11.1 INTRODUCTION

This chapter outlines the procedures to be followed in the event of an emergency situation or an equipment malfunction during FCLP or shipboard operations. It supplements the doctrine set forth in other NATOPS manuals. Aboard ship, the LSO shall immediately advise the air officer whenever a malfunction is suspected or known so that corrective action can be initiated. Shore-based equipment malfunction shall be reported to the appropriate authorities.

Note

Procedures described herein are intended for use to safely recover aircraft already airborne. Every effort should be made to correct existing malfunctions. Continued operations under such conditions or with malfunctioning equipment is not recommended.

11.2 SHORE-BASED EMERGENCIES

11.2.1 Field Carrier Landing Practice Pattern Emergencies.

1. Loss of LSO radios
 - a. Contact Tower for landing instructions, if field is Tower controlled. If field is not Tower controlled, expect standard light signals for bingo (alternating red and green), or landing (see loss of aircraft radios) as required from the LSO.
2. Loss of aircraft radios
 - a. Aircraft experiencing loss of radios in the FCLP pattern shall discontinue FCLP and land. The LSO shall signal bingo or issue

clearance to land with the appropriate light signals.

- (1) First green light — “Roger hover stop” or “Roger ball” (3-second burst).
- (2) Subsequent green lights — Power (short flashes, third consecutive flash, limiters off).
- (3) Steady green in hover — Cleared to land.
- (4) Flashing red — Waveoff.
- (5) Alternating green and red — Bingo.

Note

- A light signal will not be provided for clearance to cross the deck. Pilots are automatically cleared to cross when the intended spot is clear.
 - Pilots should expect the standard landing spot, or as prebriefed.
3. Aircraft at night with loss of exterior lights — Aircraft without exterior lights shall be directed to make a full-stop landing. Other pattern aircraft shall be advised of the position of the darkened aircraft.
 4. The following shipboard emergencies (discussed in paragraphs 11.3.1 and 11.3.2) during FCLPs shall be treated as shipboard emergencies.

11.3 SHIPBOARD EMERGENCIES

Whenever normal operating procedures are modified because of emergencies or malfunctions such as those discussed in the following paragraphs, the pilot shall be informed of existing circumstances and procedures being employed.

11.3.1 Aircraft Emergencies.

- 1. Brake failure (refer to AV-8B/TAV-8B NATOPS manual).

Note

Consideration should be given to proximity of other aircraft/ship superstructure (island)/any other obstructions on the deck of the ship.

- 2. Abort (refer to AV-8B/TAV-8B NATOPS manual).



Any delay in the decision to abort beyond 2 seconds after throttle slam may preclude a successful abort.

- 3. No lift-off on STO (rpm stagnation/loss of thrust) (refer to AV-8B/TAV-8B NATOPS manual).



If condition has not recovered, a timely ejection decision must be made if this condition occurs shortly after bow exit.

- 4. VL/loss of thrust (refer to AV-8B/TAV-8B NATOPS manual).

Note

Consideration should be given to the portion of recovery when executing procedures.

11.3.2 Landing Aids Malfunction (Night).

- 1. Complete landing aid failure/damage
 - a. CARQUALS — 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.

11.3.3 Communication Emergencies (General). Visual communications to be used in the event of radio failure or during EMCON shall be in accordance with this publication and the LHA/LHD NATOPS manual.

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.

11.3.4 Communication Emergencies (Day/Night Visual Meteorological Conditions).

- 1. Loss of LSO radios
 - a. CARQUALS — Discontinue landings. HDC shall initiate delta or bingo instructions, as appropriate. If HDC unable, standard light signals shall apply for bingo or full stop (see paragraph 11.2.1, step 2).
 - b. Deployed — Expect standard light signals from the LSO (see paragraph 11.2.1, step 2).
- 2. Loss of all ship radios
 - a. CARQUALS — Discontinue landings. Expect standard light signals for bingo or 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 (Figure 6-14) 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. CARQUALS — Discontinue landings. Expect standard light signals for bingo or full stop.

- (1) If lost communication is experienced prior to the break during Case 1/2 recovery or the beginning of an approach Case 3, 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 the 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 (Figure 6-13) 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. 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.

CHAPTER 12

LPD Operations

12.1 INTRODUCTION

The LPD class ship is typically used as an emergency deck when the primary landing platform is unavailable. The following procedures apply to CQ aboard LPD class ships. Pilots shall be guided by the procedures provided in Chapters 1 through 10 of this manual with the following exceptions.

Operations aboard LPDs are restricted to day VFR operations only because of the lack of glideslope information and approach radar. WOD and crosswind limitations are strict because of the proximity of the superstructure to the landing area. All takeoffs and landings must be vertical. Ideally, the ship should have the relative wind 30° to 40° off the bow. The ship's final course and wind direction will be transmitted by the LSO prior to pattern entry.

Particular attention must be directed to altitude during the decelerating transition because of lack of glide-slope information. Make all landings and takeoffs into the relative wind but do not land or take off heading more than 90° from the ship's heading because of the lack of visual cues and proximity to the superstructure.



Avoid stack gases during approach.

12.2 RECOVERIES

1. LPD operations shall not be conducted in weather less than 800/3.
2. Recoveries in less than Case 2 conditions with an inoperable TACAN shall not be conducted.
3. The altitude while hovering abeam the intended landing spot shall be no lower than 80 feet.
4. The aircraft shall be pointed into the relative wind while hovering above the intended landing spot.
5. All check calls (e.g., "Check forward," "Check right") used to position the aircraft over the landing spot will be relative to the aircraft.

12.3 LAUNCH AND DEPARTURES

1. The standard launch shall be a VTO with a translation to the starboard side.
2. Launches shall not be conducted with weather less than 800/3.

CHAPTER 13

CV/CVN Operations**13.1 PREFLIGHT REQUIREMENTS**

1. All pilots shall read and be familiar with the CV NATOPS manual (NAVAIR 00-80T-105).
2. All pilots shall read and be familiar with the applicable CV/CVN SOPs.
3. All pilots shall attend a CV/CVN CQ lecture within 90 days of conducting CV/CVN operations.

13.2 GENERAL FLIGHT PROCEDURES

1. All pilots shall be guided by the procedures provided in the CV NATOPS manual and applicable CV/CVN SOPs. Exceptions and additions to these procedures are provided in this chapter.
2. All radio calls shall be in accordance with the CV NATOPS manual until in contact with the V/STOL LSO. At that point, all radio calls shall be in accordance with this manual.

13.3 RECOVERY PROCEDURES**13.3.1 Case 1.**

1. Case 1 procedures as outlined in Chapter 6 of this manual shall be utilized. The pilot shall conduct an offset approach to abeam spot 3. A 3° glideslope shall be established to arrive abeam the landing spot at a 120-foot hover. The primary landing spot shall be spot 3.

2. When landing on spot 3 or 4, the main gear shall be placed on the ADLL.
3. When landing on spot 1 or 2, the main gear shall be on the FDLL, if available. If there is no FDLL, the aircraft shall be centered with respect to the deck.

13.3.2 Case 2.

1. If VMC is obtained before 1,000 feet, Case 1 procedures shall be complied with.
2. If VMC is not obtained before 1,000 feet, comply with the Case 3 procedures.

13.3.3 Case 3.

1. The V/STOL OLS and HPI are not available.
2. The ship OLS shall be set to provide a minimum of 40-foot clearance between the aircraft and the ramp. The OLS shall be flown until crossing the ramp. At that point, the pilot shall switch to visual cues provided by the ship structure. Lineup shall be maintained utilizing the ship angle deck lights.
3. A level 40- to 50-foot translation shall be conducted to spot 3.

13.4 NONSTANDARD RECOVERIES

All nonstandard recoveries shall be conducted in accordance with this manual. The main gear shall be placed on the ADLL or the FDLL.

CHAPTER 14

Extended Deployment Procedures

14.1 INTRODUCTION

Recognizing the fact that procedures designed for CQ operations are not always necessary for units conducting extended shipboard deployments, this chapter provides procedures tailored to flight operations during extended deployments. These procedures should be utilized only when the squadron commander/detachment OIC determines an appropriate experience level has been obtained. Units conducting extended deployments shall be guided by Chapters 1 through 13 of this manual with the following exceptions.

14.2 PREFLIGHT REQUIREMENTS

1. An ODO/LSO brief should be conducted before each launch cycle. The brief should include, but not be limited to, the following:
 - a. Aircraft status and position on the deck.
 - b. Shipboard facilities status to include radar, PAR, TACAN, and communications.
 - c. Changes to flight schedule and air plan.
 - d. PIM during flight operations period.
 - e. Position of other known ships in area.
 - f. Airspace restrictions.
 - g. Divert information.
 - h. Weather to include local area and divers.
 - i. S-2 update (as required).
 - j. Launch/recovery brief.
2. All pilots shall utilize the briefing guide provided in [Figure A-2](#).
3. Fuel ladder — All pilots shall calculate and brief a fuel ladder. Fuel planning during shipboard operations is extremely critical based on VL performance, mission, deck loading, and weather. To calculate a fuel ladder, a fuel flow setting appropriate with configuration should be considered.
4. Set state — The set state shall be the maximum fuel weight that the aircraft will have when crossing the deck edge for any type of recovery. The set state for 15, 20, and 25 knots of wind using the forecast maximum temperature at recovery shall be calculated prior to walking. Pilots shall be at the set state but above bingo fuel for green-water operations or the minimum fuel on deck for blue-water operations at the Charlie time.
5. All pilots should brief and walk in order to meet the following timeline:
 - a. 30 minutes prior — Aircraft preflighted, pilot strapped in, INS alignment started.
 - b. 20 minutes prior — Engine start.
 - c. 10 minutes prior — Aircraft ready for breakdown.

14.3 GENERAL PROCEDURES

14.3.1 Degraded Inertial Navigation System Alignment. Aircraft shall not launch with a degraded INS unless primary attitude instrumentation is available (i.e., horizon bars are present in the HUD). An aircraft with a degraded INS will not launch at night or in Case 3 conditions.

14.4 DECK PROCEDURES

14.4.1 Preflight. When assuming an alert condition, pilots may preflight while wearing a cranial and deck vest.

14.5 LAUNCH AND DEPARTURES

14.5.1 Overhead Rendezvous. Rendezvous overhead the ship may be conducted with prior clearance from Tower.

14.6 WORKING AREAS/BOMBING PATTERN

For sorties conducted within the ship's control area, the working areas depicted in [Figure 14-1](#) are recommended in order to deconflict airspace.

The bombing pattern depicted in [Figure 14-2](#) should be utilized when bombing a spar target or smoke flare provided by the ship. All pilots shall call "In hot/cold" and "Off safe."

14.7 RECOVERIES

14.7.1 Standard. The standard recoveries are as follows:

1. Case 1 — Delta overhead the ship as assigned. Push in order to make the assigned Charlie time.
2. Case 2/3 — TACAN primary marshal as assigned. Push at the assigned EAT.

14.7.2 Overhead. The following procedures shall be utilized by all aircraft recovering via the overhead to a Case 1 pattern:

1. Initial — The pilot shall report "Call sign, initial." Tower shall respond with "Winds are , cleared to break" or "Continue."
2. Pattern — The standard Case 1 pattern shall be utilized. Except when safety of flight is involved, all pilot and LSO radio transmissions in the Case 1 pattern may be omitted. The LSO may use the standard lost-communication light signals for "Roger hover stop" and "Cleared to land."
3. Landing — Unless told otherwise, each aircraft shall land on the following spots:
 - a. LHD — Spot 7.
 - b. LHA — Spot 7-1/2.
 - c. CV/CVN — Spot 3.

d. LPD — Spot 2.

14.8 SHORELINE RESTRICTED OPERATIONS

Amphibious operations typically require the ship to be positioned in close proximity to the shoreline. In these situations, aircraft will not be allowed to fly over land in IMC or during a night recovery if obstruction clearance cannot be guaranteed. This section provides procedures to be utilized when the ship position with respect to the shoreline restricts V/STOL operations. Any Case 2 or 3 recovery that will not allow the aircraft to intercept the gate (12 nm/1,200 feet on the BRC) over water shall be considered shoreline restricted operations.

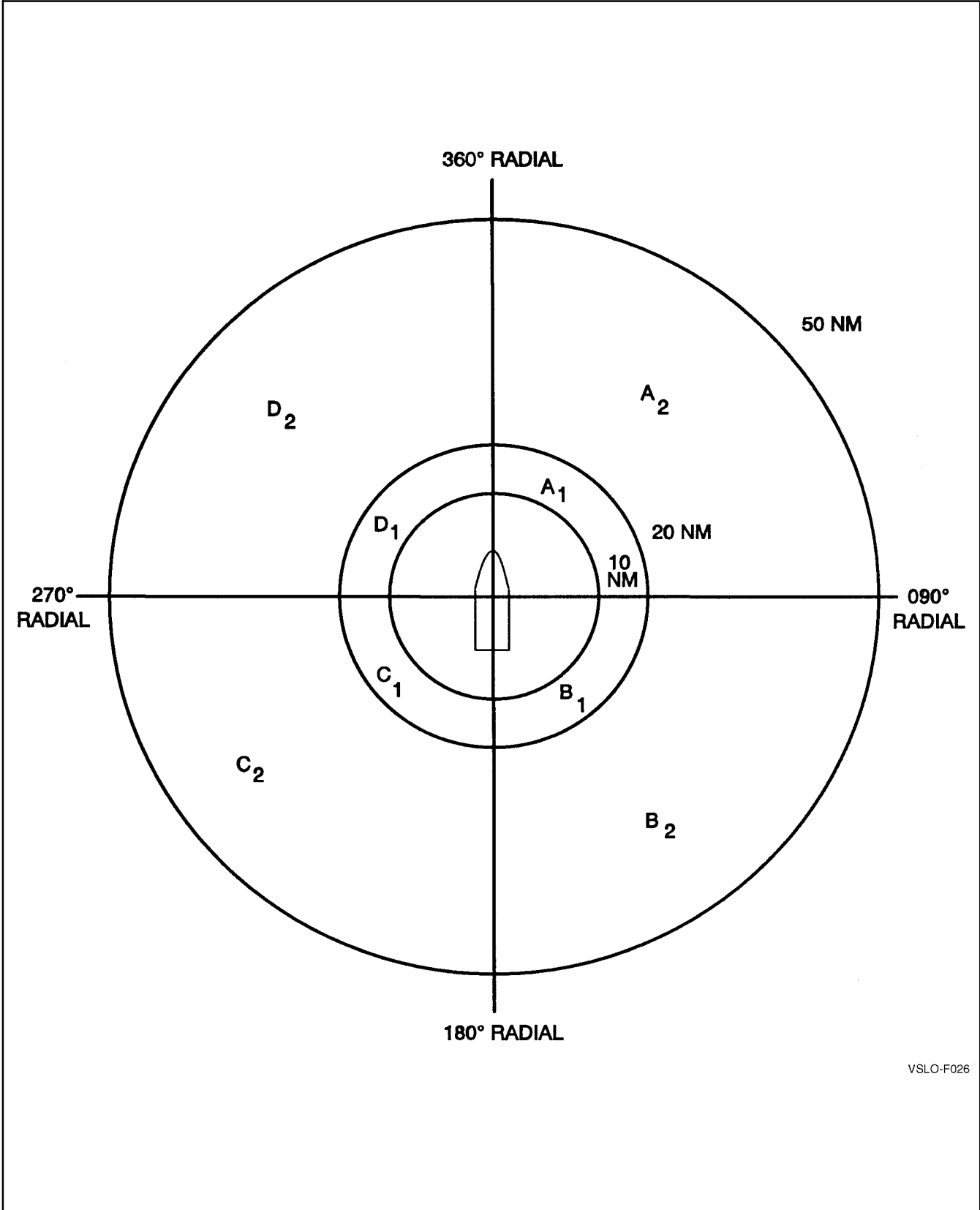
14.8.1 Departures. If a Case 2 or Case 3 departure must be conducted, the flight shall brief a departure and rendezvous radial that prevent the aircraft from overflying land. Center shall be briefed on the departure procedures to be utilized.

14.8.2 Recoveries. The standard approach during shoreline restricted operations is radar vectors to the FAF. The aircraft shall be positioned on the BRC at the FAF with landing checks completed to include 50° nozzles.

If radar vectors are unavailable, the modified overhead TACAN approach depicted in [Figure 14-3](#) should be utilized. All aircraft shall be descended to 2,000 feet while in holding prior to commencing the approach. The pilot shall report "Call sign to commencing, altimeter setting" at the IAF. At 2 DME outbound on the 210° radial relative, the pilot should select the landing gear down and commence a wings-level descent in order to be at 1,200 feet with the landing checks completed (excluding nozzles) before the turn to final. A level turn to the [final bearing](#) shall be commenced in order to remain within 8 nm of the ship. All landing checks shall be completed at the FAF.

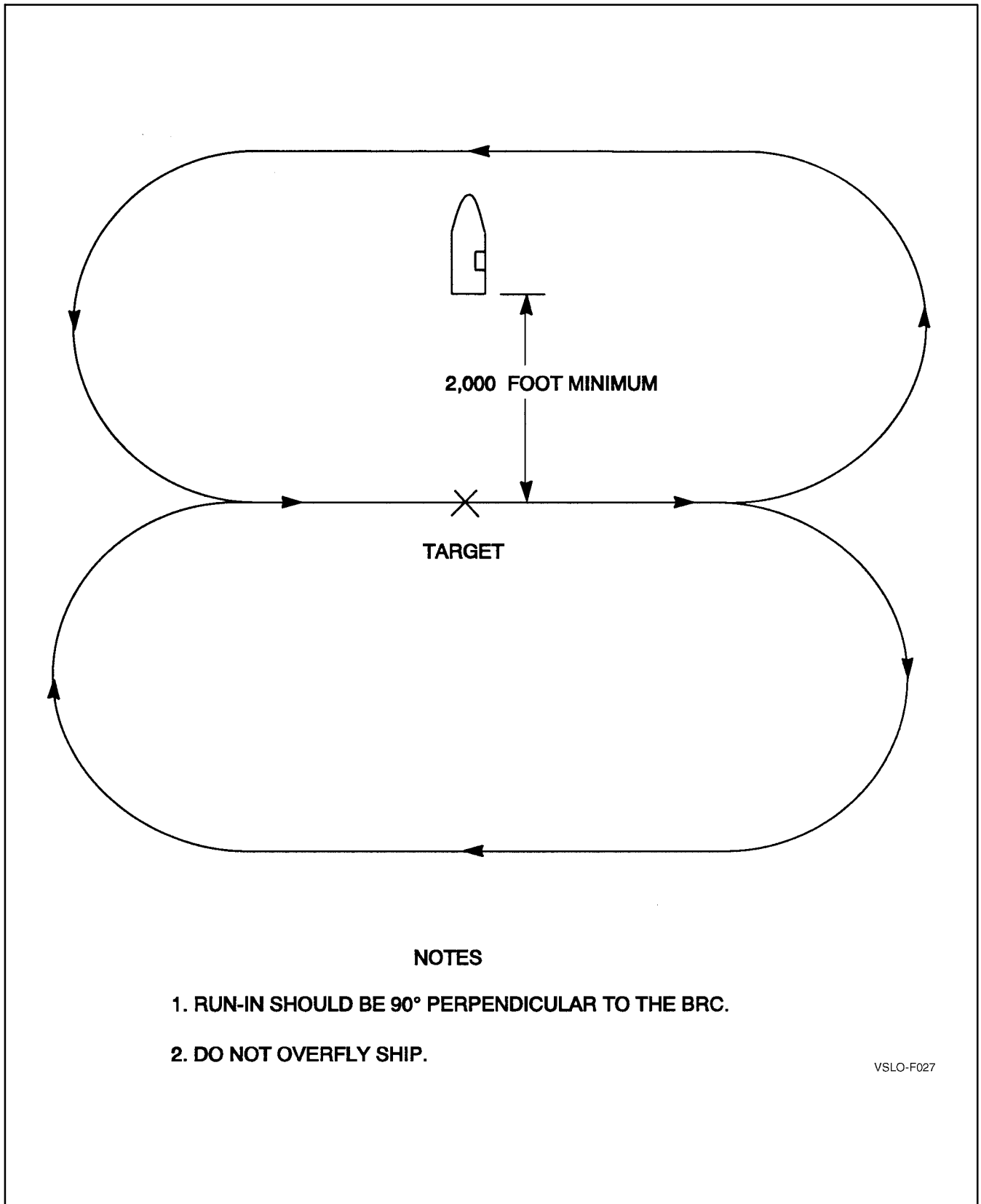
14.9 ALERT/DEFENSE OF THE EXPEDITIONARY STRIKE GROUP

14.9.1 Alerts. Various alert conditions can be employed to minimize threat reaction time in both the air-to-ground support and the DESG roles. These alert conditions employ various conditions of aircraft/crew readiness. The controlling LSO, with the aid of the squadron ODO, shall be responsible for monitoring the



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Figure 14-1. Shipboard Working Areas



NOTES

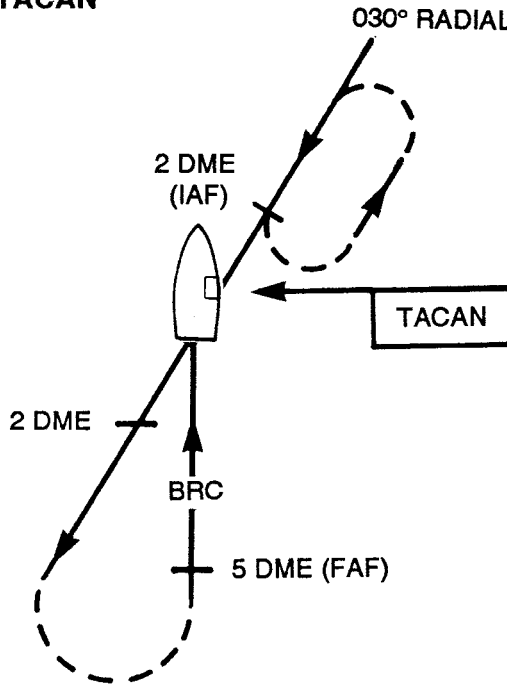
- 1. RUN-IN SHOULD BE 90° PERPENDICULAR TO THE BRC.
- 2. DO NOT OVERFLY SHIP.

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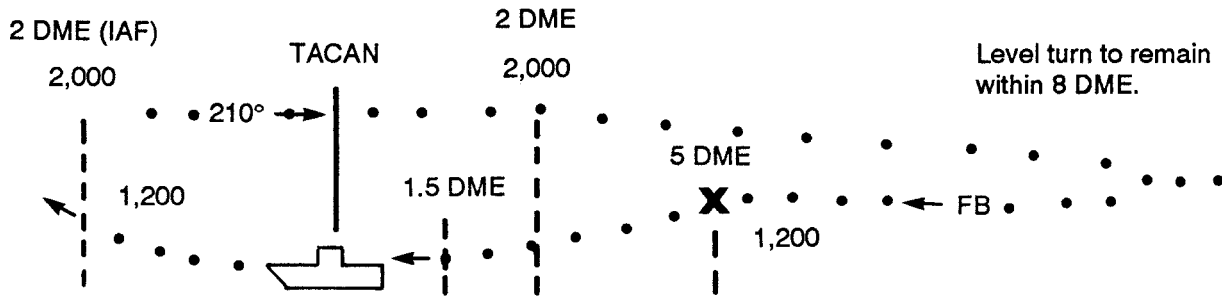
Figure 14-2. Bombing Pattern

MODIFIED OVERHEAD TACAN

All radials relative to ships BRC.



MISSED APPROACH/WAVEOFF
 CLIMB ON FINAL BEARING TO 1,200 FEET
 If no instructions by 4 DME, turn downwind, report abeam.
 If no communications, turn to BRC to remain within 8 DME.



LANDING MINIMA

CATEGORY		LHA	LPH		FLIGHT DECK ELEVATION	HIGHEST OBSTRUCTION
S-PAR	DAY	370 - 1	350 - 1	300 (300 - 1)	LHA - 70 FT	LHA - 200 FT
	NIGHT	470 - 1	450 - 1	400 (400 - 1)	LHD - 70 FT	LHD - 200 FT
S-ASR		470 - 1-1/2	450 - 1-1/2	400 (400 - 1-1/2)	LPH - 50 FT	LPH - 150 FT
S-TAC						

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Figure 14-3. Modified Overhead TACAN Approach

status of all alert conditions. If an alert status is upgraded, the ODO shall ensure all follow-on flight are upgraded as required. For example, if “Alert 30” is upgraded to “Alert 15,” the ODO shall ensure “Alert 60” is upgraded to “Alert 30,” and an additional flight is designated “Alert 60.” For Conditions I and II, pilots shall be called away early enough to permit a normal preflight inspection, start, warmup, and completion of takeoff checks 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.

1. Condition I/Alert 5 — The aircraft shall be spotted in the launch position or in a position that affords a clear route to the aircraft, with engine or APU running with complete INS alignment. No-go VTOs and ordnance checks completed if required. Monitor appropriate nets as required. Aircraft should be airborne within 5 minutes of the launch order.
2. Condition II/Alert 15 — All provisions for Condition I apply except the engine or APU does not need to be running. The aircrew should be in the cockpit with the aircraft signed for, preflighted and ground turned to ensure full mission capability. Flight lead shall report Condition II to the Tower when ready. Aircraft should be airborne within 15 minutes of the launch order.
3. Condition III/Alert 30 — Aircraft are signed for, preflighted, and ground turned to ensure full mission capability. Flightcrews shall be in full flight gear, briefed, and standing by in the ready room or working spaces. Starting equipment shall be immediately available and flight deck and launching crews shall be standing by near the stations. The ODO shall report Condition III set to CIC. Aircraft should be airborne within 30 minutes of the launch order.
4. Condition IV/Alert 60 — Aircraft are designated, ordnance loading has begun, pilots designated and briefed. Minor maintenance may be performed on the aircraft if no delay in launch is involved. The ODO shall call CIC when the flight is ready and Condition IV is set. Aircraft should be airborne within 60 minutes of the launch order.

14.9.2 Emergency Defense of the Amphibious Task Force Launches. Aircraft launched in response to a threat approaching the ship shall turn directly to the heading passed by CIC immediately after launching. The flight lead shall not extend on the BRC to complete a rendezvous before turning toward the threat.

14.10 ORDNANCE PROCEDURES

14.10.1 General. All ordnance shall be classified into three categories: free fall, chaff/flares, and forward firing. All arming to be completed on the tramline shall be done after the no-go VTO.

14.10.2 Arming.

1. Free fall — All free-fall ordnances will be armed prior to engine start.
2. Chaff/flares — Pylons containing flare pods will be armed prior to engine start. The actual arming pin for the flare pods will not be removed until the aircraft is positioned for launch on the tramline. The ALE-39 chaff and flare dispenser shall be armed prior to engine start.
3. Forward firing
 - a. Rocket pods — Pylons containing rocket pods will be armed prior to engine start. When the aircraft is positioned for launch, a stray voltage check will be done, the pods connected, and the arming pins pulled.
 - b. AIM-9 — During poststart checks, the seeker head protective cover will be removed and a tone check performed. When positioned for launch, the AIM-9 will be armed.
 - c. Gun — The gun will be armed after the aircraft is positioned for launch.

14.10.3 Ordnance Departures. Normal launch procedures and nose-to-tail launches shall not be utilized for aircraft with forward-firing ordnance or parachute flares. [Figure 14-4](#) illustrates recommended procedures to be utilized in order to expedite the launching of aircraft with ordnance that requires arming on the tramline.

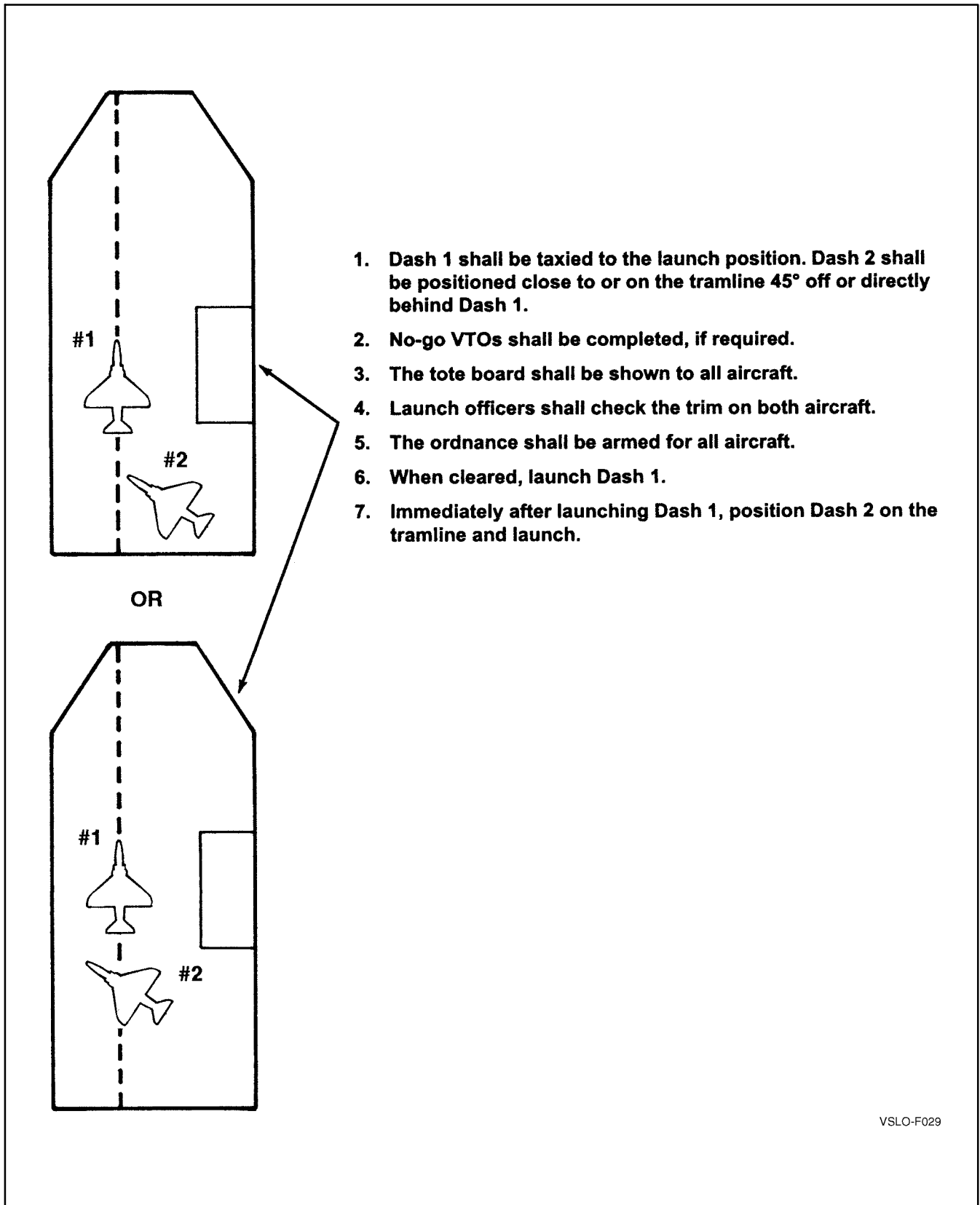


Figure 14-4. Forward Ordnance/Parachute Flares Arming/Launch

14.10.4 Ordnance Recoveries.

1. Clean or unexpended — Standard recovery as dictated by weather.
2. Hung free fall — Conduct a straight-in approach. Avoid overflight of all surface vessels.
3. Hung forward firing — Conduct a straight-in approach. Winds permitting, the nose of the aircraft shall be pointed away from the island during landing. Immediately after landing, the aircraft shall be pointed in a safe direction and dearmed. The interval between aircraft should be increased to allow aircraft to be dearmed prior to the next landing.

14.11 EMISSION CONTROL PROCEDURES

14.11.1 Preflight. Prior to walking, each pilot

shall be assigned marshal instructions and an approach time. Pilots should anticipate recovery delays and plan fuel accordingly.

14.11.2 Departures. All pilots shall ensure Center has been briefed on the departure and rendezvous procedures to be utilized.

14.11.3 Recovery. Each pilot shall enter marshal (IMC) or delta (VMC) and depart in order to meet the assigned approach or Charlie time. If VMC is obtained, execute a standard Case 1 recovery. If VMC is not obtained by the “gate,” continue with a standard Case 3 TACAN approach. The standard light signals shall be provided by the LSO. Pilots should expect to land on the standard landing spot. If a different landing spot is required, and LSO will be on the deck pointing at the landing spot.

CHAPTER 15

Landing Signal Officer Responsibilities and Command Relationships

15.1 GENERAL LANDING SIGNAL OFFICER RESPONSIBILITIES

The primary responsibility of all LSOs is the safe and expeditious launch and recovery of V/STOL aircraft aboard ship. Other responsibilities include the following:

1. Determining acceptable pilot performance in all areas of shipboard flight operations. It is the LSO's responsibility to correct any situation that, in his opinion, is unsafe or unacceptable.
2. Training pilots in all facets of launches and recoveries during shipboard operations. This training is outlined in Chapter 19 of this manual.
3. Training shipboard personnel in all facets of AV-8B shipboard operations. This training is outlined in the LHA/LHD NATOPS manual.
4. Thorough knowledge of this manual as well as the AV-8B SOB, the TAV-8B/AV-8B NATOPS manual, the LHA/LHD NATOPS manual, and the applicable sections of the CV/CVN NATOPS manual.
5. Calculation of launch and recovery data.
6. Making recommendations concerning individual pilot performance and shipboard qualifications.

15.2 SPECIFIC LANDING SIGNAL OFFICER RESPONSIBILITIES

15.2.1 Squadron/Detachment Landing Signal Officer. Each VMA squadron/detachment shall designate a squadron/detachment LSO in writing. The squadron/detachment LSO should be an advanced

(day/night) LSO or higher. The squadron/detachment LSO shall be responsible for the following:

1. The development and implementation of a squadron/detachment shipboard training plan.
2. The development and implementation of a squadron/detachment LSO training plan.
3. The coordination and scheduling of all squadron/detachment shipboard operations.
4. The maintenance of all records required in Chapter 23 of this manual.
5. Maintaining the squadron/detachment LSO ASOB computers.

15.2.2 Marine Aircraft Group Landing Signal Officer. Each MAG with V/STOL aircraft permanently assigned shall designate a MAG LSO in writing. The MAG LSO should be a training (day/night) LSO. The MAG LSO shall be responsible for the following:

1. All MAG shipboard operations and training.
2. The development and implementation of a MAG shipboard training plan.
3. The development and implementation of a MAG LSO training plan.
4. The maintenance of all records required in Chapter 23 of this manual.
5. Maintaining the following for squadron use:
 - a. The MAG FCLP SOP
 - b. FCLP briefs (day/night)
 - c. CQ briefs (day/night).

Note

To ensure standardization, the CQ briefing material shall be controlled and distributed by the LSO model manager.

6. Conducting V/STOL LSO school as required.

Note

To ensure standardization, the V/STOL LSO school curriculum shall be controlled and distributed by the V/STOL LSO model manager.

7. Maintaining the MAG LSO ASOB computers.
8. Maintaining a MAG LSO roster.
9. Making recommendations to the MAG operations officer and MAG commanding officer concerning student LSO selections and LSO designations.

15.2.3 Landing Signal Officer Model Manager. The commanding officer of MAG-14 shall act as the V/STOL LSO model manager. Representing the V/STOL LSO model manager in all LSO issues shall be the MAG-14 V/STOL LSO. Responsibilities of the V/STOL LSO model manager shall include:

1. Maintaining and distributing the CQ (day/night) briefing material to be used by all VMA squadrons.
2. Maintaining and distributing the V/STOL LSO school curriculum to be used by the MAG LSOs.
3. Maintaining this manual and recommendations for changes to the LHA/LHD NATOPS manual.
4. Conducting a V/STOL LSO review conference when necessary.
5. Monitor all FCLP and shipboard equipment research and development.

15.3 COMMAND RELATIONSHIPS

The LSO, because of direct involvement with air operations, is in the unique position of being responsible to various levels of the command structure. The two primary chains of command the LSO is responsible to are the squadron commanding officer/detachment OIC and the ship's commanding officer.

15.3.1 Squadron Commanding Officer/ Detachment Officer in Charge. The squadron V/STOL LSO shall advise and make recommendations to the squadron/ detachment commander pertaining to:

1. The state of pilot and LSO training.
2. Any unsafe tendencies of individual pilots.
3. The status of shipboard equipment and configurations that affect V/STOL shipboard operations.

15.3.2 Ship Commanding Officer. When embarked, the LSO is responsible for providing the ship's captain, through the ship's air officer, with the following:

1. The safe and expeditious launch and recovery of V/STOL aircraft.
2. A ready source of information concerning the operation of V/STOL aircraft.
3. Immediate notification of any condition that might interfere with V/STOL operations.
4. The training of ship personnel as required in V/STOL shipboard operations.

15.3.3 Seniority of Publications. To ensure safety of flight operations, when a conflict exists between this NATOPS and other publications or directives involving shipboard V/STOL flight operations, this NATOPS will take precedence in accordance with paragraph 1.1.4 of LHA/LHD NATOPS.

CHAPTER 16

Landing Signal Officer Training/Designations/Requirements

16.1 LANDING SIGNAL OFFICER PERFORMANCE AND AEROMEDICAL QUALIFICATIONS

Refer to the current OPNAVINST 3710.7.

16.2 LANDING SIGNAL OFFICER TRAINING

All LSOs under training shall be referred to as LSOs UT. All training as outlined in this chapter shall be completed before an LSO UT is designated. Whenever an LSO UT is controlling, the supervising LSO shall have immediate access to a radio with which to override the student LSO UT's transmission. The squadron LSO is responsible for monitoring the progress of LSO UT training and shall periodically brief the squadron commander and MAG LSO on the progress of LSO training.

16.2.1 Landing Signal Officer Under Training Selection. The decision to recommend initial LSO nominations rests with the individual's commanding officer, based upon the squadron LSO's recommendation. When selecting an LSO UT, consideration should be given to the following:

1. Ability to instruct — LSOs spend a majority of their time teaching pilots as well as ship personnel.
2. Motivation/desire.
3. Ability to control and coordinate.
4. Maturity.
5. Time remaining in squadron and on station — LSO training can be a very lengthy and expensive process. The LSO UT should have a minimum of 2 years time on station remaining.
6. Credibility.

7. Communication skills.

8. Flight qualifications — An LSO UT should, at a minimum, be a designated section leader and shipboard qualified with the appropriate day/night designation.

16.2.2 Landing Signal Officer Training Syllabus. The following syllabus should be completed in sequence. [Figure A-3](#) depicts an LSO UT training log that shall be maintained by the squadron LSO during the training process.

16.2.2.1 Phase 1 — Landing Signal Officer School. Phase 1 training shall be accomplished at a CNO-sponsored V/STOL LSO school in accordance with the approved syllabus. The LSO school syllabus shall be maintained by the LSO model manager. To ensure standardization, the LSO school shall be conducted by the MAG LSOs with assistance from squadron LSOs as delegated by the MAG LSO.

16.2.2.2 Phase 2 — Field Carrier Landing Practice Training. Day Phase 2 training shall consist of the following:

Note

Phase 2 or 3 shall be conducted by the appropriate category LSO. An LSO UT may observe any category LSO to gain credit for observed passes.

1. Conduct a day FCLP brief.
2. Monitor 50 day FCLP approaches and landings. Monitoring should include participating in the grading of approaches and listening to all radio calls. Upon the recommendation of the Training LSO, the LSO UT may begin controlling FCLP landings.
3. Control 50 day FCLP approaches and landings to include practice NORDO approaches and test waveoffs.

4. Control an entire day FCLP evolution from beginning to end.

Night Phase 2 training shall consist of the following:

1. AV8B night systems ground school complete.
2. Night training lab complete.
3. Conduct Night Case 1 and Case 3 FCLP brief.
4. Monitor 25 night approaches and landings. Monitoring should include participating in the grading of approaches and listening to all radio calls. A minimum of 10 Case 1 and 10 Case 3 shall be monitored.
5. Control 25 night approaches and landings to include practice NORDO approaches and test waveoffs. A minimum of 10 Case 1 and 10 Case 3 approaches shall be controlled.
6. Control an entire night FCLP evolution from beginning to end.

16.2.2.3 Phase 3 — Shipboard Training. Day Phase 3 training shall consist of the following:

1. Conduct a day CQ brief.
2. Monitor 50 day approaches and landings. Monitoring should include participating in the grading of approaches and listening to all radio calls.
3. Control 50 day approaches and landings to include practice NORDO approaches, test waveoffs, and a day practice Case 3 recovery.
4. Control an entire day evolution from beginning to end.

Night Phase 3 training shall consist of the following:

1. AV8B night systems ground school complete.
2. Night training lab complete.
3. Conduct a Night Case 1 and Case 3 CQ brief.

4. Monitor 25 night approaches and landings. Monitoring should include participating in the grading of approaches and listening to all radio calls. A minimum of 10 Case 1 and 10 Case 3 approaches and landings shall be monitored.
5. Control 25 night approaches and landings. A minimum of 10 Case 1 and 10 Case 3 approaches and landings shall be controlled.
6. Control an entire night evolution from beginning to end.

16.3 DESIGNATING LANDING SIGNAL OFFICERS

The decision to recommend LSO designations rests solely with the squadron LSO or the MAG LSO in the squadron LSO's absence. The category designation shall be recommended to the LSO UT's commanding officer. A copy of the completed student LSO UT's training log (Figure A-3) shall be included as enclosure (1). When the letter requesting qualification or qualification upgrade is signed by the MAG CO/MAGTF commander, or a designated representative, the LSO is authorized to control aircraft in that capacity. When the designation is approved, an appropriate entry shall be made in the LSO's NATOPS Qualification Jacket.

16.4 LANDING SIGNAL OFFICER DESIGNATION CATEGORIES

Each of the four LSO designation categories is differentiated into day and night qualifications. For example, an LSO could be a training LSO (day) and basic V/STOL LSO (night) at the same time. Before attaining a night qualification, the designee shall hold a day qualification of at least the same level.

16.4.1 Field V/STOL Landing Signal Officer, Day/Night (Initial Qualification). Upon satisfactory completion of Phase 1 and 2 V/STOL LSO training, the LSO UT should be considered for a field V/STOL LSO designation. This designation reflects the individual's ability to satisfactorily control V/STOL aircraft ashore during FCLP day or night operations. See Figures 16-1 and 16-2 for capabilities.

PILOT DAY QUALIFICATION						
V/STOL LSO DAY QUALIFICATION	FCLP			CQ		
	QUALIFIED			QUALIFIED		
	IQ	REF	CUR	IQ	REF	CUR
Field	N	Y	Y	N	N	N
Basic (3)	N	Y	Y	N	Y(1)	Y(1)
Advanced (2)	Y	Y	Y	Y	Y	Y
Training (2)	Y	Y	Y	Y	Y	Y

Notes:

1. Case 1 and 2 weather with a steady deck (Note 4).
2. All weather and deck conditions.
3. During Case 3 weather or with deck motion greater than that defined in Note 4, an advanced or training V/STOL LSO shall be in the tower.
4. A steady deck is defined as roll equal to or less than $\pm 5^\circ$ and/or pitch equal to or less than $\pm 1^\circ$.
5. For FCLPs, weather minimums are 1,000/3; minimums may be waved to 800/3 by the squadron/detachment commander if required.

Figure 16-1. V/STOL Landing Signal Officer Day Qualifications and Capabilities

PILOT NIGHT QUALIFICATION						
V/STOL LSO NIGHT QUALIFICATION	FCLP			CQ		
	QUALIFIED			QUALIFIED		
	IQ	REF	CUR	IQ	REF	CUR
Field	N	Y	Y	N	N	N
Basic (3)	N	Y	Y	N	Y(1)	Y(1)
Advanced (2)	Y	Y	Y	Y	Y	Y
Training (2)	Y	Y	Y	Y	Y	Y

Notes:

1. Case 1 and 2 weather with a steady deck (Note 3).
2. All weather and deck conditions.
3. A steady deck is defined as roll equal to or less than $\pm 4^\circ$ and/or pitch equal to or less than $\pm 1^\circ$.
4. For FCLPs, weather minimums are 1,500/3.

Figure 16-2. V/STOL Landing Signal Officer Night Qualifications and Capabilities

16.4.2 Basic V/STOL Landing Signal Officer, Day/Night (Second Designation). Upon satisfactory completion of all LSO phase training, the LSO UT shall be considered for a basic V/STOL LSO designation. See Figures 16-1 and 16-2 for capabilities.

Note

- An LSO may be certified during an extended cruise without completing Phase 2 FCLP training, but that LSO shall be restricted from controlling FCLPs until certified by a Training LSO as being competent. No specific number of approaches or landings are required, but the individual shall control at least one period to include brief and debrief of the period.
- A steady deck condition is defined in [Figures 16-1 and 16-2](#).

16.4.3 Advanced V/STOL Landing Signal Officer, Day/Night (Third Designation). In order to be considered for an advanced V/STOL designation, the designee shall have:

1. Been designated a basic V/STOL LSO;

2. Completed an extended shipboard deployment as a designated LSO or LSO UT. For purposes of this chapter an extended deployment is generally considered to be 45 days or greater;
3. Controlled aircraft during Case 3 recoveries;
4. Controlled aircraft in sea states heavier than steady deck conditions;
5. Conducted shipboard Phase 1, 2, and 3 training; and should have:
6. Controlled aircraft with nonstandard recoveries in use.

See [Figures 16-1 and 16-2](#) for capabilities.

This designation reflects an LSO’s ability to control V/STOL aircraft aboard ship under all weather and deck conditions. Advanced V/STOL LSOs may train an LSO UT according to the LSO capabilities chart, [Figure 16-3](#).

Note

An advanced V/STOL LSO can conduct shipboard Phase 1, 2, and 3 training.

		DESIRED QUALIFICATION			
		Field LSO	Basic LSO	Advanced LSO	Training LSO
I N S T R U C T O R	Advanced LSO	X(1)	X(2)	X	
	Training LSO	X	X	X	X

Notes:

1. Pilots being controlled cannot be initial FCLP qualified.
2. Pilots being controlled cannot be initial shipboard qualified.
3. LSO must be certified by a training LSO prior to designation.
4. Only the MAG/MAGTF commander can designate an LSO.

Figure 16-3. Landing Signal Officer Training Capabilities

16.4.4 Training V/STOL Landing Signal Officer, Day/Night (Final Designation). A Training V/STOL LSO reflects the attainment of the highest level of qualification and experience gained as a result of performance in subordinate categories. The responsibility for recommending designation as a training V/STOL LSO rests with the MAG commanding officer, based upon the MAG LSO's recommendation, and represents judgment of the individual's preparedness to assume the responsibility of a training V/STOL LSO. In order to be considered for a training V/STOL LSO designation, the designee shall have:

1. Been designated an advanced V/STOL LSO.
2. Shown the ability to administer, instruct, and supervise LSO training as delineated in step 3.
3. Brief, control, and debrief an entire CQ and FCLP evolution as a training LSO, under the supervision of a current training LSO. No minimum number of approaches is specified but shall be left to the discretion of the supervising LSO.

Note

A training V/STOL LSO shall certify that all required LSO training is complete and that the designee is capable of fulfilling the responsibilities of the requested designation category.

16.5 LANDING SIGNAL OFFICER REQUALIFICATION

1. All LSOs shall be considered field qualified for 12 months after controlling the last shipboard or FCLP launch and recovery.

2. All LSOs shall be considered shipboard qualified for 12 months after controlling the last shipboard launch and recovery.
3. LSO requalification shall consist of the following:
 - a. A review of all applicable manuals with the MAG LSO. Emphasis shall be on changes that have occurred since the LSO's last shipboard period.
 - b. Controlled FCLP and shipboard launches and landings under the supervision of an advanced LSO or higher. No minimum number of approaches is specified but shall be left to the discretion of the supervising LSO.

16.6 MINIMUM LANDING SIGNAL OFFICER REQUIREMENTS

Figure 16-4 specifies the minimum number of LSOs each unit should strive to maintain.

16.7 V/STOL LANDING SIGNAL OFFICER GRADING CRITERIA

The following shall be utilized to standardize V/STOL LSO grading criteria:

1. Cut pass — C = 0.0
2. Waveoff — WO = 1.0
3. No grade — - = 2.0
4. Fair pass — (OK) = 3.0
5. OK pass — OK = 4.0
6. OK underline — OK = 5.0

UNIT	TRAINING LSO	ADVANCED LSO	BASIC LSO	STUDENTS
MAG	1 ⁽¹⁾	0	0	0
VMA	1 ⁽¹⁾	1 ⁽¹⁾	2 ⁽²⁾	2
DET	1 ⁽¹⁾	1 ⁽¹⁾	1 ⁽¹⁾	2
Notes:				
1. Should be day/night qualified.				
2. One should be day/night qualified.				

Figure 16-4. Recommended Minimum Landing Signal Officer Manning

CHAPTER 17

Pilot Currency/Minimum Requirements

17.1 MINIMUM REQUIREMENTS

The following minimum requirements shall be met before conducting day or night shipboard operations. Once these requirements are satisfied, the final responsibility for acceptable FCLP performance and currency lies with the squadron commanding officer/detachment OIC with the recommendation of the squadron/detachment LSO.

17.1.1 Day Requirements

1. Fifty hours in type.
2. All simulator and FCLP sorties as outlined in MCO P3500.14 Training and Readiness Manual shall be completed.
3. One test waveoff and one practice NORDO approach during FCLP operations.
4. Attendance at a preshipboard brief within 10 days of shipboard operations.
5. [Figure 17-1](#) provides day currency requirements.

17.1.2 Night Requirements

1. Shall have met all requirements listed in 17.1.1 and must be day CQ current.
2. One hundred hours in type.
3. [Figure 17-2](#) provides night currency requirements.
4. For Night Case 1 operations, pilot shall be Night Systems Qualified, Night Unaided Carrier Qualified, and aided FCLP Qualified.

17.2 WAIVER OF MINIMUM REQUIREMENTS

All minimum requirements listed above may be waived by the MAG/MAGTF commander or a designated representative if operational necessity requires.

17.3 FIELD CARRIER LANDING PRACTICE REFRESHER LIMITATIONS

When FCLP refresher is required, unless unusual operating circumstances dictate, no longer than 14 days should elapse between the last FCLP period and the first shipboard landing.

DAY (5)					
DAYS SINCE LAST DAY CURRENT	REQUIREMENTS PRIOR TO DAY SHIP LANDING	WEATHER	DECK	DIVERT FIELD	CURRENCY REQUIREMENT
1 to 14 days	FCLP not required	Ship's minimums	All conditions	N/R	One landing
15 to 29 days	FCLP refresher at the discretion of the CO	TACAN minimums	Steady deck (1), or	Divert available	One landing
30 to 59 days	FCLP refresher (2)	TACAN minimums	Steady deck (1), or	Divert available	One landing
60 days to 6 months	FCLP refresher (2)	800/3 (3)	Steady deck (1), or	Divert available	One landing
6 to 12 months	FCLP refresher (2)	1,000/3 (4)	Steady deck (1), or	Divert available	Four landings
Greater than 12 months	Refer to initial carrier qualification				Refer to initial carrier qualification (6)

Notes:

1. Steady deck is defined as roll equal to or less than $\pm 5^\circ$ and /or pitch equal to or less than $\pm 1^\circ$.
2. See pilot performance in paragraph 3.4.
3. May be waived to TACAN minimums by the commanding officer or the appointed direct representative.
4. May be waived to 800/3 by the commanding officer or the appointed direct representative.
5. All initial qualifications should have a steady deck, divert available, and the same weather requirement as 6 to 12 months.
6. The Group Commanding Officer has the authority to reduce requirements based on pilots proficiency and experience level.

Figure 17-1. Day Currency Requirements

NIGHT (5)						
DAYS SINCE LAST NIGHT SHIP LANDING	FCLP REFRESHER REQUIRED	REQUIREMENT TO A NIGHT SHIP LANDING OR TAKEOFF	WEATHER	DECK	DIVERT FIELD	CURRENCY REQUIREMENT
1 to 14 days	Not required	None	Ship's minimums	ALL conditions	N/R	One Landing
15 to 29 days	CO discretion (2)	One day landing/takeoff same day, or two day landings/takeoffs within 48 hours	TACAN minimums	Steady deck (1) or	Divert available	One Landing
30 to 59 days	FCLP refresher (2) (8)	Two day landings/takeoffs within 36 hours and no less than 1 hour flight time (day or night)	800/3 (3)	Steady deck (1) and	Divert available	Two Landings
60 days to 6 months	FCLP refresher (2) (8)	Same as 30 to 59 day requirement	1,000/3 (4)	Steady deck (1) and	Divert available	Two Landings
6 to 12 months	FCLP refresher (2)	Same as 30 to 59 day requirement	1,500/5	Steady deck (1) and	Divert available	Four Landings
Greater than 12 months	Refer to initial qual (2)	Refer to initial qualifications	(7)	(7)	Divert available	Refer to initial qual

Notes:

1. Steady deck is defined as roll equal to or less than $\pm 4^\circ$ and/or pitch equal to $\pm 1^\circ$.
2. See Pilot Performance in paragraph 3.4.
3. May be waived to TACAN minimums by the commanding officer or the appointed direct representative.
4. May be waived to 800/3 by the commanding officer or the appointed direct representative.
5. For initial CQ, a minimum of four landings must be completed one-half hour after sunset.
6. When a day ship takeoff/landing is required, a practice Case 3 approach utilizing the OLS and HPI (or its equivalent) to complete the landing should be utilized.
7. All initial qualifications should have a steady deck, divert available, and the same weather requirement as 6 to 12 months.
8. When FCLPs are required, but an appropriate field facility as defined in 3.3.1 is not available, Day Case 3 recoveries may be substituted. Day landings should be followed by Dusk approaches/landings.
9. NVD qualified pilots should conduct one unaided Case 3 approach and landing every thirty days. If outside this thirty-day window, the pilot's next approach and landing shall be unaided, unless waived by the commanding officer or the appointed direct representative.

Figure 17-2. Night Currency Requirements

CHAPTER 18

Carrier Qualification, Field Carrier Landing Practice, and Refresher Requirements

18.1 QUALIFICATIONS

18.1.1 Minimum Landings for Initial Field Carrier Landing Practice Qualification. This paragraph contains the minimum number of landings for FCLPs. The final number of landings to qualify will be at the discretion of the controlling V/STOL LSO, but not to exceed operational limitations (paragraph 18.2).

1. Eight day landings and takeoffs.
2. Eight night landings and takeoffs, including:
 - a. Four unaided (Night Case 3) night landings and takeoffs. Two landings shall be completed between 1/2 hour after sunset and 1/2 hour before sunrise.
 - b. Four aided (Night Case 1) landings and takeoffs. Aided recoveries shall not be attempted until the pilot is Night System Qualified.

Note

Pilots that are not Night System Qualified shall complete eight unaided (Night Case 3) night landings and takeoffs. Four landings shall be completed between 1/2 hour after sunset and 1/2 hour before sunrise.

Landings must be made from a visual or instrument approach. VTOs to immediate landings will not count for initial or refresher qualification purposes.

18.1.2 Minimum Landings for Initial Carrier Qualification. This paragraph contains the minimum number of landings for carrier qualification. The final number of landings to qualify will be at the discretion of the controlling V/STOL LSO but not to exceed operational limitations (paragraph 18.2).

1. Eight day landings and takeoffs.

2. Eight night landings and takeoffs, including:

- a. Four unaided (Night Case 3) night landings and takeoffs. Two landings shall be completed between 1/2 hour after sunset and 1/2 hour before sunrise.
- b. Four aided (Night Case 1) landings and takeoffs. Aided recoveries shall not be attempted until the pilot is Night System Qualified.

Note

Pilots that are not Night System Qualified shall complete eight unaided (Night Case 3) night landings and takeoffs. Four landings shall be completed between 1/2 hour after sunset and 1/2 hour before sunrise.

Landings must be made from a visual or instrument approach. VTOs to immediate landings will not count for initial or refresher qualification purposes.

18.1.3 Minimum Landings for Refresher. When the provisions of [Figures 17-1](#) and [17-2](#) are complied with, ship/field qualification is current for a period of 6 months. Requirements after six months shall be four day landings and takeoffs and four night landings (Minimum 2 unaided) and takeoffs. Initial qualification requirements are necessary after 12 months.

18.2 OPERATIONAL LIMITATIONS

1. The qualifying pilot should not exceed in any 24-hour period:
 - a. Eight day landings and takeoffs
 - b. Four night landings and takeoffs
 - c. Six and one-half hours in the cockpit
 - d. Three flights.

Note

A qualification flight is defined as 1) four landings with any combination of hot refueling, 2) a period of four or more landings that concludes in engine shutdown, 3) standing by for launch in an aircraft for more than 1 hour at any time, and 4) all bingo/diverts, planned or otherwise.

2. Provided other operational limitations have not been exceeded and on the recommendation of the controlling V/STOL LSO, the squadron/detachment commander or a designated representative may waive daily landing limitations to the following:
 - a. Total day landings — twelve.
 - b. Total night landings — six.
 - c. Total flights — four.
3. Day ship landings must be conducted to the satisfaction of the controlling V/STOL LSO prior to a pilot participating in night ship qualification. The accumulation of eight day landings and takeoffs will normally satisfy this requirement. In the event that the controlling V/STOL LSO considers that a pilot's performance warrants additional landings, such recommendation shall be made to the squadron commanding officer. Every possible effort will be made to debrief pilots after day events and prior to night qualifications or refresher.
4. LSOs shall maintain the same crew rest requirements as the aircrew. 12 hours from first brief to last land for day time operations and 10 hours for night operations. This limit does not apply to the LSO's assistant in the tower and/or HDC at night and is waiverable by the Squadron Commander.

18.2.1 Divert Field Requirements. When a divert field is required for flight operations, the following requirements and conditions should be assessed prior to designating the field as a valid divert:

1. Should be at least 6,000 feet hard-surface runway.
2. Shall be operational during shipboard operations.
3. Should have an approved TACAN approach.
4. Should have appropriate field lighting for night operations.
5. Divert weather shall be in accordance with the current OPNAVINST 3710.7 alternate airfield requirements and IFR filing criteria.

18.3 PILOT CERTIFICATION BY THE V/STOL LANDING SIGNAL OFFICER

The decision to recommend a day/night initial or refresher shipboard qualification rests solely with the squadron/detachment LSO. If a pilot's performance warrants additional landings beyond the minimum required, a recommendation shall be made to the squadron/ detachment commander.

The cognizant V/STOL LSO shall report verbally and in writing when individual pilots have completed day/night ship qualification. The originals of such reports shall be delivered to the squadron/detachment commander who will certify the pilot as day/night ship qualified. Copies shall be provided for the Aviator's NATOPS Qualification Jacket. Reciprocal acceptance of ship qualification and V/STOL LSO certification between commands is authorized. The cognizant senior V/STOL LSO may recommend revocation of a qualification anytime a pilot standard of performance is less than satisfactory.

CHAPTER 19

Pilot Shipboard Workups

19.1 INTRODUCTION

Readiness refers to the capability of the ship and the embarked MAGTF to perform their assigned missions

while training and operating safely. Adherence to the standardized workup requirements provided in [Figure 19-1](#) will increase combat effectiveness and safety, thus enhancing readiness.

PILOT SHIPBOARD WORKUPS

STAGE ONE — Detachment pilot/LSO selection and Ship's personnel training.

STAGE TWO — Day and Night carrier qualifications.

- a. Each pilot shall complete the number of landings required for carrier qualifications and LSO training.
- b. Stage Two shall be completed prior to progressing to subsequent Stages unless waived by ACECO.

STAGE THREE — Shipboard proficiency training.

- a. Each pilot shall conduct two TACAN and two CCA approaches. One approach shall be to a full stop. If an ICLS is available, one needles approach shall be conducted.
- b. Each pilot should launch with ordnance, complete a sortie, and recover at the ship.
- c. Each pilot should conduct one cross-axial and one bow-to-stern approach. Additionally pilots should be exposed to landings on different spots.
- d. Each pilot should be exposed to simultaneous jet/helo flight operations.

STAGE FOUR — Combat readiness evaluation.

- a. Integrated operations as dictated by the MAGTF commander.

Figure 19-1. Pilot Shipboard Workups

CHAPTER 20

Equipment/Personnel Requirements

20.1 INTRODUCTION

The following equipment and personnel are required for shipboard flight operations:

20.1.1 Day Operations.

1. UHF radio with guard capability. The LSO shall have control of this radio without diverting attention from the aircraft being controlled. This radio should be a PICT or equivalent system.
2. Backup radio.
3. Waveoff and cut lights (a portable Aldis lamp may be substituted at the squadron commander's/detachment OIC's discretion if the waveoff and cut lights are inoperable).
4. Portable Aldis lamp.
5. Current copies of this manual, the AV-8B/TAV-8B NATOPS manual, the LHA/LHD NATOPS manual, and the AV-8B SOB. The CV NATOPS manual is required for CV/CVN operations only.
6. A qualified LSO.

20.1.2 Night/Case 3 Operations.

1. All equipment and personnel listed in paragraph 20.1.
2. A qualified LSO. The LSO shall have an assistant (not necessarily an LSO) present whenever more than two aircraft are in the CQ pattern.
3. A pilot familiar with Case 3 recoveries shall be stationed in AOCC/HDC/AATCC during night Case 3 operations and recoveries in actual Case 3 conditions. For extended deployments, this requirement is valid until the ACE commander and the HDC officer determine it is no longer needed.
4. OLS and HPI or equivalent.

5. All lighting required in the AV-8B SOB and the LHA NATOPS Manual.

Note

- For unaided recoveries, if the OLS fails during night recoveries consideration shall be given to diverting the aircraft. If diverting the aircraft is not possible, the pilot shall fly a Case 3 approach to 1 nm astern the ship. At this point, the LSO shall assume positive control and "talk" the pilot to a recovery at the standard landing spot.
 - During extended deployments, night aided operations may be conducted without the use of the OLS at the discretion of the squadron commander/detachment OIC. This type of operation shall only be conducted during highlight, [green water](#) operations when the current weather is Case 1 and forecasted to remain Case 1 throughout the flight window. The LSO assumes full responsibility for safe recovery of aircraft during this type of approach.
 - Night operations may be conducted without the HPI at the discretion of the squadron commander/detachment OIC.
6. For Night Case 1 recoveries, the LSO shall have a set of NVDs available.



Closure and rates of descent are initially more difficult to discern and may cause late recognition of aircraft trends. Use of NVG/NVDs by the LSO for aircraft in close is not recommended.

CHAPTER 21

Flight Operations

21.1 INTRODUCTION

LSOs shall be guided by the AV-8B/TAV-8B NATOPS manual, AV-8B SOB, LHA NATOPS manual, and Chapters 1 through 14 of this manual when conducting flight operations. The following procedures shall be conducted by the controlling LSO before and during flight operations.

21.2 BEFORE FLIGHT OPERATIONS

1. Brief the HDC officer on the following:
 - a. Flight schedule/air plan changes.
 - b. Type of operations planned (i.e., launches, recoveries, patterns).
 - c. Weather, divert, and fuel requirements.
2. Brief the Air Boss on the following:
 - a. All items included in the HDC officer brief (step 1).
 - b. Refueling, watering, parking, taxiing, no-go VTO, and WOD requirements.
 - c. Equipment/lighting requirements.
 - d. Radio plan between the controlling LSO, the LSO UT, and the Air Boss in normal and emergency situations, and as required in Chapter 22.
 - e. The suitability of the working environment. The LSO shall advise the Air Boss if any situation develops that will degrade the ability of the controlling LSO to safely accomplish the mission.
3. The following equipment/facilities shall be checked prior to flight operations:
 - a. Flight deck.

- b. SINS.
- c. Waveoff/cut lights.
- d. Backup radio.
- e. Aldis lamp.
- f. All lighting required for night operations shall be checked a minimum of 1 hour prior to night operations.

21.3 FLIGHT OPERATIONS

21.3.1 Primary Flight Control. A qualified LSO shall man PriFly at all times to include all alert periods. During alert periods, the LSO may leave PriFly with the permission of the Air Boss.

21.3.2 Recovery. If the controlling LSO determines an aircraft that is conducting a Case 3 approach with the assistance of a final controller is not within the parameters of a safe approach, the LSO shall assume visual control of the aircraft by transmitting "Paddles control" on the final controller frequency.

21.3.3 Rolling/Pitching Deck. The following restrictions apply during rolling/pitching deck conditions:

1. Zero to 5° roll/0° to 3° pitch — Normal flight operations.
2. Greater than or equal to 6° roll/greater than or equal to 4° pitch — Use extreme caution while taxiing. All aircraft shall be chocked and chained whenever the ship is in a turn.
3. Greater than 5° pitch and 10° of roll during the day and 4° of pitch and 8° of roll at night or with a wet deck should be considered the operational limit. If the maximum allowable pitch/roll limit has been reached, operations should be terminated and all aircraft chocked and chained in place.

WARNING

- Launching aircraft with a rolling deck compounded by a wet deck, maximum crosswind component, or excess end speeds of more than 15 knots may incur significant deviations from tramline center.
- Exceeding the steering limitation of 45° in either direction during periods of significant deck motion may cause the aircraft to enter an uncontrollable free-castering condition.

21.3.4 Launches. Prior to launching, the LSO shall ensure the information provided in paragraph 8.3 of this manual has been passed.

21.3.5 Pattern. The maximum number of aircraft in the day or night pattern should be three. Additional aircraft may be added if the controlling LSO feels additional aircraft can be safely handled.

21.3.6 Bingo. When a divert is required, the controlling LSO shall calculate and update a bingo fuel figure based on a bingo profile to the nearest suitable divert. If the divert field weather is below 1,000/3, the fuel required to conduct an instrument approach shall be added to the bingo fuel figure. For green-water operations, aircraft shall be on deck at or above the bingo fuel figure.

CHAPTER 22**Communication****22.1 GENERAL**

The LSO must possess a thorough knowledge of visual and radio communication procedures as well as a complete familiarity with the operation of all available communications equipment.

22.2 RADIO COMMUNICATION

The LSO should restrict radio transmissions to the absolute minimum necessary to provide positive corrective signals to the pilot during the actual approach. It must be realized, however, that during the initial stages of FCLP and carrier landing operations the number of transmissions will be much greater than the transmissions required after the pilot has become proficient. Radio communications may be used for airborne brief/ debrief at the discretion of the controlling LSO whenever the situation requires it. This includes the pattern and final approach. Two-way radio communications are required for all normal carrier operations.

22.3 RADIO CONTROL

To ensure simultaneous radio transmissions from two or more PriFly personnel are not directed to an aircraft in an extreme situation, the controlling LSO should be the primary source for radio transmissions

directed to V/STOL aircraft during the initial phase of the launch cycle and the terminal phase of the recovery cycle. The initial phase of the launch cycle begins with the launch officer's signals and ends when the aircraft is safely airborne and climbing. The terminal phase of the recovery cycle begins at the abeam position or when the pilot calls the "Ball" and ends when the aircraft has landed.

22.4 STANDARD V/STOL LANDING SIGNAL OFFICER PHRASEOLOGY

The V/STOL LSO must, on occasion, use voice calls to effect safe aircraft recovery. Calls that are too frequent or verbose actually degrade pilot training and performance. Safety of flight requires that pilots receive short meaningful transmissions that can be instantly recognized and understood. [Figures 22-1, 22-2 and 22-3](#) contain listings of commonly used informative, advisory, and imperative phrases.

22.5 RADIO COMMUNICATIONS DURING EMERGENCY SITUATIONS

During emergency situations such as loss of visual landing aids, reduced cockpit visibility, etc., the LSO may be required to revert to a complete radio talk-down providing lineup, glideslope, and corrective information. The general format for such an approach should follow that of a CCA.

Used to inform pilots of existing situations.			
AIRCRAFT TREND	TRANSMISSION	MEANING	RESPONSE
N/A	"PADDLES CONTACT"	LSO ASSUMES CONTROL	N/A
FAST/SLOW ON APPROACH OR DECEL	"YOU'RE FAST/SLOW"	SELF-EXPLANATORY	ADJUST POWER/NOZZLES/ATTITUDE TO ESTABLISH PROPER CLOSURE
HIGH/LOW ON APPROACH OR DECEL/HOVER	"YOU'RE HIGH/LOW"	SELF-EXPLANATORY	ADJUST POWER/ ATTITUDE FOR PROPER ALTITUDE
AIRCRAFT IN LDG POSITION/CLEAR OF OBSTACLES	"CLEARED TO LAND"	CLEARED TO LAND	LAND

Figure 22-1. Informative Calls

Used to direct pilot's attention to potential difficulties and prevent possible control errors.			
AIRCRAFT TREND	TRANSMISSION	MEANING	RESPONSE
DRIFTING LEFT OR RIGHT OF APPROACH CENTERLINE	"YOU'RE LEFT/RIGHT"	AIRCRAFT LINEUP IS L/R OF APPROACH CENTERLINE	CORRECT LINEUP
AIRCRAFT SETTLES	"DON'T SETTLE/DON'T GO LOW"	AIRCRAFT WILL GO BELOW GLIDESLOPE	ADD POWER/CHECK SINK RATE
AIRCRAFT CLIMBING	"DON'T CLIMB/DON'T GO HIGH"	AIRCRAFT WILL GO ABOVE GLIDESLOPE	REDUCE POWER, STOP CLIMB, OR INCREASE SINK RATE
STAGNATION ON DECEL OR VL	"KEEP IT COMING"	SELF-EXPLANATORY	RE-ESTABLISH PROPER CLOSURE OR RATE OF DESCENT
FAST	"SLOW IT DOWN"	SELF-EXPLANATORY	ADJUST NOZZLES/ATTITUDE TO ESTABLISH PROPER CLOSURE

Figure 22-2. Advisory Calls

Used to direct pilots to execute a specific control action.			
AIRCRAFT TREND	MANDATORY IMMEDIATE RESPONSE		
	TRANSMISSION	MEANING	RESPONSE
SETTLING ON APPROACH OR INCREASING RATE OF DESCENT ON VL	"A LITTLE POWER"	AIRCRAFT WILL GO LOW OR LAND HARD	CORRECT WITH POWER
SINKING (ON/ APPROACH) OR VERY FAST RATE OF DESCENT ON VL	"POWER"	AIRCRAFT IS LOW OR WILL LAND HARD	ADD POWER
YAWING/ROUGH ATTITUDE CONTROL	"CENTER THE VANE/BALL"	SIDESLIP IS BUILDING, AIRCRAFT OUT OF RELATIVE WIND	REDUCE SIDESLIP
ATTITUDE TOO HIGH/LOW	"ATTITUDE"	NOSE TOO HIGH/LOW	REESTABLISH CORRECT ATTITUDE
DRIFT DURING VL	"CHECK FORWARD/BACK/ LEFT/RIGHT"	AIRCRAFT DRIFTING DURING VL	STOP RATE OF DESCENT, CORRECT FOR DRIFT, CONTINUE LANDING
AIRCRAFT BEYOND SAFE LIMITS DURING APPROACH	"WAVEOFF"	WAVEOFF APPROACH	EXECUTE WAVEOFF
WRONG CONFIGURATION	"CHECK GEAR/FLAPS"	SELF-EXPLANATORY	COMPLY
ROUGH AIRCRAFT CONTROL IN HOVER	"STABILIZE"	STABILIZE HOVER	ESTABLISH A STEADY HOVER
N/A	"HOVER"	UNSAFE CONDITIONS DEVELOP DURING VL	ADD POWER/REESTABLISH 50-FOOT HOVER
AIRCRAFT OUT OF CONTROL	"(CALL SIGN), EJECT"	EJECT	EJECT
SETTLE ON ACCEL FROM STO/VTO	1. (STO) "STOP THE NOZZLES" (VTO) "HOVER STOP" 2. "LIMITERS" 3. "EJECT"	NOZZLE OUT TOO FAST. STOP SETTLE WITH NOZZLES TRIP LIMITERS EJECT	STOP NOZZLE OUT. IF NO EFFECT, SELECT STO/HOVER. STOP. FULL THROTTLE, TRIPPING LIMITER EJECT
OVER-ROTATION DURING STO	"GET YOUR NOSE DOWN"	NOSE HAS PITCHED UP EXCESSIVELY	FULL FORWARD STICK, REDUCE NOZZLE ANGLE BUT NO LESS THAN 20°
VISIBLE ENGINE OR MECHANICAL FAILURE	1. "ABORT" 2. "EJECT"	1. ABORT TAKEOFF 2. EJECT	1. PERFORM NATOPS SHIPBOARD ABORT 2. EJECT

Figure 22-3. Imperative Calls (Sheet 1 of 2)

AIRCRAFT TREND	TRANSMISSION	MEANING	RESPONSE
AIRCRAFT DEVIATES EXCESSIVELY FROM STO/TRAMLINES DURING STO	"LINEUP"	CORRECT TO STO/TRAMLIN	APPLY APPROPRIATE RUDDER
SMOKE FROM MLG DURING STO	"OFF BRAKES"	RELEASE BRAKES	RELEASE BRAKES
SLOWER THAN NORMAL ACCELERATION DURING STO DECK RUN	1. "ABORT" 2. "POWER/LIMITERS" 3. "EJECT"	1. ABORT TAKEOFF 2. FULL POWER/LIMITERS OFF 3. EJECT	1. PERFORM NATOPS SHIPBOARD ABORT 2. ADD FULL POWER/TRIP LIMITER 3. EJECT
IMPROPER OR OUT OF CONTROL VTO	"IDLE"	REDUCE THROTTLE TO IDLE	SELECT IDLE
N/A	"SUSPEND"	STOP LAUNCH SEQUENCE	SELECT IDLE UNLESS TAKEOFF ROLL HAS COMMENCED

Figure 22-3. Imperative Calls (Sheet 2 of 2)

CHAPTER 23

Records

23.1 INTRODUCTION

The squadron/detachment LSO shall ensure the following records are maintained and submitted when required.

23.2 LOGBOOK

A field and shipboard logbook shall be maintained at the squadron level. Comments will be of sufficient detail so a comprehensive debrief can be provided to the pilots.

23.3 SHIPBOARD LANDING TREND ANALYSIS

A shipboard landing-trend analysis record as depicted in [Figure A-5](#) shall be maintained for each

pilot. The pilot performance record shall be reviewed periodically, and the pilot debriefed on any dangerous trends.

23.4 SQUADRON SHIPBOARD/LANDING SIGNAL OFFICER TRAINING REPORT

The Squadron Shipboard/LSO Training Report is depicted in [Figure A-6](#). The report shall be submitted to the V/STOL MAG commander on the first day of each new fiscal quarter.

23.5 LOG SYMBOLS

The symbols commonly used for recording comments on each approach during FCLP and shipboard operations are depicted in [Figure 23-1](#).

DESCRIPTIVE SYMBOLS			
SYMBOL	MEANING	SYMBOL	MEANING
WO	Waveoff	C	Unsafe, gross deviations inside waveoff point
HWO	Heavy waveoff	()	Parentheses around any symbol signifies "slightly" (i.e., (F) means "slightly fast")
OWO	Own waveoff	Square	A square drawn around any signal indicates that a signal was not answered.
TWO	Test waveoff	Circle	A circle drawn around around any symbol indicates that a signal was answered too slowly.
<u>OK</u>	Perfect Pass	OC	When used as a prefix to any symbol, OC indicates "overcontrolled."
OK	Reasonable deviations with good corrections	PD	Pitching deck
(OK)	Reasonable deviations	RD	Rolling deck
_____	Below average but safe pass		

Figure 23-1. Log Symbols (Sheet 1 of 2)

DESCRIPTIVE SYMBOLS			
SYMBOL	MEANING	SYMBOL	MEANING
AA	Angling approach	LIG	Long in the groove
ACC	Accelerate	LL	Landed left
AFU	All fouled up	LLU	Late lineup
AR	At the ramp	Lo	Low
ATT	Attitude	LoHo	Low hover
ATTH	Air taxi to hover	LP	Late power
AW	All the way	LR	Landed right
B	Flat glideslope/hover attitude	LUL	Lined up left
C	Climbing	LUR	Lined up right
CB	Coming back to lineup	ND	Nose down
CD	Coming down	NEP	Not enough power
CLO	Close	NEROD	Not enough rate of descent
CPD	Chased pitching deck	NESA	Not enough straightaway
CRD	Chased rolling deck	NLU	Not lined up
CU	Cocked up	NOZ	Nozzles
CV	Chased vane	OR	Overrotate
DEC	Decelerate	OS	Overshoot
DFD	Dived for deck	OT	Out of turn
DFOT	Drift forward on touchdown	P	Power
DLW	Dropped left wing	PNOD	Pulled nose off deck (takeoff)
DN	Dropped nose	PNU	Pulled nose up
DR	Drift in hover	RUF	Rough
DRW	Dropped right wing	RVL	Rolling vertical landing
ER	Early rotation	S	Settle
F	Fast	SLO	Slow
FD	Fouled deck	SROD	Slow rate of descent
FIRM	Too hard for ship landing (bounce)	ST	Steep turn
FRD	Fast rate of descent	T	Trundle
Hi	High	TCA	Too close abeam
HiHo	High hover	TMROD	Too much rate of descent
Ho	Hover	TWA	Too wide abeam
HUC	Hung up in cobblestones	VL	Vertical landing
IC	In close (last one-third of glideslope)	WAS	Wide abeam the landing spot
IM	In middle (middle one-third of glideslope)	X	Start (first one-third of glideslope)
IT	In turn	+	Cross (from abeam deck to over spot)
LI	Late idle		

Figure 23-1. Log Symbols (Sheet 2 of 2)

CHAPTER 24

Aircraft Mishap Statement Considerations

24.1 GENERAL

In most instances of an aircraft shipboard mishap, the LSO is in the best position to evaluate the pattern sequence of events that culminated in the actual mishap. Therefore, the LSO's statement can be critical to the Aircraft Mishap Board's accurate determination of cause. The following is an outline of items that apply to most V/STOL launch and recovery mishaps. These items should be used by the LSO as a checklist to ensure that the statement is as accurate and complete as possible. Controlling LSOs shall have access to PLAT/CCTV, with audio if available, to assist in preparation of their statements.

24.2 LANDING SIGNAL OFFICER MISHAP STATEMENT

1. Narrative

- a. State the events leading up to the mishap in chronological order as you observed them.
- b. Include actions and justifications as appropriate.

2. Environmental factors

- a. Weather — Include both the official observed weather and "LSO called."
- b. Deck conditions — Include wet/dry/petroleum, oil, lubricant greased; ship's turn, roll, heave, and pitch; and other evolutions occurring on the flight deck that may have been a factor.
- c. Wind — Direction, velocity, gusts, shears, burble off island and bow, whether observed or surmised.

- d. LSO equipment — State what equipment was serviceable or unserviceable, and if the air officer was informed of systems that were not in operation. State opinion regarding the possibility that the unserviceability of any gear could have had an effect on the mishap.
- e. LSO horizon — State what the LSO was utilizing as a horizon reference (destroyer position, planeguard helicopter, etc.).
- f. OLS/VLA — Intensity setting, moonbeam settings, and status of deck and drop lights.

3. Air operations

- a. Had the LSO recommended to cancel flight operation prior to the mishap?
- b. Were air operations canceled after the mishap?

4. LSO data

- a. Type qualification day/night, date received, and past experience.
- b. Length of time in duty status that day, physical condition, and fatigue factor.

5. Mishap pilot performance

- a. Update pilot's trend analysis sheet with squadron LSO.
- b. Include a narrative of pilot's specific trends.
- c. Include a performance comparison with the pilot's "experience-level" peers.

SHIPBOARD V/STOL TREND ANALYSIS																		
1983																		
YEAR																		
HOVER STOP																		
AV-8B ACFT																		
PILOT VMA-000 SODN																		
LHA-0 SHIP																		
DATE	D/N	GR	GLIDESLOPE, SPEED, AND V/STOL ERRORS									CONTROL ERRORS		LANDING		L S O	REMARKS - INCLUDE STO/VTO ERRORS	
			AW	OT	X	IM	IC	AR	+	Ho	VL	POWER	ATT.	SPT	REL HDG			
11/20	DN	WD	LOE														B	
11/20	DN	-	LOE		(20)							(RUE)			7 1/2	↑	B	(PNU) STO
11/20	DN	-			(HI)		(F)								7 1/2	↑	B	(OS) SPOT
11/20	DN	(OK)										(HI)	(HUC)		7 1/2	↑	B	SCAN
11/20	DN	(OK)	T												4	↓	H	
11/24	DN	(OK)													4	↓	H	
11/22	DN	(OK)													4	→	V	SCAN
12/1	DN	-	(B)						LO	LO	LO	TMROD	NEP		5	↑	L	
12/2	DN	-	(T)						C		H1			OC	2	↑	L	(LPD)
12/7	DN	-	F					0°		H1	H1	(RVL)	T	RUE	4	↑	B	
	DN																	
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EXAMPLE

VSLO-F031

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