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FLIGHT TRAINING INSTRUCTION T-45 STRIKE

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Subj: CARRIER QUALIFICATION, FLIGHT TRAINING INSTRUCTION
T-45 STRIKE

1. CNATRA P-1211 (Rev. 05-14) PAT, "CARRIER QUALIFICATION, FLIGHT TRAINING INSTRUCTION T-45 STRIKE" is issued for information, standardization of instruction, and guidance for all flight instructors and student aviators within the Naval Air Training Command.
2. This publication shall be used as an explanatory aid to support the T-45 Advanced Strike Flight Training Curriculum. It will be the authority for the execution of all flight procedures and maneuvers herein contained.
3. Recommendations for changes shall be submitted via CNATRA TCR form 1550/19 in accordance with CNATRAINST 1550.6E.
4. CNATRA P-1211 (07-01) PAT is hereby cancelled and superseded.

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By direction

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CARRIER QUALIFICATION

T-45

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INTERIM CHANGE SUMMARY

The following Changes have been previously incorporated in this manual:

CHANGE NUMBER	REMARKS/PURPOSE

The following interim Changes have been incorporated in this Change/Revision:

INTERIM CHANGE NUMBER	REMARKS/PURPOSE	ENTERED BY	DATE

HOW TO USE THIS FTI

This Flight Training Instruction (FTI) is your textbook for the Carrier Qualification Stage of your Undergraduate Jet Pilot Training and is the source document for all procedures related to CQ. In addition, it includes suggested techniques for performing each maneuver and making corrections.

Use this FTI to prepare for CQ Stage syllabus events. Know all the procedures in the assigned section(s), review the glossary, and be prepared to ask your instructor about anything that remains unclear. After each event, review the FTI materials to reinforce your understanding and to clarify any difficult maneuvers or procedures.

Note that this FTI also contains information on emergencies related to this stage. This section of the FTI amplifies but does not supplant the emergency procedures information contained in the T-45 NATOPS manual.

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INTRODUCTION

What sets a Navy-trained jet pilot apart from all other pilots is the ability to land a jet aircraft precisely and safely on a carrier deck.

Carrier Qualification (CARQUAL) will be the most demanding and memorable phase of training. Unlike other stages, there will be weeks of preparation for only a few moments of performance at the ship. Ground lectures, simulator flights, and FCLPs will prepare you for the task of landing the T-45 aboard the carrier.

The simulator flights will let you "see" the ship and get a feel for what your CARQUAL flights will look like. A highly skilled LSO will grade and debrief each FCLP pass. After field qualifications, you will be ready for the carrier.

You will be thoroughly briefed on all aspects and procedures of the CARQUAL flight by the LSOs. Enroute, pattern, approach, flight deck, and launch procedures will be covered in great detail during the ship's brief.

CHAPTER ONE
IMPROVED FRESNEL LENS OPTICAL LANDING SYSTEM (IFLOLS)

100. MODEL DESCRIPTION

There are two models of the IFLOLS lens: one is a portable shore-based model (Figure 1-1) and the other is the shipboard model. The model (Figure 1-2) used on carriers is line and inertial stabilized. Line stabilization compensates for the ship's pitch and roll, where inertial compensates for pitch, roll, and heave.

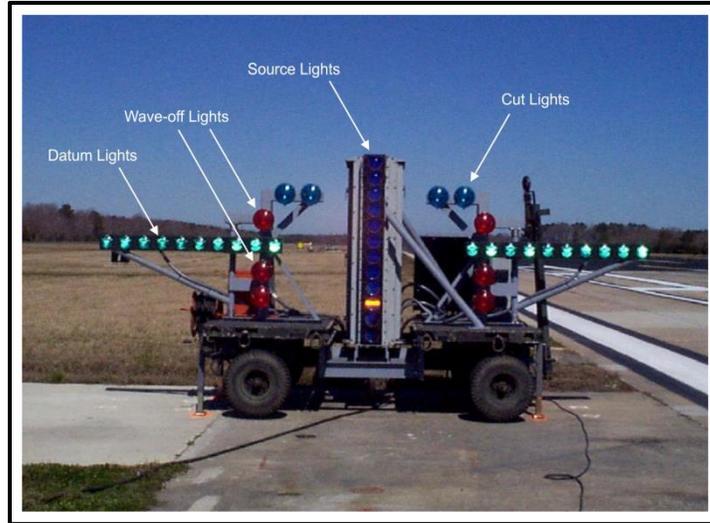


Figure 1-1 IFLOLS lens - Shore-based Model

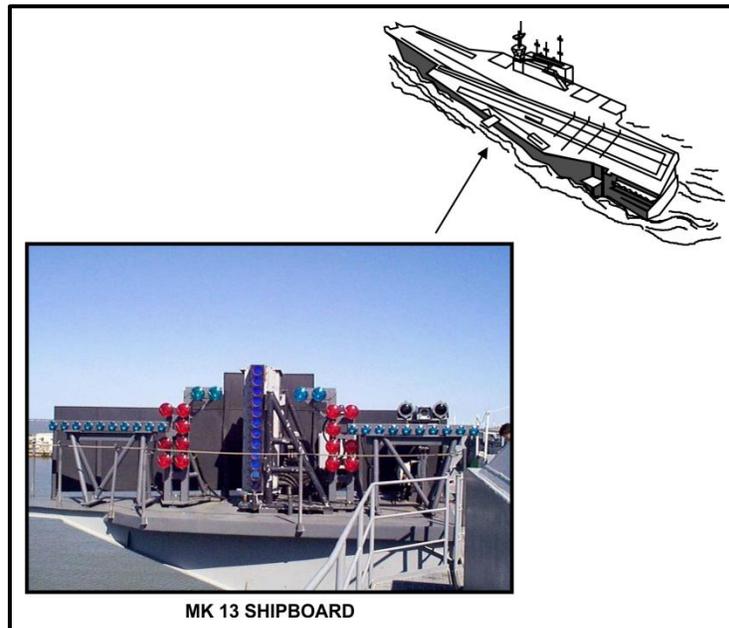


Figure 1-2 IFLOLS lens - Ship-based Model

101. COMPONENT DESCRIPTION

The IFLOLS lens consists of a lens assembly, cut lights, waveoff lights, and datum lights.

LENS ASSEMBLY

The lens assembly contains 12 vertical light cells. Depending on your position on the glidepath, one of the 10 upper amber cells or 2 bottom red cells is visible. The visible lens indicates your position relative to the glideslope (i.e., above, on, or below the optimum glideslope).

CUT LIGHTS

Mounted horizontally and centered above the lens box are four green cut lights that initially indicate a "Roger ball" call to aircraft that are operating under "ziplip," EMCON (Emissions Control), or NORDO at the ship. Additional illumination of the cut lights is a call for power. Ziplip is normally used during day Case I fleet operations to minimize radio transmissions. EMCON is a condition where all electronic emissions are minimized.

WAVEOFF LIGHTS

Waveoff lights are mounted vertically on each side of the lens box. These red lights are controlled by the Landing Signal Officer (LSO) and used to indicate that either the deck is foul or the approach is not set up properly or is unsafe. On the shipboard model, there are 3 additional auxiliary waveoff lights on each side and adjacent to the primary waveoff lights.

NOTE

Alternating cut and waveoff lights by the LSO is a signal to the aircraft on approach to RTB (Bingo, if necessary).

DATUM LIGHTS

Green datum lights are mounted horizontally to the lens assembly with 10 lights on each side. The position of the ball in reference to the datum lights provides you glideslope information.

102. LENS OPERATION

All source lights in the lens box are illuminated during operation (Figure 1-3). Each of the 12 cells is angled slightly from the adjacent cell for a total vertical coverage of 1.7 degrees. The lenses are manufactured in such a way that only one cell, or part thereof, can be seen from a particular angle. Each cell projects a bar of horizontal light that appears to be a ball until very close range; therefore, the term "meatball" or "ball" is used to describe the light. As stated previously, the red bottom cells indicate an excessively low condition. *Never accept or finesse a low ball.*

Rolling the lens relative to the ship's roll axis compensates for the hook-to-eye distance of different type aircraft.

The ball is visible on the lens at plus or minus .85 of a degree vertically from optimum glideslope and about 20 degrees either side of centerline. These conditions create a wedge-shaped area in which the ball can be seen on the lens (Figure 1-4).

Because the lens assembly projects a wedge of light, the closer the aircraft comes to the lens, the narrower the wedge becomes; therefore, smaller glideslope corrections are required the closer the aircraft is to touchdown. If your aircraft is not in the 1.7-degree wedge, the ball will not be visible. If you understand glideslope geometry, you will realize the importance of flying to a good start.

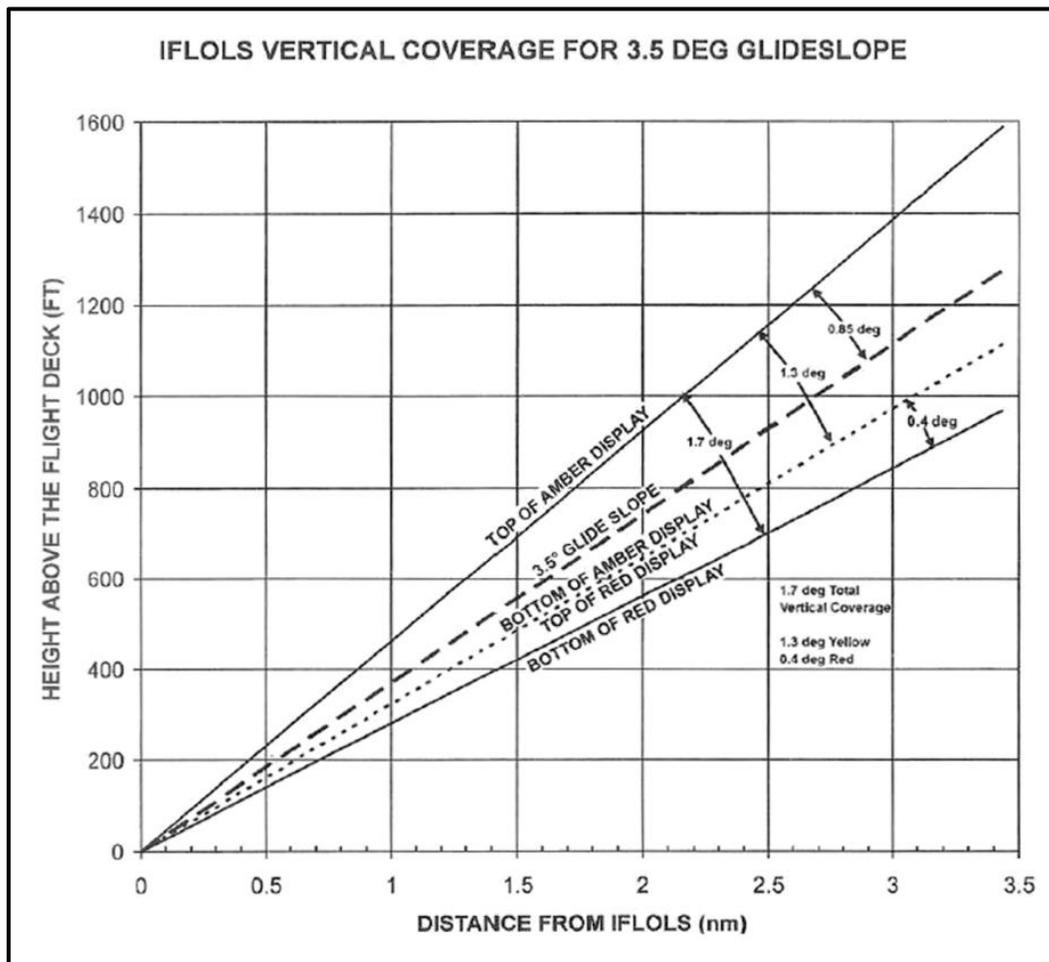


Figure 1-3 IFLOLS Vertical Coverage

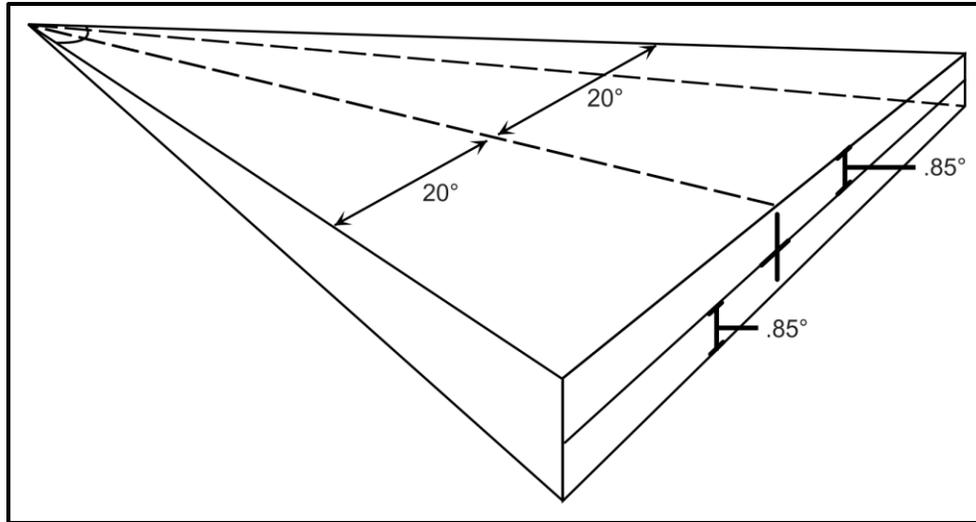


Figure 1-4 Optical Coverage of the Fresnel Lens

103. GLIDESLOPE

Because of the divergence of each lens cell, the size of the ball projected by that cell increases as distance from that cell increases, and vice versa. The following graphic illustrates this relationship, as well as the sink rate/ball position relationship. Note that at 1 mile the thickness of the center cell is approximately 15 ft. The entire lens is approximately 194 ft thick at one mile and only 20 ft thick at the ramp. It must be noted also that as distance increases, resolution of the cells decreases. Thus, the information you receive within one mile is better resolved and more accurate the closer the aircraft gets to touchdown.

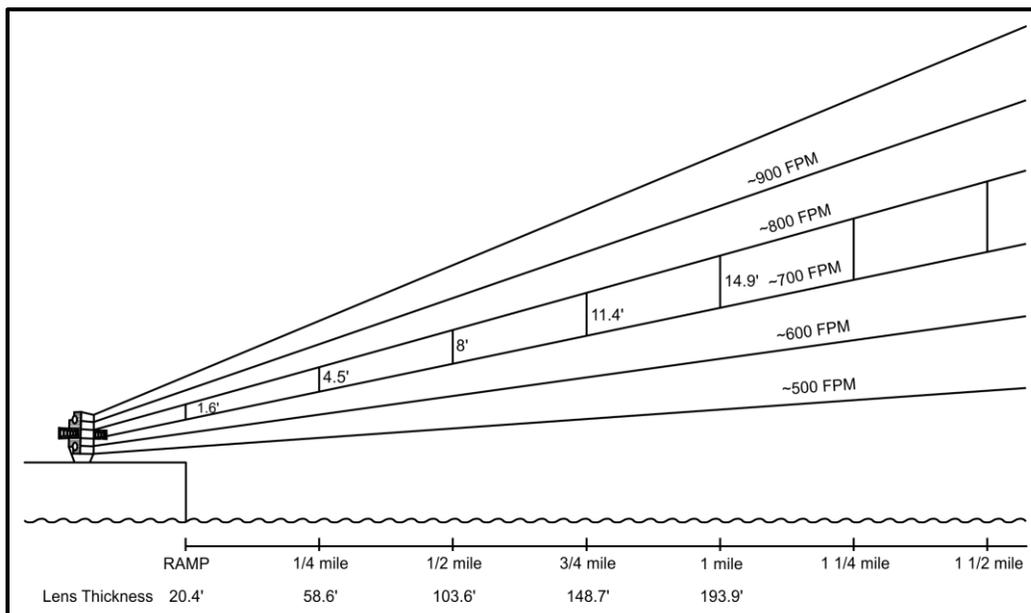


Figure 1-5 Optimum Glideslope

1-4 IMPROVED FRESNEL LENS OPTICAL LANDING SYSTEM (IFLOLS)

DISTANCE FROM TOUCHDOWN	VERTICAL BEAM HEIGHT OF ALL 12 CELLS (FT)	VERTICAL BEAM HEIGHT OF A YELLOW SOURCE CELL (FT)	VERTICAL BEAM HEIGHT OF A RED LOW CELL (FT)
TOUCHDOWN	13.6	1.1	1.4
RAMP (230 FT)	20.4	1.6	2.2
1/4 nm	58.6	4.5	6.7
1/2 nm	103.6	8.0	12.0
3/4 nm	148.7	11.4	17.3
1 nm	193.9	14.9	22.6
2 nm	374.3	28.7	43.8

Figure 1-6 Vertical Field Angle Table

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CHAPTER TWO LANDING SIGNAL OFFICER (LSO)

200. GENERAL INFORMATION

The LSO or "Paddles" is responsible for the safe and expeditious recovery of fixed-wing aircraft aboard the ship. The LSO also has the ultimate responsibility for the training of pilots in carrier landing techniques by conducting ground training, counseling, and debriefing individual pilots on their performance during FCLP and CQ evolutions. The LSO can see your aircraft developing a trend that may result in a poor approach or landing.

201. LSO CALLS

The LSO uses radio calls to effect the safe recovery of aircraft. LSOs will keep communications short and to the point using standard phraseology whenever possible. Your safety depends on your ability to respond to these calls. Due to the training environment, nonstandard phraseology is sometimes necessary. LSO phraseology is categorized into three types of calls: INFORMATIVE, ADVISORY, and IMPERATIVE.

INFORMATIVE

INFORMATIVE CALLS

ACTION REQUIRED

“You’re (a little) high.”	Adjust rate of descent immediately with power to reestablish a centered ball.
“You’re (a little) low.”	Correct glideslope immediately.
“You’re going high/low.”	Adjust rate of climb/descent with power to maintain a centered ball.
“You’re lined up left/right.”	Make lineup correction back to centerline.
“You’re drifting left/right.”	Stop drift and correct lineup to centerline.
“You’re fast/slow.”	Adjust nose attitude/power to reestablish optimum AOA.
“Winds are starboard/port/axial.”	Scan lineup to maintain centerline.
“You’re under/overpowered.”	Adjust power and attitude as required.
“You’re wide abeam.”	Use less AOB in approach turn and adjust rate of descent and altitude accordingly.
“You’re close abeam.”	Use more AOB in approach turn and adjust rate of descent and altitude accordingly.

“You’re angling.”	Correct lineup to centerline.
“You’re overshooting.”	Increase AOB to maximum allowable.

ADVISORY

The LSO’s advisory calls are used to direct your attention to potential difficulties in order to prevent possible control errors.

<u>ADVISORY CALLS</u>	<u>ACTION REQUIRED</u>
“Keep your turn in.”	Adjust AOB to prevent overshoot.
“Don’t settle/Don’t go low.”	Adjust power to avoid going below glideslope.
“Don’t climb/Don’t go high.”	Adjust power to stop the ball from rising.
“Don’t settle through it.”	Adjust rate of descent with power to maintain optimal glideslope.
“Easy with the power.”	Reduce magnitude of power correction to intercept and maintain optimal glideslope and airspeed.
“Easy with your wings.”	Reduce magnitude of lineup correction to intercept and reestablish centerline.

IMPERATIVE

Imperative calls direct you to execute a specific control action. *Imperative calls are mandatory and require an immediate response.*

<u>IMPERATIVE CALLS</u>	<u>ACTION REQUIRED</u>
“A little power.”	Correct with power.
“Power.”	Add power.
“Power back on.”	Add power to maintain appropriate glideslope and AOA.
“Attitude/(A little attitude.)”	Increase nose attitude (slightly) to establish landing attitude.
“Right for lineup.”	Correct lineup to centerline, then level wings.
“Come left.”	Correct lineup to centerline, then level wings.

“Bolter.”	Power to MRT, retract speedbrakes, and rotate nose to takeoff attitude and climb.
“Waveoff” or “Waveoff, foul deck.”	Power to MRT, retract speedbrakes, maintain optimum AOA and climb to pattern altitude. Fly up the landing area centerline. At the bow, turn to parallel the BRC.
“Waveoff starboard side.”	Power to MRT, retract speedbrakes and climb to pattern altitude. Fly up the starboard side of the ship.
“Speedbrakes”	Retract/extend speedbrakes, as appropriate.
“Climb.”	Adjust nose attitude, level the wings, and maintain MRT to establish a positive rate of climb. (May follow a bolter or waveoff call.)
“Level your wings.”	Roll wings level.
“Drop your hook.”	Extend arresting hook.
“Drop your gear.”	Lower landing gear.
“Drop your flaps.”	Extend flaps/slats.

202. GRADING CRITERIA

Each pass flown during FCLPs and at the ship is graded by the LSO on a 0- to 5-point scale. The grade, with appropriate comments, is recorded in your training jacket. Following is a partial list of symbols (including their meanings and applicable points) that the LSO uses in grading the passes.

<u>SYMBOL</u>	<u>POINTS</u>	<u>DESCRIPTION</u>
<u>OK</u>	5	Perfect pass
OK	4	Reasonable deviations with good corrections
(OK)	3	Fair pass, reasonable deviations
<u>B</u> [↗]	2.5	(B with diagonal arrow) bolter
–	2	No grade, below average but safe pass
<u>B</u> [↗]	2	No grade bolter

PWO	2	Pattern waveoff
WO	1	Waveoff, aircraft not set up properly for a safe approach (technique)
—C→	0	(C with horizontal arrow) cut pass, unsafe, gross deviations inside waveoff window
TWO	NC	Test waveoff, practiced during FCLPs to demonstrate proper waveoff technique
OWO	NC	Own waveoff, executed when clearance to land via Roger ball or cut lights are not received
OWO	2	Own waveoff, executed when clearance to land via Roger ball or cut lights are received
WOFD	NC	Waveoff—foul deck
NC	NC	No count (used in grade column)

See Figures 2-1 and 2-2 for additional symbols used by LSOs to describe landings on the Pilot Performance Record.

Symbol	Meaning	Symbol	Meaning
()	Parentheses around any symbol signify "slightly" (e.g., (F) means "slightly fast")	CU	Cocked-up
	A square drawn around any symbol indicates that a signal was not answered by the pilot	DEC	Decelerate
	A circle drawn around any symbol indicates that a signal was answered too slowly	DFD	Dived for deck
OC	When used as a prefix to any symbol, OC indicates "over-controlled"	DLW	Dropped left wing
-A>	APC/AUTO	DN	Dropped nose
M	Manual (APC-equipped aircraft)	DRW	Dropped right wing
PD	Pitching deck	EG	Eased gun
I	Mode 1 ACLS (record in grade column)	F	Fast
.	When placed between two symbols, indicates "on" (e.g., S LUIC)	FD	Fouled deck
A	An APC/AUTO approach downgraded to manual	GLI	Gliding approach
AA	Angling approach	H	High
ACC	Accelerate		Landed left wing down
AFU	All fouled up		Landed right wing down
B	Flat glideslope		Landed nose first
C	Climbing	LIG	Long in the groove
CB	Coming back to the left	LLU	Late lineup
CD	Coming down	LL	Landed left
CH	Chased	LO	Low
CO	Come-on	L-R	Left to right
COCO	Climbed on come-on	LR	Landed right
CPD	Chased pitching deck	LUL	Lined up left
		LUR	Lined up right
		ND	Nosedown
		NEA	Not enough attitude
		NELR	Not enough left rudder
		NEP	Not enough power
		NERD	Not enough rate of descent

Figure 2-1 LSO Grading Symbols (1 of 2)

Symbol	Meaning	Symbol	Meaning
NERR	Not enough right rudder	TTL	Turned too late
NESA	Not enough straight away	TTM	Turned too much
NH	No hook	TTS	Turned too soon
NLU	Not lined up	TWA	Too wide abeam
NSU	Not set up	(—)	For emphasis(underline)
OS	Overshoot	∴	Landed 3 points
OSCB	Overshot coming back	↻	Over the top
P	Power	✂	Fly up through the glideslope
PNU	Pulled nose up	✂	Fly down through the glideslope
ROT	Rotate	IT	In the turn
RUF	Rough	OT	Out of turn (as aircraft starts to roll wings level)
R-L	Right to left	X	At the start (first one-third of glideslope)
S	Settle	IM	In the middle (middle one-third of glideslope)
SD	Spotted deck	IC	In close (last one-third of glideslope)
SHT	Ship in turn	AR	At the ramp
SLO	Slow	TL	To land
SRD	Stopped rate of descent	IW	In the wires
ST	Steep turn	OW	Over the wires
TCA	Too close abeam	AW	All the way
TMA	Too much attitude		
TMRD	Too much rate of descent		

Figure 2-2 LSO Grading Symbols (2 of 2)

CHAPTER THREE

FIELD CARRIER LANDING PRACTICE (FCLP)

300. DAY FCLP

The procedures and techniques required for a successful carrier or field carrier landing are refinements of procedures and techniques you should have previously mastered. At this stage of training, you will be required to execute the most precise approach/landing yet. Before you actually land aboard a carrier, you will practice in the simulator and at the field.

START/TAXI/TAKEOFF

Normal procedures apply for FCLP with the following special considerations:

1. Conduct a thorough preflight with emphasis on strut inflation and tire condition.
2. FCLP patterns may be entered after takeoff or by flying to an outlying field.
3. Refer to NATOPS Chapter 4 for FCLP landing configuration limitations.

NOTE

SNAs will not fly to or from an outlying field in formation without an instructor pilot in the flight. When arriving at the outlying field, fly a standard FCLP pattern entry or as briefed.

FCLP PATTERN ENTRY

The FCLP pattern is the familiar racetrack pattern (Figure 3-1). Call the initial at the appropriate altitude and airspeed. The tower may direct you to switch to the "paddles" frequency prior to the break or once established on downwind. When launching directly into the FCLP pattern, you will normally check in on the LSO frequency prior to takeoff.

BREAK

Execute a level 17-unit break at 70-80 degrees AOB, 300 KIAS at 800 ft AGL or in accordance with local course rules when cleared by the tower. Reduce power to idle and extend speed brakes. Lower your landing gear and flaps/slats below 200 KIAS.

DOWNWIND

Descend to 600 ft AGL when wings level on downwind, trim for on speed, cross-check AOA, and complete the landing checklist prior to reaching the abeam position.

ABEAM POSITION

Maintain the proper interval and fly to an abeam distance of 0.9 to 1.1 nm laterally (adjusted for

wind) at an altitude of 600 ft AGL. Fly the *reciprocal* of the runway heading +/- crab necessary to compensate for winds. Do not blindly follow the aircraft ahead. Make a full abeam call to the LSO (on the first pass only), stating your side number, abeam, gear, flaps, "on-speed" KIAS, fuel state, and qual number. After your first pass, limit your abeam call to your qual number and position. Do not transmit when another aircraft is on the ball unless it is an emergency.

Precise control of altitude, AOA, and airspeed at the abeam position is paramount. Prior to reaching the 180, your aircraft should be trimmed up for optimum AOA in level flight.

180-DEGREE POSITION

The proper 180 position is 15 seconds past the abeam under no-wind conditions. As wind becomes a factor, the 180 is adjusted so that a 27-30 degree AOB turn results in a centerline start with 15-18 seconds of straightaway (Figure 3-1). At the 180 position, roll into 27-30 degrees AOB and adjust power to set a 200-300 fpm rate of descent. Maintain optimum AOA. Being too wide abeam at the 180 will require less AOB to arrive at the correct 90-degree position, while being too close abeam will require up to maximum AOB to prevent an overshoot.

NOTE

The turn from the 180 to the 90 should primarily be an instrument scan.

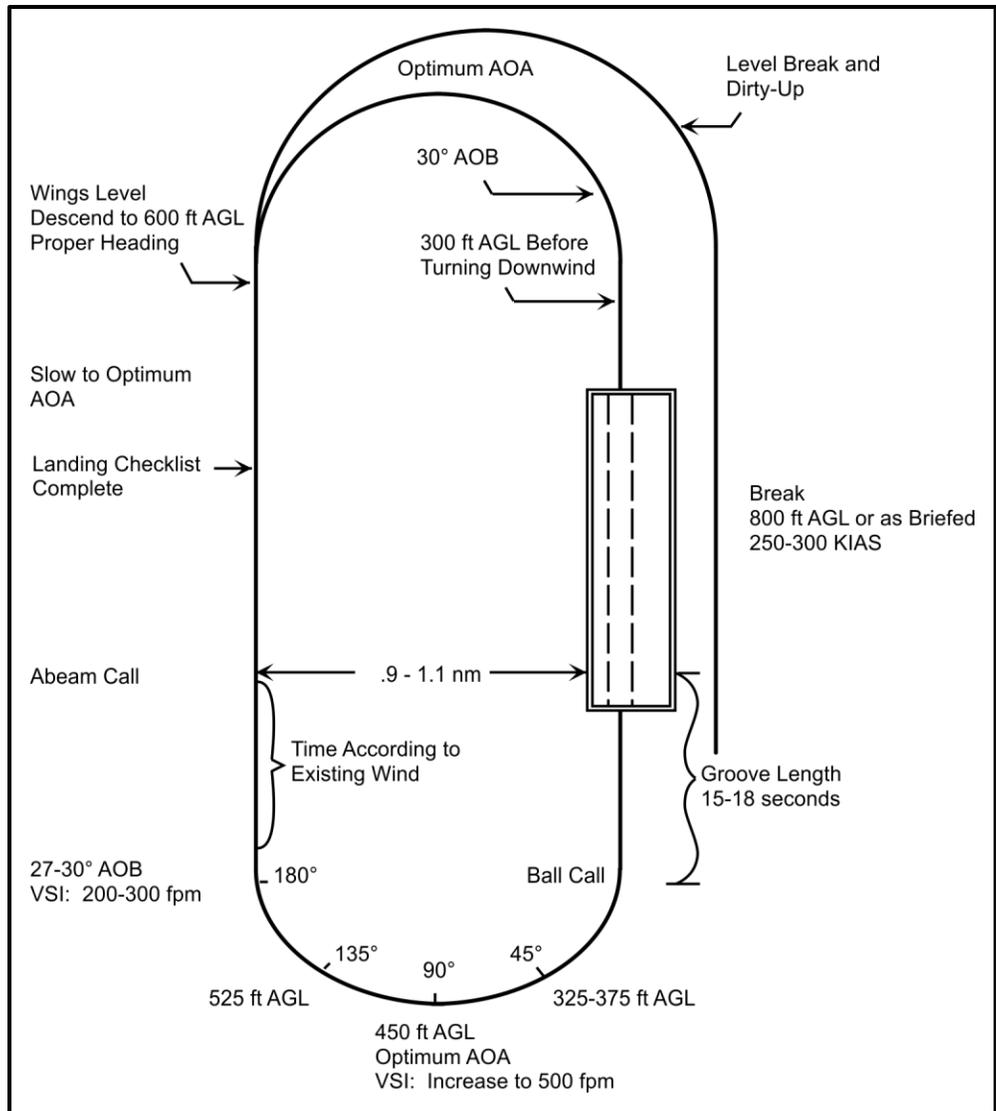


Figure 3-1 Day FCLP Pattern

90-DEGREE POSITION

At the 90 (450 ft AGL), maintain optimum AOA and increase rate of descent to 500 fpm. It may be necessary to adjust altitude if you are too deep or too close (Figures 3-2 and 3-3). If you are too deep at the 90, 450 ft AGL will result in a low start. If you are too close, 450 ft AGL will result in a high start. Passing through the 90, adjust AOB as necessary to prevent overshooting or undershooting the centerline.

NOTE

At the 90, transition from an instrument scan to an inside/outside scan.

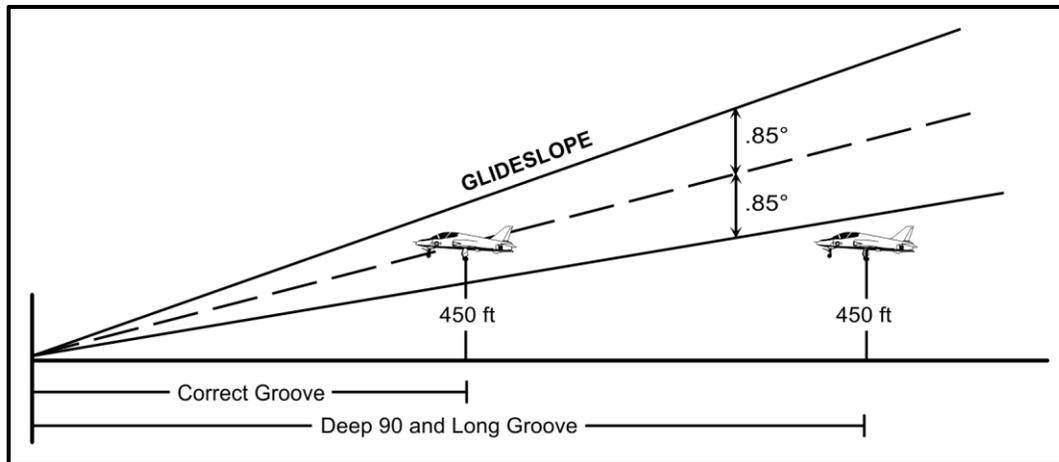


Figure 3-2 Deep 90

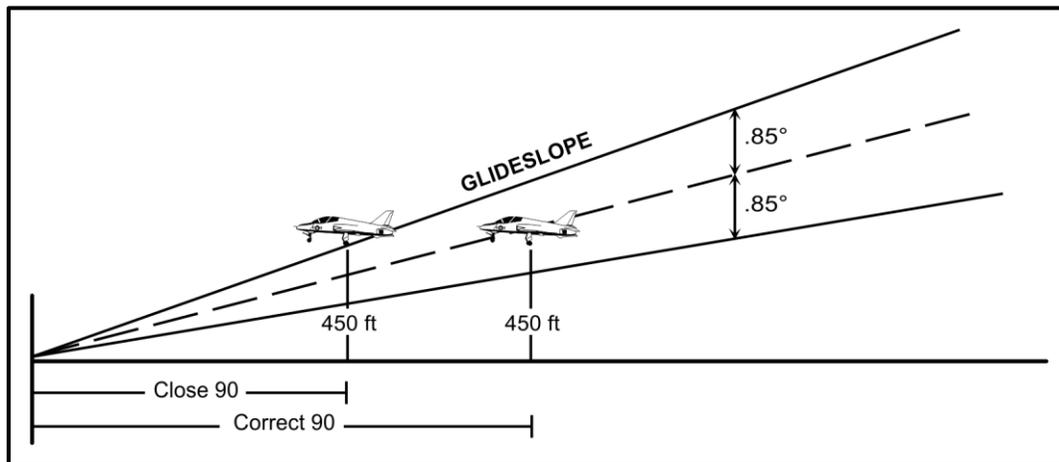


Figure 3-3 Close 90

45-DEGREE POSITION

Pass through the 45 at 325-375 ft AGL at optimum AOA. At this position, you should acquire the ball. From the 45 to the start, adjust AOB to arrive on centerline, maintain on-speed attitude and rate of descent to arrive with a stabilized centered ball. An aggressive VSI scan from the 45 to the start position will allow for a stabilized rate of descent and is paramount.

NOTE

The ball position at the 45 is mainly a reference and corrections should be made on the VSI. Because of the width of the glideslope, flying the ball at the 45 will normally result in overcorrections.

3-4 FIELD CARRIER LANDING PRACTICE (FCLP)

START

The start is, without a doubt, the most important phase during FCLPs, carrier qualifications, and carrier-type approaches. Pilots need to arrive wings level, on centerline, on speed with proper rate of descent (ROD) to maintain a centered ball. Poor starts are a direct result of improper abeam/180 positions, RODs that do not allow for proper 90 and 45 altitudes, and not flying an optimum AOA. *If the meatball is not acquired by the start, a "Clara" shall be made.*

GROOVE

The groove is the portion of the approach from a wings-level start to touchdown; ideally this should be 15-18 seconds. With the ball in sight, call the ball: side number, aircraft type, ball, fuel state, qual number.

NOTE

Do not call the ball if the aircraft ahead of you is on the ball or just touching down. Never descend below 300 ft AGL without a ball.

The glideslope is a 3.25 degree (above the horizon) fixed path determined by the angle of the Fresnel lens. The rate of descent necessary to stay on this glideslope depends on your ground speed (and therefore changes slightly with wind conditions). Proper execution of the approach requires an accurate, rapid scan. Your goal on the approach is to keep the meatball centered/cresting, stay on centerline and on speed all the way to touchdown.

If the ball is low, fix it early by getting the ball back above the datums. Don't wait until in-close to at-the-ramp to fix a low ball. If the ball is high in close, do not attempt to re-center the ball but stabilize it while remaining on speed.

Correct for glideslope, lineup, and AOA with quick, aggressive coordination of stick and throttle. Make a correction as soon as one is required; if you hesitate, you will encounter greater deviations. Make appropriate corrections all the way to touchdown.

TOUCHDOWN

Touchdown should occur on centerline, on speed, with a centered ball. Upon touchdown, simultaneously advance power to MRT, retract speed brakes, and rotate to takeoff attitude. Maintain wings level and verify a positive rate of climb. Turn downwind off your interval (at 300 ft AGL or higher).

NOTE

Keep feet off the brakes at touchdown.

WAVEOFF

The waveoff is a *mandatory* signal and comes in verbal form from the LSO, or in the form of red flashing lights on the lens, or both. To perform a waveoff, simultaneously advance the power to MRT, retract the speed brakes, and maintain optimum AOA. Level the wings if necessary and verify a positive rate of climb.

NOTE

If slow when the waveoff is initiated, maintain landing attitude and accelerate to optimum AOA during the climbout.

When you have established a comfortable climb and are approaching pattern altitude (600 ft AGL), adjust power as necessary to maintain altitude and pattern airspeed.

TURN TO DOWNWIND

After a waveoff, bolter, or touch and go, begin the turn to downwind after climbing to a minimum of 300 ft AGL and when your interval is at your 10 o'clock position. During your climb and turn downwind, maintain 130 KIAS or on-speed AOA, whichever is greater, and 30-degree AOB in the crosswind.

DELTA PROCEDURES

If the deck or runway becomes fouled, you will be directed to go into a holding (Delta) pattern (Figure 3-4). You will be cleared out of the Delta Pattern by a "Charlie" call. See glossary for examples.

Delta Easy

In the Delta Easy pattern, remain in a dirty configuration, speed brakes in at 130 KIAS, and at pattern altitude or as directed by the LSO. Fly a normal racetrack pattern offset to the left-hand side of the runway while maintaining proper interval on the aircraft ahead. When aircraft in the Delta Easy pattern are cleared, the first aircraft to reach the 180 will resume the landing pattern.

Delta Clean

If instructed to Delta Clean when already established in the FCLP pattern, clean up, accelerate to 200 KIAS, and climb to 2,000 ft MSL or the altitude directed. If you are told to Delta upon arrival at the field, enter the initial in accordance with course rules or as directed by the LSO/tower, maintain 200 KIAS, and proceed overhead the duty runway taking interval with the aircraft already in the Delta pattern. Fly a normal racetrack pattern while maintaining proper 10 o'clock interval. All aircraft should remain within 3 nm of the field. When cleared out of Delta, all aircraft will extend gear/flaps and descend to pattern altitude. The first aircraft approaching the abeam at 600 ft AGL with landing checks complete will commence the approach turn. All other aircraft will follow in order.

3-6 FIELD CARRIER LANDING PRACTICE (FCLP)

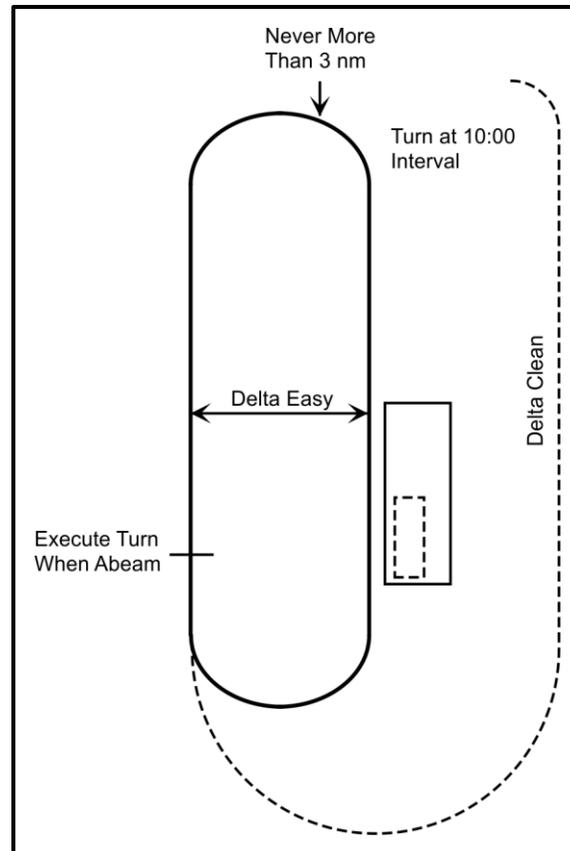


Figure 3-4 Delta Pattern

301. GLIDESLOPE AND AIRSPEED CORRECTIONS

You should correct any errors made immediately. The earlier you make a correction, the easier corrections and counteractions will be.

The following list presents some glideslope/AOA deviations you can expect to see and the corrections required.

Remember, the glideslope is wedge-shaped and becomes progressively narrower as you get closer to the runway. Therefore, you must decrease the magnitude of a correction for an equivalent amount of ball movement as you approach touchdown.

NOTE

All glideslope deviations will require a *minimum* of three corrections in order to regain optimum glideslope.

OVER POWERED

Refer to Figure 3-5 for the following discussion of glideslope corrections.

High

Reduce power to increase your rate of descent. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Almost immediately following this countercorrection, a third adjustment will be required. Continue to “stair step” the ball down in order to land on glideslope. *Do not let the ball go from high to low.*

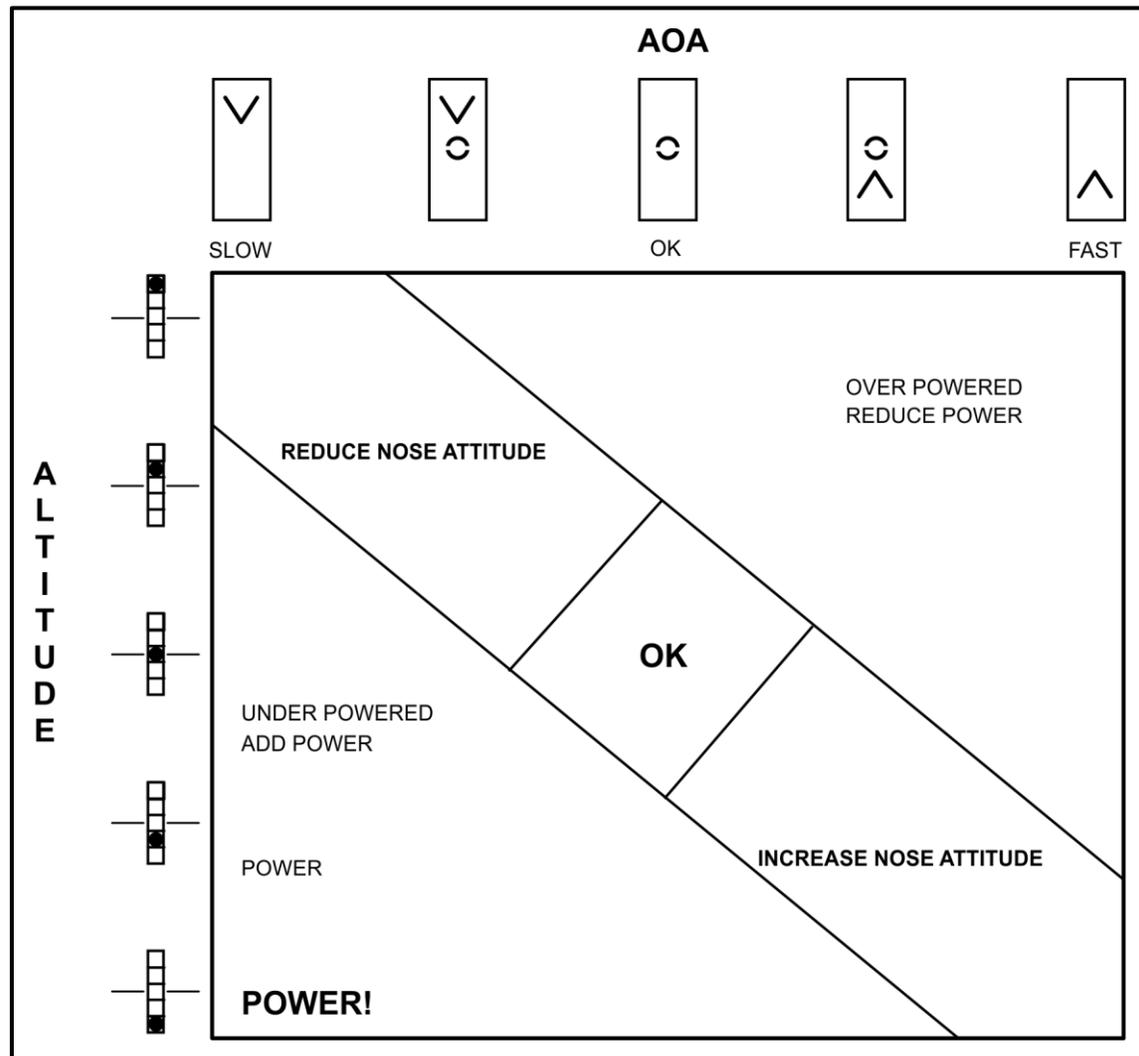


Figure 3-5 Glideslope Corrections

Fast

Reduce power. As the aircraft decelerates, coordinate an increase in nose attitude slightly to maintain a cresting ball and work it back on speed. Approaching optimum AOA, add power as necessary to maintain glideslope and readjust nose attitude to maintain optimum AOA. Again, you will have to make a third correction.

3-8 FIELD CARRIER LANDING PRACTICE (FCLP)

High and Fast

Fix the fast first, then the high. As in the high or fast approach, you must reduce power. Increase nose attitude as necessary to correct back to optimum AOA. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Continue to “stair step” the ball down in order to land on glideslope. *Do not let the ball go from high to low.*

UNDER POWERED**Low**

Add power as necessary to move the ball above the datums while maintaining optimum AOA. With the ball stabilized above the datums, reduce power to increase your rate of descent. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Continue to “stair step” the ball down in order to land on glideslope. *Never accept a low ball. Never finesse a low ball.*

Slow

Add power. As the aircraft accelerates, decrease nose attitude as required to obtain optimum AOA then adjust power as necessary to maintain glideslope. To stabilize glideslope, a third power correction is mandatory.

Low and Slow

Fix the low first, then the slow. Add power as necessary to move the ball above the datums while maintaining nose attitude. With the ball stabilized above the datums, adjust power and decrease nose attitude as required to obtain optimum AOA. When on speed, reduce power to increase your rate of descent. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Continue to “stair step” the ball down in order to land on glideslope. *Never accept a low ball. Never finesse a low ball.*

POWER OK**High and Slow**

Fix the slow first, then the high. If the aircraft is not excessively slow, lower the nose attitude to initiate the correction. If you are excessively slow, you will have to add power. When on speed and with the ball stabilized above the datums, reduce power to increase your rate of descent. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Continue to “stair step” the ball down in order to land on glideslope. *Do not let the ball go from high to low.*

Low and Fast

Fix the low first, then the fast. Add power as necessary to move the ball above the datums. With the ball stabilized above the datums, adjust power and increase nose attitude as required to obtain optimum AOA. When on speed, reduce power to increase your rate of descent. As the ball descends, add power to stabilize the ball above the datums and readjust your nose attitude to maintain optimum AOA. Continue to “stair step” the ball down in order to land on glideslope. *Never accept a low ball. Never finesse a low ball.*

LINEUP CORRECTIONS

Roll into the groove on the extended centerline of the carrier box. Lineup is critical at the carrier. The relatively small size of the landing area makes it imperative that you land on the centerline with no drift. If you’re not lined up at the start, make an *immediate* lineup correction. Failure to make lineup corrections in a timely manner will cause scan breakdown both in glideslope and AOA deviations. Be aware that lineup corrections require a corresponding power adjustment.

Being aware of local area winds will help you correct for lineup when rolling out in the groove. Remember, abeam distance is adjusted so that a consistent 27- to 30-degree AOB turn results in a centerline start. With consistent crosswinds, use the crab technique to maintain lineup. Don’t forget that every lineup correction requires a counter-correction as you approach the centerline. Chasing lineup will cause glideslope errors to follow.

COMMON ERROR: Fixating on the ball and not scanning lineup all the way to touchdown.

REQUIRED COMMUNICATIONS FOR FCLP**NOTE**

If you are departing for an outlying field, use standard communications for departure and pattern entry.

AT HOLDSHORT

When launching directly into the FCLP pattern, set Full Flaps and 3 ½ degrees Nose Up trim. Communicate the following to the LSO when directed: side number, up and ready, fuel state, and student qual number.

CAUTION

During FCLPs, the potential exists for multiple aircraft to position at the hold short in close proximity. Aircrew must pay particular attention to aircraft spacing to avoid a collision. LSOs shall brief this situation in detail to include taxi, hold short, takeoff procedures, and avoidance of wingtip overlap while positioning at the hold short.

ENTRY CALL

When at the initial, make the following call; "Tower, (side number), initial." Tower will then advise you of your interval and clear you to break. For direct entry, paddles/Tower will clear aircraft for takeoff and downwind.

NOTE

These reports are mandatory even if an aircraft is on the ball.

AT ABEAM ON FIRST PASS OUT OF THE BREAK

Make the following call to the LSO: side number, aircraft location (abeam), gear/flaps, "on-speed" KIAS, fuel state, and student qual number.

AT ABEAM ON SUBSEQUENT PASSES

After the first pass at the abeam, the call is, "qual number, abeam."

NOTE

If at any time the LSO goes NORDO, the tower will take charge of the pattern until the problem can be resolved.

BALL CALL

As you roll into the groove with a ball, communicate the following: side number, aircraft type, ball, fuel state, and qual number.

NOTE

If you do not have the meatball in sight after rolling into the groove, immediately call "Clara." The LSO will respond with calls, such as, "You're high" or "You're low." Follow the LSO's calls. Once you have sight of the ball, call "ball."

WARNING

Never descend below 300 ft AGL without a ball.

RADIO DIFFICULTIES IN THE PATTERN

If NORDO in the pattern, roll into the groove and flash the taxi light to signal lost communication. The LSO will respond with cut lights and verbal acknowledgement in case the aircraft is receive only. Aircraft will expect to full stop that pass unless waveoff lights are given; then aircraft will full stop on the next pass. If the LSO is NORDO he/she may elect to continue FCLPs using cut/waveoff lights. Tower will then inform pattern aircraft when to full stop/depart. Momentary (2 seconds) cut lights on the ball the first time signal "Roger ball." Subsequent momentary illumination of cut lights means "add power." Alternating cut and waveoff lights signal you to proceed to your prebriefed divert field.

302. NIGHT FCLP

Night FCLP serves two important purposes. Ball control demands intensified concentration (because no other adequate visual references exist). It also demonstrates the need for smooth, precise instrument flying in the pattern. No more than 5 aircraft will be allowed in the night FCLP pattern. You will receive a thorough briefing, including local course rules, prior to night FCLPs.

LIGHTING

Night field lighting used at the FCLP field is the same as for night familiarization except that the wheels watch high intensity light is normally extinguished along with the runway edge lights on the FCLP runway.

Two types of field lighting can be used for night FCLPs: normal runway lighting and/or the permanent carrier deck lighting (Figure 3-6), which resembles actual flight deck lighting.

NOTE

Use caution not to mistake the runway edge lighting as the IFLOLS source.

The abeam position is marked by a red light placed on the LSO shack abeam the intended point of landing. At LSO discretion, usually only white lights simulating the carrier deck are illuminated on the FCLP runway. Aircraft lighting and procedures are similar to night familiarization with emphasis on the following:

1. Check the field/carrier switch in FIELD prior to leaving the line area.
2. Check the operability of your approach lights.

3-12 FIELD CARRIER LANDING PRACTICE (FCLP)

NOTE

Aircraft will not be allowed in the night FCLP pattern without operating approach lights.

3. Observe normal light management during taxi. Nav lights: bright, anti-collision and taxi lights: ON.
4. When cleared for takeoff, ensure taxi light and strobe/anti-collision lights are ON before taking the duty.

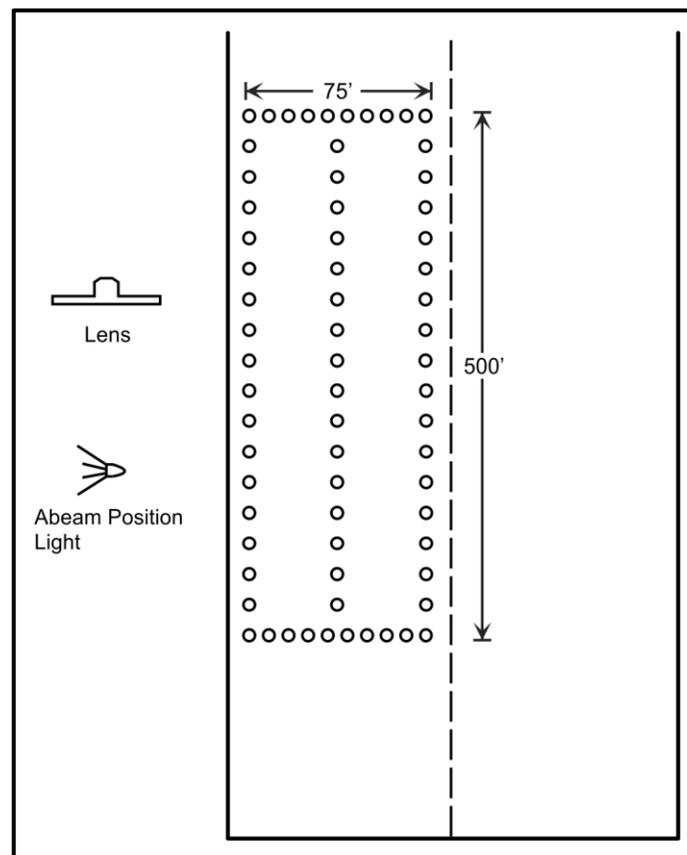


Figure 3-6 Permanent Airfield Carrier Box Lighting

PROCEDURES FOR NIGHT FCLP OVERHEAD ENTRIES

Intercept initial and break altitudes as directed by course rules. Make "initial" call. Enter the break at 300 KIAS, lights BRIGHT/STEADY, and strobes/anti-collision light on. Perform a level break using approximately 45 degrees AOB when instructed by the LSO/tower. Reduce power to IDLE and extend speed brakes. At 200 KIAS or less, extend landing gear and flaps/slats and descend to 600 ft AGL. Report abeam position as per day FCLPs. From this point, procedures are similar to day FCLP with the following exceptions (Figure 3-7):

1. Due to the absence of visual cues, a strong instrument scan is essential for flying a consistent pattern.
2. Do not descend below 300 ft AGL without acquiring the ball.
3. Do not turn crosswind until at or above 500 ft AGL.

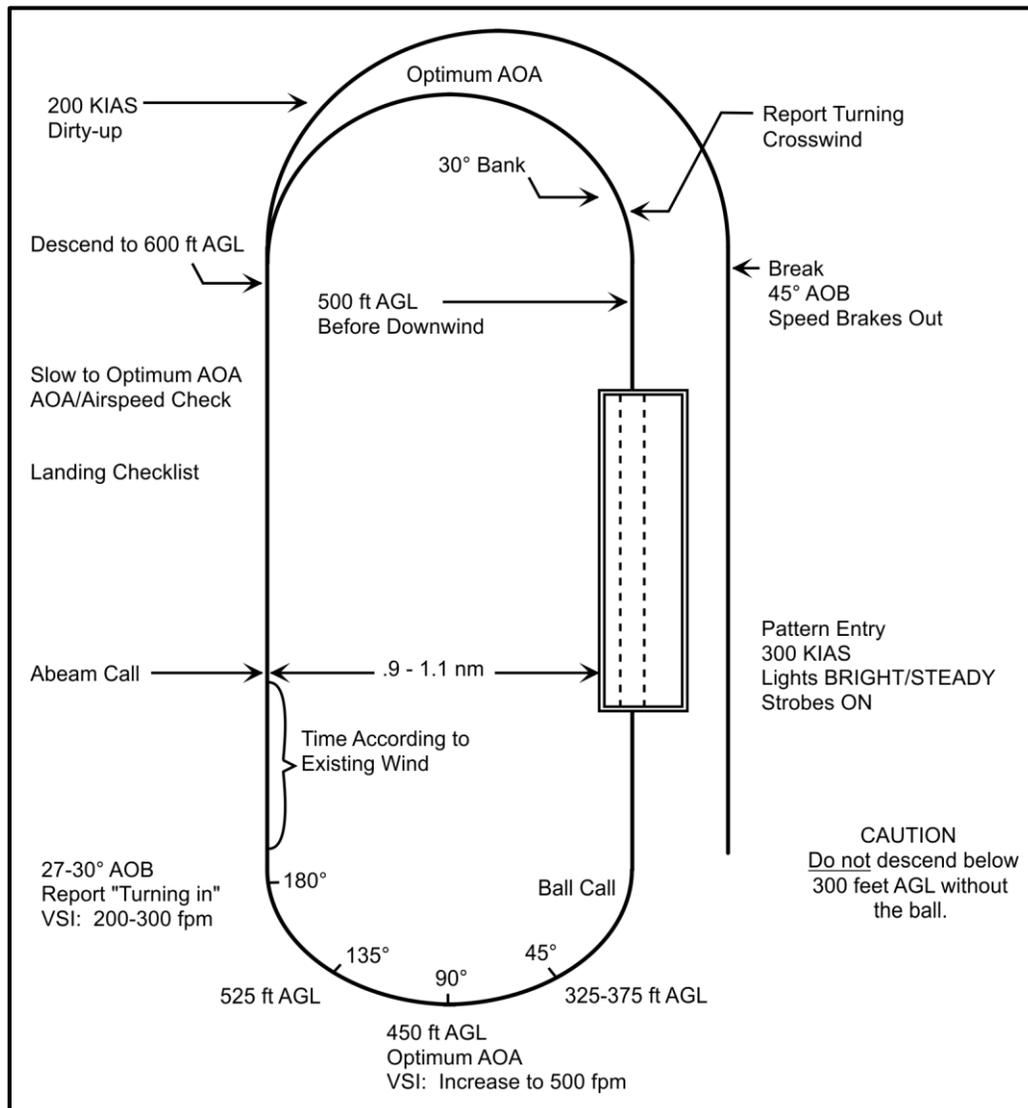


Figure 3-7 Night FCLP Pattern/Overhead Entry

NIGHT FCLP DIFFERENCES

A solid landing pattern is paramount for night FCLPs. With fewer visual cues available, a strong instrument scan is required to get to a good start. Once in the groove, the procedures for controlling lineup at night are the same procedures as for day FCLP except that lineup drift is more difficult to detect with the shortened "carrier box" runway. The pattern is the same, but the

3-14 FIELD CARRIER LANDING PRACTICE (FCLP)

most significant difference is the lack of lineup information. At the 180, the carrier box lights will not be visible, so judging the abeam and timing are critical. The carrier box lights only become visible passing the 90, so deviations must be noted and corrected for on subsequent passes.

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CHAPTER FOUR CARRIER QUALIFICATION

400. SHIP'S BRIEF

Prior to carrier qualifications, you will be given a ship's brief covering:

1. Administrative and general information
2. Preflight
3. Ground procedures
4. Takeoff and enroute procedures
5. Ship marshal procedures
6. Approaches to the ship
7. Carrier pattern/landing procedures
8. Deck procedures
9. Catapult procedures
10. Refueling/cold start procedures
11. Departure procedures
12. Bingo
13. Emergency procedures

ADMINISTRATIVE AND GENERAL INFORMATION

The LSO will give a thorough ship's brief, and prior to your first carrier qualification flight, you will receive a course rules brief covering procedures specific to the local operating area. Each flight is preceded by a sortie brief similar to your LSO "Ship's Brief." All items will be covered again during the sortie brief via your Lead/Safe.

When preflighting for a CQ sortie, pay particular attention to tires, struts, launch bar, holdback fitting, snubber pressure, tail hook bumpers, and the tail hook (checking that it is greased), and ensure that the aircraft is "soloized."

401. MARSHAL PROCEDURES (CASE I)

Case I refers to recoveries and departure procedures and landing pattern conducted in VMC conditions of 3,000/5 or greater within the carrier control zone.

Each flight to the ship will be led by a Lead/Safe instructor who will give you specific instructions for radio checks, takeoff and rendezvous procedures, and formation. Along with the flight lead, each overhead time will include an additional Late/Safe who will arrive at the ship 30 minutes after the overhead time. The Lead/Safes will act as return leads for students in the event of an emergency.

NOTE

Pilots earn their reputation while working around the ship. This includes good formation, flying the ball well, and sounding professional on the radios.

Following the rendezvous and outbound, the Lead/Safe will switch the flight to the Warning Area controller. The flight will then be instructed to contact the ship's Marshal. Enroute, crossing the beach line, the Lead/Safe will tell the flight to check "feet wet" checklist complete (Anti-skid: OFF, Lights: OFF, Box: INS).

The flight lead will check in to Marshal with callsign, number in flight, position, altitude, low state, and lineup. Marshal will assign case recovery holding instructions, including assigned altitude, ship's weather, altimeter setting, base recovery course (BRC), bingo information, and a request for a "see me". When the ship is in sight, the flight leader will call, "See you at ten [or as shown on DME]." Marshal may switch the flight directly to Tower or direct it to hold overhead.

MARSHAL PATTERN ENTRY

Establish level flight at your assigned altitude 10 nm prior to entering the holding pattern (Figure 4-1) in balanced formation or as briefed.

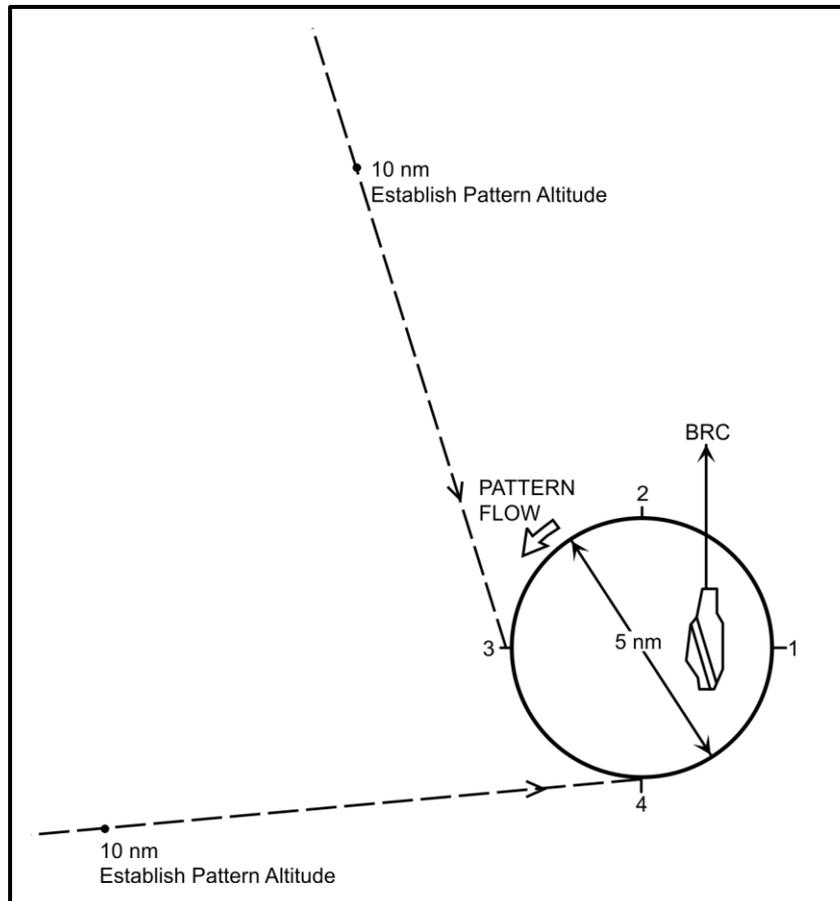


Figure 4-1 Case I Marshal Pattern Entry

MARSHAL HOLDING PATTERN DESCRIPTION

The overhead marshal pattern is a counterclockwise circling pattern tangent to the ship's BRC with the ship at the 1 o'clock position (Figure 4-2). The pattern is no more than 5 nm in diameter and no lower than 1,500 ft AGL. In marshal, the flight will remain at max conserve unless briefed otherwise. Flights in marshal are separated vertically by a minimum of 1,000 ft.

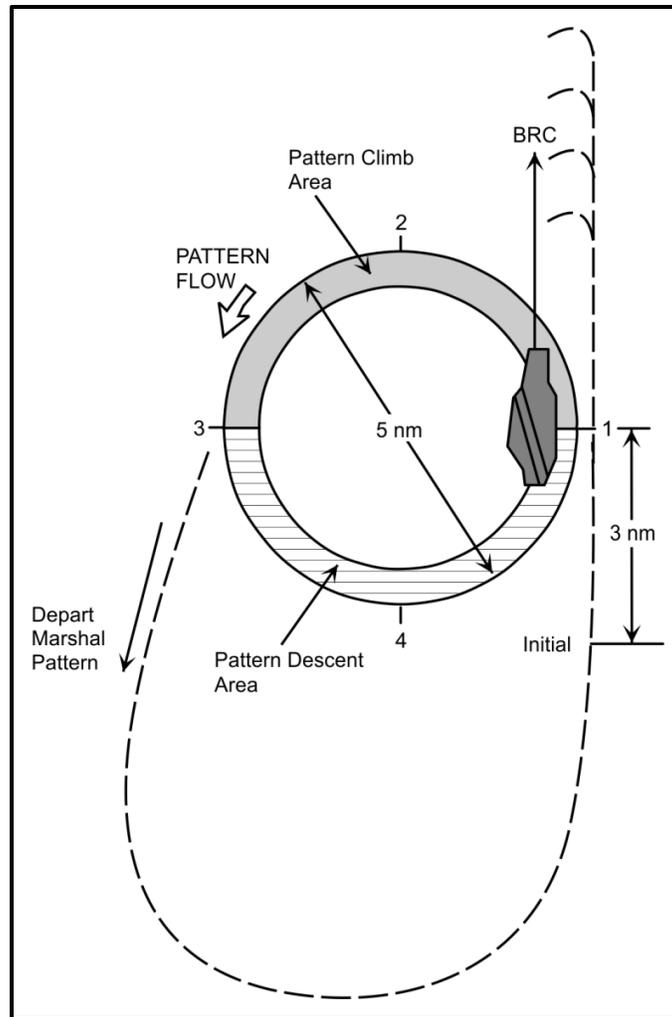


Figure 4-2 Case I Marshal Pattern Recovery

MARSHAL PATTERN RECOVERY (CASE I)

Make all descents in marshal only when you are abeam and aft of the ship (between positions 3 and 1 in Figure 4-2). When given a "Signal Charlie" the lead will verbally switch the flight to tower (if not already there) and depart the holding pattern and lead the flight to the initial. After receiving a Charlie the flight lead will depart marshal on a heading of approximately 210 degrees relative to BRC. The lead will form the flight in right echelon prior to arriving at the initial.

402. MARSHAL PROCEDURES (CASE II)

The Case II Marshal procedures are used when weather is less than 3,000/5 but greater than 1,000/5 at the ship. It is used when a VFR penetration cannot be made. The approach to the ship's VFR pattern may be via radar vectors or a TACAN fix from the ship. The Case II recovery is a controlled IMC descent to the break and the VFR pattern. In no case will a section of more than two aircraft execute a Case II recovery.

As in Case I marshal procedures, each flight will be led to the ship by a Lead/Safe. Following rendezvous, outbound, and entering the Warning Area, the flight will contact Marshal. If a Case II recovery is directed by Marshal, the flight will proceed to the Case II marshal pattern holding fix. The fix is normally located along the ship's aft BRC by adding the Marshal assigned altitude (angels), plus fifteen. That formula will determine the distance from the carrier to establish the fix (Figure 4-3).

MARSHAL PATTERN ENTRY AND HOLDING (CASE II)

The Case II marshal holding pattern is located at the Case II marshal fix. Use a normal entry procedure for a non-standard holding pattern that you learned in RI. Use normal holding configuration in the marshal pattern. Strive to establish a one-minute leg inbound to the fix at 200 KIAS (Figure 4-3).

NOTE

Lead/Safe may brief holding at the fix (no one-minute legs) to facilitate Lead/Safe TACAN RDZV.

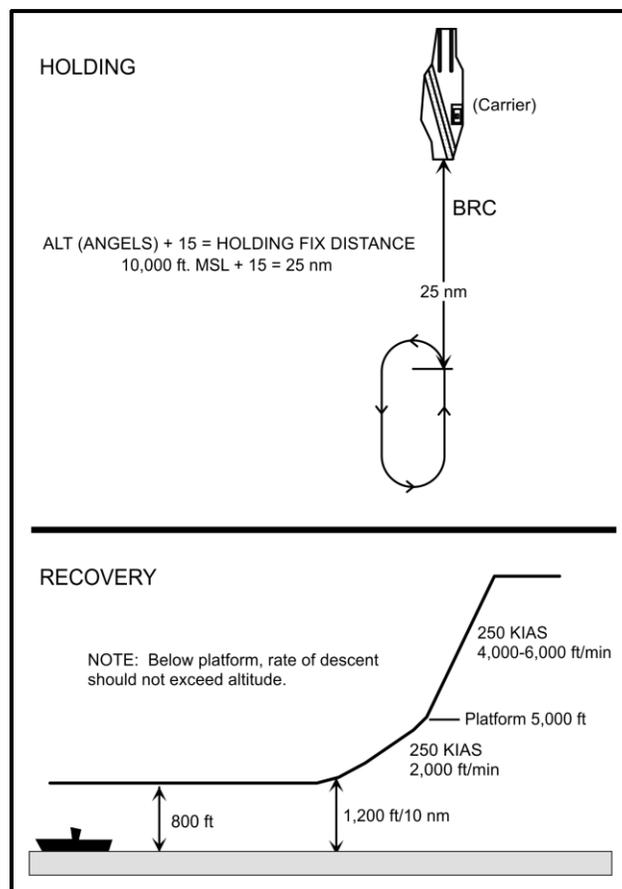


Figure 4-3 Case II Marshal Holding and Recovery

MARSHAL PATTERN RECOVERY TO SHIP'S PATTERN (CASE II)

Once cleared to the ship's pattern, at the fix inbound to the ship, commence a 250 KIAS descent at 4,000-6,000 ft/min. Maintain this descent to "Platform Altitude" 5,000 ft. At that point, retract speed brakes and slow the rate of descent to 2,000 ft/min (not to exceed the minute-to-live rule). Continue the descent until at approximately 1,200 ft AGL and 10 nm. At this time slow the rate of descent further to arrive at the initial at 800 ft and 300 KIAS. At the initial, resume normal carrier pattern procedures.

403. CARRIER PATTERN ENTRY

The flight will arrive at a 3-nm initial astern the ship and parallel to the ship's BRC (Figure 4-4). At this point, the flight should be wings level at 800 ft and 300 KIAS.

The flight leader will advise the tower of the flight's position by communicating, "Flight of (number), initial." Maintain 800 ft AGL and fly just outboard the starboard side of the ship.

NOTE

A common problem during pattern entry is that Dash Two flies too tight a parade position for Dash Three to match.

SPIN PROCEDURES

If the pattern is full, Tower may instruct the flight to spin. At the bow, the flight lead begins a climbing left turn to an altitude of 1,200 ft AGL remaining within 3 DME of the ship at 300 KIAS. Caution must be exercised reentering the initial to avoid additional flights entering the break.

BREAK

When cleared by the Tower, the flight leader will break on his interval or no earlier than 1 nm past the bow (or as directed) using 70-80 degrees AOB as in day FCLPs. Each wingman breaks at 17-second intervals after the lead breaks. Remember to check the clock and use it to set an exact break interval. Too often students fail to hold their heading and altitude after the lead has broken. Don't make this mistake! *Always* concentrate on maintaining the proper heading and altitude. No aircraft should break more than 4 nm ahead of the ship. Execute a level break on instruments. Haze or lack of a defined horizon makes an instrument break imperative. Out of the break, fly the reciprocal of the BRC heading. Descend to 600 ft when established on downwind. At 200 KIAS, extend gear, flaps/slats and hook (as required). SNAs will normally perform two Touch and Go's first with the hook up, then go "Hook Down" for their first trap.

404. CARRIER APPROACH

The following items illustrate differences between carrier approaches and field approaches.

1. Because of high winds at the ship, power corrections for a low ball will require a larger addition.
2. Corrections for a high ball will require smaller power reductions.
3. It is harder to correct for lineup at the ship due to the short length of the deck and the constant movement of the centerline.
4. Due to wind over the deck and ship's movement through the water, you will feel high and tight when flying through the 90; resist the tendency to ease your turn and increase your rate of descent, thus causing low, overshooting starts.
5. At the ship, spotting the deck in close typically results in a settle/fly through down at the ramp or a bolter. This is a scan breakdown.
6. You will experience a greater tendency at the ship to fixate on one single item, such as the meatball, airspeed, or the wires. *Don't fixate, keep your scan moving.*
7. Although the landing area is angled approximately 10 degrees, the pattern is flown parallel to the BRC (base recovery course).

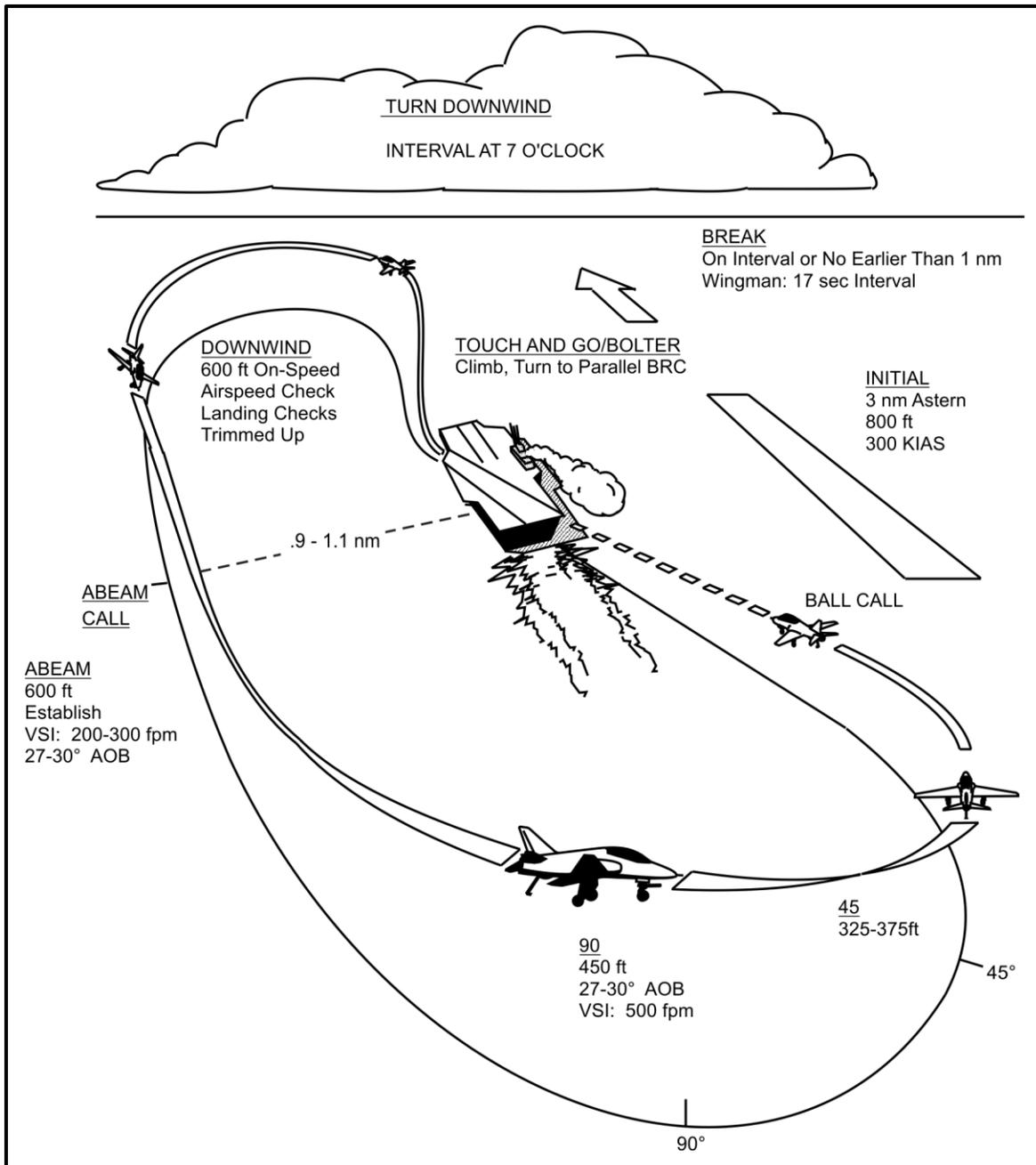


Figure 4-4 Carrier Landing Pattern

405. CARRIER LANDING PATTERN

Once you're established on downwind with wings level, descend to 600 ft, slow to optimum AOA, and retrim as necessary. Perform your AOA/airspeed check and complete your landing checklist. Pay particular attention to your configuration: landing gear down, flaps full down, slats extended, speed brakes extended, hook up initially for 2 touch-and-go landings or as directed by the Tower, *anti-skid off*, and harness as required.

4-8 CARRIER QUALIFICATION

406. ABEAM/180 POSITION

Verify your distance abeam (0.9-1.1 nm). Failing to monitor the abeam distance and either angling in or away will result in being too close or wide abeam. Make the abeam call only if an aircraft is not on the ball. At any time during the pattern, the LSO may ask for your qual number-respond accordingly.

The ship will have a 20-30 kt wind across the deck. Start your approach turn once you see the white of the round down. The abeam and the 180 are collocated at the ship. Proper setup at the 180 cannot be overemphasized. A poor setup at the 180 makes a good start almost impossible.

At the abeam position, roll into 27-30 degrees AOB and adjust power and nose slightly to set up a 200-300 fpm rate of descent. Maintaining optimum AOA is essential. It will be much more difficult to obtain a consistent 90 if optimum AOA is not maintained.

NOTE

If you are too close abeam, turning a little later may be required to allow for enough straight-away. If you are too wide abeam, turning a little earlier may help prevent a long-in-the-groove.

90-DEGREE POSITION

When at the 90, maintain optimum AOA and adjust AOB to avoid an overshoot/undershoot, cross-check altitude (450 ft AGL), and increase VSI to a 500-fpm descent. Because the ship is moving away from you, you will appear high and tight. It is a common tendency that, while coming through the 90-degree position, you will increase rate of descent and shallow your AOB due to the appearance of the ship. ***Resist the tendency to reduce AOB and to increase your rate of descent.*** The ship is moving away from you.

45-DEGREE POSITION

At the 45-degree position (the 45), you may be able to start to acquire the ball. Adjust AOB as necessary to roll out on centerline. Cross-check altitude 325-375 ft, maintain AOA, and proper rate of descent.

NOTE

An advisory call from the LSO normally occurs from the 90 to the groove to avoid an overshooting start/angling approach. Maximum AOB may be required in order to stop an overshoot. If greater AOB is needed, a waveoff by the LSO will result.

NOTE

The ball will be a little low at the 45 if you are on profile due to the roll angle of the lens. Use the ball as a reference in the turn, but do not fly the ball until you roll out on centerline.

GROOVE

The wings level transition is the most dynamic phase of each pass. The excess energy required in the turn to maintain proper AOA must be bled off while maintaining optimum AOA and rate of descent. As you roll wings level, reduce power slightly to maintain on speed and a proper rate of descent and call the ball. If you do not see the ball, call "Clara." Do not descend below 300 ft without a ball. Do not fixate on the ball but continue to scan your lineup and AOA. Glideslope becomes progressively narrower as you get closer to touchdown, so you must decrease the magnitude of each correction for an equivalent amount of ball movement as you approach touchdown.

LINEUP

Roll into the groove using the extended centerline of the angled deck as your reference. Roll out with the centerline between your legs and keep it there all the way to touchdown. If it becomes necessary for the ship to create its own wind, lineup will be more difficult as the ship's centerline will be moving constantly to the right.

Lineup is critical at the ship. You will not receive proper glideslope information unless you are on centerline due to the roll angle of the lens.

407. LSO CALLS

LSO calls during carrier operations are identical to FCLP LSO calls.

NOTE

Not responding appropriately to an LSO call at the ship may result in a disqual. These commands are mandatory and will be practiced during FCLPs. It is imperative that each pilot responds properly. Carrier qualifications can be very unforgiving and the margin for error very small.

408. TOUCH AND GO/BOLTER

The procedures for touch-and-go landings and bolters are identical. Continue to fly the ball all the way to touchdown. Upon touchdown, simultaneously advance power to MRT, retract speed brakes, and rotate to takeoff attitude. Maintain wings level and verify a positive rate of climb. Once a positive rate of climb is established and your aircraft is abeam the bow, use a 10-degree wing dip right to parallel the ship's BRC. Take interval on any aircraft that reaches the bow prior

to you, either entering the break or launching off the cat.

NOTE

To avoid interfering with aircraft off the cat or in the break, do not cross the ship's bow.

Climb to pattern altitude (600 ft), and turn downwind when your interval reaches your 7 o'clock position. If unable to find interval, ask tower to call your turn. Perform the landing checklist.

409. WAVEOFF

All waveoffs are made up the angled deck unless otherwise directed by the LSO or Tower. Waveoff calls are mandatory. Student pilots will not initiate their own waveoffs unless the ball call has not been rogered by the in-the-middle position or an emergency situation dictates. Waveoffs may result from a fouled deck, winds/deck out of limits, or aircraft not being set up for a safe landing.

To perform a waveoff, simultaneously advance the power to MRT, retract the speed brakes, and maintain optimum AOA. Level the wings if necessary and verify a positive rate of climb.

NOTE

If slow when the waveoff is initiated, maintain landing attitude and accelerate to optimum AOA during the climbout.

Once you have established a positive rate of climb and you are abeam the bow, turn slightly right to parallel the ship's BRC. Climb to 600 ft, turn downwind with proper interval, and perform landing checklist.

410. DELTA PROCEDURES

If a signal Delta is given by the Tower while you're in the pattern, maintain pattern altitude and fly the same landing pattern. Fly the pattern at 130 KIAS in the landing configuration with speed brakes retracted (Delta Easy). When cleared from the Delta pattern, the first aircraft to reach the 180 position resumes the normal approach.

If instructed to Delta Clean when already established in the pattern, clean up, accelerate to 200 KIAS, and climb to 1,000 ft MSL or the altitude directed by Tower. Fly a normal racetrack pattern while maintaining proper interval. All aircraft should remain within 3 nm of the ship. When cleared out of Delta, all aircraft will dirty up and descend to pattern altitude. The first aircraft approaching the abeam at 600 ft AGL with landing checks complete will commence the approach turn. All other aircraft will follow in order.

411. CARRIER ARRESTMENT

Execute the approach exactly as you would a touch and go, *flying the ball all the way to touchdown*. When the aircraft touches down, advance the power to MRT and retract your speed brakes. *Do not anticipate an arrested landing*. Maintain MRT until your aircraft comes to a complete stop and the yellow shirt located at the 1 to 2 o'clock position signals for power back. The yellow shirt will then signal for brake release and a pullback followed by a hook up signal and taxi forward. The pullback allows for the wire to clear the hook. *Follow the yellow shirt's instructions/commands*.

NOTE

Ensure feet are off the brakes at touchdown!

NOTE

Applying brakes during the pullback could cause the aircraft to tilt back potentially damaging the tail section. Once given Hook Up and Taxi Forward signals by the taxi director (yellow shirt), use power to stop any backward motion.

CHAPTER FIVE FLIGHT DECK PROCEDURES

500. POSTLANDING PROCEDURES

To clear the landing area, advance power as necessary, engage high-gain nose wheel steering, and follow the yellow shirt's signals as you taxi past the foul deck line. It is important to clear the landing area safely, but expeditiously. You will be passed from one yellow shirt to another as you taxi from the landing area to the catapult or refueling area. Once clear of the landing area, taxi slowly. If it is necessary to use power above 70%, inform the Tower. If you lose sight of your director or if you are receiving signals from more than one director at a time, **stop**. **Follow the yellow shirt's signals explicitly**. Do not anticipate any signals. If in doubt, **stop**. Always use high-gain nose wheel steering on the flight deck. The yellow shirts expect you to use high gain. The yellow shirts will taxi each jet into close proximity to other aircraft, the island, or the deck edge to utilize all available space. It is critical that the pilot never breaks eye contact with the controlling yellow shirt.

During refueling or hot seat evolutions, the yellow shirt will guide you to a spot where you will be "chocked and chained". The parking brake should remain engaged while parked. Once the signal is passed (by the controlling yellow shirt) that the aircraft is chocked and chained, the pilot may then take his/her mask off, safe the seat and a hot seat or refueling can be performed.

NOTE

All SNAs will be sidelined to refuel following their first trap.
Paragraph 503 contains on-deck hot refueling procedures.

501. DECK PERSONNEL

You must be able to recognize the deck personnel and their functions. All Taxi Directors, Catapult Spotters, Catapult Officers, Flight Deck Officers, and Arresting Gear Officers wear yellow jerseys and are the **only** persons authorized to control the movement of the aircraft on the flight deck. Additionally, Flight Deck Officers, Chief Warrant Officers and Chief Petty Officers wear khaki pants. The Catapult Officer and Arresting Gear Officer can be identified by orange and green reflective tape on their cranials.

Maintenance personnel, catapult, and arresting crews wear green jerseys. The Catapult and Arresting Gear Officers also wear orange and green reflective tape on their cranials. Plane captains wear brown; plane handlers (pushers, chockers, chainers, etc.), phone talkers, and elevator operators wear blue; fueling personnel wear purple. Safety and medical personnel, LSOs, final checkers, and quality assurance personnel wear white. Ordnance and crash crews wear red.

NOTE

Flight Deck Officers, Chief Warrant Officers, and Chief Petty Officers are the only personnel on the deck that will be wearing khaki pants.

DECK PERSONNEL SIGNALS TO PILOT

The following signals are directed to pilots or deck crews by the yellow shirt. Signals performed above the waist are directed to pilots; signals performed below the waist are directed to deck crews.

1. Proceed to next director: director pats sides of head with both hands, then points to next director (near arm extended toward new director, other arm moved across chest pointing toward new director).
2. I have control: new director will hold one arm straight up and will begin giving directions as soon as you look at him.
3. Slow down: director extends arms down with palms toward ground, then moves them up and down several times.
4. Turn left: director points right arm downward and moves left arm repeatedly upward and backward, speed of arm movement indicating desired rate of turn.
5. Turn right: director points left arm downward and moves right arm repeatedly upward and backward, speed of arm movement indicating desired rate of turn.
6. Move ahead: director extends arms forward at shoulder level with hands upraised above eye level and palms facing backward and makes beckoning arm motion, speed of arm movement indicating desired speed.
7. Move back (pushback): director holds arms down by sides, palms facing forward, and then sweeps them forward and upward repeatedly to shoulder height.
8. Emergency stop: director extends arms above head with wrists crossed and fists clenched.
9. Brakes on: director extends arms above head with fists clenched.
10. Brakes off: director extends arms above head and alternately clenches and unclenches fists.
11. Install chocks: director extends arms down 45 degrees from body with fists closed, thumbs pointed inward, and then swings arms from outward to inward.
12. Install chain tiedowns: director rotates hands in a vertical circle in front of body.

5-2 FLIGHT DECK PROCEDURES

13. Remove chocks: director holds arms down at sides with fists closed and thumbs pointed outward and then swings arms outward.
14. Remove chain tiedowns: director makes wiping motion down left arm with right hand and down right arm with left hand.
15. Chain tiedowns in place: director rotates hands in a vertical circle in front of body and then gives thumbs up.
16. Throttle back: director extends arm in front of body with fist at waist level and thumb extended up, then grasps thumb with other hand and rocks as if pulling throttle to IDLE.
17. Engage nose wheel steering: director points to nose with index finger and points to nose wheel with other hand.
18. Disengage nose wheel steering: director points to nose with index finger and makes lateral wave with open palm of other hand at shoulder height.
19. Engine runup: Catapult Officer waves index and middle finger in circular motion at head level.
20. Open canopy: director places hand palm-down on top of head and raises hand as though hinged at wrist.
21. Hook up: director positions left hand in front of body palm down and moves right hand upward bringing extended thumb into left palm.
22. Launch: Catapult Officer squats, touches the deck, then raises his hand.
23. Hook down: director positions left hand horizontally in front of his body palm up, then moves right hand down bringing extended thumb into left palm.
24. Lights on/off: director points to eyes with two fingers.
25. Fuel top off: director or pilot pats top of head.
26. Engine shutdown: director points finger at one side of throat and moves hand sideways as if to cut throat.

PILOT SIGNALS TO DECK PERSONNEL

Following is a list of visual signals you will use in communicating with deck personnel.

1. Fuel status: pilot moves thumb extended from fist toward mouth in a drinking motion and then uses fingers to signal amount of remaining fuel in hundreds of pounds.

2. Fuel quantity signal: pilot signals 700 lb, for example, with a clenched fist followed by two fingers extended horizontally. See your T-45 NATOPS for a complete listing of signals.
3. Cut fuel: pilot holds extended fingers at throat and moves hand sideways as if to cut throat.
4. Brake failure: pilot drops arresting hook and turns on lights.

502. MANNING AIRCRAFT PROCEDURES

COLD PLANE

Any time you man an aircraft on the flight deck, request an escort to the aircraft from Flight Deck Control. When manning an aircraft that has been shut down, perform an exterior inspection just as you would conduct the shore-based inspection, again emphasizing the launch bar, tail hook bumpers, tail hook, hook point (should be greased), landing gear struts, holdback, underside of fuselage, and tire pressure.

WARNING

You may not be able to preflight some portions of the aircraft due to positioning on the edge of the flight deck. Do not attempt to inspect the tail section and hook if the aircraft is parked tail over water. A hook check will be given after you taxi forward and the hook can be lowered onto the flight deck.

Perform an interior inspection just as you would on shore, but pay extra attention to potential cockpit FOD such as loose cockpit gauges/HUD. Complete "entering cockpit" checklist except ensure aft cockpit ANTI- SKID switch is set to ON, and forward cockpit ANTI-SKID switch is set to OFF.

NOTE

Gauges may be loose due to previous impacts of aircraft on the deck during landings; you must verify that all gauges are secure. Loose gauges can be dangerous during catapult launch.

1. Perform the prestart checklist.
2. Start the engine when authorized by a plane captain (brown shirt).
3. Close the canopy when appropriate.
4. Complete the post-start checklist.
5. Complete the plane captain's checks.

5-4 FLIGHT DECK PROCEDURES

6. Complete the takeoff checklist prior to the aircraft being broken down by the yellow shirt.

NOTE

The takeoff checklist is the same as for shore-based procedures with emphasis placed on the following:

1. Position the ANTI- SKID switch to OFF.
 2. Set the stabilator trim to 3 1/2 degrees noseup.
7. When ready to taxi, give the "up and ready" call (with gross weight). Ensure there is no one on the ball.

NOTE

Your oxygen mask must be on whenever you are not chocked and chained.

HOT SEAT PROCEDURES

There may be times when you will man an aircraft that has just landed. Follow these procedures:

1. With the aircraft chocked and chained, the outgoing pilot safes the seat, sets the throttle to IDLE with full friction applied (throttle locked), and sets the parking brake.
2. The outgoing pilot verifies that the cockpit switches are left in the proper positions.
3. The outgoing pilot unstraps from the seat, extends the seat and leg straps, and opens the canopy on signal from the plane captain.

NOTE

Prior to opening the canopy, ensure that the FOD safety screen is installed over the port engine intake.

4. The outgoing pilot hands all personal gear to the plane captain then exits the aircraft as expeditiously as practical.
5. The new pilot enters as quickly as practical.
6. The outgoing pilot briefs the incoming pilot on aircraft status.
7. The new pilot completes the taxi/takeoff checklists.
8. When ready, the new pilot gives the "up and ready" call.

9. Up and ready will be confirmed by the yellow shirt with a thumbs up.

NOTE

The outgoing pilot shall be escorted to flight deck control.

503. HOT REFUELING

For this operation, follow these procedures:

1. Follow the yellow shirt's taxi directions to the fueling area where your aircraft will be chocked and chained and fuel hose attached.
2. Canopy must remain down and locked during refueling.
3. Indicate the aircraft fuel state when signaled by the fueling crew (purple shirt).
4. Watch your fuel quantity indicator; give a thumbs up to the purple shirt to indicate that fuel is being received.
5. Give the cut signal when fuel gauge reaches 3,000 lbs.
6. When fueling is complete, the ground crew will disconnect the fueling hose.
7. When you are ready to taxi, make the "up and ready" call.

504. SHUTDOWN

When shutting down the aircraft, follow the procedures outlined in the NATOPS.

1. Follow the yellow shirt signals to the parking area.
2. When the yellow shirt signals, the blue shirts will chock and chain the aircraft.
3. Set the parking brake ON.
4. The yellow shirt will signal the pilot when the aircraft is fully chocked and chained down.
 - a. Complete the post landing checklist.
5. Shutdown the engine when signaled; a brown shirt (plane captain) will monitor the shutdown.

505. CATAPULT PROCEDURES

While taxiing to the catapult, complete the takeoff checklist, compute the aircraft's gross weight,

5-6 FLIGHT DECK PROCEDURES

and acknowledge the weight board prior to crossing the jet blast deflector (JBD). When computing gross weight, round up to the closest 500-pound increment. For example, 12,300 to 12,500. If the figure is correct on the weight board, give the thumbs up signal. If the weight is too low on the weight board, raise it in 500-pound increments by moving your hand up and down vertically with your palm up. If the weight shown is too high, lower it in 500-pound increments by moving your hand horizontally with your palm down. If the weight is more than 1,000 pounds off, call the Tower with the gross weight of the aircraft. To ensure precise spotting on the catapult, you must follow the taxi director's signals.

The following is a list of steps and visual signals for catapult operations.

1. Ensure the takeoff checklist is completed and trim set to 3.5 degrees noseup with flaps/slats set to full *prior* to passing the JBD.
2. Roger the weight board.
3. Extend launch bar: director rests right elbow in left palm at waist level with right arm up at waist level and then brings right hand down to horizontal position.
4. Engaging nose wheel steering: director points right index finger to his nose and presents a lateral wave with open palm of the left hand at shoulder height.
5. Taxi: director extends arms forward at shoulder level with hands upraised at eye level, palms facing toward each other and then moves hands horizontally back and forth across the front of chest, speed of arm movement indicating desired speed.
6. Slight turn left/right: director will nod head in direction of turn while giving move ahead signal.
7. Brakes on (when in holdback): director extends arms above head with open palms toward aircraft and then closes fists.
8. Tension: director extends arms overhead with fists closed and then opened with palms forward (indication to release brakes); then hand toward bow is swept down to a 45-degree position toward deck, while other hand is swept up 45 degrees toward sky.
9. Engine run-up: Catapult Officer/Catapult Safety Observer (CSO) makes circular motion with index and middle finger at or above head level.
10. Acknowledge salute: Catapult Officer/CSO returns salute.
11. Launch signal: Catapult Officer/CSO extends arm overhead and sweeps upraised hand downward in direction of the launch, touching the deck and returning the hand to horizontal in the direction of the launch.

12. Hang fire: Catapult Officer/CSO extends right-hand index finger overhead and points horizontally at left palm extended vertically.
13. Suspend: Catapult Officer/CSO raises arms above head with wrists crossed (indicating the launch is to be suspended).
14. Throttle back: Catapult Officer/CSO holds one fist above head with thumb up, then grasps thumb with other hand and rocks as if pulling throttle back.

NOTE

If your launch is suspended, do not throttle back until the Catapult Officer/CSO gives the throttle back signal.

PRE-LAUNCH PROCEDURES

When directed by the Catapult Director (yellow shirt), place the launch bar switch to EXTEND; the nose wheel steering (NWS) is automatically disengaged with the launch bar extended.

The yellow shirt may signal to reengage NWS to get the launch bar seated properly into the catapult track (the box). Press and hold the NWS button and *slowly* apply rudder as directed by the yellow shirt. Once the launch bar is properly seated in the track, the director will signal you to disengage NWS.

NOTE

Only small NWS inputs are required. Do not apply excessive NWS inputs during hookup. Deck personnel are working around the nose gear.

Following signals, taxi forward slowly to position the launch bar over the shuttle (significant power may be required). When the launch bar drops over the shuttle, the aircraft will be stopped as the holdback engages the catapult buffer.

NOTE

To prevent the possibility of breaking the holdback link, you *must* keep taxi speed to a crawl.

Apply and hold the brakes when signaled. When the take tension signal is given by the catapult director, release the wheel brakes and place your heels on the deck with toes below the toe bars. See Figure 5-1. As tension is taken, you will feel the aircraft squat.

WARNING

Never operate the parking brake past the JBD. Forgetting to release the parking brake will result in blown tires on the catapult shot.

The Catapult Director will pass control to the Catapult Officer. The Catapult Officer will direct engine runup and checks. Advance throttle to MRT. Check your engine instruments (EGT, RPM, fuel flow) and monitor your central warning system indicators and advisory lights while wiping out control surfaces. When wiping out the cockpit controls, verify full throw of the stick and rudder in all directions.

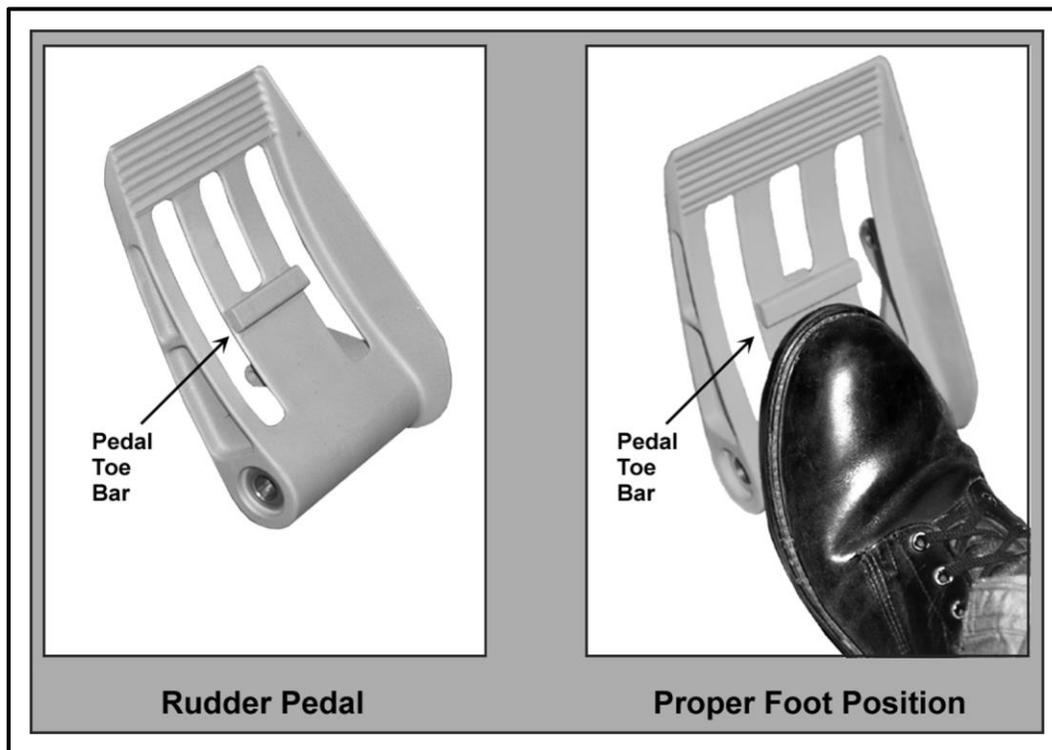


Figure 5-1 Pedal Toe Bar

LAUNCH

When ready for launch, place the launch bar switch to retract, grasp the catapult hand grip, lock your elbow, and then crisply give a right-handed salute to the Catapult Officer/CSO. Cup your hand loosely behind the stick and place your head firmly against the headrest.

NOTE

Even with heels placed on the deck, brakes may inadvertently be applied during a catapult launch, resulting in a blown tire, if launch bar switch is not in the up position.

NOTE

If launch bar is retracted below max RPM, an ACCEL light may illuminate.

NOTE

Failing to use the catapult grip could result in power settings less than MRT during the cat stroke.

The Catapult Officer will make final checks, clear fore and aft, then touch the deck. After about a 1-2 second delay, acceleration will be felt. You will reach flying speed in about 2 seconds.

NOTE

If "bubble launch," the CSO will return the salute. The Catapult Officer will then effect the launch.

The bow of the ship should pass under the nose at 120 KIAS minimum or excess end airspeed, whichever is greater. Refer to the Catapult Launch Minimum Endspeed Chart in NATOPS Chapter 8. Let your hand follow the stick as it moves aft during the cat stroke. As your aircraft clears the end of the stroke, rotate to 10-12 degrees noseup attitude and establish a positive rate of climb, climb to pattern altitude, and check for interval.

506. SUSPEND PROCEDURES

Although the pilot, Catapult Officer, or Air Boss can all initiate a suspend, the following procedures apply to the pilot only.

If at any time during the launch sequence, the pilot elects to suspend, he/she will broadcast over the radio (Tower freq.), "SUSPEND, SUSPEND, SUSPEND," while simultaneously shaking the head from side to side.

NOTE

When the aircraft is in tension, keep both hands down below the canopy rails until the salute. Any gesture made above the canopy rails may be incorrectly perceived as a salute.

The Catapult Officer will signal suspend followed by the signals to retract the shuttle, raise the launch bar, and bring the shuttle forward. Maintain MRT until the Catapult Officer gives the throttle back signal; only then reduce the throttle to IDLE.

NOTE

Under no circumstances should the power be reduced until the Catapult Officer signals for power back. Be prepared to go flying.

If the launch sequence is continued after suspension, control will be returned to the catapult yellow shirt. The launch sequence will continue as normal, beginning with the launch bar extend signal.

507. DEPARTURES**CASE I DEPARTURE**

After launch, establish a wings level, positive rate of climb. Use 20 degrees angle of bank to turn right for 20 degrees of heading change, and bring the landing gear and flaps/slats up when wings level at 140 KIAS. After the aircraft is clean, turn back to parallel the BRC heading maintaining 500 ft AGL and accelerate to 300 KIAS. At 7 miles begin a climbing turn toward home base, switch/contact Departure and continue your climb outside 10 miles from the ship to the assigned or appropriate cruise altitude.

NOTE

Do not overfly the ship during a transit to the beach. A minimum of 10 nm should be maintained from the ship.

Once in communication with Departure, the controller will instruct the pilot to report "sweet lock/sweet comm" with the appropriate FACS FAC facility. Once reported, a switch to that controlling agency will be made.

CASE II DEPARTURE

After launch, establish a wings level, positive rate of climb. Use 20 degrees angle of bank to turn right for 20 degrees of heading change, and bring the landing gear and flaps/slats up when wings level at 140 KIAS. After aircraft is clean, turn back to parallel the BRC heading maintaining 500 ft AGL and accelerate to 300 KIAS. At 7 miles begin a climbing turn toward home base, switch/contact Departure and continue your climb outside 10 miles from the ship to the assigned or appropriate cruise altitude.

At 7 nm, if you are unable to climb VFR, perform the following:

1. Turn to intercept the 10 DME arc and maintain 500 ft or 500 ft below the clouds, whichever is higher.
2. Arc to and intercept the assigned departure radial outbound.
3. Climb to the assigned altitude once you're established on the departure radial.

NOTE

If you arrive at 7 nm and are able to remain VMC, perform the same procedures as that of a Case I departure.

4. When VMC, report "VMC on top" and turn to desired heading to RTB while remaining outside 10 miles from the ship.

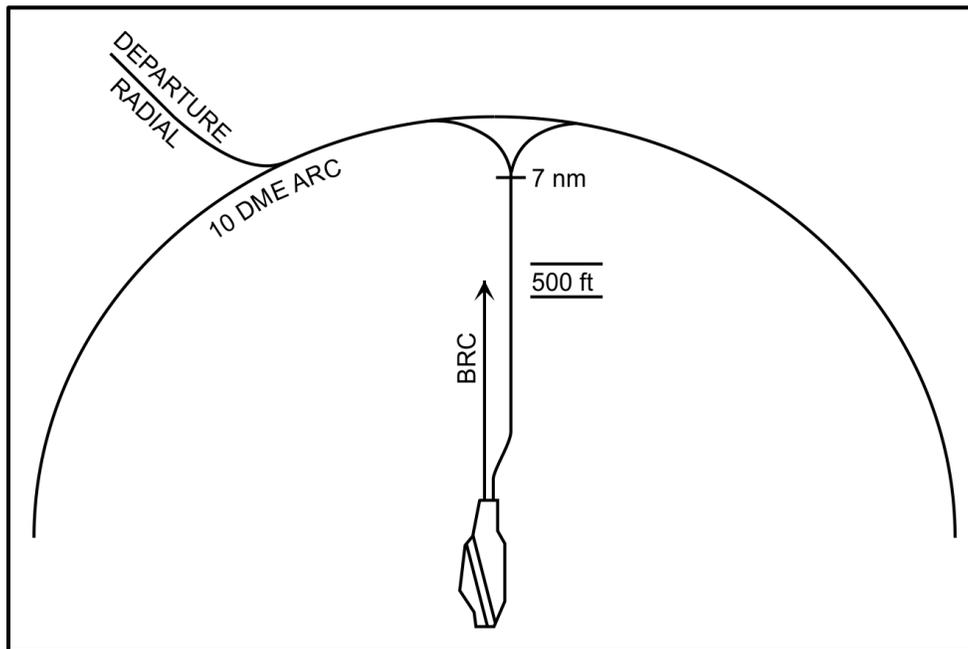


Figure 5-2 Case II Departure

NOTE

During the departure, cross-check HSI and wet compass to ensure no errors exist.

5. If still IMC at 18,000 ft, report "Popeye" to receive instructions.

LANDING ASHORE

When returning ashore following carrier operations:

1. Complete "Feet Dry" Checklist.
 - a. Ensure the hook is "UP."
 - b. Ensure the anti-skid is "ON." (SKID light will not illuminate until gear is down)
 - c. Ensure the taxi light, strobe/anti-collision lights are "ON." ("pinky" switch ON)

5-12 FLIGHT DECK PROCEDURES

- d. Box "HYBD".
2. Complete Landing Checklist.
3. Use the appropriate procedures for braking with carrier tire pressure. (check line speeds)

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CHAPTER SIX EMERGENCY PROCEDURES

600. BINGO

Bingo is an *emergency* situation. It means that you are at emergency fuel levels, not minimum fuel.

The fuel state of every aircraft is constantly monitored by Air Ops and Tower. When the fuel state reaches hold-down (as set by Air Ops) you will be held on deck for refueling. Advise the tower if you have been directed to taxi to the catapult with a fuel state at or below hold-down.

COMPUTING BINGO PROFILE (CLEAN)

In a clean configuration, the computation of the bingo profile will be computed as follows (refer to Figure 6-1).

1. Determine the distance to base.

NOTE

You will receive information on bearing/distance (pigeons) to the bingo field and bingo fuel state from Marshal on initial check-in. This information is periodically updated and broadcast over Marshal and Tower frequencies.

2. Refer to the PCL to determine proper bingo information.
 - a. Fuel required
 - b. Time required for bingo (total time required from start of climb to landing)
 - c. Speed (KIAS) for climb
 - d. Cruise altitude
 - e. Cruise (KIAS/IMN) speed at cruise altitude
 - f. Descent (KIAS) speed
 - g. Descent point

Always verify bingo figures passed by the ship with your bingo fuel chart based on your knowledge of the distance to the bingo field. On the next page is an example of a bingo profile computation problem:

1. Determine proper bingo information.
2. Example variables:
 - a. Aircraft configuration: gear up, flaps up
 - b. Zero fuel weight: 10,500 lbs
 - c. Drag index: 0
3. Distance to bingo field: 100 nm

NOTE

Fuel required includes 300 pounds reserve fuel, maximum thrust climb to altitude, and idle descent to sea level.

4. Example answers:
 - a. DIST TO BASE = 100 nm
 - b. FUEL REQD = 712 lb
 - c. CLIMB SPEED = 300 KIAS
 - d. CRUISE ALT = 20,000 feet
 - e. CRUISE SPEED = 218 KCAS .48 IMN
 - f. DESCENT SPEED = 180 KIAS
 - g. DESCENT DIST = 55 nm (from bingo field)

SAMPLE BINGO

GEAR UP - FLAPS UP
ZERO FUEL WEIGHT -10,500 POUNDS

REMARKS

DATE: JUNE 2005
DATA BASIS: FLIGHT TEST

ENGINE: F405-RR-401
U.S. STANDARD DAY, 1962

FUEL GRADE: JP-5
FUEL DENSITY: 6.8 LBS/GAL

	MAXIMUM RANGE CRUISE										SEA LEVEL CRUISE		
	DIST TO BASE	FUEL REQD		CLIMB SPEED	CRUISE			DESCEND		FUEL REQD		CRUISE SPEED	
		NO WIND	100 KT HEAD WIND		ALT	SPEED	SPEED	DISTANCE		NO WIND	100 KT HEAD WIND		
								NO WIND	100 KT HEAD WIND				
NM	LB	LB	KCAS	FEET	KCAS	IMN	KCAS	NM	NM	LB	LB	KCAS	
DRAG INDEX = 0	25	420	515		5,000	221	.37		14	6	429	535	220
	50	528	682		10,000	222	.40		27	13	559	771	221
	75	625	815		15,000	219	.44		41	21	690	1,006	221
	100	712	921	300	20,000	218	.48		55	29	820	1,240	222
	125	795	1,006	Knots/	25,000	225	.55	180	69	37	952	1,474	222
	150	869	1,081	0.75	30,000	224	.60		83	46	1,083	1,707	223
	175	935	1,150	Mach	35,000	215	.65		97	55	1,216	1,940	224
	200	999	1,238		35,000	216	.65		97	55	1,349	2,172	224
	225	1,063	1,327		35,000	216	.65		97	55	1,482	2,404	225
250	1,127	1,392		40,000	213	.71		111	65	1,616	2,635	226	
DRAG INDEX = 50	25	433	542		5,000	214	.35		12	5	441	562	214
	50	551	731		10,000	214	.39		24	11	582	823	215
	75	656	875		15,000	214	.43		37	17	724	1,085	216
	100	752	993	265	20,000	213	.47		49	24	867	1,348	216
	125	840	1,089	Knots/	25,000	215	.52	170	61	31	1,010	1,610	216
	150	924	1,175	0.70	30,000	214	.58		74	39	1,153	1,872	217
	175	1,000	1,259	Mach	35,000	208	.63		86	47	1,297	2,135	217
	200	1,074	1,361		35,000	208	.63		86	47	1,442	2,398	218
	225	1,147	1,464		35,000	208	.63		86	47	1,587	2,661	218
250	1,221	1,568		35,000	209	.63		86	47	1,733	-	219	
DRAG INDEX = 100	25	444	566		5,000	210	.35		11	5	452	589	209
	50	572	773		10,000	208	.38		22	10	604	877	209
	75	685	933		15,000	207	.41		33	15	757	1,165	210
	100	788	1,060	245	20,000	207	.46		44	21	911	1,454	211
	125	880	1,132	Knots/	30,000	201	.54	165	66	34	1,066	1,742	211
	150	965	1,257	0.60	30,000	201	.54		66	34	1,221	2,030	212
	175	1,051	1,358	Mach	35,000	195	.59		77	41	1,377	2,318	212
	200	1,133	1,477		35,000	195	.59		77	41	1,533	2,606	213
	225	1,216	1,597		35,000	196	.59		77	41	1,690	2,893	213
250	1,299	1,717		35,000	196	.59		77	41	1,848	-	214	
DRAG INDEX = 150	25	454	588		5,000	206	.34		10	4	462	614	204
	50	590	812		10,000	204	.37		20	8	624	927	205
	75	710	949		20,000	201	.44		40	19	787	1,240	205
	100	818	1,079	235	25,000	201	.49		50	24	951	1,553	206
	125	914	1,199	Knots/	30,000	189	.51	160	60	30	1,116	1,866	207
	150	1,006	1,339	0.55	30,000	190	.51		60	30	1,281	2,179	207
	175	1,099	1,480	Mach	30,000	190	.52		60	30	1,447	2,491	208
	200	1,192	1,622		30,000	190	.52		60	30	1,615	2,803	208
	225	1,285	1,765		30,000	190	.52		60	30	1,783	-	209
250	1,378	1,862		35,000	192	.58		70	36	1,952	-	210	

- NOTES: 1. FUEL REQUIRED INCLUDES 300 LB RESERVE FUEL
 2. INITIAL ALTITUDE IS SEA LEVEL
 3. MAXIMUM THRUST CLIMB TO CRUISE ALTITUDE
 4. IDLE THRUST MAXIMUM RANGE DESCENT TO SEA LEVEL (SPEEDBRAKES RETRACTED)

Figure 6-1 Bingo Chart (Clean)

NOTE

The drag index is determined according to the external stores of the aircraft. With no external stores, the drag index of the T-45 is 0.

BINGO FLIGHT PROCEDURES (CLEAN)

Upon reaching bingo fuel status, turn in the shortest direction to the bingo heading, clean up and commence a climb at MRT on the bingo profile outside seven miles or as directed by Tower/Departure, avoiding the overhead stack. Bingo aircraft should be cognizant of other aircraft overhead the ship during their departure to minimize the risk of a midair collision. Squawk 7700, declare an emergency and communicate intentions to appropriate controlling agencies. At your descent point, begin an idle descent to the bingo field at the descent airspeed.

NOTE

If bingo fuel occurs during a communication failure, immediately execute a bingo. A bingo profile can be executed from any point in the CQ pattern.

NOTE

Always cross-check your wet compass once established on a bingo.

NOTE

If the Bingo Profile is properly flown, you should arrive overhead the field with 300-500 lbs of fuel. This allows enough fuel to make a turn downwind or a 360 in the event you are unable to make a safe approach on the first try. Use good headwork.

COMPUTING BINGO PROFILE (DIRTY)

If your aircraft has a gear and/or flap/slat malfunction resulting in a dirty configuration, the fuel requirements will be higher. Dirty bingo information is computed in the same manner as clean bingo except that a different chart is used (Figure 6-2).

SAMPLE

BINGO

GEAR DOWN - FULL FLAPS
ZERO FUEL WEIGHT -10,500 POUNDS

REMARKS

DATE: JUNE 2005

ENGINE: F405-RR-401

FUEL GRADE: JP-5

DATA BASIS: FLIGHT TEST

U.S. STANDARD DAY, 1962

FUEL DENSITY: 6.8 LBS/GAL

	MAXIMUM RANGE CRUISE									SEA LEVEL CRUISE			
	DIST TO BASE	FUEL REQD		CLIMB SPEED	CRUISE			DESCEND		FUEL REQD		CRUISE SPEED	
		NO WIND	50 KT HEAD WIND		ALT	SPEED	SPEED	DISTANCE		NO WIND	50 KT HEAD WIND		
	NM	LB	LB	KCAS	FEET	KCAS	IMN	KCAS	NM	NM	LB	LB	KCAS
DRAG INDEX = 0	25	743	1,001		8,000	122	.21		8	4	758	1,074	123
	50	1,142	1,598		12,500	118	.23		12	7	1,226	1,858	124
	75	1,541	2,187		15,000	117	.23		15	9	1,704	2,652	126
	100	1,950	2,809		15,000	118	.24		15	9	2,195	-	127
	125	2,369	-	120	15,000	119	.24	110	15	-	2,697	-	129
	150	2,819	-		12,500	120	.23		12	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
250	-	-		-	-	-		-	-	-	-	-	
DRAG INDEX = 50	25	749	1,011		8,000	121	.21		8	4	764	1,087	122
	50	1,155	1,620		12,500	117	.22		12	7	1,239	1,885	124
	75	1,562	2,221		15,000	116	.23		14	9	1,725	2,694	125
	100	1,979	2,854		15,000	117	.23		14	9	2,222	-	127
	125	2,406	-	120	15,000	118	.24	110	14	-	2,732	-	128
	150	2,866	-		12,500	120	.23		12	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
250	-	-		-	-	-		-	-	-	-	-	
DRAG INDEX = 100	25	754	1,022		8,000	121	.21		8	4	771	1,100	122
	50	1,169	1,643		12,500	116	.22		12	7	1,252	1,912	123
	75	1,583	2,257		15,000	116	.23		14	8	1,745	2,737	125
	100	2,007	-		15,000	117	.23		14	-	2,250	-	126
	125	2,442	-	120	15,000	118	.24	110	14	-	2,766	-	127
	150	-	-		-	-	-		-	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
250	-	-		-	-	-		-	-	-	-	-	
DRAG INDEX = 150	25	760	1,032		8,000	120	.21		7	4	777	1,112	122
	50	1,182	1,664		12,500	115	.22		12	7	1,264	1,937	123
	75	1,602	2,291		15,000	116	.23		14	8	1,763	2,776	124
	100	2,034	-		15,000	117	.23		14	-	2,275	-	125
	125	2,476	-	120	15,000	118	.24	110	14	-	2,798	-	127
	150	-	-		-	-	-		-	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
250	-	-		-	-	-		-	-	-	-	-	

NOTES: 1. FUEL REQUIRED INCLUDES 300 LB RESERVE FUEL
 2. INITIAL ALTITUDE IS SEA LEVEL
 3. MAXIMUM THRUST CLIMB TO CRUISE ALTITUDE
 4. IDLE THRUST MAXIMUM RANGE DESCENT TO SEA LEVEL (SPEEDBRAKES RETRACTED)

Figure 6-2 Bingo Chart (Dirty)

When in a dirty configuration, compute your bingo profile as follows:

1. Determine the distance to base.
2. Refer to the PCL to determine proper bingo information.
 - a. Fuel required
 - b. Speed (KIAS) for climb
 - c. Cruise altitude
 - d. Cruise (KIAS/IMN) speed at cruise altitude
 - e. Descent (KIAS) speed
 - f. Descent point

Here is an example problem:

1. Determine proper bingo information
2. Example variables
 - a. Aircraft configuration: gear down, flaps full
 - b. Zero fuel weight: 10,500 lb
 - c. Drag index: 0 to calculate speed
 - d. Distance to bingo field: 100 nm

NOTE

Fuel required includes 300 pounds reserve fuel, maximum thrust climb to altitude, and idle thrust descent to sea level.

3. Example answers
 - a. DIST TO BASE = 100 nm
 - b. FUEL REQD = 1,950 lb
 - c. CLIMB SPEED = 120 KCAS
 - d. CRUISE ALT = 15,000 feet

- e. CRUISE SPEED = 118 KCAS/ 24 IMN
- f. DESCENT SPEED = 110 KCAS
- g. DESCENT DIST = 15 nm (from bingo field)

BINGO FLIGHT PROCEDURES (DIRTY)

Upon reaching bingo fuel status, turn in the shortest direction to the bingo heading and commence a climb at MRT on the bingo profile outside seven miles or as directed by Tower/Departure, avoiding the overhead stack. Bingo aircraft should be cognizant of other aircraft overhead the ship during their departure to minimize the risk of a midair collision. Squawk 7700, declare an emergency and communicate intentions to appropriate controlling agencies.

601. BLOWN TIRE

If the tire blows during a touch and go/bolter or after a catapult launch, you will be directed to bingo by Tower/Departure. Turn in the shortest direction to the bingo heading and commence a climb at MRT on the bingo profile outside seven miles or as directed, avoiding the overhead stack. Expect a Lead/Safe to join on you to inspect your aircraft during your departure. If the flaps/slats are not damaged expect to fly the gear down/flaps up bingo profile to conserve fuel. Monitor your fuel carefully during the bingo profile and refer to your PCL for proper field arrestment procedures.

NOTE

Without anti-skid protection, ensure brake pressure is not applied during all carrier landings to prevent blown tire(s).

If the blown tire occurs after an arrestment, follow the yellow shirt's signals to taxi or be towed out of the landing area.

602. CROSS-DECK PENDANT/HOOK POINT FAILURE

Immediately determine if your aircraft can be stopped on the flight deck. If so, immediately bring the throttle to IDLE and apply max braking. If your aircraft cannot be stopped on the deck, determine if you have adequate airspeed for flight. If airspeed is not adequate, eject. If your airspeed is adequate, maintain MRT, check speed brakes retracted, and smoothly rotate to optimum AOA. If the sink rate is not arrested, increase the AOA to 24 units, maintain wings level, and establish a positive rate of climb.

603. NWS FAILURE ON FLIGHT DECK

The indications of a nose wheel steering failure are as follows:

1. MSTR ALERT light flashes
2. Caution tone sounds in headset
3. NOSE WHEEL STR amber caution light illuminated
4. NOSE WHEEL STR green advisory light extinguished (if high gain selected)
5. Rudder pedals ineffective for steering

If these indications are present, stop the aircraft. Do not taxi with inoperable NWS. Inform the Tower of NWS failure, press the paddle switch to disengage NWS, and press the MSTR ALERT light (to cancel the light and tone). The deck crew will attach a tow bar. While you are being towed, follow the flight director's signals.

NOTE

Do not engage NWS or use differential braking with the tow bar attached.

604. BRAKE FAILURE

The illumination of the HYD caution light, a low indication of pressure on the brake pressure gauge, or a decrease or loss of brake pedal pressure are indications of brake failure. If these indications occur, use high gain nose wheel steering and available braking to maintain directional control while stopping. If only one brake fails, use NWS and the functioning brake to stop the aircraft.

Ensure the throttle is at IDLE, engage the parking brake, drop the arresting hook (to signal deck personnel that a brake failure has occurred) and advise the tower of your situation.

Move the throttle to OFF when necessary or if a collision is unavoidable. ***Make every effort to keep the aircraft on the flight deck, even if it means running into the island, yellow gear or another aircraft.*** If the aircraft is leaving the flight deck, eject. Once a wheel is off the flight deck (i.e., aircraft is no longer level), the aircraft may be out of the ejection envelope. The following water egress procedures may be necessary.

Pull the MDC firing handle and activate emergency oxygen. In the event of an underwater egress, it is possible to breathe under water with the oxygen equipment to a depth of 16 feet.

If you can evacuate ***with*** the survival kit, release the upper Koch fittings, pull the emergency restraint release (to release leg restraints), evacuate the aircraft with the seatpack, and inflate your life preserver unit (LPU).

If you must evacuate *without* the survival kit, release the upper Koch fittings, pull the emergency restraint release, release the lower Koch fittings, disconnect oxygen/communication connectors, and inflate your LPU.

If the cockpit has flooded, the LPU may have inflated due to the water-activated automatic inflation device. If so, care must be taken during exit to avoid damage to the LPU.

605. LAUNCH BAR MALFUNCTION (AIRBORNE)

A launch bar malfunction is indicated by the red L BAR warning light accompanied by the warning tone. If these indications occur, verify that the launch bar switch is in the RETRACT position. If the launch bar fails to retract, inform the LSO/Tower and refer to the PCL. If the launch bar is visually confirmed to be undamaged in the DOWN position, clean up and exit the pattern using standard procedures. Plan to land past the cross-deck pendant at the divert/home base.

606. CATAPULT MALFUNCTIONS/EMERGENCIES

If an aircraft emergency occurs while you're on the catapult, perform catapult suspend procedures.

NOTE

Keep both hands down in the cockpit and out of sight so that hand movements cannot be confused with a salute.

1. Use a head shake as a negative signal and transmit, "Suspend, suspend, suspend."
2. Maintain MRT until the Catapult Officer gives the throttle back signal.

HANG FIRE (CATAPULT MALFUNCTION)

A catapult hang fire occurs when the Catapult Officer has touched the deck, the button has been pushed to launch the aircraft, but the catapult does not fire. If a hang fire occurs, the Catapult Officer will give the suspend signal followed by the hang fire signal. Once the catapult is "safed," the Catapult Officer will then give the throttle back signal.

HOLDBACK FITTING FAILURE

Once the aircraft is in tension, a holdback fitting failure may occur. When a holdback fitting fails, the aircraft will begin rolling forward and feel like it is on a normal takeoff roll as opposed to a catapult stroke. If this happens, retard the throttle immediately to IDLE, extend speed brakes and apply maximum braking. If necessary, use NWS to remain on the deck. The launch bar must be retracted or the NWS button pressed to activate the NWS.

NOTE

Failure to perform the above procedures immediately may make it impossible to keep the aircraft on the flight deck, requiring you to eject. If you are unable to eject, pull the MDC handle, activate emergency oxygen, ride the aircraft into the water, and perform a water egress.

CATAPULT MALFUNCTION (COLD/SOFT CATAPULT)

Immediately determine if the aircraft can be stopped on the flight deck. If you cannot stop the aircraft on the deck, determine if you have adequate airspeed for flight. If your airspeed is not adequate, eject. If your airspeed is adequate, maintain MRT and smoothly rotate aircraft to optimum AOA to stop sink rate. If the sink rate is not arrested, increase AOA to 24 units. Maintain wings level and establish a positive rate of climb.

607. COMMUNICATION FAILURE

In the event of a communications failure, always troubleshoot the system by checking switches and looking for loose connections.

ENROUTE TO SHIP

Using hand signals, notify the lead of your NORDO condition and fuel state. The Lead/Safe will escort you back to home base or coordinate with Marshal to have another Lead/Safe escort you back to home base.

IN THE PATTERN

Fly a normal pattern to the start, call the ball in the blind and attempt to land if cut lights are received. If no cut lights are received, waveoff your approach and fly up the angled deck. Do not descend below 300 ft. Once abeam of the ship's bow, turn to parallel the ship's BRC. Climb and maintain 600 ft., turn on your interval and remain in the pattern. If a Lead/Safe joins on you he/she will take the lead and escort you home. If a Lead/Safe does not join on you continue in the normal pattern until you trap or reach bingo fuel.

NOTE

If you reach bingo fuel state or an emergency occurs that requires exiting the pattern, proceed to your divert field and squawk 7700 in your IFF. Cross-check your wet compass and HSI to ensure that heading is properly aligned. A Lead/Safe will attempt to join on you and escort you to the bingo field.

ON FLIGHT DECK

Never taxi to a catapult for launch with a known communication malfunction. Give the communication failure signal to the yellow shirt (point at ears or mask followed by a thumbs down) and follow the yellow shirt's signals to a parking area. Troubleshoot the malfunction when practicable (cycle the switches and check the mask and helmet connections).

LANDING WITH A BLOWN MAIN TIRE

Upon touchdown, with a single blown main tire, the aircraft will begin an immediate and rapid yaw or swerve into the side of the blown tire. Additionally, the aircraft will establish an AOB of approximately 3 degrees opposite the direction of yaw (i.e., right yaw, left AOB). During the initial swerve, and subsequent pilot inputs to correct it, cockpit lateral accelerations (side-to-side) can reach up to 0.5 g that can be very uncomfortable. Landing area lateral deviations will vary depending on how rapidly correct control inputs (rudder inputs opposite the swerve) are applied. Due to these characteristics, a short field, fly-in arrestment at the divert field is the NATOPS recommended procedure to recover the aircraft.

For a short field arrestment, request LSO assistance and expect a "talk down" to a fly-in arrestment. The LSO may elect to use a shallower glideslope than usual; visual glideslope information provided by the lens/landing aide may conflict with LSO calls. Under these circumstances, disregard visual glideslope information and respond solely to LSO calls. A normal, on-speed approach should be flown using half flaps if practical. Reconfigure the flaps only after visual inspection confirms no flap damage from the blown tire. During the approach to land, the pilot should be prepared for the distinct possibility of a bolter and be ready to perform an immediate go-around. Normal touch-and-go or bolter technique should be used with an additional and simultaneous rudder application (requiring up to 180 pounds of force) to counter the effects of the blown tire. Prompt but smooth aft stick application, up to full aft stick, will reduce time on deck. Once airborne, center the rudder pedals (to prevent a rudder-induced roll) and maintain a flyaway attitude. Power should be reduced only when arrestment is assured, either by an LSO call or deceleration is felt by the pilot.

See NATOPS for more information and procedures.

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CHAPTER SEVEN SELF-TEST

LANDING SIGNAL OFFICER

1. Give the corrective action (response) to each of the following calls and state whether it is informative, advisory, or imperative.
 1. "You're low."
 2. "Right for lineup"
 3. "Easy with it."

ANSWER:

1. You're low: adjust glideslope immediately (informative call)
2. Right for lineup: come right to correct lineup to centerline (imperative call)
3. Easy with it: reduce magnitude of power correction (advisory call)

FIELD CARRIER LANDING PRACTICE (FCLP)

2. Upon arriving at the 180-degree position, you find that you are too close. In order for you to arrive at the correct 90-degree position, should you increase or decrease your AOB?

ANSWER: When you are too close at the 180-degree position, you will have to use maximum AOB to arrive at the correct 90-degree position to prevent overshooting. In addition, you must increase your initial rate of descent to be at the correct altitude at the 90-degree position.

GLIDESLOPE AND AIRSPEED CORRECTIVE ACTIONS

3. You are making your approach to the carrier. While making glideslope corrections for low and on speed, you overcontrol and the ball starts to rise at the ramp. What should you do?

ANSWER: In this situation you should stop the movement of the ball but not attempt to recenter it. If you attempt to recenter the ball, you could overcontrol again, causing a very dangerous situation.

NIGHT FCLP LIGHTING

4. What's the most important difference between day FCLP and night FCLP?

ANSWER: The lack of visual cues at night.

CARRIER PROCEDURES

5. During carrier qualification when is it appropriate to initiate your own waveoff?

ANSWER: You may initiate your own waveoff only in an emergency or if you have not received a "Roger ball" call by the in-the-middle position.

6. Briefly describe the Case I Marshal (holding) pattern.

ANSWER:

1. Left-hand circling pattern (with flight in balanced formation) tangent to ship's BRC with the ship at the 1 o'clock position.
2. No more than 5 nm in diameter
3. At assigned altitude (minimum: 1,500 ft)
4. Minimum separation of flights (vertically): 1,000 ft
5. Marshal airspeed: max conserve

7. Identify the common errors associated with the carrier pattern break.

ANSWER:

1. Failure to check clock to set an exact break interval
2. Failure to hold heading and altitude after interval has broken
3. Gaining or losing altitude in the break--haze and loss of visual cues make an instrument break imperative

8. Describe the four-plane break procedure during a carrier pattern entry.

ANSWER:

1. The lead will break on interval or no earlier than 1 nm past bow or as directed by Tower.
2. Each wingman breaks at 17-second intervals after lead breaks.
3. Execute level break: use approximately 70-80 degrees AOB, reduce power to IDLE, and extend speed brakes.
4. Descend to 600 ft AGL when wings level on downwind.
5. At 200 KIAS, extend gear and flaps/slats.

9. True or false. The 180-degree position is the same as the abeam position when there is a 25- to 30-kt wind across the deck.

ANSWER: True

10. True or false. A right-to-left crosswind will always be present at the ship.

ANSWER: False. A right-to-left crosswind may be present on calm days due to axial winds. With high natural winds the winds will normally be down the angle.

11. What should you do if you lose sight of the taxi director while taxiing?

ANSWER: Stop

12. Identify the personnel associated with the following shirt colors:
Yellow, Green, Brown, Blue, Purple, White, Red

ANSWER:

1. Yellow: Plane Directors, Catapult Spotter, Catapult Officer, Flight Deck Officer, Arresting Gear Officer
2. Green: maintenance, catapult, and arresting gear personnel
3. Brown: Plane Captains
4. Blue: Plane Handlers (pushers, checkers, chainers, etc.), Phone Talkers, Elevator Operators
5. Purple: Fueling crews
6. White: safety and medical personnel, LSOs, final checker, and Quality Assurance (QA)
7. Red: ordnance and crash crews

13. What are the differences in the takeoff checklist when performed on the carrier?

ANSWER: Anti-skid is set to OFF and stabilator trim is set to 3 1/2 degrees noseup.

14. What is the first thing you must accomplish before starting the hot seat procedures?

ANSWER: Verify that a FOD safety screen has been placed over the port engine intake.

15. Why is the parking brake never used beyond the JBD?

ANSWER: To eliminate the possibility of blowing both main tires on the catapult.

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APPENDIX A GLOSSARY

A

Air Boss: Officer (located in Pri-Fly) in charge of all flight deck and tower operations within 10 nautical miles of the ship.

Air Operations Officer: The officer who coordinates all matters pertaining to air operations including CATCC.

Airplan: Schedule of carrier flight operations published daily.

Angels: Altitude in thousands of feet. For example, Angels 1.5=1,500 feet.

Axial Winds: Winds down the longitudinal axis of the ship created by the ship's forward movement. This causes a right-to-left crosswind across the angled deck.

B

Bingo: Refers to the minimum fuel state required to divert safely to the nearest suitable field.

Bolter: A touchdown on the carrier in which the arresting hook does not engage the arresting wires.

BRC: Base recovery course, which is the ship's magnetic course.

Buster: Proceed at maximum airspeed, generally for an immediate Charlie.

C

Carrier Air Traffic Control Center (CATCC): The centralized department responsible for the status-keeping of all carrier air operations and control of all airborne aircraft involved in launch and recovery.

Case I: Weather 3,000/5 or greater exists at the ship (3,000-foot ceiling and 5-nm visibility within the carrier control zone). Refers to recovery/departure procedures used during VMC conditions. Case I recoveries will marshal overhead the ship and enter the pattern via the break.

Case II: Weather less than 3,000/5 but greater than 1,000/5 exist at the ship. Case II recovery is a controlled IMC descent to the break and the VFR pattern. It is used when a VFR penetration cannot be made. The approach may be via radar vectors or a TACAN approach. In no case will more than a section of two aircraft execute a Case II recovery. Case II departure is a procedure used to climb through IFR conditions to VMC.

Case III: Recovery/departure procedures used at the ship when weather is less than 1,000/5 or at night.

CCA: Carrier-controlled approach similar to a GCA.

Charlie: Signal for aircraft to land aboard the ship.

Cherubs: Altitude in hundreds of feet. For example Cherubs 3 = 300 feet.

Chicks: Wingmen in a flight.

Clara: A pilot transmission indicating the pilot does not have the visual landing aid (ball) in sight.

Clara lineup: A pilot transmission indicating the pilot does not have a usable lineup reference.

Cross-Deck Pendant (CDP): Arresting gear wire.

Cut lights: Green lights mounted horizontally and centered above the IFLOLS lens box (controlled by the LSO). Used during ziplip and EMCON conditions to give pilots clearance to land, i.e. "Roger Ball" or indicate power is needed on the aircraft.

D

Datum Lights: Green reference lights mounted horizontally on the IFLOLS lens on each side of the centered cell.

Delta Clean: Signal for aircraft in the pattern to raise gear and flaps/slats and hold as directed.

Delta Easy: Signal for aircraft to remain at pattern altitude with gear and flaps/slats down and speed brakes retracted.

E

Emission Control Procedures (EMCON): Electronic emission control procedures are in effect at the ship to avoid detection. All radio, radar, and navigation equipment transmissions are eliminated except as required for safety of flight.

Expected Approach Time (EAT): Time at which an aircraft is cleared inbound to penetrate from a pre-assigned fix.

F

Father: Code name for the ship's TACAN.

Feet Wet or Feet Dry: Aircraft crossing the coastline enroute to or returning from the ship.

Field Carrier Landing Practice (FCLP): LSO-graded landings conducted at the field prior to any carrier evolution.

Foul Deck: Landing Area (LA) is not free of all obstructions or the flight deck is not ready to recover aircraft.

Foul Line (ship only): A line painted on both sides of the landing area to define the minimum area that must be free of obstructions in order to consider the deck clear.

H

Hangar Deck: Area below the flight deck used to store and repair aircraft.

Hawk: Term used for Lead/Safes to perch above low state aircraft. (ex: “Hawk 302”)

Holdback: Metal fitting designed to hold an aircraft in place and break or release at a preset level of force during a catapult stroke.

Hold-Down: Fuel state at which an aircraft will be refueled on deck prior to launch.

Hook to Eye: The vertical distance measured between the pilot's eye and the aircraft's hook point.

Hook to Ramp: The clearance distance between the aircraft's hook point and the flight deck as it crosses the ramp.

Hot Refueling: Aircraft receives fuel with engine turning.

Hot Seat: The replacement of one pilot by another pilot while the engine is turning.

I

Improved Fresnel Lens Optical Landing System (IFLOLS): Pilot's landing aid, i.e. meatball.

Interval: The time between you and the aircraft you are to follow.

J

Jet Blast Deflector (JBD): Hydraulically lifted deck plate mounted behind each catapult.

L

Landing Area (LA): The area of the Flight Deck used to recover aircraft. NO personnel or equipment are allowed in the LA during recovery operations.

Launch Bar: Metal arm attached to the nose gear and used to launch the aircraft.

Landing Signal Officer (LSO): Controls all fixed-wing aircraft from the 180 position to touchdown during carrier and FCLP landings.

M

Marshal: Holding pattern used during Case I, II, and III recoveries and a term used to identify the ship's radar control room.

Meatball: Light projected by source lens on the IFLOLS.

Mini Boss: Assistant to the Air Boss. Primarily manages operations forward of the ship's island during launch and recovery.

Mother: Code name used for the carrier.

Mark Your Father: Bearing and distance from the carrier.

O

On the Ball: LSO call stating that an aircraft is in the groove.

Overhead Time: The scheduled time a flight is expected overhead the ship.

P

Paddles: Call sign for the LSO.

Parrot: IFF

Pigeons: The magnetic bearing and distance to the divert field named.

Pilot Landing Assistance Television (PLAT): Video camera system used to record carrier operations.

PIM: Position of intended movement.

Plane Guard: SAR helicopter or ship assigned during aircraft launch and recovery, usually located in starboard Delta for a helicopter, three miles astern for a ship.

Platform: A reporting point during an approach (normally 20 nm from the ship at 5,000 ft) at which speed brakes are retracted and the rate of descent is decreased to 2,000 feet per minute.

Popeye: Code word used to signify that aircraft is operating IMC.

Pri-Fly: Tower location where the Air Boss oversees the pattern and flight deck operations.

Pull Back: Action following an arrestment whereby the wire is partially retracted to allow the pilot to raise the tailhook.

Push Back: Action taken anytime the aircraft needs to be moved backwards by deck personnel.

Pogo: Return to previous frequency if unable to establish communications on frequency assigned.

R

RTB: Signal to return to base

Ramp: The aft end of the flight deck.

Ramp Time: Time assigned for an aircraft to be crossing the ramp.

Roll Angle: Movement of the lens about the roll axis (set for each type of aircraft) to maintain a constant targeted hook-to-ramp distance and hook touchdown point.

Round Down: The aft end of the landing area that is curved downward and painted white.

S

"See You": Communication used to indicate the flight lead has the ship in sight.

Shuttle: The portion of the catapult that attaches to the launch bar during catapult launches.

Spin: Term used to direct a flight to depart for the break remaining within 3 miles at 1,200 ft.

Starboard Delta: Holding pattern used by helicopters and COD aircraft flown on the starboard side of the ship using right-hand turns.

Steer: A heading to an airfield.

Strangle Your Parrot: Turn off your IFF.

Suspend: Stop the catapult launch sequence.

Sweet Lock: Positive TACAN lock-on.

T

Tension: The portion of the catapult launch sequence when the shuttle is hydraulically moved forward to engage the launch bar.

Tiedown: Chocks and chains used to secure aircraft on the flight deck.

Trick or Treat: Aircraft in pattern that has enough fuel for one more approach. If the aircraft doesn't trap, it will have to bingo.

W

Waveoff: Procedure used to terminate an approach when directed by the LSO or Tower.

Wind-Over-Deck: The amount of wind crossing the deck which is either caused by natural wind or the ship's movement.

Z

Ziplip: Condition under which radio communications are minimized.

APPENDIX B
T-45 CARRIER QUALIFICATION BRIEFING GUIDE

The following items will be briefed by the flight lead for all Carrier Qualification flights. The brief will be conducted 2.5 hours prior to scheduled takeoff time.

1. Lineup/Qual Numbers
2. Flight Call Sign/Clearance
3. Times
 - a. Walk
 - b. Manup
 - c. GTS Start (Takeoff – 15 min)
 - d. Takeoff (dependent on ship's position)
 - e. Overhead/Charlie
4. Weather
 - a. Departure
 - b. Enroute
 - c. Ship
 - d. Divert field
 - e. Bingo field
5. Waypoint Plan
6. Communication Plan. Radio 1/Radio 2
7. Preflight. Perform normal preflight, paying extra attention to the following items:
 - a. Carrierization card in ADB
 - b. Tire pressure
 - c. Launch bar

- d. Holdback assembly
- e. Landing gear - proper servicing; security
- f. Tailhook - security; greased
- g. Tailhook snubber pressure - 950 psi +/- 50
- h. Cockpit
 - i. Instruments secure - both c/p
 - ii. No loose gear, minimum pubs/gear in cockpit
 - iii. Check cat grip
 - iv. Rear cockpit - Harness locked; "Soloized"
- 8. Ground Procedures
 - a. Steam Ingestion Bleed Valve Checks
 - b. Comm checks (check appropriate channelization)
 - c. Marshal (normally in chocks)
 - d. Taxi
 - i. 300-foot centerline/150-foot staggered
 - ii. Bumpier due to carrier pressure tires
- 9. Enroute
 - a. Take off and departure
 - b. IFR/VFR clearance/Rendezvous
 - c. Enroute to ship - Feet Wet Checklist
 - i. Anti-skid Switch – Off
 - ii. Lights – Off
 - iii. Box INS

- d. Strike Check-in
 - i. Number in flight
 - ii. Position
 - iii. Low Fuel State
- e. Marshal Check-in
 - i. Position
 - ii. Altitude
 - iii. Low fuel state
 - iv. Line-up
 - v. Qual numbers
 - vi. Marshal will pass
 - (a). Case Recovery
 - (b). Type Recovery
 - (c). Expected BRC/Final Bearing
 - (d). Bingo/hold-down numbers for IP/Students
- 10. Fuel Management
 - a. Individual pilot responsibility
 - b. Note bingo distance, bearing, and fuel required.
 - c. Hold-down: Gear down/flaps up Bingo numbers, but not less than Clean Bingo + 300 pounds.
- 11. Approaches to the ship
 - a. Case I (WX 3,000/5)
 - i. Holding
 - (a). #1 Radio – Marshal or Tower Frequency depending on altitude.

- (b). Formation Considerations
 - (c). Lead/Safe common in #2 radio.
- ii. Signal “Charlie” from Tower, flight will descend from holding IAW CV NATOPS/this instruction.
 - (a). Depart low holding at PT 3 on a heading 210° relative to BRC.
 - (b). SNAs hook up for first two passes unless otherwise directed.
- iii. Wings level at 1200 feet/5 NM, then descend to the initial.
- iv. Initial
 - (a). 800 feet at 3 NM/300 knots.
 - (b). Flight lead will call “initial.”
- v. FTI Formation
- vi. Lead breaks not sooner than 1 NM upwind; wingmen use 17-sec interval.
- vii. Ensure BRC in course window
- viii. Spin procedures
 - (a). Initiate spin no later than the bow.
 - (b). Climb to 1200 feet/stay within 3 NM.
 - (c). Flight lead calls “spin 90.”
 - (d). Descend to 800-feet for break
 - (e). Spin pattern has priority over break traffic.
- b. Case II (WX 1,500/5, waivable to 1,000/5 by CVN CO)
 - i. Marshal as assigned: DME = angels + 15
 - ii. Only sections may penetrate IMC. Lead may break up the division for individual holding.
 - (a). Dash 2 will normally remain with lead.

- (b). Dash 3 and 4 will be dropped off at marshal altitude and proceed to holding point. Expect another lead to join and lead them on the CV-1 into the break.
 - iii. Descend at 250 knots, S/B out, 4,000-6,000 FPM.
 - iv. Lead will call "Platform" at 5,000 feet and shallows rate of descent to 2,000 FPM.
 - v. When ship in sight, lead will call "See you at DME" and switch to Tower frequency; enter normal break (800 feet/300 knots).
 - vi. If not VMC or ship is not in sight by 800 feet/5 NM, report to App (BTN 15), proceed on BRC, and stand by for vectors.
- 12. CV Pattern
 - a. Pilot-controlled pattern
 - b. Break
 - i. 800 feet AGL/300 knots.
 - ii. Lead – no earlier than one mile upwind.
 - iii. Wing – 17 seconds after lead.
 - iv. Level break on the instruments.
 - v. Descend to 600 feet on downwind.
 - c. Downwind
 - i. Landing checklist - Harness: Check, Anti-skid: Off, Hook: Up, for two touch-and-goes (unless directed otherwise).
 - ii. RADALT: set to 380 feet/450 feet.
 - iii. AOA/airspeed/fuel state cross check
 - iv. Abeam, call "Qual number, Abeam."
 - d. Approach Turn
 - i. Abeam position. Lead should set proper distance abeam (0.9 to 1.1 NM). Use TACAN DME on downwind for backup.

- ii. Turn when you first see white of the round down.
 - iii. 90-degree position: 450 feet AGL.
 - iv. 45-degree position: 375 feet AGL.
 - v. Do not look for or fly the ball too early.
 - vi. Ball acquisition - check VSI and adjust (500-600 FPM).
 - vii. No lower than 300 feet without a ball.
 - viii. Fly the numbers - Avoid looking outside the cockpit early in the approach turn. You will appear high and tight.
- e. In the Groove
- i. Work to a good start.
 - ii. Call the ball: "Side number, Goshawk ball, fuel state, and qual number."
 - iii. Meatball, line up, angle of attack.
 - iv. Fly the ball all the way to touchdown. Landing should be a surprise.
 - (a). MRT and S/B in upon touchdown.
 - (b). MRT until a complete stop.
 - v. Line-up corrections all the way to touchdown.
 - (a). Meatball is inaccurate unless you are on centerline.
 - (b). Watch large line-up corrections IC-AR
 - vi. Do not spot the deck.
 - (a). Do not look at the wires or back of the ship.
 - (b). Always keep your scan moving.
 - vii. Rules to live by
 - (a). Never accept a low ball or lead a low.
 - (b). Never re-center a high ball in close, but stop the rising ball.

- (c). Do not take your own waveoff unless it's an emergency or no "roger ball."
- f. LSO Calls
 - i. Advisory
 - ii. Informative
 - iii. Imperative
- g. Waveoffs
 - i. Mandatory.
 - ii. Straight ahead (up the angle) unless otherwise directed.
 - iii. Do not over-rotate. Hold 17 units AOA/maintain landing attitude (if slow). Do not nose down.
- h. Touch and Go or Bolter
 - i. MRT, S/B in, rotate, and climb to 600 feet.
 - ii. Turn slightly right to parallel BRC at the bow. (do not cross the bow)
 - iii. If necessary, ask for interval.
 - iv. First aircraft to the bow has priority.
- i. Downwind
 - i. Turn with interval at 7 o'clock.
 - ii. Fly instruments - scan altitude, heading, and abeam distance.
 - iii. Reciprocal of BRC, 0.9 - 1.1 NM abeam.
 - iv. TACAN Gouge
 - (a). Bearing 30° DME: 2.0
 - (b). Bearing 45° DME: 1.4
 - (c). Abeam DME: 0.9-1.1

- j. Delta Pattern
 - i. “Easy” – Gear and flaps down, S/B in, 150 knots.
 - ii. “Clean” – Max endurance (~200 knots, maintain interval).
 - iii. First aircraft abeam after “Charlie” call commences the approach turn.
- 13. Deck Procedures
 - a. Arrestment
 - i. Fly the ball to touchdown.
 - ii. MRT, S/B in on touchdown all the way to a complete stop.
 - iii. Yellow shirt director at 1-2 o'clock
 - (a). Watch for signals (off brakes, pull back, raise hook).
 - (b). Use power (not brakes) to stop backward motion on pull back.
 - b. Leaving the landing area
 - i. Use high gain NWS.
 - ii. Taxi director signals – above and below waist.
 - iii. Follow taxi director
 - (a). Don’t rush, slow down.
 - (b). If unsure of signal, STOP and ask Tower.
 - (c). Keep head out of cockpit while taxiing.
 - iv. After first arrestment on the first day, expect to hot pump/top off fuel.
 - v. Notify Tower/deck personnel if fuel is at or below hold down after subsequent arrestments.
 - c. Taxi to JBD
 - i. Route and placement of director
 - ii. Takeoff checklist prior to crossing JBD.

- (a). Full flaps, 3-1/2 degrees noseup trim, RADALT set to 40 feet.
- (b). Baro Altimeter should indicate approximately 60 feet.
- iii. Weight board/signals (500-lb increments). Expect to roger weight board approaching the catapult.
- iv. Stop if you lose sight or are unsure who your director is.
- d. Catapult procedures
 - i. Watch the director.
 - ii. Taxi slowly
 - iii. Extend launch bar when directed.
 - (a). Use high gain NWS only when directed (+/- 20 degrees, low gain not available).
 - (b). **DO NOT** lower launch bar prior to rogering a correct weight board.
 - iv. Taxi slowly into holdback fitting; update BRC; may require 90 percent RPM to taxi forward to set launch bar once holdback is attached.
 - v. Tension signal (after signal, aircraft director will pass you off to Catapult Officer).
 - (a). Remain at IDLE.
 - (b). Heels on deck - Off brakes!
 - vi. Runup signal
 - (a). MRT - use cat grip.
 - (b). Retract launch bar (when at MIL).
 - (c). Wipeout controls/rudder pedals (check gauges/instruments).
 - (d). Head against seat.
 - (e). Salute Catapult Officer – ensure heels on deck.

- vii. Suspend
 - (a). Prior to salute - shake head “no” and broadcast, “Suspend, suspend!”
 - (b). After salute - same, but be ready to go.
 - (c). Remain at MRT until Cat Officer gives the "throttle back" signal.
- viii. Catapult techniques
 - (a). Hold stick lightly - allow it to come back aft during the stroke, set 10-12 deg attitude as the A/C flies away, but don't overrotate.
 - (b). Scan ADI, AOA, airspeed. Proceed upwind and look for interval. Minimum of 1 NM before turning downwind if only A/C in pattern.

14. Refueling Procedures

- a. Locations
- b. Review Push-Back procedures.
- c. Signals for chocks and chains.
- d. Canopy closed.
- e. Purple shirt refueling signals.
- f. Cut signal at 3,000 pounds. Monitor engine page.
- g. Call “side number, up and ready, gross weight.”
- h. Mask: On, Takeoff checklist complete, prior to being broken down.

15. Aircraft Manup

- a. Cold start/flight deck
 - i. Location of A/C (obtained from flight deck control, escort required). Boots on deck 45 minutes prior to launch. Strapped-in and awaiting start signal 30 minutes prior to scheduled launch.
 - ii. Preflight - same as before (don't hang into net to do preflight).
 - iii. Beware of intakes, exhausts, and props!

- iv. Avoid landing area if ops in progress.
 - v. Same start, checks, etc. (Start on yellow shirt signal only.)
 - vi. Alignment procedures.
 - vii. No hook check if tail over water until A/C pulls forward.
 - viii. Call “side number, up and ready, gross weight.”
- b. Hot switches
- i. Aircraft chocked and chained.
 - ii. Seat – safe and parking brake set.
 - iii. NWS – OFF.
 - iv. Throttle friction on.
 - v. Leave all electrical equipment on.
 - vi. Unstrap, loosen waist straps, seat up, and rudder pedals extended.
 - vii. Upon signal from PC and intake FOD screen in place, Canopy - Open.
 - viii. Debrief oncoming pilot after switch.
16. Normal Departure Procedures
- a. Case I
- i. Perform clearing turn.
 - ii. Maintain 500 feet to 7 NM at 300 KIAS, then climb and turn on course (shortest direction to divert); stay outside of 10 DME while climbing.
 - iii. Contact Departure
 - iv. If directed to join on a Lead/Safe, Tower will pass appropriate information.
 - (a). 250 knot rendezvous.
 - (b). Reselect Aux radio for coordination.

- v. Do not exit Warning Area until two-way comm established with FACSFAC.
 - vi. Complete fuel dry checks.
 - b. Case II
 - i. Perform clearing turn.
 - ii. Contact Departure.
 - iii. Maintain 500 feet to 7 NM at 300 KIAS, then turn in shortest direction on the 10 DME arc, proceed outbound and climb on the departure radial/heading from Departure.
 - iv. Rendezvous (if directed by Tower).
 - (a). VFR on top
 - (b). TACAN Rendezvous
 - v. Mandatory reports
 - (a). “Airborne”
 - (b). “Arcing”
 - (c). “Outbound”
 - (d). “VMC on top”
17. Bingo Procedures
- a. Be prepared to bingo at all times.
 - b. Update bingo info as provided by Tower.
 - c. Notify Tower when at bingo fuel state - This is an Emergency Procedure!
 - d. Turn to bingo heading and clean up (including hook).
 - e. Accelerate to 300 KIAS – level (clear pattern/initial/overhead stack).
 - f. Switch to Departure, if required, and commence MRT climb to predetermined altitude outside seven miles or when cleared by Tower/Departure (PCL Bingo Chart/kneeboard).

- g. Don't wait for safety pilot to join. Lead/Safe will run you down.
 - h. Dial up bingo field TACAN. Squawk 7700.
 - i. IMC as necessary to preserve profile.
 - j. Contact FACS/FAC/Approach Control. Lead/Safe may coordinate if applicable; relay emergency fuel situation.
 - k. Complete feet dry checklist.
 - l. Determine best pattern entry - downwind or base leg entry, VFR straight-in, min fuel GCA.
 - m. Heads up for other A/C.
 - n. Land on speed.
 - o. Remember carrier-pressurized tires; plan full runway rollout.
18. Emergencies
- a. Aborts.
 - b. NORDO - fly A/C first, then check fittings and switches.
 - i. Fly normal pattern; watch for cut lights; waveoff as directed. Subsequent cut lights: Power.
 - ii. Remain in the pattern until you trap or are joined by a Lead/Safe.
 - iii. If bingo fuel - BINGO!/Squawk 7700.
 - iv. If require immediate landing, turn landing light on. LSO will use cut lights to roger ball.
 - c. Loss of NAVAIDS.
 - d. Lost plane.
 - e. Lost sight/inadvertent IMC.
 - f. Down plane/SAR.
 - g. Bird strike.

- h. Midair.
 - i. Landing gear malfunctions (probable steer).
 - j. Brake failure.
 - i. Airborne - probable steer and short field arrestment.
 - ii. On deck - drop hook and transmit to Tower.
 - k. Catapult Emergencies.
 - i. Cold, soft, holdback failure, hang fire, suspend.
 - ii. Launch bar warning light/launch bar down airborne.
 - iii. ACCEL caution light.
 - iv. Brake Pressure caution light.
 - l. Flameout (during catapult/airborne).
 - m. Blown tire/smoked tire.
 - n. Hydraulic failure - dirty bingo.
 - o. System failure.
 - p. Ejection - Flight deck/low altitude.
19. Miscellaneous
- a. NATOPS/QOD
 - b. TIMS/Yellow sheets
 - i. All paperwork is completed at shore detachment site. If RON, keep a record of day one numbers.
 - ii. Log traps, cats, touch and goes, bolters, and field landing.
 - c. Flight isn't over until you are out of the aircraft, the paperwork is done, and you have reported to the SDO.
 - d. Reputation is earned around the ship - be professional and alert. Have Fun!