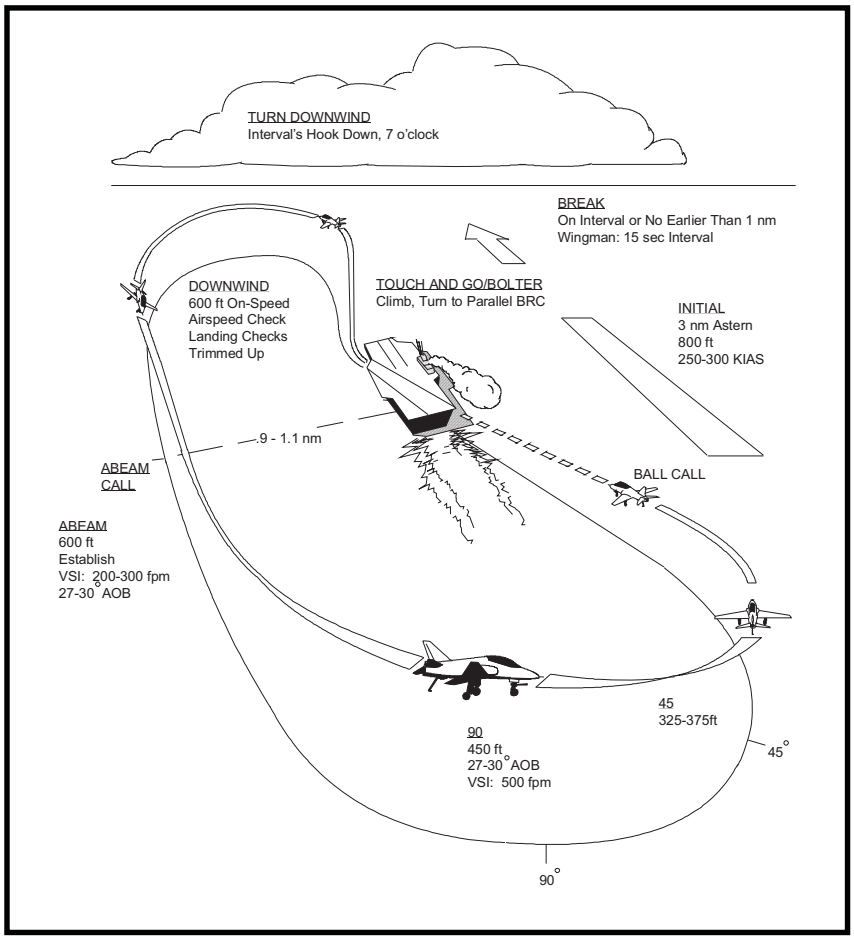
NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS **CNATRA P-1211 (7-01) PAT**

CARRIER QUALIFICATION



FLIGHT TRAINING INSTRUCTION
T-45TS, ADV, and IUT

2001

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.

FRESNEL LENS OPTICAL LANDING SYSTEM (FLOLS)

MODEL DESCRIPTION

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

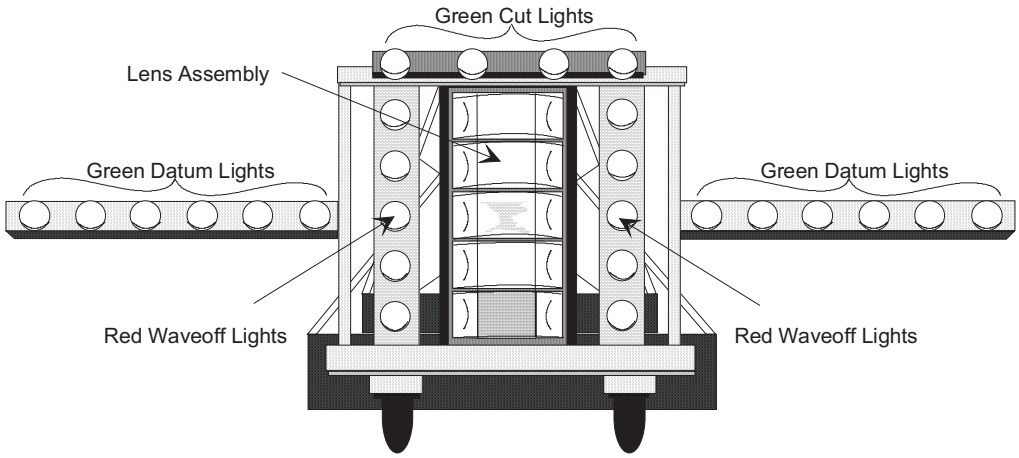


Figure 1: FRESNEL LENS--SHORE-BASED MODEL

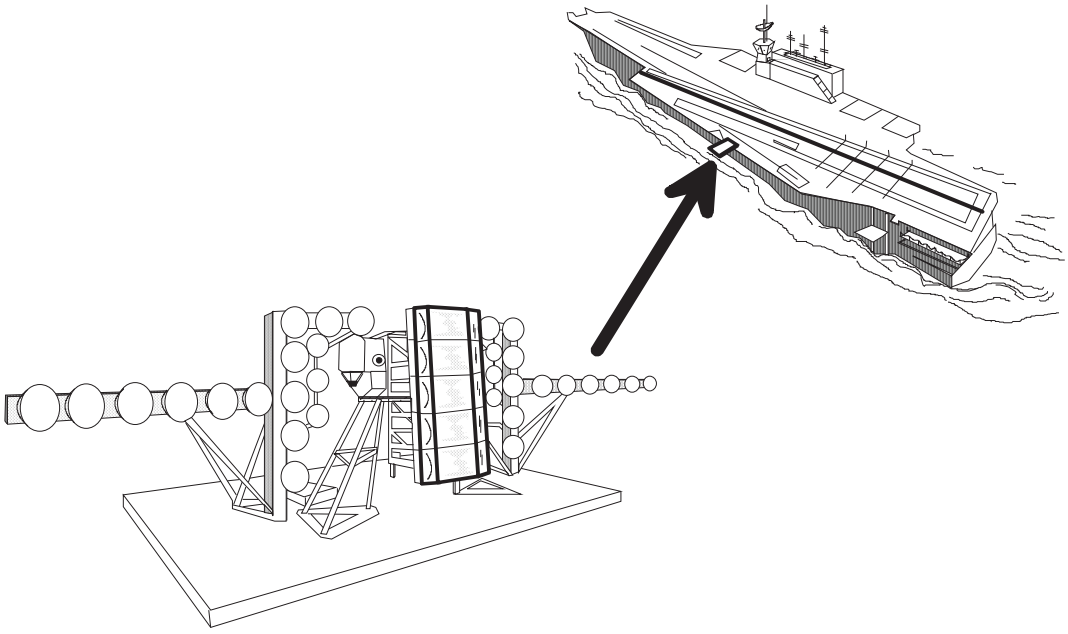


Figure 2: FRESNEL LENS--SHIP-BASED MODEL

COMPONENT DESCRIPTION

The Fresnel lens consists of a lens assembly, “cut” lights, waveoff lights, and datum lights.

LENS ASSEMBLY

The lens assembly is a box one ft wide by four ft high containing five vertical light cells. Depending on your position on the glidepath, one of the four upper amber cells or the bottom red cell is visible. The visible lens indicates your position relative to the glideslope, i.e., above, on, or below the optimum glidelsope.

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, 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. “Bingo” is signaled by alternating waveoff and cut lights.

NOTE: On the shipboard model, there are 3 auxiliary waveoff lights on each side and adjacent to the primary waveoff lights.

DATUM LIGHTS

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

LENS OPERATION

All source lights in the lens box are illuminated during operation (Figure 3). Each of the five cells is angled slightly from the adjacent cell for a total vertical coverage of 1.5 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 cell indicates 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 3/4 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 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 1.5-degree wedge, the ball will not be visible. If you understand glideslope geometry, you will realize the importance of flying to a good start.

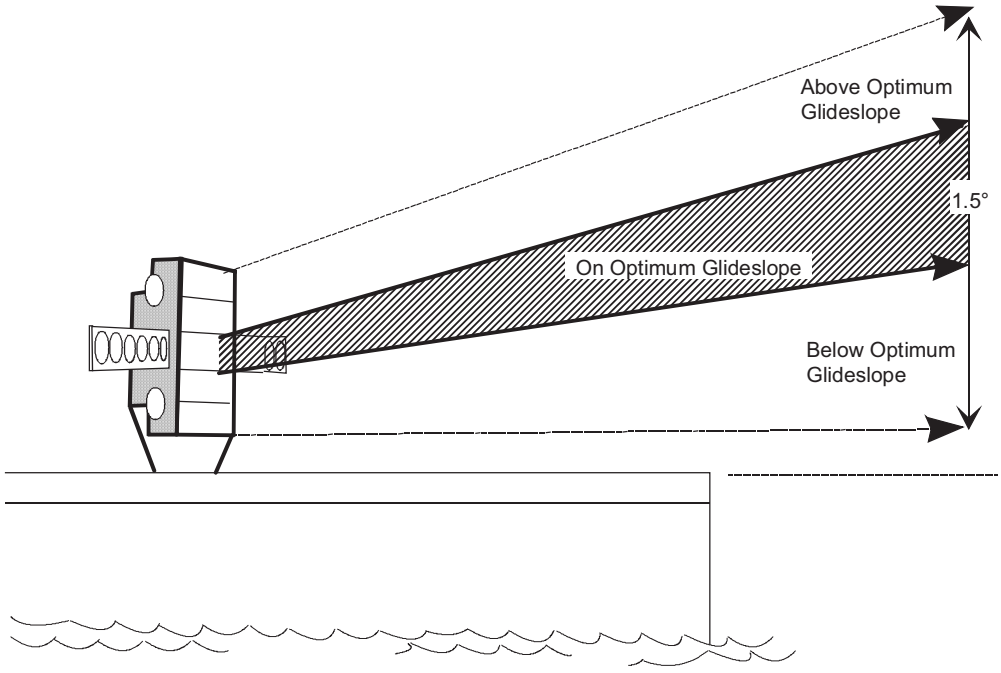


Figure 3: ABOVE, ON, AND BELOW OPTIMUM GLIDESLOPE

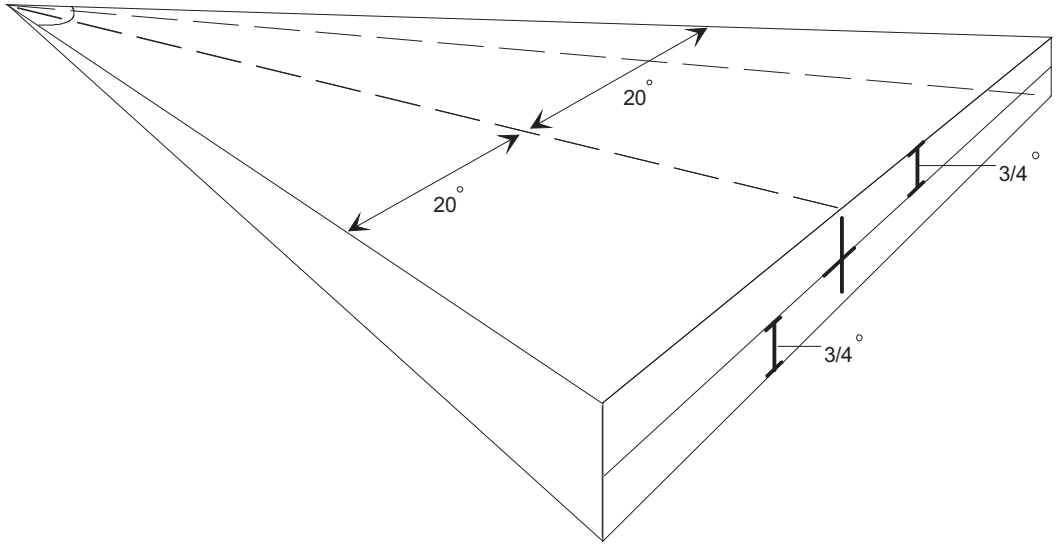


Figure 4: OPTICAL COVERAGE OF THE FRESNEL LENS

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 36 ft. The entire lens is 180 ft thick at one mile and only 15 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.

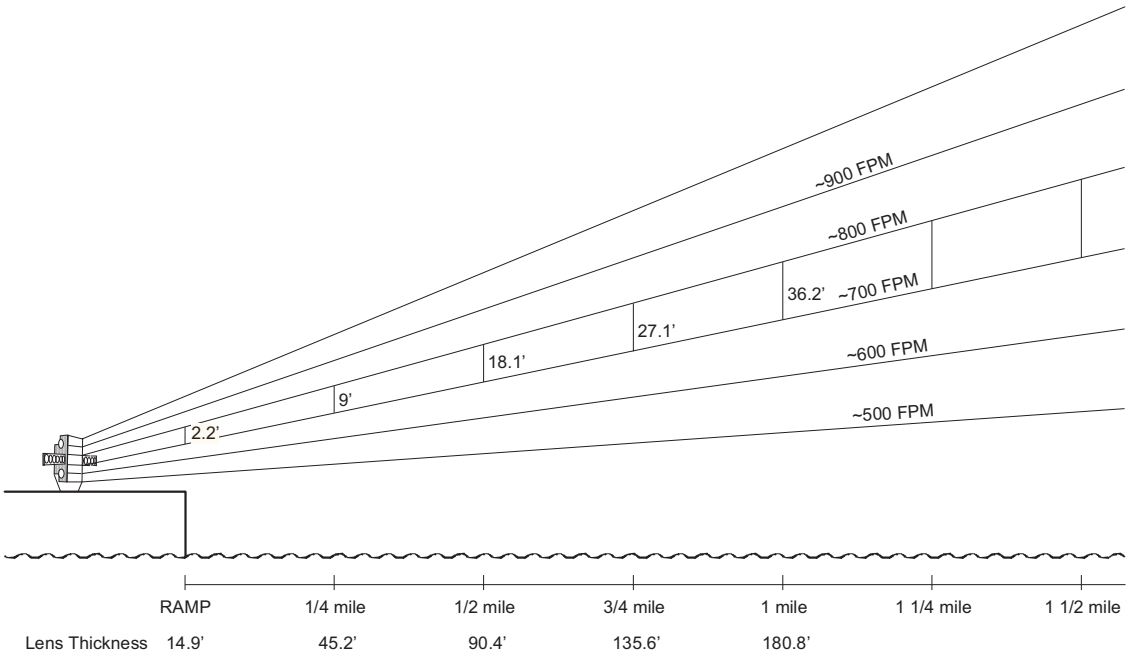


Figure 5: OPTIMUM GLIDESLOPE

IMPROVED FRESNEL LENS OPTICAL LANDING SYSTEM (IFLOLS)

The IFLOLS (Figure 6) is replacing the presently used FLOLS (pp 3-6). The theory and operation of the FLOLS and IFLOLS are the same. Primary differences are:

The IFLOLS has 7 additional cells, for a total of 12. This allows for more exact glideslope information, and a higher definition visual aid which can be referenced out to 1.5 nm. The IFLOLS will appear to be much more “sensitive” due to its increased accuracy.

The number of Datum Lights has increased to 10.

The vertical coverage has been increased to 1.7 degrees vice the 1.5 of FLOLS.

Acquisition range has been increased from 3/4 nm to 1 1/2 nm.

Due to present limited shipboard use IFLOLS, you will be briefed and FCLPed with a shore based IFLOLS, prior to CQ using IFLOLS.

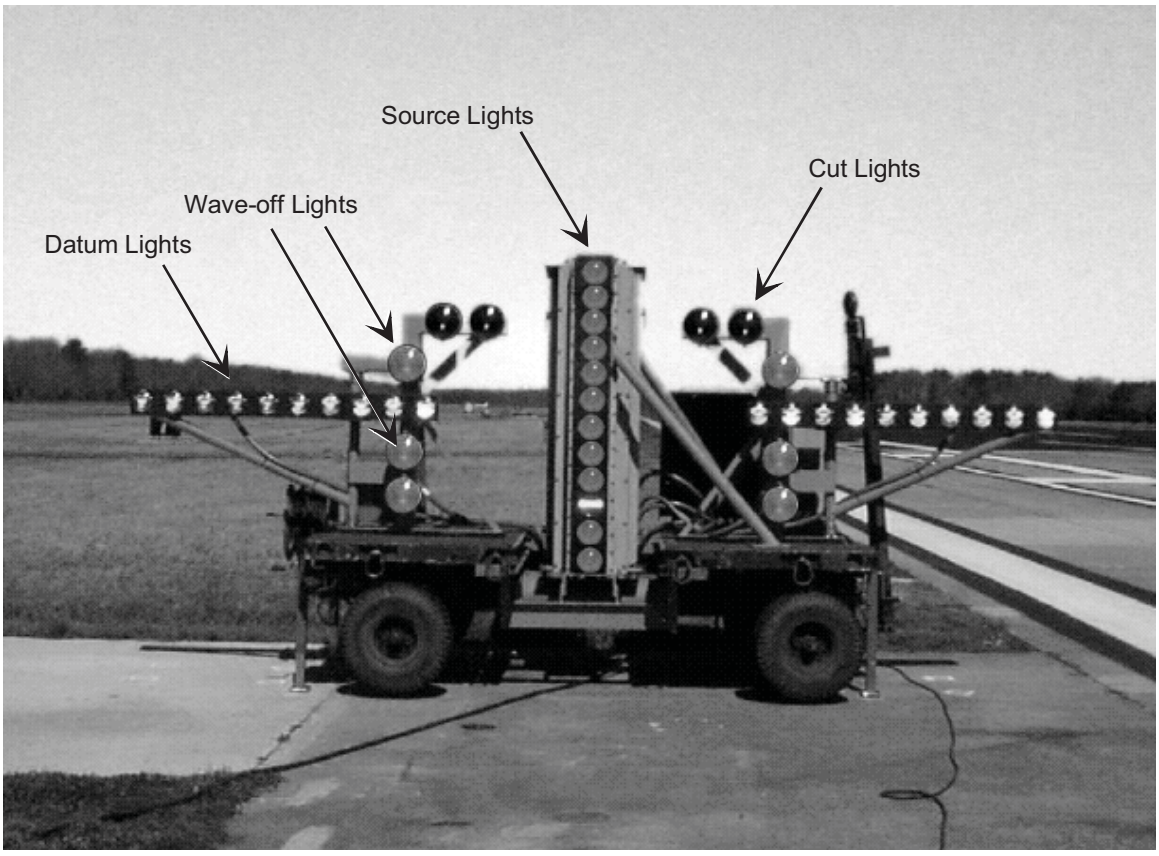
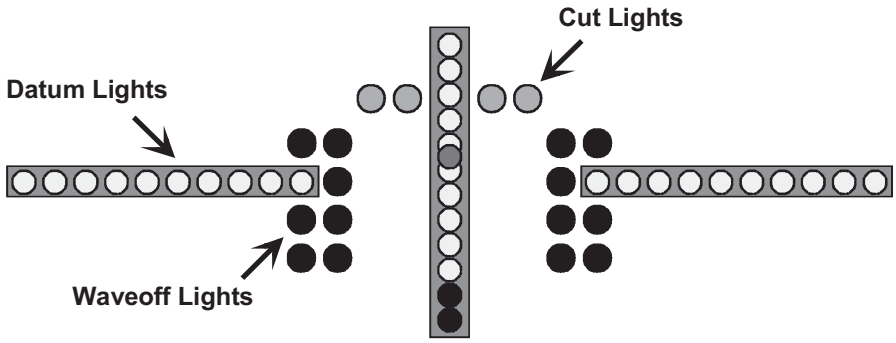


Figure 6: IMPROVED FRESNEL LENS (1 OF 2)

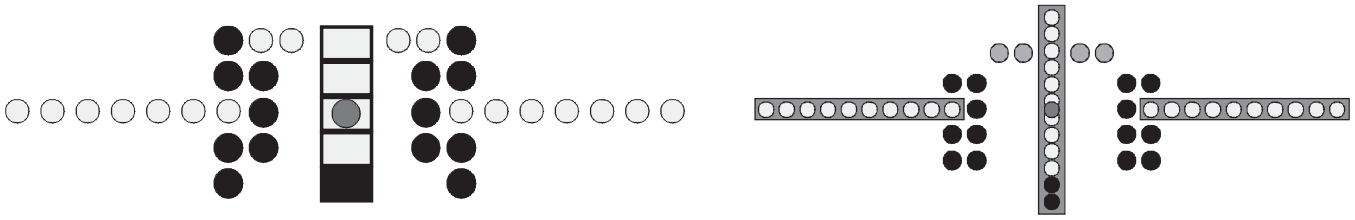


IFLOLS CONFIGURATION

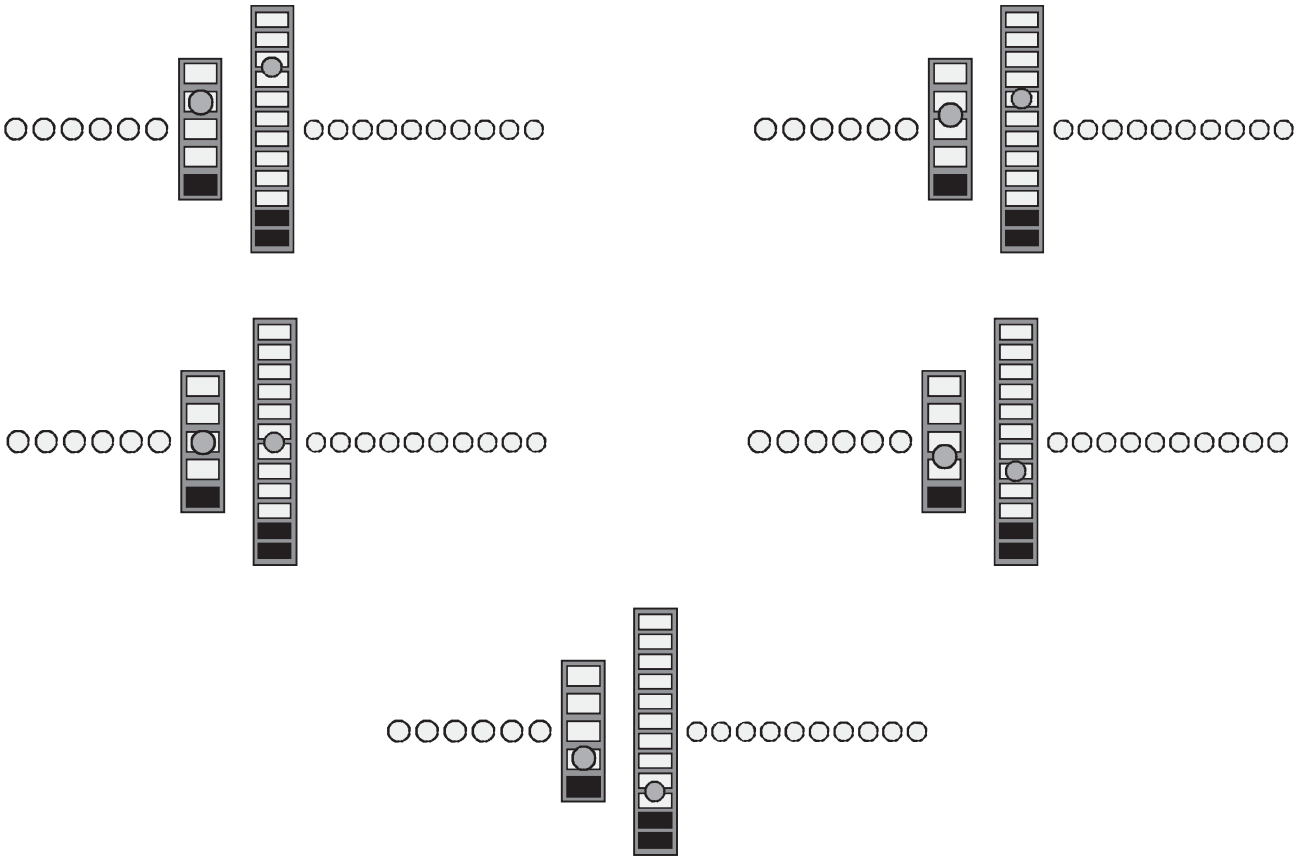
MK 14 SHORE-BASED

MK 13 SHIPBOARD

Figure 6: IMPROVED FRESNEL LENS (2 OF 2)



FLOLS AND IFLOLS COMPARISON



FLOLS AND IFLOLS COMPARISON - BALL POSITION

Note: The same magnitude of glideslope deviation *appears* greater on the IFLOLS. Use caution as to not overcontrol glideslope.

Figure 6A: FLOLS and IFLOLS COMPARISON

LANDING SIGNAL OFFICER

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.

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/nose attitude to reestablish a centered ball.
"You're (a little) low."	Correct glideslope immediately.
"You're going high/low."	Adjust rate of descent with power/nose attitude 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 (slightly) starboard/ port/axial."	Monitor lineup to maintain centerline.
"You're under/overpowered."	Adjust power and attitude as required.
"Ship's in a starboard/port turn."	Adjust lineup as necessary.
"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.
"Deep 90."	Compensate by increasing pattern altitude.
"Close 90."	Compensate by decreasing pattern altitude.

"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.

ADVISORY CALLS	ACTION REQUIRED
"Keep your turn in."	Increase AOB to prevent overshoot.
"Don't settle/Don't go low."	Adjust power/attitude to avoid settling below glideslope.
"Don't climb/Don't go high."	Adjust power/attitude to stop the ball from rising.
"Don't settle through it."	Adjust rate of descent with power/nose attitude to intercept and maintain optimum glideslope.
"Easy with the power."	Reduce magnitude of power/nose attitude correction to intercept and reestablish optimal glideslope and airspeed.

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

IMPERATIVE CALLS	ACTION REQUIRED
"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 line up to centerline, then level wings.
"Come left"	Correct line up to centerline, then level wings.
"Bolter."	Power to MRT, retract speed brakes, and rotate nose attitude to establish optimum AOA and climb.
"Wave off" or "Wave off, foul deck."	Power to MRT, retract speed brakes, and adjust landing attitude to maintain proper attitude and climb to pattern altitude. Fly up the landing area centerline. At the bow, turn parallel to the BRC.
"Wave off up the starboard side."	Power to MRT, retract speed brakes, and adjust nose attitude to maintain proper attitude and climb to pattern altitude. Fly up the starboard side of the ship.
"Speed brakes."	Retract speed brakes, as appropriate.

"Climb."	Adjust nose attitude to optimum AOA, level 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.

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.

SYMBOL	POINTS	DESCRIPTION
OK	5	Perfect pass
OK	4	Reasonable deviations with good corrections
(OK)	3	Fair pass, reasonable deviations
B	2.5	(B with diagonal arrow) bolter
–	2	No grade, below average but safe pass
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 7 and 8 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
		DFD	Dived for deck
		DLW	Dropped left wing
		DN	Dropped nose
○	A circle drawn around any symbol indicates that a signal was answered too slowly	DRW	Dropped right wing
		EG	Eased gun
OC	When used as a prefix to any symbol, OC indicates "over-controlled"	F	Fast
		FD	Fouled deck
A→	APC/AUTO	GLI	Gliding approach
M	Manual (APC-equipped aircraft)	H	High
PD	Pitching deck	⊙∴	Landed left wing down
I	Mode 1 ACLS (record in grade column)	∴⊙	Landed right wing down
•	When placed between two symbols, indicates "on" (e.g., S• LUIC)	∴⊙∴	Landed nose first
A	An APC/AUTO approach downgraded to manual	LIG	Long in the groove
		LLU	Late lineup
AA	Angling approach	LL	Landed left
ACC	Accelerate	LO	Low
AFU	All fouled up	L-R	Left to right
B	Flat glideslope	LR	Landed right
C	Climbing	LUL	Lined up left
CB	Coming back to the left	LUR	Lined up right
CD	Coming down	ND	Nosedown
CH	Chased	NEA	Not enough attitude
CO	Come-on	NELR	Not enough left rudder
COCO	Climbed on come-on	NEP	Not enough power
CPD	Chased pitching deck	NERD	Not enough rate of descent

Figure 7: 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		
S	Settle	**X**	At the start (first one-third of glideslope)
SD	Spotted deck	**IM**	In the middle (middle one-third of glideslope)
SHT	Ship in turn		
SLO	Slow	**IC**	In close (last one-third of glideslope)
SRD	Stopped rate of descent	**AR**	At the ramp
ST	Steep turn	**TL**	To land
TCA	Too close abeam	**IW**	In the wires
TMA	Too much attitude	**OW**	Over the wires
TMRD	Too much rate of descent	**AW**	All the way

Figure 8: LSO GRADING SYMBOLS (2 OF 2)

FIELD CARRIER LANDING PRACTICE (FCLP)

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:

* Conduct a thorough preflight with emphasis on strut inflation and tire condition.

* FCLP patterns may be entered after takeoff or by flying to an outlying field.

* Refer to NATOPS Chapter 4 for FCLP landing configuration limitations.

NOTE: SNPs 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 9). 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 downwind. Often you will check in on the paddles frequency on deck and launch directly into the pattern under LSO control.

BREAK

Execute a level 15 unit break at 70-80 degrees AOB, 250-300 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 downwind, trim for on-speed, cross-check AOA, and complete the landing checklist prior to reaching the abeam position.

ABEAM POSITION

Fly to an abeam distance of 0.9 to 1.1 nm laterally and maintain the proper interval and 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 an 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.

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- to 30-degree turn results in a centerline start with 15-18 seconds of straightaway (Figure 9). At the 180 position, roll into 27-30 degrees AOB and adjust power to set a 200- to 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 is primarily an instrument scan with several outside looks as required.

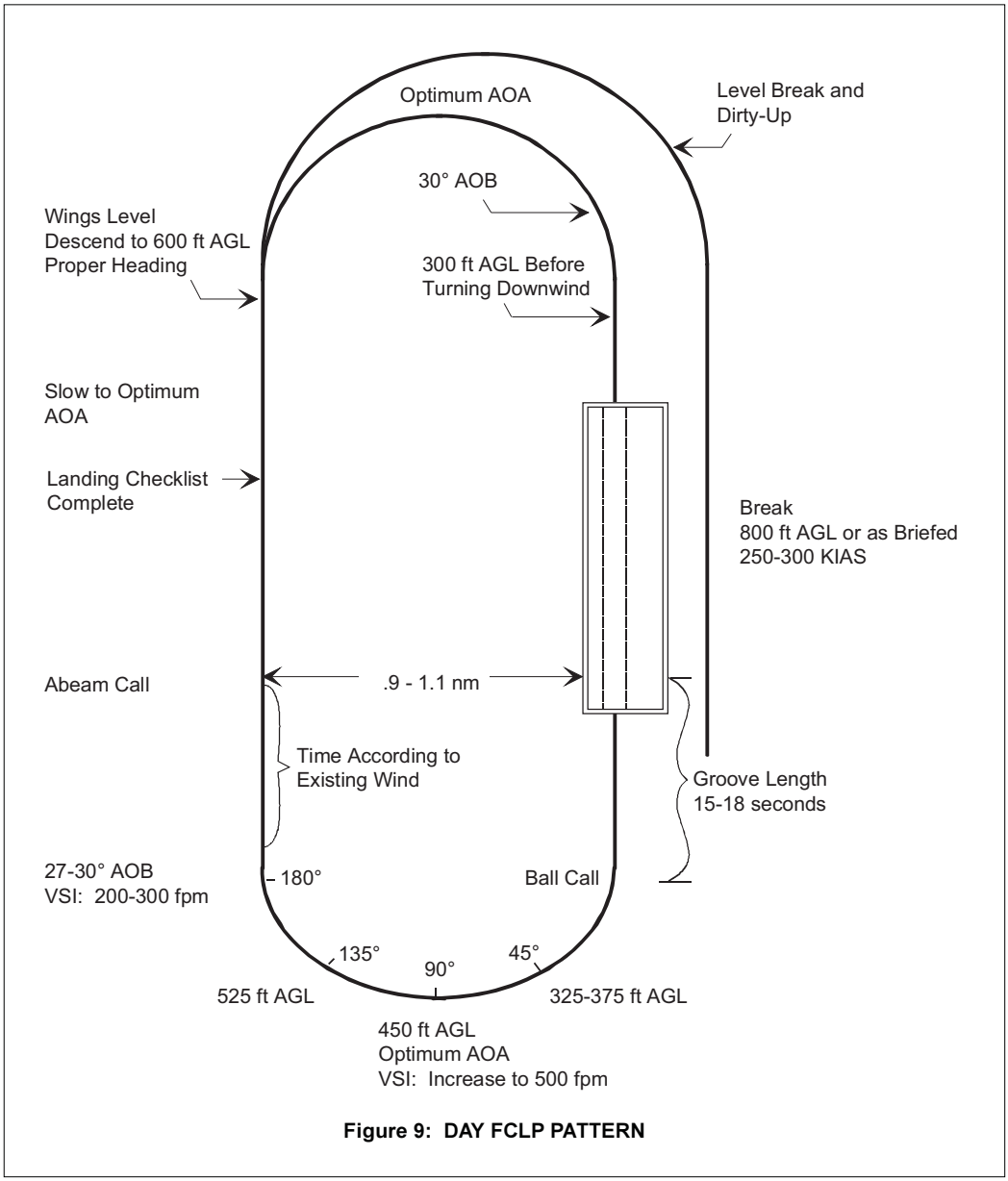


Figure 9: DAY FCLP PATTERN

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 close or too deep (Figures 10 and 11). 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: From the 90 to the 45, begin to transition from an instrument scan to a VFR scan, while maintaining a proper rate of descent.

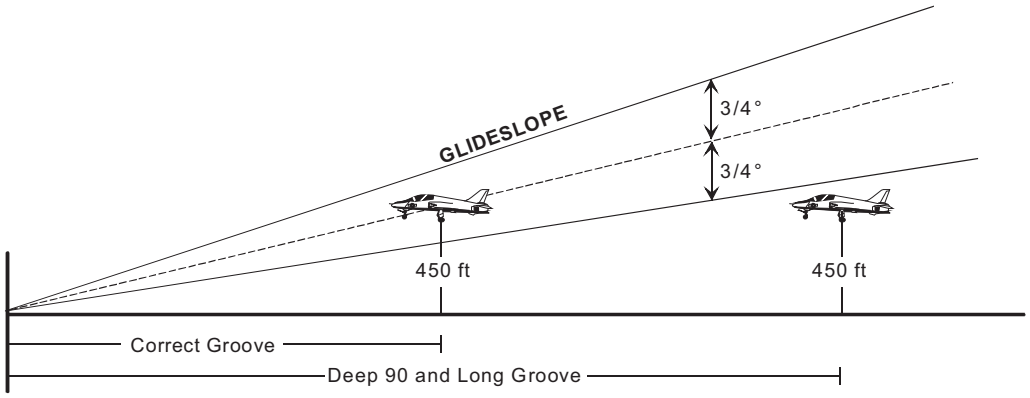


Figure 10: DEEP 90

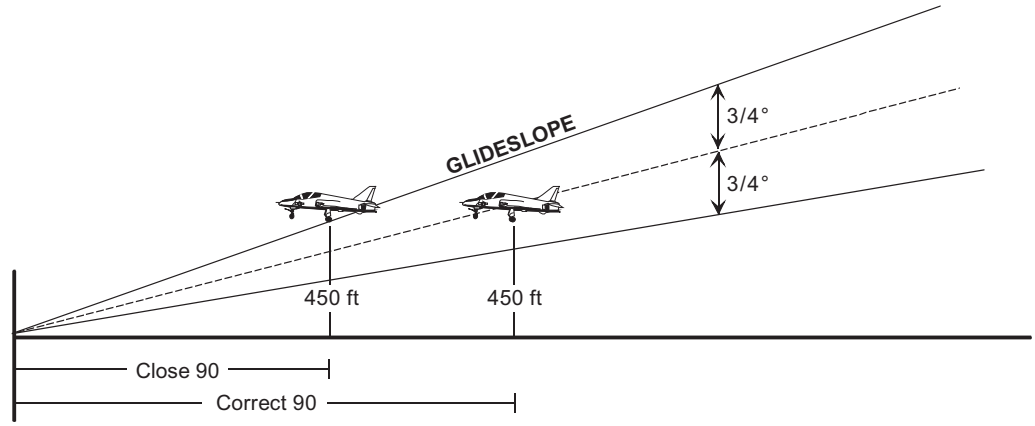


Figure 11: CLOSE 90

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.

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 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" call will 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, stay on centerline and on-speed AOA all the way to touchdown.

Do not overcorrect the ball in close to at-the-ramp. If the ball starts to go low, apply enough power to stop the ball's movement. Likewise, if the ball goes high in close, do not attempt to recenter the ball but stabilize it while maintaining AOA.

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 centered ball. Upon touchdown, simultaneously advance power to MRT, retract speed brakes, rotate to optimum AOA (approximately 12 degrees nose up) and establish a climb. Turn downwind off your interval (at 300 ft AGL or higher). **Ensure feet are off the Brakes!**

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. When performing a waveoff, simultaneously level the wings and advance power to MRT while retracting your speed brakes, maintaining landing attitude, and climb.

With your descent stopped, establish an optimum AOA rate of climb. 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.

DO NOT initiate your own waveoff except in an emergency or if you have not received a “Roger ball” by in-the-middle. DO NOT take your own waveoff in close. The waveoff will normally be taken straight ahead or as directed by the LSO.

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 a 30-degree AOB while climbing to pattern altitude.

DELTA PROCEDURES

If the deck or runway becomes fouled, you will be directed to go into a holding (Delta) pattern (Figure 12). You will be cleared out of the Delta Pattern by a “Charlie” call. See glossary for examples.

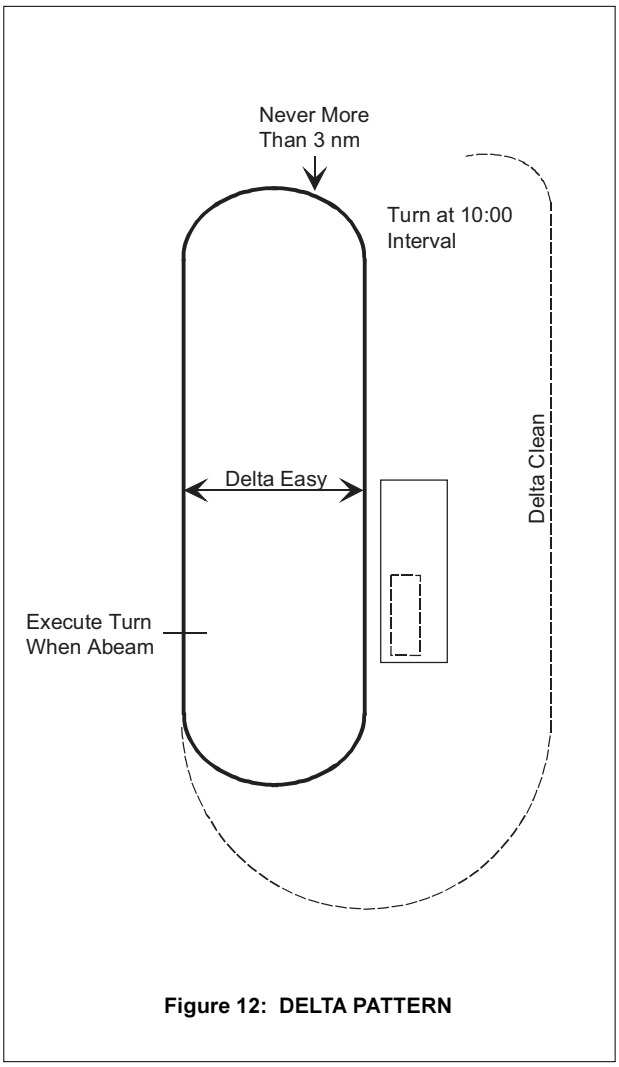


Figure 12: DELTA PATTERN

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, the first aircraft abeam will depart the Delta pattern to arrive at the initial with wings level, at 250 KIAS, and at initial altitude for the break. All aircraft will follow in order.

GLIDESLOPE AND AIRSPEED CORRECTIONS

You should correct any errors made immediately. The earlier you make a correction, the easier corrections and countercorrections 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, and 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 13 for the following discussion of glideslope corrections.

High
Reduce power to increase your rate of descent and adjust nose attitude to maintain optimum AOA. As the ball approaches the center, add power to reestablish and maintain the proper glideslope and readjust your nose attitude to maintain optimum AOA. Almost immediately following this countercorrection, a third adjustment will be required.

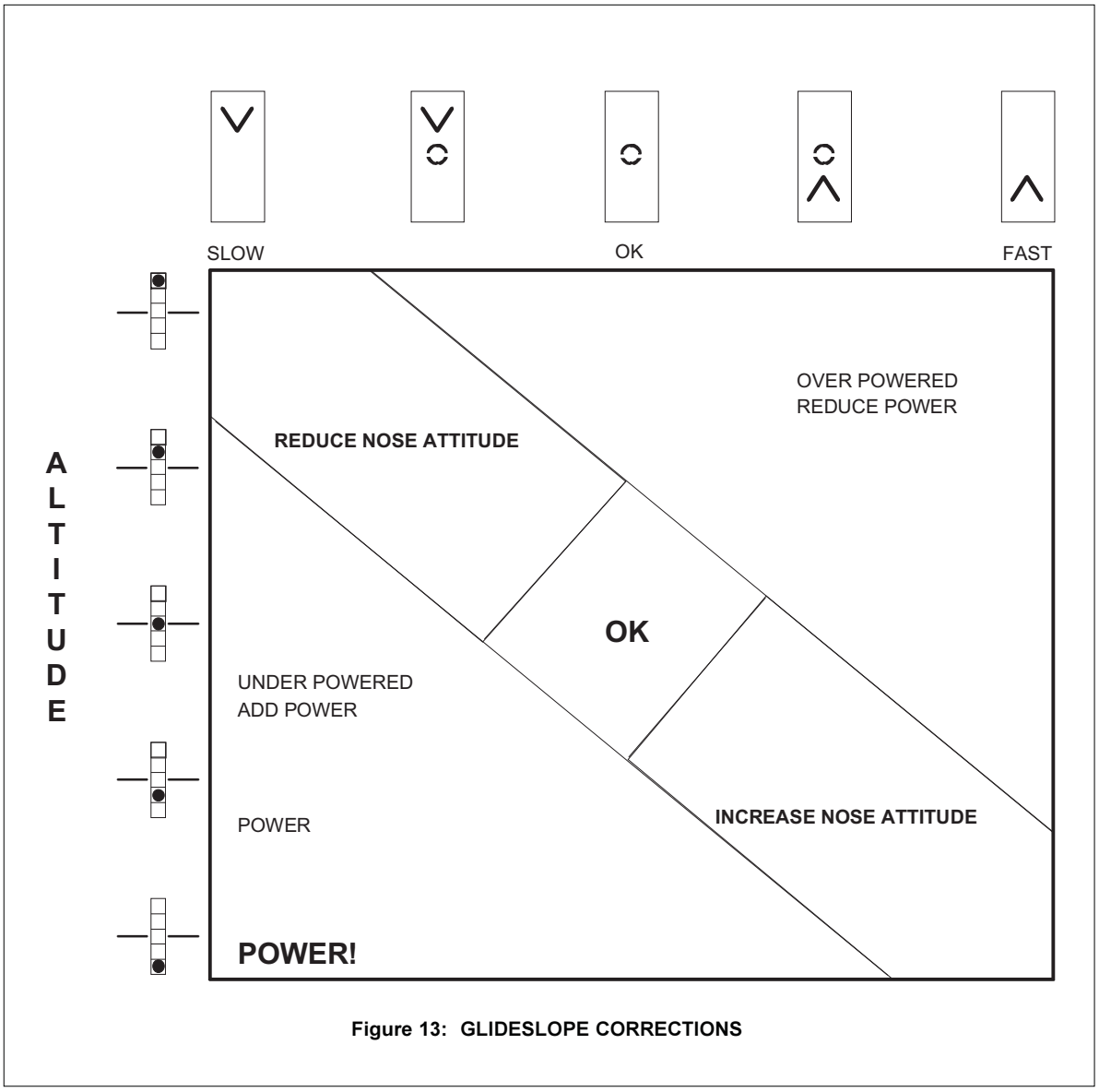


Figure 13: GLIDESLOPE CORRECTIONS

If the ball goes high in close or at the ramp, stop the movement but do not attempt to recenter the ball. Avoid the temptation to cut power or drop your nose when you are high or climbing in-close to at-the-ramp. Accept the high or take your bolter. A large power reduction in close to at-the-ramp is referred to as a cut or ease gun. This condition is unsafe and is never an acceptable correction—a high "come down" will result in a hard landing, blown tires, and possible structural damage.

Fast
Reduce power. As the aircraft decelerates, coordinate an increase in nose attitude slightly to maintain a centered 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.

High and Fast
As in the high or fast approach, you must reduce power. As the ball approaches the center, increase nose attitude as necessary to correct back to optimum AOA. The aircraft approaches on-speed prior to regaining a centered ball. Adjust power to control your rate of descent and to maintain proper AOA. As the ball approaches the center, use nose attitude and power to stabilize on the proper AOA and glideslope.

Under Powered

Low
Add power and adjust nose attitude to maintain optimum AOA. Once the ball is centered, reduce power to reestablish glideslope and readjust your nose attitude to maintain optimum AOA. Do not lead a low by reducing power prior to a centered ball. An inevitable third correction is required to stabilize on glideslope. Never accept a low ball. Never finesse a low ball.

Slow
Add power. As the aircraft accelerates, decrease the nose attitude slightly to obtain optimum AOA and then readjust attitude to maintain AOA and reduce power to maintain glideslope. To stabilize glideslope, a third power correction is mandatory.

Low and Slow
Add power immediately. Maintain nose attitude while adding power. As the ball centers, prior to your regaining the proper AOA, decrease nose attitude to stay on glideslope until optimum AOA is reached. If the aircraft returns to on-speed while the ball is still low, adjust the nose attitude to maintain proper AOA while waiting for the glideslope correction to be completed. When the ball is centered, simultaneously adjust the nose attitude and reduce power to reestablish the proper rate of descent. Add power and adjust nose attitude as necessary to stabilize the aircraft on glideslope and airspeed. A third power and attitude correction is required.

Power Ok

High and Slow
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. If your aircraft accelerates to on-speed prior to the ball reaching the center, a small power reduction is necessary. If the AOA continues to indicate that you are slow, add power, and as the ball approaches the center, accelerate your aircraft to the proper AOA.

Low and Fast
Raise the nose to start the ball coming up and decelerate to optimum AOA. If the aircraft slows to on-speed prior to the ball being centered, add power and maintain on-speed. When the ball is centered, reduce power to reestablish glideslope and adjust nose attitude to maintain optimum AOA. If you're still fast with the ball centered, reduce power and readjust nose attitude as necessary to maintain a centered ball and decelerate to optimum AOA. Approaching optimum AOA, add power to maintain proper glideslope.

CAUTION: Never accept a low ball. If you're low, add power immediately. Do not reduce power until the ball is centered.

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
To request takeoff directly into the FCLP pattern, communicate the following to the LSO when directed: LSO call, side number, aircraft status, fuel state, and student qual number.

ENTRY CALL
If departing and re-entering for the break, make the following call entering the pattern to the controlling agency: "Tower, (side number), initial." For direct entry, paddles/tower will clear aircraft for takeoff and downwind.

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

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, type aircraft, you see the meatball, 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."

CAUTION: Never descend below 300 ft AGL without a ball.

RADIO DIFFICULTIES IN THE PATTERN
If your receiver operates but your transmitter does not, the LSO may elect to work your aircraft in the pattern. If a receiver failure occurs while you're in the pattern, rock your wings and expect to perform a full-stop landing on the next pass. 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.

* In all cases, remember: "Aviate, navigate, communicate."

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 6 aircraft will be allowed in the night FCLP pattern. You will receive a thorough briefing, including local course rules, prior to night FCLP.

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 extinguished.

Two types of field lighting are used for night FCLP: the permanent carrier deck (Figure 14), which closely resembles actual flight deck lighting.

The abeam position is marked by a red light placed abeam the intended point of landing. Usually only white lights simulating the carrier deck will be illuminated during night FCLPs. Aircraft lighting and procedures are similar to night familiarization with emphasis on the following:

* Check the field/carrier switch in FIELD prior to leaving the line area.

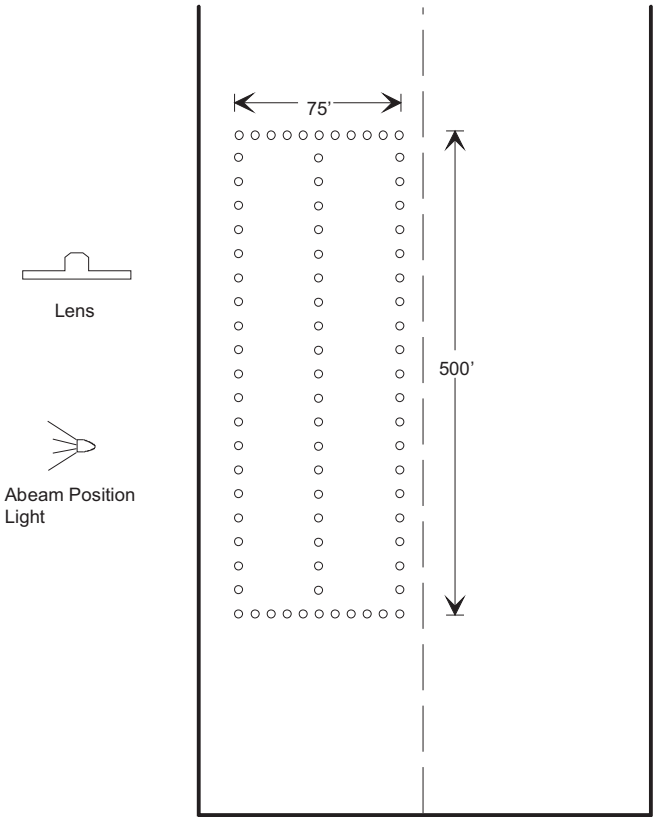


Figure 14: PERMANENT AIRFIELD CARRIER BOX LIGHTING

* Check the operability of your approach lights.

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

* Observe normal light management during taxi. Nav lights: bright, anti-collision, taxi light and strobe lights ON as required.

* Entering the holdshort, set the anti-collision and strobe lights OFF (or as directed by the LSO) if you're taking off from the same field at which you will be operating.

* When cleared for takeoff, ensure anti-collision light is ON before taking duty.

PROCEDURES FOR NIGHT FCLP OVERHEAD ENTRIES

Intercept initial and break altitudes as directed by course rules. Make "entry call." Enter the break at 250 KIAS, lights BRIGHT/STEADY, and strobes off/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 15):

* Due to the absence of visual cues, a strong instrument scan is essential for flying a consistent pattern.

* Do not descend below 300 ft AGL without acquiring the ball.

* Do not turn crosswind until at or above 500 ft AGL and cleared by the tower or the LSO.

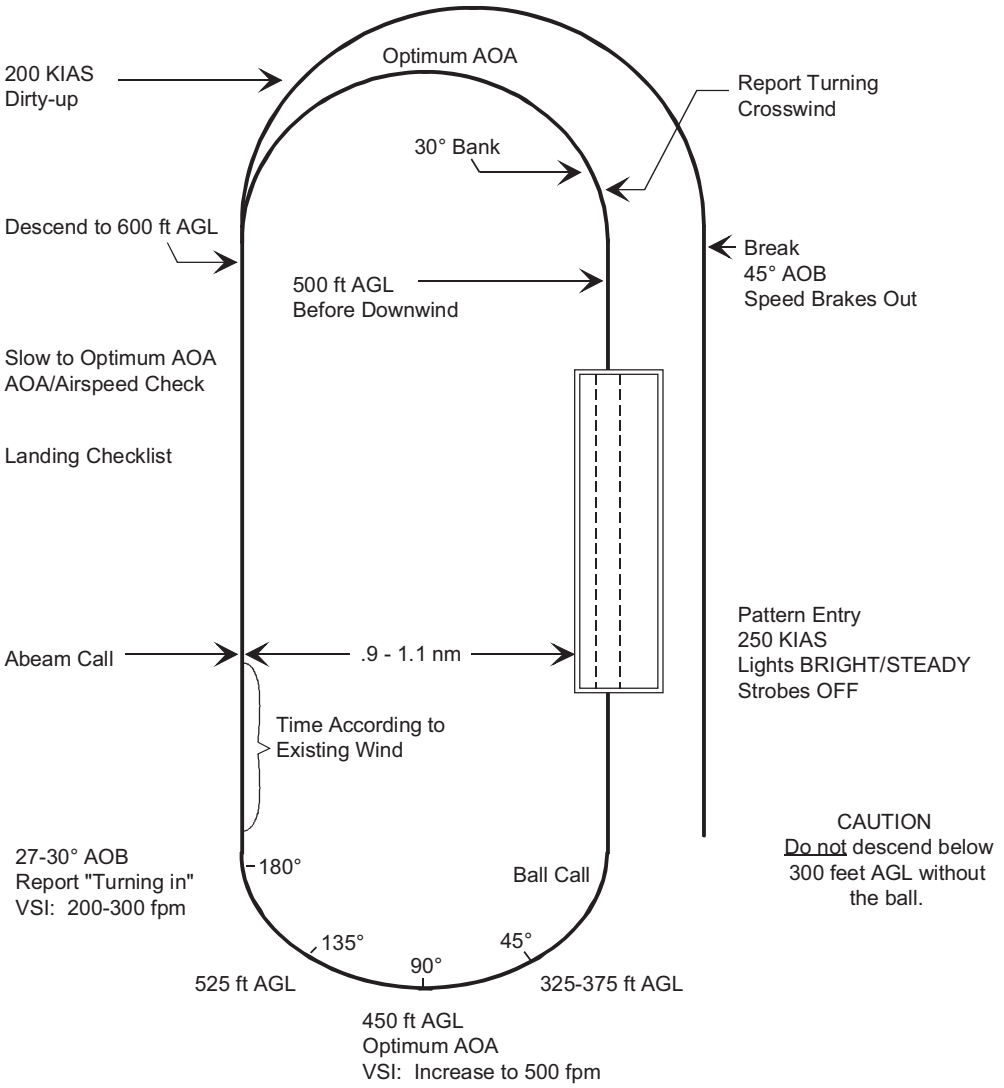


Figure 15: NIGHT FCLP PATTERN/OVERHEAD ENTRY

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 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.

CARRIER QUALIFICATION

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
14. LSO calls/grades
15. Carrier qualification test

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 CV 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."

Carrier Qualification

MARSHAL PROCEDURES (CASE I)

Case I refers 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 who have completed carrier qualification or 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. Never key the UHF, except during emergency situations, until it is certain that no other aircraft is on the ball.

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 when feet wet, the lead safe will tell the flight to check the "shore-to-ship" checklist complete.

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, EAT, 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 16) in balanced formation or as briefed.

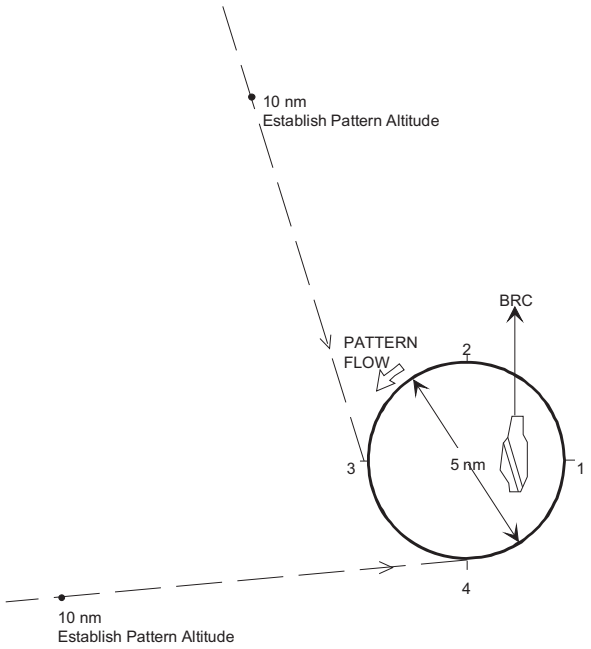


Figure 16: CASE I MARSHAL PATTERN ENTRY

Carrier Qualification

MARSHAL HOLDING PATTERN DESCRIPTION

The overhead marshal pattern is a counterclockwise circling pattern tangent to the ship's BRC with the ship at the 3 o'clock position (Figure 17). 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.

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, Figure 17). 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 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 and secure lights prior to arriving at the initial.

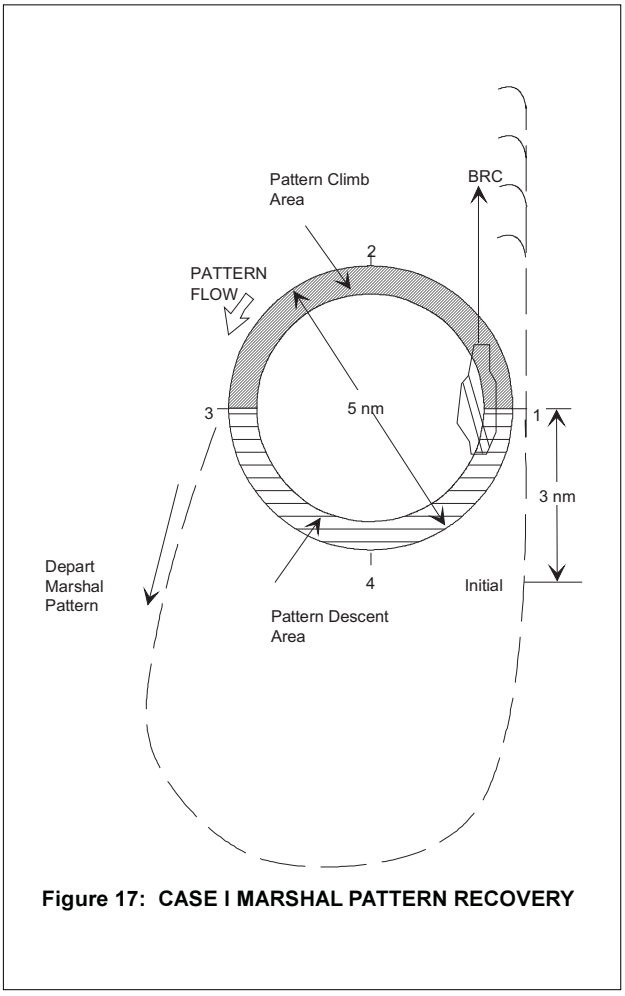


Figure 17: CASE I MARSHAL PATTERN RECOVERY

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 on 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 procedures, 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 determined and 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 18).

MARSHAL PATTERN ENTRY AND HOLDING (CASE II)
The Case II marshal holding pattern is a normal "non-standard holding pattern" 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 230 KIAS (Figure 18).

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 slow the rate of descent to a rate 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 800 ft and 250-300 KIAS to the break. At the break resume normal carrier pattern procedures.

CARRIER PATTERN ENTRY
The flight will arrive at a 3-nm initial astern of the ship and parallel to the ship's BRC (Figure 19). At this point, the flight should be wings level at 800 ft and between 250 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. A common problem during pattern entry is that Dash Two flies too tight a parade position for Dash Three to match.

NOTE: Exterior lights, to include position, collision, and strobe lights, will be extinguished prior to entering the break.

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 using a max 30 degrees AOB. Remain within 3 DME of the ship at 250-300 KIAS. Caution must be exercised reentering the initial to avoid additional flights entering the break.

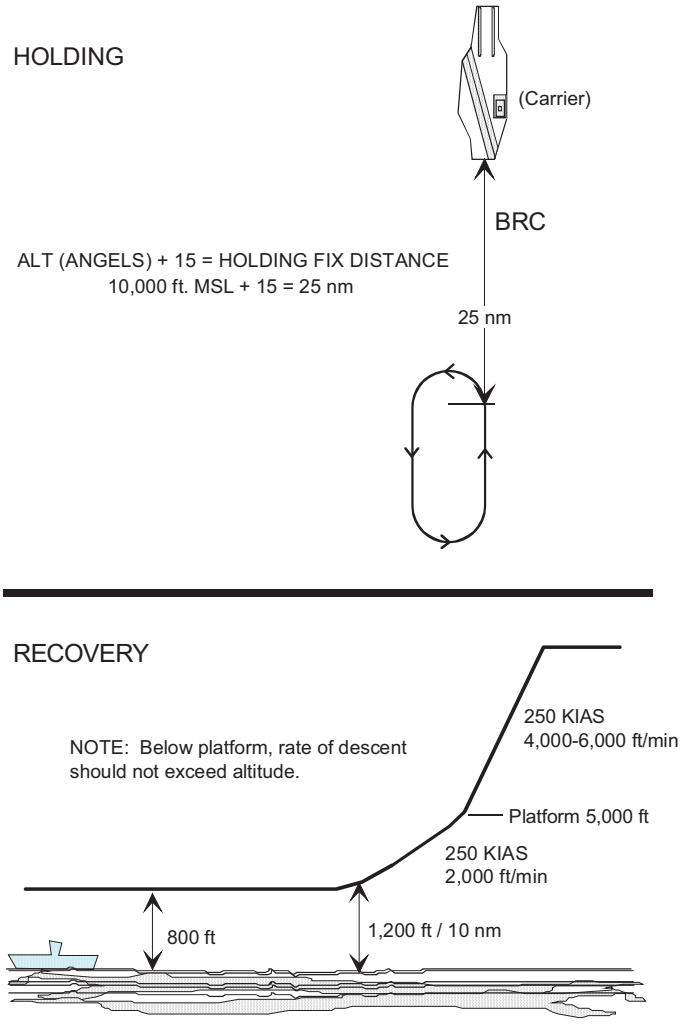


Figure 18: CASE II MARSHAL HOLDING & RECOVERY

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 FCLP's. Each wingman breaks at 15-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 instrument level break. Descend to 600 ft when established downwind. Out of the break, intercept the reciprocal of the BRC. Haze or lack of a defined horizon makes an instrument break imperative. At 200 KIAS, extend gear and flaps/slats.

CARRIER APPROACH

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

* Because of high winds at the ship, power corrections for a low ball will require a larger addition.

* Corrections for a high ball will require smaller power reductions.

* 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.

* Due to wind over the deck, 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.

* At the ship, spotting the deck in close will result in a settle at the ramp and a possible No. 1 wire. This is a scan breakdown.

* You will experience a greater tendency at the ship to fixate on a single item, such as the meatball, airspeed, or the wires. Don't fixate, Keep your scan moving.

* Although the landing area is angled approximately 10 degrees, the pattern is flown parallel to the BRC (base recovery course).

Carrier Qualification

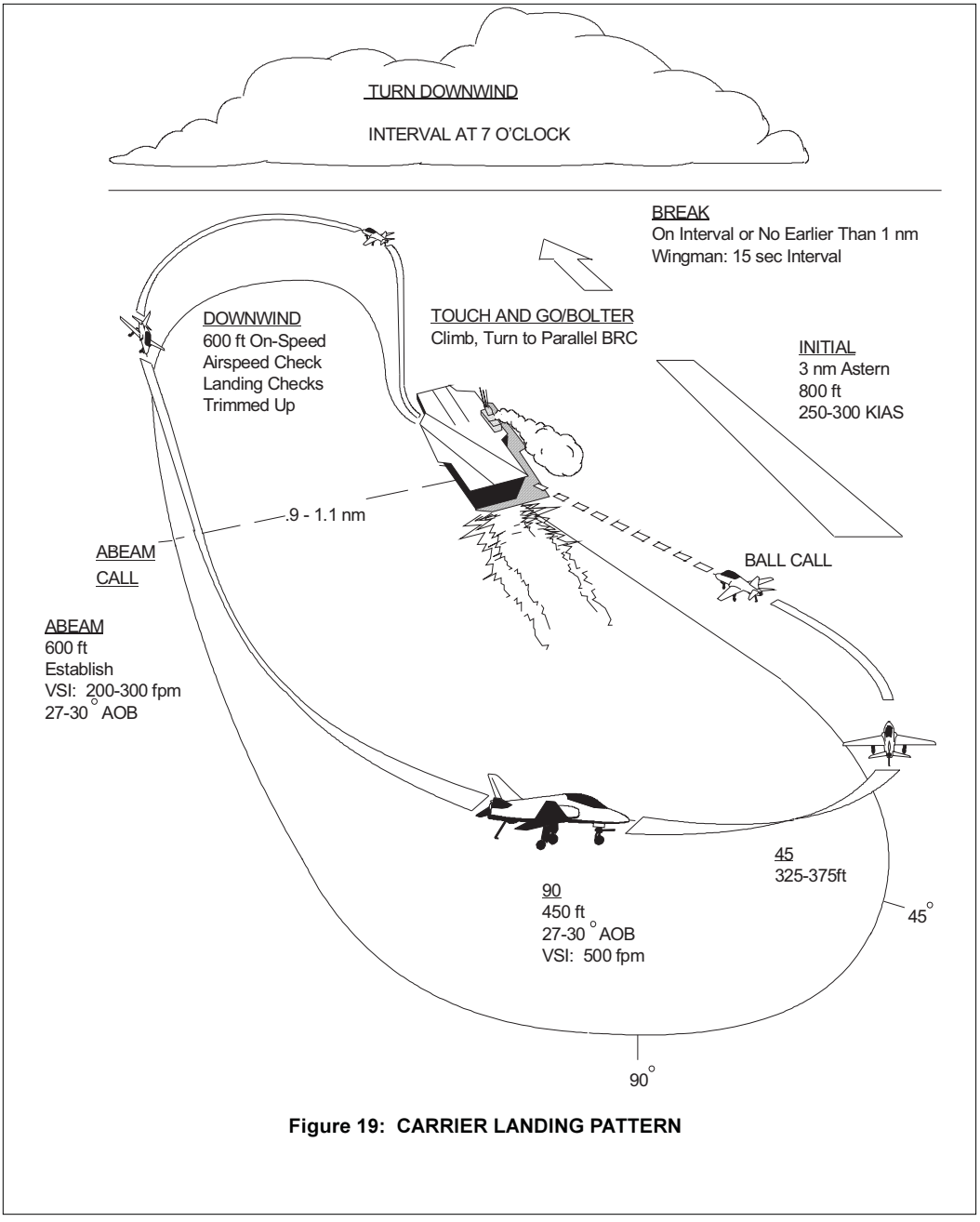


Figure 19: CARRIER LANDING PATTERN

CARRIER LANDING PATTERN

Once you're established 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 LSO, anti-skid off, and harness locked.

Carrier Qualification

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 25-30 kt wind across the deck. Turn abeam the LSO platform. 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, a 27-30 degree AOB turn (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 (“Keep your turn in”) normally occurs from the 90 to the groove to avoid an overshooting start. Maximum AOB will be required in order to stop the overshoot. If greater AOB turn is needed, a waveoff by the LSO will result.

GROOVE

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. Do not fixate on the ball but continue to scan your lineup and AOA. Glideslope becomes progressively narrower as you get closer to touchdown, you must decrease the magnitude of each correction for an equivalent amount of ball movement as you approach touchdown. 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.

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.

Scan the lineup all the way to touchdown, using small wing dips to make corrections. Lineup is critical at the ship—many accidents during carrier operations are lineup related.

Carrier Qualification

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

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

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 optimum AOA. Maintain wings level and verify a positive rate of climb and maintain optimum AOA. Once a positive rate of climb is established and your aircraft is abeam the bow, use 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.

CAUTION: Ensure feet are off the Brakes!

CAUTION: 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) at optimum AOA and turn downwind with proper interval. Turn downwind when the aircraft ahead reaches your 7 o'clock position. Perform the landing checklist. If unable to find interval, ask tower to call turn.

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

To perform a waveoff, simultaneously advance power to MRT, retract speed brakes, maintain landing attitude (not to exceed optimum AOA), level wings, and climb up the angled deck. Verify a positive rate of climb and maintain optimum AOA. Once you have established a positive rate of climb and you are abeam the bow, turn right to parallel the ship's BRC. Climb to 600 ft, turn downwind with proper interval, and perform landing checklist.

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.

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 pull back followed by a stop signal and hook up signal. The pull back allows for the wire to clear the hook. If the pilot applies the brakes during the evolution, the aircraft will tilt back, potentially damaging the tail section. Follow the yellow shirt's instructions/commands.

FLIGHT DECK PROCEDURES

POSTLANDING PROCEDURES

To clear the landing area, advance power to no more than 70 percent, engage high gain nose wheel steering, and follow the yellow shirt's signals as you taxi past the foul deck line. You will be passed from one yellow shirt to another as you taxi from the landing area to the catapult or refueling area. 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.

While taxiing to the catapult, complete the takeoff checklist, compute the aircraft's gross weight, 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. Follow yellow shirt's direction to line up on catapult.

During refueling or hot seat evolutions, 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. Once the signal is passed (by the controlling yellow shirt) that the aircraft is chocked and chained, the pilot may then take his/her feet off the brakes and hot seat or refueling can be performed.

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.

* 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).

* I have control: new director will hold one arm straight up and will begin giving directions as soon as you look at him.

* Slow down: director extends arms down with palms toward ground, then moves them up and down several times.

* Turn left: director points right arm downward and moves left arm repeatedly upward and backward, speed of arm movement indicating desired rate of turn.

* Turn right: director points left arm downward and moves right arm repeatedly upward and backward, speed of arm movement indicating desired rate of turn.

* 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.

* Move back (push back): director holds arms down by sides, palms facing forward, and then sweeps them forward and upward repeatedly to shoulder height.

* Emergency stop: director extends arms above head with wrists crossed and fists clenched.

* Brakes on: director extends arms above head with fists clenched.

* Brakes off: director extends arms above head and alternately clenches and unclenches fists.

* Install chocks: director extends arms down 45 degrees from body with fists closed, thumbs pointed inward, and then swings arms from outward to inward.

* Install tiedowns: director rotates hands in a vertical circle in front of body.

* Remove chocks: director holds arms down at sides with fists closed and thumbs pointed outward and then swings arms outward.

* Remove chain tiedowns: director makes wiping motion down left arm with right hand and down right arm with left hand.

* Chain tiedowns in place: director rotates hands in a vertical circle in front of body and then gives thumbs up.

* 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.

* Engage nose wheel steering: director points to nose with index finger and points to nose wheel with other hand.

* Disengage nose wheel steering: director points to nose with index finger and makes lateral wave with open palm of other hand at shoulder height.

* Engine runup: catapult officer waves index and middle finger in circular motion at head level.

* Open canopy: director places hand palm-down on top of head and raises hand as though hinged at wrist.

* Hook up: director positions left hand in front of body palm down and moves right hand upward bringing extended thumb into left palm.

* Launch: catapult officer squats, touches the deck, then raises his hand.

* 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.

* Lights on/off: director points to eyes with two fingers.

* Fuel top off: director or pilot pats top of head.

* 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.

* 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.

* 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.

* Cut fuel: pilot holds extended fingers at throat and moves hand sideways as if to cut throat.

* Brake failure: pilot drops arresting hook and turns on light.

MANNING AIRCRAFT PROCEDURES

CAUTION: Any time you man an aircraft on the flight deck, request an escort to the aircraft from flight deck control.

COLD PLANE
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.

CAUTION: You may not be able to preflight some portions of the aircraft due to its positioning on the edge of 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.

CAUTION: 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.

* Perform the prestart checklist.

* Start the engine when authorized by the yellow shirt; a plane captain (brown shirt) will monitor the engine start.

* Close the canopy when appropriate.

* Complete the post-start checklist.

* Complete the plane captain’s checks.

* Complete the taxi/takeoff checklist prior to taxiing.

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

- Position the ANTI-SKID switch to OFF.

- Set the stabilator trim to 3 1/2 degrees noseup.

- Check the HOOK BYP switch to CARRIER.

* 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:

* 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.

  CAUTION: Prior to performing hot seat procedures, ensure that the FOD safety screen is installed over the port engine intake.

* The outgoing pilot verifies that the cockpit switches are left in the proper positions.

* The outgoing pilot unstraps from the seat, extends the seat and leg straps, and opens the canopy on signal from the plane captain.

* The outgoing pilot exits the aircraft with all personal gear as expeditiously as practical.

* The new pilot enters as quickly as practical.

* The outgoing pilot briefs the incoming pilot on aircraft status.

* The new pilot completes the taxi/takeoff checklists.

NOTE: The takeoff checklist is the same as for Manning Aircraft procedures stated above with the following exceptions.

- Check the ANTI-SKID switch is set to OFF.
- Set the stabilator trim to 3 1/2 degrees noseup.
- Check HOOK BYP switch to CARRIER.

* When ready, the new pilot gives the “up and ready” call.

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

CAUTION: The outgoing pilot must be escorted to flight deck control.

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

HOT REFUELING
For this operation, follow these procedures:

* Follow the yellow shirt’s taxi directions to the fueling area where your aircraft will be chocked and chained to prevent movement before fueling hoses are attached.

* Canopy must remain down and locked during refueling.

* Indicate the aircraft fuel state when signaled by the fueling crew (purple shirt).

* Watch your fuel quantity indicator; give a thumbs up to the purple shirt to indicate that fuel is being received.

NOTE: Give cut signal when fuel gauge reaches 2,800 lbs.

* When fueling is complete, the ground crew will disconnect the fueling hose.

* When you are ready to taxi, make the “up and ready with gross weight” call.

SHUTDOWN
When shutting down the aircraft, follow the procedures outlined in the NATOPS:

* Follow the yellow shirt signals to the parking area.

* When the yellow shirt signals, the blue shirts will chock and chain the aircraft.

* Set the parking brake ON.

* The yellow shirt will signal the pilot when the aircraft is fully chocked and chained down.

  -Apply the gust lock.

  -Complete the postlanding checklist.

* Shut down the engine only when signaled by the yellow shirt; a brown shirt (plane captain) will monitor the shutdown.

CATAPULT PROCEDURES

To ensure precise spotting on the catapult, you must follow the taxi director's signals. The following is a list of visual signals for catapult operations.

NOTE: 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. Roger the weight board.

* 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.

* 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.

* 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.

* Slight turn left/right: director will nod head in direction of turn while giving move ahead signal.

* Brakes on (when in holdback): director extends arms above head with open palms toward aircraft and then closes fists.

* 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 (it is mandatory for the pilot to go to MRT).

* Retract launch bar: director rests right elbow in left palm with right arm extended horizontally at waist level and then raised to vertical.

* Engine runup: Catapult Officer/Catapult Safety Petty Officer (CSPO) makes circular motion with index and middle finger at head level.

* Acknowledge salute: Catapult Officer/CSPO returns salute.

* Launch signal: Catapult Officer/CSPO 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.

* Hang fire: Catapult Officer/CSPO extends right-hand index finger overhead and points horizontally at left palm extended vertically.

* Suspend: Catapult Officer/CSPO raises arms above head with wrists crossed (indicating the launch is to be suspended).

* Throttle back: Catapult Officer/CSPO stands in front of aircraft's wing and holds one fist above head with thumb up, then grasps thumb with other hand and rocks as if pulling throttle back.

WARNING: Do not throttle back until the catapult officer walks in front of the aircraft and gives the throttle back signal during suspended launches.

PRELAUNCH 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.

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

CAUTION: Never operate the parking brake beyond the JBD.

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.

CAUTION: 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, advance power to MRT, wipe out the controls, release the wheel brakes, **place your heels on the deck**, **with toes below the toe bars**, (Figure 20) and then place the launch bar switch to RETRACT (launch bar will be held down by shuttle tension). Grasp the catapult handgrip and lock your elbow. As tension is taken, you will feel the aircraft squat.

WARNING: Selecting launch bar RETRACT before receiving the retract signal from the aircraft director may raise the launch bar before it is properly seated in the shuttle spreader assembly, resulting in a mispositioned launch bar.

CAUTION: If launch bar is retracted below max rpm, an ACCEL light may illuminate.

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

During the engine runup and checks, the catapult director will pass control to the catapult officer. 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 the full throw of the stick and rudder in all directions.

WARNING: Brakes may inadvertently be applied during a catapult launch, resulting in a blown tire, even with heels placed on the deck.

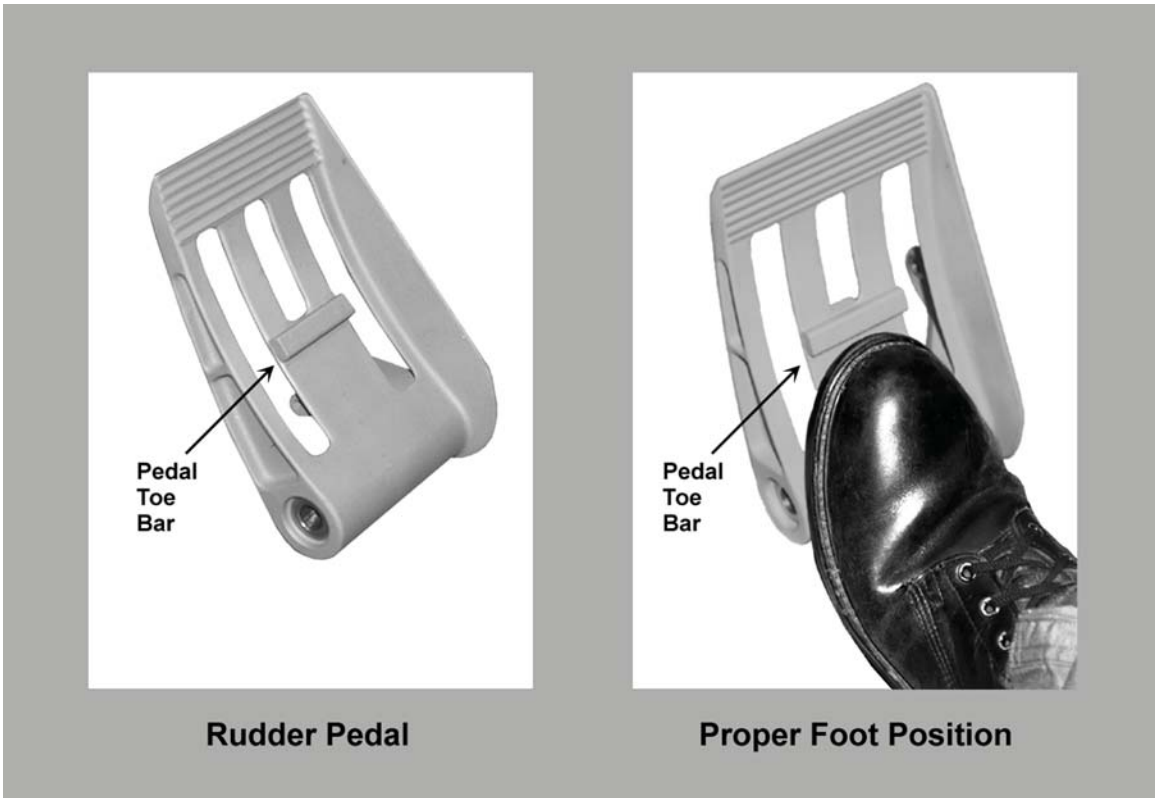


Figure 20: PEDAL TOE BAR

LAUNCH

When ready for launch, crisply give a right-handed salute to the Catapult Officer/CSPO. Cup your hand loosely behind the stick and place your head firmly against the headrest.

The catapult officer will make final checks, looking fore and aft, then touch the deck. After about a 1-second delay, an acceleration will be felt reaching flying speed in about 2 seconds.

NOTE: If "bubble launch," the CSPO will return salute. The Catapult Officer will effect the launch once clearing fore and aft.

NOTE: The bow 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, lower hook, and check for interval.

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 UHF, "SUSPEND, SUSPEND, SUSPEND," while simultaneously shaking the head from side to side.

CAUTION: 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 confused with 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 steps in front of your aircraft and gives the throttle back signal; only then reduce the throttle to IDLE.

CAUTION: Under no circumstances should the power be reduced until the catapult officer walks in front of the aircraft's wing and signals for power back. Be fully prepared to go flying.

If the launch sequence is to continue 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.

DEPARTURES

While CQ is in progress, there will be enough lead safes overhead the ship at all times with enough fuel to escort the remaining SNPs in the pattern back to the beach. The ship will constantly update the "pigeons" (bearing and range back to the home field) information.

CASE I DEPARTURE WITH A STEER

After the aircraft clears the catapult, rotate to 10-12 degrees noseup attitude and establish a positive rate of climb. Raise your gear (once a positive rate of climb is established) and flaps/slats at 140 KIAS. Climb to and maintain 500 ft and accelerate to 300 KIAS. Continue outbound parallel to the ship's BRC. When directed or at 7 nm, begin a climbing turn toward home base or to join on lead safe as directed and continue your climb to the assigned or appropriate cruise altitude. When instructed, switch from tower frequency to departure frequency and check in.

CAUTION: 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 assign a squawk and instruct the pilot to report a sweet lock on the appropriate field. Once reported, a switch to the controlling agency will be made.

CASE II DEPARTURE

After your aircraft clears the catapult, rotate to 10-12 degrees noseup attitude to establish a positive rate of climb. Raise gear (once a positive rate of climb is established) and flaps/slats at 140 KIAS and climb to and maintain 500 ft. Accelerate to 300 KIAS and continue outbound on the ship's BRC. At 7 nm, if you are unable to climb in VFR, perform the following:

* Turn to intercept the 10 DME arc and maintain 500 ft or 500 ft below the clouds.

* Arc to and intercept the assigned departure radial.

* Climb to the assigned altitude once you're established on the departure radial.

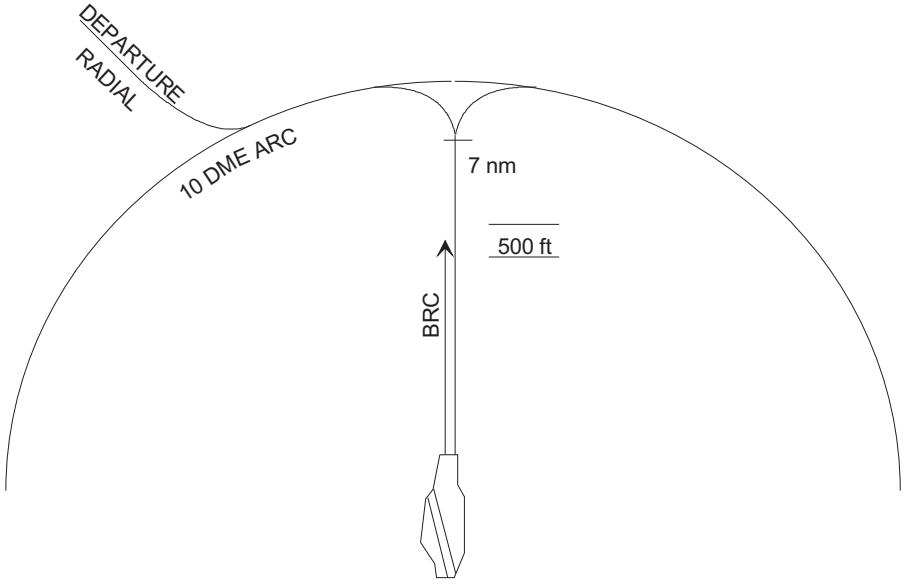


Figure 21: CASE II DEPARTURE

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

* When in VMC on top. turn to desired heading to RTB.

CAUTION: During the departure, verify HSI and wet compass to ensure no errors exist.

* If still IMC at 18,000 ft, report “Popeye” to receive instructions.

Full stop ashore following carrier operations:

* Complete the landing checklist.

* Ensure the hook is “UP.”

* Ensure the anti-skid is “ON.”

* Ensure the anti-collision lights are “ON.”

* Use the appropriate procedures for braking with carrier tire pressure.

NOTE: Your flight is not over until the yellow sheet is signed. Ensure that you use the correct codes.

EMERGENCY PROCEDURES

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 the 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 22).

* Determine the distance to base.

NOTE: You will receive information on bearing/distance (pigeons) to the divert field and bingo fuel state from marshal on initial check-in. This information is periodically updated and broadcast over marshal and tower frequencies. Always write down bingo and pigeons information.

* Refer to the PCL to determine proper bingo information.

  - Fuel required
  - Time required for bingo (total time required from start of climb to landing)
  - Speed (KIAS) for climb
  - Cruise altitude
  - Cruise (KIAS/IMN) speed at cruise altitude
  - Descent (KIAS) speed
  - 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. Here is an example of a bingo profile computation problem:

* Determine proper bingo information
* Example variables

  - Aircraft configuration: gear up, flaps up
  - Zero fuel weight: 10,500 lb
  - Drag index: 0

SAMPLE

BINGO

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

REMARKS

DATE: JUNE 1995
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		
		FUEL REQD			CRUISE			DESCEND		FUEL REQD		
	DIST TO BASE	NO WIND	100 KT HEAD WIND	CLIMB SPEED	ALT	SPEED		SPEED	DISTANCE NO WIND	DISTANCE 100 KT HEAD WIND	NO WIND	100 KT HEAD WIND	CRUISE SPEED
	NM	LB	LB	KCAS	FEET	KCAS	IMN	KCAS	NM	NM	LB	LB	KCAS
DRAG INDEX = 0	25	421	516		5,000	217	.36		14	6	429	535	220
	50	529	683		10,000	219	.40		27	13	559	771	221
	75	626	814		15,000	217	.43		40	20	690	1,006	221
	100	714	918	300	20,000	217	.48		54	28	820	1,240	222
	125	796	1,000	Knots/	25,000	223	.54	180	67	36	952	1,474	222
	150	871	1,077	0.75	30,000	220	.59		80	44	1,083	1,707	223
	175	938	1,144	Mach	35,000	218	.65		93	53	1,216	1,940	224
	200	1,002	1,231		35,000	218	.65		93	53	1,349	2,172	224
	225	1,066	1,318		35,000	218	.65		93	53	1,482	2,404	225
	250	1,128	1,383		40,000	211	.71		107	62	1,616	2,635	226
DRAG INDEX = 50	25	434	543		5,000	212	.35		12	5	441	562	214
	50	553	733		10,000	211	.38		24	11	582	823	215
	75	658	875		15,000	212	.42		36	17	724	1,085	216
	100	753	989	265	20,000	212	.47		48	24	867	1,348	216
	125	841	1,084	Knots/	25,000	211	.51	170	60	30	1,010	1,610	216
	150	926	1,209	0.70	25,000	212	.51		60	30	1,153	1,872	217
	175	1,003	1,249	Mach	35,000	208	.63		83	45	1,297	2,135	217
	200	1,075	1,349		35,000	208	.63		83	45	1,442	2,398	218
	225	1,148	1,450		35,000	209	.63		83	45	1,587	2,661	218
	250	1,221	1,552		35,000	209	.63		83	45	1,733	-	219
DRAG INDEX = 100	25	445	568		5,000	207	.34		11	5	452	589	209
	50	574	775		10,000	205	.37		22	9	604	877	209
	75	687	931		15,000	207	.41		32	15	757	1,165	210
	100	789	1056	245	20,000	206	.45		43	20	911	1,454	211
	125	883	1,131	Knots/	30,000	196	.53	165	64	33	1,066	1,742	211
	150	969	1,256	0.60	30,000	197	.53		64	33	1,221	2,030	212
	175	1,051	1,344	Mach	35,000	195	.59		75	40	1,377	2,318	212
	200	1,132	1,460		35,000	196	.59		75	40	1,533	2,606	213
	225	1,212	1,577		35,000	196	.59		75	40	1,690	2,893	213
	250	1,294	1,695		35,000	196	.59		75	40	1,848	-	214
DRAG INDEX = 150	25	455	590		5,000	203	.34		10	4	462	614	204
	50	592	814		10,000	201	.36		20	8	624	927	205
	75	712	946		20,000	199	.44		39	18	787	1,240	205
	100	820	1,077	235	25,000	197	.48		49	23	951	1,553	206
	125	917	1,196	Knots/	30,000	189	.51	160	59	29	1,116	1,866	207
	150	1,009	1,334	0.55	30,000	189	.51		59	29	1,281	2,179	207
	175	1,101	1,474	Mach	30,000	189	.51		59	29	1,447	2,491	208
	200	1,191	1,575		35,000	187	.56		68	35	1,615	2,803	208
	225	1,281	1,707		35,000	187	.57		68	35	1,783	-	209
	250	1,372	1,841		35,000	188	.57		68	35	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 22: 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.

* Distance to bingo field: 100 nm

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

* Example answers

  -DIST TO BASE = 100 nm

  -FUEL REQD = 714 lb

  -CLIMB SPEED = 300 KIAS

  -CRUISE ALT = 20,000 feet

  -CRUISE SPEED = 217 KIAS .48 IMN

  -DESCENT SPEED = 180 KIAS

  -DESCENT DIST = 54 nm (from bingo field)

BINGO FLIGHT PROCEDURES (CLEAN)

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

Upon reaching bingo fuel status, turn to your bingo heading (do not delay performing the turn or climb, but be on the lookout for other aircraft), clean up, and fly the bingo profile (climb at MRT). Communicate your intentions to the ship. Do not delay in executing a bingo profile while awaiting Tower reply. Squawk 7700 and communicate to any appropriate controlling agency.

At your descent point, begin idle descent to the bingo field at the descent airspeed.

CAUTION: 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)

Since bingo profiles are normally flown in a clean configuration, bingo information calculated from the CV is for a clean bingo. However, 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 23).

SAMPLE

BINGO

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

REMARKS

DATE: JANUARY 1997
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 NO WIND	FUEL REQD 50 KT HEAD WIND	CLIMB SPEED	CRUISE ALT	CRUISE SPEED		DESCEND SPEED	DESCEND DISTANCE NO WIND	DESCEND DISTANCE 50 KT HEAD WIND	FUEL REQD NO WIND	FUEL REQD 50 KT HEAD WIND	CRUISE SPEED
	NM	LB	LB	KCAS	FEET	KCAS	IMN	KCAS	NM	NM	LB	LB	KCAS
DRAG INDEX = 0	25	742	1,002		8,000	121	.21		8	4	758	1,074	123
	50	1,146	1,600		12,500	120	.23		12	7	1,226	1,858	124
	75	1,539	2,191		15,000	118	.24		15	9	1,704	2,652	126
	100	1,942	2,813		15,000	119	.24		15	9	2,195	-	127
	125	2,353	-	120	15,000	120	.24	110	15	-	2,697	-	129
	150	2,818	-		12,500	123	.23		12	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
	250	-	-		-	-	-		-	-	-	-	-
DRAG INDEX = 50	25	749	1,012		8,000	121	.21		8	4	764	1,087	122
	50	1,159	1,623		12,500	119	.23		12	7	1,239	1,885	124
	75	1,558	2,225		15,000	118	.24		14	8	1,725	2,694	125
	100	1,968	2,858		15,000	118	.24		14	8	2,222	-	127
	125	2,386	-	120	15,000	119	.24	110	14	-	2,732	-	128
	150	2,860	-		12,500	122	.23		12	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
	250	-	-		-	-	-		-	-	-	-	-
DRAG INDEX = 100	25	755	1,023		8,000	120	.21		8	4	771	1,100	122
	50	1,171	1,646		12,500	118	.23		12	7	1,252	1,912	123
	75	1,578	2,261		15,000	117	.23		14	8	1,745	2,737	125
	100	1,996	-		15,000	118	.24		14	-	2,250	-	126
	125	2,422	-	120	15,000	118	.24	110	14	-	2,766	-	127
	150	2,905	-		12,500	121	.23		12	-	-	-	-
	175	-	-		-	-	-		-	-	-	-	-
	200	-	-		-	-	-		-	-	-	-	-
	225	-	-		-	-	-		-	-	-	-	-
	250	-	-		-	-	-		-	-	-	-	-
DRAG INDEX = 150	25	760	1,033		8,000	120	.21		7	4	777	1,112	122
	50	1,183	1,666		12,500	118	.22		12	7	1,264	1,937	123
	75	1,597	2,296		15,000	116	.23		14	8	1,763	2,776	124
	100	2,021	-		15,000	117	.23		14	-	2,275	-	125
	125	2,456	-	120	15,000	117	.23	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 23: BINGO CHART (DIRTY)

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

* Determine the distance to base.

* Refer to the PCL to determine proper bingo information.

  - Fuel required

  - Speed (KIAS) for climb

  - Cruise altitude

  - Cruise (KIAS/IMN) speed at cruise altitude

  - Descent (KIAS) speed

  - Descent point

Here is an example problem:

* Determine proper bingo information

* Example variables

  - Aircraft configuration: gear down, flaps full

  - Zero fuel weight: 10,500 lb

  - Drag index: 0 to calculate speed

  - Distance to bingo field: 100 nm

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

* Example answers

  - DIST TO BASE = 100 nm

  - FUEL REQD = 1,942 lb

  - CLIMB SPEED = 120 KIAS

  - CRUISE ALT = 15,000 feet

-CRUISE SPEED = 119 KIAS/.24 IMN

-DESCENT SPEED = 110 KIAS

-DESCENT DIST = 15 nm (from bingo field)

BINGO FLIGHT PROCEDURES (DIRTY)
Upon reaching bingo fuel status, turn to your bingo heading. Do not delay performing the turn or climb, but be on the lookout for other aircraft. Fly your computed bingo profile and climb at MRT. Communicate the same information as you would for a clean bingo.

Determining dirty configuration bingo, gear down, flaps/slats down is figured the same way as the previous two configuration profiles. Use the drag index to calculate speed and the 50 drag index to calculate fuel and time. Squawk 7700 and communicate your situation to the appropriate agency. Refer to your PCL or NATOPS for appropriate and current charts.

BLOWN TIRE
Procedures for handling a blown tire depend on the situation under which the malfunction occurs. If the tire blows during a touch and go or after a catapult launch, you may trap aboard or be directed to return to home field direct. If it occurs after an arrestment, follow the yellow shirt's signals to taxi or be towed out of the landing area. If you are instructed to bingo, you should fly the dirty profile, which will require you to monitor fuel carefully. Even if you are well above bingo fuel, you should still fly the dirty bingo profile (the most fuel efficient profile) or as directed by a lead safe. Refer to your PCL or NATOPS for proper field arrestment procedures. Not following these procedures explicitly may result in a hook skip.

WARNING: Directional control on the runway will be extremely difficult with one or both main tires blown.

CROSS-DECK PENDANT/HOOK POINT FAILURE
Immediately determine if your aircraft can be stopped on the deck. 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.

NWS FAILURE ON FLIGHT DECK
The indications of a nose wheel steering failure are as follows:

* MSTR ALERT light flashes

* Caution tone sounds in headset

* NOSE WHEEL STR amber caution light illuminated

* NOSE WHEEL STR green advisory light extinguished (if high gain selected)

* 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.

WARNING: Do not reengage NWS or use differential braking while the tow bar is attached.

BRAKE FAILURE

The illumination of the HYD 1 PRESS 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.

Drop the arresting hook (to signal deck personnel that a brake failure has occurred), ensure that the ANTI-SKID switch is in OFF position, and engage the parking brake if possible.

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 or other 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 and ejection is no longer recommended. 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.

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 Landing Gear Malfunction-Landing Guide chart in your PCL. If the launch bar is visually confirmed to be in the DOWN position, clean up, exit the pattern using standard procedures, and rendezvous on the lead safe overhead according to tower instructions.

CATAPULT MALFUNCTIONS/EMERGENCIES

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

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

* Use a head shake as a negative signal and transmit, "Suspend, suspend, suspend."

* Maintain MRT until the catapult officer steps in front of the aircraft's wing and 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," he will then step in front of the aircraft and 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.

CAUTION: 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 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.

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 safe of your NORDO condition and fuel state. Always pass your fuel state to the lead—never assume that the flight lead is aware of it. The lead safe will contact marshal and attempt to have a lead safe escort you back to home base.

IN THE PATTERN

Fly a normal pattern to the start and call the ball. If no "Cut light" is received, wave off your approach and do not descend below 300 ft. Fly up the angled deck, rocking your wings. Once abeam of the ship's bow, turn to parallel the ship's BRC. Climb to and maintain 500 ft, accelerate to 150 KIAS, continue in the pattern, turning on your interval until a lead safe joins on you. The lead safe will join on the right. The lead safe will take the lead and lead you home.

CAUTION: When climbing, stay heads up for other aircraft. Stay within 5 nm of the ship: don't lose sight of the ship.

CAUTION: If you reach bingo fuel state or an emergency occurs that requires an immediate landing prior to rendezvous with the lead safe, immediately proceed to your divert field and squawk 7700 on 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 is the highly 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 Fresnel lens 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 or full flaps. 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.

For a shipboard arrested landing attempt, the LSO may elect to adjust the touchdown point by targeting the 2-wire. The pilot should be prepared for the possibility of a bolter/hook skip. Should this occur, aggressive and rapid rudder pedal deflection after touchdown (requiring up to 180 pounds of force within 0.25 seconds) is required to counter the swerve of a single blown tire to stay within the lateral confines of the landing area. Once airborne, center the rudder pedals and establish a flyaway attitude.

If arresting gear is not available, perform a flared landing with half flaps (if able) using the longest and widest runway available consistent with wind direction and speed. Simulations have shown that landing with a crosswind component of greater than 5 knots on the side corresponding to the blown tire was extremely hazardous due to loss of directional control below approximately 60 KIAS. Crosswinds of up to 15 knots on the side corresponding to the good tire were controllable to a full stop. If landing distance permits, a quartering tailwind corresponding to the side of the good tire is preferable to a headwind landing with the crosswind corresponding to the side with the blown tire. Prior to attempting a tailwind landing, the Landing Distance Chart (section XI) should be referenced to verify that an adequate runway exists. Offset to land on the side of the runway corresponding to the good tire. Upon touchdown, simultaneously retard power to idle and counter swerve with rudder. Nosewheel steering (NWS) effectiveness can be increased by applying forward stick, up to full forward. Do not use high gain NWS until the aircraft has slowed to taxi

speed. As the aircraft slows through 100 KIAS, differential braking may be required to maintain directional control. Since anti-skid will be off, aggressive braking will result in blowing the remaining good tire. Additionally, smooth brake application is required to avoid pilot-induced directional oscillations. If rudder inputs at touchdown are not sufficient to prevent a high-speed departure from the prepared runway surface, ejection may be the only remaining option and the decision to eject should not be delayed.

NOTE: Rudder inputs to counter swerve should be applied without brake application. Since the anti-skid system is off, any brake application at high speed increases the likelihood of a blown main tire.

* See NATOPS for more information and procedures.

SUMMARY

Following your landing at home base after your initial carqual, you will reflect on how enjoyable this phase of your training has been. All the preparation—studying, being attentive at lectures, working hard during FCLPs—has culminated with your traps at the ship and has been well worthwhile.

You can be justifiably proud of your accomplishments, but your greatest pride will be the knowledge that you are now a Navy carrier pilot—something that separates you from all other pilots in the world.

SELF-TEST

FRESNEL LENS OPTICAL LANDING SYSTEM (FLOLS)

1. Identify the function, color, and location of the FLOLS lights--source, cut, waveoff, and datum-- and briefly explain the function of each.

   ANSWER:
   1. The 5 source lights in the lens box indicate the aircraft's relative position on the glideslope (as referenced to the datum lights). The top 4 lights are amber and the bottom light is red.

   2. There are 4 green cut lights mounted horizontally on top of lens. The cutlights are used to indicate "Roger Ball," thereafter power. Utilized during Ziplip or EMCON at the ship (when radio calls are not normally made).

   3. There are 4 red waveoff lights mounted vertically on each side of the lens box. The waveoff lights flash to indicate a mandatory waveoff command by the LSO.

   4. There are 6 green datum lights mounted horizontally on each side of the center lens of the lens box. The datum lights provide the reference for optimum glideslope and are used in conjunction with the source lights in the lens box.

LANDING SIGNAL OFFICER

2. Give the corrective action (response) to each of the following calls and state whether it is informative, advisory, or imperative.

   "You're low"
   "Right for lineup"
   "Easy with the power"

   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 the power: reduce magnitude of power/attitude correction (advisory call)

FIELD CARRIER LANDING PRACTICE (FCLP)

3. 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

4. You are making your approach to the carrier. While making glideslope corrections for low and on-speed, you overcontrol and the ball starts to go high 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

5. What is the most important difference between day FCLP and night FCLP?

   ANSWER: The lack of visual cues at night.

CARRIER PROCEDURES

6. 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.

7. Briefly describe the Case I marshal (holding) pattern.

   ANSWER: Left-hand circling pattern (with flight in balanced formation) tangent to ship's BRC with ship at 3 o'clock position.

   * No more than 5 nm in diameter
   * At assigned altitude (minimum: 1,500 ft)
   * Minimum separation of flights (vertically): 1,000 ft
   * Marshal airspeed: max conserve

8. 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

9. 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 15-second intervals after lead breaks.
   3. Execute level break: use approximately 79-80 degrees AOB, reduce power to IDLE, and extend speed brakes.
   4. Descend to 600 ft AGL.
   5. At 200 KIAS, extend gear and flaps/slats.

10. 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

11. 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.

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

    ANSWER: Stop immediately!

13. 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

14. 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 & HOOK BYP switch set to CARRIER.

15. 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.

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

    ANSWER: TO ELIMINATE THE POSSIBILITY OF THE PILOT FORGETTING TO DISENGAGE THE PARKING BRAKE BEFORE LAUNCH AND BLOWING BOTH MAIN TIRES.

APPENDIX A

Study Resources for Carrier Qualification:

[A] T-45 NATOPS Flight Manual, A1-T45AB-NFM-000 or A1-T45AC-NFM-000
[B] T-45 Carrier Qualification FTI
[C] CV NATOPS Manual, NAVAIR 00-8T-105
[D] LSO NATOPS Manual, NAVAIR 00-80T-104

T-45 UJPT, E2-C2, ADV, & IUT CQFP-01 : "Field Carrier Landing Practice (FCLP)," 1.0 hr, Classroom

Lesson Preparation:

*[B] "Fresnel Lens Optical Landing System," "Field Carrier Landing Practice (FCLP)," and "Glossary of Terms," T-45 Carrier Qualification FTI

Reinforcement:

*[A] Part III, "Normal Procedures," Part IV, "Flight Characteristics," and Part XI, "Performance Data," T-45 NATOPS Flight Manual, A1-T45AB-NFM-000 or A1-T45AC-NFM-000

Lesson Objectives for CQFP-03X exam preparation:

* Recall the operating characteristics of the Fresnel lens
* Recall Landing Signal Officer (LSO) responsibilities
* Recall the correct procedures/techniques in response to LSO commands during FCLP approach
* Recall procedures/techniques for flying FCLP pattern
* Diagram the FCLP pattern
* Recall procedures/techniques for performing waveoff
* Recall procedures for Delta pattern
* Recall procedures/techniques for control of glideslope and airspeed during FCLP approach
* Recall the procedures/techniques for controlling lineup on FCLP approach
* Recall required communications for FCLP takeoff, approach, and landing

T-45 UJPT, E2-C2, & ADV CQFP-02: "Night FCLP Procedures," 0.5 hr, Classroom

Lesson Preparation: N/A

Reinforcement: N/A

Lesson Objectives for Carrier Qualification Flight Procedures CQFP-03X exam preparation:

* Recall night FCLP lighting
* Recall procedures for night FCLP
* Receive the procedures/techniques for controlling lineup on night FCLP approach
* Recall required communications for night FCLP takeoff, approach, and landing

T-45 IUT CQFP-02: "CAR QUAL/Lead Safe Procedures," 1.5 hr, Classroom

Lesson Preparation:

*[A] Part III, "Normal Procedures," Part IV, "Flight Characteristics," and Part XI, "Performance Data," T-45 NATOPS Flight Manual, A1-T45AB-NFM-000 or A1-T45AC-NFM-000

*[B] "Fresnel Lens Optical Landing System," "Field Carrier Landing Practice (FCLP)," and "Glossary of Terms," T-45 Carrier Qualification FTI

Reinforcement:

*[A] Chapter 8, "Carrier-Based Procedures," T-45 NATOPS Flight Manual, A1-T45AB-NFM-000 or A1-T45AC-NFM-000

*[B] Study

*[C] Section IV, "Launching Aircraft," and Section V, "Recovering Aircraft," CV NATOPS Manual

*[D] Chapter 6, "Shipboard Procedures," LSO NATOPS Manual, NAVAIR 00-80T-104

Lesson Objectives for IUT CQFP-04X exam preparation:

* Receive lead safe procedures overview
* Recall lead safe requirements (# overhead)
* Recall FCLP currency requirements
* Recall CNATRA CV weather limits
* Recall SNA limitations
* Recall IUT/lead safe limitations
* Recall Carrier Qualification briefing requirements
* Review ground procedures
* Review marshal check-in procedures
* Interpret marshal procedures (Case I)
* Interpret marshal procedures (Case II)
* Recall procedures/techniques for CV pattern entry
* Recall procedures/techniques for the carrier pattern
* Recall lead safe overhead procedures
* Recall emergency/escort procedures
* Recall procedures/techniques for flying a bingo profile (clean)
* Recall procedures/techniques for flying a bingo profile (dirty)
* Compute a bingo profile (clean)
* Compute a bingo profile (dirty)
* Recall procedures/techniques for blown tire

T-45 UJPT, E2-C2, & ADV CQFP-03X: "Carrier Qualification Stage Examination," 1.0 hr, CAI

T-45 UJPT, E2-C2, & ADV CQFP-04: "Carrier Qualification Shipboard Procedures," 1.0 hr, Classroom

Lesson Preparation:

*[B] "Carrier Qualification" and "Flight Deck Procedures," T-45 Carrier Qualification FTI

*[C] Section IV, "Launching Aircraft," and Section V, "Recovering Aircraft," CV NATOPS Manual

Reinforcement:

*[A] Chapter 8, "Carrier-Based Procedures," T-45 NATOPS Flight Manual, A1-T45AB-NFM-000 or A1-T45AC-NFM-000

*[C] Section IV, "Launching Aircraft," and Section V, "Recovering Aircraft," CV NATOPS Manual, NAVAIR 00-8T-105

*[D] Chapter 6, "Shipboard Procedures," LSO NATOPS Manual, NAVAIR 00-80T-104

Lesson Objectives for Carrier Qualification Flight Procedures CQFP-06X exam preparation:

* Recall procedures/techniques for CV pattern entry
* Recall procedures/techniques for the carrier pattern
* Interpret marshal procedures (Case I)
* Interpret marshal procedures (Case II)
* Recall carrier pattern/landing procedures
* Recall carrier pattern break and turn downwind procedures at CV
* Recall procedures/techniques for approach turn to CV
* Recall procedures/techniques for controlling glideslope/airspeed on carrier approach
* Recall procedures/techniques in response to LSO calls during carrier approach
* Recall procedures/techniques for performing touch and go and bolter
* Recall procedures/techniques for performing a waveoff
* Recall procedures for Delta pattern
* Recall procedures/techniques for arrested landings

* Recall after CV arrestment procedures
* Recall procedures/techniques for taxiing aircraft on flight deck
* Recall procedures for catapult hookup
* Recall procedures/techniques for catapult launch
* Identify catapult director/officer signals
* Recall procedures to initiate suspend
* Recall procedures for catapult malfunctions/emergencies
* Recall procedures/techniques for performing Case I departure
* Recall procedures/techniques for performing Case II departure
* Recall NATOPS recovery and landing procedures for T-45
* Identify procedures/techniques for flying a bingo profile (clean)
* Identify procedures/techniques for flying a bingo profile (dirty)
* Recall procedures/techniques for communications failure in pattern
* Recall procedures/techniques for communications failure on deck
* Recall safety of flight situations/procedures during operational flight
* Recall procedures/techniques for blown tire
* Recall procedures for NWS failure on deck
* Recall procedures for brake failure on deck
* Recall procedures for launch bar failure to retract
* Identify indications of launch bar failing to retract
* Recall procedures for landing gear unsafe/fails to extend
* Recall procedures for ejection
* Recall procedures/techniques for short field arrestment

T-45 UJPT, E2-C2, & ADV CQFP-05; IUT CQFP-03: "Ship's Brief," 3.0 hr, Classroom

Lesson Preparation: N/A

Reinforcement: N/A

Lesson Objectives for Carrier Qualification Flight Procedures CQFP-06X exam preparation:

* Receive ship's brief
* Interpret marshal procedures (Case I)
* Interpret marshal procedures (Case II)
* Recall procedures/techniques for CV pattern entry
* Recall procedures/techniques for the carrier pattern
* Recall the procedures/techniques for controlling glideslope and airspeed on carrier approach
* Recall the principle for controlling lineup on carrier approach
* Recall procedures/techniques in response to LSO commands during carrier approach
* Identify criteria for executing a waveoff
* Recall procedures/techniques for performing a waveoff
* Recall procedures for Delta pattern
* Recall procedures/techniques for arrested landings
* Recall after CV arrestment procedures
* Recall procedures/techniques for taxiing aircraft on flight deck
* Identify the various types of flight deck personnel
* Recall functions/responsibilities of various types of flight deck personnel
* Identify signals used by flight deck personnel
* Identify catapult director/officer signals
* Recall procedures for catapult hook-up
* Recall procedures/techniques for catapult launch
* Recall procedures to initiate suspend
* Recall procedures for catapult malfunctions/emergencies

* Recall procedures for performing hot refueling on CV flight deck
* Recall preflight procedures on CV flight deck
* Recall procedures for manning aircraft on CV flight deck
* Recall procedures for shutdown of aircraft on CV flight deck
* Recall procedures/techniques for performing Case I departure
* Recall procedures/techniques for performing Case II departure
* Compute bingo profile (clean)
* Recall procedures/techniques for flying a bingo profile (clean)
* Compute bingo profile (dirty)
* Recall procedures/techniques for flying a bingo profile (dirty)
* Recall procedures for communications failure in pattern
* Recall procedures for communications failure on flight deck
* Recall safety of flight situations/procedures during operational flight
* Recall the procedure/techniques for blown tire
* Recall the procedures for NWS failure on deck
* Recall procedures for brake failure on deck
* Identify indications of launch bar failing to retract
* Recall procedures for launch bar failing to retract
* Recall the procedures/techniques for cross-deck pendant/hook point failure

T-45 UJPT, E2-C2, & ADV CQFP-06X; IUT CQFP-04X: "Ship's Brief Examination," 1.0 hr, CAI

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.

Air Plan: Schedule of carrier flight operations published daily but subject to change.

Angels: Altitude in thousands of feet. For example, Angels 1.5 = 1500 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. Bingo is an emergency situation.

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: Refers to departure/recovery procedures and landing patterns conducted in VMC conditions 3,000/5 or greater exist (3,000-foot ceiling and 5-nm visibility within the carrier control zone). 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 or ADF 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: Used for weather less than 1,000/5 or at night or when weather is below 1,000 feet 1/2 hour after sunset or 1/2 hour before sunrise.

CCA: Carrier-controlled approach similar to a GCA.

Charlie: Refers to the time the first aircraft is expected at the ramp. A "Charlie" or "Charlie on arrival" is a directive to enter the pattern now. "Charlie five" means be at the ramp in five minutes.

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

Chicks: Wingmen in a flight.

Clara: Meatball is not in sight.

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

Cut Lights: Green lights mounted horizontally and centered above the Fresnel lens box (controlled by the LSO). Utilized during ziplip and EMCON conditions instead of UHF to give pilots clearance to land, i.e., "Roger Ball." Also, used in conjunction with waveoff lights to signal bingo.

D

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

Delta: Enter holding pattern as directed or continue to hold.

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): The future time at which an aircraft is cleared to depart inbound or penetrate from a preassigned fix. Aircraft depart and commence approach at assigned time if no further instructions are received.

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 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.

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

H

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

Hawk: Term used for a lead safety. (Hawking chicks)

Holdback: Metal fitting designed to 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.

In the Middle Position: A distance on the groove that is between the "start" and the "in close" position. The middle third of the groove.

J

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

L

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

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

M

Marshal: 1. Holding pattern during Case I, II, and III recoveries. 2. The term used for the ship's radar controller.

Meatball: Light projected by source lens on the FLOLS.

Mirror: Landing aid used prior to the development of the Fresnel lens.

Mother: Code name used to signify the carrier.

Mark Your Father: State bearing and distance from ship.

O

On the Ball: LSO call stating hold your transmission until aircraft in groove has landed.

Overhead Time: The scheduled time a flight of aircraft is expected overhead the ship for pattern entry.

P

Paddles: The 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 in the ship's TACAN approach (normally at 20 nm from the ship at 5,000 ft) at which 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 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 back 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 or the downwind end of the platform of the runway.

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 touchdown point.

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

S

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

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

Spin: Depart and reenter the break. Normally performed at the bow if unable to break prior to 4 nautical miles upwind.

Starboard Delta: Holding pattern used by the helicopters and COD aircraft flown on the starboard side of the ship and using right-hand turns at 500 feet.

Start: The first third of the groove length.

Steer: A heading to an airfield for normal divert from the ship when not in bingo profile. When directed, proceed to the field named.

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 remove slack.

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.

Walk time: The time you are to leave the ready room to man your aircraft.

Z

Ziplip: Condition under which radio communication is minimized.