

Communications

9.1 GENERAL <http://www.wings-of-gold.com/cnatra/LSONATOPSMAY09.pdf>

The LSO shall possess a thorough knowledge of visual and radio communication procedures as well as complete familiarity with the operation of all available communication equipment, including ACLS data link if applicable. In addition, he should ensure that all pilots under his cognizance are periodically examined on their knowledge of visual communication procedures.

9.2 RADIO COMMUNICATIONS

Under normal recovery conditions, the LSO should restrict his radio transmissions to the minimum necessary to provide positive corrective signals to the pilot during the actual approach. It must be realized, however, that at some times (i.e., initial stages of FCLP, excessive deck motion, restricted ceiling/visibility, etc.) the number of LSO radio transmissions will be greater than normal. Radio communications may be used for airborne brief/debrief at the discretion of the controlling LSO whenever the situation requires it. This includes the pattern and final approach.

The LSO should not permit perceived pressure to maintain total radio silence during EMCON training or ZIP LIP conditions to override his absolute responsibility for the safe recovery of aircraft.

9.3 STANDARD LSO PHRASEOLOGY

The LSO must on occasion use radio transmissions to effect safe aircraft recovery. Calls that are too frequent or verbose actually degrade pilot training and performance. Safety of flight requires that pilots receive short meaningful transmissions that can be instantly understood. **Figure 9-1** contains a listing of standard LSO informative, advisory, and imperative phrases.

LSOs shall train pilots on these standard LSO voice calls, their meanings, and the correct response to them. LSOs shall adopt a voice call strategy that is primarily limited, under normal conditions, to the calls listed herein. Such a strategy will reduce pilot confusion or misinterpretation of any nonstandard calls.

9.4 RADIO COMMUNICATIONS DURING EMERGENCY SITUATIONS

During emergency situations such as loss of visual landing aids, reduced cockpit visibility, excessive deck motion, etc., the LSO will often be required to give pilots a complete radio talkdown, providing lineup, glideslope, and corrective information. The LSO should brief the pilots as time permits on format for the talkdown as well as expected pilot responses to calls.

INFORMATIVE CALLS

Used to inform pilots of existing situations.

TRANSMISSION	MEANING	RESPONSE (Aircraft in Manual Mode)	RESPONSE (Aircraft in APC Mode)
"You're (a little) high."	Aircraft is (slightly) above optimum glide-slope.	Adjust sink rate with power/nose attitude to establish center ball.	Adjust sink rate with nose attitude to establish center ball. (Avoid using in close.)
You're (a little) low."	Aircraft is (slightly) below optimum glide-slope.	Adjust glide slope immediately.	Adjust glide slope immediately.
"You're going high (low)."	Unless corrected, aircraft will go above (below) optimum glide-slope.	Adjust sink rate with power/nose attitude to maintain center ball.	Adjust sink rate with nose attitude to maintain center ball.
"You're on centerline."	Self-explanatory.	N/A	N/A
"You're on glideslope/glidepath."	Self-explanatory.	N/A	N/A
"You're on speed."	Self-explanatory.	N/A	N/A
"You're lined up left/right."	Aircraft has undershot/overshot centerline.	Reestablish centered lineup.	Reestablish centered lineup.
"You're drifting left/right."	Aircraft is drifting left/right of center-line.	Correct lineup to centerline.	Correct lineup to centerline.
"You're (a little fast/slow)." (To be followed by "Go manual" if auto.)	Self-explanatory.	Adjust nose attitude/power to establish optimum AOA.	APC is not maintaining aircraft at optimum AOA. Disengage APC and adjust power/attitude to maintain optimum AOA.
"Roger Ball" ("Auto"/"Coupled" as appropriate).	LSO acknowledges pilot has meatball acquisition, lineup reference, and angle of attack.	N/A	N/A
"Paddles contact."	LSO assuming control from CCA.	N/A	N/A
"Continue."	LSO acknowledges CLARA call but is not able to assume control from CCA	Continue approach to minimums	Continue approach to minimums
"The deck is moving down/up (a little)."	OLS information may be invalid (to be followed by advisory/imperative calls).	Adjust power and attitude under LSO guidance.	Adjust attitude under LSO guidance.
"The deck is steady."	OLS information is valid	Fly normal approach.	Fly normal approach.
"Winds are (slightly) starboard/port/axial."	Self-explanatory.	Monitor lineup to maintain centerline.	Monitor lineup to maintain centerline.
"You're underpowered/overpowered."	Self-explanatory.	Adjust attitude and power as required.	Not used.
"Ship's in a starboard/port turn."	Self-explanatory.	Adjust lineup as necessary.	Adjust lineup as necessary.
"MOVLAS recovery."	MOVLAS is in use.	Fly published pattern altitude until "Roger ball" received.	Fly published pattern altitude until "Roger ball" received.

Figure 9-1. Standard Radio Phraseology (Sheet 1 of 4)

ADVISORY CALLS

Used to direct pilot's attention to potential difficulties and prevent possible control errors.

TRANSMISSION	MEANING	RESPONSE (Aircraft in Manual Mode)	RESPONSE (Aircraft in APC Mode)
"Keep your turn in."	If angle of bank is not adjusted, the aircraft will overshoot the centerline.	Adjust angle of bank.	Adjust angle of bank.
"Check your lineup." (Start only.)	Aircraft lineup is not optimum.	Correct lineup drift or position to maintain aircraft on centerline.	Correct lineup drift or position to maintain aircraft on centerline.
"Back to the right/left."	Aircraft is drifting such that if drift is not corrected, it will overshoot the centerline.	Correct lineup drift to remain on centerline.	Correct lineup drift to remain on centerline.
"Don't settle." "Don't go low."	Aircraft will settle below optimum glideslope if not corrected.	Check sink rate and meatball to avoid settling below glideslope.	Check sink rate and meatball to avoid settling below glideslope.
"Don't climb." "Don't go high."	Aircraft is on or above optimum glideslope with insufficient rate of descent to maintain constant glideslope.	Adjust power/attitude to stop the ball from rising.	Adjust power/attitude to stop the ball from rising.
"Don't go any lower (higher)."	Aircraft is maintaining position well below (above) optimum glideslope with insufficient or no correction.	Adjust power/attitude to make positive correction toward optimum glideslope.	Adjust attitude to make positive correction toward optimum glideslope.
"Don't chase it"	Advises pilot the deck is moving up/down and may present an illusion of a climb or descent	Disregard deck motion and adjust power/attitude to maintain rate-of-descent and optimum airspeed.	Disregard deck motion and adjust power/attitude to maintain rate-of-descent and optimum airspeed.
"Hold what you've got."	OLS information is invalid. Present rate-of-descent is correct to maintain proper glideslope.	Adjust power/attitude. Hold present rate-of-descent and optimum airspeed.	Adjust attitude. Hold present (optimum) rate-of-descent.
"Fly the ball."	OLS information is valid.	Scan the lens and adjust power/attitude to maintain optimum glideslope.	Scan the lens and adjust attitude to maintain optimum glideslope.
"Easy with it."	Magnitude of power correction immediately preceding this transmission is excessive.	Reduce magnitude of power correction to intercept and reestablish optimum glideslope and airspeed.	Reduce magnitude of nose attitude correction to intercept and reestablish optimum glideslope and airspeed.
"Easy with your nose."	Magnitude of nose attitude correction immediately preceding this transmission is excessive.	Reduce magnitude of nose attitude correction to establish optimum aircraft attitude.	Not used.
"Easy with your wings."	Magnitude of lineup correction immediately preceding this transmission is excessive.	Reduce magnitude of lineup correction to intercept and reestablish centerline.	Reduce magnitude of lineup correction to intercept and reestablish centerline.

Figure 9-1. Standard Radio Phraseology (Sheet 2)

IMPERATIVE CALLS

Used to direct the pilot to execute a specific control action. MANDATORY IMMEDIATE RESPONSE

TRANSMISSION	MEANING	RESPONSE (Aircraft in Manual Mode)	RESPONSE (Aircraft in APC Mode)
"A little power."	Aircraft is decelerating or settling.	Correct with power.	Not used.
"Power back on."	Pilot has made an excessive power reduction.	Add power to maintain optimum glideslope/AOA.	Disengage APC. Add power to maintain optimum glideslope/AOA.
"Power."	Aircraft is low/slow.	Add power.	Disengage APC. Refer to Note.
"Burner."	Aircraft is extremely underpowered or in extremis.	Select afterburner power.	Select afterburner power.
"Go manual."	Disengage APC.	Not used.	Disengage APC. Refer to Note.
"Attitude." ("A little attitude.")	Manual: Aircraft nose is low. Auto: Aircraft is low/setting or nose is low.	Increase nose attitude (slightly) to establish landing attitude.	Increase nose attitude (slightly) to reduce sink rate or to establish landing attitude.
"(A little) right/left rudder."	Aircraft does not have enough right or left rudder and will land yawed right or left if not corrected.	Adjust rudder to return aircraft to balanced flight.	Not applicable.
"(A little) Right for lineup." "(A little) Come left."	Aircraft will land left/right if not corrected.	Correct lineup to centerline, then level wings.	Correct lineup to centerline, then level wings.
"Bolter."	Self-explanatory.	Execute bolter in accordance with model NATOPS manual.	Execute bolter in accordance with model NATOPS manual.
"Waveoff" or "Waveoff, foul deck."	Self-explanatory.	Execute waveoff in accordance with model NATOPS manual.	Execute waveoff in accordance with model NATOPS manual.
"Waveoff up the starboard side."	Discontinue turning attempt to overfly the landing area.	Execute waveoff in accordance with model NATOPS manual starboard of the landing area (island).	Execute waveoff in accordance with model NATOPS manual starboard of the landing area (island).
"Cut."	Aircraft is in a position to land.	For barricade recovery, retard throttle(s) to idle and secure engine(s) once safely on deck.	For barricade recovery, retard throttle(s) to idle and secure engine(s) once safely on deck.
"Speedbrakes."	Speedbrakes are extended.	Retract speedbrakes.	Retract speedbrakes.
"Extend speedbrakes."	Self-explanatory.	Comply.	Comply.

Figure 9-1. Standard Radio Phraseology (Sheet 3)

IMPERATIVE CALLS (Cont.)

TRANSMISSION	MEANING	RESPONSE (Aircraft in Manual Mode)	RESPONSE (Aircraft in APC Mode)
"Drop your hook."	Self-explanatory.	Comply.	Comply.
"Drop your gear."	Self-explanatory.	Comply.	Comply.
"Drop your flaps."	Self-explanatory.	Comply.	Comply.
"Level your wings."	Aircraft is in angle of bank.	Comply.	Comply.
"Downgrade."*	Disengage ACLS.	Disengage ACLS.	Disengage ACLS.
"Climb."	Aircraft has bolted/waved off but has not established proper attitude/power for positive rate of climb.	Adjust nose attitude to optimum, level wings, and maintain MRT (afterburner if required) to establish positive rate of climb.	
<p>Note</p> <p>* Aircraft is considered to be in manual mode immediately after the "Downgrade" call. Manual calls/responses are subsequently applicable.</p>			

Figure 9-1. Standard Radio Phraseology (Sheet 4)

CHAPTER 11

Pilot Performance Records

11.1 INTRODUCTION

The effectiveness and combat readiness of the aircraft carrier depends on the overall efficiency of carrier landing operations. To effectively carry out assigned missions, each aviator must be able to perform a carrier approach and landing within the standards set for this evolution. The cognizant commanding officer and air wing commander shall be immediately informed about those pilots who display unsafe practices or unsatisfactory progress. The LSO shall recommend to the commanding officer or air wing commander either additional field/carrier work or immediate grounding and evaluation of those individual pilots concerned.

11.2 LOG BOOKS

The controlling LSO shall maintain a field and carrier logbook. Comments should be sufficiently detailed to enable the LSO to give a comprehensive debrief to the pilots concerned. The Landing Signal Officer's Log, OPNAV 3760/76 (5-87) (S/N 0107-LF-037-6390), may be used for documentation.

The Senior Air Wing Staff LSO shall ensure that all COD shipboard approaches are logged in a separate COD log maintained in the Air Operations office on board the ship.

11.3 PILOT PERFORMANCE RECORDS

The LSO shall keep a smooth carrier landing trend analysis for all pilots making carrier landings in aircraft for which his command is reporting custodian, using OPNAV Form 3760/71 (Figure 11-1) or by using the APARTS (Figure 11-2). The pilot performance record should be updated daily, reviewed and debriefed routinely, and the pilot and his commanding officer notified of any unsatisfactory trends. LSO logbooks and pilot performance records are privileged and personal documents. Extracts from them are authorized for official use provided they are interpreted and compiled by the LSO concerned.

11.3.1 Automated Performance Assessment and Readiness Training System (APARTS)

APARTS is a computer software program designed to assist the LSO in recording and analyzing pilot and LSO carrier landing performance information. The system provides various summaries for individual pilots, squadrons, or an entire air wing. The results may be displayed on the computer screen or printed out for a hard copy record (Figure 11-2). Copies of fleet and FRS APARTS programs, including operating manuals, may be obtained from the U.S. Navy LSO School.

11.4 STANDARD LOG SYMBOLS

The following symbols are in common use for recording comments concerning approaches/landings during FCLP and carrier operations. The symbols used in APARTS are also listed. If there is no corresponding APARTS symbol, the space is left blank.

CARRIER LANDING TREND ANALYSIS														
OPNAV FORM 3760/71 (Rev. 7-71)														
PILOT ROGER BALL														
YEAR 1990 ACFT F-18 SQUADRON VFA-00 SHIP CV-00														
DATE	DN	GR	GLIDESLOPE & SPEED ERRORS						CONTROL ERRORS		LINE UP AND WINGS	WIRES	REMARKS - INCLUDE USE OF APC AND ANCL5	
			..*	OT	X	IM	IC	AR	POWER	ATTITUDE				
4/2	⊙	(AW)		H		(H)				(NDTL)		1 2 3 4	A	
4/2	⊙	WO						DEC	CD	NEPIC		1 2 3 4		
4/2	⊙	(OW)						SRD	B		DNTL	1 2 3 4		
4/4	⊙	OK									(DLIC)	1 2 3 4		
4/6	⊙	(OW)	H								RIFWIC	1 2 3 4		
4/7	⊙	OK										1 2 3 4		
4/7	⊙	(OW)	(SL)					(H)		OCCO		1 2 3 4		
4/8	⊙	C					OC (H)	CD	→	EG		1 2 3 4	LANDED ON WO	
4/8	⊙	I			(L)			(L)				1 2 3 4	I	
4/9	⊙	I	HF								WUX-IM	1 2 3 4		
6/5	⊙	WO										1 2 3 4	LIG	
6/5	⊙	OK			(OS)				(S)		(OSX)	1 2 3 4		
6/6	⊙	(OW)	NEP	S			LO	→		NEPAW		1 2 3 4		
6/6	⊙	I					SRD	→	I			1 2 3 4		
6/6	⊙	I					SRD	→	I		NDIC	1 2 3 4		
6/8	⊙	(OW)					PL	→				1 2 3 4		
6/8	⊙	I					AA		TMP	B	TMPIC	1 2 3 4	DRWAR	
6/20	⊙	(OW)					AA		ACC			1 2 3 4	TWA	
	DN											1 2 3 4		
	DN											1 2 3 4		
	UN											1 2 3 4		
	DN											1 2 3 4		
	DN											1 2 3 4		

LSO-F018

Figure 11-1. Example Carrier Landing Trend Analysis Form

SQUADRON: ALL TREND ANALYSIS							AIRCRAFT: ALL				
RECOVERY PERIOD: 9006021200 - 9006201200							DAY/NITE/ALL: ALL				
PILOTS SELECTED: BALL, ROGER							MOVLAS: ALL RECOVERIES				
DATE	GLIDE SLOPE AND SPEED ERRORS						CONTROL ERRORS		LINEUP & WING	OTHER	WIRE #
	GRADE	AW	X	IM	IC	AR	POWER	ATT			
06/02D	(OK)		H	(H)				(NDTL)			2
06/02N	WO				DEC	CD	NEPIC				WO
06/02N	(OK)				SRD	B		DNTL			4
06/04D	OK								(DLIC)		3
06/06D	(OK)	H							RUFWIC		4
06/07D	OK					(B)					4
06/07D	(OK)	(SLO)				(/)	OCCOIC				4
06/08D	C			OC(H)	CD	CD	EGIC EGAR				T1
06/08N	M1		(LO)			(LO) (B)					2
06/09D	—	H F							LULX LULIM		4
06/15D	WO		LIG								WO
06/15D	OK					(S)			(OSX)		2
06/16D	(OK)		S	LO	LO		NEPAW				1
06/16N	B			OCS	H	^				^AR	B
06/16N	—			SRD	H	\		NDIC			1
06/18D	(OK)		OCSLO		F	F					3
06/18N	—					B	TMPIC		DRWAR LRWDIW		4
06/20D	(OK)				ACC				AA		2
TOTAL # OF APPROACHES – 18											

Figure 11-2. APARTS Trend Analysis

11.4.1 General Symbols

<u>SYMBOL</u>	<u>APARTS SYMBOL</u>	<u>MEANING</u>
WO	WO	Waveoff
WOP	WOP	Waveoff Pattern
OWO	OWO	Own Waveoff
TWO	TWO	Test Waveoff
TLU	TLU	Test Lineup
<u>OK</u>	<u>OK</u>	Perfect pass
OK	OK	Reasonable deviations with good corrections
(OK)	(OK)	Fair. Reasonable deviations
—	--	No-grade. Below average but safe pass
C →	C	Cut. Unsafe, gross deviations inside waveoff window
B ↗	B	Bolter
NC	NC	No count (used in grade column)
()	()	Parentheses around any symbol signifies "a little" (e.g., (F) means "a little fast")
_____	<u>Comment</u>	Underline. For emphasis
PATT	PATT	Pattern
Ⓐ	(A)	APC/Auto

 APC/Auto downgraded to manual

| M1 Mode I ACLS (record in grade column)

 Mode I ACLS, uncoupled after the ball call

• • A dot between two symbols indicates "on" (e.g., S• LUIC)

— - A dash between two symbols indicates "to" (e.g., HIM-IC)

SQUARE Comment [] A square around any symbol indicates that a signal was not answered

CIRCLE Comment () A circle around any symbol indicates that a signal was answered too slowly

 OC When used as a prefix to any symbol, " " indicates "over controlled"

11.4.2 Descriptive Symbols

<u>SYMBOL</u>	<u>APARTS SYMBOL</u>	<u>MEANING</u>
AA	AA	Angling approach
ACC	ACC	Accelerate
AFU	AFU	All "fouled" up
B	B	Flat glideslope
	C	Climbing
CB	CB	Coming back to lineup
CD	CD	Coming down

NAVAIR 00-80T-104

CH	CH	Chased
CO	CO	Come-on
CU	CU	Cocked up
DD	DD	Deck down
DEC	DEC	Decelerate
DL	DL	Drifted left
DN	DN	Dropped nose
DR	DR	Drifted right
DU	DU	Deck up
EG	EG	Eased gun
F	F	Fast
FD	FD	Fouled deck
GLI	GLI	Gliding approach
H	H	High
HO	HO	Hold off
LIG	LIG	Long in the groove
LL	LL	Landed left
LLU	LLU	Late lineup
LO	LO	Low
LR	LR	Landed right
LTR	LTR	Left to right
LU	LU	Lineup
LUL	LUL	Lined up left
LUR	LUR	Lined up right

LWD	DLW	Left wing down
N	N	Nose
NC	NC	Nice correction
ND	ND	Nose down
NEA	NEA	Not enough attitude
NEP	NEP	Not enough power
NERD	NERD	Not enough rate of descent
NERR	NERR	Not enough right rudder
NESA	NESA	Not enough straight away
NH	NH	No hook
NSU	NSU	Not set up
OR	OR	Overrotate
OS	OS	Overshoot
OSCB	OSCB	Overshot coming back
P	P	Power
PD	PD	Pitching deck
PNU	PNU	Pulled nose up
ROT	ROT	Rotate
RUD	RUD	Rudder
RUF or \surd	RUF	Rough
RWD	DRW	Right wing down
RR	RR	Right rudder
RTL	RTL	Right to left

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S	S	Settle
SD	SD	Spotted deck
SHT	SHT	Ship's turn
SKD	SKD	Skid
SLO	SLO	Slow
SRD	SRD	Stopped rate of descent
ST	ST	Steep turn
TCA	TCA	Too close abeam
TMA	TMA	Too much attitude
TMP	TMP	Too much power
TMRD	TMRD	Too much rate of descent
TMRR	TMRR	Too much right rudder
TTL	TTL	Turned too late
TTS	TTS	Turned too soon
TWA	TWA	Too wide abeam
W	W	Wings
WU	WU	Wrapped up
XCTL	XCTL	Cross control
	^	Over the top
	LLWD	Landed left wing down
	LRWD	Landed right wing down
	LNFB	Landed nose first

	3PTS	Landed 3 points
	/	Fly through the glideslope (going up)
	\	Fly through the glideslope (going down)

11.4.3 Symbol Suffixes

<u>SYMBOL</u>	<u>APARTS SYMBOL</u>	<u>MEANING</u>
CCA	CCA	Carrier controlled approach
OT	OT	Out of turn (as aircraft rolls wings level)
BC	BC	Ball call
X	X	At the start (first one-third of glideslope)
IM	IM	In the middle (middle one-third of the glideslope)
IC	IC	In close (last one-third of glideslope)
AR	AR	At the ramp
TL	TL	To land
IW	IW	In the wires
AW	AW	All the way

LANDING SIGNAL OFFICER REFERENCE MANUAL (Rev B): <http://63.192.133.13/VMF-312/LSO.pdf> (5.6Mb)

CHAPTER 20

WAVING CONCEPTS

20.1 GENERAL

VOICE CALLS

1. As a general voice call strategy, informative and advisory calls are used early in an approach and imperative calls are used late in the approach. A shift to more imperative voice calls may be required for a disoriented pilot or for demanding environmental/weather conditions.
2. A calm and confident sounding "Roger Ball" (or "Paddles Contact") is critical to pilot confidence in the LSO. An excitable or unconfident sounding call may have a negative effect on subsequent pilot responsiveness.
3. Try to wave such that the pilot makes his own corrections. When his performance or recovery conditions start deteriorating, you must increase your involvement in the pass.
4. LSO must be alert for a settle on lineup corrections. A "power" call prior to the lineup call should be considered when aircraft is in close.
5. At least one LSO must **always** be monitoring the radio during a recovery. As controlling or B/U LSO, avoid redirecting your attention (such as to the LSO Log Book or phone calls) when your eyes should be on approaching aircraft, deck status, etc.

SCAN

1. LSO scan breakdown (GS, LU, AOA cues) can lead to drastic deviation in one dimension. A common LSO (and pilot) mistake is excess attention to GS at the expense of the LU. Thus, the backup LSO must also be actively involved in the pass and alert to breakdown of the controlling LSO's scan.
4. Inside the normal waveoff point, use waveoff any time deck goes foul and any time 100% power is needed for aircraft to clear ramp.

2. LSOs can become perceptually "deceived" by a smooth approach with a minor deviation (such as little high). This can negatively affect critical perceptions in close and can also hurt LSO credibility during debrief. This deception can also be brought on by a series of smooth approaches with some deviation. Over a period of time, pilots will try to fly the type of approach that they think the LSO wants to see for an OK grade.

EQUIPMENT

1. Do not let the lens be turned on until you have the capability to communicate and to use the pickle.
2. LSO (or backup, or other team member) must always check lens setting before each pass. Proper arresting gear weight settings must also be verified.
3. Do not accept an aircraft without an approach light or with a flashing approach light. If possible, ask pilot to check gear or hook (as appropriate) well prior to ball call. LSO NATOPS provides specific guidance.
4. Do not secure from the LSO platform with the lens still on.

WAVE-OFF

1. LSOs have dual waving responsibilities, a safe **and** expeditious recovery). The safety aspect must **never** be compromised.
2. The wave-off call must be given firmly but calmly. An over-excited call may lead to excessive pitch response from the pilot and an inflight engagement.
3. Always use waveoff call and pickle simultaneously when waveoff is required.
5. After 2 or 3 power and/or attitude calls without sufficient pilot response, use the waveoff.

20.2 PILOT CONSIDERATIONS

EXPERIENCE

1. LSO should consider a very inexperienced pilot as especially unpredictable, however, LSO should not "lower his guard" for highly skilled or experienced pilots. They will occasionally make critical, unpredictable errors requiring waveoff.
2. Low proficiency in pilots can be evidenced by poor starts.
3. LSO should consider moving waveoff point out slightly for a pilot known to be unproficient.
4. Early wires and bolters over a period of time by the same pilot is indicative of "deck-spotting".

PAST PERFORMANCE

1. The quality level of a pilot's past performance (FCLP or CV ops) is no guarantee of the same on any given approach.
2. LSO should never assume that a pilot can salvage an approach without LSO help.
3. LSO should never assume that a pilot will make the proper correction for a given deviation.
4. The pilot who experiences more than 2 passes (possibly excluding foul deck waveoffs) to get aboard has a higher probability of making radical corrections in-close to in-the-wires. Ease the anxiety of pilots who have experienced multiple passes on a given recovery by talking to them and debriefing any trend. Increase your involvement in subsequent passes to guarantee a safe recovery.
5. For CQ-type "endurexes", the last pass has a good probability of exhibiting some type of "get-aboard-itis".

UNRESPONSIVENESS

1. If LSO notes slow pilot responsiveness consider moving waveoff window out further from ship.
2. LSO should never assume that the pilot will make the correct response to an LSO call in close. Be prepared to follow up the call with waveoff.
3. Waveoff should be used for an unresponsive pilot.

DISTRACTIONS/VERTIGO

1. Any malfunction which causes a change in the normal pilot habit patterns can degrade the visual approach (i.e., no TACAN, no needles, no gyro).
2. For a disoriented pilot (i.e., vertigo) or one suffering from fatigue, the LSO may have to "climb into the cockpit" (i.e., LSO talkdown) to effect a safe recovery (however, do not stay there if you do not have to).
3. Waveoff point should be moved out for a disoriented pilot.

20.3 APPROACH PROFILE

STARTS

1. Poor trends leading to the start and at the start are good indicators that the pass is going to be a problem due to pilot disorientation or poor pilot scan.
2. A major glideslope deviation at the start to in-the-middle is difficult for the pilot to salvage. Extra LSO assistance is needed to help pilot get aboard.
3. During day recoveries, beware of pilot tendency to try and salvage an extremely poor start (i.e., OSX, NESA, HFX, HFX, etc.). If not stable approaching in-close position, use waveoff.
4. A poor start frequently leads to overcontrol tendencies in the remainder of the pass.

DEVIATIONS

1. For significant multiple deviations in close, a waveoff should be used by the LSO. As a rule of thumb, if 2 major deviations (from among GS, LU, AOA or power) are AFU approaching the waveoff point, use waveoff. This is especially critical during CQ.
2. For unsettled dynamics (speed, power, wing position, flight vector, pitch) in close, LSO should consider giving a waveoff.
3. Be prepared for sink rate increases during late lineup corrections.
4. LSO should not accept a low trend on an approach.
5. LSO should not accept a high-all-the-way trend on approach.

BE PREPARED

1. More ramp strikes occur when a pilot is correcting for a high deviation in close than for a low deviation.
2. High at the ramp with less than optimum rate of descent can lead to a dangerously long bolter. Do not hesitate to use waveoff.
3. High at the ramp with excessive rate of descent can easily result in a hard landing.
4. During CQ, pilot scan is usually slow, therefore, be extremely cautious of multiple deviations in-the-middle to in-close.
5. Be alert for the "moth effect" (drift left in close or at the ramp) due to pilot fixation on the meatball at the expense of lineup.

20.4 AIRCRAFT CHARACTERISTICS

ENGINES/APC

1. If calls are necessary for aircraft with slow engine response (S-3, F-14), they must be given well prior to glideslope interception when correction is being made for a high deviation.
2. For aircraft with excellent engine response (EA-6B, E-2C), be alert for pilot over control of power. This also includes excessive power reductions following too much power.
3. For aircraft which have difficult APC disengagement, waveoff point should be moved out slightly.
4. APC should not be used in high wind conditions (greater than approximately 35 knots).
5. If one attitude call does not get sufficient pilot response, switch to a power call (or waveoff, if needed).
6. For T-45, slow spool up time (turbofan engine), do let it stay back on the power.
7. For T-45, tendency is to be over powered, especially in close. Difficult to correct.

LINE-UP

1. Lineup control for "slow movers" (S-3, E-2, T-45) is more critical in shifting wind conditions than for "fast movers".
2. For EA-6B, beware of settle on lineup correction, especially when aircraft is LOSLOIC.
3. Large wing-span aircraft (i.e., E-2, S-3, F-14, etc.) must be on lineup and have little or no drift by the in close position. EA-6B aircraft must be wings level prior to touchdown to preclude possible damage to wingtip speedbrakes with large late lineup correction.

RATE OF DESCENT

1. For F-14, HFIM-IC trend is potentially disastrous due to DECS potential.
2. For F-14, do not allow HCDIC trend. Excess sink rate is difficult to stop with power.
3. For F-14, in a HNDIC situation with APC, excessive sink rate will result and is hard to stop unless a very timely call is given.
4. F-14B and F-14A w/ MOD DLC have significantly increased DLC authority over F-14A. Beware of excessive sink rates developing from power reduction in conjunction with DLC activation.

WIND OVER DECK

1. For F/A-18 and F-14, due to normally high approach speed, LSO must pay close attention to closure under light WOD conditions.
2. For E-2/S-3, aircraft glideslope control through the "burble" is difficult under high WOD conditions. Starboard winds accentuate the "burble" and make glideslope control increasingly difficult for most aircraft.

NOSE MOVEMENT/ATTITUDE

1. For F/A-18, do not allow significant nose movement and/or power reduction, especially for HIC deviation.
2. For EA-6B, glideslope control is very sensitive to nose movement and can also lead to a decel.
3. For S-3, beware of a drop nose in conjunction with DLC activation in close. Excessive sink rate will result.
4. For T-45, power still controls glideslope B but use of nose to influence aircraft is valid/taught technique.

20.5 MALFUNCTIONS

1. Whenever time permits, obtain briefing on aircraft malfunction. Try to avoid relying on memory. Determine pilot workload for the malfunction and increase involvement in the pass accordingly.
2. Be aware of possible configuration and/or speed differences for an aircraft with a malfunction. Verify approach speed and utilize actual aircraft weight for arresting gear setting if minimum recovery wind is a problem.
3. For aircraft with configuration (i.e., FLAP/SLAT) problems or loss of an engine, consult ARBs to determine if non-standard hook-to-eye input needs to be made to CLASS system.
4. With less than optimum lighting configuration, LSO range discrimination is degraded, this causing difficulty in determining a safe waveoff point. Be alert for effects of autokinesis while controlling aircraft with reduced lighting.
5. For an aircraft with only a single light visible, consider having the NFO use his flashlight as an extra reference. Also consider having CATCC or B/U LSO provide range calls.
6. For a NORDO aircraft, move waveoff window out. Always use voice calls in addition to light signals.
7. Remain alert for malfunction during ACLS Mode I approach. Smooth trends early in approach are no assurance of successful termination.
8. For single engine approach, do not accept a poor start or a high deviation after the "in the middle" position.
9. F-14B single engine secondary mode (SESM) CV landings are severely restricted due to potential significant loss of available thrust.

21.7 F/A-18 A/B/C/D

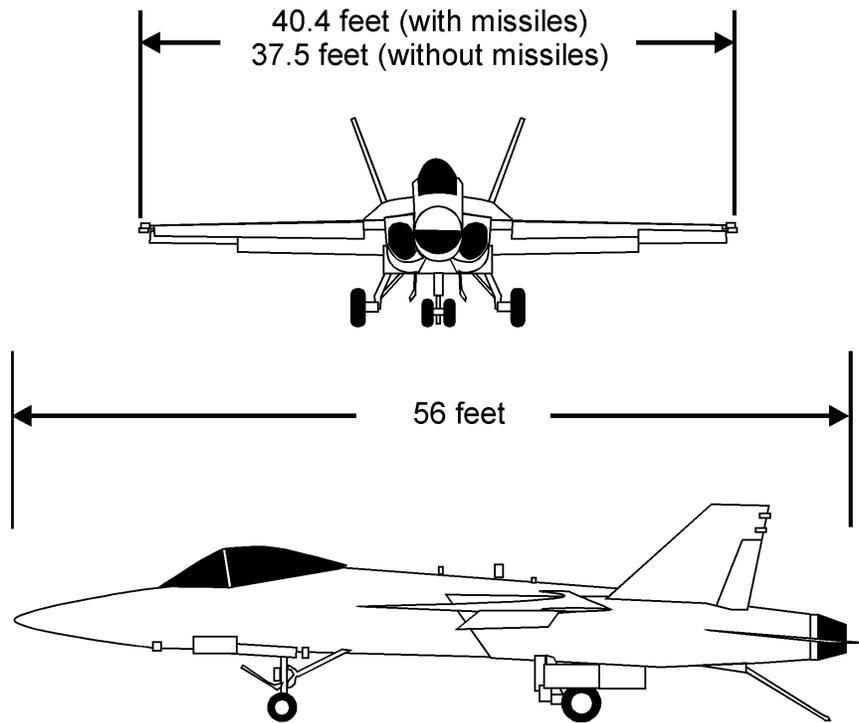


Figure 21-6 F/A-18A/B/C/D

F/A-18A/B/C/D DESIGN

<p>DIMENSIONS</p>	<p>Wing span - 40.4 feet with missiles, 37.5 feet without missiles Fuselage - 56 feet, H/E - 16.7 feet Basic weight - 24,500 pounds Landing configuration: - Flaps extended full down - Approach light on - gear down</p>
<p>EXTERNAL LIGHTING</p>	<p>Approach light Wing tip lights Pylon lights Red strobe lights top of each vertical stabilizer</p>
<p>APPROACH MODES/AIDS</p>	<p>APCS ICLS ACLS Modes I/IA/II/III HUD</p>
<p>FUEL</p>	<p>Max trap fuel - 8,500 pounds Day/VFR - 300 to 400 pounds per pass Night/IFR - 800 to 1,000 pounds per pass</p>
<p>RESTRICTIONS</p>	<p>Max trap weight - 33,000/34,000 pounds (check ARBs)</p>

F/A-18A/B/C/D PERFORMANCE

GLIDESLOPE	Turbofan engines, good response Control glideslope with power Excellent APCS Low gust responsiveness due high approach speed and wing loading Settle on lineup corrections
LINEUP	Favorable control due to forward visibility and small wing span
AOA/SPEED	Approximate max trap speed - 146 knots Good stability Day - top of canopy level with right vertical stabilizer Night - approach light in line with wing tip lights
WAVEOFF	Good engine response High approach speed, waveoff window extended May consider extending waveoff window for APCS approach
TENDENCIES	Settle on lineup Nose down correction for high
MISHAP TRENDS	High coming down on lineup correction Off-center landings

F/A-18A/B/C/D MALFUNCTIONS/EMERGENCIES

HYDRAULIC FAILURE	#2A or 2B - no wheel brakes or nose wheel steering #1A or 1B - carrier landing prohibited
NO FLAPS	Aircraft not recoverable due to excessive WOD requirement
NO HUD	Primary attitude and AOA information lost, pilot scan degraded
STANDBY ATTITUDE MODE	Use of backup attitude reference severely degrades pilot scan
SINGLE ENGINE	Half flaps Reasonable waveoff capability May experience yaw problems when slow
BARRICADE	Max gross weight - 33,000 pounds Max engaging speed - 135 knots Check HTDP, WOD