

LSO nomenclature define vertical flightpath position in terms of the angular deviation from the nominal glideslope which usually ranges from  $3.5^{\circ}$  to  $4^{\circ}$ . Position on glideslope includes degrees of high [HI] and low [LO] deviations about the glideslope centerline [OK] as Figure 2-3 shows. "A little high" is signified by (HI), "moderately high" by HI, and "very high" by HI. A similar scheme is applied to the other kinds of deviations as shown below.

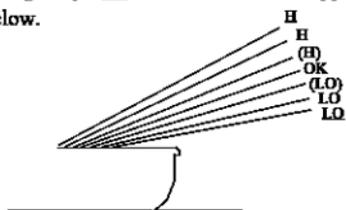


Figure 2-3. LSO Glideslope Descriptors.

LSO's specify angle of attack in terms of the equivalent airspeed deviation. High angle of attack is considered to be slow (SLO), low angle of attack is fast (F), and on-speed is (OK). Gradations of fast and slow are illustrated in Figure 2-4.<sup>19</sup>

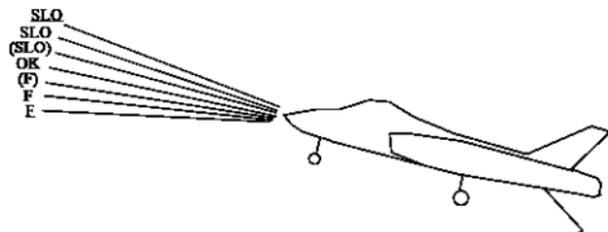


Figure 2-4. LSO Angle of Attack (Airspeed) Descriptors.

<sup>19</sup>Numerical definitions of angle-of-attack status is generally specified for each aircraft in its respective NATOPS Manual.

<sup>20</sup>These values should be viewed as absolute. They can be expected to vary within the LSO community and be adjusted from time to time.

Lateral flightpath position consists of being lined up left (LUL) or lined up right (LUR) with respect to the canted deck centerline. Figure 2-5 shows the LSO gradations in lineup position.

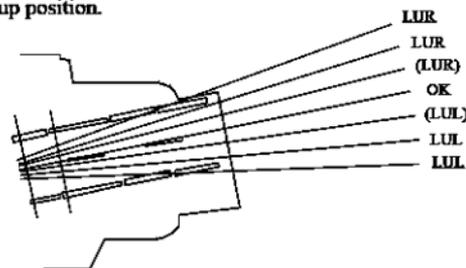
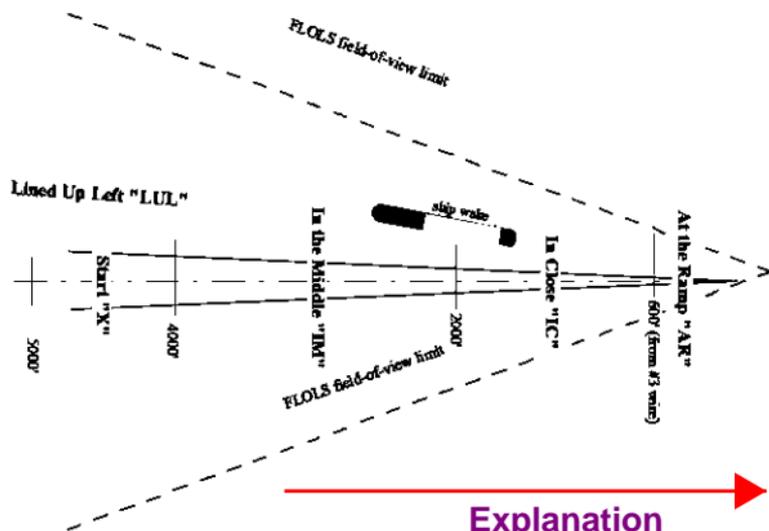


Figure 2-5. LSO Lineup Descriptors.

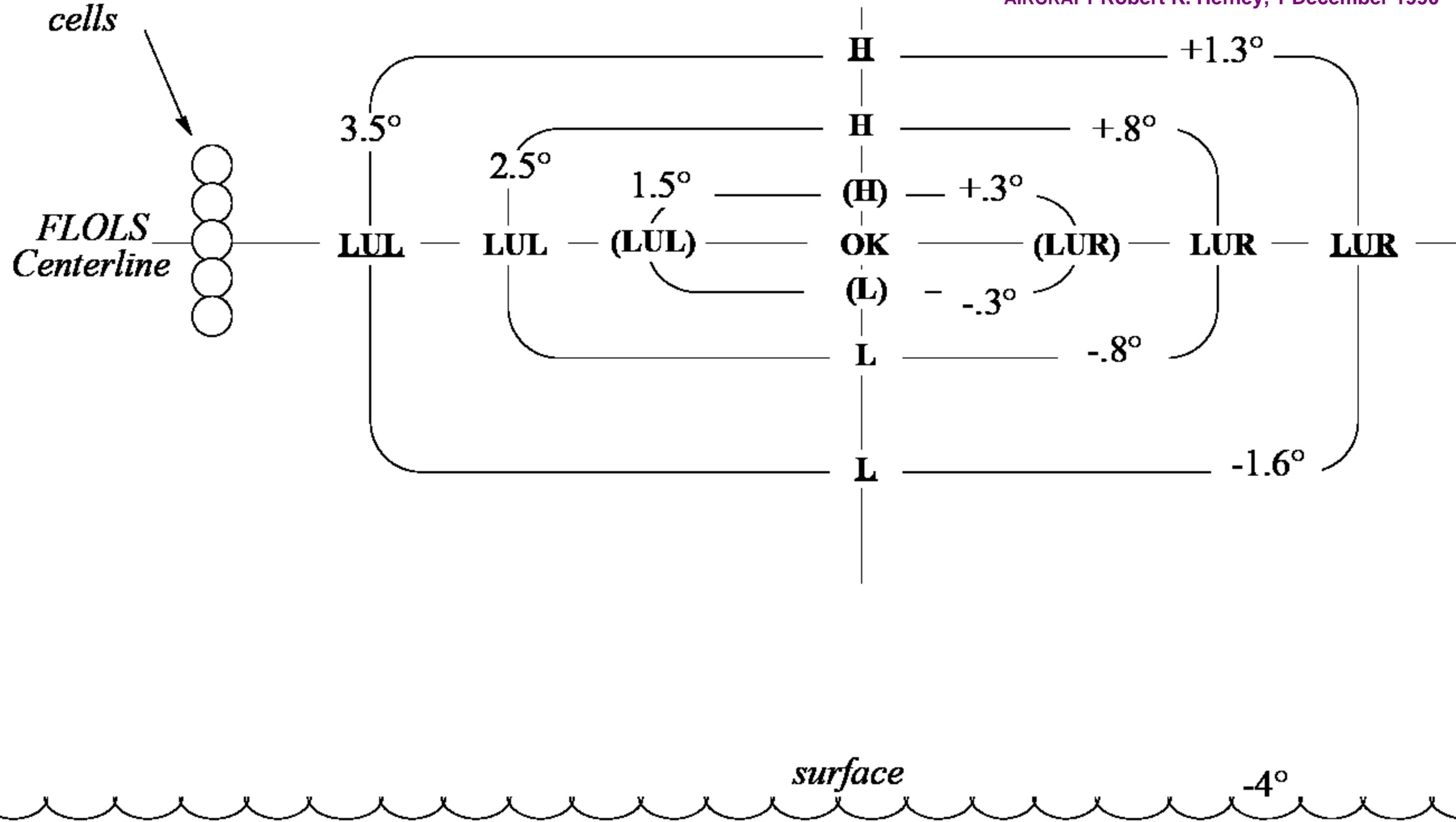
A set of specific values for the above descriptors is given in Table 2-1 based on the study of LSO procedures reported in Reference 45. In addition to the position states, rate-of-change states are also listed, i. e., sink rate and drift rate.<sup>20</sup>



Explanation

*FLOLS*  
*cells*

*Deck Centerline*



**Figure 2-6. Scale Drawing of Approach Flightpath Parameters.** EXPLANATION

**Table 2-1. LSO-Based Performance Parameters****Primary States (position, speed)****Range:**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>
at the ramp	AR	100-600 ft from touchdown
in close	IC	600-2000 ft from touchdown
in the middle	IM	2000-4000 ft from touchdown
at the start	X	4000-5000 ft (~3/4 nm —beginning final leg)

**Glideslope position:**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>	<i>meaning</i>
very high	H	1.3°	well above FLOLS beam (~4 balls high)
high	H	0.8°	at upper visible limit of FLOLS beam
a little high	(H)	0.3°	in center of "one-ball-high" FLOLS indication
OK	OK	0	in center of "on-glideslope" FLOLS indication
a little low	(LO)	-0.3°	in center of "one-ball-low" FLOLS indication
low	LO	-0.8°	at lower visible limit of FLOLS beam
very low	LQ	-1.6°	well below FLOLS beam (~5 balls low)

**Angle of Attack (Speed):**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>	<i>meaning</i>
very slow	<u>SLO</u>	+3 units	nose-down chevron (green)
slow	SLO	+2 units	nose-down chevron (green)
a little slow	(SLO)	+1 units	donut + nose-down chevron (green)
OK	OK	0	donut, on-speed AOA
a little fast	(F)	-1 unit	donut + nose-up chevron (red)
fast	F	-2 units	nose-up chevron (red)
very fast	E	-3 units	nose-up chevron (red)

**Lineup Position:**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>	<i>meaning</i>
lined up very far rt	<u>LUR</u>	3.5°	right of deck centerline
lined up right	LUR	2.5°	right of deck centerline
lined up a little right	(LUR)	1.5°	right of deck centerline
OK	OK	0	on deck centerline
lined up a little left	(LUL)	1.5°	left of deck centerline
lined up left	LUL	2.5°	left of deck centerline
lined up very far left	<u>LUL</u>	3.5°	left of deck centerline

**Secondary States (rate of change of position)****Sink Rate:**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>	<i>meaning</i>
not enough R/D	NERD!	0.8 °/sec	approx level flight @ 1000' range
not enough R/D	NERD	0.4 °/sec	approx level flight @ 2000' range
not enough R/D	NERD	0.2 °/sec	approx level flight @ 4000' range
not enough R/D	(NERD)	0.1 °/sec	
OK	OK	0	descending on GS
too much R/D	(TMRD)	-1 °/sec	
too much R/D	TMRD	-2 °/sec	
too much R/D	<u>TMRD</u>	-4 °/sec	

**Drift Rate:**

<i>verbal description</i>	<i>symbol</i>	<i>value</i>	<i>meaning</i>
very fast right drift	<u>DR</u>	1.0 °/sec	~10° heading error at 1/4 nm
right drift	DR	0.5 °/sec	~5° heading error at 1/4 nm
a little right drift	(DR)	0.2 °/sec	~2° heading error at 1/4 nm
OK	OK	0	
a little left drift	(DL)		
left drift	DL		
very fast right drift	<u>DL</u>		

**OUTER-LOOP CONTROL FACTORS FOR CARRIER AIRCRAFT**

Robert K. Heffley, 1 December 1990