

DCA22LA126

OPERATIONAL FACTORS/HUMAN PERFORMANCE

Attachment 9: Simulator Evaluation

SIMULATOR EVALUATION

Location: FedEx Training Facility, Memphis TN
Date: July 26, 2022
Time: 1300 CDT

Overall Objectives:

- Document simulator fidelity
- Document procedures for visual approach.
- Document any possible difference with airplane indications
- Document RAAS messages
- Document HUD and ND indications

Aircraft: B-757 simulator -200

Airport: Tulsa International Airport (KTUL)

Invited Participants:

Shawn Etcher (NTSB, Operations)¹
Dajuan Sevillian (NTSB, Human Performance)
Sabrina Woods (NTSB, Human Performance)
Matthew Rigsby (FAA AVP 100)
Todd Johnson (FedEx)
Max Clark (Airline Pilots Association)

Initial Simulator Setup:

- Configuration:
 - Landing Weight ~174,200 lbs
 - Landing Fuel ~ 19,900 lbs
 - CG 31.2
 - APU - OFF
 - Outside temp 23.3°C, Dewpoint 21.7°C
 - V2- 150
 - Flaps 30
 - Autobrake - Off
- Cloud heights as overcast at 5,500 feet msl.
- Weather:
 - METAR KTUL 080853Z 04006KT 10SM FEW043 BKN055 BKN070 BKN250 23/22 A2986 RMK AO2 SLP104 T02330217 51002=
- Night

¹ Due to pandemic restriction in place at the time Mr. Etcher was unable to attend.

- Left seat was Pilot Flying (PF); Right seat was Pilot Monitoring (PM).
- Fuel freeze to be utilized during the entire simulator evaluation in order to repetitively simulate the incident flight.
- **All approaches to begin on the downwind leg of for the 18's however, on the west side of TUL, unless otherwise specified.**
- All runs were conducted with motion **off** unless noted otherwise.
- All runs maximum altitude of 7,000 feet in IMC
- All runs conducted until landing and full stop on the runway.
- Repeat any runs as needed and note each.

Run 1: Normal Visual Night Landing Runway 18R

Procedure

- Normal landing procedures
 - a. Allow for acclimation of normal procedures and indications
 - b. Normal traffic pattern
- Set up the ND and FMC for **ILS 18L**

Specifics items to note

- Photo document view once out of the clouds
- When autopilot was disengaged by PF.
- Flight Freeze when prior to rolling out on an east/base leg heading and photodocument view of airport, additionally note the distance from the airport on the sim console. Once documented unfreeze and continue.
- Flight Freeze on base to final leg (dogleg) photodocument cockpit indications on ND and HUD and view outside at the airport. Note lights (if possible, for 18L as well). Once document unfreeze and continue.
- Flight Freeze when established on final for **18R** preferably around 2 NM. Photodocument HUD, ND and outside. Once documented unfreeze and continue.
- Document when RAAS alerts and the runway it states, if possible, record dB of audible alert.
- On landing rest feet on pedals and unlock thrust reversers.
- Document RAAS audible on runway remaining then apply brakes and thrust reverse to stop on runway.

	Notes
	a. Aircraft indications noted Visual references were relatively high fidelity to include heading, altitude and airspeed indications. White "LOC" illuminated at top of PFD. Localizer indicator diamond shows aircraft is far to right of centerline. Aural alerts included "1000 ft," "18R," subsequent distance to and runway length remaining callouts b. Aircraft/Pilot Notes: dB level of RAAS approximately 60dB however SIM operator did cycle through volume to demonstrate capability.



Photo 1: View of airport on right base 18R



Photo 2: View of ND on right base with LOC 18L selected.



Photo 3: View of airport turning base to final for 18R



Photo 4: View of HUD turning base to final for 18R with LOC 18L selected

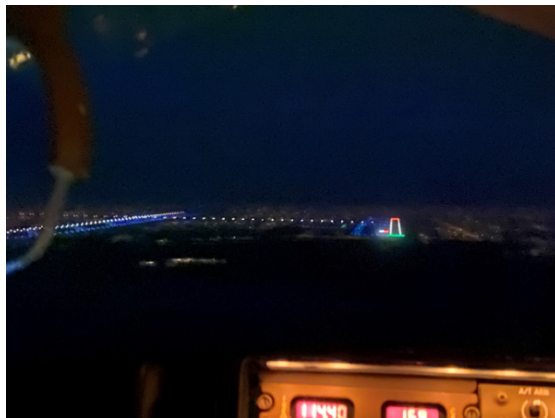


Photo 5: View of airport on 3-mile final 18R



Photo 6: View of PFD on 3.6-mile final 18R with LOC 18L selected

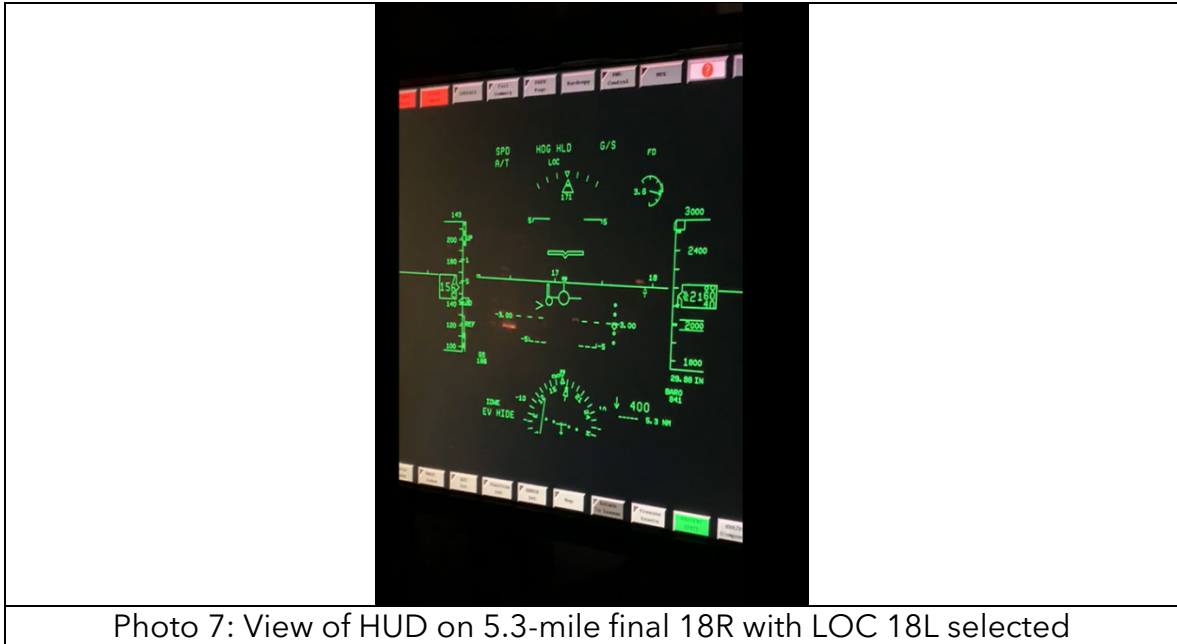


Photo 7: View of HUD on 5.3-mile final 18R with LOC 18L selected

Run 2: Normal Visual Night Landing Runway 18L

Procedure

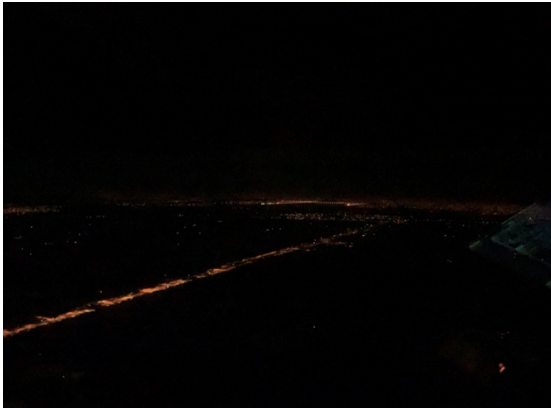
- Normal landing procedures
 - a. Allow for acclimation of normal procedures and indications
 - b. Righthand traffic pattern
- Set up the ND and FMC for **ILS 18L**

Specifics items to note

- Photo document view once out of the clouds
- When autopilot was disengaged by PF.
- Flight Freeze when prior to rolling out on an east/base leg heading and photodocument view of airport, include, if possible, documentation of 18R and 18L lighting in the simulator. Additionally note the distance from the airport on the sim console. Once documented unfreeze and continue.
- Flight Freeze on base to final leg (dogleg) photodocument cockpit indications on ND and HUD and view outside at the airport, if possible, document view of 18L **and** 18R lighting. Note lights (if possible, for 18L as well). Once document unfreeze and continue.
- Flight Freeze when established on final for 18L preferably around 2 NM. Photodocument HUD, ND and outside. Once documented unfreeze and continue.

- Document when RAAS alerts and the runway it states, if possible, record dB of audible alert.
- On landing rest feet on pedals and unlock thrust reversers.
- Document RAAS audible on runway remaining, if applicable, then apply brakes and thrust reverse to stop on runway.

	Notes
	a. Aircraft indications noted Visual references were relatively high fidelity to include heading, altitude and airspeed indications. REILS, PAPIs and parallel taxiway edge lights clearly visible. b. Aircraft/Pilot Notes: Base leg distance from airport/threshold 12 nautical miles dB level of RAAS approximately 60 dB

	
Photo 8: View of airport on right base 18L approximately 10 nm from 18L threshold	Photo 9: View of ND turning base to final for 18L with LOC 18L selected.
 Photo 10: View of airport on final 18L	

Run 3: Normal Visual Night Landing Runway 18R

Procedure

- Normal landing procedures
 - a. Allow for acclimation of normal procedures and indications
- Set up the ND and FMC for **ILS 18R**

Specifics items to note

- Photo document view once out of the clouds
- When autopilot was disengaged by PF.

- Flight Freeze when prior to rolling out on a west/base leg heading and photodocument view of airport, include, if possible, documentation of 18R and 18L lighting in the simulator. Additionally note the distance from the airport on the sim console. Once documented unfreeze and continue.
- Flight Freeze on base to final leg (dogleg) photodocument cockpit indications on ND and HUD and view outside at the airport, if possible, document view of 18L **and** 18R lighting. Note lights (if possible, for 18L as well). Once document unfreeze and continue.
- Flight Freeze when established on final for 18**L** preferably around 2 NM. Photodocument HUD, ND and outside. Once documented unfreeze and continue.
- Document when RAAS alerts and the runway it states, if possible, record dB of audible alert.
- On landing rest feet on pedals and unlock thrust reversers.
- Document RAAS audible on runway remaining, if applicable, then apply brakes and thrust reverse to stop on runway.

	Notes
	a. Aircraft indications noted Visual references were relatively high fidelity to include heading, altitude and airspeed indications. PAPIs clearly visible. "Glideslope" annunciated several times through approach to runway.

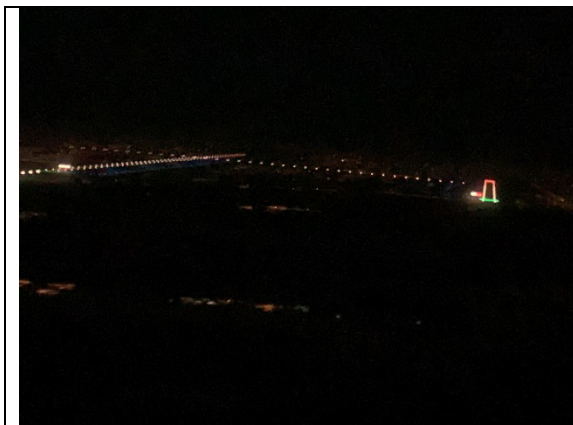


Photo 11: View of airport on final about 4.2 nm from 18R threshold



Photo 12: View of PFD and ND on final approach to 18R



Run 4: Normal Visual Night Landing Runway 18R

Procedure

- Normal landing procedures
 - a. Allow for acclimation of normal procedures and indications
 - b. Normal traffic pattern
- Set up the ND and FMC for **ILS 18L**
- **No Flight freeze run in actual real time**

Specifics items to note

- Photo document view once out of the clouds
- When autopilot was disengaged by PF.
- Document when RAAS alerts and the runway it states, if possible, record dB of audible alert.
- On landing rest feet on pedals and unlock thrust reversers.
- Document RAAS audible on runway remaining then apply brakes and thrust reverse to stop on runway.

	Notes
	a. Aircraft indications noted Visual references were relatively high fidelity to include heading, altitude and airspeed indications. PAPI lights clearly visible. No other discernible change from Run 1.

Airport Diagram

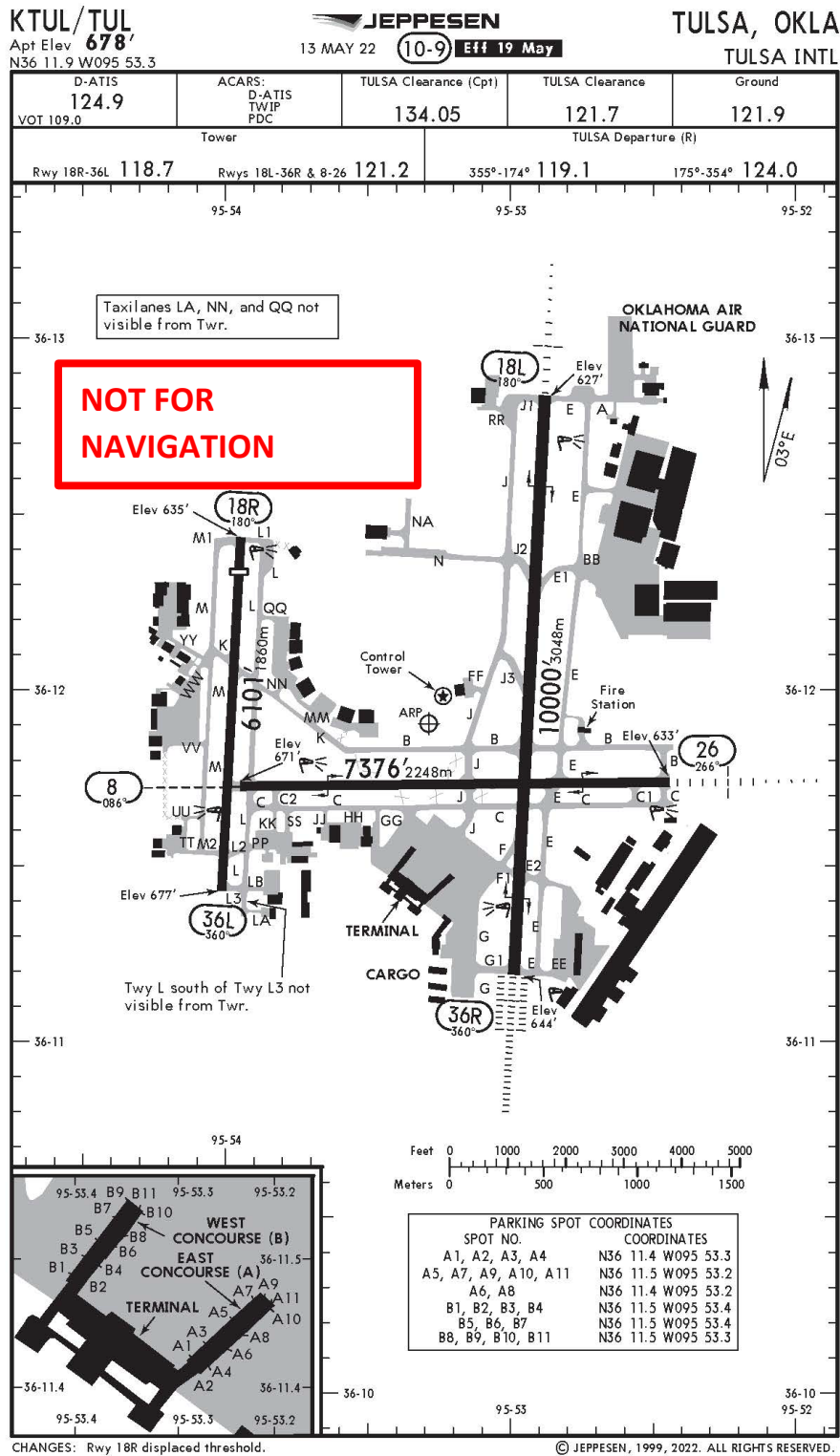


Figure 1. TUL Airport Diagram (Source: Jeppesen)

ILS 18L

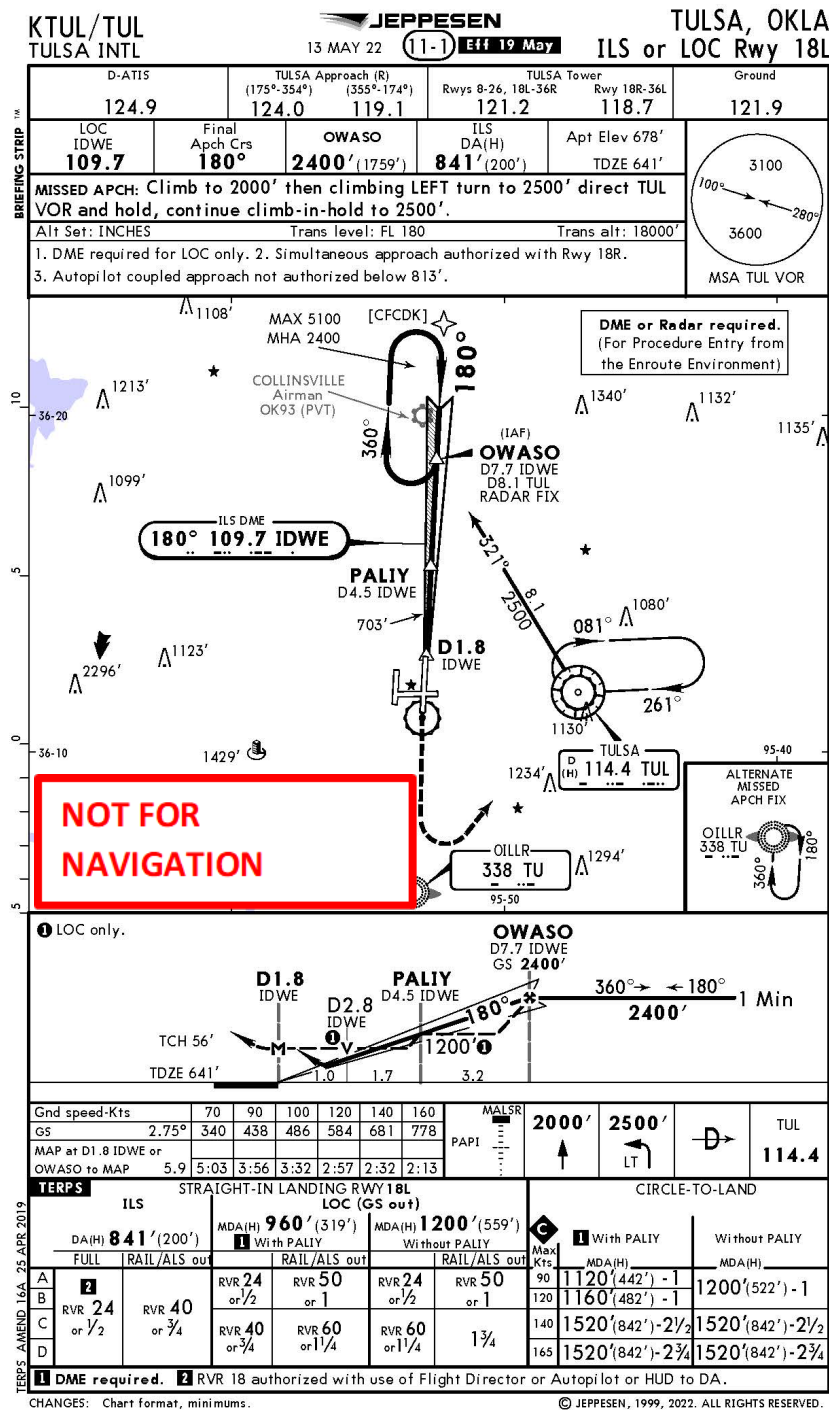


Figure 2: TUL ILS 18L Approach Chart (Source: Jeppesen)

ILS 18R

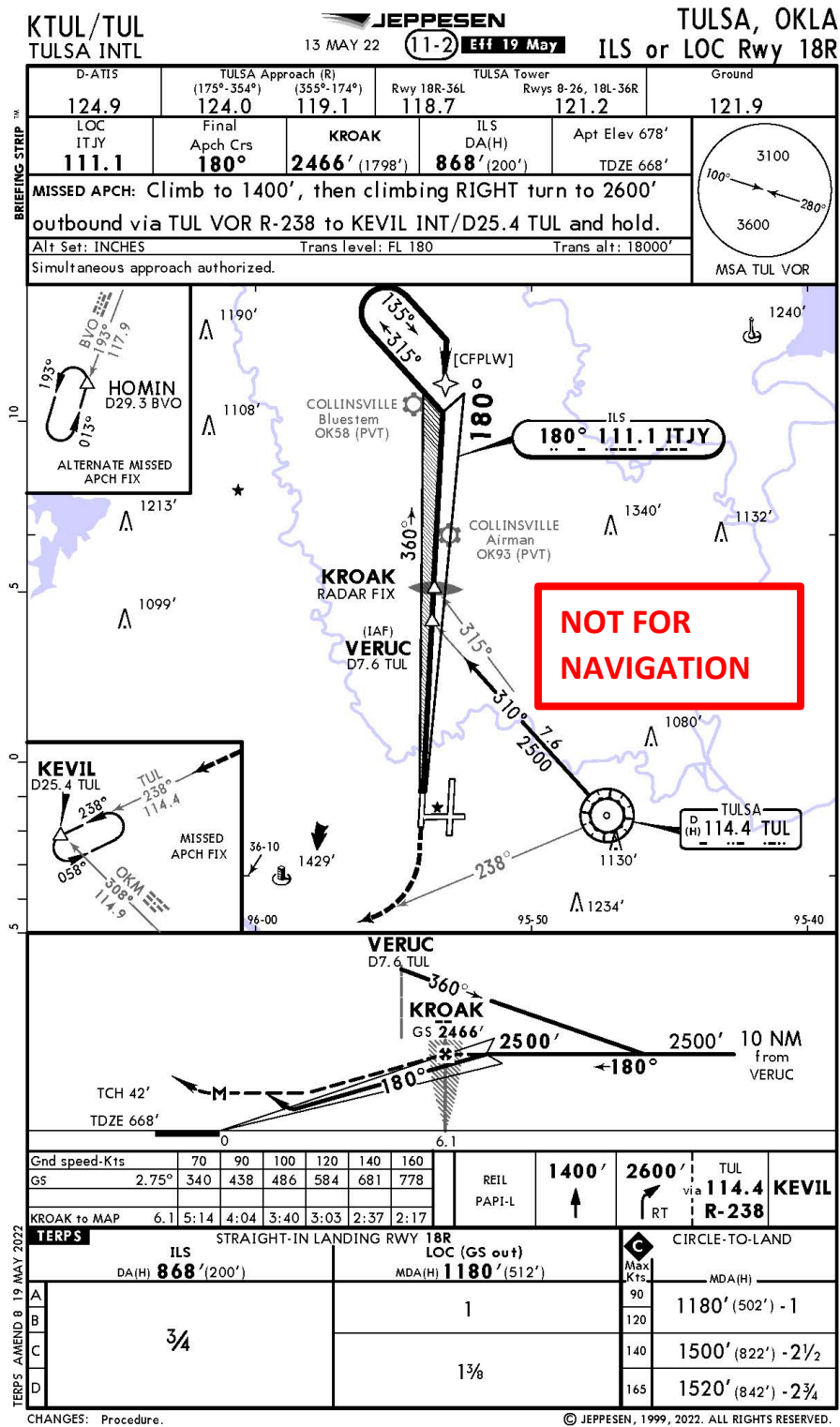


Figure 3. TUL ILS 18R Approach Chart (Source: Jeppesen)