

# Omega Tanker KC-707

## Air Refueling Procedures Brief



N707MQ- Centerline



N624RH- MPRS (right hose shown)

## Centerline KC-707 Tanker:

- Dual-redundant centerline refueling drogues
- Looks like KC-135
- Feels like KC-10

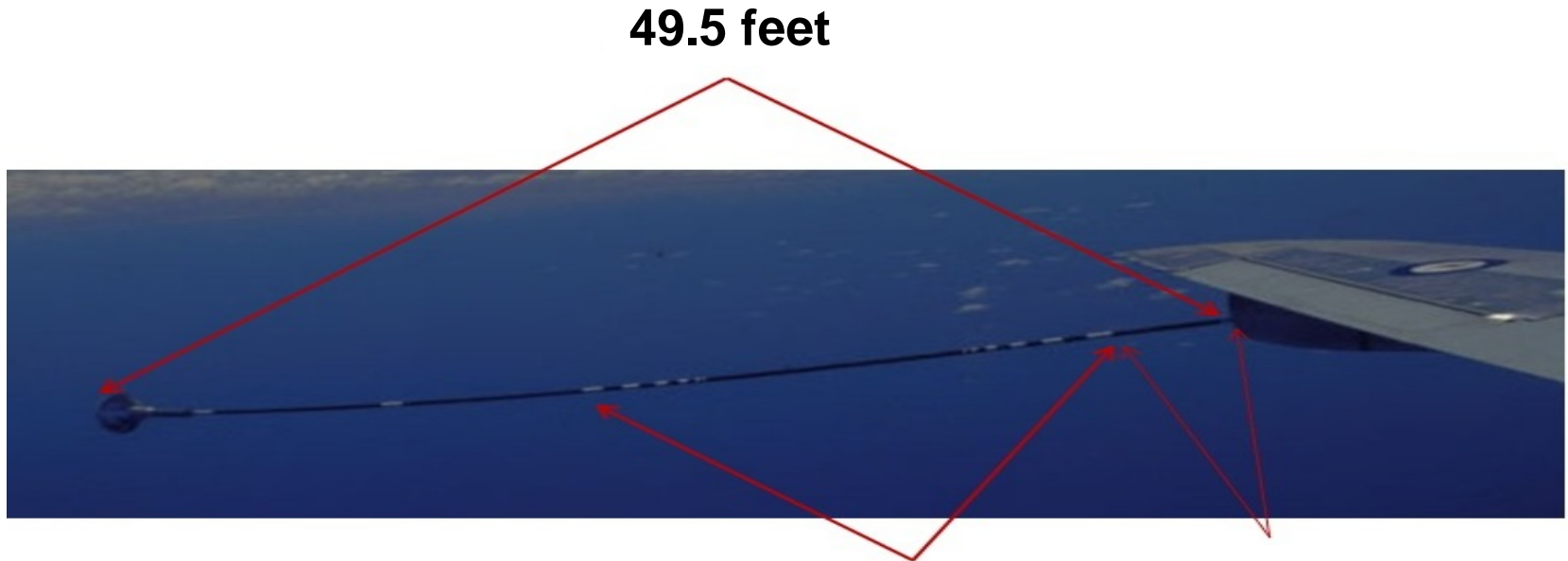
## MPRS KC-707 Tanker

- One pod on each wing
- Looks like KC-135
- Feels like any tanker with wing pods

**NOTE: Both tankers are consistent with NATOPS/USAF/NATO Procedures**

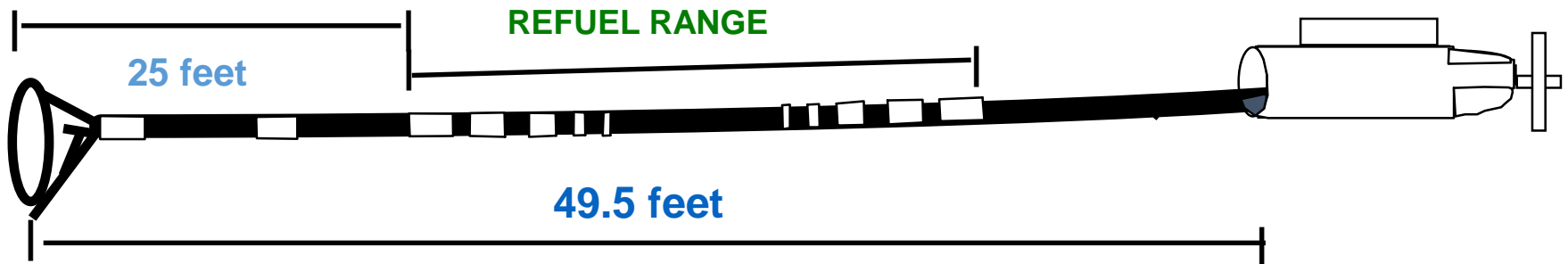


# MPRS Tanker Features



20 feet  
(Refuel range)

5 feet  
(Push in to start)



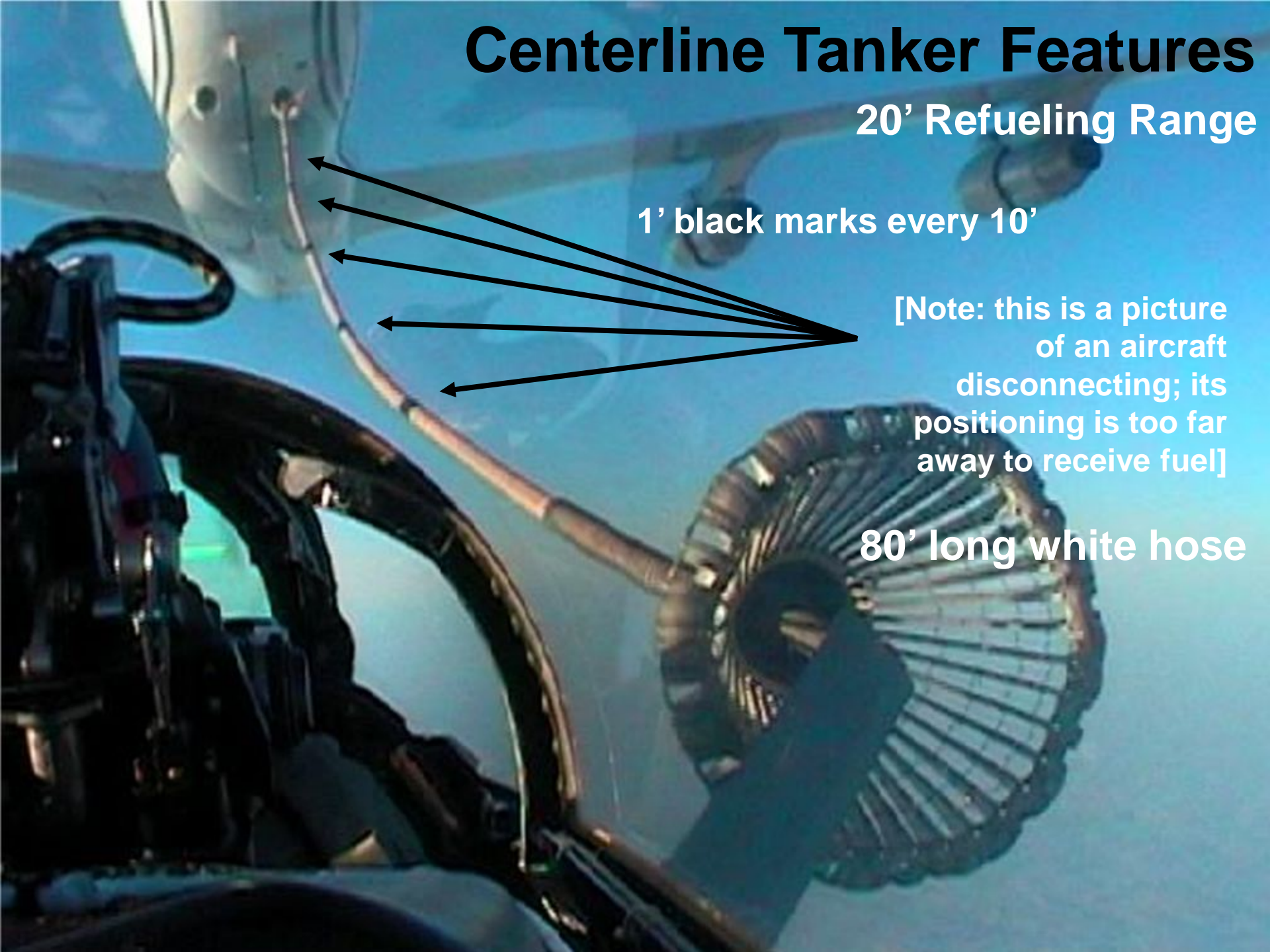
# Centerline Tanker Features

20' Refueling Range

1' black marks every 10'

[Note: this is a picture of an aircraft disconnecting; its positioning is too far away to receive fuel]

80' long white hose





# Tanker Lighting

---

## Tanker AR Status Lights (Dimmable)

- **Amber**—tanker is ready
- **Green**—system is pressurized and fuel is flowing
- **Red**—dead hose or tanker not ready (**not** dimmable)

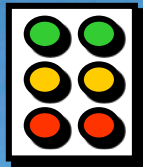
## Position Lighting

- Red Beacon/White Strobe – upper/lower beacons (lower turned off for AR)
- Engine Nacelle (dimmable), 3 Formation (dimmable) per side, Logo (dimmable), AR Pod (dimmable), IR at tail

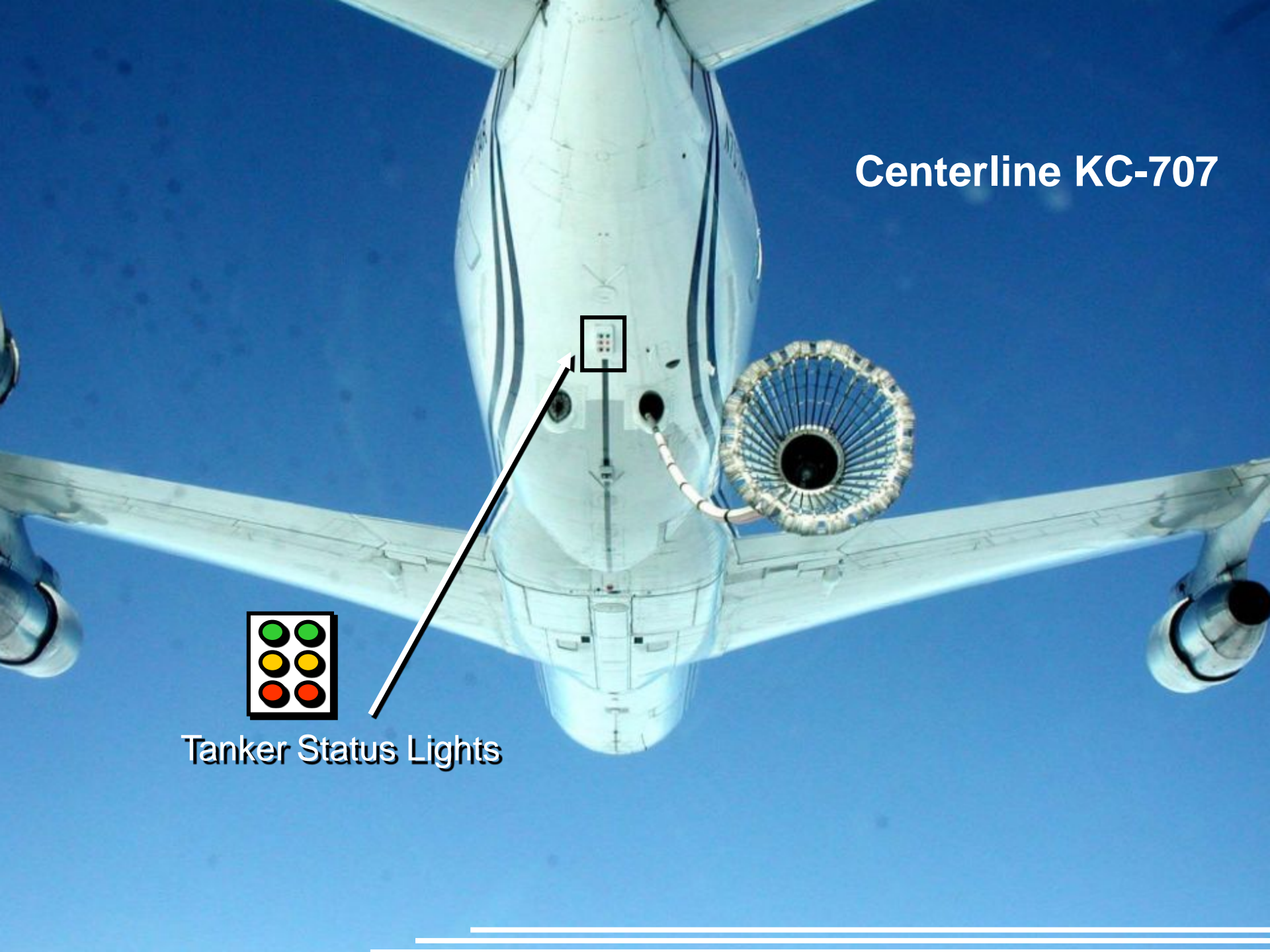
## Standard Aircraft Navigation Lighting

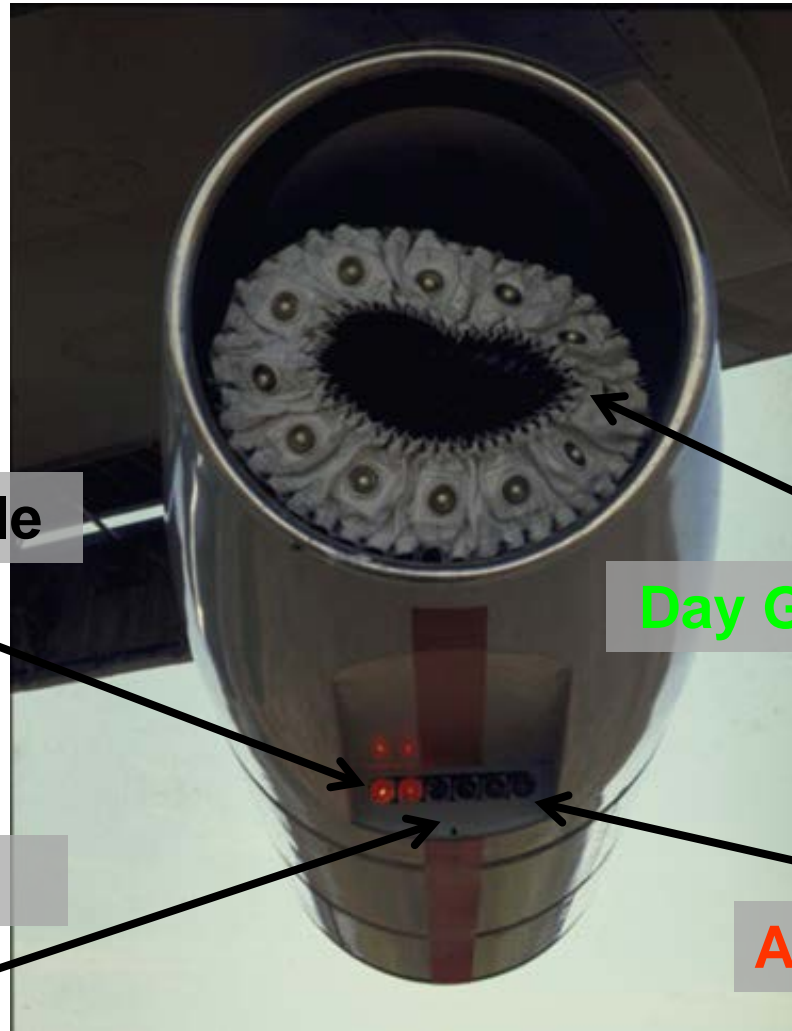
- Green/Red/White (white turned off for AR, all dimmable)

# Centerline KC-707



Tanker Status Lights





**Red** – Not Dimmable

**Day Glo:** Fixed intensity

**Green:** Dimmable

**Amber:** Dimmable



# Rendezvous Procedures

---

## **Standard ATP-56B**

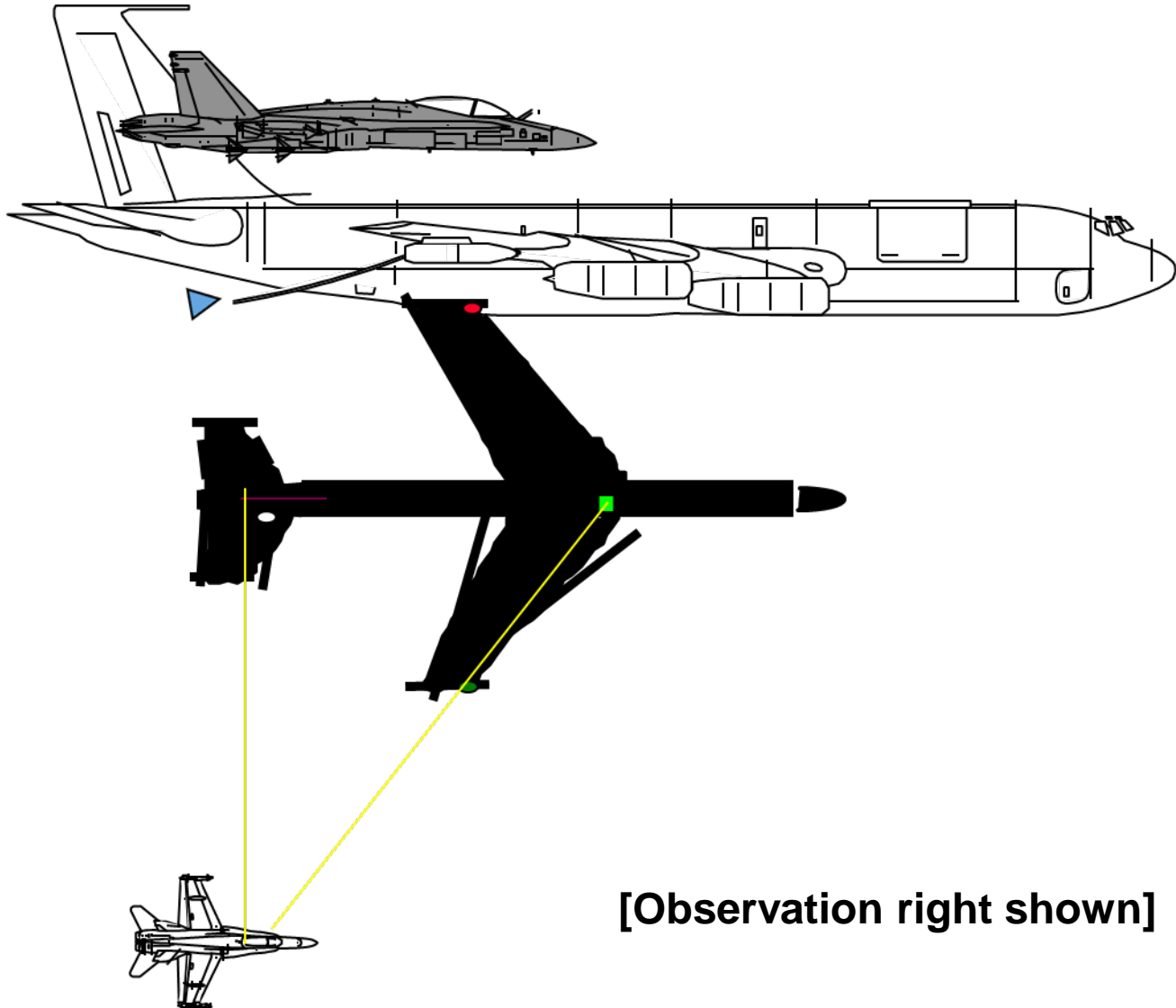
- 250-325 KIAS (Individual NATOPS may vary)
- Left-hand turns unless otherwise required
- ATP-56(B) comm plan

## **Check-in/join up procedure (boom frequency)**

- Inbound by 10 NM call sign, squadron, side number, and offload request
- Cleared to “Observation Left”
- Maintain 1000’ altitude (below), 1 NM lateral separation until visual with the tanker



# Observation Position



[Observation right shown]



# Air Refueling Procedures

---

- **Tanker will direct receiver**
  - “Cleared Astern Left” or “Cleared Astern Right” (MPRS)
  - “Cleared Astern” (centerline)
- **Hose in trail, steady **amber** light—Tanker READY**
- **When stable and “cleared contact,” receiver initiates contact**
- **Once in contact, move hose in 5 ft (activates fuel transfer valve), continue another 10 ft to the center of the refueling range (~15 ft)**
- **Green light on/amber light off/tanker system is pressurized with fuel flowing**
- **Actual refueling pressure is not gauged and based on indirect factors. Average is ~50 psi at 400 GPM max**



# Air Refueling Procedures (Cont.)

---

- **Proper position is on line, at the same altitude as where the basket flew at pre-contact, 5-10 ft in.**
- **200-300 gal/min flow rate: depends on receiver's fuel state (usually lower fuel state= higher flow rate)**
- **All contacts monitored and taped by the tanker's mission recording system**
- **Flight Engineer will correct receiver position in FEET as necessary: "back 10"; "up 10", "down five" etc.**



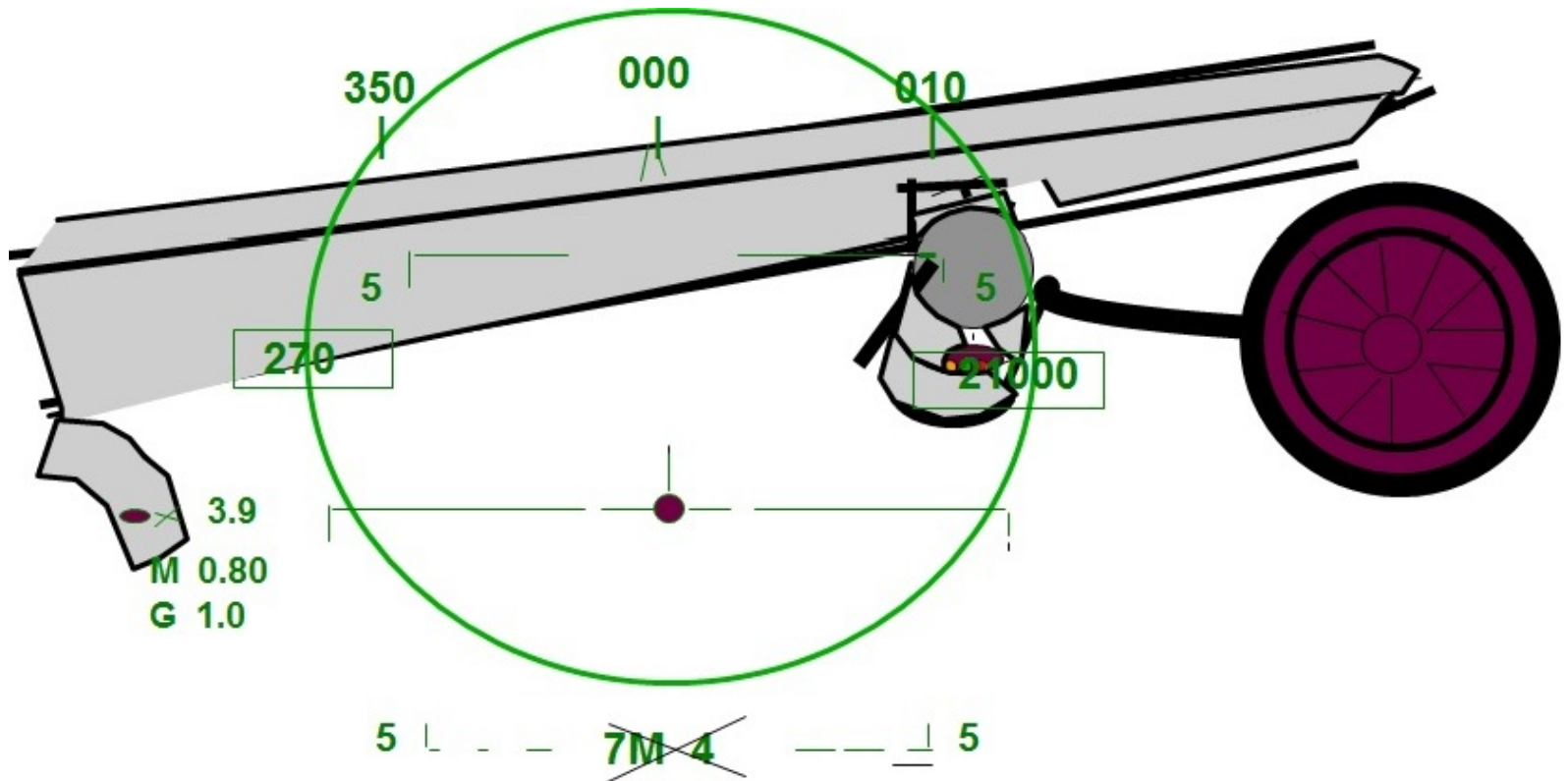
# MPRS Air Refueling Techniques

---

- **The most important point to pick is a position on the wing next to the pod. Typically this is only 1-2 ft to the left of the pod**
- **Maneuver 1 hose length behind and low.**
- **Stabilized position is 6 to 10 ft from basket**
- **The picture will be different for different airspeeds and hose state.**

# MPRS Right View – Pre-Contact

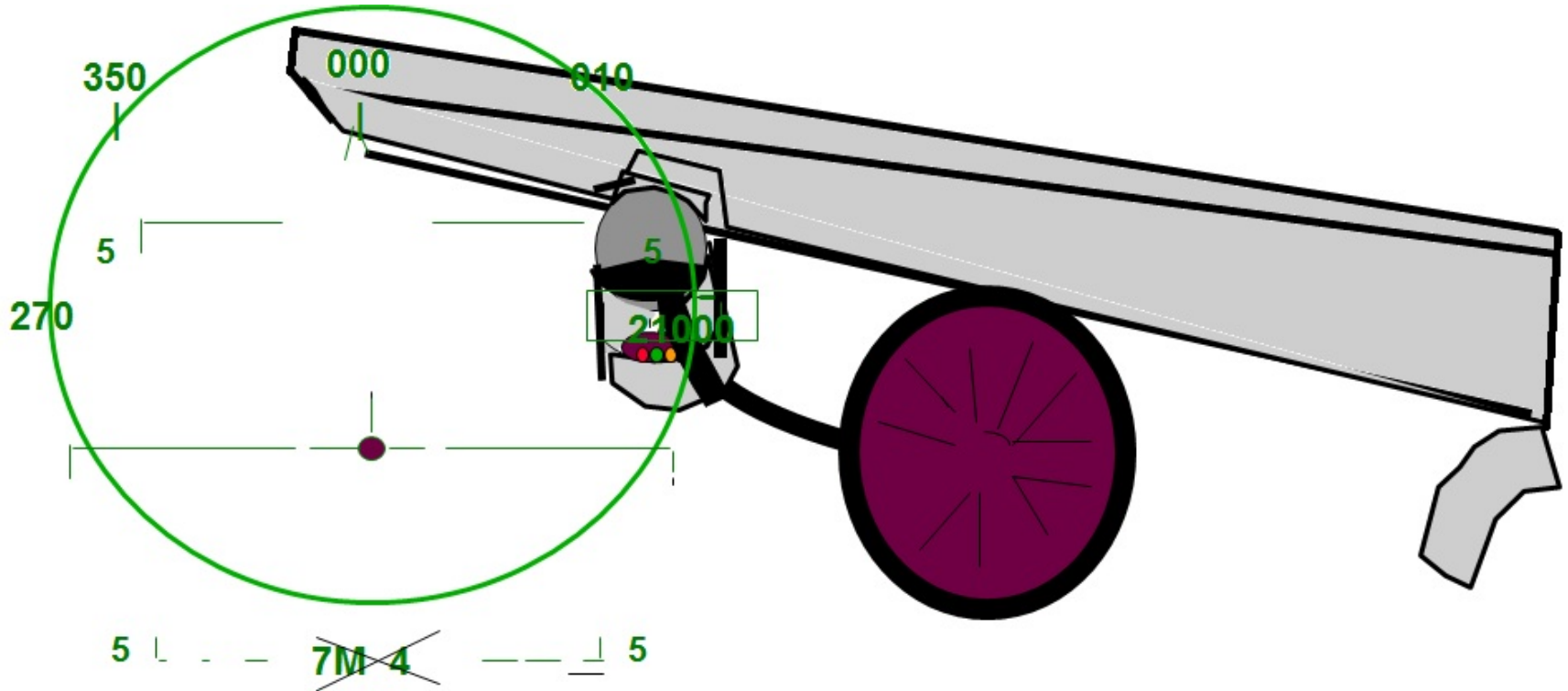
From RAAF F-18A HUD



**Stabilized Position**

# MPRS Left View – Pre-Contact

From RAAF F-18A HUD



Stabilized Position

# Centerline View



# EA-6B Centerline View







# Common Plugging Errors

---

- **Not setting the line before starting the approach**
- **Flying off basket**
- **Excessive closure**
  - Excessive basket movement in bow wave
  - Missed approach hard to stop closure
  - Very hard to make final correction
  - Greater risk of basket/aircraft damage
  - Sine wave in hose on contact
- **Stagnating/soft contact**

# Examples of Poor Positioning (1)

**Left:** EA-6B too low and close

**Right:** F/A-18 too low and close



**NOTE: only 3 markings**

# Examples of Poor Positioning (2)

F/A-18 too close



**NOTE: only 3 markings**



# Examples of Poor Positioning (3)

## F/A-18 too far away



**NOTE: 5 black marks on hose;  
1 blocked by basket**



# Post-AR Procedures

---

- **After pre-briefed offload or “offload complete” receiver initiates disconnect (leave the basket where you found it)**
  - **DON'T DISCONNECT FROM A HIGH OR LOW OR LEFT OR RIGHT POSITION. Hose reel damage may occur.**
- **“Reform right”, wait for any wingmen**
- **When flight is rejoined, cleared to depart to right and high unless requested and cleared otherwise**
- **Tanker will provide fuel offloaded in pounds when stable on the right wing**



# Abnormal Procedures

---

## **Inside or Outside refueling range (73 ft – 53 ft)**

- Amber light flashes/green light out
- Green light extinguished/no status lights (KDC-10)

## **Emergency disconnect (BREAKAWAY!)**

- Called by anyone due to an unsafe condition
- RED status tanker light will flash



# More Information

---

## Omega Air Refueling Website

- More pictures
- Videos of tanking ops
- Mission Planning Information
- Email and Phone Contact Information

[www.OmegaAirRefueling.com](http://www.OmegaAirRefueling.com)

**NOTE:** The following slides are TMS limits, NATOPS notes, warnings, and cautions from the MPRS AAR clearance message. No need to read further unless desired



# FA-18A-F & EA-18G Limits

---

**Limitations: IAW T/M/S NATOPS/NATIP, ATP-56B, Applicable NAVAIR interim flight clearances, and the following (the most restrictive limits shall apply):**

**A. Refueling envelope:**

- 1) Altitude: 5,000 ft to 35,000 ft MSL
- 2) Airspeed:
  - a. Min airspeed: 250 KIAS
  - b. Max airspeed: 325 KIAS

**B. Maximum closure/contact rate: 5 knots**





# FA-18A-F & EA-18G Warnings/Cautions/Notes

---

## Warnings

- A. Tanking position high and inboard relative to the tanker's outboard engine may result in the receiver inboard engine rolling back or flaming out. The receiver aircraft may also depart controlled flight if flown directly in the tanker engine wash.
- B. Strong vortices in a position high relative to the tanker wing can result in departure from controlled flight and midair with the tanker. Avoid high positions where you can look down on the tanker wing.

## Cautions

- C. Due to degraded handling qualities in wake turbulence, avoid any tendency to go high and outboard during engagement or a missed approach to the basket. Receiver aircraft have received AOA vane and refueling probe damage during AAR when venturing into the wingtip aerodynamic environment.
- C. The dihedral of the tanker wing presents the optical illusion that you are constantly in a turn and caution is advised at night or no horizon flying that the wings of the 707 should not be used as a reference for the horizon, *i.e.* matching your wings with the 707s.



# FA-18A-F & EA-18G Warnings/Cautions/Notes

---

## Notes

- E. From observation position maneuver to stabilized position one hose length aft and 10 to 15 ft below the basket before moving to pre-contact position. (Full trail hose length is 49.5 ft vice 74 ft for KC-135/KC10).
- F. The astern position is 6-10 ft aft of basket. Trim laterally to remove stick forces. Center the ball with rudder trim if required.
- G. Final corrections when closing on the drogue may be difficult due to tanker-receiver aerodynamic interaction.
- H. Use smooth and small power and attitude adjustments during contact.
- I. Tanker outboard engine jet wash may create buffet on receiver inboard wing. The effect is stronger at 300 KCAS than at 250 KCAS.
- J. When refueling from tanker wing pods lateral stick and trim inputs are required to counter the receiver aircraft tendency to roll toward the tanker.
- K. Consult ATP-56B for procedures.



# EA-6B Limits

---

## **Limits: IAW EA-6B NATOPS, other applicable NAVAIR interim flight clearances and the following:**

- A. When refueling, utilize a minimum closure/contact rate (not to exceed 5 knots).
- B. AR engagement during tanker bank angle changes is prohibited.
- C. AR engagement during moderate or greater turbulence is prohibited.
- D. "Topping-off" is prohibited to prevent damage to the fuel system, therefore maximum fuel onload is limited to less than 1,000 lbs below maximum fuel as specified in EA-6B NATOPS.
- E. AR operations are authorized for:
  - 1) Airspeed: 250 - 300 KIAS
  - 2) Altitude: 5,000 ft AGL to 35,000 ft MSL



# EA-6B Warnings/Cautions/Notes

---

## CAUTIONS

- A. Extreme aerodynamic forces exist behind the Boeing 707 tanker aircraft while conducting IFR operations. Full lateral trim away from the tanker may be required while refueling and may not zero out lateral stick forces required to maintain position.
- B. Do not ascend above the chord line of the refueling pod at any time.
- C. At night or without a visible horizon, the Boeing 707 wing dihedral can present the visual illusion of constantly turning.
- D. From observation position, maneuver to stabilized position one hose length aft and 10 to 15 ft below the basket before moving to the astern position. (Full trail hose length is 49.5 ft vice 74 ft for the KC-135/KC-10.)
- E. Consult ATP-56B for procedures.
- F. The Omega B707-338C tanker was formerly an RAAF B707-338C tanker. The AR equipment has been overhauled, but not modified.
- G. Use minimum closure/contact rate. Final corrections may be difficult due to tanker-receiver aerodynamic interaction.



# AV-8B Limits

---

- **Flight clearances, and the following (the most restrictive limits shall apply):**
- A. When refueling, utilize a minimum closure/contact rate (not to exceed 5 knots).
- B. AR operations from Omega B707-338C are authorized for:
  - (1) 5,000 ft to 35,000 ft MSL
    - (A) Min airspeed: 250 KIAS
    - (B) Max airspeed: 300 KIAS



# AV-8B Warnings/Cautions/Notes

---

## Warning

- A. Strong vortices in a position high relative to the tanker wing can result in departure from controlled flight and midair with the tanker (based on F/A-18 data). Avoid high positions where you can look down on the tanker wing.

## Cautions

- B. Transition from cruise flaps to auto flaps while tanking may result in disengagement unless timely power corrections are made to correct positional trends. If the flap transition results in a sustained pilot-induced oscillation, execute emergency break-away procedures. Cruise or stol flaps must be selected before attempting to reconnect to the basket.
- C. The dihedral of the tanker wing presents the optical illusion that you are constantly in a turn and caution is advised at night or no horizon flying that the wings of the 707 should not be used as a reference for the horizon, *i.e.* matching your wings with the 707s.



# AV-8B Warnings/Cautions/Notes

---

## Notes

- D. Per the October 2003 AV-8B NATOPS conference, selected refueling procedures were modified as follows:
- 1) Use of auto flaps is prohibited while attempting to engage the drogue basket.
  - 2) Switching from cruise flaps to auto flaps is authorized after probe engagement with the drogue.
  - 3) Selection of auto flaps should occur after the aircraft is stabilized in the refueling basket and before aircraft angle of attack increases above 5 degrees.
  - 4) Waiting to initiate the transition from cruise to auto until the angle of attack has increased above 5 degrees will cause an abrupt change in flap position, resulting in a more severe pitch attitude change, oscillations, and possible disconnect from the basket.
- E. From observation position maneuver to stabilized position one hose length aft and 10 to 15 ft below the basket before moving to pre-contact position. (Full trail hose length is 49.5 ft vice 74 ft for KC-135/KC-10).
- F. The astern position is 6-10 ft aft of basket. Trim laterally to remove stick forces. Center the ball with rudder trim if required.



# AV-8B Warnings/Cautions/Notes

---

## Notes (continued)

- G. Final corrections when closing on the drogue may be difficult due to tanker-receiver aerodynamic interaction.
- H. Use smooth and small power and attitude adjustments during contact.
- I. Tanker outboard engine jet wash may create buffet on receiver inboard wing. The effect is stronger at 300 KCAS than at 250 KCAS.
- J. When refueling from tanker wing pods lateral stick and trim inputs are required to counter the receiver aircraft tendency to roll toward the tanker.
- K. Consult ATP-56B for general AR procedures.
- L. The Omega B707-338C tanker was formerly an RAAF B707-338C tanker. The AR equipment has been overhauled, but not modified.