1. **Introduction.** The Italian Air Force (ITAF) has two main tanker types: the KC-767A and the KC-130J. Additionally the Tornado IDS is convertible to the tanker role by fitting an externally carried AAR pod (Buddy-Buddy).

2. **Tanker Aircraft Types.**
   a. **KC-767A.** See Annex A for full details of the KC-767A;
   b. **KC-130J.** See Annex B for full details of the KC-130J;

3. **Non-ITA Receiver Qualification and Currency.**
   a. **General.** Normally, before attempting to refuel from an ITAF tanker, foreign aircrew must be receiver qualified and current within their own military organization. Additionally, foreign receivers that only practise AAR as a means to meet currency requirements, must have practised AAR in the last six months, either day or night. Adherence to ATP-3.3.4.2(C), national AAR SOPs and the directions of the present National SRD is a requirement for the execution of AAR with an ITAF tanker/receiver. Before flight, the receiver aircrew must review the AAR operations with a qualified instructor, either from the ITAF or his own Nation, face to face or VTC, as practicable. As a minimum, this briefing will include: closure limitations, lighting schemes, procedures, possible difficulties, and emergency actions. In exceptional circumstances, the ground briefing may be replaced by viewing an AAR Training DVD, if available from the tanker STANEVAL POC. Exceptions to the above requirements will be addressed by the POC. Receiver national rules apply if they are more restrictive.

   b. **Initial Qualification.** AAR activities aimed at obtaining the initial qualification of foreign receivers aircrews on an ITAF tanker normally must be arranged and formalized in a bi-lateral agreement with the ITAF, unless direct authorization is required for urgent operational reasons. Ab-initio receiver training with ITAF tankers will normally require a full training package, to include ground briefings and airborne instructions tailored to the needs and experience of the receiving nation pilot. Course specifics will be determined by the parties in consultation with specific tanker STANEVAL POCs, and will be detailed in the bi-lateral agreement. Generally, the foreign receiver pilot must undertake a minimum of three sorties (two sorties if already qualified on a similar tanker and AAR system) under the supervision of a FJ AAR instructor qualified and current on the tanker; each sortie have to include a minimum of 20 minutes of activities with the tanker, including two contacts (one of which must involve the transfer of fuel), and rendezvous/rejoining procedures. On the first sortie the instructor must be on board of the receiver aircraft or in another aircraft if dual control aircraft doesn’t exist. Exceptions to this requirement will be addressed by the POC. Receiver national rules apply if they are more restrictive.

   c. **Currency.** AAR currency from all ITAF tankers is 6 months. Once an initial qualification has been obtained, currency may be updated on any similar (or larger)
tanker with similar AAR systems (Medium/Large Tanker with WARP/Centerline Hose-Drogue and/or BOOM for KC-767A, Medium/Large Turboprop Tanker with WARP Hose-Drogue for KC130J, Fighter Jet Buddy-Buddy/Medium/Large Tanker with WARP/Centerline Hose-Drogue for A200 Tornado).

d. **Re-Currency if currency has elapsed/expired.** A qualified and current instructor, either from the ITAF or from own Nation, must monitor at least one re-currency flight to regain currency if AAR receiver currency of non-ITA aircrew has expired. The instructor may be in another aircraft, including the tanker, provided suitable radio communications are available.

4. **Safety Rules.** Receivers executing AAR with ITAF tankers must adhere to the following rules concerning separations between aircraft:

a. A receiver will never be authorized to change position in a way that his flight trajectory cross under or behind another receiver already in contact or authorized for contact.

b. Receiver movement in a formation should be planned to avoid that one of them cross an airspace between tanker and another receiver.

5. **Source documents.**

a. SMA – OPR-069 - ITAF Air Crews Operational Training (Ed. 2005)

b. CSA 469 – AAR National Regulations (Ed. 2005 CH 3)

6. **POC for National SRD.**

Stato Maggiore dell’Aeronautica (Italian Air Force Staff)
3° Reparto – 1° Ufficio
Viale dell’Università, 4
00185 Roma
Italy
Tel: (+39) 06 4986 4029
Fax: (+39) 06 4986 5310

7. **Receiver type certified.** Details of receiver technical clearances are published at National SRD-Italy Annex A, B and C. The publishing of information in those Annexes does not constitute an automatic authority to undertake refueling. A published AAR technical compatibility for a specific tanker/receiver combination only verifies that the subject tanker and receiver are technically capable of safely conducting AAR. The authorization to undertake AAR with ITAF military aircraft (tanker or receiver) is provided through formal bilateral agreements between the participants such as a Technical Arrangement or an Implementing Arrangement deriving from an MOU. Other valid forms of authorization are represented by Air Tasking Order and/or Special Instructions, and Exercise/Operations Order. Besides, AAR activities requested and coordinated by the MCCE in Eindhoven under the framework of the ATARES Technical Arrangement are normally cleared without further national processing.

In addition to the formal authorization, in order that AAR activity can be executed, both the receivers and tankers must have technical compatibility assessments that are current and the crews appropriately trained and current in AAR activity (see paragraph 3 above).
8. **Non-ITA Receivers/ITA Tankers Clearance Release Process.** In order to have an assessment of a specific AAR technical compatibility and obtain an official clearance from the Italian Authorities to refuel from ITAF tanker, foreign nation’s receiver operators need to submit a written request to the specified Italian POC at the Air Staff (see paragraph 9) attaching the following documents:

- a filled in Technical Data Survey as specified in the ATP-3.3.4.2(C) - Chapter 5 – SRD-AAR Clearance Procedure, paragraph 5;
- Tanker/Receiver Technical Compatibility released by the applicant Airworthiness Authority or by the System Design Responsible (normally the platform original manufacturer) of the receiver, in accordance with the operational flight envelope and limitations (if any) of the Italian tanker as certified by ITA Authority (ARMAEREO).
- in case of request of clearance release as per read across from a platform of the same type from another nation already cleared, an official statement from the Airworthiness Authority of the receiver is needed to demonstrate that the two aircraft configuration differences in terms of system design, performances and flight characteristics do not affect AAR capabilities and functionalities.

In the process of a new AAR clearance release, within the Italian structure, the following offices are responsible for:

- Italian Air Staff – 4° Reparto – Logistica – 2° Ufficio;
- Italian MOD – “Segretariato Generale della Difesa e Direzione Nazionale degli Armamenti – Direzione degli Armamenti Aeronautici” (ARMAEREO) – Vice Direzione Tecnica 1°Ufficio ; as the National Airworthiness Authority is responsible to conduct the technical compatibility assessment;
- Italian Air Force Logistic Command (COMLOG) – 1° Divisione – Centro Sperimentale Volo (Official Test Center); if deemed necessary, this unit is responsible to conduct AAR flight trials in coordination with the receiver operators or the System Design Responsible;
- Flight trials cost sharing need to be agreed between nations and they are normally paid by the foreign receiver operator.

Following flight trials and/or technical analysis, when the foreign receiver/tanker platform is deemed suitable for AAR with the ITAF platform, the Italian Air Staff - 3° Reparto will provide a positive response to the foreign operator and will integrate ATP-3.3.4.2, National SRD-Italy as appropriate.

In case of negative response the Italian Air Staff -3° Reparto will notify also any recommended modifications considered essential to allow the AAR operations.

A technical compatibility assessment for a receiver/tanker combination remains valid only when AAR related items on either platform are not modified. Items that affect AAR compatibility include, but are not limited to:

- physical changes to the area around the fuel on-take system;
- modifications to the fuel system (e.g., new fuel pumps, modified external fuel tanks etc);
- upgrades to a platform’s flight control system or (for fly by wire aircraft) control laws;
- camouflage is modified (boom only);
- any modification that amends the data that was previously submitted in the Technical Data Survey that informed the original assessment;
- for tankers, the AAR associated markings and lighting.

Whenever a platform (tanker or receiver) is modified such that it may impact AAR operations, the technical compatibility of the tanker/receiver combination must be reviewed. It is incumbent upon the nation operating the modified platform to inform the other nation/s when such modifications are planned or incorporated and request an updated technical compatibility assessment.

9. POC for Tanker/Receiver Clearances.

Stato Maggiore dell'Aeronautica (Italian Air Force Staff)
3º Reparto - 1º Ufficio
Viale dell'Università, 4
00185 Roma
Italy
Tel: (+39) 06 4986 4029
Fax: (+39) 06 4986 5310

10. POCs for STANEVAL.

a. Main POC:
Comando Squadra Aerea (Italian Air Force Command)
Comando Forze Mobilità e Supporto
Ufficio Air Operation
Via di Centocelle, 301
00175 ROMA
Italy
Tel: (+39) 06 2400 4533
Fax: (+39) 06 2400 4505

b. For KC-767A:
14 th Wing
8th Sqn
Aeroporto Militare
Via di Pratica 45
00040 Pomezia (ROMA)
Italy
Tel: (+39) 06 91293304
Fax: (+39) 06 91292068

c. For KC-130J:
46th Air Brigade
National Training Centre/ Centro Addestramento Equipaggi
Aeroporto Militare
Viale Caduti di Kindu, 1
56100 Pisa (PI)
Italy
Tel: (+39) 050 928954/928953
Fax: (+39) 050 928950
d. For A-200A Tornado Buddy-Buddy:

6th Wing
102nd Sq. OCU Tornado
Aeroporto Militare
Via Castenedolo 85
25016 Ghedi (BS)
Italy
Tel:(+39) 030 904 2102
Fax:(+39) 030 904 2532

11. National SRD Last Update. 1st June 2012

1A. **Introduction.** The KC-767A is a multi-role, multi-mission strategic tanker/transport that provides in-flight refuelling to tactical and strategic aircraft. In addition, it is fitted with a receptacle to receive fuel from boom equipped tankers.

a. **Tanker Dimensions.** The KC-767A is 48.51 m (159 ft 2 inch) long with a wingspan of 47.57 m (156 ft 1 inch).

b. **Maximum Transferable Fuel.** Total fuel capability is 72,700 kg (160,532 lb). Maximum fuel available for offload on a four hour sortie is approximately 45,290 kg (100,000 lb).

c. **Fuel Transfer Rate.** The tanker can transfer fuel at the following rates:
   - **Boom.** Is designed to offload at rates ranging from 300 to 900 gpm at 50 psi, depending on receiver capability.
   - **Center Drogue.** Is designed to offload up to 600 gpm at 50 psi.
   - **Wing Drogues.** Is designed to deliver fuel at up to 400 gpm (each pod) at 50 psi.

2A. **AAR Equipment.** The KC-767A has 1 externally mounted Boom installed on the aft lower fuselage, 1 Center Drogue integrated system and 2 Wing Drogues contained in WARPS (Wing Air Refuelling Pod) located under each wing outboard of the engines.

a. **AAR Equipment – Boom.**

   - **Description.** The boom is approximately 8.50m (28 ft) long with an additional 5.80m (19.10 ft) of telescoping inner fuel tube. When the boom is fully extended it has a total length of 14.30 m (47.1 ft). The boom is operated with fly-by-wire controls, remotely by the ARO from the RARO station; the telescoping motors are hydraulic. The boom is equipped with a Boom Interphone System which permits direct communication with suitably equipped receivers.

   - **Basic Operation.**
     - **When ready to refuel,** the boom is lowered from its stowed position and about 3 m (10 ft) of the retractable portion is extended by the boom operator.
     - **When cleared,** the receiver moves from a stabilized (zero rate of closure) astern position to a steady boom contact position.
     - **Closure to contact** will be slow and stable (approximately 1 foot per second) with the receiver stabilizing in the contact position.
     - **When this is achieved,** the boom operator flies the boom to the receiver aircraft’s receptacle and extends the boom to make contact and engages locking toggles in the receptacle thus holding the boom nozzle in contact.
     - **The receiver then maintains** its position within the boom operating envelope.
WARNING

THE RECEIVER WILL STABILIZE IN THE ASTERN POSITION AND ATTAIN A ZERO RATE OF CLOSURE. IF THE RECEIVER FAILS TO ATTAIN A STABILIZED POSITION, OR IT BECOMES APPARENT THAT A CLOSURE OVERRUN WILL OCCUR, BREAKAWAY PROCEDURES WILL BE INITIATED. FAILURE TO DO SO COULD RESULT IN A MID-AIR COLLISION.

EXCESSIVE CLOSURE RATE COULD CAUSE THE TANKER TO DESCEND INTO THE PATH OF THE RECEIVER. THE TANKER OR RECEIVER IS TO INITIATE A BREAKAWAY AT THE FIRST INDICATION OF A CLOSURE OVERRUN. THE TANKER PILOT MUST BE PREPARED TO DISCONNECT THE AUTOPILOT IF NECESSARY TO PREVENT ALTITUDE DEVIATIONS.

CAUTION

FAILURE OF THE BOOM FLIGHT CONTROL SYSTEM. SHOULD THE BOOM FLY-BY-WIRE CONTROL SYSTEM SUFFER CERTAIN FAILURES, THE BOOM OPERATOR MAY NOT BE ABLE TO CONTROL THE BOOM. THE RECEIVER PILOT MUST FOLLOW THE BOOM OPERATOR’S INSTRUCTIONS EXPLICITLY; THE BOOM OPERATOR WILL DIRECT THE RECEIVER TO DISCONNECT.

NOTE

BOOM OPERATORS ARE USING A REMOTE VISION SYSTEM AND DO NOT HAVE DIRECT VIEW OF THE RECEIVER.

(3) Automatic Disconnect. Provided the receiver remains within the envelope, contact is maintained; however, if the receiver moves beyond the limits, a disconnect will automatically occur provided the tankers system is operating in normal.

CAUTION

APPROACHING BOOM LIMITS AT RELATIVELY HIGH VELOCITY CAN CAUSE STRUCTURAL DAMAGE AS A RESULT OF AN INABILITY TO DISCONNECT DUE TO BINDING ACTION OF THE BOOM NOZZLE.

OPERATION OF THE BOOM WITH A RECEIVER IN CONTACT OUTSIDE THE AUTOMATIC DISCONNECT ENVELOPE IS NOT ALLOWED.
AN AUTOMATIC DISCONNECT IS COMMANDED WHEN THE RECEIVERS REACHES 15 DEGREES LEFT OR RIGHT AZIMUTH IF “BOOM ENV LIMITS IS OFF”. PRIOR TO 15 DEGREES LEFT OR RIGHT AZIMUTH NOZZLE BINDING IS LIKELY TO OCCUR, DISCONNECTING IN THIS POSITION CAN CAUSE EQUIPMENT DAMAGE.

(4) **Boom Envelope.** The air refuelling boom limits of movement are shown in the following figures (figure A1, A2); The disconnect envelope varies according to the receiver type. The largest disconnect envelope extends from 20 to 40 degrees in elevation and 10 degrees in azimuth. Although contacts can be made throughout the air refuelling envelope depending on airspeed, the preferred contact area is from 26 to 34 degrees elevation, to minimize nozzle cocking and the potential for the nozzle to catch on the lip of the receptacle.

**Figure A1 - KC-767A BOOM ENVELOPE LIMITS**

<table>
<thead>
<tr>
<th>Receiver envelope</th>
<th>Green PDL Envelope</th>
<th>Automatic Disconnect Envelope</th>
<th>Mechanical Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telescoping (feet)</td>
<td>*</td>
<td>11.1 – 18.3</td>
<td>0 to 20</td>
</tr>
<tr>
<td>Azimuth (degrees)</td>
<td>*</td>
<td>+10 to -10</td>
<td>+30 to -30</td>
</tr>
<tr>
<td>Elevation (degrees)</td>
<td>*</td>
<td>26 - 34</td>
<td>20 to 40</td>
</tr>
</tbody>
</table>

*-Determined during receiver qualification test
The KC-767A tanker air refueling altitude/airspeed Boom envelopes is shown in Figure A3
NOTE: at heavy tanker gross weights, the usable envelope may be restricted above FL200 by the amber band (stall margin) due to the prohibition against lowering the flaps.
(5) **Normal disconnect.** To make a normal disconnect, the receiver releases the receptacle toggles (this may also be commanded remotely by the boom operator) and remains stabilized in the contact position until the boom operator confirms a disconnect has been achieved; the receiver then moves to the astern position.

(6) **Brute Force Disconnect.** The boom nozzle contains an Independent Disconnect System (IDS). The IDS allows the nozzle the ability to disconnect from the receiver aircraft independent of action by the receiver aircrew. The IDS eliminates delayed disconnects, increases aerial refueling safety and significantly reduces the chance of a brute force disconnect and the possibility of damaging the boom. However there are two types of brute force disconnect, inadvertent, and controlled tension (coordinated).

(a) **Inadvertent Brute Force Disconnect.** An inadvertent brute force disconnect is defined as any unplanned disconnect which is the result of rapid receiver aircraft movement toward to the aft limit, causing a mechanical separation of tanker and receiver.

(b) **Controlled Tension Brute Force Disconnect.** A controlled tension brute force disconnect is defined as an intentional coordinated disconnect accomplished by gradual aft movement of the receiver aircraft (approximately 1 foot per second) until the boom is fully extended, and ending with a controlled tension boom pullout. Coordination between the receiver pilot and boom operator is required to accomplish a smooth disconnect. Following a controlled tension disconnect, AAR may be continued with other receivers, provided the results of the following

![CAUTION]

A CONTROLLED TENSION BRUTE FORCE DISCONNECT WILL BE ACCOMPLISHED ONLY AS A LAST RESORT, AFTER ALL OTHER NORMAL AND EMERGENCY METHODS OF DISCONNECT HAVE FAILED.

AAR FOR RECEIVERS THAT REQUIRED A CONTROLLED TENSION DISCONNECT WILL BE TERMINATED EXCEPT DURING FUEL EMERGENCIES OR WHEN CONTINUATION OF AAR IS DICICTED BY OPERATIONAL NECESSITY. IF THE RECEIVER REQUIRES FURTHER AAR, THE FOLLOWING ACTIONS MUST BE ACCOMPLISHED BEFORE ATTEMPTING ANOTHER CONTACT:

(i) VISUAL INSPECTION OF THE RECEIVER RECEPTACLE AREA AND AAR BOOM.

(ii) OPERATIONAL CHECK OF THE BOOM FOR BINDING OR UNCONTROLLABILITY.

(iii) TEST OF THE TANKER SIGNAL COIL.
b. AAR Equipment - Center Drogue System.

(1) Description. The center drogue is an integrated system containing the hardware and controlling software necessary to complete a refueling mission. The hose extends 75 feet behind the aircraft and provides a refueling range of 50 to 70 feet. See Figure 4 for the center drogue hose trail lengths versus functions. The system provides flow rates up to 600 gallons per minute at 50 psi.

(2) Basic Operation. The receiver pushes the hose into the refueling range (Figure 4). The signal light will display green if greater than 100 lb/min offload (no signal lights when in the refueling range and less than 100 lb/min offload). If the tanker has authorized offload, the fuel flow will start automatically. Fuel flow will continue until the offload is complete, or until the receiver flies out of the refueling range (Figure A4). The receiver disconnects from the hose by first maneuvering back to the Preset Trail Position. Once the hose is fully extended, the receiver disconnects by applying an aft force of about 650 lbs on the coupling.

THE RECEIVER SHOULD REPORT ANY SLACK HOSE CONDITIONS TO THE TANKER.

Figure A4 - KC-767A CENTER DROGUE HOSE TRAIL LENGTHS
(3) Center Drogue System Envelope. The KC-767A tanker air refueling altitude/airspeed Center Drogue System envelope is shown in Figure A5

Figure A5 - KC-767A CENTER DROGUE ALTITUDE/AIRSPEED ENVELOPE – WARPS ON

**NOTE:** at heavy tanker gross weights, the usable envelope may be restricted above FL200 by the amber band (stall margin) due to the prohibition against lowering the flaps.
c. **AAR Equipment - Wing Aerial Refueling Pods.**

(1) **Description.** Wing drogues are contained in an aerodynamic pod called a Wing Aerial Refueling Pod (WARP). A WARP is located under each wing and allows fuel transfer to receiver aircraft using a hose and drogue assembly.

The drogue coupling is a MA4 type coupler. The hose has the same range of the Center hose (Figure A6). A fuel sub-system controls and directs the flow of fuel to the receiver. The system will deliver fuel at up to 400 gpm at 50 psi. If the integrated fuel pump fails, fuel flow may be possible using system fuel pressure at a much reduced rate.

(2) **Basic Operation.** The receiver pushes the hose into the refueling range (Figure 4). The signal light will display green if greater than 100 lb/min offload (no signal lights when in the refueling range and less than 100 lb/min offload). If the tanker has authorized offload, the fuel flow will start automatically. Fuel flow will continue until the offload is complete, or until the receiver flies out of the refueling range (Figure A4). The receiver disconnects from the hose by first maneuvering back to the Preset Trail Position. Once the hose is fully extended, the receiver disconnects by applying an aft force of about 650 lbs on the coupling (Figure A6).

**CAUTION**

**IF ICE HAS FORMED ON THE RAT BLADES, THE RECEIVER AIRCRAFT SHOULD NOT FLY DIRECTLY BEHIND THE WARPS UNTIL IT IS VERIFIED THAT ALL ICE HAS BEEN SHED. THE TANKER SHOULD INITIATE RAT ROTATION PRIOR TO THE RECEIVER REACHING THE PRECONTACT POSITION. SEE FIGURE 6 FOR THE WING DROGUE HOSE TRAIL LENGTHS VERSUS FUNCTIONS.**

Figure A6 - KC-767A WING DROGUE HOSE TRAIL LENGTHS
(3) **WARPs Envelope.** The KC-767A tanker air refueling altitude/airspeed WARPs envelope is shown in Figure A7

Figure A7 - KC-767A WARPS ALTITUDE/AIRSPEED ENVELOPE

**NOTE:** at heavy tanker gross weights, the usable envelope may be restricted above FL200 by the amber band (stall margin) due to the prohibition against lowering the flaps.
3A. Lighting system.

a. Aircraft.

(1) **Rendezvous Lights.** The rendezvous lights are located on the upper and lower fuselage. Rendezvous lights allow receiver aircraft to distinguish between different tankers in a formation. They also aid the receiver in visually locating the tanker during rendezvous.

The rendezvous light system consists of 2 strobes that can be individually set to red, white, or a Night Vision Goggle (NVG) compatible mode. The pilot can set both rendezvous lights to flash, in the selected color combination. The rendezvous lights are synchronized so the upper and lower strobes flash at the same time. The rendezvous lights will be turned red and ON for all breakaways.

(2) **Formation Lights.** The airplane has 10 NVG compatible Light-Emitting Diode (LED) formation light strips.

Formation lights are located on the left and right forward and aft fuselage, and on both sides of the vertical stabilizer (Figure A8, A9, A10). All 10 formation lights are dimmable via a single control.

Each wing tip has a set of 8 formation lights. These lights are the only visual reference for the tanker wing tip during NVG operation.

(3) **Receiver Centerline Reference Lights.** Two NVG compatible LED light strips are located along the fuselage underside centerline (Figure A8).

(4) **Fuselage Underbody Lights.** The under body lights are NVG compatible and are located as follows:

   (a) One light on the forward face of the SACS pod on the left side.

   (b) One light on the forward face of the SACS pod on the right side.

   (c) One light on the left inboard engine strut.

   (d) One light on the right inboard engine strut.

The forward fuselage underbody lights are mounted in the leading edge of the Situation Awareness Camera System (SACS) fairing. These lights illuminate the forward underbody of the fuselage and the leading inboard surfaces of both engines.

The left and right fuselage underbody lights are mounted in each engine struts on the inboard side to illuminate portions of the underwing surfaces and a portion of the fuselage, in particular, the wing root underside surface and attaching fuselage area.

The engine strut underbody lights are inhibited when NVG mode is active. The remaining underbody lights operate when NVG mode is active, but are not
specially NVG compatible. The intensity must be manually set as desired for NVG operations.

(5) Underbody – Outboard Nacelle Illumination Floodlights. To enable receiver pilots to use the nacelle as a visual reference and stay out of the engine’s exhaust, the airplane has an outboard nacelle illumination floodlight on the inboard side of each wing refueling pod pylon. Each floodlight illuminates the outboard side of the engine nacelle (the inboard side is illuminated by the forward fuselage underbody).

Two lights (left and right) illuminate the engine nacelles.

(a) One light on the inboard face of the left wing drogue pylon.

(b) One light on the inboard face of the right wing drogue pylon.

(6) Underwing Lights. The underwing lights are inhibited when NVG mode is active. These lights consist of:

(a) One light on the left outboard engine strut

(b) One light on the right outboard engine strut.

(c) One light on the outboard face of the left drogue pylon.

(d) One light on the outboard face of the right drogue pylon.

(e) Lower Horizontal Stabilizer Lights

(i) One light on the left aft fuselage.

(ii) One light on the right aft fuselage.

The left and right underwing lights are mounted in the engine struts to illuminate portions of the underwing surfaces outboard of the engine. The left light is mounted in the left engine strut on the outboard surface. The right light is mounted in the right engine strut on the outboard surface.

Additionally, 2 lights, one mounted in the outboard face of the left and right drogue pylons illuminate the wing tips. Left and right Lower Horizontal Stabilizer lights are mounted in the fuselage below the Horizontal Stabilizer to provide illumination to the underside of the stabilizer for approaching aircraft.

(7) Position Lights. Position lights are not dimmable and must be off for night drogue operations.
Figure A8 – KC767A KC-767A EXTERIOR LIGHTING LOCATIONS

Figure A9 – KC767A KC-767A EXTERIOR LIGHTING LOCATIONS
Figure A10 – KC767A EXTERIOR LIGHTING LOCATIONS

1. NORMAL AND NVG
2. DISABLED IN NVG MODE

FORWARD EXTERIOR LIGHTS

PILOT DIRECTOR LIGHTS

FORMATION LIGHTS (1)

ROVR REFERENCE (1)

FORMATION LIGHTS (1)
Figure A11 – KC767A WING DROGUE SIGNAL

AFT EXTERIOR LIGHTS

UNDERWING (2)
UNDERBODY (1)
UNDERWING (2)
UNDERBODY (2)
UNDERWING (2)
UNDERBODY (2)
UNDERWING (2)
UNDERBODY (1)
UNDERWING (2)
UNDERWING (2)
UNDERWING (2)

1. NORMAL AND NVG
2. DISABLED IN NVG MODE
Figure A12 – KC767A EXTERIOR LIGHTING LOCATIONS

b. Boom Lighting.
(1) **Boom Flood Light.** Boom flood lights are located beneath and aft position of the APU in the tail cone; Figure A13. The boom flood lights consist of three 3 halogen flood lights that illuminate the pre-contact and contact envelope and suitable for Boom Aerial Refueling Camera System (BARCS) operation. The installation minimizes receiver distraction during approach to tanker due to the near-IR (Red color) light sources.

(2) **Boom Marker Lights and Boom Nozzle Light.** The boom nozzle fairing (ice shield) contains 2 fluorescent lights and 1 incandescent white light. The 2 fluorescent lights (boom marker lights) emit a near-ultra-violet light, which excites the luminous boom markings making them glow during night AR. (If Installed) The white incandescent light (boom nozzle light) is used to illuminate the boom nozzle for the boom operator during night AR.

Figure A13 - KC-767A BOOM FLOOD LIGHT ILLUMINATION

(3) **Pilot Director Lights (PDL).** Receiver pilot director lights (Figure A14) are mounted longitudinally along the bottom of the fuselage between the nose landing gear and the main landing gear and are used to direct receiver aircraft during boom air refueling.

The PDLs consist of 2 rows of lights: the left row for elevation and the right row for telescoping. The elevation lights consist of 1 green, 2 amber, 2 red triangular panels, and 2 illuminated white letters; U (UP) at the forward end, and D (DOWN) at the aft end.
The lights signal receiver elevation correction (up or down), while a single green bar indicates in position. The colored panels and letters are dimly illuminated by background lights.

The telescoping lights consist of 1 green, 2 amber, 2 red, and 4 white rectangular panels, and 2 illuminated white letters; A (AFT) at the forward end, and F (FORWARD) at the aft end. Prior to contact the Aerial Refueling Operator (ARO) uses a “coaching” switch on the Telescope Control Stick (TCS) to communicate desired corrections.

The lights and letters signal desired receiver corrections forward or aft, up or down, in the AR envelope. In contact the PDLs remain illuminated.

The PDLs are programmed to automatically signal the receiver pilot with a visual indication of corrections required to maintain the proper refueling position. The yellow and red lights indicate closer proximity to the edge of the envelope. The air refueling envelope is determined by the receiver type selected by the Aerial Refueling Control System (ARCS).

The ARO has a graphical display of scale bars depicting the AR envelope on the Head-Mounted Display (HMD) and Aerial Refueling Operator Control Display Unit (AROCDU) displays.

All PDL lights, except the background lights, will flash during a breakaway.

Figure A14 - KC-767A PILOT DIRECTOR LIGHT (PDL) CONFIGURATION

(4) Radio Silent Procedures. During radio silence, the PDLs can be used to give positioning commands to direct a receiver into the boom contact position. A steady red PDLs commands a large movement in the direction indicated, and a
flashing red light commands a small correction. The PDLs can also be extinguished to signal a request for disconnect.

(5) Failure of PDLs to Illuminate

**PDLs Fail to Illuminate When Performing Contact.** If the PDLs do not illuminate when a receiver makes contact, the receiver pilot will inform the boom operator if refueling will continue. If refueling is continued, verbal corrections from the boom operator may be requested.

**PDLs Fail During Contact.** If the PDLs go out during contact, the receiver will initiate a disconnect and return to the astern position. Subsequently, if refueling is continued, verbal corrections from the boom operator may be requested.

c. Drogue Lighting

(1) **Center Drogue Lighting.** The center drogue illumination is provided by a halogen tunnel light, a hose flood light and 3 receiver lights (Figure A15).

The hose flood light and tunnel light, in conjunction with the receiver lights, allows the receiver pilot to see the first 20 feet of hose markings, indicating hose position and stability out of the tunnel.

The center drogue tunnel is illuminated by a white floodlight to provide the receiver pilot a hose origin reference to use when maintaining the contact position. Lower lamp output is provided to minimize blooming during NVG.

A center drogue hose floodlight on the aft fuselage underside illuminates the first 5 feet of the hose extending from the center drogue unit. This light illuminates the hose markings and allows the receiver pilot to judge forward and aft movement. The 3 center drogue receiver floodlights are located on the aft fuselage underside. The lights are NVG compatible in low voltages setting. The 2 of the center drogue receiver flood lights are located adjacent to the boom floodlights and produce a white beam aiming down and forward to minimize distraction.

The third center drogue receiver floodlight is located directly aft of the center drogue hose floodlight and illuminates the forward section of the hose from 5 ft to approximately 15 feet. The light beam is aimed down to minimize distractions for the receiver pilot. The center drogue basket incorporates LED lights around the perimeter of the assembly to indicate the location of the drogue target envelope. Light intensity cannot be adjusted; however the light is NVG compatible.

(2) **Wing Drogue Lighting.** Each wing drogue illumination is provided by an NVG compatible Wing Aerial Refueling Pod (WARP) tunnel light, hose inspection lights, and a drogue hose aft flood (Figure A16).

The hose inspection lights illuminate the inboard side of the wing drogue and the first 25 feet of the hose extending from the pod.

This allows receiver pilots to use the wing drogue as a visual reference. It also permits receiver pilots to see the markings on the wing drogue hose and judge forward and aft movement.

The airplane has an inspection light on the left and right sides of the aft fuselage. The hose floodlights provide additional illumination coverage of the hose. The
floodlights illuminate the top and side of 50 feet length of hose at all speeds and aircraft weight. These lights are usable in NVG mode.

To give the receiver pilots a hose origin reference to use when maintaining the contact position, each wing drogue tunnel is illuminated with an LED floodlight. Tunnel lighting consists of 4 individual LEDs; 2 are white for normal night illumination and 2 are infrared (IR) LEDs for NVG use. Each wing drogue basket incorporates LED lights around the perimeter of the assembly to indicate the location of the drogue target envelope.

Light intensity cannot be adjusted; however the light is NVG compatible.

Figure A15 - KC-767A CENTER DROGUE TUNNEL, RECEIVER AND FLOOD LIGHT ILLUMINATION
(3) **Drogue Signal Lighting.** The center drogue and wing drogues signal lights are controlled as shown in Figure A17

**NOTE**

THE CENTER DROGUE SIGNAL LIGHTS ALSO ILLUMINATE TO SIGNAL BOOM RECEIVERS. THE GREEN LIGHT ILLUMINATES WHEN FUEL IS FLOWING THROUGH THE BOOM. THE RED LIGHT FLASHES WHEN THE ARO SIGNALS A BREAKAWAY. THE AMBER LIGHT IS NOT USED FOR BOOM RECEIVERS.
(a) **Center Drogue Signal Lights.** To signal center drogue status to the receiver pilots, the airplane has two sets of three NVG-compatible center drogue signal lights installed on the underside of the aft fuselage, one set on each side of centerline drogue tunnel (Figure 18). Each set consists of a green light, an amber light, and a red light. For NVG operations, each of the three signal lights in the set has an NVG compatible outline that remains illuminated whether the signal light is on or off. See Figure 19 for a depiction of the relationship between the center wing drogue signal lighting indications and hose length markings.
### Figure A18 – KC767A DROGUE SIGNAL LIGHT SETTINGS

<table>
<thead>
<tr>
<th>Advisory Light</th>
<th>Meaning</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Steady Red</strong></td>
<td>• No contact permitted, if not in contact; • Disconnect Requested, if in contact; • Red signal light selected ON (Manual OFF/ON command)</td>
<td>ON if contact not permitted</td>
</tr>
<tr>
<td></td>
<td>Disconnect Requested</td>
<td>ON white drogue is in contact and upon drogue power off, drogue lock status indicated, or loss of communications with the drogue.</td>
</tr>
<tr>
<td></td>
<td>Reel Recalibration and Suspend</td>
<td>ON white Reel Recalibration Suspend selection.</td>
</tr>
<tr>
<td></td>
<td>Reel Recalibration and Auto after a Suspend</td>
<td>ON upon Reel Recalibration Auto after Suspend.</td>
</tr>
<tr>
<td><strong>Flashing Red</strong></td>
<td>Breakaway (PUI: ACS1049, ACS1050)</td>
<td>Execute BREAKAWAY procedures.</td>
</tr>
<tr>
<td><strong>Steady Amber</strong></td>
<td>• Ready for contact • Receiver aircraft too far aft if in contact</td>
<td>ON if contact permitted and no fuel flow if Wet Refueling has been selected. ON if contact permitted and hose position is &lt; 5 ft from full trail if Dry Refueling has been selected.</td>
</tr>
<tr>
<td><strong>Flashing Amber</strong></td>
<td>Receiver aircraft too close</td>
<td>ON if hose position is &lt;= 50 ft and receiver is in contact</td>
</tr>
<tr>
<td><strong>Steady Green</strong></td>
<td>Fuel flowing</td>
<td>ON upon fuel flowing (&gt;100 lb/min) and hose position is between &gt;=5 ft from full trail and &gt;50 ft. (OFF upon not fuel flowing; or hose position is not between &gt;=5 ft from full trail or &gt;50 ft).</td>
</tr>
<tr>
<td></td>
<td>Hose position within refuel range, if Dry Refueling has been selected</td>
<td>ON if hose position is &gt;= 5 ft from trail and &gt;50 ft if Dry Refueling has been selected.</td>
</tr>
<tr>
<td><strong>Flashing Green</strong></td>
<td>Fuel is available</td>
<td>Manually selected by ARO to indicate fuel is available for offload.</td>
</tr>
<tr>
<td><strong>Flashing Green &amp; Amber</strong></td>
<td>NA</td>
<td>Not used.</td>
</tr>
<tr>
<td><strong>All Off</strong></td>
<td>Offload complete</td>
<td>All OFF if offload complete- the planned amount of fuel has been transferred.</td>
</tr>
<tr>
<td></td>
<td>Soft contact</td>
<td>All OFF if Drogue has been commanded to OPEN valve, flow meter indicates no fuel flow after 1 minute, and Wet Refueling has been selected.</td>
</tr>
<tr>
<td></td>
<td>Drogue off</td>
<td>All OFF except for &quot;Contact Denied&quot; or Breakaway selection, when Drogue is powered off and stowed.</td>
</tr>
</tbody>
</table>
Annex A to National SRD-ITALY

Figure A19 – KC767A CENTER DROGUE SIGNAL LIGHTS

Figure A20 – KC767A CENTER AND WARP DROGUE SIGNAL LIGHTS AND HOSE MARKINGS
(b) Wing Drogue Signal Lights. Signal lights are installed on each wing drogue on the further most aft end of the WARP structure just above the exit tube fairing so that they are visible to the receiver pilots from anywhere within the refueling envelope (See Figure A21). The LED lights consist of amber, red and green indicators. The amber and green lights may be adjusted in intensity. The red light can be flashed on and off. The infrared LEDs are illuminated with one of three specific patterns representing red, amber or green status. A failure of any of the LEDs within the clusters associated with the colored indicators does not affect the other LEDs within the cluster. Several LEDs within a cluster must fail before illumination of a particular color is degraded sufficiently to affect mission performance.

As shown in Figure A21, when in the NVG mode, the colored LED lights are off and the NVG lights provide unique patterns to resemble red, amber, and green light.

See Figure A20 for a depiction of the relationship between the wing drogue signal lighting indications and hose length markings.

Figure A21 – KC767A WING DROGUE SIGNAL LIGHTS
4A. **KC767A Rendezvous Equipment and Communications.**
   
   a. **Rendezvous Equipment.** The KC-767A is equipped with the following rendezvous equipment:
      
      1. TACAN A/A with bearing and DME
      2. Military TCAS
      3. Civil TCAS
      4. FMS
      5. UHF/DF
      
      The Tanker TACAN, when utilized in the BEACON mode will provide the receiver with a bearing to the tanker. The INVERSE mode provides the tanker with a bearing to the receiver.
      
      The preferred tanker TACAN mode is A/A INVERSE and BEACON. The receiver shall be in A/A T/R mode. Y-Channels are typically used for Air Refueling rendezvous, but the system also works with X Channels.
      
      There is no radar skin paint or radar beacon available.

   b. **Communications.** The KC-767A is equipped with the following radio equipment:
      
      1. UHF
      2. VHF
      3. HF
      4. Civil SATCOM
      5. Military SATCOM
      6. Boom interphone capability

      **WARNING**

      WHEN BOOM IS DEPLOYED AND A RECEIVER AIRCRAFT IS WITHIN ½ MILE, HF TRANSMISSION IS PROHIBITED.

5A. **Receiver Aircraft Permanently Certified.**

   a. KC-767A
   b. A-11A (AMX - ITAF)
   c. TA-11A (AMX Trainer - ITAF)
6A. Source documents.

b. CMM(EP).1C-KC767A-1RDS (D779T1058-ITAF)
1B. Introduction. The KC-130J is a multi-role, multi-mission tactical tanker/transport that provides in-flight refuelling to tactical aircraft and helicopters as well as rapid ground refuelling when required. Additional tasks performed are aerial delivery of troops and cargo, emergency medevac, tactical insertion of combat troops and equipment, evacuation missions, SAR for fighter aircraft involved in overwater flights and support as required of Special Ops (see airdrop of leaflet).

2B. Specifications.

a. AAR Equipment. The KC-130J has 2 drogue equipped refuelling stations, one mounted on each wing outboard of the engines.

(1) Description. Each refuelling station consists of a Cobham 48-000 refuelling pod, 93 ft (28.5 m) of hose with MA-3 reception coupling and a 27 in (0.67 m) diameter high-speed fixed-wing or 54 in (1.3 m) diameter low-speed helicopter paradrogue. Helicopters may not refuel from a high-speed drogue. The KC-130J has fuel boost pumps fitted in the AAR pods to improve performance when the fuselage tank is not installed. Fuel flows when the hose is pushed in 5 ft (1.5 m); flow continues provided the hose is maintained in the refuelling range, between 20 – 80 ft (6 - 24 m) of hose extension. Hydraulic pressure provides the force required to rewind the hose during refuelling to reduce hose slack and the potential development of a sine wave/hose whip. The force required to disengage from the drogue is 420 (+ 30)lb. During the refuelling, the receiver should maintain a position on the hose so that the 50-foot marker is approximately at the pod tunnel entrance.
WARNING

THE AREA OF EXTREME TURBULENCE DIRECTLY BEHIND AND SLIGHTLY TO THE RIGHT OF THE TANKER SHOULD BE AVOIDED. BLADE STALL AND UNCONTROLLED SETTLING MAY BE ENCOUNTERED IF THIS AREA IS ENTERED.

(2) **Hose.** The KC-130J normal hose length is 93 (±0.5) ft (28.4 m) in length, of which 85 ft (26 m) of hose trails from the hose reel tunnel. The hose contains a removable end fitting. The total hose length may be adjusted by trimming to remove damaged portions within following limits: from 93 ft (28.4 m) to 83 ft (25.3 m), trailing from the hose reel. The black aerial refuelling hose is marked with 1 foot bands of white weather resistant material every 10 ft. There are also two 5 foot white bands at either end of the optimum helicopter fuelling range.

![Diagram of hose with markings and coupling end.]

(3) **Drogues.** In any configuration the two pods may contain either a high or low speed aerial refuelling drogue.

![Diagram of drogue pods with marked lengths and coupling ends.]

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Incomplete Coupling. If coupling is accomplished at less than the required closure rate and with insufficient force to cause the probe to completely enter the reception coupling, the locking action will not occur. If the locking action does not occur and the pilot of the receiver aircraft adjusts his position rearward relative to the tanker, the hose and probe will separate and the hose will remain
in position at the time of separation. Incomplete locking action could result fuel spraying from the coupling, and this could result in a dangerous condition in case the receiver aircraft configuration is such that engine air intakes are directly behind the probe.

(5) Dead Hose. It is possible that tanker hose response will need to be reset while refuelling is in progress. Indications of this may be hose slack and possible whip after engagement of a dead hose by the receiver. When these conditions occur, as reported by the tanker observer or by the receiver pilots, the receiver will be instructed to disconnect and to remain clear of the affected hose (moving outboard of the hose as instructed by the tanker). The hose shall be cycled, the response set, the TANKER READY symbol will illuminate, and when cleared, the receiver may move to the contact position. If hose response is subsequently improper, the receiver should be directed to a spare hose. Refuelling may be completed by the dead hose if the proper technique is employed and if extreme care is exercised only during fuel emergency. Under these conditions, minimum possible closure rate is necessary to avoid bending or breaking the receiver probe, and minimizing hose slack and resultant whip. As previously mentioned refuelling from a dead hose is an emergency procedure and should be executed accordingly. Dead hose refuelling may also be required if a tanker encounters partial electrical or utility hydraulic system failure. Complete utility system failure will always be hydraulic indicated by illumination of the HYDRAULIC PRESSURE OFF symbol (Pod RED light on).

CAUTION

EVEN NORMAL CLOSURE RATE (2 TO 5 KTS) ON A KNOWN DEAD HOSE OR ABNORMAL HOSE (HOSE THAT HAS NOT BEEN RESET) CAN BE CONSIDERED EXCESSIVE AND CAN LEAD TO LARGE SINE WAVE FORMATION.

RECEIVER AIRCRAFT MUST BE AWARE OF POTENTIAL FOR SINE WAVE FORMATION AND BE PREPARED TO REACT BY IMMEDIATELY DISENGAGING.

CAUTION

DO NOT ENGAGE DROGUE IF THE TANKER LOWER ROTATING BEACON IS ILLUMINATED.

CAUTION

IMPROPER DISENGAGEMENT POSITION OR AIRCRAFT MISALIGNMENT AT DISCONNECT MAY RESULT IN A MOMENT PRODUCING A BINDING FORCE
BETWEEN THE PROBE AND RECEPTION COUPLING, GREATLY INCREASING REQUIRED DISENGAGEMENT FORCE, AND POSSIBLY RESULTING IN STRUCTURAL FAILURE OF THE PROBE OR REFUELLING HOSE.

CAUTION

AN EXCESSIVE DISENGAGEMENT RATE MAY ALSO RESULT IN EXCESSIVE LOADS ON THE PROBE AND REFUELING HOSE.

(6) KC130J Lighting.

(a) Drogue Lights. The refuelling drogue has 6 equally spaced self luminous lights for increased visibility from receiver aircraft during night refuelling operations.

(b) POD and Hose Lights. Lights located on the horizontal stabilizer illuminate the AAR Pod and a portion of the hose during night operations.

(c) POD Status Lights. The aft end of the POD contains a pod status light assembly for signalling a receiver aircraft. The POD lights can be operated in two modes of operation, Normal and Covert. Red, green, and amber lights are located on the trailing edge of each AAR pod for use in the
overt lighting scheme. For covert lighting, a symbolic lighting scheme consisting of small LED's surround these red green and amber lights.

\(\text{(d) Pod Status Lights explanation.}\) The following tables and figures reports the AAR pod status lights meanings:

<table>
<thead>
<tr>
<th>Pod Mode</th>
<th>Normal</th>
<th>Covert</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>Stowed and Locked</td>
<td>X</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Hydraulic Pressure Low</td>
<td>ON</td>
<td>OFF</td>
<td>X</td>
</tr>
<tr>
<td>Tanker Ready</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>Fuel Flow</td>
<td>X</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Break-away</td>
<td>Flash</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

\[
\text{Receiver Position} \quad \text{Overt Lights} \quad \text{Covert Lights} \quad \text{Meaning}
\]

- **Before Contact**
  - Steady Red
  - Steady Amber
  - Steady Circle with a Y
  - Steady Y (see Picture below)
  - Pod not ready, do not make contact (if refuelling is absolutely required, contact using emergency procedures shall be coordinated)
  - Pod system ready for contact

- **In Contact**
  - Steady Green
  - Steady Amber
  - Steady Circle
  - Steady Y
  - Fuel flow greater then 50 gpm
  - Past the inner refueling limit

- **Anytime**
  - Steady Red
  - Steady Circle with Y
  - Low hydraulic pressure, no hose response
  - Disconnect, pod malfunction
(e) **Aircraft lighting.** Following is a schematic of the KC130J lighting.

<table>
<thead>
<tr>
<th>Night</th>
<th>Day</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Night Setting" /></td>
<td><img src="image2" alt="Day Setting" /></td>
<td>Tanker Ready (Yellow Light)</td>
</tr>
<tr>
<td><img src="image3" alt="Night Setting" /></td>
<td><img src="image4" alt="Day Setting" /></td>
<td>Fuel Flows (Green Light)</td>
</tr>
<tr>
<td><img src="image5" alt="Night Setting" /></td>
<td><img src="image6" alt="Day Setting" /></td>
<td>Hydraulic Failure (Red Light)</td>
</tr>
</tbody>
</table>
(f) **Normal Operations.** Before a receiver is cleared for contact, the beacon is turned off to indicate the tanker’s AAR checklist has been completed.

(g) **Breakaway.** The light signal commanding a breakaway is the tanker’s lower rotating beacon being switched on. On a KC-130J, in addition to the lower rotating beacon the pod will display a flashing red light (overt) or a flashing circle combined with flashing a Y (covert).

(h) **EMCON.** AAR during EMCON constraint requires additional light signals from the tanker; these are provided by hand held ALDIS lamps or portable light as available. These lights will be seen in the paratroop door windows located at the rear of the fuselage on both sides of the aircraft.

b. **Mark facilities.** NIL.
c. **KC-130J Refuelling Height and Speed.**

**CAUTION**

**RECEIVER LIMITATION IN SPEED AND ALTITUDE WITHIN KC130J AAR ENVELOPE SHALL BE NOTIFIED TO THE TANKER.**

**NOTE**

THE MINIMUM ALTITUDE FOR ALL TANKER EVOLUTIONS (ASSIGNED STATION, FORMATIONS, RV, ENGAGEMENTS/DISENGAGEMENTS AND DEPARTURES) SHALL BE THE ONE REPORTED IN THE ENVIRONMENT FOR THE FIXED/ROTARY WING RECEIVER AS APPROPRIATE BUT NOT BELOW 1500 FT AGL AT NIGHT FOR ROTARY WING RECEIVER.

(1) **Fixed Wing Receiver - High Speed Drogue**

(a) **AAR Altitude Range.** AAR altitude range is from 5000 ft amsl to 25000 ft amsl.

(b) **Maximum Hose Extension/Retraction Speed.** The maximum speed for high speed drogue extension is 250 KIAS.

(c) **Speed Range.** The speed range for high-speed fixed-wing drogue is 185 KIAS to 250 KIAS.

(d) **High Speed Drogue Envelope.** See figure below.

![Diagram of KC-130J AAR Envelope](image.png)
(2) **Rotary Wing Receiver - Low Speed Drogue**

(a) **AAR Altitude Range.** AAR altitude range is from 1000 ft amsl to 10000 ft amsl.

(b) **Maximum Hose Extraction/Retraction Speed.** The maximum hose extraction/retraction and engagement speed with the low speed drogue is 120 KIAS.

(c) **Speed Range.** The speed range for the low speed helicopter drogue is 105 KIAS to 120 KIAS (acceleration to 130 KIAS is allowed when the tanker and the receiver are in contact).

(d) **Low Speed envelope.** See figure below.

![Diagram showing low speed envelope for AAR](image)

### d. Maximum Transferable Fuel.

Total fuel loads are normally up to 58,000 lb (26,350 kg). Transferable fuel is dependent on sortie duration; around 26,000 lb (12,680 kg) is available for transfer during a 4 hr flight, assuming a fuel burn rate of 6,000 lb/hr (2,720 Kg/hr) and a landing at the alternate airport at the minimum allowable fuel (6000 lb + 2000lb holding time).

### e. Fuel Transfer Rate.

The rate of fuel transfer during AAR is governed by several factors. One is the transfer rate capability of the receiver aircraft. Another is a function of the tanker fuel systems configuration and mode of tanker refuelling system operations. Two primary methods are available, using the fuselage tank AAR pumps or using the POD pumps. Receiver limitation on pressure applies and must be notified to the tanker.

(1) **With Removable Fuselage Tanks.** The tanker has the capability to mount a roll on/off fuselage tank of 3,600 gallon with two AAR pumps available. Only
one AAR pump will be used at a time unless otherwise instructed by the receiver aircrew. Pump rating is 300 GPM at 90 PSI.

(2) Without Removable Fuselage Tanks. If only the wing store fuel is available, each pod is supplied with a Pod Pump to increase the pressure provided by the internal tank transfer pump. Each pump is rated at 45+ 10 PSI and can pump up to 300 GPM when all 8 internal tank transfer pump are available.

(3) Lower Fuel Transfer Rate. The lower transfer rate can be selected on request if limitation applies to the receiver airplane AAR system. Transfer rates in the range of 28-40 PSI up to maximum tanker capability may be planned for or requested based on receiver limitations (using only internal tanks transfer pump).

f. Regulated Fuel Pressure. Fuel is delivered to the receiver at or below 50 PSI (3.5 bars) at the drogue with any of the method reported in sub para d.

g. Fuel Types Available for AAR. JP-8 (F34), JP-4 (F40) and JP5 (F44).

h. Rendezvous Aids. The KC-130J has the following radar, navigation, and RV aids:

(1) Three VHF/UHF (AM/FM capable) radio, two HF (SSB/AM) radio.

(2) Two VOR, two TACAN, two ADF, two GPS, and two INS.

(3) One UHF-DF (V/UHF N1), A/A TACAN (DME and bearing), Radar (Skin Paint mode allows limited Air to Air capability), IFF and TCAS. The ability of the A/A TACAN to provide azimuth is dependent on tanker and receiver equipment compatibility.

i. Dimensions. The KC-130J is 97 ft (29 m) long, with a wingspan of 132 ft (40 m); the aircraft height is 38 ft (12 m) and the stabilizer span is 52 ft (16 m).
j. Receiver Aircraft Permanently Certified.

(1) A-11A (AMX - ITAF)
(2) TA-11A (AMX Trainer - ITAF)
(3) A-200A (Tornado IDS - ITAF)
(4) EA-200B (Tornado ECR - ITAF)
(5) F-2000A (Eurofighter Typhoon - ITAF)
(6) TF-2000A (Eurofighter Typhoon Trainer – ITAF)
(7) FT-339B/A (MB-339CD - ITAF)
(8) AV8B (Italian Navy) - read across with US Marine Corp
(9) EC-725 (French Air Force)

3B. Source documents.
   a. CMM(EP).1C-130J-1
   b. CMM(EP).1C-130J-2-44GS-00-1
1C. Introduction. The Italian Tornado can be converted, mainly for training purposes, to the AAR role by fitting a refuelling pod on the centerline pylon.

2C. Specifications.

a. AAR Equipment. The ITA Tornado A-200 has a AAR tanker capability through the installation of a Sargent Fletcher buddy-buddy refuelling pod at the centerline fuselage station. The hose is 16 m (51 ft) long and terminates in a Flight Refuelling Ltd coupling and a 0.7 m (28 in) drogue. The hose must be pushed in 1.5 m (5 - 7 ft) for fuel to flow.

b. Refuelling Heights and Speeds. Any height between sea level and 20,000 ft. Speed range is 200 to 320 KIAS or .75 Mach, with an optimum of 270 KIAS.

c. Maximum Transferable Fuel. Total fuel load is 8.000 kg (17,630 lb). Transferable fuel quantity depends on the tanker sortie duration.

d. Fuel Transfer Rate. Maximum transfer rate is 600 kg/min (1.300 lb/min).

e. Regulated Fuel Pressure. Fuel pressure at the drogue is regulated to be between 240 to 380 KPA (35 to 55 psi).

f. Fuel Types Available for AAR. The primary fuel used is F-34.

g. Receiver Types Certified. The following aircraft are cleared to refuel from the A-200 Tornado:

(1) A-11A (AMX - ITAF)
(2) TA-11A (AMX Trainer - ITAF)
(3) A-200A (Tornado IDS - ITAF)
(4) E-A200A (Tornado ECR - ITAF)
(5) F-2000A (Eurofighter Typhoon - ITAF)
(6) TF-2000A (Eurofighter Typhoon Trainer – ITAF)
(7) FT-339B/A (MB-339CD - ITAF)

h. Lighting. The refuelling pod has two sets of red, green and amber equipment status lights mounted on the hose tunnel. The lights indicate the following:

- Amber Light: The pod system is ready for receiver contact.
- Green Light: Fuel is flowing from the pod to the receiver aircraft.
- Steady Red: Do not make contact.
- Flashing Red: The receiver is to breakaway.
The drogue canopy is fitted with 4 equally spaced white lights for night refuelling. A floodlight illuminates the lower fuselage.

i. **Mark Facilities.** The aircraft is fitted with strobe lighting.

j. **Dimensions.**
k. **RV and Navigation Aids.** The aircraft has the following radio, navigation and RV aids:

   (1) VHF and UHF radios.(HF radios deleted);
   
   (2) TACAN, Doppler, INS and MLS;
   
   (3) A/A TACAN.

3C. **Source documents.**

   AER IF-PA 200-1.