Welcome to Technical Order 00-105E-9, 1 February 2006, Revision 11.

This is Segment 10 covering Chapter 7 from the YAL-1A to Chapter End.

To navigate, click on the bookmarks and click on the (+) symbols, then click on subject links to go to specific views in this segment.

To go directly to the Technical Order, click on the Continue button.

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For technical order improvements, correcting procedures, and other inquiries, please use the above media most convenient.
This page is provided to notify the user of any informational changes made to Technical Order 00-105E-9 in this Segment and the current Revision. Informational changes will be referenced in the Adobe Reader's Bookmark tool as a designator symbol illustrated as a `<[C]>` for quick reference to the right of the affected aircraft. The user shall insure the most current information contained in this TO is used for his operation. Retaining out of date rescue information can negatively affect the user’s operability and outcome of emergencies. If the user prints out pages his unit requires, the user shall print the affected page(s), remove and destroy the existing page(s), and insert the newly printed page(s) in the binder provided for that purpose. A Master of this TO shall be retained in the unit’s library for reference, future printing requirements and inspections.

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<th>CHAPTER</th>
<th>AIRCRAFT</th>
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AIRBORNE LASER AIRCRAFT PAINT SCHEME
NOTE:
The intent of this aircraft file is not to disclose an indepth explanation of the ABL systems and how the systems work together to create the laser. The following developmental drawings on pages YAL-1A.3 thru YAL-1A.32 are to be used for orientation of the aircraft, locating all on-board personnel in case of mishap and identifying hazards and their locations. Pages YAL-1A.33 and YAL-1A.34 are a 747-400 Freighter similarly listed in Chapter 18 for the Civil Reserve Air Fleet (CRAF) illustrating aircraft entry and systems shutdown.

CREW EGRESS INFORMATION:
* The aft lower lobe cargo door is BLOCKED.
* The maximum number of personnel is limited by egress capability (16 inertial reels) to 16 SOBs.
* There are no plans to reconfigure and replace the slide bustles on door 1L and the upper deck door, and by putting a slide on door 2R.
* The minimum number of SOBs is the ferry flight crew, Pilot and Copilot.
* All personnel must be forward of STA 1000 during taxi, takeoff, and landing. AFT of STA 1000 in flight is only allowed during a declared emergency, and then only for the absolute minimum duration, in Level A hazmat suit with SCBA.
* During taxi, takeoff, and landing, there are a maximum of 8 SOBs allowed on the upper deck, and a maximum of 8 SOBs allowed on the main deck. This is because there are only egress provisions for 8 on each deck (i.e. 8 inertial reels at each of two egress paths on each deck).
* Other than observation ports and windows on the upper deck, there are no windows on this configuration.
### ABL CHEMICAL INVENTORY AND HAZARDS AND TERMS

<table>
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<tr>
<th>Chemical</th>
<th>On-board Storage (lbs)</th>
<th>FTA/SIL Carts Qty. (gal or lbs)</th>
<th>IMF Storage (gal or lbs)</th>
<th>GPRA Capacity (gal)</th>
<th>Cryogenic</th>
<th>Asphyxiant</th>
<th>Corrosive</th>
<th>Pressure</th>
<th>Fire</th>
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<td>X</td>
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**NOTE:**
The column hi-lighted in red is for the chemicals on board the aircraft. The other chemicals not in red are for various ground based facilities and portable transfer carts that interface with the aircraft during laser fueling.

**TERMS:**
- BHP - Basic Hydrogen Peroxide
- IRST - Infrared Sensor and Tracker
- CL₂ - Chloride
- MDA - Missile Defence Agency
- FTA - Fluid Transfer Assemblies
- NH₃ - Ammonia
- GPS - Global Positioning System
- PRS - Pressure Recovery System
- H₂O₂ - Hydrogen Peroxide
- UARRSI - Universal Aerial Refueling
- He - Helium
- Receptacle Slipway Installation
- I₂ - Iodine
- WL - Waterline
ABL CONFIGURATION - UPPER DECK

- Stairway to Upper Deck and Flightdeck
- Business Class Seats (5)
- Lavatory
- Crew Entry Door (Type 1[48X24])
- Mid First Controllers (4)
- Control Racks (2)
- Salon
ABL CONFIGURATION - STATION 1000

- ECS DUCTS
- BILL/TILL BEAM TUBE
- INTEGRATED/BILL HEAT EXCHANGER
- HELIUM SERVICE PANEL
- (ILLUM)NATOR BENCH SYSTEM EE RACKS (2)
- POWER MODULE #4
- WING TO BODY FAIRING

STA 1000
BULKHEAD & AIRLOCK NOT SHOWN
ABL CONFIGURATION - UPPER DECK 1300
AND LOWER LOBE 1480
ABL CONFIGURATION - STATION 1900

- AFT OPTICAL BENCH
- AFT 1ST CONTROLLER
- COS COMPRESSOR
- AFT BEAM TUBE SUPPORT
- HALON TANKS (2)
- HALON TANKS (4)
- POWER MODULE 45

STA 1900
ABL KEY FEATURES

- Nose-Mounted Turret
- Beam Control System
- Battle Management
- Separation Bulkhead
- Illuminator Lasers
- Active Laser Ranger
- Deployment Storage
- Engines
- High Energy Laser
- Engines Deployment Storage
LASER SYSTEM OVERVIEW OF HAZARDS

FOR SA 0050

ODS CONTROLLERS
* BENCH ISOLATION
* HIGH BANDWIDTH

CIS CONTROLLERS
* FWD CONTROL RACK
* AFT CONTROL RACK

AMMONIA TANKS
(BHP HEX)

IODINE VAPORIZER

MID OPTIC BENCH (MOB)

HELIUM TANKS
* PRIMARY (SOG)
* SECONDARY (NOZZLES)

PEROXIDE TANKS
* EJECTORS
* TURBOPUMP
* HELIUM HEATER

LASER MODULE (UPPER LOBE)
* SOG / CATCH TANK
* GGS
* UPPER INTEGRATING STRUCTURE

AFT OPTIC BENCH (AOB)

AOB CONTROLLER
* BENCH ISOLATION

CIS
* LEC
* LSSR

CIS CONTROLLERS
* FWD CONTROL RACK
* AFT CONTROL RACK
FLUID SUPPLY SYSTEM HAZARDS

HELIUM HEATER IN LOWER LOBE

C12 PRESSURANT HELIUM TANKS

NH₃ TANKS

IODINE OVENS

H₂O₂ TANKS

SERVICE HELIUM TANKS

N₂ TANK

PRESSURANT HELIUM TANKS (H₂O₂/NH₃)

CHLORINE TANK IN LOWER LOBE

H₂O₂ TANKS

H₂O₂ TANKS

TANKS

TANKS

TANKS

TANKS

TANKS

TANKS

TANK

TANK

TANK
CHLORINE SYSTEM OVERVIEW OF HAZARDS

MODULE VAPORIZERS
RETURN LINE TO DUMP MAST
PRESSURANT COMPONENTS AND LINES
HE PRESSURANT TANK ON HOT HELIUM PALLET
TANK AND FILL LINE SHUT OFF VALVES
DUMP MAST
C12 FILL PANEL
NOTE:
Three storage tanks (4th shown is for keep out zone). Secondary containment around all tanks and isolation valves for liquid leak containment.

AMMONIA SYSTEM OVERVIEW OF HAZARDS
HYDROGEN PEROXIDE 70% SYSTEM OVERVIEW OF HAZARDS

- **Secondary Containment Around All Tanks and Isolation Valves**

- **Pressurant Supplied by Seven Helium Tanks. Other Tank Is for NH₃ Identical to Service He Tanks.**

- **Eight Composite Over Wrapped Tanks Six Tanks for PRS, 2 Tanks for TMS/He Hex PRS Requires Variable Flow Rate Adjusted for Altitude Via Tank Pressure.**

- **Tanks and Primary Plumbing Lines Are Halar Coated for H₂O₂ Stability.**
IODINE SYSTEM OVERVIEW OF HAZARDS

COTS AIRCRAFT OVENS HOUSE VAPORIZER AND MIXER FOR UNIFORM TEMPERATURE. EACH OVEN/VAPORIZER SERVES 3 MODULES.

$\text{I}_2$ TANK COOLED POST MISSION RETURN FLIGHT WITH NH$_3$ FLOW THROUGH EXTERNAL TUBING.

230$^\circ$/$18^\circ$ TEMPERATURE FOR $\text{I}_2$/He FEED LINE TO GGS

OVERBOARD VENT LINE AT 230 $^\circ$F.
LIGHTWEIGHT GRAPHITE OVER WRAPPED TANKS. ALL HELIUM/N2 TANKS ARE THE SAME DESIGN.

EIGHTEEN “SERVICE” HELIUM TANKS FOR LASER FLOW

SEPARATE SINGLE “PURGE” He TANK MOUNTED HORIZONTALLY OVER GN2 TANK

HELIUM HEATER PALLET IN AFT LOWER LOBE HEATS HELIUM FOR Cl₂ AND I₂ VAPORIZATION.
MULTIPLE HEADERS FOR VALVE ACTUATION PROVIDE FOR FLEXIBILITY AND PEAK DEMAND GN2 SUPPLY TUBING FROM HEADERS (TYPICALLY 1/4") TO INDIVIDUAL COMPONENTS WILL BE FIELD ROUTED

ONE GRAPHITE OVER - WRAPPED TANK - SAME DESIGN AS HELIUM TANKS

PROVIDES GN2 FOR SEVERAL FUNCTIONS
* GAIN GENERATOR ISOLATION PURGE
* NOZZLE ENERGIZERS
* TMS VACUUM PUMP SHAFT PURGE
* VALVE ACTUATION (125 AND 250 PSIA)

HIGH PEAK FLOW DEMAND DRIVES DESIGN. SHORT DURATION TRANSIENT DURING STANDBY TO READY = 7.5 LB/SEC
SECONDARY CONTAINMENT FOR CRITICAL TANKS

- SECONDARY CONTAINMENT EQUIPPED WITH LEAK DETECTORS FOR CIS AND BACKUP DISPLAYS
  - Cl₂ has pressure transducers
  - NH₂ & H₂O₂ vapor detectors and liquid level sensors

- SECONDARY CONTAINMENT FOR TANKS AND PRIMARY SHUT OFF AND JETTISON VALVES ON C12, NH₃ AND H₂O₂ TANKS

- CAPABLE OF BEING DRAINED OVERBOARD THROUGH DUMP MAST VIA CIS OR BACKUP PANEL
VENTING OF LARGE HELIUM TANK FARMS

HELIUM TANK FARM
* POTENTIAL OVERPRESSURE OF AIRCRAFT FUSELAGE FROM HELIUM TANK FARMS
  * MANIFOLD CRACKS/BREAKS
  * ALL TANKS BLOW DOWN THROUGH RUPTURED LINE

* 18 TANK HELIUM FARM AND 7 TANK H₂ O₂ PRESSURANT He TANKS

* EACH TANK HAS ORIFICE AT OUTLET TO LIMIT TOTAL FLOW RATE FROM TANKS TO PREVENT

WARNING - EXTREMELY DANGEROUS

The Composite Overwrapped Pressure Vessels (COPVs) are the single most hazardous items on the aircraft. They are nominally at 4600 psig. If more than one ruptures, the aircraft fuselage will break! Handle With Care!
To defend against the ballistic missile threat, the U.S. Air Force, Missile Defense Agency (MDA) and Team ABL — comprising Boeing, TRW and Lockheed Martin — are developing a high-energy chemical oxygen iodine laser (COIL) carried aboard a modified Boeing 747-400F Freighter that is capable of shooting down ballistic missiles while hundreds of miles from the missile launch sites.

**ABL SYSTEM DESCRIPTION**

- **Passive Defense:** Alerts Theater to specific impact areas, which allows early defense preparations.
- **Detriment:** Debris falls well short of target area.
- **Enhance Mid and Terminal Systems:** By reducing the number of incoming targets and providing inbound missile track information to terminal systems.
- **Shoot Until Kill Assessment and Multiple Engagement Capability:**
- **Time Critical Targeting:** Provides accurate launch points for attack operations.
AIRFRAME MATERIALS

1. AIRFRAME MATERIALS

NOTE:
The 747-400 airframe consists of advanced composite materials. These materials are illustrated by the provided graphic.
1. NORMAL/EMERGENCY ENTRY
   a. Pull entry door handles from recess position and rotate 180 degrees clockwise for entry doors located on left side and counterclockwise for entry doors on right side.

   NOTE:
   - All entry doors open outward.
   - Opening a door from the outside disengages the emergency evacuation system and the escape chute will not deploy.
   - All emergency escape chutes are deployed from inside the aircraft only.

   b. Press release button on crew escape hatch, located top forward center of crew compartment, and rotate escape hatch handle 180 degrees clockwise. Push escape hatch inward.

   c. Pull handle, located on crew door, and rotate 180 degrees counterclockwise. Push door inward until slide tracks are engaged, then slide door aft.

   NOTE:
   - All entry doors open outward.

2. UPPER DECK CREW SERVICE/ENTRY DOORS
   a. To unlock door, push access panel.
   b. Lift door handle.

3. CUT-IN
   a. Cut areas along window lines as last resort.
FLIGHTDECK CONTROL SWITCH LOCATIONS

THrust Levers, ENGINE FIRE T-Handles, APU Switches,
FUEL Control Switches and Battery Switch

Note:
The battery switch should be actuated last when
shutting down systems.

APU Selector - Rotate Off

Battery Switch - Press
Note: On symbol
Is removed

APU Switch - Pull
(If not illuminated, may require
Pushing and holding the button
Under the switch to release.)

Thrust Levers - Retard

Engine Fire T-Handles - Pull
(If not illuminated, may require
Pushing and holding the button
Under the switch to release.)

Flightdeck Facing Forward

Fuel Control Switches - Off
1. FLIGHTDECK ARRANGEMENT
   a. A pilot’s/captain’s station is located at forward left side of the flightdeck compartment.
   b. A co-pilot’s/first officer’s station is located at forward right side of the flightdeck compartment.
   c. A first observer’s station is located just aft of the co-pilot’s/first officer’s station.
   d. A second observer’s station is located just aft of the pilot’s/captain’s station.
   e. The flightdeck compartment also may have a crew rest area just aft of the pilot’s/second observer’s station on the left side of the compartment.
2. SEAT ADJUSTMENTS - PILOT/CAPTAIN & CO-PILOT/FIRST OFFICER

NOTE:
All seats are provided with seat belts and manually actuated control handles for mechanically operated seat adjustments.

a. The pilot’s/captain’s and co-pilot’s/first officer’s seats are also provided with toggle switches for electrically powered operation of the horizontal and vertical seat adjustments.

b. Both the captain’s and first officer’s seats are mounted on seat tracks to permit forward and aft seat travel. The aft ends of the seat tracks are curved outboard so that during the last few inches of aft travel the seats move outboard to provide easement of pilot ingress and egress.

c. Each seat is fitted with four bogie roller swivel assemblies which retain the seat base to the seat tracks and also prevent lateral movement of the seat. The roller swivels located within each bogie assembly assist in the freedom of movement of the seat during fore and aft seat travel.

d. Each seat contains manually operated controls for horizontal and vertical adjustments, thigh support pad adjustment, seat back recline and lumbar support adjustments.

e. In addition, each seat contains two power adjustment control switches for electrically powered operation of the horizontal and vertical seat adjustments.

f. Both seats are also provided with adjustable arm rests, manual/automatic inertia reel shoulder harness, lap straps with rotary buckle and crotch strap, and lifejacket stowage.
AIRCREW AND PASSENGER
EXTRACTION- Continued

3. SEAT ADJUSTMENTS - FIRST & SECOND OBSERVER'S SEATS

a. The first observer seat is mounted on the flight compartment floor on the right side of the compartment and is capable of horizontal, lateral and vertical adjustments.

b. The first observer seat contains manually operated controls for horizontal, lateral and vertical adjustments, seat back recline adjustment and lumbar support adjustments.

c. The second observer seat is mounted on top of a book stowage compartment on the left side of the compartment and is not capable of horizontal, lateral or vertical adjustments.

d. The second observer seat contains manually operated controls for seat back recline and lumbar support adjustments only.

e. Both seats are also provided with adjustable armrests, manual/automatic inertia reel shoulder harness, lap straps with rotary buckle and crotch strap, and lifejacket stowage.
AIRCREW AND PASSENGER
EXTRACTION- Continued

4. SEAT ADJUSTMENTS - MISSION CREW SEATS

a. The mission crew seats are located on main deck aft of stairwell. These seats have adjustments for vertical, horizontal, recline, lateral, swivel and lumbar.

b. These seats are also provided with adjustable armrests, manual/automatic inertia reel shoulder harness, lap straps with rotary buckle and crotch strap.
AIRCREW AND PASSENGER EXTRACTION- Continued

5. PASSENGER SEATS

a. The passenger seats are located on the upper deck aft of flightdeck. These seats are business class type seats. They have adjustments for horizontal and recline with a leg rest. This adjustment is located mid way on the left armrest.

b. These seats are equipped with standard airline seat safety belts with the adjustable buckle. Pull up on buckle to release belt.