

WELCOME TO TECHNICAL ORDER 00-105E-9, 1 JULY 2004, REVISION 9.

THIS IS SEGMENT 11 COVERING CHAPTERS 9 AND 10.

TO NAVIGATE

CLICK ON THE BOOKMARKS AND CLICK ON THE (+) SYMBOLS, THEN CLICK ON SUBJECT LINKS TO GO TO SPECIFIC VIEWS IN THIS SEGMENT.



CONTINUE

NOTICE

CONTACT

**TO GO DIRECTLY TO THE TECHNICAL ORDER,
CLICK ON THE CONTINUE BUTTON.**

**TO SEE THE SEGMENT INFORMATION CHANGE NOTICE,
CLICK ON THE NOTICE BUTTON.**



**TO CONTACT THE TECHNICAL CONTENT MANAGER ,
CLICK ON THE CONTACT BUTTON.**

TECHNICAL ORDER 00-105E-9 TECHNICAL CONTENT MANAGER

WRITTEN CORRESPONDENCE:

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Tyndall AFB, Florida 32403-5319



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<http://www.afcesa.af.mil/CEX/fire/index.asp>

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DSN 523-6150

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DSN 523-6390

For technical order improvements, correcting procedures, and other inquiries, please use the above media most convenient.

SEGMENT 11 INFORMATION CHANGE NOTICE

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 Retaining out of date rescue information can negatively affect the user's operability and outcome of emergencies.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.

<u>CHAPTER</u>	<u>AIRCRAFT</u>	<u>PAGE</u>	<u>EXPLANATION OF CHANGE</u>
9	UH-60A	ALL	New file added to chapter.
10	OV-10	ALL	New file added based on renewed use.
10	RQ-1/MQ-1	ALL	New file combining RQ-1 and the newly added MQ-1. Incorporates Safety Supplement-8, dated 23 January 2004.

NOTE

Chapter 9 contains emergency rescue and mishap response information for the following aircraft:

USAF	UH-IN
USAF	CH-3E
USAF	HH-1H
USAF	MH-53J
USAF	MH-60G
USAF	UH-60A
USAF	V-22

CHAPTER 9

U.S. AIR FORCE

HELICOPTER

AEROSPACE EMERGENCY RESCUE AND MISHAP RESPONSE INFORMATION

9-1. INTRODUCTION AND USE.

9-2. This section contains emergency rescue and mishap response information illustrations in alpha-numerical order relative to type and model of aircraft. This arrangement of illustrations is maintained from Chapter 4 throughout the remainder of the publication.

9-3. GENERAL ARRANGEMENT.

9-4. Aircraft type designation has been positioned in the upper right corner of the horizontal illustration for rapid identification. Additional aids to rapid orientation are:

a. Recent technological advances in aviation have caused concern for the modern firefighter. Aircraft hazards, cabin configurations, airframe materials, and any other information that would be helpful in fighting fires, the locating and rescue of personnel will be added as the information becomes available.

b. Suggested special tools/equipment are listed in the upper left corner, on the Aircraft/Entry page of each listed aircraft.

c. Procedural steps covering emergency/normal entrances, cut-ins, engine/APU shutdown, safetying ejection/escape systems, and aircrew extraction are outlined on the left side of each page with coordinated illustrations on the right.

d. Illustrations located on right side of pages are coordinated with text by numerals and small letters depicting both paragraph and subparagraph on the page.

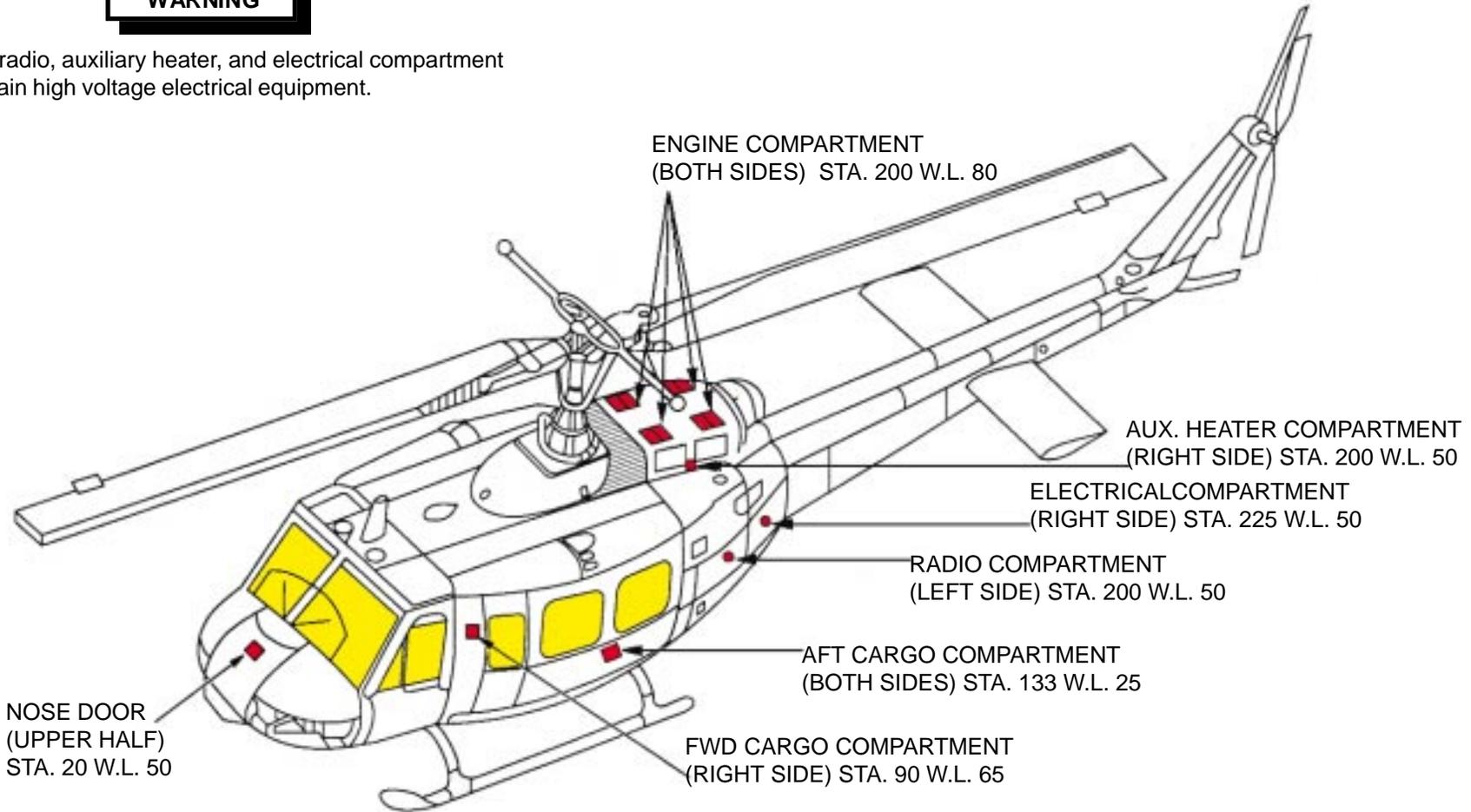
e. Each illustration is consistently colored and/or pattern keyed to highlight essential emergency rescue information.

f. Details are pulled directly from the illustration to highlight an area, thus eliminating unnecessary searching for desired information.

AIRCRAFT SKIN PENETRATION POINTS

WARNING

The radio, auxiliary heater, and electrical compartment contain high voltage electrical equipment.



SPECIAL TOOLS/EQUIPMENT
 Power Rescue Saw

AIRCRAFT ENTRY
WARNING

Caution must be exercised when entering rotor blade area. Entry must be from side of aircraft.

1. NORMAL ENTRY

- a. Rotate crew door handle, located left and right forward fuselage, counterclockwise to unlatch door. Pull out and forward to open position.
- b. Pull passenger-cargo door handle, located left and right fuselage, down to unlatch and release door. Slide door aft to open position.

2. EMERGENCY ENTRY

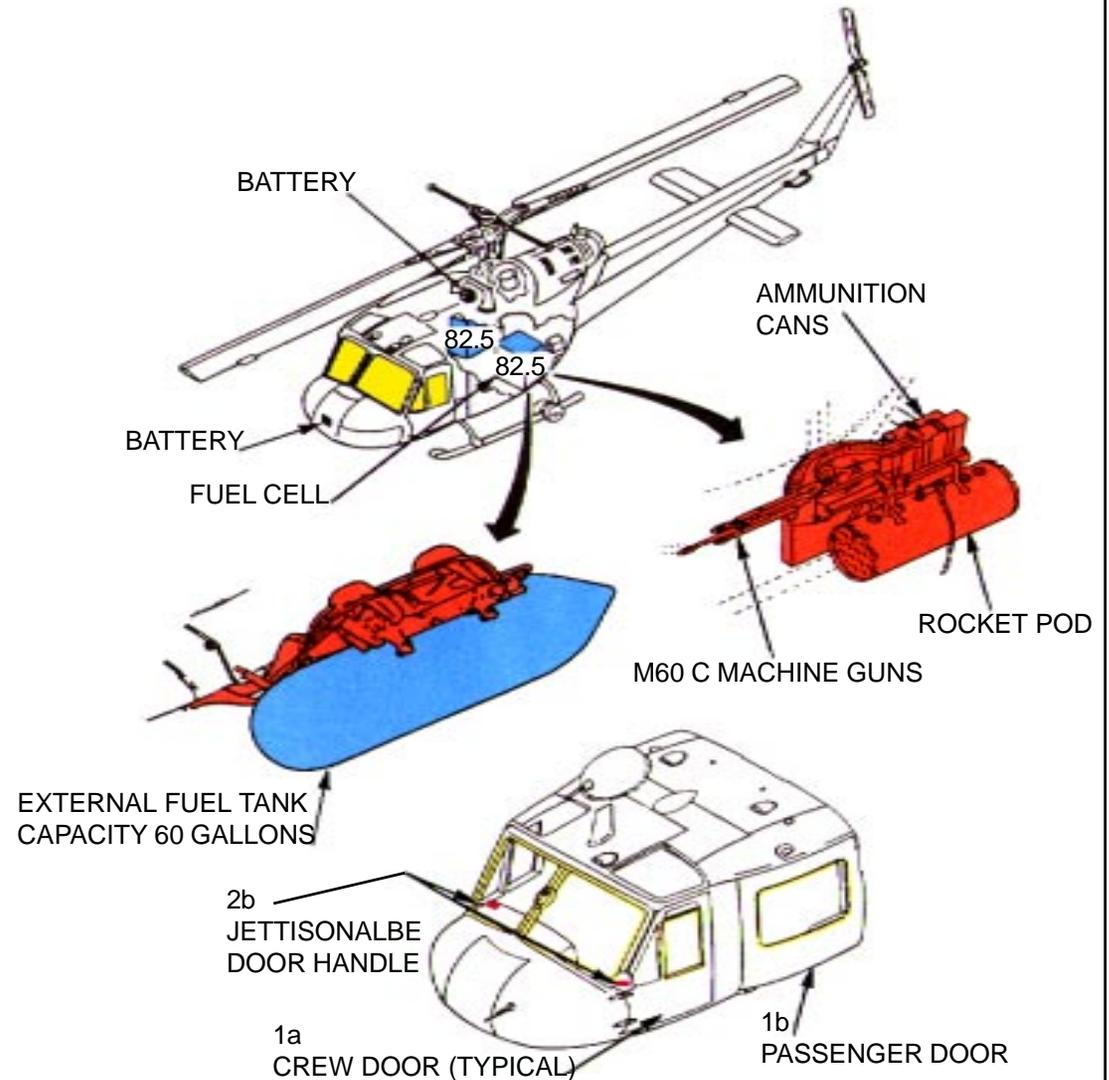
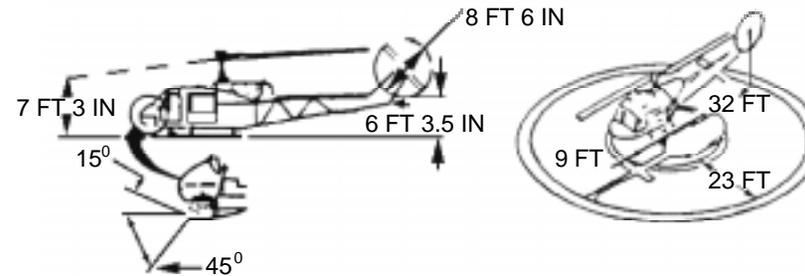
- a. Slide, break or cut crew door window, located left and right forward fuselage.
- b. Reach inside door and pull emergency release handles, located forward of right and left crew door frames, aft to release doors.
- c. Pull doors outward and place away from exits.

3. CUT-IN

- a. Cut plastic windows and glass windshield to gain entry.

NOTE:

If helicopter has internal auxiliary tanks - fuel capacity is 50 - 60 gallons. If cargo auxiliary tank is installed - 350 gallons.



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

- Pull fire T-handles, located upper center instrument panel. (UH-1N only- twin engine only)
- Place fuel switches, located on pedestal console, to OFF position.

WARNING

For VIP models only. Do not apply rotor brake above 130 RPM. Doing so could cause brake disc failure resulting in uncontrolled movement of the aircraft or disintegration of the brake disc. Application of the rotor brake when the aircraft is on ice may also result in uncontrolled movement.

- Apply rotor brake (if installed), located overhead on right side of cabin roof, down and forward to lock.
- Turn battery switch to OFF position.

2. AIRCREW EXTRACTION

NOTE:

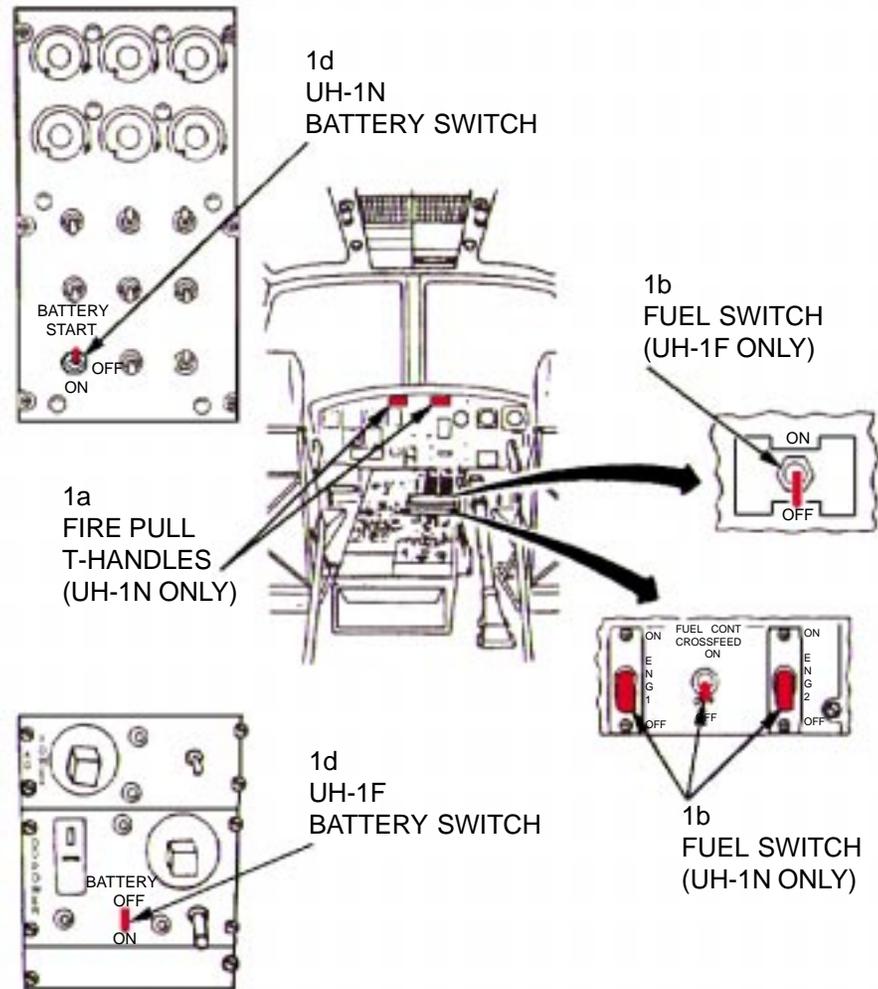
Aircrew seats are equipped with shoulder harness and lap belts. Troop seats are equipped with lap belts only.

- Unlatch lap belts and remove shoulder harness from crewmembers.

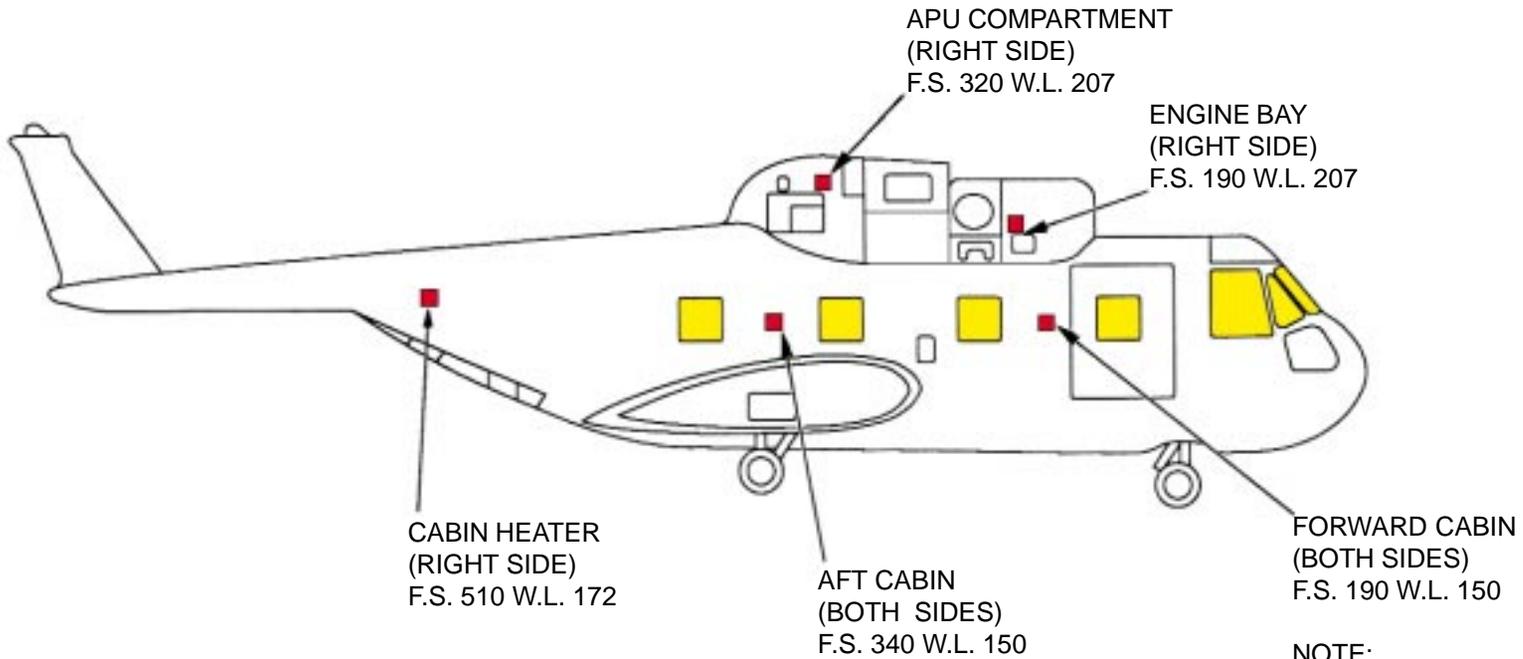
NOTE:

Red handles under each seat can be pulled downward to tilt seat backward. Seat is very heavy, hand assist seat back is necessary.

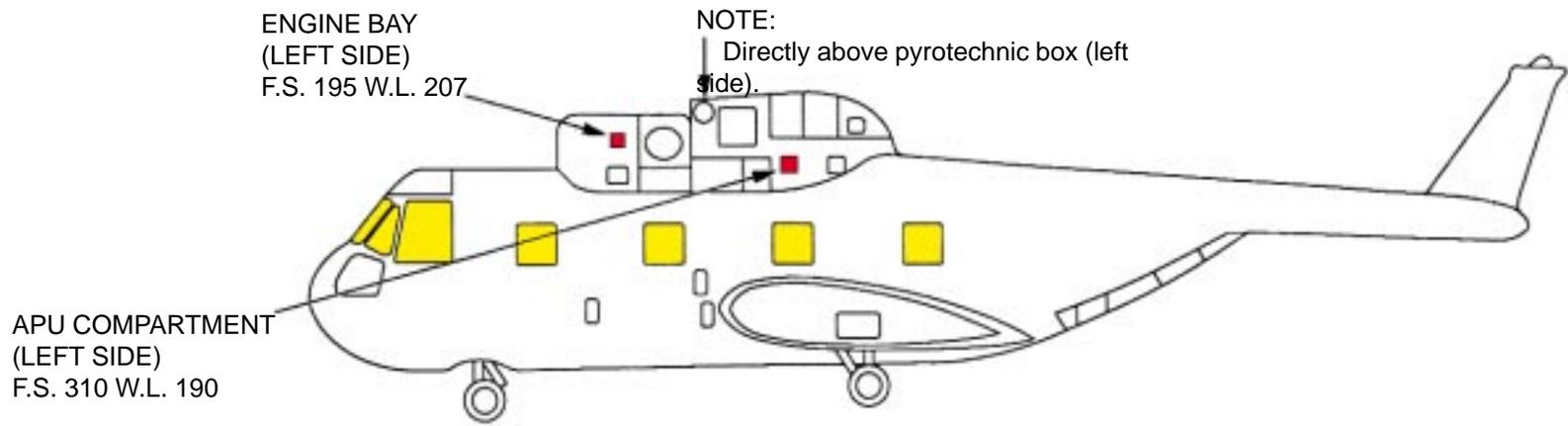
- Unlatch lap belts from passengers (if applicable).



AIRCRAFT SKIN PENETRATION POINTS



NOTE:
Directly above ammunition
storage
and aft of the M-60 machine gun.

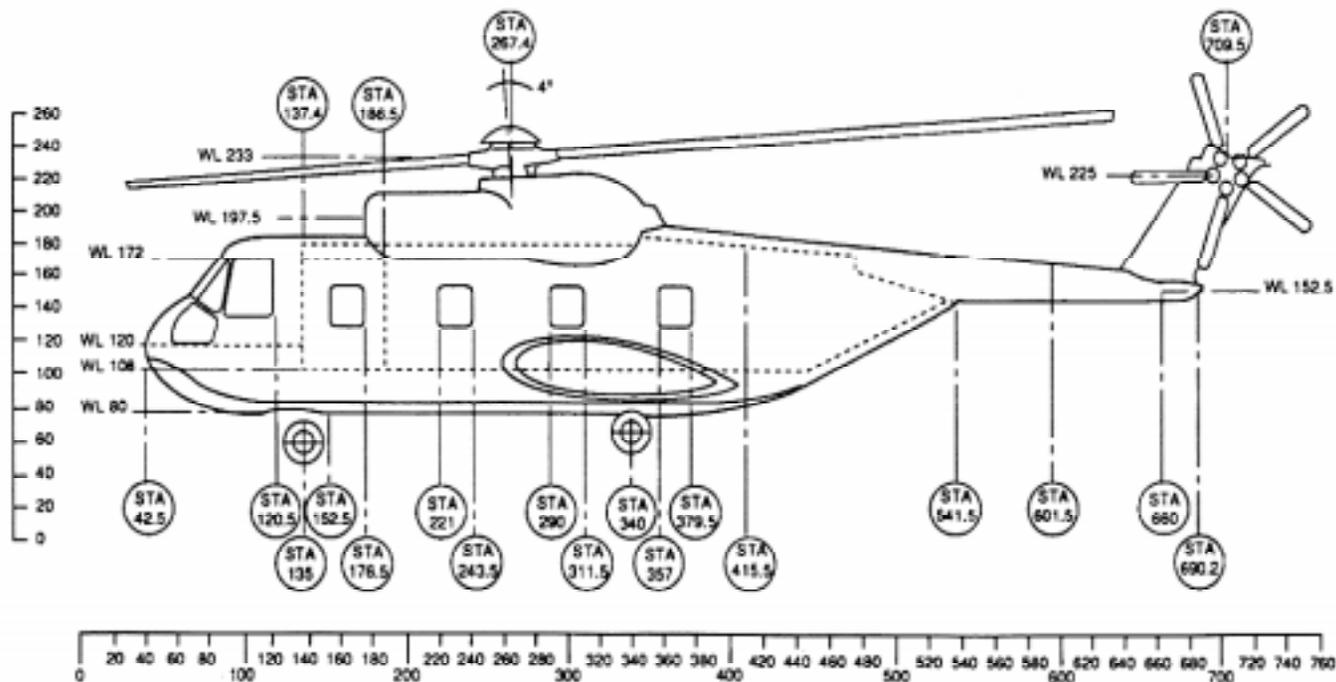
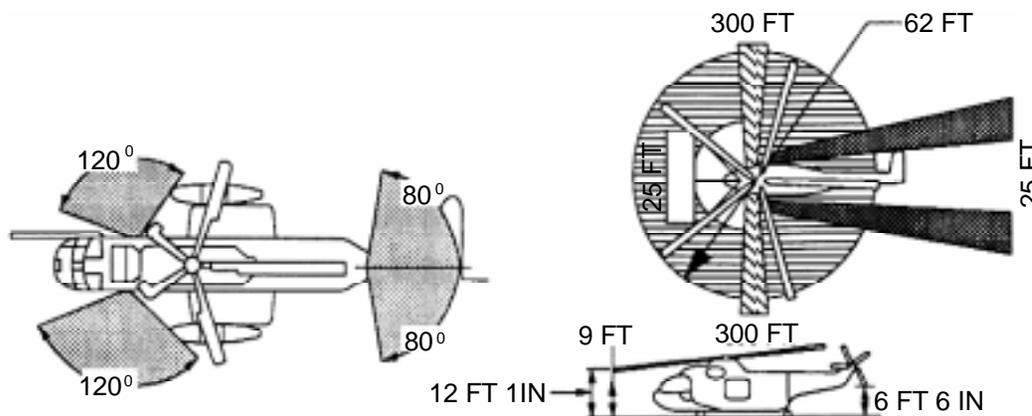


NOTE:
Directly above pyrotechnic box (left
side).

NOTE:
Penetrating the APU compartment also provides
access to the oil cooler and the aft main gear box.

AIRCRAFT HAZARDS

-  STARTER/TURBINE DISINTEGRATION AREA
-  ROTOR BLADE DANGER AREA
-  VERY HIGH FREQUENCY FAN NOISE, VIBRATION AND INGESTION
-  ENGINE EXHAUST - TEMPERATURE
-  GUN MUZZLE AREA - INDICATES AREA WHERE A MAXIMUM DEPRESSION UP OF -30 DEGREES IS ESTABLISHED TO MISS THE EXTERNAL AUXILIARY FUEL TANKS



AIRCRAFT ENTRY

1. NORMAL ENTRY

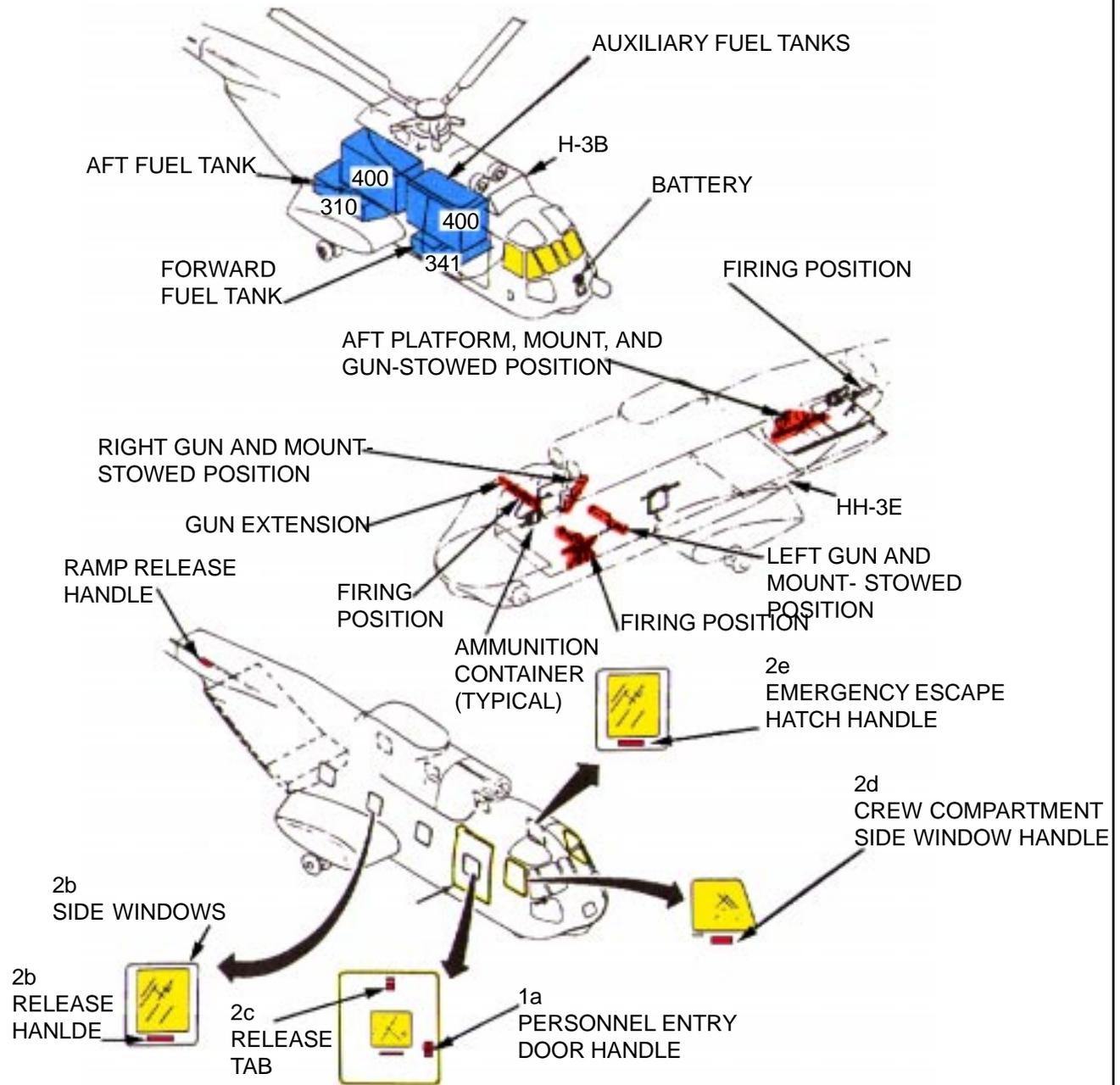
- a. Rotate handle, located on personnel entry door right forward fuselage, down and slide door aft.

2. EMERGENCY ENTRY

- a. Pull ramp release handle, located on tail pylon under cover, down. Ramp will open by its own weight.
- b. Pull release handle, on sponson jettisonable windows located left and right fuselage, down and remove windows.
- c. Pull release tab, located on personnel entry door, down and pull door aft.
- d. Press button to release handle, on crew compartment side windows, located on right and left fuselage, rotate down and forward. Pull window out and up.
- e. Pull release handle on emergency escape hatch, located forward left fuselage, down and remove hatch.

3. CUT-IN

- a. Cut forward fuselage windows, and crew compartment door.



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

- Place engine speed control levers, located on overhead panel to OFF position.
- Pull emergency T-handles, located on overhead panel down.
- Place battery switch, located on overhead panel, in OFF position.

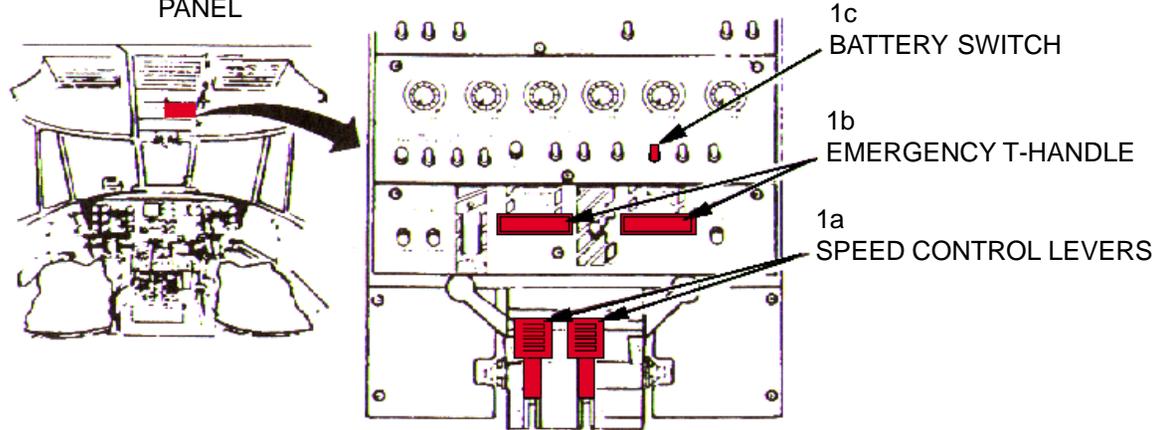
2. AIRCREW-LITTER-TROOP EXTRACTION

NOTE:

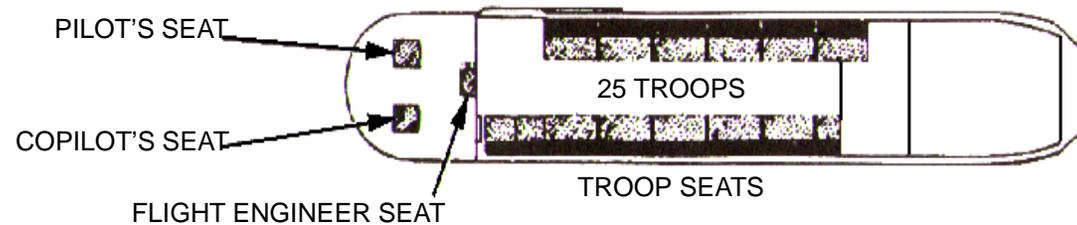
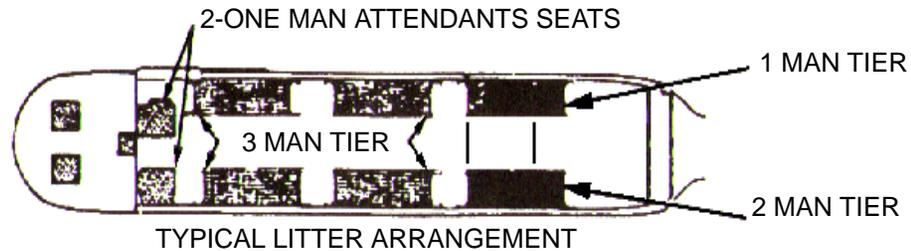
Aircrew seats are equipped with shoulder harness and lap belts. Troop seats are fitted with safety belts only.

- Unlatch lap belts and remove shoulder harness from crewmember(s).
- Unstrap occupants in the litters. Some patients may be connected to medical equipment.
- Unlatch safety belts in troop compartment.

OVERHEAD ENGINE CONTROL QUADRANT AND SWITCH PANEL



CABIN ARRANGEMENTS FOR AIRCREW, LITTER AND TROOP EXTRACTIONS



SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
Crash Ax

AIRCRAFT ENTRY

1. NORMAL ENTRY

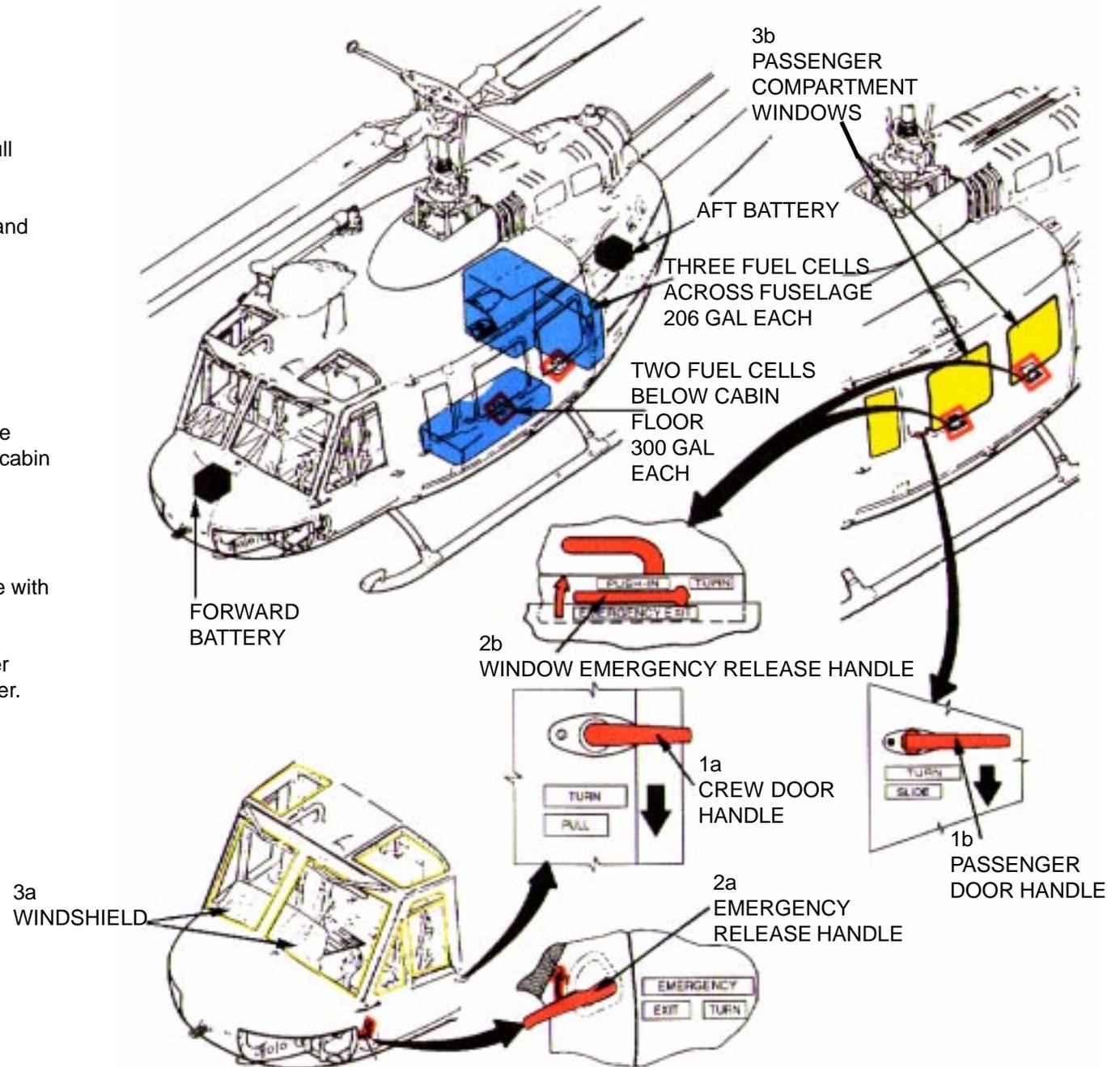
- a. Turn crew door handle clockwise and pull door open.
- b. Turn passenger door handle clockwise and slide door aft.

2. EMERGENCY ENTRY

- a. Turn external crew door jettison handle clockwise and remove door completely.
- b. Turn window external emergency release handle clockwise and push window into cabin area.

3. CUT-IN

- a. Shatter windshield around edge of frame with ax or hammer.
- b. Shatter glass around frame of passenger compartment windows with ax or hammer.



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

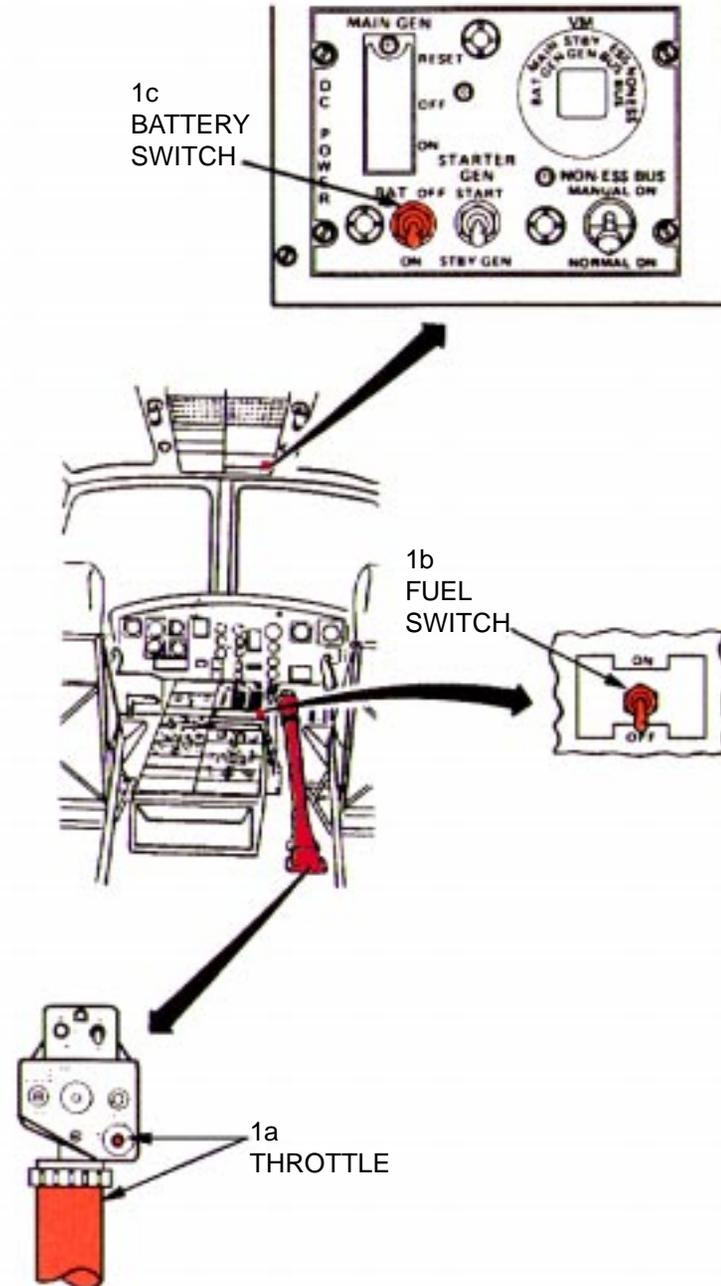
- a. Rotate throttle located on collective stick clockwise to idle position, press and hold detent button located on collective head, rotate throttle again to CUT-OFF position.
- b. Place fuel switch, located on pedestal console, to OFF position.
- c. Place battery switch, located on overhead console, to OFF position.

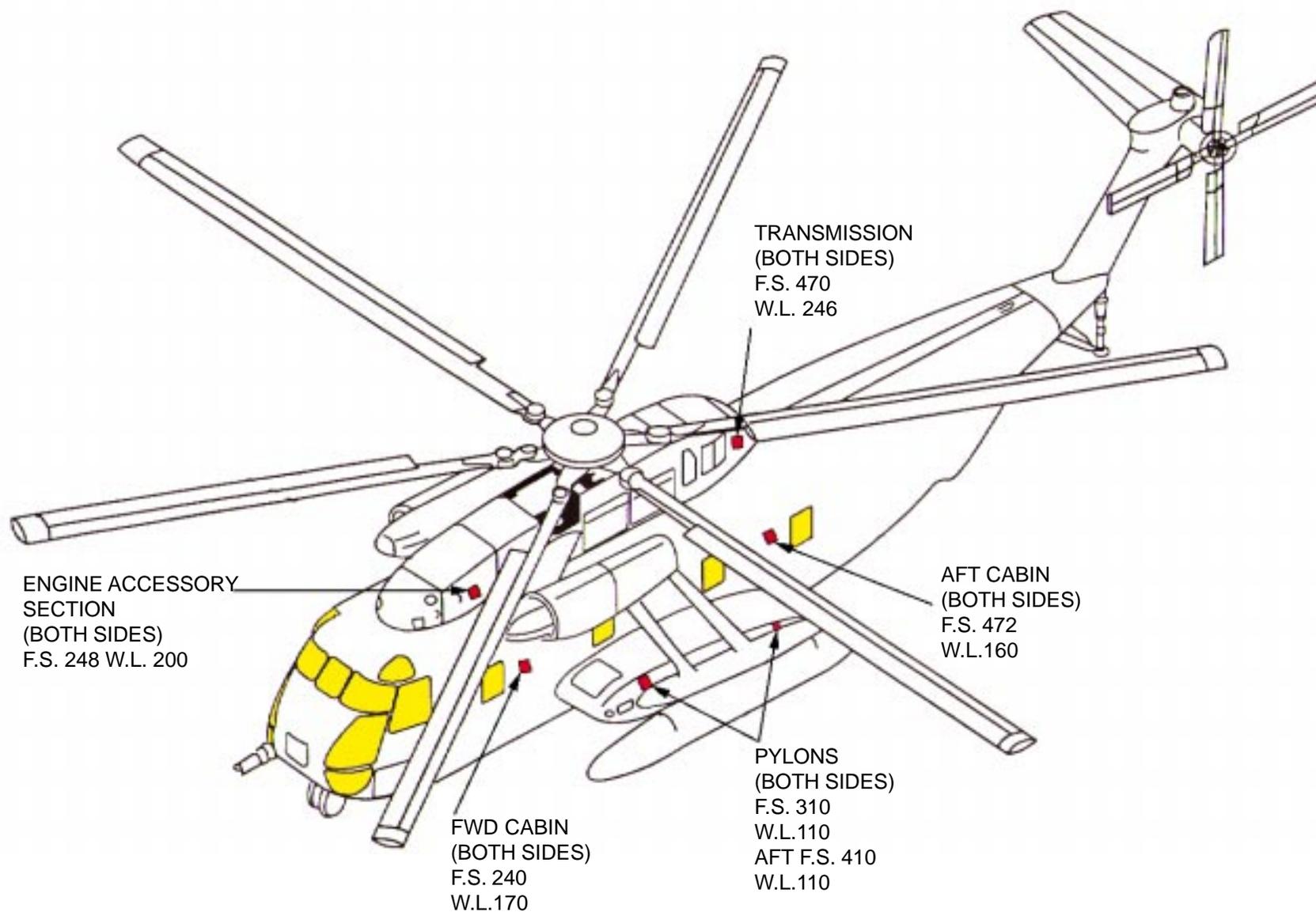
2. AIRCREW - TROOP EXTRACTION

NOTE:

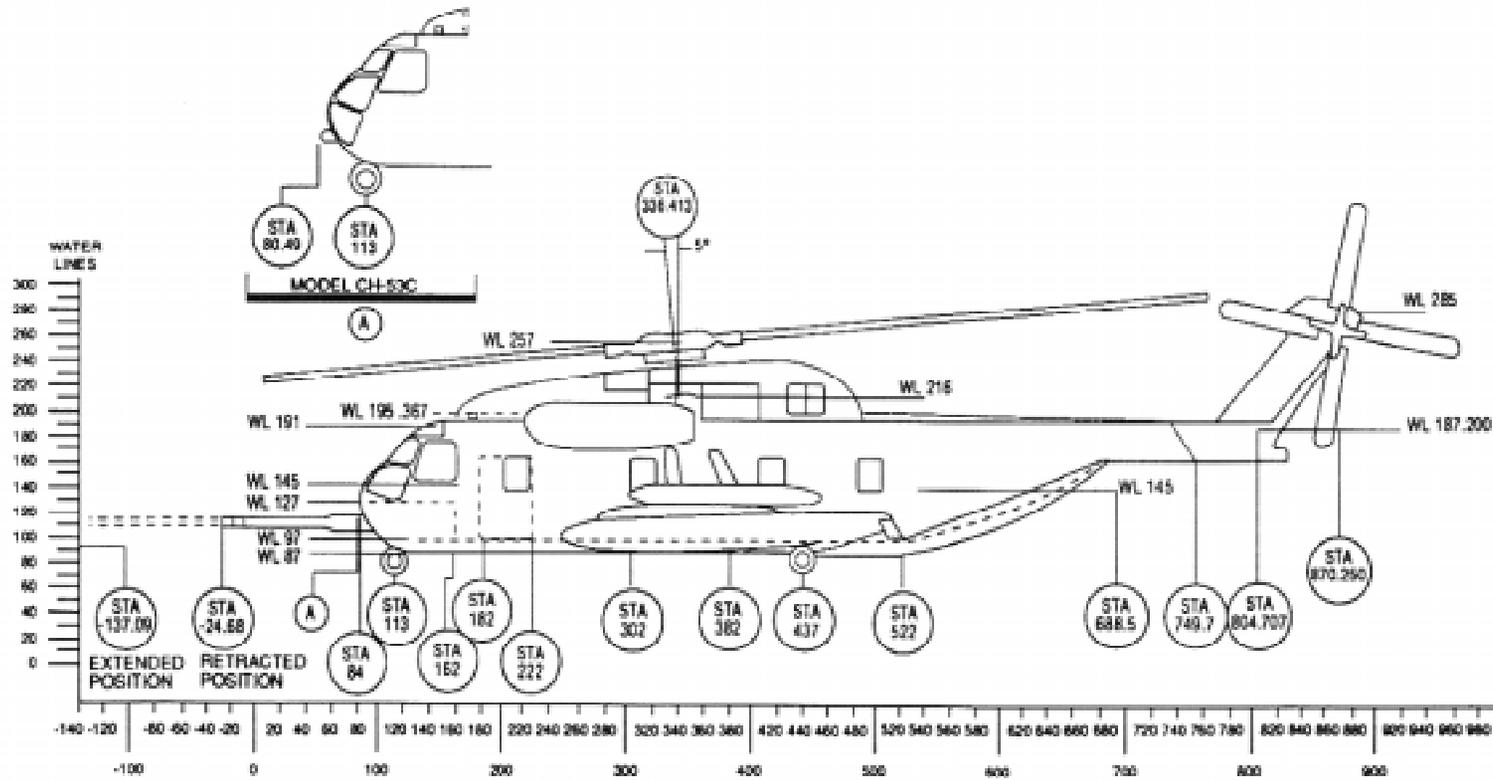
Aircrew seats are equipped with shoulder harness and lap belts. Troop seats fitted with safety belts only.

- a. Unlatch lap belt and remove shoulder harness from crewmembers.
- b. Unlatch safety belts in troop compartment.





AIRCRAFT STATION LOCATIONS



AIRCRAFT ENTRY

1. NORMAL ENTRY

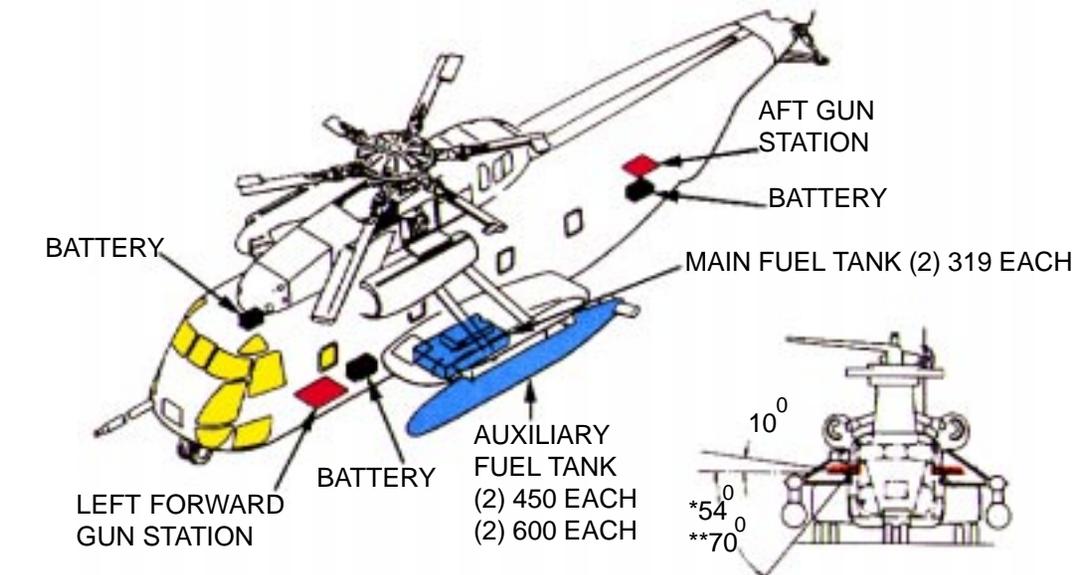
- a. Press button, located on crew compartment personnel door right forward fuselage, to release handle, rotate forward to unlatch. Push door inward.

2. EMERGENCY ENTRY

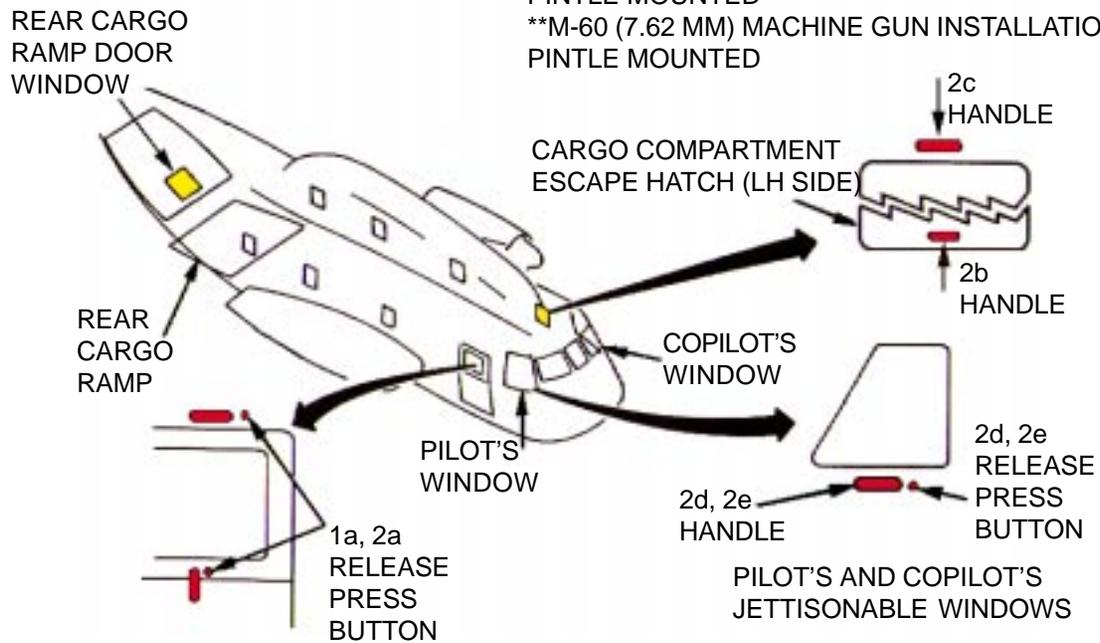
- a. Press button, located on top of personnel door, to release handle, rotate handle forward to release door from hinges. Pull door out.
- b. Press release on handle, located on cargo compartment escape hatch left side of fuselage, rotate handle clockwise. Pull window out and up.
- c. Press release on handle, located above escape hatch on left side of fuselage, rotate handle counterclockwise and press hatch inboard.
- d. Press button, located on pilot's side window left forward fuselage, to release handle, rotate handle down and forward. Pull window out.
- e. Press button, located on copilot's side window right forward fuselage, to release handle, rotate handle down and forward. Pull window out.

3. CUT-IN

- a. Cut fuselage windows at cargo ramp door window and emergency escape hatch.



*M-2 (.50 CAL) MACHINE GUN INSTALLATIONS
PINTLE MOUNTED
**M-60 (7.62 MM) MACHINE GUN INSTALLATIONS
PINTLE MOUNTED



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

WARNING

RPMs must be reduced to prevent blade dipping, aircraft rotation, and boom contact.

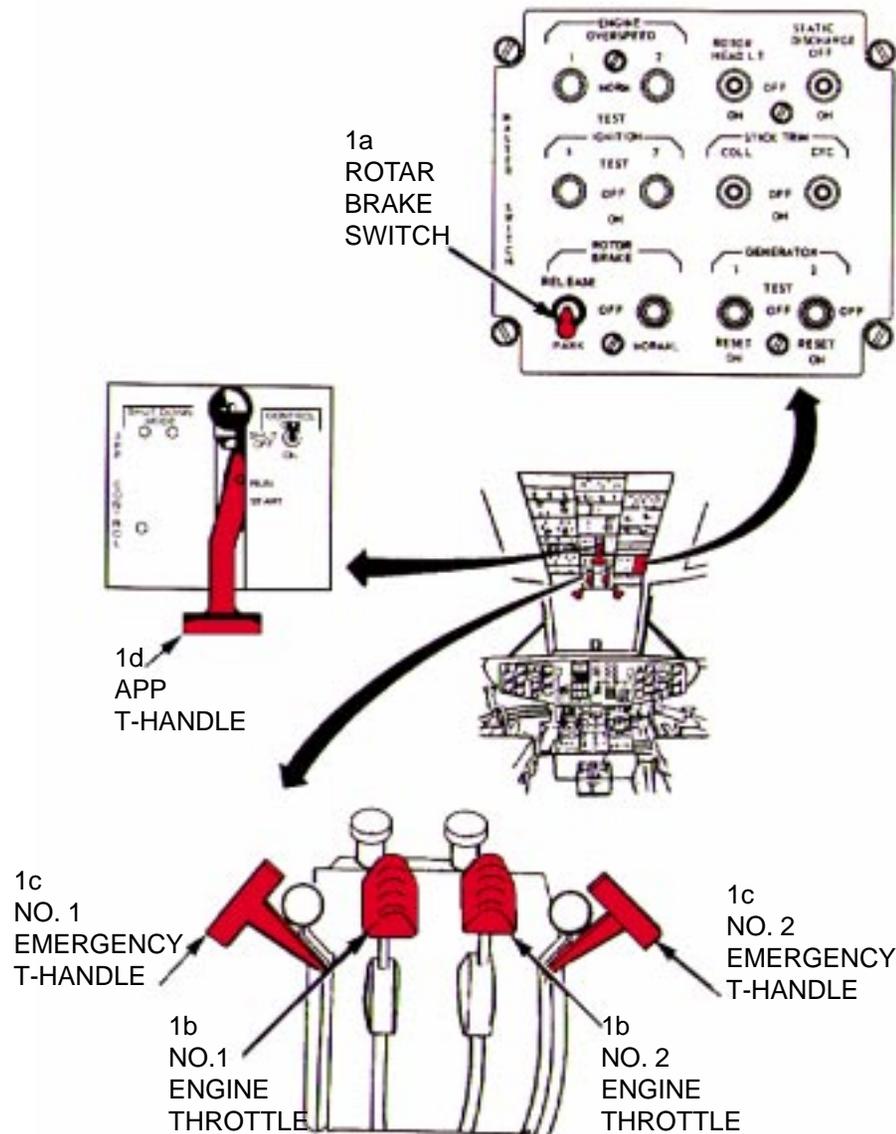
- Place Rotor Brake switch to PARK position.
- Retard Throttles to SHUT-OFF position.
- Place T-handles on engine control quadrant to FULL AFT position.
- Place APP T-handle to FULL AFT position.

2. AIRCREW EXTRACTION

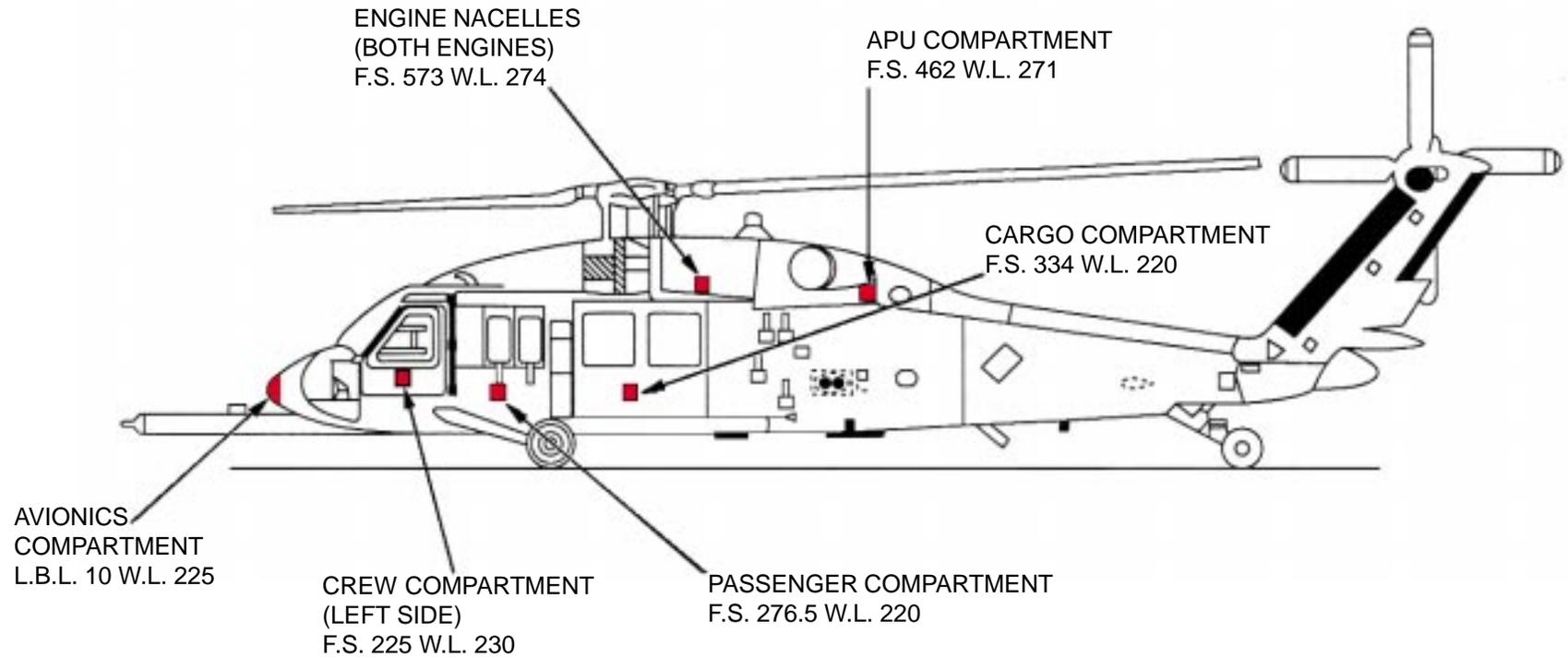
NOTE:

Aircrew seats are equipped with shoulder harness and lap belts only.

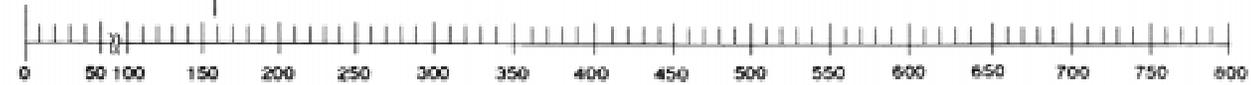
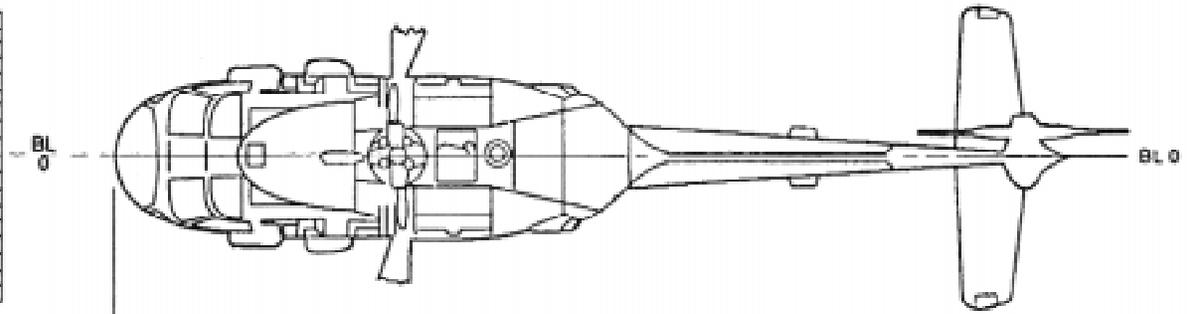
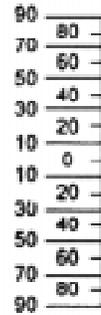
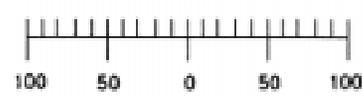
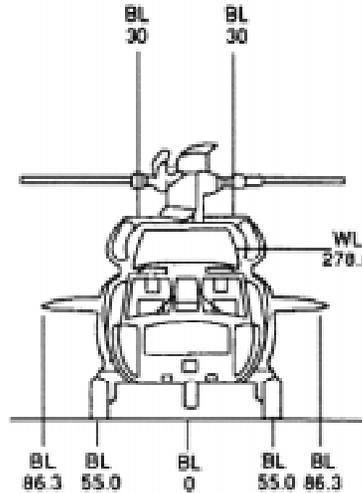
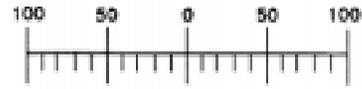
- Unlatch lap belt and remove shoulder harness from crewmember(s).
- Unlatch and remove safety belts in troop compartments.



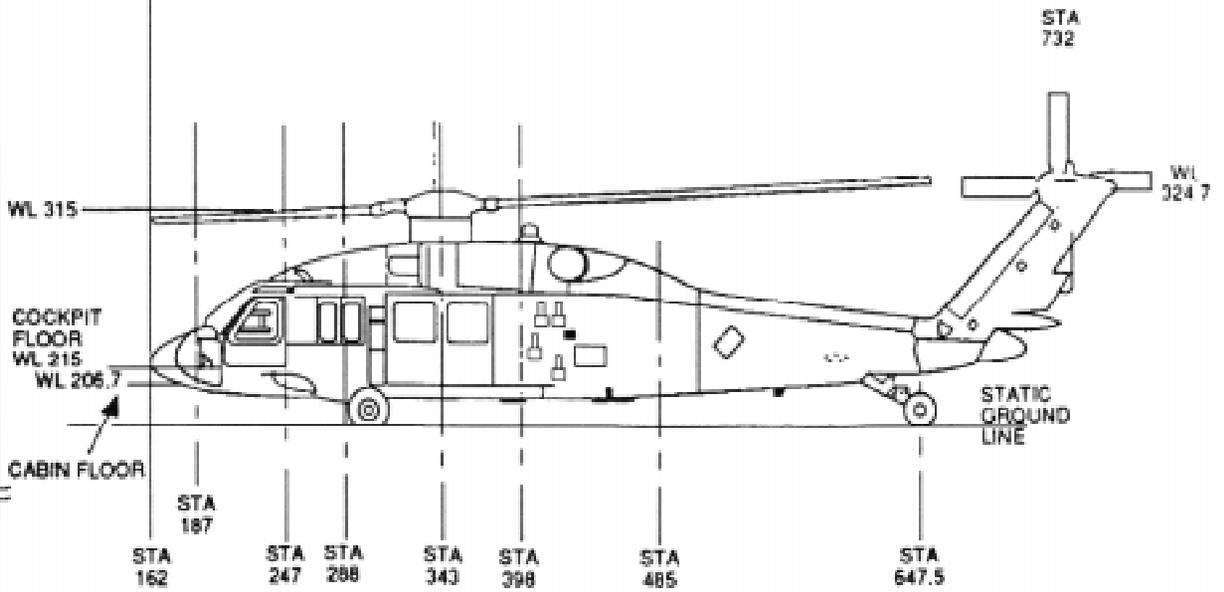
AIRCRAFT SKIN PENETRATION POINTS



AIRCRAFT STATION LOCATIONS



REFERENCE DATUM



SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
Crash Ax

MH-60G

AIRCRAFT ENTRY

1. NORMAL ENTRY

- Turn cockpit door handle counterclockwise to the open position to open door.
- Turn cabin door handle counterclockwise to the open position and slide door aft.

2. EMERGENCY ENTRY

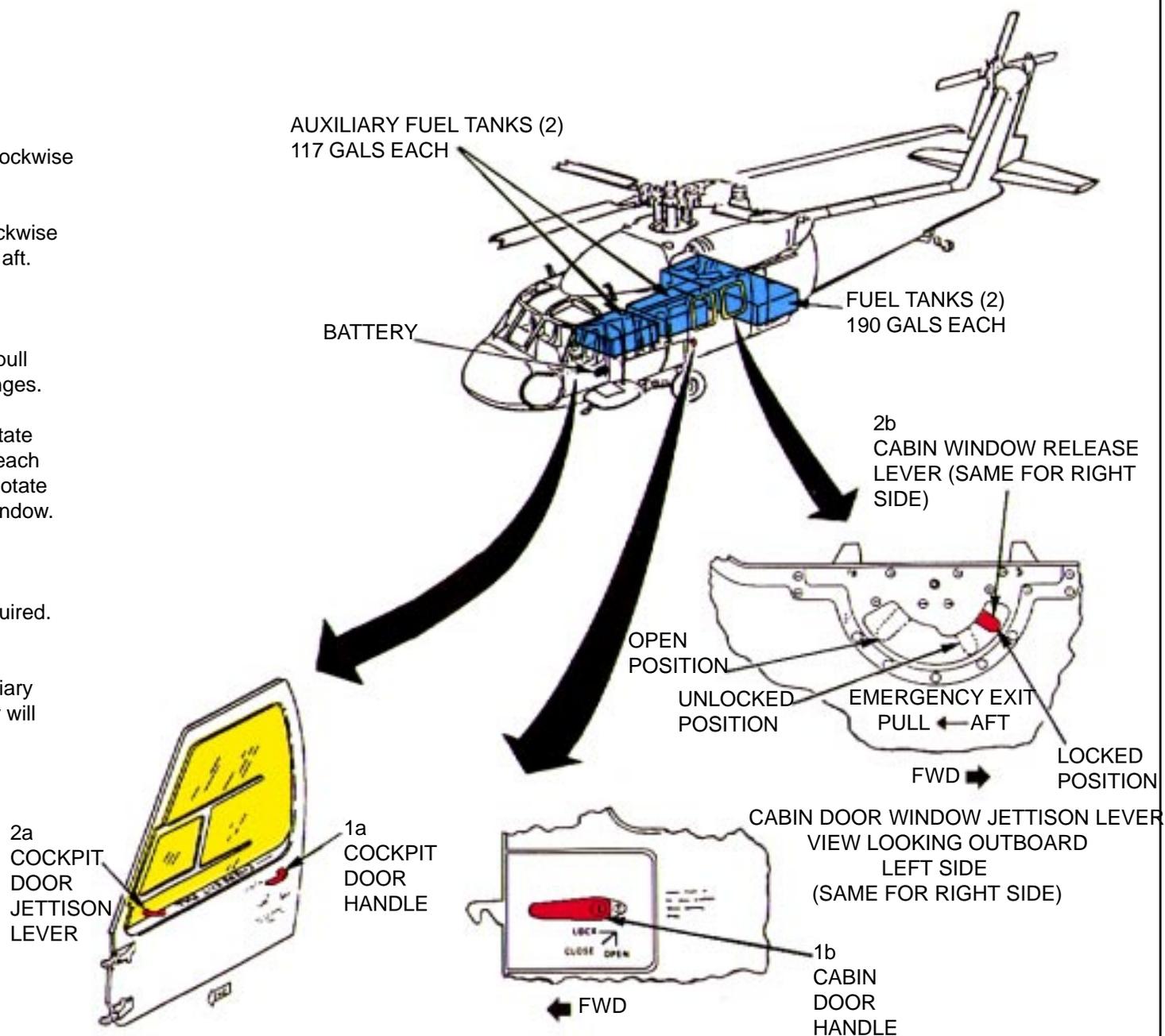
- Break window in cockpit door and pull jettison lever aft to release door hinges.
- Break window in cabin door and rotate emergency handle, located below each window, to the aft open position. Rotate bottom of window out to remove window.

3. CUT-IN

- Break window or windshield as required.

NOTE:

Future replacement of internal auxiliary fuel tanks will be 185 gallons. They will be crash-worthy and self-sealing.



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

NOTE:

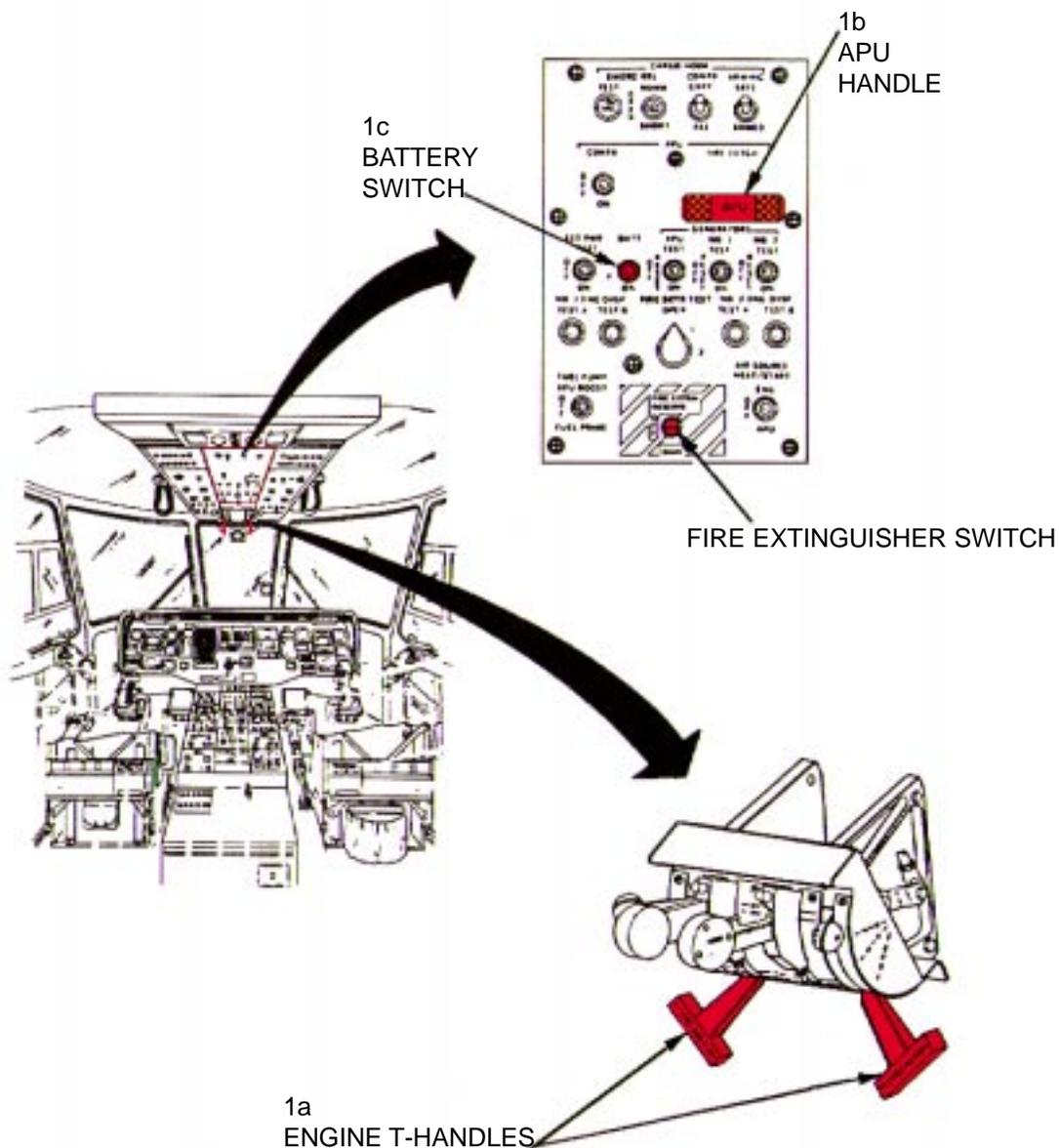
To activate the installed fire extinguishing system, on T-handle must be pulled (agent is discharged to last T-handle pulled). Then reposition the fire extinguisher switch from OFF to MAIN or RESERVE. Battery switch must be in the ON position.

- Pull engine emergency T-handles, located on control quadrant, FULL aft.
- Pull APU T-handle, located on upper console, DOWN.
- Place battery switch, located on upper console, to the OFF position.

2. AIRCREW - TROOP EXTRACTION

NOTE:

- All aircrew seats have a complete lap belt and dual torso restraint shoulder harness attached to a rotary release buckle.
 - All troop seats have a lap belt and shoulder harness attached to a rotary release buckle.
- Release aircrew from seats by rotating rotary release buckle. Move restraints away before extraction to prevent entanglement.
 - Release troops from seats by rotating rotary release buckle. Move restraints away before extraction to prevent entanglement.



AIRCRAFT PAINT SCHEME

UH-60A



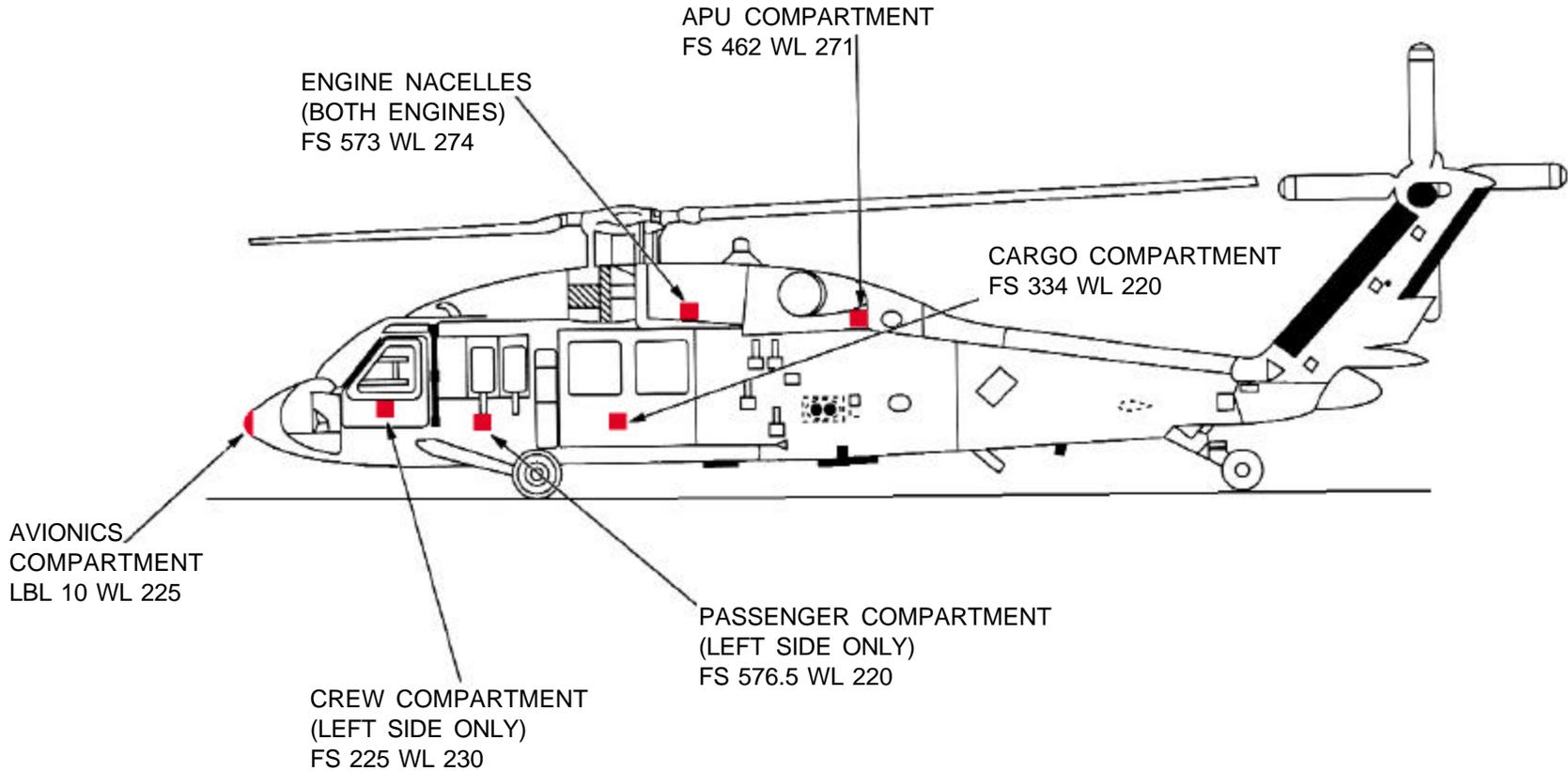
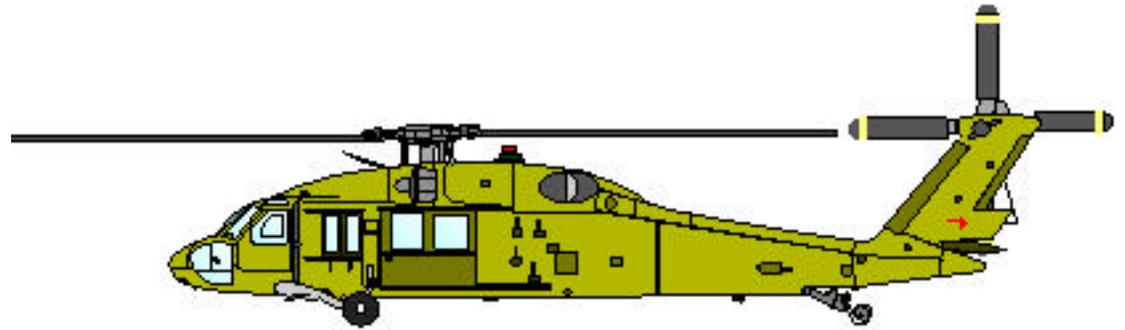
UH-60A. 2

AIRCRAFT SKIN PENETRATION POINTS

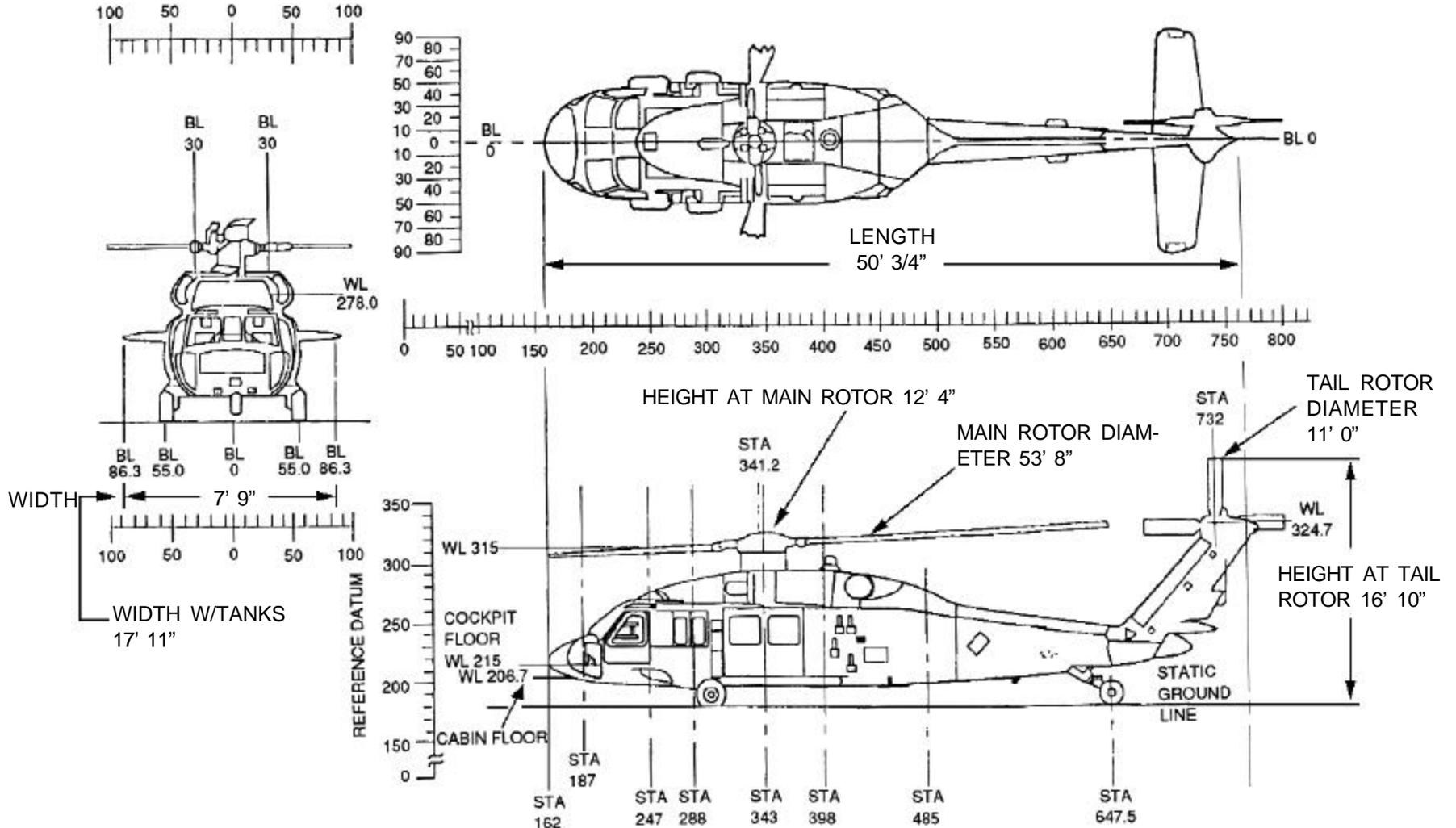
UH-60A

T.O. 00-105E-9

- EFFECTIVITY:
- EH-60A "QUICK FIX" (Electronic)
 - EH-60B "SOTAS"
 - UH-60L Medical Evacuation or Troop Carrier
 - UH-60Q "DUST OFF" (Medical Evacuation)
 - MH-60K Special Operations (with refueling nose boom)

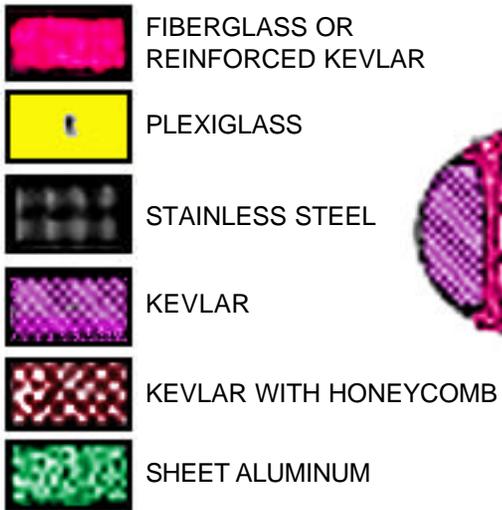


AIRCRAFT DIMENSIONS



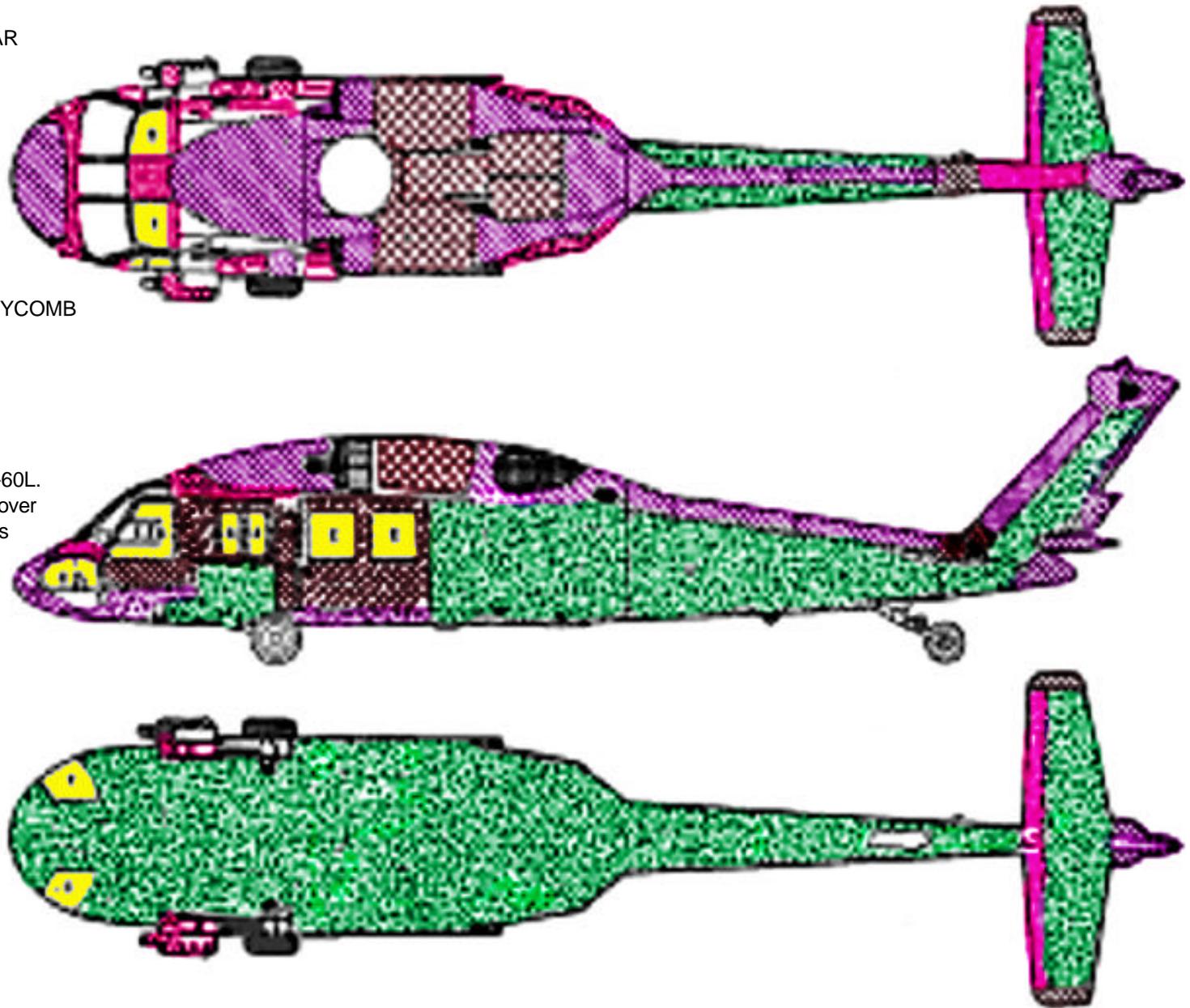
AIRFRAME MATERIALS

UH-60A



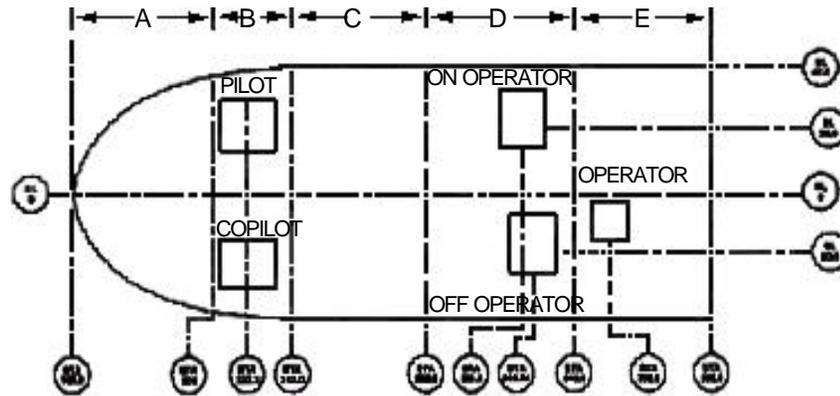
NOT ILLUSTRATED:

The HH-60G is the same as the UH-60L. The floor boards are made of Kevlar over Nomex honey comb with a fiberglass rear facing.

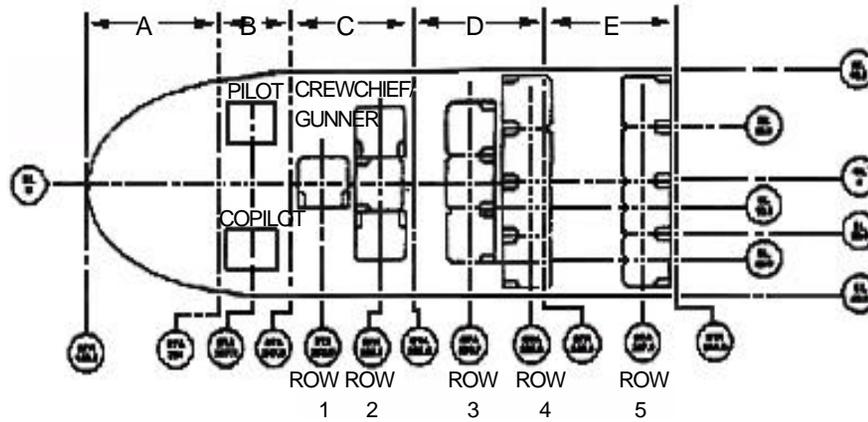


CABIN CONFIGURATIONS

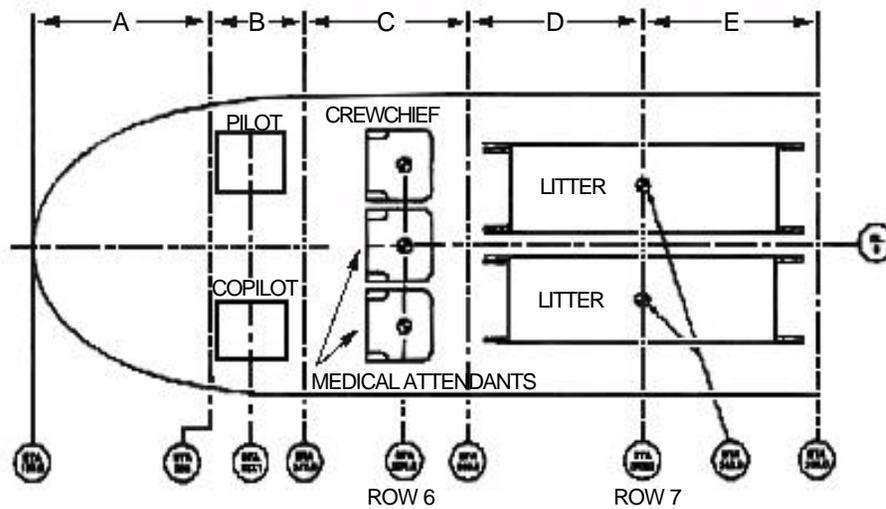
ELECTRONIC CONFIGURATION



TROOP CONFIGURATION



MEDEVAC CONFIGURATION (LITTERS ROTATE)



SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
Crash Ax
Fire Drill II

UH-60A

AIRCRAFT ENTRY

1. NORMAL ENTRY

- Turn cockpit door handle counterclockwise to the open position to open door.
- Turn cabin door handle counterclockwise to the open position and slide door aft.

2. EMERGENCY ENTRY

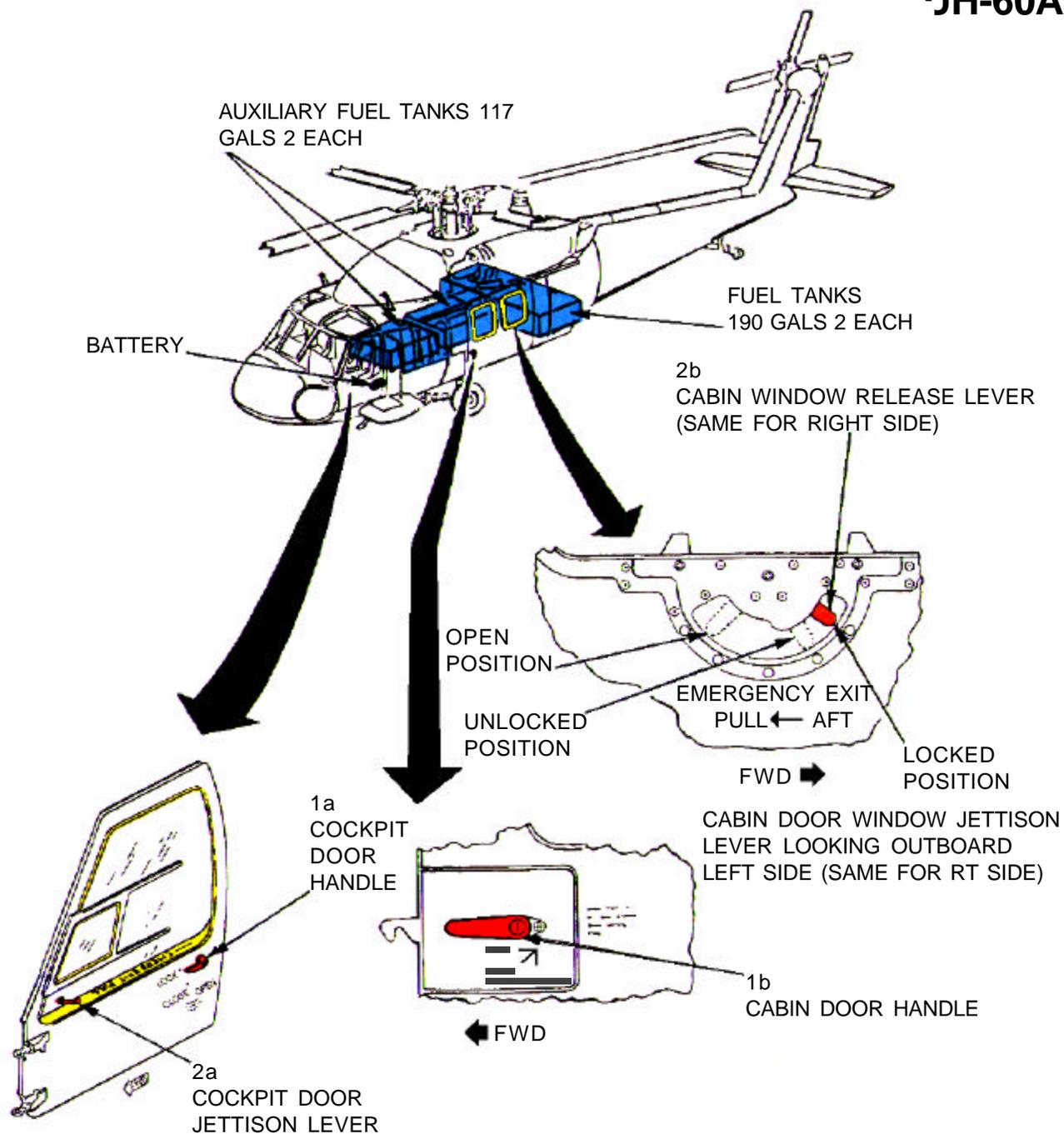
NOTE:

Doors are not pyrotechnically equipped.

- Break window in cockpit door and pull jettison lever aft to release door hinges.
- Break window in cabin door and rotate emergency handle, located below forward window, to the aft open position. Push bottom of window out to remove window. Both cabin windows on side operate this way.

3. CUT-IN

- Break window or windshield as required.



ENGINE SHUTDOWN AND AIRCREW EXTRACTION

1. ENGINE SHUTDOWN

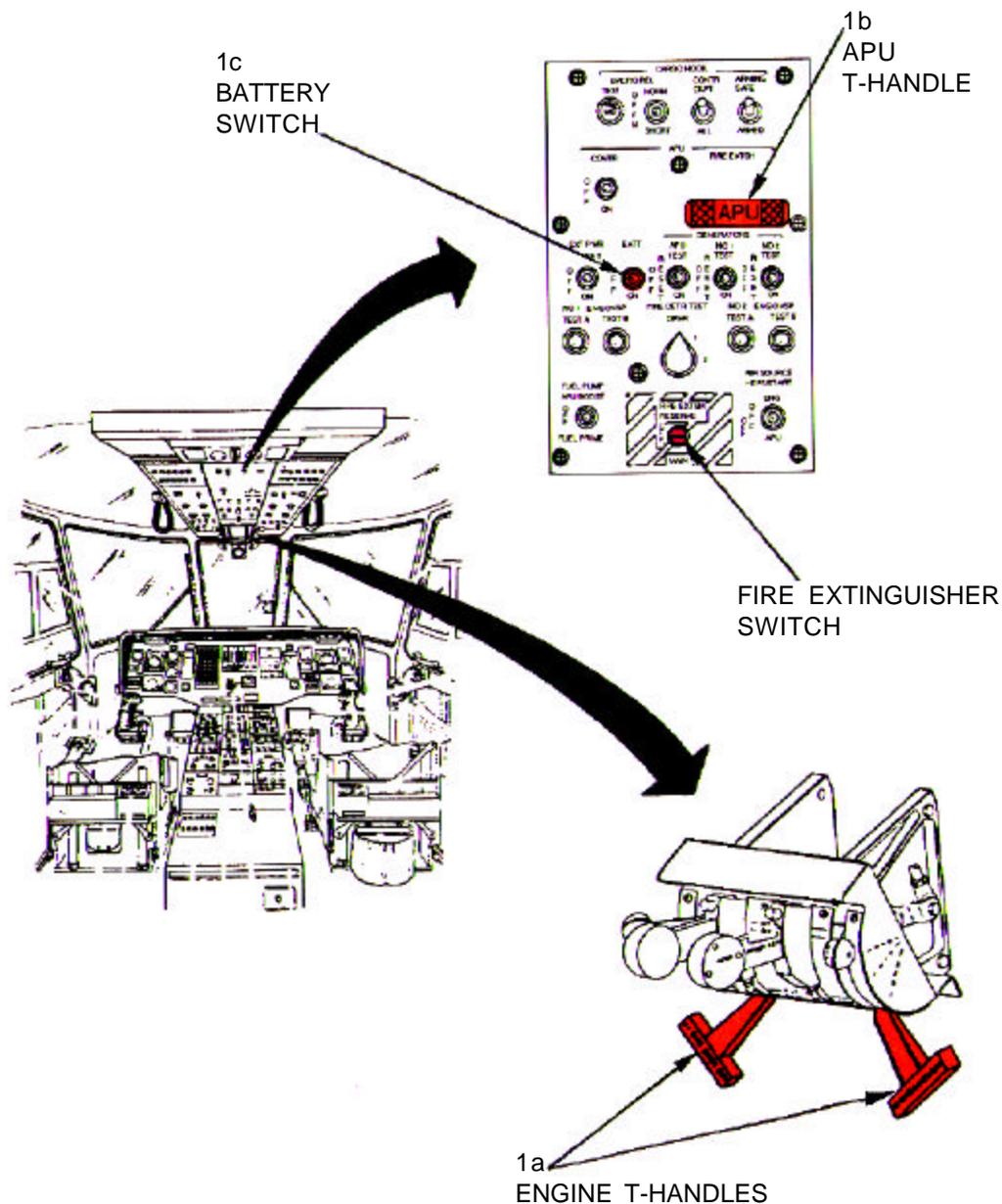
NOTE:

Battery switch must be in the ON position. To activate the installed fire extinguishing system, one T-handle must be pulled (agent is discharged to last T-handle pulled). Then, reposition the fire extinguisher switch from OFF to MAIN or RESERVE.

- Pull engine emergency T-handles, located on control quadrant, FULL AFT, to cut off fuel flow.
- Pull APU T-handle, located on overhead console, DOWN.
- Place battery switch, located on overhead console, to the OFF position.

2. AIRCREW EXTRACTION

- Release all lap belts and shoulder harnesses from aircrew. All aircrew seats have a complete lap belt and dual torso restraint shoulder harness centrally attached to a rotary release buckle or a pull-up release lever.
- Disconnect personnel leads from aircrew.
- Release all lap belt and shoulder harnesses from troop seats occupants. All troop seats have a lap belt and shoulder harness centrally attached to a rotary release buckle.



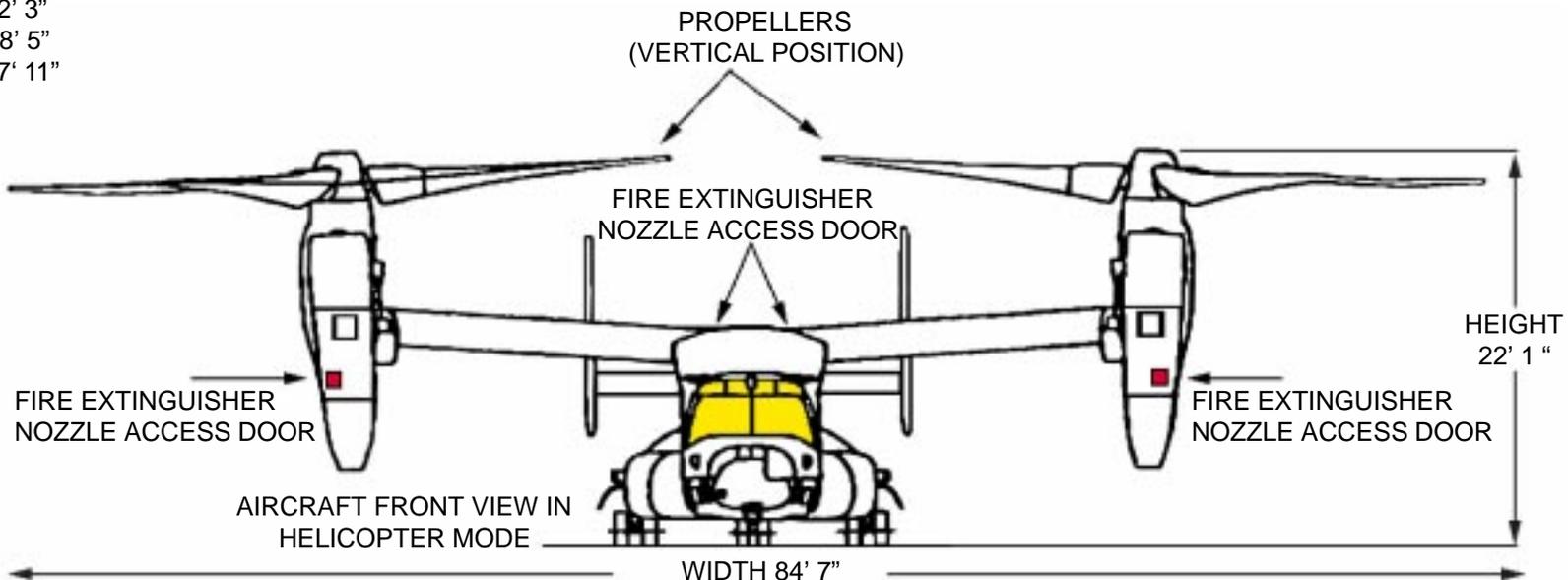
V-22.1 **AIRCRAFT HAZARDS AND DIMENSIONS**

V-22

T.O. 00-105E-9

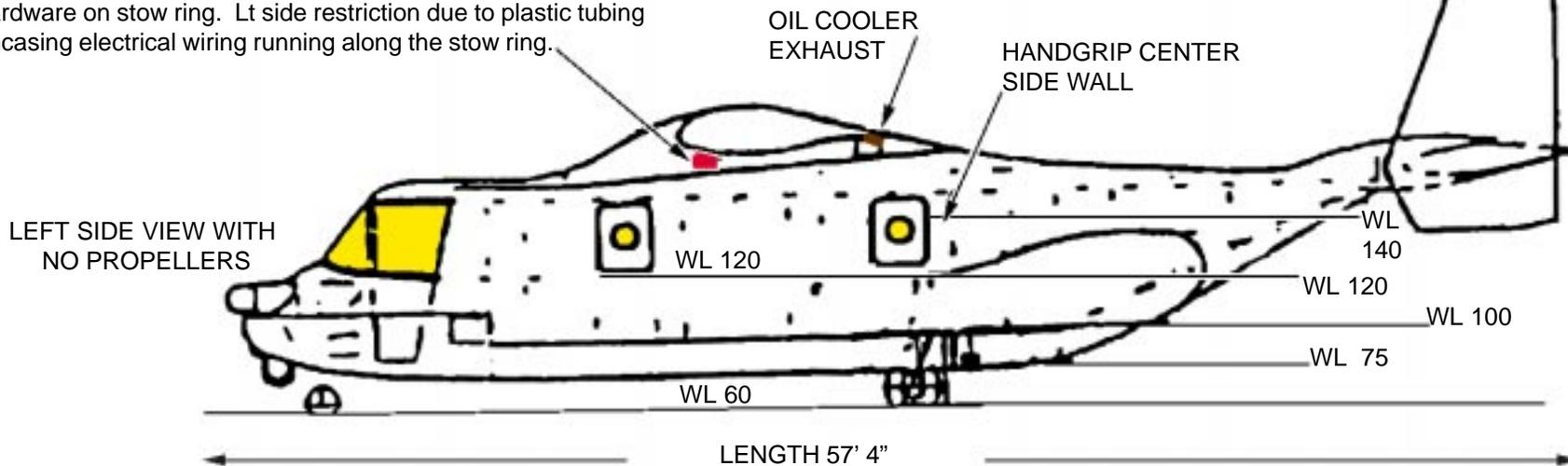
DIMENSIONS WHEN WINGS ARE STOWED

LENGTH 62' 3"
 WIDTH 18' 5"
 HEIGHT 17' 11"



SPRING LOADED FIRE EXTINGUISHER NOZZLE ACCESS DOOR ON MID WING AREA (TYPICAL BOTH SIDES)

Doors do not open to full 90 degrees. Rt side restriction due to hardware on stow ring. Lt side restriction due to plastic tubing encasing electrical wiring running along the stow ring.



AIRCRAFT HAZARDS-Continued

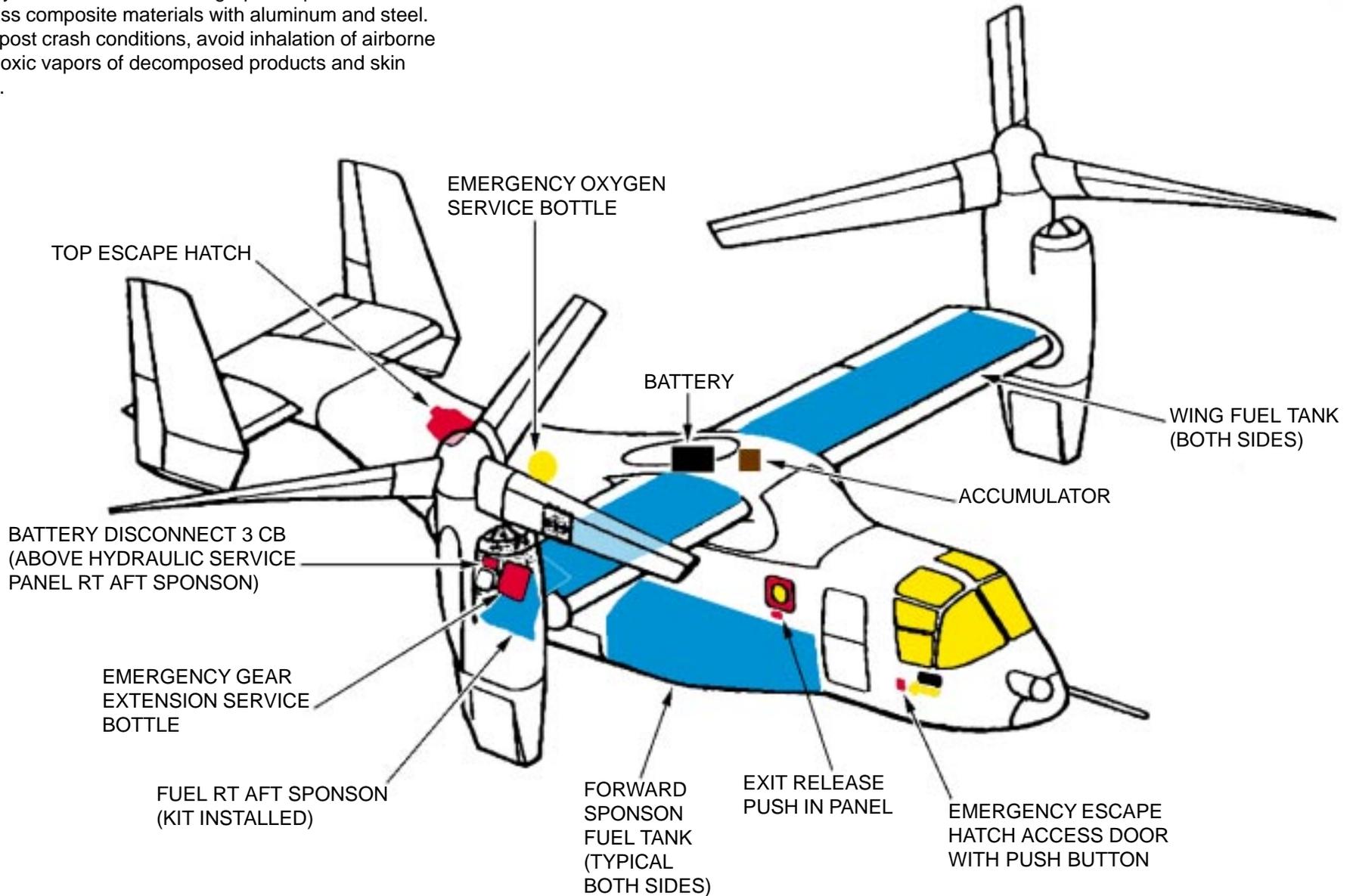
WARNING

AIRFRAME MATERIALS

Primarily constructed of carbon graphite epoxies and fiberglass composite materials with aluminum and steel. During post crash conditions, avoid inhalation of airborne fibers, toxic vapors of decomposed products and skin contact.

PNEUMATIC SYSTEM: 5,000 PSI
ENGINE OIL RESERVOIR: 3 GALS

TOTAL FUEL:
3,640 GALS
15,390 LITRES



AIRCRAFT HAZARDS-Continued

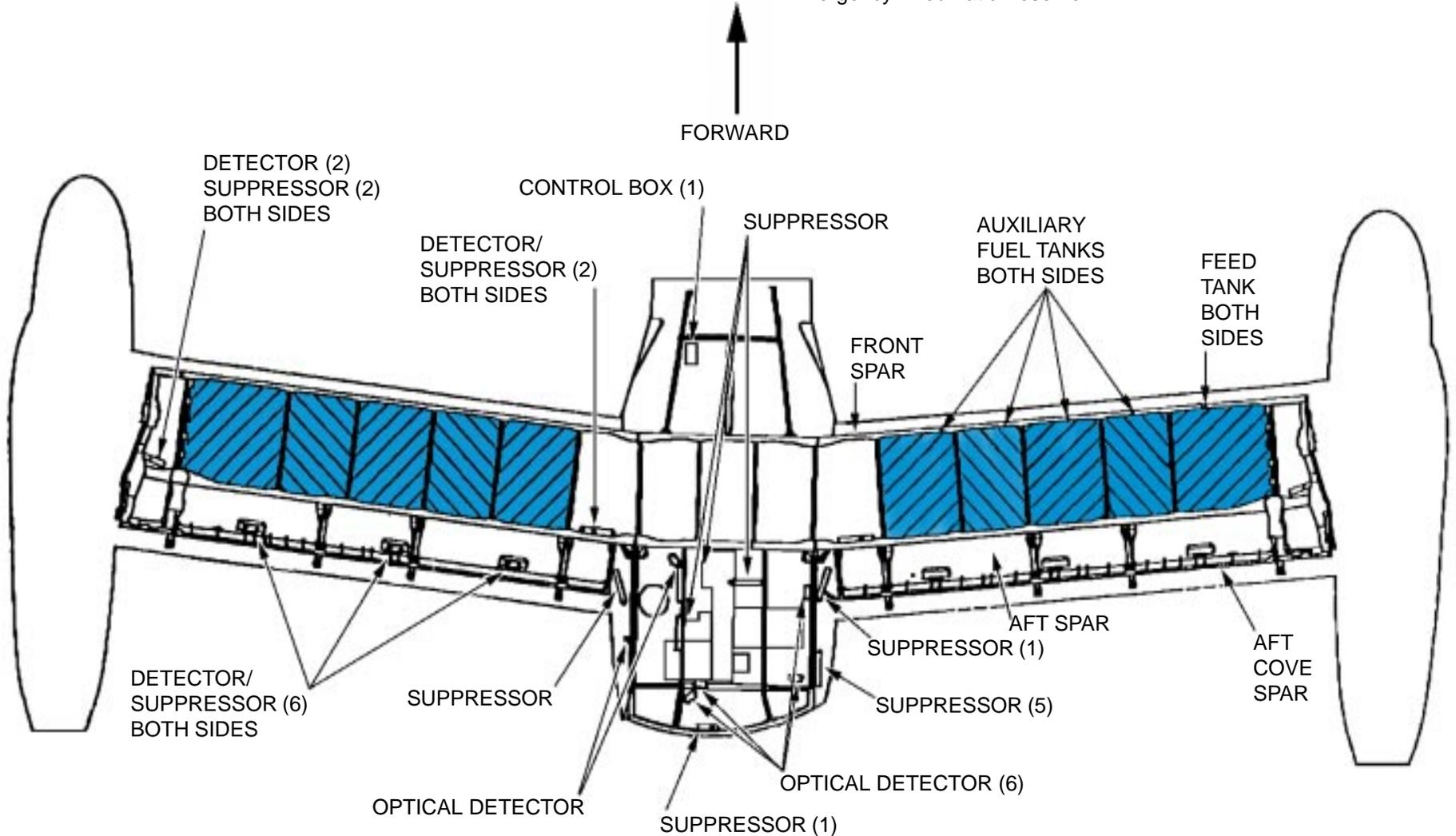
WING FIRE PROTECTION SYSTEM (WFPS)
SOF CONFIGURATION

NOTE:
Numbers in parentheses are totals.

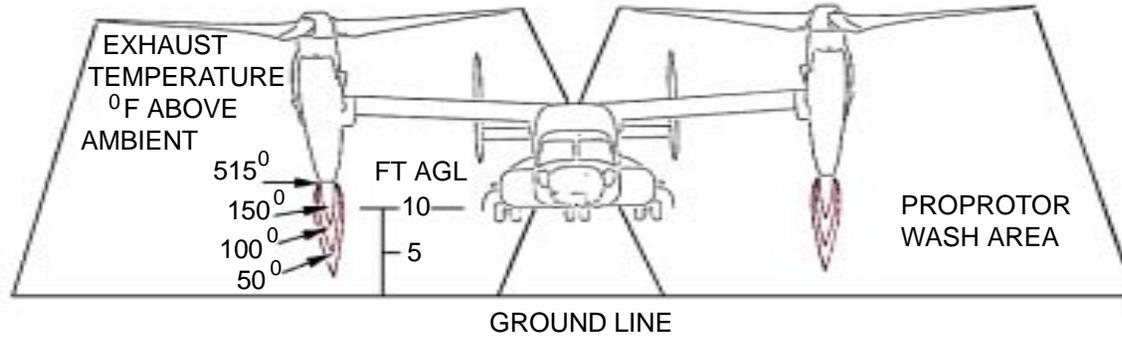
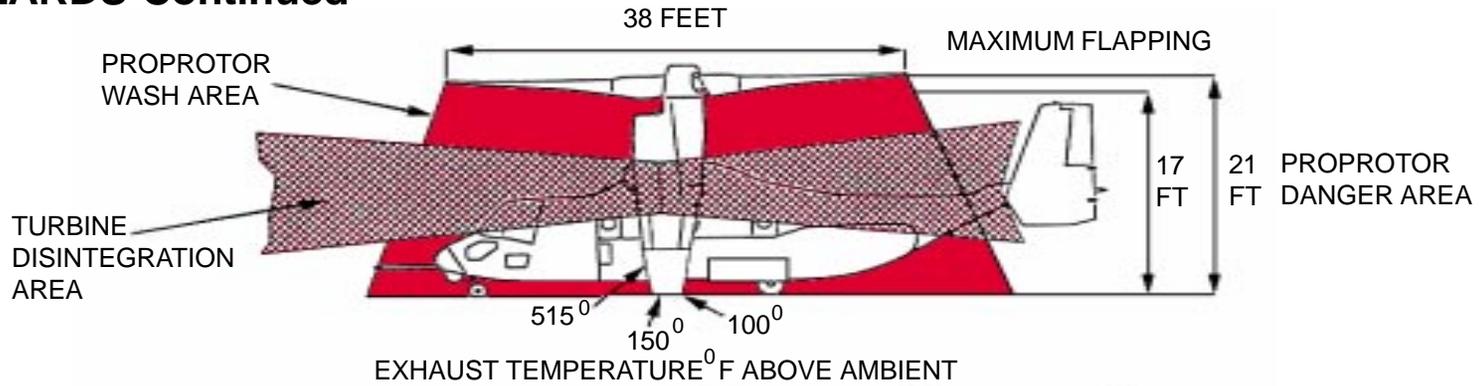
FLAMMABLE FLUIDS AND HAZARDOUS MATERIALS

- Fuel Tanks
- Mid Wing Gearbox Oil
- Proprotor Gearbox Oil
- Engine Oil
- Tilt-Axis Gearbox Oil
- Emergency Oxygen
- Main Landing Gear
- Emergency Pneumatic Reservoir
- Variable Frequency Generator No. 3
- Variable Frequency Generator No. 4
- Shaft Driven Compressor
- Auxiliary Power Unit
- No.3/Utility Hydraulic Sys. Accumulator
- Windshield Washer
- Forward Landing Gear

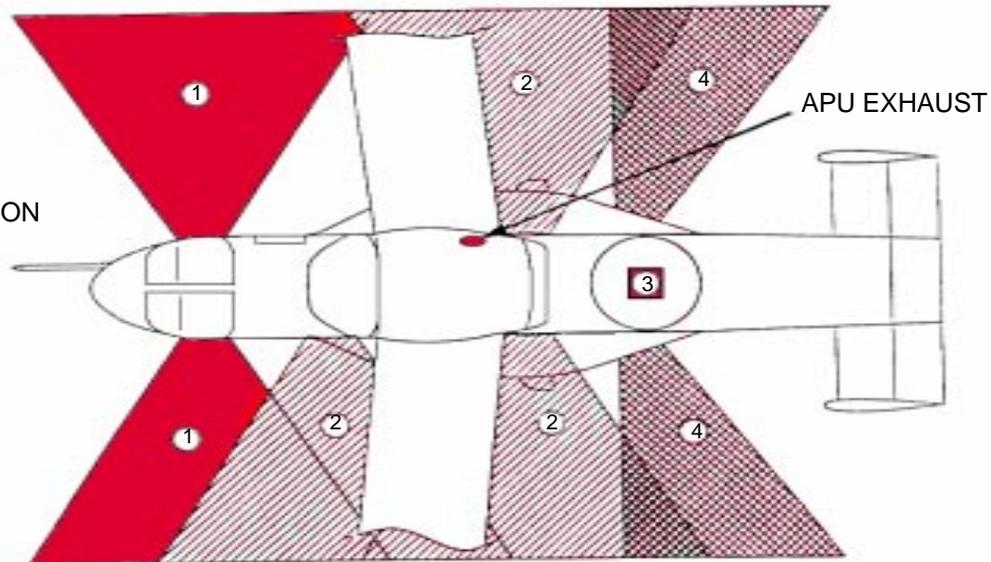
V-22



AIRCRAFT HAZARDS-Continued



- 1 COCKPIT SIDE WINDOW JETTISON
- 2 CABIN ESCAPE HATCH JETTISON
- 3 CABIN UPPER ESCAPE HATCH JETTISON
- 4 CHAFF/FLARE

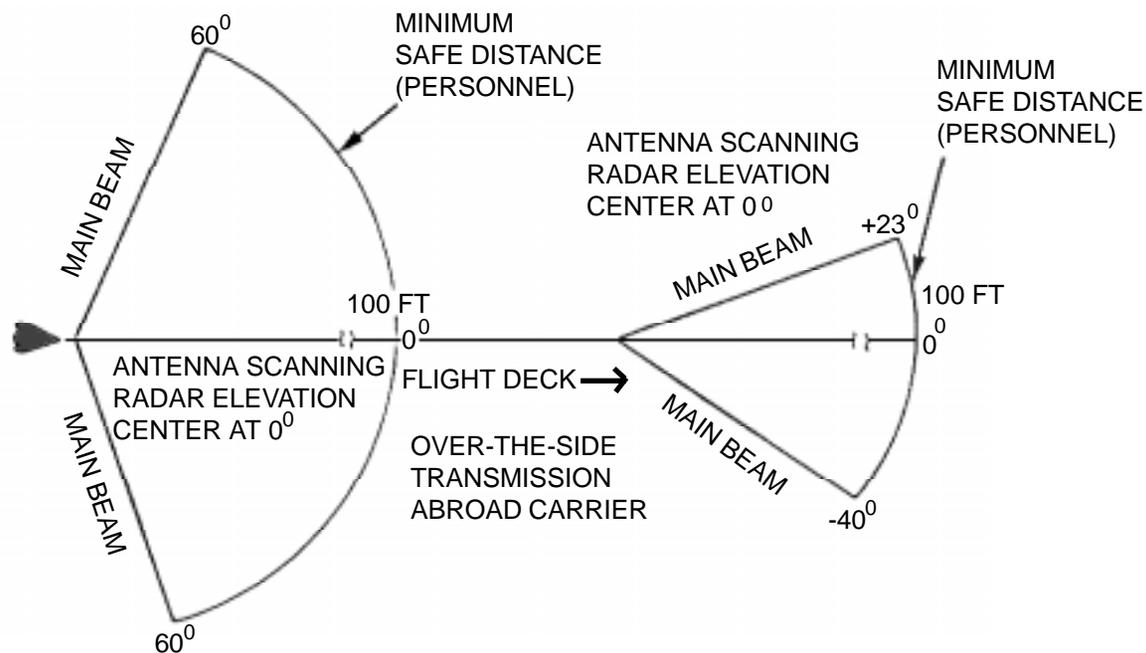


AIRCRAFT HAZARDS-Continued

MULTIFUNCTION RADAR HAZARD AREA

NOTES:

1. Minimum safe distance for personnel in multifunction radar ground or flight deck operations are shown by the arc. Do not enter the radiation hazard area inside the arc.
2. Do not conduct fueling operations within a radius of 140 feet of any operating radar antenna.
3. Ground operations for doppler radar require that antenna transmits into horn. Do not operate unit without horn.
4. When multifunction radar antenna is not radiating, minimum safe distance from other radiating antennas is 10 feet.



AIRCRAFT HAZARDS-Continued

OBOGS, OBIGGS, FLARE/CHAFF, BATTERY DISCONNECT AND LANDING GEAR PIN LOCATIONS

1. OBOGS/OBIGGS

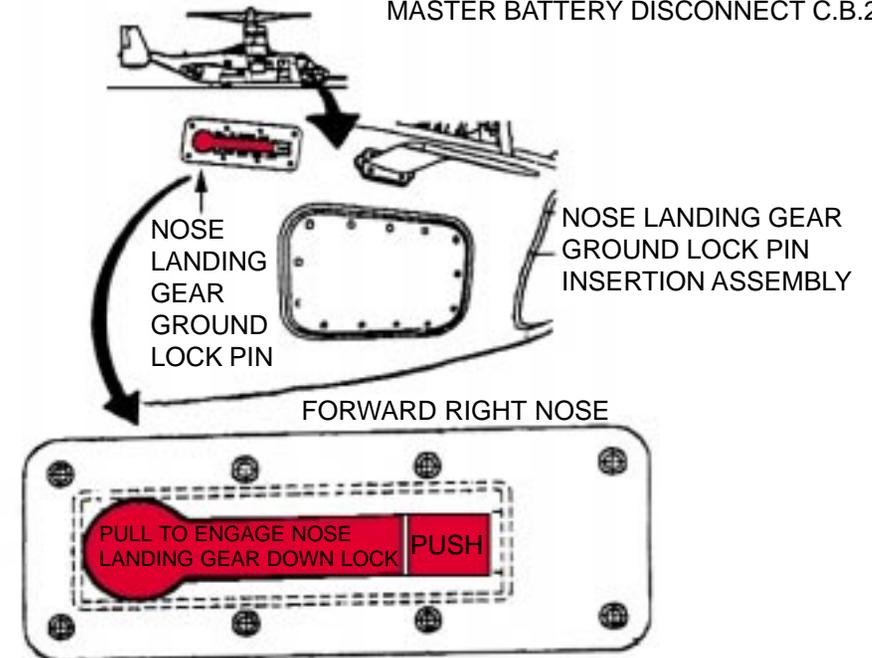
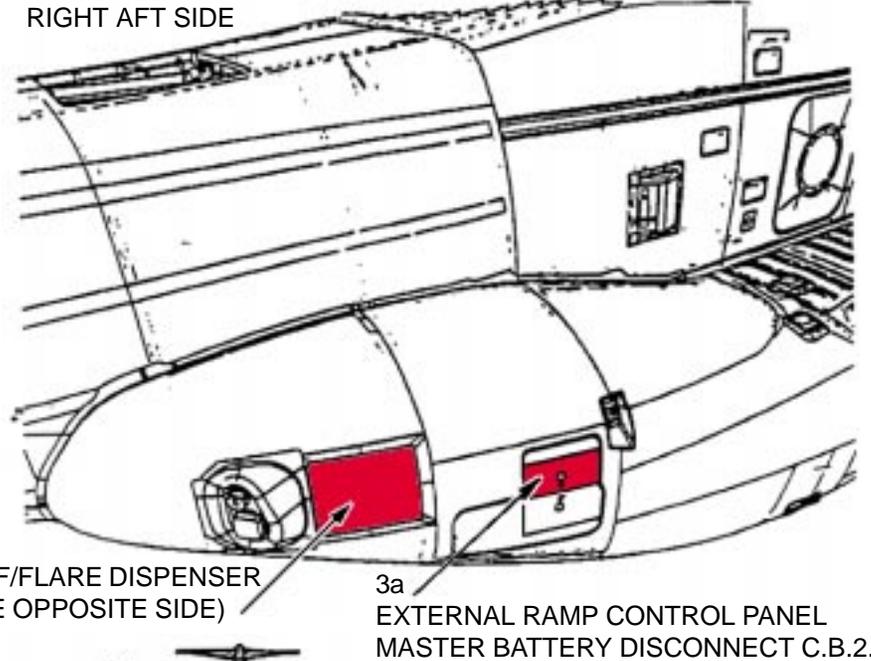
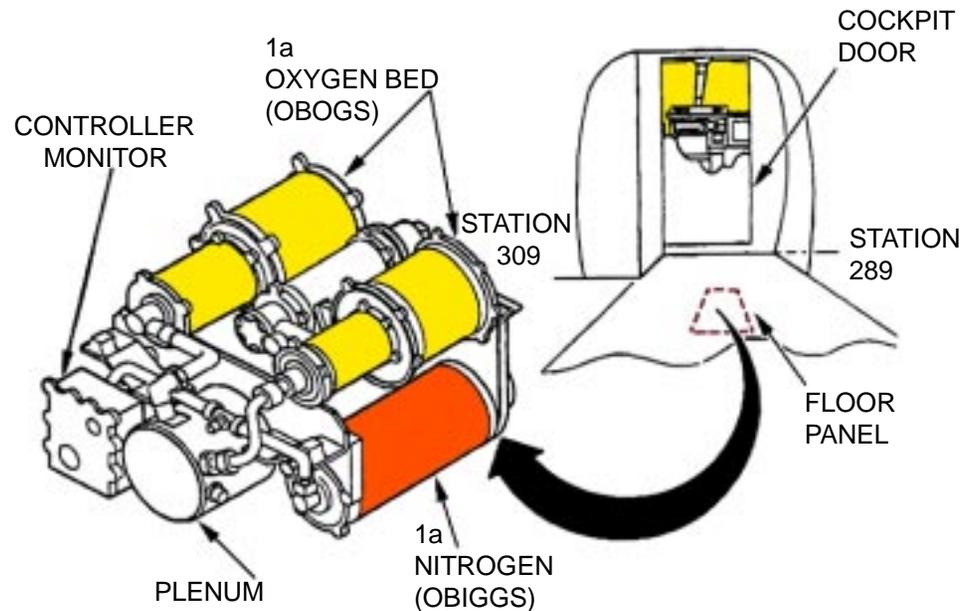
a. An onboard oxygen generating system (OBOGS) produced oxygen enriched air for the crew breathing and an onboard inert gas generating system (OBIGGS) produced nitrogen for fuel tank inerting. Both systems are located in the cabin floor panel.

2. FLARE AND CHAFF (Pyrotechnics)

a. Dispensers are located on the aft right and left sponsons.

3. BATTERY DISCONNECT

a. The two external battery disconnect circuit breakers are located on the right aft sponson in the external ramp control panel. Pulling the two circuit breakers will remove all electrical loads with the exception of the ramp and ground refuel defuel panel.

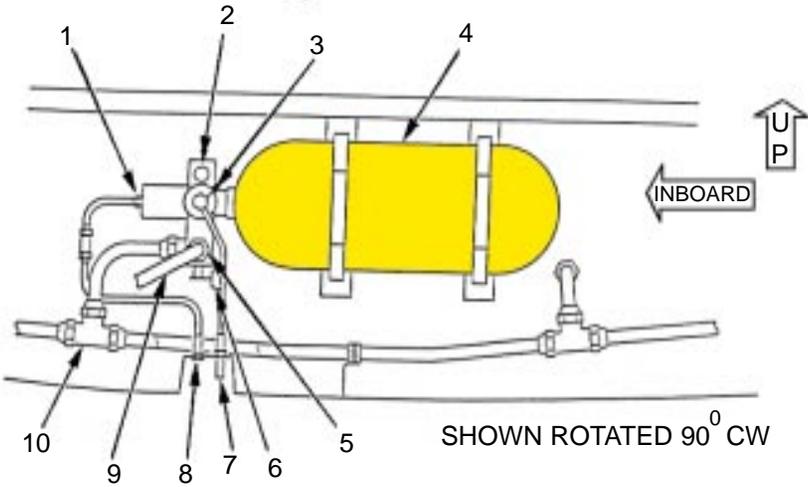
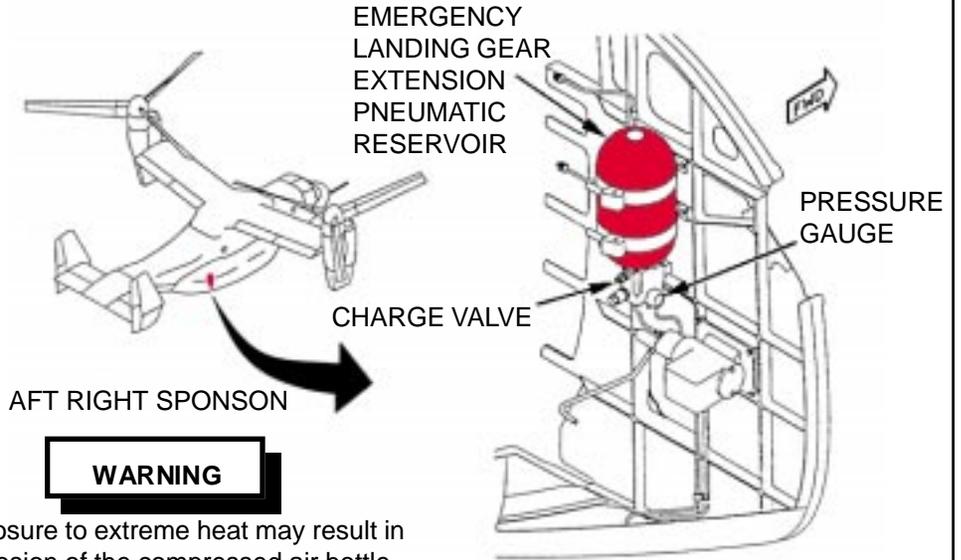
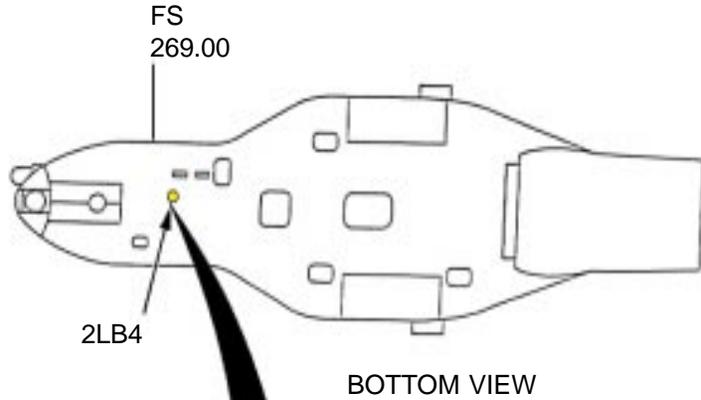


AIRCRAFT HAZARDS-Continued

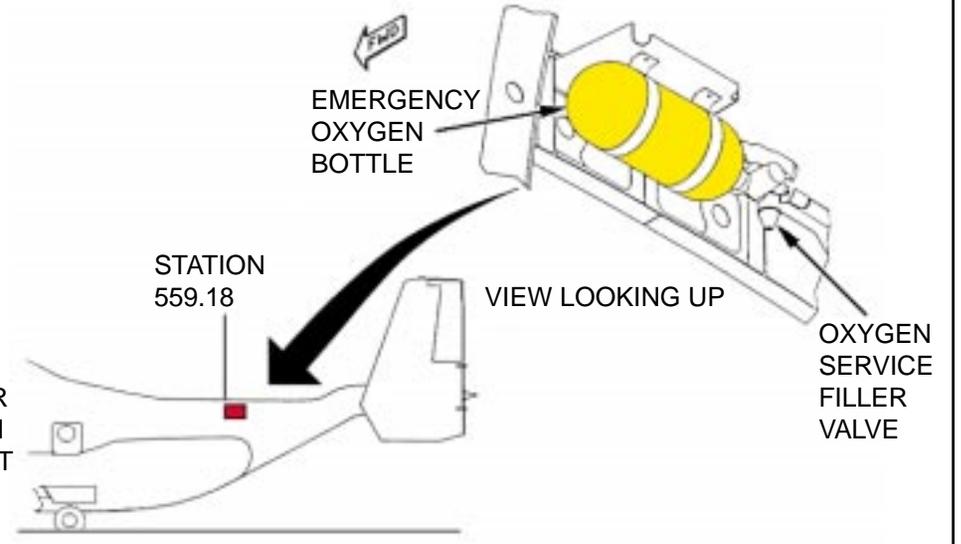
EMERGENCY LANDING GEAR EXTENSION PNEUMATIC RESERVOIR AND EMERGENCY OXYGEN BOTTLE LOCATIONS

NOTE:

The aircraft is equipped for pneumatic emergency gear extension system. The air reservoir bottle is located to the right aft sponson. The nominal pressure of the bottle is 2800PSI.



- | | |
|-------------------------------|----------------------------------|
| 1. HIGH PRESSURE RELIEF VALVE | 6. ISOLATION VALVE CONTROL LEVER |
| 2. PRSSURE SWITCH | 7. EXTERNAL FILL PORT CONNECTION |
| 3. FILL PORT | 8. HIGH/LOW PRESSURE RELIEF VENT |
| 4. EMERGENCY OXYGEN BOTTLE | 9. OBOGS CONNECTION PORT |
| 5. ISOLATION VALVE | 10. OXYGEN DISTRIBUTION LINE |



SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
Crash Ax

AIRCRAFT ENTRY

1. NORMAL ENTRY

NOTE:

The ingress/egress systems consist of the jettisonable cockpit side windows, cabin door, internal cockpit door, four cabin escape hatches, and the cargo ramp.

WARNING

Do not approach aircraft until rotor blades have stopped.
Approach aircraft on right side to normal entrance door.

- a. Turn door handle, lower bottom half of right cabin door, and raise top half of door until it locks in place.

2. EMERGENCY ENTRY (NON-EXPLOSIVE)

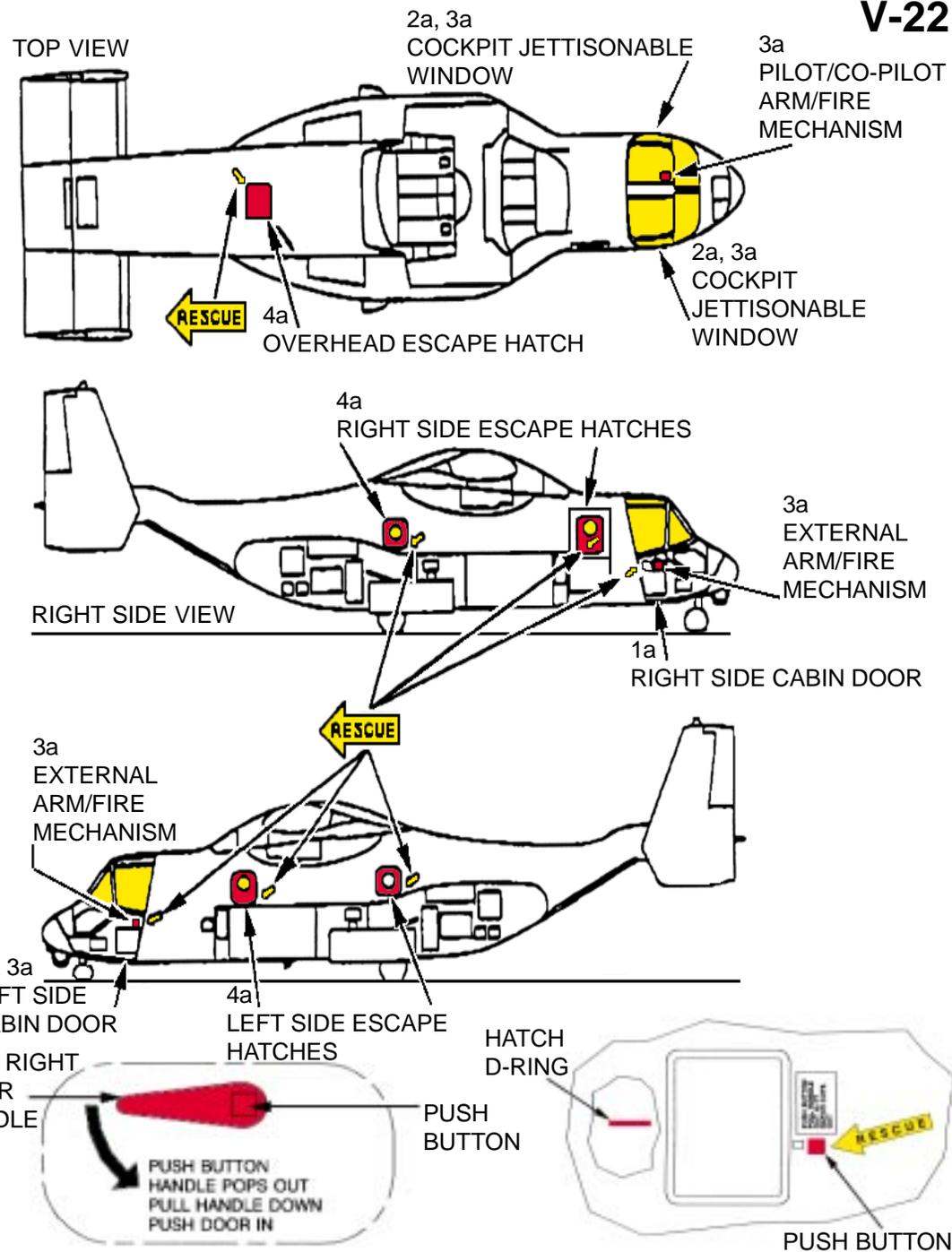
- a. Internal and external emergency release levers are installed in the upper half of the cabin door. Push button, pull either lever to disengage door rollers from their tracks, the door lock pin (if engaged), and the door latch pins.
b. Place door to the side away from the escape path.

3. COCKPIT JETTISONABLE WINDOWS (EXPLOSIVE)

WARNING

Personnel positioned within 50 feet of the window/hatch, (window equipped with linear explosive charge around periphery) during jettison could be injured by flying debris. Activation of the jettison system, when combustible fuel and /or vapors are present may result in a fire. Simultaneous window jettison can result unconsciousness or death to crewmembers.

- a. Approach aircraft from front. Right cabin window jettison D-ring is located beneath right cabin window. Left cabin window jettison D-ring is located beneath left cabin window.
b. Push button and remove access panel to expose jettison D-ring.
c. Step away from windows approximately 10 feet, at a 45 degree angle, face away from aircraft, and pull D-ring/lanyard firmly.



AIRCRAFT ENTRY-Continued

5. CARGO RAMP

NOTE:

The cargo ramp provides rapid loading and deployment of troops and cargo. It also affords emergency evacuation when on the ground.

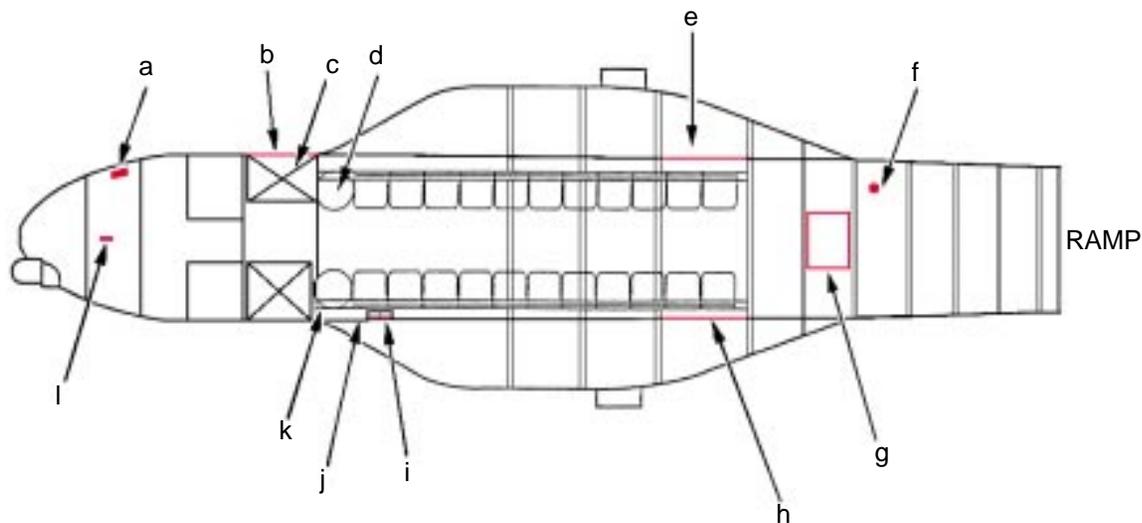
- a. The ramp may be lowered by opening the external ramp control access panel, located on the right aft sponson, and positioning the cargo ramp switch to OPEN. (Not installed on A/C #7.) The external battery disconnect circuit breakers are located inside this panel as well.

6. CUT-IN - WINDOW CUTTING ASSEMBLIES

- a. The side windows are removed by a window cutter assembly. Each assembly consists of a continuous length of explosive cord molded into a silicone rubber charge holder. A fiberglass retainer bolted to the window frame secures the charge holder against the side window. If pyrotechnics fail, cockpit windows are too thick for conventional ax and a power rescue saw OR extracation saw will have to be used.

7. PERSONNEL SURVIVAL EQUIPMENT LOCATIONS

- a. Forward Fire Extinguisher (mounted to bulkhead)
- b. Cabin Door and Escape Hatch
- c. Flotation Equipment (provisions)
- d. Alternate Seat Position or 20-Man Life Raft
- e. Aft Right Side Escape Hatch
- f. Aft Fire Extinguisher
- g. Escape/Maintenance Hatch (top of fuselage)
- h. Aft Left Side Escape Hatch
- i. First Aid Kit
- j. Forward Left Side Escape Hatch
- k. 12 - Man Life Raft
- l. Nuclear, Biological, Chemical (NBC), Ventilator



AIRCRAFT ENTRY-Continued

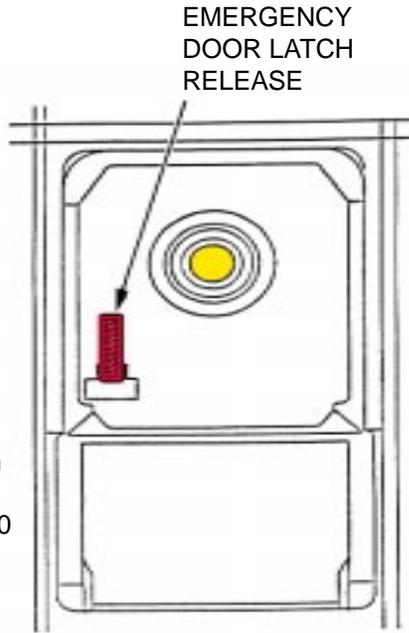
COCKPIT AND CABIN ESCAPE HATCHES

8. CABIN ESCAPE HATCHES (EXPLOSIVE)

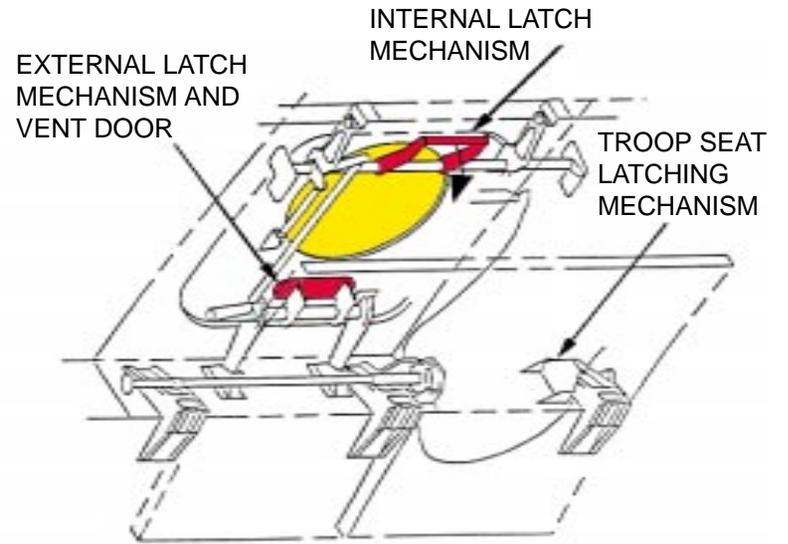
NOTE:

Four escape hatches are provided in addition to the cabin upper door. Two hatches are located on the left side of the cabin, one on the right side, and one in the aft cabin ceiling above the cargo ramp. Internal and external release mechanisms are provided for all escape hatches.

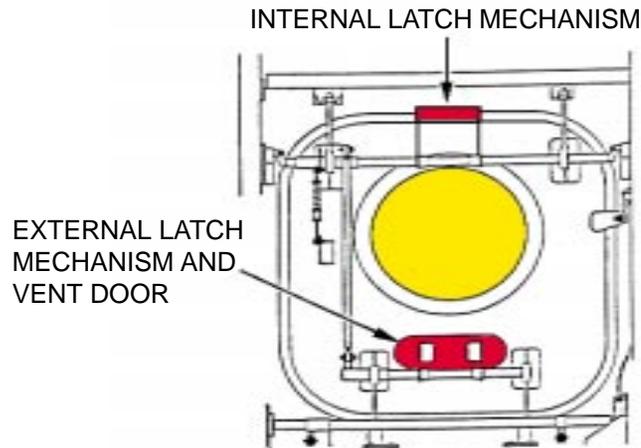
- a. An external release is located in a recessed compartment near the side of each escape hatch and is similar to the jettisoning window system. Open recessed compartment to expose clipped handle which is connected to the firing mechanism by a 10 foot lanyard.
- b. A pull force of 20 - 25 pounds is required to arm and fire each cabin escape hatch.



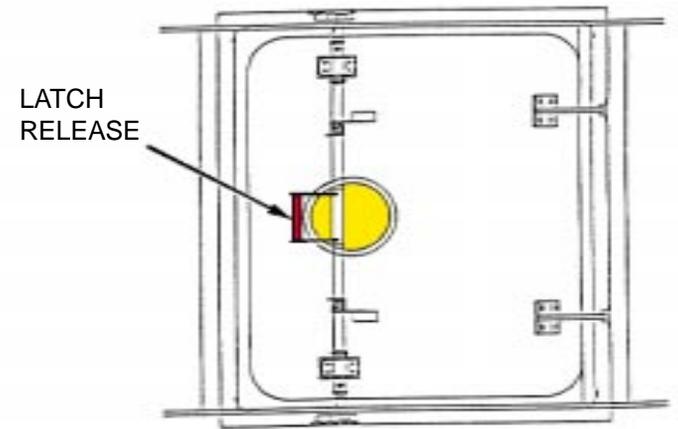
MAIN CABIN DOOR



RIGHT AND LEFT AFT EMERGENCY ESCAPE HATCH AND TROOP SEAT RELEASE



LOOKING OUTBOARD LEFT FORWARD EMERGENCY ESCAPE HATCH AND TROOP SEAT RELEASE HANDLES



LOOKING UP AFT TOP FUSELAGE ESCAPE HATCH

ENGINE AND APU SHUTDOWN

1. ENGINE SHUTDOWN

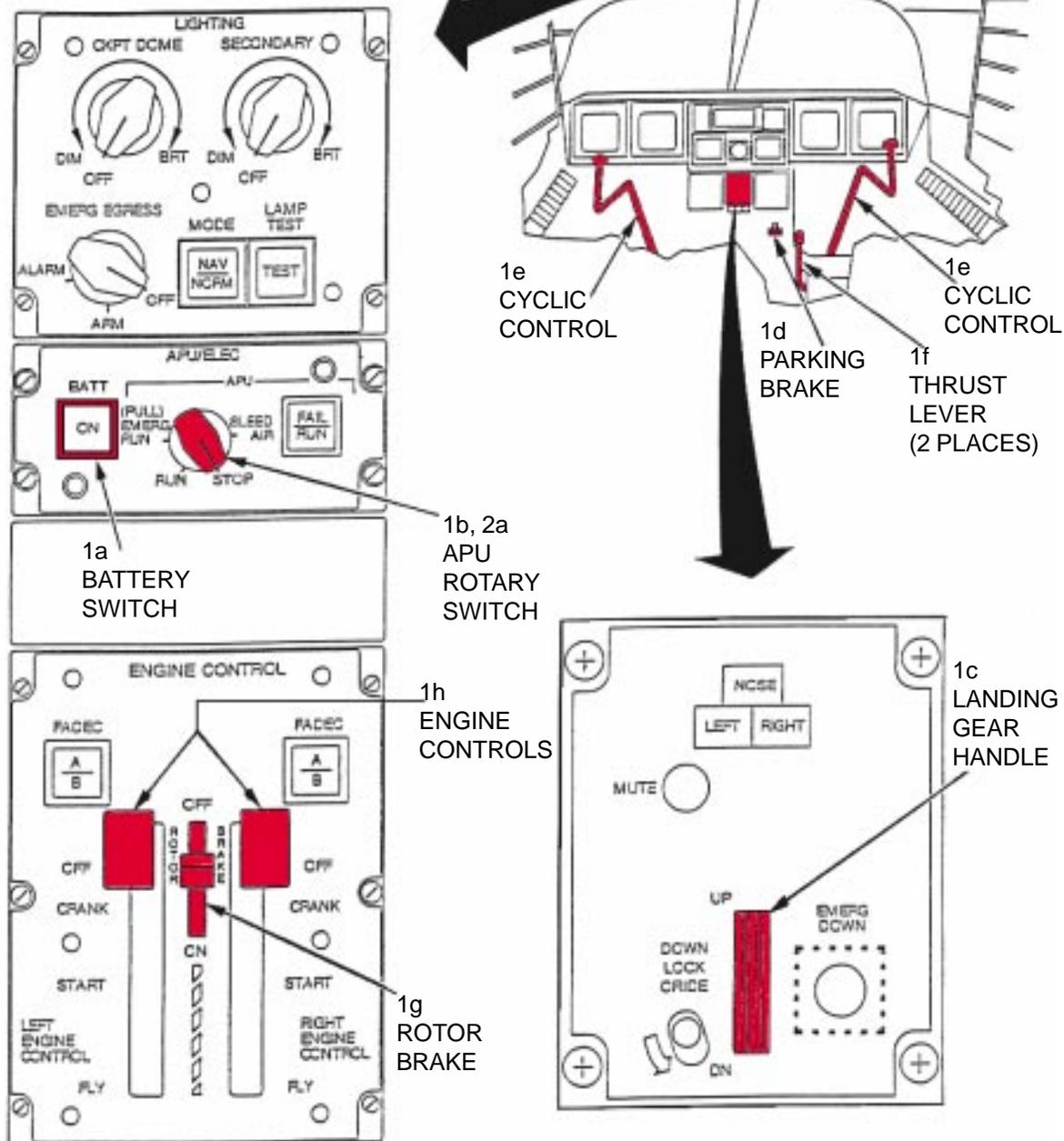
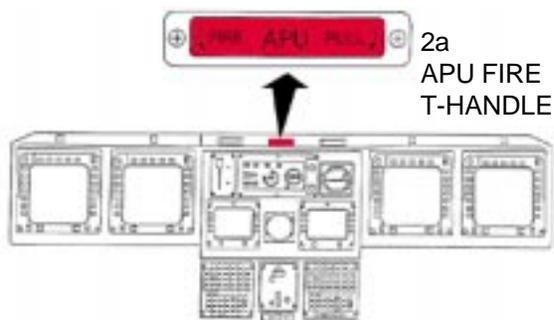
NOTE:

All engine shutdown components are located on the overhead and center consoles.

- Push battery switch to OFF position.
- Place APU rotary switch in the STOP position.
- Place landing gear control handle in the DOWN position.
- Set the parking brake.
- Place cyclic controls in NEUTRAL position.
- Place thrust lever in the FULL AFT position.
- Place rotar brake handle in the ON position.
- Place engine controls in the OFF position.

2. APU SHUTDOWN

- Shutdown sequence is automatic once APU rotary selector switch is placed in the STOP position.
- Pull the APU fire T-handle, located forward center instrument panel, to shut off fuel flow to the APU. Pulling the handle discharges APU fire extinguisher bottle.



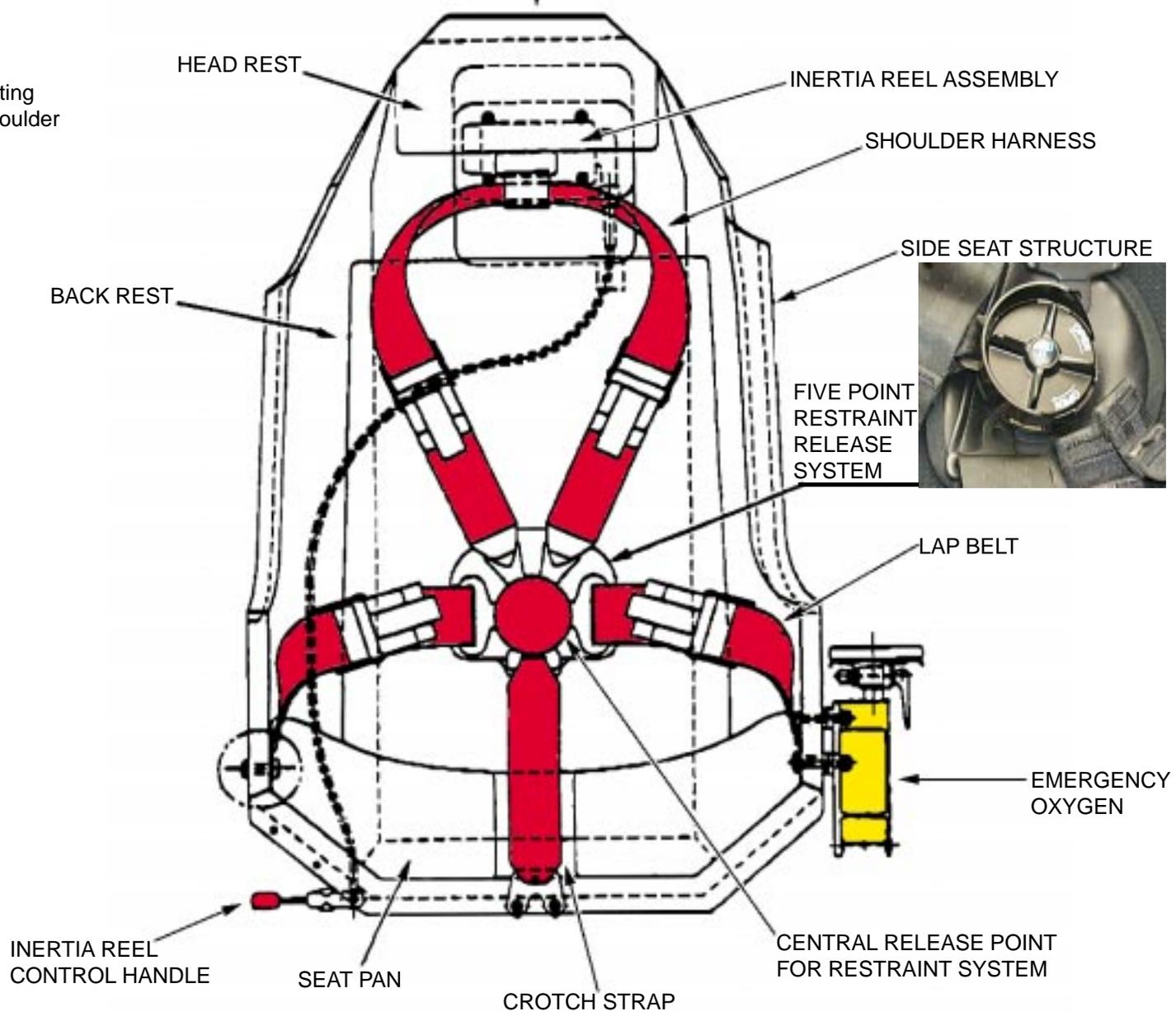
AIRCREW EXTRACTION

PILOT, CO-PILOT, AND JUMP SEAT ASSEMBLY

V-22

1. AIRCREW EXTRACTION

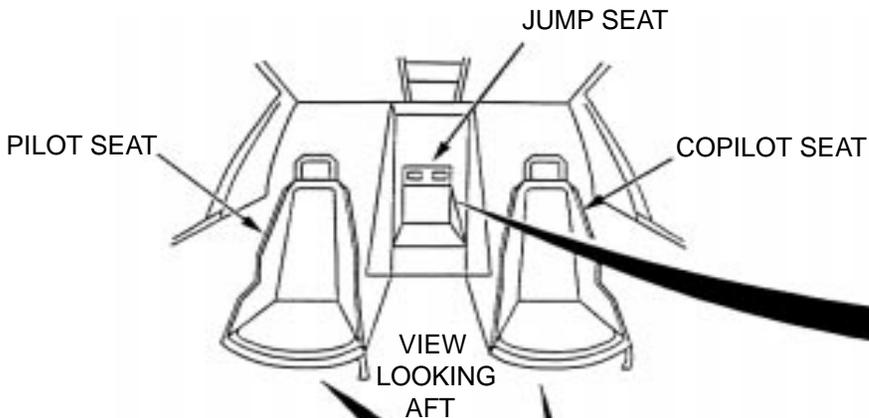
- a. Disconnect communication lead.
- b. Disconnect oxygen hose.
- c. Release restraint system by actuating central release point to release shoulder harness, lap belt and crotch strap.



AIRCREW EXTRACTION-Continued

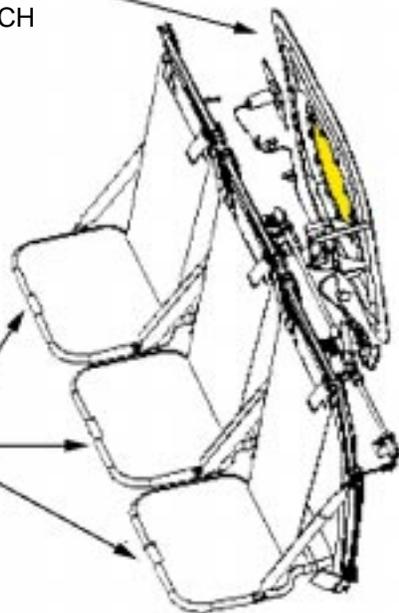
1. AIRCREW EXTRACTION-Continued

- d. Troop and crew chief seats are equipped with shoulder strap and lap belt, lift the three point release lever.
- e. Jump seats are equipped with the five point release system. Rotate rotary buckle to release occupant.



EMERGENCY HATCH

TROOP SEATS



INERTIA REEL

ADJUSTERS

FIVE POINT ATTACHMENT

ADJUSTER

PILOT AND COPILOT SEAT RESTRAINT SYSTEM

ADJUSTERS

INERTIA REEL LOCK/ UNLOCK CONTROL

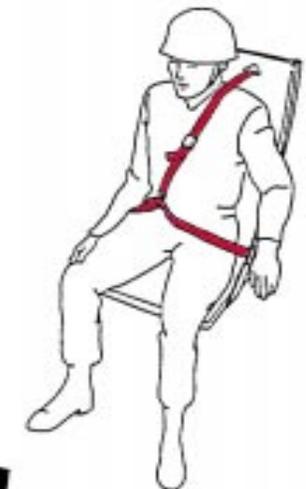
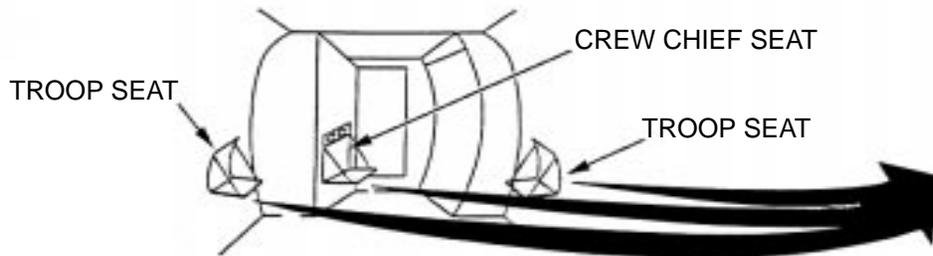
SINGLE ACTION BUCKLE ASSEMBLY

TROOP SEAT

CREW CHIEF SEAT

TROOP SEAT

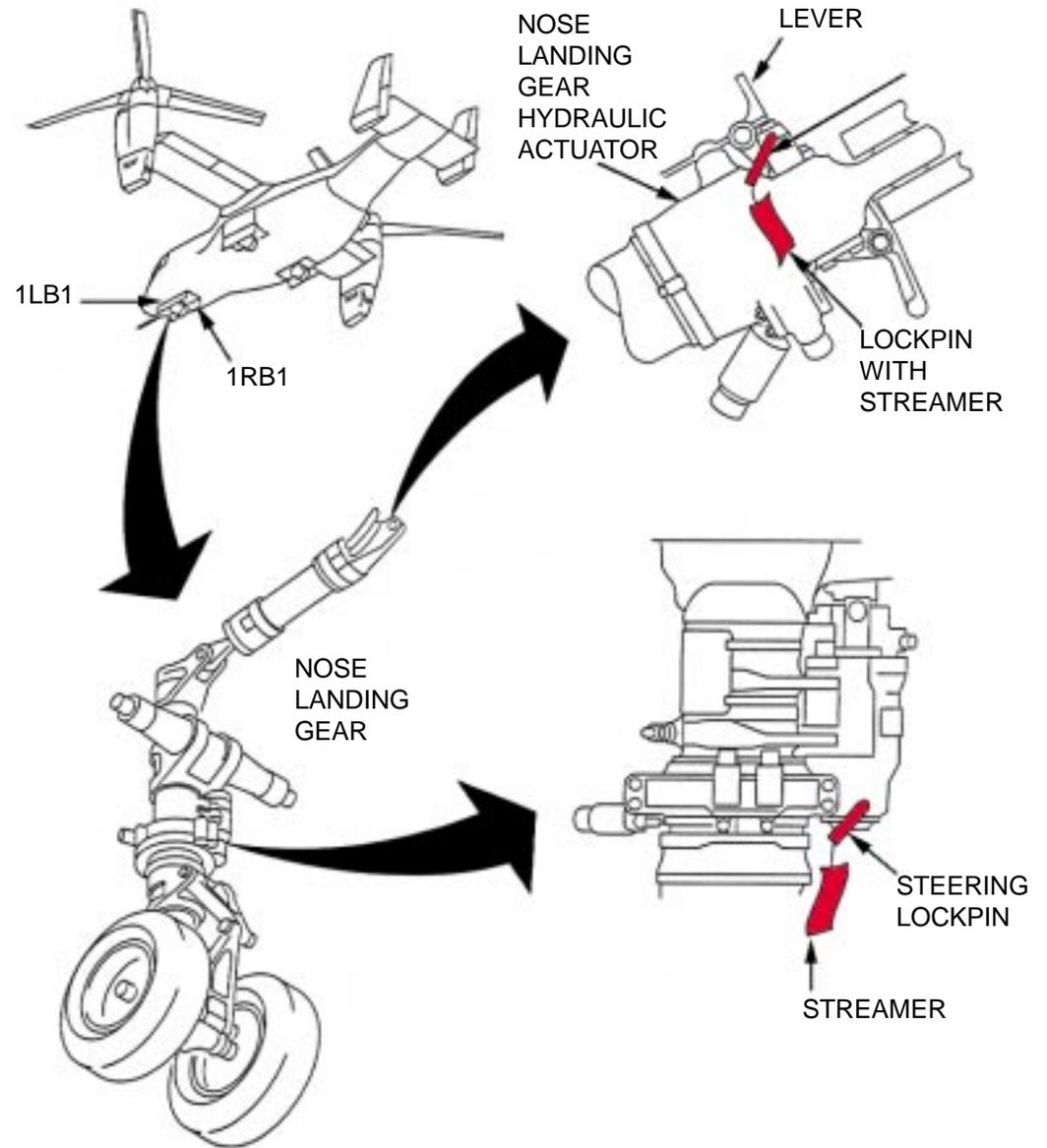
VIEW LOOKING FORWARD



GROUND SAFETY LOCKPINS

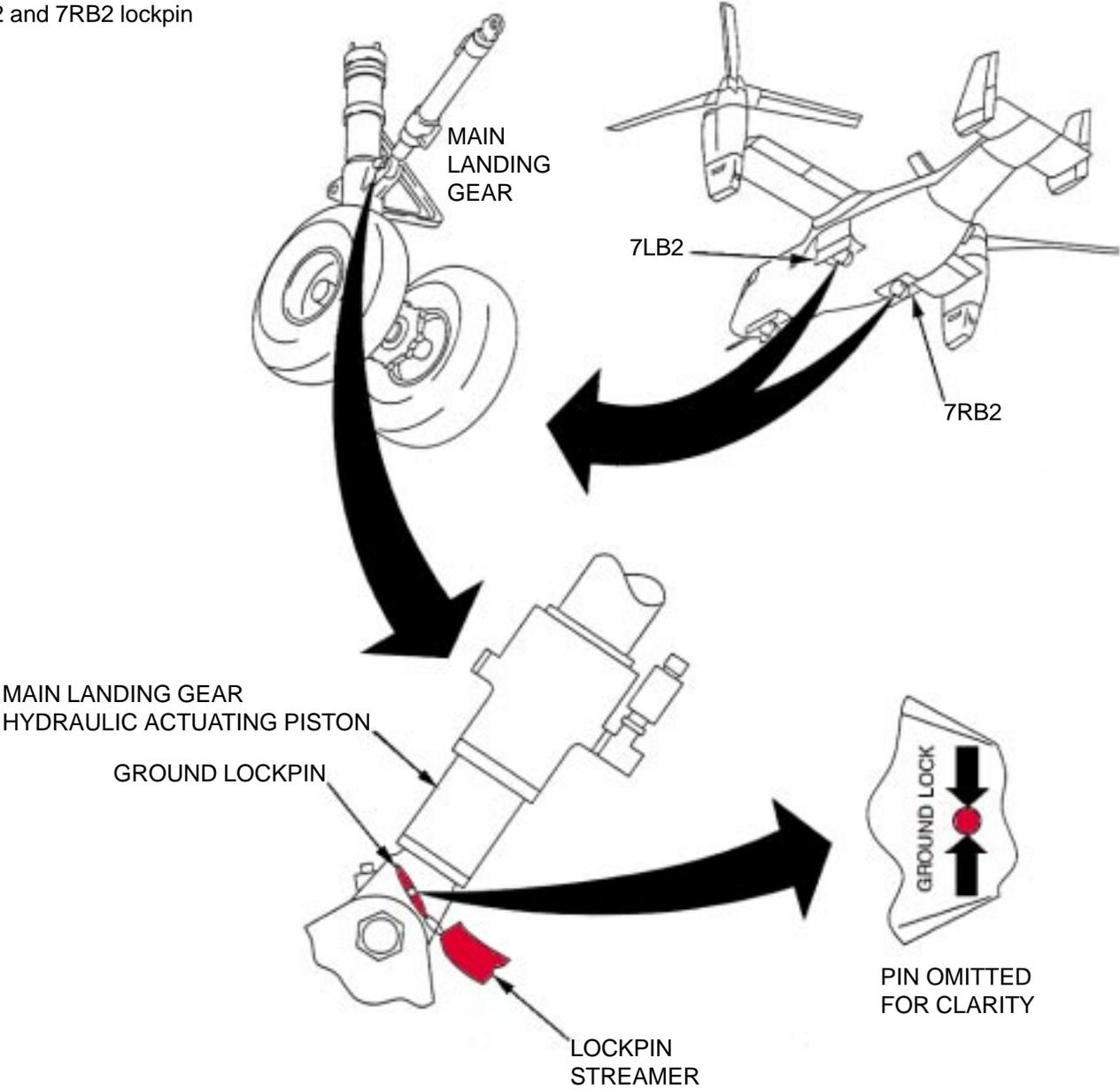
1. NOSE LANDING GEAR LOCKPINS

- The nose landing gear lockpin assembly allows insertion of the lockpin by ground crew, from the right side of the aircraft nose. Depress handle release mechanism to delploy handle.
- Pull handle to activate ground lockpin.



2. MAIN LANDING GEAR LOCKPINS

- a. Left and right main wheel wells, doors 7LB2 and 7RB2 lockpin holes are on hydraulic actuating pistons.



NOTE

Chapter 10 contains emergency rescue and mishap response information for the following aircraft:

**USAF
USAF
USAF
USAF
USAF**

**OV-10
RQ-1/MQ-1
RQ-4A
SR-71
U-2**

CHAPTER 10

U.S. AIR FORCE

OBSERVATION/RECONNAISSANCE

AEROSPACE EMERGENCY RESCUE AND MISHAP RESPONSE INFORMATION

10-1. INTRODUCTION AND USE.

10-2. This section contains emergency rescue and mishap response information illustrations in alpha-numerical order relative to type and model of aircraft. This arrangement of illustrations is maintained from Chapter 4 throughout the remainder of the publication.

10-3. GENERAL ARRANGEMENT.

10-4. Aircraft type designation has been positioned in the upper right corner of the horizontal illustration for rapid identification. Additional aids to rapid orientation are:

a. Recent technological advances in aviation have caused concern for the modern firefighter. Aircraft hazards, cabin configurations, airframe materials, and any other information that would be helpful in fighting fires, the locating and rescue of personnel will be added as the information becomes available.

b. Suggested special tools/equipment are listed in the upper left corner, on the Aircraft/Entry page of each listed aircraft.

c. Procedural steps covering emergency/normal entrances, cut-ins, engine/APU shutdown, safeying ejection/escape systems, and aircrew extraction are outlined on the left side of each page with coordinated illustrations on the right.

d. Illustrations located on right side of pages are coordinated with text by numerals and small letters depicting both paragraph and subparagraph on the page.

e. Each illustration is consistently colored and/or pattern keyed to highlight essential emergency rescue information.

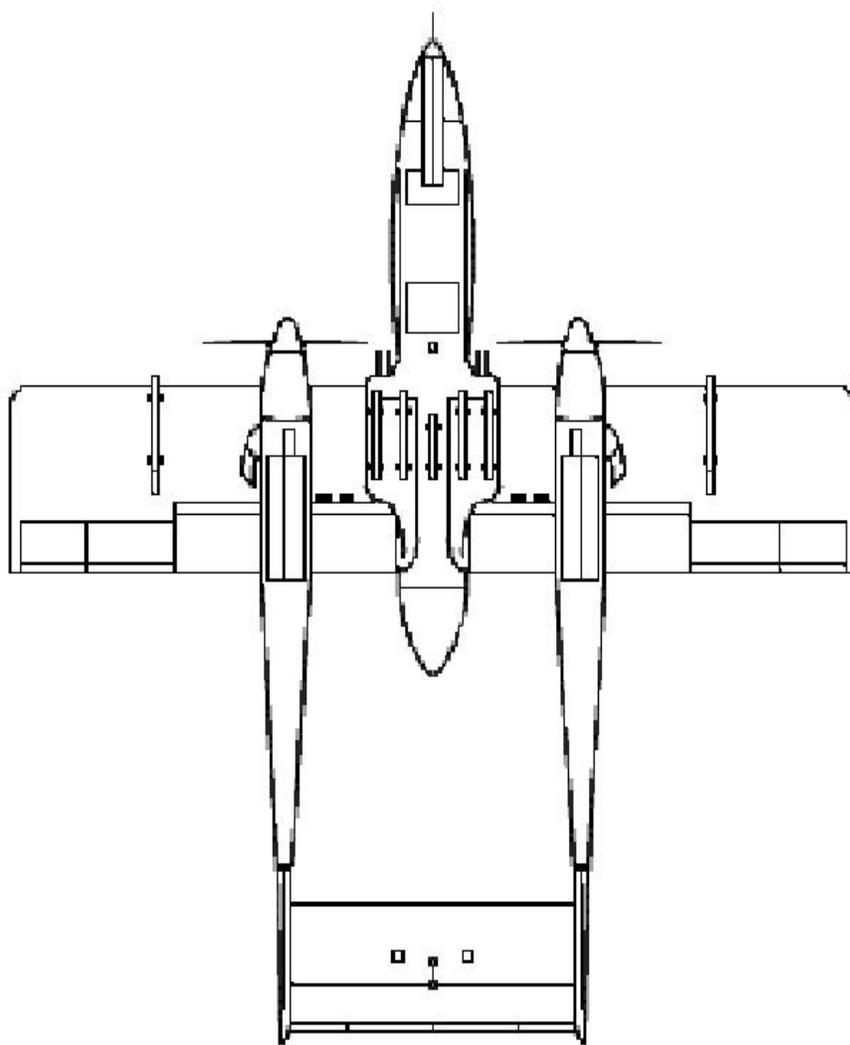
f. Details are pulled directly from the illustration to highlight an area, thus eliminating unnecessary searching for desired information.

AIRCRAFT PAINT SCHEME

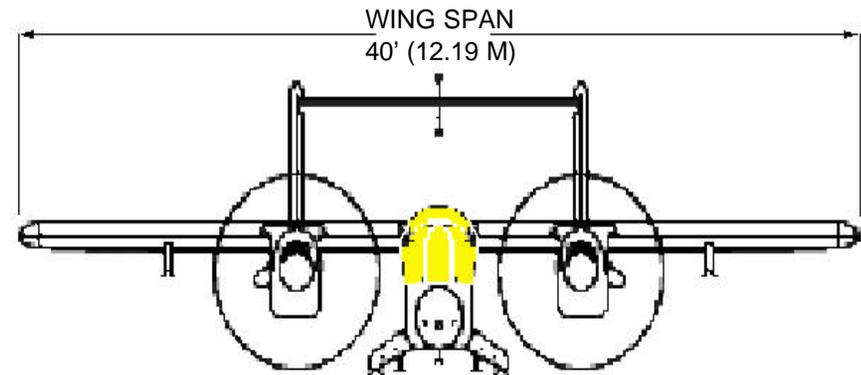


AIRCRAFT DIMENSIONS

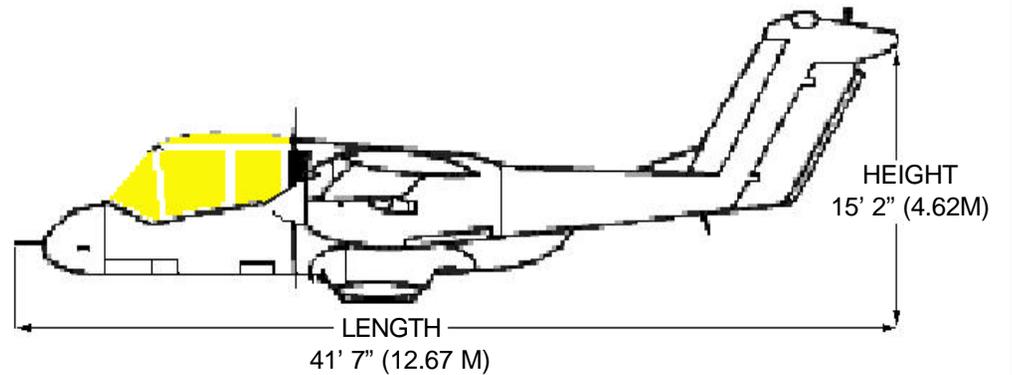
OV-10A



BOTTOM VIEW



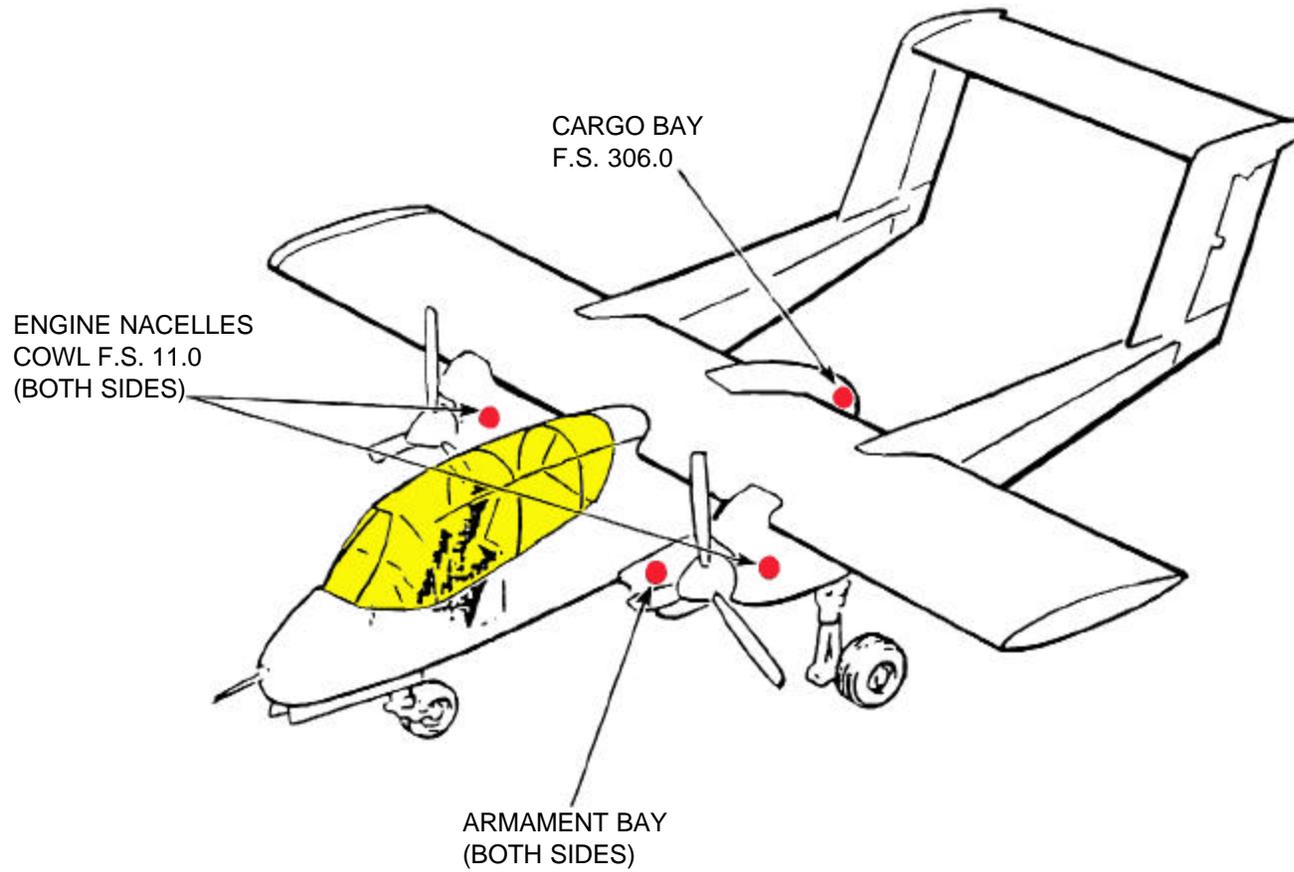
WING SPAN
40' (12.19 M)



LENGTH
41' 7" (12.67 M)

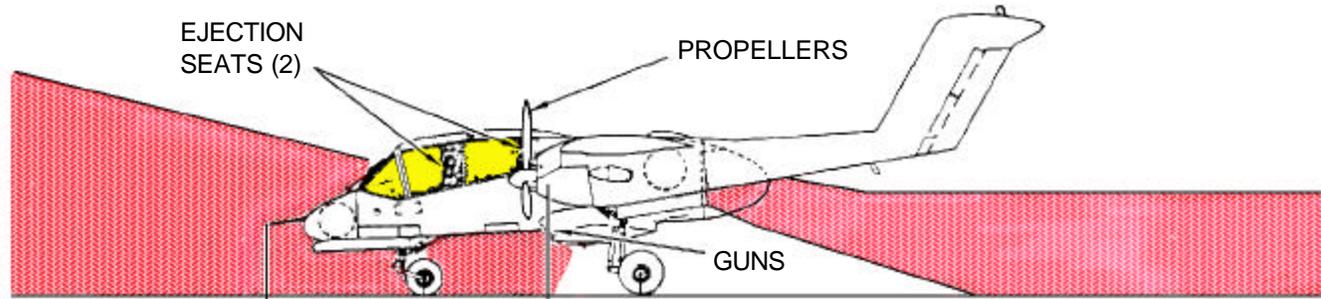
HEIGHT
15' 2" (4.62M)

AIRCRAFT SKIN PENETRATION POINTS



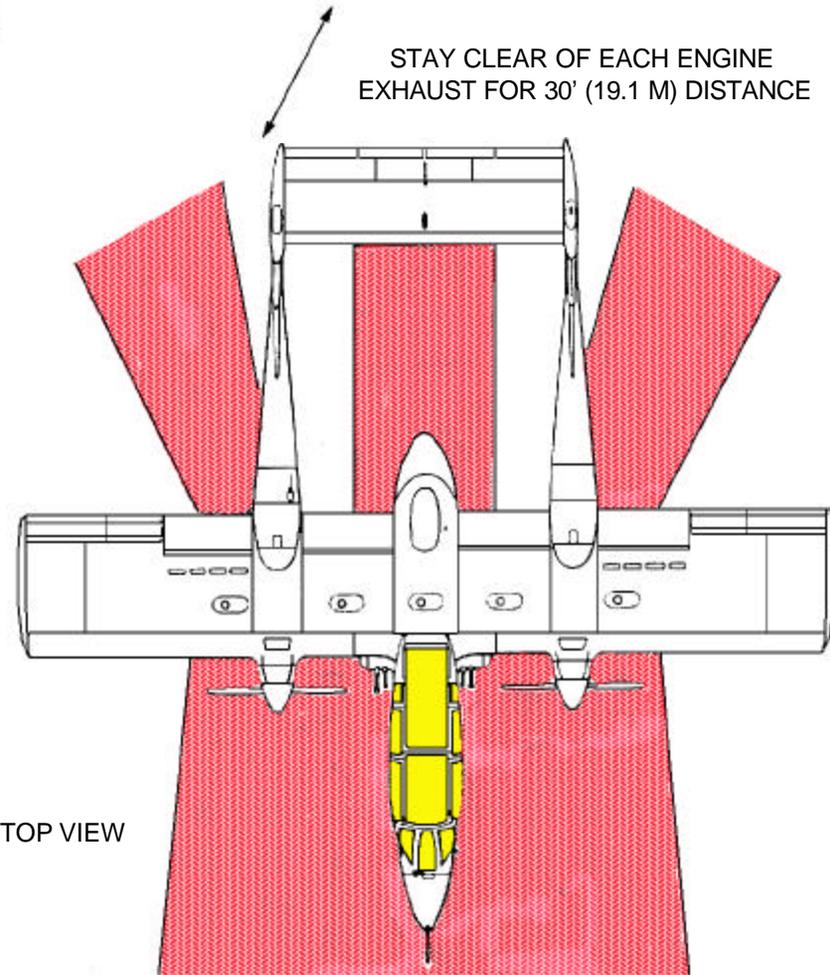
DANGER AREAS

OV-10A



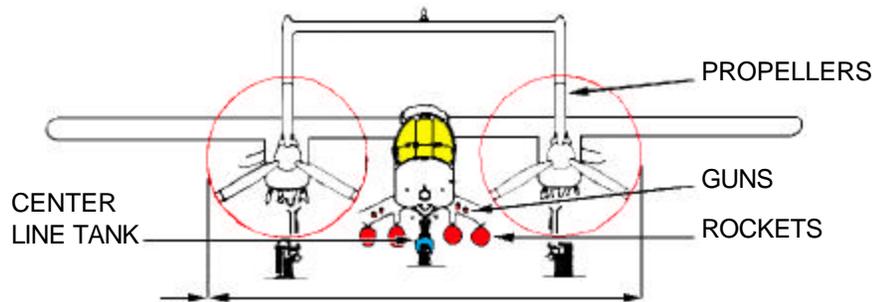
STAY CLEAR OF THIS AREA WITH ENGINES OPERATING AND OR GUNS OR ARMED ROCKETS

STAY CLEAR OF EACH ENGINE EXHAUST FOR 30' (9.1 M) DISTANCE



TOP VIEW

STAY CLEAR OF THIS AREA WITH ENGINES OPERATING AND OR GUNS OR ARMED ROCKETS



STAY CLEAR OF AREA IN FRONT OF AIRCRAFT (GUN AND ROCKET TRAJECTORIES)

SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
Fire Drill II

AIRCRAFT ENTRY

1. NORMAL/EMERGENCY ENTRY

- a. Rotate pilot's cockpit canopy door handle, located on right and left side of fuselage, clockwise 90 degrees on right side and counterclockwise 90 degrees on left.

NOTE:

Bungee will hold canopy open on right side only.

- b. Rotate observer's cockpit canopy door handle, located on right and left side of fuselage aft of pilot's cockpit, right side clockwise, left side counterclockwise.

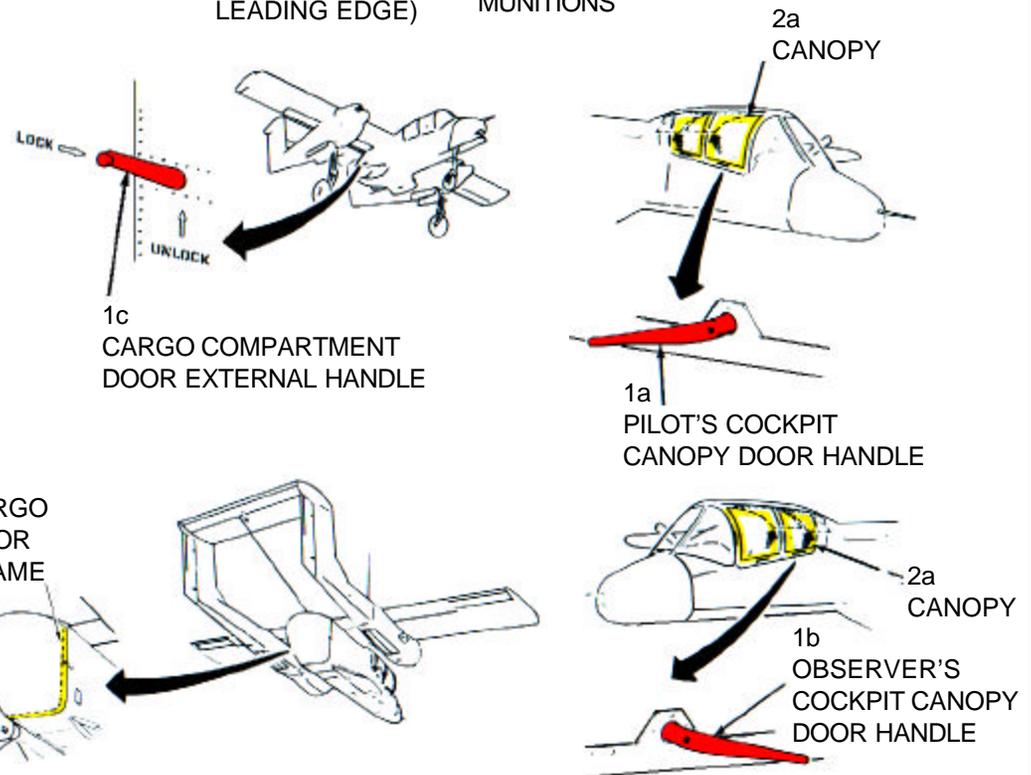
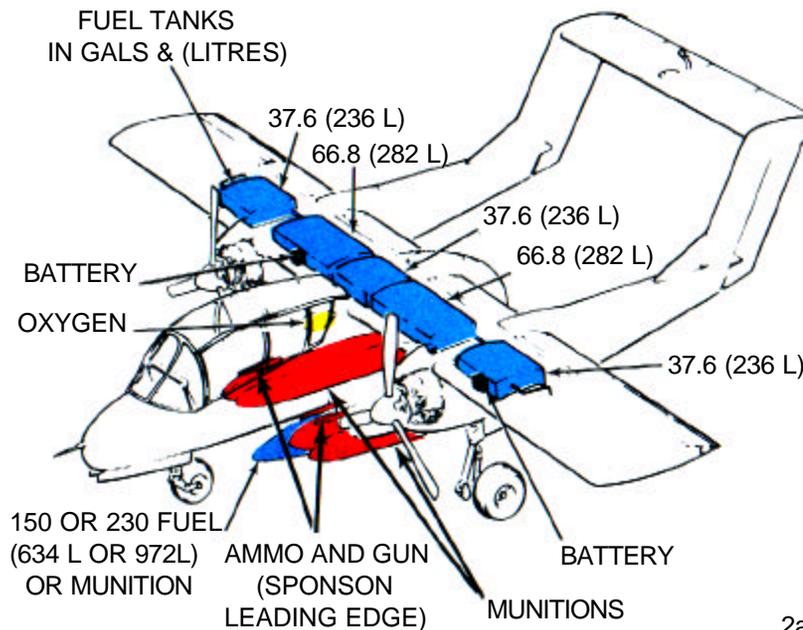
NOTE:

Bungee will hold canopy open on right side only.

- c. Rotate cargo compartment door external handle, located on left side of fuselage, counterclockwise, then pull door open.

2. CUT-IN

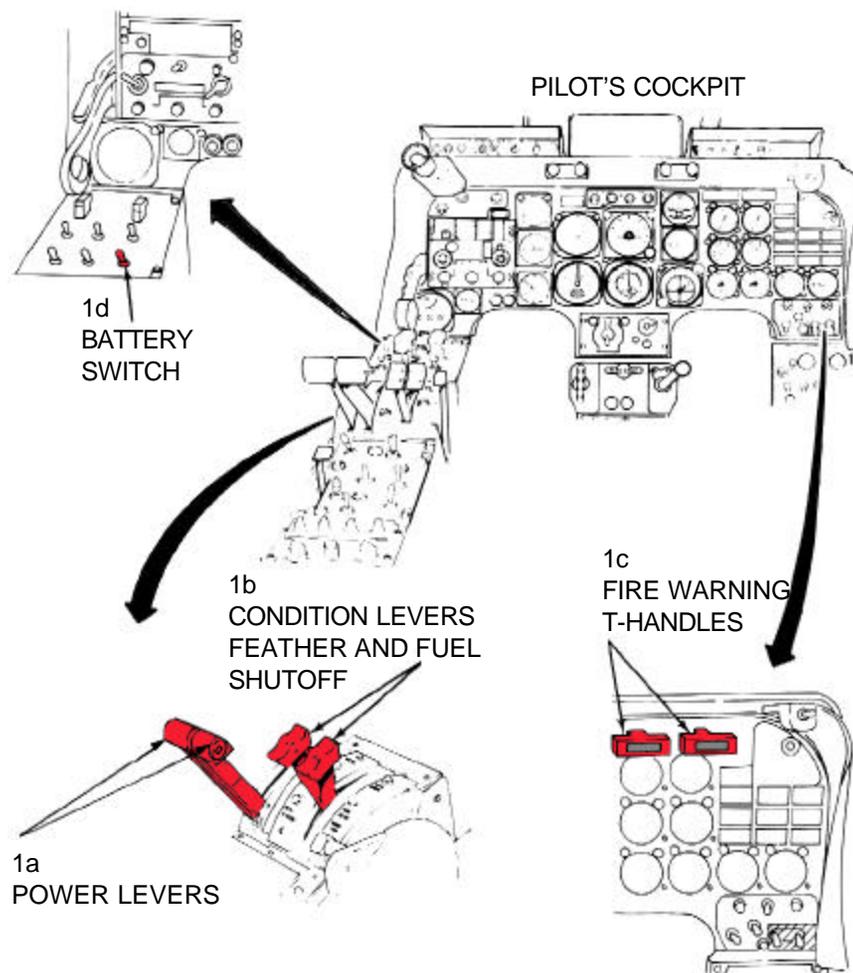
- a. Cut acrylic plastic canopy next to canopy frame for pilot and observer.
- b. Cut aft of cargo door frame to gain access to cargo compartment.



ENGINE SHUTDOWN

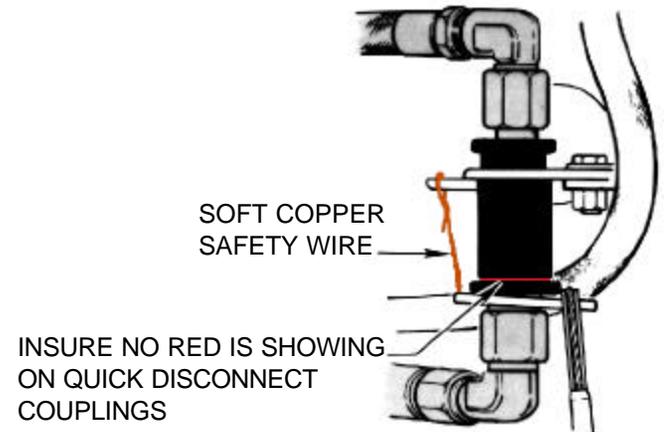
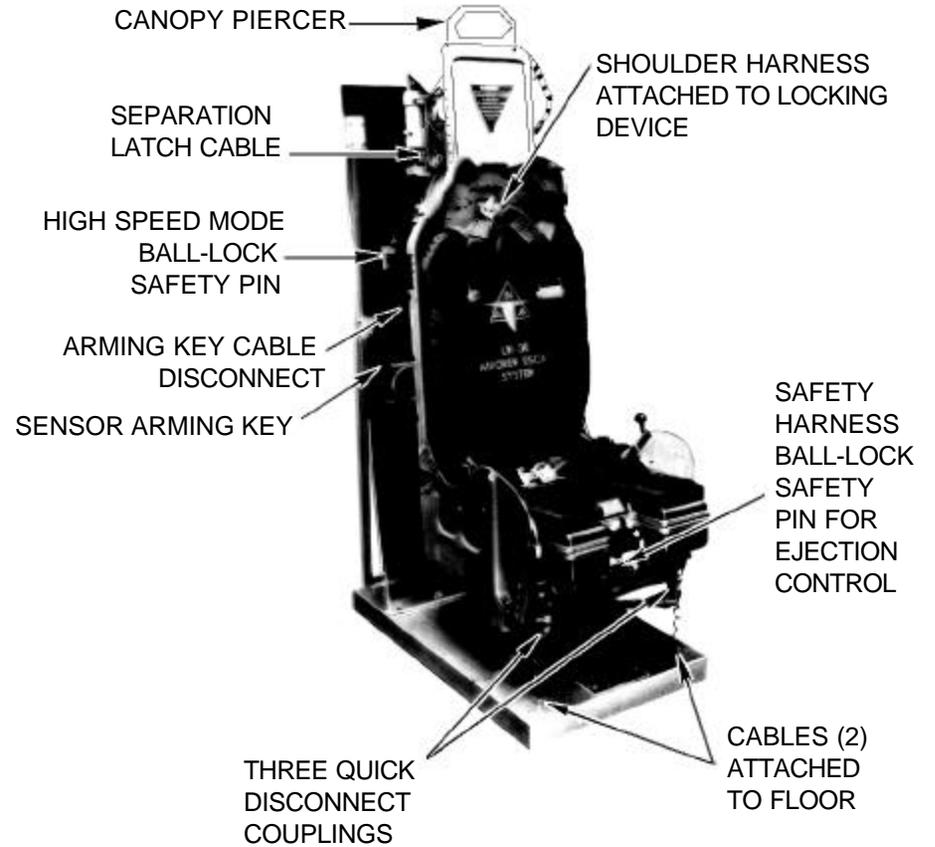
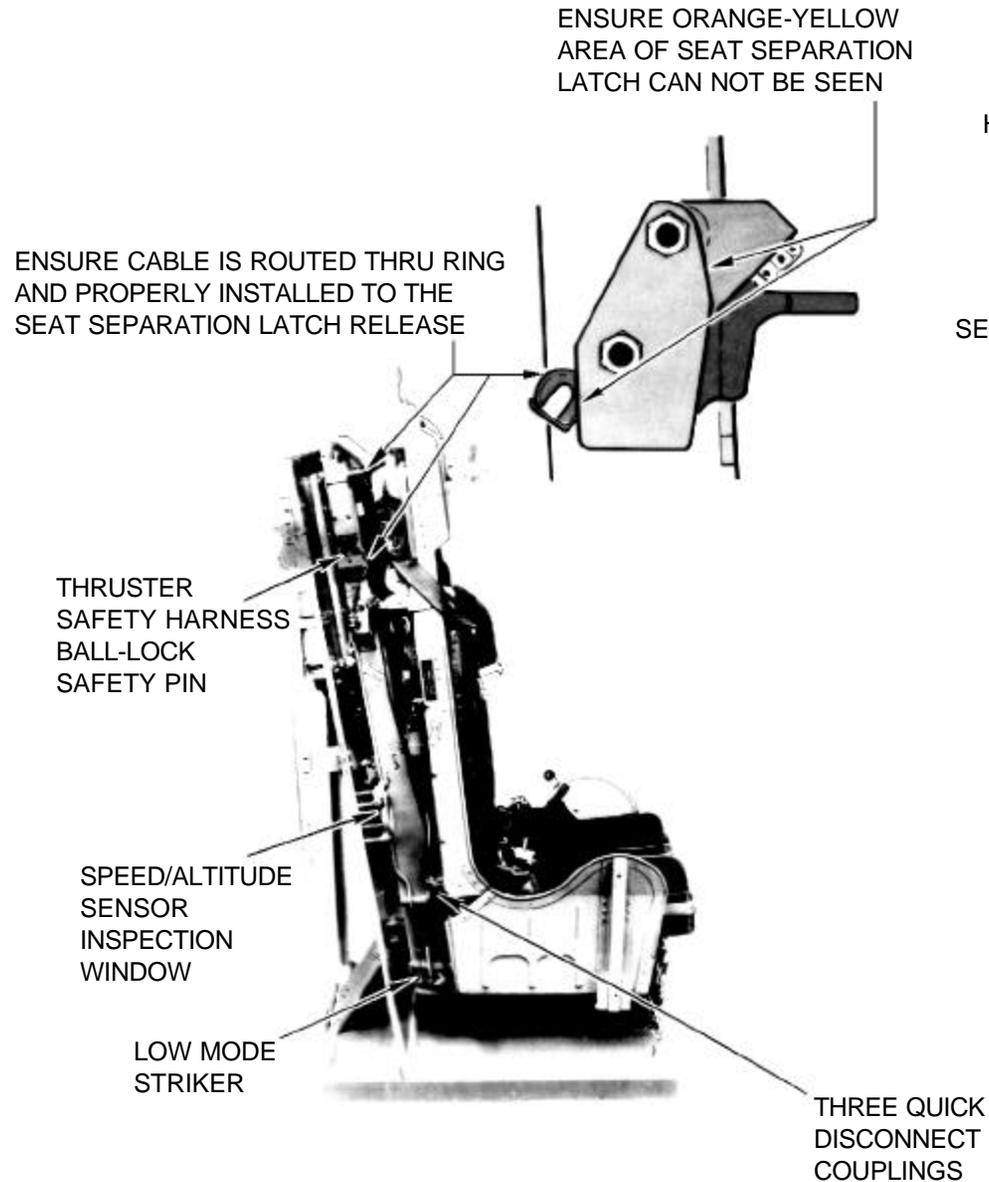
1. ENGINE SHUTDOWN

- a. Retard power levers, located on the left console both cockpits to GROUND START or MINIMUM THRUST position.
- b. Retard condition levers, located on the left console both cockpits, aft to the FEATHER and FUEL SHUT OFF position.
- c. If engines fail to shutdown: Pull fire warning T-handles, located on the right upper instrument panel, to the OUT position.
- d. Place battery switch, located on the left console just forward of power levers, to the OFF position.



EJECTION SYSTEM INFORMATION

1. LW-38 EJECTION SEAT ORIENTATION



SAFETYING EJECTION SYSTEM AND AIRCREW EXTRACTION

1. NORMAL SAFETYING EJECTION SYSTEM

- a. Insert initiating safety pin in the ejection control D-ring, located between legs of crewmember.
- b. Insert parachute thruster safety pin in thruster, located aft and to the side of seat head rest.

2. EMERGENCY SAFETYING EJECTION SYSTEM

WARNING

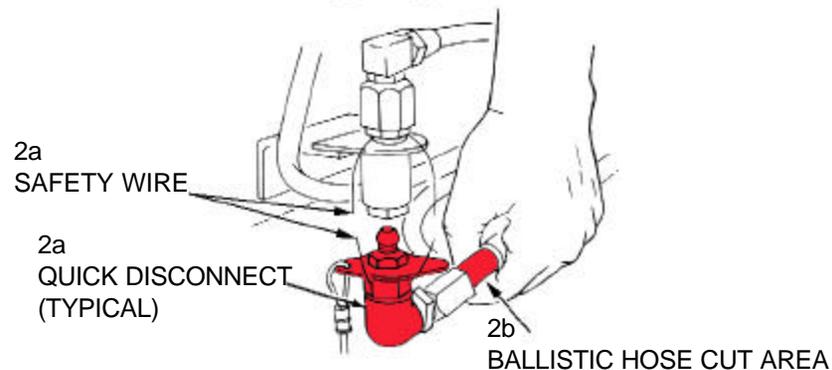
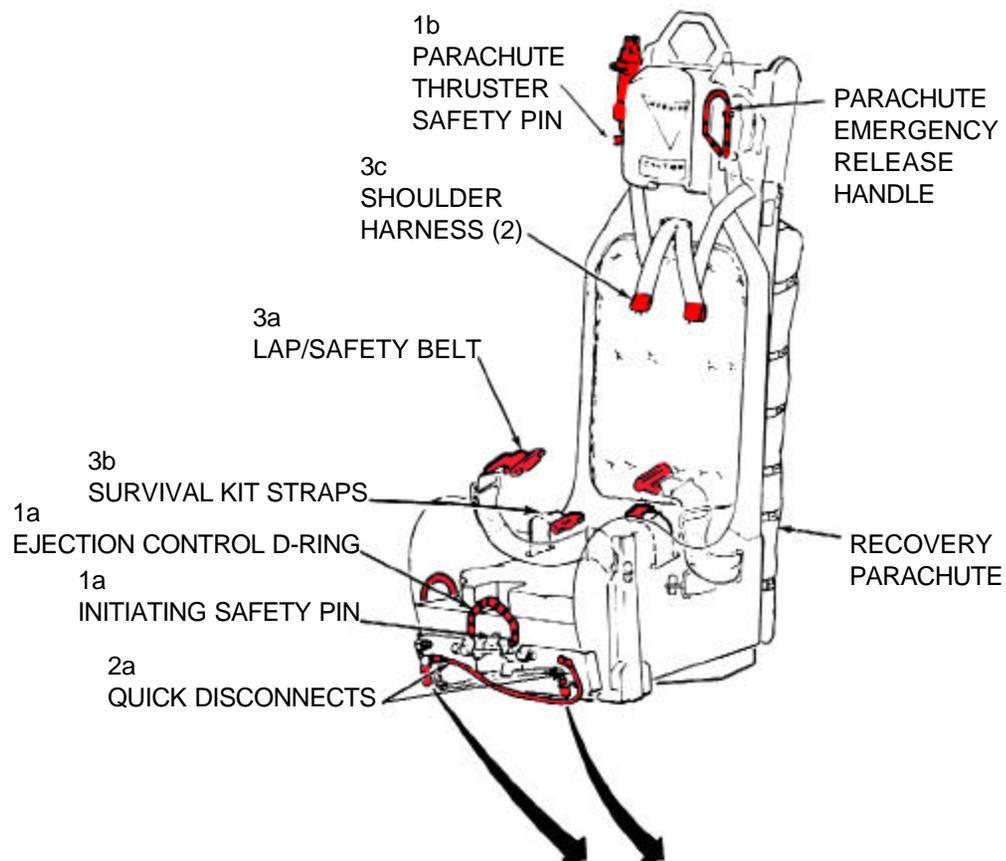
- Quick disconnects must be disconnected on both seats to disable all initiators.
 - When seats are in full down position, or when access to quick disconnects is not possible use normal safetying procedures above.
- a. Break or cut safety wire and push down sharply on quick disconnects, two located on forward part of seat bucket, one on right side and one on left side.
 - b. If quickdisconnect fails to disconnect, cut ballistic hose of disconnect at the outlet port. If these efforts can not be done, normal safetying must be accomplished.

3. AIRCREW EXTRACTION

- a. Release lap/safety belt, located on midriff of crewmember, by pulling up on buckle lever.
- b. Release left and right survival kit straps, located on at each aft corner of seat bucket.
- c. Release Koch fittings on shoulder harness, located at each crewmember's shoulder.
- d. Remove crewmember(s).

NOTE:

Pilot's seat shown. Observer's parachute and thruster mounted on opposite side.



UAV PAINT SCHEMES

RQ-1 PREDATOR



MQ-1 HUNTER/KILLER



UAV GENERAL INFORMATION

The purpose of this UAV file is to inform Emergency Services and aircraft recovery personnel of the description, hazards, subsystems, materials, shutdown procedures, and weapons associated with this Unmanned Aerial Vehicle (UAV) system.

The RQ-1 "Predator" is a Medium Altitude Endurance (MEA) UAV. The MQ-1 "Hunter/Killer" UAV has the additional capacity to support AGM-114 missiles.

The UAV is a mid-wing monoplane with a slender fuselage housing, the payload and fuel, a high aspect ratio wing, and inverted-V tails.

The UAV is powered by a four cylinder Rotax engine requiring 100 octane aviation fuel type 110 LL Avgas with a capacity of 405 litres.

The primary function is video reconnaissance accessing battle damage and battlefield chaos for intelligence planners.

The Predator system is composed of three parts: the air vehicle with its associated sensors and communications equipment, the ground control station (GCS), and the product or data dissemination system. One Predator system has four air vehicles with sensors and data links, one GCS, and one Trojan Spirit II SATCOM system. SATCOM (or Predator Primary Satellite Link (PPSL)). Predator missions do not employ support aircraft.

The sensors include an electro-optic/infrared (EO/IR) payload Skyball with a zoom lens and a spotter lens, and a Northrop Grumman/Westinghouse Tactical Endurance Synthetic Aperture Radar (TESAR) and other detection system payloads. The MQ-1 UAV may also carry the AN/AAS-52(V)1 infrared detecting set.

In addition, the MQ-1 may also carry two AGM-114 missiles.

The UAV has a Ku-band satellite data link to provide over-the-horizon mission capabilities.

The RQ-1 has installed deicing equipment.



RQ-1 PREDATOR



MQ-1 HUNTER/KILLER

RQ-1 UAV SPECIFICATIONS**RQ-1/MQ-1****Performance:**

Altitude	25,000 FT (7,620 M) or less
Range	1200 nautical miles
Cruise Speed	>70 kts
Endurance	>40 hrs
Conventional launch and recovery	approx. 2000 FT (600 M)

Weights:

Weight fully loaded	<2300 LB (1035 KG)
Weight payload	450 LB (202.5 KG)
Payload	450 LB (204 KG)

Electro-optical payloads:

2 colour DLTV television	Variable zoom, 955 mm Spotter
High resolution FLIR	6 field of view, 19 to 560 MM
Synthetic Aperture Radar	all weather surveillance, 1 FT resolution
Optional payloads	Laser target designator and rangefinder, ECM/ESM, moving target indicator, communications relay

Datalinks:

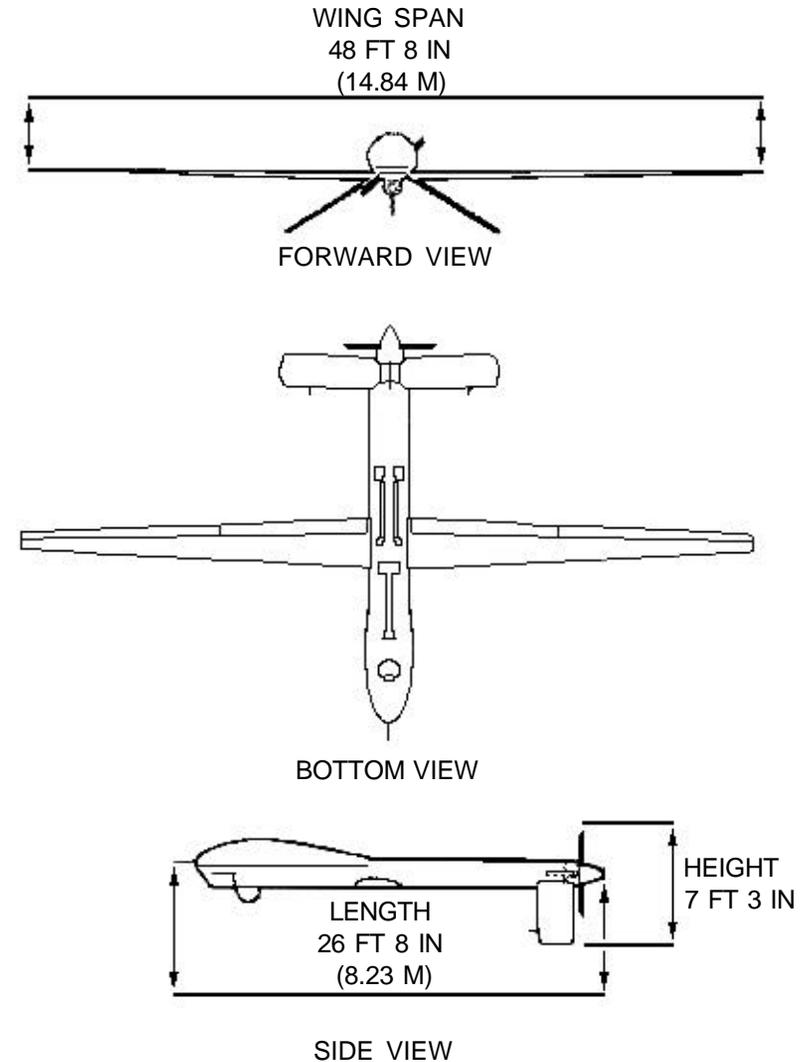
Radio Relay	C-band LOS and Ku Band Satellite
Data distribution system	UHF and VHF radio Trojan Spirit II or Global Broadcast System for dissemination

Vehicles:

Ground data	2 HMMWV Transports
Data dissemination	5.5 M dish for Ku-band Ground Data Terminal 2.4 M dish for data dissemination

Ground Control Station:

Trailer	30 FT x 8 FT x 8 FT (9.14 M x 2.44 M x 2.44 M)
Air transportability	C-130 and C-141 transportable



MQ-1 UAV SPECIFICATIONS

RQ-1/MQ-1

RQ-1 Weights:

Maximum Ramp Weight: 2250 lb.

Empty Operating Weight

Without Anti-Ice System 1680 lb.

With Anti-Ice System 1760 lb.

Basic Airframe Weight

Without Anti-Ice System 1130 lb.

With Anti-Ice System 1210 lb.

Fuel Weight (Full Tanks 640 ± 20) 660 lb.

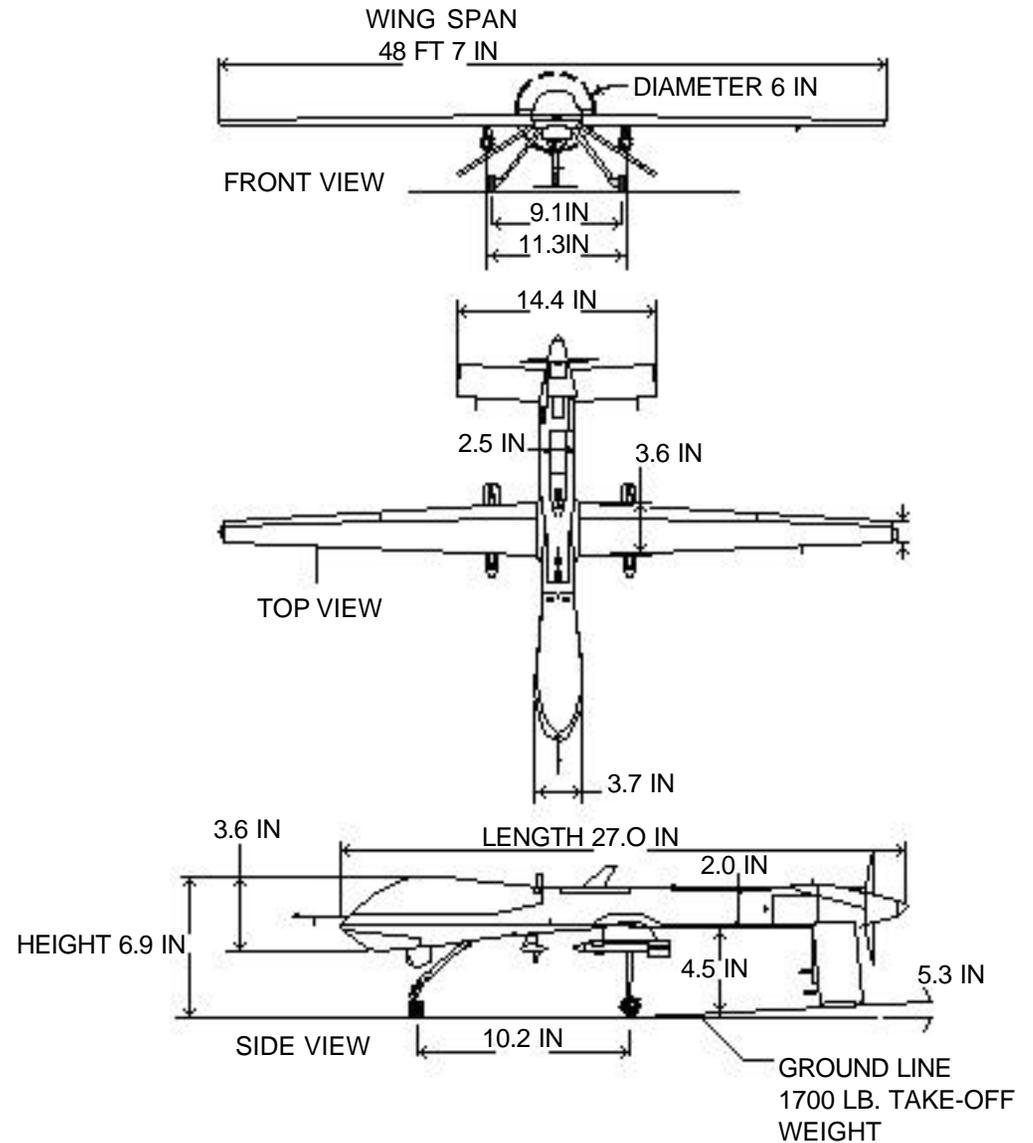
Maximum De-Icing Fluid 68 lb.

MQ-1 Additional Weight:

With AGM-114 (2) 2452

Data distribution system:

T rojan Spirit II or
Predator Primary
Satellite Link (PPSL)



UAV STRUCTURAL MATERIALS

RQ-1/MQ-1

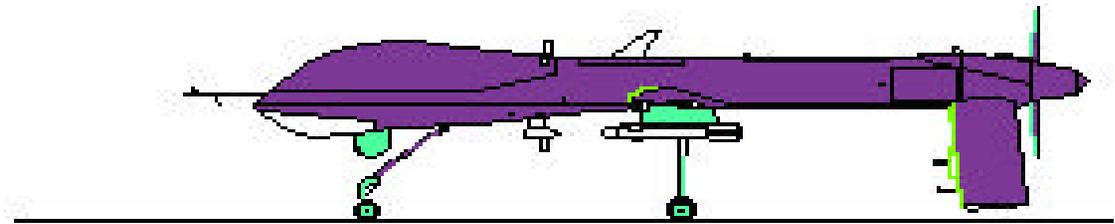
1. STRUCTURAL MATERIALS

 ALUMINUM/STEEL

 COMPOSITE

 TITANIUM

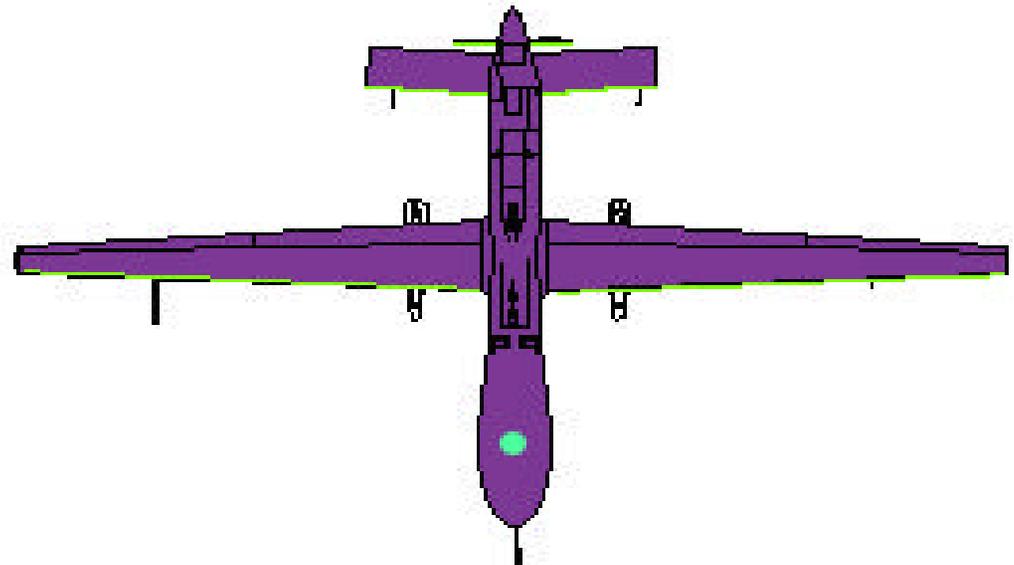
- a. Composite percentage is 92%. The outer fuselage is made of composite material consisting of carbon fiber and Kevlar, with quartz fiber. The vehicle is mainly a sandwich laminate structure. Core materials are Nomex, foam and wood. Fabric is predominately face layers for the sandwiched laminates. The landing gear is made from carbon fiber fabric layers. Internal support structures are made from carbon fiber unidirectional tape. Fibers are carbon and glass. The general material - carbon and glass fiber foam, Nomex and wood.
- b. The EO/IR Sensor is mostly composed of aluminum and glass. See page 7, item 27.
- c. The leading edges of the wings and tails are titanium where microscopic holes weep ethylene glycol deicing fluid.
- d. The internal support structures, on page 7, the bulkheads at 6, 7 and 13, are aluminum.
- e. The landing gear legs are composite, with aluminum and steel mechanisms at the top and bottom.
- f. The wheels are aluminum.
- g. The engine is aluminum and steel.
- h. The avionics boxes, inside the fuselage are mostly aluminum, usually housing plastic and copper circuit boards.
- i. The batteries are nickle-cadium (Ni-Cad).
- j. Fuel cells are made of a rubberized fabric. See page 8 items 9 and 10.
- k. The AGM-114 weapon pylons are made of aluminum.



LEFT SIDE VIEW



FRONT VIEW

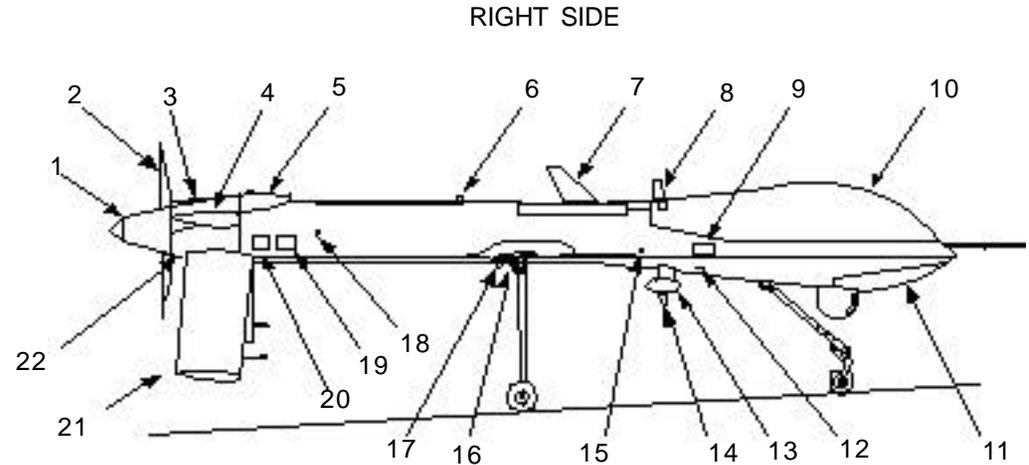


BOTTOM VIEW

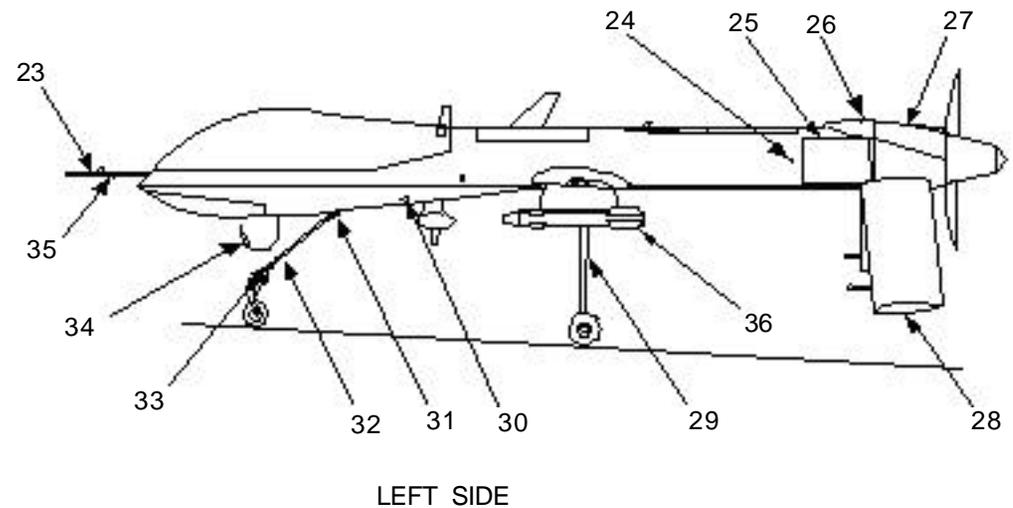
UAV EXTERNAL FEATURES

RQ-1/MQ-1

1. SPINNER ASSEMBLY
2. VARIABLE PITCH PROPELLER ASSEMBLY
3. COWL FLAP
4. AIR INLET TUBE FAIRING
5. COOLING DUCT COVER ASSEMBLY
6. UPPER APX-100 IDENTIFICATION FRIEND OR FOE ANTENNA
7. ULTRA HIGH FREQUENCY/VERY HIGH FREQUENCY ARC210 ANTENNA
8. C-BAND UPPER OMNIDIRECTIONAL ANTENNA
9. GLOBAL POSITIONING SYSTEM TEST PANEL ACCESS
10. KU SATELLITE COMMUNICATIONS RADOME ASSEMBLY
11. SYNTHETIC APERTURE RADAR RADOME/NON-RADIO FREQUENCY COVER
12. FRONT AVIONICS BAY COOLING AIR INLET
13. C-BAND DIRECTIONAL ANTENNA
14. C-BAND LOWER OMNIDIRECTIONAL ANTENNA
15. ENGINE KILL SWITCH
16. MAIN LANDING GEAR RETRACT ASSEMBLY
17. LOWER APX-100 IDENTIFICATION FRIEND OR FOE ANTENNA
18. HEATED STATIC PORT (RIGHT)
19. GROUND POWER PANEL ACCESS
20. NETWORK JUNCTION BOARD PRINTED WIRE ASSEMBLY PANEL
21. RIGHT TAIL ASSEMBLY
22. LOWER ENGINE COWL ASSEMBLY
23. ALPHA PROBE ASSEMBLY
24. HEATED STATIC PORT (LEFT)
25. POWERBAY PANEL
26. RED WARNING STROBE LIGHT
27. UPPER ENGINE DOWL ASSEMBLY
28. LEFT TAIL ASSEMBLY
29. MAIN LANDING GEAR
30. FRONT AVIONICS BAY COOLING AIR INLET
31. NOSE LANDING GEAR RETRACT ASSEMBLY
32. NOSE LANDING GEAR
33. NOSE WHEEL AND SHOCK
34. ELECTRO-OPTICAL/INFRARED SENSOR/AN/AAS-52(V)1
35. YAW STRING
36. AGM-114 PYLON, RAIL, AND MISSILE (LT SIDE SHOWN, RT SIDE NOT SHOWN) (MQ-1 ONLY)



RIGHT PYLON REMOVED FOR CLARITY



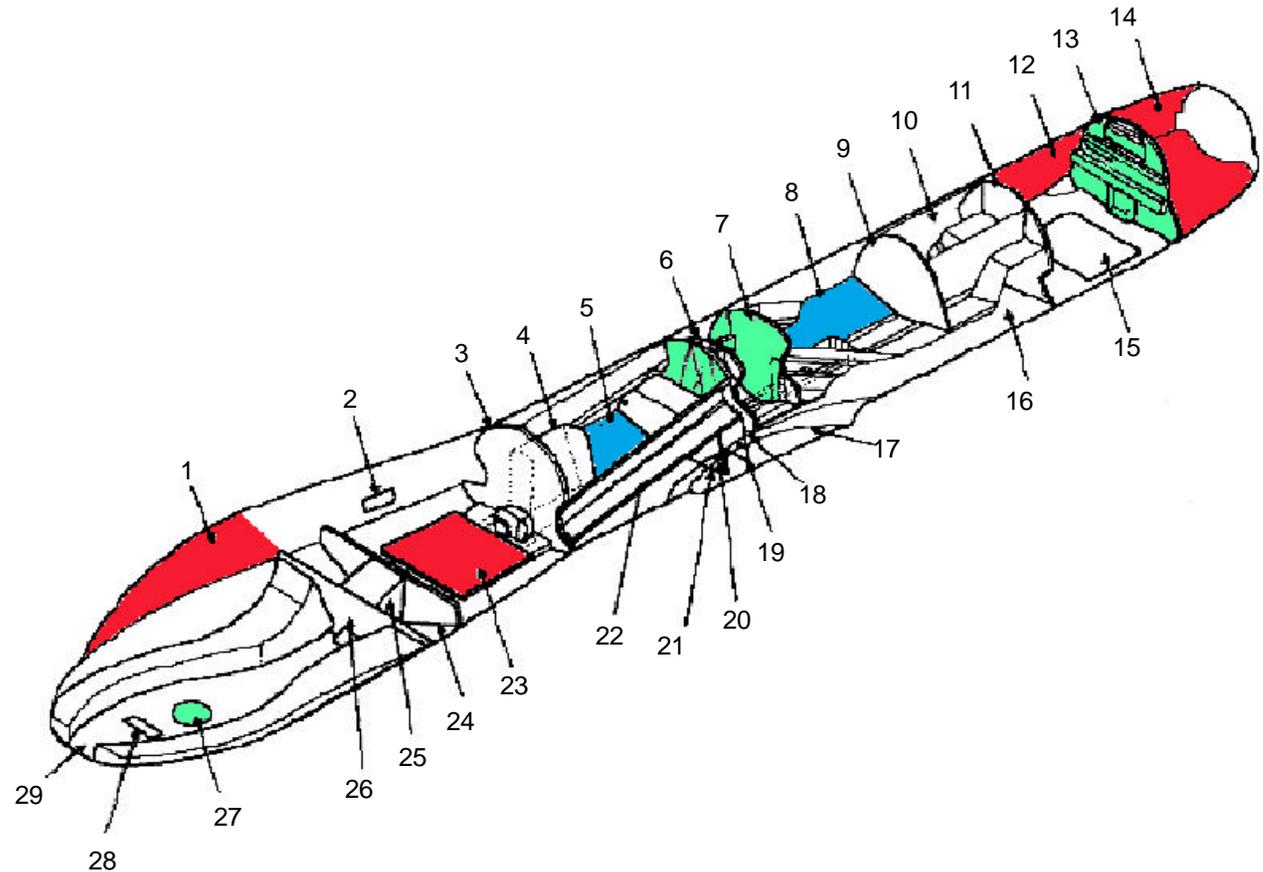
UAV INTERNAL FEATURES

RQ-1/MQ-1

NOTE:

The fuselage is a semimonocoque composite structure.
Bulkhead in the middle support the wings.

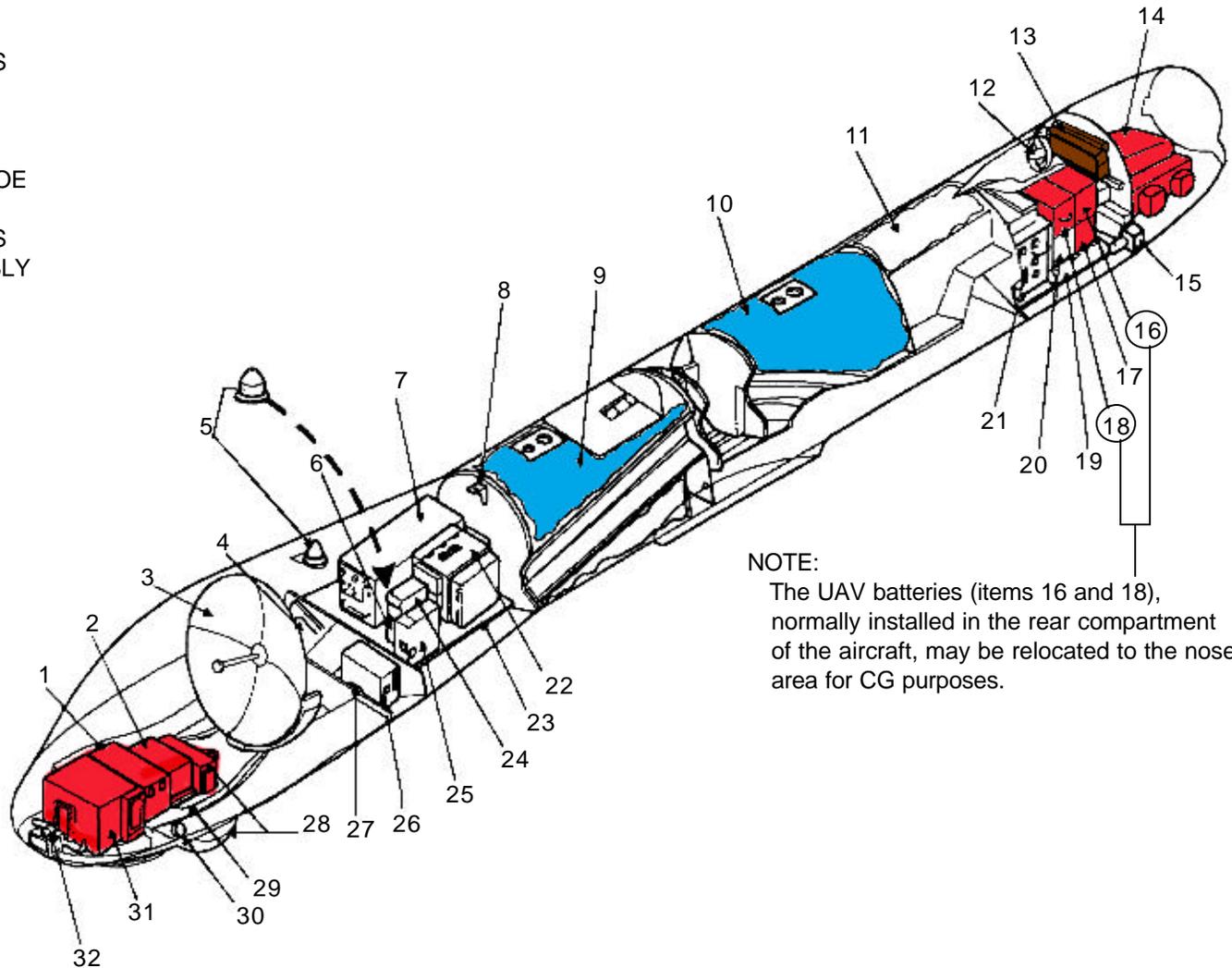
1. FRONT AVIONICS BAY
2. GPS TEST PANEL ACCESS
3. BULKHEAD 3
4. NOSE LANDING GEAR BAY
5. FORWARD FUEL CELL BAY
6. BULKHEAD 6 (ALUMINUM)
7. BULKHEAD 7(ALUMINUM)
8. AFT FUEL CELL BAY
9. BULKHEAD 8
10. ACCESSORY BAY
11. BULKHEAD 9
12. POWERBAY
13. BULKHEAD 10 (ALUMINUM)
14. ENGINE BAY
15. AFT EQUIPMENT BAY TRAY
16. MAIN LANDING GEAR BAY
17. WING FILLET
18. MAIN LANDING GEAR ATTACHMENT
19. BULKHEAD 5
20. WING SPAR ATTACHMENT POINTS
21. BULKHEAD 4
22. CABLE CONDUIT
23. FRONT AVIONIC BAY TRAY
24. BULKHEAD 2
25. NOSE LANDING GEAR BAY PROTRUSION
26. BULKHEAD 1
27. OPENING FOR ELECTRO-OPTICAL/
INFRARED SENSOR (ALUMINUM/GLASS)
OR AN-AAS-52(V)1
28. OPENING FOR SAR ANTENNA
ASSEMBLY
29. FRONT BAY PAYLOAD TRAY



UAV INTERNAL FEATURES-Continued

RQ-1/MQ-1

1. SYNTHETIC APERTURE RADAR ANTENNA
2. INERTIAL NAVIGATION SYSTEM/GPS
3. KU-BAND SATELLITE COMMUNICATIONS ANTENNA
4. VIDEO CASSETTE RECORDER
5. GPS ANTENNAS (LEFT AND RIGHT)
6. APX-100 IDENTIFICATION FRIEND OR FOE TRANSPONDER
7. KU-BAND SATELLITE COMMUNICATIONS SENSOR PROCESSOR MODEM ASSEMBLY
8. C-BAND UPPER OMNIDIRECTIONAL ANTENNA BRACKET
9. FORWARD FUEL CELL ASSEMBLY
10. AFT FUEL CELL ASSEMBLY
11. ACCESSORY BAY
12. ENGINE COOLING FAN
13. OIL COOLER/RADIATOR
14. 914F ENGINE
15. TAIL SERVO (LEFT AND RIGHT)
16. BATTERY ASSEMBLY #2
17. POWER SUPPLY
18. BATTERY ASSEMBLY #1
19. AFT EQUIPMENT BAY TRAY
20. SECONDARY CONTROL MODULE
21. SYNTHETIC APERTURE RADAR PROCESSOR/AGM-114 ELECTRONICS ASSEMBLY
22. PRIMARY CONTROL MODULE
23. FRONT BAY AVIONICS TRAY
24. ARC-210 RECEIVER/TRANSMITTER
25. FLIGHT SENSOR UNIT
26. VIDEO ENCODER
27. DE-ICE CONTROLLER
28. ELECTRO-OPTICAL/INFRARED SENSOR/AN/AAS-52(V)1 ELETRONICS ASSEMBLY
29. FRONT BAY PAYLOAD TRAY
30. ICE DETECTOR
31. SYNTHETIC APERTURE RADAR (SAR) RECEIVER/TRANSMITTER
32. NOSE CAMERA ASSEMBLY



NOTE:

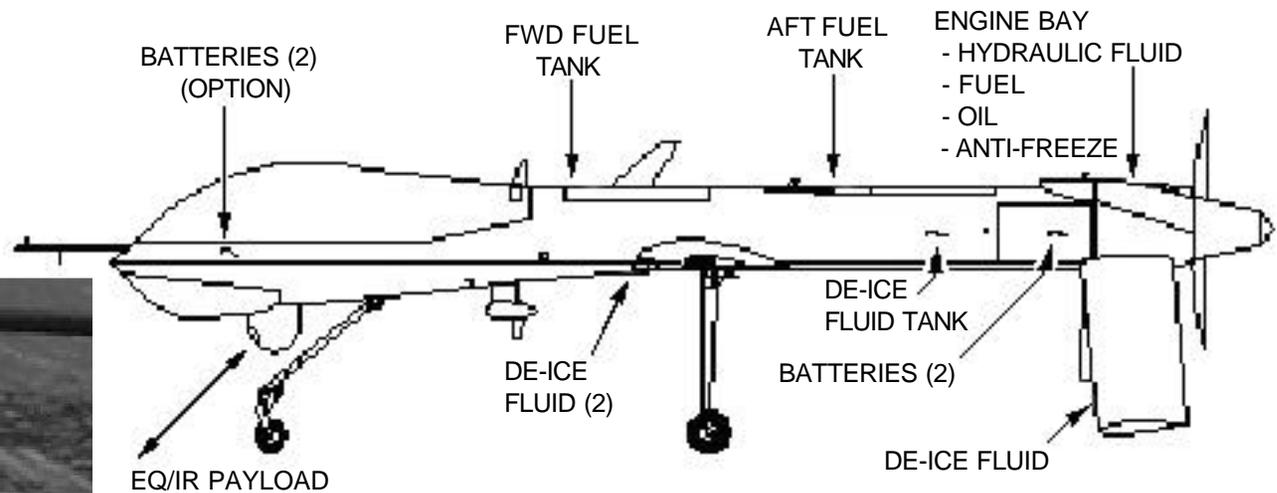
The UAV batteries (items 16 and 18), normally installed in the rear compartment of the aircraft, may be relocated to the nose area for CG purposes.

HAZARDOUS MATERIALS INVENTORY

1. HAZARDOUS MATERIALS INVENTORY

The Table lists the hazardous materials used on the UAV and the graphic defines the location of each material within the UAV. The airframe is comprised of numerous composite materials (e.g., Kevlar, carbon fibers, glass fibers and epoxy) none of which is considered hazardous in its cured state. However, precautions are required relative to handling of fractured composite materials and their combustion by-products.

SYSTEM, COMPONENT DESCRIPTION	GENERAL MATERIAL	SPECIFIC MATERIALS
EO/IR Payload	Lens Coating	Thorium Fluoride
Batteries	Dry Cell	Nickel Cadmium (NiCad)
De-Ice Wings, Tails and Tank	Anti-Freeze	Ethylene Glycol
Engine Bay A. Hydraulic Fluid B. Fuel C. Oil D. Anti-Freeze	Fluid Aviation Gasoline Lubricant Coolant	Aeroshell Fluid 4 MIL-H-5606A Shell 100 LL TORCO Synthetic MPZ20/50 MOBIL 1 Formula 15/50 PRESTONE Anti-Freeze



FORWARD LOOKING INFRARED (FLIR) POD
(REFER TO PAGE 3-11 FOR RADIOACTIVE COATING HAZARDS)

UAV APPROACH, ENGINE AND BATTERY SHUTDOWN

RQ-1/MQ-1

1. UAV APPROACH

WARNING

Approach can be made from either side. Be sure to avoid the propeller area and use extreme caution when entering the forward missile firing areas.

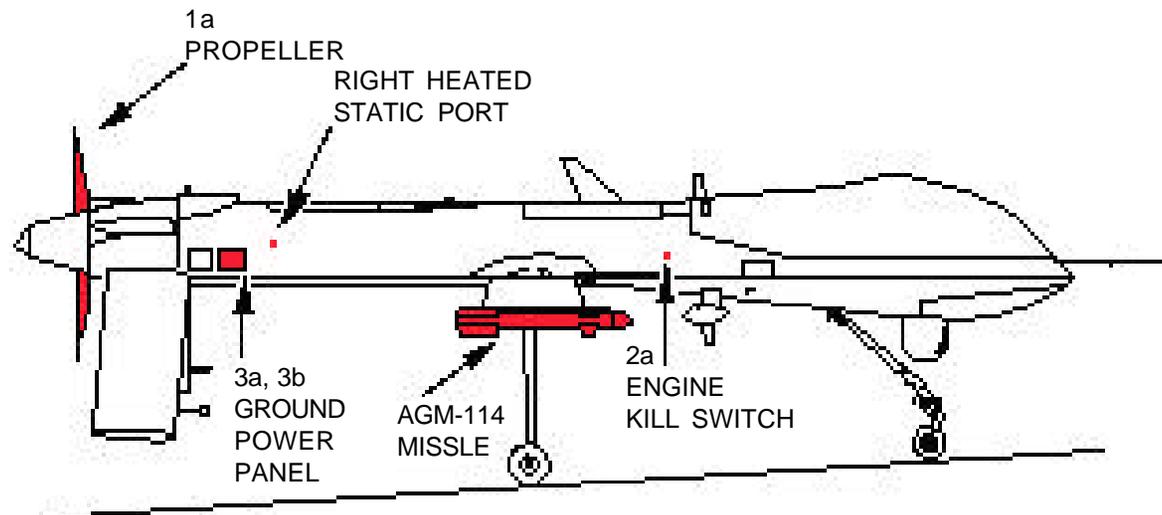
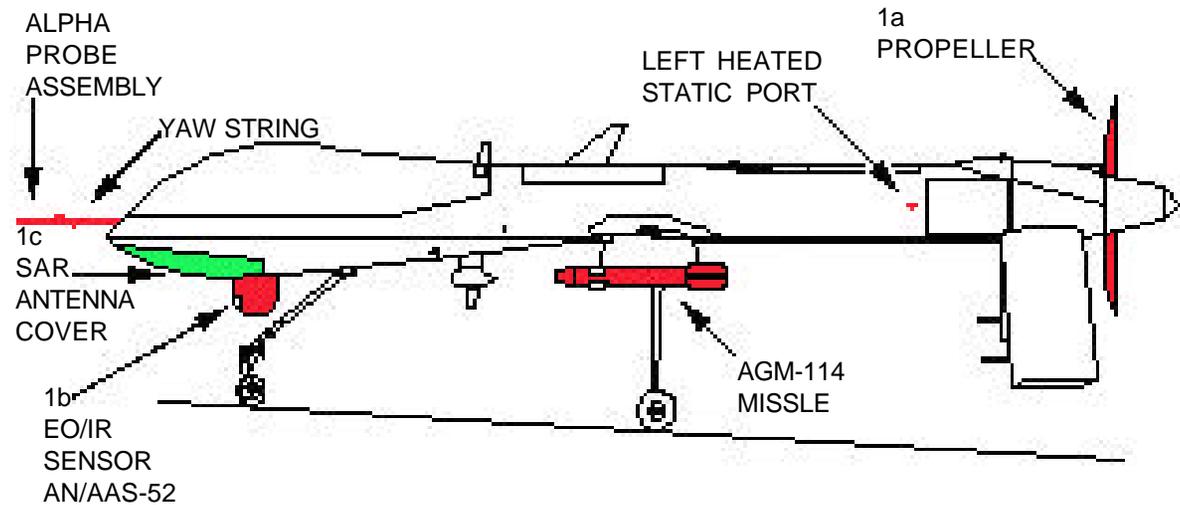
- a. Avoid the fuel powered propeller located at the aft section when engine is running.
- b. The EO/IR sensor has three glass lenses and is located under the nose dome. Laser capability is established from the AN/AAS-52 payload. Call sign for laser equipped MQ-1 is Star 1, 2, etc. Fire protection must be informed when the laser is installed. A non laser UAV is identified with call sign Kodar 1, 2, etc.
- c. The SAR antenna is located just forward of the EO/IR sensor, behind the chin fairing. The SAR antenna contains Byrellium. (See Chapter 3 hazard specifics and pages 7 and 8 for internal view of SAR.)

2. ENGINE SHUTDOWN

- a. Use the engine kill switch, located on the right side forward of right main landing gear to shut the engine down. This is the only method for engine shutdown.

3. BATTERY SHUTDOWN

- a. The battery switch is located inside aft right side of the fuselage near the tail section behind the ground power panel. The two batteries are nickle-cadium and capable of giving off possible toxic fumes.
- b. Place the battery switch, inside the ground power panel area, in the OFF position to turn off all power to the UAV.



MQ-1 SYSTEM HAZARDS

1. AGM-114 MISSILE SYSTEM

The system consists of a modified RQ-1 Predator aircraft, resulting in the MQ-1 Hunter/Killer and components from an M-299 launcher (used on the AH-64 Apache helicopter), shipping containers, the Predator Ground Control Station (GCS), and the AN/AWM 101A launcher electronics tester. The production model of the MQ-1L evaluated for this study is further defined as "Block 5" by the government. The MQ-1L is a long endurance, medium altitude Unmanned Aerial Vehicle (UAV). The aircraft has the ability to incorporate different reconnaissance payloads. Aircraft control is provided via pilot commands from within a Ground Control Station (GCS). The GCS is enclosed in a portable shelter that incorporates workstations to enable the operators to control/monitor the MQ-1L and its sensor sub-systems and to exploit collected data. Control commands are up-linked from the GCS to the aircraft and reconnaissance imagery/aircraft status data is down linked via either C-Band Line-Of-Sight or Ku-Band Satellite links. The aircraft maximum gross weight is 2,250 pounds, with an empty weight of 1,680 pounds. It is powered by a standard commercial aircraft piston engine with a pusher propeller. The aircraft has an all-digital flight control system. The fuselage contains two bays, one forward and one aft, for payload and avionics. The graphite-epoxy composite airframe has 5-g capability at its take-off weight. The entire aircraft can be disassembled and transported within a single shipping container and can be reassembled in approximately eight hours by four trained personnel. The aircraft components consist of the fuselage, wings, tail surfaces, and landing gear. The fuselage contains the propulsion system, fuel system, and two payload/avionics bays.

2. PROPULSION SYSTEM

The engine is a Rotax 914 aircraft piston engine powering a variable pitch, two-blade composite pusher propeller. The engine uses airflow and standard automotive antifreeze for cooling, and 7.6 liters of automotive oil for lubrication.

3. INTERNAL BAYS

The MQ-1L possesses two internal bays within the fuselage to house equipment that adapts the platform for the AGM-114 function (payload) and also the necessary avionics required for continuous flight. The payload and avionics subsystems are distributed among the two bays.



MQ-1

NOTE:

The new variants of the RQ-1/MQ-1 airframe are expanding into new mission capabilities. This new variant will have a wing span of 86 feet using higher altitudes (above 50,000 feet) and extended range (ER), for military and peace time use. The USAF designation Predator B-ER or MQ-9, named ALTAIR, will be for scientific, atmospheric research, surveillance, reconnaissance, and other missions. In the near future, the US Navy, USCG, Homeland Defence and NASA will be using variants of the ER. NASA will use the name ALTUS for their variant.



MQ-1

MQ-1 SYSTEM HAZARDS-Continued

4. FUEL SYSTEM

The aircraft's fuel is contained in the forward and aft fuel tanks located in the fuselage. Each fuel tank consists of a rubberized fuel bladder supported by the fuselage structure. Each tank has its own filler neck, cap, and fuel level sensor located in a small access hatch on top of the fuselage over each tank. The filler caps provide atmospheric venting as well as a means for servicing the tanks. The aircraft's two fuel tanks have a total capacity of 600 pounds, but standard maximum fuel is 550 pounds. The DIN 51600, O-NORMC 1103 EURO-SUPER RON 95, and AVGAG 100 LL BLUE fuels used are standard 95 to 100-octane reciprocating aircraft engine fuels.

5. PAYLOAD

The mission essential payloads consist of laser designators, television, and infrared systems. The MQ-1L has the AN/AAS-52 installed in the forward bay. The AN/AAS-52 sensor is part of a family of sensors based on the Forward-Looking Infrared Laser Range Finder/Detector system. This payload also supports a laser illuminator. The AN/AAS-52 system operates in day/night/adverse weather conditions to provide long-range surveillance, target acquisition, tracking, range finding, and laser designation for multiple laser-guided munitions.

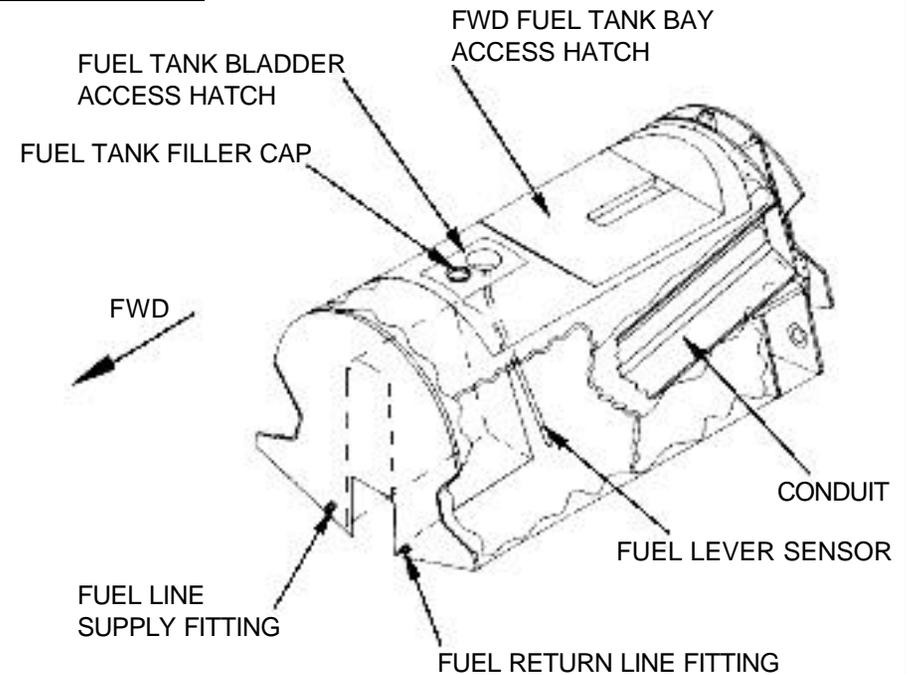
6. ELECTRICAL POWER SUBSYSTEM

The electrical power system for the aircraft includes a three Kilowatt starter/alternator, a 28-volt direct current (DC) power supply, two 14 Amp-hour Ni-Cad battery pack (more battery packs can be added as mission requirements dictate), and the ground power panel. The alternator provides alternating current (AC) energy from the engine. This energy varies in proportion to engine speed. The AC energy from the alternator is supplied to the power converter. The power converter rectifies this power to render a stable 28-volt DC supply. This 28-volt power resides on the 28-volt bus and will be referred to as "+28 VDC". Battery power is used to augment/supply power in the event of engine/alternator failure. The battery packs are 13 centimeters (cm) x 15 cm x 30 cm and weighs approximately 8 pounds. It is comprised of two strings of rechargeable Ni-Cad dry cells. Battery energy is not used if the 28-volt bus remains above 28 volts. The batteries are intended as maintenance free and possess a lifecycle of approximately 500 charge/discharge cycles. The aircraft starter control connector that is located within the ground power panel must be plugged into the Starter/Ground Power Cart umbilical cord to be started. This electrical power connector provides ground electrical power so that use of onboard electrical power is not required.

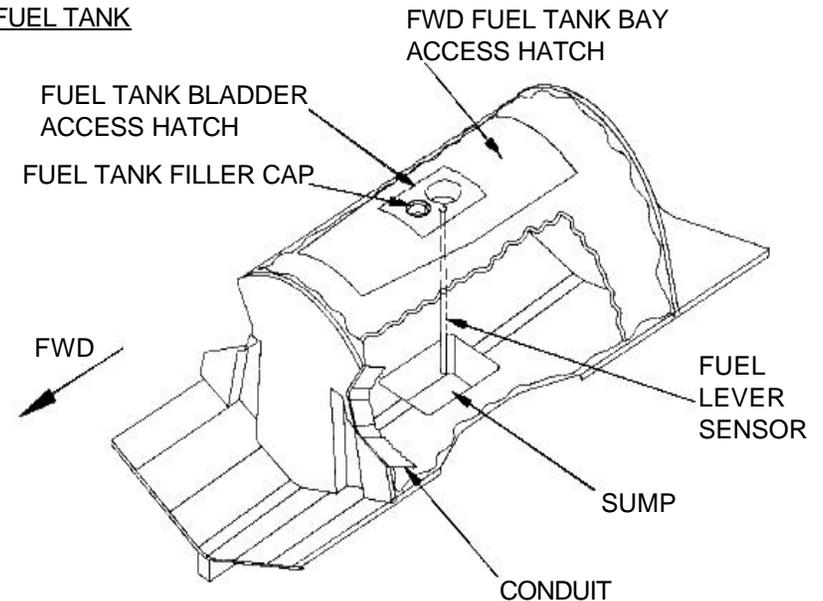
RQ-1/MQ-1

T. 00-105E-9

FWD FUEL TANK



AFT FUEL TANK



MQ-1 SYSTEM LEVEL HAZARDS

1. MQ-1L SYSTEM LEVEL HAZARDS

Both the MQ-1L and AGM-114 weapon possess materials and components that present potential hazards to personnel during ground operations and pose collateral issues via unintended functions during flight.

- a. Ground Hazards. The items that pose ground hazards consist of the engine fuel and batteries. In addition, the operating MQ-1L poses occupational hazards such as moving parts (propeller), high voltages, sharp edges, and falling weights.
- b. Engine Fuel. Preparation for transport of the MQ-1L includes removal of residual fuel (to include "depuddling"). Atmospheric venting and fuel tank access during MQ-1L operations is provided via the filler caps.
- c. Batteries. The MQ-1L utilizes Ni-Cad batteries to provide power when the engine alternator is not operating and at times when operational energy demands exceed the capacity of the engine alternator. This type of battery provides energy via chemical and not thermal means. When being transported, the batteries are in a discharged state and therefore pose no risk from an electrical perspective. Consequently, the medium used as a source of energy poses only a hazardous materials management concern when disposed of.
- d. Occupational Hazards. Those occupational hazards that exist from accessible areas in and around the aircraft are managed via cautions/warnings within the Technical Orders that are issued to the field.

2. AGM-114 SYSTEM LEVEL HAZARDS

- a. Ground Hazards. In addition to hazards posed by ordnance (rocket motor and warhead), the AGM-114 system also presents potential hazards due to the use of pressurized containers, EEDs, and a thermal battery.
- b. AGM-114 Pressurized Containers. There are two pressurized containers within the AGM-114, the accumulator and the gyro.
 - (1) Accumulator. The accumulator vessel proof pressure is 13,200 psi and the vent pressure is 13,500 psi (established via failure of a burst disk) that is incorporated to prevent internal pressures from reaching the 22,000 psi tested burst point. The operating pressure of the accumulator is 8,000 psi nominal (initial fill pressure).

RQ-1/MQ-1

- (2) Gyro. The gyro vessel proof pressure is 5,400 psi and the vent pressure is 3,600 psi (established via failure of a burst disk) that is incorporated to prevent internal pressures from reaching the 6,750 psi design burst point. The gyro vessel operating pressure is 3,000 psi.

- c. AGM-114 Electro-explosive Devices (EED). All AGM-114 EEDs meet the requirements of MIL-I-23659, including the 1-amp/1-watt, five minute no-fire requirement and passing the 25 KV Electrostatic Discharge (ESD) test. AGM-114 EEDs exist as de-ice, gyro, accumulator, and battery initiation squibs. The de-ice, gyro, and accumulator squibs initiate piston actuators. The de-ice squib assembly resides external to the weapon and has been designed for and tested to demonstrate no ejection of mechanical parts. The gyro and accumulator EEDs reside within the weapon body and have been tested to show that no venting or ejecta exit the missile. The battery squib is completely contained when functioned.
- d. AGM-114 Thermal Battery. The AGM-114 thermal battery is initiated by either of two 1-amp/1-watt, five-minute no-fire initiators. The stimuli used to fire these squibs is derived from the AEA "Missile Squib Fire" signal and is switched by the "Squib Arm" discrete signal. These signals are provided from the AEA as part of the launch sequence. The launch sequence occurs after AEA is commanded as "powered", the missile is selected (powered), and "Arm" and "Fire" commands have been received from the GCS via the MQ-1L PCM. Once squibbed, the thermal battery is active and can provide electrical stimulus for no more than 30 minutes. Testing has also shown that the maximum skin temperature reached by the battery, even in a no-load condition, is 575°F. Analysis has shown that this may cause the accumulator to be heated enough to fail the burst disk, allowing the gas to vent through the control section, but will not cause ignition of the warhead or rocket motor. In addition, no inadvertent thermal battery ignition has occurred in over 175 LAT missiles launched, or missile handling and operation. Thus no safety related failures are expected from the thermal battery.

3. INADVERTENT ROCKET MOTOR INITIATION (MISSILE LAUNCH)

- a. An inadvertent rocket motor initiation event poses the potential for loss of life to personnel on the ground as well as a potential loss of asset and/or collateral damage during airborne operations. The stimuli required by the AGM-114 to initiate its rocket motor is intended to be supplied only as a consequence of an ordered set of sequential events via a distributed system. This system consists of the GCS, MQ-1L, and AEA. The aggregate of hardware/software/protocol of these three subsystems and specific ground-based management techniques constitutes the distributed system safety.

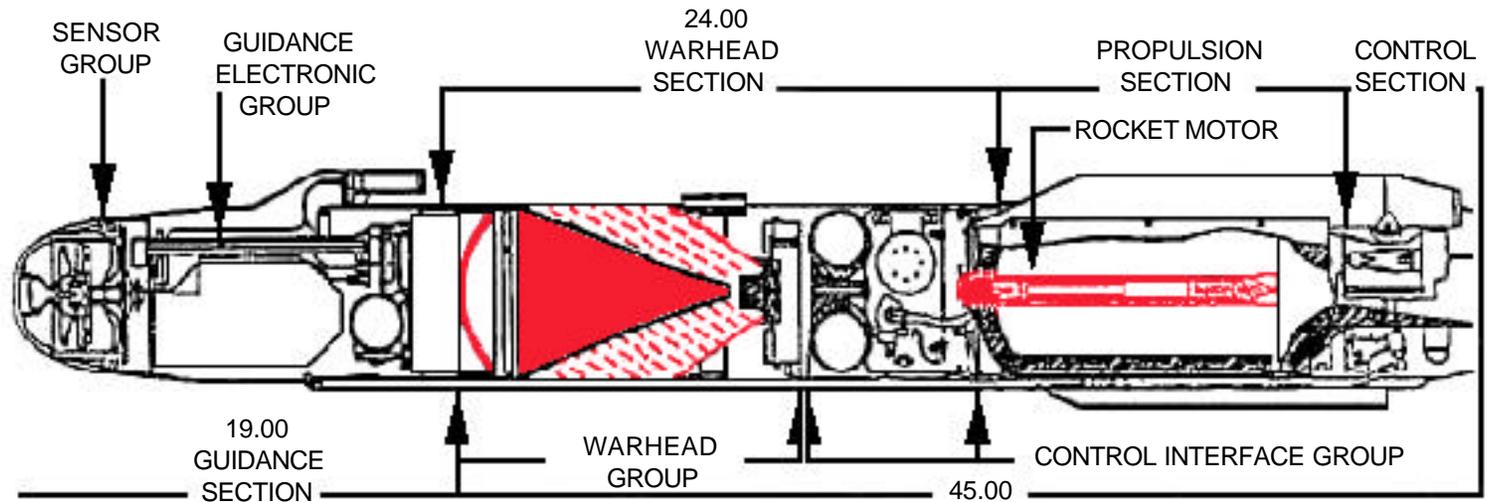
UAV MUNITIONS

1. AGM-114K-2 MISSILE AND WARHEAD SUBSYSTEM

The AGM-114 missiles are laser-guided rocket propelled anti-armor and anti-material weapons developed by the U.S. Army to be deployed from a helicopter. The AGM-114K-2 configuration employs a dual shaped charge warhead system. A precursor warhead first defeats reactive armor, then the main warhead is functioned to defeat the remaining armor. The AGM-114M configured weapon employs a Blast-Fragmentation (blast-frag) warhead. The blast-frag warhead is designed to separate from the missile upon impact and penetrate the target before detonating. Both missiles consist of a Guidance Section, Warhead Section, Propulsion Section and Control Section. The explosive is two zirconium sponge incendiary charges. The colorized area with broken lines consists of zirconium particles with calcium stearate flakes.



AGM-114 MISSILE



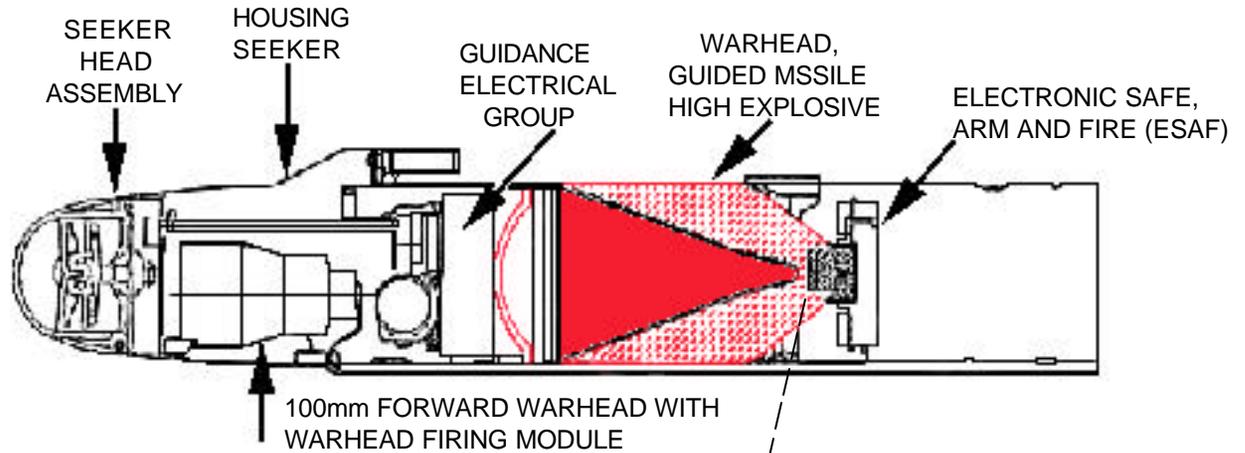
AGM-114 K-2 MISSILE CONFIGURATION

UAV MUNITIONS-Continued

2. AGM-114K-2 CONFIGURATION

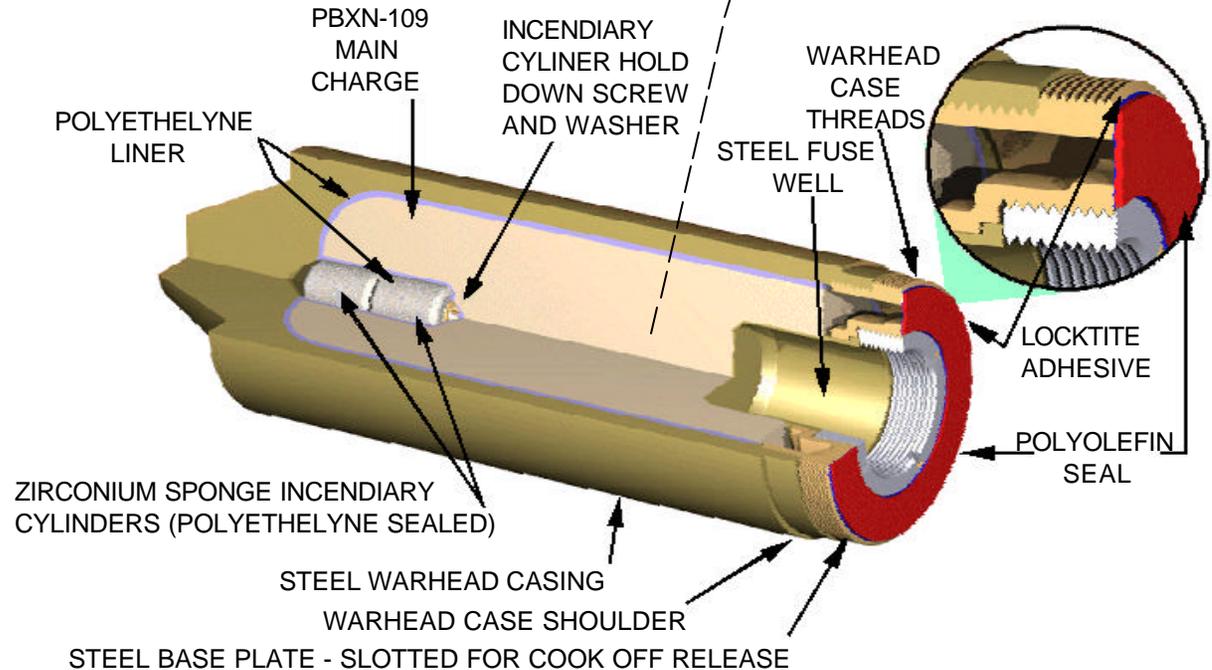
The warhead function sequence is initiated when either crush switch (or back-up g-switch) located in the front of the weapon is closed. Upon receipt of this indication, the ESAF processor sends a trigger signal to the FWFM initiating the precursor warhead to defeat the reactive armor. The ESAF processor then sends a trigger signal to the Main Module after a preprogrammed factory delay ("Fuze Data" from the guidance section) causing its output to the main warhead to occur after the precursor warhead has had the opportunity to perform its task. This staging of functions allows the main warhead to defeat the main armor.

AGM-114 K-2 MISSILE CONFIGURATION



3. AGM-114K-2 HAZARD CLASSIFICATION

The classification for the AGM-114K-2 missile is listed below:
 DOD Class/Division/SCG – 1.1E
 DOT Label: Explosive 1.1E
 DOT Proper Shipping Name: ROCKETS
 UN Serial Number 0181



UAV MUNITIONS-Continued

4. AGM-114M WARHEAD

The blast-frag warhead is installed in the warhead section in place of the main warhead for the K-2 missile. The precursor warhead is also removed. The blast frag warhead consists of a warhead body, 2.511 Kg PBXN-109 explosive fill, two zirconium sponge incendiary charges, and the fuze well and aft closure components. Two incendiary cylinders are bolted with a stainless steel bolt to the front inside of the steel case. These cylinders (111 grams each) are pressed sifted zirconium metal particles with calcium stearate flakes. The steel warhead casing with incendiary cylinders installed is coated internally with AC 5120 Polyethylene. The PBXN-109 explosive is cast into the case over the incendiary cylinders. A slotted base plate is screwed onto the aft end of the warhead case to allow attachment of the fuze well and Time Delay Fuze Assembly (TDFA). A polyolefin seal seals the slots. An 18-gram PBXN-5 booster pellet is placed between the fuze and inside of the fuze well.

5. AGM-114M CONFIGURATION

The warhead function sequence is initiated when either crush switch located in the guidance section is closed. Upon receipt of this indication, the time delay CCA in the TDFA provides a delay to allow time for the blast-frag warhead to pass through any barrier before providing an output to the blast-frag warhead. The warhead function consists of blast energy from the warhead main fill coupled with initiation of incendiary cylinders in the front of the warhead and case fragmentation.

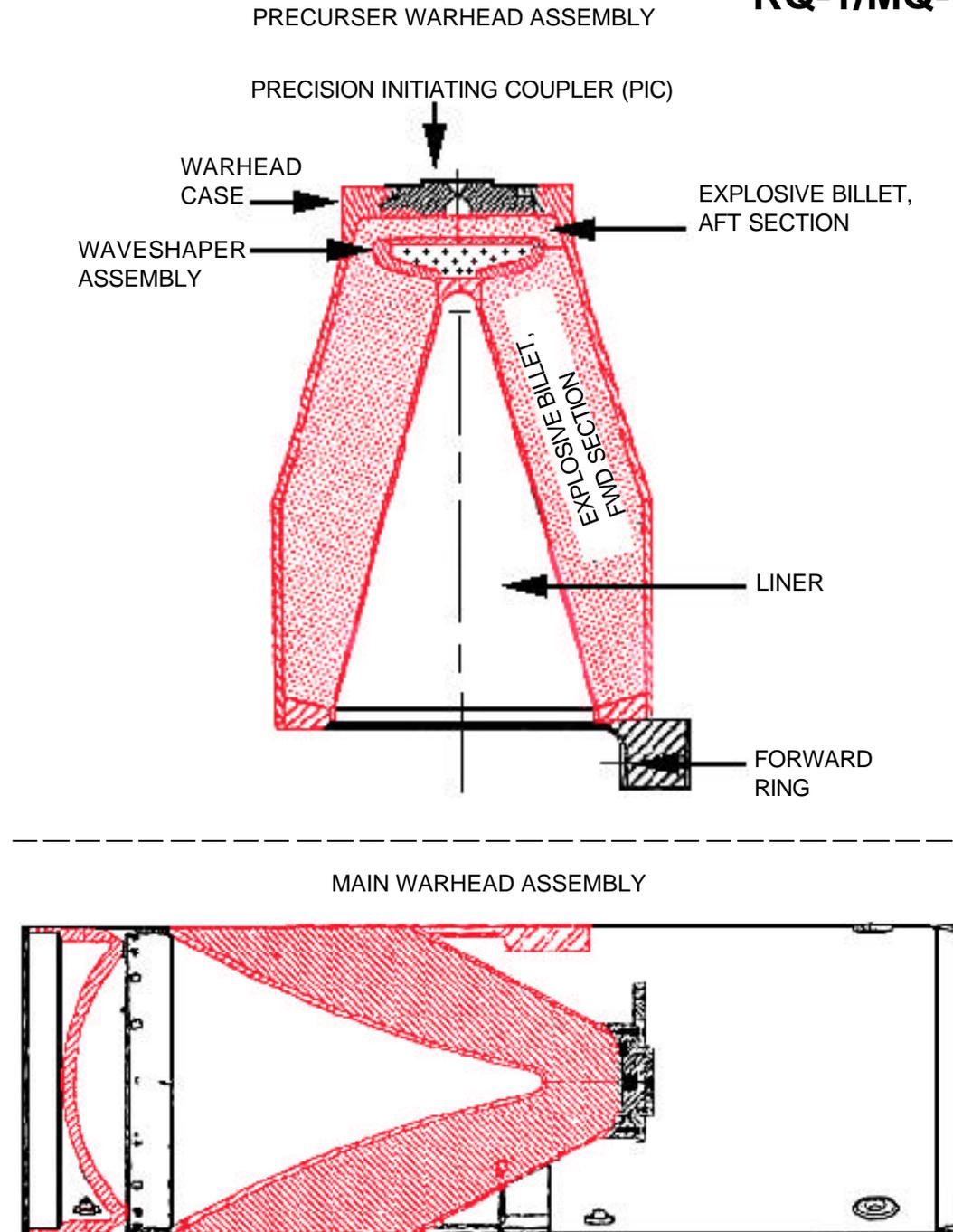
6. AGM-114M HAZARD CLASSIFICATION

The interim classification for the AGM-114M missile is listed below. The final hazard classification is in Tri-Service coordination:

DOD Class/Division/SCG – 1.1E
 DOT Label: Explosive 1.1E
 DOT Proper Shipping Name: ROCKETS
 UN Serial Number 0181

RQ-1/MQ-1

T. 00-105E-9



UAV GENERAL INFORMATION

The Global Hawk system is comprised of the Global Hawk High Altitude Endurance Unmanned Aerial Vehicle (HAE UAV) and a Common Ground Station (CGS). The primary mission is to provide overt, continuous, long endurance, all weather, day/night wide area reconnaissance and surveillance.

The aerial vehicle is a conventional design, high-aspect ratio, low wing, tricycle landing gear UAV powered by a single Allison AE3007H turbofan engine. It is capable of carry Electro-Optical (EO), infrared (IR), and Synthetic Aperture Radar (SAR) payloads simultaneously.

The CGS (not illustrated) is made up of two independent mobile, self- sustained van complexes; a Launch and Recovery Element (LRE) and a Mission Control Element (MCE).

Actual zero fuel weight varies based on kits installed in the UAV.

FUEL TANK CAPACITY: 2270 GALS (15,436 LBS)

ZERO FUEL WEIGHT: 11,300 to 12,250 LBS

WARNING

When approaching the aircraft, ground and emergency response personnel should be aware of UAV hazards, such as hot brakes, running engine, antenna radiation and leaking fluids that may be flammable.

RQ-4A



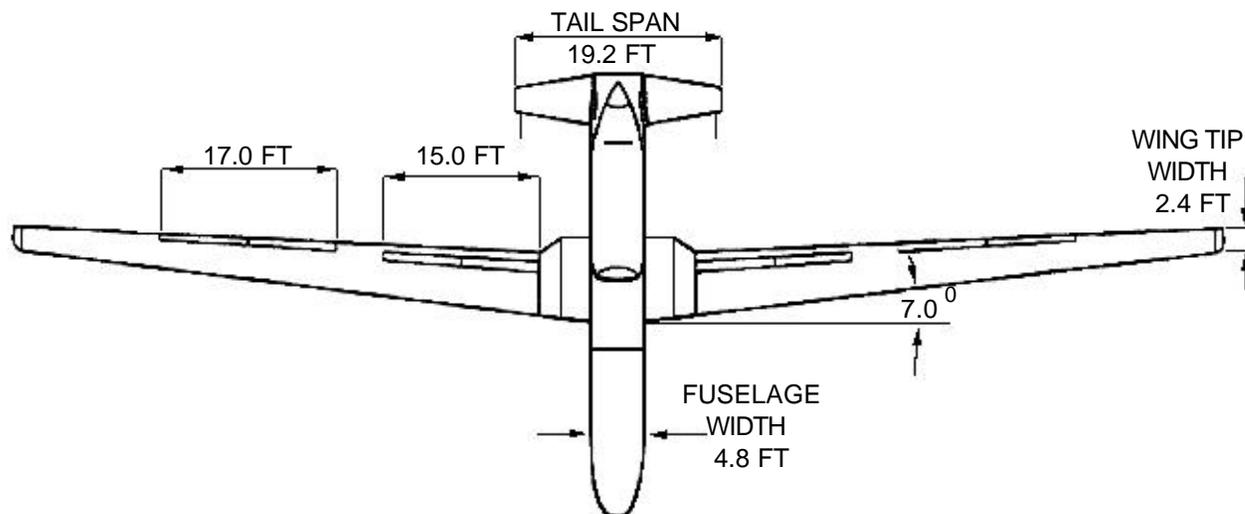
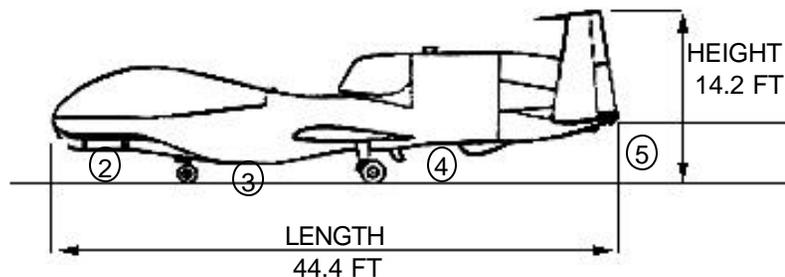
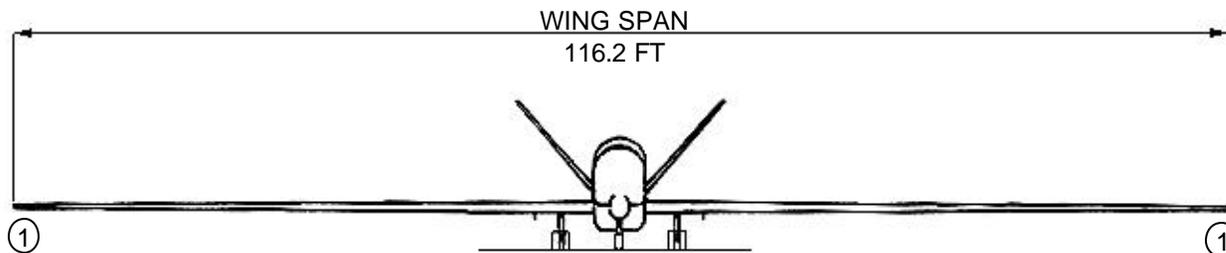
UAV DIMENSIONS AND CLEARANCES

DIMENSIONS AND CLEARANCES

NOTE:

Clearances are based on normal operating conditions with maximum gross weight fuel load. Tires are inflated to proper pressures. Struts are properly serviced and fully compressed due to the fuel load. Wing tip clearance shown at maximum deflection during tow (1.6G).

- 1. WING TIP: 26.0 INCHES
- 2. EO/IR PANEL: 33.5 INCHES
- 3. SAR RADOME: 19.5 INCHES
- 4. CDL RADOME: 27.5 INCHES
- 5. TAIL LIGHT COVER: 66.5 INCHES



UAV HAZARDOUS MATERIALS

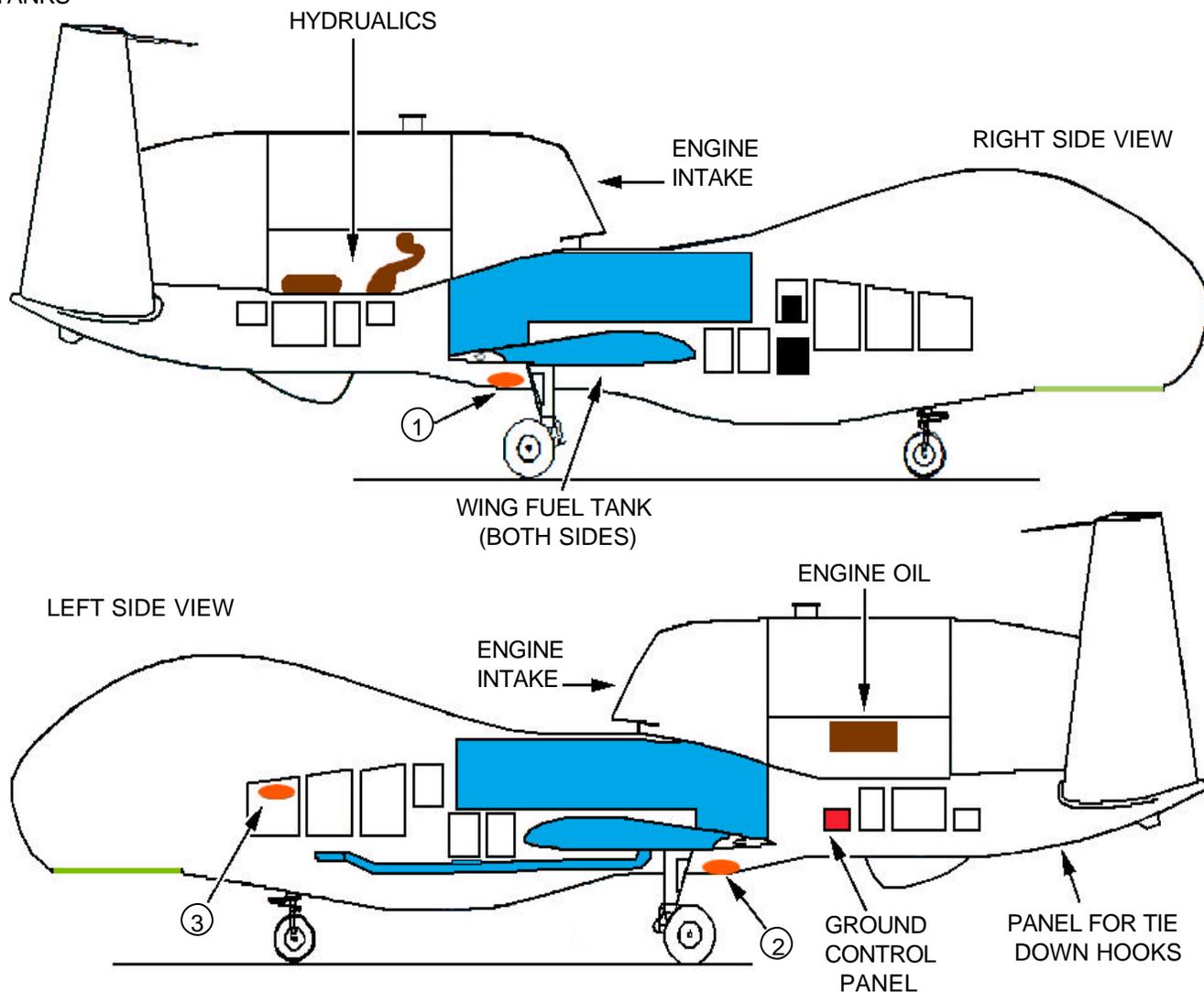
HAZARDOUS MATERIALS LOCATIONS

- FUEL: JP-8, 930 GALS - MAIN TANK
1215 GALS - WING TANKS
- ENGINE OIL, MIL-L-7606
HYDRAULIC FLUID: MIL-L-5808
HYD ACCUMULATOR (1)
2000 PSI - 2 GALS
- EO/IR LENS WITH THORIUM COATING
- NICAD BATTERY(3) 28 VOLT (STAINLESS STEEL BOXED)
- NITROGEN BOTTLES (3)

NOTE:
All 3 nitrogen bottles at 3000 PSI

1. Emergency gear blowdown (right side MLG)
2. Emergency brake (left side MLG)
3. Ku SATCOM waveguide pressurization (forward left side equipment compartment)

Tire pressures:
Nose Wheel 93 PSI
Main Wheels 193 PSI



UAV STRUCTURAL COMPOSITION

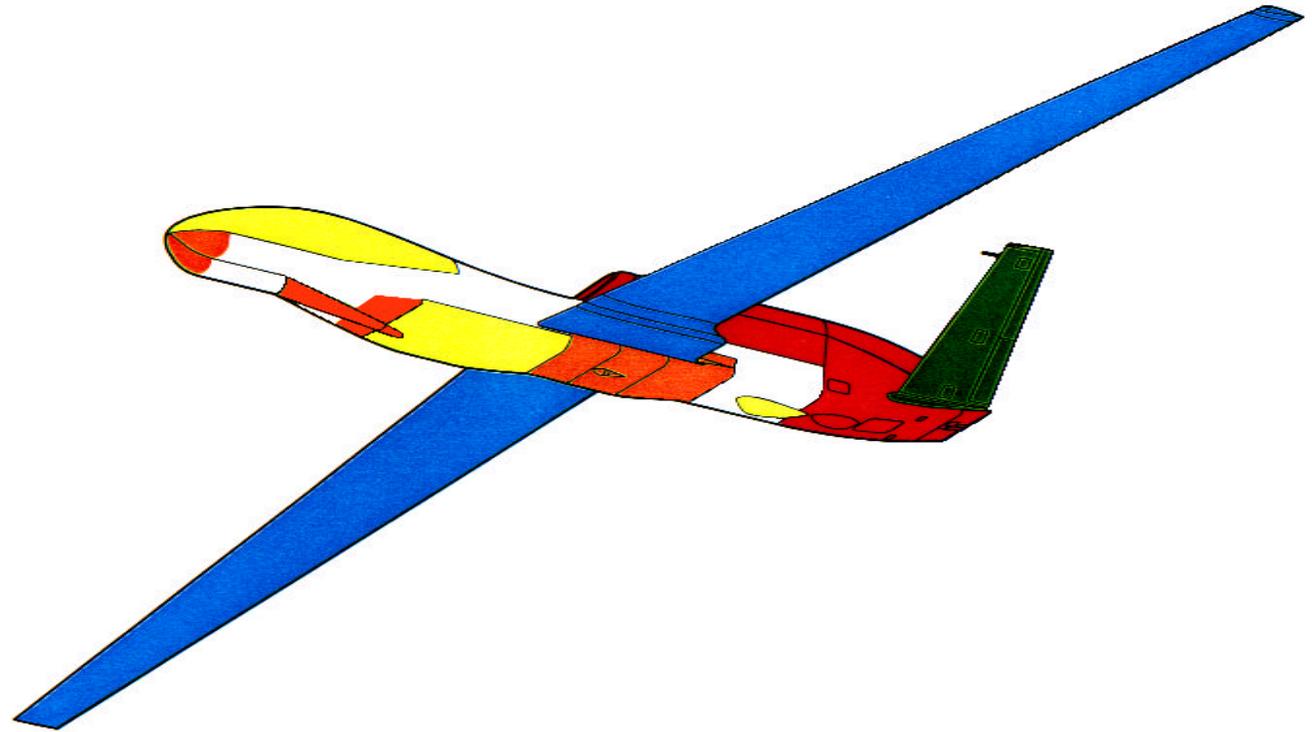
RQ-4A

STRUCTURAL KEY

	WINGS
	RADOMES
	V-TAIL
	AFT FUSELAGE AND NACELLE
	FAIRINGS AND LANDING GEAR DOORS

NOTE:

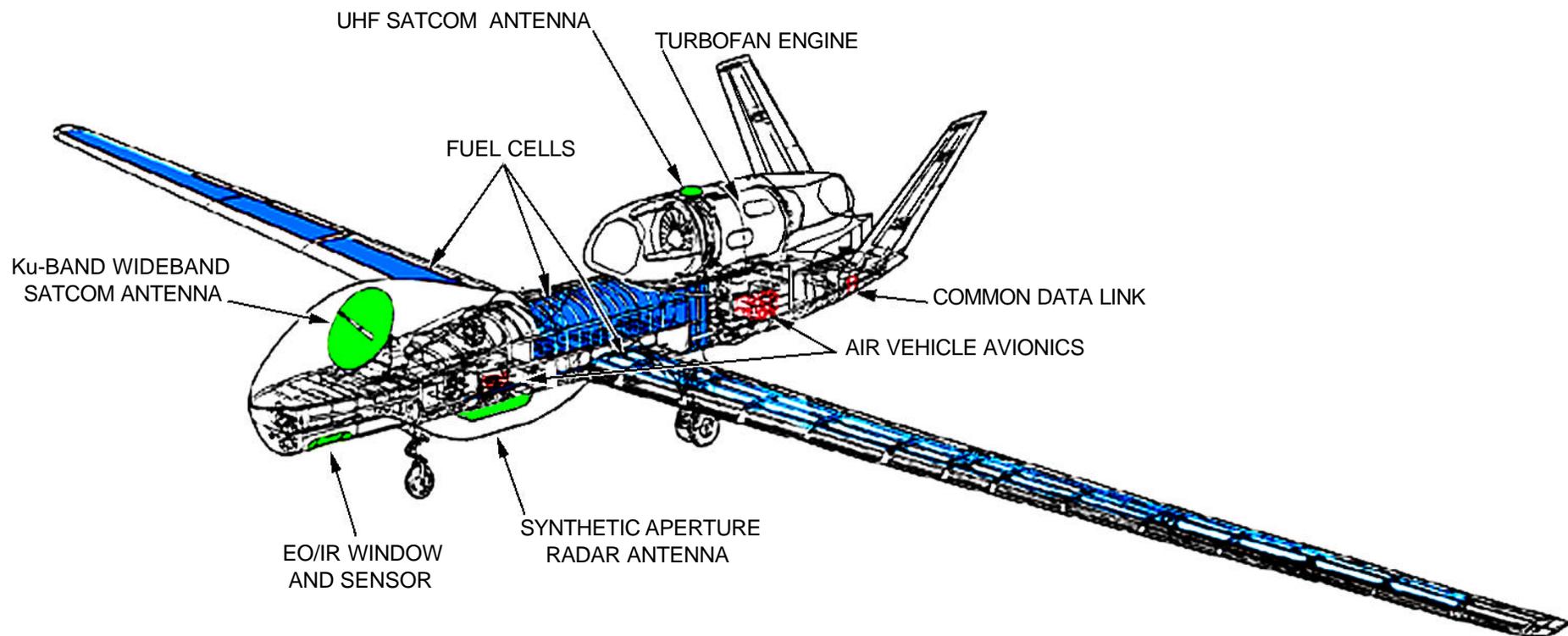
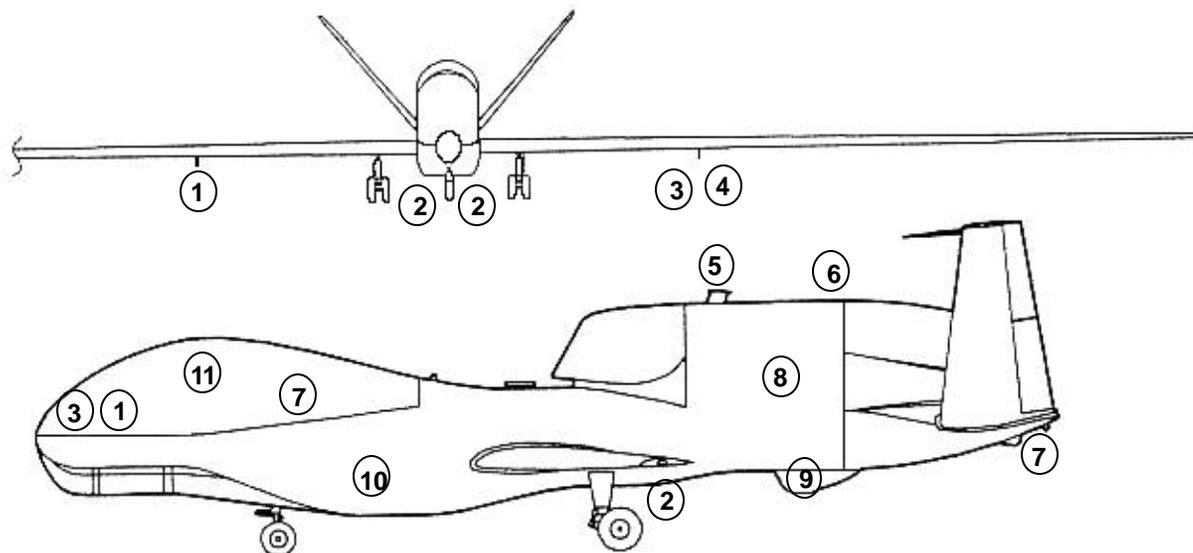
All external surfaces are made of graphite composite material. These materials are not considered exotic or advanced, but rather fiberglass. The wings, radomes, and cowlings are made of graphite epoxy. The engine is encased in kevlar for heat and fire protection. Gel coats are not used.- Thermoset resin is used. These materials are used in the manufacture of the major composite structures (wing, engine, nacelle, v-tail, etc.).



UAV DANGER AREAS

MULTIPLE ANTENNA LOCATIONS

1. UHF LOS C² and Voice Receiver
2. Radio Altimeters
3. UHF LOS C² Transmitter
4. VHF Voice
5. UHF SATCOM
6. GPS
7. IFF
8. Differential GPS
9. CDL
10. SAR
11. Ku SATCOM

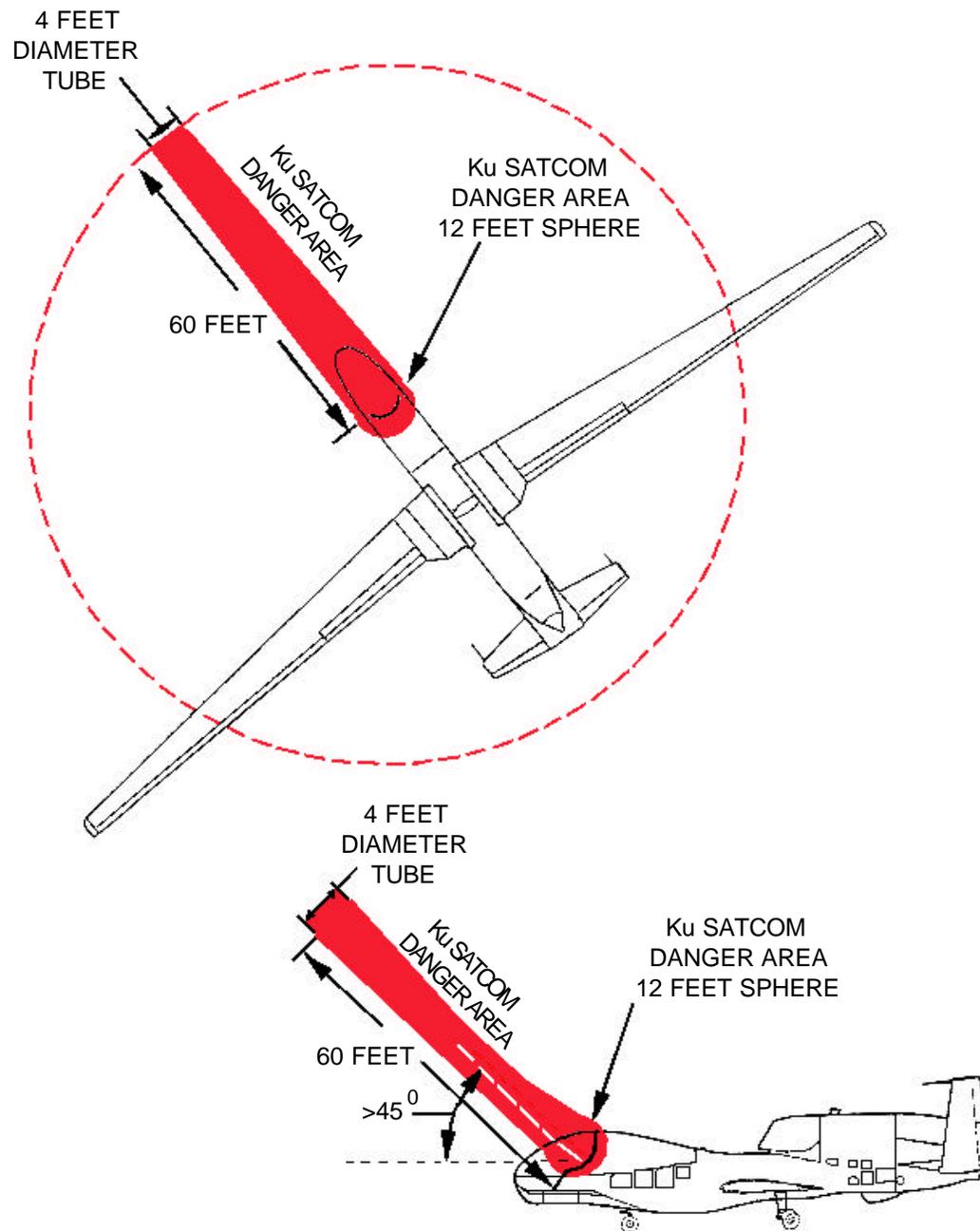


UAV DANGER AREAS-Continued

Ku SATCOM ANTENNA RADIATION AREAS

NOTE:

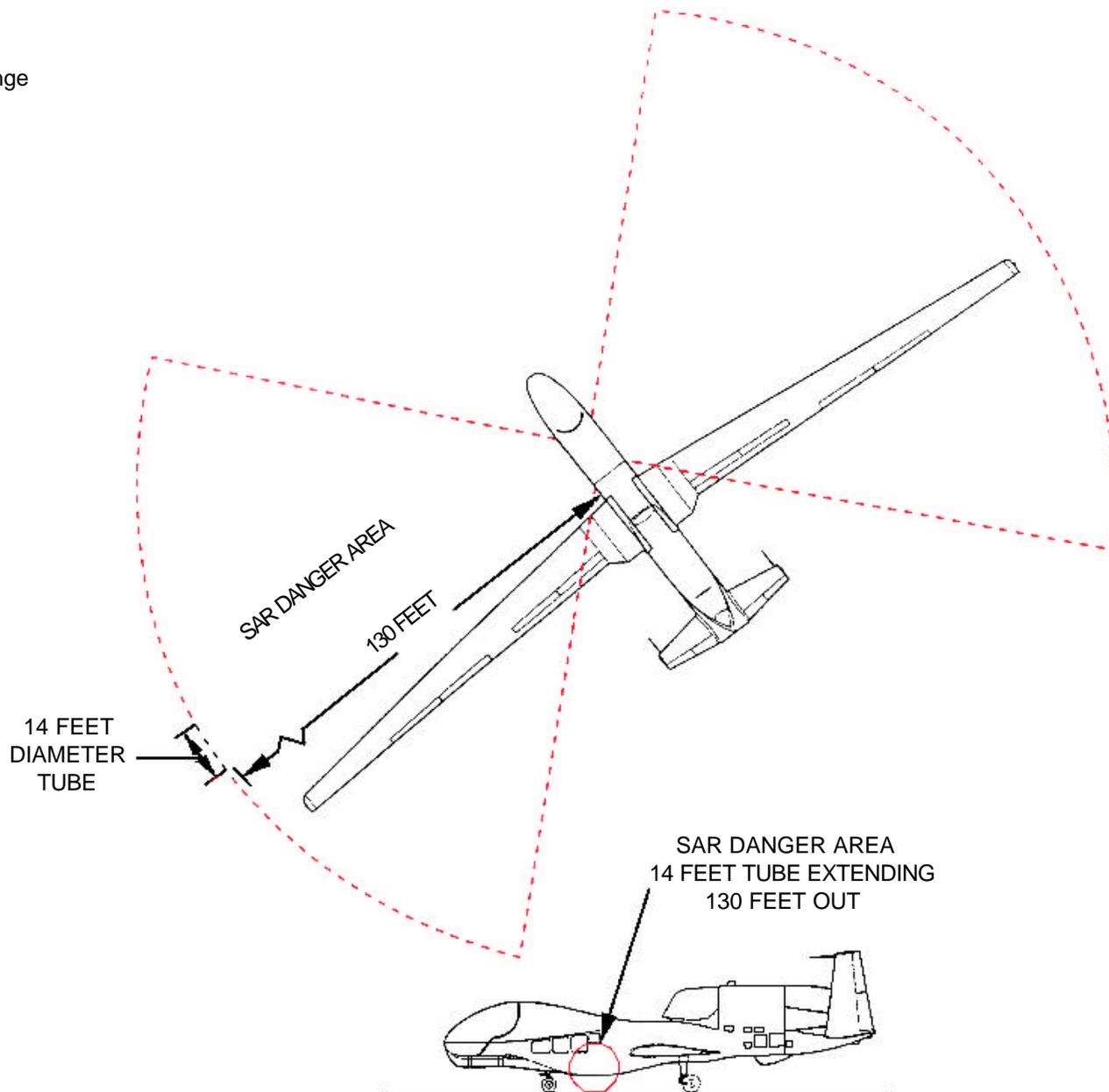
Dashed lines indicate Ku SATCOM antenna range of motion/radiation potential.



UAV DANGER AREAS-Continued

SAR ANTENNA RADIATION AREAS

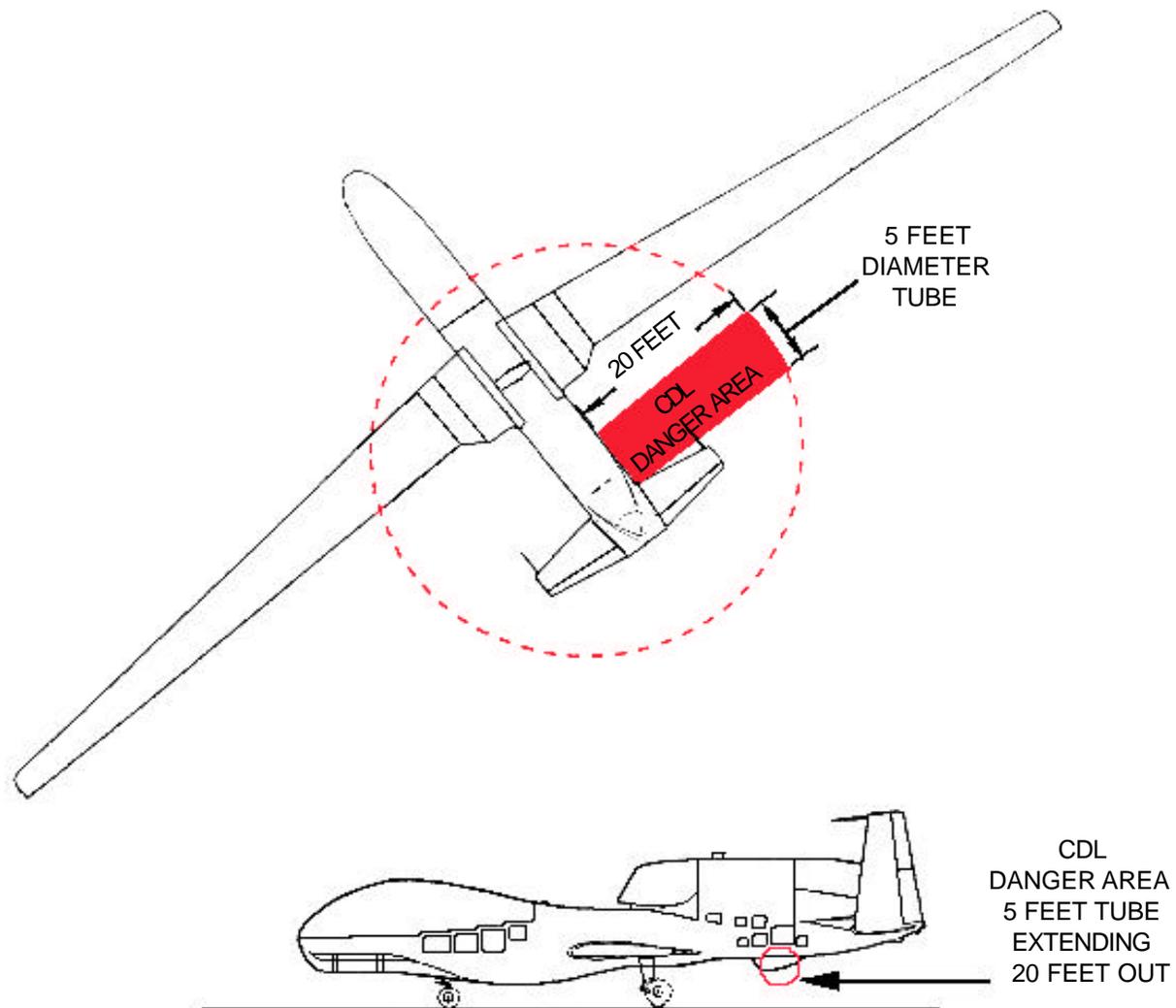
NOTE:
Dashed lines indicate SAR antenna range
of motion/radiation potential.



UAV DANGER AREAS-Continued

CDL ANTENNA RADIATION AREAS

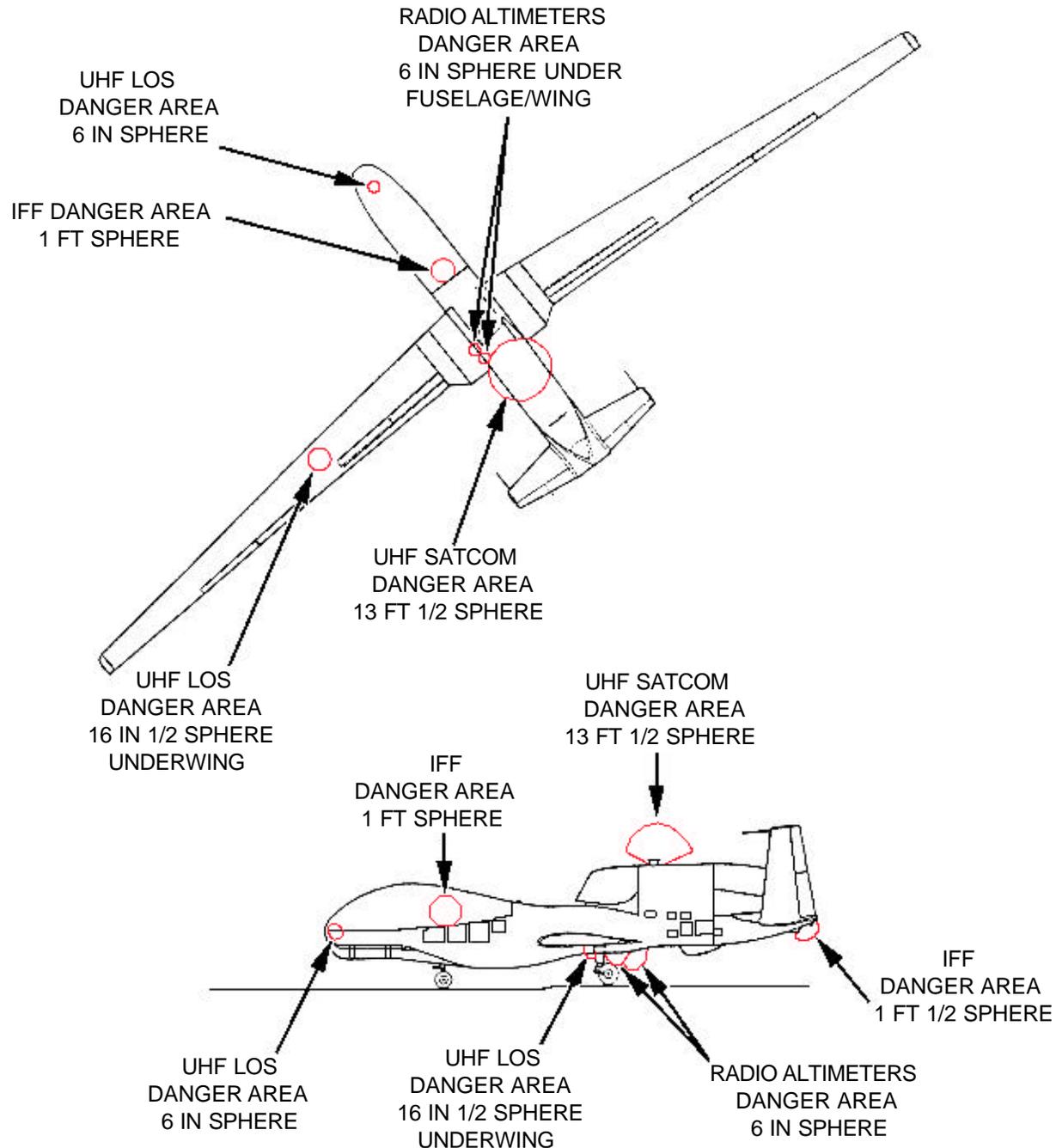
NOTE:
Dashed lines indicate CDL antenna range
of motion/radiation potential.



UAV DANGER AREAS-Continued

FIXED ANTENNA RADIATION AREAS

NOTE:
Radiation areas for fixed antenna varies in size.



UAV DANGER AREAS-Continued

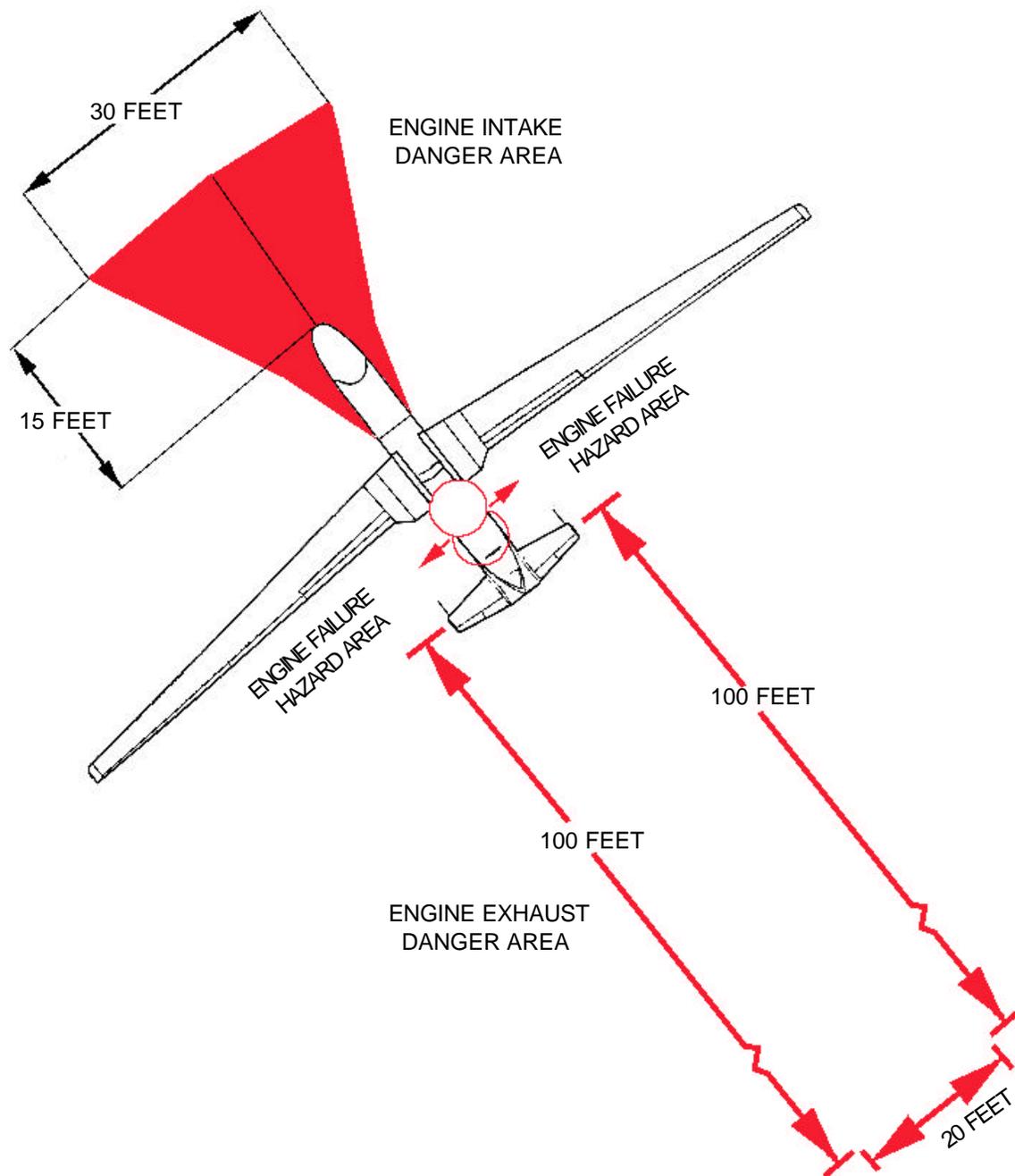
ENGINE INTAKE, EXHAUST AND FAILURE AREAS

WARNING

Clear all equipment and personnel from the aft of the aircraft (100 feet back and 20 feet wide). This area subject to the heat and exhaust air velocity produced by the engine.

NOTE:

These danger areas exist during normal operations, engine runs and taxiing procedures.



EMERGENCY ENGINE SHUTDOWN

1. EMERGENCY ENGINE SHUTDOWN

NOTE:

Items in capitalization denote the designations on the ground control panel (GCP).

- Install ground safety pin prior to engine shutdown, if time permits.

NOTE:

The installed pin safes all radiation ICS, ISS (dangerous RF emissions), all EEDs (electro-explosive devices), all EOD items, disables landing gear retraction, inhibits commands for taxi and brake release and inhibits engine RPM greater than 70%.

- Move the EMER STOP switch, located on the GCP, up.

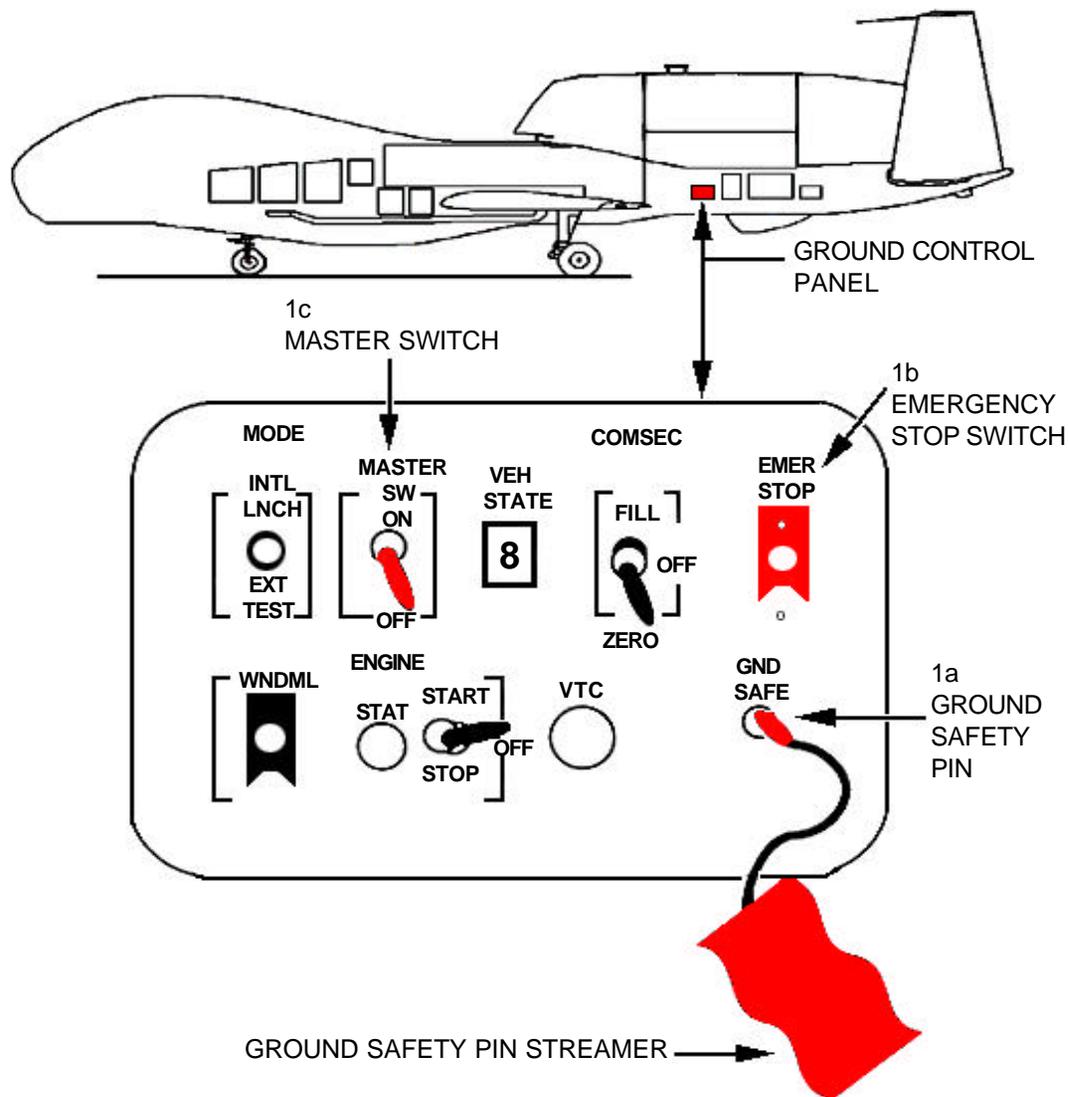
CAUTION

Brakes will release when engine is shutdown. Place wheel chocks at front and rear of MLG tires.

- Move the MASTER SW to the OFF position.

NOTE:

This will remove all power from the UAV, closes the main fuel shut off valve, shuts down engine, releases brakes and logs event in IMMC fault log.



UAV RECOVERY

1. DIVERT PROCEDURES

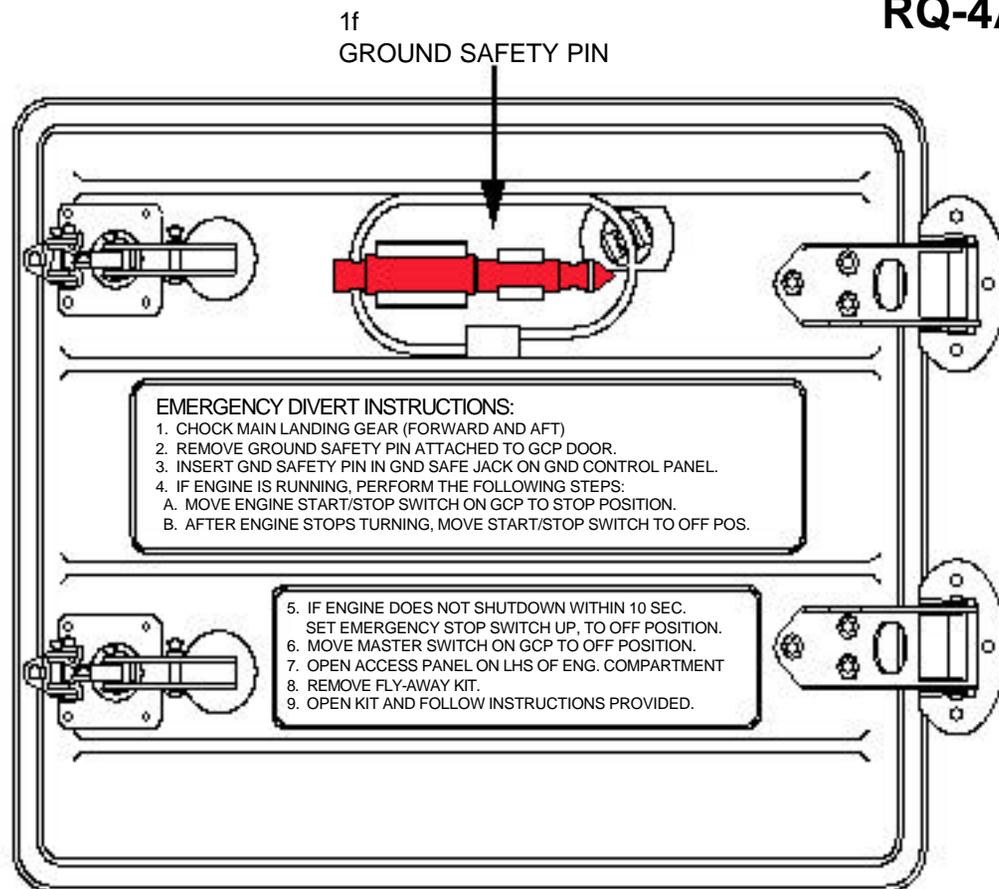
NOTE:

The following procedures and information are intended for crews designated with the assigned responsibilities.

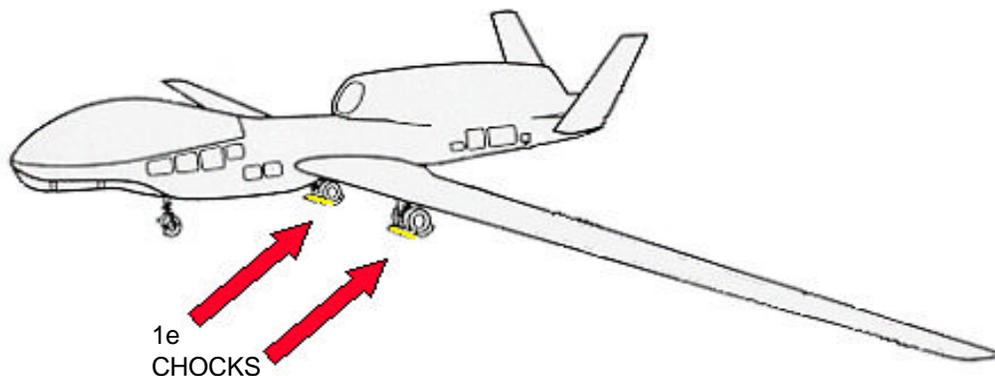
- a. These procedures secure a Global Hawk that has landed and has stopped on the runway.

WARNING

- There is no visual camera for the UAV operator. Maintain radio contact with the airfield control tower and the Command and Control Operator (CCO).
 - The UAV has several cryptographically keyed systems that may be classified SECRET. Contact the CCO to verify the level of classification.
 - Follow the standard procedures for potentially hot brakes. Do not enter wheel area from sides.
- b. Note the danger zones described in Figures 1 through 3. Communicate with CCO to determine which antennas are operating. Minimize exposure time within Danger Zones.
- c. Ground personnel will visually inspect the aircraft for hazards, such as hot brakes and leaking fluid.
- d. If not previously completed, open the Ground Control Panel (GCP) on the aft left-hand side of the aircraft.
- e. If not previously completed, follow all the steps on the Divert Instruction placard. Install chocks in proper locations. Refer to next page for Fly-Away Kit location and contents.
- f. Verify the Ground Safety Pin is in the GND SAFE jack and the engine has shutdown. Notify the CCO the Ground Safety Pin is inserted and the engine has shutdown.



1e
DIVERT INSTRUCTIONS PANEL



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

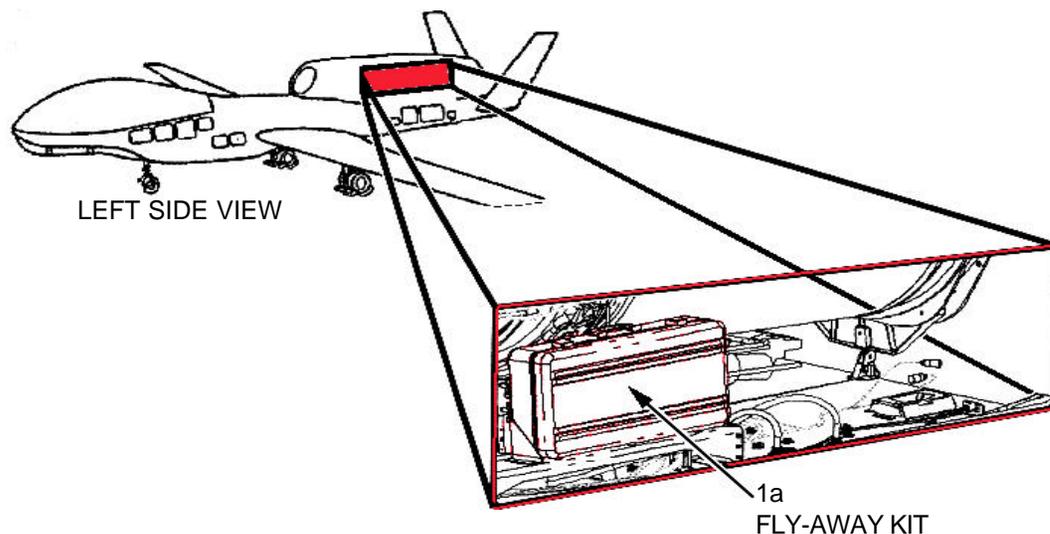
NOTE:

The Ground Safe Pin performs the following functions:

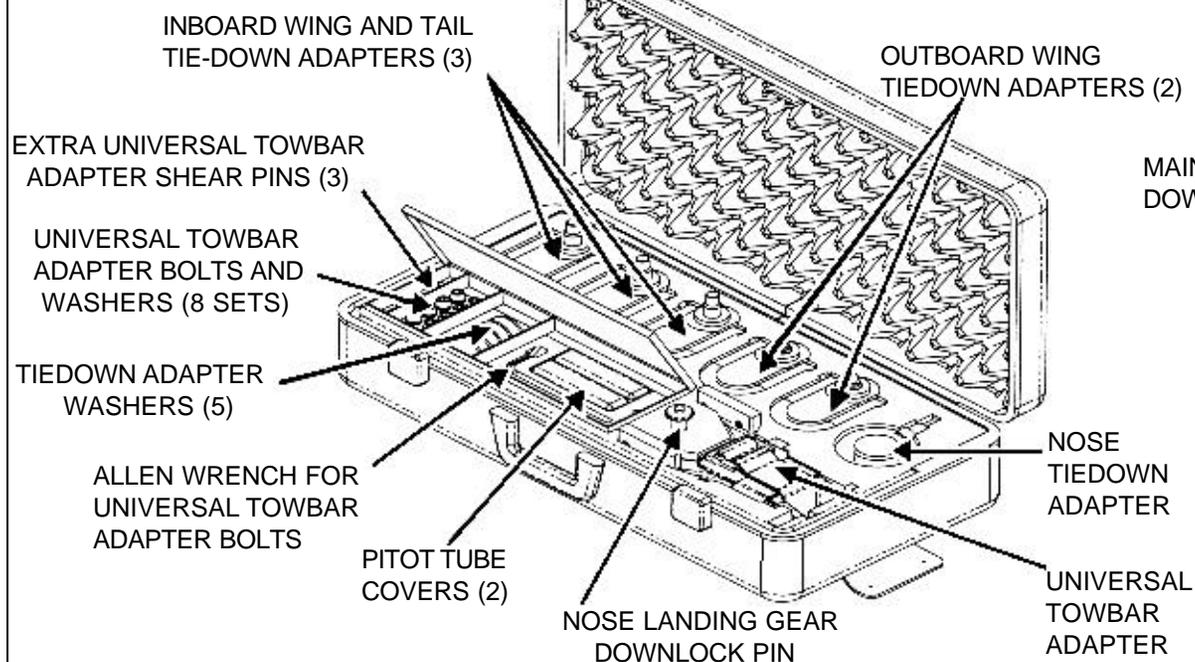
- (1) Inhibits dangerous RF emissions.
- (2) Disables landing gear retraction.
- (3) Inhibits commands for taxi and brake release.
- (4) Safes all Explosive Ordnance Devices (EOD).

- g. If not previously completed, open the left-hand side engine compartment access panel and locate the Fly-Away Kit . Remove the four mounting bolts that secure the Fly-Away Kit . Use a 7/16 inch wrench or socket to remove the mounting bolts.

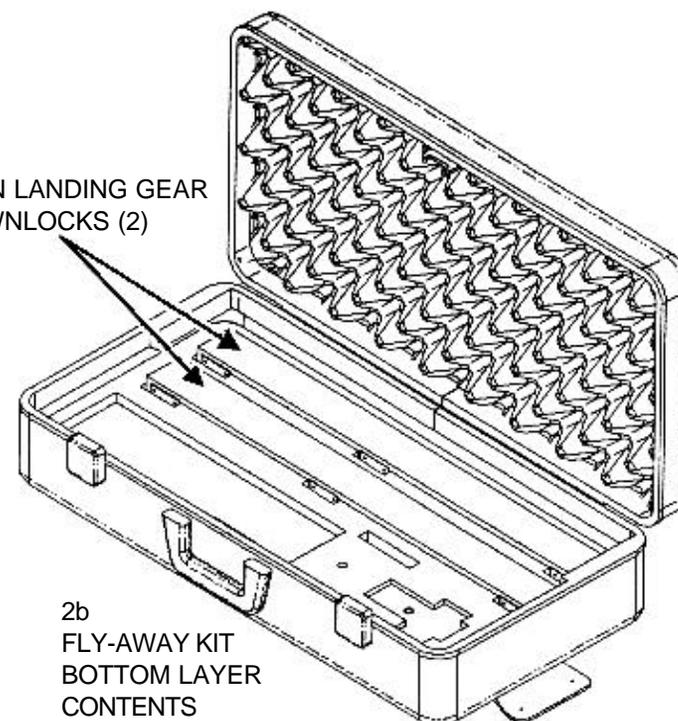
- h. See Fly-Away Kit layout and contents.



2a
FLY-AWAY KIT
TOP LAYER CONTENTS



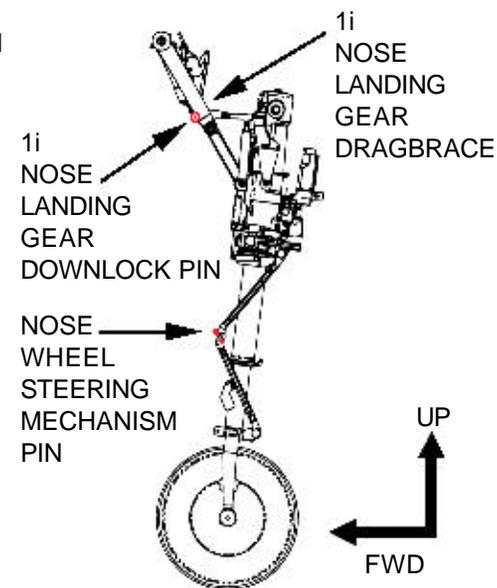
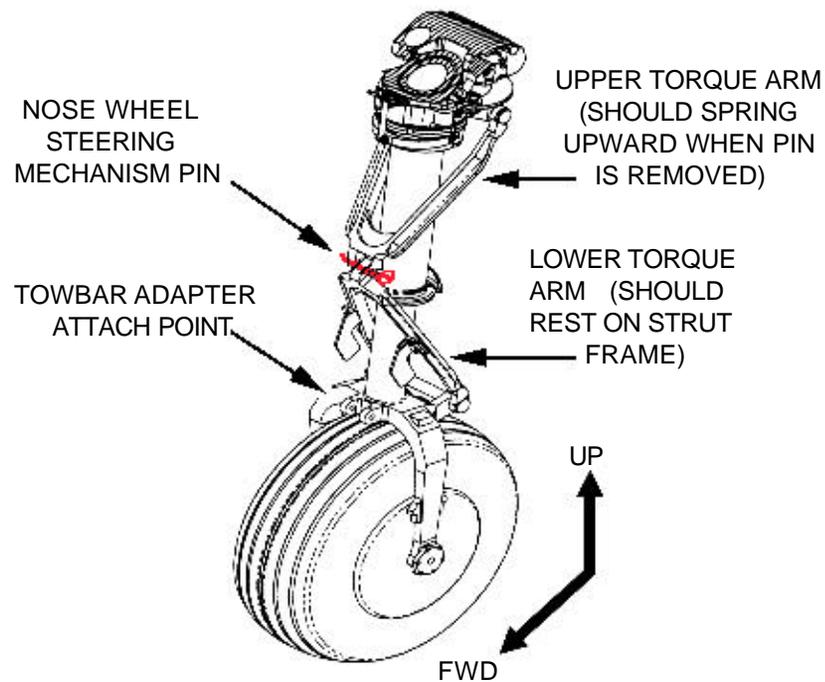
MAIN LANDING GEAR
DOWNLOCKS (2)



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

- i. Insert the Nose Landing Gear Downlock Pin in the hole provided on the NLG dragbrace.
- j. Install the Main Landing Gear Downlocks on the chrome of the MLG retract actuators.



1j MAIN LANDING GEAR DOWNLOCK



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

- k. Verify the Master Switch, located on the GCP, is in the OFF position.
- l. Move the COMSEC Switch, located on the GCP, to the ZERO position then to the OFF position.
- m. Close Ground Control Panel (GCP) door.
- n. Tow aircraft to a hangar or a safe location.

WARNING

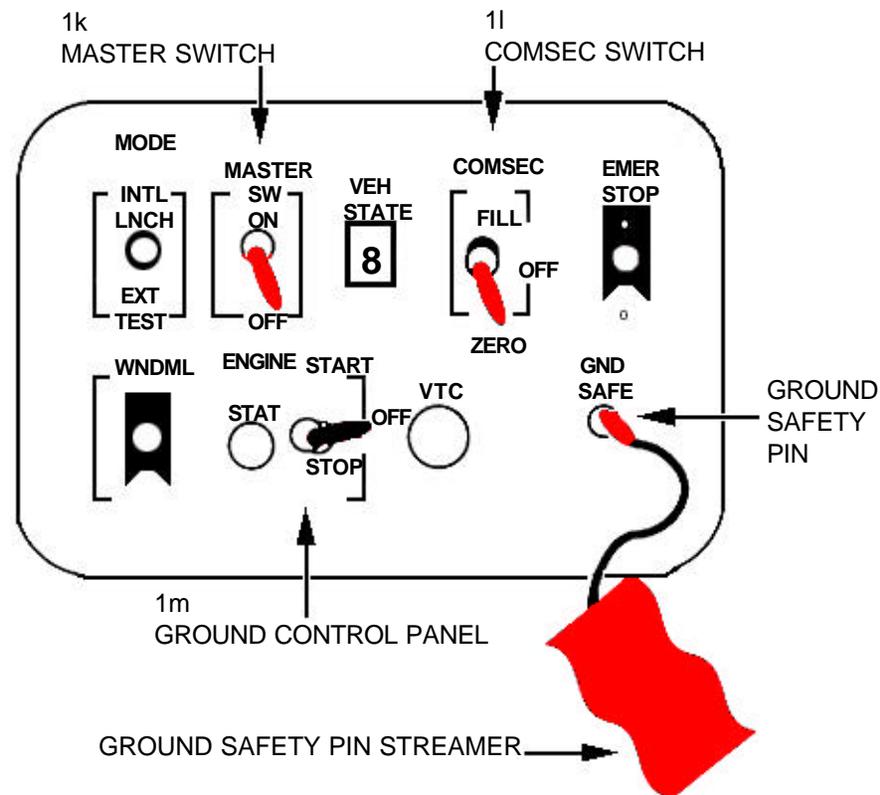
Failure to follow the safety precautions while towing the aircraft with personnel sitting on the outer wing section may result in injury or death to the personnel.

- (1) If the aircraft has landing in an unbalanced configuration (one wing heavier than the other), up to four personnel may sit on outer section of the high wing to balance the wings during towing in adverse or emergency conditions.

CAUTION

Torque arm attach pin must be removed and torque arms separated before towing. If torque arms are not separated before towing, the Nose Landing Gear could be damaged during towing.

- (2) Disconnect the Nose Wheel Steering Mechanism. See previous page.
 - (a) While pushing in the ball-lock button on the end of torque arm attach pin, remove the cap and the pin from the torque arms.
 - (b) Be sure the upper torque arm raises to the full up position (upper torque arm should spring up) and the lower torque arm rests on the strut frame.
 - (c) Stow the pin in upper torque arm.



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

- n.(3) Install the Universal Towbar Adapter on the Towbar. If an F-5 or T-38 aircraft towbar is used the Universal Towbar Adapter is not required.
- Turn the handle on the Towbar until the Universal Towbar Adapter fits snugly between the forks.
 - Secure the Universal Towbar Adapter to the Towbar with eight bolts, washers supplied in the Fly-Away Kit. Use the Allen Wrench supplied with the Fly-Away Kit to tighten the bolts. If a Torque Wrench with Allen Wrench adapters is available, torque the bolts to 95-105 inch-pounds above the prevailing torque. The prevailing torque should be between 10-80 inch pounds.

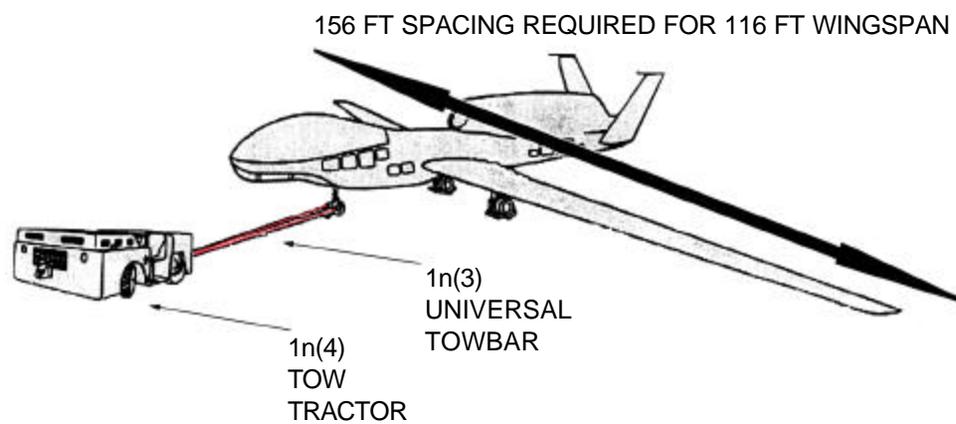
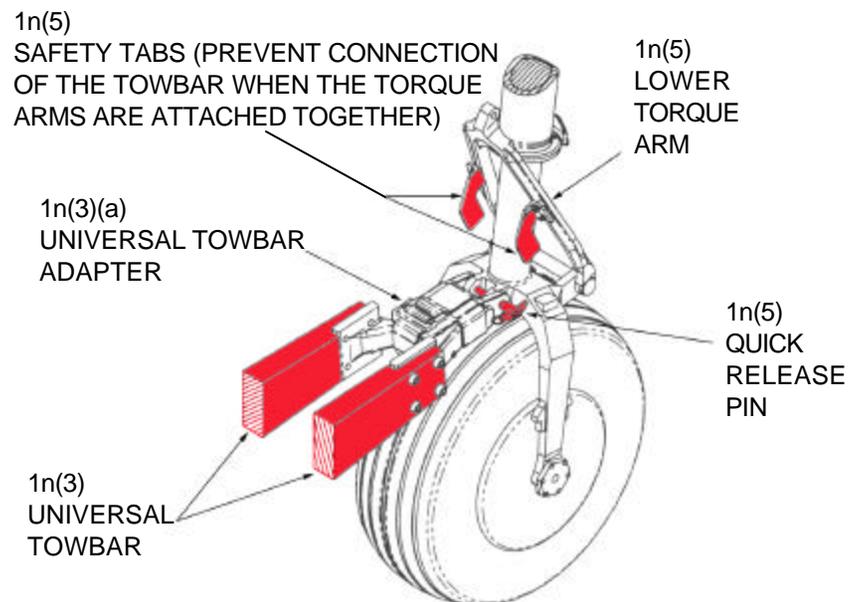
NOTE:

Personnel performing this function must be familiar with safety precautions reflected in AFOSH STD 91-100.

- Request the tow tractor driver to move the Tow Tractor into position.
- Raise Lower Torque Arm upward. This will allow clearance to engage the Towbar Adapter/Towbar below the Safety Tabs. With the Lower Torque Arm raised, position the Towbar Adapter/Towbar on the Nose Landing Gear Strut and insert the quick release pin through the Nose Wheel Attach Point and the Towbar Adapter/Towbar.
- Rest the Lower Torque Arm on the strut frame to prevent interference with the Nose Landing Gear Doors.
- Attach the other end of the Towbar Adapter/Towbar to the Tow Tractor hitch.

NOTE:

Whenever towing in areas with less than 20 feet of wing tip clearance on both sides (total of 156 feet space between obstructions), wing walkers should be used on both wing tips. A tail walker is required for backing the UAV.



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

n.(8) If required, assign the wing walkers to the wing tips to help guide and balance the UAV. Note the illustrated large wing span.

(9) Assign one tow observer to ride on the Tow Tractor.

(10) Verify the brakes are off by physically moving the brake disk.

(11) The tow observer will request the wing walker assistants to remove the wheel chocks from the Main Landing Gear.

CAUTION

- Have the aircraft in motion before starting a turn.
- When a tow vehicle with automatic transmission is used, tow in the low range.
- Avoid sudden starts and stops. Failure to do so may result in shearing towbar pin.
- Whenever the UAV is towed, a wing walker should have a set of chocks to stop the UAV should the shear pin fail.
- If the shear pin fails, additional shear pins can be found in the Fly-Away Kit.
- Do not exceed 5 MPH while towing the UAV.
- The Nose Wheel must not be turned greater than 30 degrees while towing the UAV. Damage to the Nose Landing Gear Doors may occur if the 30 degree limit is exceeded.
- Before towing the UAV, ensure the winds in the area do not exceed 30 knots. Do not tow the UAV if the winds are in excess of 30 knots.

UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

CAUTION

Uneven pavement may cause wing to contact ground.
156 feet of spacing is required for a 116 foot wing span.

- (12) Move the UAV to the designated area.
 - (13) Once UAV has cleared the runway, call airfield control tower and inform them the UAV is clear of the runway.
 - (14) At the destination, the observer will request the wing walkers to place the wheel chocks in front and back of both Main Landing Gear Wheels. (See next page.)
 - (15) If one wing is heavier than the other and will dip to the ground, place foam or other material under the wingtip to protect the wing.
- o. If the UAV is going to be parked outside for an extended period of time, cover the engine inlet and exhaust with clean tarps.

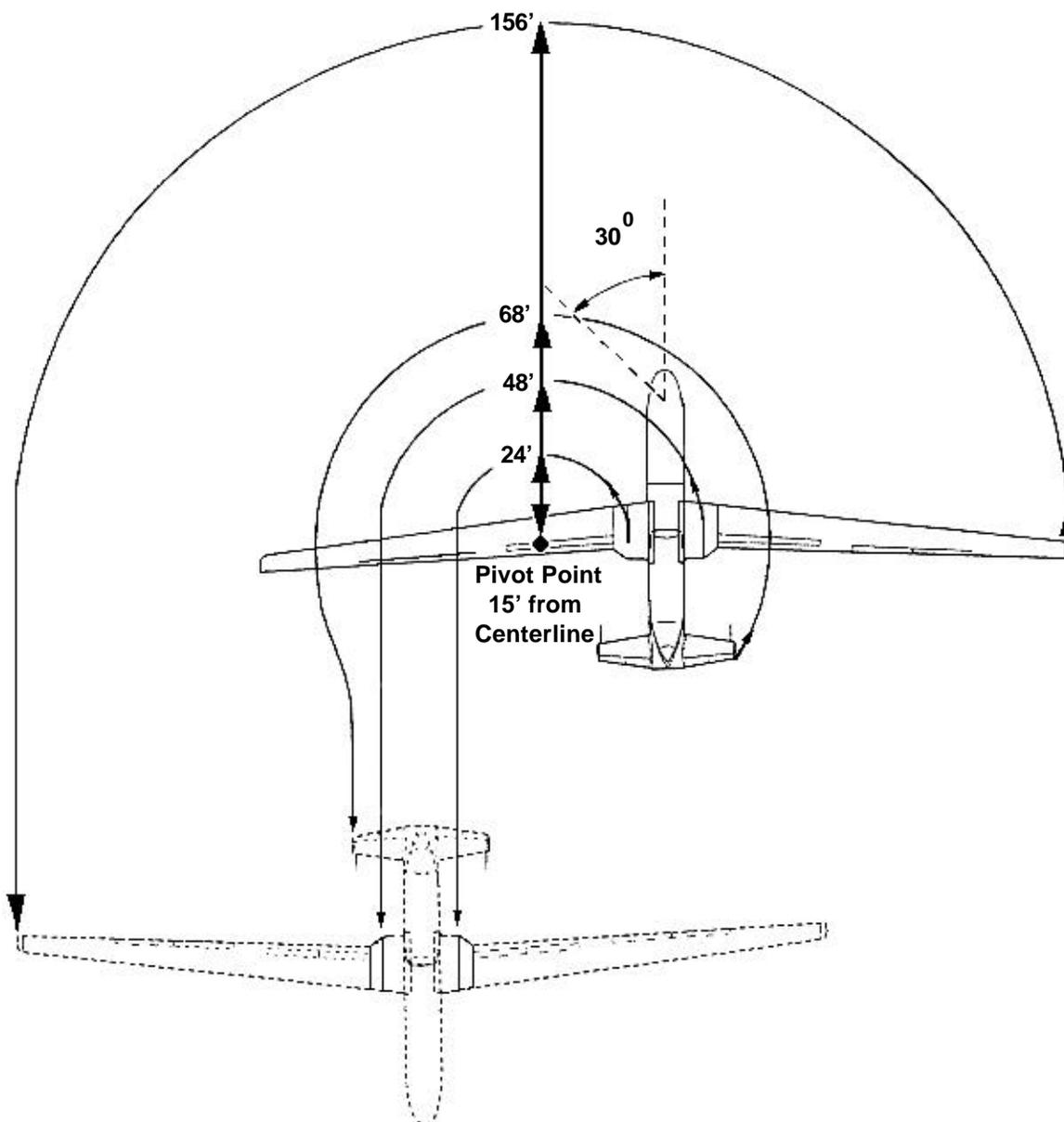
WARNING

Failure to follow the safety precautions while towing the UAV with personnel sitting on the outer wing section may result in injury or death to the personnel.

NOTE:

If the UAV has landing in an unbalanced configuration (one wing heavier than the other), up to four personnel may sit on outer section of the high wing to balance the wings during towing in adverse or emergency conditions.

UAV TURNING AREAS AND GROUND CLEARANCES DURING TOW



UAV RECOVERY - Continued

1. DIVERT PROCEDURES - CONTINUED

p. If a Grounding Cable is available, ground the UAV to a designated grounding point on the tarmac. The UAV grounding points are forward of the right wing and above the right wing on the right side of the fuselage.

- (1) Connect the Ground Cable clamp to a designated grounding point on the tarmac.
- (2) Connect the Ground Cable plug to the UAV receptacle.

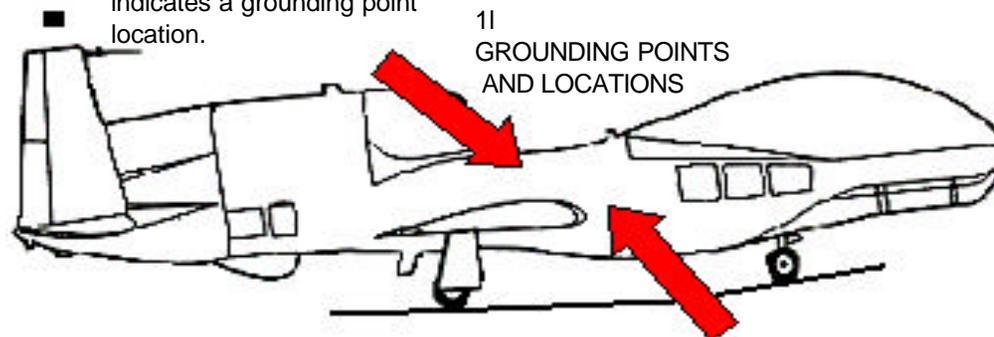
q. If necessary, perform the following steps to secure the UAV to the ground.

- (1) Remove tiedown adapter plugs or the mylar tape from the UAV at the illustrated locations.
- (2) Install the tiedown adapters, as specified, by part number and location on Table 1. The wing and tail tiedown adapters require a large washer, which is supplied in the Fly-Away Kit. Use a 1-1/16 inch wrench or socket to secure the tiedown adapters to the UAV.
- (3) Attach rope, chain or cargo straps to the tiedown adapters and secure the UAV to the ground. As near as possible, arrange the tiedowns in a symmetrical pattern. As a minimum secure the UAV at the nose, tail and right and left outer wing tiedowns.

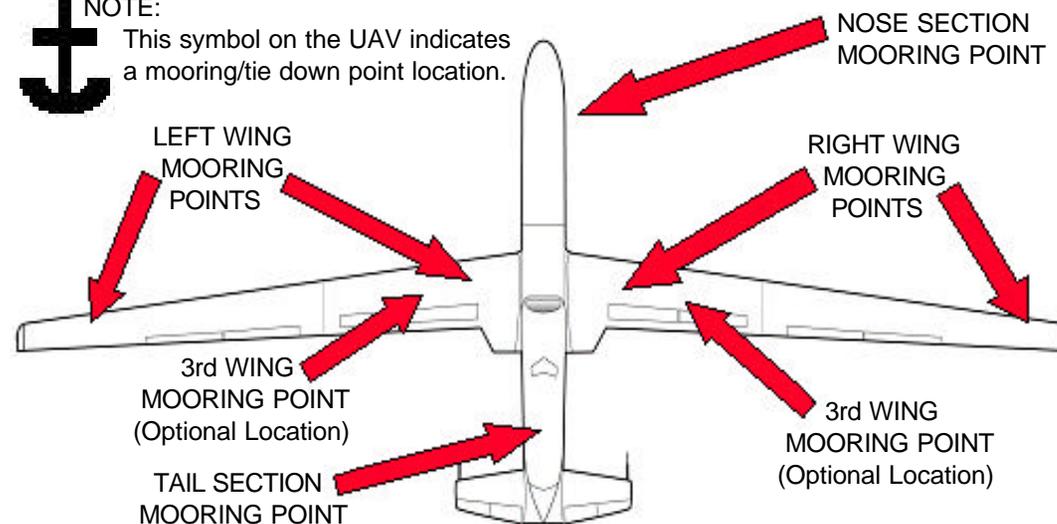
r. Maintain security at the UAV to prevent unauthorized access. The UAV has several cryptographically keyed systems that may be classified SECRET. Moving the Comsec Switch to the ZERO position DID NOT declassify all the UAV systems.

s. Use a maintenance stand or equivalent to install the Pitot Tube Cover on the pitot tubes at the top of the ruddervators.

NOTE:
 This symbol on the UAV indicates a grounding point location.

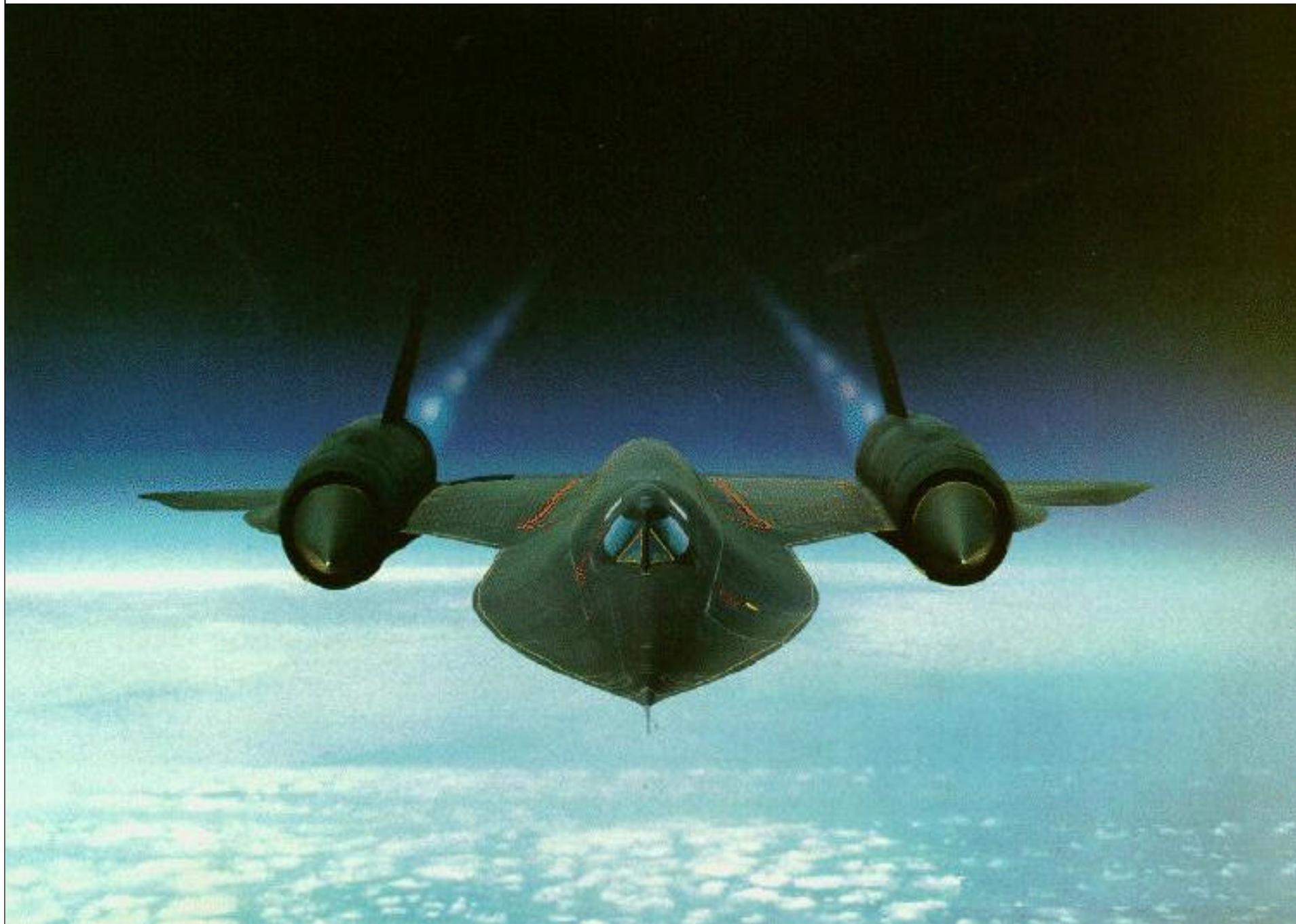


NOTE:
 This symbol on the UAV indicates a mooring/tie down point location.



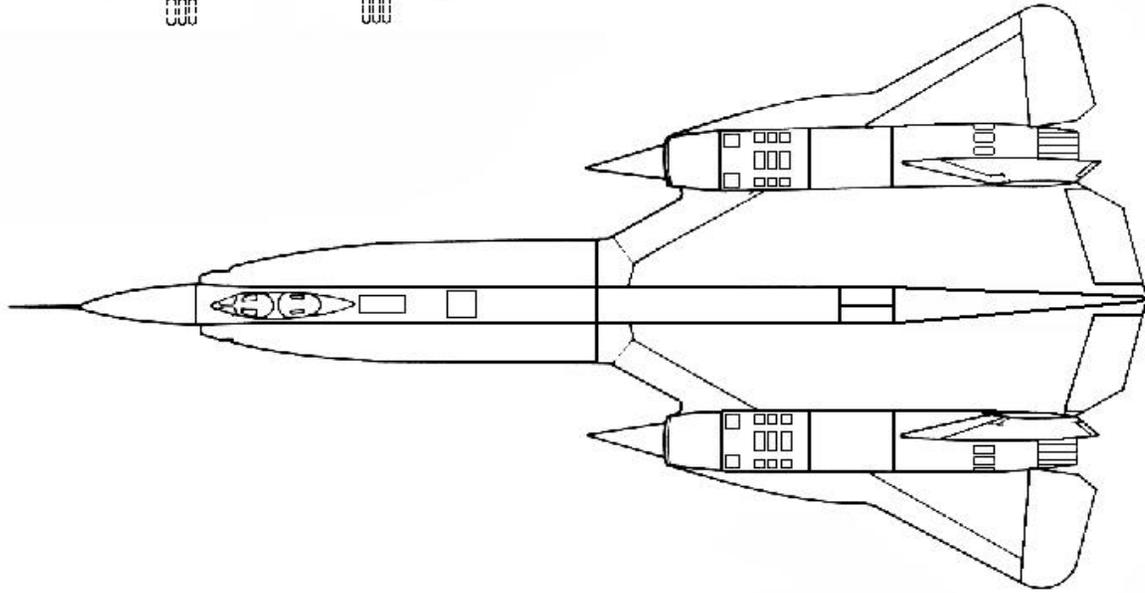
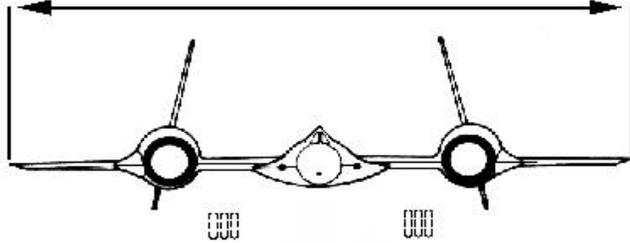
ADAPTER	LOCATION	PART NUMBER
Nose Section	To the right of the NLG-FS 205	3673310M218-1
Tail Section	Bottom of fuselage, below the ground power panel - FS 522	3673310M208-3
Lt Outboard Wing	Outboard of aileron, close to the wing tip - Xw 663	3673310M208-5
Lt Inboard Wing	Forward of MLG - Xw 67.5	3673310M208-3
Rt Outboard Wing	Outboard of aileron, close to the wing tip - Xw 663	3673310M208-5
Rt Inboard Wing	Forward of MLG - Xw 67.5	3673310M208-3

Table 1. UAV Tiedown Locations and Parts

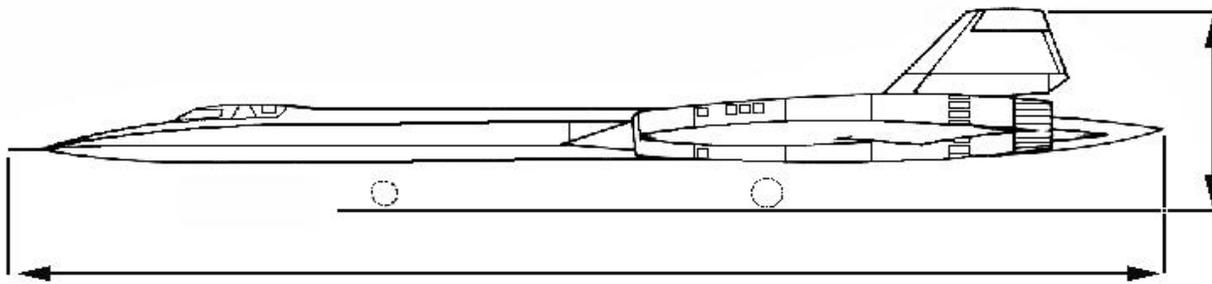


AIRCRAFT DIMENSIONS

WING SPAN
55 FT 7 IN
(16.95)



HEIGHT
18 FT 6 IN
(5.64M)



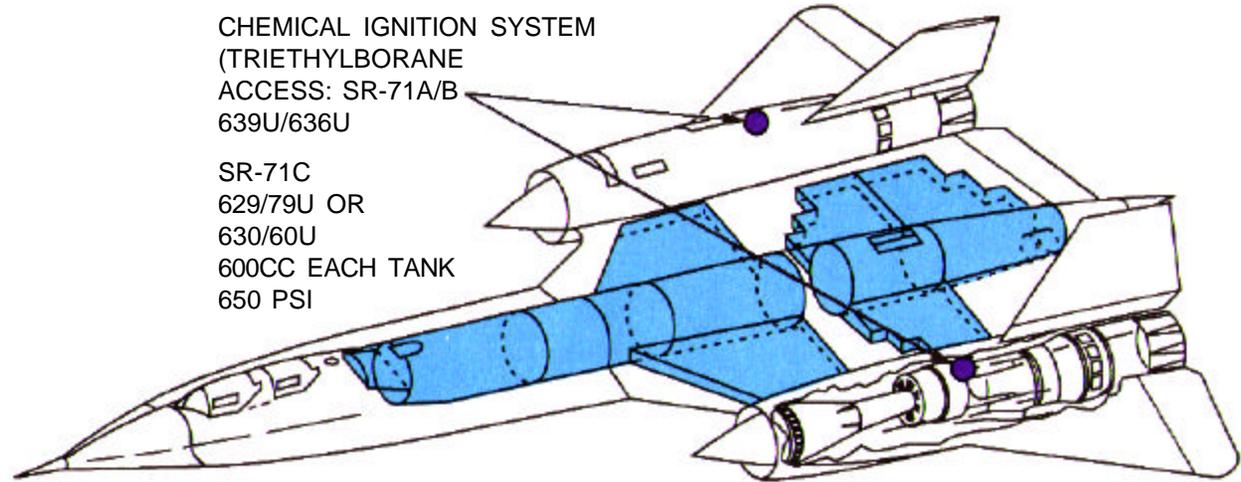
LENGTH 107 FT 5 IN (32.74M)

AIRCRAFT HAZARDS

SR-71

CHEMICAL IGNITION SYSTEM
 (TRIETHYLBORANE)
 ACCESS: SR-71A/B
 639U/636U

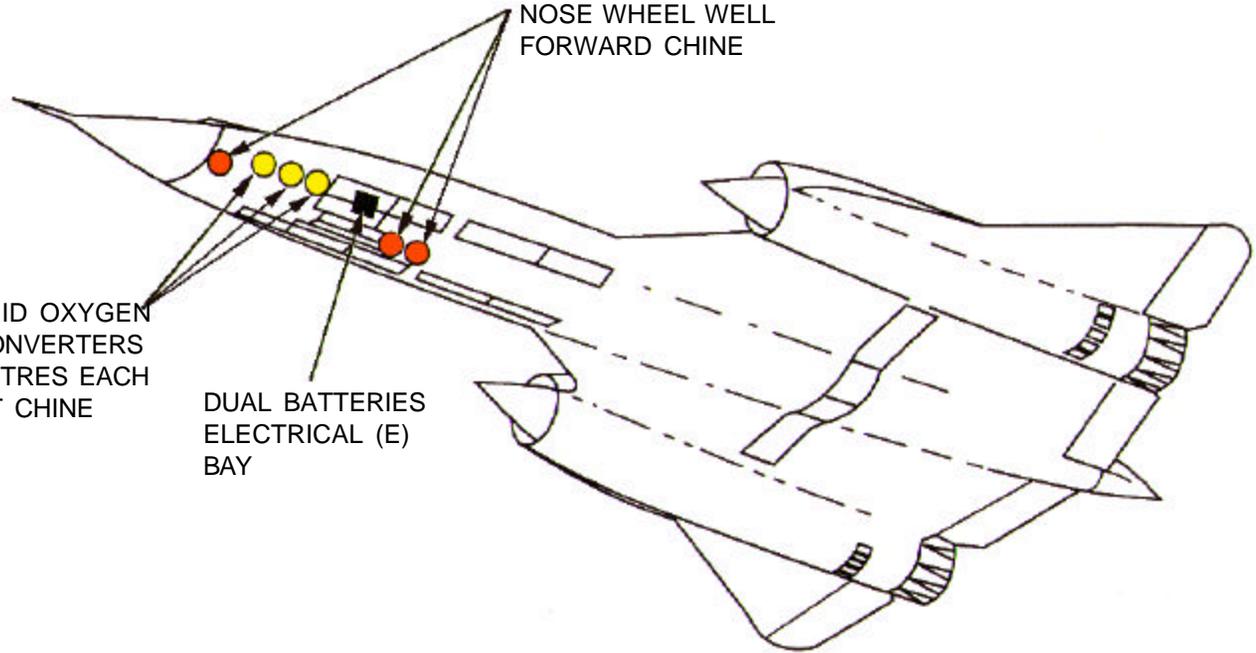
SR-71C
 629/79U OR
 630/60U
 600CC EACH TANK
 650 PSI



LIQUID NITROGEN
 156 LITRES
 NOSE WHEEL WELL
 FORWARD CHINE

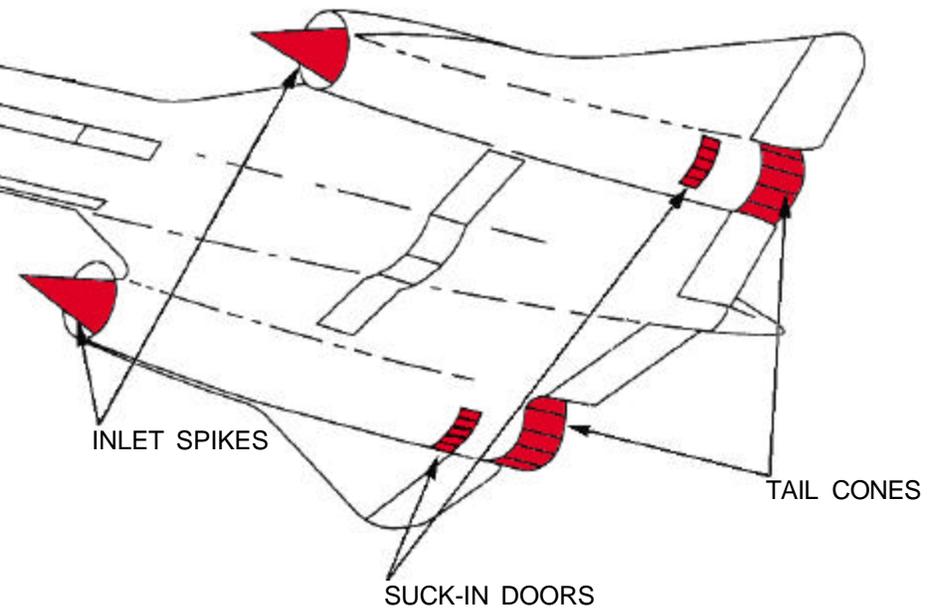
LIQUID OXYGEN
 3 CONVERTERS
 10 LITRES EACH
 LEFT CHINE

DUAL BATTERIES
 ELECTRICAL (E)
 BAY



WARNING

- The SR-71 is equipped with a chemical ignition system containing triethylborane (TEB). A 600cc tank is mounted on the top forward side of each engine. TEB will ignite when exposed to oxygen at all temperatures. TEB is pyrophoric liquid and reacts violently with carbon tetrachloride and halogenated hydrocarbons. Do not use halon 1211 to extinguish fires on the SR-71. Refer to table 10-1 for a complete list of acceptable and unacceptable fire fighting agents.
 - Use extreme caution when applying cold liquid or gas extinguishing agents to hot metal surfaces. Applying the cold agents directly to hot metal surfaces can result in stress explosions with possible injury to personnel.
1. ENGINE AIR INLET DUCT FIRE
 - a. Comply with emergency engine shutdown procedures.
 - b. Apply dry chemical powder or CO2 directly into the engine inlet duct around the inlet spike.
 2. ENGINE NACELLE AND TAILPIPE FIRES
 - a. Place the chemical "IGNITER PURGE" switch, located on the right instrument panel, to the "DUMP" position (UP). Engines must be running at 5000 to 6000 RPM to dump the CIS tank.

**CAUTION**

- Actuate dump switch immediately to ensure hydraulic pressure and power will be available to dump the CIS tank. Power will be required for up to 10 seconds.
- b. Comply with emergency engine shutdown procedures.
 - c. Apply dry chemical powder or CO2 directly into the lower "suck in" door located at the engine accessory section (aft).
 - d. If a tail cone fire is indicated, apply agent directly into the engine tail cone.

FIRE FIGHTING AGENTS FOR SR-71 FIRES**(EXCLUDING TEB FIRES)**

ACCEPTABLE IN ORDER OF PREFERENCE:

1. AFFF fire extinguisher, 3M I.D. 98-0211- 0170-8.
2. Aqueous Film Forming Foam Liquid, FC206.
3. Aqueous Film Forming Foam, FC200.
4. Carbon Dioxide (CO₂).
5. Purple K Powder (PKP).
6. Water spray or mist.

NOTE:

Dry chemical powder is preferred for nacelle fires.

UNACCEPTABLE:

1. Halon 1211.
2. Mechanical Foam.
3. Ansul +50 B Dry Chemical mixed with area water.
4. Ansul MetalX Dry Chemical mixed with area water.
5. Chlorobromomethane (CBM).
6. High Expansion Foam.
7. Soda and acid type extinguishers.

CAUTION

These agents may be used only as an absolute last resort to extinguish SR-71 fires.

(FIRE FIGHTING AGENTS FOR TEB FIRES)

APPROVED IN ORDER OF PREFERENCE:

1. AFFF fire extinguisher, 3M I.D. 98-0211- 0170-8.
2. Water spray or mist.

PROHIBITED:

1. Halon 1211.
2. Ansul MetalX Dry Chemical mixed with area water.
3. Chlorobromomethane (CBM).
4. High Expansion Foam.
5. Soda and acid type extinguishers.

SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
 Ballistic Hose Dearing Cutter
 Knife Fire Drill II
 1/2 Inch Drive Socket Wrench Extension
 1/2 Inch Drive Socket Wrench Handle
 Drogue Gun Safety Caps (2) Part # 5-10109-30
 Canopy Handle (Optional)

AIRCRAFT ENTRY

1. MANUAL ENTRY

- a. Insert socket wrench extension into 1/2 inch drive opening, located on left side of fuselage below each canopy, and rotate clockwise to unlock canopy.

NOTE:

A firefighter on each side (2) of each canopy (2) are required to lift each canopy.

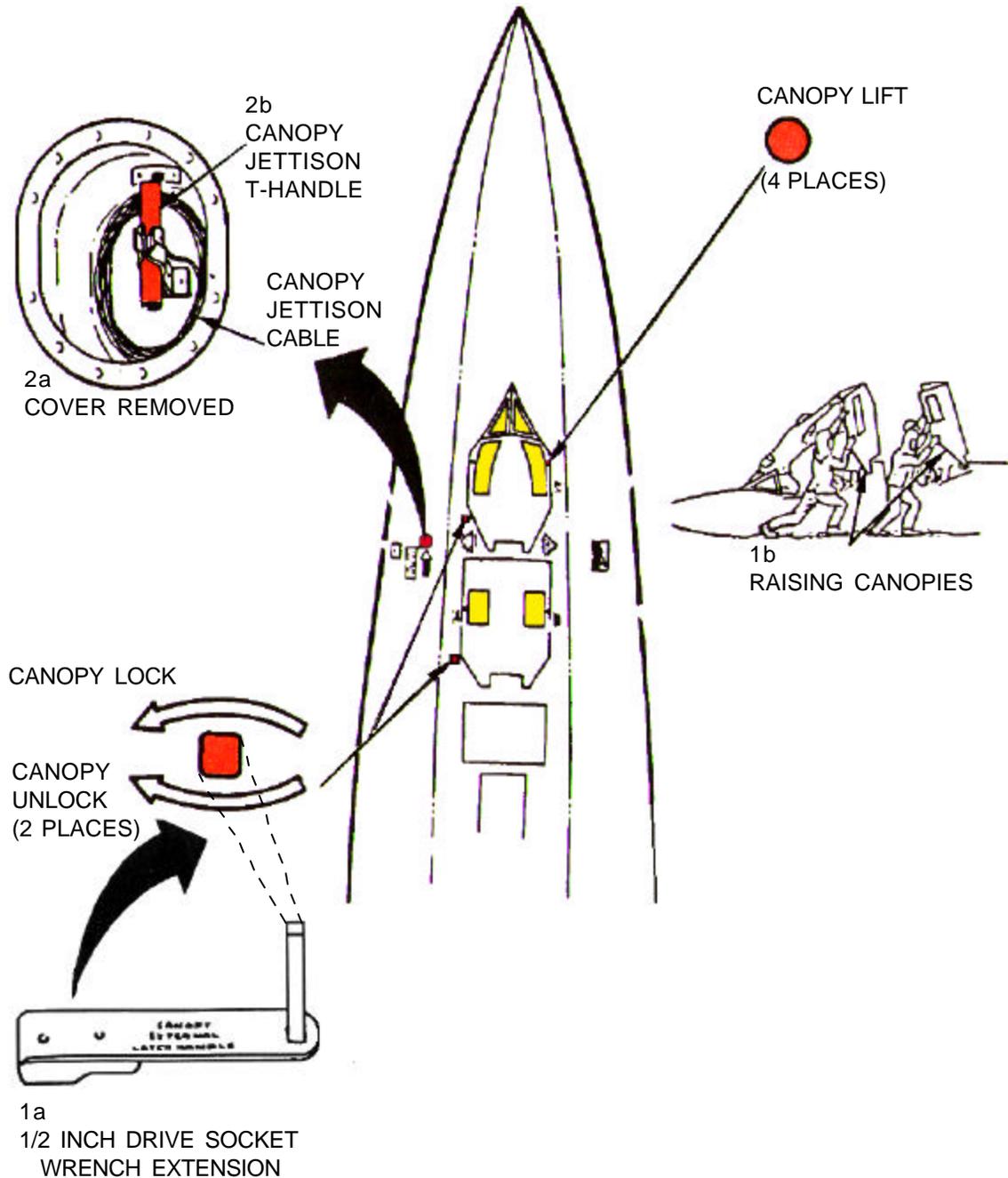
- b. Raise canopies to their normal open position. Canopies must either be held open or if conditions warrant, rotate the canopies aft at the hinge line to shear canopies from aircraft.

2. EMERGENCY ENTRY

- a. Press quick disconnect on jettison access cover, located on left side of fuselage below pilot's canopy (fwd), and remove cover.
- b. Pull canopy jettison T-handle out approximately 9 feet and pull sharply to jettison canopies.

WARNING

The ejection seats must be safetied immediately to prevent injury or death to personnel.



ENGINE SHUTDOWN

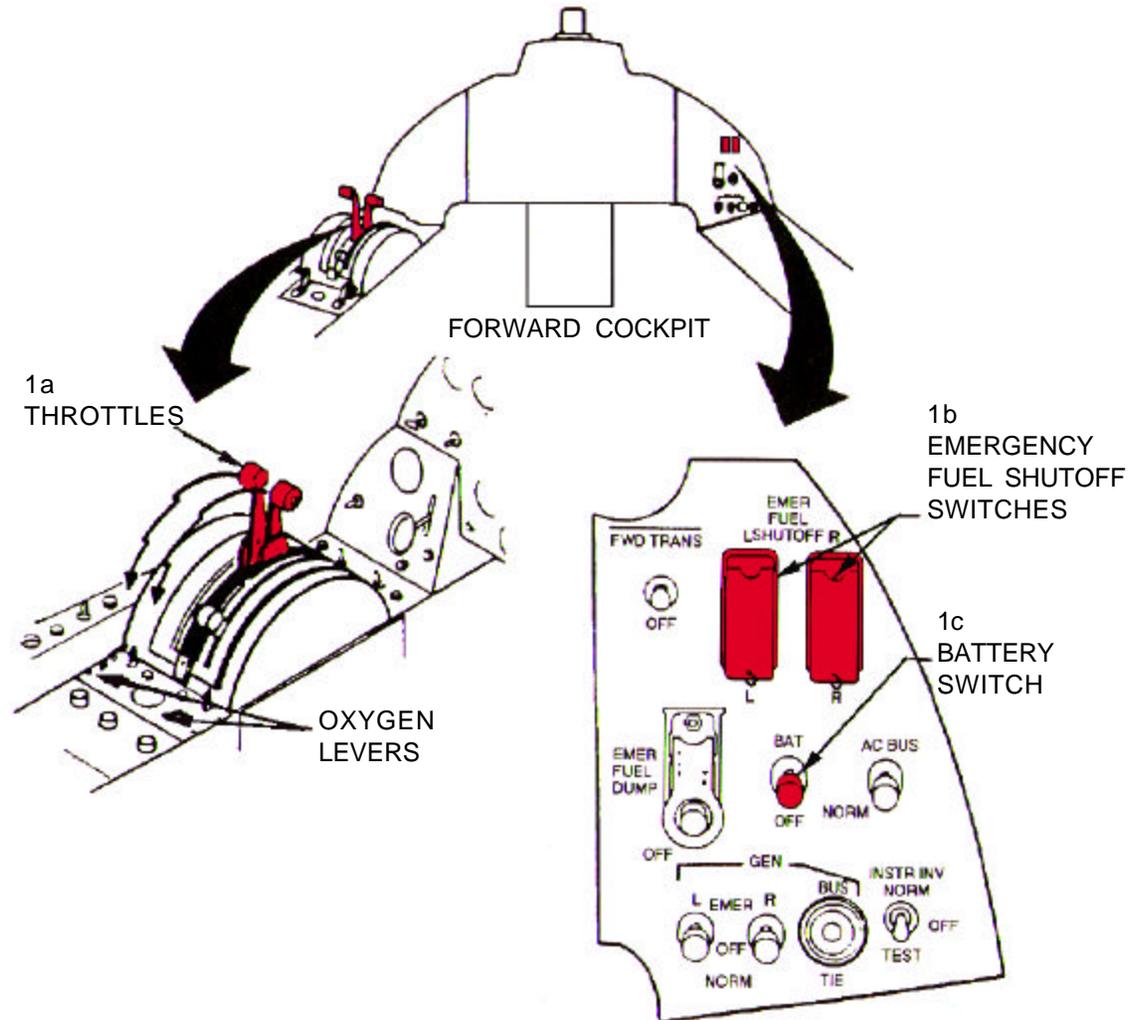
1. ENGINE SHUTDOWN

- Retard throttles, located on pilot's left side console, to IDLE DETENT then raise throttles and move aft to CUT-OFF position.
- Place emergency fuel shutoff switches, located on pilot's right instrument panel, to OFF position.

NOTE:

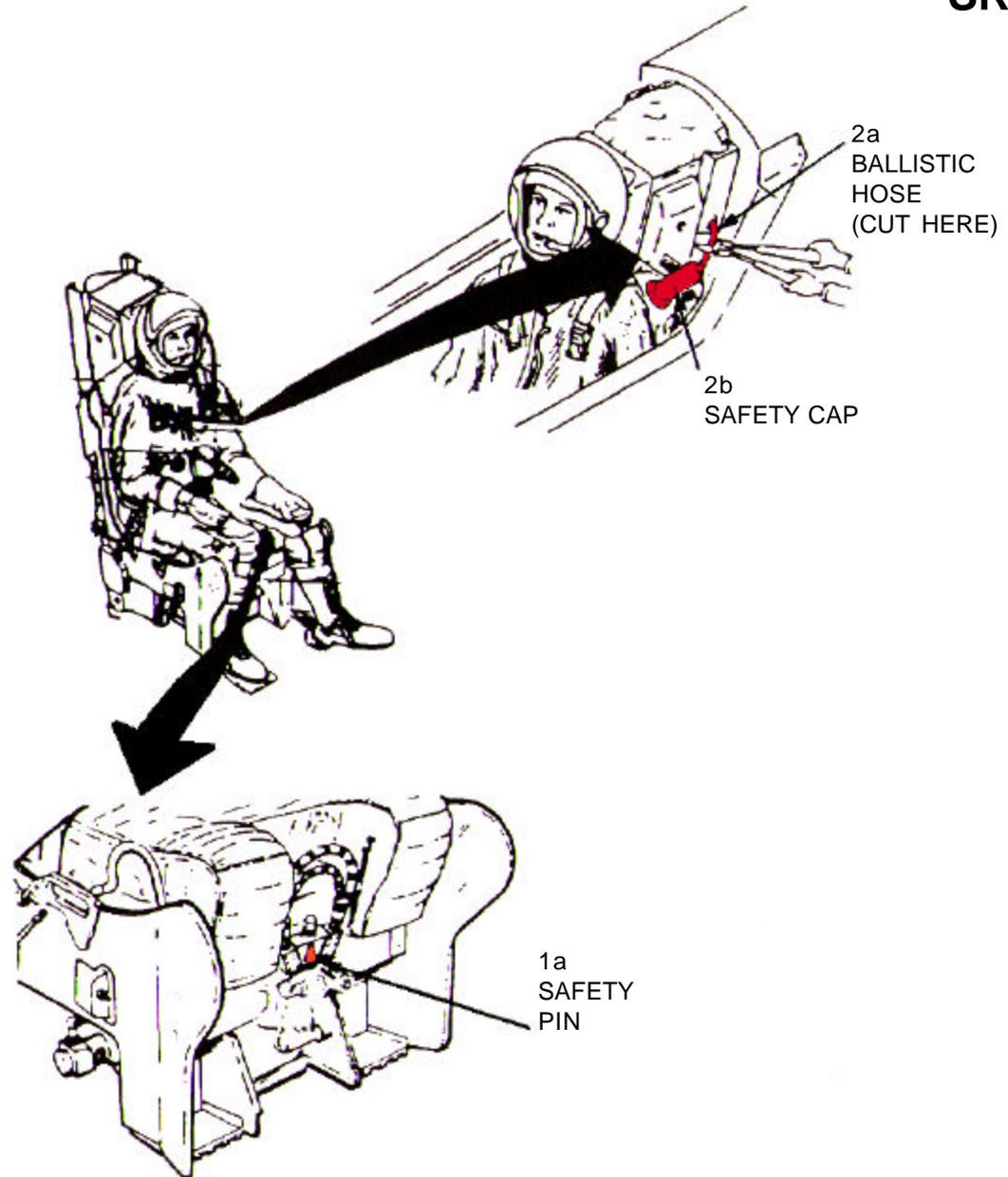
Wait 5 seconds to allow fuel valves to close before turning battery OFF.

- Place battery switch, located on pilot's right instrument panel, to OFF position.



SAFETYING EJECTION SEAT

1. NORMAL SAFETYING EJECTION SEAT
 - a. Insert safety pin in seat ejection control handle, located front center of each seat.
2. EMERGENCY SAFETYING EJECTION SEAT
 - a. Cut ballistic hose, located on top left side of each ejection seat.
 - b. Install drogue gun safety caps on parachute drogue guns, located behind the left shoulder of each crewmember.



SR-71

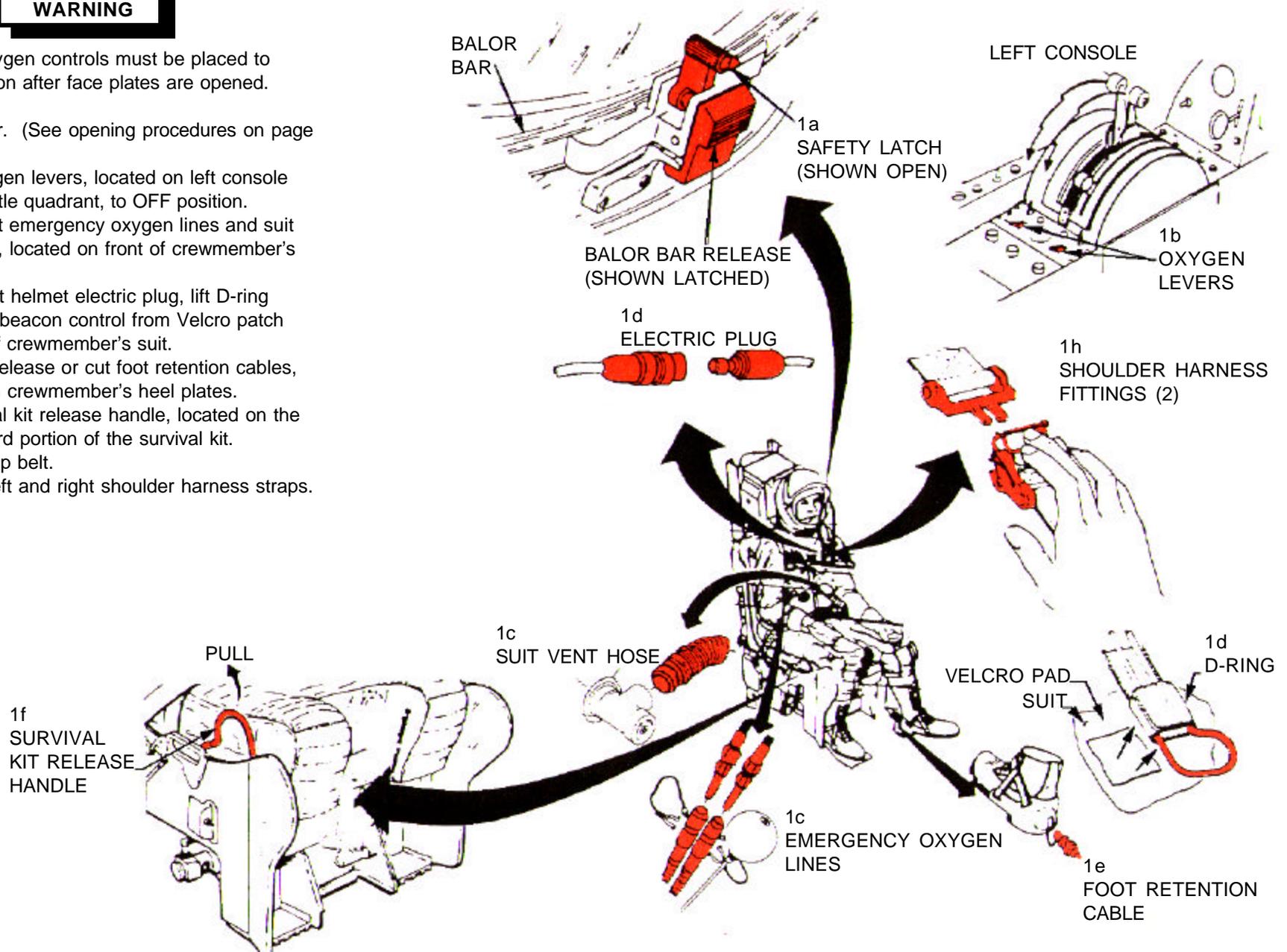
AIRCREW EXTRACTION

1. AIRCREW EXTRACTION

WARNING

Normal oxygen controls must be placed to OFF position after face plates are opened.

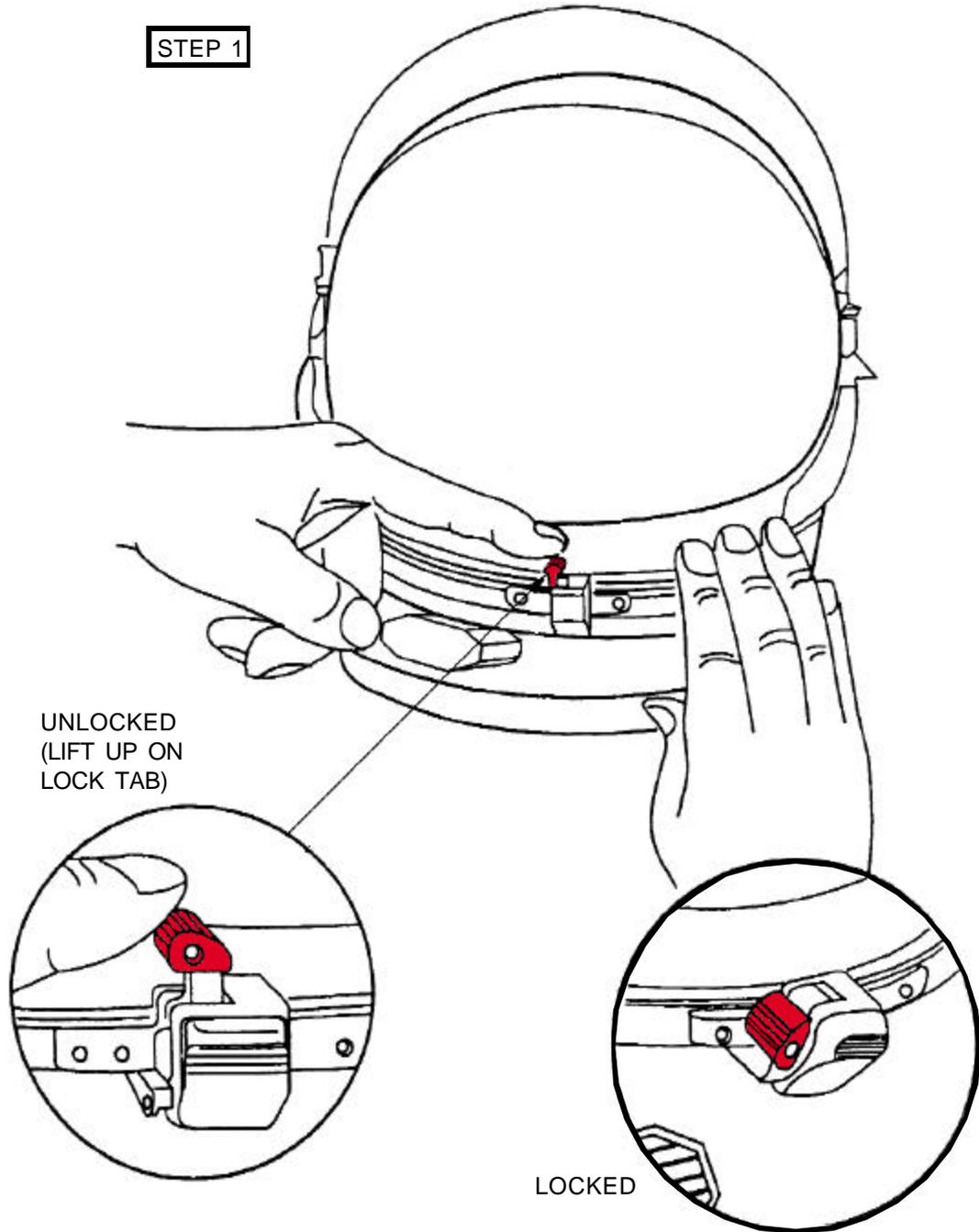
- a. Open visor. (See opening procedures on page SR-71.8)
- b. Place oxygen levers, located on left console aft of throttle quadrant, to OFF position.
- c. Disconnect emergency oxygen lines and suit vent hose, located on front of crewmember's suit.
- d. Disconnect helmet electric plug, lift D-ring and radio beacon control from Velcro patch on front of crewmember's suit.
- e. Manually release or cut foot retention cables, located on crewmember's heel plates.
- f. Pull survival kit release handle, located on the right forward portion of the survival kit.
- g. Release lap belt.
- h. Release left and right shoulder harness straps.



VISOR LATCH OPENING PROCEDURES

1. TO OPEN THE VISOR

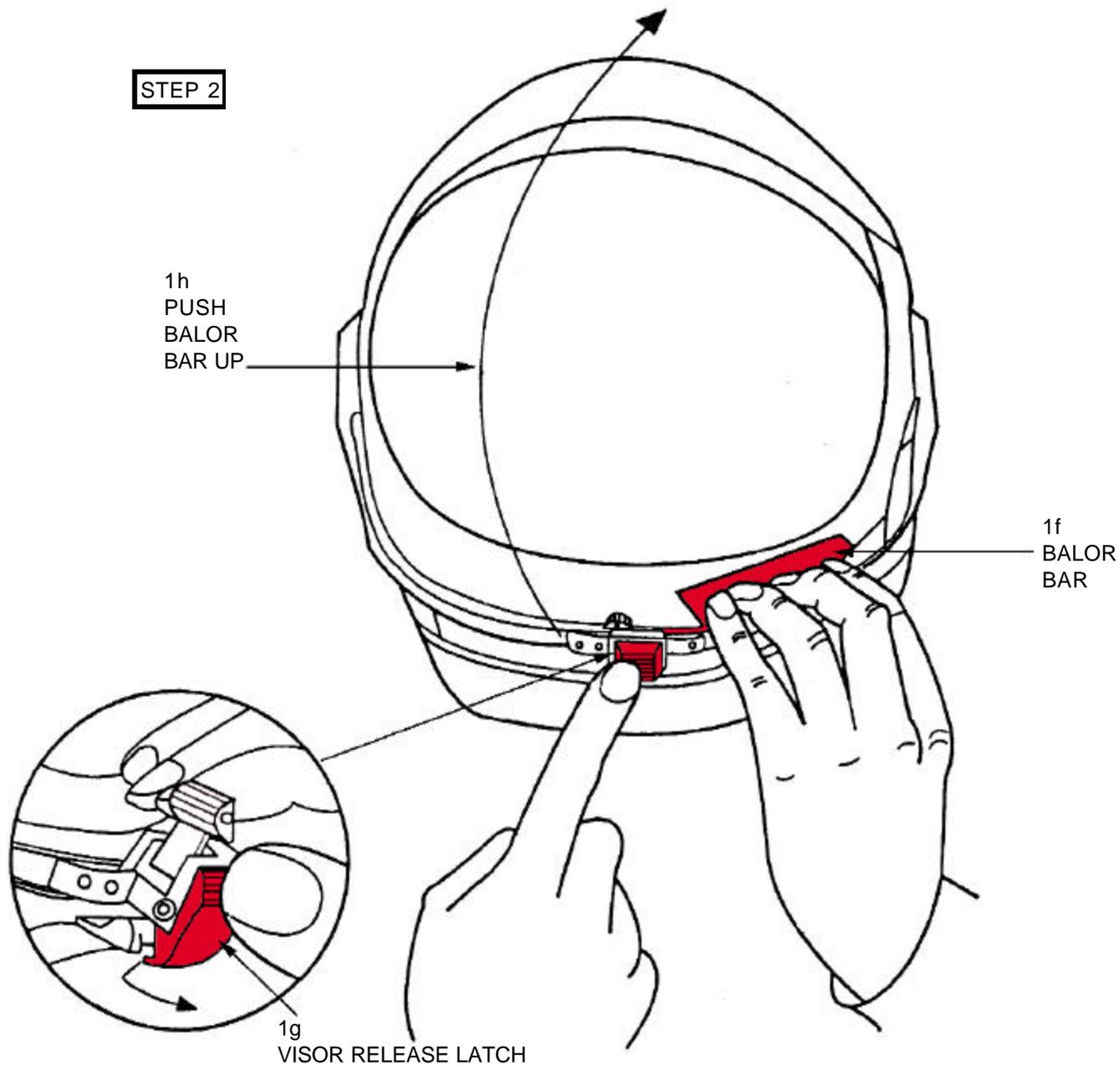
- a. Facing the front of the helmet, identify the balor bar (aluminum alloy curved bar) that wraps around the front of the lower part of the visor.
- b. Lift up the 1/2 inch long locking tab, located left side of locking mechanism (looking visor head on), until it is in the vertical position.
- c. Push down on the entire balor bar, while holding bar down (movement is 1/8 inch), push in on the centrally located visor release latch (tends to have a rotating motion rather than a straight in push motion).
- d. While continuing to push in on the spring-loaded release latch, release the downward pressure on the balor bar. The balor bar will spring up.
- e. Force the balor bar up over the top of the helmet which will open the visor.

STEP 1

VISOR LATCH OPENING PROCEDURES-Continued

SR-71

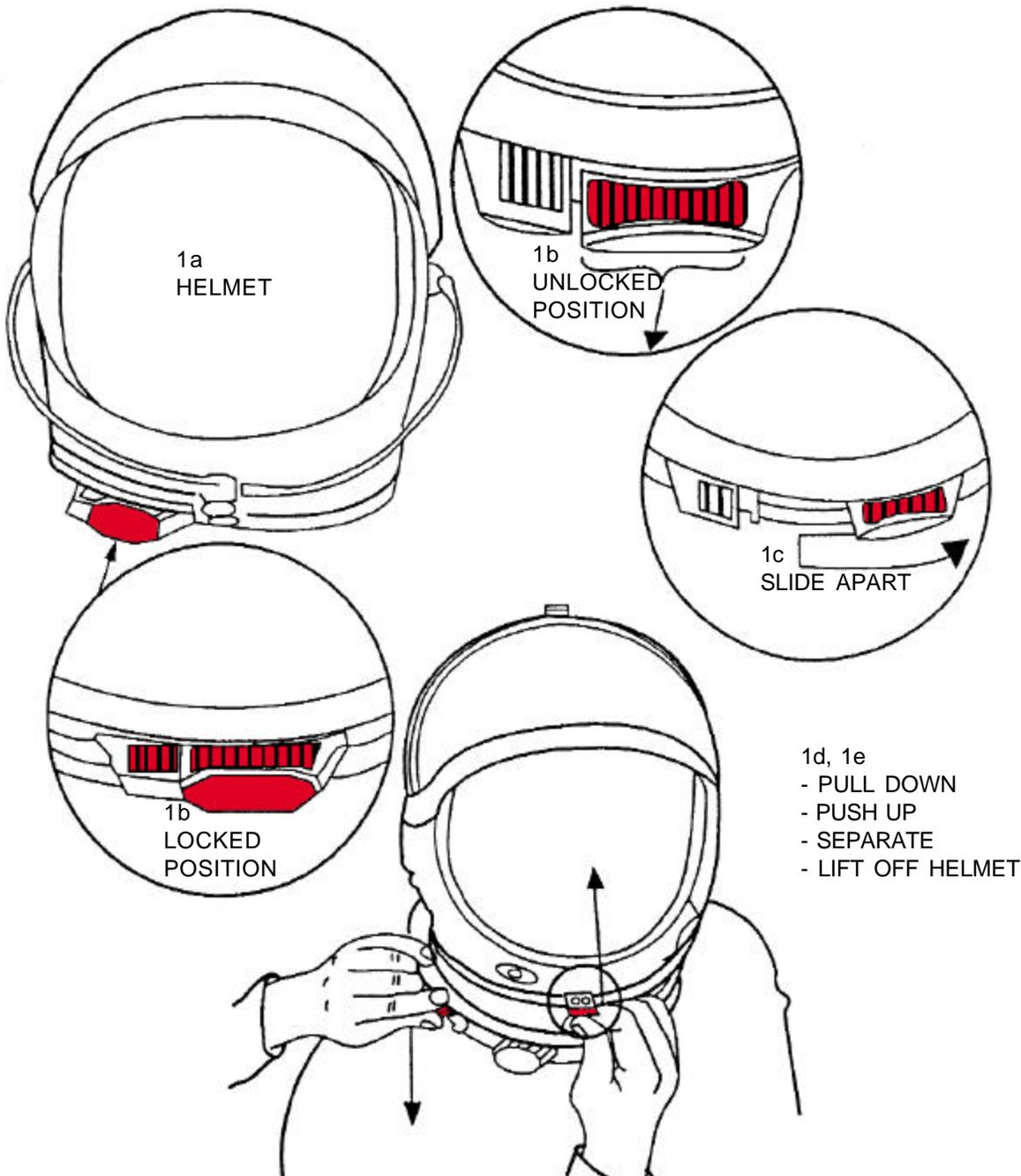
1. TO OPEN THE VISOR-Continued
 - f. Pull down on balor bar.
 - g. While pulling down on balor bar, push in on the visor release latch.
 - h. Lift the balor bar up and push it to the top of the helmet to the full open position.



HELMET REMOVAL

1. TO REMOVE THE HELMET

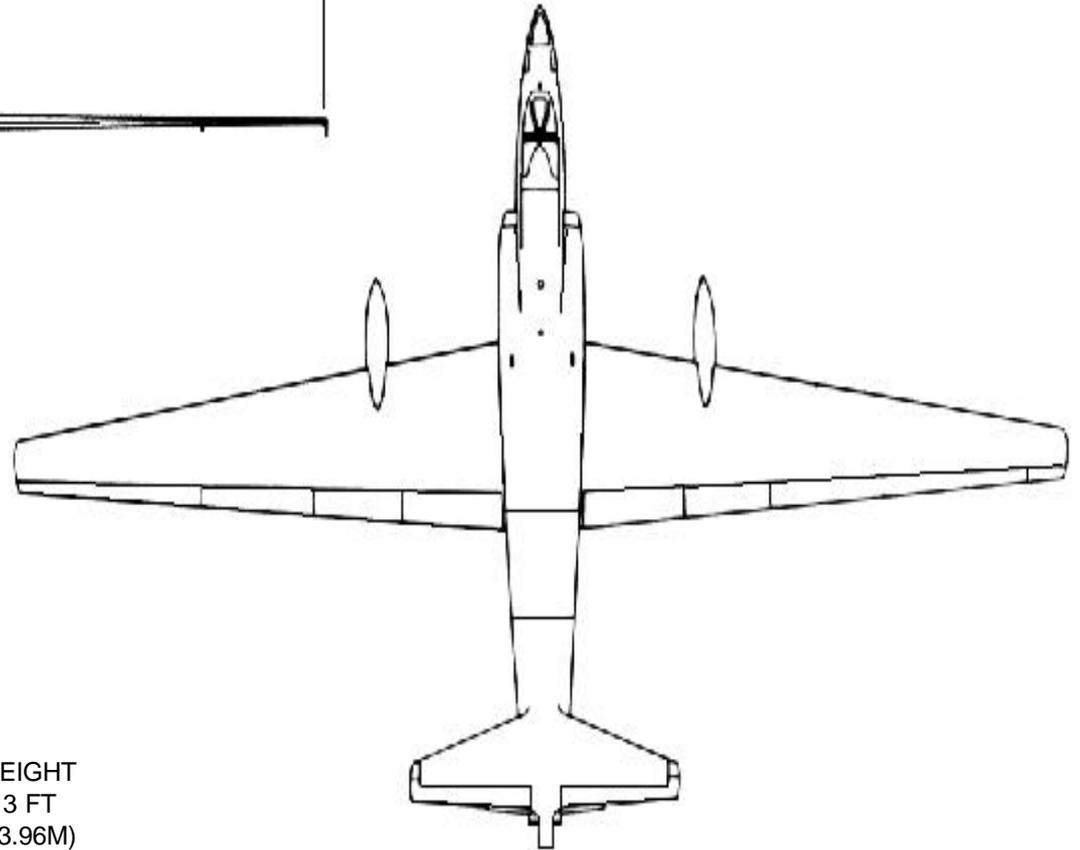
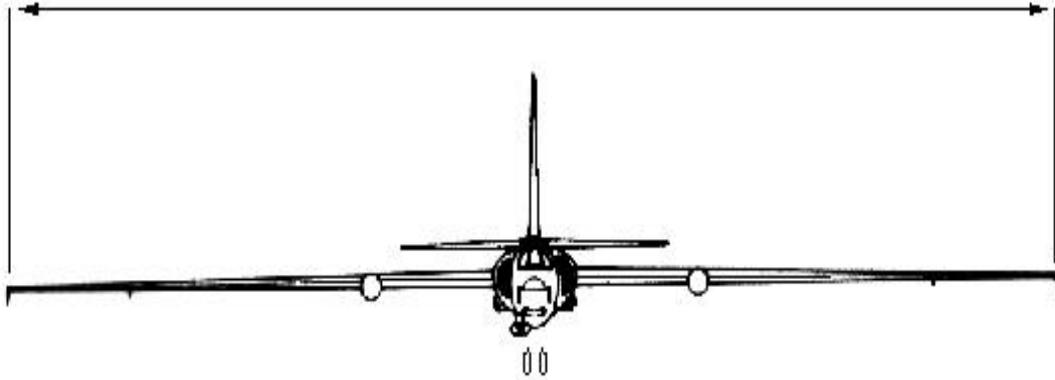
- a. Facing the front of the helmet, identify the neck ring (the lower most metal ring before getting to the gold colored cloth of the suit).
- b. Slightly left of center (looking head on at the front of helmet) a black mechanism locks the neck ring to the suit. With both hands, grasp the left part of this latch with left hand and the right part (latch has raised lip) with right hand.
- c. Pull right portion away from neck ring and at same time pull latch apart until separated.
- d. At this point, the locking teeth (or dogs) inside the ring have now receded into the neck ring freeing the helmet from the suit.
- e. The seal between the helmet and neck ring will take some effort to separate once it is unlocked. This separation can be accomplished fairly easily by holding down on the neck ring locking mechanism while pulling up on the latch mechanism used to lock the balor bar in the down position.



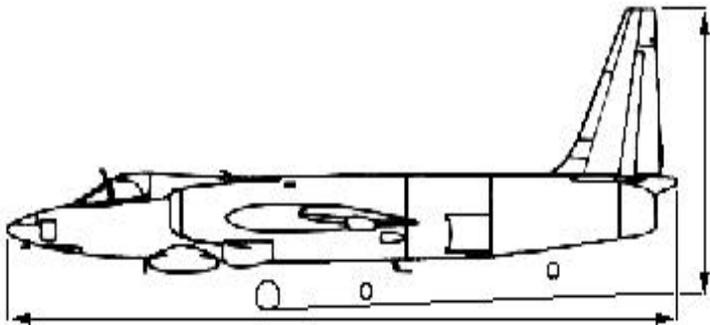


AIRCRAFT DIMENSIONS

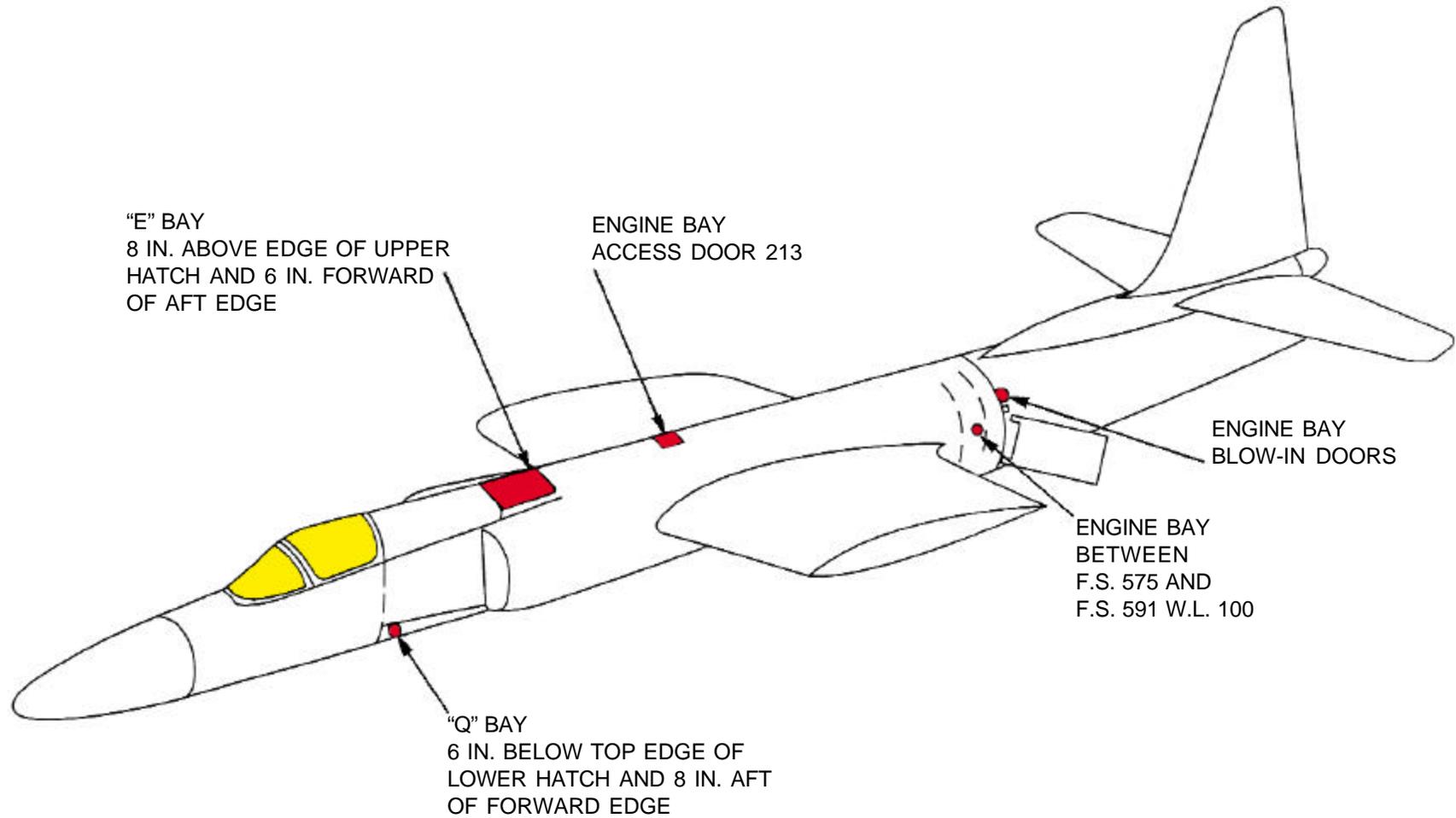
WING SPAN
80 FT (24.38 M)



HEIGHT
13 FT
(3.96M)



LENGTH
49 FT 7 IN (15.11 M)

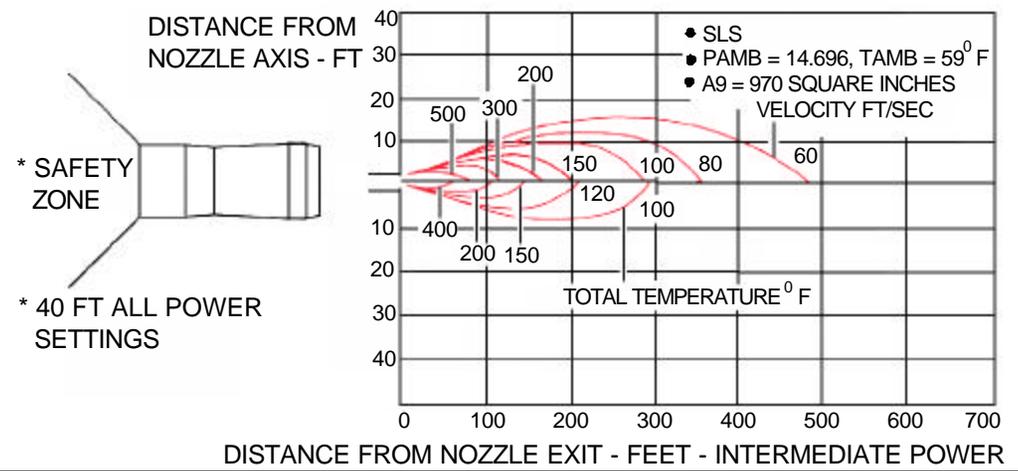
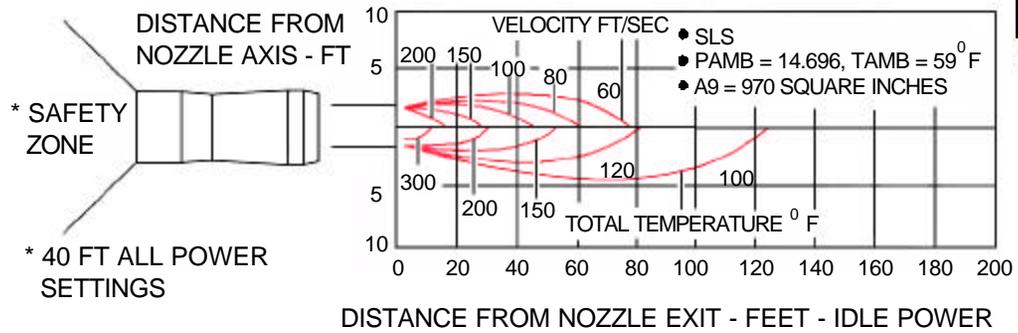
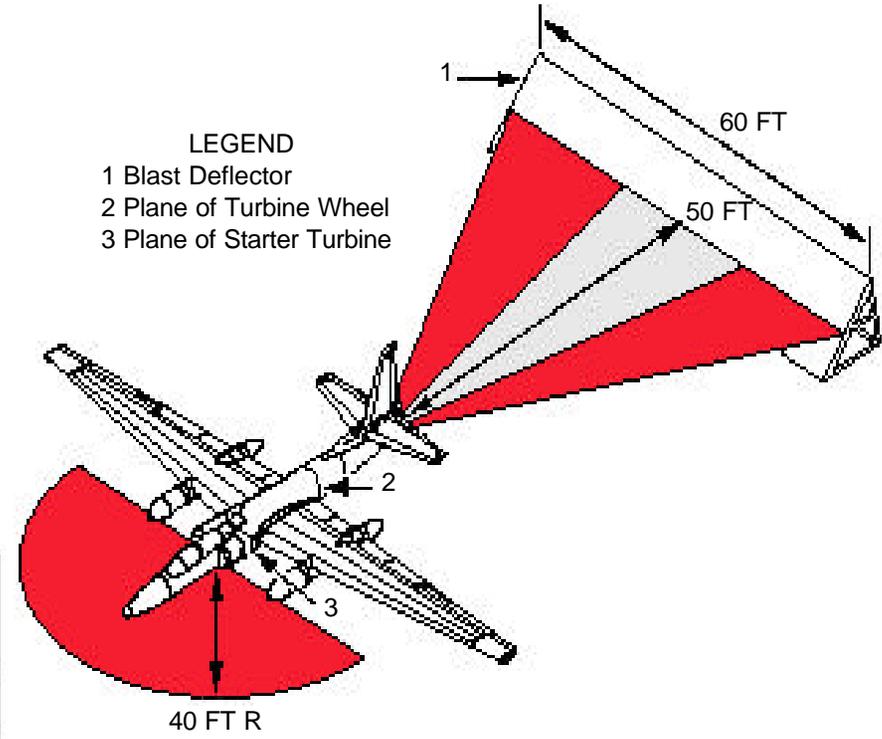


AIRCRAFT HAZARDS INFORMATION

1. ENGINE GROUND RUNUP DANGER AREAS

WARNING

- The area near the intake ducts, starter exhaust, and engine exhaust is very dangerous - keep clear.
- During start and runup, avoid plane of starter turbine and engine turbine wheels.
- During runup, engine noise may cause permanent damage to ears. Within 100 feet, use ear perscribed plugs. Within 50 feet use perscribed ear plugs and protective covers.
- If blast deflector is not available, clear aft exhaust area for 200 feet.



SPECIAL TOOLS/EQUIPMENT

Power Rescue Saw
 1/2 In. Drive Socket Wrench Extension
 1/2 In. Drive Socket Wrench Handle
 Disarming Tool Fire Drill II

AIRCRAFT ENTRY - U-2S AND U-2ST MODELS

WARNING

If engine is running, personnel approaching aircraft must be aware of the intake danger areas, see page U-2.4, and use a means of protecting themselves to reduce the hazard of injury or death from engine intake suction and exhaust.

1. MANUAL ENTRY

NOTE:

In two seat aircraft, procedures are identical.

a. Depress spring-loaded retaining button at the base of the canopy locking lever on the right side of the aircraft below the canopy rail. The canopy locking lever will spring free from its flush mounted position. Rotate the lever in a clockwise direction to release canopy lock. Lift canopy from rail and open toward left side of aircraft until hold-open prop latch engages.

b. Insert 1/2 inch drive socket wrench extension into 1/2 inch square drive socket opening, located on right side of fuselage behind canopy, rotate handle counterclockwise.

2. EMERGENCY ENTRY

a. Push quick-release button on access door, located on left forward side of fuselage below canopy, withdraw T-handle, and uncoil cable to approximately 6 feet. Do not apply tension to cable until it is uncoiled.

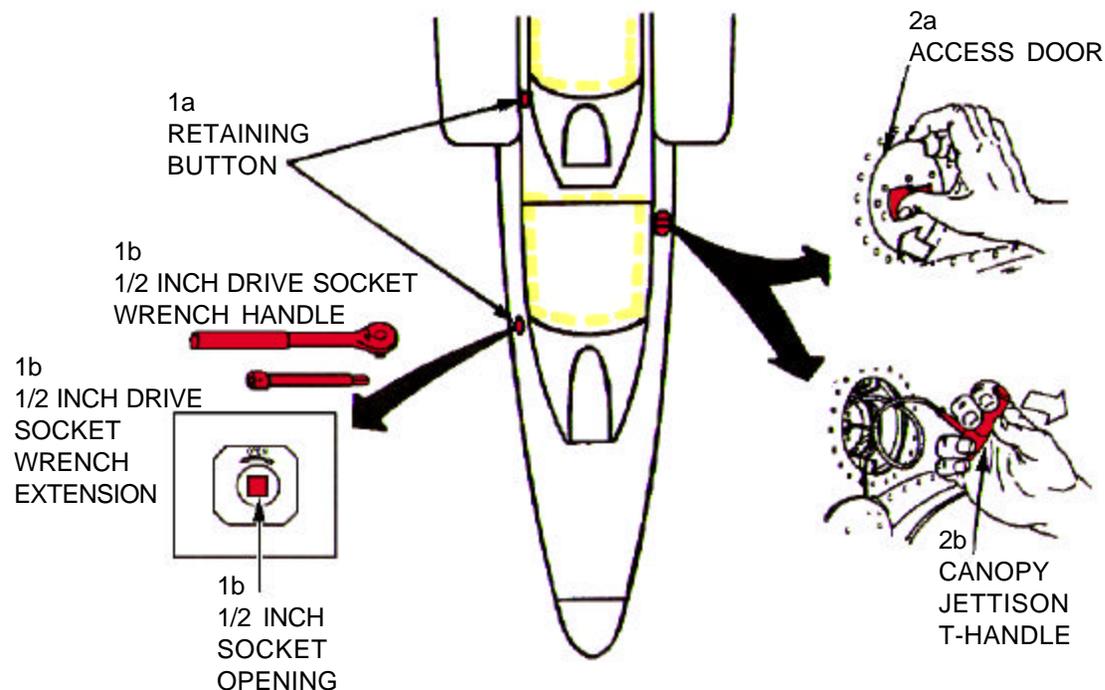
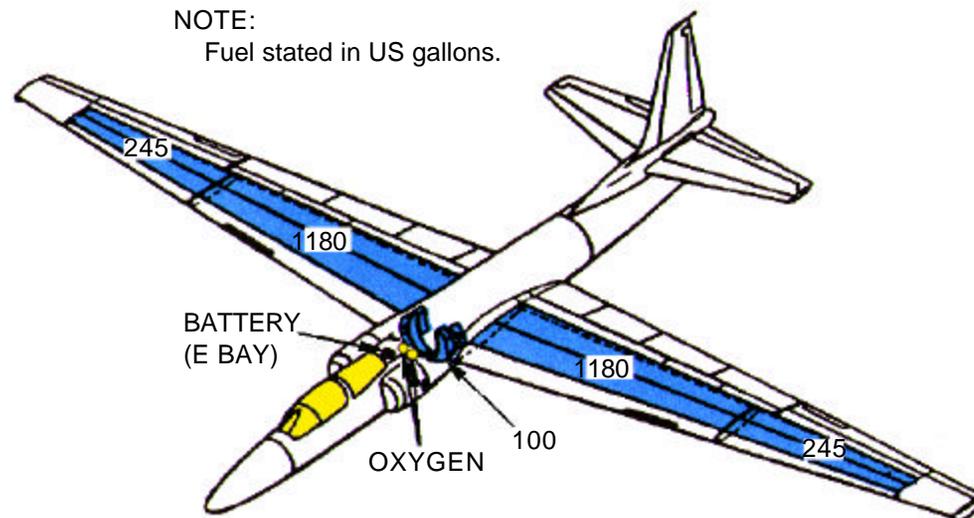
b. Grasp T-handle and pull sharply. Canopy will jettison up and aft immediately. Avoid canopy impact area.

3. CUT-IN

a. Cut-in around canopy frame on all four sides as required.

NOTE:

Fuel stated in US gallons.



ENGINE AND OXYGEN SHUTDOWN

1. ENGINE SHUTDOWN

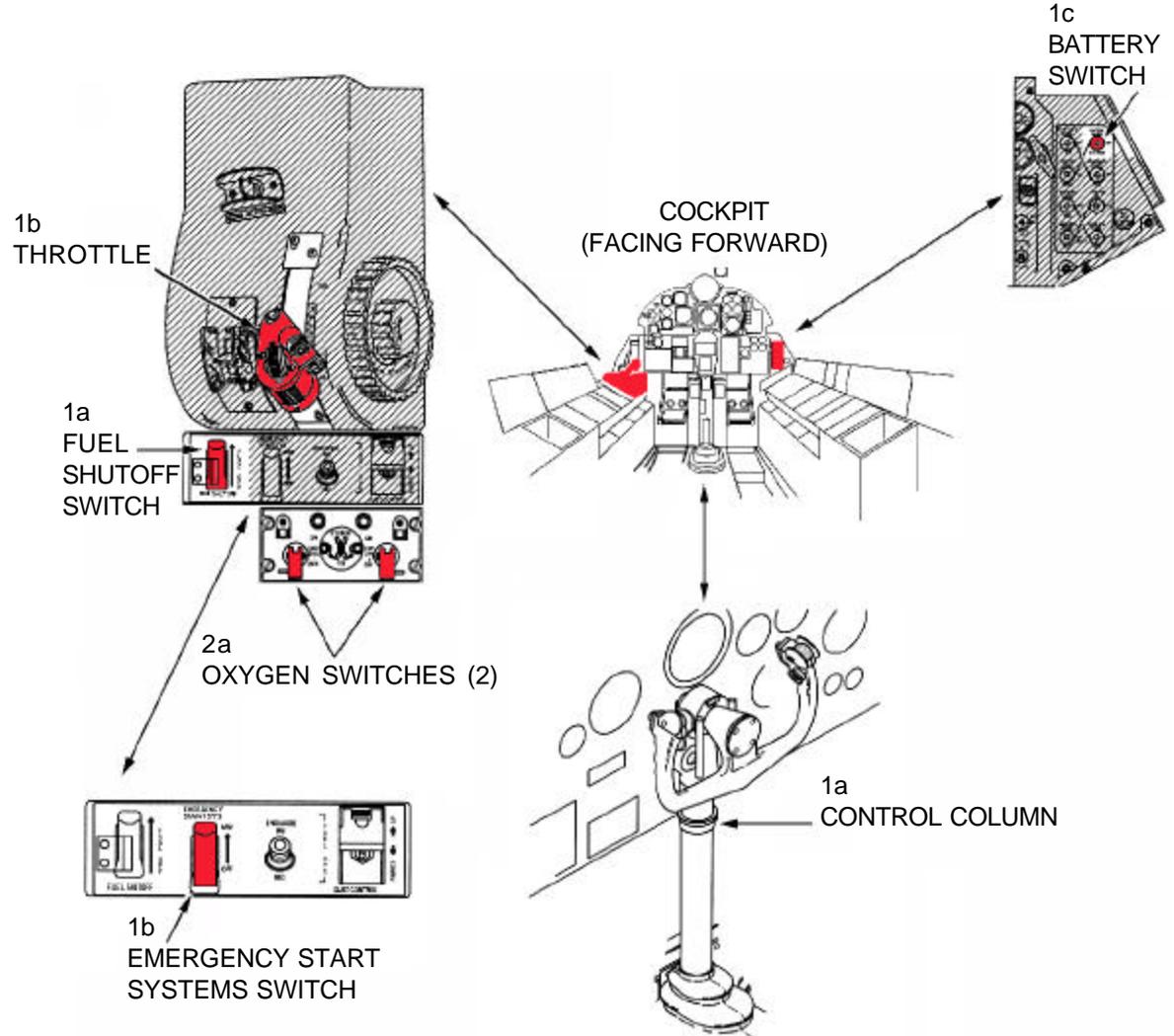
WARNING

Reaching between the control column and instrument panel to move the control column is hazardous, as control column initiator may pyrotechnically actuate and quickly position the control column forward, causing injury to personnel.

- Move the guarded toggle fuel shutoff switch, located aft of throttle, right to OFF.
- Pull throttle, located on forward left side console, aft to OFF.
- Position battery switch, located lower right of forward instrument panel, to OFF.
- Position emergency start systems switch to OFF, if armed.

2. OXYGEN SHUTDOWN

- Position oxygen system consisting of two guarded toggle switches, located aft of fuel shutoff switch panel, aft to OFF.



AIRCREW EXTRACTION

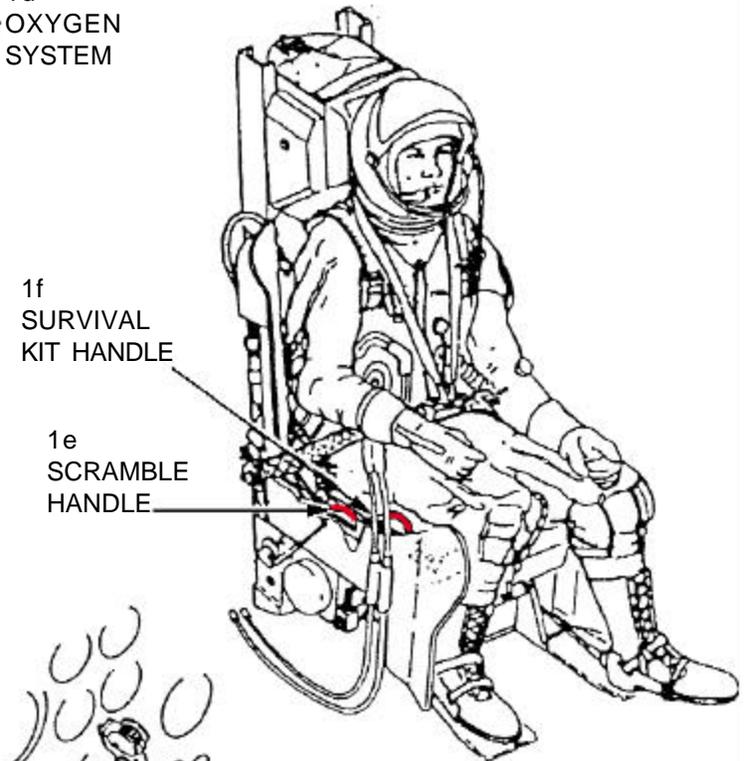
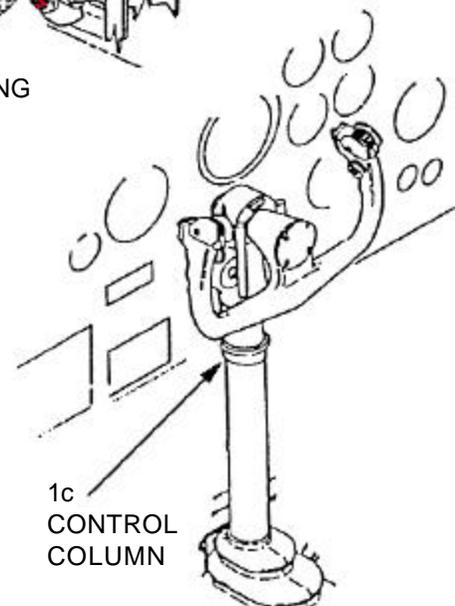
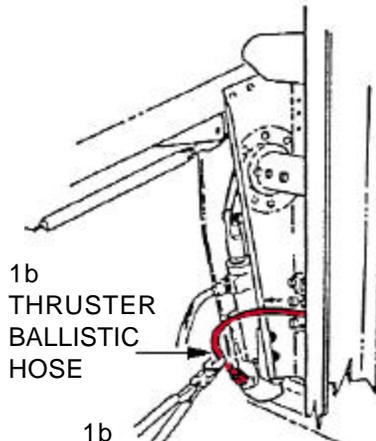
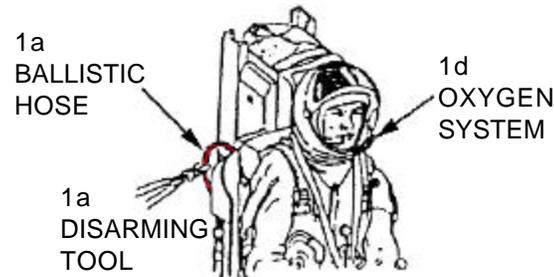
1. RAPID AIRCREW EXTRACTION

- a. Sever ballistic hose at upper right of seat with disarming tool.
- b. Sever canopy unlock thruster lower hose with disarming tool.

WARNING

Reaching between control column and instrument panel to move control column is hazardous, as control column initiator may fire, causing injury to personnel.

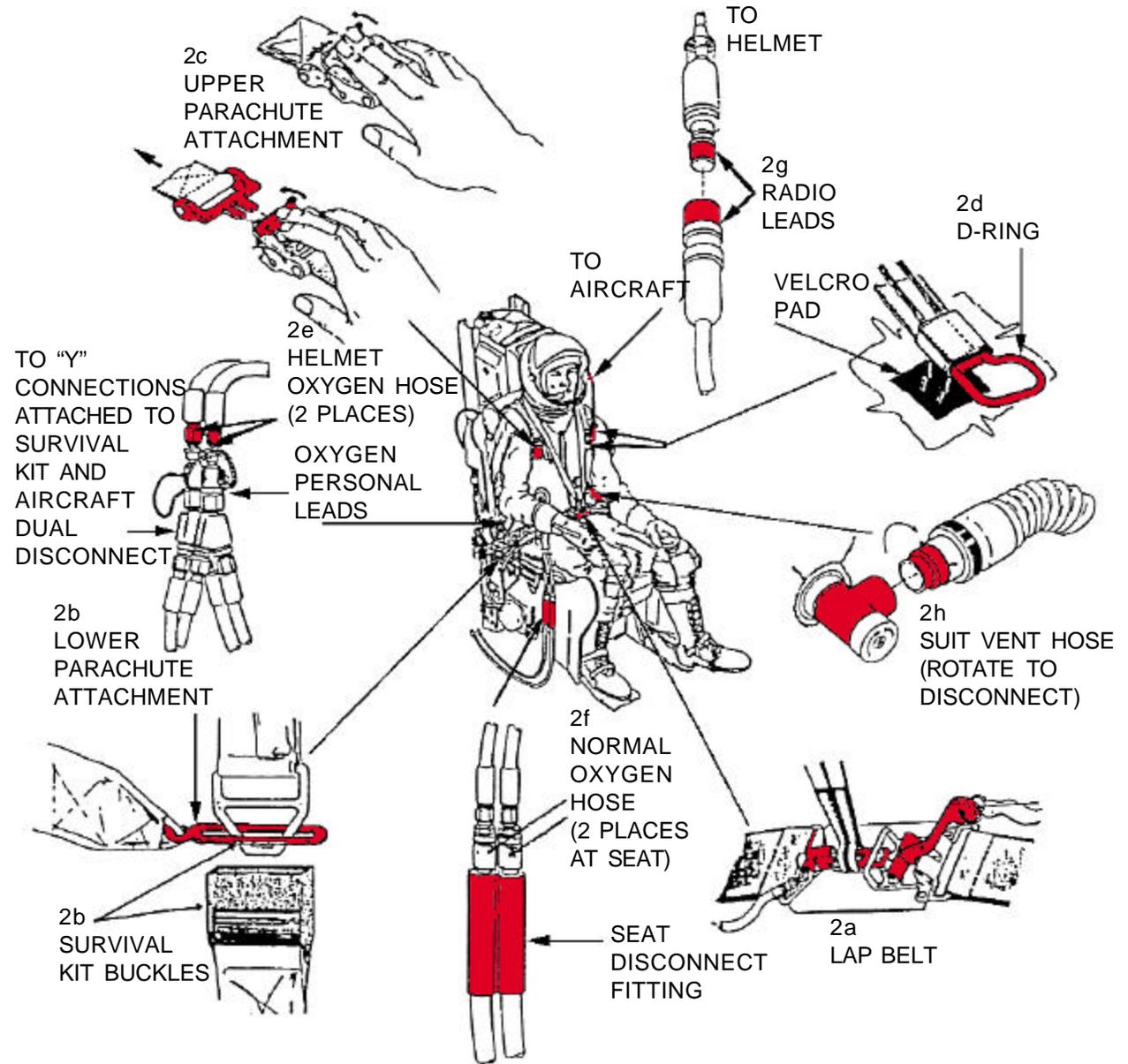
- c. While avoiding placing arm between control column and instrument panel, move control column forward to end of travel.
- d. Insure oxygen system is OFF at helmet prior to unlocking faceplate or visor of helmet. (See VISOR LATCH OPENING PROCEDURES.)
- e. Depress thumb button and pull scramble handle to release personal restraints. (Expect several loud ballistic reports from equipment release initiators.)
- f. Pull up on kit handle to release kit from crewmember.
- g. Remove crewmember.



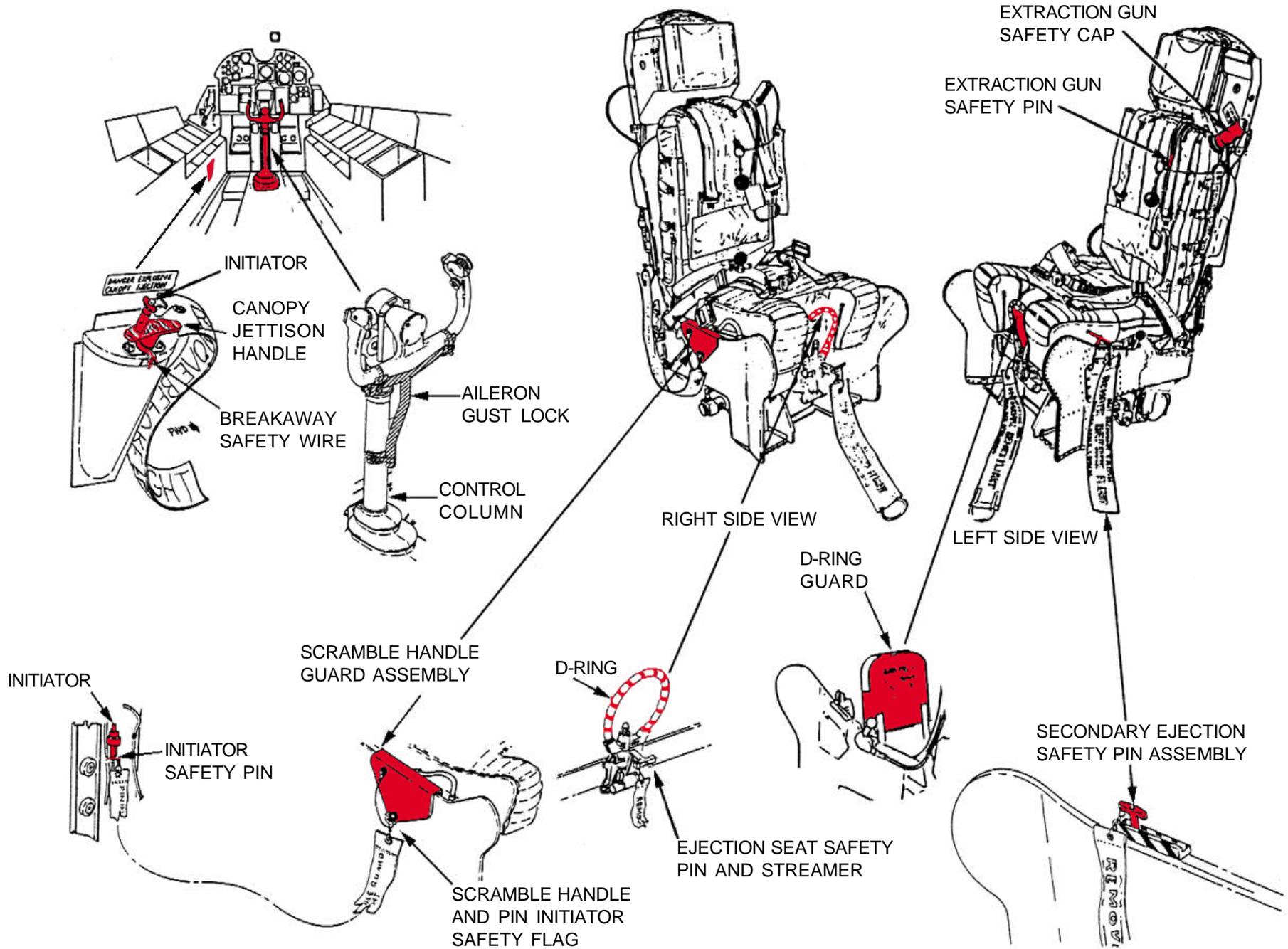
AIRCREW EXTRACTION-Continued

2. NORMAL AIRCREW EXTRACTION

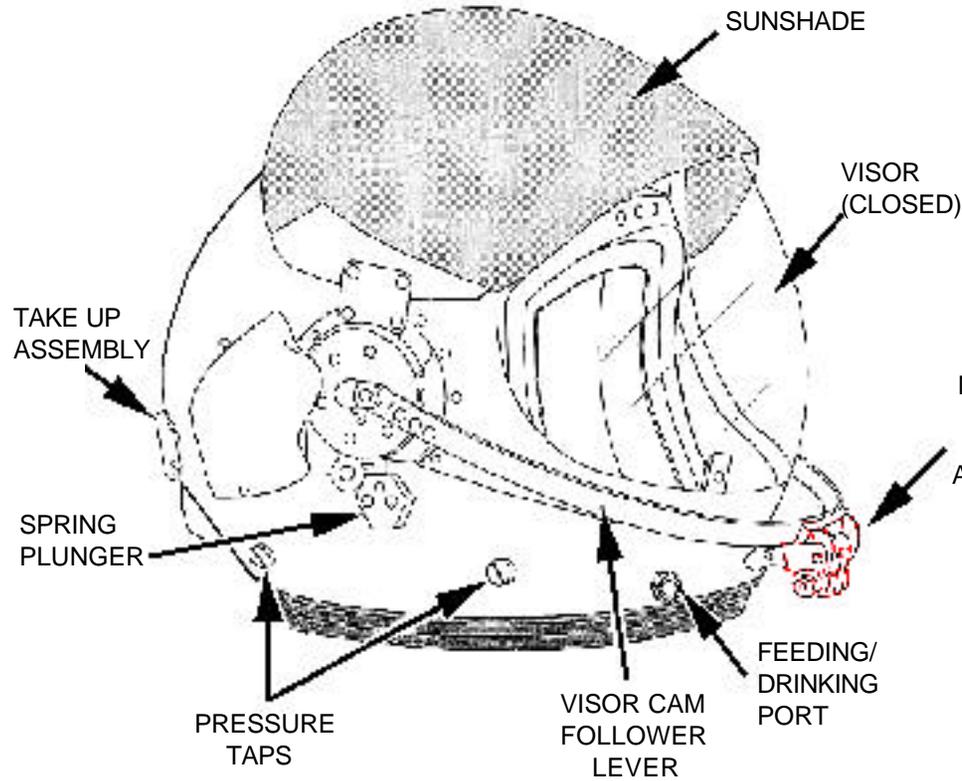
- a. Open lap belt (this will also release shoulder harness).
- b. Remove lower parachute attachments and survival kit belts.
- c. Disconnect upper parachute shoulder attachments.
- d. Lift parachute D-ring from Velcro pad.
- e. Disconnect both oxygen hoses from helmet.
- f. Unsnap oxygen keepers - 2 places.
- g. Disconnect radio leads.
- h. Disconnect suit vent hose.
- i. Remove crewmember. (Spur attachments will disconnect when member is raised up.)



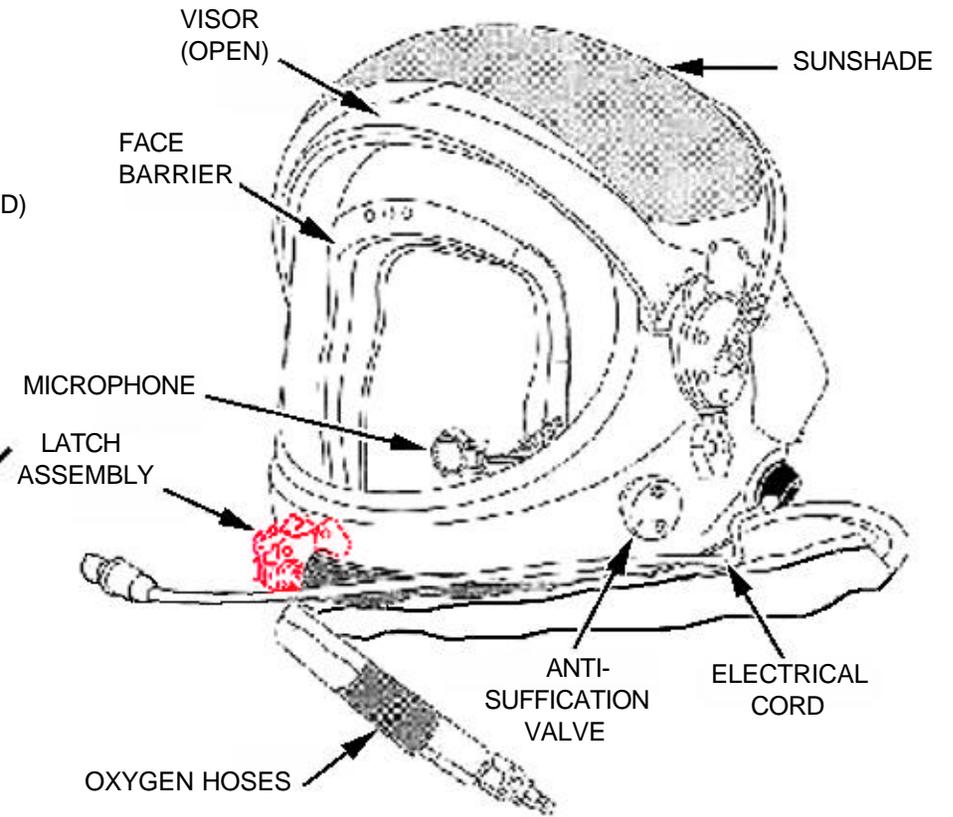
INTERNAL GROUND SAFETY DEVICES



HELMET COMPONENTS



HELMET - VISOR CLOSED - RIGHT VIEW



HELMET - VISOR OPEN - LEFT VIEW