

**BY ORDER OF THE
SECRETARY OF THE AIR FORCE**



**AIR FORCE INSTRUCTION 11-2B-2,
VOLUME 3**

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Flying Operations

B-2--OPERATIONS PROCEDURES

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This volume implements AFD 11-2, *Aircraft Rules and Procedures*; AFD 11-4, *Aviation Service*; and AFI 11-202V3, *General Flight Rules*. It applies to all B-2 units. This volume does not apply to Air Force Reserve Command (AFRC) units and members. This volume does not apply to the Air National Guard (ANG). MAJCOMs/DRUs/FOAs are to forward proposed MAJCOM/DRU/FOA-level supplements to this volume to HQ AFFSA/XOF, through HQ ACC/DOTO, for approval prior to publication IAW AFD 11-2. Copies of MAJCOM/DRU/FOA-level supplements, after approved and published, will be provided by the issuing MAJCOM/DRU/FOA to HQ AFFSA/XOF, HQ ACC/DOTO, and the user MAJCOM/DRU/FOA offices of primary responsibility. Field units below MAJCOM/DRU/FOA level will forward copies of their supplements to this volume to their parent MAJCOM/DRU/FOA office of primary responsibility for post publication review. **NOTE:** The terms Direct Reporting Unit (DRU) and Field Operating Agency (FOA) as used in this paragraph refer only to those DRUs/FOAs that report directly to HQ USAF. When guidance in this volume duplicates, changes or conflicts with already published information contained in other ACC documents, the material in this volume takes precedence. Keep supplements current by complying with AFI 33-360V1, *Publications Management Program*. See **Paragraph 1.5.** of this volume for guidance on submitting comments and suggesting improvements to this volume. Records Disposition: ensure that all records created by this AFI are maintained and disposed of IAW AFMAN 37-139, "Records Disposition Schedule."

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

Many of the changes appearing throughout this instruction are administrative. A substantial amount of the restrictions covered in **Chapter 7** have been moved to **Chapter 3** for ease of use. All references to rescinded publications, ACCR 51-18 and T.O. 1B-2A-1-2, were deleted. Paragraph **1.5.2.**: Add 509 BW procedures for processing changes to this AFI. Paragraph **2.2.7.**: Add on-scene commander procedures for CSAR operations. Paragraph **2.3.**: Add reference to AFI 11-202V2 ACC SUP 1 for mission planning

area materials required. Paragraph 2.4.: Add requirement for web-based mission planning tools. Paragraph 2.4.4.: Add actual combat missions and exercise specific missions will be planned by a 509 OSS Mission Planning Cell (MPC). Paragraph 2.4.5.3.: Add new guidance on required use of PFPS/Sectional Charts. Paragraph 3.3.1.6.: Add reference to B-2 Go-No-Go guide for takeoff restrictions. Paragraph 3.4.1.: Add B-2 crewmembers should back up navigation and remain vigilant for B-2 specific weather avoidance restrictions. Paragraph 3.4.2.4. Add simulated engine loss during air refueling is permissible under IP supervision and limited to pulling a single throttle to idle to simulate the loss of one engine. Paragraph 3.5.1.: Add low level/terrain following (TF) limitations and restrictions to align with B-1 and B-52 guidance. Reduce minimum low level/TF altitude from 1000 feet to no lower than 400 feet AGL. Include guidance on night/IMC TF limitations. Paragraph 3.6.2.2.: Delete definitions for standard, non-standard, and stream formations. Add reference to Federal Aviation Administration Handbook (FAAH) 7610.4J Special Military Operations. Paragraph 3.6.2.6.3.: Delete definitions of Emission Control (EMCON) options; referenced AFTTP 3-1 for EMCON level descriptions. Paragraph 3.6.2.7.: Add new formation collision avoidance guidance. Delete lost wingman procedures and replace with “Broke Lock” with/without communications to better suit non-standard formation procedures. Paragraph 3.6.3.3.2.: Add use appropriate fan headings for all MITOs. Paragraph 3.6.3.10.5.: Add altitude changes for IMC formation lead changes may be accomplished in a stabilized forward or aft echelon position. Paragraph 3.6.3.11.5.: Change Post Air Refueling Rejoin in Formations with More Receivers than Tankers for clarification. Paragraph 3.6.3.11.6.4.: Change to allow air refueling late arrivals to rejoin at least 1000 feet above or below the refueling block altitude. Paragraph 3.7.: Add fuel minimums criteria. Paragraph 4.3.: Add Synthetic ILS (SILS)/Synthetic TACAN (STACAN) Approach guidance. Paragraph 5.2.1.: Change weapons release criteria to allow release if a malfunction is only due to a loss of redundancy not affecting weapons accuracy or normal weapons release. Paragraph 6.5.3.: Add airspeed below 10,000 feet MSL guidance for unplanned exits of an MTR. Paragraph 6.6.: Add nose high/low recovery procedures.

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Chapter 1

INTRODUCTION

1.1. Aircrew Responsibility. This volume, in conjunction with other governing directives, outlines those procedures applicable to the operation of B-2 aircraft under most circumstances, but is not to be used as a substitute for sound judgment or common sense. Operations or procedures not specifically addressed may be accomplished if they enhance safe, effective mission accomplishment.

1.2. Deviations. Deviations from these procedures require specific approval of the HQ ACC/DO unless an urgent requirement or an aircraft emergency dictates otherwise, in which case the mission commander will take the appropriate action to safely recover the aircraft.

1.3. References. This volume, in conjunction with T.O. 1B-2A-1, *Flight Manual*; T.O. 1B-2A-1-3, *Supplemental Flight Manual*; T.O. 1B-2A-25-1, *Nuclear Bomb Basic Information*; T.O. 1B-2A-25-2, *Nuclear Bomb Delivery Operating Procedures*; T.O. 1B-2A-34-2-1, *Nonnuclear Weapons Delivery Manual*; AFTTP 3-1V23, *B-2 Tactical Employment*; AFI 11-214, *Aircrew, Weapons Director, and Terminal Attack Controller Procedures for Air Operations*; and FAAH 7610.4J, *Special Military Operations* are the primary references for B-2A operating procedures. Training units may develop phase manuals from the procedures contained in these documents. Phase manuals may be used to augment initial and mission qualification training at operational units. Phase manuals may expand these basic procedures--in no case will they be less restrictive.

1.4. Waivers. Waiver requests will be forwarded to HQ ACC/DOT for approval. Units subordinate to a NAF will provide their NAF/DO/OV with an informational copy. Waivers, if approved, will be issued for a maximum of one year from the effective date.

1.5. Processing Changes:

1.5.1. Recommendations for changes to this volume will be submitted through HQ ACC/DOT to HQ ACC/DO on AF Form 847, **Recommendation for Change of Publication**.

1.5.2. 509 BW Procedures:

1.5.2.1. Crew members will submit AF Form 847 to 509 OGV for coordination and approval.

1.5.2.2. 509 OGV will send 847s to HQ ACC/DOTO for coordination.

1.5.3. HQ ACC/DO will:

1.5.3.1. Process recommendation for change.

1.5.3.2. Forward recommended changes to HQ AFFSA/XO for AF/XO approval.

1.5.3.3. Address time sensitive changes by immediate action message.

Chapter 2

MISSION PLANNING

2.1. Flight Manuals. Crewmembers are personally responsible for maintaining adequate knowledge of system operations, normal, and emergency procedures. Each crewmember will have the appropriate checklists for the respective flight.

2.2. Local Aircrew Aids. Aircrew aids will include the following:

- 2.2.1. Briefing guides.
- 2.2.2. Local VHF/UHF/HF channelization and airfield NORDO procedures.
- 2.2.3. Impoundment procedures.
- 2.2.4. Fuel dump/weapon jettison areas.
- 2.2.5. Divert/alternate base information.
- 2.2.6. Recovery with ferried, retained, or hung weapons on board.
- 2.2.7. On-scene commander procedures for CSAR operations.
- 2.2.8. Other information as deemed necessary by the unit. Examples include stereo flight plans, ERCC/taxiback procedures, local training areas/MOAs, and maintenance brevity codes.

2.3. Mission Planning Responsibility. Individual crewmembers are responsible for complete and accurate mission planning. Individual flying squadrons are responsible for providing sufficient mission planning areas to support the flying schedule. The mission planning areas will provide materials IAW AFI 11-202V2 ACC SUP 1. The 509 OSS will maintain mission planning facilities for operational sorties.

2.4. Mission Planning Procedures. Accomplish flight planning to insure safe accomplishment of all phases of flight. As a minimum, mission planning includes takeoff procedures, enroute procedures, planned simulated/actual threats, target study/weapons delivery, air refueling, fuel requirements, formation procedures/briefing (if applicable), chart preparation and landing procedures. A review of bird advisory and hazard information will be accomplished. Web-based planning tools should be readily available to the flight crew to help facilitate efficient flight planning. This access should include (as a minimum): aircraft status, weather data, scheduling information, flight currency, NOTAM, and airfield data. **NOTE:** Target study will be conducted in accordance with local procedures outlined in **Chapter 8**. The 509 OSS/OSK is the responsible agency for the target study officer checkout program.

2.4.1. Planning/Preparation Requirements: Crewmembers will be afforded sufficient time to mission plan their sortie commensurate with the type and amount of training scheduled. Normally eight hours will be given, however this period may be reduced proportional to the amount of pre-generated material available. Both crewmembers must be present for mission planning. Unit schedulers will ensure other activities, such as recurring academic training, training device periods, additional duties, etc., will not interfere with time allotted for mission planning and mission briefing. **NOTE:** This is not intended to limit mission rehearsal trainers.

2.4.2. Crew Mission Planning:

2.4.2.1. The pilot-in-command will ensure mission planning is completed in sufficient detail for the planned mission, review currencies for both crewmembers, and review aircraft restrictions for each activity planned. An alternate mission will be planned to include activity to be accomplished in the event of equipment failure or adverse weather factors. The alternate mission should parallel as closely as possible the original mission.

2.4.2.2. The pilot-in-command is ultimately responsible for the accuracy and completeness of all the mission data. He/she must ensure crew substitutions are made in sufficient time for the substitute to be thoroughly briefed and be familiar with the applicable mission data.

2.4.3. **Mission Briefing/Debriefing:**

2.4.3.1. The pilot-in-command will designate the crewmember who will conduct the formal mission briefing. If, due to mission requirements or as a result of a substitution, the mission briefing must be delayed until the day of the flight, adequate time must be provided for this brief before the pre-takeoff briefing.

2.4.3.2. The briefing will include, but not limited to the all scheduled activities and requirements in **Attachment 2** from takeoff through mission termination. Items should be covered in sufficient detail so that only a short review is required in flight. If the interval from the initial briefing to takeoff exceeds 72 hours, a complete review and briefing must be re-accomplished.

2.4.3.3. All crews involved in a formation flight must attend a formation briefing. The basic guide is in **Attachment 3**. The unit may augment the guide as necessary.

2.4.3.4. Units not specifically associated with the 509 BW that operate the B-2 (for example 419 FLTS at Edwards AFB) may develop briefing guides appropriate for flight activities

2.4.3.5. The formation lead and/or pilot-in-command is responsible for conducting a thorough debriefing covering all significant aspects of the flight. For FTU sorties, this debriefing must be accomplished prior to the next training sortie.

2.4.4. **Operational/Exercise Mission Planning Pretakeoff Briefing.** Actual combat missions and exercise specific missions (e.g., ORI/Flag missions) will be planned by a 509 OSS Mission Planning Cell (MPC) IAW OG OI 11-10.

2.4.5. **Chart Preparation:**

2.4.5.1. **Local Area Charts.** A local area chart is not required if the local in-flight guide includes controlled bailout areas and provides sufficient detail of the local area to remain within assigned training areas.

2.4.5.2. **Navigation Route Chart.** For overland operational training flights, a current chart of sufficient scale providing navigation and terrain/obstacle avoidance information will be carried. Sufficient navigational information will be included to ensure successful mission accomplishment.

2.4.5.3. **PFPS/Sectional Charts.**

2.4.5.3.1. Aircrew members flying under VFR or inside the MTRS in the CONUS will supplement existing mission planning materials (e.g. CHUM, FLIP AP/1B, etc.) with either:

2.4.5.3.1.1. PFPS/Falcon View with the following overlay options selected: Airports/heliports, airspace boundaries, airways, MTR, parachute jump and SUAS boundaries; or

2.4.5.3.1.2. Sectional aeronautical charts.

2.4.5.3.2. Low level charts and route books used during flight will be annotated with location and dimensions of Class A/B/C/D airspace, civil/military airfields and other potential high density traffic areas (e.g., parachute activity areas and ultra light/hang glider/glider sites, etc.) within 5 NM of any planned VFR route or MTR lateral boundary. Applicable airfield approach control frequencies in the vicinity of Class A/B/C/D airspace will be annotated and briefed on all such flights. In addition, annotate and brief the intersection of other VR/IR routes (if applicable) and any other possible areas of conflict.

2.4.5.3.3. Low level charts and route books will also be annotated with a minimum safe altitude (MSA) or route abort altitude (RAA) for each leg, updated by the Chart Update Manual (CHUM), and annotated for all man-made obstacles above the planned flight altitude.

2.4.5.3.4. Use of sectional aeronautical charts in flight is not required.

2.4.5.3.5. Aircrew members flying outside CONUS will follow gaining MAJCOM, theater or host nation guidance on mission planning. If no gaining MAJCOM, theater or host nation guidance exists, use the best charts or Falcon View overlay options available to accomplish the requirements of **Paragraph 2.4.5.3.2.**

2.4.6. **Performance Planning Criteria.** A minimum of 1,000 feet overrun must be available in addition to the minimum runway required (MRR). When 1,000 feet of overrun are not available, reserve 1,000 feet of the runway to satisfy the minimum overrun requirements. Runway available for takeoff planning must be actual runway length minus any portion of the runway used to satisfy overrun requirements at the liftoff end of the runway.

Chapter 3

NORMAL OPERATING PROCEDURES/RESTRICTIONS

3.1. Preflight. Normal pre-flight flow is described in the pre-flight procedures section of the local **Chapter 8** section of this instruction. The pilot-in-command must ensure that the publications required by AFI 11-202V3 are onboard the aircraft. Tech order and associated directives requirements are defined in local **Chapter 8**.

3.2. Taxi.

3.2.1. Accomplish a static last chance inspection IAW local **Chapter 8** of this instruction.

3.2.1.1. Aircrew will confirm the brakes are set and the radar is not transmitting prior to ground checks. The ground crew will clear the B-2 prior to taxi. Verbal acknowledgment from the aircrew is mandatory.

3.2.2. Crewmembers will observe the following taxi limitations:

3.2.2.1. Minimum taxi interval is 500 feet in trail.

3.2.2.2. Do not taxi the aircraft with a reported RCR of 6 or less anywhere on the taxi route. Taxi route will be cleared to a minimum of 75 feet wide for taxi RCR purposes.

3.2.2.3. See local **Chapter 8** for further taxi limitations.

3.3. Takeoff/Departure:

3.3.1. Do not takeoff if the following conditions exist:

3.3.1.1. If the RCR is reported less than 9.

3.3.1.2. Standing or pooled water on the runway.

3.3.1.3. On training missions, if the computed takeoff roll exceeds 80% of the available runway (waiverable by 509 OG/CC).

3.3.1.4. Any attitude indicator, heading indicator, or standby instrument inoperative.

3.3.1.5. One or more engines inoperative (peacetime) from start of takeoff roll.

3.3.1.5.1. During emergency evacuations, launch of aircraft with one or more engines inoperative may be accomplished at the discretion of the wing commander or when specifically directed by higher headquarters. At no time will launch be directed when computed takeoff distance exceeds 95 percent of runway available.

3.3.1.6. See the B-2 Go-No-Go guide in **Section 3** of the B-2 In-flight Guide for further restrictions.

3.3.2. Intersection takeoffs are not authorized without 509 OG/CC approval.

3.4. Air Refueling:

3.4.1. Air refueling operations are authorized along published routes/tracks. Random air refueling is authorized with approval by ARTCC. Once the rendezvous is complete, the tanker is responsible for

navigation IAW TO 1-1C-1-37, however B-2 crewmembers should back up navigation and remain vigilant for B-2 specific weather avoidance restrictions.

3.4.2. Aircrew will observe the following air refueling limitations and restrictions:

3.4.2.1. Do not conduct air refueling with control stick steering engaged.

3.4.2.2. Do not conduct air refueling when an FCS CAUTION exists, except when necessary for safe recovery of the aircraft.

3.4.2.3. Do not conduct air refueling when encountering turbulence which, in the opinion of the pilot-in-command or boom operator, denies a safe margin of control of either aircraft or boom.

3.4.2.4. Do not conduct air refueling with less than four engines operating, except when necessary for safe recovery of the aircraft. Simulated engine loss during air refueling is permissible under IP supervision and limited to pulling a single throttle to idle to simulate the loss of one engine. Avoid rapid throttle movements, particularly on the side with the engine in idle. See T.O. 1B-2A-1 for further engine limitations.

3.4.2.5. Do not conduct air refueling when the tanker has less than all engines operating (applies to training missions only).

3.4.2.6. Do not conduct air refueling when any flight control problems are suspected or encountered in flight which, in the opinion of the receiver pilot, would deny a safe margin of control.

3.4.2.7. Do not conduct air refueling when tanker aircraft is unable to retract landing gear.

3.4.2.8. Discontinue air refueling after a known loss of tanker disconnect capability except during the following conditions:

3.4.2.8.1. During an emergency fuel situation (limit contact time to that required to obtain fuel).

3.4.2.8.2. Operational missions, ORI, emergency evacuations or deployments/re-deployments (limit contact time to that required to obtain fuel).

3.4.3. **Breakaway Training:**

3.4.3.1. Do not accomplish breakaway training from the contact position unless the receiver system is normal and both the receiver and tanker have demonstrated normal disconnect capability prior to beginning maneuver.

3.4.3.2. The tanker pilot, boom operator, and receiver pilot will coordinate the maneuver prior to in-flight accomplishment. In-flight coordination must include when the maneuver will occur and who will give the command of execution.

3.4.4. **Boom Limit Demonstration:**

3.4.4.1. Boom envelope demonstrations will be performed under IP supervision.

3.4.4.2. The boom operator and the receiver pilot will confirm normal disconnect capability prior to the start of the demonstration.

3.4.4.3. The receiver pilot will inform the boom operator when the demonstration is started, the limit to be demonstrated, and when terminating the demonstration.

3.4.5. **Override Boom Latching Procedures:** Override boom latching procedures training must be under instructor pilot supervision. Brief procedures between receiver pilots and boom operators as required by applicable air refueling tech orders. Both tanker and receiver systems must be fully operational.

3.5. Low Level Flight:

3.5.1. **Low Level/TF Limitations.** This paragraph establishes limitations and restrictions for IFR routes (IR), VFR routes (VR), and low level/TF flight training activity. The low level environment defined by this instruction is at or below 5,000 feet AGL.

3.5.1.1. Do not fly low level/TF lower than **400** feet AGL or in accordance with FLIP AP/1B or AP/3, which ever is higher.

3.5.1.2. Minimum weather for low level/TF flight is 1,500 foot ceiling and 5 mile visibility for training areas or higher as defined in FLIP for VR routes. (N/A for Night/IMC Qualified Crews).

3.5.1.3. Visual contour flight is prohibited.

3.5.1.4. First and second detent positions will not be used to maintain TF altitudes. First and second detent may only be used to arrest a fly-up upon reaching a safe altitude.

3.5.1.5. Do not conduct low level/TF flight in areas of:

3.5.1.5.1. Forecast severe turbulence.

3.5.1.5.2. Forecast moderate turbulence in mountain wave effect.

3.5.1.5.3. Severe turbulence reported by military aircraft.

3.5.1.5.4. If conditions of moderate turbulence, not associated with mountain wave effect, persist for an extended period, exit conditions as soon as possible.

3.5.1.6. Do not initiate a TF letdown or continue TF flight if any of the following conditions exist:

3.5.1.6.1. FCS CAUTION or any FCS malfunction that denies the pilot a safe margin of control.

3.5.1.6.2. Complete loss of CM (unless GPS integrated) or WX (unless VMC) radar modes.

3.5.1.6.3. Inoperative radar antenna or radar altimeter.

3.5.1.6.4. Mode for primary navigation solution (PNS) is less than INERTIAL.

3.5.1.6.5. Loss of reliable flight path marker.

3.5.1.6.6. Unable to set TRT on all four engines using normal throttles.

3.5.1.7. Night/IMC TF Limitations:

3.5.1.7.1. Only crews who are night/IMC TF qualified or crewmembers who are receiving night/IMC TF checkout IAW AFI 11-2B-2V1 and the 509 BW B-2A Terrain Following Upgrade Training Syllabus with a qualified instructor are authorized to fly night/IMC TF.

3.5.1.7.2. The terrain following, radar (pertains only to TF, DTED TA, CM, and WX modes), and navigation (pertains only to inertial modes) systems must be fully operational to conduct night/IMC TF operations.

3.5.1.7.3. Both crewmembers must have a Vertical Situational Display (VSD) and TF display selected, and one crewmember must display a TA display—preferably DTED TA.

3.5.2. See **Attachment 7** of the local **Chapter 8** of this instruction for TF standards.

3.6. Formation:

3.6.1. **Safety.** Formation is a potentially hazardous operation. Strict compliance with briefed and authorized procedures is essential to the safe conduct of any training or combat mission. These procedures cannot substitute for proper aircrew judgment during formation operations.

3.6.2. General Formation Procedures and Responsibilities:

3.6.2.1. B-2 formation procedures are currently limited to three-ship operations.

3.6.2.2. The B-2 operates under non-standard formation rules as defined in Federal Aviation Administration Handbook (FAAH) 7610.4J Special Military Operations. Indicate "Nonstandard" in the remarks section of the filed flight plan. Flight leaders must advise ATC upon initial contact, and each subsequent controller or controlling agency, of separation used. Advisories are not required when operating within an ALTRV or airspace specifically designed for formation flight activity.

3.6.2.3. When flying nonstandard formation, advise ATC of the longitudinal, lateral, and/or vertical separation between flight lead and the last aircraft in formation so they can provide appropriate separation from other aircraft.

3.6.2.4. Should separation between the flight leader and other aircraft in the formation exceed ATC separation limitations or vary significantly from that reported to ARTCC for the nonstandard formation, the aircraft outside the formation limits will no longer be considered part of the formation. The pilot will inform the leader of his or her position and request ATC provide individual control until reestablished in formation.

3.6.2.5. Responsibilities:

3.6.2.5.1. **Flight Lead Responsibilities.** Flight lead will be responsible for the safe and effective operation of the flight. The flight lead plans, briefs and debriefs the flight. Flight lead will ensure all aircraft are thoroughly briefed on all aspects of multi-ship formation flying to include the communications plan, aircraft spacing, rejoins, "broke lock" procedures, air refueling and lead changes. See **Attachment 3** of this instruction for formation briefing guide.

3.6.2.5.2. **Wingman Responsibilities.** Wingmen have the primary responsibility for safe separation and are responsible for executing flight lead's plan.

3.6.2.6. Communications and Radio Procedures:

3.6.2.6.1. **General.** Flight lead will develop a communications plan based on the tactical plan for the mission and the Special Instructions (SPINS). Radio terminology should be standardized with AFTTP 3-1 radio calls. As a minimum, flight lead must maintain an interplane frequency. If possible, all aircraft should monitor ATC frequency. Every flight member must stay vigilant for incorrect or missed radio calls. The radio plan should include use of all available communications devices to include interim Line-of-Sight/Beyond-Line-of-Sight radios. Contingencies for loss of components as well as communications out procedures should be

briefed. Formation standards are found in **Attachment 6** to the local **Chapter 8** of this instruction.

3.6.2.6.2. Call Signs:

3.6.2.6.2.1. To preclude confusion by ARTCC, if aircraft positions within a flight are changed, do not change the flight call sign and Mode III IFF squawk. However, change the position numbers within the flight to the one assumed.

3.6.2.6.2.2. Receiver call signs will be IAW T.O. 1-1C-1-37. For large formation air refueling operations, aircraft may use assigned air refueling position for communications with their air refueling mate. For any abnormal or emergency situations use tactical call sign.

3.6.2.6.3. **Emission Control (EMCON).** Emission control must be practiced to the greatest extent possible during peacetime if crews are to effectively use it in wartime. EMCON options will be briefed by the formation lead. See AFTTP 3-1 for descriptions of each EMCON level. Use Have Quick/KY-58 to the maximum extent possible.

3.6.2.7. Collision Avoidance:

3.6.2.7.1. **General.** It is imperative that all formation members take an active role to avoid a collision. As stated above, in most phases of formation flight, the wingman is responsible for separation. However, if circumstances (defined below) preclude the wingman from ensuring separation, the responsibility for flight path deconfliction transfers to lead. Therefore the wingman must inform lead (if still in communication) of the situation and the flight lead must become directive to ensure separation. Considering the fact that the B-2 utilizes non-standard formation spacing, "Lost Wingman" in the traditional sense (close fighter formation) needs to be amended. The following rules for flight path deconfliction must be applied:

3.6.2.7.2. **Broke Lock.** If the wingman loses visual (blind) and radar contact (broke lock) during station keeping, he/she must immediately call "broke lock." This call assumes IMC conditions. When any flight member calls "broke lock," lead will immediately report current altitude and heading to the flight and ensure at least 500' altitude separation is established and maintained between all aircraft. If in a climb or descent, lead will continue to report altitude and heading every 1,000 feet until all wingmen report visual or tied or flight is level at deconflicted altitudes. All flight members will take appropriate action to ensure proper formation spacing (vertical and/or lateral) is obtained and provide positions reports when conditions permit. All preceding aircraft will ensure K-band beacons are operating and/or partially open speedbrakes as required to expedite radar contact. In three-ship formations, trailing aircraft should remain in formation with the aircraft they are station keeping with. For example, if number three aircraft is station keeping off of two and the number two aircraft calls "broke lock," three should remain tied to two.

NOTE: Normally, wingmen should perform station keeping off of the immediately preceding aircraft.

3.6.2.7.3. **Broke Lock and Lost Comm.** If a wingman becomes "broke lock" and is unable to contact the lead aircraft, the wingman will utilize all available communications devices on board the B-2 to establish contact with lead. This includes the use of GUARD frequency, HF and SATCOM. Simultaneously, the wingman must take positive steps to ensure separation. If in straight and level flight, maintain established altitude separation and previously cleared flight path. If straight ahead and in a climb or descent, turn fifteen degrees away from lead's

last known heading. If in a turn and in a climb or descent, roll out to obtain separation. If all attempts to regain contact with lead aircraft fail, attempt to contact ATC to obtain a separate clearance. If NORDO, comply with Flight Information Handbook procedures and recover or continue mission as appropriate. If in flights of three aircraft, trailing aircraft should initially remain in formation with the aircraft they are station keeping with as described in **Paragraph 3.6.2.7.2**. Once flight path deconfliction is assured, lead will direct the formation as appropriate.

NOTE: Wingmen should be extremely vigilant when climbing/descending through a preceding aircraft's altitude and must be visual or in radar contact before crossing altitudes.

3.6.3. Specific Formation Procedures and Restrictions:

3.6.3.1. **Mission Planning.** The flight lead will conduct the formation briefing that will cover all planned, anticipated and potential activities as well as the responsibilities of each member. Specific emphasis will be placed on critical areas of formation flight including: rejoins, climbs/descents, air refueling, low level entry, range procedures and formation breakup. Additional emphasis should be placed on the hazards associated with wake turbulence/wing tip vortices associated with a multiple heavy aircraft formation to include discussion/briefing on proper lateral and/or vertical positioning for avoidance. Use the formation briefing guide in **Attachment 3** of this instruction or the guide in the locally produced In-flight Guide. Flight leads may add additional items to their briefing to enhance mission completion.

3.6.3.2. **Ground Operations.** Flight lead will develop and brief the formation plan for how he/she wants to accomplish formation items on the ground. Last Chance inspections will be accomplished for each individual aircraft IAW this instruction and local **Chapter 8** procedures.

3.6.3.2.1. Do not taxi closer than 500 feet from the preceding aircraft to prevent FOD damage. Do not stagger--use the taxi line.

3.6.3.3. Takeoff Procedures:

3.6.3.3.1. B-2 formations will use a minimum of 1 minute spacing between brake release for formation members. Takeoff intervals may be increased as necessary for aircraft performance, training, weather or mission requirements. For practice MITOs, aircraft spacing may be reduced to 30 seconds. Practice MITOs are restricted to 2-ship only, no greater than 300,000 lbs gross weight, TRT and in base escape master mode. Practice MITOs will only be accomplished as part of a nuclear training mission.

3.6.3.3.2. Use caution for wake turbulence on departure, and adjust climb routing to avoid areas of potential wake turbulence. Appropriate fan headings will be flown for all MITOs to account for preceding aircraft's wake turbulence. If wake turbulence is encountered, smoothly adjust flight path laterally to exit turbulence. Do not adjust throttles and use caution for G limitations.

3.6.3.3.3. Lead will climb out at 280 KIAS until .77 mach and then climb at .77 mach. Lead should limit bank angle to 25 degrees during departure to allow wingmen to use cutoff. Wingmen will initially climb at 280 KIAS until "visual" or "tied" to preceding aircraft. Once "visual" or "tied" the wingman may accelerate to 325 KIAS to close. During intermediate level off, wingmen will stack down 500 feet. During an IMC departure when trailing aircraft are not yet "tied," lead will call altitude every 5000 feet, call turns, and report level off. In addition,

wingmen will turn over the same geographical point based on timing from lead's call, radar, or air-to-air TACAN/STACAN. Wingman will call "visual," "tied" and "saddled" as appropriate. Wingmen will use cutoff only when in visual contact with preceding aircraft.

3.6.3.3.4. During the departure and climb, once closure airspeed is established and a wingman loses visual and radar contact with the preceding aircraft, the wingman will immediately comply with the procedures for "broke lock" in **Paragraphs 3.6.2.7.2.** and **3.6.2.7.3.**

3.6.3.4. **Aborts:**

3.6.3.4.1. MITO aborts will be called by the aborting aircraft once it is fully under control. If lead aborts during a MITO, wingman should taxi clear to maintain formation integrity unless the mission dictates otherwise. If wingmen abort, they may rejoin enroute if briefed by lead.

3.6.3.4.2. For all formation takeoffs, inform the formation if aborting after takeoff. If a wingman aborts the formation, he/she will obtain ATC clearance to clear the stream. Lead should attempt to assist the aborting aircraft in any way possible. The formation flight lead will take the necessary action to reconfigure the formation.

3.6.3.5. **Level Off.** Lead will determine and brief the formation spacing at level off. Lead will obtain an altitude block for all intermediate and final level off altitudes. Lead will direct a minimum of 500 feet altitude stack between aircraft.

3.6.3.6. **Enroute Formation :**

3.6.3.6.1. **Enroute Trail.** The primary enroute formation (cell formation as defined by FAAH 7610.4J) is trail. Enroute trail consists of two or more aircraft stacked up at 500 foot intervals and one to two miles spacing (as briefed by lead). Station keeping is maintained through the use of visual or electronic means (TACAN or radar). Weather considerations and the desired EMCON level will dictate the appropriate needs. Wingmen may station keep off of the lead aircraft or the preceding aircraft as briefed by lead. See local **Chapter 8** for formation standards. Lead will also brief standard altitudes, airspeeds, and climb rates to help wingmen maintain position.

3.6.3.6.2. **Stream Formation.** "Stream" formation as defined by FAAH 7610.4J may also be flown. This is primarily used for multiple formations flying the same route of flight (e.g., exercises, ORIs, etc.) and is flown in conjunction with an altitude reservation (ALTRV). The mission planning cell for the activity will brief the stream formation procedures when appropriate.

3.6.3.7. **Echelon Formation.** Echelon formation will be used in air refueling involving multiple tankers and/or receivers. It will be flown in accordance with the procedures defined in TO 1-1C-1-37. Lead will brief when the formation will assume the echelon position.

3.6.3.7.1. Assume echelon in straight and level flight by succeeding aircraft turning from formation heading in increments of 5 to 10 degrees. Aircraft will return to lead's heading as they approach proper echelon position.

3.6.3.7.2. Turns into an echelon are limited to 15 degrees of bank. All aircraft must execute the turn at the same time, or when time permits, maneuver back to trail formation.

3.6.3.7.3. Turns greater than 30 degrees into the echelon are permitted only in an emergency. If turns into the echelon greater than 30 degrees are required direct the formation back into radar trail and then execute the turn.

3.6.3.8. **Airspeed and Altitude.** Closely monitor and control airspeed and altitude throughout formation flight. Power settings and rates of climbs, descents, airspeed increases and decreases should be prebriefed or announced on interplane frequency to allow formation members to maintain position. Plan the mission to consider the airspeed requirements of the heaviest aircraft.

3.6.3.9. **Mid-Mission Rejoin.** All mid-mission rejoins will be thoroughly prebriefed by lead. Lead will ensure a minimum of 1000 feet between aircraft during the rejoin. The rejoin should provide a sufficient straight leg beyond the planned rendezvous point to effect join-up. The preferred method of rejoin is to arrive over a common navigational control point, then departing on a common leg. Complete the rejoin before executing any other training (i.e., AR, Low Level etc.).

3.6.3.10. **Position Changes:**

3.6.3.10.1. Position changes will only be accomplished in straight and level flight. Once initiated, the position change will take priority over all other activities.

3.6.3.10.2. Altitude separation is the most critical element during position changes. A minimum of 500 feet altitude separation between aircraft will be maintained until swapping altitudes to complete the lead change.

3.6.3.10.3. Maintain radar or visual contact throughout the position change. If radar contact and visual contact is lost during the position change, maintain altitude separation. Notify lead and attempt to re-establish radar or visual contact by all means available. Lead will not direct an altitude swap until all wingmen have visual or radar contact.

3.6.3.10.4. **Visual Formation Lead Changes.** When a lead change is directed, the wingman moves to a line abreast position with a minimum of 1000 feet wing tip spacing. After confirming positive lead change altitudes, reset IFF as required. The old lead will move aft to the trailing wingman position and then assume radar trail position.

3.6.3.10.5. **IMC Formation Lead Changes:**

3.6.3.10.5.1. **Formation Position Change--Any Aircraft Moves to Lead:**

3.6.3.10.5.1.1. **Step 1.** Lead determines the aircraft to move forward (maneuvering aircraft). The maneuvering aircraft will echelon (normally right) using 30 degrees of bank and turning 30 degrees off heading. When 30 degrees off heading, reverse the turn using 30 degrees of bank and return to formation heading. This will provide approximately 2 NM offset.

3.6.3.10.5.1.2. **Step 2.** After established in echelon, the maneuvering aircraft will accelerate forward, increasing airspeed 30 KIAS maximum. The maneuvering aircraft should resume formation airspeed and stabilize approximately 1¼ NM forward from the original lead. When the maneuvering aircraft is in the forward echelon and positive visual and/or radar contact is established, conduct the required altitude changes. Note: altitude changes may be accomplished in a stabilized aft echelon position so long as all trailing aircraft maintain visual and/or radar contact with the preceding aircraft.

3.6.3.10.5.1.3. **Step 3.** The maneuvering aircraft will then assume lead position and clear the formation members to fall into trail position.

3.6.3.10.5.1.4. **Step 4.** The formation lead should be advised by the last aircraft after the formation is reformed.

3.6.3.10.5.2. Formation Position Change--Any Aircraft to the End of the Formation:

3.6.3.10.5.2.1. **Step 1.** Lead determines the aircraft to move aft (maneuvering aircraft). The maneuvering aircraft will echelon (normally right) using 30 degrees of bank and turning 30 degrees from the formation heading. When 30 degrees off heading, reverse the turn using 30 degrees of bank and return to formation heading. This will provide approximately 2 NM of offset.

3.6.3.10.5.2.2. **Step 2.** After establishing in echelon, the maneuvering aircraft will decelerate toward the end of the formation, decreasing airspeed 30 KIAS MAX. The maneuvering aircraft should resume formation airspeed and stabilize approximately $\frac{3}{4}$ NM aft of the last aircraft. When the maneuvering aircraft is in the aft echelon position and positive visual and/or radar contact is established, formation lead directs required altitude changes. Note: altitude changes may be accomplished in a stabilized forward echelon position so long as all trailing aircraft maintain visual and/or radar contact with the preceding aircraft.

3.6.3.10.5.2.3. **Step 3.** The maneuvering aircraft will then move into trail position using no more than 15 degree heading corrections.

3.6.3.10.5.2.4. **Step 4.** The formation lead should be advised by the last aircraft after the formation is reformed.

3.6.3.11. Air Refueling Procedures:

3.6.3.11.1. These procedures supplement T.O. 1-1C-1-37, *B-2A Flight Crew Air Refueling Procedures*.

3.6.3.11.2. Lead will direct the wingmen to move to the echelon position when the formation is rolled out behind the tanker(s). In VMC, prebriefed automatic echelon is authorized at lead's discretion.

3.6.3.11.3. Visual observation formation may be authorized at 509 OG/CC discretion once the procedures are incorporated into T.O. 1-1C-1-37.

3.6.3.11.4. Wingmen will maintain meteorological watch and monitor formation navigation to back up the tanker.

3.6.3.11.5. Post Air Refueling Rejoin in Formations with More Receivers than Tankers:

3.6.3.11.5.1. Once the lead aircraft has completed air refueling, he/she will move to a one mile left 60 degree echelon position stacked down 500 feet from the air refueling base altitude of the lead tanker. When the number two aircraft has completed refueling, lead will move out to two miles and stack down 1000 feet to allow number two to assume the one mile echelon at 500 feet below base altitude. In formations of more than two receivers, the preceding aircraft will move out another mile and step down another 500 feet each time a successive receiver completes refueling. Lead should be aware of the bottom of the air refueling block and obtain a larger block clearance from ARTCC if stacking down another 500 feet will take him/her below the block.

3.6.3.11.5.2. Once all receivers are complete, the tanker(s) will climb to the top of the block. Wingmen will decrease power to drop behind their preceding aircraft, while maintaining altitude. Once the wingman is in visual contact or tied to the preceding aircraft, he/

she will move to a trail position. Once all wingmen are in trail position lead may maneuver the formation off the air refueling track.

3.6.3.11.6. Late Arrivals:

3.6.3.11.6.1. Delayed B-2 aircraft will use IMC procedures to accomplish non-standard formation join-up while part of the formation is conducting air refueling.

3.6.3.11.6.2. Contact the tanker on air refueling frequency to obtain permission to join the formation, and if approved, obtain heading, airspeed, and altitude information.

3.6.3.11.6.3. Contact the controlling ARTCC and state intentions to obtain clearance. MARSAs are declared by the tanker IAW FAAH 7610.4J.

3.6.3.11.6.4. Joining aircraft must have visual or radar contact before leaving an altitude. Maintain at least 1000 feet above or below the refueling block altitude until cleared to rejoin the formation. Once cleared into the formation, assume appropriate echelon position.

3.6.3.12. **Low Level.** Formation low level is not authorized in the B-2.

3.6.3.13. **Tactical Formation.** Tactical formation is currently not authorized in the B-2.

3.6.3.14. **Formation Break-up and Recovery.** Flight lead will coordinate for formation breakup. Separation may be obtained by vectors from ARTCC/Approach Control or through spacing from airspeed changes.

3.7. Fuel Minimums:

3.7.1. The fuel reserve requirements of AFI 11-202V3, *General Flight Rules*, apply except as outlined below:

3.7.1.1. Normal recovery fuel is 18,000 pounds.

3.7.1.2. Minimum fuel is 15,000 pounds.

3.7.1.3. Emergency fuel is 10,000 pounds.

3.7.2. The minimum fuel reserve at a remote or island destination (as defined by AFI 11-202V3 ACC Sup 1) is 30,000 pounds. If weather conditions require an alternate, the fuel reserve is that required to delay for 2 hours.

3.8. Traffic Pattern Operations:

3.8.1. Maximum bank angle for visual patterns is 45 degrees.

3.8.2. Use the following procedures for all landings:

3.8.2.1. Plan to land (IFR and VFR) within the designated touchdown zone (TDZ). AFJMAN 11-226, *US Standard for Terminal Instrument Procedures (TERPS)*, defines the TDZ as the first 3,000 feet of the landing runway beyond the threshold.

3.8.2.2. Plan normal landings (IFR and VFR) to touch down on centerline within the TDZ. The desired touchdown point is from 750 to 2,500 feet beyond the threshold. Make the actual touchdown at a point and speed which will permit a safe, full stop landing within the remaining runway. Initiate a go-around if this is not possible.

3.8.3. Touch-and-go landings are authorized only under the following conditions:

3.8.3.1. Flight manual restrictions and procedures apply.

3.8.3.2. Land in the designated TDZ at a point which would allow a normal full-stop landing on the remaining runway. Initiate a go-around if this is not possible.

3.8.3.3. RCR must be 9 or higher.

3.8.3.4. Non-instructor pilots require a minimum of 1,000 foot ceiling and 3 miles visibility.

3.8.4. The aircraft commander will brief, either inflight or during mission planning, the individual being supervised on the following items prior to accomplishing them:

3.8.4.1. Flight manual procedures.

3.8.4.2. Go/No-Go procedures.

3.8.4.3. Aircraft commander taking control of the aircraft if necessary.

3.8.4.4. Unplanned go-around or refused landing.

3.8.4.5. See [Table 3.1](#) for traffic pattern and landing limitations.

Table 3.1. Traffic Pattern and Landing Limitations and Restrictions.

| Approach Type | Gross Weight | Crosswind Component | Weather | IP Supervision | Night | RCR |
|--|--------------|---------------------------------|-----------------------|----------------|----------------|-------------|
| Normal Low Approach | 300,000 | N/A | Approach WX mins | No | Yes | N/A |
| Touch and Go (<i>NOTES 1,2,3</i>) | 270,000 | 20 | 300/1 (Non-IP 1000/3) | No | Yes | 9 or higher |
| Sim Eng Out Low Appch (<i>NOTE 5,6</i>) | 270,000 | N/A | NOTE 4 | No | IP Supervision | N/A |
| Sim Eng Out Touch and Go/Full Stop Landing (<i>NOTE 6</i>) | 270,000 | 20 Touch and Go 25 Full Stop | NOTE 4 | Yes | Yes | Dry |

NOTES:

1. 25 knots with IP on board.
2. IP supervision is required if not touch and go qualified.
3. Go around if not in the designated touch down zone. Runway length and RCR consideration must permit an aborted takeoff using computed landing ground run distance.
4. Minimum weather required is circling minima or 1,000 feet/2 miles visibility, whichever is higher.
5. Initiate go-around/missed approach no lower than 200 HAT.
6. Unplanned go-around/takeoff portion of maneuver requires the use of four engines.

Chapter 4

INSTRUMENT PROCEDURES

4.1. Approach Category. The B-2A is designated as an approach category **D** aircraft. If a case exists where airspeed for circling approaches exceeds 166 knots, use category **E** minima.

4.2. Off-Station Practice Instrument Approaches:

4.2.1. Airfield must be designated by 509 OG/CC as suitable for B-2 landings.

4.2.2. Off-station training will be coordinated with the Operations Supervisor.

4.3. Synthetic ILS (SILS)/Synthetic TACAN (STACAN) Approaches. SILS/STACAN approaches will be flown in VMC only and IAW local **Chapter 8** procedures. SILS/STACAN approaches flown at night will be further restricted to a low approach only.

Chapter 5

AIR-TO-SURFACE WEAPONS EMPLOYMENT

5.1. General. References: AFTTP 3-1V23, T.O. 1B-2A-34-2-1, T.O. 1B-2A-25-1, and T.O. 1B-2A-25-2 are the primary references for weapons employment theory, planning techniques, and analysis. AFI 11-2B-2V1, *B-2--Aircrew Training*, contains qualification and scoring criteria. AFI 11-214 contains operating and training procedures. **Chapter 8** to this volume contains additional guidance.

5.1.1. Prior to operating on weapon ranges, all ACC crewmembers will comply with all associated range guides.

5.1.2. Unit weapons and tactics offices must ensure aircrews have the most current range information prior to flight.

5.2. In-flight Procedures. Observe the following safety precautions for flight activity with weapons (the definition of a weapon is any live, inert, or training munition):

5.2.1. No release system, indicator, or weapon bay door malfunction may exist unless the malfunction is only a loss of redundancy which does not affect weapons accuracy or normal weapons release (e.g., single power drive unit failure).

5.2.2. Do not conduct simulated bomb runs, unusual maneuvers, touch and go landings, or other potentially hazardous activity while carrying weapons. Carrying weapons does not preclude accomplishing air refueling or transition (excluding touch and gos).

5.2.3. Weapons Unlock/Release Consent will not be completed until the aircraft is within the designated bombing range and cleared "hot" by the Range Control Officer (RCO).

5.2.4. Withhold weapons when an inflight emergency procedure is being accomplished or when an engine is shut down (excluding combat). Weapons will also be withheld when release exceeds or will result in exceeding aircraft T.O. limits, CG limits, briefed track/timing tolerances, or deconfliction for fragmentation.

5.2.5. Do not open weapon bay doors during flight with weapons on board other than for intentional release or jettison.

5.2.6. If release is verified by the RCO or the aircrew using the B-2 Mission Management System (MMS), aircrew may conduct additional training without restriction provided no weapons remain on the aircraft.

5.2.7. Crews experiencing an unsuccessful release or hung store will accomplish weapon jettison only if in the opinion of the pilot in command, the retention of stores would adversely affect the safe recovery of the aircraft. If jettison is required, consult the range guide and contact the RCO for coordination. If recovering with the weapons, accomplish the abort/post release checklist and return directly to home station or other suitable landing base, avoiding overflight of populated areas. Air refueling may be accomplished for safe recovery of the aircraft.

5.2.8. Do not operate in SIM mode when live or inert weapons are aboard the aircraft.

5.2.9. Do not practice simulated emergency procedures when weapons are loaded on the aircraft.

5.2.10. Direct questions concerning weapon ranges and restrictions to the appropriate agency responsible for the range. If unable to find the OPR or responsible agency, contact HQ ACC/DOR, DSN 574-4661.

5.3. Hung Weapon(s) Procedures. Refer to [Chapter 8](#) for recovery procedures at Whiteman with hung weapons. If the crew is required to land at an airfield other than Whiteman with hung or retained weapons, advise the local authorities of the situation so that proper coordination can be accomplished with their safety office.

Chapter 6

ABNORMAL OPERATING PROCEDURES

6.1. General. This chapter contains procedures to be followed when other-than-normal situations occur. They do not, however, replace or supersede procedures contained in the flight manual.

6.1.1. Accept no aircraft for flight with a malfunction which denies the crew the ability to safely operate in all phases of flight or any malfunction that, if airborne, would require mission termination. Consult the B-2 Inflight Guide (IFG) for individual Go/No-Go items.

6.1.2. Once a malfunctioning system is isolated and/or the fault corrected, do not use that system again unless use in a degraded mode is essential for recovery. Do not conduct ground or in-flight troubleshooting after completing flight manual emergency procedures.

6.1.3. Fuel dumping will be conducted only to reduce aircraft gross weight in an emergency. When circumstances permit, dump over unpopulated areas above 8,000 feet AGL. Advise the appropriate air traffic control agency of intention, altitude, and location when fuel is dumped and when the operation has been completed.

6.1.4. Do not taxi the aircraft with a brake system malfunction. Do not taxi with a nose wheel steering malfunction with the exception of using nose wheel steering override, or differential braking to clear the active runway. After clearing the runway, the crew will stop until the malfunction can be cleared.

6.2. Takeoff Aborts:

6.2.1. When a takeoff is aborted and hot brakes are suspected or computed, taxi to the hot brake area and comply with local guidance (509 BWI 21-104 and B-2 IFG). Consult T.O. 1B-2A-1 brake energy charts and the B-2 IFG to determine cumulative brake energy absorption and any taxi delays required. Allow the fire department to determine brake temperature. Follow fire department direction if hot brakes are detected. If temperature is below the taxi limit, as determined on the maintenance charts, taxi back is authorized. Consult the brake energy charts for subsequent takeoff delays if warranted.

6.2.2. Recheck takeoff data prior to a subsequent attempted takeoff. Particular emphasis should be placed on changes in environmental conditions, gross weights, and potential brake energies if a subsequent aborted takeoff is experienced.

6.3. Air Aborts:

6.3.1. A training mission will be aborted regardless of apparent damage or subsequent normal operation and landed as soon as practical for any of the following:

6.3.1.1. Bird strike/FOD.

6.3.1.2. Over G.

6.3.1.3. Any FCS CAUTION, regardless if it clears with FCS reset.

6.3.1.4. Engine flameout or shutdown even if it is successfully restarted.

6.3.1.5. Confirmed or suspected fuel leaks.

6.3.1.6. Any directed air abort item in the B-2 Go/No Go guide.

6.4. Radio Failure. When all on-board radios are inoperative, accomplish procedures outlined in AFI 11-205, *Aircraft Cockpit and Formation Flight Signals*, and FLIP. Local procedures will be used for radio-out landing patterns.

6.4.1. **IFF/SIF Failure.** Immediately notify controlling agencies if the IFF is inoperative, and provide accurate position reports for separation from other traffic.

6.5. Low Level Procedures. Whenever the aircrew cannot positively determine that the aircraft is within the approved route boundaries/planned route, immediately climb to a safe altitude. If not in contact with ARTCC, squawk emergency until contact is made.

6.5.1. Abort low level for the following reasons:

6.5.1.1. Aircraft malfunction precludes flying low level.

6.5.1.2. Flight outside the published route corridor and altitude.

6.5.1.3. Weather deteriorates below minimums for TF.

6.5.2. Low level abort procedures are defined in the local **Chapter 8** of this instruction.

6.5.3. If a low level route abort, TF fly-up, or unplanned climb causes the aircraft to exit the MTR, slow below 250 KCAS airspeed after terrain/obstacle clearance is assured when below 10,000 feet MSL. Avoid federal airways and Class A/B/C/D airspace. Re-enter route only at published alternate entry points. Confirm re-entry time with route scheduling via HF phone patch or with AFSATCOM. If required to keep route timing but are unable to re-enter the MTR, climb above 10,000 feet MSL before increasing airspeed.

6.6. Unusual Attitudes. Practice unusual attitude recoveries are prohibited in flight.

6.6.1. **Nose High Recovery Procedure.** Recovery from an excessively nose high attitude is accomplished by adding power as required, establishing a bank angle of less than 60 degrees, assisting the nose to a minus three degree pitch attitude, then returning the aircraft to level flight in both pitch and bank.

6.6.2. **Nose Low Recovery Procedure.** Recovery from an excessively nose low attitude is accomplished by reducing power and extending speedbrakes as required, rolling wings level, then increasing stick back pressure to return the aircraft to level flight.

6.7. Flight Characteristics Demonstrations (FCD). Practice FCDs as defined in the T.O. 1B-2A-1 are prohibited in flight.

6.8. Chase Procedures. Chase operations may be required to aid in the safe recovery of the B-2. Chase operations at Whiteman AFB will be conducted by formation qualified pilots using T-38 aircraft.

6.8.1. The following restrictions apply to chase operations:

6.8.1.1. Minimum chase spacing is 150 feet.

6.8.1.2. Never fly directly over or under the other aircraft.

6.8.1.3. All aircraft will be on a common UHF frequency.

6.9. Emergency Procedures:

6.9.1. The following general guidelines provide a framework for making decisions and taking actions in response to emergency situations.

6.9.1.1. Maintain aircraft control.

6.9.1.2. Analyze the situation.

6.9.1.3. Assess the need for emergency egress.

6.9.1.4. Perform required critical actions, assess the degree of degradation, and evaluate the capability to continue the mission. Contact the unit or controlling command post when conditions permit after encountering emergencies. While this should be accomplished as soon as practical, it should not interfere with immediate concerns dictated by the situation: aircraft control, checklist procedures, and notifying ATC. Weigh carefully the impact of continuing the mission versus the capabilities of the aircraft and crew. Consult the Go-No-Go guide in the B-2 IFG.

6.9.1.5. If aborting the mission, consider the following:

6.9.1.5.1. Return to the departure base or continue to the destination base via the most direct route, if different.

6.9.1.5.2. Land at the nearest suitable ACC base.

6.9.1.5.3. Land at the nearest possible airfield.

6.9.1.5.4. Further training is not authorized while returning to the local area or reducing gross weight for landing. Prohibited activities include: air refueling (except when required for safe recovery of the aircraft), low level navigation and bombing, fighter activity, and transition.

Chapter 7

CREW AND AIRCRAFT OPERATIONAL LIMITATIONS AND RESTRICTIONS

7.1. Scope. This chapter adds B-2A aircraft limitations and restrictions to those already specified in flight manuals and other portions of this instruction and applies to all ACC aircrews.

7.2. Crew Requirements. The minimum crew is specified in T.O. 1B-2A-1. Waiver information for special situations is located in AFI 11-2B-2V1.

7.3. General Limitations:

7.3.1. New/Modified Aircraft and Equipment. Crewmembers not qualified in the operation of new or modified aircraft equipment will not operate that equipment unless under the supervision of an instructor pilot qualified in that equipment.

7.3.2. Authorized Fuel Loads. Aircraft will be loaded with standard fuel loads IAW T.O. 1B-2A-5-2.

7.3.3. Stalls and Approach to Stalls. Practice stalls and approach to stalls are prohibited inflight and authorized in the WST only.

7.3.4. Steep Turns. Steep turns will be accomplished at 45 degrees of bank within alpha and "G" restrictions.

7.4. Aircrew and Aircraft Limitations:

7.4.1. Brief all practice AFTTP 3-1 maneuvers or emergency procedures before the maneuver (either inflight or during mission planning).

7.4.2. Do not practice compound simulated emergencies during critical phases of flight except those specifically authorized for Flight Instructor Course (FIC) training.

7.4.3. After taking the appropriate action to rectify a malfunction, resume training only if the designated pilot in command determines no hazard to safe aircraft operations exists. In an actual emergency, terminate all training and emergency procedures practice.

7.4.4. Crewmembers must be mission ready when carrying nuclear weapons.

Chapter 8

LOCAL OPERATING PROCEDURES

8.1. General. This chapter is reserved for local unit operating procedures. Local **Chapter 8** procedures will not be less restrictive than those contained elsewhere in this volume, nor is the chapter intended to be a single source document for procedures contained in other directives or regulations. Unnecessary repetition of guidance provided in other established directives should be avoided; however, reference to those directives is acceptable when it serves to facilitate location of information necessary for local operating procedures.

8.2. Review. A copy of this chapter will be forwarded to HQ ACC/DOT for review. Returned comments/required changes will be provided to the unit as appropriate. This procedure need not delay distribution.

8.3. Format. The local chapter will be organized in the following format and will include, but is not limited to, the following:

- 8.3.1. Section A. Introduction/purpose
- 8.3.2. Section B. Applicability
- 8.3.3. Section C. Ground Operations
- 8.3.4. Section D. Flying Operations
- 8.3.5. Section E. Weapons Employment
- 8.3.6. Section F. Abnormal Procedures
- 8.3.7. Attachments. (Illustrations)

8.4. Content. This chapter will include procedures for the following, if applicable:

- 8.4.1. Command and Control
- 8.4.2. Fuel Requirements
- 8.4.3. Divert Instructions
- 8.4.4. Jettison Areas (IFR/VFR)
- 8.4.5. Controlled Bailout Areas

- 8.4.6. Local Weather Procedures
- 8.4.7. Low Level Route Abort Procedures
- 8.4.8. Approved Alternate Missions
- 8.4.9. Unit Standards (Optional)

CHARLES F. WALD, Lt General, USAF
DCS/Air & Space Operations

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

AFPD 11-2, *Aircraft Rules and Procedures*

AFPD 11-4, *Aviation Service*

AFTTP 3-1V23, *B-2 Tactical Employment*

AFI 11-2B-2V1, *B-2 Aircrew Training*

AFI 11-202V3, *General Flight Rules*

AFI 11-205, *Aircraft Cockpit and Formation Flight Signals*

AFI 11-214, *Aircrew, Weapons Director, and Terminal Attack Controller Procedures for Air Operations*

AFMAN 11-226, *US Standard for Terminal Instrument Procedures (TERPS)*

AFI 33-360V1, *Publications Management Program*

AFMAN 37-139, *Records Disposition Schedule*

T.O. 1B-2A-1, *Flight Manual*

T.O. 1B-2A-1-3, *Supplemental Flight Manual*

T.O. 1B-2A-25-1, *Nuclear Bomb Basic Information*

T.O. 1B-2A-34-2-1, *Nonnuclear Weapons Delivery Manual*

T.O. 1-1C-1-37, *B-2A Flight Crew Air Refueling Procedures*

FAAH 7610.4J, *Special Military Operations*

Abbreviations and Acronyms

ACC—Air Combat Command

ACCR—Air Combat Command Regulation

ACCI—Air Combat Command Instruction

AFMAN—Air Force Manual

AFR—Air Force Regulation

AFSATCOM—Air Force Satellite Communication

AFTTP—Air Force Tactics, Techniques, and Procedures

AGL—Above Ground Level

AHC—Aircraft Handling Characteristics

ALTRV—Altitude Reservation

API—Aircrew Position Indicator

ARIP—Air Refueling Initiation Point
ARMS—Aviation Resource Management System
ATD—Aircrew Training Device
AVTR—Aircraft Video Tape Recorder
BQT—Basic Qualification Training
BRA—Bomb Rack Assembly
BS—Bomb Squadron
BW—Bomb Wing
BQ—Basic Qualified
CBI—Computer Based Instruction
CC—Commander
CDE—Chemical Defense Equipment
CFTR—Combined Force Training
CHUM—Chart Update Manual
CM—Coherent Map Mode of B-2 Radar
CMR—Combat Mission Ready
COMSEC—Communications Security
CPT—Cockpit Procedures Trainer
CSS—Control Stick Steering
CT—Continuation Training
CTP—Companion Trainer Program
CW—Chemical Warfare
DMPI—Designated Mean Point of Impact
DNIF—Duty Not Involving Flying
DO—Director of Operations
DTED—Digital Terrain Elevation Data
EC—Electronic Combat
E&E—Escape and Evasion
EEFI—Essential Elements of Friendly Information
EMCON—Emission Control
EOR—End of Runway
ERCC—Engine Running Crew Change

FAA—Federal Aviation Administration
FAAH—Federal Aviation Administration Handbook
FENCE—Fuel, Emissions, Navigation, Communications, Expendables
FCD—Flight Characteristic Demonstration
FCS—Flight Control System
FEB—Flight Evaluation Board
FIC—Flight Instructor Course
FLIP—Flight Information Publication
FLOT—Forward Line of Own Troops
FTU—Formal Training Unit
GCC—Graduated Combat Capability
HAT—Height Above Touchdown
HF—High Frequency
HHD—Higher Headquarters Directed
HHQ—Higher Headquarters
JDAM—Joint Direct Attack Munition
IAW—In Accordance With
ICWT—Initial Chemical Warfare Training
IFF—Identification Friend or Foe
IFR—Instrument Flight Rules
IMC—Instrument Meteorological Conditions
IOS—Instructor Operator Station
IP—Instructor Pilot
IQC—Initial Qualification Course
IQT—Initial Qualification Training
KIAS—Knots Indicated Airspeed
LC—Lost Communications
MAJCOM—Major Command
MARSA—Military Assumes Responsibility for Separation of Aircraft
MC—Mission Capable/Mission Commander
MCM—Multi-Command Manual
MCR—Multi-Command Regulation

MITO—Minimum Interval Takeoff
MOA—Military Operating Area
MQT—Mission Qualification Training
MRR—Minimum Runway Required
MS—Mission Support
MT—Mission Trainer
MTRS—Military Training Route Structure
NAF—Numbered Air Force
NMR—Non Mission Ready
NORDO—No Radio
NSS—Navigation System
OG—Operations Group
OMR—Optical Mark Reader
OPSEC—Operations Security
ORI—Operational Readiness Inspection
OSS—Operations Support Squadron
OT&E—Operational Test and Evaluation
PFPS—Portable Flight Planning System
RCO—Range Control Officer
RCR—Runway Condition Reading
RCS—Radar Cross Section
RLA—Rotary Launcher Assembly
RQC—Requalification Course
RWS/AAT—Range-While-Search/Air-to-Air Track Modes of B-2 Radar
RZ—Rendezvous
SA—Situational Awareness
SAFE—Selected Area For Evasion
SEFE—Stan/Eval Flight Examiner
SELO—Stan/Eval Liaison Officer
SILS—Synthetic Instrument Landing System
SOF—Supervisor of Flying
SQ—Squadron

SUAS—Special Use Air Space
TA—Terrain Avoidance
TACAN—Tactical Air Navigation
TBD—To Be Determined
TDY—Temporary Duty
TDZ—Touch Down Zone
TF—Terrain Following
TR—Transit Route
TRT—Takeoff Rated Thrust
TRP—Training Review Panel
TSO—Target Study Officer
TTR—Tactics Training Range
UHF—Ultra High Frequency
UMD—Unit Manning Document
VFR—Visual Flight Rules
VHF—Very High Frequency
VMC—Visual Meteorological Conditions
WST—Weapons Systems Trainer
WX—Weather Mode of B-2 Radar

Terms

Alternate Entry Control Point (Alternate Entry Fix)—The route point(s) upon which a control time for an alternate entry into the route is based.

Attempted Release—The SMP issues a release pulse in either automatic or manual mode with all switches correctly positioned.

Blind—No visual contact with the friendly aircraft/ground position; opposite of visual.

Broke Lock—Loss of radar contact with element or aircraft; opposite of tied.

End Maneuver Area—A control point terminating the weapon run area.

Entry Control Time—The scheduled time over the Primary/Alternate Entry Control Point.

High Altitude Activity—Same as AFI 11-2B-2V1.

Hung Weapon—A live or inert weapon that does not separate from the aircraft following an attempted release.

Live Weapon—Actual munitions containing a primary explosive charge (JDAM, Mk 84, CBU-87, etc.).

Low Altitude Activity—Same as AFI 11-2B-2V1.

Maneuver Area—The portion of an IR between the SMA and End Maneuver Area (EMA).

MASMS (Military Airspace Management System)—The term MASMS in this instruction refers to the automated scheduling system operated by Detachment 1, HQ ACC/DOR, the Military Airspace Management System Office at Offutt AFB, NE.

Medium Altitude Activity—Same as AFI 11-2B-2V1.

Mountainous Terrain—Terrain that varies more than 1000 feet in elevation in 10 NM along published track.

Operating Altitudes—Altitudes for all routes will be published in FLIP AP/1B or AP/3. TF altitudes will be based on a minimum altitude published for the route, the clearance plane settings developed by local airspace managers at the originating activity, Tech Order minimums, or training restrictions, whichever is higher.

Practice Weapon—A weapon intended for training or practice and containing no primary explosive charge.

Primary/Alternate Exit Point—The final waypoint published in FLIP for the primary or alternate exit of a route.

Primary/Alternate TF Initiation Point (Start TF)—The FLIP waypoint at which air crew are authorized to begin TF operations.

Primary/Alternate TF Termination Point (End TF)—The point which denotes the end of TF operations.

Primary Entry Point (PEP)—Referred to as the Entry Fix. The route point upon which a control time for route entry is based.

Retained Weapon—A weapon still on board the aircraft with no release attempted or after successfully releasing the intended number of weapons in a partial load. Weapons not released due to procedural errors are retained.

Saddled—Informative call from wingman indicating the return to briefed formation position.

Start Maneuver Area—The point that defines the start of the weapon run area.

Tied—Positive radar contact with element or aircraft.

Visual Contour Flight—Operation at a predetermined altitude above the ground, following contours visually with radar altimeter crosscheck.

Weapon—Any live, inert, or training munition.

Addresses

HQ AFSSA/XO and XOF
1535 Command Dr, Suite D-309
Andrews AFB MD 20762-7002

HQ ACC/DO, DOT, and DOTO
205 Dodd Blvd, Suite 101
Langley AFB VA 23665-2789

Attachment 2**FLIGHT BRIEFING GUIDES**

NOTE: Ensure the majority of time is used for discussion of tactics, complicated mission segments/special activities, and other new or important items. If regular briefing items have already been discussed during mission planning or are standard, specialty checklist items, they may be reviewed briefly or omitted as appropriate.

A2.1. Roll Call (Crew Number), Security Classification.**A2.2. Review of Weather Planning Factors:**

- A2.2.1. Takeoff
- A2.2.2. Low level (primary and backup)
- A2.2.3. Air refueling
- A2.2.4. Recovery

A2.3. Mission Profile:

- A2.3.1. Priority of training events
- A2.3.2. Currency items/problems

A2.4. Mission Data:

- A2.4.1. Call Sign
- A2.4.2. Mission Date
- A2.4.3. Crew Rest/Show/Step
- A2.4.4. Arrive at aircraft
- A2.4.5. Crew/transition duty day
- A2.4.6. Taxi/takeoff/land time/duration

A2.5. Aircraft Number/Maintenance/TCTO Status.**A2.6. Ground Operations/Emergencies:**

- A2.6.1. Emergency egress/emergency engine shutdown
 - A2.6.1.1. With/without interphone
 - A2.6.1.2. After taxi

A2.7. Takeoff Performance Review:

- A2.7.1. Fuel load/gross weight/weapons load

A2.8. Takeoff/Departure:

- A2.8.1. Procedures/crew coordination
- A2.8.2. Aborts
- A2.8.3. Emergencies after decision speed
- A2.8.4. Departure routing
- A2.8.5. Obstructions
- A2.8.6. Planned level off altitude and airspeed

A2.9. Enroute:

- A2.9.1. Overview
- A2.9.2. Action/crunch points
- A2.9.3. Restricted airspace
- A2.9.4. High terrain
- A2.9.5. Emergency airfields
- A2.9.6. Late takeoff considerations or alternate mission

A2.10. Air Refueling:

- A2.10.1. Track/area
- A2.10.2. Tanker call sign/aircraft type
- A2.10.3. RZ type and altitude/block
- A2.10.4. C/R plan/EMCON procedures
- A2.10.5. Onload
- A2.10.6. End A/R request
- A2.10.7. Missed A/R considerations

A2.11. Low Level:

- A2.11.1. Pilot/mission commander specific considerations/brief
- A2.11.2. Letdown type
- A2.11.3. Level off altitude and considerations
 - A2.11.3.1. Terrain elevation
 - A2.11.3.2. Radar altimeter lock-on altitude
 - A2.11.3.3. Roundout/level off altitudes
 - A2.11.3.4. IFR altitude
 - A2.11.3.5. Range-specific procedures

A2.11.3.6. Withhold/Hung weapons procedures

A2.12. Communications:

- A2.12.1. Command Post (authentication/ launch/recovery)
- A2.12.2. VHF/UHF/HF/AFSATCOM/MILSTAR/HAVE QUICK
- A2.12.3. Secure voice procedures
- A2.12.4. Recall procedures

A2.13. Recovery:

- A2.13.1. Hung/withheld weapon procedures
- A2.13.2. Fuel reserve
- A2.13.3. Divert options
- A2.13.4. Approach review
 - A2.13.4.1. Crew coordination
 - A2.13.4.2. Low vis landing procedures
 - A2.13.4.3. Transition to landing
 - A2.13.4.4. Safety check
- A2.13.5. Simulated Emergency Procedures.
- A2.13.6. ERCC/Taxiback procedures
- A2.13.7. Warm seat swap procedures

A2.14. In-Flight Emergencies:

- A2.14.1. Crew coordination
 - A2.14.1.1. Fly and navigate
- A2.14.2. Airmanship
 - A2.14.2.1. Who flies vs. who accomplishes checklist
 - A2.14.2.2. Loss of interphone/cockpit communications
 - A2.14.2.3. Ejection procedures

A2.15. Crew Coordination (General):

- A2.15.1. Transfer of aircraft control and AFCS modes
- A2.15.2. Leaving/returning to seat/going on or off oxygen
- A2.15.3. Altitude calls

A2.16. Specialized Briefings/Special Subjects:

- A2.16.1. Target Study
- A2.16.2. Chase/Formation briefing
- A2.16.3. Unusual/special events--flyby, FCF
- A2.16.4. Range Considerations
- A2.16.5. Radar/Visual Search Responsibilities
 - A2.16.5.1. Departure/Enroute/Recovery
 - A2.16.5.2. High Density Traffic Areas
- A2.16.6. Mid-Air Collision Avoidance
 - A2.16.6.1. From Other Military Aircraft
 - A2.16.6.2. From Civilian Aircraft

A2.17. Reminders:

- A2.17.1. ACC Special Interest Items
- A2.17.2. Flight manual changes
- A2.17.3. Flight clothing and equipment

Attachment 3**FORMATION BRIEFING GUIDE**

NOTE: This minimum briefing guide is provided as an example to stress mission events and objectives rather than reinforce technical order procedures. A standardized briefing format is especially important when flying with other units. Brief only actions required to meet mission and EMCON objectives.

A3.1. ROLL CALL:

- A3.1.1. Time Hack
- A3.1.2. Mission Changes
- A3.1.3. Call Signs/pilots
- A3.1.4. Tail Numbers
- A3.1.5. Parking Locations
- A3.1.6. Mx Status
- A3.1.7. Weapons configurations
- A3.1.8. Fuel loads

A3.2. WEATHER:

- A3.2.1. Takeoff
- A3.2.2. En route
- A3.2.3. Air refueling
- A3.2.4. Low level
- A3.2.5. Destination
- A3.2.6. Alternates

A3.3. MISSION OVERVIEW:

- A3.3.1. Mission Objectives
- A3.3.2. TGTs/Times
- A3.3.3. Intelligence
- A3.3.4. EW/GCI lines
- A3.3.5. FLOT
- A3.3.6. Route/Tgt Area Defenses
- A3.3.7. Passive Detection
- A3.3.8. SAR
- A3.3.9. Tactical Considerations

A3.4. COMM PLAN:

- A3.4.1. EMCON level
- A3.4.2. Frequencies
- A3.4.3. Change over times/points/procedures
- A3.4.4. IFF/SIF
- A3.4.5. Code words
- A3.4.6. Bullseye points

A3.5. GROUND OPERATIONS:

- A3.5.1. Taxi Route/Delays
- A3.5.2. Takeoff Data Review

A3.6. TAKEOFF:

- A3.6.1. Spacing
- A3.6.2. Aborts
- A3.6.3. Departure Route
- A3.6.4. Joinup/Airspeed/Intermediate Level offs
- A3.6.5. Late Takeoff
- A3.6.6. Delayed aircraft rejoin procedures

A3.7. LEVEL OFF:

- A3.7.1. Altitude Block/Planned Speeds
- A3.7.2. Level Off/TF Checks
- A3.7.3. Trail/Visual formation procedures
- A3.7.4. Position Changes
- A3.7.5. High Bomb Runs
- A3.7.6. TGTs/TOTs/Alt stacks

A3.8. AIR REFUELING:

- A3.8.1. Call Signs/CR Plan/Times/Onloads/Altitudes
- A3.8.2. Receiver Assignments/Wingman Responsibilities/Positions
- A3.8.3. Overruns & Breakaway
- A3.8.4. Night/IMC procedures
- A3.8.5. End AR plan
- A3.8.6. Lost AR plan

A3.9. FORMATION LOW LEVEL: Formation low level is currently not authorized.

- A3.9.1. A/A TACAN/Radios
- A3.9.2. Penetration/Spacing/Split-up
- A3.9.3. Threat Reactions
- A3.9.4. Target area tactics
- A3.9.5. Weapon fusing
- A3.9.6. Release parameters
- A3.9.7. With hold criteria
- A3.9.8. Safe escape considerations
- A3.9.9. Safe separation
- A3.9.10. Route aborts/emergency airfields
- A3.9.11. Route abort Altitude
- A3.9.12. Rejoin

A3.10. RECOVERY/REJOIN:

- A3.10.1. Location
- A3.10.2. Altitudes/Airspeeds
- A3.10.3. A/A TACAN/Radios
- A3.10.4. Rejoin Point
- A3.10.5. Routing/Penetration/Breakup

A3.11. SPECIAL SUBJECTS:

- A3.11.1. Emergencies
- A3.11.2. Broke Lock Procedures
- A3.11.3. EMCON/Chattermark
- A3.11.4. Fallout Plan (Lead breaks etc. for multi-ship deputy flt lead)
- A3.11.5. Lead Changes
- A3.11.6. Mid Mission Rejoins
- A3.11.7. Freqs/Air-to-Air/Speeds
- A3.11.8. Bingo Fuels

A3.11.9. Hung Stores

A3.11.10. Alternate Mission/No later than times

A3.11.11. Debriefing

A3.12. QUESTIONS:

Attachment 4**STRANGE FIELD PROCEDURES**

A4.1. Mission Planning. During mission planning, crews should review the following information for each base of intended landing:

A4.1.1. FLIP Enroute Supplement:

- A4.1.1.1. Traffic pattern altitudes/airfield specific differences
- A4.1.1.2. Navaids scheduled maintenance period(s)
- A4.1.1.3. Facilities/services/fuels available
- A4.1.1.4. Load bearing capacity

A4.1.2. FLIP Planning Documents:

- A4.1.2.1. Special notices
- A4.1.2.2. Preferred routings
- A4.1.2.3. Terminal Control Areas
- A4.1.2.4. ICAO information

A4.1.3. Instrument Approach Plates:

- A4.1.3.1. Airfield layout/obstacles/runway length and width
- A4.1.3.2. Final approach runway alignment
- A4.1.3.3. Airfield lighting
- A4.1.3.4. Navigation chart (review for local terrain features)

A4.1.4. Security Requirements:

- A4.1.4.1. Aircraft security requirements
- A4.1.4.2. Storage of classified materials

A4.2. Review of Arrival/Approach Procedures. Before departure from each base crews may use the following guide as a means of reviewing the arrival/approach procedures for the next intended landing base:

A4.2.1. Departure:

- A4.2.1.1. Obstacles
- A4.2.1.2. Rate of climb required
- A4.2.1.3. Emergency/minimum safe altitudes
- A4.2.1.4. SID/routing/navaids/altitude requirements

A4.2.2. Enroute Descent:

- A4.2.2.1. Start descent point
- A4.2.2.2. Rate of descent required
- A4.2.2.3. Transition altitude
- A4.2.2.4. Terminal fix (IAF, FAF, PAR/ASR, etc.)
- A4.2.2.5. Lost communication procedures
- A4.2.2.6. Emergency/minimum safe/sector altitudes

A4.2.3. Published Penetration:

- A4.2.3.1. IAF/holding fix
- A4.2.3.2. Initial rate of descent required
- A4.2.3.3. Transition altitude
- A4.2.3.4. Altitude restrictions
- A4.2.3.5. Emergency/minimum safe/sector altitudes
- A4.2.3.6. Final approach fix
- A4.2.3.7. Lost communication procedures

A4.2.4. Final Approach--Published or Radar:

- A4.2.4.1. Rate of descent
- A4.2.4.2. Timing
- A4.2.4.3. Weather minimums/MDA/DH
 - A4.2.4.3.1. Aircraft/aircrew restrictions
- A4.2.4.4. Missed approach procedures
- A4.2.4.5. Lost communication procedures
- A4.2.4.6. Transition to visual/runway environment/landing