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SECRETARY OF THE AIR FORCE**

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VOLUME 3**

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Flying Operations

F-15E--OPERATIONS PROCEDURES



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This volume establishes effective and safe operations of the F-15E and implements AFPD 11-2, *Aircraft Rules and Procedures*; AFPD 11-4, *Aviation Service*; and AFI 11-202V3, *General Flight Rules*. It applies to all F-15E units. It does not apply to ANG and AFRC. MAJCOMs/DRUs/FOAs are to forward proposed MAJCOM/DRU/FOA-level supplements to this volume to HQ AFFSA/XOF, through HQ ACC/A3TO, for approval prior to publication IAW AFPD 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/A3TO, 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. Keep supplements current by complying with AFI 33-360V1, *Publications Management Program*. Instruction Changes. Submit recommendations for change to this volume on an AF IMT 847, *Recommendation for Change of Publication*, to the parent NAF and MAJCOM. Forward approved recommendations to HQ ACC/A3TO. The Paperwork Reduction Act of 1974 as amended in 1996 affects this instruction. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 37-123, (will convert to 33-363) *Management of Records* and disposed of in accordance with the *Air Force Records Disposition Schedule (RDS)* located at <https://afrims.amc.af.mil>

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SUMMARY OF CHANGES

Para 2.2.2. clarifies approval authority for squadron/group and wing standards. **Para 2.3.4.4.** updates TF mission planning requirements. **Para 2.4.1.** clarifies flight briefing requirements. **Para 2.4.1.1.** requires that briefings start at least 1.5 hours before scheduled takeoff. **Para 2.4.1.2.** requires that formation flight briefings will cover flight member responsibilities, deconfliction contracts, combat mission priorities, and sensor management. **Para 2.4.1.8.1.** requires that the following special subjects be briefed on every sortie: radar/visual search responsibilities, departure/enroute/recovery, high density traffic areas, mid-air collision avoidance from other military aircraft and from civilian aircraft. **Para 2.4.2.1.** requires that upgrade missions will be flown on the first sortie. **Para 2.4.3.** requires that all flights will debrief the inflight execution of flight member responsibilities, deconfliction contracts, tactical employment priorities, and sensor management. **Para 2.5.2.5.** adds On-Scene Commander Checklist to required items. **Para 2.5.2.7.** adds requirement for a local area map in the inflight guide. **Para 2.6.** updates requirements for use of Combat Edge Use. **Para 3.4.2.** clarifies the minimum RCR for taxi operations. **Para 3.7.1.** clarifies the minimum RCR for takeoff. **Para 3.7.8.** prohibits takeoff over any raised web barrier or loose/slack cable. **Para 3.8.4.2.** clarifies RSC limitations. **Para 3.9.2.** directs Flight leaders will maintain tech order climb speeds until join-up is accomplished. **Para 3.9.4.** directs that Flight members will join in sequence IAW AFTTP 3-3.17. **Para 3.10.** defines formation roles and contracts. **Para 3.10.1.** requires that Flight leads will brief a formation deconfliction/blind/get well plan for every phase of flight. **Para 3.10.3.** clarifies airspace and altitude limitations for rolling maneuvers. **Para 3.11.1.2.** defines wingman deconfliction responsibilities. **Para 3.14.4.** directs that crews will fly at maneuvering airspeeds as published in T.O. 1F-15E-1. when below 10,000 MSL outside Special Use Airspace. **Para 3.14.4.1.** directs that air-to-air system checks above 10,000 MSL to the maximum extent practical. **Para 3.15.3.2.** directs FDL fuel status should not be used as the primary source of fuel checks. **Para 3.15.4.3.** directs that the airspace intended for conducting the G-awareness exercise is free from potential traffic conflicts. **Para 3.18.6.5.** clarifies minimum altitude for night operations when using LANTIRN or Night Vision Goggles. **Para 3.18.7.** directs that descents into the low altitude MTR or MOA under be radar control or radar flight following to the maximum extent practical. **Para 3.19.2.5.** states that If the NAV/FLIR is inoperable, NVGs may be used in place of the NAV/FLIR if both crewmembers are current and qualified. **Para 3.19.2.10.** directs that during low altitude night operations WSOs will select NAV/FLIR on the HUD repeater to the maximum extent possible. **Para 3.19.3.1.** directs aircrews who experience failure of any portion of the TF system or HUD/FLIR imagery (or NVG if used in place of the NAV/FLIR) while flying night low level will immediately climb to, or above, the MSA/RAA. **Para 3.19.3.3.** further clarifies route abort procedures. **Para 3.22.1.4.** clarifies NVG donning/doffing procedures. **Para 3.22.1.5.** clarifies NVG use under high illumination conditions. **Para 3.24.2.2.** restricts landings over any raised web barrier or loose/slack cable. **Para 3.25.1.** allows overhead patterns with unexpended practice ordnance and unexpended live air-to-air ordnance and at deployed locations with unexpended live ordnance if required by local force protection arrival procedures. **Para 3.31.2.2.** clarifies the RSC for formation landings. **Para 3.33.2.** directs that WSOs will not fly during takeoff or landing, AAR operations, close formation or rejoins to close formation, tactical maneuvering, weapons delivery, below 1,000 feet AGL (unless flying practice instrument approaches/patterns and no lower than non-precision approach minimums, the pilot's weather category or 500' AGL or overhead patterns. **Para 4.3.4.3.** clarifies power settings for trail departures. **Para 4.3.6.1.** limits trail recoveries to home station/deployed locations with ATC approval. **Para 5.3.2.** clarifies maneuvering limitations when configured with three external wing tanks. **Para 6.2.3.** directs that the combat laser not be fired outside of approved areas. **Para 6.2.4.** prohibits off-range attacks with live air-to-ground

ordnance loaded. **Para 6.6.2.** clarifies the minimum pattern altitude for night non-TF deliveries and while using NVGs. **Para 6.8.1.** lists procedures for IMC and Inertially aided weapons deliveries. **Para 7.1.3.** limits fuel dumping when circumstances permit to above 10,000 feet AGL. **Para 7.4.2.** clarifies escort procedures for non-emergency aborts. **Para 7.4.4.** clarifies over-g procedures. **Para 7.12.5.2.** clarifies supervisory requirements for practice emergency patterns. **A3.17.** and **A3.18.** add requirements to brief formation specific responsibilities and priorities, flight member mission priorities, sensor prioritization and deconfliction contracts. A bar (|) indicates revisions from the previous edition.

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Chapter 1

INTRODUCTION

1.1. General:

1.1.1. **Scope.** This volume outlines the procedures applicable to the safe operation of the F-15E. With the complementary references, this volume prescribes standard operational procedures for all USAF F15E aircrews.

1.1.2. **Aircrew Responsibility.** This volume, in conjunction with other governing directives, prescribes procedures for operating F-15E aircraft under most circumstances. It is not a substitute for sound judgment. Procedures not specifically addressed may be accomplished if they enhance safe and effective mission accomplishment.

1.1.3. **Deviations.** Deviations from these procedures require specific approval of the MAJCOM/A3 unless an urgent requirement or an aircraft emergency dictate otherwise. In that case, the pilot in command will take the appropriate action to safely recover the aircraft.

1.1.4. **References.** The primary references for F-15E operations are T.O. 1F-15E-1, *Flight Manual--F-15E*; T.O. 1F-15E-34-1-1, *Non-Nuclear Weapons Delivery Manual--F-15E*; AFTTP 3-1V1, *General Planning and Employment Considerations*; AFTTP 3-3V17, *Fundamentals--F-15E*; AFI 11-202V3; AFI 11-214, *Aircrew and Weapons Director Procedures for Air Operations*; and this volume. Training units may develop phase manuals from the procedures contained in these documents. Phase manuals may expand on basic procedures but in no case will they be less restrictive. Operational units may use these phase manuals.

1.2. **Waivers.** Forward waiver requests through appropriate channels to the applicable MAJCOM/A3 for approval. Approved waivers are effective until the next AFI 11-2F-15EV3 rewrite, unless stipulated otherwise on the waiver approval message. Provide information copies of approved waivers to the other volume OPRs.

1.3. **Distribution.** Each aircrew is authorized a copy of this volume.

Chapter 2

MISSION PLANNING

2.1. Responsibilities. The responsibility for mission planning is shared jointly by all flight members and the operations and intelligence functions of fighter organizations.

2.2. General Procedures:

2.2.1. Accomplish sufficient flight planning to ensure safe mission accomplishment to include fuel requirements, map preparation, and takeoff/landing data. Consider and factor in foreseeable safety risks and risk mitigation factors in accordance with Operational Risk Management. (ORM)

2.2.2. Standards. The SQ/CC is the approval authority for squadron standards. Group/Wing standards may be published and approved by the OG/CC. All standards will be reviewed by Operations Group Stan/Eval (OGV) for standardization and compliance with AFI 11-series guidance.

2.3. Map/Chart Preparation:

2.3.1. **Local Area Maps.** A local area map is not required if the unit aircrew aid includes jettison areas, divert information, controlled bailout areas, and provides a local area map of sufficient detail to remain within assigned training areas.

2.3.2. Charts. Flight Information Publications (FLIP) en route charts may be used instead of maps on navigational flights within areas that are adequately covered by these charts.

2.3.3. Low Altitude Maps:

2.3.3.1. On all low altitude flights, each aircraft in the flight will contain a minimum of one Chart Handbook Manual (CHUM) updated map of the low altitude route/operating area. The map will be of a scale and quality that terrain features, hazards, and chart annotations are of sufficient detail to allow navigation and safe mission accomplishment.

2.3.3.2. Prepare maps for low-level navigation IAW this instruction and as directed locally. Highlight all man made obstacles at or above the planned flight altitude. Additionally, annotate headings and time and/or distance tick marks on low level maps.

2.3.3.3. Annotate all maps with a Route Abort Altitude (RAA). Compute the RAA, for the entire route/area, at a minimum of 1,000 feet above the highest obstacle/terrain feature (rounded up to the next 100 feet) within the lateral limits of the route or training area, but in no case less than 5 NM either side of planned route.

2.3.4. Terrain Following (TF) Flight Map Preparation:

2.3.4.1. In addition to the requirements of **2.3.3.1.**, annotate a Minimum Safe Altitude (MSA) for each leg of the intended route of flight. The MSA is defined as an altitude which provides 1000 feet of clearance above the highest obstacle/terrain (rounded up to the next 100 feet), within 5NM of the planned course.

2.3.4.2. Annotate headings, maximum/minimum route structure altitudes, RAAs and MSAs on the chart. To ensure maps accurately display planned routes, planned night turn point bank angles should reflect realistic systems limitations.

2.3.4.3. For night TF missions, flight leads should select letdown points that avoid initial descents into rugged or mountainous terrain.

2.3.4.4. In order to ensure proper operation of the TF system, TF letdown corridors for the primary and alternate entry points for low level routes will be computed and briefed. As a minimum, compute MSA and Recovery Initiation Altitude (RIA) (IAW AFTTP 3-3.17) and values for terrain at 1 NM and command level off.

2.3.5. PFPS/sectional chart use during mission planning for Visual Flight Rules (VFR) flight or flight inside a Military Training Route (MTR)

2.3.5.1. Aircrew members flying under VFR or inside MTRs in the Continental United States (CONUS) will supplement existing mission planning materials (e.g. CHUM, FLIP AP/1B, etc.) with one of the following:

2.3.5.1.1. Portable Flight Planning System(PFPS-Falcon View) with the following overlay options selected:

Airports/heliports, airspace boundaries with approach control frequencies annotated, airways, MTR, parachute jump and Special Use Airspace (SUA) boundaries; or

2.3.5.1.2. Sectional Aeronautical Charts (use in flight is not required); and 1:250,000 low level charts/route books 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, and D airspace will be annotated and briefed on all such flights. In addition, annotate and brief the intersection of other Visual Routes (VR) or Instrument Routes (IR) routes (if applicable) and any other possible areas of conflict.

2.3.5.1.3. 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 PFPS overlay options available to accomplish these requirements.

2.4. Briefing/Debriefing:

2.4.1. **Briefing.** Flight leads are responsible for presenting a logical briefing which will promote safe and effective mission accomplishment. Flight leads are responsible for ensuring contracts, roles and responsibilities of each flight member are established, briefed and debriefed. Flight leads will ensure briefing start time provides adequate time to discuss required briefing items depending on complexity of the mission and aircrew capabilities.

2.4.1.1. As a minimum, begin briefings at least 1.5 hours before scheduled takeoff. Alert briefings will start in sufficient time to be completed prior to pilot changeover.

2.4.1.2. All formation flight briefings will cover flight member responsibilities, deconfliction contracts, combat mission priorities, and sensor management. Reference paragraph 3.10. for other formation briefing requirements.

2.4.1.3. All crewmembers/passengers must attend the flight briefing unless previously coordinated with unit supervisors. Anyone not attending the flight brief must receive a briefing on mission events and emergency procedures.

2.4.1.4. Briefing guides will be used to provide the flight lead/briefer with a reference list of items which may apply to particular missions. Items listed may be briefed in any sequence. Those items published in Air Force Instructions, (AFI) Air Force Tactics, Techniques and Procedures manuals, (AFTTP) or squadron/wing standards and understood by all participants may be briefed as "standard". Specific items not pertinent to the mission need not be covered.

2.4.1.5. Takeoff and Landing Data (TOLD) will be annotated on mission data cards. The minimum TOLD required is maximum abort speed for expected conditions (i.e. dry/wet/icy), rotation/NWLO (Nose Wheel Lift Off)/takeoff speed, takeoff distance, single engine rotation/NWLO/takeoff speed, and normal/heavy weight landing distance.

2.4.1.6. Review takeoff data, and ensure every member of the flight understands it. Place particular emphasis on takeoff and abort factors during abnormal situations such as short/wet runway, heavy gross weights, non-standard cable configurations, and abort sequence in formation flights.

2.4.1.7. When dissimilar aircraft or aircraft configurations are flown in formation, brief flight responsibilities, proper formation position (to ensure adequate wingtip clearance), and aircraft-unique requirements for each phase of flight.

2.4.1.8. For all low-level mission briefings, emphasize low altitude flight maneuvering, obstacle/ground avoidance, Low Altitude Warning System (LAWS) features, low altitude comfort level, and complacency avoidance. For low altitude training over water/featureless terrain, include specific considerations with emphasis on minimum altitudes and spatial disorientation.

2.4.1.8.1. Crews will brief the following special subjects on every sortie: radar/visual search responsibilities, departure/enroute/recovery, high density traffic areas, mid-air collision avoidance from other military aircraft and from civilian aircraft.

2.4.1.9. For Low Altitude Navigation Infra-Red Night (LANTIRN) missions, emphasize ensuring the LANTIRN system is fully operational, the transition from medium altitude to low-level TF operations, and TF maneuvering limitations.

2.4.1.10. Structure flight briefing to accommodate the capabilities of each flight member.

2.4.1.11. Brief an appropriate alternate mission for each flight. The alternate mission must be less complex than the primary and should parallel the primary mission (Basic Fighter Maneuvers, (BFM) Basic Surface Attack, (BSA) Tactical Intercepts. (TI) If not parallel, brief the specific mission elements that are different. Mission elements/events may be modified and briefed airborne as long as flight safety is not compromised. Flight leads will ensure changes are acknowledged by all flight members. Do not fly unbriefed missions/events.

2.4.2. **Multiple Sortie Days.** If all flight members attend an initial or mass flight briefing, the flight lead on subsequent flights need brief only those items that have changed from the previous flight(s). On multiple-go days when aircraft turn times do not allow follow-on mission brief(s) and only the initial flight brief is accomplished for all goes, the following guidance applies:

2.4.2.1. Upgrade missions will be flown on the first sortie (second sortie if the first is non-effective for weather, maintenance or airspace availability). Subsequent missions will be of equal or less complexity with no additional upgrade training without OG/CC approval.

2.4.2.2. Participants in continuation training missions may fly their primary or alternate missions in any sequence.

2.4.3. **Debriefing.** All missions will be debriefed. All flights will debrief the inflight execution of flight member responsibilities, deconfliction contracts, tactical employment priorities, and sensor management.

2.5. Unit Developed Checklists/Local Aircrew Aids:

2.5.1. Unit developed checklists may be used in lieu of flight manual checklists (except -25 checklists) provided they contain, as a minimum, all items (verbatim and in order) listed in the applicable checklist.

2.5.2. Units will produce an aircrew aid that, as a minimum, includes:

2.5.2.1. Briefing Guides.

2.5.2.2. Local radio channelization and airfield diagrams.

2.5.2.3. Impoundment procedures, emergency action checklists, and No Radio (NORDO)/divert information.

2.5.2.4. Arresting gear information for divert bases.

2.5.2.5. Bailout and Jettison Areas, On-Scene Commander Checklist

2.5.2.6. Cross-country procedures to include: command and control, engine documentation, Joint Oil Analysis Program (JOAP) samples, and aircraft servicing.

2.5.2.7. Other information as deemed necessary by the units. For example: stereo flight plans, turnaround procedures, local training area diagrams, instrument preflight, alert procedures, local area maps of sufficient detail to remain within assigned training areas.

2.6. Combat Edge Use. The use of the COMBAT EDGE vest is optional in the F-15E. Select Pressure Breathing (PBG) on all sorties except those using Aircrew Eye and Respiratory Protection System (AERPS) or Aircrew Chemical Defense Equipment (ACDE)

Chapter 3

NORMAL OPERATING PROCEDURES

3.1. Ground Communications. The pilot will brief the ground crew as required. Prior to starting the pilot will get an "OK" signal from the rear cockpit occupant. Use operational headsets to the maximum extent possible during all engine start, pre-taxi checks, and when technicians are performing tasks on the aircraft. Hand signals may be used as a last resort, or if required during alert scramble or combat operations.

3.1.1. During the Before Taxi flight control checks, confirm the proper movement and position of the flight control surfaces with the crew chief.

3.2. Ground Visual Signals. When ground intercom is not used, use visual signals IAW AFI 11-218, *Aircraft Operations and Movements on the Ground*, and this volume. All signals pertaining to operation of aircraft systems will originate with the pilot. The crew chief will repeat the given signals when it is safe to operate the system. Aircrew should not activate any system that could pose danger to the ground crew prior to receiving proper acknowledgment from ground personnel. The following signals augment AFI 11-218.

3.2.1. **Jet Fuel Starter (JFS) Start.** With clenched fist, pilot makes a pulling motion.

3.2.2. **Flight Controls Check.** Raise arm, clench fist, and make a stirring motion.

3.2.3. **Brake Check.** Hold left or right arm horizontal, open hand and push forward, breaking at the wrist (as in applying rudder pedal pressure with feet).

3.2.4. **Digital Electronic Engine Control, (DEEC) Improved Digital Electronic Engine Control, (IDEEC) Automatic Thrust Departure Prevention (ATDP) Check.** With the fingers and thumb of each hand extended and joined at the tips, open and close the fingers and thumbs of both hands simultaneously, simulating nozzle opening and closing.

3.2.5. **Target Pod Clear.** Extend arm and rotate a closed fist in a circular motion.

3.2.6. **Loss of Brakes While Taxiing.** Lower tailhook.

3.3. Preflight. Do not carry baggage/equipment in an unoccupied rear cockpit (**EXCEPTION:** Forms/maps may be stowed in the map case).

3.4. Ground Operations:

3.4.1. The minimum taxi interval is 150 feet staggered or 300 feet in trail. Spacing may be reduced when holding short of or entering the runway.

3.4.2. Do not taxi during snow and/or icy conditions until the taxi route and runway have been checked for safe conditions. In this case, taxi on the centerline with a minimum of 300 feet spacing. The minimum Runway Condition Reading (RCR) for taxi operations is RCR 10. OG/CCs may waive this to RCR 8.

3.4.3. Maximum taxi speed during sharp turns (more than 45 degrees of turn) is 10 knots. Above 10 knots the aircraft may skid and/ or depart the three point attitude.

3.4.4. **End of Runway Arming/DeArming.** Keep hands in view of ground personnel during quick check, arming or dearming operations. If the intercom system is not used during End of Runway (EOR) checks, the pilot will establish and maintain visual contact with the ground personnel to allow the use of visual signals.

3.4.5. Do not taxi in front of aircraft while it is having forward firing ordnance armed or de-armed.

3.5. Flight Lineup. Flights will line up as appropriate based on weather conditions, runway conditions, and runway width. Use a minimum of 500 feet spacing between separated elements/flights. For formation takeoffs, wingmen must maintain wingtip clearance with their element leader. If runway width precludes line-up with wingtip clearance between all aircraft in the flight, use 500 feet spacing between elements or delay run-up until the preceding aircraft/element releases brakes.

3.6. Before Takeoff Checks. Just prior to takeoff, all flight members will inspect each other for proper configuration and any abnormalities. Wingmen will indicate they are ready for takeoff by a head nod, radio call, or landing/taxi light signal.

3.7. Takeoff:

3.7.1. Do not takeoff if the RCR is less than 12. OG/CCs may waive this to RCR 8.

3.7.2. On training missions, do not takeoff if the computed takeoff roll exceeds 80 percent of the available runway. For single ship takeoffs, if the single ship computed military power takeoff distance exceeds one-half of the available runway, takeoff using afterburner.

3.7.3. When operating from airfields equipped with a compatible, remotely operated cable, ensure the departure end cable is raised for all takeoffs and landings, unless another departure end cable is in place.

3.7.4. Use a minimum of 10 seconds (15 seconds when using afterburners) takeoff interval between aircraft/elements. Use a minimum of 20 seconds takeoff interval when carrying live air-to-surface ordnance or when not rejoining prior to entry to Instrument Meteorological Conditions. (IMC)

3.7.5. Aircraft/elements will steer toward the center of the runway at the start of the takeoff roll.

3.7.6. During rolling takeoffs, align the aircraft with the runway heading prior to advancing the throttles.

3.7.7. OG/CCs may approve intersection takeoffs if operational requirements dictate.

3.7.8. Do not takeoff over any raised web barrier (e.g., MA-1A, 61QS11), or loose/slack cable (BAK-12/13/14)

3.8. Formation Takeoff:

3.8.1. Formation takeoffs are restricted to elements of two aircraft.

3.8.2. Elements must be led by a qualified flight leader unless an Instructor Pilot (IP) is in the element.

3.8.3. Aircraft must be within 3,000 pounds weight of each other and symmetrically loaded. Consider symmetrically loaded as those store loadings which do not require an abnormal trim or control application to counter a roll or yaw during takeoff and acceleration to climb airspeed.

3.8.4. Do not make formation takeoffs when:

- 3.8.4.1. The runway width is less than 125 feet.
- 3.8.4.2. The runway surface condition (RSC) is reported as wet, slush, ice, or snow on the runway. OG/CCs may waive this requirement if the center 125 feet of the runway is clear of standing water, ice, slush, or snow.
- 3.8.4.3. The crosswind or gust component exceeds 15 knots.
- 3.8.4.4. Loaded with live air to ground munitions.
- 3.8.4.5. Ferrying aircraft from a contractor or Air Logistics Center (ALC) facilities.
- 3.8.4.6. The computed takeoff roll exceeds 50% of the available runway.

3.9. Join-Up/Rejoin:

- 3.9.1. Day weather criteria for a VFR join-up underneath: ceiling 1,500 feet and visibility 3 miles.
- 3.9.2. Flight leaders will maintain tech order climb speeds until join-up is accomplished unless mission requirements necessitate a different airspeed.
- 3.9.3. Flight leaders should limit their angle of bank to 30 degrees for turning rejoins immediately after takeoff.
- 3.9.4. Flight members will join in sequence IAW AFTTP 3-3.17.
- 3.9.5. For further join-up procedures, see Night Join-up (3.21.3.) and Chapter 4.2.

3.10. Formation, General: IP/flight leads are responsible for ensuring contracts, roles and responsibilities of each flight member are established, briefed, executed and debriefed. If any flight member cannot fulfill their basic responsibilities, contracts, or other assigned tasks, they will immediately communicate that information to the flight/element lead. IP/flight leads will task element leads/wingmen based on their ability to fulfill basic responsibilities and other assigned tasks. For additional formation considerations, reference AFTTP 3-3.17 and AFTTP 3-1.17

- 3.10.1. Flight leads will brief a formation deconfliction/blind/get well plan for every phase of flight and ensure every flight member understands the plan. All flight members are responsible for executing briefed deconfliction/blind/get well plan.
- 3.10.2. **IMC.** In IMC, the maximum flight size is four aircraft except when flying in close formation with a tanker (refer to T.O. 1-F15E-1, Section VIII *Air Refueling Procedures*)
- 3.10.3. **Maneuvers.** Do not use rolling maneuvers to maintain or regain formation position below 5,000 feet Above Ground Level (AGL) or outside of special use airspace.
- 3.10.4. **Signals.** Airborne visual signals will be in accordance with AFI 11-205. For four-ship flights, formation changes will be initiated by radio call, when practical. When formation position changes are directed by radio, all Wingmen will acknowledge prior to initiating the change. A radio call is mandatory when directing position changes at night or under instrument conditions.
- 3.10.5. **Recovery.** When circumstances permit, flight leads will direct a battle damage/bomb check after each mission prior to or during Return to Base (RTB). Except at night/IMC, this check is mandatory following the expenditure of any ordnance (including all types of 20mm ammunition). Brief

deconfliction responsibilities and position change procedures. Fly no closer than fingertip formation spacing.

3.10.6. **Breakups.** Flight leaders will not break up formations until each wingman has a positive fix from which to navigate (visual, Inertial Navigation, (INS) Embedded GPS/INS, (EGI) or Tactical Air Navigation (TACAN)

3.10.7. **Changing Leads:**

3.10.7.1. When flying in limited visibility conditions, initiate lead changes from a stabilized, wings level attitude.

3.10.7.2. The minimum altitude for a lead change is 500 feet AGL over land or 1,000 feet AGL over water (for night see paragraph 3.21.4.2., for IMC see paragraph 4.6.)

3.10.7.3. Do not initiate lead changes with the wingman further aft than 30 degrees from line abreast.

3.10.7.4. Flight/element leads will not initiate a lead change unless the aircraft assuming the lead is in visual contact and in a safe position to do so.

3.10.7.5. Initiate a lead change by visual signal or radio call.

3.10.7.6. Acknowledge receipt of the lead by visual signal or radio call.

3.10.7.7. A lead change is effective upon acknowledgment.

3.10.7.8. The former leader then moves to the appropriate wing position.

3.11. **Formation Deconfliction:**

3.11.1. **General.** Apply the following rules for flight path deconfliction during tactical maneuvering:

3.11.1.1. Flight/element leads will consider wingman/element position and ability to safely perform a maneuver before directing it.

3.11.1.2. Wingmen/elements must maneuver relative to the flight lead/lead element and maintain sight. Trailing aircraft/elements are responsible for deconflicting with lead aircraft/elements. Wingmen/elements will vertically deconflict above or below the lead/lead element when required. During low altitude maneuvering, wingmen/trailing elements will deconflict above the lead/lead element.

3.11.2. **Loss of Visual.** Use the following procedures when one or more flight members/elements lose visual contact within the formation:

3.11.2.1. When any flight member/element calls "Blind," then the appropriate flight member/element will immediately respond with "Visual" and a position report or "Blind."

3.11.2.2. When the other flight member/element is also "Blind," then the flight leader will take action to ensure altitude separation between flight members/elements. The flight lead will specify either AGL or Mean Sea Level (MSL) when directing the formation to deconflict and use a minimum of 500 feet altitude separation. Avoid climbs/descents through the deconfliction altitude when possible.

3.11.2.3. When there is not a timely acknowledgment of the original "Blind" call, then the flight member/element initiating the call will maneuver away from the last known position of the other flight member/element and alter altitude.

3.11.2.4. If visual contact is still not regained, the flight leader will take additional positive action to ensure flight path deconfliction within the flight to include a Terminate/Knock-It-Off call if necessary. Consider scenario restrictions such as sanctuary altitudes and/or adversary blocks.

3.11.2.5. Aircraft will maintain altitude separation until visual and, if necessary, will navigate with altitude separation until mutual support is regained.

3.11.3. **Two-Ship.** The following rules apply for flight path deconfliction during tactical maneuvering of two-ship formations:

3.11.3.1. The wingman is normally responsible for flight path deconfliction.

3.11.3.2. The flight lead becomes responsible for deconfliction when:

3.11.3.2.1. Tactical maneuvering places the leader in the wingman's "blind cone" or forces the wingman's primary attention away from the leader (e.g., wingman becomes the engaged fighter).

3.11.3.2.2. The wingman calls "padlocked."

3.11.3.2.3. The wingman calls "blind."

3.11.3.2.4. Deconfliction responsibility transfers back to the wingman once the wingman acknowledges a visual on his lead.

3.11.4. **Three/Four-Ship (or Greater).** When flights of more than two aircraft are in tactical formation:

3.11.4.1. Formation visual signals performed by a flight/element leader pertain only to the associated element unless specified otherwise by the flight leader.

3.11.4.2. Trailing aircraft/element(s) will maintain sufficient spacing so that primary emphasis during formation maneuvering/turns is on low altitude awareness and deconfliction within elements, not on deconfliction between elements.

3.12. Chase Formation:

3.12.1. **Restrictions.** Any pilot may fly safety chase for aircraft with a problem or under emergency conditions. Pilots who have successfully completed an Instrument/Qualification evaluation may chase as safety observer for aircraft performing simulated instrument flight or hung ordnance patterns. Specialized missions (i.e., Operational Test and Evaluation (OT&E), Weapon Systems Evaluation Program (WSEP), live weapons delivery, etc.) and training conducted IAW AFI 11-2F-15EV1 may be chased by Combat Mission Ready (CMR)/Basic Mission Capable (BMC) pilots designated by group/squadron commanders. All other chase events may only be flown by IP/Flight Examiners (FE) or upgrading IPs under the supervision of an IP.

3.12.2. Procedures:

3.12.2.1. A safety observer in a chase aircraft, except IP/FE/specialized mission chase, will maneuver in a 30-60 degree cone with nose/tail clearance to 1,000 feet, to effectively clear and/or provide assistance.

3.12.2.2. IP/FE/specialized mission aircraft will maneuver as necessary, but must maintain nose/tail separation.

3.12.2.3. No chase aircraft will stack lower than the lead aircraft when below 1,000 feet AGL.

3.12.2.4. For live ordnance missions, the chase pilot is responsible for maintaining own ship frag deconfliction.

3.13. Show Formation. Brief and fly show formations as approved. Refer to AFI 11-209 and applicable MAJCOM directives for specific rules and appropriate approval levels to participate in static displays and aerial events.

3.14. Maneuvering Parameters:

3.14.1. Minimum Altitudes:

3.14.1.1. Nose high/low speed recoveries and Aircraft handling Characteristics (AHC) vertical maneuvers - 10,000 feet AGL.

3.14.1.2. Aerobatics - Remain above 5,000 feet AGL during all aerobatics maneuvering.

3.14.2. **Flight Avoidance.** Avoid flight through wingtip vortices and jetwash. If it is unavoidable, immediately unload the aircraft to approximately 1 G.

3.14.3. **Configuration.** Do not extend flaps during ACBT.

3.14.4. **Authorized speeds below 10,000 feet MSL (outside Special Use Airspace).** Aircrew flying in CONUS below 10,000 MSL (outside Special Use Airspace) will fly at maneuvering airspeeds as published in T.O. 1F-15E-1.

3.14.4.1. Flight leads will accomplish air-to-air (A/A) system checks above 10,000 MSL to the maximum extent practical. If unable to accomplish A/A checks above 10,000 MSL, use safe maneuvering airspeeds for formation flights as published in T.O. 1F-15E-1. Flight leads/aircraft commanders will accomplish terrain following checks above 10,000 MSL to the maximum extent possible. Aircrews who must accomplish terrain following checks below 10,000 MSL will minimize the time at higher airspeeds.

3.14.4.2. Crews flying outside CONUS will follow gaining MAJCOM, theater or host nation guidance on airspeeds. If no gaining MAJCOM, theater or host nation guidance exists, use the guidance in this instruction to the maximum extent practical.

3.15. Ops Checks/G-Awareness Exercises:

3.15.1. Accomplish sufficient ops checks to ensure safe mission accomplishment. Additionally, each aircrew should monitor the fuel system carefully throughout the flight to identify low fuel, trapped fuel or out of balance situations as soon as possible. Ops checks are required:

3.15.1.1. During climb or at level-off after takeoff.

3.15.1.2. Prior to each Air Combat Training (ACBT) engagement or intercept. In addition, a check for proper operation of all transfer tanks (wing tanks balanced and tank 1 feeding) will be performed prior to and between engagements or planned maneuvering above 30 units Angle of Attack (AOA).

3.15.1.3. Prior to entering an air-to-surface range, once while on the range if multiple passes are made, and after departing the range.

3.15.1.4. Following Air Refueling.

3.15.2. Minimum Ops Check items--engine instruments, total and internal fuel quantities/balance, G-suit connection, oxygen system, cabin altitude, and Overload Warning System (OWS).

3.15.3. In formation flights, the flight leader may initiate ops checks by radio call or visual signal and Wingmen will respond appropriately.

3.15.3.1. The query and response for ops checks will include pointer over counter readings (e.g. "13 over 25, externals" or "13 over 18, CFTs") Following Conformal Fuel Tank (CFT) and external fuel consumption, ensure tank-one is feeding correctly; add a "balanced" call to the normal Ops Check reply when wing fuel balance checks are required and the difference is no greater than 200 lbs. (e.g. "8 squared and balanced, tank-1") [EXCEPTION: Total fuel only may periodically be used during high demand phases of flight]

3.15.3.2. Fighter Data Link (FDL) fuel status should not be used as the primary source of fuel checks.

3.15.4. G-awareness exercises will be accomplished IAW AFI 11-214 and AFTTP 3-3.17.

3.15.4.1. G-awareness exercises will be filmed in the Heads Up Display (HUD) and in Hot Mic.

3.15.4.2. Unless performing a syllabus required event, flight members will maintain a minimum of 6,000 feet separation between aircraft during the execution of all G-awareness exercises. On board systems (e.g., Air-to-Air TACAN, RADAR, Data Link) should be used to establish and maintain separation prior to maneuver execution. During maneuver execution use visual lookout and briefed formation contracts as primary means of ensuring aircraft deconfliction. If required, use on board systems to enhance situational awareness during the maneuver.

3.15.4.2.1. Do not use G-awareness turns for systems checks or other items that detract from the intended purpose.

3.15.4.3. Flight/element leads will ensure the airspace intended for conducting the G-awareness exercise is free from potential traffic conflicts. Use air traffic control (ATC) services to the maximum extent practical to make sure the airspace is clear. Conduct the G-awareness exercise in the following airspace with preference to the order as listed:

3.15.4.3.1. Special use airspace (e.g., restricted/warning areas, Air Traffic Control Assigned Airspace, (ATCAA) Military Operating Areas (MOA) and MAJCOM approved large-scale exercise/special missions' areas)

3.15.4.3.2. Above 10,000 MSL outside of special use airspace.

3.15.4.3.3. Inside the confines of military training routes and above 5,000 AGL.

3.15.4.3.4. Below 10,000 MSL outside of special use airspace.

3.16. Radio Procedures:

3.16.1. Preface all communications with the complete flight call sign (except for wingman acknowledgment). Transmit only that information essential for mission accomplishment or safety of flight. Use visual signals when practical.

3.16.2. Make a "Knock-It-Off" (KIO) or "Terminate" call IAW AFI 11-214. Any flight member may make this call. A KIO applies to any phase of flight and any type of mission. All participants will acknowledge a KIO by repeating the call.

3.16.3. Acknowledge radio checks which do not require the transmission of specific data by individual flight members in turn (Example: "2, 3, 4"). Acknowledgment indicates the appropriate action is complete, in the process of being completed, or the flight member understands.

3.16.4. In addition to the radio procedures outlined in AFI 11-202V3, AFMAN 11-217V1 and V2, and FLIP publications; the following radio transmissions are required:

3.16.4.1. ATC Instructions/Clearance. All flight members will acknowledge understanding the initial ATC clearance. Acknowledge subsequent ATC instructions when directed by the flight lead, or anytime during trail departures.

3.16.4.2. Gear Checks. Each pilot will report gear down on base leg, or, if making a VFR straight-in approach not later than 3 miles on final. When flying an instrument approach, report gear down in response to ATC instructions or no later than the final approach fix or glide path interception point. A wingman or chase need not make this call during a formation or chased approach.

3.17. Change of Aircraft Control. Both aircrew members must know at all times who has control of the aircraft. Use the statement "You have the aircraft" to transfer aircraft control. The aircrew member receiving control of the aircraft will acknowledge "I have the aircraft" and lightly shake the stick. Once assuming control of the aircraft, maintain control until relinquishing it as stated above. **EXCEPTION:** If the intercom fails, the pilot in the front cockpit (if not in control of the aircraft) will shake the stick and assume control of the aircraft and radios unless prebriefed otherwise.

3.18. Low Altitude Procedures:

3.18.1. Formation:

3.18.1.1. Fly low level formation positions/tactics using AFTTP 3-1.17 and AFTTP 3-3.17 defined formations.

3.18.1.2. Line abreast formation is authorized at or above 300 feet AGL. When flying below 300 feet AGL, direct the wingman to a wedge formation position.

3.18.2. Terrain/Obstacle Clearance:

3.18.2.1. All obstacle avoidance planning will be based on MSA and RAA as defined in paragraph [2.3.3.3](#).

3.18.2.2. If unable to visually acquire or ensure lateral separation from known vertical obstructions which are a factor to the flight, flight leads will direct a climb not later than 3 NM prior to the obstacle to ensure vertical separation. The climb must be to an altitude at or above briefed RAA/MSA. Do not descend below this altitude until visual with the obstruction or until positional/situational awareness dictates it is safe to do so.

3.18.2.3. During all low altitude operations the LAWS will be set at 90 percent of the briefed minimum altitude or 90 percent of the command-directed minimum altitude, whichever is higher. Adjust the setting as appropriate for each applicable phase of flight.

3.18.2.4. During all low altitude operations, the immediate reaction to task saturation, diverted attention, knock-it-off, or emergencies is to climb to a prebriefed safe altitude (minimum 1000 feet AGL).

3.18.3. **Maneuvering.** When crossing high or hilly terrain, maintain positive G and do not exceed approximately 120 degrees of bank. Maneuvering at less than 1G is limited to upright bunting maneuvers.

3.18.4. **Minimum Airspeed.** The minimum airspeed for low level navigation is 300 KCAS. Minimum airspeed during TF operations is the specified flight manual minimum.

3.18.5. **Minimum Weather.** The weather minimums for visual low level training are 1,500 feet ceiling and 3 miles visibility for any route or area, or as specified in FLIP for Military Training Routes, unit regulations, or national rules, whichever is higher.

3.18.6. **Minimum Altitude:**

3.18.6.1. 500 Feet AGL For: Low Altitude Training (LOWAT) Category I qualified aircrews.

3.18.6.2. 300 Feet AGL For: LOWAT Category II qualified aircrews and F-15E Formal Training Unit (FTU) students/instructors when conducting training IAW an applicable syllabus.

3.18.6.3. 100 Feet AGL For: LOWAT Category III qualified aircrews.

3.18.6.4. Training in the 300 feet to 100 feet AGL altitude block will be in short segments consistent with real-world risks and realistic tactical considerations.

3.18.6.5. For night operations the minimum altitude is MSA unless operating under the conditions of paragraph 3.19., LANTIRN Operations or paragraph 3.22., Night Vision Goggles (NVG) Procedures

3.18.6.6. For over water operation the minimum altitude is 1000 feet above the surface unless in sight of land or using TF flyup protection. If in sight of land or using TF flyup protection the minimum altitude may be lowered to 500 feet above the surface.

3.18.6.7. For Air to Surface range operations, minimum altitudes will be determined by Range restrictions, AFI 11-214 restrictions, or aircrew minimums, whichever is greater.

3.18.7. **Low Altitude Route/Area Entry Procedures:** Accomplish descents into the low altitude MTR or MOA under radar control or radar flight following to the maximum extent practical.

3.18.7.1. **Visual Meteorological Conditions (VMC) Route/Area Abort Procedures:**

3.18.7.1.1. Maintain safe separation from the terrain and other aircraft.

3.18.7.1.2. Comply with VFR altitude restrictions and squawk applicable IFF modes and codes.

3.18.7.1.3. Maintain VMC at all times. If unable, follow IMC procedures outlined below.

3.18.7.1.4. Attempt contact with controlling agency, if required.

3.18.7.2. **IMC Route/Area Abort Procedures:**

3.18.7.2.1. Immediately climb to, or above, the briefed RAA.

3.18.7.2.2. Maintain preplanned ground track. Execute appropriate lost wingman procedures if necessary.

3.18.7.2.3. If deviations from normal route/area procedures are required, or if the RAA/MSA is higher than the vertical limits of the route/area, squawk emergency.

3.18.7.2.4. Attempt contact with the appropriate ATC agency for an Instrument Flight Rules (IFR) clearance. If required to fly in IMC without an IFR clearance, cruise at appropriate VFR altitudes until IFR clearance is received.

3.19. LANTIRN Operations:

3.19.1. **Minimum Altitude.** The minimum altitude for LANTIRN training will be the higher of VR/IR Route, MOA minimum altitude or aircrew minimum altitude as certified by the unit commander IAW AFI 11-2F-15EV1.

3.19.2. Operational Procedures:

3.19.2.1. An operational LANTIRN system is required to conduct night or day IMC low level operations below MSA.

3.19.2.2. Unarmed TF operations in IMC are prohibited.

3.19.2.3. During TF navigation operations, the pilot will maintain 400 KCAS minimum airspeed in mountainous terrain.

3.19.2.4. Check Terrain Following Radar (TF)/LANTIRN systems inflight using flight manual procedures (Dash-1) on every flight involving TF/LANTIRN operations. TF flight is not authorized until these checks are accomplished and TF systems provide terrain clearance commands. The intent is to ensure all LANTIRN systems are functioning properly prior to sustained low altitude LANTIRN operations. If any feature that is critical to overall system performance (i.e. Combined Altitude Radar Altimeter (CARA), INS) is questionable or disabled, discontinue the checks and/or LANTIRN portion of the mission.

3.19.2.5. Overall responsibility to determine minimum equipment required for TF operations is at the wing level. However as a minimum, lists will include an operational TF radar, radar altimeter, Navigation Forward Looking Infrared (NAV FLIR) HUD display and an E-SCOPE. If the NAV/FLIR is inoperable, NVGs may be used in place of the NAV/FLIR if both crewmembers are current and qualified. Additionally, for IMC TF operations, an operational A/A and A/G radar is required.

3.19.2.6. Each crew will confirm by inter-cockpit communication that the TFR and radar altimeter are on and working properly before descending below the MSA.

3.19.2.7. Initially set a 1000 feet AGL Set Clearance Plane (SCP) to verify proper systems operation prior to commencing letdown to a lower SCP.

3.19.2.8. During low altitude operations, the pilot will not operate any heads down sensor while flying outside of TF system limits. Sole attention will be placed on re-establishing aircraft parameters within TF limits.

3.19.2.9. Any maneuvering that will put the aircraft outside of TF limits, negating fly-up protection, will be at or above the applicable MSA or RAA.

3.19.2.10. During low altitude night operations, Weapon Systems Officers (WSO) will select NAV/FLIR on the HUD repeater to the maximum extent possible.

3.19.3. Abnormal Operation:

3.19.3.1. Aircrews who experience failure of any portion of the TF system or HUD/FLIR imagery (or NVG if used in place of the NAV/FLIR) while flying night low level will immediately climb to, or above, the MSA/RAA. If the failure(s) can be cleared and safe TF regained, TF operations may resume. If the aircraft position cannot be accurately determined, aircrews will terminate the low level portion of the mission and execute route abort procedures IAW paragraph 3.18.7.

3.19.3.2. For night operations, if the TFR/LANTIRN system fails prior to route entry, aircrews may still enter the route and continue the mission at the MSA, provided the above provisions are met.

3.19.3.3. Use the following procedures if NAV/FLIR or NVG (if used in place of NAV/FLIR) visibility is insufficient for use as an aid for terrain avoidance at night, climb to MSA or RAA (N/A for IMC TF qualified crews, and supervised crews in IMC TF upgrade training, using IMC procedures on an Instrument Route. (IR)

3.20. Air Refueling. Pilots undergoing initial/recurrency training in air refueling will not refuel with a student boom operator. (does not apply to KC-10)

3.21. Night Procedures:

3.21.1. Night Ground Operations:

3.21.1.1. When ground personnel are working under the aircraft, the anti-collision lights should be OFF and the position lights ON and not flashing.

3.21.1.2. Taxi on the taxiway centerline with a minimum of 300 feet spacing.

3.21.1.3. Use the taxi light while taxiing unless it might interfere with an aircraft landing or taking off. The taxiing aircraft will come to a stop if the area cannot be visually cleared without the taxi light.

3.21.1.4. Both wingtip position lights must be operational for flight (substituting a formation light in lieu of a wingtip position light is not permitted).

3.21.2. **Night Takeoff.** During a night formation takeoff, direct brake release and configuration changes on the radio. Following takeoff, each aircraft/element will climb on runway heading to 1,000 feet AGL before initiating turns, except where departure instructions specifically preclude compliance.

3.21.3. **Night Join-Up.** Weather criteria for night join-up underneath is a ceiling of 3,000 feet and 5 miles visibility. After join-up, turn all the anti-collision lights OFF and position lights to ON except for the last aircraft in formation, which will keep the anti-collision light ON unless otherwise directed by the flight lead.

3.21.4. Night Formation Procedures:

3.21.4.1. When in trail formation maintain aircraft spacing primarily by instruments, RADAR/Air-to-Air Interrogator (AAI), and/or timing with visual reference secondary. If aircraft spacing

cannot be ensured, then establish altitude separation (1,000 feet minimum). Cross-check instruments at all times to ensure ground clearance.

3.21.4.2. Do not change lead or wing formation positions below 1,500 feet AGL unless on RADAR downwind. Direct lead and position changes using the radio and from a stabilized, wings-level attitude.

3.21.4.3. Night references for fingertip and route formation positions are specified in AFTTP 3-3.17.

3.21.4.4. Prior to a formation break-up at night, the flight leader will transmit attitude, altitude, airspeed, and altimeter setting, which will be acknowledged by Wingmen. Wingmen will confirm good navigational aids.

3.21.5. Night Landing:

3.21.5.1. Normally land from an instrument straight-in approach. Refer to AFI 11-202V3, as supplemented, for specific procedures.

3.21.5.2. Only perform night formation landings when required for safe recovery of the aircraft.

3.22. NVG Procedures:

3.22.1. NVG briefing issues and guides:

3.22.1.1. NVG briefings are IAW [Attachment 15](#).

3.22.1.2. NVGs will not be worn in IMC.

3.22.1.3. NVGs must be preflight tested and adjusted for the individual in the unit eyeline prior to NVG operations. Do not wear NVGs during takeoff or landing. Do not don NVGs until at least 2,000 feet AGL in climbing or level flight. In all cases, remove NVGs prior to the final approach fix.

3.22.1.4. All flight members will make a radio call or use a briefed visual signal, such as beacons off/on, when going "goggles on" or "goggles off." Only one crewmember per aircraft will don/doff goggles at a time.

3.22.1.5. **Operating Outside of TF Limits:** Under high illumination conditions the minimum altitude while using NVGs without the TF engaged is 1,000 feet AGL. Under low illumination conditions the minimum altitude while using NVGs without the TF engaged is MSA. Established night weather minimum criteria apply for NVG operations IAW AFI 11-202V3 and AFI 11-214.

3.22.1.6. NVGs may be worn for night tanker rejoins, but will be raised to the up/stowed position or removed no later than the precontact position.

3.22.1.7. Unless required for battle damage checks or aircraft assistance, Wingmen wearing NVGs will fly no closer than route formation.

3.22.1.8. For Battle Damage Checks NVGs will remain on. The aircraft performing the check will approach with position lights bright steady/flash or beacons on while the aircraft being checked sets external lights to a minimum, preferably off.

3.22.2. Abnormal Procedures:

3.22.2.1. In-Flight Emergencies. (IFE) During in-flight emergencies, immediately assess whether the NVGs aid or hinder completing emergency procedures. If they are a hindrance or the emergency may deteriorate into an ejection situation, remove and stow the NVGs.

3.22.2.2. Lost Sight. If you lose sight within a flight, consider highlighting position by increasing exterior lighting level, activating the afterburners, or deploying chaff/flares as the situation warrants.

3.22.2.3. NVG Failure. Ensure separation from other aircraft and the ground before attempting to remedy the NVG failure.

3.22.2.3.1. Transition to instruments.

3.22.2.3.2. Perform lost wingman procedures if appropriate.

3.22.2.3.3. Route abort/climb above MSA if appropriate.

3.22.2.3.4. Terminate/KIO as applicable.

3.22.2.3.5. If other aircraft are in the vicinity, direct them to raise their external lights to non-NVG visible levels. If these steps do not solve the problem, stow NVGs and proceed with non-NVG plan.

3.22.2.4. Inadvertent Flight into Weather. Encountering poor weather conditions during NVG operations may cause loss of SA and aircrew distraction/disorientation.

3.22.2.4.1. Single Ship or Separated from Flight Members:

3.22.2.4.1.1. Transition to instruments.

3.22.2.4.1.2. Climb to MSA.

3.22.2.4.1.3. Terminate/KIO as applicable.

3.22.2.4.2. Formation Flight. If entering weather in formation/close proximity to other aircraft, perform the steps under NVG failure, as appropriate, then climb/descend to attempt to regain VMC.

3.23. Fuel Requirements:

3.23.1. Joker Fuel. A pre-briefed fuel needed to terminate an event and proceed with the remainder of the mission.

3.23.2. Bingo Fuel. A pre-briefed fuel state that allows the aircraft to return to the base of intended landing or alternate, if required, using preplanned recovery parameters and arriving with normal recovery fuel as listed below:

3.23.3. Normal Recovery Fuel. The fuel on initial or at the Final Approach Fix (FAF) at the base of intended landing or alternate, if required. Fuel quantity will be as established locally or 2,500 pounds, whichever is higher.

3.23.4. **Minimum/Emergency Fuel.** Declare the following when it becomes apparent that an aircraft may land at the intended destination or alternate, if required, with:

3.23.4.1. Minimum Fuel. 1900 pounds or less.

3.23.4.2. Emergency Fuel. 800 pounds or less.

3.24. Approaches and Landings:

3.24.1. General Procedures:

3.24.1.1. The desired touchdown point for a VFR approach is 500 feet from the threshold or the glide path interception point for a precision approach. When local procedures or unique conditions require landing beyond the normal touchdown point, adjust the touchdown point accordingly.

3.24.1.2. Minimum pattern and touchdown spacing between landing aircraft is 3,000 feet for similar aircraft (e.g., F-15 A-E versus F-15 A-E), 6,000 feet for dissimilar aircraft (e.g., F-15 A-E versus F-16) or as directed by MAJCOM or the landing base, whichever is higher. Increase spacing whenever wake turbulence is anticipated.

3.24.1.3. Normally, all aircraft will land in the center of the runway and clear to the turnoff (cold) side of the runway when speed/conditions permit.

3.24.2. Landing Restrictions:

3.24.2.1. When the computed landing roll exceeds 80 percent of the available runway, land at an alternate if possible.

3.24.2.2. Do not land over any raised web barrier (e.g., MA-1A, 61QS11), or loose/slack cable (BAK-12/13/14)

3.24.2.3. During the aerobrake portion of a normal, dry runway landing, leave flaps down to provide increased aerodynamic drag and normal nose fall.

3.24.2.4. When the RCR at the base of intended landing is less than 12, land at an alternate if possible. If an alternate is not available, an approach end or mid-field arrestment is recommended.

3.25. Overhead Traffic Patterns:

3.25.1. Overhead patterns can be made with unexpended practice ordnance and unexpended live air-to-air ordnance. Overhead patterns may be performed at deployed locations with unexpended live ordnance if required by local force protection arrival procedures.

3.25.2. Initiate the break in the first 3,000 feet of the runway or as local procedures direct.

3.25.3. Execute individual breaks in a level 180 degree turn to the downwind leg at minimum intervals of 5 seconds (except IP/FE chase or when in tactical formation).

3.25.4. Aircraft must be wings level on final at approximately 300 feet AGL and 1 mile from the planned touchdown point.

3.26. Tactical Overhead Traffic Patterns. Tactical entry to the overhead traffic pattern is permitted when:

3.26.1. Specific procedures are developed and coordinated with appropriate air traffic control agencies.

3.26.2. No more than four aircraft are in the flight.

3.26.3. No aircraft are offset from the runway in the direction of the break. The intent is to avoid requiring a tighter than normal turn to arrive on normal downwind.

3.26.4. Normal downwind, base turn positions, and spacing are flown.

3.27. Touch-and-Go Landings:

- 3.27.1. Fly touch-and-go landings IAW AFI 11-202V3, as supplemented by MAJCOM.
- 3.27.2. Do not fly touch-and-go landings with live or hung ordnance (except a safed 20mm gun) or with fuel remaining in any external tank.

3.28. Low Approaches:**3.28.1. Minimum Altitudes:**

- 3.28.1.1. Normal/no flap single ship low approaches - so that touchdown does not occur.
 - 3.28.1.2. IP/FEs flying chase position - 50 feet AGL.
 - 3.28.1.3. Formation low approaches and non-IP/FE chase - 100 feet AGL.
 - 3.28.1.4. Chase aircraft during an emergency - 300 feet AGL unless safety or circumstances dictate otherwise.
- 3.28.2. **Go-Around.** During go-around, remain 500 feet below VFR overhead traffic pattern altitude until crossing the departure end of the runway unless local procedures, missed approach/climb-out procedures, or controller instructions dictate otherwise.

3.29. Closed Traffic Patterns. Initiate the pattern at the departure end of the runway unless directed/cleared otherwise by local procedures or the controlling agency. When in formation, a sequential closed may be flown with ATC concurrence at an interval to ensure proper spacing. Plan to arrive on downwind at 200-250 KCAS.

3.30. Back Seat Approaches and Landings:

- 3.30.1. A Rear-Cockpit (RCP) landing qualified instructor pilot may accomplish back seat landings. An upgrading IP may only accomplish back seat landings when a RCP landing qualified IP is in the front cockpit.
- 3.30.2. During back seat approaches and landings, the front seat pilot will visually clear the area, monitor aircraft parameters and configurations, and be prepared to direct a go-around or take control of the aircraft (as briefed by the rear cockpit IP) if necessary.

3.31. Formation Approaches and Landings:**3.31.1. General:**

- 3.31.1.1. Normally accomplish formation landings from a precision approach. If not, accomplish the landing from a published instrument approach or a VFR straight-in approach using available approach path guidance (VASI, PAPI, PLASI, etc.) In all cases, use a rate of descent similar to a normal precision approach.
- 3.31.1.2. Continuation training formation landings must be led by a qualified flight leader unless an IP is in the element.
- 3.31.1.3. Do not practice formation approaches with a combined fuel/stores weight greater than 10,000 pounds. N/A for FE Chase.

3.31.1.4. Aircraft must be within 3,000 pounds weight of each other and symmetrically loaded as defined in paragraph [3.8.3](#).

3.31.1.5. Position the wingman on the upwind side if crosswind exceeds 5 knots.

3.31.1.6. The wingman must maintain a minimum of 10 feet lateral wingtip spacing.

3.31.1.7. If the wingman overruns the leader after landing, accept the overrun and maintain the appropriate side of the runway and aircraft control. Do not attempt to reposition behind the leader. The most important consideration is wingtip clearance.

3.31.2. Formation Landings are Prohibited When:

3.31.2.1. The crosswind or gust component exceeds 10 knots.

3.31.2.2. The RSC (or primary braking portion of the runway for dual surface runways) is reported wet, slush, ice or snow is on the runway.

3.31.2.3. The runway width is less than 125 feet.

3.31.2.4. Landing with hung ordnance or unexpended live ordnance (excluding live air-to-air missiles, 20mm ammunition, or chaff/flares).

3.31.2.5. The weather is less than 500 feet and 1.5 miles or a flight member's weather category, whichever is higher, except in an actual emergency requiring a formation landing.

3.32. After Shutdown Procedures. All flight members will accomplish a post flight walk-around. The intent of this inspection is to find evidence of birdstrike, lost panels, damaged ordnance, structural damage resulting from over-Gs or other in-flight abnormalities.

3.33. F-15E Crew Duties. Unless briefed otherwise during the crew coordination brief, the following duties apply. (EXCEPTION: The restrictions listed in paragraph [3.33.2](#) may not be altered.)

3.33.1. General:

3.33.1.1. Both crewmembers are responsible for the successful completion of each assigned mission. Conduct a crew briefing before each flight to ensure that both crewmembers are thoroughly familiar with all aspects of the mission. Brief radar and visual lookout responsibilities, crew coordination, and specific duties during each phase of flight.

3.33.2. WSO Flying. WSOs will not fly during:

3.33.2.1. Takeoff or landing.

3.33.2.2. AAR operations.

3.33.2.3. Close formation or rejoins to close formation.

3.33.2.4. Tactical maneuvering.

3.33.2.5. Weapons delivery (actual or simulated).

3.33.2.6. Below 1,000 feet AGL (unless flying practice instrument approaches/patterns and no lower than non-precision approach minimums, the pilot's weather category or 500' AGL. (whichever is higher))

3.33.2.7. Overhead patterns

3.33.3. **Use of Checklist.** The pilot and WSO will use the appropriate checklists in accomplishing all items from preflight through engine shutdown.

3.33.4. **Prestart.** The pilot will accomplish the ground crew briefing, when required, in accordance with the briefing guide contained in this volume.

3.33.5. **Communications.** The crewmember not in control of the aircraft will normally control the radio and navigational equipment.

3.33.6. **Takeoff.** The WSO will check the Min go/Max abort speed when required, monitor engine/flight instruments, check gear and flaps up, and advise the pilot of any discrepancies.

3.33.7. **Climb/Departure:**

3.33.7.1. The aircrew member flying the aircraft will call altimeter setting to 29.92 when passing the transition altitude.

3.33.7.2. The aircrew member not in control of the aircraft will monitor the published or clearance departure procedures.

3.33.7.3. Accomplish a complete weapons systems check on each flight to the maximum extent possible.

3.33.8. **Cruise/Navigation/Instrument Flight.** The WSO will:

3.33.8.1. Relay aircraft attitude/altitude/airspeed information to the pilot when departing a formation in weather/night flying conditions.

3.33.9. **Air-to-Air Procedures:**

3.33.9.1. General Intercepts:

3.33.9.1.1. The aircrew member in command of the radar will acknowledge target position information, acquire radar contact, and assume control of the intercept in accordance with AFI 11-214.

3.33.9.1.2. The aircrew member not in command of the radar will provide descriptive commentary, assist as necessary in accomplishing the intercept and will monitor the position of other flight members in the formation.

3.33.9.2. **Pilot Responsibilities, ACBT/Intercepts:**

3.33.9.2.1. Acknowledge and comply with weapons controller instructions in accordance with AFI 11-214.

3.33.9.2.1.1. Monitor radar scope and attempt visual contact with the target.

3.33.9.2.1.2. Monitor armament status.

3.33.9.2.1.3. Visually ensure required fighter-target separation.

3.33.9.3. **WSO Responsibilities, ACBT/Intercepts:**

3.33.9.3.1. Verify armament switches are set.

3.33.9.3.2. Monitor radar scope, evaluate target position, and clear six o'clock.

3.33.9.3.3. Maintain visual area surveillance.

3.33.9.3.4. Provide descriptive/directive commentary as to bogey location and required maneuvers.

3.33.9.3.5. Monitor armament status.

3.33.10. **Visual Air-to-Surface Weapons Deliveries:**

3.33.10.1. **Pilot Responsibilities:**

3.33.10.1.1. Ensure positive identification of the target.

3.33.10.1.2. Perform weapons delivery and escape maneuvers with particular emphasis on threat and fragmentation envelopes.

3.33.10.2. **WSO Responsibilities:**

3.33.10.2.1. Aid the pilot in locating and identifying the target.

3.33.10.2.2. Monitor delivery and escape maneuvers with particular emphasis on altitude and airspeed.

3.33.11. **Radar/PGM Air-to Surface Deliveries:**

3.33.11.1. **Pilot Responsibilities:**

3.33.11.1.1. Perform armament checks, weapons delivery, and escape maneuvers. Be prepared to initiate alternate delivery.

3.33.11.2. **WSO responsibilities:**

3.33.11.2.1. Acquire and designate the target on the radar or targeting pod unless otherwise briefed.

3.33.11.2.2. Monitor delivery and escape maneuvers with particular emphasis on altitude and airspeed.

3.33.12. **Air Refueling:**

3.33.12.1. **Pilot Responsibilities:**

3.33.12.1.1. Accomplish the air refueling and, if not accomplishing the refueling, be prepared to immediately press the air refueling release button when the IP/UIP in the rear seat is accomplishing the refueling.

3.33.12.2. **WSO Responsibilities:**

3.33.12.2.1. Advise the pilot of boom position and call when boom is positively clear/disconnected.

3.33.13. **Penetrations/Descents:**

3.33.13.1. The aircrew member in control of the aircraft will advise the other crewmember of intentions when performing any penetration or approach. Both crewmembers must confirm the Decision Height (DH)/Minimum Descent Altitude (MDA) for an approach, or the RAA/MSA altitude for descents into low level routes.

3.33.13.2. Both crewmembers will refer to appropriate FLIP publications during the holding, penetration, and approach.

3.33.13.3. The crewmember not in control of the aircraft will verbally check altimeter settings and altitude when passing transition altitude. Additionally, advise the other crewmember when 1,000 feet above any intermediate level off altitude, 100 feet above decision height/minimum descent altitude for the approach being flown, or when 1000 feet above the minimum altitude during descents into low level routes.

3.33.14. **Landing.** The crewmember not in control of the aircraft will:

3.33.14.1. Monitor the landing pattern with emphasis on engine power, altitude, airspeed, and landing and flap position.

3.33.14.2. Visually clear the area.

3.33.14.3. Monitor ground speed versus runway remaining during the landing roll to assess aerobraking effectiveness and available stopping distance.

3.33.15. **After Landing.** The pilot will:

3.33.15.1. Take control of the aircraft when the rear seat IP accomplishes the landing.

3.33.15.2. Taxi the aircraft.

Chapter 4

INSTRUMENT PROCEDURES

4.1. Approach Category:

4.1.1. The F-15E is Approach Category E. Accomplish missed approach IAW flight manual procedures. Missed approach airspeed is 200-250 KCAS.

4.1.2. Use approach Category D minimums at an emergency/divert airfield where no Category E minimums are published provided:

4.1.2.1. A straight-in approach is flown.

4.1.2.2. The aircraft is flown at a final approach airspeed of 165 KCAS or less.

4.1.2.3. The aircraft is flown at 255 knots true airspeed (KTAS) or less for the missed approach segment of the approach. At high pressure altitudes and temperatures 255 KTAS may not be compatible with published missed approach airspeeds and Category D approaches should not be flown.

4.1.3. The F-15E INS is approved for enroute Area Navigation. (RNAV) RNAV approaches are not authorized.

4.2. Takeoff and Join-Up:

4.2.1. The flight leader must get an appropriate ATC clearance (altitude block or trail formation) when a flight join-up is not possible due to weather conditions or operational requirements. Formation trail departures must comply with instructions for a nonstandard formation flight as defined in FLIP.

4.2.2. If weather is below 1500 feet and 3 miles (5 KM), each aircraft/element will climb on takeoff heading to 1,000 feet AGL before initiating any turns, except when departure instructions specifically preclude compliance.

4.3. Trail Procedures:

4.3.1. General:

4.3.1.1. During trail formations, basic instrument flying is the first priority and must not be sacrificed when performing secondary trail tasks. Strictly adhere to the briefed airspeeds, power settings, altitudes, headings, and turn points. If task saturation occurs, cease attempts to maintain trail, concentrate on flying the instrument departure, and then notify the flight lead. The flight lead will then notify ATC.

4.3.1.2. Flight leaders will request non-standard formation from ATC.

4.3.1.3. ATC instructions issued to the lead aircraft apply to the entire flight.

4.3.1.4. Flight leads will brief aircraft/element spacing.

4.3.1.5. Each aircraft/element will follow the No Radar Contact procedures until the aircraft/element immediately in trail has radar contact and called "tied."

4.3.2. **No Radar Contact:**

4.3.2.1. The flight leader will call initiating all turns. Subsequent aircraft must delay turns to maintain the desired spacing.

4.3.2.2. Each aircraft/element will maintain 20 seconds or 2-3 mile spacing using all available aircraft systems and navigational aids to monitor position.

4.3.2.3. During climbs and descents, each aircraft/element will call passing each 5,000 foot altitude increment with altitude and heading (or heading passing) until join-up, level-off, or the following aircraft/element calls "tied."

4.3.2.4. Each aircraft/element will call initiating any altitude or heading change. Acknowledgments are not required; however, it is imperative that preceding aircraft/elements monitor the radio transmissions and progress of the succeeding aircraft/elements and immediately correct deviations from the planned route.

4.3.2.5. Each aircraft/element will maintain at least 1,000 feet vertical separation from the preceding aircraft/element until establishing radar/visual contact, except in instances where departure instructions specifically preclude compliance. Reduce vertical separation to 500 feet if necessary to comply with MSA restrictions.

4.3.2.6. In the event a visual join-up cannot be accomplished on top or at level-off, the flight leader will request altitude separation for each succeeding aircraft/element to meet the requirements of the above paragraph.

4.3.3. **Radar Contact:**

4.3.3.1. Each aircraft/element will call "tied" when radar contact is established with the preceding aircraft. Once all aircraft are tied, no further radio calls are required, except to acknowledge ATC instructions, unless radar contact is lost.

4.3.3.2. In flights of three or more aircraft, use all available aircraft systems (i.e. radar, TACAN, AAI, etc.) to ensure that trail is maintained on the correct aircraft.

4.3.4. **Trail Departures:**

4.3.4.1. Use a minimum of 20 seconds takeoff spacing.

4.3.4.2. Each aircraft/element will accelerate in MIL/AB power until reaching 350 KCAS. Climb at 350 KCAS until reaching cruise mach/TAS, unless otherwise briefed.

4.3.4.3. Upon reaching briefed tech order climb speed, the flight leader will set 850 FTIT for PW-220 (900 FTIT for PW-229) unless otherwise briefed.

4.3.4.4. Limit all turns to a maximum of 30 degrees of bank.

4.3.5. **En route Trail.** Flight leads must brief airspeeds, power settings, and configurations.

4.3.6. **Trail Recovery:**

4.3.6.1. Trail recoveries are only authorized at home station/deployed locations. Prior to their use, applicable ATC agencies must approve and local operating procedures must address trail recovery procedures. As a minimum, procedures must address each recovery profile, missed approach, climb-out, lost contact, lost communications and desired/maximum spacing requirements.

4.3.6.2. Limit trail recovery to a maximum of four aircraft.

- 4.3.6.3. Trail recoveries are authorized when weather at the base of intended landing is at/above the highest pilot weather category in the flight or approach minimums, whichever is higher.
- 4.3.6.4. The flight lead must brief the flight on spacing, configuration, and airspeeds.
- 4.3.6.5. The flight lead must coordinate the trail recovery with ATC prior to taking spacing.
- 4.3.6.6. Prior to split-up, the flight lead must ensure that all Wingmen have operative navigational aids and air-to-air radar.
- 4.3.6.7. Accomplish flight separation IAW local directives and in VMC if possible.
- 4.3.6.8. The formation must squawk as directed by ATC.
- 4.3.6.9. ATC instructions to the lead aircraft will be for the entire flight. ATC will provide radar flight following for the entire formation.
- 4.3.6.10. Limit all turns to a maximum of 30 degrees of bank.
- 4.3.6.11. Once established on a segment of a published approach, each aircraft must comply with all published altitudes and restrictions while maintaining in-trail separation.
- 4.3.6.12. Unless local procedures establish defined reference points for airspeed/configuration changes, the flight lead must direct changes by radio. At flight lead's call, all aircraft must simultaneously comply with the directed change.
- 4.3.6.13. All aircraft must report the final approach fix.
- 4.3.6.14. If contact is lost with the preceding aircraft, the pilot will transmit "Callsign (C/S) lost contact." The preceding aircraft will respond with altitude, airspeed and heading. Establish altitude deconfliction and coordinate a separate clearance with ATC. If contact is lost while established on a segment of a published approach, flight members may continue the approach, but must confirm separation via navigation aids. If separation cannot be confirmed, execute missed approach or climb-out as instructed by ATC.
- 4.3.6.15. Flight leads will coordinate with local ATC prior to penetration if the trail recovery will terminate in a Precision Approach Radar (PAR) or Airport Surveillance Radar (ASR) approach.

4.4. Formation Break-up. If possible, accomplish formation break-up in VMC. If IMC, accomplish the break-up in straight and level flight. Prior to a break-up in IMC, the flight leader must transmit attitude, airspeed, altitude, and altimeter setting which will be acknowledged by Wingmen. Wingmen must confirm good navigational aids.

4.5. Formation Penetration:

- 4.5.1. Restrict formation penetrations in route/close formation to two aircraft when the weather at the base of intended landing is less than overhead traffic pattern minimums.
- 4.5.2. If a formation landing is intended, position the wingman on the appropriate wing prior to weather penetration.
- 4.5.3. Formation penetrations using radar trail procedures are authorized when weather at the base of intended landing is at/above the highest pilot weather category in the flight or approach minimums, whichever is higher.

4.6. Formation Approach. During IMC formation flights, do not change lead or wing positions below 1,500 feet AGL unless on RADAR downwind.

4.7. Simulated Instrument Flight. Simulated instrument flight requires a qualified safety observer (pilot or WSO) in either cockpit or in a chase aircraft.

4.8. Use HUD. Use the HUD as an additional instrument reference not as the sole instrument reference. The HUD is the primary reference for low level/TF operations. Do not use the HUD to recover from an unusual attitude or when executing lost wingman procedures except when no other reference is available.

Chapter 5

AIR-TO-AIR WEAPONS EMPLOYMENT

5.1. References. AFI 11-214 contains air-to-air procedures, to include operations with live ordnance applicable to all aircraft. This chapter specifies procedures or restrictions applicable to F-15E operations.

5.2. Simulated Gun Employment. Missions may be flown with a loaded gun provided the gun is safed IAW T.O. 1F-15E-34-1-1-CL-1 and a trigger check is first performed with the master arm switch in arm with Training Mode deselected. Point the aircraft away from other aircraft and inhabited areas during the trigger check. Do not perform a trigger check with a hot gun. If an aircraft is flown with a hot gun or live missiles, the procedures in AFI 11-214 apply.

5.3. Maneuvering Limitations:

5.3.1. Minimum airspeed during LOWAT maneuvering is 350 KCAS.

5.3.2. When configured with three external wing tanks, aircraft will operate under the LIMITED maneuvering category as defined in AFI 11-214. When configured with external wing tanks and no centerline, UNLIMITED maneuvering is allowed once the externals are empty (flight manual restrictions still apply).

5.3.3. Negative-G guns jinks are prohibited.

5.3.4. When acting as a restricted maneuvering target for low altitude intercepts, the minimum airspeed is 300 KCAS.

5.3.5. Air-to-air tactical maneuvering (ACBT and unlimited or limited maneuvering intercepts) is prohibited when wing fuel imbalance results in a 30 unit restriction IAW Dash-1 Ch 5 and 6. When the imbalance is corrected to within Dash-1 limits, the briefed mission can be continued.

Chapter 6

AIR-TO-SURFACE WEAPONS EMPLOYMENT

6.1. References. AFI 11-214 contains air-to-surface procedures applicable to all aircraft. This chapter specifies procedures or restrictions applicable to F-15E operations. Qualification and scoring criteria are contained in AFI 11-2F-15EV1.

6.2. Off-Range Attacks. Restrictions in AFI 11-214 apply. Off range attacks may be conducted when carrying authorized practice ordnance provided:

- 6.2.1. The A/G training mode is used on the Programmable Armament Control Set (PACS).
- 6.2.2. Stations with training ordnance are not selected on the PACS.
- 6.2.3. Do not fire the combat laser outside of approved areas.
- 6.2.4. Do not perform off-range attacks with live or heavyweight inert air-to-ground ordnance loaded.

6.3. Weather Minimums. Basic weather minimums established in AFI 11-214 apply. A minimum ceiling of 2,000 feet AGL is required for climbing or diving deliveries and 1,500 feet AGL for level deliveries.

6.4. Pop-Up Attacks. Abort pop-up attacks if airspeed decreases below 350 KCAS (300 KCAS above 10,000 feet AGL).

6.5. Night Surface Attack Procedures. All procedures in AFI 11-214 apply.

- 6.5.1. For weapons deliveries at night, the weather must allow the Range Control Officer (RCO) (for a class A range) or a flight member/range personnel (for a class B or C range) to clear the target area and spot/score the ordnance impact.
- 6.5.2. Multiple weapons deliveries may be accomplished at night and/or during IMC, if range patterns and procedures which ensure positive aircraft separation are established and briefed. When accomplishing multiple deliveries, fly the downwind using TFR or at MSA or above, range restrictions permitting. If the downwind is flown at MSA or above, do not begin a TFR descent to the planned delivery altitude until in a position to remain within TF limits.

6.6. LANTIRN Pattern Procedures:

- 6.6.1. When using TF while performing weapons deliveries on a range, all maneuvering in the bombing pattern below MSA will be inside TF limits.
- 6.6.2. Minimum pattern altitude for night non-TF deliveries is MSA. Under high illumination conditions, the minimum altitude while using NVGs without the TF engaged is 1,000 feet AGL.
- 6.6.3. Maximum angle of bank during night LANTIRN recovery maneuvers (from loft or climbing safe escape) is 135 degrees.

6.7. Loft Recovery Procedures:

6.7.1. Escape maneuvers following loft deliveries are instrument recoveries which exceed numerous TF limits. Use the following procedures to manually recover to within TF limits:

6.7.1.1. Recovery Initiation Altitude (RIA) is the sum of the escape corridor MSA and altitude lost during the dive recovery. Compute RIA for the planned escape corridor. The escape corridor is defined as a 10NM wide corridor, starting at the planned roll out point and extending for 8NM along the egress heading. The MSA is 1,000 feet above the highest obstacle within the corridor, rounded up to the nearest 100 feet.

6.7.1.2. Following release, roll to 120-135 degrees of bank and execute a 4-5G slicing turn. As the nose passes the horizon, decrease bank angle to 90 degrees and continue to decrease bank angle to keep the nose from dropping lower than 10 degrees nose low. Roll out on egress heading or upon reaching 10 degrees nose low and follow TF steering when it appears. If approaching RIA before rolling out, or before TF steering appears, pull to recover at or above MSA.

6.7.2. Prior to loft deliveries, aircrews must verify accuracy of the standby ADI with the Electronic Attitude Director Indicator (EADI).

6.7.3. If the TF system fails during recovery, maintain the appropriate minimum altitude (RAA/MSA) that provides terrain clearance.

6.7.4. If at any time during a low altitude, nose-high LANTIRN weapons delivery (loft) or recovery, airspeed drops below 300 KCAS, abort the maneuver and recover. Direct primary emphasis towards aircraft attitude, altitude and regaining airspeed.

| 6.8. IMC Weapons Deliveries:

6.8.1. For IMC deliveries through or above the weather, comply with the weather restrictions in AFI 11-214 and the applicable Range Orders.

6.8.1.1. Select EGI as PPKS

6.8.1.2. Verify GPS accuracy of 50' or better.

6.8.1.3. Verify target coordinates.

6.8.1.4. Radar/System Deliveries.

6.8.1.4.1. For Radar or System designations, both a target direct and one target offset High Resolution Map (HRM) patch map (1.3 NM or better) is required.

6.8.1.4.2. For Inertially Aided Munitions, verify Smart Weapons page target coordinates match system coordinates. Verify no weapon DGRD cues. Release IN ZONE LAR.

Chapter 7

ABNORMAL OPERATING PROCEDURES

7.1. General. Follow the procedures in this chapter when other than normal circumstances occur. These procedures do not supersede flight manual guidance.

7.1.1. Do not accept an aircraft for flight with a malfunction addressed in the emergency/abnormal procedures section of the flight manual until it has been corrected.

7.1.2. Do not use a malfunctioning system unless it is required for safe recovery of the aircraft. Do not continue in-flight troubleshooting a malfunction after completing flight manual emergency procedures and the aircraft may be safely recovered.

7.1.3. Only conduct fuel dumping to reduce aircraft gross weight for safety of flight. When circumstances permit, dump above 10,000 feet AGL over unpopulated areas. Ensure the dump switch is returned to normal before landing. Make the appropriate entry in the AFTO Forms 781.

7.1.4. Do not taxi aircraft with malfunctions that effect the nosewheel steering or brake system.

7.1.5. For actual or perceived flight control malfunctions, terminate maneuvering and take appropriate action. If the flight control problem was due to crew member/passenger stick or rudder interference, the pilot will take appropriate action to ensure no further flight control interference occurs.

7.2. Ground Aborts:

Delayed aircraft may join the flight at a briefed rendezvous point or may fly a briefed alternate single ship mission. If accomplishing a join-up, cease tactical maneuvering until the delayed aircraft is joined and all flight members are ready to continue.

7.3. Takeoff Aborts:

7.3.1. If aborting the takeoff, clear to the appropriate side of the runway as expeditiously as possible based on position within the element. If this is not feasible because of possible cable engagement, clear straight ahead. As soon as practical, give call sign and state intentions. Call "Cable, Cable, Cable" to indicate a departure-end arrestment. Following aircraft hold their position, abort or takeoff as appropriate to maintain adequate clearance.

7.3.2. When applying the brakes above 120 KCAS during a takeoff abort, or hot brakes are suspected; declare a ground emergency, taxi the aircraft to the designated hot brake area, and follow hot brake procedures.

7.3.3. If aborting a takeoff lower the tailhook if there is any doubt about the ability to stop on the runway.

7.4. Air Aborts:

7.4.1. If an abort occurs after takeoff, all aircraft will maintain their original numerical call sign.

7.4.2. Escort aircraft with an emergency to the field of intended landing. The flight leader will determine if an escort is required for non-emergency aborts.

7.4.3. Abort the mission and land out of a straight-in approach, regardless of apparent damage or subsequent normal operation, for any of the following:

7.4.3.1. Birdstrike/Foreign Object Damage.

7.4.3.2. Flight control system anomalies. This does not include flight control system lights that reset IAW flight manual procedures.

7.4.3.3. Engine flameout, stagnation or shutdown.

7.4.4. If an aircraft experiences an over-G, use the following procedures:

7.4.4.1. Immediately terminate maneuvering and call up the OWS matrix to analyze the displayed parameters.

7.4.4.2. If level "1" (one) is displayed in any column of the matrix except Mass Items (MIT), perform a battle damage check with emphasis on the overall condition of the aircraft. If no abnormalities are noted, the flight lead may continue the briefed mission. If a subsequent level "1" or greater over-G occurs, terminate the mission, perform a battle damage check, RTB and fly a straight-in approach, except as noted below.

7.4.4.3. If level "1" (one) is displayed in the MIT column, or level "2" (two) or greater is displayed in any column of the matrix, terminate the mission, perform a battle damage check, RTB and fly a straight-in approach.

7.4.4.4. Document all over-Gs in the AFTO Form 781.

7.5. Engine Malfunctions. Report all engine anomalies during maintenance debriefing.

7.6. Radio Failure:

7.6.1. **General.** Individual aircraft experiencing radio failure will comply with procedures outlined in FLIP, AFI 11-202V3, this volume, Host Nation and local directives.

7.6.2. **Formation:**

7.6.2.1. Flight members who experience total radio failure while in close or route formation will maneuver within close/route parameters to attract the attention of another flight member and give the appropriate visual signals. Terminate the mission as soon as practical and lead the NORDO aircraft to the base of intended landing or a divert base. Perform a formation approach to a drop-off on final unless safety considerations dictate otherwise.

7.6.2.2. If flying other than close/route formation when radio failure occurs, the NORDO aircraft should attempt to rejoin to a route position at approximately 500 feet on another flight member. The NORDO aircraft is responsible for maintaining clearances from other flight members until his presence is acknowledged by a wing rock, signifying clearance to join. Once joined, the NORDO aircraft will give the appropriate visual signals. If pre-briefed, the NORDO aircraft may proceed to a rendezvous point and hold. If no one has rejoined prior to reaching BINGO fuel, the NORDO aircraft should proceed to the base of intended landing or a divert base. Aircraft experiencing any difficulty/emergency in addition to NORDO will proceed as required by the situation.

7.6.3. **Surface Attack NORDO Procedures:**

7.6.3.1. **Manned Ranges:**

7.6.3.1.1. Attempt contact with the RCO on the appropriate back-up frequency.

7.6.3.1.2. If unable to establish contact, make a pass by the range control tower on the attack heading while rocking wings, and turn in the direction of traffic. The flight leader will either rejoin the flight and RTB, or direct another flight member to escort the NORDO to a recovery base.

7.6.3.1.3. If the NORDO aircraft has an emergency, make a pass by the range control tower, if practical, on the attack heading while rocking wings, turn opposite the direction of traffic, and proceed to a suitable recovery base. The flight leader will direct a flight member to join-up and escort the emergency aircraft.

7.6.3.2. **Unmanned Ranges:**

7.6.3.2.1. Make a pass over the target, if possible, while rocking wings. The leader will either rejoin the flight in sequence and recover, or direct another flight member to escort the NORDO aircraft to a recovery base. A NORDO with an emergency, if practical, should make a pass over the target, rocking wings, turn opposite direction of traffic, and proceed to a recovery base. The flight leader will direct a flight member to join-up and escort the emergency aircraft.

7.6.3.3. **Unexpended Ordnance.** If radio failure occurs and circumstances preclude landing with unexpended ordnance, accomplish a safe jettison of the ordnance provided the following conditions are met:

7.6.3.3.1. The NORDO aircraft joins on another flight member which has radio contact with the RCO and the remainder of the flight.

7.6.3.3.2. Stores jettison visual signals specified in AFI 11-205 (hold fist at top of canopy and make several pumping motions) are relayed to the NORDO aircraft to initiate jettison.

7.6.4. **NORDO Recovery:**

7.6.4.1. If a formation straight-in approach is flown and a go-around becomes necessary, the escorting aircraft will go-around, pass the NORDO aircraft and rock his wings. The NORDO aircraft will go-around if the situation allows. If the NORDO aircraft is in formation as a wingman, the leader will initiate a gentle turn into the wingman and begin the go-around.

7.6.4.2. A NORDO aircraft intending to make an approach-end cable engagement should signal the escorting aircraft by extending the tailhook. If the NORDO aircraft is not escorted, the pilot should fly a straight-in approach flashing the landing light on final to signal the tower.

7.7. Severe Weather Penetration. Avoid flight through severe weather. If unavoidable, flights should break-up and obtain separate clearances prior to severe weather penetration.

7.8. Lost Wingman Procedures. In any lost wingman situation, immediate separation of aircraft is essential.

7.8.1. **General Procedures.** Upon losing sight of the leader or if unable to maintain formation the wingman will simultaneously:

7.8.1.1. Execute the applicable lost wingman procedures.

7.8.1.2. Transition to primary flight instruments.

7.8.1.3. Inform lead by transmitting "C/S is lost wingman."

7.8.1.4. Leader must acknowledge the lost wingman's radio call and, when appropriate, transmit attitude, heading, altitude, airspeed, and other parameters.

7.8.1.5. After executing a lost wingman procedure, do not attempt rejoining with the flight until obtaining permission from the flight lead.

7.8.1.6. When able, obtain a separate clearance.

7.8.1.7. Observe all published terrain clearance limits.

7.8.1.8. If a wingman becomes separated and any aircraft experiences radio failure, the aircraft with the operational radio will obtain a separate clearance. The NORDO aircraft will squawk code 7600 while proceeding with previous clearance. If an emergency situation arises along with radio failure, turn the IFF to EMERGENCY for the remainder of the flight.

7.8.1.9. Only practice lost wingman procedures in VMC.

7.8.2. **Two/Three-Ship Flight Procedures: NOTE:** For three-ship echelon, refer to four-ship procedures.

7.8.2.1. **Wings-Level Flight (Climbing, Descending, or Straight and Level).** Turn away using 15 degrees of bank for 15 seconds, then resume original heading.

7.8.2.2. **Turns:**

7.8.2.2.1. Outside the Turn. Reverse the direction of turn using 15 degrees of bank for 15 seconds. Continue straight ahead to ensure separation prior to resuming the turn.

7.8.2.2.2. Inside the Turn. Momentarily reduce power to ensure nose-tail separation and direct the flight leader to roll out of the turn. Maintain the original turn. The leader may only resume the turn when separation is ensured.

7.8.2.3. Final Approach. Momentarily turn away from lead to ensure clearance and execute the published missed approach procedure.

7.8.2.4. Missed Approach. Momentarily turn away from lead to ensure clearance and continue the published or assigned missed approach procedure. Climb to 500 feet above missed approach altitude.

7.8.3. Four-Ship Flight Procedures. Number 2 and 3 follow the procedures outlined above. Number 4's initial action assumes that number 3 has also gone lost wingman. In addition to paragraph 7.8.1., number 4 will:

7.8.3.1. Wings-Level Flight (Climbing, Descending, or Straight and Level). Turn away using 30 degrees of bank for 30 seconds, then resume the original heading.

7.8.3.2. **Turns:**

7.8.3.2.1. Outside the Turn. Reverse direction of turn using 30 degrees of bank for 30 seconds to ensure separation from lead and number 3.

7.8.3.2.2. Inside the Turn. Momentarily reduce power to ensure nose-tail separation and increase bank angle by 15 degrees. Direct the leader to roll out. The leader will only resume the turn when separation is ensured.

7.9. Spatial Disorientation (SD). Conditions which prevent a clear visual horizon or increase pilot tasking are conducive to SD. To prevent SD, the pilot must increase his instrument cross-check rate. If SD symptoms are encountered:

7.9.1. Single Ship:

7.9.1.1. Concentrate on flying basic instruments with frequent reference to the attitude indicator. Use heads-down instruments. Consider transferring control to the other crewmember.

7.9.1.2. If symptoms persist and conditions permit, fly straight and level flight until symptoms abate. Consider using the autopilot.

7.9.1.3. If necessary, declare an emergency and advise ATC.

7.9.1.4. It is possible for SD to proceed to the point where the aircrew is unable to see or interpret the flight instruments. In this situation, aircraft control may be impossible. If this occurs, the aircrew should consider ejecting.

7.9.2. Formation Lead:

7.9.2.1. Advise the Wingmen of the disorientation and comply with procedures in paragraph [7.9.1](#).

7.9.2.2. Use the Wingmen to confirm attitude and provide verbal feedback.

7.9.2.3. If symptoms persist, terminate the mission and recover the flight by the simplest and safest means possible.

7.9.3. Formation Wingman:

7.9.3.1. Advise lead of the disorientation.

7.9.3.2. Lead will advise wingman of aircraft attitude, altitude, heading, and airspeed.

7.9.3.3. If symptoms persist and conditions permit, lead will establish straight and level flight for 30-60 seconds.

7.9.3.4. If the above procedures are not effective, lead should consider passing the lead to the wingman, provided the leader will be able to maintain situational awareness from a chase position. Transfer lead while in straight and level flight. Once assuming the lead, maintain straight and level flight for 60 seconds. If necessary, terminate the tactical mission and recover by the simplest and safest means possible.

7.9.4. Greater Than Two-Ship Formation. Lead should separate the flight into elements to more effectively handle a wingman with persistent SD symptoms. Establish straight and level flight IAW paragraph [4.4](#). (Formation Break-up). Plan to keep the element with the SD pilot straight and level while the other element separates.

7.10. Armament System Malfunctions:

7.10.1. General:

7.10.1.1. Aircrew will not attempt to expend ordnance using a delivery system with a known weapons release malfunction.

7.10.1.2. When abnormal missile launch or erratic missile flight is noted after launch, visually inspect the launching aircraft to determine if any damage has occurred.

7.10.2. Inadvertent Release:

7.10.2.1. Record switch positions at the time of inadvertent release and provide to armament and safety personnel. Record the impact point, if known.

7.10.2.2. Safe the armament switches and do not attempt further release in any mode. Treat remaining stores as hung ordnance and follow hung ordnance procedures during RTB.

7.10.2.3. If remaining stores present a recovery hazard, jettison them in a suitable area on a single pass, if practical.

7.10.3. Failure to Release/Hung Ordnance. Note switch positions. If ordnance failed to release with switches properly set, proceed as follows.

7.10.3.1. Live Ordnance:

7.10.3.1.1. Attempt to release store(s) using an alternate delivery mode. If unsuccessful, attempt to jettison store(s) using selective jettison procedures. Lastly, consider attempting to selectively jettison the pylon if ordnance is unsecured or security cannot be determined.

7.10.3.1.2. All release and fuzing settings should be noted then safed.

7.10.3.1.3. If ordnance remains on the aircraft, follow the hung ordnance recovery procedures.

7.10.3.2. Practice/Inert Ordnance:

7.10.3.2.1. Re-check switch positions and make an additional attempt to expend. If no release occurs, select an alternate delivery mode in an attempt to expend.

7.10.3.2.2. If the secondary release mode fails, ordnance from other stations/dispensers may be released providing the aircraft remains within symmetrical load limits.

7.10.3.2.3. If remaining stores present a recovery hazard, jettison them in a suitable area on a single pass, if practical.

7.10.3.2.4. If ordnance remains on the aircraft, follow the hung ordnance recovery procedures.

7.10.4. Hangfire/Misfire:

7.10.4.1. A missile that fires but fails to depart the aircraft is a hangfire. If this occurs, the missile should be closely observed and safety checked by a chase pilot.

7.10.4.2. A missile that fails to fire when all appropriate switches were selected is a misfire. If this occurs, safe the Master Arm switch and follow the hung ordnance recovery procedures.

7.10.5. Hung Ordnance/Weapons Malfunction Recovery:

7.10.5.1. If practical, visually inspect the aircraft for damage.

7.10.5.2. Declare an emergency for hung live ordnance (not required for hung practice/inert ordnance or for live unexpended ordnance).

7.10.5.3. If available, obtain a chase aircraft and avoid populated areas and trail formations.

7.10.5.4. Land from a straight-in approach.

7.11. Post Arresting Gear Engagement Procedures:

7.11.1. Do not shut down the engine(s) unless directed by the ground crew, there is a fire or other conditions dictate.

7.11.2. Raise the tailhook on the ground crew's signal.

7.11.3. Do not taxi until directed.

7.12. In-flight Practice of Emergency Procedures:

7.12.1. A Simulated Emergency Procedure is defined as any procedure that produces an effect which closely parallels an actual emergency, such as retarding the throttle to simulate the drag equivalent to a flamed out engine.

7.12.2. Only practice aborted takeoffs in the flight simulator, Cockpit Procedures Trainer (CPT), or, if the trainer is unavailable, a static aircraft.

7.12.3. Simulated in-flight loss of both engines is prohibited.

7.12.4. Practice in-flight engine shutdown is prohibited.

7.12.5. Emergency Landing Patterns (Refer to AFI 11-202V3).

7.12.5.1. **Field Requirements.** Practice of emergency landing patterns at active airfields is authorized provided that crash rescue and air traffic control facilities are available and in operation.

7.12.5.2. **Supervisory Requirements.** IQT pilots prior to the initial instrument/qualification evaluation require an IP on board the aircraft or in chase. After the initial instrument/qualification evaluation, supervision will be an IP/IWSO on board the aircraft or in chase. MQT pilots require a SOF in place and an IP or flight lead monitoring from the traffic pattern.

7.12.5.3. Pattern Procedures:

7.12.5.3.1. Include the type of practice emergency pattern in the gear check call.

7.12.5.3.2. Initiate practice single-engine go-arounds in sufficient time to ensure the aircraft does not descend below 300 feet AGL. Simulated single-engine approaches may descend below 300 feet AGL provided the approach terminates in a full stop landing or the go-around from a low approach or touch and go landing is performed with both engines. When conducting such training, the pilot will advise the appropriate air traffic controller of his intentions.

7.13. Search and Rescue Combat Air Patrol (SARCAP) Procedures. If an aircraft crashes, immediately attempt to locate possible survivors and initiate rescue efforts. Expect that the aircrews may initially suffer from shock or have delayed reactions due to ejection injuries. The following procedures are by no means complete and should be adjusted to meet each unique search and rescue situation.

7.13.1. Knock off maneuvering.

7.13.2. Establish a SARCAP commander.

- 7.13.3. Notify ATC/Ground Controlled Intercept (GCI) of the emergency situation, squawk 7700 as requested.
- 7.13.4. Communicate the emergency situation and aircraft/flight intentions immediately to applicable control agencies. Use GUARD frequency if necessary.
- 7.13.5. Mark the last known position of survivors/crash site using any means available (TACAN, INS, ATC/GCI position and/or visual references).
- 7.13.6. Remain above the highest ejection altitude, if known, or the highest observed parachute until determining the position of all possible survivors.
- 7.13.7. Deconflict other aircraft assisting in the SARCAP by altitude to preclude midair collision. Establish high/low CAPs as necessary to facilitate communications.
- 7.13.8. Revise BINGO fuels or recovery bases as required to maintain maximum SARCAP coverage. Do not overfly the adjusted BINGO fuel.
- 7.13.9. Relinquish SARCAP operation to designated rescue forces upon their arrival.
- 7.13.10. Follow local or briefed procedures.

7.14. Lateral Asymmetry. Reference TO 1F-15E-1, Chapter 5, for restrictions associated with lateral asymmetries.

- 7.14.1. When a fuel imbalance develops that exceeds Dash-1 limits for maneuvering above 30 units, terminate maneuvering and investigate.
 - 7.14.1.1. If the imbalance was caused by a slow feeding CFT, external or internal wing tank, restrict flight operations to instrument procedures, deployment missions, level/climbing weapons deliveries or restricted maneuvering intercepts, until the imbalance is corrected.
 - 7.14.1.2. If the fuel imbalance cannot be corrected, terminate the mission. The above events can be flown to reduce gross weight.

Chapter 8

LOCAL OPERATING PROCEDURES

8.1. General. This chapter is reserved for unit local operating procedures. Procedures herein will not be less restrictive than those contained elsewhere in this volume, nor is this chapter intended to be a single source document for procedures contained in other directives or regulations. Avoid unnecessary repetition of guidance provided in other established directives; however, reference to those directives is acceptable when it serves to facilitate location of information necessary for local operating procedures. This chapter is authorized to be issued to each F-15E crewmember.

8.1.1. When published, units will forward copies to MAJCOM and appropriate subordinate agencies, who will review the **Chapter 8** and return comments or required changes back to the unit(s), if appropriate. The process need not delay distribution unless specified otherwise by MAJCOM or a subordinate agency. If a procedure is applicable to all F-15E units, it will be incorporated into the basic volume.

8.1.2. Organize the local chapter in the following format and, as a minimum, include the following:

- 8.1.2.1. Section A. Introduction.
- 8.1.2.2. Section B. General Policy.
- 8.1.2.3. Section C. Ground Operations.
- 8.1.2.4. Section D. Flying Operations.
- 8.1.2.5. Section E. Weapons Employment.
- 8.1.2.6. Section F. Abnormal Procedures.
- 8.1.2.7. Attachments. (Illustrations)

8.1.3. Include procedures for the following, if applicable:

- 8.1.3.1. Command and Control.
- 8.1.3.2. Fuel Requirements and Bingo Fuels.
- 8.1.3.3. Diversion Instructions.
- 8.1.3.4. Jettison Areas/Procedures/Parameters (IFR/VFR).
- 8.1.3.5. Controlled Bailout Areas.
- 8.1.3.6. Local Weather Procedures.
- 8.1.3.7. Unit Standards (Optional).
- 8.1.3.8. Approved Alternate Missions.
- 8.1.3.9. Cross-Country Procedures (if applicable).
- 8.1.3.10. Search and Rescue and On-Scene Commander (SARCAP) Procedures.
- 8.1.3.11. Local environmental Restrictions to Flight Operations (winds, sea state, temperature, etc.) applicable to unit locations.

8.2. Forms Adopted. AF Form 847, *Recommendation for Change of Publication*, AFTO Form 781, *ARMS Aircrew/Mission Flight Data Document* or *Maintenance Discrepancy and Work Document*

NORMAN R. SEIP, Maj Gen, USAF
Acting DCS/Air and Space Operations

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

AFI 11-202V3, *General Flight Rules*

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

AFI 11-209, *Air Force Aerial Events*

AFI 11-2F-15EV1, *F-15E--Aircrew Training*

AFI 33-360V1, *Air Force Content Management Program--Publications*

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

AFI 11-218, *Aircraft Operations and Movement on the Ground*

AFMAN 11-217V1 and 2, *Instrument Flight Procedures*

AFPD 11-2, *Aircraft Rules and Procedures*

AFPD 11-4, *Aviation Service*

AFTTP 3-1V1, *General Planning and Employment Considerations*

AFTTP 3-1.17, *Tactics--F-15E*

AFTTP 3-3.17, *Combat Aircraft Fundamentals--F-15E*

AFMAN 37-123, *Management of Records*

FLIP, *Flight Information Publication*

T.O. 1F-15E-1, *Flight Manual--F-15E*

T.O. 1F-15E-1-1, *Flight Manual, Performance Data--F-15E*

T.O. 1F-15E-34-1-1, *Non-Nuclear Weapons Delivery Manual--F-15E*

Abbreviations and Acronyms

AAI—Air-to-Air Interrogator

AB—After Burner

ACBT—Air Combat Training

ACDE—Aircrew Chemical Defense Equipment

ACMI—Air Combat Maneuvering Instrumentation

ADI—Attitude Direction Indicator

AERPS—Aircrew Eye and Respiratory Protection System

AFI—Air Force Instruction

AFTTP—Air Force Tactics, Techniques, and Procedures

AGL—Above Ground Level
AHC—Aircraft Handling Characteristics
ALC—Air Logistics Center
AOA—Angle of Attack
ASR—Airport Surveillance radar
ATC—Air Traffic Control
ATDP—Automatic Thrust Departure Prevention
AWACS—Airborne Warning and Control System
BFM—Basic Fighter Maneuvers
BMC—Basic Mission Capable
BSA—Basic Surface Attack
CAP—Combat Air Patrol
CARA—Combined Altitude Radar Altimeter
CDIP—Continuously Displayed Impact Point
CG—Center of Gravity
CHUM—Chart Update Manual
CMR—Combat Mission Ready
CONUS—Continental United States
CPT—Cockpit Procedures Trainer
C/S—Callsign
DEEC—Digital Electronic Engine Control
DGRD—Degraded
DH—Decision Height
DRU—Direct Reporting Unit
EADI—Electronic Attitude Director Indicator
ECM—Electronic Counter Measures
EGI—Embedded GPS INS
EOR—End of Runway
FOA—Field Operating Agency
FAF—Final Approach Fix
FDL—Fighter Data Link
FE—Flight Examiner

FLIP—Flight Information Publications
FTU—Formal Training Unit
FW—Fighter Wing
FTIT—Fan Inlet Turbine Temperature
G—Gravitational Load Factor
GCI—Ground Controlled Intercept
GPS—Global Positioning System
HRM—High Resolution Map
HUD—Heads Up Display
IAW—In Accordance With
IDEEC—Improved Digital Electronic Engine Control
IFE—In-Flight Emergency
IFF—Identification Friend or Foe
IFR—Instrument Flight Rules
IMC—Instrument Meteorological Conditions
IMT 8—The form formerly known as AF Form 8
IP—Instructor Pilot
IQT—Initial Qualification Training
IR—Infrared or IFR Route
JFS—Jet Fuel Starter
JOAP—Joint Oil Analysis Program
KCAS—Knots Calibrated Airspeed
KIO—Knock-It-Off
LANTIRN—Low Altitude Navigation and Targeting Infrared for Night
LAWS—Low Altitude Warning System
LOWAT—Low Altitude Training
MAJCOM—Major Command
MDA—Minimum Descent Altitude
MIT—Mass Item
MOA—Military Operating Area
MQT—Mission Qualification Training
MSA—Minimum Safe Altitude

MSL—Mean Sea Level
MTR—Military Training Route
N/A—Not Applicable
NAF—Numbered Air Force
NAV FLIR—Navigation Forward Looking Infrared
NLT—Not Later Than
NM—Nautical Miles
NORDO—No Radio
NWLO—Nose Wheel Lift Off
NVG—Night Vision Goggles
OGV—Operations Group Stan/Eval
OPR—Office of Primary Responsibility
OT&E—Operational Test and Evaluation
OWS—Overload Warning System
PACS—Programmable Armament Control Set
PAPI—Precision Approach Path Indicator
PAR—Precision Approach Radar
PBG—Pressure Breathing
PFPS—Portable Flight Planning System
PGM—Precision Guided Munition
PLASI—Precision Landing Slope Indicator
PPKS—Present Position Keeping System
RAA—Route Abort Altitude
RCO—Range Control Officer
RCP—Rear Cockpit
RCR—Runway Condition Report
RDS—Records Disposition Schedule
RIA—Recovery Initiation Altitude
RNAV—Area Navigation
RSC—Runway Surface Condition
RTB—Return to Base
RWR—Radar Warning Receiver

SARCAP—Search and Rescue Combat Air Patrol

SCP—Set Clearance Plane

SD—Spatial Disorientation

SUA—Special Use Airspace

TACAN—Tactical Air Navigation

TAS—True Airspeed

TOLD—Takeoff and Landing Data

TF—Terrain Following

TFR—Terrain Following Radar

TI—Tactical Intercepts

T.O.—Technical Order

TOT—Time On Target

VASI—Visual Approach Slope Indicator

VFR—Visual Flight Rules

VMC—Visual Meteorological Conditions

VR—Visual Route

WIC—Weapons Instructor Course

WSEP—Weapon Systems Evaluation Program

WSO—Weapon Systems Officer

Attachment 2**GENERAL BRIEFING GUIDE****A2.1. Mission Data:**

- A2.1.1. Time Hack
- A2.1.2. EP/Threat of the Day
- A2.1.3. Mission Objective(s)
- A2.1.4. Mission Overview
- A2.1.5. Mission Data Card:
 - A2.1.5.1. Mission Commander/Deputy Lead
 - A2.1.5.2. Joker/Bingo Fuel
 - A2.1.5.3. Takeoff and Landing Data
 - A2.1.5.4. Working Area
- A2.1.6. Weather/Sunrise/Sunset/Moon Illumination
- A2.1.7. Tactical Decision Aid (LANTIRN):
 - A2.1.7.1. Transmissivity/Absolute Humidity
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- A2.1.9. Personal Equipment
- A2.1.10. FCIF/Pubs/Maps

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 - A2.2.1.2. Armament
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- A2.2.3. Check-In
- A2.2.4. Taxi/Marshaling/Arming
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A2.3. Takeoff:

- A2.3.1. Runway Lineup
- A2.3.2. Formation Takeoff/Takeoff Interval
- A2.3.3. Abort
- A2.3.4. Jettison Procedures

A2.3.5. Low Altitude Ejection

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A2.5. Recovery:

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A2.5.2. Battle Damage/Bomb Check

A2.5.3. Type Recovery

A2.5.4. Flight Break-Up

A2.5.5. Pattern and Landing

A2.5.6. After Landing/De-Arm

A2.5.7. Emergency/Alternate Airfields

Attachment 3

SPECIAL SUBJECT BRIEFING GUIDE (AS APPLICABLE)

A3.1. Instructor Responsibilities.

A3.2. Chase Procedures.

A3.3. IFF Procedures.

A3.4. Radar/Visual Search Responsibilities/Midair Collision Avoidance.

A3.4.1. Radar / Visual Search Responsibilities

A3.4.2. Departure/Enroute/Recovery

A3.4.2.1. High Density Traffic Areas

A3.4.3. Mid-Air Collision Avoidance

A3.4.3.1. From Other Military Aircraft

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A3.6. Terrain Avoidance:

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A3.6.2. Use of Radar Altimeters/MSL Floor Settings

A3.7. Bird Strike Procedures/Use of Visor(s).

A3.8. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency).

A3.9. G-Awareness:

A3.9.1. G-Suit connection/G-tolerance/G-Awareness Turn

A3.9.2. Use of L-1 Anti-G Straining Maneuver (AGSM)

A3.10. Visual Illusions/Perceptions.

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A3.12. Lost Wingman.

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A3.14. SARCAP and On-Scene Commander Procedures

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| A3.18. Flight Member Responsibilities

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| A3.19. Training Rules/Special Operating Instructions/Rules of Engagement.**| A3.20. ORM: Flight safety hazards to this flight, and factors mitigating the risk**

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- A4.1.1. Airspace Restrictions
- A4.1.2. Area Orientation
- A4.1.3. Instructor Responsibilities
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- A4.2.2. Holding
- A4.2.3. Penetration
- A4.2.4. Missed Approach / Climb Out

A4.3. Special Subjects:

- A4.3.1. "G" Awareness:
 - A4.3.1.1. G-Suit connection/G-tolerance/G-Awareness Turn
 - A4.3.1.2. Use of L-1 Anti-G Straining Maneuver (AGSM)
- A4.3.2. Fuel Awareness/AB Use/Consumption Rates
- A4.3.3. Maneuvering Limitations:
 - A4.3.3.1. Airspeed and "G"
 - A4.3.3.2. Recognition/Prevention/Recovery From Out of Control
 - A4.3.3.3. Maneuvering at Heavyweight/High Angles of Attack/Asymmetrical Configuration
 - A4.3.3.4. Effects of Center of Gravity (CG) Throughout the Flight
 - A4.3.3.5. Time to Ground Impact:
 - A4.3.3.5.1. Wings Level
 - A4.3.3.5.2. Overbank/Under G
- A4.3.4. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)
- A4.3.5. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 5**AIR REFUELING BRIEFING GUIDE****A5.1. General:**

- A5.1.1. Tanker Call Sign(s)/Receiver assignments
- A5.1.2. Refueling Track(s):
 - A5.1.2.1. Altitude
 - A5.1.2.2. Airspeed
 - A5.1.2.3. Airspace Restrictions
- A5.1.3. ARIPs, ARCPs, ARCTs
- A5.1.4. Radio Frequencies

A5.2. Buddy Procedures:

- A5.2.1. Departure
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A5.3. En Route:

- A5.3.1. Route of Flight
- A5.3.2. Formation
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A5.4. Rendezvous:

- A5.4.1. Type Rendezvous
- A5.4.2. Holding Procedures/Formation
- A5.4.3. Ground Radar Assistance
- A5.4.4. Tanker Identification - TACAN/Radar/AAI/Visual
- A5.4.5. Radar Procedures/Techniques
- A5.4.6. Wingman/Deputy Lead Responsibilities
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A5.5. Refueling:

- A5.5.1. Checklist Procedures
- A5.5.2. Radio Calls
- A5.5.3. Refueling Order

A5.5.4. Techniques

A5.5.5. Radio Silent Procedures:

A5.5.5.1. EMCON

A5.5.5.2. Visual Signals

A5.5.6. Fuel Off-Load

A5.5.7. Bingo Fuel (Abort Points/Abort Bases)

A5.5.8. Drop-Off Procedures

A5.5.9. Wake Turbulence

A5.6. Reform and Exit:

A5.6.1. Formation

A5.6.2. Clearance

A5.7. Emergency Procedures:

A5.7.1. Breakaway Procedures

A5.7.2. Systems Malfunctions

A5.7.3. Damaged Receptacle

A5.8. IMC/Night Considerations:

A5.8.1. Lost Wingman Procedures

A5.8.2. Aircraft Lighting

A5.9. Special Subjects:

A5.9.1. Fuel Awareness/AB Use/Consumption Rates

A5.9.2. Flight Path Deconfliction/Other Receiver Considerations

A5.9.3. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

A5.9.4. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 6**AIR COMBAT TRAINING (ACBT)/INTERCEPT BRIEFING GUIDE****A6.1. General/Adversary Coordination/GCI Coordination:**

A6.1.1. Call Signs.

A6.1.2. Number and Type Aircraft.

A6.1.3. Scenario:

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A6.1.3.2. Type Threat Simulated/Tactics Limitations (If Any)

A6.1.3.3. CAP Points/Target Locations

A6.1.3.4. Safe Areas/FEBA/Ground Threats

A6.1.3.5. VID/EID/BVR Criteria

A6.1.4. Mission Contingencies:

A6.1.4.1. Single Radar Scope/No GCI

A6.1.4.2. Single Frequency

A6.1.4.3. Area Weather/Alternate Mission

A6.1.4.4. Minimum Participants (Primary/Alternate Missions)

A6.1.5. Area Information:

A6.1.5.1. Controlling Agency (GCI/AWACS/ACMI)

A6.1.5.1.1. GCI/Flight

A6.1.5.1.2. Comm Requirements

A6.1.5.1.3. Type/Level of Control

A6.1.5.1.4. Datalink setup/procedures

A6.1.5.2. Airspace Restrictions

A6.1.5.3. CAP Points/Target locations

A6.1.5.4. Frequencies

A6.1.5.5. Squawks

A6.1.5.6. Block Altitudes/Min Altitudes/Flight Parameters

A6.1.5.7. Transmissions

A6.1.5.7.1. KIO

A6.1.5.7.2. Shots/Kills

A6.1.5.7.3. Fuel/Altitude Awareness

A6.1.6. Rendezvous/Recovery Procedures:

A6.1.6.1. Dissimilar Formation

A6.1.7. Weapons Employment:

A6.1.7.1. Simulated Ordnance (Type/Quantity)

A6.1.7.2. Shot Criteria

A6.1.7.3. Kill Criteria/Removal

A6.1.7.4. Shot/Kill Passage

A6.1.8. Training Rules.

A6.1.9. Emergency Procedures:

A6.1.9.1. Recovery

A6.1.9.2. Escort Procedures

A6.1.10. Debriefing (Time/Place).

A6.2. Flight/Element Tactics:

A6.2.1. Avionics Set-up:

A6.2.1.1. Radar

A6.2.1.2. INS

A6.2.1.3. IFF

A6.2.1.4. Air-to-air TACAN

A6.2.2. CAP/Patrol Phase:

A6.2.2.1. Type Pattern

A6.2.2.2. Formation/Altitude/Airspeed

A6.2.2.3. Search Responsibilities

A6.2.2.4. Commit

A6.2.2.4.1. Criteria/Range

A6.2.2.4.2. Procedures

A6.2.3. Ingress/Intercept Phase:

A6.2.3.1. Formation/Altitude/Airspeed

A6.2.3.2. Detection:

A6.2.3.2.1. Search Responsibilities (Radar/Visual)

A6.2.3.2.2. Radar Sorting

A6.2.3.3. Targeting Plan

A6.2.3.4. Intercept Type/Planned Tactics

A6.2.3.4.1. Plan (Direct Attack/Deception)

- A6.2.3.4.2. Mutual Support Requirements
- A6.2.3.4.3. Identification Requirements/Procedures
- A6.2.3.4.4. Minimum Altitudes/Airspeeds
- A6.2.3.4.5. Vertical/Horizontal Conversions/Turning Room
- A6.2.3.5. Night/IMC Intercepts
 - A6.2.3.5.1. Electronic Counter Measures (ECM)/Chaff/ Evasion Restrictions
 - A6.2.3.5.2. Radar Requirements
 - A6.2.3.5.3. Altitude Separation Requirements
- A6.2.4. Engagement Phase:
 - A6.2.4.1. Plan
 - A6.2.4.1.1. Turn and Fight
 - A6.2.4.1.2. Hit and Run
 - A6.2.4.1.3. Abort
 - A6.2.4.2. Clearance for Wingman to Engage
 - A6.2.4.2.1. Offensive
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 - A6.2.4.3. Alternate Plan (Degraded Situation)
- A6.2.5. Egress/Separation Phase:
 - A6.2.5.1. Disengagement Plan (Why/When/How)
 - A6.2.5.1.1. Loss of Mutual Support
 - A6.2.5.1.2. Fuel
 - A6.2.5.1.3. Ordnance
 - A6.2.5.2. Egress Formation/Responsibilities
- A6.2.6. Contingencies:
 - A6.2.6.1. Single Contact
 - A6.2.6.2. Short Range Commit
 - A6.2.6.3. Single Ship (Loss of Mutual Support)
 - A6.2.6.4. Safe Escape/Rendezvous Point
- A6.2.7. Live Missile/Hot Gun Safety Procedures.
- A6.2.8. Additional Considerations:
 - A6.2.8.1. Threat Reaction
 - A6.2.8.2. Degraded Systems

A6.2.8.3. Tactical Lead Changes

A6.2.8.4. Bandit Options

A6.2.8.5. Film/VTR

A6.2.8.6. Codewords

A6.2.8.7. environmental Considerations

A6.2.9. Alternate Mission:

A6.2.9.1. Type Mission (refer to appropriate mission briefing guide)

A6.2.9.2. Mission Objectives

A6.3. Special Subjects:

A6.3.1. "G" Awareness:

A6.3.1.1. G-Suit connection/G-tolerance/G-Awareness Turn

A6.3.1.2. Use of L-1 Anti-G Straining Maneuver (AGSM)

A6.3.2. Fuel Awareness/AB Use/Consumption Rates.

A6.3.3. Flight Path Deconfliction.

A6.3.4. Maneuvering Limitations:

A6.3.4.1. Airspeed and "G"

A6.3.4.2. Recognition/Prevention/Recovery from Out of Control

A6.3.4.3. Time to Ground Impact

A6.3.4.3.1. Wings Level

A6.3.4.3.2. Overbank/Under "G"

A6.3.5. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

A6.3.6. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 7**AERIAL GUNNERY BRIEFING GUIDE****A7.1. General:**

- A7.1.1. Formation.
- A7.1.2. Area Information:
 - A7.1.2.1. Controlling Agency
 - A7.1.2.2. Airspace Restrictions
 - A7.1.2.3. Frequencies
- A7.1.3. Switch Positions.
- A7.1.4. Arming Procedures.
- A7.1.5. Intercept/Set-Up.
- A7.1.6. Shooter Sequence.
- A7.1.7. Position Changes.
- A7.1.8. Chase Procedures.
- A7.1.9. Timing.

A7.2. Employment:

- A7.2.1. Firing Parameters:
 - A7.2.1.1. Minimum Range
 - A7.2.1.2. Overtake
 - A7.2.1.3. Angle-Off
 - A7.2.1.4. Error Analysis
- A7.2.2. Contingencies:
 - A7.2.2.1. Avionics Malfunctions
 - A7.2.2.2. Gun Malfunctions
 - A7.2.2.3. Range Estimation Without Radar
- A7.2.3. Safety Considerations:
 - A7.2.3.1. Target Fixation
 - A7.2.3.2. Debris Avoidance
 - A7.2.3.3. Fouls

A7.3. Training Rules/Special Operating Instructions.

A7.4. Alternate Mission:

A7.4.1. Type Mission (refer to appropriate mission briefing guide)

A7.4.2. Mission Objectives

A7.5. Special Subjects:

A7.5.1. Minimum Altitudes.

A7.5.2. "G" Awareness:

A7.5.2.1. G-Suit connection/G-tolerance/G-Awareness Turn

A7.5.2.2. Use of L-1 Anti-G Straining Maneuver (AGSM)

A7.5.3. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.

A7.5.4. Maneuvering Limitations:

A7.5.4.1. Airspeed/"G"/Stress

A7.5.4.2. Recognition/Prevention/Recovery From Out of Control

A7.5.5. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

I A7.5.6. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 8**LOW-LEVEL NAVIGATION BRIEFING GUIDE****A8.1. General:**

- A8.1.1. Route/Clearance/Restrictions.
- A8.1.2. Flight Responsibilities:
 - A8.1.2.1. Navigation
 - A8.1.2.2. Radar/Visual Search
- A8.1.3. Entry/Spacing /Holding/Initial Altitude (MSA).

A8.2. Route Procedures:

- A8.2.1. Fence Checks.
- A8.2.2. Tactical Formation/Turns.
- A8.2.3. Low-Level Navigation:
 - A8.2.3.1. Dead Reckoning/Use of Navigation Aids/ Equipment (i.e. INS/TSD)
 - A8.2.3.2. Radar Procedures/Techniques/Predictions
 - A8.2.3.3. Visual Procedures/Techniques/IR Predictions
 - A8.2.3.4. Updates/Calibrations
 - A8.2.3.5. Time/Fuel Control
 - A8.2.3.6. Terrain Following/Avoidance/Wingman Considerations
 - A8.2.3.7. Leg Altitudes/Set Clearance Plane/Obstacles (MSL/AGL)
 - A8.2.3.8. Turnpoint Acquisition
- A8.2.4. Threat Reactions:
 - A8.2.4.1. RWR/ECM/CHAFF/FLARES
 - A8.2.4.2. Engagement Criteria
 - A8.2.4.3. Flight Path Deconfliction
 - A8.2.4.4. Termination

A8.3. Emergencies:

- A8.3.1. Aircraft Malfunctions
- A8.3.2. Route Abort Procedures (RAA/MSA)/ATC Frequencies

A8.4. Training Rules/Special Operating Instructions.**A8.5. Alternate Mission:**

A8.5.1. Type mission (refer to appropriate mission briefing guide)

A8.5.2. Mission Objectives

A8.6. Special Subjects:

A8.6.1. Airspace Restrictions.

A8.6.2. "G" Awareness:

A8.6.2.1. G-Suit connection/G-tolerance/G-Awareness Turn

A8.6.2.2. Use of L-1 Anti-G Straining Maneuver (AGSM)

A8.6.3. Fuel Awareness/AB Use/Consumption Rates.

A8.6.4. Flight Path Deconfliction.

A8.6.5. Maneuvering Limitations:

A8.6.5.1. Airspeed and "G"

A8.6.5.2. Recognition/Prevention/Recovery From Out of Control

A8.6.6. Time to Ground Impact:

A8.6.6.1. Wings Level

A8.6.6.2. Overbank/Under "G"

A8.6.7. Night Considerations.

A8.6.8. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

I A8.6.9. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 9**AIR-TO-SURFACE WEAPONS EMPLOYMENT BRIEFING GUIDE--RANGE MISSION****A9.1. Range Information:**

- A9.1.1. Target/Range Description
- A9.1.2. Restrictions
- A9.1.3. Range Entry/Holding
- A9.1.4. Radio Procedures
- A9.1.5. Formation
- A9.1.6. Sequence of Events
- A9.1.7. Pattern Procedures
- A9.1.8. Aircraft fallout plan
- A9.1.9. Rejoin on range for late takeoffs

A9.2. Employment Procedures/Techniques:

- A9.2.1. Avionics/Switch Positions:
 - A9.2.1.1. Weapons Switchology/Delivery Mode
 - A9.2.1.2. Radar Switchology
 - A9.2.1.3. Special Weapons Switchology
- A9.2.2. Laydown/Loft Events:
 - A9.2.2.1. Ground track/Altitude/Airspeed
 - A9.2.2.2. Radar/Optical Depiction (OAP/TGT)
 - A9.2.2.3. Radar/Optical Tuning/Techniques
 - A9.2.2.4. Pickle/Release Point
 - A9.2.2.5. Breakaway/Recovery Technique
 - A9.2.2.6. Backup Deliveries
 - A9.2.2.7. Delivery Spacing
- A9.2.3. Pop-Up Delivery:
 - A9.2.3.1. Entry Airspeed/Altitude
 - A9.2.3.2. Pop Point/Pull-Up Angle/Power Setting
 - A9.2.3.3. Target Acquisition
 - A9.2.3.4. Pull Down/Apex Altitudes
 - A9.2.3.5. Pattern Corrections

A9.2.4. Roll-In:

- A9.2.4.1. Position
- A9.2.4.2. Techniques (Pitch/Bank/Power)
- A9.2.4.3. Roll-Out/Wind Effect

A9.2.5. Final:

- A9.2.5.1. Aim-Off Distance
- A9.2.5.2. Dive Angle
- A9.2.5.3. Airspeed
- A9.2.5.4. HUD Depiction
- A9.2.5.5. Sight Picture/Corrections/Aim-Point
- A9.2.5.6. Release Parameters
- A9.2.5.7. Release Indications
- A9.2.5.8. Recovery Procedures

A9.3. Special Procedures:

- A9.3.1. Live Ordnance Considerations:
 - A9.3.1.1. Safe Escape/Safe Separation
 - A9.3.1.2. Fuse Arming/Frag Avoidance
- A9.3.2. Laser Operations.

A9.4. Night Procedures:

- A9.4.1. Aircraft Lighting
- A9.4.2. Radio Calls
- A9.4.3. Target ID/Range Lighting
- A9.4.4. Night Spacing Techniques
- A9.4.5. Instrument Cross-check/Disorientation

A9.5. Over Water Range Operations:

- A9.5.1. Employment Techniques:
 - A9.5.1.1. Depth Perception/Reduced Visual Cues
 - A9.5.1.2. Distance/Altitude Estimation
 - A9.5.1.3. Pop-Up Positioning
 - A9.5.1.3.1. Timing
 - A9.5.1.3.2. Visual / Aircraft References to Establish Pull-Up Point

A9.5.2. Special Considerations:

A9.5.2.1. Adjusted Minimum Altitudes

A9.5.2.2. Training Rules/Special Operating Procedures

A9.6. Range Departure Procedures:

A9.6.1. Armament Safety Checks

A9.6.2. Rejoin

A9.6.3. Battle Damage/Bomb Check

A9.6.4. Jettison Procedures/Parameters

A9.6.5. Hung/Unexpended Ordnance

A9.6.6. Inadvertent Release

A9.6.7. Gun Unsafe/Jam

A9.7. Training Rules/Special Operations Instructions.**A9.8. Alternate Mission:**

A9.8.1. Type Mission (refer to appropriate mission briefing guide)

A9.8.2. Mission Objectives

A9.9. Special Subjects:

A9.9.1. Error Analysis.

A9.9.2. Fouls.

A9.9.3. Minimum Altitudes.

A9.9.4. Target Fixation.

A9.9.5. "G" Awareness:

A9.9.5.1. G-Suit connection/G-tolerance/G-Awareness Turn

A9.9.5.2. Use of L-1 Anti-G Straining Maneuver

A9.9.6. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.

A9.9.7. Maneuvering Limitations:

A9.9.7.1. Airspeed/"G"/Stress (Carriage/Release)

A9.9.7.2. Recognition/Prevention/Recovery From Out of Control

A9.9.8. Time to Ground Impact:

A9.9.8.1. Wings Level

A9.9.8.2. Overbank/Under "G"

A9.9.9. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

I A9.9.10. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 10**AIR-TO-SURFACE WEAPONS EMPLOYMENT BRIEFING GUIDE--SURFACE ATTACK TACTICS****A10.1. General Mission Data:**

A10.1.1. Intelligence/Threat Scenario.

A10.1.2. Low-Level (See Low-Level Briefing Guide).

A10.1.3. Fence Checks.

A10.1.4. Operating Area Entry/Description/Boundaries.

A10.1.5. Target Area/Clearing Pass:

A10.1.5.1. Location/Description/Elevation/TOT

A10.1.5.2. Visual Cues in the Target Area

A10.1.5.3. Target Area Weather:

A10.1.5.3.1. Ceiling/Visibility

A10.1.5.3.2. Winds/Altimeter

A10.1.5.3.3. Sun Angle/Shadows

A10.1.5.3.4. IR Considerations

A10.1.6. Threat Array:

A10.1.6.1. Type/Capabilities

A10.1.6.2. Locations

A10.1.6.3. Countermeasures:

A10.1.6.3.1. Chaff/Flare

A10.1.6.3.2. Terrain masking

A10.1.6.3.3. Radio Silent Procedures

A10.1.6.3.4. Authentication/Comm-Jamming/Chattermark Procedures

A10.1.6.4. Threat Reactions:

A10.1.6.4.1. LOWAT

A10.1.6.4.2. IP to Action Point

A10.1.6.4.3. During Delivery

A10.1.7. Ordnance/Weapons Data:

A10.1.7.1. Type/Fuzing

A10.1.7.2. Weapons Settings

A10.1.7.3. Desired Effects

A10.1.7.4. Specific Aim Points

A10.1.7.5. Minimum Altitudes

A10.1.7.5.1. Safe Escape/Safe Separation

A10.1.7.5.2. Fuze Arming/Frag Avoidance

A10.1.8. Laser Operations.

A10.2. Employment Procedures:

A10.2.1. Tactics:

A10.2.1.1. Overview

A10.2.1.2. Ingress:

A10.2.1.2.1. Formation

A10.2.1.2.2. Speed/Altitude

A10.2.1.3. Weapons Delivery:

A10.2.1.3.1. Type Delivery

A10.2.1.3.2. Switchology

A10.2.1.3.3. Attack Parameters:

A10.2.1.3.3.1. Action Point/Pop Point

A10.2.1.3.3.2. Altitudes (Pull-Down/Apex/Release/Minimum)

A10.2.1.3.4. Visual Lookout/Mutual Support Responsibilities

A10.2.1.4. Egress:

A10.2.1.4.1. Recovery/Return to Low Altitude

A10.2.1.4.2. Loss of Mutual Support/Rendezvous Point

A10.3. Range Departure Procedures:

A10.3.1. Armament Safety Checks

A10.3.2. Rejoin

A10.3.3. Battle Damage/Bomb Check

A10.3.4. Jettison Procedures/Parameters

A10.3.5. Hung/Unexpended Ordnance

A10.3.6. Inadvertent Release

A10.3.7. Gun Unsafe/Jam

A10.4. Mission Reporting (BDA/In-Flight Report).

A10.5. Contingencies:

- A10.5.1. Rejoin for late takeoff
- A10.5.2. Two/Three Ship Options
- A10.5.3. Tactical Lead Changes
- A10.5.4. Air-to-Air TACAN
- A10.5.5. Codewords
- A10.5.6. Weather Backup Deliveries
- A10.5.7. Degraded Systems
- A10.5.8. Reattack
- A10.5.9. Wounded Bird/Escort Procedures

A10.6. Night Procedures:

- A10.6.1. Aircraft Lighting
- A10.6.2. Radio Calls
- A10.6.3. Target ID/Range Lighting
- A10.6.4. Night Spacing Techniques
- A10.6.5. Instrument Cross-check/Disorientation

A10.7. Training Rules/Special Operating Instructions.

A10.8. Alternate Mission:

- A10.8.1. Type Mission (refer to appropriate mission briefing guide)
- A10.8.2. Mission Objectives

A10.9. Special Subjects:

- A10.9.1. Error Analysis.
- A10.9.2. Fouls.
- A10.9.3. Minimum Altitudes.
- A10.9.4. Target Fixation.
- A10.9.5. "G" Awareness:
 - A10.9.5.1. G-Suit connection/G-tolerance/G-Awareness Turn
 - A10.9.5.2. Use of L-1 Anti-G Straining Maneuver
- A10.9.6. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.
- A10.9.7. Maneuvering Limitations:
 - A10.9.7.1. Airspeed/"G"/Stress (Carriage/Release)
 - A10.9.7.2. Recognition/Prevention/Recovery From Out of Control

A10.9.8. Time to Ground Impact:

A10.9.8.1. Wings Level

A10.9.8.2. Overbank/Under "G"

A10.9.9. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

I A10.9.10. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 11**AIR-TO-SURFACE WEAPONS EMPLOYMENT BRIEFING GUIDE--INTERDICTION/
ARMED RECCE/CLOSE AIR SUPPORT****A11.1. General Information:**

- A11.1.1. Intelligence/Threat Scenario.
- A11.1.2. Low Level.
- A11.1.3. En Route Formation(s)/Look Out Responsibilities/LOWAT (if applicable).
- A11.1.4. Fence Checks.
- A11.1.5. Ordnance/Weapons Data:
 - A11.1.5.1. Type/Fuzing.
 - A11.1.5.2. Weapons Settings.
 - A11.1.5.3. Live Ordnance Procedures/Minimum Altitudes:
 - A11.1.5.3.1. Safe Escape/Safe Separation
 - A11.1.5.3.2. Fuse Arming/Frag Avoidance
 - A11.1.5.3.3. Missile Launch Parameters
 - A11.1.5.4. Laser Operations
- A11.1.6. Control Agency:
 - A11.1.6.1. Call Sign
 - A11.1.6.2. Frequencies
- A11.1.7. Coordination:
 - A11.1.7.1. Attack Package Times/Support
 - A11.1.7.2. Data Gathering/Passage
 - A11.1.7.3. Airspace Restrictions
 - A11.1.7.4. Mission Number
 - A11.1.7.5. Friendly Forces
 - A11.1.7.6. Play Time

A11.2. Armed RECCE/Close Air Support Procedures:

- A11.2.1. Working Area
- A11.2.2. Formations/Working Altitudes
- A11.2.3. Target Types/Threat Array
- A11.2.4. Attack Tactics

A11.3. Weapons Delivery:

A11.3.1. Tactics:

A11.3.1.1. Type Delivery

A11.3.1.2. Switchology

A11.3.1.3. Attack Parameters:

A11.3.1.3.1. Action Point/IP/Pop Point

A11.3.1.3.2. Altitude (Pull-Down/Apex/Release/Minimum)

A11.3.1.4. Visual Lookout/Mutual Support Responsibilities

A11.3.1.5. Egress:

A11.3.1.5.1. Recovery/Return to Low Altitude

A11.3.1.5.2. Loss of Mutual Support/Rendezvous Point

A11.3.2. Battle Damage/Bomb Check.

A11.3.3. Mission Reporting (BDA/In-Flight Report).

A11.4. Combat SAR Procedures:

A11.4.1. Communications Procedures

A11.4.2. Downed Aircraft Procedures

A11.4.3. On-Scene Commander

A11.4.4. Fuel Considerations

A11.4.5. Ordnance Considerations

A11.5. Contingencies:

A11.5.1. Two/Three-Ship Option

A11.5.2. Tactical Lead Changes

A11.5.3. Air-to-Air TACAN

A11.5.4. Code Words/Comm Out Signals

A11.5.5. Weather Back-Up Deliveries

A11.5.6. Degraded Systems

A11.5.7. Reattack

A11.5.8. Asymmetrical Considerations

A11.5.9. Jettison Procedures/Parameters

A11.5.10. Hung/Unexpended Ordnance Procedures

A11.5.11. Wounded Bird/Escort Procedures

A11.6. Training Rules/Special Operations Instructions.**A11.7. Alternate Mission:**

A11.7.1. Type Mission (Refer to appropriate mission briefing guide)

A11.7.2. Mission Objectives

A11.8. Special Subjects:

A11.8.1. Error Analysis.

A11.8.2. Fouls.

A11.8.3. Minimum Altitudes.

A11.8.4. Target Fixation.

A11.8.5. "G" Awareness:

A11.8.5.1. G-Suit connection/G-tolerance/G-Awareness Turn

A11.8.5.2. Use of L-1 Anti-G Straining Maneuver

A11.8.6. Fuel Awareness/Ops Checks/AB Use Consumption Rates.

A11.8.7. Maneuvering Limitations:

A11.8.7.1. Airspeed/"G"/Stress (Carriage/Release)

A11.8.7.2. Recognition/Prevention/Recovery From Out of Control

A11.8.8. Time to Ground Impact:

A11.8.8.1. Wings Level

A11.8.8.2. Overbank/Under "G"

A11.8.9. Hazards Associated with Human Factors (i.e., Channelized Attention, Task Saturation/Prioritization, and Complacency)

A11.8.10. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 12**ALERT BRIEFING GUIDE**

A12.1. Purpose. This guide is all inclusive and is designed to incorporate all the applicable items from the General Briefing Guide. If a specialized mission such as air refueling is anticipated, the specific briefing guide for that mission should also be used.

A12.2. Mission Data:

A12.2.1. Time Hack.

A12.2.2. Mission Data Card:

A12.2.2.1. Call Signs

A12.2.2.2. Aircraft/Location / Status

A12.2.2.3. Takeoff/Landing Data (Worst Case)

A12.2.2.4. Joker/Bingo Fuel

A12.2.3. Actual/Forecast Weather:

A12.2.3.1. Homebase

A12.2.3.2. Alternates

A12.2.3.3. Individual Weather Category/Mandatory Status

A12.2.4. NOTAMs.

A12.2.5. FCIF/Pubs/Maps.

A12.2.6. Personal Equipment.

A12.2.7. Alert Packet:

A12.2.7.1. Authenticators/Duress Code

A12.2.7.2. Security Procedures

A12.2.8. Airfield Status:

A12.2.8.1. Actual versus Max Allowable Tailwind

A12.2.8.2. Barriers

A12.2.8.3. Navigation Aids

A12.2.8.4. Hazards to Taxi/RCR

A12.3. Ground Procedures:

A12.3.1. Aircraft/Armament Preflight

A12.3.2. Cockpit Set-Up

A12.3.3. Engine Run/Hot Preflight

A12.3.4. Crew Chief Briefing

A12.3.5. Quick Check Procedures

A12.4. Launch Procedures:

A12.4.1. Notification/UHF Frequency/Authentication Requirement.

A12.4.2. Status:

A12.4.2.1. Airborne Order

A12.4.2.2. Battle Stations

A12.4.2.3. Runway Alert

A12.4.2.4. Scramble

A12.4.3. Taxi.

A12.4.4. Takeoff/Runway Lineup/Interval/Formation:

A12.4.4.1. Day VMC

A12.4.4.2. Day IMC

A12.4.4.3. Night VMC

A12.4.4.4. Night IMC

A12.4.5. Join-Up/Trail Formation/Power Settings/Airspeeds.

A12.5. In-Flight Procedures:

A12.5.1. Formation.

A12.5.2. Airspeeds.

A12.5.3. Weapons Safe Checks.

A12.5.4. Radar Search Responsibilities.

A12.5.5. Degraded Fire Control System.

A12.5.6. Transfer of Lead Procedures.

A12.5.7. Ops Checks.

A12.5.8. EMCON Procedures.

A12.5.9. Region Minimum Safe Altitude.

A12.5.10. VID Procedures:

A12.5.10.1. Authority Required to Close

A12.5.10.2. Formation/Tactics

A12.5.10.3. Range/Altitude Separation Requirements on Target Prior Permission to Close With/
Without Visual Contact

A12.5.10.4. Radar Lock-On Requirements

A12.5.10.5. Maximum Closure Speed

A12.5.10.6. Minimum Airspeed

A12.5.10.7. Loss of Contact Procedures

A12.5.10.8. Breakaway Procedures

A12.5.10.9. Restrictions

A12.5.11. Aircraft in Distress:

A12.5.11.1. Minimum Closure Distance

A12.5.11.2. Visual Signals - Day/Night

A12.5.11.3. Escort Procedures

A12.5.11.4. Recovery/Landing Visual Signals

A12.5.11.5. Dissimilar Formation Procedures

A12.5.12. Jettison Procedures.

A12.5.13. Lost Wingman.

A12.5.14. SARCAP.

A12.5.15. Emergency Airfields.

| A12.6. Special Subjects:

A12.6.1. Emergency of the Day

A12.6.2. Fuel Awareness

A12.6.3. Maneuvering Limitations

A12.6.4. Recognition/Prevention/Recovery from Loss of Control

A12.6.5. Spatial Disorientation

A12.6.6. Recall Procedures

A12.6.7. Rules of Engagement (ROE)

A12.6.8. Hazards Associated with Human Factors (i.e. Channelized attention, Task Saturation/Prioritization, Complacency)

| A12.6.9. ORM: Flight safety hazards to this flight, and factors mitigating the risk

Attachment 13**CREW COORDINATION/PASSENGER/GROUND CREW BRIEFING GUIDE****A13.1. Crew Coordination/Passenger:**

A13.1.1. Pre-Flight:

A13.1.1.1. Use of Ejection seat and associated equipment

A13.1.1.2. Use of oxygen system

A13.1.2. Prohibited Items.

A13.1.3. Cockpit Layout.

A13.1.4. Flight Maneuvering Parameters.

A13.1.5. Mission Duties.

A13.1.6. Change of Aircraft Control.

A13.1.7. WSO Flying Parameters.

A13.1.8. Rear Seat Landing Procedures.

A13.1.9. Emergencies:

A13.1.9.1. Runway Departure

A13.1.9.2. Canopy Loss

A13.1.9.3. Ejection/Egress (With and Without Intercom)/Command Selector Valve Position

A13.1.9.4. Loss of Intercom

A13.1.9.5. Bird Strike Procedures/Use of Visor(s)

A13.1.10. Flight Control Interference:

A13.1.10.1. Rudder Interference

A13.1.10.2. Rudder Pedal Adjustment

A13.1.10.3. Stick Interference

A13.2. Ground Crew:

A13.2.1. Act only on pilot's or WSO's instructions

A13.2.2. Ground emergency procedures

A13.2.3. Hand signals

A13.2.4. Aircraft danger areas

Attachment 14

MISSION DEBRIEFING GUIDE

A14.1. Ground Procedures.

A14.2. Takeoff/Join-Up Departure.

A14.3. En Route Procedures.

A14.4. Recovery/Landing/After Landing.

A14.5. General:

A14.5.1. SIs

A14.5.2. Radio Procedures

A14.5.3. Flight Discipline/Effectiveness

A14.6. Mission Accomplishment/Analysis:

A14.6.1. Mission Reconstruction

A14.6.2. Mission Support

A14.6.3. VTR/Film Assessment

A14.6.4. Anti-G Straining Maneuver Effectiveness

A14.6.5. Learning Objectives Achieved

A14.6.6. Lessons Learned

A14.6.7. Recommendations for Improvement

A14.7. Comments/Questions.

Attachment 15**NIGHT VISION GOGGLE (NVG) BRIEFING GUIDE**

A15.1. Purpose. This guide is meant to highlight general NVG considerations, and provides a reference for a basic NVG briefing. All applicable NVG considerations should be incorporated into the specific briefing for the mission being flown.

A15.2. Weather/Illumination

- A15.2.1. Civil/Nautical Twilight
- A15.2.2. Moon Rise/Set Times/ Phase/Elevation/Azimuth
- A15.2.3. Ceiling/Visibility
- A15.2.4. LUX/ EO TDA
- A15.2.5. Obscurants to Visibility

A15.3. NVG Preflight

- A15.3.1. Check Adjustments/Helmet Fit And Security
- A15.3.2. Batteries
- A15.3.3. Resolution/Focus
- A15.3.4. NVG Compatible Flashlight

A15.4. Cockpit Preflight

- A15.4.1. Cockpit Setup
- A15.4.2. Cockpit Lighting (Leaks)/Mirrors Up
- A15.4.3. Cockpit Fam
- A15.4.4. Check Focus And Stow For Taxi

A15.5. Before Takeoff

- A15.5.1. Don NVGs/Check And Adjust/Disconnect
- A15.5.2. Stow For Takeoff

A15.6. Airborne

- A15.6.1. Exterior Lights
- A15.6.2. Scan Pattern
 - A15.6.2.1. Forward Scan
 - A15.6.2.2. Narrow Field Of View
 - A15.6.2.3. Peripheral Vision

A15.6.2.4. Scan Techniques

A15.6.3. Join-Up And Enroute Considerations

A15.6.3.1. Rejoin/Closure

A15.6.3.2. Air-Air TACAN

A15.6.3.3. G-Awareness Considerations

A15.6.3.3.1. Lighting

A15.6.3.3.2. Deconfliction/Separation

A15.7. Mission

A15.7.1. Route Study/Scene Interpretation

A15.7.1.1. NVG predictions/albido

A15.7.1.2. Terrain/Shadowing/Visual Illusions/Visible Horizon

A15.7.1.3. City/Cultural Lighting

A15.7.1.3.1. Direction/ Orientation Of Lighting

A15.7.1.3.2. Aggressive Formation Maneuvering

A15.7.1.3.3. Terrain Avoidance

A15.7.1.3.3.1. Radar Altimeter

A15.7.1.3.3.2. Terrain Following Usage

A15.7.1.3.4. Map Reading

A15.8. Target Area

A15.8.1. Rv/Holding Procedures (NVG Differences)

A15.8.2. Target Study/Acquisition (NVG Predictions)

A15.8.3. Deliveries/Pattern Procedures

A15.8.3.1. Minimum Altitudes

A15.8.3.2. Flight Member Responsibilities

A15.8.3.3. Moth Effect

A15.8.3.4. Deconfliction

A15.8.3.5. External Lighting/Deconfliction Procedures

A15.8.4. Laser/IR Pointer Operations

A15.8.5. Threat I.D And Reaction

A15.8.6. Egress

A15.9. NVG/Laser/IR Pointer Safety

- A15.9.1. Lost Sight-NVGs
- A15.9.2. Lost Wingman-NVGs
- A15.9.3. Depth Perception
- A15.9.4. Visual Illusions
- A15.9.5. NVG Failure
- A15.9.6. Battery Failure/Swap Out
- A15.9.7. Overconfidence In NVG Capabilities
- A15.9.8. Transition To Instruments
- A15.9.9. Correct Lighting of Primary/Secondary Flight Instruments
- A15.9.10. Disorientation/Misorientation/Vertigo
- A15.9.11. Target Fixation
- A15.9.12. Lack of Dive Information
- A15.9.13. Fatigue
- A15.9.14. Aircraft Emergency
- A15.9.15. Ejection-Goggles-Off
- A15.9.16. Laser Eye Protection (LEP) Use
- A15.9.17. Laser/IR Pointer Use/Safety
- A15.9.18. NVG/IR Pointer FOD Considerations (Batteries, Equipment, etc)