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SECRETARY OF THE AIR FORCE**

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Flying Operations

T-38 OPERATIONS PROCEDURES

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This manual implements Air Force Instruction (AFI) 11-200, *Aircrew Training, Standardization/Evaluation, and General Operations Structure*. This manual prescribes standard procedures used by all pilots operating an Air Force T-38 aircraft and applies to all civilian employees and uniformed members of the Regular Air Force, the Air Force Reserve, and the Air National Guard flying the T-38. This publication does not apply to the U.S. Space Force. Ensure all records generated as a result of processes prescribed in this publication adhere to Air Force Instruction 33-322, *Records Management and Information Governance Program*, and are disposed in accordance with the Air Force Records Disposition Schedule, which is located in the Air Force Records Information Management System. Refer recommended changes and questions about this publication to the office of primary responsibility (OPR) using the Department of the Air Force Form 847, *Recommendation for Change of Publication*; route Department of the Air Force Forms 847 from the field through the Standardization and Evaluation functional chain. This publication may be supplemented at any level, but all direct supplements must be routed to the OPR of this publication for coordination prior to certification and approval. Field units below Major Command level will coordinate copies of their supplements with their parent Major Command OPR prior to publication. The authorities to waive wing/unit level requirements in this manual are identified with a Tier (“T-0, T-1, T-2, T-3”) number following the compliance statement. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the publication OPR for non-tiered compliance items.

SUMMARY OF CHANGES

This interim change updates the applicability statement for application to civilian employees across the total force and certifies the publication as current. It also provides minor administrative updates to the antecedent publication statement, the records management statement, the recommending changes statement, the allowing implementing and supplementing publications statement and the waiver authority statement in the opening paragraph. Bargaining Obligation: before implementing this publication for bargaining unit civilian employees, organizations must fulfill their collective bargaining obligations. A margin bar (|) indicates newly revised material.

Chapter 1—GENERAL GUIDANCE	5
1.1. Scope.....	5
1.2. Roles and Responsibilities.....	5
1.3. References.....	5
Chapter 2—MISSION PLANNING	6
2.1. Responsibilities.....	6
2.2. General Procedures:.....	6
2.3. Map and Chart Preparation:.....	6
2.4. Briefing and Debriefing:.....	7
2.5. Unit-Developed Checklists and Local Pilot Aids:.....	8
Chapter 3—NORMAL OPERATING PROCEDURES	10
3.1. Ground Visual Signals.....	10
3.2. Preflight:.....	10
3.3. Fuel Requirements:.....	10
3.4. Ground and Taxi Operations.....	10
3.5. Before-Takeoff Checks.....	11
3.6. Flight Lineup.....	11
3.7. Takeoff:.....	11
3.8. Formation Takeoff:.....	11
3.9. Join-up and Rejoin:.....	12
3.10. Maneuvering Parameters:.....	12
3.11. Ops Checks:.....	13
3.12. G-awareness Exercise.....	13
3.13. Radio Procedures:.....	14

3.14.	Change of Aircraft Control.....	14
3.15.	Formations (General):.....	14
3.16.	Tactical Formations:.....	15
3.17.	Chase Formation:.....	16
3.18.	Show Formation.....	16
3.19.	Weather and IFR:.....	16
3.20.	Low-Altitude Procedures (General):.....	18
3.21.	Minimum Altitudes.....	19
3.22.	Low-Level Route and Area Abort Procedures:.....	19
3.23.	Night Operational Procedures:.....	20
3.24.	Approaches and Landings:.....	21
3.25.	Overhead Traffic Patterns:.....	21
3.26.	Tactical Overhead Traffic Patterns.....	21
3.27.	Low Approaches:.....	22
3.28.	Closed Traffic Patterns.....	22
3.29.	Rear Cockpit Approaches and Landings:.....	22
3.30.	Formation Approaches:.....	22
3.31.	Formation Landings:.....	22
3.32.	Landing Restrictions:.....	23
Chapter 4—AIR-TO-AIR WEAPONS EMPLOYMENT		24
4.1.	References.....	24
4.2.	Maneuvering Limitations:.....	24
Chapter 5—AIR-TO-SURFACE WEAPONS EMPLOYMENT		25
5.1.	References.....	25
5.2.	Weather Minimums.....	25
5.3.	Popup Attacks.....	25
5.4.	Night Weapons Delivery and Range Operations.....	25
Chapter 6—ABNORMAL OPERATING PROCEDURES		26
6.1.	General.....	26
6.2.	Ground Aborts:.....	26
6.3.	Takeoff Aborts:.....	26
6.4.	Air Aborts:.....	26

6.5.	Radio Failure:	27
6.6.	Severe Weather Penetration.....	28
6.7.	Lost Wingman Procedures.....	28
6.8.	Spatial Disorientation (SD).....	29
6.9.	In-flight Practice of Emergency Procedures:	30
6.10.	Search and Rescue (SAR) Procedures.	31
6.11.	Solo Student Restrictions (Undergraduate Flying Training only):	31
6.12.	Birdstrike and Loss of Canopy Procedures:.....	32
6.13.	Nonpilot Aircrew Flying.....	32
Attachment 1—GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION		33
Attachment 2—INSTRUCTIONS FOR USING AF FORM 4290		35
Attachment 3—GROUND OPS/TAKEOFF/DEPARTURE BRIEFING GUIDE		36
Attachment 4—RECOVERY/AFTER LANDING BRIEFING GUIDE		38
Attachment 5—SPECIAL SUBJECT BRIEFING GUIDE		39
Attachment 6—ADVANCED HANDLING/INSTRUMENT BRIEFING GUIDE		40
Attachment 7—AIR COMBAT TRAINING/INTERCEPT BRIEFING GUIDE		41
Attachment 8—BASIC FIGHTER MANEUVERS/AIR COMBAT MANEUVERING BRIEFING GUIDE		45
Attachment 9—ESCORT MISSION BRIEFING GUIDE		47
Attachment 10—LOW-LEVEL NAVIGATION BRIEFING GUIDE		48
Attachment 11—AIR-TO-SURFACE WEAPONS EMPLOYMENT/RANGE MISSION BRIEFING GUIDE		50
Attachment 12—CREW/PASSENGER/GROUND CREW COORDINATION BRIEFING GUIDE		58
Attachment 13—MISSION DEBRIEFING GUIDE		59

Chapter 1

GENERAL GUIDANCE

1.1. Scope. This manual outlines the procedures applicable to the safe operation of the T-38. With the complementary references cited, this manual prescribes standard operational procedures to be used by all pilots operating T-38 aircraft.

1.2. Roles and Responsibilities. This manual prescribes procedures for operating T-38 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.

1.1.1. Commanders. Commanders at their respective tier levels are responsible for complying with guidance in this manual. (T-1). T-38 flying unit wing commanders, delegated no lower than Operations Group Commander (or equivalent), are responsible for providing local operating guidance to supplement the requirements of this Manual. (T-1).

1.1.2. Pilot in Command (PIC) Authority. The pilot in command is responsible for, and is the final authority for the operation of the aircraft. (T-1). Pilots will use best judgement to safely conduct flying operations. (T-1).

1.3. References. The primary references for T-38 operations are Technical Order (TO) 1T-38A-1, *Flight Manual, USAF Series T-38A and AT-38B Aircraft*; TO 1T-38C-1, *Flight Manual, USAF Series T-38C Aircraft*; T-38-specific tactics and flying fundamentals publications (e.g., AETCMAN 11-251, V1, *T-38C Flying Fundamentals*; and this manual.

Chapter 2

MISSION PLANNING

2.1. Responsibilities. The responsibility for mission planning is shared jointly by the individual pilots and the operations functions of organizations.

2.2. General Procedures:

2.2.1. Pilot will accomplish sufficient flight planning to ensure safe mission accomplishment. **(T-1).** AFI 11-202, V3 specifies minimum requirements.

2.2.2. Pilots will compute takeoff and landing data for all flights. **(T-1).** MAJCOM-approved tab data or electronic calculators may be used.

2.2.3. Runway Condition Assessment Matrix (RCAM). When necessary, aircrews will use the RCAM to derive the Runway Condition Reading (RCR) and associated information (i.e. Runway Surface Condition (RSC), pilot reported braking action, etc.) from the Runway Condition Code (RCC) described in published Field Condition (FICON) NOTAMS. **(T-2).** The RCAM is located in the Flight Information Handbook.

2.2.4. MAJCOMs will provide guidance on use of flight planning software. **(T-2).**

2.2.5. The T-38C embedded Global Positioning System (GPS)/Inertial navigation system (EGI), with Block 9 (and later) software in conjunction with use of the T-38C Navigation Data Verification Tool, Block 9, Version 2.2 (and later), is certified for Instrument Flight Rules (IFR) enroute, terminal area navigation (RNAV) and RNAV approach procedures in the national airspace system.

2.2.5.1. RNAV terminal operations, including conventional or RNAV departure procedures,

conventional or RNAV standard terminal arrivals and RNAV (GPS) approaches are authorized.

2.2.5.2. RNAV Q-routes and T-routes are authorized IAW FAA AC 90-100A.

2.2.5.3. Operations are not permitted for any procedures with "RNP" in the title. **(T-1).**

2.2.5.4. RNAV Substitution for out of service nav aids is restricted to distance measuring only. **(T-2).** Bearing and radial guidance are not accurate due to the T-38 EGI not compensating for the applied magnetic variation of the substituted nav aids.

2.3. Map and Chart Preparation:

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

2.3.2. **Charts.** Flight information publication (FLIP) en route charts may be used instead of maps on navigational flights within areas adequately covered by these charts.

2.3.3. Low Altitude Maps:

2.3.3.1. On low-altitude flights (500 feet to 1,000 feet above ground level [AGL]), each pilot in the flight will carry a current map of the low altitude route or operating area. **(T-2).** The map will be of such scale and quality that terrain features, hazards and chart

annotations are of sufficient detail to allow individual navigation and safe mission accomplishment. **(T-2)**.

2.3.3.2. Pilots will prepare maps for low-altitude flights according MAJCOM guidance and as directed locally. **(T-2)**. Pilots will highlight all man-made obstacles at or above the planned flight altitude and annotate time and distance tick-marks on low-level maps to ensure positive positional awareness of obstacles within 5 nautical miles (nm) on either side of the planned route of flight. **(T-2)**.

2.3.3.3. Pilots will annotate all maps with a minimum safe altitude (MSA). **(T-2)**. MSA will be computed for each leg of the route by adding 500 feet to the highest obstruction to flight within 5 nm of route centerline to include the aircraft turn radius. **(T-2)**.

2.3.3.4. Pilots will annotate all maps with a route abort altitude (RAA). **(T-2)**. Pilots will compute RAA by adding 1,000 feet (2,000 feet in mountainous terrain as defined in AFI 11-202V3) to the elevation of the highest obstruction to flight within 22 nm either side of the entire planned route. **(T-2)**. The RAA will be computed for the route and conspicuously annotated on the chart. **(T-2)**.

2.4. Briefing and Debriefing:

2.4.1. Flight leads are responsible for presenting a logical briefing that will promote safe, effective mission accomplishment. **(T-2)**. In addition, the following guidance applies:

2.4.1.1. All pilots, crewmembers and passengers will attend the briefing and debriefing unless previously coordinated with the flight lead/instructor pilot (IP), or with unit supervisors if Flight Lead/IP is not immediately available. **(T-2)**.

2.4.1.2. For local sorties, briefings will begin at least 1 hour before scheduled takeoff. **(T-2)**.

2.4.1.3. During deployed operations, exercises and quick-turns, if all flight members attend an initial or mass flight briefing, the flight lead on subsequent flights during the same flight duty period must brief only those items that have changed from the previous flights. **(T-2)**.

2.4.1.4. Briefers will structure flight briefings to accommodate the capabilities of each pilot in the flight. **(T-2)**.

2.4.1.5. Briefers will use briefing guides to provide the flight lead or briefer with a reference list of items which may apply to particular missions. **(T-2)**. Items listed may be briefed in any sequence. Those items understood by all participants may be briefed as standard. Specific items not pertinent to the mission need not be covered.

2.4.1.6. During the briefing for all low-level missions, briefers will emphasize the following items: obstacle awareness, ground avoidance, pilot determination of low-altitude comfort level and the avoidance of complacency. **(T-2)**.

2.4.1.7. The squadron operations officer must approve dissimilar formations prior to accomplishment. **(T-2)**. When dissimilar aircraft are flown in formation, briefers will brief proper position (to ensure adequate wingtip clearance), responsibilities and aircraft-unique requirements for each phase of flight. **(T-2)**.

2.4.1.8. When appropriate, brief an alternate mission for each flight. (T-2). The alternate mission will be less complex than the primary mission. (T-2).

2.4.1.9. Mission elements and events may be modified and coordinated airborne as long as flight safety is not compromised. (T-2). Unbriefed missions or events will not be flown. (T-2). Flight leads will ensure changes are acknowledged by all flight members. (T-2).

2.4.1.10. All missions will be debriefed. (T-2).

2.4.2. Required topics for flight briefing guides are contained in Attachments **3 through 13**. Units may augment these guides as necessary. The following is a listing of the briefing guides in this manual:

2.4.2.1. Ground Ops/Takeoff/Departure Briefing Guide (**Attachment 3**).

2.4.2.2. Recovery/Landing Briefing Guide (**Attachment 4**).

2.4.2.3. Special Subject Briefing Guide (**Attachment 5**).

2.4.2.4. Advanced Handling/Instrument Briefing Guide (**Attachment 6**).

2.4.2.5. Air Combat Training/Intercept Briefing Guide (**Attachment 7**).

2.4.2.6. Basic Fighter Maneuvers/Air Combat Maneuvers Briefing Guide (**Attachment 8**).

2.4.2.7. Escort Mission Briefing Guide (**Attachment 9**).

2.4.2.8. Low-Level Navigation Briefing Guide (**Attachment 10**).

2.4.2.9. Air-to-Surface Weapons Employment/Range Mission Briefing Guide (**Attachment 11**).

2.4.2.10. Crew/Passenger/Ground Crew Coordination Briefing Guide (**Attachment 12**).

2.4.2.11. Mission Debriefing Guide (**Attachment 13**).

2.5. Unit-Developed Checklists and Local Pilot Aids:

2.5.1. Unit-developed checklists may be used in lieu of flight manual checklists, if unit-developed checklists contain, as a minimum, all items (verbatim and in order) listed in the applicable flight manual checklist (allowance approved for this MDS volume per AFI 11-215, *Flight Manuals Program*). Pilots will still carry a current flight manual checklist and have it immediately available on all flights. (T-2).

2.5.2. Local aids will include, as a minimum, the following items:

2.5.2.1. Briefing guides pertinent to the unit's mission(s). (T-2).

2.5.2.2. Local ultra high frequency and very high frequency channelization. (T-2).

2.5.2.3. Appropriate airfield diagrams (home and auxiliary fields), including aircraft arresting systems. (T-2).

2.5.2.4. Emergency information (impoundment procedures, emergency action checklists, radio failure and divert information). (T-2).

2.5.2.5. Aircraft arresting systems information at divert bases. (T-2).

2.5.2.6. Bailout and jettison area. **(T-2)**.

2.5.2.7. Cross-country procedures to include command and control, engine documentation, Joint Oil Analysis Program samples and aircraft servicing. **(T-2)**.

2.5.2.8. Other information as deemed necessary by the unit (for example, stereo flight plans, turnaround procedures, local training areas and instrument preflight). **(T-3)**.

Chapter 3

NORMAL OPERATING PROCEDURES

3.1. Ground Visual Signals. The pilot will ensure that no system that could pose a risk to the ground crew is activated prior to receiving proper acknowledgment from ground personnel. **(T-2).** When ground intercom is not used, pilots will use visual signals in accordance with AFMAN 11-218, *Aircraft Operation and Movement on the Ground* and this manual. **(T-2).** The crew chief will repeat the given signal when it is safe to operate the system. **(T-2).**

3.2. Preflight:

3.2.1. Baggage or equipment will not be carried in an unoccupied T-38 rear cockpit, except in approved cargo carriers. **(T-2).** MAJCOM's may define what an approved cargo carrier is based on tactical operations/training requirements. **Exception:** Aircrew flight equipment may be secured in the rear cockpit.

3.2.2. Objects will not be placed on top of the glare shield during start with the canopies open. **(T-2).**

3.2.3. Publications, maps and personal items will all be secured in the cockpit to avoid flight control or throttle interference. **(T-2).**

3.2.4. After time compliance technical order 1T-38C-546, do not place items under ejection seats. **(T-2).** Before time compliance technical order 1T-38C-546, soft-sided, pliable items may be placed under ejection seats. **(T-2).**

3.2.5. Cans of oil or hydraulic fluid will not be carried in the aircraft, except in the weapon system support pod. **(T-2).**

3.3. Fuel Requirements:

3.3.1. **Joker Fuel.** A prebriefed fuel needed to terminate an event and transition to the next phase of flight.

3.3.2. **Bingo Fuel.** A prebriefed fuel state which 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.

3.3.3. **Normal Recovery Fuel.** The fuel on initial or at the final approach fix at the base of intended landing or alternate, if required. Fuel quantity will be as established locally or 800 pounds, whichever is higher.

3.3.4. **Minimum and Emergency Fuel.** When it becomes apparent an aircraft will land at the base of intended landing or alternate (if required), declare the following (as applicable):

3.3.4.1. Minimum fuel--600 pounds or less.

3.3.4.2. Emergency fuel--400 pounds or less.

3.4. Ground and Taxi Operations.

3.4.1. **Taxi Interval.** The minimum taxi interval is 150 feet staggered or 300 feet in trail. **(T-2).** Spacing may be reduced when holding short of or entering the runway. Use caution to avoid jet blast when canopies are open.

3.4.2. **Ice or Snow Conditions.** Do not taxi during ice or snow conditions until all portions of the taxi route and runway have been checked for safe conditions. **(T-2)**. When ice or snow are present on the taxiway, taxi on the center line with a minimum of 300 feet of spacing. **(T-2)**.

3.5. Before-Takeoff Checks. Before time compliance technical order 1T-38C-546, remove and properly stow ejection seat and canopy jettison safety pins once clear of the aircraft parking area, but not later than completion of the before takeoff checklist according to the appropriate flight crew checklist. **(T-2)**.

3.5.1. After the before-takeoff checks have been completed and prior to takeoff, flight members will inspect accompanying aircraft for proper configuration and any abnormalities. **(T-2)**.

3.5.2. Pilots will use the videotape recorder or video-data transfer system to the maximum extent practical. **(T-2)**.

3.6. Flight Lineup. Flights will line up as appropriate based on weather conditions, runway conditions and runway width. If formation takeoffs are planned, wingmen must maintain wingtip clearance with their element leader. **(T-2)**. If runway width permits, line up with wingtip clearance between all aircraft in the flight. **(T-2)**. Trailing elements will delay engine run up if wingtip clearance cannot be ensured. **(T-2)**. Place the wingman on the upwind side if the crosswind exceeds 5 knots. **(T-2)**.

3.7. Takeoff:

3.7.1. Do not take off when the runway condition reading is less than 10. **(T-2)**.

3.7.2. Takeoff data will be reviewed and understood by every member of the flight. **(T-2)**. Particular emphasis should be placed on takeoff and abort factors during abnormal situations such as short or wet runway, heavy gross weights, nonstandard barrier configurations and abort sequence in formation flights. **(T-2)**.

3.7.3. Pilots will not take off if the computed takeoff roll exceeds 80 percent (single ship or interval takeoff) or 70 percent of the available runway (formation takeoff). **(T-2)**.

3.7.4. The operations group commander may approve intersection takeoffs if operational requirements dictate.

3.7.5. Use afterburner (AB) on all takeoffs. **(T-2)**.

3.7.6. Rolling takeoffs are authorized. **(T-2)**.

3.7.7. If installed, pilots will ensure the instrument hood is in the retracted position for all takeoffs and landings. **(T-2)**.

3.8. Formation Takeoff:

3.8.1. Formation takeoffs are restricted to elements of two aircraft. **(T-2)**.

3.8.2. Elements will be led by a qualified flight lead unless an IP or flight lead qualified squadron supervisor is in the element. **(T-2)**.

3.8.3. Pilots will not takeoff in formation when:

3.8.3.1. Runway width is less than 150 feet. **(T-2)**.

3.8.3.2. Standing water, ice, slush, or snow is on the runway. (T-2).

3.8.3.3. Crosswind component, including gusts, exceeds 15 knots. (T-2).

3.8.3.4. Aircraft is being ferried from contractor or Air Force depot-level maintenance facilities. (T-2).

3.8.4. Takeoff interval between aircraft or elements will be a minimum of 10 seconds. (T-2). When join-up is to be accomplished above a cloud layer, takeoff interval will be increased to a minimum of 20 seconds. (T-2). After releasing brakes, single ship aircraft will steer toward the center of the runway. (T-2).

3.9. Join-up and Rejoin:

3.9.1. Day weather criteria for a visual flight rules (VFR) join-up underneath a ceiling is 1,500 feet and 3 miles visibility. (T-2).

3.9.2. Flight leads will maintain 300 knots (KTS) until join-up is accomplished unless briefed or directed otherwise by the flight lead. (T-2). AB may be used to establish a rate of closure on the flight lead or lead element.

3.9.3. Flight leads will not normally exceed 30 degrees of bank during a turning join-up. (T-2).

3.9.4. Flight members will join in sequence. (T-2). For a straight-ahead rejoin, the number 2 aircraft will join on the left wing and the element will join on the right wing unless otherwise briefed. (T-2). For a turning rejoin, the number 2 aircraft will rejoin on the inside of the turn and the element to the outside. (T-2). If mission or flight requirements dictate, the flight lead will specifically direct the desired formation positions. (T-2).

3.9.5. When circumstances permit, flight leads will direct a battle damage check after each mission prior to or during return to base. (T-2). Established deconfliction responsibilities and position change procedures will be according to flying fundamentals publications. (T-2). Fly no closer than normal fingertip spacing. (T-2).

3.10. Maneuvering Parameters:

3.10.1. Except as specified for range procedures in AFI 11-214, *Air Operations Rules and Procedures*, the minimum altitude is 500 feet AGL for low altitude maneuvering. (T-2).

3.10.2. Aircraft will not descend below 5,000 feet AGL during any portion of aerobatic maneuvering. (T-2). Aerobatic flight must be performed in special use airspace. (T-2).

3.10.3. Flight through wingtip vortices or jetwash should be avoided. If this is unavoidable, the aircraft should be unloaded immediately to approximately 1 gravitational load factor. Use asymmetric G limits if evaluating a jetwash-induced over-G. T-38C pilots will use the warning, caution and advisory system or observed aircraft G to evaluate over-G conditions, including asymmetric over-Gs. (T-2).

3.10.4. Pilots will not extend the flaps in an attempt to improve aircraft performance. (T-2).

3.10.5. Pilots will not attempt to shift the center of gravity by crossfeeding or using differential throttles to improve performance. (T-2).

3.10.6. The minimum airspeed for all maneuvering is 150 KTS unless conducting training under a formal syllabus that specifies or allows a slower airspeed for the training being conducted. **(T-2)**.

3.11. Ops Checks:

3.11.1. Pilots will accomplish sufficient ops checks to ensure safe mission accomplishment. **(T-2)**. Additionally, each pilot will monitor the fuel system carefully throughout the flight to identify low fuel, trapped fuel, or an out-of-balance situation as soon as possible. **(T-2)**. Frequency should be increased during tactical maneuvering at high power settings. Pilots will accomplish ops checks during climb or at level-off after takeoff, before each engagement or intercept, before entering an air-to-surface range, once while on the range if multiple passes are made and after departing the range. **(T-2)**.

3.11.2. Minimum items to check are engine instruments, fuel quantities, fuel balance, G-suit connection (when appropriate), oxygen system and cabin altitude. **(T-2)**.

3.11.3. For formation flights, the flight lead will initiate ops checks by radio call or visual signal. **(T-2)**. Response will be made by radio call or visual signal. **(T-2)**. The query and response for ops checks will be based on the amount of fuel and Gs. Normally, the G meter should be reset between ops checks.

3.12. G-awareness Exercise. Refer to AFI 11-214 (if applicable).

3.12.1. Pilots will conduct a G-awareness exercise anytime aircrews plan or are likely to maneuver above five Gs during the mission. **(T-2)**. MAJCOMs may establish additional G-awareness exercise requirements.

3.12.2. Maintain a minimum of 4,000 feet between aircraft. **(T-2)**. Pilots will establish separation prior to maneuver execution. **(T-2)**. During maneuver execution pilots will use visual lookout and briefed formation contracts as primary means of ensuring aircraft deconfliction. **(T-2)**. Pilots will use other systems only to enhance situation awareness; for example, air-to-air tactical air navigation (TACAN), traffic collision avoidance system, etc. **(T-2)**.

3.12.3. Flight leads and pilots will ensure the airspace intended for the G-awareness exercise is free from potential conflict. **(T-2)**. Use air traffic control (ATC) services to the maximum extent practicable to make sure the airspace is clear. **(T-2)**. Conduct the G-awareness exercise in the following airspace preference to the order listed in paragraphs [3.12.3.1](#), [3.12.3.2](#), [3.12.3.3](#) and [3.12.3.4](#): **(T-2)**.

3.12.3.1. Special use airspace (for example, restricted or warning areas, ATC assigned airspace, military operating areas, or MAJCOM-approved large scale exercise or special missions areas). **(T-2)**.

3.12.3.2. Above 10,000 feet mean sea level (MSL) outside of special use airspace. **(T-2)**.

3.12.3.3. Inside the confines of military training routes/low-level training zones. **(T-2)**.

3.12.3.4. Below 10,000 feet MSL outside of special use airspace. **(T-2)**.

3.13. Radio Procedures:

3.13.1. Pilots will preface all communications (except for wingman acknowledgment) with the complete flight call sign. **(T-2)**. Transmit only information essential for mission accomplishment or safety of flight. Do not use the radio as a flight intercom. Pilots will use visual signals whenever practical. **(T-2)**.

3.13.2. Pilots will use a knock it off (KIO) radio call to cease tactical maneuvering when safety of flight is a factor, especially for an in-flight emergency. **(T-2)**. Any flight member may make this call. When a dangerous situation is developing, be directive first. A KIO applies to any phase of flight and all types of missions. All participants will acknowledge a KIO by repeating the call. **(T-2)**.

3.13.3. The flight lead should initiate all radio checks and channel changes. **Exception:** During radio silent or limited communications operations, channel changes will be as briefed. **(T-2)**.

3.13.4. Pilots will acknowledge radio checks that do not require the transmission of specific data by individual flight members in turn (for example, 2, 3, 4). **(T-2)**. Acknowledgment indicates the appropriate action is complete, in the process of being completed, or understood by the flight member.

3.13.5. In addition to the standard radio procedures outlined in AFI 11-202, V3, specific mission guides and FLIP publications, all flight members will acknowledge understanding the initial ATC clearance. **(T-2)**. All flight members will acknowledge subsequent ATC instructions when directed by the flight. **(T-2)**.

3.13.6. Brevity code and other terminology will be according to Air Force Tactics, Techniques and Procedures 3-2.5, *Multi-Service Brevity Codes (FOUO)*. **(T-2)**.

3.14. Change of Aircraft Control. Positive control of the aircraft must be maintained at all times. **(T-2)**. Transfer of aircraft control will be made with the statement “You have the aircraft.” **(T-2)**. The pilot receiving control of the aircraft will acknowledge “I have the aircraft.” **(T-2)**. Once assuming control of the aircraft, the pilot will maintain control until relinquishing it as stated above. **(T-2)**. See [paragraph 6.12](#) for procedures after a birdstrike or canopy loss.

3.15. Formations (General):

3.15.1. Flight or element leads will always consider wingman or element position and ability to safely perform a maneuver before directing it. **(T-2)**.

3.15.2. The maximum flight size in instrument meteorological conditions (IMC) is four aircraft. **(T-2)**.

3.15.3. Pilots will not use rolling maneuvers to maintain or regain formation position below 5,000 feet AGL or in airspace where aerobatics are prohibited. **(T-2)**.

3.15.4. Pilots will use airborne visual signals in accordance with AFPAM 11-205, *Aircraft Quick Reference to Aircraft Cockpit and Formation Flight Signals*. **(T-2)**. A radio call is mandatory when directing position changes at night or under instrument conditions. **(T-2)**.

3.15.5. Flight leads will not break up formations until each pilot has a positive fix from which to navigate; for example, visual, embedded GPS/inertial navigation system (EGI), TACAN, or very high frequency omnidirectional range. **(T-2)**.

3.15.6. When changing leads:

3.15.6.1. During flight in limited visibility conditions (for example haze, night, or IMC), pilots will initiate lead changes from a stabilized, wings-level attitude. **(T-2)**.

3.15.6.2. The minimum altitude for changing leads within a formation is 500 feet AGL over land or 1,000 feet AGL over water. **(T-2)**. In IMC, formation flights will not change lead or wing positions below 1,500 feet AGL unless on radar downwind. **(T-2)**. (For night position changes, see [paragraph 3.23.4](#) of this manual.)

3.15.6.3. Flight or element leads will not initiate a lead change unless the aircraft assuming the lead is in a position from which the lead change can be safely initiated and visual contact maintained. **(T-2)**.

3.15.6.4. The lead change will be initiated by either visual signal or radio call (required at night or in IMC). **(T-2)**.

3.15.6.5. Pilots will acknowledge receipt of the lead by a head nod or radio call, as appropriate. **(T-2)**.

3.15.6.6. The lead change is effective on acknowledgment. **(T-2)**.

3.15.6.7. The former lead then moves to the briefed wing position. **(T-2)**.

3.16. Tactical Formations:

3.16.1. **General.** The following rules apply for flightpath deconfliction during tactical maneuvering:

3.16.1.1. Wingmen must maneuver relative to the flight lead and maintain sight. **(T-2)**. Trailing aircraft or elements are responsible for deconflicting with lead aircraft or elements. **(T-2)**.

3.16.1.2. At low altitude, wingman or elements will deconflict by going high relative to the flight lead's or element's plane of motion. **(T-2)**.

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

3.16.2.1. If any flight member or element calls blind, the other flight member or element will immediately make a directive call, followed by an informative position call. **(T-2)**.

3.16.2.2. If the other flight member or element is also blind, the blind call will include altitude. **(T-2)**. The flight lead will take action to ensure altitude separation between flight members or elements. **(T-2)**. At low altitude, the flight lead will specify either AGL or MSL when directing the formation to deconflict. **(T-2)**. When directed to deconflict, a minimum of 500 feet of altitude separation will be used. **(T-2)**. Climbs and descents through the deconfliction altitude should be avoided, if possible.

3.16.2.3. If there is no timely acknowledgment of the original blind call, the flight member or element initiating the call will maneuver away from the last known position of the other flight member or element, alter his or her altitude, and repeat the blind call. **(T-2)**.

3.16.2.4. If visual contact is still not regained, the flight lead will take additional positive action to ensure flightpath deconfliction within the flight to include a terminate or KIO if

necessary. **(T-2)**. Scenario restrictions, such as sanctuary altitudes and/or adversary blocks should be considered.

3.16.2.5. Aircraft will maintain altitude separation until a visual is regained and, if necessary, will navigate with altitude separation until mutual support is regained. **(T-2)**.

3.16.3. **Two-Ship Formations.** The following rules apply for flightpath deconfliction during tactical maneuvering of two-ship formations.

3.16.3.1. Normally, the wingman is responsible for flightpath deconfliction. **(T-2)**.

3.16.3.2. The flight lead becomes primarily responsible for deconfliction when:

3.16.3.2.1. Tactical maneuvering places the leader in the wingman's blind cone or forces the wingman's primary attention away from the lead (for example, the wingman becomes the engaged fighter). **(T-2)**.

3.16.3.2.2. The wingman calls blind and receives an acknowledgment from the flight lead. **(T-2)**.

3.16.3.3. Primary deconfliction responsibility transfers back to the wingman once the wingman acknowledges a visual on his or her lead. **(T-2)**.

3.16.4. **Three- and Four-Ship Formations.** When flights of more than two aircraft are in tactical formation:

3.16.4.1. Formation visual signals performed by a flight or element lead pertain only to the associated element unless briefed otherwise by the flight lead. **(T-2)**.

3.16.4.2. Trailing aircraft or elements will maintain sufficient spacing so primary emphasis during formation maneuvering or turns is on altitude awareness and deconfliction within elements, not on deconfliction between elements. **(T-2)**.

3.17. Chase Formation:

3.17.1. Any qualified pilot may fly safety chase for aircraft under emergency or impending emergency conditions. Qualified flight examiners may fly chase during flight evaluations.

3.17.2. On transition sorties, the chase aircraft will perform a single-ship takeoff. **(T-2)**. In flight, the chase aircraft will maneuver as necessary, but is primarily responsible for aircraft separation. **(T-2)**. The chase aircraft will not stack lower than lead aircraft below 1,000 feet AGL. **(T-2)**. In the traffic pattern, the chase aircraft may maneuver as necessary to observe performance.

3.17.3. A safety observer in a chase aircraft will maneuver in a 30- to 60-degree cone out to 1,000 feet from which the pilot can effectively clear and/or provide assistance. **(T-2)**.

3.18. Show Formation. These formations will be specifically briefed and flown according to applicable directives. **(T-2)**. Refer to AFI 11-209, *Participation in Aerial Events* and applicable MAJCOM directives for specific rules and appropriate approval levels to participate in static displays and aerial events.

3.19. Weather and IFR:

3.19.1. **Approach Category:**

3.19.1.1. The T-38 is approach category E. **(T-2)**. A missed approach will be accomplished according to flight manual procedures. **(T-2)**.

3.19.1.2. Approach category D minimums may be used where no category E minimums are published if:

3.19.1.2.1. A straight-in approach is flown. **(T-2)**.

3.19.1.2.2. The aircraft is flown at a final approach airspeed of 165 knots indicated airspeed or less. **(T-2)**.

3.19.1.2.3. The aircraft is flown at 260 knots true airspeed or less for the missed approach segment of the approach. **(T-2)**. **Note:** At high pressure altitudes and temperatures, 260 knots true airspeed may not be compatible with published missed approach airspeeds and category D approaches should not be flown.

3.19.2. **Takeoff and Join-Up.** The flight lead must notify the appropriate ATC agency when a visual meteorological conditions (VMC) join-up is not possible because of weather conditions or operational requirements. **(T-2)**. Coordinate for an appropriate altitude block or trail formation. Formation trail departures will comply with instructions for a nonstandard formation flight as defined in DoD FLIP. The flight lead should request transponder codes for wingmen in trail.

3.19.3. **Trail Procedures.** During trail formations, basic instrument flying is the first priority and will not be sacrificed when performing secondary trail tasks. **(T-2)**. Strictly adhere to the briefed airspeeds, power settings, altitudes, headings and turn points. **(T-2)**. If task saturation occurs, immediately concentrate on flying the instrument departure and notify the flight lead. The flight lead will then notify ATC. **(T-2)**.

3.19.4. **Trail Departures:**

3.19.4.1. Use a minimum of 20-second takeoff spacing. **(T-2)**.

3.19.4.2. Unless briefed otherwise, each aircraft or element will accelerate in AB power until reaching 250 KTS, accelerate to 300 KTS in military (MIL) power and climb at 300 KTS using 600 degrees exhaust gas temperature until reaching cruise indicated/calibrated airspeed (IAS/CAS), cruise Mach, or cruise true airspeed as appropriate. **(T-3)**. All turns will be made using 30 degrees of bank. **(T-3)**.

3.19.4.3. The flight lead will call initiating all turns, unless briefed otherwise (e.g., flight lead will only call initiating turns which differ from a published departure routing). **(T-3)**. Acknowledgments are not required, but it is imperative that the flight lead monitors the progress of the trailing aircraft or elements to ensure deconfliction and immediately corrects deviations from the departure route or planned course.

3.19.4.4. Each aircraft or element will use all available aircraft systems and navigational aids to monitor position. **(T-2)**.

3.19.4.5. Each aircraft or element will maintain at least 1,000 feet of vertical separation from the preceding aircraft or element during the climb or descent and at level-off until visual contact is established, except instances where departure instructions specifically prohibit compliance. **(T-2)**.

3.19.4.6. In the event a visual join-up cannot be accomplished on top or at level-off, the flight lead will request 1,000 feet of altitude separation for each succeeding aircraft or element if all aircraft can comply with MSA restrictions. **(T-2)**. If the MSA cannot be complied with, the 1,000-foot vertical separation may be reduced to 500 feet.

3.19.5. Formation Breakup. Formation breakup should not be accomplished in IMC. However, if it is unavoidable, breakup will be accomplished in straight-and-level flight. **(T-2)**. Prior to a weather breakup, the flight lead will transmit attitude, airspeed, altitude and altimeter setting, which will be acknowledged by wingmen. **(T-2)**. Wingmen will also confirm good navigational aids according to [paragraph 3.15.5](#) of this manual. **(T-2)**.

3.19.6. Formation Penetration:

3.19.6.1. Formation penetrations are restricted to two aircraft when the weather at the base of intended landing is less than overhead traffic pattern minimums. **(T-2)**.

3.19.6.2. If a formation landing is intended, the wingman should be positioned on the appropriate wing prior to weather penetration.

3.19.7. Formation VMC Drag Procedures:

3.19.7.1. A formation VMC drag maneuver may be used to establish spacing for single-ship landings when conditions do not permit a formation landing and the following conditions are met:

3.19.7.1.1. Weather is at least a 1,500-foot ceiling and 3 miles visibility. **(T-2)**. All aircraft will maintain VMC from the drag point to landing. **(T-2)**.

3.19.7.1.2. Prior to directing the formation VMC drag under IFR, the flight lead will coordinate with the appropriate ATC agency for nonstandard formation during the remainder of the approach. **(T-2)**.

3.19.7.1.3. The wingmen may use briefed power settings and configurations (speedbrake, gear and flaps) to establish and maintain spacing. Wingmen will not fly below final approach speed and s-turns will not be used to gain or maintain separation while on final. **(T-2)**.

3.19.7.1.4. Minimum spacing is 3,000 feet, or greater if briefed. **(T-2)**.

3.19.7.1.5. The latest drag point must allow adequate time for the wingmen to establish the required separation and then for the flight lead to slow to final approach speed not later than 3 nm from the runway. **(T-2)**. On instrument final approaches, the drag is normally accomplished so as to establish separation prior to the final approach fix or glideslope intercept.

3.19.7.2. Any time the spacing is in question, the wingman will go-around or execute the missed approach, notify air traffic control and comply with local procedures. **(T-2)**.

3.19.8. Icing Restrictions. Do not fly in areas of known or reported icing. **(T-2)**. Climbs or descents through icing conditions more severe than forecast light rime are prohibited. **(T-2)**.

3.20. Low-Altitude Procedures (General):

3.20.1. During briefings, briefers will emphasize low altitude flight maneuvering and observation of terrain feature or obstacles along the route of flight. **(T-2)**. For low altitude

training over water or featureless terrain, briefers will include specific emphasis on minimum altitudes and spatial disorientation. (T-2).

3.20.2. Low-altitude formation positions and tactics will be flown using MAJCOM guidance or tactics and flying fundamentals publications, as guides. (T-2).

3.20.3. If flight leads are unable to visually acquire or ensure lateral separation from known vertical obstructions that are a factor to the route of flight, flight leads will direct a climb no later than 3 nm prior to the obstacle to ensure vertical separation by 2 nm from the obstacle. (T-2).

3.20.4. At altitudes below 1,000 feet AGL, wingmen will not fly at a lower AGL altitude than lead. (T-2).

3.20.5. When crossing high or hilly terrain, maintain a positive G on the aircraft and do not exceed approximately 120 degrees of bank. (T-2). Maneuvering at less than 1 G is limited to upright bunting maneuvers. (T-2).

3.20.6. The minimum airspeed for low-level navigation is 300 KTS. (T-2).

3.20.7. During low-altitude training, maintain a minimum of 500 feet above the highest terrain or obstacle within 1/2 nm of the aircraft. (T-2). Pilots will set the altitude warning function to alert the pilot at no less than 90 percent of planned altitude during low-level operations. (T-2).

3.20.8. During all low-altitude operations, the immediate reaction to task saturation, diverted attention, KIO, or emergencies (including any perceived loss of thrust) is to climb to RAA or a prebriefed safe altitude (minimum 1,000 feet AGL). (T-2). If a birdstrike enters the cockpit and the aircraft loses a canopy, the pilot flying will immediately select MIL or MAX power on both engines and establish a climb away from the ground. (T-2). The pilot not flying will be prepared to assume control if the pilot flying does not initiate a climb away from the ground. (T-2). In this case, the pilot will change control of the aircraft according to [paragraph 6.12.2](#) of this manual. (T-2).

3.21. Minimum Altitudes. A pilot's minimum altitude will be determined and certified by the unit commander according to AFMAN 11-2T-38, V1, *T-38 Aircrew Training*. (T-2). Pilots participating in approved stepdown training programs will comply with the requirements and restrictions of that program. (T-2). The following minimum altitudes apply to low-level training unless higher altitudes are specified by route restrictions or a training syllabus:

3.21.1. For pilots who have not completed stepdown training and who are not designated for flights at lower altitudes, the minimum altitude is 1,000 feet AGL. (T-2).

3.21.2. For night or IMC operation, the minimum altitude is 1,000 feet above the highest obstacle within 5 nm of the course. (T-2).

3.21.3. Weather minimums for visual low-level training will be 1,500 feet and 3 miles for any route or area, as specified in FLIP (for military training routes), or as specified in unit publications, whichever is higher. (T-2).

3.22. Low-Level Route and Area Abort Procedures:

3.22.1. VMC route and area abort procedures are:

3.22.1.1. Maintain safe separation from the terrain. (T-2).

3.22.1.2. Comply with VFR altitude restrictions and squawk applicable transponder modes and codes. (T-2).

3.22.1.3. Maintain VMC at all times. (T-2).

3.22.1.4. Attempt contact with controlling agency, if required. (T-2).

3.22.2. IMC route and area abort procedures are:

3.22.2.1. Immediately climb to or above the computed RAA. (Reference [paragraph 2.3.3.3](#) of this manual for computing RAA.) (T-2).

3.22.2.2. Attempt to maintain preplanned ground track. (T-2). Pilots should execute appropriate lost wingman procedures, if necessary.

3.22.2.3. If deviations from normal route or area procedures are required or if the RAA or MSA is higher than the vertical limits of the route or area, squawk emergency. (T-2).

3.22.2.4. Attempt contact with the appropriate ATC agency for an IFR clearance. (T-2). If required to fly in IMC without an IFR clearance, cruise at appropriate VFR altitudes until IFR clearance is received. (T-2).

3.23. Night Operational Procedures:

3.23.1. **Night Ground Operations.** The anticollision (beacon) light may be turned to OFF and the position lights turned to DIM if they prove to be a distraction or create a hazard. Taxi spacing will be a minimum of 300 feet and on the taxiway center line. (T-2). The landing-taxi light will normally be used during all night taxiing. (T-2). (**Exception:** When the light might interfere with the vision of the pilot of an aircraft landing or taking off, the taxiing aircraft will come to a stop if the area cannot be visually cleared without the landing-taxi light.) (T-2). For formation takeoffs, flight or element lead will turn the anticollision light to OFF and position lights to DIM when reaching the run up position on the runway. (T-2). Wingmen will maintain the anticollision light to ON and position lights to BRIGHT for takeoffs, unless IMC will be encountered shortly after takeoff. (T-2).

3.23.2. **Night Takeoff.** During a night formation takeoff, brake release and gear retraction will be called on the radio. (T-2). Following takeoff, each aircraft or element will climb on runway heading to 1,000 feet AGL before initiating turns, except where departure instructions specifically prohibit compliance or executing a night overhead traffic pattern. (T-2).

3.23.3. **Night Join-Ups.** Night join-ups are not authorized. (T-2).

3.23.4. **Night Formation Procedures:**

3.23.4.1. When in positions other than fingertip or route, aircraft spacing will be maintained primarily by instruments and/or timing, with visual reference secondary. (T-2). If aircraft spacing cannot be ensured, an altitude separation (minimum of 1,000 feet) will be established. (T-2). At all times, aircrews will cross-check instruments to ensure ground clearance. (T-2).

3.23.4.2. Do not change lead or wing positions below 1,500 feet AGL unless on RADAR downwind. (T-2). Lead changes and position changes will be called over the radio and they should be initiated from a stabilized, wings-level attitude. (T-2).

3.23.5. **Night Fingertip Position.** Night fingertip formation is flown in approximately the same position as during the day. If illumination is insufficient to use day references, exterior lighting relationships may be used. (T-2).

3.23.6. **Night Breakup.** Prior to a night formation breakup, the flight lead will transmit attitude, altitude, airspeed and altimeter setting, which will be acknowledged by wingmen. (T-2). Wingmen will also confirm good navigational aids according to [paragraph 3.15.5](#) of this manual. (T-2). This procedure is not required for a formation breakup that occurs in the overhead traffic pattern.

3.24. Approaches and Landings:

3.24.1. The desired touchdown point is 150 – 1,000 feet from the threshold for a VFR approach. (T-2). When landing from a precision approach, touchdown may be beyond the VFR touchdown zone. When local procedures or unique runway surface conditions require landing beyond a given point on the runway, the desired touchdown point will be adjusted accordingly.

3.24.2. Reduced same runway separation is authorized according to AFI 13-204, V3, *Airfield Operations Procedures and Programs*, as supplemented. (T-2). When wake turbulence is expected due to calm winds or when landing with a light tail wind, spacing should be increased.

3.24.3. If the altitude warning function is used for decision height awareness on instrument approaches, aircrews will set the data source for activation of the altitude warning function to “MSL.” (T-2).

3.25. Overhead Traffic Patterns:

3.25.1. Overhead patterns can be made with unexpended practice ordnance. (T-2).

3.25.2. Pilots will execute the break individually in a level 180-degree turn to the downwind leg at minimum intervals of 5 seconds (except for an IP or flight examiner when in chase or tactical formation). (T-2).

3.26. Tactical Overhead Traffic Patterns. Tactical entry to the overhead traffic pattern is permitted, using the following parameters:

3.26.1. A maximum of four aircraft authorized in the formation. (T-2).

3.26.2. Lateral spacing of 4,000 to 6,000 feet. (T-2).

3.26.3. No more than 6,000 feet of element spacing. (T-2).

3.26.4. If using an offset box formation, offset away from the direction of the break. (T-2).

3.26.5. The lead element will break to downwind abeam or over the touchdown point. (T-2).

3.26.6. The second element (or aircraft if three-ship formation) will delay a break to downwind until number 2 is clear of the intended flightpath. (T-2).

3.26.7. Use normal overhead altitude and airspeed. (T-2).

3.26.8. Normal downwind, base turn positions and spacing will be flown. (T-2).

3.26.9. The ATC agency must be familiar with the procedure to be flown. (T-2).

3.27. Low Approaches:

3.27.1. Observe the following minimum altitudes:

3.27.1.1. For IPs or FEs flying chase position, 50 feet AGL. (T-2).

3.27.1.2. For formation low approaches, 100 feet AGL. (T-2).

3.27.1.3. For chase aircraft during an emergency, 300 feet AGL unless safety or circumstances dictate otherwise. (T-2).

3.27.2. During go-around, remain 500 feet below a VFR overhead traffic pattern altitude until crossing the departure end of the runway (unless local procedures, missed approach, climbout procedures, or controller instructions dictate otherwise). (T-2).

3.28. Closed Traffic Patterns. Pilots will initiate the pattern at the departure end of the runway unless directed or cleared otherwise by local procedures or the controlling agency. (T-2). When in formation, a sequential closed may be flown with ATC concurrence.

3.29. Rear Cockpit Approaches and Landings:

3.29.1. Only qualified IPs or those enrolled in a course of qualification leading to instructor certification, with an IP in the front cockpit, will perform rear cockpit landings. (T-2).

3.29.2. During rear cockpit approaches and landings, the front cockpit 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. (T-2).

3.30. Formation Approaches:

3.30.1. Accomplish formation approaches from an instrument approach or a VFR straight-in approach, using precision approach path indicator or visual approach slope indicator lights, if available. (T-2). In all cases, use a rate of descent similar to that of a normal precision approach. (T-2).

3.30.2. The minimum weather required is a 500-foot ceiling and 1 1/2 miles visibility. (T-2).

3.30.3. The maximum number of aircraft is two. (T-2). Both aircraft must be similarly configured. (T-2). Do not consider the weapon system support pod configurations. Non-propulsion modernization program (PMP) modified aircraft may fly formation approaches with PMP modified aircraft.

3.31. Formation Landings:

3.31.1. A qualified flight lead must lead formation landings unless an IP is in the element. (T-2).

3.31.2. The flight lead will position the wingman on the upwind side if the crosswind exceeds 5 knots. (T-2). Do not land as a formation if the crosswind component, including gusts, exceeds 15 knots. (T-2).

3.31.3. The wingman will maintain a minimum of 10 feet lateral wingtip spacing. (T-2).

3.31.4. If the wingman overruns the lead after landing, both pilots will accept the overrun, maintain the appropriate side of the runway and maintain aircraft control. (T-2). The most important considerations are wingtip clearance and aircraft control.

3.31.5. Pilots will not land in formation:

3.31.5.1. When the runway is reported wet or when ice, slush, or snow is on the runway. **(T-2)**.

3.31.5.2. When the runway width is less than 150 feet. **(T-2)**.

3.31.5.3. If arresting gear tape connectors extend onto the runway surface at the approach end of 150-foot wide runways. **(T-2)**.

3.31.5.4. With a PMP aircraft on the wing of a non-PMP aircraft. **(T-2)**.

3.32. Landing Restrictions:

3.32.1. When the computed landing roll exceeds 80 percent of the available runway, land at an alternate runway. **(T-3)**.

3.32.2. When the runway condition reading at the base of intended landing is less than 10, land at an alternate runway. **(T-3)**.

3.32.3. Do not land over any raised web barrier (for example, MA-1A, BAK-15). **(T-2)**.

3.32.4. If the crosswind component, including gusts:

3.32.4.1. Exceeds 15 knots (dry runway) or 10 knots (wet runway), solo undergraduate flying training students will land at an alternate runway. **(T-3)**.

3.32.4.2. Exceeds 15 knots, the minimum runway length for 60- and 100-percent flap touch-and-go's on runways without a suitable barrier is 10,000 feet. **(T-2)**. Do not perform no-flap touch-and-go landings on runways without a suitable barrier when the crosswind component exceeds 15 knots. **(T-2)**.

Chapter 4

AIR-TO-AIR WEAPONS EMPLOYMENT

4.1. References. AFI 11-214 contains air-to-air procedures applicable to all aircraft. This chapter specifies additional procedures or restrictions applicable to T-38 operations.

4.2. Maneuvering Limitations:

4.2.1. Negative G guns jink maneuvers are prohibited. **(T-2).**

4.2.2. Minimum airspeed during offensive or defensive maneuvering low altitude training is 350 KTS. **(T-2).**

4.2.3. Minimum maneuvering airspeed during air combat training is 150 KTS. **(T-2).**

Chapter 5

AIR-TO-SURFACE WEAPONS EMPLOYMENT

5.1. References. AFI 11-214 contains air-to-surface procedures applicable to all aircraft. This chapter specifies procedures or restrictions applicable to T-38 operations. Qualification and scoring criteria are contained in AFMAN 11-2T-38, V1.

5.2. Weather Minimums. Basic weather minimums established in AFI 11-214 apply. **(T-2).** In no case will the ceiling be lower than 2,000 feet AGL for climbing or diving deliveries or 1,500 feet AGL for level deliveries. **(T-2).**

5.3. Popup Attacks. Abort popup attacks if airspeed decreases below 300 KTS. **(T-2).**

5.4. Night Weapons Delivery and Range Operations. Night weapons delivery and range operations are prohibited. **(T-2).**

Chapter 6

ABNORMAL OPERATING PROCEDURES

6.1. General. Follow the procedures in this chapter when abnormal circumstances occur. These procedures do not supersede procedures contained in the flight manual. (T-2).

6.1.1. Pilots will not accept an aircraft for flight with a malfunction addressed in the emergency or abnormal procedures section of the flight manual until appropriate corrective actions have been accomplished. (T-2).

6.1.2. Do not taxi an aircraft with nosewheel steering, brake system, canopy, or generator malfunctions or failures. (T-2).

6.1.3. Once a malfunctioning system is isolated and/or the fault corrected, the system will not be used again unless it is essential for recovery. (T-2). Pilots will not conduct ground or in-flight troubleshooting after flight manual emergency procedures are completed. (T-2).

6.1.4. Pilots will record all inadvertent supersonic events according to AFI 13-201, *Airspace Management*. (T-2). Units will use AF Form 4290, *Unplanned Supersonic Flight Activity Log*, following guidance at [Attachment 2](#) to record inadvertent supersonic events. (T-2).

6.2. Ground Aborts:

6.2.1. If a flight member aborts prior to takeoff and the flight lead rennumbers the flight to maintain a numerical call sign sequence, flight lead will advise the appropriate agencies of such changes. (T-2).

6.2.2. If the flight lead aborts, a flight of two or more aircraft with no designated flight lead in the formation must either sympathetically abort or proceed on prebriefed single-ship missions. (T-2).

6.2.3. Pilots who do not take off with the flight may join the flight at a briefed rendezvous point prior to a tactical event or may fly a briefed alternate single-ship mission. If a join-up is to be accomplished on an air-to-ground range, all events will be terminated until the joining aircraft has achieved proper spacing. (T-2).

6.2.4. The PIC is primarily responsible for handling in-flight emergencies. (T-2). The additional pilot (if applicable) will confirm all critical action procedures have been accomplished and provide checklist assistance at the request of the PIC. (T-2).

6.3. Takeoff Aborts:

6.3.1. If an abort occurs during takeoff roll, give the call sign and state intentions when practical. Following aircraft will alter their takeoff roll to ensure clearance or abort the takeoff if adequate clearance cannot be maintained. The phrase “barrier, barrier, barrier” will be used to direct the tower to raise the departure end barrier. (T-2).

6.3.2. When aborting, if hot brakes are suspected, declare a ground emergency. (T-2). Taxi the aircraft to the designated hot brake area and follow hot brake procedures. (T-2).

6.4. Air Aborts:

6.4.1. If an abort occurs after takeoff, all aircraft will maintain their original numerical call sign. (T-2).

6.4.2. Aborting aircraft with an emergency condition should be escorted to the field of intended landing. When other than an emergency condition exists, the flight lead should determine if an escort for the aborting aircraft is required.

6.4.3. Regardless of apparent damage or subsequent normal operation, the mission will be aborted for any of the following:

6.4.3.1. Birdstrike or foreign object damage. **(T-2)**.

6.4.3.2. Over-G. **(T-2)**. The aircraft will land as soon as practical out of a straight-in approach. **(T-2)**.

6.4.3.3. Flight control system anomalies. **(T-2)**.

6.4.3.4. Engine flameout, stagnation, or shutdown. **(T-2)**.

6.4.4. Report all engine anomalies during maintenance debriefing. **(T-2)**.

6.5. Radio Failure:

6.5.1. Formation:

6.5.1.1. A pilot who experiences total radio failure while in close or route formation will maneuver within close or route parameters to attract the attention of another flight member and give the appropriate visual signals. **(T-2)**. The mission should be terminated as soon as practical and the aircraft with radio failure led to the base of intended landing or a divert base. A formation approach to a dropoff on final should be performed unless safety considerations dictate otherwise.

6.5.1.2. If flying other than close or route formation when radio failure occurs, the aircraft should attempt to rejoin to a route position at approximately 500 feet on another flight member. The aircraft with radio failure is responsible for maintaining clearances from other flight members until its presence is acknowledged by a wing rock, signifying clearance to join. Once joined, aircraft with radio failure should give the appropriate visual signals. If prebriefed, the aircraft with radio failure may proceed to a rendezvous point and hold. If no one has rejoined prior to reaching bingo fuel, the aircraft with radio failure should proceed to the base of intended landing or a divert base. Aircraft experiencing any difficulty or emergency, in addition to radio failure, will proceed as required by the situation. **(T-2)**.

6.5.2. Surface Attack with Lost Communications Procedures:

6.5.2.1. For class A and manned class B ranges:

6.5.2.1.1. Attempt contact with the range control officer on the appropriate backup frequency. **(T-2)**.

6.5.2.1.2. If contact cannot be reestablished, make a pass by the range control tower on the attack heading while rocking wings and turn in the direction of traffic. **(T-2)**. The flight lead will either rejoin the flight and return to base or direct another flight member to escort the aircraft with radio failure to a recovery base. **(T-2)**.

6.5.2.1.3. If the aircraft with radio failure 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 recovery base. (T-2). The flight lead will direct a flight member to join up and escort the emergency aircraft. (T-2).

6.5.2.2. For unmanned class B and class C ranges, make a pass on the target, if possible, while rocking wings. (T-2). The leader will either rejoin the flight in sequence and recover or direct another flight member to escort the aircraft with radio failure to a recovery base. (T-2). If the aircraft with radio failure has an emergency, the aircraft will (if practical) make a pass on the target, rock its wings, turn the opposite direction of traffic and proceed to a recovery base. (T-2). The flight lead will direct a flight member to join up and escort the emergency aircraft. (T-2).

6.5.2.3. If radio failure occurs and circumstances prevent landing with unexpended ordnance, safe jettison of ordnance may be accomplished if the following conditions are met:

6.5.2.3.1. The aircraft with radio failure joins on another flight member who has radio contact with the range control office. (T-2).

6.5.2.3.2. Jettison visual signals specified in AFPAM 11-205 are relayed to the aircraft with radio failure to initiate jettison. (T-2).

6.5.3. **Radio Failure Recovery.** For a radio failure recovery, the procedures in AFPAM 11-205 and FLIP apply. (T-2). If a formation straight-in approach is flown and a go-around becomes necessary, the chase will go around, pass the aircraft with radio failure and rock its wings. (T-2). The aircraft with radio failure should go around if the situation allows. If the aircraft with radio failure is in formation as a wingman, the lead will initiate a gentle turn into the wingman and begin the go-around. (T-2).

6.6. Severe Weather Penetration. Do not attempt to fly through severe weather. (T-3). However, if severe weather is unavoidable, prior to severe weather penetration, flights should split up and obtain separate clearances.

6.7. Lost Wingman Procedures. In any lost wingman situation, immediate separation of aircraft is essential. On losing sight of the lead, the wingman will simultaneously execute applicable lost wingman procedures while transitioning to instruments. (T-2). Smooth application of control inputs is imperative to minimize spatial disorientation effects. Once lost wingman procedures have been executed and the wingman regains visual, wingman must obtain permission from the flight lead to rejoin the flight. (T-2).

6.7.1. For two- or three-ship flights, in wings-level flight (climb, descent, or straight and level) simultaneously inform the lead and turn away, using 15 degrees of bank for 15 seconds. (T-2). Then resume the heading and obtain a separate clearance.

6.7.1.1. When outside the turn, reverse the direction of turn, using 15 degrees of bank for 15 seconds and inform the lead. (T-2). Continue straight ahead to ensure separation prior to resuming the turn. Obtain a separate clearance. (T-2).

6.7.1.2. When inside the turn, momentarily reduce power to ensure nose-tail separation and inform the flight lead to roll out of the turn. (T-2). Maintain angle of bank to ensure lateral separation and obtain separate clearance. (T-2). The lead may resume the turn only when separation is ensured. **Note:** If in three-ship echelon, refer to four-ship lost wingman procedures ([paragraph 6.7.2.](#))

6.7.1.3. For a precision or nonprecision final, the wingman will momentarily turn away to ensure separation, commence a climb, inform lead, proceed to the missed approach point and carry out the published missed approach procedure while obtaining a separate clearance from approach control. **(T-2)**.

6.7.1.4. For a missed approach, the wingman will momentarily turn away to ensure separation, inform lead and continue the published or assigned missed approach procedure while climbing to 500 feet above missed approach altitude. **(T-2)**. The wingman will obtain a separate clearance from approach control. **(T-2)**.

6.7.2. For four-ship flights, if only one aircraft in the flight becomes separated, the previous procedures will provide safe separation. However, because it is impossible for number 4 to immediately ascertain that number 3 still has visual contact with the lead, it is imperative that number 4's initial action be based on the assumption that number 3 has also become separated. Numbers 2 and 3 will follow the procedures outlined in [paragraph 6.7.1.](#) Number 4 will follow the appropriate procedure as follows:

6.7.2.1. For wings-level flight, number 4 will simultaneously inform the lead and turn away, using 30 degrees of bank for 30 seconds. **(T-2)**. Number 4 will then resume heading and obtain a separate clearance. **(T-2)**.

6.7.2.2. When outside the turn, number 4 will reverse direction of the turn, using 30 degrees of bank for 30 seconds to ensure separation from lead and number 3. **(T-2)**. Number 4 will then obtain a separate clearance. **(T-2)**.

6.7.2.3. When inside the turn, number 4 will momentarily reduce power to ensure nose-tail separation and increase bank angle by 15 degrees. **(T-2)**. Number 4 will inform the lead to roll out. **(T-2)**. Then obtain a separate clearance. The lead will resume the turn only when separation is ensured. **(T-2)**.

6.7.3. The flight lead should acknowledge the lost wingman's radio call and transmit attitude, heading, altitude, airspeed and other parameters, as appropriate. Care must be taken to observe published terrain clearance limits.

6.7.4. If a wingman becomes separated and any aircraft experiences radio failure, the aircraft with the operational radio will obtain a separate clearance. **(T-2)**. The aircraft with radio failure will turn the transponder to normal code 7600 while proceeding with the previous clearance. **(T-2)**. If an emergency situation arises along with radio failure, turn the transponder to Emergency for the remainder of the flight. **(T-2)**.

6.7.5. With the flight lead's permission, wingmen may rejoin if weather conditions permit and a visual join-up can be accomplished.

6.7.6. Practice lost wingman procedures only in day VMC. **(T-2)**.

6.8. Spatial Disorientation (SD). Conditions that prevent a clear visual horizon or increase pilot tasking are conducive to SD. To prevent SD, the pilot will make a conscious attempt to increase his or her instrument cross-check rate. **(T-2)**. When SD symptoms are detected, the following steps will be taken until symptoms abate:

6.8.1. **Single-Ship:**

6.8.1.1. Concentrate on flying basic instruments with frequent reference to the attitude indicator. Use heads-down instruments. Defer nonessential cockpit tasks. If flying dual, consider transferring control to the other pilot.

6.8.1.2. If symptoms persist, bring the aircraft to straight-and-level flight with reference to the attitude indicator, conditions permitting. **(T-2)**. If the terrain permits, maintain a straight- and-level flight until symptoms abate.

6.8.1.3. If necessary, declare an emergency and advise ATC. **Note:** It is possible for SD to proceed to the point where the pilot is unable to see, interpret, or process information from the flight instruments. Aircraft control in such a situation is impossible. A pilot must recognize when physiological or psychological limits have been exceeded and be prepared to abandon the aircraft.

6.8.2. Formation Lead:

6.8.2.1. A flight lead experiencing SD will notify the wingmen. **(T-2)**. The flight lead will then comply with procedures in **paragraph 6.8.1 (T-2)**.

6.8.2.2. If possible, wingmen should confirm attitude and provide verbal feedback to lead.

6.8.2.3. If symptoms persist, the lead will terminate the mission and recover the flight by the simplest and safest means possible. **(T-2)**.

6.8.3. Formation Wingman:

6.8.3.1. The wingman will advise the lead when disorientation makes it difficult for the wingman to maintain position. **(T-2)**.

6.8.3.2. The lead will advise the wingman of aircraft attitude, altitude, heading and airspeed. **(T-2)**.

6.8.3.3. If symptoms persist, the lead will establish a straight-and-level flight for approximately 30 to 60 seconds, conditions permitting. **(T-2)**.

6.8.3.4. If the above procedures are not effective, the 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, the wingman will maintain straight-and-level flight for approximately 60 seconds. **(T-2)**. If necessary, terminate the tactical mission and recover by the simplest and safest means possible.

6.8.4. **Three- or Four-Ship Formation.** The lead should separate the flight into elements to more effectively handle a wingman with persistent SD symptoms. If the terrain permits, establish straight-and-level flight. The element with the SD pilot will remain straight-and-level while the other element separates from the flight. **(T-2)**.

6.9. In-flight Practice of Emergency Procedures:

6.9.1. A simulated emergency procedure is a procedure that produces an effect that would closely parallel the actual emergency, such as retarding the throttle to a degree that produces a drag equivalent to a flamed out or idle engine.

6.9.2. All training related to aborted takeoffs will be accomplished in the flight simulator, cockpit familiarization trainer, or static aircraft. **(T-2)**.

6.9.3. Practice in-flight engine shutdown is prohibited except for functional check flight training requirements. (T-2).

6.9.4. Refer to AFMAN 11-202, V3 and applicable MAJCOM supplements for emergency landing patterns. (T-2).

6.10. Search and Rescue (SAR) Procedures. If an aircraft is lost in flight, actions must immediately begin to locate possible survivors and initiate rescue efforts. All flight members must aggressively pursue location and rescue of downed personnel, even if they seem uninjured. (T-2). Many downed aircrews initially suffer from shock or have delayed reactions to ejection injuries. The following procedures are by no means complete and should be adjusted to meet each unique SAR situation: (**Note:** Specific procedures will be detailed in the unit local supplement.)

6.10.1. **Squawk.** Immediately terminate maneuvering, using appropriate KIO procedures. (T-2). Establish a SAR commander. (T-2). Place the transponder in to Emergency to alert ATC or ground control intercept of the emergency situation. (T-2).

6.10.2. **Talk.** Communicate the emergency situation and aircraft or flight intentions immediately to applicable control agencies. (T-2). Use Guard frequency if necessary. Do not use aircrew names on the radio; individual crew positions may be referenced by using the call sign and the suffix ALPHA to refer to the front cockpit occupant and BRAVO to refer to the rear cockpit occupant (for example, Cobra 04 ALPHA or Cobra 04 BRAVO).

6.10.3. **Mark.** Mark the last known position of survivors or crash site, using any means available. (T-2). Use the very high frequency omnidirectional range, TACAN, or inertial navigation system position; ATC or ground controlled intercept positioning; or ground references to identify the immediate area for subsequent rescue efforts. (T-2).

6.10.4. **Separate.** Remain above the last observed parachute altitudes until the position of all possible survivors is determined. (T-2). As a guide, allow 1 minute per 1,000 feet for a deployed parachute to descend. Deconflict other aircraft assisting in the SAR by altitude to prevent a midair collision. (T-2). Establish high or low combat air patrol, as necessary, to facilitate communications with other agencies. (T-2).

6.10.5. **Bingo.** Revise bingo fuels or recovery bases as required to maintain maximum SAR coverage over survivors or crash site. Do not overfly bingo fuel. (T-2). Relinquish SAR operation to designated rescue forces on their arrival.

6.11. Solo Student Restrictions (*Undergraduate Flying Training only*):

6.11.1. Solo students will not perform the following:

6.11.1.1. Traffic pattern stalls, approach to stalls and slow flight. (T-2).

6.11.1.2. Advanced handling characteristics maneuvers. (T-2).

6.11.1.3. Practice nose high and low recoveries. (T-2).

6.11.1.4. Practice lost wingman as wing. (T-2).

6.11.1.5. Rolling takeoffs. (T-2).

6.11.1.6. Practice emergency patterns and landings. (T-2).

6.11.1.7. Low closed or circling approaches. (T-2).

6.11.1.8. Formation landings. (T-2).

6.11.1.9. Takeoffs with crosswinds (including gusts) greater than 15 knots, or landings with crosswinds (including gusts) greater than 15 knots (dry) or 10 knots (wet). (T-2).

6.11.1.10. Patterns and landings with more than 2,500 pounds of fuel. (T-2).

6.11.1.11. Flight in an aircraft with any known malfunction or requiring an operational check (**Exception:** Inoperative instrumentation in the rear cockpit). (T-2).

6.11.1.12. Any unbriefed maneuver. (T-2).

6.11.1.13. On the wing of another solo student. (T-2).

6.11.1.14. Formation low approaches below 300 feet AGL. (T-2).

6.11.2. Solo student minimum fuel is 800 pounds. (T-2).

6.11.3. Post-contact checkride solo students may climb and descend through IMC if the ceiling is at or above 5,000 feet AGL and not more than 2,000 feet thick. Minimum in-flight visibility above and below the ceiling is 5 miles. Solo students will not level off or cruise in any IMC. (T-2).

6.12. Birdstrike and Loss of Canopy Procedures:

6.12.1. Following any birdstrike that enters the cockpit, or loss of canopy, there is high potential for extreme confusion and disorientation. Pilots should use extreme care to avoid situations resulting in both crewmembers attempting to fly the aircraft at the same time.

6.12.2. The crewmember with the intact canopy should be prepared to assume or maintain control of the aircraft. The pilot flying prior to the birdstrike or loss of canopy should maintain aircraft control (if able) until a positive transfer of aircraft control has occurred. The pilot not flying should monitor flight parameters and be ready to immediately assume control if the pilot flying is not responding appropriately (by initiating a climb if in the low-altitude environment).

6.12.3. If the aircraft is at low altitude when the birdstrike or canopy loss occurs, the pilot flying should (if able) immediately select MIL or MAX power on both engines and establish a climb away from the ground. The pilot not flying should be prepared to assume control of the aircraft if the pilot flying does not initiate a climb away from the ground.

6.12.4. In the case of a birdstrike that has entered the cockpit or canopy loss with a corresponding loss of intercom or communication difficulty, the pilot assuming control of the aircraft should shake the stick and the pilot relinquishing control should show his/her hands, if able, unless prebriefed otherwise. (See [paragraph 3.14.](#))

6.13. Nonpilot Aircrew Flying. MAJCOMs may establish procedures and restrictions for nonpilot aircrew member control of the aircraft.

MARK D. KELLY, Lt Gen, USAF
Deputy Chief of Staff, Operations

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

Air Force Policy Directive 11-2, *Aircrew Operations*, 31 January 2019

AFI 11-200, *Aircrew Training, Standardization/Evaluation and General Operations Structure*, 21 September 2018

AFI 11-202, V3, *General Flight Rules*, 10 August 2016

AFPAM 11-205, *Aircrew Quick Reference to Aircraft Cockpit and Formation Flight Signals*, 9 August 2018

AFI 11-209, *Participation in Aerial Events*, 22 May 2018

AFI 11-214, *Air Operations Rules and Procedures*, 14 August 2012

AFI 11-215, *Flight Manuals Program*, 25 March 2019

AFMAN 11-218, *Aircraft Operations and Movement on the Ground*, 5 April 2019

AETCMAN 11-251, V1, *T-38C Flying Fundamentals*, 4 April 2017

AFMAN 11-2T-38, V1, *T-38 Aircrew Training*, 14 May 2020

AFI 13-201, *Airspace Management*, 21 August 2012

AFI 13-204, V3, *Airfield Operations Procedures and Programs*, 1 September 2010

AFI 33-360, *Publications and Forms Management*, 1 December 2015

AFI 33-322, *Records Management and Information Governance Program*. 23 March 2020

Air Force Tactics, Techniques and Procedures 3-2.5, *Multi-service Brevity Codes (FOUO)*, 1 July 2016

Time Compliance Technical Order 1T-38C-546, 1 April 2009

TO 1T-38A-1, *Flight Manual, USAF Series T-38A and AT-38B Aircraft*, 15 July 2011

TO 1T-38C-1, *Flight Manual, USAF Series T-38C Aircraft*, 8 March 2016

FAA AC 90-100A, *U.S. Terminal and En Route Area Navigation Operations*, 1 March 2007

Prescribed Forms

AF Form 4290, *Unplanned Supersonic Flight Activity Log*

Adopted Forms

DAF Form 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

AB—afterburner

AFMAN—Air Force manual

AGL—above ground level

ATC—air traffic control

EGI—inertial navigation system

FLIP—flight information publication

GPS—Global Positioning System

IFR—instrument flight rules

IMC—instrument meteorological conditions

IP—instructor pilot

KIO—knock it off

KTS—knots, airspeed as displayed in the cockpit -- indicated or calibrated

MAJCOM—major command

MIL—military

MSA—minimum safe altitude

MSL—mean sea level

nm—nautical mile

MOA—military operating area

OPR—office of primary responsibility

PIC—pilot in command

PMP—propulsion modernization program

RAA—route abort altitude

RCAM—Runway Condition Assessment Matrix

RNAV—terminal area navigation

SAR—search and rescue

SD—spatial disorientation

TACAN—tactical air navigation

TO—technical order

VFR—visual flight rules

VMC—visual meteorological conditions

Attachment 2

INSTRUCTIONS FOR USING AF FORM 4290

A2.1. Purpose. Units use the AF Form 4290 to document unplanned supersonic flights according to the requirements of AFI 13-201. Logging of planned supersonic flights is not required.

A2.2. Scope. Table A2.1 provides instructions for units documenting unplanned supersonic flights on AF Form 4290.

Table A2.1. Instructions for Using AF Form 4290.

I T E M	A	B	C
	In Block	Enter	Remarks
1	UNIT	The unit that authorized the flights.	Use a separate form for each unit.
2	BASE	Departure point of flights.	Use a separate form for each departure point.
3	FROM	Starting date of flights listed.	
4	TO	Ending date of flights listed.	Complete only when this form is no longer used, or filed.
5	DATE	Date of unplanned supersonic flight.	
6	CALL SIGN	Call sign of aircraft.	Use additional lines for each aircraft in a flight.
7	TYPE AIRCRAFT	Type of aircraft.	
8	LOCATIONS	The special use airspace identifier, designated route number, or coordinates along supersonic route.	Navigation fixes may also be listed.
9	ALTITUDES	Highest and lowest altitudes of supersonic activity.	
10	NOTIFICATIONS	Personnel and offices notified, if any.	As required by local procedures.

Attachment 3**GROUND OPS/TAKEOFF/DEPARTURE BRIEFING GUIDE****A3.1. Mission Data:**

- A3.1.1. Time Hack.
- A3.1.2. Emergency Procedure/Threat of the Day.
- A3.1.3. Mission Objectives.
- A3.1.4. Mission Overview.
- A3.1.5. Mission Data Card:
 - A3.1.5.1. Mission Commander/Deputy Lead.
 - A3.1.5.2. Joker/Bingo Fuel.
 - A3.1.5.3. Takeoff and Landing Data.
 - A3.1.5.4. Working Area.
- A3.1.6. Weather/Sunrise/Sunset/Moon Illumination.
- A3.1.7. Notices to Airmen/Birdstrike Potential.
- A3.1.8. Personal Equipment.
- A3.1.9. Flight Crew Information File/Pubs/Maps.

A3.2. Ground Procedures:

- A3.2.1. Preflight:
 - A3.2.1.1. Aircraft.
 - A3.2.1.2. Armament.
- A3.2.2. Check In.
- A3.2.3. Taxi/Marshaling/Arming.
- A3.2.4. Spare Procedures.

A3.3. Takeoff:

- A3.3.1. Runway Lineup.
- A3.3.2. Formation Takeoff.
- A3.3.3. Takeoff Interval.
- A3.3.4. Abort.
- A3.3.5. Jettison Procedures.
- A3.3.6. Low-Altitude Ejection.
- A3.3.7. Landing Immediately After Takeoff.

A3.4. Departure/En Route:

A3.4.1. Routing.

A3.4.2. Trail Departure.

A3.4.3. Join-up/Formation.

A3.4.4. Systems/Ops Checks.

A3.4.5. MOA/Low-Level Entry

Attachment 4**RECOVERY/AFTER LANDING BRIEFING GUIDE****A4.1. Recovery:**

A4.1.1. Rejoin.

A4.1.2. Battle Damage/Bomb Check.

A4.1.3. Type Recovery.

A4.1.4. Flight Breakup.

A4.1.5. Pattern and Landing.

A4.2. After Landing/Dearm.**A4.3. Emergency/Alternate Airfields.**

Attachment 5**SPECIAL SUBJECT BRIEFING GUIDE**

- A5.1. Instructor Responsibilities.**
- A5.2. Chase Procedures.**
- A5.3. Transponder Procedures.**
- A5.4. Visual Search Responsibilities/Midair Collision Avoidance.**
- A5.5. Dissimilar Formations.**
- A5.6. Terrain Avoidance:**
 - A5.6.1. Departure/En Route/Recovery.
 - A5.6.2. MSL Floor Settings.
- A5.7. Birdstrike Procedures/Visor Use.**
- A5.8. Hazards Associated with Human Factors:**
 - A5.8.1. Channelized Attention.
 - A5.8.2. Task Saturation/Prioritization.
 - A5.8.3. Complacency.
- A5.9. G Awareness:**
 - A5.9.1. Turn/G-Suit Connection/G Tolerance.
 - A5.9.2. Use of L-1 Anti-G Straining Maneuver.
- A5.10. Visual Illusions/Perceptions.**
- A5.11. Spatial Disorientation/Unusual Attitudes/G Excess Illusion.**
- A5.12. Lost Wingman.**
- A5.13. Radio Inoperative.**
- A5.14. SAR.**
- A5.15. Recall Procedures.**
- A5.16. Special Interest Items.**
- A5.17. Crew/Cockpit Resource Management.**
- A5.18. Operational Risk Management.**

Attachment 6**ADVANCED HANDLING/INSTRUMENT BRIEFING GUIDE****A6.1. Airwork:**

- A6.1.1. Airspace Restrictions.
- A6.1.2. Area Orientation.
- A6.1.3. Instructor Responsibilities.
- A6.1.4. Maneuvers.

A6.2. Approaches:

- A6.2.1. Frequencies.
- A6.2.2. Holding.
- A6.2.3. Penetration.
- A6.2.4. Missed Approach/Climbout.

A6.3. Special Subjects:

- A6.3.1. G Awareness.
- A6.3.2. Fuel Awareness/AB Use/Consumption Rates.
- A6.3.3. Maneuvering Limitations:
 - A6.3.3.1. Airspeed and G.
 - A6.3.3.2. Recognition/Prevention/Recovery From Out of Control.
 - A6.3.3.3. Maneuvering at Heavyweight/High Angles of Attack.
 - A6.3.3.4. Effects of Center of Gravity throughout the Flight.
 - A6.3.3.5. Time to Ground Impact (Wings Level, Overbank and Under-G).
- A6.3.4. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Attachment 7**AIR COMBAT TRAINING/INTERCEPT BRIEFING GUIDE****A7.1. General/Adversary Coordination/Ground Controlled Intercept Coordination:**

A7.1.1. Call Signs.

A7.1.2. Number and Type Aircraft.

A7.1.3. Scenario:

A7.1.3.1. Objectives.

A7.1.3.2. Type Threat Simulated/Tactics Limitations (if any).

A7.1.3.3. Combat Air Patrol Points/Target Locations.

A7.1.3.4. Safe Areas/Forward Edge of the Battle Area/Ground Threats.

A7.1.3.5. Visual Identification/Beyond Visual Range Criteria.

A7.1.4. Mission Contingencies:

A7.1.4.1. No Ground Controlled Intercept.

A7.1.4.2. Single Frequency.

A7.1.4.3. Area Weather/Alternate Mission.

A7.1.4.4. Aircraft Fallout Plan (Primary/Alternate Missions).

A7.1.4.5. Rejoin in Area for Late Takeoffs.

A7.1.5. Area Information:

A7.1.5.1. Controlling Agency:

A7.1.5.1.1. Ground Controlled Intercept/Flight.

A7.1.5.1.2. Communications Requirements.

A7.1.5.1.3. Type/Level of Control.

A7.1.5.2. Airspace Restrictions.

A7.1.5.3. Combat Air Patrol Points/Target Locations.

A7.1.5.4. Frequencies.

A7.1.5.5. Squawks.

A7.1.5.6. Block Altitudes/Minimum Altitudes/Flight Parameters.

A7.1.5.7. Transmissions:

A7.1.5.7.1. KIO.

A7.1.5.7.2. Shots/Kills.

A7.1.5.7.3. Fuel/Altitude Awareness.

A7.1.6. Rendezvous/Recovery Procedures/Dissimilar Formation.

A7.1.7. Weapons Employment:

A7.1.7.1. Simulated Ordnance (Type/Quantity).

A7.1.7.2. Shot Criteria.

A7.1.7.3. Kill Criteria/Removal.

A7.1.7.4. Shot/Kill Passage.

A7.1.8. Training Rules.

A7.1.9. Emergency Procedures:

A7.1.9.1. Recovery.

A7.1.9.2. Escort Procedures.

A7.1.10. Debriefing (Time/Place).

A7.2. Flight/Element Tactics:

A7.2.1. Avionics Setup:

A7.2.1.1. Transponder.

A7.2.1.2. Air-to-Air TACAN.

A7.2.2. Combat Air Patrol /Patrol Phase:

A7.2.2.1. Type Pattern.

A7.2.2.2. Formation/Altitude/Airspeed.

A7.2.2.3. Search Responsibilities.

A7.2.2.4. Commit:

A7.2.2.4.1. Criteria/Range.

A7.2.2.4.2. Procedures.

A7.2.3. Ingress/Intercept Phase:

A7.2.3.1. Formation/Altitude/Airspeed.

A7.2.3.2. Detection:

A7.2.3.2.1. Search Responsibilities (Visual).

A7.2.3.3. Targeting Plan.

A7.2.3.4. Intercept Type/Planned Tactics:

A7.2.3.4.1. Plan (Direct Attack/Deception).

A7.2.3.4.2. Mutual Support Requirements.

A7.2.3.4.3. Identification Requirements/Procedures.

A7.2.3.4.4. Minimum Altitudes/Airspeeds.

A7.2.3.4.5. Vertical/Horizontal Conversions/Turning Room.

A7.2.4. Engagement Phase:

A7.2.4.1. Plan:

A7.2.4.1.1. Turn and Fight.

A7.2.4.1.2. Hit and Run.

A7.2.4.1.3. Abort.

A7.2.4.2. Clearance for Wingman to Engage:

A7.2.4.2.1. Offensive.

A7.2.4.2.2. Defensive.

A7.2.4.3. Alternate Plan (Degraded Situation).

A7.2.5. Egress/Separation Phase:

A7.2.5.1. Disengagement Plan (Why/When/How):

A7.2.5.1.1. Loss of Mutual Support.

A7.2.5.1.2. Fuel.

A7.2.5.1.3. Ordnance.

A7.2.5.2. Egress Formation/Responsibilities.

A7.2.6. Contingencies:

A7.2.6.1. Single Contact.

A7.2.6.2. Short Range Commit.

A7.2.6.3. Single Ship (Loss of Mutual Support).

A7.2.6.4. Safe Escape/Rendezvous Point.

A7.2.7. Additional Considerations:

A7.2.7.1. Threat Reaction.

A7.2.7.2. Degraded Systems.

A7.2.7.3. Tactical Lead Changes.

A7.2.7.4. Bandit Options.

A7.2.7.5. Film/Videotape Recorder.

A7.2.7.6. Codewords.

A7.2.8. Alternate Mission:

A7.2.8.1. Type Mission (Refer to appropriate mission briefing guide).

A7.2.8.2. Mission Objectives.

A7.3. Special Subjects:

A7.3.1. G Awareness.

A7.3.2. Fuel Awareness/AB Use/Consumption Rates.

A7.3.3. Flightpath Deconfliction.

A7.3.4. Maneuvering Limitations:

A7.3.4.1. Airspeed and G.

A7.3.4.2. Recognition/Prevention/Recovery from Out of Control.

A7.3.4.3. Time to Ground Impact:

A7.3.4.3.1. Wings Level.

A7.3.4.3.2. Overbank/Under G.

A7.3.5. Hazards Associated with Human Factors (Channelized Attention, Task Saturation and Complacency).

Attachment 8**BASIC FIGHTER MANEUVERS/AIR COMBAT MANEUVERING BRIEFING GUIDE****A8.1. Area Work:**

- A8.1.1. Area Description/Restrictions.
- A8.1.2. G Warmup.
- A8.1.3. Belly/Guns.
- A8.1.4. Roll-Slides.
- A8.1.5. Other Exercises.

A8.2. Setups:

- A8.2.1. Objectives.
- A8.2.2. Type Threat Simulated/Tactics Limitations.
- A8.2.3. Floor.
- A8.2.4. Beyond Visual Range:
 - A8.2.4.1. Geometry.
 - A8.2.4.2. Heading/Altitude/Airspeeds.
 - A8.2.4.3. Points/Blocks.
- A8.2.5. Perch Setups:
 - A8.2.5.1. Position.
 - A8.2.5.2. Altitude.
 - A8.2.5.3. Airspeeds.
 - A8.2.5.4. Visual/Camera On.
- A8.2.6. Butterfly - Line Abreast/Action/—Fights On.

A8.3. Weapons:

- A8.3.1. Type Used/Engagement.
- A8.3.2. Shot/Kill Criteria.
- A8.3.3. Parameters/Restrictions/Simulations.

A8.4. KIO/Terminate/Between Engagements:

- A8.4.1. Maintain Tally/Visual.
- A8.4.2. Airspeed.
- A8.4.3. Formation.
- A8.4.4. Camera Off/Fuel Check.

A8.5. Desired Learning Objectives.**A8.6. Special Subjects:**

A8.6.1. G Awareness.

A8.6.2. Fuel Awareness/AB Use/Consumption Rates.

A8.6.3. Flightpath Deconfliction.

A8.6.4. Maneuvering Limitations:

A8.6.4.1. Airspeed and G.

A8.6.4.2. Recognition/Prevention/Recovery from Out of Control.

A8.6.4.3. Time to Ground Impact:

A8.6.4.3.1. Wings Level.

A8.6.4.3.2. Overbank/Under G.

A8.6.5. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Attachment 9**ESCORT MISSION BRIEFING GUIDE****A9.1. En Route to Rendezvous/Post-Mission Navigation:**

- A9.1.1. Formation.
- A9.1.2. Route of Flight.
- A9.1.3. Control Agency Call Sign/Frequency.

A9.2. Rendezvous:

- A9.2.1. Protected Force Call Sign.
- A9.2.2. Altitude.
- A9.2.3. Airspeed.

A9.3. Escort Procedures:

- A9.3.1. Type Formation.
- A9.3.2. Tactics.
- A9.3.3. Escort Route.

A9.4. Training Rules.**A9.5. Alternate Mission:**

- A9.5.1. Type Mission. (Refer to appropriate mission briefing guide.)
- A9.5.2. Mission Objectives.

A9.6. Special Subjects:

- A9.6.1. Airspace Restrictions.
- A9.6.2. G Awareness.
- A9.6.3. Fuel Awareness/AB Use/Consumption Rate.
- A9.6.4. Flightpath Deconfliction.
- A9.6.5. Maneuvering Limitations:
 - A9.6.5.1. Airspeed and G.
 - A9.6.5.2. Recognition/Prevention/Recovery from Out of Control.
- A9.6.6. Time to Ground Impact:
 - A9.6.6.1. Wings Level.
 - A9.6.6.2. Overbank/**Under G**.
- A9.6.7. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Attachment 10**LOW-LEVEL NAVIGATION BRIEFING GUIDE****A10.1. General:**

A10.1.1. Route/Clearance/Restrictions.

A10.1.2. Flight Responsibilities:

A10.1.2.1. Navigation.

A10.1.2.2. Visual Search.

A10.1.3. Entry/Spacing/Holding/Initial Altitude (MSA).

A10.2. Route Procedures:

A10.2.1. Fence Checks.

A10.2.2. Tactical Formation/Turns.

A10.2.3. Low-Level Navigation:

A10.2.3.1. Dead Reckoning/Use of Navigation Aids/Equipment.

A10.2.3.2. Procedures/Techniques/Predictions.

A10.2.3.3. Visual Procedures/Techniques/Infrared Predictions.

A10.2.3.4. Updates/Calibrations.

A10.2.3.5. Time/Fuel Control.

A10.2.3.6. Terrain Avoidance/Wingman Considerations.

A10.2.3.7. Leg Altitudes/Obstacles (MSL/AGL).

A10.2.3.8. Turn Point Acquisition.

A10.2.4. Threat Reactions:

A10.2.4.1. Chaff/Flares.

A10.2.4.2. Engagement Criteria.

A10.2.4.3. Flightpath Deconfliction.

A10.2.4.4. Termination.

A10.3. Contingencies:

A10.3.1. Aircraft Fallout Plan.

A10.3.2. Rejoin after Late Takeoff.

A10.4. Emergencies:

A10.4.1. Aircraft Malfunctions.

A10.4.2. Route Abort Procedures (RAA/MSA)/ATC Frequencies.

A10.5. Training Rules/Special Operating Instructions.

A10.6. Alternate Mission:

A10.6.1. Type Mission. (Refer to appropriate mission briefing guide.)

A10.6.2. Mission Objectives.

A10.7. Special Subjects:

A10.7.1. Airspace Restrictions.

A10.7.2. G Awareness/Ops Checks.

A10.7.3. Fuel Awareness/AB Use/Consumption Rates.

A10.7.4. Flightpath Deconfliction.

A10.7.5. Maneuvering Limitations:

A10.7.5.1. Airspeed and G.

A10.7.5.2. Recognition/Prevention/Recovery from Out of Control.

A10.7.6. Time to Ground Impact:

A10.7.6.1. Wings Level.

A10.7.6.2. Overbank/Under G.

A10.7.7. Night Considerations.

A10.7.8. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Attachment 11**AIR-TO-SURFACE WEAPONS EMPLOYMENT/RANGE MISSION BRIEFING GUIDE*****Section A11A—Range Information*****A11.1. General Information:**

- A11.1.1. Target/Range Description.
- A11.1.2. Restrictions.
- A11.1.3. Range Entry/Holding.
- A11.1.4. Radio Procedures.
- A11.1.5. Formation.
- A11.1.6. Sequence of Events.
- A11.1.7. Pattern Procedures.
- A11.1.8. Aircraft Fallout Plan.
- A11.1.9. Rejoin on Range for Late Takeoffs.

A11.2. Employment Procedures and Techniques:

- A11.2.1. Avionics/Switch Positions:
 - A11.2.1.1. Weapons Switchology/Delivery Mode.
 - A11.2.1.2. Special Weapons Switchology.
- A11.2.2. Laydown:
 - A11.2.2.1. Ground Track/Altitude/Airspeed.
 - A11.2.2.2. Target.
 - A11.2.2.3. Pickle/Release Point.
 - A11.2.2.4. Breakaway/Recovery Technique.
 - A11.2.2.5. Backup Deliveries.
 - A11.2.2.6. Delivery Spacing.
- A11.2.3. Popup Delivery:
 - A11.2.3.1. Entry Airspeed/Altitude.
 - A11.2.3.2. Pop Point/Pullup Angle/Power Setting.
 - A11.2.3.3. Target Acquisition.
 - A11.2.3.4. Pull Down/Apex Altitudes.
 - A11.2.3.5. Pattern Corrections.
- A11.2.4. Roll-in:
 - A11.2.4.1. Position.

A11.2.4.2. Techniques (Pitch/Bank/Power).

A11.2.4.3. Rollout/Wind Effect.

A11.2.5. Final:

A11.2.5.1. Aim-off Distance.

A11.2.5.2. Dive Angle.

A11.2.5.3. Airspeed.

A11.2.5.4. Heads Up Display Depiction.

A11.2.5.5. Sight Picture/Corrections/Aim Point.

A11.2.5.6. Release Parameters.

A11.2.5.7. Release Indications.

A11.2.5.8. Recovery Procedures.

A11.3. Over-Water Range Operations:

A11.3.1. Employment Techniques:

A11.3.1.1. Depth Perception/Reduced Visual Cues.

A11.3.1.2. Distance/Altitude Estimation.

A11.3.1.3. Popup Positioning:

A11.3.1.3.1. Timing.

A11.3.1.3.2. Visual/Aircraft References to Establish Pullup Point.

A11.3.2. Special Considerations:

A11.3.2.1. Adjusted Minimum Altitudes.

A11.3.2.2. Training Rules/Special Operating Procedures.

A11.4. Range Departure Procedures:

A11.4.1. Armament Safety Checks.

A11.4.2. Rejoin.

A11.4.3. Battle Damage/Bomb Check.

A11.4.4. Jettison Procedures/Parameters.

A11.4.5. Hung/Unexpended Ordnance.

A11.4.6. Inadvertent Release.

A11.5. Training Rules/Special Operating Instructions.

A11.6. Alternate Mission:

A11.6.1. Type Mission. (Refer to appropriate mission briefing guide.)

A11.6.2. Mission Objectives.

A11.7. Special Subjects:

- A11.7.1. Error Analysis.
- A11.7.2. Fouls.
- A11.7.3. Minimum Altitudes.
- A11.7.4. Target Fixation.
- A11.7.5. G awareness.
- A11.7.6. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.
- A11.7.7. Maneuvering Limitations.
- A11.7.8. Airspeed/G/Stress (Carriage/Release).
- A11.7.9. Recognition/Prevention/Recovery from Out of Control.
- A11.7.10. Time to Ground Impact:
 - A11.7.10.1. Wings Level.
 - A11.7.10.2. Overbank and/or Under G.
- A11.7.11. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Section A11B—Surface Attack Tactics**A11.8. General Information:**

- A11.8.1. Intelligence/Threat Scenario.
- A11.8.2. Low-Level. (See Low-Level Briefing Guide.)
- A11.8.3. Fence Checks.
- A11.8.4. Operating Area Entry/Description/Boundaries.
- A11.8.5. Target Area/Clearing Pass:
 - A11.8.5.1. Location/Description/Elevation/time on target.
 - A11.8.5.2. Visual Cues in the Target Area.
 - A11.8.5.3. Target Area Weather:
 - A11.8.5.3.1. Ceiling/Visibility.
 - A11.8.5.3.2. Winds/Altimeter.
 - A11.8.5.3.3. Sun Angle/Shadows.
 - A11.8.5.3.4. Infrared Considerations.
- A11.8.6. Threat Array:
 - A11.8.6.1. Type/Capabilities.
 - A11.8.6.2. Locations.

A11.8.6.3. Countermeasures:

A11.8.6.3.1. Chaff/Flare.

A11.8.6.3.2. Terrain Masking.

A11.8.6.3.3. Radio Silent Procedures.

A11.8.6.3.4. Authentication/Comm-Jamming/Chattermark Procedures.

A11.8.6.4. Threat Reactions:

A11.8.6.4.1. Low Altitude Training.

A11.8.6.4.2. IP to Action Point.

A11.8.6.4.3. During Delivery.

A11.8.7. Ordnance/Weapons Data:

A11.8.7.1. Type/Fuzing.

A11.8.7.2. Weapons Settings.

A11.8.7.3. Desired Effects.

A11.8.7.4. Specific Aim Points.

A11.8.7.5. Minimum Altitudes:

A11.8.7.5.1. Safe Escape/Safe Separation.

A11.8.7.5.2. Fuze Arming/Frag Avoidance.

A11.8.8. Laser Operations.

A11.9. Employment Procedures/Tactics:

A11.9.1. Overview.

A11.9.2. Ingress:

A11.9.2.1. Formation.

A11.9.2.2. Speed/Altitude.

A11.9.3. Weapons Delivery:

A11.9.3.1. Type Delivery.

A11.9.3.2. Switchology.

A11.9.3.3. Attack Parameters:

A11.9.3.3.1. Action Point/Pop Point.

A11.9.3.3.2. Altitudes (Pull Down/Apex/Release/Minimum).

A11.9.3.4. Visual Lookout/Mutual Support Responsibilities.

A11.9.4. Egress:

A11.9.4.1. Recovery/Return to Low Altitude.

A11.9.4.2. Loss of Mutual Support/Rendezvous Point.

A11.10. Range Departure Procedures:

- A11.10.1. Armament Safety Checks.
- A11.10.2. Rejoin.
- A11.10.3. Battle Damage/Bomb Check.
- A11.10.4. Jettison Procedures/Parameters.
- A11.10.5. Hung/Unexpended Ordnance.
- A11.10.6. Inadvertent Release.

A11.11. Mission Reporting (Battle Damage Assessment/In-flight Report).

A11.12. Contingencies:

- A11.12.1. Rejoin for Late Takeoff.
- A11.12.2. Two-/Three-Ship Options.
- A11.12.3. Tactical Lead Changes.
- A11.12.4. Air-to-Air TACAN.
- A11.12.5. Codewords.
- A11.12.6. Weather Backup Deliveries.
- A11.12.7. Degraded Systems.
- A11.12.8. Reattack.
- A11.12.9. Wounded Bird/Escort Procedures.

A11.13. Training Rules/Special Operating Instructions.

A11.14. Alternate Mission:

- A11.14.1. Type Mission. (Refer to appropriate mission briefing guide.)
- A11.14.2. Mission Objectives.

A11.15. Special Subjects:

- A11.15.1. Error Analysis.
- A11.15.2. Fouls.
- A11.15.3. Minimum Altitudes.
- A11.15.4. Target Fixation.
- A11.15.5. G Awareness.
- A11.15.6. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.
- A11.15.7. Maneuvering Limitations:
 - A11.15.7.1. Airspeed/G/Stress (Carriage/Release).

A11.15.7.2. Recognition/Prevention/Recovery from Out of Control.

A11.15.8. Time to Ground Impact:

A11.15.8.1. Wings Level.

A11.15.8.2. Overbank/Under G.

A11.15.9. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Section A11C—Close Air Support

A11.16. General Information:

A11.16.1. Intelligence/Threat Scenario.

A11.16.2. Low-Level.

A11.16.3. En Route Formations/Lookout Responsibilities/ Low Altitude Training (if applicable).

A11.16.4. Fence Checks.

A11.16.5. Ordnance/Weapons Data:

A11.16.5.1. Type/Fuzing.

A11.16.5.2. Weapons Settings.

A11.16.5.3. Simulated Ordnance Procedures/Minimum Altitudes:

A11.16.5.3.1. Safe Escape/Safe Separation.

A11.16.5.3.2. Fuse Arming/Frag Avoidance.

A11.16.5.3.3. Missile Launch Parameters.

A11.16.6. Control Agency:

A11.16.6.1. Call Sign.

A11.16.6.2. Frequencies.

A11.16.7. Coordination:

A11.16.7.1. Attack Package Times/Support.

A11.16.7.2. Other Weasel Flights.

A11.16.7.3. Data Gathering/Passage.

A11.16.7.4. Airspace Restrictions.

A11.16.7.5. Mission Number.

A11.16.7.6. Friendly Forces.

A11.16.7.7. Play Time.

A11.17. Close Air Support Procedures:

- A11.17.1. Working Area.
- A11.17.2. Formations/Working Altitudes.
- A11.17.3. Target Types/Threat Array.
- A11.17.4. Attack Tactics.

A11.18. Weapons Delivery:

- A11.18.1. Tactics:
 - A11.18.1.1. Type Delivery.
 - A11.18.1.2. Switchology.
 - A11.18.1.3. Attack Parameters:
 - A11.18.1.3.1. Action Point/IP/Pop Point.
 - A11.18.1.3.2. Altitude (Pull Down/Apex/Release/Minimum).
 - A11.18.1.4. Visual Lookout/Mutual Support Responsibilities.
 - A11.18.1.5. Egress:
 - A11.18.1.5.1. Recovery/Return to Low Altitude.
 - A11.18.1.5.2. Loss of Mutual Support/Rendezvous Point.
- A11.18.2. Battle Damage/Bomb Check.
- A11.18.3. Mission Reporting (Battle Damage Assessment/In-flight Report).

A11.19. Combat SAR Procedures:

- A11.19.1. Communications Procedures.
- A11.19.2. Downed Aircraft Procedures.
- A11.19.3. Onscene Commander.
- A11.19.4. Fuel Considerations.
- A11.19.5. Ordnance Considerations.

A11.20. Contingencies:

- A11.20.1. Two-/Three-Ship Option.
- A11.20.2. Tactical Lead Changes.
- A11.20.3. Air-to-Air TACAN.
- A11.20.4. Codewords/Communications Out Signals.
- A11.20.5. Weather Backup Deliveries.
- A11.20.6. Degraded Systems.
- A11.20.7. Reattack.

A11.20.8. Asymmetrical Considerations.

A11.20.9. Jettison Procedures/Parameters.

A11.20.10. Hung/Unexpended Ordnance Procedures.

A11.20.11. Wounded Bird/Escort Procedures.

A11.21. Training Rules/Special Operations Instructions.

A11.22. Alternate Mission:

A11.22.1. Type Mission. (Refer to appropriate mission briefing guide.)

A11.22.2. Mission Objectives.

A11.23. Special Subjects:

A11.23.1. Error Analysis.

A11.23.2. Fouls.

A11.23.3. Minimum Altitudes.

A11.23.4. Target Fixation.

A11.23.5. G Awareness.

A11.23.6. Fuel Awareness/Ops Checks/AB Use/Consumption Rates.

A11.23.7. Maneuvering Limitations:

A11.23.7.1. Airspeed/G/Stress (Carriage/Release).

A11.23.7.2. Recognition/Prevention/Recovery from Out of Control.

A11.23.8. Time to Ground Impact:

A11.23.8.1. Wings Level.

A11.23.8.2. Overbank/Under G.

A11.23.9. Hazards Associated with Human Factors (Channelized Attention, Task Saturation/Prioritization and Complacency).

Attachment 12**CREW/PASSENGER/GROUND CREW COORDINATION BRIEFING GUIDE****A12.1. Crew/Passenger Coordination:**

- A12.1.1. Preflight.
- A12.1.2. Prohibited Items.
- A12.1.3. Cockpit Layout.
- A12.1.4. Flight Maneuvering Parameters.
- A12.1.5. Change of Aircraft Control.
- A12.1.6. Rear Seat Landing Procedures.
- A12.1.7. Emergencies:
 - A12.1.7.1. Runway Departure.
 - A12.1.7.2. Canopy Loss.
 - A12.1.7.3. Ejection/Egress (With and Without Intercom)/Ejection Mode Selector Handle Position.
 - A12.1.7.4. Loss of Intercom.
 - A12.1.7.5. Birdstrike Procedures/Visor Use.
- A12.1.8. Flight Control Interference:
 - A12.1.8.1. Rudder Interference - Rudder Pedal Adjustment.
 - A12.1.8.2. Stick Interference - Lap Belt, Utility Light, Personal Equipment, Leg Position, Paddle Switch Override.

A12.2. Ground Crew Coordination:

- A12.2.1. Act Only On Pilot's Instructions.
- A12.2.2. Ground Emergency Procedures.
- A12.2.3. Hand Signals.
- A12.2.4. Aircraft Danger Areas.

Attachment 13

MISSION DEBRIEFING GUIDE

A13.1. Ground Procedures.

A13.2. Takeoff/Join-Up/Departure.

A13.3. En Route Procedures.

A13.4. Recovery/Landing/After Landing.

A13.5. General:

A13.5.1. Special Interest Items.

A13.5.2. Radio Procedures.

A13.5.3. Flight Discipline/Effectiveness.

A13.6. Mission Accomplishment/Analysis:

A13.6.1. Mission Reconstruction.

A13.6.2. Mission Support.

A13.6.3. Videotape Recorder/Film Assessment.

A13.6.4. Anti-G Straining Maneuver Effectiveness.

A13.6.5. Learning Objectives Achieved.

A13.6.6. Lessons Learned.

A13.6.7. Recommendations for Improvement.

A13.7. Comments/Questions.