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AIR FORCE MANUAL 11-246, VOLUME 1

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Flying Operations

AIR FORCE FIGHTER TYPE AIRCRAFT DEMONSTRATIONS (A-10, F-16, F-22, F-35)

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This manual implements Air Force Policy Directive (AFPD) 11-2, *Aircrew Operations*, and supports Department of Air Force Instruction (DAFI) 11-209, *Participation in Aerial Events*. It provides guidance and procedures for Air Force performance of specific mission design series (MDS) single-ship aircraft demonstrations (demos) and mission capabilities demos. It designates Air Combat Command (ACC) as lead command for the A-10, F-16, F-22 and F-35 aircraft demo. This instruction applies ACC, United States Air Force Europe (USAFE), Pacific Air Force (PACAF), Air Force Special Operations Command (AFSOC), to Air Force Reserve (AFRS) Units. Air National Guard (ANG) units are not authorized demonstration teams per the National Guard Bureau Director of Operations (NGB/A3/10) therefore this AFMAN is not applicable to ANG. This instruction does not apply to the United States Space Force. Ensure that all records created as a result of processes prescribed in this publication are maintained IAW Air Force Manual (AFMAN) 33-322, *Records Management and Information Governance Program*, or any updated statement provided by the AF Records Management office (SAF/CIO A6P). Refer recommended changes and questions about this publication to the office of primary responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate functional chain of command. This publication may be supplemented at any level without approval of the OPR. Supplementary guidance (including supplements and separate publications) cannot contradict or be less restrictive than the parent publication, but may be more restrictive. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See DAFI 33-360, *Publications and Forms Management*, for a description of the authorities associated

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SUMMARY OF CHANGES

This document has been substantially revised and needs to be completely reviewed. **Chapter 4** has been renamed to F-16 Demonstration Maneuvers and the F-15E Demonstration Maneuvers has been removed. **Chapter 6** has been added F-35A Demonstration Maneuvers. The roles and responsibilities has been outlined along correct tiers. Added the PACAF F-16 specific demo maneuvers.

Chapter 1

OPERATIONAL PROCEDURES

1.1. Introduction. The United States Air Force (USAF) uses single-ship aerial demonstrations (demos) to exhibit the capabilities of modern, high performance USAF aircraft and the degree of skill required to operate and maintain these aircraft. ACC is designated lead command and will establish standard criteria for single-ship aerial demos of the A-10, F-16, F-22 and F-35 aircraft. Major commands (MAJCOMs) interested in developing future air show programs involving these or other fighter type aircraft are governed by this instruction and approved MAJCOM supplements. This instruction provides specific maneuvers, sequences, and parameters governing the execution of these demos. Other MAJCOMs flying single-ship aerial demos of these Mission Design Series (MDS) aircraft will comply with this instruction. Procedures for team management, selection, training, and scheduling are in accordance with (IAW) applicable MAJCOM supplements. The directives listed in **Attachment 1** provide further procedural guidance in the conduct of these events. Additionally, procedures for the United States Air Force Heritage Flight Program (USAFHFP) are included.

1.2. Terms Explained. Unless otherwise indicated, terms and definitions used in DAFI 11-209, *Participation in Aerial Events;* AFMAN 35-101, *Public Affairs Operations*; and this publication are the same. The term, "aerobatic" used in this instruction is as defined in Federal Aviation Administration (FAA) Order 8900.1, Volume 3, **Chapter 6**, *Section 1, Flight Standards Information Management System (FSIMS).* Heritage Flight (HF) applies to the performance of USAF's warbird/modern aircraft dissimilar formation flight by certified USAFHFP pilots.

1.3. Waiver Authority. Waiver Authority for this instruction is prescribed in accordance with DAFI 33-360.

1.4. Roles and Responsibilities:

1.4.1. MAJCOM/Commander (CC) will:

1.4.1.1. Provide policy and approval for their MAJCOM's single-ship demo program IAW this publication.

1.4.1.2. Certify first year single-ship demo pilots prior to the beginning of their first air show season (delegable no lower than MAJCOM/A3. **Exception:** Pacific Air Forces Commander (PACAF/CC) may delegate the certification of first-year single-ship demo pilots no lower than Wing Commander (WG/CC)). Include certification authority delegation in the MAJCOM supplement (if applicable) to this publication.

1.4.1.3. Approve Single-Ship Demo Team maneuvers and profiles. This approval may be delegated to MAJCOM/A3.

1.4.1.4. Approve the addition/removal of demo MDSs from the MAJCOMs demo program.

1.4.2. MAJCOM/A3 will:

1.4.2.1. Provide supervisory direction over the single-ship demo program.

1.4.2.2. Approve the single-ship demo schedule(s) and changes or updates.

1.4.2.3. Approve syllabi for single-ship demo aircrew upgrade training.

1.4.2.4. Approve modified demo profiles when an air or trade show does not allow the allotted time or airspace for a full profile. (Outside Continental United States (OCONUS) MAJCOM/A3s may delegate the approval authority for modified profiles no lower than WG/CC who will, in turn, inform the MAJCOM/A3 prior to the performance)

1.4.2.5. Approve narration scripts used to describe demo maneuvers to the viewing public.

1.4.2.6. ACC/A3 will:

1.4.2.6.1. Manage and execute the USAFHFP and annual Heritage Flight Training Course (HFTC). Provide travel funding for HFTC special support personnel, and for ACC Demo Team tasking beyond the requirements of **paragraph 1.4.5.8**.

1.4.2.6.2. Review/approve the ACC Demo Team schedule (initial as well as a subsequent changes) and Heritage Flights (HF) which are included within the same schedule.

1.4.2.6.3. Certify ACC demo pilots and USAFAFHFP pilots to perform heritage flights.

1.4.2.6.4. Sign the annual ACC letter to the FAA naming the certified USAFHFP pilots.

1.4.2.6.5. Approve civilian aircraft types for inclusion in the USAFHFP. ACC/A3 will receive new warbird nominations at least four months prior to proposed implementation date. Each individual warbird must fit the criteria in **paragraph 1.6.6**.

1.4.2.6.6. Organize and execute in the annual HFTC.

1.4.3. MAJCOM aerial events office or MAJCOM/A3 designee will:

1.4.3.1. Submit command-approved single-ship demo maneuver packages for FAA AFS-800 approval. This package may not conform to all guidance requirements of FAA Order 8900.1, Volume 3, **Chapter 6**, and therefore requires FAA acceptance.

1.4.3.2. Schedule/Coordinate all single-ship demos: Analyze event sites for operational suitability, safety, recruiting value, and availability of demo teams.

1.4.3.2.1. Coordinate Air Operations Squadron (AOS) movements with ACC/AOSX (plans and navigation) (if required).

1.4.3.2.2. For airshows OCONUS, other than Canadian air shows, coordinate Special Assignment Airlift Mission (SAAM) requests with base logistics readiness squadron and air mobility division to ensure passengers and equipment are transported to and from show location.

1.4.3.3. If applicable, develop an OCONUS event schedule and provide mission aerial support funding for deployments. ACC Single-Ship Demo Teams will only participate in airshows/air and trade shows outside the United States (US) if fully funded by the supported command, industry (if applicable), the airshow, other agencies or combination thereof, except Canada.

1.4.3.3.1. Teams tasked to deploy to an OCONUS (except Alaska, Hawaii, and Canada) air show/ air and trade show and fly another MAJCOM's jets or fly another ACC unit's jets that are already in place for an exercise or other event, will receive full funding by the supported command, industry (if applicable), the airshow, other agencies, or combination thereof.

1.4.3.3.2. ACC teams tasked to deploy with their own jets to an OCONUS air show/air and trade show must develop their own deployment package (demo team plus augmentation, if required) and forward it to ACC/Aerial Events (A3TA) for review. ACC will approve the deployment package and commit demo team support to the show. Funding will be provided by the supported command, industry (if applicable), the airshow, other agencies or combination thereof. Funding will include all costs associated with deployment/re-deployment and airshow participation (e.g., SAAM, temporary duty (TDY) costs, personnel).

1.4.3.4. Prepare waiver recommendations for MAJCOM approval.

1.4.3.5. Provide event sponsors with the single-ship demo team and HF support manual to assist them with the necessary preparations.

1.4.3.6. Visit and evaluate a sampling of air show environments to ensure support is adequate to minimize distractions and enhance flying safety.

1.4.3.7. If applicable, maintain the MAJCOM Aerial Events Public web site to include: current single-ship demo and heritage flight schedules, single-ship demo team and HF support manual, and scheduling guidance.

1.4.3.8. Review demo grade sheets and provide comments/feedback to appropriate wing leadership and demo pilots when warranted.

1.4.3.9. May request/review demo ground videos as necessary

1.4.3.10. Develop, review, and modify demo profiles in coordination with the teams, for MAJCOM/CC or MAJCOM/A3 approval as applicable.

1.4.3.11. Participate in the annual International Council of Air Shows (ICAS) Convention.

1.4.4. Numbered Air Force (NAF) Commanders: NAF/CC will sign the single-ship demo pilot’s grade book prior to MAJCOM/CC’s certification for first-year demo pilots. **(T-2)** There is no requirement to observe the demo prior to MAJCOM/CC certification**.**

1.4.5. Wing Commanders will:

1.4.5.1. Select and train demo team personnel IAW this instruction. Operations and maintenance group commanders may provide nominations, but the wing commander keeps the final approval authority to provide the necessary oversight of the demo program. **(T-2)**

1.4.5.1.1. Ensure mission effective command oversight of all team elements and personnel. **(T-2)**

1.4.5.1.2. Ensure dedicated maintenance support of the demo team. **(T-2)**

1.4.5.1.3. Designate responsibility for resource management of all team funding. **(T-2)**

1.4.5.2. Develop and publish a wing supplement or Operating Instruction (OI) to establish roles and responsibilities for support of the single-ship demo team. **(T-2)**

1.4.5.3. Forward the upgrading demo pilot's grade book to MAJCOM Aerial Events Office or MAJCOM designee 5 days prior to MAJCOM Certification for review. **(T-2)**

1.4.5.4. Annotate pre-certification of demo pilot (high show) in first year demo pilot's grade book and forward to NAF/CC or equivalent for endorsement prior to HFTC or the first airshow of the season at applicable. **(T-2)**

1.4.5.5. Annotate re-certification of demo pilot (high show) in demo pilot's grade book for second and subsequent year demo pilot prior to HFTC or the first airshow of the season at applicable. **(T-2)**

1.4.5.6. Coordinate with MAJCOM aerial events office on single-ship demo schedule. This may be delegated to the operations group commander (OG/CC). **(T-2)**

1.4.5.7. At the request of the MAJCOM Aerial Events office or MAJCOM designee, provide a ground video and grade sheet of a current performance for WG/CC re-certified pilots to MAJCOM/A3. **(T-2)**

1.4.5.8. Fund the demo team's annual budget per MAJCOM. **(T-2)** Fund the demo team to support no more than 20 shows within the United States and Canada (max of 2 shows) per season. Also, include funding to support participation at the ICAS Convention, the HFTC, NAF pre-certification, and team certifications, as applicable. OCONUS shows, home shows, or tasked events listed in **paragraph 1.4.3.5** are not considered in the wing budget referenced above.

1.4.5.8.1. Single-Ship demo teams tasked to participate in Continental United States (CONUS) events which are not Open Houses/Air Shows (e.g., flyovers at sporting event, HF over memorial events), will be funded per MAJCOM guidance or the agency planning/supporting the event. MAJCOMs will issue a fund cite authorization memorandum to the tasked wing for personnel travel, with a cap on the amount MAJCOM will fund and specific guidance regarding what is authorized for reimbursement (airfare or other transportation, car rental, lodging, per diem, etc.) as applicable.

1.4.5.8.2. Prior coordination is required before deviating from funding instructions or exceeding the maximum funding authorized. Unauthorized over-expenditures and/or deviations are a wing responsibility. Examples of unplanned reimbursable expenses are expenses related to an aircraft maintenance issue requiring the team to stay longer than planned or a divert-enroute to/from the show. Non-reimbursable expenses include payment for shipment of maintenance parts, etc.

1.4.5.9. Review the grade sheet of every practice and demo IAW **paragraph 1.11** of this instruction. **(T-2)** Provide the grade sheet of every practice and public demo and, upon request by MAJCOM, the ground video tape of all public demos to the MAJCOM Aerial Events Office or MAJCOM/A3 designee, within five (5) work days of each home training event/demo or within five work days after returning to home station following deployed demos. **(T-2)** These duties may be delegated to the Wing Vice Commander, OG/CC, or OG/ Deputy Commander (CD). If none of these leaders are current and qualified in the

demo aircraft MDS, the WG/CC may delegate this to a SQ/CC who is current and qualified in the MDS. This delegation is in writing via formal letter or by incorporation within a published wing supplement or OI. **Exception**: Documentation of new demo pilot initial training, in black ink, is included in the pilot grade book and forwarded per **paragraph 1.4.5.3** versus this paragraph.

1.4.5.10. Ensure ground video is available for every public single-ship demo performed.

1.4.5.11. Wing commanders are responsible for ensuring each member of their demo team applies for an official passport once identified to support a foreign air show/air and trade show, in a country that requires a passport. **(T-3)**

1.4.6. Operations/Fighter Group Commanders (OG/CC) will:

1.4.6.1. Provide command oversight of the demo team operations personnel. **(T-2)**

1.4.6.2. Coordinate with MAJCOM Aerial Events Office designee on single-ship demo schedule if delegated by the WG/CC **(T-3)**

1.4.6.3. Request relief from MAJCOM Aerial Events Office or MAJCOM/A3-designee if it is determined an event should not be supported (for safety, Operations Tempo (OPTEMPO), etc.). **(T-2)**

1.4.6.4. Attend at least one off-station show during the demo season. **(T-3)**

1.4.6.5. Provide Stage 2 certification to demo pilots IAW **paragraph 2.6.13** of this instruction. **(T-2)**

1.4.6.6. Establish procedures for nominating the "best" qualified demo pilots, narrators, and safety observers to be dedicated to the demo team. **(T-2)**

1.4.6.7. Ensure the demo team uses the Heads-Up-Display (HUD) recorder for all practices and performances at all locations with the appropriate level of classified storage. During the airshow season, review a HUD recorded demo at least once every 90 days. Annotate these reviews on the grade sheet. Ensure grade sheets reflect the USAFHFP pilot's name and type aircraft flown if applicable. **(T-2)**

1.4.6.8. Ensure the demo team obtains wing approval for production and release of unclassified cockpit media to enhance safety, debriefing, and public relations. **(T-2)**

1.4.6.9. Ensure demo pilots submit end-of-show summaries and critiques to MAJCOM Aerial Events Office or MAJCOM/A3 designated representatives within 5 working days after each show.

1.4.7. Maintenance Group Commanders (MX Grp/CC) will:

1.4.7.1. Establish procedures to nominate the best-qualified maintenance personnel to be dedicated to the demo team. **(T-2)**

1.4.7.2. Commander or designee should attend at least one off-station air show during the demo season to become familiar with the maintenance personnel impact on the demo program. **(T-3)**

1.4.8. Demo Pilots will:

1.4.8.1. Coordinate demo team availability IAW MAJCOM supplements. **(T-2)**

1.4.8.2. Coordinate demo team support requirements with event point of contact. **(T-2)**

1.4.8.3. For CONUS events, coordinate with the ACC Aerial Events Recruiting Liaison and local Air Force recruiters regarding the team's availability and ability to support local Air Force recruiting efforts. **(T-2)**

1.4.8.4. Cancel any demo when the assigned performance location compromises safety or exceeds aircraft performance capabilities. **(T-3**)

1.4.8.5. Ensure no aerobatic maneuvers of any type are performed inside the stipulated FAA crowd restraint zone of 1,500 feet (FAA may approve closer but under no circumstances will aerobatic maneuvers be performed inside 1,200 feet of the crowd line for CAT I (F-16/F-22/F-35) aircraft or 1,000 feet of crowd line for CAT II aircraft (A-10)). **(T-0)**

1.4.8.6. For off-station sites, accomplish either a practice demo or aerial survey (IAW **Attachment 3**) at the air show site prior to air show demo. **(T-2)**

1.4.8.7. Review and grade every practice and demo using the HUD tape (if available), ground video, and grade sheet per **paragraph 1.11**, obtain ground safety observer review, and forward to the reviewing officer IAW **paragraph 1.4.5.9** Upgrading demo pilots will place all grade sheets in their grade book and, upon request, will forward all HUD or ground tapes to wing leadership for review. After MAJCOM/CC certification, demo pilots will forward practice and performance grade sheets, including those for sorties occurring during training, to MAJCOM Aerial Events Office or MAJCOM/A3 designated representatives. **(T-2)** When HUD is not available, the demo pilot and safety observer will complete the grade sheet from memory as soon as possible after landing. During the air show season, at least every 90 days, actual HUD recording is required for grade sheet completion.

1.4.8.8. Demo pilots submit End-of-Show Summaries and Critiques to MAJCOM Aerial Events Office or MAJCOM/A3 designated representatives within 5 working days after each show.

1.4.9. Demo Team Ground Safety Observers will:

1.4.9.1. Complete safety observer training and documentation per **paragraph 2.5** Training is required for any personnel performing safety observer duties. **(T-2)**

1.4.9.2. Monitor all practices and demos with maneuvers conducted below 2,000 feet above ground level (AGL). **(T-2)**

1.4.9.3. Maintain two-way radio communication with the demo pilot, monitor demo pilot altitude and airspeed radio calls, and direct maneuver abort if outside prescribed parameters. **(T-2)**

1.4.9.4. Monitor the demo for potential hazards (e.g., flocks of birds, unscheduled aircraft, or weather). **(T-2)**

1.4.9.5. Critique each maneuver and note needed improvements in the performance. However, in no case should critiquing maneuvers take precedence over monitoring the safe accomplishment of maneuvers. **(T-2)**

1.4.9.6. Demo pilots will debrief each practice or actual demo with the safety observer. **(T-2)**

1.4.9.7. Demo pilots will review the HUD tape and/or ground video and should include the safety observer in the review when available. **(T-2)**

1.4.10. Individual Responsibility. This paragraph and its subparagraphs also apply to the USAFHFP pilots and support personnel. **(T-2)**

1.4.10.1. In view of the special obligations, whether performing in the air or providing ground support, each member of the team will adhere to the following policies: In no case will the provisions of AFI 11-202, Volume 3, *Flight Operations*, concerning the consumption of alcoholic beverages be violated. Additionally, alcoholic beverages will not be consumed less than 12 hours prior to reporting for duty when aerobatic maneuvers are scheduled for the following day. For cross-country flights not involving aerobatic maneuvers, the provisions of AFI 11-202, Vol 3, apply. Although the provisions of this policy do not quantify the maximum amount of alcohol permitted to be consumed, the intent, in concert with a daily regimen and peak daily mental and physical capability, mandates the highest individual responsibility and moderation with the fullest recognition of the next day's duties and obligations.

1.4.10.2. Attendance at USAF meetings/forums for the ACC Demo Team Program/USAFHFP (e.g., New Demo Team Orientation Course, MAJCOM Forums, etc.) is mandatory for all ACC demo pilots (both incoming and outgoing), and team NCOICs. These meetings are normally held during the ICAS convention or HFTC. Team pilots will be notified if required forums other than HFTC and ICAS arise. **(T-2)** Other MAJCOM Demo Teams should reference their MAJCOM guidance.

1.4.10.3. AFHFF pilots must adhere to all applicable FAA regulations. **(T-0)** Any deviations may result in decertification.

1.4.10.4. AFHFF Pilot Personal Appearance Requirements. AFHFF pilots must present a consistent and professional appearance while performing HF duties and representing the Air Force. **(T-2)** Patches or paraphernalia that can be viewed as corporate sponsorship or any type of product endorsement is prohibited**.** Helmet and sunglasses should be free of sponsorship/advertisements.

1.5. Requests and Approval.

1.5.1. CONUS, Alaska, Hawaii and Canadian. Civilian and military show organizers desiring a single-ship demo team or The Thunderbirds must submit requests to the Office of the Secretary of Air Force for Public Affairs (SAF/PA) via the Aerial Events Website, **www.airshows.pa.hq.af.mil** no later than 1 July the year prior to the event for single-ship teams, and 1 July two years prior to the event for Thunderbirds request. **(T-1)** The only events approved for participation are listed on the website. See AFMAN 35-101, section 4C.

1.5.2. Overseas Requests. For overseas units, authority for aircraft participation at civilian locations is delegated to the appropriate combatant commander in accordance with References and as otherwise specified in emergent and applicable policy and/or guidance. For MAJCOM asset participation, obtain concurrence of the MAJCOM prior to the event. Overseas requests for CONUS-based assets to specifically deploy in support of an airshow or other public event (such as Paris Air Show or Royal International Air Tattoo, etc.) will be addressed to the Combatant command at least 60 days before the event. **(T-0)** If a unit is solely supporting a community relations event and is not currently deployed to the location, or is not participating

in a long-range planning exercise, an exception to policy will be processed through the combatant command to Office of the Secretary of Defense (OSD)/Public Affairs (PA) for approval. SAF/PAY and AF/A3O must be informed.

1.5.3. Requests from other military services must be made via the Aerial Events Website. **(T-1)**

1.5.4. Units that wish to volunteer to support a SAF/PA approved military open house or civilian airshow must indicate their intent on the Aerial Events Website. **(T-1)** Support must then be approved by the respective MAJCOM/A3 (delegable to lower echelon in MAJCOM/A3). **(T-1)** Sponsors of events may contact a unit to solicit participation in their particular event. Units will not rely on the sponsor to notify SAF/PAY. ACC/A3TA will volunteer the single-ship demo teams, HFs, and the Thunderbirds for approved events on the Aerial Events website after schedules have been approved.

1.6. Scheduling and Policies: The demo season is normally from the beginning of February and extends through November. The following policies guide development of the aerial demo schedule. Waivers to these policies require the demo team's MAJCOM/A3 approval.

1.6.1. MAJCOM aerial event scheduling processes for single-ship aircraft demos and HF (ACC) differ.

1.6.1.1. The MAJCOM/A3 approved single-ship demo teams schedule will be made public at ICAS in early December. After the initial public announcement has been made, schedules can be posted to MAJCOM Aerial Event webpages, team social media platforms and, emailed to airshow Points of Contact (POCs), etc. **(T-1)**

1.6.1.2. For ACC Single-Ship Demo Team support, requests should be received not later than (NLT) 1 July for the following calendar year.

1.6.2. ACC Teams will schedule only one split-show or one dual-show at deployed locations per team per month. A demo team may accomplish one additional dual-show each month, provided one of the locations is home station. **(T-1)**

1.6.3. Demos and HFs will commence no earlier than 1/2 hour after sunrise and be complete no later than sunset. **(T-1)**

1.6.4. ACC Single-Ship demo aircraft will not stage demos more than 50 nm from the show location. **(T-0)**

1.6.5. The following factors may influence the level of support provided to an aerial event and assist in decision making.

1.6.5.1. Other Department of Defense (DoD) flying demos.

1.6.5.2. Blue Angels' participation.

1.6.5.3. Thunderbirds' participation.

1.6.5.4. Planned support for previous years cancelled (Thunderbirds, single-ship demos, flyovers).

1.6.5.5. Not supported previously/when last supported.

1.6.5.6. Previous air show's success value (especially recruiting and public relations for U.S. events).

1.6.5.7. Airfield suitability (positive/negative).

1.6.5.8. Limit support of events in same metropolitan areas.

1.6.5.9. Previous air show's compliance with the support manual.

1.6.5.10. ACC Single-Ship Demo Teams will not be scheduled for any open house, air show, air and trade show, event, etc. that will interfere with the team's attendance and participation at the annual ICAS Convention, HFTC, and COMACC certification. **(T-2)**

1.6.6. Heritage Flight: Aircraft will only include A-10, F-16, F-22 and F-35 aircraft and the following A3 approved warbirds; A-1, A-36, P-39, P-38, P-40, P-47, P-51, F-86, F-4. **(T-2)** Variants of these aircraft are approved. HF qualified aircrew are limited to only the ACC Single-Ship Demo Pilots, and AFHFF pilots named on annual letter approved by the FAA.

1.6.6.1. MAJCOM must receive new warbird MDS nominations from the pilots at least four months prior to proposed implementation date. Each individual warbird must fit the following criteria:

1.6.6.1.1. Be of U.S. Army Air Corps / Army Air Force / U.S. Air Force lineage.

1.6.6.1.2. Be a pursuit/fighter/attack type from WWII, Korea, Vietnam, or Desert Storm era.

1.6.6.1.3. Be able to maintain flight formation with modern fighters.

1.6.6.1.4. Maintain target speed of at least 220 knots while in formation.

1.6.6.1.5. Be flight worthy and pass all FAA inspections.

1.6.6.1.6. Have a paint scheme consistent with the warbird's active duty era.

1.6.6.1.7. Have NO large sponsorship logos on the aircraft.

1.6.7. ACC/A3:

1.6.7.1. May approve additional warbird type aircraft following training/practice of actual aircraft in formation with modern demo aircraft.

1.6.7.2. ACC/A3 or the designated representative may approve substitution of another warbird from the approved list, if the scheduled aircraft cannot perform or becomes unavailable. The following conditions must be met: The AFHFF pilot is current and qualified to fly the proposed warbird, and the demo pilot(s) are notified of the change.

1.6.7.3. Will approve all USAFHFP support of aerial events. Air shows scheduled to receive a single-ship demo team are eligible for a HF. HFs may be additionally approved by for non-air show events such as photo shoots or flyovers.

1.6.8. ACC/A3TA: AFHFF pilots can be added or substituted at an air show provided ACC/A3TA approval is obtained before the flight. Demo pilots must ensure AFHFF pilots meet all requirements specified in this publication prior to the flight. Demo pilots do not have authority to approve schedule changes.

1.7. Support Manual. Detailed information on show site pre-show coordination requirements is contained in the MAJCOM single-ship demo team and HF Support Manual. This manual requires annual revision and should be made available to all aerial event coordinators hosting a single-ship demo team/HF warbird pilot, via website, e-mail, normal mail, or fax. Contact the appropriate MAJCOM Aerial Events office for the applicable support manual.

1.8. Arresting Gear Support.

1.8.1. For the F-16 Demo team to perform a demo, show sites without an arresting gear and with runways greater than 7,000 feet, but less than 10,000 feet, must provide temporary arresting gear (BAK-12 or equivalent) within 80 nautical miles (nm) of the staging location and show site. **(T-2)**

1.8.2. For the F-22 and F-35 Demo Teams to perform a demo, show sites (regardless of runway length) must have either a suitable arresting gear (BAK-12 or equivalent) on site or at a 7000 feet or greater runway within 80nm of the staging location and show site. **(T-2)**

1.8.3. HF-only Arresting Gear Requirement: If demo pilots are conducting an HF-only performance without a demo profile, divert fuel/ distance to an arresting gear may not be the same concern it is with a demo profile; therefore, HF-only performance arresting gear requirements will be evaluated on a case-by-case basis by the demo pilot and ACC/A3TA.

1.9. Reporting.

1.9.1. Any unusual occurrences (in-flight emergencies, aborts or knock it offs (KIOs), weather cancellations, FAA profile violations, or any safety-of-flight-related issue) will be reported by the pilot, narrator, ground safety observer, or NCOIC via phone, or email ASAP to the MAJCOM Aerial Events office. **(T-2)**

1.9.2. Submit End of Show/Event Summaries and Critiques IAW MAJCOM Aerial Events guidelines NLT 1 week after each show . **(T-2)** ACC pilots will use the format at **Attachment 2**. **(T-2)** The Show Summary and Critique must be submitted accurately with all USAFHFP pilot(s) listed, plus the number of HFs flown by each, in order to document activity and track currency. **(T-2)** This Show Summary and Critique (when filled in) is official verification of HF performance. single-ship demo pilots may delegate submission of the Show Summary and Critique, but must personally check for accuracy and release.

1.9.2.1. Show profile.

1.9.2.2. Estimated crowd count.

1.9.2.3. Unusual occurrences/remarks.

1.9.2.4. Actual HF flight activity to include pilot, aircraft type, sortie type (e.g., 2, 3, 4-ship), and total HF sorties, including practices.

1.10. Recommended Changes and Supplements. This publication may be supplemented at any level without approval of the OPR. Supplementary guidance (including supplements and separate publications) cannot contradict or be less restrictive than the parent publication, but may be more restrictive. Subordinate units have 90 calendar days from the effective date of this publication to rewrite, or certify as current, supplements to this publication. Changes to documentation requirements in this manual may exceed the 90 calendar day implementation requirement; however, documents are to be updated or revised at the next normally required period.

1.10.1. Each demo team may supplement this instruction as necessary. Team organization, maintenance support, selection criteria, and training programs for new pilots are examples of items that may be supplemented. Submit supplements or operating instructions to MAJCOM for review prior to publication.

1.10.2. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate functional' s chain of command.

1.11. Demo Performance Reviews / Grade Sheets.

1.11.1. Record every practice and demo at locations with appropriate level of classified storage capability, to include all home station demo sorties, on the pilot's HUD tape. **(T-2)** Videotape every practice and demo involving aerobatics of any kind conducted below 2,000 feet AGL. Do not post video to any public web site until approved by a MAJCOM PA-trained team representative. **(T-2)** Debrief each demo using these videotapes and HUD when available. Demo pilots will use the approved grade sheet to evaluate each flight. **(T-2)** MAJCOM/CC or A3 may request a videotape and HUD tape for review at any time during the air show season. Demo teams will maintain videotapes, and HUD tapes for a minimum of two year. **(T-2)** Keep performance grade sheets at the unit for the duration of the demo pilot's assignment. Must be sent to MAJCOM 5 duty days after flight. Approved grade sheet templates are provided by MAJCOM. Approved grade sheet master files will be maintained and distributed by MAJCOM. Grade sheets must reflect the HF pilot's name and type aircraft flown, as well as other pilots and aircraft flown, in that order.

1.11.2. Grade each maneuver using a scale of 0 to 4 and average to compute an overall demo grade of 0 to 4. Wing reviewers must comment and make recommendations on any maneuver graded zero (0). **(T-2)** A maneuver grade of 0 should not be automatically considered dangerous unless the manner in which the maneuver was performed created a safety of flight situation. However, if safety is compromised then the overall demo is zero (0). Wing reviewers will recommend additional training for any overall demo graded zero (0). **(T-2)** The average grade for a typical air show should be a two (2). Ensure grade sheets reflect altitude and airspeed to the greatest accuracy possible. Use the following grading criteria to establish individual maneuver and overall demo grades.

1.11.2.1. To compute the maneuver grade, "X" equals the distance between the target and minimum altitudes. As an example, if the target altitude is 6,000 feet AGL and the minimum altitude is 5,000 feet AGL then "X" equals 1000 feet AGL and 1/2X equals 500 feet AGL. Grade 0 would be given for all altitudes below 5,000 feet; Grade 1 for all altitudes from 5,000 to 5,499 feet AGL; Grade 2 for all altitudes 5,500 to 5,999 feet AGL and above 6,501 feet AGL; Grade 3 for all altitudes from 6,001 to 6,500 feet AGL; and Grade 4 if altitude equals 6,000 feet AGL. (See **Figure 1.1**)

1.11.2.2. GRADE 0 – Altitude below minimum, or airspeed out of limits.

1.11.2.3. GRADE 1 – Altitude >1/2X below target, and airspeed within limits.

1.11.2.4. GRADE 2 – Altitude <1/2X below target or >1/2X above target, and airspeed within limits.

1.11.2.5. GRADE 3 – Altitude <1/2X above target, and airspeed +/- 25 knots of target.

1.11.2.6. GRADE 4 – Altitude on target, and airspeed +/- 10 knots of target.

1.11.2.7. Airspeed criteria do not apply to the A-10 unless airspeed is below minimum parameter; the maneuver grade is zero.

1.11.2.8. OVERALL GRADE = Computed average of the maneuver scores.

1.11.2.8.1. 0 = Dangerous performance.

1.11.2.8.2. 1 = Safe performance, but trend is low.

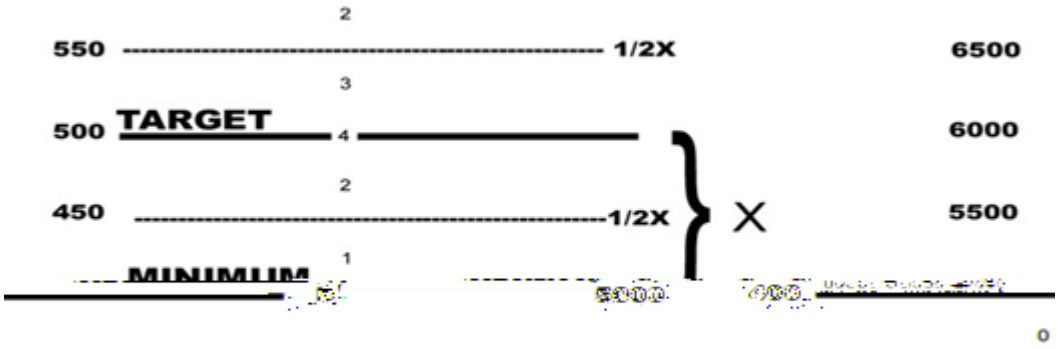
1.11.2.8.3. 2 = Average performance.

1.11.2.8.3. 3 = Outstanding performance.

1.11.2.8.4. 4 = Perfect performance; no deviations.

1.11.3. Refer to **paragraph 1.4.5.9** for wing and HHQ grade sheet and tape review requirements.

Figure 1.1. Grading Ranges.



1.12. Demo and HF Pilot Proficiency/Currency Requirements. Demo practices should include the less frequently flown low profiles. A minimum of one low profile will be flown every 45 days. A minimum of one HF performance is required every 45 days for ACC demo pilots and every 90 days for AFHFF pilots to maintain currency. ACC/A3TA will evaluate HF pilots' currency on all requirements at least 14 days prior to the scheduled HF performance. Pilots will regain currency via the HF practice procedures in **paragraph 1.21.5** If non-current pilots are unable to accomplish the practice requirements they will not fly the HF. **(T-3)**

1.12.1. Demo Pilots: To maintain currency, each pilot will fly a minimum of one demo every 15-calendar days. **(T-2)** Schedule a practice session or actual demo at least once per week during air show season. If the 15-calendar day currency is exceeded, the next demo practice is

limited to no-lower-than 1,000 feet AGL target and 900 feet AGL minimum on all maneuvers, and the OG/CC, OG/CD, or wing commander designee must be present. **(T-2)**

1.12.2. Ground Safety Observers: Perform as ground safety observer for a complete maneuver profile at least once every 120 days. Non-current safety observers will execute the duties of the safety observer at an official or practice demo while under the observation of a current certified safety observer. **(T-2)** Certified safety observer will document this training in the demo pilot grade book. **(T-2)**

1.12.3. **Abort Currency.** If an actual abort is not encountered, practice pilot abort procedures during practice demos at least once every 60 days. To meet this currency requirement the safety observer will initiate the abort call at some point during a practice demo. **(T-2)**

1.13. Termination Procedures. Terminate demos involving aerobatics flown below 2,000 feet AGL when:

1.13.1. The safety observer is unable to monitor the safe performance of maneuvers.

1.13.2. Two-way radio communication is lost between the demo pilot and safety observer.

1.13.3. Ground video recording is not capable.

1.13.4. Any time when in the judgment of the pilot or safety observer the safety of the pilot or spectators is compromised.

1.14. Transition During Performance. Each demo should be planned to fly a complete high, low, or flat show profile. However, conditions such as a changing ceiling in the show area may require the demo pilot to transition between show profiles at certain transition points. Demo pilots will not transition between profiles more than once per performance. This restriction may be waived by MAJCOM/A3. **(T-2)**

1.15. Altimeter Procedures. It is essential each demo pilot be able to quickly and accurately assess actual altitude above the ground during any maneuver in the demo. To avoid the mental exercise required to subtract an odd-numbered field elevation from the Mean Sea Level (MSL) altimeter reading to get above ground altitude, use one of the two procedures described below to zero the altimeters or set the Altimeter Field Elevation (QFE). Use these procedures for all practice and actual demos whether flown from takeoff at the show site or takeoff from a deployed location.

1.15.1. Zero Altimeter Method. Dial aircraft altimeter until indicator reads "0". Use this method if possible. Beware staging locations may have different AGL readings than show site.

1.15.2. Nearest 1,000 Feet Method. If it is not possible to zero the altimeter, dial the altimeter to the current altimeter setting for the field, then round up or down to the most appropriate 1,000 feet AGL corrected field elevation (500, round down; 501, round up).

1.16. Communication Procedures. The demo pilot and safety observer will operate on a discrete frequency during all practice and official demos. **(T-2)** This is to minimize third-party radio chatter and stepped on required radio calls during the demo. The safety observer will be the only person in direct contact with the demo pilot. **(T-2)** As such, all other parties coordinate through the safety observer for any information needed regarding the demo pilot or the demo. To ensure communications with the appropriate controlling agency (tower or air boss), the safety observer will monitor the appropriate control frequency. **(T-2)** If the safety observer is engaged in a protracted conversation with the controlling agency that prevents the safety observer from

devoting 100% attention to the primary duty of visually and aurally monitoring the demo, the safety observer will terminate the demo. **(T-2)** Once the situation has been resolved and the safety observer can once again give the demo 100% attention, the demo may continue.

1.17. Use of Teams for Static Display. The demo pilot and narrator/ground safety observer should normally arrive in two aircraft with one to be used as a spare for the demo.

1.17.1. Demo team spare aircraft can only be used as a static display provided there is absolutely no potential impact to the demo pilot being able to rapidly use the spare jet to fly a demo should the primary experience maintenance problems and appropriate aircraft security/security classification guidance is followed.

1.17.2. When applicable, wing commanders will forward OCONUS aircraft static or tour requests to ACC/A3TA for A8Z coordination and A3 approval, per SENIOR JERSEY Security Classification Guide (SCG).

1.18. Disbursement of Demo Team Funds. The WG/CC is responsible for funding his or her assigned wing's single-ship demo team, as part of the wing's overall financial planning process. Wings will plan IAW **paragraph 1.4.5.8** Mission required funding requests will be worked through the wing's Financial Management (FM) office to MAJCOM/FM. Periodically (pending availability of funds), A3 may provide funding to demo teams for audiovisual and other equipment required by this AFMAN. The demo teams are responsible for maintenance and upkeep costs of equipment provided by MAJCOM, to include purchasing new equipment, if their equipment is lost, broken or stolen.

1.19. Shortened/Modified Demos. On occasion, certain air or trade shows may require a demo pilot to fly a shortened or modified show, due to show box restrictions or the time constraints applicable to the show. MAJCOMs should consider the level of importance of participating in the show, the anticipated recruiting value, and the complexity involved in shortening a demo profile to determine the cost/benefit of attending the show. Further consideration should be given to demo pilot proficiency and experience level. A profile may be **shortened** by removing, or knocking-off the last few maneuvers. A profile may be **modified** by removing maneuvers throughout the profile, but maintaining the sequential flow of the remaining maneuvers. In no case will a demo pilot fly a shortened or modified profile when request is made upon arrival at the show site. **(T-2)** A minimum of five weeks' notice is needed from show POCs for a shortened or modified profile to be considered, and the show POC then notifies the team of the allotted performance time. The demo pilot then shortens or modifies the profile to fit in the allotted time by removing certain maneuvers, but the maneuvers must flow in the same sequence as the full profile. **(T-2)** For CONUS airshows where the profile is modified as a result of showbox/airspace constraints, upon obtaining WG/CC approval of the modified profile, Demo pilots will garner FAA Events Specialist approval by sending the modification plan to **9-AFS-800-Correspondence@faa.gov** (Cc: ACC/A3TA Aerial Events). **(T-0)** For OCONUS shows, Demo pilots should ensure the county's FAA-equivalent is aware of/approves the profile as required. Finally, Demo pilots will submit the modified profile through command aerial events to MAJCOM/A3 for approval not later than (NLT) three weeks prior to the show. **(T-2)** OCONUS MAJCOM/A3s may delegate the approval authority for modified profiles no lower than WG/CC who will, in turn, inform their MAJCOM/A3. Demo pilots are required to practice modified profiles at least once within ten working days prior to the show. **(T-2)** OG/CC or higher will monitor the practice to note safety considerations and listen to the narration. **(T-2)**

1.20. New Demo Maneuver Approvals: Forward recommendations for new or modified maneuvers not detailed in this instruction through the WG/CC to the MAJCOM/A3 for concept approval before proceeding with simulator testing and development of detailed parameters and abort procedures. Following MAJCOM/A3 concept approval, new maneuvers will be developed by the demo pilot and evaluated in the simulator prior to flight. **(T-2)** Demo pilots must obtain WG/CC approval prior to flight testing. **(T-2)** Document the approval in the grade book. Once parameters have been established and the maneuver has been flown satisfactorily in the simulator, demo pilots will fly and evaluate maneuvers in working airspace greater than 5,000 feet AGL and then again at greater than 2,000 feet AGL. **(T-2)** Once safety evaluation has been accomplished in working airspace, demo pilots will fly the maneuver over the airfield at or above 1,000 feet AGL and again at 500 feet AGL, prior to flying the maneuver at maneuver minimums. **(T-2)** Document all maneuver evaluations on a grade sheet and maintain them in the demo pilot's grade book. Once the maneuver is perfected in practice, submit a change to this AFMAN. Demo pilots will not perform new or modified maneuvers in demo performances unless approved by MAJCOM/CC or delegated MAJCOM designee. **(T-2)**

1.21. HF Procedures: Flights are scheduled per **paragraph 1.6** HF maneuvers are performed IAW **Chapter 7**

1.21.1. HF Formation Restrictions. Recommended radio communication plan is per USAF Heritage Flight Briefing Guide provided by MAJCOM.

1.21.1.1. Four-ship maximum in fingertip, route, echelon, or diamond formation.

1.21.1.2. A two-ship formation "Cross-over" break may be performed only with the warbird aircraft in the lead. The single-ship demo pilot will ensure no less than 50 feet nose-tail horizontal separation and ensure no less than 25 feet vertical separation prior to calling — "Two's clear."

1.21.1.3. A three-ship may perform the over-the-crowd pass, but without a crossover break. A three-ship may accomplish a split, followed by simultaneous rolls inside the aerobatic box. In this case, lead should accomplish the pull straight ahead. Another option after the over-the-crowd pass is to bring the formation up initial in three-ship echelon.

1.21.1.4. A four-ship may accomplish the over-the-crowd pass, but without a crossover break. The formation should be in echelon if accomplishing a pitch to downwind, or continuing to report initial. A four-ship may accomplish a split, followed by simultaneous rolls inside the aerobatic box. If accomplished, the split and rolls will be thoroughly briefed. For HFs outside the United States (e.g., Canada, the United Kingdom (UK)) over-the-crowd passes may not be authorized, so pilots may need to adjust the profile accordingly).

1.21.1.5. HF Cross Country Procedures. USAFHFP pilots are authorized to fly cross country together provided the following items are accomplished:

1.21.1.5.1. The flight will remain Visual Meteorological Conditions (VMC) at all times.

1.21.1.5.2. Pilots will thoroughly brief the mission using the USAF HF Dissimilar Formation Briefing Guide and applicable Air Force Instructions.

1.21.1.5.3. Visual signals will be thoroughly briefed in the event of radio failure. At air shows, if there is more than one demo pilot or another active duty HF pilot and the scheduled warbird falls out of the HF, the demo pilots and/or active duty HF pilot are authorized to fly the HF. If the warbird falls out of the HF at a non-air show event (sporting events, ceremonies, etc.) demo pilots or active duty HF pilot are authorized to fly the scheduled event alone, with wingman other demo pilot or active duty HF pilot (2-ship maximum (max)).

1.21.1.5.4. For HF outside the United States (e.g., Canada, UK), over-the-crowd passes may not be authorized, so pilots may need to adjust the profile accordingly.

1.21.2. Minimum HF performance altitudes are 200 feet AGL (target 300 feet AGL) over a show-line environment (lead aircraft is the determining factor for 200 feet AGL), or 500 feet above the highest obstacle within 1,000 feet over approved open air assemblies of people (e.g., stadiums, parades, funeral). A DD Form 2535, *Request for Military Aerial Support* must be submitted to the Flight Standards District Officer (FSDO) and a Certificate of Waiver issued. Otherwise the minimum altitude is 1,000 feet above the highest obstacle within 2,000 feet. Minimum altitude for the optional Flyby pass is 300 feet AGL. Minimum altitude for the Over-the-crowd pass over the primary spectator area at an Open House/Air Show is 500 feet (target 600 feet) above the highest obstacle within 2,000 feet.

1.21.3. In-flight photography of HFs requires MAJCOM/A3 approval. Lead single-ship demo pilots will submit through their wing leadership a completed photo-shoot package to MAJCOM for staffing.

1.21.4. HF Flight Lead Responsibilities:

1.21.4.1. The most senior demo pilot (determined by time as a demo pilot, then date of rank) or active duty HF pilot if no demo pilot is at the airshow/event will be the flight lead. **(T-2)**

1.21.4. 2 Is responsible for the safe conduct of the flight, and does not necessarily lead the formation.

1.21.4.3. Will ensure all HF participants, both civilian and military, project the highest professional standards of the USAF. **(T-2)**

1.21.4.4. Prior to each HF, a briefing will include all items covered in the HF Dissimilar Formation Briefing Guide IAW **Attachment 4**. **(T-2)**

1.21.4.5. All HFs will be debriefed. **(T-2)**

1.21.5. Pilots will make every attempt to fly a practice HF flight on-site at each air show location prior to performing before an audience. If the situation will not allow a full practice HF routine (all 5 passes), as a minimum the practice must include at least 10 minutes formation flight with all HF performers in their planned positions. This may be accomplished while in holding or enroute to the flyover. If weather or operational considerations preclude any practice contact ACC/A3 for authorization to proceed.

Chapter 2

DEMO TEAM PERSONNEL SELECTION AND TRAINING

2.1. General. MAJCOMs will determine MDSs and locations. Demo team-owning wing commanders will determine team composition. A typical team includes two aircraft, one demo pilot, and a minimum of two narrators, two safety observers, at least one Public Affairs officer/NCO/Amn, and necessary support personnel. A dedicated ground safety observer is required to deploy with the team. Ground safety observers may not simultaneously perform narration duties. Team selection should consider factors affecting assignment stability such as vulnerability for schools or overseas assignment.

2.2. Demo Pilot Selection. New demo pilots are normally selected by wing commanders in August and enter training no later than September prior to the new pilot's first air show season. Demo Pilot duty is normally a two-year assignment. single-ship demo pilots should have no additional duties during their tour of duty (from start of training until last airshow or completion of training replacement pilot, whichever is last).

2.3. Narrator/Ground Safety Observer Selection.

2.3.1. The Wing Commander Selection (Narrator and Ground Safety Observer).

2.3.1.1. To reduce the impact on flying operations by minimizing the number of pilots per TDY, consideration should be given to select non-rated officers or NCOs as the narrator. **(T-2)** The narrator tour of duty is a minimum of one year.

2.3.1.2. Ground safety observers must be rated officers current and qualified in the MDS. **(T-2)** Ground safety observers are selected by wing commanders during training season for upgrade training in preparation for the following air show season. Demo teams will be limited to a maximum of six ground safety observers to ensure sufficient currency and proficiency for each. **(T-2)** The normal ground safety observer tour of duty is one year. New ground safety observers may be trained during mid-season for permanent change of station (PCS) or deployment reasons if necessary, but the maximum number remains six. Demo pilots will record all ground safety observer names in the demo team grade book. **(T-2)**

2.4. Support Personnel Selection. Support personnel are selected by the wing commander. **(T-2)** As new enlisted personnel are assigned to the demo teams, it is appropriate to request assignment deferments. However, since Air Force Personnel Center's (AFPC) support and approval of the deferments is directly linked to overseas assignment vulnerability, it is strongly recommended that prospective local candidates be verified by the MAJCOM Airman Assignments Branch before they are firmly hired. A cursory check with AFPC can prevent the WG/CC from hiring people for the team who are extremely vulnerable for PCS.

2.5. Heritage Flight Training.

2.5.1. **HFTC Training.** The HFTC is designed to train single-ship demo pilots and AFHFF civilian warbird pilots to perform their HF mission. It is required for initial certification and annual re-certification. ACC/A3TA will coordinate military and civilian aircraft availability for the HFTC. ACC/A3TA will develop the HFTC academic and flying training schedules to

accomplish all training syllabus requirements for ACC Single-Ship Demo pilots and AFHFF civilian warbird pilots. Training for the USAFHFP is completed at the annual HFTC.

2.5.2. AFHFF pilots must sign and submit gratuitous service paperwork to ACC/A3 prior to participating in any USAFHFP performances.

2.5.3. For initial training, certification and annual re-certification, AFHFF pilots must meet or have the following qualifications: (Exceptions must be approved by A3 on a case-by-case basis.)

2.5.3.1. 500 hours minimum time in USAF fighter-type warbirds or 50 hours minimum time in USAF fighter-type warbirds plus 2,000 hours minimum time in active duty USAF fighter-type aircraft.

2.5.3.2. Current Formation and Safety Training (FAST) formation flight certificate with a four-ship (4L) stamp, or equivalent FAA certification, certifying four-ship flight lead qualified.

2.5.3.3. Be less than 65 years of age prior to the last day of the annual HFTC.

2.5.3.4. Current Class II Medical Certificate.

2.5.3.5. Current Level II Statement of Aerobatic Competency (SAC) card or FAA equivalent low-level card.

2.5.3.6. Commercial Pilot Certificate.

2.5.3.7. Access to or ownership of a WWII, Korean War, Vietnam War, or Desert Storm era US Army Air Corps or USAF pursuit/fighter/attack-type warbird with a current annual inspection.

2.5.3.8. Qualify for and provide DD Form 2400, *Civil Aircraft Certificate of Insurance,* DD Form 2401, *Civil Aircraft Landing Permit,* and DD Form 2402, *Civil Aircraft Hold Harmless Agreement,* certification.

2.5.3.9. ACC/A3 may remove individuals from the certified HF Pilot list for circumstances that compromise safety, the better image of the USAF, or for failing to maintain the minimum qualifications.

2.5.3.10. Annual HFTC Training. Current single-ship demo pilots will be scheduled to fly, as a minimum, two training sorties at the annual HFTC. **(T-2)** One of the training sorties must be a three or four-ship. **(T-2)** Only front-seat sorties, with the pilot actuating the controls, will count as a re-currency sortie. The AFHFF pilots must complete least one HF training sortie with an HF certified ACC Single-Ship Demo Pilot prior to performing at a public event for re-certification. **(T-2)** AFHFF pilots not able to attend re-currency training at the annual HFTC will review the HFTC ground training video; receive a re-currency brief from ACC; and accomplish a training sortie prior to performing HFs at a public event. **(T-2)** Demo pilots who fly with an AFHFF Pilot for re-currency must document the training flight and forward AFHFF documentation to ACC for re-certification. **(T-2)** Air show practices are non-public events. **(T-2)**

2.5.3.11. Trained and certified AFHFF pilots desiring to fly a warbird type in which the pilot has not previously flown for the USAFHFP must meet the following minimum qualification criteria: Fifty hours total time (TT) in aircraft type (as defined by FAA) plus

five (5) hours TT in that specific warbird or like aircraft (P-51 to P-47 or P-40, etc.) or 10 hours TT in that specific warbird if different type (P-51 to Sabre, or P-38, etc.) and hold all FAA required ratings. Prior to the first public HF performance in a warbird type new to that individual, he/she must: a) complete a full HF training profile with at least one other HF (AFHFF or demo) pilot and b) have that MDS listed next to their name on the annual FAA HF approval letter. **(T-2) Note**: Upon completing this training, notify ACC/A3TA immediately so they may coordinate with FAA for the updated letter.

2.5.4. Following successful completion of training, ACC/A3 will approve those HF pilot applicant(s) who qualify to support the program. The current and new AFHFF pilots will be included in the annual ACC/A3 letter to the FAA. Certified civilian HF pilots are authorized recurring training flights in single-ship demo pilots aircraft to acquaint themselves with flight characteristics of modern fighter aircraft participating in dissimilar formation flights. Participants are required medical clearance, egress and ejection seat training prior to flight.

2.5.5. USAFHFP Training Syllabus**.** Initial and re-currency training is normally accomplished at the annual HFTC. **(T-2)**

2.5.5.1. HF-GT (Ground Training) Accomplish prior to HF-TS-2. USAFHFP pilots will receive ground training from a certified HF pilot

2.5.5.2. Regulations (FAA/MAJCOM guidelines)

2.5.5.3. USAF HF Briefing Guide

2.5.5.4. Formation profiles/combinations

2.5.5.5. Communications

2.5.5.6. Join-up

2.5.5.7. Airspeed compatibility/control

2.5.5.8. Sight pictures

2.5.5.9. Formation changes

2.5.5.10. Flight break-up/landing

2.5.6. HF-TS-1 (N/R but desired for A-10, F-35 & F-22) (Rear Cockpit (RCP) of modern fighter (active duty), RCP of warbird (HF civilian applicant)):

2.5.6.1. Observation flight

2.5.6.2. Join-up

2.5.6.3. Sight picture (lead and wing)

2.5.6.4. HF pass profiles (lead and wing)

2.5.6.5. Flight break-up

2.5.6.7. **Note** : Attempt to accomplish at the end of the previous show season to minimize the scheduled sorties at the annual HFTC. The A-10, F-22 and F-35 demo pilot will attempt to accomplish HF-TS-1 in the backseat of an F-16D. Single-seat warbird pilots will attempt to fly a backseat sortie in another warbird.

2.5.7. HF-TS-2 (Two-ship):

2.5.7.1. Vintage fighter lead/ACC fighter wing

2.5.7.2. Join-up

2.5.7.3. Formation work/airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes.

2.5.7.4. HF pass profiles (vintage fighter lead)

2.5.7.5. Flight break-up

2.5.7.6. ACC fighter lead/vintage fighter wing

2.5.7.7. Formation work/airspeed, compatibility, climb/decent compatibility, cross-unders, breakouts, lead changes

2.5.7.8. HF pass profiles (ACC fighter lead)

2.5.7.9. Flight break-up

2.5.8. HF-TS-3 (Three-ship): **Note**: Although not ideal, this sortie may be combined with HF-TS-4 by adding a fourth aircraft following the three-ship requirements.

2.5.8.1. ACC fighter lead/Vintage fighter (x2) wing

2.5.8.2. Join-up

2.5.8.3. Formation work/airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes

2.5.8.4. HF pass profiles (ACC fighter lead)

2.5.8.5. Flight break-up

2.5.9. HF-TS-4 (Four-Ship):

2.5.9.1. Join-up

2.5.9.2. Formation work/airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes

2.5.9.3. HF pass profiles (vintage fighter lead)

2.5.9.4. Flight break-up

2.5.10. HF-TS-5 (Orientation): May be accomplished prior to HF-GT. Attempt to accomplish at the end of the previous show season to minimize the scheduled sorties at the annual HFTC:

2.5.10.1. For Demo Pilots: Fly a back seat P/TF-51 sortie during a 2, 3, or 4-ship HF profile.

2.5.10.2. For AFHFF Pilots: Fly a back seat F-16 sortie during a 2,3,4-ship HF profile.

2.6. Demo Pilot Training. Accomplish training according to the guidelines of this instruction and as supplemented. **(T-2)**

2.6.1. The Wing Commander may alter the training sequence and individual sorties, as necessary, to ensure proficiency and progress. Additional training sorties (TS) may be added as required. New demo pilots will attend a minimum of two air shows with the current demo

pilot. **(T-2)** If possible, have the new pilot fly with the current demo pilot in each air show practice demo (Not applicable (N/A) for A-10, F-22, F-35).

2.6.2. Perform maneuvers and maneuver sequences as described in this publication. New demo pilots will demonstrate proficiency in the high, low, and flat (if applicable) show profiles. **(T-2)**

2.6.3. New demo pilots will receive flight training from a currently qualified demo pilot. **(T-2)** Each new demo pilot will receive extensive ground training from their predecessor or a currently qualified demo pilot. **(T-2)** Demo pilots will review FAA Order 8900.1 during initial ground training. Teams must read carefully the sections on Participant and Aircraft Eligibility, Air Show Space Requirements, Minimum Safety Distances and Altitudes, Military Performances, and FAA AFS-800 Maneuvers Packages Approval Process, so they are familiar with the perspective of their local FSDO.

2.6.4. New demo pilots will receive training in aircraft flight control limitations and performance characteristics affecting the demo profile. **(T-2)** New demo pilots will receive training on common conditions leading to aborts for each maneuver. **(T-2)**

2.6.5. For the purpose of professional pilot development, with respective wing commander approval, Demo Pilots are authorized flights offered by military demo pilots (e.g., ACC and PACAF Single-Ship Demo Pilots, AFHFF pilots, US Navy Tactical Demonstration (TACDEMO) Pilots and National Demo Teams [Thunderbirds, Blue Angels, Snowbirds, Red Arrows]) and ICAS-recognized Aerobatic Competency Evaluators (ACE) and Inspectors. All other requests must be submitted to MAJCOM Aerial Events or A3 designated representatives for approval. These flights will not impact team deployments, performances, or redeployments.

2.6.6. In order to showcase the joint/coalition operating capabilities of the US military and coalition partners, ACC Single-Ship Demo Pilots are authorized to fly dissimilar formation (no aerobatics) with other military demo teams when the opportunity presents itself (Example: arrival day). These flights must be thoroughly briefed with all participants.

2.6.7. New Demo Pilots and ground safety observers will receive academic and flight training for standardized MDS abort procedures. **(T-2)**

2.6.8. Prior to performing public HFs, single-ship demo pilots will train with a certified AFHFF pilot, and AFHFF pilots will train with a certified single-ship demo pilot. All training will be accomplished in VMC and documented in the student activity record in the pilot's grade book. Each Demo pilot will have a grade book. The grade book will be completed in ink or computer generated; all signatures/initials will be accomplished; and nothing additional will be included in the grade book without prior MAJCOM approval. USAFHF will maintain the official AFHFF pilots' training folders (grade books). A3, or the designated representative attending the annual HFTC, will certify both single-ship femo and AFHFF pilots to perform HFs. Single-ship demo and AFHFF pilots may be certified as 2 or 3-ship qualified, if unable to complete the entire training syllabus. Initial training will include both ground training and dissimilar formation checkout flights IAW **paragraph 2.6**.

2.6.9. A-10, F-22 and F-35 will use a chase aircraft for TS-3 and TS-4. **(T-2)** A chase aircraft may be used for missions TS-5 through TS-11, or the instructor may observe from the ground. The minimum altitude for chase aircraft is 1,500 feet AGL.

2.6.10. For F-16 the currently qualified demo pilot monitoring the training program will observe the first solo training flight from the ground, and may act as the safety observer. **(T-2)**

2.6.11. Demo pilots will accomplish all training in VMC. Ensure each practice, except TS-3 and TS-4, is over a runway environment. Ground record all training flights below 2,000 feet AGL. **(T-2)**

2.6.12. Ensure demo team film crews personnel are fully trained to meet demo flying ground filming requirements. Training should emphasize equipment operation, sound techniques to capture demo narration, and techniques to capture the ground environment in the field of view during low altitude maneuvers.

2.6.13. Document training performance in an official grade book with guidance provided by MAJCOM and ensure progress is monitored by the wing commander. All training flights will be reviewed by the senior leadership IAW **paragraph 1.4.5.9**. **(T-2)**

2.6.14. Final wing commander review, pre/re-certification of the demo team (including ground safety observers) will be documented and forwarded by the wing commander IAW paragraphs **1.4.5.3**, **1.4.5.4** or **1.4.5.5**. **(T-2)** First-year pilots must accomplish at least one practice flight off home station prior to MAJCOM/CC certification. **(T-2)**

2.6.15. Stage 1 / Stage 2 Altitude Step-down Process:

2.6.15.1. Definitions: Stage 1: All maneuvers are flown no lower than a target altitude of 500 feet AGL with a minimum altitude of 400 feet AGL. Stage 2: All maneuvers are flown no lower than the target and minimum altitudes described in this publication.

2.6.15.2. Upgrading demo pilots are required to practice at a minimum of three separate off-station sites at Stage 1 (higher) altitudes prior to the first official public demo. **(T-2)** The intent of this requirement is for all upgrading pilots to gain experience at a minimum of three separate sites in a training environment before stepping down to Stage 2 (lower) altitudes off-station in an actual air show environment. This requirement only affects off-station practices. Ensure all home station practices adhere to the normal altitude step-down procedures set forth in the training syllabus. For demo pilots stationed at overseas locations where this requirement is impractical, all practice demos may be conducted at home station. However, every attempt should be made to satisfy the off-site training requirement before reverting to home field practices only to satisfy syllabus requirements.

2.6.15.2.1. These off-station practices require former demo pilot observation and/or supervisor observation (WG/CC or designee, no lower than OG/CD). **(T-2)**

2.6.15.2.2. All ground video or HUD recordings and grade sheets for off-station practices require former demo pilot and WG/CC or designee, no lower than OG/CC review. **(T-2)**

2.6.15.2.3. NAF/CC and/or/MAJCOM/CC certifications may be used for partial fulfillment of off-station requirement.

2.6.15.3. In order to conduct off station demos at Stage 2 minimums, upgrading demo pilot must first accomplish and document IAW **paragraph 2.6.11** the three off-station practices at Stage 1 minimums, and have home station certification at Stage 2 minimums. **(T-2)** Demo pilot will document this certification in the upgrading pilot's grade book. **(T-2)**

Wing commanders (delegated no lower than the OG/CC) may certify demo pilots for Stage 2 minimums upon completion of 3 off-station practices at Stage 1 minimums without requiring the pilot to accomplish a separate home station flight at Stage 2 minimums, provided pilot has shown proficiency at Stage 2 minimums during normal altitude step-down procedures set forth in the training syllabus during home station practices.

2.6.16. Ground Safety Observer Training:

2.6.16.1. During any capability demo, the ground safety observer is responsible to advise the demo pilot by radio of any observed or developing unsafe condition. This requires intimate knowledge of required maneuver radio calls, maneuver parameters, and the timing of maneuvers to ensure safety observer radio calls provide timely correction to an observed or developing deviation from procedure or direction prescribed in this publication. Safety observers will complete a closed-book parameters test for those maneuvers requiring parameter radio calls, corrected to 100 percent by a current demo pilot, prior to performing duties solo. **(T-2)** Document this training in the demo team grade book.

2.6.16.2. To increase "air show situational awareness" and improve the mutual support with the demo pilot, ground safety observers require a working knowledge of the following subjects: air show airspace; the aerobatic box; show lines; crowd lines; applicable Federal Aviation Regulations (FAR) requiring waivers; interaction with the air boss; and air show communication plans. These subjects should be reviewed by upgrading safety observers, and briefed by current demo pilots, using the Safety Observer academics provided by the MAJCOM. Document this training in the demo team grade book prior to performing duties solo. In addition, it is recommended that at least one ground safety observer per demo team, attend the Air Shows 101 course at ICAS Convention each year. Ground safety observers must also be familiar with all applicable procedures and relevant MDS parameters in this publication. **(T-2)**

2.6.16.3. Upgrading safety observers must complete a two-sortie checkout. **(T-2)** For the first sortie, the upgrading safety observer will observe a certified ground safety observer during an official or practice high show demo. **(T-2)** For the second sortie, the upgrading ground safety observer will execute the duties of the safety observer at an official or practice high show demo while under the observation of a certified safety observer. **(T-2)** Demo pilots will document this training in the demo team grade book. **(T-2)**

2.7. Training Syllabus.

Table 2.1. Training Syllabus.

Ground Training (GT)-1:
Standard Procedures
Fuel Requirements
Waivers
Aircraft Handling Characteristics
Safety Considerations

G-Awareness
Lessons Learned
Emergency and Abort Procedures
Team Management
Scheduling
All Ground Safety Observer Academic Topics
GT-2: Low Altitude Training (LOWAT) Academics.
LOWAT Environment
LOWAT Crosscheck
LOWAT and Air Show Hazards
Handling Emergency and Abort Procedures
LOWAT Effects On Aircraft Performance
Visual Illusions
GS-1 Ground Simulator Training
High and Low Show Profiles
Crosschecking Parameters During Maneuver Description
Abort Procedures
Abort Mechanics
High-speed Dive Recoveries
Slow-speed Maneuvering
Recognition and Prevention of Out-of-Control Situations
Emergency Procedures
TS-1 Training Sortie (Back seat of a two-seat model; N/A for A-10, F-35 & F-22):
Standard Demo Profile – High show
Minimum Run and Wet Runway Landing
TS-2 (Back seat of a two-seat model; N/A for A-10, F-35 & F-22)
Standard Demo Profile – Low Show
TS-3 (Front seat of a two-seat model; N/A for A-10, F-35 & F-22):
Standard Demo Profile – High Show
Accomplish Above 5,000 Feet AGL
Emergency and Maneuver Abort Procedures

TS-4 (Front seat of a two seat model; N/A for A-10, F-35 & F-22):
Standard Demo Profile – Low Show
Accomplish Above 5,000 Feet AGL
Emergency and Maneuver Abort Procedures
TS-5 through TS-11 (Front seat of a two-seat model; N/A for A-10, F-35 & F-22):
Standard Demo Profiles (upgrading demo pilots will demonstrate a safe level of proficiency on both high and low shows prior to solo – N/A for A-10, F-35 & F-22). **(T-2)**
Accomplished Over a Runway, Initial Minimum Altitude is 2,000 Feet AGL
Step Down From 2,000 Feet AGL Determined By Currently Qualified Demo Pilot Monitoring The Training Program
Minimum Run and Wet Runway Landing
Demo pilots will conduct a minimum of three abort procedures during upgrade sorties TS-5 through TS-11. **(T-2)**
TS-12 through TS-16 (Solo): A-10, F-35 & F-22 pilots will demonstrate a safe level of proficiency on both high and low shows. (T-2)
TS-17 (Solo): WG/CC high show certification.

Chapter 3

A-10 DEMO MANEUVERS

Section 3A—-General Information

3.1. General. Use maneuvers described in this chapter for training and for A-10 aerial demos. The demo sequence is designed so each maneuver is normally performed in the same direction with respect to the crowd line. As a result, the show is always oriented the same way from the spectators' point of view. The only exception to this is when wind direction and velocity make it advantageous to change the direction of the gear down pass. In this case, the remaining maneuvers may be flown in the opposite direction, or repositions may be used to fly the remaining maneuvers in the appropriate direction. Abnormal Procedures are written for each maneuver. If the entry conditions are not met for any maneuver, a wings-level pass is flown and the pilot transitions to the next maneuver. Certain maneuvers require the pilot to transmit airspeed and/or altitude to a gound safety observer. The ground safety observer confirms parameters are good, monitors the demo pilot's flight path, engine performance, and visually clears the demo area for traffic. The safety observer monitors demo pilot altitude and airspeed radio calls and directs an abort when parameter limits are exceeded. As a minimum, demo pilots transmit parameters prior to initiating the descending portion of vertical pull-throughs and Vertical Reposition maneuvers. These calls are made when the pilot reaches apex of the maneuver. Following all maneuvers and before clearing the show line to reposition for the next maneuver, the pilot ensures any descent has been stopped and the aircraft is in a climbing or level attitude with the flight path marker at or above the horizon.

3.2. Aircraft Configuration and Fuel Requirements. The demo pilot will ensure aircraft configuration for all demos is clean (no wing pylons or missiles except wingtip smoke winders) and internal fuel. Each demo uses approximately 1,000 pounds of fuel. **(T-2)** Optimum performance is obtained when fuel load is 3,500 pounds; however, the demo can be safely accomplished with a higher fuel load as long as the wing tanks are empty. The minimum fuel to start the show is 2,500 pounds.

3.2.1. Staged Show: 3,500 pounds + 2 (10 lb/nm x distance)

3.2.2. High Show: 3,500 pounds.

3.2.3. Low Show: 3,000 pounds.

3.3. A-10 Pyrotechnics and Flares.

3.3.1. Pyro. **(T-3)** The A-10 demo will only utilize pyro as a Wall of Fire and/or explosive charges that simulate guns during Flat Pass, Pop-Up Strafe Pass, and/or Two Low Angle Strafe Passes. Only ICAS-approved personnel will be permitted to utilize pyro in association with the ACC A-10 Demo Team. Each calendar year the ICAS Pyro Safety Subcommittee identifies personnel as approved Shooters in Charge (SICs). Individuals' selection will be based on experience, judgment, and safety record. Only those SICs approved by the ICAS Pyro Safety Subcommittee will be allowed to work with ACC Demo Teams. The following maximum Net Explosive Weights (NEW) will be used (all NEWs in this instruction are Trinitrotoluene (TNT) equivalent): For the Wall of Fire pass, the maximum NEW is dependent on the length of the wall. The maximum wall length is 2000 linear feet, and the maximum NEW is 20 pounds

(spread out evenly). No more than 1 pound NEW will be used for each 100 linear feet of wall. The following items will be briefed by the ACC demo pilot and the SIC, in person, prior to each performance: (1) Exact dimensions of the pyro area and the magnitude of explosives being used. (2) Aircraft/pyro de- confliction plan. (3) Demo profile and sequence of pyro (Wall of Fire). (4) Forecast wind and effects on pyro. (5) Communications plan. (6) KIO procedures. (7) Fire hazards and fire department response plan. (8) Foreign Object Damage (FOD) potential and effects.

3.3.2. Flare Use. The A-10 demo is authorized to use flares during performances at overwater civilian airshows. An individual qualified in arming, de-arming and storage of flares will be present for all airshows where flares will be used. **(T-2)** The show must have a place to store the flares in case they need to be downloaded (hanger in inclement weather). **(T-2)** Prior coordination and approval needs to be obtained from the airshow director, and standard airshow firefighting equipment and personnel need to be present during flare use for all demos. **(T-2)** With fire conditions permitting, flares will be expended during the performance so as to remain within the aerobatic box. **(T-2)** Training flares (M206, MJU-61, or equivalent) will be used for all demos. **(T-2)** Aircraft will be armed in the chocks with the CMS set to "OFF" until positioned in the arming area or airborne IAW MDS procedures. **(T-2)** The planned minimum wings-level safe altitude for dispensing is 750 feet AGL to ensure flare burnout prior to contact with the water. A max planned crosswind of 22 knots with a 4.5" burn time will push the flare 168' laterally. **(T-2)** Pilots will use the 1,500-foot line for the aerobatic planned maneuvers so that the flares will travel no closer than 1250 feet to the crowd line. **(T-2)** This will ensure burnout/duds fall into the water and not the spectator area. Flares are authorized for use during the Vertical 540, Double Aileron Roll, Slow Roll, Cuban-8, Strafe Passes, Jink out, Dedication pass, pitch out maneuvers, and reposition turns in front of the crowd. Aircraft loaded with flares will not be used as a static display. **(T-2)**

3.4. Airspeed and G Limits. Fly the A-10 demo at max power except when slowing to configure for the gear down pass or slowing to configure for the minimum run landing. The maximum Target G for this demo profile is 6.0 Gs. This does not preclude a momentary increase in G for safety considerations.

3.5. Show Line Restrictions. The A-10 demo is flown on the 1,000- foot show line. Maneuvers not conforming to FAA Order 8900.1, Volume 3, **Chapter 6**, require approval via the FAA AFS-800 Maneuver Package approval process. **(T-0)**

3.6. Airspace and Runway Requirements. Required airspace for the A-10 is 7,000 feet AGL vertically and normally a five-mile radius from show center horizontally. The minimum dimensions of the aerobatic box are 2,000 feet wide, 4,000 feet long, and 7,000 feet AGL (high show). If the FAA has waived a show line to closer than 1,000 feet, the aerobatic box may be less than 2,000 feet wide (but no less than 1,800 feet IAW FAA Order 8900.1 Volume 3 **Chapter 6** Section 3-148 Subparagraph **2**-**4**), provided there is at least 800 feet from either the primary or the secondary show line, and 1,000 feet from the other. Minimum runway length is and width is 5,000 feet x 75 feet. The demo pilot will ensure the runway, taxiway, and parking area are stressed for a 35,000-pound aircraft with single wheel type landing gear. **(T-2)**

3.7. Weather Requirements. Weather PARAMETER LIMITS for the high show profile are a ceiling of at least 5,000 feet AGL, 3 NM ground and 5 NM in-flight visibility with a discernible horizon. The low show profile ceiling is at least 3,500 feet AGL. The flat show profile ceiling is

at least 1,500 feet AGL. The ceiling requirements for each maneuver are based on waived airspace (clear of clouds) and require adjustment if using Visual Flight Rules (VFR). Plan maneuvers to maintain VMC throughout the show sequence.

3.8. High Density Altitude Demos. For high-density altitude shows, PARAMETER LIMITS must be adjusted accordingly. You must add 500 feet to APEX altitudes for each 2,000 feet of altitude above 3,000 feet MSL and 10 knots to airspeeds. For example, if the show site altitude is 5,000 feet MSL, add 500 feet to the baseline target and 10 knots to the airspeed. If the show site altitude is 7,000 feet MSL, add 1,000 feet to the baseline target and 20 knots to the airspeed.

3.9. Demo Profiles.

Table 3.1. Demo Profile.

High Show
Takeoff
Flat Pass
Vertical 540
Split-S
Double Aileron Roll
Slow Roll
Cuban 8
1/2 Reverse Cuban Eight
Level 360
Gear Down Pass
Pop-Up Strafe Pass
Two Low Angle Strafe Passes
Jink Out
Four-Point Roll
Dedication Pass
Tactical Pitch-Up to Land
Low Show
Takeoff
Flat Pass
Double Aileron Roll
Slow Roll
Cuban 8

Level 360
Gear Down Pass
Pop-Up Strafe Pass
Two Low Angle Strafe Passes
Jink Out
Four-Point Roll
Dedication Pass
Tactical Pitch-Up to Land
Flat Show
Takeoff
Flat Pass
Double Aileron Roll
Slow Roll
Level 360
Gear Down Pass
Pop-Up Strafe Pass
Two Low Angle Strafe Passes
Four Point Roll
Dedication Pass
Tactical Pitch-Up to Land

3.10. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the demo sequence as required. Repositioning turns may not include added aileron rolls or other accenting maneuvers.

Figure 3.1. A-10 Repositioning Turn.

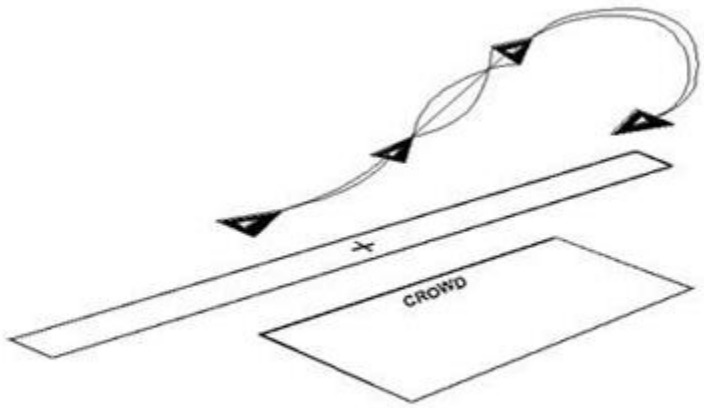


Table 3.2. A-10 Repositioning Turn Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed - Knots Calibrated Airspeed (KCAS)	Power Setting	G
Entry	300’	300	MAX	5 to 6
Exit	300’	N/A	N/A	N/A

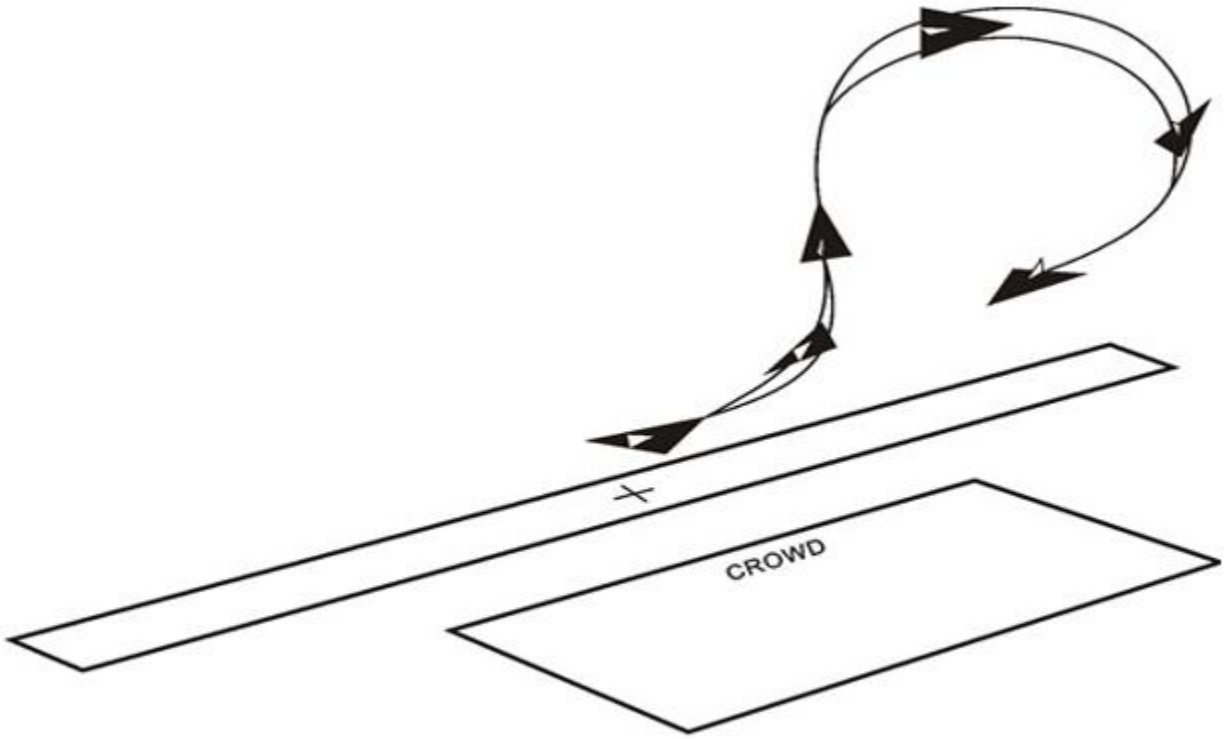
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	200’	120 / N/A	MAX	7.33
Exit	**min**	200’	N/A / N/A	N/A	N/A

3.10.1. Maneuver Description: The Repositioning Turn uses both horizontal and vertical turning room to change direction at each end of the show line. The vertical plane is used to maintain necessary proximity to the demo area. Each turn may differ slightly in order to meet entry TARGET PARAMETERS for the next maneuver and attain the proper show line alignment. To begin the maneuver, turn 15 to 45 degrees away from the crowd (depending on environmental conditions), rollout, and pull to 45 degrees nose high, and then unload. At 1,000

feet AGL minimum, execute a 270-degree aileron roll opposite the show line. Visually acquire the show line and make a descending turn to meet the entry TARGET PARAMETERS for the next maneuver. Repositioning turns may not include added aileron rolls or other accenting maneuvers.

3.10.1.1. Abnormal Procedures: If at any time the minimum altitude, airspeed, or climb angles, cannot be achieved or maintained, roll the aircraft to the nearest horizon and recover to wings- level flight.

Figure 3.2. A-10 High Speed Reposition Maneuver.



High Speed Reposition Maneuver
A-10

Table 3.3. A-10 High Speed Reposition Maneuver Parameters.

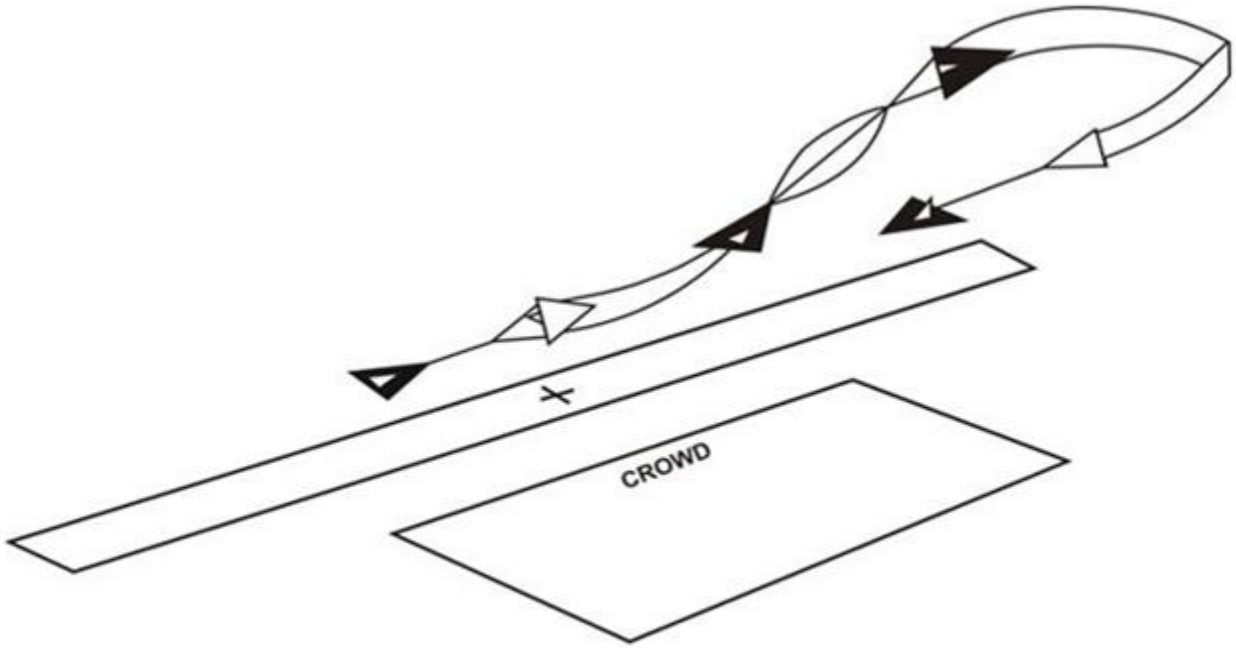
TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	330	MAX	5 to 6
Exit	300’	400	MAX	1

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry		400’	290 / Aircraft Limit (AC LMT)	MAX	7.33
Exit	**min**	200’	300 / AC LMT	MAX	7.33

3.10.2. Maneuver Description: Initiate a 75 to 90-degree bank turn away from the crowd to 45 degrees off the show line. (The maneuver may be flown behind the show line dependent upon the location of the local populace.) Once at the 45-degree turn point, initiate a 5.0 to 6.0-G pull to 45 degrees of climb (55 degrees maximum) and climb out 120 to 150 knots (120 knots minimum). At 3,500 feet AGL, initiate a 45-degree dive (55 degrees maximum) back to the appropriate show line for the next maneuver. Exit from the High Speed Reposition Maneuver by pulling at 1,200 feet AGL using 5.0 to 6.0 Gs to level off at the appropriate entry altitude for the next maneuver.

3.10.2.1. Abnormal Procedures: If at any time the minimum altitude, airspeed, or climb angles cannot be achieved or maintained, roll the aircraft to the nearest horizon and recover to wings-level flight.

Figure 3.3. A-10 Flat Wifferdill Reposition Maneuver.



3.10.3. Reposition Maneuver. The Flat Wifferdill Maneuver turn is a combination horizontal and shallow vertical turn used to change direction at each end of the show line. The Flat Wifferdill Maneuver turn uses less altitude than a normal Repositioning Maneuver. It requires a larger cut and tends to be looser and flatter than a normal Repositioning Maneuver. The target G for this maneuver is 3 to 5 Gs. Each turn may differ slightly to ensure airspeed/altitude parameters for the next maneuver are established in the Flat Wifferdill. The entry "cut" turn for the Flat Wifferdill is made to ensure no show line or crowd line penetration.

Section 3B—High Profile

3.11. Takeoff.

Figure 3.4. A-10 Takeoff.

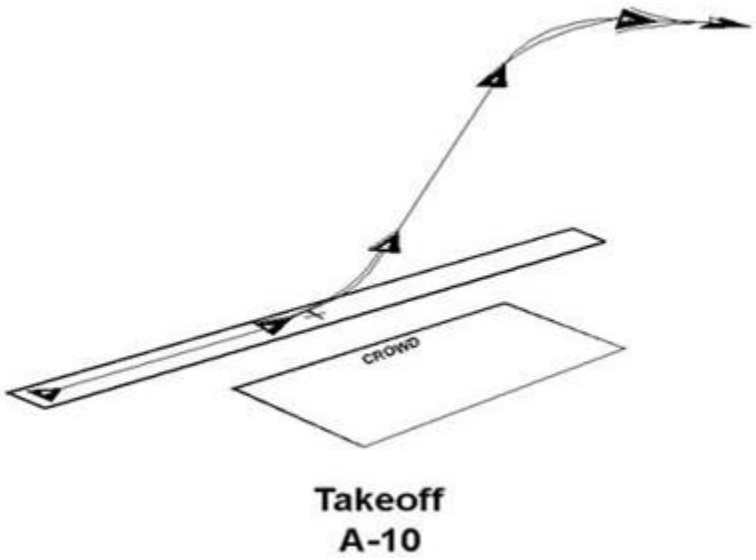


Table 3.4. A-10 Takeoff Parameters.

TARGET PARAMETERS				
	Altitude AGL	Airspeed KCAS	Power Setting	G
Entry	30’	200	MAX	3-4
Exit	N/A	N/A	N/A	N/A

PARAMETER LIMITS				
	Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	20’	175 / N/A	MAX	7.33
Exit	N/A	N/A / N/A	N/A	N/A

3.11.1. Maneuver Description: Accomplish a normal takeoff with 7-degree flaps. The rotation airspeed is 110 knots and should be accomplished using a smooth, continuous pull to obtain the normal takeoff attitude. Raise the gear with a positive rate of climb and retract the flaps once the gear is up and the gear horn is out. After gear and flap retraction, level off at 30

feet AGL and accelerate to a minimum of 175 knots. At show center or the end of the runway, with a minimum of 175 knots, pull up 30 to 45 degrees nose high using 3.0 to 4.0 Gs or the steady stall warning tone. Turn 15 to 45 degrees away from the crowd and continue climb out.

3.11.2. Abnormal Procedures: Use caution when taking off from short runways, runways at high-density altitudes, or wet runways. Takeoff and landing data (TOLD) is critical and requires careful computation at each show site. Do not fly if refusal speed is less than continuation speed. During the climb out, if the aircraft stalls or the airspeed falls below 110 knots (whichever occurs first), unload and accelerate to break the stall and/or increase airspeed to a minimum of 110 knots. Climb out can then be continued.

3.12. Flat Pass.

Figure 3.5. A-10 Flat Pass.

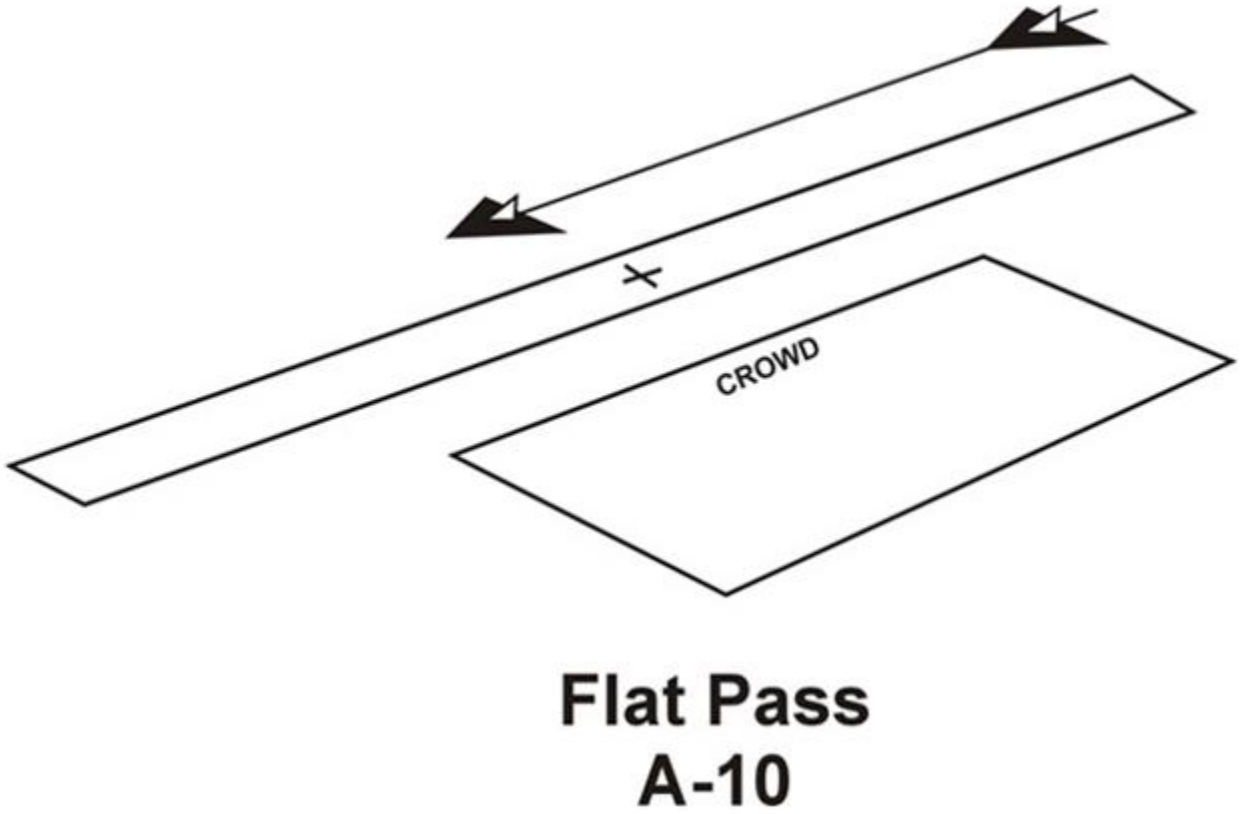


Table 3.5. A-10 Flat Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300’	325	MAX	5-6
Exit	300’	325	MAX	1

PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	200’	200 / AC LMT	MAX	N/A
Exit **min**	200’	200 / AC LMT	MAX	N/A

3.12.1. Maneuver Description: The Flat Pass is a maneuver used alone or in combination with a Wifferdill/Reposition for the purposes of displaying the aircraft or orienting the subsequent demo maneuver in the approved direction relative to the crowd line. It may be flown in either direction at any time during the demo sequence if required. It should be flown wings-level down the 500-foot show line at 300 feet AGL.

3.12.2. Abnormal Procedures: If any problems are encountered, the demo pilot should begin an immediate climbing turn away from the crowd.

3.13. Vertical 540.

Figure 3.6. A-10 Vertical 540.

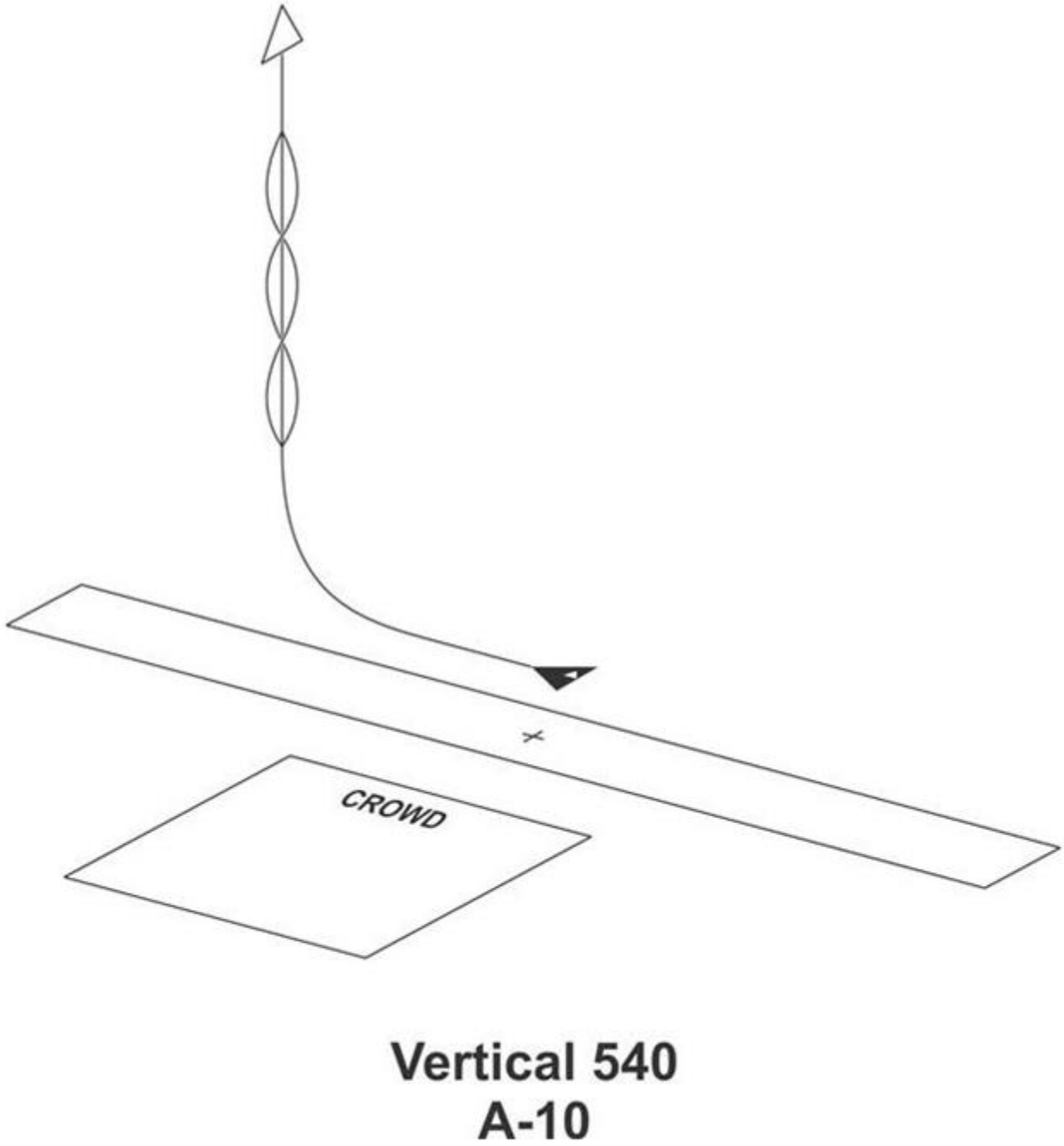


Table 3.6. A-10 Vertical 540 Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G

Entry	≥ 500’	325	MAX	1
Exit	≥ 5,000’	140	MAX	1

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	300 / N/A	MAX	N/A
Exit	**min**	3,500’	110 / N/A	MAX	N/A

3.13.1. Maneuver Description: After completion of the Flat Pass and on the 1,000 foot show line, pull up to 90 degrees nose-high using 5.0 to 6.0 Gs, unload, and execute a 540-degree roll. Once the roll is complete, pull the aircraft gently over onto its back and roll upright at no less than 110 knots. Drive straight ahead and attain target entry parameters for the next maneuver.

3.13.2. Abnormal Procedures: Vary the angle of climb for wind, weather, and aerobatic- box considerations. If at any time during the maneuver it appears the maneuver is not attaining the prescribed altitude or airspeed minimums over the top, abort the maneuver by performing a nose-high recovery IAW tech order procedure.

3.14. Split-S.

Figure 3.7. A-10 Split-S.

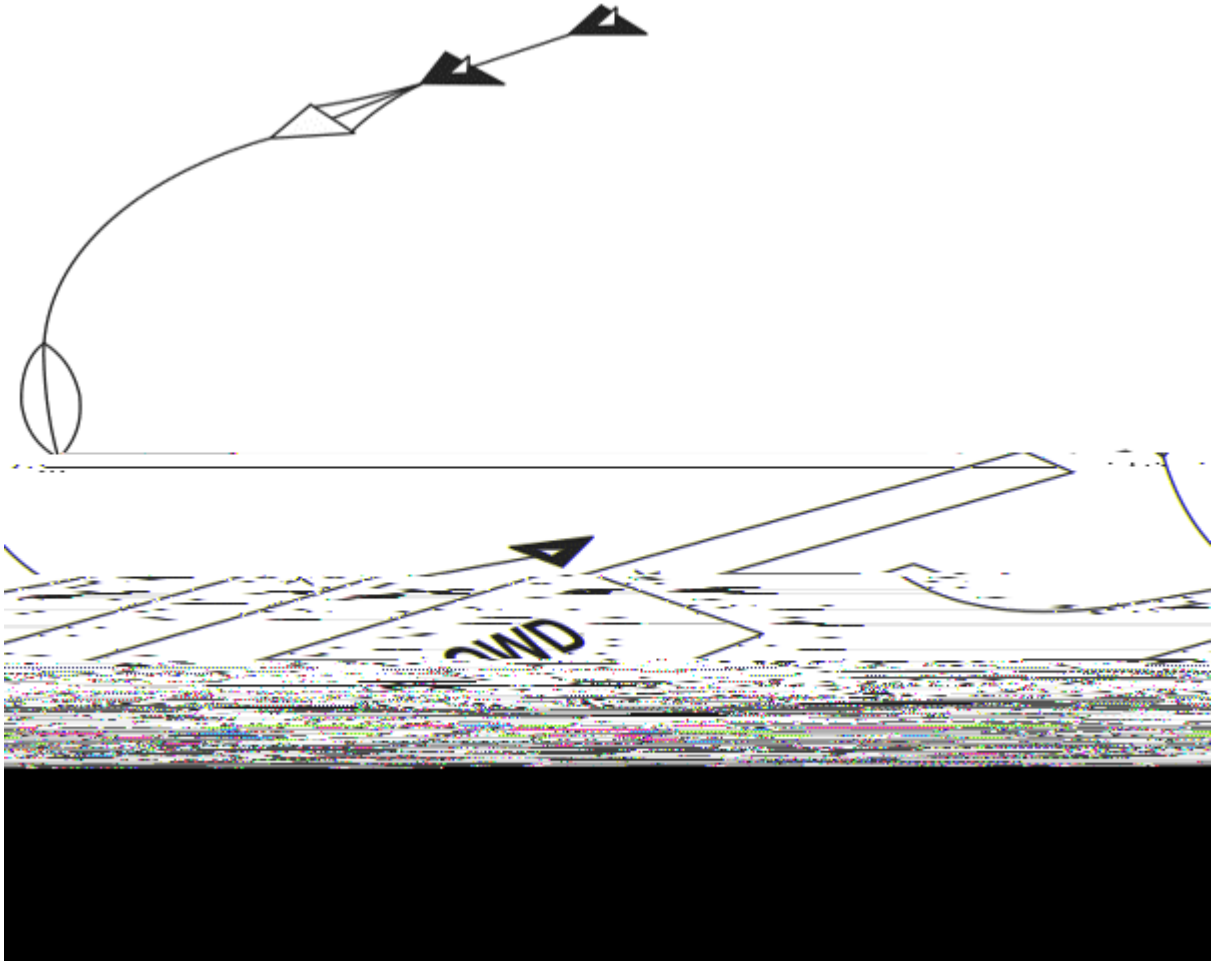


Table 3.7. A-10 Split-S Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	≥5,500	180	MAX	1
90 deg nose low	≥ 3,000’	250		
Exit ≥ 500’		As required (A/R)	MAX	1
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min**	4,500’	120 / 250	MAX	N/A

90 deg nose low	2,500’	N/A / 375		
Exit **min**	400’	N/A / N/A	A/R	N/A

3.14.1. Maneuver Description: (High Show only) On the 1,000 foot show line, after reaching the planned entry parameters of 5,500 feet AGL, perform an unloaded roll to inverted and perform an aggressive 90-degree pull to vertical. At 90 degrees nose-low execute a maximum rate unloaded 360-degree roll to be complete by 3,000 feet AGL. Continue an aggressive pull to no greater than 45 degrees nose-low. Once recovery above the minimum altitude for the follow-on maneuver is assured, vary the G-loading and dive angle as necessary to meet the entry parameters for the next maneuver. As a technique, passing approximately 1,200 feet AGL begin a 5 to 6-G pull to level off at 500 feet AGL.

3.14.2. Abnormal Procedures: If the entry parameters are not met, the pilot transitions to a wings-level flat pass or performs a slice-back as appropriate. If 5,500 feet AGL is not met, do not attempt the 360-degree roll on the down line and perform a traditional Split-S. Do not attempt to pull down from the inverted apex below 4,500 feet AGL or with more than 250 KIAS. If at any time, before reaching the 45 degrees nose-low position, the aircraft exceeds 375 knots, reduce the throttles and open the speed brakes to slow the aircraft to approximately 350 knots. If any other altitude, airspeed, or dive angle restrictions cannot be met, immediately execute a nose-low recovery by reducing the throttles to idle, opening the speed brakes, and rolling the aircraft upright to the nearest horizon.

3.15. Double Aileron Roll.

Figure 3.8. A-10 Double Aileron Roll.

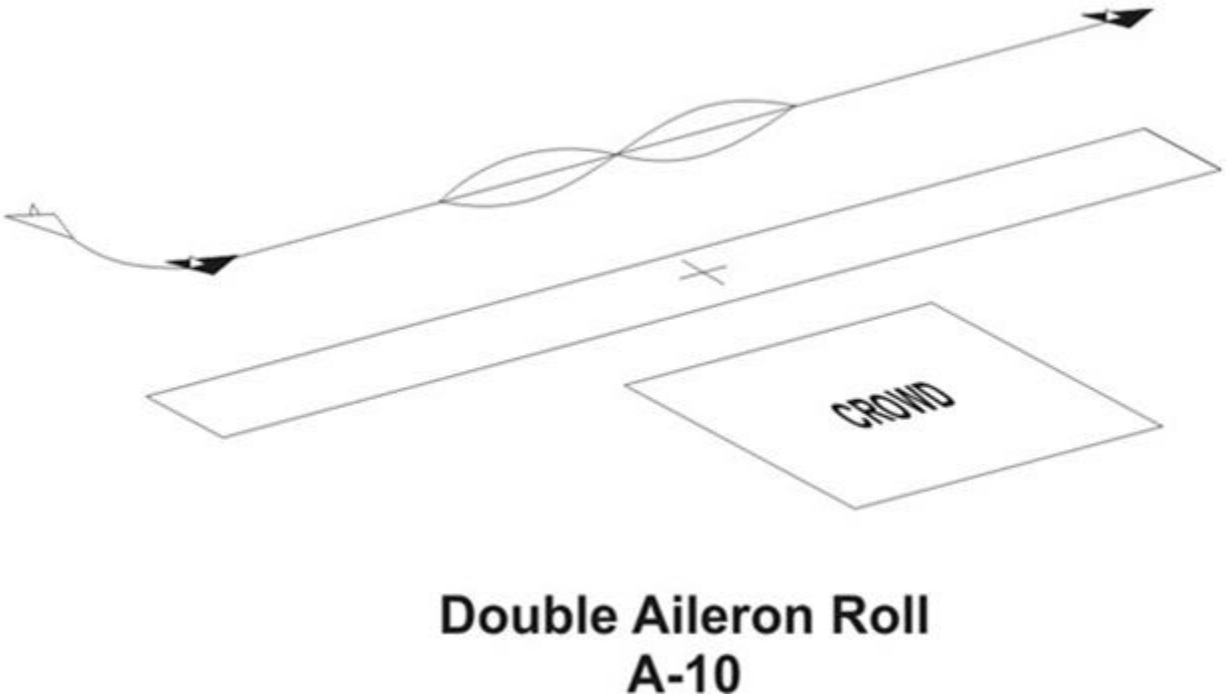


Table 3.8. A-10 Double Aileron Roll Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 500’	325	MAX	2-3
Exit 500’	325	MAX	1

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min** 400’	280 / N/A	MAX	N/A
Exit **min** 400’	270 / N/A	MAX	N/A

3.15.1. Maneuver Description: Enter the double aileron roll from wings-level flight at 500 feet AGL on the 1,000 foot show line. At 3,000 feet prior to show center, initiate a smooth 5 to 9-degree climb. As show center approaches the mid-point of the corner panel, unload the aircraft to 0 G and execute two 360-degree aileron rolls in either direction.

3.15.2. Abnormal Procedures: Abort the maneuver if at any time the nose falls more than 8 degrees below the horizon or the nose drops below the horizon prior to the beginning of the second roll. Aborting the maneuver is accomplished by rolling towards the nearest horizon to wings-level and climbing to ensure recovery at or above minimum altitude is achieved. Excessive nose drop is most likely to occur during the second half of the roll due to insufficient negative stick pressure, and a decrease in airspeed resulting in less control surface effectiveness.

3.16. Slow Roll.

Figure 3.9. A-10 Slow Roll.

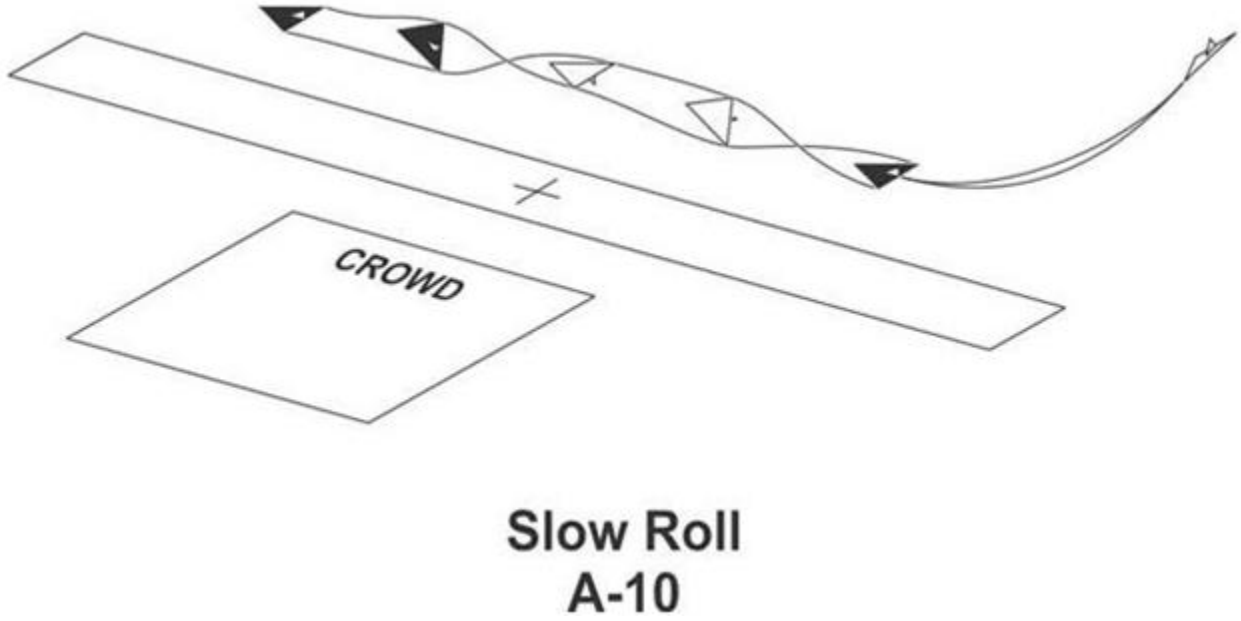


Table 3.9. A-10 Slow Roll Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	325	MAX	+1 to -1
Exit	500’	325	MAX	1

PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min**	400’	280 / N/A	MAX	N/A
Exit **min**	400’	270 / N/A	MAX	N/A

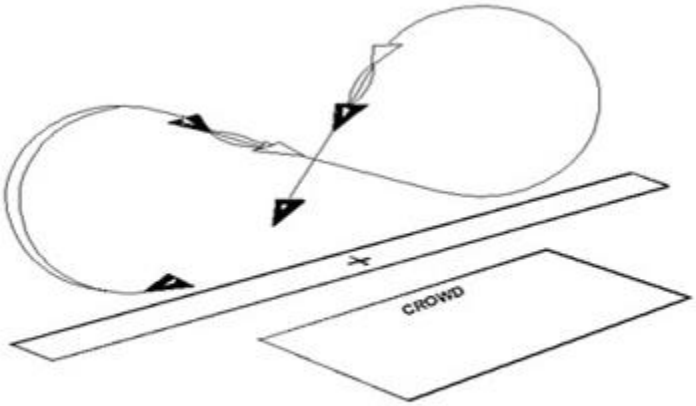
3.16.1. Maneuver Description: Position the aircraft on the 1,000 foot show line at 500 feet AGL and 325 knots using a reposition maneuver. Approximately 2,000 feet prior to show center, initiate an 8 to10-degree nose-high climb and begin an 8-second coordinated roll to the left. Top rudder should be applied approaching 90 degrees, and then slowly fed out as forward

stick pressure is applied to reach -1 G inverted flight at the 180-degree point. Left rudder is slowly fed in through the 270-degree point and slowly fed out to reach upright 1 G flight at 500 feet AGL. Dive angle during the exit should not exceed 8 degrees.

3.16.2. Abnormal Procedures: Abort the maneuver if at any time the nose falls more than 8 degrees below the horizon or the nose drops below the horizon prior to the inverted point. Aborting the maneuver is accomplished by rolling towards the nearest horizon to wings-level and climbing to ensure recovery at or above minimum altitude is achieved. Excessive nose drop is most likely to occur during the second half of the roll due to insufficient negative stick pressure, and a decrease in airspeed resulting in less control surface effectiveness.

3.17. Cuban 8.

Figure 3.10. A-10 Cuban 8.



Cuban Eight
A-10

Table 3.10. A-10 Cuban 8 Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	325	MAX	6
APEX	≥ 3,500’	180	MAX	2-4
Exit	500’	325	MAX	6

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G

Entry	**min**	400’	270 / AC LMT	MAX	7.33
APEX	**min**	3,000’	120 / AC LMT	MAX	N/A
Exit	**min**	400’	275 / AC LMT	MAX	7.33

3.17.1. Maneuver Description: On the 1,000 foot show line, with wings level and 500 feet AGL begin a smooth 6.0-G pull not to exceed the steady stall warning tone. Minimum apex altitude is 3,000 feet AGL with a minimum of 120 knots. Continue the pull until the aircraft is 45 degrees nose-low inverted (55 degrees maximum). Due to winds, it may be necessary to use more or less than 45 degrees nose-low in order to maintain show center orientation. The typical range is between 30 to 55 degrees nose-low. Do not exceed 55 degrees nose-low. At or above 3,000 feet AGL execute a 2-point hesitation roll on the 45-degree down line. Roll wings-level from the 90-degree hesitation point at or above 2,000 feet AGL. The 90-degree hesitation point requires top rudder to maintain the 45-degree down line and zero G to maintain the show line (G may be varied to adjust to the show line). As a technique, passing approximately 1,200 feet AGL, begin a 5 to 6.0-G pull to level off at 500 feet AGL. Normal apex altitude is 3,500 to 5,000 feet AGL depending upon environmental conditions. The second half is completed in the opposite direction.

3.17.2. Abnormal Procedures: If at any time during the maneuver it appears you may not attain the prescribed altitude or airspeed over the top, abort the maneuver by performing an unloaded roll to a wings-level position. Furthermore, if more than 45 degrees nose-low inverted is necessary due to winds, add 100 feet for every degree steep to roll-out and pull-out altitudes. If more than 55 degrees nose-low, roll out immediately. If unable to reach 45 degrees nose-low at or above 3,000 feet AGL on either half of the Cuban 8, execute a maximum rate 180-degree roll to wings-level at 2,500 feet AGL and execute recovery as described above.

3.18. 10 ½ Reverse Cuban 8.

Figure 3.11. A-10 ½ Reverse Cuban 8.

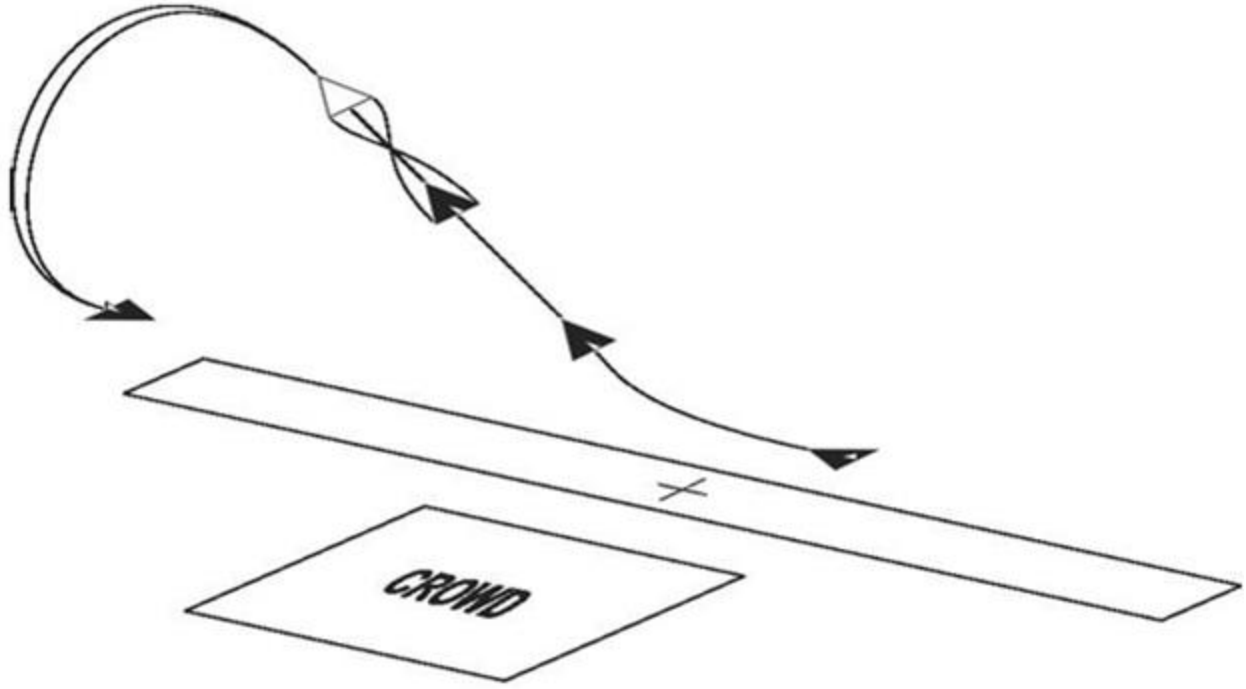


Table 3.11. A-10 ½ Reverse Cuban 8 Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	≥ 500’	325	MAX	1
Apex	> 5,000’	180		
90 deg nose low	> 3,000’	250		
Exit	≥ 500’	A/R	MAX	1

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	300	MAX	N/A
Apex	**min**	4,500’	120 / 250		
90 deg nose low	**min**	2,500’	N/A / 375		

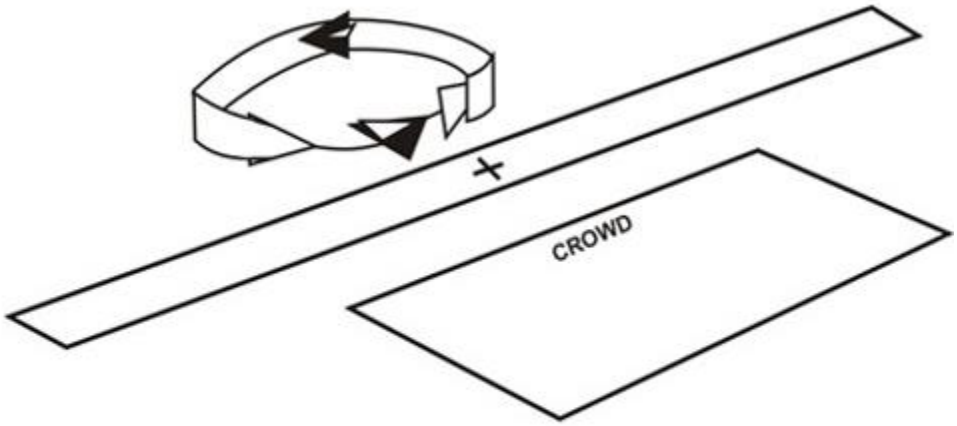
Exit	**min**	400’	N/A / N/A	A/R	N/A

3.18.1. Maneuver Description: (High Show Only) On the 1,000 foot show line, with wings level and 500 feet AGL or greater begin a smooth wings-level 6.0-G pull (not to exceed the steady stall warning tone) to a 40 to 70-degree nose-high attitude. At a minimum of 3,000 feet AGL, perform an unloaded 180-degree aileron roll to achieve an inverted climbing attitude. Initiate a smooth pull to the horizon to achieve a wings-level inverted position at 5,000 feet AGL. Continue the pull through the vertical, using 2.0-4.0 Gs, to 135 degrees of turn (45 degrees nose-low). Once recovery above the minimum altitude for the follow on maneuver is assured, vary the G-loading and dive angle as necessary to meet the entry parameters for the next maneuver. As a technique, passing approximately 1,200 feet AGL begin a 5 to 6-G pull to level off at 500 feet AGL. The ½ Reverse Cuban 8 may be flown as a vertical reposition maneuver to change direction at either end of the show line.

3.18.2. Abnormal Procedures: If the entry parameters are not met, the pilot transitions to a wings-level flat pass or performs a slice-back as appropriate. Do not attempt to pull down from the inverted apex below 4,500 feet AGL or with more than 250 KIAS. If at any time, before reaching the 45 degrees nose-low position, the aircraft exceeds 375 knots, reduce the throttles and open the speed brakes to slow the aircraft to approximately 350 knots. If any other altitude, airspeed, or dive angle restrictions cannot be met, immediately execute a nose-low recovery by reducing the throttles to idle, opening the speed brakes, and rolling the aircraft upright to the nearest horizon.

3.19. Level 360.

Figure 3.12. A-10 Level 360.



Level 360
A-10

Table 3.12. A-10 Level 360 Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	325	MAX	6
Exit	500’	250	MAX	6

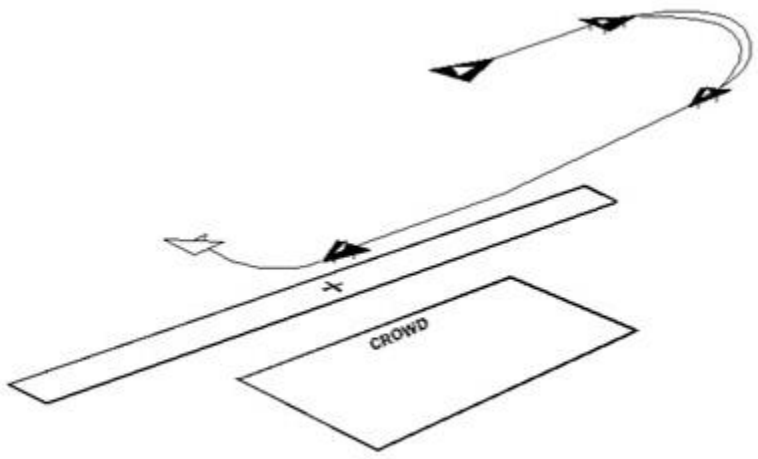
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	300 / N/A	MAX	7.33
Exit	**min**	400’	240 / N/A	MAX	7.33

3.19.1. Maneuver Description: Position the aircraft on the 1,000 foot show line at 500 feet AGL and 325 knots. At show center, turn away from the crowd using approximately 85 degrees of bank. Begin the turn with a smooth G-onset-rate to maintain 6.0 Gs or the steady stall warning horn whichever occurs first. G-loading and airspeed bleed-off rate vary with density altitude. Maintain a minimum of 240 knots. The first 180 degrees of turn should be accomplished with a 1 ¾-degree nose-up attitude and the last 180 should be accomplished with a 1 ¾-degree nose-down attitude to make the turn appear level to the crowd. Vary the bank angle and pitch to arrive at level flight at the completion of 360 degrees of turn and to ensure the maneuver is finished above the entry altitude. Ensure surface winds are taken into consideration in order to center this maneuver and to avoid overshooting the show line. Continue the turn past 360 degrees as required (usually 30 to 45 additional degrees of turn depending on winds) in order to transition to the reposition maneuver used to set up for the Gear Down pass.

3.19.2. Abnormal Procedures: If the minimum entry parameters are not met, the pilot transitions to a wings-level flat pass. If during any portion of the maneuver it becomes apparent the aircraft is descending below 400 feet AGL or airspeed decays below 240 knots, abort the maneuver by rolling wings-level and climbing to 500 feet AGL. If necessary, adjust G as required (no lower than 240 knots) to avoid overshooting the show line.

3.20. Gear Down Pass.

Figure 3.13. A-10 Gear Down Pass.



Gear Down Pass
A-10

Table 3.13. A-10 Gear Down Pass Parameters.

TARGET PARAMETER				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300’	120	A/R	1
Exit	300’	120	A/R	1

PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	200’	110 / 200	A/R	N/A
Exit	200’	110 / 200	A/R	N/A

3.20.1. Maneuver Description: After completion of the Level 360, initiate a turn toward the 500-foot show line and begin slowing the aircraft below 200 knots with full speed brakes. Upon reaching the base position for the 500-foot show line and below 200 knots, configure the aircraft with gear, full flaps, and 40% speed brakes and begin a descent down to 300 feet AGL.

Continue slowing the aircraft to 120 knots (110 knots minimum) while flying down the 500-foot show line. When passing the last of the crowd, select max power, close the speed brakes, raise the gear, and bring the flaps to seven degrees while maintaining between level flight and a slight climb. Passing 150 knots raise the flaps to zero degrees. While level to slightly climbing, turn away from the show line to set up for the Pop-Up Strafe Pass using 30 degrees of bank (45 degrees maximum).

3.20.2. Abnormal Procedures: If the minimum altitude or airspeed cannot be maintained, or the aircraft stalls, abort the maneuver by selecting max power, closing the speed brakes, and setting the flaps to MVR. If still sinking, consider engaging the fuel flows to override.

3.21. Pop-Up Strafe Pass.

Figure 3.14. A-10 Pop-Up Strafe Pass.

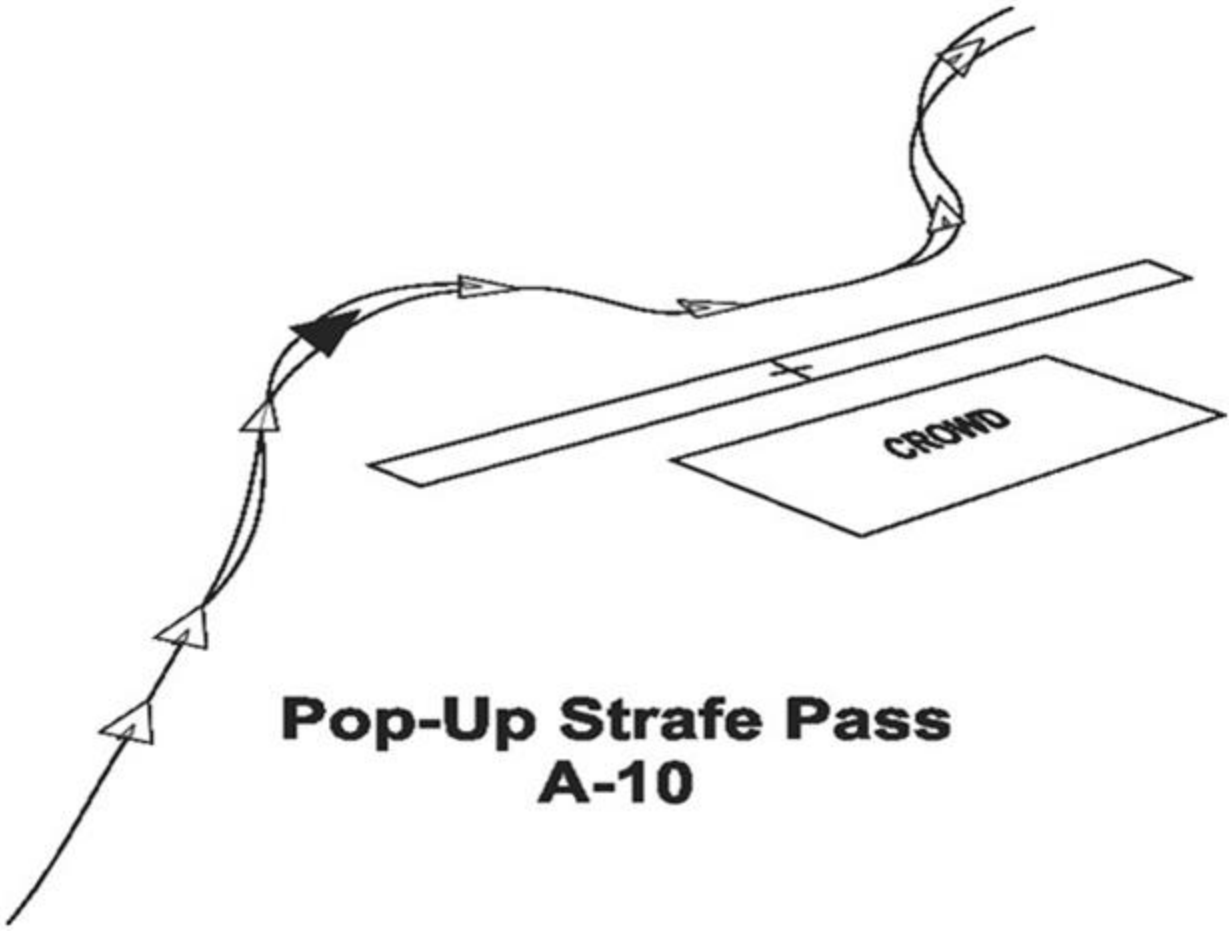


Table 3.14. A-10 Pop-Up Strafe Pass Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300’	325	MAX	1 (6 for Pull Up)

Apex (Flat) 1,500' (1,000')	225	MAX	2-4
Exit (Pyro) 200' (400')	285	MAX	6

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry 200'	250 / AC LMT	MAX	7.33
Apex 1,000'	120 / AC LMT	MAX	N/A
Exit (Pyro) 100' (300')	200 / AC LMT	MAX	7.33

3.21.1. Maneuver Description: After passing the show line corner marker, turn 30-60 degrees away from the aerobatic container in order to reposition to a pull-up point from behind the show line. As a technique, with show center coordinates as the active steer point, drive outbound, 45 degrees off the show line (wind dependent). At 2nm from show center, use a flat Wifferdill maneuver to head back toward the corner marker with the #2 needle 20 degrees off heading at 2nm inbound. Maintain the initial heading and use a 6-G pull-up to 45 degrees nose-high upon reaching 1.3nm. The show center target area should be visually acquired during the Wifferdill reposition. If unable, the above technique should place the aim point just behind the canopy bow and just above the canopy rail during the 45-degree pop. Align the aircraft to approach the preplanned strafe target/point from an appropriate angle. This angle normally ranges from 10 – 30 degrees off the 500-foot show line depending on the location of the crowd line and winds. Do not allow a vector towards the crowd! Ensure the aircraft vector, if extended to infinity, does not penetrate the crowd line. The dive angle is normally 10 – 30 (5 – 15 Flat) degrees nose-low depending on winds. The optimum dive angle is 25 (10 Flat) degrees. Do not exceed 30 (15 Flat) degrees. Recovery should be initiated at 650 feet AGL using a max performance pull in order to bottom out at or above 200 feet AGL. Be very careful not to over-G the aircraft during this pull. A minimum of 200 knots is required to make this corner. After recovering to level flight, accomplish a reposition maneuver to set up for the next strafe pass. Use the 500-foot show line at show center as a reference point for setting up each strafe pass. Do not cross the 500-foot show line. Depending on winds, this may require aiming 100 – 300 feet outside the 500-foot line away from the crowd.

3.21.2. Abnormal Procedures: If at any time the dive angle exceeds 30 (15 Flat) degrees, either abort the pass and fly through straight and level or shift the aim point longer and parallel to the show line until the dive angle is 30 (15 Flat) degrees or less. Check airspeed at 1,000 feet AGL. If it is not at least 230 knots, abort the pass and fly through straight and level.

3.22. Two Low Angle Strafe Passes.

Figure 3.15. A-10 Two Low Angle Strafe Passes.

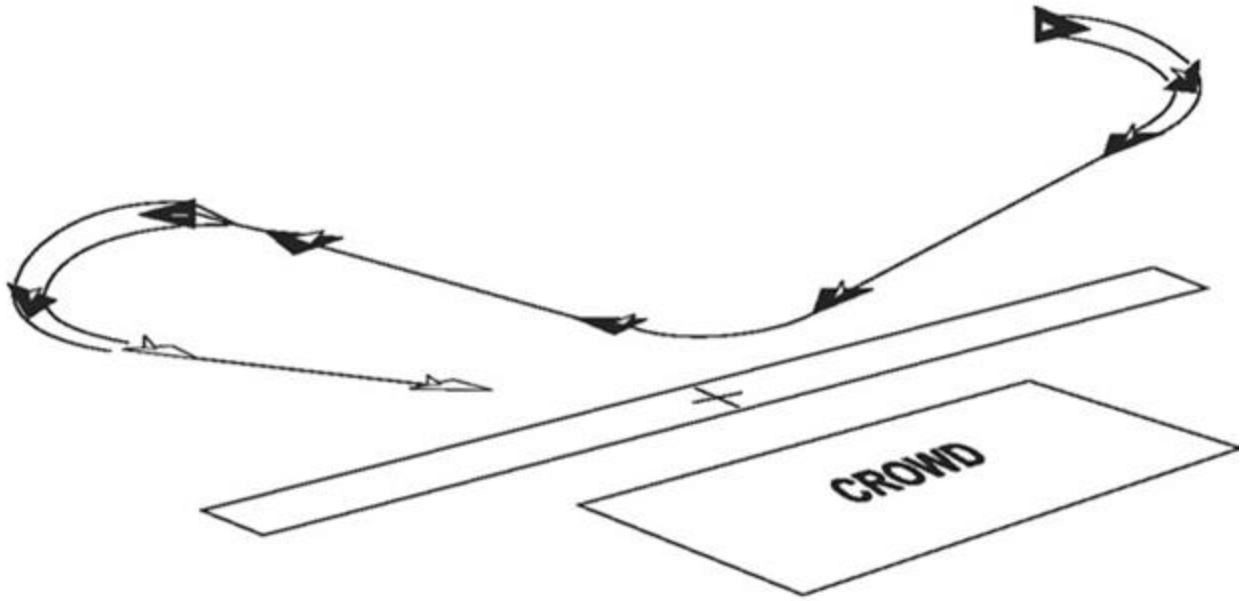


Table 3.15. A-10 Two Low Angle Strafe Passes Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry (Flat) 1,500’ (1,000’)	225	MAX	1
Exit (Pyro) 200’ (400’)	285	MAX	6

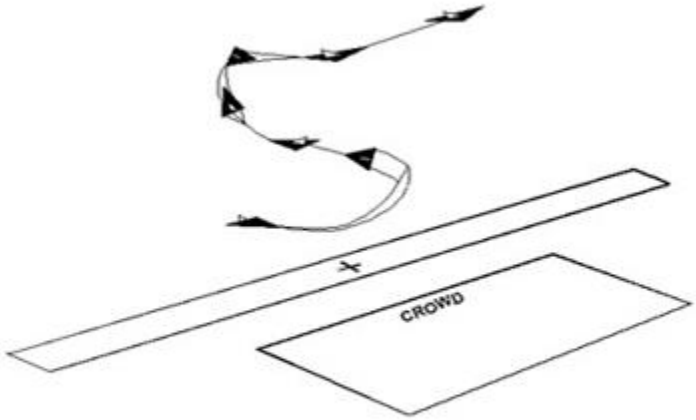
PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry 1,000’	200 / AC LMT	MAX	N/A
Exit (Pyro) 100’ (300’)	200 / AC LMT	MAX	7.33

3.22.1. Maneuver Description: After performing a reposition maneuver, align the aircraft to approach the preplanned strafe target/point from an appropriate angle. This angle normally ranges from 10 – 30 degrees off the 500-foot show line depending on the location of the crowd line and winds. Do not allow a vector towards the crowd! Ensure the aircraft vector, if extended to infinity, does not penetrate the crowd line. The dive angle is normally 10 – 30 (5 – 15 Flat)degrees nose-low depending on winds. The optimum dive angle is 25 (10 Flat) degrees. Do not exceed 30 (15 Flat) degrees. Recovery should be initiated at 650 feet AGL using a max performance pull in order to bottom out at or above 200 feet AGL. Be very careful not to over-G the aircraft during this pull. A minimum of 200 knots is required to make this corner. After recovering to level flight, accomplish a reposition maneuver to set up for the next strafe pass. Use the 500-foot show line at show center as a reference point for setting up each strafe pass. Do not cross the 500-foot show line. Depending on winds, this may require aiming 100 – 300 feet outside the 500-foot line away from the crowd. Following the last strafe pass, transition to the Jink-Out maneuver.

3.22.2. Abnormal Procedures: If at any time the dive angle exceeds 30 (15 Flat) degrees, either abort the pass and fly through straight and level or shift the aim point longer and parallel to the show line until the dive angle is 30 (15 Flat) degrees or less. Check airspeed at 1,000 feet AGL. If it is not at least 230 knots, abort the pass and fly through straight and level.

3.23. Jink-Out Maneuver.

Figure 3.16. A-10 Jink-Out.



Jink-Out
A-10

Table 3.16. A-10 Jink-Out Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G

Entry	200’	290	MAX	5 to 6
OTT	≥ 2,000’	200	MAX	4

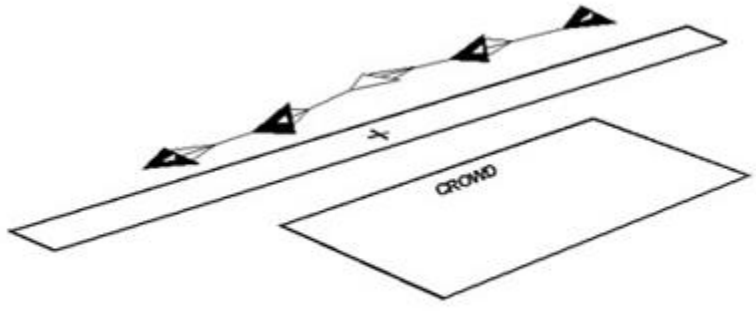
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	100’	200 / AC LMT	MAX	7.33
OTT		120 / AC LMT	MAX	N/A

3.23.1. Maneuver Description: Upon completion of the last strafe pass and level at the 200-foot target altitude, a 75 to 90-degree bank 5.0 to 6.0-G turn is initiated away from the crowd to complete a 100 to 135-degree turn to be at or beyond the 1,000-foot show line. At the completion of this 100 to 135-degree turn, pull 3.0 to 5.0 Gs up to 40 degrees (55 degrees maximum). Once pitch degree is achieved, maintain climb to 2,000 feet AGL, then roll inverted and pull to 30 degrees nose-low (40 degrees maximum). Hold till 1,200 feet AGL, then roll to the nearest horizon and level-off at 500 feet AGL. The goal of this maneuver is to show the Jink-Out in front of show center and be at the 1,000-foot line. In order for this to occur, the 100 to 135 degrees of turn is accomplished at a target of 4.0 Gs.

3.23.2. Abnormal Procedures: If at any time during the maneuver any altitude or climb/dive angle cannot be maintained, abort by rolling wings-level and climbing away from the crowd line.

3.24. Four-Point Roll.

Figure 3.17. A-10 Four-Point Roll.



Four - Point Roll
A-10

Table 3.17. A-10 Four-Point Roll Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	325	MAX	+1 to -1
Exit	500’	325	MAX	1

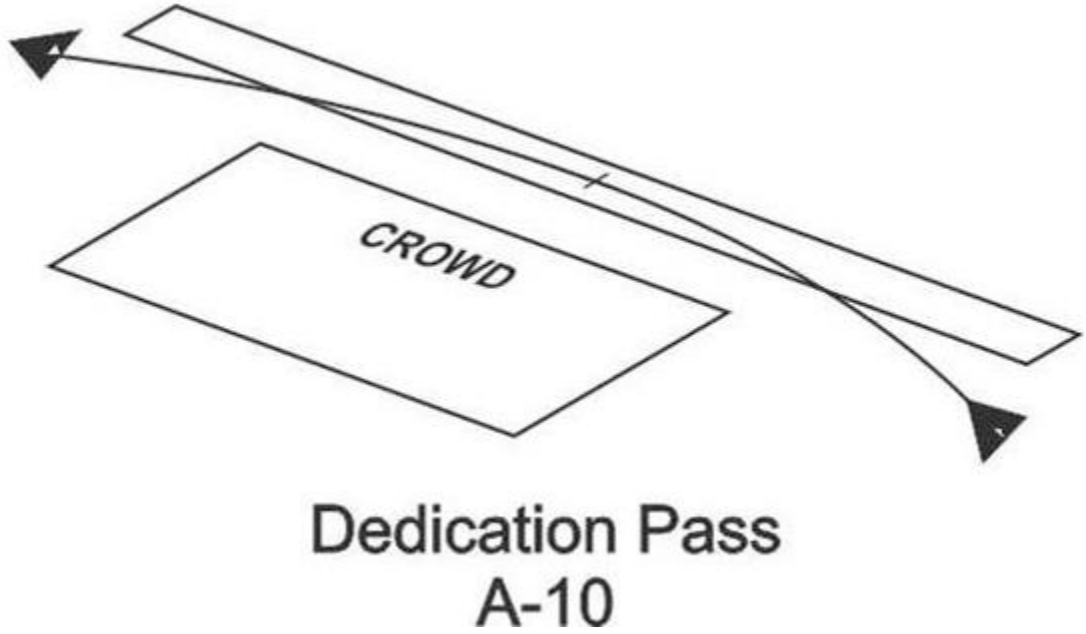
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	280 / AC LMT	MAX	N/A
Exit	**min**	400’	270 / AC LMT	MAX	N/A

3.24.1. Maneuver Description: Enter the Four-Point roll on the 1,000 foot show line at 500 feet AGL and 325 knots. 2,000 feet prior to show center, pull the nose 3 to 5 degrees nose-high, establish a climb, and unload. A cadence four-point roll to the left is then performed by pausing momentarily at the 90-degree, 180-degree, 270-degree, and 360-degree points. The pace of the cadence should ensure the aircraft is at the 180-degree point over show center. In order to facilitate sharp transitions between each 90 degrees of roll, momentarily fan the speed brakes and unload the aircraft to 0 Gs at the initiation of each roll. Be sure to close the speed brakes upon completion of the roll to avoid any unnecessary loss of airspeed. The 90-degree and 270-degree points require top rudder to maintain level flight and zero G to maintain the show line. The 180-degree point requires 1 negative G in order to maintain level flight. This is accomplished using the horizon, not the G-meter.

3.24.2. Abnormal Procedures: If at any time during the Four-Point Roll, the nose falls more than five degrees below the horizon, abort by rolling towards the nearest horizon and a wings-level position, then continue down the show line. This would most likely occur during the 3rd point (270 degrees) due to a decrease in airspeed, which results in less rudder effectiveness.

3.25. Dedication Pass. The intent of this maneuver is to pay tribute to our war fighters. It is to be flown before the Tactical Pitch-Up to Land during the High, Low, and Flat Show profiles.

Figure 3.18. A-10 Dedication Pass.



Dedication Pass
A-10

Table 3.18. A-10 Dedication Pass Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300’	325	MAX	1 to 3
Exit 300’	325	MAX	4 to 6

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min** 200’	250 / A/C Limits	MAX	7.33
Exit **min** 200’	250 / A/C Limits	IDLE to MAX	7.33

3.25.1. Maneuver Description: The maneuver is flown beyond the 500-foot line. After performing the Four-Point Roll or Strafe Passes, execute a reposition maneuver on the crowd side to arrive behind and offset the crowd. Fly the approach from behind the line, approximately 2 miles from show center, with an approximate 30-degree dive angle and a 45-degree cut (bank angle 75 to 90 degrees) to the show line, remaining beyond 500 feet from the crowd at all times. Upon reaching a point 500 feet from the corner of the crowd and 300 feet

AGL, roll the aircraft into a level arcing pass using a bank of 75 to 90 degrees. Use top rudder if necessary to maintain altitude. Optimum profile of the aircraft is achieved at approximately 80 degrees of bank. Use caution not to over bank the aircraft and allow the aircraft to lose altitude while banking. In order to maintain 500 feet from the crowd at each corner, ensure the flight path at show center extends beyond 500 feet. Continue the arc beyond the opposite crowd corner, roll out of bank, and continue a maximum 45-degree climb to set up for the Tactical Pitch-Up to Landing.

3.25.2. Abnormal Procedures: Abort the maneuver if at any time the aircraft comes closer than 500 feet to the crowd line or its lateral limits, an excessive dive angle or sink rate develops, entry parameters are not met, or the aircraft descends below 200 feet AGL. Abort the maneuver by rolling the aircraft wings-level and flying away from the crowd.

3.26. Tactical Pitch-Up to Land.

Figure 3.19. A-10 Tactical Pitch-Up to Land.

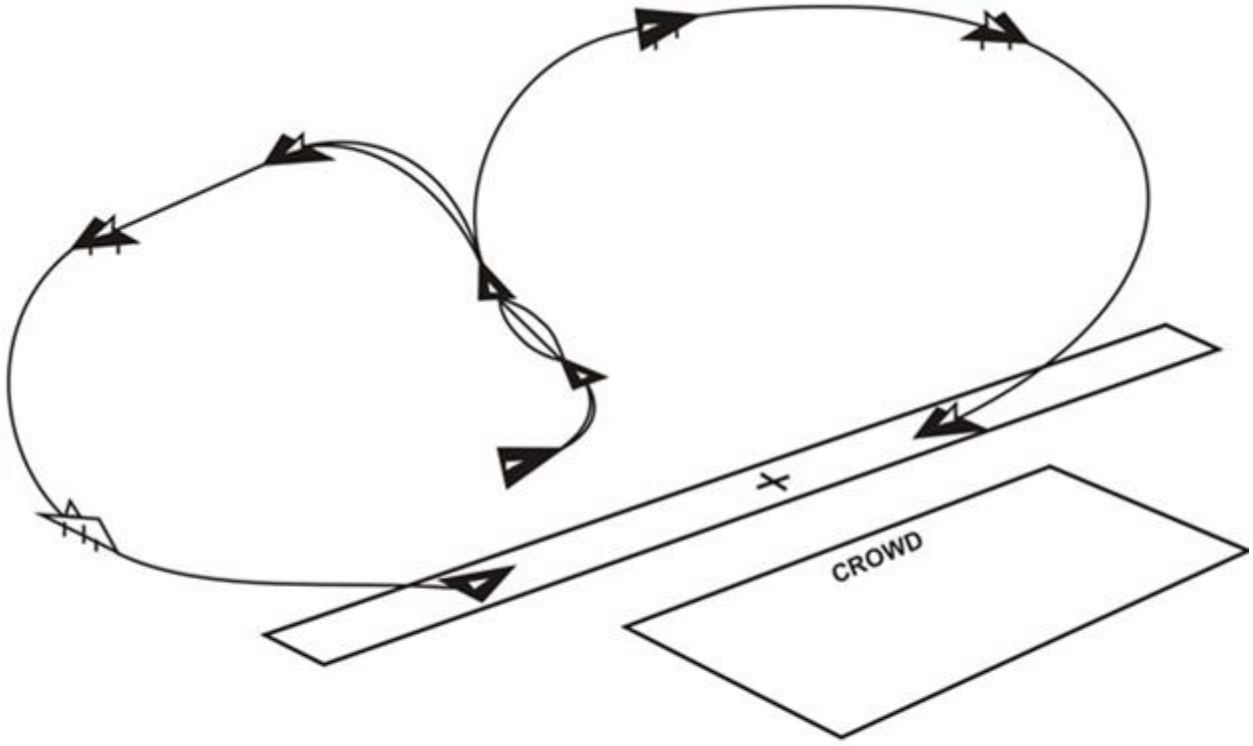


Table 3.19. A-10 Tactical Pitch-Up to Land Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G

Entry 300’	325	MAX	1
Pitch-Up 300’	350	MAX	5-6
Exit ≥1,000’	180	A/R	N/A

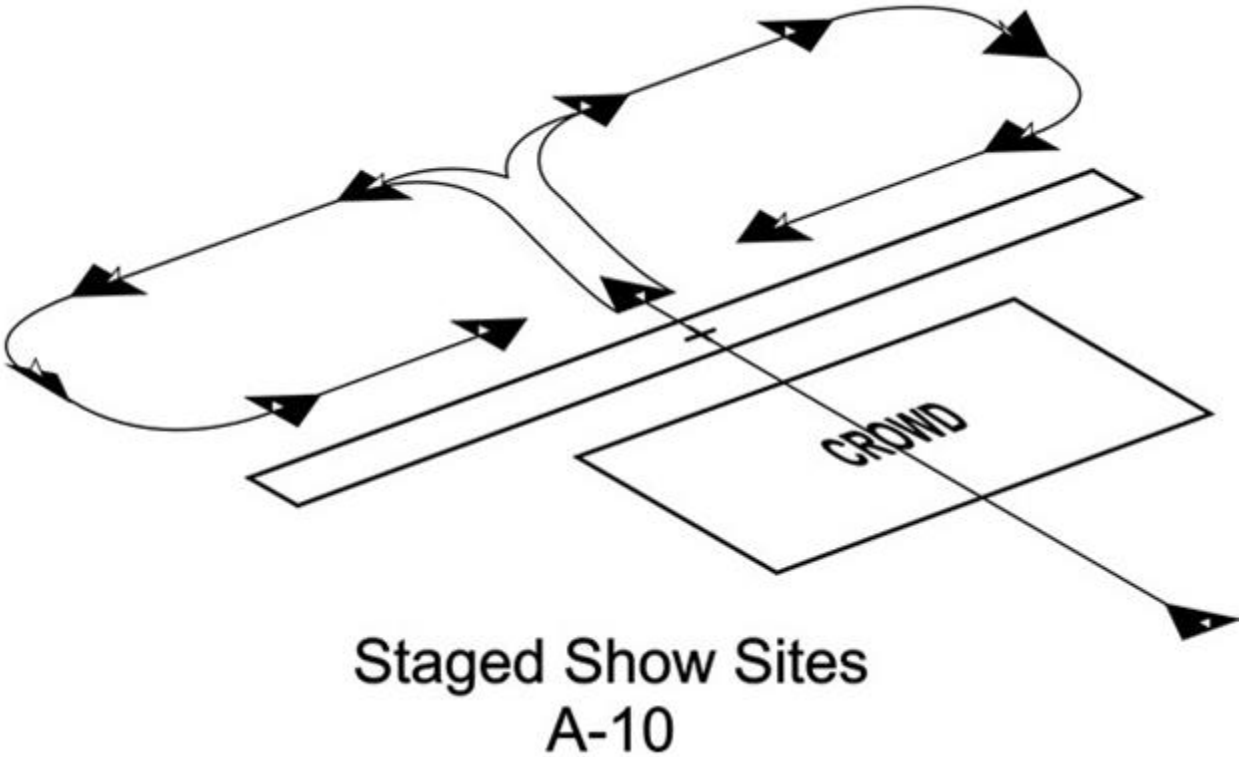
PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry **min** 200’	200 / AC LMT	MAX	N/A
Pitch- Up 200’	200 / N/A	MAX	7.33
Exit 1,000’	135 / N/A	A/R	N/A

3.26.1. Maneuver Description: Reposition the aircraft to level off at 300 feet AGL, on the 500-foot show line at 325 knots (200 knots minimum). Roll into 75 to 90 degrees of bank to turn 90 degrees away from the crowd line. Once pointed away from the crowd, pull 5.0 to 6.0 Gs to 40 degrees nose-high to achieve 1,000 feet AGL minimum. At 1,000 feet AGL minimum execute a non-acrobatic 270-degree roll and pull toward the perch point of the landing runway. Begin slowing the aircraft and configure for landing with gear, full flaps, and 40% speed brakes. Fly a normal base to final (no slower than 135 knots final turn). On final, continue slowing to 120 knots (110 minimum) to touchdown. After touchdown, perform a minimum run landing by lowering the nose, opening the speed brakes full, and initiating full anti-skid braking bringing the aircraft to a complete stop. Plan to do the minimum run landing to stop at show center. This is accomplished by planning your touchdown point 2,000 feet prior to show center. Do not land 2,000 feet prior to show center if, at the point of touchdown, there is less than 5,000 feet of useable runway remaining. In this case, plan your touchdown normally in the first 500 feet of runway. **Note**: Option; If a HF is to be performed immediately following completion of the demo, this maneuver may be deleted and a Flat Pass may be substituted. If not deleted, conduct a wings-level low approach or wings-level pass and proceed to rejoin with HF aircraft using pre-briefed procedures.

3.26.2. Abnormal Procedures: If airspeeds, altitudes, or stall warning indications are experienced with the stick shaker, execute a Go-Around to recover the aircraft. Once the Go-Around is completed, the pilot then turns out to downwind (away from the crowd) and sets up for a normal straight-in to full stop.

3.27. Staged Show Sites. When demo aircraft takeoff from other than the air show site, ensure fuel planning includes the fuel required flying to and from the show site, and any holding time required. The pilot may enter the show from behind the crowd at a minimum of 1,000 feet AGL as depicted in **Figure 3.20**, or via a Flat Pass maneuver down the show line, and complete the show as described in this chapter. Upon completion of the Dedication Pass and clearing the crowd, turn out behind the crowd and return to the staging airport. Pilots should plan to fly a full demo, but may cut he profile short as required to maintain suitable enroute return fuel.

Figure 3.20. A-10 Staged Show Sites.



3.28. Tactical Pitch- Up to Immelmann.

Figure 3.21. A-10 Tactical Pitch- Up to Immelmann.

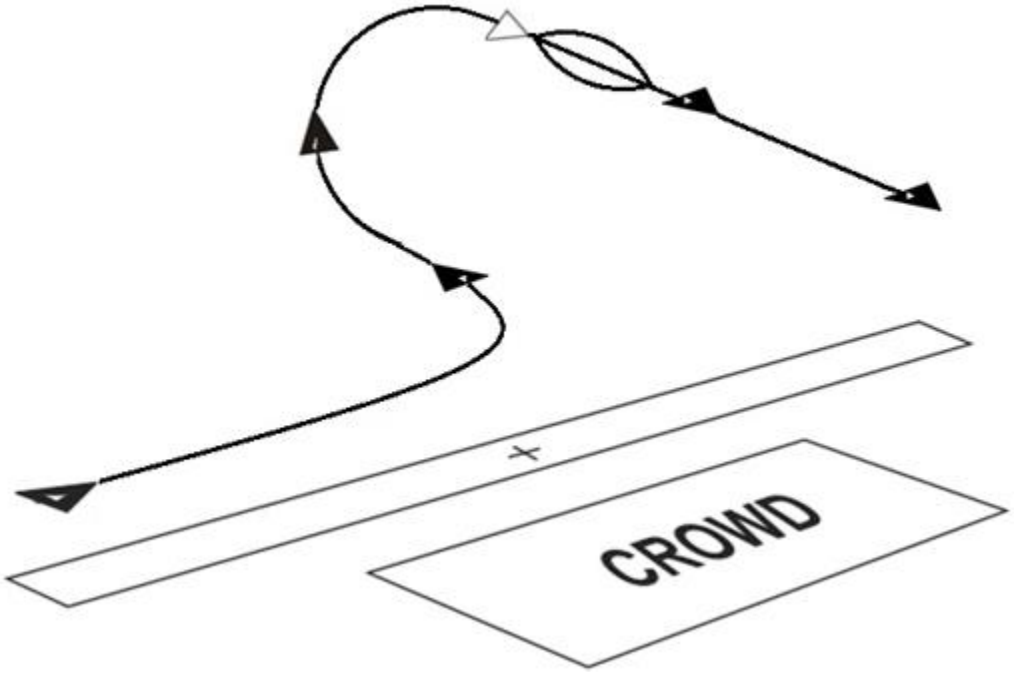


Table 3.21. A-10 Tactical Pitch-Up to Immelmann Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300’	325	MAX	1
Pitch- Up 300’	350	MAX	4-6
Exit ≥3,000’	180	A/R	N/A

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry **min** 200’	300 / AC LMT	MAX	N/A
Pitch- Up 200’	280 / N/A	MAX	7.33
Exit 1,000’	120 / N/A	A/R	N/A

3.28.1. Maneuver Description: Reposition the aircraft to level off at 300 feet AGL, on the 500-foot show line at 325 knots (300 knots minimum). Roll into 75 to 90 degrees of bank to turn 90 degrees away from the crowd line. Once pointed away from the crowd, pull 4.0 to 6.0 Gs not to exceed the steady stall warning tone. Pull the aircraft onto its back and begin an unloaded roll at 20 degrees nose high (when the canopy bow hits the horizon) and no less than 120 knots. Once rolled out wings level and facing the crowd continue a steady climb not to descend below 1,000 feet AGL. **Note**: If a HF is to be performed immediately following completion of the demo with the rejoin occurring in front of the crowd, this maneuver may be deleted and a Flat Pass may be substituted to execute the pre-briefed rejoin gameplan.

3.28.2. Abnormal Procedures: If less than 280 knots on rollout from the pitch-out, do no not attempt the Immelmann. Continue a straight ahead climb away from the crowd and return to the staging airport or Heritage Flight rejoin location.

Chapter 4

F-16 DEMO MANEUVERS

Section 4A—General Information

4.1. General. Use maneuvers described in this chapter for training and for F-16 aerial demos. The demo sequence is designed so all of the maneuvers up to the High Alpha Pass are performed in the same direction with respect to the crowd line. The High Alpha Pass is designed to be flown against the wind. Abnormal procedures are written for each maneuver. If the entry conditions are not met for any maneuver, a wings-level pass is flown and the pilot transitions to the next maneuver. Certain maneuvers require the pilot to transmit airspeed and/or altitude to a safety observer. The ground safety observer confirms parameters are good, monitors the demo pilot's flight path, engine performance, and visually clears the demo area for traffic. The safety observer monitors demo pilot altitude and airspeed radio calls and directs an abort when parameter limits are exceeded. As a minimum, F-16 demo pilots transmit parameters prior to initiating the descending portion of vertical pull-throughs for the Split-S, Shark's Tooth, and Vertical Reposition maneuvers. These calls are made when the pilot reaches apex of the maneuver. Following all maneuvers and before clearing the show line to reposition for the next maneuver, the pilot ensures any descent has been stopped and the aircraft is in a climbing or level attitude with the flight path marker at or above the horizon.

4.2. Aircraft Configuration and Fuel Requirements. Ensure aircraft configuration for all demos is clean (no wing pylons or missiles except wingtip smoke winders) and internal fuel. Fuel considerations include: Divert requirements, cable availability, temperature, and density altitude. Normal minimum fuel for take-off is:

4.2.1. Staged Show: 6,000 pounds.

4.2.2. High Show: 5,000 pounds.

4.2.3. Low Show: 4,000 pounds.

4.3. F-16 Pyrotechnics and Flares. (T-3)

4.3.1. Pyro. The F-16 demo will only utilize pyro as a Wall of Fire and only during the High Speed Pass. **(T-3)** Only ICAS-approved personnel will be permitted to utilize pyro in association with the ACC F-16 Demo Team. **(T-3)** Each calendar year the ICAS Pyro Safety Subcommittee identifies personnel as approved SICs. Individuals' selection will be based on experience, judgment, and safety record. **(T-3)** Only those SICs approved by the ICAS Pyro Safety Subcommittee will be allowed to work with ACC Demo Teams. **(T-3)** The following maximum NEW will be used (all NEWs in this instruction are TNT equivalent): For the Wall of Fire pass, the maximum NEW is dependent on the length of the wall. **(T-3)** The maximum wall length is 2000 linear feet, and the maximum NEW is 20 pounds (spread out evenly). **(T-3)** No more than 1 pound NEW will be used for each 100 linear feet of wall. **(T-3)** The following items will be briefed by the ACC demo pilot and the SIC, in person, prior to each performance: (1) Exact dimensions of the pyro area and the magnitude of explosives being used. **(T-3)** (2) Aircraft/pyro de- confliction plan. **(T-3)** (3) Demo profile and sequence of pyro (Wall of Fire). **(T-3)** (4) Forecast wind and effects on pyro. **(T-3)** (5) Communications

plan. **(T-3)** (6) KIO procedures. **(T-3)** (7) Fire hazards and fire department response plan. **(T-3)** (8) FOD potential and effects. **(T-3)**

4.3.2. F-16 Flare Use. The F-16 demo is authorized to use flares during performances at overwater civilian airshows. An individual qualified in arming, de-arming and storage of flares will be present for all airshows where flares will be used. **(T-2)** The show must have a place to store the flares in case they need to be downloaded (hanger in inclement weather). **(T-2)** Prior coordination and approval needs to be obtained from the airshow director, and standard airshow firefighting equipment and personnel need to be present during flare use for all demos. **(T-2)** With fire conditions permitting, flares will be expended during the performance so as to remain within the aerobatic box. **(T-2)** Training flares (M206, MJU-61, or equivalent) will be used for all demos. **(T-2)** Aircraft will be armed in the chocks with the CMS set to "OFF" until positioned in the arming area or airborne IAW MDS procedures. **(T-2)** The planned minimum wings-level safe altitude for dispensing is 750' AGL to ensure flare burnout prior to contact with the water. **(T-2)** A max planned crosswind of 22knots with a 4.5" burn time will push the flare 168' laterally. **(T-2)** Pilots will use the 1,500-foot line for the aerobatic planned maneuvers so that the flares will travel no closer than 1250 feet to the crowd line. **(T-2)** This will ensure burnout/duds fall into the water and not the spectator area. **(T-2)** Flares are authorized for use during the Triple Roll, Falcon Turn, Max Performance Climb, and Spiral Descent maneuvers. Aircraft loaded with flares will not be used as a static display. **(T-2)**

4.4. Airspeed and G Limits. Demo pilots may not exceed 0.95 Mach. The maximum target G for this demo profile is 7.5 Gs. This does not preclude a momentary increase in G for safety considerations.

4.5. Show line Restrictions. The F-16 demo is flown on the 1,500-foot show line. Maneuvers not conforming to FAA Order 8900.1, Volume 3, **Chapter 6**, require approval via the FAA AFS-800 Maneuver Package approval process. **(T-0)**

4.6. Airspace and Runway Requirements. Required airspace for the F-16 is 15,000 feet AGL and normally a five-mile radius from show center. The minimum dimensions of the aerobatic box are 3,000 feet wide, 6,000 feet long, and up to 15,000 feet AGL (high show). If the FAA has waived a show line to closer than 1,500 feet, the aerobatic box may be less than 3,000 feet wide, provided there is at least 1,200 feet from either the primary or secondary show line. Minimum runway length is 7,000 feet and width is 75 feet. Ensure the runway, taxiway, and parking area are stressed for a 30,000-pound aircraft with single wheel type landing gear.

4.7. Weather Requirements. Weather PARAMETER LIMITS for the high show profile are a ceiling of at least 7,000 feet AGL and three miles ground and five miles in-flight visibility with a discernible horizon. The low show profile requires 1,500 feet, three miles ground visibility and five miles inflight visibility with a discernable horizon. The ceiling requirements for each maneuver are based on waived airspace (clear of clouds) and require adjustment if using VFR rules. Plan maneuvers to maintain VMC throughout the show sequence.

4.8. High Density Altitude Demos. For high-density altitude shows, PARAMETER LIMITS must be adjusted accordingly. You must add 500 feet to APEX altitudes for each 2,000 feet of altitude above 3,000 feet MSL and 10 knots to airspeeds. For example, if the show site altitude is 5,000 feet MSL, add 500 feet to the baseline target and 10 knots to the airspeed. If the show site altitude is 7,000 feet MSL, add 1,000 feet to the baseline target and 20 knots to the airspeed.

4.9. Demo Maneuver Profiles.

Table 4.1. ACC Demo Maneuver Profiles.

High Show
Maximum Performance Takeoff and Climb to Cuban 8
High Speed Flat Pass
Triple Aileron Roll
High-G Turn
Four-Point Roll
Flat Pass
Falcon Turn
Shark's Tooth
High Alpha Pass
Muscle Climb
Knife Edge Pass
Maximum Performance Climb with Rolls
Spiral Descent
Dedication Pass
Tactical Pitch-Up to Landing
Low Show
Takeoff to Level 8 (or Cuban 8 if the ceiling is verified at or above 3,500 feet AGL)
High Speed Flat Pass
Triple Aileron Roll
High-G Turn
Four-Point Roll
Flat Pass
Falcon Turn (Profile Transition Point)
High Alpha Pass
Muscle Climb (transition as required by weather)
Knife Edge Pass (Profile Transition Point)
Dedication Pass

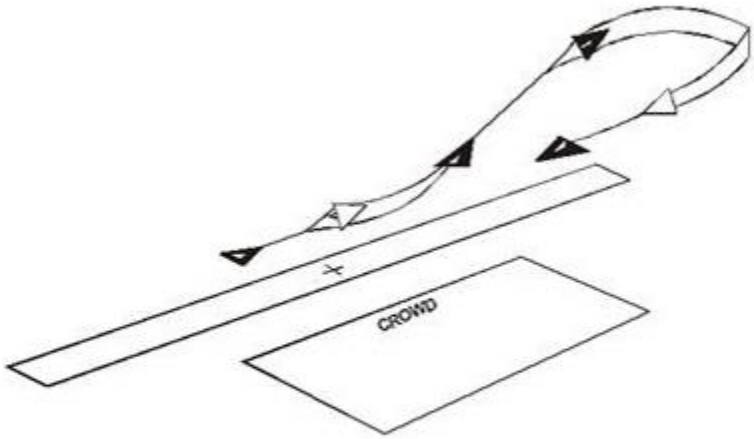
Tactical Pitch-Up to Landing

Table 4.2. PACAF Demo Profile.

High Show
Maximum Performance Takeoff and Climb to Cuban 8
High Speed Flat Pass
Triple Aileron Roll
High-G Turn
Four-Point Roll (Profile Transition Point)
Double Immelmann
Split-S
Falcon Turn (Profile Transition Point)
Shark's Tooth
High Alpha Pass
Muscle Climb
Knife Edge Pass (Profile Transition Point)
Maximum Performance Climb with Rolls
Spiral Descent
Dedication Pass
Tactical Pitch-Up to Landing
Low Show
Takeoff to Level 8 (or Cuban 8 if the ceiling is verified at or above 3,500 feet AGL)
High Speed Flat Pass
Triple Aileron Roll
High-G Turn
Four-Point Roll
Flat Pass
Falcon Turn (Profile Transition Point)
High Alpha Pass
Muscle Climb (transition as required by weather)
Knife Edge Pass (Profile Transition Point)
Dedication Pass
Tactical Pitch-Up to Land

4.10. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the demo sequence as required. Repositioning turns may not include added aileron rolls or other accenting maneuvers.

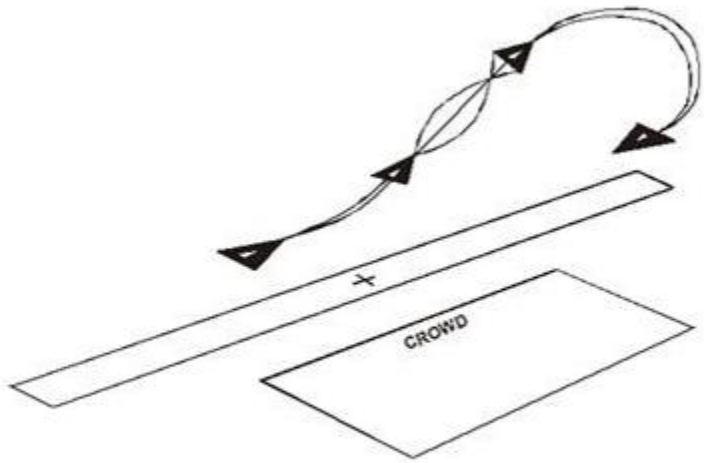
Figure 4.1. F-16 Flat Wifferdill Reposition Maneuver.



Flat Wifferdill Reposition Maneuver
F-16

4.10.1. Maneuver Description. The Flat Wifferdill Maneuver turn is a combination horizontal and shallow vertical turn used to change direction at each end of the show line when performing the low profile. The Flat Wifferdill Maneuver turn uses less altitude than a normal reposition. It requires a larger cut and tends to be looser and flatter than a normal turn. The target G for this maneuver is 6.5 to 7.0 Gs. A 270-degree turn reversal may be made while the aircraft is climbing. Each turn may differ slightly so to ensure airspeed/altitude parameters for the next maneuver are established in the flat reposition. The entry "cut" turn for the flat reposition is made to ensure no show line or crowd line penetration.

Figure 4.2. F-16 Wifferdill Reposition Maneuver.

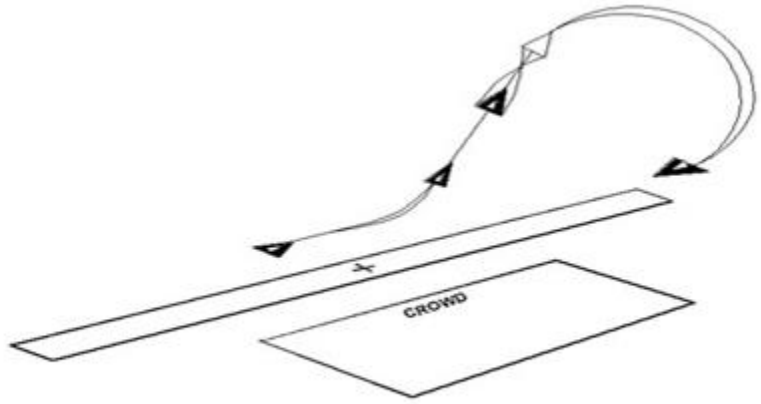


4.10.2. Maneuver Description. This maneuver is a combination horizontal and vertical turn used to change direction at each end of the show line. The vertical plane is used to maintain proximity to the demo area. Each turn may differ slightly so airspeed/altitude parameters for the next maneuver are established in the turn. As the aircraft departs the show line, maneuver in the horizontal and vertical plane to reposition for the next maneuver. The Target G for this maneuver is 6.0 to 7.0 Gs. A 270-degree rolling turn reversal is made while still climbing. During the last half of the maneuver, while descending, the turn is adjusted to establish the proper show line entry. The entry "cut" turn for the reposition is made to ensure no show line or crowd line penetration.

4.10.2.1. Abnormal Procedures: Consider weather, terrain, obstacles, and winds into the show line when determining how much vertical and horizontal turning room is necessary for the reposition.

4.10.3. **Vertical Reposition Maneuver.**

Figure 4.3. F-16 Vertical Reposition Maneuver.



Vertical Reposition Maneuver
F-16

Table 4.3. F-16 Vertical Reposition Maneuver Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	A/R	450	A/R	5.5 to 7.5
Apex	5,500’	275	A/R	Limiter
90 degrees nose low	≥3,500’	300	A/R	
Exit	500’	A/R	A/R	4 to 6

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS		
Entry	min	400’	150 / N/A	A/R / A/R	9
Apex	min	5,000’	150 / 350	A/R / A/R	9
90 degrees nose low		3,000’	150 / 350		
Exit	min	400’	A/R / A/R	A/R / A/R	9

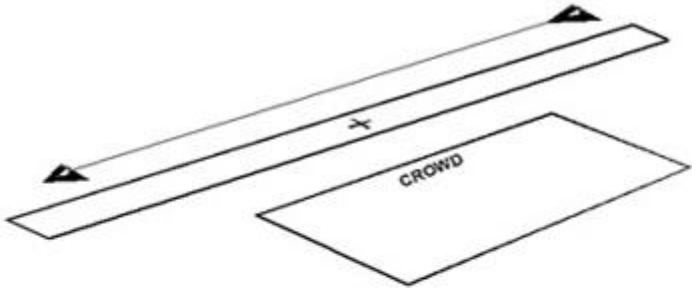
4.10.3.1. **Maneuver Description:** Fly the vertical reposition to change direction at each end of the 1,500-foot show line during a high show. Upon passing show center or at the completion of the previous maneuver, a straight-ahead climb is commenced using a 6.0 to 7.0 G pull to put the aircraft in a 55-degree nose high attitude. For slower entry parameters,

use G as required to maintain a minimum of 150 KIAS. Power setting is based upon entry parameters to ensure a minimum airspeed of 150 KIAS in the climb. Pitch attitude may be reduced as well to hold airspeed. At a minimum of 3,000 feet AGL, the aircraft is rolled inverted and the demo pilot unloads the aircraft to attain or exceed the apex target altitude. Once apex parameters are assured, initiate an aggressive 135-degree pull through the vertical, to approximately 45 degrees nose low. The peak altitude reached is a minimum of 5,000 feet AGL with a target of 5,500 feet AGL. Modulate the throttle as required to initiate the pull down with a target airspeed of 275 KIAS. Once recovery above the minimum altitude for the follow on maneuver is assured, backpressure is relaxed and the aircraft is smoothly flown to be in level flight at the entry altitude for the next maneuver. In no circumstances should the demo pilot play the G during the 135-degree pull through the vertical.

4.10.3.2. Abnormal Procedures: If entry parameters are not attained, reposition in the oblique for follow-on maneuvers. If apex parameters are not achieved with regard to airspeed or altitude, immediately recover the aircraft to the nearest horizon and abort the split-S. If the airspeed exceeds 350 KIAS during any portion of the dive or is below 3,000 feet AGL at 90 degrees nose-low, immediately initiate a dive recovery to the nearest horizon.

4.11. Flat Pass.

Figure 4.4. F-16 Flat Pass.



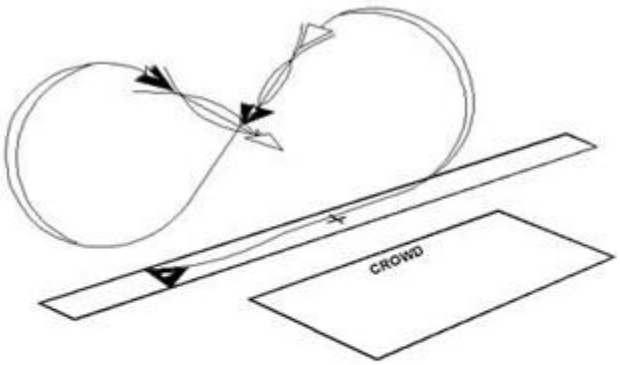
Note: May be flown either direction.

4.11.1. Maneuver Description: The flat pass is a repositioning maneuver used alone or in combination with an oblique reposition for the primary purpose of orienting the subsequent demo maneuver in the approved direction relative to the crowd line. The flat pass may be flown in either direction at any time during the demo sequence if required. It should be flown IAW **paragraph 4.13**.

Section 4B—High Profile

4.12. Maximum Performance Takeoff and Climb to Cuban 8.

Figure 4.5. F-16 Maximum Performance Takeoff and Climb to Cuban 8.



Maximum Performance
Takeoff and Climb to Cuban 8
F-16

Table 4.3. F-16 Maximum Performance Takeoff and Climb to Cuban 8 Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	200’	350	MIL to MAX	4 to 6
Apex	≥3,500’	200	MIL to MAX	2 to 4
Exit	500’	A/R	A/R	4 to 6

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	min	100’	300 / 440	MIL to MAX	9
Apex	min	3,000’	150 / 350	MIL to MAX	5
Exit	min	400’	250 / A/R	A/R	9

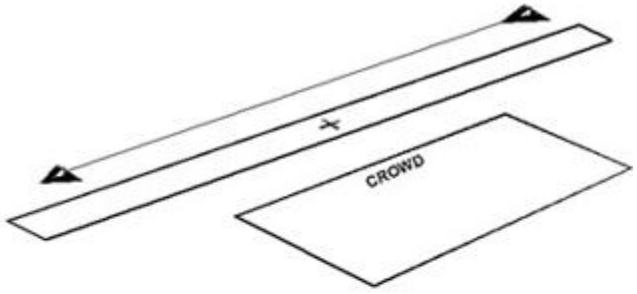
4.12.1. Maneuver Description: Do not attempt takeoff when the takeoff roll exceeds 80 percent of available runway. The takeoff is made in full afterburner. After takeoff, establish

a positive rate of climb and raise the gear, at a minimum of 300 knots begin a wings-level 4.0 to 6.0-G pull. Hold the pull until 90 degrees of pitch, then release the backpressure to approximately 2.5 G until 25 to 35 degrees nose-high inverted. Play the backpressure to ensure the over-the-top airspeed and altitude are above 150 knots and 3,000 feet AGL. Continue the pull until 25 to 45 degrees nose-low inverted. Unload to hold pitch, deselect afterburner, and perform an unloaded 1/2 roll to a wings-level upright. At 2,000 feet AGL, modulate power as required and begin a four to six-G wings-level pull to arrive on the show line at 500 feet AGL with 350 knots. Accomplish the second half of a Cuban 8 using entry airspeed of approximately 350 knots, an entry pull of 4.0 to 6.0 Gs and over-the-top minimum of 150 knots. The descending portion of the second half is accomplished exactly as the descending portion of the first half. **Note**: If airfield runway orientation is not aligned with the aerobatic box, if a crowd right-to-left takeoff is performed, or if desired for show standardization, the pilot may execute an immediate reposition to re-enter the appropriate show line from crowd left to accomplish the maneuver.

4.12.2. Abnormal Procedures: If entry parameters are not attained, clear the show line in front of the crowd. If at any time during the maneuver it appears the minimum over-the-top altitude or airspeed parameters cannot be met, abort the maneuver by performing an unloaded roll to the wings-level upright position accelerating to 250 knots in afterburner and continuing down the show line. If desired pitch attitude is exceeded while inverted, roll upright and set desired pitch angle and continue maneuver. If less than 2,500 feet AGL while inverted, initiate an immediate roll and pull to wings-level. If at any time it becomes apparent the maneuver is going to be completed inside the show line (poor wind correction, improper alignment), abort the maneuver and set up for the next pass.

4.13. High Speed Flat Pass (Right to Left).

Figure 4.6. F-16 High Speed Flat Pass.



Flat Pass
F-16

Note: May be flown either direction

Table 4.4. F-16 High Speed Flat Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300’	0.70M	MAX	.5 to 1.5
Exit	300’	≤.92M	IDLE to MAX	.5 to 1.5

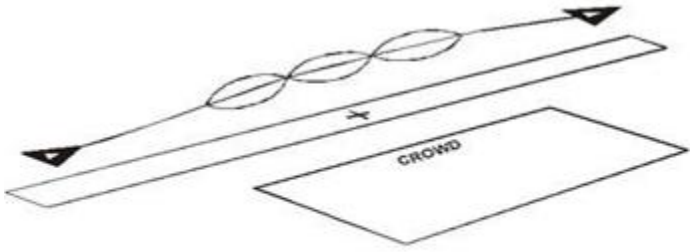
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	min	200’	N/A / .95M	MAX	N/A
Exit	min	200’	N/A / .95M	IDLE to MAX	N/A

4.13.1. Maneuver Description: This maneuver may be flown on the 500-foot show line at 300 feet AGL. After the repositioning maneuver, the pilot performs a flat pass. Upon completion of the flat pass, a reposition maneuver is flown in preparation for the next maneuver.

4.13.2. Abnormal Procedures: Deselect afterburner before exceeding 0.95 Mach.

4.14. Triple Aileron Roll (Left to Right).

Figure 4.7. F-16 Triple Aileron Roll.



Triple Aileron Roll
F-16

Table 4.5. F-16 Triple Aileron Roll Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	425	80% to MIL	.8 to 1.2
Exit	500’	450	80% to MIL	. 8 to 1.2

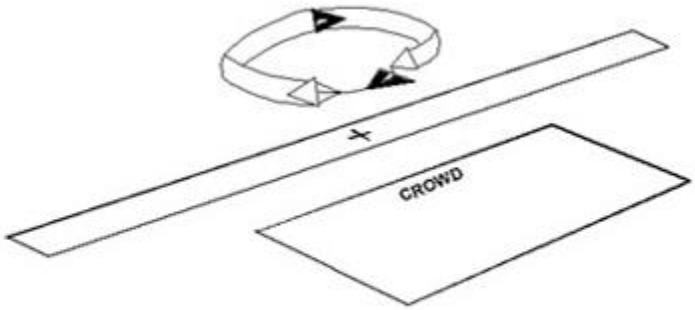
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	400 / 500	80% to MIL	2
Exit	**min**	400’	400 / 500	80% to MIL	N/A

4.14.1. Maneuver Description: On the 1,500-foot show line, at 3,500 feet prior to show center with approximately 425 knots raise the nose to 5 to 7 degrees pitch attitude, establish a climb, and relax stick pressure to approximately 0.8 Gs. Apply left-stick pressure to perform a maximum of three consecutive unloaded aileron rolls. Crosscheck the horizon and audibly count the rolls during the maneuver. As you complete the second roll, ensure the aircraft has gained altitude and the flight path marker is at or above the horizon line in the HUD. If not, abort the maneuver and recover the aircraft above the minimum altitude. If you lose count of the number of rolls or experience roll-coupling, immediately abort the maneuver. In all cases, complete the rolls at a higher altitude than entry. After rolling out wings-level upon completion of the third roll, smoothly apply aft stick pressure as required to finish the maneuver at entry altitude (the objective of the maneuver is to make the pass look symmetrical to the crowd). Then perform a repositioning maneuver to prepare for the next maneuver.

4.14.2. Abnormal Procedures: If the minimum entry parameters are not met, transition to a wings-level flat pass. At wings-level following the second roll, abort the maneuver if the flight path marker is not above the horizon line. Abort the maneuver if you lose count of the rolls during the sequence.

4.15. High-G Turn (Right to Left).

Figure 4.8. F-16 High-G Turn.



High G Turn
F-16

Table 4.6. F-16 High-G Turn Parameters.

TARGET PARAMETERS

Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	400	MIL to MAX	7.5
Exit	500’	350	MIL to MAX	6.5 to 7.5

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	330 / 440	MIL to MAX	9
Exit	min	400’	250 / 440	MIL to MAX	9

4.15.1. Maneuver Description: Beyond the 500-foot show line and just prior to show center select full afterburner (AB) and accelerate to 400 knots. At show center, turn away from the crowd using 75 to 85 degrees of bank (<75 degrees inside the 1,500-foot show line). Begin the turn with a smooth G onset-rate to approximately 7.5 Gs. G-loading and airspeed bleed-off rate vary with density altitude. Maintain a minimum of 250 knots. The first 180 degrees of turn should be accomplished with a 1¾-degree nose-up attitude and the last 180 degrees should be accomplished with a 1¾-degree nose-down attitude to make the turn appear level to the crowd. Vary the bank angle and pitch to arrive at level flight at the completion of 360 degrees of turn and to ensure the maneuver is finished above the entry altitude. Ensure surface winds are taken into consideration in order to center this maneuver on show center and to avoid overshooting the show line. As you approach show center, smoothly but briskly roll out. Perform a repositioning maneuver to prepare for the next maneuver.

4.15.2. Abnormal Procedures: If the minimum entry parameters, are not met, the pilot transitions to a wings-level flat pass. If during any portion of the maneuver it becomes apparent the aircraft may descend below 400 feet AGL or airspeed decay below 250 knots, abort the maneuver by rolling wings-level and climbing to 500 feet AGL. If necessary, adjust power and G as required (no lower than 250 knots) to avoid overshooting the show line.

4.16. Four-Point Roll (Left to Right).

Figure 4.9. F-16 Four-Point Roll.

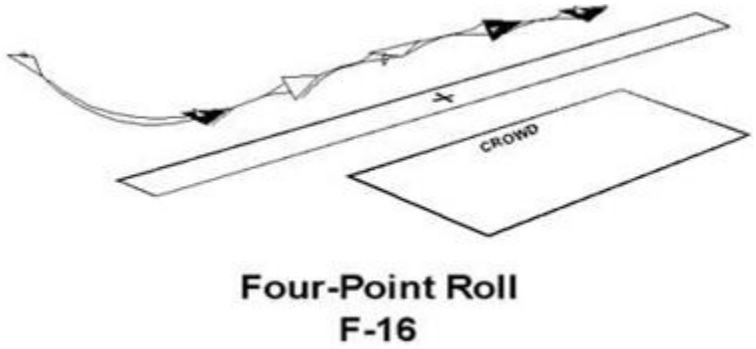


Table 4.7. F-16 Four-Point Roll Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	425	80% to MIL	.8 to 1.2
Exit	500’	450	80% to MIL	. 8 to 1.2

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	400 / 500	80% to MIL	2
Exit	min	400’	400 / 500	80% to MIL	N/A

4.16.1. Maneuver Description: On the 1,500-foot show line, at 3,000 feet prior to show center, rotate the nose 5-7 degrees nose-up, establish a climb, and relax stick pressure. A cadence Four-Point Roll to the left is then performed by pausing momentarily at the 90-degree, 180-degree, 270-degree, and 360-degree points. The pace of the cadence should ensure the aircraft is at the 180-degree point over show center. In all cases, complete the roll at a higher altitude than it starts. Move the stick briskly, initiating a left roll and an immediate stop at the proper 90-degree point when pressure is released. Upon returning to wings-level, smoothly apply aft-stick pressure as required to finish the maneuver at entry altitude (the objective of the maneuver is to make the pass look symmetrical to the crowd). At the completion of the pass, a repositioning maneuver is performed to set up for the next maneuver.

4.16.2. Abnormal Procedures: If the minimum entry parameters, are not met, the pilot transitions to a wings-level flat pass. If the flight path marker is below the horizon line at the

wings-level inverted position, make an immediate roll to the upright position (abort), clearing the show line past the end of the crowd line.

4.17. Flat Pass (Right to Left). Perform the Flat Pass as described in **paragraph 4.13** and **Figure 4.6**.

4.18. Falcon Turn (Left to Right).

Figure 4.10. F-16 Falcon Turn.

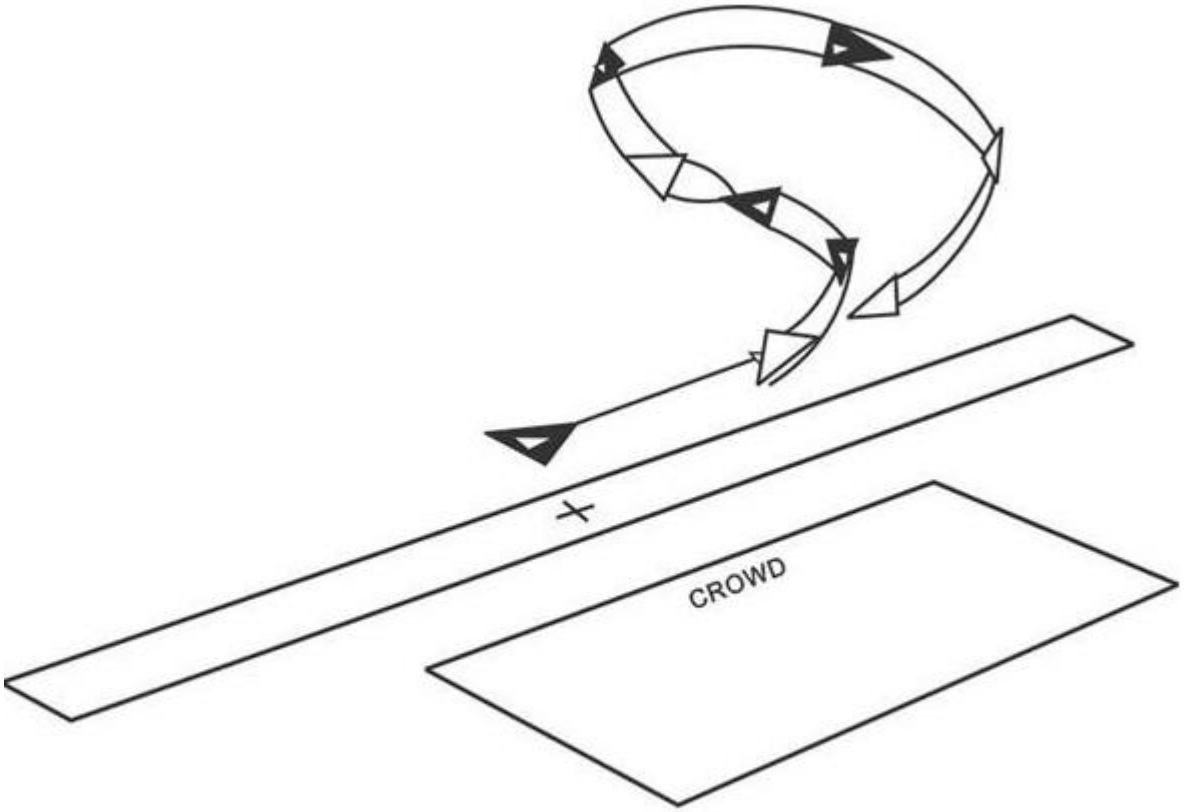


Table 4.8. F-16 Falcon Turn Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	400	MAX	6.5 to 7.5
Turn Reversal	1,500’	350	MIL to MAX	6.5 to 7.5

Exit	500’	350	MIL to MAX	6.6 to 7.5

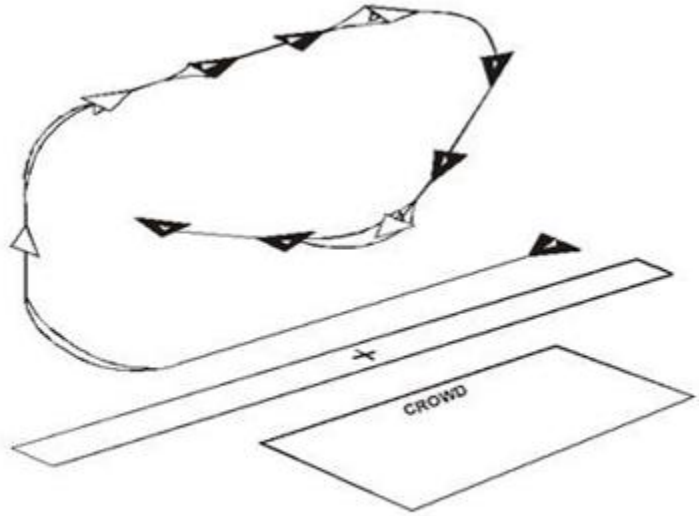
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry **min**	400’	330 / 440	MIL or Less	N/A
Turn Reversal	800’	300 / 440	A/R / A/R	N/A
Exit **min**	400’	250 / 440	A/R / A/R	9

4.18.1. Maneuver Description: This maneuver may be initiated at the 500-foot show line. Enter the show line at 500 feet AGL and 400 knots. Just prior to show center select full afterburner and perform a 6.5 to 7.5-G slightly climbing turn (20 to 30 degrees pitch angle) left away from the crowd. After 90 degrees of turn, reverse the direction of the turn to the right by unloading and rolling under 180 degrees. Perform a 6.5 to 7.5-G right slightly descending turn (10 to 20 degrees nose-low) for 270 degrees rolling out heading the opposite direction with a minimum of 250 knots. Accelerate down the show line at 500 feet AGL in preparation for the next maneuver.

4.18.2. Abnormal Procedures: If the minimum entry parameters, are not met, the pilot transitions to a wings-level flat pass. If during any portion of the maneuver it becomes apparent the aircraft may descend below 400 feet AGL or overshoot 30 degrees nose-low, abort the maneuver by rolling wings-level and climbing to 500 feet AGL. If it becomes apparent the aircraft may overshoot the show line, use airspeed and G as required (no lower than 250 knots) to prevent the overshoot. **Note:** The Falcon Turn is a profile transition point if required by changing weather conditions.

4.19. Shark's Tooth (Right to Left).

Figure 4.11. F-16 Shark's Tooth.



Shark's Tooth
F-16

Table 4.9. F-16 Shark's Tooth Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	350	MAX	6.5 to 7.5
Apex	≥6,000'	250	MIL to MAX	6.5 to 7.5
90 degrees nose low	≥3,500'	275	IDLE to MIL	A/R
Exit	500'	A/R	A/R	4 to 6

PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry min	400'	330 / N/A	MAX	9
Apex	5,000'	150 / 350	MIL to MAX	9
90 degrees nose low	3,000'	150 / 350	IDLE to MAX	9
Exit min	400'	A/R / A/R	A/R / A/R	9

4.19.1. Maneuver Description: (High Show Only. If ceiling is less than 7,000 feet AGL transition to the High Alpha pass following the Falcon Turn.) This maneuver is a three-sided square loop with the third corner at a 135-degree angle. It avoids the pure vertical recovery in the last corner of a normal square loop. On the 1,500-foot show line, at 2,000 feet past show center, select afterburner and perform a 6.5 to 7.5-G pull to 90 degrees nose-high. Maintain full afterburner in the climb to 4,500 feet AGL, and then perform a 5.0 to 7.0-G pull of 90 degrees to inverted. Roll out to wings-level upright and maintain 250 knots. At 2,000 feet past show center, roll inverted, select power as required and perform a 5.0 to 7.0-G pull to 90 degrees nose-low. Approaching 4,500 feet to 3,500 feet AGL, at a maximum of 350 KIAS, continue to pull to 45 degrees nose-low upright. Hold until reaching 2,000 feet AGL, and then perform a descending turn away from the crowd. Turn left or right to set up on the appropriate 1,000 feet AGL downwind for the High Alpha pass into the wind.

4.19.2. Abnormal Procedures: If the minimum entry parameters, are not met, the pilot transitions to a wings-level flat pass. Do not attempt to pull down from the inverted apex below 5,000 feet AGL or with more than 350 KIAS. If out of the maneuver envelope, perform a roll to wings-level upright and make a descending turn away from the crowd to set up on a downwind position for the High Alpha pass. At 90 degrees nose-low, max airspeed is 350 KIAS and minimum altitude is 3,000 feet AGL. If either is exceeded, execute a dive recovery IAW tech order procedures.

4.20. High Alpha Pass (Into the wind).

Figure 4.12. F-16 High Alpha Pass.

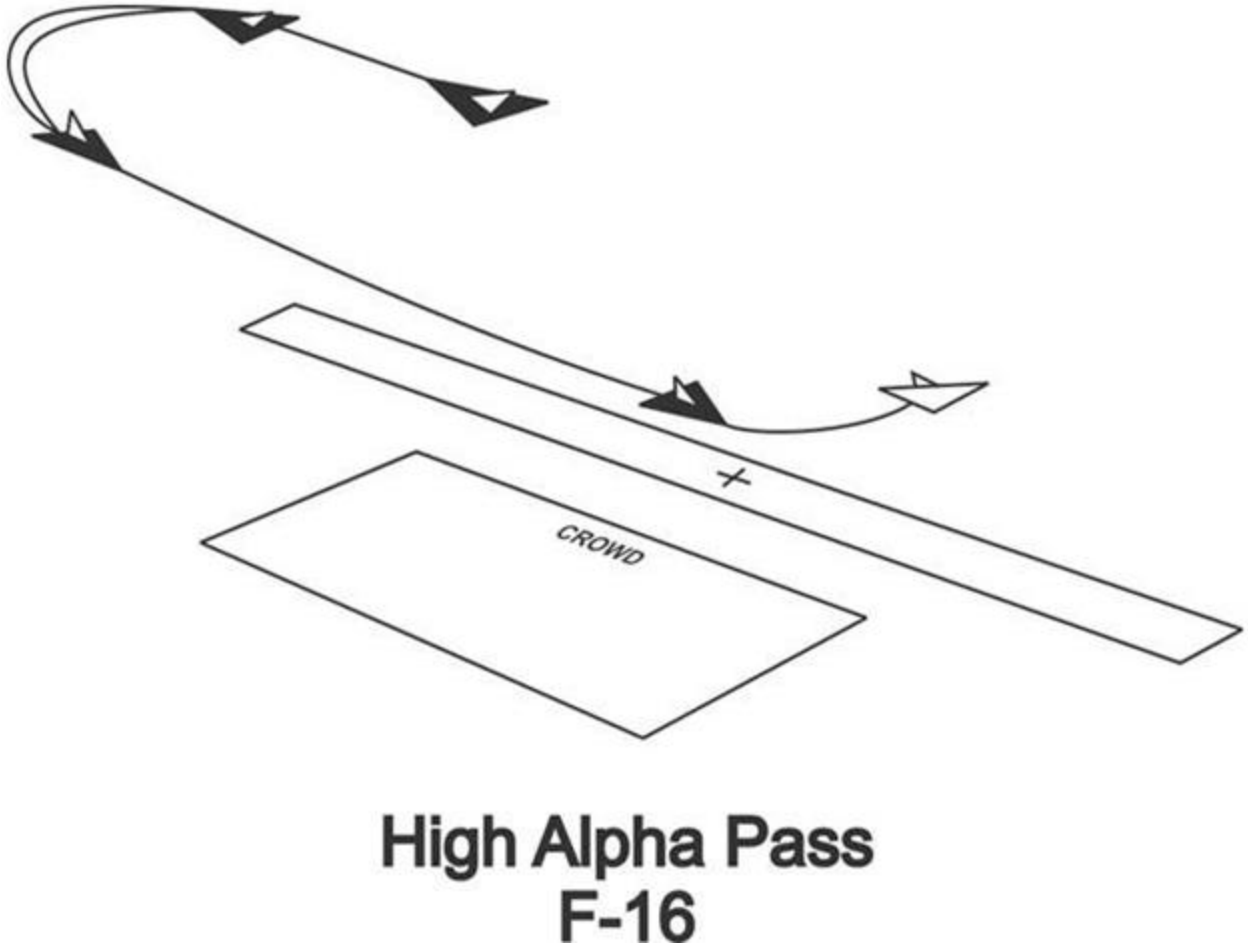


Table 4.10. F-16 High Alpha Pass Parameters.

TARGET PARAMETERS				
Altitude AGL	Airspeed KCAS	Power Setting	Angle of Attack (AOA)	G
Entry 500’	125	A/R	20 deg	.5 to 1.5
Exit 500’	125	A/R	20 deg	.5 to 1.5

PARAMETER LIMITS

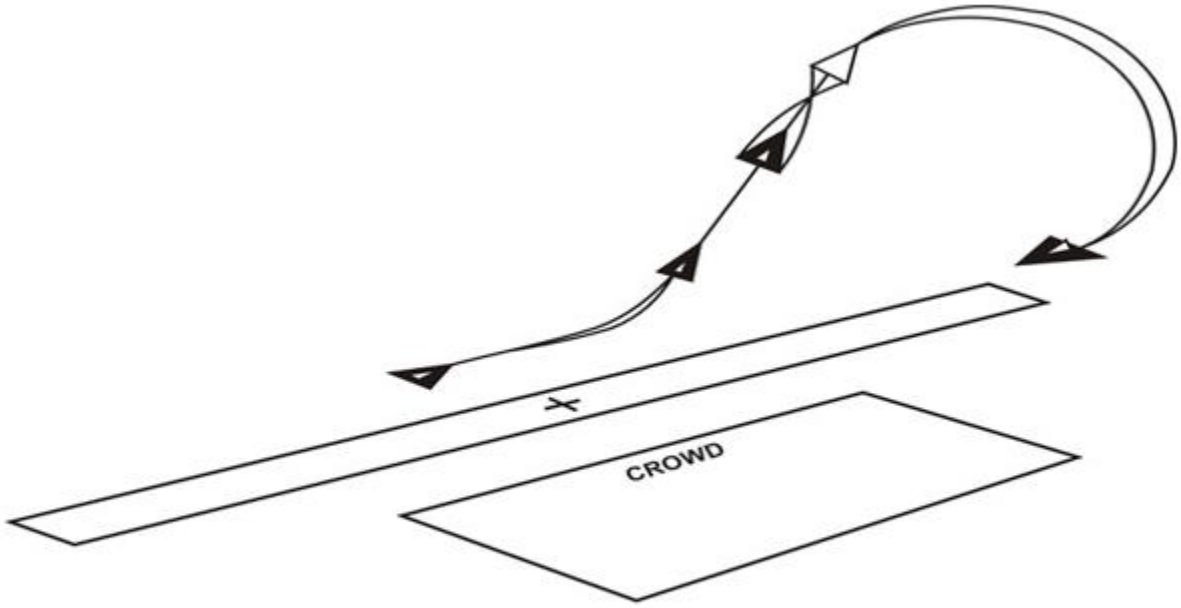
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	AOA **MIN/MAX**	G
Entry **min** 400’	115 / N/A	A/R	N/A / 23 deg	.5 to 1.5
Exit **min** 400’	115 / N/A	A/R	N/A / 23 deg	.5 to 1.5

4.20.1. Maneuver Description: During the turn to the 500-foot show line following the shark’s tooth maneuver, use speed brakes and G as required to gradually slow the airspeed and attain 125 knots and 500 feet AGL by 2,000 feet prior to show center. As the aircraft rolls out on the show line, ensure the speed brakes are retracted, smoothly bring the nose up and use power as required to achieve the target parameters. Use the Gun Cross in the HUD in relation to the pitch ladders to achieve the target AOA. As a technique, select Vertical Velocity Indicator (VVI) in the HUD to help achieve level flight, as the tendency is to climb during the maneuver. Maintain the desired ground track by looking out the sides of the canopy and cross checking the desired heading in the HUD and/or Horizontal Situation Indicator (HSI). To complete the maneuver, select full afterburner and transition to the muscle climb.

4.20.2. Abnormal Procedures: If the minimum entry parameters, are not met transition to a wings-level flat pass. If the airspeed falls below 115 knots or a descent rate develops, select full afterburner and perform a normal go-around procedure.

4.21. Muscle Climb Maneuver.

Figure 4.13. F-16 Muscle Climb Maneuver.



Muscle Climb Maneuver
F-16

Table 4.11. F-16 Muscle Climb Maneuver Parameters.

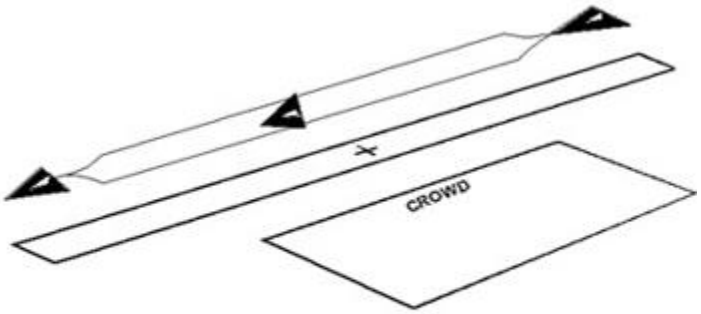
TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 500’	125	MAX	1 to 1.8
Apex ≥5,500’	175	MIL to MAX	A/R
90 degrees nose low ≥3,500’	300	A/R	
Exit 500’	A/R	A/R	4 to 6
PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min** 400’	115 / N/A	MAX	2
Apex **min** 5,000’	150 / 350	MIL to MAX	N/A
90 degrees nose low 3,000’	150 / 350	A/R	
Exit **min** 400’	A/R / A/R	A/R	9

4.21.1. Maneuver Description: Passing show center, simultaneously select full afterburner and pull up to establish up to a 55-degree nose-high attitude using 1.5 to1.8 Gs. For Low profile, vary nose position consistent with weather. The afterburner has to light in order to execute this maneuver and allow the aircraft to accelerate to maintain a minimum of 150 KIAS in the climb. Pitch attitude may be reduced to hold airspeed. The demo pilot may then transition to a Wifferdill or Vertical Reposition Maneuver (VRM) as required when adjusting to the show line for subsequent maneuvers. VRM may not be flown during the Low profile regardless of ceiling changes unless it is conducted during or after transitioning to a high profile. If a VRM is flown, the demo pilot adheres to the apex and 90-degree nose-low parameters listed in **Table 4.11** and the procedures for a VRM as described in **paragraph 4.11.3.1** Once recovery above the minimum altitude for the follow-on maneuver is assured, backpressure is relaxed and power modulated to smoothly transition to level flight at the entry altitude for the next maneuver.

4.21.2. Abnormal Procedures: If the airspeed falls below the minimum of 150 knots, a nose-high recovery should be accomplished. If the airspeed exceeds 350 KIAS during any portion of a follow-on VRM or if the aircraft is below 3,000 feet AGL at 90 degrees nose- low, immediately initiate a dive recovery to the nearest horizon.

4.22. Knife Edge Pass.

Figure 4.14. F-16 Knife Edge Pass.



Knife Edge Pass
F-16

Table 4.12. F-16 Knife Edge Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500’	425	MIL to MAX	.5 to 1.5
Exit	500’	475	MIL to MAX	.5 to 1.5

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	400’	400 / 550	MIL to MAX	N/A
Exit	min	400’	400 / 550	A/R	N/A

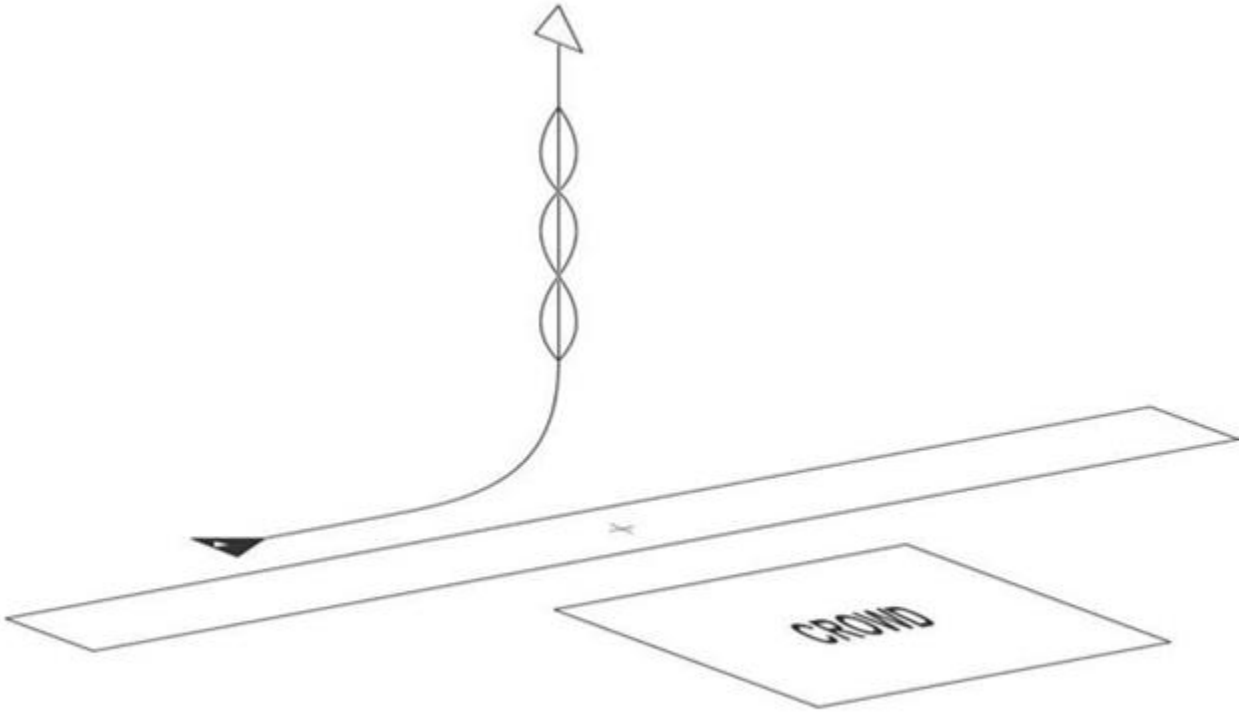
4.22.1. Maneuver Description: Enter the 1,500-foot show line at 500 feet AGL and 425 knots. At 4,000 feet prior to show center, raise the nose to 5 to 7 degrees, establish a climb, and apply stick pressure to roll 90 degrees toward the crowd. Hold this attitude until 4,000 feet past show center. Use top rudder to hold the nose above the horizon and forward stick pressure to keep the aircraft on the show line. To complete the maneuver, unload, roll wings- level, and perform a repositioning maneuver.

4.22.2. Abnormal Procedures: If the minimum entry parameters are not met, transition to a wings-level flat pass. If it becomes apparent the aircraft may descend below 400 feet AGL, roll out of the bank and clear the show line. **Note**: The Knife Edge Pass may be used as a

repositioning maneuver for the purpose of orienting the subsequent demo maneuver in the approved direction relative to the crowd line. **Note**: The Knife Edge Pass is a profile transition point if required by changing weather conditions.

4.23. Maximum Performance Climb with Rolls.

Figure 4.15. F-16 Maximum Performance Climb with Rolls.



Maximum Performance Climb With Rolls
F-16

Table 4.13. F-16 Maximum Performance Climb with Rolls Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300’	450	MIL to MAX	6 to 7.5
Recovery/Exit	250	A/R	4 to 6
2,500’ prior to assigned altitude			

PARAMETER LIMITS

Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	200’	330 / 550	MIL to MAX	9
Apex		**NTEWA**	150 / N/A	A/R	9

4.23.1. Maneuver Description: Enter on the 1,500-foot show line with a minimum of 330 knots at 300 feet AGL approaching show center 135 degrees to the crowd line, but with the flight path not directed toward the crowd. At 3,000 feet prior to show center select full afterburner and initiate a 6.5 to 7.5-G wings-level pull to arrive at show center with 90 degrees of pitch. The pull should be made so the aircraft is vertical at show center. When the aircraft is vertical, perform high-rate unloaded aileron rolls until reaching a minimum of 250 knots or 2,500 feet AGL below waivered airspace. Take every precaution to avoid slow airspeed in an exaggerated pitch attitude due to the potential of “pitch hang-up”. Stop the aileron rolls and execute a vertical recovery by smoothly pulling the nose to the nearest horizon to prevent exceeding waivered airspace. Modulate power and speed brakes as required while performing the descending portion of a repositioning maneuver to enter the show line for the next maneuver.

4.23.2. Abnormal Procedures: If the minimum entry parameters are not met, transition to a wings-level flat pass. If roll-coupling occurs during the climb (to exceed approximately 2.5 Gs), smoothly stop the roll, then pull to the nearest horizon, and roll upright. Initiate an immediate recovery to the nearest horizon if airspeed decays to 250 KIAS minimum or altitude reaches 2,500 feet AGL below the top of waivered airspace.

4.24. Spiral Descent.

Figure 4.16. F-16 Spiral Descent.

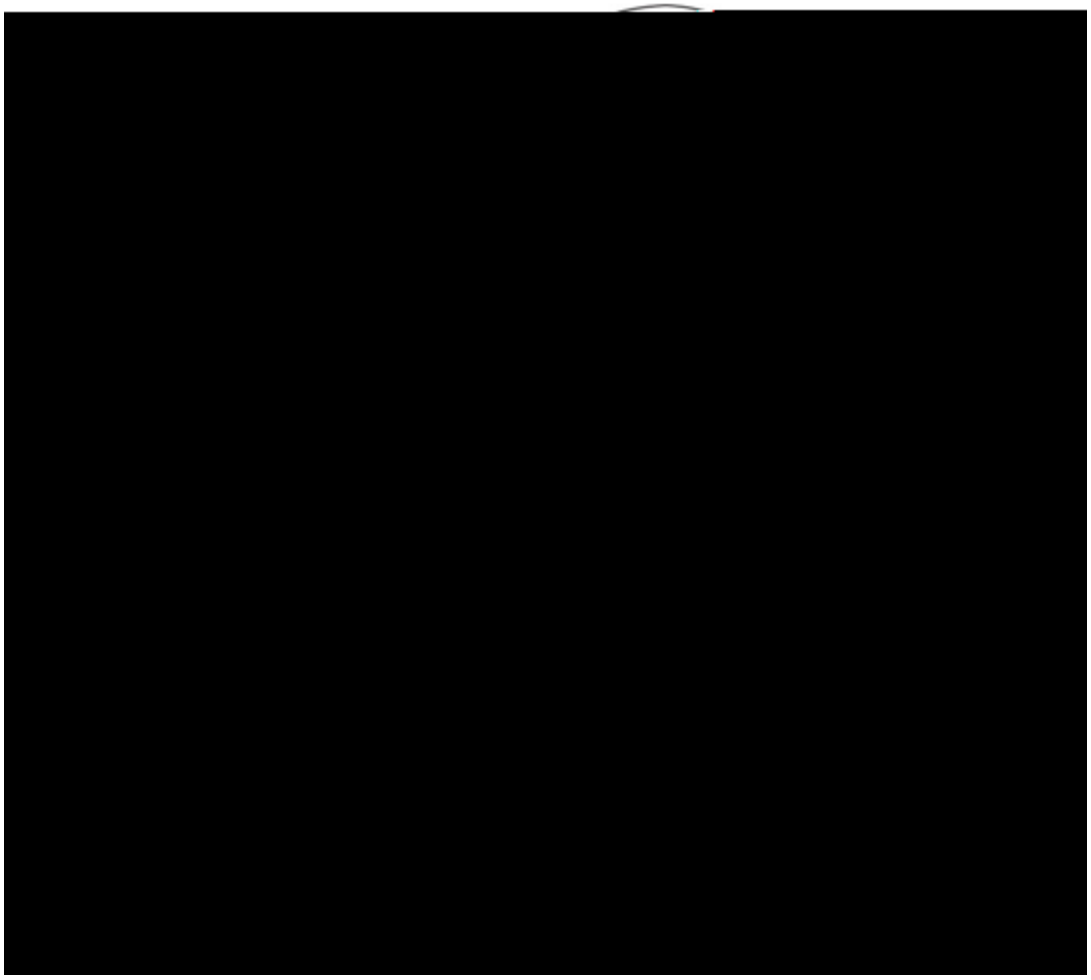


Table 4.14. F-16 Spiral Descent Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry NTEWA	200	IDLE	1 to 2
Exit 4,000’ and 45˚ NL	A/R	A/R	3 to 7

PARAMETER	LIMITS		
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G

Entry	**min**	8,000’	150 / 350	IDLE	N/A
Exit	**min**	3,500’ and ≤45˚ NL	250 / 440	A/R	8

4.24.1. Maneuver Description: As the aircraft nose is brought through the horizon, reacquire the air show environment and perform the Spiraling Descent oriented toward show center. In idle power, allow the nose to fall to 45 degrees nose-low. Once established, apply back-stick pressure and roll simultaneously to maintain at least 200 knots initially in a spiraling dive, ensuring airspeed of 250 to 440 knots prior to initiating the recovery. At approximately 5,000 feet AGL, adjust dive angle and roll in order to be wings-level, less than 45 degrees nose-low at the planned altitude of 4,000 feet AGL. The maneuver is complete when the dive angle is less than 45 degrees. Continue a descent as required to reposition for the next maneuver, however do not perform or exit the maneuver over the crowd. Do not exceed 440 knots in the descent. The airspeed window of 250-440 knots at maneuver exit allows the pilot the flexibility to show the F-16’s maneuvering ability early in the maneuver while gaining energy at or below corner velocity to set up for the next maneuver—the Dedication Pass.

4.24.2. Abnormal Procedures: If below 8,000 feet AGL at the apex of the climb (airspace restrictions, weather conditions), adjust dive angle to safely execute a recovery at 4,000 feet AGL. Initiate an immediate dive recovery if airspeed exceeds 440 knots. Show center orientation is a secondary consideration in the spiral descent; do not continue the maneuver below minimum altitude to attempt a specific orientation in the air show environment. If at any time during the maneuver it appears the aircraft may not attain the prescribed altitude/airspeed parameters, abort the maneuver. Roll out and/or pull to a wings-level position, initiate a descent and reposition the aircraft for follow-on maneuvering. Option: Due to changing weather conditions, the vertical spiraling descent may not be possible after the Max Performance Climb. Start a descent when able to maintain VMC conditions to position the aircraft for the next maneuver.

4.25. Dedication Pass. The intent of this maneuver is to pay tribute to our war fighters. It is flown prior to the Tactical Pitch-Up to Land during the High and Low Show profiles.

Figure 4.17. F-16 Dedication Pass.

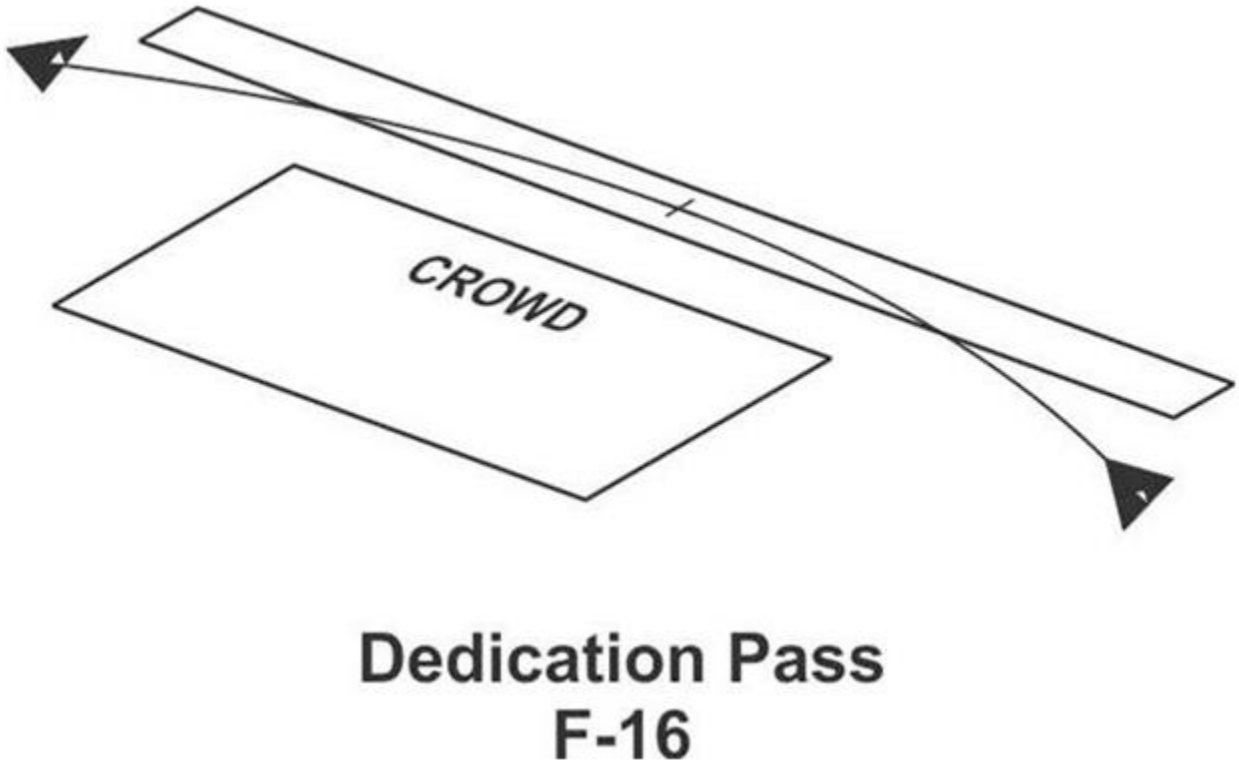


Table 4.15. F-16 Dedication Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300’	0.65M – 0.90M	MAX	1 to 3
Exit	300’	0.65M – 0.90M	IDLE to MAX	4 to 6

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	200’	N/A / .90M	MIL to MAX	9
Exit	**min**	200’	N/A / .90M	IDLE to MAX	9

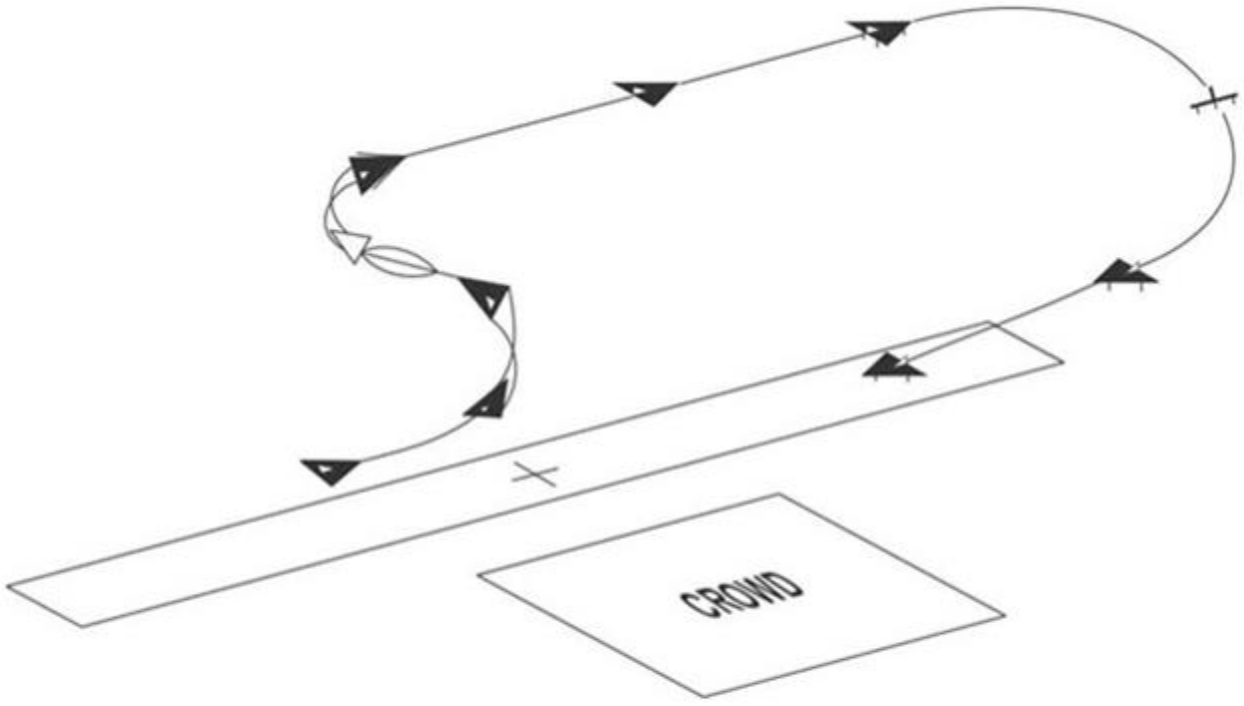
4.25.1. Maneuver Description: The maneuver is flown beyond the 500-foot show line. Following the Max Performance Climb with Rolls (high show), or Knife Edge (low show),

attain a safe airspeed and reposition the aircraft to arrive behind and offset from the crowd. Fly the approach from behind the line, approximately 2 miles from show center, with an approximate 30 degree dive angle and a 45 degree cut (bank angle 75 to 90 degrees) to the show line, remaining beyond 500 feet from the crowd at all times. Upon reaching a point 500 feet from the corner of the crowd and 300 feet AGL, roll the aircraft into a level arcing pass using bank angles of 75 to 90 degrees. Use top rudder if necessary to maintain altitude. Select max power until passing the show line or until a target airspeed of .85Mach is anticipated. Use varying pressure altitudes and temperatures to determine when to deselect afterburner to ensure the target airspeed is attained at show center and the max airspeed is not exceeded. Optimum profile of the aircraft is achieved at approximately 80 degrees of bank. Use caution not to over bank the aircraft and allow the aircraft to lose altitude while banking. In order to maintain 500 feet from the crowd at each corner, ensure the flight path at show center extends beyond 500 feet. Continue the arc beyond the opposite crowd corner, reduce power as required, roll out of bank, and continue a maximum 45-degree climb to set up for the Tactical Pitch- Up to Landing.

4.25.2. Abnormal Procedures: Abort the maneuver if at any time the aircraft comes closer than 500 feet to the crowd line or its lateral limits, an excessive dive angle or sink rate develops, entry parameters are not met, or the aircraft descends below 200 feet AGL. Abort the maneuver by rolling the aircraft wings-level and flying away from the crowd.

4.26. Tactical Pitch-Up to Landing (Direction of Landing).

Figure 4.18. F-16 Tactical Pitch-Up to Landing.



Tactical Pitch-Up To Landing
F-16

Table 4.16. F-16 Tactical Pitch-Up to Landing Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 500’	350	MIL to MAX	5 to 7
Exit Downwind Alt	250	A/R	1

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry **min** 400’	300 / 440	MIL to MAX	9
Exit Downwind Alt	200 / N/A	A/R	N/A

4.26.1. Maneuver Description: Enter on the 1,500-foot show line at 500 feet AGL and 350 knots. At 2,000 feet prior to show center raise the nose to 5 to 7 degrees pitch angle, unload, and perform a 405-degree aileron roll away from the crowd followed by a 5 to 7.5- G pull-up to point 90 degrees away from the crowd line. Execute a 180-degree roll, using afterburner and pull to the downwind leg. Configure for and execute a normal final turn and landing. Option: If a HF is to be performed immediately following completion of the demo, conduct a low approach or wings-level pass and proceed to rejoin with HF aircraft using pre-briefed procedures.

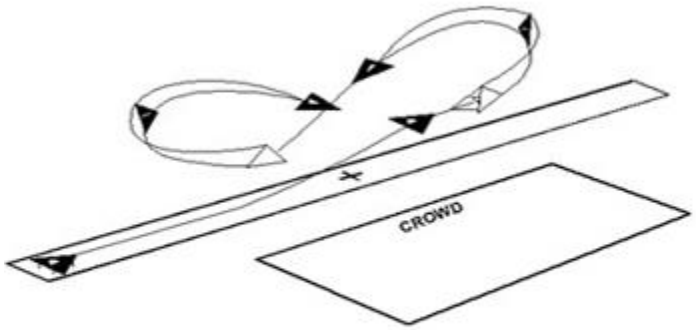
4.26.2. Abnormal Procedures: If entry parameter limits are not achieved by show center, do not perform the 405-degree aileron roll; instead, fly a simple pull-up to a normal closed pattern.

Section 4C—Low Profile

4.27. Low Abnormal Procedures: Unless otherwise noted, abnormal procedures for the low profile are the same as the high profile.

4.28. Takeoff to Level 8 (or Cuban 8). Note : If show ceiling is verified to be at or above 3,500 feet AGL, the pilot may elect to fly a Cuban 8 as described in **paragraph 4.12.1**, in lieu of a Level 8.

Figure 4.19. F-16 Level 8.



Level 8
F-16

Table 4.17. F-16 Level 8 Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 500’	400	MAX	5 to 7
Turn Reversals 500’	350	MIL to MAX	5 to 7
Exit 500’	350	A/R	1

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry min 400’	330 / 440	MAX	9
Turn Reversals min 400’	250 / 440	MIL to MAX	9
Exit min 400’	250 / 440	A/R	1

4.28.1. Maneuver Description: Do not attempt takeoff when the takeoff roll exceeds 80 percent of available runway length. If airfield conditions permit, a brake release point should be selected so takeoff occurs at show center. The show-center takeoff point is a secondary consideration to determining critical field length, abort criteria, etc. In no case initiate the takeoff with less than 6,000 feet of runway remaining. The takeoff is made in full afterburner. Ensure a positive rate of climb is established after takeoff. Once the gear is retracted, a 3 to 5-degree nose-high climb is made while accelerating to 400 knots. At this point, maintain

afterburner and begin an energy sustaining pitch-up to 500 feet AGL, using 5 to 7 Gs, and turn away from the crowd. After 225 degrees of turn, unload and reverse the direction of turn and perform a second level turn in the opposite direction. After 270 degrees with a 45-degree cut to the show line, the turn is again reversed. Vary the bank angle and pitch to arrive at level flight at the completion of the maneuver and to ensure the maneuver is finished above the entry altitude. Complete the maneuver by turning to finish on the show line heading in the same direction as takeoff. Ensure surface winds are taken into consideration in order to center this maneuver on show center and to avoid overshooting the show line. Once on the show line, execute a repositioning maneuver to prepare for the next maneuver. **Note**: If airfield runway orientation is not aligned with the aerobatic box, if a crowd right-to-left takeoff is performed, or if desired for show standardization, the pilot may execute an immediate reposition to re-enter the appropriate show line from crowd left to accomplish the maneuver.

4.28.2. Abnormal Procedures: If during any portion of the maneuver it becomes apparent the aircraft may descend below 400 feet AGL or airspeed decays below 250 knots, abort the maneuver by rolling wings-level, climbing to 500 feet AGL, and clearing the show line. Use power and G as required (no lower than 250 knots) to prevent the aircraft from overshooting the show line.

4.29. Double Immelmann.

Figure 4.20. Double Immelmann (Right to Left).

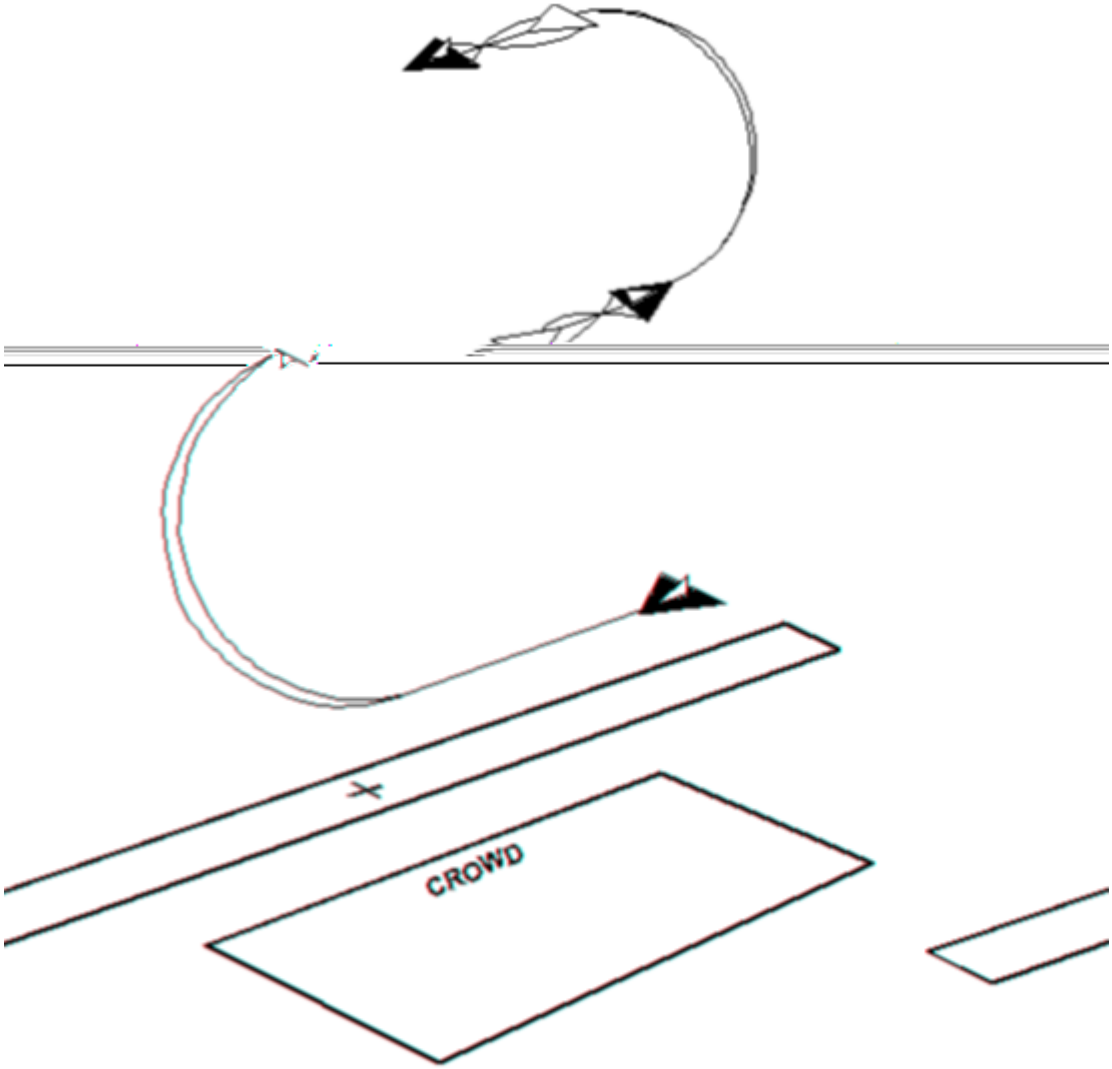


Table 4.18. F-16 Double Immelmann Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G

Entry 300’	450	MAX	6.5 to 7.5
Mid Point ≥3,000’	300	MAX	4 to 6
Apex ≤6,000’	175	A/R	A/R

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry min 200’	330 / 550	MAX	9
Mid Point min 2500’	250 / N/A	MAX	9
Apex min 5000’	150 / 350	A/R	N/A

4.29.1. Maneuver Description. Just prior to show center and wings level, select full afterburner and begin a smooth 6.5 to 7.5 G wings-level pull to execute the first Immelmann. The pull is held until inverted wings level. Relax stick pressure and perform an unloaded 180-degree roll to a wings-level upright position. Accelerate to 300 knots and initiate a 4 to 6 G pull to perform the second Immelmann. Roll out to a wings-level upright position from the second Immelmann at approximately 175 knots and proceed to the end of the show line (approx 6,000 feet).

4.29.2. Abnormal Procedures. If the minimum entry parameters are not met, the pilot will transition to a wings-level flat pass. If minimum airspeeds cannot be maintained at any point during the maneuver, recover the aircraft to wings level and clear in front of the line.

4.30. Split-S (left to Right).

Figure 4.21. Split-S.

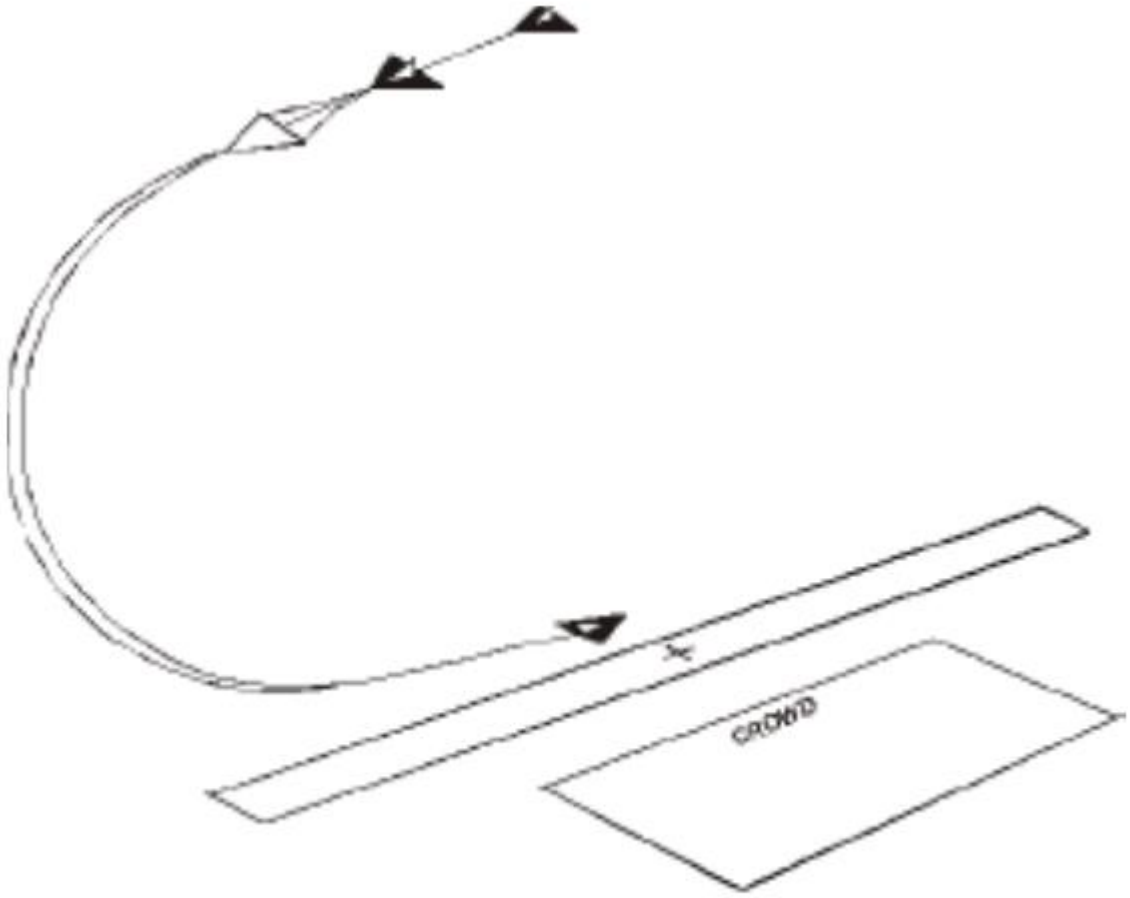


Table 4.19. Split-S.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Pull Down	≥6,000’	175	MIL or Less	Limiter Pull
90 Deg low	≥3,500’	275	A/R	A/R
Exit	500’	A/R	A/R	4 - 6

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Pull Down	min	5000’	150 / 350	Mil or Less	N/A
90 deg low		3500’	150 / 350	A/R	N/A
Exit	min	400’	A/R / A/R	A/R	9

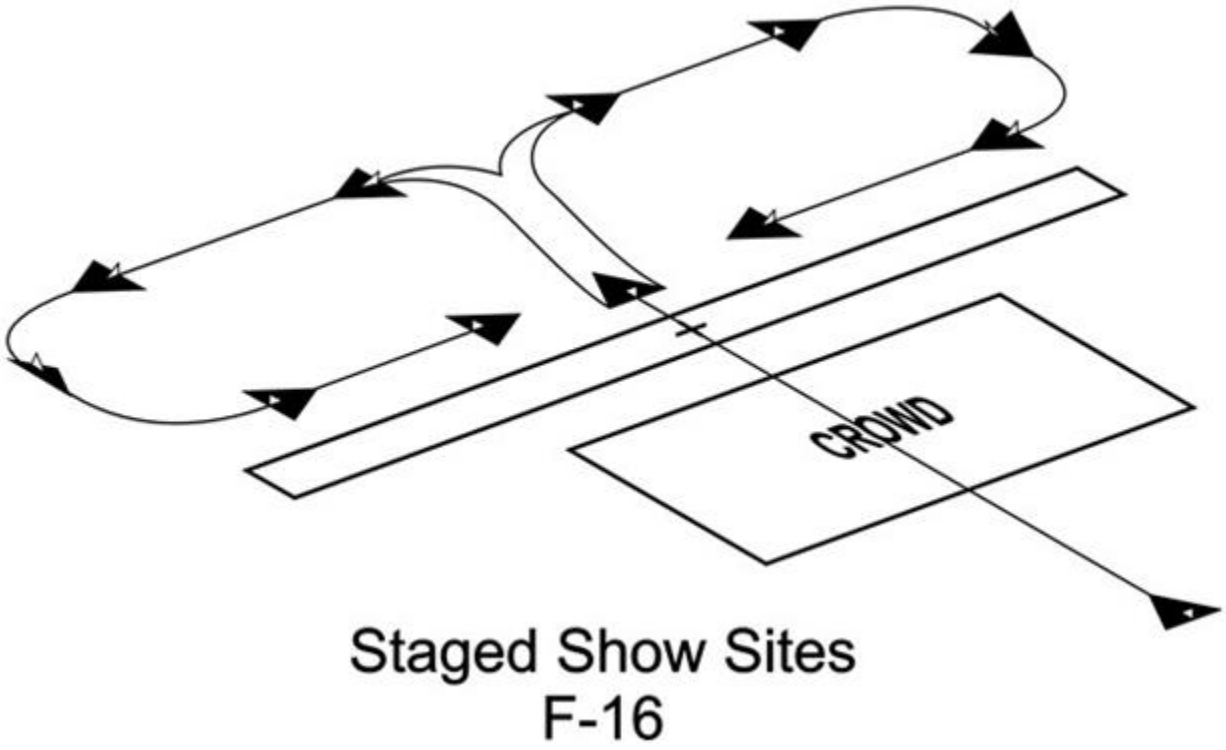
4.30.1. Maneuver Description. With Mil power or less, proceed to the end of the show line (approx 6,000 feet). At 175 knots and 6,000 feet AGL, roll inverted, perform an aggressive 135-degree pull through vertical to approximately 45 degrees nose low (NL), to reenter the show line from left to right at a minimum of 500 feet AGL. The throttle should be modulated as required to initiate the pull down with target airspeed of 175 KIAS. Once recovery above the minimum altitude for the follow-on maneuver is assured, backpressure is relaxed and the aircraft smoothly flown to be in level flight at the entry altitude for the next maneuver.

4.30.2. Abnormal Procedures. If the entry parameters are not met, the pilot will transition to a wings-level flat pass. If parameter limits cannot be maintained at any point during the maneuver, recover the aircraft to wings level and clear in front of the line. Do not attempt to pull down from the inverted apex below 5,000 feet AGL or with more than 350 KIAS. At 90 degrees NL, max airspeed is 350 KIAS and minimum altitude is 3,000 feet AGL. If either is exceeded, execute a dive recovery IAW tech order procedures.

4.31. Staged Show Sites.

4.31.1. When demo aircraft takeoff from other than the show site, plan to arrive over the show site with the fuel requirements prescribed in **paragraph 4.4** plus enroute return fuel IAW AFMAN 11-2F-16 Volume 3, *F-16 Operations Procedures*. The pilot may enter from behind the crowd at a minimum of 1,000 feet AGL (may fly at 500’ AGL with FAA approved waiver or if authorized by host nation authorities) as depicted in **Figure 4.22**, or via a Flat Pass maneuver down the show line, and complete the show as described in this chapter. Upon completion of the Dedication Pass and clearing the crowd, turn out behind the crowd and return to the staging airport. Pilots should plan to fly a full demo, but may cut the profile short as required to maintain suitable enroute return fuel.

Figure 4.22. F-16 Entrance from Behind the Crowd for Staged Shows.



4.32. Pyrotechnics Expenditure.

4.32.1. Maneuver Description. Prior to the start of the F-16 demo, the demo pilot or team safety observer will get a radio check with the SIC. Radio contact will only be initiated by the demo pilot or safety observer, and in no instance will the SIC talk to the pilot, unless safety of flight becomes an issue. Following the Cuban 8, the demo pilot will make a —"next pass hot" call. This will alert the SIC to the High Speed Pass maneuver and give the SIC permission to discharge the pyro as briefed. The pilot's responsibility is to fly the demo without distraction, and radio calls between the safety observer and the SIC will be kept to the absolute minimum necessary. The turn or vertical pull initiating the aircraft reposition following the High Speed Pass is the timing cue to discharge the —"Wall of Fire".

4.32.2. De-confliction with the aircraft will be based on altitude, timing and lateral offsets. SIC will not fire the pyro until the F-16 has pulled vertical and begun a positive rate of climb, or begun the reposition turn away from the crowd line. The F-16 will fly a ground track that is offset at least 150 feet from the F-16 pyro effect and overfly the pyro by at least 300 feet AGL. AFMAN 91-201, *Explosives Safety Standards,* dictates a minimum of 1,250 feet separation from explosive detonations to unrelated personnel. Therefore, at all Air Force Bases, pyro will be set up a minimum of 1250 feet from the crowd line. The demo pilot may continue the demo on the 500-foot show line. For all non-Air Force Base show sites, pyro will be set up a minimum of 650 feet from the crowd line, allowing the aircraft to fly on the 500-foot show line.

4.32.3. Abnormal Procedures. Safety is paramount. If at any time safety becomes an issue, anyone on the radio may make a KIO call. Following a KIO call, the pilot will discontinue his

routine and the pilot, safety observer, and SIC will acknowledge the call. If there is ever a question of timing, safety, or sequence, the SIC will not shoot the pyro.

Chapter 5

F-22 DEMO MANEUVERS

Section 5A—General Information

5.1. General. Maneuvers described in this document are used for training and flown in F-22 aerial demos as the complete aerobatic demo profile. Aerobatic maneuvers are included in this grouping, and as such treat this profile as a standard single-ship demo profile. The profile passes are listed in a specific order and described in a specific orientation to the crowd. Abnormal procedures are written for each maneuver. If the entry conditions are not met for any maneuver, the pilot recovers to wings-level flight and transitions to the next maneuver. Certain maneuvers require the pilot to transmit airspeed and/or altitude to a safety observer. The ground safety observer confirms parameters are good, monitors the demo pilot's flight path, engine performance, and visually clears the demo area for traffic. As a minimum, demo pilots transmit parameters prior to initiating the descending portion of vertical pull-throughs and Vertical Reposition maneuvers. These calls are made when the pilot reaches apex of the maneuver. The safety observer directs an abort when parameter limits are exceeded. Following each maneuver, and before clearing the show line to reposition for the next maneuver, the pilot ensures any descent has been stopped, and the aircraft is in a level or climbing attitude with the flight path marker at or above the horizon.

5.2. Aircraft Configuration and Fuel Requirements. These maneuvers should be flown in a standard configured aircraft with a full fuel load of 18,000 pounds at engine start. If mission needs dictate, taking off with less than full fuel is authorized. Under all circumstances, ensure the pilot takes off with enough fuel to execute the profile and divert if necessary. Inert weapons may be loaded; however, if the total weight exceeds 1,000 pounds, ensure the total fuel at takeoff is less than 17,000 pounds.

5.3. F-22 Pyrotechnics and Flares.

5.3.1. Pyro. The F-22 demo will only utilize pyro as a Wall of Fire and only during the High Speed Pass. **(T-3)** Only ICAS-approved personnel will be permitted to utilize pyro in association with the ACC F-22 Demo Team. **(T-3)** Each calendar year the ICAS Pyro Safety Subcommittee identifies personnel as approved Shooters in SICs. Individuals' selection will be based on experience, judgment, and safety record. **(T-3)** Only those SICs approved by the ICAS Pyro Safety Subcommittee will be allowed to work with ACC Demo Teams. **(T-3)**

5.3.1.1. The following maximum NEW will be used (all NEWs in this instruction are TNT equivalent): For the Wall of Fire pass, the maximum NEW is dependent on the length of the wall. The maximum wall length is 2000 linear feet, and the maximum NEW is 20 pounds (spread out evenly). No more than 1 pound NEW will be used for each 100 linear feet of wall.

5.3.1.2. The following items will be briefed by the ACC demo pilot and the SIC, in person, prior to each performance:

5.3.1.2.1. **(1)** Exact dimensions of the pyro area and the magnitude of explosives being used. **(T-3)**

5.3.1.2.2. **(2)** Aircraft/pyro de-confliction plan. **(T-3)**

5.3.1.2.3. **(3)** Demo profile and sequence of pyro (Wall of Fire). **(T-3)**

5.3.1.2.4. **(4)** Forecast wind and effects on pyro. **(T-3)**

5.3.1.2.5. **(5)** Communications plan. **(T-3)**

5.3.1.2.6. **(6)** KIO procedures. **(T-3)**

5.3.1.2.7. **(7)** Fire hazards and fire department response plan. **(T-3)**

5.3.1.2.8. **(8)** FOD potential and effects. **(T-3)**

5.3.2. **Flare Use.** The F-22 demo is authorized to use flares during performances at overwater civilian airshows. An individual qualified in arming, de-arming and storage of flares will be present for all airshows where flares will be used. **(T-2)** The show must have a place to store the flares in case they need to be downloaded (hanger in inclement weather). **(T-2)** Prior coordination and approval needs to be obtained from the airshow director, and standard airshow firefighting equipment and personnel need to be present during flare use for all demos. **(T-2)** With fire conditions permitting, flares will be expended during the performance so as to remain within the aerobatic box. **(T-2)** Training flares (M206, MJU-61, or equivalent) will be used for all demos. **(T-2)** Aircraft will be armed in the chocks with the CMS set to "OFF" until positioned in the arming area or airborne IAW MDS procedures. **(T-2)** The planned minimum wings-level safe altitude for dispensing is 750 feet AGL to ensure flare burnout prior to contact with the water. A max planned crosswind of 22knots with a 4.5" burn time will push the flare 168' laterally. **(T-2)** Pilots will use the 1,500-foot line for the aerobatic planned maneuvers so that the flares will travel no closer than 1250 feet to the crowd line. **(T-2)** This will ensure burnout/duds fall into the water and not the spectator area. Flares are authorized for use during the take-off high AOA loop, pedal turn, power loop, and loaded roll maneuvers. **(T-2)** Aircraft loaded with flares will not be used as a static display. **(T-2)**

5.4. Airspeed and G Limits. Demo pilots may not exceed 0.95 Mach. **(T-2)** The maximum target G for this demo is 7.5 Gs. **(T-2)** This does not preclude a momentary increase in G for safety considerations.

5.5. Show line Restrictions. The F-22 demo is flown on the 1,500-foot show line. Maneuvers not conforming to FAA Order 8900.1, Volume 3, **Chapter 6**, require approval via the FAA AFS-800 Maneuver Package approval process. **(T-0)**

5.6. Airspace and Runway Requirements. Required airspace for the F-22 is 7,000 feet AGL and normally a five-mile radius from show center horizontally. The minimum dimensions of the aerobatic box are 3,000 feet wide, 4,500 feet long, and 7,000 feet AGL. If the FAA has waived a show line to closer than 1,500 feet, the aerobatic box may be less than 3,000 feet wide, provided there is at least 1,200 feet from either the primary or secondary show line. Minimum runway length and width is 7,000 feet x 75 feet. Ensure the runway, taxiway, and parking area are stressed for a 65,000-pound aircraft with single wheel type landing gear.

5.7. Weather Requirements. Weather PARAMETER LIMITS for the high show profile are a ceiling of at least 4,500 feet AGL, three miles ground and five miles in-flight visibility with a discernible horizon. Ceiling required for the low show profile is 1,500 feet AGL, three miles ground visibility and five miles inflight visibility with a discernible horizon. The ceiling requirements for each maneuver are based on waived airspace (clear of clouds) and require adjustment if using VFR rules. Plan maneuvers to maintain VMC throughout the show sequence.

5.8. High Density Altitude Demos. For high density altitude shows, adjust PARAMETER LIMITS in accordance with the following:

5.8.1. Add 500 feet to APEX altitudes for each 2,000 feet of altitude above 3,000 feet MSL and 10 knots to entry airspeeds on all maneuvers that exceed 30 degrees AOA. For example, if the show site altitude is 5,000 feet MSL, add 500 feet to the baseline target and 10 knots to the airspeed. If the show site altitude is 7,000 feet MSL, add 1,000 feet to the baseline target and 20 knots to the airspeed.

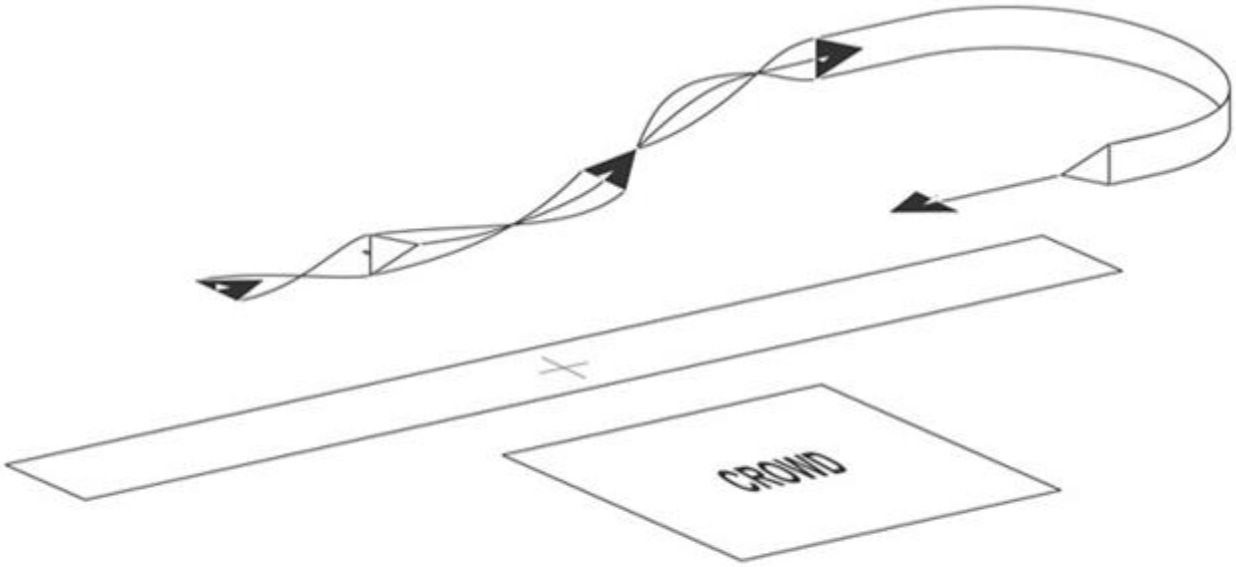
5.9. Demo Maneuver Profiles.

Table 5.1. F-22 Demo Maneuver Profiles.

High Show
Maximum Power Takeoff to High AOA Loop
Minimum Radius Turn to J-Turn Reposition
Weapon Bay Door Pass
Dedication Pass
Pedal Turn
Power Loop
Loaded Roll
Tail Slide
Slow Speed Pass
Split-S Reposition
High Speed Pass
Hoover Pitch to Land
Low Show
Maximum Power Takeoff
Minimum Radius Turn
Weapon Bay Door Pass
Dedication Pass
Slow Speed Pass
Loaded Roll
High Speed Pass
Minimum Radius Turn
Hoover Pitch to Land

5.10. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the demo sequence as required. IAW FAA regulations, 90 degrees of bank may be exceeded during repositions (if required). Repositioning turns may not include added aileron rolls or other accenting maneuvers.

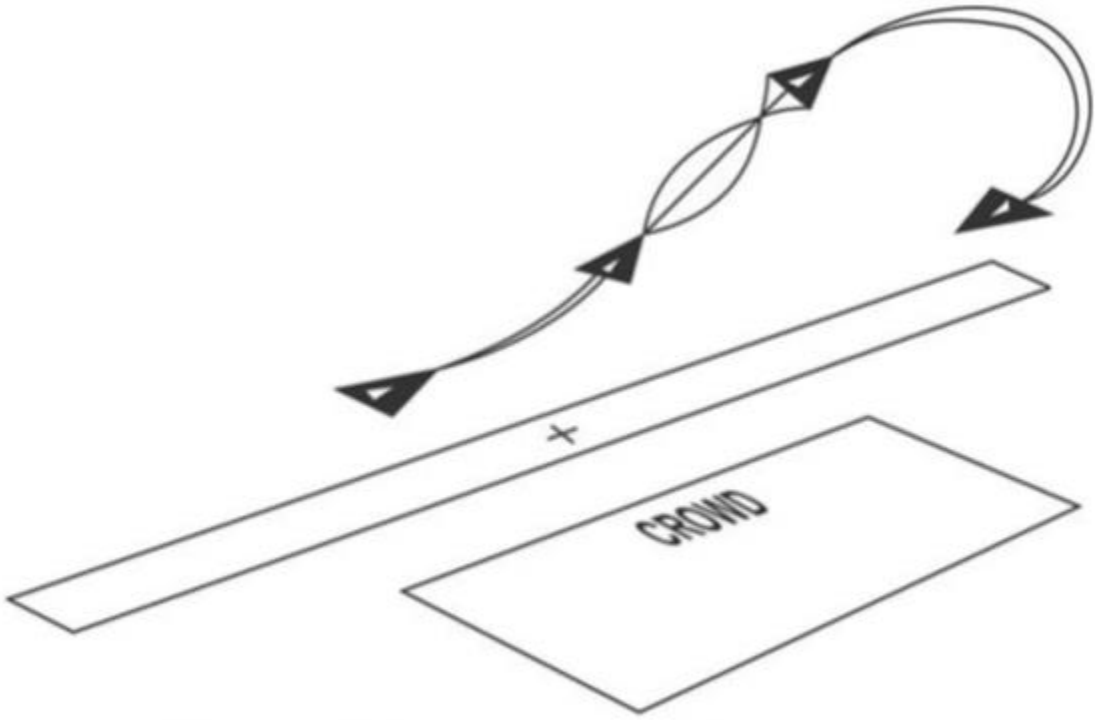
Figure 5.1. F-22 Flat Wifferdill Reposition.



Flat Wifferdill Reposition Maneuver
F-22

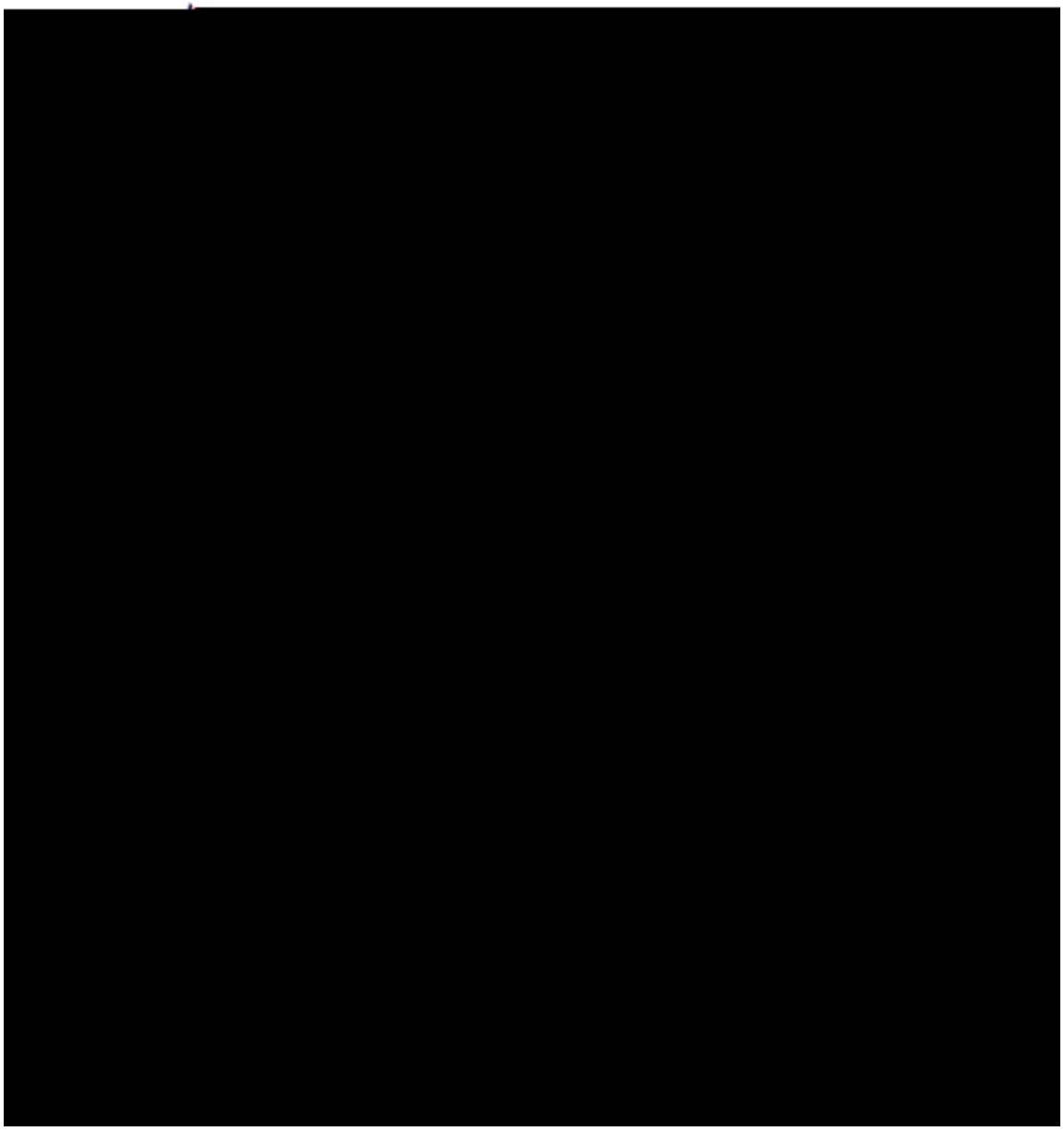
5.10.1. Maneuver Description. The Flat Wifferdill Maneuver turn is a combination horizontal and shallow vertical turn used to change direction at each end of the show line when performing the low profile. The Flat Wifferdill Maneuver turn uses less altitude than a normal Wifferdill. It requires a larger cut and tends to be looser and flatter than a normal Wifferdill. 270-degree turn reversal may be made while the aircraft is climbing. The target G for this maneuver is 6.5 to 7.0 Gs. Each turn may differ slightly to ensure airspeed/altitude parameters for the next maneuver are established in the flat Wifferdill. The entry "cut" turn for the flat Wifferdill is made to ensure no show line or crowd line penetration. **Figure 6.2** F-22 Wifferdill Reposition.

Figure 6.2. F-22 Wifferdill Turn Reposition.



5.10.2. Maneuver Description. The Wifferdill turn is a combination horizontal and vertical turn used to change direction at each end of the show line. The vertical plane is used to maintain necessary proximity to the demo area. Each turn may differ slightly so airspeed/altitude parameters for the next maneuver are established in the Wifferdill. As the aircraft departs the show line, maneuver in the horizontal and vertical plane to reposition for the next maneuver. The target G for this maneuver is 6.5 to 7.0 Gs. A 270-degree turn reversal is made while still climbing. During the last half of the Wifferdill, while descending, the turn is adjusted to establish the proper show line entry. The entry "cut" turn for the Wifferdill is made to ensure no show line or crowd line penetration.

Figure 5.3. F-22 J-Turn Reposition.

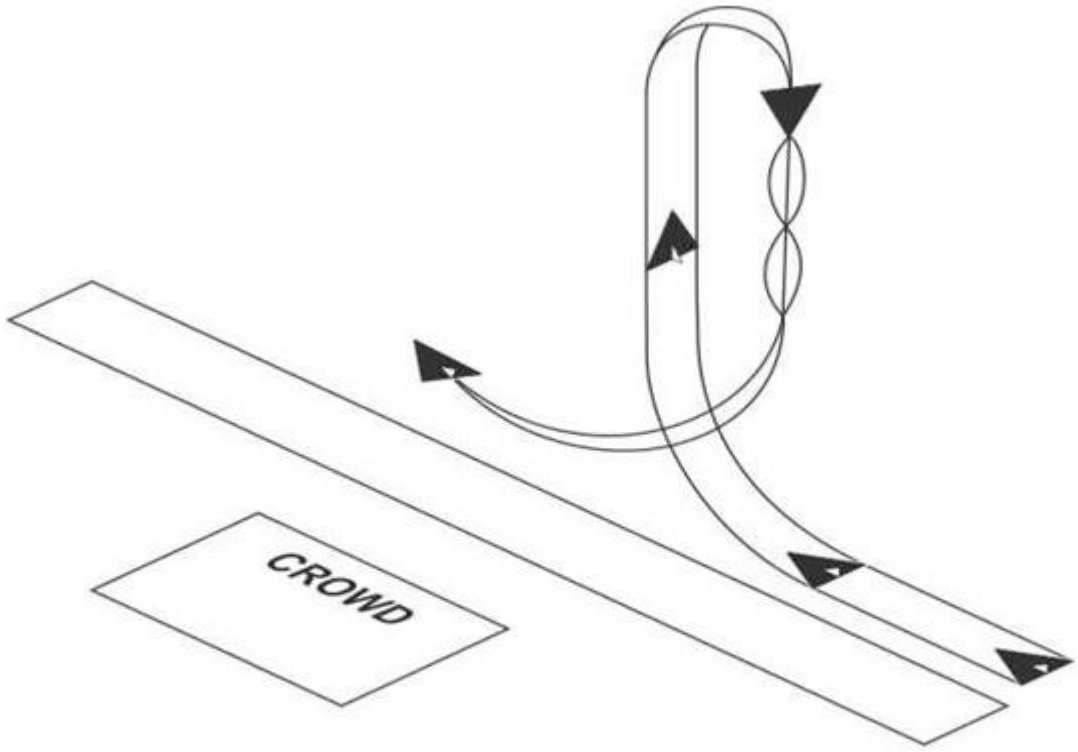


5.10.3. Maneuver Description. The J-Turn reposition maneuver can be used to quickly change directions at each end of the show line while minimizing separation from the crowd and further displaying the slow-speed maneuverability of the Raptor. From desired position with 100 KCAS minimum, aggressively apply aft stick while wings-level to climb and slow the aircraft while increasing the alpha. At 36 degrees AOA or more, use stick and rudder to maneuver in the direction of the runway. Do not maintain high alpha more than is necessary to maneuver the aircraft and do not slow the aircraft to below 75 KCAS if below 2,500 feet AGL and greater than 75 degrees nose-high. Once the nose slices back to the horizon and is pointed towards the crowd line, break the alpha to 36 degrees AOA for the recovery and maintain alpha until sink rate is arrested and begin to set up for the next pass. Regardless of nose position, recover from high AOA and fly the aircraft out not later than 2,500 feet AGL.

Section 5B—High Profile

5.11. Maximum Power Takeoff to High AOA Loop.

Figure 5.4. F-22 Maximum Power Takeoff to High AOA Loop.



T/O To High AOA Loop
F-22

Table 5.2. F-22 Maximum Power Takeoff to High AOA Loop Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Degrees Nose High (Deg NH)
Entry	0’	250	MAX	75
Pull	3,500’	100	MAX	N/A
Roll	3,000’	100	MAX	90 NL
Recovery	2,500’	N/A	MAX	N/A

Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	Deg NH
Entry		N/A	200 / N/A	MAX	80
Pull	**min**	3,000’	80 / N/A	MAX	N/A
Roll	**min**	2,800’	80 / N/A	MAX	90 NL
Recovery	**min**	2,000’	N/A / 400	MAX	N/A

5.11.1. Maneuver Description: Select full AB at brake release and check engine conditions on the roll. Rotate at tech order speed and begin climb. Confirm gear is retracted and the light is extinguished in the gear handle. Accelerate in full AB with a positive climb rate until approaching show center and on the 1,500-foot show line. At 250 KCAS begin an aggressive pull (soft to hard stop initially) up to 75 degrees nose-high. Hold 75 degrees nose-high (water mark) and allow airspeed to slow, AOA to decrease and altitude to increase. Passing 3,000 feet AGL, smoothly bring the nose to 90 degrees nose-high and wait for 3,500 feet AGL. At 3,500 feet AGL, execute a full aft stick high AOA loop to bring the nose to 90 degrees nose-low. Hold 90 degrees nose-low and accelerate. At 100 KCAS, execute a 405- degree roll to set the lift vector (LV) on a 45-degree reposition line. If 100 KCAS is not obtained prior to 2,800 feet AGL, do not execute the 405-degree roll, but rather a 45-degree roll to set the reposition line and begin recovery within parameters. Regardless of orientation, execute a 36-degree AOA recovery NLT 2,000 feet AGL and reposition for the next maneuver.

5.11.2. Abnormal Procedures: If the show profile takeoff is interrupted by an aircraft malfunction, make a normal takeoff or if conditions warrant, abort the takeoff. If an afterburner does not light or they are producing thrust asymmetrically do not initiate the pull up. If an afterburner blows out prior to initiating the pull, immediately abort the maneuver and execute a nose-high recovery. Should an engine or afterburner fail, immediately reduce both throttles to MIL or below and recover the aircraft. Do not reselect AB until any yaw rate is arrested and airspeed is >100 KCAS. If the aircraft slows to 75 KCAS prior to reaching 2,500 feet AGL, do not execute the high AOA loop and execute a nose-high recovery to wings-level. Should the takeoff need to be executed from right to left for winds or runway length, execute a 225-degree roll to set the reposition line. Regardless of the starting axis, the reposition line needs to be set and the recovery initiated by 2,000 feet AGL.

5.12. Minimum Radius Turn.

Figure 5.5. F-22 Minimum Radius Turn.

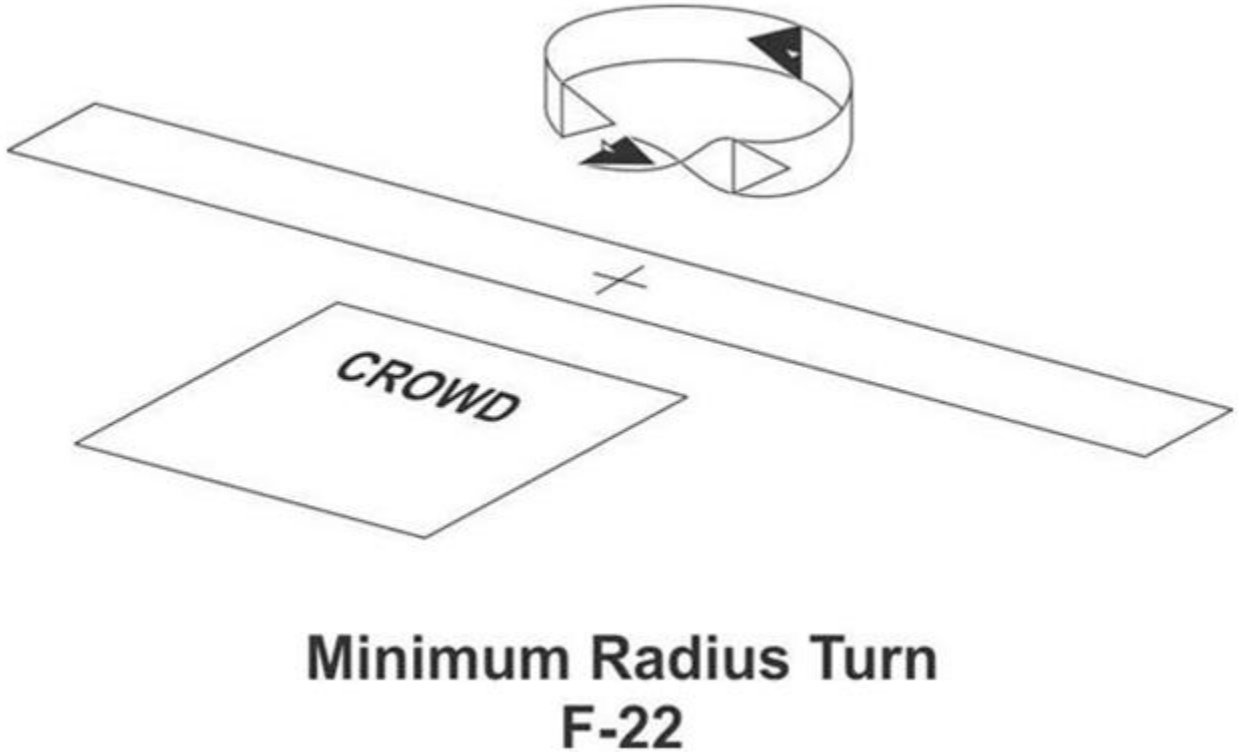


Table 5.3. F-22 Minimum Radius Turn Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G/Deg NH
Entry 500’	440	MAX	7.5
Exit 500’	275	MAX	N/A
Pull 500’	275	MAX	90
PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	G/Deg NH Max

Entry	**min**	400’	350 / 475	MAX	A/R
Exit	**min**	400’	200 / 400	MAX	A/R
Pull	**min**	400’	200 / N/A	MAX	110

5.12.1. Maneuver Description: Prior to show center, select full AB and accelerate to 440 KCAS. Beyond the 500-foot show line and at show center, turn away from the crowd using 75 to 85 degrees of bank. Begin the turn with an aggressive G onset-rate to 7.5 Gs to avoid accelerating and begin bleeding airspeed. G-loading and airspeed bleed-off rate vary with density altitude. The first 180 degrees of turn should be accomplished with a 1 ¾ degree nose-up attitude and the last 180 degrees of turn should be accomplished with a 1 ¾ degree nose-down attitude to make the turn appear level to the crowd. After the first 180 degrees of turn, continue to bleed airspeed down to 250 KCAS. Vary the bank angle, pitch, and pull to arrive at level flight, 275 KCAS, and no closer than 1,500-foot show line at the completion of 360 degrees of turn. Maximum degrees of flight path marker negative pitch allowed while correcting for altitude is 5 degrees. Ensure surface winds are taken into consideration in order to center this maneuver on show center and to avoid overshooting the show line. As you approach show center, smoothly roll out and aggressively pull the nose to 90 degrees nose-high. 90 degrees nose-high may be exceeded (up to 110 degrees) as long as the airspeed minimum is maintained. As soon as the aircraft reaches 150 KCAS, begin a full forward push to drive the nose back down to the horizon and set up for the J-Turn reposition.

5.12.2. Abnormal Procedures: If the minimum entry parameters are not met, transition to a wings-level flat pass. If during any portion of the maneuver it becomes apparent the aircraft may descend below 400 feet AGL or airspeed decays below 200 KCAS, abort the maneuver by rolling wings-level and climbing to 500 feet AGL. If the aircraft approaches 475 KCAS and the pilot is already at 9 Gs, reduce power to not less than minimum afterburner and bleed energy. If necessary, adjust power and G as required (no lower than 200 KCAS) to avoid overshooting the 1,500-foot show line. In the pull after the roll-out, if airspeed reaches 150 KCAS prior to achieving 90 degrees nose-high begin the push forward early. Do not attempt the J-turn reposition if the aircraft does not exceed 2,500 feet AGL during the turn.

5.13. Weapon Bay Door Pass.

Figure 5.6. F-22 Weapon Bay Door Pass.

Table 5.4. F-22 Weapon Bay Door Pass Parameters.

TARGET PARAMETERS					
Altitude AGL		Airspeed KCAS	Power Setting	G	Bank
Entry	300’	200	A/R	1 to 2	75
Exit	300’	200	A/R	1 to 2	75
Roll	500’	250	A/R	1 to 2	N/A

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G	Max Bank
Entry	**min**	200’	175 / N/A	A/R	N/A	90
Exit	**min**	200’	175 / N/A	A/R	N/A	90

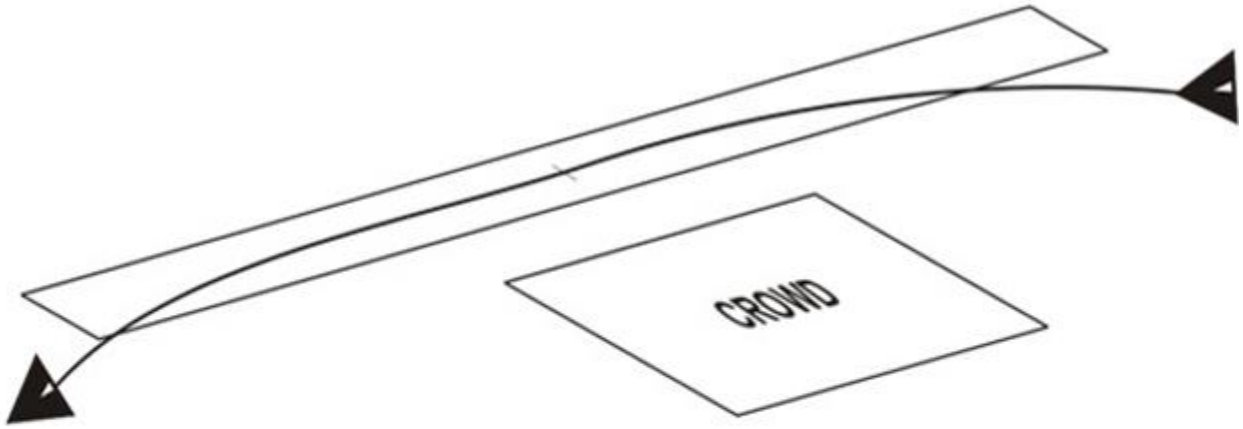
Roll	**min**	400’	200 / N/A	A/R	N/A	N/A

5.13.1. Maneuver Description: On extended show line (offset up to 30 degrees), establish wings-level and 200 KCAS. Approaching the 500-foot show line, bank away from the crowd (not to exceed 75 degrees), open all doors and begin a gentle turn to maintain bank, airspeed and altitude. Passing show center, close all doors, add power, and fly to the 1,500-foot show line. Begin a climb to 500 feet AGL and select MAX AB. Once above 500 feet AGL and 250 KCAS, execute a 300-degree roll to set your LV on the reposition line for the Dedication Pass.

5.13.2. Abnormal Procedures: Only open doors IAW tech order guidance. If doors do not open symmetrically, close all doors and abort the pass.

5.14. Dedication Pass. The intent of this maneuver is to pay tribute to our war fighters. It is to be flown before the Tactical Pitch-Up to Land during the High and Low Show profiles.

Figure 5.7. F-22 Dedication Pass.



Dedication Pass
F-22

Table 5.5. F-22 Dedication Pass Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300’	.65 - .92M	MAX	1
Exit 300’	.65 - .92M	IDLE to MAX	4 to 7.5

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	**min**	200’	.5 / .95M	IDLE to MAX	A/R
Exit	**min**	200’	.5 / .95M	IDLE to MAX	A/R

5.14.1. Maneuver Description: The maneuver is flown beyond the 500-foot show line. The approach is flown from behind the line, approximately 2 miles from show center with an approximate dive angle of 30 degrees and a maximum of 45-degree cut from the show line (as to not exceed 90 degrees of bank in the turn). Maintain beyond 500 feet horizontally from the crowd at all times. Upon reaching a point 500 feet from the corner of the crowd at 300 feet AGL, roll the aircraft into a level arcing pass using 75 to 90 degrees of bank. Select full AB until passing the show line or until .92Mach is anticipated. In order to maintain 500 feet separation from the crowd at both corners, ensure the apex of the arc is greater than 500 feet from show center (the amount depends on the degrees offset from the show line at the start of the arc and the amount of G used in the turn). Continue the arc until reaching the opposite crowd corner, roll out, reduce power and initiate a climb.

5.14.2. Abnormal Procedures: Abort the maneuver if at any time: the aircraft comes closer than 500 feet to the crowd line or its lateral limits, an excessive dive angle or sink rate develops, entry parameters are not met, or the aircraft descends below 200 feet AGL. Abort procedures are to roll wings-level, climb and fly away from the crowd.

5.15. Pedal Turn.

Figure 5.8. F-22 Pedal Turn.

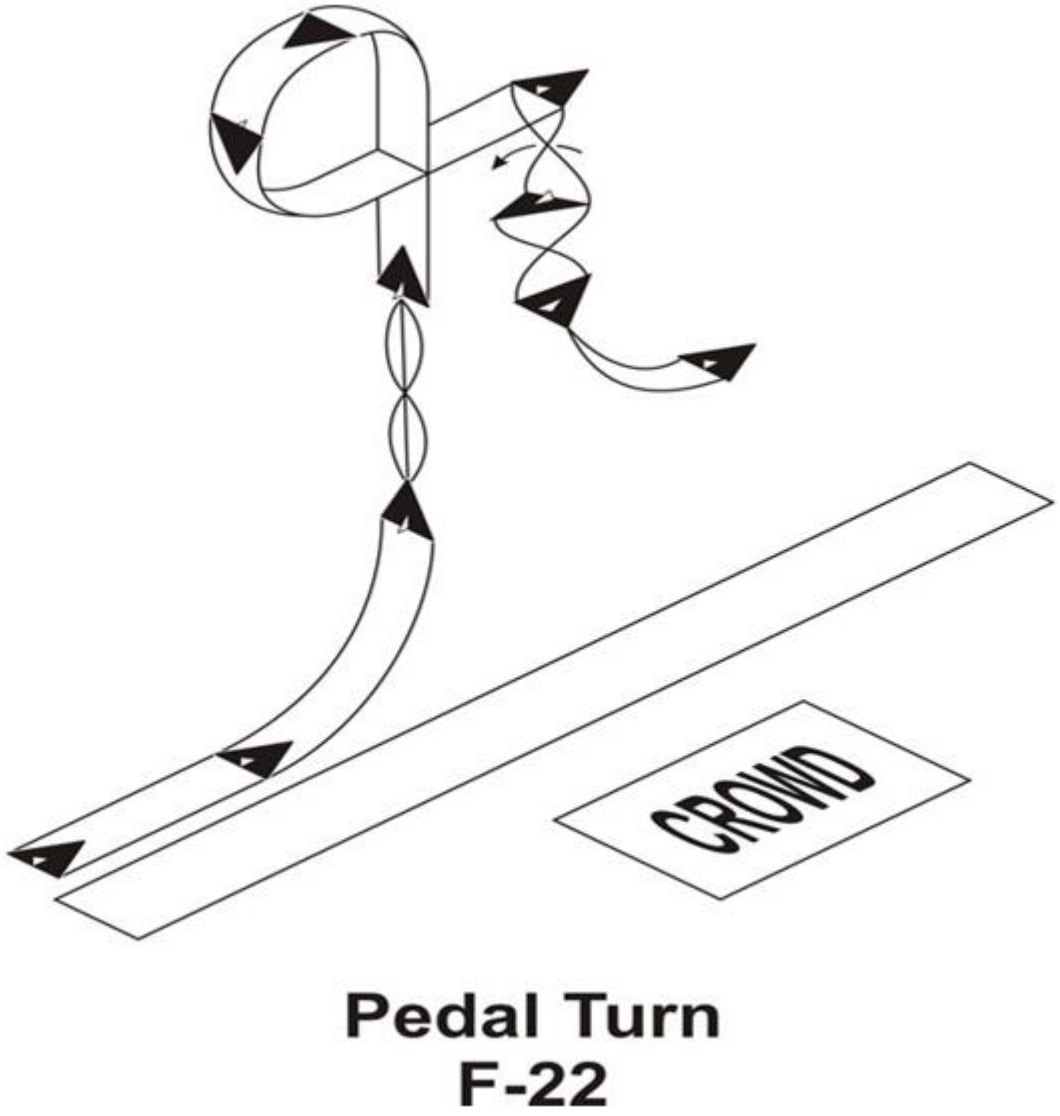


Table 5.6. F-22 Pedal Turn Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Deg NH
Entry	300’	300	MAX	0
Pull	4,000’	N/A	MAX	90
Exit / Recovery	N/A	N/A	MAX	N/A

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	Min Deg NH
Entry	**min**	200’	250 / 375	MAX	N/A
Pull	**min**	3,000’	75 / N/A	MAX	80
Exit / Recover	**min**	2,500’	N/A	MAX	

5.15.1. Maneuver Description: Following the Dedication Pass reposition, align on the 1,500-foot show line at 300 feet AGL and 300 KCAS. Approaching show center, select full AB, ensure both are lit symmetrically and begin an aggressive (soft to hard stop) pull to 90 degrees nose-high. When established 90 degrees nose-high with AOA less than 10 degrees, execute a 360-degree roll. Climb and decelerate to arrive at 4,000 feet AGL with no less than 75 KCAS. Execute a maximum (hard stop) wings-level pull to pull the nose through the inverted around to the horizon (high alpha loop). As the nose approaches the horizon upright, apply full pedal in the best direction for winds and maintain full-aft stick. Continue the turn for 360 degrees or until lined up on the 1,500-foot show line and begin an aggressive push forward to break the alpha and accelerate. Catch 36 alpha in full AB and arrest the descent rate. Should winds, weather or other factors dictate, the pedal turn may be executed as two 180-degree turns. Pre-brief this sequence of two 180-degree turns and do not execute from an airborne “on the fly” assessment. If the 180/180 pedal turn is the desired maneuver, add 1,000 feet to the apex pull, making the minimum pull 5,000 feet AGL. Execute two 360-degree rolls due to the additional altitude required.

5.15.2. Abnormal Procedures: If an afterburner does not light, do not initiate the entry pull up. If an afterburner blows out prior to initiating the apex pull, immediately abort the maneuver and execute a nose-high recovery. If the aircraft airspeed decreases to less than75 KCAS prior to reaching 4,000 feet AGL, initiate the pull early and assess altitude parameters to execute the pedal turn. If 2,500 feet AGL is reached prior to completing the pedal turn, recover early. No matter the orientation of the aircraft, initiate recovery at 2,500 feet AGL and fly a 36-degree AOA recovery to arrest sink rate. Should an engine or afterburner fail, immediately reduce both throttles to MIL or below and recover the aircraft. Do not reselect AB until yaw rate is arrested and airspeed is greater than 100 KCAS.

5.16. Power Loop.

Figure 5.9. F-22 Power Loop.

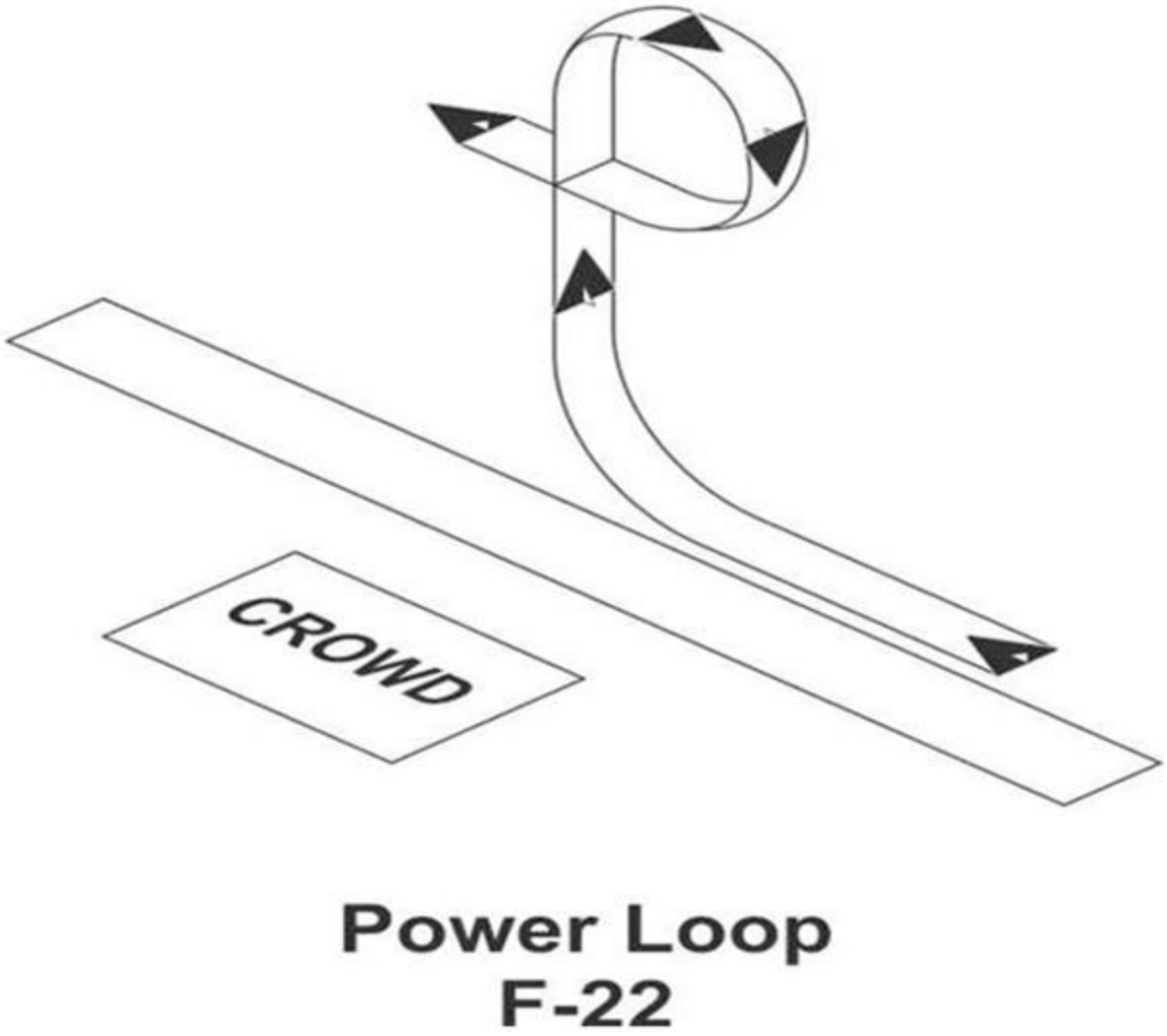


Table 5.7. F-22 Power Loop Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Alpha
Entry	1,500’	250	MAX	0
Recovery (initiate)	2,700’	A/R	MAX	36

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	Alpha **(min)**

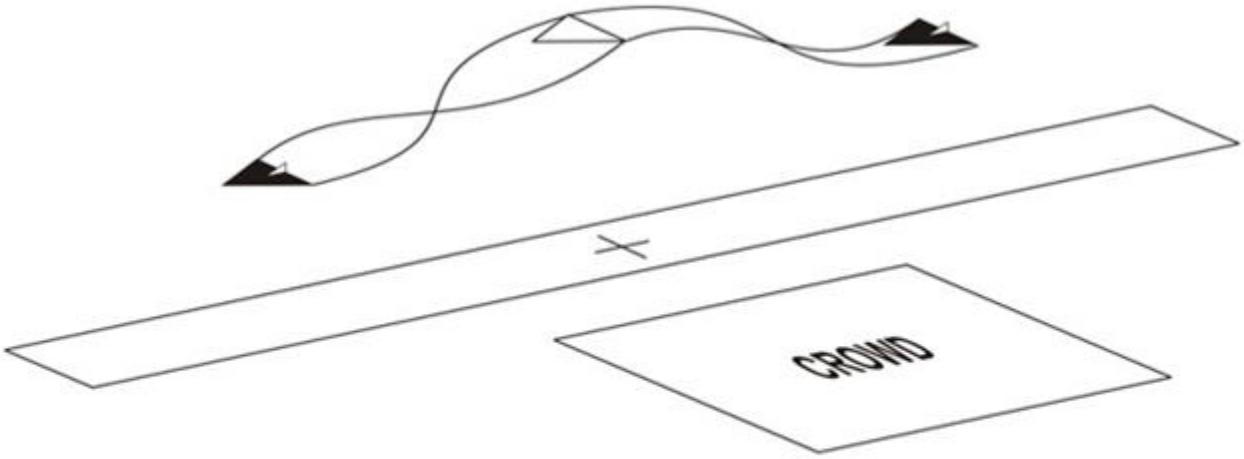
Entry	**min**	1,300’	225 / 350	MAX	N/A
Recovery(initiate)	**min**	2,500’	A/R	MAX	30

5.16.1. Maneuver Description: Following the Pedal Turn, accelerate in full AB and reposition to remain on the 1,500-foot show line and arrive at show center at 1,500 feet AGL and 250 KCAS. Abeam show center, execute a maximum wings-level pull to bring the nose of the aircraft into the vertical. Continue a maximum pull all the way around until the nose of the aircraft is upright and at the starting horizon. Command forward-stick to decrease alpha and accelerate. Catch 36 degrees AOA and maintain until sink rate is arrested.

5.16.2. Abnormal Procedures: If afterburners are not symmetrically lit, do not initiate the pull up. Smoothly pull to the nearest horizon and recover the aircraft. Should an engine fail or an afterburner blow out, ensure throttles are in MIL or below and recover the aircraft. Do not reselect AB until any yaw rate is arrested and airspeed is >100 KCAS.

5.17. Loaded Roll.

Figure 5.10. F-22 loaded Roll.



Loaded Roll
F-22

Table 5.8. F-22 Loaded Roll Parameters.

TARGET PARAMETERS		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	AOA
Entry	1,400’	150	MAX	36
Exit	1,300’	150	MAX	36

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	AOA **(max)**
Entry	**min**	1,300’	110 / N/A	MAX	40
Exit	**min**	1,200’	100 / N/A	MAX	40

5.17.1. Maneuver Description: Following recovery from the Power Loop, on the 1,500-foot show line, at 1,400 feet AGL (higher if aircraft is recovered earlier) and 36 degrees AOA, apply full lateral stick and approximately half pedal deflection with the flight path marker above the horizon. Maintain 30-36 degrees AOA initially, then remove pedal deflection and reduce back-stick pressure to maintain 20-28 degrees AOA while the LV is below the horizon. Once the LV is above the horizon, complete the roll by increasing back-stick pressure and AOA to 30-36 degrees. When the aircraft reaches upright wings-level to the horizon, decrease angle of attack, accelerate and begin to reposition for the next maneuver.

5.17.2. Abnormal Procedures: If both afterburners do not light, do not exceed 30 degrees angle of attack and recover the aircraft. If the aircraft descends below 1,200 feet AGL, immediately initiate a recovery by rolling wings-level (with decreased AOA) and pulling to the nearest horizon. If the aircraft ever exceeds 40 degrees nose-low or an excessive sink rate develops, recover. If airspeed is allowed to decay to less than 100 KCAS, terminate the maneuver and recover.

5.18. Tail Slide.

Figure 5.11. F-22 Tail Slide.

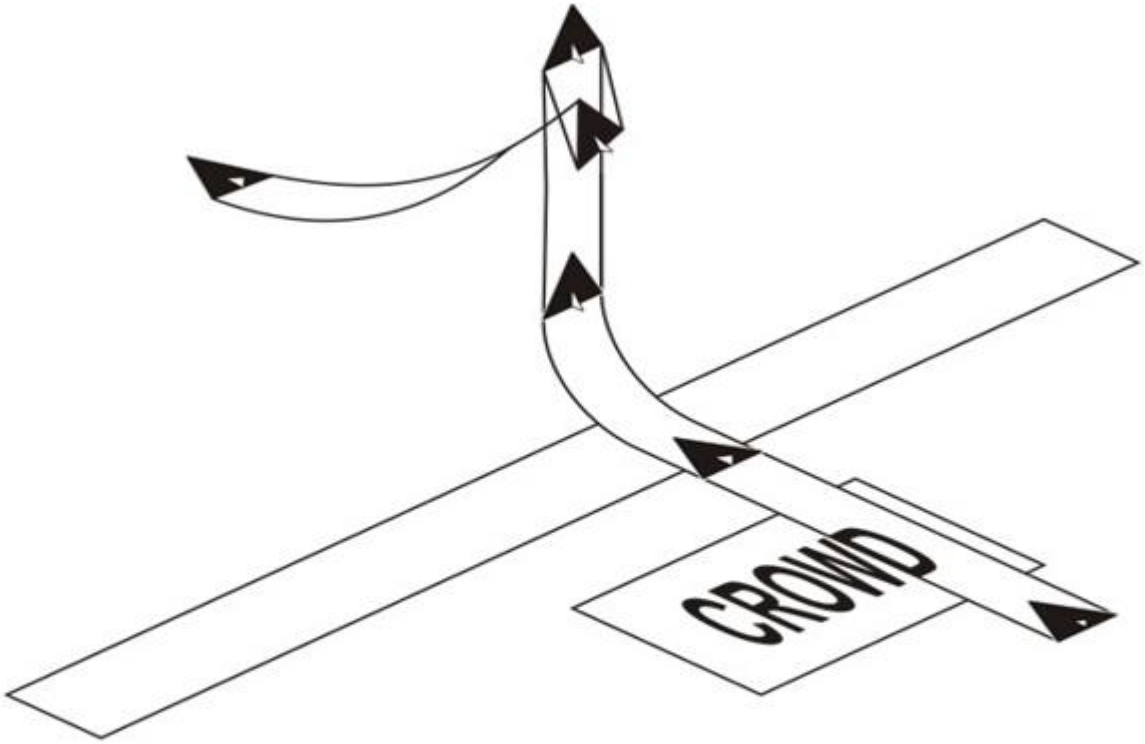


Table 5.9. F-22 Tail Slide Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Deg NH
Entry	1,000’	250	MIL	0
Apex	3,000’	0	Idle to MIL	80
Recovery	2,700’	75	MIL	N/A

PARAMETER LIMITS

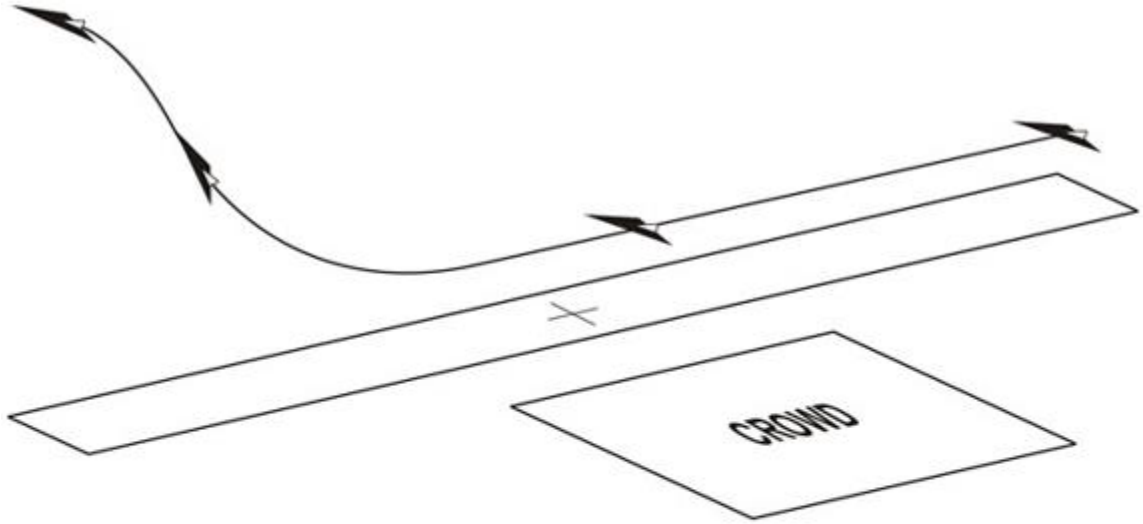
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	Deg NH
Entry	**min**	900’	225 / 350	MIL	N/A
Apex	min	2,800’	N/A	Idle to MIL	90
Recovery	min	2,500’	N/A / 85	MIL	N/A

5.18.1. Maneuver Description: After the Loaded Roll, reposition behind the crowd, perpendicular to the show line and directly behind show center. Fly over show center at 1,000 feet AGL and 250 KCAS. Select military (MIL) power over show center and at the 1,500-foot show line, execute a hard stop pull in MIL power to 80 degrees nose-high. Hold 80 degrees nose-high with back stick pressure and attempt to align the waterline and Climb Dive Marker (CDM) as the aircraft slows. Modulate power to arrive at 3,000 feet AGL and 0 KCAS. Smoothly reselect MIL power and allow the aircraft to slide backwards while holding 80 degrees nose-high. At 2,700 feet AGL or 75 KCAS backwards (whichever occurs first), push forward of the soft stop to assist the Flight Control System (FLCS) in bringing the nose down and reducing AOA. Recover in MIL power to wings-level flight. Begin a turning reposition for the Slow Speed Pass. Entry to the tail slide may be flown from show left or right if dictated by crowd or show line restrictions (e.g., foreign tradeshows). This type of entry is flown with same entry altitude and airspeed parameters; however, the entry is initiated by a climbing turn away from the crowd approximately 1,000 feet prior to show center to achieve the same tail slide parameters and position in the aerobatic box as the standard reposition over the crowd. Ensure this entry is flown and documented in practice prior to accomplishing in a public performance.

5.18.2. Abnormal Procedures: If sideslip (beta in the HUD) rapidly increases through 20 degrees or is observed greater than 30 degrees, initiate a recovery by pushing forward slightly less than the soft stop. If the tail slide begins prior to 2,800 feet AGL, immediately initiate a recovery.

5.19. F-22 Slow Speed Pass.

Figure 5.12. F-22 Slow Speed Pass.



Slow Speed Pass
F-22

Table 5.10. F-22 Slow Speed Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	AOA
Entry	1,000’	80	Cruise to MIL	36
Exit	1,000’	80	Cruise to MIL	36

PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	AOA **(max)**
Entry	**min**	900’	75 / N/A	MIL	40
Exit	**min**	900’	75 / N/A	MIL	40

5.19.1. Maneuver Description: Following the Tail Slide, begin a turn in the direction to set up the Slow Speed Pass into the wind. If wind is negligible or predominantly a crosswind, set

the pass to be the same direction as the takeoff. Maintain 120 KCAS in the reposition turn and fly to a point ~3,000 feet from the start of the crowd line. Target the line 90 degrees off pass heading at 1,000 feet AGL and 150 KCAS in MIL power. Execute a soft stop pull to align the jet on the desired heading and catch 36 degrees AOA. Do not exceed 40 degrees angle of attack. Manipulate power and pitch to maintain 1,000 feet AGL and 36 degrees AOA on show line heading. After passing the crowd on the opposite side, select full afterburner and climb to 4,000 feet AGL to set up for the Split-S. During a Low Show, the reposition may be flown no less than 500 feet AGL. In all cases, the aircraft may not be flown less than 120 KCAS greater than 30 degrees AOA when less than 900 feet AGL.

5.19.2. Abnormal Procedures: If 40 degrees angle of attack is exceeded, immediately add power and push forward to catch and sustain 36 degrees AOA. If the aircraft descends below 900 feet AGL terminate the maneuver and recover the aircraft. Do NOT select afterburner with less than 75 KCAS and greater than 36 degrees AOA. If the aircraft slows below 75 KCAS, add power (up to MIL) and decrease angle of attack. If an engine fails, IMMEDIATELY reduce power to mid-range on both throttles and begin a soft stop push to reduce AOA and gain airspeed. Do not push the nose greater than 10 degrees nose-low. Use lateral stick and pedal as required to maintain wings-level controllable flight. Accelerating through 100 KCAS, smoothly bring both throttles to MIL and full afterburner passing 125 KCAS. Recovery may be limited to 20 degrees AOA.

5.20. Split-S Reposition.

Figure 5.13. F-22 Split-S Reposition.

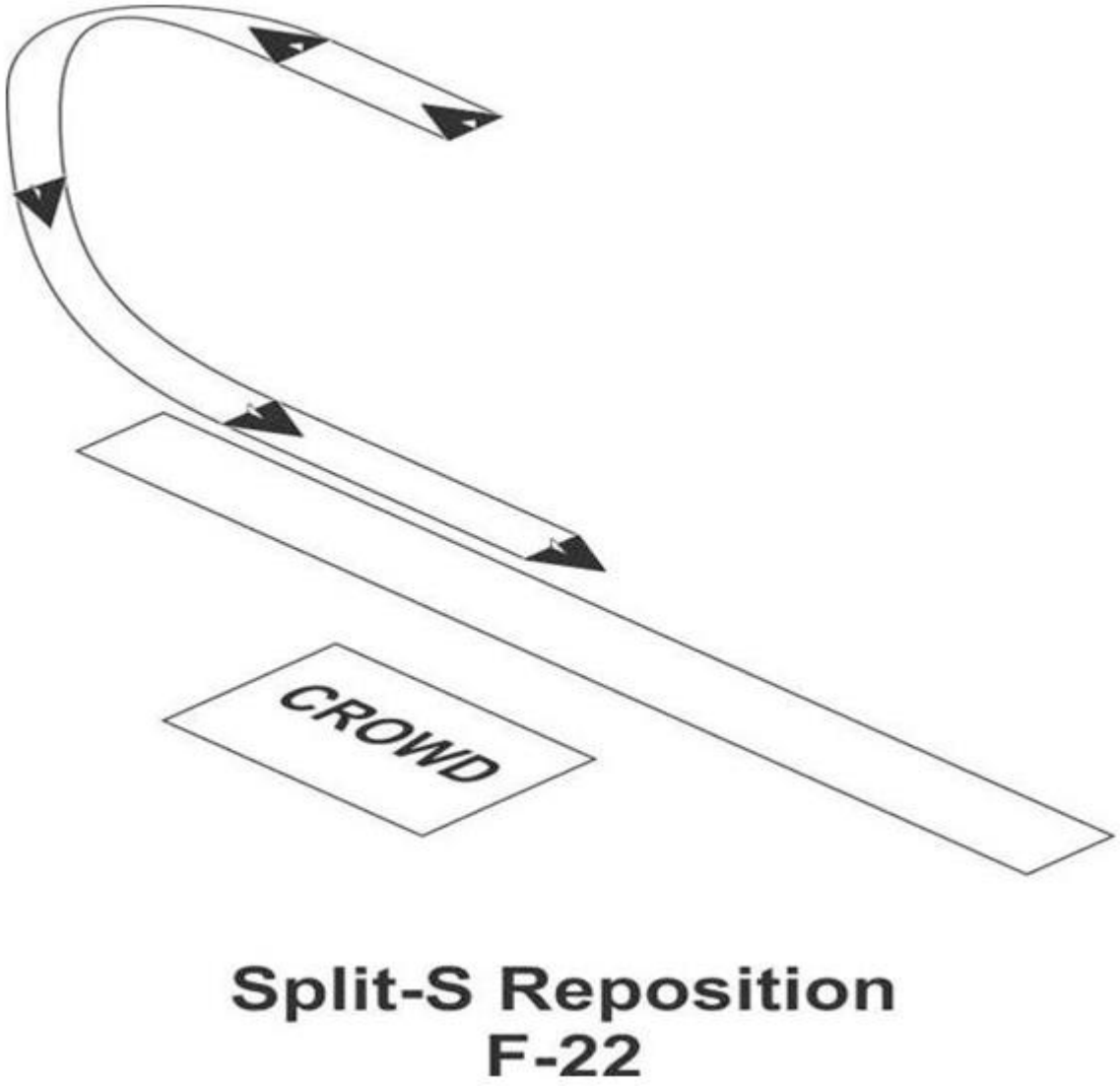


Table 5.11. F-22 Split-S Reposition Parameters.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	AOA
Entry 4,000’	200	MAX	N/A
Exit 300’	.8 - .92M	MAX	N/A
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	AOA

Entry	**min**	3,500’	150 / 275	MAX	N/A
Exit	**min**	200’	N/A / .95M	A/R	N/A

5.20.1. Maneuver Description: In the climb after the Slow Speed pass move to the 1,500-foot show line, maintain 45-50 degrees nose-high and allow the aircraft to accelerate. Tailor degrees nose-high to not only accelerate but also gain separation away from the crowd for the follow-on High Speed Pass. If the nose is held too nose-high there may not be enough room to accelerate after the maneuver. At 4,000 feet AGL roll inverted and crosscheck airspeed. With 150 KCAS (minimum) execute an energy gaining turn to proceed back towards show center. Do not exceed 350 KCAS until the nose is through 90 degrees nose-low. Orientation to the crowd line needs to be immediately assessed. If the aircraft is not on the extended show line, make immediate corrections. Position the aircraft on the non-aerobatic show line at 300 feet AGL and approximately .8Mach for the high speed pass.

5.20.2. Abnormal Procedures: Initiate a parameters call to the safety observer prior to starting the pull. If airspeed is less than 150 KCAS (minimum) push the nose toward the horizon and increase airspeed to greater than 150 KCAS (minimum). With altitude greater than 3,500 feet AGL and airspeed greater than 150 KCAS, execute Split-S. If altitude is less than 3,500 feet AGL (i.e., weather) or airspeed is above 275 KCAS, abort the Split-S reposition. Roll the aircraft away from the crowd, reposition in a horizontal plane and slice back for the next maneuver. If an aircraft malfunction that may affect the aerodynamic performance of the aircraft occurs prior to reaching 90 degrees nose-low, discontinue the pull, roll wings- level and recover the aircraft.

5.21. High Speed Pass.

Figure 5.14. F-22 High Speed Pass.

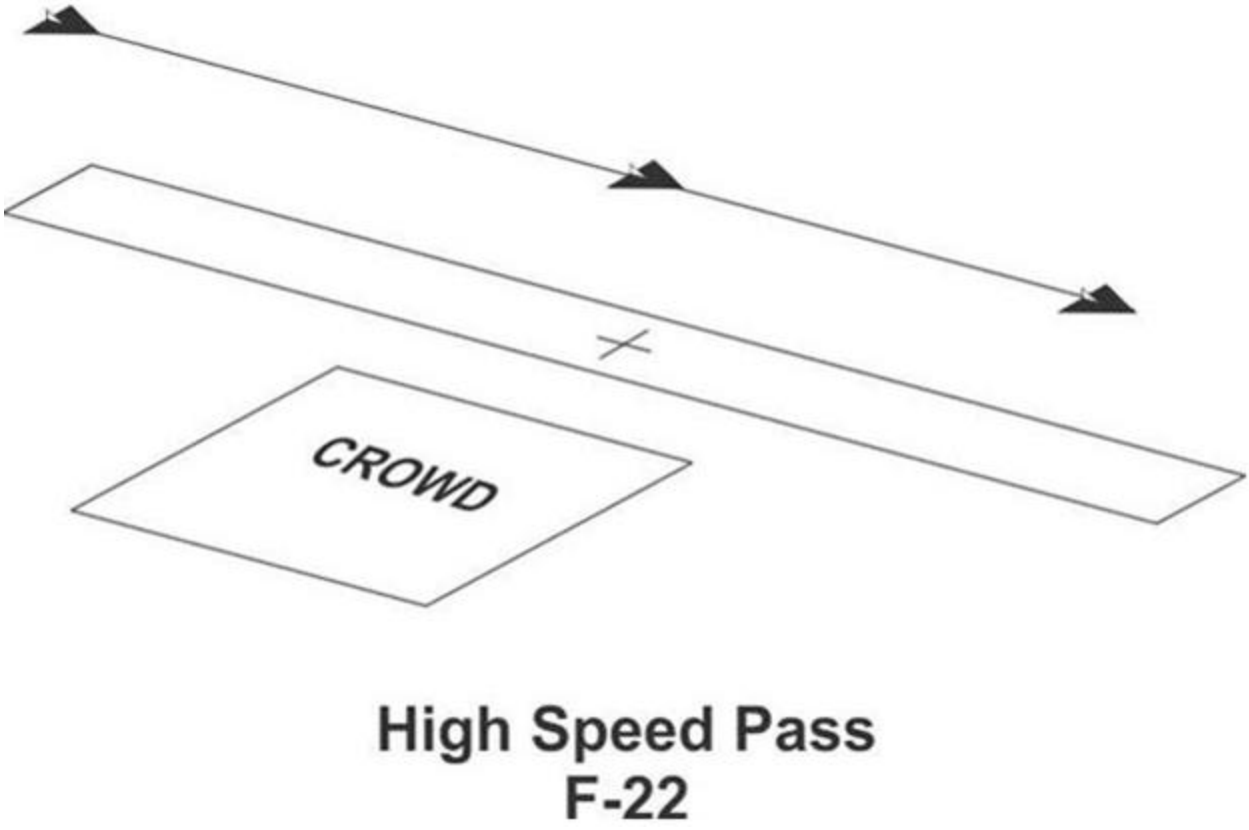


Table 5.12. F-22 High Speed Pass Parameters.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300’	.8 - .92M	MAX	1
Exit	300’	.8 - .92M	IDLE to MAX	1

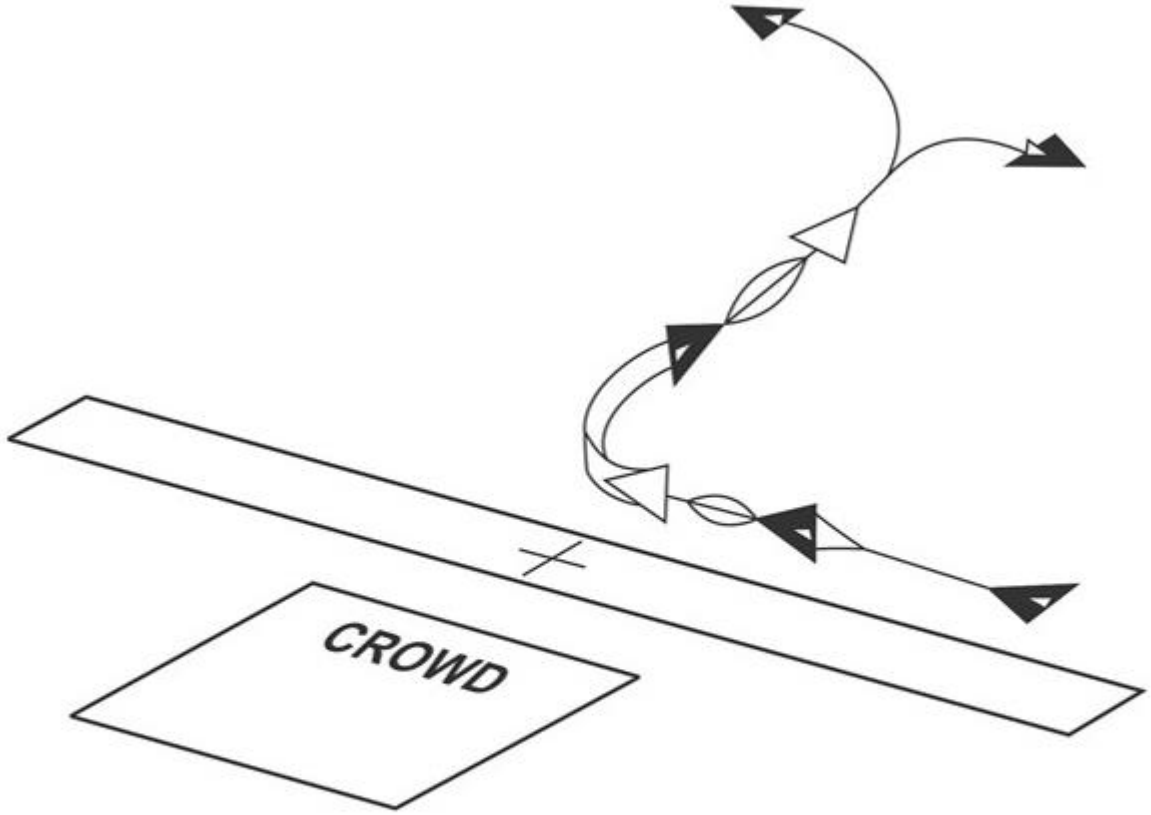
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS **MIN/MAX**	Power Setting	G
Entry	**min**	200’	N/A / .95M	A/R	N/A
Exit	**min**	200’	N/A / .95M	A/R	N/A

5.21.1. Maneuver Description: The High Speed Pass may be flown on the 500-foot show line at 300 feet AGL in maximum power, so as to target .8 - .92 Mach.

5.21.2. Abnormal Procedures: If it becomes apparent 0.95 Mach may be exceeded, afterburner should be deselected.

5.22. Hoover Pitch.

Figure 5.15. F-22 Hoover Pitch.



Hoover Pitch
F-22

Table 5.13. F-22 Hoover Pitch.

TARGET PARAMETERS			
Altitude AGL	Airspeed KCAS	Power Setting	Bank Angle
Entry 500’	300	A/R	90
Exit 500’	300	MAX	80

PARAMETER LIMITS			
Altitude AGL	Airspeed KCAS **MIN/MAX**	Power Setting	Bank Angle

Entry	**min**	400’	250 / 400	A/R	95
Exit	**min**	400’	250 / 400	MAX	85

5.22.1. Maneuver Description: Establish the jet on the 1,500-foot show line from either right to left or left to right. Prior to entering the aerobatic box, achieve 300-400 feet AGL and 300 KCAS. Approximately 3,000 feet prior to show center bring the nose of the aircraft up (5 degrees nose-high or less should be required) to obtain 500 feet AGL by 1,000 feet prior to show center. 1,000 feet prior to show center, select full afterburner and roll the aircraft to 90 degrees of bank with the canopy to the crowd. At show center, execute a 190- degree roll into the crowd (tuck under) to establish 80 degrees of bank away from the crowd. Aggressively pull for the pitch to land or to reform for the HF.

5.22.2. Abnormal Procedures: If airspeed is less than 250 KCAS, do not roll and simply pitch to land. If altitude is less than 400 feet AGL, do not execute the roll and pitch to land.

Section 5C—Low Profile

5.23. Maximum Power Takeoff. During a Low Profile, maneuvers may be flown in opposite directions dependent on direction of initial take-off and prevailing winds. Primarily, the profile begins by taking off show left to right. This orientation allows for the minimum radius turns, the weapons bay door pass, and the dedication pass all to be executed in the same direction as during a High Profile. During a Low Profile, the following maneuvers may be flown; Minimum Radius Turn, Weapon Bay Door Pass, Dedication Pass, Slow Speed Pass, Loaded Roll, High Speed Pass, Minimum Radius Turn, Hoover Pitch to Land.

Chapter 6

F-35A DEMONSTRATION MANEUVERS

Section 6A—-General Information

6.1. General. Maneuvers described in this document are used for training and flown in F-35A aerial demonstrations as the complete aerobatic demonstration profile. Aerobatic maneuvers are included in this grouping, and as such treat this profile as a standard single-ship demonstration profile. Abnormal procedures are written for each maneuver. If the entry conditions are not met for any maneuver, the pilot recovers to wings-level flight and transitions to the next maneuver. Certain maneuvers require the pilot to transmit airspeed and/or altitude to a safety observer. As a minimum, demo pilots transmit parameters prior to initiating the descending portion of vertical pull-throughs and Vertical Reposition maneuvers. These calls are made when the pilot reaches apex of the maneuver. The ground safety observer confirms parameters are good, monitors the demonstration pilot's flight path, engine performance, and visually clears the demonstration area for traffic. The safety observer directs an abort when parameter limits are exceeded. Following each maneuver, and before clearing the show line to reposition for the next maneuver, the pilot ensures any descent has been stopped and the aircraft is in a level or climbing attitude with the flight path marker at or above the horizon. Limiter pulls are defined as stick full aft with the nose wheel steering button depressed to reach the Control Law (CLAW) limit (maximum AOA allowable). Lift limit pulls are defined as pulls targeting but not exceeding 35 degrees AOA. The vertical is defined as 80-90 degrees nose high (NH) or 80-90 degrees NL. The jet's "waterline" is defined as where the nose of the aircraft is pointing. The abbreviation "A/R" for a parameter means "as required" and "N/A" means "not applicable".

6.2. Aircraft Configuration and Fuel Requirements. The profile is flown in a standard configuration aircraft. Taking off with less than full fuel is authorized. Fuel load considerations include: divert requirements, cable availability, and density altitude. All NL maneuvers were designed to recover above 500 feet AGL even in the event of a jet malfunction that relegates the aircraft to only 4Gs, 20 degrees AOA, and Military (MIL) power. 4Gs and 20 degrees AOA are available even with an FCS POWER LIMIT Caution. Normal minimum fuel for take-off is:

6.2.1. Staged Show: 14,500 pounds.

6.2.2. High Show: 14,500 pounds.

6.2.3. Low Show: 12,500 pounds.

6.3. Pyrotechnics and Flares.

6.3.1. Pyro. The F-35A demo will only utilize pyro as a Wall of Fire and only during the High Speed Pass. **(T-3)** Only ICAS-approved personnel will be permitted to utilize pyro. **(T-3)**

6.3.1.1. The following maximum NEW will be used (all NEWs in this instruction are TNT equivalent). **(T-3)** For the Wall of Fire, the maximum NEW is dependent on the length of the wall. **(T-3)** The maximum wall length is 2000 linear feet, and the maximum NEW is 20 pounds (spread out evenly). No more than 1 pound NEW will be used for each 100 linear feet of wall. **(T-3)**

6.3.1.2. The following items will be briefed by the demonstration pilot and the SIC, in person, prior to each performance:

6.3.1.2.1. **(1)** Exact dimensions of the pyrotechnics area and the magnitude of explosives being used.

6.3.1.2.2. **(2)** Aircraft/pyro de-confliction plan.

6.3.1.2.3. **(3)** Demonstration profile and sequence of pyro (Wall of Fire).

6.3.1.2.4. **(4)** Forecast wind and effects on pyro.

6.3.1.2.5. **(5)** Communications plan.

6.3.1.2.6. **(6)** KIO procedures.

6.3.1.2.7. **(7)** Fire hazards and fire department response plan.

6.3.1.2.8. **(8)** FOD potential and effects.

6.3.2. Flares. The F-35 demonstration is authorized to use flares during performances at overwater civilian airshows. An individual qualified in arming, de-arming and storage of flares will be present for all airshows where flares will be used. **(T-2)** The show must have a place to store the flares in case they need to be downloaded (hanger in inclement weather). **(T-2)** Prior coordination and approval needs to be obtained from the airshow director, and standard airshow firefighting equipment and personnel need to be present during flare use for all demos. **(T-2)** With fire conditions permitting, flares will be expended during the performance so as to remain within the aerobatic box. **(T-2)** Training flares (M206, MJU-61, or equivalent) will be used for all demos. **(T-2)** Aircraft will be armed in the chocks with the CMS set to "OFF" until positioned in the arming area or airborne IAW MDS procedures. **(T-2)** The planned minimum wings-level safe altitude for dispensing is 750 feet AGL to ensure flare burnout prior to contact with the water. A max planned crosswind of 22knots with a 4.5" burn time will push the flare 168' laterally. **(T-2)** Pilots will use the 1,500-foot line for the aerobatic planned maneuvers so that the flares will travel no closer than 1250 feet to the crowd line. **(T-2)** This will ensure burnout/duds fall into the water and not the spectator area. **(T-2)** Flares are authorized for use during the High Alpha Half Cuban, High Speed Quick Climb, Inverted to Inverted, Pedal Turn, Square Loop, Slow Speed, and Tac Pitch maneuvers. Aircraft loaded with flares will not be used as a static display. **(T-2)**

6.4. Airspeed and G Limits. In accordance with aircraft operating limits (AOLs), not to exceed 0.95 Mach.

6.5. Show Line Restrictions. The F-35A demo is flown on the 1,500-foot show line. Maneuvers not conforming to FAA Order 8900.1, Volume 3, **Chapter 6**, require approval via the FAA AFS-800 Maneuver Package approval process.

6.6. Airspace and Runway Requirements. Required airspace for the F-35A is 6,000 feet AGL and normally a five-mile radius from show center horizontally. The minimum dimensions of the aerobatic box are 3,000 feet wide, 6,000 feet long, and 6,000 feet AGL. If the FAA has waived a show line to closer than 1,500 feet, the aerobatic box may be less than 3,000 feet wide, provided there is at least 1,200 feet from either the primary or secondary show line. Minimum runway length and width is 8,000 feet x 75 feet (7,000 feet with compatible departure end arresting gear available).

6.7. Weather Requirements. Weather limits for the high show profile are a ceiling of at least 6,000 feet AGL (5,000 feet AGL if pedal turn rotation is reduced to 180 degrees of turn), three miles ground and five miles in-flight visibility with a discernible horizon. Ceiling required for the low profile is 1,500 feet, three miles ground visibility and five miles inflight visibility with a discernible horizon. Cloud clearance for each maneuver is based on waived airspace (clear of clouds) and require adjustment if using VFR. Plan maneuvers to maintain VMC throughout the show sequence.

6.8. High Density Altitude Demonstrations. The parameters in this profile are written for density altitudes ranging between 2,000 - 7,999 feet MSL. For density altitudes 5,000 – 7,999 feet MSL, the same parameters may be used, but adjust engine start fuel load such that the high show is started with 11,500 pounds of gas or less. For 8,000 feet MSL density altitudes or greater, adjust PARAMETER LIMITS in accordance with the following: add 1,000 feet and 25 KCAS to any number marked with an asterisk in the TARGET PARAMETERS and PARAMETER LIMITS section.

6.9. Demonstration Maneuver Profiles.

Table 6.1. Demonstration Maneuver Profiles.

High Show
Max Afterburner Takeoff To High-Alpha Half Cuban 8
Weapons Bay Doors Pass
High Speed To Max Climb
Min Radius Turn To High Alpha Loop
Dedication Pass
Inverted To Inverted Roll Flat Pass
Pedal Turn
Square Loop
Slow Speed To Split-S Reposition
Opposing Rolls Flat Pass
Tactical Pitch
Low Show
Max Afterburner Takeoff To Level Cuban 8
Weapons Bay Doors Pass
High Speed Pass
Min Radius Turn
Dedication Pass
Inverted To Inverted Roll Flat Pass

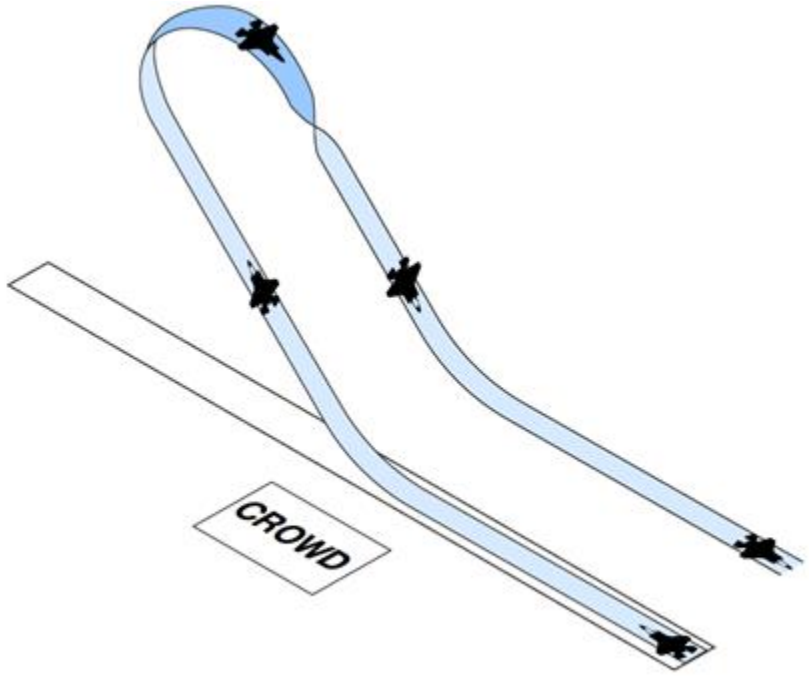
Slow Speed Pass
Opposing Rolls Flat Pass
Tactical Pitch

6.10. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the flight sequence A/R. IAW FAA regulations, 90 degrees of bank may be exceeded during repositions (if required). The standard repositioning maneuver is of a climbing check turn away from the show line, a 270 degrees roll away from the crowd (i.e., roll left to turn right), and then a descending turn back toward the show line while setting up for the next maneuver.

Section 6b—High Profile

6.11. F-35A Max Afterburner Takeoff To High-Alpha Half Cuban 8.

Figure 6.1. Max Afterburner Takeoff To High-Alpha Half Cuban 8.



MAX AFTERBURNER TAKEOFF TO HIGH-ALPHA HALF CUBAN 8

Table 6.2. Max Afterburner Takeoff To High-Alpha Half Cuban 8.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	N/A	350	MAX	LIMITER
Pull	2,000’	250	MAX	LIMITER
Apex	4,000’	75	MAX	LIMITER
Exit	500’	A/R	A/R	N/A
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull

			MIN/MAX		
Entry	Min	N/A	300 / N/A	MAX	N/A
Pull	Min	1,700’	200 / N/A	MAX	N/A
Apex	Min	3,500’	50 / N/A	MAX	N/A
Exit	Min	400’	150 / N/A	MAX	N/A

6.11.1. Maneuver Description: Select MAX AB at brake release and check engine conditions on the roll. Rotate at tech order speed and begin climb. Confirm gear is retracted and the light is extinguished in the gear handle. Accelerate in MAX AB with a positive rate of climb until passing show center and on the 1,500-foot show line. At 350 KCAS execute a 5-7G pull to 60 degrees NH. Hold 60 degrees NH (waterline) until passing 2,000 feet AGL then execute a limiter pull until 60-75 degrees NL inverted while ensuring at least 150 KCAS passing the vertical NH. Neutralize pitch stick and roll towards the crowd with full lateral stick until upright. A slight on crowd heading crossing angle is normal which requires a slight bank away from the crowd during the recovery to arrive at show center on the 500-foot line. Level off approaching show center at 500 feet AGL using dive recovery rules without the perception of squaring the bottom of the recovery.

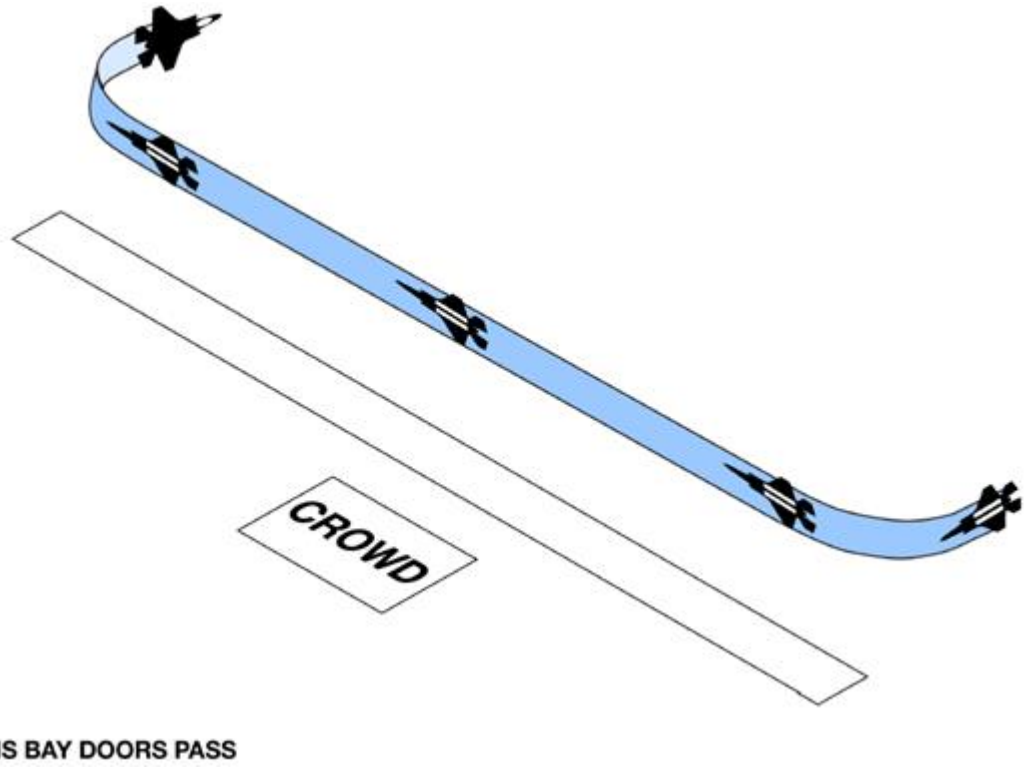
6.11.1.1. Approaching waterline on the horizon inverted, altitude and airspeed parameters are radioed to the safety observer. “On top 4.5, 75”, for example, correspond to 4,500 feet AGL and 75 KCAS. With at least the PARAMETER LIMITS met, a response of “send it” is radioed to the pilot. Otherwise, “abort, abort, airspeed” or “abort, abort, altitude” is radioed to the pilot at which time the pilot aborts the maneuver.

6.11.1.2. For a staged show, enter the aerobatic box from behind and over the crowd in MAX AB (NTE .95M), perpendicular to the show line and at 1,000’ AGL (or 1,000’ above the highest obstacle within 2,000 feet laterally, where applicable). At show center, roll 270 degrees left or right and then execute an idle power 270 degree left or right turn to reposition for the initial maneuver. Following the staged entry maneuver and in the aerobatic box, planned/minimum altitude numbers become 300/200 feet AGL respectively for the entry to the follow on maneuver.

6.11.2. Abnormal Procedure: If airspeed decays to less than 150 KCAS during any vertical NH maneuver, recover by commanding full forward stick and maintaining MAX AB. If the AB fails to light before the pull to vertical is initiated, abort the maneuver. If the AB blows out during the vertical climb, abort the maneuver and execute a nose high recovery. If the AB blows out at any time inverted, abort and roll wings level.

6.12. Weapons Bay Doors Pass.

Figure 6.2. F-35A Weapons Bay Doors Pass.



WEAPONS BAY DOORS PASS

Table 6.3. F-35A Weapons Bay Doors Pass.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Bank
Entry	300’	300	A/R	75
Exit	300’	300	A/R	75
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Bank
Entry Min	200’	250 / 350	A/R	90
Exit Min	200’	250 / 350	A/R	90

6.12.1. Maneuver Description: Enter at a 30-45 degrees angle off in front of the show line and set and maintain 300 KCAS and 300 feet AGL. While wings level and approaching the 1,500- foot show line, open the weapons bay doors, then bank away from the crowd to maintain airspeed, altitude and apex no closer than the 500-foot show line. Select MAX AB at show center then close the weapons bay doors approximately 3 seconds later and roll out. Use of top pedal to maintain altitude A/R is permitted. Abort the pass if the doors don’t open normally and symmetrically.

6.13. High Speed To Max Climb.

Figure 6.3. F-35A High Speed To Max Climb.

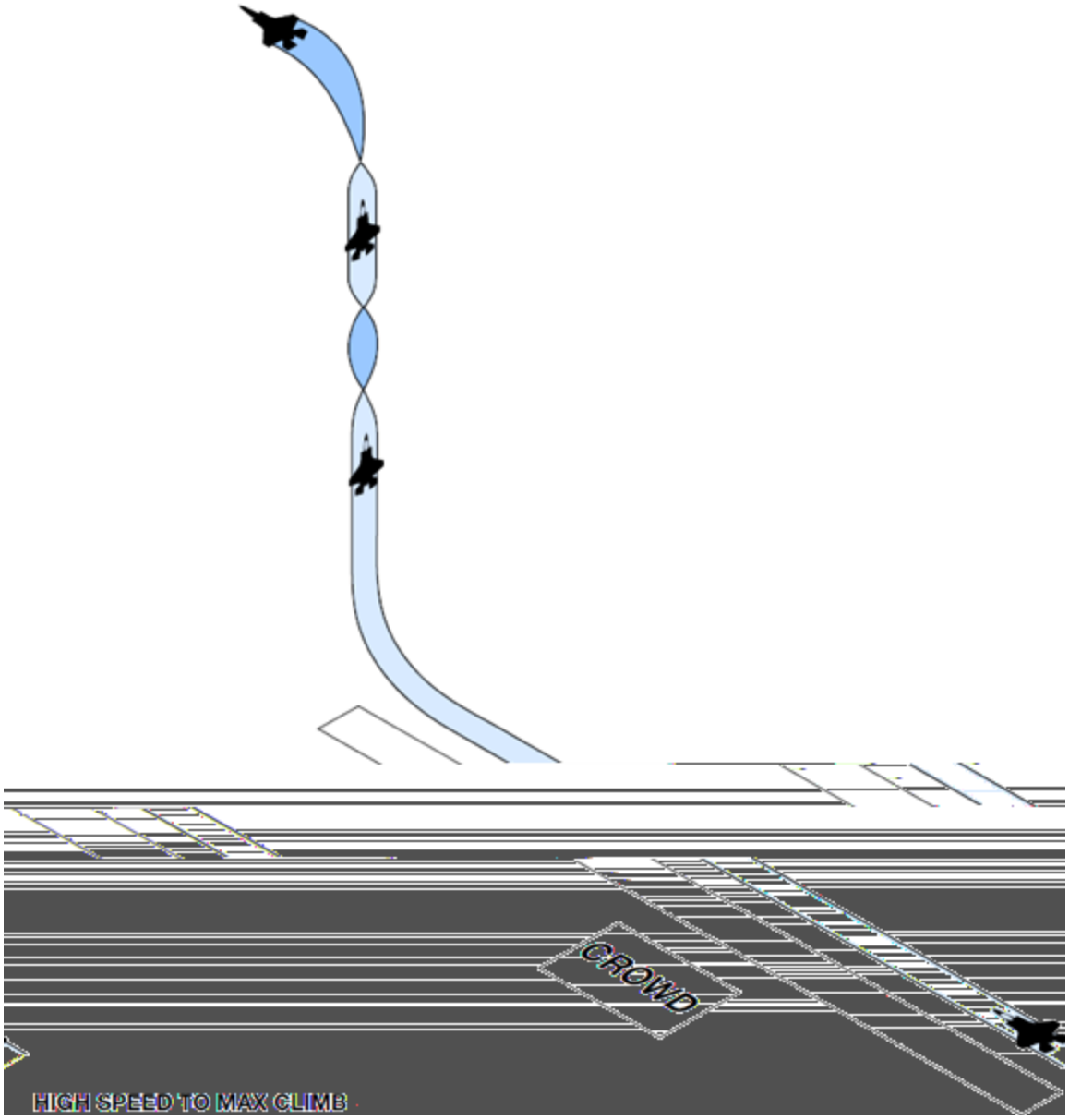


Table 6.4. F-35A High Speed To Max Climb.

TARGET PARAMETERS			
Altitude AGL	Mach	Power Setting	Pull
Entry 300’	0.95	Min AB	N/A
Pull 300’	0.95	MAX	7.5G
Exit Ceiling– 3,500’ (TFR or WX, NLT 11,500’)	A/R	IDLE	LIMITER
PARAMETER LIMITS			
Altitude AGL	Mach	Power Setting	Pull

			MIN/MAX		
Entry	Min	200’	0.8 / 0.95	A/R	9G
Pull	Min	200’	0.8 / 0.95	A/R	9G
Exit	Apex	< Ceiling	N/A / N/A	A/R	9G

6.13.1. Maneuver Description: Enter on the 500-foot show line at 300 feet AGL, .95Mach, and MIN AB (as little as 70% Estimated Time of Return (ETR) may be all that’s required to hold .95Mach at sea level density altitudes). Just prior to the end of the show line, execute a symmetric pull not to exceed 7.5Gs to the vertical NH while selecting MAX AB. Once vertical NH, unload, and execute a 360 degrees aileron roll with pure lateral stick. NLT 3,500’ below the top of the waivered airspace or weather ceiling but not later than 11,500 feet AGL, roll 180 degrees and begin a NH recovery not to exceed 7.5Gs. Execute a spiraling descent using idle / speed brake A/R to set up for the next maneuver.

6.13.2. Abnormal Procedures: Discontinue AB if .95Mach is reached. If the AB blows out during the vertical climb, abort the maneuver and execute a nose high recovery.

6.14. Min Radius Turn To High Alpha Loop.

Figure 6.4. F-35A Min Radius Turn To High Alpha Loop.

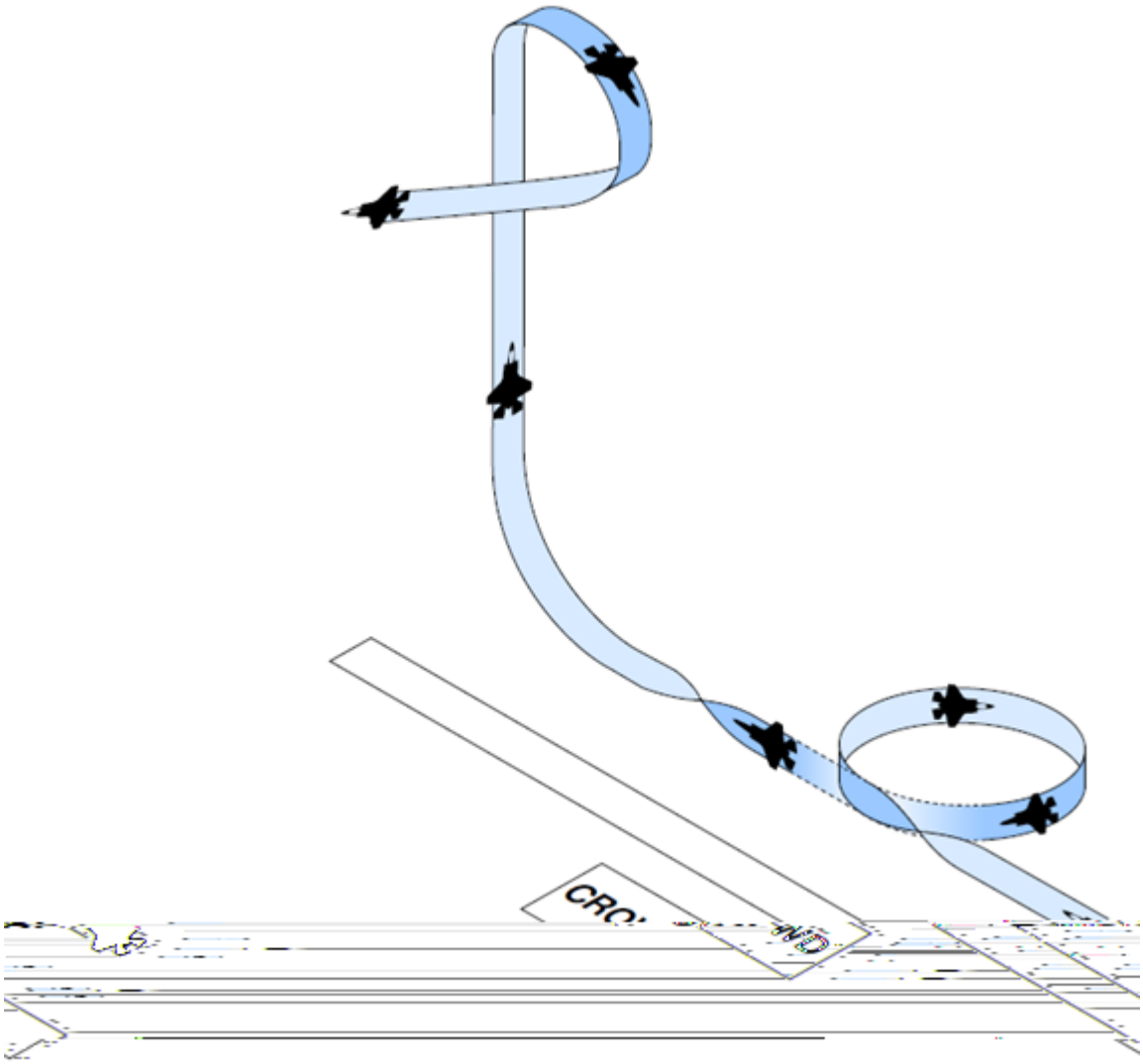


Table 6.5. F-35A Min Radius Turn To High Alpha Loop.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	500’	430	MAX	5-7G
Exit	500’	350	MAX	5-7G
Pull	500’	350	MAX	5-7G
Vertical	3,200’	250	MAX	LIMITER
Apex	4,700’	75	MAX	LIMITER
Exit	500’	A/R	A/R	N/A
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull

			MIN/MAX		
Entry	Min	400’	350 / 450	A/R	7.5G
Exit	Min	400’	250 / 450	MAX	7.5G
Pull	Min	400’	325 / 450	MAX	7.5G
Vertical	Min	2,700’	150 / N/A	MAX	LIMITER
Apex	Min	4,000’	50 / 300	MAX	LIMITER
Exit	Min	400’	150 / N/A	MAX	N/A

6.14.1. Maneuver Description: Enter on the 500-foot show line at 500 feet AGL and 430 KCAS. Select MAX AB and pull to maintain 400-430 KCAS through the first 180 degrees of turn with a 1.5 degrees NH flight path marker (FPM) to make the turn appear level. Tighten turn for second 180 degrees to end on the 1,500-foot show line utilizing a 1.5 degrees NL FPM. Approaching show center, unload and roll wings level, accelerate A/R to 350 KCAS and initiate a 5-7G pull to the vertical NH. At 3,200 feet AGL and at least 150 KCAS, execute a limiter pull through to wings level, upright, and 30-45 degrees NL. Neutralize pitch stick to break the alpha, regain at least 150 KCAS, and fly a lift limit recovery A/R.

6.14.2. Abnormal Procedures: Abort the maneuver if the AB blows out at any time. Throttle modulate if the aircraft accelerates at 7.5 Gs. If the aircraft descends below 400 feet AGL during the min radius turn or the airspeed decays below 250 KCAS, abort the maneuver by climbing and clearing the show line with a MAX AB, lift limit pull. Abort the high alpha loop into a NH recovery (stick full forward) if airspeed decays to below 150 KCAS prior to reaching 3,200 feet AGL in the vertical.

6.15. Dedication Pass. The intent of this maneuver is to pay tribute to our war fighters. It is to be flown before the Tactical Pitch-Up to Land during the High and Low Show profiles.

Figure 6.5. F-35A Dedication Pass.

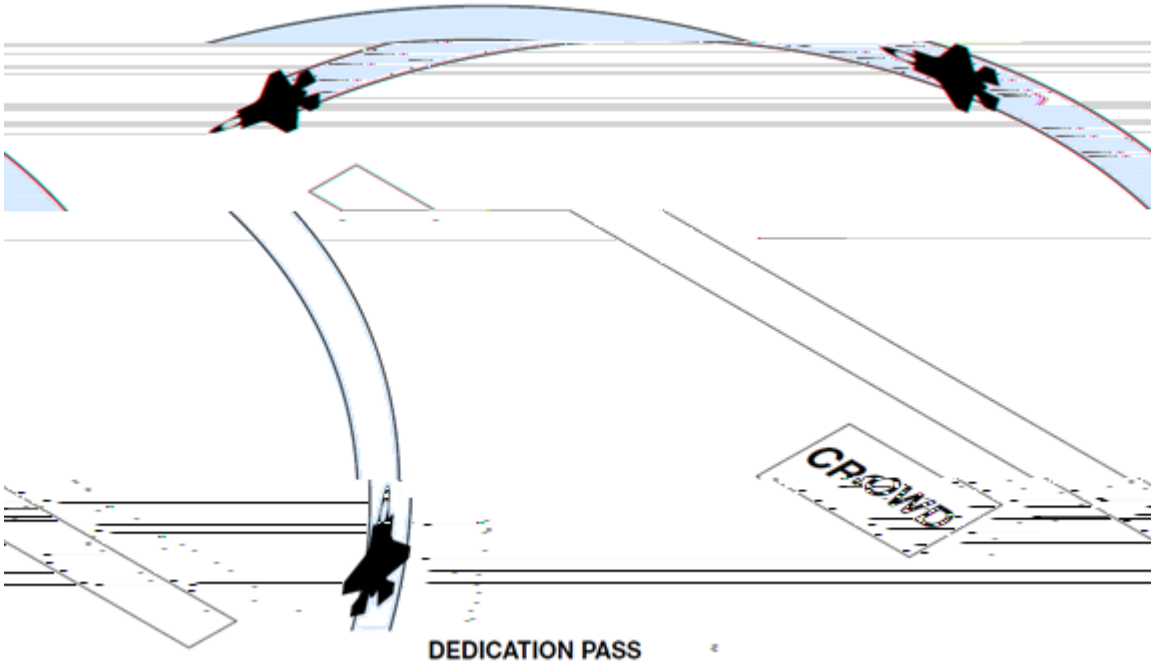


Figure 6.6. F-35A Dedication Pass.

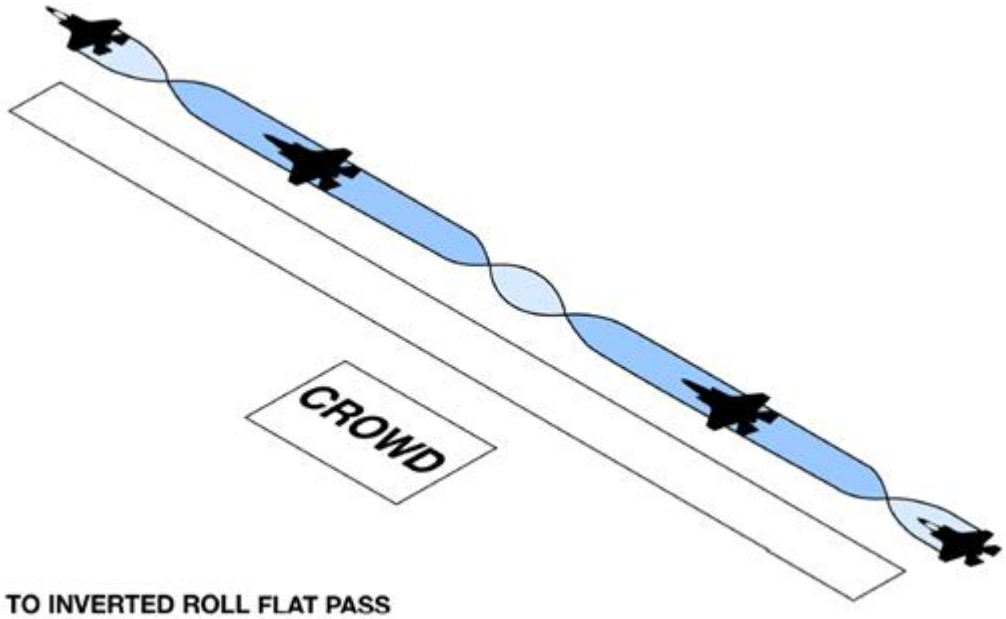
TARGET PARAMETERS				
Altitude AGL		Mach	Power Setting	Pull
Entry	300’	0.65-0.95	MAX	A/R
Exit	300’	0.65-0.95	MAX	A/R
PARAMETER LIMITS				
Altitude AGL		Airspeed / Mach MIN/MAX	Power Setting	Pull
Entry Min	200’	0.5 / 0.95	A/R	7.5G
Exit Min	200’	0.5 / 0.95	A/R	7.5G

6.15.1. Maneuver Description: Enter from behind the crowd, approximately 2-3 miles from show center, and on a 30-45 degrees cut. Maintain beyond 500 feet horizontally from the crowd at all times. Upon reaching a corner marker and at 300 feet AGL, roll the aircraft into a level arcing pass using 75 degrees of bank. Select MAX AB until past the show line or until .95Mach is anticipated (then set MIN AB). Use of top pedal to maintain altitude A/R is permitted.

6.15.2. Abnormal Procedures: Discontinue AB if .95Mach is reached.

6.16. Inverted To Inverted Roll Flat Pass.

Figure 6.6. F-35A Inverted To Inverted Roll Flat Pass.



INVERTED TO INVERTED ROLL FLAT PASS

Table 6.7. F-35A Inverted To Inverted Roll Flat Pass.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	300’	400	A/R	A/R
Exit	500’	400	A/R	A/R
PARAMETER LIMITS				

Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry	Min	200’	325 / 475	MIL	A/R
Exit	Min	200’	325 / 475	MIL	NTE 5° NL

6.16.1. Maneuver Description: Enter on the 1,500-foot show line at 300 feet AGL and 400 KCAS. Approaching the aerobatic box, execute an energy sustaining pull to 5-10 degrees NH FPM and then neutralize the stick. Roll inverted away from the crowd with pure lateral stick. Bunt to -1G to maintain approximately 5 degrees NH FPM flight for 3-5 seconds. Approaching show center, execute a pure lateral stick 360 degrees roll until once again wings level inverted. Bunt to -1G to maintain level flight for another 3-5 seconds or until approaching the end of the aerobatic box. Roll with pure lateral stick back upright, past wings level, with angle of bank as desired to reposition away from the show line. Alternate the direction of each roll during this maneuver. Use caution for the “push-pull”, negative to positive G physiological effect.

6.16.2. Abnormal Procedures: Abort the maneuver, roll wings level, and perform a lift limit pull to clear the show line if airspeed decays below 325 KCAS, or if the aircraft descends below 400 feet AGL at more than 5 degrees NL.

6.17. Pedal Turn.

Figure 6.7. F-35A Pedal Turn.

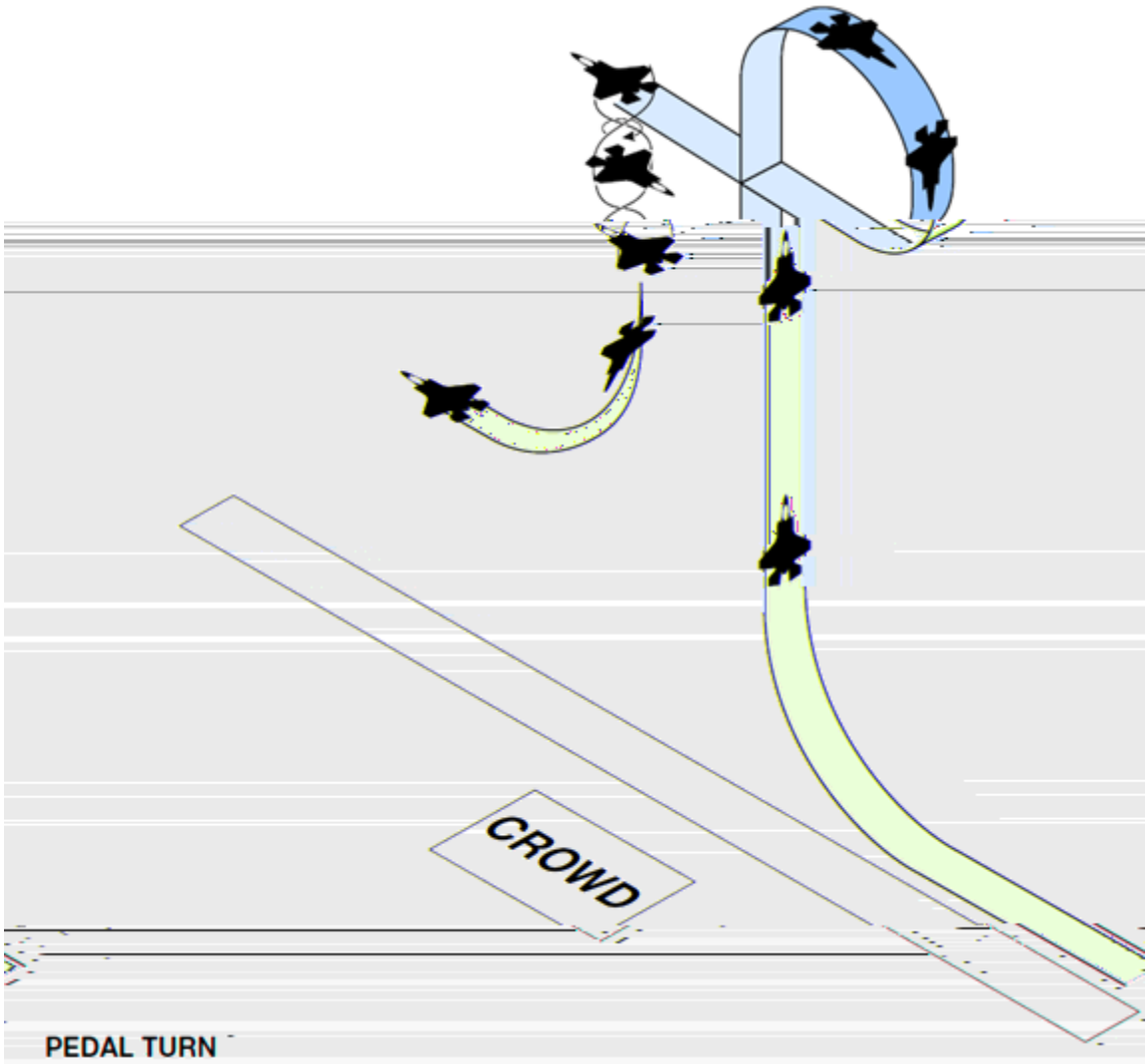


Table 6.8. F-35A Pedal Turn.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	1000’	*420	MAX	5-7G
Vertical NH	-4,000’	325	MAX	LIMITER
Recovery	-2,500’	N/A	MAX	A/R
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry min	N/A	*400 / 475	MAX	7.5G
Vertical NH min	-3,500’	150 / N/A	MAX	LIMITER
Recovery min	-2,250’	150 / N/A	MAX	LIFT LIMIT

6.17.1. Maneuver Description: Enter on the 3,000 foot show line at 500 feet AGL and 420 KCAS. Select MAX AB approaching show center and execute a 5-7G pull to the vertical NH. Passing 4K' AGL, perform a limiter pull. With the nose through the vertical NL, maintain full aft stick, while commanding full lateral stick and full pedal in the direction of the crowd. Hold full controls for 360 degrees of turn, but initiate recovery no later than 2,500 feet AGL by commanding neutral stick and neutral pedal to arrest the pedal turn. With rotation stopped, execute a lift limit pull A/R to complete the recovery.

6.17.1.1. Whether (WX) Flex: A 6,000 feet AGL ceiling is required for the full maneuver as written. For ceilings < 6,000 feet AGL, but at or above the high show minimum of 5,000 feet AGL, modify the maneuver as follows:

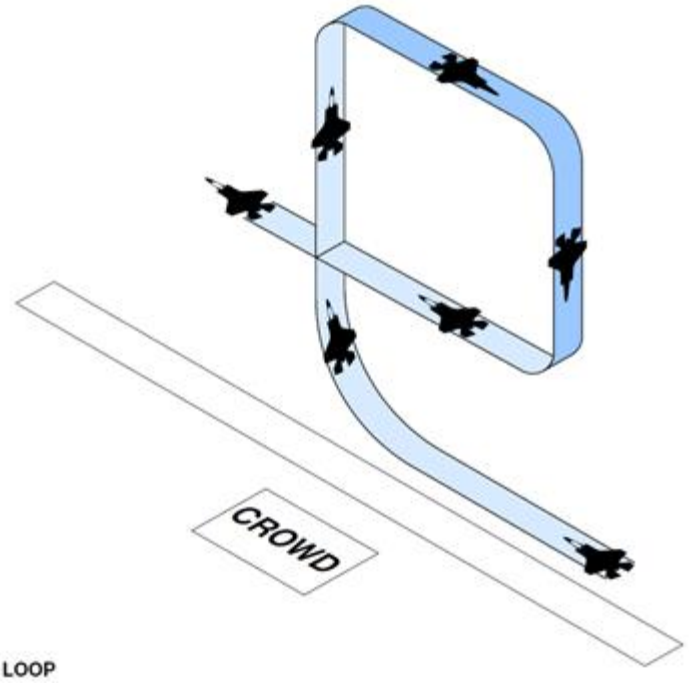
6.17.1.1.1. Execute the entry pull at 400 KCAS (380 KCAS min) and the vertical NH pull at 2,750 feet AGL (2,000 feet AGL min). Complete just 180 degrees of pedal turn into the crowd.

6.17.1.1.2. At the "On top" radio call from the pilot, a radio response of "[degrees of turn]" is made by the safety observer IAW the brief for the ceiling conditions. For example, with a 5,200 feet AGL ceiling, an "On top 4.9, 95" call, would be responded to with "180". Additionally, an "abort, abort" call should be made from the safety observer if the stated degrees of rotation is exceeded.

6.17.2. Abnormal Procedures: If the AB does not light, do not initiate the entry pull up. If the AB blows out in the vertical, abort the maneuver and execute a NH recovery. No matter the orientation, a 35 degrees AOA recovery will be initiated at 2,500 feet AGL to arrest sink rate and clear the show line. Should the AB fail during the pedal turn, recover the aircraft to level flight.

6.18. Square Loop.

Figure 6.8. F-35A Square Loop.



SQUARE LOOP

Table 6.9. F-35A Square Loop.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	500’	±370	MAX	5-7G
2nd Pull	±3,200’	250	MAX	LIMITER
3rd Pull	±4,800’	175	MAX	LIMITER
Recovery	±3,250’	235	MAX	LIMITER
Exit	1000’	A/R	MAX	LIFT LIMIT
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry	400’	±325 / 420	MAX	7.5G
2nd Pull	±2,700’	150 / N/A	MAX	LIMITER
3rd Pull	±3,700’	100 / 250	MAX	LIMITER
Recovery	±3,000’	150 / 250	MAX	LIMITER
Exit	400’	150 / N/A	MAX	LIFT LIMIT

6.18.1. **Maneuver Description:** Enter on the 1,500-foot show line at 500 feet AGL and 370 KCAS. Select MAX AB approaching show center and execute a 5-7G pull to the vertical NH. Maintain vertical climb until 3,200 feet AGL. Execute a limiter pull and set min-AB to bring the aircraft nose inverted. Gradually push full forward stick as the FPM approaches the horizon and track inverted along the 1,500-foot show line for 3-5 seconds. A slight descent is normal even with the stick full forward. Do not extend the inverted flight in attempts to correct show

center positioning and use caution for the "push-pull", negative to positive G physiological effect. Above 3,700 feet AGL and less than 250 KCAS, execute a limiter pull to 90 degrees NL. Aggressively push to ensure nose tracks in the vertical NL. NLT 3,250 feet AGL or 250 KCAS, whichever occurs first, execute a limiter pull in MAX AB to return the waterline to the horizon, then continue with a lift limit pull to complete the recovery. On top challenge/response required IAW **paragraph 7.10.1** just prior to the 3rd pull.

6.18.2. Abnormal Procedures: If the AB fails to light before the pull to vertical is initiated, abort the maneuver. If the AB blows out during the vertical climb, or the jet decelerates below 150 KCAS prior to 3,000 feet AGL, abort the maneuver and execute a nose high recovery. If the AB blows out at any time inverted, the altitude falls to below 3,700 feet AGL, or the airspeed is outside of the 100-250 KCAS window, abort and roll wings level. Once 90 degrees NL, do not delay any recovery below 3,000 feet AGL and utilize a lift limit pull to minimize altitude loss in the recovery if required.

6.19. Slow Speed To Split-S Reposition.

Figure 6.9. F-35A Slow Speed To Split-S Reposition.

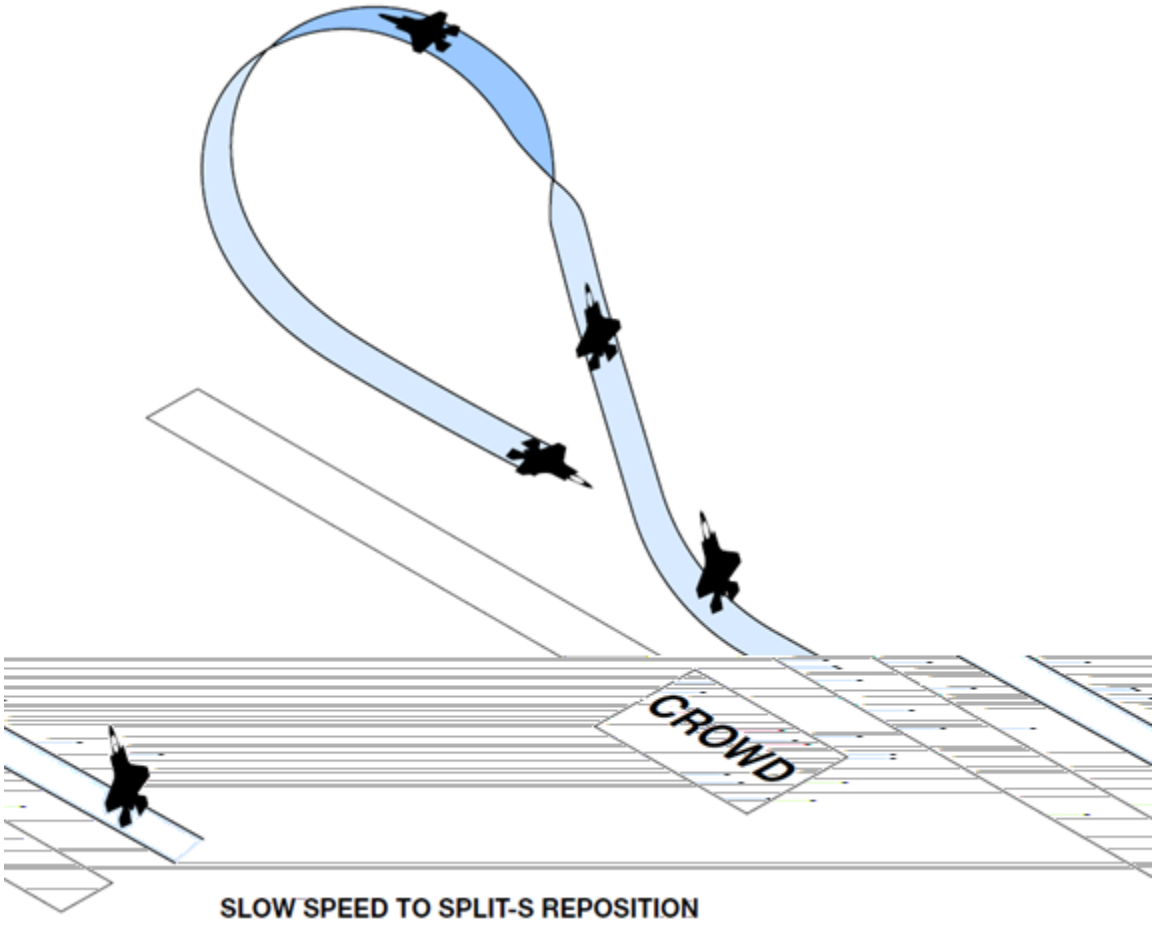


Table 6.10. F-35A Slow Speed To Split-S Reposition.

TARGET PARAMETERS			
Altitude AGL	AOA	Power Setting	Pull

Entry		1,000’	30-35	A/R	A/R
Exit		500’	27-32	A/R	A/R
PARAMETER LIMITS					
Altitude AGL			AOA MIN/MAX	Power Setting	Pull
Entry	Min	400’	N/A / 40	A/R	A/R
Exit	Min	400’	N/A / 40	A/R	A/R

Table 6.11. Split-S Reposition Parameters.

TARGET PARAMETERS					
Altitude AGL			Airspeed KCAS	Power Setting	Pull
Inverted		-4,000’	150	MAX	LIFT LIMIT
Exit		300’	A/R	MAX	A/R
PARAMETER LIMITS					
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	Pull
Inverted	Min	-3,500’	100 / 300	A/R	LIMITER
Exit	Min	200’	150 / .95M	A/R	LIFT LIMIT

6.19.1. Maneuver Description: Enter the maneuver at 1,000 feet AGL, 30-35 degrees AOA, 0.6NM from show center, on the 500-foot show line, and ETR to maintain a -1,000 to -1,500 feet per minute descent. Use ETR to arrest descent rate NLT show center and stabilize the aircraft at 500 feet AGL. Airspeed in level flight is approximately 110-120 KCAS. At the safety observers “show center” call, which should occur roughly two-thirds of the way down the show line, select MAX AB and allow the aircraft to climb and gradually accelerate to and maintain 175 KCAS. This results in a climb angle of roughly 50-55 degrees NH on the waterline. While climbing, check approximately 5 degrees away from the crowd with lateral stick to move to the 1,500-foot show line. Passing 3,500 feet AGL roll inverted (full lateral stick toward crowd) and execute a lift limit pull. Do not exceed 250 KCAS until the nose is through 90 degrees NL. Level off using dive recovery rules without the perception of squaring the bottom of the recovery. G should build slowly and linearly up to but not exceed 4Gs in the recovery. Additionally, “check 5 L/R” phraseology should be used by the safety observer to correct show line errors during the slow speed pass and subsequent climb to the Split-S.

6.19.2. Abnormal Procedures: If 40 degrees AOA is exceeded or if the aircraft descends below 400 feet AGL, select MAX AB, terminate the maneuver, and execute a lift limit pull A/R. If the AB blows out or if the inverted pull through window isn’t achieved, abort the maneuver, roll to the nearest horizon and clear the show line with a lift limit pull. If the aircraft is not on the extended show line for the next maneuver, make a correction after the nose is through at least the vertical NL.

6.20. Opposing Rolls Flat Pass.

Figure 6.10. F-35A Opposing Rolls Flat Pass.

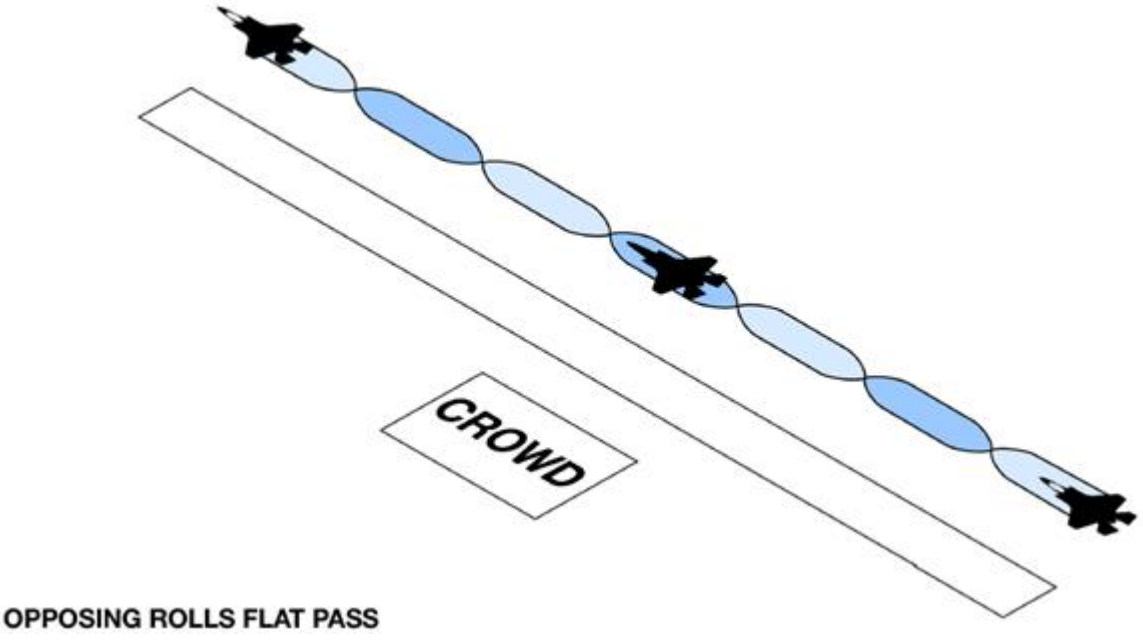


Table 6.11. F-35A Opposing Rolls Flat Pass.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	300’	400	A/R	A/R
Exit	500’	400	A/R	A/R
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry Min	200’	325 / 475	MIL	A/R
Exit Min	200’	325 / 475	MIL	NTE 5° NL

6.20.1. Maneuver Description: Enter on the 1,500-foot show line at 300 feet AGL and 400 KCAS. Approaching the aerobatic box, execute an energy sustaining pull to 5-10 degrees NH FPM and then neutralize the stick. Roll 360 degrees into the crowd with pure lateral stick, pause, and repeat two more times alternating roll direction each time.

6.20.2. Abnormal Procedures: Abort the maneuver, roll wings level, and perform a lift limit pull to clear the show line if airspeed decays below 325 KCAS, or if the aircraft descends below 400 feet AGL at more than 5 degrees NL.

6.21. Tactical Pitch.

Figure 6.11. F-35A Tactical Pitch.

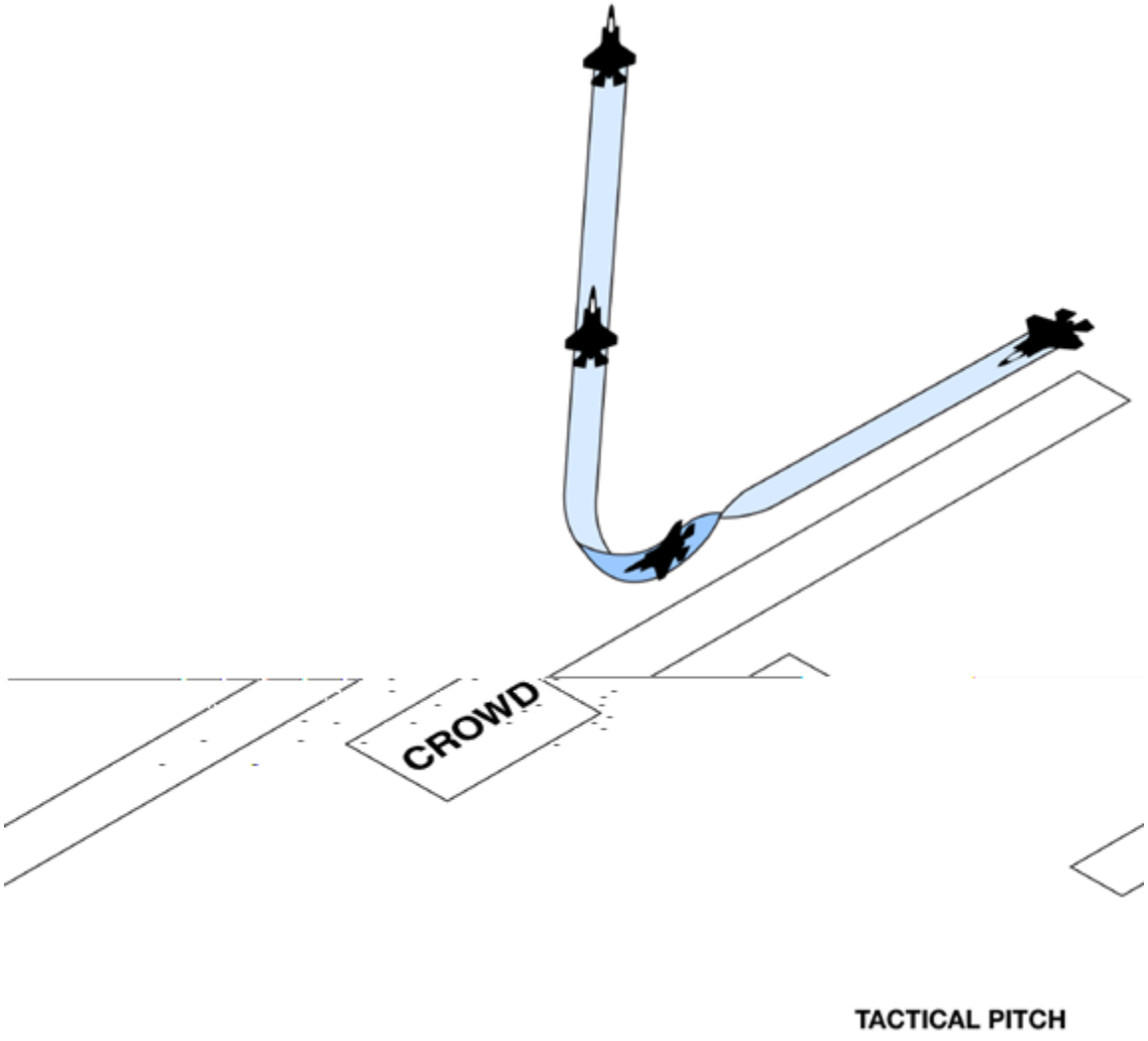


Table 6.12. F-35A Tactical Pitch.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	300’	320	MAX	LIMITER
NH RCVY	2,500’	150	MAX	A/R
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry Min	200’	275 / 375	MAX	N/A
NH RCVY Min	1,000’	125 / N/A	MAX	N/A

6.21.1. Maneuver Description: Enter on the 500-foot show line, 300 feet AGL, and 320 KCAS. Select MAX AB, set 45 degrees of bank, and perform a limiter pull for 120-135 degrees of turn. Roll out using full lateral stick and then (high show only) smoothly pull to set

approximately 75 degrees of pitch on the waterline demonstrating the jet's ability to climb out after an aggressive change in nose position. Terminate the maneuver with a nose high recovery.

6.21.2. Abnormal Procedures: If the airspeed decays below 125 KCAS in the NH climb, abort the maneuver by rolling wings level and commanding full forward stick (A/R) until less than 30 degrees of pitch and then accelerate away from the show line. The entire maneuver can be executed in MIL power if required.

Section 6C—--Low Profile

6.22. Max Afterburner Takeoff To Level Cuban 8.

Figure 6.12. F-35A Max Afterburner Takeoff To Level Cuban 8.

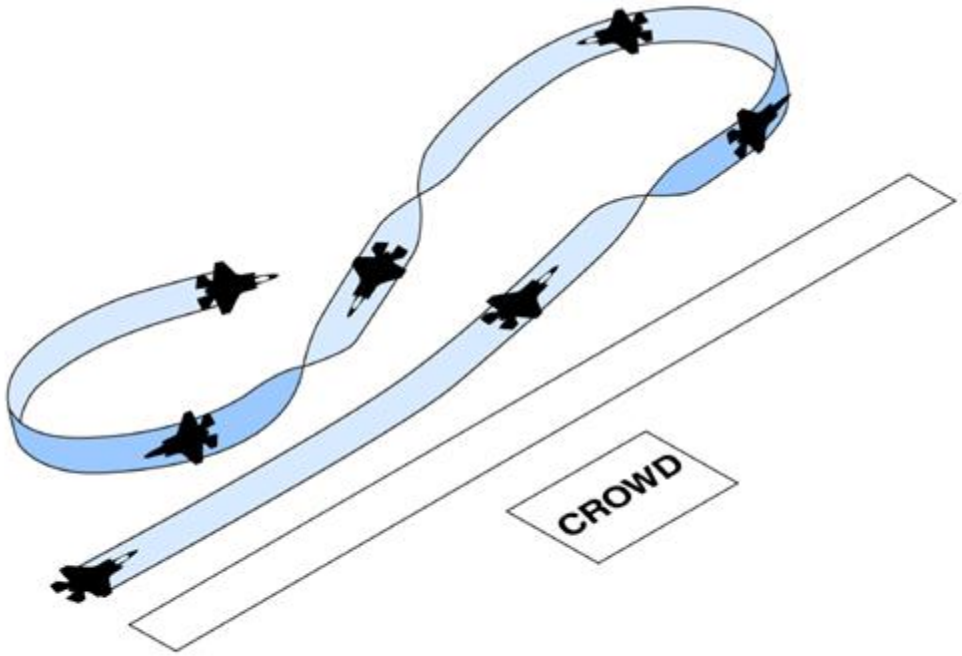


FIGURE 8

Table 6.13. F-35A Max Afterburner Takeoff To Level Cuban 8.

TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	Pull
Entry	NA	325	MAX	A/R
Turn Reversals	500'	430	MAX	A/R
Exit	500'	430	MAX	A/R
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Pull
Entry	NA	250 / 475	MAX	7.5G

Turn Reversals	400’	250 / 475	MAX	7.5G
Exit	400’	250 / 475	MAX	7.5G

6.22.1. Maneuver Description: Select MAX AB at brake release and check engine conditions on the roll. Confirm gear is retracted and the light is extinguished in the gear handle. Accelerate in MAX AB with a positive rate of climb until approaching the end of the aerobatic box and on the 500-foot show line (1,500-foot show line is okay if that’s where the runway is). At a minimum of 325 KCAS (430 KCAS optimal) set 75 degrees of bank and begin an energy sustaining turn away from the crowd. Once past the 1,500-foot show line, bank angle can be increased to capture and maintain 500 feet AGL. After 225 degrees of turn (pull A/R to end on a 45 degree cut to the show line), unload and drive towards show center and join the ground track of the 1,500-foot show line. Approaching the end of the aerobatic box and on the 1,500-foot show line, perform a second, level, 225 degrees turn to again end on a 45 degree cut to the show line. Complete the maneuver by turning to once again join the 1,500-foot show line heading in the same direction as takeoff. Staged show entry IAW **paragraph 7.10.1**.

6.22.2. Abnormal Procedures: Abort the maneuver, roll wings level, and perform a lift limit pull to clear the show line if airspeed decays below 250 KCAS or aircraft descends below 400 feet AGL.

Chapter 7

USAFHFP MANEUVERS (T-2)

7.1. General. This chapter establishes the operational procedures for the USAFHFP. HFs are scheduled per IAW **paragraph 1.6** Formation restrictions are IAW **paragraph 1.21.1**.

7.2. Aircraft Configuration. Aircraft configuration for all HFs will be clean (e.g., no wing pylons or missiles, no external fuel tanks, no travel pods).

7.3. Airspace Requirements. Minimum required airspace for the HF demo is 1,500 feet AGL vertically and a five-mile radius from show center horizontally. Minimum aerobatic box dimensions, if required, are 3,000 feet deep, 4,000 feet long, and 1,500 feet AGL.

7.4. Weather Requirements. Weather minimums for HF demos are 1,500-foot ceilings and 3 statute miles visibility with a discernable horizon, maintaining VMC at all times during the rejoin and demo. HF formations that are transiting from point-to-point (non-demo) must maintain VMC at all times.

7.5. Formations. For HF operations, there are three formations that dictate the position of the wingmen with respect to lead: fingertip/Vic, echelon, and diamond formations. There are two variations that dictate the distance between the wingmen and lead: Close and route.

7.5.1. **Fingertip/Vic Formation.** (**Figure 7.1**) Fingertip may be flown as 2, 3, or 4-ship and is intended as the primary demo formation. Fly fingertip on an approximate 30-degree line. Minimum wingtip spacing is three feet, and in no case should the wingtips overlap. The objective should not be to fly as close as possible, but to fly a safe and presentable formation. A Vic formation is a 3-ship fingertip formation.

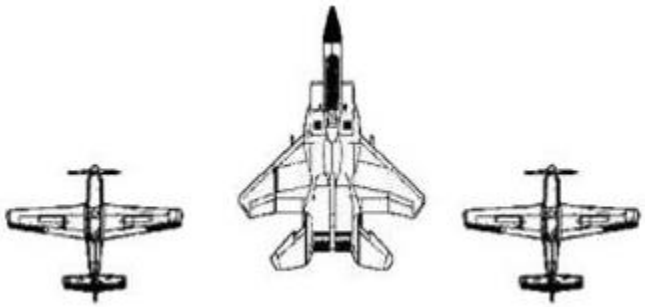
7.5.1.1. References:

7.5.1.1.1. Wingmen: Standard Fingertip.

7.5.1.1.2. Breakout:

7.5.1.1.3. Wingmen: Turn away from lead. Number two use caution for wingmen on the opposite side from lead.

Figure 7.1. Fingertip/Vic Formation.



7.5.2. Echelon Formation. (**Figure 7.2**) Echelon may be flown as 3 or 4-ship, is a variation of fingertip, and is typically used when maneuvering in preparation for the break to land. Turns should be made away from wingmen.

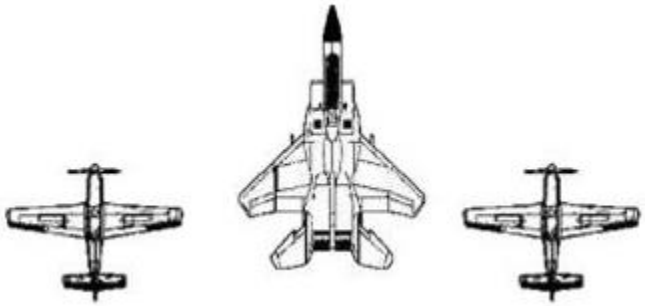
7.5.2.1. References:

7.5.2.1.1. Wingmen: Standard Fingertip.

7.5.2.1.2. Breakout:

7.5.2.1.3. Wingmen: Turn away from lead. Numbers two and three use caution for wingmen on the opposite side from lead.

Figure 7.2. Echelon Formation.



7.5.3. Diamond Formation. (**Figure 7.3**) May be flown as a 4-ship only. It may be flown during HF demos or training. It may be briefly practiced when transiting from point-to-point, but is not otherwise authorized for use when a HF formation is transiting from point-to-point.

7.5.3.1. References:

7.5.3.1.1. Wingmen: Standard Fingertip

7.5.3.1.2. Slot:

7.5.3.1.3. Fore/Aft: Must have nose/tail separation on lead and be far enough aft to maintain sight of wingmen in peripheral vision.

7.5.3.1.4. Left/Right: Line astern of lead

7.5.3.1.5. Depth: Below jet/prop wash

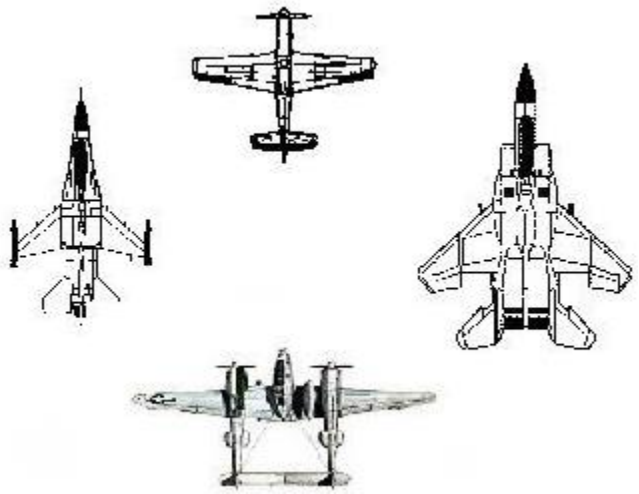
7.5.3.1.6. Breakout:

7.5.3.1.7. Lead: Up

7.5.3.1.8. Wingmen: Turn away from lead

7.5.3.1.9. Slot: Down and aft from lead

Figure 7.3. Diamond Formation.

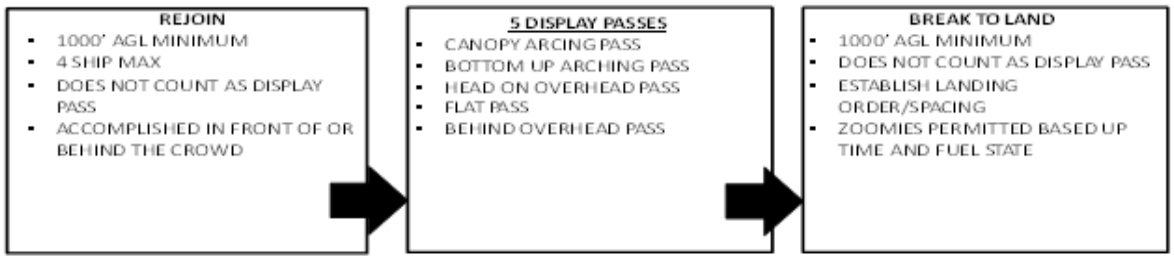


7.5.4. Close. Close formation defines the closest the aircraft will fly in proximity to each other, and is intended as the primary demo formation distance. Anytime the aircraft are inside the 2 ship-widths minimum spacing for route, they are considered to be in close formation. Minimum wingtip spacing is three feet.

7.5.5. Route. Route formation is an extension of fingertip, provides a slightly greater distance between the aircraft, and is intended for use as deemed necessary by the flight lead. Excessive maneuvering, turbulence, birds, or point-to-point transiting may warrant the use of route formation. Spacing is 2 ship-widths to 500 feet, from line abreast to 30 degrees aft, and vertically the same as fingertip.

7.6. USAFHFP Display Profile. (**Figure 7.4**) The HF display profile is comprised of three separate and distinct phases: Rejoin, Display Passes, and Break to Land. A Flyby Pass may be flown after the aircraft break to land, if the aircraft requires an additional pass to obtain the required spacing to land. Additional passes may be flown with the coordination of the air boss. ACC Demo pilots will only fly approved maneuvers during the execution of additional passes. All pilots must be vigilant during this phase of flight as aircraft speeds can vary tremendously.

Figure 7.4. HF Display Profile.



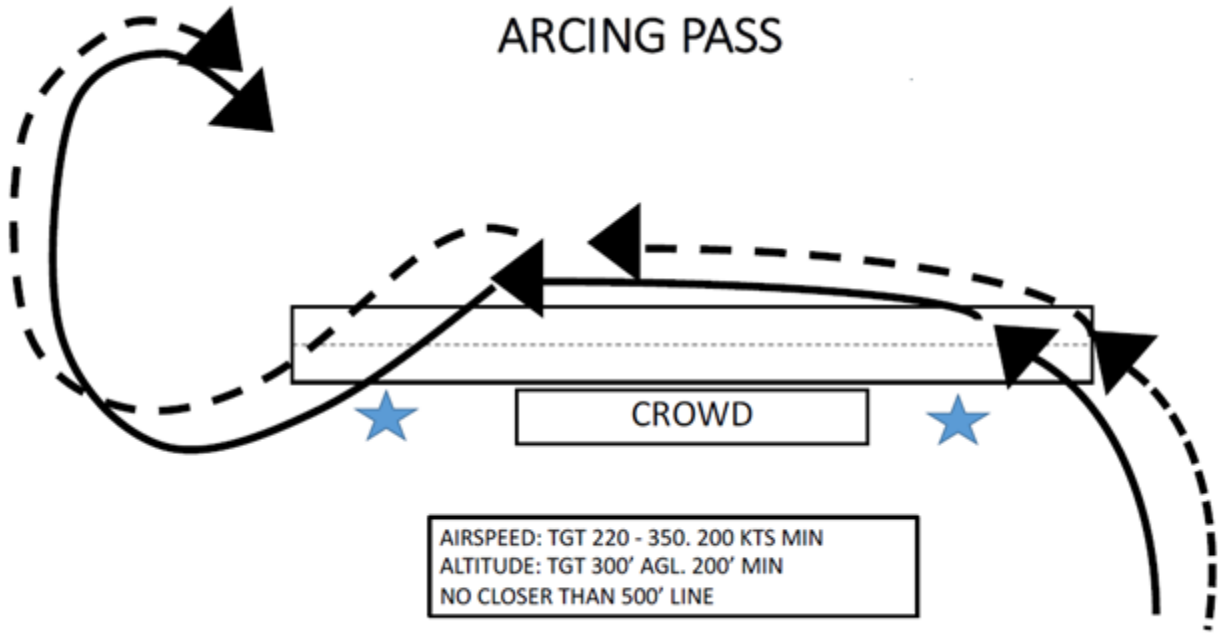
7.6.2. Hold and Rejoin. The rejoin phase must be accomplished at 1,000 feet AGL above the highest obstacle within 2,000 feet of the flight path of the formation. The rejoin typically occurs behind the crowd. Following the rejoin, align the formation for the display passes.

7.6.3. Alternate Hold and Rejoin. If the air show environment does not allow a rejoin behind the crowd, an alternate method may be flown. Typically, the warbird aircraft(s) will takeoff prior to the demo and hold behind the crowd. However, due to fuel considerations, airspace constraints, terrain, etc. a more appropriate takeoff sequence and hold area may be desired and should be briefed. Regardless of the takeoff sequence and hold point, the HF should brief in detail the departure and rejoin plan with contingencies following the demo the heritage formation should maneuver to the pre-determined rejoin location (1,000 feet AGL minimum) to set-up for the display passes. The rejoin in front of the over-the-crowd pass does not count as a display pass.

7.6.4. Display Passes. Five display passes are normally flown as part of the HF demo: Arcing Pass, Bottom up Arcing Pass, In Front Over-the-Crowd Pass, Flat Pass, and Over-the-Crowd Pass. The standard HF demo consists of the five passes and in the order mentioned above. However, a deviation to the standard is acceptable provided the deviation is fully briefed prior to flight.

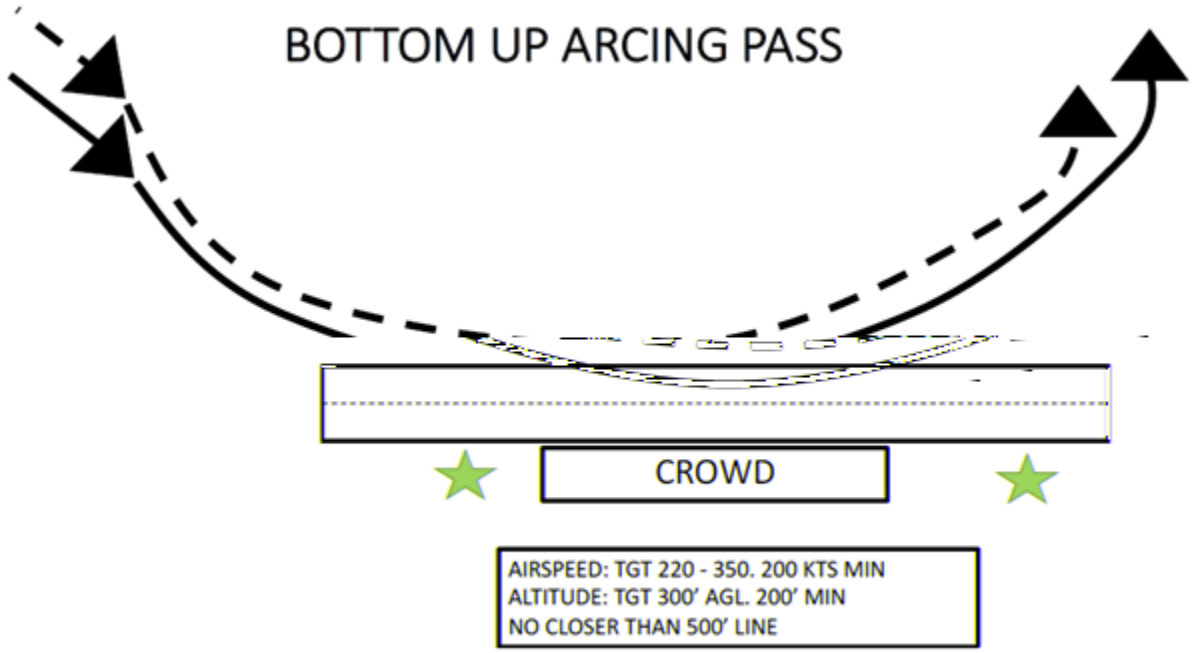
7.6.5. Arcing Pass. (**Figure 7.5**) Align the formation to enter the show line at an approximate 45-degree angle. Fly a descending, arcing turn no closer than 500 feet from the crowd, to include the corners of the crowd line. In order to maintain 500 feet from the corners, the flight path must extend beyond 500 feet from the crowd at show center. Maintain at or above the minimum altitude, giving consideration to wingmen on the inside of the turn. Accelerate during the descent to attain the target airspeed and provide extra energy for the reposition. Exit the show line on an appropriate angle to reverse for the next pass maintaining 500 feet from the crowd, and begin a climb for the reposition. Maintain at or above 200 knots during the reposition.

Figure 7.5. Arcing Pass.



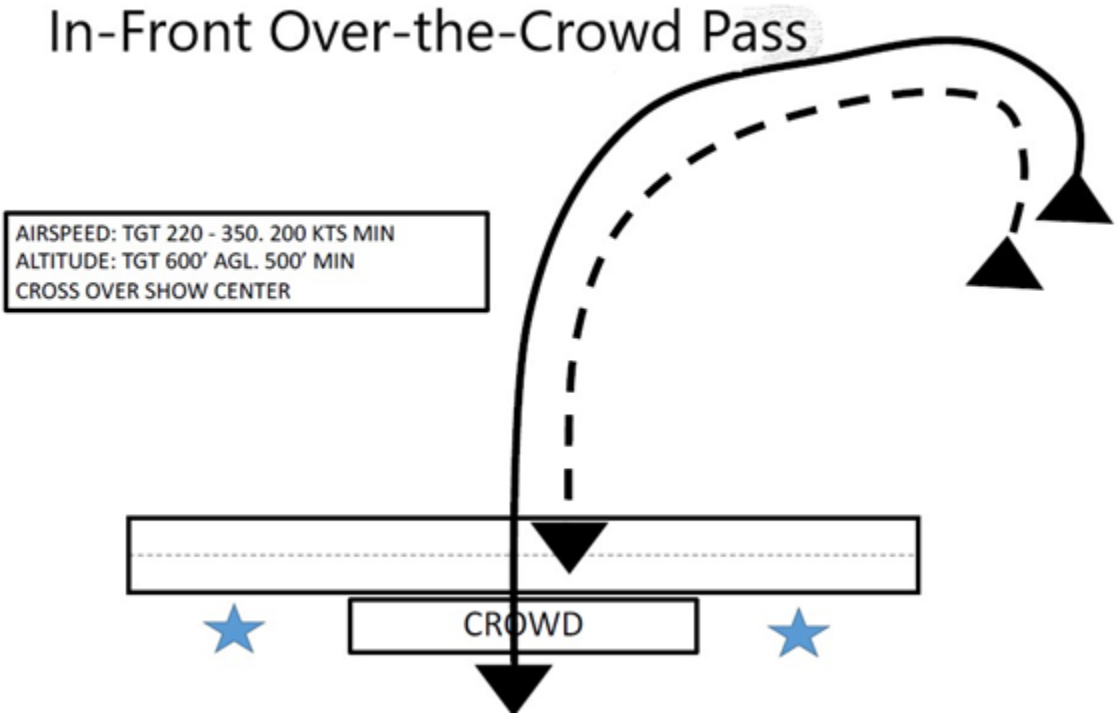
7.6.6. Bottom Up Arcing Pass. **(Figure 7.6)** Maneuver the formation to the left of the crowd and in front with sufficient turning room to conduct the pass beyond the 500-foot show line. Ideally, climb during the reposition to allow for a descending pass and acceleration during the maneuver. Based on formation players and performance characteristics, determine if formation position changes are warranted (e.g., for a two-ship determine if the fighter should be on the inside or outside of the turn). Approaching crowd right initiate a climbing turn away from the crowd. Maintain at or above 200 knots during the reposition.

Figure 7.6. Bottom Up Arcing Pass.



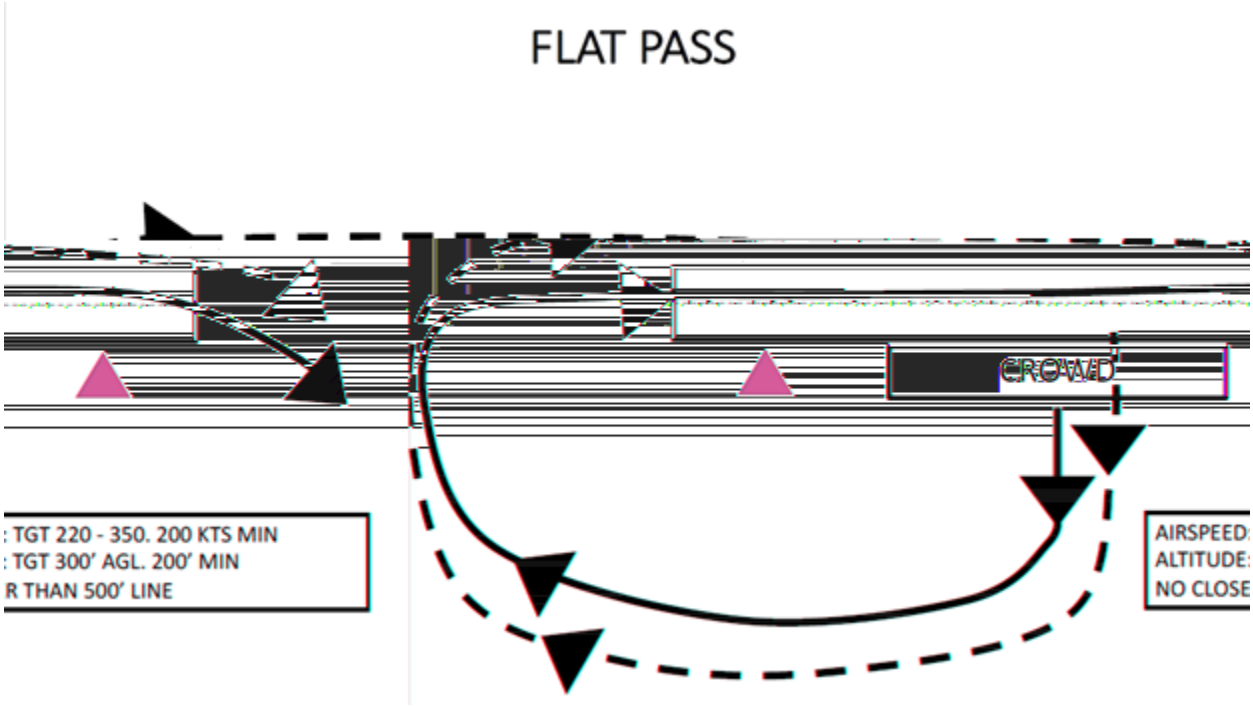
7.6.7. In-Front Over-the-Crowd Pass. **(Figure 7.7)** Continue the climb away from the crowd from the previous pass to allow for sufficient turning room to maneuver the formation to pass over-the-crowd, at show center, and at the target altitude. Set wings level at least one half mile prior to reaching the primary spectator area. Do not descend below the FAA waivered minimum altitude (500 feet AGL).

Figure 7.7. In-Front Over-the-Crowd Pass.



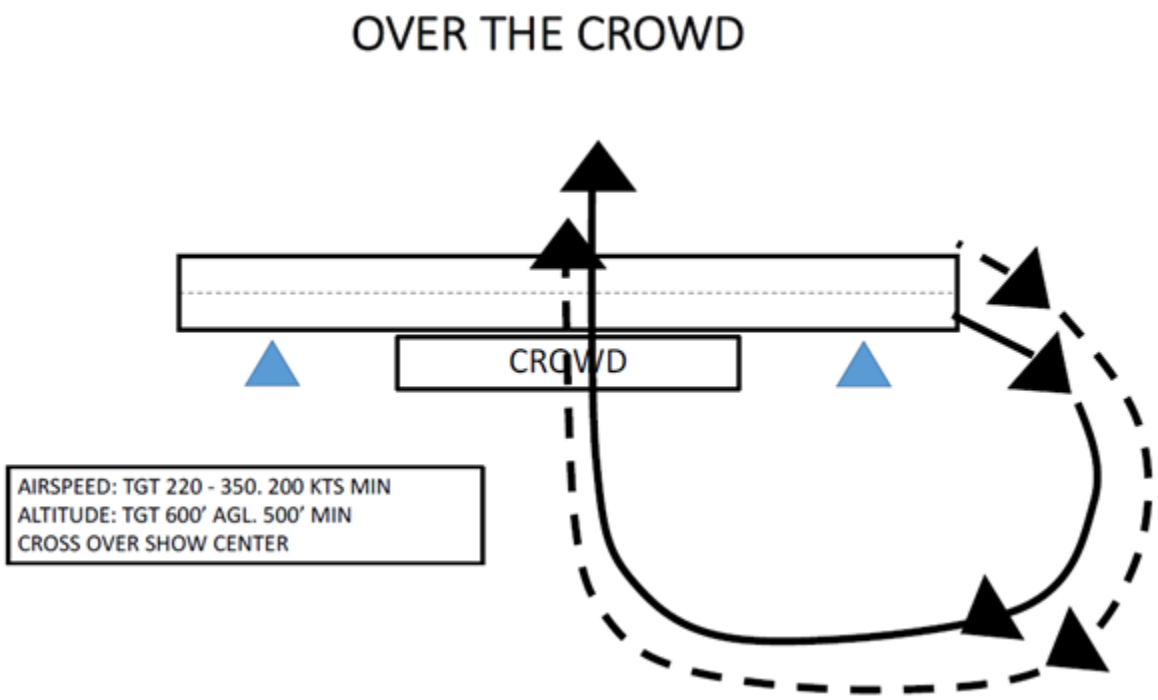
7.6.8. Flat Pass. (**Figure 8.8**) Following the In-Front Over-the-Crowd pass initiate a right turn to align the formation to enter the 500-foot show line and fly a straight-and-level flat pass. Maintain at or above the minimum altitude and accelerate during the descent to attain the target airspeed and provide extra energy for the reposition. Exit the show line in a climbing arc to establish the 270-degree arc for the over-the-crowd pass, or to maneuver for a reposition, maintaining 500 feet from the crowd. Maintain at or above 200 knots during the reposition and climb.

Figure 7.8. Flat Pass.



7.6.9. Over-the-Crowd Pass/Break-to-Land. (**Figure 8.9**) Continue the climbing turn to 1,000 feet AGL minimum while maneuvering the formation behind the crowd in a position to fly directly over show center at the target altitude and airspeed. Set wings level at least one half mile prior to reaching the primary spectator area. Do not descend below the FAA waivered minimum altitude (500 feet AGL minimum). Once past the crowd, lead will call for the break IAW **paragraph 1.21.1**.

Figure 7.9. Over-the-Crowd.



7.6.10. Additional Passes (Optional). Additional passes are optional passes flown after the Over-The-Crowd Pass and Break-To-Land. Following the break-to-land, each aircraft may fly additional passes with coordination with the air boss. Following the break, each aircraft will obtain the required spacing. Demo pilots will only fly approved maneuvers during execution of additional passes. Civilian warbird pilots may fly aerobatic maneuvers on the appropriate category show line. All pilots must be vigilant during this phase of flight as aircraft speeds can vary tremendously.

7.7. USAF Heritage Flight Training Program. The following guidance applies to the ACC HFTC, and covers all training requirements:

7.7.1. The intent of the annual training program is to prepare ACC Demonstration aircrews and USAFHF vintage aircraft pilots to safely fly in formation at public air shows and open house events which benefit AF Recruiting.

7.7.2. Air Force recruiting and community relations programs. Because support staff are acting in an official capacity related to DoD activities, use of invitational travel orders to pay travel, per diem, lodging and local transportation is also permitted as specified in the Joint Travel Regulation, Volume II.

7.7.2.1. Military aircrew members, key military leadership/civilian personnel (ACC staff and host wing) and ACC aerial events defense contractors who have flights authorized in a performance work statement may fly on warbird civil aircraft during HF training course training sessions.

7.7.3. Military media personnel and civilian media personnel (as part of an approved media orientation flight in accordance with AFMAN 35-101) may fly as passengers on those warbirds engaged in observation flights provided the aircraft are not engaged in demonstration training

or formation flights. Training is to take place over unpopulated areas. All warbird operators must have liability insurance covering training flights and passengers. **(T-1)**

JOSEPH GUASTELLA, Lt Gen, USAF
Deputy Chief of Staff, Operations

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 11-202, Volume 3, *Flight Operations*, 10 June 2020

AFI 33-322, *Records Management and Information Governance Program*, 28 July 2021

AFMAN11-2F-16, Volume 3, *F-16 Operations Procedures*, 04 February 2020

DAFI 35-101, *Public Affairs Procedures*, 07 December 2020

AFMAN 91-201, *Explosives Safety Standards*, 28 May 2020

AFPD 11-2, *Aircrew Operations*, 31 January 2019

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

DAFI 11-209, *Participation in Aerial Events*, 20 May 2021

FAA Order 8900.1, *Flight Standards Information Management System (FSIMS)*, 01 May 2007 (or current edition)

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

DD Form 2400, *Civil Aircraft Certificate of Insurance*

DD Form 2401, *Civil Aircraft Landing Permit*

DD Form 2402, *Civil Aircraft Hold Harmless Agreement*

DD Form 2535, *Request for Military Aerial Support*

Abbreviations and Acronyms

A3—Directorate of Operations

AB—Afterburner

A/C—Aircraft

AC LMT—Aircraft Limit

ACC—Air Combat Command

ACC/A3TA—ACC Aerial Events Branch

ACE—Aerobatic Competency Evaluators

AFHFF—Air Force Heritage Flight Foundation

AF/A3O—Headquarters Air Force Director of Current Operations

AFI—Air Force Instruction

AFPD—Air Force Policy Directive

AFMAN—Air Force Manual

AFRIMS—Air Force Records Information Management System

AGL—Above Ground Level

AOA—Angle of Attack

AOL—Aircraft Operating Limits

AOS—Air Operations Squadron

AOSX—Plans and Navigation

A/R—As Required

ATC—Air Traffic Control

CC—Commander

CDM—Climb Dive Marker

CLAW—Control Law

CONUS—Continental United States

DAFI—Department of Air Force Instruction

DEG NH—Degrees Nose High

DEMO or demo—Demonstration

DoD—Department of Defense

DRU—Direct Reporting Unit

ETR—Estimated Time of Return

FAA—Federal Aviation Administration

FAR—Federal Aviation Regulations

FCS—Flight Control System

FLCS—Flight Control System

FM—Financial Management

FOD—Foreign Object Damage

FPM—Flight Path Marker

FSDO—Flight Standards District Office

FSIMS—Flight Standards Information Management System

G—Gravitational Load Factor (Number of times the force gravity)

GS—Ground Simulator

GT—Ground Training

HF—Heritage Flight

HFTC—Heritage Flight Training Course

HIS—Horizontal Situation Indicator

HUD—Heads-Up-Display

IAW—In Accordance With

ICAS—International Council of Air Shows

IOI—Item of Intrest

K—Thousand

KCAS—Knots Calibrated Air Speed

KIAS—Knots Indicated Air Speed

KIO—Knock it Off

LAHD—Low Altitude High Drag

lb—Pound (Weight measurement)

LOWAT—Low Altitude

L/R—Left and Right

LV—Lift Vector

MAJCOM—Major Command

MAX or max—Maximum

MIA—Missing In Action

MIL—Military

MIN—Minimum

MDS—Mission Design Series

MSL—Mean Sea Level

N/A—Not Applicable

NAF—Numbered Air Force

NH—Nose High

NEW—Net Explosive Weight

NL—Nose Low

NLT—Not Later Than

NM—Nautical Miles

NOTAMS—Notices to Airmen

NTE—Not to Exceed

NTEWA—Not to Exceed Waivered Airspace

OCONUS—Outside Continental United States

OG/CC—Operations Group Commander

OG/CD—Operations Group Deputy Commander

OI—Operating Instruction

OPR—Office of Primary Responsibility

OPTEMPO—Operations Tempo

OTT—Over the Top

PA—Public Affairs

PACAF/CC—Pacific Air Forces Commander

PCS—m Permanent Change of Station

POC—Point of Contact

POW—Prisoner Of War

Pyro—Pyrotechnic

QFE—Altimeter Field Elevation

RDS—Records Disposition Schedule

SAAM—Special Assignment Airlift Mission

SAC—Statement of Aerobatic Competency

SIC—Shooter-in-Charge

TACDEMO—US Navy Tactical Demonstration

TDY—Temporary Duty

TGT—Target

TNT—Trinitrotoluene

T/O—Takeoff

TOLD—Takeoff and Landing Data

TRACON—Terminal Radar Control Facility

TS—Training Sortie

TT—Total Time

UK—The United Kingdom

US—United States

USAF—United States Air Force

USAFHFP—United State Air Force Heritage Flight Program

VFR—Visual Flight Rules

VMC—Visual Meteorological Conditions

VRM—Vertical Reposition Maneuver

VVI—Vertical Velocity Indicator

WG/CC—Wing Commander

WX—Whether

Terms

Abnormal Procedure—Specific abort procedure for maneuver

Dual-show—an aerial demo at two separate sites on the same day within 50 NM

Pull-through—to complete a complicated maneuver

Special Assignment Airlift Mission (SAAM)—A dedicated U.S. military aircraft, chartered to deliver sensitive, classified or explosive defense articles to a specific customer location when no commercial delivery capability exists.

Split-show—an aerial demo at two separate sites within 500 NM on consecutive days.

Staged Show—an aerobatic box that is not geographically co-located with the airfield from which the jet is parked such as an over water show or show at an airfield from which the pilot is not planning to take off/land.

Attachment 2

SHOW/EVENT SUMMARY AND CRITIQUE (MAJCOM MAY DEVELOP THEIR OWN CRITIQUE)

A2.1. Example Show/Event Summary and Critique. Single-Ship demonstration teams will use their MAJCOM-approved forms to critique air shows:

(Insert MDS) DEMONSTRATION TEAM AIR SHOW SUMMARY AND CRITIQUE

Show/Event Location:___Date(s):___ Demos/HFs: (Include rehearsal dates):

Date/Time: _____/_____; Demo (Y/N) (High/Low/Flat) / HF (Y/N)

HF pilot names: Other Demo

Pilots_____

AFHFF Pilots_____

If cancelled/aborted, reason:

_____

Additional issues: _____

Estimated attendance: _____

Date/Time: _____/_____; Demo (Y/N) (High/Low/Flat) / HF (Y/N)

HF pilot names: Other Demo

Pilots_____

AFHFF Pilots_____

If cancelled/aborted, reason:

_____

Additional issues: _____

Estimated attendance: _____

Date/Time: _____/_____; Demo (Y/N) (High/Low/Flat) / HF (Y/N)

HF pilot names: Other Demo

Pilots_____

AFHFF Pilots_____

If cancelled/aborted, reason:

_____

Additional issues: _____

Estimated attendance: _____

Date/Time: _____/_____; Demo (Y/N) (High/Low/Flat) / HF (Y/N)

HF pilot names: Other Demo

Pilots_____

AFHFF Pilots_____

If cancelled/aborted, reason:

_____

Additional issues: _____

Estimated attendance: _____

Total Flying Hours Required to Support Event: __(incl hours to/from event)

Estimated Cost: Travel:__Per Diem:__Lodging:

Recruiting Support:

Was recruiter contacted? Yes / No

Was recruiter present at air show? Yes /

No

Were Recruiting Opportunities/Autographs Booth in a good location? Yes / No

What were the off-show recruiting activities?

_____

_____

PA Support:

What PA type activities did you participate in?

_____

_____

FAA Support:	UNSAT	SAT
Preshow Support/Planning:	UNSAT	SAT

Air Show Support and Operations: UNSAT SAT
Overall recommendation to attend this event again: NO / YES
REMARKS (explain above responses; “unsat” / “no” answers require comments):

_____

_____

_____

_____

Attachment 3

AERIAL SITE SURVEY

A3.1. Aerial Site Survey. Demo pilots will accomplish the following site survey actions in preparation for aerial demonstration performance:

A3.1.1. Preflight:

A3.1.1.1. Review airfield diagram (photo if possible) to include runways, taxiways, barriers, show line, crowd line, field elevation and obstacles (e.g., towers, mountains, rising terrain, buildings, etc.) **(T-2)**

A3.1.1.2. Analyze weather patterns, sun angle/elevation, mountain shadows, for impact on flight profile. **(T-2)**

A3.1.1.3. Obtain local no-fly restrictions, and noise abatement and bird avoidance procedures. **(T-2)**

A3.1.1.4. Review FAA Waiver for applicable details. Ensure airspace is waived up to the Minimum Altitude for applicable demo (e.g., Up To 5 Nm/7,000 or 15,000 Feet, as applicable.) **(T-2)**

A3.1.1.5. Identify control agencies such as on-site tower, local Terminal Radar Approach Control (TRACON) and Air Traffic Control (ATC). **(T-2)**

A3.1.2. Survey Flight:

A3.1.2.1. Circle show site, fly show line, look for maneuver reference points, and obstacles. **(T-2)**

A3.1.2.2. If Practical, accomplish aerial survey flight at same time of day as planned aerial demo. **(T-2)**

A3.1.2.3. Observe holding points (for staged shows and Heritage Flights). **(T-2)**

Attachment 4

DEMONSTRATION FLIGHT BRIEFING

A4.1. Pilots will accomplish the following flight briefing actions in preparation for aerial demos:

A4.1.1. Demo pilot will attend FAA mass briefing. **(T-2)**

A4.1.2. As a minimum review the following with ground safety observer:

A4.1.2.1. Time hack

A4.1.2.2. EP of the Day

A4.1.2.3. WX/NOTAMS

A4.1.2.4. Mission overview

A4.1.2.5. Mission data card

A4.1.2.6. Airfield diagram and show layout

A4.1.2.7. Review site survey data

A4.1.2.8. Accomplish any non-briefing items prior to flight

A4.1.3. Ground procedures:

A4.1.3.1. Start, taxi, marshalling

A4.1.3.2. Spare procedures

A4.1.4. Takeoff:

A4.1.4.1. Runway lineup

A4.1.4.2. Minimum fuel

A4.1.4.3. Abort procedures

A4.1.4.4. Low altitude ejection

A4.1.4.5. Land immediately after T/O

A4.1.5. Aerial Demonstration:

A4.1.5.1. Staged vs. Local

A4.1.5.2. Primary show (HI):

A4.1.5.2.1. Maneuvers

A4.1.5.2.2. Individual maneuver parameters

A4.1.5.2.3. Mandatory parameter radio calls

A4.1.5.2.4. WX transition (HI/LO) points

A4.1.5.3. Alternate show (LO):

A4.1.5.3.1. Maneuvers

A4.1.5.3.2. Individual maneuver parameters

A4.1.5.3.3. Mandatory parameter radio calls

A4.1.5.3.4. WX transition (HI/LO) points

A4.1.5.4. Alternate show (FLAT) –A-10 only

A4.1.5.4.1. ManeuversA4.1.5.4.2 Individual maneuvers parameters

A4.1.5.4.3. Mandatory parameter radio calls

A4.1.5.4.4. WX transition (HI/LO/FLAT) points

A4.1.5.5. Abnormal:

A4.1.5.5.1. Maneuver abort and reposition

A4.1.5.5.2. Emergencies

A4.1.5.5.3. Ground safety observer termination procedure calls/procedures

A4.1.6. Recovery:

A4.1.6.1. Pattern and Landing

A4.1.6.2. After landing/de-arm

A4.1.6.3. Emergency/alternate airfields

A4.1.7. Debrief

A4.1.7.1. When/where?

A4.1.8. Set aside time to mentally prepare for demo

Attachment 5

SAMPLE FIRST YEAR DEMONSTRATION PILOT CERTIFICATION CHECKLIST

The following actions will be taken prior to MAJCOM/CC certification: ("NLT" times are not mandatory)
1. Aug: WG/CC will:
a. Designate new demonstration pilot
b. Inform MAJCOM Aerial Events of selection
2. Sept: OG/CC will:
a. Ensure demonstration pilot has entered training
b. NLT 30 Oct - Inform MAJCOM Aerial Events of planned NAF/CC and WG/CC certification dates
3. 15 Nov. MAJCOM Aerial Events Office/A3 Designee forwards staff package to MAJCOM/CC to obtain approval of certification schedule
a. Name(s) of pilot(s) who will need certification
b. General method of certification (individually, two at a time, etc.)
c. Dates for certification (include practice and back-up dates)
Note: MAJCOM/CC certification date initiates certification countdown for individual pilot
4. MAJCOM Aerial Events Office/A3 Designee informs WG/CC of planned certification dates
5. NLT Cert – 30 days: WG/CC pre-certifies demonstration pilot and forwards grade book to NAF/CC
6. NLT Cert – 15 days: NAF/CC approves demonstration pilot and WG/CC forwards grade book to MAJCOM Aerial Events
7. NLT Cert – 14 days: applicable OG submits airspace waiver
8. NLT Cert – 7 days: protocol coordinates:
a. With airfield manager for MAJCOM/CC observation location
b. With local communications squadron for PA system at MAJCOM/CC observation location
c. With local transportation for demonstration team and unit leadership if required
9. NLT Cert – 2 days:
a. MAJCOM Aerial Events prepares IOI for MAJCOM/A3 to include: Demonstration team arrival and departure times; unit leadership arrival and departure times; practice, certification, and backup times; demonstration pilot meeting time with MAJCOM/CC; other significant information
b. MAJCOM Aerial Events forwards demonstration pilot grade book to MAJCOM/A3
c. MAJCOM Aerial Events checks with protocol to ensure support arranged
10. Demonstration team arrival: MAJCOM Aerial Events representative meets team at Base Ops
11. Cert – 2 hrs: protocol ensures setup of MAJCOM/CC observation location
12. Cert + 1 day: MAJCOM Aerial Events prepares letter to FAA (AFS 800) to inform them of additional MAJCOM pilot(s) approved to perform single-ship demonstrations
Note for ACC: ACC/A3TA will update letter to FAA to inform them of pilots approved to fly Heritage Flight profiles. **(T-0)**