

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

**AIR FORCE INSTRUCTION 11-246,
VOLUME 1**



19 JULY 2016

**AIR COMBAT COMMAND
Supplement**

24 MAY 2017

Flying Operations

**AIR FORCE AIRCRAFT
DEMONSTRATIONS (A-10, F-15, F-16,
F-22)**

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-Publishing website at www.e-publishing.af.mil for downloading or ordering.

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: HQ ACC/A3T

Certified by: HQ USAF/A35
(Maj Gen Martin Whelan)

Supersedes: AFI11-246V1, 23 October
2014

Pages: 185

(ACC)

OPR: ACC/A3TA

Certified by: HQ ACC/A3T
(Col Robert O. Cioppa)

Supersedes: AFI11-246V1_ACCSUP, 22
June 2015

Pages: 30

This instruction implements AFD 11-2, *Flight Rules and Procedures*, and supports AFI 11-209, *Aerial Event Policy and Procedures*. It provides guidance and procedures for Air Force performance of specific Mission Design Series (MDS) single-ship aircraft demonstrations and mission capabilities demonstrations. It designates Air Combat Command as lead command for the A-10, F-15, F-16, and F-22 aircraft demonstrations. This instruction does not currently apply to Air Force Reserve Command (AFRC), or Air National Guard (ANG) Units. Major Commands (MAJCOMs), Field Operating Agencies (FOAs), and Direct Reporting Units (DRUs) may supplement this instruction. MAJCOMs, FOAs, and DRUs coordinate their supplements with HQ Air Combat Command, Director of Operations, Flight Operations Division (ACC/A3T) prior to publication, and forward one copy to HQ USAF/A3OI after publication. Refer recommended changes and questions about this publication to the Office of Primary

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(ACC) AFI11-246, Volume 1, *Air Force Aircraft Demonstrations (A-10, F-15, F-16, F-22)*, is supplemented as follows: This supplement applies to all Air Combat Command (ACC) units participating in Single-Ship aerial demonstrations and USAF Heritage Flights. It does not apply to Air National Guard (ANG) or Air Force Reserve Command (AFRC) units and members. This publication may be supplemented at any level, but all direct Supplements must be routed to the OPR of this publication for coordination prior to certification and approval. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). Contact supporting records managers as required. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using Air Force (AF) Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through channels to ACC/A3TA, 205 Dodd Blvd, Suite 101, Joint Base Langley-Eustis VA 23665-2789. "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 AFI 33-360, *Publications and Forms Management*, Table 1.1 for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the Publication OPR for non-tiered compliance items." Submit requests for waivers in accordance with paragraph [1.3](#). for non-tiered compliance items.

SUMMARY OF CHANGES

This document contains tiered waiver authorities as recommended by SAF/AA in their Publications Change Manager action reviewing Air Force publications.

(ACC) This rewrite is to re-align paragraph numbers with the recently released IC to the parent instruction. Paragraph 1.6.5. - 1.6.11 was added.

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Chapter 1

OPERATIONAL PROCEDURES

1.1. Introduction. USAF uses single-ship aerial demonstration teams 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 demonstrations of the A-10, F-15E, F-16, and F-22 aircraft. MAJCOMs interested in developing future air show programs involving these USAF Mission Design Series (MDS) aircraft are governed by this instruction and approved MAJCOM supplements. This instruction provides specific maneuvers, sequences, and parameters governing the execution of these demonstrations. Other MAJCOMs flying single-ship aerial demonstrations of these MDS aircraft will comply with this instruction. Policy and procedures for team management, selection, training, and scheduling are in accordance with (IAW) applicable MAJCOM supplements. The directives listed in Attachment 1 provide further policy or procedural guidance in the conduct of these events.

1.1. (ACC) Introduction. This supplement contains guidance for ACC Single-Ship Demonstration Teams that is specific to Air Combat Command. Additionally, procedures for the United States Air Force Heritage Flight Program (USAFHFP) are included in this supplement.

1.2. Terms Explained. Unless otherwise indicated, terms and definitions used in AFI 11-209, *Aerial Event Policy and Procedures*; AFI 35-105, *Community Relations*; and this instruction are the same. The term, “aerobatic” used in this instruction is as defined in FAA Order 8900.1, Volume 3, **Chapter 6**.

1.2. (ACC) Terms Explained. Heritage Flight (HF) applies to the performance of USAF’s warbird/modern aircraft dissimilar formation flight by certified USAFHFP pilots. In this supplement, the terms proficiency, currency, and re-currency are synonymous and interchangeable.

1.3. Waiver Authority. Unless otherwise indicated, waiver authority is HQ USAF/A35. HQ USAF/A35 has delegated waiver authority for this instruction to HQ ACC/A3. MAJCOMs must submit waiver requests through appropriate MAJCOM channels.

1.3. (ACC) Waiver Authority. The waiver authority for this supplement is ACC/A3. Submit waiver requests through A3TA.

1.4. Responsibilities:

1.4.1. MAJCOM/CC will:

1.4.1.1. Provide policy for the MAJCOM’s single-ship demonstration program IAW this publication.

1.4.1.2. Certify first year single-ship demonstration pilots prior to the beginning of their first air show season. PACAF/CC may delegate the certification of first-year single-ship demonstration pilots but no lower than WG/CC. Include certification authority delegation in the MAJCOM supplement to AFI 11-246, Vol 1.

1.4.1.3. Approve single-ship demonstration team maneuvers. This approval may be delegated to MAJCOM/A3.

1.4.1.3. (ACC) ACC/A3 is authorized to approve single-ship demonstration team maneuvers for the ACC Single-Ship Demonstrations Teams.

1.4.2. MAJCOM/A3 will:

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

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

1.4.2.3. Approve syllabi for single-ship demonstration aircrew upgrade.

1.4.2.4. Approve modified demo profiles when an air or trade show does not allow the allotted time for a full profile.

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

1.4.2.5. (ACC) Demonstration teams will provide updated draft narrations NLT 1 December of each year to A3TA for A3T approval. Draft narrations must be coordinated through public affairs and approved by the team's wing commander.

1.4.2.6. (Added-ACC) Manages and executes the USAFHFP and annual Heritage Flight Training Course (HFTC). Provides travel funding for HFTC special support personnel, and for ACC Demonstration Team tasking beyond the requirements of paragraph 1.4.5.8.

1.4.2.7. (Added-ACC) Approval of the Demonstration Team schedule implies ACC approval of Heritage Flights in conjunction with ACC Single-Ship Demonstration Teams.

1.4.2.8. (Added-ACC) ACC/A3, or his designated representative, certifies demonstration pilots and Air Force Heritage Flight Foundation (AFHFF) pilots to perform Heritage Flights.

1.4.2.9. (Added-ACC) Signs the annual ACC letter to the FAA naming the certified USAFHFP pilots.

1.4.2.10. (Added-ACC) Approves civilian aircraft types for inclusion in the USAFHFP. A3 will receive new warbird nominations at least four months prior to proposed implementation date. Each individual warbird must fit the criteria in paragraph 1.6.7.

1.4.3. MAJCOM Aerial Events Office or MAJCOM/A3 designee will:

1.4.3. (ACC) MAJCOM Aerial Events Office or MAJCOM/A3 designee will (T-2):

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

1.4.3.2. Coordinate all single-ship demonstrations: Analyze event sites for operational suitability, safety, recruiting value, and availability of demonstration teams.

1.4.3.2.1. Coordinate AOS movements with ACC AOS/AOSX and assigned DCO.

- 1.4.3.2.2. Secure Dual-Role tanker operations to the maximum extent possible. When not feasible, 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. Develop the single-ship demonstration schedules and updates.
- 1.4.3.3. (ACC) ACC/A3 develops and approves the HF schedule(s) and changes or updates.
- 1.4.3.4. Perform annual review of the MAJCOM supplement to this AFI and unit single-ship demonstration training syllabi.
- 1.4.3.5. If applicable, develop an OCONUS event schedule and provide Mission Aerial Support funding for deployments.
- 1.4.3.5. (ACC) ACC Single-Ship Demonstration Teams will only participate in airshows / air and trade shows outside the US if fully funded by the supported command, industry (if applicable), the airshow, other agencies or combination thereof, except Canada.
- 1.4.3.5.1. (Added-ACC) Teams deploying OCONUS (except Alaska, Hawaii and Canada) to fly aircraft already in place: 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 funding by the supported command, industry (if applicable), the airshow, other agencies or combination thereof.
- 1.4.3.5.2. (Added-ACC) Teams deploying OCONUS with their own jets: Teams tasked to deploy with their own jets to an OCONUS air show/air and trade show must develop their own deployment package (demonstration team plus augmentation, if required) and forward it to A3TA for review. ACC will approve the deployment package and commit demonstration 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 (i.e. special assigned airlift mission (SAAM), TDY costs, personnel, etc. Canada is only required to fund lodging and local transportation.
- 1.4.3.5.3. (Added-ACC) Teams must ascertain if the narration needs to be translated into a foreign language. If so, they must coordinate the translation through A3TA, who will coordinate with the host embassy.
- 1.4.3.6. Prepare waiver recommendations for HQ ACC/A3 approval.
- 1.4.3.7. Provide event sponsors with the Single-Ship Demonstration Team Support Manual to assist them with the necessary preparations.
- 1.4.3.8. Variously visit and evaluate air show environments to ensure support is adequate to minimize distractions and enhance flying safety.

1.4.3.9. If applicable, maintain the MAJCOM Aerial Events Public web site to include: current single-ship demonstration schedules, Single-Ship Demonstration Team Support Manual, and the scheduling process.

1.4.3.9. (ACC) ACC Aerial Events Schedule on the public web site (<http://www.acc.af.mil/aerialevents/index.asp>) will include HF events.

1.4.3.10. Coordinate initial MAJCOM/CC certification of first year single-ship demonstration pilots IAW **Attachment 5**.

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

1.4.3.12. Review demonstration ground video of pilot demonstrations.

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

1.4.3.14. Participate in annual International Council of Air Shows Convention.

1.4.4. **NAF commanders or equivalent will:** Approve single-ship demonstration prior to MAJCOM/CC's certification for first-year demonstration pilots.

1.4.5. **Wing commanders or equivalent will (T-2):**

1.4.5.1. Select and train demonstration 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 demonstration program.

1.4.5.1.1. Ensure mission effective command oversight of all team elements and personnel.

1.4.5.1.2. Ensure dedicated maintenance support of the demonstration team.

1.4.5.1.3. Designate responsibility for resource management of all team funding.

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 demonstration team. (T-3).

1.4.5.3. Forward the upgrading demonstration pilot's grade book per MAJCOM supplement for approval.

1.4.5.4. Annotate pre-certification of demonstration team (high show) in demonstration pilot grade book and forward to NAF/CC or equivalent for endorsement

1.4.5.5. Annotate re-certification of demonstration team (high show) in demonstration pilot grade book for second and subsequent year demonstration pilots.

1.4.5.6. Coordinate with MAJCOM Aerial Events Office on single-ship demonstration schedule. This may be delegated to Operations Group Commander.

1.4.5.7. Provide a ground video and grade sheet of a current performance for WG/CC re-certified pilots to MAJCOM/A3.

1.4.5.7. (ACC) Forward to A3TA.

1.4.5.8. Fund the demonstration team's annual budget per MAJCOM supplement.

1.4.5.8. (ACC) Fund the demonstration 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 International Council of Air Shows (ICAS) Convention, the HFTC, Numbered AF 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 numbers above.

1.4.5.8.1. (Added-ACC) ACC Single-Ship Demonstration Teams tasked to participate in CONUS events that are not Open Houses/Air Shows (e.g., HFs over Arlington National Cemetery, etc.), will be funded by ACC using Mission Aerial Support Funds or by the MAJCOM, base, or agency planning/supporting the event. A3TA will issue a fund cite authorization memorandum to the tasked wing for personnel travel, with a cap on the amount ACC will fund and specific guidance as to what all will be authorized for reimbursement (airfare or other transportation, car rental, lodging, per diem, etc., as applicable). Prior coordination with A3TA 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: fighter breaks, requiring the team stays longer; a divert-Enroute to/from the show: Non-reimbursable expenses include payment for shipment of maintenance parts, etc. The demonstration team will be tasked to support the event through the normal scheduling process.

1.4.5.9. Review the grade sheet of every practice and demonstration IAW paragraph 1.11 of this instruction. Meet with the demonstration pilot once every 30 days to review the most recent demonstration performance using the grade sheet and HUD data when available or ground video. Once every 90 days this review uses actual HUD data with the grade sheet. Provide the grade sheet of every practice and public demonstration and the ground video tape of all public demonstrations to the MAJCOM Aerial Events Office or MAJCOM/A3 designee, within five (5) work days of each home training event/demonstration or within five work days after returning to home station following deployed demonstrations. This duty may be delegated to the WG/CV, OG/CC, or OG/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. (Added-ACC) Ensure ground video is forwarded to A3TA for every public Single-Ship Demonstration performed. Additionally, grade sheets must be e-mailed to A3TA for every demonstration flown.

1.4.5.11. (Added-ACC) Wing Commanders are responsible for ensuring each member of their demonstration 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. OG/CC will (T-2):

1.4.6.1. Provide command oversight of the demonstration team operations element personnel.

1.4.6.1. (ACC) Meet with the demonstration pilot once every 30 days to review the most recent demonstration performance using the HUD tape or ground video and the grade sheet. At least once every 90 days this review must use actual HUD data with the grade sheet.

1.4.6.2. Coordinate with MAJCOM Aerial Events Office designee on single-ship demonstration schedule (T-3).

1.4.6.3. Request relief from MAJCOM Aerial Events Office designee if it is determined that an event should not be supported (for safety, OPTEMPO, etc.).

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

1.4.6.5. Provide Stage 2 certification to demonstration pilot IAW [paragraph 2.5.13](#) of this instruction.

1.4.6.6. Establish procedures for nominating the best qualified demo pilots, narrators, and safety observers to be dedicated to the demonstration team.

1.4.6.7. (Added-ACC) Ensure your demo team uses the HUD recorder at all locations with the appropriate level of classified storage and for all home-station demonstration sorties. During the air show season review a HUD recorded demonstration at least every 90 days. Annotate these reviews on the grade sheet. Ensure grade sheets reflect the USAFHFP pilot's name and type aircraft flown.

1.4.6.8. (Added-ACC) Ensure ACC Single-Ship Demonstration Team obtains local wing approval for production and release of unclassified cockpit media to enhance safety, debriefing, and public relations.

1.4.6.9. (Added-ACC) Ensure demonstration pilots submit End-of-Show Summaries and Critiques to ACC/A3TA NLT 1 week after each show.

1.4.7. MX Grp/CC will (T-2):

1.4.7.1. Establish procedures to nominate the best-qualified maintenance personnel to be dedicated to the demonstration team.

1.4.7.2. Ensure maintenance personnel selected to the air show/demonstration program are dedicated to the demonstration team.

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

1.4.8. Demonstration pilots will (T-2):

1.4.8.1. Coordinate demonstration team availability IAW MAJCOM supplements.

1.4.8.1. (ACC) Coordinate team availability with A3TA.

1.4.8.2. Coordinate demonstration team support requirements with event point of contact.

1.4.8.3. Coordinate with local Air Force recruiter team's availability and ability to support local Air Force recruiting efforts.

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

1.4.8.5. Take special care to ensure that no aerobatic maneuvers of any type are performed inside the stipulated FAA crowd restraint zone of 1,500 feet (1,200 feet where approved by FAA). (T-0). In any case where FAA approves closer aerobatic maneuvers (e.g. FAA AFS-800 maneuver package), all maneuvers are flown at or beyond the 500-foot line.

1.4.8.6. For off-station sites, accomplish either a practice demonstration or aerial survey (IAW [Attachment 3](#)) at the air show site prior to air show demonstration.

1.4.8.7. Review and grade every practice and demonstration 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](#). During training/non-air show season, upgrading demo pilots will place all grade sheets in their grade book and will forward all HUD or ground tapes for wing leadership review. After MAJCOM/CC certification, demo pilots will begin forwarding the grade sheet and the HUD or ground tape IAW [paragraph 1.4.5.9](#) of this instruction, including those occurring during training/non-air show season in-between the demo pilot's first and second year.

1.4.8.7. (ACC) 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.

1.4.9. Demonstration team ground safety observers will (T-2):

1.4.9.1. Complete safety observer training and documentation per [paragraph 2.5](#). Training is required for any personnel performing safety observer duties, including wing leadership.

1.4.9.2. Monitor all practices and demonstrations with maneuvers conducted below 2,000 feet AGL.

1.4.9.3. Maintain two-way radio communication with the demonstration pilot, monitor demonstration pilot altitude and airspeed radio calls, and direct maneuver abort if outside prescribed parameters.

1.4.9.4. Monitor the demonstration for potential hazards (e.g., flocks of birds, unscheduled aircraft, or weather).

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.

1.4.9.6. Review the HUD tape or ground video and grade sheet of every practice and demonstration.

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

1.4.10.1. **(Added-ACC)** 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, *General Flight Rules*, 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. **(Added-ACC)** Attendance at USAF meetings/Forums to the ACC Demonstration Team Program/USAFHFP (e.g. New Demonstration Team Orientation Course, ACC Forum, etc.) is mandatory for all demonstration aircrews (both current and outgoing), and team NCOICs. Most of these meetings are normally held during the ICAS convention.

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

1.5. Requests and Approval.

1.5.1. CONUS civilian locations (including Alaska and Hawaii) desiring an aerial demonstration may submit requests to the Office of the Secretary of Air Force for Public Affairs (SAF/PA). SAF/PA posts events that are eligible for consideration on their website. In the PACOM AOR, civilian locations desiring an aerial demonstration may submit requests to the Office of Assistant Secretary of Defense for Public Affairs (OASD/PA). OASD/PA notifies PACAF of events that are eligible for consideration.

1.5.2. Air Force units may submit a request directly to HQ ACC/A3TA or other MAJCOM teams for consideration.

1.5.3. Requests from other services should be submitted, through command channels, to HQ ACC/A3T or other appropriate MAJCOM office in accordance with applicable directives.

1.6. Scheduling and Policies. Per MAJCOM supplement to this instruction.

1.6. (ACC) Scheduling and Policies: The demonstration season is normally from the beginning of Mar and extends through Nov. The following policies guide development of the aerial demonstration schedule. Waivers to these policies require A3 approval.

1.6.1. **(Added-ACC)** ACC aerial event scheduling processes differ for single-ship aircraft demonstrations and Heritage Flights. The target dates for approved schedules are as follows:

1.6.1.1. **(Added-ACC)** The ACC Single-Ship Demonstration Teams schedule will be published in February.

1.6.1.2. **(Added-ACC)** Requests for ACC Single-Ship Demonstration Team support MUST be received NLT 15 Dec.

1.6.2. **(Added-ACC)** Schedule only one split-show or one dual-show at deployed locations per team per month. A demonstration team may accomplish one additional dual-show each month, provided one of the locations is home station.

1.6.2.1. **(Added-ACC)** A split-show is an aerial demonstration at two separate sites within 500 NM on consecutive days.

1.6.2.2. **(Added-ACC)** A dual-show is an aerial demonstration at two separate sites on the same day within 50 NM.

1.6.3. **(Added-ACC)** Demonstrations and HFs will commence no earlier than 1/2 hour after sunrise and be complete no later than 1/2 hour prior to sunset.

1.6.4. **(Added-ACC)** Single-Ship demonstration aircraft will not stage single-ship demonstrations more than 50 NM from the show location.

1.6.5. **(Added-ACC)** The following factors may influence the level of support provided to an aerial event and assist in decision making.

1.6.5.1. **(Added-ACC)** Other DoD flying demonstrations.

1.6.5.2. **(Added-ACC)** Blue Angels' participation.

1.6.5.3. **(Added-ACC)** Thunderbirds' participation.

1.6.5.4. **(Added-ACC)** Planned support for previous years cancelled (Thunderbirds, Single-Ship demonstrations, flyovers).

1.6.5.5. **(Added-ACC)** Not supported previously/when last supported.

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

1.6.5.7. **(Added-ACC)** Airfield suitability (positive/negative).

1.6.5.8. **(Added-ACC)** Limit support of events in same metropolitan areas.

1.6.5.9. **(Added-ACC)** Previous air show's compliance with support manual.

1.6.5.10. **(Added-ACC)** Under no circumstances will demonstration teams 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. This will not be waived.

1.6.6. **(Added-ACC)** Participating aircraft will only include 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. Variants of these aircraft are approved. HF qualified aircrew are limited to only the ACC Single-Ship Demonstration Pilots, and AFHFF pilots named on annual ACC letter to the FAA.

1.6.6.1. **(Added-ACC)** A3 will receive new warbird MDS nominations from the pilots at least four months prior to proposed implementation date. The each individual warbird must fit the following criteria:

1.6.7. **(Added-ACC)** Be of U.S. Army Air Force / U.S. Air Force Lineage.

- 1.6.7.1. **(Added-ACC)** Be a pursuit/fighter/attack type from WWII, Korea, Vietnam, or Desert Storm era.
- 1.6.7.2. **(Added-ACC)** Be able to maintain flight formation with modern fighters.
- 1.6.7.3. **(Added-ACC)** Maintain target speed of at least 220 kts while in formation.
- 1.6.7.4. **(Added-ACC)** Be flight worthy and pass all FAA inspections.
- 1.6.7.5. **(Added-ACC)** Have a paint scheme consistent with the warbird's active duty era.
- 1.6.7.6. **(Added-ACC)** Have NO large sponsorship logos on the aircraft.

1.6.8. **(Added-ACC)** A3 may approve additional warbird type aircraft following performance of actual aircraft in formation with modern demonstration aircraft.

1.6.9. **(Added-ACC)** A3TA Branch Chief or 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 ACC demonstration pilot(s) are notified of the change.

1.6.10. **(Added-ACC)** A3TA will coordinate and obtain A3 approval for USAFHFP support of aerial events. Air shows scheduled to receive an ACC Single-Ship Demonstration Team are eligible for a HF. HFs may be additionally approved by the A3 for non-air show events such as photo shoots or flyovers.

1.6.11. **(Added) (ACC)** AFHFF pilots can be added or substituted at an air show provided A3TA Branch Chief or designated representative approval is obtained before the flight. ACC demonstration pilots must ensure AFHFF pilots meet all requirements specified in this supplement prior to the flight. ACC demonstration pilots do not have authority to approve schedule changes. A3TA will ensure A3T is notified of an added or substituted AFHFF pilot.

1.7. Support Manual. Detailed information on show site pre-show coordination requirements is contained in the MAJCOM Single-Ship Demonstration Team Support Manual. This manual requires annual revision and should be made available to all aerial event coordinators hosting a single-ship demonstration team, via website, e-mail, normal mail, or fax. For example, HQ ACC/A3TA maintains a copy of the current ACC Support Manual on the Air Combat Command Aerial Events website (<http://www.acc.af.mil/aerialevents/>).

1.8. Arresting Gear Support. For the F-15E Strike Eagle and F-16 Demonstration teams: Show sites without an arresting gear and with runways less than 8,000 feet must provide temporary arresting gear unless an airfield with suitable arresting gear on a 7,000 feet or greater runway, or a runway with length greater than 10,000 feet is within 80nm of the staging location and show site. (T-2). For the F-22 Demonstration team: All 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. (ACC) Arresting Gear Support. For the F-16 Demonstration team, a suitable arresting gear is a BAK-12 or equivalent.

1.9. Reporting.

1.9.1. Any unusual occurrence (In-Flight Emergencies, Aborts/KIO, 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, fax, or email ASAP to the MAJCOM Aerial Events office. (T-2).

1.9.1.1. **(Added-ACC)** Show profile.

1.9.1.2. **(Added-ACC)** Estimated crowd count.

1.9.1.3. **(Added-ACC)** Unusual occurrences/remarks.

1.9.1.4. **(Added-ACC)** Actual HF flight activity to include pilot, aircraft type, sortie type (i.e. 2,3,4-ship), and total HF sorties, including practices.

1.9.2. Submit End of Show Summaries and Critiques to MAJCOM Aerial Events NLT 1 week after each show IAW the MAJCOM approved format. See sample at [Attachment 2](#).

1.9.2. **(ACC)** Submit ACC Show Summary and Critique, using format at [Attachment 2](#), to A3TA. The ACC 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. This ACC Show Summary and Critique (when filled in) is official verification of HF performance. ACC Single-Ship Demonstration Pilots may NOT delegate submission of the ACC Show Summary and Critique, but must personally check for accuracy and release.

1.10. Recommended Changes.

1.10.1. 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 Form 847s from the field through the appropriate functional's chain of command to HQ ACC/A3T.

1.10.1.1. 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' AGL and then again at greater than 2,000' 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' AGL and again at 500' 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 gradebook. Once the maneuver is perfected in practice, submit a change to this AFI IAW [paragraph 1.10.1](#). Demo pilots will not perform new or modified maneuvers in actual demonstrations unless approved by MAJCOM/CC. (T-2).

1.10.2. Each demonstration 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 HQ ACC/A3TA for coordination prior to publication.

1.11. Demonstration Performance Reviews / Grade Sheets.

1.11.1. Record every practice and demonstration at locations with appropriate level of classified storage capability, to include all home station demonstration sorties, on the pilot's HUD tape. Videotape every practice and demonstration involving aerobatics of any kind conducted below 2,000 feet AGL. Do not post video to any public web site until approved by MAJCOM/PA. Debrief each demonstration using these videotapes and HUD when available. Demonstration 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. Demonstration teams will maintain videotapes, and HUD tapes for a minimum of one year. (T-2). Keep performance grade sheets at the unit for the duration of the demo pilot's assignment. Approved grade sheet templates will be provided by ACC/A3TA.

1.11.1. (ACC) Approved grade sheet master files will be maintained and distributed by A3TA. Grade sheets must reflect the HF pilot's name and type aircraft flown, as well as other ACC 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 demonstration 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 demonstration is zero (0). Wing reviewers will recommend additional training for any overall demonstration 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 demonstration 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 and the minimum altitude is 5,000 feet then "X" equals 1000 feet and 1/2X equals 500 feet. Grade 0 would be given for all altitudes below 5,000 feet; Grade 1 for all altitudes from 5,000 to 5,499 feet; Grade 2 for all altitudes 5,500 to 5,999 feet and above 6,501 feet; Grade 3 for all altitudes from 6,001 to 6,500 feet; and Grade 4 if altitude equals 6,000 feet. (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

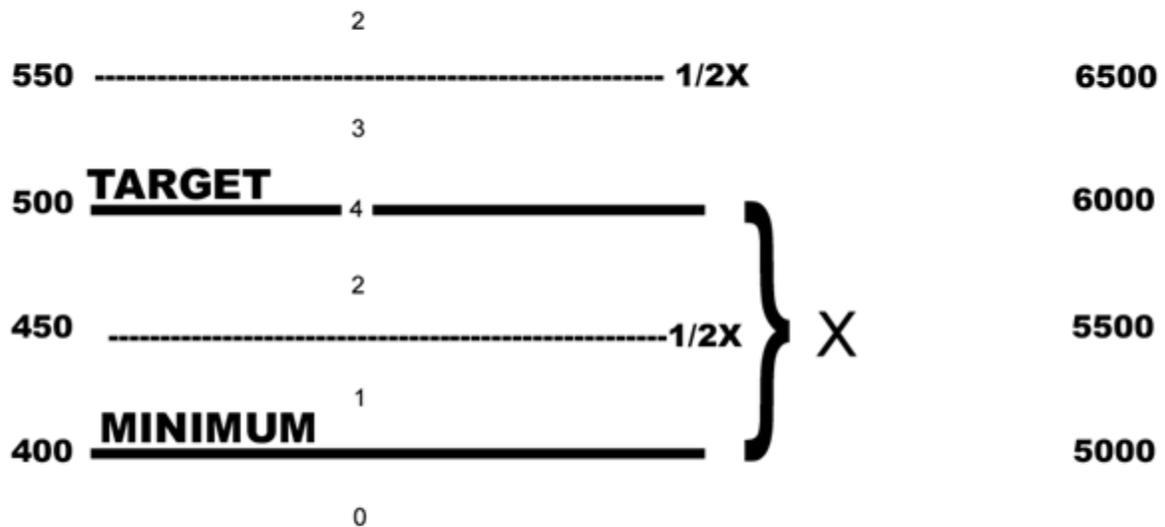
1.11.2.7. Airspeed criteria do not apply to the A-10 unless airspeed is below minimum parameter; the maneuver grade is zero.

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
- 1.11.2.8.4. 3 = Outstanding performance
- 1.11.2.8.5. 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. Proficiency Requirements.

1.12. (ACC) Proficiency Requirements (T-3). Demonstration 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 demonstration pilots and every 90 days for AFHFF pilots to maintain currency. 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 1.20.5](#). If non-current pilots are unable to accomplish the practice requirements they will not fly the HF.

1.12.1. Demo Pilots: To maintain currency, each pilot will fly a minimum of one demonstration every 15-calendar days. (T-2). Schedule a practice session or actual demonstration at least once per week during air show season. If the 15 calendar day currency is exceeded, the next demonstration is limited to no-lower-than 1,000 feet AGL target and 900 feet AGL minimum on all maneuvers, and the operations group commander, deputy operations group commander, or WG/CC designee must be present. (T-2). MAJCOMs may determine additional procedures for pilots to regain currency.

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 demonstration while under the observation of a certified safety observer. (T-2). Document this training in the demo team grade book.

1.12.3. If an actual abort is not encountered, practice pilot abort procedures during practice demonstrations at least once each 60 days. For the purpose of meeting this currency requirement, during a practice demonstration, the safety observer initiates the abort call.

1.13. Termination Procedures. Terminate demonstrations 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 demonstration pilot and safety observer.

1.13.3. Videotaping is lost.

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 demonstration 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 demonstration pilot to transition between show profiles at certain transition points. Determine frequency of transition between profiles via MAJCOM supplement to this directive.

1.14. (ACC) Transition During Performance. Demonstration pilots will not transition between profiles more than once per performance.

1.15. Altimeter Procedures. It is essential that each demonstration pilot be able to quickly and accurately assess actual altitude above the ground during any maneuver in the demonstration. To avoid the mental exercise required to subtract an odd-numbered field elevation from the MSL altimeter reading to get above ground altitude, use one of the two procedures described below to “zero the altimeters” (QFE). Use these procedures for all practice and actual demonstrations 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.

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 corrected field elevation (500, round down; 501, round up).

1.16. Communication Procedures. The demonstration pilot and safety observer will operate on a discrete frequency during all practice and official demonstrations. (T-2). This is to minimize the amount of third-party radio chatter that can distract the demo pilot and step on required radio calls from the pilot and safety observer during the demonstration. 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 demonstration. 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 demonstration, the safety observer will terminate the demonstration. (T-2). Once the situation has been resolved and the safety observer can once again give the demonstration 100% attention, the demonstration may continue.

1.17. Use of Teams for Static Display. The demonstration pilot and narrator/ground safety observer should normally arrive in two aircraft with one to be used as a spare for the demonstration. Do not use the spare aircraft for static display since it negates the purpose of a spare aircraft for the demonstration.

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

1.17.1. **(Added)** Demonstration team spare aircraft can be used as a static display provided there is absolutely no 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. When applicable, wing commanders will forward OCONUS aircraft static or tour requests to A3TA for A8Z coordination and A3 approval, per SENIOR JERSEY Security Classification Guide (SCG).

1.18. Disbursement of Demonstration Team Funds. Per MAJCOM supplement.

1.18. (ACC) Disbursement of Demonstration Team Funds. The wing commander is responsible for funding his or her assigned wing's Single-Ship Demonstration 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 FM office to ACC/FM, info A3TA. Periodically (pending availability of funds), A3 may provide funding to demonstration teams for audiovisual and other equipment required by this Supplement or the AFI. The demonstration teams are responsible for maintenance and upkeep costs of equipment provided by ACC, to include purchasing new equipment, if their equipment is lost, broken or stolen.

1.19. Shortened/Modified Demonstrations. On occasion, certain air or trade shows may require that a demonstration pilot fly a shortened or modified show, due to 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

demonstration 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 four 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). Demo pilots will submit a modified profile through command aerial events to MAJCOM/A3 for approval NLT three weeks prior to the show. (T-2). (OCONUS MAJCOM/A3s (PACAF) may delegate the approval authority for modified profiles no lower than WG/CC. Include delegation of approval authority in the MAJCOM supplement to AFI 11-246, Vol. 1.) 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. (Added-ACC) HF Procedures: Flights are scheduled per paragraph **1.6**. HF maneuvers are performed IAW **Chapter 8**.

1.20.1. **(Added-ACC) HF Formation Restrictions.** Recommended radio communication plan is per USAF Heritage Flight Briefing Guide provided by A3TA.

1.20.1.1. **(Added-ACC)** Four-ship maximum in fingertip, route, echelon, or diamond formation.

1.20.1.2. **(Added-ACC)** A two-ship formation "Cross-over" break may be performed only with the warbird aircraft in the lead. The ACC Single-Ship Demonstration 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".

1.20.1.3. **(Added-ACC)** 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.

1.20.1.4. **(Added-ACC)** 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.

1.20.1.5. **(Added-ACC) HF Cross Country Procedures.** USAFHFP pilots are authorized to fly cross country together provided the following items are accomplished:

1.20.1.5.1. **(Added-ACC)** The flight will remain VMC at all times.

1.20.1.5.2. **(Added-ACC)** Pilots will thoroughly brief the mission using the USAF Heritage Flight Dissimilar Formation Briefing Guide and applicable Air Force Instructions.

- 1.20.1.5.3. **(Added-ACC)** Visual signals will be thoroughly briefed in the event of radio failure.
- 1.20.1.6. **(Added-ACC)** At air shows, if there is more than one ACC demonstration pilot or another active duty HF pilot and the scheduled warbird falls out of the HF, the demonstration 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.) demonstration pilots or active duty HF pilot are authorized to fly the scheduled event alone, with wingman other demonstration pilot or active duty HF pilot (2-ship max).
- 1.20.2. **(Added-ACC)** 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 must be submitted to the 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.
- 1.20.3. **(Added-ACC)** In-flight photography of HFs requires A3 approval. Lead Single-Ship Demonstration Pilots will submit through their wing leadership a completed photo-shoot package to A3TA for staffing.
- 1.20.4. **(Added-ACC)** Prior to each HF, a briefing will include all items covered in the Heritage Flight Dissimilar Formation Briefing Guide IAW [Attachment 4](#). All HFs will be debriefed. The most senior demonstration pilot (determined by time as a demo pilot, then date of rank) or active duty HF pilot if no demonstration pilot is at the airshow/event will be the flight lead. The flight lead is responsible for the safe conduct of the flight, and does not necessarily lead the formation. Additionally, the flight lead will ensure all HF participants, both civilian and military, project the highest professional standards of the USAF.
- 1.20.5. **(Added-ACC)** 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 3 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 A3TA for authorization to proceed.

Chapter 2

DEMONSTRATION TEAM PERSONNEL SELECTION AND TRAINING

2.1. General. MAJCOMs will provide team description and location via supplement. A standard team includes two aircraft, one demonstration pilot, a minimum of two narrators, two safety observers, 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.

2.1. (ACC) General. ACC has the following Single-Ship Demonstration Teams. All teams will include two aircraft:

2.1.1. **(Added-ACC)** - F-16 at Shaw AFB, SC. (Demo & HF)

2.1.2. **(Added-ACC)** - F-22 at Joint Base Langley-Eustis, VA. (Demo & HF)

2.2. Demonstration Pilot Selection. New demonstration 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. Demonstration pilot duty is normally a two-year assignment.

2.2. (ACC) Demonstration Pilot Selection. ACC Single-Ship Demonstration Pilots will 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. Narrators are selected by the wing commander. 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. The narrator tour of duty is a minimum of one year.

2.3.2. 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 PCS/deployment reasons if necessary, but the maximum number remains six. Record all ground safety observer names in the demo team grade book.

2.4. Support Personnel Selection. Support personnel are selected by the wing commander. As new enlisted personnel are assigned to the demonstration teams, it is appropriate to request assignment deferments. However, since AFPC's support/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. Training. Accomplish training according to the guidelines of this instruction and as supplemented.

2.5. (ACC) Training. (T-2) Training for the USAFHFP is completed at the annual HFTC IAW paragraph 2.7. The HFTC is designed to train ACC Single-Ship Demonstration Pilots to perform their HF mission. This training is also a requirement for certification of new AFHFF civilian pilots. A3TA will coordinate military and civilian aircraft availability for the HFTC. A3TA will develop the HFTC academic and flying training schedules to accomplish all training syllabus requirements for ACC Single-Ship Demonstration pilots and civilian warbird pilots.

2.5.1. 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.

2.5.2. Perform maneuvers and maneuver sequences as described in this AFI. New demonstration pilots will demonstrate proficiency in the high, low, and flat show profiles. (T-2).

2.5.3. New demonstration pilots will receive flight training from a currently qualified demonstration pilot. (T-2). Each new demonstration pilot will receive extensive ground training from their predecessor or a currently qualified demonstration pilot. (T-2).

2.5.3. (ACC) Demonstration 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.

2.5.4. New demonstration pilots receive training in aircraft flight control limitations and performance characteristics affecting the demonstration profile. New demonstration pilots receive training on common conditions leading to aborts for each maneuver. F-16 demonstration pilots receive training on the flight control system, FLCS limiters and their effect on level flight, and sustaining inverted level flight at <165 KCAS.

2.5.4. (ACC) For the purpose of professional pilot development, with respective wing commander approval, ACC Demonstration Team pilots are authorized flights offered by: ACC Single-Ship Demonstration Pilots, AFHFF pilots and National Demonstration Teams (Thunderbirds, Blue Angels, Snow Birds, Red Arrows, US Navy TAC Demo) and recognized by ICAS Aerobatic Competency Evaluators (ACE) and Inspectors. All other request must be submitted to A3TA for approval. These flights will not impact team deployments, performances, or redeployments. In order to showcase the joint/coalition operating capabilities of the US military and coalition partners, ACC Single-Ship Demonstration Pilots are authorized to fly dissimilar formation (no aerobatics) with other military demonstration teams when the opportunity presents itself (ex: arrival day). These flights must be thoroughly briefed with all participants.

2.5.5. New demonstration pilots and ground safety observers receive academic and flight training for abort procedures. Furthermore, the established abort procedures are standardized by MDS. Demonstration pilots will conduct a minimum of three abort procedures during upgrade sorties TS-5 through TS-11. (T-2).

2.5.5. (ACC) Prior to performing public HFs, ACC Single-Ship Demonstration Pilots will train with a certified AFHFF pilot, and AFHFF pilots will train with a certified ACC Single-Ship Demonstration Pilot. All training will be accomplished in VMC and documented in the

student activity record in the pilot's grade book. A3TA will develop a grade book for each new HF pilot. 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 A3TA approval. A3TA will maintain the official AFHFF pilots' training folders (grade books). A3, or the designated representative attending the annual HFTC, will certify both Single-Ship Demonstration and AFHFF pilots to perform HFs. Single-Ship Demonstration 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 **AFI 11-246 para. 2.6.**

2.5.5.1. **(Added-ACC)** Following successful completion of training, A3 will approve those HF pilot applicant(s) who qualify to support the program. He will include the current and new AFHFF pilots in the annual letter to the FAA. Certified civilian Heritage Flight pilots are authorized recurring training flights with ACC Single-Ship Demonstration Pilots in ACC aircraft to acquaint themselves with flight characteristics of ACC modern fighter aircraft participating in dissimilar formation flights. Participants are required medical clearance, egress and ejection seat training prior to flight.

2.5.5.2. **(Added-ACC)** AFHFF pilots must sign and submit gratuitous service paperwork to A3TA prior to participating in any USAFHFP performances.

2.5.6. New demonstration pilots who fly off-station demonstrations will attend a minimum of two air shows with the current demonstration pilot. (T-2). If possible, have the new pilot fly with the current demonstration pilot in each air show practice demonstration (N/A for A-10 & F-22).

2.5.6. **(ACC)** For initial training, certification and annual re-certification AFHFF pilots must meet or have the following qualifications:

2.5.6.1. **(Added-ACC)** 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.

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

2.5.6.3. **(Added-ACC)** Be less than 65 years of age. Furthermore, pilots will no longer fly HFs upon reaching the age of 65.

2.5.6.4. **(Added-ACC)** Current Class II Medical Certificate.

2.5.6.5. **(Added-ACC)** Current Level II Statement of Aerobatic Competency (SAC) card or FAA equivalent low-level card.

2.5.6.6. **(Added-ACC)** Commercial Pilot Certificate.

2.5.6.7. **(Added-ACC)** Access to, or ownership of, a WWII, Korean, Vietnam, or Desert Storm era US Army Air Corps or USAF pursuit/fighter/attack-type warbird with a current annual inspection.

2.5.6.8. **(Added-ACC)** 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.

2.5.6.9. **(Added-ACC)** Exceptions to the above qualifications must be approved by A3 on a case-by-case basis.

2.5.6.10. **(Added-ACC)** A3 may remove individuals from the certified HF Pilot list for circumstances that compromise safety, the better image of the United States Air Force, or for failing to maintain the minimum qualifications.

2.5.6.11. **(Added-ACC) Annual HFTC Training. (T-2)** Current ACC Single-Ship Demonstration Pilots will be scheduled to fly, as a minimum, two training sorties at the annual HFTC. At a minimum, one of the training sorties must be a three or four-ship. Only front-seat sorties, with the pilot actuating the controls, will count as a re-currency sortie. The AFHFF pilots must complete at least one training sortie for re-certification. 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 A3TA; and accomplish a training sortie prior to performing HFs at a public event. Demo pilots must forward AFHFF documentation to ACC for re-certification. Air show practices are non-public events.

2.5.6.12. **(Added-ACC)** 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 the new warbird, the pilot must complete a HF training sortie in that warbird.

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

2.5.7. A-10 and F-22 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.

2.5.8. For F-15E & F-16 the currently qualified demonstration pilot monitoring the training program will observe the first solo training flight from the ground, and may act as the safety observer. (T-2).

2.5.9. Accomplish all training in VMC. Ensure each practice, except TS-3 and TS-4, is over a runway environment. Videotape all training flights below 2,000 feet AGL.

2.5.10. Thoroughly train demonstration team film crews. Training should emphasize equipment operation, sound techniques to capture demonstration narration, and techniques to capture the ground environment in the field of view during low altitude maneuvers.

2.5.11. Document training performance in an official grade book 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).

2.5.12. Final wing commander review, pre/re-certification of the demonstration crew and ground safety observer will be documented and forwarded by the wing commander IAW [paragraph 1.4.5.3](#) or [1.4.5.4](#). (T-2). First-year pilots who fly demonstrations off-station must accomplish at least one practice flight off home station prior to MAJCOM/CC certification. (T-2).

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

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

2.5.13.2. Upgrading pilots who fly demonstrations off-station are required to practice at a minimum of three separate off-station sites at Stage 1 (higher) altitudes prior to the first official public demonstration. (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. At overseas locations where this requirement is impractical, all practice demonstrations 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.

2.5.13.2.1. These off-station practices require former demonstration pilot observation and/or supervisor observation (no less than OG/CD or WG/CC designee).

2.5.13.2.2. All ground video or HUD recordings and grade sheets for off-station practices require former demonstration pilot and OG/CC or WG/CC designee review.

2.5.13.2.3. NAF / MAJCOM/CC certifications may be used for partial fulfillment of this requirement.

2.5.13.3. In order to conduct off station demonstrations at stage 2 minimums, upgrading demo pilot must first accomplish and document IAW [paragraph 2.5.11](#) the 3 off-station practices at stage 1 minimums, and have home station certification at stage 2 minimums. (T-2). Document this certification in the upgrading pilot's grade book.

2.5.13.3. (ACC) Wing Commanders, delegated no lower the Operations Group Commander, may certify demonstration 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.

2.5.14. Ground Safety Observer Training

2.5.14.1. During any capability demonstration the ground safety observer is responsible to advise the demonstration 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 so that 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.

2.5.14.2. 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 FARs that require waiver; 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 base attend the Air Shows 101 course at ICAS each year. Ground safety observers are also familiar with all applicable procedures and parameters relevant to MDS in this publication.

2.5.14.3. 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 demonstration. (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 demonstration while under the observation of a certified safety observer. (T-2). Document this training in the demo team grade book.

2.6. Training Syllabus.

2.6.1. GT-1 (Ground Training):

- 2.6.1.1. Standard Procedures
- 2.6.1.2. Fuel Requirements
- 2.6.1.3. Waivers
- 2.6.1.4. Aircraft Handling Characteristics
- 2.6.1.5. Safety Considerations
- 2.6.1.6. G-Awareness
- 2.6.1.7. Lessons Learned
- 2.6.1.8. Emergency/Abort Procedures
- 2.6.1.9. Team Management
- 2.6.1.10. Scheduling
- 2.6.1.11. All Ground Safety Observer academic topics

2.6.2. GT-2: LOWAT Academics.

- 2.6.2.1. LOWAT Environment

- 2.6.2.2. LOWAT Crosscheck
- 2.6.2.3. LOWAT /Air show Hazards
- 2.6.2.4. Handling Emergency and Abort Procedures
- 2.6.2.5. LOWAT effects on aircraft performance
- 2.6.2.6. Visual Illusions
- 2.6.3. GS-1 (Ground Simulator Training)
 - 2.6.3.1. High and Low Show Profiles
 - 2.6.3.2. Crosschecking parameters during Maneuver Description
 - 2.6.3.3. Abort Procedures
 - 2.6.3.4. Abort Mechanics
 - 2.6.3.5. High-speed Dive Recoveries
 - 2.6.3.6. Slow-speed Maneuvering
 - 2.6.3.7. Recognition and Prevention of Out-of-Control Situations
 - 2.6.3.8. Emergency Procedures
- 2.6.4. TS-1 (Back seat of a two-seat model; N/A for A-10 & F-22):
 - 2.6.4.1. Standard ACC Demonstration Profile – High show
 - 2.6.4.2. Minimum Run/Wet Runway Landing
- 2.6.5. TS-2 (Back seat of a two-seat model; N/A for A-10 & F-22)
 - 2.6.5.1. Standard ACC Demonstration Profile – Low show
- 2.6.6. TS-3 (Front seat of a two-seat model; N/A for A-10 & F-22):
 - 2.6.6.1. Standard ACC Demonstration Profile – High show
 - 2.6.6.2. Accomplish above 5,000 feet AGL
 - 2.6.6.3. Emergency/Maneuver Abort Procedures
- 2.6.7. TS-4 (Front seat of a two seat model; N/A for A-10 & F-22):
 - 2.6.7.1. Standard ACC Demonstration Profile – Low show
 - 2.6.7.2. Accomplish above 5,000 feet AGL
 - 2.6.7.3. Emergency/Maneuver Abort Procedures
- 2.6.8. TS-5 through TS-11 (Front seat of a two-seat model; N/A for A-10 & F-22):
 - 2.6.8.1. Standard ACC Demonstration Profiles (upgrading demonstration pilots will demonstrate a safe level of proficiency on both high and low shows prior to solo – N/A for A-10 & F-22) (T-2).
 - 2.6.8.2. Accomplished over a runway, initial minimum altitude is 2,000 feet AGL

2.6.8.3. Step down from 2,000 feet AGL determined by currently qualified demonstration pilot monitoring the training program

2.6.8.4. Minimum run/wet runway landing

2.6.9. TS-12 through TS-16 (Solo): A-10 & F-22 pilots will demonstrate a safe level of proficiency on both high and low shows. (T-2).

2.6.10. TS-17 (Solo): Wing/CC high show certification.

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

2.7.1. **(Added-ACC)** HF-GT (Ground Training) Accomplish prior to HF-TS-2. USAFHFP pilots will receive ground training from a certified HF pilot:

2.7.1.1. **(Added-ACC)** Regulations (FAA/ACC guidelines)

2.7.1.2. **(Added-ACC)** USAF Heritage Flight Briefing Guide

2.7.1.3. **(Added-ACC)** Formation profiles/combinations

2.7.1.4. **(Added-ACC)** Communications

2.7.1.5. **(Added-ACC)** Join-up

2.7.1.6. **(Added-ACC)** Airspeed compatibility/control

2.7.1.7. **(Added-ACC)** Sight pictures

2.7.1.8. **(Added-ACC)** Formation changes

2.7.1.9. **(Added-ACC)** Flight break-up/landing

2.7.2. **(Added-ACC)** HF-TS-1 (N/R but desired for F-22) (Rear Cockpit (RCP) of modern fighter (active duty), RCP of warbird (HF civilian applicant)):

2.7.2.1. **(Added-ACC)** Observation flight

2.7.2.2. **(Added-ACC)** Join-up

2.7.2.3. **(Added-ACC)** Sight picture (lead and wing)

2.7.2.4. **(Added-ACC)** HF pass profiles (lead and wing)

2.7.2.5. **(Added-ACC)** Flight break-up

2.7.2.6. **(Added-ACC) Note:** Attempt to accomplish at the end of the previous show season to minimize the scheduled sorties at the annual HFTC. The F-22 demonstration 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.

2.7.3. **(Added-ACC)** HF-TS-2 (Two-ship):

2.7.3.1. **(Added-ACC)** Vintage fighter lead/ACC fighter wing

2.7.3.2. **(Added-ACC)** Join-up

2.7.3.3. **(Added-ACC)** Formation work-airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes

- 2.7.3.4. **(Added-ACC)** HF pass profiles (vintage fighter lead)
- 2.7.3.5. **(Added-ACC)** Flight break-up
- 2.7.3.6. **(Added-ACC)** ACC fighter lead/vintage fighter wing
- 2.7.3.7. **(Added-ACC)** Formation work-airspeed compatibility, climb/decent compatibility, cross-unders, breakouts, lead changes
- 2.7.3.8. **(Added-ACC)** HF pass profiles (ACC fighter lead)
- 2.7.3.9. **(Added-ACC)** Flight break-up
- 2.7.4. **(Added-ACC)** HF-TS-3 (Three-ship):
 - 2.7.4.1. **(Added-ACC)** ACC fighter lead/Vintage fighter (x2) wing
 - 2.7.4.2. **(Added-ACC)** Join-up
 - 2.7.4.3. **(Added-ACC)** Formation work-airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes
 - 2.7.4.4. **(Added-ACC)** HF pass profiles (ACC fighter lead)
 - 2.7.4.5. **(Added-ACC)** Flight break-up
 - 2.7.4.6. **(Added-ACC) Note:** Although not ideal, this sortie may be combined with HF-TS-4 by adding a fourth aircraft following the three-ship requirements.
- 2.7.5. **(Added-ACC)** HF-TS-4 (Four-Ship):
 - 2.7.5.1. **(Added-ACC)** Join-up
 - 2.7.5.2. **(Added-ACC)** Formation work-airspeed compatibility, climb/descent compatibility, cross-unders, breakouts, lead changes
 - 2.7.5.3. **(Added-ACC)** HF pass profiles (vintage fighter lead)
 - 2.7.5.4. **(Added-ACC)** Flight break-up
- 2.7.6. **(Added-ACC)** 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:
 - 2.7.6.1. **(Added-ACC)** For ACC Demo Pilots: Fly a back seat P/TF-51 sortie during a 2,3,4-ship HF profile.
 - 2.7.6.2. **(Added-ACC)** For AFHFF Pilots: Fly a back seat F-16 sortie during 2,3,4-ship HF profile.

Chapter 3

A-10 DEMONSTRATION MANEUVERS

Section 3A—General Information

3.1. General. Use maneuvers described in this chapter for training and for A-10 aerial demonstrations. The demonstration 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. Demonstration 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 monitors the demonstration pilot altitude and airspeed radio calls and directs an abort when parameter limits are exceeded. 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. Ensure aircraft configuration for all demonstrations is clean (no wing pylons or missiles except wingtip smoke winders) and internal fuel. Each demonstration uses approximately 1,000 pounds of fuel. Optimum performance is obtained when fuel load is 3,500 pounds; however, the demonstration 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.

3.3. Airspeed and G Limits. The A-10 demonstration is flown 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 demonstration profile is 6.0 Gs. This does not preclude a momentary increase in G for safety considerations.

3.4. Show Line Restrictions. The majority of the A-10 demonstration 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.

3.5. 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 3,000 feet wide, 4,000 feet long, and 7,000 feet AGL (high show). If the FAA has waived a show line to closer than 1,500 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 5,000 feet x 75 feet. Ensure the runway, taxiway, and parking area are stressed for a 35,000-pound aircraft with single wheel type landing gear.

3.6. Weather Requirements. Weather PARAMETER LIMITS for the high show profile are a ceiling of at least 5,000 feet, 3 miles ground and 5 miles in-flight visibility with a discernible horizon. The low show profile ceiling is at least 3,500 feet. The flat show profile ceiling is at least 1,500 feet. 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.

3.7. Demonstration Profiles.

3.7.1. High Show

- 3.7.1.1. Takeoff
- 3.7.1.2. Flat Pass
- 3.7.1.3. Vertical 540
- 3.7.1.4. Split-S
- 3.7.1.5. Double Aileron Roll
- 3.7.1.6. Slow Roll
- 3.7.1.7. Cuban 8
- 3.7.1.8. 1/2 Reverse Cuban Eight
- 3.7.1.9. Level 360
- 3.7.1.10. Gear Down Pass
- 3.7.1.11. Pop-Up Strafe Pass
- 3.7.1.12. Two Low Angle Strafe Passes
- 3.7.1.13. Jink Out
- 3.7.1.14. Four-Point Roll
- 3.7.1.15. Dedication Pass
- 3.7.1.16. Tactical Pitch-Up to Land

3.7.2. Low Show

- 3.7.2.1. Takeoff
- 3.7.2.2. Flat Pass
- 3.7.2.3. Double Aileron Roll
- 3.7.2.4. Slow Roll
- 3.7.2.5. Cuban 8
- 3.7.2.6. Level 360
- 3.7.2.7. Gear Down Pass
- 3.7.2.8. Pop-Up Strafe Pass
- 3.7.2.9. Two Low Angle Strafe Passes

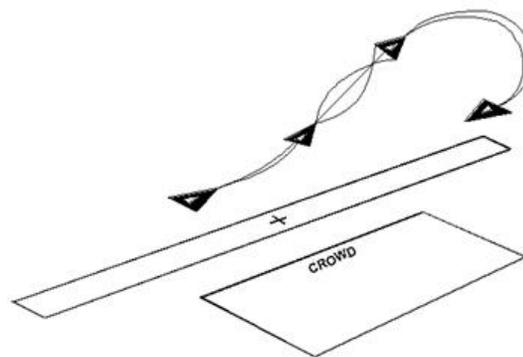
- 3.7.2.10. Jink Out
- 3.7.2.11. Four-Point Roll
- 3.7.2.12. Dedication Pass
- 3.7.2.13. Tactical Pitch-Up to Land

3.7.3. Flat Show

- 3.7.3.1. Takeoff
- 3.7.3.2. Flat Pass
- 3.7.3.3. Double Aileron Roll
- 3.7.3.4. Slow Roll
- 3.7.3.5. Level 360
- 3.7.3.6. Gear Down Pass
- 3.7.3.7. Pop-Up Strafe Pass
- 3.7.3.8. Two Low Angle Strafe Passes
- 3.7.3.9. Four Point Roll
- 3.7.3.10. Dedication Pass
- 3.7.3.11. Tactical Pitch-Up to Land

3.8. Repositioning Turn.

Figure 3.1. A-10 Repositioning Turn.



**Repositioning Turn
A-10**

Table 3.1. A-10 Repositioning Turn Parameters.

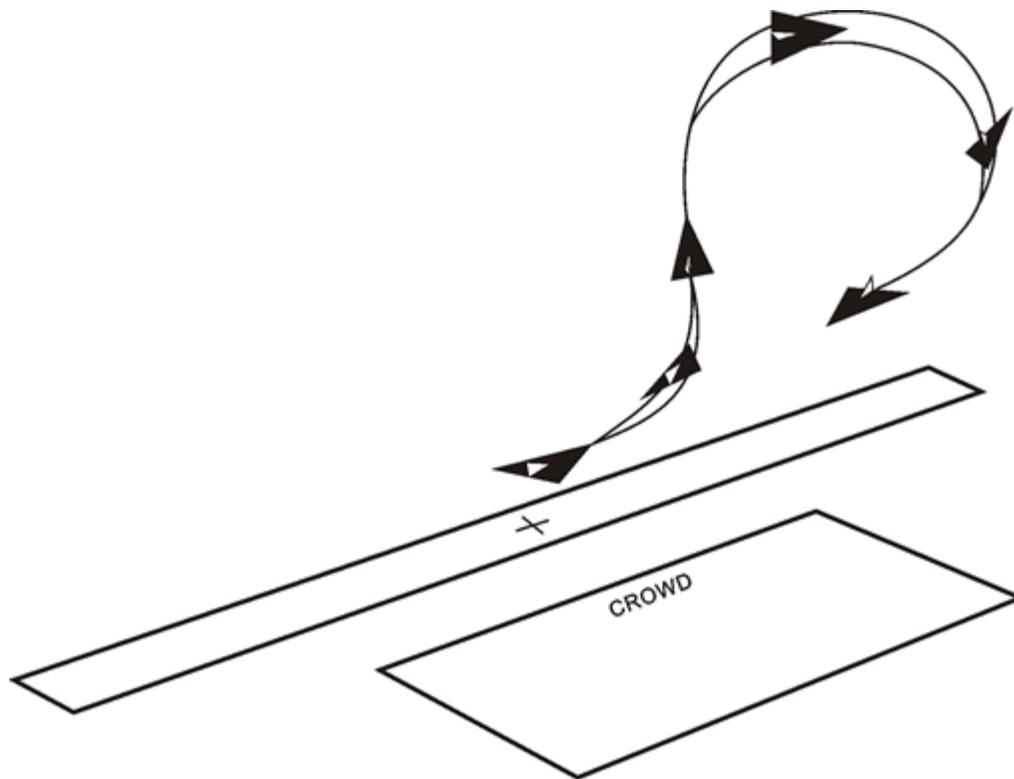
TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	G
Entry	300'	300	MAX		5 to 6
Exit	300'	N/A	N/A		N/A
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	200'	120 / N/A	MAX	7.33
Exit	min	200'	N/A / N/A	N/A	N/A

3.8.1. **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 demonstration 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 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.

3.8.2. **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.

3.9. High Speed Reposition Maneuver.

Figure 3.2. A-10 High Speed Reposition Maneuver.



**High Speed Reposition Maneuver
A-10**

Table 3.2. A-10 High Speed Reposition Maneuver Parameters.

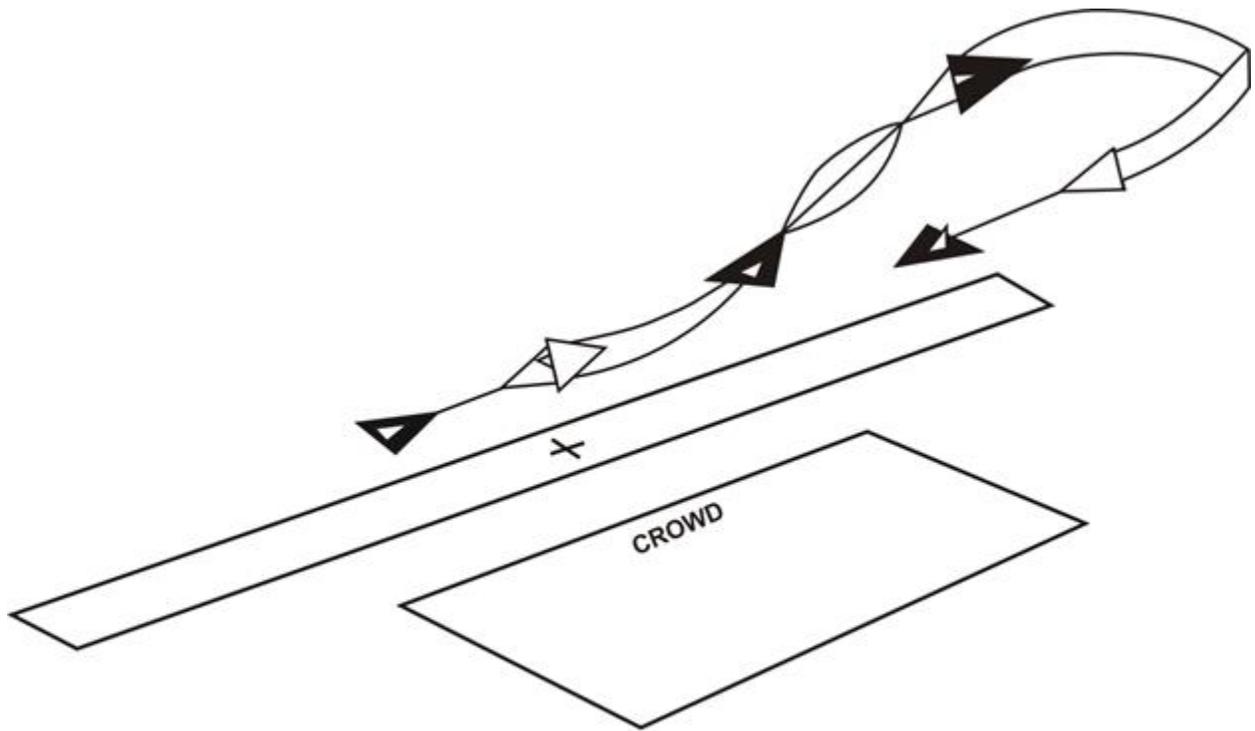
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	330	MAX	5 to 6
Exit	300'	400	MAX	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	400'	290 / AC LMT	MAX	7.33
Exit	min 200'	300 / AC LMT	MAX	7.33

3.9.1. **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 using 5.0 to 6.0 Gs to level off at the appropriate entry altitude for the next maneuver.

3.9.2. **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.

3.10. Flat Wifferdill 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 so that 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 3.3. A-10 Flat Wifferdill Reposition Maneuver.



Flat Wifferdill Maneuver A-10

Section 3B—High Profile

3.11. Takeoff.

Figure 3.4. A-10 Takeoff

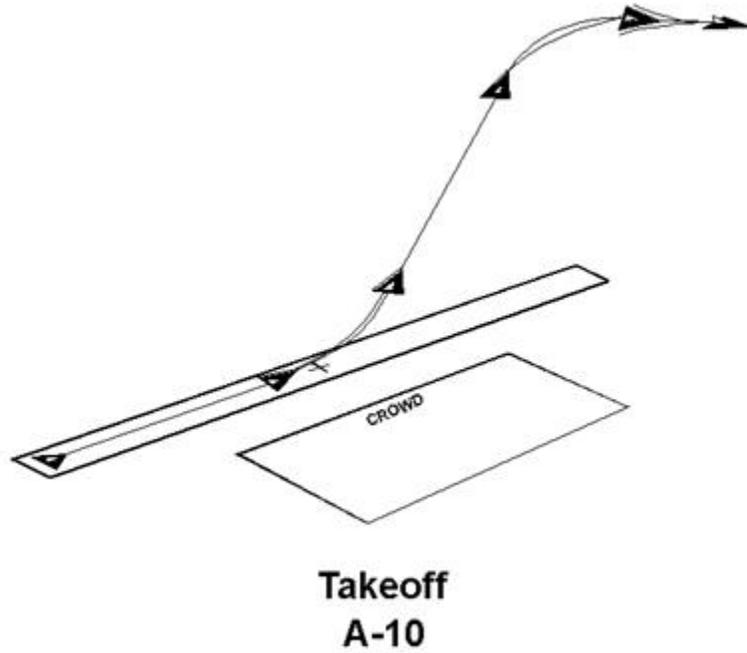


Table 3.3. A-10 Takeoff Parameters.

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

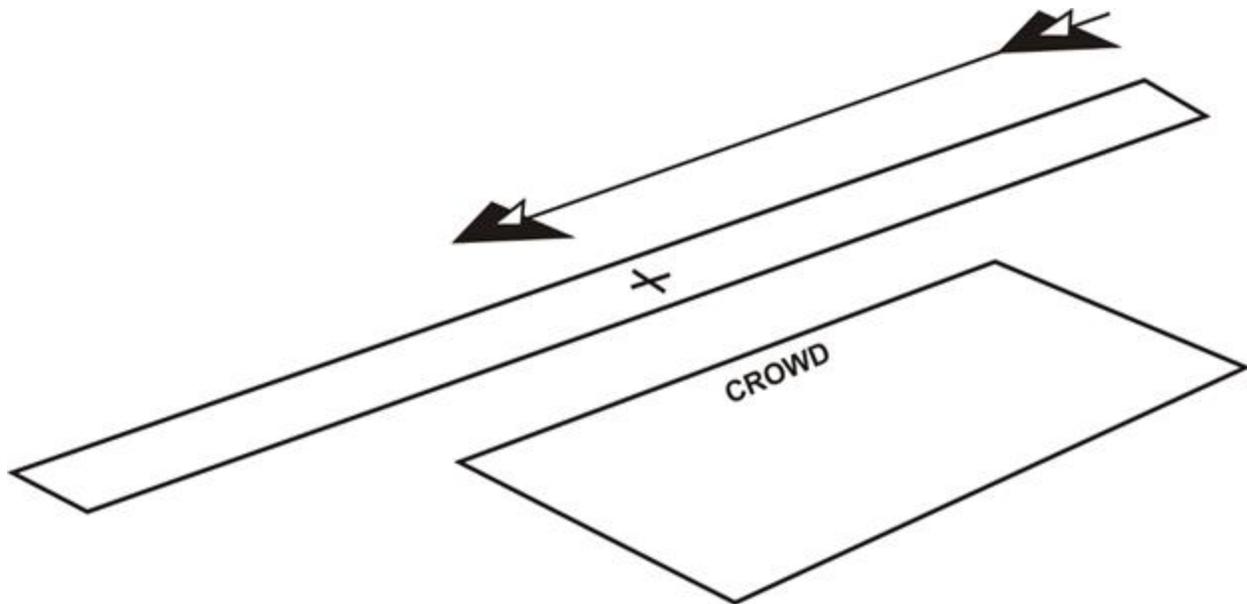
Entry	20'	175 / N/A	MAX	7.33
Exit	N/A	N/A / N/A	N/A	N/A

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 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. TOLD data 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.



Flat Pass A-10

Table 3.4. A-10 Flat Pass Parameters.

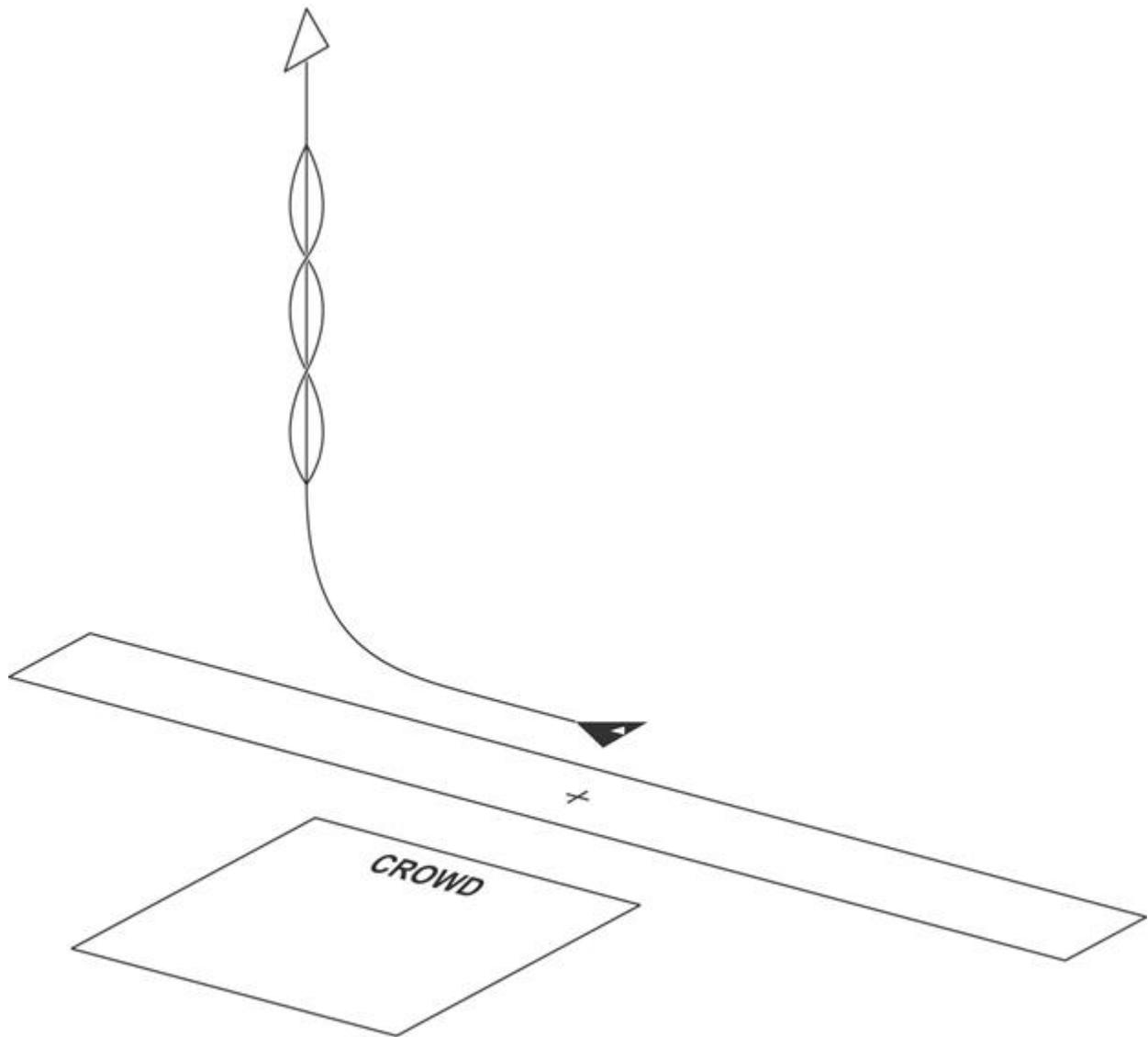
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	325	MAX	5-6
Exit	300'	325	MAX	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	200'	200 / AC LMT	MAX	N/A
Exit	min 200'	200 / AC LMT	MAX	N/A

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 demonstration maneuver in the approved direction relative to the crowd line. It may be flown in either direction at any time during the demonstration 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.



Vertical 540
A-10

Table 3.5. 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 1,500' 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 aerobic-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.

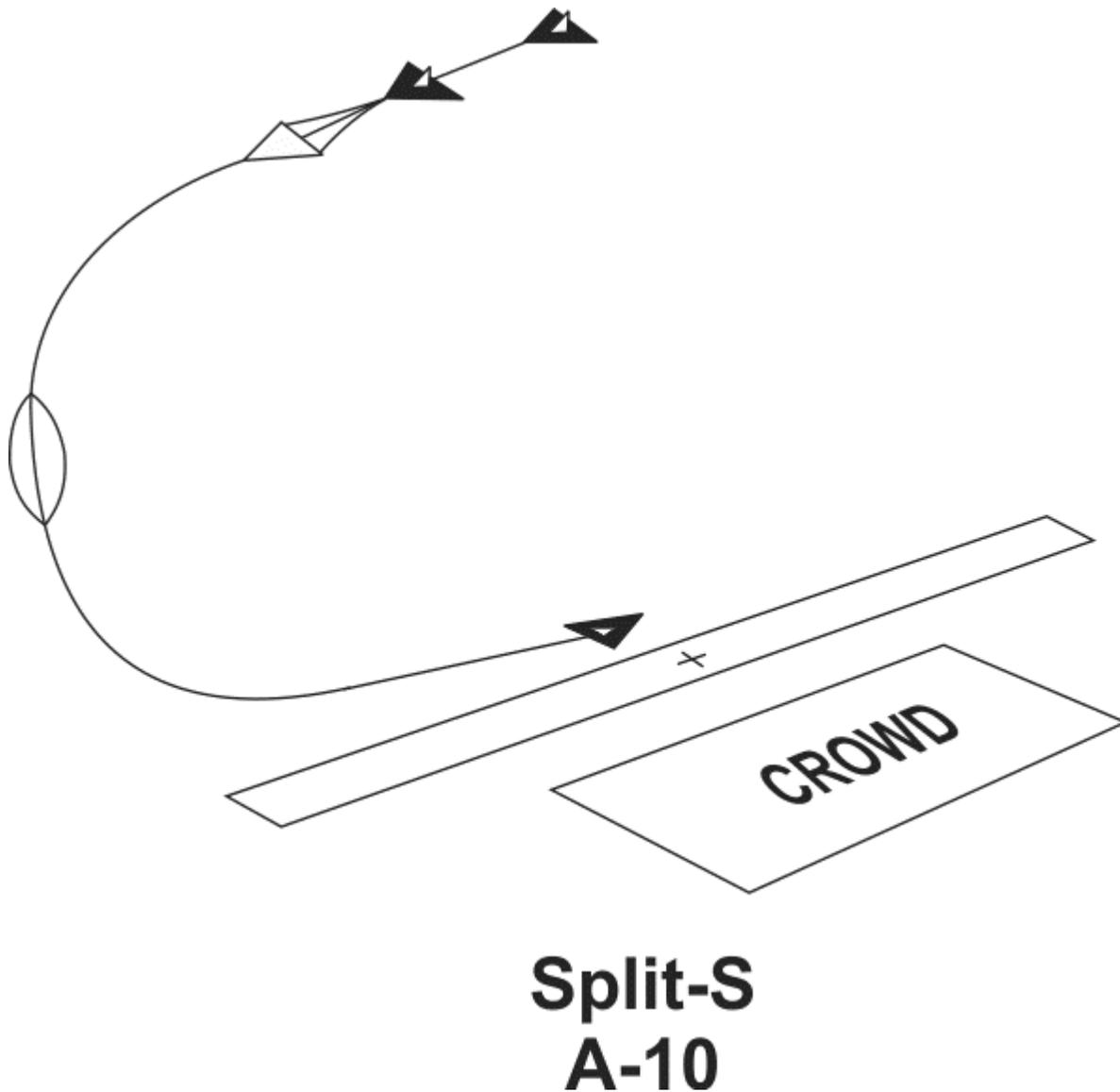


Table 3.6. A-10 Split-S Parameters.

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

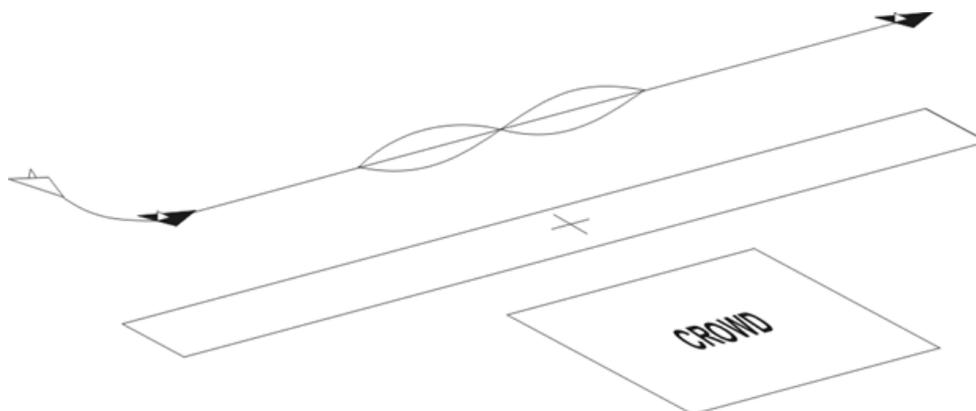
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 4,500'	120 / 250	MAX	N/A
90 deg nose low		N/A / 375		
Exit	min 400'	N/A / N/A	A/R	N/A

3.14.1. Maneuver Description: (High Show only) On the 1,500' show line, after reaching the planned entry parameters of 5,500' 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' 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' AGL begin a 5 to 6-G pull to level off at 500' 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' 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' 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.



**Double Aileron Roll
A-10**

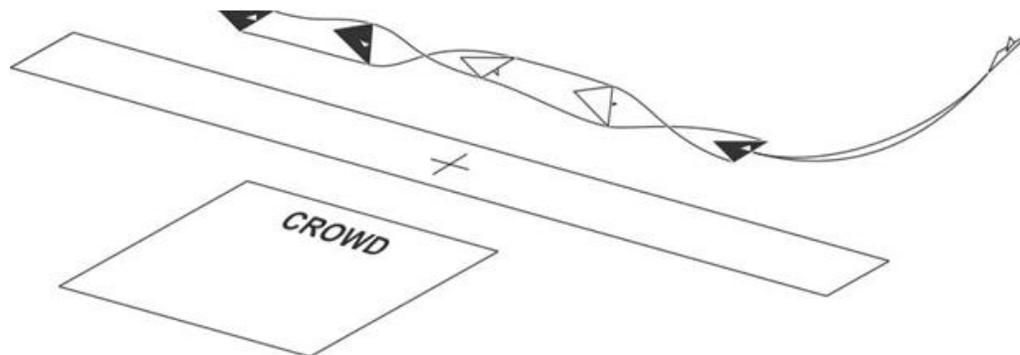
Table 3.7. A-10 Double Aileron Roll Parameters.

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' AGL on the 1,500' 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.

**Slow Roll
A-10**

Table 3.8. 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 1,500' show line at 500' AGL and 325 knots using a reposition maneuver. Approximately 2,000' prior to show center, initiate an 8 to 10-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' 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.

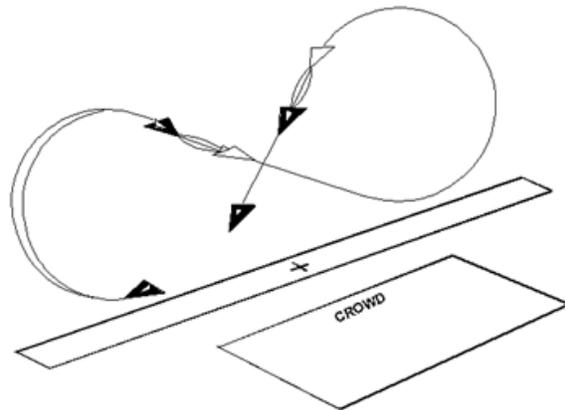
Cuban Eight
A-10

Table 3.9. A-10 Cuban 8 Parameters.

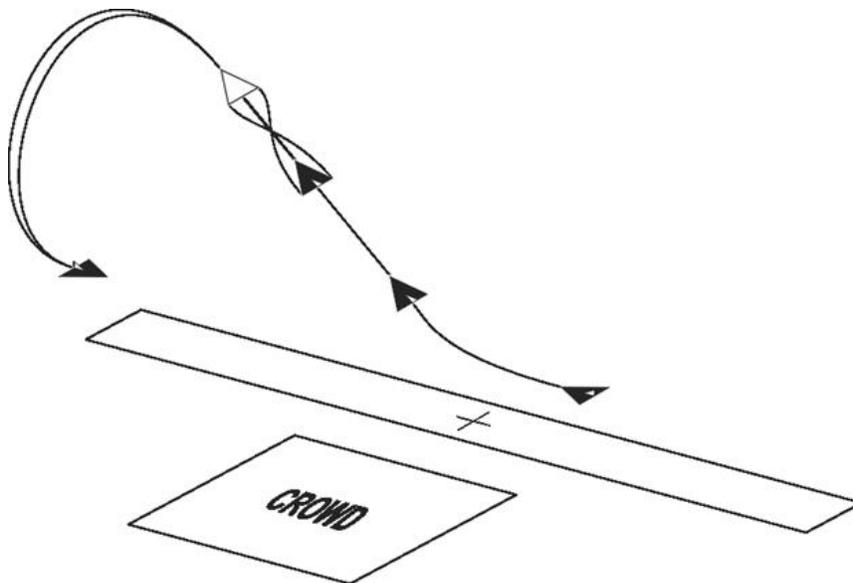
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	325	MAX	6
APEX	≥ 3,500'	180	MAX	2-4
Exit	500'	325	MAX	6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	270 / AC LMT	MAX	7.33
APEX	min 3,000'	120 / AC LMT	MAX	N/A
Exit	min 400'	275 / AC LMT	MAX	7.33

3.17.1. **Maneuver Description:** On the 1,500' 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' 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' 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' AGL on either half of the Cuban 8, execute a maximum rate 180-degree roll to wings-level at 2,500' AGL and execute recovery as described above.

3.18. $\frac{1}{2}$ Reverse Cuban 8.

Figure 3.11. A-10 $\frac{1}{2}$ Reverse Cuban 8.



**$\frac{1}{2}$ Reverse Cuban Eight
A-10**

Table 3.10. 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 1,500' 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' AGL begin a 5 to 6-G pull to level off at 500' 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' 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.

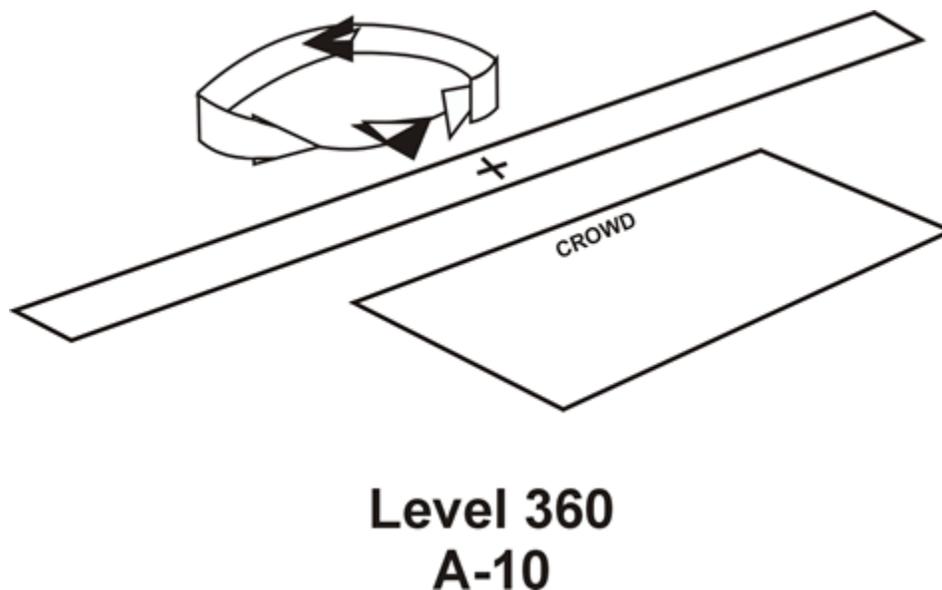


Table 3.11. A-10 Level 360 Parameters.

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

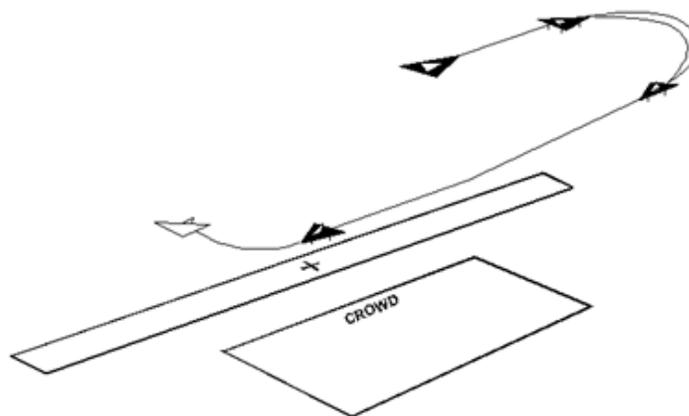
3.19.1. **Maneuver Description:** Position the aircraft on the 1,500' show line at 500' AGL and 325 knots. At show center, turn away from the crowd using approximately 85 degrees of bank. Begin the turn with a smooth G-onset-rate to maintain 6.0 Gs or the steady stall warning horn whichever occurs first. 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 3.12. A-10 Gear Down Pass Parameters.

TARGET		PARAMETERS		
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.

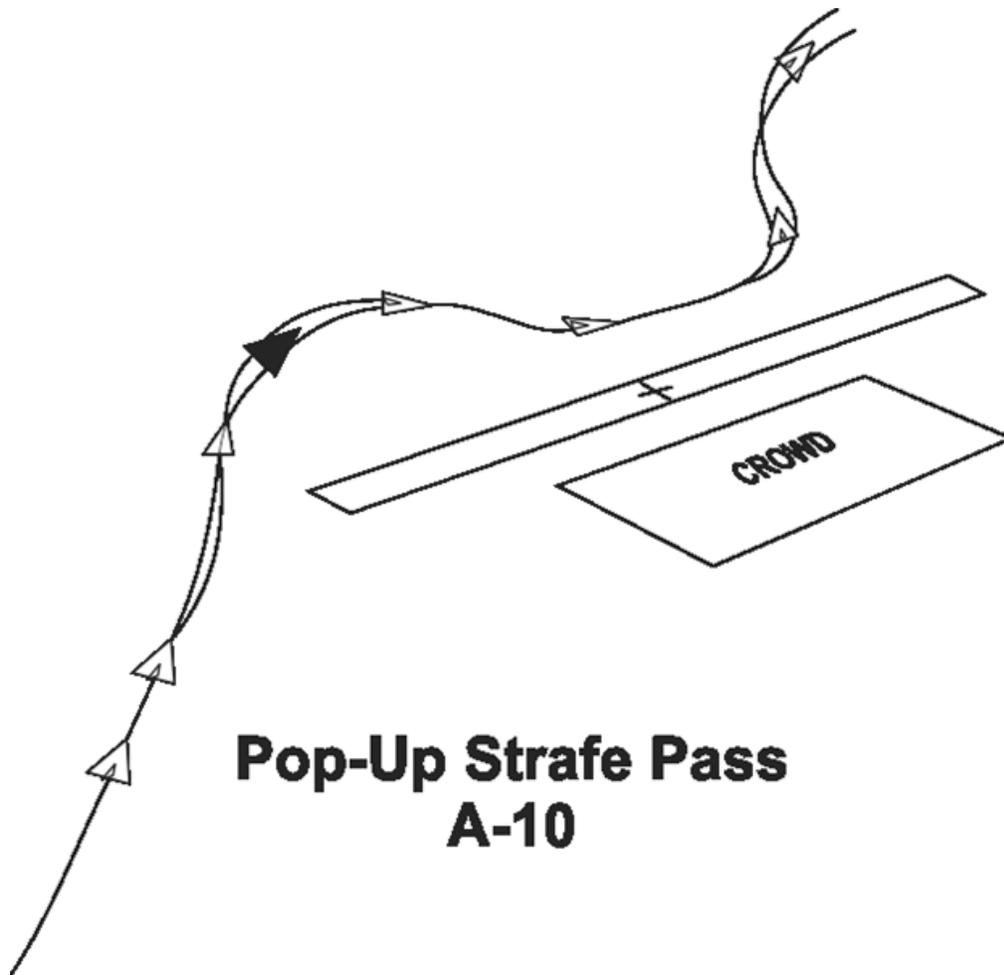


Table 3.13. A-10 Pop-Up Strafe Pass Parameters.

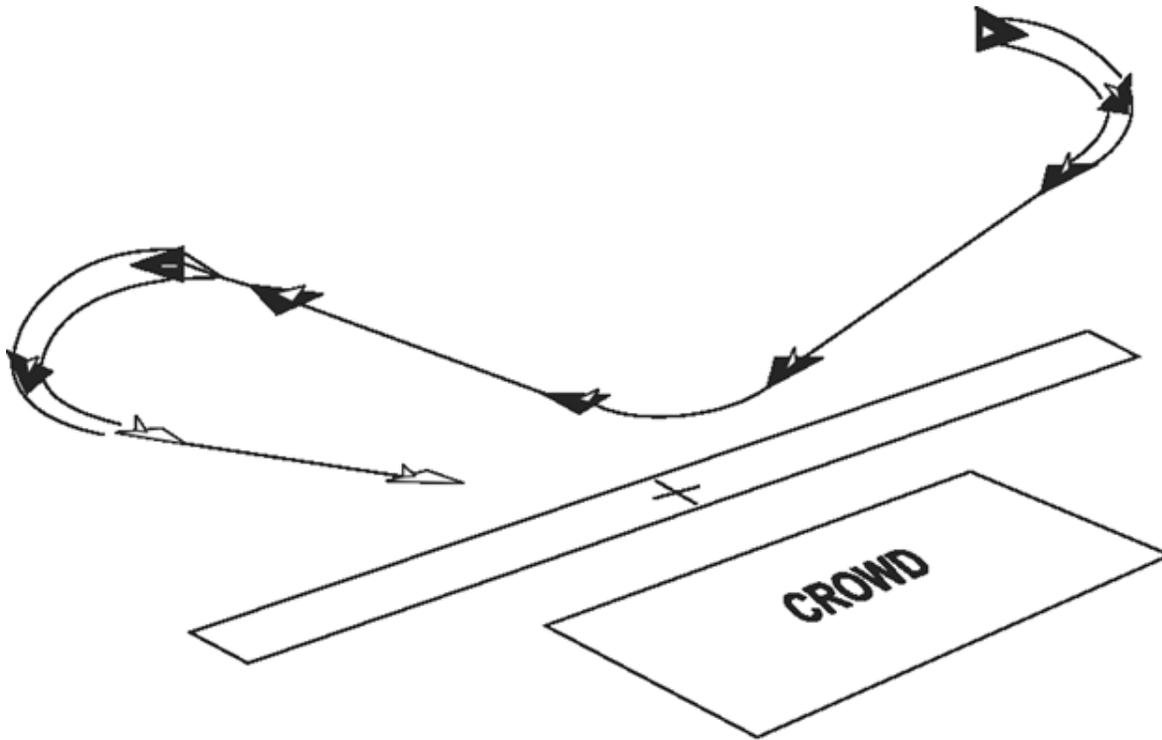
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	325	MAX	1 (6 for Pull Up)
Apex (Flat)	1,500' (1,000')	225	MAX	2-4
Exit (Pyro)	200' (400')	290	MAX	6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	200'	250 / AC LMT	MAX	7.33
Apex	1,000'	120 / AC LMT	MAX	N/A
Exit (Pyro)	100' (300')	250 / 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 that 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 250 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.



Two Low Angle Strafe Passes A-10

Table 3.14. A-10 Two Low Angle Strafe Passes Parameters.

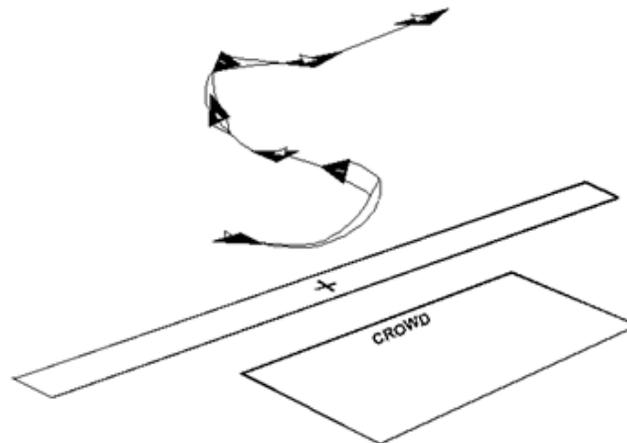
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry (Flat)	1,500' (1,000')	225	MAX	1
Exit (Pyro)	200' (400')	290	MAX	6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	1,000'	200 / AC LMT	MAX	N/A
Exit (Pyro)	100' (300')	250 / AC LMT	MAX	7.33

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 250 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

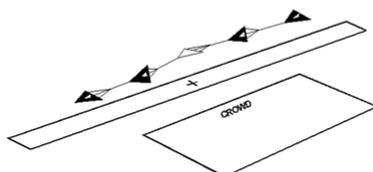
Table 3.15. A-10 Jink-Out Parameters.

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	1,900'	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 1,500-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 1,500-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

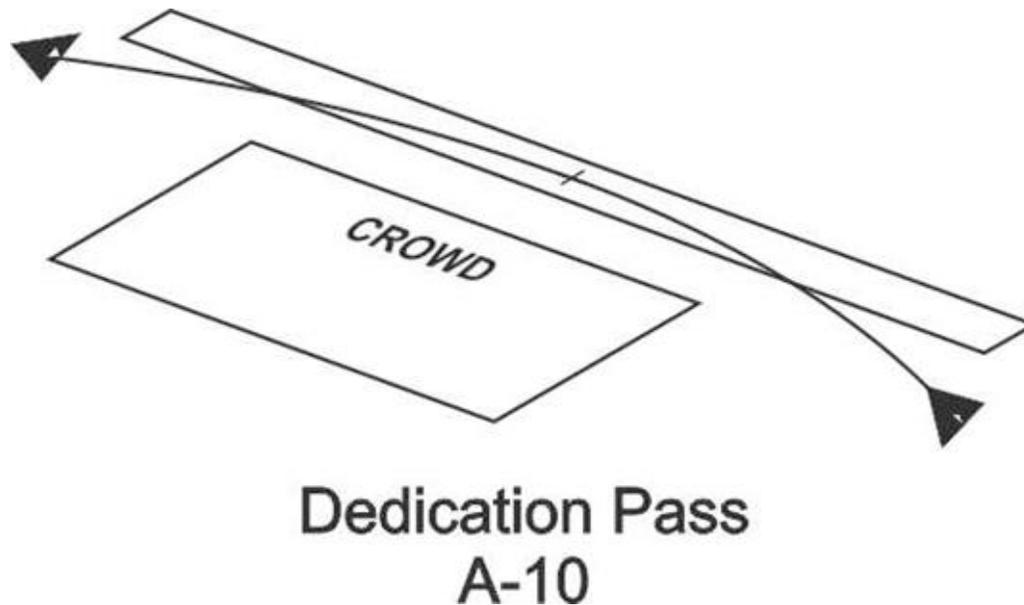
Table 3.16. A-10 Four-Point Roll Parameters.

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 1,500' 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.**Table 3.17. 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

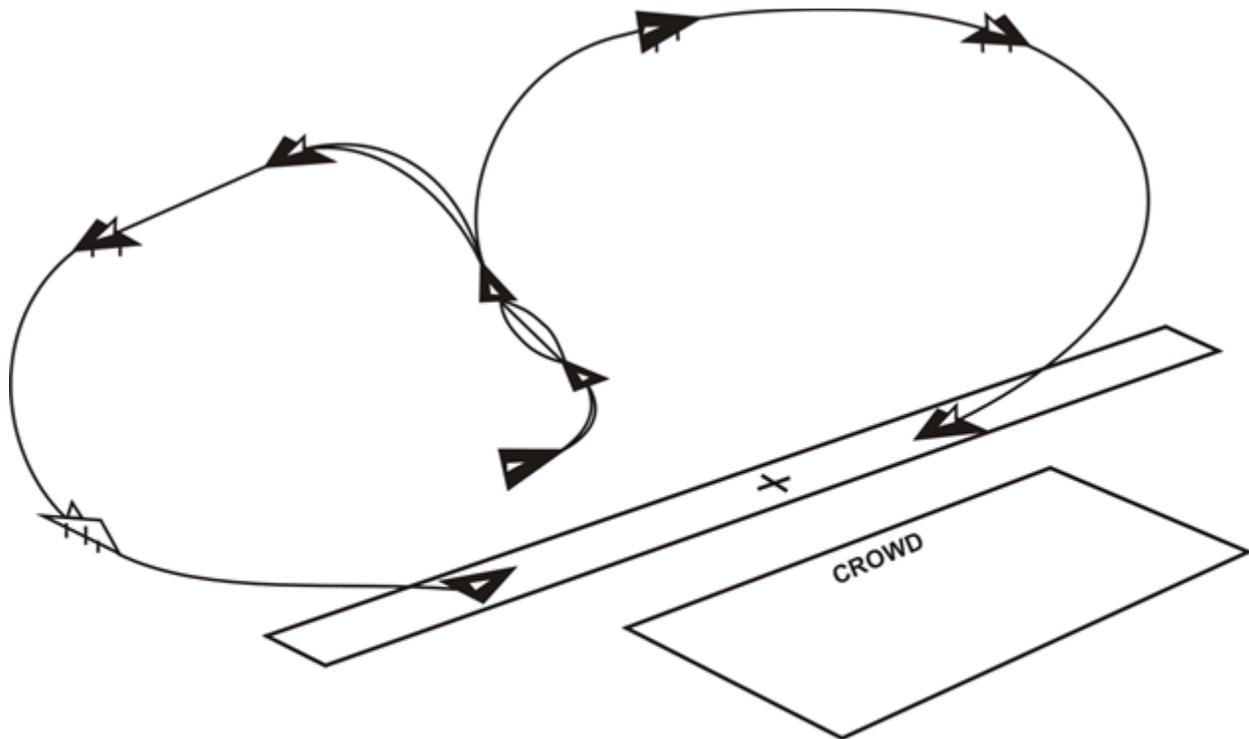
3.25.1. Maneuver Description: The maneuver is flown beyond the 500-foot line. After performing the Four-Point Roll or Strafe Passes, execute a reposition maneuver on the crowd side to arrive behind and offset the crowd. Fly the approach from behind the line, approximately 2 miles from show center, with 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' 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.



Tactical Pitch-Up To Land A-10

Table 3.18. 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

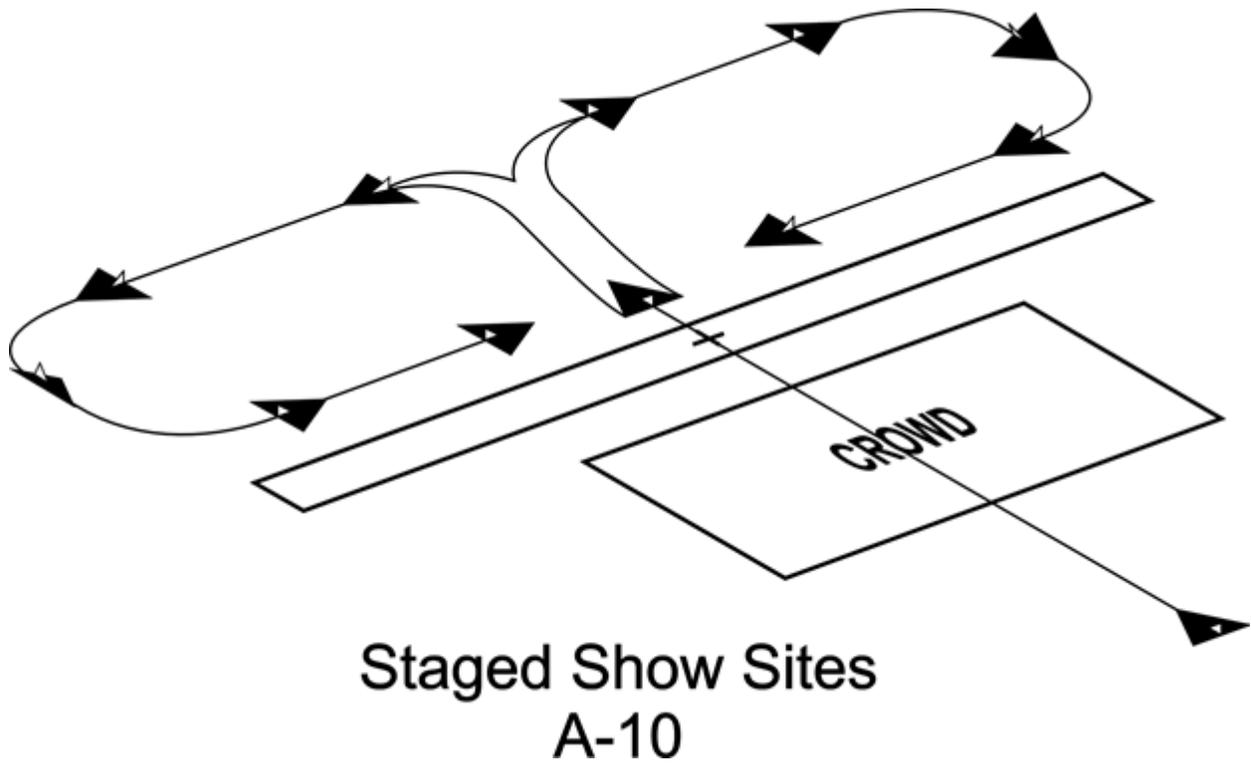
Exit	≥1,000'	180	A/R	N/A
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	200 / AC LMT	MAX	N/A
Pitch-up	200'	200 / N/A	MAX	7.33
Exit	1,000'	135 / N/A	A/R	N/A

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. **Option:** If a Heritage Flight is to be performed immediately following completion of the demonstration, 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 Heritage Flight 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 demonstration 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 ft AGL as depicted in Figure 3.18, 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 demonstration, but may cut the profile short as required to maintain suitable enroute return fuel.

Figure 3.20. A-10 Staged Show Sites.



Chapter 4

F-15E DEMONSTRATION MANEUVERS

Section 4A—General Information

4.1. General. Use maneuvers described in this chapter for training and for F-15E aerial demonstrations. The demonstration sequence is designed so each maneuver is normally flown in the same direction with respect to the crowd line with the following exceptions: The Maximum Performance Takeoff Inverted, Flat Pass, the first Split-S, and the aileron roll preceding the tactical pitch to landing. As a result, the show is always oriented the same way from the spectators' point of view. 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. Demonstration pilots transmit parameters prior to initiating the descending portion of vertical pull-throughs for the Split-S and Vertical Reposition Maneuvers. These calls are made when the pilot reaches apex of the maneuver. Ground safety observer and the WSO monitor demonstration pilot altitude and airspeed radio calls and direct an abort when parameter limits are exceeded. 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 demonstrations is clean with CFTs, no wing pylons on stations 2 and 8, no LANTIRN pods, no external fuel tanks, and no travel pods. Fuel considerations include: divert requirements, cable availability, temperature, and density altitude. Normal minimum fuel for takeoff is:

4.2.1. Staged Show: 16,500 pounds

4.2.2. High Show: 14,000 pounds

4.2.3. Low Show: 13,000 pounds

4.3. Airspeed and G Limits. Demonstration pilots may not exceed 0.94 Mach. The maximum target G for this demonstration is 7.5 Gs. This does not preclude a momentary increase in G for safety considerations.

4.4. Show line Restrictions. The majority of the F-15E demonstration is flown on the 1,500-foot (1,200' if approved by the FAA) 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.

4.5. Airspace and Runway Requirements. Required airspace for the F-15E is 15,000 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 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 x 75 feet. Ensure the runway, taxiway, and parking area are stressed for a 62,000-pound aircraft with single wheel type landing gear. If needed, on a case by case basis, the absolute minimum weight allowable is 52,000-pounds with no CFT gas.

4.6. Weather Requirements. Weather PARAMETER LIMITS for the high profile are a ceiling of at least 5,000 feet, three miles ground and five miles in-flight visibility with a discernible horizon. The low show profile ceiling is at least 2,500 feet. The flat show profile ceiling is at least 1,500 feet. 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.

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

4.7.1. 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.

4.8. Demonstration Maneuver Profiles.

4.8.1. High Show

- 4.8.1.1. Maximum Performance Takeoff Inverted
- 4.8.1.2. Flat Pass
- 4.8.1.3. High-G Turn
- 4.8.1.4. Triple Aileron Roll
- 4.8.1.5. Four-Point Roll
- 4.8.1.6. Cuban 8
- 4.8.1.7. Low Angle Strafe Pass
- 4.8.1.8. LAHD Bomb Pass
- 4.8.1.9. SAM Weave
- 4.8.1.10. Dedication Pass
- 4.8.1.11. Knife Edge Pass
- 4.8.1.12. Maximum Performance Climb with Rolls
- 4.8.1.13. Spiral Descent
- 4.8.1.14. Tactical Pitch-Up to Landing

4.8.2. Low Show

- 4.8.2.1. Maximum Performance Takeoff Inverted
- 4.8.2.2. Flat Pass
- 4.8.2.3. High-G Turn
- 4.8.2.4. Triple Aileron Roll
- 4.8.2.5. Four-Point Roll
- 4.8.2.6. Level 8

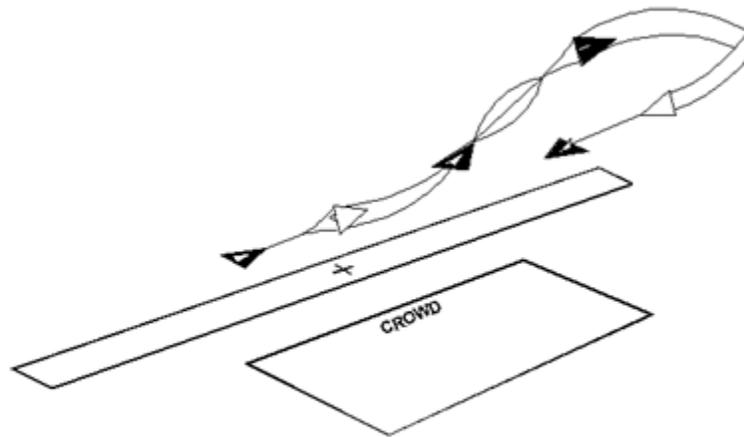
- 4.8.2.7. Low Angle Strafe Pass
- 4.8.2.8. LAHD Bomb Pass
- 4.8.2.9. SAM Weave
- 4.8.2.10. Dedication Pass
- 4.8.2.11. Knife Edge Pass
- 4.8.2.12. Tactical Pitch-Up to Landing

4.8.3. Flat Show

- 4.8.3.1. Maximum Performance Takeoff Inverted
- 4.8.3.2. Flat Pass
- 4.8.3.3. High-G Turn
- 4.8.3.4. Triple Aileron Roll
- 4.8.3.5. Four-Point Roll
- 4.8.3.6. Level 8
- 4.8.3.7. Dedication Pass
- 4.8.3.8. Knife Edge Pass
- 4.8.3.9. Tactical Pitch-Up to Landing

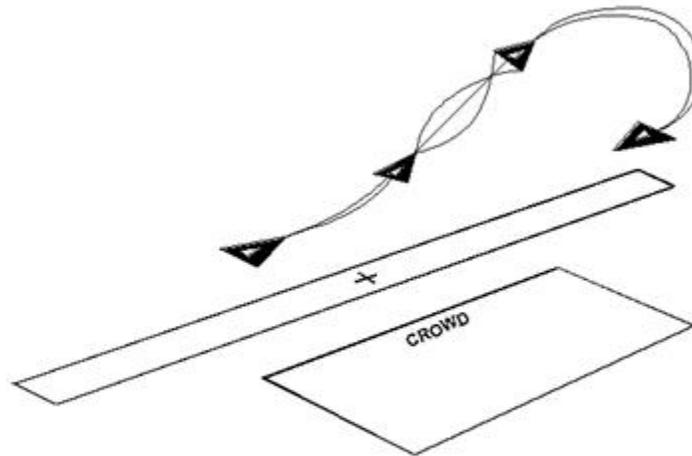
4.9. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the demonstration sequence as required. Repositioning turns may not include added aileron rolls or other accenting maneuvers.

Figure 4.1. F-15E Flat Wifferdill Reposition Maneuver.



**Flat Wifferdill Reposition Maneuver
F-15E**

4.9.1. Flat Wifferdill 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 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 so that airspeed/altitude parameters for the next maneuver are established in the flat Wifferdill. The entry "cut" turn for the flat Wifferdill is typically made away from the crowd. However if local conditions dictate, the turn may be made toward the crowd side, provided the aircraft is beyond the corner marker (500' past the edge of the crowd) to ensure no show line or crowd line penetration.

Figure 4.2. F-15E Wifferdill Reposition Maneuver.

Wifferdill Reposition Maneuver F-15E

4.9.2. **Wifferdill Reposition Maneuver.** 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 demonstration area. Each turn may differ slightly so that 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 typically made away from the crowd. However if local conditions dictate, the turn may be made toward the crowd side, provided the aircraft is beyond the corner marker (500' past the edge of the crowd) to ensure no show line or crowd line penetration.

Figure 4.3. F-15E Vertical Reposition Maneuver.

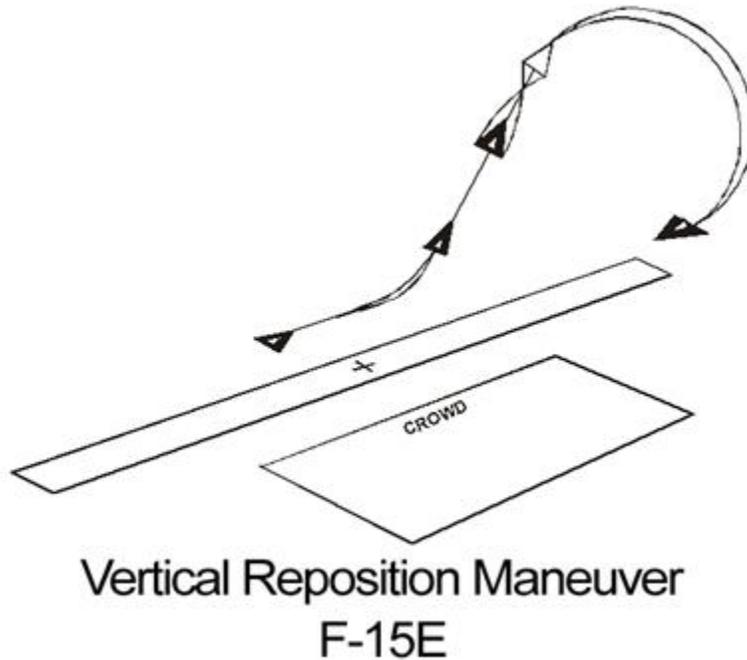


Table 4.1. F-15E Vertical Reposition Maneuver Parameters.

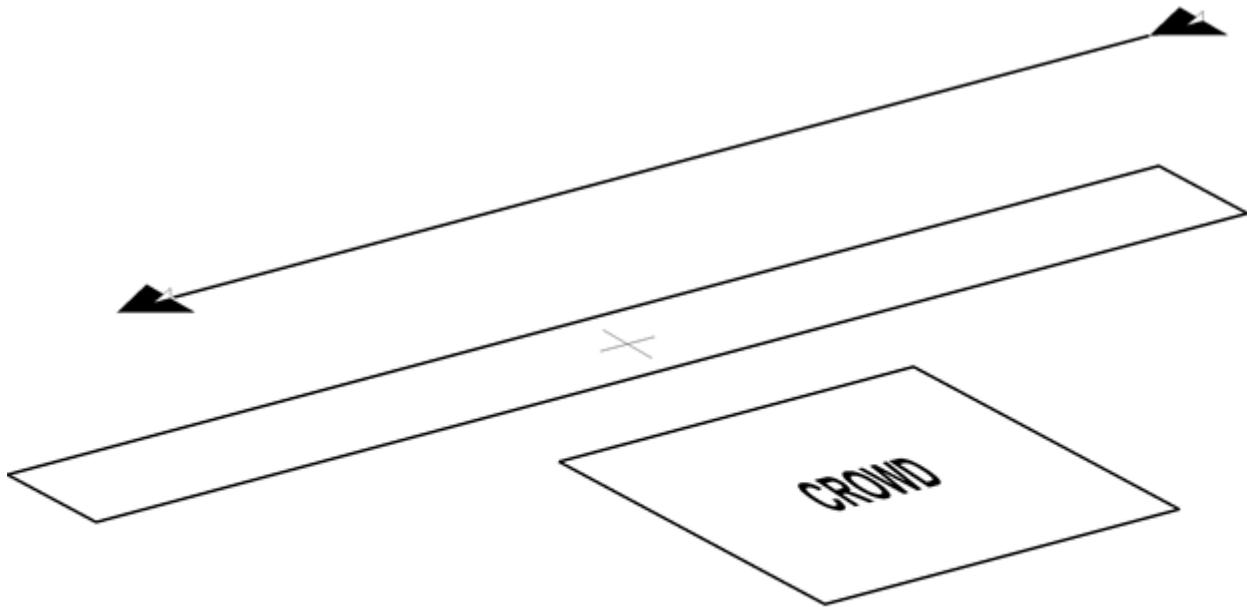
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	A/R	.92M	MIL to MAX	6.5 to 7.0
Apex	$\geq 5,500'$	350	MIL to MAX	3 to 5
90 degrees nose low	$\geq 4,500'$	350	A/R	N/A
Exit	500'	A/R	A/R	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G

Entry	min	200'	350 / .94M	A/R	8
Apex		5,000'	300 / 400	A/R	8
90 degrees nose low		4,000'	300 / 425	A/R	N/A
Exit	min	400'	A/R / A/R	A/R	3-5

4.9.3. **Vertical Reposition Maneuver:** The Vertical Reposition Maneuver may be flown to change direction at each end of the 1,500' show line. Upon passing show center or at the completion of the previous maneuver with a minimum of 350 knots, begin a straight-ahead climb using 6.5 to 7.0 Gs to put the aircraft in a 40 to 55-degree nose-high attitude. At a minimum of 4,500 feet AGL, perform an unloaded 180-degree roll to achieve an inverted climbing attitude. Initiate a smooth pull to the horizon to achieve a wings-level inverted position at or above 5,500 feet AGL. Continue the pull in maximum power through the vertical, using 3.0-5.0 Gs to 135 degrees of turn (45 degrees nose-low). As the nose drops below the horizon and the airfield environment is reacquired, correct as necessary to complete the Vertical Reposition Maneuver down the show line. On a standard day, at 90 degrees nose-low, airspeed should be between 300 to 400 knots and altitude greater than 4,000 feet AGL. At 135 degrees, backpressure is relaxed and the aircraft smoothly flown to be in level flight at 500 feet AGL for the next maneuver. Aircraft power should be modulated through the vertical to achieve the desired airspeed upon rollout for the next maneuver.

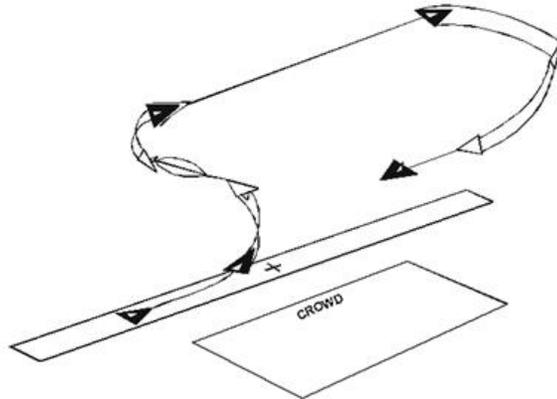
4.9.3.1. **Abnormal Procedures:** If not within the target airspeed window, adjust pitch attitude during climb to achieve desired airspeed. If below minimum apex altitude, maintain an inverted climb until reaching minimum apex altitude. If you are below 4,000 feet AGL and over 400 knots prior to achieving 90 degrees nose-low, execute emergency dive recovery procedures. If at any time during the maneuver it appears that the aircraft cannot attain the prescribed altitude/airspeed parameter limits, abort the maneuver. Reposition the aircraft for follow-on maneuvering.

Figure 4.4. F-15E Flat Pass Reposition Maneuver.



Flat Pass Reposition Maneuver F-15E

4.9.4. **Flat Pass Reposition Maneuver.** The flat pass is a repositioning maneuver used alone or in combination with a Wifferdill for the primary purpose of orienting the subsequent demonstration maneuver in the approved direction relative to the crowd line. It should be flown IAW [paragraph 4.11](#).

*Section 4B—High Profile***4.10. Maximum Performance Takeoff Inverted.****Figure 4.5. F-15E Maximum Performance Takeoff Inverted.****Maximum Performance T/O-Inverted
F-15E****Table 4.2. F-15E Maximum Performance Takeoff Inverted Parameters.**

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	0'	190	MAX	23-25 AOA
Exit	1,000'	250	MAX	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	0'	180 / N/A	MAX	N/A
Exit	800'	225 / 350	MAX	N/A

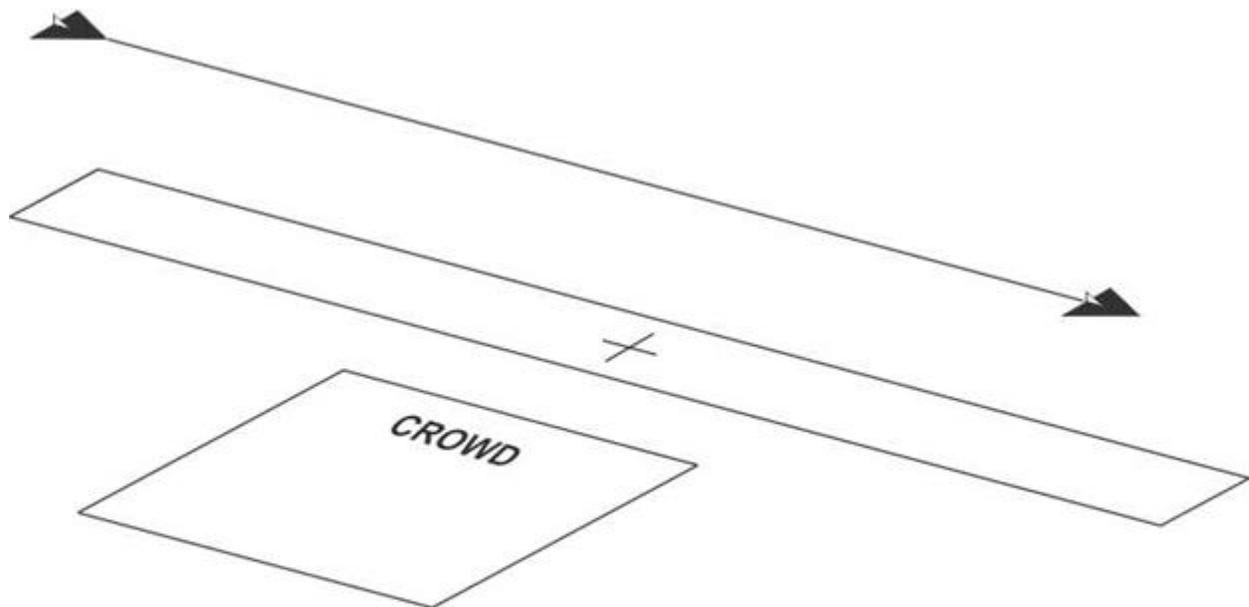
4.10.1. Maneuver Description: The takeoff is performed with flaps and in full afterburner. At 190 knots, execute a smooth, but brisk aft-pull of the stick to achieve takeoff rotation. After a positive rate of climb is established, retract the gear and flaps and rotate the nose to achieve a 23 to 25-unit AOA climb (max AOA 30 units). Smoothly roll and pull away from

the crowd to a wings-level inverted position with afterburners pointing directly at the crowd. Hold inverted flight for approximately five seconds, accelerate to 250 to 400 knots, and then perform a 270-degree right turn to position for the Flat Pass. Minimum airspeed in the climb is 190 knots; minimum altitude inverted is 800 feet AGL. **Option:** From inverted flight, roll 180 degrees to a wings-level upright position. Delay for approximately 3-5 seconds, and then perform a right 270-degree roll to position for the Four-Point Roll.

4.10.2. **Abnormal Procedures:** If the show profile takeoff is interrupted by an aircraft malfunction, make a normal takeoff, or if conditions warrant, abort the takeoff. **NOTES:** The Max Performance Takeoff/Inverted may be flown in either direction. A normal takeoff may be flown in place of the Max Performance Takeoff (Climb and Inverted) if required. Reasons include, but are not limited to: weather (ceiling, visibility, winds) and field conditions (rising terrain, high density altitudes, etc.). If flying the normal takeoff to accomplish a weather check before starting the actual profile, start the show from a staged position.

4.11. Flat Pass.

Figure 4.6. F-15E Flat Pass.



Flat Pass (Optional) F-15E

Table 4.3. F-15E Flat Pass Parameters.

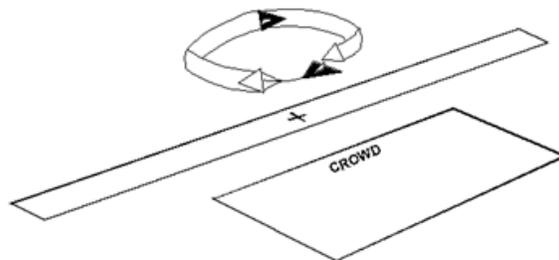
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	.92M	MAX	1
Exit	300'	.92M	IDLE to MAX	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	N/A / .94M	A/R	N/A
Exit	min 200'	N/A / .94M	A/R	N/A

4.11.1. **Maneuver Description:** This Flat Pass may be flown to orient the aircraft for the High-G Turn. The Flat Pass may be flown on the 500-foot show line at 300 feet AGL in maximum power, so as to target 0.92 Mach.

4.11.2. **Abnormal Procedures:** Deselect afterburner before exceeding 0.94 Mach.

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

Figure 4.7. F-15E High-G Turn.



High G Turn
F-15E

Table 4.4. F-15E High-G Turn Parameters.

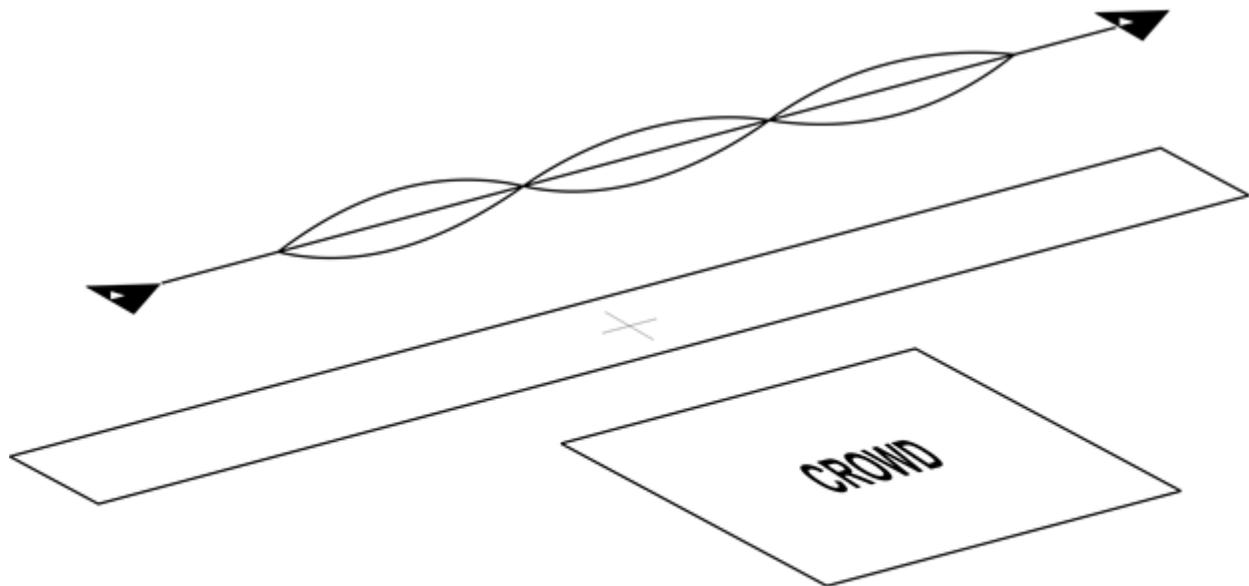
TARGET PARAMETERS				
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	450	MAX	7.5
Exit	500'	350	MAX	2 to 4
PARAMETER LIMITS				
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	400 / 500	MAX	9
Exit	min 400'	300 / 425	MAX	9

4.12.1. **Maneuver Description:** Beyond the 500' show line and approximately 3,000 feet prior to show center, select full AB and accelerate to approximately 450 knots. At show center, turn away from the crowd using approximately 75 to 85 degrees of bank. Begin the turn with a smooth G-onset-rate to maintain airspeed at approximately 350 knots and 7.5 Gs. 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. 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 on or beyond the 1,500' show line and 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.

4.12.2. **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 300 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 300 knots) to avoid overshooting the show line.

4.13. Triple Aileron Roll (Left to Right).

Figure 4.8. F-15E Triple Aileron Roll (Left to Right).



Triple Aileron Roll F-15E

Table 4.5. F-15E Triple Aileron Roll Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	425	80% to MIL	2 to 4
Exit	500'	425	80% to MIL	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	375 / 475	80% to MIL	N/A
Exit	min 400'	375 / 475	80% to MIL	N/A

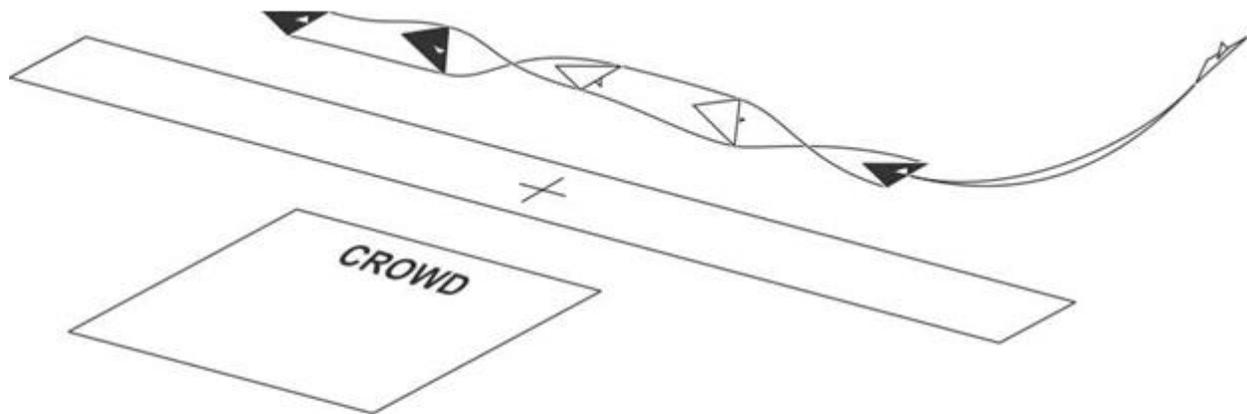
4.13.1. **Maneuver Description:** At 4,000 feet prior to show center on the 1,500' show line with 425 knots and a minimum of 500 feet AGL, raise the nose eight degrees, establish a climb, and relax stick pressure. Apply full left-stick pressure to perform a maximum of three

consecutive unloaded aileron rolls. As the second roll is completed, it is important to ensure the aircraft has gained altitude and the nose is still above the horizon. At the completion of the third roll, roll out and reposition for the Four-Point Roll.

4.13.2. **Abnormal Procedures:** If starting parameters are not achieved, abort maneuver and transition to a flat pass. If the nose drops below level inverted on the second roll or roll-coupling occurs (to exceed approximately 2.5 G) immediately roll wings-level and climb to minimum altitude.

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

Figure 4.9. F-15E Four-Point Roll.



Four-Point Roll F-15E

Table 4.6. F-15E Four-Point Roll Parameters.

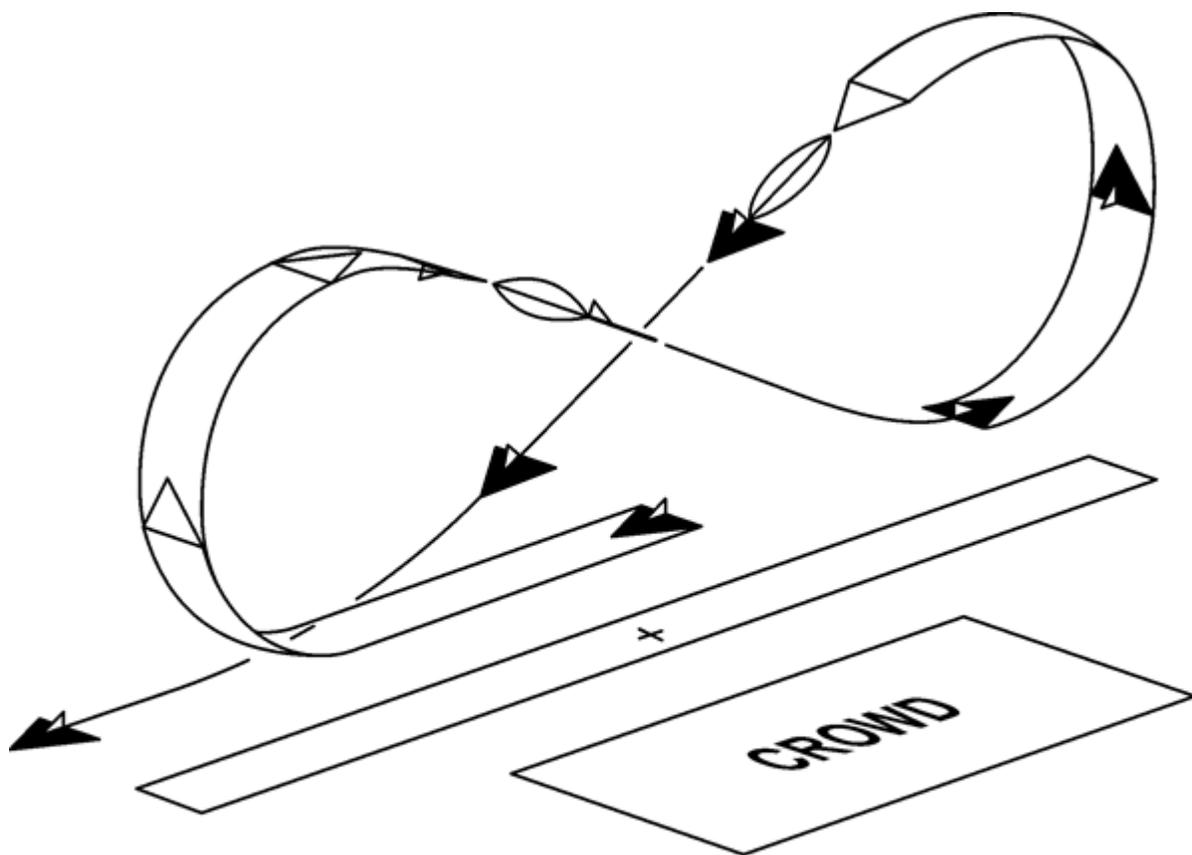
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Nominal Power Setting	G
Entry	500'	425	80% to MIL	1 to 3
Exit	500'	425	80% to MIL	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	375 / 475	80% to MIL	N/A
Exit	min 400'	375 / 475	80% to MIL	N/A

4.14.1. **Maneuver Description:** At 4,000 feet prior to show center on the 1,500' show line, smoothly pull the nose to five degrees up, establish a climb, and relax stick pressure. A cadenced four-point roll to the left is then performed by pausing momentarily at the 90-degree, 180-degree, 270-degree, and 360-degree points. Move the stick briskly, causing a left roll and an immediate stop at each point when pressure is released. The pace of the cadence should ensure the aircraft is at the 180-degree point over show center.

4.14.2. **Abnormal Procedures:** If starting parameter limits are not achieved, abort maneuver and transition to a flat pass. During the maneuver, if the nose is below the horizon at the 180-degree inverted point, abort the maneuver by rolling to wings-level.

4.15. Cuban 8 (Right to Left).

Figure 4.10. F-15E Cuban 8.



Cuban Eight F-15E

Table 4.7. F-15E Cuban 8 Parameters.

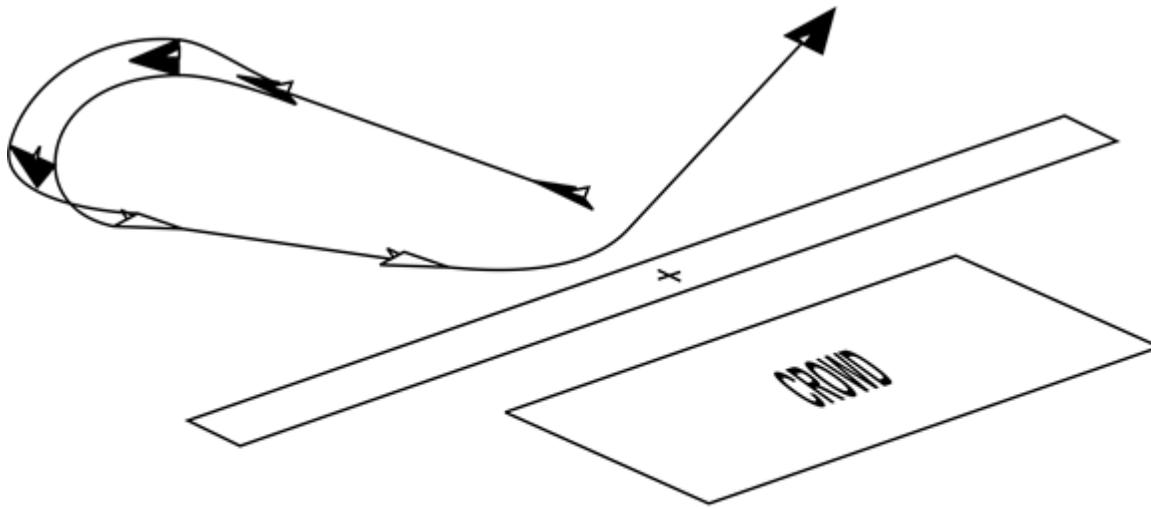
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	400	MAX	25 AOA
Apex	≥4,500	175	IDLE-MIL	1 to 2
Exit	500'	400	MIL-MAX	3 to 5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	350 / 450	MAX	6
Apex	4,000	150 / 250	IDLE-MAX	4
Exit	min 400'	325 / 450	MAX	6

4.15.1. **Maneuver Description:** Following the Four-Point Roll, reposition the aircraft and descend to fly wings-level down the 1,500-foot show line at 500 feet AGL and 400 knots. Approximately 3,000 feet past show center, begin a brisk but smooth wings-level pull to approximately 25-units AOA. Normal apex altitude is above 4,500 feet AGL. At apex altitude, reduce power. Airspeed should be 150-250 knots. The pull is held until the nose passes through 125-140 degrees of pitch where the backpressure is eased to maintain a constant nose track of 25-45 degrees nose-low inverted. The 25 to 45-degree nose-low inverted attitude is held until approximately 3,000 feet AGL and airspeed should be approximately 300 knots. At 3,000 feet AGL, advance throttles to MIL and perform an unloaded roll to wings-level upright. Roll the aircraft as necessary to maintain proper alignment along the show line (wind correction). Gradually increase back-stick pressure to ensure aircraft does not descend below 500 AGL. At no later than 1,200 feet AGL initiate full afterburner and begin a brisk but smooth wings-level pull to approximately 25-unit AOA. The second half is completed in the opposite direction using the procedures described earlier.

4.15.2. **Abnormal Procedures:** If either or both afterburners fail to light abort maneuver by decreasing pitch attitude to level flight and investigate malfunction. If apex airspeed is less than 175 knots, decrease back-stick pressure and accelerate to target airspeed before reducing throttles and pulling nose through horizon. 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 that 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.

4.16. Low Angle Strafe Pass (Left to Right).

Figure 4.11. F-15E Low Angle Strafe Pass.



Low Angle Strafe Pass F-15E

Table 4.8. F-15E Low Angle Strafe Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	$\geq 2,000'$	350	80% to MIL	1 to 2
Exit	400'	400	80% to MIL	5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 1,500'	300 / 400	MAX	N/A
Exit	min 300'	350 / 450	MAX	9

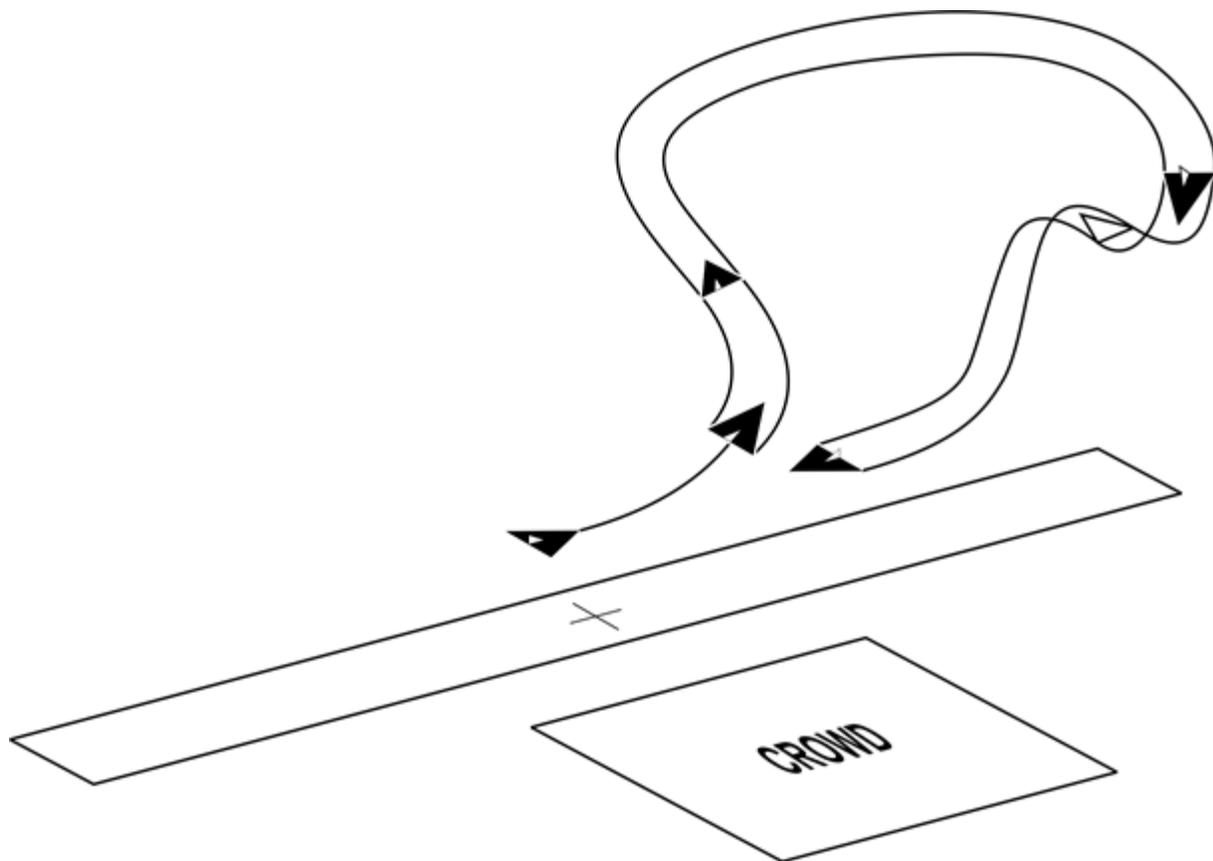
4.16.1. **Maneuver Description:** After performing a reposition maneuver, align the aircraft to fly down the 1,500' line. At 6,000' from show center roll and pull to a 20-degree dive angle. The dive angle is normally 10 – 25 degrees nose-low depending on winds. The optimum dive angle is 20 degrees. Do not exceed 25 degrees. Recovery should be initiated at 1,000 - 800 feet AGL using a max performance pull in order to bottom out at or above 300

feet AGL. Be careful not to over-G the aircraft during this pull. In order to make this corner, you need to obtain a minimum of 400 knots. After recovering to level flight, accomplish a repositioning maneuver to set up for the LAHD Bomb Pass. Use the 1,500-foot show line as a reference point, and offset the pyro area at least 150 feet.

4.16.2. **Abnormal Procedures:** If entry parameter limits are not met, abort the maneuver and perform a wings-level pass. If at any time the dive angle exceeds 25 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 25 degrees or less. Check airspeed at 1,500 feet AGL. If it is not at least 375 knots, abort the pass and fly through straight and level.

4.17. LAHD Bomb Pass (Right to Left).

Figure 4.12. F-15E LAHD Bomb Pass.



LAHD Bomb Pass F-15E

Table 4.9. F-15E LAHD Bomb Pass Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry (Pull up)	500'	400 at pull-up	80% to MIL	2-4
Exit	400'	400	80% to MIL	5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry (Pull up)	min 400'	325 / 450	MAX	6
Exit	min 300'	350 / 450	MAX	9

4.17.1. **Maneuver Description:** After performing the Low Angle Strafe Pass, continue straight and level to approximately 3,000 feet past show center, then begin a 40 to 50-degree turn away from the crowd starting a slight climb to apex around 1,000 feet AGL accelerating to approximately 450 knots. At approximately 2.5 miles from show center, make a flat turn and pull to a point to begin a run-in at 500 feet AGL and 20-30 degrees off the show line. Align the aircraft to fly slightly offset the preplanned bombing target/point, away from the crowd. Do not allow a vector towards the crowd! At approximately 1.3 miles from the target, pull up to 20-40 degrees nose-high. Passing approximately 1,500 feet AGL and approaching the run-in on the 500-foot show line, roll-in on the target. The dive angle is normally 10 – 25 degrees nose-low depending on winds. The optimum dive angle is 20 degrees. Do not exceed 25 degrees. Recovery should be initiated at 1,000 feet AGL using a max performance pull in order to bottom out at or above 400 feet AGL. Be careful not to over-G the aircraft during this pull. In order to make this corner, you need to obtain a minimum of 400 knots. Use the 500-foot show line at show center as a reference point, and offset the pyro area at least 150 feet. After recovering to level flight, accomplish a reposition maneuver to set up for the SAM Weave.

4.17.2. **Abnormal Procedures:** If entry parameter limits are not met, abort the maneuver and perform a wings-level pass. If at any time the dive angle exceeds 25 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 25 degrees or less. Check airspeed at 1,500 feet AGL. If it is not at least 375 knots, abort the pass and fly through straight and level.

4.18. SAM Weave.

Figure 4.13. F-15E SAM Weave.

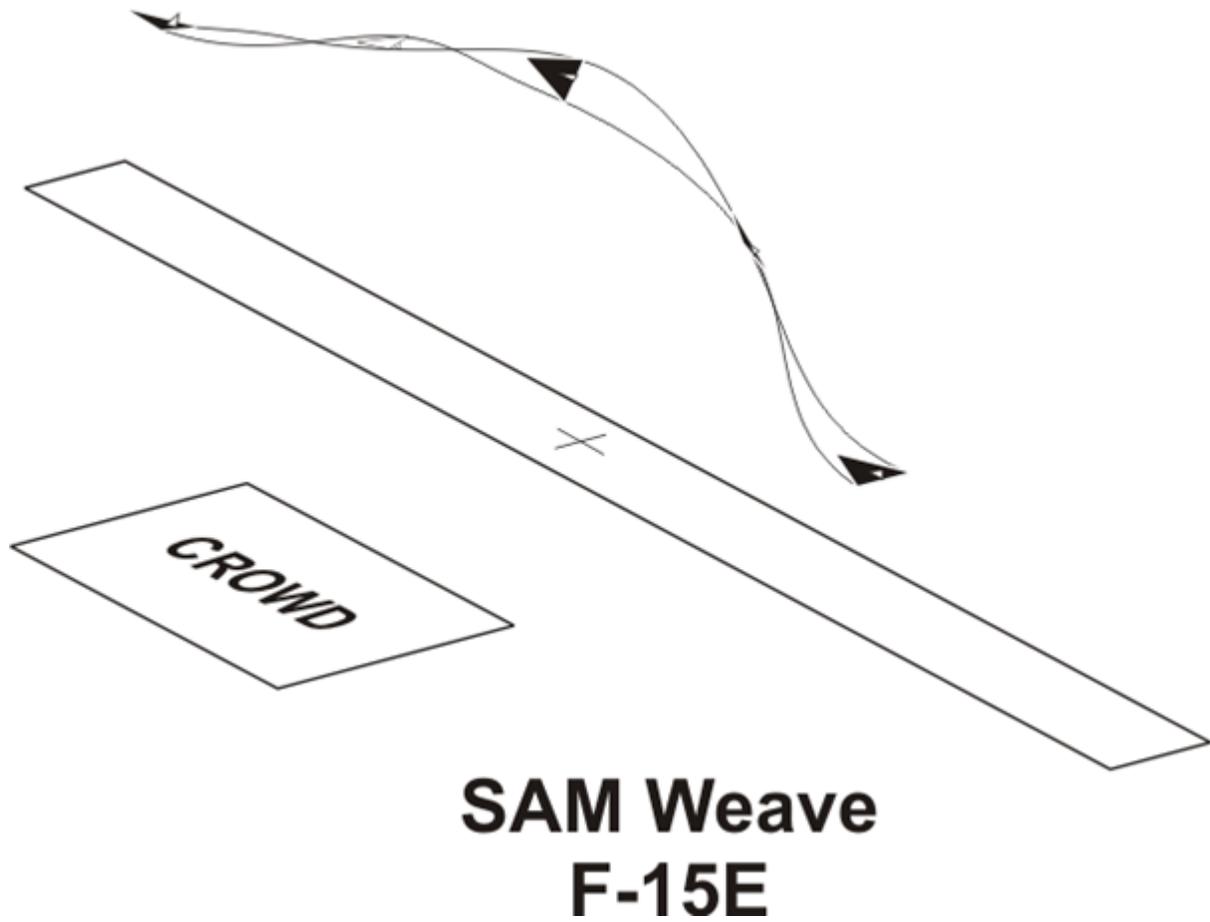


Table 4.10. F-15E SAM Weave Parameters.

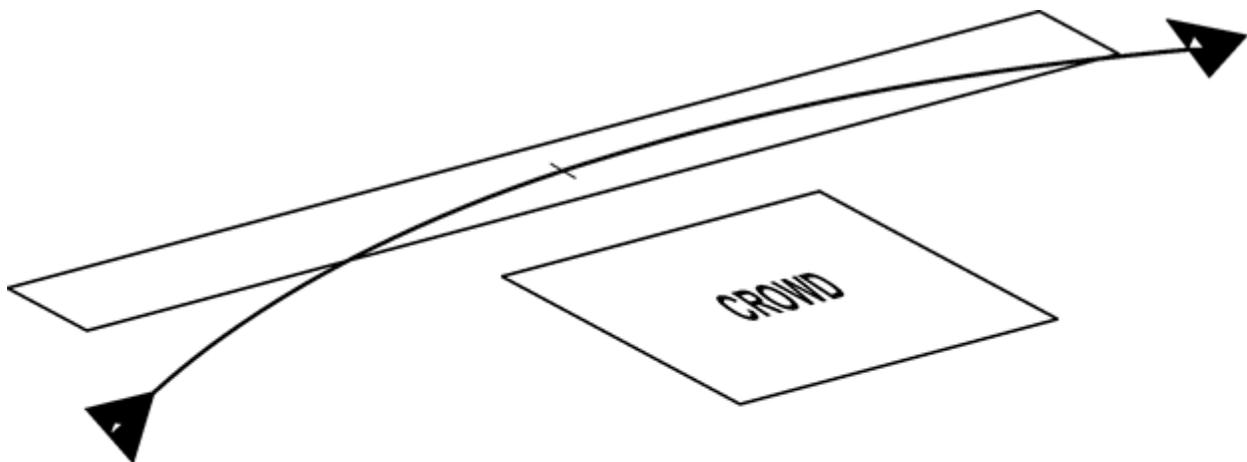
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	400'	400	80% to MAX	5-6
Exit	500'	400	80% to MAX	5-6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 300'	350 / 450	MAX	2
Exit	min 400'	300 / 450	MAX	9

4.18.1. **Maneuver Description:** After performing the LAHD Bomb Pass recovery to level flight, begin a right 30 to 70-degree turn away from the crowd ensuring a slight climb away from the ground. The bank angle should be approximately 70-90 degrees ensuring you are at or above 500 feet AGL and beyond the 1,500' show line at the end of the turn. Rapidly unload the jet and roll left 135 degrees and use a max performance pull into the oblique 10-20 degrees nose-high. Then rapidly unload and roll the jet 180 degrees to the right and perform a maximum pull to 10-20 degrees nose-low into the oblique. Once reaching 10-20 degrees nose-low, rapidly unload, and roll upright to pull up into a normal reposition for the Dedication Pass.

4.18.2. **Abnormal Procedures:** If entry parameter limits are not met, abort the maneuver and perform a normal reposition maneuver. If at any time the dive angle exceeds 25 degrees nose-low, immediately transition to a level pull to the reposition maneuver. At no time should airspeed drop below 300 knots or should the jet be lower than 400 feet AGL. If the airspeed drops below 300 knots in the climb, accelerate uphill prior to pull down.

4.19. Dedication Pass.

Figure 4.14. F-15E Dedication Pass (Left to Right).



Dedication Pass F-15E

Table 4.11. F-15E Dedication Pass Parameters.

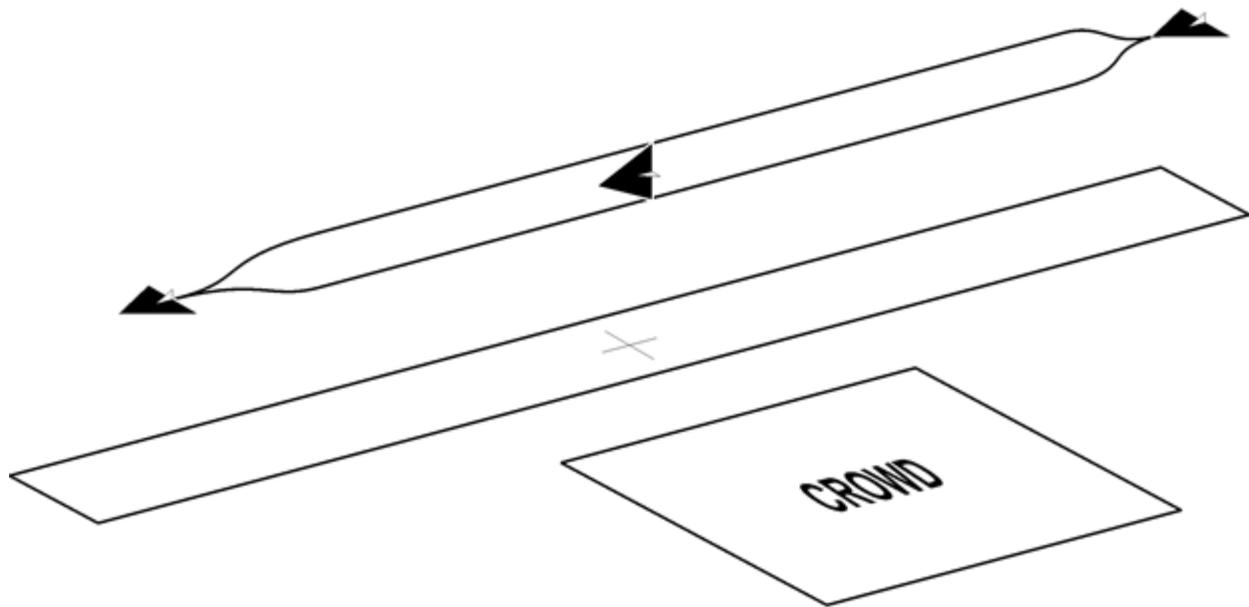
TARGET		PARAMETERS	
Altitude AGL	Airspeed KCAS	Power Setting	G
Entry 300'	.85M	MIL	1 to 3
Exit 300'	.85M	IDLE to MIL	4 to 6
PARAMETER		LIMITS	
Altitude AGL	Airspeed KCAS MIN/MAX	Power Setting	G
Entry min 200'	.6M / .94M	MIL	9
Exit min 200'	.6M / .94M	IDLE to MIL	9

4.19.1. **Maneuver Description:** The maneuver is flown beyond the 500-foot line. Following the Sam Weave (high or low show), or Level 8 (flat show), attain a safe airspeed and reposition the aircraft 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. Select mil power until passing the show line or until a target airspeed of .85M 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. Ensure military power is selected prior to entering the arcing pass and through the exit of the maneuver. Do not use afterburner during the arcing pass. 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 Knife Edge Pass.

4.19.2. **Abnormal Procedures:** Abort the maneuver if at any time the aircraft comes closer than 500' 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.

4.20. Knife Edge Pass.

Figure 4.15. F-15E Knife Edge Pass (Right to Left).



Knife Edge Pass F-15E

Table 4.12. F-15E Knife Edge Pass Parameters.

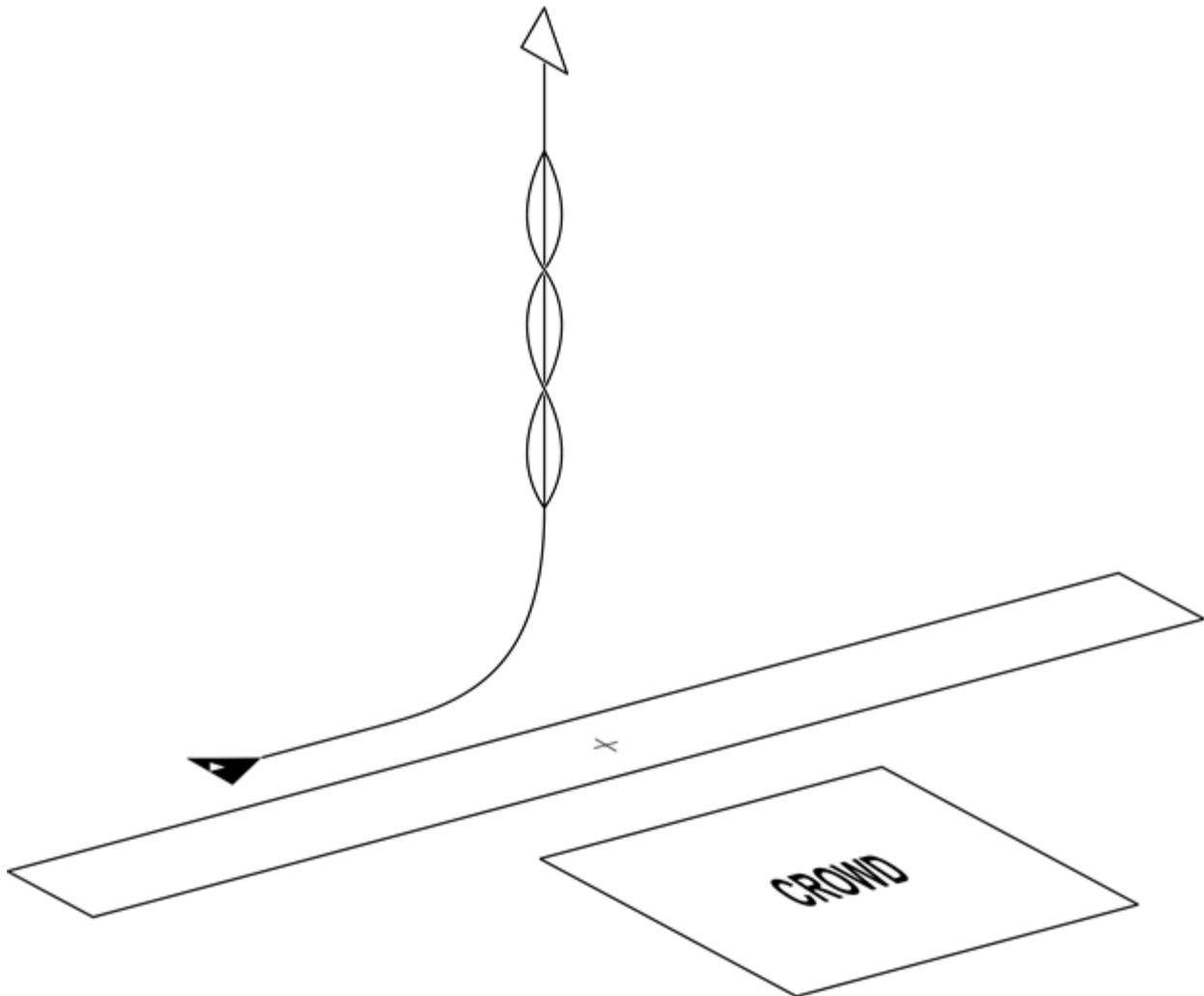
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	400	MAX	1 to 3
Exit	500'	500	80% to MAX	1 to 3
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	350 / 450	MAX	4
Exit	min 400'	400 / 600	80% to MAX	4

4.20.1. **Maneuver Description:** Enter the 1,500' show line at 500 feet AGL and 400 knots. At 8,000 to 6,000 feet prior to show center, raise the nose three to five degrees, establish a

climb, and apply stick pressure to roll 90 degrees toward the crowd. The aircraft is held in this position until 8,000 to 6,000 feet past show center. Top rudder is applied to help hold the nose above the horizon so the full maneuver can be accomplished. Forward stick pressure is applied to keep the aircraft on the show line and to maintain level flight.

4.20.2. **Abnormal Procedures:** If entry parameters are not met, abort the maneuver, make a flat pass, and reposition for the next maneuver. If the nose falls below level flight (zero degrees pitch in the HUD) or if the aircraft descends below 400 feet AGL, abort the maneuver.

4.21. F-15E Maximum Performance Climb with Rolls (Left to Right). [Figure 4.16.](#) F-15E Maximum Performance Climb with Rolls.



Maximum Performance Climb With Rolls F-15E

Table 4.13. F-15E Maximum Performance Climb with Rolls Parameters.

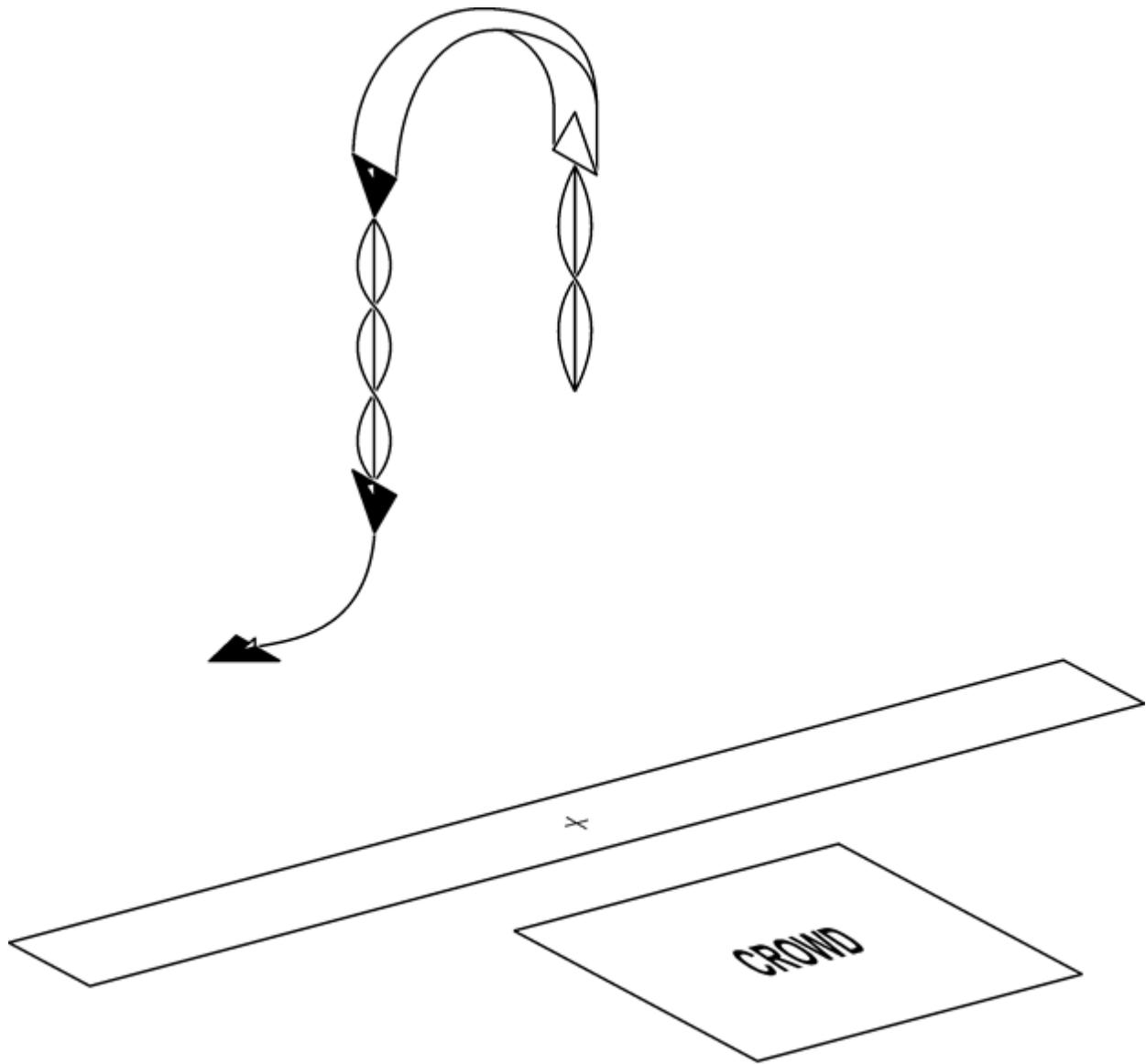
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	500	MAX	5-6
Exit	NTEWA	175	80% to MAX	2 to 5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	450 / 550	MAX	8
Exit	min 10,000'	125 / 250	80% to MIL	6

4.21.1. **Maneuver Description:** Approach show center on the 1,500' show line, wings-level at 500 knots and 300 feet AGL. At 3,500 feet prior to show center select full afterburner and initiate a 6 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 3,000 feet below waived airspace. Stop the aileron rolls and execute a vertical recovery by smoothly pulling the nose to the nearest horizon. Deselect afterburner and modulate power as necessary to set up for the spiral descent.

4.21.2. **Abnormal Procedures:** If entry parameters are not met at 3,000 feet prior to show center, delay until entry parameters are met. If entry parameters are not met prior to 2,000 feet past show center, abort the maneuver and reposition for the next pass. If the airspeed decreases below 150 knots in the climb, initiate a vertical recovery

4.22. Spiral Descent.

Figure 4.17. F-15E Spiral Descent.



**Spiral Descent
F-15E**

Table 4.14. F-15E Spiral Descent Parameters.

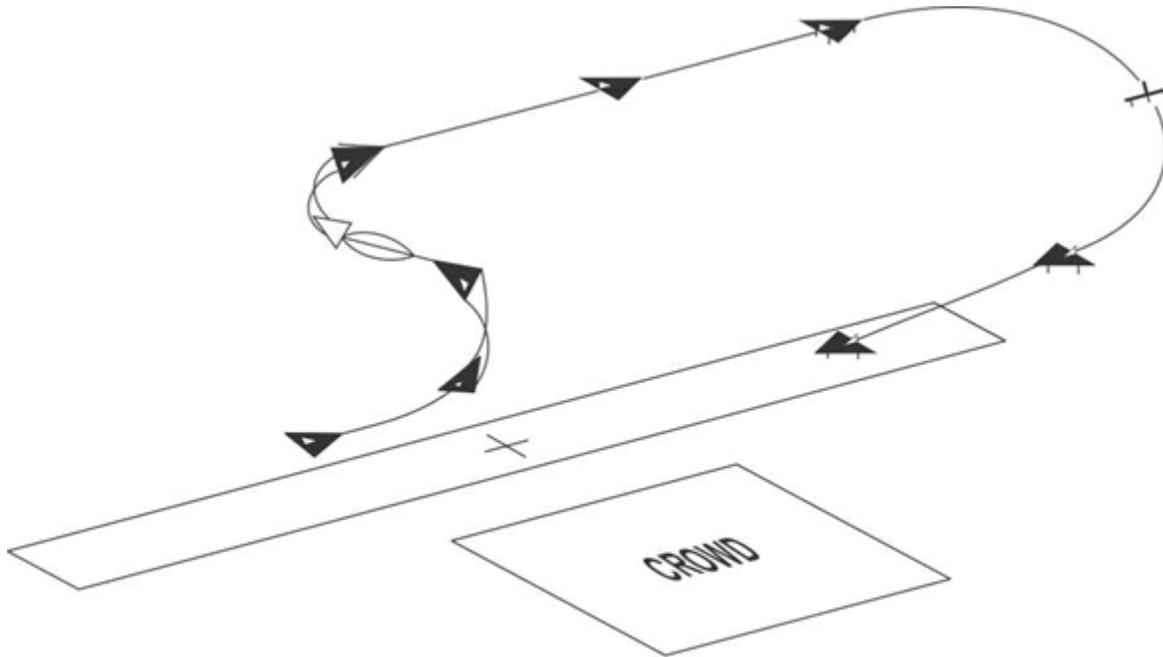
TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	G
Entry	NTEWA		175	IDLE	1 to 2
Exit	6,000'		400	IDLE	3 to 7
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	10,000'	125 / 250	IDLE	N/A
Exit	min	5,000'	A/R / 450	IDLE	8

4.22.1. **Maneuver Description:** As the aircraft nose is brought through the horizon, reacquire the air show environment. In idle power, perform a vertical spiraling descent oriented toward show center. Initiate dive recovery to recover by 6,000 feet AGL. Do not exceed 450 knots in the descent. The direction of the dive recovery should be as necessary to reposition for the next maneuver, however do not exit the maneuver over the crowd.

4.22.2. **Abnormal Procedures:** If entry airspeed window is not met (too fast) adjust dive angle to minimize airspeed in the descent. If below 12,000 AGL at the apex of the climb (airspace restrictions, weather conditions), adjust dive angle to safely execute a recovery at 6,000 AGL. When initiating the spiral descent at altitudes above 15,000 AGL, adjust minimum dive recovery altitude accordingly. (If starting at 18,000' AGL, initiate dive recovery at 9,000 AGL) Initiate an immediate dive recovery if airspeed is at/or above 450 knots. Show center orientation is a secondary consideration in the spiral descent. If at any time during the maneuver it appears that the aircraft is not attaining 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 Climb. Start a descent when able to maintain VMC conditions to position the aircraft to set up for the next maneuver.

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

Figure 4.18. F-15E Tactical Pitch-Up to Landing.



Tactical Pitch-Up To Landing F-15E

Table 4.15. F-15E Tactical Pitch-Up to Landing Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	350	MAX	4 to 6
Exit	Downwind Alt	250	A/R	1 to 4
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	300 / 425	MAX	8
Exit	Downwind Alt	200 / 350	A/R	N/A

4.23.1. **Maneuver Description:** On the 1,500' show line at 3,000 feet prior to show center, 500 feet AGL, and 350 knots select afterburner. Smoothly pull the nose five degrees up,

establish a climb, and relax stick pressure. Perform an unloaded 405-degree aileron roll followed by an aggressive pull-up to downwind. During the pull to downwind, terminate afterburner and slow to below 300 knots. Configure for and execute a normal final turn and landing.

4.23.1.1. **Option 1:** On the pull-up to downwind, an additional 180-degree roll (reversal) may be performed to land from the opposite direction. Start at 4,000 feet prior to show center.

4.23.1.2. **Option 2:** If a Heritage Flight is to be performed immediately following completion of the demonstration, conduct a low approach or wings-level pass and proceed to rejoin with Heritage Flight aircraft using pre-briefed procedures.

4.23.2. **Abnormal Procedures:** If entry parameters are not achieved by show center, pull-up to a normal closed pattern.

Section 4C—Low Profile

4.24. Maximum Performance Takeoff Inverted. Perform the Maximum Performance Takeoff Inverted as described in **paragraph 4.10.** *NOTE:* Unless otherwise stated, **Abnormal Procedures** for the low profile are the same as the high profile.

4.25. Flat Pass. Perform the Flat Pass as described in **paragraph 4.11.**

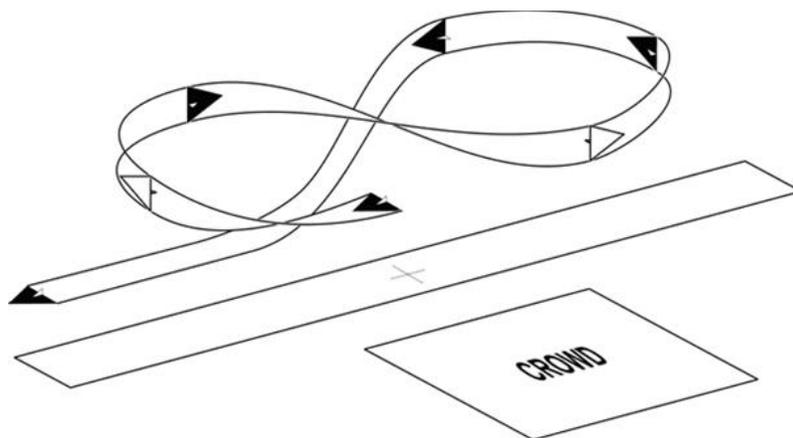
4.26. High-G Turn (Right to Left). Perform the High-G turn as described in **paragraph 4.12.**

4.27. Triple Aileron Roll (Left to Right). Perform the Triple Aileron Roll as described in **paragraph 4.13.**

4.28. Four-Point Roll (Right to Left). Perform the Four-Point Roll as described in **paragraph 4.14.**

4.29. Level 8 (Right to Left).

Figure 4.19. F-15E Level 8.



**Level 8
F-15E**

Table 4.16. F-15E Level 8 Parameters.

TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	G
Entry	500'		450	MAX	6-7
Exit	500'		400	MAX	2 to 4
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	400'	400 / 500	MAX	9
Exit	min	400'	300 / 450	MAX	9

4.29.1. **Maneuver Description:** At approximately 2,500 feet past show center, select full afterburner and accelerate to approximately 450 knots. Turn away from the crowd using approximately 85 degrees of bank (<75 degrees inside the 1,500' show line). Begin the turn with a smooth G onset-rate to maintain airspeed at approximately 350-400 knots and 5 to 7 Gs. G-loading and airspeed bleed-off rate varies with density altitude. Maintain a minimum of 300 knots. The first 180 degrees of turn should be accomplished with a 1¾-degree nose-up attitude to make the turn appear level to the crowd. After 225 degrees of turn, unload and briskly roll wings-level. Approaching the show line, reverse direction of turn and accomplish a second level turn in the opposite direction. Adjust power to enter the second turn with the same entry parameters as the first. Fly the second turn using the same techniques as the first. After 270 degrees and with a 45-degree cut to the show line, reverse the turn again. 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. Ensure surface winds are taken into careful consideration to center the maneuver over show center and to avoid overshooting the show line. Complete the maneuver by turning as required to finish on the show line heading the same direction as entry. Perform a repositioning maneuver to set up for the next maneuver.

4.29.2. **Abnormal Procedures:** Adjust power and G as required to avoid overshooting the show line. If the aircraft descends below 500 feet AGL, reorient lift vector to ensure a timely correction. If the aircraft descends below 400 feet AGL or the airspeed decays below 300 knots, abort the maneuver by rolling wings-level, climbing to 500 feet AGL, and repositioning for the follow-on maneuver.

4.30. Low Angle Strafe Pass (Left to Right). Perform the low angle strafe pass as described in paragraph 4.16. At the completion of the low angle strafe pass, reposition the aircraft to set up for the LAHD Bomb Pass.

4.31. LAHD Bomb Pass (Right to Left). Perform the LAHD Bomb Pass as described in paragraph 4.17.

4.32. SAM Weave. Perform the SAM Weave as described in **paragraph 4.18**.

4.33. Dedication Pass (Left to Right). Perform the Dedication Pass as described in **paragraph 4.19**.

4.34. Knife Edge Pass (Right to Left). Perform the Knife Edge Pass as described in **paragraph 4.20**.

4.35. Tactical Pitch-Up to Landing (Direction of Landing). Perform the Tactical Pitch-Up to Landing as described in **paragraph 4.23**.

Section 4D—Flat Profile

4.36. Maximum Performance Takeoff Inverted. Perform the Maximum Performance Takeoff Inverted as described in **paragraph 4.10**.

NOTE: Unless otherwise stated, **Abnormal Procedures** for the flat profile are the same as the high profile.

4.37. Flat Pass. Perform the Flat Pass as described in **paragraph 4.11**.

4.38. High-G Turn (Right to Left). Perform the High-G Turn as described in **paragraph 4.12**.

4.39. Triple Aileron Roll (Left to Right). Perform the Triple Aileron Roll as described in **paragraph 4.13**.

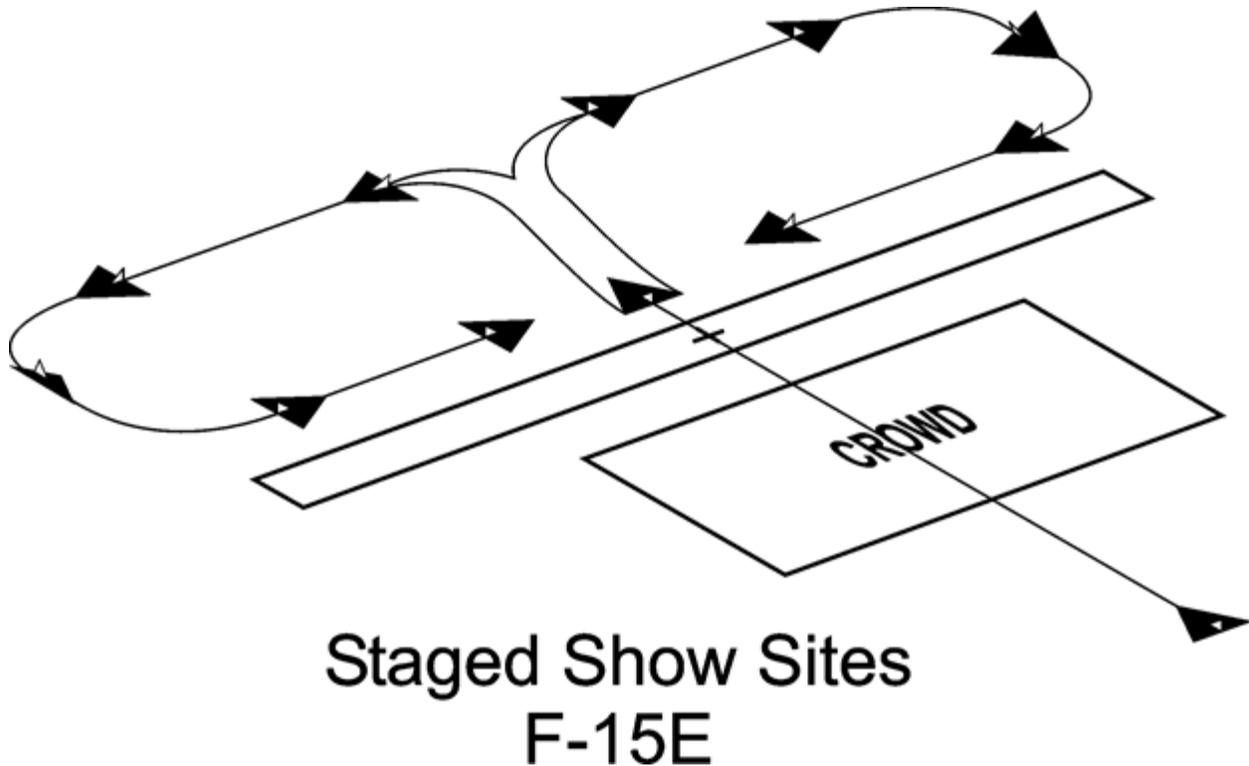
4.40. Four-Point Roll (Right to Left). Perform the Four-Point Roll as described in **paragraph 4.14**.

4.41. Level 8 (Right to Left). Perform the Level 8 as described in **paragraph 4.29**.

4.42. Dedication Pass (Left to Right). Perform the Dedication Pass as described in **paragraph 4.19**.

4.43. Knife Edge Pass (Right to Left). Perform the Knife Edge Pass as described in **paragraph 4.20**.

4.44. Tactical Pitch-Up to Landing (Direction of Landing). Perform the Tactical Pitch-Up to Landing as described in **paragraph 4.23**, however, DO NOT perform the rolling portion of the maneuver. The maneuver is non-aerobatic.

*Section 4E—Staged Show Sites***4.45. Staged Show Site Entry.****Figure 4.20. F-15E Staged Show Sites.**

Staged Show Sites F-15E

4.45.1. When demonstration aircraft takeoff from other than the show site, plan to arrive over the show site with the fuel requirements prescribed in [paragraph 4.2](#) plus enroute return fuel IAW AFI 11-2F-15E, Vol 3. The pilot may enter from behind the crowd at a minimum of 1,000 ft AGL as depicted in [Figure 4.20](#), or via a Flat Pass maneuver down the show line, and complete the show as described in this chapter. Upon completion of the last pass and clearing the crowd, turn out behind the crowd and return to the staging airport. Pilots should plan to fly a full demonstration, but may cut the profile short as required to maintain suitable enroute return fuel.

Chapter 5

F-16 DEMONSTRATION MANEUVERS

Section 5A—General Information

5.1. General. Use maneuvers described in this chapter for training and for F-16 aerial demonstrations. The demonstration 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. Demonstration 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. The ground safety observer monitors demonstration pilot altitude and airspeed radio calls, and directs an abort when parameter limits are exceeded. 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.

5.1.1. **(Added-ACC) F-16 Pyrotechnics . (T-3)** The F-16 demonstration will only utilize pyrotechnics (pyro) as a Wall of Fire and only during the High Speed Pass. Only ICAS-approved personnel will be permitted to utilize pyrotechnics (pyro) in association with the ACC F-16 demonstration 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 demonstration teams.

5.1.1.1. **(Added-ACC)** The following maximum Net Explosive Weights (NEW) will be used (all NEWs in this instruction are TNT equivalent):

5.1.1.2. **(Added-ACC)** 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.

5.1.1.3. **(Added-ACC)** The following items will be briefed by the ACC demonstration pilot and the SIC, in person, prior to each performance: (1) Exact dimensions of the pyrotechnics area and the magnitude of explosives being used. (2) Aircraft/pyro de-confliction plan. (3) Demonstration profile and sequence of pyro (Wall of Fire). (4) Forecast wind and effects on pyro. (5) Communications plan. (6) Knock-it-off (KIO) procedures. (7) Fire hazards and fire department response plan. (8) FOD potential and effects.

5.2. Aircraft Configuration and Fuel Requirements. Ensure aircraft configuration for all demonstrations 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:

5.2.1. Staged Show: 6,000 pounds.

5.2.2. High Show: 5,000 pounds.

5.2.3. Low Show: 4,000 pounds.

5.3. Airspeed and G Limits. Demonstration pilots may not exceed 0.94 Mach. The maximum target G for this demonstration profile is 7.5 Gs. This does not preclude a momentary increase in G for safety considerations.

5.4. Show line Restrictions. The majority of the F-16 demonstration 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.

5.5. 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.

5.6. Weather Requirements. Weather PARAMETER LIMITS for the high profile are a ceiling of at least 7,000 feet and three miles ground and five miles in-flight visibility with a discernible horizon. The Low Show profile requires 1,500' and 5 miles in-flight 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.

5.6. (ACC) Weather Requirements . The Low Show profile requires 1,500', three miles ground visibility and five miles inflight visibility with a discernible horizon.

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

5.7.1. 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.

5.8. Demonstration Maneuver Profiles.

5.8.1. High Show

5.8.1.1. Maximum Performance Takeoff and Climb to Cuban 8

5.8.1.2. High Speed Flat Pass

5.8.1.3. Triple Aileron Roll

5.8.1.4. High-G Turn

5.8.1.5. Four-Point Roll

5.8.1.6. Flat Pass

5.8.1.7. Falcon Turn

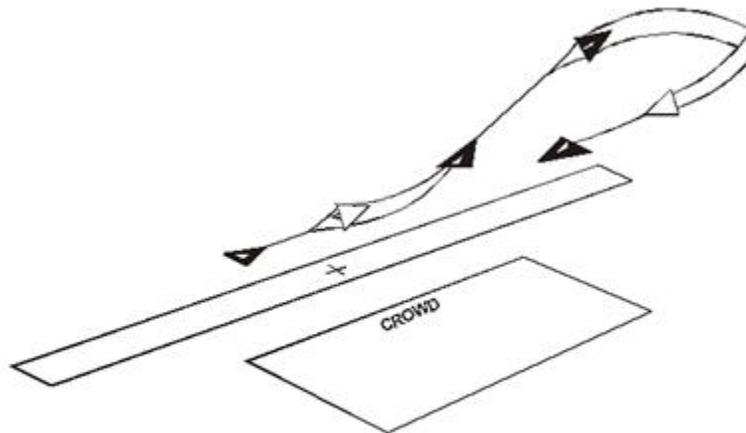
5.8.1.8. Shark's Tooth

- 5.8.1.9. High Alpha Pass
- 5.8.1.10. Muscle Climb
- 5.8.1.11. Knife Edge Pass
- 5.8.1.12. Maximum Performance Climb with Rolls
- 5.8.1.13. Spiral Descent
- 5.8.1.14. Dedication Pass
- 5.8.1.15. Tactical Pitch-Up to Landing

5.8.2. Low Show

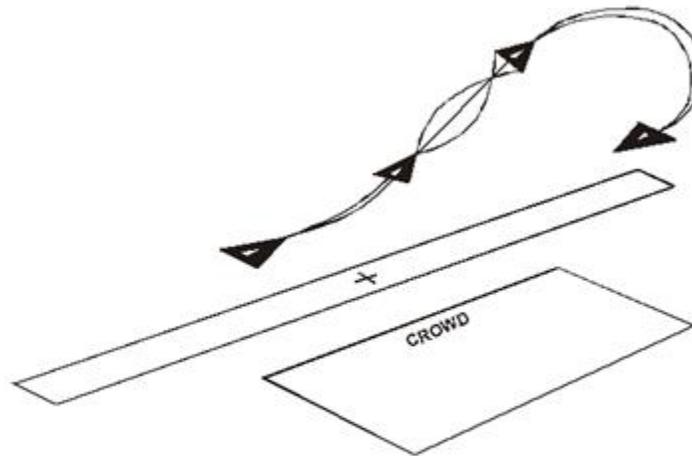
- 5.8.2.1. Takeoff to Level 8 (or Cuban 8 if the ceiling is verified at or above 3,500' AGL)
- 5.8.2.2. High Speed Flat Pass
- 5.8.2.3. Triple Aileron Roll
- 5.8.2.4. High-G Turn
- 5.8.2.5. Four-Point Roll
- 5.8.2.6. Flat Pass
- 5.8.2.7. Falcon Turn
- 5.8.2.8. High Alpha Pass
- 5.8.2.9. Muscle Climb (transition as required by weather)
- 5.8.2.10. Knife Edge Pass
- 5.8.2.11. Dedication Pass
- 5.8.2.12. Tactical Pitch-Up to Landing

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

Figure 5.1. F-16 Flat Wifferdill Reposition Maneuver.

Flat Wifferdill Reposition Maneuver
F-16

5.9.1. Flat Wifferdill 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 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 that 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 5.2. F-16 Wifferrill Reposition Maneuver.

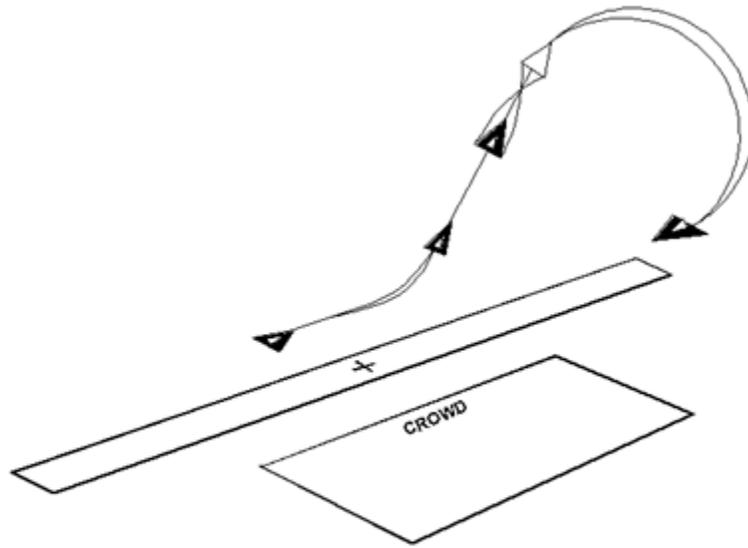
Wifferrill Reposition Maneuver
F-16

5.9.2. Wifferrill Reposition Maneuver. 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 demonstration area. Each turn may differ slightly so that 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.

5.9.2.1. 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.

5.9.3. Vertical Reposition Maneuver.

Figure 5.3. F-16 Vertical Reposition Maneuver.



Vertical Reposition Maneuver
F-16

Table 5.1. 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	$\geq 3,500'$	300	A/R	
Exit	500'	A/R	A/R	4 to 6
PARAMETER	LIMITS			
Altitude AGL	Airspeed KCAS MIN/MAX	Power Setting	G	

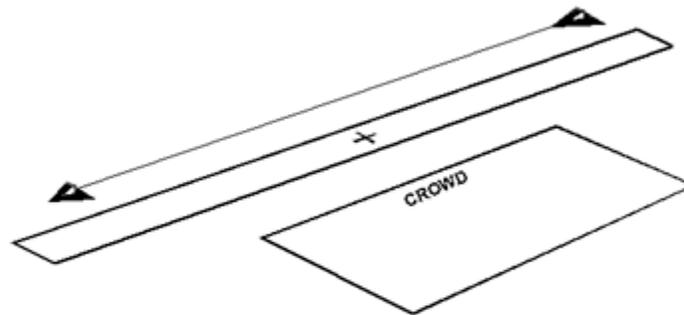
Entry	min	400'	150 / N/A	A/R	9
Apex	min	5,000'	150 / 350	A/R	9
90 degrees nose low		3,000'	150 / 350		
Exit	min	400'	A/R / A/R	A/R	9

5.9.3.1. **Maneuver Description:** Fly the vertical reposition to change direction at each end of the 1,500' 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 demonstration 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 demonstration pilot play the G during the 135-degree pull through the vertical.

5.9.3.2. **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.

5.9.4. Flat Pass.

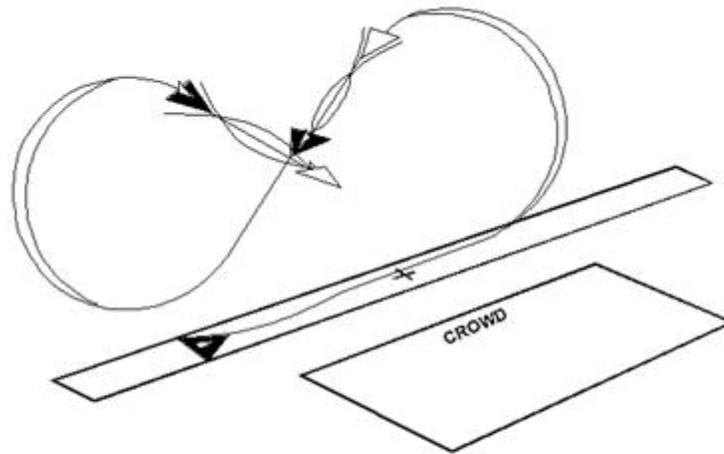
Figure 5.4. F-16 Flat Pass.



Flat Pass
F-16

NOTE: May be flown either direction.

5.9.4.1. **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 demonstration maneuver in the approved direction relative to the crowd line. The Flat Pass may be flown in either direction at any time during the demonstration sequence if required. It should be flown IAW **paragraph 5.11.**

*Section 5B—High Profile***5.10. Maximum Performance Takeoff and Climb to Cuban 8.****Figure 5.5. F-16 Maximum Performance Takeoff and Climb to Cuban 8.**

Maximum Performance
Takeoff and Climb to Cuban 8
F-16

Table 5.2. 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		

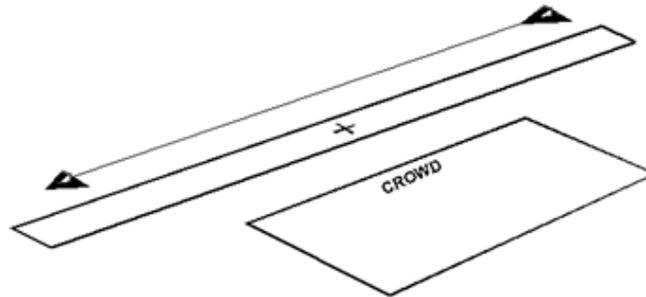
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	100'	300 / 440	MIL to MAX	9
Apex	min	3,000'	150 / 350	MIL to MAX	5
Exit	min	400'	250 / A/R	A/R	9

5.10.1. **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 alignment or takeoff considerations drive a crowd right-to-left takeoff, the pilot may execute an immediate reposition to re-enter the appropriate show line from crowd left to accomplish the complete maneuver.

5.10.2. **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 that 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.

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

Figure 5.6. F-16 Flat Pass.



Flat Pass
F-16

NOTE: May be flown either direction

Table 5.3. F-16 Flat Pass Parameters.

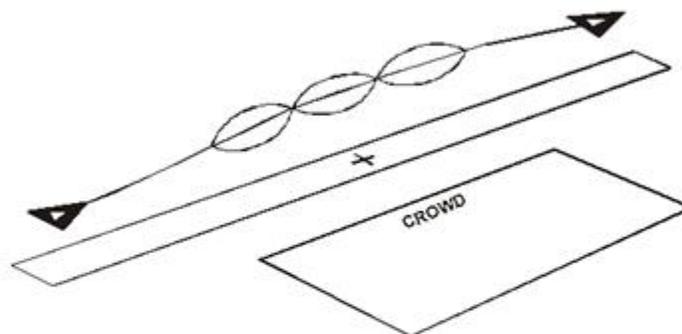
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	<u>0.70M</u>	MAX	.5 to 1.5
Exit	300'	<u>≤.92M</u>	IDLE to MAX	.5 to 1.5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	N/A / .94M	MAX	N/A
Exit	min 200'	N/A / .94M	IDLE to MAX	N/A

5.11.1. **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.

5.11.2. **Abnormal Procedures:** Deselect afterburner before exceeding 0.94 Mach.

5.12. Triple Aileron Roll (Left to Right).

Figure 5.7. F-16 Triple Aileron Roll.



**Triple Aileron Roll
F-16**

Table 5.4. 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		

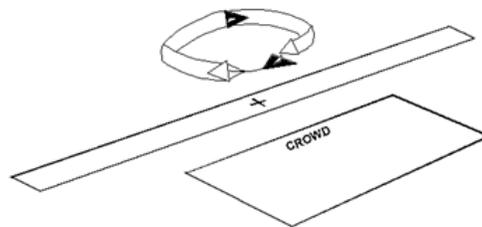
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	400'	400 / 500	80% to MIL	2
Exit	min	400'	400 / 500	80% to MIL	N/A

5.12.1. **Maneuver Description:** On the 1,500' show line, at 3,500 feet prior to show center with approximately 425 knots raise the nose to 5-7 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 that the flight path marker is 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.

5.12.2. **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.

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

Figure 5.8. F-16 High-G Turn.



High G Turn
F-16

Table 5.5. F-16 High-G Turn Parameters.

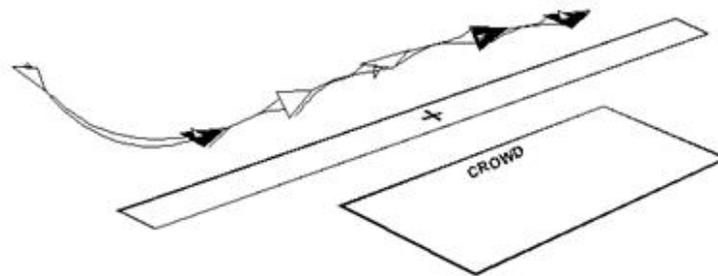
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	400	MIL to MAX	7.5
Exit	500'	350	MIL to MAX	6.5 to 7.5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	330 / 440	MIL to MAX	9
Exit	min 400'	250 / 440	MIL to MAX	9

5.13.1. **Maneuver Description:** Beyond the 500' show line and just prior to show center select full 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' 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.

5.13.2. **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.

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

Figure 5.9. F-16 Four-Point Roll.



Four-Point Roll
F-16

Table 5.6. 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

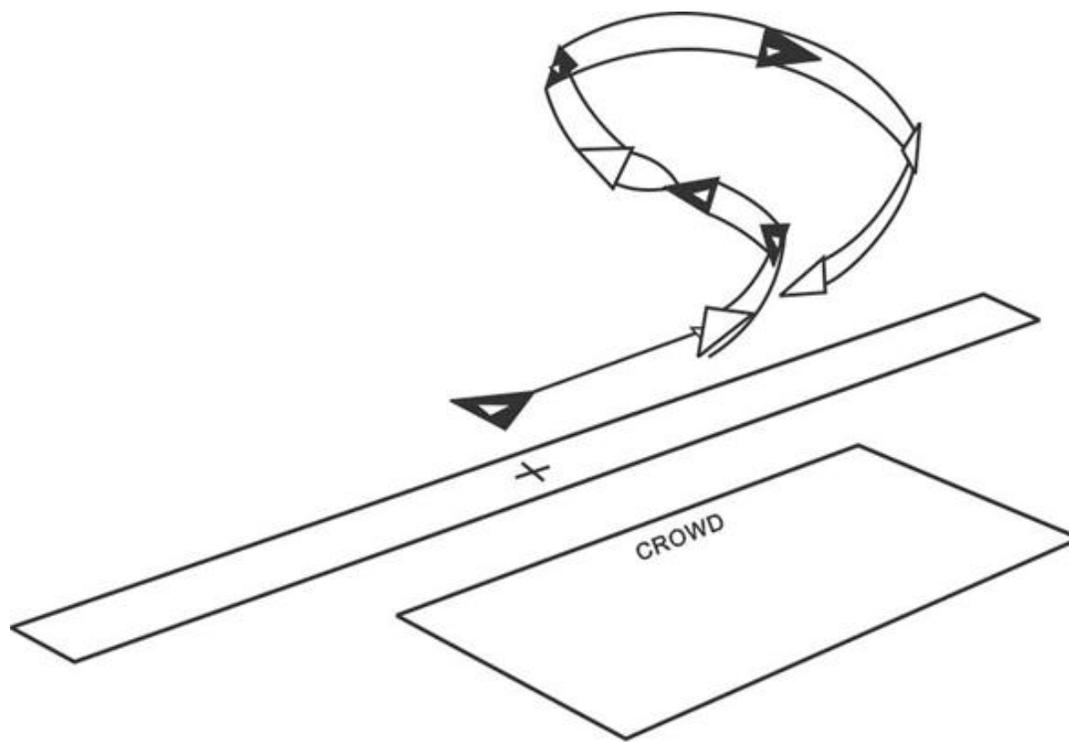
5.14.1. **Maneuver Description:** On the 1,500' show line, at 3,000 feet prior to show center, rotate the nose five to seven degrees nose-up, establish a climb, and relax stick pressure. A cadence four-point roll to the left is then performed by pausing momentarily at the 90-degree, 180-degree, 270-degree, 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.

5.14.2. **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.

5.15. **Flat Pass (Right to Left).** Perform the Flat Pass as described in [paragraph 5.11](#) and [Figure 5.6](#).

5.16. **Falcon Turn (Left to Right).**

Figure 5.10. F-16 Falcon Turn.



**Falcon Turn
F-16**

Table 5.7. F-16 Falcon Turn Parameters.

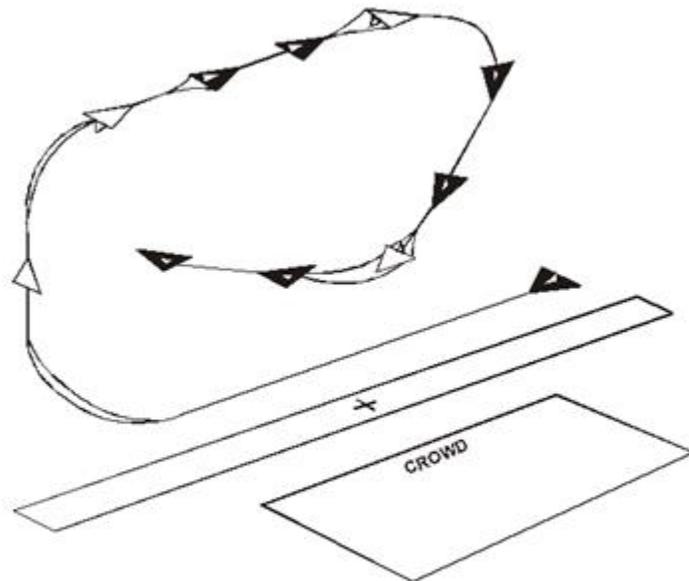
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	400	MAX	6.5 to 7.5
Turn Reversal	1,500'	350	MIL to MAX	6.5 to 7.5
Exit	500'	350	MIL to MAX	6.6 to 7.5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	330 / 440	MIL or Less	N/A
Turn Reversal	800'	300 / 440	A/R	N/A
Exit	min 400'	250 / 440	A/R	9

5.16.1. **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.

5.16.2. **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.

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

Figure 5.11. F-16 Shark's Tooth.



**Shark's Tooth
F-16**

Table 5.8. 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

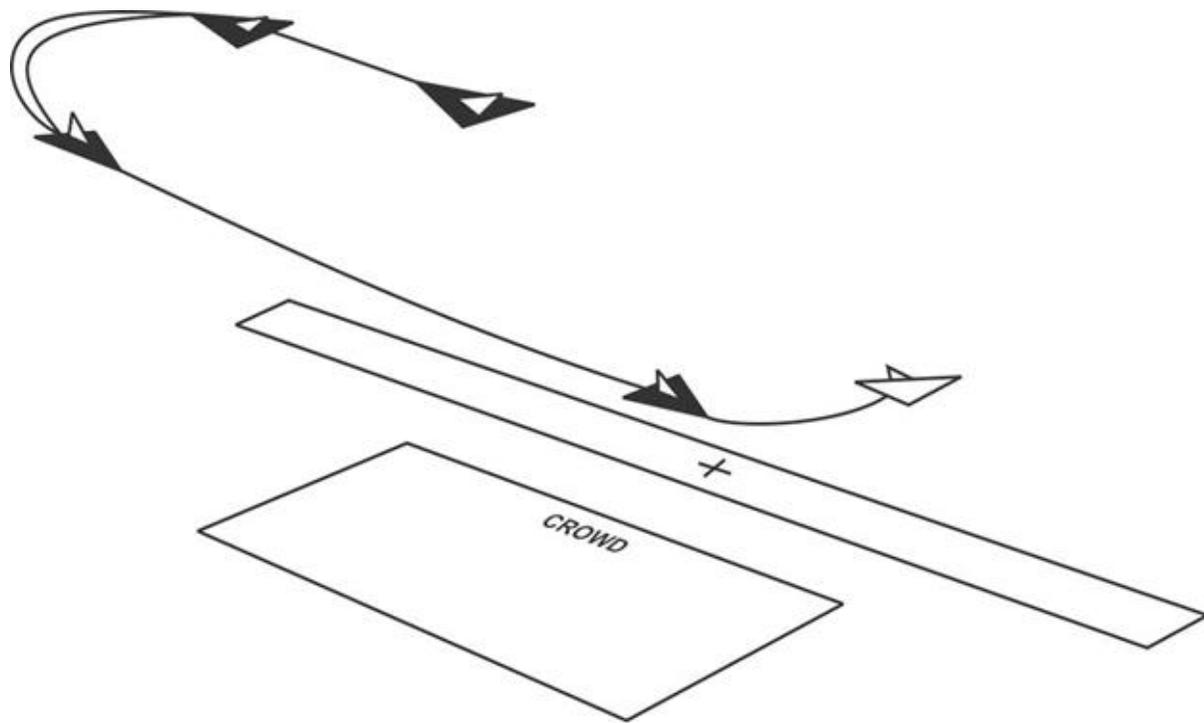
			MIN/MAX		
Entry	min	400'	330 / N/A	MAX	9
Apex		5,000'	150 / 350	MIL to MAX	9
90 degrees nose low		3,000'	150 / 350	IDLE to MIL	9
Exit	min	400'	A/R / A/R	A/R	9

5.17.1. **Maneuver Description:** (High Show Only. If ceiling is less than 7,000' 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' 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 downwind for the High Alpha pass into the wind.

5.17.2. **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.

5.18. High Alpha Pass (Into the wind).

Figure 5.12. F-16 High Alpha Pass.



High Alpha Pass F-16

Table 5.9. F-16 High Alpha Pass Parameters.

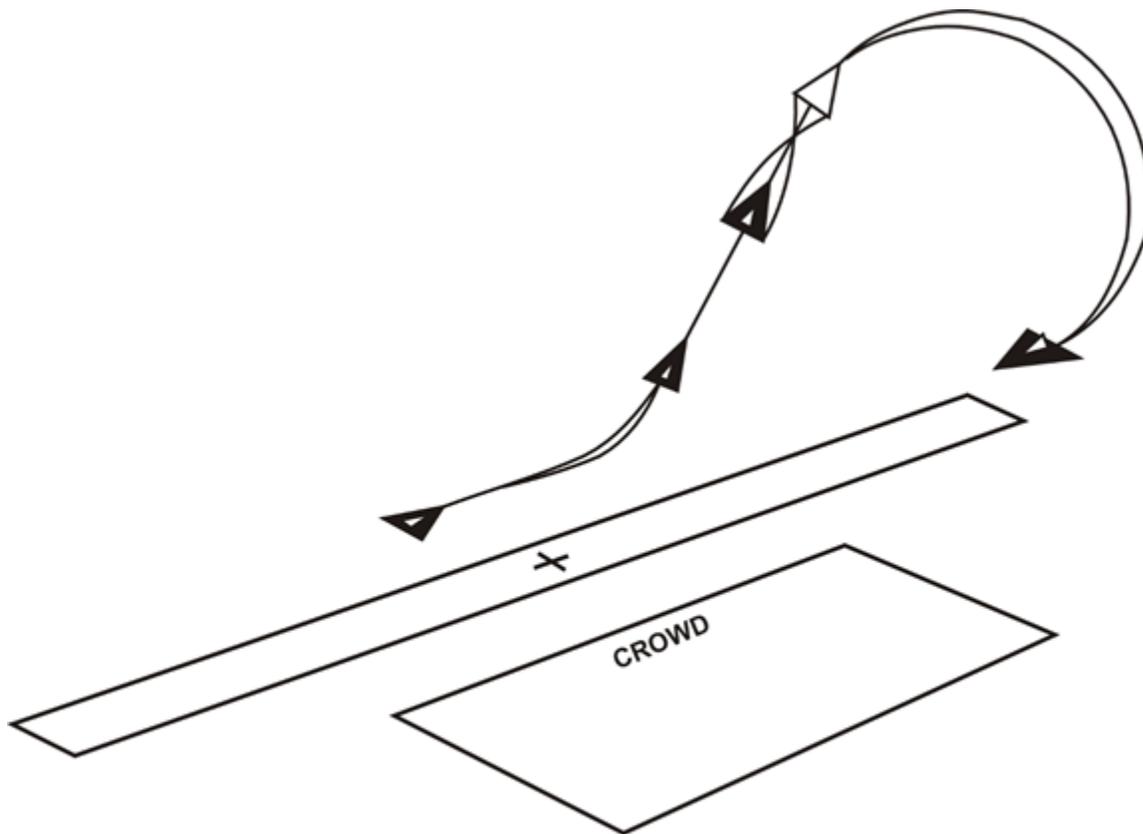
TARGET		PARAMETERS			
Altitude AGL		Airspeed KCAS	Power Setting	AOA	G
Entry	500'	125	A/R	20 deg	.5 to 1.5
Exit	500'	125	A/R	20 deg	.5 to 1.5
PARAMETER		LIMITS			
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	AOA MIN/MAX	G
Entry min	400'	115 / N/A	A/R	N/A / 23 deg	.5 to 1.5
Exit min	400'	115 / N/A	A/R	N/A / 23 deg	.5 to 1.5

5.18.1. **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' 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 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 HSI. To complete the maneuver, select full afterburner and transition to the muscle climb.

5.18.2. **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.

5.19. Muscle Climb Maneuver.

Figure 5.13. F-16 Muscle Climb Maneuver.



Muscle Climb Maneuver F-16

Table 5.10. F-16 Muscle Climb Maneuver Parameters.

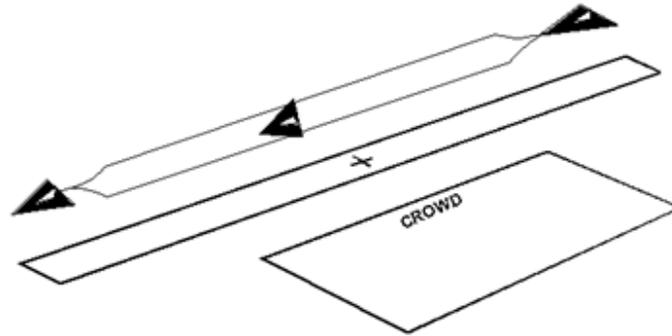
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	125	MAX	1 to 1.8
Apex	≥5,500'	175	MIL to MAX	A/R
90 degrees nose low	≥3,500'	300	A/R	
Exit	500'	A/R	A/R	4 to 6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	115 / N/A	MAX	2
Apex	min 5,000'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

5.19.1. **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 – 1.8 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 demonstration 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. If a VRM is flown, the demonstration pilot adheres to the apex and 90-degree nose-low parameters listed in Table 5.10. and the procedures for a VRM as described in **paragraph** 5.9.3.1. 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.

5.19.2. **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.

5.20. Knife Edge Pass.

Figure 5.14. F-16 Knife Edge Pass.



Knife Edge Pass
F-16

Table 5.11. F-16 Knife Edge Pass Parameters.

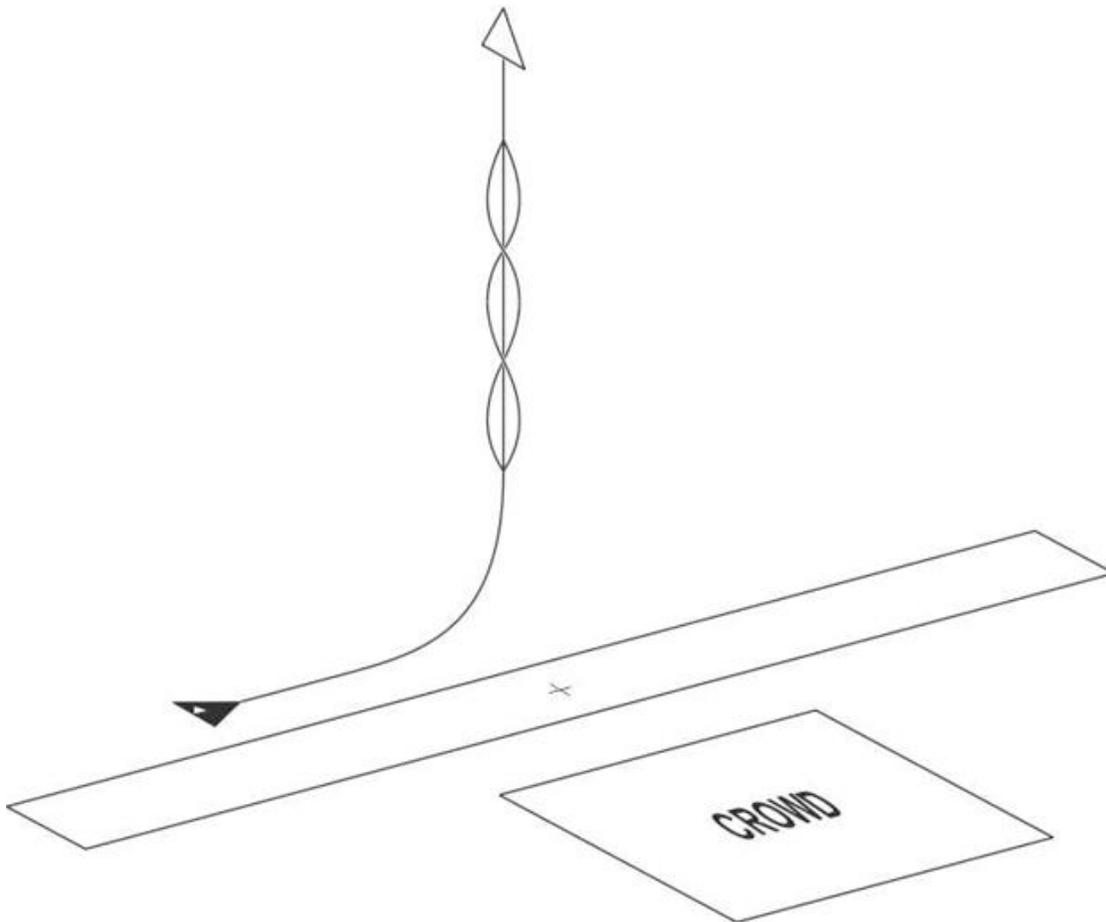
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	500'	425	MIL to MAX	.5 to 1.5
Exit	500'	475	MIL to MAX	.5 to 1.5
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 400'	400 / 550	MIL to MAX	N/A
Exit	min 400'	400 / 550	A/R	N/A

5.20.1. **Maneuver Description:** Enter the 1,500' show line at 500 feet AGL and 425 knots. At 4,000 feet prior to show center, raise the nose to five to seven 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.

5.20.2. **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 demonstration 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.

5.21. Maximum Performance Climb with Rolls.

Figure 5.15. F-16 Maximum Performance Climb with Rolls.



Maximum Performance Climb With Rolls F-16

Table 5.12. F-16 Maximum Performance Climb with Rolls Parameters.

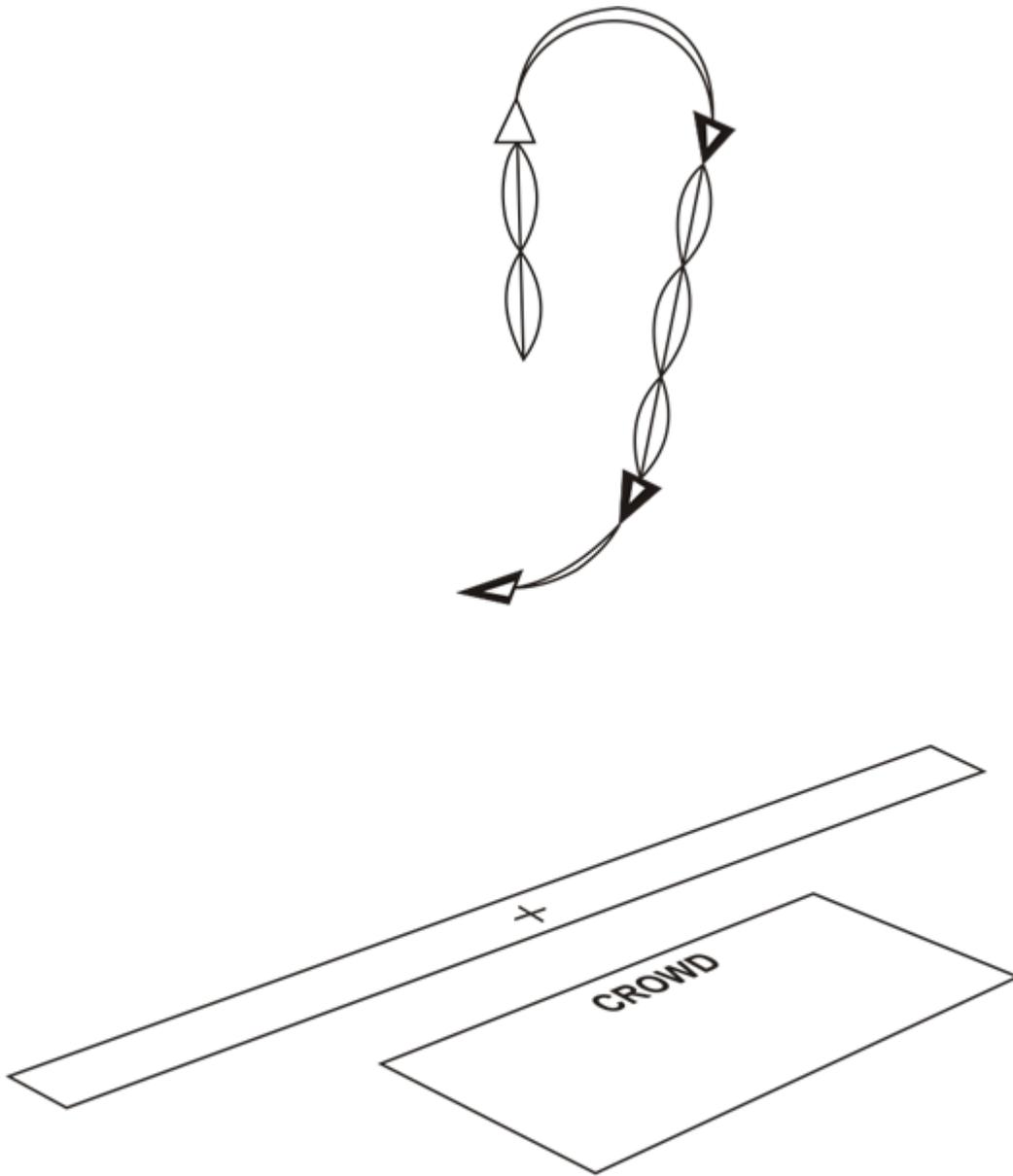
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	450	MIL to MAX	6 to 7.5
Recovery/Exit 2,500' prior to assigned altitude		250	A/R	4 to 6
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	330 / 550	MIL to MAX	9
Apex	NTEWA	150 / N/A	A/R	9

5.21.1. **Maneuver Description:** Enter on the 1,500' 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 below waived 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 waived 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.

5.21.2. **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 G), 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 below the top of waived airspace.

5.22. F-16 Spiral Descent.

Figure 5.16. F-16 Spiral Descent.



Spiral Descent F-16

Table 5.13. F-16 Spiral Descent Parameters.

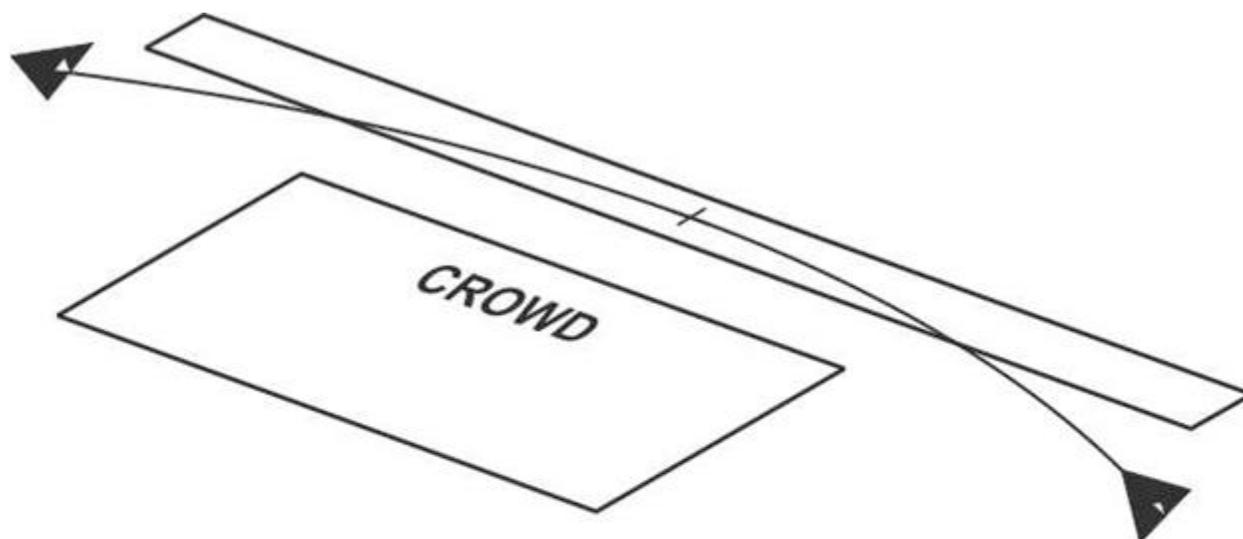
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	NTEWA	200	IDLE	1 to 2
Exit	4,000' and 45° NL	A/R	A/R	3 to 7
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 8,000'	150 / 350	IDLE	N/A
Exit	min 3,500' and $\leq 45^\circ$ NL	250 / 440	A/R	8

5.22.1. **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 250-440 knots prior to initiating the recovery. At approximately 5,000' 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'. 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.

5.22.2. **Abnormal Procedures:** If below 8,000' AGL at the apex of the climb (airspace restrictions, weather conditions), adjust dive angle to safely execute a recovery at 4,000' 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 that 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.

5.23. 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 5.17. F-16 Dedication Pass.



Dedication Pass F-16

Table 5.14. F-16 Dedication Pass Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	<u>0.65M – 0.90M</u>	MAX	1 to 3
Exit	300'	<u>0.65M – 0.90M</u>	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

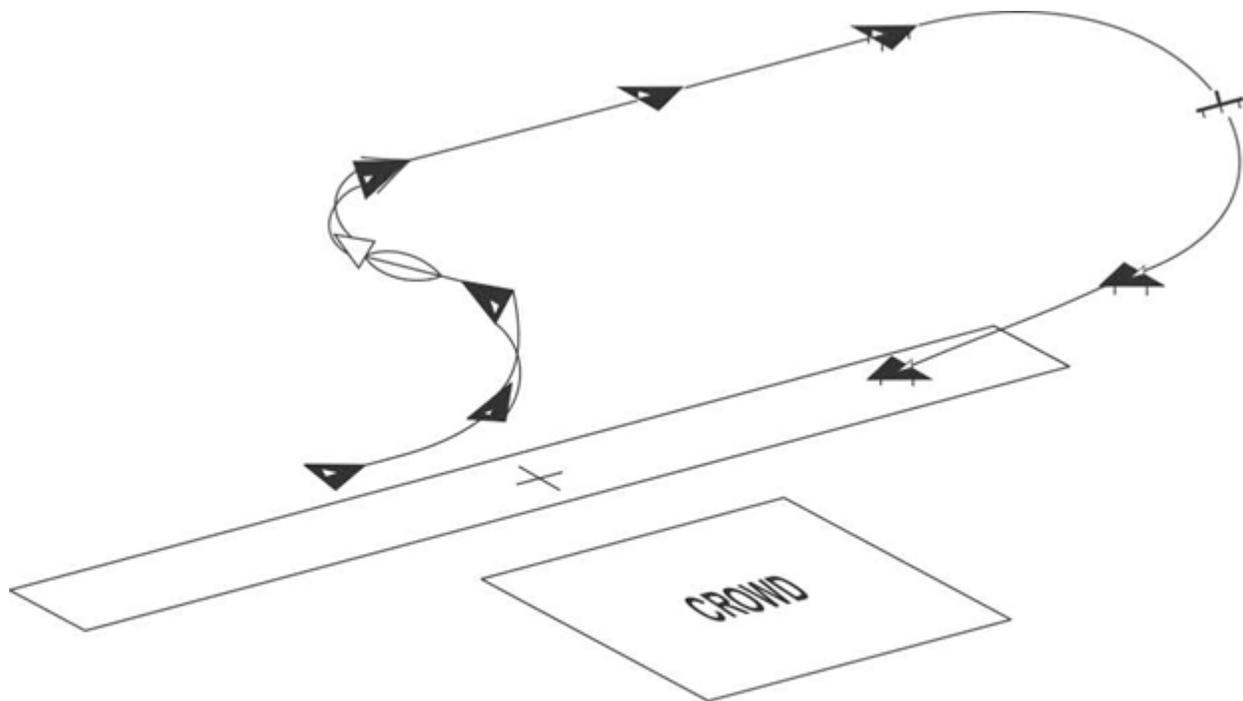
5.23.1. Maneuver Description: The maneuver is flown beyond the 500-foot line. Following the Max Performance Climb with Rolls (high show), or Knife Edge (low show), attain a safe airspeed and reposition the aircraft to arrive behind and offset from the crowd. Fly the approach from behind the line, approximately 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 .85M 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.

5.23.2. **Abnormal Procedures:** Abort the maneuver if at any time the aircraft comes closer than 500' 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.

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

Figure 5.18. F-16 Tactical Pitch-Up to Landing.



**Tactical Pitch-Up To Landing
F-16**

Table 5.15. 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

5.24.1. **Maneuver Description:** Enter on the 1,500' show line at 500 feet AGL and 350 knots. At 2,000 feet prior to show center raise the nose to five to seven degrees pitch angle, unload, and perform a 405-degree aileron roll away from the crowd followed by a 5.0 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 Heritage Flight is to be performed immediately following completion of the demonstration, conduct a low approach or wings-level pass and proceed to rejoin with Heritage Flight aircraft using pre-briefed procedures.

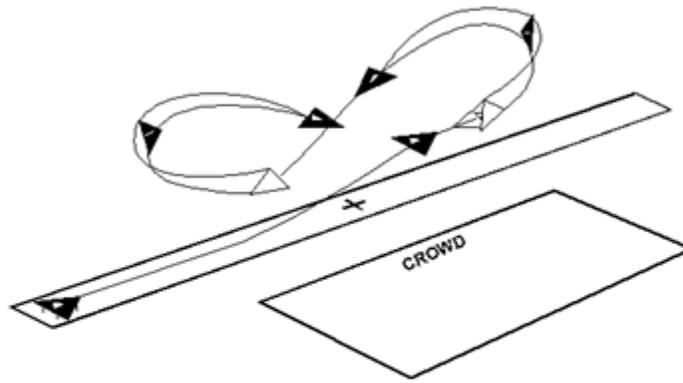
5.24.2. **Abnormal Procedures :** If entry parameter limits are not achieved by show center, do not perform the 405-degree aileron roll; instead, fly a simple pull-up to a normal closed pattern.

Section 5C—Low Profile

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

5.26. Takeoff to Level 8 (or Cuban 8). **NOTE:** If show ceiling is verified to be at or above 3,500' AGL, the pilot may elect to fly a Cuban 8 as described in [paragraph 5.10.1](#), in lieu of a Level 8.

Figure 5.19. F-16 Level 8.



Level 8
F-16

Table 5.16. 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

5.26.1. 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 three to five-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 5.0 to 7.0 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 either a Flat Pass (left to right takeoff) or the Triple Aileron Roll (right to left takeoff).

5.26.2. 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.

5.27. Flat Pass (Right to Left). If the direction of takeoff is left to right, use the repositioning maneuver following the Level or Cuban 8 to prepare for a flat pass as described in **paragraph 5.11.1**. At 2,000 feet past show center, execute a repositioning maneuver to set up for the next maneuver.

5.28. Triple Aileron Roll (Left to right). Perform the triple aileron roll as described in **paragraph 5.12.1**. When wings-level following the last aileron roll, the pilot performs a repositioning maneuver to set up for the next maneuver.

5.29. High-G Turn (Right to Left). Perform the high-G turn as described in **paragraph 5.13.1**. At 2,000 feet past show center, perform a repositioning maneuver to set up for the next maneuver.

5.30. Four-Point Roll (Left to Right). The four-point roll is performed as described in **paragraph 5.14.1**. At the completion of the pass, execute a repositioning maneuver to set up for the next maneuver.

5.31. High Speed Pass. Perform the High Speed Flat Pass as in **paragraph 5.20.1**. At the completion of the pass, execute a repositioning maneuver to set up for the next maneuver.

5.32. Falcon Turn (Left to Right). The Falcon Turn is performed as described in **paragraph 5.16.1**. At the completion of the maneuver, pull up to a downwind to prepare for the High Alpha

pass against the wind. If the wind favors a right to left final, a normal 180-degree pitch-up to downwind is performed. *NOTE:* The Falcon Turn is a profile transition point if the weather ceiling has changed.

5.33. High Alpha Pass (Into the wind). This maneuver may be flown on the 500-foot show line. The High Alpha pass is performed as described in **paragraph 5.18.1**. At 3,000 feet past show center, perform a repositioning maneuver to set up for the next maneuver.

5.34. Muscle Climb. Perform the Muscle Climb as described in **paragraph 5.19.1**. At the completion of the pass, execute a reposition maneuver to set up for the next maneuver.

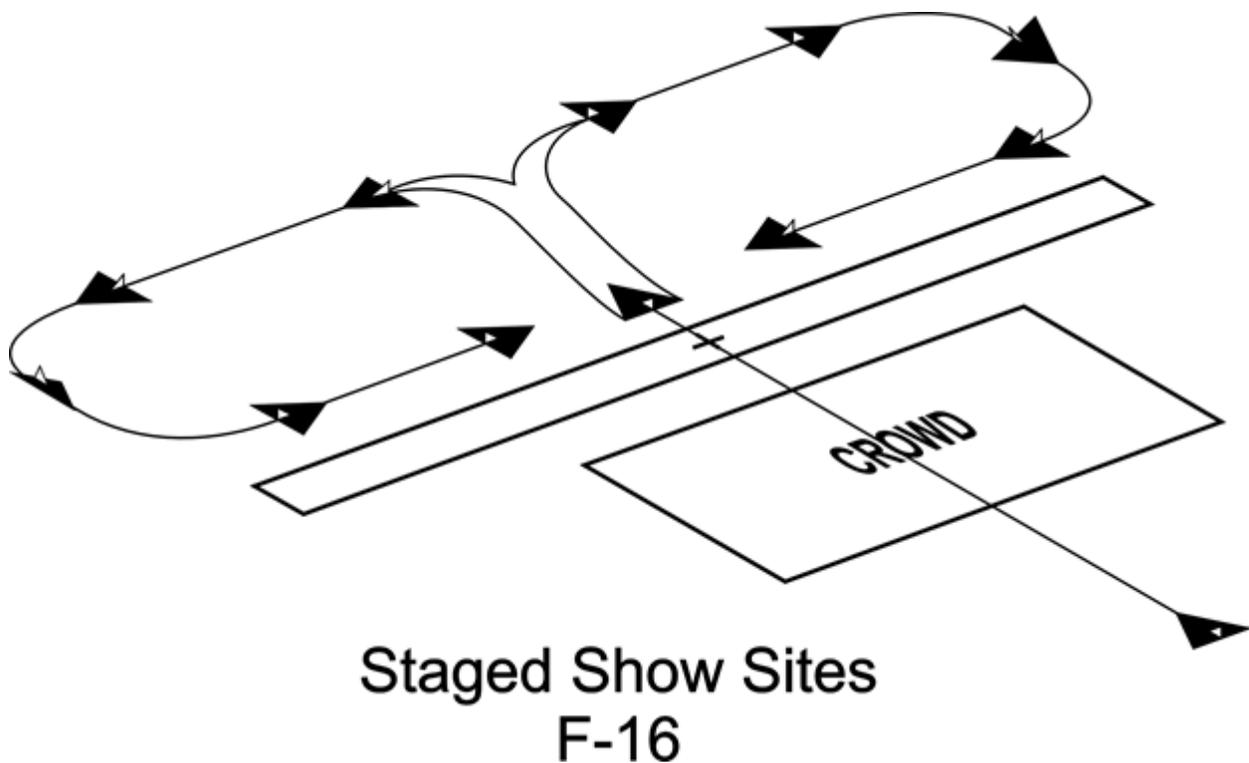
5.35. Knife Edge Pass. Perform the Knife Edge Pass as in **paragraph 5.20.1**. At the completion of the pass, execute a reposition maneuver to set up for the next maneuver.

5.36. Dedication Pass. Perform the Dedication pass as described in **paragraph 5.23.1**.

5.37. Tactical Pitch-Up to Landing. The tactical pitch-up to landing is performed as described in **paragraph 5.24.1**.

5.38. Staged Show Sites.

Figure 5.20. F-16 Staged Show Sites.



5.38.1. When demonstration aircraft takeoff from other than the show site, plan to arrive over the show site with the fuel requirements prescribed in **paragraph 5.2** plus enroute return fuel IAW AFI 11-2F-16 Vol 3. The pilot may enter from behind the crowd at a minimum of 1,000 ft AGL as depicted in **Figure 5.20**, 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 demonstration, but may cut the profile short as required to maintain suitable enroute return fuel.

5.39. (Added-ACC) Maneuver Description – Pyro. Prior to the start of the F-16 demonstration, the demonstration pilot or team safety observer will get a radio check with the SIC. Radio contact will only be initiated by the demonstration 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 demonstration 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 pyrotechnics as briefed. The pilot’s responsibility is to fly the demonstration 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”.

5.39.1. **(Added-ACC)** 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. IAW AFMAN 91-201, *Explosives Safety Standards*, dictate a minimum of 1250 feet separation from Hazard C/D 1.1 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 demonstration pilot may continue the demonstration 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.

5.39.2. **(Added-ACC) Abnormal Procedures – Pyro.** 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 6

F-22 DEMONSTRATION MANEUVERS

Section 6A—General Information

6.1. General. Maneuvers described in this document are used for training and flown in F-22 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 Tactical Demonstration 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 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.

6.2. Aircraft Configuration and Fuel Requirements. These maneuvers are 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.

6.3. Airspeed and G Limits. Demonstration pilots may not exceed 0.94 Mach. The maximum target G for this demonstration is 7.5 Gs. This does not preclude a momentary increase in G for safety considerations.

6.4. Show line Restrictions. The majority of the F-22 demonstration 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.

6.5. Airspace and Runway Requirements. Required airspace for the F-22 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, 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.

6.5. (ACC) Airspace and Runway Requirements. Required airspace for the F-22 is 7,000' AGL.

6.6. 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 profile is 1,500 feet. 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.

6.6. (ACC) Weather Requirements. The Low Profile requires 1,500 feet, three miles ground visibility and five miles inflight visibility with a discernible horizon.

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

6.7.1. 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.

6.8. Demonstration Maneuver Profiles.

6.8.1. High Show

6.8.1.1. Maximum Power Takeoff to High AOA Loop

6.8.1.2. Minimum Radius Turn to J-Turn Reposition

6.8.1.3. Weapon Bay Door Pass

6.8.1.4. Dedication Pass

6.8.1.5. Pedal Turn

6.8.1.6. Power Loop

6.8.1.7. Loaded Roll

6.8.1.8. Tail Slide

6.8.1.9. Slow Speed Pass

6.8.1.10. Split-S Reposition

6.8.1.11. High Speed Pass

6.8.1.12. Hoover Pitch to Land

6.8.2. Low Show

6.8.2.1. Maximum Power Takeoff

6.8.2.2. Minimum Radius Turn

6.8.2.3. Weapon Bay Door Pass

6.8.2.4. Dedication Pass

6.8.2.5. Slow Speed Pass

6.8.2.6. Loaded Roll

6.8.2.7. High Speed Pass

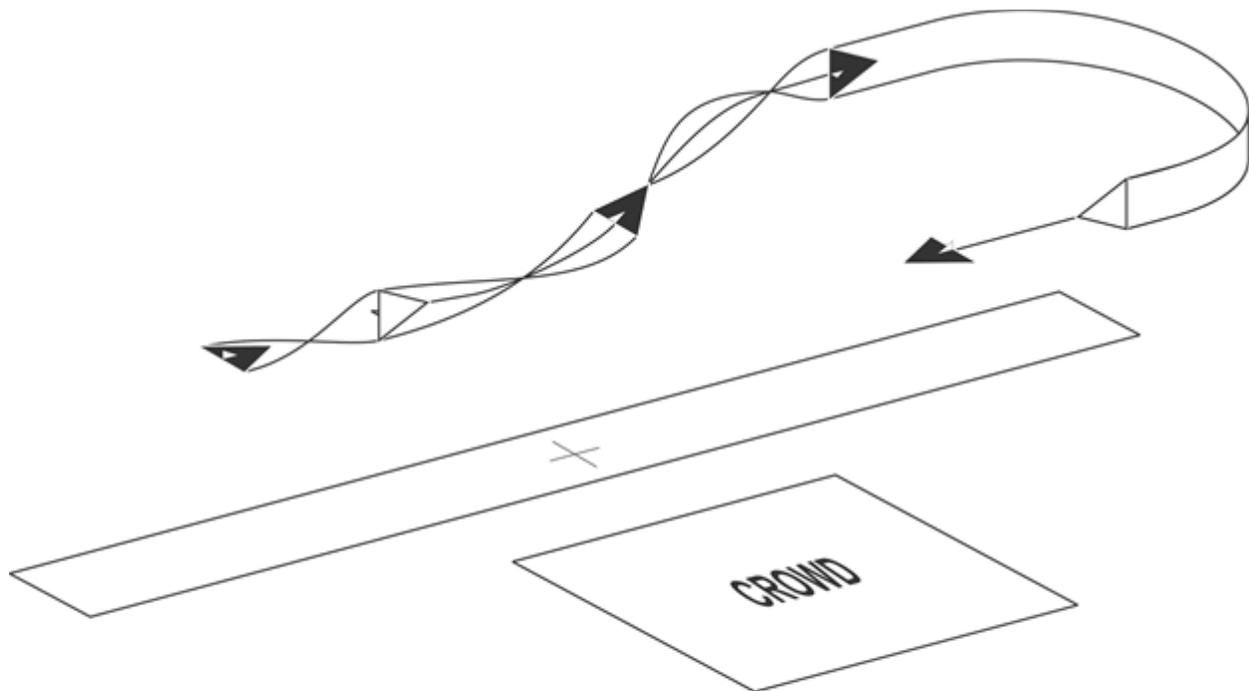
6.8.2.8. Minimum Radius Turn

6.8.2.9. Hoover Pitch to Land

6.9. Reposition Maneuvers. Reposition maneuvers may be flown in either direction at any time during the demonstration 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.

6.9.1. Flat Wifferdill 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 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 so that 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 6.1. F-22 Flat Wifferdill Reposition.

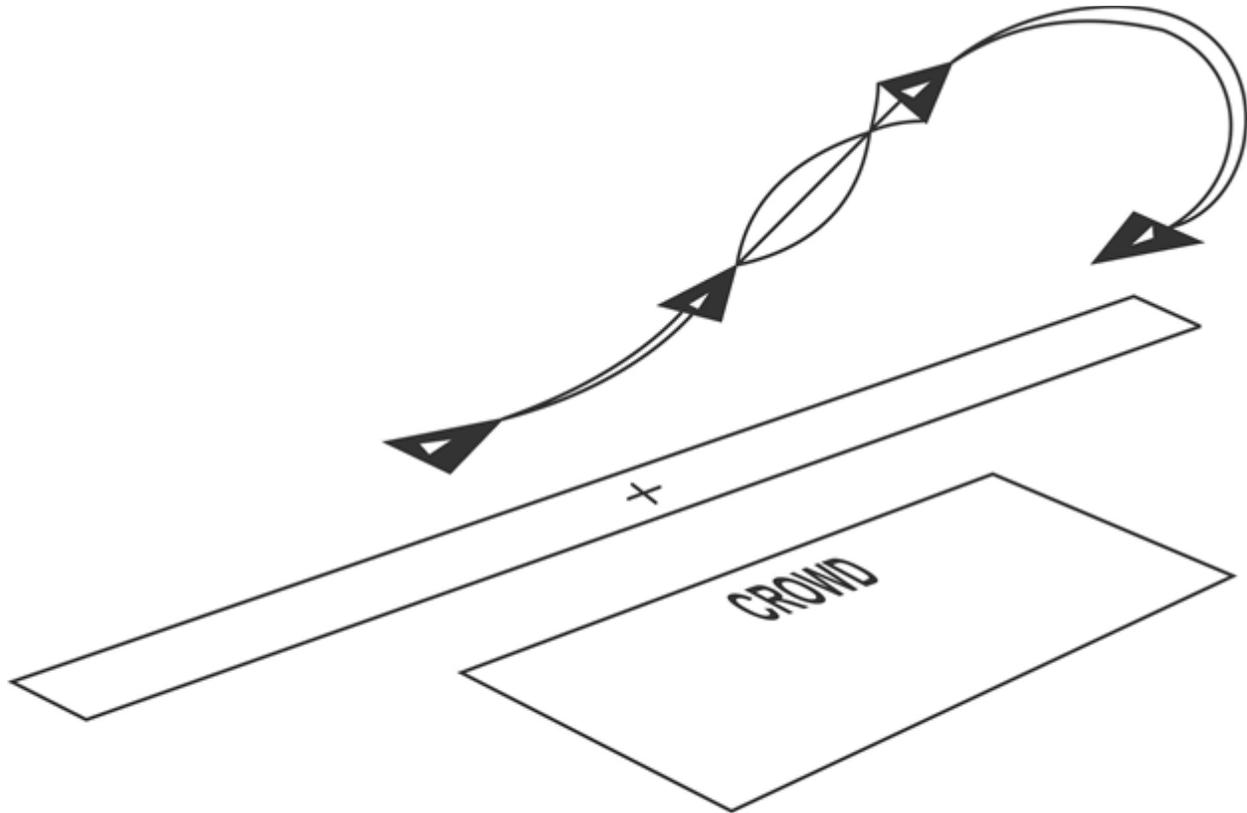


Flat Wifferdill Reposition Maneuver F-22

6.9.2. Wifferdill Reposition Maneuver. 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 demonstration area. Each turn may differ slightly so that 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.

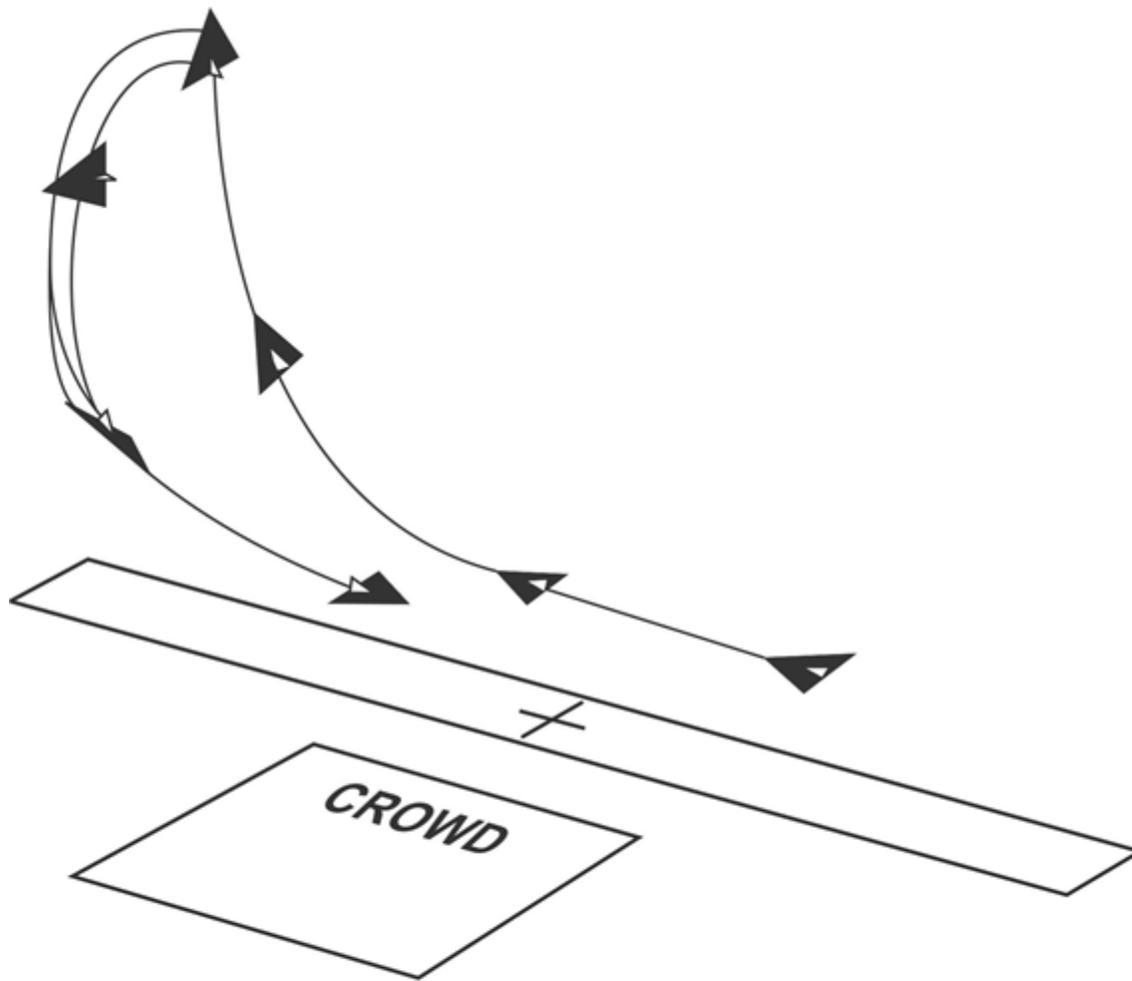
Figure 6.2. F-22 Wifferdill Reposition.



Wifferdill Reposition Maneuver F-22

6.9.3. J-Turn Reposition Maneuver. 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 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.

Figure 6.3. F-22 J-Turn Reposition.

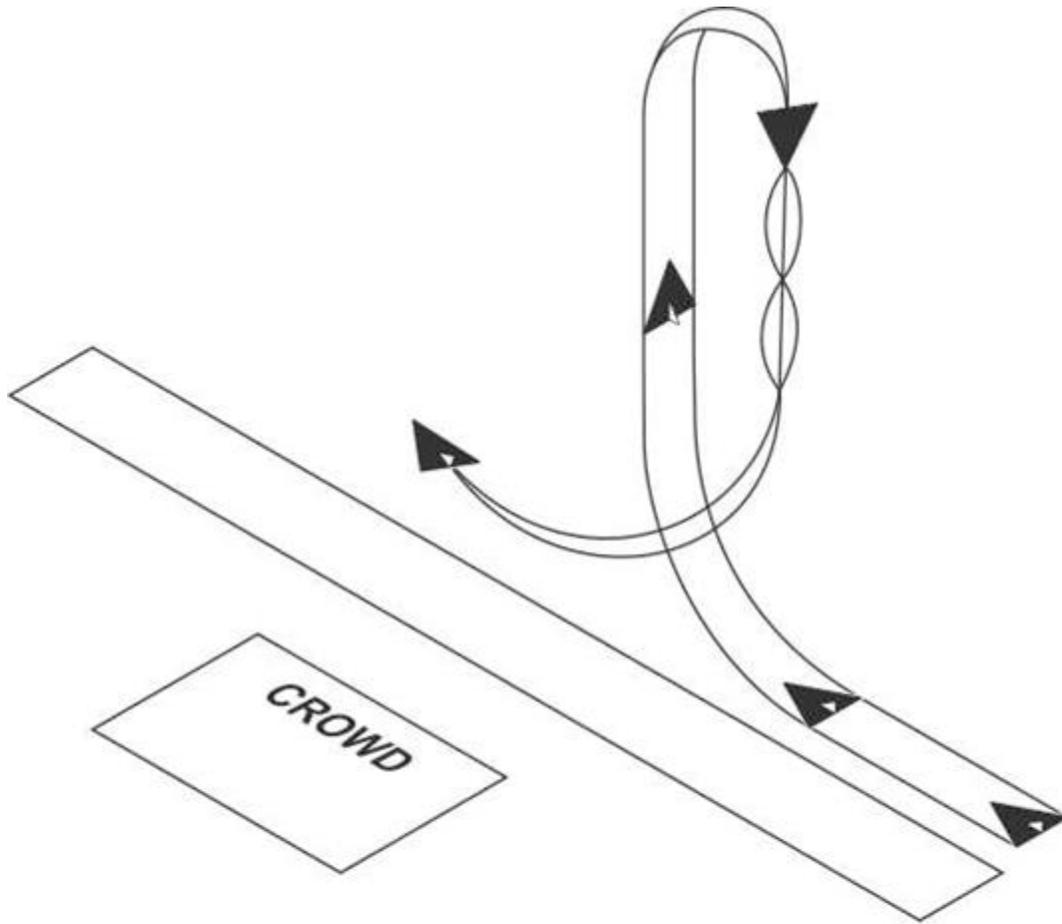


J-Turn F-22

Section 6B—High Profile

6.10. Maximum Power Takeoff to High AOA Loop.

Figure 6.4. F-22 Maximum Power Takeoff to High AOA Loop.



T/O To High AOA Loop F-22

Table 6.1. F-22 Maximum Power Takeoff to High AOA Loop Parameters.

TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	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
PARAMETER		LIMITS		

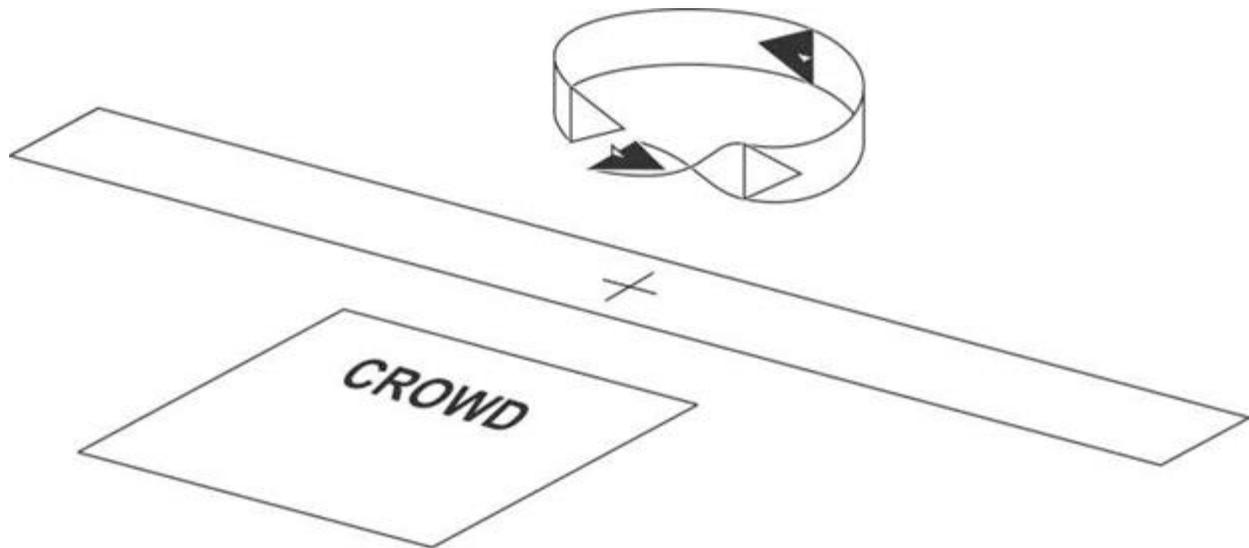
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Deg NH
Entry	N/A	200 / N/A	MAX	80
Pull	min 3,000'	80 / N/A	MAX	N/A
Roll	min 2,800'	80 / N/A	MAX	90 NL
Recovery	min 2,000'	N/A / 400	MAX	N/A

6.10.1. **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' 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 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.

6.10.2. **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.

6.11. Minimum Radius Turn

Figure 6.5. F-22 Minimum Radius Turn.



Minimum Radius Turn F-22

Table 6.2. 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

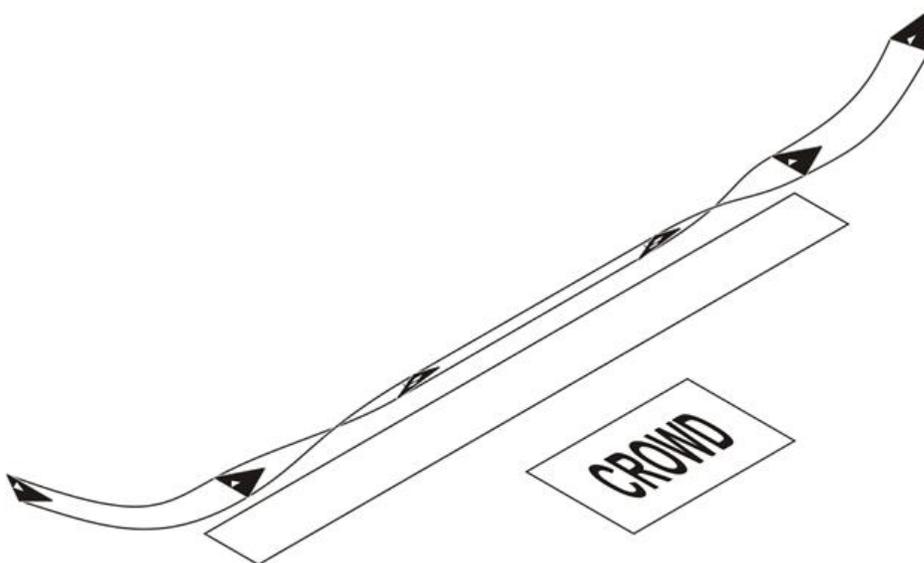
6.11.1. **Maneuver Description:** Prior to show center, select full AB and accelerate to 440 KCAS. Beyond the 500' show line and at show center, turn away from the crowd using 75 to 85 degrees of bank. Begin the turn with an aggressive G onset-rate to 7.5 Gs to avoid accelerating and begin bleeding airspeed. G-loading and airspeed bleed-off rate vary with

density altitude. The first 180 degrees of turn should be accomplished with a $1\frac{3}{4}$ degree nose-up attitude and the last 180 degrees of turn should be accomplished with a $1\frac{3}{4}$ 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.

6.11.2. 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' 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.

6.12. Weapon Bay Door Pass.

Figure 6.6. F-22 Weapon Bay Door Pass.



**Weapon Bay Door Pass
F-22**

Table 6.3. F-22 Weapon Bay Door Pass Parameters.

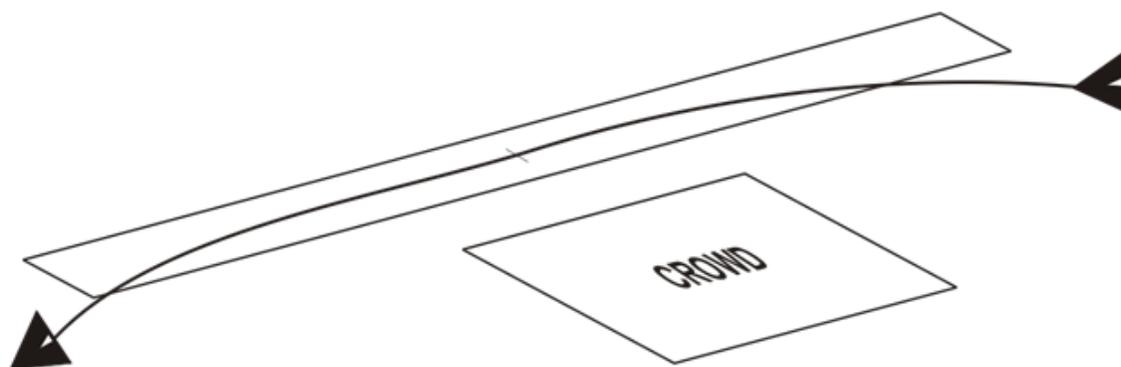
TARGET		PARAMETERS			
Altitude AGL		Airspeed KCAS	Power Setting	G	Bank
Entry	300'	200	A/R	1 to 2	75
Exit	300'	200	A/R	1 to 2	75
Roll	500'	250	A/R	1 to 2	N/A
PARAMETER		LIMITS			
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G	Max Bank
Entry	min 200'	175 / N/A	A/R	N/A	90
Exit	min 200'	175 / N/A	A/R	N/A	90
Roll	min 400'	200 / N/A	A/R	N/A	N/A

6.12.1. **Maneuver Description:** On extended show line (offset up to 30 degrees), establish wings-level and 200 KCAS. Approaching the 500' 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' 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 lift vector (LV) on the reposition line for the Dedication Pass.

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

6.13. Dedication Pass.

Figure 6.7. F-22 Dedication Pass.



Dedication Pass F-22

Table 6.4. F-22 Dedication Pass Parameters.

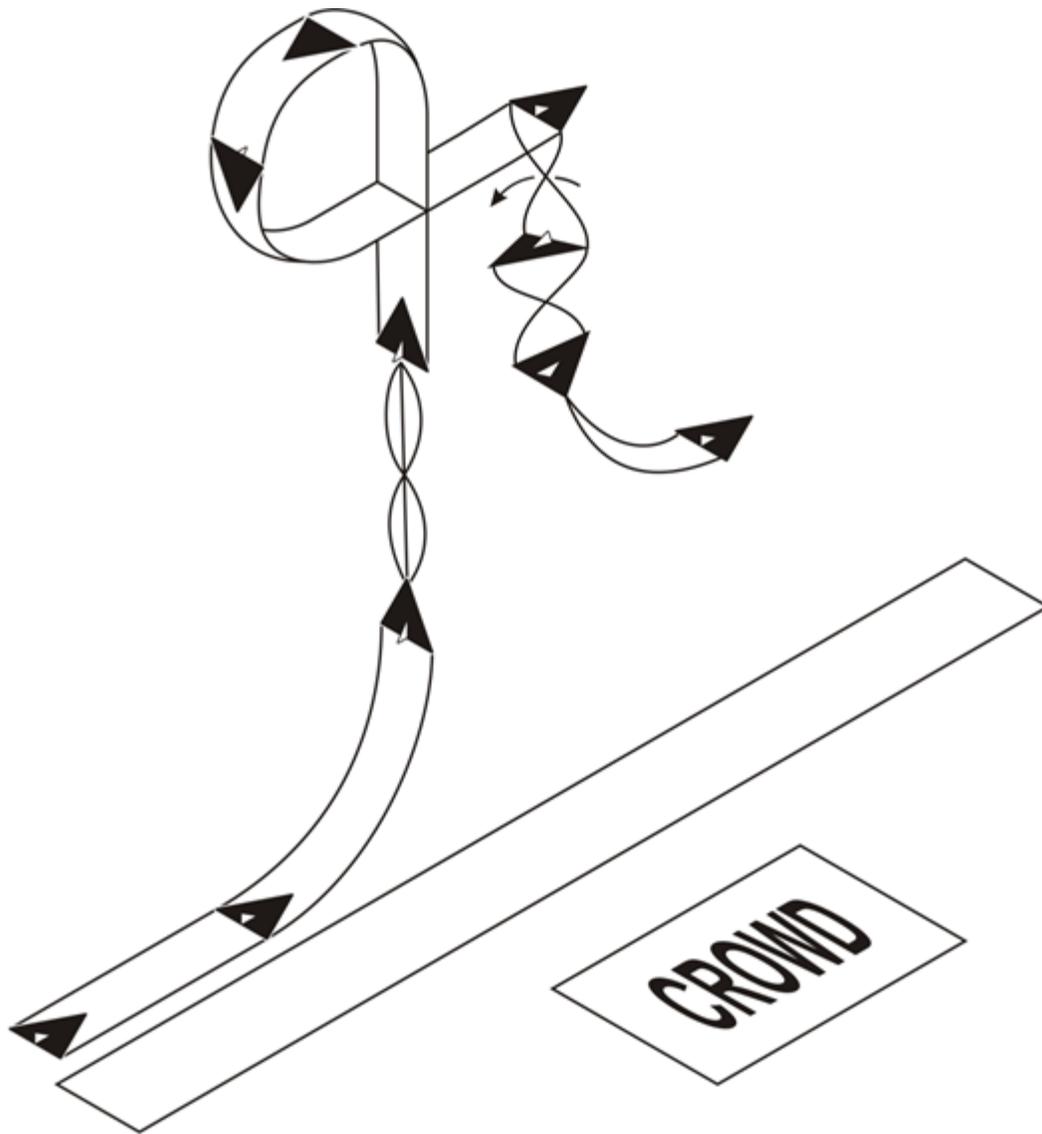
TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	G
Entry	300'		.65 - .92M	MAX	1
Exit	300'		.65 - .92M	IDLE to MAX	4 to 7.5
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min	200'	.5 / .94M	IDLE to MAX	A/R.
Exit	min	200'	.5 / .94M	IDLE to MAX	A/R

6.13.1. **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' 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 .92M 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' 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.

6.13.2. **Abnormal Procedures:** Abort the maneuver if at any time: the aircraft comes closer than 500' 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.

6.14. Pedal Turn.

Figure 6.8. F-22 Pedal Turn.



**Pedal Turn
F-22**

Table 6.5. F-22 Pedal Turn Parameters.

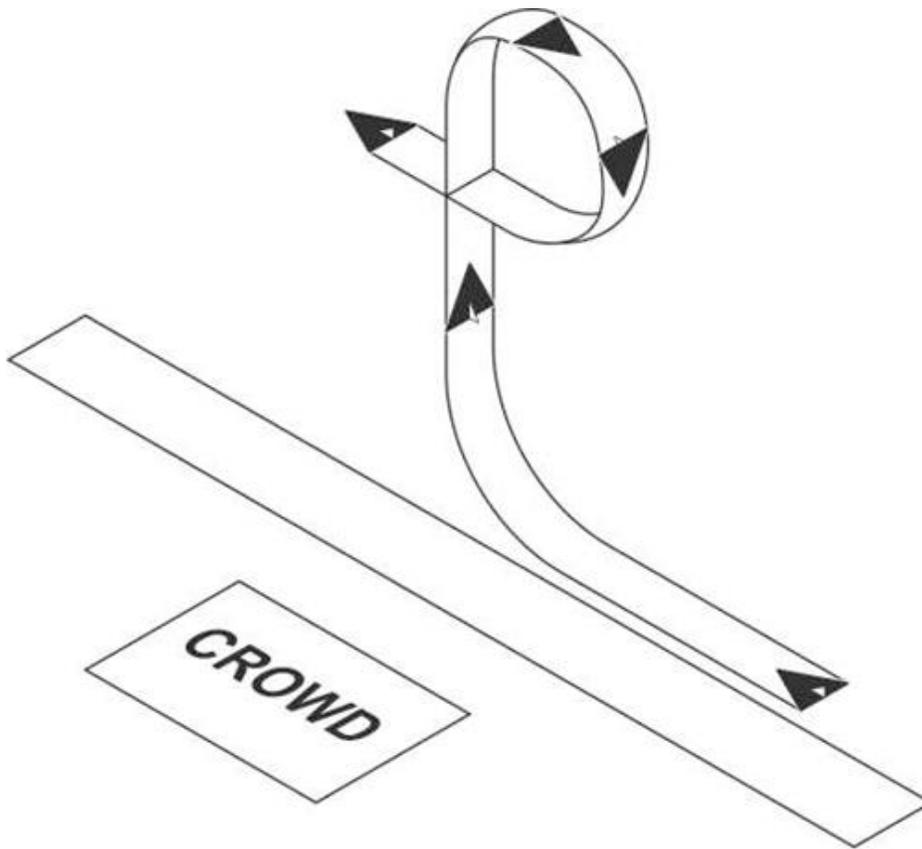
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	Deg NH
Entry	300'	300	MAX	0
Pull	4,000'	N/A	MAX	90
Exit / Recovery	N/A	N/A	MAX	N/A
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Min Deg NH
Entry	min 200'	250 / 375	MAX	N/A
Pull	min 3,000'	75 / N/A	MAX	80
Exit / Recover	min 2,500'	N/A	MAX	

6.14.1. **Maneuver Description:** Following the Dedication Pass reposition, align on the 1,500-foot crowd 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 crowd 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.

6.14.2. **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 than 75 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.

6.15. Power Loop.

Figure 6.9. F-22 Power Loop.



Power Loop F-22

Table 6.6. F-22 Power Loop Parameters.

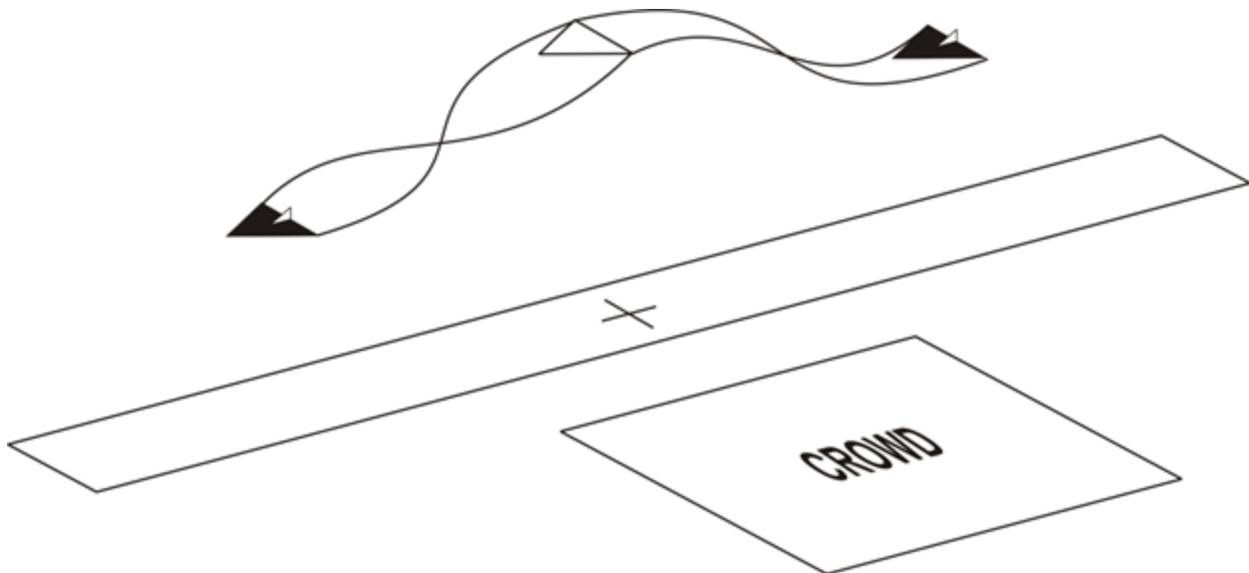
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	Alpha
Entry	1,500'	250	MAX	0
Recovery (initiate)	2,700'	A/R	MAX	36
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Alpha (min)
Entry	min 1,300'	225 / 350	MAX	N/A
Recovery (initiate)	min 2,500'	A/R	MAX	30

6.15.1. **Maneuver Description:** Following the Pedal Turn, accelerate in full AB and reposition to remain on the 1,500' 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 alpha and maintain until sink rate is arrested.

6.15.2. **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.

6.16. Loaded Roll

Figure 6.10. F-22 loaded Roll.



Loaded Roll F-22

Table 6.7. F-22 Loaded Roll Parameters.

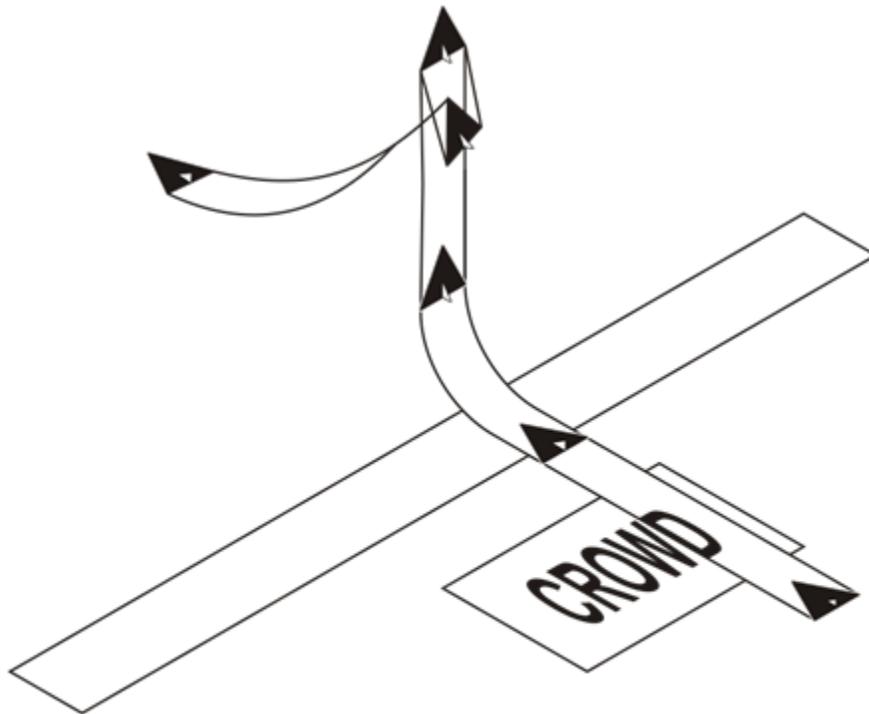
TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	AOA
Entry	1,400'		150	MAX	36
Exit	1,300'		150	MAX	36
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	AOA (max)
Entry	min	1,300'	110 / N/A	MAX	40
Exit	min	1,200'	100 / N/A	MAX	40

6.16.1. **Maneuver Description:** Following recovery from the Power Loop, on the 1,500' 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.

6.16.2. **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.

6.17. Tail Slide.

Figure 6.11. F-22 Tail Slide.



Tail Slide F-22

Table 6.8. F-22 Tail Slide Parameters.

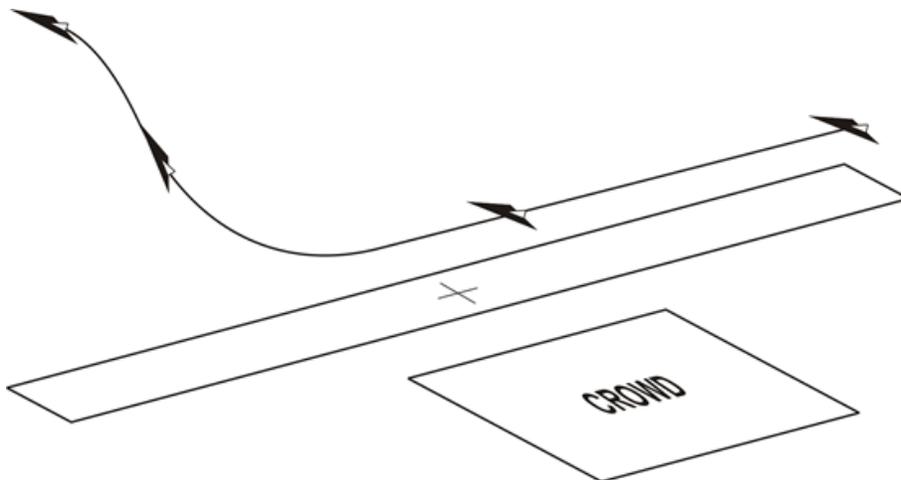
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	Deg NH
Entry	1,000'	250	MIL	0
Apex	3,000'	0	Idle to MIL	80
Recovery	2,700'	75	MIL	N/A
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	Deg NH
Entry	min 900'	225 / 350	MIL	N/A
Apex	min 2,800'	N/A	Idle to MIL	90
Recovery	min 2,500'	N/A / 85	MIL	N/A

6.17.1. **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 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 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 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' 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.

6.17.2. **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.

6.18. F-22 Slow Speed Pass.

Figure 6.12. F-22 Slow Speed Pass.



Slow Speed Pass F-22

Table 6.9. F-22 Slow Speed Pass Parameters.

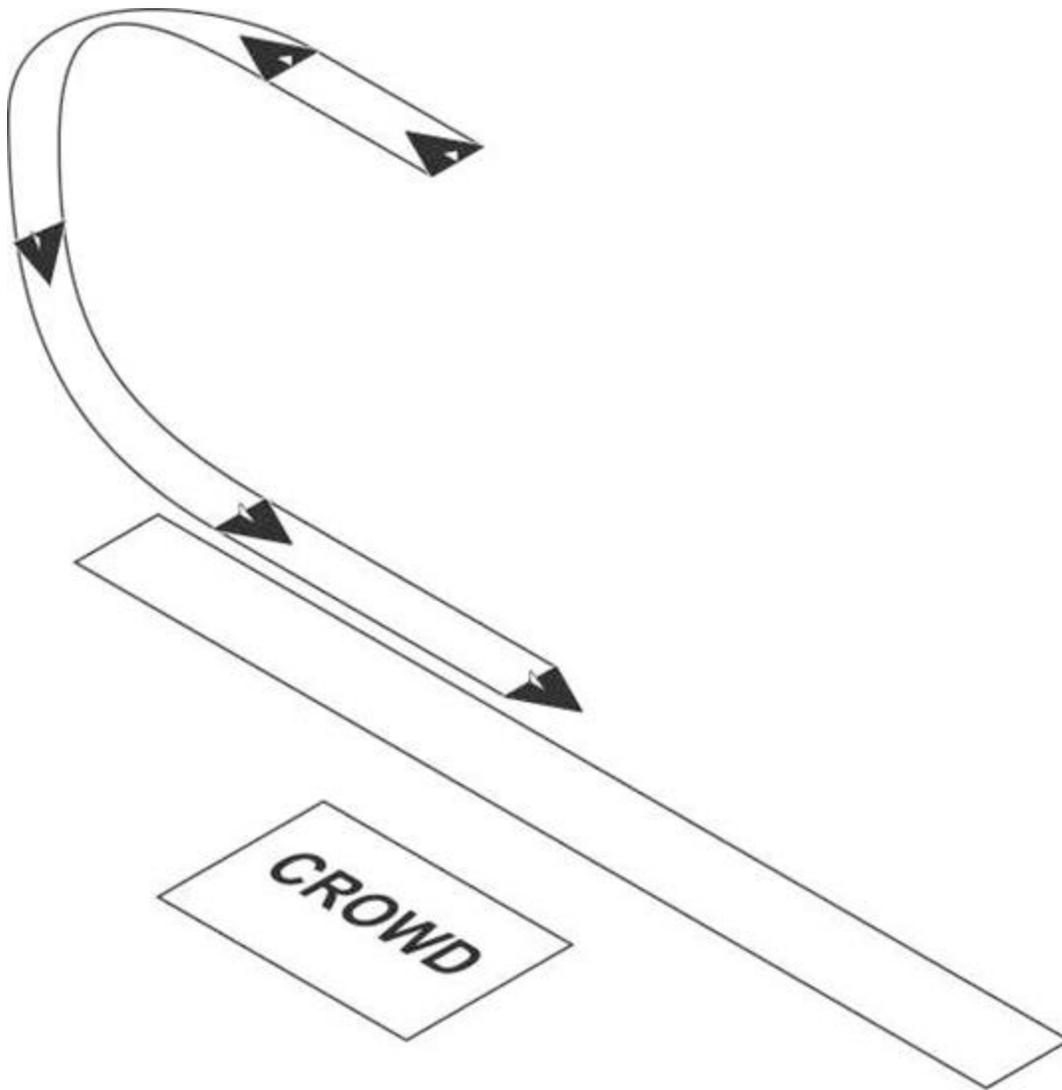
TARGET			PARAMETERS		
Altitude AGL			Airspeed KCAS	Power Setting	AOA
Entry	1,000'		80	Cruise to MIL	36
Exit	1,000'		80	Cruise to MIL	36
PARAMETER			LIMITS		
Altitude AGL			Airspeed KCAS MIN/MAX	Power Setting	AOA (max)
Entry	min	900'	75 / N/A	MIL	40
Exit	min	900'	75 / N/A	MIL	40

6.18.1. **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' 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 angle of attack. Do not exceed 40 degrees angle of attack. Manipulate power and pitch to maintain 1,000 feet AGL and 36 degrees angle of attack 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.

6.18.2. **Abnormal Procedures:** If 40 degrees angle of attack is exceeded, immediately add power and push forward to catch and sustain 36 degrees. 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.

6.19. Split-S Reposition.

Figure 6.13. F-22 Split-S Reposition.



**Split-S Reposition
F-22**

Table 6.10. F-22 Split-S Reposition Parameters.

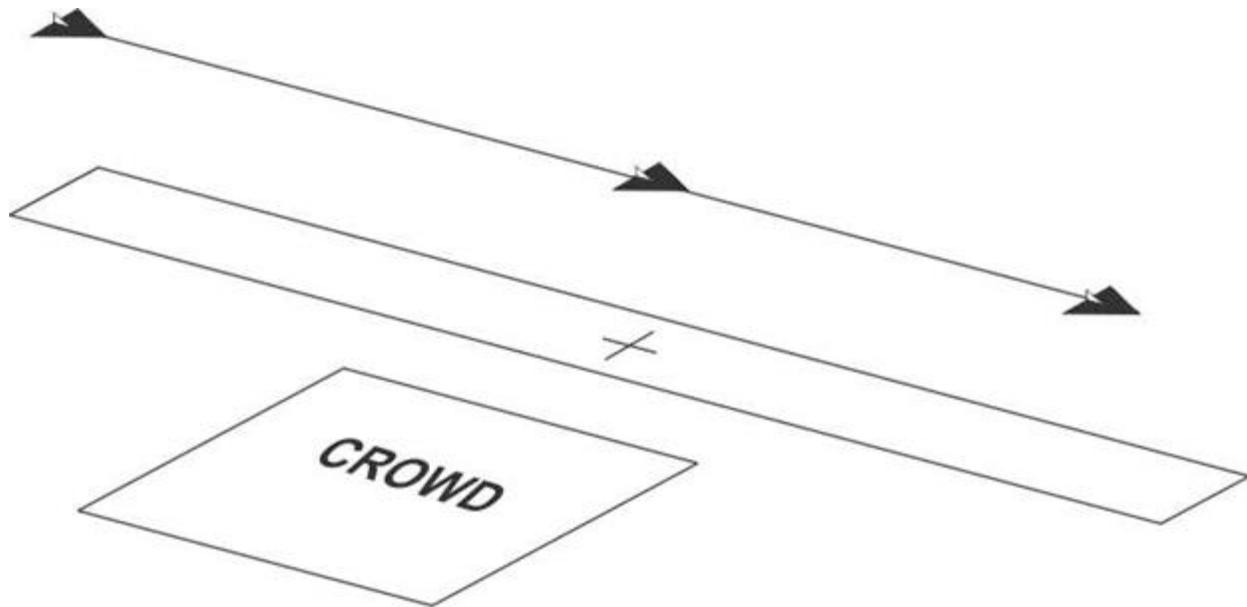
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	AOA
Entry	4,000'	200	MAX	N/A
Exit	300'	.8 - .92M	MAX	N/A
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	AOA
Entry	min 3,500'	150 / 275	MAX	N/A
Exit	min 200'	N/A / .94M	A/R	N/A

6.19.1. **Maneuver Description:** In the climb after the Slow Speed pass move to the 1,500' 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 .8M for the high speed pass.

6.19.2. **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 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 asserts prior to reaching 90 degrees nose-low, discontinue the pull, roll wings-level and recover the aircraft.

6.20. High Speed Pass.

Figure 6.14. F-22 High Speed Pass.



High Speed Pass F-22

Table 6.11. F-22 High Speed Pass Parameters.

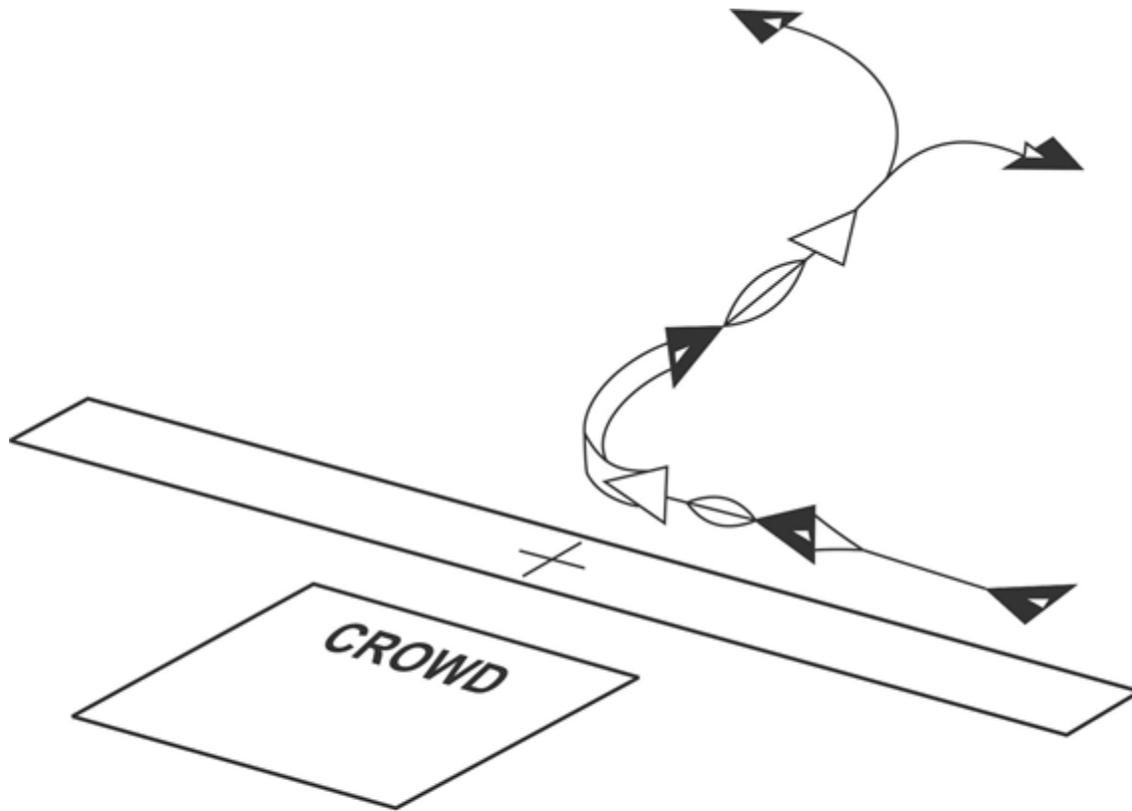
TARGET		PARAMETERS		
Altitude AGL		Airspeed KCAS	Power Setting	G
Entry	300'	.8 - .92M	MAX	1
Exit	300'	.8 - .92M	IDLE to MAX	1
PARAMETER		LIMITS		
Altitude AGL		Airspeed KCAS MIN/MAX	Power Setting	G
Entry	min 200'	N/A / .94M	A/R	N/A
Exit	min 200'	N/A / .94M	A/R	N/A

6.20.1. **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.

6.20.2. **Abnormal Procedures:** If it becomes apparent 0.94 Mach may be exceeded, afterburner should be deselected.

6.21. Hoover Pitch.

Figure 6.15. F-22 Hoover Pitch.



Hoover Pitch F-22

Table 6.12. 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

6.21.1. **Maneuver Description:** Establish the jet on the 1,500 foot crowd 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 Heritage Flight.

6.21.2. **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 6C—Low Profile

6.22. Maximum Power Takeoff. NOTE: 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.

6.23. Minimum Radius Turn.

6.24. Weapon Bay Door Pass.

6.25. Dedication Pass.

6.26. Slow Speed Pass.

6.27. Loaded Roll.

6.28. High Speed Pass.

6.29. Minimum Radius Turn.

6.30. Hoover Pitch to Land.

Chapter 7

PUBLICATION MANAGEMENT

7.1. Information Collection, and Records.

7.1.1. **Information Collections.** No information collections are created by this publication.

7.1.2. **Records.** The program records created as a result of the processes prescribed in this publication are maintained in accordance with AFMAN 33-363, and are to be disposed of in accordance with the Air Force Records Disposition Schedule (RDS), located at <https://www.my.af.mil/afrims/afrims/afrims/rims.cfm>.

Chapter 8 (Added-ACC)

USAFHFP MANEUVERS (T-2)

8.1. (ACC) General. This chapter establishes the operational procedures for the USAFHFP. HFs are scheduled per paragraph 1.6. Formation restrictions are included in paragraph 1.20.1.

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

8.3. (ACC) Airspace Requirements. Minimum required airspace for the HF demonstration 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.

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

8.5. (ACC) 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.

8.5.1. (ACC) Fingertip/Vic Formation. (Figure 8.1.) Fingertip may be flown as 2, 3, or 4-ship, and is intended as the primary demonstration 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.

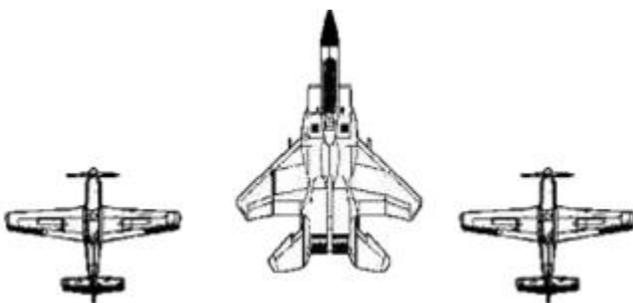
8.5.1.1. (ACC) References:

8.5.1.2. (ACC) Wingmen: Standard Fingertip

8.5.1.3. (ACC) Breakout:

8.5.1.4. (ACC) Wingmen: Turn away from lead. Number two use caution for wingmen on the opposite side from lead.

Figure 8.1. (ACC) Fingertip/Vic Formation.



8.5.2. (ACC) Echelon Formation. (Figure 8.2.) 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.

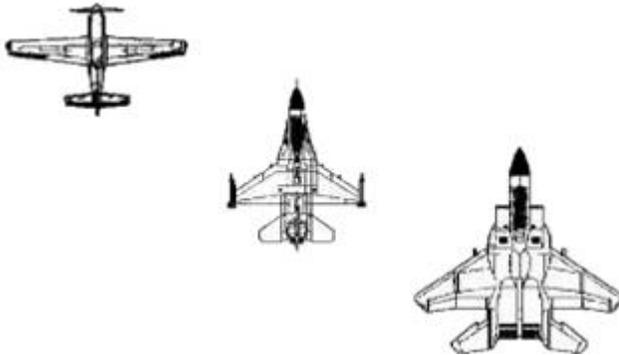
8.5.2.1. (ACC) References:

8.5.2.2. (ACC) Wingmen: Standard Fingertip

8.5.2.3. (ACC) Breakout:

8.5.2.4. (ACC) Wingmen: Turn away from lead. Numbers two and three use caution for wingmen on the opposite side from lead.

Figure 8.2. (ACC) Echelon Formation.



8.5.3. (ACC) **Diamond Formation.** (Figure 8.3.) May be flown as a 4-ship only. It may be flown during HF demonstrations 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.

8.5.3.1. (ACC) References:

8.5.3.2. (ACC) Wingmen: Standard Fingertip

8.5.3.3. (ACC) Slot:

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

8.5.3.5. (ACC) Left/Right: Line astern of lead

8.5.3.6. (ACC) Depth: Below jet/prop wash

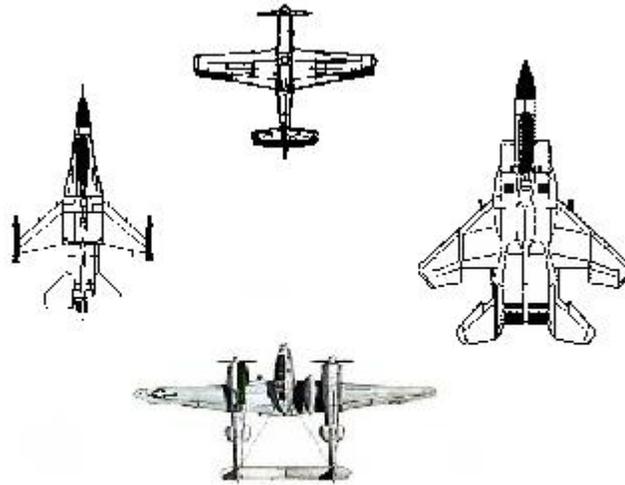
8.5.3.7. (ACC) Breakout:

8.5.3.8. (ACC) Lead: Up

8.5.3.9. (ACC) Wingmen: Turn away from lead

8.5.3.10. (ACC) Slot: Down and aft from lead

Figure 8.3. (ACC) Diamond Formation.

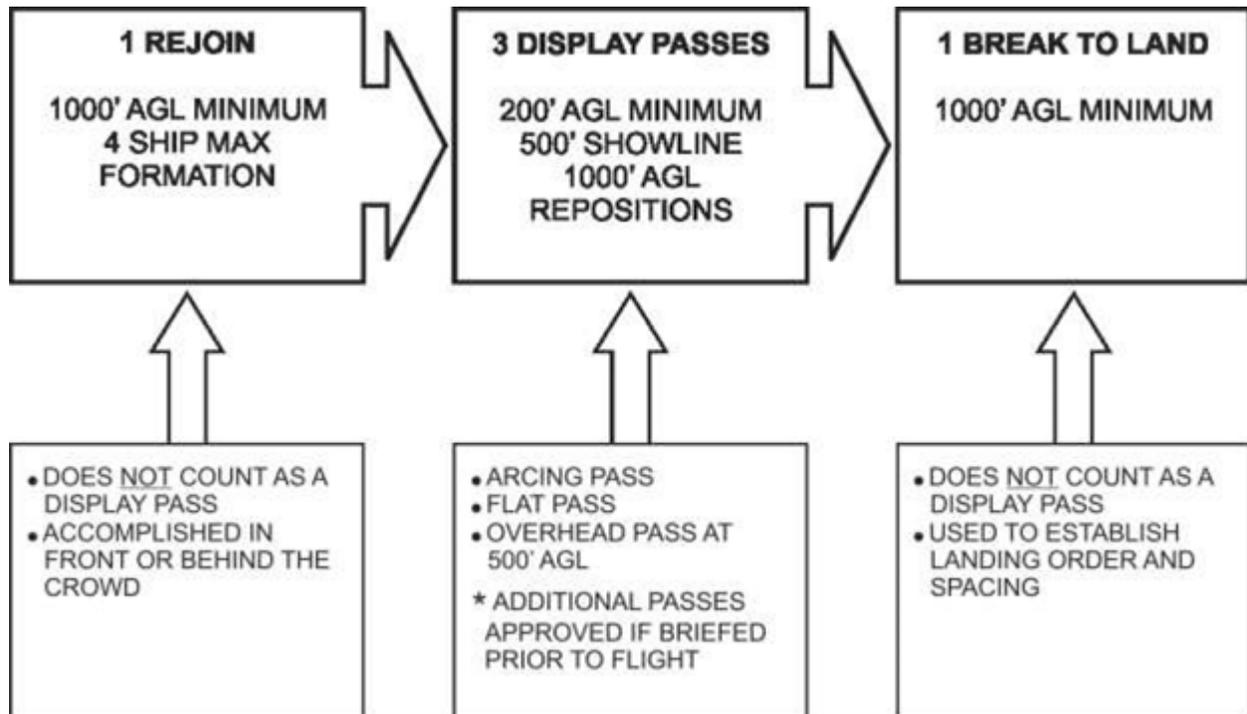


8.5.4. (ACC) Close. Close formation defines the closest the aircraft will fly in proximity to each other, and is intended as the primary demonstration formation distance. Anytime the aircraft are inside the 2 ship-widths minimum spacing for route, they are considered to be in close formation. Minimum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

8.5.5. (ACC) 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.

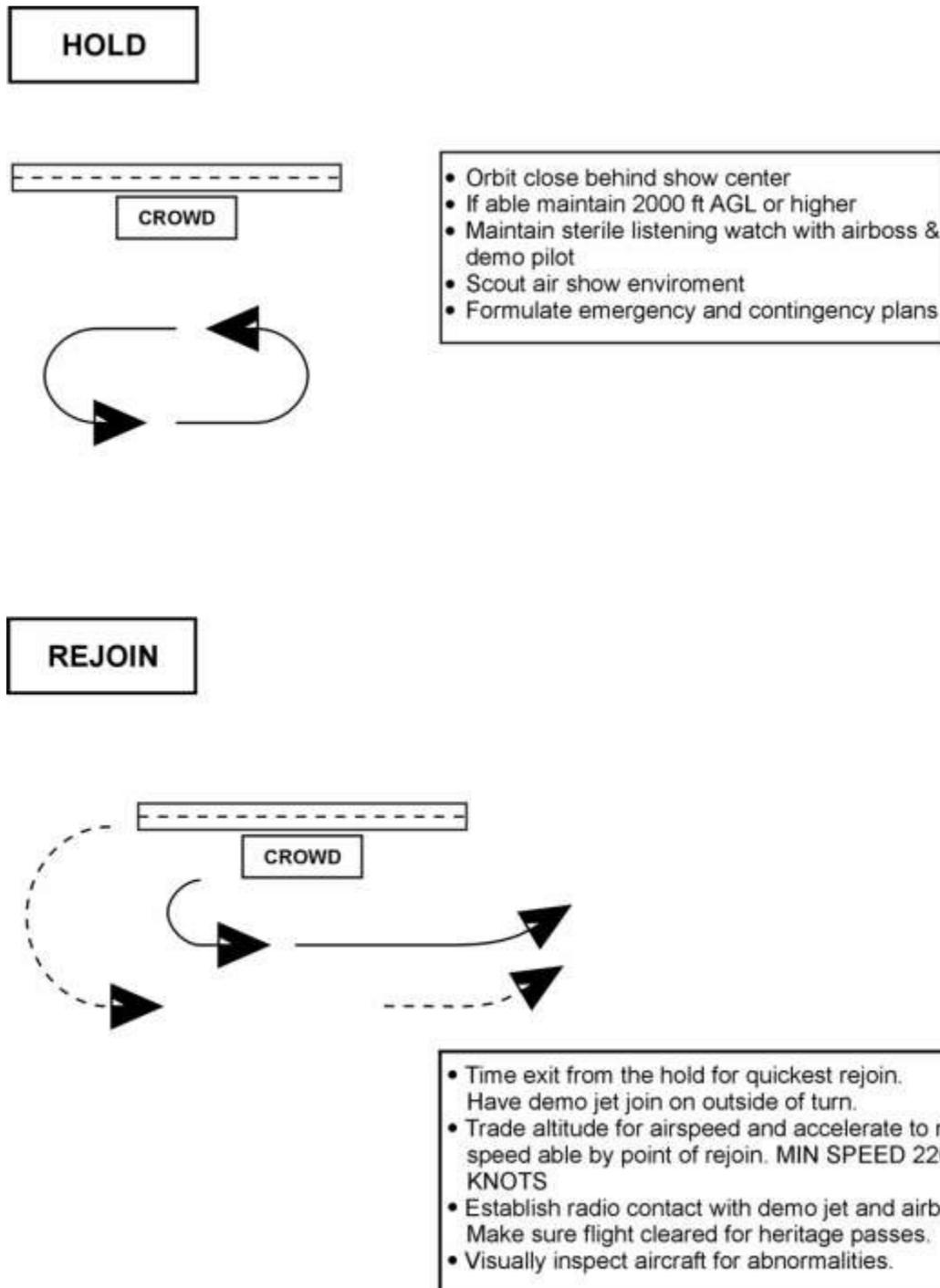
8.6. (ACC) USAFHFP Display Profile. (Figure 8.4.) The HF display profile is comprised of three separate and distinct phases: Rejoin, Display Passes, and Break to Land. A Flyby Pass may be flown after the aircraft break to land, if the aircraft requires an additional pass to obtain the required spacing to land. Additional passes may be flown with the coordination of the air boss. ACC Demonstration 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 8.4. (ACC) HF Display Profile.



8.6.1. (ACC) Hold and Rejoin. (Figure 8.5.) 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.

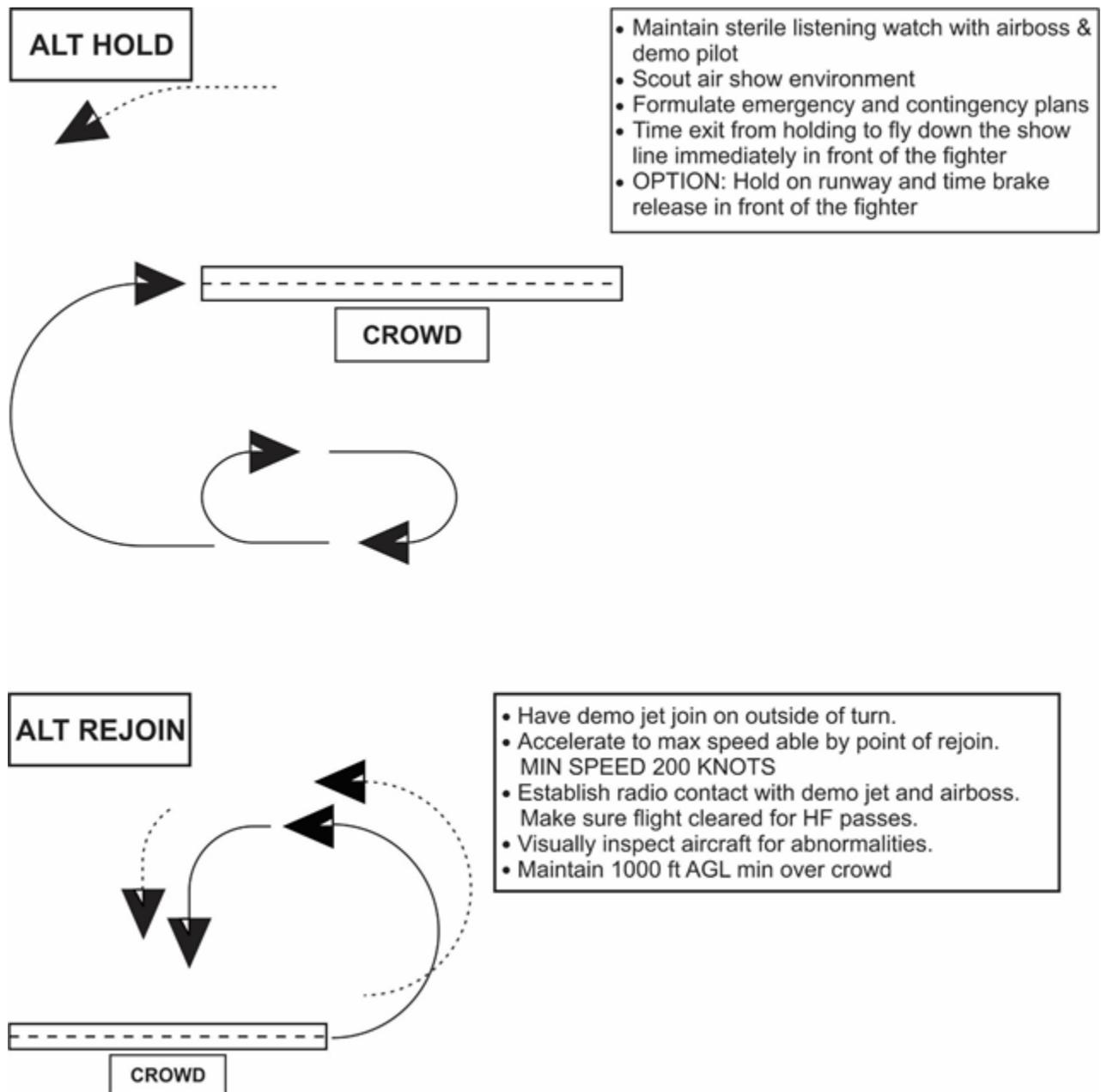
Figure 8.5. (ACC) Hold and Rejoin.



8.6.2. (ACC) **Alternate Hold and Rejoin.** (Figure 8.6.) If the air show environment does not allow a rejoin behind the crowd, an alternate method may be flown. The warbird aircraft holds behind the crowd and maneuvers down the show line in front of the ACC fighter near the end of the capabilities demonstration. The ACC fighter follows the warbird down the show line and accomplishes the rejoin in front of the crowd. The formation is then led towards and over the crowd from the show line side (1,000 feet AGL minimum) to set-up for

the display passes. Another option is for the warbird to accomplish a takeoff in front of the ACC fighter near the end of the capabilities demonstration, accomplish the rejoin in front of the crowd, and fly towards and over the crowd from the show line side to set-up for the display passes. This over-the-crowd pass does not count as a display pass.

Figure 8.6. (ACC) Alternate Hold and Rejoin.

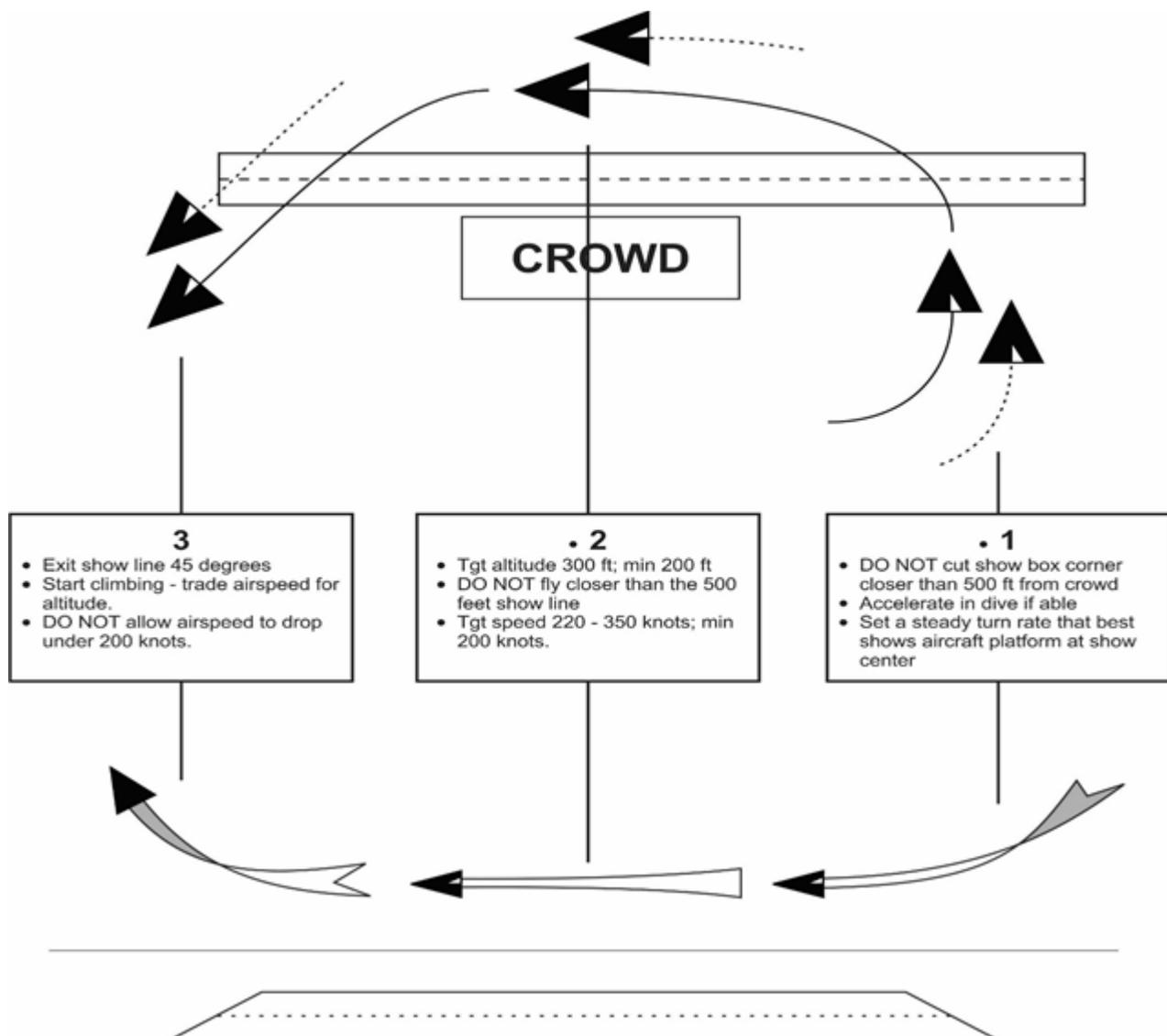


8.6.3. (ACC) Display Passes. There are three display passes that are normally flown as part of the HF demonstration: Arcing Pass, Flat Pass, and Over-the-Crowd Pass. The standard HF demonstration consists of the three passes and in the order mentioned above. However, any deviation to the standard (sequence and number of passes) is acceptable given the deviation is fully briefed prior to flight. A deviation may be required because of display

time available, and ground or in-flight obstructions that dictate where the formation may fly. Except for emergencies, no in-flight deviation from briefed is authorized. An optional fourth Flyby Pass may be flown after the aircraft break to land, if the aircraft need an additional pass to obtain the required spacing to land.

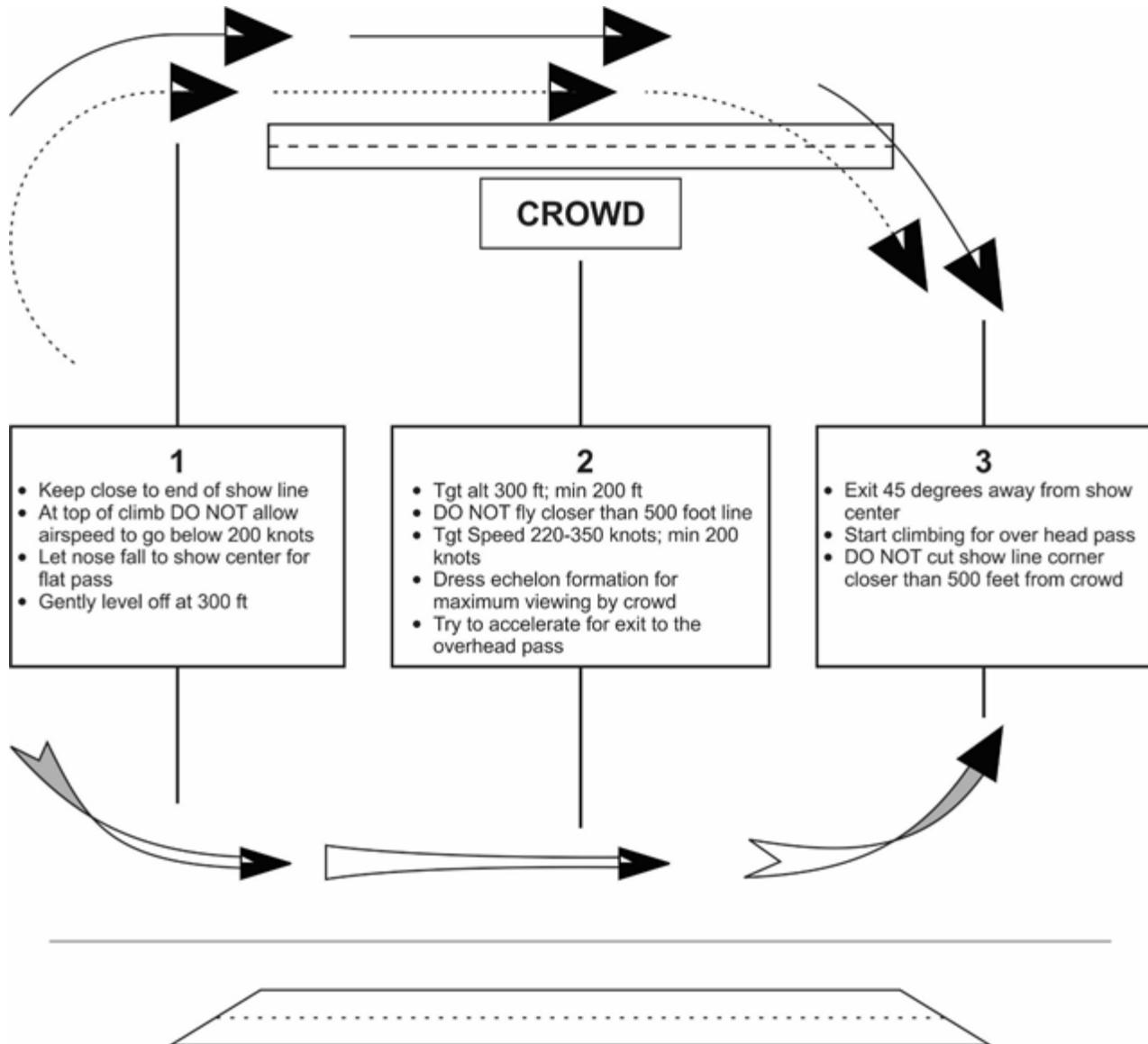
8.6.4. (ACC) **Arcing Pass.** (Figure 8.7.) Align the formation to enter the show line at an approximate 45-degree angle. Fly a descending, arcing turn no closer than 500 feet from the crowd, to include the corners of the crowd line. In order to maintain 500 feet from the corners, the flight path must 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 approximate 45-degree angle, maintaining 500 feet from the crowd, and begin a climb for the reposition. Maintain at or above 200 knots during the reposition.

Figure 8.7. (ACC) Arcing Pass.



8.6.5. (ACC) **Flat Pass.** (Figure 8.8.) Following the reposition, fly a descending 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 8.8. (ACC) Flat Pass.

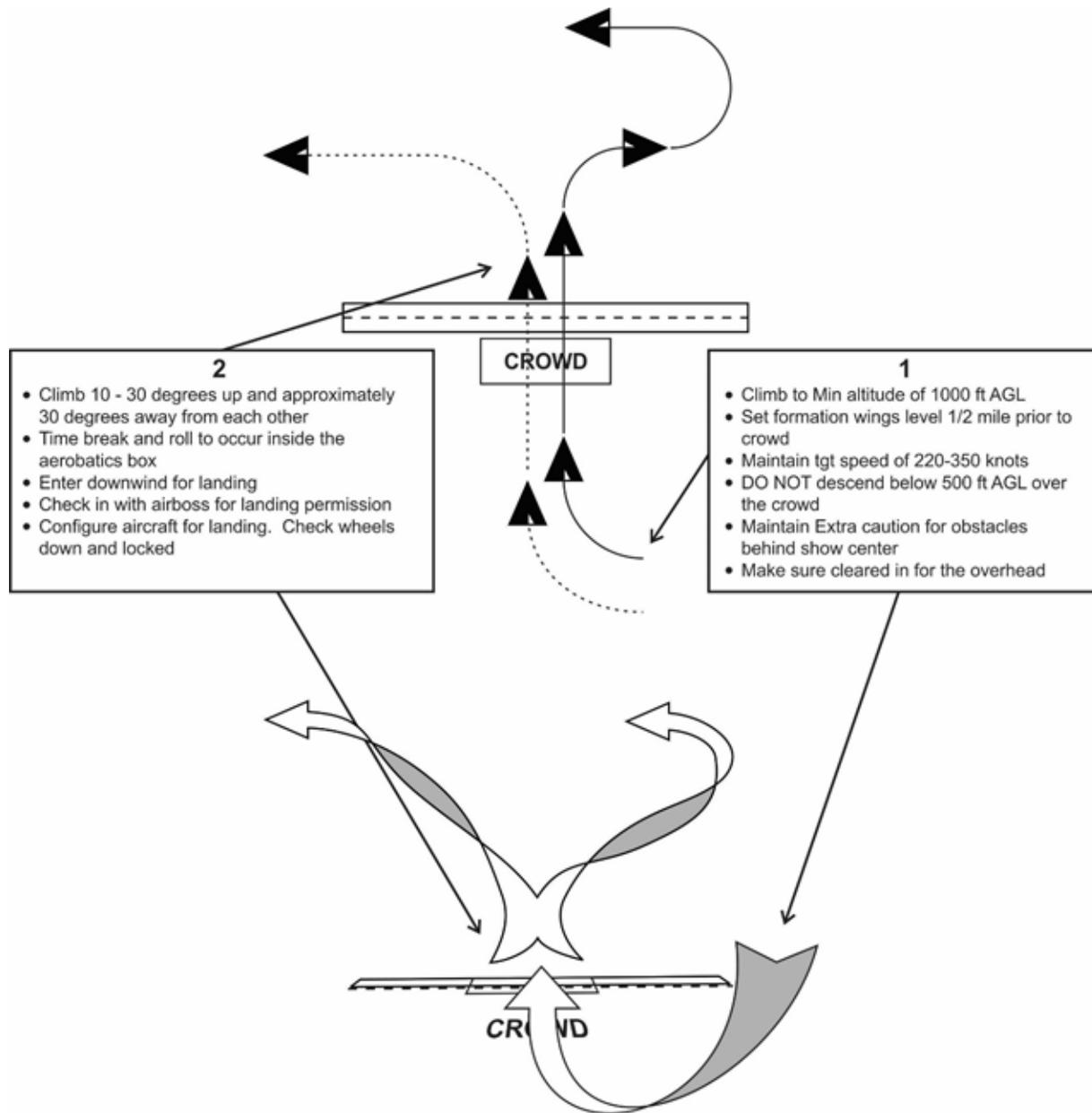


8.6.6. (ACC) **Over-the-crowd Pass/Break-to-land.** (Figure 8.9.) Continue the climbing turn to 1,000 feet AGL minimum while maneuvering the formation behind the crowd in a position to fly directly over show center at the target altitude and airspeed. Set wings level at least one half mile prior to reaching the primary spectator area. Do not descend below the

FAA waived minimum altitude (500' AGL minimum). Once past the crowd, lead will call for the break IAW paragraph **1.20.1.2**.

8.6.7. (ACC) Flyby Pass (Optional). The Flyby Pass is an optional fourth pass flown after the over-the-crowd pass and break-to-land. This pass is usually flown if the aircraft need an additional pass to obtain the required spacing to land. Following the break-to-land, each aircraft may fly one gear-up flyby pass, only over a runway, no closer than the 500-foot show line, at 300 feet AGL minimum. Military demo pilots will fly a straight and level pass. (For civilian warbird pilots only: The pass may be to accomplish a non-aerobatic pass on the 500-foot show line or on the appropriate category line if an aerobatic maneuver is performed. The flyby pass will be accomplished at a minimum altitude of 200 feet AGL). Following the flyby pass, each aircraft will obtain the required spacing during the closed pull-up, configure, and land. Additional passes may be flown with the coordination of the air boss. ACC Demonstration pilots will only fly approved maneuvers during execution of additional passes. All pilots must be vigilant during this phase of flight as aircraft speeds can vary tremendously.

Figure 8.9. (ACC) Over-the-Crowd Pass/Break-to-Land.



JOHN W. RAYMOND, Lt Gen, USAF
Deputy Chief of Staff, Operations

(ACC)

HERBERT J. CARLISLE, General, USAF
Commander

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

DoD Directive 5410.18, *Community Relations*, 30 May 2007
(**Added-ACC**) AFMAN 91-201, *Explosive Safety Standards*, 12 January 2011
DoD Instruction 5410.19, *Armed Forces Community Relations*, 13 November 2001
AFI 11-202, *V3 General Flight Rules*, 22 October 2010
AFI 33-360, Publications and Forms Management, 1 December 2015
AFI 11-209, *Aerial Event Policy and Procedures*, 4 May 2006
AFI 31-101, *Integrated Defense*, 3 October 2009
AFI 35-105, *Community Relations*, 26 January 2010
AFMAN 33-363, *Management of Records*, 1 March 2008
Part 91, Federal Aviation Regulations
FAA Order 8900.1, *Flight Standards Information Management System (FSIMS)*
AF Records Disposition Schedule (RDS),
<https://www.my.af.mil/afrims/afrims/afrims/rims.cfm>.
Sponsor Support Manual available via ACC/A3TA Website,
<http://www.acc.af.mil/aerialevents>

Prescribed Forms

(**Added-ACC**) No forms are prescribed by this supplement

Adopted Forms

AF Form 847, Recommendation for Change of Publication
(**Added-ACC**) DD Form 2400, *Civil Aircraft Certificate of Insurance*
(**Added-ACC**) DD Form 2401, *Civil Aircraft Landing Permit*
(**Added-ACC**) DD Form 2402, *Civil Aircraft Hold Harmless Agreement*

Abbreviations and Acronyms

AGL—Above Ground Level
(**Added-ACC**) **AFHFF**—Air Force Heritage Flight Foundation
EAA—Experimental Aircraft Association
FAA—Federal Aviation Administration
FLCS—Flight Control System
(**Added-ACC**) **FOD**—Foreign Object Damage

(Added-ACC) FSDO—Flight Standards District Office

G—Gravity

(Added-ACC) HF—Heritage Flight

HUD-Heads-Up—Display

ICAS—International Council of Air Shows

KCAS—Knots Calibrated Air Speed

KIAS—Knots Indicated Air Speed

(Added-ACC) KIO—Knock it Off

MIA—Missing In Action

MDS—Mission Design Series

MSL—Mean Sea Level

(Added-ACC) NEW—Net Explosive Weight

POW—Prisoner Of War

SAAM—Special Assignment Airlift Mission

(Added-ACC) SIC—Shooter-in-Charge

(Added-ACC) USAFHFP—United State Air Force Heritage Flight Program

VMC—Visual Meteorological Conditions

Terms

Abnormal Procedure—Specific abort procedure for maneuver

Attachment 2

EXAMPLE SHOW SUMMARY AND CRITIQUE

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

F-16 EAST DEMONSTRATION TEAM AIR SHOW SUMMARY AND CRITIQUE

Show Location: _____ Dates(s): _____

Demos Time/Type: _____/_____; _____/_____; _____/_____
Time (H/L/Cnx) Time (H/L/Cnx) Time (H/L/Cnx)

Estimated Attendance Each Day: _____/_____/_____

Total Flying Hours Required to Support Event: _____

Estimated Cost: Travel: _____ Per Diem: _____ Lodging: _____

Recruiting Support

Was recruiter contacted? Yes / No

Was recruiter present at air show? Yes / No

Was Recruiting Opportunities and 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 or no answers require comments):

Attachment 2 (ACC)

EXAMPLE SHOW SUMMARY AND CRITIQUE

A2.1. (ACC) Example Show Summary and Critique. Single-Ship Demonstration teams and military HF pilots will use the approved A3TA provided format to each team/pilot. See sample critique below: (Note: This example applies to and is mandatory for ACC.)

Figure A2.1. (ACC) ACC Example Show Summary and Critique Page 1.



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR COMBAT COMMAND
LANGLEY AIR FORCE BASE VA

14 Jul 14

MEMORANDUM FOR A3TA

FROM: F-22 Heritage Flight Team

SUBJECT: Air Show Critique, Offutt AFB, NE 19-20 July

1. F-22 performed at Offutt AFB, NE 19-20 July. The following tables reflect actual data.

USAF AIRCRAFT			Warbird		
	F-22	Choose an item.	P-51	Choose an item.	Choose an item.
Date of flight	Name of pilot	Name of pilot	Name of pilot	Name of pilot	Name of pilot

Hours		
RAP	Non-Rap	Total

TDY COST				
Travel	Per DIEM	Lodging	Misc.	Total

Rating Scale		
<i>5 – Outstanding; 4 - Above Average; 3 – Average; 2 - Below Average; 1 - Poor</i>		
Graded Area	Grade	Remarks
FAA	Grade.	
Preshow Support	Grade.	
Airboss Support	Grade.	
Airshow Support	Grade.	

Figure A2.2. (Added-ACC) ACC Example Show Summary and Critique Page 2.

Recruiter Support	Grade	
Was Recruiter contact made?	Yes/No.	
Was recruiting present at airshow?	Yes/No.	
Was Recruiting booth in a good location?	Yes/No.	

Media/PA	Event	Date	Total Events	Details (include name of newspaper, TV station, etc...)
What Media/PA activities occurred at this event?		Click		
		Click		
Recruiter	Event	Date	Total Events	Details (include name of school, hospital, etc...)
What recruiting activities occurred at this event?		Click		
		Click		

Overall Grade
Choose an item.
Crowd Count for each day:

A2.1.1. (Added-ACC) **Note:** This document (when filled in) is official verification of HF performance. Demonstration pilots may NOT delegate submission of this document but must personally check for accuracy and release.

Attachment 3**AERIAL SITE SURVEY**

A3.1. Aerial Site Survey. Pilots Will Accomplish Following Site Survey Actions In Preparation For Aerial Demonstration. (T-2).

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 (Such As Towers, Mountains, Rising Terrain, Buildings, Etc.)

A3.1.1.2. Analyze Weather Patterns, Sun Angle/elevation, Mountain Shadows, For Impact On Flight Profile

A3.1.1.3. Obtain Local No-fly Restrictions, Noise Abatement, And Bird Avoidance Procedures

A3.1.1.4. Review FAA Waiver For Applicable Details, Airspace (Up To 5 Nm/15,000 Feet)

A3.1.1.5. Identify Control Agencies Such As On-site Tower/local Radar (Tracon) Traffic Control

A3.1.2. Survey Flight:

A3.1.2.1. Circle Show Site, Fly Show Line, Look For Maneuver Reference Points, And Obstacles

A3.1.2.2. If Practical, Accomplish Aerial Survey Flight At Same Time Of Day As Planned Aerial Demo

A3.1.2.3. Observe Holding Points (For Staged Shows And Heritage Flights)

Attachment 4

DEMONSTRATION FLIGHT BRIEFING

A4.1. Demonstration Flight Briefing. Pilots will accomplish the following flight briefing actions in preparation for aerial demonstrations: (T-2).

A4.1.1. Demonstration 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. Abnormal:
 - A4.1.5.4.1. Maneuver abort and reposition
 - A4.1.5.4.2. Emergencies
 - A4.1.5.4.3. 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 provide guidance and 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 forward SSS to MAJCOM/CC to obtain approval of certification schedule
 - ___ a. Names of pilot that will need certification
 - ___ b. General method of certification (individually, two at a time, etc)
 - ___ c. Dates for certification
- NOTE:** MAJCOM/CC certification date initiates certification countdown for individual pilot
- ___ 4. MAJCOM Aerial Events inform WG/CC of planned certification dates
 - ___ 5. NLT Cert – 30 days: WG/CC pre-certify demonstration pilot and forward grade book to NAF/CC
 - ___ 6. NLT Cert – 15 days: NAF/CC approve demonstration pilot and WG/CC forward 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 prepare 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 forward 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 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 if training is accomplished WELL AFTER COMACC certification.

Attachment 5 (ACC)

SAMPLE FIRST YEAR DEMONSTRATION PILOT CERTIFICATION CHECKLIST

Figure A5.1. (ACC) *SAMPLE ACC FIRST YEAR DEMONSTRATION PILOT CERTIFICATION CHECKLIST*

(Note: *This sample applies to and is mandatory for ACC.*)

A5.1. (ACC) First Year Demonstration Pilot Certification Checklist. The following actions will be taken prior to COMACC certification: (NLT times provide timing guidance and are not mandatory)

- ___ 1. Aug:
 - A. WG/CC:
 - ___ 1.) Designates new demonstration pilot and informs A3T NLT Aug
 - ___ 2.) Performs mid-training review and annotates grade book
 - B. A3T:
 - ___ 1.) Forwards SSS to COMACC to obtain approval of certification schedule
 - ___ 2.) Prepares letter to FAA National Air show Coordinator to inform them of additional ACC pilot(s) approved to perform single-ship demonstrations and Heritage Flights
 - ___ 2. Sept: OG/CC ensures demonstration pilot has entered training
 - ___ 3. NLT 31 Dec: OG/CC informs A3T of planned NAF/CC and WG/CC certification dates general method of certification (individually, two at a time, etc.)
- Note:** COMACC certification date initiates certification countdown for individual pilot
- ___ 4. NLT Cert – 60 days: 1 OG submits airspace waiver for COMACC certifications and informs A3TA
 - ___ 5. NLT Cert – 30 days: WG/CC pre-certifies demonstration pilot and signs grade book
 - ___ 6. NLT Cert – 15 days: NAF/CC approves demonstration pilot and signs grade book
 - ___ 7. NLT Cert – 7 days: A3TA ensures:
 - ___ a. Coordination for COMACC observation location
 - ___ b. Coordination for PA system at COMACC observation location
 - ___ 8. NLT Cert – 2 days:
 - ___ a. A3T prepares info SSS for COMACC outlining the certification itinerary
 - ___ b. A3T forwards demonstration pilot grade book to A3
 - ___ c. A3TA checks with protocol to ensure support arranged
 - ___ 9. Demonstration team arrival: A3T representative meets team at Base Ops
 - ___ 10. Cert – 2 hrs: protocol ensures setup of COMACC observation location

Note: A3TA updates letter to FAA to inform them of pilots approved/disapproved to perform single-ship demonstrations and Heritage Flights if selected pilot is replaced or fails to successfully complete training/obtain certification.