

**BY ORDER OF THE COMMANDER  
AIR COMBAT COMMAND AND PACIFIC  
AIR FORCES**



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COMBAT AIR FORCES**

*Supplement*

**ADDENDUM A**

**9 OCTOBER 2012**

*Maintenance*

**CAF: AIRCRAFT AND EQUIPMENT  
MAINTENANCE MANAGEMENT (F-22)**

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This addendum implements AFI 21-101, CAF Supplement, *AIRCRAFT AND EQUIPMENT MAINTENANCE MANAGEMENT*. This supplement prescribes policies and procedures governing aerospace equipment maintenance management of F-22 aircraft for Air Combat Command (ACC) and Pacific Air Forces (PACAF). This addendum does not apply to the Air National Guard (ANG) or Air Force Reserve Command (AFRC); however, ANG/AFRC personnel assigned to Classic Associate Units supporting CAF units will comply with the guidance provided within this supplement. Maintenance units will use this instruction in conjunction with the CAF supplement to AFI 21-101; if a conflict exists between the CAF supplement and this addendum the addendum will take precedence. Additionally this addendum merges and clarifies CAFI 21-105 LO requirements. This addendum will take precedence on conflicts with CAFI 21-105. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual 33-363, *Management of Records*, and disposed of IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS) located at <https://www.my.af.mil/gcss-af61a/afirms/afirms/>. Contact supporting records managers as required. Send comments, questions, and suggested improvements to this publication on AF Form 847, Recommendation

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## Chapter 1

### MANAGEMENT PHILOSOPHY AND POLICY

#### 1.1. Maintenance Concept. (See AFI 21-101, Paragraph 1.4)

1.1.1. General Concept of Repair: The basic concept of aircraft repair is to perform repairs at the lowest level of maintenance, to the fullest extent possible, consistent with good management, quality assurance and by using good Operational Risk Management (ORM) concepts outlined in AFI 90-901 and AFPD 90-902. Unless aircraft TOD prohibits repair; use of general repair TOD, use of general maintenance TOs as outlined in T.O. 00-5-1, and repair cycle asset management as outlined in T.O. 00-20-3 should be used to pursue local repair.

1.1.2. Maintenance Assistance Requests: Technical/maintenance assistance: advice, assistance, and training pertaining to installation, operation, and maintenance of equipment using currently authorized procedures; authorization for one-time, limited duration or permanent repairs beyond existing technical order (TO) procedures; authorization for limited use of non-listed substitutes to prevent work stoppage. On direction from the Production Superintendent, Action Requests (AR) are submitted to MXG/QA and FSR/ETS to the Technical Support Center (TSC) in the Field Information Network (FIN) system and distributed via email through the AR distribution list. Units submit a -107/AR in FIN IAW TO 00-25-107, *Maintenance Assistance*. (See AFI 21-101, Paragraph 1.4.1)

#### 1.2. Use of Technical Orders (TO) and TO Supplements. (See AFI 21-101, Paragraph 1.6)

1.2.1. All TO change requests will be accomplished via the Portable Maintenance Aids (PMA) option for Technical Order Change Request (TODCR) to include changes requested to PDF form technical orders. (See AFI 21-101, Paragraph 1.6.2.1)

**1.3. Maintenance Information Systems (MIS).** Integrated Maintenance Information System (IMIS) is the maintenance information system of input for F-22 aircraft maintenance action(s); however, IMDS remains the MIS of record and entry for PS&D inputs/actions. IMIS users and managers will consider each MIS applicable when MIS is referenced throughout this and other AFIs/T.Os. IMDS and IMIS will accurately reflect all F-22 maintenance actions. All personnel documenting maintenance must have access to and be trained/qualified to use IMIS and IMDS. IMIS integrates AFTO 781-series form equivalents and will be used IAW TO 00-20-1 and TO 00-20-2 to document maintenance on aircraft as required. (See AFI 21-101, Paragraph 1.12)

1.3.1. Once equipment (e.g., AFE, AME, ejection seat, gun) is removed from the aircraft through IMIS, subsequent off equipment maintenance will be documented in IMDS until IMIS parts forms capability exists. The owning workcenter performing the off-equipment maintenance will have parts manager access and update IMIS with configuration management updates to the end item.

**1.4. Electronic aircraft forms (e-forms):** The F-22 operates with e-forms and e-TOs that are utilized on remote PMAs, which must be docked/undocked (synchronized) with a squadron/base level server; this ensures the master aircraft forms and T.O. data base are maintained. Synchronization will be accomplished via an RF link between the PMA and the server where RF infrastructure is available or through a physical dock/undock process.

1.4.1. A review of current aircraft e-forms will be performed prior to performing maintenance tasks. Real time RF link updates will be accomplished before and after tasks are performed or if aircraft status is changed. In the event of a “comm-out” scenario, personnel will retrieve the latest e-forms from the main server by physically docking/undocking with the server at least two times per day for aircraft committed to the daily flying schedule and at least once daily for aircraft in prolonged maintenance docks/functions. Dock forms drive with the IMIS server prior to support section turn-in.

1.4.2. During scenarios where RF communication connectivity is available, real time synchronization is required.

1.4.3. During “comm-out” or RF unavailability conditions, each aircraft will have a dedicated PMA (aircraft e-forms drive) used for each aircraft to ensure adequate control of most current status/maintenance documentation. If in a “comm-out” scenario and an aircraft on the flying schedule is time constrained for hard dock/undock (e.g. quick turn), the aircraft expeditor or flightline supervisor will ensure aircraft e-forms, status and/or debrief actions are reconciled between undocked PMA and server work station to facilitate continued sortie generation of maintenance activities.

## Chapter 2

### SAFETY

#### 2.1. Flightline Safety. (See AFI 21-101, Paragraph 2.8)

2.1.1. All personnel will wear protective foot coverings (booties) when walking on any external surface of aircraft. Operational risk management must be used whenever wearing booties may not provide enough traction for the individual to work safely.

2.1.2. Use of powered AGE inside of hangars is governed by facility construction and local directives.

#### 2.2. Warning Tags. (See AFI 21-101, Paragraph 2.14)

2.2.1. The tag is designed to preclude inadvertent system activation. The bottom portion of the AF Form 1492, *Warning Tag*, will remain attached. Use the electronic warning alerts within IMIS and annotate the tag number in the discrepancy narrative causing the warning condition.

## Chapter 3

### GENERAL RESPONSIBILITIES FOR COMMANDERS AND KEY LEADERS

#### 3.1. Wing Commander Responsibilities. (See AFI 21-101, Paragraph 3.2)

3.1.1. Ensures funding is projected/available to support annual Signature Management Program (SMP) flight test requirements.

#### 3.2. Maintenance Group Commander Responsibilities. (See AFI 21-101, Paragraph 3.4)

3.2.1. The MXG/CC (or equivalent) will: (See AFI 21-101, Paragraph 3.4.1)

3.2.1.1. Determine who will perform Package Maintenance Plan (PMP) functions.

3.2.1.2. Establish and maintain an effective Low Observables (LO) maintenance program.

3.2.1.3. Appoint fully qualified/experienced LO technicians to QA.

3.2.1.4. Ensure LO section coordinates with PS&D to schedule annual aircraft audits.

3.2.1.5. Monitor annual LO audit trends to ensure fleet LO mission capable status is accurately documented and reported.

3.2.1.6. Support all MAJCOM directed Radar Cross Section (RCS) test events (e.g. SMP flight test, Acceptance Test Facility (turntable), and Repair Verification Radar assessments).

3.2.1.7. Work closely with the OG/CC to balance flying requirements with maintenance capability to minimize LO backlog.

3.2.1.8. Ensure all maintenance personnel complete annual LO awareness training through the MTF.

3.2.1.9. Ensure hot wash/lessons learned information is documented for each Theater Security Package (TSP) deployment and shared with all CAF F-22 units/MAJCOMs.

3.2.1.10. Approve aircraft to fly for more than 4 sorties in Aero Only configuration.

#### 3.3. /Chief

3.3.1. "Bad Actor" program is a collaborative responsibility between OEM, SPO, and RST. Site Leads serve as point of contact for repair cycle asset historical reports. (See AFI 21-101, Paragraph 3.10.30)

#### 3.4. Wing LO Survivability Superintendent Responsibilities.

3.4.1. LO Subject Matter Expert (SME) responsible to the wing leadership and ACC/A8F for SMP and other RF diagnostic test events.

3.4.2. Interface with the CAF LO SME and Responsible Test Organization on all SMP deployment scheduling requirements, to include dates, personnel, equipment, etc.

3.4.3. Projects TDY budget to support wing SMP flights per the CAF SMP Memorandum of Agreement (MOA).

3.4.4. Coordinates local RCS site surveys for frequency/band width emissions licensing and ensures local compliance with all federal, state and local Operational Safety and Health Administration regulations during Radio Frequency measurements.

3.4.5. Participate in CAF LO working group meetings/conferences.

3.4.6. Review aircraft Maintenance Information Systems and Signature Assessment Systems to validate the integrity of LO mission capable status reporting.

3.4.7. Provides wing leadership with survivability and vulnerability assessments based on LO system health status and projected in-theater threats.

3.4.8. Produces statistical reports/trend analysis to facilitate RCS reduction analysis in order to better understand the impact of LO health on survivability and vulnerability.

### **3.5. HQ ACC/A4V Weapon System Team (WST) Responsibilities**

3.5.1. Represent the CAF as the link with the program office and the SSO.

3.5.2. Responsible for airframe systems, support equipment, and configuration management.

3.5.3. Responsible for avionics systems, Operational Flight Program (OFP) development/release, and configuration management.

3.5.4. Coordinates manpower issues with the MAJCOM Functional Managers.

3.5.5. Manages and updates the Mission Essential Subsystem Lists (MESL).

3.5.6. Manages master equipment inventory list life cycle requirements.

3.5.7. Manages IMIS support; establishes IMIS capability, sustainment, and support requirements. Interprets field indicators and translates IMIS solutions.

3.5.8. TCTO/TOD manager. Approval authority for validation/verification of field releasable TCTOs, TOD updates, and manages TODCRs.

3.5.9. Reviews, coordinates, and approves field level Deficiency Reports.

3.5.10. Approves fleet wide IPI requirements and publishes through the TODCU for inclusion into TOD.

### **3.6. ACC/A8F Responsibilities**

3.6.1. Manage the CAF LO system.

3.6.2. Define LO system requirements to meet operational readiness objectives.

3.6.3. Develop and coordinate CAF policy and procedures for LO functions.

3.6.4. Establish CAF LO metrics and LO system status reporting standards.

3.6.5. Perform an on-site LO process compliance review at each unit at least biennial.

3.6.6. Represent the CAF at all applicable LO meetings and conferences.

3.6.7. Develop and maintain the CAF memorandum of agreement for Signature Management Program requirements.

3.6.8. Coordinate all required RCS test events with the applicable organizations.

3.6.9. Review RCS test analysis and make a determination if additional RCS interrogation is required.

3.6.10. Ensure each unit and component command HQ is provided a copy of applicable RCS test events/annual reports and fully understands the status of each aircraft tested.

### **3.7. MAJCOM/A4M Responsibilities.**

3.7.1. Manage the command's LO ASM career field manpower and training requirements.

3.7.2. Coordinate all intra-command LO ASM TDY manning assistance requests.

3.7.3. Represent MAJCOM at 2A7X5 utilization and training workshops.

3.7.4. Represent MAJCOM for all applicable 2A7X5 issues at LO conferences and meetings.

3.7.5. Forecast and ensure scheduling of 2A7X5 supplemental training.

## Chapter 4

### AIRCRAFT/HELICOPTER MAINTENANCE SQUADRON (AMXS/HMXS)

#### 4.1. Production Superintendent

4.1.1. Exceptional release authorities will complete the exceptional release using the most current IMIS data. If required, validate using IMIS server, but aircraft status from an undocked PMA may be used to determine status and airworthiness of the aircraft. (See AFI 21-101, Paragraph 4.5.1)

#### 4.2. Flightline Expediter. (See AFI 21-101, Paragraph 4.6)

4.2.1. Inform MOC and Debrief Section of all ground aborts and spare aircraft usage. When a spare is used, ensure the Data Transfer Card (DTC) of the aborted aircraft is delivered to debrief section.

#### 4.3. Aircrew and Maintenance Debrief Section. (See AFI 21-101, Paragraph 4.7)

4.3.1. After engine shutdown following an attempted sortie, actual sortie, or multiple sorties (in the case of hot pits/contingency operations), the aircraft DTC will be debriefed using the IMIS via the "Process Failure Data" function.

4.3.2. Notify production superintendent, expediter, or crew chief after aircrew debrief is completed on the IMIS server so that a forms update of the PMA hard drive can be accomplished. Forms update via docking is not required between flights if landing status is Code 1 or 2.

4.3.3. If IMIS is unable to read the DTC or the aircrew is unable to provide it (i.e. ground abort for cross-country), debrief personnel will coordinate with the production superintendent to ensure that data for the Crash Survivable Memory Unit (CSMU) and the Comprehensive Engine Diagnostic Unit (CEDU) is downloaded manually using the Portable Maintenance Aid no later than the end of the flying period. The downloaded information will be utilized to create a JCN that is specific to the Fault Reporting Code via the IMIS function for "Process AT File."

4.3.4. If IMIS capability is not available to support a debrief (i.e. cross-country, demo, evacuation), the aircrew will determine if the aircraft is airworthy using procedures in AFI 11-2F-22AV3, F-22A--Operations Procedures.

4.3.5. Debrief personnel will review IMDS screen 174 after each debrief session and ensure that all debriefed flying hours and failures are accurately documented in IMDS. IMIS/IMDS reconciliation will be conducted in conjunction w/ops personnel responsible for sortie/hour accounting.

## Chapter 5

### MAINTENANCE SQUADRON (MXS)

#### 5.1. Accessories Flight

##### 5.1.1. E&E Section.

5.1.1.1. The Emergency Oxygen System (EOS) will be maintained by Egress personnel. (See AFI 21-101, Paragraph 5.5.2.3)

#### 5.2. Fabrication Flight. (See AFI 21-101, Paragraph 5.9)

5.2.1. Flight CC/Chief Responsibilities. The Flight CC/Chief will: (See AFI 21-101, Paragraph 5.9.1)

5.2.1.1. Forecast funding to attend and participate in applicable LO meetings, Corrosion Prevention Advisory Board (CPABs) and other structural related programs/meetings.

5.2.1.2. Ensure accuracy of LO mission capable status documentation and reporting. This includes establishment of a Signature Assessment System (SAS) data integrity team to ensure data is routinely cross checked for accuracy.

5.2.1.3. Manage the maintenance data collection process, review data for correctness and take necessary action to rectify incorrect reporting.

5.2.1.4. Appoint a LO shift supervisor to coordinate shift workload with production.

5.2.1.5. Report fleet LO mission capable status to the applicable MAJCOM WST on a daily basis. Fleet SAS average reported must not include non-possessed aircraft.

5.2.2. Low Observable Aircraft Structural Maintenance Section: (See AFI 21-101, Paragraph 5.9.5)

5.2.2.1. Purpose of Low Observable Aircraft Structural Maintenance (AFSC 2A7X5):

Responsible for performing aircraft LO system and structural repairs using advanced techniques and materials. Designs, repairs, modify, and fabricate repair parts and components. Identifies and applies preservative treatments, corrosion preventatives, and LO materials. Inspects and ensures structural and LO integrity. Ensures personnel identify and treat corrosion on aerospace ground equipment. Supervises fabrication and repair of tubing assemblies using applicable technical data and engineering drawings. Uses electronic maintenance information systems to train personnel and track, manage, and monitor aircraft maintenance.

5.2.2.2. LO Section NCOIC will: (See AFI 21-101, Paragraph 5.9.5.3)

5.2.2.2.1. Coordinate with MXS Production Super to ensure fast/accelerated LO cure processes are used to the maximum extent possible to reduce flow time and increase aircraft availability.

5.2.2.2.2. Ensure LO ASM personnel receive pre-placement, special purpose, periodic and termination occupational physicals as deemed necessary by local Medical Group Aero medical Services IAW AFI 48-145.

- 5.2.2.2.3. Ensure LO ASM personnel provide updated information required to obtain and retain special program security access to the unit or group security manager in a timely manner.
- 5.2.2.2.4. Ensure a LO CRF security training plan is developed IAW applicable security guidance to be used for each individual working within the section.
- 5.2.2.2.5. Coordinate with maintenance supervision and PS&D to group other maintenance actions (e.g. TCTOs, OTIs) with scheduled LO work.
- 5.2.2.2.6. Work with AMU Supervision, Production Superintendent and AMU PS&D to schedule aircraft downtime for LO REDUX at the appropriate time based on overall fleet health and/or SAS damage priority screen. LO REDUX time must be focused on reducing SAS margins. Other scheduled/unscheduled LO FOM/TCTOs/maintenance must be planned separately. LO margin maintenance (REDUX) is 3-5 days and must focus on multiple discrepancies, longer-lasting repairs, and greater SAS margin buyback. A long-line REDUX (8-10 days) is preferred when aircraft availability permits.
- 5.2.2.2.7. Establish procedures for quick look LO inspections on all next day flyers to identify aircraft that will exceed 100% SAS margin and assess possible quick fix repair options. Assess and utilize accelerated cure repairs to those specific damages to return aircraft to mission capable status in quickest means possible.
- 5.2.2.2.8. Maximize use of spray facilities by limiting to spray restoration, concurrent LO repairs may be accomplished during spray restoration. Primary brush/roll application should be performed in other hangar locations.
- 5.2.2.2.9. Develop a dedicated LO Outer Mold Line (OML) inspection crew to maintain inspection consistency and inspector proficiency.
- 5.2.2.2.10. Establish an OML team rotation plan to ensure all LO personnel remain proficient.
- 5.2.2.2.11. Coordinate depot assistance through MAJCOM and Lead Command weapon system manager.
- 5.2.2.2.12. Ensure no other maintenance is accomplished on the aircraft, equipment, or within the environmentally controlled/cordoned-off areas during corrosion prevention/treatment or coatings restoration when hazardous/toxic materials are in use, which requires the use of specialized personal protective equipment.
- 5.2.2.2.13. Ensure deficiency reports (DR) are accomplished as necessary IAW T.O. 00-35D-54, *USAF Deficiency Reporting, Investigation, and Resolution*.
- 5.2.3. Low Observable/Composite Repair Facility (LO/CRF) Manager.
- 5.2.3.1. Responsible for reporting facility operation deficiencies such as the Heating, Ventilation and Air Conditioning (HVAC) systems, compressed and breathing air systems, electrical systems, plumbing and drainage systems in the LO/CRF and on assigned real property of the LO/CRF.
- 5.2.3.2. Perform tasks related to the overall management and operations of the LO/CRF, including energy management and equipment inventory.

5.2.3.3. Perform facility inspections to determine repair and maintenance requirements. Ensure all measures are taken to maintain security accreditation of facility if required.

5.2.3.4. Submit facility work orders through Civil Engineer (CE) Customer Service. In cases of established/approved contract maintenance for facilities, contact contractor for emergency or out of cycle maintenance. This includes warranty repairs and maintenance required.

5.2.3.5. Track the completion of contractor and CE work orders. Maintain a record of all work to include response time and time required until satisfactory completion of work.

5.2.3.6. Perform facility and safety inspections as required by technical orders and Air Force instructions.

5.2.3.7. Perform escort duties or provide escorts as needed for contract maintenance personnel within special access areas of the LO/CRF.

#### 5.2.4. LO Support Section Responsibilities.

5.2.4.1. Stocks supplies, consumables, tools, and equipment to support Low Observable aircraft inspection, maintenance, and surface treatment. Control tool storage areas, Support CTK/Special tools, E-tools, test equipment. See AFI 21-101, Chapter 10 for detailed procedures.

5.2.4.2. Issue/turn in materials to/from workers using an approved tool accountability system.

5.2.4.3. Control and maintain TMDE IAW TO 33-1-27, Maintenance Support of Precision Measurement Equipment. Comply with T.O. 33K-1-100-2-CD-1, TMDE Calibration Interval Technical Order and Work Unit Code Reference Guide; T.O. 00-20-14, and other applicable technical directives concerning the use, care, handling, transportation, and calibration of TMDE owned by the section.

5.2.4.4. Provide monthly critical support equipment status update to Sq Supervision.

5.2.4.5. Manage section's hazardous material (HAZMAT) program.

5.2.4.6. Process supply requests, maintains AF Form 2413, *Supply Control Log* (or operates remote devices), tracks MICAP due-outs, monitors bench stock, conducts bench stock and adjusted stock level reviews. See AFI 21-101, Chapter 11 for detailed procedures.

5.2.4.7. In addition to common responsibilities outlined in AFI 21-101, CAF Supplement, Chapter 3, the support section NCOIC will ensure a section due-out release point and holding bins are established.

5.2.4.8. Maintain bench and operating stocks. See AFI 21-101, Chapter 11 for detailed procedures.

5.2.4.9. Maintain QRL as needed and provide it to technicians.

5.2.4.10. Track and process DIFM assets.

5.2.4.11. Manage reusable containers IAW AFI 24-203, Preparation and Movement of Air Force Cargo, and T.O. 00-20-3.

5.2.4.12. Organize and coordinate effective shipping and staging operation.

5.2.4.13. Maintain records and documentation actions to ensure compliance with applicable directives.

### **5.3. Propulsion Flight**

5.3.1. Jet, Turboprop, Turbo-shaft Engine Intermediate Maintenance (JEIM) Section. (See AFI 21-101, Paragraph 5.12.4)

5.3.1.1. Units with F119-PW-100 engines will use the Integrated Maintenance Information System (IMIS). Engine work folder information not contained in IMIS will be established IAW this instruction. When maintenance is required beyond the scope of the Jet Intermediate Maintenance (JEIM) induction JCN, a separate JCN/WCE will be created. The engine work package number is used to document all in-shop actions, rather than on JCN. (See AFI 21-101, Paragraph 5.12.4.7)

5.3.1.2. Track the total operating time of old and new components on the Serially Controlled/Time Tracked Item Replacement Record. (See AFI 21-101, Paragraph 5.12.4.7.1.3)

5.3.1.3. Units possessing the F119-PW-100 engine will use IMIS to document IPIs IAW 00-20-1. (See AFI 21-101, Paragraph 5.12.4.7.1.5)

## Chapter 6

### MAINTENANCE OPERATIONS SQUADRON

#### 6.1. Maintenance Operations Flight (MOF)

##### 6.1.1. Engine Management (EM) Section

6.1.1.1. If IMDS-CDB and CEMS are unavailable for more than 48 hours at home station or while deployed all MXG work-centers will use IMIS until IMDS-CDB and CEMS become available. IMIS has the ability to store approximately a 2 week period of data without IMDS updating, allowing the use of IMIS to continue until such time as IMDS-CDB and CEMS become available. (See AFI 21-101, Paragraph 6.2.3.16)

6.1.1.2. Engine Management Point of Contact Appointment. Ensure each AMU OIC/Superintendent designates in writing, one primary and one alternate engine monitor as points of contact for EM. Designation letter will include appointees name, rank, office symbol, and phone number. Letter will be updated as personnel change. (See AFI 21-101, Paragraph. 6.2.3.18)

##### 6.1.2. MMA section

##### 6.1.2.1. Maintenance Information Systems (MIS)

6.1.2.1.1. DIT teams will ensure IMDS, the MIS of record, accurately reflects IMIS entries. (See AFI 21-101, Paragraph. 6.2.6.16.6)

## Chapter 7

### MAINTENANCE PLANS, SCHEDULING AND DOCUMENTATION (PS&D)

#### 7.1. Pre-Dock and Post-Dock Meetings

7.1.1. Aircraft going into PMP status or an inspection that is LO intrusive will require Pre/Post- dock meeting. (See AFI 21-101, Paragraphs 7.2.2 & 7.2.3)

#### 7.2. Aircraft Configuration Management

7.2.1. Create a JCN in IMIS for each missing item due MIS interface anomalies for maintenance events. (See AFI 21-101, Paragraph 7.2.4.5)

## Chapter 8

### QUALITY ASSURANCE (QA)

#### 8.1. OIC/Superintendent (QA OIC/SUP) Responsibilities

8.1.1. Works with squadron leadership to establish a comprehensive inspection program that assures the integrity of LO maintenance and SAS documentation associated with mission capable status reporting. This includes frequent personal evaluations of aircraft OML inspections, SAS documentation and LO repair processes IAW established technical order guidance.

#### 8.2. Chief Inspector Responsibilities

8.2.1. Ensure IPI TODCRs are submitted to ACC/A4V TODCU for consideration and implementation into the master IPI listing.

#### 8.3. LO Inspector Responsibilities. (See AFI 21-101, [Paragraph 8.5](#))

8.3.1. Identify/report all LO training and process deficiencies to the fabrication flight chief.

8.3.2. Include periodic participation in annual aircraft LO audit inspections as part of Maintenance Standardization Evaluation Program.

## Chapter 9

### IMPOUNDMENT PROCEDURES

**9.1. Reasons for Impoundment of Aircraft or Equipment. Impound aircraft or equipment:**  
(See AFI 21-101, [Paragraph 9.4](#))

9.1.1. For any known contamination such as fuel, hydraulic fluid, PAO, oil.

**Chapter 10**

**TOOL AND EQUIPMENT MANAGEMENT**

**10.1. No additional guidance for F-22 aircraft maintenance.**

**Chapter 11**

**MAINTENANCE SUPPLY SUPPORT**

**11.1. No additional guidance for F-22 aircraft maintenance.**

**Chapter 12**

**WING WEAPONS MANAGER AND WEAPONS STANDARDIZATION**

**12.1. No additional guidance for F-22 aircraft maintenance.**

**Chapter 13****MOBILITY AIRCRAFT DEFENSIVE SYSTEMS LOADING POLICY**

**13.1. No additional guidance for F-22 aircraft maintenance.**

## Chapter 14

### ADDITIONAL MAINTENANCE REQUIREMENTS AND PROGRAMS

#### 14.1. Aircraft Structural Integrity Program (ASIP). (See AFI 21-101, Paragraph 14.6)

14.1.1. Units will assign an ASIP Project Officer as the point of contact for the OEM, 673 AESS/SYE and MAJCOM ASIP POC.

14.1.2. The ASIP data collection for F-22 is transparent to maintainers. The autonomous nature of the aircraft systems does not require inputs or actions apart from routine downloads of the Crash Survivable Memory Unit and/or DTC. All data for Individual Aircraft Tracking (IAT) is performed by OEM and 673 AESS/SYE. (See AFI 21-101, Paragraph 14.6)

#### 14.2. End-of-Runway (EOR) Inspection. (See AFI 21-101, Paragraph 14.13)

14.2.1. Dearm will only be performed when aircraft is flying with a hot gun. (See AFI 21-101, Paragraph 14.13.5)

#### 14.3. Red Ball Maintenance. (See AFI 21-101, Paragraph 14.30)

14.3.1. Docking and un-docking of PMA is not required to release the aircraft for flight.

14.3.2. For deployment launch out sorties, all red ball maintenance will be documented on AFTO Form 781Hs and 781As in accordance with TO 00-20-1. All off-station maintenance and red ball maintenance prior to launch will be documented on 781A and 781H forms IAW 00-20-1. Upon arrival to the deployed or TDY location, annotate aircraft drive forms with maintenance actions accomplished during the deployment launch Red Ball maintenance.

#### 14.4. IFF Mode IV Program. (See AFI 21-101, Paragraph 14.37)

14.4.1. Aircrew commanded Mode IV interrogation/replies are adequate for 2 month requirement. Document valid Mode IV interrogation/replies in IMIS/IMDS. Invalid Mode IV responses require a pilot reported discrepancy/job control number creation.

#### 14.5. Packaged Maintenance Plan (PMP) personnel

14.5.1. The PMP maintenance management concept enables consolidating of scheduled maintenance requirements contained in T.O. 1F-22A-6-1 by programmed initial and recurring intervals of 300 hour increments for hourly controlled tasks. The prime contractor manages engineering inspection requirements through T.O. 1F-22A-6-1, providing periodic updates as required. Owning units load the requirements contained in T.O. 1F-22A-6-1 into IMDS and utilize IMDS maintenance forecast and reporting functions to determine PMP content for each aircraft for the upcoming 300 hour interval. The intent of the 300 hour initial and recurring intervals is to mitigate LO break-in requirements to facilitate mandated inspections. All aircraft have initial/recurring 300-hour PMP events, however the scope of each event varies based on aircraft structural configuration and IAT integrity data analysis. Not all PMP events are LO intrusive, so it's feasible for those PMP events to be accomplished during normal scheduled maintenance activities and not drive the need to schedule the aircraft down for multiple days.

MARK A. ATKINSON, Maj Gen, USAF  
Director of Logistics

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

AFI 11-2F-22AV3, *F-22A--Operations Procedures*, 8 December 2009

AFI 21-101, *Aircraft and Equipment Maintenance Management, Interim Change 1*, 11 Aug 2011

AFI 21-101, *CAFSUP\_I, CAF: Aircraft and Equipment Maintenance Management*, 11 Jul 2012

AFI 24-203, *Preparation and Movement of Air Force Cargo*, 14 May 2012

AFI 48-145, *Occupational and Environmental Health Program*, 15 September 2011

AFI 90-901, *Operational Risk Management*, 1 April 2000

AFMAN 33-363, *Management of Records*, 1 Mar 2008

AFPAM 90-902, *Operational Risk Management Guidelines and Tools*, 14 December 2002

CAF SMP MOA, 3 March 2010

CAFI 21-105, *Fabrication Program*, XX July 2012

TO 00-5-1, *AF Technical Order System*, 1 May 2011

TO 00-20-1, *Aerospace Equipment Maintenance Inspection, Documentation, Policies, and Procedures*, 15 June 2011

TO 00-20-2, *Maintenance Data Documentation*, 17 September 2010

TO 00-20-3, *Maintenance Processing of Reparable Property and the Repair Cycle Asset Control System*, 1 January 2009

TO 00-20-14, *Air Force Metrology and Calibration Program*, 30 September 2011

TO 00-25-107, *Maintenance Assistance*, 15 August 2011

TO 00-35D-54, *USAF Deficiency Reporting, Investigation, and Resolution*, 1 November 2011

TO 1F-22A-6-1, *Aircraft Scheduled Maintenance Data Table, F-22A Aircraft*, 12 March 12

TO 33-1-27, *Maintenance Support of Precision Measurement Equipment*, 30 November 1998

TO 33K-1-100-2-CD-1, *TMDE Calibration Interval Technical Order/Work Unit Code Reference Guide*, 30 November 2011

***Adopted Forms***

AF Form 847, *Recommendation for Change of Publication*

AF Form 1492, *Warning Tag*

AF Form 2413, *Supply Control Log*

***Abbreviations and Acronyms***

**AFE**—Aircrew Flight Equipment

**AME**—Alternate Mission Equipment  
**AR**—Action Requests  
**ASM**—Aircraft Structural Maintenance  
**CEDU**—Comprehensive Engine Diagnostic Unit  
**CPAB**—Corrosion Prevention Advisory Board  
**CRF**—Composite Repair Facility  
**CSMU**—Crash Survivable Memory Unit  
**DR**—Deficiency Report  
**DTC**—Data Transfer Card  
**ETS**—Engineering Technical Services  
**FIN**—Field Information Network  
**FSR**—Field Service Representative  
**IMDS**—Integrated Maintenance Data System  
**IMIS**—Integrated Maintenance Information System  
**LO**—Low Observable  
**MESL**—Mission Essential Subsystem Lists  
**MIS**—Maintenance Information Systems  
**MOA**—Memorandum of Agreement  
**OFP**—Operational Flight Program  
**OML**—Outer Mold Line  
**ORM**—Operational Risk Management  
**PMA**—Portable Maintenance Aid  
**PMP**—Package Maintenance Plan  
**RCS**—Radar Cross Section  
**RF**—Radio Frequency  
**SAS**—Signature Assessment System  
**SME**—Subject Matter Expert  
**SMP**—Signature Management Program  
**TO**—Technical Order  
**TOD**—Technical Order Data  
**TODCR**—Technical Order Change Request  
**TODCU**—Technical Order Data Control Unit

**TSC**—Technical Support Center

**TSP**—Theater Security Package

**WST**—Weapon System Team

## Attachment 2

### F-22 OUTER MOLD LINE AUDIT

**A2.1.** The Low Observables Section is responsible to perform a Signature Assessment System (SAS) and aircraft Outer Mold Line (OML) audit on each assigned aircraft annually. The audit is used to confirm that damage defects entered in the SAS during daily OML inspections or damages removed from SAS during routine maintenance provide for an accurate representation of the LO system health. This can only be performed by physically matching aircraft damages with the entries in SAS. Errors identified during the audit must be recorded in the audit historical file and corrected in the SAS immediately. Any aircraft audit that results in a +15% or -15% SAS margin deviation indicates a potential deficiency with the OML inspection process. Maintenance supervisors with direct oversight of LO processes must ensure significant variances are understood and corrective actions, e.g. training, additional QA oversight, process changes, etc. immediately follow. Internal root cause analysis and corrective actions must be documented for historical purposes any time an audit exceeds the margin percentages outlined above. Units must also establish a local SAS management policy outlining the frequency of QA evaluations to ensure SAS data for each aircraft is accurate. Note: There is an unacceptable risk to aircraft radar cross section and aircraft survivability due to substandard maintenance practices or inaccurate maintenance documentation into the SAS. Aircraft scheduled for an audit should be identified during the monthly/weekly shared resources meeting.

A2.1.1. All aircraft scheduled to support a Theater Security Package/contingency deployment must not have an audit due within 30 days of arriving at the deployed location.

**A2.2.** The SAS and OML audit historical files: The SAS and OML audit files will be maintained for 5 years. Each audit file will include at a minimum:

A2.2.1. Name of person/s performing the audit.

A2.2.2. Date of audit.

A2.2.3. Pre-audit SAS margin percentage using sector with the highest number.

A2.2.4. Post-audit SAS margin percentage using sector with greatest change, except in the case where a decrease in margin is greater than an increase in any sector. Sector increases are always more critical than sector decreases.

A2.2.5. Number of new damages identified.

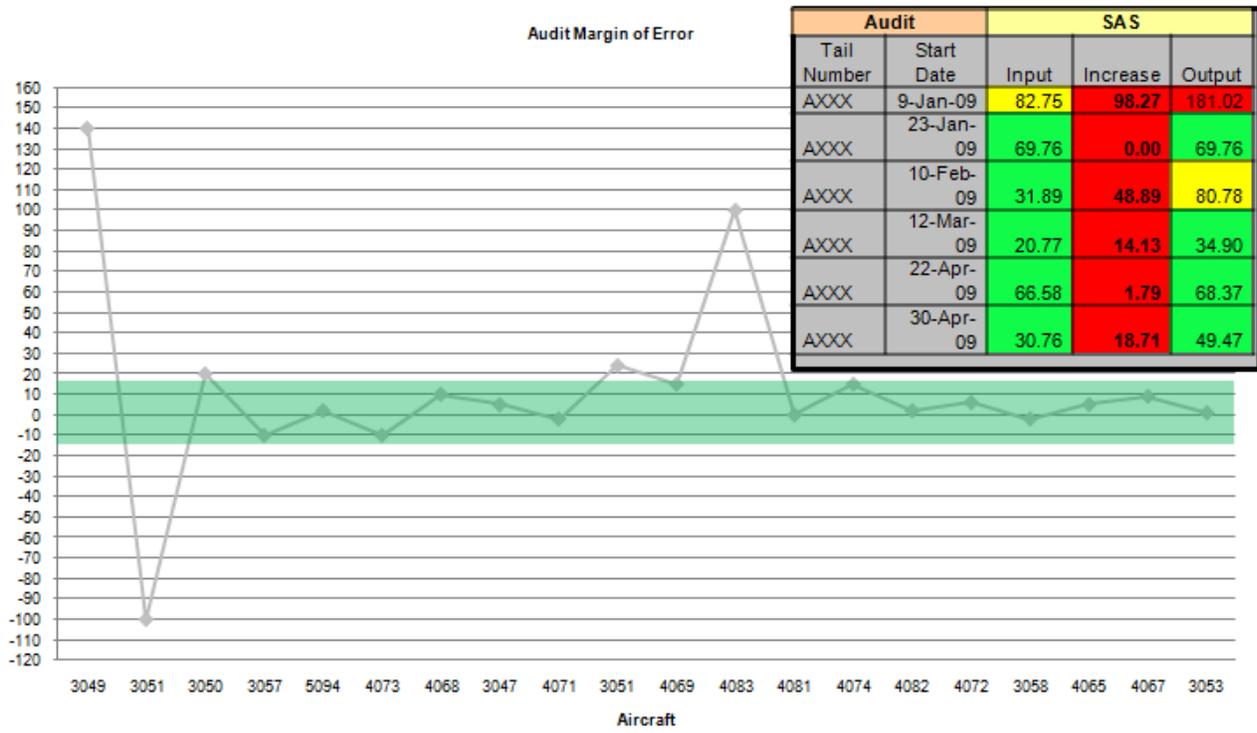
A2.2.6. Number of previously repaired damages not removed from SAS.

A2.2.7. Number of duplicate entries identified.

A2.2.8. Root cause and corrective action when post audit results in a +15% or -15% change.

A2.2.9. An (Figure A2.1) will be created and used to monitor OML inspection compliance.

Figure A2.1. Audit Metric.

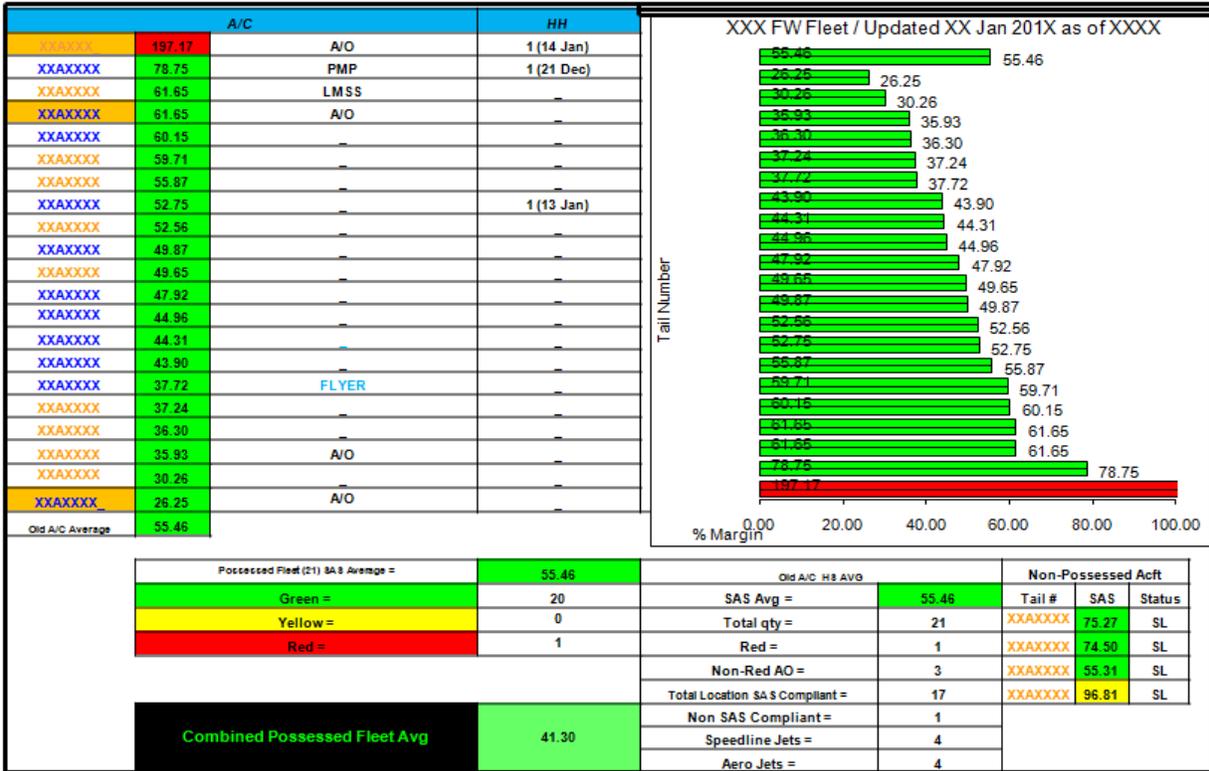


Attachment 3

DAILY SAS REPORTING METRICS

A3.1. Fleet SAS margin numbers must be documented in a format similar to the chart below (Figure A5.1). Key information includes SAS margin number for each aircraft, fleet SAS average and number of aero only panels. Fleet SAS average reported must not include non-possessed aircraft. This information must be disseminated within the wing MXG as required and MAJCOM F-22 Weapon System Team at least daily.

Figure A3.1. Daily SAS Reporting Metrics.

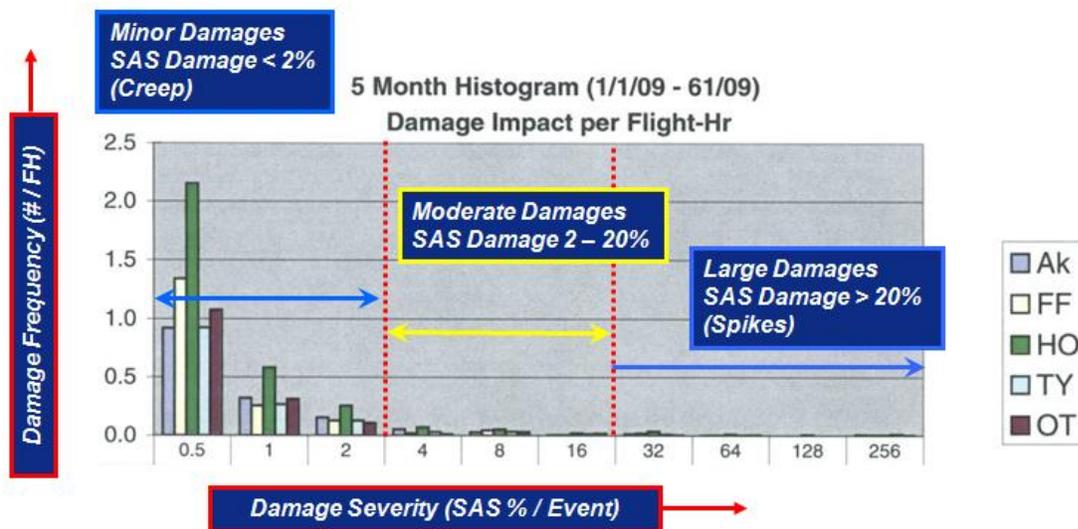


## Attachment 4

## SAS CREEP DESCRIPTION

**A4.1.** The chart below (Figure A.4.1) shows a categorization approach to optimize maintenance activities. It outlines three categories of damages, those with an impact greater than 20% (major “spikes”), those between 2% and 20% (moderate “routine”) and those less than 2% (minor “creep”). Post flight OML inspections accomplished by the crew chief and/or LO personnel must identify any LO spike damages as soon as possible after flight if the aircraft is on the next day flying schedule.

**Figure A4.1. SAS Creep Description.**



**Note: Actual chart includes all data (including SAS creep rate) by base**

**SAS Creep = LO Damages 2% or Less**

A4.1.1. The damage definition/SAS creep metric must be used to establish a battle rhythm for managing LO maintenance. Minor damages are repaired through scheduled SAS REDUX. Moderate damages should primarily be worked in groups in conjunction with other scheduled maintenance, e.g. Packaged Maintenance Plans, TCTOs, and panel removals to facilitate other maintenance. Any existing moderate damages should be the priority when performing scheduled SAS reduction efforts. Large damages driving significant increases in SAS must be fixed as soon as possible to manage SAS growth. In some cases it may be prudent to define large damages as >10 percent to effectively control SAS margins. This more aggressive approach is particularly beneficial prior to major deployments. Units have the option to define spikes as >10% if necessary to control spike growth, but the SAS creep definition provided above must be used in all cases.

A4.1.2. Use wing analysis and scheduling experts to help balance flying operations and LO maintenance events/downtime to best manage LO fleet health. Failure to effectively balance flying and LO maintenance requirements could lead to an uncontrollable LO backlog.

## Attachment 5

## CANOPY TRANSPARENCY COATING TRACKING

**A5.1.** Units will track canopy coating data in a format similar to the chart below (Figure A.5.1). The tracking sheet must also include transparency manufacture and damage information by placing a flag note in each block used to track canopy hours. This data is tracked to help units predict reliability. Canopy data must be disseminated to MXG supervisors, MAJCOM weapon system team and the LM canopy IPT at least weekly.

**Figure A5.1. Canopy Transparency Coating Tracking.**

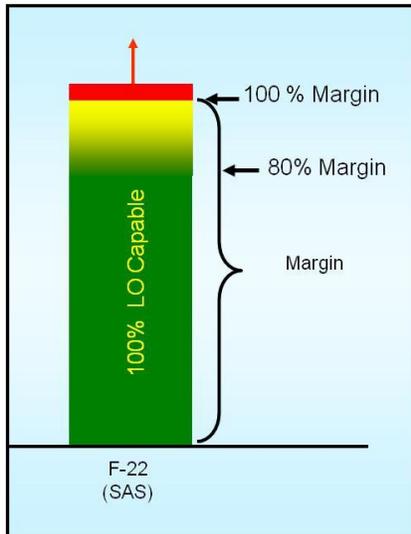
A/C	CANOPY HOURS	Visual Status	A/C	CANOPY HOURS	Visual Status	A/C	CANOPY HOURS	Visual Status	A/C	CANOPY HOURS	Visual Status
05-090	260.7	8	06-118	154.3	9	07-131	92.7		07-142	193	20
05-102	95.7		06-119	8.5	1	07-133	49.4		07-143	143	4
05-103	3.6		06-121	184.5	6	07-134	62.4		07-144	147.9	3
06-108	273	3	06-122	397		07-135	158		07-145	108.7	
06-110	73.5	2	06-123	192.9	12	07-136	85		07-146	214.1	6
06-112	76.3					07-137	23.8		07-147	293.1	15
06-113	189.1	4	06-126	148.7	2	07-138	179.4	2	07-148	283.8	10
06-114	380.3	10	06-127	112	5	07-139	75.7		07-149	139.8	2
06-115	152.6		06-129	114.5		07-140	167.7	25	07-150	96.7	2
06-117	111.3	1	06-130	58.8	1	07-141	119.4	6	07-151	173.7	31
<b>Canopy Hours</b>					<b>Visual Status</b>						
1-99.9 Hours					Major Visual Anomalies						
100 - 199.9 Hours					Minor Visual Anomalies						
200+ - Hours					No Visual Anomalies						
Number Inserted In Box = Repairs In Zone 1											

## Attachment 6

## SAS MARGIN DEFINITION

**A6.1.** The graphic below (Figure A.6.1) depicts the SAS margin scale used to determine mission capable status for the F-22 LO system.

**Figure A6.1. SAS Margin Definition.**



A6.1.1. The LO margin for each aircraft is determined via OML inspection and use of SAS. An aircraft is fully mission capable for the LO system when the SAS margin is less than or equal to 100 percent. LO restoration is required when 100 percent SAS margin exceeded.

A6.1.2. Manage fleet LO by taking advantage of opportunistic downtime or scheduling LO restoration time when RCS margin approaches unit determined threshold (typically around 80%). Fleet SAS margin averages should be maintained at or below 60 percent during peace time operations to effectively manage SAS margin growth. Utilize a SAS top 5/10 priority list or SAS priority screen to schedule LO maintenance events. Any top 5/10 priority list must be kept current for other opportunities such as FOM work, aero-coated panel restoration if aircraft is down, complete concurrent spike and moderate damage repairs.

A6.1.3. SAS does not rank-order aircraft in terms of RCS.

A6.1.4. SAS number does not correlate to an RCS pattern.

A6.1.5. SAS is not a mission planning tool.