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SECRETARY OF THE AIR FORCE**

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Maintenance



**AIR FORCE METROLOGY AND
CALIBRATION PROGRAM**

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This publication implements Air Force Policy Directive (AFPD) 21-1, *Air and Space Maintenance*. It provides guidance and procedures on the United States Air Force Metrology and Calibration (AFMETCAL) Program management requirements throughout the Air Force (AF). It applies to Major Command (MAJCOM), all AF military and civilian personnel, and calibration activities who design, develop, acquire, use, operate, maintain, or manage test, measurement, and diagnostic equipment (TMDE), including the Air Force Reserve and Air National Guard (ANG), except where noted otherwise. This publication may be supplemented at any level, but all supplements must be routed to the Office of Primary Responsibility (OPR) listed above for coordination prior to certification and approval. Refer recommended changes and questions about this publication to the OPR listed above using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate chain of command. 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 Air Force Instruction (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. 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 Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the AF.

SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. Major changes include moving roles and responsibilities from Technical Order (TO) 002014, *Air Force Metrology and Calibration Program*, to this AFI.

1. Requirements. The AFMETCAL Program is a hierarchical system of calibration laboratories, personnel, equipment, and procedures to ensure systems and equipment measurements are safe, accurate, uniform, reliable and traceable to either the National Institute of Standards and Technology (NIST) or AFMETCAL-approved sources. All TMDE used to make or verify meaningful (quantifiable) measurements shall be calibrated.

1.1. Air Force Materiel Command (AFMC) is designated as the AF lead agent for establishment, oversight, processes, and procedures for AFMETCAL. The AFMETCAL Program is organized in AFLCMC/WNM.

1.2. Acquisition of systems and equipment includes assessment of calibration and measurement requirements. For additional information see MIL-HDBK-1839A, *Department of Defense Handbook Calibration and Measurement Requirements*. Acquisitions requiring a Calibration and Measurement Requirement Summary (CMRS) shall comply with MILSTD1839, *Calibration and Measurement Requirements*.

1.3. AFMETCAL serves as the AF technical authority on metrology issues and is the AF single point of contact for calibration services and traceability of measurements to NIST. AFMETCAL makes TMDE calibration and repair responsibility determinations. AFMETCAL publishes responsibility determinations in TO 33K-1-100-1, *Calibration Procedure for Maintenance Data Collection Codes and Calibration Measurement Summaries*, and TO 33K-1-100-2, *TMDE Calibration Notes, Calibration Interval, Technical Order and Work Unit Code Reference Guide*, and Calibration and Measurement Summary (CMS) TOs.

1.4. Repair Network. The AFMETCAL program has been recognized as a Repair Network under the Repair Network Integration (RNI) initiative. Under RNI, the AFMETCAL Director serves as the Product Repair Manager, the Repair Network Manager resides within the AFMETCAL Plans and Analysis Section, the Precision Measurement Equipment Laboratories (PMEL) MAJCOM Functional Managers (MFM) serve as the MAJCOM leads, and PMEL Managers serve as the Node Managers.

1.5. Air Force Primary Standards Laboratory (AFPSL). The AFPSL maintains the AF Measurement Standards. The standards are traceable to NIST or other sources as approved by AFMETCAL. AF Measurement Standards are used to ensure the accuracy and traceability of Base Measurement Standards. Base Measurement Standards are provided to PMELs.

1.6. Precision Measurement Equipment Laboratories (PMELs). The Deputy Chief of Staff, Logistics, Engineering & Force Protection (AF/A4) approves the establishment of PMELs at selected installations. The PMEL is the base-level AFMETCAL Program focal point. It is the activity authorized to possess and use base measurement standards. Operational details of the program are set forth in this AFI, TO 00-20-14, and related command directives.

1.7. Other Department of Defense (DoD) Services Calibration Laboratories. The use of other DoD Services calibration laboratories is authorized when approved by the applicable MFM and AFMETCAL. The Army, Navy and Marine Corps operate calibration laboratories using similar measurement techniques and management concepts. These laboratories provide measurement traceability to NIST. Units requesting support from another service shall follow the guidance in TO 00-20-14, which includes the interservice support agreement guidance.

2. Roles and Responsibilities.

2.1. Deputy Chief of Staff, Logistics, Engineering, and Force Protection (AF/A4) shall:

2.1.1. Advocate for AFMETCAL requirements.

2.1.2. Authorize the establishment or closure of AF calibration laboratories. Prior to authorizing, solicit input from the AFMETCAL Director on impact establishment/closure would have on AF calibration support capabilities, processes, and/or costs.

2.2. Commander, Air Force Materiel Command (AFMC/CC) shall:

2.2.1. Appoint an AFMETCAL Director, who will also function as the Product Group Manager (PGM) for AF calibration standards and systems.

2.2.2. Provide the AFMETCAL Director with resources and operation support.

2.3. **Program Managers (PMs)/PGMs shall:**

2.3.1. Assess, and when deemed appropriate, integrate metrology, calibration and alignment requirements in system and equipment acquisition planning processes, statements of work, and requests for proposal.

2.3.2. Include AFMETCAL Director on CMRS development and for metrology, calibration and alignment issues associated with system and equipment sustainment planning, support equipment integrated product development, and technical interchanges. Identify metrologyrelated Government Furnished Equipment (GFE)/Contractor Furnished Equipment requirements to the AFMETCAL Director.

2.3.3. Include AFMETCAL Director on system and equipment acquisition data calls, and data call for TMDE centrally funded by the working capital fund.

2.3.4. Coordinate with AFMETCAL Director during system and equipment design reviews.

2.3.5. Coordinate requirements for contracted calibration services through the AFMETCAL Director (including, but not limited to, Public-Private Partnerships, Interim Contract Support, Contract Logistics Support or when managing Support Equipment as spares when acting as the Inventory Control Point).

2.3.6. Include MILSTD1839D, *Calibration and Measurement Requirements*, for new systems and equipment acquisitions that require a CMRS.

2.4. **AFMETCAL Director (AFLCMC/WNM) shall:**

2.4.1. Plan, program, and budget for:

2.4.1.1. PMEL and AFPSL calibration standards/systems acquisition.

- 2.4.1.2. AFMETCAL Research and Development requirements to develop adequate National and AF calibration standards.
- 2.4.1.3. Calibration and maintenance services provided through the AFPSL, or centrally funded as designated in published AF calibration determinations contained in TO 33K11001, TO 33K11002, and/or applicable Calibration and Measurement Summaries (CMSs).
- 2.4.1.4. Development and maintenance of AF Calibration TOs (33K Series).
- 2.4.1.5. Development and maintenance of AFMETCAL automated calibration procedures used by PMELs to calibrate TMDE.
- 2.4.2. Review MAJCOM (or equivalent) requests to establish or close PMELs and forward a recommendation on the request to the Air Force Director of Logistics (AF/A4L) for a decision.
- 2.4.3. Provide cradle-to-grave management of AF calibration capabilities to include acquisition of calibration standards and systems, comprised of:
 - 2.4.3.1. PMEL Base Measurement Standards and equipment for field-level PMELs cataloged in the AF Equipment Management System Allowance Source Code (ASC) 734.
 - 2.4.3.2. AFMETCAL PGM developed PMEL calibration systems cataloged in various ASCs.
 - 2.4.3.3. AF measurement standards and equipment for the AFPSL.
- 2.4.4. Manage operation and maintenance of the AFPSL.
- 2.4.5. Be the AF technical authority on metrology issues and the single point of contact for calibration services and traceability of measurements to NIST.
- 2.4.6. Represent the AF to the Joint Technical Coordination Group for Calibration and Measurement Technology and provide support to subgroup activities.
- 2.4.7. Provide metrology technical and engineering support to MAJCOMs (or equivalent) to resolve metrology problems and/or improve calibration techniques. Coordinate with MAJCOM (or equivalent) Functional Managers to:
 - 2.4.7.1. Establish calibration facility requirements/standards for PMELs.
 - 2.4.7.2. Identify home station and deployed requirements for new and replacement calibration standards, considering equipment for effectiveness and productivity improvement.
 - 2.4.7.3. Identify metrology training requirements.
 - 2.4.7.4. Identify applicable ASC entries to the ASC manager.
 - 2.4.7.5. Redistribute excess PMEL calibration standards.
 - 2.4.7.6. Evaluate TMDE calibration software developed by PMELs for potential AF wide use.
- 2.4.8. Coordinate annual equipment buys with the support equipment PGM.

- 2.4.9. Develop and publish an AFMETCAL master plan to program and budget for AFPSL and PMEL calibration standards/systems acquisitions.
- 2.4.10. Serve as the AF program manager and metrology focal point for countries participating in the Security Assistance Program. Coordinate the use of PMEL services to support security assistance activities. Support AF Security Assistance Programs for metrology and calibration requirements as stipulated in Government to Government agreements.
- 2.4.11. Develop, publish and maintain TO 00-20-14, in coordination with MAJCOM (or equivalent) PMEL functional managers.
- 2.4.12. Develop, publish and maintain AF Calibration TOs (33K Series) and coordinate their validation and verification.
- 2.4.13. Develop metrology support concepts and acquire/provide calibration equipment to support Automatic Test Equipment (ATE) and Systems in coordination with PMs, and the support equipment PGM.
- 2.4.14. Make calibration responsibility determinations, establish initial calibration intervals, and adjust calibration intervals for TMDE and publish in TO 33K-1-100-1/2 or AF CMSs.
- 2.4.15. Be the AF approval authority for requests to obtain calibration services from a commercial or other nonAF laboratory (see also AFI 63-101/20-101, *Integrated Life Cycle Management*).
- 2.4.16. Serve as the AF focal point for the AFMETCAL Assessment and Certification Program.
- 2.4.16.1. Maintain a method to assess and certify calibration entities, including contractor operated AF-owned calibration laboratories, for compliance with this instruction and other AF directives.
 - 2.4.16.2. Establish and maintain a Laboratory Evaluation Team of qualified SNCOs who hold the 2P0 AF Specialty. The Laboratory Evaluation Team will:
 - 2.4.16.2.1. Assess the effectiveness and capability of each AF PMEL to perform measurements that are safe, accurate, reliable, and traceable through the AFPSL to the NIST and other AFMETCAL approved sources.
 - 2.4.16.2.2. Provide recommendation to the AFMETCAL Director on the certification status of each PMEL.
 - 2.4.16.2.3. Supplement each MAJCOM IG as subject matter experts during the MAJCOM Unit Effectiveness Inspection cycle on wings with PMEL inspection requirements IAW AFI 90-201, *The Air Force Inspection System*, Attachment 3.
 - 2.4.16.2.4. The Laboratory Evaluation Team Chief will approve/disapprove MAJCOM IG requests for non-AFMETCAL Laboratory Evaluation Team members to assist completing AFI 90-201, Attachment 3 requirements during the Unit Effectiveness Inspections (UEI) cycle. Determination will be made considering training and qualification of requested individuals and the availability of the Laboratory Evaluation Team members.

- 2.4.16.3. Administer the Proficiency Testing/Measurement Assurance Program (PT/MAP) IAW TO 00-20-14.
- 2.4.16.4. Issue an AFMETCAL Program Certificate of Compliance when a PMEL meets all assessment criteria outlined in TO 00-20-14.
- 2.4.16.5. Void or withhold a calibration laboratory's certification for reasons such as inability to show traceability to NIST, lack of technical capability required to calibrate customer TMDE, failure to provide adequate facilities and controlled environment for those facilities, or failure to satisfy AFMETCAL certification criteria contained in TO 00-20-14. In extreme cases, support may be discontinued for base measurement standards after coordination with the owning MAJCOM (or equivalent) functional manager.
- 2.4.16.6. Recommend action, including closure, for laboratories unable to achieve certification to AF/A4L and the owning MAJCOM (or equivalent).
- 2.4.17. Specify PMEL facility requirements and perform reviews of facility project documentation.
- 2.4.18. Collaborate with all product centers, sustainment centers, test centers and Air Force Research Laboratory to identify new or increased measurement capabilities.
- 2.4.19. Collaborate with the Missile Defense Agency to identify metrology needs and manage development of National and DoD measurement standards and calibration services.
- 2.4.20. Interface with PMs, PGMs, AF support contractors, MAJCOM (or equivalent), and other DoD agencies to:
- 2.4.20.1. Evaluate and report deficiencies and recommend changes to weapon system and equipment calibration support concepts throughout their life cycle.
 - 2.4.20.2. Provide AFMETCAL data requirements for weapon system and equipment acquisition data calls, and centrally-procured TMDE funded by the working capital fund data calls.
 - 2.4.20.3. Evaluate and make approval recommendations for contractor prepared CMRS data, Support Equipment Requirements Document (SERD) or equivalent document relative to calibration and measurement traceability requirements.
 - 2.4.20.4. Participate in PM and PGM system/product life cycle planning and technical interchanges.
 - 2.4.20.5. Provide metrology-related GFE, when available, to AF contractors as required for calibration support development.
- 2.4.21. Chair AFMETCAL Advisory Group meeting, as required, and be responsible for its charter.
- 2.4.22. Chair a PMEL Management Information System (MIS) Configuration Control Board (CCB), when required.

2.4.22.1. Provide guidance, in conjunction with the PMEL MIS CCB, to the Maintenance Information Technology Program Management Office for the development and maintenance of a PMEL MIS.

2.4.22.2. Identify PMEL management information system requirements to AF/A4 and MAJCOMs.

2.5. MAJCOMs (or equivalent) shall:

2.5.1. Operate and maintain certified PMELs IAW TO 00-20-14 and AFI 21-101, *Aircraft and Equipment Maintenance Management* to provide calibration and maintenance support for TMDE operated by users within their area of responsibility.

2.5.2. Support the AFMETCAL Director as requested by providing a member for the AFMETCAL Advisory Group, PMEL MIS CCB.

2.5.3. Appoint a PMEL Functional Manager to coordinate implementation of the AFMETCAL requirements. PMEL Functional Managers shall:

2.5.3.1. Coordinate and provide virtual assessment data requested by the AFMETCAL Laboratory Evaluation Team.

2.5.3.2. Solicit root cause data concerning Proficiency Testing/Measurement Assurance Program failures and provide to AFMETCAL Laboratory Evaluation Team when requested.

2.5.3.3. Provide PMEL data as requested by the AFMETCAL Repair Network Manager to support the Repair Network.

2.5.4. Coordinate commander requests for PMEL establishment, location change or closing with HAF/A4L for final approval.

2.6. Commanders shall:

2.6.1. Ensure PMELs are operated and maintain certification IAW TO 00-20-14 to provide calibration and maintenance support for TMDE operated by users within their area of responsibility. **(T-1)**.

2.6.2. Ensure new and updates to current PMEL facility designs are coordinated with the local Civil Engineering unit and incorporate the requirements IAW FC 4-218-01F, *Air Force Criteria for Precision Measurement Equipment Laboratory Design and Construction*. **(T-1)**.

2.6.3. Coordinate any PMEL establishment, location change or closing with AFMETCAL and owning MAJCOM. **(T-1)**.

2.6.4. Provide maximum support to AF activities, other federal agencies, contractors (authorized to receive such support) and security assistance programs under the guidelines of AFI 25-201, *Intra-Service, Intra-Agency, and Inter-Agency Support Agreements Procedures*, AFI 99-103, *Capabilities Based Test and Evaluation* and this AFI. **(T-1)**.

2.7. TMDE Flight Chief/PMEL Manager. The TMDE Flight Chief/PMEL Manager (referred to as PMEL Manager for the remainder of this document) is the senior on-site

manager responsible for the overall PMEL, management system, quality program and production control functions. The PMEL manager shall:

2.7.1. Operate and maintain certified PMELs IAW TO 00-20-14 and AFI 21-101 to provide calibration and maintenance support for TMDE operated by users within the PMEL area of responsibility. **(T-1)**.

2.7.2. Ensure the PMEL is maintained in a condition that facilitates effective mission performance. **(T-1)**. This includes ensuring adequate facility environmental system support is provided to meet PMEL equipment calibration/verification requirements. **(T-2)**.

2.7.3. Organize and operate the PMEL so permanent, temporary and mobile facilities meet the requirements of this AFI and TO 00-20-14. **(T-1)**.

2.7.4. Establish a Management System (MS) IAW TO 00-20-14 and command directives. **(T-1)** The MS shall be effective and meet all requirements of TO 00-20-14. **(T-1)** Sound decision-making ability must be apparent in the documentation of the MS. A culture that fosters continuous process improvement (CPI) must be evident. **(T-2)**

2.7.5. Establish a Quality Program (QP) IAW TO 00-20-14 and command directives. **(T-1)** The QP shall be effective and meet all requirements of TO 00-20-14. **(T-1)** The PMEL shall demonstrate capability of measurement area disciplines through the measurement capability assessment and participation in the PT/MAP. The ability to self-identify and take appropriate corrective action must be evident within root cause and trend analysis documentation. **(T-2)**.

2.7.5.1. The PMEL QP and AFMETCAL Program evaluates processes used to validate the technical proficiency and capability of the PMEL.

2.7.5.2. The PMEL Manager shall designate a quality manager and alternate(s) to administer the program. The PMEL Quality Manager (however named) is responsible to the PMEL Manager. The quality manager shall have direct access to the PMEL Manager and the technical manager.

2.7.6. Participate in the PT/MAP IAW TO 00-20-14 and command directives. **(T-1)**.

2.7.7. Designate a technical manager (however named) and alternate(s) to continuously evaluate and manage technical operations.

2.7.8. Establish a Production Control Section. **(T-1)**. The Production Control Section will:

2.7.8.1. Schedule TMDE using the priority system established in TO 00-20-14. **(T-1)**.

2.7.8.2. Establish a TMDE Coordinator training program, ensure TMDE monitors are properly trained, and maintain a database or log to track training events (dates, names, organizations, etc.). **(T-3)**.

2.7.8.3. Establish procedures for turn-in and pick up of TMDE. **(T-2)**.

2.7.8.4. Use the PMEL Automated Management System (PAMS)/MIS to control TMDE processed for maintenance. **(T-1)**.

- 2.7.8.5. Ensure the current status of all TMDE processed into the PMEL for repair and calibration is reflected in the PAMS/MIS database. **(T-3)**. **(Exception to ANG, (T-2))**.
- 2.7.8.6. Assist Owning Work Center (OWC) personnel in locating TMDE to meet their mission requirements and avoid abuse of the TMDE priority system. **(Exception to ANG, (T-2))**. The OWC should attempt to meet mission requirements prior to requesting emergency or mission essential support.
- 2.7.8.7. Manage shipment of TMDE and maintain a file consisting of all supporting documentation for each type of shipment. **(T-2)**. TMDE items needing contract, warranty, depot or lateral calibration/repair and return are processed through local Deployment and Distribution Flight, Traffic Management Element IAW TO 00-20-14, and AFI 24-203, *Preparation and Movement of Air Force Cargo*. **(T-1)**
- 2.7.8.8. Deliver and return items of TMDE that are fragile or subject to environmental damage and require support from other laboratories by courier. **(T-2)**.
- 2.7.9. Establish a Maintenance Supply Support Function. **(T-2)**. Maintenance Supply Support function will manage the flight's maintenance-supply actions IAW AFI 23-101, *Air Force Materiel Management*, AFMAN 23-122, *Materiel Management Procedures*, and other applicable supply directives. **(T-1)**. Provide assistance to other flight personnel to resolve supply problems.
- 2.7.10. Ensure the TMDE Availability rate for the total TMDE inventory supported is tracked and reported in PAMS (or equivalent MIS) and exceeds 93 percent while simultaneously meeting the customers' requirements. **(T-3)**. **(Exception to ANG, (T-2))**. **Note:** TMDE Availability is a measure of the percentage of total TMDE inventory operationally capable of performing its designed function based on the TMDE condition (serviceability). It is expressed mathematically as the total number of serviceable TMDE end items divided by the total TMDE inventory.
- 2.7.11. Provide data as defined on MetWeb or as requested by the AFMETCAL Repair Network Manager through the PMEL MFM to support RNI operations.
- 2.7.12. Ensure all TMDE in deferred and in-maintenance status is periodically reviewed and PAMS/MIS accurately reflects correct maintenance status for all TMDE applicable to the laboratory. **(T-1)**. Also, ensure accuracy and completeness of data entered in PAMS/MIS to include the maintenance time. **(T-1)**.
- 2.7.13. Process items of TMDE identified as being beyond the PMEL capability to repair or calibrate IAW TO 00-20-14, TO 00-20-3, *Maintenance Processing of Repairable Property and the Repair Cycle Asset Control System*, TO 00-25-107, *Maintenance Assistance*, and AFI 23-101. **(T-1)**.
- 2.7.14. Ensure Rapid Assistance Support for Calibration (RASCAL), Jet Engine Test Stand Calibrator (JETSC), Portable Automatic Test Equipment Calibrator (PATEC), and Transportable Field Calibration Unit (TFCU) are maintained as complete sets and available for immediate peacetime or wartime deployment. **(T-1)**. Coordinate with AFMETCAL through the PMEL MFM prior to turn-in or redistribution of AFMETCAL-procured standards (including RASCAL, JETSC, TFCU, PATEC, etc.) as well as TMDE

from other sources which gives the PMEL a capability identified by a Note Code listed in TO 33K-1-100-2.

2.7.15. Ensure TMDE is calibrated and certified IAW the requirements of this AFI, TO 00-20-14, CMS TOs, TO 33K-1-100-1, and TO 33K-1-100-2. **(T-1)**.

2.7.16. Ensure technicians who certify TMDE are qualified/trained to do so. **(T-1)**.

2.7.16.1. Ensure training records are reviewed IAW AFI 36-2201, *Air Force Training Program*. **(T-1)**.

2.7.16.2. Submit annual calls and “out of cycle” requests for technical training course quotas through the Pipeline Management System, as needed.

2.7.16.3. Submit Field Evaluation Questionnaire IAW AFI 36-2201. **(T-1)**.

2.7.17. Coordinate PMEL facility design and construction proposals of facility project documentation with the local Civil Engineering unit to assure requirements IAW FC 4-218-01F, *Air Force Criteria for Precision Measurement Equipment Laboratory Design and Construction*. **(T-1)**. Submit plans to AFMETCAL prior to implementation. **(T-1)**.

2.7.18. Ensure good housekeeping practices are established and maintained. No eating, drinking, smoking or use of other tobacco products shall be permitted in the calibration and repair areas. **(T-1)**.

2.7.19. Minimize the location of purely administrative functions within the calibration and repair area of the PMEL. **(T-3)**. **Note:** Completion of the necessary forms used for certification is not considered an administrative function.

2.7.20. Establish a customer relations program to provide technical assistance and advice and to obtain customer feedback on TMDE matters. **(T-3)**. **Note:** The program should include visits, telephone/email contact or locally-developed customer survey letters sent to all OWC customers annually. Maintain records documenting these visits, contacts, and surveys. **(T-2)**.

2.7.21. For non-PAMS PMELs, submit the PMEL Report, RCS: HAF-ILM (SA) 7808, and the PMEL Inventory Listing, RCS: HAF-ILM (A) 9450, IAW TO 00-20-14, and ensure all data is accurate and submitted on time. **(T-1)**.

2.7.22. Maintain the security of the information in PAMS/MIS by limiting access to and reset access codes when compromise is suspected **(T-2)**.

2.7.23. Establish a system to control test fixtures IAW TO 00-20-14. **(T-1)**.

2.7.24. Coordinate calibration support with medical equipment personnel IAW AFI 41-201, *Managing Clinical Engineering Programs* and AFI 41-209, *Medical Logistics Support*. **(T-1)**.

2.7.25. Initiate and maintain an effective safety program that includes a fire safety program IAW AFI 91-203, *Air Force Consolidated Occupational Safety Instruction*. **(T-1)**.

2.7.26. Ensure classified TMDE is protected IAW AFI 16-1404, *Air Force Information Security Program*. **(T-1)**.

2.8. TMDE Owners and Users. As determined by the AFMETCAL Program, TMDE used to make quantitative measurements as directed by applicable AF directives which have an effect on the accuracy and/or reliability of AF systems and subsystems shall be calibrated. TMDE Owners and Users shall:

2.8.1. Ensure in-use TMDE is calibrated at regularly scheduled intervals specified in applicable CMSs, TO 33K-1-100-1 and TO 33K-1-100-2. **(T-1).** **Note:** Authorized calibration exceptions are identified in TO 00-20-14, applicable CMS, and TO 33K-1-100-2.

2.8.2. Remove TMDE from service when the calibration due date has expired or the validity of the calibration is in question. **(T-2).**

2.8.3. Calibrate, certify and repair TMDE specified in any applicable CMS or TO 33K-1-100-2 as USER at the specified interval. **(T-1).** If the USER organization does not have the capability, obtain calibration and maintenance support from the lowest echelon organization having the capability. If no other organization has the capability, the PMEL may assist by providing training, workspace, technical assistance or support, as resources allow. Refer to TO 00-20-14 for further procedures.

2.8.4. Request approval from AFMETCAL through the local/supporting PMEL prior to obtaining calibration of AF TMDE from non-AF sources. **(T-1).**

2.8.5. Perform all applicable User Procedures IAW TO 00-20-14. **(T-1).**

2.8.6. Provide proper care, handling, cleanliness and transportation of TMDE IAW equipment specific TOs and manuals and TO 00-20-14. **(T-1).**

2.8.7. Ensure vehicles used to transport TMDE are equipped to provide full protection to TMDE from damage that may occur from weather, vibration or shock IAW applicable technical orders and/or commercial manuals. **(T-1).**

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

- AFPD 211, *Maintenance of Military Materiel*, 29 Oct 2015
- AFMAN 23-122, *Materiel Management Procedures*, 8 Aug 2013
- AFMAN 33363, *Management of Records*, 1 Mar 2008
- AFI 10-201, *Status of Resources and Training System*, 19 Apr 2013
- AFI 21-101, *Aircraft and Equipment Maintenance Management*, 21 May 2015
- AFI 23-101, *Air Force Materiel Management*, 8 Aug 2013
- AFI 24-203, *Preparation and Movement of Air Force Cargo*, 2 Nov 2010
- AFI 25-201, *Intra-Service, Intra-Agency, and Inter-Agency Support Agreements Procedures*, 18 Oct 2013
- AFI 16-1404, *Air Force Information Security Program*, 29 May 2015
- AFI 33-360, *Publication and Forms Management*, 25 Sep 2013
- AFI 36-2201, *Air Force Training Program*, 15 Sep 2010
- AFI 41-201, *Managing Clinical Engineering Programs*, 15 Oct 2014
- AFI 41-209, *Medical Logistics Support*, 6 Oct 2014
- AFI 63-101/20-101, *Integrated Life Cycle Management*, 7 Mar 2013
- AFI 90-201, *The Air Force Inspection System*, 21 April 2015
- AFI 91-203, *Air Force Consolidated Occupational Safety Instruction*, 15 Jun 2012
- AFI 99-103 *Capabilities Based Test and Evaluation*, 16 Oct 2013
- FC 4-218-01F, *Air Force Criteria for Precision Measurement Equipment Laboratory Design and Construction*, 28 Oct 2015
- MILSTD1839, *Calibration and Measurement Requirements*
- MILHDBK1839A, *Department of Defense Handbook Calibration and Measurement Requirements*, 27 November 2000
- TO 00-20-3, *Maintenance Processing of Reparable Property and the Repair Cycle Asset Control System*, 15 Aug 15
- TO 002014, *Air Force Metrology and Calibration Program*, 30 Aug 2014
- TO 00-25-107, *Maintenance Assistance*, 1 Oct 2015
- TO 33K-1-100-1, *Calibration Procedure for Maintenance Data Collection Codes and Calibration Measurement Summaries*, 30 November 2014

Prescribed Forms

None

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

AF—Air Force

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFMC—Air Force Materiel Command

AFMETCAL—Air Force Metrology and Calibration

AFPD—Air Force Policy Directive

AFPSL—Air Force Primary Standards Laboratory

AFRIMS—Air Force Records Information Management System

ASC— Allowance Source Code

ANG—Air National Guard

ASC—Allowance Source Code

ATE—Automatic Test Equipment

CCB—Configuration Control Board

CMRS—Calibration and Measurement Requirements Summary

CMS—Calibration and Measurement Summary

DOD—Department Of Defense

FOA—Field Operating Agency

GFE—Government Furnished Equipment

IAW—In Accordance With

JETSC—Jet Engine Test Stand Calibrator

MAJCOM—Major Command

MFM—MAJCOM Functional Manager

MIL—Military

MIS—Management Information System

NIST—National Institute of Standards and Technology

OPR—Office of Primary Responsibility

PATEC—Portable Automatic Test Equipment Calibrator

PGM—Product Group Manager

PM—Program Manager

PMEL—Precision Measurement Equipment Laboratory
PT/MAP—Proficiency Testing/Measurement Assessment Program
QP—Quality Program
RASCAL—Rapid Assistance Support for Calibration
RDS—Records Disposition Schedule
RNI—Repair Network Integration
SERD—Support Equipment Recommendation Data
SNCO—Senior Non-Commissioned Officer
SPM—System Program Manager
STD—Standard
TFCU—Transportable Field Calibration Unit
TMDE—Test, Measurement, and Diagnostic Equipment
TO—Technical Order
UEI—Unit Effectiveness Inspections
USAF—United States Air Force

Terms

Air Force Metrology and Calibration (AFMETCAL)—Refers to measurement standards and TMDE, professional and technical metrologists, performing work centers, a system of worldwide laboratory facilities, TMDE users, calibration data, and integrated planning. The program provides for maintenance and calibration of TMDE to verify the reliability and ensure the accuracy of systems, subsystems, and equipment.

Air Force Primary Standards Laboratory (AFPSL)—The highest level calibration standards laboratory in the AFMETCAL Program. It maintains AF measurement standards certified by the NIST or other nationally recognized standards. The AFPSL (located at Heath, Ohio) uses these measurement standards to calibrate base level or PMEL measurement standards and equipment for AF customers.

Alignment—The physical, electrical, or software action that enables a calibration technician to adjust TMDE so that performance will be within required operational parameters/accuracies.

Calibration—A comparison between equipment items, one of which is a measurement standard of known accuracy, to detect, correlate, adjust and report any variations in the accuracy of the other item.

Calibration and Measurement Requirement Summary (CMRS)—A three-category, inline summary of measurement parameters. A CMRS identifies all measurement requirements within a specific system or item of equipment. The CMRS further displays the contractors' proposed solutions for maintaining the system measurement requirements within the stated limits. It is also used to identify the need for new calibration standards.

Calibration and Measurement Summary (CMS)—A technical order which identifies calibration support necessary to ensure the operational readiness of a specific weapon system, subsystem or mission. The summary describes the calibration concept and is the calibration authority for the applicable weapon system, weapon subsystem or mission.

Certification—The documented designation that standards and TMDE have been calibrated and meet established technical requirements. When used to refer to a calibration laboratory (PMEL or AFPSL), certification means the laboratory fulfills AFMETCAL assessment criteria.

MAJCOM (or equivalent)—This term refers to all Air Force Major Commands (MAJCOMs) and includes the Air National Guard (ANG), Field Operating Agencies (FOAs), and Direct Reporting Units (DRUs).

Metrology—The science or system of weights and measures used to determine conformance to technical requirements. This includes the development of standards and systems for absolute and relative measurements.

MetWeb—MetWeb provides dynamic data applications for use by the AF Metrology community. This primarily includes personnel assigned to Precision Measurement Equipment Laboratories (PMEL) and their MAJCOM Functional Managers (MFM).

Precision Measurement Equipment Laboratory (PMEL)—A laboratory authorized to own and use AF base measurement standards to maintain working standards. The working standards are used along with PMEL-owned TMDE to maintain (troubleshoot, align, repair, and calibrate) TMDE designated as PMEL responsibility.

Support Equipment Recommendation Data (SERD)—A contractual data item submitted by the contractor to identify weapon system support equipment requirements.

Test, Measurement, and Diagnostic Equipment (TMDE)—Those devices used to maintain, evaluate, measure, calibrate, test, inspect, diagnose, or otherwise examine materials, supplies, equipment, and systems to identify or isolate actual or potential malfunctions, or decide if they meet operational specifications established in technical documents.

Traceability—The ability to relate individual measurement results to national standards or nationally accepted measurement systems through an unbroken chain of comparisons all having stated uncertainties.

Types of Standards Used in Measurement and Testing—The term "standard" means equipment or physical constants serving as the basic means by which we derive accurate and traceable precision measurements. These standards include:

a. National Measurement Standards—Equipment or physical constants identified by NIST to serve as a basic measurement reference throughout the United States.

b. Air Force Measurement Standards—Equipment certified by NIST or AFMETCAL-approved sources, and used by the AFPSL as a basic measurement reference for the USAF.

c. Air Force Base Measurement Standards—Equipment certified by the AFPSL or AFMETCAL-approved sources for use by an AF PMEL as a measurement reference.

d. Calibration Systems—A collection of calibration standards and ancillary equipment uniquely configured to support a specific workload or multiple measurement parameters. (Calibration Systems may be developed for use in either an automated or manual mode.

AFMETCAL retains engineering and configuration authority for Calibration Systems identified with an AFMETCAL cage code.)

e. Working **Standards**—PMEL-certified TMDE used to calibrate other TMDE.