Micro Metrology Inc.

Calibration Labs

9553 Vassar Avenue
Chatsworth, CA 91311

Approval:

President Date

Approval:

Quality Assurance Manager Date

This copy is: Controlled_____ Uncontrolled_____

MANUAL

1 TITLE

MMI Quality Manual

1.1 SCOPE

This manual defines the policies of MMI for complying with the requirements of ANSI/NCSL Z540-1-1994, ISO 10012-1 and ISO/IEC Guide 25-1990 (hereafter referred to as ISO Guide 25*). This manual is an all inclusive policy document. It includes all the policies that address requirements from documenting the organization and management structure to handling complaints.

1.2 FIELD OF APPLICATION

This Quality Manual documents the requirements for Quality Assurance at MMI. The manual is a Quality Policy document and is used by MMI for controlling the applicable Quality requirements for its business. MMI develops its procedures and work instructions as needed addressing each element of the quality policy as stated in this manual and as it applies to the business. When elements of the policy do not apply to the company, it is so stated in the body of the policy. As MMI develops the quality program to meet the applicable part of the ISO Guide 25* requirements for accreditation, it uses these policies as a guide.

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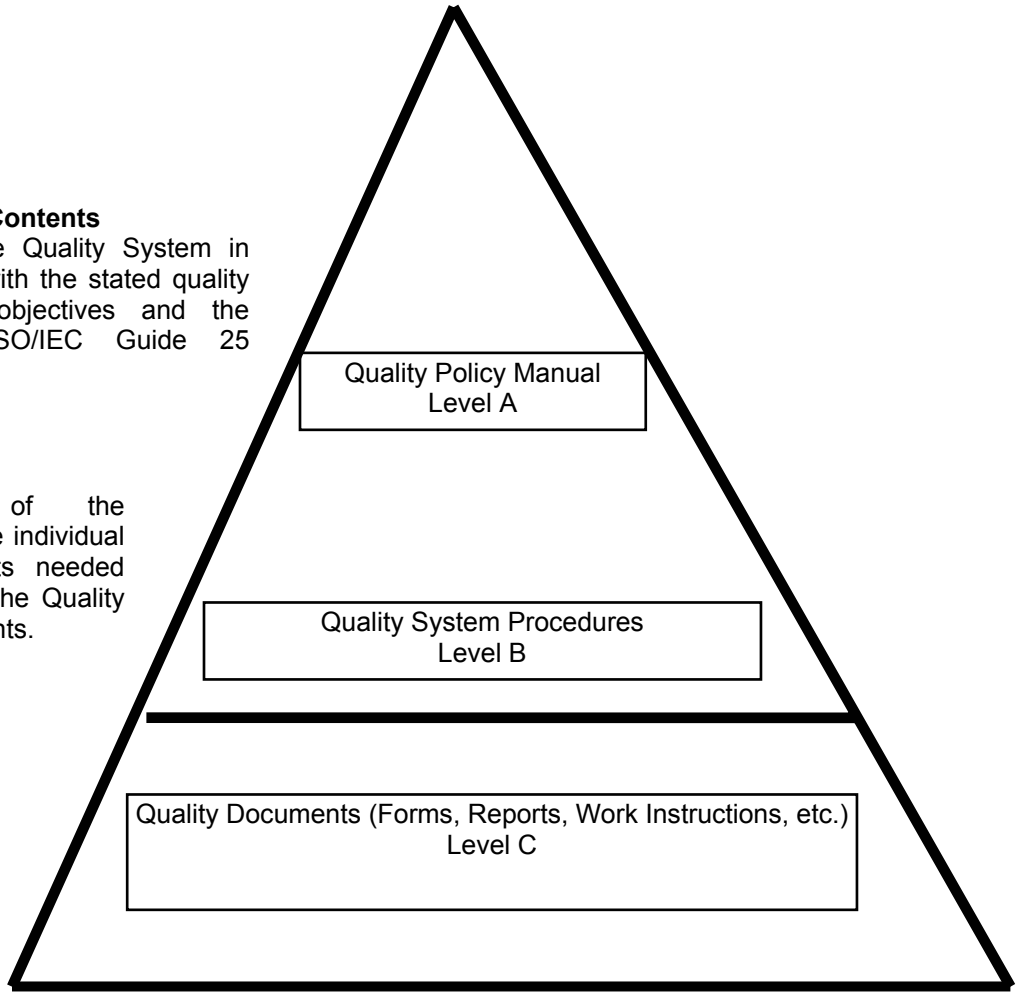
1.3 THE QUALITY MANUAL

This Quality Manual is intended to comply with the applicable requirements of ISO/IEC Guide 25, ANSI/NCSL Z540-1-1994, and ISO 10012-1 (hereafter referred to as ISO Guide 25*). A complete Quality Manual for MMI is made up of a three tiered system as shown in the following diagram.

Documents Contents
Describes the Quality System in accordance with the stated quality policy and objectives and the applicable ISO/IEC Guide 25 standard.

Description of the activities of the individual functional units needed to implement the Quality System elements.

Detailed work documents.



Note: Any level in this hierarchy may be used separately, used with cross - references or combined.

The Quality Manual is a controlled document in the company and is issued by the Quality Assurance Manager through a document control and release process (P4.5-1). Current date of issue and effectivity are specified on each page of the document. The Quality Manual is issued and controlled as a complete document and it's configuration is so noted on the "Revision History" page, which is updated with each revision of the Quality Manual. When this document is issued for information purposes, i.e., proposals, customer requests, outside agencies, etc., the document is identified as "Uncontrolled". Uncontrolled copies may be obtained from management. This document does not contain confidential information. The Quality Manual may be revised by submitting to the Quality Assurance Manager in writing the requested change (F4.5-2) and the reason for the change. The Quality Assurance Manager considers the change, assuring the change does not affect the quality program or the accreditation process in an adverse way. Changes to the Quality Manual come under the procedures for document control.

The President is responsible for approving the Quality Manual document and approving its distribution. The review of the manual is accomplished when changes to the Standards' requirements are made or as indicated above.

The Quality Manual, when released, bears the signature of the authorizing management personnel and contains the appropriate date and release configuration. The Quality System procedures and work instructions do contain proprietary information and are not distributed with the Quality Manual.

2 QUALITY POLICY AND OBJECTIVES

2.1 QUALITY POLICY

Micro Metrology is committed to providing its customers with on-time deliveries, zero defects, and to consistently meet our customer's quality requirements.

We achieve these goals by:

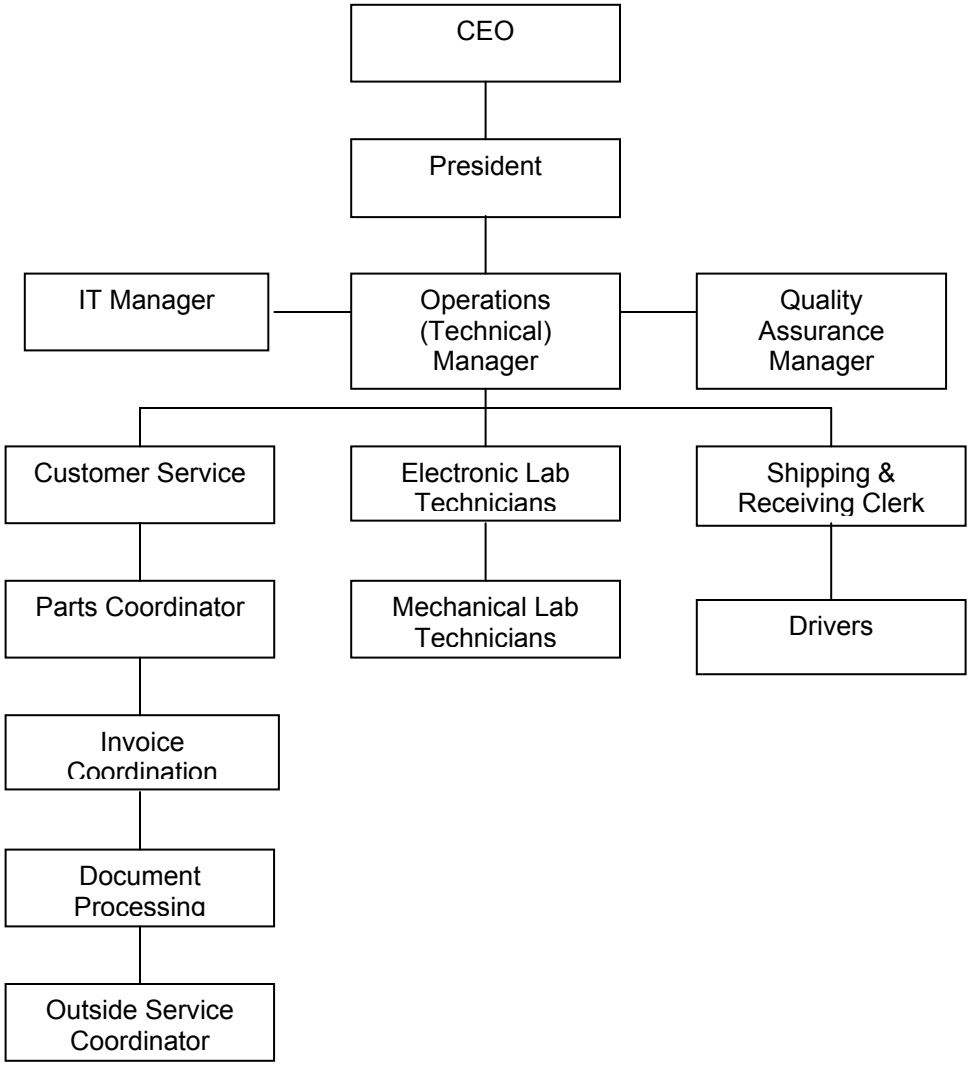
a) Communicating our quality policy to all MMI employees and demonstrating how it effects their role within the company.
b) Providing training to all employees in order to implement the quality program.
c) Creating a work environment that promotes teamwork and problem solving.
d) Maintaining a high level of customer satisfaction.

2.2 QUALITY GOALS AND OBJECTIVES

MMI's quality goals and objectives are measurable. They will be reviewed at every Management Review meeting (P4.1-1). These goals and objectives are delineated in the Statistical Techniques chart within P4.20-1: Statistical Techniques.

3 DESCRIPTION OF THE ORGANIZATION

3.1 ORGANIZATION CHART



3.2 RESPONSIBILITIES AND AUTHORITIES

The responsibility, authority and the interrelation of personnel who manage, perform and verify work affecting quality, is defined and documented in P4.1-1: Management Responsibility.

4 IMPLEMENTATION

4.1 ORGANIZATION AND MANAGEMENT

4.1.1 Purpose

This document defines MMI's policy for defining its organization and management structure and its policy for confidentiality and proprietary rights.

4.1.2 Referenced Documents

P4.1-1: Management Responsibility

4.1.3 Policy

4.1.3.1 MMI is a California Corporation founded by Allen Ganner in 1978. It is operated under its contractual arrangements and is governed by the laws of the state of California. The company operates from one location in Chatsworth, California. Activities include calibration, repair services and sales of M&TE.

4.1.3.2 MMI is organized and operates so that all in-house and out-of-house services meet the requirements of ISO Guide 25*. These requirements are documented as part of MMI's quality system and are subject to customer verification at unscheduled intervals.

4.1.3.3 MMI management staff utilizes all available knowledge, experience and resources to satisfy customer requirements and those of the ISO Guide 25* standard.

4.1.3.4 MMI stresses communication between its management and personnel to ensure that employees have an outlet to discuss commercial, financial and other pressures, which might adversely affect the quality of their work.

4.1.3.5 MMI operates all labs to establish and maintain customer confidence in decisions, honesty and integrity.

4.1.3.6 MMI has documented the responsibility, authority and interrelation of personnel who manage, perform or verify work affecting the quality of calibrations and tests (reference P4.1-1: Management Responsibility).

4.1.3.7 Supervisors and laboratory personnel are experienced in calibration technology, methods and procedures. They understand the Company's commitment to the quality objective of metrology services and are able to fairly assess the results of their own work. The ratio of supervisory to non-supervisory personnel is such as to allow for adequate supervision. (e.g., 1 management representative for every 4 technicians)

4.1.3.8 The Operations (Technical) Manager is responsible for the calibration items, their calibration and data, and has overall responsibility for the technical operations of the lab.

4.1.3.9 The Quality Assurance Manager has responsibility for implementing and updating the quality system and has access the highest level of management through MMI's open door policy.

4.1.3.10 In case of absence, the President has designated a Deputy Quality Assurance Manager and a Deputy Technical Manager.

4.1.3.11 MMI does not guarantee the protection of clients' confidential information and proprietary rights. However, if this is made a contractual requirement, then at that time MMI will develop a customer specific procedure incorporating these requirements.

4.1.3.12 MMI does not participate in interlaboratory comparisons and proficiency testing programs at this time.

4.2 QUALITY SYSTEM, AUDIT AND REVIEW

4.2.1 Purpose

This document defines MMI's policy for establishing, documenting, and maintaining a quality system as a means of providing quality products and support to our customers.

4.2.2 Referenced Documents

P4.1-1: Management Responsibility
P4.2-1: Quality System
P4.3-1: Contract Review
P4.5-1: Document and Data Control
P4.14-1: Corrective and Preventive Actions
P4.16-1: Control of Quality Records
P4.17-1: Internal Quality Audits
P4.18-1: Training
F4.5-2: Document Approval
WI4.6-1: Limits of Authority

4.2.3 Policy

4.2.3.1 The laboratory has established and maintains a quality system. The elements of this system are documented (see P4.2-1) and are available for use by laboratory personnel. It defines and documents policies, objectives and the commitment of management to good laboratory practice. Management ensures that these policies are communicated to, understood and implemented by laboratory personnel. The QA Manager maintains the Quality System.

4.2.3.2 The Quality Manual and related quality or calibration documents and forms are under the direct control and approval of the QA Manager. The laboratory's quality system is established in order to meet the requirements of ISO Guide 25*. It is the goal of our company and commitment of management to:

4.2.3.2.1 Maintain a quality policy statement, including quality goals and objectives (see section 2)
4.2.3.2.2 Maintain a current organizational chart (see section 3).
4.2.3.2.3 Describe the relations between management, technical operations, support services and the quality system (see Organizational Chart and Interrelation Chart in P4.1-1).
4.2.3.2.4 Prepare procedures for control and maintenance of documentation to conform to applicable standards in test, inspection and calibration procedures (see P4.5-1 and P4.16-1).
4.2.3.2.5 Maintain job descriptions of key staff (see P4.18-1).
4.2.3.2.6 MMI has two approved signatories for Certifications and Data Reports. They are the Quality Assurance Manager and the Technical Manager. In the case of absence for either signatory, the designated Deputy may sign in their place. Signatories for other functions of MMI may be found in WI4.5-2 and WI4.6-1.
4.2.3.2.7 Establish procedures for achieving traceability of measurements (see section 4.6).
4.2.3.2.8 Maintain a scope of calibrations or tests (see Appendix A).
4.2.3.2.9 Assure new work is reviewed for scope and capability before such work is accepted (see P4.3-1).

4.2.3.2.10 Assure calibrations conducted by this laboratory are performed in accordance with documented and approved calibration procedures. (see Section 4.7)
4.2.3.2.11 Prepare procedures for handling calibration items (see section 4.8).
4.2.3.2.12 Describe the major equipment and measurement standards used by the laboratory (see section 4.5).
4.2.3.2.13 Document the calibration, verification and maintenance of equipment used by MMI (see sections 4.5-4.7).
4.2.3.2.14 Refer to quality assurance practices that include the use of reference materials and internal quality control schemes.
4.2.3.2.15 Prepare procedures to be followed for feedback and corrective action whenever measurement discrepancies or departures from documented policies and procedures occur (see P4.14-1).
4.2.3.2.16 Document arrangements for permitting departures from company policies, procedures or specifications (see P4.5-1).
4.2.3.2.17 Maintain procedures for dealing with customer complaints (see section 4.13).
4.2.3.2.18 Maintain procedures for protecting confidentiality and proprietary rights if required by customer contract (see section 4.1)
4.2.3.2.19 Document procedures for internal audit and review (see P4.17-1) and any subsequent corrective actions (see P4.14-1).
4.2.3.2.20 Document procedures for establishing and changing calibration intervals (see section 4.5).
4.2.3.2.21 Indicate MMI's policy concerning the technique(s) used for determining measurement uncertainty and calibration/verification adequacy (see section 4.6).
4.2.3.2.22 Document procedures regarding the specific length of time that records, certificates, and reports are to be maintained (see section 4.9).

4.2.3.3 The quality system is reviewed at least once a year by management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements (see P4.1-1).

4.2.3.4 Based on the results of quality audits and other relevant factors, MMI reviews and modifies the Quality System as necessary.

4.3 PERSONNEL

4.3.1 Purpose

This document defines MMI's policy for assessing training needs and recording the training of MMI personnel.

4.3.2 Referenced Documents

P4.18-1: Training

4.3.3 Policy

4.3.3.1 All MMI personnel have the necessary education, training, technical knowledge and experience for their job assignments.

4.3.3.2 Training of personnel is kept up-to-date and consistent with employee assignments and new developments (see P4.18-1).

4.3.3.3 Records on the relevant qualifications, training, skills and experience of technical personnel are maintained by MMI.

4.4 ACCOMMODATION AND ENVIRONMENT

4.4.1 Purpose

The purpose of this document is to define MMI's policy for monitoring and controlling the laboratory accommodations.

4.4.2 Referenced Documents

P4.15-2: Accommodation and Environment
WI4.15-2: Good Housekeeping Guidelines

4.4.3 Policy

4.4.3.1 Laboratory accommodations are such as to facilitate proper performance of calibrations/verifications (see P4.15-2).

4.4.3.2 Particular care is taken when such activities are undertaken at sites other than the permanent laboratory premises.

4.4.3.3 The environment in which these activities are undertaken and the measurement standards and equipment used are such that they do not invalidate the results or adversely affect the required accuracy of measurement.

4.4.3.4 The laboratory effectively controls, monitors and records environmental conditions as required. Attention is paid to humidity, temperature and (vibration levels when relevent), as appropriate, to the laboratory concerned.

4.4.3.5 When necessary, correcting compensations are applied to measurement results to reduce measurement uncertainties. Records contain both the original and the corrected data.

4.4.3.6 The Electronic, Mechanical, Pressure and Force laboratories are separated since the activities therein are incompatible.

4.4.3.7 Access to and use of areas affecting the quality of these activities is defined and controlled.

4.4.3.8 Adequate measures are taken to ensure good housekeeping in the laboratory (See WI4.15-2).

4.5 EQUIPMENT AND REFERENCE MATERIALS

4.5.1 Purpose

This document defines MMI's policy for acquiring, maintaining, marking and controlling inspection, measuring, and test equipment used by MMI. Records of this equipment are also maintained.

4.5.2 Referenced Documents

P4.11-1: Control of Inspection, Measuring, and Test Equipment
WI4.11-1: Measuring Standards Program

4.5.3 Policy

4.5.3.1 The laboratory reviews contract requirements to ensure that it is furnished with all items of equipment required for the correct performance of calibrations/verifications. In those cases where the laboratory needs to use non-MMI equipment, the laboratory ensures that the relevant requirements of ISO Guide 25* are met.

4.5.3.2 Equipment and documentation is maintained and conditions of use are recorded in the Maintenance Management System.

4.5.3.3 Maintenance procedures are documented. Any item of equipment which gives suspect results, or has been shown by verification or otherwise to be defective, is taken out of service, clearly identified and wherever possible stored at a specified place until it has been repaired and shown by calibration/verification to perform satisfactorily. The laboratory examines the effect of this defect on previous calibrations. Any customers affected are to be notified in writing and appropriate corrective action is to be taken.

4.5.3.4 Each item of equipment including reference materials is, when appropriate, labeled, marked or otherwise identified to indicate its calibration status. Any limitation on the calibration or any restriction of use is also indicated on the equipment (See WI4.11-1).

4.5.3.5 Records are maintained of each item of equipment and all reference materials significant to the calibrations/verifications performed. Calibration certificates and other relevant information concerning the item is available (See P4.11-1).

4.5.3.6 Measuring and test equipment (including measurement standards) are calibrated at appropriate intervals established on the basis of their stability, purpose and usage, and maintained to assure acceptable reliability. The intervals are such that calibration is again carried out prior to any probable change in accuracy that is of significance in the use of the equipment. Depending on the results from preceding calibrations, intervals of I, M & TE are shortened, if necessary, to ensure continued accuracy.

4.6 MEASUREMENT TRACEABILITY AND CALIBRATION

4.6.1 Purpose

This document defines the requirements for ensuring measurement traceability of reference standards, reference materials, and I,M & TE, for providing a calibration recall program, and for the selection of outside calibration vendors.

4.6.2 Referenced Documents

P4.8-1: Measurement Traceability and Calibration
P4.13-1: Control of Nonconforming Material and I,M & TE
P4.14-1: Corrective and Preventive Action
WI4.11-1: Measuring Standards Program

4.6.3 Policy

4.6.3.1 New measuring and testing equipment is calibrated and/or verified before being put into service.

4.6.3.2 MMI ensures the recall or removal from service of any standard or equipment that has broken calibration seals, or is suspected to be malfunctioning because of mishandling, misuse, or unusual results (see P4.13-1).

4.6.3.3 The overall quality program and calibration system is designed and operated so as to ensure that measurements are traceable to the National Institute of Standards and Technology (NIST) or the laboratory provides evidence of correlation of results. Calibration certificates indicate this traceability where applicable (see section 4.10).

4.6.3.4 Reference standards of measurement held by the laboratory are used for calibration or verification only and for no other purpose. These standards are calibrated and certified traceable to the NIST. These measurement standards are supported by documented evidence that attests to the relevant factors under which the results were obtained.

4.6.3.5 Where relevant, reference standards and measuring and test equipment are subject to in-service checks between calibrations and verifications.

4.6.3.6 Reference materials are, where possible, traceable to national or international standards of reference.

4.6.3.7 MMI has established and maintains an effective documented system for the managing, calibration, and use of measuring equipment, including measurement standards, used to demonstrate compliance with specified requirements (See WI4.11-1). The system provides for the prevention of errors by prompt detection of deficiencies and by timely corrective action (see P4.14-1).

4.6.3.8 When MMI's calibrations are performed by an outside vendor, the laboratory ensures that the vendor complies with the requirements of it's guidelines (see Section 4.11).

4.7 CALIBRATION AND TEST METHODS

4.7.1 Purpose

This document defines MMI's policy regarding the documentation and use of appropriate calibration instructions, the control of computers or automated equipment, and the calculation of measurement uncertainties.

4.7.2 Referenced Documents

P4.5-1: Document and Data Control
P4.6-1: Purchasing
P4.10-1: Inspection and Test
P4.11-1: Control of Inspection, Measuring and Test Equipment
P4.15-1: Handling, Storage, Packaging, Preservation and Delivery
P4.20-1: Statistical Techniques

4.7.3 Policy

4.7.3.1 The laboratory has documented instructions on the use and operation of relevant equipment, on the handling and preparation of items, and for calibration and/or testing, where the absence of such instructions could jeopardize the calibrations or tests. Instructions, standards manuals and reference data relevant to the work of the laboratory are maintained up-to-date and are readily available to the staff.

4.7.3.2 The laboratory uses appropriate methods and procedures for calibrations / verifications, estimation of uncertainty of measurement, and analysis of calibration data. These procedures are adequate for their purpose and contain the required range and tolerance of each item or unit parameter being calibrated or verified and a description of the measurement standards/equipment needed.

4.7.3.3 Where methods are not specified, MMI attempts to select methods that have been published in international or national standards, those published by reputable technical organizations or in relevant scientific texts or journals.

4.7.3.4 Were it is necessary to employ methods that have not been well established, these are subject to agreement with the customer, be fully documented and be available to the customer or other recipients of the relevant reports.

4.7.3.5 MMI uses documented procedures and appropriate statistical techniques to select samples used as part of a test method (see P4.20-1).

4.7.3.6 Calculations and data transfers are subject to appropriate checks.

4.7.3.7 When computers and automated equipment are used for the recording, reporting, storage or retrieval of calibration data, the laboratory ensures that the requirements ISO Guide 25* are complied with (see P4.5-1).

4.7.3.8 Documented procedures exist for the purchase (see P4.6-1), reception (see P4.10-1) and storage (see P4.15-1) of consumable materials used for the technical operations of the laboratory.

4.7.3.9 MMI takes into account identified uncertainties in the measurement process including those that are attributable to measuring equipment/standards, personnel, procedures, and environment. Action is taken when the total uncertainty compromises the ability to make measurements within the limits of permissible error.

4.8 HANDLING OF CALIBRATION AND TEST ITEMS

4.8.1 Purpose

This document defines MMI's policy for handling, storing, packaging, preserving, and delivering calibration and test items. The use of tamper resistant seals is also covered.

4.8.2 Referenced Documents

P4.10-1: Inspection and Test
P4.15-1: Handling, Storage, Packaging, Preservation and Delivery

4.8.3 Policy

4.8.3.1 The laboratory has a documented system for uniquely identifying the items to be calibrated.

4.8.3.2 Upon receipt of the calibration item, any abnormalities or departures from standard condition as prescribed in the relevant calibration method are recorded. Where there is any doubt as to the item's suitability for calibration, the laboratory consults the customer for further instruction before proceeding.

4.8.3.3 The laboratory has documented procedures (see P4.15-1) and appropriate facilities to avoid deterioration or damage to the calibration item, during storage, handling, preparation and calibration. Where items have to be stored or conditioned under specific environmental conditions, these conditions are maintained, monitored and recorded where necessary. MMI has storage and security arrangements that protect the integrity of secured items.

4.8.3.4 The laboratory has documented procedures for the receipt (see P4.10-1), handling, storage and safe return of calibration items, including provisions necessary to protect the integrity of the laboratory.

4.8.3.5 Tamper-resistant seals are affixed to operator accessible controls or adjustments on measurement standards or measuring and test equipment, which invalidates the calibration if moved. The laboratory's calibration system provides instructions for the use of such seals and for the disposition of equipment with damaged or broken seals.

4.9 RECORDS

4.9.1 Purpose

This document defines MMI's policy for controlling and maintaining quality records.

4.9.2 Referenced Documents

P4.16-1: Control of Quality Records

4.9.3 Policy

4.9.3.1 The laboratory maintains a record system to suit its particular circumstances and comply with any applicable standards and regulations.

4.9.3.2 Records, i.e. hard copies and computer data, pertaining to calibration equipment, certificates and reports are safely stored and held secure and in confidence to the customer.

4.9.3.3 Certificates, reports, or data sheets attesting to the date, accuracy, and calibration status under which the results furnished were obtained, support measurement standards used in the calibration system.

4.9.3.4 MMI maintains documented procedures (see P4.16-1) on the identification, collection, indexing, accessing, filing, storing, maintenance, retention, disposal and safeguarding of records. Records are kept until it is no longer probable that they may need to be referred to.

4.10 CERTIFICATES AND REPORTS

4.10.1 Purpose

This document defines MMI's policy for the reporting of calibration results and the formatting of calibration certificates.

4.10.2 Referenced Documents

P4.11-2: Certificates and Reports

4.10.3 Policy

4.10.3.1 The results of the calibration carried out by the laboratory are reported accurately, clearly, unambiguously and objectively. A calibration report or certificate includes the information necessary for the interpretation of calibration results.

4.10.3.2 Each certificate or report is created to include certain pertinent information (see P4.11-2). The format for each type of calibration report is standardized as far as possible.

4.10.3.3 Where the certificate or report contains results of subcontractor calibration, these results are clearly identified.

4.10.3.4 Amendments to certificates are made in the form of another document. These amendments meet the relevant requirements of clause 12 of ISO Guide 25.

4.10.3.5 Customers are notified in writing if either MMI's I, M & TE is found to be defective and casts doubt on the validity of results given in a calibration certificate or if a customer's I, M & TE is found to be significantly out of tolerance.

4.10.3.6 Confidentiality may **not** be preserved if a customer requires transmission of calibration data by electronic means, i.e. Fax, telephone, or Internet.

4.11 SUBCONTRACTING OF CALIBRATION OR TESTING

4.11.1 Purpose

This document defines MMI's policy regarding the subcontracting of I, M & TE to qualified subcontractors and the notification to clients of the intent to subcontract work.

4.11.2 Referenced Documents

P4.6-1: Purchasing.

4.11.3 Policy

4.11.3.1 Where MMI subcontracts any part of its calibration, this work is serviced by a laboratory complying with the requirements of ISO Guide 25*.

4.11.3.2 MMI ensures and is able to demonstrate that its sub-contractors are competent.

4.11.3.3 MMI advises the customer of its intention to subcontract any portion of the calibration to another party, if required by contract.

4.11.3.4 MMI records and retains details of the competence and compliance of its sub-contractors and maintains an Approved Vendor List. Accreditation of a laboratory to ISO Guide 25* **may** serve as the basis for compliance with this requirement.

4.12 OUTSIDE SUPPORT SERVICES AND SUPPLIES

4.12.1 Purpose

This document defines the requirements for the use of procured support services and supplies in support of calibration.

4.12.2 Referenced Documents

P4.6-1: Purchasing
P4.10-1: Inspection and Test
P4.11-1: Control of Inspection, Measuring and Test Equipment

4.12.3 Policy

4.12.3.1 Where MMI procures outside services and supplies in support of calibrations, MMI uses only those outside services and supplies that are of adequate quality to sustain confidence in MMI's calibrations.

4.12.3.2 MMI has procedures to ensure that purchased equipment, materials and services comply with specified requirements (see P4.6-1). MMI, wherever possible, ensures that purchased equipment and consumable materials are not used until they have been inspected (see P4.10-1), calibrated (see P4.11-1) or otherwise verified as complying with any standard specifications relevant to the calibrations or test concerned.

4.12.3.3 MMI maintains an Approved Vendor List of all suppliers from whom it obtains support services or supplies required for calibrations (see section 4.11).

4.13 COMPLAINTS

4.13.1 Purpose

This document defines the requirements for handling and recording customer complaints. Follow-up to ensure that the complaint has been resolved is also included.

4.13.2 Referenced Documents

P4.14-2: Complaints

4.13.3 Policy

4.13.3.1 MMI has documented policies and procedures for the resolution of complaints received from customers about the laboratory's activities. A record is maintained of complaints and of the actions taken by the laboratory (See P4.14-2).

4.13.3.2 Where a complaint, or any other circumstance, raises doubt concerning MMI's compliance with its own policies or procedures, with the requirements of ISO Guide 25*, or with the quality of MMI's calibrations, MMI ensures that those areas of activity and responsibility involved are promptly audited (see section 4.2).

5 REVISION HISTORY

Revision	Date	Summary of Changes
0.2	8/18/00	Change to Organizational Structure Section 3.0
1.0	9/5/00	Initial release with reviewed/approved corrections