PRECISION MEASUREMENTS, INC.	CALIBRATION PROCEDURE Timers	PMI-0061-0797 REV. B Page 1 of 4
APPROVALS	PRINT/SIGNATURE	ORIGINAL ISSUE
PREPARED	R. Ayala /	03/10/90
METROLOGY MGR./SUPV.	R. Ayala /	03/10/90
TECHNICAL OPERATIONS	R. Ayala /	03/10/90
DOCUMENT CONTROL	P. Kirsch /	03/10/90

AREVISION NO.	DESCRIPTION	DATE	PREPARED BY	APPROVED BY
A	Revised to include reference to applicable ISO and ANSI Standards.	11/07/02	B. Bahrs	R. Ayala
B	Revised to include use of the Helmut Klein Timometer for calibration of stopwatches.	04/06/14	P. Kirsch	D. Miller

1.0 PURPOSE

1.1 To establish a comprehensive procedure for the calibration of Timers in accordance with ISO/IEC 17025, ANSI/NCSL Z540, and/or customer requirements.

2.0 SCOPE

2.1 This procedure includes basic instructions for the calibration and performance testing of all Timers.

2.2 This procedure includes the testing of essential instrument parameters.

2.3 Tolerances are according to individual manufacturer specifications, or as designed by the applicable customer.
Note: Certain, specific procedural elements contained in this procedure may be omitted or altered according to individual customer designated requirements.

2.4 From this point forward the Test Instrument will be referred to as the "TI".

3.0 STANDARDS

3.1 The following listed standards are representative of those required to perform the calibration outlined in this procedure and which are available at Precision Measurements, Inc.

DESCRIPTION	MANUFACTURER	MODEL #
Electronic Counter	Hewlett Packard	5345
Synth/Function Generator	Hewlett Packard	3325A
Stopwatch	Cole Parmer	94410-10
Timometer	Helmut Klein	4500

4.0 TEST CHARACTERISTICS

INSTRUMENT CHARACTERISTIC	PERFORMANCE SPECIFICATION
Time	Manufacturer's and/or customer

5.0 PRELIMINARY OPERATION

5.1 Check instrument for damage and basic operating performance. Any observed damage and/or performance malfunction(s) shall be recorded on the service documentation.
Note: Any damage degrading the performance of the instrument and/or malfunction(s) detected at any point in the process described in this procedure must be corrected prior to proceeding with the calibration process herein described.

5.2 Clean the TI by wiping it down with a mild solution. Check unit for damage. Any damage is to be noted on the Service Documentation.

6.0 PROCEDURE

6.1 Once this procedure is started, any and all Out of Tolerance conditions are to be recorded. Continue to the end prior to attempting any adjustment or repair.
Note: If the unit is not safely operable, then the TI shall be deemed inoperative and submitted for repair.

6.2 Turn the unit on and allow it to warm-up for stabilization in order to ensure it will meet manufacturer an/or customer specifications.

6.3 Zero the display of the unit (if applicable), and set the unit to run to a pre-determined time specified by the customer and/or manufacturer.

6.4 Using the appropriate standard(s), measure the actual elapsed time versus the pre-determined time. Verify that the measured time is within the manufacturer and/or customer specification limits.

6.5 Stopwatch calibration using the Helmut Klein Timometer

6.5.1 Set the Timometer to measure error in seconds per day by pressing the readout button so the upward arrow is displayed in the upper left had corner of the display.

6.5.2 Place the stopwatch on the pickup sensor.

6.5.3 Set the cyclus to 30 seconds.

6.5.4 Note the error in seconds per day (sec/day)

6.5.5 Calculate the 1 second error by the formula:

1 second error = (sec/day)/86400 (86400 is number of seconds in a day)

Example: -1.36 (sec/day) / 86400(sec/day) = -0.00001574

6.5.6 Calculate specific time error by multiplying 1 second error by the required time increment. (i.e. 10 sec, 5 min, etc.)

Example:

For 10 second time: 10 x -0.00001574 = -0.0001574
Algebraically adding to 10 results in final value of 9.9998426

If a 24 hr test result is needed:
The result can be expressed as 86398.64 seconds or 23:59:58.64 hrs

6.5.7 Record the results using the required unit of measure (sec or hrs) and to the required resolution.

7.0 DOCUMENTATION

7.1 Record the calibration results including quantitative data, if required, in accordance with Precision Measurements, Inc.'s Operational Procedures and customer requirements, as applicable.