Technical Procedure for Equipment Calibration

1.0 Purpose - This procedure specifies the required elements for the calibration and use of individual electronic balances and measurement scales and the maintenance requirements for Alternate Light Sources (ALS), cyanoacrylate fuming chambers, humidity chambers and table-top downflow hoods.

2.0 Scope - This procedure applies to all electronic balances, L-scales, 6" scales, ALSs, cyanoacrylate fuming chambers, humidity chambers and table-top downflow hoods within the Latent Evidence sections of the State Crime Laboratory.

3.0 Definitions

- **Balance** – An instrument for measuring weight.
- **Calibration** – Checking or adjusting (by comparison with a standard) the accuracy of a measuring instrument. Calibrations are performed by approved service contractors for all balances in State Crime Laboratory Latent Evidence sections.
- **Calibration Check –** The process of periodically verifying the calibration status of an instrument by comparison with a reference standard.

4.0 Equipment, Materials and Reagents

4.1 Equipment

- Electronic Balances
- Plastic L-Scale
- 6" Plastic Scale
- Alternate Light Source with appropriate filters and goggles
- Cyanoacrylate Fuming Chambers
- Humidity Chambers
- Table-Top Downflow Hoods

4.2 Materials and Reagents

- Balances
- Weigh Boats
- Latent Evidence Chemical Reagents
- NIST Calibrated Steel Scales (24", 36" primary standard ruler, and 48")

5.0 Procedure

5.1 Standards and Controls

5.1.1 New Balances

5.1.1.1 New balances shall be installed and leveled according to manufacturer's specifications. An external calibration shall be performed by an outside vendor prior to use.

5.1.1.1.1 All balance calibrations, maintenance, and repairs shall be conducted in accordance with the ISO/IEC 17025 requirements by an accredited calibration laboratory utilizing ANSI/ASTM Class 1 weights.

5.1.1.2 Records of vendor scope of accreditation shall be maintained by the North Carolina State Crime Laboratory.

5.1.1.3 Individual balance calibration records shall be retained in the individual Latent Evidence sections.

5.2 Calibrations

5.2.1 Balances

5.2.1.1 Calibration for all Latent Evidence balances shall be done on a yearly basis by an approved ISO accredited outside vendor.

5.2.1.2 Yearly calibration documentation shall be retained in the individual Latent Evidence sections.

5.2.1.3 Certificates of calibration issued by the approved ISO accredited outside vendor shall be maintained in individual section records.

5.2.1.4 When a Latent Evidence balance has been placed out of service, correct operation shall be demonstrated after repair and at the next performed calibration. Until such time as the balance is calibrated by an approved vendor it shall not be used.

5.2.2 L-Scales and 6" Scales

5.2.2.1 Maintenance Schedule

5.2.2.1.1 Each 24" and 48" steel scale shall be calibration checked annually. Calibration checks shall be conducted by comparing each steel scale to the NIST Calibrated 36" Primary Standard Ruler in the NCSCL Firearms Section. The calibration check shall be documented and maintained by the respective Latent Evidence sections.

5.2.2.1.2 Each L-scale and 6" plastic scale used in case work shall be calibration checked annually. Calibration checks are conducted by comparing each scale to the 24" or 48" steel scales maintained in the Latent Evidence units. Calibration checks shall be documented and maintained by the respective Latent Evidence section.

5.2.2.2 Calibration Check Procedure

5.2.2.2.1 Compare the 24" and 48" steel scales directly with the NIST Calibrated 36" Primary Standard Ruler in the NCSCL Firearms Section. Ensure the entire length of the 24" and 48" steel scales are compared every 30cm/300mm.

5.2.2.2.2 Record the results of the checks as pass (+) or fail (-). Document the primary standard ruler used, including the ruler's serial number.

Tolerance of the 24" and 48" steel scales will be +/-1mm at each 10cm/100mm measurement.

5.2.2.2.3 Compare the L-scale and/or 6" plastic scale to the Latent Evidence 24" or 48" steel scale. Ensure the entire length of the L-scales and 6" scales are compared every 10cm/100mm.

5.2.2.2.4 Record the results of the checks as pass (+) or fail (-). Document the steel scale used, including the scale's serial number, and the measurements along the scales that were checked (i.e. 10cm, 20cm, etc.). Tolerance of the L-scale and 6" plastic ruler will be +/-1mm at each 10cm/100mm measurement.

5.2.2.2.5 Any scale that is damaged, broken, or fails the calibration check shall be removed from case work, archived in FA and discarded.

5.2.3 Alternate Light Sources (ALS), Cyanoacrylate Fuming Chambers, Humidity Chambers and Table-Top Downflow Hoods

5.2.3.1 There is no regular maintenance required for this equipment within the Latent Evidence sections.

5.2.3.2 Any new ALS, cyanoacrylate fuming chamber, and humidity chambers shall have a performance verification conducted prior to its use and shall be recorded at the time it is conducted. Refer to the Technical Procedure for Latent Evidence Processing for instructions on conducting the performance verification. Retain the documentation of the performance verification in the appropriate resource in FA.

5.2.3.3 When an ALS, cyanoacrylate fuming chamber, humidity chamber or table-top downflow hood is placed out of service, correct operation shall be demonstrated after repair and shall be recorded at the time it is conducted.

5.3 Identification of Scales

5.3.1 Each 24" and 48" steel scale shall be identified by its serial number, which shall be maintained in the critical equipment list.

5.3.2 The serial number of the 36" primary standard ruler used to conduct calibration checks shall be recorded.

5.3.3 Each L-scale and 6" plastic scale utilized in casework shall be uniquely identified and a record of the scale shall be kept within the respective Latent Evidence section.

5.3.4 Scales shall be legibly marked with the laboratory designation and a sequential number (ex: RAL-01, TRL-02, and WRL-01).

5.3.5 If a scale is taken out of service, it is the responsibility of the individual examiner to update the record to reflect the change.

5.3.6 Any new scale being placed into service shall be calibration checked prior to its use and the check shall be recorded at the time it is conducted. The new scale shall be assigned the next sequential number (per laboratory).

5.4 Calculations

5.4.1 Balances in Latent Evidence are used exclusively for the production of section approved chemical reagents. Apart from the instructions for mixing specific reagents, no additional calculations are required when utilizing a Latent Evidence balance.

5.4.2 L-scales and 6" plastic scales are used exclusively for the generation of 1:1 (to scale) images/photographs. No calculations are required when utilizing a Latent Evidence scale.

5.5 Application of Procedure to Reagents

5.5.1 Turn balance on.

5.5.2 Ensure that the balance is clean and that the weighing table is clear of any debris.

5.5.3 Place the weigh boat onto the weighing table. Tare the balance.

5.5.4 Pour or scoop the required reagent into the weigh boat until the desired weight has been reached.

5.5.5 Upon completion of all measurements turn balance off.

5.6 Uncertainty of Measurement

5.6.1 Currently Latent Evidence does not utilize any electronic balance in a manner by which to procure a quantitative measurement that is essential to casework results.

5.6.2 Currently Latent Evidence utilizes L-scales and 6" plastic scales in order to generate 1:1 (to scale) images/photograph of latent prints and impression evidence. The scales are not used in a manner by which to procure a quantitative measurement that is essential to casework results.

6.0 Limitations

6.1 Balances within Latent Evidence sections are utilized to obtain approximate weight measurements of commercial chemicals for the preparation of evidence processing reagents. Additional quality control measures are in place to ensure that all reagents prepared work properly prior to and contemporaneously with being used on test items. As such, any deviation in as found/as left values from the annual calibration certificate that may occur as the result of normal use does not affect any Latent Evidence test result.

7.0 Safety – Make sure the balance is plugged in and not near a source of water.

8.0 References - Manufacturer's information and Operator Manual for each model of balance, ALS, cyanoacrylate fuming chamber, humidity chamber and table-top downflow hood.

9.0 Records

- Certificates of Calibration for balances

10.0 Attachments – N/A

Revision History		
Effective Date	Version Number	Reason
04/01/2025	2	5.2.2.1 and 5.2.2.3: added to measure entire length of scales 5.2.2.2 and 5.2.2.4: added the requirement to document the scale and the scale's serial number and increments of measurement checks 5.2.2.2.5: added archive in FA Added 5.2.3 8.0: added additional equipment Updated ruler to scale and unit to section throughout