

APA Standard for Polygraph Instrumentation

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1. STATEMENT OF PURPOSE:

This Standard is provided to define minimal design and functionality requirements for polygraph instrumentation. Compliance with this Standard is voluntary.

2. DEFINITIONS:

A. A polygraph test is a standardized, scientific test of the veracity of a person's answers to closed test questions (yes/no), using an array of physiological sensors. The analytic theory of the polygraph test is that greater changes in physiological activity are loaded at different types of test questions as a function of deception or truth-telling in response to the investigation target questions. The testing procedures and instrumentation work together to obtain and analyze the test data to support a professional opinion in the form of a polygraph test result. A polygraph test consists of three phases: interview; data acquisition; and, data analysis. An additional interview may occur following these phases to resolve inconsistencies.

B. For the purpose of this Standard, a modern computerized polygraph shall consist of several parts, including:

1. Recording sensors,
2. A data acquisition system or data interface device,
3. Computer application software to conduct the examination, and record, display, output, and analyze the test data, and
4. A computer platform, consisting of application software, hardware, firmware, and operating system.

3. RECORDING SENSORS

The array of polygraph recording channels shall include:

- A. Sensor(s) for changes in circumference in the torso that accompany breathing,
- B. Electrodermal activity,

- C. Cardiovascular activity,
- D. Muscular activity,
- E. An optional vasomotor sensor may be used, and
- F. Other validated sensors¹ may also be used.

4. DATA ACQUISITION AND DISPLAY.

Time series data acquisition and output of changes in physiological activity minimally include the following:

- A. A data sampling rate and data storage rate of not less than 25 samples per second.
- B. The capability to displayed online (computer screen) with an x-axis (time) scale rate of 1 inch per 10 seconds (2.54 cm / 10sec),
- C. The capability to print the recorded times-series data (on paper charts or printable graphic file such .pdf or .png) with an x-axis (time) scale rate of 1 inch per 10 seconds (2.54 cm / 10sec).

5. COMPUTING PLATFORM

- A. Polygraph application software shall include a description of the minimum hardware requirements, including the processor type, operating system, and user interface devices.
- B. Documentation shall be deemed as established by computing hardware manufacturers when commercially available computing platforms are used.

6. POLYGRAPH APPLICATION SOFTWARE

- A. Polygraph application software shall provide the capability to uniquely and distinctly identify and differentiate each polygraph examination.
- B. Polygraph application software shall record the date and time of each time-series recording and the audio-video or audio recording of the entire examination,
- C. Data removal.

¹ Sensor validation is a combination of correlation with the criterion of interest, along with a known contribution or improvement to the structural model (together with the other sensors).

Polygraph application software shall include functionality to remove identifying information from an examination for quality control, research, training, or other reason. Removed information shall include:

1. Identify of the examinee (including the name, date of birth, and other information),
2. Date, time and location of the examination,
3. Examiner name and agency, and
4. Test question text and verbal answers.

D. NCCA ASCII export and import.

In order to support a range of activities including quality control, research and development, each instrument shall support the importation of recorded information from and exportation to a standardized cross platform data format.

1. Polygraph application software shall provide functionality for the export of the recorded examination data to the NCCA ASCII Standard, a cross-platform specification for polygraph examination data.
2. Polygraph application software shall provide functionality to import recorded time series data from the NCCA ASCII Standard

E. Question templates.

Polygraph application software shall support the development, formulation, organization and management of examination templates and test questions for validated polygraph techniques, including the following functions:

1. Organizing and presenting the sequence of questions required by each technique,
2. Capturing and presenting the exact textual language of each polygraph question, including the announcement of test onset and end,
3. Capturing and organizing the expected answer to each text question, and
4. Organizing and presenting the variation of each test question sequence as specified by validated polygraph techniques.

F. Presentation of test stimuli.

Polygraph application software shall support the accurate presentation of test stimuli during testing, including the question text and correct sequence of test questions, through the following methods:

1. Verbal presentation of all test stimuli by the examiner, and
2. Automated presentation of each test stimuli using either:
 - a. Audio recording of the text of all test stimuli, or
 - b. Computer synthesized voice recording of the text of all test stimuli.

G. Sensor data recording and signal processing.

1. Data acquisition shall occur at not less than 25 samples per second.
2. Information on signal processing for each polygraph recording sensor shall be documented and available from the instrument manufacturer sufficient to support reproduction and independent validation, including:

a. Breathing sensors.

Information shall include the filter type and design characteristics, including whether hardware or software based, along with corner frequencies and other necessary parameters,

b. Cardiovascular sensor.

Information shall include the type of sensor, all signal processing methods and filter design characteristics including whether mathematical, electronic, or digital, along with corner frequencies and other necessary parameters,

c. Electrodermal sensor.

Information shall include the type of circuit design (i.e., constant current or constant voltage) and whether data are recorded and displayed in resistance, conductance or dimensionless units.

Information should include a description of any filters, including all design characteristics, including whether mathematical, electronic, or digital, along with corner frequencies and other necessary parameters. Polygraphs that provide multiple different EDA operating modes should provide information on each of the different operating modes. Recommendation or requirements for

electrode type (i.e., wet gel, solid or adhesive gel, or metal plate), in addition to electrode location or placement, should be provided by the instrument manufacturer,

d. Vasomotor sensor.

Information shall include the wavelength(s) of infrared light employed. Any use of filter technologies, whether electronic or software,

e. Activity sensor.

Information shall include type of sensor technology employed (i.e., pneumatic or piezoelectric) along with any use of amplifiers or filters, including whether electronic or digital, and

f. Other validated sensors.

Use of other validated sensors shall be permissible when published and replicated information is available, including the type of sensor technology, validity coefficients, structural coefficients, deployment parameters, and signal processing methods.

H. Data management during recording.

Polygraph application software shall provide functionality for the presentation of test stimuli in addition to the management and display of the time-series data during recording, including:

1. Recording announcement of test onset and test end.
2. Recording the onset of each test stimulus event within the time-series data,
3. Recording the end of each test stimulus event within the time-series data,
4. Recording the location of all answers to test questions,
5. Dressing the display of the time series data for each recording sensor including,
 - a. Adjustment and display of the time series data, recorded events, and relative magnitude of changes in physiological activity,

- b. Adjustment of the displayed y-axis offset (vertical location) of the time-series data for each recording sensor within the recorded polygraph chart,
- 6. Annotation of unexpected events (behavioral or environmental) within the recorded time-series data, including additional instructions, that may alter or influence the process of test data analysis, and
- 7. Comments or additional information, captured peripherally to or outside of the time-series data, that describes what happened during testing.

I. Reviewing test data

Polygraph application software shall provide functionality to review the data after recording, including capabilities for the dressing, adjustment and display of the time series data after the completion of recording including,

- a. The printed or displayed visual size or amplitude of recorded changes in physiological activities,
- b. The printed or displayed y-axis offset (vertical location) of the time-series data for each recording sensor within the recorded polygraph chart,
- c. The announcement to the examinee of the test beginning and ending,
- d. Onset and end of all test stimuli and answers
- e. Post-hoc annotations within the time-series data that provide information that may be important to to the process of test data analysis, and
- f. Post-hoc comments or additional information, captured peripheral to or outside of the time-series data, that describes what occurred during testing that may influence the process of data analysis or the analytic result.
- g. Post-hoc annotations and comments shall be clearly identified and audited as such.

J. Examination Notes

Polygraph application software shall include functionality to keep and make use of additional information notes that describe the process and development of the examination, the process of test data analysis, or the analytic result.

K. Test data analysis

1. Manual test data analysis

Polygraph application software shall include functionality to support manual test data analysis including,

- a. Documentation of numerical scores obtained from manual feature extraction methods,
- b. Documentation of categorical conclusions based on manual scores, and
- c. Output of manual scores and categorical test results in both digital and printed formats, sufficient for quality control, program evaluation, and research activities.

2. Automated and objective test data analysis via computer algorithm

Polygraph application software should include functionality to support the automated and objective analysis of polygraph test data using at least one open-source or open-standard data analysis method that provides for:

- a. Automated feature extraction,
- b. Automated data aggregation or data reduction,
- c. Automated computation of a likelihood function or statistical classifier,
- d. Automated execution of decision rules to parse a categorical test result from the numerical and statistical information, and
- e. Automated production of an analysis output report, in digital and printed format, that includes both statistical and categorical test results, along with sufficient information about analysis parameters to support reproduction of the analytic result in addition to quality control, program evaluation, and other research activities.

7. CERTIFICATION OF COMPLIANCE

- A. Compliance with this model policy is voluntary.
- B. Manufacturer representation of compliance.

Manufacturers may demonstrate their instrument's compliance with this Standard using any of the following processes, and may report that compliance in their advertising and other documentation.

1. Self-certification,
 2. Independent certification by contracted parties with no other fiscal or professional association with the instrument manufacturer,
 3. Independent certification by a peer consortium of instrument manufacturers.
- C. The APA Board shall provide a letter of acknowledge of receipt of notification from instrument manufacturers who provide documentary evidence of their compliance with this Standard through the means specified in 7.B.1-3 above.

8. REFERENCES

- A. American Polygraph Association (2011). *Meta-analytic survey of criterion accuracy of validated polygraph techniques*. *Polygraph*, 2011, 40(4) 195-305. [Electronic version] Retrieved January 15, 2023, from [http://www .polygraph.org](http://www.polygraph.org).
- B. Editorial Staff (2019). Introduction to the NCCA ASCII Standard. *Polygraph & Forensic Credibility Assessment*, 48(2): 125-135.

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