DEPARTMENT OF CONSUMER AFFAIRS

BAR

Bureau of Automotive Repair

Bureau of Automotive Repair

California Vehicle Inspection System

Data Acquisition Device Specification

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1. INTRODUCTION

This document is the final Bureau of Automotive Repair (BAR) California Vehicle Inspection System (Cal-VIS) Data Acquisition Device (DAD) Specification. BAR's intent is to document all of BAR's Hardware, Firmware, and Software requirements for the DAD, used to support California's Smog Check Program and Vehicle Safety Systems Inspection Program, within this document.

1.1 Purpose

The intended audience for this specification is the On Board Diagnostic (OBD) community that will develop the DAD Hardware, Firmware, and Software. Where this document is specific, it is because these are areas where BAR and/or stakeholders in the Smog Check and Vehicle Safety Systems Inspection Programs are aware of shortcomings in other OBD second generation (OBDII) implementations and BAR is attempting to ensure uniform and consistent tests, to the greatest extent possible, as required by the Health and Safety Code Section 44036(a) and the Business and Professions Code Section 9888.5(a).

1.2 Scope

The OBD Inspection System (OIS) consists of a computer with attached bar code scanner, printer, biometric device, camera, and DAD. These separate components may be assembled by vehicle inspection stations, may be provided as a unit by various vendors, or could be an all-in-one solution such as an integrated tablet. The OIS shall run a BAR tested and approved version of Microsoft Windows operating system software. The operating system software version shall be supported by Microsoft. When no longer supported, the operating system software shall be updated to a supported version. The OIS accesses BAR's Cal-VIS software to conduct Smog Check or Vehicle Safety Systems inspections. The OIS resides in various Smog Check and Vehicle Safety Systems Inspection Program stations across the state, and other locations such as Fleet, Referee, schools, BAR Roadside, and BAR Headquarter sites. The Smog Check vehicle inspection functionality within the Cal-VIS software is used by licensed technicians performing Smog Check vehicle inspections and other station personnel. The Vehicle Safety Systems inspection functionality within the Cal-VIS software is used by licensed technicians performing Vehicle Safety Systems Inspections. A single computer system can be used to perform both business functions.

1.3 Definitions, Acronyms, and Abbreviations

The definitions of all terms, acronyms, abbreviations, and references required to properly interpret this BAR California Vehicle Inspection System Data Acquisition Device Specification are included within the text of this document.

1.4 External Documents and Specifications

This DAD specification relies on external documents and specifications. The following is a list of these external documents and specifications and where they may be obtained. These external documents and specifications are incorporated by reference.

Referenced External Document or Specification	Source
National Marine Electronics Association (NMEA) 0183 Standard for Interfacing Marine Electronic Devices Version 4.10 standard, dated June 2012	Available for purchase from the National Marine Electronics Association
National Geospatial-Intelligence Agency (NGA) Standardization Document, Department of Defense World Geodetic System 1984, dated 2014-07-08	Available from BAR
IEC 61000-4-2 - International Electrotechnical Commission (IEC) immunity standard on Electrostatic Discharge (ESD), dated 2008-12-09	Available for purchase from the International Electrotechnical Commission
SAE J1978 200204, "OBD II Scan Tool - Equivalent to ISO/DIS 15031-4: December 14, 2001", revised 2002-04	Available for purchase from the Society of Automotive Engineers International
SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07	Available for purchase from the Society of Automotive Engineers International
SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02	Available for purchase from the Society of Automotive Engineers International
SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", issued 2021- 04	Available for purchase from the Society of Automotive Engineers International
SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", issued 2021-04	Available for purchase from the Society of Automotive Engineers International
SAE J2534-1 201510, "Recommended Practice for Pass-Thru Vehicle Programming", revised 2015-10	Available for purchase from the Society of Automotive Engineers International

Referenced External Document or Specification	Source
ISO 14229-1:2020 "Road vehicles – Unified diagnostic services (UDS)", dated 2020-02	Available for purchase from the International Organization for Standardization
FCC Part 15 Class A, dated 04-03-2023	See Code of Federal Regulations https://www.ecfr.gov/current/title-47/chapter-I/subchapter-A/part-15
ISO 9141-2:1994 amended 1:1996, dated 1996-12	Available for purchase from the International Organization for Standardization
"Volkswagen Group of America K-Line Communication Description", Version 3.0, dated 11/20/09	Available from BAR
SAE J1850 200606, Class B Data Communication Network Interface, Reaffirmed 2006-06	Available for purchase from the Society of Automotive Engineers International
ISO 14230-4: Road vehicles - Diagnostic systems - Keyword protocol 2000 - Part 4: Requirements for emission-related systems, dated 2000-06-01	Available for purchase from the International Organization for Standardization
"Keyword Protocol 2000 Data Link Layer Recommended Practice", Version 1.5, dated October 1, 1997	Available from BAR
ISO 15765-4: Road vehicles - Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emissions-related systems, dated 2021-07	Available for purchase from the International Organization for Standardization
"A summary of the most common mistakes when implementing the OBD on CAN (ISO15765-4) initialization sequence"	Available from BAR
ISO 2768-1: General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications, dated 1989-11-15	Available for purchase from the International Organization for Standardization
DAD Communication Specification	Available to DAD Vendors after signing the non-disclosure agreement. Otherwise, not available per Government Code 11340.9(e)

Referenced External Document or Specification	Source
DAD Encryption Specification	Available to DAD Vendors after signing the non-disclosure agreement. Otherwise, not available per Government Code 11340.9(e)
ISO 27145-4:2016, dated 2016-04-01	Available for purchase from the International Organization for Standardization

2. DATA ACQUISITION DEVICE OVERVIEW

The DAD connects to the OIS computer for the purpose of retrieving OBD second generation (OBDII) information from a vehicle. The OIS connects to a BAR authorized website to access and run the Cal-VIS software. The Cal-VIS software will determine and control the vehicle inspections. The DAD shall be functional in a standard automotive repair environment and thus be resistant to shock, vibration, and environmental exposure in order to ensure reliability and accuracy. The OIS computer has standard connections and interfaces to allow interchangeability of different brands of bar code scanners, printers, and BAR certified DADs. The DAD is intended to receive instructions from the Cal-VIS software. The DAD will collect OBD data from the vehicle, carry out all tasks in accordance with this DAD specification, and report it to the Cal-VIS software.

This specification does not apply to the bar code scanner, biometric device, camera, or printer, which are not part of this specification, and are not to be included as a part of this specification. This specification covers the DAD which is comprised of all hardware, firmware, and software (including drivers) necessary to receive instructions from the Cal-VIS software and carry out all tasks to obtain data from the vehicle and report it back to the Cal-VIS software in accordance with this specification. Portions of the DAD are expected to be software (e.g., drivers) that will be installed on the OIS computer.

3. REQUIREMENTS

3.1 General Requirements

3.1.1.   The DAD Vendor shall only release the current production version of the Cal- VIS software to stations.

3.1.2.   The DAD shall be compatible with typical automotive service operating environments.

3.1.3.   The DAD shall not cause malfunctions to any vehicle's systems or operation.

3.1.4.   The DAD shall be compatible with the OIS operating system(s).

3.1.5.   The DAD shall be compatible with the OIS web browser(s).

3.1.6.   All DAD Vendor software necessary to complete a vehicle inspection shall be located in a folder named by the DAD Vendor within the c:\Program Files or c:\Program Files (x86) folder.

3.1.7.   The DAD hardware, including fasteners and enclosures, shall be corrosion resistant under conditions normally encountered in the automotive repair environment for the period of the warranty.

3.1.8.   The DAD hardware, including fasteners and enclosures, shall not transmit heat that could burn the user.

3.1.9.   The DAD Vendor shall supply all hardware, firmware, and software drivers necessary to operate the DAD and meet the requirements of this specification.

    3.1.9.1.   When the Cal-VIS software queries the DAD for connection type, the DAD shall identify the means in which the DAD is currently communicating with the OIS computer. (e.g., The DAD is connected by USB cable, Ethernet cable, Bluetooth or Wi-Fi).

3.1.10.   The DAD Vendor shall be responsible to update the hardware and/or firmware and/or software to conform to the DAD specification version to which the DAD was certified.

    3.1.10.1.   The updates shall be provided to the state and stations at no cost.

    3.1.10.2.   The normal scheduled updates shall be provided to the state and stations on a quarterly basis, at a minimum.

    3.1.10.3.   BAR may choose to waive the normal scheduled update.

3.1.10.4. The updates shall be implemented on all DAD Vendors' devices within two (2) weeks of receiving approval from BAR.

3.1.10.5. If a problem is detected with the DAD that seriously impacts the California Smog Check Program or the Vehicle Safety Systems Inspection Program, the DAD Vendor shall provide an emergency update, on a schedule mandated by BAR.

3.1.10.5.1. In the event that a software security scan of the DAD results in High and/or Very High findings, the DAD Vendor shall remediate these problems with an emergency update.

3.1.10.5.2. In the event that a software security scan of the DAD results in lower priority findings, the DAD Vendor shall remediate these problems at the next quarterly update.

3.1.11. The DAD shall utilize a mechanism to update the DAD hardware, firmware, and software as needed to meet this specification.

3.1.11.1. The DAD Vendor shall document the mechanism for the update of the DAD hardware/firmware/software that is agreed to by BAR.

3.1.11.2. The DAD Vendor shall comply with BAR's file verification process.

3.1.11.3. The DAD Vendor shall notify BAR of all DAD related changes.

3.1.11.4. The DAD Vendor shall not implement changes without first submitting the change to BAR for testing or review to ensure the DAD continues to meet all the requirements in this DAD specification. DAD related items include for example: DAD hardware, DAD drivers, DAD firmware, DAD firmware update software, DAD user assistance software, and DAD Vendor server interaction with DADs.

3.1.11.5. DAD change notification to BAR shall include: description, justification, identifying version, impact to BAR and users, documented testing performed by DAD Vendor, intended implementation plan, related risks, and potential cost to end user if applicable.

3.1.11.6. Any change to the DAD Vendor's hardware shall cause the hardware version number to increase.

3.1.11.7. Any change to the DAD Vendor's firmware shall cause the firmware version number to increase.

3.1.11.8. Any change to the DAD Vendor's software shall cause the

software version number to increase. This includes all the files necessary to install and operate the DAD.

3.1.12. The DAD Vendor shall supply a programming interface compatible with the OIS operating system(s) (e.g., APIs, development drivers).

3.1.13. The DAD Vendor shall ensure proper and functioning communication between the DAD software and the Cal-VIS software.

  3.1.13.1. The DAD shall return communication errors that identify the source of the communication error explicitly; (e.g., The DAD had an internal error, or the vehicle returned an error or bad message, which caused an error).

3.1.14. The DAD Vendor shall provide live person technical support to the purchasers of the DAD via a toll-free number.

3.1.15. The DAD Vendor shall provide technical support to the purchasers of the DAD via a public facing Website that offers tips on how to diagnose DAD problems, frequently asked questions (FAQs) on how the DAD operates and how to resolve any support issues, ability to create a support request(s) to resolve any DAD incidents, as well as information on how and where to purchase a DAD.

3.1.16. The DAD Vendor shall provide live person technical support Monday through Friday (excluding California State holidays) from 8 a.m. - 5 p.m. Pacific Time (Business Hours).

3.1.17. The DAD Vendor shall respond to DAD customer inquiries within two (2) Business Hours of receipt of inquiry.

3.1.18. The DAD Vendor shall provide technical support to DAD customers within two (2) Business Hours of receipt of request.

3.1.19. The DAD Vendor shall provide to the purchaser a warranty that the DAD will be free of defects in materials and workmanship for a minimum period of one (1) year from the date of delivery.

3.1.20. The DAD Vendor shall provide, within 3 days of BAR's request, DAD sales reports that lists the DADs sold. This report shall list the DAD unique, sequential serial number, customer name, address, and phone number.

3.1.21. The DAD Vendor shall offer the DAD for sale directly to the public without requiring the purchase of any other item or device.

  3.1.21.1. DADs shall only be branded with company information (logos, etc.) for the DAD Vendor who submitted the devices to BAR and received BAR certification.

3.1.22. The DAD shall support encrypted communications between the Cal-VIS software and the DAD per BAR's DAD Encryption Specification.

    3.1.22.1. When requested by the Cal-VIS software, the DAD shall encrypt all data transmissions.

    3.1.22.2. The DAD Vendor shall notify BAR immediately if they have knowledge of or suspect that the encryption has been compromised.

3.1.23. The DAD shall only interact with Cal-VIS and DAD Vendor servers.

    3.1.23.1. DAD Vendor interaction with the DAD shall not interrupt a vehicle inspection once started.

    3.1.23.2. DAD Vendors shall provide BAR a description of all their servers that interact with the DAD outside of the vehicle inspection sequence to support BAR verification of only Cal-VIS and DAD Vendor server interaction.

Global Navigation Satellite System

3.1.24. The DAD shall contain a Global Navigation Satellite System (GNSS) receiver capable of receiving transmissions available from satellites of various countries, including but not limited to the Global Positioning System (GPS) and Global Navigation Satellite System (GLONASS) systems.

    3.1.24.1. The GNSS receiver shall collect required location and accuracy data per BAR's DAD Communication Specification.

        3.1.24.1.1. The GNSS receiver shall be accurate to within 15 meters horizontally when a GNSS signal is available from 3 or more satellites.

        3.1.24.1.2. The GNSS receiver shall connect to 3 or more satellites when the satellites are available.

        3.1.24.1.3. The GNSS receiver shall provide accuracy data to the Cal-VIS software when location and fix have been determined (latitude and longitude are available from the chipset). Examples of accuracy data include horizontal dilution of precision (HDOP), vertical dilution of precision (VDOP), position (3D) dilution of precision (PDOP), etc.).

    3.1.24.2. The GNSS receiver shall provide data per the National Marine Electronics Association (NMEA) 0183 Standard for Interfacing Marine Electronic Devices Version 4.10 standard.

3.1.24.2.1. The GNSS receiver shall support a subset of data formats from the NMEA 0183 Standard for Interfacing Marine Electronic Devices Version 4.10 standard per BAR's DAD Communication Specification.

3.1.24.3. When requested by the Cal-VIS software, the DAD shall transmit the NMEA formatted current data to the Cal-VIS software per BAR's DAD Communication Specification.

3.1.24.4. The GNSS receiver shall have "cold start," "warm start," and "hot start" capability.

3.1.24.4.1. The GNSS receiver shall provide required location and accuracy data per BAR's DAD Communication Specification to the Cal-VIS software within 30 seconds after a "hot start" of the GNSS receiver.

A cold start is when the GNSS receiver deletes all prior stored information, attempts to locate satellites, and then calculates a GNSS fix. This takes the longest because there is no known information.

A warm start is when the GNSS receiver has estimates of the current time within 20 seconds, the current position within 100 kilometers, the GNSS receiver's velocity within 25 m/s, and the GNSS receiver has valid almanac data. The GNSS receiver must acquire each satellite signal and obtain that satellite's detailed orbital information, called ephemeris data. Each satellite broadcasts its ephemeris data every 30 seconds and is valid for up to four hours.

A hot start is when the GNSS receiver has valid time, position, almanac, and ephemeris data, enabling a rapid acquisition of satellite signals.

3.1.24.5. When the Cal-VIS software prompts the user to go outside to acquire location data, the DAD shall, without connection to the OIS computer, collect GNSS data for a number of seconds configurable by the Cal- VIS software.

3.1.24.5.1. The DAD shall acquire a GNSS location and fix without connection or communication to the Cal-VIS software.

3.1.24.5.2. The DAD shall have an external or on-screen button for the user to start acquisition of the location data.

3.1.24.5.2.1. Once the external or on-screen button is pressed, the DAD shall notify the user when a GNSS fix, with a minimum 15-meter

accuracy in the horizontal plane, has been established.

3.1.24.5.3. The DAD shall have a Light Emitting Diode (LED) indicator on the housing or onscreen notification to indicate the GNSS fix status.

3.1.24.5.3.1. If a LED indicator is used, it shall blink once per second when no GNSS signal is available.

3.1.24.5.3.2. If a message is used, it shall contain the wording "No Location Data Available" when no GNSS signal is available.

3.1.24.5.3.3. If a LED indicator is used, it shall blink 3 times per second while acquiring a GNSS fix.

3.1.24.5.3.4. If a message is used, it shall contain the wording "Acquiring Location Fix" while acquiring a GNSS fix.

3.1.24.5.3.5. If a LED indicator is used, it shall be on and not blinking when a GNSS fix, with a minimum 15- meter accuracy in the horizontal plane, has been established within the last 15 minutes.

3.1.24.5.3.6. If a message is used, it shall contain the wording "Location Fix Obtained" when a GNSS fix, with a minimum 15-meter accuracy in the horizontal plane, has been established within the last 15 minutes.

3.1.24.5.4. The DAD shall store the NMEA data in memory until transmitted to the Cal-VIS software.

3.1.24.5.5. The DAD shall be capable of storing, at a minimum, 300 seconds of GNSS/NMEA 0183 data collected at a frequency of one sample per second.

3.1.24.5.6. The GNSS receiver shall be contained within the DAD housing.

3.1.24.5.6.1. The GNSS receiver's antenna electrical connections shall not be accessible from the outside of the DAD housing.

3.1.24.5.7. The DAD shall use the World Geodetic System 1984 standard (WGS84) standard for coordinates.

J2534 Compliant Driver

3.1.25. The DAD shall accept Cal-VIS software direct J2534 function calls made to the DAD Vendor provided J2534 compliant driver without passing through the IDAD dll.

3.1.25.1. When the Cal-VIS software makes direct J2534 function calls to the DAD Vendor provided J2534 compliant driver, the DAD Vendor is not responsible for meeting the vehicle connectivity rates specified in this document.

3.1.25.2. When the Cal-VIS software makes direct J2534 function calls to the DAD Vendor provided J2534 compliant driver, the DAD shall communicate with the vehicle according to SAE standards.

3.1.26. All Cal-VIS software to vehicle communication shall go through the DAD Vendor provided J2534 compliant driver.

3.1.26.1. The DAD shall not be capable of programming or reprogramming any vehicle's onboard computer(s) using a J2534 interface.

3.1.27. The DAD Vendor provided J2534 compliant driver shall work with Microsoft Windows as outlined in Section 1.2 of this DAD specification.

Analog Data Sampler

3.1.28. When requested by the Cal-VIS software, the DAD shall measure, store, and transfer data to the Cal-VIS software from an internal Analog Data Sampler device (ADS).

3.1.28.1. The ADS shall support a minimum of two analog channel inputs.

3.1.28.2. Each channel shall support input ranges from ±50 millivolts (mV) to ±20 Volts (V) as follows:

3.1.28.2.1. The measured range between – 50 mV and + 50 mV.

3.1.28.2.2. The measured range between – 100 mV and + 100 mV.

3.1.28.2.3. The measured range between – 200 mV and + 200 mV.

3.1.28.2.4. The measured range between – 500 mV and + 500 mV.

3.1.28.2.5. The measured range between – 1 V and + 1 V.

3.1.28.2.6. The measured range between – 2 V and + 2 V.

3.1.28.2.7. The measured range between – 5 V and + 5 V.

3.1.28.2.8. The measured range between – 10 V and + 10 V.

3.1.28.2.9. The measured range between – 20 V and + 20 V.

3.1.28.3. Each channel shall have 10 equal divisions per measurement range listed under 3.1.28.2. E.g., support input sensitivity from 10 mV per division at the low range to 4 V per division at the high range.

3.1.28.4. Each channel shall support the following analog offset ranges: ±250 mV for 50 mV to 200 mV range; ±2.5 V for 500 mV to 2.0 V range; and ±25 V for 5.0 V to 20.0 V range.

3.1.28.5. Analog channel-to-channel isolation shall be for direct current (DC) to 50 megahertz (MHz): > 50 decibel (dB).

3.1.28.6. Analog channel input impedance shall be >= 150 kiloohms (kΩ) and <= 20 picofarad (pF) for each channel.

3.1.28.7. Analog bandwidth for each channel shall be 50 MHz.

3.1.28.8. The ADS shall be capable of measuring the following calculated rise times at the corresponding frequencies per industry standard T10 to T90.

3.1.28.8.1. 7 nanoseconds (ns) at 100 Mega Samples per second (MS/s).

3.1.28.8.2. 14 ns at 50 MS/s.

3.1.28.8.3. 28 ns at 25 MS/s.

3.1.28.8.4. 70 ns at 10 MS/s.

3.1.28.8.5. 140 ns at 5 MS/s.

3.1.28.8.6. 280 ns at 2.5 MS/s.

3.1.28.8.7. 700 ns at 1 MS/s.

3.1.28.8.8. 1.4 microseconds (µs) at 500 Kilo Samples per second (KS/s).

3.1.28.8.9. 2.8 µs at 250 KS/s.

3.1.28.8.10. 5.6 µs at 125 KS/s.

3.1.28.8.11. 14 µs at 50 KS/s.

3.1.28.8.12. 28 µs at 25 KS/s.

3.1.28.8.13. 70 µs at 10 KS/s.

3.1.28.8.14. 140 µs at 5 KS/s.

3.1.28.8.15. 280 µs at 2.5 KS/s.

3.1.28.8.16. 700 µs at 1 KS/s.

3.1.28.8.17. 1.4 milliseconds (ms) at 500 Sample per second (S/s).

3.1.28.8.18. 2.8 ms at 250 S/s.

3.1.28.8.19. 5.6 ms at 125 S/s.

3.1.28.8.20. 14 ms at 50 S/s.

3.1.28.8.21. 28 ms at 25 S/s.

3.1.28.8.22. 70 ms at 10 S/s.

3.1.28.8.23. 140 ms at 5 S/s.

3.1.28.8.24. 280 ms at 2.5 S/s.

3.1.28.8.25. 700 ms at 1 S/s.

3.1.28.9. Each channel of the ADS shall support a switched, positive signal connection to any of the following Diagnostic Link Connector (DLC) pins: 1,2,6,7,10,14,15,16. Each ADS channel will not be required to measure the same pin concurrently.

3.1.28.10. Each channel of the ADS shall support a switched, positive signal connection to an internal signal generator capable of generating a square wave signal with an amplitude of 5 V.

3.1.28.11. The negative signal connection from each of the channel inputs shall be connected to pin-5 of the DLC.

3.1.28.12. The ADS shall be capable of true sample rates from 1 S/s through 100 MS/s for each channel.

3.1.28.13. The ADS inputs shall be protected against overvoltage up to 100 V.

3.1.28.14. The ADS shall support the following analog sample rates (real-time): (100, 50, 25, 10, 5, 2.5, 1) MS/s, (500, 250, 125, 50, 25, 10, 5, 2.5, 1) KS/s, (500, 250, 125, 50, 25, 10, 5, 2.5, 1) S/s. Note to DAD Vendors: the ADS may sample at a higher sample rate and downsample to the values presented here. However, the ADS may not sample at a lower sample rate and upsample to the values presented here.

3.1.28.14.1. If downsampling is performed, DAD Vendors shall provide to BAR a listing of the DAD's actual sample rates.

3.1.28.15. The ADS DC accuracy shall be ± 3% of full scale.

3.1.28.16. The ADS time-based accuracy shall be < ± 50 points per million (ppm).

3.1.28.17. The ADS shall support the following modes of triggering: (manual, rising edge, falling edge, either edge, greater than pulse width, less than pulse width, window pulse width).

3.1.28.18. The ADS shall be capable of capturing pre-trigger data up 50 Mega Samples (MS).

3.1.28.19. The ADS shall be capable of storing at least 50 MS of ADS data or the ADS shall stream ADS data to the OIS computer at up to the maximum sample rate.

3.1.28.20. When storing samples for transfer, the ADS shall be capable of transferring all sample data to the OIS computer in less than 10 seconds.

3.1.28.21. The DAD shall have a National Institute of Standards and Technology (NIST) traceable (or NIST approved 3rd party traceable certification) calibrated, 0.000 to +5.000 +/- 0.005 V DC square wave at 1 kilohertz (kHz) with 50% duty cycle and 7 ns minimum rise time calibration verification source on each analog channel input.

3.1.28.21.1. The calibration verification source shall be capable of presenting the square wave on pin-1 of the self-test connector.

3.1.28.21.2. The calibration verification source shall be contained within the DAD.

3.1.28.21.3. The DAD shall perform a calibration verification on the ADS through the DAD's J1962 diagnostic connector.

3.1.28.21.4. The DAD's J1962 diagnostic connector shall be plugged into the self-test connector to perform the calibration verification.

3.1.28.21.5. The calibration verification shall return a pass / fail result when requested by the Cal-VIS software.

3.1.28.21.6. The DAD shall enable and disable the calibration verification source upon request by the Cal-VIS software.

3.1.28.22. Calibration or replacement of the ADS shall only be performed by the DAD Vendor at the DAD Vendor's facility after inspection and quality control checks ensuring that the ADS meets the accuracy requirements of this DAD specification have been successfully completed.

3.1.28.23. The DAD Vendor shall deliver to BAR upon request specifications for the ADS and / or its components.

3.1.29. The DAD shall be fully functional with a minimum voltage of 10.0 V DC on pin-16 of the J1962 diagnostic connector, with pin-5 as the ground.

3.1.30. The DAD shall be fully functional with a maximum voltage of 32.0 V DC on pin-16 of the J1962 diagnostic connector, with pin-5 as the ground.

3.1.31. The DAD shall be protected against electrostatic discharge (ESD) up to 2,000 V as per IEC 61000-4-2 Level 1, on all electrical connections to the DAD.

3.1.32. The DAD shall measure the resistance between the J1962 diagnostic connector pin-6 and pin-14.

3.1.32.1. The DAD range of resistance measurement shall be from 0 ohms (Ω) through 10 kiloohms (kΩ).

3.1.32.2. The DAD shall measure resistance with an accuracy of +/- 10 Ω below 1000 Ω.

3.1.32.3. The DAD shall measure resistance with and accuracy of +/- 1% of the measured value between 1000 Ω and 9,999 Ω.

3.1.32.4. The DAD shall not be subject to accuracy standards at a measured value of 10 kΩ or greater.

3.1.32.5. The DAD resistance raw sample rate shall be at least 120 hertz (Hz).

3.1.32.6. The DAD reported resistance reading shall be updated no more

than once per second.

3.1.32.7. The DAD shall present the resistance measurement, as the apparent resistance between the pins, comprised of the mean of at least the last 120 raw samples.

3.1.32.7.1. The DAD shall report the resistance measurements below 0 as a negative value, using a minus (-) sign, to indicate an error condition.

3.1.32.8. The DAD resistance measurement shall not be affected by the DAD's connection to any other J1962 diagnostic connector pins.

3.1.32.9. The DAD resistance measurement shall not affect the communications on any J1962 diagnostic connector communication pins.

3.1.32.10. The DAD shall be capable of measuring resistance on a powered Controller Area Network (CAN) bus in an idle state.

3.1.32.10.1. The DAD shall not be required to accurately measure resistance on a powered CAN bus in an actively communicating state.

3.1.32.11. The DAD shall not draw in excess of 1 milliamp (mA) of current through the J1962 diagnostic connector pins during the resistance measurement.

Vehicle System Voltage

3.1.33. The DAD shall measure the vehicle system voltage when requested by the Cal-VIS software.

3.2 Specific Requirements

Standards

3.2.1. If a conflict exists between what this specification requires and what any externally referenced standard requires, this specification overrides the externally referenced standard.

3.2.1.1. To the extent the DAD Vendor knows or has reason to believe that an element of this specification conflicts with any externally referenced standard and that implementation in accordance with this specification will adversely impact the ability of the DAD to properly interface with vehicles, the DAD Vendor shall identify the conflict and the known or suspected associated adverse impact to BAR to request clarification as to how the specification shall be implemented.

3.2.2. The DAD shall meet all SAE J1978 200204, "OBD II Scan Tool - Equivalent to ISO/DIS 15031-4: December 14, 2001", revised 2002-04, excluding 7.5, 7.6, 8.1 and 8.2, 11.5.

3.2.3. The DAD shall be compliant with SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07.

3.2.4. The DAD shall be compliant with SAE J1979 201702, "E/E Diagnostic Test Modes," revised 2017-02.

3.2.5. The DAD shall be compliant with SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", issued 2021-04.

3.2.6. The DAD shall be compliant with SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", issued 2021-04.

3.2.7. The DAD shall be compliant with SAE J2534-1 201510. "Recommended Practice for Pass-Thru Vehicle Programming", revised 2015-10.

  3.2.7.1. Section 7.2.2 of J2534-1 201510, "Recommended Practice for Pass- Thru Vehicle Programming", revised 2015-10 specifies the <Timestamp> parameter. The DAD shall accurately record and store this parameter with a resolution of 0.000 001 seconds (1 microsecond) and an accuracy of +/- 0.000 001 seconds (1 microsecond). (Note: the SAE specification only requires 0.001 second resolution).

    3.2.7.1.1. For ISO14230 and ISO9141 communication protocols, the DAD shall return the <Timestamp> as specified in section 7.2.2 of J2534-1 201510, "Recommended Practice for Pass- Thru Vehicle Programming", revised 2015-10 for each byte of a message received, with the accuracy specified in Section 3.2.7.1 of this document for appropriate communication protocols.

3.2.8. The DAD shall be compliant with ISO 14229-1:2020 "Road vehicles – Unified diagnostic services (UDS)", dated 2020-02.

3.2.9. The DAD shall report GNSS data compliant with the National Marine Electronics Association's (NMEA) 0183 Standard for Interfacing Marine Electronic Devices version 4.10 standard, dated June 2012.

3.2.10. If wireless communication is used for any portion of the communication between the OIS computer and the vehicle's OBDII port, the DAD shall be FCC Part 15 Class A, dated 04-03-2023 approved.

Log Files

3.2.11.   The DAD Vendor shall collect required log data and may collect additional DAD Vendor specified log data.

    3.2.11.1. The DAD Vendor shall collect DAD-Vehicle Communications Log (aka Vehicle Communication Data Log) data per BAR's DAD Communication Specification.

        3.2.11.1.1.   The DAD-Vehicle Communications Log data shall be sent to the Cal-VIS software.

        3.2.11.1.2.   The DAD-Vehicle Communications Log data shall be in ASCII text.

        3.2.11.1.3.   The DAD-Vehicle Communications Log data shall be the communication data as sent and received from the vehicle's OBDII system.

        3.2.11.1.4.   Upon request to BAR from the DAD Vendor, BAR will supply the DAD-Vehicle Communications Log data.

    3.2.11.2. The DAD Vendor may choose to collect separate, additional log data from the DAD if needed for diagnostic purposes.

        3.2.11.2.1.   If collected, the separate, additional log data shall be sent to the Cal-VIS software.

    3.2.11.3. The DAD Vendor may retrieve the log file(s) from the OIS computer.

    3.2.11.4 The DAD shall end collecting of Log Data when indicated by the Cal-VIS software.

Testable Vehicles

3.2.12.   The DAD shall access the OBDII SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02, SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", Issued 2021-04, and SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", Issued 2021-04 defined data from all gasoline fueled vehicles required to have OBDII systems, including passenger, light and medium duty trucks and shall report the data to the Cal-VIS software.

3.2.13.   The DAD shall access the OBDII SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02, SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", Issued 2021-04, and SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", Issued 2021-04 defined data from all diesel fueled vehicles required to have OBDII systems, including

passenger, light and medium duty trucks – 1998 and newer up to and including fourteen thousand (14,000) Gross Vehicle Weight Rating (GVWR), and shall report the data to the Cal-VIS software.

3.2.14. The DAD shall access the OBDII SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02, SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", Issued 2021-04, and SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", Issued 2021-04 defined data from all alternate fueled (e.g., LPG, CNG, Hydrogen, Methanol, any ratio of ethanol / gasoline including E85) vehicles required to have OBDII systems, including passenger, light and medium duty trucks and shall report the data to the Cal-VIS software.

3.2.15. The DAD shall access the OBDII SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02, SAE J1979-2 202104, "E/E Diagnostic Test Modes: OBDonUDS", Issued 2021-04, and SAE J1979-DA 202104, "Digital Annex of E/E Diagnostic Test Modes", Issued 2021-04 defined data from all hybrid vehicles required to have OBDII systems and shall report the data to the Cal-VIS software.

Connectivity Rate

Regarding the following Connectivity Rate requirements, BAR understands and acknowledges that on a per vehicle basis, successful communication may not be technically possible. This may be due to physically broken components required for communications such as diagnostic connectors or wiring. For the purposes of determining the connectivity rate and to the extent identifiable, BAR intends to exclude these vehicles from the calculation. However, to the extent technically feasible, BAR does not intend to exclude vehicles from the calculation that, by design, are not necessarily within applicable SAE/ISO specifications. The DAD Vendor will be expected to provide a solution that can accommodate noncompliant vehicles to the extent feasible and BAR will exclude specific vehicles only upon request by the DAD Vendor and approval by BAR with data supporting that the specific vehicles are noncompliant and there is no technically feasible solution (e.g., there is no change possible in the DAD software or hardware that would allow communication to successfully occur, necessary hardware or software changes to accommodate the vehicle can be shown to cause communication problems with other compliant vehicles, etc.). BAR may publish Connectivity Rates of any and all DAD Vendor(s).

3.2.16. The DAD Vendor shall provide the necessary hardware, firmware, and software to ensure the Model Year 1996 – 1999 non-diesel fueled vehicles maintain a priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

3.2.16.1. The DAD Vendor shall maintain a non-priority one data connectivity

rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

BAR shall adjust these connectivity rates in zero-point one zero percent (0.10%) increments to ensure uniform and consistent tests. The connectivity rate shall be lowered if all DADs by all DAD Vendors are technically incapable of retrieving all of the data. Both connectivity rates are set initially to ninety-nine-point nine zero percent (99.90%) but can be adjusted independently of each other.

For example, the priority one data connectivity rate could be set to 99.90% while the connectivity rate for non-priority one data could be set to 99.10%. Priority one data is defined under the "Successful Communication" section.

3.2.17.   The DAD Vendor shall provide the necessary hardware, firmware, and software to ensure the Model Year 1998 – 2003 diesel fueled vehicles maintain a priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

    3.2.17.1. The DAD Vendor shall maintain a non-priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

BAR shall adjust these connectivity rates in zero-point one zero percent (0.10%) increments to ensure uniform and consistent tests. The connectivity rate shall be lowered if all DADs by all DAD Vendors are technically incapable of retrieving all of the data. Both connectivity rates are set initially to ninety-nine-point nine zero percent (99.90%) but can be adjusted independently of each other.

For example, the priority one data connectivity rate could be set to 99.90% while the connectivity rate for non-priority one data could be set to 99.10%. Priority one data is defined under the "Successful Communication" section.

3.2.18.   The DAD Vendor shall provide the necessary hardware, firmware, and software to ensure the Model Year 2000 and later non-diesel fueled vehicles maintain a priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

3.2.18.1. The DAD Vendor shall maintain a non-priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

BAR shall adjust these connectivity rates in zero-point one zero percent (0.10%) increments to ensure uniform and consistent tests. The connectivity rate shall be lowered if all DADs by all DAD Vendors are technically incapable of retrieving all of the data. Both connectivity rates are set initially to ninety-nine-point nine zero percent (99.90%) but can be adjusted independently of each other.

For example, the priority one data connectivity rate could be set to 99.90% while the connectivity rate for non-priority one data could be set to 99.10%. Priority one data is defined under the "Successful Communication" section.

3.2.19. The DAD Vendor shall provide the necessary hardware, firmware, and software to ensure the Model Year 2004 and later diesel fueled vehicles maintain a priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

3.2.19.1. The DAD Vendor shall maintain a non-priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

BAR shall adjust these connectivity rates in zero-point one zero percent (0.10%) increments to ensure uniform and consistent tests. The connectivity rate shall be lowered if all DADs by all DAD Vendors are technically incapable of retrieving all of the data. Both connectivity rates are set initially to ninety-nine-point nine zero percent (99.90%) but can be adjusted independently of each other.

For example, the priority one data connectivity rate could be set to 99.90% while the connectivity rate for non-priority one data could be set to 99.10%. Priority one data is defined under the "Successful Communication" section.

3.2.20. The DAD Vendor shall provide the necessary hardware, firmware, and software to ensure vehicles that only communicate on UDS OBD protocol maintain a priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

3.2.20.1. The DAD Vendor shall maintain a non-priority one data connectivity rate of ninety-nine-point nine zero percent (99.90%), which includes providing the necessary accommodations for vehicles noncompliant with the required SAE and ISO standards as specified by the ARB OBDII regulation (title 13, California Code of Regulations, sections 1968.1 and 1968.2).

BAR shall adjust these connectivity rates in zero-point one zero percent (0.10%) increments to ensure uniform and consistent tests. The connectivity rate shall be lowered if all DADs by all DAD Vendors are technically incapable of retrieving all of the data. Both connectivity rates are set initially to ninety-nine-point nine zero percent (99.90%) but can be adjusted independently of each other.

For example, the priority one data connectivity rate could be set to 99.90% while the connectivity rate for non-priority one data could be set to 99.10%. Priority one data is defined under the "Successful Communication" section.

3.2.21. The DAD connectivity rates shall be based on OBDII certified vehicles subject to the California Smog Check Program.

3.2.22. The DAD shall not exclude an entire vehicle make, model or manufacturer, even though the overall connectivity rate is satisfied (e.g., Toyota Camry or Ferrari).

3.2.23. For a vehicle to be exempted from the Connectivity Rate calculation, the DAD Vendor shall submit a request to and obtain approval from BAR.

3.2.23.1. The submitted request shall contain the technical reasons and supporting data that explains why the vehicle did not communicate.

Successful Communication

A successful communication, for purposes of this document (i.e., for determining a successful event in calculating the Connectivity Rate per the previous sections), shall be defined as when:

3.2.24. The DAD retrieves per SAE/ISO specifications and this document, all the data supported on a vehicle and requested by the Cal-VIS software from all OBD-related electronic control units (ECU)s on the vehicle. Note: there are two standards depending on the data. Priority one standard shown below, and all other data.

3.2.24.1. For vehicles which use the OBDII communication services $01 to $0A (OBD Classic vehicles), priority one data is the following data: Mode $01 PID $00, Mode $01 PID $01, Mode $01 PID $1C, Mode $03, Mode $09 info type $00, Mode $09 info type $01, Mode $09 info

type $02, and Mode $0A.

3.2.24.2. For UDS OBDII vehicles, priority one data is the following data: Service $22 support DIDs $F400, $F420, $F440, $460, $480, $F500; Service $22 DID $F501: Service $22 DID $F401 (if it is supported); Service $22 DID $F41C: Service $22 DID $F40C; Service $22 DID $F800; Service $22 DID $F801; Service $22 DID $F802; Service $19 DTCInformationType $42 FunctionalGroupIdentifier $33 DTCStatusMask $08 DTCSeverityMask $02; Service $19 DTCInformationType $42 FunctionalGroupIdentifier $33 DTCStatusMask $04 DTCSeverityMask $02; Service $19 DTCInformationType $55 FunctionalGroupIdentifier $33. UDS OBD is a subset of UDS services which are defined in ISO 14229-1 and specified by ISO 27145.

3.2.24.3. For the purposes of this requirement, 'supported on a vehicle' shall be defined as data/parameters indicated as supported by one or more ECUs on the vehicle and sent by each applicable ECU to the DAD upon receiving a request per the SAE/ISO standards and this document.

3.2.25. The DAD accurately transmits the data requested by the Cal-VIS software.

Communication Protocols

3.2.26. The DAD shall be capable of communicating with vehicles using ISO 9141-2:1994 amended 1:1996, dated 1996-12 (5 baud initialization, 10.4 kbaud compatible) communication protocol.

3.2.26.1. The DAD shall perform initialization in a manner compliant with the document "Volkswagen Group of America K-Line Communication Description", Version 3.0, dated 11/20/09 and produced by Volkswagen Group of America, available from BAR upon request.

3.2.26.2. Regardless of whether the received keywords from the vehicle are $08 08 (indicating P2 min = 25msec) or $94 94 (indicating P2 min = 0 msec), the DAD shall use a P2min of 0 msec (e.g., shall be prepared to accept responses from a vehicle using keywords $08 08 that are received before 25 msecs).

3.2.27. The DAD shall be capable of communicating with vehicles using SAE J1850, 200606, Class B Data Communication Network Interface, Reaffirmed 2006-06, Variable Pulse Width (10.4 kbaud compatible) communication protocol.

3.2.27.1. Vehicles that respond to SAE J1850, 200606, Class B Data Communication Network Interface, Reaffirmed 2006-06 requests

from the DAD with either the correct header bytes of $48 6B addr where 'addr' is the address of the responding ECU or the incorrect header bytes of $68 6B addr shall be considered J1850 compliant by the DAD and vehicle ECU responses with either header bytes shall be accepted as valid vehicle responses.

3.2.28.   The DAD shall be capable of communicating with vehicles using SAE J1850 200606, Class B Data Communication Network Interface, Reaffirmed 2006-06, Pulse Width Modulation (41.6 kbaud compatible) communication protocol.

   3.2.28.1. Vehicles that respond to SAE J1850 200606, Class B Data Communication Network Interface, Reaffirmed 2006-06 requests from the DAD with either the correct header bytes of $41 6B addr where 'addr' is the address of the responding ECU or the incorrect header bytes of $61 6B addr shall be considered J1850 compliant by the DAD and vehicle ECU responses with either header bytes shall be accepted as valid vehicle responses.

3.2.29.   The DAD shall be capable of communicating with vehicles using ISO 14230-4: Road vehicles - Diagnostic systems - Keyword protocol 2000 - Part 4: Requirements for emission-related systems, dated 2000-06-01, (both 5-baud 'slow' initialization and 10.4 kbaud 'fast' initialization) communication protocol.

   3.2.29.1. The DAD shall perform initialization in a manner compliant with the document "Volkswagen Group of America K-Line Communication Description", Version 3.0, dated 11/20/09 referenced above.

   3.2.29.2. The DAD shall perform initialization in a manner compliant with the document "Keyword Protocol 2000 Data Link Layer Recommended Practice", Version 1.5, dated October 1, 1997 and available from BAR upon request.

   3.2.29.3. With respect to 'fast' initialization, regardless of keywords received from the vehicle (i.e., compliant keywords per ISO 14230-4: Road vehicles - Diagnostic systems - Keyword protocol 2000 - Part 4: Requirements for emission-related systems, dated 2000-06-01, section 4.4 StartCommunication service, noncompliant keywords, or even missing keywords), if the DAD receives a positive StartCommunication response from the vehicle, the DAD shall use the functionality of keyword $8FE9 (decimal 2025) for messages sent to the vehicle and attempt further communications as if compliant keywords were received.

3.2.30.   The DAD shall be capable of communicating with vehicles using raw Controller Area Network (CAN) (11 bit header, 500 kbaud compatible) communication protocol.

3.2.31. The DAD shall be capable of communicating with vehicles using raw CAN (29 bit header, 500 kbaud compatible) communication protocol.

3.2.32. The DAD shall be capable of communicating with vehicles using ISO 15765-4: Road vehicles - Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emissions-related systems, dated 2021-07, (11 bit header, 500 kbaud compatible) communication protocol.

    3.2.32.1. The DAD shall implement CAN in a manner consistent with the document "A summary of the most common mistakes when implementing the OBD on CAN (ISO15765-4) initialization sequence" written by DaimlerChrysler AG, Mercedes Car Group Vehicle Diagnostic Engineering and available from BAR upon request.

3.2.33. The DAD shall be capable of communicating with vehicles using ISO 15765-4: Road vehicles - Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emissions-related systems, dated 2021-07, (29 bit header, 500 kbaud compatible) communication protocol.

3.2.34. The DAD shall be capable of communicating with vehicles using SAE J1979-2, 202104, E/E Diagnostic Test Modes: OBDonUDS", issued 2021-04, UDS communication protocol.

3.2.35. The DAD determination of the communication protocol with the vehicle shall be automatic and fully integrated into the DAD hardware, firmware, and software.

Initialization Sequence

3.2.36. The DAD shall have a default communication protocol sequence(s) for the order in which the various communication protocols are attempted when establishing communication with the vehicle.

    3.2.36.1. The DAD Vendor shall select the default communication protocol sequence(s) because of demonstrated high success rates.

    3.2.36.2. The default communication protocol sequence(s) shall be provided to BAR in writing prior to DAD Certification.

    3.2.36.3. The default communication protocol sequence(s) shall be provided to BAR in writing upon request.

3.2.37. Prior to initialization, the DAD may be sent the preferred communication protocol sequence by the Cal-VIS software. If the DAD is sent the preferred communication protocol sequence, the DAD shall first attempt to establish communication with the vehicle using this preferred communication protocol sequence.

3.2.37.1. If the DAD is not sent a preferred communication protocol sequence, the DAD shall use the default communication protocol sequence.

3.2.37.2. If the DAD is sent a preferred communication protocol sequence, and the vehicle fails to communicate with the DAD, the DAD shall use the default communication protocol sequence(s).

3.2.38. The DAD, in coordination with the Cal-VIS software, shall conduct initialization in a manner that maximizes the successful communication with vehicles.

3.2.39. If the DAD establishes communication (e.g., positive response to a Mode $01 Parameter ID (PID) $00 request or a positive StartCommunication response received for OBD Classic) with one (1) or more ECUs on the vehicle:

3.2.39.1. The DAD shall request all received responses to a Mode $01 PID $00 request when requested by the Cal-VIS software and if no vehicle ECU supports any Mode $01 PIDs from $00-$20 (e.g., all received responses are all zeros indicating no supported PIDs):

3.2.39.1.1. The DAD shall again request Mode $01 PID $00 to see if any non-zero responses are received. If at least one (1) ECU responds with support for some Mode $01 PIDs, the DAD shall proceed with the inspection/data collection when requested by the Cal-VIS software. If all the received responses still indicate no supported PIDs, the DAD shall terminate communication (e.g., use of a StopCommunication message or allow P3 to expire on ISO 9141 and ISO 14230 protocols) and then attempt to initialize communication with the vehicle beginning with the next protocol in the sequence (e.g., if communication was established in ISO 14230 but all ECU responses indicated no Mode $01 PIDs were supported, ISO 14230 communication shall be terminated and then the DAD shall attempt to initialize with the next protocol (e.g., J1850 PWM, etc.)) such that initialization on ISO 14230 will be attempted again only after all other protocols have been tried.

3.2.39.2. The DAD shall request and transmit all received responses to a Mode $01 PID $01 request when requested by the Cal-VIS software.

3.2.39.3. If the Cal-VIS software determines that all the received responses still indicate support only for comprehensive components, the Cal-VIS

software will command that the DAD shall terminate communication (e.g., use of a StopCommunication message or allow P3 to expire on ISO 9141 and ISO 14230 protocols) and then attempt to initialize communication with the vehicle beginning with the next protocol in the sequence (e.g., if communication was established in ISO 14230 but all ECU responses indicated only comprehensive components were supported, ISO 14230 communication shall be terminated and then the DAD shall attempt to initialize with the next protocol (e.g., J1850 PWM, etc.)) such that initialization on ISO 14230 will be attempted again only after all other protocols have been tried.

Negative Response Codes

3.2.40. For ISO 15765-4 protocol:

    3.2.40.1. The DAD shall handle negative response codes per Table 11 of SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02.

    3.2.40.2. Additionally, for response code $78-Request correctly received-response pending, upon receipt of a $78 for any request made by the DAD (i.e., any mode, any PID, InfoType, etc…, regardless of whether SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02 allows that response code for that request), the DAD shall pass $78 to the Cal-VIS software and shall upon notification from the Cal-VIS software reset to a wait time sent from the Cal-VIS software and wait for the response from the vehicle.

    3.2.40.3. The DAD shall accept consecutive $78 response messages (each one resulting in a reset of P2 and waiting an additional P2max until the max wait time sent by the Cal-VIS software is met) then giving up and moving on to collect other data.

    3.2.40.4. The DAD shall give up on the request, when instructed by the Cal-VIS software.

    3.2.40.5. For response code $22- Conditions not correct, the DAD shall give up on collecting that data item and move on to collecting other data when instructed by the Cal-VIS software.

    3.2.40.6. The DAD shall return the negative response code $22 to the Cal-VIS software as the result for the requested item in cases where the DAD received a $22 instead of a valid response with actual data.

3.2.41. For all other OBD classic protocols:

    3.2.41.1. The DAD shall handle negative response codes per Table 10 of SAE J1979 201702, "E/E Diagnostic Test Modes", revised 2017-02.

Not Supported, Not Available, Not Valid Items

3.2.42.   Whenever data is requested by the Cal-VIS software and the only responses received from ECUs are invalid responses (e.g., the data does not have the expected number of data bytes, error checking indications indicate the data was not properly received, data collisions that cannot be reconciled with data collision handling specified in the applicable protocol specifications, etc.), the DAD shall report the invalid responses to the Cal-VIS software.

3.2.43.   The DAD shall NOT request data from the vehicle unless the specific data is requested by the Cal-VIS software.

ECU Address Format

3.2.44.   The DAD shall identify the ECU address for each data item it transmits to the Cal-VIS software.

3.2.44.1. The ECU Address format shall only apply to addresses not transmitted directly to the Cal-VIS software by the J2534 dll.

3.2.44.2. For the ISO 15765-4 11-bit header protocol, the ECU Address shall be reported as Hex represented as ASCII with a value between 07E8 and 07EF (i.e., vehicle ECU using CAN identifier of $07E8 shall reported as 07E8 to the Cal-VIS software).

3.2.44.3. For all other OBD classic protocols, the ECU Address shall be reported as Hex represented as ASCII with a value between 00 and FF (i.e., vehicle ECU with an address of $0A shall be reported as 0A to the Cal-VIS software).

Protocol Name Format

3.2.45.   If the DAD Vendor uses a non-standard protocol or a permutation of a standard protocol to communicate with 'Problem Vehicles', the DAD Vendor shall define each unique non-standard protocol name in conjunction with BAR's Cal-VIS software Contractor and BAR.

OBD Classic Data Collection

3.2.46.   For OBD Classic Vehicles, the DAD shall collect OBDII data from the vehicle per the Cal-VIS software request.

UDS OBD Data Collection

3.2.47.   For UDS OBD vehicles, the DAD shall collect OBDII data from the vehicle per the Cal-VIS software request.

3.2.47.1. The DAD shall properly assemble, as indicated in the messages themselves, multiple frame messages.

Physical Hardware

Cabling

3.2.48. The cable between the DAD and the OIS computer shall be sufficient to transmit the data specified throughout this document.

3.2.49. The cable between the DAD and the SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07 Type A or Type B vehicle connector shall not exceed six (6) feet.

3.2.50. The DAD cable sheathing shall be of a material that will not leave markings on vehicle paint.

3.2.51. The DAD cable connectors shall be equipped with strain reliefs.

Identification

3.2.52. The DAD shall be equipped with external identification that displays the unique, sequential serial number.

3.2.52.1. The DAD external serial number shall be readable when the DAD is used to perform vehicle inspections.

3.2.52.1.1. If a label needs to be replaced, the DAD Vendor shall replace the label.

3.2.52.1.1.1. The replacement label shall be the same type and appearance label affixed to the DAD submitted for certification.

3.2.53. The DAD serial number shall not match any other device made by the DAD Vendor, even if the other device is not used in California's vehicle inspection programs.

3.2.54. The unique sequential serial number on the exterior shall match the unique, sequential, electronic serial number.

3.2.55. Each DAD shall include a unique, sequential, electronic serial number at the hardware level that is unique to the DAD.

3.2.56. The DAD unique, sequential, electronic serial number shall be sent to the Cal-VIS software upon request.

3.2.57. The format of the serial number shall be XXNNNNNN where the 'XX' are

two alpha characters, assigned by BAR, that uniquely identify the DAD Vendor, followed by six numbers that shall start with '000001' and increase sequentially with each additional DAD.

3.2.57.1. For each DAD Vendor, the two alpha character serial number prefix shall be different for each DAD hardware revision.

3.2.58. The DAD Vendor shall set the metadata on the DLL files.

3.2.58.1. The metadata shall include: 'file version', 'assembly version', 'description', company name' and 'product name'.

3.2.59. The DAD Vendor shall sign all DLLs and binary files.

3.2.59.1. The certificate used for signing the files shall be from a trusted Microsoft Windows authority.

Durability

3.2.60. Configured with cables connected and loosely coiled, the DAD shall withstand three (3) consecutive drops onto a concrete floor from a height of forty-eight inches (48") and continue to meet all requirements.

Connectors

3.2.61. The DAD's connection to the vehicle's OBDII port shall conform to SAE J1962, 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07, "External Test Equipment Connector Type A" or "External Test Equipment Connector Type B" and "Vehicle Connector Type A" or "Vehicle Connector Type B".

3.2.62. If the DAD uses a Type B connector, the DAD shall be designed to not be harmed when connected to a vehicle's Type A OBDII port.

3.2.63. The pins used in the DAD's connectors shall have all edges "broken" (chamfered or rolled edges), in such that, the mating vehicle connector is not damaged. ISO 2768-1: General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications, dated 1989-11-15 and SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07.

DAD Functionality Check

3.2.64. The DAD shall include a mechanism to ensure that the DAD is functional during a vehicle inspection. [The intent of this functionality check is to verify that the DAD is functional and that the hardware has not been damaged since the previous vehicle inspection].

3.2.64.1. The mechanism shall verify the integrity of the DAD cable from the DAD SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07 connector up to the DAD device/processor.

   3.2.64.1.1. The mechanism shall verify the DAD's ability to communicate with the vehicle on every required OBD protocol.

3.2.64.2. The mechanism shall verify the integrity of the ADS.

3.2.64.3. The mechanism shall verify the integrity of the GNSS Receiver.

   3.2.64.3.1. The mechanism shall verify communication from the GNSS Receiver.

   3.2.64.3.2. The mechanism shall verify data downloaded from the GNSS Receiver.

3.2.64.4. The mechanism shall verify the resistance check functionality and include the entire DAD to vehicle cable including the DAD's J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07 connector.

3.2.64.5. The mechanism shall, by design, ensure that it cannot be used to simulate a successful vehicle inspection in lieu of an actual vehicle.

3.2.64.6. The DAD shall have a tamper detection mechanism.

   3.2.64.6.1. The tamper detection mechanism shall indicate to the Cal- VIS software a tampered status when access to the DAD internal physical components was attempted by an unauthorized party.

   3.2.64.6.2. The tamper detection mechanism shall indicate to the Cal- VIS software a tampered status when reading of the DAD firmware was attempted by an unauthorized party.

   3.2.64.6.3. The tamper detection mechanism shall store the tamper status in a manner that cannot be erased by removing power (also known as a 'non-volatile' memory) within the DAD housing.

   3.2.64.6.4. When the DAD's main battery is fully discharged, and the DAD is not powered externally, the tamper detection mechanism shall set a tampered status when

a tamper is done.

    3.2.64.6.5. Once a tamper has been detected, the tamper detection mechanism shall only indicate to the Cal-VIS software that the tamper status no longer exists after the DAD has been inspected and quality control checks have been successfully completed by the DAD Vendor at the DAD Vendor's facility.

    3.2.64.6.6. Once a tamper has been detected and not cleared, the DAD shall be unusable for a vehicle inspection.

        3.2.64.6.6.1. If a tamper has been detected and not cleared, all Cal-VIS software calls to the DAD for OBD data or vehicle communications shall return an error for "Tampered".

3.2.65. The DAD shall perform the functionality check when requested by the Cal-VIS software.

3.2.66. The DAD functionality check results shall be electronically reported to the Cal-VIS software.

3.2.67. The DAD Vendor shall report to BAR within 48 hours the DADs that have been returned to them as tampered along with the details.

3.2.68. If the DAD Vendor wishes to return the broken or tampered DAD to service, the DAD Vendor must repair the DAD including all indications of physical damage and inform BAR they wish to have the DAD unlocked.

    3.2.68.1. A broken or tampered DAD shall not be repaired in the field.

DAD General Electrical

3.2.69. The DAD shall protect its circuitry from electrical damage caused by vehicles in compliance with the SAE J1978 200204, "OBD II Scan Tool - Equivalent to ISO/DIS 15031-4: December 14, 2001", revised 2002-04 specification.

3.2.70. The DAD shall contain a battery capable of powering the DAD for a minimum of ten (10) minutes while trying to obtain a GNSS fix.

3.2.71. The DAD shall not require power to be present on pin-16 in order to communicate with the vehicle.

    3.2.71.1. The DAD may use power if it is present on pin-16 but shall not require it to be present.

3.2.71.2. If power is not present on pin-16 the DAD shall be supplied with an alternate means of powering.

3.2.71.3. Alternate power sources must be approved by BAR.

3.2.71.4. The DAD shall have some method of notifying the user that power or ground is not available at the SAE J1962 201607, "Diagnostic Connector - Equivalent to ISO/DIS 15031-3: December 14, 2001", revised 2016-07 Type A or Type B vehicle connector when the alternate power or ground source requires user action to activate it and/or make an additional connection. This method must be approved by BAR.

3.2.72. The DAD shall utilize pin-5 (signal ground) for the signal ground to establish and maintain communication with the vehicle if pin-5 is connected to ground.

3.2.72.1. If ground is not present on pin-5, the DAD shall be supplied with an alternate means of grounding.

3.2.73. The DAD shall retrieve data from an OBDII system while being subjected to Radio Frequency Interference (RFI) or Electromagnetic Interference (EMI) caused by vehicles under test, and/or other station EMI/RFI generators, such as air compressors and arc welding equipment.

3.2.74. If wireless technology is used, there shall be no loss of communication between the transmitter and receiver when they are within thirty feet (30') of each other.

3.2.74.1. There shall be no loss of communication between the DAD transmitter and receiver while either the DAD transmitter and/or receiver is within three feet (3') of a BAR-97 Certified chassis dynamometer's Power Absorption Unit (PAU) during loaded operation.

3.2.74.2. There shall be no loss of communication between the DAD transmitter and receiver while either the DAD transmitter and/or receiver is within two feet 2' of a vehicle engine's Original Equipment Manufacturer (OEM) (not modified) electronic engine controls, while the vehicle's engine is running.

3.2.74.3. There shall be no loss of communication between the DAD transmitter and receiver, while either the DAD transmitter and/or receiver are within five feet (5') of a five horsepower (5-hp.) Alternating Current (AC) electric motor.

3.2.74.4. There shall be no loss of communication between the DAD transmitter and receiver, while either the DAD transmitter and/or

receiver are subjected to Citizen's Band (CB), Emergency Band, or other types of radio transmissions.

4. FUNCTIONAL VALIDATION TESTS

BAR will verify that each requirement of this specification has been met. This section includes requirements and a sampling of the testing that may be done.

4.1 Testing

4.1.1.   Inspection of materials and fasteners: Pass = Verify that the materials used in construction are resistant to corrosion and abrasion.

4.1.2.   Inspection of electrical connectors: Pass = Verify that the electrical connectors utilized coincide with connectors specified in the document.

4.1.3.   Inspection of strain reliefs: Pass = Verify that strain reliefs are used on all connections.

4.1.4.   All tests shall be performed both while the DAD is powered on and off and has been soaked for eight (8) hours at standard ambient conditions (or simulated ambient conditions) ranging from twenty degrees (20°) to one hundred thirty degrees (130°), Fahrenheit (F).

   4.1.4.1.   Drop test onto concrete floor three times from a height of forty-eight inches (48"). Pass = Verify that the DAD is fully functional after the final drop.

   4.1.4.2.   Apply battery voltage of up to thirty-two point zero (32.0) V DC +/- one (1) V for a minimum of ten (10) minutes with the positive voltage applied to pin-16 and ground applied at pin-5 (signal ground), of the J1962 diagnostic connector. Pass = Verify that the DAD is fully functional after the end of the test.

   4.1.4.3.   Apply battery voltage of up to thirty-two point zero (32.0) V DC +/- one (1) V for a minimum of ten (10) minutes with ground applied to pin-16 and the positive battery voltage applied at pin-5 (signal ground), of the J1962 diagnostic connector. Pass = Verify that the DAD is fully functional after the end of the test.

   4.1.4.4.   Apply battery voltage ranging from eight point zero (8.0) to fifteen point zero (15.0) V DC +/- one (1) V for a minimum of five (5) minutes, positive voltage applied at pin-7 and pin-15 and ground applied at pin-5 (signal ground), of the J1962 diagnostic connector. Pass = Verify that the DAD is fully functional after the end of the test.

4.1.5.   Automatic (without user intervention) DAD boot up upon OIS computer start.

4.1.6.   Successful initialization / communication with all OBDII relevant ECUs and retrieve all of the OBDII data requested.

4.1.7.   Successful transmission of all requested OBDII data from all OBDII relevant ECUs to the Cal-VIS software.

4.1.8.   Successful update of the DAD firmware and software using the DAD Vendor's proposed mechanism.

4.1.9.   If wireless technology is used, there shall be no loss of communication between the transmitter and receiver when they are within thirty feet (30') of each other.

4.1.10. If wireless technology is used, there shall be no loss of communication between the transmitter and receiver while either the DAD transmitter and/or receiver is within three feet (3') of the chassis dynamometer's PAU during loaded operation.

4.1.11. If wireless technology is used, there shall be no loss of communication between the transmitter and receiver while either the DAD transmitter and/or receiver is within two feet (2') of a vehicle engine's OEM (not modified) electronic engine controls, while the vehicle's engine is running.

4.1.12. If wireless technology is used, there shall be no loss of communication between the transmitter and receiver while either the DAD transmitter and/or receiver is within five feet (5') of a five horsepower (5-hp.) Alternating Current (AC) electric motor.

4.1.13. If wireless technology is used, there shall be no loss of communication between the transmitter and receiver while either the DAD transmitter and/or receiver is within a closed vehicle with the windows up.

4.1.14. Satellite availability shall be determined by a BAR supplied GNSS device.

4.1.15. Proof of DAD operation without connecting to non-BAR approved internet sites shall be performed by restricting the Internet Protocol (IP) range that the Cal-VIS software may access.

4.1.16. The DAD shall be presented with a pure sine wave with an amplitude of 5 V and a frequency of 500 kHz, on one of the DLC pins. The ADS shall be commanded to collect 500 msec of data on the DLC pin at 50 MS/s. This data shall be compared against a NIST traceable oscilloscope (BAR is currently using a Rigol DS6104 for certification) at 50 MS/s sampling the same waveform. The samples shall be within 1% of the samples taken by the "comparison scope".

5. CERTIFICATION, ANNUAL RECERTIFICATION AND DECERTIFICATION/CITATION

Prior to the beginning of the Certification Testing Event, BAR will make available a Testing environment (Sandbox) for the DAD Vendors use.

5.1 Certification

On a showing of interest by means of written requests to BAR from DAD Vendors, BAR shall conduct the Certification Testing Event no more than annually. BAR reserves the right to schedule additional Certification Testing Events as program needs dictate.

BAR shall charge a Certification Testing Fee for each Certification Testing Event.

If both a wired and wireless DAD configuration are submitted during the same Certification Testing Event, they will be tested for a single Certification Testing Fee.

The DAD Certification Testing Fee shall be fixed by the department based upon its actual costs of the Certification Testing Event, shall be calculated from the time that the equipment is submitted for testing until the time that the Certification Testing Event is complete, and shall in no event exceed the dollar limit specified in Section 44036(b)(2) of the Health and Safety Code.

BAR will accept DADs for the Certification Testing Event during a two (2) week collection period, as designated by BAR. At the conclusion of this collection period, BAR will close the Certification Testing Event and no additional Certification Submittal Packages will be accepted.

5.1.1.　All DADs submitted for the Certification Testing Event shall be the full and current configuration proposed for sale. PARTIAL, DATED, OR INCOMPLETE MODELS ARE NOT ACCEPTABLE and shall be returned to the DAD Vendor if submitted.

5.1.2　To apply for the Certification Testing Event, the DAD Vendor shall contact BAR at the contact information provided under Section 5.2 Annual Recertification located later in this document and shall request a Certification Submittal Package.

5.1.3　The DAD Vendor shall submit a Certification Submittal Package to BAR, which shall contain:

5.1.3.1.　A completed Application for Certification form which shall collect the following information: DAD Vendor name, DAD Vendor address, DAD Vendor phone number, DAD Vendor email address, DAD Vendor website, DAD make name or number, DAD model name or number,

DAD hardware version, DAD firmware version, DAD software version, DAD serial numbers, DAD Vendor supplied computer model and serial number. In addition, if applicable: partnering company(ies) name, partnering company(ies) address, partnering company(ies) phone number, partnering company(ies) email address, partnering company(ies) website, and partnering company(ies) role(s). Certification that the undersigned hereby certifies, to the best of his/her knowledge, that the above equipment submitted for testing and evaluation has been designed and tested in accordance with the California Vehicle Inspection System Data Acquisition Device Specification, and all subsequent addenda, and that they meet all of the requirements contained therein. The signature of the person representing the DAD Vendor. The date the Application for Certification form was signed.

5.1.3.2. A copy of the DAD Vendor's retailer's seller's permit or certification of registration issued by the State of California's Board of Equalization.

5.1.3.3. A Check or Money Order, payable to the Department of Consumer Affairs "DCA" for the DAD Certification Fee.

5.1.3.4. To assist in the Certification Testing Event, the DAD Vendor shall supply BAR with the following: laptop computer with login credentials, DAD user guide with a description of the user interface, all end user documentation, DAD setup and operation instructions, all DAD related drivers, documentation showing installation of DAD drivers, latest version of the DAD firmware, latest version of the DAD software, documentation showing setup and use of the DAD software including DAD self-test, documentation showing the installation, removal, and downgrade of DAD drivers and software, photos of the DAD with all accessories, documentation of any known abnormal interaction with vehicles.

5.1.4. The DAD Vendor shall submit one hard copy of the Certification Submittal Package to BAR.

5.1.4.1. The DAD Vendor shall submit additional hard copies of the Certification Submittal Package when requested by BAR.

5.1.5. The DAD Vendor shall submit one electronic copy of the Certification Submittal Package to BAR in portable document format (pdf).

5.1.6. The DAD Vendor shall certify that the DAD submitted for the Certification Testing Event complies with all applicable California and Federal administrative, safety, ergonomic, licensing, and DAD specification requirements. Ignorance of the law is no excuse for noncompliance.

The DAD Certification Submittal Package and its contents will be treated by BAR as confidential and will be kept secured. The DAD Certification Testing Fee shall cover up to two (2) attempts in each phase; additional testing will require additional fees.

Once accepted for the Certification Testing Event, BAR DAD Certification will be done in two (2) phases, Alpha Testing and Beta Testing. The DAD Vendor will have two attempts to pass each phase of testing.

In the first phase (Alpha Testing), the DAD will be tested by BAR and/or its designee in a laboratory setting.

For the Alpha Testing:

5.1.7.   The DAD Vendor shall provide BAR with ten (10) DADs with a single hardware/firmware/software version.

    5.1.7.1. If the DAD Vendor is seeking certification for DADs with multiple connection means (i.e., wireless with different connection means (i.e., Wi- Fi. Bluetooth), wired with different connection means (i.e., Ethernet, USB)), the DAD Vendor shall provide BAR with five (5) DADs for each connection means.

5.1.8.   All DADs and equipment supplied to BAR by the DAD Vendor shall become and remain the property of BAR, except as detailed below.

    5.1.8.1. The DAD Vendor shall maintain all DADs and equipment supplied to BAR free of charge for the duration of the DAD Certification period of one year plus any recertification period.

        5.1.8.1.1. The DAD Vendor shall complete maintenance within 72 hours of BAR call for service.

        5.1.8.1.2. The DAD Vendor shall visit BAR in person to perform maintenance if not possible remotely.

5.1.9.   The DAD Vendor shall provide BAR with one (1) Laptop computer for use during Alpha Testing, which shall be returned to the DAD Vendor upon the completion of Alpha Testing.

The Alpha Testing will determine if the DAD successfully communicates with BAR simulators and/or in-use vehicles, collects the requested data and meets other selected requirements of this DAD specification.

After all Alpha Testing has been completed BAR will issue results to the DAD Vendor. If the DAD passes Alpha Testing, the DAD will proceed onto Beta Testing. If the DAD fails the first attempt of Alpha Testing, the DAD will be returned to the DAD Vendor. The failed DAD may have its deficiencies addressed and may be resubmitted for a second attempt of Alpha Testing within 90 days from the date of

failure. If the failed DAD is resubmitted for a second attempt of Alpha Testing, the DAD Vendor shall submit the revised DADs along with a new Certification Submittal Package, excluding the DAD Certification Testing Fee.

If the DAD fails Alpha Testing on the second attempt, the DAD has failed the Certification Testing Event and will be returned to the DAD Vendor and shall not be eligible for additional testing in the current Certification Testing Event.

The failed DAD may have its deficiencies addressed and may be submitted during the next Certification Testing Event collection period. If the failed DAD is submitted again, the DAD Vendor shall submit a new Certification Submittal Package, including the DAD Certification Testing Fee.

In the second phase (Beta Testing), the DAD will be deployed at California Smog Check stations and used to collect data from in-use vehicles. BAR may require a minimum sample size for each of the model year and fuel type groups covered under Connectivity Rate.

The DADs shall meet the Connectivity Rate in order to pass Beta Testing.

BAR will begin counting test records upon activation of all required DADs in each Beta Testing step (Sacramento Region Testing and Statewide Testing).

5.1.10.   The DAD Vendor shall be responsible for finding Smog Check stations willing to partner with the DAD Vendor for Beta Testing.

5.1.11. The DAD Vendor shall email BAR the chosen Smog Check stations.

    5.1.11.1. The chosen Smog Check stations shall be subject to BAR approval. BAR's approval is based on the Smog Check station following vehicle inspection procedures as specified in the Smog Check Manual.

    5.1.11.2. BAR may remove Smog Check stations from Beta status if they fail to follow vehicle inspection procedures as specified in the Smog Check Manual.

5.1.12.   The DAD Vendor shall deploy ten (10) DADs to the BAR approved Smog Check stations in the Sacramento Region for the collection of the first one thousand five hundred (1,500) test records.

    5.1.12.1. For the Sacramento Region collection of the first one thousand five hundred (1,500) test records, the DAD Vendor shall collect an equal number of test records by each of the available DAD connection means (wired and wireless if both have been submitted to BAR).

5.1.12.1.1. If the wired DAD submitted can be connected by multiple means (i.e., Ethernet and USB), the DAD Vendor shall collect an equal number of test records by each of the wired connection means.

5.1.12.1.2. If the wireless DAD submitted can be connected by multiple means (i.e., Wi-Fi and Bluetooth), the DAD Vendor shall collect an equal number of test records by each of the wireless connection means.

5.1.13. Following the collection of these one thousand five hundred (1,500) test records and with agreement from BAR, the DAD Vendor shall deploy a minimum of an additional forty (40) DADs to the field statewide for the collection of the remaining test records.

5.1.13.1. For the Statewide Testing, the DAD Vendor shall collect an equal number of test records by each of the available DAD connection means (wired and wireless if both have been submitted to BAR).

5.1.13.1.1. If the wired DAD submitted can be connected by multiple means (i.e., Ethernet and USB), the DAD Vendor shall collect an equal number of test records by each of the wired connection means.

5.1.13.1.2. If the wireless DAD submitted can be connected by multiple means (i.e., Wi-Fi and Bluetooth), the DAD Vendor shall collect an equal number of test records by each of the wireless connection means.

BAR may approve the use of additional DADs above the minimum for use during Beta testing. During Beta Testing, BAR will continuously monitor for compliance with this DAD specification. If BAR finds that the DAD is not in compliance with this DAD specification, the DAD fails the first attempt at Beta Testing. The failed DAD may have its deficiencies addressed and may be resubmitted for a second attempt of Beta Testing. If the failed DAD is resubmitted for a second attempt of Beta Testing, the DAD Vendor shall submit the revised DADs along with a new Certification Submittal Package, excluding the DAD Certification Testing Fee.

5.1.14. During Beta Testing, the DAD Vendor shall be responsible for Root Cause Analysis to determine the reason the DAD failed to meet this DAD specification.

5.1.15. During Beta Testing, the DAD Vendor shall investigate and explain to BAR all Smog Check inspections with an Inspection Status other than 'D' (done) as identified in BAR provided Beta Testing summary reports.

If the DAD Vendor investigation yields that the problem with the Smog Check inspection was due to a DAD issue, BAR may fail the DAD and require the DAD issue to be addressed before starting the second attempt of Beta Testing.

5.1.16.   The DAD Vendor shall propose, and if accepted by BAR, implement a solution for all DAD issues prior to starting the second attempt of Beta Testing.

BAR will only count Smog Check inspections with an Inspection Status of 'D' (done).

Beta Testing will continue until a stable configuration (hardware/firmware/software) of the DAD has collected twenty thousand (20,000) records in accordance with the required minimum sample sizes for each of the model year and fuel type groups covered in the Connectivity Rate section of this DAD specification.

If a DAD Vendor has not completed Beta Testing within 120 calendar days of entering Beta Testing, BAR shall evaluate whether the DAD Vendor will be allowed to continue Beta Testing. If BAR determines that the DAD Vendor will not be allowed to continue Beta Testing, the DAD has failed Beta Testing.

At the conclusion of Beta Testing, BAR will evaluate whether the requirements of this DAD specification have been met.

At the conclusion of Beta Testing, if the DAD successfully meets all of the requirements of this DAD specification, as determined by BAR, the DAD shall be certified for use in California's vehicle inspection programs for a period of one (1) year. At the conclusion of Beta Testing, if the DAD does not successfully meet all of the requirements of this specification, as determined by BAR, the DAD shall NOT be certified for use in California's vehicle inspection programs.

If the DAD does not pass Alpha and Beta Testing on the second attempt, the DAD will be returned to the DAD Vendor and shall not be eligible for additional testing in the current Certification Testing Event.

5.2 Annual Recertification

5.2.1.   All DADs shall be recertified on their annual recertification date.

5.2.2.   Ninety (90) days prior to the conclusion of the one-year certification period, the DAD Vendor shall meet with BAR to discuss the resolution of any outstanding issues.

5.2.3.   If there are outstanding issues, the DAD Vendor shall correct the outstanding issues prior to submitting the Annual Recertification Submittal Package.

5.2.4.   The DAD Vendor shall supply testing results which prove that all outstanding issues have been mitigated. BAR may request additional testing by the DAD Vendor.

No fee will be charged for the annual recertification.

BAR shall evaluate if any necessary changes have been completed and whether the DAD continues to meet the requirements of this specification. If BAR determines that the DAD does continue to meet the requirements of this specification, the DAD shall be recertified for another one (1) year period. If BAR determines that the DAD does not continue to meet the requirements of this specification, the DAD shall NOT be recertified and shall NOT be used in California's vehicle inspection programs. The failed device may have its deficiencies addressed and may be submitted during the next Certification Testing Event collection period. If the failed DAD is submitted again, the DAD Vendor shall submit a new Certification Submittal Package including the Certification Fee.

The BAR contact for DAD Certification, Annual Recertification and Decertification/Citation matters is:

DAD Certification Lead Engineer
BAR Engineering and Research Branch
10949 North Mather Drive Rancho
Cordova, CA 95670
BAROIS.Certification@dca.ca.gov

5.3 Decertification or Citation

If BAR finds that a DAD Vendor fails to furnish or install required firmware/software updates to the DAD or to meet the specifications, standards, or requirements as provided in this DAD specification, BAR shall decertify the DAD and prevent the use of the DAD in California's vehicle inspection programs, or in the alternate, issue a citation to the DAD Vendor.

Decertification

If BAR finds cause to decertify a DAD Vendor's DAD, BAR shall file and serve a notice in writing or by electronic mail to the DAD Vendor. The notice shall contain a summary of the facts and allegations that form the cause or causes for decertification.

Service of the notice may be given in any manner authorized by Business and Professions Code Section 124.

If a written or electronic request for a hearing is received within five (5) days from the date of service, a hearing shall be held as provided for as follows: BAR shall hold a hearing within ten (10) days of the date on which BAR received a timely request for a hearing. BAR shall notify the DAD Vendor or representative of the time and place of the hearing. The hearing shall be limited in scope to the time period, facts, and allegations specified in the notice prepared by BAR.

The DAD Vendor shall be notified of the determination by the BAR Chief, or the BAR Chief's designee, who shall issue a decision and notify the DAD Vendor within ten (10) days of the close of the hearing.

The DAD Vendor may request an administrative hearing to contest the decision of the BAR Chief or the BAR Chief's designee within thirty (30) days of the date of the determination by the BAR Chief, or the BAR Chief's designee.

Citation

Any citation issued by BAR shall specify the nature of the violation and may specify a fine not to exceed one thousand dollars ($1,000) for each day the DAD Vendor fails to furnish or install the specified software updates by the specified period.

BAR shall base its assessment and amount of the fine on the following circumstances: the gravity of the violation; the good faith of the DAD Vendor; and the history of previous violations.

Any citation shall be served pursuant to subdivision (c) of Section 11505 of the Government Code.

The DAD Vendor may request a hearing in accordance with Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code. A written or electronic request for a hearing shall be submitted in writing and received by BAR within thirty (30) days from the date of service of the citation.

If BAR does not receive any request for a hearing from the DAD Vendor within thirty (30) days from the date of service of the citation, the citation shall be deemed the final order.

In addition to requesting an administrative hearing, the cited DAD Vendor may request an informal conference to review the contents of the citation. A request for an informal conference shall be made in writing, within ten (10) days from the date of service of the citation, to the BAR Chief or the BAR Chief's designee.

The BAR Chief or the BAR Chief's designee shall hold, within sixty (60) days from the receipt of the request, an informal conference with the cited DAD Vendor. At the conclusion of the informal conference, the BAR Chief or the BAR Chief's designee may affirm, modify, or dismiss the citation, including any fine levied, order or abatement, or order of correction issued. The BAR Chief or the BAR Chief's designee

shall state in writing the reasons for his or her action and transmit within fifteen (15) days of the informal conference, a copy of the findings and decision to the cited DAD Vendor. Unless an administrative hearing as provided for in the above subsection was requested in a timely manner, an informal conference decision that affirms the citation shall be deemed to be a final order with regard to the citation issued, including the fine levied and the order of abatement.

If the citation, including any fine levied or order of abatement or correction, is modified, the citation originally issued shall be considered withdrawn and a new citation issued. If the cited DAD Vendor desires a hearing to contest the new citation, a request shall be made in writing, within ten (10) days of receipt of the informal conference decision, to the BAR Chief or the BAR Chief's designee. The hearing shall be held pursuant to Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code. A cited DAD Vendor may not request an informal conference for a citation that has been modified following an informal conference.

Any failure to comply with the final order for payment of a fine, or to pay the amount specified in any settlement agreement, is cause for decertification of the DAD Vendor's DAD.