

CALTEST™ INSTRUMENTS, INC.

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California Environmental Protection Agency
Air Resources Board
Mobile Source Operations Division
Mobile Source Enforcement Branch

August 31, 1999

Mr. Paul E. Jacobs, Chief
Mobile Source Enforcement Branch
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

SEP 2 1999

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DECLARATION OF COMPLIANCE WITH THE SAE J1667 SPECIFICATIONS

I, Howard L. Sargent, represent CalTest Instruments, Inc. My title is Executive Vice President/Chief Engineer. I am authorized by CalTest Instruments, Inc., to provide this declaration. My company manufactures and markets in the State of California the following models of smokemeters:

- CalTest 1000 full flow
- CalTest 1000TR full flow, measuring engine RPM & oil temperature
- CalTest 1000WIN partial flow
- CalTest 1000WIN-TR partial flow, measuring engine RPM & oil temperature

Each of these smokemeter models is in compliance with the specifications set forth in the Society of Automotive Engineers (SAE) J1667 recommended practice, issued in February 1996 and entitled "Snap-Acceleration Smoke Test Procedure for Heavy-Duty Diesel Powered Vehicles". Compliance with these SAE J1667 specifications is disclosed to all current or potential purchasers or users of our smokemeters through my company's product literature and pages of smoke meter owner's manual, as attached hereto and incorporated herein by reference.

I declare under the penalty of perjury, under the laws of the State of California, that the foregoing is true and correct and if called upon to do so, I could and would competently testify thereto.

Executed this 31st day of August, 1999, at Los Angeles, California.

Signed: Howard L. Sargent
Howard L. Sargent, EVP/Ch. Engr.

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

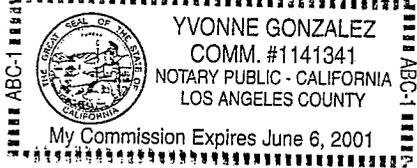
State of California

County of Los Angeles

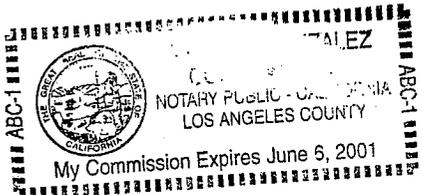
On August 31 1999 before me, Yvonne Gonzalez Notary Public,
DATE NAME, AND TITLE OF NOTARY - E.G., "JANE DOE, NOTARY PUBLIC"

personally appeared Howard C. Sargent,
NAME(S) OF SIGNER(S)

personally known to me - OR - proved to me on the basis of satisfactory evidence



to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

Yvonne Gonzalez

OPTIONAL

The data below is not required by law, however it may prove valuable to the person relying on the document and could prevent fraudulent reattachment of this form.

DESCRIPTION OF ATTACHED DOCUMENT

Declaration of compliance with the Sae J 1067 Specifications

TITLE OR TYPE OF DOCUMENT

H

NUMBER OF PAGES

August 31, 1999

DATE OF DOCUMENT

SIGNER(S) OTHER THAN NAMED ABOVE

CAPACITY CLAIMED BY SIGNER

- INDIVIDUAL
- CORPORATE OFFICER
Executive Vice President
TITLE(S)
- PARTNER(S)
- LIMITED
- GENERAL
- ATTORNEY-IN-FACT
- TRUSTEE(S)
- GUARDIAN/CONSERVATOR
- OTHER: _____

SIGNER IS REPRESENTING:

NAME OF PERSON(S) OR ENTITY (IES)
Cal Test Instruments, Inc.

1 Introduction

The CalTest 1000 Smokemeter set is a diesel exhaust smoke opacity test system requiring only a few minutes to test an engine and print out opacity, density K, Test Averages and PASS or FAIL.

The smokemeter's state-of-the-art microprocessor & sophisticated software make it a good diagnostic tool. Maintenance managers can use the CalTest 1000 just-before & just-after maintenance actions to determine cost effectiveness of maintenance decisions. The clean-air-award-winning supervisor of the Antelope Valley Bus Company, Lancaster, California, has used CalTest smokemeters that way for years. He said: "I don't have to spend a lot of time training mechanics...The computer prompts the operator what to do at each step...My chance of receiving a citation for excessive smoke has been reduced to almost NIL!"

The CalTest 1000 meets or exceeds 1996 SAE J1667 specs & performed excellently in the SAE J1667 Committee's correlation testing of U.S.- & foreign-made smokemeters in California, April 1-4, 1996. By a wide margin, the CalTest 1000 was the fastest & most user-friendly of all smokemeters tested.

Features

- **SAE J1667 snap-acceleration test procedure.** The 1996 SAE J1667 Recommended Practice provides an SAE J1667 Snap-Acceleration Test Procedure, plus smokemeter specifications. The CalTest 1000 has the SAE J1667 test procedure in its software. The LCD tells the operator what to do, step-by-step.
- **Three other snap-acceleration test procedures—for increased accuracy.** One drawback of the SAE J1667 snap procedure is that all three test snaps are averaged. A defective snap (the acceleration pedal was not depressed fully & rapidly, or was released too soon), causes testing inaccuracy. The CalTest 1000 software has three other more accurate snap procedures, with such "bad" readings unused. For example, 5, not 3, test snaps are done (adding only 40 seconds to test time). The "closest 3" are then identified by the microprocessor (*after comparing the 6 possible combinations of 3 snaps*) and averaged.
- **Under Load Testing.** The CalTest 1000 has a pre-programmed 20-Second Under Load Test for testing with a dynamometer or (using an optional sensor mount) while the vehicle is on the road. Also, in its Current Mode, the CalTest 1000 displays real-time opacity/density (A "curve"—continuous line—of the opacity can be recorded by an optional strip chart recorder.). If desired, the 1/2 second Bessel filter (used in all snap testing) can be turned off for such testing, so that *instantaneous* opacity/density is output.
- **Other Maintenance Manager or Smokemeter Operator options/inputs:**
 - Calibration Check 6.2.1 SAE J1667: Max. diff. from professional filter: $\pm 2\%$. Last check date on printouts.
 - Post-Test Zero Shift Check 5.4.3 SAE J1667: A five-second check at the end of a snap test. Max. shift: $\pm 2\%$.
 - Ambient Air Conditions input App.B SAE J1667: Press. & dry bulb temp. & rel. humidity or wet bulb temp.
 - Max. permissible snap Test Average Input an opacity or density specified by law or maintenance manager.
 - Max. permissible test snap Range For SAE J1667 test: $\pm 5\%$. For other tests, select $\pm 3\%$ or $\pm 5\%$ or OFF.
 - Setting Date and Time.
 - LCD backlighting options Backlighting provides full LCD display visibility under all lighting conditions.
 - Selecting LCD display units Opacity/density, inches/mm, HP/KW, making the CalTest 1000 a *worldwide* tester.
 - Custom designing the contents of printouts
 - Edit the 3-line printout heading
 - Select units on printouts *For worldwide preferences:* opacity only...density only...opacity and density.
 - Include/omit Ambient Air Corrections Optional corrections of snap test results for unusual air conditions.
 - Include/omit Post-Test Zero Shift Check This optional check can be added at the end of a snap test.
 - PC Link Output to the organization's PC software storing test data.
- **Beer-Lambert Alignment Chart** Step-by-step finding of "Standard" opacity when the exhaust is nonstandard. [The CalTest 1000 does it automatically]. Shows relationship between opacity, density and optical path length [exhaust diameter].

1 Introduction

The CalTest 1000TR Smokemeter set is a diesel exhaust smoke opacity test system for rapidly testing an engine and printing out opacity readings and overall test results.

The smokemeter's state-of-the-art microprocessor & sophisticated software make it a good diagnostic tool. Maintenance managers use the CalTest 1000TR just-before & just-after maintenance actions to determine cost effectiveness of maintenance decisions. The clean-air-award-winning supervisor of the Antelope Valley Bus Company, Lancaster, California, has used CalTest smokemeters that way for years. He said: "I don't have to spend a lot of time training mechanics...The computer prompts the operator what to do at each step...My chance of receiving a citation for excessive smoke has been reduced to almost NIL!"

The CalTest 1000TR meets or exceeds SAE J1667 (Feb96) specs. It performed superbly in SAE J1667 Committee's accuracy testing of 6 brands of U.S.- & foreign-made smokemeters in California, April 1-4, 1996. By a wide margin, the CalTest meter was the fastest & most user-friendly of all smokemeters tested.

Features

- **SAE J1667 Snap-acceleration testing, Stall Testing, and Rolling-acceleration testing with RPMs and oil temperatures printed out for last three purge and all test readings.** No other brand of smokemeter does that.
- **Three other snap-acceleration test procedures—for increased accuracy.** One drawback of the SAE J1667 snap procedure is that all 3 test snaps are averaged. A defective snap (The accelerator was not depressed fully & rapidly, or was released too soon) causes testing inaccuracy. The CalTest 1000TR software has three other more accurate snap procedures, with such "bad" readings unused. For example, in C3of5 (closest 3 of 5), 5, not 3, test snaps are done (adding only 40 seconds to test time). The *microprocessor picks the "closest 3" (after comparing the 6 possible combinations of 3 snaps)* and averages them.
- **Last three "purge" snaps on print outs.** SAE J1667 specifies "at least three" purge snaps to clean out soot and ensure the engine is fully warmed. CalTest smokemeters (1) permit unlimited purge snaps, and (2) include the last three purge opacities on printouts. If a vehicle is cited for excessive smoke and the last three purge snaps were not close together, the printout would support a protest that testing was defective.
- **Under Load Testing.** The CalTest 1000TR has a pre-programmed 20-Second Under Load Test for testing with a dynamometer or (using an optional sensor mount) while the vehicle is on the road. Also, in its Current Mode, the CalTest 1000TR displays real-time opacity/density (A "curve"—continuous line—of the opacity can be recorded by an optional strip chart recorder.). If desired, the 1/2 second Bessel filter (used in all snap testing) can be turned off for such testing, so that *instantaneous* opacity/density is output.
- **Other Maintenance Manager or Smokemeter Operator options/inputs:**
 - Calibration Check** 6.2.1 SAE J1667: Max. diff. from professional filter: $\pm 2\%$. Last check date on printouts.
 - Post-Test Zero Shift Check** 5.4.4a SAE J1667: Sooting of optics during the test must not exceed 2% opacity.
 - Ambient Air Conditions input** App.B SAE J1667: Press. & dry bulb temp. & rel. humidity or wet bulb temp.
 - Max. permissible snap Test Average** Input an opacity or density specified by law or maintenance manager.
 - Max. permissible test snap Range** For SAE J1667 test: $\pm 5\%$. For other tests, select $\pm 3\%$ or $\pm 5\%$ or OFF.
 - Setting Date and Time.**
 - Selecting LCD display units** (except tests with RPM/Temp option). Opacity/density, inches/mm, HP/KW.
 - Custom designing the contents of printouts**
 - Edit the 3-line printout heading** (Name of testing organization, meter operator, etc.)
 - Select printouts units** (excepts tests w/ RPM/Temp option). Opacity, density or both.
 - Include/omit Ambient Air Correction.** See page 13.
 - Include/omit Post-Test Zero Shift Check** in the 3 "more snaps" tests. (Included in RPM/Temp tests)
 - PC Link** Output to the organization's PC software storing test data.
- **Beer-Lambert Alignment Chart** Step-by-step finding of "Standard" opacity when the exhaust is nonstandard. [The CalTest 1000TR does it automatically]. Shows relationship between opacity, density and optical path length [exhaust diameter].

Features and Specifications of the CalTest 1000-WIN and CalTest 1000WIN-TR Smokemeter Sets

1000-WIN meets these specifications of the State of New York Dept. of Transportation:

- Meets SAE J1667 specs for heavy-duty diesel vehicle snap-acceleration testing. Rated for opacity values of 0 to 99.9%
- Portable for field (roadside) usage. Max. weight 25 lbs. Battery operated (min. 10 hours life). Low battery warning.
- AC/DC power availability
- Displays prompts to user during testing. Displays warning of need for cleaning and maintenance of analyzer
- Must store & download 40 test results. Interface with PC/laptop database. Software compatible with Windows 98 and Microsoft Access 97. Software in meter for downloading.
- Partial flow analyzer
- Sensor rotates 90° on telescoping pole. Sensor easily fastens on 2" to 6" pipes
- Ability to enter vehicle data into software. Alpha/numeric key data entry
- Capability of printing multiple copies
- Choice in data printed (min. 10 lines)
- Corrects test results for operator input of air temp., barom. pressure, & rel. humidity

CalTest 1000-WIN meets these add'l specs:

- OPTIONAL EQP: Oil temperature sensor
RPM sensor
(model becomes CalTest 1000-WIN-TR)
- 45 foot-extension cable
- Self-calibrates at zero before testing
- 1-year warranty, parts and labor
- CalTest stocks parts consumed in testing

These 1000-WIN features exceed, or are in addition to, New York DOT specifications:

- Y2K-compliant software has under-load testing in addition to snap-testing. Density can be on print-out. Port for a strip chart recorder.
- One person testing. Processor hand-holdable. High capacity rechargeable battery.
- AC operation also recharges DC batteries.
- Large & backlit LCD. Easy-to-read display prompts at each test step (a CalTest tradition). Flashing warnings of other needed actions.
- Stores/downloads 400 test results. Optional factory-installed Flash Memory (2,000 tests). RS232 port for 10-foot cable downloading.
- Optional PC/laptop software (storage, reports).
- Most streamlined probe nose, with largest volumetric intake--to optimize opacity accuracy
- Large friction washers--rapid sensor mount. 180° sensor rotation-pole used both low & high
- Keypad & touch screen LCD for data entry. Built-in Bar Code Reader (up to 85 characters)
- Prints via cable or optional infrared wireless
- Extensive choice in data entered/printed out.
- Sensors for air temp., barom. pressure & relative humidity (No operator input needed. Fully automatic correction for air conditions)

Additional specs not required by NY DOT:

- ❖ Sensor shock pads (accidental dropping)
- ❖ Post-test zero-shift check (SAE J1667)
- ❖ Factory calibrated using 5 opacity filters
- ❖ Backup lithium battery