

## Development of the J2825 On-Highway Motorcycle Sound Test Procedure

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### Authors

**Thomas C. Austin**

*Sierra Research, Inc*

**Pamela Amette**

*Motorcycle Industry Council, Inc*

**Christopher F. Real**

*DPS Technical, Inc*

**John F. Lenkeit**

*Dynamic Research, Inc*

In response to a growing need for a practical and technically valid method for measuring exhaust sound pressure levels (SPL) of on-highway motorcycles, the SAE Motorcycle Technical Steering Committee has developed Surface Vehicle Recommended Practice J2825<sup>1</sup>, Measurement of Exhaust Sound Pressure Levels of Stationary On-Highway Motorcycles, which includes a stationary sound test procedure and recommendations (CR1) for vehicle sound level limit values. Key goals of the development process included: minimal equipment requirements (CR2), ease of implementation by non-technical personnel, and consistency with the federal EPA requirements; in particular, vehicles compliant with the EPA requirements should not fail when assessed using J2825 exactly as it is published (CR3).

Development of the recommended practice and the technical support information involved a comprehensive field study of 25 motorcycles and 76 different exhaust systems, ranging from relatively quiet OEM systems to unbaffled, aftermarket exhaust systems. For the various motorcycle/exhaust system configurations, SPL (Sound Pressure Level / dBA) measurements were made using the EPA pass-by procedure and several different stationary measurement methods.

Correlations between the results obtained by these different methods were studied for the entire subject group (combinations of motorcycle and exhaust system) as well as for sub-groups based on motorcycle engine configuration.

Of the stationary measurement methods explored; the most reliable results were obtained when the SPL was measured 20 inches from the tailpipe outlet.

On the basis of engine configuration, stationary test results were correlated with results measured using the wide-open throttle, EPA pass-by procedure. (CR4)

For four-cylinder motorcycles, the best correlation was obtained at 5000 rpm; for all other engine types the best correlation was obtained at 2000 rpm. Satisfactory results were also obtained using idle SPL measurement. (CR5)

The detailed procedure SAE J2825 and supporting data has been published.

<http://saepcmech.saejournals.org/content/4/2/1142.abstract> (This is a brief review of the published supporting data)

<http://saepcmech.saejournals.org/content/4/2/1142.full.pdf+html> (This is the full supporting data technical paper.)

[http://standards.sae.org/j2825\\_200905/](http://standards.sae.org/j2825_200905/) (This is the actual test procedure.)

## Notes

As one of the authors of the sound testing procedure and having performed independent studies of vehicle sound measurements I have included these comments.

(CR1) The sound level recommendations in the recommended practice have been implemented to insure that truly legal motorcycles do not fail the roadside sound test. **Any deviation from these values or the procedure has the potential of falsely failing an EPA legal vehicle. Any changing of any of the processes or values in that are specified in the Recommended Practice invalidates utilizing the support data as a reference. PLEASE utilize the procedure as it is published. The technical community will update the practice.**

(CR2) The equipment segment in the standard must be adhered to. **Sub standard measuring equipment in a high pulse environment will give inaccurate measurements.**

(CR3) When used as directed in the standard, confirmed false failures are virtually eliminated.

(CR4) The EPA pass-by method for motorcycles has been a successful test method for measuring total vehicle sound and matching motorcycle sound levels with other transportation vehicles. J2825 allows for a stationary exhaust sound level reading to be taken, and when done as directed will repeatedly capture excessively loud vehicles.

(CR5) When using the idle mode exclusively some vehicles could have an equipment or accessory component rattle. The complete test method should utilize the elevated test rpm to eliminate this possibility.

The Life | Protecting the Ride



Sound expert and motorcyclist Chris Real is at the forefront of educating people about motorcycle sound.

### How To Conduct A Sound Test

Conducting an SAE J2825 sound test procedure on an on-highway motorcycle may seem daunting, but it's easy. Here's how to do it:

- 1 Find a clear test site. No wall or sign should be within 8 feet of the motorcycle.
- 2 Decide whether you want to use the idle, set rpm or swept rpm test procedure. The idle test procedure requires that the motorcycle engine run for at least 5 seconds at idle. The set rpm procedure requires that the motorcycle operator run the engine at the test speed for that motorcycle—5,000 rpm for three- and four-cylinder motors, and 2,000 rpm for all others—for at least two seconds. The swept rpm procedure requires that the engine be slowly accelerated to the test rpm. When the specified engine speed is reached, the throttle is quickly closed. The acceleration should take at least two seconds.
- 3 Have someone sit on the motorcycle in a normal riding position with one or both feet on the ground. Or you can put the motorcycle up on its center stand, if it has one, or put the front wheel in a restraint so that the bike is vertical. If you are conducting just the "idle" test, you can put the motorcycle on its side stand or center stand without someone sitting on the bike.
- 4 Set the sound meter for an A-weighting and for slow dynamic response. (For the swept test the meter should be set for a fast dynamic response.) Hold the sound meter microphone 20 inches from the exhaust outlet at a 45-degree angle to the normal line of travel of the motorcycle and at the same height as the exhaust outlet.
- 5 If the motorcycle has more than one exhaust outlet, test each side of the motorcycle that has an outlet.
- 6 Take three readings to confirm your data.

To see a video that shows how to conduct a sound test, go to YouTube.com/AmericanMotorcyclist.

### NEW BIKE TEST PROCEDURE GAINING GROUND ON THE ISSUE OF MOTORCYCLE SOUND

SOUND GURU CHRIS REAL EXPLAINS THE NEW STREETBIKE TEST

When Chris Real rides his motorcycle near his home in Upland, Calif., he always passes a sign at the border of a private community that upsets him: "No Motorcycles Allowed Beyond This Point." "I hate that sign," said Real, a nationally recognized sound expert and president of DPS Technical (www.ChemHelp.com). "They have dealt with noise by not allowing motorcycles there."

When there is a sound problem, Real explained in a talk to delegates at the AMA Congress held in Columbus, Ohio, Oct. 8-10, people need to understand it, identify it, study it and then control it. A new Society of Automotive Engineers (SAE) sound test procedure—SAE J2825, "Measurement of Exhaust Sound Pressure Levels of Stationary On-Highway Motorcycles"—is a tool to be used when dealing with sound issues, said Real, who helped develop the procedure. "It was developed for roadside sound measurement and control of excessively loud motorcycles with significantly modified exhaust systems," he said. Only very loud motorcycle exhausts would fail the procedure, he said.

The new procedure sets a decibel limit of 92 dB(A) at idle for all motorcycles. Motorcycles with three or four cylinders have a decibel limit of 100 dB(A) at 5,000 rpm or 75 percent of maximum engine speed, whichever is less, when using what is known as the "set" rpm test, or for a "swept" test that involves slowly accelerating to the specified rpm.

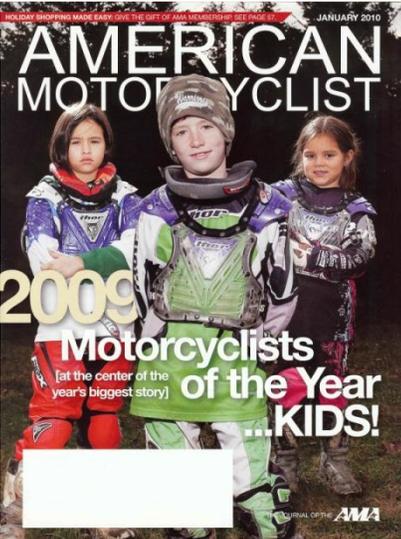
All other motorcycles have a decibel limit of 96 dB(A) at 2,000 rpm, or 75 percent of maximum engine speed, whichever is less, for the set or swept test. "The 100 dB(A) is with your ear 20 inches away from the exhaust pipe, not at a sidewalk cafe," Real said, addressing the source of many citizen complaints about motorcycle sound.

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Special recognition is given to the American Motorcyclist Association for promoting responsible motorcycling.

More information: Contact Chris Real, President, DPS Technical, Inc. (909) 981-5228 [www.dpstechnical.com](http://www.dpstechnical.com).