



SURFACE VEHICLE RECOMMENDED PRACTICE

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Electromagnetic Compatibility Measurement Procedure
for Vehicle Components - Immunity to AC Power Line Electric Fields

RATIONALE

Off-road vehicles often negotiate areas crossed by high voltage (up to 1000000 V) power transmission lines. During operation, the vehicle electronics will be exposed to intense AC electric fields. The field intensity from power lines is expected to be higher for these "off-road" vehicles than "on-road" vehicles because of their close proximity to these power lines.

There is no known comparable SAE or ISO test method.

FOREWORD

This test method is most applicable to off-road vehicle use. Road vehicles have also seen disruptive fields in service and it may be wise to consider application of this test method during development.

Field levels measured during testing have reached as high as 15000 V/m. Laboratory testing for these conditions should always be performed for vehicle electronics for vehicles which routinely encounter off-road driving. Such vehicles would include agricultural and timber harvesting equipment, as well as earth moving and construction vehicles.

1. SCOPE

This SAE Recommended Practice covers the recommended testing techniques for the determination of electric field immunity of an automotive electronic device when the device and its wiring harness is exposed to a power line electric field. This technique uses a parallel plate field generator and a high voltage, low current voltage source to produce the field.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1113-1 Electromagnetic Compatibility Measurement Procedures and Limits for Components of Vehicles, Boats (up to 15 m), and Machines (Except Aircraft) (16.6 Hz to 18 GHz)

SAE J1113-22 Electromagnetic Compatibility Measurement Procedure for Vehicle Components - Part 22 - Immunity to Radiated Magnetic Fields

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Documents

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3. DEFINITIONS

For general definitions, refer to SAE J1113-1.

4. TEST APPARATUS

The test apparatus shall consist of the following:

4.1 Voltage Source

Any voltage source capable of supplying approximately at least 15000 VAC (50 or 60 Hz, as appropriate) at a current of at least 50 mA can be utilized. Some capacity above this voltage level is recommend to compensate for high voltage corona discharges on plate edges, bleeding currents from the system.

4.2 High Voltage Voltmeter

A high impedance voltmeter capable of measuring at least 15000 Vrms.

NOTE: An example of the construction of a parallel plate field generator is shown in Appendix B.

5. TEST SETUP

NOTE: Hazardous voltage and fields exist on and near the parallel plate field generator when the equipment is energized. Test personnel should ensure that no one is in contact with the field generator, the plates, field distribution wires, the generator, or cables during a test.

Test setup should be as shown in Figures 1 and 2. The device under test is installed central to and midway between the field plates of the parallel plate field generator. The resistors used in this fixture are glass, high voltage resistors.

Placing the equipment under test with its centroid at the mid-point between the plates, with its side at least 150 mm from the outer edges of the field plates is recommended to ensure field uniformity and test repeatability.

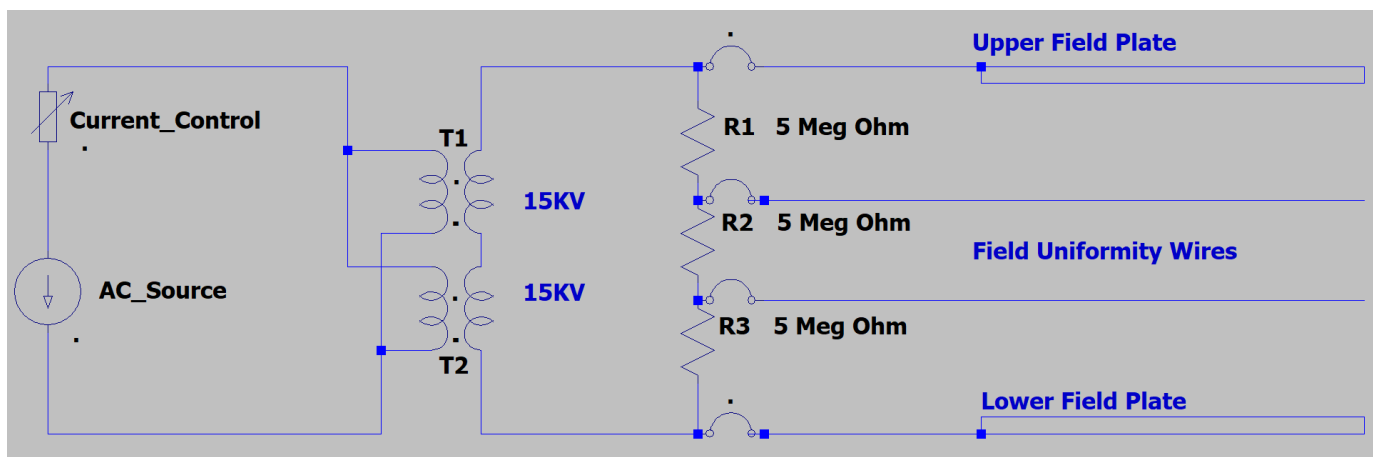


Figure 1 - Example of generator circuit

Commercially available neon sign transformers (T1 and T2) have been successfully used to construct the HV generator using a parallel input connection and series output connection. Connect the power lines from the generator to the top and bottom plate at the same point where the HV resistors are connected. The same points should be used to arrange connections via separate lines to a voltage metering system.