

INSTRUCTIONS FOR CONDUCTING CS01 TEST PER MIL-STD-462, NOTICE 2 ON AC POWER LINE CABLES

These instructions allow the tester to overcome the challenge of measuring low signals in the presence of high ac power line voltage.

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INTRODUCTION

Obtaining accurate measurement of bandwidth signals in the presence of high ac power line voltage can be particularly troublesome. The solution to this problem is based on the Lissajous pattern of an oscilloscope equipped with X-Y mode. The required equipment is listed in the procedure for the CS01 test. A power line isolation transformer and an oscilloscope with X-Y display mode will be needed as shown in Table 1. The equipment is set up as shown in Figure 1.

Item	Manufacturer	Model No.
Power-line Isolation Transformer	Solar	7033-1
Oscilloscope with X-Y Display Mode	Tektronix	475

Table 1. List of Test Apparatus.

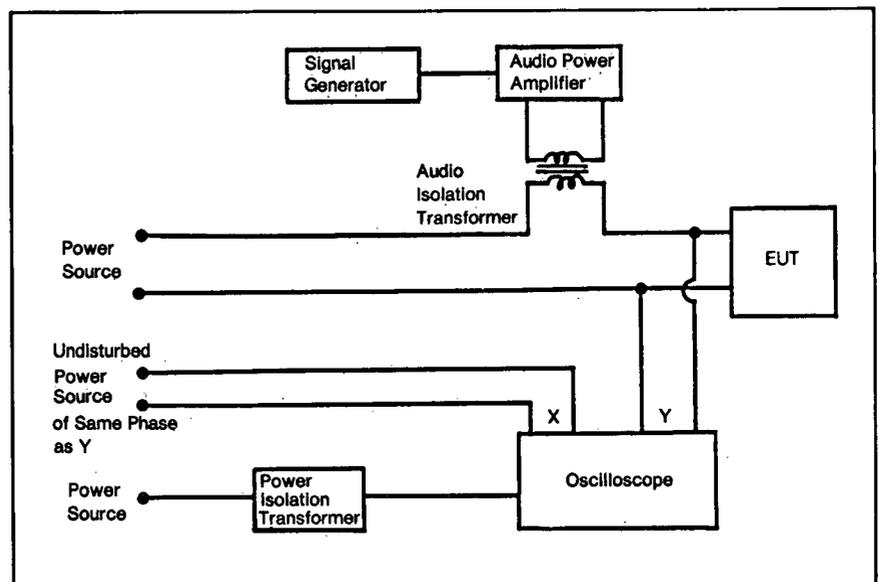


Figure 1. Test Configuration.

TEST PROCEDURE

The EUT and the test equipment are connected as shown, and the oscilloscope is then adjusted to the X-Y mode. After turning on the EUT, the tester obtains a Lissajous pattern by adjusting the oscilloscope knobs. The desired result is shown in Figure 2. The gain of the oscilloscope in the vertical and horizontal displays should be adjusted to 5 V/div. or less.

The interference signal is then injected into the power lead when the power oscillator is turned on. A signal similar to that shown in Figure 3 should be obtained. The power output of the injected signal should be adjusted according to the following formula:

$$B \text{ (volt peak-to-peak)} = C (V_{\text{rms}}) \times \sqrt{8}$$

where

B = Vertical deviation in the center-line scale.

C = Amplitude required by the standard.

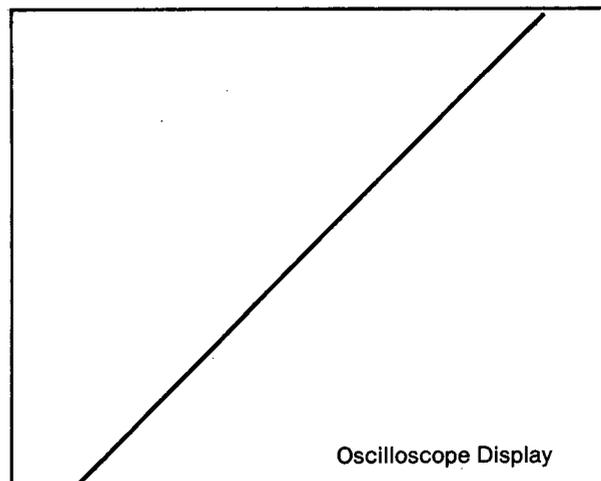


Figure 2. Lissajous Pattern for Two Signals with the Same Frequency and the Same Phase.

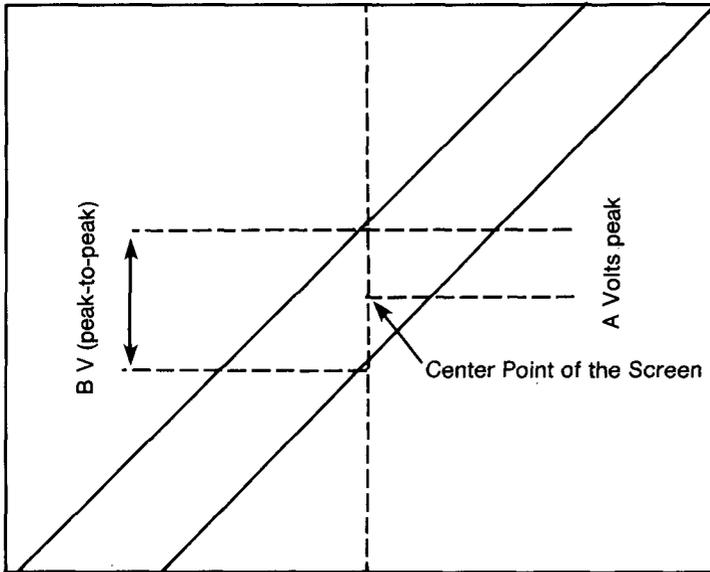


Figure 3. Oscilloscope Display Lissajous Pattern of the Injected Signal on the Power Cord.

The tester then conducts the procedure as described in MIL-STD-462. An example of an 8 volt peak-to-peak injected signal is shown in Figure 4. The oscilloscope controls should be adjusted so that the upper line touches the center point of the screen. Once again the interference signal is injected into the power lead by turning on the power oscillator. The power output of the injected signal is adjusted according to the following formula:

$$A \text{ (volt peak)} = C \text{ (Vrms)} \times \sqrt{2}$$

where

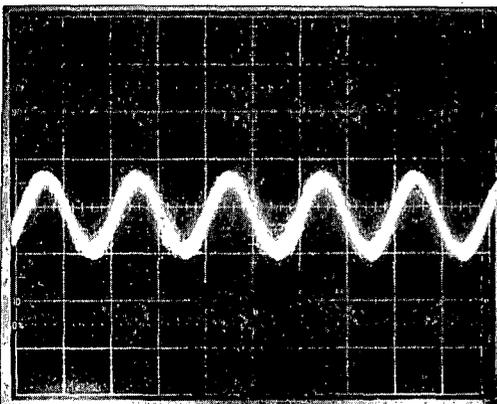
A = Vertical deviation above the center point of the screen (Figure 3).

C = Amplitude required by the standard.

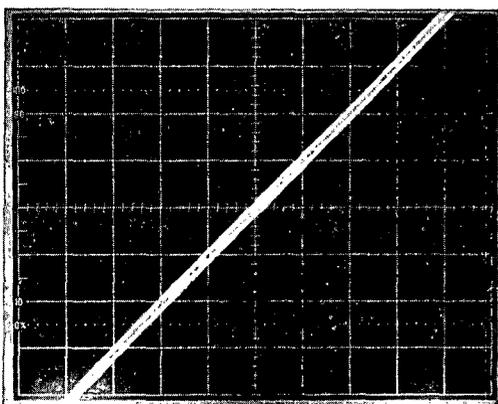
Once again the test should be conducted as described in MIL-STD-462.

CAUTIONARY NOTE

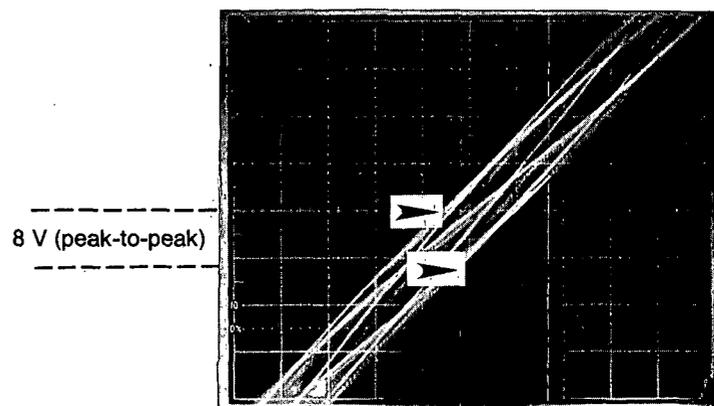
When adjusting the oscilloscope to obtain the Lissajous pattern, the tester may note that a slight phase shift between the X and Y power frequency signals has separated the diagonal line into two lines forming a narrow ellipse. In this situation, the tester should adjust the oscilloscope controls so that the upper line touches the center point of the screen. The test procedure is then carried out as described above. ■



A. Injected Signal in the Absence of Power-Line Voltage
Amplitude: 5 V/div.



B. Lissajous Pattern of the Power-Line Voltages with the Same Phase. X-gain = 5 V/div. Y-gain = 5 V/div.



C. Lissajous Pattern of the Injected Signal in the Presence of Power-Line Voltage.
X-gain = 5 V/div. Y-gain = 5 V/div.

Figure 4. Photographed Examples of the Signals.