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Standard Guide for Measuring Some Electronic Characteristics of Ultrasonic Examination Instruments[1]

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1. Scope

1.1 This guide describes procedures for electronically measuring the following performance-related characteristics of some sections of ultrasonic instruments:

1.1.1 *Power Supply Section*:

line regulation,
battery discharge time, and
battery charge time.

1.1.2 *Pulser Section*:

pulse shape,
pulse amplitude,
pulse rise time, pulse length, and
pulse frequency spectrum.

1.1.3 *Receiver Section*:

vertical linearity,
frequency response,
noise and sensitivity, and
dB controls.

1.1.4 *Time Base Section*:

horizontal linearity, and
clock (pulse repetition rate).

1.1.5 *Gate/Alarm Section*:

delay and width,
resolution,
alarm level,
gain uniformity,
analog output, and
back echo gate.

1.2 This guide complements Practice E 317, and is not intended for evaluating the performance characteristics of ultrasonic examination instruments on the inspection/production line.

NOTE 1—No access to internal circuity is required.

2. Referenced Documents

2.1 *ASTM Standards:*

E 317 Practice for Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Systems Without the Use of Electronic Measurement Instruments[2]

E 1316 Terminology for Nondestructive Examinations[2]

2.2 *Military Standard:*

MIL-STD-45662A Calibration System Requirements[3]

2.3 *Other Standard:*

IEEE Std. 100, IEEE Standard Dictionary of Electrical and Electronic Terms[4]

3. Summary of Guide

3.1 The electronic performance of each section is measured by identifying that portion of the electrical circuit of the instrument which comprises the section, applying the recommended stimulus or load, or both, and performing the required measurements using commercially available electronic test equipment. These data are then summarized in tabular or graphical form as performance-related values which can be compared with corresponding values of other ultrasonic examination instruments or of values for the same instrument obtained earlier (see Section 12 for a suggested reporting format).

3.2 The following describes the sections of the ultrasonic instrument and their interrelations during measurement:

3.2.1 *Power Supply Section*—The power supply section is that portion of the total instrument circuitry which supplies the regulated DC voltages required to power all other sections of the ultrasonic instrument, including the high voltage (that is, pulser and CRT voltage) circuitry.

3.2.2 *Pulser Section*—The pulser section is that portion of the total instrument circuitry which generates the electrical pulse used to energize the ultrasonic search unit. The pulser

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[2] *Annual Book of ASTM Standards*, Vol 03.03.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[4] Available from Institute of Electrical and Electronic Engineers, 345 E47th St., New York, NY 10017.

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