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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE TEKTRONIX, MODELS 2236, 2236 OPT 14 AND 2236A

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REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

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SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope Tektronix, Models 2236, 2236 Opt 14 and 2236A. The manufacturers' manuals were used as the prime data sources in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

a. Model Variations. Variations among models are listed in text.

b. Time and Technique. The time required for this calibration is approximately 4 hours, using the dc and low frequency technique.

2. Forms, Records, and Reports

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25.

b. Adjustments to be reported are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) follows the designated adjustment. Report only those adjustments made and designated with (R).

3. Calibration Description. TI parameters and performance specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Vertical Deflection	Range: 2 mV/div to 5 V/div Accuracy: $\pm 2\%$
Bandwidth	Range: 2 mV/div Accuracy: Dc to at least 90 MHz Range: 5 mV/div to 5 V/div Accuracy: Dc to at least 100 MHz
Aberrations (2236, 2236 opt 14)	Range: 2 mV/div Accuracy: +5%, -5%, 5% p-p Range: 5 mV/div to 0.5 V/div Accuracy: +4%, -4%, 4% p-p

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications			
Aberrations (2236A)	Range: 2 mV/div to 0.5 V/div Accuracy: +4%, -4%, 4% p-p			
Horizontal				
A sweep timing	Range: 0.5 s/div to 0.05 μ s/div Accuracy: $\pm 2\%$ Range: (X10 mag): 50 ms/div to 5 ns/div Accuracy: $\pm 3\%$			
B sweep timing	Range: 50 ms/div to 0.05 μ s/div Accuracy: $\pm 2\%$ Range: (X10 mag): 5 ms/div to 5 ns/div Accuracy: $\pm 3\%$			
Sweep linearity	Accuracy: $\pm 5\%$ (measured over any 2 of the center 8 divisions)			
Deflection (X-Axis)	Range: 2 mV/div to 5 V/div Accuracy: $\pm 3\%$			
A trigger sensitivity	Frequency	10 MHz	60 MHz	100 MHz
	Internal	0.35 div	1.2 div	1.5 div
	External	40 mV	150 mV	250 mV
B trigger sensitivity	Internal only	0.35 div	1.2 div	1.5 div
Probe adjust	Range: 0.5 V p-p Accuracy: $\pm 5\%$			
Counter timer multimeter				
Time base	Accuracy: $\pm 1 \times 10^{-5}$; $\pm 1 \times 10^{-7}$ (2236 opt 14)			
DC Volts	Range: 0.5 to 500 V Accuracy: $\pm 0.1\%$ of rdg + 1 LSD			
AC Volts	Range: 0.5 to 350 V Accuracy: $\pm 1\%$ of rdg + 6 LSD			
Resistance	Range: Accuracy: 50 Ω $\pm 0.3\%$ of rdg + 20 LSD 500 Ω $\pm 0.15\%$ of rdg + 2 LSD 5 kΩ $\pm 0.15\%$ of rdg + 2 LSD 50 kΩ $\pm 0.15\%$ of rdg + 2 LSD 500 kΩ $\pm 0.15\%$ of rdg + 2 LSD 5 MΩ $\pm 0.15\%$ of rdg + 2 LSD 50 MΩ $\pm 0.15\%$ of rdg + 2 LSD 100 MΩ $\pm 1\%$ of rdg + 1 LSD			
CH 1 Volts				
DC Volts	Range: 0.5 to 500 V Accuracy: $\pm 0.3\%$ of rdg + 6 LSD			
AC Volts	Range: 0.5 to 350 V @ 20 kHz Accuracy: $\pm 1\%$ of rdg + 6 LSD			

SECTION II EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment to be used in this calibration procedure. This equipment is issued with Secondary Transfer Calibration Standards Set AN/GSM-286, AN/GSM-287, or AN/GSM-705. Alternate items may be used by the calibrating activity. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI. Where the four-to-one ratio cannot be met, the four-to-one accuracy of the equipment selected is shown in parenthesis.

5. Accessories Required. The accessories required for this calibration are common usage accessories issued as indicated in 4 above, and are not listed in this calibration procedure. The following peculiar accessory is also required for this calibration: standardizer, 5-80 pF.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
OSCILLOSCOPE CALIBRATOR	Volts out: Range: 10 mV to 20 V Accuracy: $\pm 0.5\%$ Time markers: Range: 5 ns/D to 0.5 s/D Accuracy: $\pm 0.5\%$ Sine wave frequency: Range: 50 kHz to >100 MHz	John Fluke, Model 5820A, MIS-38938 (5820A-5C-GHZ)
CALIBRATOR	DC Volts: Range: 400 mV to 400 V Accuracy: $\pm 0.025\%$ AC Volts: Range: 400 mV to 300 V Accuracy: (20 Hz to 20 kHz) $\pm 0.25\%$ Resistance: Range: 10 Ω to 100 M Ω Accuracy: $\pm 0.0375\%$	John Fluke, Model 5720A/CT (p/o MIS-35947), w/power amplifier, John Fluke, Model 5725A/CT (5725A/CT)
DIGITAL MULTIMETER	Range: -8.64 to < 0.1 V dc Accuracy: $\pm 0.12\%$	John Fluke, Model 8840A/AF-05/09 (AN/GSM-64D)
GPS TIME/FREQUENCY GENERATOR	Output Frequency: 1 MHz Accuracy: 1×10^{-8}	Datum, Model 9390-6000