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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE, OS-288/G (TEKTRONIX, TYPE 2465B) AND TEKTRONIX, TYPES 2465B OPT46 AND 2467B

Headquarters, Department of the Army, Washington, DC

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SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope, OS-288/G (Tektronix, Type 2465B), and Tektronix, Types 2465B OPT46 and 2467B. The manufacturer's manual was used as the prime data source in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

a. Model Variations. Tektronix, Type 2465B OPT46 and 2467B OPT10 are equipped with an IEEE bus.

b. Time and Technique. The time required for this calibration is approximately 6 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 adjustments. 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
<u>Vertical gain CH1 and CH2</u>	Range: 2 mV/div to 5 V/div Accuracy: $\pm 2\%$ (1 M Ω input coupling) $\pm 3\%$ (50 Ω input coupling)
ΔV cursors CH 3 and CH 4	Accuracy: $\pm (1.25\% \text{ of reading} + .03 \text{ div})$ Range: .1 and .5 V/div Accuracy: $\pm 10\%$

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications
<u>Trigger level readout</u>	Accuracy: Within $\pm[3\%$ of setting + 3% of p-p signal + 0.2 division + 0.5 mV +(0.5 mV x probe attenuation factor)]
Sensitivity CH 1 and CH2	0.35 division Dc to 50 MHz
Dc coupled	1.0 division at 300 MHz
	1.5 division at 500 MHz
Ac coupled	0.35 division 60 Hz to 50 MHz
	1.0 division at 300 MHz
	1.5 division at 500 MHz
CH 3 or CH 4	0.5 x CH 1 or CH 2 requirement
<u>Horizontal timing</u>	
A sweep	Range: 500 ms/div to 5 ns/div extended to 0.5 ns with X10 mag Accuracy: 500 and 200 ms $\pm(1.2\%$ of time interval +0.6% of FS) 100 ms to 5 ns $\pm(0.7\%$ of time interval +0.6% of FS) X10 mag: $\pm(1.2\%$ of time interval +0.6% of FS)
B sweep	Range: 50 ms/div to 5 ns/div extended to 0.5 ns with X10 mag Accuracy: $\pm 1.0\%$ of time interval +0.6% of FS X10 mag: $\pm 1.5\%$ of time interval +0.6% of FS
Δ time with cursors	Accuracy: $\pm(0.5\%$ of time interval + 0.3% of FS) X10 mag: $\pm(1\%$ of time interval + 0.3% of FS)
Δ time with sweep delay	Accuracy: $\pm(0.3\%$ of time interval + 0.1% of FS + 200 ps) X10 mag: $\pm(0.8\%$ of time interval + 0.1% of FS + 200 ps)
Δ time with cursors on B sweep	Accuracy: $\pm(0.8\%$ of time interval + 0.3% of FS) X10 mag: $\pm(1.3\%$ of time interval + 0.3% of FS)
Delay sweep	Accuracy: $\pm(0.3\%$ of delay setting + 0.6% of FS) +0 to -25 ns
<u>Bandwidth</u>	Dc to 400 MHz at 5 mV or greater
<u>Calibrator</u>	
Output voltage	0.4V $\pm 1\%$ into 1 M Ω load
Repetition period	Two times the A SEC/DIV setting for SEC/DIV from 100 ns to 100 ms 0.1% during sweep time
<u>Parametric measurement</u>	
Period accuracy	0.9% + 0.5 ns + jitter error

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.

5. Accessories Required. The accessories required for this calibration are common usage accessories issued as indicated in paragraph 4 above and are not listed in this calibration procedure.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
DIGITAL MULTIMETER	Range: 0 to 20 V Accuracy: $\pm 0.025\%$	John Fluke, Model 8840A/AF-05/09 (AN/GSM-64D)
OSCILLOSCOPE	Used in CAL 01 adjustment procedure	(OS-303/G)
OSCILLOSCOPE CALIBRATOR	Volts out: Range: 10 mV to 20 V Accuracy: $\pm 0.5\%$ Time markers: Range: .5 ns to .5 s Accuracy: $\pm 0.175\%$ Pulses: Risetime: ± 0.225 ns Sine wave frequency range: 0 Hz to 500 MHz	John Fluke, Model 5820A (5820A-5C-GHz) (MIS38938)

SECTION III CALIBRATION PROCESS

6. Preliminary Instructions

a. The instructions outlined in paragraphs 6 and 7 are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in table 2.

c. Unless otherwise specified, verify the results of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.