

*TB 9-6625-2293-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR

OSCILLOSCOPE

TEKTRONIX, TYPE 2465

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, Tektronix, Type 2465. 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. None.

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. 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</u>						
CH1 and CH2	Range: 2 mV/div to 5 V/div					
	Accuracy: $\pm 2\%$					
Delta V cursors	Accuracy: $\pm(1.25\%$ of reading $+0.03$ div)					
CH 3 and CH 4	Range: 0.1 and 0.5 V/div					
	Accuracy: $\pm 10\%$					
<u>Trigger CH 1 and CH 2</u>						
Level readout	Accuracy: Within $\pm [3\%$ of setting $+3\%$ of p-p signal $+0.2$ division $+(0.5$ mV x probe attenuation factor)]					
Sensitivity						
Dc coupled	0.35	division	dc	to	50	MHz
	1.0	division		at	500	MHz
Ac coupled	0.35	division	60 Hz	to	50	MHz
	1.0	division		at	500	MHz

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications	
<u>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/div $\pm$ (1.2% of time interval + 0.6% of FS) 100 ms to 5 ns/div $\pm$ (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: $\pm$ (0.7% of time interval + 0.6% of FS) X10 mag: $\pm$ (1.2% of time interval + 0.6% of FS)	
A sweep delta 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)	
Delta time with sweep delay	Accuracy: $\pm$ (0.3% of time interval + 0.1% of FS)	
Delay sweep	Accuracy: $\pm$ (0.3% of delay setting + 0.6% of FS) + 0 to -25 ns	
<u>Frequency Response</u>	VOLTS/DIV switch setting	With internal 50 Ω termination
3 dB bandwidth CH 1 and CH 2	2 mV	Dc to 100 MHz
	5 mV or greater	Dc to 300 MHz
-4.7 dB bandwidth CH 3 and CH 4	0.1 V or 0.5 V	Dc to 300 MHz
	10 Hz or less	
<u>Calibrator</u>		
Output voltage	Range: 0.4 V Accuracy: $\pm$ 1% into 1 M Ω load	
Repetition period	Range: two times the A SEC/DIV setting for SEC/DIV from 200 ns to 200 ms Accuracy: $\pm$ 0.1%, during sweep time	

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 and 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. The following peculiar accessories are 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)
DIGITAL MULTIMETER	Range: 0 to 20 V Accuracy: $\pm 0.025\%$	John Fluke, Model 8840A/AF-05/09 (AN/GSM-64D)
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: Risettime: ± 0.225 ns Sine wave frequency: Range: 1 Hz to 500 MHz	John Fluke, Model 5820A, MIS-38938 (5820A-5C-GHZ)

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.

d. When indications specified in paragraphs 7 through 13 are not within tolerance, perform **SECTION IV, MENU CALIBRATION PROCESS**. After adjustments are made, repeat paragraphs 7 through 13. Do not perform **SECTION IV** if all other parameters are within tolerance.

e. Unless otherwise specified, all controls and control settings refer to the TI.

7. Equipment Setup

WARNING

HIGH VOLTAGE is used or exposed during the performance of the calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions. REDUCE OUTPUT(S) to minimum after each step within the performance check where applicable.

a. Connect TI to a 115 V ac source.