

***TB 9-6625-2239-35**

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE, AN/USM-425(V)1 (TEKTRONIX, TYPE 465M) AND TEKTRONIX, TYPES 465, 465 WITH OPTIONS, 465B AND 465B WITH OPTIONS

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*This bulletin supersedes TB 9-6625-2239-35, dated 5 November 1990.

SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope, AN/USM-425(V)1 (Tektronix, Type 465M) and Tektronix, Types 465, 465 with options, and 465B with options. The manufacturer's 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. Models may be equipped with the following options or combination of options: Option 4 - EMC modification; Option 5 - TV sync separator; and Option 7 - external dc operation. The addition of these options has no affect on the parameters calibrated within this bulletin. Throughout this bulletin, Tektronix, Type 465M is considered to be the same as the AN/USM425(V)1. Tektronix, Type 465 with options or any combination of options is considered to be the same as the Tektronix, Type 465. The Tektronix, Type 465B with options or any combination of options is considered to be the same as the Tektronix, Type 465B. Differences between the AN/USM-425(V)1, Tektronix, Type 465, and the Tektronix, Type 465B are identified within the text, tables, and figures. Vertical mode bandwidth limiting pushbuttons are labeled differently among the various models and serial numbers. The bandwidth limiting pushbutton will be identified as 20 MHz/TRIG VIEW pushbutton within the text. A SWEEP MODE pushbuttons are labeled differently among the various models and serial numbers. The A SWEEP MODE pushbutton will be identified as HORIZ DISPLAY A pushbutton within the text.

b. Time and Technique. The time required for this calibration is approximately 3 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: 5 mV to 5 V per division Accuracy: $\pm 3\%$ ($\pm 2\%$ for AN/USM-425(V)1)
Timing A sweep	Range: Unmag: 0.5 s/div to 0.05 μ s/div (0.5 s/div to 0.02 μ s/div for Tektronix, Type 465B) Mag: X10 extends range to 5 ns/div (2 ns/div for Tektronix, Type 465B) Accuracy: Unmag: $\pm 2\%$ Mag: $\pm 3\%$
B sweep	Range: Unmag: 50 ms/div to 0.05 μ s/div (50 ms/div to 0.02 μ s/div for Tektronix, Type 465B) Mag: X10 extends range to 5 ns/div (2 ns/div for Tektronix, Type 465B) Accuracy: Unmag: $\pm 2\%$ Mag: $\pm 3\%$
Delay time and differential time measurement	Range: 5 s to 0.2 μ s after start of A sweep Accuracy: $\pm 1\%$ over one or more major dial divisions ± 0.01 major dial division over less than 1 major dial division
Risetime	Range: 3.5 ns or less Aberrations: +3%, -3%, total p-p 3% (+4%, -4%, total p-p 4% for Tektronix, Type 465B on 5 mV to 2 V range)
Bandwidth	Range: Dc to 100 MHz
Calibrator	Range: 0.3 V (1.0 V for AN/USM-425(V)1) Accuracy: $\pm 1.0\%$

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 when the equipment listed in table 2 is not available. 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 will be listed, and the actual accuracy of the equipment selected will be shown in parenthesis.

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 accessory is also required for this calibration: 5 - 80 pF standardizer.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
OSCILLOSCOPE CALIBRATOR	Voltage output: Range: 30 mV to 30 V Frequency: 1 kHz Accuracy: $\pm 0.25\%$ Time markers: Range: 1 ns to .5 s Accuracy: $\pm .5\%$ Risettime: .875 ns (1 ns or less) Aberrations: $\pm .875\%$ ($\pm 1\%$) Level sine wave: Reference frequency: 50 kHz Amplitude: 30 mV Capability: >100 MHz	Fluke, Model 5820A-5C-GHZ (5820A-5C-GHZ)
DIGITAL MULTIMETER	Range: 0 to +55 V Accuracy: $\pm .25\%$	Fluke, Model 8840A/AF05 (AN/GSM-64D)

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 result 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 8 through 12 are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs 8 through 12. Do not perform power supply check if all other parameters are within tolerance.

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