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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE AN/USM-488 AND TEKTRONIX, TYPE 2235

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REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms)directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also provide DA Form 2028 information to AMCOM via e-mail, fax, or the World Wide Web. Our fax number is DSN 788-6546 or Commercial 256-842-6546. Our e-mail address is: 2028@redstone.army.mil. Instructions for sending an electronic 2028 may be found at the back of this manual. For the World Wide Web, use https://amcom2028.redstone.army.mil.

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*This bulletin supersedes TB 9-6625-2139-35, dated 18 March 2002 including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope AN/USM-488 and Tektronix, Type 2235. 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 2 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: ±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	Range: 2 mV/div to 0.5 V/div Accuracy: +4%, -4%, 4% p-p

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications			
Horizontal				
A sweep timing	Range: 0.5 s/div to 0.05 μs/div Accuracy: ±2% Range: (X10 mag): 50 ms/div to 5 ns/div Accuracy: ±3%			
B sweep timing	Range: 50 ms/div to 0.05 μs/div Accuracy: ±2% Range: (X10 mag): 5 ms/div to 5 ns/div Accuracy: ±3%			
Sweep linearity	Accuracy: ±5% (measured over any 2 of the center 8 divisions)			
Deflection (X-Axis)	Range: 2 mV/div to 5 V/div Accuracy: ±3%			
A trigger sensitivity	Frequency	10 MHz	60 MHz	100 MHz
	Internal	0.35 div[1]	1.0 div	1.5 div
	External	35 mV	120 mV	150 mV2
B trigger sensitivity	Internal only	0.35 div	1.0 div	1.5 div
Calibrator amplitude	Range: 0.5 V Accuracy: ±2%[3]			

[1]0.3 division for type 2235.
[2]200 mV for type 2235.
[3]±5% for type 2235.

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. 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: ±0.5% Time markers: Range: 5 ns/D to 0.5 s/D Accuracy: ±0.5% Sine wave frequency: Range: 50 kHz to >100 MHz	John Fluke, Model 5820A, MIS-38938 (5820A-5C-GHZ),
DIGITAL MULTIMETER	Range: -8.64 to < 0.1 V dc Accuracy: ±0.12%	John Fluke, Model 8840A/AF-05/09 (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 manuals for this TI.

d. When indications specified in paragraphs **8** through **11** are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs **8** through **11**. Do not perform power supply check if all other parameters are within tolerance.

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

7. Equipment Setup

WARNING

HIGH VOLTAGE is used or exposed during the performance of this 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. Remove protective cover from TI only when necessary to make adjustments. Replace cover after completing the adjustments.