*TB 9-6625-2024-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE OS-245(P)/U, AND TEKTRONIX TYPES 7603 AND 7603N OPT 11S, VERTICAL AMPLIFIER AM-6565/U, AND TEKTRONIX TYPES 7A15A AND 7A15AN OPT 11, AND DUAL TIME BASE TD-1085/U AND TD-1159/U AND TEKTRONIX TYPES 7B53A, 7B53AN OPT 5 AND OPT 11S

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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, 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 immediately preceding the hard copy 2028. For the World Wide Web, use: https://amcom2028.redstone.army.mil.

*This bulletin supersedes TB 9-6625-2024-35, dated 27 June 1983, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope OS-245(P)/U, and Tektronix Types 7603 and 7603N OPT 11S, Vertical Amplifier AM-6565/U, and Tektronix Types 7A15A and 7A15AN OPT 11, and Dual Time Base TD-1085/U and TD1159/U and Tektronix Types 7B53A, 7B53AN OPT 5 and OPT 11S. TM 11-6625-2658-14 and the manufacturer's manuals were 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 that effects calibration.

b. Time and Technique. The time required for calibration of each TI 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
OSCILLOSCOPE OS-245(P)/U AND TEKTRONIX TYPES 7603 AND 7603N OPT 11S	
Power requirements	115 V ac at 60 Hz
Deflection factor (each vertical compartment)	Compatible with all 7000 series plug-in units. Difference between compartments; less than 1%.
Calibrator output Tektronix Types 7603 and 7603N OPT 11S	Range: 1 V dc or p-p, OS-245 (P)/U 4 V, .4 V, and .04 V dc or p-p for Accuracy: ±1%
Risetime (mainframe)	3.5 ns or less, aberrations 0.5 minor div or less
VERTICAL AMPLIFIER AM-6565/U AND TEKTRONIX TYPES 7A15A AND 7A15AN OPT 11	
Vertical gain and attenuation	Range: X1, 5 mV/div to 10 V/div; X10, 500 µV/div to 1 V/div Accuracy: X1, ±2% of indicated deflection factor with GAIN adjusted at 10 mV/div; X10, ±10%.
Risetime	X1: In OS-245 (P)/U or Tektronix Types 7603 or 7603N OPT 11S oscilloscope mainframe, 5.4 ns or less, aberrations 2% or less.
DUAL TIME BASE TD-1085/U	
Main sweep time (over center eight divisions)	Range: 0.05 µs/div to 5.0 s/div Accuracy: Unmag: ±3% Mag: ±5%
Delayed sweep time (over center eight divisions)	Range: 0.05 µs/div to 0.5 s/div Accuracy: Unmag ±3% Mag ±5%
Variable time delay differential delay time measurement	Range: 0 to 10 times the TIME/DIV OR DLY TIME control settings from 5 s/div to 1 µs/div Accuracy: 5 s/div to 1 s/div, within 1.4% of measurement plus 0.3% of FS[1] 0.5 s/div to 1 µs/div, within 0.7% of measurement pulse 0.3% of FS[1]
DUAL TIME BASE TEKTRONIX TYPES 7B53AN OPT 5 AND OPT 11S, 7B53A, AND TD-1159/U	
Main sweep time (over center eight divisions)	Range: 0.05 µs/div to 5.0 s/div Accuracy: ±2% unmag, 2.5% mag from 50 ms/div to 0.5 µs/div ±3% unmag, 3.5% mag, from 5 s/div to 0.1 s/div and 0.2 µs/div to 0.05µs/div

See footnote at end of table.

Table 1. Calibration Description - Continued

Test Instrument Parameters	Performance Specifications
DUAL TIME BASE TEKTRONIX TYPES 7B53AN OPT 5 AND OPT 11S, 7B53A, AND TD-1159/U (Continued)	
Delayed sweep time (over center eight divisions)	Range: 0.05 µs/div to 0.5 s/div Accuracy: ±3% unmag, 3.5% mag from 50 ms/div to 0.5 µs/div ±4% unmag, 4.5% mag from 0.5 s/div to 0.1 s/div and 0.2 µs/div to 0.05 µs/div
Variable time delay Differential delay time measurement	Range: 0 to 10 times the TIME/DIV OR DLY TIME control settings from 5 s/div to 1µs/div Accuracy: 5 s/div to 1 s/div, within 1.4% of measurement plus 0.3% of FS[1] 0.5 s/div to 1 µs/div, within 0.7% of measurement plus 0.3% of FS[1]

[1]Full scale is 10 times the **TIME/DIV OR DLY TIME** setting.

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 the 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: Extender Tektronix Type 067-0589-00, and Standardizer, variable from 5 to 80 pF (7916146), and Calibration Adapter, Tektronix Type 067-0587-01.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
DIGITAL MULTIMETER	Range: -3049 to +140 V dc Accuracy: ±0.025%	Hewlett-Packard, Model 3490AOPT060 w/high voltage probe (3490AOPT060)
DUAL TIME BASE[1]	Must be compatible with required oscilloscope and vertical amplifier	Tektronix, Type 7B53A or 7B53AN OPT 5 or OPT 11S or TD 1085/U or TD-1159/U
OSCILLOSCOPE[1]	Must be compatible with required dual time base and vertical amplifier	Tektronix, Type 7603 or 7603N OPT 11S or OS-245 (P)/U

See footnote at end of table.

Table 2. Minimum Specifications of Equipment Required - Continued

Common name	Minimum use specifications	Manufacturer and model (part number)
OSCILLOSCOPE CALIBRATOR	Time markers: Range: 10 ns to 5 s Accuracy: ±0.75%, 10 to 20ns ±0.5%, 50 ns to 0.1 s 0.75%, 0.2 to 0.5 s Voltage amplitude: Range: 20 mV to 50 V at 1 kHz Accuracy: ±0.5% Pulses: Risetime: 1 ns or less	John Fluke, Model 5820A (5820A-5C-GHZ) MIS 38938
VERTICAL AMPLIFIER[1]	Must be compatible with required dual time base and oscilloscope	Tektronix, Type 7A15A, 7A15AN OPT 11 or AM-6565/U

[1]Normally supplied as a system.

SECTION III
PRELIMINARY OPERATIONS

6. Preliminary Instructions

a. The instructions outlined in paragraphs **6** and **7** 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 and item identification number 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 and TM 11-6625-2658-14 for these TIs.

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.