

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPES, 08-46/U- SERIES, OS-5001/U-SERIES, AND DUMONT/FAIRCHILD MODELS 304-A AND 304-AR

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SECTION I GENERAL

1. Purpose and Scope. This bulletin provides instructions for the calibration of Oscilloscopes OS-46/U-Series, OS-500/ U-Series, and Dumont/Fairchild Models 304-A and 304-AR. The manufacturer's instructions manual and TM 11-5131 were used as the prime data

source in compiling these instructions. The oscilloscope will be referred to as the "test instrument" throughout this bulletin.

a. Model Variations. Variations among models are described in text.

*This bulletin supersedes TB 9-6625-358-50, 18 September 1969, including all changes.

b. Time and Technique. The time required for this calibration is approximately 4 hours, using the dc and low frequency technique.

2. Calibration Data (DA Form 2416). Maintenance forms, records, and reports which are to be used by calibration personnel at all calibration levels are listed in and prescribed by TM 38-750.

3. Reporting of Equipment Publication Improvements. The reporting of errors, omissions, and recommendations for improving this publication by the

individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-CRA, Fort Monmouth, N.J. 07703.

4. Calibration Description. Test instrument parameters and performance specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description

<i>Test instrument parameters</i>	<i>Performance specification</i>
Power input requirement	115 or 230v, $\pm 10\%$: 50 to 400 Hz, 110w.
Sinusoid frequency response:	
Ac or dc coupling	Max. deviation down: 10% at 100,000 Hz; 50% at 3000,000 Hz.
Input impedance ¹	2.2 megohms, paralleled by 50 mmf.
Linear Sweep:	
Frequency	2 to 30.000 Hz.
Amplitude	4-in. min. undistorted.
Expansion	6 times full screen.
Horizontal deflection	1.2 vdc full scale through amplifier at full gain.
Voltage:	
Range	0 to 1,000 vdc.
Scales	0.1, 1, 10, and 100, $\pm 2\%$.
Multiplier range	X1 and X10 $\pm 5\%$.
Calibration Voltage:	
Amplitude	0.1v pp
Accuracy	$\pm 5\%$

¹This specification is for information only and is not necessarily verified in this bulletin.

SECTION II EQUIPMENT REQUIREMENTS

5. Equipment Required. Table 2 identifies the specific equipment used in this calibration procedure. This equipment is issued with secondary transfer calibration standards set 4931-621-7877 and AN/TSM-55 calibration set 4940900-2615 and is to be used in performing this procedure. Alternate items may be used by the calibration 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 accuracy ratio between the standard and test instrument. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment selected is shown in parentheses.

6. Accessories Required. The accessories listed in table 3 are issued with secondary transfer calibration standards set 4931-621-7877 and AN/TSM-55 calibration set, 4940-400-2615 and are to be used in this calibration procedure. When necessary, these items may be substituted by equivalent items unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required

Item	Common name	Minimum use specifications	Manufacturer, model and part No. ¹
A1	AC VOLTAGE STANDARD	Range: .033583 to .037118 vrms at 1 kHz.	Hewlett-Packard, Model 745A-C90 (MIS-10342) (John Fluke Model 760A or Hewlett-Packard, Model 6290B)
A2	AC/DC VOLTMETER	Accuracy: $\pm 0.75\%$ Range: 0.353vrms and +108.0 to 111.1	John Fluke, Model 887AB (MIS-10216) (John Fluke, Model 883)
A3	AUTOTRANSFORMER	Accuracy: $\pm 1.25\%$ ac $+0.25\%$ dc Range: 105 to 125 vac Accuracy: $\pm 1\%$	General Radio, Model W10MT3AS3 (7910809) (General Radio, Model W10MT3A (6120-054-7794))
A4	SQUARE-WAVE GENERATOR	Range: 10 Hz to 300 kHz Risettime: 0.02 μ sec or less	Hewlett-Packard, Model 211AR (85989658-2) (Fairchild, Model 791 (6625-098-6482))
A5	TEST OSCILLATOR	Range: 100 to 300,000 Hz at 0.3535 vrms Accuracy: $\pm 2.5\%$	Preston, Model 134A (MIS-10224) (Hewlett-Packard, Model 652A (6625-935-4214))

¹Items listed in parentheses denote Transportable Maintenance Calibration Facilities equipment.

Table 3. Accessories Required

Item	Common name	Description
B1	ADAPTER.....	General Radio, Model 274-QBJ (7909402)
B2	CABLE ¹	30-in. RG-58()/U; double banana plug terminations (7907470)
B3	VOLTAGE DIVIDER.....	Hewlett-Packard, Model 11047A (7911560)
B4	LEAD.....	24-in., No. 18; single banana plug terminations (7907497)

¹Two required.

SECTION III PRELIMINARY OPERATIONS

7. Preliminary Instructions. a. The instructions outlined in this section 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 and item identification number as listed in tables 2 and 3. For the identification of equipment referenced by item numbers prefixed with A, see table 2, and for prefix B, see table 3.

WARNING

HIGH VOLTAGE is used during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

8. Equipment Setup. a. Remove protective cover from test instrument.

b. Connect test instrument to autotransformer (A3).

c. Connect autotransformer b 115-volt ac source and adjust output for 115 volts ac.

d. Position test instrument controls as listed in (1) through (13) below:

- (1) SCALE control fully clockwise.
 - (2) INTENSITY control fully counterclockwise.
 - (3) Y POSITION control to midrange.
 - (4) X POSITION control to midrange.
 - (5) SYNC SELECTOR switch in INT.
 - (6) Y AXIS VOLTS FULL SCALE switch to OFF.
 - (7) MULTIPLIER control fully counterclockwise.
 - (8) X SELECTOR switch to OFF.
 - (9) X AMPLITUDE control fully counterclockwise.
 - (10) SWEEP RANGE switch to EXT CAP.
 - (11) SWEEP VERNIER control fully counterclockwise.
 - (12) SYNC AMPLITUDE control to midrange (0).
 - (13) FOCUS control to midrange.
- e. Energize equipment and allow 10 minutes for equipment to warm up and stabilize.
- f. Position spot to the center of crt, using X and Y POSITION controls. Adjust INTENSITY control as required.
- g. Turn MULTIPLIER switch to 1 and adjust Y AXIS D-C BAL control to return trace to same