*TB 9-6625-1944-35

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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR SQUARE WAVE GENERATOR HEWLETT-PACKARD, MODEL 211 B

Headquarters, Department of the Army, Washington, DC
5 July 1988

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*This bulletin supersedes TB 9-6525-1944-50, 22 December 1975, including all changes.

SECTION I

IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Square Wave Generator, Hewlett-Packard, Model 211B. 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 4 hours, using the de 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
Output:	
50Q	Range: >5 V into 50Q Risetime: <5 ns (reference at 5 V into 50Q)
600Q	Range: >60 V into open circuit Risetime: <140 ns into open circuit
Trigger output	Width: 10 ns +5 ns Amplitude: >2 V into 50Q Polarity: + or -

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 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 accuracy's listed in table 2 provide a four-to-one ratio between the standard and TI.

5. Accessories Required. The accessories listed in table 3 are issued as indicated in paragraph 4 above and are 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 and model (part number)
A1	AUTOTRANSFORMER	Range: 105 to 125 V ac Accuracy: +1X%	General Radio, Model WO1MT3AS3 or Ridge, Model 9020F (7910809)
A2	DIGITAL VOLTMETER	Range: -19.8 to -70.7 V dc Accuracy: +0.25%	Hewlett-Packard, Model 3490AOPT060 (3490AOPT060) Dana, Model 5000, or Dana, Model 5000, w/641
A3	OSCILLOSCOPE	Range: 5 ns to 5 MHz .5 to 60 V Accuracy: ±3%	Tektronix, Type R5440 (MIS-28706/1 Type 1) w/5A48 (MIS-28706/3) and 5B42 (MIS-28706/4) and 5S14 (MIS-28706/5)

Table 3. Accessories Required

Item	Common name	Description (part number)
B1	ATTENUATOR	X10, Tektronix, Type 011-0059-02
B2	CABLE	30-in., RG-58/U; BNC plug termination's (7907467)
B3	LEAD1	32-in., single banana plug to test hook (red) (7915941-1)

[1]Two required.

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 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.

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 10 are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs 8 through 10. Do not perform power supply check if all other parameters are within tolerance.

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

a. Remove TI protective cover as required for adjustments.

b. Connect TI to autotransformer (Al).

c. Connect autotransformer to 115-V ac source and adjust for 115-V output.

d. Position controls as listed in (1) through (7) below:

(1) **FREQUENCY (Hz)** dial to **10.**
(2) **MULTIPLIER** switch to **10K.**
(3) **SYMMETRY** control to mid position.
(4) **AMPLITUDE (V ACROSS** Ωswitch to **5**.
(5) **VERNIER** control fully ccw.
(6) **AMPLITUDE** control fully ccw.
(7) **TRIGGER POLARITY** switch to -.

e. Press LINE pushbutton to ON position.
f. Allow 10 minutes for TI to warm up and stabilize.

8. 600-Ohms Output

a. Performance Check

(1) **Connect OUTPUT 600**Ω to 5A48 (p/o A3), using cable (B2).

(2) Adjust **AMPLITUDE** control fully cw. If oscilloscope does not display a negative pulse with at least 60 V, perform b below.

(3) Adjust **AMPLITUDE** control for a 60-V indication on oscilloscope.

(4) Measure rise and falltime using standard measurement technique. Rise and falltime as indicated on oscilloscope will be less than 140 ns.

b. Adjustments. Adjust R88 (fig. 1) for greatest amplitude without distortion on falltime (R).

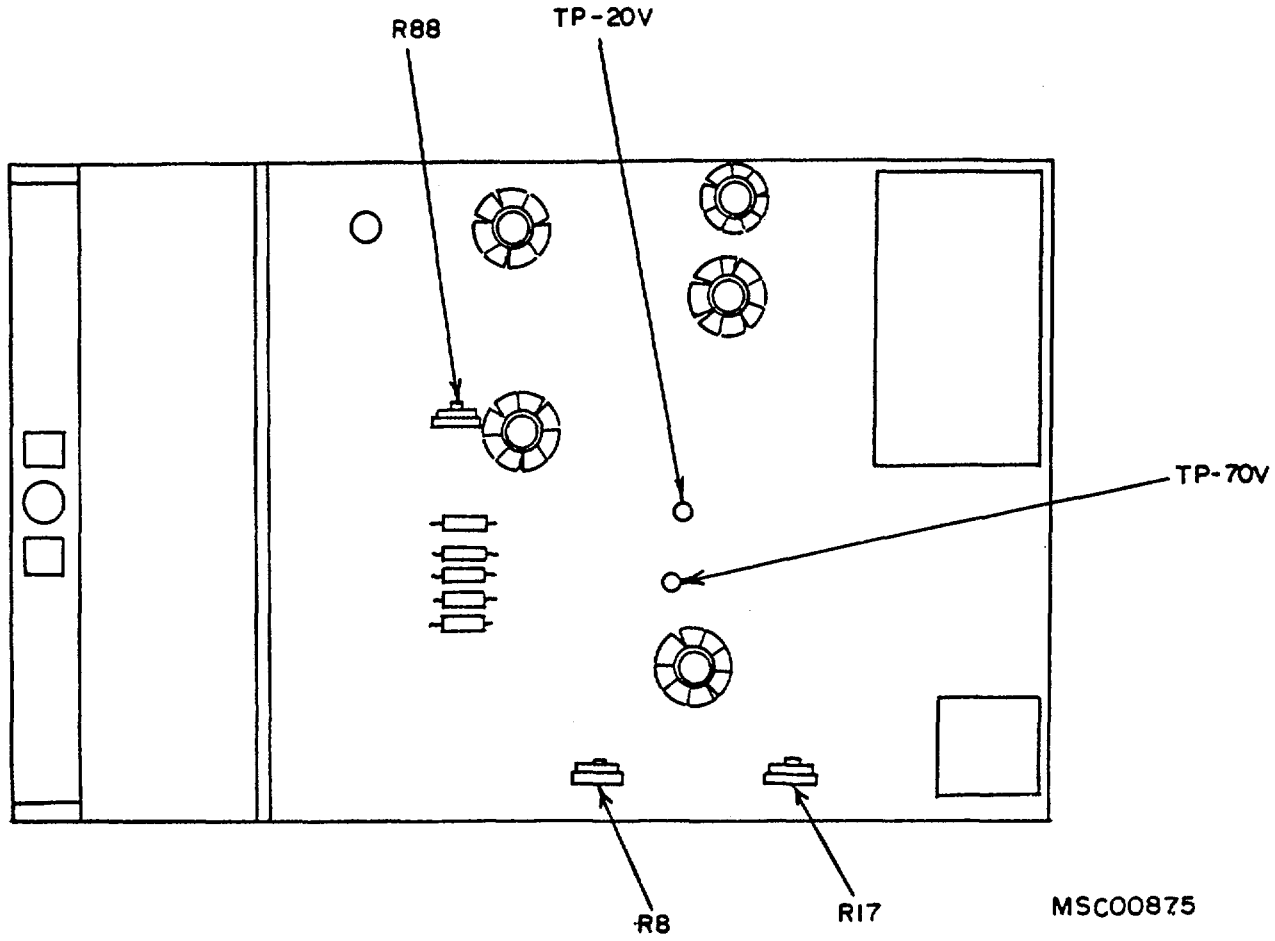

Figure 1. Hewlett-Packard, Model 211B - bottom view.

9. 50-Ohms Output

a. Performance Check

(1) **Connect OUTPUT 50Ω** to 5S14 (p/o A3), using cable and attenuator (B2 and B1).

(2) Set **MULTIPLIER** switch to **1M** and adjust **FREQUENCY (Hz)** dial to 5.

(3) Adjust **VERNIER** control fully cw. Oscilloscope will indicate a negative pulse of at least .5 V.

(4) Adjust **VERNIER** control for a .5-V indication on oscilloscope.

(5) Measure rise and falltime using standard measurement technique. Rise and falltime as indicated on oscilloscope will be less than 5 ns.

b. Adjustments. No adjustments can be made.

10. Trigger Output

a. Performance Check

(1) Connect **TRIGGER OUTPUT** to 5S14 (p/o A3), using cable (B2).

(2) Set **MULTIPLIER** switch to **1M** and adjust **FREQUENCY (Hz)** dial to 5.

(3) Adjust **VERNIER** control fully cw. Oscilloscope will indicate a negative pulse of at least 2 V.

(4) Measure pulse width at 50 percent of amplitude as indicated on oscilloscope. Pulse width as indicated on oscilloscope will be between 5 and 15 ns.

(5) Set **TRIGGER POLARITY** switch to +.

(6) Repeat 3 and 4 above. Oscilloscore indications will remain the same except pulse will be positive.

b. Adjustments. No adjustment can be made.

11. Power Supply

NOTE

Do not perform power supply check if all other parameters are with tolerance.

a. Performance Check

(1) Connect digital voltmeter A2 to TP-20V(fig.1) and chassis ground, using leads B3. Vary autotransformer A1output between 105 and125 v ac. If digital voltmeter does not indicate between -19.8 and -20.2 V dc, perform b(1).

(2) Adjust autotransformer output to 115 V ac.

(3) Connect digital voltmeter to TP- 70V (fig. 1) and chassis ground, using leads (B3). Vary autotransformer output between 105 and 125 V ac. If digital voltmeter does not indicate between -69.3 and -70.7 V dc, perform b(2) below.

(4) Adjust autotransformer output to 115 V ac.

b. Adjustments

(1) Adjust autotransformer output to 115 V ac. Adjust R8 (fig. 1) for a -200-V de indication on digital voltmeter (R).

(2) Repeat a(1l) above.

(3) Adjust autotransformer output to 115 V ac. Adjust R17 (fig. 1) for a -70.0-V dc indication on digital voltmeter (R).

(4) Repeat a(3) above.

12. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA Label/Form in accordance with TB 750-25.

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