*TB 9-6625-2216-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR UNIVERSAL COUNTER HEWLETT-PACKARD, MODEL 5314A AND OPTION 001

Headquarters Department of the Army, Washington, DC
25 July 2007

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, US 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.

*This bulletin supersedes TB 9-6625-2216-35, dated 8 September 1988, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Universal Counter, Hewlett-Packard, Model 5314A and Option 001. 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. Variations among models are described in text, tables, and figures.

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 parameter	Performance specifications
Time base:	
Standard oscillator	Frequency: 10M Aging rate: < 3 parts in 10^7 per month Line voltage: < ± 1 part in 10^7 for ± 10% variation
Option 001	Frequency: 10 MHz Aging rate: < 1 part in 10^7 per month Line voltage: < ± 1 part in 10^8 for ± 10% variation
Channel A sensitivity	< 25 mV rms: 10 Hz to 100 MHz
Channel B sensitivity	< 25 mV rms: 10 Hz to 2.5 MHz

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-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 actual accuracy of the equipment is 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.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
AUTOTRANSFORMER	Range: 105 to 125 V ac Accuracy: 1%	Ridge, Model 9020A (9020A)
FREQUENCY DIFFERENCE METER	Resolution: 1 part in 10^{10}	Tracor, Model 527E (527E)
FUNCTION/ARBITRARY GENERATOR	Range: 10 Hz to 10 MHz Amplitude: 0 to 100 mV	Agilent, Model 33250A (33250A)
SIGNAL GENERATOR	Range: 10 to 500 MHz Amplitude: 0 to 100 mV	(SG-1207/U)
TIME/FREQUENCY WORKSTATION	Range: 1 MHz Accuracy: ± 1 part in 10^{10}	Datum, Model ET6000-75 (13589305)

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. Unless otherwise specified, all controls and control 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. 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.

b. Connect TI to autotransformer.

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

d. Press **STBY/ON** pushbutton to **ON** (in) and allow at least 1 hour for stabilization. If TI has been disconnected from line power for more than 24 hours, allow at least 24 hours for warm-up before beginning calibration.

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

(1) **NORM/HOLD** pushbutton to **NORM** (out).

(2) Function pushbuttons to **FREQ A/START A** (in) and **PER A/T A-B** (out).

(3) **SHIFT** key (blue pushbutton) (out).

(4) **RESOLUTION** pushbutton to **1 Hz** (in).

(5) **CHANNEL A** and **CHANNEL B** controls as follows:

(a) **LEVEL A** and **LEVEL B** to mid-range.

(b) **SLOPE** to **??** (out).

(6) **ATTN** pushbutton to **X1** (out).

(7) **SEP/COM** pushbutton to **SEP** (out).

8. Time Base Stability

a. Performance Check

(1) Connect 1 MHz output of time/frequency workstation to **REF INPUT** of frequency difference meter.

(2) Connect frequency difference meter **SIG INPUT** to TI test point TP P (located on the bottom of A1 next to U2 behind front panel).

(3) Adjust **OSC ADJ** (front panel) for option 001 (located on top, left corner) for minimum difference indication on frequency difference meter.

(4) Allow at least 24 hours for TI time base oscillator stabilization. Frequency difference meter will indicate less than 3 parts in 10^7 (1 part in 10^7 for option 001).

(5) Adjust autotransformer output to 105 V ac. Allow 1 minute for oscillator to stabilize. Verify that TI oscillator drift is less than 1 part in 10^7 (1 part in 10^8 for option 001).

(6) Adjust autotransformer output to 125 V ac. Allow 1 minute for oscillator to stabilize. Verify that TI oscillator drift is less than 1 part in 10^7 (1 part in 10^8 for option 001).

(7) Adjust autotransformer output to 115 V ac.

b. Adjustments. No further adjustments can be made.

9. Sensitivity

a. Performance Check

(1) Connect function/arbitrary generator 50 Ω output to **INPUT A**, using 50 Ω termination.

(2) Adjust function/arbitrary generator frequency to 10 Hz and slowly increase output until TI displays a stable indication of applied frequency. Function/arbitrary generator output will not exceed 25 mV rms.

(3) Repeat technique of (2) above, varying function/arbitrary generator frequency from 10 Hz to 10 MHz. Function/arbitrary generator output will not exceed 25 mV rms.

(4) Substitute signal generator for function/arbitrary generator, using termination.

(5) Press **RESOLUTION** pushbutton **10 Hz N = 1** (in).

(6) Repeat technique of (2) above, varying signal generator frequency from 10 to 100 MHz. Signal generator output will not exceed 25 mV rms.

(7) Substitute function/arbitrary generator for signal generator.

(8) Position controls as listed in (a) through (c) below:

(a) Press **SEP/COM A** pushbutton to **COM A** (in).

(b) Press **FREQ A/START A** pushbutton (out).

(c) Press **1 HZ N = 100** (in).

(9) Adjust function/arbitrary generator frequency to 10 Hz and slowly increase output until TI displays 1.00. Function/arbitrary generator output will not exceed 25 mV rms.

(10) Repeat technique of (9) above, varying function/arbitrary generator frequency from 10 Hz to 2.5 MHz. Function/arbitrary generator output will not exceed 25 mV rms.

b. Adjustments. No adjustments can be made.

10. Final Procedure

a. Deenergize and disconnect all equipment.

b. Annotate and affix DA label/form in accordance with TB 750-25.

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army

0714307

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342293 requirements for calibration procedure TB 9-6625-2216-24.

INSTRUCTIONS FOR SUBMITTING AN ELECTRONIC 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" whomever@redstone.army.mil
To: <2028@redstone.army.mil

Subject: DA Form 2028

1. **From**: Joe Smith
2. Unit: home
3. **Address**: 4300 Park
4. **City**: Hometown
5. **St**: MO
6. **Zip**: 77777
7. **Date Sent**: 19-OCT –93
8. **Pub no:** 55-2840-229-23
9. **Pub Title**: TM
10. **Publication Date**: 04-JUL-85
11. Change Number: 7
12. Submitter Rank: MSG
13. **Submitter FName**: Joe
14. Submitter MName: T
15. **Submitter LName**: Smith
16. **Submitter Phone**: 123-123-1234
17. **Problem**: 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. **Text**

This is the text for the problem below line 27.