*TB 9-6625-2313-40

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR PRECISION COMPONENT ANALYZER WAYNE KERR, MODEL 6425B

Headquarters, Department of the Army, Washington, DC
31 October 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, 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 send in your comments electronically to our E-mail address: 2028@redstone.army.mil or by fax 256-842-6546/DSN 788-6546. For the World Wide Web use: https://amcom2028.redstone.army.mil. Instructions for sending an electronic 2028 can be found at the back of this manual.

*This bulletin supersedes TB 9-6625-2313-50, dated 22 February 2006.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of the Precision Component Analyzer, Wayne Kerr, Model, 6425B. 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 dc and low frequency technique.

2. Forms, Records, and Reports. Forms, records and reports required for calibration personnel at all levels are prescribed by TB 750-25.

3. Calibration Description. TI parameters and performance applications which pertain to this calibration are in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Output Frequency	Range: 100 Hz and 1 kHz Accuracy: ± 1 % Output: 0 to 20 V rms
Capacitance	Range: 0.1 pF to 2000 μf[1] Accuracy: ± 0.05 %
Inductance	Range: 10 μh to 10 H[2] Accuracy: ± 0.10 %

[1]Verified from 100 pF to 1 μf.
[2]Verified from 100 μh to 10 H.

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 Reference Calibration Standards Set NSN 4931-00-621-7878. Alternate items may be used by the calibrating activity. The item 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 selected 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)
CAPACITANCE MEASURING SYSTEM[1]	Range: 0.1 pF to 2000 μf Accuracy:[2]	General Radio, Model 1615A (1615A)
CAPACITANCE STANDARD NO. 1	Range: 5.0 nF to 1.0 μF Accuracy:[2]	Arco Electronic, Model SS-32 (7907233)
CAPACITANCE STANDARD NO. 2	Range: 100 pF to 1.0 nF Accuracy:[2]	General Radio, Model 1422D (1422D)
INDUCTOR STANDARD NO. 1	Range: 100 μH Accuracy: ±0.025% (0.16%)	General Radio, Model 1482B (1482B)
INDUCTOR STANDARD NO. 2	Range: 1 mH Accuracy: ±0.025% (0.05%)	General Radio, Model 1482E (1482E)
INDUCTOR STANDARD NO. 3	Range: 100 mH Accuracy: ±0.025% (0.04%)	General Radio, Model 1482L (1482L)
INDUCTOR STANDARD NO. 4	Range: 200 mH Accuracy: ±0.025% (0.09%)	General Radio, Model 1482C (1482C)
INDUCTOR STANDARD NO. 5	Range: 1 H Accuracy: ±0.025% (0.08%)	General Radio, Model 1482P (1482P)
INDUCTOR STANDARD NO. 6	Range: 10 H Accuracy: ±0.025%	General Radio, Model 1482T (1482T)
MULTIMETER	Range: 100 Hz and 1 kHz Frequency accuracy: ±0.25%	Agilent, Model 3458A (3458A)

[1]Used to characterize the capacitance standard set.

[2]Combined accuracy of capacitance measuring system and capacitance standard will be ±0.0125 %

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. Set power switch to **ON** and allow at least 20 minutes for TI to warm-up and stabilize.

b. Press **Main Index** pushbutton.

8. Output Frequency

a. Performance Check

(1) Connect multimeter to TI's yellow measurement terminal. Set multimeter to read frequency.

(2) From keypad select **CODE,** then **9.1** (clears data in non-volatile memory), then press **ENTER** key.

(3) Press **NORMAL** soft key, then press **(▼)** soft key and set display to **100 Hz**.

(4) Multimeter will indicate between 99.99 and 100.01 Hz.

(5) Press **(▲)** soft key to display **1.0 kHz**; multimeter will indicate between 990 and 1010 Hz.

b. Adjustments. No adjustments can be made.

9. Trimming O/C and S/C

NOTE

It is important that trimming operations are made with Kelvin leads arranged as they will be for measurement checks. Measurements may be affected by movement of the leads. If an out-of-tolerance condition exists, repeat the trimming operation.

a. Connect Kelvin leads (supplied with TI) to TI, observing and matching color coding on both TI and Kelvin leads.

b. From keypad press **Main Index** (pause) then **CODE**, **9.1**, and **ENTER** keys.

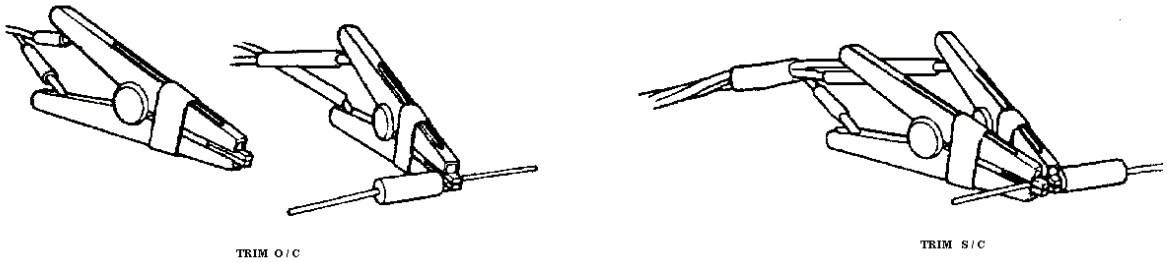
c. Press **NORMAL** soft key.

d. Press soft keys listed in (1) through (10) below for respective settings:

(1) **10.0 kHz**.
(2) **1.00 Vac**.
(3) **0.0 Vdc**.
(4) **Bias Off**.
(5) **C**.
(6) **G**.
(7) **PARALLEL**.
(8) **Auto**.
(9) **REP**.
(10) **SLOW**.

e. From the keypad press **CODE**, **9**, then **ENTER** keys. The upper left of crt display should read ***8**.

f. Place the Kelvin leads in a position that will approximate the measurement position. Connect leads as illustrated in figure 1 for TRIM O/C. Ensure that the clips are separated by at least 5 cm (approximately 2.5 inches).



NOTE: **MAY ALSO CLIP LEAD(S) TO A PIECE OF BARE WIRE**.

Figure 1. Trim O/C and S/C.

g. The residual capacitance reading should not exceed 8.8 pF, with parallel conductance reading not exceeding ± 10 ns.

h. Press **TRIM O/C** pushbutton, (allow 10-15 seconds) then press **TRIGGER** pushbutton to initiate auto-trim process. The display should read **0.0 fF (±2.0 fF)** and **0.0 nS (±0.04 ns)**.

i. Connect leads as illustrated in figure 1 for TRIM S/C, ensuring that the lead clips are not touching each other. The analyzer should autorange to range ***1** and the drive level should change to **100 mA**.

j. Press soft keys for **L**, **R**, and **SERIES** settings.

k. The residual inductance and resistance readings should not exceed 350 nH and 20 mΩ respectively.

l. Press **TRIM S/C** pushbutton, (allow 10-15 seconds) then **TRIGGER** pushbutton to initiate auto-trim. The display should read **0.0 nH (±0.4 nH)** and **0 μΩ (± 30μΩ)**.

m. Press soft key for **Single** trigger setting.

n. Press soft key **(▼)** until frequency display in step **9 d** (1) is **1 kHz**.

10. Capacitance

NOTE

It is important that trimming operations are made with Kelvin leads arranged as they will be for measurement checks. Measurements may be affected by movement of the leads. If an out-of-tolerance condition exists, repeat the trimming operation and the measurement check.

a. Performance Check

(1) Characterize and record each capacitance value listed in table 3 utilizing the capacitance measuring system.

(2) Connect appropriate standard to TI.

(3) Press soft keys **C, G, PARALLEL** and **REP** settings.

(4) The TI's capacitance indication will be within ±0.05% of characterized value, if not, perform **b** below.

Table 3. Capacitance

Capacitance (μf) (nominal)
0.0001[1]
0.0005
0.0009
0.001
0.005[2]
0.009
0.01
0.05
0.09
0.1
0.5
1.0[3]

[1]Use capacitance standard No. 2.
[2]Use capacitance standard No. 1.
[3]Use 0.5, 0.4, and 0.1 μF capacitors with adapter.

(5) Press soft key for **Single** trigger setting.

b. Adjustments. Repeat paragraphs **9** and **10** above being careful with movement of Kelvin leads. Otherwise, no adjustments can be made.

11. Inductance

NOTE

It is important that trimming operations are made with Kelvin leads arranged as they will be for measurement checks. Measurements may be affected by movement of the leads. If an out-of-tolerance condition exists, repeat the trimming operation and the measurement check.

a. Performance Check

(1) Repeat technique of paragraph **9** above.

(2) Connect appropriate standard from table 4 to TI.

(3) Press soft keys for **L**, **R**, **SERIES**, and **REP** settings.

(4) The TI inductance indication will be within ±0.10% of standard's test report value, if not, perform **b** below.

Table 4. Inductance Measurement

Inductor standard (nominal value)	
100	µH
1	mH
10	mH
100	mH
1	H
10	H

(5) Press soft key for **Single** trigger setting.

b. Adjustments. Repeat **9** and **11** above being careful with movement of Kelvin leads. Otherwise, no adjustments can be made.

12. 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
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Secretary of the Army

0724703

Distribution:

To be distributed in accordance with STD IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6625-2313-40.

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.