

*TB 9-4931-443-50

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR AC PRECISION SUPPLY, N. H. RESEARCH MODEL SF 613-1

Headquarters, Department of the Army, Washington, DC
6 August 2004

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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), or DA Form 2028-2 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. For the World Wide Web, use <https://amcom2028.redstone.army.mil>.

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*This technical bulletin supersedes TB 9-4931-443-35, dated 27 October 1971, including all changes.

SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of AC Precision Supply, N. H. Research Model SF 613-1. 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 Variation. Variations among models are described in text.

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

a. Forms, records, and reports required for calibration personnel at all level 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) will follow the designated adjustment. Report only those adjustments made and designated (R).

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

Table 1. Calibration Description

| Test instrument parameters | Performance specifications |
|----------------------------|---|
| Line voltage regulation | Satisfactory performance with any line voltage between 105 and 125 v ac |
| Frequency | Range: 10 Hz to 100 kHz Accuracy: $\pm 1\%$ of setting |
| Distortion | Maximum of 0.05%, 50 Hz to 10 kHz and maximum of 1%, 10 Hz to 100 kHz |
| Stability | Drift is not more than 20 ppm after 2 minutes |

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. 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 the calibration procedure.

Table 2. Minimum Specifications of Equipment Required

| Common name | Minimum use specifications | Manufacturer and model (part number) |
|-------------------|--|---|
| AUDIO ANALYZER | Range: 50 Hz Capability: 0.05% distortion | Boonton, Model 1121 (1121) |
| AUTOTRANSFORMER | Range: 105 to 125 V ac Accuracy: ±1% | General Radio, Model W10MT3AS3 (7910809) or Ridge, Model 9020A (9020A), or Ridge, Model 9020F (9020F) |
| FREQUENCY COUNTER | Range: 50 Hz to 100 kHz Accuracy: ±0.25% | Fluke, Model PM6681/656 (PM6681/656) |
| MULTIMETER | Range: 100 V ac Resolution: 20 ppm | Fluke, Model 8840A/AF05 (AN/GSM-64D) |

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 test instrument from protective cover as required for adjustments.

b. Connect test instrument **EXCITER UNIT** power cable to test instrument **POWER UNIT** receptacle **P201** located on rear panel.

c. Connect test instrument **POWER UNIT** power cable to autotransformer.

d. Connect autotransformer to 115 volt ac source and adjust controls for 115 volt output.

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- e. Position **EXCITER** controls as listed in (1) through (4) below:
 - (1) **FREQUENCY HZ** controls to **100** and **MULT** switch to **X10**.
 - (2) **CAL** control fully counterclockwise.
 - (3) **ATTENUATOR** switch to **2**.
 - (4) **VOLTAGE** controls to **11111**.
- f. Position **POWER UNIT** controls as listed in (1) through (6) below:
 - (1) **ON/RESET-STANDBY** switch to **STANDBY**.
 - (2) **METERING** switch to **VOLTAGE**.
 - (3) **OUTPUT MODE** switch to **VOLTAGE**.
 - (4) **REG ADJ** control to **5**.
 - (5) **RANGE** switch to **RANGE I**.
 - (6) **ON-LINE** switch to **ON**.
- g. Allow at least 2.5 hours for equipment to warm-up and stabilize.

8. Exciter Frequency and Stability

a. Performance Check

- (1) Connect frequency counter to **EXCITER UNIT** jack **J101** (located on rear panel).
- (2) Adjust **EXCITER UNIT VOLTAGE** and **ATTENUATOR** switches as required for stable presentation on frequency counter.
- (3) Frequency counter will indicate between 990 and 1010 Hz. If not, perform **b** below.
- (4) Repeat technique of (2) and (3) above at test instrument **FREQUENCY HZ** switch settings listed in table 3. Frequency counter will indicate within limits specified. If not, perform **b** below.

Table 3. Frequency Accuracy

| Test instrument FREQUENCY HZ switch positions | Frequency counter indication (Hz) | |
|--|-----------------------------------|-------------|
| | Min | Max |
| 999 X1 | 989 | 1,009 |
| 010 X1 | 99 msec | 101.01 msec |
| 100 X100 | 9,900 | 10,100 |
| 010 X100 | 990 | 1,010 |
| 020 X100 | 1,980 | 2,020 |
| 030 X100 | 2,970 | 3,030 |
| 040 X100 | 3,960 | 4,040 |
| 050 X100 | 4,950 | 5,050 |
| 060 X100 | 5,940 | 6,060 |
| 070 X100 | 6,930 | 7,070 |
| 080 X100 | 8,920 | 8,080 |

Table 3. Frequency Accuracy Continued

| Test instrument FREQUENCY Hz switch positions | Frequency counter indication (Hz) | |
|--|-----------------------------------|--------|
| | Min | Max |
| 090 X100 | 8,810 | 9,090 |
| 200 X10 | 1,980 | 2,020 |
| 300 X10 | 2,970 | 3,030 |
| 400 X10 | 3,960 | 4,040 |
| 500 X10 | 4,950 | 5,050 |
| 600 X10 | 5,940 | 6,060 |
| 700 X10 | 6,930 | 7,070 |
| 800 X10 | 7,920 | 8,080 |
| 900 X10 | 8,910 | 9,090 |
| 101 X100 | 9,999 | 10,201 |
| 102 X100 | 10,098 | 10,302 |
| 103 X100 | 10,197 | 10,403 |
| 104 X100 | 10,296 | 10,504 |
| 105 X100 | 10,395 | 10,605 |
| 106 X100 | 10,494 | 10,706 |
| 107 X100 | 10,593 | 10,807 |
| 108 X100 | 10,692 | 10,908 |
| 109 X100 | 10,791 | 11,009 |

b. Adjustments

- (1) Turn **EXCITER UNIT FREQUENCY HZ** controls to **100 X100**.
- (2) Adjust **C729** and **C723** (fig. 1) in the same direction in equal increments until frequency counter indicates 10,000 Hz (R).

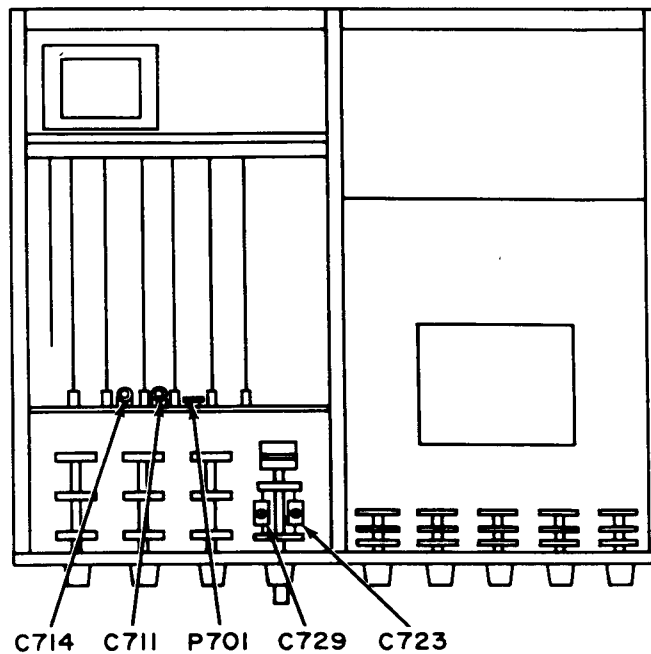


Figure 1. Exciter unit - top view.

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- (3) Turn **EXCITER UNIT FREQUENCY Hz** controls to **100 X10**.
- (4) Repeat a (2) through (4) above.

9. Distortion

a. Performance Check

- (1) Connect **EXCITER UNIT** jack **J101** to **POWER UNIT** jack **J201** (rear panel).
- (2) Connect audio analyzer to **POWER UNIT 160V** and common jacks.
- (3) Turn **EXCITER UNIT FREQUENCY HZ** controls to **050 X1**.
- (4) Set **POWER UNIT ON/RESET STANDBY** switch to **ON/RESET**.
- (5) Adjust **EXCITER UNIT VOLTAGE** and **ATTENUATOR** switches for 100-volt indication on voltmeter portion of audio analyzer.
- (6) Measure distortion at 50 Hz. Distortion will be less than 0.05%. If not, perform **b** below.
- (7) Repeat technique of (3) through (6), above at **FREQUENCY Hz** control settings listed in table 4. Audio analyzer will indicate within limits specified. If not, perform **b** below.

Table 4. Distortion (Power Unit)

| Test instrument FREQUENCY Hz setting | Frequency (Hz) | Distortion as indicated on Audio analyzer (%) |
|---|----------------|---|
| 100 X1 | 100 | 0.05 |
| 100 X10 | 1,000 | 0.05 |
| 010 X100 | 1,000 | 0.05 |
| 020 X100 | 2,000 | 0.05 |
| 050 X100 | 5,000 | 0.05 |
| 100 X100 | 10,000 | 0.05 |
| 200 X100 | 20,000 | 1 |
| 500 X100 | 50,000 | 1 |
| 700 X100 | 70,000 | 1 |
| 900 X100 | 90,000 | 1 |
| 999 X100 (Cal cw) | 100,000 | 1 |

b. Adjustments

- (1) Adjust **P701** (fig. 1) for minimum distortion (R).
- (2) Repeat (1) above at **FREQUENCY HZ** control settings of **200 X100** (20 kHz) and **200 X10** (2 kHz).
- (3) Turn **FREQUENCY HZ** controls to **100 X100** (10 kHz).
- (4) Adjust **C714** (fig. 1) for minimum distortion (R).
- (5) **FREQUENCY HZ** controls to **500 X100** (50 kHz).
- (6) Adjust **C711** (fig. 1) for minimum distortion (R).
- (7) Turn **FREQUENCY HZ** controls to **900 X100** (90 kHz).

- (8) Adjust **C207** (fig. 2) for minimum distortion (R).

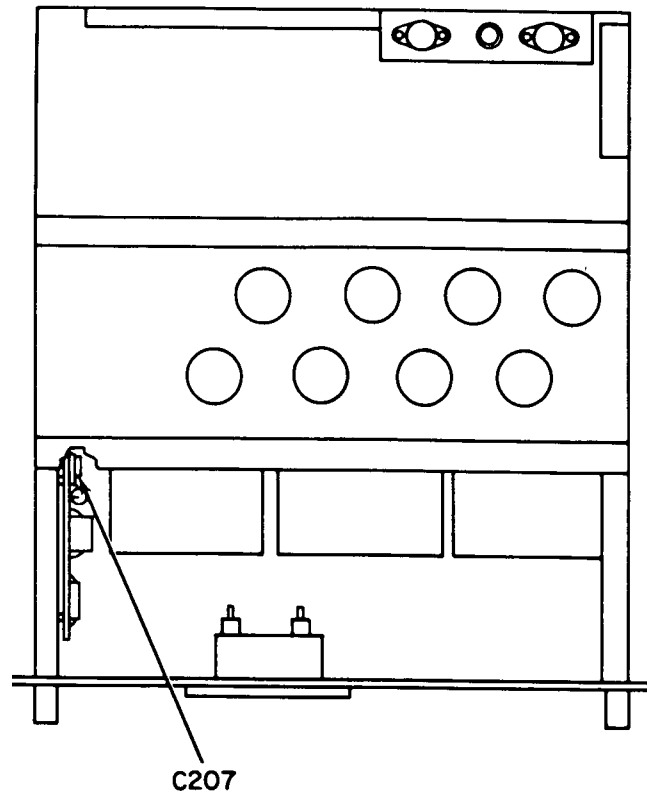


Figure 2. Power unit – top view

- (9) Repeat a (3) through (7) above.

10. Power Unit Voltage and Stability

a. Performance Check

- (1) Connect multimeter between **POWER UNIT 160V** jack and common.
- (2) Turn **FREQUENCY HZ** controls to **100 X10** and adjust **VOLTAGE** and **ATTENUATOR** switches until multimeter indicates 100V on the most sensitive null position.
- (3) After two minutes, multimeter indication will not drift more than 2 mv.
- (4) Record multimeter indication.
- (5) Vary autotransformer between 105 and 125 volts (wait one minute at 105 and 125 volts). Multimeter indication will remain within $\pm 0.05\%$ of value recorded in (4) above at each autotransformer voltage setting.
- (6) Adjust autotransformer to 115 volts.

b. Adjustments. No adjustments can be made.

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11. 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:

Official:

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*General, United States Army
Chief of Staff*



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0416002

Distribution:

To be distributed in accordance with STD IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-4931-443-50.

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.milT
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.

