TB 9-4920-458-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR RUBIDIUM FREQUENCY STANDARD EFRATOM, MODEL FRT-GR-LA

Headquarters, Department of the Army, Washington, DC
9 May 1994

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SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Rubidium Frequency Standard, Efratom, Model FRT-GR-LA. Calibration and Measurements Requirement Summary (CMRS) IFTE89P63031100, dated 26 June 1992, 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 1 hour, 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. 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
Frequency	Range: (J1, J2) 0.5 to 0.7 V rms into 50Ω at l0 MHz (J3, J4) 1.0 V rms into 50Ω at 10 MHz (J5 to J8) 1.0 V rms into 50Ω at 10 MHz Accuracy: ±0.02 Hz

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. 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 on table 2 provide a four-to-one ratio between the standard and TI.

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)
TIME/FREQUENCY WORKSTATION	Range: 10 MHz Accuracy: ±5 parts in 10^{10}	Autek Systems Corp., Model 620 (MIS-38946)

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 results 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 the 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. Connect TI to 115 V ac source and verify **POWER ON** indicator is illuminated.

b. Allow at least 1 hour for warmup and verify **OPERATION** indicator is illuminated.

8. Frequency Accuracy

a. Performance Check

(1) Connect TI **10 MHz OUTPUT J1 0.5-0.7 VRMS 5OΩ** connector (rear panel) to time/frequency workstation **INPUT FREQ/ TIME**.

(2) Measure 10 MHz offset. If time/frequency workstation offset indication is not within ±002000 E-12, perform **b** below.

(3) Repeat technique of (1) and (2) above for remaining TI **10 MHZ OUTPUT** connectors, except connect TI **10 MHZ OUTPUT 1 VRMS** connectors using a 2X attenuator in (1) above.

b. Adjustments

(1) Remove TI top cover.

(2) Set TI **CONTROL VOLTAGE/RUBIDIUM LAMP/EXT DC SUPPLY** switch to **EXT DC SUPPLY.** If TI meter does not indicate 24 ±1 V dc, adjust R13 on power supply board (inside right of TI) (R).

(3) Set TI **CONTROL VOLTAGE/ RUBIDIUM LAMP/EXT DC SUPPLY** switch to **CONTROL VOLTAGE**.

NOTE

If crystal trim adj is adjusted too fast in (4) or (5) below, the control loop opens and a search circuit is automatically initiated to relock the atomic resonance. This may take up to 30 seconds.

(4) If TI meter indication is 1.5 V dc or less, remove screw to access hole on top of **RUBIDIUM OSCILLATOR** and adjust crystal trim adj slowly cw until meter indicates approximately 8 to 9 V dc. Replace screw (R).

(5) If TI meter indication is 12 V dc or greater, remove screw to access hole on top of **RUBIDIUM OSCILLATOR** and adjust crystal trip adj slowly ccw until meter indicates approximately 8 to 7 V dc. Replace screw (R).

(6) Adjust R1 dial (inside bottom of TI) for a minimum indication on time/frequency workstation (R).

(7) Replace TI top cover.

9. 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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By Order of the Secretary of the Army:

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