# *TB 9-6625-2004-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

# CALIBRATION PROCEDURE FOR MODULATION METERS ME-57/U AND ME-57A/U

Headquarters, Department of the Army, Washington, DC
31 May 2005



**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 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 9-6625-2004-35, dated 11 December 2003.

## SECTION I
## IDENTIFICATION AND DESCRIPTION

**1. Test Instrument Identification.** This bulletin provides instructions for the calibration of Modulation Meters ME-57/U and ME-57A/U. TM 11-6625-400-12, TM 11-6625-400-35, and TM 11-6625-2629-14&P were used as the prime data sources 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 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 parameters | Performance specifications | |
|---|---|---|
| Deviation range (kHz) | Modulating frequency range and accuracy (kHz) | |
| | 50 Hz to 20 kHz | 20 to 70 kHz |
| 0 to 20 | ± 0.75 kHz | ±1.5 kHz |
| 0 to 50 | ± 2 kHz | ±4 kHz |
| 0 to 100 | ± 5 kHz | ±10 kHz |
| 0 to 300 | ± 15 kHz | ±30 kHz |
| 0 to 1000 | ± 100 kHz | ±100 kHz |
| Modulating frequencies | 50 Hz to 20 kHz with carrier frequencies of 20 to 100 MHz | |
| Input sensitivity | 0.005 V required for limiting | |
| Carrier shift accuracy | ± 10% of indicated value | |
| Audio output | 1 V rms corresponding to 40 kHz deviation on 0 to 50 kHz range | |
| RF oscillator | Range: 20 to 1000 MHz<br>Accuracy: ± 10% | |

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

**5. Accessories Required.** The accessories required for the 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) |
|---|---|---|
| ATTENUATOR | Range: 0 to 120 dB | Hewlett-Packard, Model 355D (355D) |
| MEASURING RECEIVER | Frequency range: 50 to 750 MHz<br>FM Deviation: 19.25 to 400 kHz<br>Accuracy: ± 1% of reading 1 digit | Hewlett-Packard, Model 8902A |
| MULTIMETER | Range: 189 to 201 V dc and 1 V rms<br>Accuracy: ± 0.75% | Fluke, Model 8840A/AF-05 (AN/GSM-64D) |
| SIGNAL GENERATOR | Range: 18 to 990 MHz<br>Accuracy: ± 2.5%<br>FM : 1 to 300 kHz | (SG-1207/U) |

## 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 TM 11-6625-400-12, TM 11-6625-400-35, and TM 11-6625-2629-14&P for this TI.

**d.** When indications specified in paragraphs **8** through **12** are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs **8** through **12**. Do not perform power supply check if all other parameters are within tolerance.

**e.** 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 TI protective cover.

**b.** Connect TI to a 115 V ac source.

**c.** Set TI **POWER ON/OFF** switch to **ON** and allow 30 minutes for warm-up and stabilization.

## 8. RF Oscillator Accuracy

### a. Performance Check

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

(a) **TUNE/FINE TUNE** switch to **TUNE**.

(b) **FREQUENCY RANGE-MC** switch to **20-55**.

(c) **FREQUENCY-MC** dial to **20** using **TUNING** knob.

(d) **DEVIATION RANGE KC** switch to **1000 TUNE**.

(2) Connect signal generator **OUTPUT RF** to TI **INPUT**.

(3) Set signal generator for an initial 20 MHz, 5 mV output.

(4) Adjust signal generator frequency for a 0 indication on TI **CARRIER SHIFT** meter and a black line indication on TI **LIMITING** meter. Signal generator final frequency indication will be between 18.00 and 22.00 MHz.

**NOTE**

If TI interference is encountered during this check, momentarily disconnect TI, verify generated frequency on frequency counter, and reconnect TI.

(5) Repeat technique of (3) and (4) above using settings listed in table 4. If signal generator does not indicate within limits specified, perform **b** below.

Table 4. RF Oscillator

| Test instrument | | Signal generator | | |
|---|---|---|---|---|
| **FREQUENCY RANGE-MC** switch settings | **FREQUENCY-MC** dial settings | Initial frequency settings (MHz) | Final frequency indications (MHz) | |
| | | | Min | Max |
| 20-55 | 35 | 35 | 31.5 | 38.5 |
| 20-55 | 50 | 50 | 45 | 55 |
| 55-120 | 60 | 60 | 54 | 66 |
| 55-120 | 87.5 | 87.5 | 78.75 | 96.25 |
| 55-120 | 115 | 115 | 103.5 | 126.5 |
| 120-250 | 130 | 130 | 117 | 143 |
| 120-250 | 185 | 185 | 166.5 | 203.5 |
| 120-250 | 240 | 240 | 216 | 264 |
| 250-500 | 260 | 260 | 234 | 286 |
| 250-500 | 375 | 375 | 337.5 | 412.5 |
| 250-500 | 475 | 475 | 427.5 | 522.5 |
| 500-1000 | 550 | 550 | 495 | 605 |
| 500-1000 | 750 | 750 | 675 | 825 |
| 500-1000 | 900 | 900 | 810 | 990 |

**b. Adjustments**

(1) Set **FREQUENCY RANGE-MC** switch to **20-55**.

(2) Set signal generator frequency to 35 MHz.

(3) Loosen setscrew that holds **FREQUENCY-MC** dial to oscillator shaft and adjust oscillator shaft for a 0 indication on **CARRIER SHIFT** meter.

(4) Adjust **FREQUENCY-MC** dial to **35 MHz** and tighten setscrew.

**9. Input Sensitivity**

**a. Performance Check**

(1) Set **FREQUENCY RANGE-MC** switch to **250-500** and adjust **FREQUENCY-MC** dial to **400** using **TUNING** knob.

(2) Set signal generator for a 400 MHz, 5 mV output.

(3) Adjust **TUNING** knob for maximum indication on **LIMITING** meter while maintaining 5 mV level. If **LIMITING** meter pointer is not within the black area, perform **b** below.

**b. Adjustments**. Adjust LIMITING ADJ R51 (fig. 1) until **LIMITING** meter pointer is at beginning edge of black area (R).

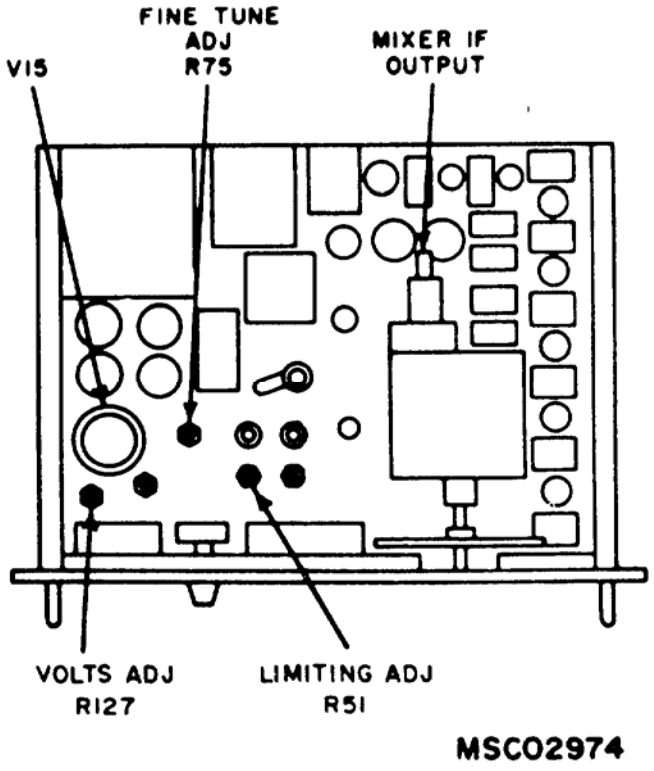


Figure 1. Modulation meter - top view.

**10. Carrier Shift**

**a. Performance Check**

(1) Set **FREQUENCY RANGE-MC** switch to **20-55** and adjust **FREQUENCY-MC** dial to **50** using **TUNING** knob.

(2) Set signal generator for a 50 MHz, 100 mV output.

(3) Adjust **TUNING** knob for a 0 indication on **CARRIER SHIFT** meter.

(4) Set **TUNE/FINE TUNE** switch to **FINE TUNE** and adjust **TUNING** knob for a 0 indication on **CARRIER SHIFT** meter. Record signal generator frequency indication.

(5) Adjust signal generator frequency for a -250 kHz indication on TI **CARRIER SHIFT** meter. Record signal generator frequency indication.

(6) Subtract lower from higher frequency indication recorded in (4) and (5) above. If difference is not between 225 and 275 kHz, perform **b** below.

(7) Adjust signal generator frequency for +250 kHz indication on TI **CARRIER SHIFT** meter. Record signal generator frequency indication.

(8) Subtract lower from higher frequency indication recorded in (4) and (7) above. If difference is not between 225 and 275 kHz, perform **b** below.

**b. Adjustments**

(1) Set signal generator frequency to 50.25 MHz.

(2) Adjust FINE TUNE ADJ R75 (fig. 1) until **CARRIER SHIFT** meter indicates -250 kHz (R).

**NOTE**

If positive and negative shift are both high, adjustment of FINE TUNE ADJ R75 alone will not correct out-of-tolerance condition. Refer to TM 11-6625-2629-14&P for realignment procedures.

(3) Set signal generator frequency to 49.75 MHz.

(4) Adjust FINE TUNE ADJ R75 (fig. 1) until **CARRIER SHIFT** meter indicates +250 kHz (R).

(5) Repeat (1) through (4) above until no further adjustment is required.

**11. Frequency Deviation**

**a. Performance Check**

(1) Connect equipment as shown in figure 2.

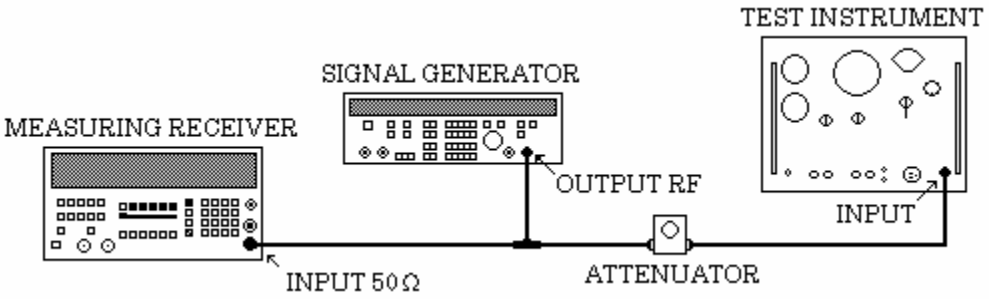


Figure 2. Frequency deviation - equipment setup.

(2) Set **DEVIATION RANGE KC** switch to **20** and **FREQUENCY RANGE-MC** switch to **20-55**.

(3) Set measuring receiver to measure frequency.

(4) Set signal generator for a 50 MHz, 100 mV output and set attenuator, as necessary, to limit signal to black section of TI **LIMITING** meter.

(5) Adjust **TUNING** knob for a 0 indication on **CARRIER SHIFT** meter.

(6) Set signal generator FM internal modulation frequency to 1 kHz.

(7) Set measuring receiver to measure FM.

(8) Adjust signal generator FM internal modulation frequency for a 20 kHz full scale indication on TI **DEVIATION** meter. If measuring receiver does not indicate between 19.25 and 20.75 kHz, perform **b** below.

(9) Repeat technique of (2) through (8) above for control settings and indications listed in table 5. If measuring receiver does not indicate within limits specified, perform **b** below.

Table 5. Frequency Deviation

| Test instrument | | | | Signal generator | | Measuring receiver indications (kHz) | |
|---|---|---|---|---|---|---|---|
| **FREQUENCY RANGE-MC** switch settings | **FREQUENCY-MC** dial settings | **DEVIATION RANGE KC** switch settings | **DEVIATION** meter indications (kHz) | Frequency (MHz) | Mod freq (kHz) | Min | Max |
| 55-120 | 100 | 50 | 50 | 100 | 1 | 48 | 52 |
| 120-250 | 200 | 100 | 100 | 200 | 1 | 95 | 105 |
| 250-500 | 400 | 300 | 300 | 400 | 1 | 285 | 315 |
| 500-1000 | 750 | 1000 | 300[1] | 750 | 1 | 200 | 400 |

[1]Deviation limitation of measuring receiver.

**b. Adjustments**

(1) Set **FREQUENCY RANGE-MC** switch to **55-120** and **DEVIATION RANGE KC** switch to **50**.

(2) Set signal generator frequency to 100 MHz.

(3) Adjust **TUNING** knob for a 0 indication on **CARRIER SHIFT** meter.

(4) Adjust signal generator FM internal modulation frequency for a 50 kHz indication on measuring receiver.

(5) Adjust **CAL ADJ** (front panel) for a 50 kHz indication on **DEVIATION** meter (R).

**12. Audio Output**

**a. Performance Check**

(1) Connect multimeter **INPUT HI** and **LO** to TI **AUDIO OUTPUT**.

(2) Set multimeter to measure volts ac.

(3) Set **DEVIATION RANGE KC** switch to **50** and **FREQUENCY RANGE-MC** switch to **20-55**.

(4) Set signal generator for a 50 MHz, 100 mV output and FM internal modulation frequency to 20 kHz.

(5) Adjust signal generator FM internal modulation frequency for a 40 kHz indication on TI **DEVIATION** meter. If multimeter does not indicate 1 V rms, perform **b** below.

**b. Adjustments**. Adjust **AUDIO ADJ** (front panel) for a 1 V rms indication on multimeter (R).

**13. Power Supply**

**NOTE**

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

**a. Performance Check.** Connect multimeter **INPUT HI** to pin 6 of V15 (fig. 1) and **LO** to chassis ground. If multimeter does not indicate between 189.15 and 200.85 V dc, perform **b** below.

**b. Adjustments.** Adjust VOLTS ADJ R127 (fig. 1) for a 195 V dc multimeter indication (R).

**14. 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:

PETER J. SCHOOMAKER
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*Chief of Staff*

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0509404

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342178, requirements for calibration procedure TB 9-6625-2004-35.

## 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.