*TB 9-6625-2291-24

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OPTICAL ATTENUATION TEST SET TS-4335/G

Headquarters, Department of the Army, Washington, DC
4 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 9-6625-2291-35, dated 30 January 1995.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for calibration of the Optical Attenuation Test Set, TS-4335/G. The manufacturer's manual and TM 11-6625-3252-12&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 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
Transmit	Range: ≥32 dBm
Reference level	Range: -0 to -60 dBm Accuracy: ± 0.5 dBm at -20 dBm/ 25° C Linearity: ± 0.09 dBm
Attenuation mode	Range: 0 to -55 dBm[1] Accuracy: ± 0.2 dBm

[1]Not tested above -10 and below -50 dBm.

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 Standards Set 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 the TI. Where the four to one ratio cannot be met, the four-to-one 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. The following peculiar accessory is also required for this calibration: Optical fiber jumper cable, FC-to-biconic (9/125 micron single-mode).

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
LIGHTWAVE MULTIMETER	Range: 0 to -50 dBm Accuracy: 0.125 dB (.212) dB	Hewlett-Packard, Model 8153A (8153A) w/power sensor module, 81531A (81531A), and connector interface adapters, FC (8100FI) and Biconic (81000WI)
FOCUS-LWCM	Range: -10 to -50 dBm Stability: 0.03 dB /hr.	Nichols Research Corp Model 202-60018-01 (202-60018-01)
MULTIMETER	Range: 1.000 Vdc	Fluke 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 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

Always keep end of fiber optic cable 1 foot away from eyes. Never look into the end of an energized fiber optic cable.

CAUTION

Keep optical output connectors clean at all times. Dust and dirt will degrade optical performance. Keep connectors capped when not in use.

a. Remove dust cap from **TRANSMIT** port. Carefully clean fiber optic connector in **TRANSMIT** port and optical fiber jumper cable, FC-to-biconic (9/125 micron single-mode), with Q-tip moistened slightly with 90% pure isopropyl alcohol.

NOTE

Substitution of lower grade isopropyl alcohol or freon based cleaners can cause damage to connectors.

b. Ni-Cad rechargeable batteries should be in fully charged state. Push **PULL ON** pushbutton to (off), charge 14 hours minimum.

c. Pull **PULL ON** pushbutton to (on). Ensure TI display has clear crisp resolution, if not adjust A2R12 (fig. 1) for best clarity and resolution.

NOTE

All adjustments are made on measurement and display printed circuit board (fig. 1).

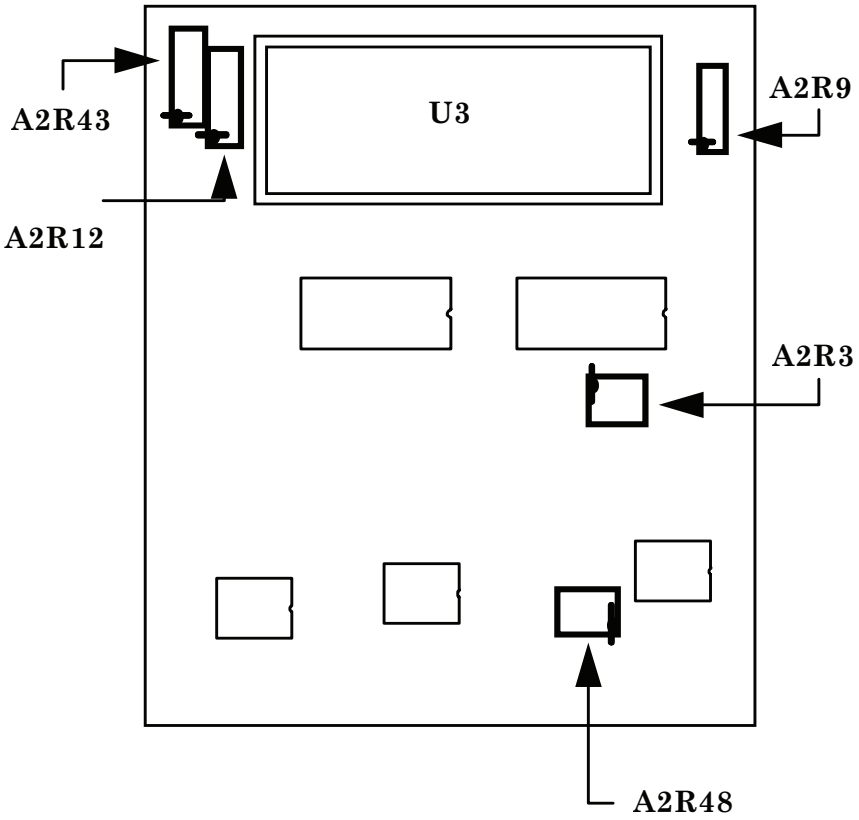

Figure 1. Measurement and display printed circuit board.

8. Transmit Verification

a. Performance Check

NOTE

When connecting and disconnecting optical fiber jumper cable, hold cable just behind connector on strain relief boot while rotating connector to prevent cable from twisting. Doing this will prevent damage to optical surfaces at cable ends and TI **TRANSMIT** and **RECEIVE** ports. Avoid any excessive movement of optical fiber jumper cable when making power measurements.

(1) Install connector adapter FC (81000FI) to lightwave multimeter **OPTICAL INPUT** port.

(2) Connect biconic end of optical fiber jumper cable to **TRANSMIT** port and other end to lightwave multimeter **OPTICAL INPUT** port.

(3) Press **TRANSMIT ON OFF** switch to **ON** and rotate **TRANSMIT ADJUST** knob fully clockwise until slight resistance is encountered.

(4) Set lightwave multimeter to measure dBm at 1310.0 nm.

(5) If lightwave multimeter indication is not greater than -32 dBm, perform **b** below.

NOTE

Maximum transmit level varies with fiber core diameter.

(6) Press **TRANSMIT ON OFF** switch to **OFF**.

b. Adjustments. Repeat **7 a** above.

NOTE

If repeating **7 a** above does not produce desired results, optical fiber jumper cable may need replacing or repair as indicated.

9. Reference Level Verification

a. Performance Check

(1) Push **LEVEL dBm** pushbutton to (in).

(2) Remove FC end of optical fiber jumper cable from lightwave multimeter **OPTICAL INPUT** port.

(3) Remove connector adapter FC (81000FI) from lightwave multimeter **OPTICAL INPUT** port and install biconic (81000WI) connector adapter to lightwave multimeter **OPTICAL INPUT** port.

(4) Carefully remove biconic end of optical fiber jumper cable from **TRANSMIT** port.

(5) Connect biconic end of optical fiber jumper cable to lightwave multimeter **OPTICAL INPUT** port and FC end to FOCUS-LWCM **OPTICAL I-O**.

(6) Set FOCUS-LWCM output for 1310.0 nm and -20.00 dBm.

(7) Record lightwave multimeter indication to within ± 0.01 dBm.

(8) Carefully remove optical fiber jumper cable connection from lightwave multimeter **OPTICAL INPUT** port and connect to **RECEIVE** port.

(9) If TI does not indicate within ±0.5 dBm of value recorded in (7) above, perform **b**(1) and (2) below.

(10) Carefully remove optical fiber jumper cable connection from **RECEIVE** port and connect to lightwave multimeter **OPTICAL INPUT** port.

(11) Set FOCUS-LWCM output for -40.00 dBm.

(12) Measure and record lightwave multimeter indication to within ±0.01 dBm.

(13) Carefully remove optical fiber jumper cable connection from lightwave multimeter **OPTICAL INPUT** port and connect to **RECEIVE** port.

(14) If TI does not indicate within ±0.59 dBm of value recorded in (12) above, perform **b**(3) and (4) below.

(15) Carefully remove optical fiber jumper cable connection from **RECEIVE** port and connect to lightwave multimeter **OPTICAL INPUT** port.

(16) Set FOCUS-LWCM output for lightwave multimeter indication of -10 dBm. Record indication within ±0.01 dBm.

(17) Carefully remove optical fiber jumper cable connection from lightwave multimeter **OPTICAL INPUT** to **RECEIVE** port. TI will indicate value recorded in (16) above ±0.59 dBm.

(18) Use technique of (15) through (17) above for FOCUS-LWCM settings of -30 and -50 dBm. TI will indicate within ±0.59 of recorded value.

b. Adjustments

(1) Connect multimeter **HI** to U3 pin 34 and **LO** to pin 21, adjust A2R9 (fig. 1) for multimeter indication of 1.000 V dc and then disconnect multimeter (R).

NOTE

A2R43 and A2R3 adjustments interact.

(2) Adjust A2R43 (fig. 1) for a TI indication equal to recorded value in **a** (7) above ±0.01 dBm (R).

(3) Adjust A2R3 (fig. 1) for a TI indication equal to recorded value in **a** (12) above ±0.01 dBm (R).

(4) Repeat **a** (5) through (14) above as necessary until within tolerance conditions are met.

10. Attenuation Mode

a. Performance Check

(1) Ensure FC end of optical fiber jumper cable is connected to FOCUS-LWCM **OPTICAL I-O** and connect biconic end to lightwave multimeter **OPTICAL INPUT** port.

(2) Set FOCUS-LWCM output for lightwave multimeter indication of -20.00 ±0.01 dBm.

(3) Carefully remove optical fiber jumper cable connection from lightwave multimeter **OPTICAL INPUT** port and connect to **RECEIVE** port.

(4) Press **ATTENUATION MODE (dB) -40** pushbutton (in).

(5) If TI does not indicate between -20.20 and -19.80, perform **b** below.

(6) Press **ATTENUATION MODE (dB) -20** pushbutton (in).

(7) If TI does not indicate between 00.20 and -00.20, perform **b** below.

(8) Press **ATTENUATION MODE (dB) -25** pushbutton (in).

(9) If TI does not indicate between -05.20 and -04.80, perform **b** below.

(10) Press **ATTENUATION MODE (dB) -30** pushbutton (in).

(11) If TI does not indicate between -10.20 and -09.80, perform **b** below.

(12) Press **ATTENUATION MODE (dB) -35** pushbutton (in).

(13) If TI does not indicate between -15.20 and -14.80, perform **b** below.

b. Adjustments

(1) Perform **a** (1) through (4) above.

(2) Adjust A2R48 (fig. 1) for TI indication between -20.01 and -19.99 (R).

NOTE

If out-of-tolerance condition still exists, A2R43 and A2R3 may need to be readjusted slightly according to paragraph **9** above; then repeat paragraph **10**.

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:

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

Official:

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

0722110

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 344557, requirements for calibration procedure TB 9-6625-2291-24.

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.