TB 9-6625-2271-50

CHANGE 2

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR AUDIO ANALYZER BOONTON, MODEL 1120-S/10 and 1121

Headquarters, Department of the Army, Washington, DC
14 February 2007

TB 9-6625-2271-50, 18 July 2003, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages	**Insert Pages**
15 through 18	15 through 18

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

Official:

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General, United States Army
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Distribution:

To be distributed in accordance with Std. IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6625-2271-50.

TB 9-6625-2271-50

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR AUDIO ANALYZER BOONTON, MODEL 1120-S/10 and 1121

Headquarters, Department of the Army, Washington, DC
8 July 2004

TB 9-6625-2271-50, 18 July 2003, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages	Insert Pages
1 and 2	1 and 2
3 and 4	3 and 4
9 and 10	9 and 10
15 and 16	15 and 16

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By Order of the Secretary of the Army:

Official:

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Administrative Assistant to the Secretary of the Army

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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR AUDIO ANALYZER BOONTON, MODEL 1120-S/10 and 1121

Headquarters, Department of the Army, Washington, DC
18 July 2003

Approved for public release; distribution is unlimited

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 9-6625-2271-50, dated 21 August 2000.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Audio Analyzer, Boonton, Model 1120-S/10 and 1121. The manufacturer's manuals were 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. Variations among models are described within the text.

b. Time and Technique. The time required for this calibration is approximately 6 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 a 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
Dc level measurement	Range: 3, 30, 300 V FS Accuracy: ±1% or 3 counts whichever is greater
Ac level measurement	Range: 3, 30, 300 mV and 3, 30, 300 V Range: 50 Hz to 50 kHz (1 mV to 300 V) Accuracy: ±1% Range: 20 to 50 Hz and 50 to 100 kHz (1 mV to 300 V) Accuracy: ±2% Range: 10 to 20 Hz[1] (1 mV to 300 V) Accuracy: ±3% Range: 10 Hz to 100 kHz[1] (.3 mV to 300 V) Accuracy: ±4
Flatness	Range: 1 mV to 300V Range: 50 Hz to 50 kHz (1 mV to 300 V) Accuracy: ±0.5% Range: 20 to 50 Hz and 50 kHz to 100 kHz (1 mV to 300 V) Accuracy: ±1.0% Range: 10 to 20 Hz[1] (1 mV to 300 V) Accuracy: ±2.0%

See footnotes at end of table.

Table 1. Calibration Description Continued

Frequency counter	Range: 20 Hz to 500 kHz Sensitivity: 3 mV Accuracy: ±1 ppm/yr +1 count
Audio filters	Range: 30 kHz low-pass Accuracy: ±2 kHz Range: 80 kHz low-pass Accuracy: ±4 kHz Range: 220 kHz low-pass Accuracy: ±20 kHz Range: 400 Hz high-pass Accuracy: ±40 Hz
Distortion measurement	Range: 10 Hz to 20 kHz Accuracy: ±1 dB Range: 20 to 100 kHz Accuracy: ±2 dB Input voltage range: 10 mV to 300 V
SINAD measurement	Frequency range: 10 Hz to 100 kHz Input voltage range: 10 mV to 300 V Display range: -120.00 to 0.00 dB[2] Accuracy: ±1 dB, 20 Hz to 20 kHz ±2 dB, 10 Hz to 100 kHz
Output frequency	Range: 20 Hz to 140 kHz Accuracy: ±10 ppm +1 count ±10 ppm +Time base error +1 count(Boonton 1121)
Output level	Range: 10 Hz to 50 kHz, 0.6 mV to 16 V Accuracy: ±0.5% of setting +0.05% of range Range: 50 to 100 kHz, 0.6 mV to 16 V Accuracy: ±1.0% of setting +0.05% of range Range: 100 to 140 kHz, 0.6 mV to 16 V Accuracy: ±1.5% of setting +0.1% of range
Flatness	Ref 1 kHz (.30 mV to 8 V into 50Ω) Accuracy: ±0.5%; 10 Hz[1] to 50 kHz
Output distortion	Range: 10 Hz to 20 kHz, 80 kHz bandwidth Accuracy: 0.01% (<-80 dB) Range: 20 to 50 kHz, 220 kHz bandwidth Accuracy: 0.02% (<-74 dB) Range: 50 to 100 kHz, 500 kHz bandwidth Accuracy: 0.056% (<-65 dB) Range: 100 to 140 kHz, 500 kHz bandwidth Accuracy: 0.1% (<-60 dB)

[1]Not checked below 20 Hz.
[2]Not verified below -30 dB.

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 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)
AC MEASUREMENT STANDARD	Range: 20 Hz to 120 kHz 2.97 mV to 16.256 V Accuracy: ±.125%	John Fluke, Model 5790A (5790A)
CALIBRATOR	Range: 3 to 300 V dc Accuracy: ±0.2755% Range: 20 Hz to 100 kHz, 30 mV to 300 V Accuracy: ±.25% Range: 220 Hz , 1 mV Accuracy: ±.2.5%	John Fluke, Model 5720A/CT (p/o MIS-35947); w/power amplifier, John Fluke, Model 5725A (5725A
MULTIMETER	ACV range: 20 Hz to 100 kHz, 1 mV to 3 V rms Accuracy: ±0.175%	Hewlett-Packard, Model 3458A/E02 (3458A/E02)
FREQUENCY COUNTER	Range: 20 Hz to 140 kHz Accuracy: ±2.5 ppm	John Fluke, Model PM6681/656 (PM6681/656)
SPECTRUM ANALYZER[1]	Range: 1 kHz <-75 dBm	Hewlett-Packard, Model 3585A (MIS-35951)
SYNTHESIZER/FUNCTION GENERATOR	Frequency range: 1200 Hz to 80 kHz Attenuator Accuracy: ±0.25 dB @ 1200 Hz ±0.5 dB @ 80 kHz	Agilent, Model 33250A (33250A)
TIME & FREQUENCY GENERATOR	Range: 10 MHz Accuracy: ±0.25 ppm	Datrum, Model 9390-6000 (9390-6000)

[1]Used only for adjustments.

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 applicable sections 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 manuals for this TI.

d. Unless otherwise specified, all controls and control settings refer to the TI.

7. Equipment Setup and Internal Calibration.

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 top cover and assure A4S1 switch segments are all in the up position as shown in figure 1. Note initial settings (if not up) for return after completion of procedure.

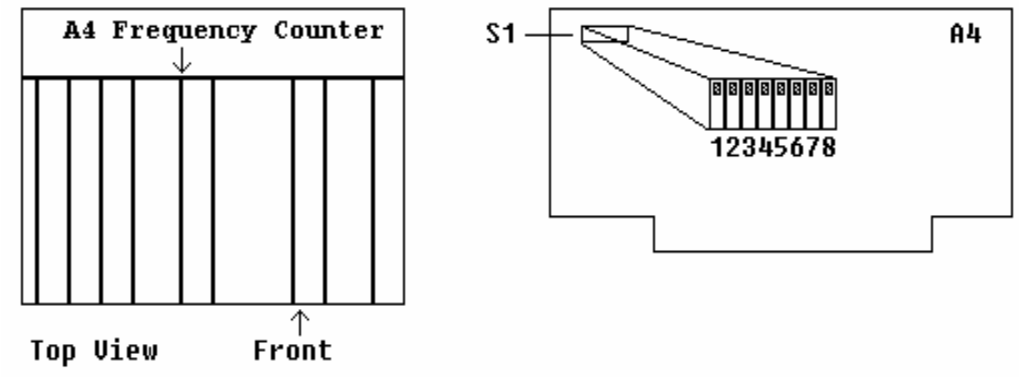

Figure 1. A4S1 - switch location.

b. Replace top cover and connect TI to a 115 V ac source.

c. Set **LINE** switch to **ON** and allow 1 hour for warmup.

d. Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT HIGH** and **LOW** using balanced cable supplied with TI.

NOTE

If balanced cable is not available then connect as shown in figure 2 for this and all future reference to balanced cable.

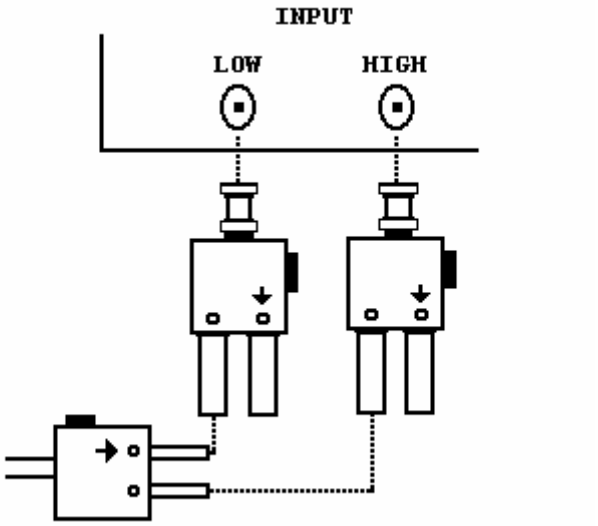

Figure 2. Input connection.

e. Set calibrator for a 3 V, 1 kHz output.

f. Press **LCL INIT** key. Press **INPUT FLOAT** key and verify **INPUT FLOAT** indicator is illuminated.

g. Press **SPCL** key and enter **20 ENTER** using **DATA ENTRY** keys. Allow sufficient time for ac self-calibration to complete before continuing.

NOTE

As self-calibration is being performed, verify no error codes are displayed on TI.

h. Disconnect calibrator from TI.

i. Connect TI **INPUT LOW** to **INPUT HIGH** using a short cable.

j. Press **SPCL** key and enter **23 ENTER** using **DATA ENTRY** keys. Allow sufficient time for dc zero calibration to complete before continuing.

NOTE

As offset self-calibration is being performed, verify no error codes are displayed on TI.

k. Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT HIGH** and **LOW** using balanced cable.

l. Set calibrator for a 3 V dc output.

m. Press **SPCL** key and enter **24 ENTER** using **DATA ENTRY** keys. Allow sufficient time for dc calibration to complete before continuing.

NOTE

As self-calibration is being performed, verify no error codes are displayed on TI.

n. Set calibrator output to standby.

8. Dc Measurement Accuracy

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT HIGH** and **LOW** using balanced cable.

(2) Press keys as listed in (a) through (c) below:

(a) **LCL INIT**
(b) **INPUT FLOAT** (assure illumination)
(c) **FILTERS DC**

(3) If TI does not indicate between -0.003 and 0.003 V perform **b** below.

(4) Set calibrator for a 3 V dc output. TI will indicate between 2.97 and 3.03 V.

(5) Repeat technique of (4) above using calibrator output settings and TI indications listed in table 3 below.

Table 3. Dc Measurement

Calibrator output settings (V dc)	Test instrument indications (V)	
	Min	Max
30	29.7	30.3
300	297	303
-300	-303	-297
-30	-30.3	-29.7
-3	-3.03	-2.97

b. Adjustments. No specific dc input adjustments can be made; however, misalignment of balance adjustments located after ac measurement accuracy can adversely affect this parameter.

9. Ac Measurement Accuracy

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT HIGH** and **LOW** using balanced cable.

(2) Press **LCL INIT** key. Press **INPUT FLOAT** key and verify **INPUT FLOAT** indicator is illuminated.

(3) Set calibrator for a 3 mV, 1 kHz output. If TI indication is not between 2.970 and 3.030 mV, perform **b** below.

(4) Repeat technique of (3) above using calibrator output settings and TI indications listed in table 4.

Table 4. Ac Measurement Accuracy

Calibrator output settings		Test instrument indications (V)	
Amplitude (V)	Frequency	Min	Max
.03	1 kHz	29.70 m	30.30 m
.3	1 kHz	297.0 m	303.0 m
3	1 kHz	2.970	3.030
30	1 kHz	29.70	30.30
300	1 kHz	297.0	303.0
.003	50 Hz	2.970 m	3.030 m
.03	50 Hz	29.70 m	30.30 m
.3	50 Hz	297.0 m	303.0 m
3	50 Hz	2.970	3.030
30	50 Hz	29.70	30.30
300	50 Hz	297.0	303.0
.003	49 Hz	2.940 m	3.060 m
.03	49 Hz	29.40 m	30.60 m
.3	49 Hz	294.0 m	306.0 m
3	49 Hz	2.940	3.060
30	49 Hz	29.40	30.60
200	49 Hz	196.0	204.0
.003	20 Hz	2.940 m	3.060 m
.03	20 Hz	29.40 m	30.60 m
.3	20 Hz	294.0 m	306.0 m
3	20 Hz	2.940	3.060
30	20 Hz	29.40	30.60
200	20 Hz	196.0	204.0
3	100 kHz	2.940	3.060
30	100 kHz	29.40	30.60
200	100 kHz	196.0	204.0
.003	51 kHz	2.940 m	3.060 m
.03	51 kHz	29.40 m	30.60 m
.3	51 kHz	294.0 m	306.0 m

b. Adjustments

NOTE

All adjustments interact and must be performed in their entirety. After making adjustments in this section, it is necessary to return to beginning of procedure.

(1) Connect spectrum analyzer input to TI **MONITOR** (rear panel).

(2) Connect TI **OUTPUT HIGH** to **INPUT HIGH** and **LOW** using tee connector and two cables.

(3) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (g) below:

(a) **LCL INIT**.
(b) **INPUT FLOAT** (assure illumination).
(c) **SPCL**.
(d) **28 ENTER**.
(e) **SOURCE LEVEL**.
(f) **3 V**.
(g) **ANALYZER LEVEL**.

(4) Adjust spectrum analyzer controls to observe a 1 kHz signal.

(5) Alternately adjust A0R29 and A0C35 (fig. 3) for minimum indication on spectrum analyzer (R).

(6) Press **SPCL** key and enter **27 ENTER** using **DATA ENTRY** keys. Adjust A0R12 (fig. 3) for minimum indication on spectrum analyzer.

(7) If <-75 dB was not achieved in (5) or (6) above, then alternately adjust A0C5, A0C10, and A0R12 (fig. 3) for minimum indication on spectrum analyzer (R).

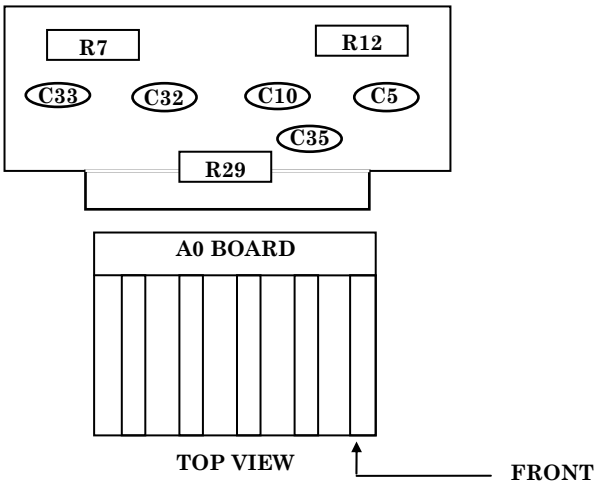

Figure 3. Input board - adjustment locations.

(8) Press **SPCL** key and enter **26 ENTER** using **DATA ENTRY** keys.

(9) Adjust A0R7 (fig. 3) for minimum indication on spectrum analyzer (R).

(10) If <-75 dB was not achieved in (9) above then alternately adjust A0C32, A0C33, and A0R7 (fig. 3) for minimum indication on spectrum analyzer (R).

(11) Disconnect spectrum analyzer from equipment setup.

(12) Disconnect TI **OUTPUT HIGH** from **INPUT HIGH** and **LOW**.

(13) Connect TI **OUTPUT HIGH** to **INPUT HIGH** and connect **OUTPUT LOW** to **INPUT LOW**.

(14) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (l) below:

(a) **LCL INIT**.

(b) **SOURCE LEVEL**.

(c) **3 V**.

(d) **SOURCE FREQ**.

(e) **100 kHz**.

(f) **INPUT FLOAT** (assure illumination).

(g) **SPCL**.

(h) **17 ENTER**.

(i) **28 ENTER**.

(j) **RATIO**.

(k) **SPCL**.

(l) **27 ENTER**.

(15) Adjust A0C5 (fig. 3) for a 100.0 percent indication on TI (R).

(16) Press **SPCL** key and enter **26 ENTER** using **DATA ENTRY** keys.

(17) Adjust A0C32 (fig. 3) for a 100.0 percent indication on TI (R).

(18) Reverse **INPUT HIGH** and **LOW** connections and repeat (13) above.

(19) Adjust A0C10 (fig. 3) for a 100.0 percent indication on TI (R).

(20) Press **SPCL** key and enter **26 ENTER** using **DATA ENTRY** keys.

(21) Adjust A0C33 (fig. 3) for a 100.0 percent indication on TI (R).

10. Frequency Measurement

a. Performance Check

(1) Connect synthesizer/function generator **SIGNAL** to TI **INPUT HIGH** using a 50Ω feed through termination.

(2) Connect a time/frequency workstation 10 MHz output to synthesizer/function generator **EXT REF IN 10 MHz** (rear panel).

(3) Press keys as listed in (a) and (b) below.

(a) **LCL INIT**.
(b) **ANALYZER FREQ**.

(4) Set synthesizer/function generator for a square wave, 100 Hz, 3 mV output. TI will indicate between 99.99 and 100.01 Hz

(5) Repeat technique of (4) above using synthesizer/function generator settings and TI indications listed in table 5.

Table 5. Frequency Accuracy

Synthesizer/function generator settings		Test instrument frequency indications	
(kHz)	(V)	Min	Max
1	.003	999.9 Hz	1000.1 Hz
100	.003	99.99 kHz	100.01 kHz
40 Hz	1.5	39.999 Hz	40.001 Hz
190 Hz	1.5	189.999 Hz	190.001 Hz
210 Hz	1.5	209.99 Hz	210.01 Hz
1.9	1.5	1899.99 Hz	1900.01 Hz
2.1	1.5	2099.9 Hz	2100.1 Hz
19	1.5	18999.9 Hz	19000.1 Hz
21	1.5	20.999 kHz	21.001 kHz
190	1.5	189.999 kHz	190.001 kHz
210	1.5	209.99 kHz	210.01 kHz
490	1.5	489.99 kHz	490.01 kHz

b. Adjustments. No adjustments can be made.

11. Filters Frequency Accuracy

a. Performance Check

(1) Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT HIGH** and **LOW** using balanced cable.

(2) Press keys as listed in (a) through (c) below.

(a) **LCL INIT**.

(b) **INPUT FLOAT**.

(c) **FILTERS LP 30**.

(3) Set calibrator for a 1 V, 1 kHz output.

(4) Press TI **RATIO** key to establish reference at 1 kHz.

(5) Set calibrator frequency to 27.99 kHz. TI will indicate >70.7 percent.

(6) Set calibrator frequency to 32.01 kHz. TI will indicate <70.7 percent.

(7) Set calibrator frequency to 1 kHz.

(8) Press TI **RATIO** key. **RATIO** light will be extinguished.

(9) Press TI **FILTERS LP 80** key then **RATIO** key to establish reference at 1 kHz.

(10) Set calibrator frequency to 75.99 kHz. TI will indicate >70.7 percent.

(11) Set calibrator frequency to 84.01 kHz. TI will indicate <70.7 percent.

(12) Set calibrator frequency to 1 kHz.

(13) Press TI **RATIO** key. **RATIO** light will be extinguished.

(14) Press TI **FILTERS LP 220** key then **RATIO** key to establish reference at 1 kHz.

(15) Set calibrator frequency to 199.9 kHz. TI will indicate >70.7 percent.

(16) Set calibrator frequency to 240.1 kHz. TI will indicate <70.7 percent.

b. Adjustments. No adjustments can be made.

12. Distortion Measurement Accuracy

a. Performance Check

(1) Connect TI **OUTPUT HIGH** to **INPUT HIGH** using short shielded cable.

(2) Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT LOW** .

(3) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (h) below:

(a) **LCL INIT**.

(b) **INPUT FLOAT** (assure illumination).

(c) **SOURCE FREQ**.

(d) **21 Hz**.

(e) **SOURCE LEVEL**.

(f) **1 V**.

(g) **ANALYZER DIST**.

(h) **dB**.

(4) Set calibrator for a 1 mV, 222 Hz output. If TI indication is not between -59 and -61 dB, perform **b** below.

(5) Press TI **SOURCE FREQ** key and enter **1 kHz** using **DATA ENTRY** keys. If TI indication is not between -59 and -61 dB, perform **b** below.

(6) Repeat technique of (5) above using TI **SOURCE FREQ** settings and indications listed in table 6.

Table 6. Distortion Measurement Accuracy at -60 dB

Test instrument **SOURCE FREQ** settings (kHz)	Test instrument indications (dB)	
	Min	Max
19.99	-61	-59
21	-62	-58
50	-62	-58
100	-62	-58

(7) Set calibrator for a 10 mV, 222 Hz output. Repeat technique of (5) above using TI **SOURCE FREQ** settings and indications listed in table 7.

Table 7. Distortion Measurement Accuracy at -40 dB

Test instrument **SOURCE FREQ** settings	Test instrument indications (dB)	
	Min	Max
21 Hz	-41	-39
1 kHz	-41	-39
19.99 kHz	-41	-39
21 kHz	-42	-38
50 kHz	-42	-38
100 kHz	-42	-38

(8) Connect calibrator **OUTPUT HI** and **LO** to TI **INPUT LOW**.

(9) Set calibrator for a .1 V, 222 Hz output. Repeat technique of (5) above using TI **SOURCE FREQ** settings and indications listed in table 8.

Table 8. Distortion Measurement Accuracy at -20 dB

Test instrument **SOURCE FREQ** settings	Test instrument indications (dB)	
	Min	Max
21 Hz	-21	-19
1 kHz	-21	-19
19.99 kHz	-21	-19
21 kHz	-22	-18
50 kHz	-22	-18
100 kHz	-22	-18

b. Adjustments

NOTE

The adjustments provided are for the notch filter. These adjustments will not affect distortion accuracy; however, capability will be enhanced by lowering residual distortion. Perform the following only if TI indications are high.

(1) Connect TI **OUTPUT HIGH** to **INPUT HIGH** and **OUTPUT LOW** to **INPUT LOW**.

(2) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (d) below:

(a) **LCL INIT**.

(b) **SOURCE LEVEL**.

(c) **3 V**.

(d) **ANALYZER DIST**.

(3) Adjust A2R57 and A2R58 (fig. 4) for minimum distortion indication on TI.

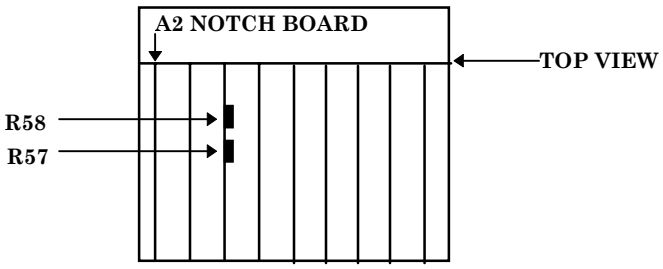

Figure 4. Distortion measurement - adjustment locations.

13. Output Frequency Accuracy

a. Performance Check

(1) Connect TI **OUTPUT HIGH** to frequency counter **CHANNEL A** input.

(2) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (e) below:

(a) **LCL INIT**.

(b) **SOURCE LEVEL**.

(c) **1 V**.

(d) **SOURCE FREQ**.

(e) **21.111 Hz**.

(3) Adjust frequency counter controls for a stable display. If frequency counter indication is not between 21.110 and 21.112 Hz, perform **b** below.

NOTE
Values in parenthesis are for model 1121.

(4) Enter 322.22 Hz using **DATA ENTRY** keys. Frequency counter will indicate between 322.2068 (322.2065) and 322.2332 (322.2335) Hz.

(5) Repeat technique of (4) above using TI **SOURCE FREQ** and frequency counter indications listed in table 9.

Table 9. Output Frequency Accuracy

Test instrument **SOURCE FREQ** (Hz)	Frequency counter indications (Hz)			
	1120/S-10		1121	
	Min	Max	Min	Max
433.33	433.3157	433.3443	433.3152	433.3448
5444.4	5444.246	5444.554	5444.24	5444.56
6555.5	6554.434	6556.566	6554.428	6556.572
76666	76664.23	76667.77	76664.16	76667.84
87777	87775.12	87778.88	87775.03	87778.97
98888	98886.01	98889.99	98885.91	98890.09
99999	99997.0	100001.0	99996.9	100001.1
140000	139997.6	140002.4	139997.5	140002.5

b. Adjustments

(1) Connect time/frequency generator **OUTPUT 10 MHz** to TI rear panel **X CLOCK** input.

(2) For 1120-S/10 perform (a) below, for 1121 perform (b) below.

(a) Remove top cover and set A4S1 switch positions 7 and 8 (fig. 5) to open (down) and press **LCL INIT** key.

(b) Press **SPCL 35**, and **ENTER**.

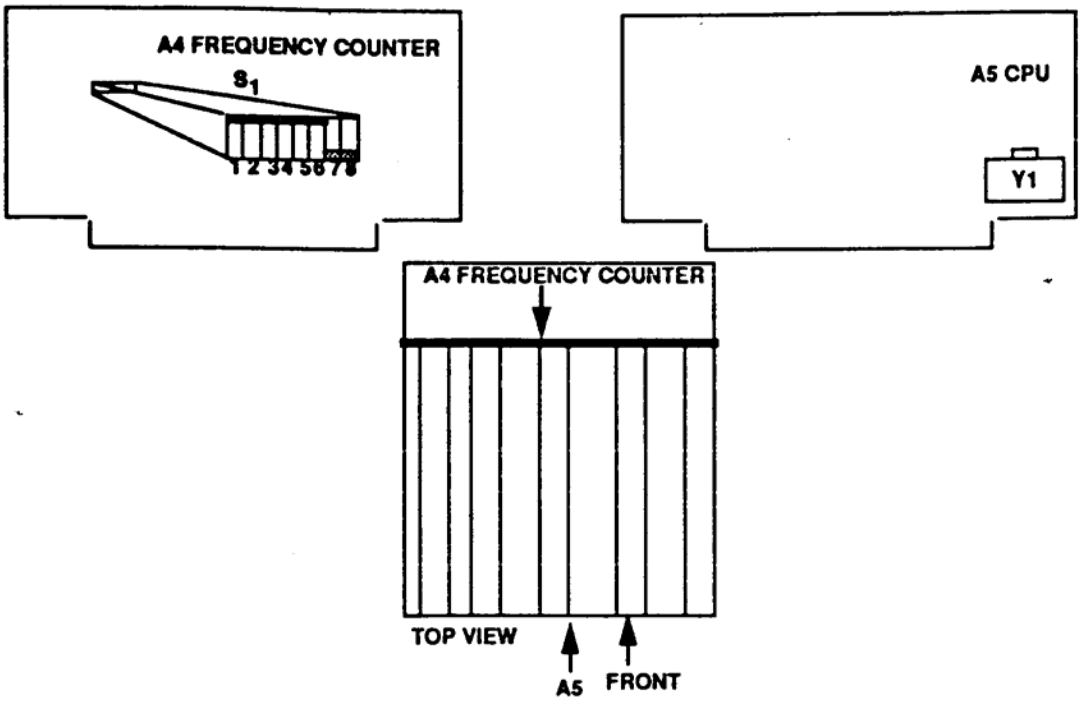

Figure 5. Time base accuracy - adjustment locations.

(3) Remove cover screw from A5 CPU Y1 (fig. 5) and adjust internal slotted screw for a TI indication of 10000.00 kHz (±1 count) (R).

(4) For 1120-S/10 only, reset A4 FREQUENCY COUNTER S1 switch positions 7 and (8 fig. 5) to the closed (up) position.

(5) Replace A5 CPU Y1 (fig. 5) cover screw and TI top cover.

14. Output Level

a. Performance Check

(1) Connect TI **OUTPUT HIGH** to ac measurement standard **INPUT 2 HI** and **LO**. Setup ac measurement standard to measure levels at **INPUT 2**.

(2) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (e) below:

(a) **LCL INIT**.
(b) **SOURCE LEVEL**.
(c) **3 mV**.
(d) **SOURCE FREQ**.
(e) **1 kHz**.
(f) **SPCL**
(g) **75 ENTER**

(3) If ac measurement standard indication is not between 2.97 and 3.03 mV ac, perform **b** below.

(4) Repeat technique of (2) (b) through (g) and (3) above using TI **SOURCE** settings and ac measurement standard indications listed in table 10.

Table 10. Level Accuracy

Test instrument **SOURCE** settings		Ac measurement standard indications	
LEVEL	**FREQ**	Min	Max
3 mV	90 kHz	2.955 mV	3.045 mV
3 mV	120 kHz	2.925 mV	3.075 mV
30 mV	1 kHz	29.835 mV	30.165 mV
30 mV	90 kHz	29.685 mV	30.315 mV
30 mV	120 kHz	29.52 mV	30.48 mV
300 mV	1 kHz	298.35 mV	301.65 mV
300 mV	90 kHz	296.85 mV	303.15 mV
300 mV	120 kHz	295.2 mV	304.8 mV
3 V	1 kHz	2.9835 V	3.0165 V
3 V	90 kHz	2.9685 V	3.0315 V
3 V	120 kHz	2.952 V	3.048 V
16 V	1 kHz	15.912 V	16.088 V
16 V	90 kHz	15.832 V	16.168 V
16 V	120 kHz	15.744 V	16.256 V

(5) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (g) below:

(a) **LCL INIT**.
(b) **SOURCE LEVEL**.
(c) **3 mV**.
(d) **SOURCE FREQ**.
(e) **1 kHz**.
(f) **SPCL**.
(g) **75 ENTER**.

(6) Record the ac measurement standard indication as reference.

(7) Press TI **SOURCE FREQ** key and enter **20 Hz** using **DATA ENTRY** keys. The ac measurement standard indication will be within ±0.5 percent of reference recorded in (6) above.

(8) Repeat (7) above using TI **SOURCE FREQ** settings as listed in table 11.

Table 11. Output Flatness

Test instrument **SOURCE FREQ** settings (Hz)
40
80
160
320
640
1200
2000
4000
8000
16000
32000
50000

b. Adjustments

(1) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (f) below:

(a) **SOURCE FREQ**.

(b) **1 kHz**.

(c) **SOURCE LEVEL**.

(d) **3.000 V**.

(e) **SPCL**

(f) **75 ENTER**

(2) Adjust A6R23 (fig. 6) for an ac measurement standard indication of 3.000 V.

(3) Enter **511 mV** using **DATA ENTRY** keys and record ac measurement standard indication.

(4) Enter **512 mV** using **DATA ENTRY** keys and adjust A7R21 (fig. 6) for a ac measurement standard indication of 1 mV greater than that recorded in (3) above (R).

(5) Enter **1.023 V** using **DATA ENTRY** keys and record ac measurement standard indication.

(6) Enter **1.024 V** using **DATA ENTRY** keys and adjust A7R17 (fig. 6) for an ac measurement standard indication of 1 mV greater than that recorded in (5) above (R).

(7) Enter **2.047 V** using **DATA ENTRY** keys and record ac measurement standard indication.

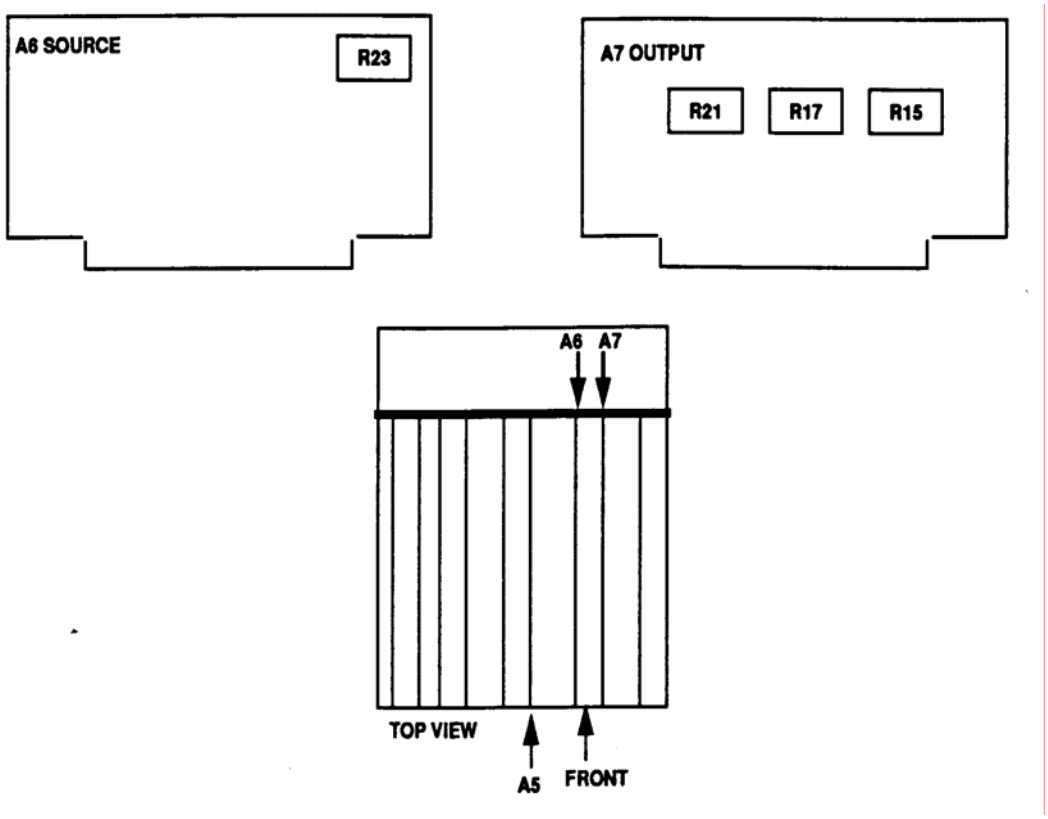

Figure 6. Output level - adjustment locations.

(8) Enter **2.048 V** using **DATA ENTRY** keys and adjust A7R15 (fig. 6) for an ac measurement standard indication of 1 mV greater than that recorded in (7) above (R).

(9) Enter **3.000 V** using **DATA ENTRY** keys and adjust A6R23 (fig. 6) for an ac measurement standard indication of 3.000 V (R).

15. Output Distortion

a. Performance Check

(1) Connect TI **OUTPUT HIGH** to **INPUT HIGH** using a short shielded cable.

(2) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (h) below:

(a) **LCL INIT**.
(b) **SOURCE LEVEL**.

(c) **1 V**.
(d) **SOURCE FREQ**.
(e) **20 Hz**.
(f) **ANALYZER DIST**.
(g) **SPCL**.
(h) **75 ENTER**.

(3) If TI indication is not <.01 percent, perform **b** below.

(4) Press TI **SOURCE FREQ** key and enter **40 Hz** using **DATA ENTRY** keys. If TI indication is not <.01 percent, perform **b** below.

(5) Repeat (4) above using TI **SOURCE FREQ** settings listed in table 12.

Table 12. Output Distortion

Test instrument **SOURCE FREQ** settings (Hz)
80
160
320
640
1280
2560
5120
10240
19990

(7) Enter **21 kHz** using **DATA ENTRY** keys. If TI indication is not <.02 percent, perform **b** below.

(8) Enter **42 kHz** using **DATA ENTRY** keys. If TI indication is not <.02 percent, perform **b** below.

(9) Enter **84 kHz** using **DATA ENTRY** keys. If TI indication is not <.056 percent, perform **b** below.

(10) Enter **99 kHz** using **DATA ENTRY** keys. If TI indication is not <.056 percent, perform **b** below.

b. Adjustments. No specific adjustments are provided for the output circuitry of TI. The adjustments listed in paragraph **12**, Distortion Measurement Accuracy, could cause a failure of this test. If distortion indications are only slightly high, perform paragraph **12b** then perform paragraphs **12a** and **15**.

16. SINAD Measurement Accuracy

a. Performance Check

(1) Connect equipment as shown in figure 7.

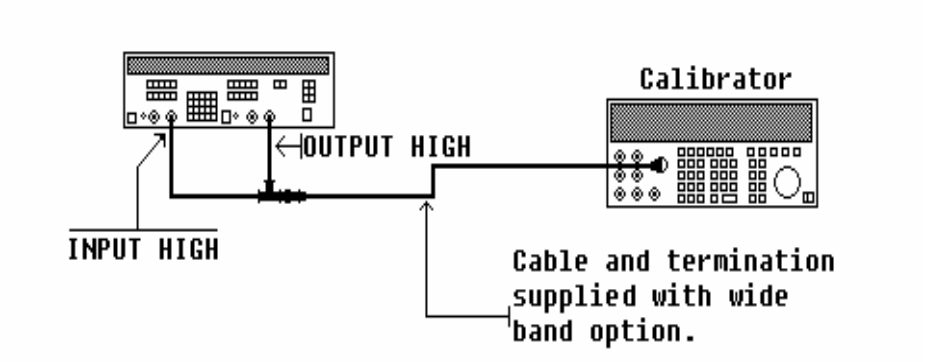

Figure 7. SINAD measurement.

(2) Press keys and enter values using **DATA ENTRY** keys as listed in (a) through (j) below:

(a) **LCL INIT**.
(b) **SOURCE LEVEL**.
(c) **1 V**.
(d) **SOURCE FREQ**.
(e) **600 Hz**.
(f) **SPCL**.
(g) **75 ENTER**.
(h) **ANALYZER SINAD**.
(i) **SPCL**.
(j) **10 ENTER**.

(3) Set calibrator for a .1581 V, 1200 Hz output. TI indication will be between -9 and -11 dB.

(4) Repeat technique of (3) above using calibrator output settings and TI indications listed in table 13.

Note

To accommodate both TI models the absolute values will be used in this test. (no sign)

Table 13. SINAD Measurement

Calibrator output settings		Test instrument indications	
V	Frequency	Min	Max
.05	1200 Hz	19	21
.01581	1200 Hz	29	31
.1581[1]	80 kHz	8	12
.05	80 kHz	18	22
.01581	80 kHz	28	32

[1]Press TI **SOURCE FREQ** key and enter **40 kHz** using **DATA ENTRY** keys.

b. Adjustments. No adjustments can be made.

17. Final Procedure

a. Deenergize and disconnect all equipment. Return switch settings to original positions.

b. Annotate and affix DA label/form in accordance with TB 750-25.

By Order of the Secretary of the Army:

JOHN M. KEANE
General, United States Army
Acting Chief of Staff

Official

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army

0314003

Distribution:

To be distributed in accordance with Std. IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6625-2271-50.

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.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.