TB 9-6625-2132-35

CHANGE 2

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIFFERENTIAL AMPLIFIERS AM-6881/U (TEKTRONIX, TYPE 7A13) AND AM-6786/U (TEKTRONIX, TYPE 7A22)

Headquarters, Department of the Army, Washington, DC
29 November 2005

TB 9-6625-2132-35, 23 March 2005, 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**
5 and 6	5 and 6

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

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the Secretary of the Army

0527602

Distribution:

To be distributed in accordance with IDN 342240, requirements for calibration procedure TB 9-6625-2132-35.

TB 9-6625-2132-35

CHANGE 1

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Headquarters, Department of the Army, Washington, DC
13 September 2005

TB 9-6625-2132-35, 23 March 2005, is changed as follows:

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Remove Pages	**Insert Pages**
7 and 8	7and 8

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*TB 9-6625-2132-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIFFERENTIAL AMPLIFIERS AM-6881/U (TEKTRONIX, TYPE 7A13) AND AM-6786/U (TEKTRONIX, TYPE 7A22)

Headquarters, Department of the Army, Washington, DC
23 March 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, US Army Aviation and Missile Command, 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 9-6625-2132-35, dated 25 Apr 1985, including all changes.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Differential Amplifiers AM6881/U (Tektronix, Type 7A13) and AM-6786/U (Tektronix, Type 7A22). The manufacturers' 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 in text, tables, and figures.

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 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
Tektronix, Type 7A13	
Deflection factor	Range: 1 mV/div to 5 V/div Accuracy: ±1.5%
Frequency response	Risetime: 3.5 ns or less [1] Accuracy: Aberrations less than ±3% of displayed square wave
Comparison voltage	Range: 0 to ±10 V Accuracy: ±0.1% of setting +5 mV
Tektronix, Type 7A22	
Deflection factor	Range: 10 µV/div to 10 V/div Accuracy: ±2%
Bandwidth limit	Range: 100 Hz to 1 MHz HF-3dB point, 9 steps in a 1-3 sequence [1] Accuracy: ±10% Range: 0.1 Hz to 10 kHz LF-3dB point, 6 steps in a 1-10 sequence Accuracy: ±12%

[1] Although TI specification is as listed, the oscilloscope mainframe used will determine this value. If mainframe utilized does not meet this risetime specification, the TI risetime calibration specification met will need to reflect the oscilloscope mainframe specification used in the procedure.

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 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 this calibration procedure. The following peculiar accessories are also required for this calibration: Extender, Tektronix, Type 067-0589-00, and Standardizer 5-80 pF; BNC plug to BNC jack, 7916146.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
FUNCTION/ ARBITRARY GENERATOR	Frequency: Range: 10 Hz to 1 MHz Display Accuracy: ±2.5% Amplitude: 6 V p-p Flatness: ±0.25%	Agilent, Model 33250A (33250A)
MULTIMETER	Range: -10 to +10 V dc Accuracy: ±0.025%	Fluke, Model 8840A/AF05 (AN/GSM-64D)

Table 2. Minimum Specifications of Equipment Required - Continued

Common name	Minimum use specifications	Manufacturer and model (part number)
OSCILLOSCOPE	Compatible with TI and supplied by owner	Tektronix, Type 7000 series (See Table 1 footnote)
OSCILLOSCOPE CALIBRATOR	Voltage output: Range: 1 mV to 100 V Accuracy: ±0.75% Pulses: Range: 100 Hz to 100 kHz Risetime: 875 ps Accuracy: ±0.75%	Fluke, Model 5820A-5C-GHZ (5820A-5C-GHZ)
TIME BASE	Compatible with TI and supplied by owner	Tektronix, Type 7B series

SECTION III
CALIBRATION PROCESS FOR DIFFERENTIAL AMPLIFIER TEKTRONIX, TYPE 7A13

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 the 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 side covers from TI as required to make adjustments.

b. Install TI into oscilloscope left vertical compartment, using extender. Install time base into horizontal compartment.

c. Position controls as listed in (1) through (11) below:

(1) **+** and **-** polarity pushbuttons out.

(2) **VOLTS/DIV** switch to 10 mV and **VOLTS/DIV VARIABLE** control to **CAL** (detent).

(3) **+INPUT** and **-INPUT** pushbuttons to **GND**.

(4) **VOLTS** counter set to 0.000 (cw 0.000 for TI's with electrical counter).

(5) **PULL VOLTS/DIV VAR FOR X10 Vc** control pushed in.

(6) **VAR BAL** control to midrange.

(7) **BW** pushbutton to 5 MHz.

(8) **POSITION** control to midrange.

(9) **X10 BAL** control to midrange.

(10) **STEP ATTEN BAL** control to midrange.

(11) **SW 10** switch (fig. 1) fully ccw (R in = 1 MΩ).

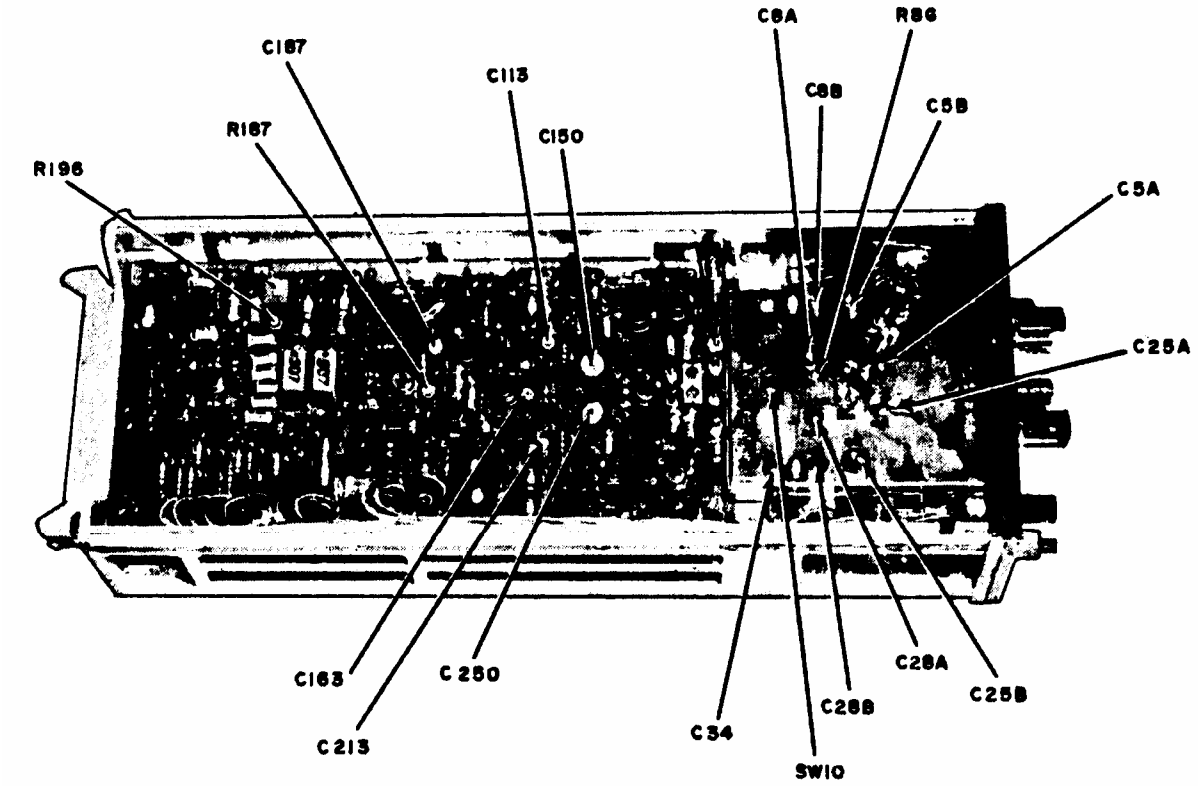

Figure 1. Adjustment locations - left side view (Type 7A13).

d. Press oscilloscope **VERT MODE** and **TRIG SOURCE** pushbuttons to **LEFT**.

e. Press time base pushbuttons as listed in (1) through (7) below:

(1) **LEVEL/SLOPE** pushbutton to **POSITIVE SLOPE**.

(2) **MODE** pushbutton to **AUTO**.

(3) **COUPLING** pushbutton to **AC**.

(4) **SOURCE** pushbutton to **INT**.

(5) **MAGNIFIER** pushbutton to **X1** (IN).

(6) **TIME/DIV** or **DLY TIME** switch to 0.5 ms.

(7) **TIME/DIV VARIABLE** control to **CAL**.

f. Set oscilloscope **ON/OFF** switch to **ON** and allow at least 20 minutes for warm-up.

8. Gain and Deflection Accuracy

a. Performance Check

(1) Press TI **+INPUT** pushbutton to **DC** and set **VOLTS/DIV** switch to 1 mV.

(2) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** to TI **+INPUT**.

(3) Press oscilloscope calibrator **VOLTAGE** key and set for a 5 mV, 1 kHz output.

(4) Turn oscilloscope calibrator **EDIT FIELD** knob to bring up oscilloscope calibrator **err** display and set for 0.0 percent. Adjust TI **GAIN** (front panel) for 5 divisions of vertical deflection on oscilloscope (R).

(5) Set TI and oscilloscope calibrator to values listed in table 3 and adjust oscilloscope calibrator **EDIT FIELD** knob for 5 divisions of vertical deflection on oscilloscope. Oscilloscope calibrator **err** display will be within ± 2 percent of output specified in table 3.

b. Adjustments. No further adjustments can be made.

Table 3. Attenuator Accuracy

Test instrument **VOLTS/DIV** switch settings	Oscilloscope calibrator output settings (1 kHz)	Oscilloscope vertical deflections (div)
2 mV	10 mV	5
5 mV	20 mV	4
10 mV	50 mV	5
20 mV	.1 V	5
50 mV	.2 V	4
.1 V	.5 V	5
.2 V	1 V	5
.5 V	2 V	4
1 V	5 V	5
2 V	10 V	5
5 V	20 V	4

9. Comparison Voltage and Linearity

NOTE

For Type 7A13, SN B199999 and below, perform steps (1) through (6) below. For Type 7A13, SN B200000 and above, perform (7) through (9) below.

a. Performance Check

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

(a) **+INPUT** pushbutton to **GND**.

(b) **VOLTS/DIV** switch to **1 mV**.

(c) **VOLTS** counter to 9.999 plus 1 digit to indicate 9.000 (cw to 0.000 for TI with electrical counter).

(2) Connect multimeter between TI **Vc OUT 0-10V** jack and chassis ground.

(3) Press polarity **+** (positive) pushbutton. If multimeter does not indicate between +9.985 and +10.015 V dc, perform **b** (1) below. Press polarity **-** (negative) pushbutton. If multimeter does not indicate between -9.985 and -10.015 V dc, perform **b** (1) below.

(4) Adjust **VOLTS** counter to indicate 0.999 plus one digit to indicate 0.000 (ccw to 1.000 for TI's with electrical counter). If multimeter does not indicate between -0.994 and -1.0006 V dc, perform **b** (2) below.

(5) Press polarity pushbutton to **+** and adjust **VOLTS** counter to 0.100. Multimeter will indicate between +0.0944 and +0.1051 V dc.

(6) Repeat technique of (5) above for **VOLTS** counter settings listed in table 4. Multimeter will indicate within limits specified.

Table 4. Comparison Voltage Linearity

Test instrument **VOLTS** counter settings	Multimeter indications (V dc)	
	Min	Max
0.300	0.2947	0.3053
0.500	0.4945	0.5055
0.700	0.6943	0.7057
1.000	0.994	1.006
3.000	2.992	3.008
5.000	4.990	5.010
7.000	6.988	7.012
9.000	8.986	9.014

(7) Press polarity **+** (positive). Repeat technique of (1) and (2) above. If multimeter does not indicate between +9.985 and +10.015 V dc, perform **b** (3) below.

(8) Press polarity **-** (negative) pushbutton. If multimeter does not indicate between -9.985 and -10.015 V dc, perform **b** (4) below.

(9) Press polarity + (positive) pushbutton. Adjust **COARSE** and **FINE** controls until **VOLTS** counter indicates 5.000. If multimeter does not indicate between +4.997 and +5.003 V dc, perform **b** (5) below.

b. Adjustments

NOTE

Interaction exists between R573 and R575 (fig. 2). If adjustments were made, repeat a (1) through (5) above for best compromise.

(1) Adjust R573 (fig. 2) for a 10 V dc indication on multimeter (R). Adjust for best compromise between + and polarity.

(2) Adjust R575 (fig. 2) for a 1 V dc indication on multimeter (R). Adjust for best compromise between + and - polarity.

(3) Adjust R686 (fig. 2) for a +10 V dc indication on multimeter (R).

(4) Adjust R727 (fig. 2) for a –10 V dc indication on multimeter (R).

(5) Adjust R696 (fig. 2) for a +5 V dc indication on multimeter (R).

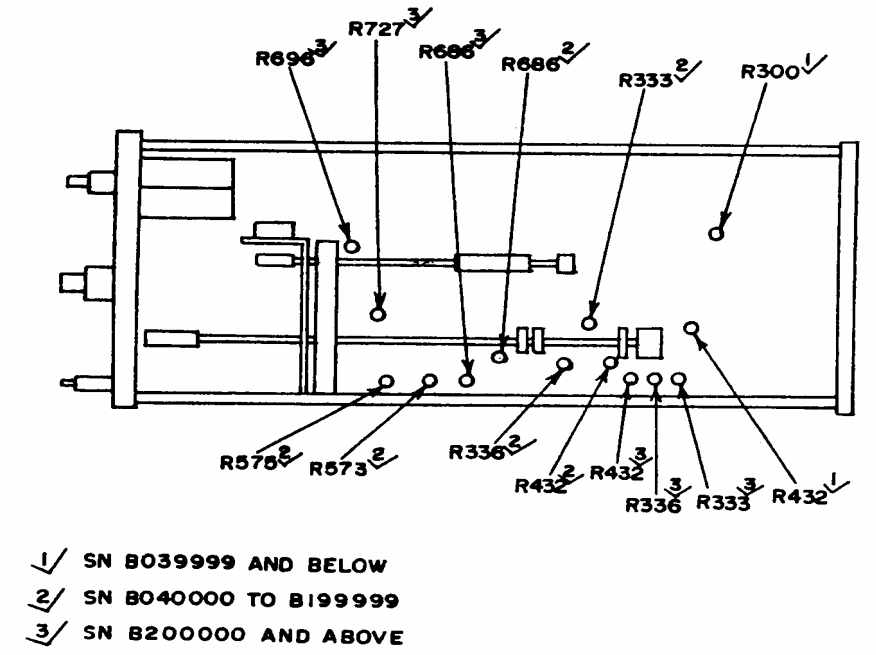

Figure 2. Adjustment locations - right side view (Type 7A13).

10. +INPUT and -INPUT Attenuator Compensation

a. Performance Check

(1) Position TI controls as listed in **(a)** through (c) below:

(a) **VOLTS/DIV** switch to **10 mV**.
(b) **BW** pushbutton to **FULL**.
(c) **+INPUT** pushbutton to **DC**.

(2) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** output to TI **+INPUT**, using standardizer.

(3) Press oscilloscope calibrator **VOLTAGE** key and set oscilloscope calibrator output for 1 kHz and 6 divisions of vertical deflection on oscilloscope.

(4) Adjust standardizer for optimum square wave (square corners and flat tops).

(5) Repeat technique of (3) above for TI **VOLTS/DIV** settings listed in table 5. If aberrations on square wave are more than 3 minor divisions, perform appropriate adjustment listed in table 5.

Table 5. +INPUT and -INPUT Attenuator Compensation

Test instrument **VOLTS/DIV** switch settings	Adjustments (fig. 1)			
	+INPUT		-INPUT	
	Square corner	Flat top	Square corner	Flat top
10 mV	- - -	- - -	- - -	C34 (R)
20 mV	- - -	- - -	- - -	- - -
50 mV	- - -	- - -	- - -	- - -
.1 V	C8A (R)	C8B (R)	C28A (R)	C28B (R)
.2 V	- - -	- - -	- - -	- - -
.5 V	- - -	- - -	- - -	- - -
1 V	C5A (R)	C5B (R)	C25A (R)	C25B (R)

(6) Remove connection from **+INPUT** and connect to **-INPUT**.

(7) Press **+INPUT** pushbutton to **GND** and **-INPUT** pushbutton to **DC**.

(8) Set **VOLTS/DIV** switch to **10 mV**.

(9) Repeat technique of (5) above for **-INPUT**.

b. Adjustments. No further adjustments can be made.

11. High-Frequency Response and Risetime

a. Performance Check

(1) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** output to TI **+INPUT**, using a 50 Ω feedthrough termination.

(2) Position TI controls as listed in (a) through (e) below:

(a) **VOLTS/DIV** switch to **50 mV**.
(b) **+INPUT** pushbutton to **DC**.
(c) **-INPUT** pushbutton to **GND**.
(d) **VOLTS** counter set to 0.000.
(e) **BW** pushbutton to **FULL**.

(3) Set time base to .05 μs and magnifier pushbutton to **X10** (out).

(4) Press oscilloscope calibrator **EDGE** key. Set oscilloscope calibrator output frequency to 100 kHz and set amplitude for 6 divisions of vertical deflection on oscilloscope. Center displayed pulse vertically on crt.

(5) Measure risetime, using standard risetime technique. If risetime is not 3.5 ns or less, and aberrations are not 1.5 minor divisions or less, perform appropriate procedure and adjustments listed in table 6 (see table 1 footnote).

b. Adjustments. No further adjustments can be made.

Table6. High-Frequency Compensation and Adjustment Sequence

Test instrument SN range	Oscilloscope calibrator EDGE frequency setting	Time base sweep rate	Adjustments	Procedures
B040000 and above	10 kHz	.1 ms/div	R196 (R)[1] (fig. 1)	Set TI VOLTS/DIV switch to 10 mV and press BW push-button to 5 MHz. Adjust for best flat top. Press BW pushbutton to FULL for remaining adjustments.
	100 kHz	.5 µs/div	R432 (R) (fig. 2)	Adjust for optimum square corner.
		.5 µs/div or 1 µs	R336 (R) R432 (R) (fig. 2)	Adjust for optimum square corner.
		50 ns/div	R333 (R)	Adjust for optimum square corner.
B039999 and below	10 kHz	20 µs/div	R196 (R)[2] [3] (fig. 1)	Set TI VOLTS/DIV switch to 10 mV and press BW push-button to 5 MHz. Adjust for best flat top. Press BW pushbutton to FULL for remaining adjustments.
	100 kHz	1 µs/div	R432 (R) (fig. 2)	Adjust for optimum square corner. (Ignore fast spike if any, that may remain on top front corner.)
		.1 µs/div	R300 (R) (fig. 2)	Adjust for best flat top.
	100 kHz	5 or 10 ns/div	C187 (R) R187 (R) C163 (R) (fig. 1)	Adjust for optimum square corner.
			C113 (R) (fig. 1)	Adjust for minimum ripple near front corner.
			C150 (R) C250 (R) (fig. 1)	Adjust for optimum square corner. Adjust in equal increments to maintain C150 and C250 at/or near the same physical positions.
		10 ns/div	C213 (R)[4] C250 (R) (fig. 1)	Press - polarity pushbutton. Adjust for optimum square corner on bottom portion of waveform.
		5 ns/div	C150 (R) C113 (R) C163 (R) (fig. 1)	Press + polarity pushbutton. Readjust for optimum square corner.

[1]If R196 is adjusted, repeat 11 a (4).

[2]If R196 is adjusted, repeat paragraph 11 a (5).

[3]Press +INPUT pushbutton to GND and -INPUT pushbutton to DC. Set time base trigger slope switch to - (negative).

[4]Press +INPUT pushbutton to DC, -INPUT pushbutton to GND, VOLTS/DIV switch to 10 mV, and BW pushbutton to 5 MHz. Press time base trigger slope pushbutton to +, MAGNIFIER pushbutton to X1, and TIME/DIV switch to 50 µs. Adjust oscilloscope calibrator to 10 kHz and amplitude for 8 divisions of vertical deflection on oscilloscope.

12. Final Procedure

a. Deenergize and disconnect all equipment and reinstall protective cover on TI.

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

SECTION IV
CALIBRATION PROCESS FOR DIFFERENTIAL AMPLIFIER TEKTRONIX, TYPE 7A22

13. 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 the 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.

NOTE

Side covers must remain in place on TI during calibration. Remove only as required to make adjustments and reinstall to calibrate.

14. 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. Install TI into oscilloscope left vertical compartment, using extender. Install time base in horizontal compartment.

b. Position TI controls as listed in (1) through (7) below:

(1) **VOLTS/DIV** switch to **1 mV** and **VARIABLE** control to **CAL IN**.

(2) **POSITION** control to midrange.

(3) **HF-3dB POINT** switch to **1 MHz**.

(4) **LF-3dB POINT** switch to **1 Hz**.

(5) **+AC-GND-DC** pushbutton to **DC** and **-AC-GND-DC** pushbutton to **GND**.

(6) **STEP ATTEN DC BAL** control to midrange.

(7) **OFFSET COARSE** and **FINE** controls to midrange.

c. Position time base controls as listed in (1) through (7) below:

(1) **TIME/DIV** switch to 0.5 ms.

(2) **COUPLING** pushbutton to **AC**.

(3) **SOURCE** pushbutton to **INT**.

(4) **MODE** pushbutton to **AUTO**.

(5) **TIME/DIV** or **DLY TIME VARIABLE** control to **CAL**.

(6) **+SLOPE-** pushbutton to **+SLOPE**.

(7) **MAGNIFIER** pushbutton to **X1** (IN).

d. Position oscilloscope **VERT MODE** pushbutton to **LEFT** and **TRIG SOURCE** pushbutton to **LEFT**.

e. Set oscilloscope **POWER** (ON/OFF) switch to ON and allow at least 20 minutes for warm-up.

15. Gain and Attenuator Accuracy

a. Performance Check

(1) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** to TI **+INPUT** jack.

(2) Press oscilloscope calibrator **VOLTAGE** key and set for a 5 mV, 1 kHz output. If oscilloscope does not display 5 divisions of vertical deflection, adjust TI **GAIN** (front panel) for 5 divisions.

(3) Turn oscilloscope calibrator **EDIT FIELD** knob to bring up oscilloscope calibrator **err** display.

(4) Set TI and oscilloscope calibrator to values listed in table 7 and adjust oscilloscope calibrator **EDIT FIELD** knob for number of divisions of vertical deflection shown in table. Oscilloscope calibrator **err** display will be within ± 2 percent of output specified in table 7.

b. Adjustments. No further adjustments can be made.

Table 7. Attenuator Accuracy

Test instrument **VOLTS/DIV** switch settings	Oscilloscope calibrator output settings (1 kHz)	Oscilloscope vertical deflections (div)
.2 mV	1 mV	5
.5 mV	2 mV	4
2 mV	10 mV	5
5 mV	20 mV	4
10 mV	50 mV	5
20 mV	.1 V	5
50 mV	.2 V	4
.1 V	.5 V	5
.2 V	1 V	5
.5 V	2 V	4
1 V	5 V	5
2 V	10 V	5
5 V	20 V	4
10 V	10 V	5

16. Attenuation Compensation

a. Performance Check

(1) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** output to TI **+INPUT**, using termination.

(2) Set **VOLTS/DIV** switch to 50 mV and **POSITION** control to midrange.

(3) Press oscilloscope calibrator **EDGE** key and set oscilloscope calibrator output for 1 kHz and 5 divisions of vertical deflection on oscilloscope. If upper leading corner is not square, adjust C241 (fig. 3) for optimum square wave (R).

(4) Remove connection from **+INPUT** and connect to **-INPUT**.

(5) Press **-AC-GND-DC** pushbutton to **DC**. If lower leading corner is not square, adjust C141 (fig. 3) for optimum square wave (R).

(6) Set **VOLTS/DIV** switch to .1 V.

(7) Press **+AC-GND-DC** pushbutton to **DC** and **-AC-GND-DC** pushbutton to **GND**.

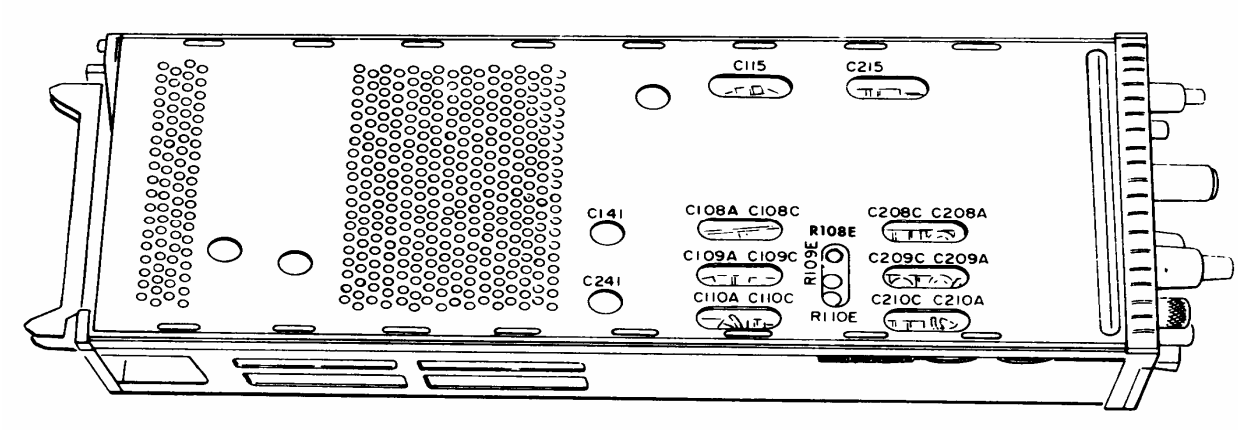

Figure 3. Adjustment locations - left side view (Type 7A22).

(8) Connect oscilloscope calibrator **SOURCE/MEASURE CHAN 1** output to TI **+INPUT**, using standardizer.

(9) Press oscilloscope calibrator **VOLTAGE** key and set oscilloscope calibrator output for 1 kHz and 6 divisions of vertical deflection on oscilloscope. Center displayed pulse vertically on crt.

(10) Adjust standardizer for optimum square wave. If optimum square wave cannot be obtained, adjust C115 (fig. 3) for optimum square wave (R).

(11) Repeat technique of (10) above for TI **VOLTS/DIV** switch settings and adjustments listed in table 8.

b. Adjustments. No further adjustments can be made.

Table 8. Attenuator Compensation

Test instrument **VOLTS/DIV** switch settings	Adjustments (fig. 3)		
	+INPUT		-INPUT
	Leading corner	Flat top	Flat bottom
50 mV	C108C (R)	C108A (R)	C208A (R)
20 mV	- - -	- - -	- - -
10 mV	- - -	- - -	C215 (R)
.1 V	- - -	- - -	- - -
.2 V	C109C (R)	C109A (R)	C209A (R)
.5 V	- - -	- - -	- - -
1 V	- - -	- - -	- - -
5 V	C110C (R)	C110A (R)	C210A (R)
2 V	- - -	- - -	- - -
10 V	- - -	- - -	- - -

17. Input Attenuator Differential Balance

a. Performance Check

(1) Connect equipment as shown in figure 4.

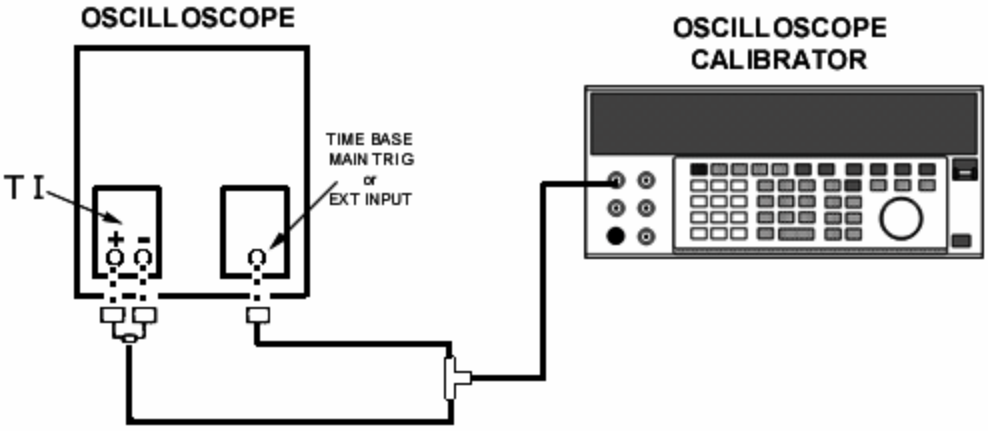

Figure 4. Differential balance - equipment setup (Type 7A22).

(2) Set **VOLTS/DIV** switch to 50 mV and press **+** and **-AC-GND-DC** pushbuttons to **DC**.

(3) Set oscilloscope time base **TRIGGER SOURCE** switch to **EXT**.

(4) Press oscilloscope calibrator **VOLTAGE** key and set oscilloscope calibrator for a 50 V, 1 kHz output. If display on oscilloscope is not of minimum amplitude, adjust R108E (fig. 3) for minimum amplitude (R).

(5) Repeat technique of (4) above for TI **VOLTS/DIV** switch settings and adjustments listed in table 9.

b. Adjustments. No further adjustments can be made.

Table 9. Differential Balance

Test instrument **VOLTS/DIV** switch settings	Oscilloscope calibrator Output settings (1 kHz) (V)	Adjustments (fig. 3)	
		Minimum amplitude	Minimum spikes
50 mV	50	- - -	C208C (R)
.1 V	50	- - -	- - -
.2 V	100	R109E (R)	C209C (R)
.5 V	100	- - -	- - -
1 V	100	- - -	- - -
5 V	100	R110E (R)	C210C (R)
2 V	100	- - -	- - -
10 V	100	- - -	- - -

18. HF and LF-3dB Point

a. Performance Check

(1) Connect function/arbitrary generator output to TI **+INPUT**.

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

(a) **VOLTS/DIV** switch to 1 V.

(b) **-AC-GND-DC** pushbutton to **GND**.
(c) **LF -3dB POINT** switch to **DC**.
(d) **HF -3dB POINT** switch to **1 MHz**.

(3) Set time base **TRIGGERING SOURCE** pushbutton to **INT**.

(4) Adjust function/arbitrary generator frequency to 1 kHz and amplitude for 6 divisions of vertical deflection on oscilloscope.

(5) Increase function/arbitrary generator frequency until the Oscilloscope CRT vertical display decreases to 4.2 div. If function/arbitrary generator frequency does not indicate between 0.9 and 1.1 MHz, perform **b** below.

(6) Repeat technique of (5) above for **HF** and **LF-3dB** switch settings and indications listed in table 10.

b. Adjustments. Set function/arbitrary generator frequency to 1.0 MHz. Adjust C425 (located on right side of TI) for 4.2 divisions of vertical deflection on oscilloscope (R).

Table 10. High and Low Frequency -3dB Point

Test instrument **HF And LF -3db POINT** switch settings	Function/arbitrary generator frequency limits	
	Min	Max
.3 MHz	270 kHz	330 kHz
.1 MHz	90 kHz	110 kHz
30 kHz	27 kHz	33 kHz
10 kHz	9 kHz	11 kHz
3 kHz	2.7 kHz	3.3 kHz
.3 kHz	270 Hz	330 Hz
.1 kHz[1]	90 Hz	110 Hz
10 Hz[2]	8.8 Hz	11.2 Hz
.1 kHz	88 Hz	112 Hz
1 kHz	880 Hz	1120 Hz
10 kHz	8.8 kHz	11.2 kHz

[1]Return **HF-3dB POINT** switch is left at 1 MHz position
[2]Starts **LF-3dB POINT** switch positions.

19. Final Procedure

a. Deenergize and disconnect all equipment and reinstall protective cover on TI.

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

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Army

0502602

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 342240, requirements for calibration procedure TB 9-6625-2132-35.

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.