

TB 9-6625-2099-35

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

**CALIBRATION PROCEDURE FOR
DUAL TRACE AMPLIFIERS AM-6880/U
(TEKTRONIX, TYPE 7A18),
TEKTRONIX, TYPES 7A18A, 7A18A W/OPTION 6,
AND AM-6785/U (TEKTRONIX, TYPE 7A26)**

Headquarters, Department of the Army, Washington, DC
30 October 2002

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TB 9-6625-2099-35, 19 July 2002, 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

1 thru 6
11 thru 14

Insert Pages

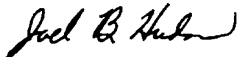
1 thru 6
11 thru 14

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

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***TB 9-6625-2099-35**

CALIBRATION PROCEDURE FOR DUAL TRACE AMPLIFIERS AM-6880/U (TEKTRONIX, TYPE 7A18), TEKTRONIX, TYPES 7A18A, 7A18A W/OPTION 6, AND AM-6785/U (TEKTRONIX, TYPE 7A26)

Headquarters, Department of the Army, Washington, DC
19 July 2002

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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, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028, 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>.

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*This bulletin supersedes TB 9-6625-2099-35, dated 29 March 1993, including all changes.

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**SECTION I
IDENTIFICATION AND DESCRIPTION**

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Dual Trace Amplifiers, AM-6880/U (Tektronix, Type 7A18), Tektronix, Types 7A18A, 7A18A w/Option 06, and AM-6785/U (Tektronix, Type 7A26). The manufacturer's manuals 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. Variations among models are described in text.

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. When adjustments are in tables, the (R) follows the designated adjustments. 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 |
|---|--|
| AM-6880/U (Tektronix, Type 7A18), Tektronix, Types 7A18A, and 7A18A w/option 06 | |
| Vertical gain | Range: 5 mV/div to 5 V/div Accuracy: ±2% with gain adjusted at 10 mV/div |
| Risetime w/oscilloscope | Accuracy: 7900 series, 4.7 ns (75 MHz) 7800 series, 4.7 ns (75 MHz) 7700 series, 4.7 ns (75 MHz) 7600 series, 5.0 ns (70 MHz) 7500 series, 5.8 ns (60 MHz) 7400 series, 7.0 ns (50 MHz) |

Table 1. Calibration Description - Continued

| Test instrument parameters | Performance specifications |
|----------------------------------|---|
| AM-6785/U (Tektronix, Type 7A26) | |
| Vertical gain | Range: 5 mV/div to 5 V/div Accuracy: ±2% with gain adjusted at 10 mV/div |
| Risetime w/oscilloscope | Accuracy: 7900 series, 1.8 ns (200 MHz) 7800 series, 1.9 ns (180 MHz) 7700 series, 2.3 ns (150 MHz) 7600 series, 3.5 ns (100 MHz) 7500 series, 3.9 ns (90 MHz) 7400 series, 5.8 ns (60 MHz) Aberrations: +4% or -4% and 6% p-p of pulse amplitude |

**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 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. 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 accessory is also required for this calibration: Extender, Tektronix, Type 067-0589-00, and Standardizer 580 pF, APN 7916146.

Table 2. Minimum Specifications of Equipment Required

| Common name | Minimum use Specifications | Manufacturer and model (part number) |
|-------------------------|--|--|
| OSCILLOSCOPE CALIBRATOR | Volts out: Range: 20 mV to 20 V at 1 kHz Accuracy: ±0.5% Square wave capabilities: Frequency: 1 kHz to 1 MHz Amplitude: 30 mV to 2.5 V Aberrations: ±2% Risetime: 0.45 ns or less | John Fluke, Model 5820A, (5820A-5C-GHZ), MIS-38938 |
| OSCILLOSCOPE | Compatible with TI and supplied by owner | Tektronix, Type 7000 series (7000 series) |
| TIME BASE | Compatible with TI and supplied by owner | Tektronix, Type 7B series (7B series) |

**SECTION III
CALIBRATION PROCESS FOR AM-6880/U (TEKTRONIX TYPE 7A18)
AND TEKTRONIX, TYPES 7A18A AND 7A18A W/OPTION 06**

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 manuals 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 protective cover from TI only when necessary to make adjustments. Replace cover after completing adjustments.

b. Remove the left side panel from the oscilloscope and install TI into oscilloscope left vertical compartment and time base into horizontal right compartment.

c. Connect oscilloscope to a 115 V ac power source. Energize oscilloscope and allow at least 20 minutes for warm up.

d. Position oscilloscope controls as listed in (1) through (3) below:

(1) Press **VERT MODE/LEFT** pushbutton.

(2) Press **TRIG SOURCE/VERT MODE** pushbutton.

(3) Adjust **INTENSITY, FOCUS, READOUT,** and **GRAT ILLUM** controls as desired.

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

(1) **DISPLAY MODE** switch to **CH 1**.

- (2) **TRIGGER SOURCE** switch to **MODE**.
- (3) **CH 2 POLARITY** switch to **+UP**.
- (4) **CH 1** and **CH 2 POSITION** controls to midrange.
- (5) **CH 1** and **CH 2 VOLTS/DIV** switches to 10 mV.
- (6) **CH 1** and **CH 2 AC-GND-DC** switches to **DC**.
- (7) **CH 1** and **CH 2 VOLTS/DIV VARIABLE (CAL IN)** pressed to in position.

8. Vertical Gain

a. Performance Check

- (1) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** and connect oscilloscope calibrator **CHAN 2** to TI **CH2**.
- (2) Set oscilloscope calibrator **VOLTAGE** output for 50 mV at 1 kHz amplitude.
- (3) Adjust TI time base controls as necessary for a stable display.
- (4) Adjust TI **CH 1 GAIN** control (front panel) for **5** divisions of display.
- (5) Set oscilloscope calibrator **VOLTAGE** output to settings as listed in 1st row of table 3. Oscilloscope calibrator frequency will remain at 1 kHz for all settings in table 3.
- (6) Set **CH 1 VOLTS/DIV** switch to **VOLTS/DIV** settings in 1st row of table 3 and rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in 1st row of table 3. Oscilloscope calibrator **err** display will indicate within limits specified in table 3; if not, perform **b** below.
- (7) Repeat technique of (3) through (6) above for remaining rows listed in table 3. Oscilloscope calibrator **err** display indications will be within limits specified in table 3.

Table 3. Ch 1 Vertical Gain

| Test instrument VOLTS/DIV switch settings | Oscilloscope calibrator voltage output | Test instrument display divisions | Oscilloscope calibrator Err display limits (±%) |
|--|--|--------------------------------------|---|
| 5 mV | 20 mV | 4 | 2 |
| 20 mV | .1 V | 5 | 2 |
| 50 mV | .2 V | 4 | 2 |
| .1 V | .5 V | 5 | 2 |
| .2 V | 1 V | 5 | 2 |
| .5 V | 2 V | 4 | 2 |
| 1 V | 5 V | 5 | 2 |
| 2 V | 10 V | 5 | 2 |
| 5 V | 20 V | 4 | 2 |

- (8) Set **DISPLAY MODE** switch to **CH 2**.

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(9) Press oscilloscope calibrator **CHANNEL** pushbutton and press blue soft pushbutton located below **CHAN 2**.

(10) Set oscilloscope calibrator **VOLTAGE** output for 50 mV at 1 kHz amplitude.

(11) Adjust TI time base controls as necessary for a stable display.

(12) Adjust TI **CH 2 GAIN** control (front panel) for **5** divisions of display.

(13) Set oscilloscope calibrator **VOLTAGE** output to settings as listed in 1st row in table 4. Oscilloscope calibrator frequency will remain at 1 kHz for all settings in table 4.

(14) Set **CH 2 VOLTS/DIV** switch to **VOLTS/DIV** settings in 1st row of table 4 and rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in 1st row of table 4. Oscilloscope calibrator **err** display will indicate within limits specified in table 4; if not, perform **b** below.

(15) Repeat technique of (11) through (14) above for remaining rows listed in table 4. Oscilloscope calibrator **err** display indications will be within limits specified in table 4.

Table 4. Ch 2 Vertical Gain

| Test instrument VOLTS/DIV switch settings | Oscilloscope calibrator Voltage output | Test instrument display divisions | Oscilloscope calibrator Err display limits (±%) |
|--|---|-----------------------------------|--|
| 5 mV | 20mV | 4 | 2 |
| 20 mV | .1V | 5 | 2 |
| 50 mV | .2V | 4 | 2 |
| .1 V | .5V | 5 | 2 |
| .2 V | 1 V | 5 | 2 |
| .5 V | 2 V | 4 | 2 |
| 1 V | 5 V | 5 | 2 |
| 2 V | 10V | 5 | 2 |
| 5 V | 20V | 4 | 2 |

(16) Deenergize oscilloscope and remove TI from left vertical compartment and reinstall, using extender.

(17) Energize oscilloscope.

(18) Set **CH 1 VOLTS/DIV** switch to **5 mV** and **DISPLAY MODE** switch to **CH 1**.

(19) Ensure oscilloscope calibrator **CHAN 1** is connected to **CH 1** using a 5-80 pF standardizer. Press oscilloscope calibrator **CHANNEL** pushbutton and press blue soft pushbutton located below **CHAN 1**.

(20) Set oscilloscope calibrator **EDGE** output frequency to 1 kHz.

(21) Adjust oscilloscope calibrator output for 6 divisions of display.

6 CHANGE 1

(22) Adjust standardizer for optimum square wave. If optimum square wave cannot be obtained, adjust **CHANNEL 1 C100 (CH 2 adjust C100 CHANNEL 2)** (fig. 1 or 2) to midrange and readjust standardizer for optimum square wave.

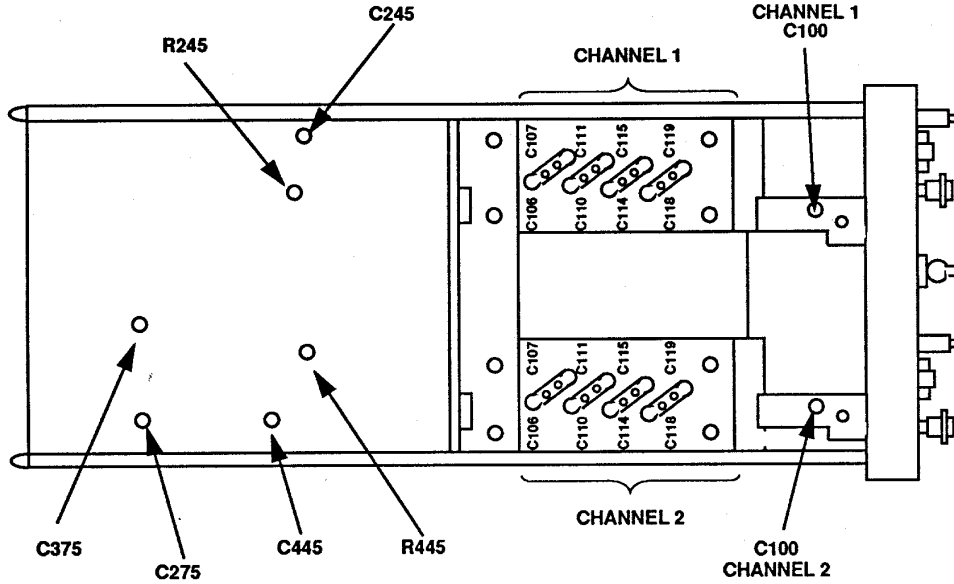


Figure 1. AM688/U (Tektronix, Type 7A18) - left side view.

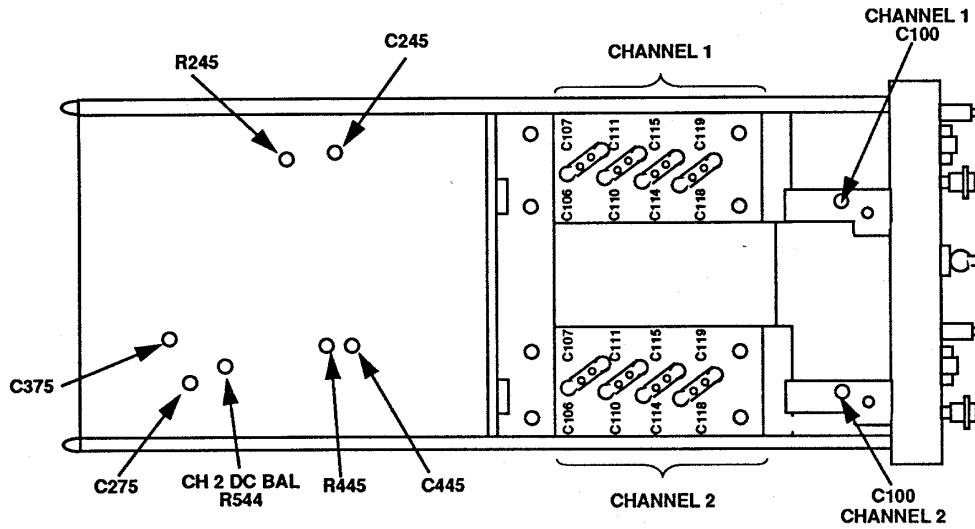


Figure 2. Tektronix, Type 7A18A and 7A18A w/option 06 - left side view.

NOTE

Use figure 1 for AM-6880/U (Tektronix, Type 7A18), and figure 2 for Tektronix, Type 7A18A and 7A18A w/option 06.

(23) Set **CH 1 VOLTS/DIV** switch to **10 mV** and adjust calibration generator output controls for a 6 division display.

(24) Using corresponding adjustments listed in table 5, adjust for optimum square wave on display.

Table 5. Attenuator Compensation

| Test instrument | | |
|------------------------------|---|----------|
| VOLTS/DIV switch settings | CH 1 and CH 2 adjustments (fig. 1 or 2) ¹ | |
| | Square corners | Flat top |
| 10 mV | C106 | C107 |
| 20 mV | C110 | C111 |
| 50 mV | C114 | C115 |
| .5V | C118 | C119 |

¹Adjustments are numbered the same for **CH1** and **CH2**.

(25) Repeat technique of (23) and (24) above for the remaining **VOLTS/DIV** switch settings listed in table 5.

(26) Repeat technique of (18) through (25) above for **CH 2**.

(27) Deenergize oscilloscope and remove TI and extender from left vertical compartment and reinstall TI into left vertical compartment.

(28) Energize oscilloscope.

b. Adjustments. No further adjustments can be made.

9. Risetime

a. Performance Check

(1) Set **DISPLAY MODE** switch to **CH 1**.

(2) Set **CH 1 VOLTS/DIV** switch as listed in row of table 6.

(3) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** and connect oscilloscope calibrator **CHAN 2** to TI **CH 2** using a 50Ω feedthrough termination.

(4) Set oscilloscope calibrator **EDGE** output frequency as list in row of table 6.

(5) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in table 6. Measure risetime using standard risetime techniques. Risetime will be within limits as specified in table 6; if not, perform **b** below.

Table 6. Ch 1 Risetime

| Test instrument VOLTS/DIV switch settings (V) | Oscilloscope series | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument risetime limits (nS) |
|---|---------------------|--|-----------------|-----------------------------------|--------------------------------------|
| | | Volts | Frequency (kHz) | | |
| .2 | 7900 | 1 | 100 | 5 | 4.7 |
| .2 | 7800 | 1 | 100 | 5 | 4.7 |
| .2 | 7700 | 1 | 100 | 5 | 4.7 |
| .2 | 7600 | 1 | 100 | 5 | 5.0 |
| .2 | 7500 | 1 | 100 | 5 | 5.8 |
| .2 | 7400 | 1 | 100 | 5 | 7.0 |

(6) Repeat technique of steps (2) through (5) above for appropriate series oscilloscope.

(7) Set **DISPLAY MODE** switch to **CH 2**.

(8) Set **CH 2 VOLTS/DIV** switch as listed in 1st row of table 7.

(9) Ensure oscilloscope calibrator **CHAN 2** is connected to TI **CH 2** using a 50Ω feedthrough termination. Press oscilloscope calibrator **CHANNEL** pushbutton then press blue soft pushbutton located below **CHAN 2** on oscilloscope calibrator display.

(10) Ensure oscilloscope calibrator **EDGE** output and frequency are set as listed in 1st row of table 7.

(11) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in table 7. Measure risetime using standard risetime techniques. Risetime will be within limits as specified in table 7; if not, perform **b** below.

Table 7. Channel 2 Risetime

| Test instrument VOLTS/DIV switch settings (V) | Oscilloscope series | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument risetime limits (nS) |
|---|---------------------|--|-----------------|-----------------------------------|--------------------------------------|
| | | Volts | Frequency (kHz) | | |
| .2 | 7900 | 1 | 100 | 5 | 4.7 |
| .2 | 7800 | 1 | 100 | 5 | 4.7 |
| .2 | 7700 | 1 | 100 | 5 | 4.7 |
| .2 | 7600 | 1 | 100 | 5 | 5.0 |
| .2 | 7500 | 1 | 100 | 5 | 5.8 |
| .2 | 7400 | 1 | 100 | 5 | 7.0 |

(12) Repeat technique of steps (8) through (11) above for series oscilloscope being used.

b. Adjustments

(1) Remove connections and 50Ω feedthrough termination from oscilloscope calibrator and TI.

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(2) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** using a 50 Ω feedthrough termination. Set oscilloscope output to **CHAN 1** using technique in (11) above.

(3) Set **DISPLAY MODE** switch to **CH 1** and **CH 1 VOLTS/DIV** switch to **10 mV**.

(4) Set oscilloscope calibrator to **EDGE**, and output to 60 mV at 1 kHz.

(5) Adjust **CH 1 POSITION**, oscilloscope, and time base controls as necessary to view waveform.

(6) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain 6 divisions on oscilloscope display. If aberrations are not less than 0.24 divisions peak-to-peak, adjust **R245**, **C245**, and **C275** (**CH 2** adjust **R445**, **C445**, and **C375**) (fig. 1 or 2) for optimum square wave with aberrations of less than 0.24 divisions peak-to-peak (R).

(7) Repeat technique of (2) through (6) above for **CH 2**.

10. Final Procedure

- a. Deenergize and disconnect all equipment.
- b. Annotate and affix DA Label/Form in accordance with TB 750-25.

SECTION IV CALIBRATION PROCESS FOR AM1-6785/U (TEKTRONIX, TYPE 7A26)

11. Preliminary Instructions

a. The instructions outlined in paragraphs **13** and **14** 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. Addition maintenance information is contained in the manufacturers manuals for this TI.

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

12. 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 set within the performance check when applicable.

- a.** Remove protective cover from TI only when necessary to make adjustments. Replace cover after completing adjustments.
- b.** Remove the left side panel from oscilloscope and install TI into oscilloscope left vertical compartment and time base into right horizontal compartment.
- c.** Connect oscilloscope to a 115 V ac power source. Energize oscilloscope and allow at least 20 minutes for warm up.
- d.** Position oscilloscope controls as listed in (1) through (3) below:
 - (1) Press **VERT MODE/LEFT** pushbutton.
 - (2) Press **TRIG SOURCE/VERT MODE** pushbutton.
 - (3) Adjust **INTENSITY, FOCUS, READOUT,** and **GRAT ILLUM** controls as desired.
- e.** Position TI controls as listed in (1) through (7) below:
 - (1) **DISPLAY MODE** switch to **CH 1**.
 - (2) **TRIGGER SOURCE** switch to **MODE**.
 - (3) **CH 2 POLARITY** switch to **+UP**.
 - (4) **CH 1** and **CH 2 POSITION** controls to midrange.
 - (5) **CH 1** and **CH 2 VOLTS/DIV** switches to **10 mV**.
 - (6) **CH 1** and **CH 2 AC-GND-DC** switches to **DC**.
 - (7) **BW** switch to **FULL**.

13. Vertical Gain

a. Performance Check

- (1) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** and connect oscilloscope calibrator **CHAN 2** to TI **CH 2**. Ensure oscilloscope calibrator **CHAN 1** output is presently selected by pressing oscilloscope calibrator **CHANNEL** pushbutton and then pressing blue soft pushbutton located below **CHAN 1** on oscilloscope calibrator display.
- (2) Set oscilloscope calibrator **VOLTAGE** output to 50 mV and frequency to 1 kHz.
- (3) Adjust **CH 1 POSITION**, oscilloscope, and time base controls as necessary to view waveform.
- (4) Adjust **CH 1** (front panel) **GAIN** control for 5 divisions of display.
- (5) Set oscilloscope calibrator **VOLTAGE** output as listed in 1st row of table 8.
- (6) Set **CH 1 VOLTS/DIV** switch as listed in 1st row of table 8 and rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in 1st row of table 8. Oscilloscope calibrator **err** display will indicate within limits as specified in table 8; if not, perform **b**(1) through (4) below.

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(7) Repeat technique of steps (4) through (6) above for remaining rows listed in table 8. Oscilloscope calibrator **err** display indications will be within limits specified in table 8.

Table 8. Ch 1 Vertical Gain

| Test instrument VOLTS/DIV switch settings | Oscilloscope calibrator VOLTAGE output | Test instrument display divisions | Oscilloscope calibrator Err display limits (±%) |
|--|--|--------------------------------------|---|
| 5mV | 20 mV | 4 | 2 |
| 20 mV | .1V | 5 | 2 |
| 50 mV | .2V | 4 | 2 |
| .1V | .5V | 5 | 2 |
| .2V | 1V | 5 | 2 |
| .5V | 2V | 4 | 2 |
| 1V | 5V | 5 | 2 |
| 2V | 10 V | 5 | 2 |
| 5V | 20 V | 4 | 2 |

(8) Set **DISPLAY MODE** switch to **CH 2**.

(9) Set oscilloscope calibrator output to **CHAN 2** using technique in step 1 above.

(10) Set oscilloscope calibrator **VOLTAGE** output to 50 mV at 1 kHz.

(11) Adjust **CH 2 POSITION**, oscilloscope, and time base controls as necessary to view waveform.

(12) Adjust **CH 2** (front panel) **GAIN** control for 5 divisions of display.

(13) Set oscilloscope calibrator **VOLTAGE** output as listed in first row of table 9 .

(14) Set **CH 2 VOLTS/DIV** switch as listed in first row of table 9 and rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in first row of table 9. Oscilloscope calibrator **err** display will indicate within limits as specified in table 9; if not, perform **b(5)** through (12) below.

(15) Repeat technique of steps (12) through (14) above for remaining rows listed in table 8. Oscilloscope calibrator **err** display indications will be within limits specified in table 9.

Table 9. Ch 2 Vertical Gain

| Test instrument VOLTS/DIV switch settings | Oscilloscope calibrator VOLTAGE output | Test instrument display divisions | Oscilloscope calibrator Err display limits (+%) |
|--|---|--------------------------------------|---|
| 5mV | 20 mV | 4 | 2 |
| 20 mV | .1 V | 5 | 2 |

Table 9. Ch 2 Vertical Gain - Continued

| Test instrument VOLTS/DIV switch settings | Oscilloscope calibrator VOLTAGE output | Test instrument display divisions | Oscilloscope calibrator Err display limits (±%) |
|--|---|--------------------------------------|---|
| 50 mV | .2 V | 4 | 2 |
| .1 V | .5 V | 5 | 2 |
| .2 V | 1 V | 5 | 2 |
| .5 V | 2 V | 4 | 2 |
| 1 V | 5 V | 5 | 2 |
| 2 V | 10 V | 5 | 2 |
| 5 V | 20 V | 4 | 2 |

(16) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** using a 50Ω feedthrough termination. Ensure oscilloscope calibrator **CHAN 1** output is selected by using technique in step (1) above.

(17) Set **DISPLAY MODE** switch to **CH 1** and **CH 1 VOLTS/DIV** switch to **10 mV**.

(18) Set oscilloscope calibrator to **EDGE**, and output a 60 mV, 1 kHz output.

(19) Adjust **CH 1 POSITION** and time base controls as necessary to view display.

(20) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain 6 divisions on oscilloscope display. If displayed waveform does not have flat tops, perform **b(13)** below (**CH 2, b(14)** below).

(21) Remove 50Ω feedthrough termination from oscilloscope calibrator **CHAN 1** and **TI CH 1**. Reconnect oscilloscope calibrator **CHAN 1** to TI **CH 1** using a 5-80 pF standardizer. Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain 6 divisions 6 divisions of vertical display.

(22) Adjust standardizer for optimum square corner and flat top. If standardizer cannot be adjusted for optimum square wave, adjust **CH 1 C134** (fig. 3) (**CH 1 C130** (fig. 3) for **SN B160000** and above) to midrange and readjust standardizer for optimum square wave.

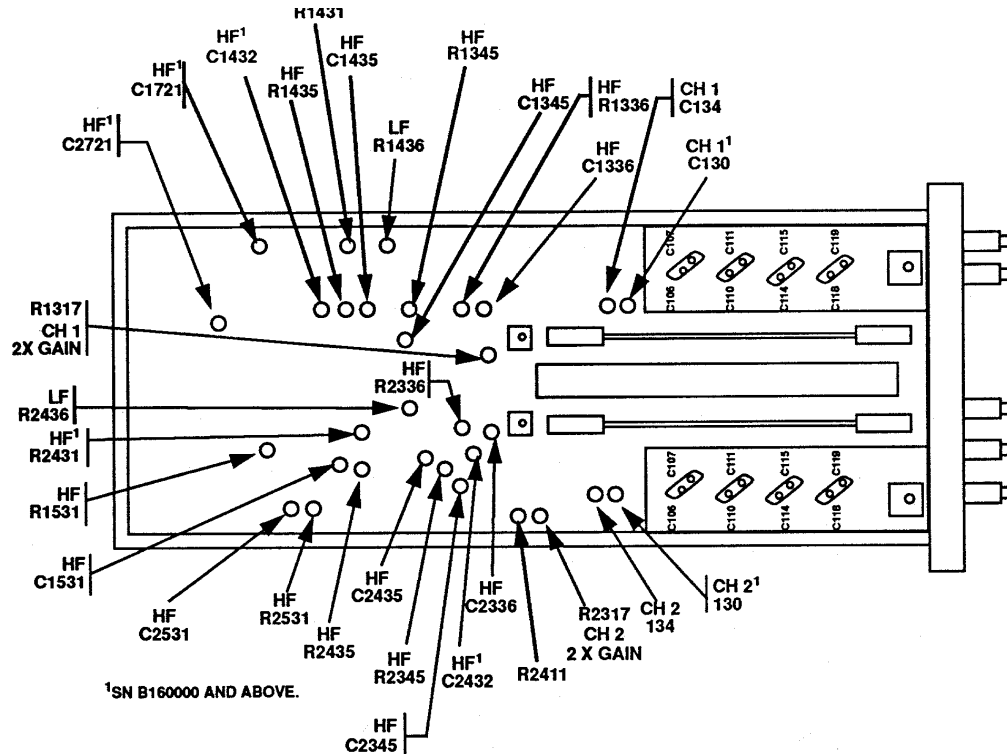


Figure 3. AM-6785/U and Tektronix, Type 7A26 - left side view.

- (23) Adjust oscilloscope calibrator output for 6 divisions of display at each **VOLTS/DIV** switch setting listed in table 10. If oscilloscope does not display square corners and flat tops, perform appropriate adjustments listed in table 10.
- (24) Remove 5-80 pF standardizer from oscilloscope calibrator **CHAN 1** and TI **CH 1**.
- (25) Set **DISPLAY MODE** switch to **CH 2**, and repeat technique of (16) through (23) above for **CH 2**.
- (26) Ensure oscilloscope calibrator **CHAN 2** is connected to TI **CH 2** using a 50Ω feedthrough termination. Ensure oscilloscope calibrator **CHAN 2** output is selected by using technique in step (1) above.
- (27) Set **DISPLAY MODE** switch to **CH 2** and **CH 2 VOLTS/DIV** switch to **10 mV**.
- (28) Set oscilloscope calibrator to **EDGE**, and output a 60 mV, 1 kHz output.
- (29) Adjust **CH 2 POSITION** and time base controls as necessary to view display.
- (30) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain 6 divisions on oscilloscope display. If displayed waveform does not have flat tops, perform **b**(14) below.

(31) Remove 50Ω feedthrough termination from oscilloscope calibrator **CHAN 2** and TI **CH 2**. Reconnect oscilloscope calibrator **CHAN 2** to TI **CH 2** using a 5-80 pF standardizer. Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain 6 divisions of vertical display.

(32) Adjust oscilloscope calibrator output for 6 divisions of display at each **VOLTS/DIV** switch setting listed in table 10. If oscilloscope does not display square corners and flat tops, perform appropriate adjustments listed in table 10.

(33) Remove 5-80 pF standardizer from oscilloscope calibrator **CHAN 2** and TI **CH 2**.

Table 10. Attenuator Compensation

| Test instrument | | |
|-------------------------------------|---|----------|
| VOLTS/DIV switch settings | CH 1 and CH 2 adjustments (fig. 3) ¹ | |
| | Square corners | Flat top |
| 20 mV | C106 | C107 |
| 50 mV | C110 | C111 |
| .1 mV | C114 | C115 |
| 1 V | C118 | C119 |

¹Adjustments for CH 1 and CH 2 are numbered the same.

b. Adjustments

(1) Ensure oscilloscope calibrator output and TI **VOLTS/DIV** switch setting is set as indicated in first row of table 8.

(2) Adjust **CH 1 GAIN** (front panel) for 4 divisions of amplitude.

(3) Set **CH 1 VOLTS/DIV** switch to **10 mV** and oscilloscope calibrator output for 50 mV.

(4) Adjust R1317 CH 1 2X GAIN (fig. 3) for 5 divisions of amplitude (R).

(5) Ensure oscilloscope calibrator output and TI **VOLTS/DIV** switch setting is set as indicated in first row of table 9.

(6) Adjust **CH 2 GAIN** control (front panel) for 4 divisions of amplitude.

(7) Set **CH 2 AC-GND-DC** switch to **AC**.

(8) Adjust R2411 (fig. 3) polarity gain for minimum gain change while switching **CH 2 POLARITY** switch between **+UP** and **INVERT**.

(9) Set **CH 2 AC-GND-DC** switch to **DC** and repeat (6) through (8) above until no further adjustments are needed.

(10) Set **CH 2 AC-GND-DC** switch **DC** and **VOLTS/DIV** switch to **10 mV**.

(11) Set oscilloscope calibrator output controls for 50 mV at 1 kHz.

(12) Adjust R2317 CH 2 2X GAIN (fig. 3) for **5** divisions of amplitude (R).

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(13) Adjust LF R1436 and R1431 (LF R1436 for SN 159999 and below) (fig. 3) for best flat top (minimum tilt) (R).

(14) Adjust LF R2436 and HF R2431 (LF R2436 for SN 159999 and below) (fig. 3) for best flat top (minimum tilt) (R).

14. Risetime

a. Performance Check

(1) Set **DISPLAY MODE** switch to **CH 1**.

(2) Set **CH 1 VOLTS/DIV** switch as listed in first row of table 11.

(3) Connect oscilloscope calibrator **CHAN 1** to TI **CH 1** using a 50Ω feedthrough termination and connect oscilloscope calibrator **CHAN 2** to TI **CH 2** using a 50Ω feedthrough termination.

(4) Set oscilloscope calibrator **EDGE** output frequency as listed in first row of table 11.

(5) Adjust oscilloscope calibrator output controls for divisions as listed in table 11 for oscilloscope display divisions.

(6) Adjust **TI CH 1 POSITION**, and TI time base controls to view waveform. If aberrations exceed limits listed in table 11 perform adjustments as indicated in table 11.

Table 11. Ch 1 Aberrations

| Test instrument VOLTS/DIV switch settings (mV) | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument aberrations limits (± 4 % and 6% pk-pk) of pulse amplitude | | Test instrument aberration adjustments |
|---|--|-------|-----------------------------------|--|------|--|
| | (mV) | (MHz) | | Pass | Fail | |
| 10 | 50 | 1 | 5 | | | b(l) |

(7) Set **DISPLAY MODE** switch to **CH 2**.

(8) Set **CH 2 VOLTS/DIV** switch as listed in table 12.

(9) Press oscilloscope calibrator **CHANNEL** pushbutton. Next press blue soft pushbutton located below **CHAN2** on oscilloscope calibrator when **SELECT CHANNEL** is displayed.

(10) Ensure oscilloscope calibrator **CHAN 2** is connected to TI **CH 2** using a 50Ω feedthrough termination.

(11) Set oscilloscope calibrator **EDGE** output frequency to listed in table 12.

(12) Adjust oscilloscope calibrator output controls for divisions as listed in table 12 for oscilloscope display divisions.

(13) Adjust **TI CH 2 POSITION**, and TI time base controls to view waveform. If aberrations exceed limits listed in table 12 perform adjustments as indicated in table 12.

Table 12. Ch 2 Aberrations

| Test instrument VOLTS/DIV switch settings (V) | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument aberrations limits (± 4 % and 6% pk-pk) of pulse amplitude | | Test instrument aberration adjustment s |
|--|--|--------------------|--|---|----|---|
| | (mV) | Frequency (MHz) | | Yes | No | |
| .2 | 50 | 1 | 5 | | | b(2) |

(14) Set oscilloscope calibrator output and frequency as listed in table 13.

(15) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain TI display divisions listed in table 13. Measure risetime using standard risetime techniques. Risetime will be within limits as specified in table 13 for oscilloscope series being used.

Table 13. Ch 2 Risetime

| Test instrument VOLTS/DIV switch settings (V) | Oscilloscope series | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument risetime limits (nS) |
|--|------------------------|---|--------------------|--|--|
| | | Volts | Frequency (kHz) | | |
| .2 | 7900 | 1 | 100 | 5 | 4.7 |
| .2 | 7800 | 1 | 100 | 5 | 4.7 |
| .2 | 7700 | 1 | 100 | 5 | 4.7 |
| .2 | 7600 | 1 | 100 | 5 | 5.0 |
| .2 | 7500 | 1 | 100 | 5 | 5.8 |
| .2 | 7400 | 1 | 100 | 5 | 7.0 |

(16) Set **DISPLAY MODE** switch to **CH 1**.

(17) Set **CH 1 VOLTS/DIV** switch as listed in table 14.

(18) Ensure oscilloscope calibrator **CHAN 1** is connected to TI **CH 1** using a 50Ω feedthrough termination. Press oscilloscope calibrator **CHANNEL** pushbutton then press blue soft pushbutton located below **CHAN 1** on oscilloscope calibrator display.

(19) Ensure oscilloscope calibrator **EDGE** output and frequency are set as listed in table 14.

(20) Rotate oscilloscope calibrator knob located below **EDIT FIELD** pushbutton to obtain oscilloscope display divisions as listed in table 14 . Measure risetime using standard risetime techniques. Risetime will be within limits as specified in table 14 for oscilloscope series being used.

Table 14. Channel 1 Risetime

| Test instrument VOLTS/DIV switch settings (V) | Oscilloscope series | Oscilloscope calibrator EDGE output | | Test instrument display divisions | Test instrument risetime limits (nS) |
|---|------------------------|---|--------------------|---|--|
| | | Volts | Frequency (kHz) | | |
| .2 | 7900 | 1 | 100 | 5 | 4.7 |
| .2 | 7800 | 1 | 100 | 5 | 4.7 |
| .2 | 7700 | 1 | 100 | 5 | 4.7 |
| .2 | 7600 | 1 | 100 | 5 | 5.0 |
| .2 | 7500 | 1 | 100 | 5 | 5.8 |
| .2 | 7400 | 1 | 100 | 5 | 7.0 |

b. Adjustments

(1) Adjust HF C1336, HF R1336, HF C1432, HF C1435, HF R1435, HF C1531, HF R1531, HF C1345, and HF R1345 (fig. 3) for optimum front corner and flat top (R).

(2) Adjust HF C2336, HF R2336, HF C2432, HF C2435, HF R2435, HF C2531, HF R2531, HF C2345, and HF R2345 (fig. 3) for optimum front corner and flat top (R).

15. Final Procedure

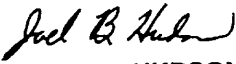
- a. Deenergize and disconnect all equipment.
- b. Annotate and affix DA label/form in accordance with TB 750-25.

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By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

OFFICIAL:


JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0215706

Distribution:

To be distributed in accordance with IDN 342232, requirements for calibration procedure TB-9-6625-2099-35.

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