

TB 9-6625-184-35

Change 2

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR WIDEBAND PLUG-IN AM-1841/USM, AM-1841A/USM, AND AM-1841B/USM (TEKTRONIX, TYPES B, B MOD 601, 53/54B, AND 53/54B MOD 601; LAVOIE, MODEL LA-265-B)

Headquarters, Department of the Army, Washington, DC

11 July 1979

TB 9-6625-184-35, 18 May 1973, is changed as follows:

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Change 1

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WIDE-BAND PLUG-IN
AM-1841/USM, AM-1841A/USM, AND AM-1841B/USM
(TEKTRONIX, TYPES B, B MOD 601, 53/54B, AND
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Headquarters, Department of the Army, Washington, DC
18 May 1973

◆ REPORTING OF ERRORS ◆

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications, should be mailed directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-TMD-EP, Redstone Arsenal, AL 35898-5000. FAX to DSN 788-2313 (commercial 256-842-2313). A reply will be furnished directly to you.

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**SECTION I
IDENTIFICATION AND DESCRIPTION**

1. Test Instrument Identification. This bulletin provides instructions for the A- and C-level calibration of Wide-Band Plug-In, AM-1841/USM, AM-1841A/USM, and AM-1841B/USM (Tektronix, Types B, B MOD 601, 53/54B, and 53/54B MOD 601; and Lavoie Model LA-265-B). The manufacturers' instruction manuals were used as the prime data sources in compiling these instructions. The wide-band plug-in will be referred to as the "TI" (test instrument) throughout this bulletin.

a. Model Variations. The type B TI may have BNC type or UHF-type input connectors. When BNC connectors are used, adapter (BI) in table 4 is not required. Component designations differ between type B instruments with serial numbers 101 through 3300 and those with serial numbers 3301 and above. These differences are noted in the appropriate paragraphs within the bulletin and the illustration (fig. 1) used is for types 53/54B and 53/54B MOD 601, AM_j-1841/ USM (same as 53/54B MOD 601), AM_j-1841A/USM (same as 53/54B and B), and all of type B and type B MOD 601 instruments with serial numbers 3301 and above. Designation "MOD 601" indicates units with military-type vacuum tubes and hermetically sealed power transformers. AM-1841B/USM is the same as Lavoie Model LA-265-B.

b. Time and Technique. The time required for this calibration is approximately 2 hours for each instrument, using the dc and low frequency technique.

2. Calibration Data Card (DA Form 2416). Maintenance forms, records, and reports which are to be used by calibration personnel at all calibration levels are listed in and prescribed by TM 38-750.

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
Power input requirements ¹	Supplied by oscilloscope
Deflection factor	0.05 v/cm to 50 v/cm dc; 0.005 v/cm to 50 v/cm ac
Signal inputs ¹	Two signal inputs with more than 60-dB isolation
Step attenuator	12 calibrated steps are provided: 0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, and 20 v/cm
Accuracy	Within $\pm 3\%$ of indicated deflection in calibrated position
Maximum input voltage ¹	600 v (dc plus peak ac)
Risetime: Tektronix, Types B and BMOD 601 w/oscilloscopes 541, 541A, 543, 545, 545A, and 555 551 531, 531A, 533, 535, and 535A 532 Tektronix, Types 53/54B and 54/54BMOD 601; Lavoie, Model LA-265-B; and AM-1841/USM, AM-1841A/USM, and AM-1841B/USM w/oscilloscopes 541 and 545 531 and 535 532	18 nsec, ² 30 nsec ³ 20 nsec ² 25 nsec, ² 35 nsec ³ 70 nsec, ² 70 nsec ³ Dc to 18 MHz; ² 3 Hz to 12 MHz ³ Dc to 14 MHz; ² 2 Hz to 10 MHz ³ Dc to 5 MHz; ² 3 Hz to 5 MHz ³
Frequency response: Tektronix Types 53/54B and 53/54B MOD 601; Lavoie Model LA-265-B, and AM-1841/USM, AM-1841A/USM, and AM-1841B/USM w/oscilloscopes 541 and 545 531 and 535 532	Dc to 20 MHz; ² 3 Hz to 12 MHz ³ Dc to 10 MHz; ² 3 Hz to 9 MHz ³ Dc to 5 MHz; ² 3 Hz to 5 MHz ³

¹This specification is for information only and is not verified in this bulletin.

²With vertical-deflection sensitivity between 0.05 and 20v/cm.

³With vertical-deflection sensitivity between 0.005 and 0.02 v/cm.

**SECTION II
EQUIPMENT REQUIREMENTS**

4. Equipment Required. Tables 2 and 3 identify the specific equipment used in this calibration procedure. The equipment to be used in performing this calibration is issued with secondary transfer calibration standards set 4931-621-7877, AN/TSM-55(V)1 (4940-400-2615), AN/TSM-55(V)2 (4940-400-2614), and TOE 29-134. Alternate items may be used by the calibrating activity when the equipment listed in tables 2 and 3 is not available. 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 tables 2 and 3. The accuracies listed in tables 2 and 3 provide a four-to-one accuracy 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 listed in tables 4 and 5 are issued with the secondary transfer calibration standards set 4931-621-7877, AN/TSM-55(V)1 (4940-400-2615), AN/TSM-55(V)2 (4940-400-2614), and TOE 29-134. These accessories are to be used in this calibration procedure. If necessary, these items may be substituted by equivalent items unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required (A-Level)

Item	Common name	Minimum use specifications	Manufacturer, model and part number
A1	VOLTAGE STANDARD	Range: 19.4 mv to 8.24 vp-p and 6.79 to 7.21 v rms at 1 kHz Accuracy: $\pm 0.75\%$	Ballantine, Model 420 (8205523)
A2	SQUARE-WAVE GENERATOR	Range: 50 Hz to 1 MHz Risetime: Less than 3 nsec	Tektronix, Type 106 (MIS-10284)
A3	OSCILLATOR	Must be compatible with TI	Tektronix, Type 530, 540, or 550 series. Must be compatible with TI

Table 3. Minimum Specifications of Equipment Required (C-Level)

Item	Common name	Minimum use specifications ¹	Calibration equipment ₂
A1	AUTOTRANSFORMER	105 to 125 vac, $\pm 3\%$	Variable power transformer, TF-510/U (General Radio, Model W10MT3A) or variable power transformer TF-171/USM
A2	OSCILLOSCOPE	30 MHz bandwidth	Tektronix, Model 545A, 545B, or 547 (must be provided)
A3	SIGNAL GENERATOR	20 mv or less to 20 v p-p, 50 Hz to 450 kHz	Signal generator AN/USM-256 (Fairchild, Model 791) with electrical dummy load DA-454/U (Fairchild, Model 4285A) and fixed attenuator CN-1204/U (Fairchild, Model 7093, or signal generator SC-299/U

Table 3. Minimum Specifications of Equipment Required (C-Level) - Continued

Item	Common name	Minimum use specifications ¹	Calibration equipment ²
A4	SIGNAL GENERATOR	50 kHz to 20 MHz constant amplitude 15 mv	Signal Generator AN/USM-272 (Tektronix, Model 191)with cable assembly CG-3364/U (Tektronix, Model 017-0502-00) and electrical dummy load DA-464/U (Tektronix, Model 017-0083-00) or RF signal generator set AN/URM-25
A5	METER CALIBRATOR	±1%	Meter calibrator TS-2734/U (John Fluke, Model 760A)
A6	RATIO TRANSFORMER	0 to 36 vac @400 Hz; Ratios: 0.0194 to 0.824:1, ±0.3%	Decade ratio transformer TF-515/U (Gertsch, Model RT-60)

¹Minimum use specifications are the principal parameters required for performance of the calibration, and are included to assist in the selection of alternate equipment. Satisfactory performance of alternate items shall be verified prior to use. All applicable equipment must bear evidence of current calibration.

²The instruments utilized in this procedure were selected from those known to be available in AN/TSM-55(V)1, AN/TSM-55(V)2, and TOE 29-134, and the listing by make or model number carries no implication of preference, recommendation, or approval by the Department of Defense for use by other agencies. It is recognized that equivalent equipment produced by other manufacturers may be capable of equally satisfactory performance in the procedure.

Table 4. Required Accessories (A-Level)

Item	Common name	Description and part number
B1	ADAPTER	BNC jack to UHF plug (10519439)
B2	ADAPTER	UHF jack to BNC plug (8109698)
B3	CABLE	36-in, RG-58/U; BNC plug and double banana plug termination (7907471)
B4	CAPACITANCE STANDARD	Variable from 5 to 80 pf (SKD 4850-44)

Table 5. Required Accessories (C-Level)

Item	Common name	Description and model number ¹
B1	ADAPTER	Plug extender MX-7775/U (Tektronix, Model 013-0055-00)
B2	ADAPTER	BNC jack to UHF plug; connector adapter UG-273/U (Amphenon, Model UG-273/U)
B3	ADAPTER ²	Binding post to BNC plug; connector adapter UG-1888/U (Pomona Electronics, Model 1296)
B4	ADAPTER	BNC jack to double banana plug; Connector Adapter UG-1887/U (Pomona Electronics, Model 1269)
B5	CABLE ASSEMBLY	36-in., RG-58C/U; BNC plug to BNC plug (Pomona Electronics, Model BNC-C-36)
B6	CABLE ASSEMBLY ²	BNC plug to black and red banana plugs; RF cable assembly CG-3572/U (Pomona Electronics, Model 2241-C-36)

Table 5. Required Accessories (C-Level) - Continued

Item	Common name	Description and model number ¹
B7	NORMALIZER	1 Megohm, 47 pf- capacitance standardizer MX-8432/U (Tektronix, Model 067-0535-00) with UHF connector or Tektronix, Model 067-0541, with BNC connector or normalizer TS-2555/U (Tektronix, Model 01 1-0030-00)
B8	TEST LEAD ²	24-in, single banana terminations (Pomona Electronics, Model B-24 (black))

¹See footnotes 1 and 2 in table 3

²Two required

SECTION III
A-LEVEL CALIBRATION FOR WIDE-BAND PLUG-IN
AM-1841/USM, AM-1841A/USM, AND AM-1841B/USM (TEKTRONIX TYPES B,
B MOD 601, 53/54B, AND 53/54B MOD 60 1; LAVOIE MODEL LA-265-B)

6. Preliminary Instructions

a. The instructions outlined in this section 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 and item identification number as listed in tables 2 and 4. For the identification of equipment referenced by item numbers prefixed with A, see table 2, and for prefix B, see table 4.

WARNING

HIGH VOLTAGE is used during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

7. Equipment Setup

- a.** Remove left-side and bottom protective covers from oscilloscope (A3).
- b.** Install TI in vertical compartment of oscilloscope.
- c.** Turn oscilloscope power on and allow 15 minutes for equipment to warm up and stabilize.
- d.** Position TI controls as listed in (1) through (3) below:
 - (1) **VERTICAL POSITION** control to midrange.
 - (2) **VOLTS/CM** switch to **.05**.
 - (3) **INPUT SELECTOR** switch to **INPUT A-DC**.

SECTION IV CALIBRATION PROCESS (A-LEVEL)

NOTE

Unless otherwise specified, verify the results of each test and take corrective action whenever the test requirement is not met before continuing with the calibration.

8. Dc Balance

a. Performance Check

(1) Adjust TI **VERTICAL POSITION** control to position oscilloscope (A3) trace on center horizontal graticule line.

(2) Turn TI **VARIABLE VOLTS/CM** control throughout its range. If oscilloscope trace moves vertically as **VARIABLE VOLTS/CM** control is turned, perform **b** below.

b. Adjustments. Adjust **DC BAL** control until no vertical movement of trace is observed on crt as **VARIABLE VOLTS/CM** control is turned throughout its range.

9. Amplifier Gain

a. Performance Check

(1) Connect voltage standard (A1) to TI **INPUT A** connector, using cable (B3) and, if required, adapter (B 1).

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

(a) **INPUT SELECTOR** switch to **INPUT A-AC**.

(b) **VARIABLE VOLTS/CM** control to **CALIBRATED**.

(c) **VOLTS/CM** switch to **.005**.

(3) Adjust voltage standard for a 4-centimeter vertical deflection on oscilloscope (A3) crt. Voltage standard will indicate between 19.4 and 20.6 millivolts peak-to-peak. If not, perform **b** below.

(4) Adjust voltage standard to obtain vertical deflection at equipment settings listed in table 6. Voltage standard will indicate within limits listed in table 6.

Table 6. Amplifier Gain Performance Check

Test instrument VOLTS/CM switch position	Oscilloscope vertical deflection (cm)	Voltage standard indication	
		Min	Max
.01	4	38.80 mv p-p	41.20 mv p-p
.02	4	77.60 mv p-p	82.40 mv p-p
.05	4	194.0 mv p-p	206.0 mv p-p
.1	4	388.0 mv p-p	412.0 mv p-p
.2	4	776.0 mv p-p	824.0 mv p-p
.5	4	1940 mv p-p	2060 mv p-p
1	4	3.880 v p-p	4.120 v p-p
2	4	7.76 v p-p	8.24 v p-p
5	4	6.79 v rms	7.21 v rms
10	2	6.79 v rms	7.21 v rms
20	1	6.79 v rms	7.21 v rms

b. Adjustments

- (1) Turn TI **VOLTS/CM** switch to **.05**.
- (2) Adjust voltage standard for a 200-millivolt peak-to-peak output.
- (3) Adjust TI **GAIN ADJ 1** control for a 4-centimeter display on oscilloscope.
- (4) Turn TI **VOLTS/CM** switch to **.005**.
- (5) Adjust voltage standard for a 20-millivolt peak-to-peak output.
- (6) Adjust TI **GAIN ADJ 2** control for a 4-centimeter display on oscilloscope.

10. VOLTS/CM Switch Compensation

a. Performance Check

- (1) Connect square-wave generator (A2) to TI **INPUT A**, using cable and termination supplied with square-wave generator, adapters (BI and B2), and capacitance standard (B4).
- (2) Turn TI **VOLTS/CM** switch to **.05** and **SELECTOR** switch to **A-DC**.
- (3) Adjust square-wave generator frequency controls for a 1-kHz output and amplitude for approximately 3.5 centimeters of vertical deflection on oscilloscope (A3) crt. Waveforms displayed on oscilloscope will have flat tops and square corners. If necessary, adjust capacitance standard for optimum square wave.

NOTE

Do not readjust capacitance standard when repeating techniques of (3) above for the remaining VOLTS/CM switch settings.

(4) Turn TI **VOLTS/CM** switch to **.005** and **INPUT SELECTOR** switch to **A-AC** and repeat (3) above. If necessary, perform **b** below.

(5) Repeat (3) above for **VOLTS/CM** switch positions of **.01** and **.02**.

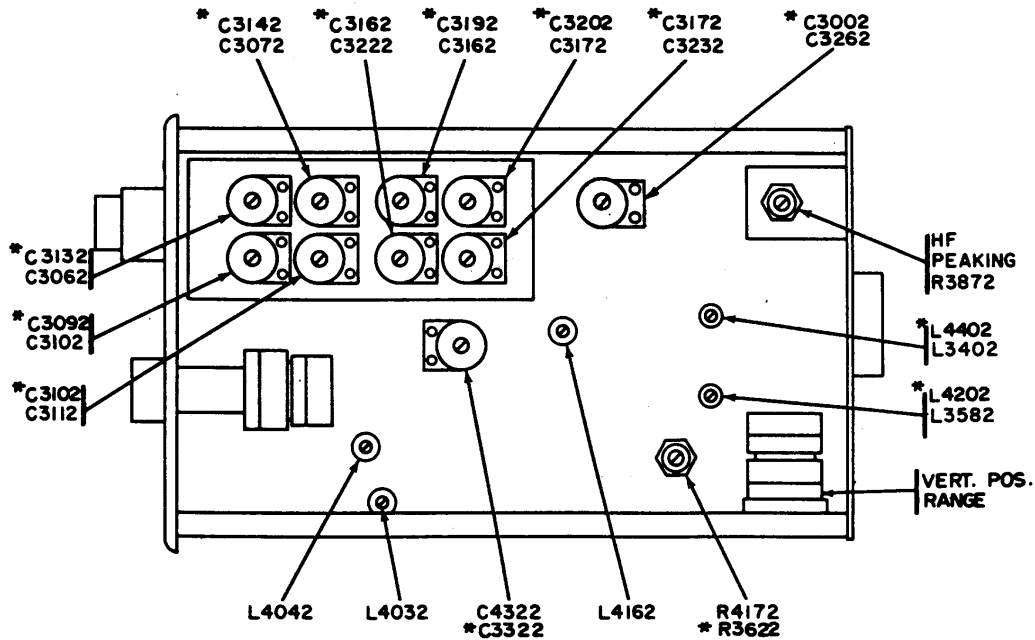
(6) Turn **INPUT SELECTOR** switch to **A-DC** and repeat (3) above for **VOLTS/CM** switch positions listed in table 7.

Table 7. VOLTS/CM Switch Compensation

Test instrument VOLTS/CM switch	Adjustments (fig. 1) ¹		Adjustments (fig. 1) ²	
	Square corner	Flat top	Square corner	Flat top
.1	C3172	C3162	C3232	C3222
.2	C3202	C3192	C3172	C3162
.5	C3102	C3092	C3112	C3102
5	C3142	C3132	C3072	C3062

¹TIs with serial numbers 101 through 3300.

²TIs with serial numbers 3301 and above.



MIC00097

* TYPE B WITH S/N 101 THROUGH 3300 .

Figure 1. Wide-band plug-in - bottom view.

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b. Adjustments

- (1) Turn TI **VOLTS/CM** switch to **.005** and **INPUT SELECTOR** switch to **A-AC**.
- (2) In type B instruments, with serial numbers 101 through 3300, adjust C3322 (fig. 1) for optimum square-wave display having minimum undershoot, overshoot, and flat top. In type B instruments, with serial numbers 3301 and above, and all other instruments, adjust C4322 (fig. 1) for same square-wave characteristics.
- (3) Turn TI **INPUT SELECTOR** switch to **A-DC**.
- (4) Perform adjustments indicated in table 7 for TI switch settings listed.

11. Low-Frequency Compensation

a. Performance Check

- (1) Turn TI **VOLTS/CM** switch to **.005** and **INPUT SELECTOR** switch to **A-DC**.
- (2) Adjust square-wave generator (A2) for a 50 Hz output. Square wave displayed on oscilloscope (A3) crt will have a flat top with no tilt. If not, perform **b** below.

b. Adjustments. For type B instruments with serial numbers 101 through 3300 adjust R3622 (fig. 1) for square-wave display having a flat top with no tilt. For type B instruments with serial numbers 3301 and above, and all other instruments, adjust R4172 (fig. 1) for the same square-wave characteristics.

12. High-Frequency Compensation

a. Performance Check

- (1) Turn TI **VOLTS/CM** switch to **.05** and **INPUT SELECTOR** switch to **A-AC**.
- (2) Adjust square-wave generator (A2) frequency to approximately 450 kHz and amplitude for a 3 centimeter vertical deflection on oscilloscope (A3) crt. Square-wave display will have minimum overshoot and undershoot. If not, perform **b(l)** below.
- (3) Turn **VOLTS/CM** switch to **.005**. Squarewave display will indicate minimum overshoot and undershoot. If not, perform **b(2)** below.

b. Adjustments

(1) For type B instruments with serial numbers 101 through 3300, adjust L4402 and L4202 (fig. 1) for optimum leading edge and slope back of leading edge. In type B instruments with serial numbers 3301 and above, and all other instruments, adjust L3402, L3582, and HF PEAKING R3872 (fig. 1) for optimum square corner with minimum overshoot.

NOTE

In all instruments, except type B with serial numbers below 3301, the L3402, L3582, and HF PEAKING R3872 controls are interacting; therefore, readjustment may be necessary.

(2) In each TI, except type B with serial numbers below 3301, adjust L4032, L4042, and L4162 (fig. 1) for square wave with minimum undershoot, overshoot, sag, or droop. For this adjustment, L3602 is provided on some type B instruments with serial numbers below 3301.

13. Risetime

a. Performance Check

(1) Turn **TI VOLTS/CM** switch to **.05**.

(2) Adjust square-wave generator (A2) for approximately 1 – MHz output.

(3) Measure risetime, using standard risetime techniques. Risetime will not exceed specifications listed in table 1.

b. Adjustments. No adjustments can be made.

14. Final Procedure

a. Deenergize and disconnect all equipment. Remove plug-in unit from oscilloscope and replace oscilloscope protective covers.

b. In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibrated Instrument). When the TI receives limited or special calibration, annotate and affix DA Label 163 (US Army Limited or Special Calibration). When the TI cannot be adjusted within tolerance, annotate and affix DA Form 2417 (US Army Calibration System Rejected Instrument).

SECTION V

**C-LEVEL CALIBRATION FOR WIDE-BAND PLUG-IN,
TEKTRONIX, MODELS B AND 53/54B**

15. Preliminary Instructions

a. The instructions outlined in this section 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 and item identification number as listed in tables 3 and 5. For the identification of equipment referenced by item numbers prefixed with A, see table 3, and for prefix B, see table 5.

WARNING

HIGH VOLTAGE is used during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

16. Equipment Setup

- a. Connect TI to oscilloscope (A2), using adapter (B1).
- b. Adjust autotransformer (A1) output voltage control to minimum.
- c. Connect oscilloscope power cord to autotransformer.
- d. Energize equipment and allow sufficient time for equipment to warm up and stabilize.
- e. Adjust autotransformer output voltage control for a meter indication of 115 volts ac.
- f. Set oscilloscope **POWER** switch to **ON** and allow 15 minutes warmup time.
- g. Position oscilloscope **TIME BASE A** controls as follows:
 - (1) **TIME/CM** switch to **.5 msec**.
 - (2) **VARIABLE TIME/CM** control to **CAL**.
 - (3) **TRIGGERING MODE** switch to **AC**.
 - (4) **TRIGGER SLOPE** switch to **+ INT**.
- h. Position TI controls as follows:
 - (1) **INPUT SELECTOR** switch to **INPUT A-DC**.
 - (2) **VOLTS/CM** switch to **.005**.
 - (3) **VARIABLE VOLTS/CM** control to **CALIBRATED**.

**SECTION VI
CALIBRATION PROCESS (C-LEVEL)**

NOTE

When the TI is not within tolerance, perform the specified adjustment and continue the performance check. When the TI is not within tolerance and no adjustment is specified, the deficiency must be corrected before continuing with the procedure.

17. Vertical Position Range

a. Performance Check. Turn TI **VERTICAL POSITION** control to midrange. Oscilloscope (A2) will display trace on center graticule line. If not, perform **b** below.

b. Adjustments. Adjust TI **VERT. POS. RANGE** adjustment (fig. 1) for oscilloscope display of trace on center graticule line.

18. Dc Balance

a. Performance Check

(1) Set TI **VARIABLE VOLTS/CM** control fully counterclockwise. Oscilloscope will display trace with no vertical shift as TI **VARIABLE VOLTS/CM** control is turned throughout its range. If trace shifts, perform **b** below.

(2) Set TI **VARIABLE VOLTS/CM** control to **CALIBRATED**.

b. Adjustments

(1) Adjust TI **DC BAL** adjustment (front panel) for oscilloscope display of trace with no vertical shift as TI **VARIABLE VOLTS/CM** control is varied from fully counterclockwise to **CALIBRATED**.

(2) Repeat paragraph **17a** above.

19. Input Selector Switch

a. Performance Check

(1) Connect oscilloscope (A2) CAL OUT connector to TI **INPUT A** connector with test lead (B8) and adapters (B3), if required.

(2) Set TI **VOLTS/ CM** switch to **.05**.

(3) Set oscilloscope **AMPLITUDE CALIBRATOR** switch to **.5 VOLTS** and adjust TI **VERTICAL POSITION** control for crt display with base line on center graticule line.

(4) Set TI **INPUT SELECTOR** switch to **INPUT A-AC**. Oscilloscope will display a vertically centered square wave.

(5) Disconnect equipment.

b. Adjustments. No adjustments can be made.

20. Gain and Input Attenuator

a. Performance Check

- (1) Connect equipment as shown in figure 2.
- (2) Set TI **INPUT SELECTOR** switch to **A-DC**.
- (3) Set TI **VOLTS/CM** switch to settings listed in table 8 and perform the following:
 - (a) Set meter calibrator (A5) decade dials to settings listed.
 - (b) Adjust meter calibrator output controls for 400 Hz and null indication on output meter.
 - (c) Adjust ratio transformer (A6) decade dials for oscilloscope (A2) display of 4 centimeters peak-to-peak. Ratio transformer will indicate within specified limits. If not, perform **b** below.
 - (d) Adjust meter calibrator output controls to zero.

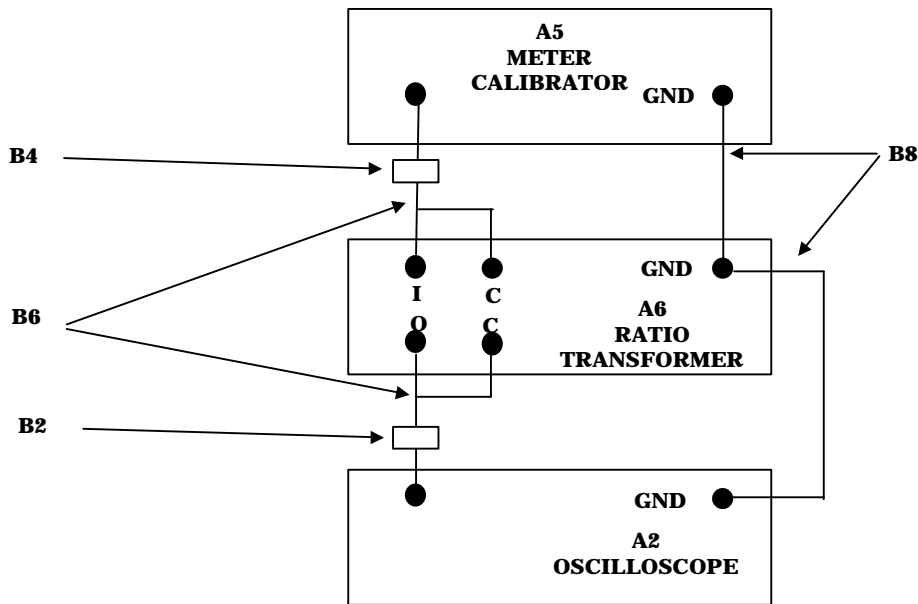


Figure 2. Gain and input attenuator setup.

Table 8. Gain and Input Attenuator

Test instrument VOLTS/CM switch setting	Meter calibrator decade dials settings	Ratio transformer decade dials indications
.005	000.3535	.01940 to .02060
.01	000.3535	.03880 to .04120
.02	000.3535	.07760 to .08240
.05	000.3535	.1 9400 to .20600
.1	000.3535	.38800 to .41200
.2	000.3535	.77600 .82400
.5	003.5350	.19400 .20600
1	003.5350	.38800 .41200
2	003.5350	.77600 .82400
5	035.3500	.19400 .20600
10	035.3500	.38800 .41200
20	035.3500	.77600 .82400

b. Adjustments

- (1) Set TI **INPUT SELECTOR** switch to **A-DC** and **VOLTS/CM** switch to **.005**.
- (2) Set meter calibrator decade dials to 000.3535 and adjust controls for a 400-Hz output with null indication on output meter.
- (3) Set ratio transformer decade dials to .02000.
- (4) Adjust TI **GAIN ADJ 2** (front panel) for oscilloscope display of 4 centimeters peak-to-peak.
- (5) Set TI **VOLTS/ CM** switch to **.05**.
- (6) Set ratio transformer decade dials to .20000.
- (7) Adjust TI **GAIN ADJ 1** (front panel) for oscilloscope display of 4 centimeters peak-to-peak.
- (8) Repeat **a** above.

21. Input Capacitance

a. Performance Check

- (1) Connect equipment as shown in figure 3.
- (2) Set TI **VOLTS/CM** switch to **.05**.
- (3) Adjust signal generator (A3) controls for 1 kHz and oscilloscope (A2) display of 4-centimeter peak-to-peak square wave.

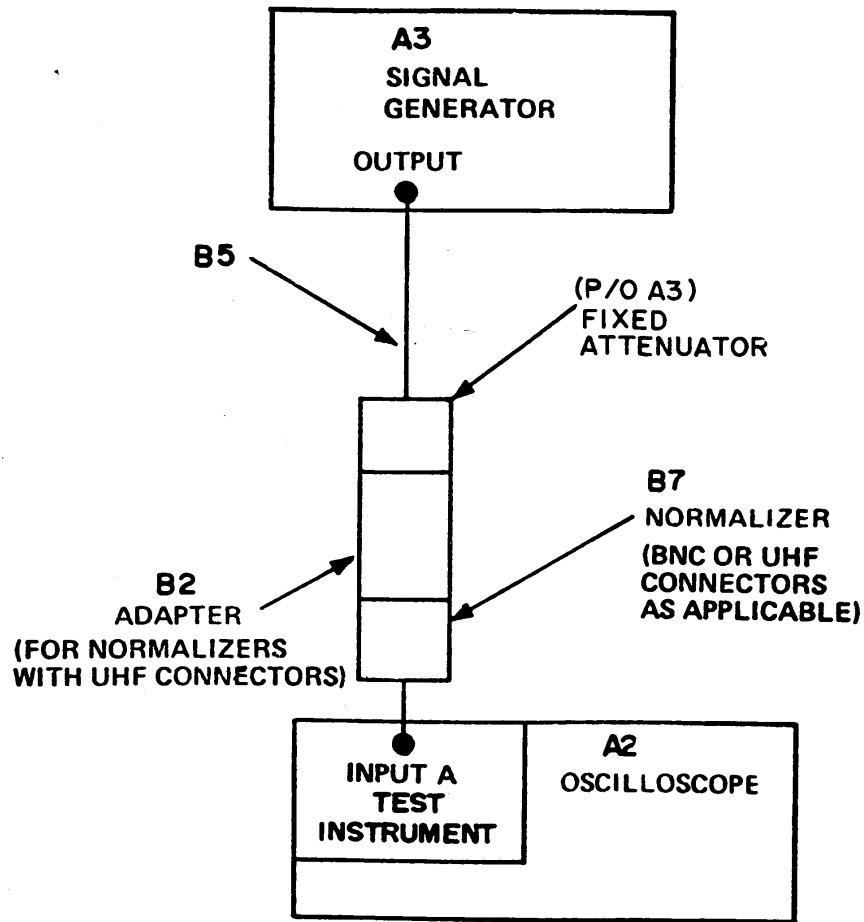


Figure 3. Input capacitance setup.

(4) Adjust oscilloscope for a 2-square-wave display. Oscilloscope will display square waves with flat tops as shown in figure 4. If not, perform b below.

b. Adjustments. Adjust TI C3262 (fig. 1) for oscilloscope display of square wave with optimum flat top, as in figure 4.

22. Attenuator Input Capacitance and Frequency Compensation

a. Performance Check. Set TI VOLTS/CM switch to settings listed in table 9. At each setting, adjust signal generator (A3) controls for 1 kHz and oscilloscope display as listed. Oscilloscope will display square wave with flat top and square leading corners, as shown in figure 4. If not, perform b below.

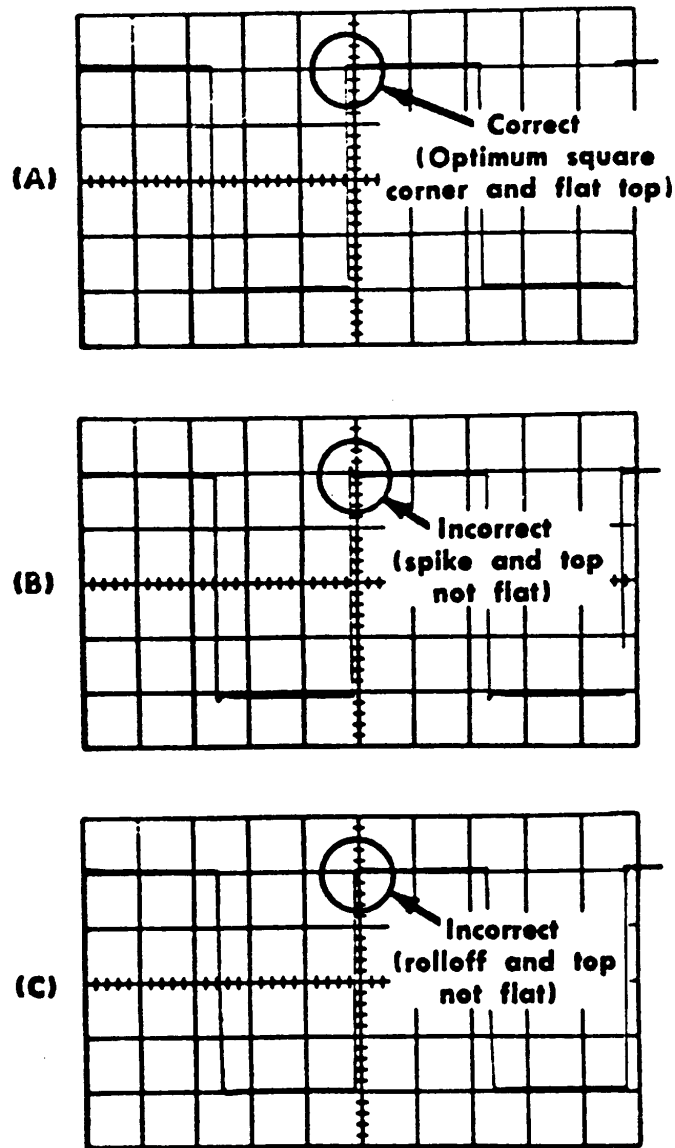


Figure 4. Optimum square wave.

b. Adjustments

(1) Set TI **VOLTS/CM** switch to settings listed in table 10. At each setting adjust signal generator controls for 1 kHz and oscilloscope display as listed.

(2) Repeat **a** above.

Table 9. Attenuator Input Capacitance and Frequency Compensation

Test instrument VOLTS/CM switch setting	Oscilloscope display (cm)
.005	3
.01	3
.02	3
.05	3
.1	3
.2 ¹	3
.5	3
1	3
2	3
5	3
10	2
20	1

¹Remove fixed attenuator (p/o A3).

23. Low-Frequency Compensation

a. Performance Check

- (1) Set oscilloscope (A2) **TIME/CM** switch to **5 msec**.
- (2) Position TI controls as listed in (a) and (b) below:
 - (a) **INPUT SELECTOR** switch to **INPUT A-AC**.
 - (b) **VOLTS/CM** switch to **.02**.
- (3) Connect equipment as shown in figure 3 without the normalizer (B7).
- (4) Adjust signal generator (A3) controls for 50 Hz and oscilloscope display of 4 centimeters peak-to-peak. Oscilloscope will display square wave with flat top. If not, perform **b** below.

b. Adjustments. Adjust TI R4172 (fig. 1) for optimum flat top.

24. High-Frequency Peaking

a. Performance Check

- (1) Connect equipment as shown in figure 5.
- (2) Position TI controls as listed in (a) and (b) below:
 - (a) **VOLTS/CM** switch to **.05**.

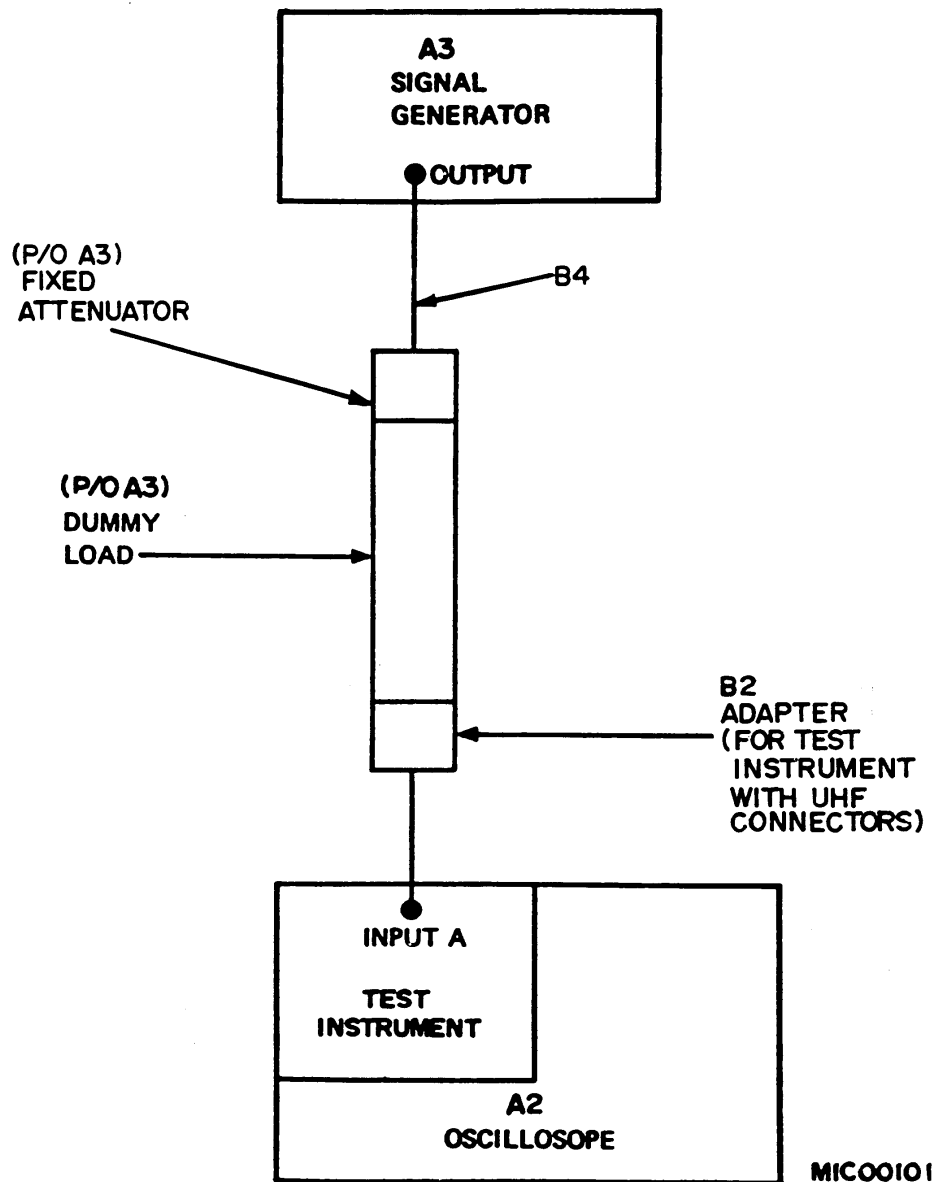


Figure 5. High-frequency peaking setup.

(b) **INPUT SELECTOR** switch to **INPUT A-DC**.

(3) Adjust signal generator (A3) controls for 450 kHz and oscilloscope (A2) display of 4-centimeter peak-to-peak square wave.

(4) Adjust oscilloscope controls for a 2-squarewave display.. Oscilloscope will display square waves with no overshoot. If not, perform **b** (1) through (4) below.

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- (5) Set **TI VOLTS/CM** switch to **.005**.

Table 10. Attenuator Input Capacitance and Frequency Compensation Adjustments

Oscilloscope display (cm)	Test instrument		
	VOLTS/CM switch setting	Adjustments (fig. 1)	
		Input capacitance (optimum flat top) (fig. 4)	Frequency compensation (square leading corner) (fig. 4)
3	.005	C4322	---
3	.1	C3222	C3232
3 ¹	.2	C3162	C3172
3	.5	C3102	C3112
3	5	C3062	C3072

¹Remove fixed attenuator (p/0 Al).

(6) Adjust signal generator controls for 450 kHz and oscilloscope for a 4-centimeter peak-to-peak square-wave display. Oscilloscope will display square waves with no overshoot. If not, perform **b** (5) through (7) below.

- (7) Disconnect equipment.

b. Adjustments

- (1) Repeat (2) through (4) above.
- (2) Set TI HF PEAKING R3872 (fig. 1) fully counterclockwise.
- (3) Adjust TI L3402 and L3582 (fig. 1) for oscilloscope display of square waves with optimum flat top.
- (4) Adjust TI HF PEAKING R3872 for oscilloscope display of square waves with square leading corners.
- (5) Repeat **a**(6) above.
- (6) Adjust TI L4032, L4042, and L4162 (fig. 11) for oscilloscope display of square waves with square leading corners.
- (7) Repeat **a** above.

25. Frequency Response

a. Performance Check

- (1) Connect equipment as shown in figure 6.

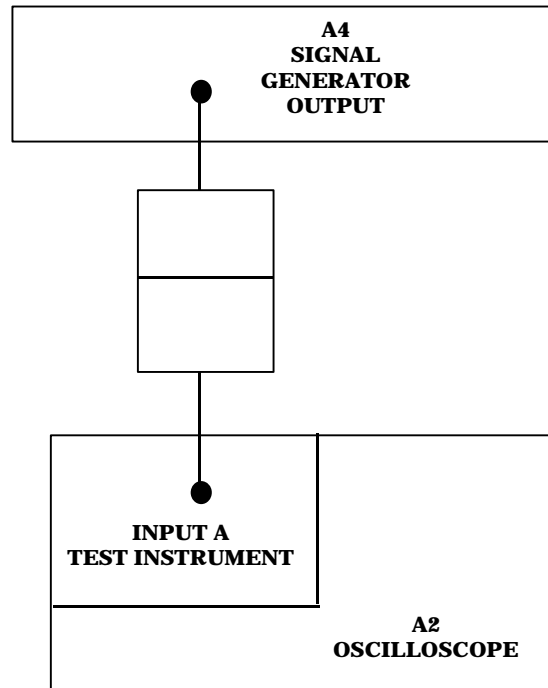


Figure 6. Frequency response setup.

- (2) Position oscilloscope (A2) TIME BASE A controls as listed in (a) through (c) below:
- (a) **TIME/CM** switch to **.1 msec.**
 - (b) **STABILITY** control fully clockwise.
 - (c) **TRIGGERING MODE** switch to **AC**.
- (3) Position TI control as listed in (a) and (b) below:
- (a) **VOLTS/CM** switch to **.05**.
 - (b) **INPUT SELECTOR** switch to **INPUT A-DC**.
- (4) Adjust signal generator (A4) controls for 50 kHz and oscilloscope for a 4-centimeter peak-to-peak sine wave display.
- (5) Increase signal generator frequency controls for oscilloscope display of 2.8-centimeter peak-to-peak sine wave. Signal generator will indicate greater than 20 MHz.

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(6) Set TI **VOLTS/CM** switch to **.005**.

(7) Repeat (4) and (5) above. Signal generator will indicate greater than 12 MHz.

b. Adjustments. No adjustments can be made.

26. Final Procedure

a. Deenergize and disconnect all equipment.

b. In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibration instrument). When the TI receives limited or- special calibration, annotate and affix DA Label 163 (US Army Limited or Special Calibration). When the TI cannot be adjusted within tolerance, annotate and affix DA Form 2417 (US Army Calibration System Rejected Instrument).

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