TB 9-6625-2341-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR SCOPEMETER, FLUKE, MODEL 105B

Headquarters, Department of the Army, Washington, DC
29 September 2004

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.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of ScopeMeter, Fluke, Model 105B. The manufacturer's manual was 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. None.

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[1]
Vertical:	Range: 5 mV/Div to 100 mV/Div Accuracy: ±(2% setting +1 pixel)
Bandwidth:	-3 db down from dc to ≥100 MHz
Trigger sensitivity:	≤10 MHz ≤1.4 div ≤100 MHz ≤2.1 div ≤150 MHz ≤2.9 div
Timebase:	Range: 5 ns/div to 1 s/div Accuracy: ±(0.08% +1 pixel)
Dc volts:	Range: 100 mV, 300 mV, 1, 3, 10, 30, 100, and 300 V Accuracy: ±(0.5% +5 counts)
Ac volts:	Range: 100 mV, 300 mV, 1, 3, 10, 30, 100, and 250 V Frequency: Accuracy: 50 to 60 Hz ±(1% +10 counts) 20 Hz to 20 kHz ±(2% +15 counts) 5 Hz to 1 MHz ±(3% +20 counts) 5 Hz to 5 MHz ±(10% +25 counts)
Ext.mV dc volt:	Range: 300 mV, 3 V Accuracy: ±(0.5% +5 counts)
Ext.mV ac volt:	Range: 300 mV, 3 V Accuracy: 50 and 60 Hz, ±(2% +15 counts)

See footnote at end of table.

Table 1. Calibration Description - Continued

Test instrument parameters	Performance specifications[1]
Resistance:	Range: 30, 300, 3 k, 30 k, 300 k, 3 M, and 30 M ohm Accuracy: 30 ohm, ±(2.5% +25 counts), 300 ohm to 30 M ohm, ±(0.5% + 5 counts)
Frequency:	Range: 1 Hz to 5 MHz Accuracy: ±(0.5% +2 counts)

[1]All specifications are +/-(% of indication +counts).

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. Alternate items may be used by the calibrating activity. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and the TI. Where the four-to-one ratio cannot be met, the 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: 50 Ω feedthrough, BNC plug to BNC jack, Tektronix, Type 011-0049-01(011-0049-01).

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications		Manufacturer and model (part number)
CALIBRATOR	Range: 100 mV ac – 200 V ac		Fluke, Model 5720A (5700A/EP) (p/o MIS-35947); w amplifier, Fluke 5725A/AR (5725A/AR)
	Frequency:	Accuracy:	
	5 Hz - 20 Hz	+/-1.25%	
	20 Hz - 50 Hz	+/-0.875%	
	50 Hz - 60 Hz	+/-1.25%	
	60 Hz – 20 kHz	+/-0.875%	
	20 kHz – 1 MHz	+/-1.25%	
	1 MHz – 5 MHz	+/-3.125%	
	Volt range:	Accuracy:	
	.1 - 300 V dc	+/-0.166%	
	Ohm range:	Accuracy:	
	10 ohm	+/- 1.25%	
	100 - 10 M ohm	+/-0.25%	
	Frequency:	Accuracy:	
	1 MHz	+/-0.175%	

Table 2. Minimum Specifications of Equipment Required - Continued

Common name	Minimum use specifications	Manufacturer and model (part number)
OSCILLOSOPE CALIBRATOR	Range: .02 V p-p - 100 V p-p (square wave) Accuracy: +/-0.75% Time markers: Range: Accuracy: 1uSec +/-0.01% Range capability: 0 - 0.5 V p-p @ 150 MHz (Sine wave) 0 - 0.3 V p-p @ 10 MHz (Sine wave) 0 - 0.13 V p-p @ 100 MHz (Sine wave) Range capability: 50 kHz – 100 MHz @ 120 mV p-p (square wave).	Fluke, Model 5820A-5C-GHZ (5820A-5C-GHz)

SECTION III
CALIBRATION PROCESS

6. Preliminary Instructions

a. The instructions outlined in paragraphs **6** and **7** are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name as listed in table 2.

c. Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. When indications specified in paragraphs **8** through **15** are not within tolerance, perform adjustments in paragraph **16**. After adjustments are made, repeat paragraphs **8** through **15**. Do not perform adjustments if all other parameters are within tolerance.

e. 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 TI from **PM 9083** holster.

b. Connect **PM 8907/803 AC/DC ADAPTOR** supplied with TI to a 115 V ac power source.

c. Insert **PM 8907/803 AC/DC ADAPTOR** low voltage plug into TI right side **POWER ADAPTOR** connector.

d. Press TI **ON/OFF** key to **ON**.

8. Scope Vertical Gain

a. Performance Check

(1) Reset by pressing pushbutton sequence (a) through (m) below:

(a) Display **SCOPE/METER/Ω/EXT.mV** and etc. Press **(F1) SCOPE** to display/highlight **SCOPE**.

NOTE

If the **SCOPE** mode is already active, press the **SUB MENU** key. Press **(F1) CLOSE**. If "The red **INPUT A** and grey **INPUT B BNC** jacks are being used as inputs now", then press **(F1) CLOSE.**

(b) **USER OPTIONS.**
(c) **(F1) MORE OPTION.**
(d) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(e) **(F5) SELECT ITEM**.
(f) Toggle ▲ or ▼ to display/highlight **RESET SCOPEMETER**.
(g) **(F5) SELECT ITEM**.
(h) (If all Scope Meter settings have been set to original setting then **(F1) CLOSE**), which should display/highlight **RESET SCOPEMETER**.
(i) Toggle ▲ or ▼ to display/highlight **RESET SCOPE**.
(j) **(F5) SELECT ITEM**.
(k) (For original settings, **SCOPE** mode needs to be selected. Change to **SCOPE** mode now? **(F1) YES** then **(F1) CLOSE**) or (if all ScopeMeter settings have been set to original setting then **(F1) CLOSE),** which should display/highlight **RESET SCOPE**.
(l) **(F1) CLOSE** which should display/highlight **RESET MENU**.
(m) **(F1) CLOSE** which should display/highlight **CONTR**.

(2) Connect equipment as shown in figure 1.

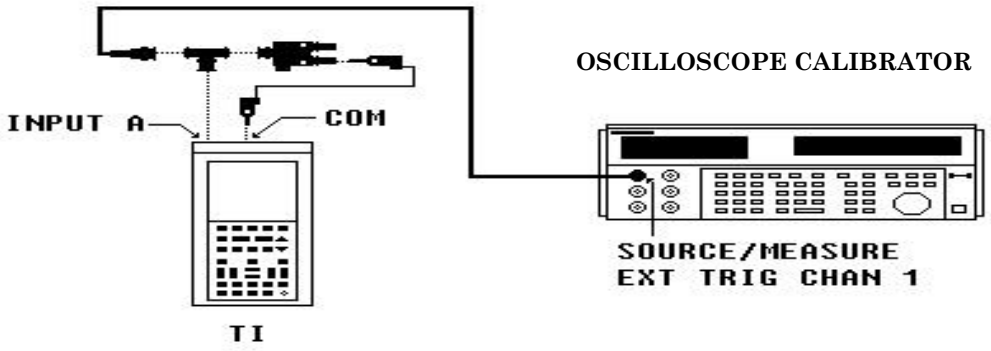

Figure 1. Scope vertical gain input A.

(3) Press pushbutton sequence as listed in (a) through (d) below:

(a) "Input B" to off by pressing (1) through (7) below:

(1) **INPUT B** to display/highlight **DISPLAY INPUT B**.

(2) **(F1) MORE INPUT B**.

(3) Toggle ▲ or ▼ to display/highlight **INPUT B**.

(4) **(F5) SELECT ITEM**.

(5) Toggle ▲ or ▼ to display/highlight **off**.

(6) **(F5) SELECT ITEM**.

(7) **(F1) CLOSE**.

(b) "Input A" probe to 1:1 by pressing (1) through (9) below:

(1) **INPUT A** to display/highlight **DISPLAY INPUT A**.

(2) **(F1) MORE INPUT A**.

(3) Toggle ▲ or ▼ to display/highlight **PROBE A MENU.**

(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT A**.

(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1** , **etc.)**.

(6) Toggle ▲ or ▼ to display/highlight **1:1**.

(7) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT A**.

(8) **(F1) CLOSE** which should display/highlight **INPUT A**.

(9) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT A**.

(c) Auto to manual range by toggling **(mV RANGE V)** on left side, under **INPUT A** pushbutton to display/highlight **A 5mVDC 1:1**.

(d) Auto to manual trigger by pressing (1) through (4) below:

(1) **TRIGGER**.

(2) **(F5) ADJUST LEVEL** which should display/highlight **AUTO LEVEL**.

(3) **(F4) MANUAL LEVEL**.

(4) Toggle ▲ or ▼ to change trigger level starting with **(LEVEL 0.000 V)** display.

(5) **RESET** oscilloscope calibrator.

(6) Perform steps as listed in (a) through (d) below for each row in table 3.

(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display TI Range settings.

(b) Set oscilloscope calibrator to Output voltage settings at 1 kHz while adjusting edit amplitude output dial for 4 vertical divisions.

NOTE

If necessary, adjust TI Trigger level by toggling ▲ or ▼ pushbutton for a stable display.

NOTE

If necessary, toggle left side ▲ **MOVE** ▼ pushbutton center to TI display.

(c) If oscilloscope calibrator Voltage error is not within specified limits, perform **b** below.

(d) Set oscilloscope calibrator to standby.

Table 3. Scope Vertical Gain

Test instrument	Oscilloscope calibrator		
Range settings **(mV/Div)**	Output volt settings at 1 kHz **(V p-p)**	Voltage error (%)	
		Min	Max
5	.02	-3	3
10	.04	-3	3
20	.08	-3	3
50	.2	-3	3

(7) Connect equipment as shown in figure 2.

(8) **(F1) CLOSE** which should display/highlight **CONTR**.

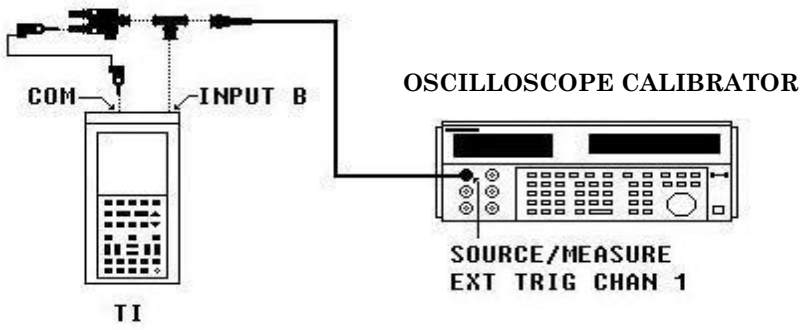

Figure 2. Scope vertical gain input B.

(9) Press pushbutton sequence as listed in (a) through (e) below:

(a) "Input A" to off by pressing (1) through (7) below:

(1) **INPUT A**.

(2) **(F1) MORE INPUT A**.

(3) Toggle ▲ or ▼ to display/highlight **INPUT A**.

(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **OFF**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.
(b) "Input B" probe to 1:1 by pressing (1) through (8) below:
(1) **INPUT B**.
(2) **(F1) MORE INPUT B**.
(3) Toggle ▲ or ▼ to display/highlight **PROBE B MENU**.
(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT B**.
(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(6) Toggle ▲ or ▼ to display/highlight **1:1**.
(7) **(F5) SELECT ITEM**.
(8) **(F1) CLOSE** which should display/highlight **INPUT B.**
(c) "Input B" to on by pressing (1) through (5).
(1) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(2) **(F5) SELECT ITEM**.
(3) Toggle ▲ or ▼ to display/highlight **ON**.
(4) **(F5) SELECT ITEM**.
(5) **(F1) CLOSE**.
(d) Auto to manual range by toggling **(mV RANGE V)** on right side, under **INPUT B** pushbutton to display/highlight **B 5mVDC 1:1**.
(e) "Input B" Trigger source and manual level by pressing (1) through (10) below:
(1) **TRIGGER**.
(2) **(F1) MORE TRIGGER**.
(3) Toggle ▲ or ▼ to display/highlight **TRIGGER SOURCE**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(6) **(F5) SELECT ITEM** which should display/highlight **TRIGGER SOURCE**.
(7) **(F1) CLOSE**.
(8) **(F5) ADJUST LEVEL**.
(9) Toggle ▲ or ▼ to change trigger level starting with **(LEVEL 0.000 V)** display.
(10) **RESET** oscilloscope calibrator.
(11) Perform steps as listed in (a) through (c) below for each row in table 4.
(a) Under **INPUT B** pushbutton on right side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set oscilloscope calibrator to Output voltage settings at 1 kHz while adjusting edit amplitude output dial for 4 vertical divisions.

NOTE

If necessary, adjust TI Trigger level by toggling ▲ or ▼ pushbutton for a stable display.

NOTE

If necessary, toggle left side ▲ **MOVE** ▼ pushbutton to center TI display.

(c) If oscilloscope calibrator Voltage error is not within specified limits, perform **b** below.

(d) Set oscilloscope calibrator to standby.

Table 4. Scope Vertical Gain

Test instrument	Oscilloscope calibrator		
Range settings **(V/Div)**	Output volt settings at 1 kHz **(V p-p)**	Voltage error **(%)**	
		Min	Max
5 m	.02	-3	3
10 m	.04	-3	3
20 m	.08	-3	3
50 m	.2	-3	3
100 m	.4	-3	3
200 m	.8	-3	3
500 m	2	-3	3
1	4	-3	3
2	8	-3	3
5	20	-3	3
10	40	-3	3
20	80	-3	3
50[1]	100	-3	3
100[2]	100	-3	3

[1]Adjust 5820A edit amplitude output controls for 2 vertical divisions.
[2]Adjust 5820A edit amplitude output controls for 1 vertical divisions.

(12) **(F1) CLOSE**.

(13) Reset oscilloscope calibrator.

b. Adjustments. Complete adjustments are in paragraph **16** (R).

9. Scope Bandwidth

a. Performance Check

(1) Reset by pressing pushbutton sequence (a) through (l) below:

(a) **USER OPTIONS**.

(b) **(F1) MORE OPTION**.

(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.

(d) **(F5) SELECT ITEM**.

(e) Toggle ▲ or ▼ to display/highlight **RESET SCOPEMETER**.

(f) **(F5) SELECT ITEM**.

(g) (If all Scope Meter settings have been set to original setting then **(F1) CLOSE)**, which should display/highlight **RESET SCOPEMETER**.

(h) Toggle ▲ or ▼ to display/highlight **RESET SCOPE**.

(i) **(F5) SELECT ITEM**.

(j) (For original settings, Scope Meter needs to be selected. Change to **SCOPE** now? **(F1) YES** then **(F1) CLOSE**) or (if all ScopeMeter settings have been set to original setting then **(F1) CLOSE**)**,** which should display/highlight **RESET SCOPE**.

(k) **(F1) CLOSE** which should display/highlight **RESET MENU**.

(l) **(F1) CLOSE** which should display/highlight **CONTR**.

(2) Connect equipment as shown in figure 3 below:

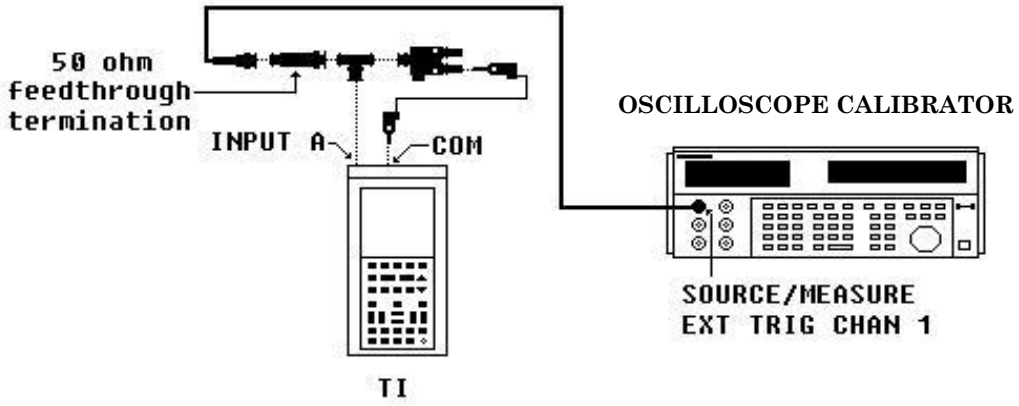

Figure 3. Scope bandwidth input A.

(3) **RESET** oscilloscope calibrator.

(4) Press pushbutton sequence as listed in (a) through (c) below:

(a) "Input B" to off by pressing (1) through (7) below:

(1) **INPUT B**.

(2) **(F1) MORE INPUT B**.

(3) Toggle ▲ or ▼ to display/highlight **INPUT B**.

(4) **(F5 SELECT ITEM)**.

(5) Toggle ▲ or ▼ to display/highlight **off**.

(6) **(F5) SELECT ITEM**.

(7) **(F1) CLOSE**.

(b) "Input A" probe to 1:1 by pressing (1) through (9) below:

(1) **INPUT A**.

(2) **(F1) MORE INPUT A**.

(3) Toggle ▲ or ▼ to display/highlight **PROBE A MENU**.

(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT A**.

(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.

(6) Toggle ▲ or ▼ to display/highlight **1:1**.

(7) **(F5) SELECT ITEM**.

(8) **(F1) CLOSE** which should display/highlight **INPUT A**.

(9) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT A**.

(c) Auto to manual range by toggling **(mV RANGE V)** on left side, under **INPUT A** pushbutton to display/highlight **A 20mVDC 1:1**.

(5) Set oscilloscope calibrator **LEVSINE** output to produce a 120 mV at 50 kHz and adjusting edit amplitude output dial for 6 vertical divisions on TI.

(6) Set oscilloscope calibrator frequency output to produce 80 MHz.

(7) Using oscilloscope calibrator, increase frequency edit dial until frequency drops the amplitude down to 4.2 divisions on TI. If frequency is not greater than or equal to 100 MHz, perform **b** below.

(8) Set oscilloscope calibrator to standby.

(9) Connect equipment as shown in figure 4 below:

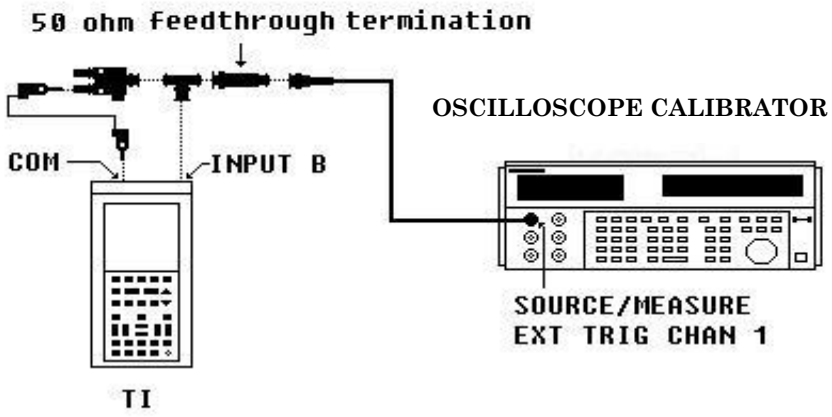

Figure 4. Scope bandwidth input B.

(10) Press pushbutton sequence as listed in (a) through (e) below:

(a) "Input A" to off by pressing (1) through (6) below:

(1) **(F1) MORE INPUT A**.

(2) Toggle ▲ or ▼ to display/highlight **INPUT A**.

(3) **(F5) SELECT ITEM**.

(4) Toggle ▲ or ▼ to display/highlight **off**.

(5) **(F5) SELECT ITEM**.

(6) **(F1) CLOSE**.

(b) "Input B" to on by pressing (1) through (7) below:

(1) **INPUT B**.

(2) **(F1) MORE INPUT B.**

(3) Toggle ▲ or ▼ to display/highlight **INPUT B**.

(4) **(F5) SELECT ITEM**.

(5) Toggle ▲ or ▼ to display/highlight **ON**.

(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.
(c) "Input B" probe to 1:1 by pressing (1) through (8) below:
(1) **(F1) MORE INPUT B**.
(2) Toggle ▲ or ▼ to display/highlight **PROBE B MENU**.
(3) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT B**.
(4) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(5) Toggle ▲ or ▼ to display/highlight **1:1**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE** which should display/highlight **INPUT B**.
(8) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT B**.
(d) Auto to manual range by toggling **(mV RANGE V)** on right side, under **INPUT B** pushbutton to display/highlight **B 20mVDC 1:1**.
(e) "Input B" Trigger source by pressing (1) through (7) below:
(1) **TRIGGER**.
(2) **(F1) MORE TRIGGER**.
(3) Toggle ▲ or ▼ to display/highlight **TRIGGER SOURCE**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.
(11) **RESET** oscilloscope calibrator.
(12) Set oscilloscope calibrator **LEVSINE** output to produce a 120 mV at 50 kHz and adjust edit amplitude output dial for 6 vertical divisions on TI.
(13) Set oscilloscope calibrator frequency output to produce 80 MHz.
(14) Using oscilloscope calibrator, increase frequency edit dial until frequency drops the amplitude down to 4.2 divisions on TI. If frequency is not greater than or equal to 100 MHz, perform **b** below.
(15) Set oscilloscope calibrator to standby.

b. Adjustments. Complete adjustments are in paragraph **16** (R).

10. Scope Trigger

a. Performance Check

(1) Reset by pressing pushbuttons sequence (a) through (l) below:
(a) **USER OPTIONS**.
(b) **(F1) MORE OPTION**.
(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(d) **(F5) SELECT ITEM**.
(e) Toggle ▲ or ▼ to display/highlight **RESET SCOPEMETER**.
(f) **(F5) SELECT ITEM**.
(g) (If all Scope Meter settings have been set to original setting then **(F1**) **CLOSE),** which should display/highlight **RESET SCOPEMETER**.
(h) Toggle ▲ or ▼ to display/highlight **RESET SCOPE**.
(i) **(F5) SELECT ITEM**.
(j) (For original settings, **SCOPE** mode needs to be selected. Change to **SCOPE** mode now? **(F1) YES** then **(F1) CLOSE**) or (if all Scope Meter settings have been set to original setting then **(F1) CLOSE),** which should display/highlight **RESET SCOPE**.
(k) **(F1) CLOSE** which should display/highlight **RESET MENU**.
(l) **(F1) CLOSE** which should display/highlight **CONTR**.
(2) **RESET** oscilloscope calibrator.
(3) Press pushbutton sequence as listed in (a) through (e) below:
(a) "Input A" to off by pressing (1) through (7) below:
(1) **INPUT A**.
(2) **(F1) MORE INPUT A**.
(3) Toggle ▲ or ▼ to display/highlight **INPUT A**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **off**.
(6) **(F5) SELECT ITEM.**
(7) **(F1) CLOSE**.
(b) "Input B" probe to 1:1 by pressing (1) through (9) below:
(1) **INPUT B** to display/highlight **DISPLAY INPUT B**.
(2) **(F1) MORE INPUT B**.
(3) Toggle ▲ or ▼ to display/highlight **PROBE B MENU**.
(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT B**.
(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(6) Toggle ▲ or ▼ to display/highlight **1:1**.
(7) **(F5) SELECT ITEM**.
(8) **(F1) CLOSE** which should display/highlight **INPUT B**.
(9) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT B**.
(c) Auto to manual range by toggling **(mV RANGE V)** on right side, under **INPUT B** pushbutton to display/highlight **B 50mVDC 1:1**.
(d) "Input B" Trigger source and Trigger slope by pressing (1) through (11) below:
(1) **TRIGGER**.
(2) **(F1) MORE TRIGGER**.
(3) Toggle ▲ or ▼ to display/highlight **TRIGGER SOURCE**.

(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(6) **(F5) SELECT ITEM**.
(7) Toggle ▲ or ▼ to display/highlight **TRIGGER SLOPE**.
(8) **(F5) SELECT ITEM**.
(9) Toggle ▲ or ▼ to display/highlight **+ SLOPE**.
(10) **(F5) SELECT ITEM**.
(11) **(F1) CLOSE**.
(e) Time range by toggling **(s TIME ns)** to read **10ns/Div**.
(4) Set oscilloscope calibrator **LEVSINE** output to produce a .5 V p-p at 150 MHz.
(5) Using oscilloscope calibrator, adjust edit dial amplitude to 2.9 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(6) Set oscilloscope calibrator **LEVSINE** output to produce a .13 V p-p at 100 MHz.
(7) Using oscilloscope calibrator, adjust edit dial amplitude to 2.1 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(8) Set range by toggling **(mV RANGE V)** on right side, under **INPUT B** pushbutton to display/highlight **B 200mVDC 1:1**.
(9) Set oscilloscope calibrator **LEVSINE** output to produce a .3 V p-p at 10 MHz.
(10) Using oscilloscope calibrator, adjust edit dial amplitude to 1.4 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(11) Set oscilloscope calibrator to standby.
(12) Connect equipment as shown in figure 3.
(13) Press pushbutton sequence as listed in (a) through (e) below:
(a) "Input A" to on by pressing (1) through (7) below:
(1) **INPUT A**.
(2) **(F1) MORE INPUT A**.
(3) Toggle ▲ or ▼ to display/highlight **INPUT A**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **ON**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.
(b) "Input B" to off by pressing (1) through (7) below:
(1) **INPUT B.**
(2) **(F1) MORE INPUT B**.
(3) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight .
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE.**
(c) "Input A" probe to 1:1 by pressing (1) through (9) below:
(1) **INPUT A**.
(2) **(F1) MORE INPUT A.**
(3) Toggle ▲ or ▼ to display/highlight **PROBE A MENU.**
(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT A**.
(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.

(6) Toggle ▲ or ▼ to display/highlight **1:1**.
(7) **(F5) SELECT ITEM**.
(8) **(F1) CLOSE** which should display/highlight **INPUT A**.
(9) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT A**.
(d) Auto to manual range by toggling **(mV RANGE V)** on left side, under **INPUT A** pushbutton to display/highlight **A 50mVDC 1:1**.
(e) "Input A" Trigger source and Trigger slope by pressing (1) through (7) below:
(1) **TRIGGER**.
(2) **(F1) MORE TRIGGER**.
(3) Toggle ▲ or ▼ to display/highlight **TRIGGER SOURCE**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **INPUT A**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.
(14) Set oscilloscope calibrator **LEVSINE** output to produce a .5 V p-p at 150 MHz.
(15) Using oscilloscope calibrator, adjust edit dial amplitude to 2.9 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(16) Set oscilloscope calibrator **LEVSINE** output to produce a 0.13 V p-p at 100 MHz.
(17) Using oscilloscope calibrator, adjust edit dial amplitude to 2.1 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(18) Set range by toggling **(mV RANGE V)** on left side, under **INPUT A** pushbutton to display/highlight **A 200 mV DC 1:1**.
(19) Set oscilloscope calibrator **LEVSINE** output to produce a .3 V p-p at 10 MHz.
(20) Using oscilloscope calibrator, adjust edit dial amplitude to 1.4 vertical divisions on TI. If TI signal is not triggered, perform **b** below.
(21) Set oscilloscope calibrator to standby.

b. Adjustments. Complete adjustments are in paragraph **16** (R).

11. Scope Time-base

a. Performance Check

(1) Reset by pressing pushbuttons sequence (a) through (l) below:
(a) **USER OPTIONS**.
(b) **(F1) MORE OPTION.**
(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(d) **(F5) SELECT ITEM**.
(e) Toggle ▲ or ▼ to display/highlight **RESET SCOPEMETER**.
(f) **(F5) SELECT ITEM**.
(g) (If all Scope Meter settings have been set to original setting then **(F1) CLOSE)**, which should display/highlight **RESET SCOPEMETER**.
(h) Toggle ▲ or ▼ to display/highlight **RESET SCOPE**.
(i) **(F5) SELECT ITEM**.
(j) (For original settings, **SCOPE** mode needs to be selected. Change to **SCOPE** mode now? **(F1) YES** then **(F1) CLOSE**) or (if all ScopeMeter settings have been set to original setting then **(F1) CLOSE**), which should display/highlight **RESET SCOPE**.

(k) **(F1) CLOSE** which should display/highlight **RESET MENU**.
(l) **(F1) CLOSE** which should display/highlight **CONTR**.

(2) **RESET** oscilloscope calibrator.

(3) Press pushbutton sequence as listed in (a) through (d) below:

(a) "Input B" to off by pressing (1) through (7) below:
(1) **INPUT B**.
(2) **(F1) MORE INPUT B**.
(3) Toggle ▲ or ▼ to display/highlight **INPUT B**.
(4) **(F5) SELECT ITEM**.
(5) Toggle ▲ or ▼ to display/highlight **off**.
(6) **(F5) SELECT ITEM**.
(7) **(F1) CLOSE**.

(b) "Input A" probe to 1:1 by pressing (1) through (9) below:
(1) **INPUT A**.
(2) **(F1) MORE INPUT A**.
(3) Toggle ▲ or ▼ to display/highlight **PROBE A MENU**.
(4) **(F5) SELECT ITEM** which should display/highlight **PROBE on INPUT A**.
(5) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(6) Toggle ▲ or ▼ to display/highlight **1:1**.
(7) **(F5) SELECT ITEM**.
(8) **(F1) CLOSE** which should display/highlight **INPUT A**.
(9) **(F1) CLOSE** which should display/highlight **DISPLAY INPUT A**.

(c) Auto to manual range by toggling **(mV RANGE V)** on left side, under **INPUT A** pushbutton to display/highlight **A 500mVDC 1:1**.

(d) Time range by toggling **(s TIME ns)** to read **1 μs/Div**.

(4) Set oscilloscope calibrator **MARKER** output to produce 1 μs pulses.

(5) Toggling horizontal ◄ **MOVE** ► pushbutton to align 2d time marker with 2d vertical graticule line.

NOTE

If necessary, for a stable trigger press **TRIGGER**, **(F5) ADJUST LEVEL,** then toggle ▲ or ▼ pushbutton to change trigger level starting with **(LEVEL 0.000 V)** display.

(6) If 10th marker is not within +/-0.04 of vertical graticule line, perform **b** below.

NOTE

0.04 division = 1 pixel

(7) Set oscilloscope calibrator to standby.

(8) Disconnect oscilloscope calibrator from TI.

NOTE

If **TRIGGER LEVEL** window is open then press **(F1) CLOSE** which should display/highlight **CONTR.**

b. Adjustments. Complete adjustments are in paragraph **16** (R).

12. Meter Dc Voltage

a. Performance Check

(1) Connect equipment as shown in figure 5 below:

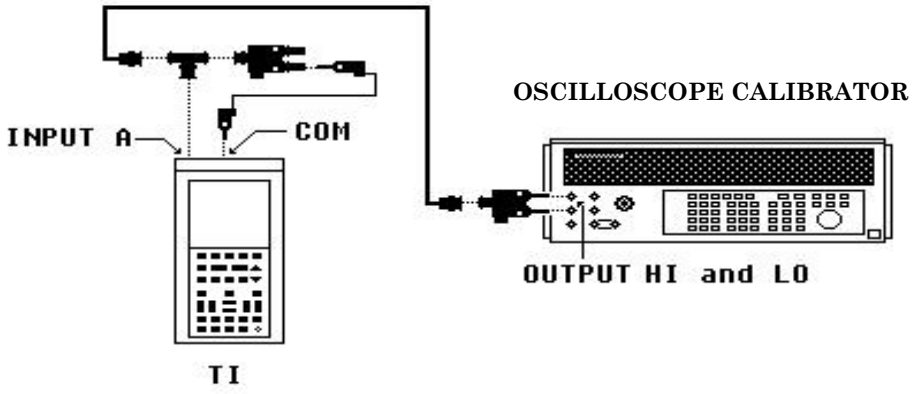

Figure 5. Meter dc voltage.

(2) Reset by pressing pushbuttons sequence (a) through (k) below:
(a) **SCOPE METER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.
(b) **(F2) METER** to display/highlight **METER**.
(c) **USER OPTIONS** should display **MORE OPTIONS**.
(d) **(F1) MORE OPTION**.
(e) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(f) **(F5) SELECT ITEM**.
(g) Toggle ▲ or ▼ to display/highlight **RESET METER**.
(h) **(F5) SELECT ITEM**.
(i) All meter settings have been set to original setting then **(F1) CLOSE** which should display/highlight **RESET METER**.
(j) **(F1) CLOSE** should display/highlight **RESET MENU**.
(k) **(F1) CLOSE**.

(3) Set "Input A" probe to 1:1 by pressing (a) through (g) below:
(a) **INPUT A**.
(b) **(F5) PROBE A MENU**.

(c) Toggle ▲ or ▼ to display/highlight **PROBE on INPUT A**.
(d) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(e) Toggle ▲ or ▼ to display/highlight **1:1**.
(f) **(F5) SELECT ITEM**.
(g) **(F1) CLOSE** which should display/highlight **CONTR**.

(4) **RESET** calibrator.
(5) Set measure to **V DC** by pressing (a) through (d) below:
(a) **MEASURE MENU** to display/highlight **(V**, **Hz**, **dB**, **TIME)**.
(b) **(F2) V**.
(c) Toggle ▲ or ▼ to display/highlight **V DC METER**.
(d) **(F5) SELECT ITEM**.
(6) Select display change by pressing (a) through (h) below:
(a) **SUB MENU**.
(b) **(F1) MORE METER**.
(c) Toggle ▲ or ▼ to display/highlight **READINGS on DISPLAY**.
(d) **(F5) SELECT ITEM** which should display/highlight **(1**, **2**, **3**, **4)**.
(e) Toggle ▲ or ▼ to display/highlight **1**.
(f) **(F5) SELECT ITEM**.
(g) **(F1) CLOSE**.
(h) **SCOPEMETER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.
(7) Perform steps as listed in (a) through (d) below for each row in table 5.
(a) Under **INPUT A** pushbutton left side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set calibrator to Output voltage settings.
(c) If TI Voltage indications are not within specified limits, perform **b** below.
(d) Set calibrator to standby.

Table 5. Meter DC Volts

Oscilloscope calibrator	Test instrument		
Output volt settings **(DC)**	Range settings **(DC)**	Voltage indication **(DC)**	
		Min	Max
.1 V	100 mV	99.00 mV	101.00 mV
.3 V	300 mV	298.0 mV	302.0 mV
1 V	1 V	0.990 V	1.010 V
3 V	3 V	2.980 V	3.020 V
10 V	10 V	9.900 V	10.10 V
30 V	30 V	29.80 V	30.20 V
100 V	100 V	099.0 V	101.0 V
300 V	300 V	298.0 V	302.0 V

b. **Adjustments**. Complete adjustments are in paragraph **16** (R).

13. Meter Ac Voltage

a. Performance Check

(1) Reset by pressing pushbuttons sequence (a) through (i) below:
(a) **USER OPTIONS**.
(b) **(F1) MORE OPTION**.
(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(d) **(F5) SELECT ITEM.**
(e) Toggle ▲ or ▼ to display/highlight **RESET METER**.
(f) **(F5) SELECT ITEM**.
(g) All meter settings have been set to original setting then **(F1) CLOSE** which should display/highlight **RESET METER**.
(h) **(F1) CLOSE** should display/highlight **RESET MENU**.
(i) **(F1) CLOSE**.
(2) **RESET** calibrator.
(3) Set measure to VAC by pressing (a) through (d) below:
(a) **MEASURE MENU** to display/highlight **(V**, **Hz**, **dB**, **TIME)**.
(b) **(F2) V**.
(c) Toggle ▲ or ▼ to display/highlight **Vrms AC METER**.
(d) **(F5) SELECT ITEM**.
(4) Set "Input A" probe to 1:1 by pressing (a) through (g) below:
(a) **INPUT A**.
(b) **(F5) PROBE A MENU**.
(c) Toggle ▲ or ▼ to display/highlight **PROBE on INPUT A**.
(d) **(F5) SELECT ITEM** which should display/highlight **(1:1**, **10:1**, **100:1**, **1000:1**, **etc.)**.
(e) ▲ or ▼ to display/highlight **1:1**.
(f) **(F5) SELECT ITEM**.
(g) **(F1) CLOSE** which should display/highlight **CONTR**.
(5) Select display change by pressing (a) through (h) below:
(a) **SUB MENU**.
(b) **(F1) MORE METER**.
(c) Toggle ▲ or ▼ to display/highlight **READINGS on DISPLAY.**
(d) **(F5) SELECT ITEM** which should display/highlight **(1**, **2**, **3**, **4)**.
(e) Toggle ▲ or ▼ to display/highlight **1**.
(f) **(F5) SELECT ITEM**.
(g) **(F1) CLOSE**.
(h) **SCOPEMETER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.
(6) Perform steps as listed in (a) through (c) below for each row in table 6.
(a) Under **INPUT A** pushbutton left side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set calibrator to Voltage output settings at selected Frequency.
(c) If TI Voltage indications are not within specified limits, perform **b** below.
(d) Set calibrator to standby.

Table 6. Meter AC Volts

Calibrator		Test instrument		
Voltage output settings **(V ac)**	Frequency settings **(Hz)**	Range settings **(V rms ac)**	Voltage indication **(V rms ac)**	
			Min	Max
.1	55	100 m	98.00 m	102.0 m
.3	55	300 m	296.0 m	304.0 m
1	20	1	0.965	1.035
1	55	1	0.980	1.020
1	19 k	1	0.965	1.035
1	21 k	1	0.950	1.050
1	500 k	1	0.950	1.050
1	900 k	1	0.950	1.050
3	55	3	2.960	3.040
10	55	10	9.800	10.20
30	55	30	29.60	30.40
100	55	100	98.00	102.0
200	55	300	197.0	203.0

(7) **RESET** calibrator.
(8) Connect equipment as shown in figure 6 below:

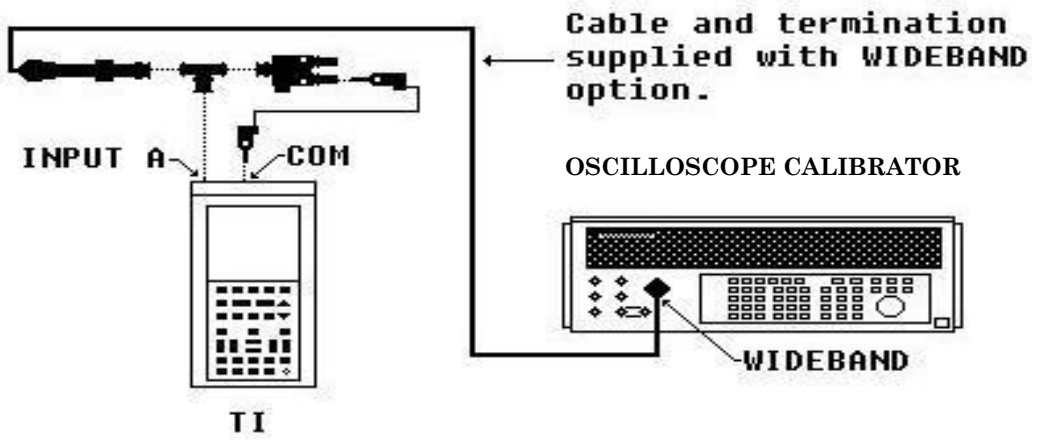

Figure 6. Meter ac voltage.

(9) Perform steps as listed in (a) through (d) below for each row in table 7.
(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display **1 V rms AC**.

(b) Set calibrator wideband to 1 volt output at selected Frequency.

(c) If TI Voltage indications are not within specified limits, perform **b** below.

(d) Set calibrator to stand-by.

Table 7. Meter AC volts

Calibrator	Test instrument	
Frequency settings (**MHz**)	Voltage indication (**V ac**)	
	Min	Max
1.1	0.875	1.125
5	0.875	1.125

(10) Press pushbutton sequence as listed in (a) through (d) below:

(a) MEASURE MENU to display/highlight (V, Hz, dB, TIME).

(b) **(F3) Hz**.

(c) Toggle ▲ or ▼ to display/highlight **Hz METER**.

(d) (F5) **SELECT ITEM**.

(11) Set calibrator frequency to 1 MHz output.

(12) If TI frequency indication is not within 0.993 and 1.007 MHz, perform **b** below.

(13) Set calibrator to standby.

b. **Adjustments**. Complete adjustments are in paragraph **16** (R).

14. Meter EXT. mV

a. Performance Check

(1) Connect equipment as shown in figure 7 below:

OSCILLOSCOPE CALIBRATOR

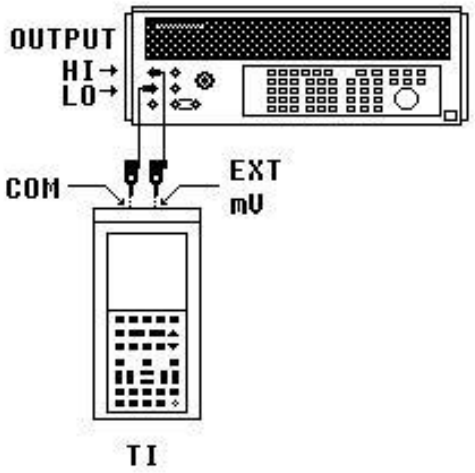

Figure 7. Meter EXT.mV.

(2) Select reset by pressing pushbuttons sequence (a) through (c) below:

(a) **SCOPE METER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.

(b) **(F5) EXT.mV** to display (The banana jacks are being used as inputs now).

(c) **(F1) CLOSE** to display/highlight **EXT.mV**.

(3) Select reset by pressing pushbuttons sequence (a) through (i) below:

(a) **USER OPTIONS**.

(b) **(F1) MORE OPTION**.

(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.

(d) **(F5) SELECT ITEM**.

(e) Toggle ▲ or ▼ to display/highlight **RESET EXTERNAL mV**.

(f) **(F5) SELECT ITEM**.

(g) (If all **EXT.mV** settings have been set to original setting then press **(F1) CLOSE),** which should display/highlight **RESET EXTERNAL mV** or (for original settings, **EXT.mV** needs to be selected. Change to **EXT.mV** mode now press **(F1) YES** then **(F1) CLOSE**).

(h) **(F1) CLOSE** should display/highlight **RESET MENU**.

(i) **(F1) CLOSE**.

(4) Select range settings and display by pressing pushbuttons sequence (a) through (m) below:

(a) **SCOPE METER/MAIN MENU** to display/highlight **EXT.mV**.

(b) **SUB MENU**.

(c) **(F1) MORE EXT.mV**.

(d) Toggle ▲ or ▼ to display/highlight **ADD MAIN READING**.
(e) **(F5) SELECT ITEM**.
(f) Toggle ▲ or ▼ to display/highlight **V DC**.
(g) **(F5) SELECT ITEM**.
(h) Toggle ▲ or ▼ to display/highlight **READINGS on DISPLAY**.
(i) **(F5) SELECT ITEM**.
(j) Toggle ▲ or ▼ to display/highlight **1**.
(k) **(F5) SELECT ITEM.**
(l) **(F1) CLOSE**.
(m) **SCOPE METER/MAIN MENU** to display/highlight **EXT.mV.**

(5) **RESET** calibrator.
(6) Perform steps as listed in (a) through (d) below for each row in table 8.
(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set calibrator to Output volt settings.
(c) If TI Voltage indications are not within specified limit, perform **b** below.
(d) Set calibrator to standby.

Table 8. EXT.mV DC

Calibrator	Test instrument		
Output volt settings **(V dc)**	Range settings **(V dc)**	Voltage indication **(V dc)**	
		Min	Max
.3	300 m	298.0 m	302.0 m
3	3	2.980	3.020

(7) Select range settings by pressing pushbuttons sequence (a) through (h) below:
(a) **SUB MENU**.
(b) **(F1) MORE EXT.mV**.
(c) Toggle ▲ or ▼ to display/highlight to **ADD MAIN READING**.
(d) **(F5) SELECT ITEM**.
(e) Toggle ▲ or ▼ to display/highlight **Vrms AC**.
(f) **(F5) SELECT ITEM**.
(g) **(F1) CLOSE**).
(h) **SCOPE METER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.

(8) Perform steps as listed in (a) through (d) below for each row in table 9.
(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set calibrator to Output volt settings at 60 Hz.
(c) If TI voltage indications are not within specified limits, perform **b** below.
(d) Set calibrator to standby.

Table 9. EXT.mV AC

Calibrator	Test instrument		
Output volt settings **(V ac)**	Range settings **(V ac)**	Voltage indication **(V ac)**	
		Min	Max
.250	300 m	243.5 m	256.5 m
2	3	1.945	2.055

(9) Reset calibrator.

b. **Adjustments**. Complete adjustments are in paragraph **16** (R).

15. Meter Resistance

a. Performance Check

(1) Select resistance by pressing pushbutton **(F3) Ω** to display/highlight **Ω**.
(2) Select reset by pressing pushbuttons sequence (a) through (i) below:
(a) **USER OPTIONS**.
(b) **(F1) MORE OPTION**.
(c) Toggle ▲ or ▼ to display/highlight **RESET MENU**.
(d) **(F5) SELECT ITEM**.
(e) Toggle ▲ or ▼ to display/highlight **RESET OHM**.
(f) **(F5) SELECT ITEM**.
(g) (If all **OHM** settings have been set to original setting then press **(F1) CLOSE**), which should display/highlight **RESET OHM** or (for original settings, **OHM** needs to be selected. Change to **OHM** mode now press **(F1) YES** then **(F1) CLOSE**).
(h) **(F1) CLOSE** should display/highlight **RESET MENU**.
(i) **(F1) CLOSE**.
(3) Press **SCOPE METER/MAIN** to display/highlight **SCOPE/METER/Ω/EXT.mV** and etc.
(4) Perform steps as listed in (a) through (c) below for each row in table 10.
(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display TI Range settings.
(b) Set calibrator to Output ohm settings.
(c) If TI Ohms indications are not within specified limits, perform **b** below.

Table 10. Zero Ohms

Calibrator	Test instrument	
Output ohm settings **(Ω)**	Range settings **(Ω)**	Ohms indication **(Ω)**
0	30	<0.25
0	300	<0.5

(5) Perform steps as listed in (a) through (d) below for each row in table 11.

(a) Under **INPUT A** pushbutton on left side, toggle **(mV RANGE V)** to display TI Range settings.

(b) Set calibrator to Output ohm settings.

(c) Adjust calibrator percent of error dial until calibrator reads exact indication on TI.

(d) If calibrator is not within Error indications, perform **b** below.

Table 11. Ohms

Test instrument	Calibrator			
Range settings **(Ω)**	Output ohm settings **(Ω)**	Error indications (%)		
		Min	Measured	Min
30	10[1]	-5		+5
300	100	-1		+1
3 k	1 k	-1		+1
30 k	10 k	-1		+1
300 k	100 k[2]	-1		+1
3 M	1 M	-1		+1
30 M	10 M	-1		+1

[1] Set calibrator **2 Wire COMP** to on.
[2] Set calibrator **2 Wire COMP** to off.

(6) Reset calibrator.

(7) Disconnect all equipment.

b. **Adjustments**. Complete adjustments are in paragraph **16** (R).

16. Adjustments

a. Refresh Flash ROMS

(1) Before doing the complete adjustments, exit program and use oscilloscope software Refresh Utility Disk, supplied with TI, to refresh Flash ROMS.

(2) A person should be familiar with the Refresh Utility Disk before starting the Calibration constants restoration.

(3) Press TI **ON/OFF** key to **OFF** and remove all connections.

(4) Remove TI battery compartment cover and battery pack.

(5) Connect **PM 8907/803 AC/DC ADAPTOR** supplied with TI to a 115 Vac power source.

(6) Insert **PM 8907/803 AC/DC ADAPTOR** low voltage plug into TI right side **POWER ADAPTOR** connector.

(7) Connect equipment as shown in figure 8 below:

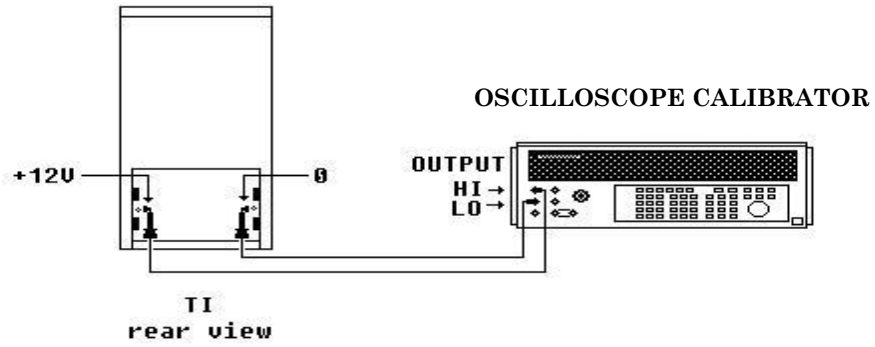

Figure 8. 12 V hookup.

(8) Connect TI Optical Interface (PM 9080, RS-232-C cable) to controller **COM 2**.

(9) Execute Refresh Utility program, read the screen, and follow the instructions.

NOTE

If the screen calls for +12 volts to complete this restoration, apply the +12 volts from calibrator to TI.

(10) After calibration constants restoration, set calibrator to standby.

b. Calibration Constants Restoration

(1) TI should be allow at least 20 minutes for warm-up.
(2) Complete reset as listed in (a) through (e) below:
(a) Select reset scope by pressing pushbutton sequence (1) through (10) below:
(1) **USER OPTIONS**.
(2) **(F1) MORE OPTION**.
(3) Toggle **▲ or ▼** to display/highlight **RESET MENU**.
(4) **(F5) SELECT ITEM**.
(5) Toggle **▲ or ▼** to display/highlight **RESET SCOPEMETER**.
(6) **(F5) SELECT ITEM**.
(7) (If all Scope Meter settings have been set to original setting then **(F1) CLOSE**), which should display/highlight **RESET SCOPEMETER**.
(8) Toggle **▲ or ▼**to display/highlight **RESET SCOPE**.
(9) **(F5) SELECT ITEM**.
(10) (For original settings, **SCOPE** mode needs to be selected. Change to **SCOPE** mode now? **(F1) YES** then **(F1) CLOSE**) or (if all **Scope Meter** settings have

been set to original setting then **(F1) CLOSE**), which should display/highlight **RESET SCOPE**.

(b) Select reset meter by pressing pushbuttons sequence (1) through (3) below:

(1) Toggle ▲ **or** ▼to display/highlight **RESET METER**.

(2) **(F5) SELECT ITEM**.

(3) (For original settings, **METER** mode needs to be selected. Change to **SCOPE** mode now? **(F1) YES** then **(F1) CLOSE**) or (if all Meter settings have been set to original setting then **(F1) CLOSE),** which should display/highlight **RESET METER**.

(c) Select reset ohms by pressing pushbuttons sequence (1) through (3) below:

(1) Toggle ▲ **or** ▼ to display/highlight **RESET OHM**.

(2) **(F5) SELECT ITEM**.

(3) (For original settings, ohm needs to be selected. Change to ohm mode now press **(F1) YES** then **(F1) CLOSE**) or (if all ohm settings have been set to original setting then press **(F1) CLOSE**), which should display/highlight **RESET OHM**.

(d) Select reset diode by pressing pushbuttons sequence (1) through (3) below:

(1) Toggle ▲**or** ▼ to display/highlight **RESET DIODE**.

(2) **(F5) SELECT ITEM**.

(3) (For original settings, DIODE needs to be selected. Change to **DIODE** mode now press **(F1) YES** then **(F1) CLOSE**) or (if all ohm settings have been set to original setting then press **(F1) CLOSE),** which should display/highlight **RESET DIODE**.

(e) Select reset **Ext.mV** by pressing pushbuttons sequence (1) through (6) below:

(1) Toggle ▲ **or** ▼ to display/highlight **EXTERNAL mV**.

(2) **(F5) SELECT ITEM**.

(3) (For original settings, EXT.mV needs to be selected. Change to **EXT.mV** mode now press **(F1) YES** then **(F1) CLOSE**) or (if all ohm settings have been set to original setting then press **(F1) CLOSE),** which should display/highlight **RESET EXT.mV**.

(4) **(F1) CLOSE**.

(5) **(F1) CLOSE**.

(6) **SCOPE METER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.

(3) Press pushbutton **BACKLIGHT** (sun shaped pushbutton just below **SPECIAL FUNCT** key) with **AUTO SET** together, then release.

(4) Set calibrator to produce + 12 V dc.

(5) Press **(F4) CALIBRATE SCOPEMETER**.

(6) Displayed are the numbers of calibration memories free. Press **(F1) CLOSE** to display **CONTRAST, SCOPE, METER, ESCAPE,** and **CAL STORE**.

(7) Press **(F2) SCOPE** to display/highlight **SCOPE** and **CAL 1**.

(8) Set calibrator to standby.

(9) Remove +12 V dc from calibrator to TI.

(10) Connect equipment as shown in figure 9 below:

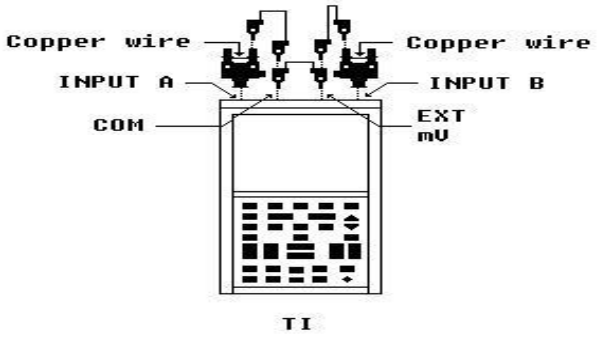

Figure 9. Input short.

(11) Toggle **▲ or ▼**to display/highlight **(▼or▼ CAL 5)**.
(12) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(13) Connect equipment as shown in figure 10 below:

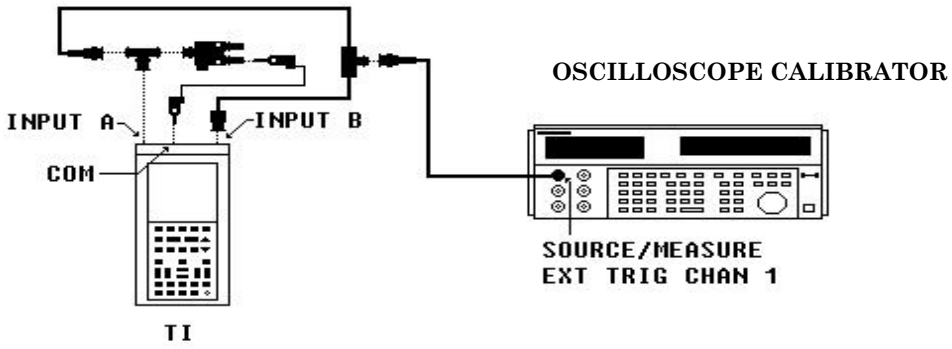

Figure 10. Attenuation and gain.

(14) Select pulse response of *1 attenuation by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼CAL 6)**.
(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 300 mV P-P.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(15) Select pulse response of *10 attenuation by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼CAL 7)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 3 V p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(16) Select pulse response of *100 attenuation by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 8)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 20 V p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(17) Select pulse response of *1000 attenuation by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 9)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 50 V p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(18) Select gain for 5 mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 10)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 20 mV p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(19) Select gain for 10mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 11)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 50 mV p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(20) Select gain for 20mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 12)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 100 mV p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(21) Select gain for 50mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 13)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 200 mV p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(22) Select gain for 100mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼CAL 14)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 500 mV p-p.

(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Oscilloscope calibrator to **STBY**.

(23) Select gain for 200mV by pressing pushbuttons sequence (a) through (d) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 15)**.

(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 1 V p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Oscilloscope calibrator to **STBY**.

(24) Select gain for 2 V by pressing pushbuttons sequence (a) through (d) below:
(a) Toggle **▲ or ▼**to display/highlight **(▲ or ▼CAL 16)**.
(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 10 V p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Oscilloscope calibrator to **STBY**.

(25) Select gain for 20V by pressing pushbuttons sequence (a) through (d) below:
(a) Toggle **▲ or ▼**to display/highlight **(▲ or ▼ CAL 17)**.
(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 100 V p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Oscilloscope calibrator to **STBY**.

(26) Shift gain *1 mode by pressing pushbuttons sequence (a) through (d) below:
(a) Toggle **▲ or ▼**to display/highlight **(▲ or ▼ CAL 18)**.
(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 200 mV p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Oscilloscope calibrator to **STBY**.

(27) Shift gain /8 mode by pressing pushbuttons sequence (a) through (c) below:
(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 19).**
(b) Set oscilloscope calibrator to produce a square wave, 1 kHz at 20 mV p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(28) Reset oscilloscope calibrator.

(29) Connect equipment as shown in figure 11 below:

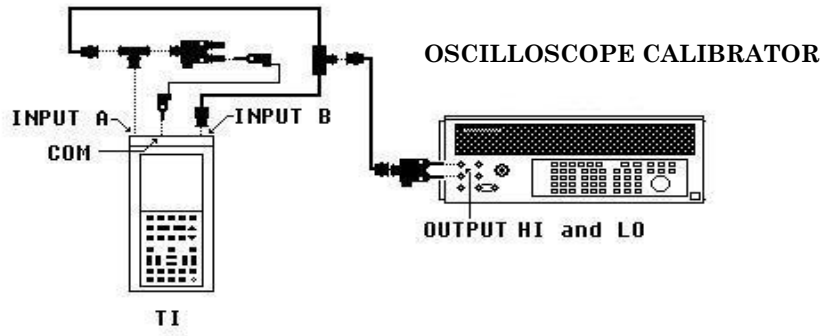

Figure 11. Trigger level.

(30) Set channel A and B, 50 percent and 90 percent trigger level by pressing pushbuttons sequence (a) through (i) below:
(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 20)**.
(b) Set calibrator to produce an output of 10 kHz at 707 mV p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(d) Toggle ▲ **or** ▼ to display/highlight **(▲ or ▼ CAL 21).**
(e) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(f) Press ▲ **or** ▼ to display/highlight **(▲ or ▼ CAL 22).**
(g) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(h) Press ▲ **or** ▼ to display/highlight **(▲ or ▼ CAL 23).**
(i) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(31) Set calibrator to standby.
(32) Connect equipment as shown in figure 12 below:

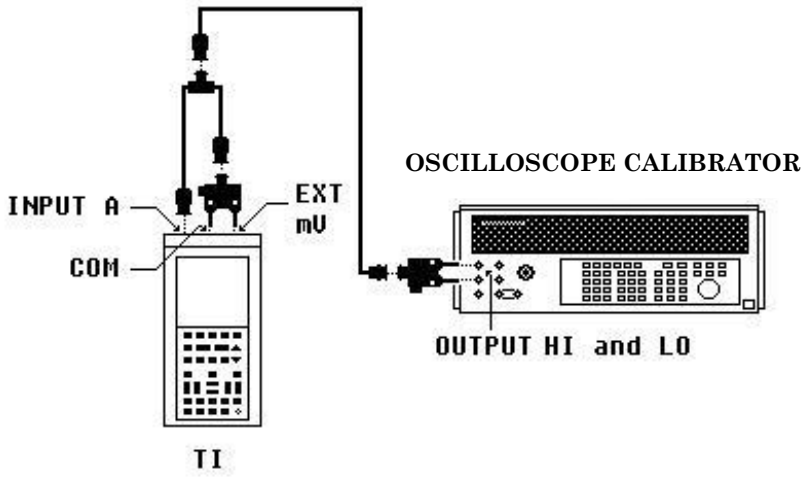

Figure 12. External trigger.

(33) Select external trigger level by pressing pushbuttons sequence (a) through (c) below:
(a) Toggle ▲ **or** ▼ to display/highlight **(▲ or ▼ CAL 24)**.
(b) Set calibrator to operate.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(34) Reset calibrator.
(35) Connect equipment as shown in figure 3.
(36) Random sampling by pressing pushbuttons sequence (a) through (c) below:
(a) Toggle ▲ **or** ▼ to display/highlight **(▲ or ▼ CAL 25)**.
(b) Set oscilloscope calibrator to produce an EDGE square wave, 1 MHz at .6 V p-p.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(37) Reset oscilloscope calibrator.
(38) Connect equipment as shown in figure 8.
(39 Set calibrator to produce +12 V dc.

(40) Press **(F3) METER** to display/highlight **METER**.

NOTE

CAL numbering sequence might not be in step.

(41) Set calibrator to standby.
(42) Remove +12 V dc from calibrator to TI.
(43) Connect equipment as shown in figure 9.
(44) Select linearity calibration, zeroing ranges and ohms ranges by pressing pushbuttons sequence (a) through (f) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 1)**.
(b) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

NOTE

During this calibration step many internal calibration constants are being set. This process can last up to 3 minutes.

(c) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 2)**.
(d) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(e) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 10)**.
(f) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(45) Disconnect all shorts from TI.
(46) Select **INPUT A**, 300 mV range and zero for open input by toggling **▲ or ▼** to display/highlight **(▲ or ▼ CAL 3)**. Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(47) Connect equipment as shown in figure 5.

NOTE

The readings on the display may not show what's being applied.

(48) Select Channel A, 300 mV, 1 V, 3 V, 30 V, 100 V, 300 V, range/gain by pressing pushbuttons sequence (a) through (x) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 4)**.
(b) Set calibrator to produce a 300 mV dc signal.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Set calibrator to **STBY**.
(e) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 23)**.
(f) Set calibrator to produce a 1 V dc signal.
(g) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(h) Set calibrator to **STBY**.
(i) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 5)**.
(j) Set calibrator to produce a 3V DC signal.
(k) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(l) Set calibrator to **STBY**.
(m) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 6).**

(n) Set calibrator to produce a 30 V dc signal.
(o) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(p) Set calibrator to **STBY**.
(q) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 24)**.
(r) Set calibrator to produce a 100V DC signal.
(s) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(t) Set calibrator to **STBY**.
(u) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 7)**.
(v) Set calibrator to produce a 300V DC signal.
(w) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(x) Reset calibrator.

(49) Connect equipment as shown in figure 7.

(50) Select EXT mV, 300 mV, 3V, range/gain by pressing pushbuttons sequence (a) through (g) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 8)**.
(b) Set calibrator to produce a 300 mV DC signal.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Set calibrator to **STBY**.
(e) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 9)**.
(f) Set calibrator to produce a 3 V dc signal.
(g) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(51) Reset calibrator.

(52) Select ohms 100, 1 k, 10 k, 100 k, 1 M, 10 M, range by pressing pushbuttons sequence (a) through (w) below:

(a) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 11)**.
(b) Set calibrator two wire resistance to produce 100 ohms.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(d) Set calibrator to **STBY**.
(e) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 12)**.
(f) Set calibrator to produce 1 k ohms.
(g) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(h) Set calibrator to **STBY**.
(i) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 13)**.
(j) Set calibrator to produce 10 k ohms.
(k) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(l) Set calibrator to **STBY**.
(m) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 14)**.
(n) Set calibrator to produce **COMP OFF** 100 k ohms.
(o) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(p) Set calibrator to **STBY**.
(q) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 15)**.
(r) Set calibrator to produce 1 M ohms.
(s) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(t) Set calibrator to **STBY**.
(u) Toggle **▲ or ▼** to display/highlight **(▲ or ▼ CAL 16).**
(v) Set calibrator to produce 10 M ohms.

(w) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(53) Set calibrator to standby.

(54) Disconnect calibrator leads from TI.

(55) Connect equipment as shown in figure 8.

(56) Set calibrator to produce +12 volts.

(57) Press **(F3) METER**.

(58) Store Cal and Generator out by pressing pushbuttons sequence (a) through (p) below:

(a) **(F5) CAL STORE**.

(b) Displayed is "New Calibration array will be saved in Flash memory. Are you sure?"

(c) **(F1) YES.**

(d) Displayed **SCOPE/METER/Ω/EXT.mV** and etc.

(e) Press **SPECIAL FUNCT**.

(f) **(F2) GENERATE MENU**.

(g) Toggle **▲ or ▼** to display/highlight **(F2) GENERATOR OUTPUT: ON/OFF**.

(h) **(F5) SELECT ITEM** to display/highlight **GENERATOR OUTPUT: ON**.

(i) **(F1) CLOSE**.

(j) **SCOPE METER/MAIN MENU** to display **SCOPE/METER/Ω/EXT.mV** and etc.

(k) Press pushbutton **BLACKLIGHT** (sun shaped pushbutton just below **SPECIAL FUNCT** key) with **AUTO SET** together, then release.

(l) **(F4) CALIBRATE SCOPEMETER**.

(m) Displayed are the numbers of calibration memories free. Press **(F1) CLOSE**.

(n) **(F3) METER**.

(o) Set calibrator to standby.

(p) Remove + 12 volts from calibrator to TI.

(59) Connect equipment as shown in figure 13 below:

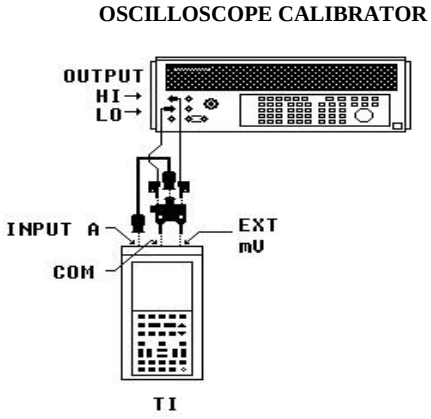

Figure 13. Current ramp.

NOTE

CAL numbering sequence might not be in step.

(60) Select current ramp by pressing pushbuttons sequence (a) through (c) below:

(a) Toggle ▲ **or** ▼ to display/highlight **(▲ or ▼CAL 18)**.
(b) Set calibrator two wire resistance to produce 100 ohms.
(c) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(61) Reset calibrator.

(62) Remove/disconnect both banana wires from calibrator **OUTPUT HI** and **LO** from TI, while leaving BNC circuit connected.

(63) Voltage ramp and 1:1 probe for **INPUT A** by pressing pushbuttons sequence (a) through (d) below:

(a) Voltage ramp by toggling**▲ or ▼** to display/highlight **(▲ or ▼CAL 17)**.
(b) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.
(c) 1:1 probe for **INPUT A** by toggling **▲ or ▼** to display/highlight **(▲ or ▼ CAL 21).**
(d) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(64) Displayed "Calibration has been completed successfully", then press **(F1) CLOSE**.

(65) Disconnect BNC cable from **INPUT A** and reconnect it to **INPUT B**.

(66) Select 1:1 probe for **INPUT B** by toggling **▲ or ▼**to display/highlight **(▲ or ▼CAL 22**).

(67) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(68) Displayed "Calibration has been completed successfully", then press **(F1) CLOSE**.

(69) Connect equipment as shown in figure 14 below:

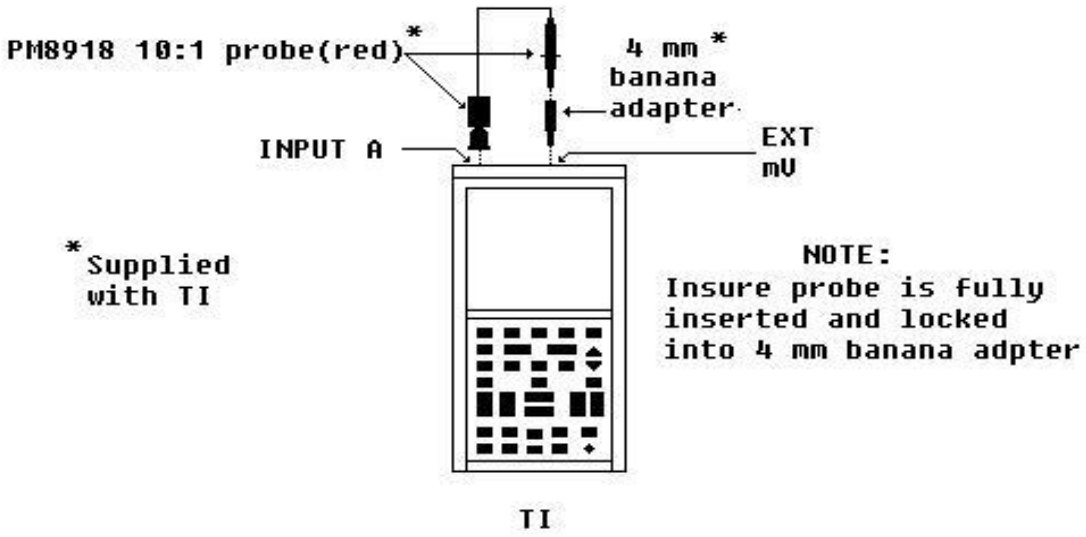

Figure 14. 10:1 probe for **INPUT** A.

(70) Select 10:1 red probe for **INPUT A** by toggling**▲ or ▼** to display/highlight **(▲ or ▼CAL 19**).

(71) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(72) Displayed "Calibration has been completed successfully", then press **(F1) CLOSE**.

(73) Disconnect PM8918 10:1 red probe from **INPUT A**.

(74) Connect equipment as shown in figure 14, but use the PM8918 10:1 grey probe to **INPUT B** side.

(75) Select 10:1 grey probe for **INPUT B** by pressing **▲ or ▼**to display/highlight **(▲ or ▼ CAL 20).**

(76) Press **(F5) READY**, then wait till display/highlight **READY** is not highlighted.

(77) Displayed "Calibration has been completed successfully", then press **(F1) CLOSE**.

(78) Disconnect PM8918 10:1 gray probe from TI.

(79) Connect equipment as shown in figure 8.

(80) Set calibrator to produce +2 volts.

(81) Press **(F3) METER**.

(82) Store Cal and Generator Out by pressing pushbuttons sequence (a) through (h) below:

(a) **(F5) STORE CAL**.

(b) Displayed "New calibration array will be saved in Flash memory. Are you sure"? Press **(F1) YES**.

(c) Displayed **SCOPE/METER/Ω/EXT.MV** and etc.

(d) **SPECIAL FUNCT**.

(e) **(F2) GENERATE MENU**.

(f) Toggle **▲ or ▼**to display/highlight **(F2) GENERATOR OUTPUT: ON/OFF**.

(g) **(F5) SELECT ITEM** to display/highlight **GENERATOR OUTPUT: OFF**.

(h) **(F1) CLOSE**.

(83) Set calibrator to standby.

(84) Remove +12 volts from calibrator to TI.

(85) Press **SCOPE METER/MAIN MENU**.

17. Final Procedure

a. Deenergize and disconnect all equipment.

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

By Order of the Secretary of the Army:

Official:

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

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

0421103

Distribution:
To be distributed in accordance with the initial distribution number (IDN) 344764, requirements for calibration procedure TB 9-6625-2341-35.

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.milT
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.