

***TB 9-4931-501-35**

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR OSCILLOSCOPE TEKTRONIX, TYPES 5403D40, 5440 R544L, R5440, AND R5441

Headquarters, Department of the Army, Washington, DC

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REPORTING OF ERRORS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedure, please let us know. Mail your letter or DA Form 2028 to: Commander, U. S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: 2028@redstone.army.mil or FAX 256-842-6546/DSN 788-6546.

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CHANGE 6

*This bulletin supersedes TB 9-4931-501-50, 28 August 1978.

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SECTION I IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Oscilloscope, Tektronix Types 5403D40, 5440, 5441, R5440, and R5441. The manufacturer's manuals were used as the prime data source in compiling these instructions. The above equipment 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 (direct current) and low frequency technique.

2. Calibration Data Card, DA Form 2416

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TM 38-750. DA Form 2416 must be annotated in accordance with TM 38-750 for each calibration performed.

b. Adjustments to be reported on DA Form 2416 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
Vertical amplifier:	
Bandwidth	Dc to 90 MHz (2/067-0680-00) Dc to 60 MHz (w/calibrated 5A48)
Risetime	3.9 ns or less (w/067-00680-00) ¹ 5.8 ns or less (w/calibrated 5A48)
Aberrations	6% or less (w/067-0680-00) 3% or less (w/calibrated 5A48)
Vertical centering	Within ± 0.5 division of graticule center
Horizontal amplifier:	
Bandwidth	Dc to 2 MHz

See footnote at end of table.

Table 1. Calibration Description - Continued.

Test instrument parameters	Performance specifications
Power input	100, 110, 120, 200, 220, and 240 Vrms $\pm 10\%$ at to 400 Hz
Calibrator:	
Voltage	400 mV $\pm 1\%$
Current	4 mA, $\pm 1\%$
Frequency	Twice the power line frequency

¹Time base plug-in limited to 4 ns.

SECTION II

EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment used in this calibration procedure. This equipment is issued with -Secondary Transfer Standards Calibration Set NSN 6695-00-621-7877 and Secondary Reference Calibration Standards for NSN 4931-00-621-7878, and is to be used in performing this procedure. Alternate items may be used by the calibrating activity when the equipment listed in table 2 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 table 2.

5. Accessories Required. The accessories, listed in table 3 are issued as indicated in paragraph 4 above and are to be used in this calibration procedure. When necessary, these items may be substituted by equivalent items unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required

Item	Common name and/or official nomenclature	Minimum use specifications	Manufacturer, model and part number
A1	AUTOTRANSFORMER (TRANSFORMER, VARIABLE POWER)	Range: 105 to 125 V rms Accuracy: $\pm 1\%$	General Radio, Model W10MT3AS3 (7910809)
A2	CALIBRATION FIXTURE	Range: 1 kHz to 1 MHz at 4 ns or less Accuracy: $\pm 1\%$	Tektronix, Type 067-0680-00 (6625-01-014-6673)
A3	DIGITAL VOLTMETER W/HIGH VOLTAGE PROBE	Range: -3060 to +240 V dc Accuracy: $\pm 0.1\%$	Dana, Model 5703-S-2127 (7912606)
A4	TIME BASE	Range: 10 ns/div and must be compatible with TI	Tektronix, Type 5B42 (MIS-28706-4)
A5	TIME MARK GENERATOR	Range: 5 and 10 ns Accuracy: $\pm 1\%$	Tektronix, Type 184(7912042-1) ¹ Tektronix Type 184 MOD 146B (7912042-2) ²
A6	VERTICAL AMPLIFIER	Must be compatible with TI	Tektronix, Type 5A48 (MIS-28706-3)

¹Secondary Reference Set.²Secondary Transfer Set.

Table 3. Accessories Required

Item	Common name and/or official nomenclature	Description and part number
B1	ADAPTER (CONNECTOR ADAPTER)	Single banana jack to alligator clip (black) (7907560)
B2	CABLE ¹	48-in., RG-58/U, BNC plug terminations (10519140)
B3	PROBE	Test hook to single banana plug (SKC-4850-14)
B4	ADAPTER	BNC plug to binding post (103-0033-00)

¹Two required.

SECTION III PRELIMINARY OPERATIONS

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 3. For the identification of equipment referenced by item numbers prefixed with A, see table 2, and for prefix B, see table 3.

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.** Refer to figure 1 for location of TI circuit boards.
- b.** Remove top and bottom protective covers from TI. Insure that line selector block (brown) (fig. 2) for 120 V ac (volts alternating current) operation is installed.
- c.** Connect TI to autotransformer (A1).
- d.** Connect autotransformer to 115-V ac source and adjust output to 115 V ac.
- e.** Install vertical amplifier (A6) into TI left compartment and time base (A4) into right compartment.
- f.** Position TI controls as listed in (1) through (5) below:
 - (1) INTENSITY control ccw (counterclockwise) (off).

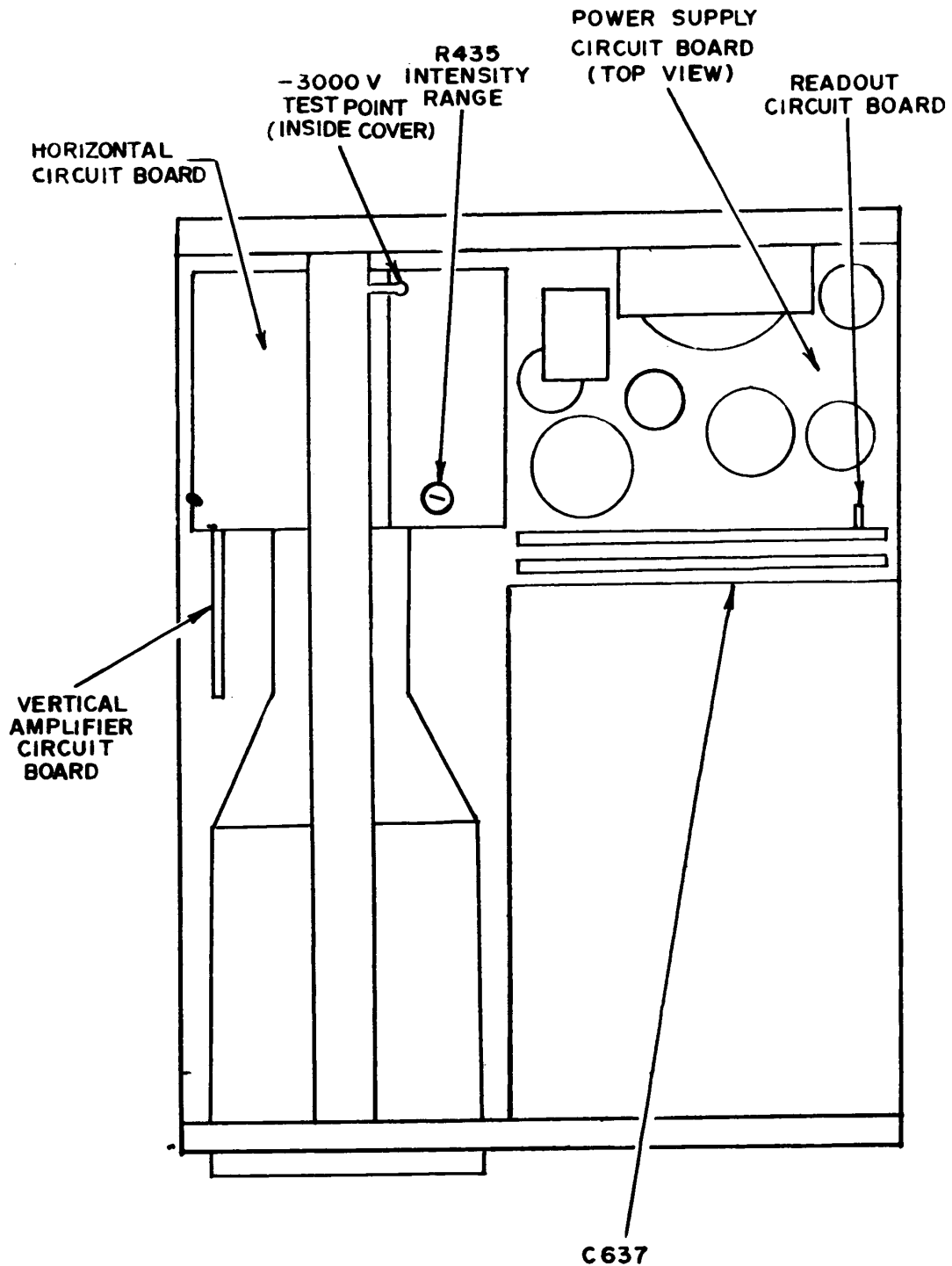


Figure 1. TI circuit board locations.

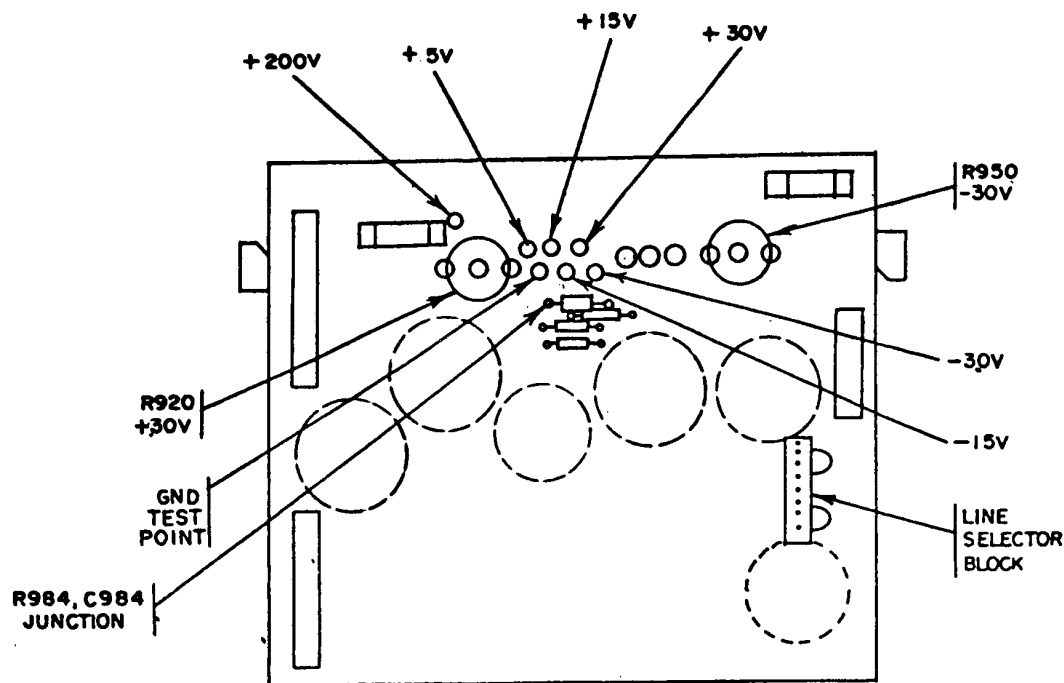


Figure 2. Power supply circuit board (bottom).

- (2) FOCUS control to midrange.
 - (3) POWER switch to on.
 - (4) GRAT ILLUM control as desired.
 - (5) READOUT INTENS control to midrange.
- g. Allow approximately 15 minutes for the TI to warmup and stabilize.

SECTION IV CALIBRATION PROCESS

NOTE

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