DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR IMPEDANCE MATCHING NETWORK CU-2193/TLQ-15

Headquarters, Department of the Army, Washington, D.C.
4 May 1977

REPORTING OF ERRORS

You can 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 and Blank Forms) should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

SECTION I
INDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. **This bulletin provides instructions for the calibration of Impedance Matching Network CU-2193/TLQ-15. The Impedance Matching Network will be referred to as Test Instrument throughout this bulletin.**

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

b. **Reportable adjustments are followed by (R) in this procedure.**

3. Calibration Description. **The Test Instrument parameters and performance specifications which pertain to this calibration are listed in table 1.**

Table 1. Calibration Description

Test Instrument parameters	Performance specifications
Input impedance . .	Produces real impedance values from 5 to 395 ohms and imaginary impedance values from negative 800 to positive 59 ohms.
Frequency range	Frequencies in the range of 1.5 to 20 MHz. Test Instrument calibration chart provides impedance and frequency data.
Input power	115 vac, 400 Hz, 30 watts (may be calibrated using 115 vac, 60 Hz input power)

SECTION II

EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment used in this calibration procedure and the minimum use specification of the required items. 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 specification listed in table 2.

Table 2. Equipment Required

Item	Common name	Minimum use specifications	Calibration equipment[1]
A1	Signal Generator	Frequency Range, 1.5 to 20 MHz, ± 1%	AN/GRM-50
A2	Rf Bridge	Frequency Range, 1.5 MHz to 20 MHz Reactance Range, 0 to 5000 ohms at 1 MHz ± 2% Resistance Range, 0 to 400 ohms ± 1%	General Radio, GR-1606B (Support equipment for AN/TLQ-15)
A3	Frequency Counter	Frequency Range, 1.5 to 20 MHz Accuracy, ± .1% Input sensitivity, .1 to 3 volts	AN/USM-207
A4	Receiver	Frequency Range, 1.5 to 20 MHZ Sensitivity, 10 microvolts	R-390/URR
A5	Termination	Impedance, 50 ohms Frequency Range, 1.5 to 20 MHz VSWR, 1.2 max	Narda 370 p/o Test Kit MK-1809/TLQ-15
A6	Ac Voltmeter	Voltage Range, 0 to 100 mv ±4% Frequency Range, 40 Hz to 1 MHz	ME-30/U

[1] The calibration equipment utilized in this procedure was selected from those known to be available at the Department of Defense facilities, and the listing by make or model number carries no implication of preference, recommendation, or approval of 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.

5. Accessories Required. **The accessories are listed in table 3. When necessary, these items may be substituted by equivalent items.**

Table 3. Accessories Required

Item	Common Name	Description and Part Number
B1	Cable assembly (4 required)	RG-58/U cable, 36 inches long (approx.), BNC connectors
B2	Lead	GR-1606 accessory lead 7 inches long.

Table 3. Accessories Required-Continued

Item	Common Name	Description and Part Number
B3	Adapter	C plug to N jack UG-565A/U
B4	Lead clip	Alligator clip and spade lug (P/O Lead Set 6625-00-356-0223) fabricated as shown in fig. 1
B5	Adapter	"T" Connector (BNC) UG-274B/U
B6	Calibration chart	P/O Test Instrument (located in carrying case)

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 (or specified sections) 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 ta**

***c*. Lead clip B4 must be fabricated as sho figure 1.**

***d*. Rf bridge preliminary zero adjustment, graph 8 of the calibration process, must be ma each calibration frequency.**

7. Equipment Setup. Connect calibration equipm shown in figure 2.

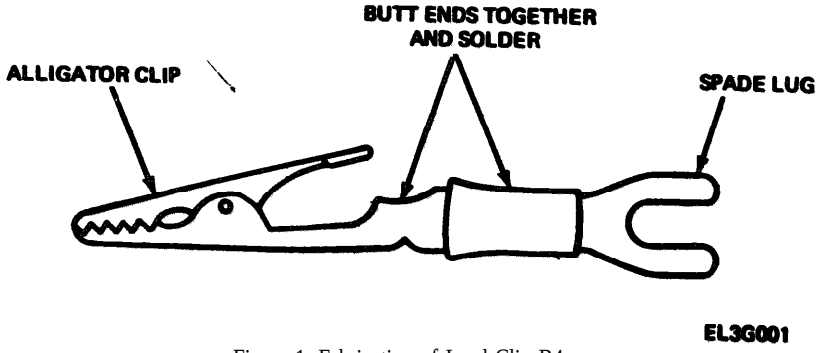


Figure 1. Fabrication of Lead Clip B4.

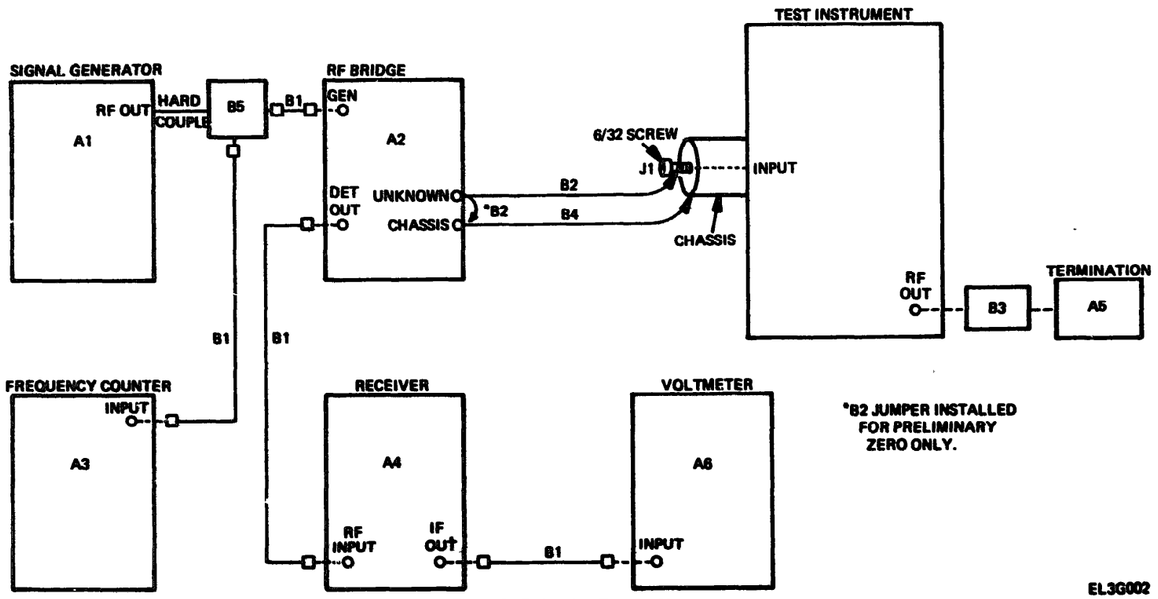


Figure 2. Calibration Test Set-Up.

SECTION IV

CALIBRATION PROCESS

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. Rf Bridge Preliminary Zero

NOTE

Unless otherwise specified, all controls and control settings refer to the Test Instrument.

a. Set signal generator (Al) frequency to 1.5 MHz ***±200*** Hz using frequency counter (A3) with output level at 3.0 volts rms unmodulated.

b. Connect power cord (P/O Test Instrument) to A1J1 and set POWER switch to ON.

c. Set SHUNT CONT switch in accordance with calibration chart (B6).

d. Set receiver (A4) to check frequency and tune for maximum signal level indication at voltmeter (AS).

e. Adjust ohms resistance and ohms reactance controls on rf bridge (A2) as indicated on the calibration chart (B6).

NOTE

Rf bridge (A2) ohms resistance and ohms reactance control adjustment depends upon the sign of reactance for each check frequency and are made accordingly:

(1) Negative sign (-) reactance on calibration chart (B6)
- Initial balance switch - high
- Ohms resistance control - 0
- Ohms reactance control - 5000

(2) Positive sign (+) reactance on calibration chart (B6)
- Initial balance switch - low
- ohms resistance control - 0
- Ohms reactance control - 0

f. Adjust initial balance resistance and reactance controls for minimum signal indication at receiver ***(A4)*** and voltmeter (A6).

g. Remove short at unknown terminal of rf bridge (A2) and connect terminal to Test Instrument input (J1).

9. Test Instrument Dial Calibratiom. a. ***Performance check***

(1) Losen lock-nuts on Test Instrument controls.

(2) Adjust Test Instrument INDUCTOR, SERIES, and SHUNT CAPACITOR controls in accordance with calibration chart (B6).

(3) Adjust rf bridge (A2) controls in accordance with calibration chart (B6).

(4) Carefully readjust rf bridge (AZ) controls for minimum signal indication at voltmeter (A6) and receiver (A4) input level meter.

(5) Record rf bridge (A2) settings. Dials should read within tolerance specified on calibration chart (B6) for Test Instrument.

(6) Repeat steps given in paragraphs 8 and 9 for each frequency on the Test Instrument calibration chart (B6).

b. Adjustments. Adjustment of the Test Instrument is considered to be part of the repair function. Refer to TM 11-5895-372-24 for the procedures necessary to adjust the Test Instrument.

10. Find Procedure. a. Deenergize and disconnect all test equipment and install the Test Instrument in its protective case.

b. In accordance with TM 38-750, annotate and affix calibration DA Label 80 (U.S. Army Calibration System). When the Test Instrument cannot be adjusted to within tolerance, annotate and affix DA Form 2417 (Unserviceable Test Instrument or Limited Use Tag).

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

Distribution:

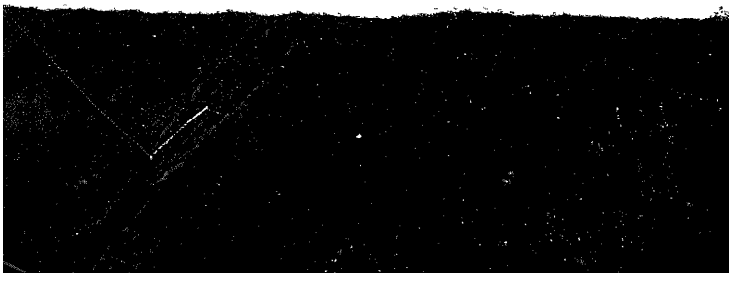
To be distributed in accordance with DA Form 12-34A literature requirements for calibration procedures publications.

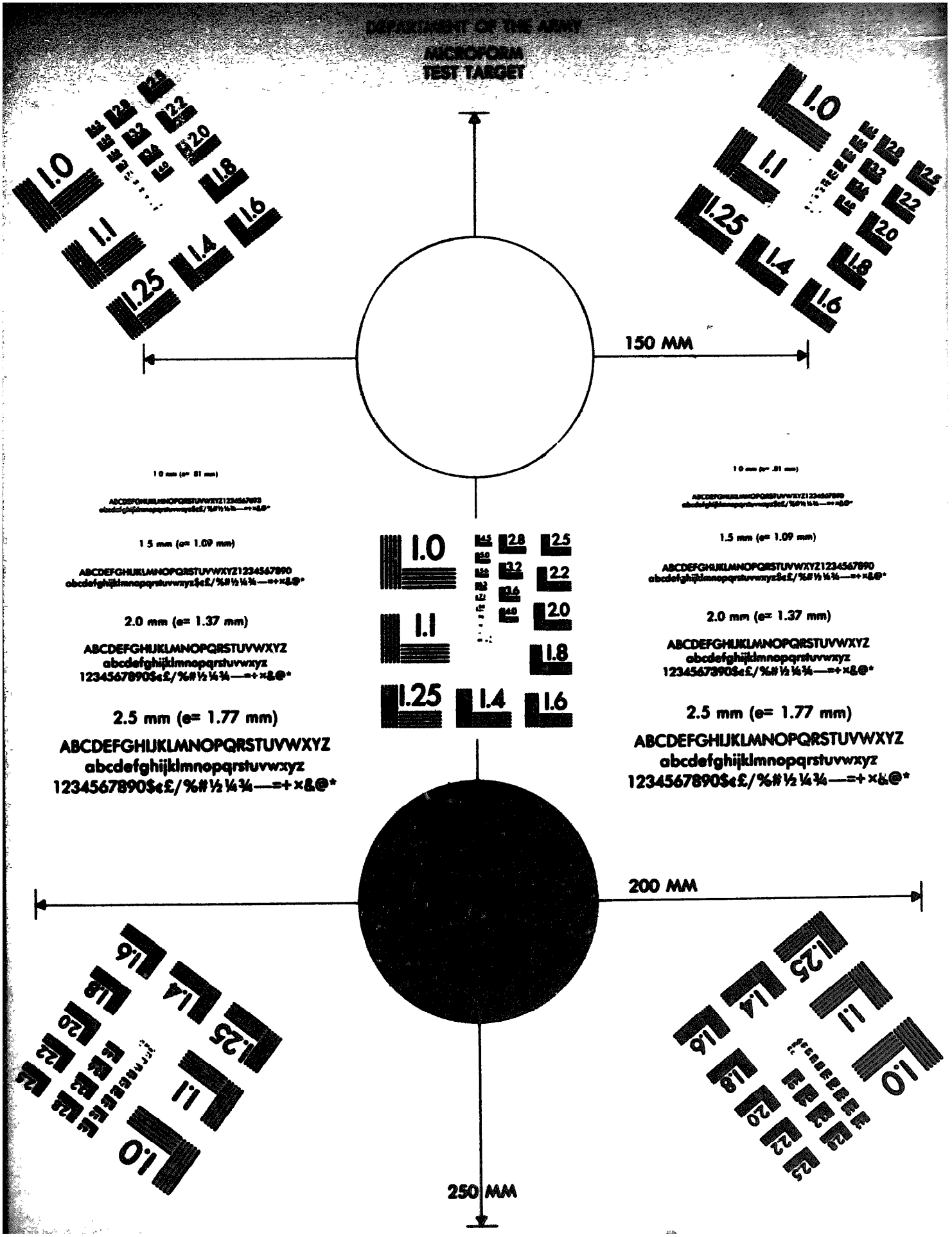
☆ U.S. GOVERNMENT PRINTING OFFICE: 769010/427

END

7-18-83

DATE




DEPARTMENT OF THE ARMY
MICROFORM
TEST TARGET
150 MM
200 MM
250 MM
1.5 mm (e= 1.09 mm)
ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
abcdefghijklmnopqrstuvwxyz$¢£/%#½¼¾—=+×&@*
2.0 mm (e= 1.37 mm)
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×&@*
2.5 mm (e= 1.77 mm)
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%#½¼¾—=+×&@*