CALIBRATION AND VERIFICATION TEST PROCEDURE FOR 3M 701 MEGOHMMETER

1. INTRODUCTION

This Specification defines the suggested method of calibration and performance verification for the 3M 701 Megohmmeter. It also defines the test equipment to be used.

2. TEST EQUIPMENT and DOCUMENTATION

A. A Keithley Model 619 Electrometer or equivalent (input impedance ≥ 1 x 10^9 Ω).

B. A decade box with a range of 1OOKΩ to 10GΩ ±1 % or the following individual resistors:

100KΩ ±1%
1MΩ ±1%
100MΩ ±1%
100MΩ ±1%
1GΩ ±1%
10GΩ ±1%

C. Figure 1 - Calibration adjustments
Figure 2 - Main PC Board Assembly issue 1
Figure 3 - Main PC Board Assembly - issue 2
Figure 4 - Main PC Board Assembly - issue 3

3. VERIFICATION PROCEDURE

A. Place selector switch in the OFF position and adjust the mechanical zero to the left end of the scale.

B. Place selector switch in the BATTERY TEST mode. Verify that pointer is in the green (100V) area on the BATTERY TEST scale.

C. Place the 100KΩ resistor across the input. Switch the unit to CONTINUITY TEST. Verify that the unit reads within limits (± 2° of 100KΩ mark on the CONTINUITY TEST scale. Short the input; verify that the unit has full-scale deflection.

D. Remove the short; place the decade box across the input. Verify that the unit reads within limits for 10GΩ and 1 MΩ in both the 10V and 100V SURFACE TEST modes. (Tolerances for the 1 MΩ / 10 GΩ

readings are shown on the top scale of the meter as small dots on either side of the respective resistance mark on the dial.)

E. Remove the decade box. Using the Keithley 619, verify that the output is between 93V and 107V in the 100V **SURFACE TEST** mode.

F. If above specifications can not be obtained proceed to Section 4, Calibration Procedures

4. CALIBRATION PROCEDURES

A. Place the batteries in the unit. Place the selector switch in the BATTERY TEST position.

B. Press the TEST button, adjust R10 so that 10.00 V ± .01V appears between U2 Pin 7 and ground. Release the TEST button.

C. Press the TEST button. Adjust R23 for 100.0V ± .1V between SW 1 Pin 12 and ground. Release the TEST button.

D. Place the selector switch in 100V SURFACE TEST position. Short the input jacks. Press TEST button. Adjust R21 so that pointer reads full scale. Release TEST button.

E. Return the selector switch to BATTERY TEST. Press the TEST button. Adjust R36 so that the pointer lies over 100V mark on BATTERY TEST scale. (For Issue 1 PC Boards, adjust the value of R8 to align the pointer, as above. You will be able to find the issue number in the vicinity of the TEST switch on the PC board.) Release the TEST button.

F. Place the unit in its case. Verify that the unit reads within the tolerance limits for the following resistances in both the 10V and 100V SURFACE TEST modes: 100KΩ, 1 MΩ, 10MΩ, 100MΩ, 1GΩ, 10GΩ. (Tolerances for the 1 MΩ - 10GΩ readings are shown on the top scale of the meter as small dots on either side of the resistance range. For the 100KΩ range, estimate ± 2° either side of the 100KΩ mark on the upper scale of the meter.)

G. Verify that the unit reads properly with a short and then a 100KΩ resistance across the test leads in the CONTINUITY TEST mode. (NOTE: for the 100KΩ range, estimate ± 2° either side of the 100KΩ mark on the continuity scale of the meter.)

701 MEGOHMMETER VERIFICATION / CALIBRATION

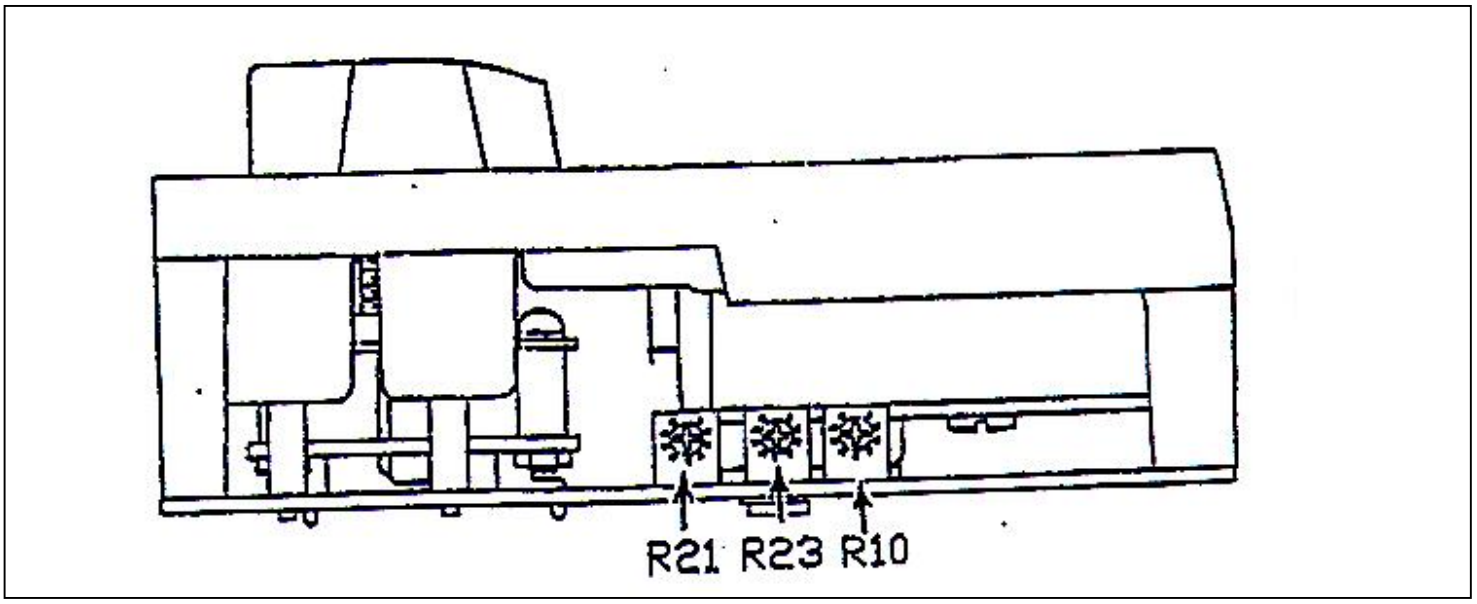

Figure 1 Calibration Adjustments
(R36 is located on opposite edge of printed circuit board)

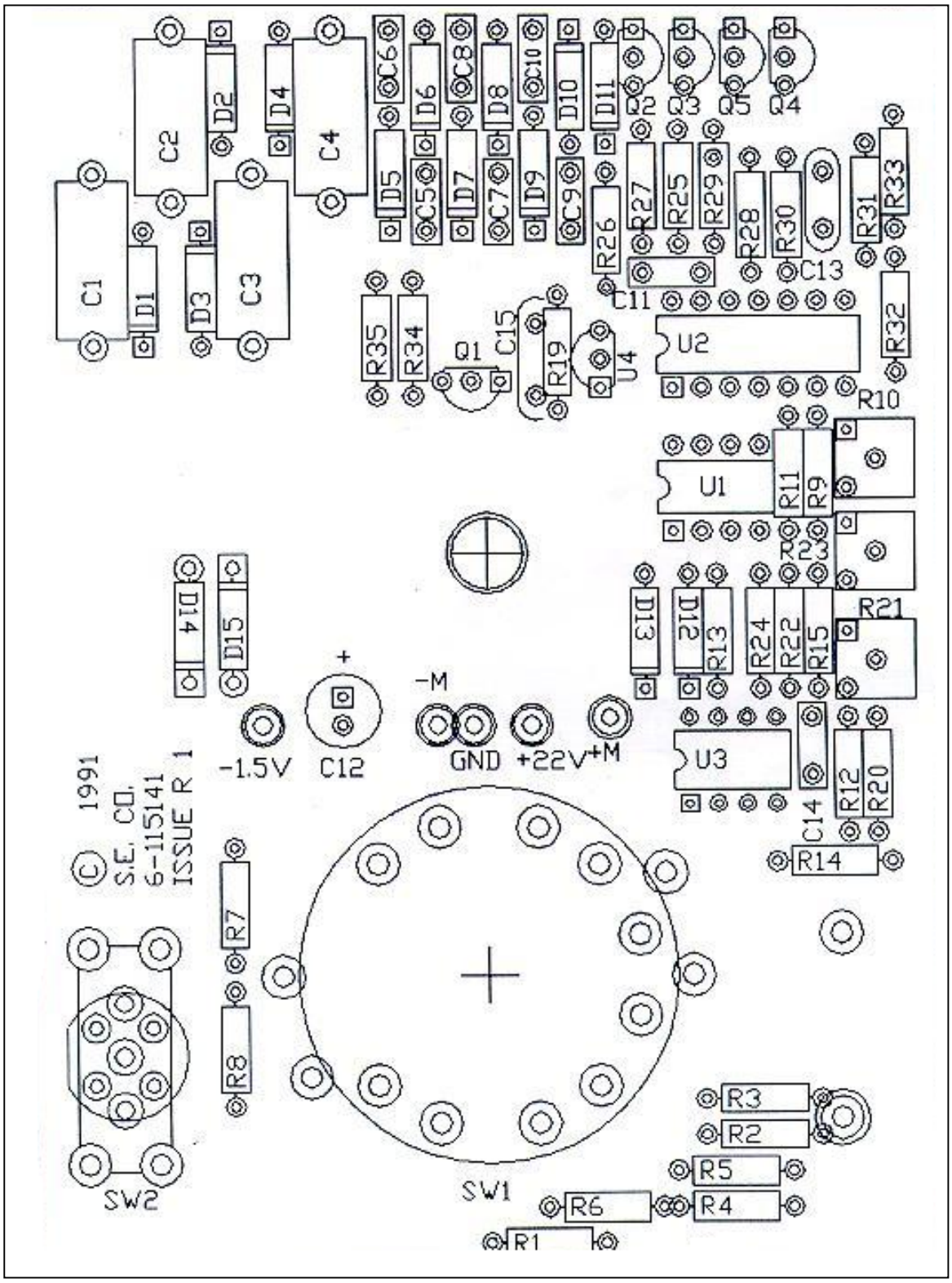

Figure 2. Main PC Board Assembly - Model T00456 3M 701 (Issue 1)

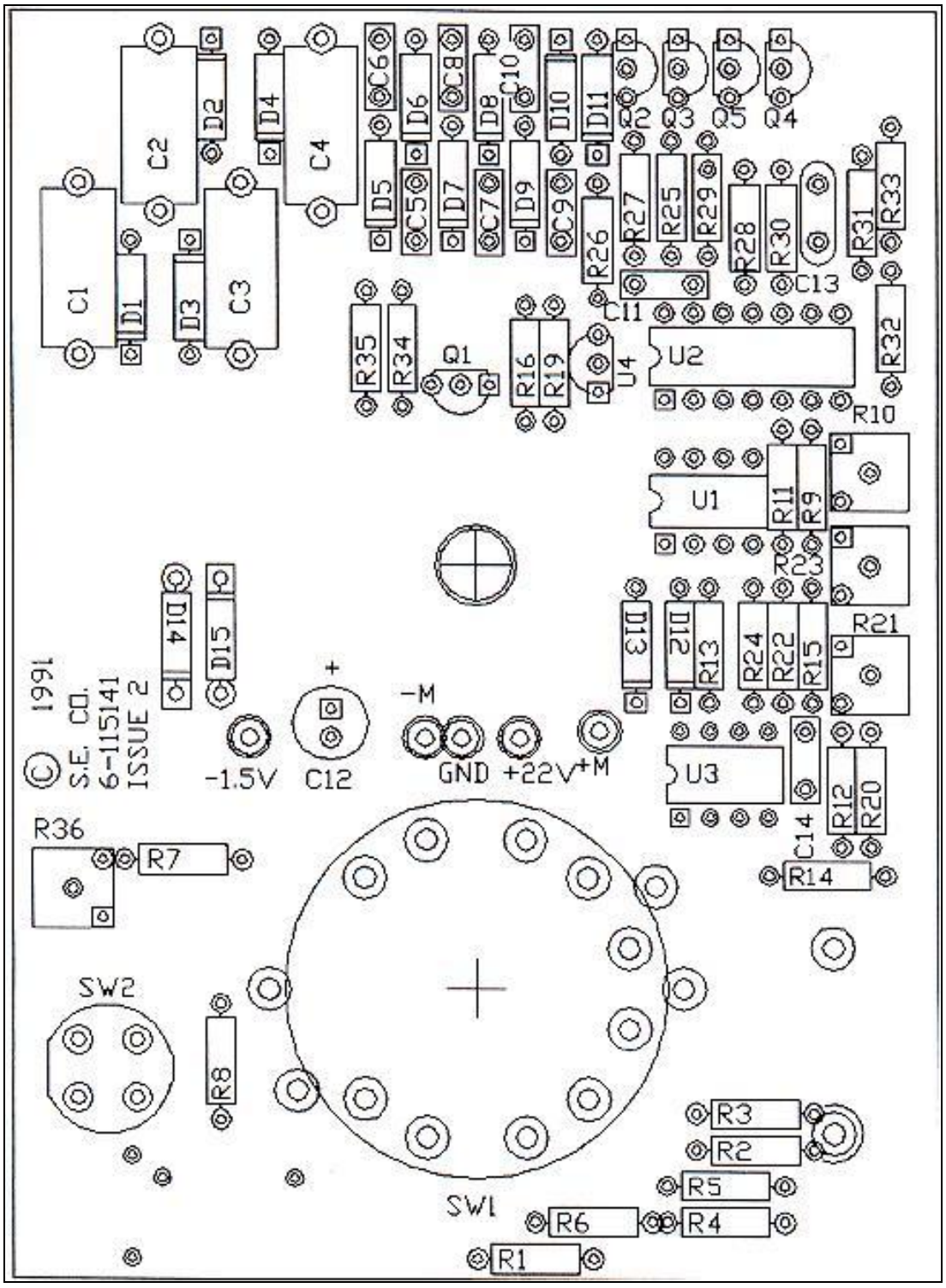

Figure 3. Main PC Board Assembly - Model T00456 3M 701 (Issue 2)

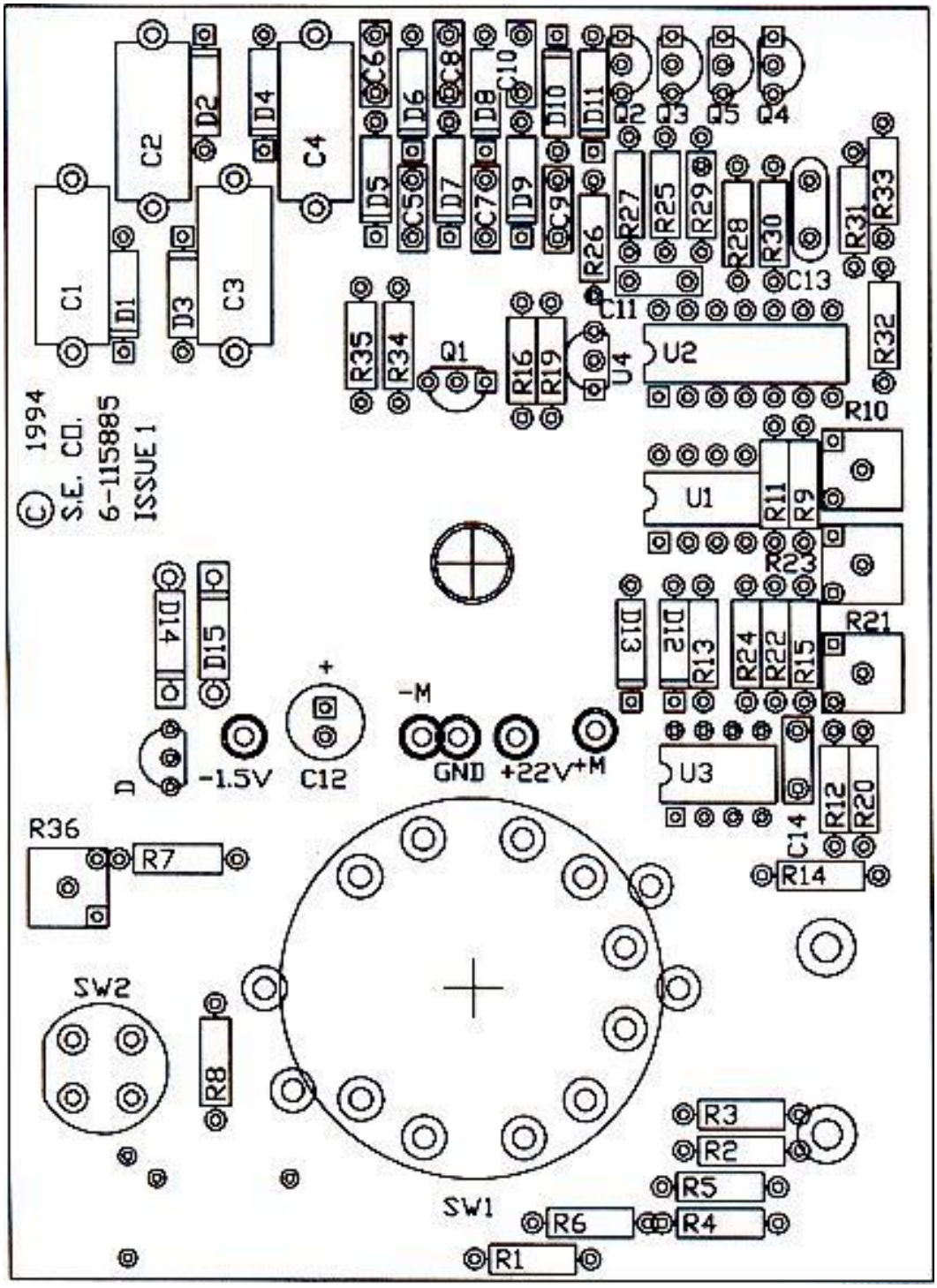

Figure 4. Main PC Board Assembly - Model T00456 3M 701 (Issue 3)

The accuracy of the 701 is based on two tolerances (+/- 5% electrical & +/-2 deg. of arc, meter's needle movement). The sum of these two tolerances are identified by two tiny dots, one on each side of the major intervals (100 kilohms, 1megohm, 10 megohms, 100 megohms, 1gigaohm, and 10 gigaohms) marks located on the top scale. So to check the 701 for resistance measurement accuracy you need to test resistances at the major intervals and confirm that the readings fall within the dots. Please be aware that we are faxing the calibration procedure for the 701 Megohmmeter to you at the fax number listed below.

3M 701 Meter Scales

Scales are nonlinear.

"A" scale - Small marks identify midpoints between each range as identified on drawing.

"B" scale – Small marks are as follows:

0 to 100K, 50Kper mark
100K to 1.0M, 100K per mark
1.0M to 10M, 1M per mark
10M to 100M, 20M per mark
100M to 1.0G, 200M per mark
1.0G to 10G, 2.0G per mark