*TB 9-6625-2280-40

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR PEAK POWER METER WAVETEK, MODEL 8502A

Headquarters, Department of the Army, Washington, DC
14 August 2007

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, ATTN: 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.

*This bulletin supersedes TB 9-6625-2280-35, dated 1 March 2005.

SECTION I
IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Peak Power Meter, Wavetek, Model 8502A. 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 6 hours, using the dc and low frequency and microwave techniques.

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
Calibrator output	Frequency range: 0.95 to 1.05 GHz Accuracy: ±5.0% Power range: 1.000 mW Accuracy: ± 4.5%[1]
Power linearity	Frequency range: 30 MHz to 40 GHz[2] Power range: Peak power mode -20 to +20 dBm[3] Accuracy: -10 dBm ±7% 0 to +10 dBm ±4% Power range: CW power mode -40 to +20 dBm[4] Accuracy: 30 dBm ±5% -20 to +20 dBm ±4%
Analog output	Coefficient: 100mV/dB(0 V = 0 dBm)
Voltage proportional to frequency	1 V dc per GHz Accuracy at 10 GHz: ± 0.5%

[1] Reflects both the uncertainty of the calibrator and the uncertainty of the power meter used to verify it

[2] Checked at 1 GHz only.

[3] -30 dBm range accuracy ±39% not checked.

[4] -40 dBm range accuracy ±14% not checked.

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 Reference Calibration Standards Set, NSN 4931-00-621-7878. 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 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.

Table 2. Minimum Specifications of Equipment Required

Common name	Minimum use specifications	Manufacturer and model (part number)
ATTENUATOR (FIXED)	Frequency range: 0.955 to 1.05 GHz Attenuator range: 10 dB Accuracy: ±0.3 dB Attenuator range: 20 dB Accuracy: ± 0.5 dB Attenuator range: 30 dB Accuracy: ±1.0 dB	Weinschel, Model 9918, 9918-10dB, 9918-20dB, and 9918-30dB (9918)
AUTOTRANSFORMER	Voltage range: 105 to 125 V ac Accuracy: ±1%	Ridge, Model 9020A (9020A)
CALIBRATOR	Dc voltage range: 5.00 and 10.00 V dc Accuracy: ±1.2%	Fluke, Model 5720A (5700A) (p/o MIS-35947)
DIRECTIONAL COUPLER	Frequency range: 1 GHz Coupling factor: 10 dB	Wavecom, Model L901E (MIS-10409/2133)
FREQUENCY COUNTER	Frequency range: 0.95 to 1.05 GHz Accuracy: ±1.25%	Fluke, Model PM6681/656 (PM6681/656)
MULTIMETER	Resistance range: 200 Ω Accuracy: ±0.01% Dc voltage range: 150 μV to 15.045 V dc Accuracy: ±0.0075%	Hewlett-Packard, Model 3458A (3458A)
OSCILLOSCOPE	Amplitude range: DC Offset measurement capability -0.002 to +0.002 mVdc	(OS-303/G)
POWER METER	Frequency range: 0.95 to 1.05 GHz Power range: 0. 1 to 9 mW Accuracy: ±1.125% Must have V_{RF} and V_{comp} terminals	Hewlett-Packard, Model E12-432A (MIS-30525) w/thermistor mount, Hewlett-Packard, Model 478A-H75 (7915907) or 8478B (8478B)

Table 2. Minimum Specifications of Equipment Required - Continued

Common name	Minimum use specifications	Manufacturer and model (part number)
PULSE GENERATOR	Amplitude: 5 V pk positive Pulse width: 10 μs PRF: 10 kHz	LeCroy, Model 9210 (9210) w/plug-ins, LeCroy, Models 9211 (9211) and 9215 (9215) (MIS 45839)
SIGNAL GENERATOR	Frequency range: 1000 MHz Output power range: 0 to +3 dBm accuracy of power meter reading	(SG-1207/U)

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 the procedure. Additional maintenance information is contained in the manufacturer's manual for this TI.

d. When indications specified in paragraphs **8** through **13** are not within tolerance, perform the power supply check prior to making adjustments. After adjustments are made, repeat paragraphs **8** through **13**. Do not perform power supply check 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.

NOTE
Perform this calibration for both RF detectors.

a. Connect both RF detectors to respective RF detector cables by pulling back on metal sleeve at RF detector end. Align the red dots of both the RF detector and RF detector cable end and make the connection.

NOTE
Ensure high speed RF detector is connected to **DETECTOR INPUT A** and low speed RF detector is connected to **DETECTOR INPUT B**.

NOTE
In text, high speed RF detector will be referred to as RF detector A and low speed RF detector will be referred to as RF detector B.

b. Connect SMA female to UHF male adapter to RF detector A.

c. Connect TI to a 115 V ac source.

d. Set TI **POWER** switch to **ON** position.

NOTE
EL display may indicate "RECAL: dt XXX DEGS-C" until power sensors reach operating temperature.

e. Set frequency counter and power meter power switches to **ON** position.

f. Allow 30 minutes for TI and equipment stabilization.

NOTE
TI will display an indication if the ±5 degrees centigrade range is exceeded. If "RECAL: dt XXX DEGS-C" appears on EL display during calibration, the RF detectors must be recalibrated.

g. Press **MENU**, then **F3**, followed by **F1** keys.

h. Connect RF detector A to **CALIBRATOR 1 GHz** output.

i. Press any **UNITS** key (**nS** or **μS** or **mS** key).

j. Wait for calibration cycle to complete, then disconnect RF detector A from **CALIBRATOR 1 GHz** output.

k. Connect RF detector B to **CALIBRATOR 1 GHz** output.

l. Press any **UNITS** key (**nS** or **μS** or **mS** key).

m. Wait for calibration cycle to complete, then disconnect RF detector B from **CALIBRATOR 1 GHz** output.

8. Calibrator Frequency Accuracy Test

a. Performance Check

(1) Press **MENU** key and then press **F3** key.

(2) Press **F1** key when **CALIBRATION/ZEROING** menu appears and then immediately press number **7** key.

CAUTION

Do not press any **UNITS** key **(nS** or **μS** or **mS** key). If any **UNITS** keys are pressed, **CALIBRATOR 1 GHZ** output power will increase to 100 mW.

(3) Connect TI **CALIBRATOR 1 GHz** output through a 10 dB attenuator (fixed) to frequency counter **C** input.

(4) Set frequency counter for **FREQ C** function. Frequency counter will indicate between 950 MHz and 1.05 GHz.

(5) Disconnect TI from frequency counter.

(6) Press **CLEAR** key three times.

b. Adjustments. No adjustments can be made.

9. Calibrator Output Level Test

a. Performance Check

(1) Set power meter power pushbutton to **OFF** position.

(2) Disconnect thermistor mount from power meter interconnect cable.

(3) Connect multimeter (resistance mode) between VRF terminal on power meter (rear panel) and pin 1 of thermistor mount end of power meter interconnect cable.

(4) Round off multimeter indication to 2 decimal places and record this value as power meter internal bridge resistance R (value will be approximately 200 Ω).

(5) Connect thermistor mount to power meter interconnect cable.

(6) Set power meter power pushbutton to **ON** position.

(7) Press **CW** key only if **CW** key is not lit.

NOTE

Allow equipment and thermistor mount to warm-up for 30 minutes before proceeding to (8) below.

(8) Set power meter **RANGE** switch to **COURSE ZERO** and adjust front panel **COURSE ZERO** control for a zero meter indication.

(9) Fine zero power meter on most sensitive range, then set power meter **RANGE** switch to **1 mW.**

(10) Ensure multimeter input terminals are isolated from chassis ground for (11) below.

(11) Adjust multimeter (dc mode) controls to measure microvolts.

(12) Connect multimeter positive lead to power meter **VCOMP** and connect multimeter negative lead to power meter **VRF.**

(13) Press **MENU** key (one time) and then **F3** key.

(14) Press **F1** key when **CALIBRATION/ZEROING** menu appears and then immediately press number **7** key.

CAUTION

Do not press any **UNITS** key **(nS, μS,** or **mS** keys). If any **UNITS** keys are pressed, **CALIBRATOR 1 GHZ** output power will increase to 100 mW.

(15) Press **CLEAR** key.

(16) Connect power meter to **CALIBRATOR 1 GHZ** output.

(17) If multimeter indication is 400 μV or less, record multimeter indication and proceed to (19) below; if not, proceed to (18) below.

(18) Hold power meter **FINE ZERO** control and adjust **COURSE ZERO** control for a multimeter indication of 200 μV or less. Record multimeter indication.

(19) Round off indications recorded in (17) or (18) above to the nearest microvolt and record this value as V_0.

NOTE

nS, μS, mS keys are **UNITS** keys.

WARNING

Do not press any **UNITS** keys when power meter is connected to TI. TI output will increase to 100 mW output power if any **UNITS** keys are pressed.

(20) Press number **7** key and record multimeter indication as V_1.

(21) Disconnect multimeter negative lead from power meter **VRF** and connect multimeter negative lead to power meter chassis ground. Record multimeter indication as V_{comp}.

(22) Disconnect multimeter negative lead from power meter chassis ground and connect multimeter negative lead to power meter **VRF.**

(23) Press **CLEAR** key.

(24) Repeat (17) through (23) above five times.

(25) Average V_0 indications recorded in (19) above.

(26) Average V_1 indications recorded in (20) above.

(27) Average V_{COMP} indications recorded in (21) above.

(28) Calculate the **CALIBRATOR** output level PRF from the below listed formula.

WHERE:

$$PRF = \frac{2V_{COMP}(V_1 - V_0) + V_0^2 - V_1^2}{4R \text{ (calibration factor)}}$$

PRF = **CALIBRATOR** output power level
V_{COMP} = Average determined in (27) above
V_1 = Average determined in (26) above
V_0 = Average determined in (25) above
R = Value recorded in (4) above
Calibration factor = value for thermistor mount at 1 GHz

(29) If calculated PRF is not between 0.955 and 1.045 mW, perform **b** below.

b. Adjustments

(1) Press **CLEAR** key.

(2) Connect power meter to **CALIBRATOR 1 GHz** output.

(3) Press number **7** key.

(4) Press any number key. If power meter indication is negative (e.g., -0.2 dBm), adjust A3R16 (fig. 1) cw to approximately twice the error or, if power meter indication is positive (e.g., +0.2 dBm), adjust A3R16 (fig. 1) ccw to approximately twice the error (R).

(5) Press any number key. If power meter does indicate 0.00 dBm, repeat (3) and (4) above.

(6) Disconnect TI from power meter.

(7) Press **CLEAR** key.

(8) Connect RF detector **A** to **CALIBRATOR 1 GHZ** output.

(9) Press any **UNITS** key **(nS** or **μS** or **mS** key). Wait for TI to calibrate itself before proceeding to (10) below.

(10) Disconnect RF detector A from **CALIBRATOR 1 GHZ** output.

(11) Connect RF detector B to **CALIBRATOR 1 GHZ** output.

(12) Press any **UNITS** key **(nS** or **μS** or **mS** key.) Wait for TI to calibrate itself before proceeding to (13) below.

(13) Disconnect RF detector B from **CALIBRATOR 1 GHZ** output.

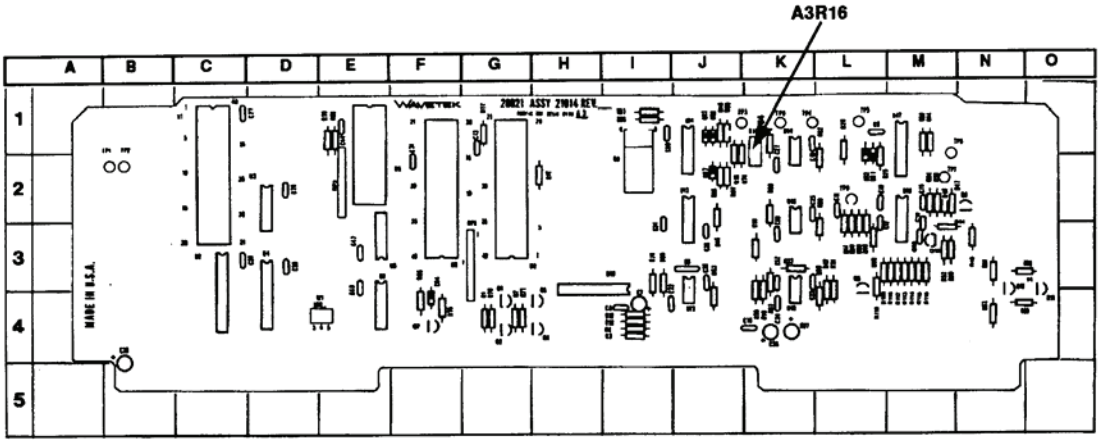

Figure 1. A3R16 - adjustment location.

10. Power Linearity Test

a. Performance Check

(1) Refer to figure 2 and connect equipment as listed in (a) through (c) below:

(a) Connect signal generator **RF OUTPUT** to directional coupler **INPUT**.

(b) Connect power meter to POINT A (fig. 2) of directional coupler.

(c) Connect 50 Ω termination to POINT B (fig. 2) of directional coupler.

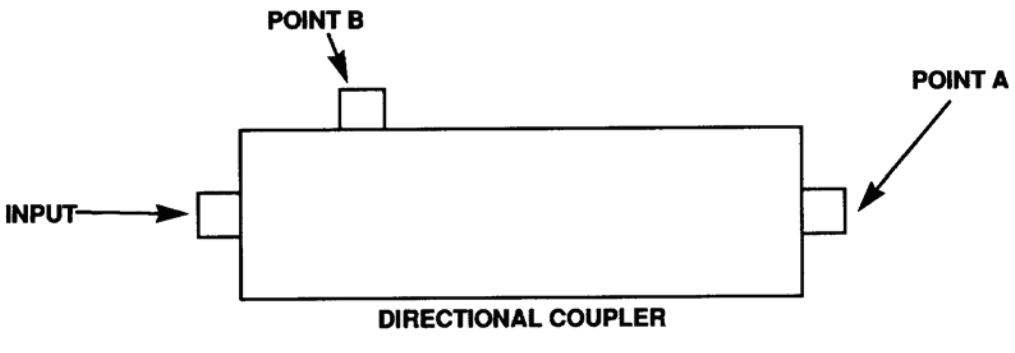

Figure 2. Power linearity - equipment setup.

(2) Adjust signal generator frequency controls for an output frequency of 1000 MHz.

NOTE

Ensure power meter zero is maintained throughout this performance check by setting signal generator **RF OFF/ON** key to the **OFF** position and checking power meter zero indication.

(3) Adjust signal generator amplitude controls for a power meter indication of 10.0 mW.

(4) Disconnect power meter from POINT A (fig. 2) and 50 Ω termination from POINT B (fig. 2).

(5) Connect power meter to POINT B (fig. 2) and 50 Ω termination to POINT A (fig. 2).

(6) Record power meter indication as P1 value.

(7) Disconnect power meter from POINT B (fig. 2) and 50 Ω termination from POINT A (fig. 2).

(8) Connect power meter to POINT A (fig. 2) and 50 Ω termination to POINT B (fig. 2).

(9) Adjust signal generator amplitude controls for a power meter indication of 1.0 mW.

(10) Disconnect power meter from POINT A (fig. 2) and 50 Ω termination from POINT B (fig. 2).

(11) Connect power meter to POINT B (fig. 2) and 50 Ω termination to POINT A (fig. 2).

(12) Record power meter indication as P2 value.

(13) Disconnect 50 Ω termination from POINT A (fig. 2).

(14) Divide P2 value recorded in (12) above into P1 value recorded in (6) above. Record results as X.

(15) Press TI keys as listed in (a) through (d) below:

(a) **MENU** key (two times).
(b) **F1** key.
(c) **500** using number keys.
(d) Any **UNITS** key (**nS** or **μS** or **mS** key).

NOTE

If TI display does not indicate **mW**, perform (16) below.

(16) Press **MENU** key four times and then press **F3 key** to place TI EL display indication in mW.

NOTE

This action changes menu format from dBm to mW.

(17) Connect RF detector A to **CALIBRATOR 1 GHZ** output.

(18) Press keys as listed in (a) through (d) below:

(a) **MENU** key.
(b) **F3** key.
(c) **F1** key.
(d) Any **UNITS** key (**nS** or **μS** or **mS** key).

(19) Disconnect RF detector A from **CALIBRATOR 1 GHZ** output.

NOTE

Press **CLEAR** key to bypass B detector calibration.

(20) Connect RF detector A to POINT A (fig. 2).

(21) Adjust signal generator amplitude controls for a power meter indication equal to P1 value recorded in (6) above.

(22) Record TI EL display indication as S1.

(23) Adjust signal generator amplitude controls for a power meter indication equal to P2 value recorded in (12) above.

(24) Record TI EL display indication as S2.

(25) Divide S2 value recorded in (24) above into S1 value recorded in (22) above. Record results as Y.

(26) Calculate linearity error (percent) using the below listed formula and record the results in table 3 under the linearity error (%) column. Linearity error will be less than linearity specification listed in table 3.

Linearity Error (%) = {[(Y/X) -1] x 100}

WHERE:

X = value recorded in (14) above

Y = value recorded in (25) above

Table 3. CW Linearity Data

Total attenuation (dB)	Linearity specification (+%)	Linearity error (+%)	Accumulated linearity error sum (%)
0	4		- - -
10	4		
20	4		
30	4		
40	5		

(27) Insert 10 dB attenuator (fixed) between POINT A (fig. 2) and RF detector A.

(28) Perform steps as listed in (a) through (c) below:

(a) (23) then (24).
(b) (21) then (22).
(c) (25) then (26).

(29) Add current linearity error to previous recorded linearity error in table 3. Record accumulated linearity error in table 3. Accumulated linearity error sum will be less than linearity specification listed in table 3.

(30) Replace 10 dB attenuator (fixed) with 20 dB attenuator (fixed) in figure 2 equipment setup.

(31) Repeat (21) through (26) above.

(32) Add current linearity error to previous recorded linearity error in table 3. Record accumulated linearity error sum in table 3. Accumulated linearity error sum will be less than linearity specification listed in table 3.

(33) Replace 20 dB attenuator (fixed) with 30 dB attenuator (fixed) in figure 2 equipment setup.

(34) Perform steps as listed in (a) through (c) below:

(a) (23) then (24).
(b) (21) then (22).
(c) (25) then (26).

(35) Add current linearity error to previously recorded linearity error in table 3. Record accumulated linearity error sum in table 3. Accumulated linearity error sum will be less than linearity specification listed in table 3.

(36) Insert 10 dB attenuator (fixed) between 30 dB attenuator (fixed) and RF detector A in figure 2 equipment setup.

(37) Repeat (21) through (26) above.

(38) Add linearity error to previously recorded linearity error in table 3. Record accumulated linearity error sum in table 3. Accumulated linearity error sum will be less than linearity specification listed in table 3.

(39) Disconnect 10 and 30 dB attenuators (fixed) from POINT A of figure 2 equipment setup.

(40) Connect pulse generator output to **TRIG INPUT** on TI rear panel.

(41) Set pulse generator controls for a pulse signal with 5 V amplitude (TTL), 10 μs duration, and a repetition rate of 1 kHz.

(42) Press keys as listed in (a) through (g) below:

(a) **PEAK** key.
(b) **MENU** key.
(c) **F2** key.
(d) **MENU** key two times.
(e) **F2** key.
(f) **100** using number keys.
(g) Any **UNITS** key (**nS** or **μS** or **mS** key).

NOTE

Perform (43) below only if TI EL display indication is not in mW.

(43) Press **MENU** key four times and then press **F3** key.

(44) Connect RF detector A to POINT A (fig. 2).

(45) Adjust signal generator amplitude controls for a power meter indication equal to P1 value recorded in (6) above.

(46) Record TI EL display indication as S1.

(47) Adjust signal generator amplitude controls for a power meter indication equal to P2 value recorded in (12) above.

(48) Record TI EL display indication as S2.

(49) Divide S2 value recorded in (48) above into S1 value recorded in (46) above. Record results as Y.

(50) Calculate linearity error (percent) using the below listed formula and recording the results in table 4 under the linearity error (%) column. Linearity error will be less than linearity specification listed in table 4.

Linearity error (%) = {[(Y/X) - 1] x 100}

WHERE:

X = value recorded in (14) above

Y = value recorded in (49) above.

Table 4. Peak Linearity Data

Total attenuation (dB)	Linearity specification (+%)	Linearity error (+%)	Accumulated linearity error sum (%)
0	4		
10	4		
20	7		
30	39		

(51) Insert 10 dB attenuator (fixed) between POINT A (fig. 2) and RF detector A.

(52) Perform steps as listed in (a) through (c) below:

(a) (47) then (48).
(b) (45) then (46).
(c) (49) then (50).

(53) Add linearity error to previously recorded linearity error in table 4. Record linearity error in table 4. Accumulated linearity error sum will be less than linearity specification listed in table 4.

(54) Replace 10 dB attenuator (fixed) with 20 dB attenuator (fixed) in figure 2 equipment setup.

(55) Repeat (45) through (50) above.

(56) Add linearity error to previous recorded linearity error in table 4. Accumulated linearity error will be less than linearity specification listed in table 4.

(57) Disconnect equipment as shown in figure 2.

(58) Repeat **10** above for TI RF detector B input.

b. Adjustments. No adjustments can be made.

11. Analog Output Accuracy Test

a. Performance Check

(1) Adjust signal generator frequency and amplitude controls for an output frequency of 1000 MHz at 0 dBm (cw).

(2) Connect multimeter to **CHANNEL A ANALOG OUTPUT** on TI rear panel.

(3) Press TI keys as listed in (a) through (e) below:

(a) **CW** key.
(b) **MENU** key (two times).
(c) **F1** key.
(d) **900** using number keys.
(e) And **UNITS** key (**nS** or **μS** or **mS** keys).

(4) Connect RF detector A to **CALIBRATOR 1 GHZ** output.

(5) Press keys as listed in (a) through (d) below:

(a) **MENU** key.
(b) **F3** key.
(c) **F1** key.
(d) Any **UNITS** key (**nS** or **μS** or **mS** key).

(6) Disconnect RF detector **A** from **CALIBRATOR 1 GHZ** output.

(7) Connect RF detector A to signal generator **RF OUTPUT.**

(8) Adjust signal generator amplitude controls for an EL display indication between -0.09 and +0.01 dBm.

(9) Record multimeter indication. If multimeter indication is not less than -10 mV dc, perform **b** below.

(10) Adjust signal generator amplitude controls for an EL display indication of -9.98 and -10.02 dBm. Record multimeter indication.

(11) Subtract multimeter indication recorded in (9) above from multimeter indication recorded in (10) above. If difference is not between -.995 and -1.005 V dc, perform **b** below.

(12) Disconnect multimeter from **CHANNEL A ANALOG OUTPUT** on TI rear panel.

(13) Connect multimeter to **CHANNEL B ANALOG OUTPUT** on TI rear panel.

(14) Press RF detector B pushbutton to **ON** and RF detector **A** to **OFF**.

(15) Connect RF detector B to **CALIBRATOR 1 GHz** output.

(16) Repeat (5) through (11) above using RF detector B.

(17) Disconnect multimeter and signal generator from TI.

b. Adjustments

NOTE

Perform first multimeter hookup and adjustments on A6 board and when instructed by text in (4) below, perform multimeter hookup and adjustments on A7 board.

(1) Connect multimeter (dc mode) LO lead to A6TP1 (A7TP1) (fig. 3).

(2) Connect multimeter (dc mode) HI lead to A6TP2 (A7TP2) (fig. 3).

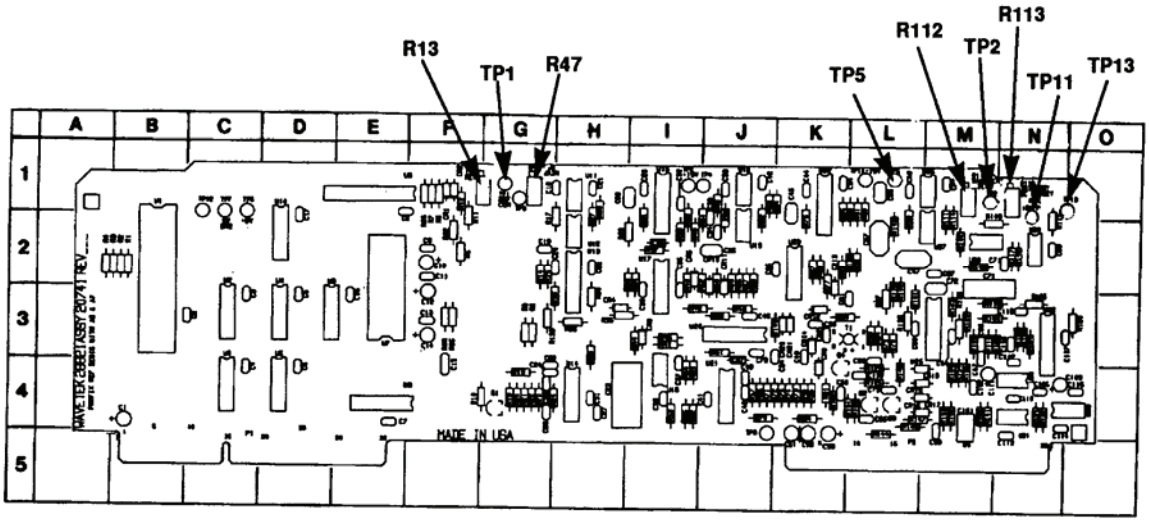

Figure 3. A6/A7 board - component locations.

(3) Adjust A6R13 (A7R13) (fig. 3) for a multimeter indication between 9.997 and 10.003 V dc (R).

(4) Repeat (1) through (3) above for A7 board.

(5) Disconnect multimeter leads from TI.

NOTE

Perform first equipment hookup and adjustments on A6 board for (6) through (17) below and, when instructed by text in (18) below, perform equipment hookup and adjustments on A7 board.

(6) Press TI keys as listed in (a) through (d) below:

(a) **MENU** key (two times).
(b) **F2** key.
(c) **20** using number keys.
(d) Any **UNITS** key (**nS** or **μS** or **mS** key).

(7) Connect **SYNC OUTPUT** (rear panel) to oscilloscope channel 2 input and set this input as an external trigger on oscilloscope.

(8) Connect oscilloscope channel 1 input LO (common) lead to A6TP11 (A7TP11) (fig. 3) and then connect oscilloscope channel 1 input HI lead to A6TP5 (A7TP5) (fig. 3).

(9) Connect pulse generator output to **TRIG INPUT** on TI rear panel.

(10) Set pulse generator controls for a pulse signal with 5 V amplitude (TTL), 10 μs pulse width, and a repetition rate of 1 kHz.

(11) Press TI keys as listed in (a) through (c) below:

(a) **PEAK** key.
(b) **MENU** key.
(c) **F2** key.

(12) Adjust A6R112 (A7R112) (fig. 3) for an oscilloscope display indication between -0.002 and +0.002 V dc offset at the end of sample time (R).

NOTE

Press channel B key in (13) (c) below when repeating steps for A7 board adjustments.

(13) Press TI keys as listed in (a) through (e) below:

(a) **MENU** key.
(b) **F1** key.
(c) Channel A key (channel B key).
(d) -**15** using number keys.
(e) **dBm** key.

(14) Connect multimeter (dc mode) LO lead to A6TP1 (A7TP1) (fig. 3).

(15) Connect multimeter (dc mode) HI lead to A6TP13 (A7TP13) (fig. 3).

(16) Adjust A6R113 (A7R113) (fig. 3) for a multimeter indication between -0.001 and +0.001 V dc offset (R).

(17) Disconnect TI from equipment setup.

(18) Repeat (6) through (17) above for A7 board.

(19) Press **RESET** pushbutton located on TI rear panel.

(20) Press TI keys as listed in (a) through (d) below:

(a) **MENU** key (eleven times).
(b) **F1** key.
(c) **1** using number key.
(d) **F2** key.

NOTE

If TI requires detector calibration when TI prompts "CONNECT DETECTOR TO CALIBRATOR THEN PRESS ANY UNITS KEY", perform the instructions and then press **7** data entry key.

(21) Connect multimeter (dc mode) to **ANALOG A** output on TI rear panel.

(22) Adjust A6R47 (fig. 3) for a multimeter indication between -0.01 and +0.01 V dc (R).

(23) Press **F3** key. Multimeter will indicate between 2.975 and 3.025 V dc.

(24) Press **F1** key. Multimeter will indicate between -4.965 and -5.035 V dc.

(25) Press **F2** key.

(26) Move multimeter (dc mode) connection from **ANALOG A** output on TI rear panel to **ANALOG B** output on TI rear panel.

(27) Adjust A7R47 (fig. 3) for a multimeter indication between -0.01 and +0.01 V dc (R).

(28) Press **F3** key. Multimeter will indicate between 2.975 and 3.025 V dc.

(29) Press **F1** key. Multimeter will indicate between -4.965 and -5.035 V dc.

(30) Disconnect TI from equipment setup.

12. Voltage Proportional to Frequency Test

a. Performance Check

(1) Press TI keys as listed in (a) through (f) below:

(a) **MENU** key (three times).
(b) **F3** key.
(c) **F2** key.
(d) **1.0** number keys.
(e) **mS UNITS** key.
(f) **CLEAR** key.

(2) Connect calibrator dc output to **FREQ INPUT** on TI rear panel.

(3) Adjust calibrator dc controls for 5.000 V dc output. TI EL **FREQ =** display will indicate between 4.98 and 5.02 GHz.

(4) Adjust calibrator dc controls for 10.00 V dc output. TI EL **FREQ =** display will indicate between 9.95 and 10.05 GHz.

(5) Disconnect calibrator from TI.

(6) Press **CLEAR** key.

b. Adjustments. No adjustments can be made.

13. Power Supply

NOTE

Do not perform power supply check if all other parameters are within tolerance.

a. Performance Test

(1) Press TI **POWER** switch to **OFF** position.

(2) Disconnect TI from 115 V ac source.

(3) Connect TI to autotransformer.

(4) Set autotransformer power switch to **ON** position and adjust autotransformer controls for 115 V ac output.

(5) Remove TI top.

(6) Set TI **POWER** switch to **ON**.

(7) Allow 30 minutes for TI to warm-up and stabilize.

(8) Connect multimeter (dc mode) to test points (refer to figure 4 for test point locations) listed in table 5. If multimeter does not indicate within the limits listed in table 5, perform corresponding adjustments listed.

(9) Adjust autotransformer controls from 105 to 125 V ac while observing multimeter indications. Multimeter indications will be within the limits listed in the change in voltage (±mV) column of table 5.

(10) Repeat (8) and (9) above for remaining power supply voltages (V dc) listed in table 5.

(11) Press TI **POWER** switch to **OFF** position.

(12) Disconnect TI from equipment setup.

(13) Replace TI top.

b. Adjustments. No further adjustments can be made.

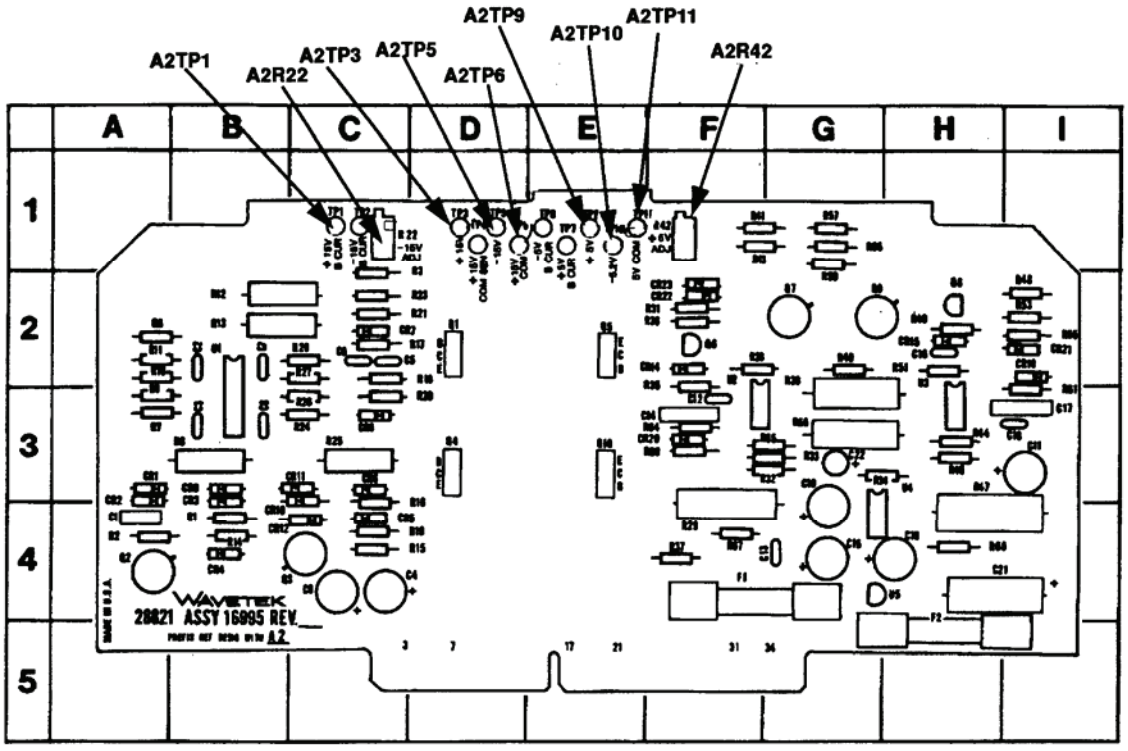

Figure 4. Power supply - component locations.

Table 5. Power Supply

Power supply voltages (V dc)	Test instrument test points (fig.4)		Multimeter indications		Change in voltage (+mV dc)	Adjustments (fig. 4)
	LO	HI	Min	Max		
+5	A2TP11	A2TP9	+4.9	+5.1	5	A2R42
-5.2	A2TP1	A2TP10	-5.0	-5.4	5.2	- - -
-15	A2TP6	A2TP5	-14.985	-15.015	15	A2R22
+15	A2TP6	A2TP3	+14.955	+15.045	15	- - -

14. 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:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:

JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0716508

Distribution:

To be distributed in accordance with STD IDS No. RLC-1500, 2 January 2003, requirements for calibration procedure TB 9-6625-2280-40.

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.mil
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.