

FACTORY CALIBRATION PROCEDURE

CONTENTS:

This is the guide for calibrating new instruments in Product Manufacturing. The procedure consists of 4 sections:

Equipment Required

Factory Test Limits - Factory Test Limits are limits an instrument must meet before leaving Manufacturing. These limits are often more stringent than advertised performance requirements. This is to insure that the instrument will meet advertised requirements after shipment, allows for individual differences in test equipment used, and (or) allows for changes in environmental conditions.

Short Form Procedure - The Short Form Procedure has the same sequence of steps and the same limits on checks or adjustments as the Main Procedure.

Main Procedure - The Main Procedure gives more detailed instructions for the calibration of the instrument. This procedure may require that some checks and adjustments be made so that performance is better than that required by the Factory Test Limits. This insures the Factory Test Limits will be met when side panels are added, permits some normal variation in test equipment and plug-in scopes, etc.

Abbreviations in this procedure will be found listed in TEKTRONIX STANDARD A-100. Definitions of terms used in this procedure may be found in TEKTRONIX STANDARD A-101.

In this procedure, all front panel control labels and Tektronix instrument names are in capital letters (VOLT/DIV, etc). Internal adjustment labels are capitalized only (Gain Adj, etc).

CHANGE INFORMATION:

This procedure has been prepared by Product Manufacturing Staff Engineering. For information on changes made to this procedure, to make suggestions for changing this procedure, or to order additional copies: please contact T-FSE,39-307.

*This procedure is
company confidential*

422
AC POWER SUPPLY

For all serial
numbers.



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EQUIPMENT REQUIRED

All TEKTRONIX test equipment must be calibrated to Factory Test Limits using methods specified in the applicable TEKTRONIX Factory Calibration Procedure. Other test equipment should be calibrated to its manufacturer's specifications. Exceptions to calibration procedures, which are necessary to improve the measurement capability of some test equipment, e.g. calibrated to $\pm 0.5\%$ accuracy at some specific setting, are noted on this Equipment Required List.

Equivalent test equipment may be used. A Test-Final Staff Engineer must approve any substitutions.

a. TEKTRONIX Instruments

- 1 TYPE 453 OSCILLOSCOPE
- 1 TYPE 76TU LINE VOLTAGE CONTROL UNIT (067-0048-00)

b. Test Fixture and Accessories

- 3 50 Ω BNC Cables (012-0057-01)
- 1 Standard Amplitude Calibrator (SAC) (067-0502-00)
- 1 422 AC Power Supply Dummy Load (PMPE Dwg #2147-B)

FACTORY TEST LIMITS

Factory Test Limits are qualified by the conditions specified in the main body of the Factory Calibration Procedure. The numbers and letters to the left of the limits correspond to the procedure steps where the check or adjustment is made. Steps without Factory Test Limits (setups, presets, etc.) are not listed. Instruments may not meet Factory Test Limits if calibration or checkout methods and test equipment differ substantially from those in this procedure.

2. POWER SUPPLY VOLTAGES

- b. -12V supply: $\pm 1\%$
- c. -12V regulation: $\pm 1\%$ between 103.5 and 127.5 volts
- d. -110 volts unregulated: $>-.970$ Volts at 103.5V line
- e. +95 Volts unregulated: ≥ 1 Volt at 103.5V line
- f. +55 Volts unregulated: ≥ 1 Volt at 103.5V line
- g. +12 Volt regulation: $\pm 2\%$ between 103.5 and 127.5 volts
- h. High Voltage: -30mV +70mV

3. POWER SUPPLY RIPPLE

- b. -12V ripple: 1mV low freq; 15mV high freq
- c. +12V ripple: 1mV low freq; 10mV high freq
- d. +55V unregulated ripple: symmetrical 120Hz; ≤ 30 mV
- e. +95V unregulated ripple: symmetrical 120Hz; ≤ 35 mV
- f. -110V unregulated ripple: 60Hz; ≤ 33 mV

4. POWER LIGHT AND SCALE ILLUM INDICATORS

- a. Power LIGHT and SCALE ILLUM indicators: must indicate

THE END

SHORT FORM PROCEDURE

This instrument must meet Factory Test Limits before it leaves Manufacturing; therefore, it must be possible to inspect to these limits. Because of normal variations in test equipment and plug-in scopes, addition of side panels, etc, this procedure may require that some checks and adjustments be made so that performance is better than that required by Factory Test Limits.

1. PRELIMINARY INSPECTION

- a. Install current modifications
- b. Install fuse: F601; 0.6 MDL

2. POWER SUPPLY VOLTAGES

- a. Setup
- b. Adjust -12V supply: $\pm 1\%$
- c. Check -12V supply regulation
- d. Check -110 Volt unregulated:
 ≥ -0.970 at 103.5V line
- e. Check +95 Volt unregulated:
>1 Volt at 103.5V line
- f. Check +55 Volt unregulated:
>1 Volt at 103.5V line
- g. Check +12 Volt regulation: $\pm 2\%$
between 103.5 and 127.5 volts
- h. Check high voltage operation:
-30mV +70mV

3. POWER SUPPLY RIPPLE

- a. Setup
- b. Check -12V ripple: 1mV low freq;
15mV high freq
- c. Check +12V ripple: 1mV low freq;
10mV high freq
- d. Check +55 unregulated ripple:
symmetrical 120Hz; $\leq 30\text{mV}$
- e. Check +95 unregulated ripple:
symmetrical 120Hz; $\leq 35\text{mV}$
- f. Check -110 unregulated ripple:
60Hz; $\leq 33\text{mV}$

4. POWER LIGHT AND SCALE ILLUM INDICATORS

- a. Check SCALE ILLUM and POWER LIGHT
indicators: must indicate

THE END

1. PRELIMINARY INSPECTION

- a. *Install current modifications*
- b. *Install fuse: F601; 0.6 MDL*

2. POWER SUPPLY VOLTAGESa. *Setup*

Connect DUMMY LOAD to TYPE AC
POWER SUPPLY amphenol connector,
connect SAC, test scope and DUMMY
LOAD with 50 Ω BNC cables as follows:

CH 1 INPUT (test scope)--RIPPLE (DUMMY LOAD)

CH 2 INPUT (test scope)--OUTPUT (SAC)

UNKNOWN OUT (DUMMY LOAD)--UNKNOWN INPUT (SAC)

Connect AC POWER SUPPLY to TU-76. Set
TU-76 to 120V. Turn AC POWER SUPPLY
on.

Set controls as follows:

<u>TYPE 453</u>	<u>DUMMY LOAD</u>
VOLTS/DIV 5mV	SUPPLY -12V
TIME/DIV 5mS	
AC-GND-DC AC	
TRIGGERS LINE	
MODE CH 2	

Set SAC, AMPLITUDE to 1 VOLTS and MODE
to -DC, MIXED.

b. *Adjust -12V supply: $\pm 1\%$*

Adjust R639 for null on TYPE 453.

c. *Check -12V regulation: $\pm 1\%$ between
103.5 and 126.5V*

Vary TU76 between 103.5 and 126.5 volts.
Check that display on TYPE 453 does not
exceed 2div in amplitude. Return TU76
to 120V.

2. (cont'd)

- d. Check -110 Volt unregulated:
 ≥ -0.970 at 103.5V line

Switch DUMMY LOAD, SUPPLY to -110V.
 Check that the unregulated part of chopped waveform displayed on TYPE 453 is more negative than a reference 30mV above the regulated segment of the display.

- e. Check +95 Volt unregulated:
 >1 Volt at 103.5V line

Switch DUMMY LOAD, SUPPLY to +95V.
 Switch SAC to +. Check that the unregulated segment of the chopped waveform displayed on the TYPE 453 is more positive than the regulated segment.

- f. Check +55 Volt unregulated:
 >1 Volt at 103.5V line

Switch DUMMY LOAD, SUPPLY to +55V.
 Check the same as in e.

- g. Check +12 Volt regulation
 $\pm 2\%$ between 103.5 and 127.5 volts

Switch DUMMY LOAD, SUPPLY to +12.
 Check for less than 4div of amplitude displayed on TYPE 453 while varying TU76 between 103.5 and 127.5 volts.
 Return TU76 to 120V.

- h. Check high voltage operation:
 $-30\text{mV } +70\text{mV}$

Switch DUMMY LOAD, SUPPLY to H.V.
 Check for less than $-30\text{mV } +70\text{mV}$
 TYPE 453.

 3. POWER SUPPLY RIPPLE

- a. Setup

Switch TYPE 453, MODE to CH 1 and
 DUMMY LOAD, SUPPLY to -12V.

3. (cont'd)

- b. Check -12V ripple: ≤ 1 millivolt
line freq; ≤ 15 millivolt high
freq

Check ripple while varying TU76 between 103.5 and 126.5V

- c. Check +12V ripple: ≤ 1 millivolt
line freq; ≤ 10 millivolt high
freq

Switch DUMMY LOAD, SUPPLY, to +12V.
Check ripple while varying TU76 between 103.5 and 126.5V. Set TU76 to 103.5V.
Switch TYPE 453 to CH 2 and SAC to UNKNOWN INPUT.

- d. Check +55 unregulated ripple:
120Hz; ≤ 30 mV

Switch DUMMY LOAD, SUPPLY, to +55. Check for 120Hz symmetrical waveform ≤ 30 mV in amplitude.

- e. Check +95 unregulated ripple:
120Hz; ≤ 35 mV

Switch DUMMY LOAD, SUPPLY, to +95. Check for 120Hz, symmetrical waveform ≤ 35 mV in amplitude.

- f. Check -110 unregulated ripple: 60Hz;
 ≤ 33 mV

Switch DUMMY LOAD, SUPPLY, to -100.
Check for 60Hz waveform ≤ 33 mV in amplitude.

4. POWER LIGHT AND SCALE ILLUM INDICATORS

Observe POWER and SCALE ILLUM indicator lights on DUMMY LOAD. Lights must be on.

THE END