FACTORY CALIBRATION PROCEDURE

CONTENTS:

General	1
Equipment required	2
Factory test limits	3
Factory calibration procedure	4

P6020

INTRODUCTION:

This is the guide for calibrating brand-new instruments, it therefore, calls out many procedures and adjustments that are rarely required for subsequent recalibration. *This procedure is company confidential.* In this procedure, all front panel control labels or Tektronix equipment names are in capital letters (VOLTS/DIV, etc.) internal adjustment labels are capitalized only (Gain Adj, etc.).

Tek form number:
0-431
July 1967
For all serial numbers.

FACTORY TEST LIMITS:

We initially calibrate the instrument to Factory Test Limits. These limits are often more stringent than advertised performance requirements. This helps insure that the instrument will meet advertised requirements after shipment, allows for inaccuracies of test equipment used, and may allow for changes in environmental conditions.

QUALIFICATION:

Factory test limits are qualified by the conditions specified in the main body of the calibration procedure. The numbers and letters to the left of the limits correspond to the factory calibration procedure steps where the check or adjustment is made. Instruments may not meet factory test limits if calibration or check-out methods and test equipment differ substantially from those in this procedure.

ABBREVIATIONS:

Abbreviations in this procedure will be found listed in TEKTRONIX STANDARD A-100.

CHANGE INFORMATION:

This procedure has been prepared by Product Manufacturing Staff Engineering. For information on changes that have been made to this procedure, to make suggestions for changing this procedure, or to order additional copies: please contact PMSE, 47-261. (DH)

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

a. TEKTRONIX Test Equipment

1	TYPE 580 SERIES OSCILLOSCOPE
1	TYPE 82 DUAL TRACE PLUG-IN UNIT
1	TYPE 109 PULSE GENERATOR
1	TYPE 113 DELAY CABLE
1	TYPE 134 CURRENT PROBE AMPLIFIER
1	TYPE 134 POWER SUPPLY
1	TYPE P6020 PASSIVE TERMINATION
1	TYPE 76TU LINE VOLTAGE CONTROL UNIT

b. Test Fixtures and Accessories

1	SINE WAVE GENERATOR 1 Hz to 1 MHz (067-0542-99)
1	50Ω Insertion Unit (017-0030-00) with copper wire loop (see drawing no. 1 at end of procedure)
1	50Ω End Line Termination (017-0047-00)
3	50Ω 5nSEC RG8 cables (017-0502-00)
1	50Ω Attenuation Unit (see drawing No. 3 at end of procedure)
1	Current Probe 60 Hz Field Coil (see PMPE drawing no. 1396-C)
1	50Ω Current Loop (see drawing No. 2 at end of procedure)

Substitute test equipment may be used. The Plant Staff Engineer must approve any substitutions. All equipment listed must perform within its manufacturer's specifications, unless otherwise stated.

It is assumed that all equipment is provided with BNC connectors; if equipment used has other than BNC connectors, adapters, not listed, may be needed.

QUALIFICATION

Factory test limits are qualified by the conditions specified in the main body of the calibration procedure. The numbers and letters to the left of the limits correspond to the factory calibration procedure steps where the check or adjustment is made. Instruments may not meet factory test limits if calibration or checkout methods and test equipment differ substantially from those in this procedure.

1. PRELIMINARY INSPECTION

2. PRESETS

3. LOW FREQUENCY RESPONSE

a. Check LF Response with Passive Termination in 1mA/mV: ≤8 kHz
b. Check LF Response with Passive Termination in 10mA/1mV: ≤900 Hz

4. PULSE ABERRATION 5% P-P, max

5. RISETIME 4.5ns, max

6. AMPLITUDE ACCURACY ±2%

THE FOLLOWING CHECK IS NOT MADE ON 100% OF THE INSTRUMENTS BUT IS DONE ON A SAMPLING BASIS ONLY.

7. PROBE SHIELDING

THE END

1. PRELIMINARY INSPECTION

Check physical appearance, workmanship, cable and connector. Check for obvious scratches, bubbles or other blemishes in the finished surface. Check that the sliding mechanism opens smoothly and firmly. When released, the mechanism should return to the closed position.

2. PRESETS

Set the TYPE 585A controls with TYPE 82 installed.

TRIGGERING SOURCE	INT AC
STABILITY	cw
TRIGGERING LEVEL	cw
TIME/CM	.1mSEC
HORIZONTAL DISPLAY	A

Set the TYPE 82 PLUG-IN UNIT controls:

MODE	A ONLY
POLARITY	NORM
GAIN	X10
A V/CM	.01
INPUT	DC

3. LOW FREQUENCY RESPONSE

a. Check LF Response with Passive Termination in 1mA/mV: ≤8 kHz

Connect the PASSIVE TERMINATION set at the 1mA/mV position to the TYPE 82 A INPUT. Connect the 50Ω Current Loop to the TYPE 191 output and attach the probe. Set the SINE WAVE GENERATOR for a frequency of 50 kHz and amplitude of 3cm using the middle of the graticule area. Set the SINE WAVE GENERATOR for a frequency of 8 kHz. Check the display amplitude to be ≥2.1cm. Return the TYPE.191 to 50 kHz.

3. (cont'd)

b. Check LF Response with Passive Termination in 10mA/mV: 900 Hz

Set the PASSIVE TERMINATION to the 10mA/mV position and the SINE WAVE GENERATOR AMPLITUDE controls for a 2cm display. Adjust the SINE WAVE GENERATOR for a frequency to 900 Hz. Check the display amplitude to be ≥1.4cm. Return the PASSIVE TERMINATION to the 1mA/mV.

4. CHECK PULSE ABERRATION 5% P-P, max

Connect two 5nsec cables from the TYPE 109 CHG LINE 1 and CHG LINE 2 connectors to the TYPE 113 DELAY CABLE. Connect the 50Ω Current Loop, with the probe attached to the TYPE 109 50Ω OUTPUT.

Set the test scope TIME/CM switch to .05μSEC and adjust the STABILITY and TRIGGERING LEVEL controls for a stable display. Adjust the TYPE 109 AMPLITUDE controls for a 3cm display. Check for pulse aberrations, 5% P-P.

5. RISETIME ≤4.5nS, max

Set the scope 5X MAGNIFIER to ON and position the fast rise portion of the waveform to the graticule center. Check pulse risetime (10% to 90% of pulse amplitude) to be 4.5nS, max.

6. AMPLITUDE ACCURACY ±2%

Remove the probe and 50Ω Current Loop from the TYPE 109 50Ω OUTPUT. Connect the 50Ω Insertion Unit with the End Line Termination removed and attach the probe to the copper wire loop. Connect the X500 Attenuation Unit, with one X10 attenuator removed, to the 50Ω Insertion Unit. Remove the Passive Termination from the TYPE 82 A INPUT (keep probe attached to the Insertion Unit) and connect the 50Ω Termination end of the X500 Attenuation Unit. Adjust the TYPE 109 AMPLITUDE

6. (cont'd)

and VOLTAGE RANGE controls for exactly 3cm of deflection of the display. Disconnect the 50Ω Termination from the input and connect the Passive Termination. Check the display amplitude to be 3cm ±2%.

Set the Passive Termination to the 10mA/mV position and again adjust the TYPE 109 AMPLITUDE controls for exactly 3cm of deflection. Remove the Passive Termination from the A INPUT, reinsert the X10 attenuator into the 50Ω Attenuation Unit and connect the 50Ω Termination end of the Attenuation Unit to the A INPUT. Check for a 3cm display ±2%.

THE FOLLOWING CHECK IS NOT MADE ON 100% OF THE INSTRUMENTS, BUT IS DONE ON A SAMPLING BASIS ONLY.

7. PROBE SHIELDING

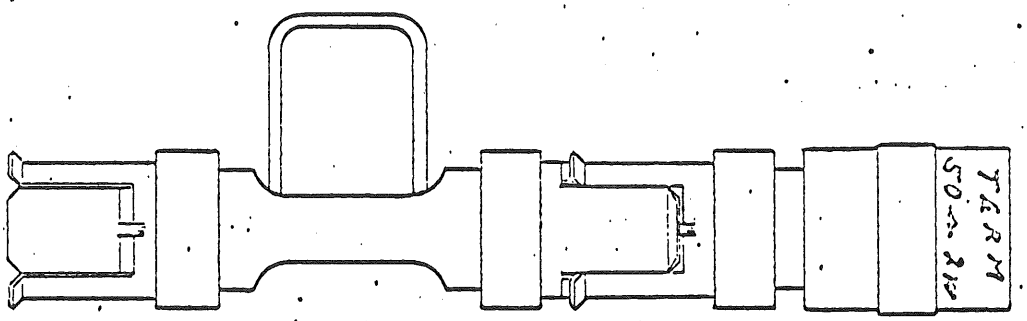
Remove the 50Ω Termination from the INPUT and replace with a TYPE 134 CURRENT PROBE AMPLIFIER with the CURRENT/DIV switch set at .5 amp. Remove the probe from the 50Ω Insertion Unit, disconnect from the PASSIVE TERMINATION and attach to the TYPE 134.

Rotate the test scope STABILITY and TRIGGERING LEVEL controls full clockwise. Set the TIME/CM switch to 10mSEC and the TYPE 82 CH A V/CM to .05. Connect the probe to the red lead of the Magnetic Shield Coil into the Line Voltage Control Unit and adjust for a 2cm display. Remove the probe from the red lead, set the TYPE 134 CURRENT/DIV switch to 1mA and insert the closed probe head into the Magnetic Coil.

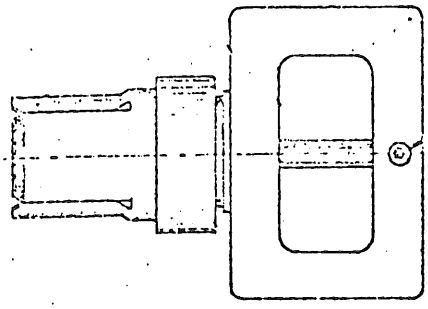
Check the display amplitude to be less than 1.5cm.

THE END

Drawing No. 1: 50Ω Insertion Unit with 50Ω Termination attached.



Drawing No. 2: 50Ω Current Loop



Drawing No. 3: X500 Attenuation Unit