FACTORY CALIBRATION PROCEDURE

CONTENTS:

067-0523-00
CALIBRATION
FIXTURE

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:
0-357
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The TYPE 84 and 067-0523-00 are electrically similar instruments. The type designation was changed at SN974.

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.

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

a. TEKTRONIX Test Equipment

1 TYPE 581A OSCILLOSCOPE (plug-in scope)
1 TYPE 540 SERIES OSCILLOSCOPE (test scope)
1 TYPE W PLUG-IN UNIT

b. Test Fixtures and Accessories

1 BNC Dual Binding Post (103-0035-00)
2 Patch cord banana plug to BNC (012-0091-00)
* 1 STANDARD AMPLITUDE CALIBRATOR (SAC) (067-0502-00)
1 Flexible extension (012-0038-00)
1 Current measuring adapter (PMPE drawing number 1525-B)
1 Current measuring adapter cable (PMPE drawing number 1524-B)
1 Standard 067-0523-00 (SN 330)

c. Other Equipment

1 20,000Ω/volt multimeter (Simpson 262, or equivalent) (067-0045-00)

* This equipment must be traceable to NBS for instrument certification.

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. PRESET CONTROLS

3. RESISTANCE

4. POWER SUPPLY CURRENT

5. POSITION RANGE ADJUST

a. Check range of POSITION RANGE ADJ: position the trace off the graticule top and bottom.

b. Adjust POSITION RANGE ADJ: scope electrical center

6. CAL REFERENCE

* b. Adjust Cal Ref Adj, R18: 0.2V ±1%

7. BIAS MAGNET AND CAL (2cm) AND ALT SYNC

b. Check CAL (2cm) AND ALT SYNC: 2cm ±10%

8. PULSER AMPLITUDE + & - 4cm, min

9. PULSER FREQUENCY 550 to 750 P/s

Pulser must operate through 50% of the range of the PULSER FREQUENCY control

10. ALT SYNC

Two traces displayed at all TIME/CM settings.

11. PULSER WAVEFORM

Jitter: less than 0.5ns
Aberrations: ≤1% (referenced to the STANDARD 067-0523-00)

* Indicates measurement characteristic; test equipment used must be traceable to the NBS for instrument certification.

THE END

1. PRELIMINARY INSPECTION

Check that the mercury reed relay terminals are about 1/32" from the magnet and on a plane parallel to the main chassis. Check for unsoldered joints, poor lead dress and long wire ends. Check for loose hardware, protruding parts and foreign material. Check controls for smooth mechanical operation and proper indexing. Check for proper spacing between knobs and front panel. Correct all defects found.

CAUTION: Wear safety glasses when working around the mercury reed relay and use minimum heat when soldering to the mercury reed relay terminals.

2. PRESET CONTROLS

CALIBRATION FIXTURE

LOAD	HIGH
DISPLAY SELECTOR	EXT INPUT
VERTICAL POSITION	midr
PULSER AMPLITUDE	midr
PULSER FREQUENCY	midr
POSITION RANGE ADJ	midr
Cal Ref Adj, (R18)	midr

3. RESISTANCE

Measure approximate resistance between 16 pin amphenol connector pins and the chassis as in the following table:

Pin No.	High load	Reversed polarity	Low load	Reversed polarity	Normal load	Reversed polarity
1	1.9kΩ	1.9kΩ	inf	inf	85kΩ	85kΩ
2	1.4kΩ	1.4kΩ	8kΩ	8kΩ	2.6kΩ	2.6kΩ
3	2.4kΩ	2.4kΩ	inf	inf	inf	inf
4	15kΩ	15kΩ	inf	inf	inf	inf
5	inf	inf	inf	inf	inf	inf
6	inf	inf	1.3MΩ	inf	inf	inf
7	450Ω	700Ω	450Ω	700Ω	450Ω	650Ω
8	inf	inf	inf	inf	inf	inf
9	2.3kΩ	2.3kΩ	9.5kΩ	10k	2.6kΩ	2.6kΩ
10	0Ω	0Ω	0Ω	0Ω	0Ω	0Ω
11	2.3kΩ	2.3kΩ	9.5kΩ	10kΩ	2.6kΩ	2.6kΩ
12	inf	inf	inf	inf	inf	inf
13	inf	inf	inf	inf	inf	inf
14	5kΩ	6.5kΩ	9kΩ	12kΩ	5.8kΩ	7.6kΩ
15	5Ω	5Ω	15Ω	15Ω	15Ω	15Ω
16	4.8kΩ	6.4kΩ	9kΩ	12kΩ	6kΩ	8kΩ

4. POWER SUPPLY CURRENT

a. Setup

Connect calibration fixture -- current measuring adapter -- flexible extension -- TYPE 581A plug-in connector. Insert the banana plugs at the free end of the current measuring adapter cable into the multimeter VΩA and COMMON jacks. Turn the plug-in scope POWER ON and check that the POWER LINE indicator is lighted.

a. The jig end of the current measuring adapter cable is designed to insert into a pair of jacks on the current measuring adapter in a manner that will operate the normally closed switches and present a current reading on the multimeter.

b. Measure power supply current

Measure approximate power supply current as in the following table:

Low Load	High Load	Amphenol Pin
0mA	88mA	1
13mA	82mA	2
0mA	90mA	3
0mA	22mA	4
0mA	1.4 A	15 (SW 135 forward)
	2.4 A	15 (SW 135 back)

Remove the current measuring adapter and flexible extension and plug the test fixture directly into the plug-in scope.

5. POSITION RANGE ADJUST

a. Check range of POSITION RANGE ADJUST: position the trace off the graticule top and bottom

Center the VERTICAL POSITION knob. Turn the POSITION RANGE ADJ from cw to ccw. Check that the trace leaves the graticule top and bottom.

a. If the POSITION RANGE ADJ has insufficient range try replacing V14.

b. Adjust POSITION RANGE ADJ: scope electrical center

Press the SCOPE AMPL. BALANCE CHECK and note the position of the trace. Release the SCOPE AMPL. BALANCE CHECK button and place the trace at the position noted with the POSITION RANGE ADJ.

b. Check SW39 for good contact closure as evidenced by an immediate and solid position shift when the SCOPE AMPL BALANCE CHECK button is pressed.

6. CAL REFERENCE

a. Setup

Place a BNC dual binding post on the SAC OUTPUT BNC connector. Connect a BNC to banana plug patch cord from one binding post to TYPE W INPUT A and from the remaining binding post to TYPE W INPUT B. Set the SAC AMPLITUDE to .2 VOLTS. Set the TYPE W inputs to AC, DISPLAY to A-B, INPUT ATTEN to 10 and MILLIVOLTS/CM to 2. Adjust the VARIABLE for exactly 5cm of deflection.

* *b. Adjust Cal Ref Adj, R18: 0.2V ±1%*

Remove the BNC to banana plug patch cords from the BNC dual binding post. Change the calibration fixture DISPLAY SELECTOR to CAL (2cm) and ALT SYNC and plug the BNC to banana plug patch cords into the CAL REFERENCE jacks. Set the plug-in scope TIME/CM to 50μSEC. Adjust Cal Ref Ad, R18 for 5cm of deflection.

Remove the BNC to banana plug cables from the calibration fixture CAL REFERENCE jacks.

b. CAUTION: The CAL REFERENCE jacks are approximately 50V above ground, exercise care not to short circuit the jacks to ground.

7. BIAS MAGNET AND CAL (2cm) AND ALT SYNC

a. Position bias magnet

Connect the calibration fixture to the plug-in scope with a flexible extension. Set the PULSER FREQUENCY cw. Change the DISPLAY SELECTOR to PULSER. Loosen the two screws holding the bias magnet. Listen for an audible buzz from the mercury reed relay. Position the bias magnet for the loudest buzz.

Turn the PULSER FREQUENCY through its range and check that there are no dead spots where the mercury reed relay does not operate, or operates irregularly.

b. Check CAL (2cm) AND ALT SYNC: 2cm ±10%

Change the DISPLAY SELECTOR to CAL (2cm) AND ALT SYNC and check for approximately 2cm of deflection. Switch the DISPLAY SELECTOR from CAL (2cm) AND ALT SYNC to PULSER several times and check that the mercury reed relay starts immediately each time.

b. If the display amplitude is 4cm with the DISPLAY SELECTOR in the CAL (2cm) AND ALT SYNC position repeat step 7a. If the display amplitude is still 4cm try replacing any or all of the T12G diodes.

8. PULSER AMPLITUDE + & - 4cm, min

Switch the calibration fixture DISPLAY SELECTOR to PULSER and center the PULSER AMPLITUDE control. Position the baseline to the top of the graticule with the VERTICAL POSITION control. Change the plug-in scope TIME/CM to 1mSEC. Turn the PULSER AMPLITUDE in a clockwise direction and check that the display amplitude increases in a downward direction. Continue turning the PULSER AMPLITUDE cw. Check that the trace will leave the graticule area. Position the baseline to the bottom of the graticule with the VERTICAL POSITION. Turn the PULSER AMPLITUDE ccw and check that the trace will leave the graticule in an upward direction.

9. PULSER FREQUENCY 550 to 750 P/s
Pulser must operate through 50% of the PULSER FREQUENCY control range

Turn the PULSER FREQUENCY from ccw to cw and check that pulses are displayed over any 50% increment of rotation.

Set the plug-in scope TIME/CM to 1mSEC. Check that a display of 5.5 pulses/10cm and 7.5 pulses/10cm may be obtained by adjusting the PULSER FREQUENCY.

10. ALT SYNC Alternates at all time settings

Turn DISPLAY SELECTOR to CAL (2cm) AND ALT SYNC. Turn the plug-in scope STABILITY cw. Check for two traces as the plug-in scope TIME/CM switch is rotated through all ranges.

11. PULSER WAVEFORM

Jitter: less than 0.5ns
Aberrations: ≤1% (referenced to the STANDARD 067-0523-00)

Remove the flexible extension and plug the calibration fixture directly into the plug-in scope. Turn the plug-in scope TIME/CM to .05μSEC and 5X MAGNIFIER ON. Trigger the plug-in scope and adjust the PULSER AMPLITUDE for a 2cm display. Adjust the PULSER FREQUENCY to its most stable position and check the leading edge of the waveform for no more than 0.5mm of time jitter. Check that aberrations in the displayed pulse do not exceed those of the STANDARD calibration fixtures by more than 1% PTP.

THE END