

NOTE REGARDING FACTORY CALIBRATION PROCEDURES  
AND TEST SPECIFICATIONS

Factory Calibration Procedures and Test Specifications are intended for use at the factory as a general guide for calibrators and quality control men. Most of the tolerances listed in these sheets are closer than advertised specifications. This is done purposely in order to insure that the instrument will meet or exceed advertised specifications when it reaches the customer.

These calibration procedures and test specifications should be used, therefore, as a guide only.

Some of the test equipment referred to in the calibration procedures is not available commercially; the Tektronix field engineer will be glad to suggest alternate approaches.

TYPE "S" PLUG-IN UNIT

FACTORY CALIBRATION PROCEDURE

Recommended Equipment:

1 540 series Oscilloscope.

1 ea. 50  $\Omega$ , 100  $\Omega$ , 200  $\Omega$ , 500  $\Omega$ , and 1 K $\Omega$  Precision Resistors.

Preliminary Inspection:

Check the instrument carefully for unsoldered joints, rosin joints, clearance of protruding parts, and other possible shorts. Check wire dress and controls for smooth operation. Check all transistor connections carefully to prevent possible burn-out. Make resistance to ground checks on the 16 pin connector. Following are the approximate readings:

<u>PIN NO.</u>	<u>RESISTANCE</u>	<u>PIN NO.</u>	<u>RESISTANCE</u>
1.	9 K $\Omega$	9.	30 K $\Omega$
2.	Zero	10.	2 K $\Omega$
3.	9 K $\Omega$	11.	10 K $\Omega$
4.	Open	12.	Open
5.	Open	13.	Open
6.	Open	14.	Open
7.	Open	15.	200 $\Omega$
8.	Open	16.	Open

Set all pots and trimmers to mid-range. Put the "S" unit into the test scope and connect the TRIGGER OUT cable to the TRIGGER IN jack on the test scope.

1. ADJUST PULSE FREQUENCY AND CHECK SYMMETRY

Set:	<u>TIME/CM</u>	<u>1 MILLISEC</u>
	<u>TRIGGERING MODE</u>	<u>AC FAST (LF REJECT)</u>
	<u>TRIGGER SLOPE</u>	<u>+ EXTERNAL</u>
	<u>DIODE MODE</u>	<u>0 ma</u>
	<u>FORWARD CURRENT</u>	<u>10 ma</u>
	<u>SENSITIVITY</u>	<u>.5 V/CM</u>

Place a 100  $\Omega$  precision resistor with no extra lead length in the DIODE CLAMP. Apply power to the test scope. Adjust the pulser as follows:

- (a) Alternately adjust the magnet position and the FREQUENCY ADJUST to give stable operation at a frequency of approximately 250 cps. The display should consist of negative going pulses of approximately 100  $\mu$ sec duration. Time jitter in the pulses is not objectionable, but the mercury switch must "make" on every excursion.
- (b) Switch the DIODE MODE to TURN ON and check the square wave for symmetry. Symmetry must be +50%

2. SET VERTICAL POSITION RANGE ADJUST

Center the front panel VERTICAL POSITION control and center the display on the CRT with the VERTICAL POSITION RANGE ADJUST.

3. ADJUST C5972

Switch the FORWARD CURRENT to 10 MA. Adjust C5972 for best square wave response. (Least roll-off with no overshoot.)

4. CHECK MICROPHONICS

Tap the upper edge of the front panel. There should be no microphonics of the ringing type.

5. SET GAIN ADJUST

Set the SENSITIVITY switch to ZERO REFERENCE. Apply 200 mv of CALIBRATOR signal to pin #1 on the 6AK5. Set the GAIN ADJUST to give 4 cm of deflection.

6. CHECK FORWARD CURRENT RANGES

Set: DIODE MODE - TURN ON

Check the FORWARD CURRENT ranges as follows: (Use bridged precision resistors or the precision resistor box.)

<u>RANGE</u>	<u>RESISTOR IN DIODE CLAMP</u>	<u>SENSITIVITY</u>	<u>(+) DEFLECTION</u>
20 ma	50 Ω	.5 v/cm	2 cm
10 ma	100 Ω	.5 v/cm	2 cm
5 ma	200 Ω	.5 v/cm	2 cm
2 ma	500 Ω	.5 v/cm	2 cm
1 ma	1000 Ω	.5 v/cm	2 cm
1 ma	100 Ω	.05 v/cm	2 cm

7. CHECK DIODE MODE SWITCH RANGES

Set: FORWARD CURRENT - 1 ma

Set the SENSITIVITY control to ZERO REFERENCE and position the trace to the bottom of the graticule.

SENSITIVITY - .05 V/CM

Check the DIODE MODE ranges as follows:

<u>RANGE</u>	<u>RESISTOR IN DIODE CLAMP</u>	<u>(+) DEFLECTION</u>
TURN ON	1 K	None
0 ma	1 K	None
.1 ma	1 K	2 cm
.2 ma	500 Ω	2 cm
.5 ma	200 Ω	2 cm
1 ma	100 Ω	2 cm
2 ma	50 Ω	2 cm

- (a) Remove resistors from the DIODE CLAMP and switch between ZERO REFERENCE and .5 V/CM. The (+) deflection should be approximately 4 cm above the zero reference. (MODE switch at 2 ma)

8. ADJUST C5922

Place the 100 Ω resistor with pigtails clipped short into the DIODE CLAMP and set the controls as follows:

8. ADJUST C5922 (cont.)

<u>SENSITIVITY</u>	<u>.5 V/CM</u>
<u>DIODE MODE</u>	<u>TURN-ON</u>
<u>FORWARD CURRENT</u>	<u>20 MA</u>
<u>TEST SCOPE TIME/CM</u>	<u>.1 μSEC</u>

Set C5922 to make the leading portion of the negative step flat with minimum overshoot. Overshoot should not exceed 5%.

9. ADJUST C5923

Set:	<u>FORWARD CURRENT</u>	<u>1 MA</u>
	<u>SENSITIVITY</u>	<u>.05 V/CM</u>

Set C5923 so that the initial spike is even with the flat portion of the negative step. The peak to peak aberration should not be more than 6 mm.

10. FINAL CHECKS

Set:	<u>SENSITIVITY</u>	<u>.5 V/CM</u>
	<u>FORWARD CURRENT</u>	<u>20 MA</u>
	<u>DIODE CLAMP</u>	<u>100 Ω (short leads)</u>
	<u>TIME/CM</u>	<u>.1 μSEC</u>

- (a) Switch the DIODE MODE from TURN ON to ZERO and observe the general appearance of the waveshape. 1 mm of ringing with no overshoot is normal.
- (b) Check rise and fall time. This should be no more than 14 nsec.
- (c) Set DIODE MODE to TURN ON and the SENSITIVITY to ZERO REFERENCE. With 20 ma FORWARD CURRENT, the aberration should be no more than 2 mm.
- (d) Replace the 100 Ω resistor in the diode clamp with a copper strap cut to length. Switch the SENSITIVITY to .05 V/CM. The aberration should be no more than 8 mm.

TYPE "S"

T E S T   S P E C I F I C A T I O N S

1. PULSER JITTER:

- (a) There must be no jitter of any kind visible with the sweep speed set to  $.1 \mu\text{sec/cm}$ .
- (b) The mercury switch must make and break on every excursion.

2. SYMMETRY:

- (a) The duty cycle of the pulser output must be between 37% and 67% with the DIODE MODE switch in the TURN-ON position.

3. MICROPHONICS:

- (a) There must be no microphonics of the ringing type.

4. CURRENTS:

- (a) All currents must be within 2% of their labelled values.

5. VERTICAL CALIBRATION:

- (a) Vertical calibration must be within 2% on either the .05 V/CM or the .5 V/CM position of the SENSITIVITY switch.

6. RISETIME

- (a) The combined risetime of a 540 series scope, adjusted with a standard "P", and the type "S" plug-in must not be greater than 14 Nsec.