

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 K PLUG-IN
FACTORY
CALIBRATION PROCEDURE

The following instruments and equipment are needed:

- 1 TYPE 540 Series Oscilloscope
- 1 TYPE 190 CONSTANT-AMPLITUDE SIGNAL GENERATOR
- 1 TYPE 105 SQUARE-WAVE GENERATOR
- 1 TYPE 107 SQUARE-WAVE GENERATOR
- 1 INPUT CAPACITANCE STANDARDIZER (CS 20)
- 1 5:1 L Pad (B52-L5)
- 1 52Ω TERMINATING RESISTOR (B52-R)
- 2 52Ω Cable
- 1 PLUG-IN EXTENSION (EP 53)

The 540 Series Oscilloscope should be set up as follows unless otherwise stated:

<u>HORIZONTAL DISPLAY</u>	541 <u>INTERNAL SWEEP</u> 545 <u>MAIN SWEEP NORMAL</u>
<u>TRIGGERING MODE</u>	<u>AUTOMATIC</u>
<u>TRIGGER SLOPE</u>	<u>-INT</u>
<u>STABILITY</u>	<u>PRESET</u>
<u>TIME/CM</u>	<u>1 MILLISEC</u>
<u>MULTIPLIER</u>	<u>1</u>
<u>TYPE 105</u>	Use a 52Ω Cable, terminated with an <u>INPUT CAPACITANCE STANDARDIZER</u> <u>(CS 20)</u> .
<u>TYPE 107</u>	Use a 52Ω Cable, terminated with a <u>TERMINATING RESISTOR (B52-R)</u> .

TYPE 190 ATTENUATOR box should be terminated with a 5:1 L PAD.

"Vertical System Electrical Center" of the 540 Series Oscilloscope should be determined in the following manner:

Using a TEST LOAD UNIT depress the PRESS TO SHORT INPUT button and observe the vertical level of the trace. If you use a normal plug-in unit, jumper between pins 1 and 3 on the 16 pin connector and observe the vertical level of the trace. This level will be referred to later in the calibration procedure.

PRE-CHECK

Make a careful visual inspection of the unit for proper wire dress and check controls for smooth mechanical operation. Make the following resistance to ground checks at the 16 pin connector:

AMPHENOL CONNECTOR PIN NUMBER	RESISTANCE TO GROUND IN Ω
1	10K
2	0
3	10K
4	infinite
5	infinite
6	infinite
7	infinite
8	infinite
9	infinite
10	2K
11	10K
12	infinite
13	infinite
14	infinite
15	300
16	infinite

PRESET CONTROLS

<u>VERTICAL POSITION</u>	mid-range
<u>VOLTS/CM</u>	<u>.05</u>
<u>VARIABLE VOLTS/CM</u>	full right (cw)
<u>AC DC switch</u>	<u>DC</u>
<u>DC BAL.</u>	mid-range
<u>GAIN ADJ.</u>	full right (cw)
VERT. POS. RANGE	mid-range
H. F. PEAKING	mid-range

Pre-set all trimmers to mid-range

Plug K unit into scope using PLUG-IN EXTENSION (EP53)

1. CHECK DC OUTPUT LEVEL

Measure between pin 1 and ground and pin 3 and ground of the 16 pin amphenol plug. (65-70 v)

2. ADJUST DC BALANCE

Position trace to about the center horizontal graticule line with the VERT. POS. RANGE control. Adjust DC BAL. so that the trace remains stationary on the screen as the VARIABLE VOLTS/CM knob is varied through-out its range.

3. ADJUST VERT. POS. RANGE

With VERTICAL POSITION knob set at mid-range, adjust VERT. POS. RANGE control to center trace on graticule "Vertical System Electrical Center".

4. CHECK GAS AND MICROPHONICS

Gas check: Switch the VOLTS/CM switch from .05 to .1 position and observe vertical shift in trace. (2 mm maximum)

Microphonics check: Rap lightly on the front panel of the plug-in unit and watch for excessive ringing type microphonics.

5. CHECK AC DC SWITCH

Set up plug-in as follows:

<u>VOLTS/CM</u>	<u>.05</u>
<u>VARIABLE VOLTS/CM</u>	full right (cw)
<u>AC DC</u>	<u>DC</u>

From SQUARE-WAVE CALIBRATOR apply 100 millivolts to INPUT. Position the base line of the calibrator waveform to the center graticule line. Now set AC DC switch to AC. The waveform should shift down so that the center graticule line is now approximately through the center of the display.

6. ADJUST GAIN

Set up plug-in as follows:

<u>AC DC</u>	<u>DC</u>
<u>VOLTS/CM</u>	<u>.05</u>
<u>VARIABLE VOLTS/CM</u>	full right (cw)

From the SQUARE-WAVE CALIBRATOR apply .2 volts to INPUT and set GAIN ADJ. for 4 cm of vertical deflection.

7. CHECK VOLTS/CM SWITCH STEPS

Set up plug-in as follows:

VARIABLE VOLTS/CM full right (cw)
AC DC DC

From SQUARE-WAVE CALIBRATOR apply signal to INPUT and check for proper deflection.

<u>SQUARE-WAVE CALIBRATOR</u>	<u>VOLTS/CM SWITCH</u>	<u>DEFLECTION</u>
.2	.05	4 cm
.2	.1	2 cm
.5	.2	2.5 cm
2	.5	4 cm
2	1	2 cm
5	2	2.5 cm
20	5	4 cm
20	10	2 cm
50	20	2.5 cm

8. ADJUST INPUT CAPACITOR

Set up plug-in as follows:

VOLTS/CM .05
VARIABLE VOLTS/CM full right (cw)
AC DC DC

From TYPE 105 apply 1 kc signal to INPUT through a CS20 and adjust 105 OUTPUT AMPLITUDE control to produce 3.5 cm of vertical deflection. Adjust C5671 for optimum flat top.

9. ADJUST VOLTS/CM SWITCH COMPENSATIONS

Set up plug-in as follows:

VARIABLE VOLTS/CM full right (cw)
AC DC DC

From TYPE 105 apply 1 kc signal to INPUT and adjust 105 OUTPUT AMPLITUDE control to produce 3.5 cm of vertical deflection on each step.

<u>VOLTS/CM SWITCH</u>	<u>ADJ. FOR OPTIMUM SQUARE CORNER</u>	<u>ADJ. FOR OPTIMUM FLAT TOP</u>
.1	C5061	C5051
.2	C5111	C5101
.5	C5161	C5151
1	C5211	C5201
2	C5261	C5251
5	C5311	C5301
10	C5361	C5351
20	C5411	C5401

10. ADJUST HF PEAKING

Reset the following scope controls:

<u>TIME/CM</u>	<u>.1 MICROSEC</u>
<u>MULTIPLIER</u>	<u>2</u>

Set up plug-in as follows:

<u>VOLTS/CM</u>	<u>.05</u>
<u>VARIABLE VOLTS/CM</u>	full right (cw)
<u>AC DC</u>	<u>DC</u>

Use a 52Ω cable from the 107 terminated at the "K" with a B52R.

From TYPE 107 apply 3 cm of signal at approximately 450 kc to INPUT.
Adjust H. F. PEAKING control for optimum square corner with no overshoot.

11. CHECK FREQUENCY RESPONSE

Reset the following scope controls:

<u>TRIGGERING MODE</u>	<u>AC SLOW</u>
<u>TIME/CM</u>	100 MICROSEC
<u>STABILITY</u>	full right (cw)

Set up plug-in as follows:

<u>VOLTS/CM</u>	<u>.05</u>
<u>VARIABLE VOLTS/CM</u>	full right (cw)
<u>AC DC</u>	<u>DC</u>

From TYPE 190 apply 3 cm of signal at 50 kc to INPUT. Now adjust TYPE 190 to obtain a frequency of 30 mc (do not change TYPE 190 OUTPUT AMPLITUDE) and see that there is at least 2 cm of vertical deflection remaining (3.5 db point).