

TYPE 180A TIME MARK GENERATOR

## FACTORY

## CALIBRATION PROCEDURE

## Recommended Equipment:

Tektronix type 541 or 543. Tektronix type "L" plug in.  
10X probe  
DC voltmeter of at least 20,000 $\Omega$ /V calibrated for an accuracy of  $\pm 1\%$  at 150 volts and 300 volts.  
An autotransformer for varying the line voltage to the instrument from 105 to 125 volts.  
A type B52-R 52 $\Omega$  terminating resistor.

## PRELIMINARY INSPECTION

Check for unsoldered joints, rosin joints, poor wire dress, check that the door swings freely, check resistance of transformer primaries and power supplies to ground. The fuse should be 3.2 amp slo blo for 117V and 0.25 amp fast blo for the oven transformer.

## 1. POWER SUPPLY VOLTAGE ADJUSTMENT.

To adjust the output voltages of the supplies, connect the instrument to the output of the autotransformer and adjust it for 117 volts. Turn the power switch to ON.

To adjust the -150 volt supply, connect the meter between ground and the -150 volt supply. The connection to the -150 volt supply may be made at the top of the 18k resistor attached to pins 3 and 9 of v744. Adjust -150 for exactly that amount.

Check the output voltage of the +225 supply by connecting the meter between ground and pin 3 of v707. The voltage of this supply should be within  $\pm 2\%$  of 225 volts.

Check the voltage of the +350 volt supply by connecting the meter between ground and pin 6 of v707. The voltage of this supply should be within 3% of 350 volts.

To check the -17 volt bias supply, connect the meter between ground and the negative side of C770 located on lower front side of the power chassis. The -17 volt supply should be between  $-17\frac{1}{2}$  and  $-15\frac{1}{2}$  volts. Measure between ground and the junction of R774 and R776 to check the -8 volt supply. The -8 volt supply should be  $\pm \frac{1}{2}$  volt of 8 volts.

## 2. POWER SUPPLY RIPPLE AND REGULATION CHECK.

The power supply regulating circuits of the type 180A are capable of holding ripple to a very low level between 105 and 125 line volts. (connected for 117 volt operation) The line voltage should be varied from 105 to 125 volts with the 50MC button pushed in at low line.

The ripple on the supplies should not exceed: -150-5 millivolts, +225-80 millivolts, +350-100 mv. These measurements are made neglecting hash due to the markers operation.

### 3. ADJUSTMENT OF TIME MARKERS.

Use the following front panel control settings of the Scope and "L" unit.

Stability	Preset
Triggering level	As appropriate
Triggering mode	AC slow, external, positive
Time/CM	1 microsecond
Magnifier	Off
"L"	
Input	DC
Volts Cm	0.5
Variable	Calibrated

Check the 10X probe compensation with the scope calibrator. Connect the probe to the marker out jack of the 180A and a coax cable between the 180A trigger out and the scope external trigger jack. Depress the 1 $\mu$ sec and 5 $\mu$ sec pushbuttons and the 10 $\mu$ sec trigger button. Adjust the test scope trigger level for proper display and adjust the 5 $\mu$ sec pot on the 180A. Adjust C116 so that the 1 $\mu$ sec markers are approximately the same amplitude as the 5 $\mu$ sec markers when viewed alone.

<u>180A</u>	<u>Test Scope Sweep</u>	<u>Adjust</u>	<u>180A Trigger</u>
1&5 $\mu$ sec	1 $\mu$ sec	5 $\mu$ sec	10 $\mu$ sec
5&10 $\mu$ sec	1 $\mu$ sec	10 $\mu$ sec	10 $\mu$ sec
10&50 $\mu$ sec	10 $\mu$ sec	50 $\mu$ sec	100 $\mu$ sec
50&100 $\mu$ sec	50 $\mu$ sec	100 $\mu$ sec	100 $\mu$ sec
100&500 $\mu$ sec	100 $\mu$ sec	500 $\mu$ sec	1millisec
500 $\mu$ sec&1ms	500 $\mu$ sec	1ms	1ms
1&5ms	1ms	5ms	10ms
5&10ms	5ms	10ms	10ms
10&50ms	10ms	50ms	100ms
50&100ms	50ms	100ms	100ms
100&500ms	100ms	500ms	1second
500ms&1sec	500ms	1sec	1sec
1&5sec	1sec	5sec	1sec

### 4. CHECK MARKER AMPLITUDE

The amplitude of the markers at the output jack should be 3 volts or more. Generally they are about 5 volts. The amplitude out at the banana jacks must be 25 volts or more.

### 5. SET FREQUENCY AND AMPLITUDE OF THE 5, 10 and 50 MC MARKERS

Trigger the scope externally from the 180 trigger at the 10 $\mu$ sec rate. Connect the 52 $\Omega$  terminator to the output jack of the 180. Connect the 10X probe to the terminator. Adjust the coupling link on the 5MC coils to the extreme upper end. (QC will secure this with Q dope)

Set C123 and C129 for maximum output at 5MC. (It is possible to set this range at 6 mc also) Set C133 and C139 for maximum output at 10MC. Set C143 and C147 for maximum output at 50MC. This range can be set at 40 MC so care should be exercised in checking the frequency. To check the frequency of the 5, 10, and 50MC output: for 5MC with the scope sweep set at 0.2 $\mu$ sec/CM. There should be 1 cycle per CM. For 10MC set the scope sweep to 0.1 $\mu$ sec/CM and there should be 1 cycle per CM. With the scope still triggered externally at 10 $\mu$ sec switch to 5x magnifier with the main sweep control set at 0.1 $\mu$ sec/CM. There should be one cycle per centimeter if the frequency is properly set at 50MC. The minimum output of all the sinewave outputs (5, 10 and 50MC) is 3 volts. On the 50MC range the output will be an indicated 1.4 volts due to the bandpass of the 540 series scope. If there are double traces on the 50mc waveform (trigger pulling) generally a slight readjustment of the 5 $\mu$ sec and 10 $\mu$ sec markers will cure this although it may be due to stages out of count, bad tubes, open LR combinations in the 5, 10 or 50 $\mu$ sec stages. There should be no appreciable trigger pulling at any trigger rate. The LMC modulation on the 5MC sinewave should not exceed 0.2 volts.

#### 5. CHECK TRIGGER AMPLITUDE AND FREQUENCY

Connect the 10X probe to the trigger output and check the amplitude. The amplitude of the triggers must be at least 6 volts and if it is over 8 volts, generally there is some defective component, V562 or C560. The trigger rates must correspond to the switch label on the front panel.

#### 6. SET CRYSTAL FREQUENCY

With the scope triggered externally from the 180 under calibration, connect the 10X probe from the plug-in to another calibrated 180 or any source of accurate frequency. Set the scope sweep to 1 $\mu$ sec/CM and stop the drift to one side or the other by adjusting C105. There should be enough range left at either side of the adjustment to make the signal drift at the rate of 3CM per second which corresponds to 3 cycles per second at 1 megacycle. The crystal oven should be allowed to heat for at least 5 minutes before this adjustment is made.

#### 7. CHECK OVEN LIGHT FOR OPERATION

Check the oven pilot light to see that it turns on and off about one time in 20-30 seconds. If the action is erratic it may be due to a poor thermostat. The oven heater is not connected through the power switch and will continue to operate if the instrument is turned off but is still connected to the line.