COMPANY CONFIDENTIAL

TYPE 163

FACTORY CALIBRATION PROCEDURE

RECOMMENDED EQUIPMENT:

Tektronix scope 540 series with C or CA plug-in.
180A Time Mark Generator.
10X Probe.
160A Power Supply.
162 Waveform Generator.

PRELIMINARY CHECK

Check for loose knobs (Do not tighten PW Mult or pulse amplitude knob.) Check binding posts for proper orientation of holes. Check wiring for shorts and dress. Check sockets on back for wiring and positioning. Check resistance to ground and between -170 and +225 volt leads. Preset all controls and adjustments to mid-range.

SET: 160A on connect to 162 and 163
162 - operating mode - recurrent
Vernier - calibrated position
Waveform duration - 1.0
Multiplier - 1

OSCILLOSCOPE

Trigger - +external - AC
Sweep - 1 millisecond/CM
Plug-in - CA
"A" channel - 20V/CM red knob CCW
"B" channel 1V/CM 10X Probe
Check probe compensation and scope gain
CA mode switch - Alternate
163 Trigger selector - Negative sawtooth
Output pulse delay - Mid-scale
Pulse width 10 μsec range
Pulse width multiplier - Approximately mid-scale
Pulse Amplitude - Maximum CW
All other adjustments - Mid-scale

1. CHECK GATE OUT

Connect 162 SAWTOOTH OUT to input of 163, "A" channel of scope CA unit, and external trigger input. Check GATE OUTPUT with 10X probe connected to "B" channel of CA. Move the probe to the PULSE OUT terminal. Preset C9 for square topped wave - (left side of chassis). Set the pulse amplitude knob on the shaft so zero output corresponds to -0- on the panel - tighten the set screw. Set the pulse amplitude knob to 25 and adjust pulse amplitude calibrator for a pulse out amplitude of 25 volts. Re-adjust C9 for flat top pulse shape.

2. SET DELAY LIMITS

Using the previous settings, turn the OUTPUT PULSE DELAY knob counter-clockwise until the pulse reaches the left end of the sawtooth and drops out. Adjust the positive delay limit so this point occurs with the knob pointer on -0-. Turn the OUTPUT PULSE DELAY knob CW to 1.0 and adjust the NEG. DELAY LIMIT until the pulse just drops out. The two limit adjustments interact so these adjustments may have to be repeated more than once to get both ends to coincide.

Check the linearity of the delay pot at the .5 position. The leading edge must fall between .4 and .6 on the graticule.

3. CHECK TRIGGER SENSITIVITY

Remove the jumper from the 162 SAWTOOTH OUT and connect it to the scope calibrator cal out jack. Set the calibrator to 2 volts. Switch the 163 trigger selector to positive pulse. Adjust the OUTPUT PULSE DELAY/POS TRIGGER bias knob for a pulse out. The 163 should trigger easily with 2 volts in.

4. SET PULSE WIDTH MULTIPLIER DIAL

Scope - CA plug-in - mode alternate.
Trigger - external automatic or ac.
Sweep speed - 10 µsec/CM.
"A" channel - Connect to 180 signal out, scope external trigger.
"B" channel 10X probe to 163 pulse out.
Gate out - to 163 input.

180 - 10 µsec markers.
163 - input to scope gate out.
Trigger selector - pos. pulse.
Pulse delay/trigger bias - .5.
Adjust the dial on shaft so 1 will come in at 1 CM ±1%. Adjust pulse width calibrator so 10 will coincide with 10 CM. These two adjustments may have to be made several times as they interact.

Set the pulse width at 10 and adjust the pulse width calibrator to widen the pulse. It must go 3% or 3 minor divisions beyond the 10 CM mark before it free runs. Return the calibration to 10. If there is not enough range left, substitute a 270 degree dial for the 180 degree dial. Check all divisions between 1 - 10 on the pulse width dial. They must be within ±5% of the dial calibration. Check for erratic operation of the pot between 1 - 10.

5. CHECK FOR PULSE DROP OUT AND CAL 1 µSEC RANGE

Switch 163 to 1 µsec range. Switch scope to 1 µsec/CM sweep speed. Switch the 180 to 1 µsec. Use the PULSE DELAY knob to position the pulse slightly and with the PULSE WIDTH MULT. dial set at 10, adjust C50 (Pulse width switch) for 10 divisions.

Turn the PULSE WIDTH MULT. dial to CCW end. The pulse should not drop out. If it does, first check the TRIGGER BIAS knob. If it is not this, replace R50 (2.7k) with a 4.7k resistor and begin again at SET PULSE WIDTH MULT DIAL trying 180 and 270 degree dials. If this does not work, replace R51 and begin again.

6. CHECK 100 AND 1000 µSEC RANGES

Switch 163 pulse width to 100 µsec, the scope time/CM to 0.1 millisec/CM, and the 180 to 100 µsec. With the PW/MULT dial at 10, the pulse width must be 10 CM wide ±3%.

Switch the 163 to 1000 µsec pulse width, the scope to 1 millisecond/CM, and the 180 to 100 µsec. With the PW/MULT dial at 10, the pulse width must be 10 CM wide ±3%.

7. CHECK RISE TIME

The rise time of the pulse leading edge must not be greater than 0.2 µsec.