FACTORY CALIBRATION PROCEDURE

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543B

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:

0-145
September 1967
For all serial numbers.

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. (KM)

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

a. TEKTRONIX Instruments

1	TYPE 543B OSCILLOSCOPE
* 1	TYPE 1A1 PLUG-IN UNIT
* 1	TYPE 184 TIME MARK GENERATOR
* 1	TYPE 191 CONSTANT-AMPLITUDE SIGNAL GENERATOR
1	TYPE P6006 10X PASSIVE PROBE
1	TYPE P6028 1X PASSIVE PROBE
1	TYPE 76TU LINE VOLTAGE CONTROL UNIT

b. Test Fixtures and Accessories

1	BNC T Male to 2 Female (103-0030-00)
3	50Ω coax cables 42" long (012-0057-00)
1	50Ω TERMINATION (011-0049-00)
* 1	50Ω TERMINATION ±0.1% (067-0120-00)
3	18" patch cords (012-0091-00)
1	30" patch cords (012-0014-00)
* 1	STANDARD AMPLITUDE CALIBRATOR (SAC)(067-0502-00)
1	LF SINE WAVE GENERATOR
1	CALIBRATION FIXTURE (1M1/TU-7 PLUG-IN) (067-0521-00)

c. Other Equipment

1	20,000Ω/VDC multimeter

d. Equipment for Sample Checks

1	DC Voltage Bridge (067-0543-99)
1	CRT Viewing Hood (016-0053-00)

* 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

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1. PRELIMINARY INSPECTION

2. PRESET CONTROLS

3. RESISTANCE CHECKS

4. LOW VOLTAGE SUPPLIES

a. Check time-delay relay: ≥15s
b. Adjust -150V Adj, R616: -150VDC
c. Check power supply voltage and regulation:

Supply	Tolerance	Max Ripple
-150VDC	±2%	5mV
+100VDC	±2%	10mV
+225VDC	±2%	5mV
+350VDC	±2%	20mV
+500VDC	±3%	20mV

5. HIGH VOLTAGE

a. Adjust High Voltage, R840: -1700V ±2%
b. Check high voltage regulation: no blooming
c. Check graticule alignment: ≤3° tilt
d. Check TRACE ROTATION range: at least + and - 3° from position noted in 5c.

6. GEOMETRY AND FOCUS

a. Adjust Geometry, R861: ≤1mm bowing
b. Check horizontal focus: no overlap of 20 marks/cm
c. Check horizontal geometry: ≤1mm bowing
d. Check vertical focus: no overlap of 0.5mm spaced traces

7. SCALE ILLUMINATION AND BEAM POSITION INDICATORS

a. Check SCALE ILLUM: off ccw, max cw
b. Check beam position indicators: Correct vertical indicator on before beam leaves graticule area; other indicator off before beam is 2cm past graticule center.

Correct horizontal indicator on before beam is 4.5cm from graticule center; other indicator off before beam is 2cm past graticule center.

8. VERTICAL GAIN

a. Adjust DC Bal, R495: range; at least + & - 2cm balance; ≤1cm from graticule center
b. Set Gain, R520: error, ≤2% range, at least + & -10%
c. Check gain change with line voltage change: ≤1% from 103.5V to 126.5V
d. Check compression or expansion: ≤1.5mm
e. Check trace drift with line voltage change: ≤1cm from 103.5V to 126.5V

9. DUAL TRACE AND CHOPPED BLANKING

a. Check ALTERNATE operation: dual trace all sweep rates
b. Check chopped blanking: transients blanked

10. AMPLITUDE CALIBRATOR

a. Adjust Cal Adj, R879: 100V
*b. Check voltage accuracy: ±2%
*c. Check .1V INTO 50Ω: ±2%
d. Check symmetry: 45 to 55%
e. Check period: 1ms ±20%

11. TRIGGERING

b. Adjust Trig Level Centering, R39

c. Adjust Trig Sens, R47: AUTO repetition rate of 40 Hz ±10%
d. Adjust Int Trig DC Level, R3

e. Check Triggering:

± EXT AC & DC	0.1V at 150 Hz
± EXT AC LF REJECT	0.1V at 150 Hz will not trigger
± EXT AC LF REJECT	0.1V at 30 kHz
± INT AC LF REJECT	1mm at 30 kHz
± INT AC LF REJECT	1mm at 150 Hz will not trigger
± INT AC	1mm at 150 Hz
± INT DC	4mm at 150 Hz within 2mm of graticule center

12. PRESET STABILITY

a. Adjust PRESET ADJUST: 50% of range
b. Check AUTO triggering:
+ & - INT, 4mm at 150 Hz
+ & - EXT, 0.5V at 150 Hz

13. LINE TRIGGERING

Triggers on correct slope

14. HORIZONTAL AMPLIFIER

a. Adjust Sweep Mag Regis, R359: ≤1mm shift
b. Adjust X100 Cal, R375: ±4%
c. Adjust X1 Cal, R342: ±2%
d. Adjust Swp Length, R176: 10.5cm ±0.3cm
e. Adjust DC Shift, R365: ≤1mm shift

14. (cont'd)

*f. Check SWEEP MAGNIFIED accuracy: ±4%
g. Adjust amplifier input, C337: ≤1mm shift

15. SWEEP TIMING

*a. Check slow sweep rate accuracy: within ±2%, except 1, 2 &5 SEC, ±2.5%
b. Check VARIABLE TIME/CM ratio: ≥2.5:1
c. Adjust fast sweep rates: ±2%
*d. Check fast sweep rate accuracy: ±2%

16. HIGH SPEED COMPENSATION

*a. Adjust amplifier high speed compensation: ±4%
*b. Adjust magnifier compensation: ±4%, except NORMAL ±2%
c. Check MAGNIFIER, ON and UNCALIBRATED: ON, when sweep is magnified, UNCALIBRATED on when sweep rate is faster than 20ns/cm

17. SINGLE SWEEP

a. Adjust Lockout Level Adj, R125: +11V, ±10% from free run
b. Check SINGLE SWEEP and READY light: single sweep sweeps once when triggered by 1mm signal; READY light is lit when sweep is armed

18. INTENSITY MODULATION

modulates on ≤15V

19. FRONT PANEL WAVEFORMS

VERT SIG OUT	≥1.2V/cm
SAWTOOTH OUT	≥135V
+GATE OUT	≥20V

20. HOLDOFF

4µsec to 400msec

21. EXTERNAL HORIZONTAL AMPLIFIER

a. Adjust Ext Horiz DC Bal, R334: ≤1cm trace shift
*b. Adjust Gain, R361M: ±2%, range ≥±10%
c. Check attenuator accuracy: ±2%
d. Check VARIABLE VOLTS/CM ratio: ≥10:1
e. Compensate attenuator, C310 and C313: ±2% of .1 VOLT/CM
*f. Check bandpass: -3dB at ≥500 kHz

22. VERTICAL TRANSIENT RESPONSE

a. Adjust DC Shift, R502: ≤1% tilt
b. Adjust HF Compensation: ≤1% aberration
c. Check positioning effect: ≤1%
d. Recheck Vertical Gain: 4cm ±1%
e. Check risetime: ≤10ns

23. VERTICAL BANDPASS

*b. Check vertical bandpass: -3dB at ≥33 MHz

24. HIGH FREQUENCY TRIGGERING

a. Check triggering at 10 MHz:

INT AC & AC LF REJ,	2mm
INT DC	6mm
EXT AC, AC LF REJECT & DC	0.2V
EXT & INT AUTO	any amplitude

b. Check triggering at 30 MHz:

INT AC & AC LF REJECT	1cm; ≤1mm jitter
EXT AC, AC LF REJECT & DC	1cm; ≤1mm jitter

[THE FOLLOWING CHECKS ARE NOT MADE ON 100% OF THE INSTRUMENTS, BUT ARE DONE ON A SAMPLING BASIS.]

25. LOW VOLTAGE POWER SUPPLY DC STABILITY

Change line voltage from 103.5V to 126.5V:

-150VDC	±0.05%
+100VDC	±0.5%
+225VDC	±0.1%
+350VDC	±0.5%
+500VDC	±0.5%

26. VISUAL WRITING RATE

No bright spot at start of trace with sweep rate of 0.02µs/cm triggered at 10 Hz

THE END

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

1. PRELIMINARY INSPECTION

a. Make General Inspection

Check for unsoldered joints, rosin joints, lead dress and long ends. Check controls for smooth mechanical operation and proper indexing except TRIGGERING LEVEL knob which hasn't been adjusted or tightened yet. Correct all defects found.

b. Pretighten TRIGGERING LEVEL knobs

Use care not to dimple the shaft. Tighten the TRIGGERING LEVEL knob just secure enough to allow the TRIGGERING LEVEL control to be used, it will be set later in the procedure.

c. Check CRT faceplate and alignment

c. Do not reject a CRT without consulting a trained CRT checker or referring to the Cathode Ray Tube Check Out Procedure.

Inspect the CRT for:

- phosphor defects
- scratches
- cracks
- bubbles

Adjust the CRT mounting bracket so that the CRT implosion shield and light guide are flush.

Place an external graticule over the CRT, tighten the CRT clamp, and adjust the CRT for alignment with the external graticule. Remove the external graticule.

Record the CRT serial number and bake date.

d. Adjust graticule lights

Adjust the graticule lights so that the bulbs extend into but do not rest on the light guide.

e. Check fuse

Check for correct fuse value:

108V, 115V, or 122V 50-60 and 400 Hz
6.25A Slo-Blo 3ag (159-0011-00)
216V, 230V, or 244V 50-60 and 400 Hz
3A Slo-Blo 3ag (159-0005-00)

2. PRESET CONTROLS

a. Preset TYPE 543B

FOCUS	ccw
INTENSITY	ccw
ASTIGMATISM	ccw
SCALE ILLUM	cw
STABILITY	ccw
TRIGGERING LEVEL	midr
TRIGGERING MODE	AC
TRIGGER SLOPE	+INT
TIME/CM	1mSEC
VARIABLE	CALIBRATED
PRESET ADJUST	ccw
HORIZONTAL DISPLAY	NORMAL (X1)
SINGLE SWEEP	NORMAL SWEEP
HORIZONTAL POSITION	midr
VERNIER	midr
EXTERNAL HORIZONTAL	
VOLTS/CM	.1
VARIABLE	CALIBRATED
AMPLITUDE CALIBRATOR	OFF
CRT CATHODE SELECTOR (scope rear panel)	EXT CRT CATHODE

Preset all internal adjustments to midr.

b. Preset 1M1

Install the 1M1 in the TYPE 543B and preset controls as follows:

TEST FUNCTION	LOW LOAD
VARIABLE	cw
VERTICAL POSITION	midr
REPETITION RATE	LOW
AMPLITUDE	ccw

3. RESISTANCE CHECKS

Measure the resistance to gnd of the following supplies. These supplies may be found on the ceramic strip inboard from T601.

Supply	Approx resistance
-150VDC	3kΩ
+100VDC	500Ω

3. (cont'd)

+225VDC	2.2kΩ
+350VDC	20kΩ*
+500VDC	30kΩ
+325VDC unreg	3.5kΩ
+ 75VDC	400Ω

*Reverse meter leads if necessary.

Check the resistance of T601 term 1 and 4 to gnd, infinity.

4. LOW VOLTAGE SUPPLIES

a. Check time-delay relay: ≥15 seconds

Connect the TYPE 543B power cord to the TYPE 76TU. Set the TYPE 76TU for 115V as read on its meter. Turn TYPE 543B POWER switch ON, check for a delay of 15 seconds or more before the audible click.

Check each low voltage supply to check for stuck relay contacts while waiting for time delay relay to close.

b. Adjust -150V Adj, R616: -150VDC

Connect the multimeter leads from the -150V supply to gnd and adjust R616, -150V Adj, for -150VDC.

c. Check power supply voltage and regulation:

Use the multimeter to check the power supply voltages. Check the power supply ripple with the test scope and X1 probe. Set 1M1 TEST FUNCTION switch at HIGH LOAD for line voltage of 103.5V and LOW LOAD for line voltage of 126.5V. Use the following table:

c. Supply Ripple

The max ripple for the +100VDC supply includes high voltage hash.

Supply	Tolerance	Max ripple
-150VDC	±3V	5mV
+100VDC	±2V	10mV
+225VDC	±4.5V	5mV
+350VDC	±7V	20mV
+500VDC	±15V	20mV

Return the TYPE 76TU to 115V.

d. Check elevated heaters:

Check the following terminals of T601 for elevation.

T601 term	approx DC voltage to gnd
22 and 23	+95V
9 and 16	+220V
18 and 19	+350V
24 and 25	-1500V to -1900V

4. (cont'd)

e. Check export windings

Connect T601 term B and C together. Check term A and D for approx 14 VAC. Remove the connection between term B and C.

5. HIGH VOLTAGE

a. Adjust High Voltage Adj, R840: -1700V ±2%

Connect the multimeter leads between the filament end of R857 and gnd. Adjust the High Voltage Adj, R840, for -1700V.

b. Check High Voltage regulation: no blooming

Set the STABILITY cw. Slowly increase INTENSITY until a trace appears, it may also be necessary to adjust the 1M1 VERTICAL POSITION control. Defocus the trace and set the INTENSITY control cw. Set the TYPE 76TU to 103.5V and check for no blooming.

Set the TYPE 76TU to 126.5V and check for no blooming. Return the TYPE 76TU to 115V. Set INTENSITY, FOCUS and ASTIGMATISM for a well-defined trace.

c. Check graticule alignment: ≤3°

Connect the multimeter across the terminals of the trace rotation coil, L778. Adjust the TRACE ROTATION for zero volts. Check for no more than 0.5cm tilt in 10cm (≤3°). Remove meter leads.

d. Check TRACE ROTATION range: at least + and - 3° from the position noted in part c of this step.

Rotate the TRACE ROTATION cw and ccw. Check that the trace rotates in the same direction as the pot + and - 0.5cm from the position at zero volts. Adjust the TRACE ROTATION to parallel the trace with the graticule center line.

TRACE ROTATION adjustment is through the center of the ASTIGMATISM knob.

6. GEOMETRY AND FOCUS

a. Adjust Geometry, R861: ≤1mm bowing

Connect the MARKER OUTPUT of the TYPE 184 to the 1M1 EXT INPUT. Set the TYPE 184 for .1mS time marks. Adjust the STABILITY and TRIGGERING LEVEL for a stable display. It may be necessary to adjust Trig Level Centering, R39, to trigger the display.

Position the display so that only the time marks are visible and adjust R861 Geometry for min bowing of markers.

b. Check Horizontal focus: no overlap of 20 marks/cm

Set the TYPE 184 for .5mS time marks and readjust TRIGGERING LEVEL and STABILITY if necessary. Adjust VARIABLE TIME/CM for 2 marks/cm. It may also be necessary to adjust the Swp Cal, R348.

Change the TYPE 184 to 50μS time marks. Adjust INTENSITY, FOCUS and ASTIGMATISM for the best resolution. Check for no overlap of time mark anywhere within the graticule.

c. Check horizontal geometry: ≤1mm bowing

Remove the time marks from the 1M1 EXT INPUT and set the STABILITY cw. Check geometry at the bottom, center and top of the graticule, 1mm or less bowing.

d. Check vertical focus: no overlap of 0.5mm spaced traces

Connect a coax cable from the SAC OUTPUT to the 1M1 EXT INPUT. Set the SAC to 1 VOLT ⊓⊔. Adjust the 1M1 VARIABLE for a display amplitude of 0.5cm. Set the SAC to .1 VOLT. Adjust FOCUS, ASTIGMATISM and INTENSITY for best resolution. Position the display to the top, center and bottom of the graticule and check for no overlap of the traces.

7. SCALE ILLUMINATION AND BEAM POSITION INDICATORS

a. Check SCALE ILLUM: Off ccw, max cw

Set the SCALE ILLUM control ccw and check for no graticule illumination. Slowly rotate the SCALE ILLUM cw, check for increasing brilliance with max at cw.

7. (cont'd)

b. Check beam position indicators
Correct vertical indicator on before beam leaves graticule area: other indicator off before beam is 2cm past graticule center.

Correct horizontal indicator on before beam is 4.5cm from graticule center; other indicator off before beam is 2cm past graticule center.

Move beam up and down, checking that correct indicator is on before beam leaves graticule area and other indicator is off before beam is 2cm past graticule center.

Move beam horizontally, checking that correct indicator is on before beam is 4.5cm from graticule center and other indicator is off before beam is 2cm past graticule center.

Return HORIZONTAL DISPLAY to NORMAL

8. VERTICAL GAIN

a. Adjust DC Bal, R495:
Range: at least + & -2cm
Balance: ≤1cm from graticule center

8a. The DC Bal must be set at graticule center to allow for circuit drift.

Set the HORIZONTAL DISPLAY TO NORMAL (X1) and the 1M1 TEST FUNCTION switch to COMMON MODE. Rotate DC Bal, R495 and check for 2cm or more of movement from graticule center in both directions. Position the trace to graticule center with the DC Bal, R495.

b. Set Gain, R520: range, at least + & -10%, error, ≤2%

Set the 1M1 TEST FUNCTION to GAIN SET. Apply 100 VOLTS from the SAC. Set Gain, R520, cw and check for 4.4cm or more of display. Set Gain ccw and check for 3.6cm or less amplitude. Set Gain, R520, for 4cm.

c. Check gain change with line voltage change: ≤1% from 103.5V to 126.5V

Set the TYPE 76TU to 103.5V and check amplitude, 4cm ±0.4mm. Set the TYPE 76TU to 126.5V and check amplitude, 4cm ±0.4mm. Return the TYPE 76TU to 115V.

8. (cont'd)

d. Check compression or expansion: ≤1.5mm

Set the 1M1 TEST FUNCTION switch to LOW LOAD. Adjust the VARIABLE and VERTICAL POSITION for a 2cm display at graticule center. Position the display to the top and then the bottom of the graticule, check for 2cm ±1.5mm max at top and bottom.

e. Check trace drift with line voltage change: ≤1cm from 103.5V to 126.5V

Remove the SAC signal from the 1M1 EXT INPUT. Set the TYPE 76TU to 103.5V, wait 30 seconds and position trace to graticule center. Change TYPE 76TU to 126.5V. Wait 30 seconds, check trace drift, 1cm max. Return TYPE 76TU to 115V.

9. DUAL TRACE AND CHOPPED BLANKING

a. Check ALTERNATE operation: dual trace all sweep rates

Apply a 50V ⎍⎍ to the 1M1 EXT INPUT and check for ALTERNATE display at all sweep rates from .1μSEC to 1 SEC. (This will assure operation at all sweep rates.)

b. Check chopped blanking: transients blanked

Set the TIME/CM switch to 2μSEC. Set the 1M1 TEST FUNCTION switch to CHOPPED. Switch the CRT CATHODE SELECTOR, located on rear panel, to CHOPPED BLANKING. Check for blanking of the rising and falling portions of the waveform. Change the CRT CATHODE SELECTOR to EXTERNAL CRT CATHODE.

10. AMPLITUDE CALIBRATOR

a. Adjust Cal Adj, R879: 100V

Connect a 50Ω coax cable from the TYPE 543B CAL OUT to the SAC UNKNOWN INPUT. Set the AMPLITUDE CALIBRATOR to 100 VOLTS. Connect a 50Ω coax cable from the SAC OUTPUT to the test scope TYPE 1A1. Set the TYPE 1A1 VOLTS/CM to .5 and INPUT SELECTOR to AC. Set the SAC to 100V, +DC, MIXED.

Remove V875 from the TYPE 543B.

10a. (cont'd)

Trigger the test scope in AUTO, -LINE and set TIME/CM to 5mSEC. The first complete half cycle of the test scope display will be the SAC voltage or reference point. The direction of error can then be determined by the polarity of the next half cycle. A positive going waveform is a positive error.

Set the Cal Adj, R879, for a null voltage (a straight line).

b. Check voltage accuracy: within ±2%

Change the instrument controls as listed in the table below while checking the AMPLITUDE CALIBRATOR error (trace separation).

AMPLITUDE CALIBRATOR & SAC VOLTS	TYPE 1A1 VOLTS/CM	Max deflection
100	.5	2cm
50	.5	2cm
20	.2	2cm
10	.1	2cm
5	.05	2cm
2	.02	2cm
1	.01	2cm
.5	.005	2cm
.2	.005	8mm
.1	.005	4mm

Add the error found in the .1 VOLTS position to the worst error of the same direction in the previous positions. Total error $\leq$2%.

c. Check .1V INTO 50Ω: ±2%

Set AMPLITUDE CALIBRATOR to .5 VOLTS (.1V INTO 50Ω) and insert the special 50Ω TERMINATION (±0.1%) into the signal path between the AMPLITUDE CALIBRATOR and the SAC UNKNOWN INPUT. Check for 4mm or less error.

d. Check symmetry: 45% to 55%

Remove the special 50Ω TERMINATION from the signal path. Reinsert V875. Set the test scope TRIGGER SLOPE to +INT and TIME/CM to 50μSEC. Set the 1A1 VOLTS/CM to .2. Change the SAC to UNKNOWN INPUT. Adjust the test scope VARIABLE TIME/CM for 1 cycle of square-wave in 10cm. Check the length of the half cycles, 4.5 to 5.5cm.

10. (cont'd)

e. Check period: 1ms ±20%

Set the test scope TIME/CM to 1mSEC, return VARIABLE to CALIBRATED. Check for 8 to 12 cycles in 10cm.

f. Check for correct output

Change the instrument controls as listed in the table below while checking the remainder of the AMPLITUDE CALIBRATOR for approximately the correct amplitude.

f. The accuracy of these positions was verified in step 10b. This step is necessary to check for wiring errors and switch defects.

AMPLITUDE CALIBRATOR mVOLTS	TYPE 1A1 VOLTS/CM	Approx Deflection
50	.02	2.5cm
20	.005	4cm
10	.005	2cm
5	.005	1cm
2	500µV/CM	4cm
1	500µV/CM	2cm
.5	500µV/CM	1cm
.2	500µV/CM	0.4cm

500µV/CM is obtained by coupling the CH1 SIGNAL OUTPUT to CHANNEL 2 INPUT with both VOLTS/CM switches at .005.

11. TRIGGERING

a. Tighten TRIGGERING LEVEL knob

Connect the multimeter between the junction of R19-R20 (TRIGGER SLOPE switch) and gnd. Set the TRIGGERING LEVEL knob for 0V, on the most sensitive VDC range. Loosen the TRIGGERING LEVEL knob set screw, align the index dot with "0" and retighten set screw. Make sure the meter remains at 0V.

b. Adjust Trig Level Centering, R39

Change the multimeter to its highest current range. Connect 2 VOLTS ⊓_⊓ from the SAC to the 1M1 EXT INPUT. Change the 1M1 TEST FUNCTION switch to LOW LOAD. Adjust the VARIABLE for 2cm amplitude. Set the SAC to .1 VOLTS. (This is 1mm of vertical amplitude.) Connect the test scope X10 probe to R49-C131 junction (C of Q45).

11b. (cont'd)

Adjust Trig Level Centering R39 for a stable square-wave on the test scope, while switching TRIGGER SLOPE between +INT and -INT.

c. Adjust Trig Sens, R47: AUTO repetition rate of 40 Hz ±10%

Set the test scope TIME/CM to 5mSEC. Change the TYPE 543B TRIGGERING MODE to AUTO. Remove the coax cable from the 1M1 EXT INPUT. Adjust Trig Sens R47 for 5cm/cycle of square-wave ±0.5cm.

d. Adjust Int Trig DC Level, R3

Change the TRIGGERING MODE to AC, reconnect the SAC signal to the 1M1 EXT INPUT. Set the SAC to .2 VOLTS. Position the display to graticule center. Set the test scope TIME/CM to 1mSEC. Adjust the Int Trig DC Level, R3 for a stable square-wave display on the test scope while switching the TRIGGER SLOPE switch between +INT and -INT.

Remove the meter leads from the junction of R19-R20 and gnd.

d. Int Trig DC Level

The setting of R3 and R39 will drift. Do not reset R39, R47 or R3 to compensate for this drift, unless the triggering cannot make the test limits in step 11e.

e. Check triggering

Remove the SAC signal and install a "T" connector on the EXT INPUT. Connect a coax cable from the "T" connector to the test scope vertical input.

Connect a coax cable from the LF SINE-WAVE GENERATOR to the "T" connector. Set the LF SINE-WAVE GENERATOR frequency to 150 Hz and adjust the amplitude for 0.1 volts, displayed on the test scope. Change the coax cable from the test scope to the TYPE 543B TRIGGER INPUT. Check both + and - slopes for triggering using the following table. Adjust TRIGGERING LEVEL and STABILITY as necessary.

11b. (cont'd)

TRIGGERING MODE	TRIGGER SLOPE	LF Sine Wave Generator Frequency	Amplitude
AC	±EXT	150 Hz	0.1V
DC	±EXT	150 Hz	0.1V
AC LF REJECT	±EXT	150 Hz	0.1V will not trigger
AC LF REJECT	±EXT	30 kHz	0.1V (check amplitude with test scope)
AC LF REJECT	±INT	30 kHz	1mm
AC LF REJECT	±INT	150 Hz	1mm will not trigger
AC	±INT	150 Hz	1mm
DC	±INT	150 Hz	4mm within 2mm of graticule center

12. PRESET STABILITY

a. Adjust PRESET ADJUST: 50% of range

Remove the LF SINE-WAVE GENERATOR coax cable from the "T" connector. Set the TRIGGERING MODE to AUTO, TRIGGER SLOPE to +LINE and TIME/CM to .1mSEC. Set the multimeter to read -150V and connect it from the center arm of the PRESET ADJUST to gnd. Adjust the PRESET ADJUST cw until a trace appears on the CRT. Check the meter reading. Advance the PRESET ADJUST until the trace brightens, read the meter. Set the PRESET ADJUST for a reading halfway between the previous readings.

b. Check AUTO triggering:
+ & - INT, 4mm at 150 Hz
+ & - EXT, 0.5V at 150 Hz

Reconnect the LF SINE-WAVE GENERATOR output to the "T" connector. Check for + & - AUTO triggering with 4mm of 150 Hz signal in INT and 0.5V in EXT. Set EXT amplitude with test scope. Remove coax cables and "T" connector.

Check that TRIGGERING LEVEL control has no effect on slope of AUTO display.

13. LINE TRIGGERING

Connect a X10 probe from the 1M1 EXT INPUT to the TYPE 543B fuse holder. Set TRIGGER SLOPE to +LINE, TRIGGERING MODE to AC and STABILITY to PRESET.

Check triggering for a positive going sine-wave in +LINE and a negative going sine-wave in -LINE. Use TRIGGERING LEVEL as necessary. Remove X10 probe from fuse holder and 1M1.

14. HORIZONTAL AMPLIFIER

a. Adjust Sweep Mag Regis, R359: ≤1mm shift

Set the HORIZONTAL DISPLAY to X100 and position the start of the display to the graticule center line. Change the HORIZONTAL DISPLAY to NORMAL (X1) and adjust the Sweep Mag Regis, R359 to return the display start to the graticule center line. Repeat several times to eliminate interaction.

b. Adjust X100 Cal, R375: ±4%

Connect 1mS, .1mS and 10μS markers from the TYPE 184 to the 1M1 EXT INPUT. Set the TRIGGERING MODE to AC, TRIGGER SLOPE to +INT and TIME/CM to 1mSEC. Adjust the STABILITY and TRIGGERING LEVEL for a stable display. Set the HORIZONTAL DISPLAY switch to SWEEP MAGNIFIED X100 and adjust the X100 Cal, R375 for 1 time mark/cm.

c. Adjust X1 Cal, R342: ±2%

Change the HORIZONTAL DISPLAY to NORMAL (X1) and adjust R342 for one 1mS time mark/cm. Switch between X1 and X100 and adjust R342 and R375 until interaction is not apparent.

d. Adjust Swp Length, R176: 10.5cm ±0.3cm

Set the HORIZONTAL DISPLAY to NORMAL (X1) and adjust the SWP LENGTH for 10.5cm.

e. Adjust DC Shift, R365: ≤1mm shift

Set the HORIZONTAL DISPLAY to X100 and position the start of the display to the graticule center line. Turn sweep on and off with SINGLE SWEEP switch, adjusting DC shift R365 for minimum drift. Repeat Steps 'a' through 'e' as necessary to eliminate interaction.

Sweep tolerances.

It may be necessary to adjust the X100 and X1 Cal to some point other than "right on" to compensate for SWEEP MAGNIFIED settings which are not adjustable. All sweep tolerances must remain within the specified test limits.

14. (cont'd)

f. Check SWEEP MAGNIFIED accuracy: ±4%

Set the HORIZONTAL DISPLAY to X1 and position the display for one 1mS mark/cm. Change the HORIZONTAL DISPLAY to X2. Use the following table to check SWEEP MAGNIFIED accuracy.

HORIZONTAL DISPLAY	Marks/cm	Max error in mm
X2	one 1mS/2cm	±3.2
X5	two .1mS/cm	±3.2
X10	one .1mS/cm	±3.2
X20	one .1mS/cm	±3.2
X50	two 10µS/cm	±3.2
X100	one 10µS/cm	±3.2

g. Adjust Amplifier input, C337: ≤1mm shift

Set the TIME/CM to .1mSEC and the HORIZONTAL DISPLAY to X5. Position the start of the display to the graticule center line. Change the TIME/CM to 50µSEC and return the start of the display to the graticule center line with C337. Switch the TIME/CM several times between .1mSEC and 50µSEC and adjust C337 for no shift.

15. SWEEP TIMING

a. Check slow sweep rate accuracy: .1mSEC to .5 SEC, within ±2%; 1, 2 & 5 SEC, ±2.5%

Set the HORIZONTAL DISPLAY to NORMAL (X1) and the TIME/CM to .1mSEC. Set the TYPE 184 to .1mS only. Use the following table to check sweep accuracy.

TIME/CM	TYPE 184 markers	time marks/cm	max error in mm
.1mSEC	.1mS	1	1.6
.2mSEC	.1mS	2	1.6
.5mSEC	.5mS	1	1.6
1 mSEC	1mS	1	1.6
2 mSEC	1mS	2	1.6
5 mSEC	5mS	1	1.6
10mSEC	10mS	1	1.6
20mSEC	10mS	2	1.6
50mSEC	50mS	1	1.6
.1 SEC	.1 S	1	1.6
.2 SEC	.1 S	2	1.6
.5 SEC	.5 S	1	1.6
1 SEC	1 S	1	2
2 SEC	2 S	2	2
5 SEC	5 S	1	2

15. (cont'd)

b. Check VARIABLE TIME/CM: ratio ≥2.5:1

Set the TYPE 184 to 1mS and the TIME/CM to 1mSEC. Rotate the VARIABLE TIME/CM ccw. Check for ≥5 time marks/2cm. Check that the UNCALIBRATED light is lit when the VARIABLE is not set to CALIBRATED.

c. Adjust fast sweep rates: ±2%

Set the TYPE 184 to 10µS and the TIME/CM to 10µSEC. Use the following table to adjust fast sweep rate timing.

TIME/CM	TYPE 184	adjust	marks/cm	max error
10µSEC	10µS	C160E	1	1.6mm
1µSEC	1µS	C160C	1	1.6mm
.5µSEC	.5µS	C160A	1	1.6mm
.1µSEC	.1µS	C361A	1	1.6mm

d. Check fast sweep rate accuracy: ±2%

TIME/CM	TYPE 184	marks/cm	max error (mm)
.1µSEC	.1µS	1	1.6
.2µSEC	.1µS	2	1.6
.5µSEC	.5µS	1	1.6
1µSEC	1µS	1	1.6
2µSEC	1µS	2	1.6
5µSEC	5µS	1	1.6
10µSEC	10µS	1	1.6
20µSEC	10µS	2	1.6
50µSEC	50µS	1	1.6

16. HIGH SPEED COMPENSATION

a. Adjust amplifier high speed compensation: ±4%

Change the TIME/CM to 2µSEC and set the TYPE 184 to 20nS. Connect a 1µS TRIGGER OUTPUT signal from the TYPE 184 to the TYPE 543B TRIGGER INPUT. Set the TRIGGER SLOPE to +EXT. Adjust compensation using the following table.

TIME/CM	HORIZONTAL DISPLAY	TYPE 184	display	adjust	max error (mm)
2µSEC	X100	20nS	1 cycle/cm	C394, C388 & C387	3.2
10µSEC	X100	.1µS	1 mark/cm	C368	3.2
2µSEC	X100	20nS	1 cycle/cm	C394, C388 & C387	3.2

Repeat Steps 14, 15, and 16 to eliminate interaction.

16. (cont'd)

b. Adjust magnifier compensations: ±4%, except NORMAL (X1), ±2%

Set the TYPE 543B TIME/CM to .1µSEC and HORIZONTAL DISPLAY to NORMAL (X1). Set the TYPE 184 to .1µS. Use the following table to adjust the magnifier compensation.

TIME/CM	HORIZONTAL DISPLAY	TYPE 184	display	adjust	max error (mm)
.1µSEC	NORMAL (X1)	.1µS	1 mark/cm	C361A	1.6
.1µSEC	X2	20nS	5 cycles/2cm	C361C	3.2
.1µSEC	X5	20nS	1 cycle/cm	C361E	3.2
.2µSEC	X10	20nS	1 cycle/cm	C361G	3.2
2µSEC	X20	.1µS	1 mark/cm	C361J	3.2
1µSEC	X50	20nS	1 cycle/cm	check	3.2

c. Check MAGNIFIER ON and UNCALIBRATED neons: ON lit when sweep is magnified, UNCALIBRATED lit when sweep rate is faster than 20ns/cm

Change the TIME/CM switch to .1µSEC and the HORIZONTAL DISPLAY to X2. Use the following table to check MAGNIFIER ON and UNCALIBRATED neons.

TIME/CM	HORIZONTAL DISPLAY	MAGNIFIER ON	UNCALIBRATED
.1µSEC	X2	on	off
.1µSEC	X5	on	off
.1µSEC	X10	on	on
.2µSEC	X10	on	off
.2µSEC	X20	on	on
.5µSEC	X20	on	off
.5µSEC	X50	on	on
1µSEC	X50	on	off
1µSEC	X100	on	on
2µSEC	X100	on	off
2µSEC	EXT	off	off
2µSEC	NORMAL (X1)	off	off

17. SINGLE SWEEP

a. Adjust Lockout Level Adj, R125: +10V to +12V from free run

Set the TYPE 543B TIME/CM to .5mSEC. Remove all connections from the 1M1 and TYPE 543B. Set TRIGGER SLOPE to +INT, TRIGGERING MODE to AC. Connect the multimeter between V125 pin 2 and gnd. Set the STABILITY control to the point just before the sweep runs, and check the meter reading. Set the SINGLE SWEEP switch to SINGLE SWEEP. Set the STABILITY cw and adjust the Lockout Level Adj, R125, for a reading 11 volts less negative.

b. Check SINGLE SWEEP and READY light: single sweep sweeps once when triggered by 1mm signal; READY light lit when sweep is armed

Set the SINGLE SWEEP to NORMAL, and the STABILITY to the point where the sweep just starts. Set the SINGLE SWEEP to SINGLE SWEEP and rotate the STABILITY cw; check that the READY light and sweep do not operate. Set the SINGLE SWEEP switch to NORMAL. Connect .5 VOLTS from the SAC to the 1M1 EXT INPUT. Obtain a stable display of 1mm amplitude. Set the SINGLE SWEEP switch to SINGLE SWEEP and check that the display extinguishes. Push the SINGLE SWEEP switch to RESET; observe that the READY light is lit and a sweep is generated.

Remove the coax cable from the 1M1 EXT INPUT. Push the SINGLE SWEEP to RESET and check that the READY light is lit. Reconnect the coax cable to the 1M1 EXT INPUT and check that a sweep is generated and the READY light extinguishes. Return SINGLE SWEEP to NORMAL.

18. INTENSITY MODULATION

Modulates on ≤15V

Connect the SAC output coax cable to the TYPE 1M1 EXT INPUT. Connect 30" patch cord to the TYPE 543B VERT SIG OUT. Connect the test scope X10 probe to the patch cord. Set the SAC to 20 VOLTS. Adjust the TYPE 1M1 VARIABLE for a test scope amplitude of 15 volts.

Position the display up until the baseline is on the CRT. Set the TIME BASE A TRIGGER SLOPE switch to +INT. Adjust the STABILITY and TRIGGERING LEVEL for a stable display.

Remove the test scope X10 probe from the patch cord. Remove the CRT gnd strap (rear panel). Plug the end of the patch cord into the EXTERNAL CRT CATHODE binding post. Set the CRT CATHODE SELECTOR to EXT CRT CATHODE. Check for brightening of a portion of the display. Remove the patch cord, SAC coax cable and replace the CRT GND strap.

19. FRONT PANEL WAVEFORMS

VERT SIG OUT	≥1.2V/cm
SAWTOOTH OUT	≥135V
+GATE OUT	≥20V

Connect the CAL OUT to the 1M1 EXT INPUT with a coax cable. Set the AMPLITUDE CALIBRATOR for 2 VOLTS. Adjust the 1M1 VARIABLE for 2cm of vertical display. Set the test scope TYPE 1M1 INPUT SELECTOR to DC. Set the test scope TRIGGERING MODE to DC and TRIGGER SLOPE to -INT. Use the test scope X10 probe and check the following amplitudes.

VERT SIG OUT	2.4 volts min
SAWTOOTH OUT	135 volts min
+GATE OUT	20 volts min

20. HOLDOFF

4μs to 400ms

Connect the test scope probe to the +GATE binding post and measure holdoff using the following table.

20. (cont'd)

TIME/CM	holdoff
.1μSEC	4-9μsec
.2μSEC	4-9μsec
.5μSEC	4-9μsec
1μSEC	15-40μsec
2μSEC	15-40μsec
5μSEC	15-40μsec
10μSEC	15-40μsec
20μSEC	15-40μsec
50μSEC	15-40μsec
.1mSEC	150-400μsec
.2mSEC	150-400μsec
.5mSEC	150-400μsec
1mSEC	1.5-4msec
2mSEC	1.5-4msec
5mSEC	1.5-4msec
10mSEC	15-40msec
20mSEC	15-40msec
50mSEC	15-40msec
.1 SEC	150-400msec
.2 SEC	150-400msec
.5 SEC	150-400msec
1 SEC	150-400msec
2 SEC	150-400msec
5 SEC	150-400msec

21. EXTERNAL HORIZONTAL AMPLIFIER

a. Adjust Ext Horiz DC Bal, R334: ≤1cm trace shift

Set the TYPE 543B TIME/CM switch to 2mSEC. Connect a BNC to banana plug patch cord from the SAWTOOTH OUT binding post to the 1M1 EXT INPUT. Set the HORIZONTAL DISPLAY switch to EXT. Use the POSITION control to keep the display on the graticule. Rotate the EXTERNAL HORIZONTAL VARIABLE back and forth and adjust the Ext Horiz Amp DC Bal, R334 for no trace shift. Set the EXTERNAL VARIABLE to CALIBRATED.

b. Adjust gain, R361M: accuracy within ±2%; range, at least + & - 10%

Install a BNC "T" connector on the TRIGGER INPUT connector. Connect a BNC to banana plug patch cord from the EXT HORIZ IN to the TRIGGER INPUT. Connect the output of the SAC to the "T" connector. Set the TRIGGER SLOPE to +EXT and the SAC to .5 VOLTS. Position the display to the center of the graticule. Check the cw extreme of R361M for 5.5cm or more of display amplitude and ccw for 4.5cm or less. Adjust R361M for 5cm amplitude.

21. (cont'd)

c. Check attenuator accuracy: ±2%

Set the EXTERNAL HORIZONTAL VOLTS/CM to 1 and the SAC to 5 VOLTS. Check for 5cm ±1mm. Set the EXTERNAL HORIZONTAL VOLTS/CM to 10 and the SAC to 50 volts and check for 5cm ±1mm.

d. Check VARIABLE VOLTS/CM Ratio: ≥10:1

Rotate the VARIABLE ccw, set the EXTERNAL HORIZONTAL VOLTS/CM to 1 and check for 5cm or less of amplitude. Return the VARIABLE to CALIBRATED.

e. Adjust 1 and 10 VOLTS/CM attenuator compensation capacitors, C310 and C313: maximum aberration, ±2% of that observed at .1 VOLT/CM

Set the SAC to .5 VOLTS and set the EXTERNAL HORIZONTAL VOLTS/CM to .1. Set the TYPE 543B TIME/CM to 5mSEC. Adjust the TRIGGERING LEVEL and STABILITY for a stable display. Check the amount of rolloff or overshoot. Change the EXTERNAL HORIZONTAL VOLTS/CM to 1, set the SAC to 5 VOLTS and adjust C310 to match the waveform at .1 VOLTS/CM.

Set the SAC to 50 VOLTS and the EXTERNAL HORIZONTAL VOLTS/CM to 10. Adjust C313 to match the waveform at .1 volts/cm.

f. Check bandpass: -3dB at ≥500 kHz

Remove the patch cords, SAC signal and T connector from the TRIGGER INPUT and EXTERNAL HORIZ IN. Set the EXTERNAL HORIZONTAL VOLTS/CM to .1 and the STABILITY cw. Connect the TYPE 191 output with a 50Ω TERMINATION to the EXTERNAL HORIZ IN. Set the TYPE 191 FREQUENCY RANGE to 50 kHz and adjust the AMPLITUDE for 6cm. Change the TYPE 191 frequency to 500 kHz and check for ≥4.2cm display amplitude.

Remove the TYPE 191 signal from the TYPE 543B and set the HORIZONTAL DISPLAY switch to NORMAL (X1). Set TRIGGER SLOPE to +INT. Remove the patch cord from the 1M1 EXT INPUT and SAWTOOTH OUT.

22. VERTICAL TRANSIENT RESPONSE

a. Adjust DC Shift, R502: ≤1% tilt

Set the TYPE 543B on its right side. Set the 1M1 TEST FUNCTION to +PULSE. Set the AMPLITUDE for 6cm. Adjust the STABILITY and TRIGGERING LEVEL for a stable display. Adjust DC Shift, R502, for waveform flat top.

b. Adjust HF Compensation: ≤1% aberration

Set the 1M1 REPETITION RATE to HIGH. Set the TIME BASE A TIME/CM to .2μSEC. Adjust TRIGGERING LEVEL for a stable display. With the TIME/CM at .2μSEC, adjust L588, L589, L599, C520 and R580 for min rolloff or overshoot (≤0.6mm).

Set the TIME/CM to .5μSEC and adjust L554, C551 and C581 for min rolloff or overshoot. Adjust C568 for min ringing at 1μSEC. Adjust L560 for min tilt at 2μSEC (≤0.6mm).

c. Check positioning effect: ≤1%

Adjust the 1M1 AMPLITUDE for 4cm. Set the TYPE 543B TIME/CM to .5μSEC. Position the top of the display to the top ½cm line and check the display aberration. Position the top of the display to the bottom ½cm line and check the change in aberration, 0.4mm max.

d. Recheck Vertical Gain: 4cm ±1%

Set the TYPE 543B STABILITY cw. Change the 1M1 TEST FUNCTION switch to GAIN SET. Connect a 100V square-wave from the SAC to the 1M1 EXT INPUT. Check for 4cm ±0.4mm. Readjust R520 Gain Adj if necessary to return gain to 4cm.

If R520 is readjusted step 22a., b., and c. must be repeated. Remove the SAC cable from the 1M1 EXT INPUT.

22. (cont'd)

e. Check risetime: ≤10nsec

Set the 1M1 TEST FUNCTION to PULSE. Adjust the STABILITY and TRIGGERING LEVEL for a stable display. Adjust the 1M1 AMPLITUDE for 5cm. Set the TIME/CM to .1μSEC, set the HORIZONTAL DISPLAY to X5. Check for ≤10nsec risetime. Change the 1M1 TEST FUNCTION switch to +PULSE and the TYPE 543B TRIGGER SLOPE to -INT. Check risetime, 10nsec or faster.

If risetime is slower than 10nsec repeat all of step 22.

23. VERTICAL BANDPASS

a. Setup

Remove the 1M1 from the TYPE 543B. Install in its place the TYPE 1A1. Preset as follows:

MODE	CH 1
POSITION	midr
VOLTS/CM	.05
VARIABLE	CALIBRATED
INPUT 1	DC

Connect the output of the SAC to INPUT 1. Set the SAC to .2 VOLTS and adjust the TYPE 1A1 GAIN for 4cm.

b. Check vertical bandpass: -3dB at ≥33 MHz

Set the TYPE 543B TIME/CM to .1mSEC and STABILITY cw. Connect the TYPE 191 output through a 50Ω TERMINATION to the TYPE 1A1 INPUT 1. Set the TYPE 191 for 50 kHz, adjust the TYPE 191 AMPLITUDE for 4cm.

Without changing the AMPLITUDE change the frequency for a display of 2.8cm (-3dB), check for a reading of 33 MHz or more.

24. HIGH FREQUENCY TRIGGERING

a. Check triggering at 10 MHz

Install a BNC "T" connector to the TYPE 1A1 INPUT 1 and reconnect the TYPE 191 signal to the "T" connector. Connect a coax cable from the "T" connector to the TRIGGER INPUT.

Use the following table to check triggering at 10 MHz in both + and - slope. Use TRIGGERING LEVEL as necessary.

TRIGGERING MODE	TRIGGER SLOPE	Amplitude	
AC LF REJECT	±INT	2mm	
AC	±INT	2mm	
DC	±INT	6mm	
DC	±EXT	0.2V	
AC	±EXT	0.2V	
AC LF REJECT	±EXT	0.2V	
AUTO	+ & - EXT	any amplitude	} any setting of TIME/CM and VARIABLE
AUTO	+ & - EXT	any amplitude	

b. Check triggering at 30 MHz:

INT AC & AC LF REJECT — 1cm; ≤1mm jitter

EXT AC, AC LF REJECT & DC — 1V; ≤1mm jitter

Set the TYPE 191 for 30 MHz. Check INT TRIGGER SLOPE (both + and -), TRIGGERING MODE AC and AC LF REJECT using the TRIGGERING LEVEL control for stable triggering. Use 1cm of amplitude and check for 1mm or less jitter (trace width).

Set the TYPE 191 FREQUENCY RANGE to 50 kHz and obtain 1V of amplitude. Set the TYPE 191 for 30 MHz. Check EXT AC, AC LF REJECT and DC, both + and - SLOPE for stable triggering with 1mm or less jitter. Use TRIGGERING LEVEL as required.

[THE FOLLOWING CHECKS ARE NOT MADE ON 100% OF THE INSTRUMENTS, BUT ARE DONE ON A SAMPLING BASIS.]

25. LOW VOLTAGE POWER SUPPLY DC STABILITY

Change from 103.5V to 126.5V:

-150VDC	±0.05%
+100VDC	±0.5%
+225VDC	±0.1%
+350VDC	±0.5%
+500VDC	±0.5%

Install the 1M1 in the TYPE 543B. Set the 1M1 TEST FUNCTION to HIGH LOAD. Set TYPE 543B TRIGGERING MODE to AC

STABILITY	ccw
AMPLITUDE CALIBRATOR	OFF
HORIZONTAL DISPLAY	NORMAL (X1)

Set the TYPE 76TU to 103.5V. Connect the DC VOLTAGE BRIDGE - lead to TYPE 543B gnd, + lead to the -150VDC supply. Set the test scope TYPE 1A1 VOLTS/CM to .02 and INPUT SELECTOR to AC. Set the DC VOLTAGE BRIDGE for a null. Change the 1M1 TEST FUNCTION to LOW LOAD and change the TYPE 76TU to 126.5V. Readout the error on the test scope, $\leq$0.075V (3.75cm).

Use the above test method to check the supplies listed in the following table.

Supply	Test scope VOLTS/CM	max deflection allowed at 126.5V
+100 VDC	.1	5cm
+225 VDC	.1	2.25cm
+350 VDC	.5	3.5cm
+500 VDC	1	2.5cm

26. VISUAL WRITING RATE

No bright spot at start of trace with sweep rate of 0.02μs/cm, triggered at 10 Hz.

Install a CRT Viewing Hood on the TYPE 543B. Apply a .1 S trigger from the TYPE 184 to the TYPE 543B TRIGGER INPUT. Set the TIME/CM to .1mSEC. Set the TRIGGER SLOPE switch to +EXT, TRIGGERING MODE to AC. Adjust the TRIGGERING LEVEL for a triggered trace. (Trace will flicker when triggered.) Change the TYPE 543B TIME/CM to .1μSEC and set the HORIZONTAL DISPLAY to X5.

Slowly advance the INTENSITY control until the trace is barely visible and position the start of the trace to the graticule center line. Check for no bright spot at the start of the trace.

THE END