FACTORY CALIBRATION PROCEDURE

CONTENTS:

This is the guide for calibrating new instruments in Product Manufacturing. The procedure consists of 4 sections:

Equipment Required

Factory Test Limits - Factory Test Limits are limits an instrument must meet before leaving Manufacturing. These limits are often more stringent than advertised performance requirements. This is to insure that the instrument will meet advertised requirements after shipment, allows for individual differences in test equipment used, and (or) allows for changes in environmental conditions.

Short Form Procedure - The Short Form Procedure has the same sequence of steps and the same limits on checks or adjustments as the Main Procedure.

Main Procedure - The Main Procedure gives more detailed instructions for the calibration of the instrument. This procedure may require that some checks and adjustments be made so that performance is better than that required by the Factory Test Limits. This insures the Factory Test Limits will be met when side panels are added, permits some normal variation in test equipment and plug-in scopes, etc.

Abbreviations in this procedure will be found listed in TEKTRONIX STANDARD A-100. Definitions of terms used in this procedure may be found in TEKTRONIX STANDARD A-101.

In this procedure, all front panel control labels and Tektronix instrument names are in capital letters (VOLT/DIV, etc). Internal adjustment labels are capitalized only (Gain Adj, etc).

This procedure is company confidential

564B

564B MOD 121N

January 1969

For all serial numbers.

CHANGE INFORMATION:

This procedure has been prepared by Product Manufacturing Staff Engineering. For information on changes made to this procedure, to make suggestions for changing this procedure, or to order additional copies: please contact PMSE, 39-307.

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

a. TEKTRONIX Instruments

1	TYPE 547 OSCILLOSCOPE
1	TYPE 1A1 DUAL-TRACE PLUG-IN UNIT
1	TYPE 2A60 AMPLIFIER
1	TYPE 2B67 TIME BASE
*1	TYPE 184 TIME-MARK GENERATOR
1	TYPE 76TU LINE VOLTAGE CONTROL UNIT
1	TYPE 106 SQUARE WAVE GENERATOR
1	TYPE P6006 10X PROBE
1	TYPE P6028 1X PROBE
1	TYPE P6019 CURRENT PROBE

b. Test Fixtures and Accessories

1	DC Voltage Bridge (DCVB) (067-0543-99) (see note)
1	Standard Amplitude Calibrator (SAC) (067-0502-00)
2	TYPE 561B/564B Test-Load Unit (067-0593-99)
1	CRT Deflection Capacitance Normalizer (067-0500-00)
2	50Ω BNC cable (012-0057-01)
*1	Precision 50Ω Termination (067-0515-00)
1	Adapter: GR to BNC male (017-0064-00)
1	Adapter: GR to BNC female (017-0063-00)
1	50Ω BNC Termination (011-0049-00)
1	TYPE 564B Remote Erase Checker (PMPE Dwg # 2196-B)
*1	MODEL 881A Fluke Differential Voltmeter
1	Adapter: Binding Post to BNC female (013-0094-00)

c. Other Equipment

1	20,000Ω/VDC Multimeter

*Equipment must be traceable to NBS for certification of measurement characteristics.

NOTE: DCVB should be calibrated to ±0.5% accuracy at 3.3kV.

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.

Factory Test Limits are qualified by the conditions specified in the main body of the Factory Calibration Procedure. The numbers and letters to the left of the limits correspond to the procedure steps where the check or adjustment is made. Steps without Factory Test Limits (setups, presets, etc.) are not listed. Instruments may not meet Factory Test Limits if calibration or checkout methods and test equipment differ substantially from those in this procedure.

4. POWER SUPPLIES

c. LV Power Supply accuracy and ripple, 104VAC to 126VAC Line:

Supply	Voltage Limit	Ripple Limit 60/120Hz	Ripple Limit 50kHz
-100V	±0.4%	≤2mV	≤10mV
-12.2V	±0.9%	≤2mV	≤10mV
+125V	±0.9%	≤3mV	≤10mV
+300V	±1.3%	≤5mV	≤20mV

d. HV supply: ±2%
e. Check HV regulation: ±0.5%

5. STORAGE PRESETS

b. Erase pulse waveform:

OP Level = 120V

	Ampl	Width
Pos Pulse	≥100V	≥25ms
Neg Pulse	≥100V	

OP Level = 280V

Pos Pulse	≥100V	≥25ms
Neg Pulse	≥190V	≥200ms

c. Recommended OP: ±10V
d. Recommended Col #1: ±5V

6. CALIBRATOR

*b. Calibrator amplitude accuracy: ±1%
*c. Calibrator frequency: 1kHz ±0.5%
d. Calibrator duty factor: 48% to 52%
e. Calibrator tr and tf: ≤2.5µs at 40V
f. Calibrator current loop: waveform present

7. PLUG-IN CONNECTIONS

a. Interconnection continuity: Continuity between Left/Right pins: 3/4, 4/3, 18/18 and 19/19
b. CRT grid modulation: Right side of 40V cal signal dimmed
c. Vertical compartment Line and Int triggering: Proper polarity
d. CRT horizontal deflection factor: 175V/10div to 192.5V/10div
e. CRT horizontal electrical center: ±8mm
f. CRT vertical deflection factor: 148V/8div to 164V/8div
g. CRT vertical electrical center

CRT Vert deflection factor	max error from graticule center
≤156V/8div	±5.0mm
≤158V/8div	±4.5mm
≤160V/8div	±4.0mm
≤162V/8div	±3.5mm
≤164V/8div	±3.0mm

h. Horizontal compartment Line and Int triggering: Proper polarity
i. CRT Chopped Blanking Squarewave t_r blanked

8. TRACE ALIGNMENT

Range: ≥6°
Must align to CRT split
Alignment: ±1mm

9. CRT CHECKS

a. CRT expansion/compression: ≤1mm
b. External CRT cathode input:
Modulation with ≤10V
c. Horizontal geometry: ≤1mm, total
d. Vertical geometry: ≤1mm, total
e. Focus: 100 markers in 10cm visible

10. CRT GRID BIAS

a. CRT Grid Bias:
Spot to left of trace in LOCATE
No spot with INTENSITY ccw
b. INTENSITY control:
No INTENSITY control in LOCATE

11. NORMAL STORAGE

a. Flood Gun Bias:
No shadows
b. Collimation #2: no fold-in into graticule area
c. Non-store Level: Storage within 2mm of CRT center in split store;
No storage in non-store mode
d. Writing rate:
T5641-200: 40μs/cm
T5641-201: 10μs/cm
e. Erase time: ≤250ms

12. INTEGRATE STORAGE

Storage with 10 sweeps at:
4μs/cm (200)
2μs/cm (201)

13. ENHANCE STORAGE

a. Enhance pulse amplitude
Storage at: 4μs/cm (200)
2μs/cm (201)
b. Enhance pulse LEVEL range:
≤0.7ms to ≥7ms

14. AUTO ERASE MODE (mod 121N only)

a. AUTO ERASE operation: Screens erase after each displayed sweep
No erase pulse in SAVE

One sweep after erase in SAVE

b. VIEWTIME range: ≤1s to ≥12s
c. Terminated ERASE PULSE OUTPUT:
Free running Auto Erase circuit
d. ERASE PULSE OUTPUT: +9V pulse
e. Enhance Lockout:
One Enhance pulse for each displayed sweep

15. REMOTE STORAGE CONTROL

a. Remote erase: Must remotely erase each screen
b. Remote save (Mod 121N only): must remotely stop auto erase circuit

16. CRT DEFLECTION PLATE CAPACITANCE NORMALIZATION

±0.5mm

THE END

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

This instrument must meet Factory Test Limits before it leaves Manufacturing; therefore, it must be possible to inspect to these limits. Because of normal variations in test equipment and plug-in scopes, addition of side panels, etc, this procedure may require that some checks and adjustments be made so that performance is better than that required by Factory Test Limits.

1. PRESETS

2. RESISTANCE

3. LINE VOLTAGE SELECTOR

4. POWER SUPPLIES

a. Adjust -100V Supply, R23
b. Check LV power supply current regulation
c. Check LV power supply accuracy and ripple, 104VAC to 126VAC Line:

Supply	Accuracy	Regulation	Ripple Limit 60/120Hz	Ripple Limit 50kHz
-100V		±0.1V	≤2mV	≤10mV
-12.2V	±0.07V	±0.06V	≤2mV	≤10mV
+125V	±0.75V	±0.1V	≤3mV	≤10mV
+300V	±3.3V	±0.3V	≤5mV	≤20mV

d. Adjust HV supply, R206: -3300V
e. Check HV regulation: ±0.5%

5. STORAGE PRESETS

a. Adjust Geometry, R475
b. Check erase pulse waveform:

	OP Level = 120V Ampl	Width
Pos Pulse	≥100V	≥25ms
Neg Pulse	≥100V	

	OP Level = 280V Ampl	Width
Pos Pulse	≥100V	≥25ms
Neg Pulse	≥190V	≥200ms

5. (CONT)

c. Adjust OP, R332, R432
d. Adjust Collimation #1, R470
e. Preset Collimation #2, R462
f. Adjust Non-store Level, R342

6. CALIBRATOR

a. Set Calibrator amplitude, R166: 40V
b. Check Calibrator amplitude accuracy: ±1%
c. Set Calibrator frequency, R154: 1 kHz
d. Check Calibrator duty factor: 48% to 52%
e. Check Calibrator t_r and t_f: ≤2.5µs at 40V
f. Check Calibrator current loop: waveform present

7. PLUG-IN CONNECTIONS

a. Check interconnection continuity: Continuity between Left/Right pins: 3/4, 4/3, 18/18, and 19/19
b. Check CRT grid modulation: Right side of 40V cal signal dimmed
c. Check Vertical compartment Line and Int triggering: Proper polarity

d. Check CRT horizontal deflection factor: 175V/10div to 192.5/10div
e. Check CRT horizontal electrical center: ±8mm
f. Check CRT vertical deflection factor: 148V/8div to 164V/8div
g. Check CRT vertical electrical center:

CRT Vert deflection factor	max error from graticule center
≤156V/8div	±5.0mm
≤158V/8div	±4.5mm
≤160V/8div	±4.0mm
≤162V/8div	±3.5mm
≤164V/8div	±3.0mm

h. Check Horizontal compartment Line and Int triggering: Proper polarity
i. Check CRT Chopped Blanking: Square wave t_r blanked

8. TRACE ALIGNMENT

Range: ≥6°
Must align to CRT split
Alignment: ±1mm

9. CRT CHECKS

a. Check CRT expansion/compression: ≤1mm
b. Check External CRT cathode input: Modulation with ≤10V
c. Check horizontal geometry: ≤1mm, total
d. Check vertical geometry: ≤1mm, total
e. Check focus: 100 markers in 10cm visible

10. CRT GRID BIAS

a. Set CRT Grid Bias, R269
Spot to left of trace in LOCATE
No spot with INTENSITY ccw
b. Check INTENSITY control
No INTENSITY control in LOCATE

11. NORMAL STORAGE

a. Adjust Flood Gun Bias, R478
b. Adjust Collimation #2, R462
c. Check Non-store level, R342
Storage within 2mm of CRT center in split store
No storage when in non-store
d. Check writing rate:
T5641-200: 40µs/cm
T5641-201: 10µs/cm
e. Check erase time: ≤250ms

12. INTEGRATE STORAGE

Storage with 5 sweeps at:
4µs/cm (200)
2µs/cm (201)

13. ENHANCE STORAGE

a. Adjust Enhance pulse amplitude, R373
b. Check Enhance pulse LEVEL range: ≤0.7ms to ≥7ms

14. AUTO ERASE MODE (Mod 121 only)

a. Check AUTO ERASE operation:
Screens erase after each displayed sweep
No erase pulse in SAVE
One sweep after erase in SAVE
b. Check VIEWTIME range:
≤1s to ≥12s
c. Check terminated ERASE PULSE OUTPUT: Free running Auto Erase circuit
d. Check ERASE PULSE OUTPUT: +9V pulse
e. Check Enhance Lockout:
One Enhance pulse for each displayed sweep

15. REMOTE STORAGE CONTROL

a. Check remote erase: Must remotely erase each screen
b. Check remote save (Mod 121N only) Must remotely stop Auto Erase circuit

16. CRT DEFLECTION PLATE CAPACITANCE NORMALIZATION

±0.5mm

THE END

1. PRESETS

TYPE 564B

ASTIGMATISM	midr
FOCUS	ccw
INTENSITY	ccw
ENHANCE LEVEL	ccw
VIEWTIME (Mod 121N only)	ccw
SCALE ILLUM	cw
CALIBRATOR	OFF
POWER	OFF
UPPER and LOWER SCREEN	
STORE	Non Store
ENHANCE	Off
AUTO ERASE	Off(Mod 121N only)
CRT CATHODE	
SELECTOR	NORMAL
Line Voltage	
Selector plug	115
Line Voltage	
Range plug	M
AUTO ERASE MODE	SIGNAL TRIG'D SWEEP (mod 121N only)

Make the following internal presets:

CRT Grid Bias	ccw
Non-Store Level	ccw
Flood Gun Bias	ccw

Dress deflection plate leads away from the chassis and CRT shield; check the CRT neck pin seals for no cracks.

2. RESISTANCE

Measure the resistance between ground and each supply listed below. All test points are located on the Power Supply Board.

		Approx Resistance		
Supply	Test Point	- Lead to Gnd	+ Lead to Gnd	Meter Range
-12.2V	P	4Ω	8Ω	x1
-100V	S	2kΩ	4.5kΩ	x1K
+125V	I	6kΩ	2kΩ	x1K
+300V	F	14kΩ	6kΩ	x1K

Measure the resistance between chassis ground and pins 5 and 9 of both plug-in connectors: 0Ω. These pins should all be returned to chassis ground near C97.

Install two Test Load units. Set both NO LOAD/FULL LOAD switches to FULL LOAD and POSITION controls cw.

3. LINE VOLTAGE SELECTOR

Connect TYPE 564B to TYPE 76TU and turn ON. Apply a line voltage of 115VAC. With test scope, measure the P-P amplitude of the waveform at Pin AG (Power Supply board) for each combination of Line Voltage and Range selectors in the following table:

Line Voltage Selector	Range Selector	Approx P-P Voltage Pin AG
115	M	160V
230	M	80V
230	LO	95V
230	HI	74V

Return Range selector to M and Voltage selector to 115.

For first time operation, apply line voltage gradually from the TYPE 76TU.

Check Fuses:

LINE FUSE: 3.2A Slo-Blo
230V FUSE: 2A Slo-Blo
HV FUSE: 150mA Fast-Blo

Check pilot light, and scale illum lights and pot for proper operation.

4. POWER SUPPLIES

a. Adjust -100V supply, R23

Set DCVB to measure -100V, and connect it between gnd and DC jack on one Test Load. Adjust R23 for bridge null.

b. Check LV power supply current regulation

For each supply listed below, use multimeter to check for approximate supply voltage at DC jack on one Test Load; if supply voltage appears correct, press OVERLOAD button on other Test Load and check overloaded supply voltage:

Supply	Approx Overloaded Supply Voltage
-100V	-60V
-12.2V	-9.5V
+125V	+118V
+300V	+225V

If supply voltage drops, press and release SHORT button. Again check overloaded supply voltage by pressing OVERLOAD button; voltage should drop as before.

b. Use OVERLOAD and SHORT buttons on one Test Load; make voltage measurements on the other Test Load.

An unusual overloaded supply voltage may indicate improper current regulation; those supplies should be closely examined before they are shorted.

4. (CONT)

c. Check LV power supply accuracy and ripple

With DCVB check accuracy of each supply at DC jack on Test Load, with Line at 115VAC and Load at FULL LOAD. Check regulation with Test Loads in FULL LOAD at 104VAC, and Test Loads in NO LOAD at 126VAC line.

			Ripple Limit	
Supply	Accuracy	Regulation	60/120Hz	50kHz
-100V		±0.1V	<2mV	<10mV
-12.2V	±0.07V	±0.06V	<2mV	<10mV
+125V	±0.75V	±0.1V	<3mV	<10mV
+300V	±3.3V	±0.3V	<5mV	<20mV

With test scope connected to RIPPLE jack on Test Load, measure ripple of each supply listed above at 104VAC and 115VAC line (FULL LOAD), and 126VAC line (NO LOAD); check both 60 and 120Hz ripple, and 50kHz ripple.

d. Adjust HV Supply, R206

Set DCVB to measure -3300V, and connect it between gnd and TP -3300V. Adjust R206 for bridge null.

e. Check HV regulation: ±0.5%

Check accuracy of HV supply at 104VAC, 126VAC, and 115VAC line, with INTENSITY cw and ccw. Return INTENSITY ccw.

5. STORAGE PRESETS

a. Adjust Geometry, R475

Adjust R475 for the recommended Flood Gun Anode voltage at center arm of pot.

a. Set for 180V if no recommendation is made.

b. Check erase pulse waveform

Place Upper and Lower screens in STORE mode. Adjust OP Level (R332 and R432) for 120V at Pins P and Q (Storage board, or ccw. With test scope check that the amplitude and width of both parts of the erase pulse, and the width of the complete erase pulse, are within the limits below. Check both upper screen (Pin P) and lower screen (Pin Q).

5b. (CONT)

OP Level = 120V

	Ampl	Width
Pos Pulse	≥100V	≥25ms
Neg Pulse	≥100V	

OP Level = 280V

	Ampl	Width
Pos Pulse	≥100V	≥25ms
Neg Pulse	≥190V	≥200ms

Adjust OP Level (R332 and R432) for 280V at Pins P and Q, or cw, and repeat. Return R332 and R432 ccw.

c. Adjust OP, R332, R432

Turn Upper Screen OP Level, R332, ccw and check Upper target backplate voltage, Pin P (Storage Board): ≤125V. Turn R332 cw and check Upper target backplate voltage: ≥275V.

Set Upper target backplate to voltage recommended by CRT manufacturing.

Repeat for Lower Screen, adjusting Lower Screen OP Level, R432. Measure Lower target backplate voltage at Pin Q (Storage Board). Set Lower target backplate to voltage recommended by CRT manufacturing.

R332 and R432 should be further adjusted so the background brightness of both targets appears equal.

c. Make these measurements with the DCVB.

d. Adjust Collimation #1, R470

Adjust R470 for the recommended Collimation Electrode (CE) #3 voltage at pin S (Storage Board).

d. Set for 150V if no recommendation is made.

e. Preset Collimation #2, R462

Adjust Collimation #2, R462, for 75V at Pin Z (Storage Board).

f. Adjust Non-store Level, R342

Place Upper and Lower screens in non-store mode. Turn R342 ccw and measure Upper target backplate voltage (Pin P): ≥80V. Turn R342 cw and measure Upper target backplate voltage: ≥165V. Turn R342 ccw until a very slight glow is present in the center of the CRT.

6. CALIBRATOR

a. Set Calibrator amplitude, R166

Remove Q162 (Power Supply board) and set CALIBRATOR to 40V DC. Set DCVB to measure +40V, and connect it between CAL OUT gnd and center connection. Adjust R166 for bridge null.

a. The MODEL 881A Differential Voltmeter may also be used for this step.

b. Check Calibrator amplitude accuracy: ±1%

With the MODEL 881A Differential Voltmeter measure the Calibrator's DC output indicated in the following table:

CALIBRATOR	Unterminated Output	Terminated Output
40V	40V ±0.4V	
4V	4V ±0.04V	
0.4V	400mV ±4mV	200mV ±2mV
40mV	40mV ±0.4mV	20mV ±0.2mV
4mV	4mV ±0.04mV	2mV ±0.02mV

Install Q162.

c. Set Calibrator frequency, R154

Alternately display TYPE 564B 40V Calibrator output and 1ms markers on test scope. Adjust R154 for one calibrator cycle per marker. Trigger test scope on markers and adjust R154 for no drift of calibrator signal. Maximum allowable drift of calibrator signal is 5 cycles in 1 second.

d. Check Calibrator duty factor: 48% to 52%

Display one cycle of calibrator signal over 10 divisions of test scope. Pulse width must be $\geq$4.8cm and $\leq$5.2cm.

e. Check Calibrator t_r & t_f: 2.5µs at 40V

Measure risetime and falltime of 40V Calibrator output: $\leq$2.5µs.

e. Use 42in BNC cable from CAL OUT to test scope to provide about 100pf load.

f. Check Calibrator current loop

With CALIBRATOR in 10mA position, check for waveform at current loop with TYPE P6019 CURRENT PROBE.

f. Displayed waveform should be alternate + and - spikes.

7. PLUG-IN CONNECTIONS

a. Check interconnection continuity

Press CONTINUITY A on one Test Load, and check that A neons on both load units light.

Press CONTINUITY B on one Test Load and check that B neons on both load units light.

Remove Test Load in VERTICAL. Press CONTINUITY B on HORIZONTAL load unit, and check that no neons light.

Install 2B67 in VERTICAL plug-in compartment.

b. Check CRT grid modulation

Display a dim, vertical trace on 564B. Apply a 40V Calibrator signal to Test Load SIGNAL INPUT and check that right side of signal dims.

c. Check Vertical compartment Line and Int triggering: Proper polarity

Connect a 1X probe from Test Load SIGNAL INPUT to Pin 8 on T1 (Power Transformer). Check for proper Line trigger polarity, while triggering 2B67 in LINE.

Trigger 2B67 in INT and check for proper polarity triggering with TYPE 2B67 LEVEL near 0.

d. Check CRT horizontal deflection factor: 175V/10div to 192.5V/10div

Connect multimeter across horizontal deflection plates and position trace to left edge of graticule; record the voltage. Position trace to right edge of graticule and record voltage. The sum of these absolute voltages should be $\geq$175V to $\leq$192.5V.

7. (cont'd)

e. Check CRT horizontal electrical center: ±8mm

Short CRT horizontal deflection plates together and check spot centering: ±8mm from graticule center.

Put 2B67 in Horiozontal compartment and Test Load in Vertical compartment.

e. Turn INTENSITY ccw while exchanging plug-ins.

f. Check CRT Vertical deflection factor: 148V/8div to 164V/8div

Connect multimeter across vertical deflection plates and position trace to bottom edge of graticule; record the voltage. Position trace to top of graticule and record voltage. The sum of these absolute voltages should be ≥148V to ≤164V.

g. Check CRT Vertical electrical center

Short CRT vertical deflection plates together and check spot centering; maximum error is a function of CRT vertical deflection factor:

CRT Vert deflection factor	max error from graticule center
≤156V/8div	±5.0mm
≤158V/8div	±4.5mm
≤160V/8div	±4.0mm
≤162V/8div	±3.5mm
≤164V/8div	±3.0mm

h. Check Horizontal compartment Line and Int triggering: Proper polarity

Connect a 1X probe from Test Load SIGNAL INPUT to Pin 8 on T1. Check for proper Line trigger polarity, while triggering 2B67 in LINE.

Trigger 2B67 in INT and check for proper polarity triggering with TYPE 2B67 LEVEL near 0.

7. (cont'd)

i. Check CRT Chopped Blanking

Apply a 40V Calibrator signal to the Test Load SIGNAL INPUT and switch CRT CATHODE SELECTOR to CHOPPED BLANKING. Check that square wave risetime is blanked. Return CRT CATHODE SELECTOR to NORMAL, and remove Calibrator signal.

8. TRACE ALIGNMENT

Display a focused, free running sweep on the TYPE 564B. Align the graticule with the line dividing the Upper and Lower screens. Turn TRACE ALIGNMENT ccw and check that trace rotates ccw. Measure vertical rise of trace across 10 horizontal cm. Turn TRACE ALIGNMENT cw and measure vertical fall of trace in 10cm. The sum of these two distances must be $\geq$1cm (6° range).

Adjust TRACE ALIGNMENT so trace is parallel to center horizontal graticule line (and Upper/Lower screen dividing line).

Check that the CRT is inserted so the bottom tabs on the rubber boot are even with the front panel. Align the screen split with the horizontal axis of the instrument.

9. CRT CHECKS

a. Check CRT expansion/compression $\leq$1mm

Apply square wave to Test Load SIGNAL INPUT and adjust for 2cm amplitude at graticule center. Check amplitude of square wave at top and bottom of graticule: 2.0cm ±0.1cm.

Exchange Test Load and TYPE 2B67, and repeat for horizontal deflection plates.

a. An unterminated TYPE 106 may be used for this step.

9a. (CONT)

Return TYPE 2B67 to Horizontal compartment and install 2A60 in Vertical compartment.

b. Check External CRT cathode input: ≤10V

Apply 10V square wave to CRT EXT INPUT, and put CRT CATHODE SELECTOR in EXT INPUT position. Check for trace modulation. Remove signal and return CRT CATHODE SELECTOR to NORM.

c. Check horizontal geometry: ≤1mm, total

Display a square wave 1mm in amplitude on 564B. Check deviation of horizontal trace from graticule lines over entire graticule area. Deviations in opposite directions are added; total error should be ≤1mm. If neeessary, adjust Geometry, R475, for optimum geometry at bottom of graticule.

c. Check CRT for double peaking, burrs, grid emission, and flare; refer to Cathode Ray Tube Check Out Procedure for methods.

d. Check vertical geometry: ≤1mm, total

With TYPE 2B67 TIME/DIV at 1mSEC, display 1ms and 0.1ms markers over the full vertical graticule area of the 564B. Check deviation of markers from graticule lines over entire graticule area. Deviations in opposite directions are added; total error should be ≤1mm.

e. Check focus

Turn TYPE 2B67 VARIABLE to display 10 1ms markers in 10cm. Adjust FOCUS and ASTIGMATISM for a focused display at graticule center. Check that 0.1ms markers are visible over entire graticule area.

10. CRT GRID BIAS

a. Set CRT Grid Bias, R269

Dispaly a trace centered on the CRT, put TYPE 2B67 in SINGLE SWEEP, and turn INTENSITY ccw. Press LOCATE and adjust R269 for a spot to the left of where the sweep had been. Release LOCATE.

10a. (cont'd)

Set TYPE 2B67 TIME/DIV to 5 SEC and adjust INTENSITY for a dim display. Check that spot disappears when INTENSITY is turned ccw. If spot is visible, turn R269 ccw until spot disappears, and recheck for locate spot in SINGLE SWEEP.

b. Check INTENSITY control

Display a focused trace, centered on the TYPE 564B CRT. Press the LOCATE button and check that the INTENSITY control has no effect upon the displayed trace. Turn INTENSITY ccw and release LOCATE.

11. NORMAL STORAGE

a. Adjust Flood Gun Bias, R478

Place Upper and Lower screens in STORE, TYPE 2B67 TIME/DIV to 1mSEC, turn FOCUS and INTENSITY cw, and fully write both screens by positioning trace vertically. Turn INTENSITY ccw. Adjust R478 so flood gun coverage of both targets is complete; adjust to remove shadows at the corners, but no further cw then is necessary to achieve complete coverage. Erase both screens.

b. Adjust Collimation #2, R462

Place Upper screen in STORE, Lower screen in non-store, and erase Upper screen. Turn R462 ccw until edges fold-in. Turn R462 cw until Upper screen coverage is just complete and no fold-in exists at outer edges.

Place Upper screen in non-store, Lower screen in STORE, and erase Lower screen. Check that no fold-in exists at screen edges; if there is fold-in, adjust R462 further cw.

Place both targets in non-store.

11. (CONT)

c. Check Non-store Level, R342

Set TYPE 2B67 TIME/DIV to 1mSEC and display 2div of Calibrator signal. Use FOCUS and ASTIGMATISM to obtain a sharp display at a low intensity. Remove the Calibrator signal, free run sweep, and turn INTENSITY cw until a slight halo appears around the trace.

Place Upper screen in STORE, and TYPE 2B67 in SINGLE SWEEP. Alternately erase Upper screen and store 1 sweep on Upper screen. Position sweep within 2mm of vertical center and check for good storage; no breaks in stored trace greater than 0.025in should be allowed. If storage is poor, increase non-store level (R342).

Repeat for Lower screen.

Place both screens in non-store. Check that the target voltage is not high enough to permit storage within the graticule area. Place both screens in STORE. Change one screen to non-store and check that target quickly changes to a non-store condition; if transition is slow, turn R342 ccw until it becomes fast. Recheck this step.

d. Check writing rate:
T5641-200 40μs/cm
T5641-201 10μs/cm

Place both screens in STORE and leave FOCUS and ASTIGMATISM set for optimum focus of 1ms, low intensity display. Set TYPE 2B67 TIME/DIV and VARIABLE for a 40μs/cm sweep (for 200 phosphor) or a 10μs/cm sweep (for 201 phosphor). Trigger TYPE 2B67 in AUTO with LINE SOURCE and turn TYPE 564B INTENSITY fully cw; adjust FOCUS for narrow trace. Place TYPE 2B67 MODE in SINGLE SWEEP.

Erase both screens and store 1 sweep of TYPE 2B67; check for a good stored trace. Repeat, checking storage throughout 7X9cm of graticule area.

e. Check writing rate over center 7X9cm of graticule.

11e. (cont'd)

If breaks >0.025" occur in the stored trace the operating point is too low, and both target voltages should be increased until no breaks occur. If the target area adjacent to the stored trace fades up the operating point is too high, and both target voltages should be decreased until no fade up is present. Background brightness of both targets should be kept equal by adjusting both R332 and R432 when the operating point is changed.

The operating point should not be adjusted more than 10V from the value recommended by CRT mfg.

e. Check erase time: ≤250ms

Set TYPE 2B67 TIME/DIV to 50mSEC. Connect a 10X probe from TYPE 2A60 INPUT to Pin P (Storage Board). Trigger TYPE 2B67 in +, press UPPER SCREEN ERASE, and adjust LEVEL to display entire erase pulse on Upper Screen. Upper Screen must begin storage of erase pulse within 250ms after pulse start.

Move probe to Pin Q and repeat for Lower Screen. Erase pulse must be displayed on Lower Screen. Remove probe.

12. INTEGRATE STORAGE

Increase TYPE 2B67 Sweep rate to 4μs/cm (for 200 phosphor) or 2μs/cm (for 201 phosphor). Press INTEGRATE and display several repetitions of sweep in one location over a 5s interval; release INTEGRATE. Check for stored display with no more than 10 sweeps; check for fade up in CRT center due to an ion burn. Erase both screens and repeat for entire graticule area.

13. ENHANCE STORAGE

a. Adjust Enhance pulse amplitude, R373

Place Upper screen in ENHANCE and display a normal, line triggered sweep. Measure enhance pulse amplitude (Test scope at Pin P) with R373 ccw; ≤25V. Place Lower screen in Enhance, turn R373 cw and measure amplitude: ≥70V. Turn R373 ccw.

13a. (cont'd)

Turn enhance LEVEL cw, and INTENSITY ccw. Alternately erase both screens and single sweep TYPE 2B67. Turn R373 cw until both screens start to fade up over ½ the screen with one enhance pulse.

Turn TYPE 564B INTENSITY cw and alternately erase and display a single sweep. Check for a good stored display at a sweep rate of 4μs/cm (for 200 phosphor) or 2μs/cm (for 201 phosphor). Check each screen in ENHANCE with other screen ENHANCE off.

Enhance LEVEL may be reduced for clear Enhanced display, but one setting must be used to check entire screen.

b. Check Enhance pulse LEVEL range: 0.7ms to 7ms

Display a normal, line triggered, sweep on TYPE 564B and measure enhance pulse width (Pin P) with LEVEL ccw: ≤0.7ms. Turn LEVEL cw and measure pulse width: ≥7ms.

14. AUTO ERASE MODE (Mod 121N only)

a. Check AUTO ERASE operation

Place TYPE 564B Upper and Lower screens in STORE and ENHANCE off. Display a normal, line triggered sweep from TYPE 2B67; change TYPE 2B67 to SINGLE SWEEP. Place Upper screen in AUTO ERASE and check that Upper screen erases after each displayed sweep with VIEWTIME ccw. Switch VIEWTIME to SAVE and check for one displayed sweep and no erase pulse when TYPE 2B67 is in NORM. Press UPPER SCREEN ERASE and check for one erase pulse and one displayed sweep. Turn VIEWTIME ccw and Upper screen AUTO ERASE off.

Repeat for Lower screen.

b. Check VIEWTIME range: ≤1s to ≥12s

With VIEWTIME ccw, test scope connected to 9-3 wire on rear of VIEWTIME switch, measure time of positive pulse: ≤1s. Turn VIEWTIME cw (not in SAVE) and measure time of positive pulse: ≥12s.

14. (CONT)

c. Check terminated Erase PULSE OUTPUT: Free running Auto Erase circuit

Set TYPE 2B67 to SINGLE SWEEP, and connect a 50Ω termination to ERASE PULSE OUTPUT. Check that Auto Erase Circuit free runs. Remove termination.

d. Check ERASE PULSE OUTPUT

Set TYPE 2B67 to NORM and TYPE 564B AUTO ERASE MODE to ERASE TRIG'D SWEEP. Check with test scope at ERASE PULSE OUTPUT for a positive going 9V pulse. Return AUTO ERASE MODE to SIGNAL TRIG'D SWEEP, and turn Auto Erase off.

e. Check Enhance Lockout

Display a 1ms/cm sweep from TYPE 2B67. Place both screens in STORE, ENHANCE, and AUTO ERASE. Set VIEW-TIME to midr and LEVEL cw. Check for only one enhance pulse for each displayed sweep.

15. REMOTE STORAGE CONTROL

a. Check remote erase

Connect TYPE 564B Remote Erase Checker (PMPE Dwg #2196-B) to REMOTE CONTROL INPUT (J950). Check that both Upper and Lower screens may be erased remotely.

b. Check remote save (Mod 121N only)

Display a free running trace on TYPE 564B, and place both screens in AUTO ERASE. Press SAVE on remote erase checker and check that screen is no longer erased automatically.

Remove Remote Erase Checker, and place both screens in non-store.

16. CRT DEFLECTION PLATE CAPACITANCE NORMALIZATION

Install Capacitance Normalizer (067-0500-00) in Vertical compartment of TYPE 564B. Apply 40V Calibrator signal to Normalizer and trigger display. Adjust C109 and dress leads for square front corner of display.

Exchange TYPE 2B67 and Normalizer, and repeat, adjusting C102 for optimum front corner.

THE END

16. Early model Capacitance Normalizers require 50V to 100V pulse for operation. Use SAC if necessary.