FACTORY CALIBRATION PROCEDURE

This procedure is company confidential

TYPE 601
5" STORAGE
DISPLAY UNIT

Tek form number:

February 1968
For all serial numbers.

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).

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. (DH)

EQUIPMENT REQUIRED:

The following equipment is necessary to complete this procedure:

a. TEKTRONIX Test Equipment

1 TYPE 547 OSCILLOSCOPE
1 TYPE 1A1 PLUG-IN UNIT
1 TYPE 76TU LINE-VOLTAGE CONTROL UNIT

b. Test Fixtures and Accessories

1 DC Voltage Bridge (067-0543-99)
1 Standard Amplitude Calibrator (SAC) (067-0502-00)
1 Storage Display Test Unit (067-0561-00)
1 Sine Wave Generator (067-0503-00)
2 P6006 10X Passive Probes (010-0128-00)
2 50Ω Terminations, BNC (011-0049-00)
3 50Ω cables, BNC (012-0057-00) (18")
1 P6028 1X Passive Probe (010-0075-00)
1 Dual Input cable, BNC (067-0525-00)
1 Sawtooth Attenuator (067-0569-00)

c. Other Equipment

1 20,000Ω/V multimeter
1 Test Graticule (PMPT Dwg #1801-B)
1 Remote Programmer (PMPT Dwg #1907-A, 1950-B & 1951-B)

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.

QUALIFICATION

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 (set-ups, 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

a. +100V Supply: 100V ±2%

b. Regulation and Ripple:

Supply	Regulation	Ripple
+100	±2%	5mV, max
+12.5	±2%	5mV, max
-75	±2%	5mV, max
+16	14.7V to 22.5V	-
-150	-142V to 159V	-
+250	+230V to +280V	-

c. Check Line Voltage Selector Switch:

Line Voltage Selector	Approximate Voltage
115V	
LO	88V
M	75V
HI	69V
230V	
LO	41V
M	35V
HI	32.5V

d. High Voltage: -3900 ±100V

5. Z AXIS OPERATION

b. On-off Level: On at +1V
Off at +0.5V

b. Risetime and Falltime:
Risetime $\leq$1µs
Falltime $\leq$2µs

6. X & Y AMPLIFIER GAIN RANGE

b. X Amplifier Gain Range:
190 to 305, min

c. Y Amplifier Gain Range:
162 to 309, min

7. X & Y POSITION RANGE AND CRT ELECTRICAL CENTER

a. CRT X Axis Electrical Center: ±0.5cm, max

b. X Amp Position Range: any where on screen

c. CRT Y Axis Electrical Center: ±0.5cm, max

d. Y Amp Position Range: any where on screen

8. STORAGE ADJUSTMENTS

b. Operating Level Range:
$\leq$125V to $\geq$285V

c. Operating Level: 135V to 190V
Operating Point must be $\geq$5V from WT or $\leq$5V from UWL

9. TILT AND LEAN

a. Tilt Adjustment Range: $\geq$6°

b. Lean Adjustment Range: $\geq$6°

10. GEOMETRY AND GAIN

a. X Amplifier Gain: 10cm, ±5%
b. Vertical Geometry: ≤1mm
c. Horizontal Geometry: ≤1mm
d. Y Amplifier Gain: 8cm, ±5%

11. ERASE TIME AND INTERVAL

a. Erase Time: ≤200ms
b. Interval: 150ms to 200ms

12. RESOLUTION AND WRITING ABILITY

a. Check Dot Writing Time and Dot Resolution: Writing Time: ≤5μs
Resolution: No bridging
No drop out
b. Vertical Line Resolution:
100 line pairs
c. Horizontal Line Resolution:
125 line pairs

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

13. X-Y PHASE DIFFERENCE

b. Phase Difference: ≤1°

14. Y-T CAPABILITY

b. Y-T Capability: No distortion

Factory TEST LIMITS are limits an instrument must meet 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, it is necessary to set up some circuits so their performance is better than required by Factory Test Limits. Therefore, the instructions given in the Factory Calibration Procedure may call for checks or adjustments which result in less error than that allowed by the Factory Test Limits.

1. PRELIMINARY INSPECTION

a. Check Fuses for proper value
b. Align and inspect CRT

2. PRESETS

a. Set the TYPE 601 controls
b. Set the TYPE 547 controls with TYPE 1A1 installed
c. Set the TYPE 1A1 controls

3. RESISTANCE

a. Check power supply resistance to ground
b. Check the amphenol connector pins to gnd

4. POWER SUPPLIES

a. Adjust +100V Supply: 100V ±2%
b. Check Regulation and Ripple

Supply	Regulation	Ripple
+100	±2%	5mV, max
+12.5	±2%	5mV, max
-75	±2%	5mV, max
+16	14.7V to 22.5V	
-150	-142V to -159V	
+250	+230V to +280V	

c. Check Line Voltage Selector Switch

Line Voltage Selector	Approximate Voltage
115V	
LO	85
M	75
HI	69
230V	
LO	41
M	35
HI	32.5

d. Adjust High Voltage: -3900V

5. Z AXIS OPERATION

a. Setup
b. Check On-Off Level: On at +1V
Off at +0.5V
c. Check Risetime and Falltime:
Risetime $\leq$1µs Falltime $\leq$2µs

6. X & Y AMPLIFIER GAIN RANGE

a. Setup
b. Check X Amplifier Gain Range: 190 to 305 min
c. Check Y Amplifier Gain Range: 162 to 309 min

7. X & Y POSITION RANGE AND CRT ELECTRICAL CENTER

a. Check CRT X Axis Electrical Center: ±0.5cm, max
b. Check X Amp Position Range: + and - 125V, min
c. Check CRT Y Axis Electrical Center: ±0.5cm, max
d. Check Y Amp Position Range: + and - 134V, min

8. STORAGE ADJUSTMENTS

a. Setup
b. Check Operating Level Range: ≤125V to ≥285V
c. Check and set Operating Point: Operating Level: 135V to 190V Operating Point must be ≥5V from WT or ≤5V from UWL
d. Adjust Collimation and Flood Gun grids

9. TILT AND LEAN

a. Check Tilt Adjustment Range: ≥6°
b. Check Lean Adjustment Range: ≥6°

10. GEOMETRY AND GAIN

a. Set X Amplifier Gain: 10cm
b. Check Vertical Geometry: ≤1mm
c. Check Horizontal Geometry: ≤1mm
d. Set Y Amplifier Gain: 8cm

11. ERASE TIME AND INTERVAL

a. Check Erase Time: ≤200ms
b. Check Interval: 150ms to 200ms

12. RESOLUTION AND WRITING ABILITY

a. Check Dot Writing Time and Dot Resolution: Writing Time: ≤5μs
Resolution: No bridging
No drop out
b. Check Vertical Line Resolution: 100 line pairs
c. Check Horizontal Line Resolution: 125 line pairs

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

13. X-Y PHASE DIFFERENCE

a. Setup
b. Check Phase Difference: ≤1°

14. Y-T CAPABILITY

a. Setup
b. Check Y-T Capability: No distortion

1. PRELIMINARY INSPECTION

a. Check Fuses for proper value.

b. Align and inspect CRT

Remove the CRT shield at the back of the TYPE 601. Loosen the neck clamp and align the CRT so the faceplate is flush with the front panel at all points. Tighten the neck clamp to 4-7 in.ozf and replace the shield.

Inspect the CRT for physical defects: phosphor defects, scratches, chips, cracks around neck pins etc. Refer to the CATHODE RAY TUBE CHECK OUT PROCEDURE for further information.

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

2. PRESETS

a. Set the TYPE 601 controls:

INTENSITY	ccw
FOCUS	ccw
ASTIG	ccw
OPERATING LEVEL	ccw
LINE (at rear)	115
Range Selector	MED
Internal Adjustments	midr

Set the TYPE 547 controls with TYPE 1A1 installed.

HORIZONTAL DISPLAY	B
MAIN TIME BASE (B)	
TRIGGERING LEVEL	0
TRIGGERING MODE	AUTO
TRIGGERING SLOPE	+
TRIGGERING COUPLING	AC
TRIGGERING SOURCE	NORM
TIME/CM	1mSEC

2. (cont'd)

c. Set the TYPE 1A1 controls:

MODE	CH 1
CHANNEL 1 & 2 VOLTS/CM	.05
CHANNEL 1 & 2 POSITION	midr
CHANNEL 1 & 2 VARIABLE VOLTS/CM	CALIB
CHANNEL 1 & 2 PULL FOR INVERT	Pushed in
CHANNEL 1 & 2 INPUT SELECTOR	DC

3. RESISTANCE

a. Check power supply resistance to ground (- polarity meter lead grounded)

Supply	Approx Resistance	Meter Range
+250	19.5kΩ	X1k
+100	3.75kΩ	X1k
+16	9.5kΩ	X1k
+12.5	7kΩ	X1
-75	4.75kΩ	X1k
-150	12.5kΩ	X1k

b. Check the amphenol connector pins to ground

Pin	Approx Resistance	Use	Meter Range
1	12.5kΩ	X Input	X1k
2	45Ω	X Input Gnd	X10
3	45Ω	Y Input Gnd	X10
4	20kΩ	Z Input	X1k
5	45Ω	Z Input Gnd	X10
6	7.5kΩ	Non Store	X10k
7	10kΩ	Erase Interval	X1k
8	∞	Unused	
9	∞	Unused	
10	∞	Unused	
11	∞	Unused	
12	∞	Unused	
13	∞	Unused	
14	45Ω	X Input Gnd	X10
15	10kΩ	Y Input	X1k
16	45Ω	Y Input Gnd	X10
17	45Ω	Z Input Gnd	X10
18	1MΩ	Remote Erase	X100k
19	0 Ω	Program Gnd	X1
20	∞	Unused	
21	∞	Unused	
22	∞	Unused	
23	∞	Unused	
24	∞	Unused	
25	∞	Unused	

4. POWER SUPPLIES

a. Adjust +100V Supply: 100V ±2%

Connect the TYPE 601 to the TYPE 76TU set for 115VAC and turn power on. Connect the DC Voltage Bridge between gnd and 100V supply (Emitter of Q413). Adjust R434 for 100V.

b. Check Regulation and Ripple

Using the DC Voltage Bridge and test scope at appropriate settings, check regulation and ripple of supplies as indicated below while varing the TYPE 76TU from 104VAC to 126VAC.

Supply	Regulation	Ripple
+100	±2%	5mV, max
+12.5	±2%	5mV, max
-75	±2%	5mV, max
+16	14.7V to 22.5V	
-150	-142V to -159V	
+250	+230V to +280V	

c. Check Line Voltage Selector Switch

Connect a multimeter across pins 10 and 11 of the power transformer and adjust the TYPE 76TU for 75VAC (across pins 10 & 11). While changing the Line Voltage Selector, check for voltages as indicated in the table below.

Line Voltage Selector	Approximate Voltage
115V	
LO	88
M	75
HI	69
230V	
LO	41
M	35
HI	32.5

Remove the multimeter and return the Line Voltage Selector to 115V, M. Set the TYPE 76TU for 115VAC.

d. Adjust High Voltage: -3900V

Connect the DC Voltage Bridge between ground and the High Voltage Test Point. Adjust R212 for -3900V. Check regulation from 104VAC to 126VAC. Must be -3900V ±100V.

5. Z AXIS OPERATION

a. Setup

Set the Remote Programmer STORE - NON STORE to NON STORE and REVERSE - NORMAL to NORMAL and connect it to the Remote Programmer connector at the back of the TYPE 601.

Connect a 50Ω terminator to the X and Y connectors on the Remote Programmer. Connect the Standard Amplitude Calbrator (SAC) OUTPUT to the Z connector. Set the SAC AMPLITUDE control to 1 VOLT and rotate the TYPE 601 INTENSITY control in the cw direction until a spot is visible on the screen. Set the spot in the center of the screen with the X and Y Pos controls (R10 & R60).

b. Check On-Off Level: On at +1V
Off at +0.5V

Set the SAC AMPLITUDE control to .5 VOLTS. Check that the spot disappears. By rotating the INTENSITY cw it must be possible to again obtain a spot on the screen. Rotate INTENSITY fully ccw and the SAC AMPLITUDE control to 1 VOLTS. No spot should appear. Rotate the INTENSITY control cw until the spot is again visible on the screen. Set the SAC AMPLITUDE control to 50 VOLTS. Set the MODE to + DC and then -DC. Return the MODE to the square wave position and the AMPLITUDE control to .5 VOLTS. Repeat the ON - OFF Level check.

c. Check Risetime And Falltime:
Risetime ≤1μs Falltime: ≤2μs

Connect a X10 probe from the TYPE 1A1 CHANNEL 1 INPUT to TP149. Set the CHANNEL 1 VOLTS/CM to 2 and the test scope B TIME/CM to 1μSEC. Adjust the TRIGGERING LEVEL control for a stable display. Note the display amplitude to be approximately 50V. Set the SAC AMPLITUDE control to .5 VOLTS. The pulse Amplitude should be zero. Set the SAC AMPLITUDE control to 1 VOLTS. Check that the risetime of the display is equal to or less than 1μs.

5.c (cont'd)

Set the TRIGGERING SLOPE to -, adjust the TRIGGERING LEVEL for a stable display and check falltime to be equal to or less than 2μs. Remove the probe from TP149 and the SAC signal from the Z connector.

6. X & Y AMPLIFIER GAIN RANGE

a. Setup

Set the test scope B TIME/CM to .5mSEC. Set the TYPE 1A1 CHANNEL 1 & 2 VOLTS/CM to 1 and the MODE switch to ADD. Pull the CHANNEL 2 PULL FOR INVERT switch and connect a X10 probe to INPUTs 1 & 2 Connect the probes to the SAC OUTPUT and set the SAC AMPLITUDE control for 100 VOLTS. Adjust the TYPE 1A1 CHANNEL 1 & 2 VARIABLE VOLTS/CM controls for a null indication of the display. Remove the probes from the SAC OUTPUT and connect one to the left and one to the right horizontal deflection plate of the TYPE 601.

b. Check X Amplifier Gain Range: 190 to 305 min

Remove the 50Ω termination from the X connector on the Remote Programmer and connect a 50Ω cable from the SAC OUTPUT. Set the SAC AMPLITUDE control to .1 VOLTS and adjust the test scope TRIGGERING LEVEL for a stable display. While observing the display, rotate the TYPE 601 X GAIN (R24) fully ccw. The display amplitude must be equal to or less than 1.9cm. Rotate R24 fully cw. The display amplitude must be equal to or greater than 3.05cm. Set the display for 1.9cm

c. Check Y Amplifier Gain Range: 162 to 309, min

Set the Remote Programmer NORMAL-REVERSE switch to REVERSE. Remove the probes from the horizontal deflection plates and connect them across the vertical deflection plates. While observing the

6.c (cont'd)

display, rotate the TYPE 601 Y Gain (R74) fully ccw. The display amplitude must be equal to or less than 1.62cm. Rotate R74 full cw. The display amplitude must be equal to or greater than 3.09cm. Set the display for 1.62cm and remove the SAC signal from the Remote Programmer. Remove the probes from the deflection plates.

7. X & Y POSITION RANGE AND CRT ELECTRICAL CENTER

a. Check CRT X Axis Electrical Center: ±0.5cm, max

Connect a 50Ω termination to the X connector on the Remote Programmer and set NORMAL-REVERSE to NORMAL. Place the test graticule in front of the CRT and rotate the INTENSITY control cw until a spot appears. Short the horizontal deflection plates together and note the position of the spot. It must be within ±0.5cm of the graticule center on the horizontal axis.

b. Check X Amp Position Range: + and - 125V, min

Connect the multimeter across the horizontal deflection plates and adjust X Pos (R10) for zero volts. Rotate R10 fully ccw and check for 125V min. Reverse meter leads, rotate R10 fully cw and again check for 125V min. Adjust R10 for zero volts.

c. Check CRT Y Axis Electrical Center: ±0.5cm, max

Short the vertical deflection plates together and note the position of the spot. It must be within ±0.5cm of the graticule center on the vertical axis.

d. Check Y Amp Position Range: + and - 134V, min

Connect the multimeter across the vertical deflection plates and adjust Y Pos (R60) for zero volts. Rotate R60 full ccw and check for 134V min. Reverse meter leads, rotate R60 fully cw and again check for 134V min. Adjust R60 for zero volts and remove the multimeter leads. Rotate the Intensity control ccw until the spot disappears.

8. STORAGE ADJUSTMENTS

a. Setup

Set the Storage Display Test Unit as follows:

DISPLAY controls

CONT-READY-SINGLE	- READY
HORIZ-VERT-CROSS HATCH	- VERT
RASTER-SINGLE DOT	- RASTER
DOTS 100/80- LINES 100	- LINES 100
DENSITY	- X5
VARIABLE DENSITY	- CALIB
Z AXIS PULSE	- 9
HORIZ-POSITIONING-VERT	- ON
TIME/LINE mSEC	- ccw- Pushed In
AMPLITUDE	- cw

Remove the 50Ω terminations from the Remote Programmer and connect 50Ω cables from the X, Y and Z connectors to X, Y and Z connectors on the Storage Display Test Unit. Set the Remote Programmer STORE-NON STORE switch to STORE.

b. Check Operating Level Range: ≤125V to ≥285V

Connect the multimeter set at appropriate volts range from the storage target backplate (TP 365) to the flood gun cathode (TP 321). With the OPERATING LEVEL fully ccw. Check that voltage is equal to or less than 125V. Rotate the OPERATING LEVEL fully cw and check that voltage is equal to or greater than 285V.

c. Check and Set Operating Point:
Operating Level: 135 to 190V
Operating Point must be ≥5V from WT or ≤5V from UWL

Each CRT will have a card containing the following information:

Writing Threshold (WT)
Upper Writing Limit (UWL)
Operating Point (OP)

The range between the "Writing Threshold" and the "Upper Writing Limit" must be equal

8c. (cont'd)

to or greater than 15V. Set the OPERATING LEVEL control to the Operating Point given. The Operating Point must be between 135V to 190V and equal to or greater than +5V from the WT and equal to or less than -5V from the UWL.

The above Operating Point will be used if the CRT meets all test limits pertaining to storage throughout the remainder of the procedure. If it does not, the Operating Point may be adjusted in either direction so long as the above limits are met. It is suggested that the voltage be raised or lowered in small increments until a new Operating Point is found (see notes).

When making the dot resolution checks; if the display exibits drop outs, the Operating Point should be raised. If the display exibits bridging, the Operating Point should be lowered.

d. Adjust Collimation and Flood Gun Grid

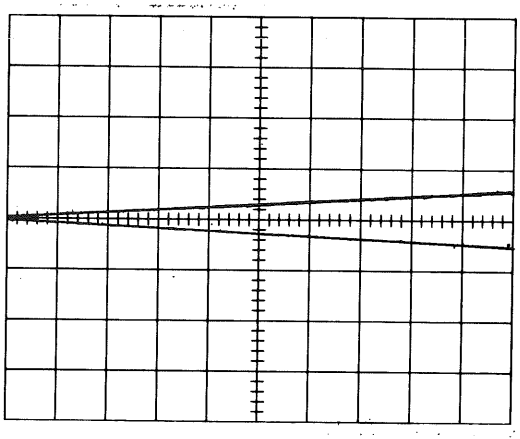
Set the Storage Display Test Unit CONT-READY-SINGLE switch to CONT. The display should be a slow sweep from the bottom to the top of the CRT. Adjust the Storage Display Test Unit HORIZ-POSITIONING-VERT controls to center the sweep display. This should fully write the screen. If it will not, increase the TYPE 601 INTENSITY AND OPERATING LEVEL controls until it does. After the screen is fully written set the Test Display Generator CONT-READY-SINGLE switch to READY. Rotate the Flood Gun Grids (R323) control fully ccw and note shadows around the edge of the screen. Rotate (R323) cw until the shadows just disappear, then rotate (R323) another 10° cw beyond this point.

Rotate Collimation (R363) full cw and while pushing the TYPE 601 ERASE switch, rotate (R363) ccw until uniform edge lighting is achieved.

9. TILT AND LEAN

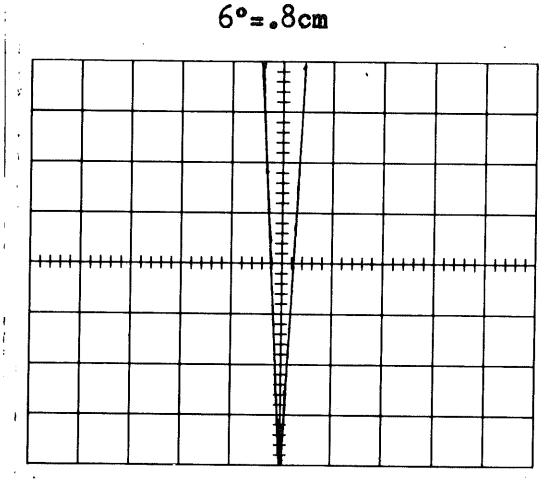
a. Check Tilt Adjustment Range: $\geq 6°$

Remove the 50Ω cable from its Y connector and connect a 50Ω termination. Set the Storage Display Test Unit CONT-READY-SINGLE switch to CONT and position the trace to graticule center with Y Pos (R60). Adjust Y Pos (R10) and X Gain (R24) for a 10cm horizontal trace. Rotate Tilt (R85) full cw and ccw. Check for a minimum of 6° (1cm) rotation of the trace (see notes). Adjust Tilt (R85) so the trace is parallel with the center horizontal graticule line.



b. Check Lean Adjustment Range: $\geq 6°$

Set the Remote Programmer NORMAL-REVERSE switch to REVERSE and set the vertical trace to graticule center with X Pos (R10). Adjust the Y Pos (R60) and Y Gain (R74) for an 8cm vertical trace (see notes). Rotate Lean (R35) full cw and ccw. Check for a minimum of 6° (0.8cm) rotation of the trace. Adjust Lean (R35) to place the trace parallel with the center vertical graticule line.



10. GEOMETRY AND GAIN

a. Set X Amplifier Gain: 10cm

Remove the 50Ω termination from the

10.a (cont'd)

Remote Programmer Y connector and connect a 50Ω cable from the SAC OUTPUT. Set the SAC AMPLITUDE switch to 1 VOLTS. Pull the Storage Display Test Unit TIME/LINE mSEC switch OUT. Adjust the X Pos and X Gain controls for full screen (10cm) of deflection. Set the SAC AMPLITUDE to 50 VOLTS and MODE to +DC and then to -DC. Return the MODE switch to the square wave position. Set the AMPLITUDE control to 1 VOLTS and check the display for 10cm of deflection.

b. Check Vertical Geometry: ≤1mm

Set the SAC to 10mVOLTS. With the X Pos control place the 1mm display to the left hand edge of the graticule. Adjust Geom (R273) for minimum bowing of the display. Using the X Pos control, check geometry over the 10cm of graticule to be equal to or less than 1mm. Set the SAC AMPLITUDE control to OFF and using X Pos (R10) place the trace to the graticule center.

c. Check Horizontal Geometry: ≤1mm

Set the Remote Programmer NORMAL-REVERSE switch to NORMAL and the SAC AMPLITUDE to .5 VOLTS. Adjust Y Pos (R60) to center the display and adjust Y Gain (R74) for 5cm of deflection. Set the SAC to 10 mVOLTS and set the 1mm display to the bottom graticule line using the Y Pos (R60). Position the trace over the 8cm of graticule and check geometry to be equal to or less than 1mm. A compromise adjustment of Geom (R273) may have to be made to satisfy both Vertical and Horizontal Geometry requirements.

d. Set Y Amplifier Gain: 8cm

Set the SAC to 1 VOLTS. Adjust the Y Gain (R74) and Y Pos (R60) for 8cm of deflection. Set the SAC AMPLITUDE to 50 VOLTS and MODE to +DC and then to -DC. Return the MODE switch to the square wave position. Set the AMPLITUDE control to 1 VOLTS and check the display for 8cm of deflection. Set the SAC AMPLITUDE to OFF

10.d (cont'd)

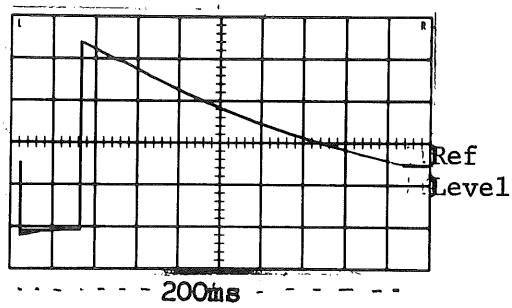
and adjust Y Pos (R60) to place the trace at graticule center. Set the Test Display Generator CONT-READY-SINGLE switch to READY. Remove the 50Ω cable from the Remote Programmer Y connector.

11. ERASE TIME AND INTERVAL

a. Check Erase Time: ≤200ms

Connect the TYPE 1A1 CH 1 X10 probe to TP321 and the CH 2 X10 probe to TP365. Set the CH 1 and CH 2 VOLTS/CM to 5. Set the test scope B TIME/CM TRIGGERING MODE to AUTO and TRIGGERING SLOPE to -. Set TIME/CM to 20mSEC and note the displayed trace reference level. Set the TRIGGERING MODE to TRIG. While repeatedly pushing the TYPE 601 ERASE switch adjust the TRIGGERING LEVEL control on the - slope to obtain a displayed wave form as shown in notes column. The time from the beginning of the sweep until the display returns to the reference level must not exceed 200ms. Remove the probes from the TYPE 601.

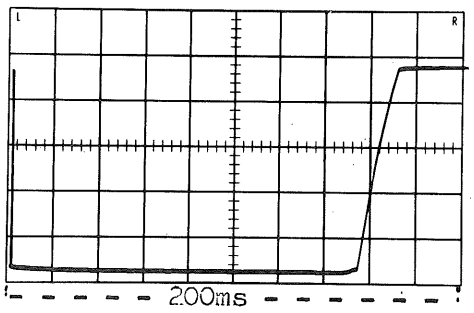
ERASE PULSE



b. Check Interval: 150ms to 200ms

Set the TYPE 1A1 MODE switch to CH 1 and connect the X10 probe to the ERASE INTERNAL jack on the remote programmer. Set the CHANNEL 1 VOLTS/CM to .2. Repeatedly push the TYPE 601 ERASE switch and adjust the test scope TRIGGERING LEVEL control on the - slope to obtain a displayed wave form as shown in notes column. Check pulse width to be between 150ms and 200ms. Remove the probe.

ERASE INTERVAL



12. RESOLUTION AND WRITING ABILITY

a. Check Dot Writing Time and Dot Resolution: Writing Time: ≤5μs Resolution: No bridging No drop out

Connect the 50Ω cable from the Storage Display Test Unit Y connector to the TYPE 601 Y INPUT. Remove the 50Ω cables from the Remote Programmer X and Z connectors and connect them to the appropriate connectors on the TYPE 601. Set the Remote Programmer STORE-NON-STORE switch to NON STORE. Set the Storage Display Test Unit CONT-READY-SINGLE switch to CONT, the HORIZ-VERT-CROSS HATCH to HORIZ, the DOTS 100/80 - LINES 100 to DOTS 100/80, DENSITY to X1.25 and Z AXIS PULSE to 5μs. Adjust the HORIZ-POSITIONING-VERT control to center the display. Adjust the TYPE 601 FOCUS, ASTIGMATISM and INTENSITY controls for optimum display resolution.

Set the Storage Display Test Unit CONT-READY-SINGLE switch to READY and the VARIABLE DENSITY to CALIB. Set the Remote Programmer STORE-NON-STORE switch to STORE and press the ERASE switch. Depress the Storage Display Test Unit CONT-READY-SINGLE switch to the SINGLE position and note the display. Check the stored dots throughout the graticule area for any indication of bridging (dots touching) or drop out (dots missing). None allowed, (see notes). Push the TYPE 601 ERASE switch.

b. Check Vertical Line Resolution: 100 line pairs

Set the Storage Display Test Unit Dots 100/80 - LINES 100 switch to LINES 100 the HORIZ-VERT-CROSS HATCH to VERT and DENSITY to X1. Push the TIME/LINE mSEC switch in and rotate full ccw. Depress the CONT-READY-SINGLE switch to the SINGLE position. Note the display. Adjust the INTENSITY, FOCUS and ASTIGMATISM as necessary and check the written lines for no bridging (running together or breaks greater than 0.025" (.6mm). Push the TYPE 601 ERASE switch.

a. The settings of INTENSITY, FOCUS and ASTIGMATISM are quite critical when making these measurements; therefore, it may be necessary to readjust these controls several times to meet test limits. If limits cannot be met, it may be necessary to use a new Operating Point (refer to step 8c).

12. (cont'd)

c. Check Horizontal Line Resolution: 125 line pairs

Set the Storage Display Test Unit DENSITY control to X1.25 and the HORIZ-VERT-CROSS HATCH switch to HORIZ. Depress the CONT-READY-SINGLE to the SINGLE position and note the display. Check the written lines throughout the graticule area for no bridging. Check the lines for no breaks greater than 0.025" (.6mm). Push the TYPE 601 ERASE switch. Remove the Remote Programmer plug from the TYPE 601.

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

13. X-Y PHASE DIFFERENCE

a. Setup

Set the SAC AMPLITUDE control to 1 VOLTS and connect a 50Ω BNC cable from its OUTPUT to the Z INPUT of the TYPE 601. Connect a 50Ω cable from the Sine Wave Generator to a BNC Dual Input Cable and connect the Dual Input Cable to the X and Y INPUTS.

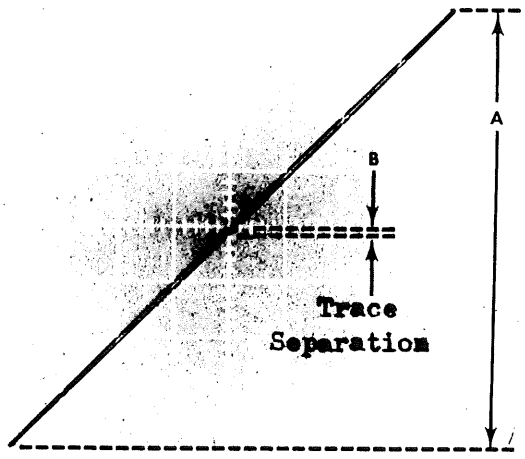
b. Check Phase Difference: <1°

Set the Sine Wave Generator for a frequency of 100kHz and note the display. Adjust the Sine Wave Generator AMPLITUDE controls so that the diagonl line is 8cm in the vertical direction. Adjust the TYPE 601 X Gain (R24) so the horizontal display width is 8cm (see notes). Check for a trace separation of less than 1.4mm.

Readjust the X Gain (R24) for a horizontal display width of 10cm. Remove the Dual Input Cable from the X and Y INPUTS.

a. The checks should be made in the non store mode of operation. This can be accomplished by connecting the Remote Programmer and setting it to the NON STORE position or by grounding pin 6 at the REMOTE PROGRAMMER connector.

If it becomes necessary to change any TYPE 601 internal adjustments for the sample checks, those adjestments will have to be recalibrated.



14. Y-T CAPABILITY

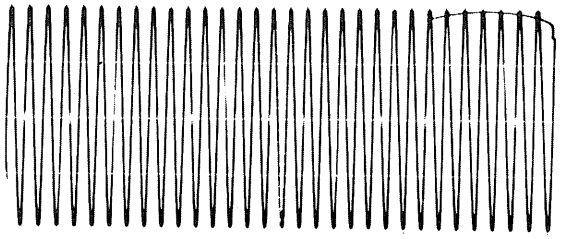
a. Setup

Connect a BNC T connector to the Sine Wave Generator OUTPUT. Connect two 50Ω cables to the T connector. Connect one cable to the TYPE 601 Y INPUT and one cable to the test scope TIME BASE A TRIGGER INPUT. Insert the Sawtooth Attenuator into the SWEEP A output jack and connect a 50Ω cable from this to the TYPE 601 X INPUT. Set the test scope A TIME/CM to 20μSEC, TRIGGERING SOURCE to EXT and MODE to TRIG.

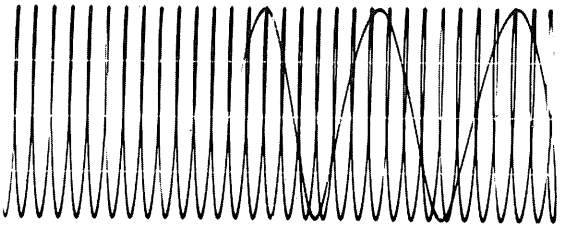
b. Check Y-T capability: No distortion

While observing the TYPE 601 CRT, adjust the test scope A TRIGGERING LEVEL control for a stable display. Adjust the Sawtooth Attenuator for a 10cm horizontal display and the Sine Wave Generator AMPLITUDE, control for a 4cm vertical display (see notes). Check for no distortion of the display.

Remove all cables from the TYPE 601.



(A) No distortion



(B) Distorted