

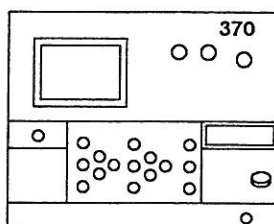


E3. Adjusting Leakage Compensation (A10R270)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R270; they are not specifications.

E3 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
VERTICAL
CURRENT/DIV 1 μ A COLLECTOR
COLLECTOR SUPPLY
POLARITY + LEAKAGE
CURSOR Mode DOT
CONFIGURATION BASE OPEN
LOOPING COMPENSATION Midrange

6065-427

Determining if Adjustment is Necessary

- EXAMINE** the Vertical CURSOR readout for a reading of $0.00 \text{ nA} \pm 0.03 \text{ nA}$.

If the readout is not within these limits, the following adjustment is necessary. Otherwise, proceed to the next step.

Adjusting Leakage Compensation

NOTE

See **Test Point and Adjustment Locations 2** in Section 7 for the location of the adjustment associated with this step.

- ADJUST** Leakage Comp adjustment R270 on the A10 Sense Board; for a Vertical CURSOR readout of 0.00 nA .

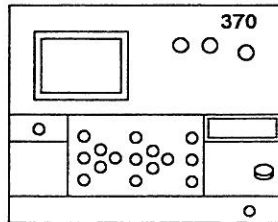


E2. Adjusting Looping Balance (A10R238)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R238; *they are not specifications.*

E2. SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
VERTICAL
CURRENT/DIV 1 A COLLECTOR
MAG MODE VERT X10
COLLECTOR SUPPLY
POLARITY AC
CURSOR Mode DOT
CONFIGURATION BASE OPEN

6065-426

Determining if Adjustment is Necessary

- Set the LOOPING COMPENSATION control fully counterclockwise.
- EXAMINE** the vertical CURSOR readout for a reading of ≤ 10 mA.

If the readout is not within these limits, the following adjustment may be necessary.

Adjusting Looping Compensation

NOTE

See Test Point and Adjustment Locations 2 in Section 7 for the location of the adjustment associated with this step.

- ADJUST** Looping Balance adjustment R238 on the A10 Sense Board; for a vertical CURSOR readout of 0.00 mA.

Removing the Setup

- Set the LOOPING COMPENSATION control to midrange.

Table 4-9
Vertical Zero Check

VERTICAL CURRENT/DIV Setting	Vertical CURSOR Readout
200 mA	0.0 $\pm$ 6 mA
100 mA	0.0 $\pm$ 3 mA
50 mA	0.0 $\pm$ 1.5 mA

E. VERTICAL

Equipment Required (see Table 4-3):

- Precision Voltage Source
- Precision Current Source
- Resistor: 25 M Ω , 0.1%, 0.5 W
- Resistor: 2.5 M Ω , 0.1%, 0.5 W
- Resistor: 250 k Ω , 0.1%, 0.5 W
- Resistor: 0.1 Ω , 0.1%, 10 W

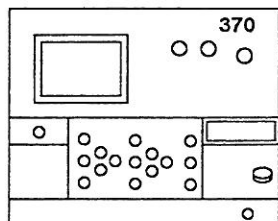


E1. Adjusting V Zero (A10R250)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R250; they are not specifications.

E1 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
MAG MODE VERT X10
VERTICAL
CURRENT/DIV 200 mA COLLECTOR
COLLECTOR SUPPLY
POLARITY AC 
CURSOR Mode DOT

6065-425

Determining if Adjustment is Necessary

- Rotate the LOOPING COMPENSATION control fully clockwise.
- EXAMINE** the vertical CURSOR readout for a reading within the limits given in Table 4-9 when the VERTICAL CURRENT/DIV control is set to 200, 100, and 50 mA.

If the readout is not within these limits, the following adjustment is necessary.

Adjusting V Zero

NOTE

See **Test Point and Adjustment Locations 2** in Section 7 for the location of the adjustment for this step.

- ADJUST** V Zero adjustment R250 on the A10 Sense Board; for a vertical CURSOR readout of 20 mA or less when the VERTICAL CURRENT/DIV control is rotated between 200 mA and 50 mA.

The adjustment is accessible through the right lower rail cutout.

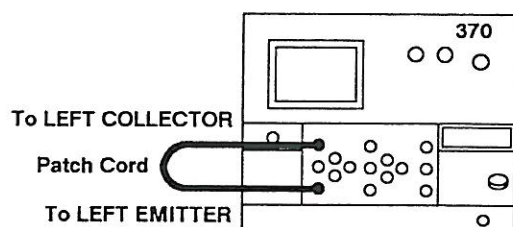


D5. Checking Step Generator Display Accuracy

Specification:

- The displayed step generator steps are located within 0.3 division of the graticule lines.

D5 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
Mode NON-STORE
HORIZONTAL VOLTS/DIV STEP GEN
VERTICAL CURRENT/DIV . 2 mA COLLECTOR
STEP GENERATOR
NUMBER OF STEPS 10
LEFT-RIGHT-STANDBY LEFT

6065-424

Checking Accuracy

- Close the Protective Cover.
- Change the following 370 setting:

COLLECTOR SUPPLY
VARIABLE Rotate clockwise until
the tallest trace reaches
the top graticule line.

- CHECK** that the top of each displayed trace is within 0.3 division of a graticule line.

Removing the Setup

- Change the following 370 setting:
LEFT-RIGHT-STANDBY STANDBY
- Remove the patch cord and close the Protective Cover.

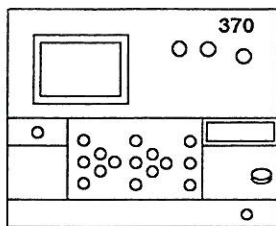


D4. Checking Displayed Noise for NON STORE COLLECTOR Settings

Specification:

- Displayed noise (peak-peak) for each COLLECTOR SUPPLY MAX PEAK VOLTS setting is no more than 2 mV for 16, 10 mV for 80, 50 mV for 400, and 250 mV for 2000.

D4 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
Mode NON-STORE
MAG MODE HORIZ X10
HORIZONTAL
VOLTS/DIV 5 mV COLLECTOR
COLLECTOR SUPPLY
POLARITY AC
MAX PEAK POWER WATTS 220
VARIABLE 0%
HIGH-LOW LOW
Protective Cover Closed

6065-421

Checking Noise at 16 MAX PEAK VOLTS

- CHECK** that the spot width is no more than 2 mV (2 minor divisions) peak-peak (see Table 4-8).

Table 4-8
Displayed Horizontal Noise

COLLECTOR SUPPLY MAX PEAK VOLTS	Horizontal Spot Width (Noise)
16	2 mV (2 minor div)
80	10 mV (2 div)
400	50 mV (10 div)
2000	250 mV (5 div)

Checking Noise at 80 MAX PEAK VOLTS

- Change the following 370 setting:

MAX PEAK VOLTS 80

- CHECK** that the spot width is no more than 10 mV (2 divisions) peak-peak (see Table 4-8).

Checking Noise at 400 MAX PEAK VOLTS

- Change the following 370 setting:

MAX PEAK VOLTS 400

- CHECK** that the spot width is no more than 50 mV (10 divisions) peak-peak (see Table 4-8).

Checking Noise at 2000 MAX PEAK VOLTS

- Change the following 370 settings:

DISPLAY
MAG MODE OFF
COLLECTOR SUPPLY
HIGH-LOW HIGH
DISPLAY
HORIZONTAL VOLTS/DIV 50 mV

- CHECK** that the spot width is no more than 250 mV (5 divisions) peak-peak (see Table 4-8).

Removing the Setup

- Change the following 370 setting:

COLLECTOR SUPPLY
HIGH-LOW LOW

Table 4-7
Collector Voltage Accuracy

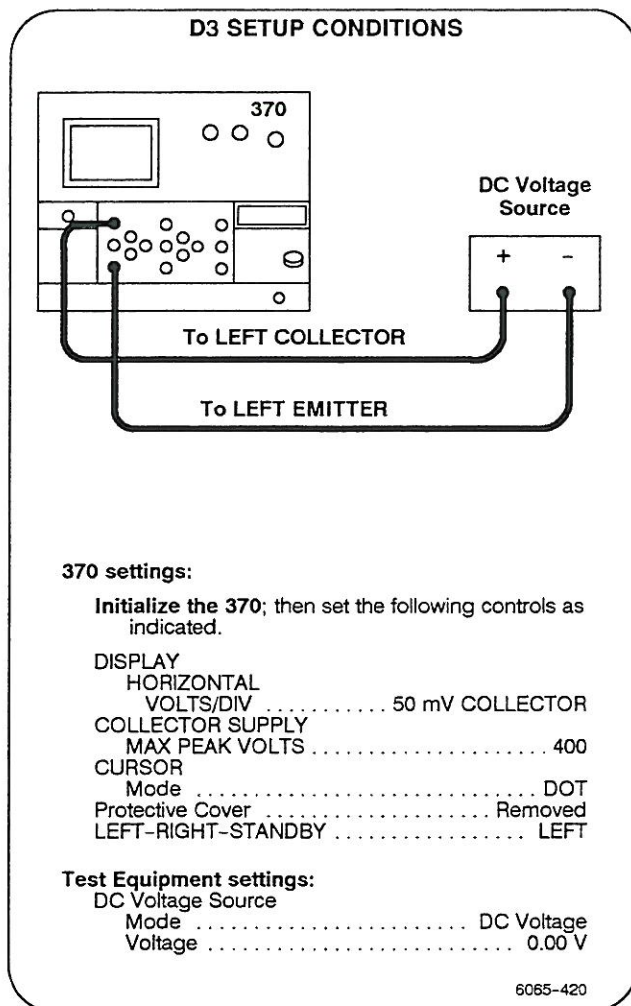
HORIZONTAL VOLTS/DIV Setting	DC Voltage Source	Horizontal CURSOR Readout
50 mV	0.00 mV	± 1.5 mV
	500.0 mV	491 to 509 mV
100 mV	0.00 mV	± 3 mV
	1000 mV	982 to 1018 mV
200 mV	0.00 mV	± 6 mV
	2000 mV	1964 to 2036 mV
500 mV	0.00 mV	± 15 mV
	5000 mV	4910 to 5090 mV
1 V	0.00 mV	± 0.03 V
	10.00 V	9.82 to 10.18 V
2 V	0.00 mV	± 0.06 V
	20.00 V	19.64 to 20.36 V
5 V	0.00 mV	± 0.15 V
	50.00 V	49.10 to 50.90 V
10 V	0.00 mV	± 0.3 V
	100.0 V	98.2 to 101.8 V
20 V	0.00 mV	± 0.6 V
	200.0 V	196.4 to 203.6 V
50 V	0.00 mV	± 1.5 V
	500.0 V	491.0 to 509.0 V
100 V	0.00 mV	± 3 V
	1000 V	982 to 1018 V
200 V	0.00 mV	± 6 V
	1000 V	978 to 1022 V
500 V	0.00 mV	± 15 V
	1000 V	975 to 1025 V

3

D3. Checking COLLECTOR Voltage Accuracy and Range in STORE DISPLAY Mode

Specifications:

- The range of HORIZONTAL COLLECTOR settings in STORE DISPLAY mode is from 50 mV/div to 500 V/div in a 1-2-5 sequence of 21 steps.
- The HORIZONTAL COLLECTOR settings are accurate to within 1.5% of the readout + 0.03 division of the setting.



WARNING

Extreme caution must be used when performing the following step due to the dangerous potentials present at the input of the 370.

Checking Collector Voltage Accuracy

- CHECK** that the horizontal CURSOR readout is within the CURSOR Readout limits for each HORIZONTAL CURRENT VOLTS/DIV and DC Voltage setting listed in Table 4-7.

There are two DC Voltage values given for each HORIZONTAL VOLTS/DIV setting in Table 4-7; check for both.

Removing the Setup

- Change the following 370 settings:
LEFT-RIGHT-STANDBY STANDBY
COLLECTOR SUPPLY
LOW-HIGH LOW
- Change the following test equipment settings:
DC Voltage Source
Voltage 0.00 V
Output Standby

WARNING

Be certain that the output of the DC voltage source is set to Off or Standby before connecting or disconnecting the test leads.

- Disconnect the DC voltage source leads from the 370.
- Replace the Protective Cover on the 370.

Removing the Setup

NOTE

- c. Change the following Test Equipment setting:

DC Voltage Source
Output Standby

The next step is also be performed with the Protective Cover removed. If the next step will not be performed, replace the Protective Cover now.

- d. Disconnect the DC voltage source leads from the 370.

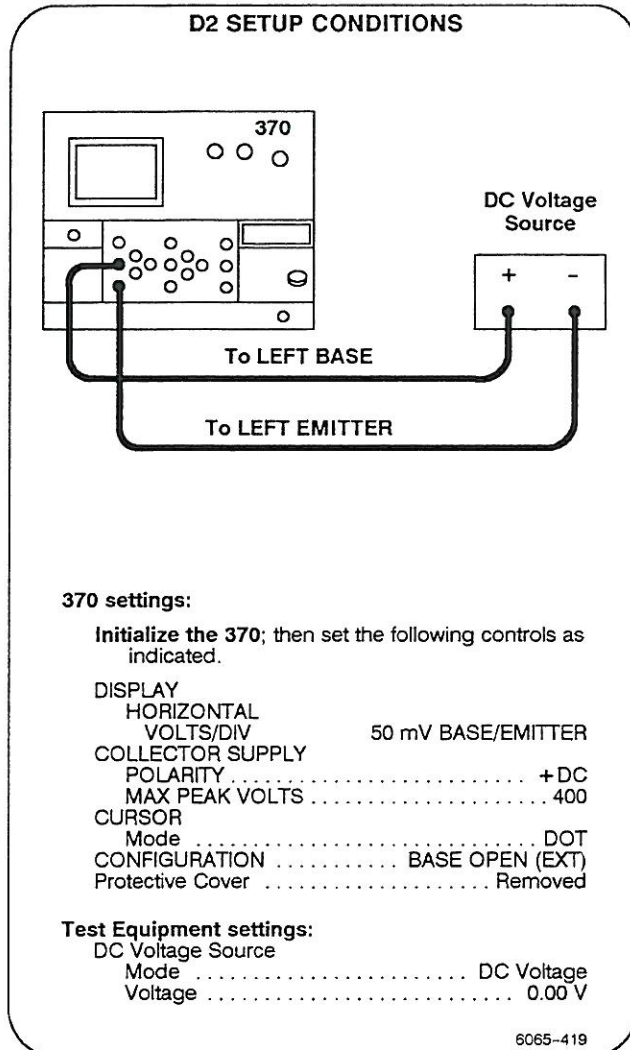
2



D2. Checking HORIZONTAL BASE/EMITTER Accuracy and Range in STORE DISPLAY Mode

Specifications:

- The range of HORIZONTAL BASE/EMITTER selections in STORE DISPLAY mode is from 50 mV to 2 V in a 1-2-5 sequence of six steps.
- The BASE/EMITTER settings are accurate to within 1.5% of the readout + 0.03 division of the setting.



NOTE

Disregard the flashing cursor on the 370 display.

Checking Base/Emitter Accuracy

- a. Change the following 370 setting:

LEFT-RIGHT-STANDBY LEFT

- b. **CHECK** that the horizontal CURSOR readout is within the CURSOR Readout limits for each HORIZONTAL (BASE/EMITTER) VOLTS/DIV and DC Voltage setting listed in Table 4-6.

There are two DC Voltage values given for each HORIZONTAL VOLTS/DIV setting in Table 4-6; check for both.

Table 4-6
Base/Emitter Voltage Accuracy

HORIZONTAL VOLTS/DIV Setting	DC Voltage Source	Horizontal CURSOR Readout
50 mV	0.000 mV	± 1.5 mV
	500.0 mV	491 to 509 mV
100 mV	0.000 mV	± 3 mV
	1000 mV	982 to 1018 mV
200 mV	0.000 mV	± 6 mV
	2000 mV	1964 to 2036 mV
500 mV	0.000 mV	± 15 mV
	5000 mV	4910 to 5090 mV
1 V	0.00 V	± 30 mV
	10.00 V	9.82 to 10.18 V
2 V	0.00 V	± 60 mV
	20.00 V	19.64 to 20.36 V

D. HORIZONTAL

Equipment Required (see Table 4-3):

- DC Voltage Source
- 1 M Ω , 5%, 0.25 W Resistor
- 10 M Ω , 5%, 0.25 W Resistor

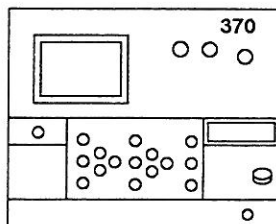


D1. Adjusting H Zero (A10R460)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R460; they are not specifications.

D1 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following control as indicated.

CURSOR
Mode DOT

6065-418

Determining if Adjustment is Necessary

- a. **EXAMINE** the horizontal CURSOR readout for a reading of 0.0 ± 1.0 V when DISPLAY HORIZONTAL VOLTS/DIV is set to 50 V and 0.0 ± 2.0 V when DISPLAY HORIZONTAL VOLTS/DIV is set to 200 V. Ignore short-term changes in the readout.

If the reading is not within these limits, the following adjustment is necessary.

Adjusting H Zero

NOTE

See Test Point and Adjustment Locations 2 in Section 7 for the location of the adjustment for this step.

- b. **ADJUST** H Zero adjustment R460 on the A10 Sense Board for a horizontal CURSOR readout of 0.00 V when HORIZONTAL VOLTS/DIV is set to 200 V and 50 V.

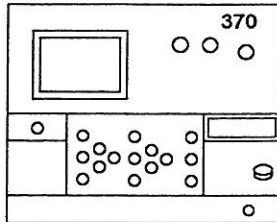
A cutout in the right side rail provides adjustment access.

C8. Examining ACQ MODE Operation

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*

C8 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following control as indicated.

DISPLAY
ACQ MODE AVG 4

6065-417

Examining ENV VERT and ENV HORIZ

d. Change the following 370 setting:

DISPLAY
ACQ MODE ENV VERT

e. **EXAMINE** the area to the left of the ENV VERT switch position for the ENV VERT indicator to be lit.

f. Change the following 370 setting:

DISPLAY
ACQ MODE ENV HORIZ

g. **EXAMINE** the area to the left of the ENV HORIZ switch position for the ENV HORIZ indicator to be lit.

Examining AVG 4 and AVG 32

a. **EXAMINE** the upper right corner of the display for the Average Count readout to appear and count up from 1 to 4.

b. Change the following 370 setting:

DISPLAY
ACQ MODE AVG 32

c. **EXAMINE** the upper right corner of the display for the Average Count readout to appear and count up from 1 to 32.

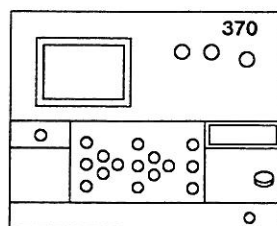


C7. Checking DISPLAY MAG X10 Accuracy

Specification:

- OFFSET with DISPLAY MAG set to X10 is accurate to within (0.5% of the readout + 0.3 division of the setting).

C7 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY	MAG MODE	HORIZ X10
	CRT CAL	ZERO CHK
	COLLECTOR SUPPLY	
	POLARITY	AC
	CURSOR	DOT

6065-416

Checking Offset for HORIZ X10

- Change the following 370 setting:

DISPLAY
MAG
OFFSET INCR Press the INCR button once to position the spot 5 divisions to the right of graticule center.

- Note the horizontal CURSOR readout.

- Change the following 370 setting:

DISPLAY
MAG
OFFSET DECR Press the DECR button twice to move the spot 10 divisions to the left.

- CHECK** that the difference between the Horizontal CURSOR reading in step b and the current reading is ≤ 60 mV.

Checking Offset for VERT X10

- Change the following 370 settings:

DISPLAY
MODE VERT X10
MAG
OFFSET Simultaneously press the INCR and DECR buttons.

Offset will be reset to zero.

- Change the following 370 setting:

DISPLAY
MAG
OFFSET INCR Press the INCR button once to move the spot up 5 divisions.

- Note the vertical CURSOR readout.

- Press the DISPLAY MAG OFFSET DECR key twice to reposition the spot down 10 divisions.

- CHECK** that the difference between the vertical CURSOR reading in part g and the current reading is ≤ 60 mA.

Table 4-5
Offset Accuracy

DISPLAY OFFSET (vertical or horizontal divisions)	Vertical CURSOR Readout Limits ($\pm$)	Horizontal CURSOR Readout Limits ($\pm$)
0.5	0.02 A	0.02 V
1.0	0.02 A	0.02 V
1.5	0.02 A	0.02 V
2.0	0.04 A	0.04 V
2.5	0.04 A	0.04 V
3.0	0.04 A	0.04 V
3.5	0.04 A	0.04 V
4.0	0.04 A	0.04 V
4.5	0.04 A	0.04 V
5.0	0.04 A	0.04 V
5.5	0.04 A	0.04 V
6.0	0.06 A	0.06 V
6.5	0.06 A	0.06 V
7.0	0.06 A	0.06 V
7.5	0.06 A	0.06 V
8.0	0.06 A	0.06 V
8.5	0.06 A	0.06 V
9.0	0.06 A	0.06 V
9.5	0.06 A	0.06 V
10	0.08 A	0.08 V

Checking Negative Horizontal Offset

- h. Change the following 370 settings:

DISPLAY
MAG
MODE HORIZ X1
OFFSET Simultaneously press the
INCR and DECR buttons.

OFFSET is now reset to zero.

- i. Change the following 370 setting:

DISPLAY
MAG
OFFSET DECR Press the DECR button
once to move the displayed
spot 0.5 division to the left.

- j. **CHECK** that the Horizontal CURSOR readout is within the limits given in Table 4-5.
- k. **CHECK** that the Horizontal CURSOR readout is accurate within the limits given in Table 4-5 by repeating steps i and j for each OFFSET setting in Table 4-5.

Checking Positive Horizontal Offset

- l. Change the following 370 settings:

COLLECTOR SUPPLY
POLARITY + 
DISPLAY
MAG OFFSET Simultaneously press the
INCR and DECR buttons.

OFFSET is reset to zero.

- m. Change the following 370 setting:

DISPLAY
MAG
OFFSET INCR Press the INCR button
once to move the
displayed spot 0.5
division to the right.

- n. **CHECK** that the Horizontal CURSOR readout is within the limits given in Table 4-5.
- o. **CHECK** that the Horizontal CURSOR readout is accurate within the limits given in Table 4-5 by repeating steps m and n for each OFFSET setting in Table 4-5.

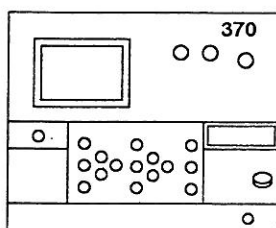


C6. Checking DISPLAY MAG OFFSET

Specifications:

- For Digital Storage Vertical and Horizontal Acquisition, the center-line display can be vertically offset up to ten divisions in 20 half-division steps.
- DISPLAY MAG OFFSET is accurate to within (0.5% of the offset (in divisions) + 0.01 division of the setting).

C6 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
CRT CAL ZERO CHK
MAG
MODE VERT X1
CURSOR
Mode DOT

6085-415

Checking Positive Vertical Offset

- a. Change the following 370 setting:

DISPLAY
MAG
OFFSET INCR Press the button once to move the displayed spot up 0.5 division.

- b. **CHECK** that the Vertical CURSOR readout is within the limits given in Table 4-5.
- c. **CHECK** that the Vertical CURSOR readout is accurate within the limits given in Table 4-5 by repeating steps a and b for each OFFSET setting in Table 4-5.

Checking Negative Vertical Offset

- d. Change the following 370 settings:

COLLECTOR SUPPLY
POLARITY - 
DISPLAY
MAG
OFFSET Simultaneously press the INCR and DECR buttons.

Simultaneously pressing INCR and DECR sets OFFSET to zero.

- e. Change the following 370 setting:

DISPLAY
MAG
OFFSET DECR Press the button once to move the displayed spot down 0.5 division.

- f. **CHECK** that the Vertical CURSOR readout is within the limits given in Table 4-5.
- g. **CHECK** that the Vertical CURSOR readout is accurate within the limits given in Table 4-5 by repeating steps e and f for each OFFSET setting in Table 4-5.



C5. Checking DISPLAY INVERT Accuracy

Specification:

- DISPLAY INVERT for Digital Storage Vertical and Horizontal Acquisition is accurate to within 0.04 x VERT/DIV or HORIZ/DIV setting.

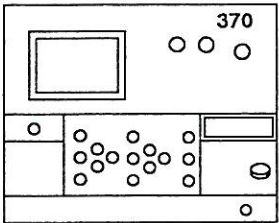
a. Change the following 370 setting:

DISPLAY
INVERT On

The indicator above the INVERT button will light.

b. **CHECK** that the spot moves from lower left corner to the upper right corner of the graticule and the vertical CURSOR readout and horizontal CURSOR readout are 0.00 ± 0.08 .

C5 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
CRT CAL ZERO CHECK
CURSOR Mode DOT

5065-414

C. Display

Examining Non-Store Gain

- l. **EXAMINE** the display to determine if the Dot Pattern's outer eight dots are positioned within the inner and outer frame patterns.

If the positioning is not correct, the following adjustment is necessary.

Adjusting X-Gain and Y-Gain

- m. **ADJUST** X-Gain adjustment R554 and Y-Gain adjustment R574 on the A5 Display Control Board to position the Dot Pattern's outer eight dots within the inner and outer Frame Patterns.

Checking and Adjusting Geometry

- n. Change the following 370 settings:

POSITION

Horizontal and Vertical Position the center dot of the Dot Pattern at graticule center.

- o. **CHECK** the Frame Pattern for ≤ 0.5 minor division of bowing and ≤ 0.75 minor division of keystone effect.

If the bowing and keystone effect are not within these limits, the following adjustment may be necessary.

- p. **ADJUST** Geometry adjustment R410 on the A18 CRT Output Board (if necessary) for minimum display bowing.

Examining the Display for Adjustment Interaction

- q. **EXAMINE** the display for all dots to be between the outer frame and inner frame of the Frame Test Pattern, within 0.5 minor division.

If not, repeat parts j through n.

- r. **EXAMINE** the display for the graticule periphery to be between the outer frame and inner frame of the frame test pattern, within 0.5 minor division.

If not, repeat parts j through n.

- s. **EXAMINE** the display for the center dot to be at graticule center, within 0.5 minor division.

Removing the Test Pattern

- t. Press the FAST key to exit the diagnostic routine.

- c. Turn the GRAT ILLUM control fully clockwise for maximum brightness.
- d. Set the Frame Test Pattern to the same intensity as the graticule using the Intensity READOUT/CURSOR control and set the Dot Test Pattern slightly brighter using the Intensity NON STORE/STORE control.

Examining Store Position

- e. **EXAMINE** the display to determine whether the center cross mark of the Frame Test Pattern aligns with the center dot of the Dot Pattern.

If the pattern centers do not align, the following adjustments are necessary.

Adjusting SY Position and SX Position

The SX and SY Position controls change the Frame Test Pattern position without affecting the Dot Test Pattern position.

- f. **ADJUST** SY Position adjustment R528 and SX Position adjustment R508 on the A5 Display Control Board so that the center cross mark of the Frame Test Pattern conforms to the center dot of the Dot Pattern (not the center of the graticule).

Examining and Adjusting D/A Gain

- g. **EXAMINE** the display to determine whether the outer eight dots of the Dot Pattern are located between the inner frame and outer frame of the Frame Test Pattern.

If the location is not correct, the following adjustment is necessary.

- h. **ADJUST** D/A Gain adjustment R842 on the A4 Digital Display Board to position the outer eight dots between the inner frame and outer frame of the Frame Test Pattern.

D/A Gain adjusts the size of the Frame Test Pattern without changing the Dot Test Pattern size.

Checking and Adjusting the Display

The Dot and Frame Test Patterns are visual aids for display alignment. Positioning, straightening and sizing of the display involves several adjustments. Three of these adjustments, GEOMETRY, TRACE ROTATION, and ORTHOGONALITY, are interactive.

- GEOMETRY adjusts the curvature of the sides, top and bottom of the test pattern:
- TRACE ROTATION tilts the test pattern about a pivot point approximately $2\frac{1}{2}$ divisions from the right side of the graticule on the horizontal center line.
- ORTHOGONALITY changes the test pattern shape from rhombic to rectangular.
- X-GAIN and Y-GAIN change the test pattern from rectangular to square.
- Front-panel POSITION controls change the position of the whole display.

Checking Orthogonality

- i. Change the following 370 settings:

POSITION

Vertical and Horizontal Position the center dot to graticule center.

TRACE ROTATION Position the three intermediate horizontal dots on the center horizontal graticule line.

- j. **CHECK** that the three intermediate vertical dots conform to the center vertical graticule line within 0.5 minor division.

If the dots do not conform, the following adjustment is necessary.

Adjusting Orthogonality

- k. **ADJUST** Orthogonality adjustment R80 on the A5 Display Control Board so that the three intermediate vertical dots conform to the center vertical graticule line.



C4. Checking Orthogonality and Geometry

Examining Store Position,
Non Store Gain, and D/A Gain

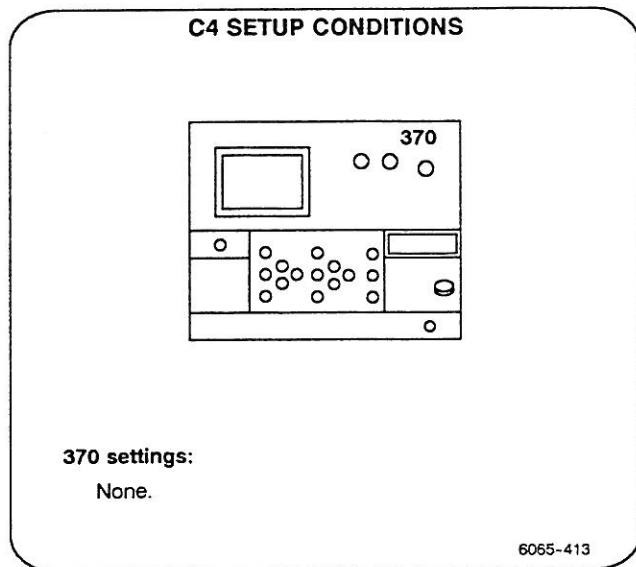
Adjusting SX Position
(A5R508), SY Position
(A5R528), D/A Gain (A4R842),
X-Gain (A5R554), Y-Gain
(A5R574), Orthogonality
(A5R80), Geom (A18R410)

Specifications:

- Orthogonality is $90^\circ \pm 0.5$ minor division.
- Geometry includes two categories: (1) Tilt or bowing is no more than 0.5 minor division. (2) Keystone effect is no more than 0.75 minor division.

IMPORTANT:

Characteristics in EXAMINE steps are provided as examples of typical instrument operation to aid in adjustment; *they are not specifications.*



NOTE

See Test Point and Adjustment Locations 1 and 3 in Section 7 for the location of adjustments associated with this step.

Initiating the Test Pattern

- Change the following 370 setting:

POWER OFF

- Hold the FAST key depressed and set the 370 POWER to ON.

This initiates the diagnostic routine. The Sony/Tektronix logo first appears, followed by the display test pattern shown in Figure 4-1.

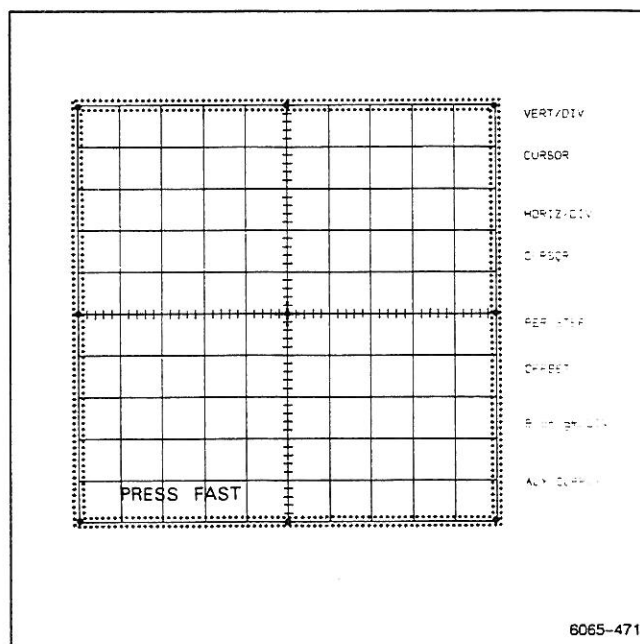


Figure 4-1. Diagnostic test pattern display.

The test pattern consists of the Frame Test Pattern overlaid over the Dot Test Pattern.

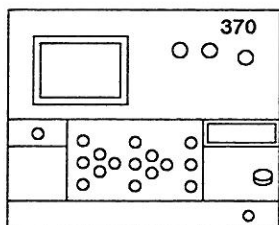


C3. Adjusting AD Gain (A3R700)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R700; they are not specifications.

C3 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

DISPLAY
CRT CAL ZERO CHECK
CURSOR
Mode DOT

6065-412

Determining if Adjustment is Necessary

- a. **EXAMINE** the vertical and horizontal CURSOR readouts for readings of 0.00 ± 0.06 .

If the CURSOR readouts are not within these limits, the following adjustment is necessary.

Adjusting AD Gain

NOTE

See Test Point and Adjustment Locations 1 in Section 7 for the location of the adjustment in this step.

- b. **ADJUST** AD Gain adjustment R700 on the A3 A/D Board for Vertical and Horizontal CURSOR readouts of 0.00.

Examining AD Gain for CAL CHK

- c. Change the following 370 setting:

DISPLAY
CRT CAL CAL CHK

- d. **EXAMINE** the vertical and horizontal CURSOR readout for a reading of 20.00 ± 0.36 .

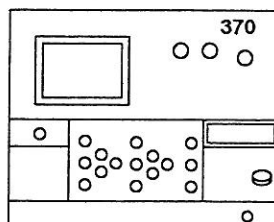


C2. Adjusting V Zero and H Zero (A3R734 and A3R724)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R734 and R724; they are not specifications.

C2 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

COLLECTOR SUPPLY
POLARITY AC
CURSOR
Mode DOT
DISPLAY
CRT CAL ZERO CHECK

8065-411

Determining if Adjustment is Necessary

- EXAMINE** the vertical CURSOR readout for a reading that does not exceed ± 0.06 A and the horizontal CURSOR readout for a reading that does not exceed 0.06 V.

If the CURSOR readouts are not within these limits, the following adjustment is necessary.

Adjusting H Zero and V Zero

NOTE

See Test Point and Adjustment Locations 1 in Section 7 for the location of adjustments in this step.

- ADJUST** H Zero adjustment R724 and V Zero adjustment R734 on the A3 A/D Board for a CURSOR readout of 0.00 for Vertical and 0.00 for Horizontal.

Examining Negative Vertical Offset

- f. Connect the digital multimeter to TP648 on the A5 Display Control Board.
- g. Change the following 370 setting:

 DISPLAY
 CRT CAL ZERO CHK
- h. **EXAMINE** the digital multimeter for a reading between -0.995 V and -1.005 V.

Examining Positive Vertical Offset

- i. Change the following 370 setting:

 DISPLAY
 CRT CAL CAL CHK
- j. **EXAMINE** the digital multimeter for a reading between +0.995 V and +1.005 V.

Removing the Setup

- k. Change the following 370 setting:

 DISPLAY
 CRT CAL OFF
- l. Disconnect the digital multimeter from TP648.

C. DISPLAY

Equipment Required (see Table 4-3):

• Digital Multimeter

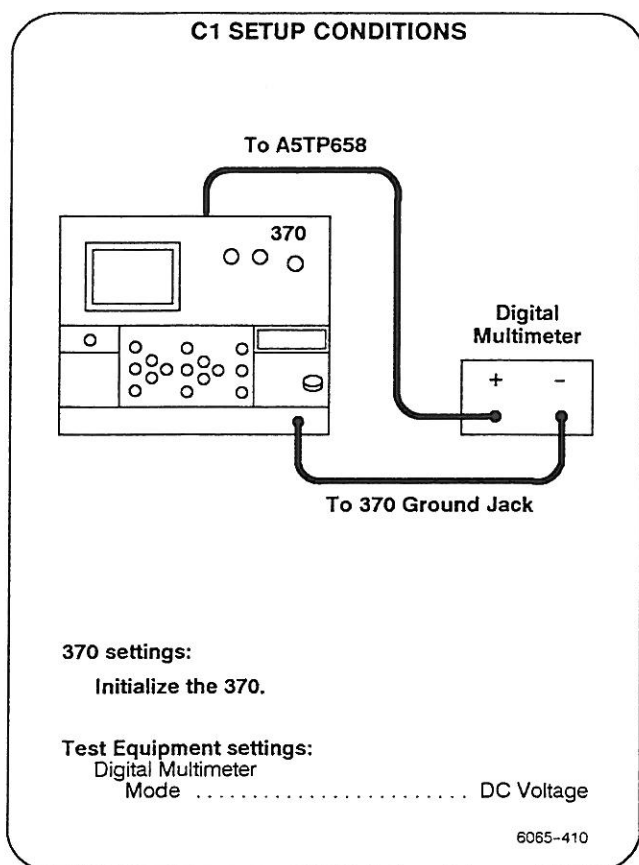
NOTE

See Test Point and Adjustment Locations 1 in Section 7 for the location of test points used in this step.

C1. Examining Display Offset

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*



Examining Negative Horizontal Offset

- a. Change the following 370 setting:

DISPLAY
CRT CAL ZERO CHK

- b. **EXAMINE** the digital multimeter for a reading between -0.995 V and -1.005 V .

Examining Positive Horizontal Offset

- c. Change the following 370 setting:

DISPLAY
CRT CAL CAL CHK

- d. **EXAMINE** the digital multimeter for a reading between $+0.995\text{ V}$ and $+1.005\text{ V}$.

- e. Disconnect the digital multimeter from TP658.

B6. Examining READOUT/CURSOR INTENSITY Operation

IMPORTANT:

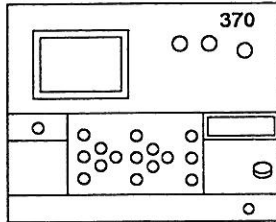
The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*

- a. **EXAMINE** the display for a continuous increase in readout and cursor brightness as the READOUT/CURSOR INTENSITY control is turned from fully counterclockwise to fully clockwise.
- b. Change the following 370 setting:

INTENSITY

READOUT/CURSOR Normal viewing level

B6 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following control as indicated.

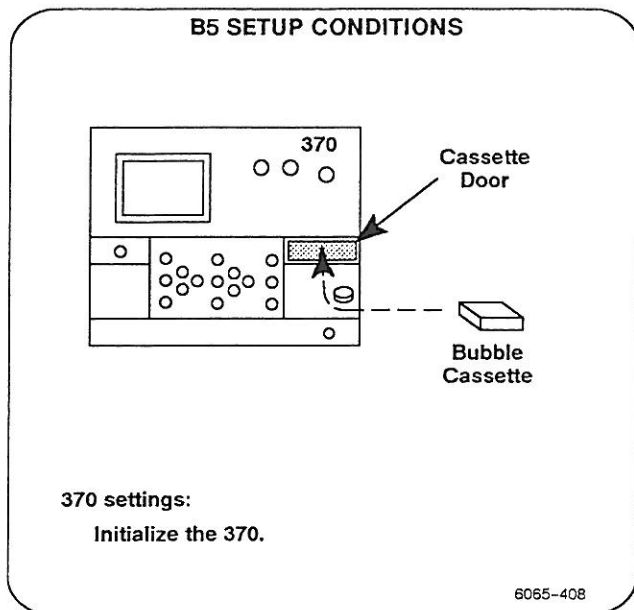
CURSOR
Mode CROSS

6065-409

B5. Examining VIEW INTENSITY Operation

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*



- a. Install in the 370 a bubble memory cassette containing a stored waveform.
- b. Change the following 370 setting:

MEMORY
Index Memory location containing
the stored waveform

DISPLAY
Mode VIEW

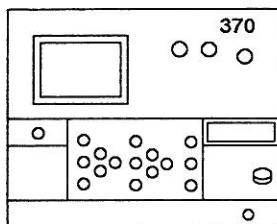
- c. **EXAMINE** the CRT for a continuous increase in brightness of the viewed trace as the VIEW INTENSITY control is turned from full counterclockwise to full clockwise.

B4. Examining NON STORE/STORE INTENSITY Operation

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*

B4 SETUP CONDITIONS



370 settings:
Initialize the 370.

6065-407

Examining STORE

- EXAMINE** the CRT for a continuous increase in spot brightness when the NON STORE/STORE INTENSITY control is turned from fully counterclockwise to fully clockwise.

Examining NON STORE

- Change the following 370 setting:

DISPLAY
Mode NON STORE

- EXAMINE** the CRT for a continuous increase in spot brightness as the NON STORE/STORE INTENSITY control is turned from fully counterclockwise to fully clockwise.

- Change the following 370 setting:

INTENSITY
NON STORE/STORE Normal viewing level



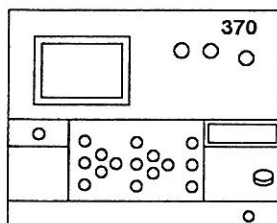
B3. Examining Astigmatism

Adjusting Astig (A18R420)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R420; *they are not specifications.*

B3 SETUP CONDITIONS



370 settings:
Initialize the 370.

6065-406

Examining Astigmatism

- a. Change the following 370 settings:

COLLECTOR SUPPLY

POLARITY AC

A spot will appear at the center of the CRT.

FOCUS INTENSITY Full counterclockwise

NON-STORE/STORE Largest possible
displayed spot

- b. **EXAMINE** the spot for a circular shape.

If the spot is not circular, the following adjustment may be necessary.

Adjusting Astigmatism

NOTE

See **Test Point and Adjustment Locations 3**
for the location of the adjustment associated
with this step.

- c. **ADJUST** Astig adjustment R420 on the A18 CRT Output Board for a circular spot shape.

Removing the Setup

- d. Change the following 370 settings:

FOCUS INTENSITY Clockwise for
smallest possible spot

NON-STORE/STORE Normal viewing



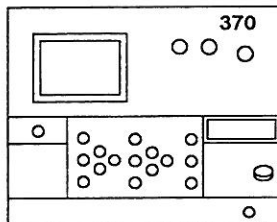
B2. Examining CRT Bias

Adjusting CRT Bias (A20R210)

IMPORTANT:

The characteristics examined in this step are provided as examples of typical instrument operation to aid in the adjustment of R210; *they are not specifications.*

B2 SETUP CONDITIONS



370 settings:

Initialize the 370; then set the following controls as indicated.

Test Equipment settings:

DISPLAY
Mode NON-STORE
COLLECTOR SUPPLY
POLARITY AC

6065-405

Examining CRT Bias

- Change the following 370 settings:

INTENSITY

NON-STORE/STORE Full counterclockwise
VIEW Full counterclockwise
READOUT/CURSOR Full counterclockwise
GRAT ILLUM Full counterclockwise

- EXAMINE** the CRT for the displayed spot to be barely visible.

If the spot is bright or not visible at all, the following adjustment may be necessary.

Adjusting CRT Bias

NOTE

R210 can be adjusted through the access hole in the high voltage shield.

- ADJUST** Grid Bias adjustment R210 on the A20 HV Regulator Board until the CRT spot is barely visible.

B. CRT

- d. Change the following 370 setting:

POWER ON

- e. **EXAMINE** the digital multimeter for a reading of -2352 V to -2448 V.

Disconnecting the Meter

- f. Change the following 370 setting:

POWER OFF

WARNING

To avoid electric shock hazard, be certain the 370 POWER switch is set to OFF before disconnecting the digital multimeter lead.

- g. Disconnect the high voltage digital multimeter probe and negative lead from the 370.

Replacing the High Voltage Shield

WARNING

To avoid electric shock hazard, be certain the 370 POWER switch is set to OFF before replacing the high voltage shield.

- h. Replace the high voltage shield.

- i. Change the following 370 setting:

POWER ON

B. CRT

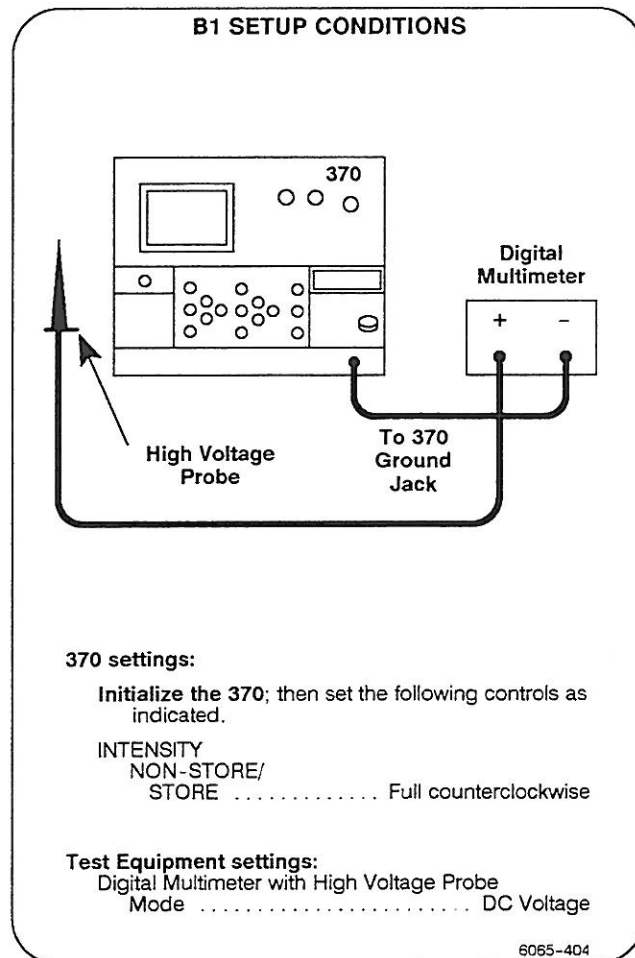
Equipment Required (see Table 4-3):

- Digital Multimeter
- High Voltage Probe for Digital Multimeter
- Pozidrive Screwdriver with #1 Point

B1. Examining the -2400 V Cathode Supply

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*



Removing the High Voltage Shield

WARNING

To avoid electric shock hazard, be certain the 370 POWER switch is set to OFF before removing or replacing the high voltage shield and connecting the digital multimeter to the 370. Be certain that the digital multimeter ground lead is connected to the 370 ground terminal.

- a. Change the following 370 setting:

POWER OFF

- b. Use a #1 Pozidrive screwdriver to remove the high voltage shield from the left side of the 370. (There are three shields on the left side; remove the center shield.)

Measuring the Cathode Voltage

NOTE

See Test Point and Adjustment Locations 3 in Section 7 for the location of the test point used in this step.

- c. Connect the negative digital multimeter lead to chassis ground, and the high voltage probe to TP400 on the A20 HV Regulator Board.

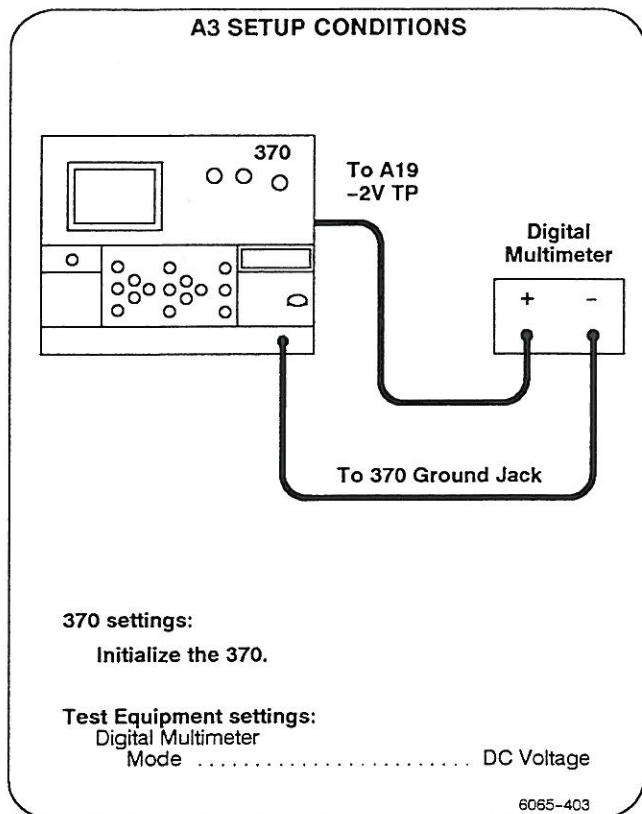


A3. Checking the -2 V Reference

Adjusting the -2 V Reference (A19R516)

Specification:

- The -2 V Reference is accurate to within 0.001 V.



NOTE

See Test Point and Adjustment Locations 3 in Section 7 for the location of the test point and adjustment for this step.

Checking the -2 V Reference

- CHECK** for a digital multimeter reading of -1.999 V to -2.001 V.

If not within these limits, perform part b.

PERFORMANCE CHECK GOTO Fig. 4-58

Adjusting the -2 V Reference

- ADJUST** -2 VADJ on the A19 LV Supply Board, for a digital multimeter reading of -2.000 V.

Removing the Setup

- Disconnect the digital multimeter leads from the 370.

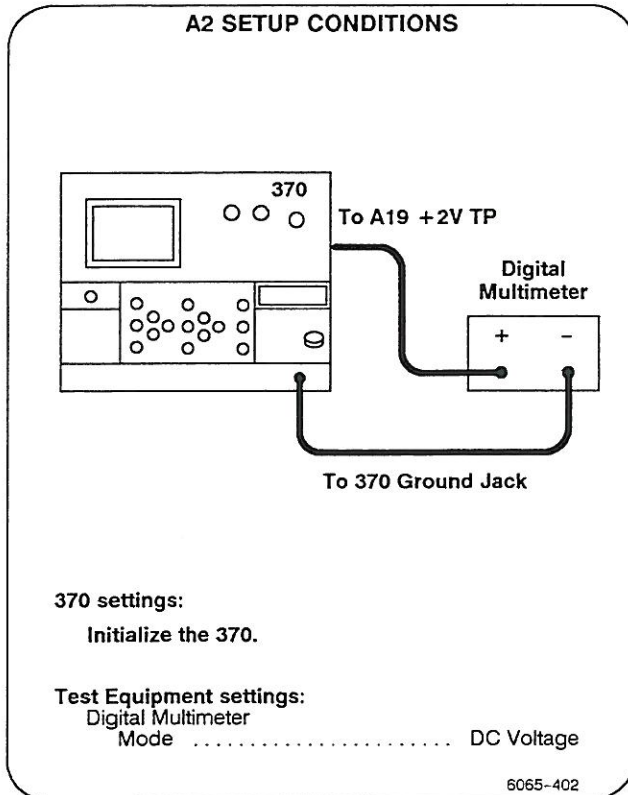


A2. Checking the +2 V Reference

Adjusting the +2 V Reference (A19R500)

Specification:

- The +2 V Reference is accurate to within 0.001 V.



NOTE

See Test Point and Adjustment Locations 3 in Section 7 for the location of the test point and adjustment for this step. (RIGHT SIDE PANEL)

Checking the +2 V Reference

- CHECK** for a digital multimeter reading of +1.999 V to +2.001 V.

If not within these limits, the following adjustment is necessary.

Adjusting the +2 V Reference

- ADJUST** +2 VADJ on the A19 LV Supply Board, for a digital multimeter reading of +2.000 V.

Removing the Setup

- Disconnect the positive lead of the digital multimeter from the test point.

Table 4-4
Voltage Regulation and Ripple

Voltage	Test Point	Deviation Limits (V)	Ripple (mV)
+5 V	+5	+4.80 to +5.20	≤ 200
-12 V	-12	-11.4 to -12.6	≤ 100
+12 V	+12	+11.4 to +12.6	≤ 100
-6.5 V	-6.5	-6.37 to -6.67	≤ 50
+6.5 V	+6.5	+6.37 to +6.67	≤ 50

A. POWER SUPPLY

Equipment Required (see Table 4-3):

- Test Oscilloscope
- Digital Multimeter

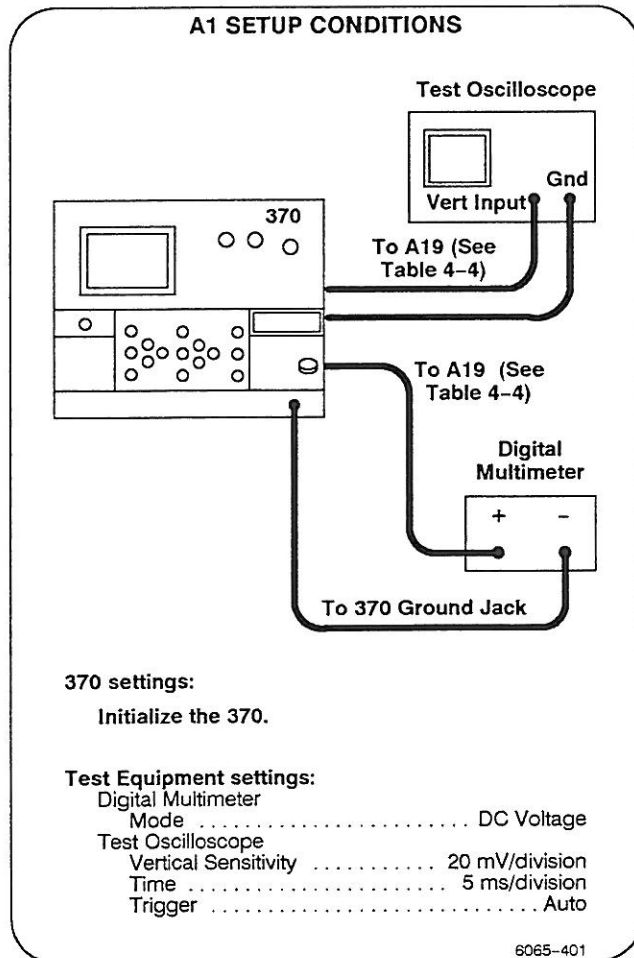
NOTE

See Test Point and Adjustment Locations 3 in Section 7 for the location of test points for this step.

A1. Examining Voltage Deviation and Ripple

IMPORTANT:

The characteristics examined in this step are examples of typical instrument operation; *they are not specifications.*



Examining Voltage Deviation

- Connect the digital multimeter to the +5 test point on the A19 LV Supply board.
- EXAMINE** the digital multimeter reading at the +5 test point and each of the other power supply test points listed in Table 4-4 for voltage levels within the given deviation.

Examining Ripple

- Disconnect the digital multimeter and connect the test oscilloscope to the +5 test point.
- EXAMINE** the test oscilloscope display at each of the test points listed in Table 4-4 for ripple displays within the given deviation.

Removing the Setup

- Disconnect the test oscilloscope.

Power-Up Sequence

The performance of this instrument can be checked at any ambient temperature from +10° C to +40° C unless otherwise stated. Adjustments must be made at an ambient temperature from +15° C to +25° C for the specified tolerances to apply.

WARNING

Adjustment of the 370 should only be performed by a qualified service technician.

1. Check that the 370 has been set for the proper power source, and that a suitable power cord has been attached.
2. Remove the 370 cabinet panels to gain access to internal adjustments and test points.

For instructions on cabinet panel removal, refer to the description under the heading COMPONENT REMOVAL AND REPLACEMENT in Section 3 of this manual.

WARNING

Use extreme care when operating the 370 with the covers removed, due to the line voltage, high voltage, and high current levels present.

3. Connect the 370 to a suitable power source.
4. Press the POWER button and allow at least 20 minutes warmup before proceeding.

Initializing the 370

The following procedure saves the power-up default 370 settings for use when the procedure calls for you to "Initialize the 370."

1. Insert a Bubble Cassette (write-protect on enable position) into the 370 Bubble Cassette receptacle until a click is heard.
2. Press the SETUP SAVE button to store the default settings in memory location 1.

These default settings plus the manual initialization settings are used as starting settings throughout this procedure, except as noted otherwise.

3. Now, to Initialize the 370:

- a. Set the COLLECTOR SUPPLY HIGH-LOW switch to LOW.
- b. Press the SETUP RECALL button (with the MEMORY Index set to location 1).
- c. Make the additional manual settings:

LEFT-RIGHT STANDBY STANDBY
Protective Cover CLOSED

The initial manual settings are as follows:

HIGH-LOW SWITCH LOW
LEFT-RIGHT-STANDBY STANDBY
Protective Cover CLOSED

The power-up default settings are as follows:

DISPLAY
MODE STORE
VERTICAL 2 A COLLECTOR
HORIZONTAL 2 V COLLECTOR
INVERT OFF
MAG OFF
OFFSET OFF
ACQUIRE NORM
STEP GENERATOR
STEP/OFFSET AMPLITUDE 50 nA
NUMBER OF STEPS 5
OFFSET 0.0 nA
POLARITY +
STEP MULTI .1X OFF
LIMIT 20 mA
PULSE OFF
COLLECTOR SUPPLY
VARIABLE 0%
MAX PEAK VOLTS 16
MAX PEAK POWER WATTS 0.08
POLARITY + 
CONFIGURATION BASE STEP GEN
MEASUREMENT REPEAT
AUX SUPPLY 0.00 V

Table 4-3 (Cont.)
Test Equipment

Item	Minimum Specification	Purpose	Example of Applicable Test Equipment
12. Transistor	2N3904	Used as DUT for acquisition of curve data	Tektronix Part No. 151-0190-00
13. Plotter	8-bit parallel interface; HPGL support	Used to check the plotter interface	Tektronix HC100 Centronix cable: Option 1
14. Controller	GPIB Support	Used to check the GPIB	a. Tektronix 4041 b. Tektronix 4050 series c. Hewlett-Packard 9836A
15. Bubble Memory Cassette		Used to store displayed curve data and instrument settings	Tektronix Part No. 020-1310-00
16. Test Adapter		Used to hold the DUT	Tektronix A1007
17. Extender Cables		Operate instrument with drawer unit detached.	Tektronix Part No. 067-1286-00.

Table 4-3
Test Equipment

Item	Minimum Specification	Purpose	Example of Applicable Test Equipment
1. Test Oscilloscope	Bandwidth, DC to 150 MHz; deflection factor, 2 mV to 5 V/DIV (with 10X, 10 M Ω probe)	Used to check Ripple.	a. Tektronix 2445A 150 MHz Oscilloscope with P6131 Probe. b. Refer to Tektronix Products catalog for compatible equipment.
2. DC Voltage Source	Voltage range: 500.0 mV to 1000 V; Accuracy: 0.1 mV; Resolution: 0.1 mV	Supplies a reference voltage to the 370.	Fluke 5101B
3. DC Current Source	Current range: 10.00 μ A to 1.999 A; Accuracy: 0.1%	Supplies a reference current to the 370	Fluke 5101B
4. Digital Multimeter	DCV: 1000 V, 4.5 digit; Accuracy: 0.05%; Resolution: 0.1 mV; Input imp: > 10 M Ω (100 mV, 10 V range); DCA: 2 A; Accuracy: 0.1%; Resolution 0.1 nA; OHM: 25 M Ω ; Accuracy: 0.05%; Resolution: 0.01 Ω	Used throughout the Checks and Adjustments to measure voltage, current, and resistance	a. Fluke 8505A and Tektronix DM501A (for 2A measurement only) b. Keithley 195A W/OP 1950
5. Tool, Alignment	Combination hex wrench and screwdriver tips for electronics use	Used to perform internal adjustments	Tektronix Part No. 003-0489-00
6. Banana Plugs	Banana plug with cap	Used to hold resistors	Tektronix Part No. 134-0016-01
7. Screw Driver	POZIDRIV; Length: 8-1/2 inch; Point Size #1, #2	Used to remove Panels and High Voltage Shield Cover	Tektronix Part No. 003-0293-00
8. Patch Cord	Banana Plug-Jack to Banana Plug-Jack	Used throughout the procedure	Tektronix Part No. 012-0031-00 (Black) 012-0039-00 (Red)
9. High Voltage Probe	Voltage range: 0 - 3 kV (DC, AC); Accuracy: $\pm 1\%$	Used to examine -2400 V.	Fluke 80K-6
10. Test lead		Used throughout the procedure	Fluke Y8131
11. Resistors	25 M Ω , 0.1%, 1/2 W; 2.5 M Ω , 0.1%, 1/2 W; 250 k Ω , 0.1%, 1/2 W; 1 M Ω , 5%, 1/4 W; 10 M Ω , 5%, 1/4 W; 100 k Ω , 0.1%, 1/8 W; 10 k Ω , 0.1%, 1/8 W; 100 Ω , 0.1%, 1/8 W; 1 Ω , 0.1%, 3W; 0.25 Ω , 0.1%, 4W	To check: 1) Emitter accuracy; 2) Displayed horizontal noise; 3) Base input impedance 4) Step Generator Ripple	Tektronix Part No. 067-1337-00.

Tektronix Field Service

Tektronix Field Service Centers and the Factory Service Center provide instrument repair and adjustment services. Contact your Tektronix Field Office or representative for further information.

Test Equipment

The test equipment listed in Table 4-3 is required for a complete Performance Check and Adjustment of the instrument. However, complete checking or adjusting may not always be necessary or desirable. You may be satisfied with checking only selected characteristics, thereby reducing the amount of test equipment actually required.

The specifications for test equipment listed in Table 4-3 are the minimum required to check performance requirements of the 370. Detailed operating instructions for test equipment are not given in these procedures; refer to the test equipment instruction manual if more information is needed.

Special Fixtures

Special fixtures are used where they facilitate instrument adjustment. These fixtures are available from Tektronix, Inc. Order by part number from Tektronix Field Offices or representatives.

Test Equipment Alternatives

The checks and adjustment procedures are based on the first item of equipment given as an example. When other equipment is substituted, control settings or setups may have to be altered. If the exact item of equipment given as an example in Table 4-3 is not available, first check the Minimum Specifications column carefully to see if any other equipment might suffice. Then check the Purpose column to see where this item is used. If used for a performance check or adjustment that is of little or no importance for your measurement requirements, the item and corresponding step(s) can be deleted.

F. STEP GENERATOR	Page
F1. Adjusting Step Generator Zero and Current Zero	4-54
F2. Checking Voltage Mode Amplitude Range, Ripple and Noise	4-56
F3. Adjusting Bias (A7R467 for serial number B300200 and up)	4-57
F4. Checking Current Mode Amplitude Range, Ripple and Noise	4-58
F5. Checking Incremental Accuracy in Voltage Mode and Number of Steps	4-60
F6. Checking Step Multi .1X Accuracy	4-62
F7. Checking STEP GENERATOR Current Mode Accuracy, Offset Control Range, and Offset Control Resolution	4-64
F8. Checking Maximum Voltage Output and STEP AMPLITUDE Control Resolution	4-68
F9. Checking Maximum Current Output ...	4-70
F10. Checking OFFSET Polarity	4-73
F11. Checking Maximum Opposing OFFSET Voltage and Absolute Accuracy in Voltage Mode	4-74
F12. Checking Maximum Current in Voltage Mode	4-76
F13. Checking the Current Limiter	4-78
F14. Checking Maximum Opposing Volts and Maximum Voltage for Current Mode	4-79
F15. Checking Maximum Opposing OFFSET Current	4-80
F16. Examining Single Measurement Mode Operation	4-81
F17. Checking PULSE Width	4-82
F18. Checking Step Rate	4-83
F19. Examining Base Configuration Selections for Internal and External Step Generator Operation	4-84
F20. Examining Emitter Configuration Selections for Internal and External Step Generator Operation ...	4-86
 G. AUX SUPPLY	
G1. Checking Aux Supply Accuracy, Resolution, and Range	4-87
G2. Checking Aux Supply Maximum Output Current	4-89
G3. Checking Aux Supply Ripple and Noise	4-90

H. COLLECTOR SUPPLY	Page
H1. Examining Collector Supply Variable Operation	4-91
Adjusting Collector Supply Offset (A6R412)	4-91
H2. Adjusting Collector Supply Gain (A6R401)	4-93
H3. Examining the Protective Cover Interlock and Polarity Settings	4-94
H4. Checking Collector Supply Max Peak Volts Range, Accuracy, and Ripple	4-96
H5. Checking Collector Supply Short Circuit Current	4-99
H6. Checking Series Resistance	4-101
H7a. Examining Looping Compensation Adjusting 16 V and 80 V Looping Compensation (A8R504, A8R502)	4-103
H7b. Adjusting Looping Compensation—Alternate Method (A9R500, A8R504, A8R502)	4-105
H8. Examining the Limiter Indicator in Voltage Mode	4-107
H9. Examining the Limiter Indicator in Current Mode	4-108
 I. BUBBLE MEMORY	
I1. Examining Bubble Memory Operation	4-109

PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

Procedure Index

	Page		Page
A. POWER SUPPLY		C6. Checking DISPLAY MAG OFFSET	4-32
A1. Examining Voltage Deviation and Ripple	4-13	C7. Checking DISPLAY MAG X10 Accuracy	4-34
A2. Checking the +2 V Reference Adjusting the +2 V Reference (A19R500)	4-15	C8. Examining ACQ MODE Operation	4-35
A3. Checking the -2 V Reference	4-16	D. HORIZONTAL	
Adjusting the -2 V Reference (A19R516)	4-16	D1. Adjusting H Zero (A10R460)	4-36
B. CRT		D2. Checking HORIZONTAL BASE/ EMITTER Accuracy and Range in STORE DISPLAY Mode	4-37
B1. Examining the -2400 V Cathode Supply	4-17	D3. Checking COLLECTOR Voltage Accuracy and Range in STORE DISPLAY Mode	4-39
B2. Examining CRT Bias	4-19	D4. Checking Displayed Noise for NON-STORE COLLECTOR Settings	4-41
B3. Examining Astigmatism	4-20	D5. Checking Step Generator Display Accuracy	4-42
B4. Examining NON-STORE/STORE INTENSITY Operation	4-21	E. VERTICAL	
B5. Examining VIEW INTENSITY Operation	4-22	E1. Adjusting V Zero (A10R250)	4-43
B6. Examining READOUT/CURSOR INTENSITY Operation	4-23	E2. Adjusting Looping Balance (A10R238)	4-45
C. DISPLAY		E3. Adjusting Leakage Compensation (A10R270)	4-46
C1. Examining Display Offset	4-24	E4. Checking STORE Mode Emitter Current/Div Accuracy and Range	4-47
C2. Adjusting V Zero and H Zero (A3R734 and A3R724)	4-26	E5a. Checking STORE Mode COLLECTOR CURRENT/DIV Accuracy and Range	4-49
C3. Adjusting AD Gain (A3R700)	4-27	E5b. Checking STORE mode COLLECTOR CURRENT/DIV Accuracy for 500 ~ mA/div through 2 A/div (Alternate Method)	4-51
C4. Checking Orthogonality and Geometry Examining Store Position, Non-Store Gain, and D/A Gain Adjusting SX Position (A5R508), SY Position (A5R528), D/A Gain (A4R842), X Gain (A5R554), Y Gain (A5R574), Orthogonality (A5R80), Geom (A18R410)	4-28	E6. Checking Step Generator Display Accuracy and Range (Without Multiplier)	4-53
C5. Checking DISPLAY INVERT Accuracy	4-31		

Table 4-2 (Cont.)
Performance Check Summary

Characteristic	Checked	Adjusted
DIGITAL STORAGE HORIZONTAL ACQUISITION		
Collector volts		
Range	D3	
Accuracy	D3	D1
Base/Emitter Volts		
Range	D2	
Accuracy	D2	D1
Display offset		
Range	C6	
Accuracy	C6	C2, C3, C4
Display Mag X10 Accuracy	C7	
Display Invert Accuracy	C5	

CRT AND READOUT

CRT		
Geometry	C4	C4
Orthogonality	C4	C4
READOUT		
AUX SUPPLY	G1	

Table 4-2 (Cont.)
Performance Check Summary

Characteristic	Checked	Adjusted
CONNECTORS		
Aux Supply Connector		
Maximum output voltage	G1	
Maximum output current	G2	
POWER SUPPLY		
Power supply reference voltage	A2, A3	A2, A3

Table 4-2 (Cont.)
Performance Check Summary

Characteristic	Checked	Adjusted
STEP GENERATOR (CONT)		
Max Opposing Volts	F14	
Ripple plus noise	F4	
Voltage Mode		
Amplitude switch range	F2	
Max voltage	F8	
Max current	F12	
Short circuit current limiting	F12	
Max Opposing Offset Volts	F11	
Max Opposing Current	F15	
Ripple plus noise	F2	F2
Step Rates	F18	
Pulsed Steps	F17	
Steps and offset polarity	F10	
Number of Steps	F5	
AUX SUPPLY		
Range (and resolution)	G1	
Accuracy	G1	
Output current	G2	
Ripple plus noise	G3	
NON STORE VERTICAL DEFLECTION SYSTEM		
NON STORE MODE		
Maximum displayed noise or ripple	D4	
Step Generator Display		
Range	E6	
Accuracy	E6	

Table 4-2 (Cont.)
Performance Check Summary

Characteristic	Checked	Adjusted
DIGITAL STORAGE VERTICAL ACQUISITION		
Collector Current		
Range	E5a, E5b	
Accuracy	E5a, E5b	E1
Emitter Current		
Range	E4	
Accuracy	E4	
Display offset	C6	
Accuracy	C4	C4
Display Mag X10 accuracy	C7	
Display invert accuracy	C5	
NON STORE HORIZONTAL DEFLECTION SYSTEM		
Collector volts		
Displayed Noise	D4	
Base/Emitter Volts		
Displayed noise	D4	
Step Generator Display		
Accuracy	D5	

PERFORMANCE CHECK SUMMARY

Table 4-2 lists key characteristics checked in this procedure and the steps in which they are checked. Also listed are steps containing adjustment instructions which may affect a characteristic's specified performance. The specifications for characteristics listed in Table 4-2 are given at the beginning of the procedure step in which they are checked.

Table 4-2
Performance Check Summary

Characteristic	Checked	Adjusted
COLLECTOR SUPPLY		
POLARITY	Not specified; examined in H3	
+ LEAKAGE	Not specified; examined in H3	
+ DC	Not specified; examined in H3	
+ 	Not specified; examined in H3	
AC 	Not specified; examined in H3	
- 	Not specified; examined in H3	
-DC	Not specified; examined in H3	
-LEAKAGE	Not specified; examined in H3	
DC Mode Ripple	H4	
Max Peak Volts		
LOW range	H4	
HIGH range	H4	
Voltage Accuracy	H4	
Range	H4	
Max Peak Current	H5	
Minimum Series Resistance (ohms)	H6	
Maximum Series Resistance (ohms)	H6	

Table 4-2 (Cont.)
Performance Check Summary

Characteristic	Checked	Adjusted
COLLECTOR SUPPLY (CONT)		
Series Resistance Available (Ω , $\pm 5\%$ or 0.1 W)	H6	
Peak Power Watts		
LOW range (16, 80 and 400V)	H6	
HIGH range (2000V)		H2
Variable Collector 0 to 100.0% Supply	Not specified; examined in H1	H1
% Indicator (5 LEDs)	Not specified; examined in H1	
Safety Interlocks	Not specified; examined in H3	
Collector Supply Disabled (LED)	Not specified; examined in H3	
Warning Indicator	Not specified; examined in H3	
Limiter Indicator	Not specified; examined in H3	
Looping compensation	Not specified; examined in H7a	
Current limiter	H5, H9	
STEP GENERATOR		
Accuracy (Current or voltage steps including offset)		
Incremental	F5, F7	
Absolute (With .1X STEP MULT enabled)	F11, F6 F7	
Offset control range	F7	
Resolution	F7	
Current Mode		
Amplitude range	F4	
Max current	F9	
Max Voltage	F14	

USING THIS PROCEDURE

The following aids are used in this procedure:

Performance Check Summary	The Performance Check Summary lists key characteristics checked in the procedure and the procedure steps in which they are checked. It also indicates which steps contain adjustments which may affect the specified performance of characteristics.
Procedure Index	The Index lists all steps included in each procedure subsection. The beginning page number is given for each step for easy location if a portion of the procedure is performed. The steps in the Index are marked with ✓ and ⊖ symbols, which are also used in the procedure to designate specification checks and internal adjustments.
Power-Up Sequence	The Power-Up Sequence ensures that operating conditions are stable and repeatable, and must be performed before any complete or partial procedure is performed.
Initializing the 370	The 370 is initialized at the beginning of most procedure steps to prevent the carry-over of inappropriate setup conditions from previous steps. Initialization also allows each step to be performed independently if only portions of the procedure are performed.
Subsection Headings	The procedure is divided into subsections by major circuit function. For example: A. Power Supply, B. CRT, etc. Each subsection contains steps to check or adjust characteristics of that major circuit.
Step Titles and Title Bars	The title of each step begins with Checking, Adjusting, or Examining, or a combination of these words. • Checking indicates that an electrical specification is checked. • Adjusting indicates that instructions are given to make one or more internal adjustments. • Examining indicates that a functional check of the circuit is performed and that no electrical specifications are checked. Each step with instructions for checking and/or adjusting instrument characteristics has a title bar positioned over the step title. The title bar contains a ✓ and/or a ⊖ to quickly identify the purpose of the step.
Specifications	All steps that check specifications list those specifications immediately after the step title.
Setup Conditions	Each step has setup conditions enclosed in a box, which include all equipment, connections, and control settings necessary to begin the step.
Parts of Steps	Each step is composed of sequential parts with alphabetic indexing. The parts are arranged into functional groups so that, for instance, if a performance check is being performed, adjustment instructions may be skipped.

TABLE 4-1 (Cont.)
Performance Check and Adjustment Procedure Options

Task	Procedure Options
Performance Check and Adjustment	• Perform the Power-Up Sequence at the beginning of the Performance Check and Adjustment Procedure. • Perform all steps in the procedure with a ✓ or a ⊖ (or both) in the bar above the step title (see the Procedure Index at the beginning of the procedure). IMPORTANT: Steps for "Examining" characteristics only (i.e., those with no "Checking" or "Adjusting" instructions included) are not necessary for checking specifications or making adjustments.
Partial Performance Check or Adjustment	• Perform the Power-Up Sequence at the beginning of the Performance Check and Adjustment Procedure. • Perform the desired steps (e.g., A1, B3, etc.) using the SETUP CONDITIONS at the beginning of each step. IMPORTANT: Although a partial adjustment procedure can be performed, we recommend that the entire subsection procedure (e.g., A. Power Supply, F. Step Generator, etc.) be performed if any adjustments are made.
Functional Check of Front Panel Controls and Connectors	• Perform the <i>First Time Operation</i> procedure in Section 3 of the 370 Operators Manual.
Complete Functional Check	• Perform the Power-up Sequence at the beginning of the Performance Check and Adjustment Procedure. • Perform only those steps with titles beginning with "Checking" or "Examining." IMPORTANT: If a "Checking" or an "Examining" step also contains the word "Adjusting" in the title and a ⊖ in the bar above the title, ignore those parts of the step with adjustment instructions.

Before making adjustments, thoroughly clean and inspect the 370 instrument as instructed in the Maintenance section of this manual.

SECTION FOUR

PERFORMANCE CHECK AND ADJUSTMENT

The Performance Check and Adjustment Procedure:

- Checks key electrical specifications
- Provides instructions for determining whether adjustment is necessary
- Provides instructions for making all internal adjustments
- Provides optional functional check instructions

Adjustment Interval

To maintain instrument accuracy, check performance every 2000 hours of operation or annually if used infrequently.

IMPORTANT:

The Performance Check and Adjustment Procedure is a multipurpose procedure. Time can be saved by performing only those steps necessary for your application. Carefully read Table 4-1 to select the appropriate procedure option for the task to be performed.

Table 4-1
Performance Check and Adjustment Procedure Options

Task	Procedure Options
Performance Check (Checking key electrical specifications)	• Perform the Power-Up Sequence at the beginning of the Performance Check and Adjustment Procedure. • Perform those steps with titles beginning with "Checking" and identified with a ✓ in the bar above the heading (see the Procedure Index at the beginning of the procedure). IMPORTANT: If a "Checking" step also contains the word "Adjusting" in the title and a ⊖ in the bar above the title, ignore those parts of the step with adjustment instructions.
Adjustment	• Perform the Power-Up Sequence at the beginning of the Performance Check and Adjustment Procedure. • Perform only those steps with "Adjusting" in the title and a ⊖ in the bar above the title (see the Procedure Index at the beginning of the procedure). IMPORTANT: Perform all parts of these adjustment steps; most adjustments are preceded by instructions for determining whether adjustment is necessary and followed by instructions for verifying that the adjustment was correctly performed.