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).

CHANGE INFORMATION:

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

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EQUIPMENT REQUIRED

All TEKTRONIX test equipment must be calibrated to Factory Test Limits using methods specified in the applicable TEKTRONIX Factory Calibration Procedure. Other test equipment should be calibrated to its manufacturer's specifications. Exceptions to calibration procedures, which are necessary to improve the measurement capability of some test equipment, e.g. calibrated to ±0.5% accuracy at some specific setting, are noted on this Equipment Required List.

Equivalent test equipment may be used. A Test-Final Staff Engineer must approve any substitutions.

a. TEKTRONIX Instruments

1 TYPE 547 OSCILLOSCOPE
1 TYPE W PLUG-IN UNIT

b. Calibration Fixtures and Accessories

1 76TU Line Voltage Control Unit (067-0048-00)
1 TYPE 576 Calibration Fixture (067-0597-99)
1 DC Voltage Bridge (067-0543-00)
1 TYPE 576 Standard Test Fixture
1 Test Adapter (013-0099-00)
1 Test Adapter (013-0098-00)
2 50Ω BNC cables (012-0057-00)

c. Other Manufacturer's Equipment

1 20,000Ω/V Multimeter
FACTORY TEST LIMITS

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.

1. PRELIMINARY INSPECTION

b. Align CRT
   Center: ±.1div, max
   tilt: .1div, max in 10div

4. POWER SUPPLIES

a. Check voltage

<table>
<thead>
<tr>
<th>Supply</th>
<th>Max</th>
<th>Max short</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>-75V</td>
<td>Adjust</td>
<td>100mA</td>
<td>5mV</td>
</tr>
<tr>
<td>R721</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-12.5V</td>
<td>±312mV</td>
<td>100mA</td>
<td>5mV</td>
</tr>
<tr>
<td>+4.5V</td>
<td>±225mV</td>
<td>1.5A</td>
<td>20mV</td>
</tr>
<tr>
<td>+5V</td>
<td>±250mV</td>
<td>500mA</td>
<td>10mV</td>
</tr>
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<td>±312mV</td>
<td>550mA</td>
<td>5mV</td>
</tr>
<tr>
<td>+15V</td>
<td>±750mV</td>
<td>200mA</td>
<td>20mV</td>
</tr>
<tr>
<td>+100V</td>
<td>±2.5V</td>
<td>175mA</td>
<td>20mV</td>
</tr>
<tr>
<td>+225V</td>
<td>±9.0V</td>
<td>4mA</td>
<td>80mV</td>
</tr>
<tr>
<td>-4000V</td>
<td>±200V</td>
<td>0.7mA</td>
<td></td>
</tr>
</tbody>
</table>

b. Check hi line noise (see table)
c. Check lo line noise (see table)
d. Check short circuit current (see table)

6. CRT

b. Adjust Trace Rotation
   range: + & - 0.25div, min, in 5 div
d. Adjust Geometry .12 div, max, in 12 div

9. HORIZ AMP GAIN

*f. Adjust "1"s Gain ±0.25%, max
*g. Adjust "3"s Gain ±0.25%, max

10. VERT AMP GAIN

*d. Adjust "5"s Gain ±0.25%, max
*f. Adjust "1"s Gain ±0.25%, max

11. DISPLAY OFFSET

<table>
<thead>
<tr>
<th>Centerline Value</th>
<th>Max. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Adjusted to 0 div</td>
</tr>
<tr>
<td>9.5</td>
<td>0.1 div</td>
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<tr>
<td>9</td>
<td>0.1 div</td>
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<tr>
<td>8</td>
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<td>7</td>
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<td>6</td>
<td>0.2 div</td>
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<tr>
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<td>0.2 div</td>
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<td>0.2 div</td>
</tr>
<tr>
<td>1</td>
<td>0.1 div</td>
</tr>
<tr>
<td>.5</td>
<td>0.1 div</td>
</tr>
<tr>
<td>0</td>
<td>Adjusted to 0 div</td>
</tr>
</tbody>
</table>

12. POSITION

*b. Check horizontal POSITION ±2%, max
   FINE + & - 2.5 div, min.
*c. Check vertical POSITION ±2%, max
   FINE + & - 2.5 div, min

13. HORIZONTAL VOLTS/DIV

*b. Check HORIZONTAL VOLTS/DIV ±1.5%, max

14. VERTICAL CURRENT/DIV

*b. Check VERTICAL CURRENT/DIV ±1.5%, max

15. VERTICAL LEAKAGE MODE

Check LEAKAGE MODE
   1nA-5nA: ±4% ±1nA, max
   10nA-5µA: ±1.5% ±1nA, max.

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576
16. RISETIME
   b. Check vertical risetime - 2%, max, in 20μS, max.
   c. Check horizontal risetime - 2%, max, in 20μS, max.

19. STEP AMPLIFIER
   c. Adjust Inv Bal ± 25mV, max.
   *e. Check step gen accuracy ±1.5%, max.
   *f. Check .1X MULT ±1.5%, max.
   h. Check vert STEP GEN and horiz STEP GEN ±3%, max

20. OFFSET
   *c. Check OFFSET MULT ±2%, max.

21. STEP GEN AMPLITUDE
   *b. Check 10th step accuracy ± 1.5%, max.
   *c. Check hi current linearity ±1.5%, max.
   *d. Check lo current linearity ±2%, max.

22. PULSED STEPS
   b. Check 300μS width, tₚ, and tᵢ
      Width: -5%, min + 15% max.
      tᵢ: 20μS, max.
      tᵢ: 20μS, max, with l step
   c. Check 80μS width, tᵢ and tᵢ
      Width: -5% min +15%
      tᵢ: 20μS, max.
      tᵢ: 20μS, max, with l step
   *d. Check 80μS amplitude ±1.5% max.

24. CURRENT LIMIT
   b. Check 2A CURRENT LIMIT
      2A, min + 40%, max.
   c. Check 500mA CURRENT LIMIT
      500mA, min +40%, max
   d. Check 100mA CURRENT LIMIT
      100mA, min +40%, max
   e. Check 20mA CURRENT LIMIT
      20mA, min +40%, max
   f. Check opposing current
      20mA, max.
   g. Check maximum step voltage
      40V, -3V, max.
   h. Check 20V opposing voltage
      20V, -.3V, max.

25. VOLTAGE LIMIT
   c. Check maximum voltage 10V, min
   d. Check opposing voltage 3V, max

26. MAX PEAK VOLTS AND RIPPLE
   a. Check 15V range +5%, min, +25% max
   b. Check 75V range +5%, min, +25% max
   c. Check 350V range +5%, min, +25% max
   d. Check 1500V range +5%, min, +25% max
   e. Check ripple 1.5%, max

27. SERIES RESISTORS
   b. Check SERIES RESISTORS
      .3Ω: .3Ω, ±1
      1.4Ω to 6.5Ω: ±5%, max

31. DISPLAYED NOISE
   a. Check 15V displayed noise 1μA, max
      LEAKAGE mode: 1nA, max
   b. Check 75V displayed noise 1μA, max
      LEAKAGE mode: 1nA, max
   c. Check 350V displayed noise 2μA, max
      LEAKAGE mode: 2nA, max
   d. Check 1500V displayed noise 5μA, max
      LEAKAGE mode: 5nA, max
   e. Check horizontal displayed noise
      5mV, max

THE END

*Indicates measurement characteristics

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SHORT FORM PROCEDURE

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. PRELIMINARY INSPECTION
   a. Check Fuses
   b. Align CRT: Center; ±.1div, max tilt; .1div .max in 10div

2. PRESETS

3. LINE VOLTAGE SELECTOR
   a. Setup
   b. Check line voltage selector

4. POWER SUPPLIES
   a. Check Voltage

<table>
<thead>
<tr>
<th>Supply</th>
<th>Max Error</th>
<th>Max short</th>
<th>Total Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>-12.5V</td>
<td>±312mV</td>
<td>100mA</td>
<td>5mV</td>
</tr>
<tr>
<td>+4.5V</td>
<td>±225mV</td>
<td>1.5A</td>
<td>20mV</td>
</tr>
<tr>
<td>+5V</td>
<td>±250mV</td>
<td>500mA</td>
<td>10mV</td>
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<tr>
<td>+12.5V</td>
<td>±312mV</td>
<td>550mA</td>
<td>5mV</td>
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<tr>
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<td>±750mV</td>
<td>200mA</td>
<td>20mV</td>
</tr>
<tr>
<td>+100V</td>
<td>±2.5V</td>
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<td>20mV</td>
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<tr>
<td>+225V</td>
<td>±9.0V</td>
<td>4mA</td>
<td>80mV</td>
</tr>
<tr>
<td>-400V</td>
<td>±200V</td>
<td>0.7mA</td>
<td></td>
</tr>
</tbody>
</table>

   b. Check hi line noise (see table)
   c. Check lo line noise (see table)
   d. Check short circuit current (see table)

5. READOUT ILLUM AND GRATICULE ILLUM

6. CRT
   a. Adjust Astigmatism
   b. Adjust Trace Rotation
      Range: 0.25div, min, in 5 div
   c. Adjust Orthogonality
   d. Adjust Geometry .12div max, in 12 div.
   e. Check resolution

7. HORIZONTAL AMP BAL
   a. Complete setup
   b. Adjust Horizontal Center
   c. Adjust "1"s Bal
   d. Adjust "5"s Bal

8. VERT AMP BAL
   a. Adjust Vert Center
   b. Adjust "2"s Bal
   c. Adjust "1"s Bal

9. HORIZ AMP GAIN
   a. Complete setup
   b. Adjust Horiz Output Gain
   c. Adjust Horiz Mag. Gain
   d. Adjust "2"s Gain
   e. Adjust 2V Cal
   f. Adjust "1"s Gain ±0.25%, max.
   g. Adjust "5"s Gain ±0.25%, max.

10. VERT AMP GAIN
   a. Complete setup
   b. Adjust Vert Output Gain
   c. Adjust Vert Mag Gain
   d. Adjust "5"s Gain ±0.25%, max.
   e. Adjust "2"s Gain
   f. Adjust "1"s Gain ±0.25%, max.

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11. DISPLAY OFFSET

Check DISPLAY OFFSET

<table>
<thead>
<tr>
<th>Centerline Value</th>
<th>Max Error</th>
</tr>
</thead>
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<td>Adjusted to 0 div</td>
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<td>9.5</td>
<td>0.1 div</td>
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<tr>
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<td>0.1 div</td>
</tr>
<tr>
<td>0</td>
<td>Adjusted to 0 div</td>
</tr>
</tbody>
</table>

12. POSITION

a. Setup
b. Check horizontal POSITION ±2%, max
c. Check vertical POSITION ±2%, max

13. HORIZONTAL VOLTS/DIV

a. Complete setup
b. Check HORIZONTAL VOLTS/DIV ±1.5%, max

14. VERTICAL CURRENT/DIV

a. Complete setup
b. Check VERTICAL CURRENT/DIV ±1.5%, max

15. VERTICAL LEAKAGE MODE

Check LEAKAGE MODE

- lnA-5nA: ±4% ±1nA, max
- 10nA-5μA: ±1.5%, ±1nA, max

16. RISETIME

a. Complete setup
b. Check vertical risetime
   -2%, max, in 20μS, max.
c. Check horizontal risetime
   -2%, max, in 20μS, max.

17. HORIZ ATTEN COMP

a. Complete setup
b. Adjust Horiz Comp

18. STEP GEN

a. Complete setup
b. Adjust Zero Crossing
c. Adjust Phasing
d. Check Line Frequency Selector

19. STEP AMPLIFIER

a. Complete setup
b. Adjust +1 Bal and Step Zero
c. Adjust Inv Bal ±25mV, max.
d. Adjust Step Amplitude
e. Check step gen accuracy ±1.5%, max
f. Check .1X MULT ±1.5%, max.
g. Adjust Output Z
h. Check vert STEP GEN and horiz STEP GEN: ±3%, max.

20. OFFSET

a. Adjust AID
b. Adjust OPPOSE
c. Check OFFSET MULT ±2%, max.

21. STEP GEN AMPLITUDE

a. Complete setup
b. Check 10th step accuracy
   ±1.5%, max
c. Check hi current linearity
   ±1.5%, max
d. Check lo current linearity
   ±2%, max

22. PULSED STEPS

a. Setup
b. Check 300μS width, tR, and tF
   Width: -5%, min. +15%, max
   tR: 20μS, max
   tF: 20μS, max, with 1 step
c. Check 80μS width, tR, and tF
   Width: -5%, min. +15%, max
   tR: 20μS, max
   tF: 20μS, max, with 1 step
d. Check 80μS amplitude ±1.5%, max

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23. RATE
   a. Setup
   b. Check RATE

24. CURRENT LIMIT
   a. Complete setup
   b. Check 2A CURRENT LIMIT
      2A, min +40%, max
   c. Check 500mA CURRENT LIMIT
      500mA, min, +40%, max
   d. Check 100mA CURRENT LIMIT
      100mA, min, +40%, max
   e. Check 20mA CURRENT LIMIT
      20mA, min, +40%, max
   f. Check opposing current
      20mA, max
   g. Check maximum step voltage
      40V, -.3V, max
   h. Check 20V opposing voltage
      20V, -.3V, max

25. VOLTAGE LIMIT
   a. Complete setup
   b. Check SINGLE and NUMBER OF STEPS
   c. Check maximum voltage 10V, min
   d. Check opposing voltage 3V, max

26. MAX PEAK VOLTS
   a. Check 15V range
      15V: +5%, min +25%, max
   b. Check 75V range
      75V: +5%, min +25%, max
   c. Check 350V range
      350V: +5%, min, +25%, max
   d. Check 1500V range
      1500V: +5%, min, +25%, max
   e. Check ripple 1.5%, max

27. SERIES RESISTORS
   a. Setup
   b. Check SERIES RESISTORS
      3Ω: .3Ω ± .1Ω
      1.4Ω to 6.5MΩ: ±10%, max

28. READOUT
   a. Check PER VERT DIV
   b. Check PER HORIZ DIV
   c. Check PER STEP
   d. Check B or gm PER DIV

29. LOGIC
   a. Setup
   b. Check LOGIC INPUT
   c. Check LOGIC OUTPUT

30. COLLECTOR SWEEP BALANCE
   a. Setup
   b. Adjust Looping Balance
   c. Adjust 350 & 1500 Looping Compensation
   d. Adjust HF Noise Rejection
   e. Check LOOPING COMPENSATION

31. DISPLAYED NOISE
   a. Check 15V displayed noise 1μ A, max
      LEAKOUT mode: 1nA, max
   b. Check 75V displayed noise 1μ A, max
      LEAKOUT mode: 1nA, max
   c. Check 350V displayed noise 2μ A, max
      LEAKOUT mode: 2nA, max
   d. Check 1500V displayed noise 5μ A, max
      LEAKOUT mode: 5nA, max
   e. Check horizontal displayed noise
      4mV, max.

32. COLLECTOR SUPPLY RESET

THE END
1. PRELIMINARY INSPECTION
   a. Check fuses
      115V 50-60Hz---6.25A SLOW
      230V 50-60Hz---4.0A SLOW
   b. Align CRT center: t.1div, max.
      tilt: .1div max in 10div
      Align CRT to bezel cross-hair.

2. PRESETS

  Preset TYPE 576 front panel controls.

  POWER OFF
  READOUT ILLUM cw
  GRATICULE ILLUM cw
  COLLECTOR SUPPLY
    POLARITY AC
    MODE NORM
    MAX PEAK VOLTS 15
    SERIES RESISTOR 140
    VARIABLE COLLECTOR SUPPLY 0%
  INTENSITY ccw
  FOCUS ccw
  VERTICAL CURRENT/DIV 2mA
  vertical POSITION ccw
  FINE ccw
  horizontal POSITION ccw
  FINE ccw
  HORIZONTAL VOLTS/DIV .5 COLLECTOR
  DISPLAY OFFSET OFF
  CENTERLINE VALUE 5
  DISPLAY INVERT released
  STEP GENERATOR AMPLITUDE 2V
  NUMBER OF STEPS 10
  CURRENT LIMIT 2A
  OFFSET MULT cw 0.0 (1.0)
  OFFSET ZERO pressed
  STEPS pressed
  STEP FAMILY REP released
  RATE 2X pressed
  STEP MULT .1X pressed
  POLARITY INVERT released
  50Hz---60Hz (rear panel) 60Hz
2. (Con’t)

Preset internal controls

Trace Rotation  midr
Vert Output Gain  midr
Horiz Output Gain  midr

3. LINE VOLTAGE SELECTOR

a. Setup

Connect TYPE 576 to TU76. Adjust TU76 for 115V. Set TYPE 576 power to ON.

b. Check line voltage selector

Connect test scope probe to terminal 23 of the power transformer. Set line voltage selector as indicated in table and check voltage, P-P, ±1V, max.

<table>
<thead>
<tr>
<th>Mode</th>
<th>115V</th>
<th>230V</th>
</tr>
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<tbody>
<tr>
<td>HIGH</td>
<td>17</td>
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<tr>
<td>MED</td>
<td>18.5</td>
<td>9.5</td>
</tr>
<tr>
<td>LOW</td>
<td>21</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Return line voltage selector to 115V MED.

4. POWER SUPPLIES

a. Voltage

Connect DC Voltage Bridge to proper location. Adjust and check power supply voltage as in table:

<table>
<thead>
<tr>
<th>Supply</th>
<th>Location</th>
<th>Max Error</th>
<th>Max short CKT current</th>
<th>Total Noise</th>
<th>Note: Typical short CKT current</th>
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<tr>
<td>-75V</td>
<td>Pin K</td>
<td>Adjust R721</td>
<td>100mA</td>
<td>5mV</td>
<td>-75  30mA</td>
</tr>
<tr>
<td>-12.5V</td>
<td>Pin I</td>
<td>±312mV</td>
<td>100mA</td>
<td>5mV</td>
<td>-12.5 20 to 60mA</td>
</tr>
<tr>
<td>+4.5V</td>
<td>Pin U</td>
<td>±225mV</td>
<td>1.5A</td>
<td>20mV</td>
<td>+4.5 1.4A</td>
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<tr>
<td>+5V</td>
<td>Pin Q</td>
<td>±250mV</td>
<td>500mA</td>
<td>10mV</td>
<td>+5  400mA</td>
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<td>Pin F</td>
<td>±312mV</td>
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<td>Pin Z</td>
<td>±750mV</td>
<td>200mA</td>
<td>20mV</td>
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<td>+100 150mA</td>
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<td>R592</td>
<td>±9.0V</td>
<td>4mA</td>
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<td>+225 1mA</td>
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<tr>
<td>*-4000V</td>
<td>R883</td>
<td>±200V</td>
<td>0.7mA</td>
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<td>-4000 .1mA</td>
</tr>
</tbody>
</table>

*check with INTENSITY CW and CCW.

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4. (Con't)

b. Check hi line noise

Set TU76 to 126V. Connect test scope probe to proper test points and check total noise as is table in step 4a. When checking the +100V supply, rotate INTENSITY full cw and verify noise remains within limits.

c. Check lo line noise

Install Cal Fixture (067-0597-99) and readout. Preset controls.

FUNCTION
CALIBRATOR RANGE
VARIABLE
VERTICAL
DISPLAY OFFSET
MULTIPLIER
HORIZONTAL VOLTS
STEP GENERATOR
STEP GENERATOR LOADS

STEP GEN
200mV
CAL
10A (ccw)
10
.5 COLLECTOR
50μA
OFF

Set TU76 to 104V and check noise as in step 4b.

Reset TU76 to 115V.

d. Check short circuit current

Connect VOM between chassis gnd and proper test point and check max short circuit current as noted in table in step 4a.

5. READOUT ILLUM AND GRATICULE ILLUM

Check READOUT ILLUM and GRATICULE ILLUM for no abrupt changes in intensity with rotation.

6. CRT

a. Adjust Astigmatism

Increase INTENSITY for normal brightness. Adjust FOCUS and Astigmatism (R891) for a small circular spot.
CALIBRATION

6. (Con't)

b. Adjust Trace Rotation Range: 0.25div, min, in 5div

Set VARIABLE COLLECTOR SUPPLY to 20%.
Position trace to graticule center with vertical FINE position. Check
Trace Rotation (R897) for + & - .25div, min, of range at +5div grati-
cule line. See Fig. 1. Adjust R897 to align trace to graticule.

c. Adjust Orthogonality

Set CALIBRATION FIXTURE STEP GENERATOR LOADS to 1k COLLECTOR SHORT. Position
the trace to graticule center with the horizontal FINE control. Adjust
Orthogonality (R685) to align trace to graticule.

d. Adjust Geometry .12 div max, in 12div.

Set CALIBRATION FIXTURE STEP GENERATOR LOADS to OFF. Adjust Geometry (R893)
for optimum geometry over full 10div.
Set STEP GENERATOR LOADS to 1k COLLECTOR SHORT and check vertical geometry. Set
VARIABLE COLLECTOR SUPPLY to 0 and re-check FOCUS and Astigmatism. Set STEP
GENERATOR LOADS to OFF.

e. Check Resolution

Set TYPE 576 VERTICAL CURRENT/DIV to
STEP GEN, POLARITY to +NP1N and VARIABLE
COLLECTOR SUPPLY to 40%. Press REP.
Check vertical resolution over entire graticule. Lines must be clearly de-

Set VERTICAL CURRENT/DIV to 2mA and
HORIZONTAL VOLTS/DIV to STEP GEN. Set
STEP GENERATOR LOADS to 1k COLLECTOR
SHORT. Check horizontal resolution
over entire graticule. Lines must be clearly defined.

Set STEP GENERATOR LOADS to OFF.
7. HORIZONTAL AMP BAL

a. Complete Setup

MAX PEAK VOLTS 15
SERIES RESISTORS .3
VARIABLE COLLECTOR SUPPLY 0%
Polarity AC
MODE NORM
VERTICAL CURRENT/DIV .5A
CENTERLINE VALUE 5
DISPLAY OFFSET HORIZ X10
vertical POSITION center
FINE center
horizontal POSITION center
FINE center
HORIZONTAL VOLTS/DIV 2 COLLECTOR
DISPLAY INVERT released

Cal Fixture
LOGIC INPUT OFF (cw)
FUNCTION STEP GEN

b. Adjust Horiz Center

Position spot to graticule center
with horizontal FINE position. Set
DISPLAY OFFSET to HORIZ X1 and adjust
Horiz Center (R681) to return spot to
graticule center. Repeat for inter-
action.

c. Adjust "1"s Bal

Set DISPLAY OFFSET to HORIZ X10 and
HORIZONTAL VOLTS/DIV to 1 COLLECTOR.
Adjust "1"s Bal (R650) to return spot
to graticule center.

d. Adjust "5"s Bal

Set HORIZONTAL VOLTS/DIV to .5 COL-
LECTOR and adjust "5"s Bal (R645) to
return spot to graticule center.

Recheck balance at 1V COLLECTOR and
2V COLLECTOR.

Leave in 2V COLLECTOR.

8. VERT AMP BAL

a. Adjust Vert Center

Set DISPLAY OFFSET to VERT X10. Po-
sition spot to graticule center with
vertical FINE position control. Set

May 1969 576
8a. (Con't)

DISPLAY OFFSET to VERT X1 and adjust Vert Center (R581) to return spot to graticule center. Repeat for interaction.

b. Adjust "2"s Bal

Set VERTICAL CURRENT/DIV to .2A and DISPLAY OFFSET to VERT X10. Adjust "2"s Bal (R545) to return spot to graticule center.

c. Adjust "1"s Bal

Set VERTICAL CURRENT/DIV to .1A and adjust "1"s Bal (R550) to return spot to graticule center. Recheck balance at .2A and .5A. Leave switch at .5A.

9. HORIZ AMP GAIN

a. Complete Setup

TYPE 576

MAX PEAK VOLTS 15
SERIES RESISTORS .3Ω
VARIABLE COLLECTOR SUPPLY 0%
POLARITY +(NPN)
MODE NORM
VERTICAL CURRENT/DIV .5A
CENTERLINE VALUE 5
DISPLAY OFFSET OFF
vertical POSITION center
FINE center
horizontal POSITION center
FINE center
HORIZONTAL VOLTS/DIV 2 COLLECTOR
DISPLAY INVERT released

Cal Fixture
LOGIC INPUT OFF(cw)
FUNCTION STEP GEN
CAL RANGE 200mV
DISPLAY OFFSET MULT 10
9. (Con't)

b. Adjust Horiz Output Gain

Adjust Horiz Output Gain (R692) for 10div of horizontal deflection when POLARITY is changed from +(NPN) to -(PNP).

c. Adjust Horiz Mag Gain

Set POLARITY to AC and DISPLAY OFFSET to X10. Adjust Horiz Mag Gain (R673) for 10div horizontal deflection when CENTERLINE VALUE is switched from 4.5 to 5.5.

d. Adjust "2"s Gain

Set POLARITY to +(NPN) and CENTERLINE VALUE to 10. Set Cal Fixture FUNCTION to HORIZ AMP CAL. Press TYPE 576 ZERO and position spot to graticule center horizontally and -5div vertically. Release ZERO and adjust "2"s Gain (R636) to center spot horizontally.

e. Adjust 2V Cal

Press TYPE 576 CAL and adjust 2V Cal (R512) to center spot horizontally.

f. Adjust "1"s Gain ±0.25%, max

Set Cal Fixture CALIBRATOR RANGE to 100mV. Set TYPE 576 HORIZONTAL VOLTS/DIV to 1V COLLECTOR. Press ZERO and re-position spot to graticule center horizontally. Release ZERO, press CAL and adjust "1"s. Gain (R638) to center spot horizontally. Release CAL and note spot remains at horizontal graticule center, ±0.25div, max.

g. Adjust "5"s Gain ±0.25%, max

Set Cal Fixture CALIBRATOR RANGE to 50mV. Set TYPE 576 HORIZONTAL VOLTS/DIV to .5V COLLECTOR. Press ZERO and re-position spot to horizontal graticule center. Release ZERO, press CAL and adjust "5"s Gain (R641) to center spot horizontally.

Release CAL and note spot remains at horizontal graticule center, ±0.25div, max.
10. VERT AMP GAIN

a. Complete setup

TYPE 576

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX PEAK VOLTS</td>
<td>15</td>
</tr>
<tr>
<td>SERIES RESISTORS</td>
<td>.3</td>
</tr>
<tr>
<td>VARIABLE COLLECTOR SUPPLY</td>
<td>0%</td>
</tr>
<tr>
<td>POLARITY</td>
<td>+(NPN)</td>
</tr>
<tr>
<td>MODE</td>
<td>NORM</td>
</tr>
<tr>
<td>VERTICAL CURRENT/DIV</td>
<td>.5A</td>
</tr>
<tr>
<td>CENTERLINE VALUE</td>
<td>5</td>
</tr>
<tr>
<td>DISPLAY OFFSET</td>
<td>OFF</td>
</tr>
<tr>
<td>vertical POSITION</td>
<td>center</td>
</tr>
<tr>
<td>FINE</td>
<td>center</td>
</tr>
<tr>
<td>horizontal POSITION</td>
<td>center</td>
</tr>
<tr>
<td>FINE</td>
<td>center</td>
</tr>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>.5 COLLECTOR</td>
</tr>
<tr>
<td>DISPLAY INVERT</td>
<td>released</td>
</tr>
</tbody>
</table>

Cal Fixture

LOGIC INPUT                     OFF (cw)
FUNCTION                        STEP GEN
CAL RANGE                        125mV

b. Adjust Vert Output Gain

Adjust Vert Output Gain (R592) for 10 div of vertical deflection when POLARITY is switched from +(NPN) to -(PNP).
Set POLARITY to AC.

c. Adjust Vert Mag Gain

Set TYPE 576 CENTERLINE VALUE to 5 and DISPLAY OFFSET to VERT X10. Adjust Vert Mag Gain (R573) for 10 div of vertical deflection while switching DISPLAY OFFSET between 4.5 and 5.5.

d. Adjust "5"s ±0.25%, max

Set Cal Fixture FUNCTION to VERT AMP CAL and CALIBRATOR RANGE to 125mV.
Set TYPE 576 CENTERLINE VALUE to 10 and POLARITY to +(NPN). Press ZERO and position spot to graticule center vertically and -5 div horizontally.
Release ZERO, press CAL and adjust "5"s Gain (R536) to return spot to graticule center vertically. Release CAL and note spot remains at graticule center vertically, ±0.25 div, max.
10. (Cont't)

   e. Adjust "2"s Gain

   Set Cal Fixture CALIBRATOR RANGE to 50mV. Set TYPE 576 VERTICAL CURRENT/DIV to .2A. Press ZERO and position spot to graticule center vertically. Release ZERO, press CAL and adjust "2"s Gain (R538) to return spot to vertical graticule center.

   f. Adjust "1"s Gain ±0.25%, max

   Set Cal Fixture CALIBRATOR RANGE to 25mV. Set TYPE 576 VERTICAL CURRENT/DIV to .1A. Press ZERO and position spot to vertical graticule center. Release ZERO, press CAL and adjust "1"s Gain (R541) to return spot to graticule center vertically.

   Release CAL and note spot remains at vertical graticule center, ±0.25div, max.

11. DISPLAY OFFSET

   Check DISPLAY OFFSET

   Set Cal Fixture CALIBRATOR RANGE to 50mV. Set TYPE 576 VERTICAL CURRENT/DIV to .2A. Press ZERO and position spot to graticule center vertically. Release ZERO and adjust Cal Fixture 50mV VARIABLE to return spot to graticule center.

   Rotate Cal Fixture DISPLAY OFFSET MULTIPLIER switch and TYPE 576 CENTER-LINE VALUE switch simultaneously from 10 to 0 and check spot deviation from vertical graticule center as in table:

   CENTERLINE
   VALUE    Max
           Error
          Adjusted to 0 div

       10     0.1 div
       9.5     0.1 div
       9      0.2 div
       8      0.2 div
       7      0.2 div
       6      0.2 div
       5      0.2 div
       4      0.2 div
       3      0.2 div
       2      0.2 div
       1      0.1 div
       .5     0.1 div
       0      Adjust to 0 div

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   Set 50mV VARIABLE to CAL.
12. POSITION

a. Setup

Cal Fixture
FUNCTION
STEP GEN

TYPE 576
POLARITY
DISPLAY OFFSET
CENTERLINE VALUE
AC
HORIZ X1
10

b. Check Horizontal POSITION

Note the spot positions 5div, ±0.1div, max, to the right for each cw position of the horizontal POSITION switch.
Return POSITION switch to center.
Press DISPLAY INVERT. Note the spot positions 5div, ±0.1div, max, to the left for each ccw position of the horizontal POSITION switch.

Set horizontal POSITION to center, DISPLAY OFFSET to OFF, and release DISPLAY INV. Rotate horizontal position FINE full cw and ccw. Note range + & - 2.5div, min.

c. Check Vertical POSITION

Set DISPLAY OFFSET to VERT X1. Note the spot positions 5div, ±0.1div, max, up for each cw position of the vertical POSITION switch.

Return the vertical POSITION switch to center and press DISPLAY INVERT. Note the spot positions 5div, ±0.1div, max, down for each ccw position of the vertical POSITION switch.

Set vertical POSITION to center, DISPLAY OFFSET to OFF, and release DISPLAY INVERT. Rotate vertical FINE full cw and ccw. Note range + & -2.5div, min.
13. HORIZONTAL VOLTS/DIV

a. Complete setup

Cal Fixture
FUNCTION
HORIZONTAL VOLTS
LOGIC INPUT
HORIZ ATTEN CHECK
.5 COLLECTOR
OFF (cw)

MAX PEAK VOLTS
SERIES RESISTORS
POLARITY
VARIABLE COLLECTOR SUPPLY
MODE
VERTICAL CURRENT/DIV
DISPLAY OFFSET
CENTERLINE VALUE
vertical POSITION
FINE
horizontal POSITION
FINE
HORIZONTAL VOLTS/DIV
DISPLAY INVERT

b. Check HORIZONTAL VOLTS/DIV
±1.5%, max

Press ZERO and adjust FINE position
to position spot vertically and ho-
izontally to graticule center. Release
ZERO and note spot is at graticule
center, ±1.5div, max.

Rotate HORIZONTAL VOLTS/DIV and Cal
Fixture HORIZONTAL VOLTS simultaneously
through each COLLECTOR and BASE position
and check for ±1.5div, max from ZERO
(except 200V).

Set TYPE 576 HORIZONTAL VOLTS/DIV to
200 and CENTERLINE VALUE to 5. Set
Cal Fixture HORIZONTAL VOLTS to 1K
and check deflection from ZERO, ±.75
div, max.

Set VARIABLE COLLECTOR SUPPLY to 0.

14. VERTICAL CURRENT/DIV

a. Complete setup

MAX PEAK VOLTS
SERIES RESISTORS
VARIABLE COLLECTOR SUPPLY
POLARITY
MODE
VERTICAL CURRENT/DIV

15
.3
100%
+(NPN)
DC
2A
CALIBRATION

14a. (Cont.)

DISPLAY OFFSET VERT X10
CENTERLINE VALUE 5
center
center
vertical POSITION one step cw
center
FINETop
horizontal POSITION 200
center
FINE
HORIZONTAL VOLTS/DIV released
DISPLAY INVERT pressed
300µS

Cal Fixture
LOGIC INPUT OFF (cw)
FUNCTION VERT CURRENT CHECK
VERTICAL 10A

b. Check VERTICAL CURRENT/DIV ±1.5%, max

Press ZERO and position spot horizontally and vertically to graticule center.
Set VARIABLE COLLECTOR SUPPLY to 100.
Check deflection from ZERO, ±.75div, max. Set CENTERLINE VALUE to 10.
Rotate VERTICAL CURRENT/DIV and Cal Fixture VERTICAL switches simultaneously through each position and check vertical deflection from ZERO, ±1.5div, max.

Set DISPLAY OFFSET to OFF.

15. VERTICAL LEAKAGE MODE

<table>
<thead>
<tr>
<th>DISPLAY OFFSET</th>
<th>VERTICAL CURRENT</th>
<th>Div of</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF 1nA-5nA:</td>
<td>±4%, ±1nA, max</td>
<td>±1.4</td>
<td></td>
</tr>
<tr>
<td>OFF 10nA-5µA:</td>
<td>±1.5%, ±1nA, max</td>
<td>±0.9</td>
<td></td>
</tr>
<tr>
<td>OFF 2nA</td>
<td>±0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF 5nA</td>
<td>±0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 10nA</td>
<td>±2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 20nA</td>
<td>±2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 50nA</td>
<td>±1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 .1µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 .2µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 .5µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 1µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 2µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERT X10 5µA</td>
<td>±1.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Set MODE to NORM.

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16. RISETIME

a. Complete setup

TYPE 576
POLARITY
VERTICAL CURRENT/DIV
DISPLAY OFFSET
vertical POSITION
FINE
horizontal POSITION
FINE
HORIZONTAL VOLTS/DIV
DISPLAY INVERT

Cal Fixture
LOGIC INPUT
FUNCTION

b. Check Vertical Rise time

-2%, max, in 20μs, max

Check the display is within 0.2div, vertically, of final value, within 2div, horizontally, from start of rise. See Fig. 2.

c. Check Horizontal Rise time

Set Cal Fixture FUNCTION to HORIZ RISETIME CHECK. Set TYPE 576 vertical POSITION one position cw and horizontal POSITION to center.

Check display is within 0.2div, horizontally, of final value, within 2div, vertically, from start of rise. See Fig. 3.

17. HORIZ ATTEN COMP

a. Complete setup

POLARITY
VERTICAL CURRENT/DIV
CENTERLINE VALUE
DISPLAY OFFSET
vertical POSITION
FINE
horizontal POSITION
FINE
HORIZONTAL VOLTS/DIV
DISPLAY INVERT

AC
2mA
5
HORIZ X10
center
center
center
50V
released
17a. (Con't)

Cal Fixture
LOGIC INPUT
FUNCTION
OFF (cw)
HORIZ COMPENSATION
b. Adjust Horiz Comp

Adjust Horiz Comp (C433) for top 1 div of display to be vertical. See Fig. 4.

18. STEP GEN

a. Complete setup

TYPE 576
MAX PEAK VOLTS
SERIES RESISTORS
VARIABLE COLLECTOR SUPPLY
POLARITY
MODE
VERTICAL CURRENT/DIV
DISPLAY OFFSET
vertical POSITION
FINE
horizontal POSITION
FINE
HORIZONTAL VOLTS/DIV
NUMBER OF STEPS
ZERO OFFSET
STEPS
REP
RATE
.1X

Cal Fixture
LOGIC INPUT
FUNCTION
STEP GENERATOR LOADS

b. Adjust Zero Crossing

Adjust Zero Crossing (R8) to bring crossover lines together. See Fig. 5.
18. (Cont.)

c. Adjust Phasing

Set TYPE 576
DISPLAY OFFSET HORIZ X10
CENTERLINE VALUE 5
HORIZONTAL VOLTS/DIV 2 COLLECTOR
horizontal POSITION full cw
80μS pressed
.5X pressed
Line Frequency (rear panel) 50Hz

Position the 80μS pulse on screen with horizontal FINE control.

Adjust Phasing (R24) to position the 80μS pulse 3div from the end of the trace.
18. (Con't)

d. Check Line Frequency switch

Set Line Frequency switch (rear panel) to 60Hz. Pulse should shift to the end of the trace.

19. STEP AMPLIFIER

a. Complete setup

<table>
<thead>
<tr>
<th>TYPE</th>
<th>576</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX PEAK VOLTS</td>
<td>15</td>
</tr>
<tr>
<td>VARIABLE COLLECTOR SUPPLY</td>
<td>0%</td>
</tr>
<tr>
<td>POLARITY</td>
<td>+ (NPN)</td>
</tr>
<tr>
<td>MODE</td>
<td>NORM</td>
</tr>
<tr>
<td>VERTICAL CURRENT/DIV</td>
<td>STEP GEN</td>
</tr>
<tr>
<td>DISPLAY OFFSET</td>
<td>HORIZ X10</td>
</tr>
<tr>
<td>CENTERLINE VALUE</td>
<td>0</td>
</tr>
<tr>
<td>vertical POSITION</td>
<td>center</td>
</tr>
<tr>
<td>FINE</td>
<td>center</td>
</tr>
<tr>
<td>horizontal POSITION</td>
<td>center</td>
</tr>
<tr>
<td>FINE</td>
<td>center</td>
</tr>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>.05 BASE</td>
</tr>
<tr>
<td>DISPLAY INVERT</td>
<td>released</td>
</tr>
<tr>
<td>STEP AMPLITUDE</td>
<td>.05V</td>
</tr>
<tr>
<td>ZERO OFFSET</td>
<td>pressed</td>
</tr>
<tr>
<td>STEPS</td>
<td>pressed</td>
</tr>
<tr>
<td>STEP FAMILY</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Cal Fixture

LOGIC INPUT OFF (cw)

FUNCTION STEP GEN

STEP GENERATOR LOADS 1K COLLECTOR SHORT

STEP GENERATOR 50μA

b. Adjust +1 Bal and Step Zero

Press ZERO and position spot horizontally to graticule center with FINE control. Release ZERO and adjust +1 Bal (R224) to return spot to graticule center.

Set STEP GENERATOR AMPLITUDE 2V and adjust Step Zero (R97) to return spot to graticule center. Repeat adjustment of R224 at .05V and R97 at 2V for no change. Shift: ±2div, max.

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19. (Con't)

c. Adjust Inv Bal

Set STEP GENERATOR AMPLITUDE to 2V and press STEP POLARITY INVERT. Adjust Inv Bal (R127) to return spot to horizontal graticule center, ±5div max. Release INVERT.

d. Adjust Step Amplitude

Set Cal Fixture STEP GENERATOR to 50µA.
Set TYPE 576:

<table>
<thead>
<tr>
<th>STEP GENERATOR AMPLITUDE</th>
<th>1V</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORIZONTAL V/DIV</td>
<td>1V BASE</td>
</tr>
<tr>
<td>NUMBER OF STEPS</td>
<td>10</td>
</tr>
<tr>
<td>REP</td>
<td>pressed</td>
</tr>
<tr>
<td>2X</td>
<td>pressed</td>
</tr>
</tbody>
</table>

Set test scope to trigger negative with a 5mSEC sweep and 2V vertical sensitivity. Connect a BNC cable from Cal Fixture EXTERNAL MONITOR to test scope INPUT. Adjust TYPE 576 Step Amplitude (R113) for 5div of vertical deflection on test scope (1V/Step).

Change test scope sensitivity to 50mV/div and INPUT ATTEN to R=∞. Position zero step to test scope graticule center. Set COMPARISON VOLTAGE to 10.0 and VC RANGE to +11.
Adjust TYPE 576 Step Amplitude (R113) to set 10th step at test scope graticule center.

e. Check Step Gen Accuracy

Rotate COMPARISON VOLTAGE from 0 to 10 and note deviation from each step from test scope graticule center. See table.

<table>
<thead>
<tr>
<th>COMPARISON VOLTAGE</th>
<th>Max Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>±0.3div</td>
</tr>
<tr>
<td>2</td>
<td>±0.6div</td>
</tr>
<tr>
<td>3</td>
<td>±0.9div</td>
</tr>
<tr>
<td>4</td>
<td>±1.2div</td>
</tr>
<tr>
<td>5</td>
<td>±1.5div</td>
</tr>
<tr>
<td>6</td>
<td>±2div</td>
</tr>
<tr>
<td>7</td>
<td>±2div</td>
</tr>
<tr>
<td>8</td>
<td>±2div</td>
</tr>
<tr>
<td>9</td>
<td>±1div</td>
</tr>
</tbody>
</table>
Check each step to be within 1div of the adjacent steps.

f. Check .1X (STEP MULT)
Set test scope sensitivity for 5mV/cm and VC RANGE to +1.1. Press TYPE 576 1X MULT. Rotate test scope COMPARISON VOLTAGE from 0 to 10 and note deviation of each step from test scope graticule center. See step 19e table.

g. Adjust Output Z
Set TYPE 576.

<table>
<thead>
<tr>
<th>Step AMPLITUDE</th>
<th>50μA</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1X</td>
<td>released</td>
</tr>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>.05 BASE</td>
</tr>
<tr>
<td>vertical POSITION</td>
<td>1 step ccw (from center)</td>
</tr>
<tr>
<td>CENTERLINE VALUE</td>
<td>10</td>
</tr>
<tr>
<td>DISPLAY OFFSET</td>
<td>HORIZ X1</td>
</tr>
</tbody>
</table>

Position top spot to graticule center with FINE position controls. Set DISPLAY OFFSET to HORIZ X10 and reposition spot to graticule center with horizontal FINE.

Switch Cal Fixture STEP GENERATOR LOADS between 1k COLLECTOR SHORT and 1k +18k and adjust Output Z (R243) for no spot shift.

Set Cal Fixture STEP GENERATOR LOADS to 1k COLLECTOR SHORT.

h. Check vert STEP GEN and horiz STEP GEN ±3% max
Set TYPE 576
DISPLAY OFFSET OFF
vertical POSITION center
HORIZONTAL VOLTS/DIV 200V

Check the vertical deflection: 10 div, ± .3div, max.

Set HORIZONTAL VOLTS/DIV to STEP GEN.
Check the horizontal deflection: 10div, ± .3div, max.
20. OFFSET

a. Adjust Aid

Set the TYPE 576:
vertical POSITION  center
DISPLAY OFFSET  HORIZ X1
HORIZONTAL VOLTS/DIV  STEP GEN

Position the right hand spot to horizontal graticule center with the FINE control.

Press AID and adjust Aid (R86) to position the left hand spot at graticule center. See note.

Set DISPLAY OFFSET to HORIZ X10. Adjust R86 for no horizontal spot shift while alternately pressing AID and ZERO. Press ZERO. 576

a. Be sure OFFSET MULT is set to exactly 10.0.
CALIBRATION

20. (Con't)

b. Adjust Oppose

Set TYPE 576 CENTERLINE VALUE to 0 and DISPLAY OFFSET to HORIZ X1.

Position the left hand spot to horizontal graticule center with the FINE control.

Set DISPLAY OFFSET to HORIZ X10.

Adjust R85 for no horizontal spot shift while alternately pressing ZERO and OPPOSE.

c. Check OFFSET MULT ±2%, max

Set the test scope sensitivity for 50mV and VC Range to +11.

Set TYPE 576.

STEP AMPLITUDE 1V
STEP FAMILY OFF
AID pressed

Position test scope trace to graticule center with TYPE 'W' POSITION. Rotate test scope COMPARISON VOLTAGE switch one step at a time, from 10 to 1, and return the trace to test scope graticule center with the TYPE 576 OFFSET MULT. Note the OFFSET MULT reading matches the test scope COMPARISON VOLTAGE reading, ±2 minor divisions, max.

21. STEP GENERATOR AMPLITUDE

a. Complete setup

TYPE 576

POLARITY + (NPN)
MODE NORM
OFFSET MULT 10.0 (cw)
OFFSET AID pressed
STEPS pressed
STEP FAMILY OFF
STEP AMPLITUDE 2V

Cal Fixture
LOGIC INPUT OFF (cw)
FUNCTION STEP GEN
STEP GENERATOR LOADS EXT ONLY
STEP GENERATOR 2V

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21a. (Con't)

Test Scope
VC RANGE 0
COMPARISON VOLTAGE 10.0
A INPUT GND
INPUT ATTEN R= \infty
MILLIVOLTS/CM 50

b. Check 10th step accuracy \( \pm 1.5\% \), max

Position test scope trace to graticule center with the POSITION control.
Set "A" INPUT to DC and VC RANGE to +11.

Rotate TYPE 576 STEP AMPLITUDE and
Cal Fixture SETUP GENERATOR simultaneously.
step by step, from 2V to 200mA. The test scope trace should be at graticule center, \( \pm 3 \text{div} \), max.

c. For 5 and below, recheck test scope for drift by setting VC RANGE to 0 and A INPUT to GND.

c. Check hi current linearity \( \pm 1.5\% \), max

Set test scope COMPARISON VOLTAGE and
TYPE 576 OFFSET MULT as in table and check error:

<table>
<thead>
<tr>
<th>OFFSET MULT (10)</th>
<th>COMPARISON VOLTAGE</th>
<th>max error</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>10</td>
<td>( \pm 3 \text{div} )</td>
</tr>
<tr>
<td>9.00</td>
<td>9</td>
<td>( \pm 2.7 \text{div} )</td>
</tr>
<tr>
<td>8.00</td>
<td>8</td>
<td>( \pm 2.4 \text{div} )</td>
</tr>
<tr>
<td>7.00</td>
<td>7</td>
<td>( \pm 2.1 \text{div} )</td>
</tr>
<tr>
<td>6.00</td>
<td>6</td>
<td>( \pm 1.8 \text{div} )</td>
</tr>
<tr>
<td>5.00 (see note)</td>
<td>5</td>
<td>( \pm 1.5 \text{div} )</td>
</tr>
<tr>
<td>4.00</td>
<td>4</td>
<td>( \pm 1.2 \text{div} )</td>
</tr>
<tr>
<td>3.00</td>
<td>3</td>
<td>( \pm 0.9 \text{div} )</td>
</tr>
<tr>
<td>2.00</td>
<td>2</td>
<td>( \pm 0.6 \text{div} )</td>
</tr>
<tr>
<td>1.00</td>
<td>1</td>
<td>( \pm 0.3 \text{div} )</td>
</tr>
</tbody>
</table>

Check the trace is within 1div of adjacent positions for each position of the COMPARISON VOLTAGE switch.

d. Check lo current linearity \( \pm 2\% \), max

Set Cal Fixture STEP GENERATOR and
TYPE 576 AMPLITUDE to .05\mu A. Repeat step 21c rotating dials from 1 to 0.00 (10).
22. PULSED STEPS

a. Setup

Set Cal Fixture STEP GENERATOR LOADS to 1k COLLECTOR SHORT.

Set TYPE 576

STEP AMPLITUDE .2mA
ZERO pressed
REP pressed
300μS pressed
POLARITY INVERT pressed
NUMBER OF STEPS 1
RATE NORM

Set test scope VC RANGE to 0.

b. Check 300μS width t_p, and t_f
Width: -5%, min, +15%, max
  t_p: 20μS, max
  t_f: 20μS, max, with 1 step

Set test scope TIME/DIV to 50μSEC.
Check pulse width at 50% point, 5.7
div, min, 7div, max. Check risetime,
20μS, max. Check falltime, 20μS, max.

Set POLARITY to AC and note the falltime
increases (approximately doubles).

Set POLARITY to +NPN.

c. Check 80μS width, t_p, and t_f
Width: -5% min, +15% max.
  t_p: 20μS, max, with 1 step
  t_f: 20μS, max

Press TYPE 576 80μS. Check falltime,
20μS, max. Check risetime, 20μS, max.
Set test scope TIME/DIV to 10μSEC.
Check pulse width, 7.6 div, min, 9.2
div, max.

d. Check 80μS amplitude

Set test scope TIME/DIV to 10μSEC,
A INPUT sw to GND and position trace
to graticule center. Set A INPUT switch
to DC and VC RANGE to +11.

Set Cal Fixture STEP GENERATOR to 200mA
and STEP GENERATOR LOADS to STEP GEN.

Set TYPE 576
STEP AMPLITUDE 200mA
POLARITY INVERT released
NUMBER OF STEPS 10

May 1969 576
22d. (Con't)

Set test scope COMPARISON VOLTAGE as in table and notes error.

<table>
<thead>
<tr>
<th>COMPARISON VOLTAGE</th>
<th>max error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>±0.3 div</td>
</tr>
<tr>
<td>2</td>
<td>±0.6 div</td>
</tr>
<tr>
<td>3</td>
<td>±0.9 div</td>
</tr>
<tr>
<td>4</td>
<td>±1.2 div</td>
</tr>
<tr>
<td>5</td>
<td>±1.5 div</td>
</tr>
<tr>
<td>6</td>
<td>±1.8 div</td>
</tr>
<tr>
<td>7</td>
<td>±2.1 div</td>
</tr>
<tr>
<td>8</td>
<td>±2.4 div</td>
</tr>
<tr>
<td>9</td>
<td>±2.7 div</td>
</tr>
<tr>
<td>10</td>
<td>±3.0 div</td>
</tr>
</tbody>
</table>

23. RATE

a. Setup

Set test scope VC RANGE to 0, INPUT ATTEN to 100, and TIME/DIV to 2mSEC.

Press TYPE 576 STEPS and 2X RATE.

b. Check RATE

Check time of one step on test scope display to be ≈4mS. Press NORM. Check time of one step to be ≈8mS.

Press .5X. Check time of one step to be ≈16mS.

Press 2X and .5X. Check time of one step to be ≈8mS.

24. CURRENT LIMIT

a. Complete setup

TYPE 576
POLARITY + (NPN)
MODE NORM
VERTICAL CURRENT/DIV 2A
DISPLAY OFFSET OFF
vertical POSITION center
FINE center
horizontal POSITION center
FINE released
DISPLAYINVERT .05 BASE
HORIZONTAL VOLTS/DIV

May 1969
24a. (Con't)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF STEPS</td>
<td>10</td>
</tr>
<tr>
<td>CURRENT LIMIT</td>
<td>2A</td>
</tr>
<tr>
<td>STEP AMPLITUDE</td>
<td>.5V</td>
</tr>
<tr>
<td>ZERO OFFSET</td>
<td>pressed</td>
</tr>
<tr>
<td>STEPS</td>
<td>pressed</td>
</tr>
<tr>
<td>REP</td>
<td>released</td>
</tr>
<tr>
<td>.1X</td>
<td></td>
</tr>
</tbody>
</table>

Cal Fixture

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGIC INPUT</td>
<td>OFF (cw)</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>STEP GEN</td>
</tr>
<tr>
<td>STEP GENERATOR LOADS</td>
<td>.1Ω</td>
</tr>
<tr>
<td>STEP GENERATOR</td>
<td>200mA</td>
</tr>
</tbody>
</table>

b. Check 2A CURRENT LIMIT 2A, min, +40%, max

Press ZERO and position spot -5div vertically and -5div horizontally.
Check horizontal deflection with COLLECTOR SUPPLY, POLARITY AT +(NPN) AND -(PNP): 4div, min, 5.6div max.

c. Check 500mA CURRENT LIMIT
500mA, min, +40%, max

Set TYPE 576 HORIZONTAL VOLTS/DIV to .5 BASE and CURRENT LIMIT to 500mA.
Set Cal Fixture STEP GENERATOR LOADS to STEP GEN.

Check horizontal deflection with COLLECTOR SUPPLY POLARITY at +(NPN) and -(PNP): 5div, min, 7div, max.

d. Check 100mA CURRENT LIMIT
100mA, min, +40%, max.

Set TYPE 576 CURRENT LIMIT to 100mA.
Set Cal Fixture STEP GENERATOR to 50mA. Check horizontal deflection with COLLECTOR SUPPLY POLARITY at +(NPN) and -(PNP): 4div, min, 5.6div, max.

e. Check 20mA CURRENT LIMIT
20mA, min, +40%, max

Set TYPE 576 CURRENT LIMIT to 20mA.
Set Cal Fixture STEP GENERATOR to 10mA. Check horizontal deflection with COLLECTOR SUPPLY POLARITY at +(NPN) and -(PNP): 4div, min, 5.6div, max.

e. If 20mA CURRENT LIMIT is above limits, allow a few minutes for the transistors to cool.
24. (Con't)

f. Check opposing current
   10mA, min 20mA, max

Set COLLECTOR SUPPLY POLARITY to AC.

Press OFFSET OPPOSE and note horizontal
deflection (from ZERO DIV), 2div, min,
4div, max. Press POLARITY INVERT and note
horizontal deflection 2div, min, 4div max.

Release POLARITY INVERT.

g. Check max step voltage
   40V, -.3V, max

Set TYPE 576

STEP AMPLITUDE 2V
CURRENT LIMIT 2A
AID pressed

Set Cal Fixture STEP GENERATOR LOAD
to 40V LOAD.

Set test scope A INPUT to GND and po-
sition trace to graticule center.

Set test scope

MILLIVOLTS/CM 20
INPUT ATTN 10
COMPARISON VOLTAGE 4
VC RANGE +11
A INPUT DC

The 10th step should be at the test
scope graticule center, ±1.5div, max.
It may be necessary to adjust the
TRIGGER LEVEL and SLOPE to observe the
10th step.

Set the test scope VC RANGE to -11.
Press TYPE 576 POLARITY INVERT. The
10th step should be at test scope grat-
icule center, ±1.5div, max.

h. Check 20V opposing Voltage
   20V, -.3V, max

Press TYPE 576 OPPOSE. Set test scope
COMPARISON VOLTAGE to 2.0 and VC RANGE
to +11. The 10th step should be at
graticule center, ±1.5div, max.
25. VOLTAGE LIMIT

a. Complete setup

TYPE 576
POLARITY + (NPN)
MODE NORM
DISPLAY OFFSET OFF
vertical POSITION center
FINE center
horizontal POSITION center
FINE center
DISPLAY INVERT released
HORIZONTAL VOLTS/DIV 2V BASE
NUMBER OF STEPS 10
ZERO OFFSET pressed
STEPS pressed
REP pressed
.1X released
STEP AMPLITUDE 1mA
POLARITY INVERT released

Cal Fixture
LOGIC INPUT OFF (cw)
FUNCTION STEP GEN
STEP GENERATOR LOADS STEP GEN
STEP GENERATOR 1mA

b. Check SINGLE and NUMBER OF STEPS

Press SINGLE several times. Observe one set of dots each time the SINGLE button is pressed.

Press REP.

Rotate NUMBER OF STEPS from 10 to 1 and note the display corresponds to each position of the switch. Set NUMBER OF STEPS to 10.

c. Check maximum voltage 10V, min

Press AID. Note horizontal deflection (from ZERO DIV) 5div, min.

Set POLARITY to -(PNP). Note horizontal deflection (from ZERO DIV), 5div, min.

d. Check opposing voltage 3V, max

Set POLARITY to AC and press OFFSET OPPOSE. Note horizontal deflection (from ZERO DIV), 1.5div, max.

Press POLARITY INVERT and note horizontal deflection, 1.5div, max.
26. MAX PEAK VOLTS AND RIPPLE

a. Check 15V range 15V, +5%, min
   +25%, max

Set TYPE 576
HORIZONTAL VOLTS/DIV 5 COLLECTOR
VARIABLE COLLECTOR SUPPLY 100%
Polarity + (NPN)
SERIES RESISTOR .3Ω
Press ZERO and position spot -5div
vertically and -5div horizontally with
FINE controls. Check horizontal
deflection with POLARITY at:

+(NPN) 3.2 div, min; 3.8 div, max
-(NPN) 3.2 div, min; 3.8 div, max
AC 6.4 div, min; 7.6 div, max

b. Check 75V range 75V, +5%, min,
   +25%, max

Set MAX PEAK VOLTS to 75 and HORIZONTAL
VOLTS/DIV to 20. Check horizontal
deflection with POLARITY at:

AC 7.8 div, min; 9.4 div, max
+(NPN) 3.8 div, min; 4.7 div, max
-(NPN) 3.9 div, min; 4.7 div, max

c. Check 350V range +5%, min,
   +25%, max

Set MAX PEAK VOLTS to 350 and HORIZON-
TAL VOLTS/DIV to 100. Check horizon-
tal deflection with POLARITY at:

-(NPN) 3.7 div, min; 4.4 div, max
+(NPN) 3.7 div, min; 4.4 div, max
AC 7.4 div, min; 8.8 div, max

d. Check 1500V range +5%, min
   +25%, max

Set HORIZONTAL VOLTS/DIV to 200 and
MAX PEAK VOLTS to 1500. Check hori-
tzontal deflection with POLARITY at
+(NPN) and -(NPN), 7.9 div, min;
9.4 div, max (from ZERO).

Set POLARITY to AC and horizontal
POSITION one step ccw from center.
Check horizontal deflection (from
ZERO), 7.9 div, min; 9.4 div, max.

May 1969
26. (Cont.)

e. Check ripple 1.5%, max

Set TYPE 576
CENTERLINE VALUE 10
DISPLAY OFFSET HORIZ X10
HORIZONTAL VOLTS/DIV 100
POLARITY +(NPN)
MODE DC
horizontal POSITION center

Set the controls as in table and position the display to graticule center with the VARIABLE COLLECTOR SUPPLY control (=50-60%). Check horizontal deflection: 1.5 div, max.

<table>
<thead>
<tr>
<th>MAX PEAK VOLTS</th>
<th>HORIZONTAL VOLTS/DIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>100</td>
</tr>
<tr>
<td>350</td>
<td>20</td>
</tr>
<tr>
<td>75</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
</tr>
</tbody>
</table>

Set POLARITY to -(PNP) and check horizontal deflection; 1.5 div, max. Set POLARITY to +(NPN).

27. SERIES RESISTORS

a. Setup

TYPE 576
MODE NORM
POLARITY AC
VERTICAL CURRENT/DIV 2A
DISPLAY OFFSET OFF
HORIZONTAL VOLTS/DIV .5 COLLECTOR
VARIABLE COLLECTOR SUPPLY 10 div of horiz deflection

Cal Fixture
STEP GENERATOR LOADS 1k COLLECTOR SHORT
VERTICAL .50mA
27. (Cont.)

b. Check SERIES RESISTORS

In the 3k and 300k position readjust VARIABLE COLLECTOR SUPPLY for 10div of deflection with STEP GENERATOR LOADS OFF.

<table>
<thead>
<tr>
<th>SERIES RESISTOR</th>
<th>PEAK VOLTS</th>
<th>HORIZONTAL VOLTS/DIV</th>
<th>VERTICAL CURRENT/DIV</th>
<th>deflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>.3</td>
<td>15</td>
<td>.5</td>
<td>2A</td>
<td>6</td>
</tr>
<tr>
<td>1.4</td>
<td>15</td>
<td>.5</td>
<td>.5A</td>
<td>4.3</td>
</tr>
<tr>
<td>6.5</td>
<td>15</td>
<td>.5</td>
<td>.1A</td>
<td>6.8</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
<td>.5</td>
<td>20mA</td>
<td>7.0</td>
</tr>
<tr>
<td>140</td>
<td>15</td>
<td>.5</td>
<td>5mA</td>
<td>5.6</td>
</tr>
<tr>
<td>650</td>
<td>15</td>
<td>.5</td>
<td>1mA</td>
<td>6.8</td>
</tr>
<tr>
<td>3k</td>
<td>350</td>
<td>50</td>
<td>20mA</td>
<td>7.5</td>
</tr>
<tr>
<td>14k</td>
<td>350</td>
<td>50</td>
<td>5mA</td>
<td>6.5</td>
</tr>
<tr>
<td>65k</td>
<td>350</td>
<td>50</td>
<td>1mA</td>
<td>7.0</td>
</tr>
<tr>
<td>300k</td>
<td>1500</td>
<td>100</td>
<td>.5mA</td>
<td>6.0</td>
</tr>
<tr>
<td>1.4M</td>
<td>1500</td>
<td>100</td>
<td>.1mA</td>
<td>6.4</td>
</tr>
<tr>
<td>6.5M</td>
<td>1500</td>
<td>100</td>
<td>50uA</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Set MAX PEAK VOLTS to 15 and VARIABLE COLLECTOR SUPPLY to 0%.

28. READOUT

a. Check PER VERT DIV

Rotate the TYPE 576 VERTICAL CURRENT/DIV switch throughout its range and check the PER VERT DIV readout to coincide with the COLLECTOR value of the VERTICAL CURRENT/DIV switch.

Set DISPLAY OFFSET to VERT X10. Rotate the VERTICAL CURRENT/DIV switch throughout its range. Check the VERTICAL CURRENT/DIV COLLECTOR value is 10 times the PER VERT DIV readout.

Set VERTICAL CURRENT/DIV to STEP GEN. PER VERT DIV readout should be off.

Set MODE to LEAKAGE. Rotate the VERTICAL CURRENT/DIV switch throughout its range. Check the VERTICAL CURRENT/DIV Emitter value is 10 times the PER VERT DIV readout.

The PER VERT DIV readout should be off in the three cw positions of the VERTICAL CURRENT/DIV switch.

Set MODE to NORM.
28. (Cont'd)

b. Check PER HORIZ DIV

Set HORIZONTAL VOLTS/DIV to STEP GEN and note PER HORIZ DIV readout is off.

Rotate the HORIZONTAL VOLTS/DIV switch throughout its range and note its value coincides with the PER HORIZ DIV readout.

Set DISPLAY OFFSET to HORIZ X10. Rotate the HORIZONTAL VOLTS/DIV switch throughout its range. Check the HORIZONTAL VOLTS/DIV value is 10 times the PER HORIZ DIV readout.

Set DISPLAY OFFSET to OFF.

c. Check PER STEP

Rotate STEP AMPLITUDE throughout its range its value coincides with the PER STEP readout.

Press .1X STEP MULT. Rotate STEP AMPLITUDE throughout its range and check its value is 10 times the PER STEP readout.

d. Check B or gm PER DIV

Set TYPE 576
Vertical CURRENT/DIV 50μA
DISPLAY OFFSET VERT X10
STEP AMPLITUDE 2V
.1X STEP MULT released

B or gm PER DIV readout should be 2.5μ. Press .1X STEP MULT.

Rotate STEP AMPLITUDE fro 2V to .05V. Check gm PER DIV readout changes from 25μ to 1μ in a 25-50-100 sequence.
28d. (Con't)

Set VERTICAL CURRENT/DIV to .2A.
Rotate STEP AMPLITUDE from .05\mu A to 200mA. Check the B PER DIV is off in the .05\mu A, .1\mu A, and .2\mu A positions and changes from 400k to 1 in the remaining positions in a 4-2-1 sequence.

Set DISPLAY OFFSET to OFF. Release .1X STEP MULT.

29. LOGIC

a. Setup

<table>
<thead>
<tr>
<th>VERTICAL CURRENT/DIV</th>
<th>2mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>2V COLLECTOR</td>
</tr>
<tr>
<td>STEP AMPLITUDE</td>
<td>2mA</td>
</tr>
<tr>
<td>Logic level</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

b. Check LOGIC INPUT

Check readout as in table:

<table>
<thead>
<tr>
<th>LOGIC INPUT</th>
<th>Logic Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TRUE</td>
</tr>
<tr>
<td></td>
<td>FALSE</td>
</tr>
<tr>
<td>PER VERT DIV readout</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOGIC INPUT</th>
<th>Logic Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>off</td>
</tr>
<tr>
<td>VOLTS</td>
<td>2mV</td>
</tr>
<tr>
<td>10X</td>
<td>20mA</td>
</tr>
<tr>
<td>1X</td>
<td>1A</td>
</tr>
<tr>
<td>2X</td>
<td>2A</td>
</tr>
<tr>
<td>5X</td>
<td>5A</td>
</tr>
<tr>
<td>10^-1</td>
<td>100mA</td>
</tr>
<tr>
<td>10^-2</td>
<td>10mA</td>
</tr>
<tr>
<td>10^-3</td>
<td>1mA</td>
</tr>
<tr>
<td>10^-4</td>
<td>100\mu A</td>
</tr>
</tbody>
</table>

PER HORIZ DIV readout

<table>
<thead>
<tr>
<th>LOGIC INPUT</th>
<th>Logic Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>off</td>
</tr>
<tr>
<td>AMP</td>
<td>2A</td>
</tr>
<tr>
<td>1X</td>
<td>1V</td>
</tr>
<tr>
<td>2X</td>
<td>2V</td>
</tr>
<tr>
<td>5X</td>
<td>5V</td>
</tr>
<tr>
<td>10^1</td>
<td>10V</td>
</tr>
<tr>
<td>10^2</td>
<td>100V</td>
</tr>
<tr>
<td>10^-2(NEG 10 mV EXP)</td>
<td></td>
</tr>
</tbody>
</table>
29b. (Con't)

PER STEP readout

STEP GEN
   OFF   off   2mA

B or gm PER DIV readout

BETA OFF   off   1

Set LOGIC INPUT switch CW to OFF.

a. Check LOGIC OUTPUT

Obtain a TRUE and FALSE indication on the OUTPUT INDICATORS in each position of the LOGIC OUTPUT switch.

<table>
<thead>
<tr>
<th>LOGIC OUTPUT</th>
<th>OUTPUT INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TRUE</td>
</tr>
<tr>
<td>VERTICAL</td>
<td>CURRENT/DIV</td>
</tr>
<tr>
<td>2X</td>
<td>2A</td>
</tr>
<tr>
<td>5X</td>
<td>.5A</td>
</tr>
<tr>
<td>10^-1</td>
<td>.5A</td>
</tr>
<tr>
<td>10^-2</td>
<td>50mA</td>
</tr>
<tr>
<td>10^-4</td>
<td>.5mA</td>
</tr>
<tr>
<td>10^-3</td>
<td>MODE switch</td>
</tr>
<tr>
<td></td>
<td>LEAKAGE</td>
</tr>
<tr>
<td>HORIZONTAL</td>
<td>VOLTS/DIV COLLECTOR</td>
</tr>
<tr>
<td>2X</td>
<td>2V</td>
</tr>
<tr>
<td>5X</td>
<td>.5V</td>
</tr>
<tr>
<td>10^-1</td>
<td>.5V</td>
</tr>
<tr>
<td>10^-2</td>
<td>.05V</td>
</tr>
<tr>
<td>NEG EXP</td>
<td>.5V</td>
</tr>
<tr>
<td>STEP POLARITY</td>
<td></td>
</tr>
<tr>
<td>NEG POL</td>
<td>pressed</td>
</tr>
<tr>
<td>STEP GEN AMPLITUDE</td>
<td></td>
</tr>
<tr>
<td>2X</td>
<td>2V</td>
</tr>
<tr>
<td>5X</td>
<td>.5V</td>
</tr>
<tr>
<td>10^-1</td>
<td>.5V</td>
</tr>
<tr>
<td>10^-2</td>
<td>.05V</td>
</tr>
<tr>
<td>VOLTS</td>
<td>.05V</td>
</tr>
<tr>
<td>10^-8</td>
<td>.05μA</td>
</tr>
<tr>
<td>10^-4</td>
<td>.5μA</td>
</tr>
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</table>

POLARITY

NEG POL -(PNP) +(NPN)
29c. (Con't)

MAX PEAK VOLTS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>15V</td>
<td>15V</td>
<td>75V</td>
</tr>
<tr>
<td>75V</td>
<td>75V</td>
<td>350V</td>
</tr>
<tr>
<td>350V</td>
<td>350V</td>
<td>75V</td>
</tr>
</tbody>
</table>

30. COLLECTOR SWEEP BALANCE

a. Setup

Remove the Cal Fixture and install the standard Test Fixture. Install the HV and Collector sweep shields.

Set the TYPE 576:

- VERTICAL CURRENT/DIV: 1uA
- HORIZONTAL VOLTS/DIV: 200V
- STEP FAMILY: OFF
- POLARITY: +(NPN)
- MODE: DC
- VARIABLE COLLECTOR SUPPLY: 100%
- MAX PEAK VOLTS: 75
- DISPLAY OFFSET: VERT X10
- CENTERLINE VALUE: 0

b. Adjust Looping Balance

Close plastic cover on Standard Test Fixture to actuate relay. Adjust LOOPING COMPENSATION and Looping Balance (C301) for minimum vertical deflection.

Switch MAX PEAK VOLTS between 15 and 75 and readjust C301 for equal deflection on both ranges. Open and close the protective cover to insure the lights and relay operate.

c. Adjust 350 and 1500V Looping Comp

Set TYPE 576:

- DISPLAY OFFSET: VERT X1
- HORIZONTAL VOLTS/DIV: 200
- MAX PEAK VOLTS: 1500

Adjust Looping Compensation (C339) for minimum vertical deflection. Switch MAX PEAK VOLTS between 1500 and 350 and readjust C339 for equal deflection on both ranges.

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30. (Con't)

   d. Adjust HF Noise Rejection

   Set MAX PEAK VOLTS to 1500 and MODE to NORM.

   Adjust HF Noise Rejection (C341) for minimum deviation from a horizontal line at start of sweep. Typical adjustment is full ccw.

   e. Check LOOPING COMPENSATION

   Rotate the LOOPING COMPENSATION control 360° for each position of the MAX PEAK VOLTS switch (maintain several div of horizontal deflection with the HORIZONTAL VOLTS/DIV switch) and note the looping passes through zero.

31. DISPLAYED NOISE

   a. Check 15V displayed noise 1.0μA, max

       LEAKAGE mode: 1nA, max

   Set MAX PEAK VOLTS to 15. Set DISPLAY OFFSET to VERT X1 and check vertical deflection: 1div, max.

   Set MODE to LEAKAGE and check vertical deflection: 1div, max.

   b. Check 75V displayed noise 2μA, max

       LEAKAGE mode: .1nA, max

   Set MAX PEAK VOLTS to 75 and check vertical deflection: 1div, max.

   Set MODE to NORM and check vertical deflection: 1div, max.

   c. Check 350V displayed noise 2μA, max

       LEAKAGE mode: .2 nA, max

   Set MAX PEAK VOLTS to 350 and check vertical deflection: 2div, max.

   Set MODE to LEAKAGE and check vertical deflection: 2div, max.
31. (Con't)

d. Check 1500V displayed noise 5μA, max
   LEAKAGE mode: 5μA, max

Set MAX PEAK VOLTS to 1500 and note
vertical deflection: 5 div, max.

Set MODE to NORM. Check vertical de-
  flection: 5div, max.

e. Check horis displayed noise 4mV, max

Set TYPE 576

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX PEAK VOLTS</td>
<td>15</td>
</tr>
<tr>
<td>VARIABLE COLLECTOR SUPPLY</td>
<td>0%</td>
</tr>
<tr>
<td>DISPLAY OFFSET</td>
<td>HORIZ X10</td>
</tr>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>.05 COLLECTOR</td>
</tr>
<tr>
<td>STEPS</td>
<td>pressed</td>
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</table>

Check horizontal deflection: 0.8div, max.

32. COLLECTOR SUPPLY RESET

Set TYPE 576

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>HORIZONTAL VOLTS/DIV</td>
<td>2 COLLECTOR</td>
</tr>
<tr>
<td>VERTICAL CURRENT/DIV</td>
<td>2A</td>
</tr>
<tr>
<td>DISPLAY OFFSET</td>
<td>OFF</td>
</tr>
<tr>
<td>VARIABLE COLLECTOR SUPPLY</td>
<td>6div</td>
</tr>
<tr>
<td>SERIES RESISTOR</td>
<td>.3Ω</td>
</tr>
</tbody>
</table>

Short the right E & C terminals on the
Standard Test Fixture. Set the transistor
selector switch to RIGHT. The COLLECTOR
SUPPLY RESET should bread between 15 and
45 seconds.

The COLLECTOR SUPPLY RESET should reset
45 seconds after it breaks.

THE END