FACTORY CALIBRATION PROCEDURE

CONTENTS:

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

Equipment Required

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

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

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

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

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

This procedure is company confidential

3A74

July 1969

For all serial numbers.

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.

520-000

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 561B OSCILLOSCOPE
1	TYPE 2B67 TIME BASE PLUP-IN
1	TYPE 545B OSCILLOSCOPE
1	TYPE 1A1 VERTICAL PLUG-IN
1	TYPE 106 SQUARE-WAVE GENERATOR
1	TYPE 191 CONSTANT-AMPLITUDE SIGNAL GENERATOR

b. Calibration Fixtures and Accessories

1	P6008 10X Probe (010-0129-00)
1	P6011 1X Probe (010-0074-00)
1	Low Frequency Sine-Wave Generator (LFSWG) (067-0542-99)
1	Standard Amplitude Calibrator (SAC) (067-0502-00)
1	Line Voltage Control Unit (TU-76) (067-0048-00
1	47pF Input Normalizer (067-0541-00)
1	50Ω BNC Termination (011-0049-00)
3	50Ω BNC Coaxial Cables (012-0057-01)
1	Micro-shock Hammer (Dwg. #1283-B)
1	560-Series Plug-In Exten. (013-0034-00)
1	GR to BNC female Adapter (017-0063-00)

c. Other Manufacturer's Equipment

1	20,000Ω/VDC Multimeter

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.

5. ZENER VOLTAGE

+50 ±5 volts

6. DC BALANCE

CH 1, 2, 3, 4, DC BAL (R427): Must adjust within ±90° of the center of rotation; less than 0.2div trace shift when VAR GAIN is changed

7. POSITION RANGE

b. Position Range control (R449) within ±90° of center of rotation
All traces must be within ±1div of vertical electrical center (with vertical POSITION centered)
c. Output Circuit Balance: ±0.2div, max

8. NORM TO INVERT SHIFT

±1div, max

9. LINE VOLTAGE TRACE SHIFT

Vertical drift due to changing line voltage (105VAC to 125VAC): 0.5div or less

10. CALIB (Output amplifier gain)

b. Range: 18 to 22
c. Balance: with one side set at 20, the other must be 20 ±1.

11. GRID CURRENT

Less than 0.2div of trace shift

12. MOCROPHONICS

Ringing-type microphonics: ≤0.5div

13. ALTERNATE MODE

Must alternate at all sweep rates with 2 or more channels on

14. CHOPPED MODE

a. CHOPPED blanking signal amplitude: >35V P-P
CH 1 Trigger noise: <300mV
c. CHOPPED display periods: 2.0±0.6μS aberration: ≤0.1div

15. CH 1, 2, 3, 4, AMPLITUDE

*b. Amplifier GAIN (R436): Range at least ±20%

16. VARIABLE GAIN

Variable gain ratio: at least 2.5:1

17. EXPANSION---COMPRESSION

Expansion-compression: less than 2.5% (3A74 only)

18. VOLTS/DIV ACCURACY

*a. VOLTS/DIV accuracy: within 2% on all ranges (referenced to .02 VOLTS/DIV)
b. Effect of multi-channel operation on gain: Less than 2% change

19. INPUT COMPENSATIONS

b. Max aberrations: 2% P-P

20. TRIGGER SIGNALS

a. DC levels (R530, Composite; R521, CH 1 only): Set at 0V with trace at CRT electrical center
Drift: less than ±4V

b. Trigger Amplitudes: AC coupled ≥2.5V/div; DC coupled, ≥2.5V/div

c. Trigger risetime (10% to "point of rollup") composite ≤0.35μs; CH 1 only ≤0.7μs

21. CHANNEL ISOLATION: at least 30,000:1

22. HIGH FREQUENCY COMPENSATION

Max aberration: 2% P-P

23. CH 1, 2, 3, 4, BANDWIDTH

* b. -3dB bandwidth: ≤2Hz (AC-coupled) to ≥2MHz

24. X-Y OPERATION

Check all channels

THE END

*Indicates measurement characteristic

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

Install current modifications

2. PRESET TYPE 3A74

a. Front panel controls
b. DC BAL, GAIN ADJ, all other internal adjustments should be centered

3. RESISTANCE CHECKS

a. Check interconnecting plug resistances--- negative meter lead to gnd
b. Check protection diodes

4. SET UP

Set up equipment; allow 5 minutes for warmup

5. ZENER VOLTAGE

Check +50V ±5V (D494)

6. DC BALANCE

Adjust CH 1, 2, 3, 4 DC BAL: less than 1 minor div trace shift when setting of VAR GAIN is changed

7. POSITION RANGE

a. Locate CRT electrical center
b. Adjust Position Range (R449): all traces less than 1div from CRT electrical center with POSITION controls centered
c. Check Output balance: within 0.2div

8. NORM-INVERT SHIFT

±1div max

9. LINE-VOLTAGE TRACE DRIFT

Check vertical drift due to changing line voltage 105VAC to 125VAC: less than 0.5div

10. OUTPUT AMPLIFIER

a. Setup
b. Adjust CAL for 20:1 gain
c. Check amplifier balance: within 5%

11. CH 1, 2, 3, 4 INPUT GRID CURRENT

Check CH 1, 2, 3, 4 input grid currents: less than 0.2div trace shift

12. MICROPHONICS

Check microphonics (ringing-type): less than 0.5div

13. ALTERNATE DISPLAY

Check for alternate display with 2 or more channels

14. CHOPPED DISPLAY

a. Adjust chopped blanking signal amplitude: 35V P-P
Check CH 1 ONLY trigger noise: 300mV or less
b. Check CRT CATHODE SELECTOR switch: switching transients blanked out in CHOPPED BALNKING position

14. (Cont.)

c. Check chopped period: 1.4µs to 2.6µs
d. Check 2,3,4 channel chopped display
Check for continous trace with any single channel

15. CH 1, 2, 3, 4, AMPLITUDE

a. Setup
b. Adjust GAIN (R436)
Check GAIN range: at least + and -20%
c. Check operation of AC-DC-GND switch

16. VARIABLE GAIN

Ratio: at least 2.5:1

17. EXPANSION--COMPRESSION

Check expansion-compression: less than 2.5% (3A74 only)

18. VOLTS/DIV ACCURACY

a. Check VOLTS/DIV accuracy: within 2%
b. Check amplitude change due to multi-channel operation: less than 2%

19. INPUT COMPENSATION

a. Setup
b. Adjust LF compensation: max aberrations, 2% P-P

20. TRIGGER SIGNALS

a. Adjust DC levels: Composite, R530
CH 1 ONLY, R521
b. Check trigger amplitude (both triggers): AC-coupled, at least 2.5V/div of deflection
DC-coupled, at lease 2.5/div of deflection
c. Check trigger risetime (10% to "point of rollup"):
Composite, 0.35µsec or less
CH 1 ONLY, 0.7µsec or less

21. CHANNEL ISOLATION

Check for at least 30,000:1 rejection of intra-channel signals

22. HIGH FREQUENCY COMPENSATION

Adjust HF Peaking (L464, L474): max aberration, 2% P-P

23. CH 1, 2, 3, 4 BANDWIDTH

a. Setup
b. Check bandwidth:
$\leq$2Hz (AC-coupled) to $\geq$2MHz

24. X-Y OPERATION

THE END

1. PRELIMINARY INSPECTION

Install current modifications.

2. PRESET TYPE 3A74

Set front panel controls all channels:

POSITION	midr
VOLTS/DIV	0.2
VAR GAIN	CAL (in detent)
AC-DC-GND	DC
MODE	OFF
TRIGGER CH 1 ONLY PULL	Pushed in
CHOP ALT	ALT
DC BAL	midr
GAIN ADJ	midr

3. RESISTANCE CHECKS

a. Filament resistance:

With an ohmmeter, on 1Ω range, check resistance to ground on interconnecting plug-in. Pin 1 ≈0.5Ω and Pin 2 ≈0Ω.

a. If pins 1 and 2 are reversed it will burn up the filament cable when the TYPE 3A74 is put into the cycle racks.

b. Check protection diodes

Use the ohmmeter to check the protection diodes in the plug-in for shorts and opens.

4. SET-UP

Preset Plug-in Scope and TYPE 2B67 and TYPE 561B.

TYPE 2B67

POSITION	Centered
MODE	NORM
TIME/DIV	.1mSEC
VARIABLE TIME/DIV	CALIBRATED (full cw)
SLOPE	+
COUPLING	AC SLOW
SOURCE	INT
LEVEL	FREE RUN (all cw)
PULL 5X MAG	Pushed in

4. (Cont.)

Connect TYPE 3A74 to TYPE 561B with an extension. Turn power on and allow to warm up 5 minutes.

TYPE 561B

ALIGNMENT	Set for level trace
FOCUS, INTENSITY and ASTIGMATISM	For best trace focused with normal intensity
CALIBRATOR	OFF
SCALE ILLUM	10
CRT GND Strap	in place
CRT CATHODE SELECTRO	CHOPPED BLANKING

5. ZENER VOLTAGE +50±5V

Connect a multimeter across D494 (+50V zener) and measure the voltage drop. +50 ±5V.

6. DC BALANCE (all channels)

CH 1, 2, 3, 4, DC BAL (Front panel R427): must adjust within ±90° of the center of rotation; less than 0.2div trace shift when VAR GAIN is changed

Turn CH 1 MODE to NORM. Adjust CH 1 DC BAL for minimum trace shift when VAR GAIN control is rotated.

Excessive trace shift may be caused by DC unbalance between V423 and V433.

Return CH 1 MODE to OFF; repeat step for CH 2, 3, and 4.

7. POSITION RANGE

a. Locate vertical electrical center of the CRT

Use a small screwdriver to short together the plates (pin 6) of V464 and V474. Note the vertical position of the trace and then remove the short circuit. (A grease pencil may be used to mark the electrical center position on the graticule.)

a. Approximately +170V exists at the plates of V464 and V474.

7. (Cont.)

b. Adjust Position Range (R449): all traces less than 1 division from vertical electrical center

Set all AC-DC-GND switches to GND. Set all POSITION controls to midr and all MODE switches to NORM.

b. Be careful that the POSITION control does not move when the MODE switch is rotated.

Adjust Position Range R449 so that all four traces are within 1 division of the vertical electrical center. R449 must adjust within 90° of the center of rotation.

c. Check Output Circuit Balance: 0.2div max

Set all MODE switches to OFF and check for a single trace positioned within 0.2div of electrical center.

8. NORM TO INVERT SHIFT (all channels) ±1div, max

Check the amount of trace shift while switching the MODE switch from NORM to INV: must be less than ±1div. Repeat for all channels.

9. LINE VOLTAGE TRACE DRIFT less than 0.5div with 105VAC to 125VAC line voltage change

Set the Line Voltage Control Unit to 105VAC and turn all MODE switches to NORM. Let the oscilloscope stabilize for a least 1 minute and position the four traces to CRT electrical center.

Change the Line Voltage Control Unit to 125VAC. Allow the system to stabilize for 1 minute and check that none of the traces has shifted more than 0.5div.

Return the Control Unit to 115VAC.

10. CALIB (Output amplifier gain)

a. Setup

Turn CH 1 MODE to NORM and the other channel MODE switches to OFF. Free run the test scope with TIME/DIV at .5mSEC and with VOLTS/DIV at 0.02. Connect a 10X probe from the test scope to pin 2 or 9 of V474. Apply a 1V squarewave signal from the SAC to CH 1 Input and adjust CH 1 VAR GAIN to obtain a 5div square-wave display on the test oscilloscope (1V P-P at the probe tip).

b. Check CAL range: 18:1 to 22:1 amplifier gain range

Adjust CAL for 20:1 gain. Move the 10X probe to terminal 21 of the interconnection plug (V474 plate). Set the test scope VOLTS/CM to 0.5. Rotate CAL and check for a test scope display amplitude 20V ±2V.

b. Terminal 21 is connected to the top end of R274 (4kΩ ww resistor mounted next to V474).

Adjust CAL for test scope display amplitude of 4cm (20V P-P).

c. Check balance: within 5%

Change the 10X probe to terminal 17 of the interconnecting plug and check the test scope display for an amplitude of 4cm ±0.2div.

c. Terminal 17 is connected to the top end of R264 (next to R274).

Disconnect the 10X probe from the TYPE 3A74. Return CH 1 VAR GAIN to CAL.

11. INPUT GRID CURRENT

Check CH 1, 2, 3, 4 Grid currents: less than 0.2div of trace shift

Switch each AC-DC-GND switch from DC to GND, checking for less than 0.2div of trace shift.

Return all AC-DC-GND switches to DC and all MODE switches to OFF.

12. MICROPHONICS: less than 0.5div of ringing-type microphonics

Set CH 1 MODE to NORM. Hold the micro-shock hammer in contact with the top of the TYPE 561B front panel and allow the slider to drop. Check for less than 0.5div of ringing-type microphonics.

Return CH 1 MODE to OFF and repeat the test for the other three channels, with only one MODE switch at a time being set to NORM.

13. ALTERNATE DISPLAY

Must alternate on 2, 3, or 4 channels at all sweep rates

Set all four MODE switches to NORM. Position the traces 1div apart on the graticule. Set the TYPE 2B67 MODE to SINGLE SWEEP and TRIGGER LEVEL to AUTO. Depress the TYPE 2B67 MODE switch to RESET and release to SINGLE SWEEP while checking the sequence of alternation one step at a time and at the following TIME/DIV settings:

.1SEC	.1mSEC
10mSEC	10μSEC
1mSEC	5μSEC

Repeat the above procedure with several combinations of channels.

14. CHOPPED MODE

a. *Adjust CHOPPED blanking signal amplitude: ≥35V P-P*
Check CH 1 ONLY trigger noise: ≤300mV

Pull out on the CH 1 TRIG ONLY switch. Set all MODE switches to NORM. Set CHOP-ALT switch to CHOP.

Connect the test scope 10X probe to the strap at the center of the CRT CATHODE SELECTOR switch (SW225, oscilloscope rear panel), ground the probe ground to the oscilloscope ground, and set the test scope VOLTS/DIV to 1.

a. If TYPE 3A74 is being calibrated in a 564B and TYPE 547/1A1 is used as a test scope; trigger noise ≤400mV.

14a. (Cont.)

Adjust C597 (blanking pluse amplitude) for a 35V test scope display.

Move the test scope probe to terminal 12 of the TYPE 2B67 interconnection plug (CH 1 internal trigger signal). Set the test scope VOLTS/DIV to .02.

Adjust C435 (CH 1 ceramic strip) for minimum noise and best waveform on the test scope display.

Install the TYPE 3A74 in the plug-in compartment. Check for 300mV or less trigger noise at terminal 12 (TYPE 2B67) and $\geq$35V pulse amplitude at SW225 (oscilloscope rear panel). readjust C597 or C435 if necessary.

a. Use of the extension will affect the display amplitude of the chopped signal; therefore the final check must be made with the TYPE 3A74 connected directly to the TYPE 561B.

b. Check CHOPPED display blanking

Switch the CRT CATHODE SELECTOR switch to CHOPPED BLANKING; check that the switching transients are blanked out on the plug-in scope display.

c. Check CHOPPED display
period: 2.0±0.6μs
aberration: $\leq$0.1div

Set all four MODE switches to NORM. Check for $\leq$0.1div of aberration on each trace. Check that the chopped period is 1.4μs to 2.6μs in length.

c. The CHOPPED period is measured from the end of one segment to the end of the next segment.

Be sure the CRT SELECTOR switch on the TYPE 561B rear panel is in the CHOPPED BLANKING position when checking chopped aberrations.

d. Check 2, 3, or 4 channel chopped display; continuous display with single channel

Check for proper display with MODE switches set to NORM; repeat with MODE switches set in INV.

Repeat the check with 3 and 2 channels (NORM MODE).

Check for a continuous unbroken trace with any one channel on.

15. CH 1, 2, 3, 4, AMPLITUDE

a. Setup

Apply a 100mV signal from the SAC to CH 1 Input. Set the CH 1, 2, 3, 4 controls as follows:

VOLTS/DIV	0.2
MODE	NORM
AC-DC-GND	DC
POSITION	center display on graticule center

b. Adjust Input Amplifier GAIN (R436)
Check range: at least ±20%

Rotate CH 1 Gain while checking for a display amplitude range of ≤4div to ≥6div.

Set GAIN for a display amplitude of 5div.

b. Be sure all four VAR GAIN controls are left in CAL (detent) position except when directed otherwise.

c. Check AC-DC-GND switch operation

Change the AC-DC-GND switch to GND; check for a straight-line trace.

Change to AC and check for display approximately centered on the graticule.

Return the AC-DC-GND switch to DC.

Repeat steps a, b, and c for all channels.

16. VARIABLE GAIN (All channels)

Variable gain ration: at least 2.5:1

Apply 100mV SAC signal to appropriate channel input. Rotate the VAR GAIN control to the point where the least amount of vertical deflection is noted. It must be 2div or less (Ratio: 2.5:1). Repeat for all channels. Leave SAC signal applied. Return VAR GAIN to the CAL position (in detent).

17. EXPANSION---COMPRESSION (All channels)

Check expansion--compression: less than 2.5% (3A74 ONLY)

Leave the VOLTS/DIV set at .02 and the SAC at 100mV. Adjust VARIABLE VOLTS/DIV for exactly 2div of display when the display is positioned to the center of the graticule.

Position the top of the square-wave display to the top line of the graticule and check for 2div ±0.05div of display.

Position the bottom of the square-wave display to the bottom line of the graticule and again check for 2div ±0.05div of display.

Subtract the expansion--compression of the TYPE 561B CRT from the total.

18. VOLTS/DIV ACCURACY (All channels)

a. *Check VOLTS/DIV accuracy: within 2% on all ranges (referenced to 0.02 VOLTS/DIV)*

Check the accuracy of the VOLTS/DIV attenuator as directed by the following table:

3A74 VOLTS/DIV	SAC Volts	Display Amplitude
.05	.2	4div ±0.08div
.1	.5	5div ±0.1div
.2	1	5div ±0.1div
.5	2	4div ±0.08div
1	5	5div ±0.1div
2	10	5div ±0.1div
5	20	4div ±0.08div
10	50	5div ±0.1div

b. *Check effect of multi-channel operation on gain: less than 2% change*

Set the VOLTS/DIV to .02 and the SAC to 100mV. Turn on several unused channels and check that the 5div display amplitude does not change by more than 0.1div.

19. INPUT COMPENSATIONS (All channels)

a. Setup

Set the controls as follows:

TYPE 3A74	
VOLTS/DIV	.02
VARIABLE	CALIBRATED
AC-DC-GND	DC
CH 2, 3, 4, MODE	OFF
CH 1 MODE	NORM
TYPE 2B67	
TIME/DIV	.5mSEC
TRIGGER SLOPE	-
TYPE 106	
REPETITION RATE	1kHz
HI AMP-FAST RISE	HI AMP
AMPLITUDE	ccw

Connect the following equipment to the TYPE 106 HI AMP output in the order listed:

GR to BNC Adapter
5:1 BNC Attenuator
50Ω BNC cable
50Ω BNC Termination
47pF Input RC Normalizer

b. Adjust input and atten compensation max aberration: 2% P-P

Adjust and check the attenuator compensation as showen below. Maximum aberration is 2% P-P at each VOLTS/DIV position

b. Readjust the TYPE 106 controls for a 5cm display each time the TYPE 3A74 VOLTS/DIV switch position is changed.

TYPE 3A74 VOLTS/DIV Position	Adjust (or check)
.02	C416
.05	C407B, C
.1	C409B, C
Remove the 5:1 Attenuator	
.2	C403B, C
.5	check
1	check
Remove the 50Ω Termination	
2	C405B, C
5	check
10	check

19b. (Cont.)

When CH 1 is compensated, repeat the same procedure for CH 2, 3, and 4. The MODE switch of the channel being calibrated should be set to NORM with the other three MODE switches set to OFF.

20. TRIGGER SIGNALS

a. Adjust DC levels (R530, Composite) (R521, CH 1 ONLY)

Turn CH 1 MODE to NORM; turn the other three MODE switches to OFF. Position CH 1 trace to CRT electrical center and check the DC BAL.

Set the test scope VOLTS/CM to .05 and coupling to DC. Position the trace to the graticule center.

Connect the test scope 10X probe to terminal 12 of the TYPE 2B67 interconnection plug. Push in the CH 1 ONLY knob and adjust R530 for zero volts on the test scope (Composite Trigger display).

Pull out on the TYPE 3A74 CH 1 ONLY knob and adjust R521 for zero volts on the test scope display (CH 1 ONLY trigger display).

b. Check amplitudes of internal triggering signals: AC-coupled, at least 2.5V/div of vert deflection; DC-coupled, at least 2V/div

Set the front panel controls as follows:

Test Scope	
TIME/DIV	5µSEC
VOLTS/DIV	.2
TYPE 3A74	
CH 2,3,4 MODE	OFF
CH 1 MODE	NORM
CH 1 AC-DC-GND	AC
CH 1 VOLTS/DIV	.02
TRIGGER CH 1 ONLY	Pulled out
TYPE 106	
HI AMP- FAST RISE	FAST RISE
REPETITION RATE	10kHz
AMPLITUDE	ccw

Connect the TYPE 106 FAST RISE OUTPUT to the CH 1 Input through a terminated 50Ω cable. Adjust the TYPE 106 + TRANSITION AMPLITUDE for a 4div display on the plug-in scope.

20b. (Cont.)

Check the test scope display (CH 1 ONLY trigger) for at least 10V (5cm) of vertical deflection.

Change CH 1 AC-DC-GND to DC. Check the test scope display for at least 10V (5cm) of vertical deflection.

Push in on the CH 1 ONLY knob and return the CH 1 AC-DC-GND switch to AC. Check the test scope display (composite triggers) for at least 10V (5cm) of vertical deflection.

c. Check trigger risetime (10% to "point of rollup"):
composite: ≤0.35μs
CH 1 ONLY: ≤0.7μs

Set the test scope controls as follows:

VOLTS/DIV	
VAR VOLTS/DIV	5div display
TIME/DIV	.5μSEC
Triggering	Stable display

Check that the test scope display risetime from the 10% point to the point of rollup is ≤0.35μs.

Pull out on the CH 1 ONLY knob and check the test scope display for a risetime of ≤0.7μs for the same amplitude points.

Remove the 10X probe from terminal 12.

c. The "point of rollup" amplitude level is used in this risetime measurement to exclude the rounded top-portion of the risetime display.

21. CHANNEL ISOLATION (All channels)

Isolation: 30,000 to 1 or greater

Change CH 1 VOLTS/DIV to 10. Change the TYPE 106 HI AMPLITUDE-FAST RISE switch to HI AMPLITUDE. Connect the HI AMPLITUDE OUTPUT to the CH 1 Input (without any termination). Change TYPE 106 to 25kHz. Adjust amplitude of TYPE 106 signal for 6div deflection. Turn the other three channels on and set V/DIV switches to .02. Check the amount of signal present on these traces, ≤0.1div.

21. (Cont.)

Repeat this procedure for the remaining channels by setting VOLTS/DIV to 10, applying the signal and looking at the remaining channels (other channels in .02 VOLTS/DIV).

Remove the TYPE 106 signal.

22. HIGH FREQUENCY COMPENSATION (All channels)

Adjust Output Amplifier compensation (HF Peaking L464, L474): max aberration, 2% P-P

Connect the TYPE 106 FAST RISE OUTPUT to CH 1 Input through a terminated 50Ω coaxial cable. Set CH 1, 2, 3, and 4 VOLTS/DIV to .02 and adjust the TYPE 106 for 4div of 100kHz signal. Change the TYPE 2B67 TIME/DIV to 1μSEC.

Adjust L464 and L474 for optimum front corner.

Check CH 2,3, and 4 for less than 2% aberration, using the procedure given above, but applying the signal to the appropriate input connectors.

Two tuning slugs are contained in each coil. Do not tighten them against each other so hard that they bind or break.

When CH 1, 2, 3, and 4 have been checked, disconnect the TYPE 106 and associated test equipment from the TYPE 3A74.

23. CH 1, 2, 3, 4 BANDWIDTH

a. Setup

Connect the following equipment to the TYPE 191 OUTPUT in the order listed:

50Ω GR cable
50Ω GR to BNC termination
CH 1 Input

Set the front panel controls as follows:

TYPE 3A74

CH 1 MODE	NORM
CH 2,3,4 MODE	OFF
VOLTS/DIV (all)	.02
AC-DC-GND (all)	DC

23a. (Cont.)

TYPE 191

FREQ RANGE	50kHz ONLY
AMPLITUDE	6div display

b. Check CH 1, 2, 3, 4 bandwidth:
upper -3dB limit; ≥2MHz
lower -3dB limit; ≤2Hz (AC-coupled)

Increase the frequency of the TYPE 191 signal until the display amplitude is reduced to 4.2div. Check the TYPE 191 for a frequency setting of 2MHz or higher.

Repeat the procedure for CH 2, 3, and 4. When finished, remove the TYPE 191 and associated equipment.

Set CH 1, 2, 3, 4 AC-DC-GND to DC. Apply a 6div 2Hz signal from the LFSWG to CH 1 Input. Switch CH 1 AC-DC-GND to AC and check for at least 4.2div of deflection.

Repeat the check for CH 2, 3, and 4. When the checks are completed, disconnect the LFSWG.

24. X-Y OPERATION

Remove the TYPE 2B67 from instrument. Install another TYPE 3A74 in right side plug-in compartment. Set left hand 3A74 CHOP-ALT switch to CHOP and the other one to ALT. With all 8 MODE switches at NORM, there must be 4 independent dots present on CRT. One Channel 1 POSITION control must position 1 dot in one direction while the other CH 1 position control positions in the other direction. Check that with both CH 4 MODE switches at NORM there is only 1 dot. Channel 4 must be operating at all times to have proper synchronization.

If the TYPE 3A74 does not X-Y properly, recheck step 14 setting C597 for a greater chopped blanking pulse.

THE END