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

529/RM529

April 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.

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 545B OSCILLOSCOPE
1 TYPE D PLUG-IN UNIT
1 TYPE 1A1 PLUG-IN UNIT
1 TYPE 184 TIME MARK GENERATOR
1 TYPE 191 CONSTANT AMPLITUDE SIGNAL GENERATOR
1 TYPE 76 TU LINE VOLTAGE CONTROL UNIT
1 TYPE 106 SQUARE-WAVE GENERATOR

b. Test Fixtures and Accessories

1 Dual output cable (067-0525-00)
2 P6028 1X Probe (010-0074-00)
1 P6006 10X Probe (010-0127-00)
2 75Ω Termination W/UHF connectors (011-0023-00)
2 75Ω Coaxial cables W/UHF connectors (012-0002-00)
2 BNC Female to UHF Male Adapters (103-0015-00)
1 Graticule (331-0161-00)
1 50Ω to 75Ω Min Loss Attenuator (011-0057-00)
1 Voltage Adapter for SAC (DWG # 1500B)
1 Standard Amplitude Calibrator (SAC) (067-0502-00)
1 DC Voltage Bridge (067-0543-99)
1 Return Loss Bridge (067-0576-00)

c. Other Equipment

1 20,000Ω/VDC Multimeter
1 Television Test Signal Generator (067-0601-00)
1 Video Generator capable of producing Bar and Sin^2 pulses

d. Equipment for Sample Checks

1 178kΩ 1/8W 1% Resistor (321-0409-00)
2 500pF 20kV capacitors (283-0096-00)

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

2. POWER SUPPLIES

c. Ripple and regulation (103.5-130 VAC):

	Ripple	ΔDC Voltage	Tolerance
-25.2V	≤10mV	≤±0.1V	--
100V	≤100mV	≤±0.5V	±5V

d. 360V: Tolerance ±5% @ 115 VAC
Ripple ≤4V

e. High Voltage: Tolerance 3%
Regulation ±1%

3. TRACE ROTATION Range: ≥6°

4. FOCUS, INTENSITY AND SCALE ILLUM

5. GEOMETRY

b. Orthogonality: 90° ±1°
c. Raster Distortion: ≤2 IEEE
d. Unblanking Plate Bias: adjusted for uniform brightness.

6. CRT

Characteristic	Test Limit
Horizontal Resolution	190 lines/10cm
Scan Area	≥7 x 10cm
Beam Intercept	≤40%, vertical ≥70%, horizontal
Spot Centering	≤0.5cm radius from graticule center
Deflection Factor	20.5-23.7V/cm, vertical 30.6-33.8V/cm, horizontal
Display Defects	none allowed

7. CALIBRATOR

b. Calibrator accuracy: .714V ±0.5%
1V ±1%
Recheck -25.2V: ±3%

8. VERTICAL BALANCE

a. DC Bal: adjustable for ≤0.5 IEEE units trace shift
b. Var DC Bal: adjustable for ≤0.5 IEEE units trace shift
c. CRT Electrical center: ±20 IEEE units 30 IEEE graticule line
d. Vertical Position Centering & Range:
Centering: ±30 IEEE from CRT elec center
Range: cw rotation position trace up and off scan area, ccw rotation positions trace down and off scan area

9. VERTICAL GAIN

b. 1.0 volts full scale gain:
Range: ≥-5% +10%
Accuracy: ±1%
c. 0.2 volts full scale gain:
Accuracy: ±1%
d. 0.5 volts full scale gain:
Accuracy: ±2%
e. VOLTS FULL SCALE Accuracy (checked with SAC): 1.0: ±1%
0.5: ±2%, 0.2: ±1%
f. Variable Ratio: ≥2.5:1
g. External Cal and B Input
Accuracy: ±1%.

10. TRIGGERING

c. Trigger requirements:
int: ≤200mV to ≥1.2V
ext: ≤250mV to ≥1.2V
d. Check External Sync Triggering: stable triggering with 5.5 volt composite sync

11. DC RESTORER

b. BO Waveform: 2.0μSEC-4.0μSEC
c. Vertical Shift: ≤1 IEEE unit

12. HORIZONTAL

a. Swp/Mag Regis: ≤2 minor div X25 to X1
b. Horizontal Gain:
2 FIELD: 9.8cm-10.4cm
All others: ≥9.8cm
c. Horizontal Position Range: cw, trace moves to the right and starts at 4.8-7cm graticule mark; ccw, trace moves to the left and ends at 3-5.2cm graticule mark
d. Horizontal Drift: ≤0.5cm in 10 seconds

13. VELOCITY MODULATION/HIGH VOLTAGE RIPPLE (SAMPLE CHECK)

b. Velocity Modulation: ≤200mV of 30 kHz
≤350mV of 30 kHz & noise
c. High Voltage Ripple: ≤1V

14. COMPRESSION/EXPANSION ≤±1%

15. FIELD SHIFT

c. Field Shift Switch: selects field that sweep will start on

16. LINE SELECTOR

b. Brightening Pulse Amplitude: ≥100mV (VIDEO OUT jack)
d. Line Selector: selects 16th-21st line
e. Variable Line Selector Range & Jitter
Range: ≤15th line of 1st field to ≥25% of 2nd field
Jitter: no noticeable jitter allowed

17. STAIRCASE ADDER

Reduces sweep to ≤2.5cm

18. TIMING

a. .125H/CM: range: ≥+ & - 2.5%
Accuracy: ±2%
b. .25H/CM: Accuracy: ±2.5%
c. Magnified Timing: ±2% @ X5, ±3% @ X25 (exclude 1st 10% of sweep)

19. FREQUENCY RESPONSE

b. Common Mode Rejection: ≥10:1 @ 2 MHz
c. Flat Response: (VOLTS FULL SCALE & 1.0) 50 Hz-6 MHz +0% -1%
50 Hz-8 MHz +0% -3%
(VOLTS FULL SCALE @ 0.5 and 0.2)
50 Hz-6 MHz +0% -1%
d. Low Pass Response: ≥80% down @ 500 kHz
e. IEEE Response: follows IRE 1958 Standard 23S-1
f. High Pass Response: 3.58 MHz ±3% 65-86% down @ + & - 400 kHz
g. Low Frequency Response: ≤1% tile @ 50 Hz
h. VIDEO OUT LF Response: ≤3% tilt on window
i. Bar Response: flat within ½ IEEE display unit
j. ½T Pulse Response: ≤3% down from bar, ≤2 IEEE units of preshoot or overshoot

20. RETURN LOSS BRIDGE

a. Video Input Return Loss ≥46dB

THE END

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. General: check CRT
b. Control Settings: Preset all pots and caps to midrange
c. Resistance Checks:

MEASURE TO GND	RESISTANCE
-12.2 (emitter Q124)	15Ω
-25V (emitter Q874)	25Ω
+100V (pin 6 V113)	1.5kΩ
+360V (C650)	8.0k
Xfmr T1 and T3	inf

2. POWER SUPPLIES

b. Adjust -25 VOLTS/CAL AMPL: Adjust R620 for -25.2V
c. Check Ripple and Regulation

Supply	Ripple	DC Voltage Change	Tolerance
-25.2V	≤10mV	≤±0.1V	--
100V	≤100mV	≤±0.5V	±5V

d. Check Unregulated Supply: 360V ±5% ≤4V ripple
Check for ≤4V ripple and voltage between 341-379V
e. Adjust High Voltage: Tolerance ±3%
Regulation ±1%
Adjust GAIN for -6400V. Check for ≤64V change while varying INTENSITY
f. Adjust Beam Current: 0.15V across R850

3. TRACE ROTATION

b. Adjust TRACE ROTATION: range ≥6°

4. FOCUS, INTENSITY AND SCALE ILLUM

b. Adjust Astigmatism, R864
c. Check INTENSITY Control: no intensity ccw, max intensity cw
d. Check SCALE ILLUM: no illum ccw, max illum cw

5. GEOMETRY

b. Check Orthogonality 90° ±1°, ≤1mm bowing or tilt
c. Check Raster Distortion: ≤2 IEEE between -50 IRE and +120 IEEE
d. Adjust Unblanking Plate Bias: Adjust R855 for uniform brightness

6. CRT

7. CALIBRATOR

b. Adjust -25 volts/cal amp: .714V ±0.5%, 1V ±1%

8. VERTICAL BALANCE

a. Adjust DC Bal (R115)
b. Adjust Var DC Bal (R130)
c. Check CRT Electrical Center: ±20 IEEE units
d. Check Vertical Position Centering and Range Center: ±30 IEEE units from elec center

9. VERTICAL GAIN

b. Adjust 1.0 Volts Vertical Gain (R169) Range ≥ -5% +10% (≥110 IEEE, ≤95 IEEE) set to 100 IEEE Accuracy ±1%
c. Adjust 0.2 Volt Gain ±1%
Adjust R119 for 100 IEEE units
d. Check 0.5 Volts Gain ±2%
Check for between 98-102 IEEE units
e. Check VOLTS FULL SCALE Accuracy
1.0: 138.6-141.4 IEEE units
0.5: 137.2-142.8 IEEE units
0.2: 138.6-141.4 IEEE units
f. Check Variable Ratio: ≥2.5:1
g. Check Ext Cal and B Inputs ±1%
Ext Cal: 138.6-141.4 IEEE units
B INPUT: 138.6-141.4 IEEE units

10. TRIGGERING

b. Adjust Trig Multi Bias
c. Check Triggering
INT ≤200mV to ≥1.2V
EXT ≤250mV to ≥1.2V
d. Check External Sync Triggering: Stable triggering with 5.5V of composite sync

11. DC RESTORER

b. Check BO Waveform, 2.0-4.0μSec
c. Check DC Restorer Vertical Shift, ≤1 IEEE Unit

12. HORIZONTAL

a. Adjust Sweep/Mag Regis R575: ≤2 minor div shift X25 to X1
b. Adjust Horizontal Gain R568
2 FIELD: 9.8-10.4cm
Check all others: ≥9.8cm
c. Check Horizontal Position
Cw trace start 4.8-7cm
Ccw trace ends 3-5.2cm
d. Check Horizontal Drift: ≤0.5mm in 10 sec

13. VELOCITY MODULATION/HIGH VOLTAGE RIPPLE (SAMPLE CHECK)

b. Check Velocity Modulation
30 kHz: ≤200mV
30 kHz + noise: ≤350mV
c. Check High Voltage Ripple ≤1V

14. COMPRESSION/EXPANSION

b. Check Compression/Expansion ≤±1%

15. FIELD SHIFT

b. Adjust Even Field Sync (R360)
c. Check Field Shift: Check that FIELD switch selects field that sweep will start on.

16. LINE SELECTOR

b. Check Brightening Pulse Amplitude: ≥100mV
c. Adjust Line Selector Range
d. Check Line Selector: selects 16th to 21st line
e. Check Line Selector Variable Range: ≤15th line to ≥25% of 2nd field, no jitter

17. STAIRCASE ADDER

b. Check Staircase Adder Relay Reduces Sweep to ≤2.5cm

18. TIMING

a. Adjust .125H/cm Timing Range: ≥ ±2.5%, Accuracy ±2%
C481 will vary sync pulses from 7.8-8.2cm.
Adjust C481 for 8cm between sync pulses
b. Check .25H/cm Timing: ±2.5%
Distance between 1st and 3rd horizontal sync pulse is 7.8-8.2cm
c. Check Magnified Timing
X5: Check sweep for 12.7 1μs marks/8cm ±2%
X25: Adjust C521 (C523 in RM529) for 31.75, .1μs marks/10cm.
Check entire sweep for 31.75, .1μs marks/10cm ±3%

19. FREQUENCY RESPONSE

b. Adjust Common Mode Rejection, C133: ≥10:1
c. Adjust Flat Response
350 kHz-6 MHz: +0% -1%
350 kHz-8 MHz: +0% -3%

19c. (cont'd)

Adjust Flat Response as in following chart:

VOLTS FULL SCALE	VARIABLE	TYPE 191 FREQ	ADJUST	DEFLECTION (IEEE units)
1.0	CALIB	350kHz	TYPE 191	140
1.0	CALIB	8 MHz	L162,L262	Max
1.0	CALIB	8 MHz	C269	135.8-140
1.0	CALIB	4 MHz	(dress) R162,R262	138.6-140
1.0	CALIB	6 MHz	check	138.6-140
1.0	ccw	350kHz	TYPE 191	140
1.0	ccw	6 MHz	check	135.8-144.2
0.5	CALIB	350kHz	TYPE 191	140
0.5	CALIB	6 MHz	C118B	138.6-140
0.2	CALIB	350kHz	TYPE 191	140
0.2	CALIB	6 MHz	C118C	138.6-140

d. Adjust Low Pass Response, ≥80% down at 500 kHz
Adjust C232, L133, L233, L134, L234, L135 and L235 for best transient response on Cal waveform.
Check multiburst ≥80% down at 500kHz

e. Check IEEE Response
Check IEEE response as in following chart:

TYPE 191	CHECK OR ADJUST	DEFLECTION (IEEE units)
50 kHz	TYPE 191	100
350kHz	check	94-97.5
1 MHz	check	70-80
2 MHz	check	31-42.5
Volts Full Scale to 0.2		
3.6MHz	check	28-70

f. Adjust High Pass Response: 3.58 MHz ±3%
65-85% down at ±400 kHz

g. Check Low Frequency Response ≤1% tilt
Top of squarewave ≤1 IEEE unit of tilt

h. Check Video Out LF Response ≤3% tilt
Top of squarewave ≤1.8mm tilt

i. Adjust Bar Response, C167: ≤½ IEEE

j. Check ½T Pulse Response: ≤3% down from bar, ≤3 IEEE units of preshoot or overshoot

k. Check IEEE and Low Pass Coil Polarization (TYPE 529 only)

20. RETURN LOSS

a. Adjust Video Input Return Loss ≥46dB

THE END

1. PRELIMINARY INSPECTION

a. General

Check the component assembly of the instrument for unsoldered joints, rosin joints, long leads, and lead dress. Check for loose hardware and protruding parts. Check controls for smooth mechanical operation, proper indexing, and proper spacing from the front panel. Correct all defects found. Check fuse, tubes, transistors and rectifiers for proper type and proper installation.

Check CRT for concavity, defects, spacing from graticule and for face plate tilt.

Check CRT pins for proper wiring and check code date and serial number against IBM card.

b. Control settings

INTERNAL ADJUSTMENTS

Set all pots and variable caps to midrange.

Set the top of the bottom slugs (RM529 only) of the vertical coils (L162, L262) approx ½" from the top of the coil form. Set the top slug even with the top of the coil form. Do not preset T135.

EXTERNAL CONTROLS

POWER	OFF
FOCUS	midr
INTENSITY	ccw
SCALE ILLUM	cw

VERTICAL

INPUT	CAL
POSITION	midr
RESPONSE	FLAT
VOLTS FULL SCALE	1.0
VARIABLE	CALIB
DC RESTORER	OFF
GAIN	midr
CALIBRATOR	EXT
Front Panel Gain	midr

HORIZONTAL

POSITION	midr
MAG	X1
FIELD	ONE
SYNC	INT
LINE SELECTOR	VARIABLE
DISPLAY	2 FIELD

All adjustments and checks are made using (331-0161-00) graticule.

1. (cont'd)

c. Resistance checks

Check the resistance to ground at the following points: Note: the resistance reading may vary slightly depending on the meter scale and the instrument control settings. All resistance readings are approximate.

MEASURE TO GND	METER SCALE	RESISTANCE
-12.2V (emitter Q124)	10Ω	15Ω
-25V (emitter Q874)	10Ω	25Ω
+100 (pin 6 V113)	1k	1.5k
+360 (C650)	1k	8k
Xfmr T1 & T3	10Ω	inf

2. POWER SUPPLIES

a. Setup

Connect the power cord to the TYPE 76 TU (set for 25 VAC) and turn the instrument under test on. Power neon must be on. Slowly increase the line voltage to 115 VAC while checking for overloading and/or shorting. Allow the instrument to operate for 20 min before making any adjustments.

Preset the TYPE 545B and TYPE D UNIT as follows:

TYPE 545B

HORIZONTAL DISPLAY	A
5X MAGNIFIER	OFF
STABILITY + TRIGGER LEVEL	cw
A TIME/CM	10mSEC
VARIABLE	CALIBRATED

TYPE D UNIT

Input Selector	A, AC
MILLIVOLTS/CM	10
MV/CM MULTIPLIER	2

b. Adjust -25 VOLTS/CAL AMPL

Connect the DC Voltage Bridge to the -25.2V supply. Adjust -25 volts/Cal Ampl (R620) for -25.2 volts.

2. (cont'd)

c. Check Ripple and Regulation

With the DC Voltage Bridge connected to the power supplies, vary the line voltage from 103.5 VAC to 130 VAC. The power supply ripple and DC voltage change must not exceed the following test limits:

	Ripple	DC Voltage Change	Tolerance
-25.2V	≤10mV	≤±0.1V	--
100V	≤100mV	≤±0.5V	±5V

Return the line voltage to 115 VAC.

d. Check Unregulated Supply 360V ±5%
≤4V ripple

Connect the DC Voltage Bridge to one end of R655 (beam rotator). The ripple must not exceed 4V and the voltage must be between 341V and 379V.

e. Adjust High Voltage Tolerance: ±3%
Regulation: ±1%

Measure the high voltage supply with the DC Voltage Bridge at the junction of the 9-2 lead and R850. Adjust the GAIN for a high voltage of -6400V. Check for no more than a 64V change in high voltage while varying the INTENSITY from min to max.

f. Adjust Beam Current 0.15V across R850

Turn POWER OFF and connect the VOM across R850 (1K resistor located on high voltage board). Set the VOM to the lowest DC voltage scale.

CAUTION: DO NOT TOUCH THE VOM AFTER POWER HAS BEEN TURNED ON. Turn power on. Set DISPLAY to 2 FIELD and turn the INTENSITY control to max. Adjust Beam Current (R848) for 0.15 volts across R850. Turn POWER OFF and remove the meter leads. Turn POWER ON.

3. TRACE ROTATION

a. Setup

Set the INPUT to A and DISPLAY to 1 FIELD. Connect a 75 Termination to one of the A VIDEO INPUT. Position the trace to the +30 graticule line.

b. Adjust TRACE ROTATION range: ≥6°

b. 6°, approx 22 IEEE units

Rotate the TRACE ROTATION from one extreme to the other. The trace must rotate at least 6° total and + & - 1° from the horizontal. Adjust the TRACE ROTATION for a level horizontal trace.

4. FOCUS, INTENSITY AND SCALE ILLUM

a. Setup

Change the INPUT to CAL and the DISPLAY to 2 LINE. Set CAL to .714 F.S. Adjust the INTENSITY control for a display of normal brightness (no halo).

b. Adjust Astigmatism

Adjust between the FOCUS and Astig (R864) controls for optimum focus of the calibrator waveform.

c. Check INTENSITY control

Rotate the INTENSITY control from full cw to full ccw. At full ccw there must be no intensity. Cw rotation must increase the intensity evenly with smooth control rotation. Return the INTENSITY to normal brightness.

d. Check SCALE ILLUM

Rotate the SCALE ILLUM through its range. There must be a smooth change in graticule illumination as the control is rotated from full ccw to full cw.

5. GEOMETRY

a. Setup

Connect the TYPE 184 MARKER OUT to the A VIDEO INPUT. Terminate the A VIDEO INPUT with 75Ω. Connect the TYPE 184 TRIGGER OUT to the EXT NEG SYNC INPUT. Set the TYPE 184 for 5μS time marks and 10kc trigger rate. Set the front panel controls as follows:

DISPLAY	.25H/cm
INPUT	A
SYNC	EXT

Adjust the VERTICAL POSITION, VOLTS FULL SCALE and VARIABLE so the time marks are approx 5 IEEE units above and below the top and bottom graticule lines.

b. Check Orthogonality 90° ± 1°

The bowing and/or tilt of the vertical lines, between the -50 IEEE and +120 IEEE graticule, must not exceed 1mm.

c. Check Raster Distortion ≤2 IEEE

Remove the TYPE 184 signals, change the DISPLAY to 2 FIELD and the SYNC to INT. Vary the trace position between the -50 IEEE and +120 IEEE graticule line. Deviation from a straight line must not exceed 2 IEEE units.

d. Adjust Unblanking Plate Bias

Change the CAL to .714 F.S. and adjust the INTENSITY for a dim display. Adjust R855 for uniform brightness.

6. CRT

The following CRT characteristics must meet the specified test limits. Refer to the Cathode Ray Tube Check Out Procedure for information on test methods.

CHARACTERISTIC	TEST LIMIT
Horizontal Resolution	190 lines/10cm
Scan Area	≥7 X 10cm
Beam Intercept	
Vertical	≤40%
Horizontal	≤60%
Spot Centering	≤0.5cm radius from graticule center
Deflection Factor	
Vertical	20.5 to 23.7V/cm
Horizontal	30.6 to 33.8V/cm
Display Defects	
Flare	No visible flare with CRT cut off or with low intensity level
Grid and/or Field Emission	No visible effects with CRT cut off or with low intensity level
Cathode Interface	No brightening of first 1 or 2cm of trace @ 2 FIELD
Charging	No perceivable charging allowed
Burrs	No burrs that cause beam to exceed trace width and/or horizontal resolution limits
Double Peaking	No double peaking allowed
Heater Cathode Leakage	No heater cathode leakage allowed.

7. CALIBRATOR

a. Setup

Connect the SAC voltage adapter to the SAC. Set the SAC to 1V and connect the output to INPUT A of the TYPE D PLUG-IN UNIT. Connect a 1X probe from INPUT B to the calibrator coax on the INPUT switch. Set the INPUT to CAL and the CAL to .714 F.S. Set the TYPE D PLUG-IN UNIT as follows:

7a. (cont'd)

MILLIVOLTS/CM	10
MV/CM MULTIPLIER	1
input switch	A-B, AC

b. Adjust -25 volts/cal Amp .714V: ±0.5%
1V: ±1%

Set the SAC voltage adapter for .714 volts. Adjust the -25 volts/Cal Amp (R620) for 0 error signal on the test scope. Change the CAL to FULL SCALE and the voltage adapter for 1 volt out. The error signal on the test scope must not exceed 1cm (10mV). Readjust the high voltage for -6400V and check the -25.2V supply for -25.2V ±3%. Replace the TYPE D PLUG-IN with a TYPE 1A1.

8. VERTICAL BALANCE

a. Adjust DC Bal

Change the INPUT to A and terminate the A VIDEO INPUT with 75Ω. Set the DC RESTORER to OFF. Switch the VOLTS FULL SCALE back and forth between 1.0 and 0.2 while adjusting the DC Bal (R115) for 0 vertical trace shift.

b. Adjust Var DC Bal

Set the VOLTS FULL SCALE to 0.2. Rotate the VOLTS FULL SCALE VARIABLE back and forth between full cw and full ccw while adjusting the Var DC Bal (R130) for 0 vertical trace shift.

c. Check CRT Electrical Center ±20 IEEE units

Set the INPUT to A and the DC RESTORER to OFF. Short the vertical deflection plates together. The trace must be within ±20 IEEE units of the +30 IEEE graticule line.

d. Check Vertical Position Centering and Range Center: ±30 IEEE from elec center

Set the POSITION control to midr. The trace must be within ±30 IEEE units of electrical center. Rotate the POSITION control full cw. The trace must position up and off the scan area. Rotate the POSITION full ccw. The trace must position down and off the scan area. Return the trace to graticule center.

9. VERTICAL GAIN

a. Setup

Connect the output of the SAC to the A VIDEO INPUT (do not terminate). Set front panel controls as follows:

INPUT	CAL
DISPLAY	2 FIELD
VOLTS FULL SCALE	1.0
VARIABLE	CALIB
CAL	.714 F.S.

b. Adjust 1.0 Volts Vertical Gain
**range: ≥-5% +10%*
accuracy: ±1%

Rotate the Vert Gain (R169) adjustment from full cw to full ccw. At full cw the display amplitude must be ≥110 IEEE units. At full ccw the display amplitude must be ≤95 IEEE units. Adjust the Vert Gain for 100 IEEE units. Change the CAL to FULL SCALE. The display amplitude must be 140 IEEE units ±1%. Check that there is no change in vertical gain with the DC RESTORER on.

c. Adjust 0.2 Volt Gain ±1%

Change the VOLTS FULL SCALE to 0.2 and the CAL to .714 F.S. Adjust the 0.2 Volts Gain (R119) for 100 IEEE units of display amplitude.

Due to interaction it may be necessary to repeat steps 9b and 9c.

d. Check 0.5 Volts Gain ±2%

Change the VOLTS FULL SCALE to 0.5. The display amplitude must be 100 ±2% IEEE units.

e. Check VOLTS FULL SCALE Accuracy
1.0: ±1%
0.5: ±2%
0.2: ±1%

Change the VOLTS FULL SCALE to 1.0, INPUT to A, and the SAC to 1 volt. The display amplitude must be 140 ±1% IEEE units.

Change the VOLTS FULL SCALE to 0.5 and the SAC to 0.5 volts. The display amplitude must be 140 ±2% IEEE units.

Change the VOLTS FULL SCALE to 0.2 and the SAC to 0.2 volts. The display amplitude must be 140 ±1% IEEE units.

9b. * range

If the vertical gain range does not meet test limits the following check must be made to confirm failure:

Set MAG to X1, DISPLAY to 2 FIELD and DC RESTORER, off. Position the trace to the -40 IEEE graticule line. Set R169 full ccw and measure the voltage between the vertical deflection plates. Apply +1.0VDC ±0.25% to C104 (end not connected to input switch) and measure the voltage between the vertical deflection plates. The voltage difference must be ≤122V. Remove the +1.0VDC. Set R169 full cw and measure the voltage between the vertical deflection plates. Reconnect the +1.0VDC to C104 and measure the voltage between the vertical deflection plates. The voltage difference must be ≥143V.

9. (cont'd)

f. Check Variable Ratio ≥2.5:1

Change the VOLTS FULL SCALE to 1.0. Adjust the VOLTS FULL SCALE VARIABLE to display max amplitude. Note the amplitude and adjust the VARIABLE to display min amplitude. The max amplitude divided by the min amplitude must be ≥2.5. Check for smooth gain change as the VARIABLE is rotated through its range. Return the VARIABLE to the calibrated detent.

g. Check Ext Cal and B Inputs ±1%

Remove the SAC signal from the A VIDEO INPUTS and connect it to the EXT CAL INPUT. Change the CALIBRATOR to EXT and the SAC to 1 volt. Check for 140 IEEE units of vertical deflection ±1%. Connect the SAC to the B VIDEO INPUTS and change the INPUT to B. Check for 140 IRE units of vertical deflection ±1%. Remove the SAC signal.

10. TRIGGERING

a. Setup

Connect the simulated video, setup with staircase signal, through a 75Ω variable attenuator to the EXT NEG SYNC INPUT. Jumper the signal to the A VIDEO INPUT. Set the front panel controls as follows;

VOLTS FULL SCALE	0.5
DC RESTORER	ON
DISPLAY	2 FIELD
SYNC	EXT
FIELD	ONE

Adjust the amplitude for 20 IEEE units of sync pulse (70 IEEE units P to P). If necessary adjust the Even Field Sync (R360) for a 2 FIELD display. Connect a voltmeter between the center tap of the TRIG MULT BIAS pot and gnd.

b. Adjust Trig Mult Bias

Turn the Trig Mult Bias adjustments cw until the display starts to lose sync or DC restoration. Note the meter reading (V_1). Turn the adjustment ccw until the display starts to lose sync or DC restoration. Note the meter reading (V_2). Adjust the Trig Mult Bias for a meter reading of $V_1 + 1/3 (V_2 - V_1)$ i.e. 1/3 of voltage difference above V_1.

10. (cont'd)

c. Check Triggering *INT ≤ 200mV to ≥1.2V*
EXT ≤ 250mV to ≥1.2V

Check for stable external triggering in all positions of the DISPLAY switch, with 250mV to 1.2V PTP composite video. Note: 1.2V is full graticule deflection with the VOLTS FULL SCALE at 1.0.

Change the SYNC to INT. Check for stable internal triggering, in all positions of the DISPLAY switch, with 200mV to 1.2V PTP composite video.

Connect a voltmeter between the base of Q335 and gnd. There must be at least 0.5 volts change on the base of Q335 as the composite video is changed from 200mV to 1 volt.

Check for stable triggering in 2 LINE with the CALIBRATOR signal.

d. Check External Sync Triggering: stable triggering with 5.5V composite sync

Connect the composite video (simulated) to A VIDEO INPUT. Connect the composite sync to the EXT NEG SYNC INPUT. Adjust the composite sync amplitude for 5.5 volts. Change the SYNC switch to EXT and check for stable triggering in all settings of the DISPLAY switch.

Remove the composite sync from the NEG EXT SYNC INPUT and return the SYNC switch to INT.

10. It is important that the proper video to sync pulse ratio is maintained while making triggering adjustments and checks. The correct video to sync pulse ratio with 140 IEEE units PTP composite signal in is: 100 IEEE units of video to 40 IEEE units of sync pulse.

11. DC RESTORER

a. Setup

Set the front panel controls as follows:

INPUT	A
VOLTS FULL SCALE	1.0
DC RESTORER	ON
DISPLAY	.25H/CM
RESPONSE	FLAT
CALIBRATOR	.714 F.S.

Test Scope

TIME/CM	.2μSEC
TRIGGER SLOPE	+INT
TRIGGERING MODE	AC LF REJ

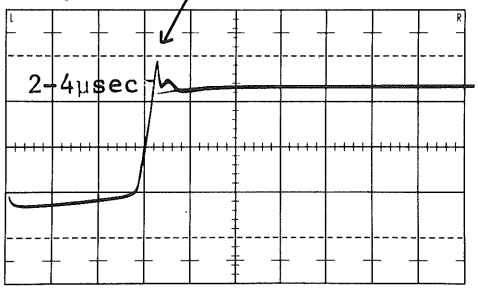
11a. (cont'd)

TYPE 1A1 PLUG-IN

INPUT SELECTOR	DC
MODE	CH1
VOLTS/CM	.2

Adjust the Conrac Receiver output for 30 IEEE units of composite video. Connect a 10X probe from INPUT A of the TYPE 1A1 PLUG-IN to the base of Q280.

If this overshoot is more than one volt check D282.



b. Check BO Waveform 2.0µsec-4.0µsec

Adjust the test scope TRIGGER LEVEL and STABILITY for a triggered display. The duration of the BO waveform must be between 2.0µsec-4.0µsec. (see notes)

c. Check DC Restorer Vertical Shift ≤1 IEEE unit

Position the back porch to the 0 IEEE graticule line. Vary the output amplitude of the Conrac Receiver from 30 to 170 IEEE units. The back porch must not shift more than 1 IEEE unit.

Change the RESPONSE to IEEE. The back porch level must not shift more than 1 IEEE unit. Return the RESPONSE to FLAT.

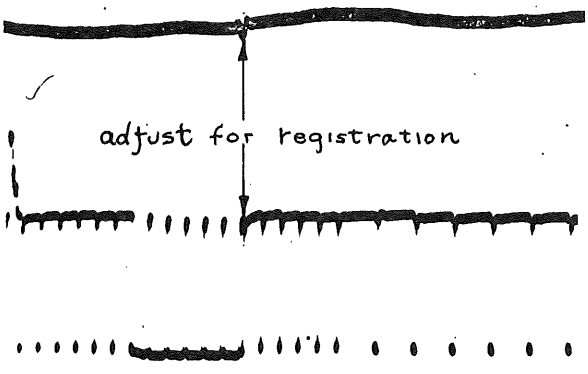
Change the INPUT to CAL. The bottom of the calibrator signal must restore to within 2 IEEE units of the back porch level.

12. HORIZONTAL

a. Adjust Sweep/Mag Regis ≤2 minor div shift X25 to X1

Change the INPUT to A, DISPLAY to 2 FIELD and MAG to X25. Position the last vertical sync pulse to the middle graticule line. Change the MAG to X1 and adjust Sweep/Mag Regis (R575) so the last vertical sync pulse is on the middle graticule line.

Due to interaction it will be necessary to repeat this adjustment several times.



b. Adjust Horizontal Gain
2 FIELD: 9.8-10.4cm
All others: ≥9.8cm

Adjust the Horiz Gain (R568) for a trace length of 9.8 to 10.4cm. Check for a trace length of at least 9.8cm in all other positions of the DISPLAY switch.

12.(cont'd)

c. Check Horizontal Position cw: →, trace starts 4.8-7cm
ccw: ←, trace ends 3-5.2cm

Change the DISPLAY to 2 FIELD. Rotate the HORIZONTAL POSITION full cw. The trace must move to the right and the start of the trace must position to between the 4.8 and 7cm graticule mark when the control is full cw.

Rotate the POSITION control ccw. The trace must move to the left and the end of the trace must position to between the 3 and 5.2cm graticule mark when the control is full ccw.

d. Check Horizontal Drift ≤0.5mm in 10 s

Change the INPUT to CAL, DISPLAY to .125H/cm and MAG to X25. Position the first leading edge of the calibrator signal to the middle graticule line. The leading edge must not drift more than ±0.5mm over a ten second period.

13. VELOCITY MODULATION/HIGH VOLTAGE RIPPLE (sample check)

a. Setup

Connect 1X probes to CHANNEL 1 and CHANNEL 2 of the TYPE 1A1. Set the TYPE 1A1 front panel controls as follows:

MODE	ADD
INPUT SELECTOR (both)	AC
VOLTS/CM (both)	0.1
VARIABLE (both)	CALIBRATED
CH 1	NORM
CH 2	INVERT

Set the front panel controls as follows:

INPUT	A
CAL	FULL SCALE
DISPLAY	2 FIELD
SYNC	EXT
INTENSITY	ccw

Connect a 178kΩ 1/8W 1% resistor between the collector of Q481 and the base of Q483. Slowly turn the INTENSITY control cw until the two spots can be seen. Set the MAG to X25 and position the spots to the center of the screen. Externally trigger the test scope with the signal at the top of R885. Terminate VIDEO INPUT A with 75Ω.

13. (cont'd)

b. Check Velocity Modulation 30 kHz: ≤200mV; 30 kHz + noise: ≤350mV

Connect the 1X probes to pin 1 of V554A and pin 6 of V554B. The amplitude of the 30 kHz component displayed on the test scope must not exceed 200mV. The amplitude of the entire signal (30 kHz + noise) must not exceed 350 mV.

c. Check High Voltage Ripple ≤1V

Connect a 500pF 20kV capacitor in series with each 1X probe. Connect the 1X probes across R849. The amplitude of the 30 kHz ripple must not exceed 1V. Remove the 1X probes and the 178kΩ resistor.

14. COMPRESSION/EXPANSION

a. Setup

Set front panel controls as follows:

DISPLAY	2 FIELD
INPUT	A
VOLTS FULL SCALE	1.0
DC RESTORER	OFF

Connect the output of the SAC to the A VIDEO INPUT (do not terminate). Adjust the VOLTS FULL SCALE VARIABLE for 30 IEEE units amplitude with the display centered on the graticule. Connect the 1X probes from the TYPE D PLUG-IN to the CRT vertical deflection plates. Set the TYPE D PLUG-IN MILLIVOLTS/CM to 100 and the MV/CM MULTIPLIER to 50. Adjust the VARIABLE for a test scope display amplitude of 5.0cm.

b. Check Compression/Expansion ≤±1%

Position the top of the display to the top graticule line. The display amplitude on the test scope must not change by more than ±1% (49.5mm-50.5mm). Position the bottom of the display to the bottom graticule line. The display amplitude on the test scope must not change by more than ±1% (49.5mm-50.5mm). The compression and/or expansion of the display viewed on the TYPE 529 must not exceed 1 IEEE unit.

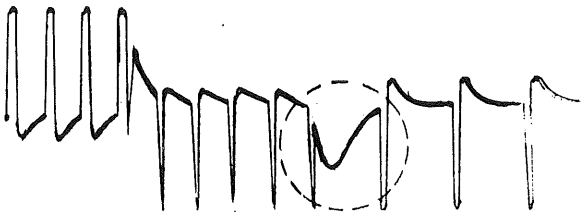
15. FIELD SHIFT

a. Setup

Apply a 200mV composite video signal to the A VIDEO INPUT. Connect a 10X probe from CHANNE 1 of the TYPE 1A1 to the junction of R369 and D370. Connect a 1X probe from the test scope EXT TRIGGER INPUT to the junction of C384 and R387. Connect a voltmeter between the center tap of R360 and gnd.

Set the test scope and TYPE 1A1 as follows:

TIME/CM	50μSEC/CM
TRIGGERING MODE	AC LF REJ
SLOPE	+EXT
INPUT SELECTOR	AC
CH1 VOLTS/CM	0.2
MODE	CH1



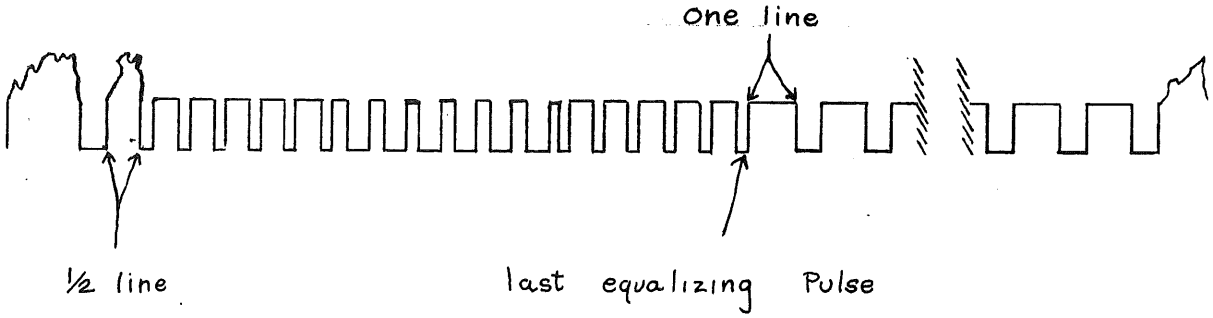
R360 adjusted correctly

b. Adjust Even Field Sync

Adjust the Even Field Sync (R360) so the multi waveform just starts to jump between the 6th and 5th equalizing pulses. Note the voltmeter reading. Adjust the Even Field Sync so the multi waveform just starts to jump between the 6th equalizing pulse and the first horizontal sync pulse. Note the voltmeter reading. Set the Even Field Sync halfway between the noted readings.

c. Check Field Shift

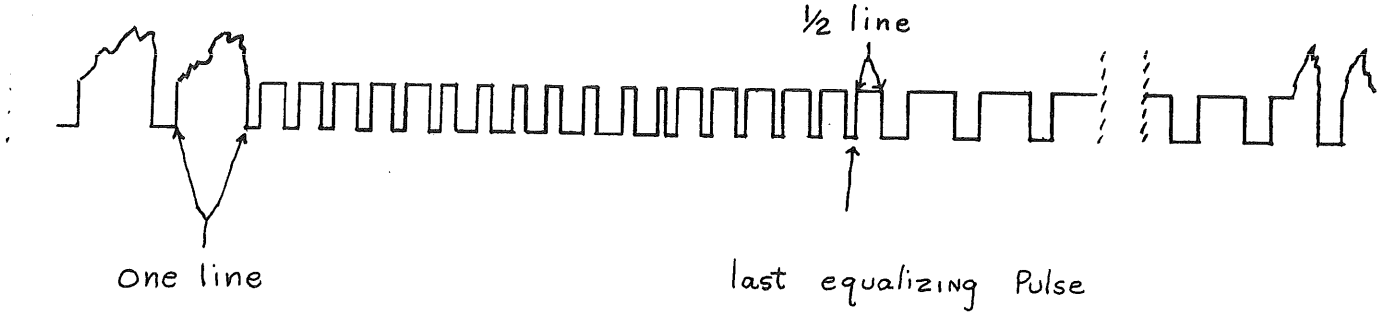
Change the DISPLAY to 2 FIELD, MAG to X25 and FIELD switch to ONE. Adjust the HORIZONTAL POSITION so the vertical blanking interval (start of second field) is displayed. Check for the following display:



Check for consistent triggering in the same field by momentarily interrupting the triggering signal (change the SYNC to EXT and back to INT). Check several times with a 200mV and a 1V trigger signal.

Change the FIELD switch to TWO. Check for the following display:

15c. (cont'd)



16. LINE SELECTOR

a. Setup

Set the front panel controls as follows:

DISPLAY	.125H/cm (LINE SELECTOR)
MAG	X1
LINE SELECTOR	21
FIELD	TWO

Set the test scope as follows:

TIME/CM	.1mSEC
TRIGGERING MODE	AC
SLOPE	+EXT
Vertical Sensitivity	.02 VOLTS/CM

Connect a 10X probe from the test scope vertical input to the VIDEO OUTPUT connector. Connect a 1X probe from the test scope EXT TRIGGER INPUT to the junction of D377 and D387. Adjust the TRIGGERING LEVEL and STABILITY for a stable triggered display.

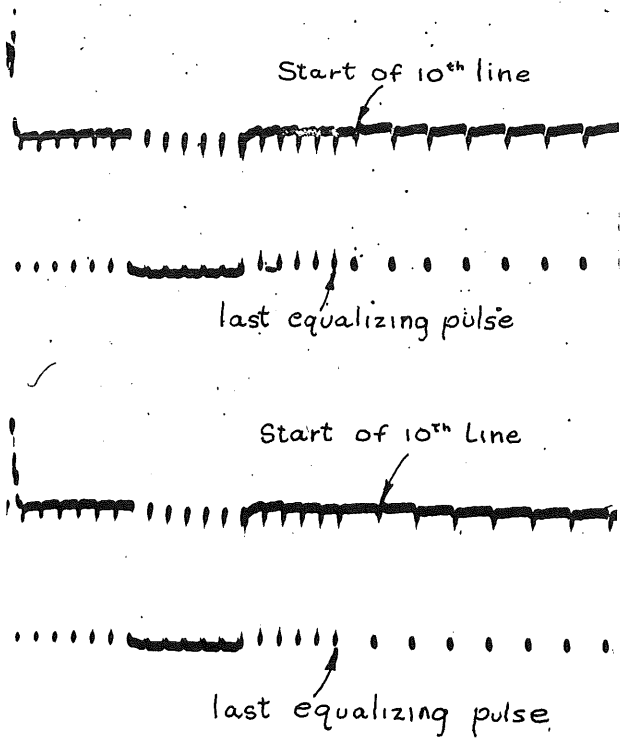
b. Check Brightening Pulse Amplitude ≥100mV

Measure the amplitude of the brightening pulse on the test scope. The brightening pulse amplitude must be ≥100mV. Connect a 75Ω Terminator to the VIDEO OUTPUT jack. The brightening pulse amplitude must be reduced by 1/2. Remove the 75Ω Terminator.

16. (cont'd)

c. Adjust Line Selector Range

Connect a voltmeter between gnd and the center tap of R458. Change the LINE SELECTOR to 21. Adjust the VIT Line Sel Range so the brightening pulse (test scope display) just starts to jump between the 21st and 22nd line. Note the voltmeter reading. Adjust the VIT Line Sel Range so the brightening pulse starts to jump between the 21st and 20th line. Note the voltmeter reading and adjust the VIT Line Sel Range for a voltage 1/2 way between the two noted readings.



d. Check Line Selector

Check that the brightening pulse starts on the corresponding line with the LINE SELECTOR in the 16-21 positions. Change the FIELD to ONE and repeat the check. The display on the TYPE 529 must be stable in each position of the LINE SELECTOR.

e. Check Line Selector Variable Range: <15th line to >25% of 2nd field; jitter: none

Rotate the LINE SELECTOR VARIABLE full ccw. Note the position of the brightening pulse (test scope display). The leading edge of the pulse must start on or before the 15th line. Change the test scope TIME/CM to 2mSEC. Slowly turn the LINE SELECTOR VARIABLE cw while observing the display on the TYPE 529. The display must be stably triggered on each horizontal sync pulse. (no indication of eratic sync pulse latching). With the VARIABLE full cw the brightening pulse (test scope display) must be at least 25% into the 2nd field.

17e. Select R418 for correct range.

17. STAIRCASE ADDER

a. Setup

Change the DISPLAY to 2 FIELD and center the display. Short pins E & F, on J501, together.

17. (cont'd)

b. Check Staircase Adder Relay reduces sweep to ≤2.5cm

Ground pin D of J501. The display sweep length should shorten to ≤2.5cm. Connect the output of the 4 step staircase generator (set for approx 12V P to P) to pin C of J501. Check for a display of four separate sweeps in 10cm. Repeat the check with the DISPLAY in 2 LINE.

Remove the staircase generator and shorting straps from J501.

18. TIMING

a. Adjust .125H/cm Timing range: ≥+ & - 2.5%; accuracy: ±2%

Change the DISPLAY to .125H/CM. Rotate the timing capacitor (C481) throughout its range. The timing capacitor must have sufficient range to vary the distance between horizontal sync pulses from 7.8cm to 8.2cm.

Adjust the timing capacitor so there is exactly 8.0cm between horizontal sync pulses.

Connect the color bar signal to the A VIDEO INPUT. Change the MAG to X25 and adjust the HORIZONTAL POSITION to display the back porch to the horizontal sync pulse. Vary the color bar signal amplitude from 200mV to 1.2V. Check that the color burst signal is phase locked (no interlacing).

b. Check .25 H/cm Timing ±2.5%

Change the DISPLAY to .25 H/CM. The distance between the 1st and 3rd horizontal sync pulse must be 7.8 to 8.2cm.

c. Check Magnified Timing X5: ±2%; X25: ±3%

Remove the video signal from the A VIDEO INPUT. Connect the TYPE 184 MARKER OUT to the A VIDEO INPUT and loop through to the test scope vertical input. Connect the + GATE A test scope output to the EXT NEG SYNC INPUT. Set the TYPE 184 for 1 and .1μs time marks. Set the test scope TIME/CM to 5μSEC and adjust the TRIGGERING LEVEL and STABILITY for a triggered display. Change the SYNC to EXT, MAG to X5 and DISPLAY to .125H/CM. Adjust the test scope TIME/CM and/or VARIABLE to obtain a stable display on the TYPE 529. Except for the first 10%, check the entire sweep for 12.7 1μs marks/8cm ±2%.

Change the MAG to X25. Adjust the HORIZONTAL POSITION to display the middle of the sweep.

a. Recheck .125H/CM timing with TYPE 184 1μS and 10μS time marks. Check the middle 8cm for 63.5μS/8cm.

18c. (cont'd)

Adjust C521 (C523 in RM529) for 31.75 .1μS marks/10cm. Except for the 1st 10%, check the entire sweep for 31.75 .1μs time marks/ 10cm ±3%. Remove the TYPE 184 signal.

19. FREQUENCY RESPONSE

a. Setup

Recheck steps 9a. and 9b.

Set the front panel controls as follows:

DISPLAY	2 FIELD
MAG	X1
VOLTS FULL SCALE	1.0
VARIABLE	CALIB
RESPONSE	FLAT
DC RESTORER	OFF
INPUT	A-B
SYNC	EXT

Connect a dual input coupler (1 T connector and 2 6" coaxial cables) to the A & B VIDEO INPUTS. Terminate both INPUTS with 75Ω. Connect the output of the TYPE 191 through a 50Ω to 75Ω min loss attenuator to the UHF T connector.

b. Adjust Common Mode Rejection ≥10:1

Set the TYPE 191 frequency to 2 MHz. Monitor the A VIDEO INPUT with the test scope and adjust the TYPE 191 amplitude for 1.5V. Adjust C133 for minimum deflection. The deflection at min must be ≤20 IEEE units.

c. Adjust Flat Response

350 kHz-6 MHz: +0% -1%
350 kHz-8 MHz: +0% -3%

c. The VIDEO OUT must be terminated with 75Ω when adjusting or checking the frequency response of the vertical amplifier.

Remove the dual input coupler and connect the TYPE 191 through the 50Ω to 75Ω min loss attenuator to the A VIDEO INPUT. Terminate the A VIDEO INPUT and the VIDEO OUT with 75Ω. Change the INPUT to A. Adjust the FLAT frequency response as follows:

VOLTS FULL SCALE	VARIABLE	TYPE 191 FREQUENCY	ADJUST	DEFLECTION (IEEE units)
1.0	CALIB	350 kHz	TYPE 191	140
1.0	CALIB	8 MHz	*L162, L262	max
1.0	CALIB	8 MHz	C269	135.8-140
1.0	CALIB	4 MHz	(dress) R162, R262	138.6-140
1.0	CALIB	6 MHz	check	138.6-140

Repeat the adjustments of C269, L162, L262, R162, R262 until the frequency response is flat within +0% -1% from 350 kHz to 6 MHz and flat within +0% -3% from 350 kHz to 8 MHz.

* In the RM529 it is usually necessary to adjust only the top slugs.

19c. (cont'd)

1.0	ccw	350 kHz	TYPE 191	140
1.0	ccw	6 MHz	check	135.8-144.2
0.5	CALIB	350 kHz	TYPE 191	140
0.5	CALIB	6 MHz	C118B	138.6-140
0.2	CALIB	350 kHz	TYPE 191	140
0.2	CALIB	6 MHz	C118C	138.6-140

d. Adjust Low Pass Response ≥80% down at 500 kHz

Change the VOLTS FULL SCALE to 1.0, INPUT to CAL, RESPONSE to LOW PASS and DISPLAY to 2 LINE. Adjust C232, L133, L233, L134, L234, L135 and L235 for optimum transient response on the calibrator waveform.

Connect the multiburst signal to the B VIDEO INPUT and terminate with 75Ω. Change the INPUT sw to B and touch up the adjustments for best transient response on the sync pulse and flag.

Return RESPONSE sw to FLAT and adjust 500 kHz for 100 IEEE units. Change RESPONSE to LOW PASS. The amplitude should not exceed 20 IEEE units.

e. Check IEEE Response

Change the RESPONSE to IEEE. Check the IEEE response with the controls set as follows:

TYPE 191 FREQUENCY	Check/Adjust	Deflection (IEEE units)
50 kHz	TYPE 191	100
350 kHz	check	94-97.5
1 MHz	check	70-80
2 MHz	check	31-42.5

Change the Volts Full Scale to 0.2.

3.6 MHz	check	28-70

Return the Volts Full Scale to 1.0.

19. (cont'd)

f. Adjust High Pass Response

Change the RESPONSE sw to FLAT and adjust the multiburst amplitude for 100 IEEE units of 3.58 MHz. Change the response to HIGH PASS. Adjust C239 for max 3.58 MHz amplitude. Adjust L138 and L238 for the same 3.58 MHz amplitude as in FLAT. Compromise between adjustments to keep the 3.58 MHz packet as symmetrical as possible. Check that the amplitude of the 3.18 MHz and 3.98 MHz packets are between 65 and 85 IEEE units.

Due to interaction it will be necessary to repeat the adjustments of the top and bottom slugs several times.

g. Check Low Frequency Response ≤1% tilt

Remove the TYPE 191 signal and connect the output of the TYPE 106 + FAST RISE to the A VIDEO INPUT. Set the TYPE 106 frequency to 50 Hz and adjust the SYMMETRY for 50% duty cycle. Adjust the amplitude for a display of 100 IEEE units.

The top of the squarewave must not tilt more than 1 IEEE unit.

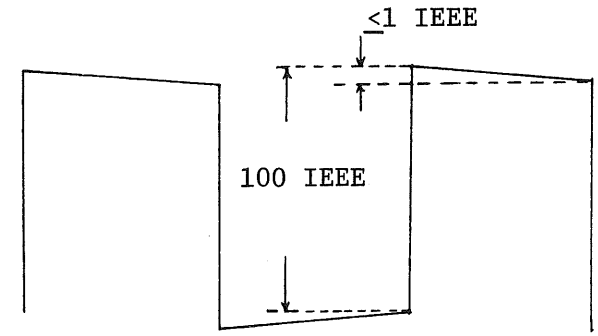
h. Check Video Out LF Response ≤3% tilt

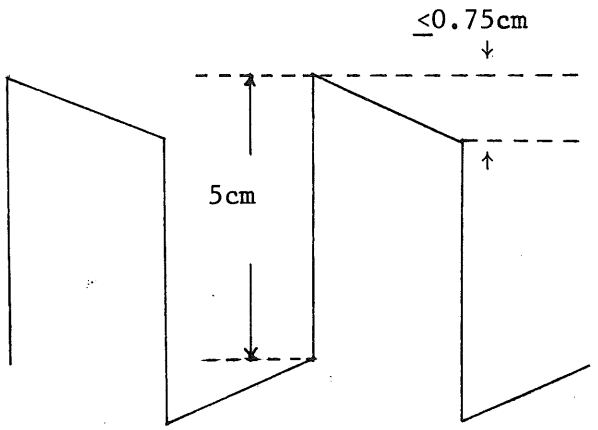
Remove the TYPE 106 signal and connect the pulse and bar signal to the A VIDEO INPUT, terminate with 75Ω. Connect a compensated 10X probe from the test scope to the VIDEO OUT jack. Externally trigger the test scope with field rate pulses from the junction of D377, D387. Set the test scope TIME/CM to 2mSEC and adjust the vertical deflection factor for a 6cm display (sync tip to top of window). The tilt on the top of the window must not exceed 3% (1.8mm).

f. Adjust High Pass Response (alternate method)

Remove the TYPE 191 signal. Connect the output of the Conrac Generator (set up with the special high pass signal) to the A VIDEO INPUT. Change the RESPONSE to FLAT and adjust the Conrac Generator amplitude for 100 IEEE units of 3.58 MHz. Change the RESPONSE to HIGH PASS. Adjust the top slug of T135 for 100 ±1 IEEE units of 3.58 MHz. Adjust the bottom slug of T135 so the amplitude of the 3.18 MHz and 3.98 MHz is between 65 and 85 IEEE units.

Due to interaction it will be necessary to repeat the adjustments of the top and bottom slugs several times.





19. (cont'd)

i. Adjust Bar Response ≤1/2 IEEE

Connect the bar signal from the Thompson Filter to the A VIDEO INPUT. Terminate the A VIDEO INPUT with 75Ω. Set the front panel controls as follows:

INPUT	A
DC RESTORER	ON
VOLTS FULL SCALE	1.0
RESPONSE	FLAT
DISPLAY	.25H
MAG	X5

Adjust the bar amplitude for 100 IEEE units and position the top of the bar to the 100 IEEE graticule line.

Adjust C167 for optimum flat top. The bar must be flat within 1/2 IEEE unit.

j. Check 1/2 T Pulse Response ≤3% down

Connect the output of a Video Generator to the A VIDEO INPUT. Program the Generator for a 1/2T and bar pulse. Adjust the output amplitude for 100 IEEE units of bar pulse. The amplitude of the 1/2T pulse must be 97-100 IEEE units.

Measure the preshoot and overshoot of the 1/2 T pulse. The amplitude of the preshoot or overshoot must not exceed 2 IEEE units.

k. Check IEEE & Low Pass Coil Polarization

k. TYPE 529 only.

Connect a 6.5μH coil to the output of the TYPE 190B. Set the TYPE 191 frequency to 50 kHz and amplitude to max (10V).

Set the RESPONSE to IEEE and INPUT to A.

Hold the coil (horizontally) next to the rear portion of the RESPONSE switch. There should be at least 10 IEEE units of displayed signal. Slowly move the coil to the front of the switch. As the coil passes the center of the switch the display amplitude must decrease and then increase as the coil is moved to the front of the switch.

20. RETURN LOSS

a. Adjust Video Input Return Loss
≥46dB

Connect the Return Loss Bridge (067-0576-00) to the TYPE 1A5 inputs. Set the 1A5 DISPLAY to A-B, A INPUT to AC, B INPUT to GND and VOLTS/CM to .2. Connect the TYPE 191 OUTPUT thru a 50Ω to 75Ω min loss ATTEN to the input of the Return Loss Bridge. Set the 191 frequency to 5 MHz and adjust the amplitude for 1 volt. Change the B INPUT to AC, VOLTS/CM to 1mV and adjust the Return Loss Bridge BAL control for min trace width. Note the common mode signal amplitude (should be less than 1mV).

Remove the 75Ω termination from one of the cables on the Return Loss Bridge, connect the cable to the A VIDEO INPUT and connect the terminator to the other connector on the loop through. Adjust the A loop through coil, by squeezing the windings together or pulling apart, for less than 2.5mV (minus the common mode signal noted previously) residual signal amplitude as viewed on the test scope. Check with all settings of the INPUT sw.

Repeat the adjustment on the B VIDEO INPUT coil.

THE END