

# TELEVISION PRODUCTS

## application notes

**Tektronix®**  
COMMITTED TO EXCELLENCE

no. 16

### Verifying the Bruch Blanking Sequence

Verification of the Bruch blanking sequence falls into the area of routine testing and, though necessary, is tedious. Using the accurate four-field selection of a 1480-Series Waveform Monitor can reduce the time required for this test. In essence, only 4 lines need to be observed to accurately determine if the sequence is occurring correctly on each field. Figure 1 shows the PAL Bruch blanking sequence and identifies lines 6, 310, 319 and 623. If the Bruch blanking sequence for PAL-M (525/60 used in Brazil) is being verified, using a PAL-M 1480-Series Waveform Monitor, disregard Figure 1. Lines 8, 259, 270, and 522 will be substituted for those above. Table 1, in the Verification Procedure, is prepared for both 625/50 PAL and 525/60 PAL-M.

The Verification Procedure that follows displays portions of two fields. The first field whose sync triggers the time base, corresponds to the field selected by front panel pushbutton. The investigation of the blanking sequence takes place at the end of this field and the beginning of the next field. Figure 2 shows field 4 followed by field 1 (FIELD 4 selected).

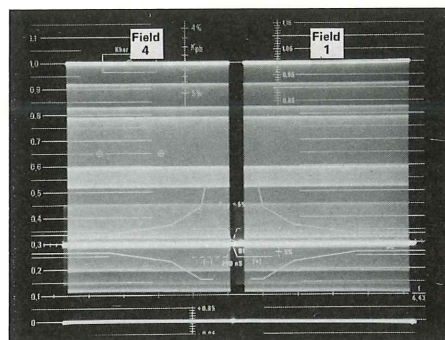


Figure 2.

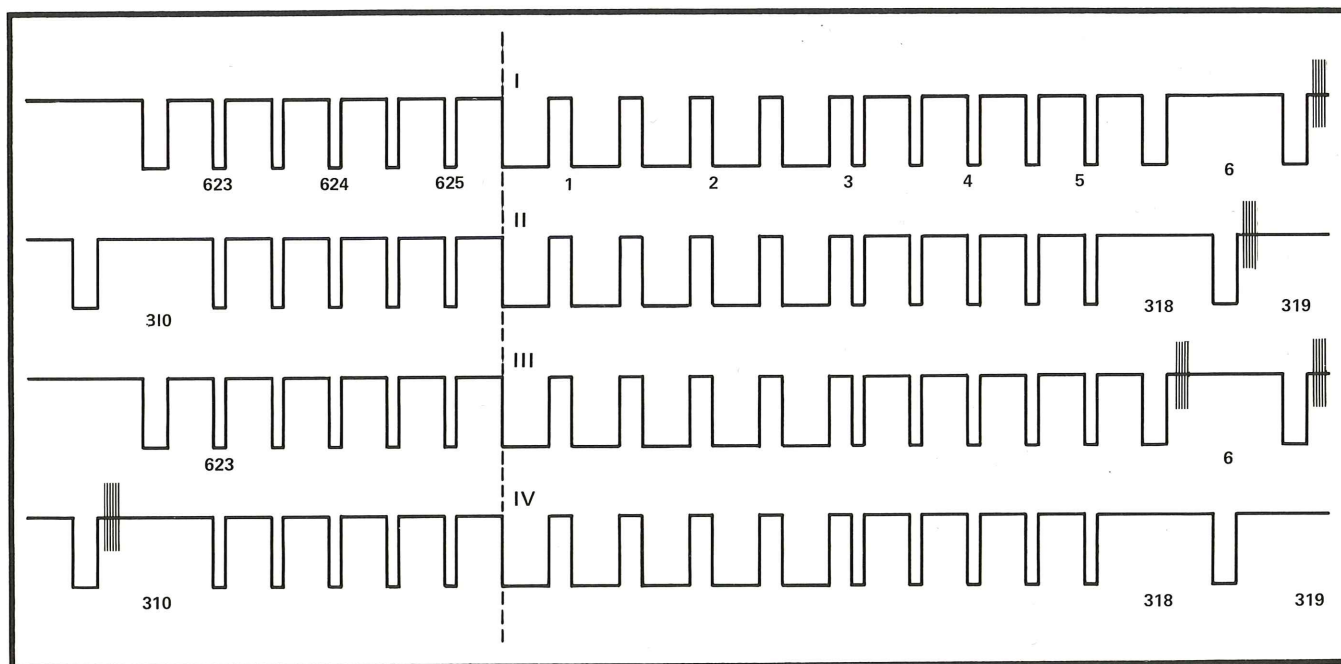
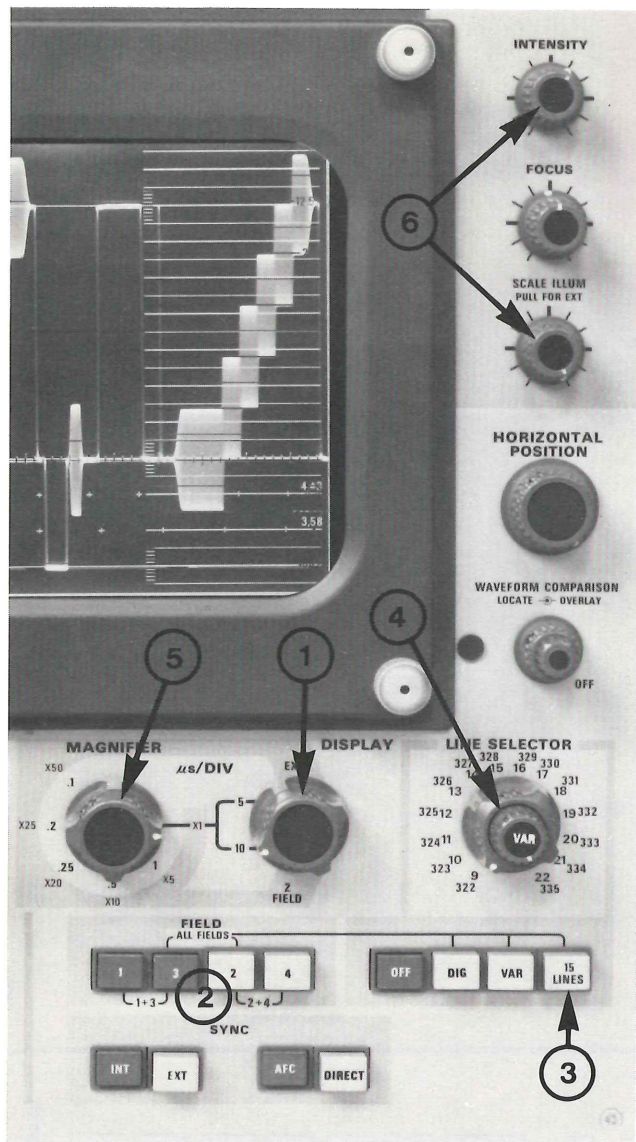


Figure 1.

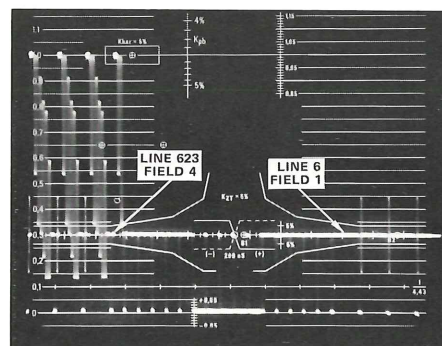


**Figure 3.**

Figure 3 shows the location of the switches and controls used in the following procedure. The numbers associated with the controls correspond to the step in the procedure in which that control is used.

#### Verification Procedure

1. Set the DISPLAY switch to 2 FIELD.
2. Depress FIELD 1 and 3 pushbuttons simultaneously.
3. Depress 15 LINES.
4. Adjust VAR LINE SELECTOR to place the intensified portion of the display on the interval between the two fields.
5. Turn the MAG switch to X50.
6. Adjust the HORIZONTAL POSITION to place the interval at mid-screen. Reduce the INTENSITY until the brightened interval is obvious. Readjust the VAR LINE SELECTOR as necessary to display the interval and at least 2 lines on either side of the interval.
7. Check for a burst on either side of the interval with a discernable flicker rate (caused by a reduced repetition rate) indicating the presence of the blanking sequence. Even if the sequence appears to be in error proceed to Step 8, where each field is investigated individually, so that the fault can be located.
8. Depress the FIELD 4 pushbutton. Check the display against that in Figure 4 and use Table 1 to determine if burst is occurring on the correct lines. Follow the remainder of Table 1 using Figure 5 as a reference to check out the entire Bruch blanking sequence.



**Figure 4.**

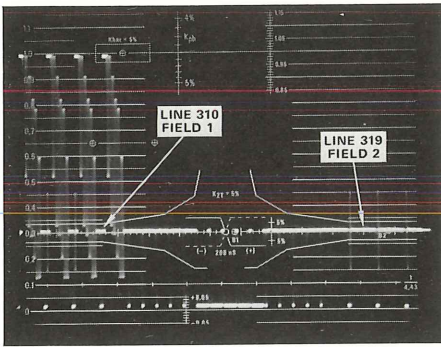


Figure 5a.

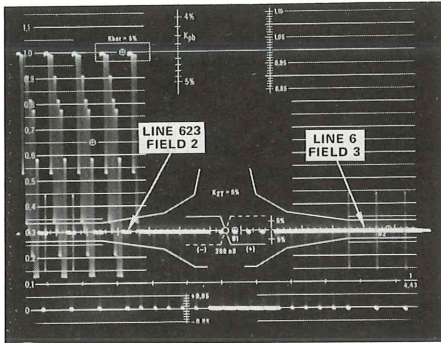


Figure 5b.

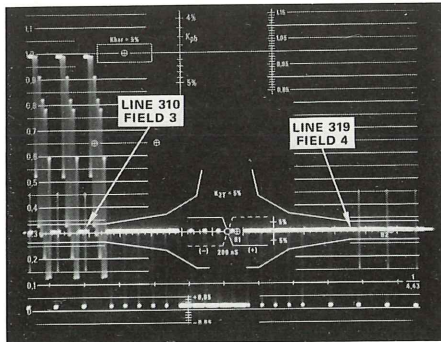


Figure 5c.

The switching used to check the Bruch blanking sequence can also be used to check burst phasing. A minor operational change to a TEKTRONIX 520-Series Vectorscope (521-521A for 625/50 PAL or 522-522A for 525/60 PAL-M) provides an accurately phased display of the burst on selected line for a particular field. Shift the lead that is on pin BO of the Sweep Circuit Board to pin BQ and lift the lead from pin BR. Connect the 1480-Series Waveform Monitor LINE STROBE OUT to the Vectorscope Z-AXIS INPUT and loop-thru connect the video signal to one of the Vectorscope signal inputs. Set the Vectorscope display to FULL FIELD. Set the 1480-Series Waveform Monitor's LINE SELECTOR to 17/330 and depress the DIG pushbutton. The Vectorscope is now displaying the phase of the burst for the selected lines as switched by the 1480-Series Waveform Monitor's FIELD selection pushbuttons. Burst phase is as follows: Field 1 — 135°, Field 2 — 225°, Field 3 — 225° and Field 4 — 135°.

This Application Note has taken advantage of two of the 1480-Series Waveform Monitor's display features, accurate field selection and the 15-line display (used to intensify the displayed vertical intervals). In addition the LINE STROBE OUT was used, along with the field switching, to control the display on a Vectorscope for a quick look at burst phasing.

Table 1

Field Selector	Field	Line Number		Burst	
		PAL	(PAL-M)	PAL	(PAL-M)
4	4	623	(522)	No	(Yes)
	1	6	(8)	No	(No)
1	1	310	(259)	No	(Yes)
	2	319	(270)	Yes	(No)
2	2	623*	(522)	No	(No)
	3	6	(8)	Yes	(Yes)
3	3	310	(259)	Yes	(No)
	4	319	(270)	No	(Yes)

\*No burst on either line 622 or line 623 of field 2.

# CHARACTERISTICS

**SCALE FACTOR**—INPUT A and B 1.0 Volts Full Screen  $1 \pm 3$  mV, 0.5 Volts Full Screen  $\pm 15$  mV, 0.2 V/F Screen  $\pm 6$  mV.

**Ratio:** INPUT A to INPUT B 1,  $\pm 0.002$ , to 1, AUX VIDEO IN to INPUT A  $1.5 \pm 0.3$  dB.

**GAIN**—INPUT A to AUX VIDEO OUT 1,  $\pm 0.005$ , INPUT A to PIX MONITOR OUT 1,  $\pm 0.02$ .

**VARIABLE VOLTS FULL SCALE RANGE**—Input signals between 0.7 volts and 2.0 volts can be adjusted to 1 volt equivalent display height.

**Maximum Input Signal**—for inspecification operation of AUX VIDEO OUT and PIX OUT, AC CPL'D: INPUT A and B 2.0 V P-P at any APL—Display distortion, 1.0 V P-P at any APL if both AUX VIDEO OUT and PIX OUT are terminated for distortion-free signal at those outputs. DC CPL'D: INPUT A and B  $\pm 1.5$  V, DC  $\pm$  Peak AC, AUX VIDEO IN  $\pm 1.5$  V, DC  $\pm$  Peak AC.

**Maximum Output DC Voltage, AUX VIDEO OUT and PIX MONITOR OUT into 75  $\Omega$ — $\pm 0.5$  V DC. Common Mode Rejection Ratio (A-B)—60 Hz  $\geq 46$  dB, 15 kHz  $\geq 46$  dB, 4.43 MHz  $\geq 34$  dB.**

**Frequency Response**—FLAT including: INPUT A or INPUT B Through AUX VIDEO OUT or PIX MONITOR OUT from 50 kHz Reference: 50 kHz to 5 MHz  $\pm 0.5\%$ , 5 MHz to 10 MHz  $\pm 0.5\%$ ,  $-3\%$ . IRE: Conforms to IRE 1958 standard 23S-1. Attenuation at 4.43 MHz,  $\geq 22$  dB. LOW PASS: Attenuation  $\geq 14$  dB, 500 kHz and above. 3.58 MHz  $\pm 1\%$  of FLAT at 3.58 MHz, 3 dB down at 3.1 to 3.4 MHz and 3.8 to 4.0 MHz. 4.43 MHz  $\pm 1\%$  of FLAT at 4.43 MHz, 3 dB down at 3.9 to 4.1 MHz and 4.7 to 4.9 MHz. DIFF'D STEPS: Permits amplitude comparisons of risers on stair-step signal with automatic gain increase of 5 times, attenuation  $\leq 2$  dB from 0.4 to 0.5 MHz, attenuation  $\geq 20$  dB at 15 kHz and 2 MHz, attenuation  $\geq 40$  dB at 3.58 MHz and 4.43 MHz.

**Linear Waveform Distortion**—Pulse Preshoot, Pulse Overshoot, and Pulse Ringing  $\leq 0.5\%$  of applied pulse amplitude. 25  $\mu$ s Bar Tilt  $\leq 0.5\%$ , Field Square Wave Tilt  $\leq 1\%$ , Pulse to Bar Ratio 0.99:1 to 1.01:1 or 0.99 to 1.01:1.

**Non-Linear Waveform Distortion**—Differential Gain Displayed  $\leq 0.5\%$  at any APL, AUX VIDEO OUT and PIX MONITOR OUT  $\leq 0.25\%$  at any APL. Differential Phase—AUX VIDEO OUT and PIX MONITOR OUT  $\leq 0.25^\circ$  at any APL.

**DC RESTORER**—Mains Hum Attenuation, Slow  $\leq 10\%$ , Fast  $\geq 26$  dB. Shift caused by Presence or Absence of Burst  $\leq 1$  IRE or 7 mV.

**Return Loss (With 75  $\Omega$  Termination)**—INPUT A or B  $\geq 40$  dB, DC to 5 MHz, AUX VIDEO IN, AUX Video OUT, or PIX MONITOR OUT  $\geq 34$  dB, DC to 5 MHz.

**Vertical Overscan**—for 1 V Peak-to-Peak Composite Video Signal all specifications are valid at 1.0, 0.5, and 0.2 volts FULL SCALE, and any vertical position setting to 5 MHz.

**Calibrator Accuracy**—1 V  $\pm 0.2\%$ , 714 mV and 700 mV  $\pm 0.5\%$ .

**Timebase Accuracy and Linearity**—5  $\mu$ s/DIV and 10  $\mu$ s/DIV Accuracy Over Center 10 Div  $\pm 1\%$ , Linearity Overall  $\pm 1\%$ .

**Magnified Timing and Linearity**—For center 10 divisions of unmagnified sweep:  $\pm 2\%$  accuracy,  $\pm 2\%$  linearity.

**2 FIELD Sweep Length and Linearity**—12.7 div,  $\pm 0.5$  div.

**FIELD SELECTOR**—Positive selection of ODD (2 & 4) or EVEN (1 & 3) in 525/60 Systems. Display starts on selected field. Positive selection of 1, 2, 3, or 4, or 1 & 3, 2 & 4, in 625/50 Systems. Display starts on selected field.

**LINE SELECTOR**—VARIABLE Range: From approximately line 20 of the selected field to approximately line 8 of the next complementary field (example, line 20 or field 1, to line 8 of field 3). Lines intensified by the strobe in 2 FIELD display are the lines displayed in 5  $\mu$ s/DIV or 10  $\mu$ s/DIV. DIGITAL: Selects line 9/322 to line 22/335. 15 LINE: Identical to VARIABLE, except that 15 successive lines are displayed. ALL FIELDS: Time overlay of all fields any setting of the DISPLAY switch.

**Sync Input Requirements**—INT 200 mV peak-to-peak to 2 V peak-to-peak composite video. EXT 400 mV peak-to-peak to 2 V peak-to-peak composite video, 200 mV peak-to-peak to 8 V peak-to-peak composite sync. Return loss  $\geq 46$  dB down to 5 MHz.

**Maximum Jitter with 1 V Peak-to-Peak Composite Video + ( $-26$ ) dB White Noise**—Direct 250 ns, AFC 90 ns.

**Maximum Jitter with Missing Horizontal Sync Pulses**— $\leq 15$  ns/missing sync pulse (maximum of 10 consecutive horizontal sync pulses missing).

**50 Hz/60 Hz Recognition**—Automatically recognizes 50 Hz or 60 Hz scan in dual standard instrument.

**Horizontal Trigger**—AFC: Horiz. Frequency 15,750  $\pm 200$  Hz, Lock-In Time  $\leq 1$  sec. Maximum Jitter with Respect to Input Sync 10 ns—Input composite Video or Composite Sync from a 140-series Generator, 12 ns—Variable APL, 12 ns—Variable APL & 4 V rms Hum, 30 ns—Variable APL & 4 V rms Hum + ( $-36$ ) dB White Noise. Jitter Reduction with Respect to White Noise  $\geq 8$  dB.

**DIRECT**—Horiz. Frequency Range  $\leq 20$  kHz. Maximum Jitter with Respect to Input Sync 12 ns—input Composite Video or Composite Sync from a 140-series Generator, 20 ns—Variable APL, 20 ns—Variable APL & 4 V rms Hum, 90 ns—Variable APL & 4 V Tum  $\pm$  ( $-36$ ) dB White Noise.

**EXTERNAL HORIZ IN**—Sensitivity 0.5 V/div, Linearity  $\pm 1\%$ .

**RGB/YRGB J9036**—RGB Sweep Length Internally selected for  $\frac{1}{3}$  normal sweep. YRGB Sweep Length internally selected for  $\frac{1}{4}$  normal sweep.

**WAVEFORM COMPARISON**—LOCATE: Range sufficient to place LOCATE indication any place on 5  $\mu$ s/DIV, or unmagnified 10  $\mu$ s/DIV sweeps. OVERLAY: Range sufficient to overlay any selected portion of 5  $\mu$ s/DIV or unmagnified 10  $\mu$ s/DIV on any other portion.

**LINE STROBE OUT**—Strobe output of line or lines selected by VARIABLE, 15 LINE, or DIGITAL line selector modes and the DISPLAY switch. TTL-amplitude, ac-coupled. Time Constant = 1  $\mu$ F, 10 k $\Omega$ .

## OPTION 1

**10X Probe Channel**—Scale Factor adjustable to 1 V peak-to-peak equivalent display height, GAIN Range  $\pm 10\%$ . Gain to AUX VIDEO: Unity,  $\pm 3\%$ , with gain adjusted for 1 V peak-to-peak equivalent display height. Tilt  $\leq 5\%$  on 50 Hz square wave, High Frequency Response  $\pm 1\%$ , 25 Hz to 5 MHz.  $\pm 3\%$ , 5 MHz to 10 MHz. Referenced to 50 kHz. Differential Phase  $\leq 0.25^\circ$  at any APL, Differential Gain  $\leq 0.25\%$  at any APL, Input Resistance 1 M $\Omega$ ,  $\pm 2\%$ , not including probe, Input RC Product 20  $\mu$ s,  $\pm 0.5\%$ , not including probe. BNC connector accepts most TEKTRONIX probes. P6065A probe recommended.

**10X Probe Calibrator**—Output Voltage 1.000 V  $\pm 0.005$  V or 0.995 to 1.005 V.

## OPTION 4

**TAPE T.W. SYNC Input**—NTSC: Syncs to either a standard negative-going composite sync pulse of 3.5 V to 4.5 V in amplitude, or a 240 Hz negative-going tape recorder pulse, 1.5 V to 4.5 V in amplitude, 2,083 ms in width, and 4.166 ms in period. PAL: Syncs to negative-going 200 Hz tape recorder pulse, 1.5 to 4.5 V in amplitude 2.5 ms in width, and 5 ms in period.

**Mains Voltage**—Ranges: 100 VAC, 110 VAC, 120 VAC, 200 VAC, 220 VAC, 240 VAC  $\pm 10\%$ . Frequency: 48 Hz to 62 Hz, Max Power Consumption 75 W.

**OPERATING TEMPERATURE**—0°C to 50°C.

## Dimensions and Weights

1480 C Series		
Height	8.25 in	21 cm
Width	8.50 in	21.6 cm
Depth	16.95 in	43.0 cm
Net Weight	21.5 lb	9.81 kg
Domestic shipping weight	$\approx 28.5$ lb	$\approx 12.9$ kg
Export-packed weight	$\approx 41.5$ lb	$\approx 18.8$ kg

Two 1480 C Series Waveform Monitors can be mounted side-by-side, or one mounted alongside an associated picture monitor in a standard 19-inch rack or console.

1480 R Series		
Height	5.25 in	13.3 cm
Width	19.0 in	48.2 cm
Rack Depth	18.0 in	45.7 cm
Net Weight	24.6 lb	11.2 kg
Domestic shipping weight	$\approx 53.1$ lb	$\approx 24.1$ kg
Export-packed weight	$\approx 75.1$ lb	$\approx 34.1$ kg

Instrument fits standard 19-inch rack.

## ORDERING INFORMATION

1480C NTSC Waveform Monitor  
1480R NTSC Waveform Monitor  
1481C PAL Waveform Monitor  
1481R PAL Waveform Monitor  
1482C PAL M Waveform Monitor  
1482R PAL M Waveform Monitor  
1485C PAL/NTSC Dual Standard Waveform Monitor  
1485R PAL/NTSC Dual Standard Waveform Monitor

Option 01 1 megohm, 20 pf probe input (probe not included)

Suggested Probe  
P6065A 10X Probe, 6-ft, Order 010-6065-13  
9-ft, Order 010-6065-15

Option 02 With carrying Case (Cabinet Version Only)

Option 03 With Blank CRT

Option 07 Slow Sweep

Option 08 Adds capability of recognizing four field sequence of SECAM (1481C, 1481R, 1485C, 1485R only)

TEKTRONIX Automatic Correction Products are also available for 525/60 NTSC systems.

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