

**COLOR BAR
PATTERN GENERATOR
CPG-1366**

**Operation
Manual**

NTSC COLOR BAR PATTERN GENERATOR WITH VIDEO OUTPUT

DESCRIPTION

This Pattern Generator is a high stability instrument designed for testing different operational circuits in TV receivers. Six most useful patterns are available for checking color generation, convergence, purity, white balance, and raster alignments.

SPECIFICATIONS

RF Output

Frequency

Switchable picture carriers:

IF: 45.75MHz

Channel 7 175.25(87.625 x 2)MHz within $\pm 0.5\%$

Channel 9 187.25(93.625 x 2)MHz within $\pm 0.5\%$

Video output: 1Vp-p into 75 ohm and FINE ADJ.

Output

Impedance

75 ohms, balanced.

Output Voltage

Aprox. 10 millivolts into 75 ohms.

Sync Signals

Crystal controlled:

Horizontal 15.75KHz.

Vertical 60.11Hz (Progressive scanning)

Return Trace

Blanking

Horizontal and vertical.

Patterns

Color bars	Ten bars, offset type; spacing at 30 degree phase intervals. Offset subcarrier frequency: 3.563795MHz within ± 200 Hz.
Dots	White dots at crosshatch intersections.
Crosshatch	White square figures: 21 vertical and 15 horizontal lines
Vertical Lines	21 white lines.
Horizontal Lines	15 white lines.
Raster	White noise-free raster.

Operating Temp

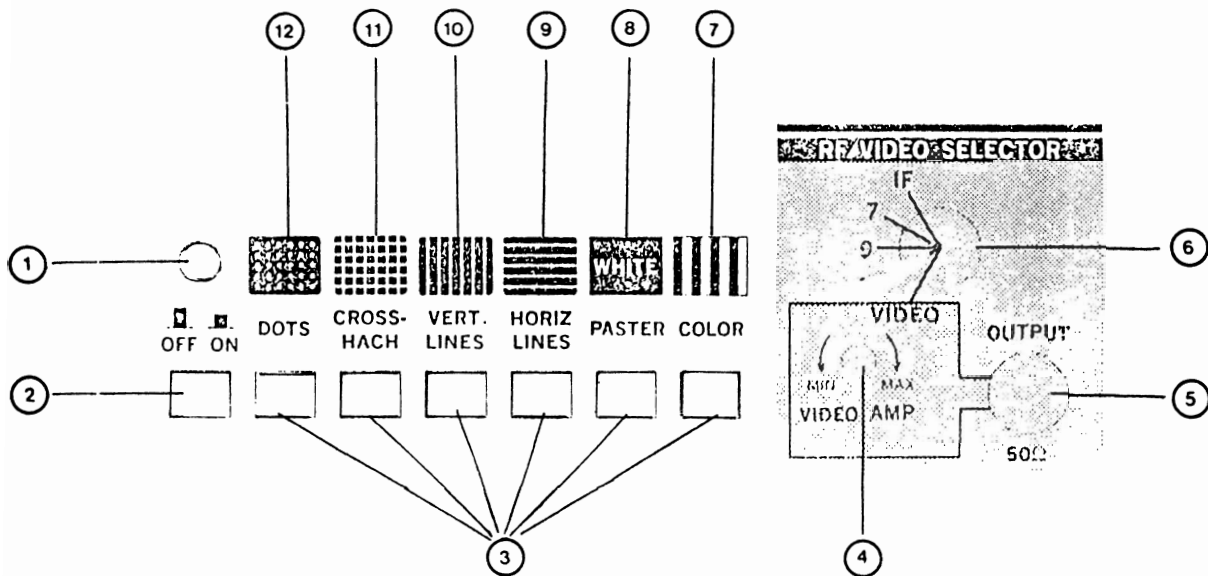
Range 32° to 122°F (0° to 50°C).

Power Supply Battery AA-3 x 6 or adapter 7 - 10V.

PANEL DESCRIPTION:

- 1 Pilot lamp: INDicates when the AC power is ON
- 2 POWER switch
- 3 PATTERN SWITCH: Selects the pattern as marked on the panel
- 4 "VIDEO" output adjustor
- 5 RF/VIDEO output jacket
- 6 CHANNEL switch: Rotaly type: **select the video channel at "IF", "7", "9", "VIDEO".**
- 7 Colors Bars
- 8 White Raster

- 9 Horizontal Lines
- 10 Vertical Lines
- 11 Crosshatch
- 12 Dots



4. Preparation

4.1 Safety Precautions

When the TV receiver chassis is exposed for checking and adjustments, observe all the safety rules related to handling such apparatus. Refer to the manufacturer's service instructions.

4.2 Preliminary Notes

4.2.1 TV receiver adjustments:

Before connecting the generator to the TV receiver, make an operational check with the T.V. broadcast signal.

The horizontal and vertical hold controls must be set to properly lock the picture signal. If the receiver is provided with automatic controls, internal or external, such as AFC and ATC (automatic tint control), set these at manual. Other controls, namely brightness, contrast, tint (or hue), color gain (amplitude or saturation) should be set for good reception.

Set audio gain at minimum. (Audio testing is not necessary.)

4.2.2 Connections and Adjustments:

1. Connect the AC plug to the AC line; set POWER switch at on. Connect the output cable to the VHF input in the receiver.
 - a. Set the ROD-EXTERNAL switch, if used, at EXTERNAL.
 - b. The output cable (300 ohms) can be used without serious mismatching when the receiver input is 75 ohms.
2. Set the LOCAL-DISTANT switch at DISTANT.
3. Select one of three channels 7, 9 or 11 depending on local conditions. If two or three channels are on the air at the same time, use the one with the least interference.
4. Select the pattern with the center knob.
5. Set the TV tuner at the generator channel.

6. Adjust the fine tuning for clear pattern display.
7. Remarks:
 - a. If the pattern is not displayed, or the black-white condition is reversed, adjust the fine tuning. Also check the channel settings in the receiver or generator; making certain that the cable is properly connected.
 - b. When "snow" noise appears with the signal, check the cable for open circuit or bad connections.

5. Use of the Patterns

5.1 General

In this section, practical applications of the patterns will be described. For detailed T.V. set circuit adjustments, the operator should refer to the manufacturer's service manual.

In the chart which follows, the use of different generator patterns is listed.

CHART FOR TEST PATTERN SELECTION

CIRCUIT CHECKS		Color Bars	Dots	Crosshatch	Vert. Lines	Horiz. Lines	White Raster	Refer to Section
Sync and Deflection Circuits								
Sync Separator/Amplifier				•				5.6.1
H or V Oscillator				•				
H AFC or APC				•				
H or V Hold				•				
H or V Centering				•				
Deflection Yoke Alignment				•				5.6.4
Linearity				•				5.6.6
Pincushion				•				5.6.4
Overscan:	Horizontal	•			•			5.2/5.7.1
	Vertical					•		5.7.2
Video Amplifier:	Smear		•		•			5.5.3:A
	Ringing				•			5.5.3:B
Color Circuits:								
Bandpass Filter		•						5.5.3:B
Burst Keyer		•						
Burst Amplifier		•						
3.58MHz Oscillator		•						
AFC, APC		•					5.5.4	
Demodulator		•						
Matrix		•						
Tint		•						5.3
Color Killer			•		•			5.5.1
Purity							•	5.8.1
White Balance							•	5.8.2
Static Convergence			•					5.8.2
Dynamic Convergence				•	•	•		5.6.2
Focus		•						5.5.4
High Voltage Regulator			•					5.6.5
Power Supply Ripple							•	5.8.3

The color bar pattern is shown in Fig. 5-1.

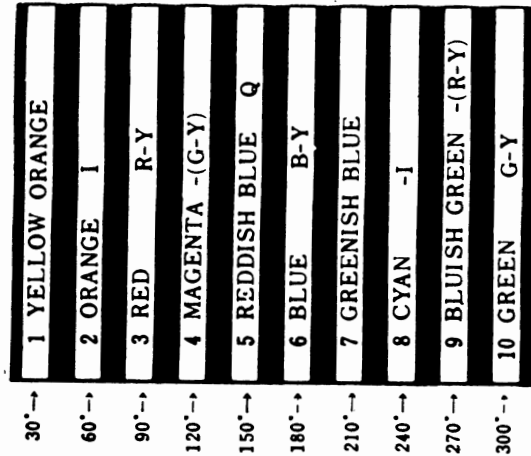


Fig. 5-1 Color bar pattern.

Figure 5-1 identifies the colors and bars which are phased with I, Q, R-Y, and G-Y. As noted at the lower part, each color is at a 30 degree phase interval referred to the color burst, also see Fig. 5-2. This type of color bar display is the gated or keyed rainbow form.

As shown in Fig. 5-1, the pattern is made up of ten color bars. Unless the horizontal hold, centering, and width controls are properly adjusted, the two end bars will not be displayed. *In general, with properly adjusted horizontal overscan, only one-half of bars No. 1 and No. 10 will be on the screen.*

The edges of the color bars will show zigzags which run up and down Barber Pole Effect; this is a normal condition.

5.3 Tint Control Adjustments

Set the brightness, contrast and color gain controls at midposition and the ATC (automatic tine control) switch at manual.

Adjust the tint control for the colors shown in Fig. 5-1.

If the tint control has to be fully set to one side, adjust the subcarrier phase shift circuit. This adjustment is made so that there is a range over which the tint can be controlled.

In the color bar signal, the luminescence component is approximately 25%. This makes it possible to use the brightness or contrast controls to adjust the brightness of the color bars.

When the color gain control is advanced too far, saturation will occur and only the red, blue and green bars will appear instead of the ten colors. Therefore, the color gain control setting should be carefully set. (*Note that maladjustment of the fine tuning will produce the same effect.*)

- NOTES:
1. When white bars appear instead of color bars, adjust the fine tuning or advance the color gain control.
 2. When the color of the bars is unsteady (color sync not effective), adjust the fine tuning. If correction cannot be made, check the color circuits.

5.4 Color Signal Tracing with a Scope

By displaying the color bar pattern signals on a scope, waveforms and voltages in different circuits of the receiver can be checked. These circuits include the bandpass amplifier, burst keyer, 3.58MHz oscillator, AFC, automatic phase control, phase shifter, demodulator, and matrix.

Waveforms can be compared with those in the manufacturer's service manual. Adjustments of the variable components can be made readily.

Voltage waveforms at the tri-color CRT grids are shown in Fig. 5-2. (In the cathode drive, the display will be inverted.)

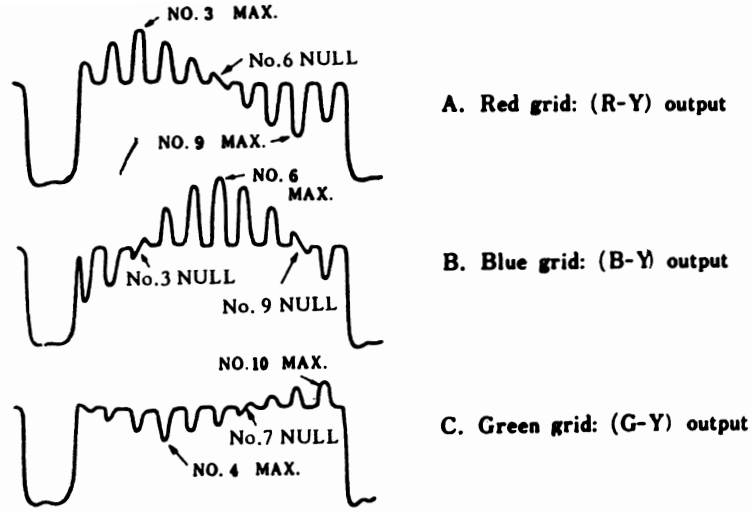


Fig. 5-2 Gated rainbow signal waveforms.

The vectorscope display of volage waveforms is shown in Fig. 5-3. The scope connections are: R-Y output to Y-axis and B-Y output to X-axis. (In Cathode drive the Vector scope display will be inverted.)

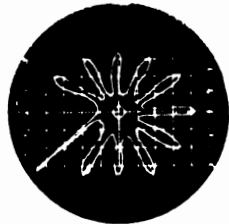


Fig. 5-3 Vectorscope display

Details of the phase relations of the color bars are shown in Fig. 5-4.

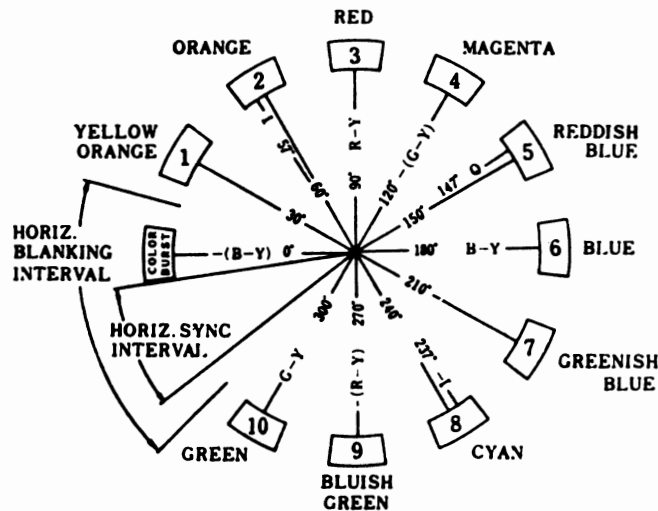


Fig. 5-4 Phase relations in the gated rainbow signal.

5.5 Dot Pattern

The dots are white and formed at the intersections of the vertical and horizontal lines in the cross-hatch. The total is 315 dots (21 vertical and 15 horizontal). However, because of raster overscan, the actual number appearing on the screen is about 80% of the total (230 to 250 dots).

The dot display is used in the following tests and adjustments.

5.5.1 Color Killer Adjustment:

The dot color will “flicker” when the color killer is adjusted. The killer is set at the point where the color is absent. (This adjustment can also be made with use of the vertical line pattern.)

5.5.2 Static Convergence Adjustment:

Adjustments are made so that at the center of the screen, white dots are produced with the overlapping of red, blue and green colors.

5.5.3 Video amplifier check:

A. Smear. This effect is apparent when there is a white or black “tail” at the right hand side of the dots. (The same effect will be observed on the lines when the vertical line pattern is used.)

B. Ringing. When there is ringing in the amplifier, one or several small white or black dots will appear close to the right hand side of the main dots. (White or black vertical lines will appear when the vertical line pattern is used.)

C. Note. These two effects will also be observed when the fine tuning is not properly set.

5.5.4 Focus Check and Adjustment:

Set brightness and contrast controls at midposition.

Set the focus control so that the dots are nearly round, or slightly oval horizontally.

If the dots at the center of the screen are not the same in size, check the dynamic focussing circuit.

5.6 Crosshatch Pattern

The crosshatch is made up of white lines, 21 vertical and 15 horizontal forming squares. Generally, due to overscanning, 17 to 19 vertical lines and 13 horizontal lines will be displayed on the screen. see Fig. 5-5.

NOTES: *With small diameter screens, the horizontal lines may appear dimmer than vertical lines, due to insufficient bandwidth in the video amplifier. Correction may be made by lowering the contrast or with fine tuning adjustment.*

5.6.1 Sync and deflection circuit checks:

In checking, adjust horizontal hold and vertical hold controls and note whether the crosshatch pattern is properly locked (synchronized) over a wide range and is not offset to one side.

If the above conditions are not satisfied, check and adjust voltage waveforms in following circuits:

1. Sync separator/amplifier.
2. Horizontal or vertical oscillator.
3. Horizontal AFC.

5.6.2 Dynamic convergence checking:

This check is made after the static convergence test, see Sect. 5.5.2.

In dynamic convergence checking, the crosshatch pattern should be with white lines, or the overlapped conditions of red, blue and green colors.

When the lines are not white, adjust the dynamic convergence controls.

NOTE: The same check can be made with use of the vertical or horizontal line patterns.

5.6.3 Pincushion Correction:

When vertical and horizontal lines are curved in the crosshatch pattern, adjust the pincushion correcting circuit.

5.6.4 Deflection yoke alignment and centering:

The deflection yoke will require proper positioning when vertical and horizontal lines in the pattern are not aligned with the X- and Y-axis of the CRT, see Fig. 5-5.

When properly positioned, the centering magnet may require adjustment to center the raster.

In practice, 17 to 19 vertical lines and 13 horizontal lines will be displayed.

5.6.5 High voltage regulation check:

When the high voltage regulation is poor, it can be detected with the crosshatch pattern.

The effect is that vertical lines are not continuous but with slight curvature when they cross the horizontal lines.

NOTE: *The same effect may be observed if the horizontal hold and horizontal AFC adjusters are improperly set.*

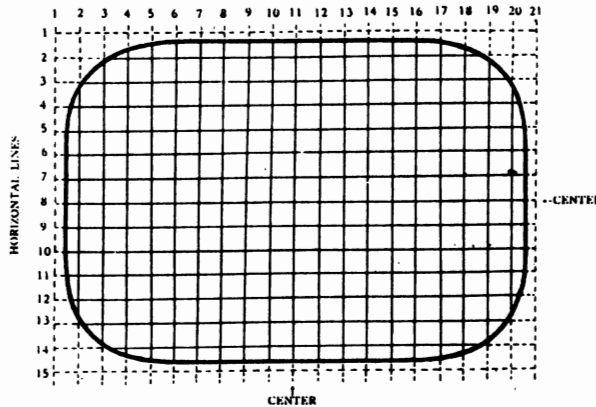


Fig. 5-5 Yoke alignment and centering

5.6.6 Linearity check:

Each square in the crosshatch must be the same in size, vertically and horizontally. If not, adjust the horizontal linearity and vertical linearity circuits.

5.7 Vertical and Horizontal Line Patterns

The two types of line patterns can be used for the same purpose as with the crosshatch pattern. However, these patterns are specially adapted for the following checks:

1. **Horizontal overscan.**
Set the horizontal width control so that 17 to 19 horizontal lines are displayed.
2. **Vertical overscan**
Set the vertical height control so that 13 vertical lines are displayed.

5.8 White Raster Pattern

The pattern is 100% white and noise-free.

The intensity can be adjusted with the brightness and contrast controls.

5.8.1 Purity Check and Adjustment:

When the white raster is not uniform over the whole surface of the screen, turn off the power to the receiver. Next, turn on the switch; this action automatically de-gausses the CRT.

If this does not “clean” the surface, move the deflection yoke forward and backwards. Until the whole surface is all-white. (without partial coloring)

In this check, if the blue and green grids in the CRT are grounded through 100K Ω resistors, an all-red display will appear and purity can be readily adjusted.

5.8.2 White balancing:

As the brightness control is varied the intensity of the raster should not change to a faint grey or black. If it does, then for the white balancing, adjust the screen voltages of the color CRT.

5.8.3. Power Supply Ripple Check:

When a wide and dark horizontal line repeatedly moves down-ward on the screen, it is an indication of AC ripple voltage affecting the video amplifier.

Capacitors in the decoupling circuits in the DC supply line should be checked for defects.

Furthermore, trouble in the DC power supply will be indicated when curved color bars move from the top to bottom on the screen.

