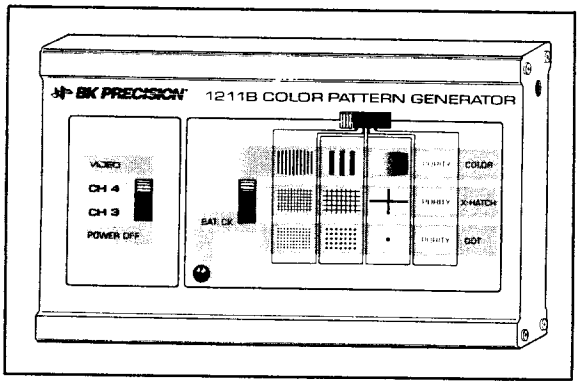
INSTRUCTION MANUAL

BK PRECISION

MODEL 1211B



COLOR PATTERN GENERATOR

BK PRECISION

TEST INSTRUMENT SAFETY

WARNING

An electric current of 10 milliamps through the heart will stop most human heartbeats. Voltage as low as 35 volts dc or ac rms should be considered hazardous; it can be fatal under certain conditions. Higher voltages are more dangerous.

1. There are no high voltages in the color pattern generator, but the video equipment under test usually contains hazardous high voltage.

2. Some equipment with a two-wire ac power cord, including some with polarized power plugs, is the "hot chassis" type. This includes most recent television receivers. A plastic or wooden cabinet insulates the chassis to protect the customer. When the cabinet is removed for servicing, a serious shock hazard exists if the chassis is touched. To make measurements in "hot chassis" equipment, always connect an isolation transformer between the ac outlet and the equipment under test. The **B & K-Precision** Model TR-110 or 1604 Isolation Transformer, or Model 1653 or 1655 AC Power Supply is suitable for most applications.

(continued on inside rear cover)

Instruction Manual
for
BK PRECISION®
Model 1211B
Color Pattern
Generator

BK PRECISION®
6470 West Cortland Street
Chicago, Illinois 60635

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INTRODUCTION

The **B & K-Precision** Model 1211B Color Pattern Generator produces ten patterns of broadcast-stable video signals in an ultra-compact battery operated, portable package. The patterns provide complete and easy convergence of color receivers, and are invaluable in analyzing, adjusting and troubleshooting television receivers, video monitors, video tape recorders, and most other video products.

The unit is suitable for field or shop use. It is small enough to fit into a field service kit. The cast aluminum and steel housing is sturdy, yet lightweight. The case affords exceptional rf shielding while offering ruggedness to withstand daily use.

This versatile instrument generates composite video output or video modulated rf output on two vhf channels. The level of video and rf outputs is fully adjustable.

CMOS integrated circuits assure long battery life while digitally generating all video, sync, and gating signals. All signals are derived from a crystal-controlled master oscillator, assuring stable jitter-free patterns.

Selectable patterns include 10 color bars gated at 30° intervals from burst, three color bars gated at 90°, 180°, and 270° from burst, and an ungated rainbow. The color patterns test color circuits and permit color demodulator alignment. Color level is adjustable from 0 to 100% to adjust color saturation and for observing operation of the color killer circuit.

Dot and crosshatch patterns are indispensable when adjusting convergence on color receivers, and for linearity, centering, and size testing and adjustment. A clear purity pattern enhances the speed and accuracy of purity adjustments.

SPECIFICATIONS

PATTERNS

Purity: Clear raster.

Dots: Single center dot, 11 x 7, 21 x 15.

Crosshatch: 1 x 1 crosshair, 11 x 7, 21 x 15.

Color Bars:

Gated Rainbow: 10 bars gated at 30° intervals from burst.

R-Y, B-Y, -(R-Y): 3 bars gated at 90°, 180°, and 270° from burst.

Ungated Rainbow: 360° phase change across screen from burst.

SYNC

Horizontal

Frequency: 63.49 µs (15,750 Hz).

Width: 5.29 µs.

Vertical

Frequency: 16.63 ms (60.11 Hz).

Width: 254 µs.

LINE WIDTH

Horizontal: 1 horizontal scan line.

Vertical: Approximately 0.3 µs.

CHROMA

Subcarrier: 3.563795 MHz; standard subcarrier offset by one horizontal line (3.579545 MHz - 15,750 Hz).

Frequency Stability: ±25ppm.

Gating: 10 bars and 3 bars produced by gating with 189 kHz and 63 kHz respectively.

Level: Externally adjustable from 0 to 100%.

SIGNAL SYNTHESIS

Scan: Progressive, using CMOS integrated circuits for long battery life.

Stability: Sync, video, and color bar gating derived from crystal-controlled 378 kHz master oscillator.

RF OUTPUT

Channels: VHF Channels 3 or 4; switch selectable.

Level: 10,000 µV to 100,000 µV p-p (typical into 75 Ω). Continuously adjustable.

Output Impedance: 75 ohms.

VIDEO OUTPUT

Level: Adjustable to 1 V p-p into 75 Ω with power supply at 9 V. All patterns available. Less amplitude for purity pattern.

Output Impedance: 75 Ω.

POWER REQUIREMENTS

Source: One 9-volt transistor battery (NEDA 1604A or equivalent) or external 9 VDC.

Battery Life: 20 hours continuous; rf output (8 hours typical for VIDEO output).

MECHANICAL

Dimensions (HWD): 1-3/8 x 3-3/4 x 6 1/4", (35 x 95 x 159 mm).

Weight: 1 lb. (450 g).

CONTROLS AND INDICATORS

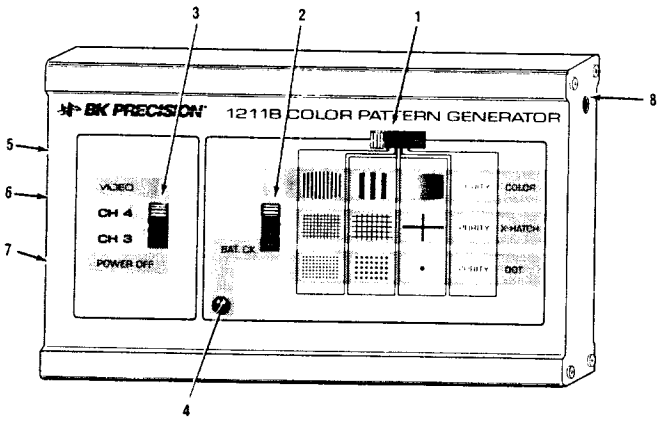

Fig. 1. Controls and Indicators.

1. **Pattern Switch.** See below.

2. **Function Switch.** See below.

   The Function and Pattern switches are wired in matrix fashion so that each combination of the two switch settings selects a different pattern. A total of 12 combinations plus BAT-CK, CHROMA, and R.F. continuous waves are possible, as defined on the front panel of the unit, and summarized in Table 1.

3. **Mode Switch.** Four-position slide switch selects output mode as follows:

   VIDEO - composite video output.

   CH 4 - rf output on channel 4.

   CH 3 - rf output on channel 3.

   POWER OFF - turns off instrument.

4. **BAT-CK Indicator.** Lights when instrument is turned on and Function switch is in BAT-CK position. Battery needs replacement if indicator does not light.

5. **OUTPUT Jack.** Output signal receptacle. Output may be VIDEO, CHROMA or R.F. continuous wave (for calibration), or an rf signal on CH 3 or CH 4, as selected by Mode switch. Output impedance is 75 Ω.

Function Switch	Pattern Switch			
	1	2	3	4
COLOR	10-bar gated rainbow	3-bar gated R-Y, B-Y, -(R-Y)	ungated rainbow	purity
X-HATCH	21 x 15	11 x 7	1 x 1 crosshair	purity
DOT	21 x 15	11 x 7	1 center dot	purity
BAT-CK	battery check		battery check CHROMA - cw	battery check R.F. - cw

Table 1. Function Switch and Pattern Switch Combinations.

6. **LEVEL Control.** Adjusts amplitude of composite video and rf output signal. The unit produces very high level output at maximum setting, which may overload some television receivers. A mid-range setting can be used for most applications.

7. **CHROMA Level Control.** Adjusts color sub-carrier amplitude from 0% to 100% saturation. A setting of about 2/3 maximum can be used for most applications.

8. **EXT DC Jack.** Accepts external 9-volt dc power. Disconnects battery when plug is inserted.

SAFETY PRECAUTIONS

WARNING

The following precautions must be observed to prevent electric shock.

1. This instrument is intended for use only by qualified electronic technicians.

2. Know and observe the TEST INSTRUMENT SAFETY recommendations listed on the inside front cover of this manual.

3. Typical use of this instrument often involves "hot chassis" equipment and nearby high voltages. Observe caution.

BATTERY OPERATION

The Model 1211B Color Pattern Generator normally operates from an internal 9-volt transistor battery. Check the battery each time the unit is switched on as follows:

1. Turn on the unit by setting the Mode switch to any position except POWER OFF.

2. Set the Function switch to BAT-CK.

3. The BAT-CK indicator should light. If not, the battery needs replacement. Battery replacement instructions are given in the MAINTENANCE section.

A fresh battery should give at least 20 hours continuous operation with rf output, about 8 hours with video output. For typical use 1 to 2 hours per day, a battery will probably last a month. An alkaline battery will give longest battery life. To conserve battery life, set the Mode switch to POWER OFF any time the instrument is not in actual use.

EXTERNAL DC OPERATION

For extensive bench use, it may be more desirable to use an external power source instead of batteries. A battery eliminator (ac adapter) is supplied for this purpose. Inserting the battery eliminator's plug into the EXT DC jack connects the external source and disconnects the battery, conserving it for field use of the instrument.

VIDEO OUTPUT

To use the composite video output, perform the following steps:

1. Connect a cable from the OUTPUT jack to the desired signal injection point in the equipment under test. In television receivers, the video de-

tector stage is usually recommended. This signal has standard negative sync polarity and should not be injected into circuits using inverted sync polarity.

2. Set the Mode switch to VIDEO.

3. The setting of the LEVEL control is dependent upon the point of signal injection. The MAX setting is typical for the input of a video monitor. A mid-range setting is typical for most other applications.

4. The CHROMA control adjusts color from 0 to 100%. A two-thirds setting is typical for most applications.

5. Select the desired pattern. Typical uses for each pattern are described in the APPLICATIONS section.

RF OUTPUT

RF output on two vhf channels is available for injection into the antenna terminals of a television receiver or VCR, into MATV signal distribution networks, etc. The following procedures explain how to set up the color pattern generator and a television receiver before starting other operations such as convergence or color adjustments. For use with equipment other than a television receiver, substitute appropriate equivalent steps.

1. Disconnect all antenna leads from the television receiver.

2. Connect a 75 Ω coaxial cable from the OUTPUT jack of the portable color generator to the vhf antenna terminals of the equipment under test.

3. Set the Mode switch of the color pattern generator to CH 3 (or CH 4).

4. Set the channel selector of the television receiver to the same channel as the color pattern generator is set.

5. Set the LEVEL control to mid-range. Too high of a setting may overload the receiver.

6. Set the CHROMA level control to about 2/3 of maximum.

7. Set the Function switch to X-HATCH and the Pattern switch to positon 1 to generate the 21 x 15 crosshatch pattern.

8. Fine tune the television receiver until a reasonably good pattern is obtained.

   a. Reduce the contrast and brightness controls on the TV set until both the horizontal and vertical lines are barely visible. At this point, one may be brighter than the other, but both should be visible.

   b. Readjust the fine tuning control for the brightest vertical lines.

c. Now set the contrast and brightness controls for a comfortable viewing intensity.

d. To obtain the sharpest test patterns and avoid "blooming" of the display, do not operate with excessive contrast and brightness during convergence or color adjustments.

9. Set the Function switch to COLOR and the Pattern switch to position 1 to generate the 10-bar gated rainbow pattern.

10. Advance the receiver color level control until color appears; ten bars should be visible. However, some sets may display only nine because of excessive overscan or blanking. When color does not appear at all or only with the color control near maximum, carefully readjust the fine tuning. It should only require a slight amount of rotation; excessive rotation indicates tuner or i-f misalignment. If this last step fails to produce color, it is likely that a malfunction exists somewhere in the receiver and must be corrected before proceeding. When the receiver is properly tuned, it is then ready for convergence or color adjustments.

USE OF PATTERNS

10-Bar Gated Rainbow

The 10 color bars are raised on a luminance pedestal and gated at 30° intervals from burst. The resulting pattern is shown in Fig. 2, and a vector diagram representation of the signal is shown in Fig. 4. The pattern is primarily used for testing and aligning color circuitry. The reference black background gives sharp edge definition and aids in recognizing color spill.

3-Bar Gated R-Y, B-Y, -(R-Y)

This pattern is derived from the rainbow pattern and gated at 90°, 180°, and 270°, respectively, to rapidly expedite color demodulator alignment procedures. Fig. 3 illustrates the pattern that should be obtained.

Ungated Rainbow

This pattern progressively scans through the 360° color spectrum from color burst.

1 x 1 Crosshair

The crosshair pattern is useful for converging vertical and horizontal lines. The intersection of the two lines corresponds to screen center and is useful for adjusting position as well as convergence.

11 x 7 Crosshatch

This crosshatch pattern is extremely useful in dynamic convergence and linearity adjustments. The sharp definition of the horizontal and vertical lines helps to ensure precise convergence.

21 x 15 Crosshatch

The primary uses for this pattern are checking size, overscan, and pincushion distortion.

1 Center Dot

The center dot defines the center of the screen and is useful for static convergence.

21 x 15 Dot, 11 x 7 Dot

These dot patterns may be used in static or dynamic convergence.

Purity

The purity pattern provides sync and reference black for a clear blemish-free raster.

CONVERGENCE

Introduction

A detailed convergence procedure is not presented here, as there are many excellent and thorough manuals available on the subject. However, the principal pattern uses are reviewed here to help speed convergence adjustments. Always use the manufacturer's service information, or, if not available, the Howard Sams "Photofact" series for convergence information.

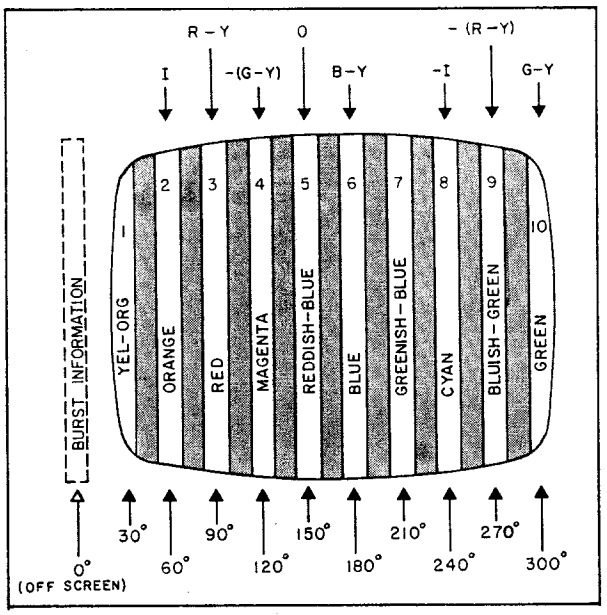

Fig. 2. 10-Bar Gated Rainbow Pattern.

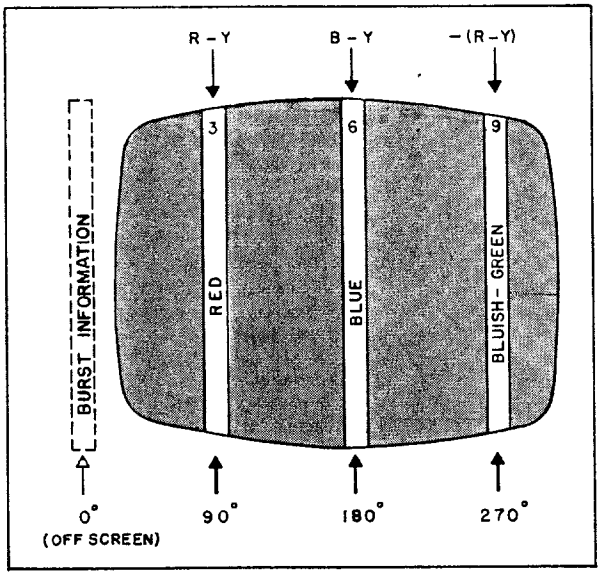

Fig. 3. 3-Bar Gated R-Y, B-Y, -(R-Y) Pattern.

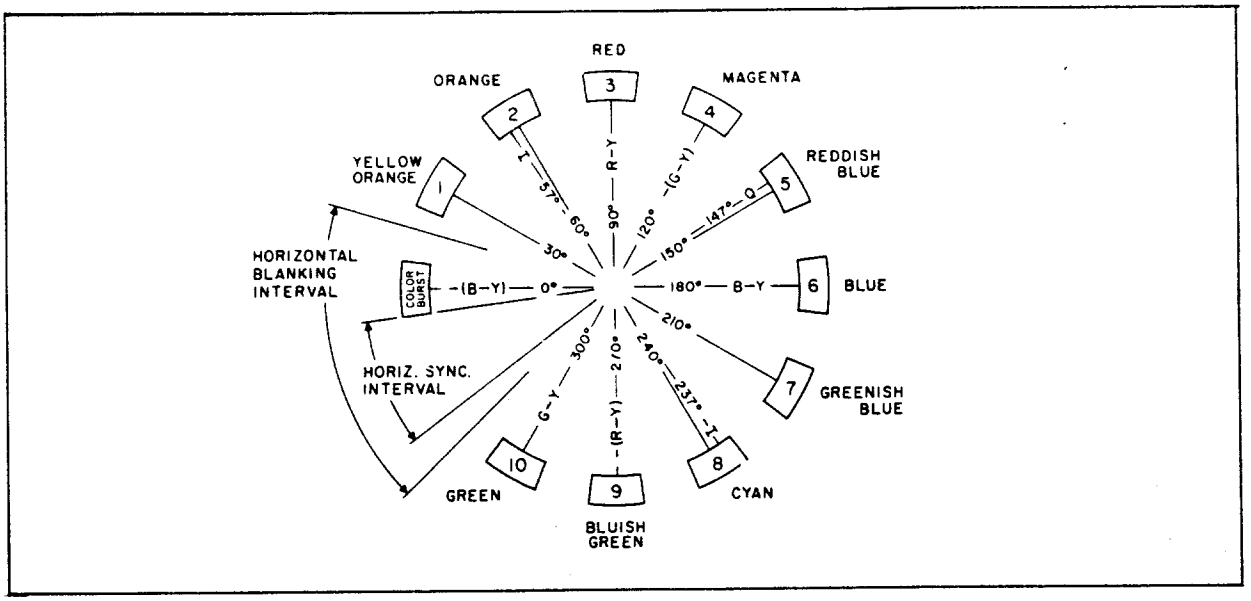

Fig. 4. Gated Rainbow Phase Relationship.

Purity

The purity pattern of this color pattern generator provides sync and a reference baseline free of video information. This solid black reference is advantageous when adjusting purity. Older methods required tuning to an unused channel or disabling the tuner. "Snow" produced by this method can be annoying and cause inaccuracy in set-up. Using the purity pattern, the operator can be assured that the adjusted purity condition will be maintained when the convergence is initiated.

Static Convergence

Static, or dc, convergence is always performed **before** and **after** purity adjustments. Use dot patterns. The single dot pattern is most convenient because it automatically pinpoints screen center and is quickly located when working from behind the set, viewing the screen at an angle or with a mirror.

Dynamic Convergence

Crosshatch is the recommended pattern for performing dynamic convergence, although some technicians use dots throughout the entire procedure. This is a matter of personal preference. However, misconvergence is more easily seen with horizontal and vertical lines.

NOTE

Defocusing, blooming, and "kinks" at crosshatch intersections indicate that brightness and contrast are excessive. It is important to never perform con-

vergence in this condition, or accuracy will greatly suffer.

The 1 x 1 crosshair pattern is useful when converging red and green lines at vertical center and horizontal center. Elimination of all other lines removes any confusion as to the correct points to converge.

COLOR ADJUSTMENTS

Introduction

The manufacturer's service notes should always be consulted when testing and aligning color circuitry. Following their recommended procedure will assure best performance. The following sections provide a general technique if the manufacturer's data is not available.

Hue Setting and Range

1. Select the 10-bar gated rainbow pattern.
2. Adjust the receiver's saturation, brightness, and contrast controls to produce a pleasing color pattern. Ten individual color bars should be visible on the face of the screen (see Fig. 2 and 4). Some receivers may only display eight or nine bars due to excessive overscan or blanking.
3. Select the 3-bar gated R-Y, B-Y, -(R-Y) pattern. Three color bars, representing the third, sixth, and

ninth bar out of the gated rainbow should now be visible (see Fig. 3).

4. Adjust the receiver's HUE control to display a red, blue, and bluish green bar in this order from left to right. If this arrangement cannot be obtained with any setting of the HUE control, then internal adjustment of the hue range coil or control is necessary.

It can be assumed that the color circuits in the receiver are operating properly if these steps produce the correct results.

Demodulator Alignment Check

A rapid check of demodulator alignment can be performed without the use of a vectorscope right in the customer's home. This technique is simple and uses the color tube itself as the analysis instrument.

1. Select the 3-bar gated R-Y, B-Y, -(R-Y) pattern and set the CHROMA control of the 1211 to 2/3 of MAX.

2. Turn the receiver's contrast control to minimum and adjust the brightness control for the brightest display possible without blooming; the receiver color control should be set to a very low level - just enough to produce color.

3. Disable the red and green guns of the CRT. Adjust the HUE control so

that color and shading in the area to the left and right of the first bar (left hand side of screen) matches the center section of that bar.

4. Now disable the blue and green guns and leave only the red gun active. When the color demodulators are properly aligned, the bar in the center of the screen will match the color and shading of the area to either side of it. A large amount of error usually indicates the need for demodulator alignment.

Color Sync Locking

The CHROMA level control varies the amplitude of the color subcarrier from 0 to 100%. Utilization of this control can help determine if the set will adequately lock on a color signal.

1. Select the 10-bar gated rainbow pattern and adjust the CHROMA control to 2/3 of MAX. This represents normal color subcarrier amplitude.

2. Adjust the receiver color control to produce a recognizable color pattern.

3. Slowly rotate the CHROMA control toward MIN until the colors become pale and finally disappear. The rate of fading will depend entirely upon the design of the receiver under test. Most receivers will maintain color

sync throughout the entire range of the CHROMA control. However, some sets may lose it just before the color disappears, evidenced by their diagonal running. Both of these conditions indicate normal operation of the color sync circuits. If a slight reduction of CHROMA causes color to fall out of lock, color syncrhronization of the receiver may be inadequate.

In the MAX position of the CHROMA control, the amplitude of the color subcarrier is 100%. This is helpful in diagnosing receiver conditions, such as rf/i-f misalignment or chroma circuit malfunction.

Color Fit

The gated color bar patterns produce color bars that are raised on a luminance pedestal so that spaces between the colors are reference black. When displaying 10- or 3-bar patterns, color should only be seen in the luminance area. A defective delay line in the video amplifier or incorrect alignment of the chroma bandpass amplifier will cause the colors to overlap or spill into the black region.

Color Killer

Color killer threshold can be set while displaying 21 x 15 or 11 x 7 crosshatch patterns. Adjust the color killer of the receiver until the vertical lines start to tear with color. Back this control off until the

tear is removed, then a slight additional amount to provide a safety margin.

DEFLECTION SYSTEM TESTS

Introduction

A rapid check of receiver scanning can help disclose any abnormal or border-line situations which might exist in the electrical or mechanical components of the deflection system. When evaluating any results from these tests, always use the manufacturer's recommendations as a criterion.

Overscan

1. Select the 21 x 15 crosshatch pattern.
2. Adjust receiver contrast and brightness to display sharp, thin lines against a black background.
3. Count the number of vertical and horizontal lines. A typical receiver will display 20 vertical and 15 horizontal lines. An additional vertical line may just be visible at the screen's edge. This one is outside the normal picture area and should be ignored when performing adjustments.

Some receivers have an inherent tendency towards a greater amount of overscan and/or blanking. This phenomenon may result in a 19 x 15, 18 x 14, or some other crosshatch pattern with less than 20

x 15 lines. The same effect will produce an 8- or 9-bar gated rainbow pattern instead of 10 bars.

Linearity, Size, and Centering

The repetitive spacing of the 21 x 15 and 11 x 7 crosshatch patterns provide a stable source with which to perform these tests and adjustments. Abnormal conditions such as pincushion distortion, deflection nonlinearity, and excessive 60 Hz hum become immediately obvious.

Vertical size and linearity should be adjusted so that all horizontal lines are evenly spaced. Inability to do so usually indicates a vertical deflection problem.

Pincushion distortion is common to a great number of large screen receivers. The outermost vertical and horizontal crosshatch lines are most useful in determining the correct amount of compensation.

A horizontal bar rolling vertically through the crosshatch pattern indicates that 60 Hz hum is entering the receiver circuitry. Excessive amounts of it cause a very noticeable and annoying pattern displacement.

The 1 x 1 crosshair pattern provides one vertical and one horizontal line which intersect at exact screen center. Any visual deviation from center may indicate a need for position adjustment.

TELEVISION RECEIVERS

A color pattern generator is indispensable for convergence and color adjust-

ment of color television receivers. This unit offers a wide variety of patterns that are valuable for general troubleshooting and signal tracing as well as in making adjustments in black and white or color television receivers. The composite video output permits signal injection into the video section and the rf output on two vhf channels permits testing of the tuner and i-f sections.

VIDEO MONITORS

Some video monitors used with small computers, word processors, etc. are similar to a television receiver except that the rf section is omitted. All patterns are used in the same manner. Most video monitors use a 75 Ω, 1-volt p-p composite video input with negative sync. This is exactly the type of video output available from this color pattern generator. Thus, it is ideal for servicing and adjusting video monitors.

VCRs AND VIDEO DISK PLAYERS

Since VCRs (video cassette recorders) and video disk players use essentially the same type of signals as a television receiver, this instrument generates appropriate test signals for troubleshooting, signal tracing, and adjustments.

MATV AND CATV

This instrument includes a combination of features that make it valuable for servicing and testing MATV (master antenna television) and CATV (cable television) systems and components. It features a broadcast type signal on two vhf channels,

75 Ω output, variable rf output level, and variable color level. RF signals can be injected into the network from the color pattern generator and measured by a signal level meter (B & K-Precision Model 430 for example) at various points to isolate causes of excessive signal attenuation such as damaged cable, defective connectors, adjustment of line amplifiers, etc.

For block diagram analysis, refer to Fig. 5. For more detailed circuit analysis, refer to the separately supplied schematic diagram.

HORIZONTAL SYNC GENERATION

The 378 kHz master oscillator consists of IC1a and IC1b. This crystal-controlled oscillator is the source from which all sync and video signals are derived. The 378 kHz signal from the oscillator is fed to the first count down stage, IC4. IC4 is a seven stage ripple counter which is reset through gates IC8b and IC8a after 24 counts. This division produces a frequency of 15,750 Hz, the horizontal sync frequency. NAND gate IC2a shapes the sync pulse to be 5.3 microseconds wide.

VERTICAL SYNC GENERATION

The second countdown stage, IC6, divides the horizontal frequency (15,750 Hz) by 262 (the number of lines per vertical frame) to produce the vertical frequency of 60.11 Hz. IC6 is a 12-stage binary counter which is reset through gates IC2b and IC8c after 262 counts. Gates IC7a and IC1e shape the vertical sync pulse to be 254 microseconds wide, NAND gate IC10c combines the horizontal

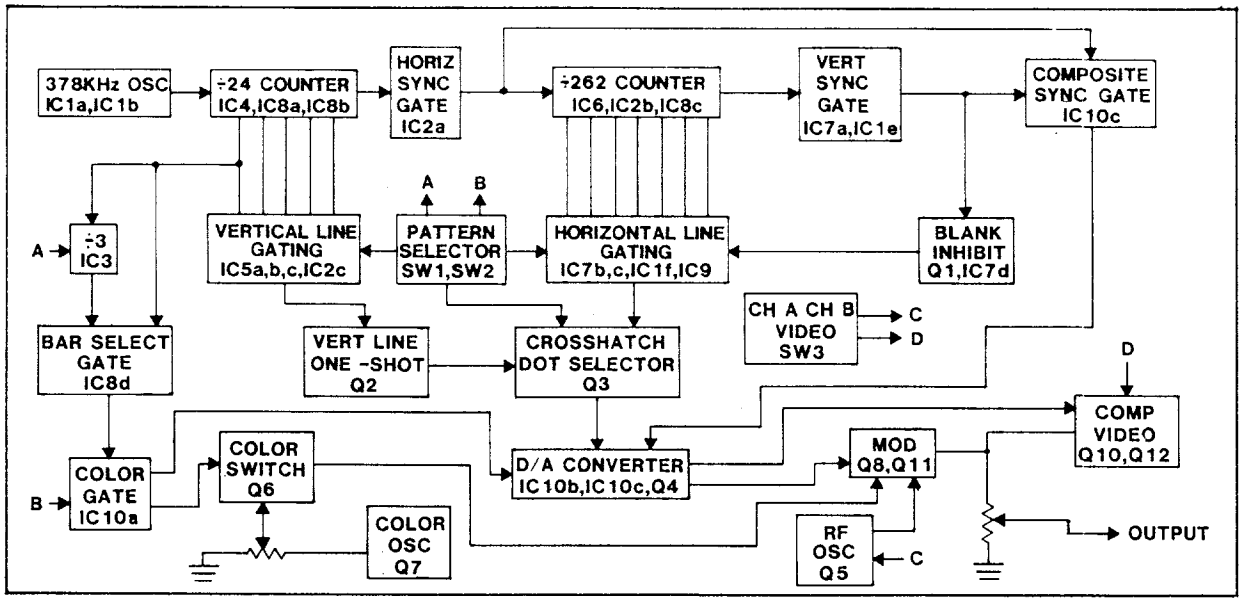

Fig. 5. Block Diagram.

and vertical sync signals for processing by the D/A converter.

VERTICAL LINE GENERATION

Vertical line gating is performed by IC5a, IC5b, and IC2c, which provide 21, 11, and 1 lines respectively. Switch SW1 selects which gate output is fed into IC5c, which OR's the three signals together. The output of IC5c feeds one-shot circuit Q2. Q2 produces a 250-nanosecond pulse at its collector for each positive-going transition at the base.

HORIZONTAL LINE GENERATION

Horizontal line gating is performed by IC7b, IC7c, IC1f, and IC9. IC7b, IC7c and IC1f provide 1, 7, and 15 lines respectively. Switch SW1 selects which signal is fed into IC9, which OR's the three signals together.

BLANKING

IC7d and transistor Q1 form a blanking inhibit circuit that insures that no patterns are produced during horizontal sync or vertical blanking intervals.

X-HATCH AND DOT PATTERNS

The output of IC9, horizontal lines, and the output of one-shot Q2, vertical lines, are fed into the base of Q3. At the collector is a combination of horizontal and vertical lines, or a crosshatch pattern.

When dot patterns are selected by switch SW2, the dc level of Q3 is shifted so that the lines are eliminated and only the intersection of vertical and horizontal lines produces output, forming dots. The output of Q3 is fed to the D/A converter.

COLOR BAR GENERATION

The color bar pattern is produced by IC3, IC8d, IC10a, IC10b, and transistor Q6. A 189 kHz signal from IC4 is routed by IC8d. This signal will produce 10 bars on the screen and one burst gate for the gated rainbow pattern. The 189 kHz signal is also fed to the divide-by-3 circuit, IC3. The output of IC3 is a 63 kHz signal which produces a 3-bar pattern plus burst for the (R-Y), (B-Y), -(R-Y) pattern. Switch SW1 selects which pattern is fed to IC10a and IC10b. IC10b drives transistor Q6, which is connected across the output of color oscillator stage Q7. A low from IC10b into the base of Q6 allows color to be injected into the modulator and composite video stage through C25, thus producing the color bars. A high from IC10b turns on Q6, disabling color and producing the spaces between the bars.

CHROMA GENERATION

Transistor Q7 is the crystal-controlled color sub-carrier oscillator. It's frequency, 3.563795 MHz, is offset by 15,570 Hz (one horizontal line) from the standard color sub-carrier frequency of 3.579545 MHz. The effect of the difference is to produce

a 360° phase shift during one horizontal line, which produces a rainbow of colors across the TV screen. The level of the color signal is adjustable from 0 to 100% by CHROMA level control, VR2.

COMPOSITE VIDEO

The D/A converter consists of IC10c, IC10b, and transistor Q4. These components, along with summing resistors R29, R30, and R48 combine the sync, vertical line video and color bar video in the correct proportions to generate a composite video signal. The composite video signal is applied to video output stage Q10 and Q12, which are enabled only in the VIDEO mode by switch SW3. The output of Q10 is routed through LEVEL control VR1 to the OUTPUT jack. The composite video signal from the D/A converter is also applied to rf modulator Q8 and Q11.

RF GENERATION

Transistor Q5 is the rf oscillator circuit, which is enabled only in the CH 3 and CH 4 modes by switch SW3. The appropriate crystal is selected by switch SW3 for operation on two different TV channels. The frequency of CH 3 is determined by X3 and the frequency of CH 4 is determined by X4. Transistor Q5 drives the modulator transistor Q8. The composite video signal is impressed on the desired carrier by Q8 and routed to the OUTPUT jack. The rf output level is adjustable by LEVEL control VR1.

POWER SUPPLY

Power is provided by a 9-volt transistor battery, or an external 9 volt source connected to the EXT DC jack. Current drain is approximately 15 milliamps. LED 1 provides a visual indication of battery condition. The battery should be discarded when LED 1 does not light. Zener diode D22 establishes a threshold reference voltage, and the battery must exceed that value for LED 1 to light.

BATTERY REPLACEMENT

When BAT-CK indicator does not light, the battery should be replaced. Remove the four screws from the left side panel; remove side panel for battery access. Use an alkaline cell for longest battery life.

CHROMA FREQUENCY CALIBRATION

1. Turn on the color pattern generator and select VIDEO mode.
2. Select BAT-CK function and the ungated rainbow color pattern.
3. Connect a frequency counter to the OUTPUT jack.
4. Adjust the CHROMA F trimmer (C13) for 3.563795 MHz (±50Hz).

RF FREQUENCY CHECK

1. Connect generator output to frequency counter. Terminate to 75 Ω.
2. Select BAT CK function and purity pattern to obtain unmodulated CW output.
3. Set MODE switch to CH 3. Output should read 61.25 MHz.
4. Set MODE switch to CH 4. Output should read 67.25 MHz.

WARRANTY SERVICE INSTRUCTIONS
(For U.S.A. and its Overseas Territories)

1. Refer to the MAINTENANCE section of your **B & K-Precision** instruction manual for adjustments that may be applicable.
2. If the above-mentioned does not correct the problem you are experiencing with your unit, pack it securely (preferably in the original carton or double-packed). Enclose a letter describing the problem and include your name and address. Deliver to, or ship PREPAID (UPS preferred in U.S.A.) to the nearest **B & K-Precision** authorized service agency (see list enclosed with unit).

If your list of authorized **B & K-Precision** service agencies has been misplaced, contact your distributor for the name of your nearest service agency, or write to:

B & K-Precision, Factory Service Operations
Maxtec International Corporation
6470 West Cortland Street
Chicago, Illinois 60635

LIMITED ONE-YEAR WARRANTY

MAXTEC INTERNATIONAL CORPORATION warrants to the original purchaser that its **B & K-Precision** product, and the component parts thereof, will be free from defects in workmanship and materials for a period of one year from the date of purchase.

MAXTEC will, without charge, repair or replace, at its option, defective product or component parts upon delivery to an authorized **B & K-Precision** service contractor or the factory service department, accompanied by proof of the purchase date in the form of a sales receipt.

To obtain warranty coverage in the U.S.A., this product must be registered by completing and mailing the enclosed warranty registration card to MAXTEC, **B & K-Precision**, 6460 West Cortland Street, Chicago, Illinois 60635 within fifteen (15) days from the date of purchase.

Exclusions: This warranty does not apply in the event of misuse or abuse of the product or as a result of unauthorized alterations or repairs. It is void if the serial number is altered, defaced or removed.

MAXTEC shall not be liable for any consequential damages, including without limitation damages resulting from loss of use. Some states do not allow limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific rights and you may also have other rights which vary from state to state.

For your convenience we suggest you contact your **B & K-Precision** distributor, who may be authorized to make repairs or can refer you to the nearest service contractor. If warranty service cannot be obtained locally, please send the unit to **B & K-Precision** Service Department, 6470 West Cortland Street, Chicago, Illinois 60635, properly packaged to avoid damage in shipment.

B & K-Precision Test Instruments warrants products sold only in the U.S.A. and its overseas territories. In other countries, each distributor warrants the B & K-Precision products which it sells.

NOTES

(continued from inside front cover)

3. Don't expose high voltage needlessly. Remove housings and covers only when necessary. Turn off equipment while making test connections in high-voltage circuits. Discharge high-voltage capacitors after removing power.

4. If possible, familiarize yourself with the equipment being tested and the location of its high voltage points. However, remember that high voltage may appear at unexpected points in defective equipment.

5. Never work alone. Someone should be nearby to render aid if necessary. Training in CPR is recommended.

BK PRECISION®

6470 West Cortland Street
Chicago, Illinois 60635

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