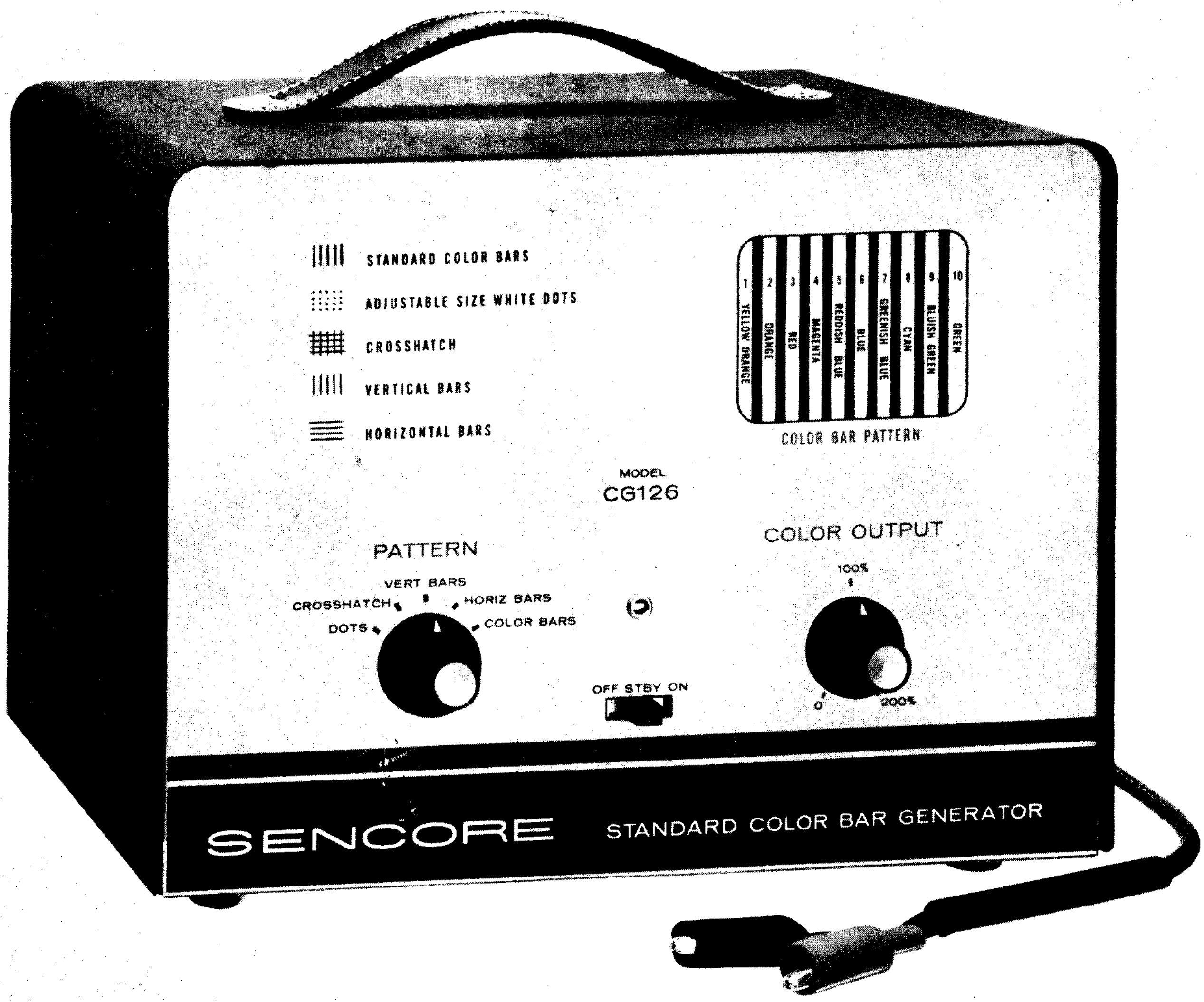
INSTRUCTION MANUAL

For The

CG126 COLOR GENERATOR



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CG126 COLOR GENERATOR

Recognizing the need for a stable, low cost generator that produces all necessary patterns for accurate convergence and trouble shooting in the home, SENCORE has developed the CG126 Standard Color Bar Generator.

The CG126 is the smallest, lightest, and least expensive generator of any on the market and yet it provides the same stable patterns of generators costing twice as much. The CG126 provides the following patterns:

Ten Standard Color Bars: The type and phase that is fast becoming the standard of the industry. Crystal controlled keyed bars (RCA type with 30 degrees phase change between each) as explained in most service literature, offer a complete gamut of colors for every color circuit test.

Adjustable Size White Dots: New stabilized dots, a must for convergence, are created by new SENCORE counting circuits. The size of the dots are adjustable from the rear of the unit.

Crosshatch Pattern: A basic requirement for fast CRT convergence, and, also, for sweep linearity and "overscan" adjustments.

Vertical and Horizontal Bars: An added feature to speed up convergence, not found on many other color generators.

SPECIFICATIONS

RF Output: Frequency is factory set to Channel 4. It can easily be changed to Channel 3 or Channel 5, if Channel 4 is used in your area.

Modulation: Any one of five patterns: Color Bars, Dots, Crosshatch, Vertical Bars, or Horizontal Bars.

Tube Complement: 6-12AU7A, 2-12AZ7, 1-12BE6

Diode Complement: 2-1N295

Crystal Complement: 1-189KC ± .005% for timer, 1-3563.795KC ± .001% for color bars.

Power Consumption: 35 watts at 117 VAC line.

Size: 11 inches wide by 8 inches high by 6 inches deep.

Net Weight: 9 1/2 pounds.

CONTROLS ON THE CG126

The CG126 is an extremely easy generator to set up and use. Only three front panel controls are needed in normal use. These are the AC power switch, the Pattern switch and the Color Output control. Additional adjustments for the timing circuits, and for dot size, are available on the rear of the unit, but these are all factory set and normally do not need to be changed.

AC Power Switch: The AC power switch is used to turn the unit ON and OFF. It also has a middle STANDBY position which is used whenever you wish to disable the pattern and RF carrier, but still keep the tube filaments hot for instant use.

Pattern Switch: The pattern switch selects one of the five patterns available to modulate the RF carrier. Composite sync is fed to the modulator at all times so that the patterns will not jump or fall out of sync when switching from one pattern to another. The following patterns are available on the CG126, each for a specific function.

1. Dots - There are 117 small size dots available, primarily for DC convergence. A color TV set that is properly converged will have white dots in the center of the picture tube (all three guns hitting the same spot on the CRT). Static (or DC) convergence is controlled by the 3 small magnets spaced at 120 degrees around the neck of the color CRT plus the blue lateral positioning magnet.

2. Crosshatch - In the crosshatch position, 9 vertical and 13 horizontal visible bars are generated. The crosshatch pattern is used for dynamic convergence adjustments, overscan adjustments (height and width) and for linearity adjustments.

3. Vertical Bars - Nine vertical bars are generated in the vertical bar position. These are used primarily when adjusting the dynamic vertical convergence controls.

4. Horizontal Bars - Thirteen horizontal bars are provided and are used primarily when adjusting the dynamic horizontal convergence controls.

5. Color Bars - Ten color bars are generated for color alignment and trouble shooting in the color circuits of the TV receiver. The color output is controlled with a separate control. The colors which would be displayed on a normal color set are shown on the upper right of the panel.

Color Output Control: The color output control changes the amount of color signal that is fed to the modulator. It is used primarily to check the color sync abilities of the receiver. A setting of 100 percent is normal. With most receivers, the control can be turned to almost zero percent before the set will lose color sync. This is indicated by diagonal bands of color (barber pole effect) within each color bar.

The 200 percent setting of the control is used to force a defective set to sync while trouble shooting.

OPERATING THE CG126

To use the CG126, plug the AC cord into a 117V AC outlet, turn the unit on and let the generator warm up for approximately 10 minutes. Connect the output cable to the antenna terminals of the TV set. Tune the TV set to Channel 4, or to the same channel as the CG126 if the CG126 has been reset to some other channel.

Turn the pattern switch to the desired pattern.

Sharp, well defined patterns are necessary for convergence adjustments and for trouble shooting. Since the settings of the TV controls will affect the quality and sharpness of the patterns produced by the CG126, we will discuss briefly how these TV controls should be set. In all of the following steps, the CG126 is on and the output cable is connected to the TV antenna terminals. The TV is set to Channel 4.

Fine Tuning - Turn the CG126 to color bars and adjust the TV fine tuning control for sharp, clear bars with a minimum of smearing on the edges. This is the best tuning point for the TV and the control should be left at this setting for all black and white patterns, also.

Occasionally, however, a higher dot contrast range (dot brightness versus background) can be achieved by mistuning the TV slightly to favor the dot frequency.

Contrast and Brightness Controls - Since the CG126 has a minimum amount of background "hash" on any of the patterns, the settings of the contrast and brightness controls can be set to your liking. However, for convergence adjustments it is desirable to have a high contrast between the pattern and the background level in which case the contrast control should be turned to near maximum.

When viewing color bars it is sometimes desirable to eliminate the Y signal completely by turning the contrast control to zero.

Vertical Hold - All color TV sets have vertical retrace blanking. If the vertical hold is not adjusted properly, retrace lines can be seen in the upper part of the picture. Adjust the vertical hold control for the minimum number of retrace lines consistent with good vertical hold.

Horizontal Hold - On some sets there may be a slight "fanning" at the top of the picture of all vertical lines in the pattern if the horizontal hold control is not adjusted properly. These can be virtually eliminated by adjusting the horizontal hold control. A high contrast setting may also cause this effect.

SETTING UP AND TROUBLE SHOOTING COLOR TV WITH THE CG126.

Setting up and trouble shooting color TV is easy with the CG126. In addition to a good generator, however, an established procedure should be followed so that time will not be wasted in following misleading conditions. We like to think of color TV trouble shooting as a three step approach.

The first step is to be sure that the color CRT and associated circuits are operating properly. This involves checking for purity and convergence. The second step in the procedure is to get a good black and white picture. If the trouble is not solved by the first two steps then it must be in the color circuits which brings up the third step of trouble-shooting the color section of the receiver

Let's see how this works with the following example. If a color set is tilted on its side or even tilted up as little as 30 degrees the purity of the CRT will go off (the electron beams from each gun will hit all three colors of phospher dots instead of just their own color). Under this condition the black and white patterns from the CG126 (dots, crosshatch etc.) will look quite presentable and you may not even be able to detect anything as being wrong. However, if you switch to color bars, the colors will be strange or completely gone and your first impression would be to start analyzing the color circuits. Thus, you can see the importance of checking for proper purity and convergence first.

Checking and Adjusting Purity. Tune the TV to an unused channel and ground the blue and green grids on the CRT through 100K resistors. Slide the yoke back and adjust the purity rings for a solid red spot that fills the center of the screen. Slide the yoke forward until the screen becomes completely red. At this point, connect the CG126 to the TV set, tune the set to Channel 4, set the pattern switch to crosshatch, and check for proper overscan adjustments. See Figure 1 for correct pattern.

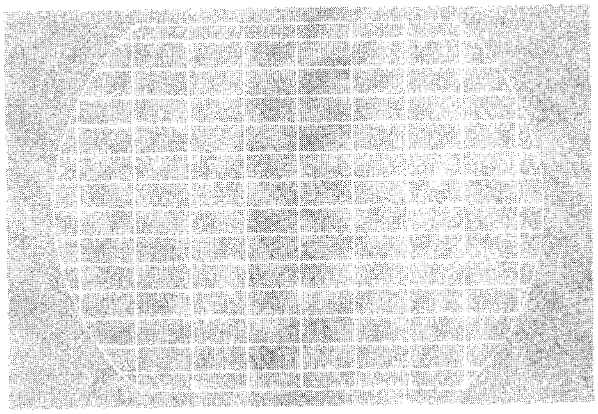


Figure 1. Crosshatch pattern.

It is sometimes possible to get good purity only by pushing the yoke too far forward, which, of course, reduces the width and height, such that the set does not overscan properly. Refer to the manufacturer's service literature for proper overscan.

If purity cannot be obtained by normal adjustments it is probable that the CRT screen mask has become magnetized, in which case a degaussing coil is needed. Move the coil around the picture tube screen for about one minute. Then remove the coil about 6 feet from the set and turn it at right angles to the CRT before turning it off.

Checking for Static and Dynamic Convergence. Connect the CG126 to the TV, tune the TV to Channel 4, and set the pattern switch to dots. Observe the dots near the center of the screen. The electron beams from all three guns should hit the CRT at the same point. If they do not, adjust the beam positioning magnets and the blue lateral magnet until they do. This is known as DC or static convergence. Note that only the dots in the center of the screen are used in this check.

For dynamic convergence the crosshatch, vertical bar and horizontal bar patterns are used. Dynamic convergence procedures are slightly different for each color set and to make these adjustments to specifications, the service literature for the set should be followed.

The second part of the procedure is to check all of the circuits which will affect the black and white picture. These circuits in color TV sets do not differ appreciably from the circuits found in black and white sets except for an additional group of controls used for black and white tracking adjustments. This group consists of separate controls for the screen voltage on each CRT gun plus a B gain, G gain and a CRT bias control. In older sets "background" controls took the place of the B gain, G gain and CRT bias controls.

To adjust these controls you should refer to service literature for the set, but basically the screen controls are adjusted for equal intensity of each color whereas the B gain, G gain and CRT bias controls are adjusted for the best black and white picture, throughout the normal range of the TV brightness and contrast controls.

Other slight differences in color TV circuits are a regulated high voltage supply to reduce blooming and loss of convergence, a separate focus voltage supply and a wider IF response to pass the color information.

If the CRT is functioning properly and a good black and white picture can be obtained, then the third step on a defective color set is to check the color circuits. The color circuits are not difficult to service if you understand the various functions that they perform. They consist of the following:

Band Pass Amplifier - The band pass amplifier is used to separate and amplify, from the video signal, the band of frequencies from 3 to 4.1 megacycles. All of the transmitted color information is within this band.

3.58 Megacycle Reference Oscillator - The reference oscillator is used to restore the color carrier in the demodulator circuits of the color TV set. It is kept in phase with the original carrier at the transmitter by controlling it with the color bursts which are on the horizontal back porch. The oscillator provides two signals separated by a 90 degree phase shift for the demodulators.

Demodulators - The demodulators beat the reference oscillator signals against the chroma signal from the band pass amplifier to produce color information signals for the CRT grids. In Zenith sets the color gun grids are driven directly from the demodulator plates. In other sets, the color signals are amplified in R-Y, G-Y and B-Y amplifiers before being applied to the grids.

Burst Amplifier - The burst amplifier separates and amplifies the burst pulse from the video signal to control the 3.58 megacycle reference oscillator.

Color Killer - The color killer circuit produces a negative bias in the absence of a color signal to cut off the band pass amplifier. It is controlled by the output of the phase detector.

Phase Detector - The phase detector compares the burst signal from the burst amplifier with the reference oscillator signal. It controls the phase of the reference oscillator signal and, also, controls the color killer.

To troubleshoot these circuits, you need the CG126 set to the color bar pattern and a good wide band service oscilloscope with a low capacity probe such as the SENCORE Model PS120.

Let's start with the band pass amplifier. Zenith uses a two stage amplifier, See Figure 2, whereas RCA uses a single stage amplifier, See Figure 3. Waveforms (W1, W2 etc.) that you should get with the CG126 are shown at each input and output of the amplifiers.

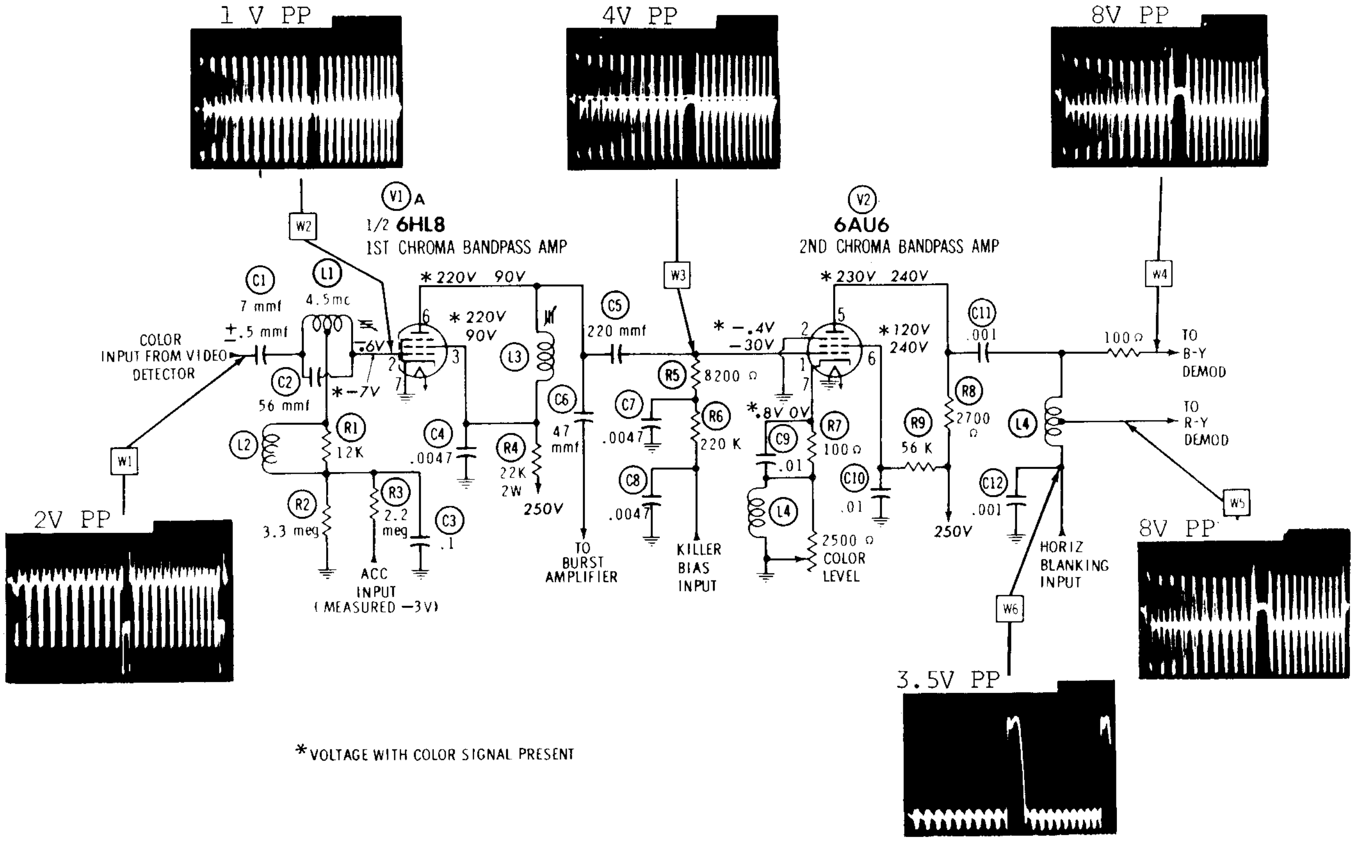


Fig. 2. Two-stage bandpass amplifier in Zenith Chassis 27KC20 receives input from video detector.

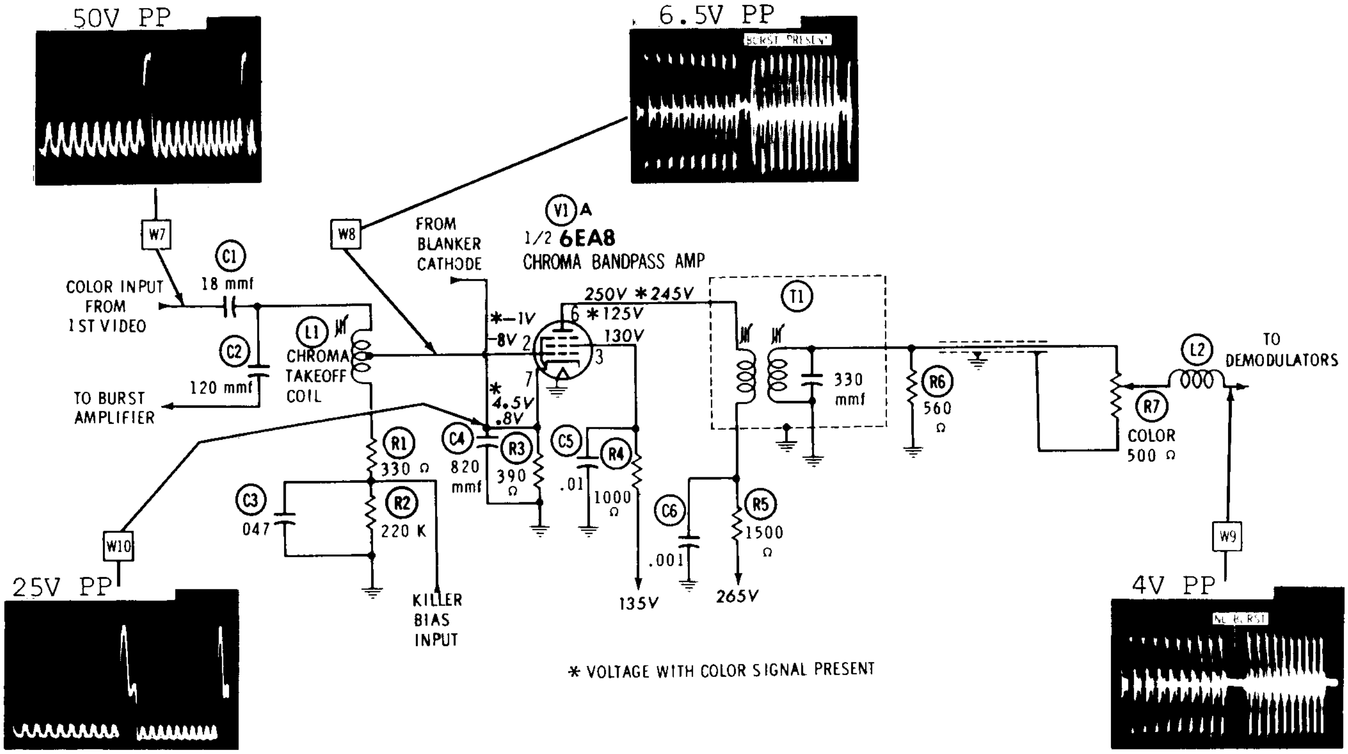


Fig. 3 In RCA Chassis CTC12, chroma signal passes through first video amplifier and one bandpass stage.

Some of the main differences between the circuits are these: (1) Zenith picks up the color input from the video detector; RCA from the first video amplifier, (2) Zenith has the burst pickoff after the signal passes through the 1st chroma amplifier; RCA picks off the burst at the input to the band-pass amplifier, (3) The burst signal appears at the output of the Zenith amplifier whereas in the RCA it is gated out because of a positive gate pulse applied to the amplifier cathode, (4) Zenith has an additional feature-ACC (Automatic Color Control) applied to the grid of the first amplifier which keeps the gain of this stage constant during minor changes in the amplitude of the incoming color signal.

The waveform at the plate of the burst amplifier is shown in Figure 4. This signal will exist only when color is being transmitted. If you switch the CG126 to a black and white pattern, the burst will disappear although the base line will still show traces of the horizontal gate pulse.

Figure 4. Waveform at plate of burst amplifier.

The waveforms at the output of the 3.58 megacycle reference oscillator and the waveforms at the oscillator inputs to the demodulators are continuous 3.58 megacycle sine wave signals and are present at all times. Refer to the service literature for the amplitude of these signals. The waveforms at the output of the demodulators or at the CRT grids in those sets that use amplifiers are shown in Figure 5. The demodulator phasing adjustments can be done with an oscilloscope or quite accurately without an oscilloscope. The latter method is faster while the scope method is more positive.

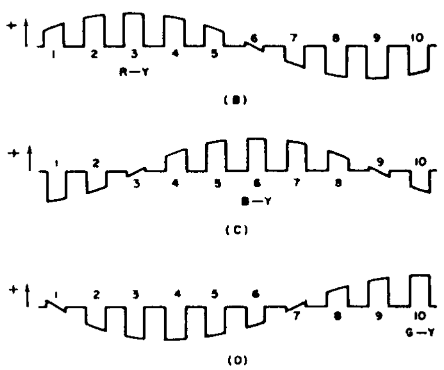
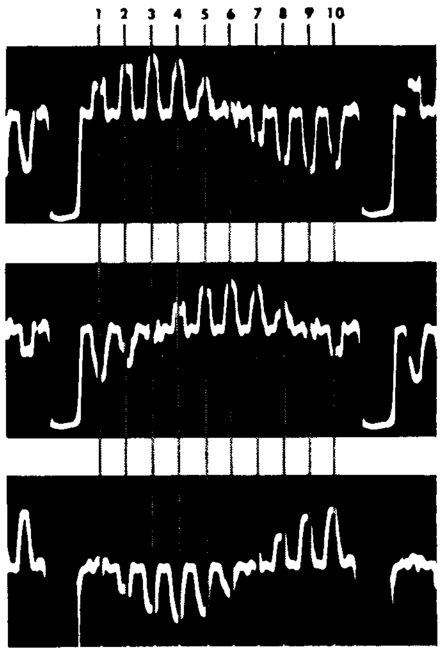


Fig. 5. Displays at red, blue and green grids (top to bottom) as seen with scope. ▶



Demodulator Phasing Adjustment Without Scope

1. Set the tint control in the TV for mid range.
2. Ground the blue and green color gun grids through 100K resistors. The sixth bar from the left of the screen on the color bar pattern should blend with the background. If the sixth bar does not blend with the background, adjust the burst amplifier transformer slugs so that blend is correct.
3. Return the blue gun to normal and ground the grids of the red and green guns through 100 K resistors. The third and ninth bars of the pattern should blend with the background. If not, adjust the "CW" driver transformer to obtain correct blend.

4. Return the green gun to normal and ground the grids of the red and blue guns through 100K resistors. The first and seventh bars of the pattern should blend with the background. If this is not obtained, repeat the complete demodulator phasing adjustment procedure above.

When using an oscilloscope to make these adjustments, proceed as above but make the grid patterns identical to those shown in Figure 5.

THE CG126 PRODUCES STANDARD COLOR BARS

The color bar pattern, used in the above trouble shooting procedure, is fast becoming the standard of the industry. It is simple to use for analyzing and adjusting color TV circuits, because one pattern covers the full color range eliminating confusion and guesswork.

The principle behind this type of pattern is simple. An oscillator that is operating at a frequency of 3563795 cycles (the color carrier frequency 3579545 cycles minus the horizontal line frequency) will appear as a 3.58 megacycle signal that is constantly changing in phase, when compared to the 3.58 megacycle reference oscillator signal in the TV, such that there is a complete change in phase of 360 degrees for each horizontal line of sweep. Thus, a complete range of colors is produced during each horizontal line. Each line displays all colors the same since the phase difference between both oscillators at the beginning of the sweep is always zero. (If the phase changes 360 degrees during one sweep starting with zero phase difference at the beginning of the sweep, then it will also be zero at the beginning of the next sweep, etc.).

By gating the 3.56 megacycle oscillator at a frequency 12 times higher than the horizontal sweep frequency, color bars can be produced that are exactly 30 degrees apart all around the color spectrum. When viewed on the picture tube in a normal operating set, they will appear as shown in Figure 6.

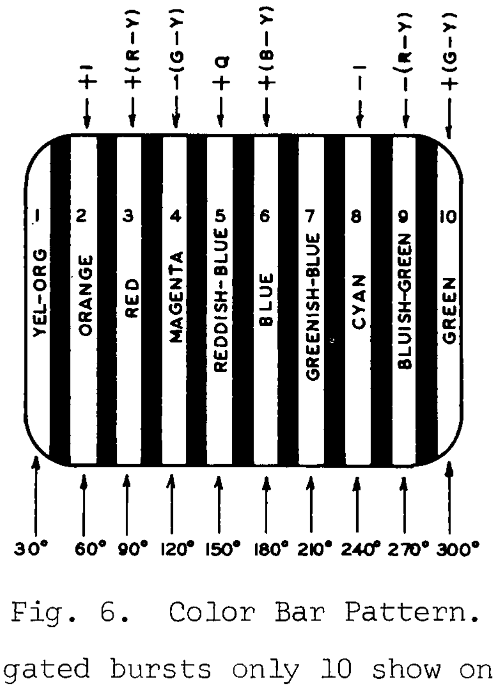


Fig. 6. Color Bar Pattern.

Note that of the 12 gated bursts only 10 show on the picture tube as color bars. This is because one of the bursts occurs at the same time as the horizontal sync pulse and, thus, is eliminated and the other occurs immediately after the horizontal sync pulse and becomes the color sync burst, which is used to control the 3.58 megacycle reference oscillator in the TV set.

MAKING CG126 ADJUSTMENTS

Adjusting the Timer. The timer on the CG126 has been designed with the fewest number of countdown stages of any generator on the market. This has one very important advantage; it permits the timer to be adjusted without taking the unit apart and it does not require an oscilloscope to make these adjustments. If the timer on the CG126 should become unlocked from the crystal controlled master oscillator (usually indicated by a weaving in the pattern) it is easy to reset the timer using an operating TV set. The timer adjustments are on the rear of the unit.

1. Set up the TV set from a station and center the horizontal hold and vertical hold controls within the locking range.

2. Remove the antenna from the TV set and feed in a signal from the CG126. Set the pattern switch to crosshatch and let the generator warm up for approximately 15 minutes.

Before proceeding with the adjustments, a discussion of what a "locked" pattern is should be explained. The CG126 produces interlace scanning just like a TV station and will cause the horizontal lines to appear as a fast intensity variation. In other words, the pattern will appear soft or have a slightly dulled appearance as opposed to a pattern that is not locked in and consequently not interlaced.

3. If the pattern has just a slight weave, mark the position of each of the controls, except the 15750, on the back of the unit, and then adjust each one slightly in each direction until the pattern locks. If the timer is too far out of adjustment proceed with Step 5.

4. If the vertical lines in the pattern slope to the left or right, adjust the 15750 cycle control until 9 vertical bars are present on the picture tube. (If the raster on TV were pulled in, you would see 11 bars). Set the control to the center of the locking range.

5. Set the 60 cycle, 900 cycle and 13500 cycle controls fully counter-clockwise. Adjust the 60 cycle control for the slightest amount of weaving in the pattern.

6. Adjust the 900 cycle control for 13 horizontal bars on the picture tube. (If the raster on the TV were pulled in, you would see 14 bars).

7. Repeat the adjustments of the 60 cycle and 900 cycle controls until you can get 13 bars with the slightest amount of weaving in the pattern.

8. Adjust the 13500 cycle control on the CG126 until the pattern becomes locked (does not weave), and the horizontal lines have a soft appearance as described above.

9. Set the 60 cycle, 900 cycle and 13500 cycle controls to the center of the locking range.

If you should desire to use an oscilloscope to set the timers, observe the waveforms on the common cathodes of each of the multivibrators (See Figure 7). Set the 15750 cycle MV (V6) for a 12 to 1 countdown; the 13,500 cycle MV (V2) for a 14 to 1 countdown; the 900 cycle MV (V3) for a 15 to 1 countdown and the 60 cycle MV (V4) for a 15 to 1 countdown.

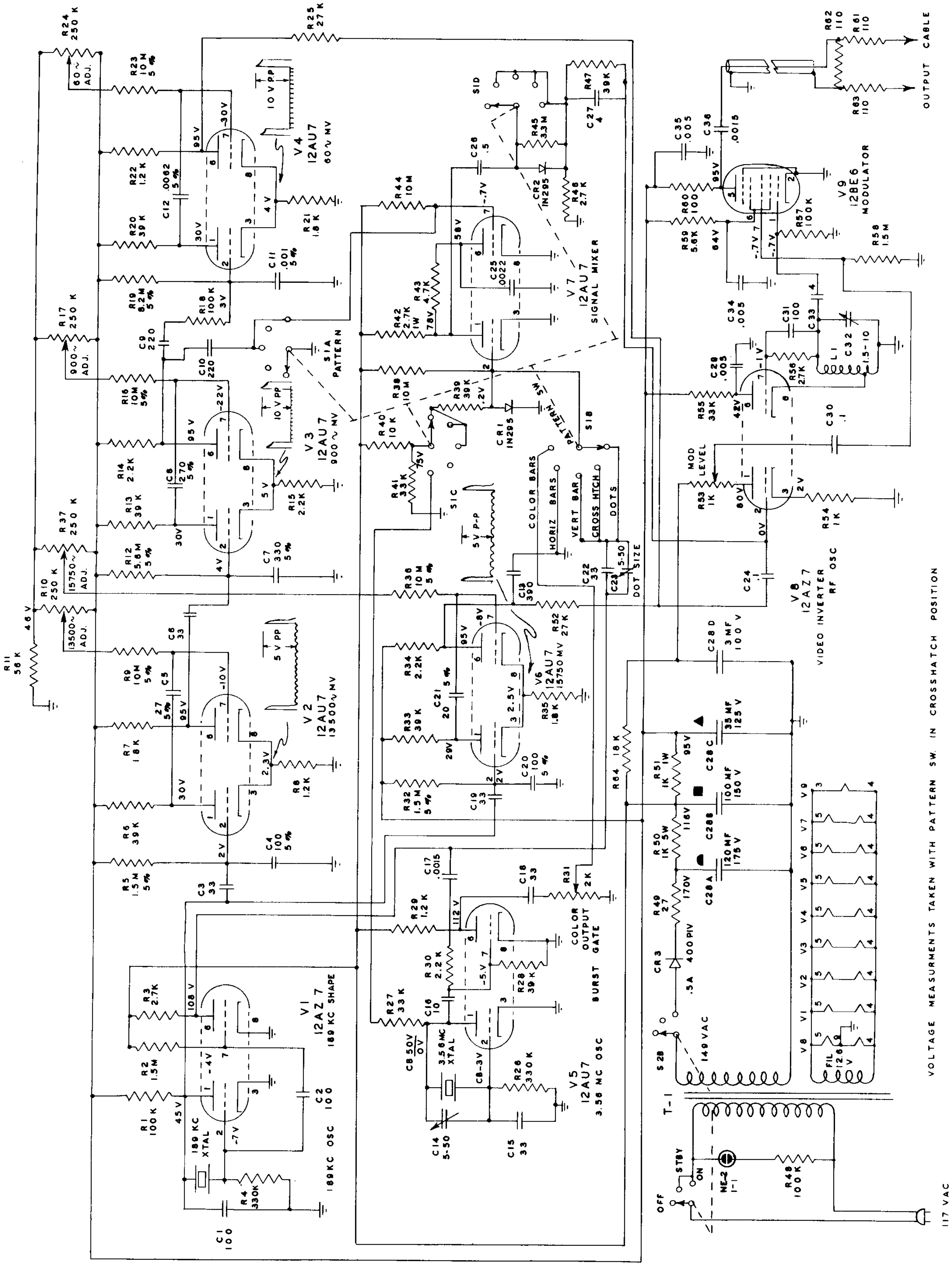


Fig. 7 MODEL CG 126 SCHEMATIC DIAGRAM

Dot Size Adjustment. The CG126 has an external dot size adjustment, on the back of the unit, which can be used to change the width of the dots or the vertical lines, in the dot, crosshatch and vertical bar patterns. The smaller the dots are made, the more readily you can notice convergence errors. However, the dots should not be made so small that they are difficult to see clearly. You should adjust the dot size trimmer to your own liking while observing the pattern on a TV.

Color Frequency Adjustment. The frequency of the color carrier must be quite accurate. This can be adjusted without using laboratory equipment by using the bursts from a color program as a standard.

To do this you must first tune in a color program on an operating color TV set. Remove the correction voltage to the 3.58 megacycle reference oscillator in the TV and adjust the reference oscillator in the TV until a beat is seen in the picture. Connect the CG126, after it has warmed up for approximately 10 minutes, to the color set and adjust for a color bar pattern. With the correction voltage to the 3.58 megacycle reference oscillator in the TV still disabled, adjust C14 (See Fig. 7) for a zero beat in the color bar pattern. For best results you should go through this procedure twice.

Modulation Level. The modulation level control (R53) can be adjusted while observing the crosshatch pattern on a TV set. Observe the points in the pattern where the horizontal and vertical lines cross. Notice that as the modulation level control is turned up, a point is reached where the brighter crossover points start to compress (get dimmer). This represents 100 percent modulation and the control should be backed off from this point slightly for the proper setting.

You may desire to eliminate the bright crossover dot by turning the modulation level up. This can be done without any harmful effects to the other patterns.

RF Oscillator Adjustment. The RF oscillator can be adjusted using a TV set or, for more accuracy, with a frequency standard to beat against. The oscillator is set at the factory to 67.25 megacycles (Channel 4). If Channel 4 is used in your area and is quite strong, such that it interferes with the patterns, it would be best to change the CG126 frequency to Channel 3 or to Channel 5.

To do this using a good color TV set, proceed as follows: First, tune the TV to the station signal on Channel 4. Without moving the fine tuning control, switch the set to Channel 3 or 5. Connect the CG126 to the set and set the Pattern switch to color bars. Adjust trimmer C32 on the CG126 until the color bar pattern is properly displayed on the screen. Check other patterns to see that they are also tuned in properly.

Disassembly Instructions. To remove the CG126 panel and chassis from the case, remove the two screws that hold the cord wrapper on the back of the unit, and remove the two screws that hold the panel to the bottom of the unit. The panel and chassis will then slip out from the front of the case.

CIRCUIT DESCRIPTION

Timer.

The heart of the CG126 is the timer which consists of five separate oscillators, (See Fig. 7); a 189 kc crystal controlled Pierce oscillator and four countdown or dividing stages. A sine wave from the plate (pin 1) of the 189 kc oscillator is coupled through capacitor divider C3 & C4 to the grid (pin 2) of the 13,500 cycle multivibrator V2. V2 synchronizes to every 14th pulse from the 189 kc osc. and generates new pulses at a 13,500 cycle rate. In other words, the 189 kc frequency is divided by 14 and the result is a new frequency at 13,500 cycles.

Each of the three other countdown multivibrators operate in exactly the same way. The 900 cycle MV V3 synchronizes to every 15th pulse from V2 (13,500 MV) and the 60 cycle MV V4 synchronizes to every 15th pulse from V3 (900MV). The 15,750 cycle MV V6 synchronizes to every 12th pulse from the 189 kc oscillator. Since all of these oscillators are locked to the 189 kc crystal controlled oscillator, the pattern and sync signals which are developed from them will all be locked together and will be in the correct time relationship to each other.

Each of the four countdown oscillator circuits are cathode coupled multivibrators and are identical except for the components that determine the frequency.

The frequency of each countdown multivibrator is controlled by changing the voltage to the grid of the 2nd section with controls R10, R17, R24 and R37. This changes the rate at which the grid rises and, thus, controls the frequency.

A sharp negative pulse is available at the 2nd section plate of each multivibrator pin 6. The pulses from the 15,750 cycle and 60 cycle multivibrators will be mixed to generate sync pulses. The pulse from the 900 cycle multivibrator is used for part of the video signal, and is also used to sync the 60 cycle MV. The pulse from the 13,500 cycle MV is used only to sync the 900 cycle MV.

A signal from pin 2 of V1 the 189kc oscillator is fed through C2 to the grid of the 2nd section of V1. This stage is a shaping stage which is driven into saturation on the positive half cycle and into cutoff on the negative half cycle of the signal, generating a square wave in the output. The output, pin 6 of V1 is used in three ways. First, the square wave is differentiated by C22, C23 and R39 when generating dots, crosshatch and vertical bar patterns. Second, it is used to drive the 3.56 MC gate, 2nd section of V5, when generating the color bar pattern.

The 3.56 megacycle oscillator is a crystal controlled Pierce type oscillator that generates a 3.56 MC sine wave. It is turned on when the pattern switch S1 is in the color bar position by applying B+ to the plate load resistor R27. The signal from the plate, pin 1, is coupled through C16 to the grid, pin 7, of the second section of V5. The 189 kc square wave also feeds the same grid through C17 and R30. The two signals are added across R28. The negative cycle of the 189 kc square wave drives the tube into cutoff so that on the plate, pin 6, bursts of 3.56 signal are riding on the negative portion of the 189 kc square wave that is present. The signal is coupled through C18 to R31, the chroma control and thence to the signal mixer. C18 and R31 differentiate the 189 kc portion of the signal such that when color bars are displayed on the TV the leading edges of the bars are bright and the trailing edges are dark.

Signal Mixers.

Now that we have seen how the required signals have been generated in the crystal oscillators and multivibrators we will see how they must be mixed to produce the composite color TV signal. The sync signals are mixed or added together across the common grid resistor R47, of the video inverter stage V8. These signals are both sharp negative pulses, one a 15.75 kc pulse fed through isolating resistor R52 and the other a 60 cycle pulse fed through R25. At the same time V8 receives video signals from the Signal Mixer stage (V7) through a resistive-capacitive network R46, R47 and C27. In the "Dot Pattern" position, a diode CR2 is switched in series with this network which allows only the most positive peaks to pass through it which produces white dots in the output.

The output of V8 is fed to the modulator through C30. The modulation level is controlled by R53.

The Signal Mixer stage V7 consists of two triodes of which each grid is fed with a different signal. The mixed output appears across the common plate load resistor R42. R43 attenuates the signal from the second triode section so that equal outputs from each triode section appear across R42.

The second triode section receives a sharp negative 900 cycle pulse from V3. This signal is shorted out when vertical bars or color bars are selected to prevent interference. The input to the first triode section depends on the setting of the pattern switch. In the first 3 positions of this switch 189 kc square wave pulses are applied through a differentiating circuit C22, C23 and R39 to the control grid of V7. CR1 removes the positive spike developed by the differentiating circuit which is undesirable. Without CR1 a black vertical bar would appear between every white vertical bar. In the 4th position (Horizontal bars) the grid is grounded. In the last position of the pattern switch (Color Bars) the 3.56 mc osc. is turned on and a 3.56 mc signal gated at a 189 kc rate is applied to the control grid of V7. This is the color pattern with black bars separating each color. The amount of signal is selected with the color output control.

Power Supply.

The power supply is of conventional design consisting of a half wave silicon rectifier followed by pi filters, R49 is a surge limiting and protecting resistor. B+ is distributed through 3 resistor-capacitor networks to the various stages in the CG126 to provide adequate filtering and good isolation. R64 and C28D constitute a low frequency boost circuit for the video inverter to insure even background intensity on all patterns.

Tuner. The tuner in the CG126 consists of one half of V8 which is used as an RF oscillator, and V9 which is the modulator and output tube.

The RF oscillator is of the Hartly type and is tuned with C32 across L1. The frequency is set at the factory to 67.25 megacycles (Channel 4). C29 is an RF bypass condenser from the plate of the oscillator (pin 6) to ground.

The modulator receives RF signals from the oscillator through C33 to the grid (pin 1) and composite video signals to the second control grid pin 7. C34 bypasses the screen (pin 6) for RF frequencies.

The output of the modulator appears across plate load resistor R60 and across the output cable through C36. R61, R62, and R63 serve to terminate the cable properly such that there are no standing waves.

CG126 TROUBLE CHART

NOTE: Make certain TV set is operating correctly before determining trouble definitely is in the CG126.

Symptom	Probable Cause	Corrective Measure
Vertical lines slant to the left or right	15.75 kc MV V6	Adjust Freq. control R37. If trouble cannot be corrected, remove unit from case. Check waveform at cathode (Pin 3) of V6; See Fig. 7. Replace V6. Check value of R32, R35 and R36 and check C19, C20 and C21 for leakage using ohmmeter.
Slow horizontal wiggle of vertical line	900 MV V3	Adjust Frequency control R17. Check waveform at cathode (pin 3) of V3. See Fig. 7. Replace V3. Check value of R12, R15 and R16 and check C6, C7, C8, C9 and C10 for leakage using ohmmeter.
Pattern has rapid wiggle in both directions	60 MV V4	Adjust Freq. control R24. Check waveform at cathode (pin 3) of V4. See Fig. 7. Replace V4. Check value of R19, R21 and R23 and check C9, C11 and C12 for leakage using ohmmeter.
Pattern has slow wiggle in both directions	13.5 Kc MV V2	Adjust Freq. control R10. Check waveform at cathode (pin 3) of V2. See Fig. 7. Replace V2. Check value of R5, R8, and R9 and check C3, C4, C5 and C6 for leakage using ohmmeter.
Faint cross-hatch appears in Dot position of Pattern Switch	Brightness setting too high on TV set. Leakage through diode CR2	Reduce brightness of TV set. Check forward to reverse resistance of CR2 and replace if required.

CG126 TROUBLE CHART (Con't.)

Symptom	Probable Cause	Corrective Measure
Excess snow in Pattern	Incorrect tuning of TV set. RF osc. V8, modulator V9.	Retune fine tuning on TV set to remove snow. Check V8 and V9 and replace if necessary.
No color bars	Color output control set to low, 3.56 mc osc., pattern switch	Increase Output with output control check V5 and replace if necessary; check pattern switch S1 for poor contacts.
Loss of detail in patterns	Incorrect tuning of TV set. Video mixer stage V8, Setting of C32.	Retune fine tuning on TV set to improve pattern detail. Check V8 and replace if necessary. Check frequency of RF osc. and reset if necessary.
Faint light or dark band moves vertically thru pattern	Pickup on output cable.	Make connection between 1 antenna terminal and TV chassis ground.
Patterns weak	V9, R53	Check and replace V9 and V8 if necessary. Check R53 value and setting.
Dead set (no output)	On-Off switch S2, rectifier CR3, R49, C28	Check if S2 is in stdby position. Check CR3 and replace if necessary. Check value of R49 and check sections of C28 for excess leakage using ohmmeter. Also, check for B+ short.

CG126 PARTS LIST

CAPACITORS

Ref. No.	Description	Stock No.
C1, C2, C31	100MMF 20% 500V	24G82
C3, C6, C15, C18, C19, C22	33 MMF 10% 500V	24G83
C4, C20	100MMF 5% 500V	24G70
C5	27MMF 5% 500V	24G75
C7	330MMF 5% 250V	24G78
C8	270MMF 5% 250V	24G79
C9, C10	220MMF 20% 600V	24G25
C11	.001 MF 5% 250V	24G80
C12	.0062 MF 5% 250V	24G81
C13	390MMF 10% 500V	24G49
C14	5-50MMF trimmer	24G47
C16	10MMF 10% 500V	24G86

CG126 PARTS LIST (Con't.)

CAPACITORS Ref. No.	Description	Stock No.
C17, C36	.0015MF 20% 600V	24G74
C21	20MMF 5% 500V	24G77
C23	5-5-MMF trimmer with bracket	24G98
C24, C30	.1 MF 20% 200V	24G27
C25	.0022 MF GMV 1000V	24G26
C26	.5MF 20% 200V	24G30
C27, C33	4MMF 10% 500V	24G72
C28	120, 100, 35, 3MF @ 175, 150, 125, 100V	24G97
C29, C34, C35	.005MF 20% 500V	24G9
C32	1.5-10MMF trimmer	24G99

RESISTORS

R1, R18, R48, R57	100K ½W 10%	14G39
R2, R58	1.5 Meg ½W 10%	14G189
R3, R46, R56	2.7K ½W 10%	14G185
R4, R26	330K ½W 10%	14G20
R5, R32	1.5 Meg ½W 5%	14G184
R6, R13, R20, R28, R33, R39, R47	39K ½W 10%	14G16
R7, R21, R35	1.8K ½W 10%	14G2
R8, R22, R29	1.2K ½W 10%	14G82
R9, R16, R23, R36	10 Meg ½W 5%	14G85
R10, R17, R24, R37	250K pot lin 30%	15G27
R11	56K ½W 10%	14G38
R12	5.6 Meg ½W 5%	14G187
R14, R15, R30, R34	2.2K ½W 10%	14G78
R19	8.2 Meg ½W 5%	14G188
R25, R52	27K ½W 10%	14G15
R27, R41, R55	33K ½W 10%	14G36
R31	2K pot lin 10%	15G24
R38, R44	10 Meg ½W 10%	14G48
R40	10K ½W 10%	14G34
R42	2.7K 1W 10%	14G37
R43	4.7K ½W 10%	14G46
R45	3.3 Meg ½W 10%	14G64
R49	27 ohm ½W 10%	14G66
R50	1K 5W 10%	14G174
R51	1K 1W 10%	14G60
R53	1K pot lin 10%	15G28
R54	1K ½W 10%	14G1
R59	5.6K ½W 10%	14G53
R60	100 ohm ½W 10%	14G74
R61, R62, R63	110 ohm ½W 5%	14G190
R64	18K ½W 10%	14G35

CG126 PARTS LIST (Con't.)

MISC. Ref. No.	Description	Stock No.
L1	.35 micro H coil	46G7
S1	4P5P rotary switch	25G67-1
S2	2P3P slide switch	25G64
T1	Power transformer	28S23-1
CR1, CR2	1N295 diode	19G2
CR3	.5A @ 400PIV rect.	16S5
	Knob	21G13
	189 KC crystal	47G1
	3563.795 KC crystal	47G3