July 9, 1963

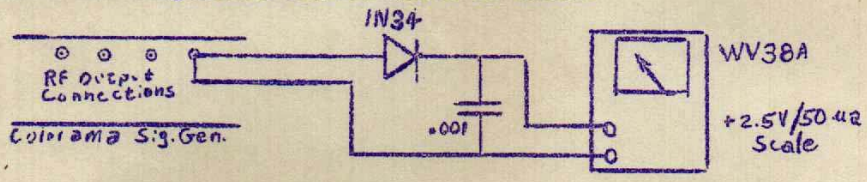
Colorama Signal Generator
Alignment Instructions

Allow a 15 minute warmup before making any alignment adjustments.
R.F. Picture and Sound Carrier Oscillator Alignment.

Equipment

1 - 1N34 diode
1 - 1000 μμf capacitor
1 - WV38A

1. Connect the components listed above as shown



2. Remove X-tal Y1 located near T5 and adjust T6 for a maximum reading on the WV38A meter.

3. Insert X-tal Y1 and remove Y2 located near T6 and adjust T5 for maximum reading on the meter.

4. Insert X-tal Y2 and remove the external circuit.

5. Connect a cable from an output connector of the Colorama Signal Generator to the antenna terminals of a color receiver.

6. Tune the receiver to correspond to the channel of the Colorama Generator (Channel 3 or 4), to check for presence of sound and pix carriers.

Alignment of Sync Generator and Pattern Generator

Counter Alignment:

A. 1. Set generator "Dot-Bar Gen." switch to the"Crosshatch" position.

2. (a) Connect scope to test point "A", designated on the schematic diagram 527C3644G
   (b) Adjust the scope to sweep at approximately a 10.5 kc rate with a stationary pattern.
   (c) Adjust R508 to obtain a wave-shape resembling trace "A", as shown on drawing No. 527C3644G. With correct adjustment, four small "pips" will be present between the large pulses.
3. (a) Move scope probe to test point "B".
   (b) Adjust scope to sweep at approximately 5,250 CPS with a stationary pattern.
   (c) Adjust R509 to obtain a wave-shape similar to trace "B". With correct adjustment one small pip will be present about halfway between the large pulses.

4. (a) Move scope probe to test point "C".
   (b) Adjust scope to sweep approximately 1500 CPS with a stationary pattern.
   (c) Adjust R511 to obtain a waveshape with the number of small pips shown in Trace "C".

5. (a) Move Scope probe to test point "D".
   (b) Adjust scope to sweep at approximately 300 CPS with a stationary pattern.
   (c) Adjust R514 to obtain a waveshape with the number of small pips shown in Trace "D".

6. (a) Move scope probe to test point "E".
   (b) Adjust scope to sweep at approximately 100 CPS with a stationary pattern.
   (c) Adjust R519 to obtain a waveshape with the same number of small pips as shown in Trace "E".

7. (a) Move scope probe to test point "F".
   (b) Adjust scope to sweep at approximately 20 CPS with a stationary pattern.
   (c) Adjust R523 to obtain a waveshape with the same number of small pips as shown in Trace "F".

It will be noted that each potentiometer (R508, R509, R511, R514, R519, and R523) has a small usable range in which the correct pattern and number of pips is maintained. It is desirable to leave each potentiometer in the center of this usable range.

A final check can be made on the counters by comparing the 60 cycle rate of the generator to an AC line. To make this check, turn the horizontal selector switch of the oscilloscope to the "line" (60 cycle) deflection position and place the scope probe on the test point 7. The resulting pattern on the scope should appear to be revolving at a slow, steady rate. Rapid or erractic movement of the pattern indicates incorrect counter adjustment.

B. Adjust R542 to obtain a PP level of 6 volts at test point 8.

C. Sub-Carrier Frequency Adjustment in the sync generator.

The frequency of the sub-carrier oscillator must be held to very close tolerances. This frequency has to be within ± 10 cycles of 3,563.795 kc (15.75 kc away from 3.579545). It is for this reason that a special crystal is used in the generator, and it is also for this reason that exact replacement parts must be used in its repair.

Checking or readjusting the frequency of the 3563.795 kc oscillator would normally involve the use of laboratory-type equipment. Fortunately however, it is possible to use the color sync burst signals on network color programs as a standard of reference. This procedure is described below.

1. Connect an antenna to the receiver and tune for a network color program. Make all adjustments necessary to produce a normal color picture. Be sure the color program is not a taped program.

2. Remove the color-sync burst signals, or DC correction voltage, used in the chroma circuit of the receiver to lock the 3.579545 MC oscillator on frequency. Information on this procedure is contained in the manufacturer's service data for the particular receiver.

3. Adjust the 3.579545 MC oscillator in the receiver for zero beat.

4. Disconnect the antenna leads from the receiver terminals. With the correcting circuit still disabled, connect the output cable of the colorama signal generator to the antenna terminals of the receiver.

5. Set the generator "Dot-Bar Gen." switch to the "Color Bar" position. Adjust the receiver fine-tuning to obtain a normal color bar pattern. Allow the equipment to warmup for approximately 10 minutes.

6. Adjust C524 so that a zero beat condition is obtained in the color bar pattern.

7. Because of the low tolerances permissible in the sub-carrier frequency adjustment, it is advisable to repeat Steps 1 through 6.

Colorplexer Alignment in the field.

Equipment: color TV receiver and service notes.
color bar test slide (furnished with the equipment).
9 pin test adaptor socket.
oscilloscope

1. Insert the test adaptor socket in the (B-Y), (R-Y) amplifier in the color receiver.

2. Connect the colorama generator output cable to the antenna terminals of the color receiver.

3. Turn the receiver and generator on and allow them to warmup for 15 minutes.

4. Switch the generator "Dot-Bar-Gen." switch to "Slide" position. Adjust 3.58 MC subcarrier in the colorplexer as described in the "Operating Instructions".

5. Insert the color bar test slide in the generator and advance the slide changer so that the test slide is in position behind the lens.

6. Adjust the generator and receiver for a picture.

7. Ground TP5 (Q signal on colorplexer).

8. Connect the oscilloscope to the grid of the (R-Y) amplifier in the receiver. Use a "Vector" test socket.

9. Set the "color" control of the receiver to maximum clockwise position.

10. Set the "Tint" control of the receiver to minimum or counterclockwise position.

11. Adjust the "Burst phase" (C5) on the colorplexer to balance or zero the signal as observed on the oscilloscope. Adjust C3 to compensate change in burst amplitude.

12. Remove the ground from TP5 and ground TP6 (I signal on the colorplexer).

13. Set the "color" control on the receiver as high as possible without overloading the receiver.

14. Adjust Q phase (L1 or C4) on the colorplexer for maximum signal on the oscilloscope.

15. Switch the generator "Dot-Bar-Gen." switch to "color bar" position.

16. Connect the oscilloscope to the grid of the (B-Y) amplifier.

17. Adjust the "Tint" control on the receiver to cancel or balance the third (3) and nineth (9) bars.

18. For the remainder of the alignment procedure be careful not to change the setting of the "Tint" control.

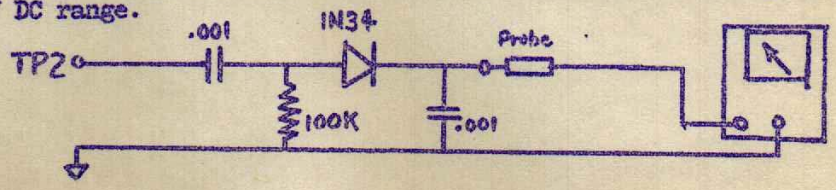
19. Switch the generator "Dot-Bar-Gen." switch to "slide" position.

20. Turn the "blue" and "green" photomultiplier gain controls to minimum or counterclockwise position.

21. Adjust "burst phase" (C5) on the colorplexer to cancel the signal on the oscilloscope.

I and Q Amplitude Balance

1. Insert test slide No. 1 (color bars).
2. Advance slide changer so that the test slide is in position behind the lens.
3. Adjust the red, blue and green photo-multiplier gain controls to obtain equal signal levels (about .5 to 1V) at their respective inputs of the colorplexer.
4. Remove V9 (burst keyer).
5. Connect TP5 and TP6 together.
6. Make a detector as shown and connect it between TP2 and a "Voltohmyst" set on the 1.5 V DC range.



7. Remove V4 and adjust R1 for minimum reading and note the reading.
8. Insert V4 and remove V3, allow about one minute for V4 to warmup, and adjust R2 for minimum reading and note the reading.
9. If step 7 is the higher reading adjust T3 so the meter will read the difference between the voltage readings taken in steps 7 and 8. If step 8 is the higher reading adjust T2.
10. Repeat steps 7, 8, and 9 until the voltages are equal. When inserting any tube allow at least one minute for the tube to warmup before making adjustments.
11. Insert all tubes and remove the jumper between TP5 and TP6. Also remove the detector circuit from TP2.
12. Check carrier balance as described in "operating instructions".

Adjustment of the Peaking Controls on the Video Preamplifier

A. Alignment of the "red" channel.

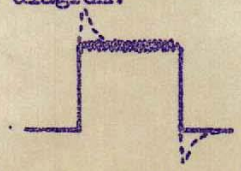
1. Insert test slide with the white square in the center and position it behind the lens.

2. Insert a VECTOR test socket in the 6922 socket.

3. Connect the oscilloscope to pin #1. Set scope for approximately 15 KC sweep.

4. Adjust the brightness control R4 and the red phototube gain control so that the square pulse observed on the oscilloscope is not being clipped.

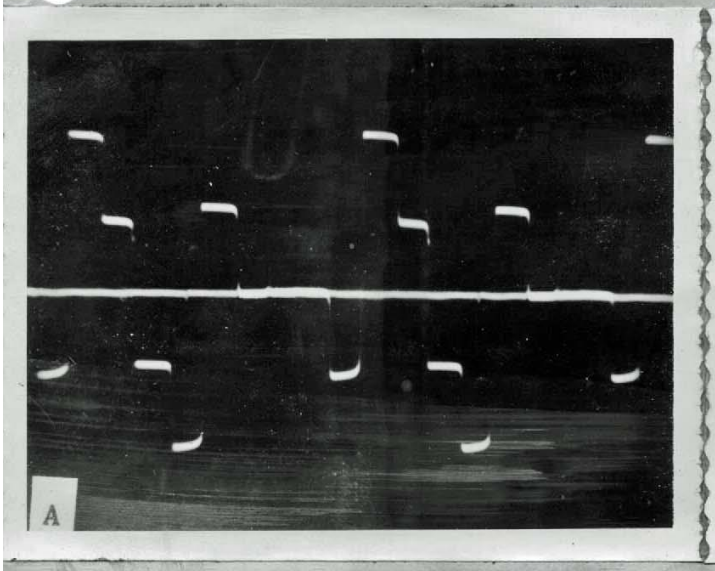
5. Adjust the two peaking controls, R316, and R322, in the red channel to produce a good square pulse. See diagram:



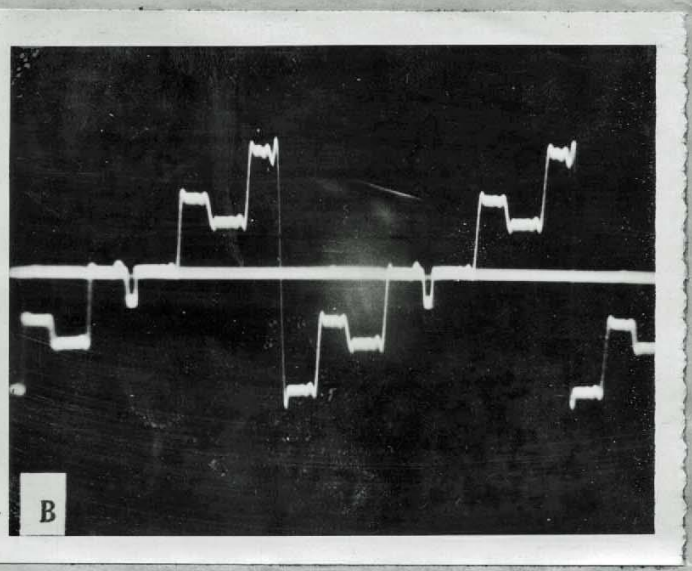
Refer to drawings No. B-527-C-3642-G and A-527-C-3691.

6. Repeat for blue and green channels.

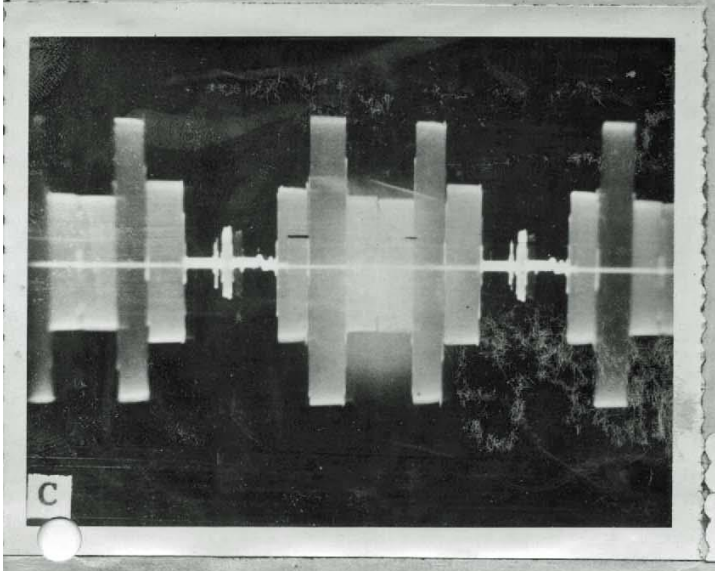
Colorplexer Waveforms Using the RCA Type
WA-1D Color Bar Generator Signal Source



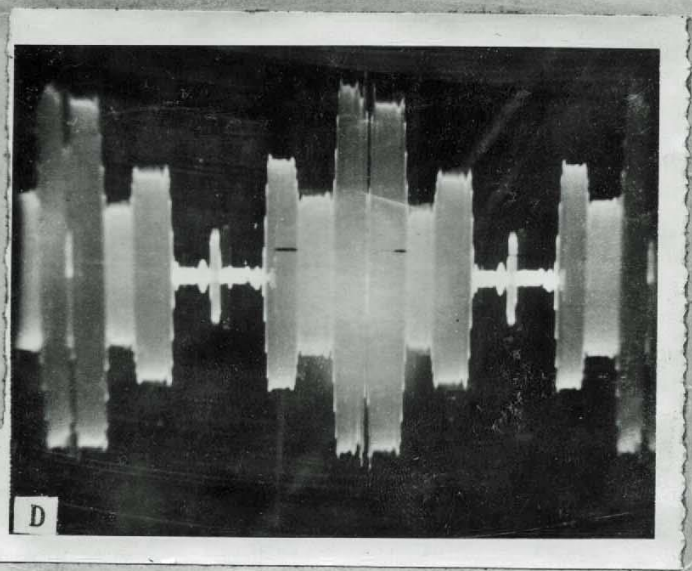
I Video TP5
Fig. A



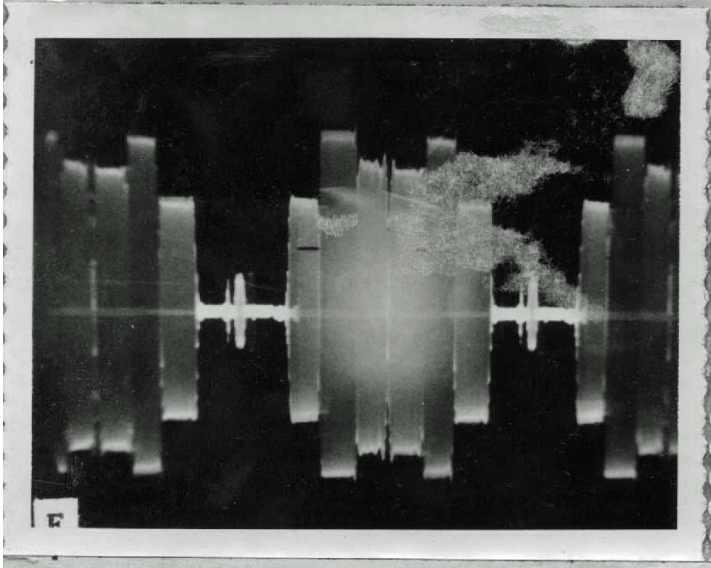
Q Video TP6
Fig. B



I Signal TP2 with TP6 Grounded
Fig. C



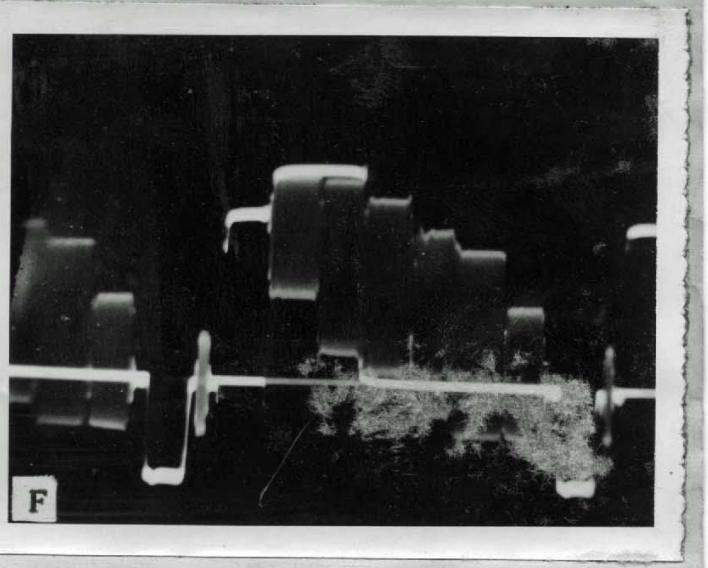
Q Signal TP2 with TP5 Grounded
Fig. D



TP2

Combined I and Q Signals with all Grounds Removed

Fig. E

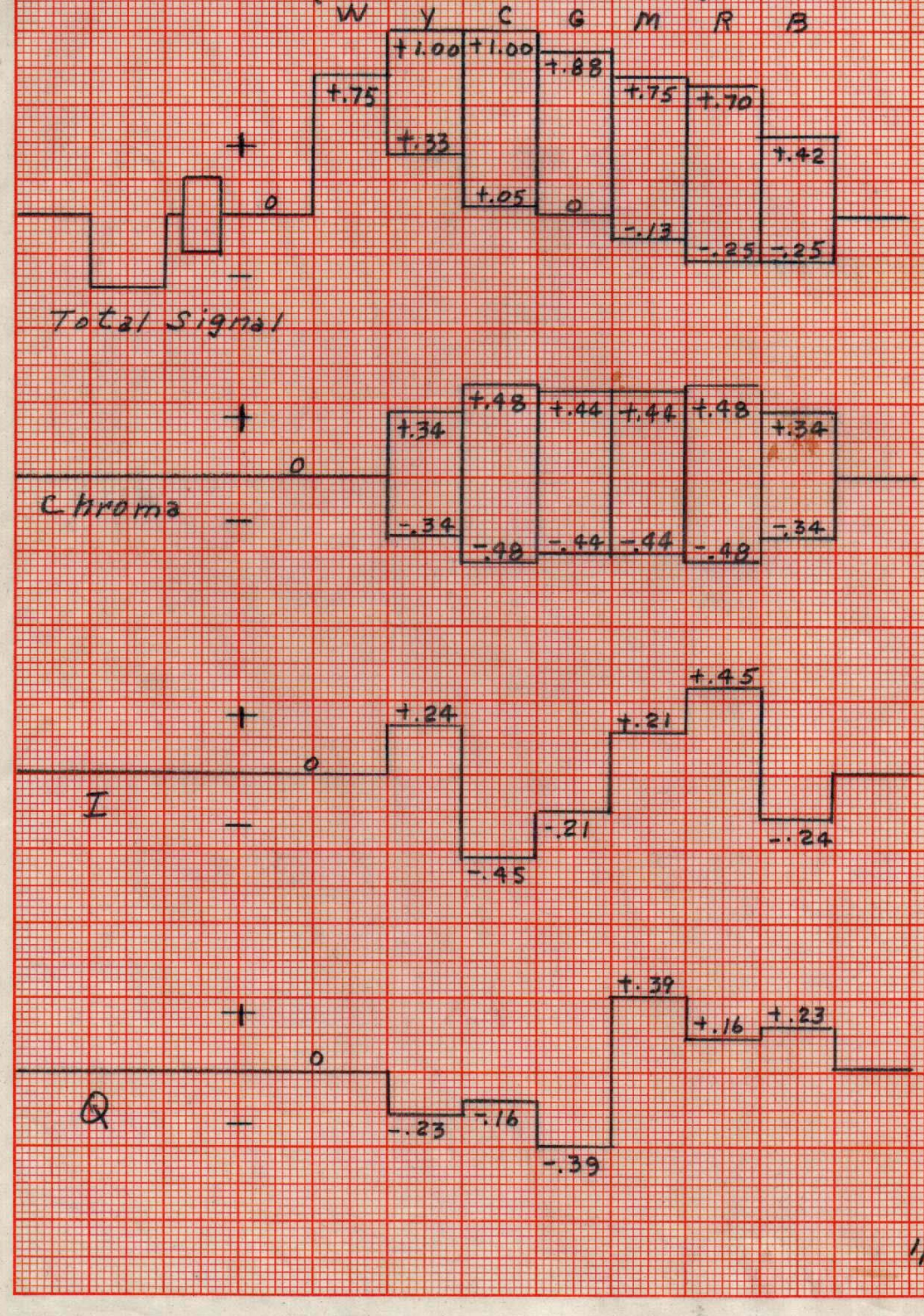


TP8 Video Output (75% Color Bars)

Fig. F

COLOR BAR SIGNAL

(75% Color Bar Level)



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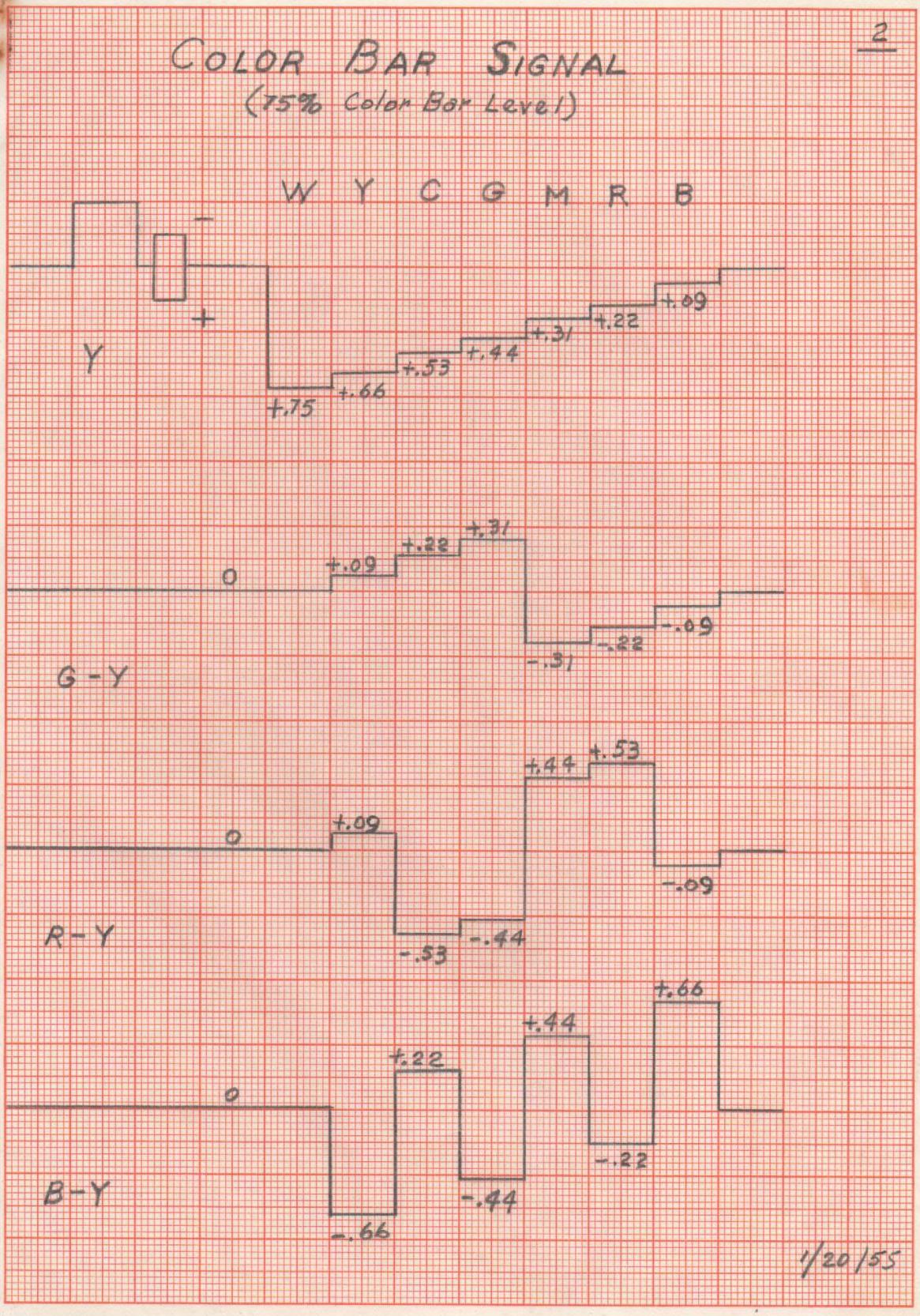
COLOR BAR SIGNAL

(75% Color Bar Level)



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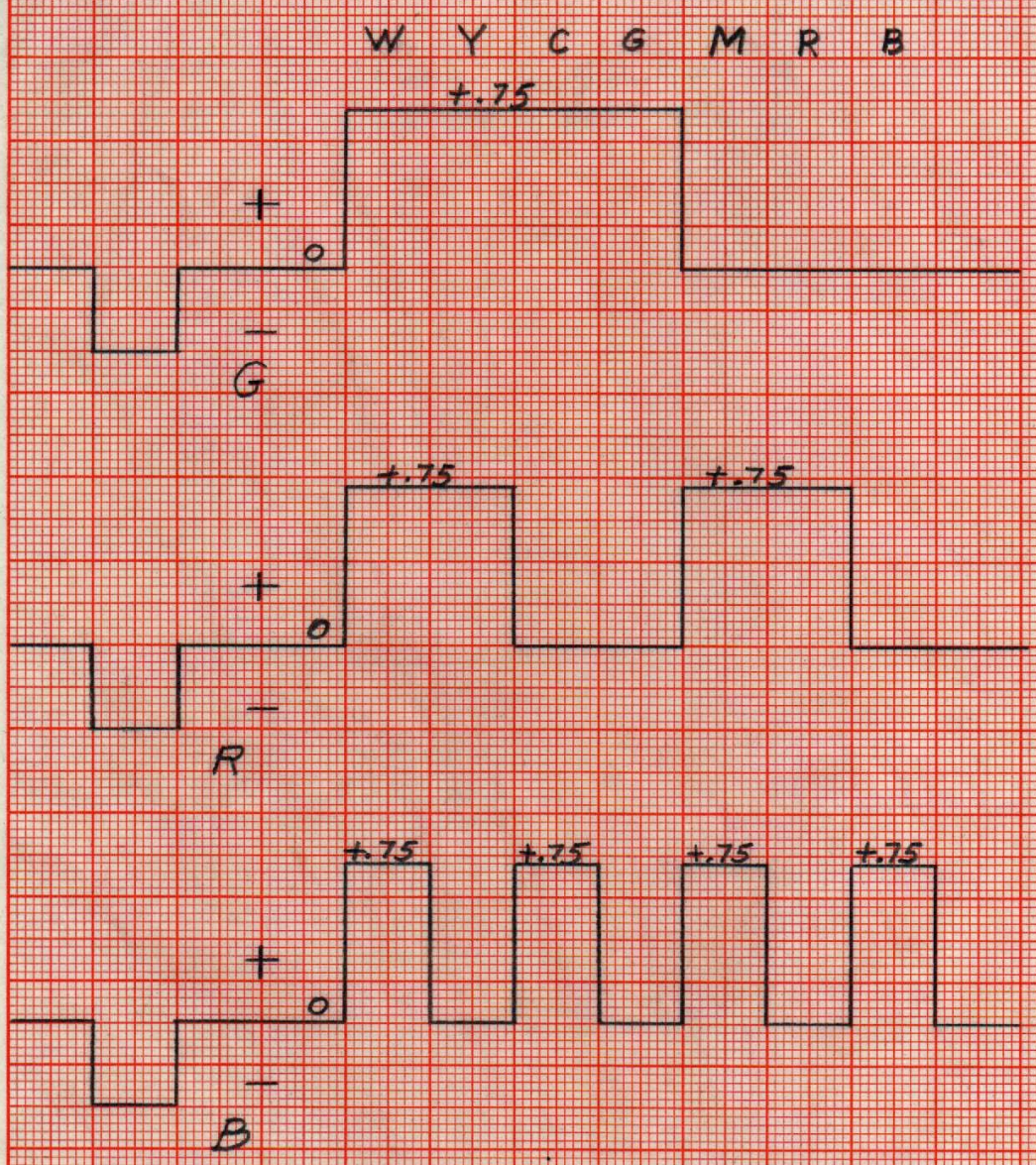
COLOR BAR SIGNAL

(75% Color Bar Level)



$$E_m = E_y + E_Q \sin(\omega t + 33^\circ) + E_I \cos(\omega t + 33^\circ)$$

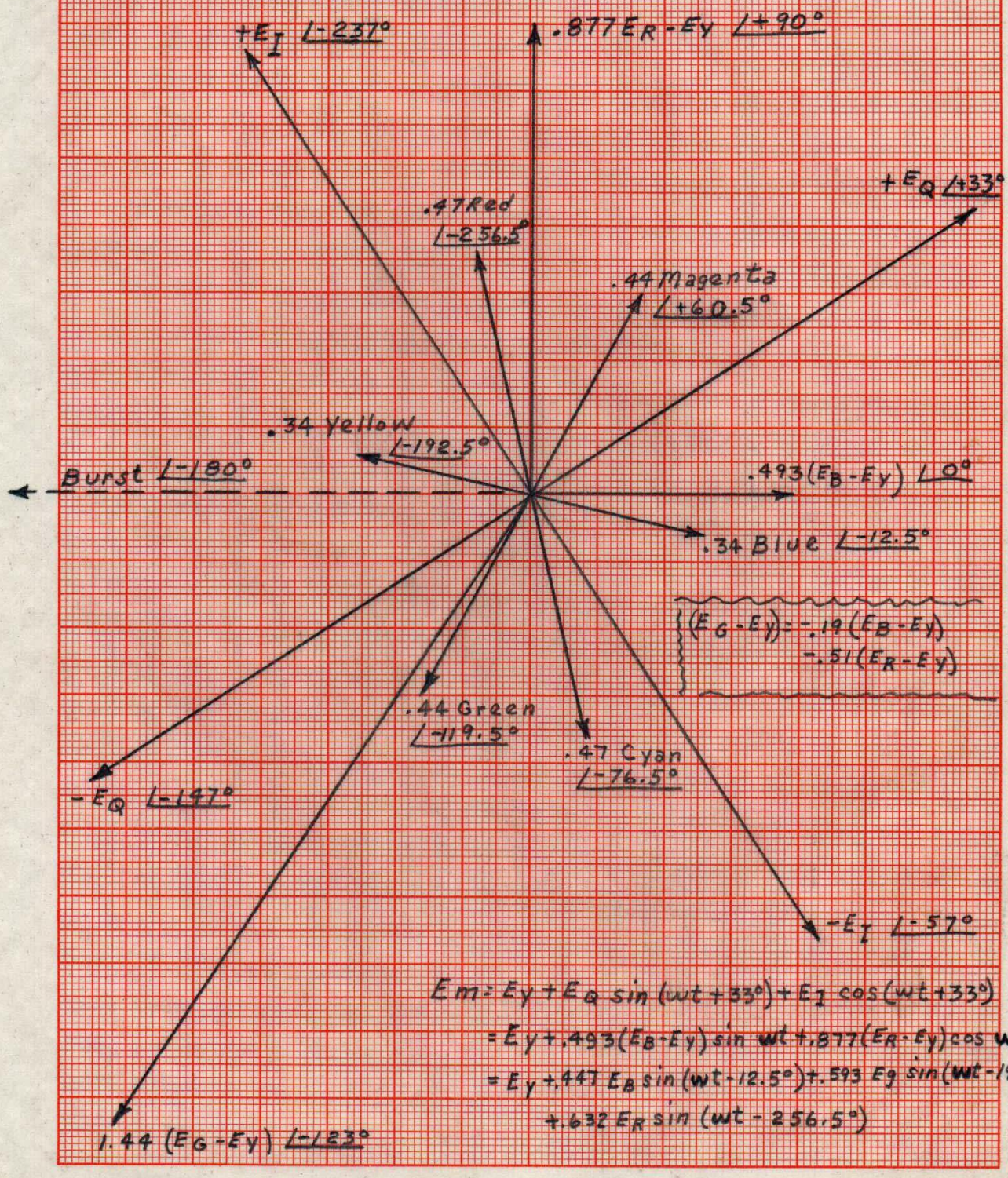
$$E_Q = +.41(E_B - E_y) + .48(E_R - E_y)$$

$$E_I = -.27(E_B - E_y) + .74(E_R - E_y)$$

$$E_y = +.587\,E_G + .299\,E_R + .114\,E_B$$

} NTSC Signal

75% BRIGHTNESS
(color only)



$$E_m = E_y + E_Q \sin(\omega t + 33°) + E_I \cos(\omega t + 33°)$$
$$= E_y + .493(E_B - E_y)\sin \omega t + .877(E_R - E_y)\cos \omega t$$
$$= E_y + .447 E_B \sin(\omega t - 12.5°) + .593 E_g \sin(\omega t - 19.5°)$$
$$+ .632 E_R \sin(\omega t - 256.5°)$$