Preliminary Specifications

IF ALIGNMENT PROCEDURES FOR COLOR RECEIVER #701 + 702

Equipment:

1) Sweep Generator -Mark-A-Sweep or equivalent.
2) Marker Generator - Hoffman Crystal RF Generator.
3) Marker Generator - RCA, WR-39B or equivalent.
4) Scope - RCA WO56A or equivalent.
5) Voltmeter - Simpson Model 260 or VTVM.
6) Crystal Diode Probe. See Figure 1

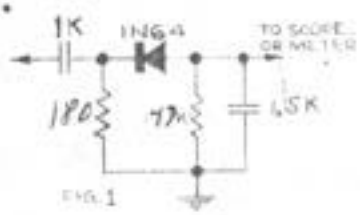

FIG. 1

Picture IF Alignment

1) Fifth IF Stage

a. Connect the scope and positive lead of the voltmeter to the junction of L400 and R401 (picture detector load resistor). Use a 10K ohm isolation resistor between the junction point and the test leads.

b. Insert crystal marker generator output into 40 Mc cascode amplifier jack on tuner in series with a 120 ohm resistor and turn tuner to UHF position.

c. Apply -8 volts of IF bias and set voltmeter to 10 volt scale.

d. Inject 41.25 Mc CW signal from marker generator and tune 41.25 Mc trap T208 (top) for maximum indication keeping generator level at a point which produces 2-3 volt reading on voltmeter.

Note: Remember that a positive bucking bias is being used in series with the video detector output, and an increase in positive potential means a decrease in detector output level.

e. Inject 47.25 Mc CW signal and tune 47.25 Mc trap T207 (top) for maximum indication with generator level set for 2-3 volt reading.

f. Connect sweep generator to grid of 5th picture IF stage, using a 1000 mmf isolation capacitor, and sweep at IF frequency.

g. Tune T208 (bottom) and T207 (bottom) for response curve shown in Figure 2. Short grid of 4th picture IF stage if spurious response affects scope picture.

Note: Tune T208 and T207 so that brass screws are well out of tinnermans. If slugs are tuned well into their respective coils they will detune the trap frequencies.

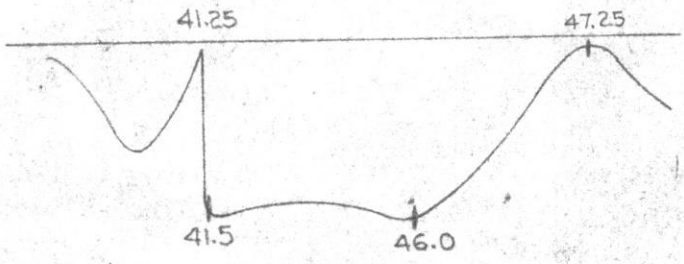

FIG. 2

2) First IF Stage

a. Connect crystal detector probe to grid of 3rd IF stage and connect scope to probe.

b. Detune 41.25 Mc trap T201 (top) to high frequency side and detune T204 to low frequency side. (SLUG OUT)

c. Inject 39.75 CW signal and tune 39.75 Mc trap T202 (top) for peak meter reading, Maintaining generator level which produces 2-3 volt reading.

d. Inject 47.25 Mc CW signal and tune 47.25 trap T203 (top) for peak meter reading. Maintain generator level which produces 2-3 volt reading.

e. Set IF bias at -5 volts.

f. Connect sweep generator through isolating capacitor to grid of 1st IF stage.

g. Tune T202 (bottom) and T203 (bottom) for response curve shown in Figure 3 while shorting lug B of T201. T203 predominant in shaping low frequency knee.

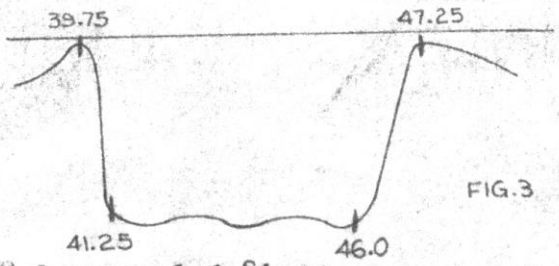

FIG. 3

3) Mixer - 1st IF Overcoupled Stage

a. Inject 41.25 Mc CW signal and time 4125 Mc sound trap T201 (top) for maximum meter reading, maintaining generator level at point which produces 2-3 volt reading.

b. Shunt plate resistor of 1st IF stage with 180 ohm resistor.

3. Mixer - 1st IF Overcoupled Stage (contd.)

c. Connect crystal detector probe to plate of 1st IF stage.

d. Remove CW generator from tuner jack and insert sweep generator output through 120 ohm series resistor.

e. Turn sound potentiometer to maximum clockwise position and back off approximately 1/4 turn.

f. Tune mixer plate coil (tuner) and T201 (bottom) to obtain curve shown in Figure 4.

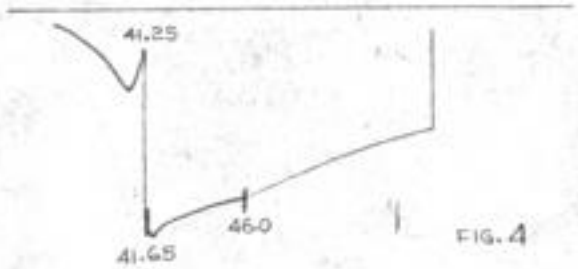

FIG. 4

4) Overall RF-IF Response

a. Turn tuner to Channel 10 with fine tuning shaft set at mid-range, and return UHF crystal output cable to jack on tuner.

b. Connect sweep generator to VHF RF input through resistive pad shown in Figure 5.

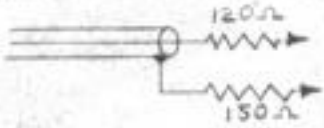

FIG. 5

c. Connect scope back to 10K isolation resistor at detector load.

d. Apply -5 volts IF bias and -4 volts RF bias.

e. Tune T204, T205, and T206 for curve shown in Figure 6. Keep sweep generator output at low enough level so that overload does not occur (approximately full attenuation with Mark-A-Sweep). T204 shapes high frequency side of response curve. T205 shapes low frequency side of response curve. T111 shapes center and rocks

4) Overall RF-IF Response (contd.)

response curve when all three are adjusted properly. It should not be necessary to retune previous circuits if they were tuned correctly.

FIG. 6

f. Increase sweep generator level so that trap points may be observed. Go through 41.25 Mc trap adjustments T208 (top) and T201 (top) if trap points do not coincide.

g. Remove 10K ohm isolation resistor.

Sound I.F. Alignment

1) Take-off Coil, Interstage, Ratio Detector Primary

a. Connect crystal CW cable to lug C of T302 through 1000 mmf isolation capacitor.

b. Connect voltmeter with positive lead to ground and negative in series with 10K isolation resistor to negative side of 5 mf electrolytic C315.

c. Inject 4.5 Mc signal at level that produces approximately 4 volts reading on meter.

d. Tune T302 (bottom), T303 (bottom and top), and T304 (bottom) for maximum meter reading (never exceed 4 volts).

2) Ratio Detector Secondary

a. Move negative lead of voltmeter to junction of R309, R310, and C312.

b. Using same generator output level as in step 1d, tune T304 secondary (top) for zero reading on meter.

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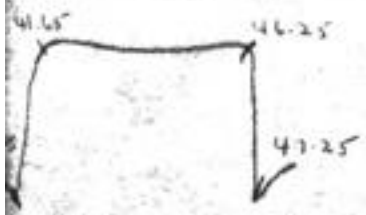
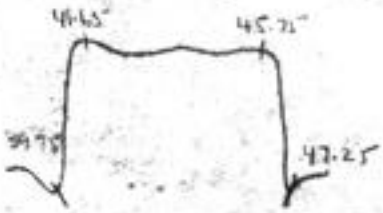
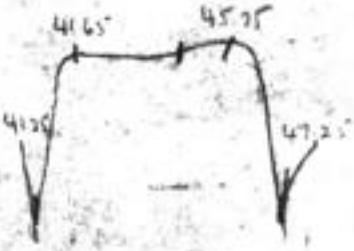


Fifth pix IF response



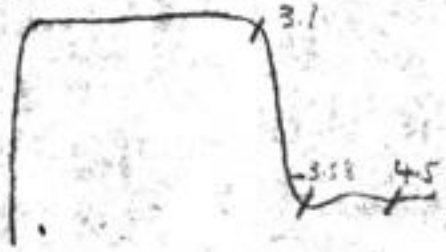
First pix IF response



Converter pix IF response
(Capacitor coupled stages)

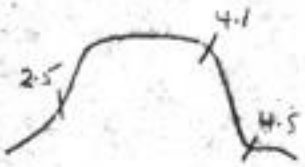
Overall pix IF response

First video amp response

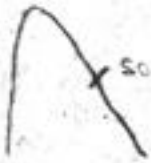


Video response after burst take off

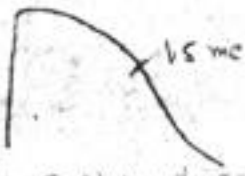
Overall video response



Band pass Amp response



Q channel response



I channel response

4-28-54

ALIGNMENT & ADJUSTMENT SPECIFICATIONS

TV PROCEDURE AND CONTROL ADJUSTMENT

olor Receiver 701 + 702

Equipment needed:

1. Wide band scope 3.5 Mc vert. min.
2. V.T.V.M.
3. 3.4 Mc - 2.9 Mc and 4.25 Mc AM signal.

Note: - Below checks were made with Browning scope model ON-5A and 10:1 probe, using an overlapped bar pattern with no blanking pulse.

1. Adjustment of Bandpass Filter

A. Turn color contrast and chroma to max.

B. Short R-609 with clip lead to ground, (killer plate load).

C. Tune primary and secondary of T-602 and L-610 out of coil.

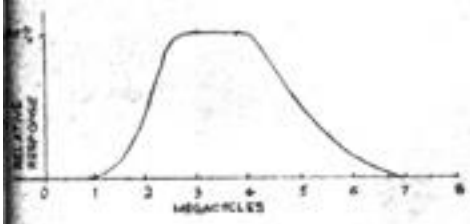
D. Clip a diode probe to cathode of "Q" demodulator V-608, Pin #2.

E. Feed a 3.40 Mc AM signal at pin #8 of bandpass amp. V-602 and tune L-610 in until meter just peaks. (VTVM on 1.5V scale).

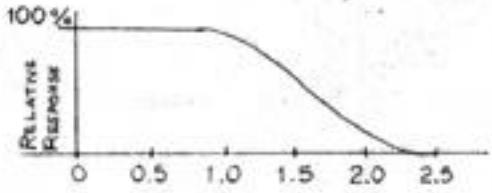
F. Feed a 2.9 Mc AM signal at pin #8 of bandpass amp. V-602 (VTVM on 1.5V scale), peak secondary top slug of T-602.

G. Feed in a 4.25 AM signal and peak pri. bottom slug of T-602 (VTVM on 1.5V scale).

Note: - Alignment of bandpass filter may also be done using a sweep generator and scope.



Bandpass for Chrominanc Channel



Bandpass for "I" Channel

H. Move scope to plate of "Q" demodulator pin #5 V-608, Feed 3.58 Mc sig. to grid of "Q" demodulator pin #1 and tune L-601 to min.

I. Move scope to plate 1st vid. amp. 6CL6 pin #6, V-401. Feed 4.5 Mc sig. to grid pin #2 V-401 and tune L-401 for min.

Control Settings.

A. Tune in an RF color signal, observe 920 KC beat on CRT face. Or when using scope, check at grid of 1st video amp. pin #2 V-401 and tune fine tuning for min. 920 KC beat.

B. Signal should be approximately 4V p-p.

C. Set contrast control R-410 ganged with R-413, for 14V p-p at plate of 2nd video amp. pin #6 V-402, approximately 1/2 turn c.w.

D. Set chrome control R-626, for approximately 1V p-p at grid of demodulator pin #7 of V-608 or V-609.

E. Set brightness control R-473, so CRT is just beyond cut-off. (when using CRT for test).

F. Set color phasing control C-407 for 1/2 capacity.

G. Set color hold control C-689 for 1/2 capacity.

Note: Horizontal oscillator should be adjusted correctly at this point.

Color Oscillator Adjustment.

A. Using a V.T.V.M. at pin #9 of package oscillator (Midland) V-605, ~~set color hold control C-689 for 1/2 capacity.~~

B. Adjust L-606 coil in plate of reactance tube V-605A for max. voltage at pin #9 of V-605 (approx. -10V DC).

C. Check at injection grids pin #7 of "I" dem. V-609 with scope, and peak pri. of T-603 in plate of color phasing tube "bottom slug", move scope lead to pin #7 of Q dem. V-608 and peak top slug sec. of T-603.

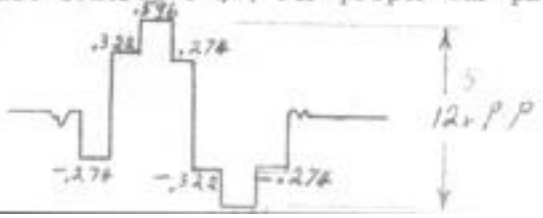
D. Set color phase control 1/2 capacity C-689. With V.T.V.M. on pin #1 of V-606, peak L-402, L-403 and T-601 for max. voltage, approx. -35V DC. (set T-601 1/2 turn ccw - on the capacitive side).

E. With V.T.V.M. on 1.5V scale, connect across C-635 in grid CKT of reactance tube V-605 detune color osc. with L-606 for approx, 20 bars out, and zero meter by adjusting AFC bal. pot R-605. Tune color oscillator on correct freq. with L-606 and adj. for final zero. (Be sure color hold is 1/2 open).

"I" and "Q" demodulator Alignment.

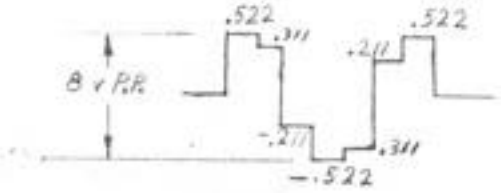
"I" Demodulator Adjustment.

A. Connect scope to pin #2 of V-610 "I" phase splitter and adjust color phase control C-407 for proper bar pattern.



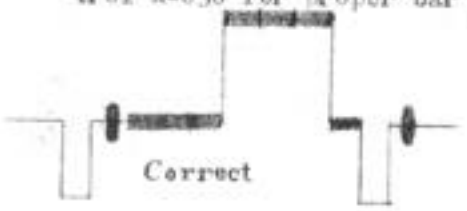
5. "Q" Demodulator Adjustment.

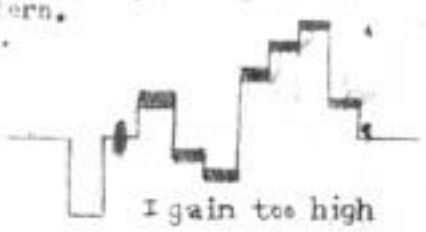
A. Connect scope to pin #2 of "Q" phase splitter V-402 and adjust sec. of T-603 top slug for proper bar pattern.



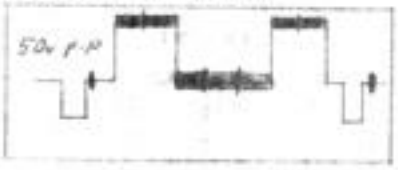
6. "I" Gain Adjustment.

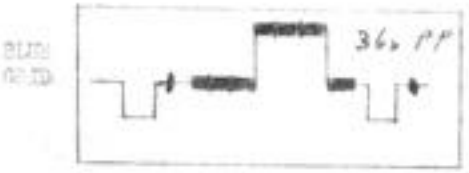
A. Move scope to grid of blue gun, and adj. "I" gain control R-650 for proper bar pattern.

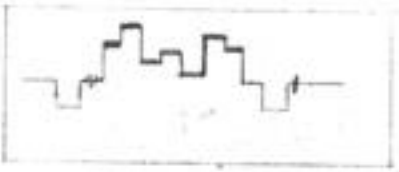




B. Check at each grid on CRT for correct bar pattern.







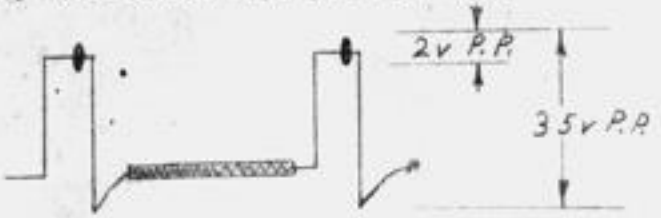
Note: Ratios between red, green, and blue sig. may vary between CRT's.

7. Waveforms.

A. Plate 1st video amp. pin #6 V-401.

Waveforms. (contd.)

B. Grid burst amp. pin #8 V-604.



C. Burst phase det. pin #1 V-606.

D. Burst phase det. pin #8 V-603.

E. Burst Keyer grid pin #2 V-604.

F. Killer plate pin #6 V-607.

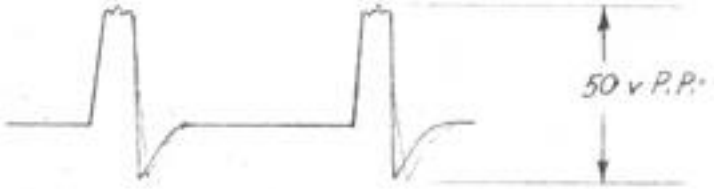
Note: With color signal input, the voltage at grid of color killer pin #7 V-607 should be approx. -15 V DC.

Horiz. Osc. Waveforms

Horiz. Osc. and Sync.

A. Plate sync sep. pin #1 V-602.

B. Junction R-672 and C-607 horiz. sync take-off.

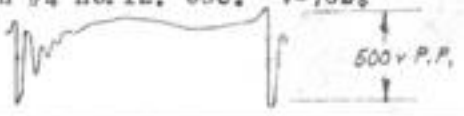


C. Across horiz. locking range cond. C-721.

D. Across C-703.

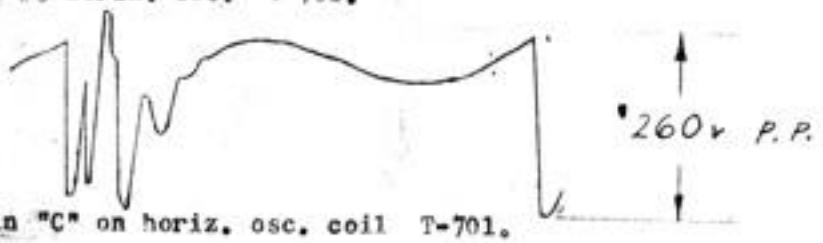
E. Pin #3 horiz. osc. V-702.

F. Pin #4 horiz. osc. V-702.

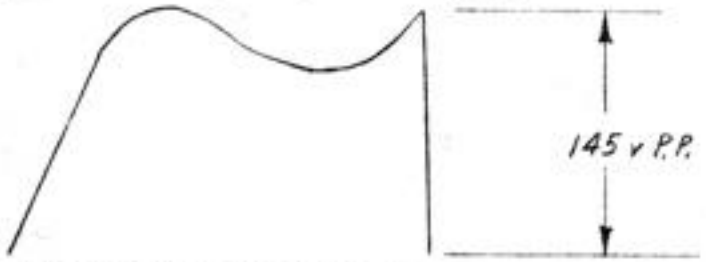


Horiz. Osc. and Sync. (contd.)

G. Pin #5 horiz. osc. V-702.



H. Pin "C" on horiz. osc. coil T-701.



DC voltages on horiz. osc.

DC Voltages on Horiz. Osc. V-702.

A.	Pin #1	-33.0V
	Pin #2	+148.0V
	Pin #3	-14.2V
	Pin #4	-74.0V
	Pin #5	+205.0V
	Pin #6	Ground

Horiz. Osc. Alignment.

A. Tune in signal.

B. Connect scope to pin "C" on horiz. osc. coil. Slug (top) for proper waveform (see waveform "H" in step #8) while keeping pix in sync by adjust stabilizing coil (bottom slug) for correct freq. and horiz. hold control R-728.

Note: Horiz. osc. should pull in from approx. 1-1/2 bars either side of hold control. Pull-in range may be adjusted by setting horiz. locking control C-721.

J.L. Whisenhunt

JLW:jdc

4-28-54

ALIGNMENT AND ADJUSTMENT FOR CONVERGENCE

PURITY AND GRAY SCALE

V. Procedure and Control Adjustment

1) Linearity and Size Adjustments

a. Locate purity coil so that back edge is 4½ inches from back edge of CRT socket.

b. Tune in a signal in a normal manner by adjusting fine tuning, contrast, brightness and AGC.

c. Adjust vertical linearity and height. Horizontal width and linearity should be made now, as any adjustment of linearity controls will effect dynamic convergence.

d. Care should be taken not to over scan the CRT as this effects purity.

e. Check horizontal oscillator control circuit for proper operation, as other circuits depend on the oscillator operating properly.

2) High Voltage Check

a. Using a high voltage meter set the high voltage to (20KV max) - (19KV min) no load.

Use a dummy load when setting hi voltage regulation. A 33.3 megohm, 15 watt, 25KV high voltage resistor is a sufficient dummy load. (600uA).

b. When dummy load is across hi voltage the high voltage should not drop more than 2.5%.

c. If the voltage is too high or too low adjust the voltage regulator control for proper voltage.

3. Purity Adjustments

a. Turn the brightness control to max. (CW) rotation.

b. Turn the green and blue screen controls to min. (CCW) rotation.

c. Turn the red screen control to max. (CW) rotation.

d. Pull the convergence magnets out as far as possible, so they do not effect the beams.

e. Adjust purity pot for no current through purity coil and disconnect neutralizing coil plug. Turn contrast and chroma to minimum.

f. Keeping yoke level, Move yoke back and forward for best purity. If contamination occurs, a slight amount of purity current may be necessary (keep purity current at a minimum value). Make sure there is no neck shadows.

g. Next check the blue purity by turning down the red and green screens and turning blue screen up. The green purity is checked in same manner, a slight compromise adjustment may be necessary for over-all best purity.

h. Plug in neutralizing coil and adjust neutralizing current to help eliminate any slight contamination that may be caused by external magnetic fields. When neutralizing current is changed repeat steps, (E, F, and G).

Note: In some CRT's, a close convergence may help purity.

White Raster Adjustment.

a. Turn contrast and chroma controls to min. (CCW) and brightness control to max. (CW).

b. Adjust blue, green, and red screens for a low white brightness.

c. Turn brightness control to a brightness that is just visible. Note if raster changes color. By adjustment of blue and green background controls, bring raster back to same value of white scale.

Important: This adjustment will determine white brightness tracking.

DC Convergence Adjustments.

a. With horiz. convergence transformer peaked by clipping scope on insulation of green lead on horizontal convergence transformer.

b. Connect dot generator to any convenient point in video amp. adjust dots to approximately an inch apart, keep output low.

c. Set DC convergence voltage to max. voltage.

d. Turn vert. and horiz. dynamic convergence to min. (CCW).

e. Keeping raster focused at all times, adjust convergence magnets for a small triangle, with max. D.C. convergence, the blue dot is at 12:00 o'clock, red dot at 9:00 o'clock and green dot at 3:00 o'clock. (within the center of the screen).

f. The dots should cross over at mid-range of DC convergence control, giving a white dot with no edge contamination. With min. DC convergence voltage the dots should reverse their position - blue dot is at 6:00 o'clock, red dot at 3:00 o'clock, and the green dot at 9:00 o'clock.

g. Most of the convergence controls are interdependent. Example - when making DC convergence adjustment it effects focus and the magnets effect the DC convergence. Care should be taken NOT to leave the magnets too close to neck of CRT as this position causes beam distortion and also purity contamination.

Note: Keep yoke level for best convergences.

h. The horizontal and vertical dynamic convergence controls are for proper dot overlap at edges of picture, first adjust vertical dynamic convergence control for equal displacement of vertical dots from top to bottom, in center of screen. Readjust DC convergence for best convergence on a vertical line down center of screen.

i. Adjust horizontal dynamic convergence control until the dots are equally displaced along horizontal line, in center of screen. Readjust DC convergence for best convergence on a horizontal line in center of tube. If blue dot is too low, more horizontal dynamic convergence voltage is needed.

j. If dots are in phase error when horizontal dynamic convergence is turned up, by observing one side of raster not being converged, adjustment of horizontal convergence phase may correct this error. If same phase error occurs in vertical direction, the vertical shaping control may correct the vertical displacement error.

k. Disconnect dot generator.

Highlight Adjustment

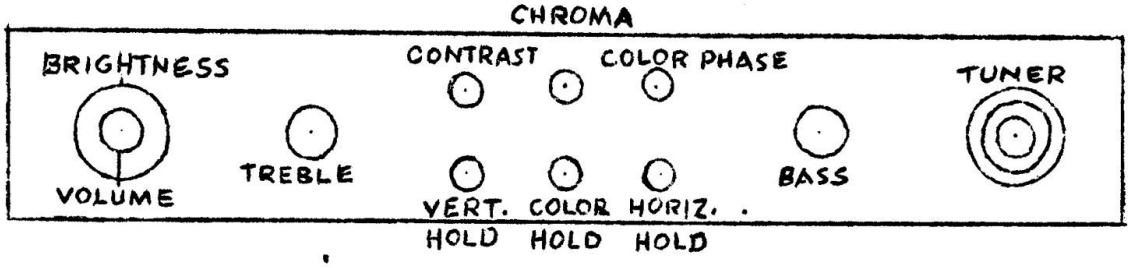
a. With brightness turned to high level and contrast about mid-position, tune in a black and white pix, and adjust the green and blue gain controls for a highlight brightness equal to step #4.

b. This step changes the gain of the green and blue video amplifier 12BH7's, thus giving proper drive to each gun to produce a white light.

J.L. Whisenhunt

TUNING OF COLORCASTER

Tuning the Colorcaster is different from that of a black and white set only in respect to its color operation. The black and white reception is identical to that of a normal black and white receiver.



The above diagram of the front panel controls will be referred to throughout the text on the operation of the individual controls. The receiver is first tuned for black and white reception, and these tuning instructions apply to a set which has been properly adjusted by a technician. The order in which the controls would be adjusted is as follows:

1. Switch receiver on by turning volume control to the right until the on and off switch clicks on.
2. Turn chroma control to the left as far as it will go.
3. Adjust channel tuner to the station desired.
4. Turn contrast control counter-clockwise or completely off.
5. After set has been on approximately two minutes, advance brightness control until raster is barely visible.
6. Advance contrast control by turning clockwise until picture contrast is normal.

7. Adjust fine tuning control for proper operation. Fine tuning control should be adjusted to a point where sound beat appears in the picture, and then back off from this point until the sound bars and beat just disappear.

8. Adjust contrast control for normal contrast setting. Care should be taken not to overdrive the set.

9. Vertical and horizontal hold controls should be adjusted to approximate mid-range or to a point mid-way between the points at which loss of sync occurs.

The receiver should now be adjusted for proper black and white reception, and the color adjustments should now be made in the following order:

1. Before attempting the adjustment of the Colorcaster to receive color, be sure the station being viewed is broadcasting a color signal. This can best be done by checking the station broadcast schedule. Network color telecasts are not always broadcast in color by the local transmitter. If color is being transmitted, a very fine grained beat will appear in the picture.

2. Advance the chroma control until the desired amount of color appears in the picture. If no color is evident, try readjustment of the fine tuning control. Set the fine tuning control for the position which will give color response with a minimum of sound beat in the picture.

3. If the color is out of sync, that is, if the color appears as diagonal bars in the picture but is not synchronized with the black

and white picture, adjust the color hold control until the diagonal color bars disappear and the picture appears as a normal color picture. This control should not be permanently set until the receiver has been in operation for approximately five minutes to allow the circuits to properly warm up and stabilize.

4. At this point, while the colors will appear on the picture in their proper places, the hue of the colors may be in error. In other words, flesh tones may appear with a bluish-green tinge, or bananas may appear as orange in color. The color phase control should be adjusted until the color tones in the picture are of a proper hue. Flesh tones are usually the easiest to identify and, with proper adjustment, these will normally appear to be slightly pink. A considerable range of color can be obtained with the color phase control and for that reason, it should be adjusted to give a proper color balance. This can normally be observed by viewing subjects in the picture and setting the color to that which appears normal for the subject.

The contrast, chroma and fine tuning controls should all be checked for proper adjustment at this time, in order to adjust the picture to the best control and contrast balance.

TROUBLES DUE TO MISADJUSTMENT

A. No Color

1. Check setting of chroma control.

2. Check fine tuning adjustment. A fine grained beat will be present in picture when color is being broadcast.
3. Adjust AGC control on back of receiver.
4. Check antenna connections. Weak signal will cause loss of color information.
5. Check with local station to see if color is actually being transmitted over local transmitter.

B. Incorrect Colors in Scene, Picture in Focus

1. Adjust color phase control.

C. Color Bars Drifting Vertically Across Black and White Picture

1. Adjust color hold control.

D. Picture Out of Focus

1. Check chroma control setting.
2. Check contrast control setting.
3. Check brightness setting. Any excessive gain through these controls will de-focus picture.

E. Blurred or Incorrect Colors

1. Check for excessive chroma setting.
2. Check for high setting of contrast.

F. Rolling Picture (Monochrome or Color)

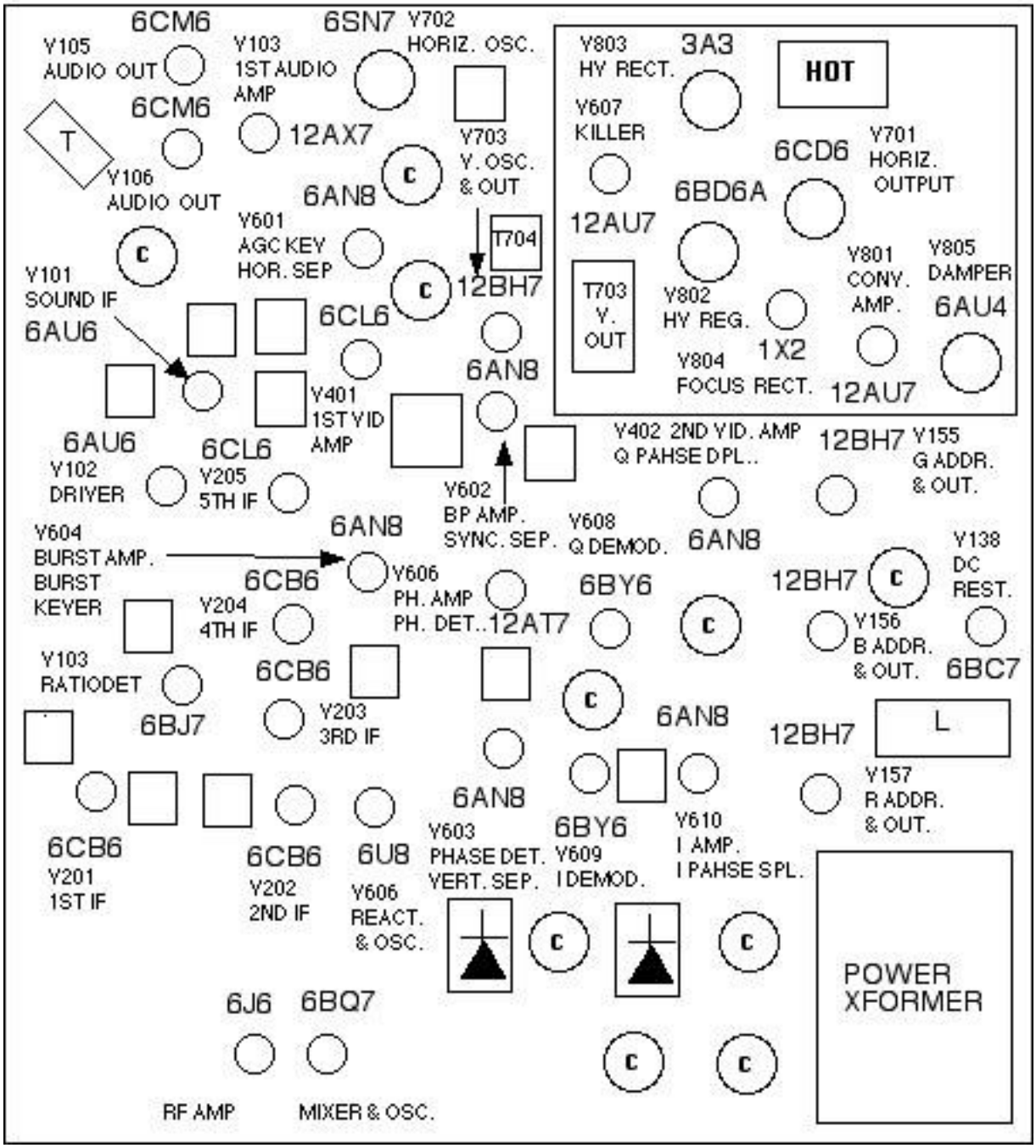
1. Adjust vertical and horizontal hold controls.

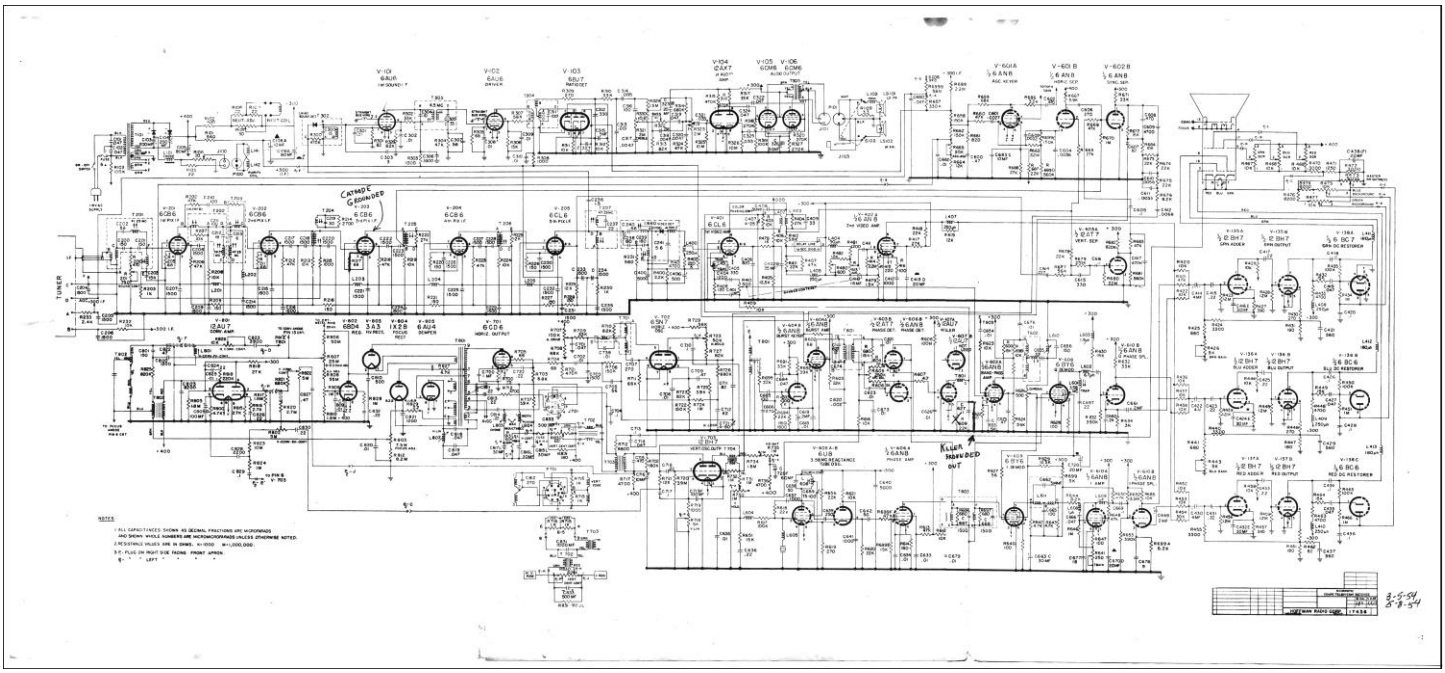
CAUTION:

The brass screw type adjustments on rear of Colorcaster should be made only by a qualified color television technician. The high voltage

adjustment on rear of receiver also should only be made by a technician as well as all controls located inside the cabinet of the Colorcaster. Contrast, brightness and chroma should not be operated at maximum setting.

HOFFMAN 15M1300U Colorcaster
TUBE LAYOUT 05/23/06




CATHODE GROUNDED
KILLER GROUNDED GRID
TUNER
NOTES:
1. ALL CAPACITANCES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS (MF) SHOWN WHOLE NUMBERS ARE MICROMICROFARADS (MMF) UNLESS OTHERWISE NOTED.
2. RESISTANCE VALUES ARE IN OHMS. K=1000 M=1,000,000.
3. F. PLUG ON RIGHT SIDE FACING FRONT APRON.
LEFT