CBS TELEVISION

485 Madison Avenue, New York 22, N.Y.

July 28, 1954

Alignment Procedure for Bandpass Amplifier, Color A.F.C. and Matrix Circuits

- H. Pollack

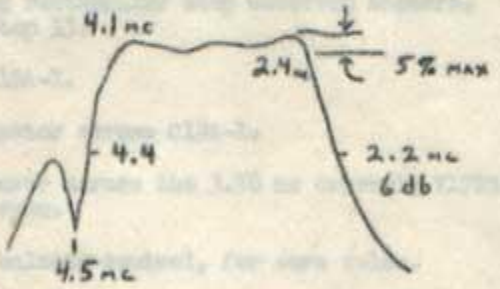
Equipment

1. Volt Ohmyst or equivalent with calibrated detector probe
2. Oscilliscope (Sylvania type 400 or equivalent)
3. Video Detector
4. Video sweep generator and marker generator

Bandpass Amplifier

1. Place a -30 volt bias supply between the grid of the color killer (pin 2, V16-B) and ground.
2. Feed a video sweeper into the grid of the 1st. video amplifier (pin 2, V14).
3. With the video detector at pin 2, V22, set the chroma control, R16A-7, to one-half of its maximum value; and adjust T16A-1 and L16A-1, in the bandpass amplifier, V16-A; and L14-2, in the cathode of the 1st. video amplifier, for the response shown in Figure 1. L14-2 will affect the location of the trap and should be set at 4.5 mc.

Figure 1:



4. Remove bias supply.

3.58 Video Trap

1. Put video detector at the junction of R15A-5, L15A-1, R25A-1, R26A-1 and R27A-1 at the output of 2nd. video amplifier.
2. Tune the trap, L14-5, to 3.58 mc.
3. Remove sweep equipment.

Color A.F.C.

1. Connect a color bar signal to the 1st. video grid.
2. Connect the calibrated detector probe of the voltmeter to terminal 2 of T19B-1.
3. Adjust T19B-1 for 5 volts p - p.

4. Connect the voltmeter, set to read negative D.C. volts, between pin 7 of phase detector, V18, and ground.

5. Short grid (pin #1) of burst amplifier, V17, to ground.

6. Adjust the bottomm core of T21A-1, quadrature coil, for maximum volts, and the top core for minimum volts.

7. Remove short from burst amplifier grid.

7a. Set HUE control, C14-9, to mid-range.

8. Short term 2, T19B-1 to ground.

9. Tune L14-6 and T17-1 for maximum negative voltage.

10. Remove short from T19B-1.

11. Place a short across C19A-1 (grid circuit of reactance tube V19-A).

12. Adjust T19A-1 (plate of reactance tube) until the colors are almost stationary.

Note: If a picture tube is not available, use the following procedure to adjust T19A-1: Place a scope at TP-2, which is tied to pin 3 of V24B, and adjust T19A-1 until a slow revolving rectangular step waveform appears. Then proceed with step 13.

13. Remove short across C19A-1.

14. Connect the D.C. voltmeter across C19A-1.

15. Place a 10 mmfd condenser across the 3.58 mc crystal, V19BX-1, so that the oscillator is out of sync.

16. Adjust R18-2, A.F.C. balance control, for zero volts.

17. Remove 10 mmfd condenser and voltmeter.

18. Put the scope at TP-2, I phase splitter, V24-B.

19. With I off, Q on, adjust C14-9, the HUE control, for zero video output on scope.

20. Put the scope at TP-1, Q phase splitter, V15-B.

21. With Q off, I on, tune the top core of T21A-1 for zero video output. This adjustment should be very small if Step 6 was done accurately.

Matrix Adjustment - Final Adjustment of Receiver

1. Put scope at blue kine grid.

2. Using a standard color bar signal, adjust chroma control for best cancellation of green and yellow bars.

3. Adjust "I" gain control for best cancellation of red bars. Repeat Step 2 and 3 until best cancellation of green, yellow and red bars is observed.

4. Place scope at green kine grid and check cancellation of red, magenta and blue bars.

5. Place scope at red kine grid and check cancellation of green, blue and cyan bars.

Color Engineering Department
HP:cj

COLOR ENG. DEPT.

6/30/54

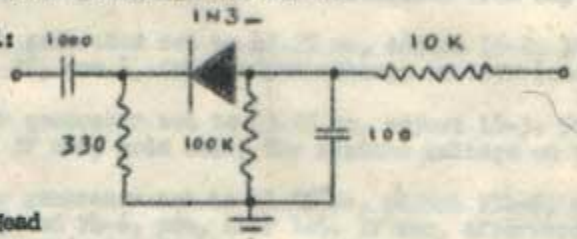
IF and Sound Alignment Procedure for 205 Receiver

- P. Ma_irth

A. Equipment Required

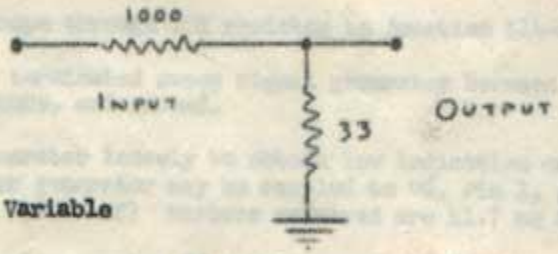
1. Oscilliscope (DuMont, Sylvania or equivalent)
2. Sweep Signal Generator (RCA or equivalent - IF and RF)
3. Marker Generator
4. Detector Probe with Damping Resistor

Figure 1:



5. IF Input Head
6. Variable Bias Supply 0 - 8V
7. VTVM
8. 30 db Pad

Figure 2:



9. RF Attenuator - Variable

B. Signals Required

1. Sweep signal - 38 - 49 mc
2. Marker Frequencies - 39.75
   41.25
   41.70
   43.40
   45.00
   45.75
   47.25
3. RF Sweep Signal - all channels
4. Modulated signal with sound, channel 3.

C. Trap Alignment

1. Connect bias box to AGC bus and set to -4 V.

2. Connect VTVM (DC volts, 5V scale) to detector output. Connect meter ground to junction C14-1, R14-3, R14-2, video bias, and meter probe to junction L14-4 and R14-1, video detector load.

3. Remove tube shield from VHF converter tube 6U8 on tuner.

4. Connect marker generator to IF Input head and slip on 6U8 on tuner.

5. With marker generator set to 39.75 mc, adjust L4-5, 1st. IF, can 1, for minimum voltage on VTVM.

Note a: Switch VTVM to 1.5V scale and increase marker output to obtain good indication on VTVM. Adjust bias as needed, but never below -1.0 volts.

Note b: All trap adjustments are accessible from top of chassis only.

6. With marker generator set to 47.25 mc, adjust L5-2, 1st. IF, can 2, and L8-1, 5th. IF, can 1, for minimum voltage on VTVM (see note a).

7. With marker generator set to 41.25 mc, adjust L8-3, 5th. IF, can 2, and L4-2, 1st. IF can, grid coil, for minimum voltage on VTVM (see note a).

8. With marker generator set to 41.25 mc, adjust P14-5, pot, near 5th. IF can, first, and P4-6, pot, near 1st. IF can, afterwards, for minimum output on VTVM (see note a).

9. Disconnect VTVM and marker generator.

D. IF Alignment

1. Connect oscilliscope through 10K resistor to junction L14-4 and R14-1.

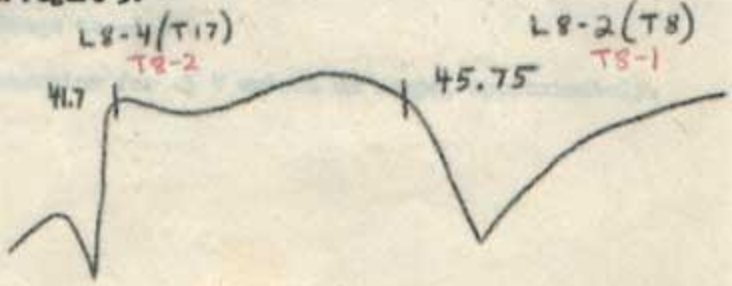
2. Connect properly terminated sweep signal generator between V8, Pin 2, grid of 5th. IF tube, and ground.

3. Couple marker generator loosely to obtain low indication on swept response. (Marker generator may be coupled to V6, Pin 1, grid of 3rd. IF tube, through 1,000 mmf) Markers required are 41.7 mc and 45.75 mc.

4. Adjust sweep signal generator ## output to obtain 5 volts output on scope (approximately).

5. Adjust L8-2, 5th. IF, can 1, and L8-4, 5th. IF, can 2, to obtain response curve shown in Figure 3.

Figure 3:



Note mc: Adjustment is to be made in such a way that L8-2 determines the response near 45.75 mc, and L8-4 affects the response near 41.7 mc.

6. Disconnect sweeper and marker generator.

7. Connect bias box to AGC bus and set for -5 volts.

8. Connect properly terminated sweep signal generator through 1,000 mmf ceramic button condenser with short leads to V5, Pin 1, grid of 2nd. IF tube.

9. Couple marker generator loosely (in ground wire of signal generator). Marker frequencies required are 41.7, 45.0, and 45.75.

10. Adjust sweep generator output for 5 volts output on oscilliscope.

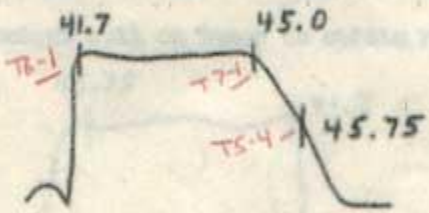
11. Adjust T6-1, 3rd. IF can, for sharp corner at 41.7 mc. The correct adjustment occurs just at the point where the sharp corner begins to round off.

12. Adjust T5-4, 2nd. IF can, to set the 45.75 marker at the 50% point of the slope on the high frequency side.

13. Adjust T7-1, 4th. IF can, for a flat response between 45.0 mc and 41.7 mc.

14. Touch up T5-4, T6-1 and T7-1 to obtain response of Figure 4.

Figure 4:



15. Disconnect sweep signal generator, marker generator and oscilliscope.

16. Connect sweep signal generator to V4-1, Pin 1, grid of 1st. IF tube, through 1,000 mmf ceramic button capacitor with short leads.

17. Connect detector probe with damping resistor to V5, Pin 5, plate of 2nd. IF tube.

18. Couple marker generator loosely for indication. Marker frequencies required are 41.7 mc and 45.75 mc.

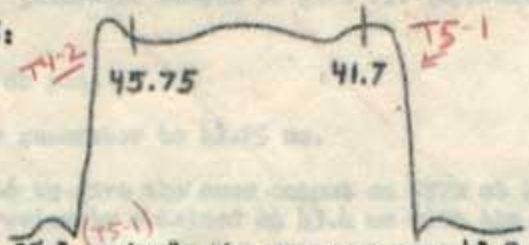
19. Connect oscilliscope to detector probe.

20. Adjust bias voltage to -1.5V.

21. Adjust sweep generator for .5 V output on scope, approximately.

22. Adjust L4-4, 1st. IF plate, can 1, and L5-1, 1st. IF plate, can 2, for response given in Figure 5.

Figure 5:



Note d: L5-1 controls the response near 41.7 mc and L4-2 adjusts the tilt of the response.

23. Disconnect sweep signal generator and marker generator (leave detector, oscilliscope and bias box connected.)

24. Connect sweep signal generator to IF input head and slip over 6U8 in tuner.

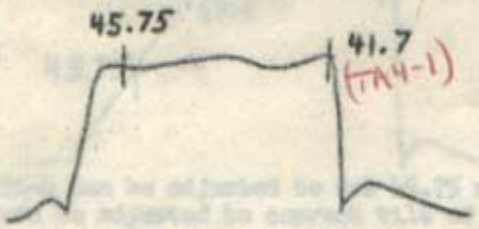
25. Connect marker generator loosely. Marker frequencies required are 41.7 and 45.75.

26. Adjust sweep generator for .5V output on scope, approximately.

27. Adjust L4-3, 1st IF grid can, for sharp corner at 41.7 mc. 41.7 mc should be on top of response close to corner.

28. Adjust mixer output coil on tuner to obtain response given in Figure 6.

Figure 6:



29. Disconnect oscilliscope from detector.

30. Disconnect detector.

31. Connect detector to V7, Pin 5, 4th. IF amp.

32. Connect VTVM to detector.

33. Disconnect sweep generator from IF input head.

34. Connect marker generator through 30 db pad to IF input head and slip on 6U8 in tuner.

35. Marker signals required are 41.25 and 43.4.

36. Set marker generator output to give .5V (approximately) on VTVM at 43.4 mc.

37. Remove 30 db pad.

38. Set marker generator to 41.25 mc.

39. Adjust P4-6 to give the same output on VTVM at 41.25 mc, without 30 db pad, as previously obtained at 43.4 mc with the 30 db pad.

40. Disconnect detector and VTVM.

41. Disconnect marker generator.

42. Connect oscilliscope to junction L14-4 and R14-1 through 10K resistor.

43. Adjust bias box to -6 volts.

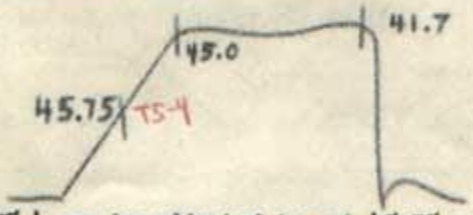
44. Connect sweep signal generator to IF input head.

45. Adjust sweep generator output for 5V on oscilliscope.

46. Connect marker generator loosely. Marker frequencies required are 41.7, 45 and 45.75.

47. Response should be as shown in Figure 7.

Figure 7:



Note e: T5-4 can be adjusted to set 45.75 marker to 50% point. T7-1 can be adjusted to correct tilt of response.

48. Disconnect sweep signal generator.

49. Repeat steps 1 through 7 as outlined under Section C - "Trap Alignment", but do not touch P4-6.

50. Disconnect marker generator.

51. Disconnect input head.

52. Slip shield cover over 6U8 on tuner.

E. Overall Response Check

1. Connect oscilliscope to junction L14-4 and R14-1 through 10K resistor.

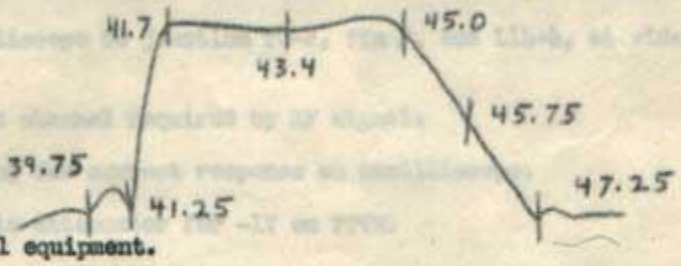
2. Connect bias box to AGC bus with -6V.

3. Connect balanced RF sweep generator to antenna.

4. Connect IF markers loosely into IF strip. Use all marker frequencies.

5. Check response on selected channels by switching RF sweep generator and channel selector simultaneously. The fine tuning should be adjusted to keep all marker frequencies at correct points, as shown in Figure 8.

Figure 8:



6. Disconnect all equipment.

F. Sound Alignment

1. Connect modulated RF signal through variable attenuator to antenna input.
2. Connect bias box to AGC bus with -6V.
3. Connect VTVM to junction C10-1, R10-1 and T9-1, Pin 1, in return of ration detector driver grid coil.
4. Connect oscilliscope to junction T8-2, Pin F, and L14-4, at video detector.
5. Set channel to channel required by RF signal.
6. Set fine tuning for correct response on oscilliscope.
7. Adjust variable attenuator for -1V on VTVM.
8. Adjust T8-3, 4.5 mc sound detector can, for maximum output on VTVM.
9. Reduce variable attenuator for -1V on VTVM.
10. Adjust top and bottom of T9, L9-1 and L9-2 sound IF transformer can, for maximum output on VTVM.
11. Adjust variable attenuator for -1V on VTVM.
12. Remove VTVM.
13. Connect VTVM to junction C11-5 and R11-4, at ration detector.
14. Adjust L9-1 and L9-2 (top and bottom), and T10-1 (top), ratio detector primary, for maximum output on VTVM.
15. Disconnect VTVM.
16. Connect VTVM ground to junction R11-4 and R11-3, ratio detector load resistor, and probe to junction R11-1 and C11-2, audio output.
17. Adjust T10-1, ratio detector secondary, (bottom), for zero output on VTVM. (Use 1.5V scale.)

    Note g: This adjustment is made by letting the meter needle go from positive to negative and then returning it to zero.

18. Disconnect all equipment.

C. Summary of Recommended Sequence for IF and Sound Alignment

		Input Signal Connected to:	Type Signal	Output Indicator Connected to:	Output Indicator
1.	IF rejection traps	Converter - tuner	CW	Video detector	VTVM
2.	5th. IF stage	Grid of 5th. IF	Sweep	Video detector	Oscilliscope
3.	Tripler stages	Grid of 2nd. IF	Sweep	Video detector	Oscilliscope
4.	1st. IF plate circuit	Grid of 1st. IF	Sweep	Plate of 2nd. IF	Oscilliscope
5.	1st. IF grid circuit	Converter - tuner	Sweep	Plate of 2nd. IF	Oscilliscope
6.	30 db trap	Converter - tuner	CW	Plate of 4th. IF	VTVM
7.	Overall IF	Converter - tuner	Sweep	Video detector	Oscilliscope
8.	IF rejection traps	Converter - tuner	CW	Video detector	VTVM
9.	Overall RF	Antenna	Sweep	Video detector	Oscilliscope
10.	4.5 mc detector	Antenna	TV signal	Grid of limiter	VTVM
11.	Sound IF	Antenna	TV signal	Ratio detector load	VTVM
12.	Ratio detector	Antenna	TV signal	Audio output	VTVM