DUMONT

First with the Finest in Television

SERVICE NOTES

FOR

DU MONT TELESETS

ALLEN B. DU MONT LABORATORIES, INC.

Teleset Service Control Department

MARKET STREET **EAST PATERSON, N. J.**

RA-103D, RA-104A, RA-110A SECTION

This section is devoted to information pertaining to the above mentioned Telesets. The reason for this consolidation is obvious since for all practical purposes the chassis is the same in all models.

At the time of this writing, the original RA-103 manual is in process of revision. The revised manual will include information pertaining to all RA-103 models ever manufactured as well as new models using the RA-103 main chassis.

A schematic diagram covering the RA-103D, RA-104W and RA-110A is presently available at a cost of $0.15 each. This schematic includes all information necessary for servicing these Telesets except for alignment. A temporary alignment procedure is included in this section.

All pages in this section will be numbered as follows: 103d-1, 103d-2, etc.

Index RA-103D Section

1/13/50

RA-103D

The RA-103C chassis which has proven so successful in the field has been improved in several respects and is now being manufactured as the RA-103D.

Two cabinet styles are presently being produced. The table model is called the "Rumson" and the console model is known as the "Sheffield".

With the increased horizontal size of the picture it was obviously necessary to increase the horizontal sweep voltage. To accomplish this it was necessary to use a negative voltage supply utilizing a pair of 6X4 rectifiers in a full wave rectifier circuit. This circuit is very similar to that used in the RA-105A Telesets and described in the RA-105 Service Manual. Incidentally, when carrying this chassis, care must be taken to prevent breaking the 6X4's.

Another important improvement in the RA-103D is the noise immunity of the sync circuits. These chassis will perform satisfactorily in many locations where the RA-103C Telesets would jump vertically with bursts of noise.

The changes made to improve the noise immunity are evident by a comparison between the RA-103D schematic diagram and the RA-103C schematic. A list of these changes follow:

1. The video amplifier V205 is changed from a 6AC7 to a 6AG7. Circuit changes necessary to change the 6AC7 to a 6AG7 have been made and an examination of the schematic will reveal the component changes.

2. In the coupling between V204B the sync take off stage and V212A the sync clipper, C219 and R224 are deleted, as direct coupling is used. C282 located at the plate of the sync take off tube is also deleted.

3. The horizontal sync circuits are essentially the same as was used in the RA-103.

4. The vertical buffer stage has several changes. The purpose of these changes is to improve the noise immunity of the vertical sync circuit.

5. As in the RA-105B, the DC plate current no longer flows through the primary of the blocking oscillator transformer.

6. R270, the 12K resistor has been deleted. This was connected across the black-brown winding of the blocking oscillator transformer.

7. The vertical saw generator and deflection amplifier is for all practical purposes identical to that previously used.

8. The horizontal saw generator has several component value changes which were necessitated by the additional horizontal size requirements.

9. A horizontal size switch similar to that used in the RA-105 is incorporated in the flyback transformer circuit. The switch is available at the side of the high voltage supply shield.

10. Capacitors C275 and C276, the filters in the power feedback circuit return to the output of the negative voltage supply.

Although the schematic diagram for the RA-103D shows the blue lead of transformer T201 going to ground, in earlier models this lead is returned to the +175 volt line. No B+ is applied to the plate of V216A through the primary of T201 because of capacitor C303. The operation is still the same however, because on the early models, the blue lead is at AC ground potential.

RA-104A Teleset

An adaptation of the RA-103D chassis using a 15DP4 cathode-ray tube has been designated the RA-104A. At the present time a table model known as the "Hastings" is the only version being produced.

To properly mount the cathode-ray tube it was necessary to physically remove the high voltage power supply from the main chassis and run interconnecting cables between the two chassis. The parts list pertaining to this model will be found on the schematic diagram.

RA-110A Teleset

The RA-110A Teleset consists of the RA-103D chassis driving a 19AP4 metal cone cathode-ray tube. This set is presently being produced in two cabinet models. One model is identified as the "Westwood" which provides television and FM and is encased in a mahogany cabinet with solid doors. The other model is called the "Fairfield" and includes the same services but is in an open cabinet.

Instructions for the proper handling of the 19" cathode-ray tube have been included in the General Section of these service notes and, therefore, will not be repeated here.

Because of the greater picture size necessary with the 19" tube several circuit differences had to be made. These are all listed on the schematic diagram, which is used jointly for the RA-103D, RA-104A and RA-110A Telesets. The flyback transformer for the RA-110A is different than that used on the RA-103D as the high voltage used on the cathode ray tube is approximately 9KV. The use of a lower accelerating voltage on the cathode-ray tube is necessary in order to provide sufficient horizontal sweep voltage.

On the RA-110A models a deflection yoke known as the "wide angle deflection yoke" has been developed especially for use with the 19" cathode-ray tubes. On the schematic diagram the part number is listed as 21004241. This is an error. The part number of the deflection yoke should be changed to 21004971. Incidentally, this yoke is the same as used on the RA-108A Telesets to be described later.

On the schematic diagram for the RA-103D, RA-104A and RA-110A Telesets, only the Westwood is mentioned under the heading RA-110A. This schematic applies equally to the Fairfield.

INPUTUNER IDENTIFICATION

A new and more sensitive Inputuner is used in the new line of Telesets. However, it is important to note that this new tuner which, incidentally, has been labelled the "bottom-coupled tuner" is not incorporated in all the sets produced under the RA-103D, RA-104A and RA-110A designation.

In the early RA-103D Telesets up to serial no. 033070 and in the early RA-104A Telesets up to serial no. 04924, the Inputuners were the same as used in the RA-105A Telesets. Therefore, the schematic diagram for this tuner will be found in the RA-105A Service Manual.

In the later RA-103D and RA-104A Telesets (after the above-mentioned serial numbers) the tuner used is the new bottom-coupled tuner. Some Telesets whose serial numbers are lower than those mentioned above contain the bottom coupled tuner if the designation "ECN 1829" is stamped on the right hand side of the main chassis.

The entry of the antenna lead into the front end of the tuner identifies the "bottom-coupled tuner."

The tube layout is also reversed in that the 6J6 RF stage is located at the front of the tuner chassis and the mixer (6AK5) and oscillator (6AB4) are located towards the rear in the order named.

The use of a 6AB4 as an oscillator stage improves the stability of this circuit. The time required to bring the tube to normal operating temperature is much less than for a 6J6.

A high pass filter is located in the input circuit of the RF stage. This circuit provides greater rejection to any signal whose frequency may fall in the IF range. This applies especially to international short wave stations and diathermy equipment.

For sales made in fringe areas, it is important that only Telesets containing the "bottom-coupled Inputuner" be installed.

LOCAL-DISTANCE SWITCH

One of the major features of this line of Telesets is the use of a novel circuit arrangement referred to as a local-distance (L-D) switch.

The serviceman who has been handling our line of Telesets in fringe areas for the past few years will definitely be pleased with the effect this L-D switch produces.

In weak signal areas necessitating turning the contrast control to maximum to get any useful signal, it was often found that the sound could be tuned in but no picture was available. Also if the Teleset was detuned from the channel marking on the dial, it was often possible to obtain a fairly strong picture but no sound.

This condition was due to a shifting of the carrier frequency down on the video IF response curve. With the contrast at maximum the grid-cathode capacity of the controlled stages changes and detunes these stages.

The effect of the L-D switch is to retune the video IF strip so the carrier is placed back up on the video IF fesponse curve.

Examination of the schematic indicates that capacitor C310 is removed from the grid circuit when the switch is in the "distance" position.

This switch is useful only in weak signal areas requiring maximum clockwise rotation of the contrast control to get a usable signal.

We have been notified by a few servicemen that they thought the L-D switch was reversed in the set because, as the switch was turned from local to distance the picture became weaker. However, by reducing the signal input to the receiver (either using an attenuator or a weak station) so the contrast control had to be turned fully clockwise, the L-D switch then worked normally.

The effect obtained by using the L-D switch when the signal is strong is described by one of the three following statements:

1. Picture becomes stronger.
2. Picture becomes weaker.
3. No noticeable difference.

The effect that takes place when receiving a strong signal is actually of no consequence. The important thing is that when receiving a weak signal (requiring full contrast) the picture becomes stronger when the switch is placed in the "distance" position. Therefore, to test the operation of this switch, a weak signal must be applied to the receiver terminals.

TROUBLES ENCOUNTERED WITH NEW TELESETS

It is of vital importance that the serviceman in the field inform us of any troubles that he is having with the new Telesets. The quicker we hear reports of mal-functions the easier it is for production changes to be made to prevent future defects of the type encountered. To date only a few items have shown up as faulty in these sets and they are presented as follows:

1. Some trouble has been encountered when arcing occurs between the crossed leads under the socket of V217 the vertical deflection amplifier. It was found that an arc would occur between the plate and grid circuit of these tubes. This resulted in a collapsing of the picture in a vertical direction and this condition has since been remedied. If the serviceman should run into this in the field the simplest method of preventing the reoccurrence of this trouble is to route one end of the leads on the outside of the socket and the other lead on the inside of the socket.

2. A few complaints have been received where the vertical deflection amplifier tube (V217) caused noise in the audio system. It was found that this was caused by an arcing in the base of the 6SN7 itself. If anyone in the field runs across this fault please advise us of the manufacturer of the tube.

BARKHAUSEN OSCILLATION

The condition known as Barkhausen Oscillation has appeared on a number of RA-104A and RA-110A Telesets. The indication of this trouble is one or more vertical black lines on the left-hand side of the raster.

To eliminate this condition, take the following steps:

1. Use only co-ax transmission line. Use RG-11/U in the fringe areas and RG-59/U in strong signal areas. (See page Ins-1 Installation Section).

2. Make sure the shield of the co-ax is properly grounded to the antenna connector shield.

3. Keep the co-ax transmission line away from the power supply chassis.

4. Place a metal plate (preferably copper) under the power supply chassis and main chassis. This plate need only be large enough to act as a bond between the two chassis.

5. If the above steps do not cure the condition replace the 6BG6. Also ascertain that the drive control is properly adjusted.

"THUMPING" IN THE RA*108A AND RA-110A TELESETS

An interesting phenomenon which could be the source of some annoyance has occurred in Telesets using the 19AP4 metal tube.

This condition may be described as an "electrostatic pendulum". The "pendulum" consists of a swinging back and forth in a definite rhythm of the tag tied to the high voltage lead. This warning tag makes a resounding "thump" each time it strikes the metal.

When installing the Teleset, the position of the tag should be noted to prevent this condition occurring.

HUM IN AUDIO OUTPUT

A loud hum in the audio system of all Teleset models may be caused by a heater-cathode short in the 6AL7GT tuning indicator tube.

ALIGNMENT PROCEDURE

The alignment procedure for the RA-103D, RA-104A and RA-110A Telesets is in preparation. This procedure will be reproduced on a single sheet similar to that used for the schematic diagram.

If it becomes necessary to align any of these sets in the near future (it should not be necessary) the following instructions are presented.

VIDEO IF ALIGNMENT PROCEDURE FOR RA-103D, RA-104A AND RA-110A

Note: If the set has a local-distance switch place it in the local position and set C310 to ½ its total capacity before proceeding with alignment.

1. Feed a 21.9 mc AM modulated signal into the grid of the first video IF V201. Place an oscilloscope on grid of cathode-ray tube using only enough signal to get a satisfactory picture on scope. Tune trap L222 and Z201 (top) for minimum signal on scope.

2. Change signal generator frequency to 20.4 mc and tune L225 for minimum signal on scope.

3. Feed a 25 mc signal wobbulated about 6 mc into grid of third video IF (V203). Turn contrast control off. To align third video IF use coils L210 and L212. Short out L209. L212 affects left side of curve. L210 affects right side. Peaks must be even and carrier cannot exceed more than 15% down from right peak. A 22.4 mc marker should be just inside the left peak. Response curve should appear on scope as shown in Fig. 1.

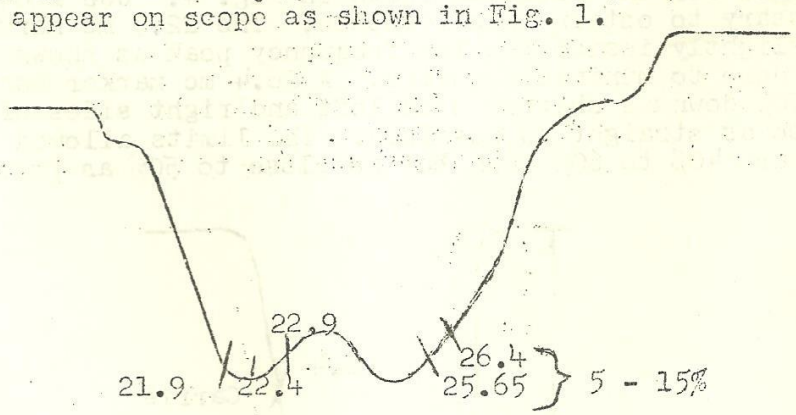


Fig. 1

4. Feed wobbulated signal into grid of second video IF (V202). Turn contrast control full on. Use no more signal than the amount required to obtain a clear picture on the scope. Adjust L208, L207 and L209 to obtain the curve shown in Fig. 2. L208 will position center peak. L207 will move shoulders up or down. L209 will position carrier on right shoulder.

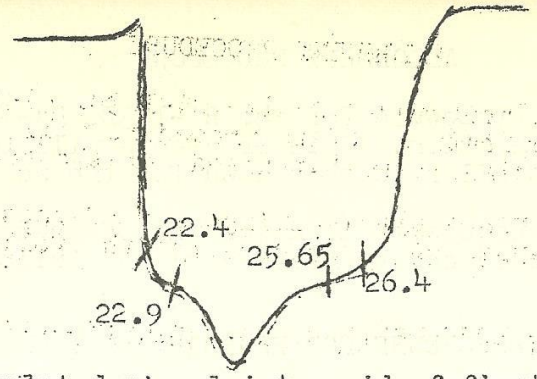


Fig. 2

5. Feed wobbulated signal into grid of first video IF (V201). Adjust L204 and L206 to obtain curve shown in Fig. 3

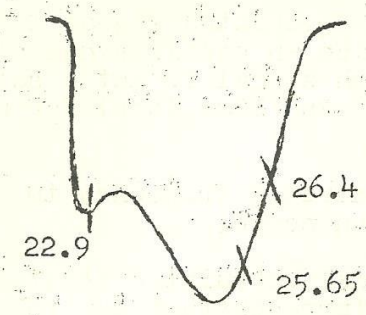


Fig. 3

6. This is the most important step in the alignment. Attach a wire to the grid of the 6AL5 in the mixer stage of the Inputuner (V102). Feed wobbulated signal into grid. L201 and L203 should be adjusted for the response shown in Fig. 4. Use L204 and L206 if necessary to obtain this response. The 22.9 mc marker must be placed slightly inside the low frequency peak as shown in Fig. 4. This is done to minimize ringing. A 26.4 mc marker must be placed 50% down as shown. Both left and right sides of curve should be as straight as possible. The limits allowed for the carrier are 40% to 60% down but as close to 50% as possible.

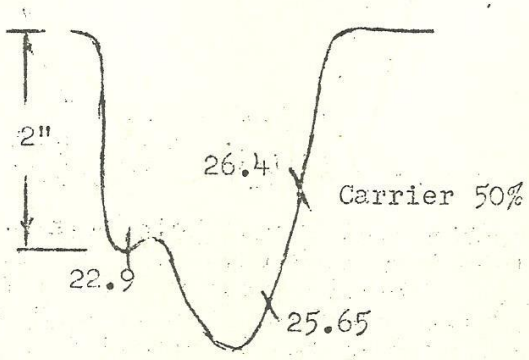


Fig. 4

7. Feed a 4½ mc AM signal into grid of video amplifier (V205) using a crystal rectifier in the scope lead. Tune L216 for minimum signal on scope.

8. By careful minor adjustment of some or all coils while watching a test pattern after the above alignment has been

completed improvements in picture quality can sometimes be made. Watch effects of these adjustments on vertical and horizontal definition, ringing, trailing blacks, trailing whites, etc.

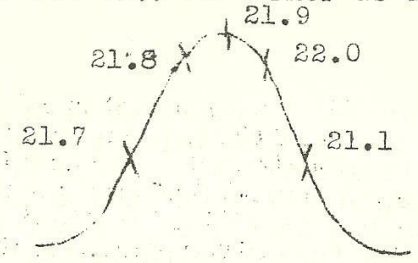
For Sets with the Local-Distance Switch

9. After set has been aligned place local-distance switch in distance position and tune set to a 50 microvolt test pattern. Adjust L206 for maximum signal. Tune to a strong test pattern (500 microvolt) and adjust C310 for the best picture.

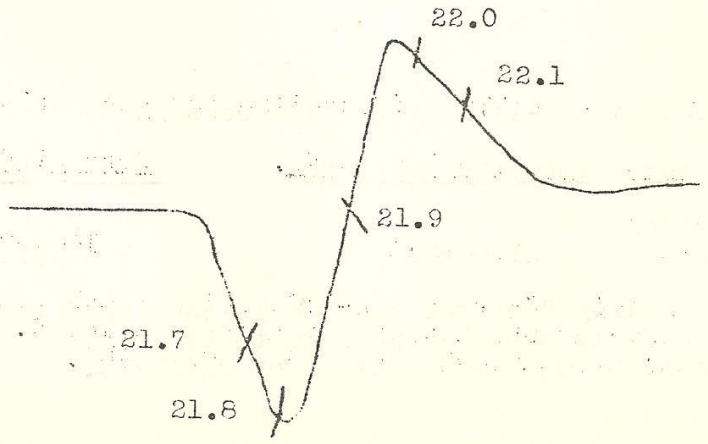
SOUND IF ALIGNMENT PROCEDURE

1. Place a crystal probe in scope lead and connect to plate of second sound IF (V208) at can end. Feed a 22 mc wobbulated RF signal with about 1 mc sweep into grid of first sound IF (V207). Adjust top and bottom of L202 for maximum amplitude and a symmetrical curve as shown in Fig. 5.

2. Feed wobbulated signal into grid of first video IF (V201). Adjust secondary (bottom) of Z201 for maximum output. Adjust primary (top) of Z201 for 21.9 mc marker as shown in Fig. 5.



3. Place scope lead on sound take off point. Leave wobbulator where it is. Adjust top and bottom of Z203 for response shown in Fig. 6. Bottom of can will affect gain; top will affect symmetry of curve.



RA-103D, RA-104A, RA-110A SECTION

ERRATA SHEET

Several errors in the schematic diagram for the subject Telesets have been brought to our attention. Please correct these errors on your copy as follows:

Main Chassis Schematic

1. Connect pin #4 of V211 (the second sound amplifier) to the positive side of capacitor C208B. (Without this connection, the plate of the first sound amplifier and the screen grid of the second sound amplifier would be without B+ power.)

1. Parts List Sheet

The parts listed in the lower right hand corner under the heading "For the RA-110A Teleset make the following changes", should be located at the end of the "Receiver Parts List RA-103D, and RA-104A" and ahead of "Miscellaneous Parts List, Rumson and Sheffield Teleset RA-103D". These changes apply to the "Receiver Parts List etc."

2. Receiver Parts List RA-103D and RA-104A.

Symbol	Incorrect Part No.	Correct Part No.
C283	03014269	03014260
R281	010214620	01012400

3. Westwood Teleset RA-110A (Miscellaneous Parts List)

Component	Incorrect Part No.	Correct Part No.
Deflection yoke	21004241	21004971

4. Under the heading "For the RA-110A Teleset make the following changes", C287 is shown as an item to be deleted. The part number should be 03014740 instead of 02014740.

RA-103D, RA-104A, RA-110A SECTION

PRODUCTION CHANGES

Several circuit changes have been made since the schematic diagram for Teleset models RA-103D, RA-104A, RA-110A was issued. (Incidentally, this schematic also applies to the Fairfield Telesets under the heading RA-110A).

These changes are as follows:

Change #1

C308 in the plate circuit of V202, the 2nd video IF stage was deleted.

Purpose of Change:

To reduce regeneration caused by the incorporation of the "bottom coupled Inputuner."

If the serviceman changes the Inputuner on the early RA-103D or RA-104A Telesets to a "bottom coupled Inputuner" this change should also be made.

Change #2

C299 (in the plate circuit of V212A) was deleted as a separate capacitor and its symbol changed to C216C. Capacitor C216 was changed from a 3 section capacitor to a 4 section capacitor to accomplish this change.

C216 as a four section capacitor is described as follows:

C216 03014120 Cap E 10/10/10/10 mf + 75% -10% 300V

Change #3

R331 in the negative voltage supply was changed from 27K $\frac{1}{2}$W to 22K $\frac{1}{2}$W.

Purpose of Change:

The purpose of this change was to increase the negative bias supplied to the video amplifier stage V205.

The new part is described as follows:

R331	02031930	Res F C 22K 10% ½W

Change #4

The specification of capacitor C310 used in the Local-Distance switch circuit was changed to .8 to 7 mmfd.

The part number is not affected as this merely corrects a specification error.

Change #5

The values of R217 and R282, (the parallel circuit in the B+ lead to V216B and V217) have been changed from 10K each to 6.8K each.

Purpose of change

To increase the supply voltage to the vertical saw generator and vertical deflection amplifier in order to provide adequate vertical size for all uses of this chassis.

The new parts are described as follows:

R217	02037870/RC40BF682K	Res F C 6.8K ± 10% 2W
R282	02037870/RC40BF682K	Res F C 6.8K ± 10% 2W

Change #6

Changes A, B, and D, apply to RA-110A main chassis only. Change C applies to RA-104A and RA-110A main chassis.

A. R304 was originally a 50K resistor in the chassis used in the RA-110A. This resistor is deleted in the models currently being produced.

B. J206-1 is being deleted from the chassis used in the RA-110A. Because of this deletion, the 4 prong cable assembly P206 is changed from part #50016842 to part #50016843. The only difference between these two cable assemblies is that the white wire has been removed from pin #1.

C. The linearity coil L219 is changed from part #21004771 to #21004752.

D. The part number of T204 is changed from #20004521 to #20004581. The high voltage output obtained with this new transformer is approximately 9000 volts, which is 1000 volts lower than that obtained from #20004521.

Purpose of changes

A, and C, -- to improve horizontal linearity.
B -- the white wire is no longer necessary when R304 is deleted.
D -- to reduce the high voltage and obtain greater picture size.

The letter "D" stamped on the rear of the chassis, identifies it as containing changes #5 and #6 as noted above.

Change #7

R218 (located in the plate circuit of the video detector) has been changed from a 39K ½W resistor to an 18K ½ watt resistor. The description of the new part follows:

Part No.	Description
02030780	Res F C 18K ± 5% ½W

Purpose of Change

To reduce the dip that occurred in the center of the response curve of the third video IF stage. This dip was caused by the addition of the 20.4 mc trap circuit.

Change #8

The color designation of certain video IF coils have been changed as follows:

Symbol	Old Color	New Color	New Part No.
L206	Blue	Green	21004135
L208	Blue	Green	21004135
L212	Violet	Blue	21004136

Purpose of Change

To provide coils that will operate more nearly on design center.

The first chassis affected by this change are as follows:

Chassis	Serial No.
103D	0321680
104A	044201
110A	017128

Change #9

The voltage rating of capacitor C252 (coupling the plate of V213 to the grid of V216A) was changed from 200 volts to 400 volts.

This part is now described as follows:

Part No.	Description
02014040	Cap Pa .1 mfd ± 25% 400V

Purpose of Change

To prevent the possibility of voltage breakdown of this capacitor. Obviously any replacements should be made using the 400 volt unit.

Change #10

The wattage rating of R334 (shown on the schematic below V211) has been increased from ½ W to 1 W. This part is now described as follows:

Part No.	Description
02033770	Res F C 16K ± 5% 1W

Purpose of Change

To prevent failure of this part due to overheating. Any replacements should of course be made with the new part.

Change #11

Some field complaints have been received pertaining to horizontal jitter when receiving a weak TV station. A very critical setting of the horizontal phasing control would usually eliminate the jitter.

This condition has been caused by feedback of the pulses of the horizontal output system into the horizontal sync circuits and video amplifier.

To reduce this feedback it was necessary to make the following changes:

1. In the early models, the plate circuit of V205, the video amplifier, was connected to the junction of R286B and the focus control. With this wiring arrangement, the only time the B+ line going to the video amplifier was completely by-passed by C264B, was when the focus control was at its extreme clockwise position.

In order that this line be adequately by-passed at all times, the B+ line to the video amplifier is now connected to the arm of the focus control. This change is shown in Fig. 1.

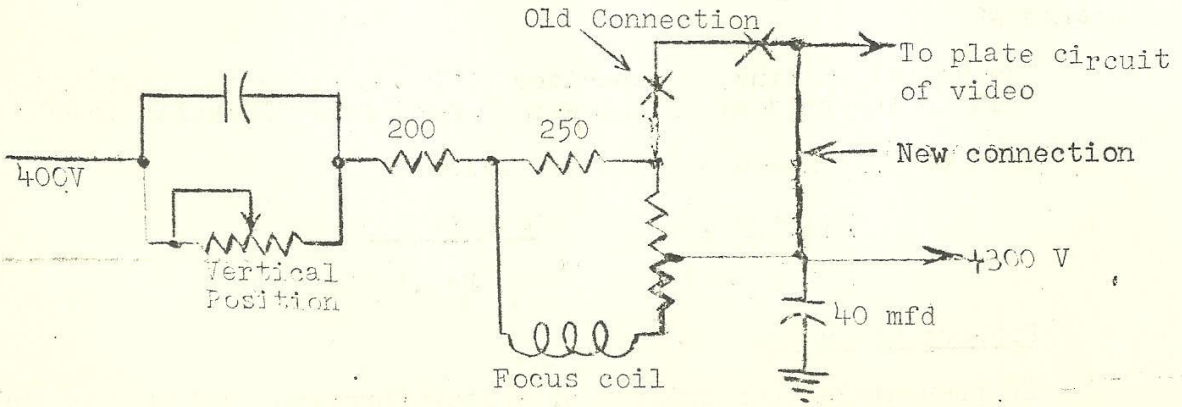


Figure 1

This change reduces the B+ voltage of the video amplifier about 25 to 30 volts but does not noticeably affect the operation of this stage.

2. In addition to the above wiring change, it was necessary to redress certain leads to eliminate pick up in the sync circuits. The proper lead dress is described in items (a) and (b) below and illustrated in Figure 2.

(a) The lead from the coupling capacitor (C306) to the grid of the sync clipper (V212A) should not be run under the main cable between the two large filter capacitors. Rather, it should go straight from the terminal board toward the rear of the chassis, and then after a 90° turn, it goes to the grid of V212A so that it passes under the main cable at right angles.

(b) The lead from the high side of the yoke now goes to pin 6 of the 5V4 by running parallel with the main cable through the space between the two large filter capacitors and then to the 5V4. This lead (colored yellow) should go toward the linearity coil after emerging from the grommet and then after a 90° turn to pin 6 of the 5V4.

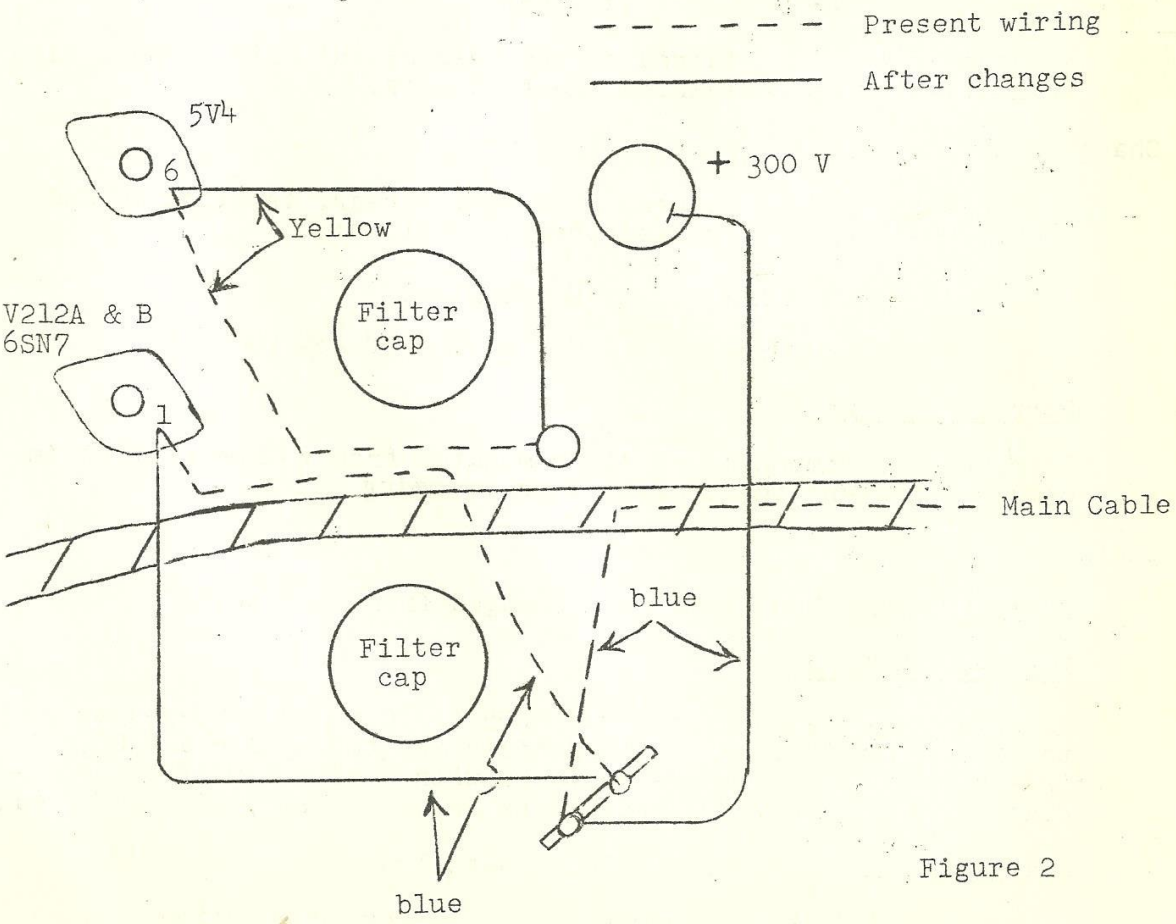


Figure 2

Change #12

The value of line filter capacitors C260 and C261 has been changed from .05 mf 600V to .02 mf 600V. This part is now described as follows:

Part No.	Description
03018570 0301856C	Cap Pa .02 mf 20% 600V

Purpose of Change

To reduce shock hazard between chassis and ground.

The first chassis affected by this change are identified as follows:

Model No.	Serial No.
RA-103D	0336565
RA-104A	0411020
RA-110A	1016691

A large letter "K" stamped on the rear of the main chassis also identifies it as containing these changes.

Change #13

C312 has been added between S202 Sec. 2 rear, terminal 10 and R246. The new part is described as follows:

Part No.	Description
03000950	Cap Pa .05 mf 25% 200V

Purpose of Change

To remove DC component of discriminator from volume control in order to prevent the control from becoming noisy.

Change #14

V201, V202 and V203 have been changed from 6AG5 to 6BC5.

Purpose of Change

To obtain increased gain. The 6BC5 has G_m=6000 compared to the 6AG5, G_m=5000. When it is necessary to replace a 6AG5, it is recommended that it be replaced with a 6BC5. If V203 is replaced with a 6BC5, C213 should be changed from .005 to 470 mmf.

Change capacitor specifications as follows:

Symbol	New Part No.	New Description
C213	03016480	Cap F Ce 470 mmf min. 600V

The first chassis affected by this change are identified as follows:

Model No.	Serial No.
RA-103D	0340724
RA-104A	0413334
RA-110A	1022236

Change #15

Change capacitor specifications as follows:

Symbol	New Part No.	New Description
C217	03014770	Cap Pa .1 mf 20% 400V
C218	03019120	Cap Pa .047 mf 20% 400V
C221	03014820	Cap Pa .1 mf 20% 600V
C244	03019110	Cap Pa .047 mf 20% 200V
C257	03019130	Cap Pa .1 mf 10% 400V
C258	03014770	Cap Pa .1 mf 20% 400V
C263	03014910	Cap Pa .01 mf 20% 400V
C275	Same as C257	
C276	Same as C217	

Purpose of Change

Critical paper-cased paper capacitors replaced by plastic-moulded paper capacitors to eliminate possible failure under humid conditions.

Change #16

Change specifications as follows:

Symbol	New Part No.	New Description
C255	0301594O	Cap Pa .02 mf 10% 400V
R274	02032070	Res F C 330,000 10% ½W
R276	02032140	Res F C 1P2 meg 10% ½W
R279	02032130	Res F C 1 meg 10% ½W
R326	02031750	Res F C 680 10% ½W
	02041750	
	02051750	

Purpose of Change

Circuit values changed to eliminate high-voltage arcing in vertical output tube, since such arcing disturbs the raster vertically.

The first chassis affected by this change are identified as follows:

Model No.	Serial No.
RA-103D	0336701
RA-104A	0411701
RA-110A	1017121

Change #17

Add symbols and specifications to L221 deflection yoke as follows:

Symbol	Part No.	Description
R355	02031740	Res F C 560 10% ½W

Located between L221-4 and L221-5

R356	02031740	Res F C 560 10% ½W

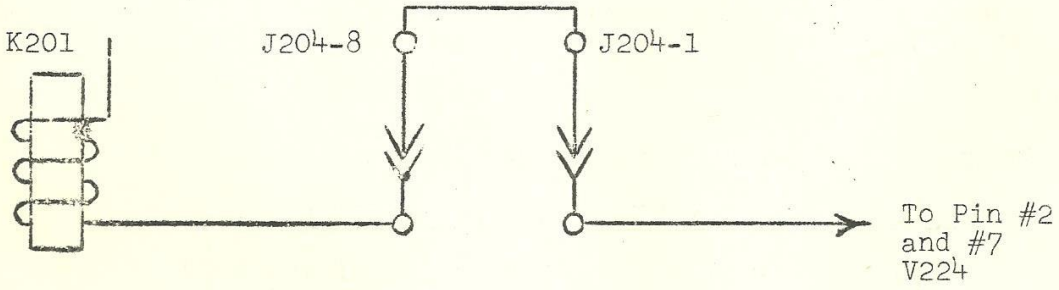
Located Between L221-5 and L221-6

Change #18

J204-8 and J204-1 were connected in series between junction of C300 and R233 and junction of C266 and V220 pin #3.

Delete connection from junction of C300, C296 to J204-8 and the above circuit of J204-8 and J204-1.

Add ground connection at junction of C300 and C296. "Break" connection from V224, pin #2 to K201 and insert the following:



Change capacitor specifications as follows:

Symbol	New Part No.	New Description
C213	02016480	Cap F Ce 470 min. 600V

At L221, change number of terminal connected to J204-4 from ④ to ③, delete present ② and ③.

Purpose of Change

Relay-tube-interlock circuit, and 3rd video IF screen capacitor C213, changed to reduce regeneration.

Change #19

Am Tuner used with RA-104A

Change capacitor specifications as follows:

Symbol	New Part No.	New Description
C403	03012730/3-1273	Cap Ce 47 mmf 10% 500V

Purpose of Change

Capacitor across RF plate winding reduced from 100 mmf to 47 mmf to increase gain.

RA-103D, RA-104A, RA-110A Section

ELIMINATION OF REGENERATION ON CHANNEL 5

Important Notice

A condition known as regeneration has been encountered in the field on channel 5. The sets affected are mainly the RA-110A models, namely the Westwood and Fairfield. It is also possible for the condition to exist in the RA-104A models, namely the Hastings and Wellington.

This condition usually exists in the fringe areas and can readily be recognized by the serviceman. As the contrast control is advanced, a pattern of fine black lines runs diagonally across the screen. These are known as "snakes" and are caused by a heterodyne between the third harmonic (79.2 mc) of the video IF (26.4) and the carrier of channel 5 (76-82 mc). Advancing the contrast further will cause the picture to become heavily masked with "snow" which is the effect of the regeneration.

This condition is caused to a major extent, by feedback of the third harmonic of the video IF, from the CRT grid lead back to the antenna and RF section of the tuner. Since the lead to the CRT grid is longer in the RA-104A and RA-110A models, it is obvious why regeneration has been greater in these sets.

1. DO NOT USE TWIN LEAD transmission line. Use co-axial cable only for the transmission line. RG-11/U should be used in the fringe areas. The loss in this cable is approximately 2.1 db per 100 ft. at 100 mc as compared to 2.4 db per 100 ft. of twin lead. RG-59/U should not be used in the fringe area as the line losses are 3.8 db per 100 ft. at 100 mc. The RG-11 is a much heavier cable and its outside diameter is .4 inches as compared to .24 inches of the RG-59/U.

2. Change the bias circuit of the video amplifier V205, from that shown in Fig. 1 to the circuit shown in Fig. 2. In the existing circuit, the bias voltage for the mixer and the video amplifier are taken from the same point. The new bias circuit applies bias to the video amplifier from a different point. The only changes involved follow:

   a. Insert a 200 ohm ½ watt resistor between the relay coil and the junction of R233 and C296.
   b. Remove the connection between C300 and the junction of R337 and R336. Leave C300 connected to the junction of R219, C215, R218 and L212.
   c. Connect the junction of the relay coil and the added 200 ohm resistor to the video amplifier grid circuit at C300.
   d. Remove R216 (8.2K), R336 (27K), and R337 (12K). Add a 6.8K ½ watt resistor as shown in Fig. 3.

3. Insert a resonant trap coil in series with the CRT grid lead as shown in Figure 3.

4. Add a .005 mfd disc ceramic capacitor from pin 3 of V203 to ground. (Filament of third video IF amplifier). The description of the added parts follow:

Part Number	Description
02030310/RC20BF201J alternate numbers 02050310, 02040310	Res F C 200 ohms ± 5% ½W
02031870/RC20BF682K	Res F C 6.8K ± 10% ½W
21005411	Coil, trap 79 mc
03015610	Cap F Ce .005 mfd 450V

If any difficulty is experienced after these changes have been made, please contact the Teleset Service Control Department.

These changes are now incorporated in the current production receivers.

The first chassis affected by this change are identified as follows:

Model	Serial Number
RA-103D	0328476
RA-104A	048401
RA-110A	1011400

A large letter "H" stamped on the rear of the main chassis also identifies it as containing these changes.

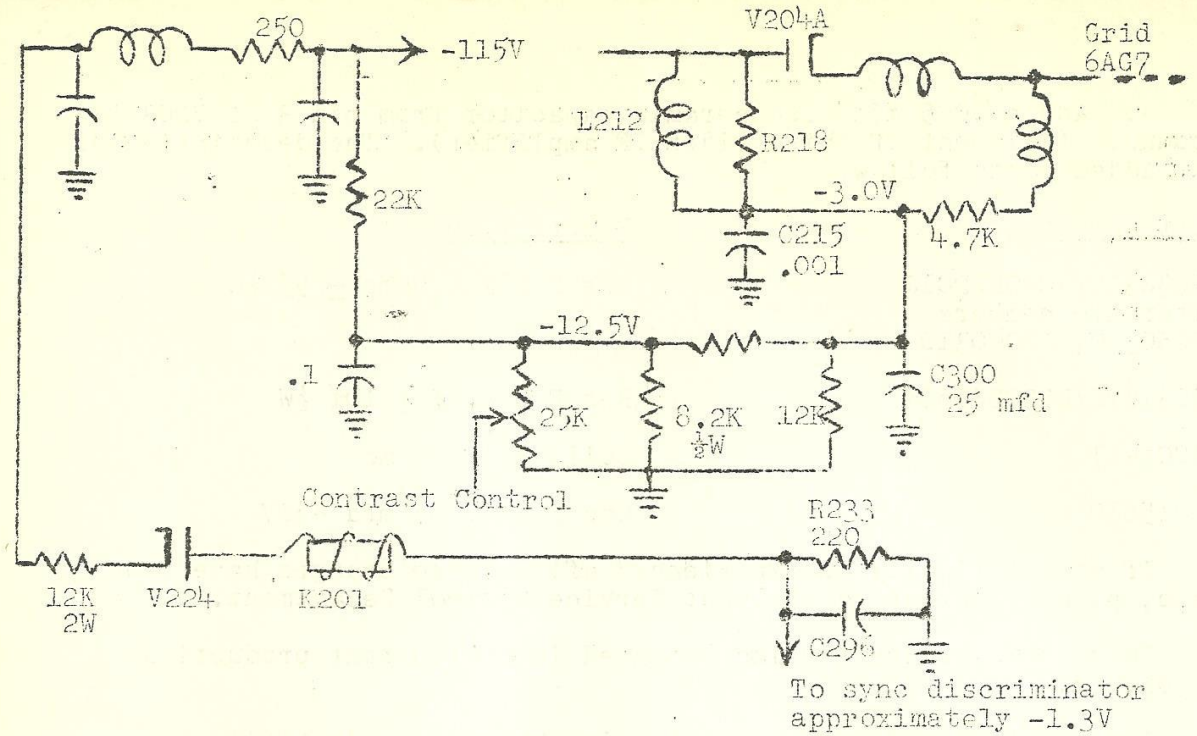


Figure 1

Present Bias Circuit

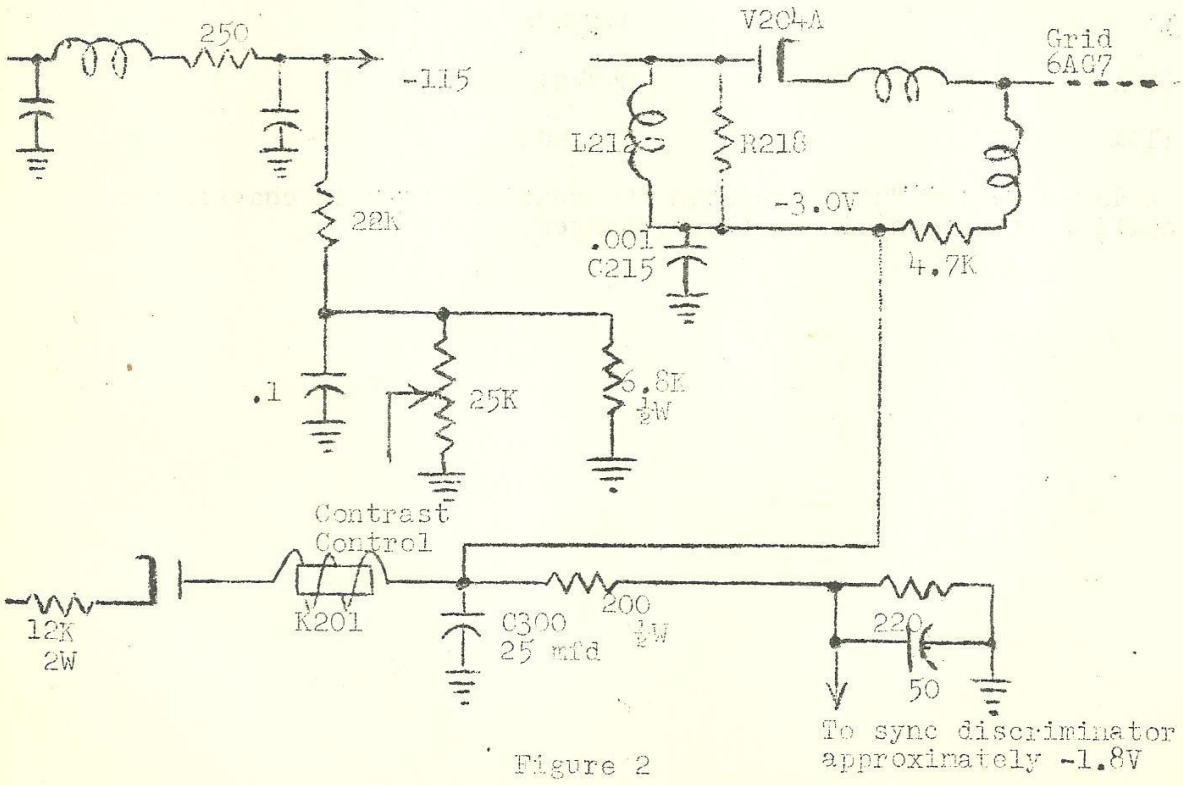


Figure 2

Proposed Bias Circuit

103d-13b

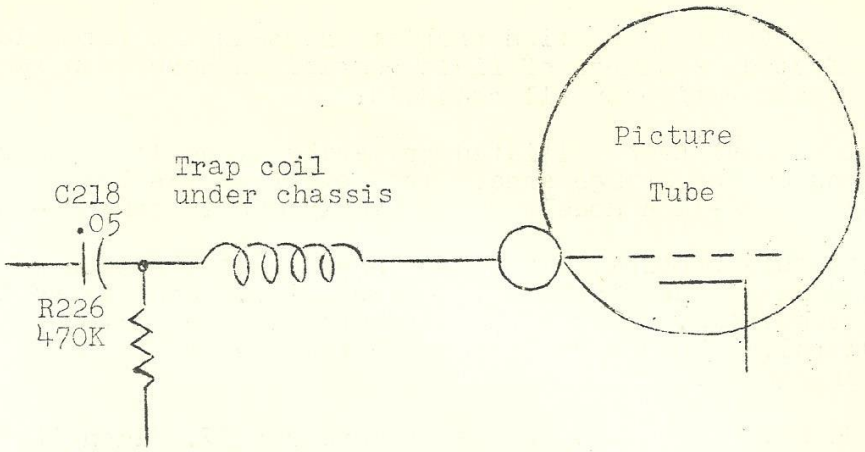


Figure 3

Location of Trap

RA-103D, RA-104A, RA-110A Section

ELIMINATION OF REGENERATION ON ALL CHANNELS

In addition to the regeneration problem on channel 5 for which a cure has been effected, a number of field complaints have been received concerning regeneration on all channels.

The complaints have been initiated primarily by dealers and service organizations in the fringe area. The condition has been noticed on the RA-104A and RA-110A models particularly and in some RA-103D models.

To eliminate this problem, several changes are to be made in the video IF strip and one change in the video amplifier. See Figure 1 for a simplified schematic. Those items affected are indicated by an encircled numeral. The numeral refers to the step to be made in the following procedure.

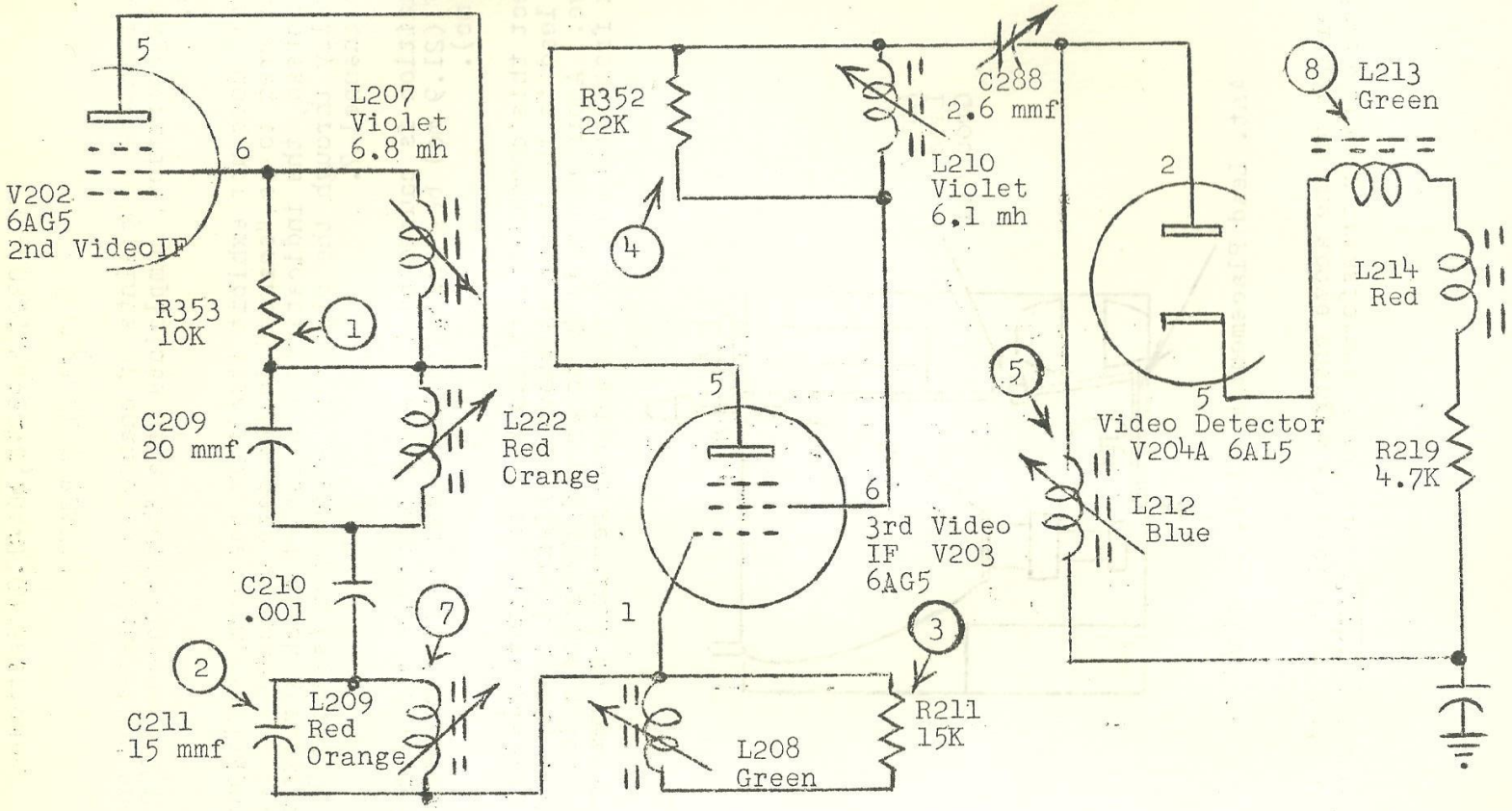
1. Add a 10K ½ watt 5% resistor across L207. Identify it as R353.
2. Change C211 (connected across L209) from 10 mmf 500V to 15 mmf 500V
3. Change R211 from 3.9K ½ watt to 15K ½ watt.
4. Add a 22K ½ watt 5% resistor across L210. Identify it as R352.
5. Remove R218, the 18K ½ watt resistor connected across L212 in the video detector input circuit. (In earlier sets R218 was was 39K and in some of the later sets there are two 39K resistors connected in parallel. See change #7 on page 12a of this section).
6. Add a 22K ½ watt 10% resistor across C217 and L216. (This is the 4.5 mc trap). Identify it as R351. (not shown in Fig.1)
7. Change L209 (color code red white) part number 21004801 to part number 21004802 (color code red orange).
8. Change L213 (color code yellow) part number 21004467 to (color code green) part number 21004464.

The part numbers of the new parts other than the coils mentioned in items 7 and 8 above, follow:

Symbol	Part Number	Description
R353	02030720/RC20BF103J	Res F C 10K ± 5% ½W
C211	03012050/3-1205	Cap F Ce 15 mmf 500V
R211	02030760/RC20BF153J	Res F C 15K ± 5% ½W
R352	02030800/RC20BF223J	Res F C 22K ± 5% ½W
R351	02031930/RC20BF223K	Res F C 22K ± 10% ½W

In addition to reducing regeneration, these changes will also improve picture quality.

Figure 1. Simplified schematic showing changes necessary to reduce regeneration on all channels and improve picture quality. The only items affected are indicated by an encircled numeral. See page 13d for detailed instructions. There are no wiring changes, only additions and deletions of certain components and changes in value of certain other components.



103d-13e

RA-103D, RA-104A, RA-110A Section

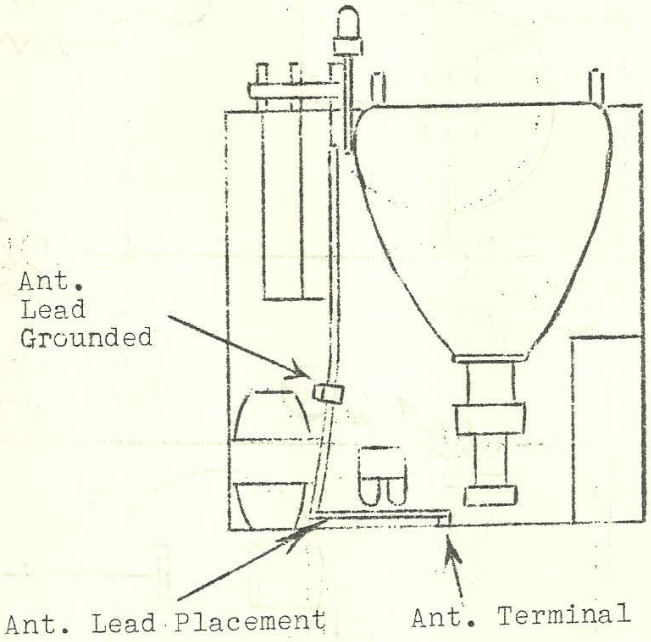
CHANNEL 7 BEAT

Separate from the complaints of channel 5 regeneration and all channel regeneration, complaints of a "beat" on channel 7 have been received.

This "beat" does not exhibit itself in the form of diagonal black lines referred to as "snakes" in the note on channel 5 regeneration. Instead, the indications consist of black streaks running horizontally through the picture when the set is tuned "on the nose" to channel 7.

This condition is caused by the eighth harmonic (175.2 mc) of the sound IF (21.9 mc) beating with the video carrier of channel 7 (175.25 mc).

To correct this condition, it has been found that placing the antenna lead to the tuner as shown on Figure 1 below, is very effective. Another remedy is to ground the antenna lead one-half way back from the tuner to the antenna terminal on rear of chassis.



Should neither of the above changes correct this condition, the sound discriminator transformer should be <u>slightly</u> detuned.

Alignment Procedure for Teleset Models RA-103D, RA-104A, RA-110A

Please make the following correction in the subject procedure:

The top photo shows the primary of Z203 on top of the chassis and the bottom chassis photo shows the secondary of Z203 on the underside of the chassis. These designations should be reversed.

On pages 8 and 9 in the RA-103C section a procedure for elimination of flicker due to line voltage variations is described. It was also mentioned that if the modifications listed did not eliminate the trouble, then it would be necessary to resort to the use of a constant-voltage transformer.

The use of such a transformer is not confined solely to the RA-103C Telesets (Chatham, Savoy, etc.). It should be used in many locations especially with the RA-110A models (Fairfield and Westwood). Unlike the RA-108A models (Bradford and Mansfield) which contain a self-regulating power transformer, the RA-110A is affected by line voltage fluctuations.

Many of the complaints received on the Westwood and Fairfield Telesets pertaining to "jumping" or "pumping" (slow flicker) of the picture, lack of sharpness or definition, may, in many cases, be caused by either a fluctuating or low line voltage, depending upon the nature of the complaint. It is desirable, therefore, that dealers and service organizations stock one or more of the Sola constant-voltage transformers for use with these Telesets.

Installations in show rooms, or other locations where these sets are subject to public observation should be made using such a transformer if the line voltage is not stable.

These transformers are identified as the Sola CVA constant-voltage transformer and may be obtained from the Teleset Service Control Department. The list price of this item is $37.50.

Microphonic 6AB4 Oscillator Tubes

Some field complaints have been registered that the 6AB4 Oscillator tube in the Inputuner has become microphonic.

If a microphonic condition occurs (this is evident if the sound howls when the volume is turned up, or if a noise is heard in the speaker as the Teleset is tuned) it is suggested that the following procedure be followed:

1. Reverse the loudspeaker leads.

2. Replace the 6AB4.