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SERVICE NOTES

FOR

DU MONT TELESETS

ALLEN B. DU MONT LABORATORIES, INC.

Teleset Service Control Department

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

RA-105B and RA-108A Section

The section that follows contains information pertinent to the service of RA-105B and RA-108A Telesets.

It is felt that there is enough difference between the RA-105B and RA-105A models to warrant a separate section.

Index RA-105b Section

1/13/50

DU MONT MODEL RA-108A TELESET

The RA-108A television receiver is an outgrowth of the RA-105A and the RA-106A models which have proven so successful in the field.

Basically the main chassis is very similar to that of the standard RA-105A and the RA-106A. The power supply used with the RA-108A is similar to that used in the RA-106A models. On the pages that follow, a detailed comparison will be made between these chassis and the circuit differences will be listed.

The first cabinet model of this Teleset is called the "Bradford". This model has doors that resemble the doors on the Westbury. The first sets shipped will be dark mahogany.

The Bradford contains a main chassis, power supply chassis, 19" metal cone tube, and a 45 RPM record changer. No AM Tuner is used with this model.

On the RA-108A as well as the other new models, the tube is so masked that the entire width of the tube is visible. The top and bottom is masked so that the aspect ratio of 4:3 is maintained.

One of the outstanding features of this television set is the use of a metal cone 19" television tube. This tube, identified as a 19AP4, is approximately 7" shorter that the 20BP4. With the shorter tube length, the deflection angle is approximately 66° as compared with the deflection angle of 54° which is used in the 20BP4.

The serviceman should be very careful when using this tube as the entire metal cone is at the high accelerating potential which is approximately 13,000 volts. There is no specific point on the metal cone where the high voltage connection has to be made. However, on this model the high voltage connection is made with a clamp on the rim of the tube. (This is at the front of the tube.)

You will note that the high voltage lead coming out of the power supply is apparently short. This length is adequate since an extension to the clamp on the tube plugs into the high voltage lead from the power supply.

To avoid the possibility of accidental contact with the metal cone, a protective cover fits glove-like over the metal cone. When replacing tubes, this cover should be placed over the new tube.

INSTALLATION AND HANDLING OF TYPE 19AP4 TELEVISION PICTURE TUBE

Anti-Corona Coating

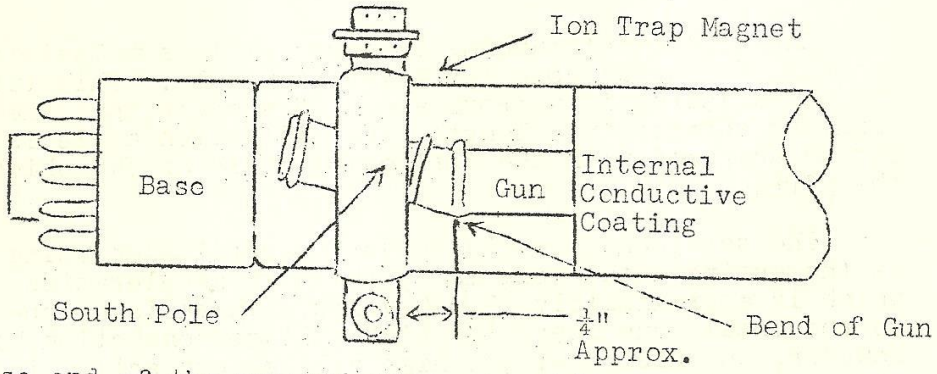
An anti-corona coating has been placed on the glass funnel and neck to give satisfactory operation under conditions of high humidity. Avoid handling the tube by the neck and funnel. Moisture and salts from the hands will lessen the effectiveness of the coating. If the coating becomes dirty or contaminated, wash with water or mild soap and water. Make sure that any soap is removed with a water rinse. Do not use chemical solvents or abrasives for cleaning.

Anti-glare Coating

The face plate of the 19AP4 has been given an anti-glare coating to reduce reflection from the viewing surface of the tube under conditions of high ambient lighting. Observe the same precautions in handling that were described under anti-corona coating.

Ion Trap Adjustment

Make all initial ion trap adjustments at the lowest setting of the brightness control possible. The correct position for the ion trap magnet is shown in figure #1.



With the base end of the gun pointing up as shown, slide the magnet over the neck. The north pole should be to the left adjacent to pin #12 and the south pole to the right adjacent to pin #6. The magnet should be placed about ¼" in back of the bend in the gun for the first adjustment.

Rotate the ion trap magnet about an eighth of a turn each way and slide it back and forth along the neck stopping at the point of maximum brightness. Keep reducing the brightness as the system is brought into line to avoid damage to the tube. After alignment at low brightness, make a final adjustment with the brightness control set to where the raster just starts to "bloom". At this point, the raster begins to expand in size rapidly.

If no raster appears and all other conditions are normal, it is possible that the magnet polarity is reversed. Rotate the magnet through half a turn around the neck. Then make adjustments as before. If there is still no raster, try another magnet before looking for other sources of trouble.

Do not leave the tube on any longer than necessary when making preliminary adjustments. If the beam of electrons is operated at high intensity before being brought into line with the ion trap magnet, it may damage the internal structure of the tube. For the same reason, it is important that the final adjustment of the magnet is made for maximum screen brightness. Failure to do this may result in burning the limiting aperture or the release of gas into the tube.

Focus Coil and Deflection Yoke Adjustment

The focus coil and deflection yoke should be carefully aligned so that the raster covers the screen properly. Do not use the ion trap magnet to get screen coverage. It should be used only to obtain maximum pattern brightness.

Focus

The sets are to be shipped with the yoke and focus coil assembly removed. Therefore, proper focus depends upon the careful adjustment of the focus coil.

To get the best focus, the deflection yoke should be pushed all the way to the front and the focus coil should be pulled back as far as necessary to obtain the best focus.

IMPORTANT ADDITION TO ABOVE PROCEDURE

Sometimes it will be found possible to get two brightness maximums when moving the ion trap magnet back and forth along the neck. The correct position to use is closer to the base of the tube. The second maximum is usually found when the magnet is close to the case of the focus coil. The magnetic shunting effect of the focus coil case on the ion trap magnet changes the field strength so that a brightness maximum is obtained in this incorrect location. Tubes should not be operated at the second maximum since spot centering is disturbed and there is a possibility of tube damage.

DIFFERENCES BETWEEN THE RA-108A MAIN CHASSIS AND THE RA-105A MAIN CHASSIS

The essential differences between the main chassis used in the RA-108A and the main chassis used in the RA-105A are listed below:

The power transformer used on this chassis is self-regulating. It was made by Sola Electric especially for our use. The can that protrudes on the side of the chassis is a 1.5 mfd capacitor identified on the schematic as C302. This capacitor is used in conjunction with the regulator transformer.

The use of this regulating transformer will make our Telesets using this chassis immune from line bops and flicker. The DC output voltage remains constant within ± 2% with AC line voltage variation of ± 10%. This means that in most cases the size and position adjustments will not have to be made when the set is installed.

A 20.4 mc trap is included in this chassis. This trap was also put in the later RA-105A Telesets. This trap is used to reduce the interference from the video carrier on adjacent channels. The interference would, of course come from the higher channel.

This circuit is located at the input to the 6AL5 and consists of the series parallel combination of C300, C301 and L221.

One half of V204 is no longer used. This is due to the use of a different type of AGC. As will be pointed out later, the AGC comes free with the new synch circuits.

The 1st video amplifier has been changed from a 6AG5 to a 6BA6. This necessitated certain changes in the circuit constants which are obvious from examination of the circuit diagram.

Note that the sync is no longer taken off at the output of the 1st video amplifier. The sync takeoff point is now at the input to the 6AL5 video detector.

The third video amplifier has been changed from 6K6GT to a 6V6GT/G. This will provide greater video gain.

Notice also that the output of the cathode follower V206A is direct coupled to the third video amplifier.

The method of sync amplification and detection used in this model performs very satisfactorily. Note that a lead from pin #1 of V204 is fed to the 6AU6 (V225). The purpose of this stage is to amplify the signal and couple it through the transformer Z206 to the sync and AGC detector V226. This amplifier is narrow band and the transformer is tuned to 26.4 mc.

One half of V226 the 6AL5 is used to detect the signal and feed it to V217 the sync clipper where the sync is clipped and then fed to the horizontal and vertical circuits.

The other half of the 6AL5, V226 (pins #2 and 5) is used to detect the signal and use it for AGC. The greater the amplitude of the sync, the more the tube will conduct. The amount it conducts of course, depends upon the setting of the AGC control R350.

When the tube conducts, the AGC voltage is developed by current flowing through R361. Because of the filtering action of C308, R362, C303, R246, C226, R245 and C227, the voltage fed back to the mixer and 1st and 2nd video IF stages is effectively D.C.

As in the RA-105A, when FM is used, the gain of the mixer and 1st video IF stage is controlled by the AVC voltage from the sound limiter stage.

AGC ADJUSTMENT

In order to set the AGC voltage in the field it is necessary to use a signal generator so that the receiver input can be specified. It is also important that the signal generator and receiver be tuned to a frequency that will give a video IF frequency of exactly 26.4 mc.

In order to eliminate frequency errors in setting the signal generator, the beat frequency method should be used; that is, beat the signal generator frequency with the video carrier frequency (see Table 1) of a tele-station. This can be accomplished by using the following procedure:

1. Connect an antenna to the receiver input in the normal manner, then connect the output terminals of a VHF signal generator directly across the receiver input. i.e. in parallel with the antenna.

2. Connect a vacuum tube voltmeter (VTVM) to J209 (Jack on top of main chassis) and set to read negative voltage on the 5 volt scale.

3. With the receiver operating normally, tune in a tele-station, preferably a low frequency station. Adjust the output of the signal generator to approximately 2500 micro-volts. Set the signal generator to the approximate frequency of the video carrier (see Table 1) of the tele-station to which the receiver is tuned. Tune the signal generator slowly through the region of the video carrier frequency; note the diagonal lines on the face of the picture tube that appear to rotate as the signal generator frequency is slowly changed. The point that corresponds

to almost zero beat is when the number of diagonal lines decreases to about 2 or 3 lines. Tuning the signal generator at this point in either direction will result in a larger number of diagonal lines. Several attempts may have to be made in order to make sure that the signal generator is tuned to the proper frequency.

When it is tuned, the antenna should be removed and the signal generator output set to 1000 microvolts.

4. Adjust the AGC pot R350 so that -2.8 volts is obtained on the VTVM connected to J209. No further adjustment should be made.

TABLE I

Channel	Sound Carrier	Video Carrier
2	59.75 mc	55.25 mc
3	65.75 "	61.25 "
4	71.75 "	67.25 "
5	81.75 "	77.25 "
6	87.75 "	83.25 "
7	179.75 "	175.25 "
8	185.75 "	181.25 "
9	191.75 "	187.25 "
10	197.75 "	193.25 "
11	203.75 "	199.25 "
12	209.75 "	205.25 "
13	215.75 "	211.25 "

The horizontal sync circuits are essentially the same as they have been in the RA-105A.

The vertical buffer circuit is changed however, and resembles very closely the changes made in the RA-103 and RA-105A sync modification. Notice that DC plate current no longer flows through the primary of the blocking oscillator transformer.

The 12K resistor identified on the RA-105A print as R340 has been removed.

The vertical saw generator and amplifier circuits are practically the same as those in the RA-105A.

The sound circuits are, for all practical purposes, identical to those used in the RA-105A.

The "Mansfield" is the second cabinet style being produced as the RA-108A Teleset. This model does not include a record player. Other than this difference and the cabinet, the Mansfield and the Bradford are identical.

DIFFERENCES BETWEEN THE RA-108A POWER SUPPLY AND THE RA-106A POWER SUPPLY

The differences noted below are the result of comparing the RA-106 power supply diagram issued with the RA-105 service manual and the schematic for the RA-108A power supply.

A 4 mfd 250V capacitor, C718, is connected from pin #3 of V701A to ground.

A 10K ½W resistor R728 is connected between pin #3 of V701A and the output of the negative voltage supply.

In the screen grid circuit of V702, the parallel combination of R707 and R708 is changed to a series circuit. R707 is changed to 47 ohms and is connected to the screen. R708 is changed to 18K.

C706 is connected between the junction of R707 and R708 and pin #3 of V702.

In the negative voltage supply C710 and C715 are changed to 50 mfd 250V. R720 is removed and replaced with L701. The higher voltage capacitors are necessary to satisfy underwriters. The choke is used instead of the resistor to improve the filtering action.

In the high voltage supply circuit R709 and R710 have been deleted. These were the 4.7Ω resistors connected in series with the filaments of the 1B3.

A 220 mmf is connected between pins #4 and #5 of the horizontal output transformer. This reduces the high voltage in an effort to increase horizontal size.

The parllel combination of R714 and R725 (680Ω each) has been changed to a single 350Ω 20W resistor R714.

Resistor R722 formerly connected between C715 and pin 8 of V701B has been changed to 18K and connected between pin8 of V701B and the plates of the 6X4. The 10 ohm delay resistor in the filament circuit of the relay control tube V701B is disconnected from ground and goes to the M1 M2 leads on the filament transformer, T702.

R715 in parallel with R727 in the grid circuit of V705 the damper tube, has been changed from 100K to 120K.

A size switch has been incorporated in this supply. This performs the same function as the switch on the RA-105 power supply.

In the 5V4G damper circuit, capacitors C716 and C714 instead of going to ground have been connected to the output of the negative voltage supply. This will permit the possibility of obtaining greater horizontal size.

The filament transformer T702 mounted on the power supply chassis is different than the T702 that was formerly used. It has two secondaries and the primary is connected thru the cabling to the primary of the transformer on the main chassis. This makes it unnecessary to use a separate AC cable.

The rating of fuse F701 has been increased to 6 amperes.

RA-105B TELESET

The RA-105B Teleset is now being produced in a single model known as the Sussex.

The main chassis used in this Teleset is the same as that used in the RA-108A.

The power supply chassis is very similar to that used in the RA-105A. The differences between the two power supplies are noted below.

This model uses the new 15DP4 cathode-ray tube. This tube makes use of a bent gun and of course, requires the use of a magnet. The method of adjustment of the ion trap magnet is the same as outlined in the information on the RA-108A. Incidentally, the same procedure should be used with the 12QP4. One item that should be pointed out is the fact that a different magnet is used on each tube. Therefore, the magnets should not be interchanged.

The tube in the RA-105B is masked in the same fashion as that in the RA-108A. This method of masking is also used in the RA-103D.

DIFFERENCE BETWEEN THE RA-105B POWER SUPPLY AND THE RA-105A POWER SUPPLY

The differences noted below are a result of comparing the RA-105A power supply diagram issued with the RA-105 service manual and the schematic for the RA-105B power supply.

In the negative supply filter, C411A and C411B have been changed from 70 mfd 175V to 50 mfd 250V. This increase in voltage rating was made to satisfy the underwriters requirements. An additional 50 mfd capacitor C416 was added to reduce the hum.

R415 the series dropping resistor was changed from 250 ohms 5W to 600 ohms 20W.

Resistor R416 was removed from the cathode circuit of V401B, changed from a 6.8K to 18K and connected between the plate-grid circuit of the 12AU7 and pin #1 of J402.

The cathode of V401 (12AU7) is connected to pin #9 and then to the plates of the 6X4's. This circuit change will prevent the relay from chattering when the set is first turned on.

The 10 ohm resister R417 in the filament circuit of the 12AU7 has been removed from ground. Both sides of the filament in this tube are now connected to the secondary of the filament transformer T402.

This T402 is an addition to this chassis as it was not used on the RA-105A power supply.

C409 and C408, the two capacitors in the power feedback circuit from the 5V4 are removed from ground and returned to the output of the negative voltage supply.

Note also that the circuit arrangement for the horizontal size switching circuit has been changed.

WIDE ANGLE YOKE FOR 19AP4

When replacing the deflection yoke in either of the RA-108A models, part #21004971 should be used as the replacement.

This yoke has been designed especially for the 19AP4 cathode-ray tubes. The main advantage to be derived from the use of this yoke is that the problem of neck cut-off (shadows in the sides or corners) has been eliminated.

INPUTUNERS

Three different Inputuners have been used in the RA-105B and RA-108A Telesets.

Two of these tuners use the "bottom-coupled" circuit but are physically different.

In the RA-103D, RA-104A, and RA-110A section, it was mentioned that the bottom-coupled tuner could be identified by the entry of the antenna cable into the front of the tuner.

The above statement applies to all bottom-coupled tuners except those used in the first 500 Bradfords. In these early RA-108A Telesets, the antenna lead enters the rear of the Inputuner chassis. The physical location of the tubes is the same as for the non-bottom-coupled tuner as used in the RA-105A Telesets. However, as with all bottom-coupled tuners, the oscillator tube is a 6AB4.

The third tuner mentioned above is the tuner that was used in the RA-105A Telesets and is not as sensitive as the bottom-coupled tuner.

To sum up the Inputuner situation, it can be stated that:

1. All RA-108A Telesets (Bradfords and Mansfields) contain bottom-coupled Inputuners.

2. All RA-105B Telesets (Sussex) do not contain bottom-coupled Inputuners.

3. Before installing an RA-105B in a fringe area, examine the Inputuner to be sure it is of the "bottom-coupled variety".

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.

TROUBLES IN THE RA-108A AND RA-105B TELESETS

One trouble that has been encountered in these Telesets that may be confusing to the serviceman is a condition wherein the filaments of the 5U4G rectifiers do not light. If a short on the secondary of the regulating transformer should develop, this will cause the voltage of the 5U4G's which, incidentally, is also regulated, to drop very low, and thus give the appearance that the 5U4G's are not lit. If this should occur, an investigation of the .05 capacitor connected from the cathode of the 5U4G should be made. Another possible cause of a short is the wire going to capacitor C302 which is located on the side of the main chassis. If replacement of this capacitor or transformer becomes necessary, not only should the part number be specified in obtaining a replacement, but the color dot on the transformer and, or, capacitor should be indicated. There are three different colors used, red, yellow and white. Thus, a condenser with a red dot should be used with a transformer having a red dot.

Local-Distance Switch

This switch is used on the RA-105B and RA-108A Telesets as well as the RA-103D series.

However, the effect of this switch will not be as noticeable on these Telesets as on the RA-103D line because the AGC circuit will tend to counteract any change that takes place in signal level in the IF strip. Nevertheless, in very weak signal areas where the amplitude of the signal is too low to affect the AGC, a noticeable increase will result from using the L-D switch.

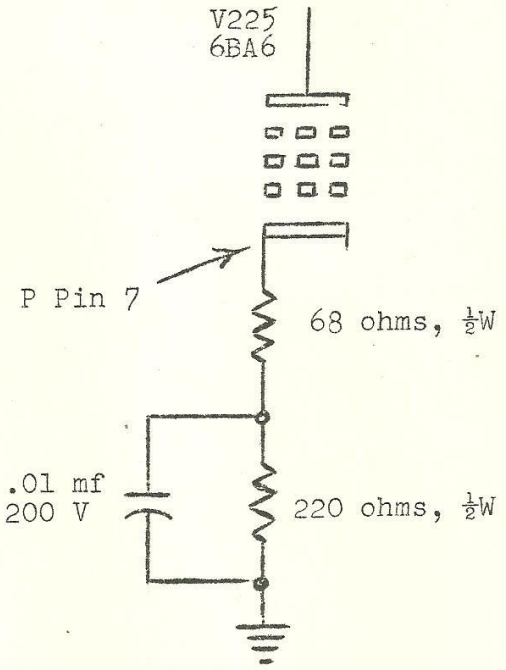
RA-105B, RA-108A Section

Method for Correcting Vertical Jitter

Intermittent vertical jitter has been observed in the field, particularly in the Philadelphia area on some RA-105 and RA-108 models. This has been caused by compression of the synch signals in the narrow-band synch amplifier chassis. To correct this condition, it is suggested that the following changes be made in the narrow-band synch circuit:

1. V225 should be changed from a 6AU6 to a 6BA6
2. Resistor R363, located in the small narrow-band synch chassis should be changed from 22K ½W to 15K ½W.
3. Remove resistor R356, the 100 ohm ½W resistor connected between pin 7 and ground on the 6AU6. This resistor should be replaced with a 68 ohm ½W resistor in series with a 220 ohm ½W resistor bypassed by a .01 mf condenser. This combination should be connected between pin 7 and ground of V225 as shown on sketch below.

The narrow-band amplifier must be realigned after this change.



Part Numbers for New Components are as follows:

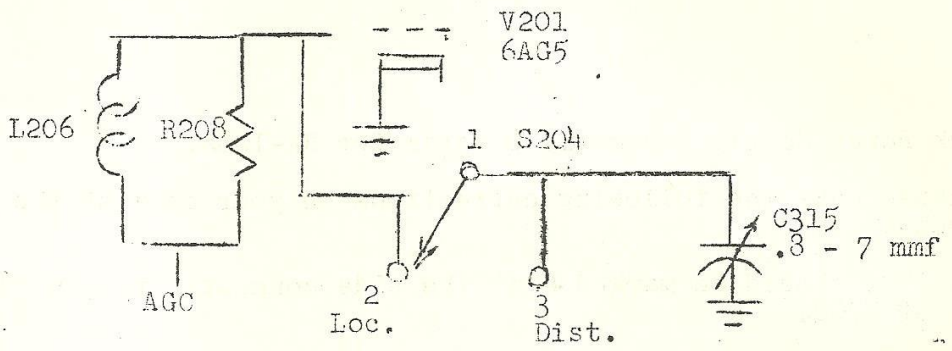
Part Number	Description
02031630	Res F C 68 ohms 10% ½W
02042090	
02030320	Res F C 220 ohms 5% ½W
02050320	
02030760	Res F C 15K 5% ½W
03014900	Cap Pa .01 mf 20% 200V

ERRATA SHEET

Main Chassis Schematic Diagram for Teleset Models RA-105B and RA-108A.

Several errors in the subject schematic recently issued to the field have been brought to our attention. The corrections for these errors follow:

1. The Local-Distance switch connections should be as shown in the following diagram:



2. L221 (the 20.4 mc trap) in the cathode circuit of V204 should be shown as an adjustable coil.

3. R222, the screen dropping resistor of V205, should be shown as 1W.

4. R227, the plate dropping resistor of V206-A should be shown as 1W.

5. C221, the coupling condenser between the plate of V207 and the control grid of the CRT, should be shown as 0.1.

6. Terminal #3 of R281 (the tone control) shown connected to ground, should be connected to the junction of R277 and C252 in the volume control circuit.

7. Pin #1 of V218 should be a cathode; pin #7 of V218 should be a plate.

8. The capacitor connected between pin #2 and pin #7 should be identified as follows:
   C267 .01 300V ± 5%

9. The tolerances of C279 and C280 should be shown as ± 20%.

Flyback Power Supply Schematic Diagram for RA-105B.

Please make the following corrections on your copy of the subject schematic:

1. C404 should be marked + at the side connected to pin #3 of V402, and - at the other side.

2. C416 should be marked + at the ground side and - at the top side.

Flyback Power Supply Schematic Diagram for RA-108A.

Please make the following corrections on your copy of the subject schematic:

1. C705 should be marked + at the side connected to pin #3 of V702.

RA-108A
Production Changes

Bradford Record Changer

The record changer originally used in the Bradford Teleset was the 45 RPM changer. The record changer used in the Bradford Telesets currently being produced is a dual speed changer designed to operate at 33 1/3 RPM or 45 RPM.

The letter A is plainly stamped on the outside of the carton containing the Bradford Teleset with the dual speed changer.

Add the following items to the Miscellaneous Parts List, Bradford only, on the rear of the Main Chassis schematic diagram for Teleset Models RA-105B and RA-108A.

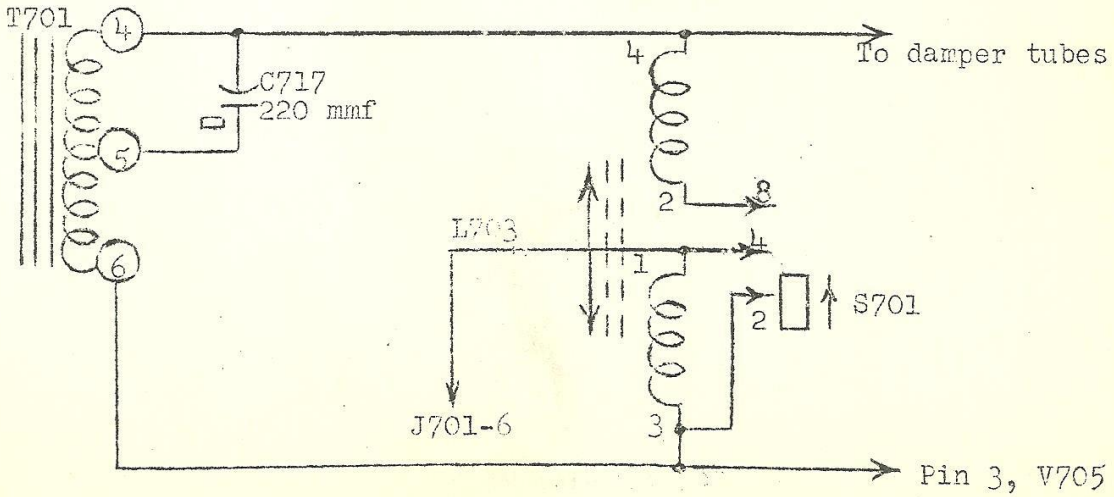
Part Number	Description
19034521	Reproducer, Sound 45/33 RPM (Record changer)
64002381	Button, plug

A box of 10 adapters to permit the playing of the RCA type record (large center hole) on this player is included with each Bradford Teleset. These adapters are a disc like affair that fit into the center hole of the RCA 45 RPM records. The part number of these adapters is 19034550 and are referred to in the operating handbook on the Bradford Teleset as "RS-46 adapters".

Power Supply

The following circuit change has been made since the schematic diagram for the RA-108A power supply was issued.

The size selector switch (S701), the horizontal size inductor and circuit were changed as shown in the following sketch:



In this new circuit, please note that L704, part #21004763 is no longer used. The description and part numbers of the new parts follow:

Symbol	Part Number	Description
S701	05003681	Switch 3 positions
L703	21005021	Inductor, horizontal size

Purpose of Change:

The change was made in order to reduce excessive temperatures in the horiz ontal deflection transformer T701.

The size control operation with this new circuit is as follows:

1. Maximum picture size is obtained with the size control switch S701 turned to the middle position. (Connecting points #2 and 4 together.)

2. When the size control switch is turned counter-clockwise (CCW), (the position shown on the schematic) the series coil (lower coil on schematic) is in the circuit and smaller size will be obtained with the size coil slug turned out of the coil form.

3. Both the series and shunt coils are in the circuit when the switch is turned to the clockwise position. This will connect points 4 and 8 together. In this position and with the size coil slug turned out of the coil form, absolute minimum size is obtained.

Identification of Chassis Containing This Change

A large number "2" stamped on the rear of the power supply identifies it as containing this change.

RA-105B, RA-108A Section

Changes in Sussex, Bradford and Mansfield Telesets

Tubes V201, V202, V203 and V217 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.

Deflection yoke #601

Add symbols and specifications to deflection yoke #601 as follows:

Symbol	Part No.	Description
R601	02031740	Res F C 560 10% ½W
Located between L601-4 and L601-5		
R602	02031740	Res F C 560 10% ½W
Located between L601-5 and L601-6		

"Hook" in Bradford, Mansfield and Sussex Telesets

On some of the above mentioned models, the top portion of the picture leans over usually from right to left. This condition is referred to as a "hook".

To eliminate this "hook", it is necessary to change the value of C263 (located in the grid circuit of the sync clipper V217) from .01 mfd to .1 mfd.

The elimination of the "hook" by this change will make the set much less immune to noise. That is, heavy ignition will cause the set to lose sync (both horizontal and vertical) whereas under the same heavy ignition noise, without the change, the set will not lose sync.

Obviously, this change should not be applied to any set located in a very noisy area as the loss of the sync is more annoying than the "hook". In some cases it may be possible to eliminate the hook by using a .05 mfd in place of the .01. The loss of noise immunity will be less with a .05 than with a .1 mfd.

In the near future, the Telesets will contain both condensers but with the .01 actually in the circuit. One side of each condenser will be brought out to a pin. Insertion of a jumper across these pins on top of the chassis will enable the serviceman to parallel the .1 with the .01 to eliminate the hook.

Notice

The modification indicated above to eliminate the "hook" has been incorporated in the current production Telesets.

All RA-108A Telesets beginning with serial number 086458 have the modification. These chassis are identified by a large letter "C" stamped on the rear.

The additional capacitor is to be identified with the symbol C218, part number 03014040.

IMPORTANT

The change to eliminate the "hook" should not be made in a noisy area as the noise immunity is decreased by this change.