DUMONT

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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.**

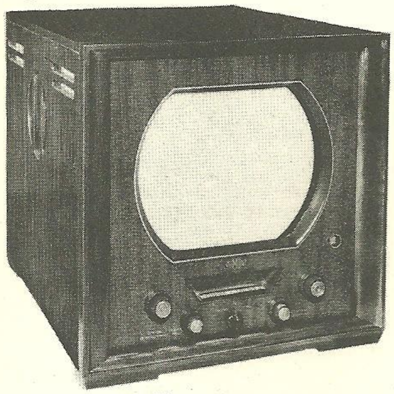
RA-111A

Du Mont Telesets*

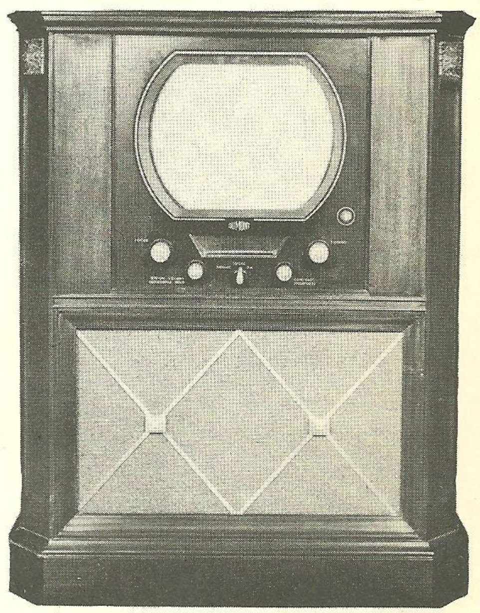
SERVICE INFORMATION

for

Model RA-111 A



Putnam



Guilford

DUMONT

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* TRADE MARK

INTRODUCTION

The Model RA-111A Teleset is produced in the following styles:

Name	Model No.	Cabinet	Services
Putnam	RA-111-A1	Mahogany Table Model	FM & TV
	RA-111-A4	Blonde Table Model	FM & TV
Guilford	RA-111-A2	Mahogany Open Console	FM & TV
	RA-111-A5	Blonde Open Console	FM & TV

	Picture Tube	Speaker
Putnam	$12\frac{1}{2}$"	6"
Guilford	$12\frac{1}{2}$"	10"

A single compact chassis (Figure 1) containing all the necessary circuits for outstanding TV and FM reception is used.

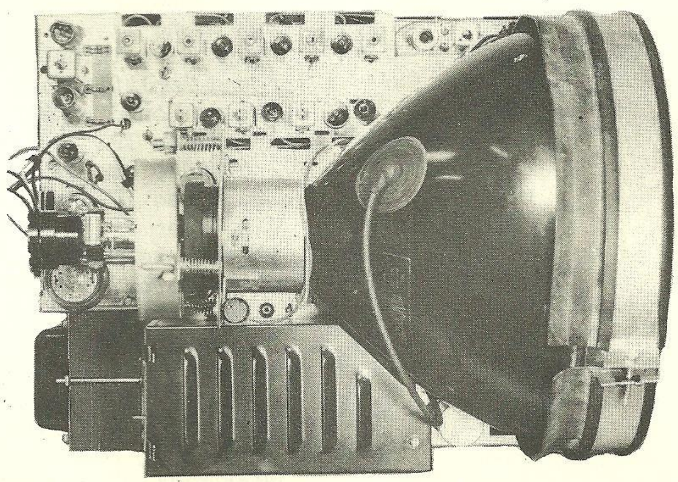


Figure 1. RA-111A Chassis

FEATURES

This new Du Mont Teleset contains several notable features including the following:

1. The new Du Mont Four Section Inputuner incorporating the spiral Inductuner and tuned input for improved selectivity and higher gain.

2. An automatic gain control circuit to permit ease of tuning plus freedom from fading due to variations in signal level.

3. The famous Du Mont narrow band sync circuit, for maximum noise immunity.

4. Unlike many of the competitive 12½ inch television receivers, Du Mont uses a separate Sound IF Strip for optimum audio performance.

RA-111A TUBE COMPLEMENT

A total of twenty-five tubes, including the CRT, the tuning indicator and two rectifiers are incorporated in this chassis.

Tube Symbol	Tube Type	Tube Function
V101	6J6	RF Amplifier
V102	6AK5	Mixer
V103	6AB4	VHF Oscillator
V201	6AU6	1st Sound IF
V202	6AU6	2nd Sound IF
V203	6T8	Sound Discriminator, First Sound Amplifier and AGC Clamp
V204	6AQ5	Second Sound Amplifier
V205	6AU6	1st Video IF
V206	6AU6	2nd Video IF
V207	6AU6	3rd Video IF
V208	6AU6	4th Video IF
V209A	½ 6AL5	Video Detector
V209B	½ 6AL5	DC Restorer
V210	6AH6	Video Amplifier
V211	12QP4	Picture Tube
V212	6BA6	Narrow Band Sync Amplifier
V213	6AL5	Sync and AGC Detector
V214	6SN7-GT	Horizontal AFC and Saw Generator
V215	6BQ6	Horizontal Deflection Amplifier
V216	1B3-GT	High Voltage Rectifier
V217	6W4-GT	Damper
V218	5U4G	Low Voltage Rectifier
V219	6AU6	First Sync Clipper
V220A	½ 6SN7	Second Sync Clipper
V220B	½ 6SN7	Vertical Saw Generator
V221	6SN7	Vertical Deflection Amplifier
V222	6AL7-GT	Tuning Indicator

ELECTRICAL CHARACTERISTICS

Average Power Ratings (Line Voltage – 117 volts AC)

Television and FM positions – 200 watts

CRT High Voltage (Line Voltage 117 volts AC)

9.0 ± 1 KV   Zero Brightness

Audio Power Output (At 400 Cycles)

1 watt across 3.2 ohm resistive load in place of speaker.

Picture Size

Dimensions 8 5/8" X 11 3/8"
Area   88 square inches

PHYSICAL CHARACTERISTICS

Cabinet Size

	Height	Width	Depth
Putnam	18"	18 1/2"	20 3/8"
Guilford	35 1/2"	25 5/8"	20 11/16"

2.0 CIRCUIT DESCRIPTION

(Reference Circuit Diagram in Envelope)

2.1 RF Tuning Assembly

The RA-111A Teleset incorporates the latest Du Mont Four Section Inputuner which provides continuous coverage of all VHF TV channels plus the standard FM channels. It employs the same inductive tuning principle which has won for the Du Mont Three Section Inputuner its reputation for trouble-free, reliable performance.

The circuits of this new Four Section Tuner are built around the latest Mallory-Ware miniature spiral type Inductuner, Figure 1.

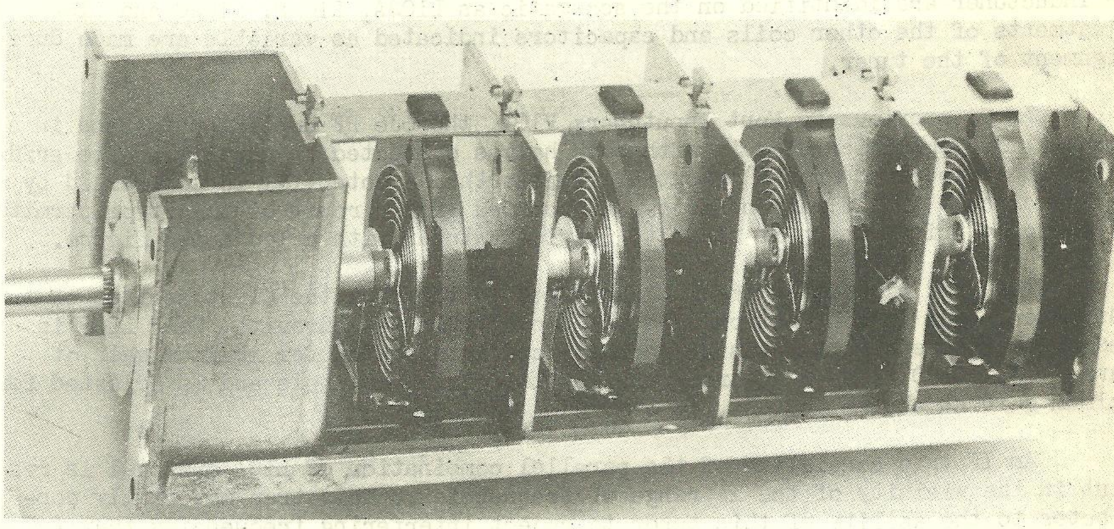


Figure 1. Mallory-Ware Spiral Inductuner

The use of this new spiral type Inductuner results in a smaller, more compact Inputuner. Improved selectivity and higher gain have been achieved by the additional tuned circuit and advanced circuit design.

The advantages derived from the higher-selectivity of this new Inputuner is freedom from interference by TV stations on channels adjacent to that being received as well as freedom from interference caused by FM broadcast stations.

The input impedance of this new tuner is 72 ohms unbalanced to ground. Therefore, for optimum results, co-axial cable must be used when installing Du Mont Telesets. The co-axial cable should be RG-59/U if the Teleset is to be installed in a strong or moderately strong signal area. For fringe locations, RG-11/U which also has a characteristic impedance of 72 ohms but has a much lower line loss, should be used.

The incoming signal is applied to the primary of T101 between one end of the winding and the center tap which is ground. This transformer utilizing a bifilar winding can be used for matching either 300 ohm balanced transmission line or 72 ohm unbalanced.

A 300 ohm balanced transmission line would be connected to the outside terminals of the primary. A 72 ohm unbalanced transmission line (co-axial cable) would be connected between either end of the primary and the grounded center tap.

In Du Mont Telesets, only the connections for the 72 ohm co-axial input are brought out to the antenna jack at the rear of the set. This is done to insure that only co-axial transmission line is used when installing Du Mont Telesets.

The four variable tuning inductors that are ganged together and comprise the Inductuner are identified on the schematic as L102A, L102B, L102C and L102D. Adjustments of the other coils and capacitors indicated as variable are made during alignment of the tuner.

As in previous Du Mont Inputuners, V101, the 6J6 RF amplifier is used in a grounded grid amplifier circuit with both halves connected in parallel. The grids of the tube are at rf ground potential whereas the dc potential is controlled by the AGC circuit in the main chassis. A grounded grid circuit of this type permits the use of a triode in an rf stage to provide a tuner with a low noise figure.

The grid circuit of the 6J6 amplifier is tuned by the first section of the Inductuner L102A in conjunction with the capacity in the circuit. Coil L103 is used to track the high television channels and is adjusted for maximum gain at channel 13. C100 is used to track the low television channels and is adjusted for maximum gain at channel 6.

An IF trap consisting of the parallel combination of L101 and C101 is resonant in the vicinity of the IF range of frequencies. This trap materially contributes to the ability of this tuner to reject interfering frequencies that fall in the IF pass band of the Teleset.

A double tuned bandpass circuit couples the plate of the RF amplifier V101 to the grid of the mixer tube V102. Within this circuit is a compensated system of bottom side coupling comprising circuit elements L105, C111, L107 and C113. This circuit provides correct band width and signal transfer over the entire tuning range (54 - 216 mc).

C110 and C112 are used to track the circuits over the lower television channels and are adjusted to balance the bandpass at channel 6. L108 and L113 track the circuits over the high television channels and are adjusted to balance the bandpass at channel 13. Further adjustment of the bandpass at channel 13 may be had by adjusting the inductance L107. This inductance although shown as a variable coil on the schematic, actually consists of a small metal strip one side of which is fastened with a screw to the chassis, thus making the ground connection. The bandpass may be changed by adjusting the position of this strip.

The oscillator circuit utilizing a 6AB4 triode is of the Colpitts type in which the feedback voltage from the plate to grid is accomplished by means of the interelectrode capacitance of V103. The oscillator tuned circuit consists of the variable inductor L102D with series inductor L110 and shunt inductance L109. This combination being resonated by adjustable capacitor C118 and the tube capacitance.

The low television channels are tracked by C118. A 70 mc crystal controlled signal is fed into the tuner and C118 is adjusted to obtain a difference frequency of 21.9 mc. This 21.9 mc signal is then beat against a 21.9 mc crystal controlled signal fed into a test IF strip. The capacitor is properly adjusted when a condition of zero beat is observed on an oscilloscope used as an indicator.

Adjustable coil L110 serves to track the high television channels and is adjusted in the same manner as C118. A crystal controlled signal of 217.5 mc is fed into the tuner for this high end tracking adjustment.

Both the oscillator output and the incoming signal are fed to the control grid of the 6AK5 mixer tube. When properly tuned to a television channel these two signals beat together to produce an IF of 21.9 mc for sound and 26.4 mc for picture. It is understood of course, that the necessary sidebands accompany the two intermediate frequencies.

These new frequencies are available in the plate circuit of the mixer tube and in this Teleset they are applied to the primary of a transformer that is used in a link coupling circuit to couple the tuner output into the first video IF amplifier in the receiver proper.

All power necessary to operate the tuner is obtained from the receiver chassis. The gain of the tuner is controlled by the application of AGC voltage to the grids of both the RF amplifier and the mixer stage. This will be discussed in more detail in a later section on AGC.

Video IF Strip

Four stages of IF amplification utilizing 6AU6 tubes comprise the video IF strip. A four stage amplifier of this type will provide high gain with excellent stability and freedom from regeneration. The gain of this strip is controlled by application of AGC voltage to the grids of the first and second stages. R218 and C214 act as an IF filter in the grid circuit of the first video IF while R223 and C217 perform the same function in the second stage.

The first stage functions not only as a video IF amplifier but also amplifies the 21.9 mc sound IF. The sound take-off point is in the plate circuit of this stage. Undesired frequencies that would cause interference with the desired signal are attenuated both by special traps as well as the pass band of the IF strip. A 27.9 mc trap, intended to attenuate the sound carrier of the lower adjacent channel to which the Teleset is tuned, is contained within the transformer Z205. It consists of an absorption type trap coupled into the transformer secondary. The 27.9 mc is produced when the local oscillator beats with the sound carrier of the lower channel adjacent to that being received.

A second trap, consisting of C282 in parallel with the series combination of C283 and L212 is located in the coupling circuit between the third and fourth video IF stages. This combination is designed to attenuate the 21.9 mc signal that accompanies the picture. The series resonant circuit of C283 and L212 presents a low impedance to ground at 21.9 mc. Above resonance, this combination of C283 and L212 becomes inductive and the resultant inductance in parallel with C282 presents a parallel resonant circuit and thus, high impedance to frequencies in the IF range. A circuit of this type will attenuate the undesired signal without affecting the desired IF band.

Video Detector and Amplifier

The video IF signal is applied to the video detector V209A ($\frac{1}{2}$ 6AL5) through transformer Z208. The circuit is so connected that the polarity of the composite video signal is black negative. This term indicates that the "black" portion of the picture which includes blanking and sync extends in a negative direction.

Instead of the usual method of applying the video to the grid of the picture tube this Teleset utilizes the cathode drive system whereby the signal is applied to the cathode of the picture tube instead of the grid. Therefore, to get the proper polarity of picture the polarity of the composite video signal as applied to the cathode of the picture tube must be black positive. The use of a single video amplifier will invert the black negative signal available at the output of the video detector to a black positive signal as observed at the cathode of the picture tube.

An IF filter in the form of C227 and L202 is used in the output circuit of the video detector. To insure that this detector output circuit provides good high frequency response a shunt peaking coil L201 is used. A 4.5 mc "grain" trap usually found in Du Mont Telesets, is located between the plate circuit of the video detector and the grid of the video amplifier.

A 6AH6 which is the miniature version of the 6AC7 is used in the single video amplifier stage. The contrast control for the receiver is located in the cathode circuit of this stage and adjusts gain by varying the bias. R237 in series with the contrast control is by-passed with a .005 mfd capacitor to produce some high frequency peaking. A 10 mfd capacitor is used as the screen grid by-pass to provide good low frequency response in this stage. Shunt peaking in the form of L204 is used in the plate circuit of this stage to insure good high frequency response. A combination of direct and capacitor coupling is used between the plate circuit of the video amplifier and the cathode of the cathode-ray tube. The direct coupling portion of the circuit is used to assure that the DC restoration is as complete as possible. Picture brightness is controlled by varying the negative voltage on the grid of the CRT by means of R239B.

There is no CRT sensitivity control used in this Teleset. Instead, the second grid is connected to the +325 volt line.

Sound IF Strip

As in all Du Mont Telesets, a separate sound IF strip is used. This strip consists of two straight forward IF stages utilizing 6AU6 tubes followed by a conventional discriminator utilizing one-third of a multiple section tube (6T8).

Since this Teleset is also used for the reception of standard FM broadcast stations using wide band FM, the circuits are designed to pass a bandwidth of 150 KC with a guard band of 25 KC on each side. Thus, the response of the amplifier strip must be 200 KC.

AVC voltage is developed in the grid circuit of V202, the second sound IF stage which also performs the limiting function. This voltage is developed when grid current flows through R206 and is filtered by R205, C205 and C206. This AVC voltage is applied to the grid circuit of V201. When the selector switch is in the FM position, this AVC voltage is applied to the first video IF stage as well as the RF amplifier and mixer in the Inputuner.

The audio output of the discriminator appears as a differential voltage across R209 and R210. This signal is applied to the service selector switch through a de-emphasis circuit consisting of R211 and C270. The purpose of this circuit is to de-emphasize or attenuate the high modulating frequencies. This is necessary since these frequencies are pre-emphasized at the FM broadcasting stations.

A 6AL7-GT tuning indicator is connected across the output of the discriminator circuit.

Audio Amplifier Section

The audio amplifier section is composed of two stages of audio amplification utilizing the triode section of the 6T8 as a voltage amplifier driving a 6AQ5 as the power output stage.

The input to the first sound amplifier appears on a contact of the service selector switch. This permits application of either phono output or sound discriminator output to the amplifier as desired.

A compensated volume control is used in the grid circuit of the first sound amplifier. The compensation circuit consisting of R320 and C288 from the center tap of the volume control to ground, will provide some bass boost when the volume control is adjusted to a point near the center tap.

Resistance coupling is used between the first sound amplifier and the power output stage. Some negative feedback from the plate circuit of the power amplifier to the plate circuit of the 6T8 triode section is applied. The power output of this amplifier is rated at 1 watt as measured at 400 cycles across a 3.2 ohm resistor in place of a loudspeaker.

Composite Synch Section

In the block diagram (in envelope with schematics) of the RA-111A, one section block is referred to as the "composite synch section". This designation is used to indicate that if one of the stages contained within this section were to fail, both horizontal and vertical synch would be lost.

The stages contained in this section are referred to on the schematic diagram as V212, the narrow band synch amplifier, V213, the synch and AGC detector, V219, the first synch clipper and V220A, the second synch clipper.

The first two tubes mentioned, namely V212 and V213, comprise a special Du Mont circuit known as the narrow band synch circuit. The use of this same type circuit in the RA-105B, and RA-108A Telesets gained for these receivers, a reputation, second to none because of their extreme immunity to noise. The term "noise immunity" as used in this text is meant to designate the ability of a Teleset to hold synchronism (both vertically and horizontally) despite the presence of interfering noise pulses.

The principle involved in this narrow band type of synch circuit is to eliminate these noise pulses before they arrive in the synch circuits. To accomplish this end result, a special narrow band video IF stage is used. This stage is referred to on the circuit diagram as V212, the narrow band synch amplifier.

The video IF signal is fed from the cathode of the video detector to the control grid of V212, the 6BA6 narrow band synch amplifier stage. The video IF signal is amplified by this 6BA6 which is a remote cut-off tube and used in this circuit to prevent compression of the synchronizing pulses. Two cathode resistors are used but only one is by-passed. The degeneration resulting from the un-bypassed resistance also reduces the possibility of synch compression.

The output from the 6BA6 is coupled to the AGC and synch detector, V213, by means of a special narrow band transformer identified as Z209. The response of this transformer is such that when tuned to 26.4 mc, the bandwidth 3 db down from 26.4 mc is 700 kc ± 50 kc and 1 mc ±50 kc at 6 db down. This narrow band transformer will, therefore, exclude all the higher video frequencies as well as the noise pulses, most of which usually appear in the higher video ranges. The response of the transformer is adequate to pass those frequencies necessary to reproduce the synch pulses for proper synchronization of the receiver. (The method of adjusting this transformer is found on the alignment procedure sheet.)

One-half of V213 (pins 1 and 7) is used as the AGC detector. The AGC voltage is developed when this half of the tube conducts, developing a voltage across resistors R316 and R251. The amount the tube conducts and thus, the resulting AGC voltage depends upon the setting of the AGC control and the strength of the incoming signal. The purpose of the AGC control is to bias the AGC diode so that weak signals will not develop AGC with its resultant reduction in receiver gain.

Two AGC lines are used to feed AGC voltage to the controlled stages. One line connected across R251 is used to feed AGC to the grid circuits of both the 1st and 2nd video IF stages. RC decoupling circuits in the grid circuits of the 1st and 2nd IF stages prevent any of the IF signal from feeding back into the AGC line. The second line, connected across C238 is used to feed AGC to the Inputuner.

The circuitry involved here is somewhat different, however, from that of the AGC line fed to the video IF's. A delay circuit consisting of R265, a 10 megohm resistor connected back to the 150 volt line, will apply a low positive voltage to the AGC line. This positive voltage will oppose and cancel out, any AGC developed with weak signal input. The result is that on weak signals, AGC is applied to the 1st two video IF stages, whereas no AGC is applied to the Inputuner stages.

The purpose of this arrangement is to permit the tuner to operate at maximum gain with weak signal input. The signal voltage fed to the mixer grid will then be relatively high which is desirable. This condition will result in a higher signal to noise ratio to produce a picture with a lower noise content than could otherwise be obtained.

With a circuit of this type, it is apparent that the grids of the rf and mixer tubes would tend to go positive at low signal levels, since the positive voltage would be greater than the negative AGC voltage. To prevent this, a special AGC clamp tube is used to keep the grids at ground potential while the delay action is taking place. The tube is a diode section of the 6T8 (V203).

The second half of V213 (pins 2 and 5) is used as the synch detector with the detected composite video signal appearing at pin 5. The setting of the AGC control has no effect on the operation of the synch detector, since both pins 2 (plate) and 5 (cathode) will ride at the potential of the AGC control when no signal is applied. The composite video signal is then coupled to the grid of the first synch clipper V219.

A 10K resistor R284, in series with C261 is used to attenuate any noise pulses that may still exist after coming from the narrow band circuit. The synch clipper stage, operating at low plate and screen potentials in conjunction with a long time constant grid circuit will result in the removal of the composite synch signal from the video signal.

This composite synch signal is then fed to the 2nd synch clipper V220A. This stage functions to perform some additional clipping of the synch pulses and also inverts the polarity of the composite synch. The polarity of the synch pulses at the plate of the V220A is positive. This polarity is required for synchronization of the horizontal and vertical oscillators. The additional clipping is necessary in this stage to remove any irregularities from the synch pulses. To improve the clipping action, the grid is returned to +215 volts.

The composite synch signal is fed to both the horizontal and vertical circuits from the plate of V220A. We will consider the vertical circuits first and then return to this point and proceed through the horizontal circuits.

Vertical Sweep Section

The vertical sweep section is composed of V220B ($\frac{1}{2}$ 6SN7), the vertical saw generator and V221 (6SN7) the vertical sweep amplifier. The vertical saw generator stage functions both as a blocking oscillator and a discharge tube.

The composite synch signal is fed from the plate of V220A to the grid circuit of the vertical saw generator V220B, through what is known as an integrator circuit. This integrator is composed of R289, C265, R290, C266, R291, and C267. The purpose of this circuit is to derive a 60 cycle synch pulse from the composite synch signal fed into its input. Composite synch is so called because it consists of horizontal synch pulses, equalizing pulses and the serrated vertical synch pulse.

Six equalizing pulses, followed by the serrated vertical synch pulse, followed by six additional equalizing pulses, is a sequence that occurs at the end of each vertical scanning field (bottom of picture). The 60 cycle pulse mentioned above, is derived from the serrated vertical synch pulse sometimes referred to as the vertical synch pulse interval. This type of circuit also constitutes an effective noise filter since most noise pulses are high frequency in content and are by-passed to ground.

The vertical synch pulse output from the integrator is applied to the grid of the vertical saw generator through a winding of the blocking oscillator transformer. This blocking oscillator circuit is slightly different from that used in previous Du Mont Telesets. The blocking oscillator transformer, for example, consists of two windings instead of the three windings used in previous vertical blocking oscillator circuits. Although the circuit arrangement is slightly different the desired end result which is the correct vertical sweep waveform remains the same as in all Du Mont Telesets.

This circuit oscillates because of the coupling from the plate cathode circuit to the grid circuit through the transformer. The circuit blocks because of the grid current charging C271. This capacitor discharging through R293 and the vertical hold control, R292, developes sufficient negative bias to keep the tube beyond cut-off. The rate at which the capacitor discharges through R293 and the vertical hold control determines the blocking frequency of the circuit. Reducing the resistance in the circuit with the hold control increases the blocking frequency and increasing the resistance in the circuit decreases the frequency.

During the period the tube is cut-off, the vertical sawtooth signal is formed by charging capacitors C269 through resistors R294, the vertical size control R295 and R296. When the tube goes into oscillation it conducts very heavily, discharging the capacitor (C269) through the plate cathode circuit of the tube and the resistance R296. The heavy discharge current flowing through this resistor will put a negative pulse on the return trace of this waveform. This pulse is necessary to speed up the vertical return trace.

The amplitude of the sawtooth portion of the waveform may be varied by adjustment of the size control, R295. Maximum size will be obtained when the size control is shorted out. Minimum size will be obtained when the entire resistance of the potentiometer is in the circuit.

The vertical sweep signal is applied to the vertical saw generator where the signal is amplifier and inverted. Both halves of this 6SN7 are connected in parallel. The linearity control, R299, is located conventionally in the cathode circuit of this stage. The linearity control varies the bias and thus, the operating point of the tube. Any curvature in the vertical sweep waveform that could produce non-linearity can thus be eliminated by the opposite curvature in the tube characteristics. The low end of the grid cathode circuit is returned to the -50 volt line, which is the B- side of the low voltage power supply.

The amplified and inverted signal is applied to the primary of T204. This transformer is an output transformer designed to match the impedance of the yoke to the impedance of the 6SN7. The transformer does not change the polarity of the signal.

Horizontal Synch Sweep and High Voltage Section

In the block diagram, four tubes are shown as those responsible for the performance of the horizontal synch, the sweep and the high voltage function of the Teleset. These stages are identified as V214, which is a 6SN7 and is responsible for the synchronization and formation of the horizontal sawtooth waveform. The next stage is V215, a 6BQ6 beam power tube which is an adaptation of the 6L6. This stage is responsible for increasing the amplitude of sweep sufficiently to properly sweep the tube.

The two stages used in the horizontal output stage are a 1B3, high voltage rectifier and the 6W4, damper.

Horizontal AFC and Saw Generator

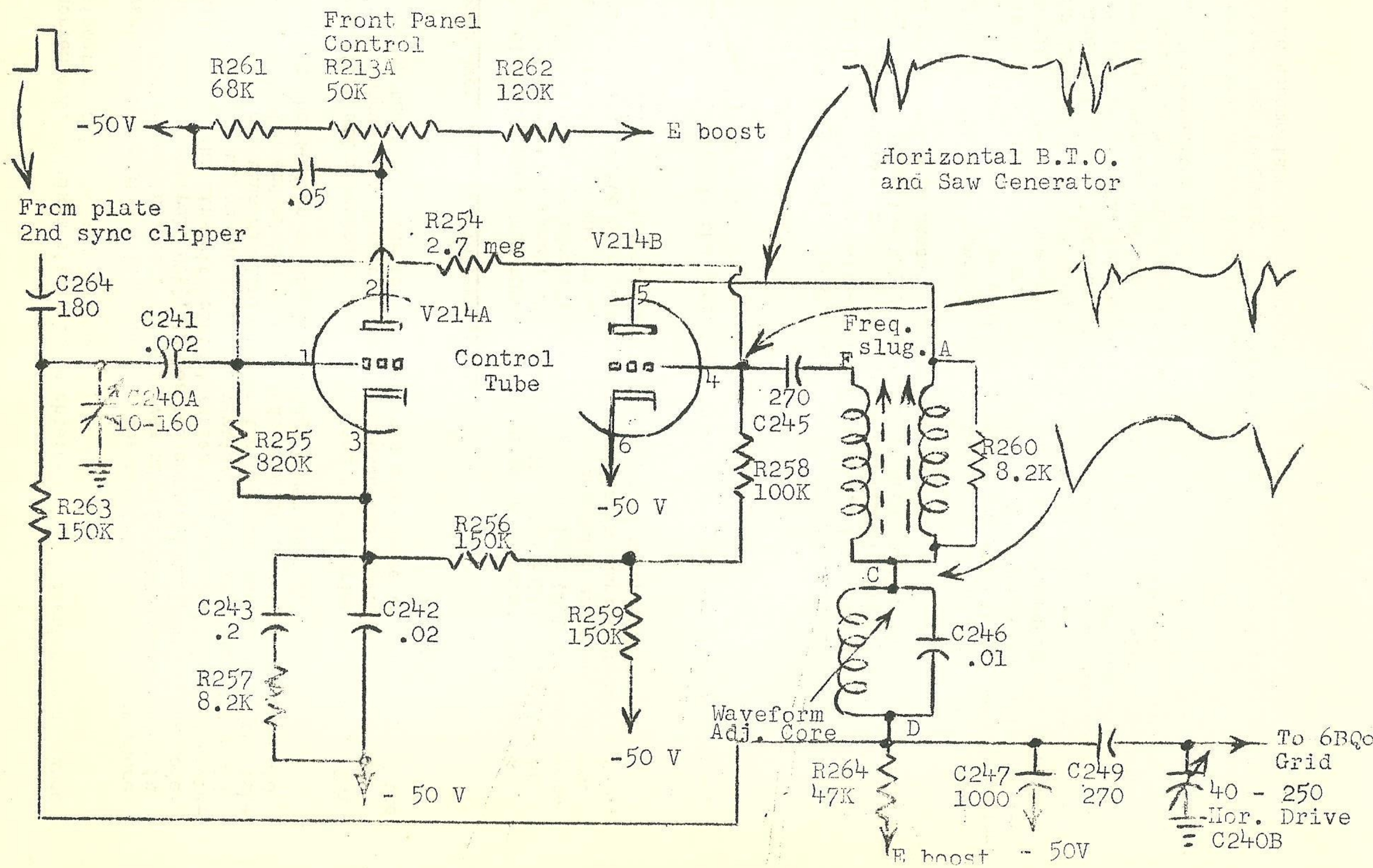
The circuit used for the development and synchronization of the horizontal sawtooth signal is known as the pulse-width AFC system. For explanation purposes, the circuit has been redrawn from the main chassis schematic and appears on the following page. The designation V214A and V214B is used only on this simplified schematic and not on the main chassis schematic.

V214B is the triode responsible for the formation of the horizontal sawtooth signal. The tube operates in a blocking oscillator circuit and acts as a discharge tube as well as an oscillator. The circuit oscillates because of the feedback from the plate circuit to the grid circuit through the transformer Z210. The circuit blocks since C245 charges when the grid draws current during oscillation, and the negative voltage developed when C245 discharges through the circuit resistance is sufficient to keep the tube beyond cut-off. The free running blocking frequency therefore, depends upon the adjustment of Z210 and the time constant of the grid circuit. The horizontal sawtooth waveform is developed by charging C247 through R264. The capacitor is discharged through V214B when the circuit oscillates.

The other half of the 6SN7, V214A is called the control tube and its purpose is to control the frequency of the blocking oscillator circuit. The manner in which this is accomplished is described in the following paragraphs:

RA-111

Horizontal A.F.C. and Saw Generator



The control tube is maintained beyond cut-off except during the period or a portion of the period of the incoming synch pulse. This tube is biased beyond cut-off by the negative voltage fed back from the grid circuit of the blocking oscillator through R254, the 2.7 meg resistor.

The DC control voltage is applied to the blocking oscillator tube across resistor R259 which is common to the cathode circuit of the control tube and the grid circuit of the blocking oscillator.

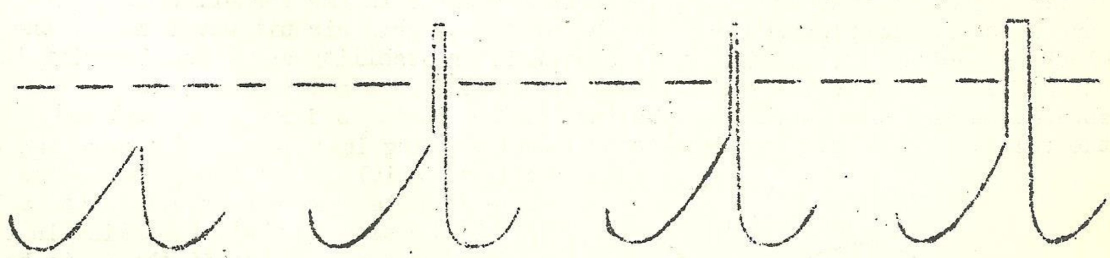
The average voltage drop across R259 will vary with the average amount of current drawn by the control tube when it conducts. This variation will cause the discharge time of C245 to speed up or slow down depending on the direction of the voltage variation. For example, if a change takes place in the control tube to effect an increase in the voltage drop across R259, this more positive voltage will speed up the discharge of C245 and thus increase the blocking frequency.

Likewise, if a change takes place in the control tube to effect a decrease in the average voltage drop across R259, this less positive voltage will slow up the discharge of C245 and thus decrease the blocking frequency.

The next step in our sequence is to provide a method of informing the control tube of any tendency of the BTO to change frequency and thus permit the control tube to apply the necessary corrective action. This is accomplished by comparing a voltage derived from the sawtooth developed in the output circuit, to the incoming synch pulses. The comparison takes place in the grid circuit of the control tube.

The incoming synch pulses are fed from the plate of the second synch clipper V220A into the grid circuit of the control tube and the voltage derived from the output voltage as previously mentioned is fed to the grid circuit of the control tube through R263, the 150K resistor and is developed across C240A the variable capacitor.

The important waveforms are shown in the following figure, these exist in the grid circuit of the control tube.



A. Voltage fed back from output circuit. Teleset not tuned to a channel.

B. Incoming synch pulse superimposed on sawtooth. Normal synch condition.

C. Same as B except frequency of oscillator tends to run fast.

D. Same as B except frequency of oscillator tends to run slow.

Now that we have described all the elements of this deflection and synchronization system, let us examine the synchronizing action.

Figure A is the waveform of the voltage fed back from the output circuit as it appears across C240A. Figure B is the combination of this sawtooth signal and the incoming synch pulse under the conditions of normal synch. The dashed line designated as ECO represents the cut-off potential of the control tube. As is indicated by this sketch the synch pulse drives the tube to conduction. The amount that the tube conducts depends upon the amplitude of the synch pulse and the pulse-width. Since the amplitude of the synch pulses are held constant by virtue of the clipping stages, any variation in the amount the control tube conducts depends upon the width of the pulse.

To accurately follow the synchronizing action it is necessary that we consider the conditions shown at Figure B as representative of those that exist when the circuit is properly synchronized. If now, the frequency of the blocking oscillator tends to increase, the phase relationship between the synch pulses and the sawtooth will change. This results in a large portion of the synch pulse becoming lost in the fast slope of the sawtooth. Under these conditions the portion of the pulse causing conduction of the control tube is very narrow. This reduces the average voltage drop across R259 and will decrease the frequency of the BTO. See Figure C.

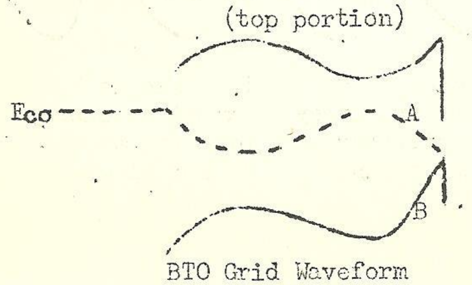
If, on the other hand, the frequency of the blocking oscillator tends to decrease, the phase relationship will change so that a greater portion of the synch pulse width rides on the peak of the sawtooth waveform. Thus, the width of the pulse causing conduction of the control tube will be greater, resulting in a greater average voltage drop across R259 and an increase in frequency of the oscillator. See Figure D.

Therefore, by an examination of the above action it can be seen that the blocking oscillator frequency will remain synchronized with the incoming synch pulses. The noise immunity of this circuit is also good since as a rule the noise pulses would have to ride upon the peak of the sawtooth waveform in order to cause the tube to conduct.

To insure maximum stability from the use of a circuit of this type a ringing circuit consisting of one of the coils included in Z210 and C246 is used.

When this circuit is shock excited by a pulse it will oscillate or "ring" at its resonant frequency. This "ringing" results in the formation of a sine wave which is superimposed on both the plate and grid circuit waveforms of the blocking oscillator. To improve the oscillator stability and noise immunity the control voltage from the control tube is applied at a point where, due to the above-mentioned sine waves, the voltage on the plate is increasing fast and the voltage on the grid is decreasing fast (becoming less negative) toward the cut-off potential of the tube. Since the cut-off potential varies with plate voltage, it can be seen by the dotted line in the adjoining figure, that if the plate becomes more positive, the cut-off potential becomes more negative. Therefore, for optimum stability, the angle that exists between curve A and B should be as large as possible at the point where the oscillator is synchronized.

BTO Plate Waveform
(top portion)



BTO Grid Waveform
(Top Portion)

Horizontal Deflection Amplifier

The horizontal sawtooth signal developed across C247 in the plate circuit of the horizontal saw generator, V214B is applied to a 6BQ6 deflection amplifier. A drive control (C240B) designed to adjust the amount of sawtooth voltage fed to the deflection amplifier is located in the grid circuit. This control should not be adjusted after making the necessary adjustments on the horizontal synch circuits since it may upset the operation of this circuit. The proper procedure to follow in making adjustments in this circuit is found on the Block Diagram, Adjustments and Troubleshooting Sheet.

A 1B3 in a conventional kick-back high voltage supply circuit is used in this model. A 6W4 used in a conventional power feedback circuit provides the damper function. Two linearity controls and a size coil comprise the adjustable components found in the output circuit.

A shunt series type size control is used across the secondary of T202. The portion of the inductance across R278 is in series with the deflection yoke, whereas the remaining half is in parallel with the yoke. This horizontal size control circuit presents a constant load to the secondary of T202. Adjustment of the slug to increase the parallel coil inductance results in a decrease of the series coil inductance, thus maintaining the total inductance constant. This arrangement permits variation of size without affecting linearity. Resistor R278 is used across the series portion of the size coil to prevent ringing.

Low Voltage Power Supply

A low voltage power supply utilizing a single 5U4G supplies the necessary DC power to the circuits.

This supply is adequately protected by the use of a 3 amp. fuse in the primary of the transformer.

3. INSTALLATION

Du Mont Telesets are designed to simplify the installation problem for as many different types of locations as possible.

Despite all the features engineered into Du Mont Telesets to accomplish this purpose, carelessness, or lack of basic installation knowledge on the part of the installation man, can cancel out the effects of these features.

A breakdown of the various types of locations where these Telesets may be installed is important in order to point out the advantages to be derived from installing an RA-111A Teleset.

There are numerous types of conditions with which the serviceman is faced when installing a Teleset. Although not a complete list, the following represents with a fair degree of accuracy, the types of locations where Telesets are normally installed.

1. A fringe area (area of weak signal).

2. An area containing reflections which produce "ghosts".

3. An area which is extremely noisy, either due to automobile ignition interference or industrial machinery in the vicinity.

4. Areas of varying signal strength from the transmitter.

5. Areas where fairly strong FM interference is normally encountered.

In addition to the above, combinations of several of the above conditions are often found in one location.

Let us consider each of those areas and determine how the RA-111A Teleset makes for ease of installation.

1. Fringe Areas

The RA-111A due to its high sensitivity and excellent synch circuits will perform very well in the fringe areas, providing of course, that a good installation is made. For optimum results, coaxial type transmission line should be used when installing Du Mont Telesets. For the fringe areas, RG-11/U coaxial cable should be used. This cable has a characteristic impedance of 72 ohms designed to match the input impedance of the Teleset. It has much lower line losses than RG-59/U coaxial cable. RG-59/U also has an impedance of 72 ohms but due to its higher line losses should be used only in strong or moderately strong signal areas. RG-11/U coaxial cable can be recognized in comparison to RG-59/U because of its larger diameter. The outside diameter of RG-11/U is .4" as compared to .2" for the RG-59/U. The loss in RG-11/U is 2.1 db per 100 foot at 100 mc as compared to 3.8 db per 100 foot at 100 mc for RG-59/U.

2. "Ghost" Areas

In installations in areas of this type where there are reflections from surrounding buildings or the terrain causing "ghosts" in the received picture, the conditions should be carefully examined to determine whether or not the "ghost" is coming in the same direction as that of the direct signal or whether it is coming at an angle. If the delayed signal causing the "ghost" is coming from the same direction as the desired signal, then it is impossible to eliminate the condition at the receiver. Reflections of this type usually exist because of the location of the television transmitter. "Ghosts" caused by this condition would remain until the transmitter is moved to a more suitable location.

If the "ghost" is caused by a reflection from an object located at an angle from the desired signal, the condition may be alleviated in some cases simply by rotating the antenna slightly. However, if other conditions will not permit this, it may be necessary to install separate antennas with separate transmission lines. If the problem is extremely acute, it may be necessary to go to a very narrow beam antenna such as a Yagi or in some cases even a Rhombic antenna, if space permits, may be desirable. It is possible, however, that if the customer desires to go to the additional expense, the use of a rotating mechanism for turning the antenna may be in order.

Another "ghost" condition could be caused by a mismatch at the antenna terminal of the Teleset. For example, if 300 ohm transmission line were used, the mismatch at the antenna terminal would result in reflections that would be delayed by an amount equal to the time it takes for the signal to travel twice the length of the cable. The seriousness of this condition will depend primarily upon the length of the cable. In this case, the only obvious answer is to use the proper coaxial transmission line.

In certain urban locations where there are many tall buildings reflecting the transmitted signal, it may be desirable to use an indoor antenna as in some locations, the indoor antenna will work better than the outdoor antenna as far as "ghosts" are concerned. Also, if the "ghost" condition is very bad, it may be necessary to polarize the antenna at some unconventional angle in order to pick out a signal that is clean and free from reflections.

3. Noisy Areas

Due to the excellent noise immunity as provided by the narrow band synch type circuit, the installation of these Telesets in noisy industrial areas or locations of heavy traffic, is greatly simplified. Obviously, precautions must be taken pertaining to the method of running the coaxial transmission line. Whenever possible, the antenna and the coaxial cable should be kept as far away from the source of interference as possible and the coax should be grounded at several points along the line. If the noise is extremely bad, it may be necessary to run RG-11/U which has more effective shielding instead of the RG-59/U.

4. Areas of Varying Signal Strength from the Transmitter

Varying signal strength from the transmitter occurs not only in fringe areas but also may be encountered in areas close to the television transmitter proper. In either case, where the set is located in a fringe area where the signal varies or in a very strong area where the signal varies, the AGC circuit in this chassis will maintain the picture steady at all times. The AGC circuit is also effective in locations near airports where a condition due to reflection from airplanes, commonly known as "airplane flutter" is encountered.

5. Areas of Strong FM Interference

The problem of installation in areas where formerly FM interference was encountered will be greatly simplified because of the high image rejection and selectivity of the RA-111A Teleset. It is doubtful that any FM interference will be seen except in those locations where the Teleset is located very close to the FM transmitter proper. Traps to eliminate FM interference caused by these isolated cases can be obtained from the Teleset Service Control Department.

Surveys

In many locations, it is desirable to check reception before permanently installing the Teleset. To assist in making a survey, we are preparing a special test set incorporating the RA-111A chassis. The chassis will be enclosed in an aluminum carrying case to permit ease of handling. Meters for indicating the line voltage as well as the relative signal strength will be included. Many such test sets incorporating the RA-103 chassis have been in use in the field for the past few years. Information pertaining to the price of this test set will be published later.

Customer Education

In addition to the above, what is perhaps one of the most important items involved in the installation of the Teleset pertains to the proper education of the customer. It is definitely to the advantage of the serviceman to see that the customer knows how to properly adjust his Teleset. A very complete handbook on the proper method of using the Teleset is attached to each receiver. Nevertheless, it should be the responsibility of the installer to properly instruct the customer how the receiver should be adjusted and the handbook may be, therefore, used as a reference.

Lack of proper education in the past has resulted in many unnecessary service calls on which the additional time spent in call backs represents a definite loss in profit to the installer, as well as a dissatisfied customer.

The above resume is not intended to be a complete manual on installation but rather an attempt to clarify to the installation man the advantages of the RA-111A Teleset in solving problems normally encountered in his installations.

In the event that a particular location is encountered where the serviceman is unable to cope with the situation, he should contact either the Du Mont Regional Field Service Manager or the Teleset Service Control Department.

4.0 Service Sheets

In the large envelope accompanying these service notes are three service sheets. When devising these sheets it was intended that as much service information as deemed necessary was included on these sheets. The Schematic Diagram and the Alignment Procedure sheets were devised for use by the serviceman at his bench. The third sheet "Block Diagram, Adjustments and Troubleshooting" was designed to be used by the serviceman when making service calls.

Please send your comments on these sheets and also your ideas on improving them. These sheets have been made exclusively for your benefit, therefore, it is essential that we supply you with the information you need.

You will note on the schematic diagram for the RA-111, a number of symbols. In the lower right hand corner of the schematic you will find a legend that attempts to describe their purpose. It was necessary to use these symbols as we deleted as many interconnecting lines as possible in an attempt to simplify the schematic. As indicated in the legend it was intended that the large outlined symbol indicate the source of a voltage and the small plain symbol indicate the point to which the voltage was applied. In the event a short circuit occurred on the +338 volt line, it would merely be necessary to check all points indicated by a wheel.

Waveform Observations

All waveforms that are of importance in the servicing of the RA-111 Teleset are shown on the schematic.

For additional information on the use of the oscillograph in servicing Telesets, please refer to the RA-105 Service Manual, pages 26 through 34.

Corrections to RF Assembly Schematic Diagram

Please make the following corrections on the RF Assembly (Four Circuit Bottom Coupled Inputuner) Schematic Diagram for RA-111A Teleset, first edition (April 3, 1950).

1. The secondary of T202 is shown incorrectly as going to Z205. It should be shown going to Z204.

2. Delete coil shown connected between C100 (8 - 50 mmfd) and junction of C103 and L104. Coil is shown with asterisk and no symbol number.

3. Connect C100 (8-50 mmfd) directly to Pin 7 of V101.

5/19/50

RA-111A Section

5.0 Service Procedures

and

Troubleshooting Hints

This section of the service notes for the RA-111A Teleset will include information pertaining to various servicing and troubleshooting procedures that require detailed information. Additions to this section will be made whenever necessary.

INPUTUNER TROUBLE:

No particular difficulty should be encountered in the field from Inputuner troubles. Loss of picture and sound, weak picture and sound or intermittent picture and sound are conditions usually resulting from faulty tubes.

In the event of a component failure, it is very important that the placement of the component, its lead length and the associated wiring, be maintained exactly the same as when received from the factory. For replacement purposes use only the exact replacement part as specified on the Parts List. In the event that alignment becomes necessary or the cause of the defect cannot be found, the Inputuner should be returned to the factory for exchange.

NOISY INPUTUNER

Bright flashes on the screen that occur while tuning the Teleset is an indication of a noisy Inputuner. This condition, if it exists, will usually occur on the high channels. Lubrication of the Inductuner will overcome this condition. Use only Lubriplate #105 for lubrication of the Inductuner. This may be obtained from the Teleset Service Control Department.

It is not necessary to clean the Inductuner with carbon-tet before applying the lubricant as was required for the original Inductuner.

To lubricate the Inductuner, proceed as follows:

Remove the Inductuner cover by removing the four special type fasteners found on the top-side of the Inductuner. These fasteners may readily be removed by first rotating them 90°.

Apply Lubriplate #105 to the contact ring, indicated by arrows in Figure 5-1. This is the only point where lubricant need be applied.

Procedure for the Removal and Replacement of Inputuner Assembly.

Note: The Inputuner for the RA-111A (Part No. 89003301 includes the dial cam assembly complete. Therefore, when returning the Inputuner for replacement, the Inputuner must be sent with its dial cam assembly intact.

Important: Do not cut any leads from the Inputuner; keep them full length.

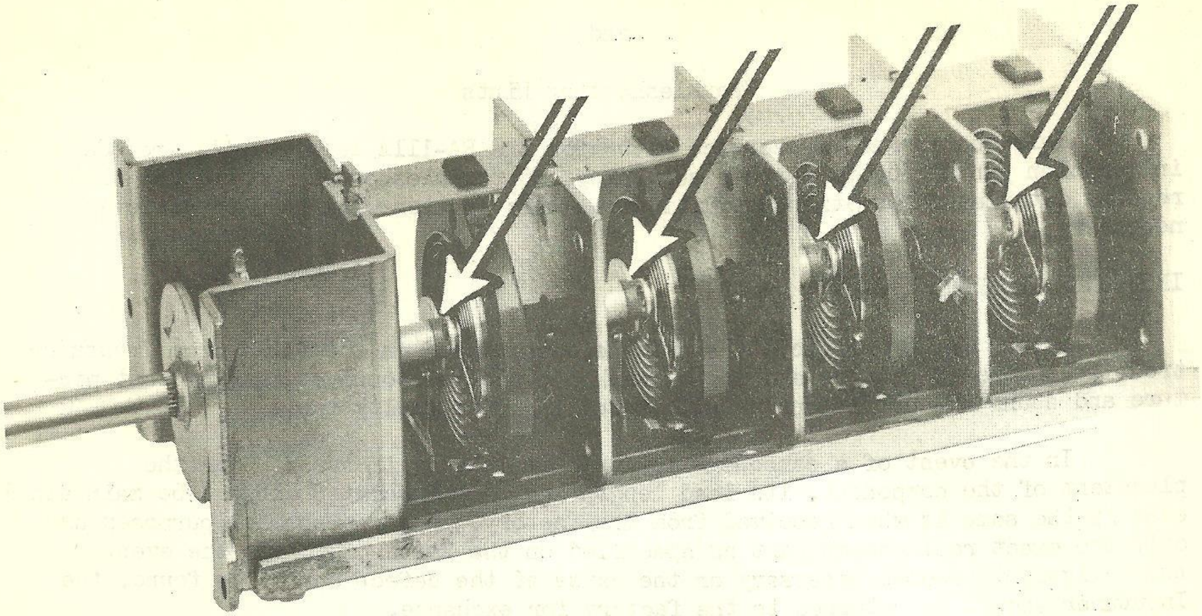


Figure 5-1. Inductuner Lubrication Points

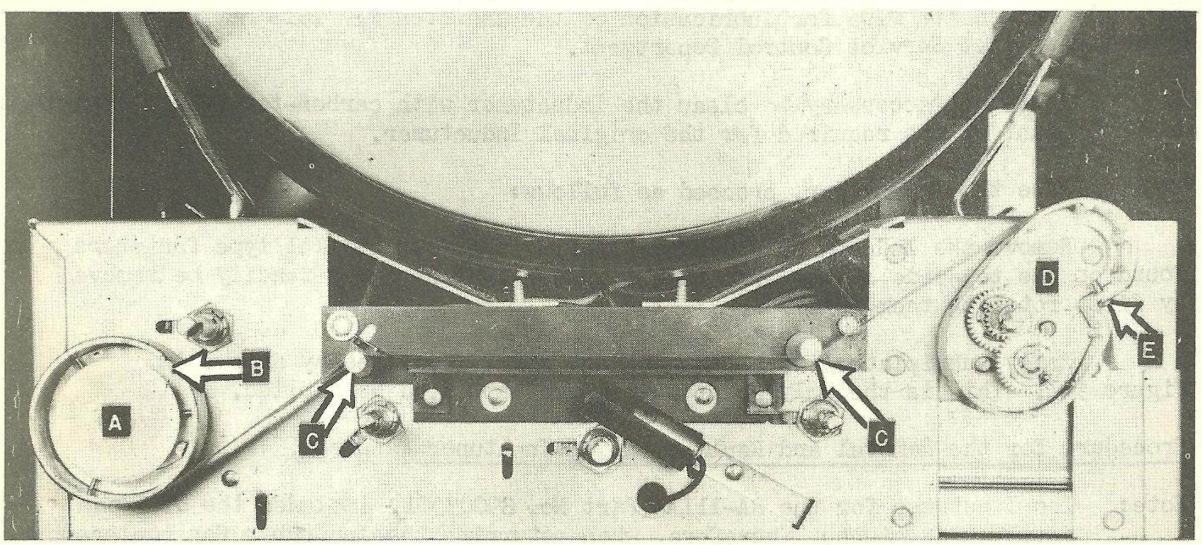


Figure 5-2. Dial Drive Assembly RA-111A

1. Disconnect tape from cam (D - Figure 5-2) by removing the clutch head screw and clamp (E).

2. Unsolder the three leads coming from the Inputuner to the receiver chassis, noting color coding of the wire and the terminals from which the wires were removed.

3. Unsolder the twin-lead to the first video IF transformer.

4. Disconnect the Inputuner antenna cable at the antenna terminal.

5. Remove the four screws which hold the Inputuner to the mounting plate beneath it.

6. Remove the four screws which hold the Inputuner mounting plate to the receiver chassis, and remove plate. (Note: The mounting plate for the Inputuner is part of the main chassis and is not supplied with replacement Inputuners).

7. Remove Inputuner from beneath chassis.

8. To replace Inputuner, follow the above procedure in reverse.

Replacement and Calibration of Dial Tape

1. Rotate the tuning control fully counter-clockwise.

2. Rotate drum (A - Figure 5-2) five complete turns counter-clockwise.

3. Insert loop end of dial tape into slot (B) of drum (A).

4. Holding drum (A), feed dial tape over left idler (C) and under right idler (C).

5. Release drum (A) and carefully allow dial tape to wind on it.

6. Insert clutch-head screw (E) through clamp and then through slotted end of dial tape.

7. Adjust dial tape so that junction of colored and uncolored portion of tape lies directly underneath right idler (C).

8. Tighten clutch-head screw (E).

9. Tune in an FM station near 100 mc. If the dial marker is not closer than $\pm$ 0.5 mc from the assigned frequency of the station selected, the tuning control should be rotated fully counter-clockwise, clutch-head screw (E) loosened slightly, and the slotted end of the dial tape slid the necessary distance in the proper direction; then tighten clutch-head screw (E).

10. The dial marker should now fall in that portion of the tape allotted to each channel. If not, step 9 may be repeated. However, the maximum deviation of the calibration of the local FM station selected is $\pm$ 0.5 mc.

Note: In areas where no FM station is available, a TV station may be substituted for the FM station referred to in step 9 above.

Lubrication of Dial Drive Mechanism

Cam Gears : "Ucon" brand, 75H-47000XY23D

Drum Mech : "Ucon" brand, 75H-1400XY23D

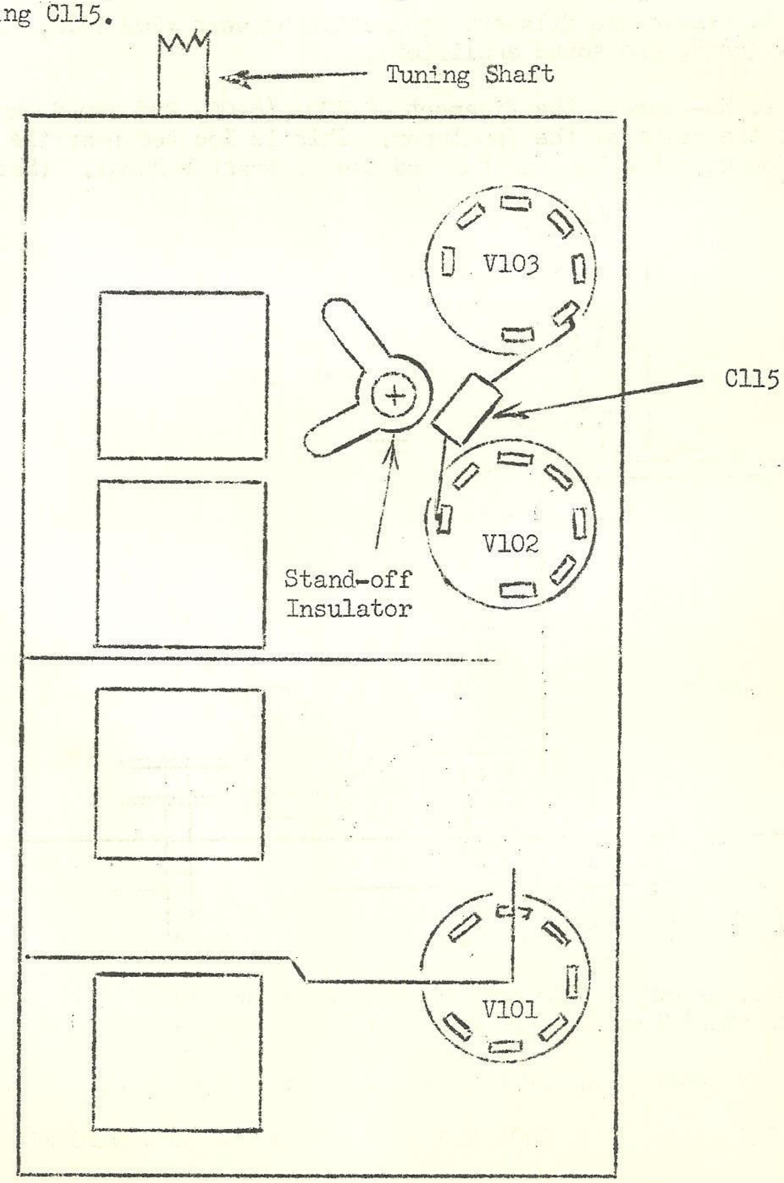
Important : These lubricants will attack paint on dial tape. Use sparingly, and with caution.

High-Channel Sensitivity

A few field complaints have been received indicating that the high channel sensitivity of the new model Telesets is low in certain areas, as a result of low oscillator injection voltage.

If this condition should be encountered it is suggested that the following procedure be followed to improve the sensitivity:

> Remove the Inputuner and dress capacitor C115 as far away from the bottom of the Inputuner chassis (not bottom plate) as possible and close to the standoff insulator mounted between V102 (6AK5) and V103 (6AB4). (See the following figure.) Care should be exercised not to disturb the position of other components in the Inputuner while redressing C115.



Elimination of Channel 7 Beat

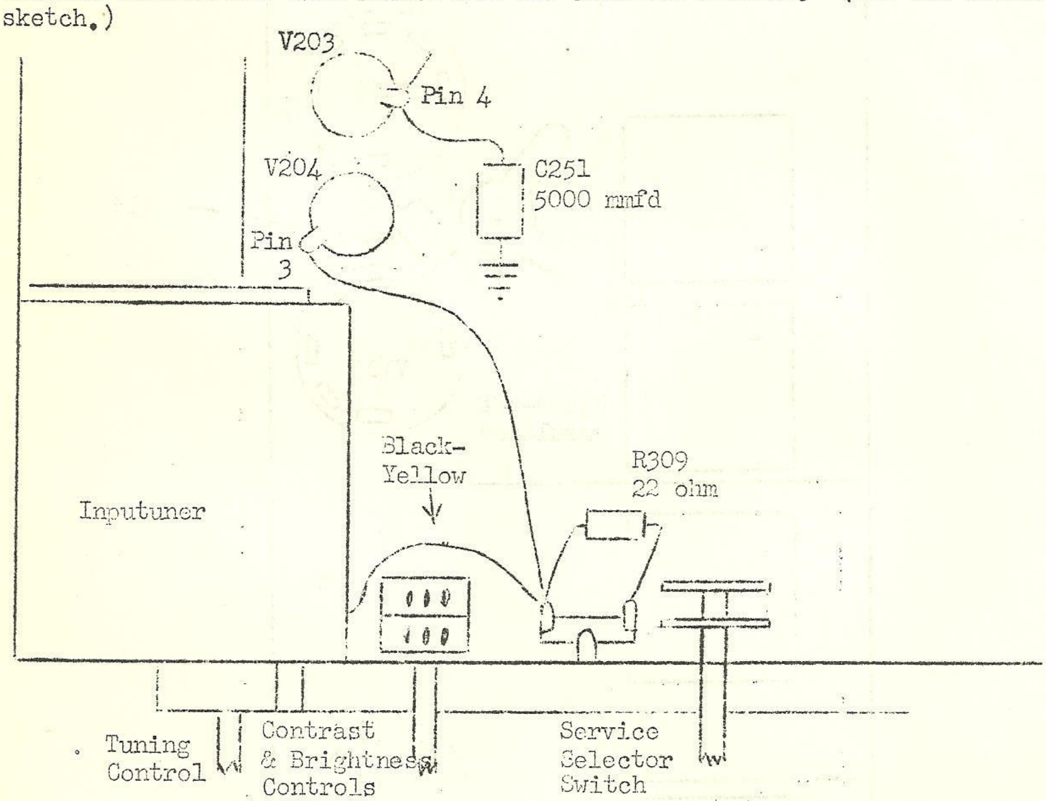
A few complaints of an annoying "beat" on channel 7 in the RA-111A Telesets have been received.

This interference is the result of the 8th harmonic (175.2 mc) of the sound IF (21.9 mc) beating against the video carrier (175.25 mc) of channel 7 and thus producing a 50 kc beat. This beat shows up in the picture as black horizontal streaks.

The following circuit changes are necessary to eliminate this condition:

1. Remove the filament connection between V203 (6T8, 1st sound amplifier) and V204 (6AQ5, 2nd sound amplifier).

2. Re-connect the filament of V204 (6AQ5, 2nd sound amplifier) to filament tie point of the Inputuner. This is located near the front end of the chassis between the band switch and the contrast control. (See the following sketch.)



3. Connect a 5000 mmfd capacitor between pin 4 (filament) of V203 (6T8, 1st sound amplifier) and ground.

The description of the part added in step 3 above is as follows:

C251	03015610	Cap Ce 5000 mmfd min

Video IF Bandwidth Adjustment

If difficulty is encountered obtaining the curves specified in steps 1, 4 or 6 of the alignment procedure, it is possible that the coupling capacitor inside of the associated video IF transformer (Z205, Z206 or Z208) may require adjustment. These capacitors take the form of a wire protruding from the bottom of these video IF transformers which fits into a sleeve inside. They are preset at the factory during alignment for proper bandwidth and are sealed in place with Miracle Adhesive C2M55. In order to readjust the coupling, the wire protruding from the bottom of the transformer should be heated with a soldering iron to soften the adhesive. Once the wire is free, the heat may be removed and the wire slid in (for increased bandwidth) or out (for decreased bandwidth) of the sleeve to adjust for proper bandwidth. The wire should then be sealed in place with Miracle Adhesive C2M55 (obtainable from Du Mont Spare Parts Sales).

Under normal circumstances it will not be necessary to readjust these coupling capacitors and it is recommended that they not be tampered with unless a test with a sweep generator and oscillograph definitely indicates improper bandwidth.

6.0 Production Changes

The first edition (April 3, 1950) of the main chassis Schematic Diagram for the RA-111A is shown as issue #11 through P-71. This issue identification has significance only to Du Mont for the purpose of identifying production changes. All production changes made to these Telesets will have arbitrary numbers assigned with the numbers listed consecutively. In these production changes a number may be shown in parentheses adjacent to the change number. This number is used as a reference number for Du Mont and has no significance in the field.

Change #1 (M-80)

The following changes are to be made on the main chassis schematic, in order to improve the horizontal linearity by eliminating the packing on the right side of the picture, and to change position of the $\frac{1}{4}$ amp. fuse in the high voltage section as recommended by U/L .

Capacitor C251 (pin 8, V215) is to be changed from .005 mfd 25% 600V to .05 mfd 25% 400V.

The new part is to be identified as follows:

Symbol	Part Number	Description
C251	03014020	Cap Pa .05 mf 25% 400V

Delete fuse, F202, connected from T202-1 to junction of C256 and L205 (yellow). Replace with line.

Connect fuse, F202, from junction of C272 and C254, to junction of R300 and + 300V.

The two windings of L207 should be shown separately with no connection between them and with terminals coded as follows: Top coil - yellow and 4; Bottom coil - white and red.

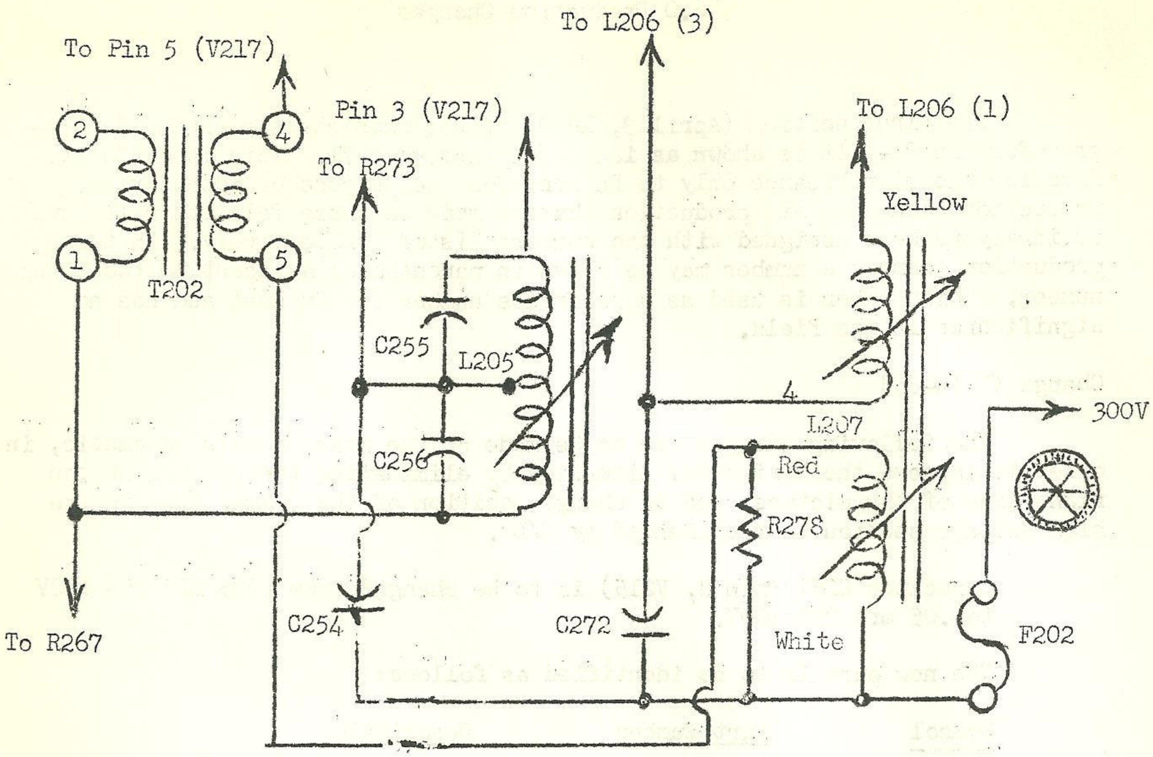
Disconnect line between T202 (5) and junction of C254 and C272.

Disconnect L207 (red) from C272 (.5) and reconnect to T202-5.

Disconnect L207 (white) from L206 (3) and reconnect to junction of C254 and C272.

R278 (10K) should remain connected from L207 (red) and L207 (white).

Connect L207 (4) to L206 (3) and free end of C272 (.5).



NEW CIRCUIT

Change #2 (M-91)

The following changes are to be made in RA-111A main chassis schematic and parts list in order to improve picture quality.

Delete R234 - 10K 5% ½W - connected between L202 and L203 near V209A.

The part number for L202 video peaking coil, should be changed in the main parts list so as to read as follows:

Symbol	Part Number	Description
L202	21004463	Coil Video Peaking

The color coding for L202 is changed from "red-green" to "white".

This change was incorporated in chassis starting with chassis #112214. These chassis are identified by a large letter C stamped on rear fold of chassis.

RA-111A Section

Change #3

Fuse F201 has been changed from 3 amp. to 4 amp.

The new part is described as follows:

Symbol	Part Number	Description
F201	11000800	Fuse 4 amp.

Purpose of change

To prevent blowing line fuses.

Any serviceman having difficulty with line fuses blowing in the RA-111A should replace with a 4 amp. fuse.

Change #4 (ECN-4244)

The following color code changes on IF Transformers are to be made on the Main Chassis Schematic:

Change note near Z204-1 from "Red dot" to "Orange dot".
Change note near Z205-1 from "Red dot" to "Blue dot".
Change note near Z207-1 from "Red dot" to "Black dot".
Change note near Z208-1 from "Red dot" to "Green dot".

Purpose of change

To provide a means for easy identification of IF transformers.

Change #5 (M-98)

Coupling capacitor C280 is changed from 1.7 mmfd to 2.5 mmfd.

The new part is to be identified as follows:

Symbol	Part Number	Description
C280	03016897	Capacitor Coupling 2.5 mmfd.

Purpose of change

To improve sound attenuation.

Change #6 (M-112)

The following changes are made to incorporate a Local-Distance switch on the RA-111A chassis:

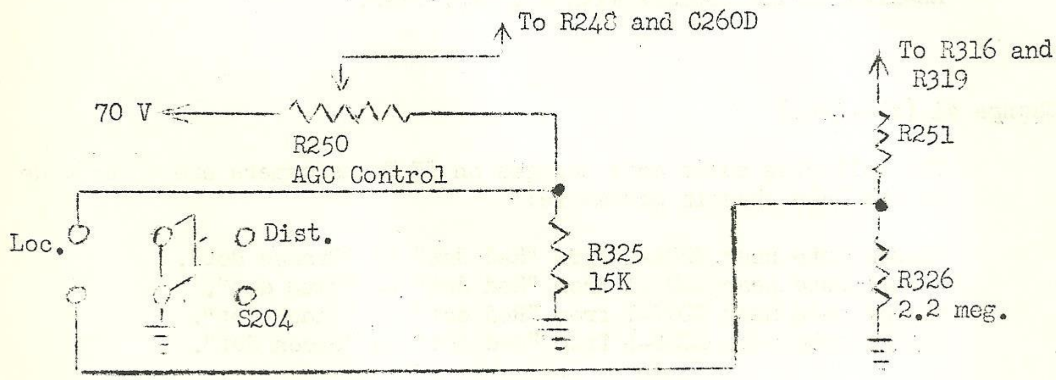
1. Delete F201, fuse and fuse holder, and connect AC line direct.

2. In hole occupied by fuse holder install a DPDT toggle switch, S204, with end terminals facing side of chassis.

3. Disconnect R250 (25K) from ground, and connect new resistor R325 (15K) in series with R250. Connect other end of R325 to ground.

4. Disconnect ground side of R251 (270K), and connect new resistor R326 (2.2 meg.) in series with R251. Connect other ends of R326 to ground.

5. Run two leads to switch and connect to terminals as shown in sketch below; one from junction of R251 and R326, another from junction of R250 and R325:



6. Connect the two center terminals of S204 with jumper and run to nearest ground. (See sketch above.)

The new parts are identified as follows:

Symbol	Part Number	Description
R325	02031910 02041910 02051910	Res F C 15K 10% ½W
R326	02032170 02042170 02052170	Res F C 2.2 meg 10% ½W
S204	05003690 05003050	Switch Toggle DPDT

Purpose of Change:

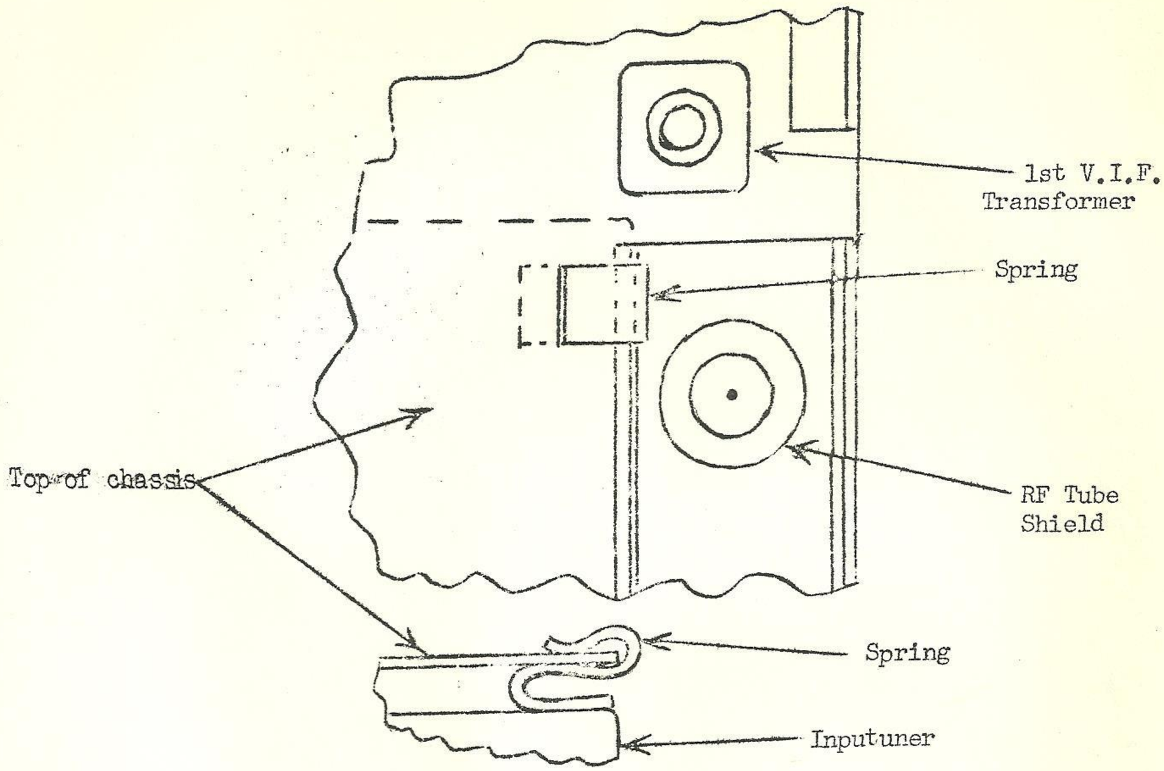
To give increased sensitivity in weak signal areas.

The local-distant switch is used in "Local" position in locations having normally acceptable signal strength. It may be set in "Distance" position for increased sensitivity in weak signal areas, provided the signal strength on other stations is not excessive. Evidence of such overloading might appear either as a loss in the full range of gray tones or as the presence of sound bars in the picture. In the "Distance" position, the receiver safely handles all signals below a 15,000 microvolt level.

The Local-Distance switch is incorporated in the RA-111A chassis starting with serial #115321, and coded with the large letter "F" on rear fold of chassis.

Change #7 (M103)

A grounding spring is to be inserted between the Inputuner and the chassis as shown in sketch below:



New Part is identified as follows:

Part Number	Description
30015401	Spring

Purpose of change

To reduce regeneration.

Change #8 (M-121)

Resistor R296 is changed from 4.7K to 5.1K.

New part is to be identified as follows:

Symbol	Part Number	Description
R296	02030650 02040650 02050650	Res F C 5.1K 5% ½W

Purpose of change

To eliminate packing at the top of the raster.

 6/15/50

7.0 Parts List Changes

This sub-section of the RA-111A Service Notes will be used to inform interested parties of changes that affect the parts list appearing on the Schematic Diagram service sheet. If a production change (see sub-section 6.0 Production Changes) causes a part number change, addition or deletion, the notation will appear in both sub-sections.

The following changes of part numbers, (items 1 - 3) and additions of alternate part numbers are to be made to the Parts List of the first edition (April 3, 1950) of the Schematic Diagram for the RA-111A (issue #11 through P-71).

1. Part number changes and additions in Main Chassis Parts List (April 7, 1950).

Symbol	Part Number	Description
C244	03019640	Cap Pa .05 mf 20% 400V
	03100120	
C251	Same as C244	
C254	03019190	Cap Pa .25 mf 600V
C266	03018640	Cap Pa .005 mf 10% 400V
C280	03016897	Capacitor Coupling
F201	11000800	Fuse 4 amp.
L202	21004463	Coil Video Peaking
R296	02030650	Res F C 5.1K 5% ½W
	02040650	
	02050650	
R325	02031910	Res F C 15K 10% ½W
	02041910	
	02051910	
R326	02032170	Res F C 2.2 meg 10% ½W
	02042170	
	02052170	
S204	05003690	Switch Toggle DPDT
	05003050	

Old Part No.	New Part No.	Description
34001908	34002374	Socket Asy CRT
34001918		
34002374		
	30015401	Spring

2. Part number additions in Miscellaneous Parts List (March 30, 1950) Putnam and Guilford.

Part Number	Description
45001854	Window, Safety Glass
32000782	Front Panel (Blonde)

3. Part Number change in RF Tuning Assembly Parts List (March 4, 1950).

Old Part No.	New Part No.	Description
89003801	89003301	Inputuner Assembly

4. Alternate part numbers are to be added to the following parts in Main Chassis Parts List (April 7, 1950).

Symbol	Part Number	Added Alt. Part No.	Description
C205	03000950	03100030	Cap Pa .05 mf 25% 200V
C210	03001450	03100090	Cap Pa .01 mf 25% 400V
C211	03012560	03100220	Cap Pa .01 mf 25% 600V
C212	03001570	02100400	Cap Pa .005 mf 25% 600V
C231	03015370	03100250	Cap Pa .05 mf 25% 600V
C238	03019440	03100380	Cap Pa .001 mf 25% 600V
C241	03014430	03100300	Cap Pa .002 mf 10% 600V
C242	03018350	03100450	Cap Pa .02 mf 5% 400V
C243	03018330	03100470	Cap Pa .2 mf 5% 400V
C244	03019640	03100120	Cap Pa .05 mf 20% 400V
C246	03003410	03100320	Cap Pa .01 mf 10% 400V
C252	03018[illegible]20	03100050	Cap Pa .15 mf 20% 200V
C254	03019190	03100280	Cap Pa .25 mf 600V
C255	03018360	03100370	Cap Pa .15 mf 10% 200V
C256	03019590	03100350	Cap Pa .05 mf 10% 200V
C261	03014780	03100040	Cap Pa .1 mf 20% 200V
C262	03014770	03100130	Cap Pa .1 mf 20% 400V
C266	03018640	03100310	Cap Pa .005 mf 10% 400V
C267	03018470	03100010	Cap Pa .02 mf 25% 200V
C268	03014820	03100260	Cap Pa .1 mf 20% 600V
C272	03002190	03100070	Cap Pa .5 mf 200V
C285	03014260	03100160	Cap Pa .5 mf 25% 400V
C286	03014900	03100000	Cap Pa .01 mf 20% 200V
R212	02032250 02042250	02052250	Res F C 10 meg 10% ½W
R240	02036910	02046910 02056910	Res F C 62 K 5% 2W
R241	02036630	02056630	Res F C 4.3K 5% 2W
R270	02037650	02057650	Res F C 100 ohms 10% 2W
R271	02037840	02057340	Res F C 3.9K 10% 2W
R277	02038100	02058100	Rds F C 560K 10% 2W
R302	02036600	02056600	Res F C 3.3K 5% 2W
R309	02034570	02054570	Res F C 22 ohms 10% 1W