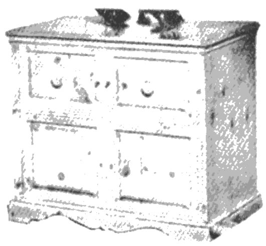
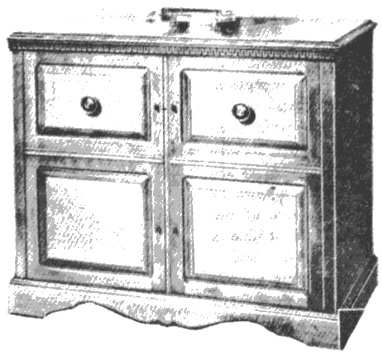
ALLEN B. DU MONT LABS., INC. **MODEL RA-101**

Devonshire, Hampshire, Plymouth, Revere, Sherwood, Westminster



PLYMOUTH



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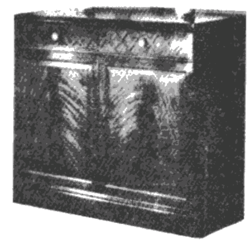

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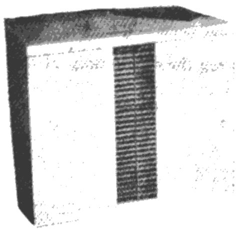
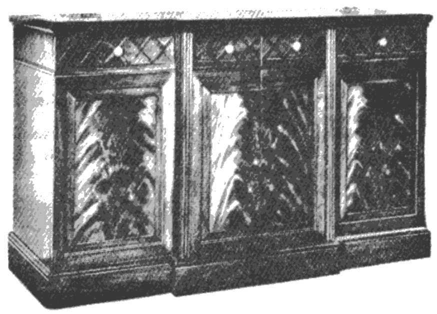
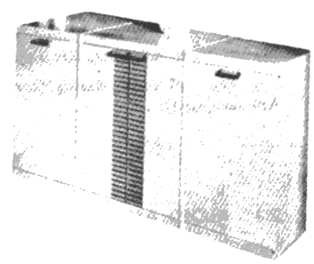


DEVONSHIRE



WESTMINSTER



HAMPSHIRE

Electrical Characteristics

AVERAGE POWER RATINGS:

(*Line Voltage* ....*117 Volts A.C.*)

Tele: *543 Watts*
FM: *223 Watts*
AM: *160 Watts*
Phono: *152 Watts*

CURRENT RATINGS:

Tele: *4.90 Amperes*
FM: *2.02 Amperes*
AM: *1.46 Amperes*
Phono: *1.43 Amperes*

AUDIO POWER OUTPUT:

8 Watts undistorted

RF FREQUENCY RANGE:

44 to 216 MC continuous tuning covering 13 Television channels and the FM band

Input impedance: *72 OHMS*

Intermediate Frequencies:

Television Video ....*26.4 MC*
Television Audio ....*21.9 MC*
AM Tuner ....*456 KC*

1.0 INTRODUCTION

1.1 DESCRIPTION OF SET.

The Model RA-101 is a complete home entertainment unit containing facilities for television, FM and AM reception. Included in the model is an automatic record changer.

The set appears in the following six different style cabinets: Westminister, Hampshire, Sherwood, Devonshire, Revere and Plymouth. The electrical circuits of all cabinet styles are similar. Differences between the model are in the type of record changer, size of cathode-ray tube and the size of the speaker used. The Westminister and Hampshire utilize a 20-inch diameter cathode-ray tube, a 15-inch speaker and a Webster Model 70 Record Changer. The other four models employ a 15-inch diameter cathode-ray tube, a 12-inch speaker and a Webster Model 56 Record Changer.

All cabinet styles contain the following chassis and sub-assemblies:

1. Audio amplifier chassis (containing the audio amplifier and its power supply).

2. Sweep chassis (containing sweep circuits, a power supply for low voltage and bias voltage for the sweep and RF-IF chassis, and the high-voltage supply for the cathode-ray tube).

2a. Sync stabilizer chassis (containing automatic frequency control circuit).

3. The RF-IF chassis (containing both sound and video IF circuits, video amplifier, RF input system).

4. The AM tuner chassis (containing the tuning unit for AM reception).

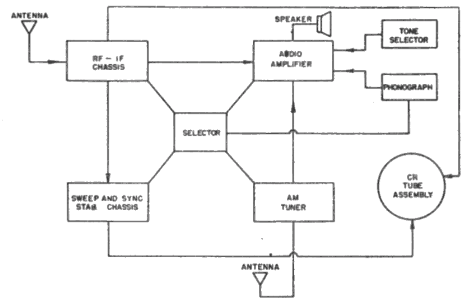


Figure 1. Block Diagram of RA-101 Receiver

5. The tuning meter assembly. (The Tele-FM tuning meter plus the cable connecting it to the RF-IF chassis.)

6. The tone selector assembly (consisting essentially of a push button switch and the tone control attenuators).

7. The service selector switch assembly (consisting of a push button switch system).

8. Record changer assembly (containing the complete assembly of motor, turntable, pick-up arm and changing mechanism).

9. Cathode-ray tube assembly (consisting of the cathode-ray tube socket, cabling, focusing coil and deflection yoke).

A block diagram of the set showing the relationship of the various circuits is given in Figure 1.

2.0 DESCRIPTION OF CIRCUITS

2.1 AUDIO AMPLIFIER CHASSIS.

The audio amplifier assembly contains its own power supply furnishing sufficient output to operate the entire audio system and sound IF of the RF tuner. The amplifier section itself contains four tubes, namely: two tubes, Type 6SN7, V1 and V2, and two tubes, Type 6V6, V3 and V4. The audio amplifier is resistance coupled. V1 is a dual triode with both sections connected as voltage amplifiers in cascade. The sound volume control is in the input circuit of the first stage. The tone control is connected in the plate circuit of the second half of V1. The first half of V2 is another voltage ampli-

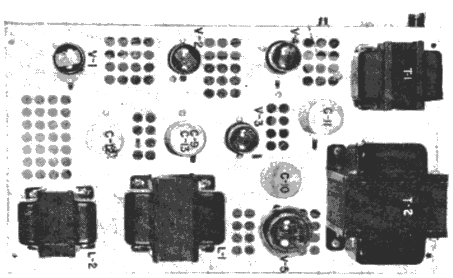


Figure 2. Audio Amplifier Chassis

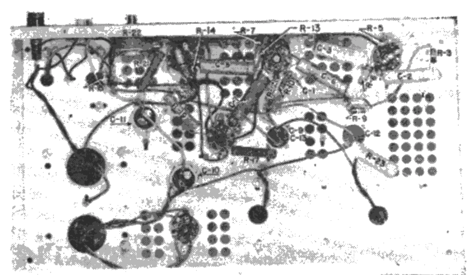


Figure 3. Audio Amplifier Chassis

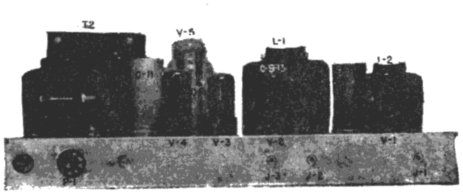


Figure 4. Audio Amplifier Chassis

fier which in turn feeds the second half of V2. The second half of V2 is the phase inverter containing balanced plate and cathode-loads from which the signal is derived to drive the two 6V6's, V3 and V4 in push-pull. The power supply on this chassis also furnishes B+ to the AM Tuner, the RF and Sound IF sections of the RF-IF chassis, and focusing current to the cathode-ray tube focusing coil. The Focus control is also on this chassis.

2.2 SWEEP CHASSIS.

The sweep chassis contains the power supply which furnishes both B+ and bias voltages to the sweep chassis and also to the video IF amplifier and the video amplifier on the RF-IF chassis. A negative voltage is also derived from this same power supply to furnish a negative bias voltage for both the sweep and RF-IF chassis. This low voltage power supply

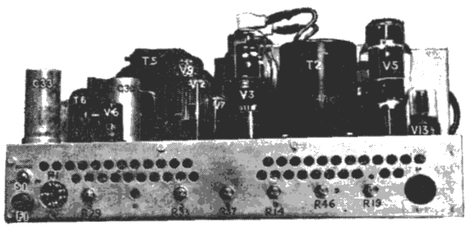


Figure 5. Sweep Chassis

contains two 5U4G rectifiers, V9 and V10, each of which is operated as a half wave rectifier to result in full wave rectification. A time delay relay in this power supply prevents B+ from being available for about 30 seconds.

The sweep chassis also contains the high voltage power supply. This power supply uses two Type 2X2 rectifiers, V11 and V12, which are connected to operate as a voltage doubler circuit. This voltage doubler furnishes high positive voltage to the anode of the cathode-ray tube. The sweep circuits on this chassis generate both the vertical and horizontal sweep voltages for the deflection yoke of the cathode-ray tube. A toggle switch on the chassis is available to shut off the high voltage at the convenience of the serviceman.

The sweep circuits are used to generate deflection voltages which when applied to the cathode-ray tube will cause the electron beam to scan across the face of the tube. The sweeps must be synchronized to those at the transmitter, and for that purpose, synchronizing pulses transmitted with the video signal are used.

The sync pulses are obtained from the video channel on the RF-IF chassis and fed to V2, the sync amplifier. The output from V2 drives the circuits in the sync stabilizer chassis.

SYNC STABILIZER CHASSIS

Four stages comprise the sync stabilizer chassis. The signal from the sync amplifier is clipped by V1, the clipper stage on the sync stabilizer. The three other stages on the sync stabilizer chassis comprise the "automatic frequency control" circuit The object of the "AFC" circuit is to obtain pulses for synchronization that are stable in frequency and phase and not affected by extraneous disturbances. The principle used is to originate the pulses by a local oscillator, whose frequency and phase are controlled by the incoming sync pulses. The oscillator output will then be used to pulse the sweep circuits.

The oscillator used is an electron coupled oscillator using a 6K6 tube. The oscillator is coupled to the phase discriminator by transformer coupling (T1). The sync pulses are fed to the center tap of the discriminator transformer from the clipper stage. With respect to the center tap, the sinusoidal oscillator output on the discriminator plates are 180 degrees out of phase. The pulse, being center fed, adds to both plates with the same polarity. When the oscillator frequency is in adjustment, the pulse rides the sine wave at the 180 degree point in its cycle. See Figure 7. During one-half the cycle, one section of the dual diode will conduct, and during the second half of the cycle, the other section of the diode will conduct. The output voltage across the diode load will be the same in magnitude throughout the cycle, since the magnitude of the voltage on each plate is equal during each diode's conduction period. If the oscillator frequency changes, the pulse will no longer ride the mid-point of the wave. See Figure 7. Now the pulse voltage adds to the sine wave voltage on one plate while it subtracts from the voltage on the other plate. Thus during the cycle, the magnitude of the output voltage will change. A bias of -1.5 volts is applied to the cathode circuit of the diode. Since this voltage supply has no d-c return path to ground in the diode cathode circuit, no current will flow and the 1.5 volts will be applied equally to both cathodes. The output voltage of the diode stage will add or subtract from the -1.5 volts. The -1.5 volts are used to bias the "reactance tube" V4 through the diode lead.

There is, therefore, a d-c voltage that is constant for proper oscillator frequency, but changes when the oscillator frequency is not correct. The voltage is fed to the grid of the "reactance tube" (V4). Output from the oscillator is fed to the cathode of the reactance tube through C10, a .01 μf capacitor. This capacitor causes a phase shift of the signal. Depending upon the voltage on the grid of the reactance tube, the output

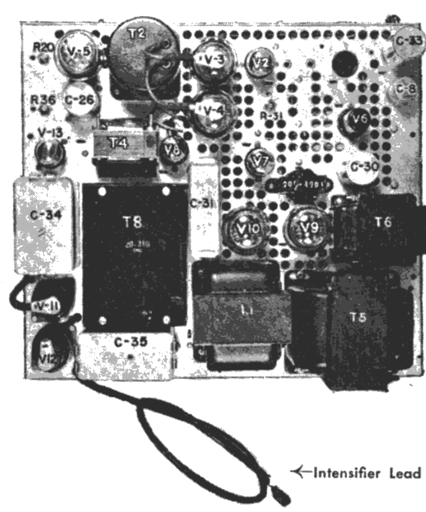
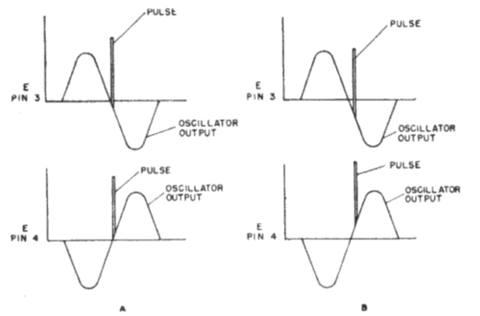


Figure 6. Sweep Chassis



7(a) Oscillator Synchronized to Pulse Frequency **7(b) Oscillator Not Synchronized to Pulse Frequency**

Figure 7. AFC Diagram

impedance of the reactance tube will be of a certain inductive value. Changes in the oscillator frequency or phase with respect to the pulse frequency will cause different values of voltage on the reactance tube grid and therefore vary the inductive output impedance of the tube.

By coupling the reactance tube across the oscillator coil, the oscillator frequency will vary in such a manner as to correct its deviation from the proper value. The oscillator is thus synchronized to the pulse frequency.

There is a filter circuit between the discriminator and the reactance tube (C12, R17 and C11). Any irratic pulses or disturbances are by-passed to ground by the filter, and therefore will not affect the operation of the sweeps. The oscillator output is a distorted sine wave which, when differentiated, will give a pulse output. The differentiating circuit used is C6, C7, R9 and R10.

The signal from the plate of the electron coupled oscillator is then fed to the second half of V2, a Type 6SN7, which is connected as a driven sweep generator (sometimes called a sawtooth wave generator). The signal from the sweep generator is then fed to the grids of the horizontal deflection amplifiers, two tubes Type 807. These tubes are V3 and V4, which operate in parallel to drive the horizontal output transformer T2. Because of the relatively high frequency components present in the horizontal sweep signal, it is necessary that the primary of this output transformer have relatively few turns compared to the vertical deflection amplifier in order to keep the distributed capacitance within the transformer to a minimum. Also, much more power must be delivered to the horizontal deflection coils due to greater energy losses. Thus it is necessary to supply more current and power to the horizontal output transformer than to the vertical.

The horizontal damping tube, V5, is a 6AS7. This tube is a dual triode which is connected across the output of the horizontal output transformer. The function of the horizontal damping tube is to eliminate the oscillation which occurs from an overshoot on the sawtooth voltage. The horizontal sweep signal is fed to the deflection yoke. Horizontal positioning is obtained by means of a potentiometer which injects a portion of the bias voltage into the secondary of the horizontal output transformer.

The vertical sync amplifier, V6, is a 6SJ7. This tube amplifies the vertical sync signal and transmits it to one of the windings of the vertical blocking oscillator transformer. The vertical blocking tube oscillator consists of one-half of V7, a Type 6SN7. This blocking tube oscillator triggers the sweep generator which is the second half of V7. The vertical sweep signal from the sweep generator is fed to the vertical deflection amplifier which consists of another 6SN7 with both halves operating in parallel. The vertical deflection amplifier drives the primary of T4, the vertical output transformer. Because the vertical sweep operates at a low frequency of 60 cycles (distributed capacitance has much less effect than at 15,750 cycles), it is possible to use more turns of wire in T4 and thus obtain the same number of ampere turns as used in the horizontal output transformer, and drive the primary of T4 with less current. Thus, a 6SN7, operated in parallel, will furnish sufficient current as a deflection amplifier to operate the vertical output transformer. Vertical positioning is obtained by means of a potentiometer, which injects a portion of the bias voltage into the secondary of the vertical output transformer.

The beam control amplifier, V13, is also on the sweep chassis. This amplifier is a dual triode, Type 6SN7, which receives the signal from the vertical output transformer on one grid and a signal derived from the horizontal output on the other grid.

One-half of this tube is normally conducting and the other half is normally cut off. If either of the sweeps fail, the half of the dual triode which is conducting becomes non-conducting. Since the solenoid of the relay is connected in series with the plate of the normally conducting half of the tube, the relay contacts are allowed to open. The opening of these relay contacts applies a positive voltage to the cathode of the cathode-ray tube, thus cutting off the beam of the cathode-ray tube, and preventing a stationary bright spot or line from appearing on the screen if the sweep should fail.

2.3 THE RF-IF CHASSIS.

The RF tuning assembly is the complete input system for the Du Mont Teleset. It consists of three separate variable inductors (the Du Mont Inputuner) which cover the range of 44 to 216 megacycles without band-switching. In the Du Mont input system are the tubes V1, V2, and V9. V1 and V9 are type 6J6 tubes and V2 is a Type 6AK5; V1 is an RF stage; V9 is the local oscillator, and V2 is the mixer.

The output of the RF section is the intermediate frequency of the Teleset. This intermediate frequency differs, however, from the normal AM receiver in that it is a *band* of frequencies which contains both video and sound signals. The video and sound IF signals can be separated because they occur at different frequencies due to the fact that they were transmitted on separate carriers, 4.5 megacycles apart. The sound IF is separated from the video signals by means of a sound trap and is impressed on the grid of the first sound IF stage. The sound IF amplifier is a three-stage amplifier consisting of V3, V4 and V5, which utilize Type 6BA6 tubes. After passing through the sound IF amplifiers, the sound IF signal passes through the two limiter stages, V6 and V7, which are connected in cascade. These tubes remove amplitude modulation from the FM signal. The output of the second limiter is coupled to the discriminator tube by means of the discriminator transformer. The discriminator, V8, is a 6AL5. This is a typical discriminator circuit for removing the modulation from the intermediate frequency and is so tuned that its output is zero volts, at exactly 21.9 megacyles. The voltage output of the discriminator is a varying DC voltage whose magnitude is dependent upon the deviation of frequency of the sound IF signal from the center value of 21.9 megacycles. The FM teletuning meter is connected to one of the cathodes of the discriminator and registers zero when the FM or television station being received is properly tuned. The output of the discriminator is the audio signal which is fed to the audio amplifier, which in turn drives the speaker.

The tuned circuit in the plate of the mixer tube, V2, is tuned to have a band pass between 21.5 and 26.4 megacycles.

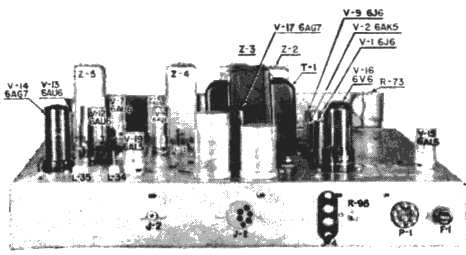


Figure 8. RF-IF Chassis

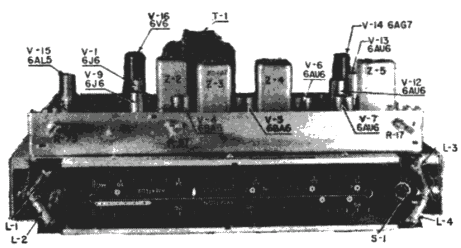


Figure 9. RF-IF Chassis

The sound IF frequency is picked off prior to the tuned circuit and the video IF frequency passes through to the grid of V10, the first video IF amplifier. Two sound traps are located, one between the first and second video IF stages and the other between the second and third video IF stages. These sound traps prevent the sound IF signals from passing through the video IF amplifier and causing interfering patterns in the picture. In all there are five video IF stages in the Model RA-101. These five stages consist of V10, V11, V12, V13, and V14. All of these stages employ the same tube type, a 6AU6, with the exception of V14, which uses a 6AG7. The video IF stages utilize special coupling circuits to provide a band pass of 4 megacycles. The output of the fifth viedo IF stage feeds V19, the video detector. V19 is a 6AL5 which is connected as a half wave diode detector. The output of the video detector feeds the first video amplifier, V17, a 6AG7. V17 in turn feeds V16, a 6V6, connected as a cathode follower output. The output of V16 is coupled directly to the control grid of the cathode-ray tube. However, V15, the DC restorer and sync clipper is connected across the output.

The DC restorer and sync clipper consists of a single tube, V15, a 6AL5. One-half of this tube operates as the DC restorer and the other half as the sync clipper. The signal is taken from the plate of the sync clipper and fed to the sweep chassis as composite sync.

There are a number of other components also located on this chassis. These items are enumerated below:

1. The Contrast Control, which effectively is the same control on the video signal as the volume control is on the audio signal, varies the output of the video IF amplifier by varying the negative bias voltage applied to the grids of the first two video IF amplifiers.

2. The Picture Brightness Control is located on this chassis. It is used to set the intensity level of the background of the picture.

3. Because the Picture Brightness Control is located on this chassis, it is also convenient to place the relays for the sweep failure protection circuit for the cathode-ray tube on this same chassis.

4. The Sound Volume Control is also located on this chassis to consolidate all controls on a single chassis, and is connected by cable to the audio chassis.

5. The motor for driving the pointer on the FM teletuning dial, the magnetic clutch, and the hand vernier tuning mechanism, all of which are used in conjunction with the inductuner, are also included on this chassis, thus consolidating all front panel controls on one chassis.

6. The Grid Drive Control—which adjusts the cathode-ray tube grid sensitivity.

2.4 THE AM TUNER CHASSIS.

AM tuner chassis, which is employed in the Model RA-101, consists essentially of four major sections. The RF amplifier is a tuned RF stage which feeds a 6SA7 converter. The 6SA7 serves the function of both oscillator and mixer to convert the RF signal to an intermediate frequency of 456 KC. This chassis contains one IF amplifier, a 6SK7, which in turn feeds a 6SN7. One-half of this tube acts as a diode detector and the other half as a cathode follower output. This chassis contains its own heater transformer but B+ is supplied to it from the audio chassis.

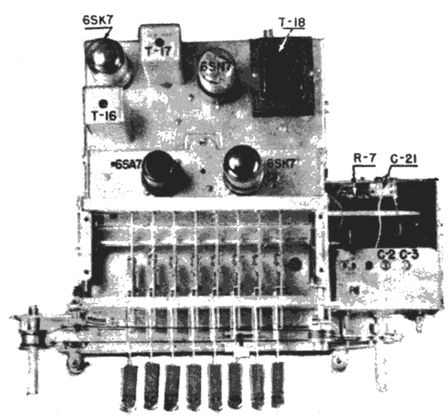


Figure 10. AM Tuner

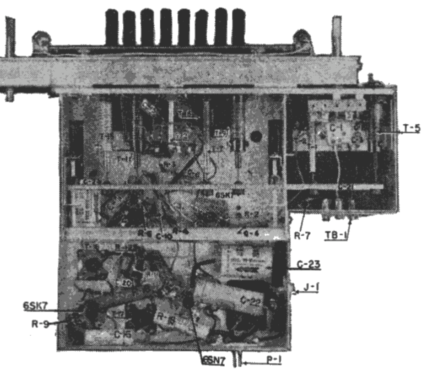


Figure 11. AM Tuner

2.5 THE TONE SELECTOR.

The Tone Selector is a separate assembly with five different RC circuits connected for varying the quality of the audio signal. This separate assembly is located directly behind the bezel for the teleset.

2.6 THE SERVICE SELECTOR.

The Service Selector is a push-button switch assembly which connects both AC and DC circuit voltages to the proper units depending upon the service selected, and switches the output of the three different chassis to the input of the audio amplifier.

2.7 RECORD CHANGER.

The Record Changer, as previously stated, is a Webster Model 70 in both the Westminster and Hampshire cabinet styles. In the Sherwood, Devonshire, Revere and Plymouth cabinet styles, the Webster Model 56 is used. The output of the record changer is fed to the audio amplifier chassis through the service selector switch. Since the output from the record changer does not have a flat frequency response, the high frequency end of the response curve must be attenuated. This attenuator and de-emphasizing circuit is an RC network which is placed in parallel with the signal from the record changer and is mounted on a bracket at the rear of the unit.

2.8 THE CATHODE-RAY TUBE ASSEMBLY.

The Cathode-ray Tube for the Westminster and Hampshire cabinet styles is the Du Mont Type 20BP4. It is mounted in a cradle which may be raised by a mechanical driving mechanism to place the tube in viewing position. The same tilt-mechanism which is controlled by a switch on the lid, lowers the tube when it is not in use. The cathode-ray tube, its focusing coil, and its deflection yoke are all mounted in position so that they cannot shift in this cradle.

The cathode-ray tube used in the Sherwood, Devonshire, Revere, and Plymouth cabinet styles is the 15AP4. This tube is mounted in a fixed position in the cabinet and contains no tilt-mechanism. The focusing coil and deflection yokes are fixed in their respective positions on the neck of the tube.

3.0 INSTALLATION

Installations, at the present state of the television art, are of the utmost importance. Customer satisfaction will depend entirely upon a well made installation. The best teleset manufactured is not capable of improving upon the signal presented to it by its antenna. The consumer is not technically educated enough to appreciate the difficulties involved in obtaining a clean picture in our urban areas. He will judge the television industry by the picture presented to him in his home. No amount of explanations or apologies will offset the unfavorable impression created by a noisy, blurry, jumpy picture.

Remember also, that a teleset purchaser will remain a teleset owner, only as long as he is able to enjoy the entertainment provided by the art. A rejected and returned teleset will not improve a dealer's net profit. It, therefore, is important for the service or installation man to bend every effort to make a good installation when a teleset is sold, not only for his own immediate profit, but also for the good of the art as a whole. The mortality will be high among servicemen attempting to profit from television installations. The field is complex and demanding of perfection. Only those who have firmly grasped and assimilated the necessary techniques and principles, will survive the competitive era now approaching. The following installation data is not complete. To be of value to a practicing serviceman it should be amplified by study and experimentation on his part.

3.1 THE PRESALE SURVEY.

When an installation is contemplated, make a complete survey before starting any permanent work. This will assure the prospective teleset owner of good reception before he buys. It will also enable the dealer to avoid a great deal of expense and trouble if conditions prove impossible at the proposed location.

To make a survey the following equipment is required:

1. A portable, sturdy television receiver.
2. A sectional mast or pole, which can be extended to 20 or 25 feet.
3. A portable antenna kit, which can be easily assembled into several simple directive arrays.
4. A set of tuned dipoles to receive each station and reject all others.
5. Lengths of co-axial and/or parallel lead-in equipped with connectors.
6. Lengths of A.C. power lines, equipped with connectors.

Select a temporary position for the antenna, bearing in mind the requirements for a clean signal. Connect the antenna to the receiver and examine the resulting picture.

If the picture is satisfactory on all stations available, orient the antenna for maximum signal strength, and note the location so determined. A permanent installation may then be made.

Should the location prove to be poor, one or more picture defects will be evident. Various remedies should be applied until a clean picture results. A permanent installation can then be made. The advantages of the survey method should be self-evident. Trying out different antennas and antenna positions in permanent form is not only difficult but almost impossible.

RECORD CHANGER: Webster Model 56, TV RCD.CH. p. 1-1
RECORD CHANGER: Webster Model 70, TV RCD.CH. p. 1-10

3.2 ANTENNA AND LEAD-IN.

The antenna which is recommended for use with a Du Mont teleset is known as the Cosgrove Antenna. This antenna has been designed for Du Mont telesets in accordance with Du Mont specifications. It is a wide band antenna so that it picks up almost equally well all signals between 44 and 216 megacycles. The impedance of the antenna is 72 ohms and the lead-in from this antenna to the set, therefore, must be made with 72 ohm cable. Thus the antenna and lead-in system is matched to the input impedance of the receiver which is also 72 ohms. Since the input system of the Du Mont teleset is unbalanced, the inner conductor of the 72 ohm co-axial cable is connected to the input terminal and the shield is connected to ground.

3.3 REFLECTIONS.

Reflections are exactly what their name implies. Any surface which is at the correct angle to the transmitting and receiving points, will provide an additional, reflected, signal path.

This reflected signal will be accepted by the receiver, and will be presented on the viewing screen, along with the direct signal. However, there will be an appreciable time and phase difference between the two signals and they will not coincide on the viewing screen.

If the reflected signal is of equal or approximately equal amplitude to the direct signal, it will affect the synchronization stability (horizontal line displacement) of the receiver and may make it impossible to attain correct sweep synchronization. If the time difference is negligible or very small, no obvious ghost will be seen. However, it will be present, and will evidence itself by blurring the outlines of whatever picture is presented on the screen. Remember also that reflection conditions may change, with every change in atmospheric humidity, so that an erratic and unstable picture may result as the reflection strength changes. The usual reflection will appear on the screen as an offset, duplicate of the pattern being viewed. The amount of offset is proportional to the difference in signal path lengths.

The reflection problem can only be solved by proper selection of antennas and their orientation and directivity. The antenna must be directive enough to accept the direct signal from the desired transmitter. It must also discriminate against reflections received from different directions. It is frequently possible to achieve this result by rotating a single dipole. Usually, however, more antenna directivity must be used. This is accomplished by adding reflectors to the dipole or using a directive antenna such as the "V" or rhombic.

On occasion a complex type of ghost will be encountered due to multiple reflections. This may result in a reflection being received from the same direction as the direct signal, in which case, antenna directivity will not reduce the reflection.

The only recourse for this condition is to attenuate the composite signal until the reflection is below the noise level. The direct signal will probably still be strong enough to be usable. If not, nothing else can be done, except to tolerate it or to add a special antenna and the RF matching stage. If it is impossible to eliminate ghosts on all stations with a single antenna, multiple antennas with a switching arrangement or a matching amplifier can be used. Each antenna should be adjusted for best response on a single station.

3.4 NOISE.

Signal to noise ratio is dependent upon both the strength of the received signal and upon the level of the local noise. If the ratio is too low the picture will be unusable. High peak pulse noise also may trigger the sweep circuits and make the picture unusable.

If the signal is weak, normal atmospheric and set noise will be high enough in comparison to the signal to have the same effect as a high level of local noise.

If the local noise level is high, only an extremely strong signal will overcome it. In this type of situation only by removing the source of local noise will an acceptable picture result. Many types of apparatus will cause appreciable noise in a given locality. Electric motors, neon signs, automobiles, household appliances will all radiate interfering noises if too near the teleset antenna.

Random noise, atmospheric or set, will evidence itself as light and dark spots in the picture. From a distance, the effect resembles a snow storm.

Pulse type noises, from motors, automobiles, etc., will create streaks or "tear out" across the picture. This type of noise may also trigger the vertical sync circuits and cause the picture to skip a frame or so (roll up or down).

The noise problem may be attacked from two angles. One is to endeavor to increase the signal pickup while attenuating noise. Often this can be accomplished by using a high gain, directive antenna. Anything done to increase signal strength will raise the signal to noise ratio; shortening the lead-in, using lower loss lead-in, or elevating the antenna, are effective.

Moving the antenna out of the direct noise field, even at the expense of increasing lead-in strength, is often beneficial. If the signal strength is extremely low, recourse might be had to a long wire "V" or rhombic antenna .

In regard to signal strength level, remember: that beyond approximately 50 miles from the transmitter, receiving conditions will be very poor. If beyond "line of sight" from the transmitter, usually nothing much can be done to secure reliable reception; however, some installations have been known to work satisfactorily.

The second method of attack on the poor signal to noise ratio problem is to eliminate noise at its source. The source of local noise should be determined and remedies applied to reduce or eliminate it. Electric motors, diathermy, neon signs, elevators, household appliances are all susceptible to proper filtering, bonding or shielding.

3.5 INTERFERENCE AND FADING.

A variety of different types of signals will create visual interference on the viewing screen. Ultra short wave diathermy or harmonics of short wave diathermy apparatus will seriously interfere with good reception of the picture. The interference will appear as one or two dark bands moving slowly up or down the screen, if the signal is strong. A weak diathermy signal will appear as bands of cross hatch or herring bones, moving up and down the screen. If the diathermy is extremely strong, the sweeps will lock in on it instead of the picture. In this case a stationary type of interference will result, while the picture will move through the background.

Harmonic or image signals of different services will also affect the picture. The type of interference seen will vary as the modulation on the interfering signal varies. Usually it will consist of alternate dark and light lines, moving vertically or horizontally, changing in width, number, and speed, as the audio modulation on the interfering signal changes. An unmodulated carrier will cause a herring bone or spotty type of interference all over the screen area.

Interference caused by signals from other television and FM stations at the image frequency of the teleset, can be eliminated with wave traps. A tuned circuit, resonating to the image frequency of the interfered with television station, will usually eliminate this type of interference. The trap can be a parallel circuit placed in series with the ungrounded side of the lead-in. Or, it can be a series circuit placed across the lead-in. All traps should be located as close as possible to the antenna terminals of the teleset. Traps will not be effective if interference is being received at the desired tele-station's frequency. In such a case, the antenna, if directive, can be oriented to discriminate against the interference. Or, the combined interfering and desired signal can be attenuated until the interfering signal is too weak to cause trouble. This will, of course, be ineffective if the interference is as strong as, or stronger than, the desired signal. Harmonics of lower frequency services, diathermy, and other teleset local oscillators, will cause the types of interference mentioned above.

Fading will cause the picture to become alternately stronger and weaker. As the signal becomes stronger, the picture will lose detail and contrast, and become "soft," or "mushy." When the picture signal becomes weak, the picture seen will fade into the background noise. It will also lose synchronism and either skip a vertical frame or tear out horizontally.

Fading is normally the result of wave addition and subtraction between reflections and direct signals. Or, of varying propagation conditions due to reception beyond the reliable service area of a given transmitter. Nothing much can be done to eliminate this condition. Antenna gain and directivity will help. But if conditions at the receiving location are such that severe fading occurs, it usually must be tolerated.

4.0 MAINTENANCE AND ADJUSTMENT

4.1 SAFETY PRECAUTIONS.

Before attempting any sort of servicing or adjustment it is imperative that the serviceman bear in mind certain safety precautions.

HIGH VOLTAGE PRECAUTIONS

1. The high voltage applied to the accelerating electrode is 12,000 volts and contact with it can cause severe burns or even *DEATH.*
2. *Always* turn OFF the high voltage switch on the sweep chassis before doing any work on this chassis.
3. *Always* turn OFF all power, and remove the power plug from wall receptacle before removing any chassis from the cabinet.
4. *Always* make adjustments with only *one* hand.
5. *Always* turn OFF all power before soldering or making connections.

CATHODE-RAY TUBE PRECAUTIONS

1. *Do not* bump the tube against hard objects.
2. *Do not* use tools near the tube.
3. *Always* wear safety goggles and gloves when handling the tube.
4. *Always* stand the tube on its face on a thick piece of felt in a protected place if it is removed from the cabinet.
5. *Always* replace a tube if it becomes scratched and return it to the factory for a pressure test.

4.2 ADJUSTMENT OF CONTROLS.

Normal operating procedure should be followed. See operating instruction manual. If satisfactory results are not acquired, then further adjustments should be made as outlined below. If required results are still not obtained, a diagnosis should be made to locate the trouble.

A. LOCATION OF CONTROLS

Control	*Chassis*	*Designation*	*Location on Chassis*
Sensitivity	RF-IF	R96 (Fig. 8)	Rear-Left
Focus	Audio	R22 (Fig. 3)	Rear-Left
Vert. Hold	Sweep	R29 (Fig. 5)	Rear-Left
Vert. Size	Sweep	R33 (Fig. 5)	Rear-Left
Vert. Linearity	Sweep	R37 (Fig. 5)	Rear-Center
Vert. Positioning	Sweep	R36 (Fig. 6)	Top Front
Hor. Peaking	Sweep	R14 (Fig. 5)	Rear-Center
Hor. Linearity	Sweep	R46 (Fig. 5)	Rear-Right
Hor. Size	Sweep	R31 (Fig. 6)	Top-Center
Hor. Positioning	Sweep	R20 (Fig. 6)	Top-Rear
Hor. Damping	Sweep	R19 (Fig. 5)	Top-Rear
Hor. Frequency	Sync. Stabilizer		Top of Phase Discriminator Transformer
Hor. Phase	Sync. Stabilizer		Bottom of Phase Discriminator Transformer

All other controls are on the control panel and are marked.

B. ADJUSTMENT OF CONTROLS

1. Sensitivity Control Adjustment (should not be touched except when cathode-ray tube is changed).
   a. Press the "Tele" button on the service selector switch.
   b. Increase brightness for raster appearance.
   c. Decrease brightness until raster just fades out.
   d. Check voltage on cathode of cathode-ray tube. If the voltage is less than 45 volts, this adjustment is correct. If the voltage is greater than 45 volts, turn sensitivity control full clockwise, increase brightness until 45 volts are obtained and then turn sensitivity control for disappearance of raster.

For test patterns see back of Manual

2. Turn up contrast control for image, and adjust the focus control for a clear picture.

3. If the picture is tilted, adjust the yoke on the neck of the cathode-ray tube. Loosen both top and bottom screws to turn yoke. Be certain that the set is turned off. Remember, contact with the high voltage may be lethal.

4. Increase brightness more than usual, and adjust vertical hold control if necessary.

5. When horizontal adjustment is necessary the following procedure should be followed:

a. Turn the screwdriver adjustment (horizontal frequency adjustment on phase discriminator transformer) until the test pattern or picture comes into sync.

b. Turn clockwise until the test pattern falls out of sync, then back off until it pulls in again. Note the position where "pull in" occurs.

c. Continue rotating counterclockwise until the test pattern falls out of sync again. Then turn clockwise until it pulls in. Note the position of the control for this second pull in point.

d. Set the adjustment half way between the two "pull in" points.

6. Adjust phase control for proper blanking and sync pulse, if necessary. Then readjust frequency as outlined above.

7. Set the vertical linearity, size and positioning controls for a good pattern.

8. Set the horizontal controls for good linearity, as well as for size and positioning.

EFFECTS OF CONTROLS ON LINEARITY

Control	*Effect on Pattern*
Hor. linearity	Flattens and expands pattern on right side.
Hor. peaking	Flattens and expands both sides, but affects left side more.
Hor. damping	Flattens and expands left side of pattern.
Vert. linearity	Flattens and expands top side of pattern.

4.3 TROUBLESHOOTING PROCEDURE.

Although much information can be given for diagnosing trouble in the Telesets, the information is of a general nature. The nature, location and repair of troubles must be analyzed by the repairman. This necessitates a good working knowledge of the circuits of the sets, as well as an understanding of television principles. It behooves the repairman to study teleset circuits as well as outside information on television.

Before attempting to repair a set, a diagnosis should be made to determine in what channel or circuit there is trouble. Remember that in 99% of cases only one trouble develops at a time. It is only a waste of time and effort to indiscriminately test circuits of a set when trouble occurs. The method to follow is by use of logic and symptoms to localize the trouble before testing. When the troublesome circuit has been localized, a tube check should be made for faulty tubes. A few examples of proper reasoning are presented below.

Assume that the following trouble is evident: No picture can be obtained, but sound is operating. First of all, it can be assumed that the Inputuner is operating correctly. If it weren't, the sound channel would not be operating. Turn the brightness control clockwise. If a raster appears, the sweep circuits must be operative. The trouble has been localized to the video channel. The repairman can now test the video channel.

If when the brightness control is advanced, no raster appears, the difficulty can be in either the sweep circuits or the high voltage power supply. A failure of either sweep circuit will cause excessive bias on the cathode-ray tube and cut it off. Check the voltage on the cathode of the cathode-ray tube. If it is excessive, a failure of sweep is indicated. If it is normal, a failure of high voltage is indicated. Thus, the trouble has been localized to either the sweep or high voltage circuits.

Another condition is that there is picture, but no sound. Check the action of the tuning meter. If it is operating correctly, the trouble is in the audio amplifier. If it is not, the trouble is in the sound IF channel. This assumption comes from the fact that the tuning meter operates from the sound discriminator. Again, it can be assumed that the Inputuner is operating correctly since the picture is being received.

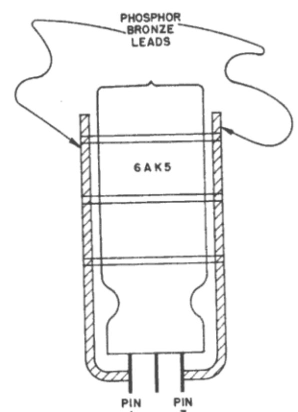


Figure 12(a). 6AK5 Adapter Tube

If the receiver is completely dead (no picture, no sound), check the input power, input power cords and interlock (safety) switches. The antenna lead-in cable or the Inputuner may be bad. If these checks do not reveal the trouble, the low voltage power supply outputs should be checked. In case of Inputuner difficulties (aside from bad tubes), the entire unit should be removed and sent back to the factory.

If the sound channel is operating correctly, and the picture alone is distorted, an analysis can be made by merely viewing the screen of the cathode-ray tube. Such faults as too strong a signal, too weak a signal, outside interfering signals, excessive ripple, distortion and phase shift, can be viewed on the screen. Once recognized as specific faults, corrections can be made. The procedure to follow then is:

1. Analyze symptoms.
2. By reasoning, localize trouble to possible channels.
3. By tests, locate actual channel.
4. By further tests, find and correct trouble.

Normal signal tracing methods of testing is recommended for the audio amplifier and the sound channel. For the video channel, response curves can be checked by using a wobbulator and an oscillograph. For the sweep channel, waveforms can be viewed and checked against those given in section 4.5.

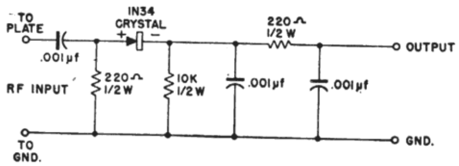


Figure 12(b). Probe Detector

4.4 REQUIRED TEST EQUIPMENT

VACUUM TUBE VOLTMETER—20,000 ohms-per-volt voltmeter with ranges approximately 0 to 5 V, 0 to 10 V, 0 to 100 V, 0 to 500 V.

CATHODE-RAY OSCILLOGRAPH—Du Mont Type 208-B recommended for RF-IF alignment, and audio amplifier servicing. Du Mont Type 224-A or Type 241 for troubleshooting sweep chassis.

SIGNAL GENERATORS—

(1) FM Signal Generator—This is a wobbulator-type signal generator whose center frequency ranges from 20 to 30 megacycles with a sweep width of ±5 megacycles (adjustable). The voltage output of this generator should be 0.1 volts.

(2) RF Signal Generator—With amplitude modulation available. RF range from 20 megacycles to a minimum of 60 megacycles. The RF signal must be adjustable to within 10 kc with a calibrated attenuator on the output.

(3) Audio Signal Generator (for Checking Audio Amplifiers).

TRAVELING DETECTOR—This is a crystal detector mounted in a probe assembly to enable IF stages to be aligned stage-by-stage. (See Figure 12b.)

6AK5 ADAPTER TUBE—See Figure 12a.

OPTIONAL TEST EQUIPMENT

VIDEO SWEEP GENERATOR—Output varies from 0 to 6 megacycles.

VOLTAGE CALIBRATOR—Du Mont Type 264-A recommended for use in measuring peak-to-peak voltages.

SQUARE WAVE GENERATOR—For servicing audio and video amplifiers.

4.5 SWEEP WAVEFORMS.

Sweep waveforms are given in Figure 16. Waveforms were taken with the following control settings:

Line Voltage	—115 volts a-c
Horizontal Damping Control	—Full counterclockwise
Horizontal Linearity	—Full clockwise
Horizontal Peaking	—Full clockwise
Vertical Linearity	—Full counterclockwise
Vertical Size	—Full clockwise
Horizontal Size	—Full counterclockwise
Vertical Hold	—Set to lock picture
Positioning Controls	—Normal setting

5.0 CUSTOM MODEL

The circuits of the custom model are identical to all other RA-101 models. The chassis are mounted in a rack as can be seen in Figure 13. A 20-inch cathode-ray tube is mounted in a separate rack. Two 12-foot cables are provided for connecting the cathode-ray tube and the speaker to the chassis on the main rack. Cabling may be as long as 35 feet, depending upon individual requirements. No record player is included in this model.

5.1 INSTALLATION.

1. SELECT THE PLACE OF INSTALLATION TO CONFORM WITH THE FOLLOWING REQUIREMENTS AND LIMITATIONS.

(a) The cathode-ray tube should be placed so it may be viewed by the greatest number of people with a minimum rearrangement of the room furnishings.

(b) The cathode-ray tube should be placed sufficiently high so that its view is not obstructed by the normal movements of people in the room.

(c) The speaker should be placed sufficiently high to overcome interference from normal floor noise.

(d) The control panel should be convenient to *authorized* operating personnel, but out of reach of meddlers.

(e) The room or hall into which chassis rack and the cathode-ray tube mounting rack extend should be well ventilated and free from dust and fumes.

2. POWER REQUIREMENTS.

(a) The Custom Model Teleset requires an A-C power source of 115 volts 60 cycles from which it draws approximately 5 amperes for Television operation.

(b) It is recommended, that power be supplied from a special power line direct from the meter.

3. WALL CUT-OUTS.

(a) The wall cut-out for the speaker is a circle 12-1/4 inches in diameter.

(b) The wall cut-out for the cathode-ray tube is a square 22-1/4 by 22-1/4 inches.

(c) The wall cut-out for the control panel is given in Figure 29.

(d) Note the special cut-out required for the control panel when the wall is greater than 2-1/2 inches thick. See Figure 29.

4. MOUNTING THE SPEAKER.

(a) Mount the speaker on its baffle (item 14).

Note

The speaker grill (item 15) may be mounted between the baffle and the speaker, or on the face of the baffle.

(b) Fasten the speaker and the baffle to either the front or the rear side of the wall as desired.

(c) If the baffle is fastened on the rear side of the wall, it will probably be desirable to mount the speaker grill on the front side of the wall over the speaker cut-out.

5. MOUNTING THE CATHODE-RAY TUBE.

(a) Remove the tube from its cradle and place it in a safe place.

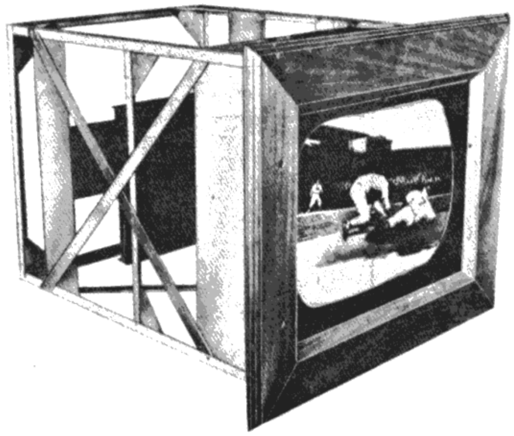


Figure 13(a). Cathode-Ray Tube Mounting for Custom Model

Note

EXERCISE EXTREME CARE IN HANDLING THE TUBE SO IT IS NOT SCRATCHED OR STRUCK.

DO NOT HOLD THE TUBE BY ITS NECK.

(b) Mount the tube cradle through the wall from the front side with the rubber-padded, tube-support bracket on the bottom. Fasten the cradle securely to the wall through the flange.

(c) Replace the tube in its cradle from the front side of the wall so that the face of the tube is flush with and resting on the rubber-padded support bracket.

(d) Place the tube frame assembly in position and secure it with the 4 mounting screws.

(e) Place the tube socket on the tube base.

6. MOUNTING THE CHASSIS RACK.

(a) Remove the knobs from the controls on the front panel, taking care that the position of each is noted.

(b) Remove the screws which hold the metal panel (item 4) and remove this panel.

(c) Remove the tuning meter plug from its jack on the RF-IF chassis.

(d) Remove the screws which hold the bezel panel (item 3) and remove this panel.

(e) Set the rack in position behind the wall.

(f) Loosen the 4 set screws which hold the RF-IF chassis and slide the chassis forward until it is flush with the front side of the wall.

(g) Replace the bezel and metal panels on the front side of the wall.

(h) Replace the tuning meter plug in its jack on the RF-IF chassis.

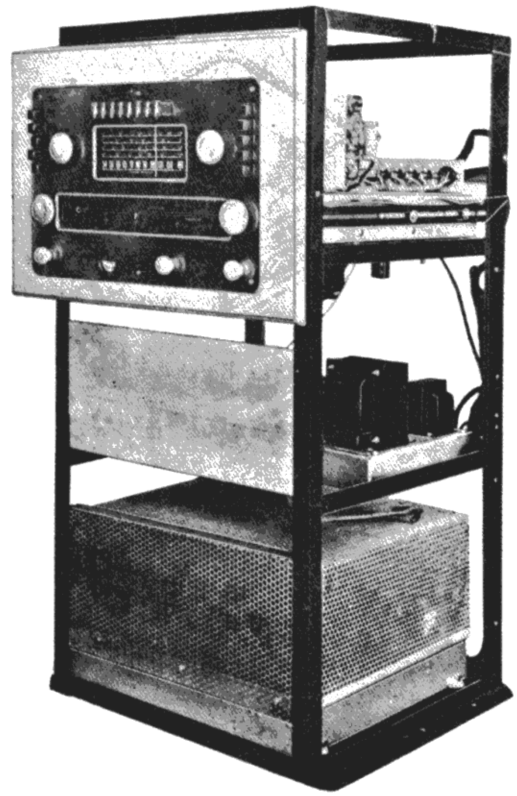


Figure 13(b). Main Rack for Custom Model

(i) Replace the knobs on the controls on the front panel.

(j) Tighten the set screws to hold the RF-IF chassis securely in position.

(k) Fasten the rack to the floor with screws through the mounting holes in the base.

7. FINAL ADJUSTMENTS.

(a) Connect the high voltage lead to the cathode-ray tube.

(b) Connect the cable from the cathode-ray tube into its jack on the sweep chassis.

(c) Connect the cable from the speaker into its jack on the main chassis.

(d) Check to be sure the cables between the AM tuner and the RF chassis are connected to the audio amplifier.

(e) Check to be sure the cables to and from the Tone Selector are connected.

(f) Be sure the interlocks on the sweep chassis are closed.

(g) Plug in the A-C plug and make certain that each of the facilities is operating properly.

MODEL RA-101

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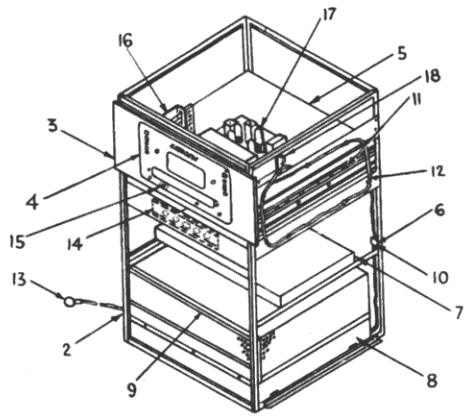


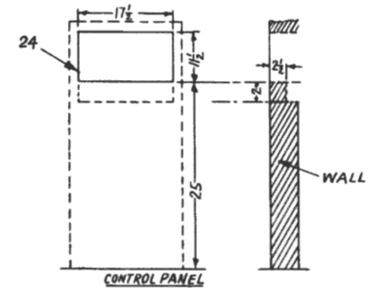
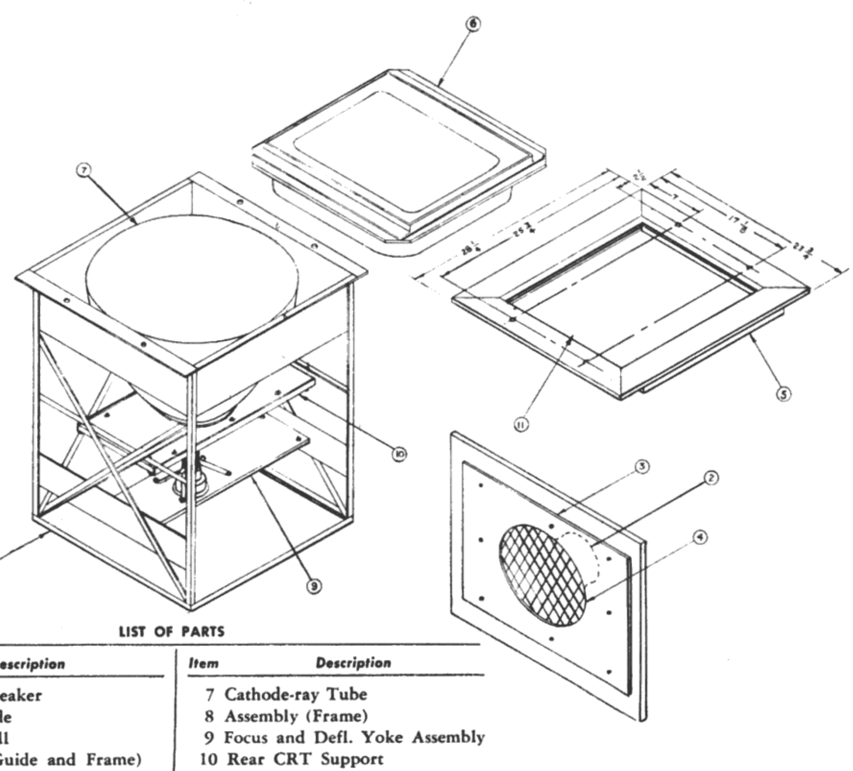


Figure 14.

Installation Diagrams for Custom Model

LIST OF PARTS

Item	Description	Item	Description
1	Assembly	9	H. V. Cover
2	Rack	10	A. C. Plug
3	Bezel Panel	11	Wall Thickness Adjustment
4	Metal Panel	12	Loop Antenna
5	RF and IF Chassis Modified for Custom Model	13	Intensifier Lead and Clip Assembly
6	Bracket (A.C. Plug)	14	Sync. Chassis Assembly
7	Audio Amplifier	15	Tuning Indicator
8	Sweep Chassis Modified for Custom Model	16	Tone Selector Assembly
		17	A. M. Tuner Assembly
		18	Service Selector



LIST OF PARTS

Item	Description	Item	Description
2	12" P.M. Speaker	7	Cathode-ray Tube
3	Speaker Baffle	8	Assembly (Frame)
4	Speaker Grill	9	Focus and Defl. Yoke Assembly
5	Assembly (Guide and Frame)	10	Rear CRT Support
6	Rubber Mask (CRT)	11	Safety Glass

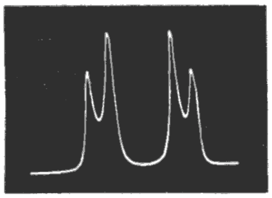


Figure 15-A
Oscillogram of the dual sound IF curve (untuned).

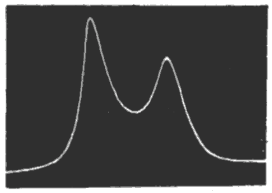


Figure 15B
Oscillogram of the single sound IF curve (untuned). This is the response curve appearing on the right of Figure 15-A after it has been expanded.

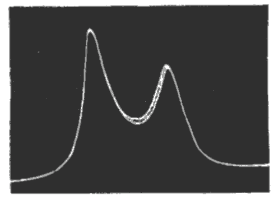


Figure 15C
Oscillogram of Figure 15-B with birdie at 21.9 mc.

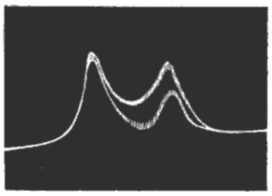


Figure 15-D
Ostillogram showing the effect of too much birdie.

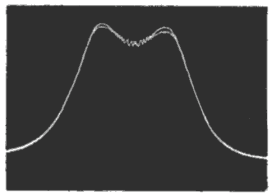


Figure 15-E
Properly tuned sound IF curve with birdie at 21.9 mc.

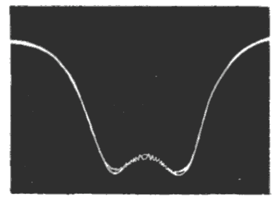


Figure 15-F
Sound IF curve obtained at the grid of the first limiter (properly adjusted). Birdie at 21.9 mc.

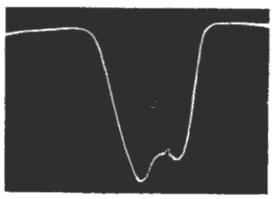


Figure 15-G
Oscillogram of overall sound IF response. (The improper alignment is due to the different amplitude of the signal now being applied to the grids of each stage.) (Birdie at 21.9 mc.)

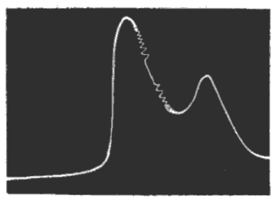


Figure 15-H
Oscillograph showing a slight amount of overload caused by too much signal from the wobbulated signal generator.

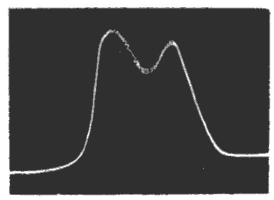


Figure 15-I
Oscillogram showing excessive overload caused by too much signal from the wobbulated signal generator.

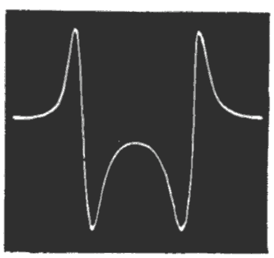


Figure 15-J
Double discriminator curve.

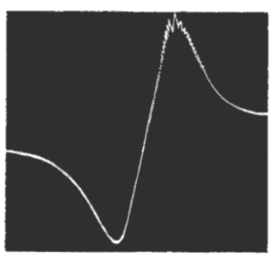


Figure 15-K
Single discriminator curve (expanded from double curve). Birdie at 21.9 mc.

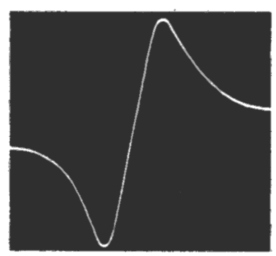


Figure 15-L
Properly aligned discriminator curve. Birdie at 21.9 mc.

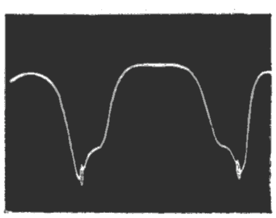


Figure 15-M
Video IF response curve: Wobbulated signal generator at the grid of V14. Oscillograph at the cathode of V16. Birdie at 26.4 mc.

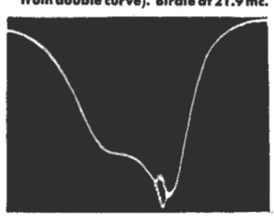


Figure 15-N
Same as Figure 15-M except that the sweep of the oscillograph has been expanded to obtain a single curve.

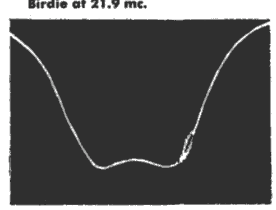


Figure 15-O
Same as Figure 15-N with L37 and L44 properly tuned (birdie at 26.4 mc.).

Figure 15. Alignment Waveforms

MODEL RA-101

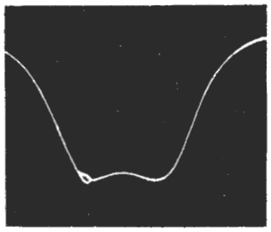


Figure 15-P
Same as Figure 15-O except that the birdie is at 22.4 mc.

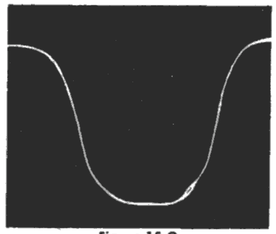


Figure 15-Q
Video response curve showing excessive overloading due to too much signal applied to the stage from the wobbulated signal generator.

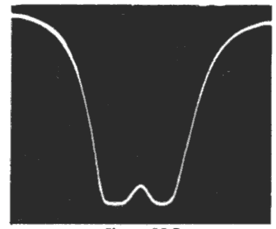


Figure 15-R
Video IF response curve showing slight overloading due to too much signal applied to the stage from the wobbulated signal generator.

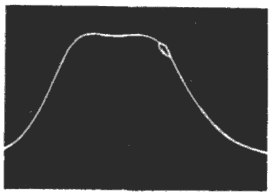


Figure 15-S
Video IF response curve: Wobbulator to the grid of V13 and the traveling detector to the oscillograph at the plate of V14. L34 and L35 properly tuned (birdie at 26.4 mc.).

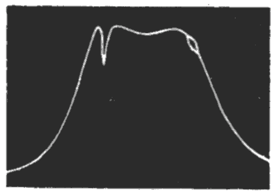


Figure 15-T
Video IF response curve: Wobbulator to the grid of V12 and the traveling detector to the oscillograph at the plate of V13. L31 and L32 properly tuned (birdie at 26.4 mc.).

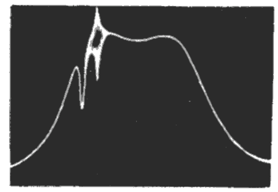


Figure 15-U
Sound trap much too low. Birdie at 21.9 mc.

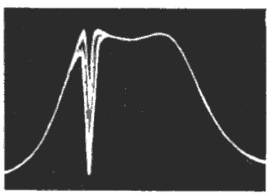


Figure 15-V
Sound trap properly set. Birdie at 21.9 mc.

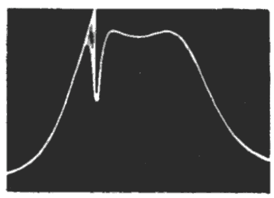


Figure 15-W
Sound trap slightly too high.

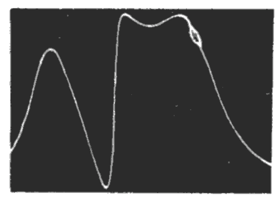


Figure 15-X
Video IF response curve: Wobbulator to the grid of V11 and the traveling detector to the oscillograph at the plate of V12. L27 and L28 properly tuned (birdie at 26.4 mc.).

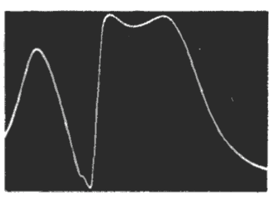


Figure 15-Y
Sound trap too low .

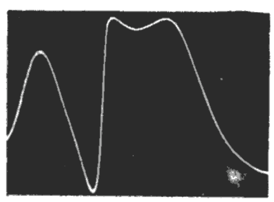


Figure 15-Z
Sound trap properly adjusted.

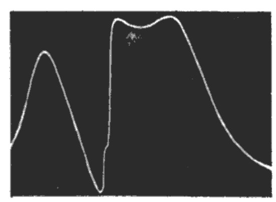


Figure 15-AA
Sound trap too high.

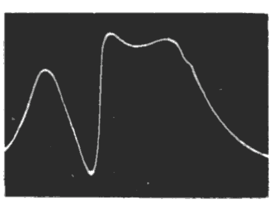


Figure 15-BB
Video IF response curve: Wobbulator to the grid of V10 and the traveling detector to the oscillograph at the plate of V11. L24 and L25 properly tuned (birdie at 26.4 mc.).

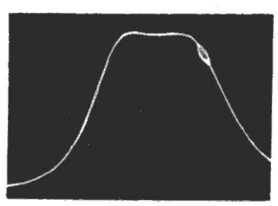


Figure 15-CC
Video IF response curve: Wobbulator to the grid of V2 and the traveling detector to the oscillograph at the plate of V10. L5 and L6 properly tuned (birdie at 26.4 mc.).

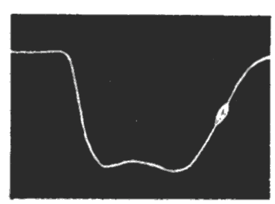


Figure 15-DD
Overall video IF response curve: Wobbulator to the grid of V2 and the oscillograph to the cathode of V16. The birdie at 26.4 mc. is 50% down on the curve.

Figure 15. Alignment Waveforms (Continued)

TABLE I

DATA FOR ALIGNMENT

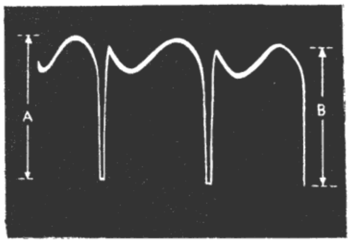
SOUND CHANNEL

To Adjust	Type of Input Signal Required	Connect Generator Leads Across	Connect Output Leads Across	Feed Output Leads Directly Into Oscillograph or Into Oscillograph Via Probe Detector	Adjust Coils to Conform to Fig. No.	Remarks
Z2	Wobbulator, RF Signal Generator	Pin 1, V3 and Chassis	Pin 5, V4 and Chassis	Probe Detector	15-E	RF Signal Generator Set at 21.9 mc to give birdie
Z3	Wobbulator, RF Signal Generator	Pin 1, V4 and Chassis	Pin 5, V5 and Chassis	Probe Detector	15-E	RF Signal Generator Set at 21.9 mc to give birdie
Z4	Wobbulator, RF Signal Generator	Pin 1, V5 and Chassis	R27	Direct	15-F	Connect 100 k resistor in series with oscillograph
Z2, Z3, Z4	Wobbulator, RF Signal Generator	Pin 1, V3 and Chassis	R27	Direct	15-G	
Z5	Wobbulator, RF Signal Generator	Pin 1, V7 and Chassis	Pin 1, V8 and Chassis	Direct	15-L	Readjust Z4 and Z3 to obtain good response curve

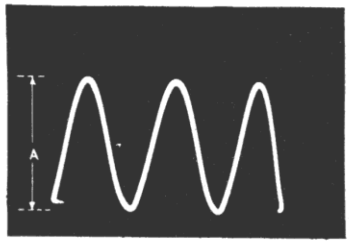
VIDEO CHANNEL

To Adjust	Type of Input Signal Required	Connect Generator Leads Across	Connect Output Leads Across	Feed Output Leads Directly Into Oscillograph or Into Oscillograph Via Probe Detector	Adjust Coils to Conform to Fig. No.	Remarks
L37, L44	Wobbulator, RF Signal Generator	Pin 4, V14 and Chassis	Pin 8, V16 and Chassis	Direct	15-O	RF Signal Generator set at 26.4 mc
L34, L35	Wobbulator, RF Signal Generator	Pin 1, V13 and Chassis	Pin 8, V14 and Chassis	Probe Detector	15-S	
L31	Wobbulator, RF Signal Generator	Pin 1, V12 and Chassis	Pin 5, V13 and Chassis	Probe Detector	15-T	
L9	Wobbulator, Signal Generator	Pin 1, V12 and Chassis	Pin 5, V13 and Chassis	Probe Detector	15-V	RF Signal Generator at 21.9 mc (Sound Trap Adjustment)
L27, L28	Wobbulator, RF Signal Generator	Pin 1, V11 and Chassis	Pin 5, V12 and Chassis	Probe Detector	15-X	
L26	Wobbulator	Pin 1, V11 and Chassis	Pin 5, V12 and Chassis	Probe Detector	15-Z	Second sound trap adjustment. Remove RF Generator
L24, L25	Wobbulator, RF Signal Generator	Pin 1, V10 and Chassis	Pin 5, V11 and Chassis	Probe Detector	15-BB	
L5, L6	Wobbulator, RF Signal Generator	Pin 1, 6AK5 Adapter (V2) and Chassis	Pin 5, V10 and Chassis	Probe Detector	15-CC	Remove V2 and replace with 6AK5 adapter tube. See Figure 12(a)
	Wobbulator Signal Generator	Pin 1, 6AK5 Adapter (V2) and Chassis	Pin 8, V16 and Chassis	Probe Detector	15-DD	Signal generator set at 26.4 mc.

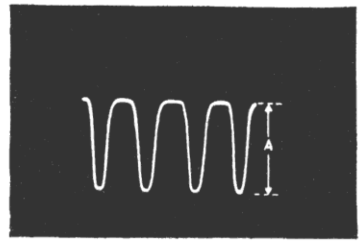
MODEL RA-101



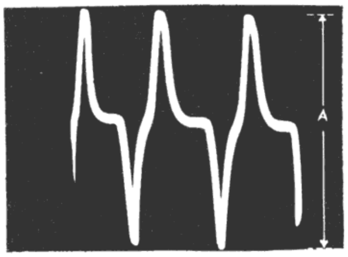
Cathode of Discriminator Tube V2 Pin 8 Sync Stab
A=22 volts B=20 volts



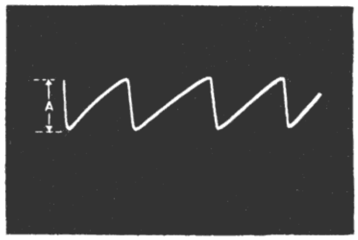
Oscillator Grid, Tube V3 Pin 5 Sync Stab
A=35 volts



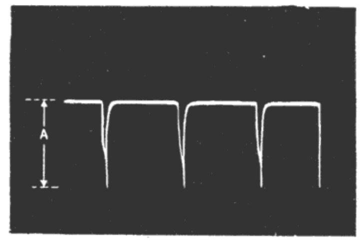
Oscillator Plate Tube V3 Pin 3
A=52 volts



Horizontal Saw Gen Grid Tube V2 Pin 4
A=72 volts

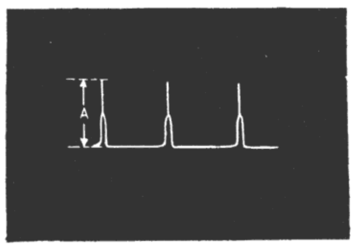


Horizontal Saw Gen Tube V2 Pin 5
A=50 volts

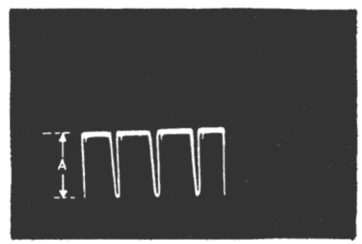


Damping Tube Plate Tube V5 Pin 2
A=450 volts

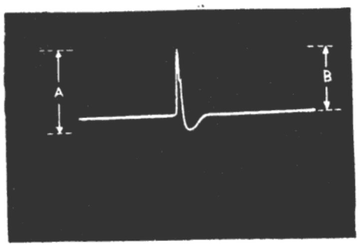
Sync Amplifier Grid Tube V2 Pin 1
A=4.5 volts



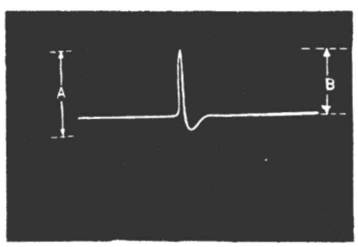
Sync Amplifier Plate Tube V2 Pin 2
A=17 volts



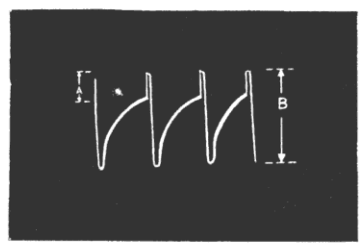
Vertical Sync Amp Grid Tube V6 Pin 4
A=35 volts



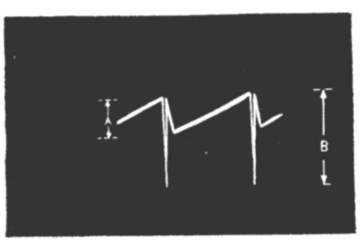
Vertical Sync Amp Plate Tube V6 Pin 8
A=55 volts B=50 volts



Vertical BTO Red Trans Lead
A=60 volts B=50 volts



Vertical Saw Gen Grid Tube V7 Pin 4
A=25 volts B=105 volts



Vertical Saw Gen Plate Tube V7 Pin 5
A=25 volts B=125 volts

Vertical Deflection Amp Grid Tube V8 Pin 4
A=60 volts B=85 volts

Vertical Amp Plate Tube V8 Pin 2
Sweep Non-Linear Due to Extreme Position of Controls
A=125 volts

Figure 16. Sweep Waveforms

TABLE 2

TABLE OF VOLTAGES

D. C. voltages taken with no signal applied. These voltages should be regarded as only representative and not absolute. All measurements are taken with respect to ground.

Tube No.	Tube Type	Function	Pin 1	Pin 2	Pin 3	VOLTAGES Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
AUDIO AMPLIFIER CHASSIS										
V1	6SN7	VOL AMP		120	3.4		105	5.5		
V2	6SN7	PWR AMP PHASE INV		120	5.2	15	280	40		
V3	6V6	PWR AMP			320	280				20
V4	6V6	PWR AMP			320	280				20
V5	5U4G	RECTIFIER		330/340						
SWEEP CHASSIS										
V2	6SJ7	SYNC AMP SAW GEN	0.2 a-c	60+9 a-c		28 a-c	22+10 a-c			
V3 & V4	807	DEF AMP		305	10 a-c	17.5		Plate 500+800 ac		
V5	6AS7	HOR. DAMP.	85 a-c			85 a-c		0-80		
V6	6SJ7	SYNC AMP								120+20 a-c
V7	6SN7	CLAMPING				18 a-c	110+4 a-c			
V8	6SN7	DEF AMP	5 a-c	385+100 a-c	6-20	5 a-c	385+100 ac	6-20		
V13	6SN7	SWEEP PROTECT	350	350	17	2.4 a-c		17		
SYNC STABILIZER CHASSIS										
V1	6SJ7	SYNC AMP				10 a-c	225	300		5.6 a-c
V2	6H6	DISCRIMINATOR				5.7 a-c				5.0 a-c
V3	6K6	OSCILLATOR			210+61 a-c	235	58 a-c			0.5
V4	6AC7	CONTROL AMPLIFIER					0.1	86-140		250+68 a-c
OUTPUT PLUG						10 a-c	-17	400		28 a-c
RF-IF CHASSIS										
V3	6BA6	SOUND IF AMP	-.50				170	85	.75	
V4	6BA6	SOUND IF AMP	-.45				165	85	.75	
V5	6BA6	SOUND IF AMP	-.45				175	85	.80	
V6	6AU6	1ST LIMITER					50	50	.25	-.50
V7	6AU6	2ND LIMITER					40	40	0	-.80
V8	6AL5	DISCRIMINATOR	.10	-.50					-.50	
V10	6AU6	VIDEO IF AMP	-.20				190	115	.80	
V11	6AU6	VIDEO IF AMP	-.20				170	105	.65	
V12	6AU6	VIDEO IF AMP	-.20				180	105	.65	
V13	6AU6	VIDEO IF AMP	-.10				200	130	.80	
V14	6AG7	VIDEO IF AMP				0	3.0	110		225
V15	6AL5	D C RESTORER	.50	30			30			
V16	6V6	CATHODE FOLLOWER			245	245	30			45
V17	6AG7	VIDEO AMPLIFIER				0	2.0	95		110
V19	6AL5	VIDEO DETECTOR	NO D-C VOLTAGES							

MODEL RA-101

ALLEN B. DU MONT LABS., INC.

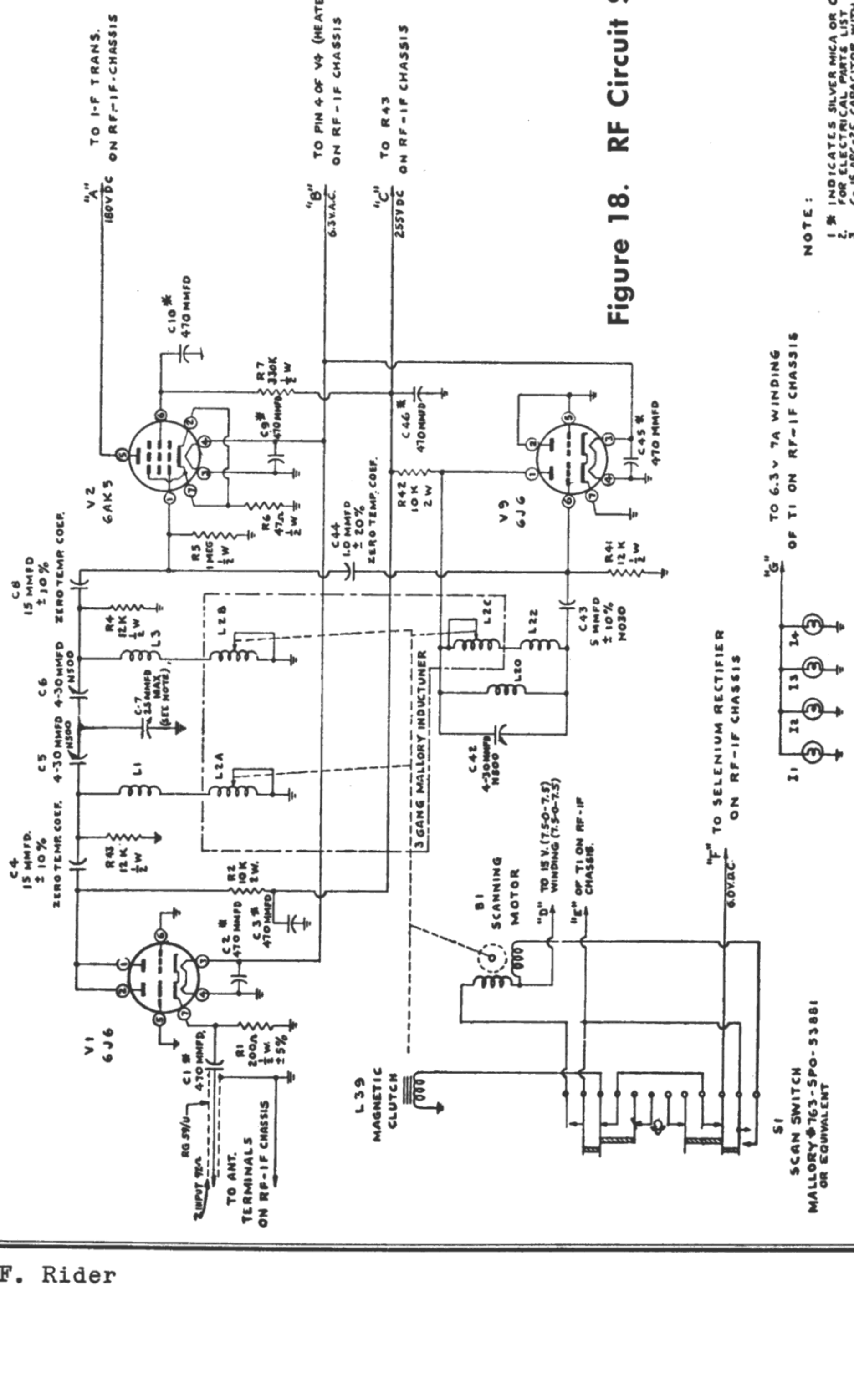


Figure 18. RF Circuit Schematic

ALLEN B. DU MONT LABS., INC. MODEL RA-101

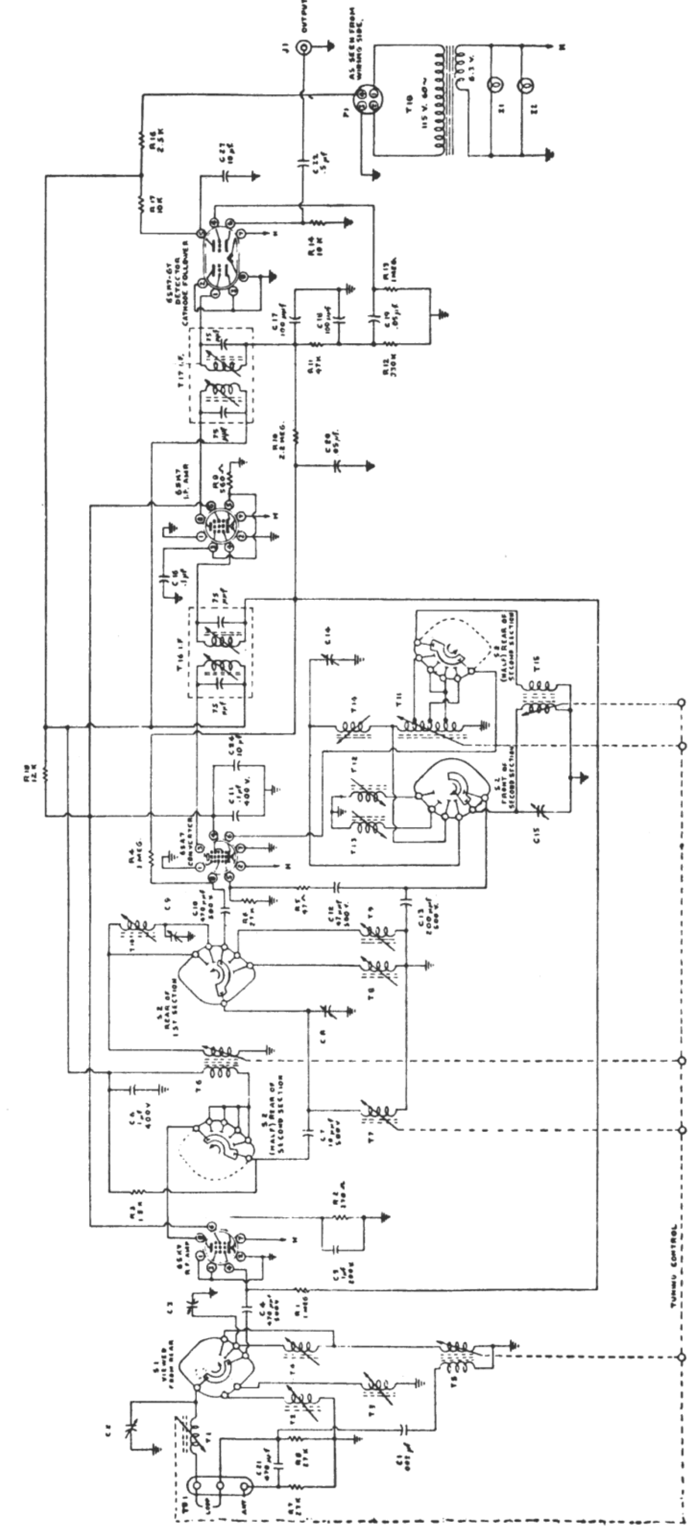


Figure 19. AM Tuner Schematic

MODEL RA-101 ALLEN B. DU MONT LABS., INC.

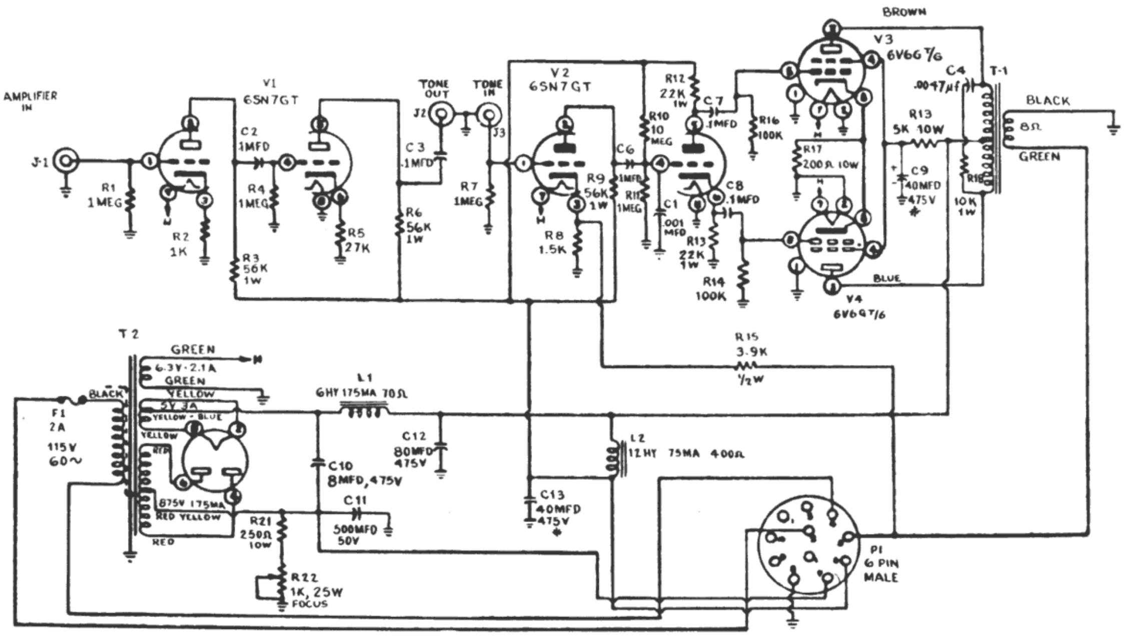


Figure 20. Audio Amplifier Schematic

NOTES:
1- ALL ITEMS BEARING CIRCUIT SYMBOL DESIGNATIONS REFER TO DE-2226
2- ALL PAPER CAPACITORS ARE 600V
3- ALL MICA CAPACITORS ARE 500V
4- Ω=OHM; K=1000 OHMS; MEG=1,000,000 OHMS
• - μf =MICROFARADS, μμf =MICRO-MICROFARADS VALUES ARE μf IF NOT OTHERWISE SPECIFIED

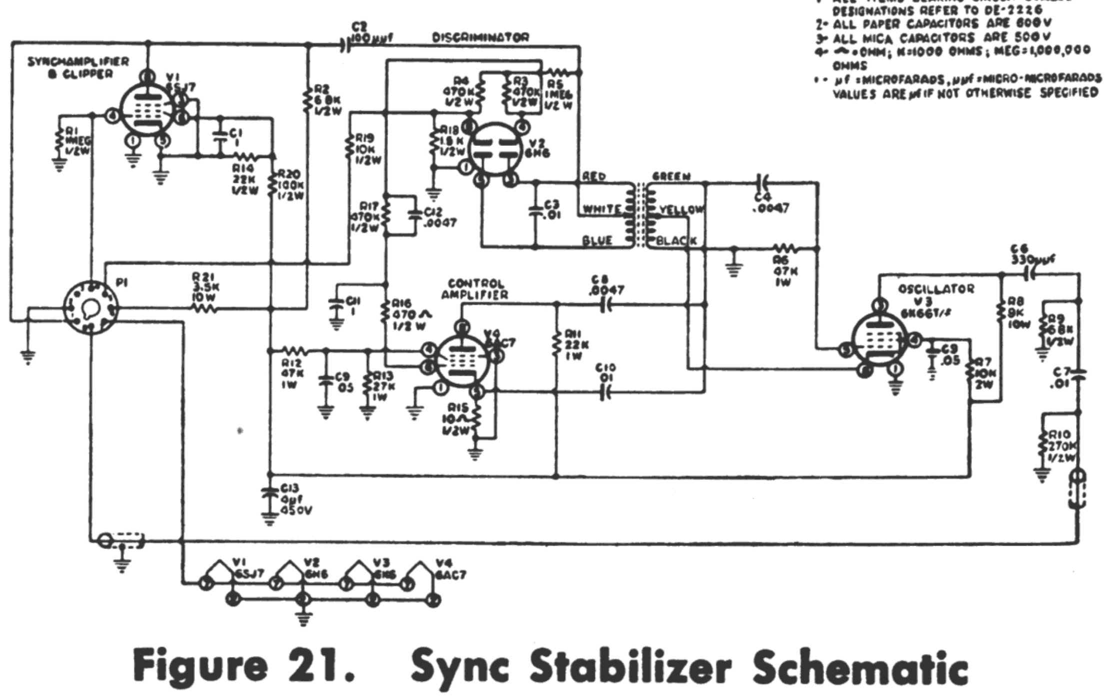
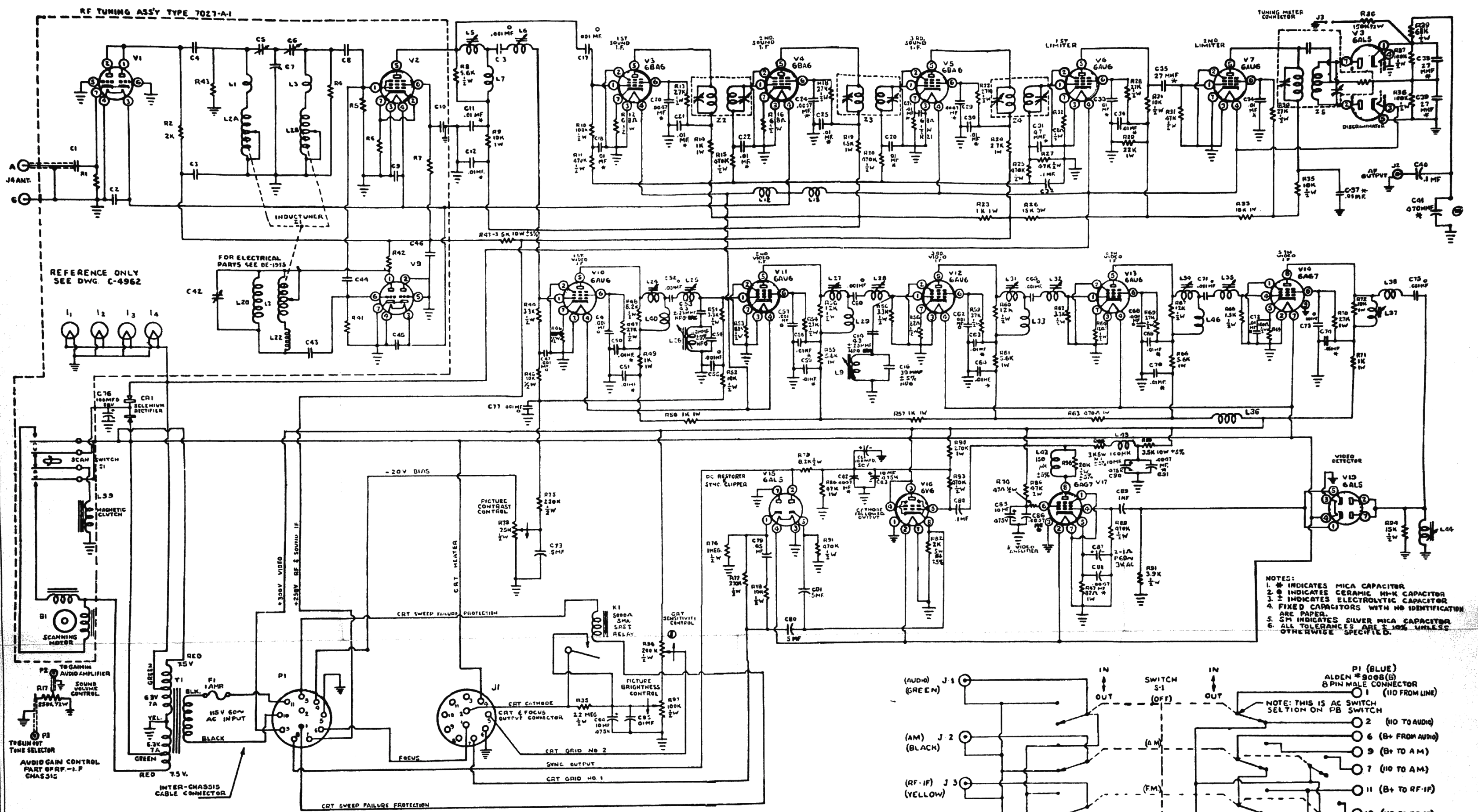


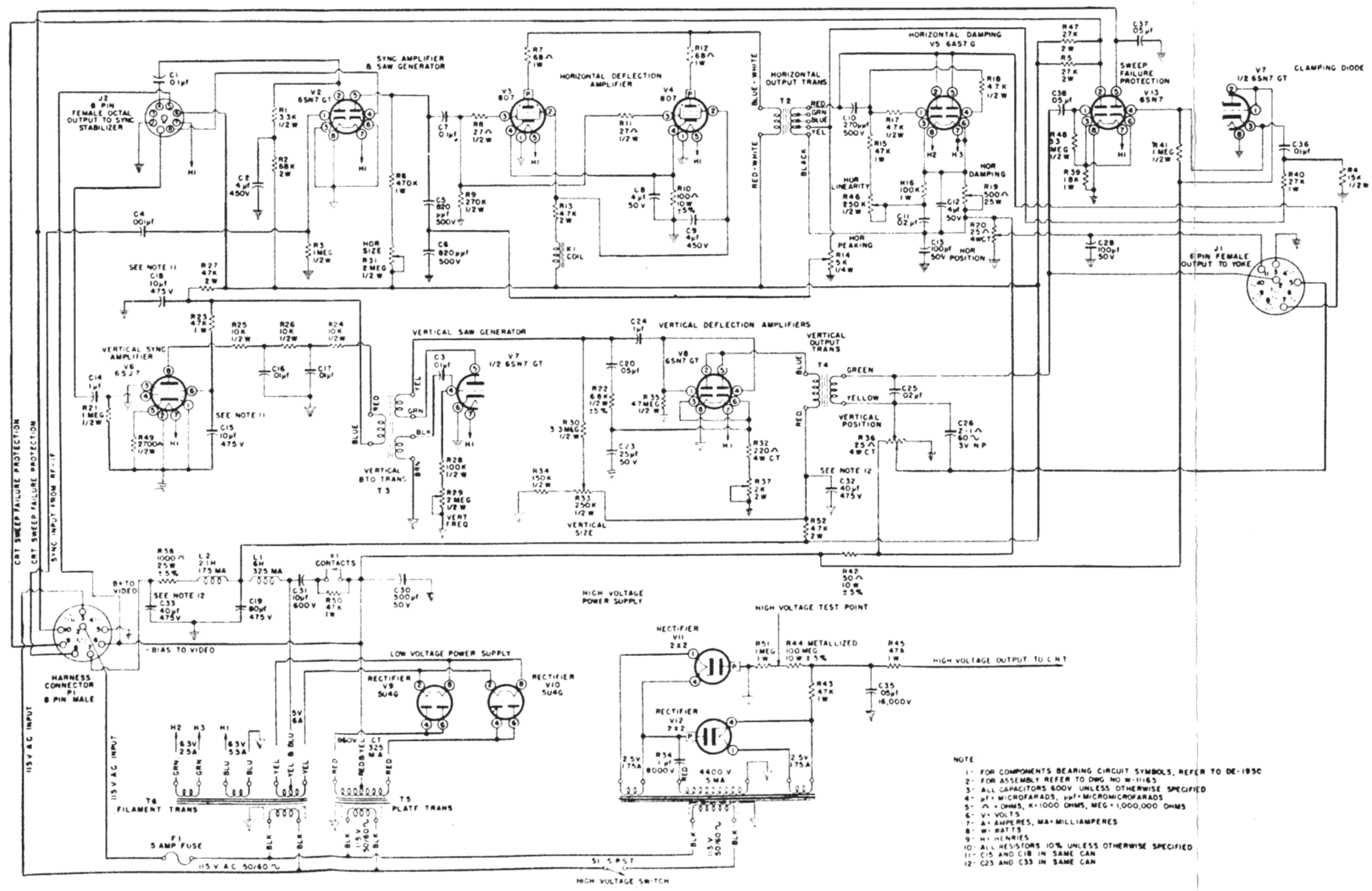
Figure 21. Sync Stabilizer Schematic

ALLEN B. DU MONT LABS., INC.



NOTE: PIN CONNECTIONS ON P1 ARE SHOWN FROM BOTTOM OR WIRING SIDE OF CONNECTOR
CONNECTIONS ON P1 ARE FROM TOP OR PLUG SIDE.

Figure 25. RF-IF Circuit Schematic



NOTE

1 - FOR COMPONENTS BEARING CIRCUIT SYMBOLS, REFER TO DE-195C
2 - FOR ASSEMBLY REFER TO DWG NO W-11165
3 - ALL CAPACITORS 600V UNLESS OTHERWISE SPECIFIED
4 - µf = MICROFARADS, µµf = MICROMICROFARADS
5 - Ω = OHMS, K = 1000 OHMS, MEG = 1,000,000 OHMS
6 - V = VOLTS
7 - A = AMPERES, MA = MILLIAMPERES
8 - W = WATTS
9 - H = HENRIES
10 - ALL RESISTORS 10% UNLESS OTHERWISE SPECIFIED
11 - C15 AND C18 IN SAME CAN
12 - C23 AND C33 IN SAME CAN

Figure 22. Sweep Circuit Schematic

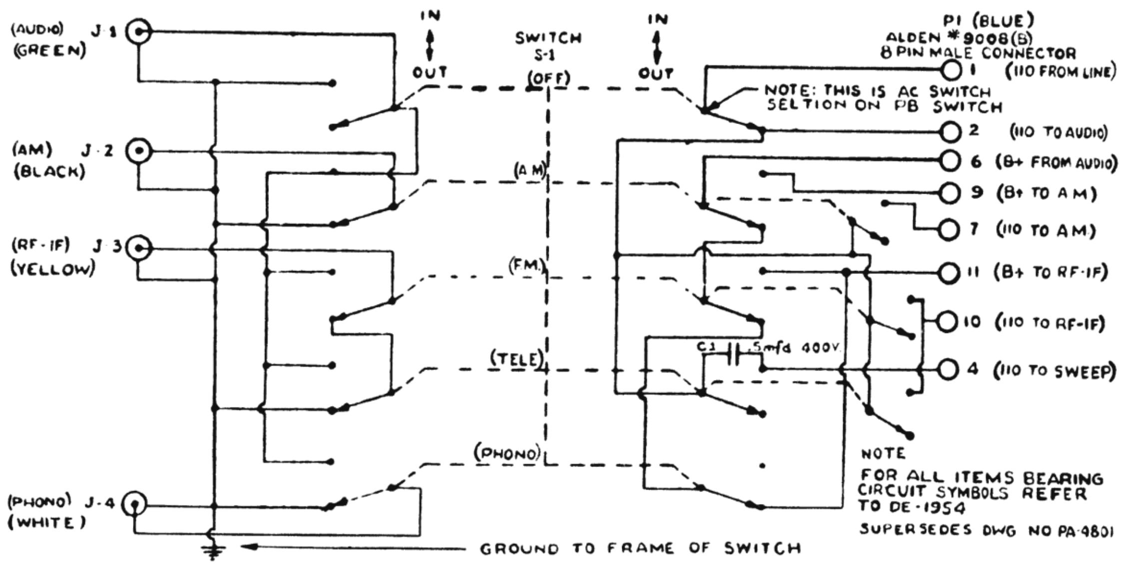


Figure 23. Service Selector Schematic

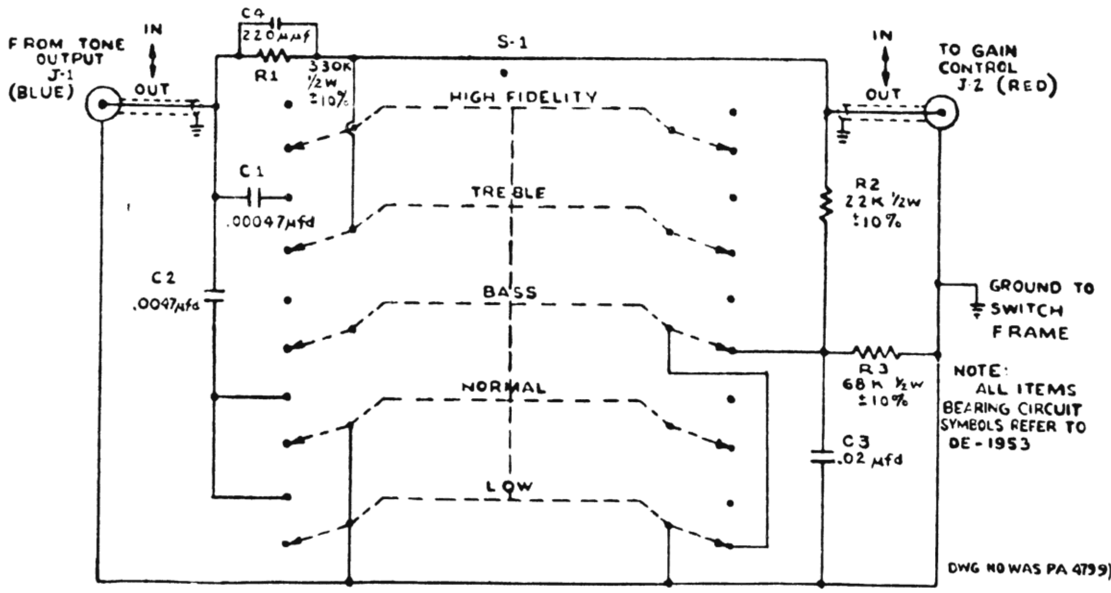


Figure 24. Tone Selector Schematic

6.0 ELECTRICAL PARTS LIST

6.1 AUDIO AMPLIFIER ELECTRICAL PARTS LIST DE-1949.

Type 7001-A

Symbol No.	Reference Drawing or Part No.	Description
C1	3-1217	Capacitor, fixed: ceramic; 1000 mmf; 300 V; ±10%
C2	3-1189	Capacitor, fixed: paper; wax; .1 mfd; 600 V; ±25%
C3		Same as C2
C4	CM35A472K	Capacitor, fixed: mica; 4700 mmf; 500 V; ±10%
C6		Same as C2
C7		Same as C2
C8		Same as C2
C9	3-1162	Capacitor, fixed: electrolytic; 40+40 mfd; 475 V
C10	3-1167	Capacitor, fixed: electrolytic; 8 mfd; 475 V
C11	3-1166	Capacitor, fixed: electrolytic; 500 mfd; 50 V
C12	3-1247	Capacitor, fixed: electrolytic; 80 mfd; 475 V.
C13		Part of C9
F1	11-7	Fuse, cartridge: 2 amp.
J1	9-276	Connector, female: 1 pin
J2		Same as J1
J3		Same as J1
L1	21-329	Choke, 6 hy; 175 ma; 70 ohm—(DD-4550-D)
L2	21-330	Choke, 12 hy; 75 ma—(DD-4539-D)
P1	9-330	Connector, male: 6 pin
R1	RC21BF105K	Resistor, fixed: composition; 1 megohm; 1/2 W; ±10%
R2	RC21BF102K	Resistor, fixed: composition; 1 K; 1/2 W; ±10%
R3	RC31BF563K	Resistor, fixed: composition; 56 K; 1 W; ±10%
R4		Same as R1
R5	RC21BF272K	Resistor, fixed: composition; 2700 ohm; 1/2 W; ±10%
R6		Same as R3
R7		Same as R1
R8	RC21BF152K	Resistor, fixed: composition; 1500 ohm; 1/2 W; ±10%
R9		Same as R3
R10	RC21BF106K	Resistor, fixed: composition; 10 megohm; 1/2 W; ±10%
R11		Same as R1
R12	RC31BF223K	Resistor, fixed: composition; 22K; 1 W; ±10%
R13		Same as R12
R14	RC21BF104K	Resistor, fixed: composition; 100 K; 1/2 W; ±10%
R15	RC21BF392K	Resistor, fixed: composition; 3900 ohm; 1/2 W; ±10%
R16		Same as R14
R17	2-555	Resistor, fixed: wire wound; 200 ohm; 10 W; ±5%
R18	RC31BF103K	Resistor, fixed: composition; 10,000 ohm; 1 W; ±10%
R19	2-13	Resistor, fixed: wire wound; 5 K; 10 W; ±5%
R21	2-168	Resistor, fixed: wire wound; 250 ohm; 10 W; ±5%
R22	1-469	Resistor, variable; wire wound; 1 K; 25 W; ±10%
T1	20-338	Transformer, Audio Output—(20D-4790)
T2	20-304	Transformer, Plate Filament—(DD-4541-D)
V1	25-6SN7GT	Tube, electron; type 6SN7GT
V2		Same as V1
V3	25-6V6GT/G	Tube, electron; type 6V6GT/G
V4		Same as V3
V5	25-5U4G	Tube, electron; type 5U4G

6.2 SWEEP CHASSIS ELECTRICAL PARTS LIST DE-1950.

Type 7002-A1

Symbol No.	Reference Drawing or Part No.	Description
C1	CM20B101K	Capacitor, fixed: mica; 100 mmfd; 500 V; ±10%
C2	3-1255	Capacitor, fixed: paper; .05 mfd; 600 V; ±25%
C3	3-1256	Capacitor, fixed: paper; .01 mfd; 600 V; ±25%
C4	3-1209	Capacitor, fixed: paper; .001 mfd; 600 V; ±25%
C5	CM25B821K	Capacitor, fixed: mica; 820 mmfd; 500 V; ±10%
C6	CM25B821K	Capacitor, fixed: mica; 820 mmfd; 500 V; ±10%
C7	3-1256	Capacitor, fixed: paper; .01 mfd; 600 V; ±25%
C8	3-1168	Capacitor, fixed: electrolytic; 4 mfd; 50 V; +75, -10%
C9	3-1202	Capacitor, fixed: electrolytic; 4 mfd; 450 V; +40, -10%
C10	CM20B271K	Capacitor, fixed: mica, 270 mmfd; 500 V; ±10%
C11	3-1257	Capacitor, fixed: paper; 0.02 mfd; 600 V; ±25%
C12	3-1168	Capacitor, fixed: electrolytic; 4 mfd; 50 V; +75, -10%
C13	3-301	Capacitor, fixed: electrolytic; 100 mfd; 50 V; +150, -25%
C14	3-1189	Capacitor, fixed: paper; .1 mfd; 600 V; ±25%
C15	3-1200	Capacitor, fixed: electrolytic; two section; 10-10 mfd; 475 V; +40, -10%
C16	3-1256	Capacitor, fixed: paper; .01 mfd; 600 V; ±25%
C17	3-1256	Capacitor, fixed: paper; .01 mfd; 600 V; ±25%
C18		Part of C15
C20	3-1255	Capacitor, fixed: paper, .05 mfd; 600 V; ±25%
C21	3-1255	Capacitor, fixed: paper; .05 mfd; 600 V; ±25%
C23	3-1126	Capacitor, fixed: electrolytic; 8 mfd; 150 V; +100, -25%
C24	3-1189	Capacitor, fixed: paper; .1 mfd; 600 V; ±25%
C25	3-1257	Capacitor, fixed: paper; 0.02 mfd; 600 V; ±25%
C26	3-812	Capacitor, fixed: electrolytic; impedance 1.0 ohm @ 60 cycles/sec. 3 W.V. N.P.
C28	3-301	Capacitor, fixed: electrolytic; 100 mfd; 50 V; +150, -25%
C30	3-1166	Capacitor, fixed: electrolytic; 500 mfd; 50 V; +40, -10%
C31	3-1201	Capacitor, fixed: paper; 10 mfd; 600 V; +20, -10%
C32	3-1162	Capacitor, fixed: electrolytic; two section; 40+40 mfd; 475 V; +40, -10%
C33		Part of C32
C34	3-1198	Capacitor, fixed: paper; .1 mfd. 8000 V; +20, -10%
C35	3-1199	Capacitor, fixed: paper; 0.05 mfd; 16,000 V; +20, -10%

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C36	3-1256	Capacitor, fixed: paper; .01 mfd; 600 V; ±25%
C37	3-1255	Capacitor, fixed: paper; .05 mfd; 600 V; ±25%
C38	3-1255	Capacitor, fixed: paper, .05 mfd; 600 V; ±25%
CR1	25-1N34	Crystal Unit, rectifying
F1	11-11	Fuse,cartridge: 5 amp.
J1	9-365	Connector, female: 6 pin
K1	5-226	Relay, Time Delay: SPST
L1	21-331	Choke, filter: 325 ma. (DD-4549-D)
L2	21D-4722	Choke, 2.1 h: 175 ma.
P1	9-331	Connector, male: 8 pin
R1	RC21BF392K	Resistor, fixed: composition; 3900 ohm; 1/2 W; ±10%
R2	RC41BF473K	Resistor, fixed: composition; 47,000 ohm; 2 W; ±10%
R3	RC31BF104K	Resistor, fixed: composition; 100,000 ohm; 1 W; ±10%
R4	RC21BF153K	Resistor, fixed: composition; 15,000 ohm; 1/2 W; ±10%
R5	1-473	Resistor, variable: composition; 25,000 ohm; 1/2 W; ±20%
R6	RC31BF474K	Resistor, fixed: composition; 470,000 ohm; 1 W; ±10%
R7	RC31BF270K	Resistor, fixed: composition; 27 ohm; 1 W; ±10%
R8	RC21BF270K	Resistor, fixed: composition; 27 ohm; 1/2 W; ±10%
R9	RC21BF274K	Resistor, fixed: composition; 270,000 ohm; 1/2 W; ±10%
R10	2-244	Resistor, fixed: wire wound; 100 ohm; 10 W; ±5%
R11	RC21BF270K	Resistor, fixed: composition; 27 ohm: 1/2 W; ±10%
R12	RC31BF270K	Resistor, fixed: composition; 27 ohm; 1 W; ±10%
R13	2-11	Resistor, fixed: wire wound; 10,000 ohm: 10 W; ±5%
R14	1-554	Resistor, variable: composition; 5000 ohm; 1/4 W; ±20%
R15	RC31BF473K	Resistor, fixed: composition; 47,000 ohm; 1 W; ±10%
R16	RC31BF104K	Resistor, fixed: composition; 100,000 ohm; 1 W; ±10%
R17	RC21BF472K	Resistor, fixed: composition; 4700 ohm; 1/2 W; ±10%
R18	RC21BF472K	Resistor, fixed: composition; 4700 ohm; 1/2 W; ±10%
R19	1-470	Resistor, variable: wire wound; 500 ohm; 25 W; ±10%
R20	1-472	Resistor, variable: wire wound; 25 ohm; 4 W; C.T.; ±10%
R21	RC21BF105K	Resistor, fixed: composition; 1 megohm; 1/2 W; ±10%
R22	RC21BF682J	Resistor, fixed: composition; 6800 ohm; 1/2 W; ±5%
R23	RC31BF473K	Resistor, fixed: composition; 47,000 ohm; 1 W; ±10%
R24	RC21BF103K	Resistor, fixed: composition; 10,000 ohm; 1/2 W; ±10%
R25	RC21BF103K	Resistor, fixed: composition; 10,000 ohm; 1/2 W; ±10%
R26	RC21BF103K	Resistor, fixed: composition; 10,000 ohm; 1/2 W; ±10%
R27	RC41BF473K	Resistor, fixed: composition; 47,000 ohm; 2 W; ±10%
R28	RC21BF104K	Resistor, fixed: composition; 100,000 ohm: 1/2 W; ±10%
R29	1-475	Resistor, variable: composition; 250,000 ohm; 1/2 W; ±20%
R30	RC21BF335K	Resistor, fixed: composition; 3.3 megohm; 1/2 W; ±10%
R31	1-563	Resistor, variable: composition: 2 megohm; 1/2 W; ±30%
R32	RC31BF221K	Resistor, fixed: composition; 220 ohm; 1 W; ±10%
R33	1-475	Resistor, variable: composition; 250,000 ohm; 1/2 W; ±20%
R34	RC21BF154K	Resistor, fixed: composition; 150,000 ohm; 1/2 W; ±10%
R35	RC21BF475K	Resistor, fixed: composition; 4.7 megohm; 1/2 W; ±10%
R36	1-472	Resistor, variable: wire wound; 25 ohm; 4 W; C.T. ±10%
R37	1-565	Resistor, variable: wire wound; 2000 ohm: 2 W; ±10%
R38	2-223	Resistor, fixed: wire wound; 1000 ohm; 25 W; ±5%
R39	RC31BF182K	Resistor, fixed: composition; 1800 ohm; 1 W; ±10%
R40	RC31BF562K	Resistor, fixed: composition; 5600 ohm; 1 W; ±10%
R41	RC21BF105K	Resistor, fixed: composition; 1 megohm; 1/2 W; ±10%
R42	2-247	Resistor, fixed: wire wound; 50 ohm; 10 W; ±5%
R43	RC31BF473K	Resistor, fixed: composition; 47,000 ohm; 1 W; ±10%
R44	2-939	Resistor, fixed: metallized; 100 megohm; 10 W; ±5%
R45	RC31BF473K	Resistor, fixed: composition; 47,000 ohm; 1 W; ±10%
R46	1-475	Resistor, variable: composition; 250,000 ohm; 1/2 W; ±20%
R47	RC41BF273K	Resistor, fixed: composition; 27,000 ohm; 2 W; ±10%
R48	RC21BF335K	Resistor, fixed: composition; 3.3 megohm; 1/2 W; ±10%
R50	RC31BF473K	Resistor, fixed: composition; 47,000 ohm; 1 W; ±10%
R51	RC31BF105K	Resistor, fixed: composition; 1 megohm; 1 W; ±10%
S1	5-11	Switch,toggle: SPST
T1	20-46	Transformer, Horizontal Oscillator
T2	20D-4706	Transformer, Horizontal Sweep Output
T3	20D-4901	Transformer, Vertical Blocking Tube Oscillator
T4	20-359	Transformer, Vertical Output
T5	20D-4716	Transformer, Plate
T6	20D-4707	Transformer, Filament
T8	20D-11085	Transformer, Plate-Filament
V1	25-6SJ7	Tube, electron: type 6SJ7
V2	25-6SN7GT	Tube, electron: type 6SN7GT
V3	25-807	Tube, electron: type 807
V4	25-807	Tube, electron: type 807
V5	25-6AS7G	Tube, electron: type 6AS7G
V6	25-6SJ7	Tube, electron: type 6SJ7
V7	25-6SN7GT	Tube, electron: type 6SN7GT
V8	25-6SN7GT	Tube, electron: type 6SN7GT
V9	25-5U4G	Tube, electron: type 5U4G
V10	25-5U4G	Tube, electron: type 5U4G
V11	25-2X2	Tube, electron: type 2X2
V12	25-2X2	Tube, electron: 2X2
V13	25-6SN7GT	Tube, electron: type 6SN7GT

6.3 RF ASSEMBLY ELECTRICAL PARTS LIST DE-1955. Type 7027-A1

B1	30-763	Motor: A.C.; tuning
C1	CM20C471K	Capacitor, fixed; mica; 470 mfd; ±10% 500 V
C2	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
C3	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
C4	3-1205	Capacitor, fixed: ceramic; 15 mmfd; ±1.5 mmfd.
C5	3-307	Capacitor, variable: ceramic; 4-30 mmfd; trimmer
C6	3-307	Capacitor, variable: ceramic; 4-30 mmfd; trimmer

C7	3-1214	Capacitor, variable: 25 mmfd; air
C8	1205	Capacitor, fixed: ceramic; 15 mmfd; ±1.5 mmfd.
C9	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
C10	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
C42	3-307	Capacitor, variable: ceramic; 4-30 mmfd; trimmer
C43	3-1323	Capacitor, fixed: ceramic; 5 mmfd ±0.5 mmfd
C44	3-1215	Capacitor, fixed: ceramic; 1 mmfd; ±20%
C45	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
C46	CM20C471K	Capacitor, fixed: mica; 470 mmfd; ±10%; 500 V
I1	39-16	Lamp, incandescent: 6-8 V; 0.25 amp.
I2	39-16	Lamp, incandescent: 6-8 V; 0.25 amp.
I3	39-16	Lamp, incandescent: 6-8 V; 0.25 amp.
I4	39-16	Lamp, incandescent: 6-8 V; 0.25 amp.
L1		See Wiring Diagram
L2A	21-357	Inductor, variable (3 gang Inductuner)
L2B		Part of L2A
L2C		Part of L2A
L3		See Wiring Diagram
L20	21A-11281	Coil, shunt
L22		See Wiring Diagram
L39	34C-4739-101	Assembly, Magnetic Clutch Body
R1	2-957	Resistor, fixed: composition; 200 ohm; ±5%; 1/2 W
R2	2-943	Resistor, fixed: composition; 10,000 ohm; ±10%; 2 W
R4	2-956	Resistor, fixed: composition; 12,000 ohm; ±10%; 1/2 W
R5	2-1208	Resistor, fixed: composition; 1 megohm; ±10%; 1/2 W
R6	2-953	Resistor, fixed: compositon; 47 ohm; ±10%; 1/2 W
R7	2-1202	Resistor, fixed: composition; 330,000 ohm; ±10%; 1/2 W
R41	2-956	Resistor, fixed: composition; 12,000 ohm; ±10%; 1/2 W
R42	2-943	Resistor, fixed: composition; 10,000 ohm; ±10%; 2 W
R43	2-956	Resistor, fixed: composition; 12,000 ohm; ±10%; 1/2 W
S1	5-205	Switch,rotary jack
V1	25-6J6	Tube, electron: twin triode; miniature type;Type 6J6
V2	25-6AK5	Tube, electron: R.F. amplifier pentode; miniature type; Type 6AK5
V9	25-6J6	Tube, electron: twin triode; miniature type; Type 6J6

6.4 IF ASSEMBLY ELECTRICAL PARTS LIST DE-1951. Type 7003-A1

C11	CM35B103K	Capacitor, fixed: mica; 10,000 mmfd; 300 V; ±10%
C12		Same as C11
C13	3-1217	Capacitor, fixed: ceramic; 1,000 mmfd; ±20%; High K
C14	3-1294	Capacitor, fixed: ceramic; 4.3 mmfd; ±.25 mmfd
C16	CM20C390J	Capacitor, fixed: mica; 39 mmfd; 500 V; ±5%
C17		Same as C13
C18		Same as C11
C20	CM35B472K	Capacitor, fixed: mica; 4700 mmfd; 500 V; ±10%
C21		Same as C11
C22		Same as C11
C24		Same as C20
C25		Same as C11
C26		Same as C11
C27		Same as C11
C29		Same as C20
C30		Same as C11
C31	CM20B470K	Capacitor, fixed: mica; 47 mmfd; 500 V; ±10%
C32	3-1189	Capacitor, fixed: paper; 100,000 mmfd 600 V; ±25%
C33		Same as C11
C34		Same as C11
C35	CM20B270K	Capacitor, fixed: mica; 27 mmfd 500 V; ±10%
C36		Same as C11
C37		Same as C11
C38		Same as C35
C39		Same as C35
C40		Same as C32
C41	CM35B471K	Capacitor, fixed: mica; 470 mmfd 500 V; ±10%
C47		Same as C13
C49		Same as C13
C50		Same as C11
C51		Same as C11
C52		Same as C13
C53		Same as C14
C54		Same as C16
C55		Same as C13
C57		Same as C13
C58		Same as C11
C60		Same as C13
C61	3-301	Capacitor, fixed: electrolytic; 100 mfd; 50 V; -150, -25%
C62		Same as C13
C63		Same as C11
C64		Same as C11
C65		Same as C13
C68		Same as C13
C69		Same as C11
C70		Same as C11
C71		Same as C13
C72		Same as C11
C73		Same as C13
C74		Same as C11
C75		Same as C13
C76		Same as C61
C77		Same as C13
C78	3-1192	Capacitor, fixed: paper; 0.5 mfd 600 V; ±25%
C79	3-1255	Capacitor, fixed: paper; .05 mfd 600 V; ±25%
C80		Same as C78
C81		Same as C78
C82		Same as C20
C83	3-1164	Capacitor, fixed: electrolytic; four section 10+10+10+10 mfd; 475 V; +40, -10%
C84		Same as C32
C85		Same as C83
C86		Same as C20
C87	3-812	Capacitor, fixed: electrolytic; impedance 1.0 ohm at 60 cps; 3 V
C88		Same as C20
C89		Same as C32
C90		Part of C83
C91		Same as C20
C94		Part of C83
C95	3-1256	Capacitor, fixed: paper, 10,000 mmfd; 600 V; ±25%
C59		Same as C11
CR1	30-790	Rectifier, selenium
F1	11-3	Fuse, cartridge: 1 ampere
J1	9-276	Connector, female: 1 pin
J2	9-334	Connector, female: 6 pin
J3	9-418	Connector, female: 2 pin
J4	16-244	Board, terminal: two terminal
K1	5-206	Relay, SPST

R98		Same as R60
R99	RC21BF154K	Resistor, fixed: composition; 150,000 ohms; 1/2 W; ±10%
T1	20-307	Transformer, filament per DD-4554-D
V3	25-6BA6	Tube, electron: Type 6BA6
V4		Same as V3
V5		Same as V3
V6	25-6AU6	Tube, electron: Type 6AU6
V7		Same as V6
V8	25-6AL5	Tube, electron: Type 6AL5
V10		Same as V6
V11		Same as V6
V12		Same as V6
V13		Same as V6
V14	25-6AG7	Tube, electron: Type 6AG7
V15		Same as V8
V16	25-6V6GT/G	Tube, electron: Type 6V6GT/G
V17		Same as V14
V19		Same as V8
Z2	20C-4917	Transformer, Sound; I.F.
Z3		Same as Z2
Z4		Same as Z2
Z2	20C-4917	Transformer, Discriminator

6.5 TONE SELECTOR ELECTRICAL PARTS LIST DE-1953.

Type 7009-A1

C1	CM35B471K	Capacitor, fixed: mica; 470 mmfd; 500 V; ±10%
C2	CM35B472K	Capacitor, fixed: mica; 4700 mmfd; 500 V; ±10%
C3	3-1257	Capacitor, fixed: paper; 0.02 mfd; 600 V; ±25%
C4	CM20A221K	Capacitor, fixed: mica; 220 mmfd; 500 V; ±10%
J1	9-276	Connector, female: 1 contact
J2	9-276	Connector, female: 1 contact
R1	RC21BF334K	Resistor, fixed: composition; 330K; 1/2 W; ±10%
R2	RC21BF223K	Resistor, fixed: composition; 22K; 1/2 W; ±10%
R3	RC21BF683K	Resistor, fixed: composition; 68K; 1/2 W; ±10%
S1	5C-4803	Switch, push button, 5 position selector

6.6 SERVICE SELECTOR ELECTRICAL PARTS LIST DE-1954.

Type 7010-A1

C1	3-219	Capacitor, fixed: paper; 0.5 mfd; 200 V; ±25%
J1	9-276	Connector, female: 1 contact; shielded
J2		Same as J1
J3		Same as J1
J4		Same as J1
P1	9-366	Connector, chassis: male; 8 pin
S1	5C-4804	Switch, push button; 5 position

6.7 RECORD CHANGER ELECTRICAL LIST.

(DE-1978—Type 7007-A1)

C1	3-1257	Capacitor, fixed: paper; .02 mfd; 600 V
P1	9-340	Connector, male: 2 prong
R1	RC21BF473K	Resistor, fixed: composition; 47,000 ohm; 1/2 W; ±10%
RC1	69-2	Record Changer, intermix
I2	39-5	Lamp, incandescent, 6 W; 110 V
S2	5-222	Switch, sensitive, SPST, spring return, normally closed

(DE-1979—Issue 3—Type 7018-A1)

C1	3-1257	Capacitor, fixed: paper; .02 mfd; 600 V
I2	39-5	Lamp, incandescent, 6 watt; 110 V
P1	9-340	Connector, male: 2 prong
R1	RC21BF473K	Resistor, fixed: composition; 47,000 ohm; 1/2 W; ±10%
RC1	69-1	Record Changer, non-intermix
S2	5-222	Switch, sensitive, SPST, spring return, normally closed

6.8 CATHODE-RAY TUBE AND OTHER CABINET MOUNTINGS ELECTRICAL PARTS LIST.

(DE-1952—Type 7008-A1)

M1	30-739	Meter, 150 mμ., zero center, dwgs. no. DD4649B with scale dwg. DD4640B

(DE-1957—Issue 2—Type 7005-A1)

F1	11-54	Fuse, cartridge: 8 amp; 250 V
F2		Same as F1
I1	40-6	Lamp, glow: neon; 115 V; 1/4 watt
L1	21-C4882-101	Focus Coil Assembly
L2	21-354	Inductor, fixed: deflection yoke
S1	5-51	Switch, push: SPST
S7		Same as S1

(DE-1958—Issue 1—Type 7012-A1)

F1	11-54	Fuse, cartridge: 8 amp; 250 V
F2		Same as F1
I1	40-6	Lamp, glow: neon; 115 V; 1/4 watt
L1	21C-4882-101	Focus Coil Assembly
L2	21-354	Inductor, fixed: deflection yokes
S1	5-51	Switch, push: SPST

(DE-2014—Issue 2—Type 7017-A1)

LS1	53-11	Speaker, Dynamic, 12"

(DE-2013—Issue 1—Type 7006-A1)

LS1	30-761	Loudspeaker, 15", Permanent Magnet Dynamic

(DE-2060—Issue 1—Types 7022-A1, A2, 7023-A1)

B1	52-60	Motor, A.C.: series; 100 pound inches
F1	11-56	Fuse, cartridge: 1/2 amp.; 250 V
P1	9-340	Connector, male: 2 prong
S3	5-218	Switch, sensitive: SPST, normally open
S4	5-217	Switch, sensitive: SPST, normally closed
S5		Same as S4
S6	5-220	Switch, pull: SPDT; no off
V1	25-20BP4	Tube, electron: type 20BP4; cathode-ray

(DE-2061—Issue 1—Types 7024-A1, A2, 7025-A1, A2, and 7026-A1, A2)

V1	25-15AP4	Tube, electron: Type 15AP4, cathode-ray

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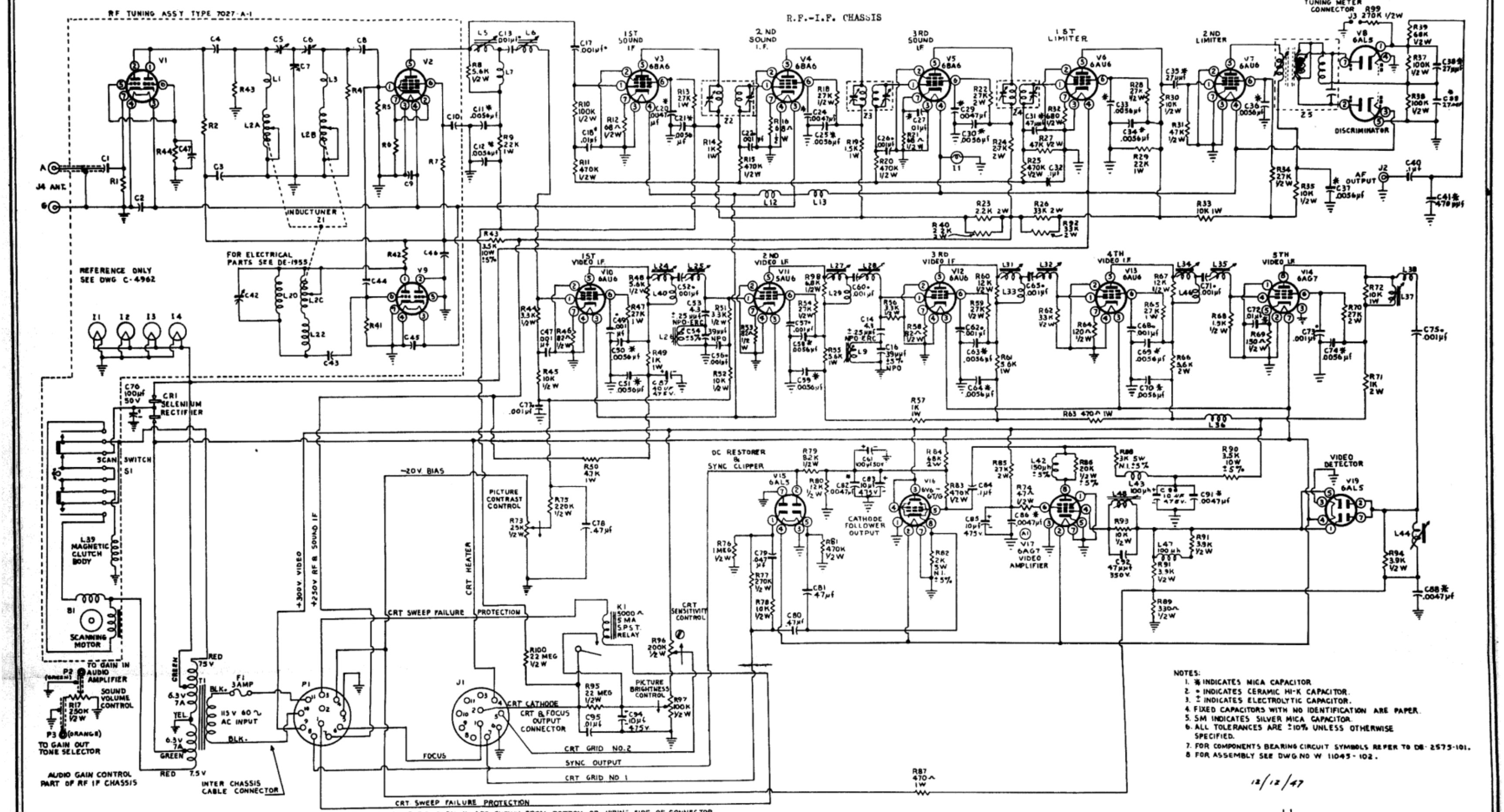
L5	21B-4896	Coil, 21.9 mc Video I.F.
L6	21B-4897	Coil, 21.9 mc Video I.F.
L7	21A-4893	Coil, 21.9 mc Video I.F. Coupling
L9	21B-4895	Coil, 21.9 mc Video I.F. Sound Trap
L12	21A-4891	Coil, 21.9 mc Video I.F. Decoupling Choke
L13		Same as L12
L24		Same as L6
L25		Same as L6
L26		Same as L9
L27		Same as L6
L28		Same as L6
L29	21A-4894	Coil, 21.9 mc Video I.F. Coupling
L31		Same as L6
L32		Same as L6
L33		Same as L29
L34		Same as L6
L35		Same as L5
L36		Same as L12
L37		Same as L6
L38	21A-4892	Coil, 21.9 mc Video I.F. Coupling
L40		Same as L29
L42	21A-4903 Part 2	Coil, Peaking: 150 mμh ±5%
L43	21A-4903 Part 1	Coil, Peaking: 100 mμh ±5%
L44		Same as L6
L46		Same as L7
P1	9-335	Connector, male: 10 pin
R8	RC21BF562K	Resistor, fixed: composition; 5600 ohm; 1/2 W; ±10%
R9	RC31BF103K	Resistor, fixed: composition; 10,000 ohm; 1 W; ±10%
R10	RC21BF104K	Resistor, fixed: composition; .10 megohm; 1/2 W; ±10%
R11	RC21BF474K	Resistor, fixed: composition; 47 megohm; 1/2 W; ±10%
R12	RC21BF680K	Resistor, fixed: compositon; 68 ohms; 1/2 W; ±10%
R13	RC21BF273K	Resistor, fixed: composition; 27,000 ohms; 1/2 W; ±10%
R14	RC31BF102K	Resistor, fixed: composition; 1,000 ohms; 1 W; ±10%
R15		Same as R11
R16		Same as R12
R17	1-561	Resistor, variable: composition; .25 megohm; 0.4 to 0.75 W; ±20%
R18		Same as R13
R19	RC31BF152K	Resistor, fixed: composition; 1500 ohms; 1 W; ±10%
R20		Same as R11
R21		Same as R12
R22		Same as R13
R23		Same as R14
R24	RC31BF272K	Resistor, fixed: composition; 2700 ohms; 1 W; ±10%
R25		Same as R11
R26	2-259	Resistor, fixed: composition; 15,000 ohms; 3 W; ±10%
R27	RC21BF473K	Resistor, fixed: composition; 47,000 ohms; 1/2 W; ±10%
R28		Same as R13
R29	RC31BF223K	Resistor, fixed: composition; 22,000 ohms; 1 W; ±10%
R30	RC21BF103K	Resistor, fixed: composition; 10,000 ohms; 1/2 W; ±10%
R31		Same as R27
R32		Same as R12
R33		Same as R9
R34		Same as R13
R35		Same as R30
R37		Same as R10
R38		Same as R10
R39	RC21BF683K	Resistor, fixed: composition; 68,000 ohms; 1/2 W; ±10%
R43	2-947	Resistor, fixed: wire wound; 3,500 ohms; 10 W; ±5%
R44	RC21BF332K	Resistor, fixed: composition; 3,300 ohms; 1/2 W; ±10%
R45		Same as R30
R46	RC21BF820K	Resistor, fixed: composition; 82 ohms; 1/2 W; ±10%
R47		Same as R13
R48	RC21BF822K	Resistor, fixed: composition; 8200 ohm; 1/2 W; ±10%
R49		Same as R14
R50		Same as R14
R51		Same as R44
R52		Same as R30
R53		Same as R46
R54		Same as R13
R55	RC31BF562K	Resistor, fixed: composition; 5600 ohms; 1 W; ±10%
R56		Same as R44
R57		Same as R14
R58		Same as R46
R59		Same as R13
R60	RC21BF123K	Resistor, fixed: composition; 12,000 ohms; 1/2 W; ±10%
R61		Same as R55
R62		Same as R44
R63	RC31BF471K	Resistor, fixed: composition; 470 ohms; 1 W; ±10%
R64	RC21BF121K	Resistor, fixed: composition; 120 ohms; 1/2 W; ±10%
R65		Same as R13
R66		Same as R55
R67		Same as R60
R68	RC21BF152K	Resistor, fixed: composition; 1500 ohms; 1/2 W; ±10%
R69	RC21BF151K	Resistor, fixed: composition; 150 ohms; 1/2 W; ±10%
R70	RC31BF273K	Resistor, fixed: composition; 27,000 ohms; 1 W; ±10%
R71		Same as R14
R72		Same as R9
R73	1-560	Resistor, variable: composition; 25,000 ohms; .75 W; ±20%
R74	RC21BF470K	Resistor, fixed: composition; 47 ohms; 1/2 W; ±10%
R75	RC21BF225K	Resistor, fixed: composition; .22 megohms; 1/2 W; ±10%
R76	RC21BF105K	Resistor, fixed: composition; 1 megohm; 1/2 W; ±10%
R77	RC21BF274K	Resistor, fixed: composition; .27 megohms; 1/2 W; ±10%
R78		Same as R30
R79		Same as R48
R80	RC31BF473K	Resistor, fixed: composition; 47,000 ohms; 1 W; ±10%
R81		Same as R11
R82	2-946	Resistor, fixed: wire wound; 2,000 ohms; 5 W; ±5%; N.I.
R83		Same as R11
R84	RC31BF274K	Resistor, fixed: composition; .27 megohms; 1 W; ±10%
R85	RC41BF473K	Resistor, fixed: composition; 47,000 ohms; 2 W; ±10%
R86	RC21BF203J	Resistor, fixed: composition; 20,000 ohms; 1/2 W; ±5%
R87	RC31BF820J	Resistor, fixed: composition; 82 ohms; 1 W; ±10%
R88	2-945	Resistor, fixed: wire wound; 3,000 ohms; 5 W; ±5%; N.I.
R89		Same as R11
R90		Same as R43
R91	RC21BF392K	Resistor, fixed: composition; 3900 ohms; 1/2 W; ±10%
R94	RC21BF153K	Resistor, fixed: composition; 15,000 ohms; 1/2 W; ±10%
R95	2-1681	Resistor, fixed: composition; 22 megohm; 1/2 W; ±10%
R96	1-555	Resistor, variable: composition; 200,000 ohms; 0.4-0.75 W; ±20%
R97	1-478	Resistor, variable: composition; 100,000 ohms; 1/2 W; ±20%

MODEL RA-101B

ALLEN B DUMONT LABORATORIES, INC.

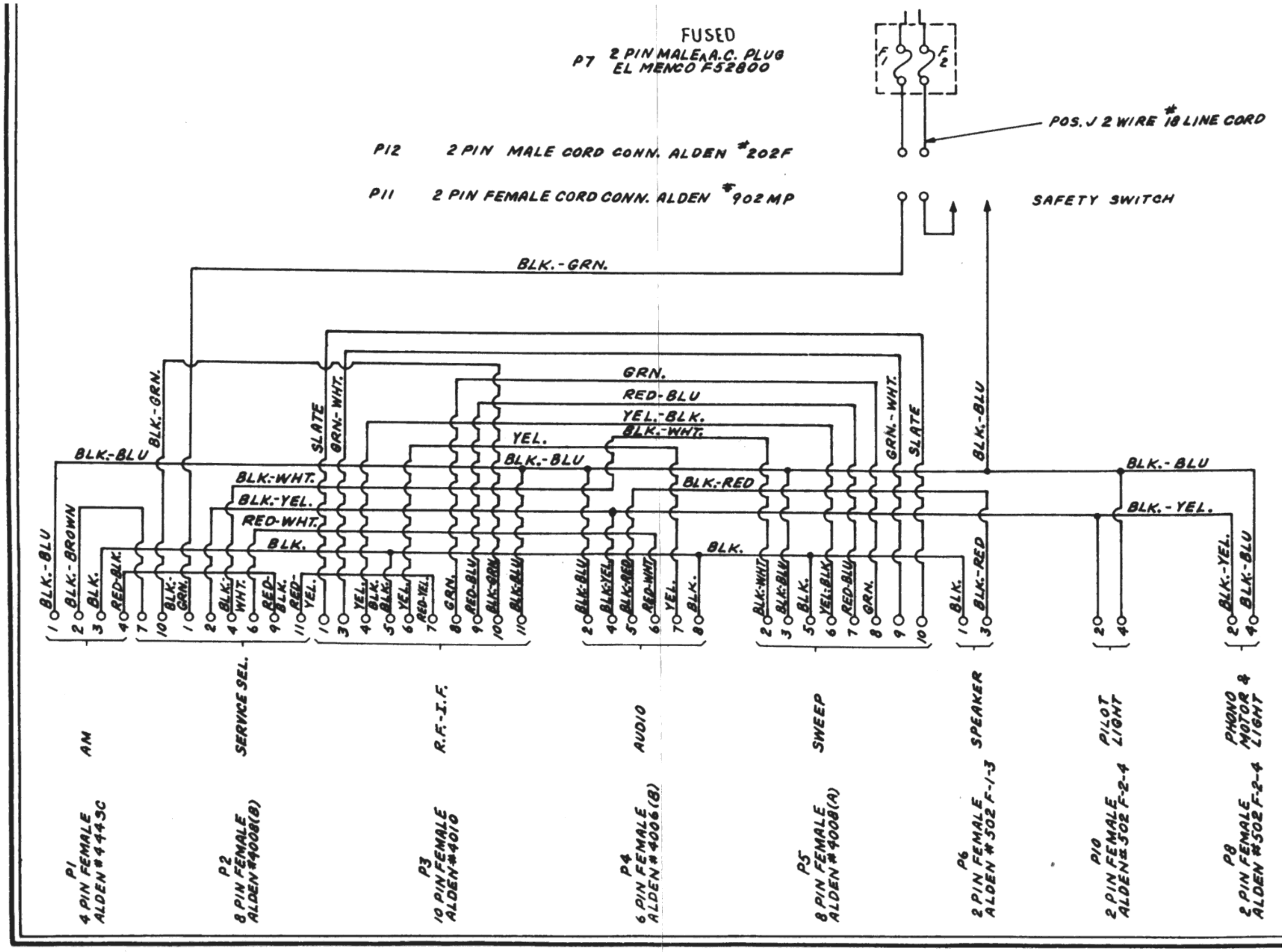
R.F.-I.F. CHASSIS

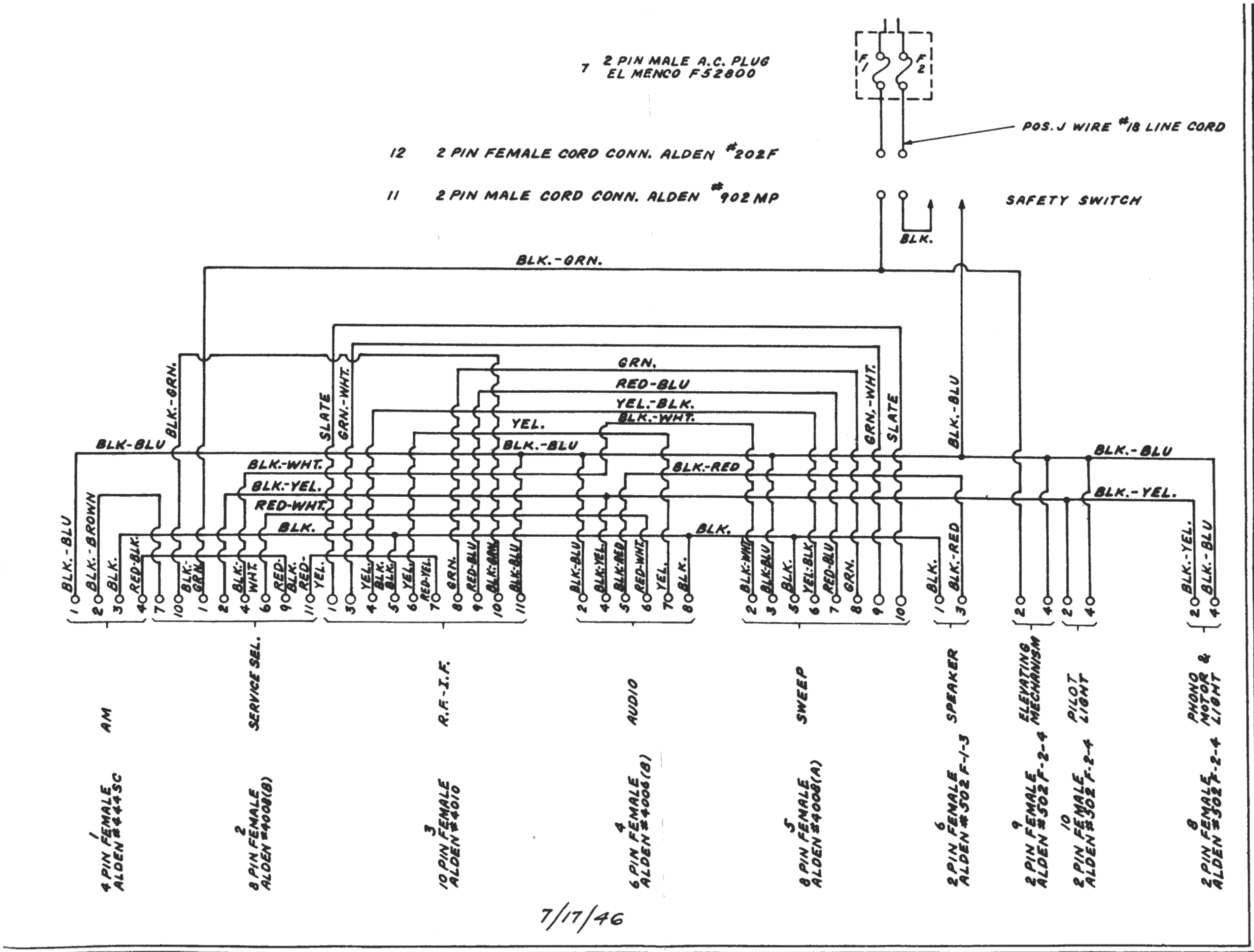


NOTES:
1. ✱ INDICATES MICA CAPACITOR.
2. + INDICATES CERAMIC HI-K CAPACITOR.
3. ± INDICATES ELECTROLYTIC CAPACITOR.
4. FIXED CAPACITORS WITH NO IDENTIFICATION ARE PAPER.
5. SM INDICATES SILVER MICA CAPACITOR.
6. ALL TOLERANCES ARE ±10% UNLESS OTHERWISE SPECIFIED.
7. FOR COMPONENTS BEARING CIRCUIT SYMBOLS REFER TO DE-2575-101.
8. FOR ASSEMBLY SEE DWG NO W 11045-102.

12/12/47

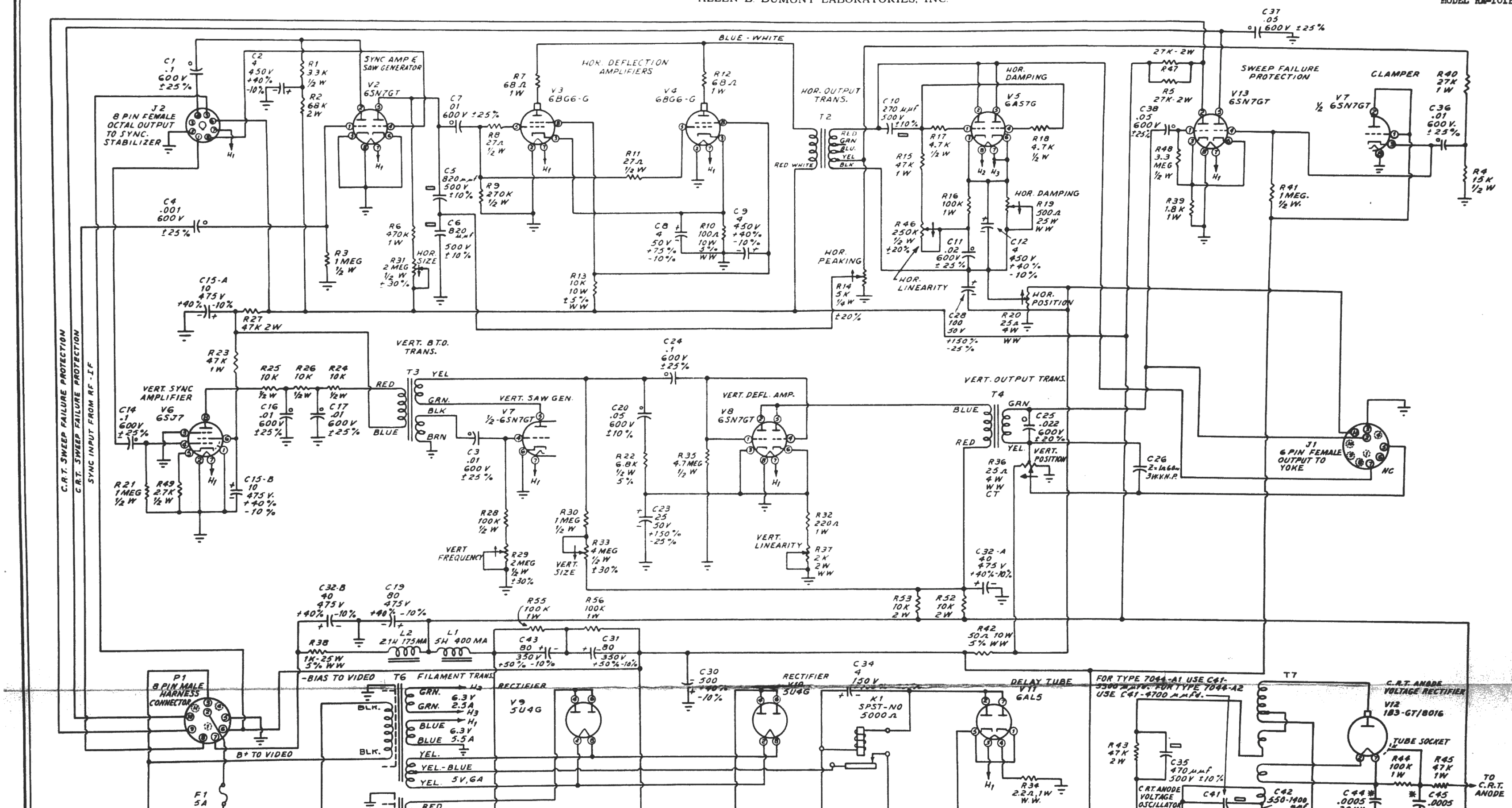
NOTE: PIN CONNECTIONS ON J1 ARE SHOWN FROM BOTTOM OR WIRING SIDE OF CONNECTOR. CONNECTIONS ON P1 ARE FROM TOP OR PLUG SIDE.


FUSED
P7 2 PIN MALE A.C. PLUG
EL MENCO F52800
P12 2 PIN MALE CORD CONN. ALDEN #202F
P11 2 PIN FEMALE CORD CONN. ALDEN #902 MP
POS. J 2 WIRE #18 LINE CORD
SAFETY SWITCH
BLK.-GRN.
GRN.
RED-BLU
YEL.-BLK.
BLK.-WHT.
YEL.
BLK.-BLU
BLK.-RED
BLK.-WHT.
BLK.-YEL.
RED-WHT.
BLK.
SLATE
GRN.-WHT.
BLK.-YEL.
P1 4 PIN FEMALE ALDEN #4443C
AM
P2 8 PIN FEMALE ALDEN #4008(B)
SERVICE SEL.
P3 10 PIN FEMALE ALDEN #4010
R.F.-I.F.
P4 6 PIN FEMALE ALDEN #4006(B)
AUDIO
P5 8 PIN FEMALE ALDEN #4008(A)
SWEEP
P6 2 PIN FEMALE ALDEN #502 F-1-3
SPEAKER
P10 2 PIN FEMALE ALDEN #502 F-2-4
PILOT LIGHT
P8 2 PIN FEMALE ALDEN #502 F-2-4
PHONO MOTOR & LIGHT
BLK.-BROWN
RED-BLK.
YEL.-RED
RED-YEL.


7 2 PIN MALE A.C. PLUG
EL MENCO F52800
12 2 PIN FEMALE CORD CONN. ALDEN #202F
11 2 PIN MALE CORD CONN. ALDEN #902MP
POS. J WIRE #18 LINE CORD
SAFETY SWITCH
BLK.
BLK.-GRN.
GRN.
RED-BLU
YEL.-BLK.
BLK.-WHT.
YEL.
BLK.-BLU
BLK.-RED
BLK.-WHT.
BLK.-YEL.
RED-WHT.
BLK.
SLATE
GRN.-WHT.
BLK.-BLU
BLK.-YEL.
1 4 PIN FEMALE ALDEN #444SC
AM
2 8 PIN FEMALE ALDEN #4008(B)
SERVICE SEL.
3 10 PIN FEMALE ALDEN #4010
R.F.-I.F.
4 6 PIN FEMALE ALDEN #4006(B)
AUDIO
5 8 PIN FEMALE ALDEN #4008(A)
SWEEP
6 2 PIN FEMALE ALDEN #502 F-1-3
SPEAKER
9 2 PIN FEMALE ALDEN #502 F-2-4
ELEVATING MECHANISM
10 2 PIN FEMALE ALDEN #302 F-2-4
PILOT LIGHT
8 2 PIN FEMALE ALDEN #302 P-2-4
PHONO MOTOR & LIGHT
7/17/46

ALLEN B. DUMONT LABORATORIES, INC.

MODEL RA-101B



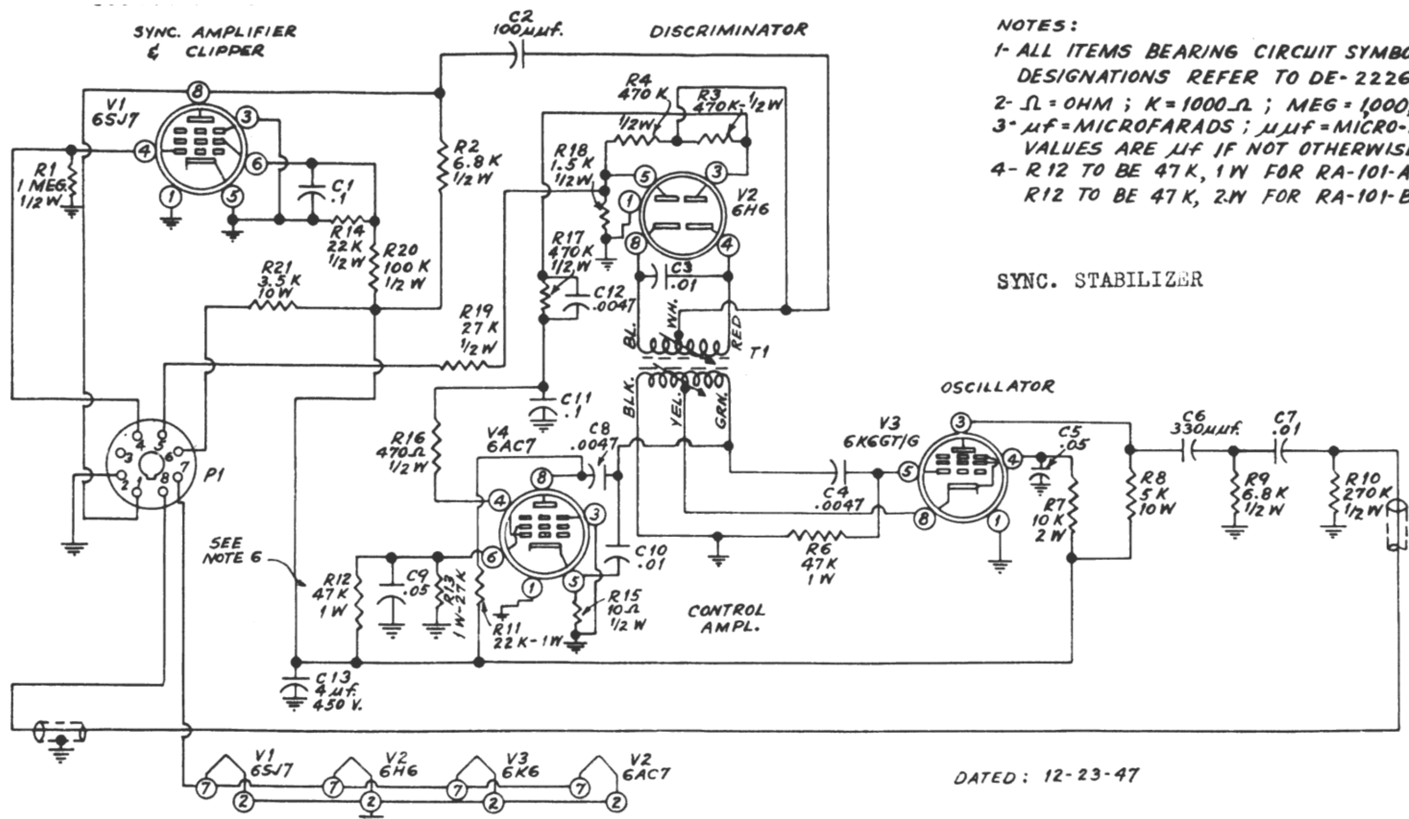
▭ = MICA
○ = PAPER
✱ = CERAMIC

NOTES:
1- ALL CAPACITOR VALUES ARE MICROFARAD UNLESS OTHERWISE SPECIFIED.
2- ALL RESISTORS ARE 10% TOLERANCE UNLESS OTHERWISE SPECIFIED.
3- C43 AND C31 MAY BE 80 μf +50% -10%, 350 V, 500 MA AT 120 ∼ RIPPLE CURRENT.

SWEEP CHASSIS

DATE: 6-7-48

NOTE: LEADS MARKED "A" ARE TO BE CONNECTED TO A SINGLE POINT INDEPENDENTLY.



NOTES:
1- ALL ITEMS BEARING CIRCUIT SYMBOL DESIGNATIONS REFER TO DE-2226.
2- Ω = OHM ; K = 1000 Ω ; MEG = 1,000,000 Ω
3- µf = MICROFARADS ; µµf = MICRO-MICROFARADS VALUES ARE µf IF NOT OTHERWISE SPECIFIED.
4- R12 TO BE 47 K, 1 W FOR RA-101-A (DE-2226-101)
R12 TO BE 47 K, 2 W FOR RA-101-B (DE-2226-102).

SYNC. STABILIZER

DATED: 12-23-47

The most important difference between the RA-101A and the RA-101B is in the sweep chassis. In the RA-101A telesets, a cascade voltage doubler using a 60 cycle transformer was used. The output voltage from this supply was approximately 12 Kv.

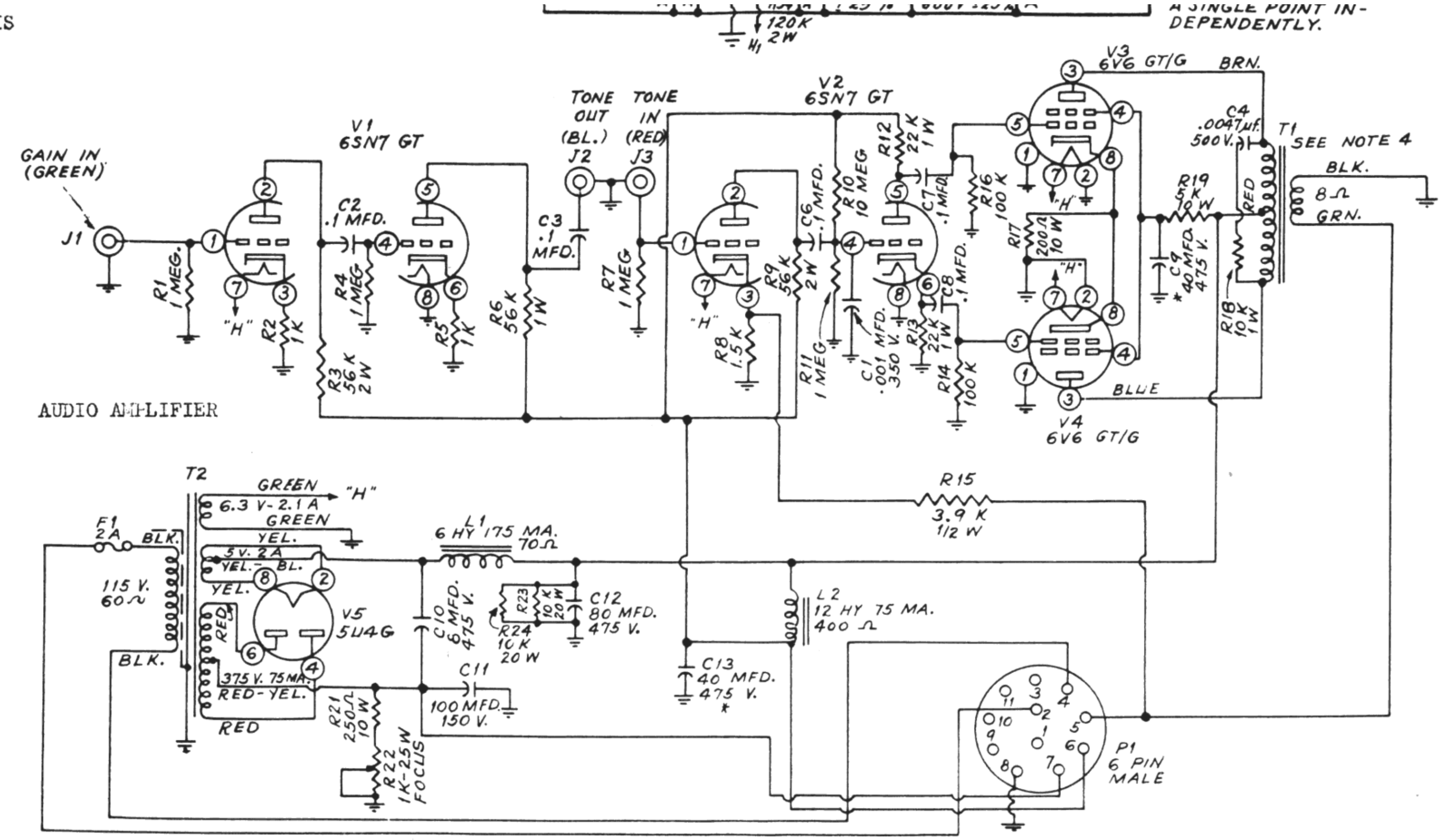
In the RA-101B, an RF power supply is used to provide the necessary high voltage. The output voltage of this supply is usually set for approximately 17 Kv. This output voltage can be varied by adjusting C42.

Another change that is incorporated in the sweep chassis o the 101B is the use of a 6AL5 in a time delay circuit. This t in conjunction with relay K1, prevents the application of high surge voltages to the filter capacitors of the low voltage pow supply.

In the audio amplifier used with the RA-101B an additional 10,000 ohm 20 watt resistor was added across C12, the 80 mfd. filter condenser in the power supply. This change was necess to increase the focus current because of the higher voltage us for the Cathode-ray tube.

SWEEP CHASSIS

AUDIO AMPLIFIER



DATED: 6-7-48

NOTES:
1- ALL RESISTORS 1/2 W. UNLESS OTHERWISE SPECIFIED.
2- ALL CAPACITORS 600 V. UNLESS OTHERWISE SPECIFIED.
*2 SECTION ELECTROLYTIC CAPACITOR.
3- FOR ELECTRICAL COMPONENTS SEE DE-1949-102 FOR RA-101-A & DE-1949-103 FOR RA-101-B.
4- WITH T1 TRANSF. MADE BY DINION & MARKED DNC., USE C4 = .0047 μfd.
WITH T1 TRANSF. MADE BY CHICAGO, USE C4 = .001 μfd.
CHICAGO TRANSF. TO BE RUBBER STAMPED IN RED WITH LETTER "C" ON TOP OF LAMINATIONS.

ssis of
This tube
f high
ge power

ional
mfd.
necessary
age used