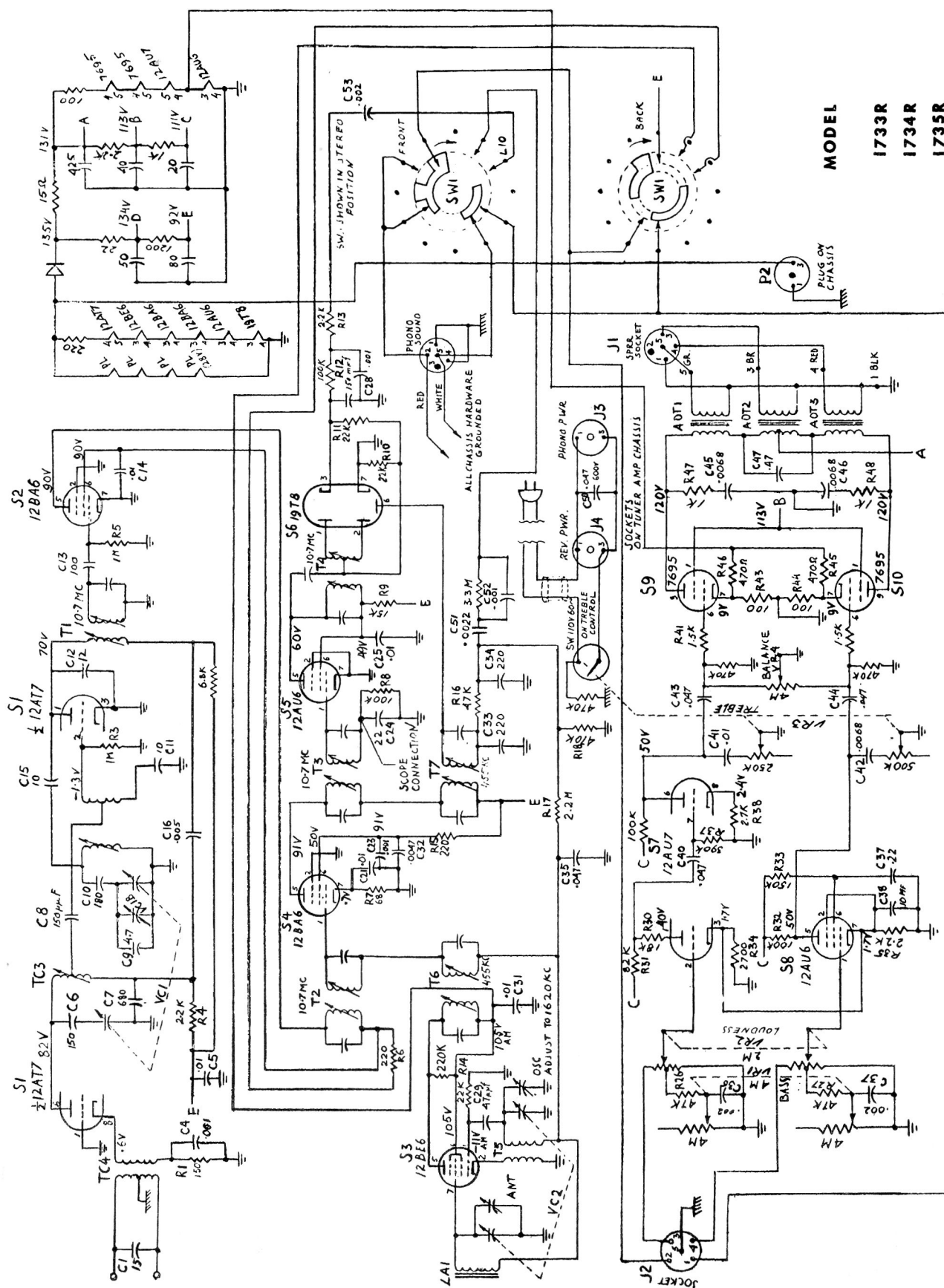
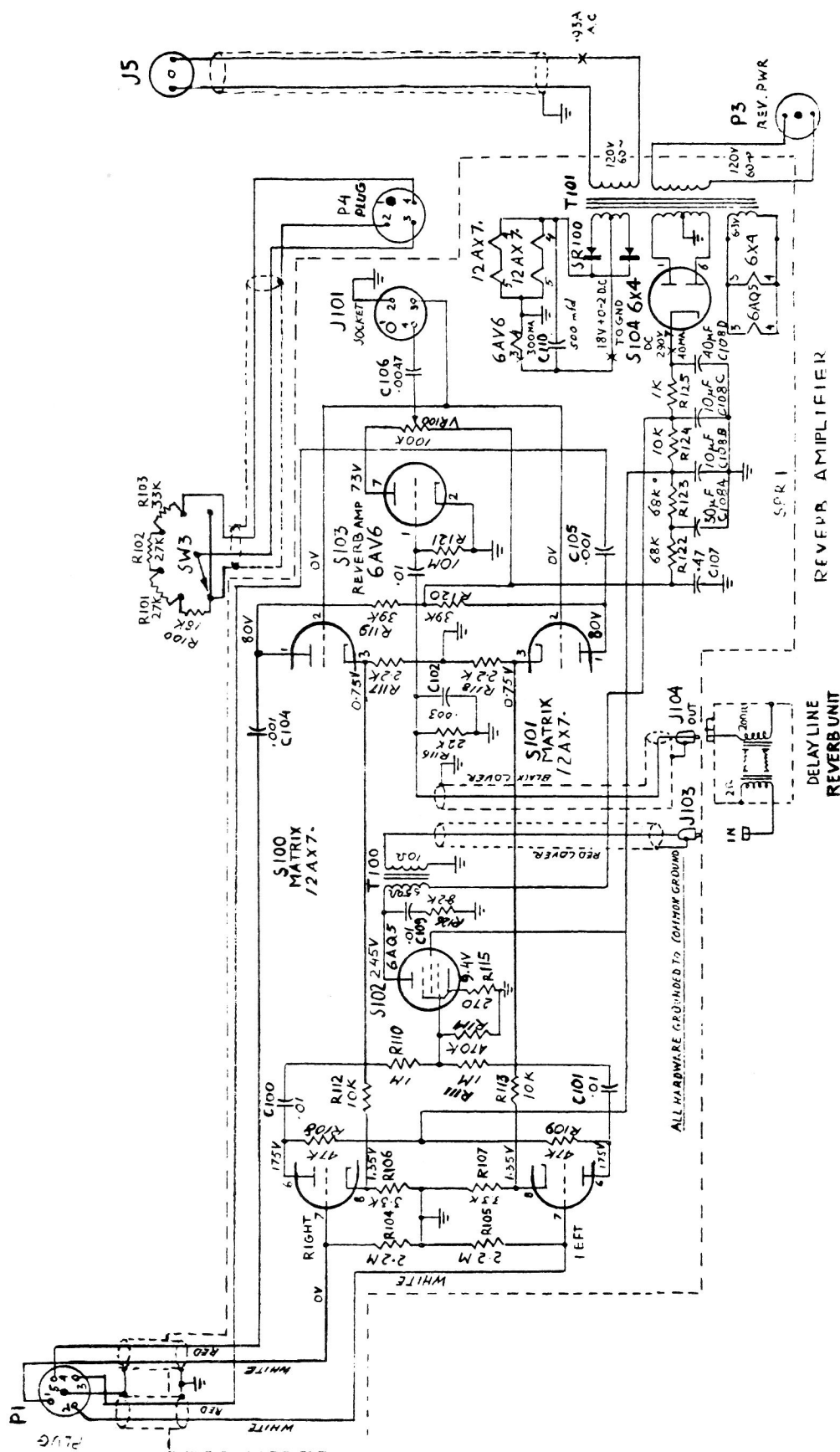






STEREO REVERBAPHONIC OPERATION

The two stereophonic channels are referenced as the R (right) channel and L (left) channel. The reference to direct signal means the regular R or L signal without any reverberation signal component added. The reference to main amplification system means the normal high fidelity amplifier without reverberation circuitry added.

The signal from channel R is impressed onto the grid of one section of a 12AX7 tube S100. The signal is coupled via its cathode into the cathode of the second section of the 12AX7 which serves as a matrix stage. The signal from the plate of this stage is fed to the input of the R channel pre-amplifier S8 of the main amplification system. So far, nothing has been introduced to modify or change the character of the direct R channel signal, including its level. Similarly the L channel signal is routed via a second 12AX7 S101 in an analogous manner to the input of the L channel main pre-amplifier S7. A monophonic signal source would of course simply place the same signal on both L and R channels.

The R channel signal in addition to its path outlined above, appears in amplified form at the plate of the first section of the 12AX7, S100 and is conducted via a suitable network to the grid of a 6AQ5 driver stage S102 in parallel with a similarly derived signal from the L channel source S101. The composite R and L signals are now introduced, by means of a coupling transformer T100, to the input of the Philco Reverbaphonic Unit.

The input is connected to a field winding that induces energy via a suitable magnetic structure onto two ferrite rotors. Thus a turning force is induced into each of the two rotors proportional to the signal in the field winding. Each rotor or motor is physically connected to a mechanical delay line of discrete length, diameter and winding pitch. The torsional motion applied to these lines takes a finite period of time to travel from one end to the other. The far end of each line is connected to a similar ferrite rotor or generator which when actuated by a torsional impulse induces a signal into a second field winding, again in proportion to its motion, but now significantly time delayed from the

original signal source. The mechanical parameters of the two referenced lines in conjunction with their transmitting and receiving transducers provide time delays of .029 seconds and .037 seconds respectively. To concentrate all of the sensitivity of the system into the torsional mode and thus minimize excitation by any other mode, the delay lines are split in the center and each half is reverse wound. Because the delay line termination is operated as an open ended or unmatched system a portion of the energy is reflected back over the line. These repeated reflections decay in value logarithmically. This is the same character of decay which occurs in a reverberant hall. The use of the two delay lines gives a relatively smooth delay characteristic to the reverberant signal. By means a realistic character is imparted even on sustained notes.

After being discreetly delayed and shaped by the Reverbaphonic Unit it is impressed onto the grid of a 6AV6, output amplifier stage S103. The plate is coupled into a resistance network through the reverber control VR100. The

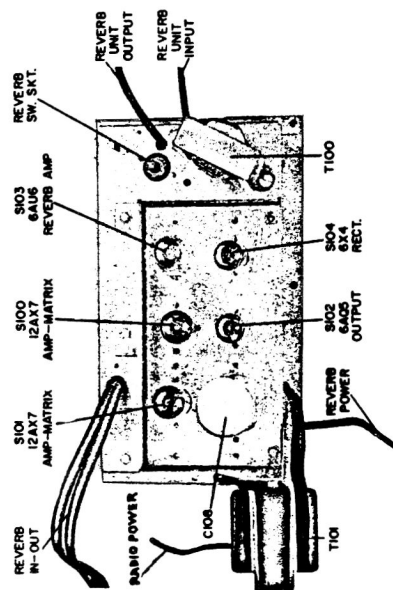
Reverb switch WS2 varies this network to permit the selection of the desired level of reverberant signal which is to be eventually introduced into the main amplifier system.

The higher the level of the reverberant signal impressed on the system the greater is the length of audible time that the logarithmic signal envelope is effective. Thus, by varying the Reverb control setting reverberation time can be in effect varied up to 2 seconds. This action of the control means that subjectively the apparent size of a living room can be varied up to that of a large auditorium.

The Reverb switch decreases the signal in three 6 db steps from a maximum point 3 db above the direct signal down to a point 15 db below the direct signal. An additional step cuts off the reverberant signal completely. Just as the reverberation in a live auditorium creates an additional sound level over the same sound produced in a heavily draped room, so the reverberated signal from the Philco Reverbaphonic system adds a discreet amount of energy to the main signal.

The reverberant signal, after leaving the arm of the Reverb switch is impressed onto the grids of the R and L matrix stages, the second sections of S100 and S101. At this point the plate circuits of the R and L matrix stages contains not only the unmodified R or L direct signals but have matrixed with them a certain amount of the reverberated signal. The composite signal resulting from the addition of the reverberated signal to either R or L direct signal is now impressed onto the respective R and L main preamplifier grids S8 and S7. Thus our path is now complete with the reverberant signal properly matrixed with the direct signal.

Note that the Reverbaphonic system is located at a relatively low signal level point at the input to the main amplifier. Since this is a very sensitive point to undesired extraneous material, particularly hum, the heaters of the tubes used in the reverbaphonic sound amplifier are operated from direct current supply.



ALIGNMENT PROCEDURE

To align without Reverb. unit connected, a jumper plug must be used to connect Power (110 V - 60 Cycle) from Socket marked Reverb. Power on Radio Chassis to plug marked Radio Power on same chassis.

AM ALIGNMENT PROCEDURE

RADIO CONTROLS - Set the loudness control to maximum, set the function switch to AM and the tuning gang closed.

OUTPUT INDICATOR - Connect either an a-c voltmeter or an oscilloscope across the voice coil terminals.

SIGNAL GENERATOR - Use an AM r-f signal generator with modulated output.

OUTPUT LEVEL - During alignment, maintain the output below .4 volts a-c.

CAUTION - To avoid shock hazard, the receiver should be connected to the a-c line through an isolation transformer.

1. Connect generator, through a .05 mfd condenser, to grid, pin 7, of the AM convertor, S-3. Connect ground lead to chassis.
2. Set generator to 455 kc, tuning gang fully closed and adjust, in order T6, T7 Top and Bot cores for maximum output. Repeat until no further gain is indicated.
3. Connect generator to radiating loop. Set generator to 1600 kc. Set receiver to 1600 kc as indicated by pointer. Adjust VC-2B for maximum.
4. Set generator to 1400 kc. Tune receiver to signal and adjust VC-2A for maximum.

FM ALIGNMENT PROCEDURE

AM Broadcast Section should be aligned first

1. Calibrate the scope for 2 volts P/P.
2. Connect the scope, through a 100,000 ohm isolating resistor, to junction of R8 and C24. Scope ground lead to chassis. (see schematic)
3. Connect the signal generator to bottom of T1 secondary (junction of T1 with R1 and C5). Generator ground lead to chassis.
4. Inject marker signal, 10.7 mc (unmodulated).

5. Inject sweep signal, 1.7 mc, approximately 150 kc total deviation (do not over sweep).
6. Adjust Top and Bottom cores T3, T2 and T1 for maximum amplitude, symmetrical curve with the 10.7 mc marker at top of curve. Adjust input signal to maintain output, as shown on scope below 2 volts peak during alignment. Repeat step 6 until no further gain is obtained.
7. Calibrate the scope for 5 volts P/P.
8. Change the scope connections to L10 (FM audio output to function switch).
9. Remove sweep signal. Inject 10.7 mc, 30% AM modulated signal. Adjust Bottom core T4 for minimum indication between peaks. See note below.
10. Inject 10.7 mc sweep signal and adjust Top core T4 for maximum symmetrical output.
11. Touch up cores as in Step 6 plus Top core T4 for a symmetrical, maximum amplitude, discriminator curve. To check alignment, discriminator curve should not shift in frequency with an increase in signal input (below overload). If a shaft does occur, the I-F is not properly aligned, particularly the first stage, T1.
12. Inject 108.5 mc, 30% AM modulated signal, through an antenna matching network to the receiver antenna terminals.
13. Open tuning condenser. Insert a 6 mil, non-metallic, shim between stator and rotor of the FM gang and close gang against shim. Adjust VC3 for minimum indicating between peaks.
14. With tuning condenser fully closed, inject 87.75 mc, 30% AM modulated signal, and adjust TC2 for minimum indication between peaks. See note below.
15. Inject 91 mc, sweep signal and with tuning gang tuned to 91 mc, adjust TC3 for maximum output. See note below.

NOTE: Signal input must be as low as possible in order to obtain a sharp indication. In some cases it may be necessary to set signal generator to the first subharmonic.

RECORD CHANGER - Garrard Model 209.
