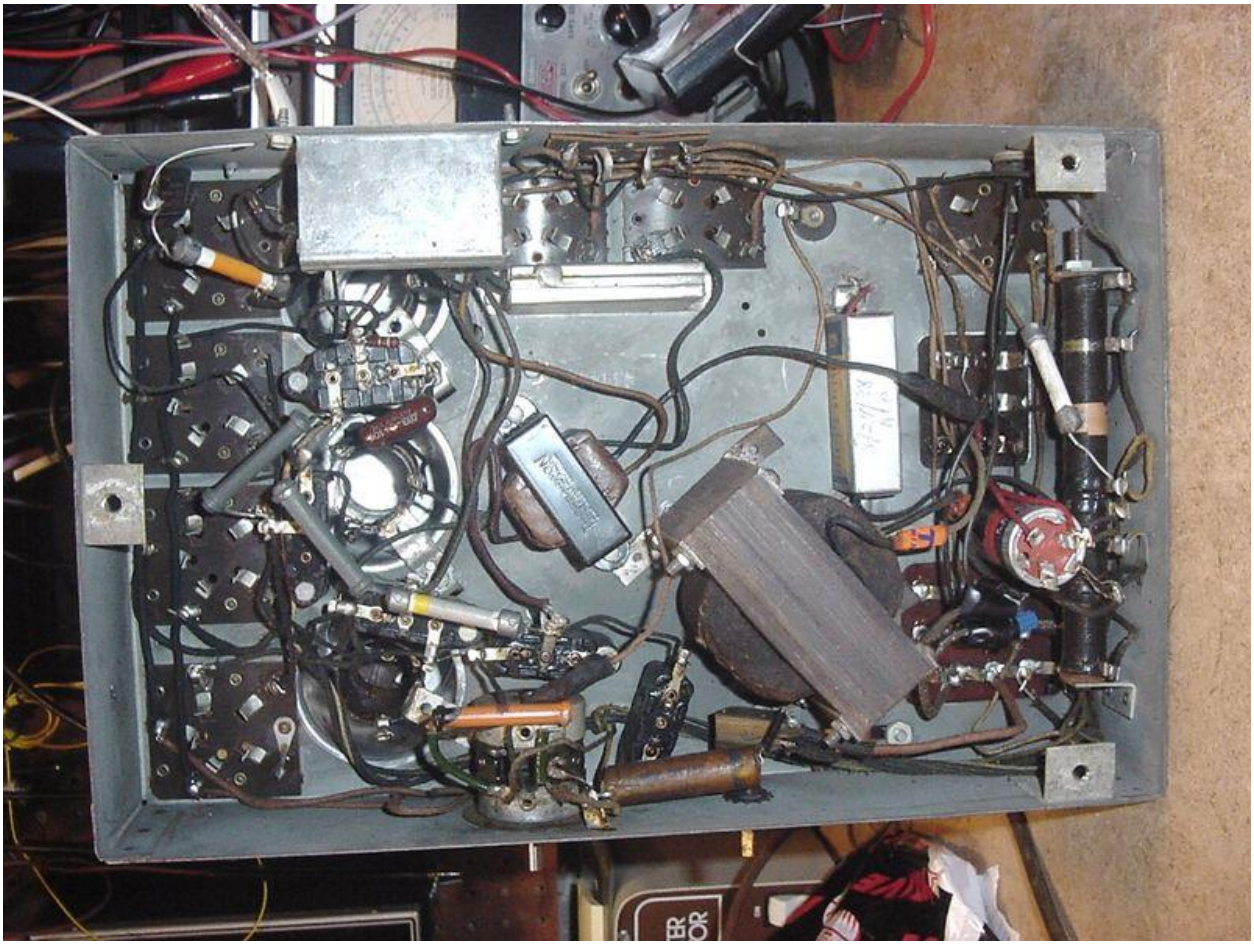
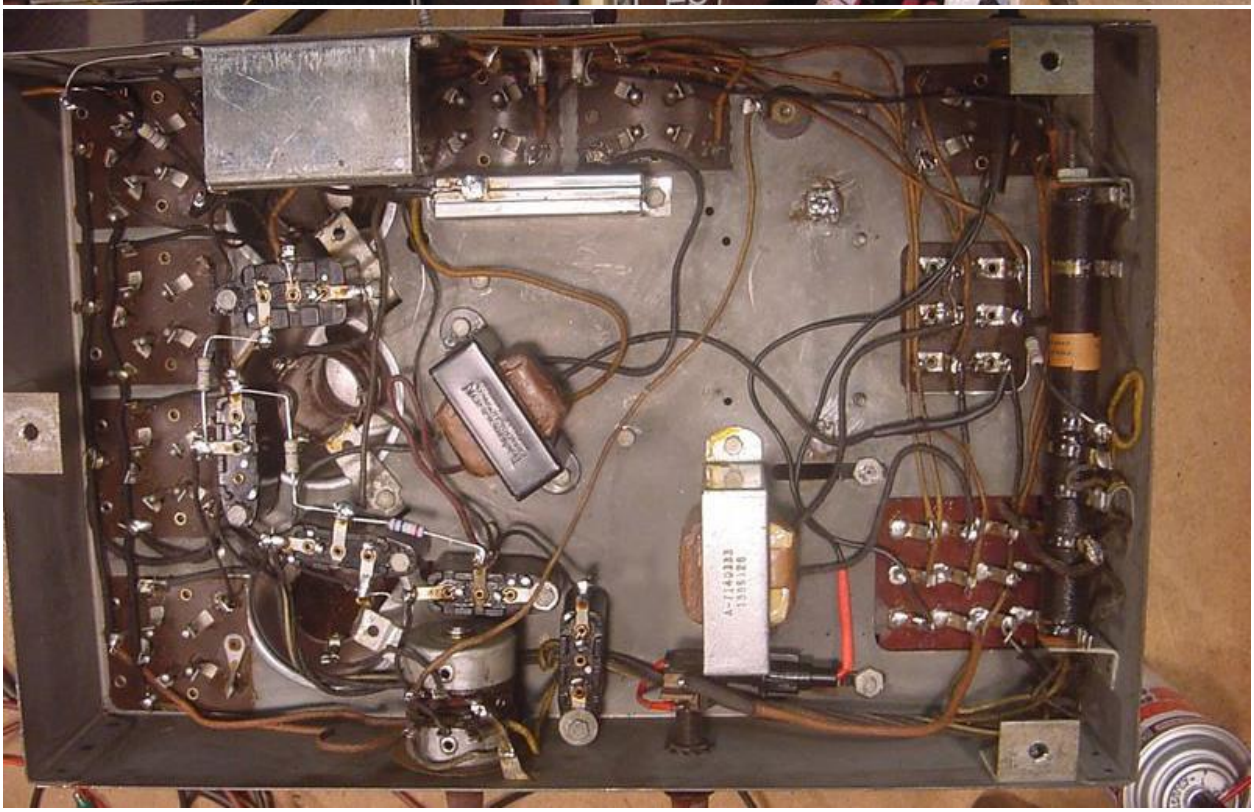
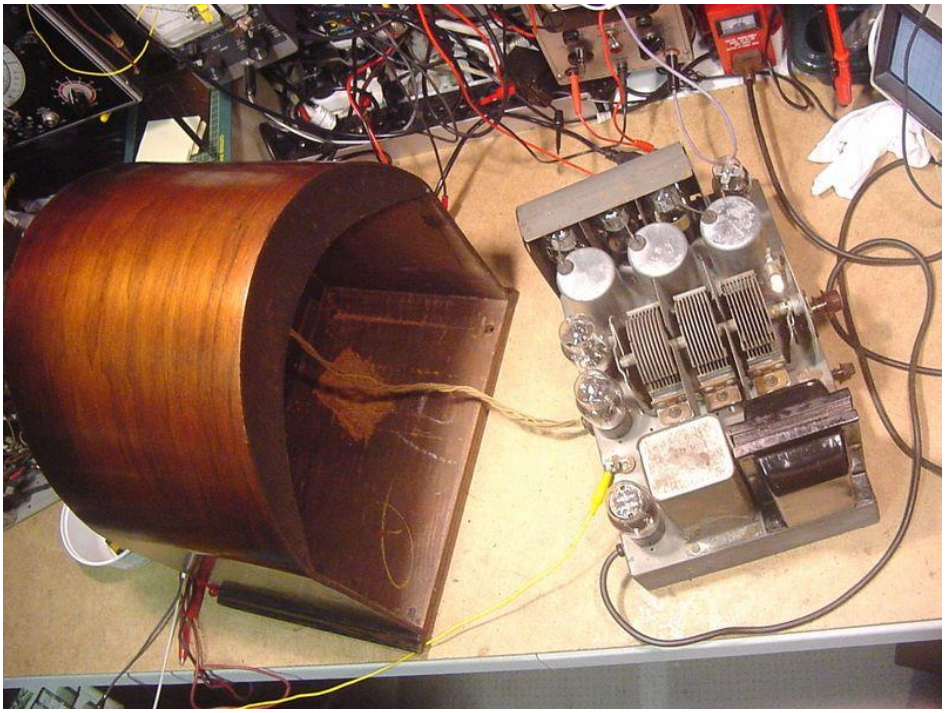
Philco Model 20 'Baby Grand' Restoration – Gerry O'Hara

The Philco model 20 'Baby Grand' was the first of the Philco 'cathedral' table top sets, introduced in August, 1930. This is a tuned radio frequency (TRF) design, but using more modern technology than the 1925 FADA described in another SPARC project article. By 1930, the 'Neutrodyne' circuitry of the FADA and its contemporaries had given way to the introduction of the screen grid valve that gave much greater inherent stability at radio frequencies. This technology, coupled with improved inter-stage screening and the convenience of a single knob tuning represented a great step forward in receiver design in the late-1920's. The next big step in receiver evolution was to be when RCA began making its superheterodyne (superhet) patents available to its licensees in late-1930, but the Philco 20 pre-dates that step (just). Bringing a new receiver to market at the onset of the 'Great Depression' was a risky business and the performance versus price was a very important consideration. It turned out that the Philco 20 was a true 'depression buster' for the Philco company and sales of the Model 20 were in excess of 300,000 – a combination of a reasonable price ($49.50, less tubes), good performance and a popular cabinet style were a winning combination in a highly-competitive market. The set of tubes was not cheap though: 3 x #24 at $3.30 each, a #27 at $2.20, 2 x #71A at $2.25 each and a #80 at $1.90, totalling $18.50. The success of the Model 20 was the stepping-stone for the company to develop a new range of superhet designs in 1931, including the classic Model 70 and 90 cathedrals. The SPARC museum has examples of the Model 20 and Model 70 on display.

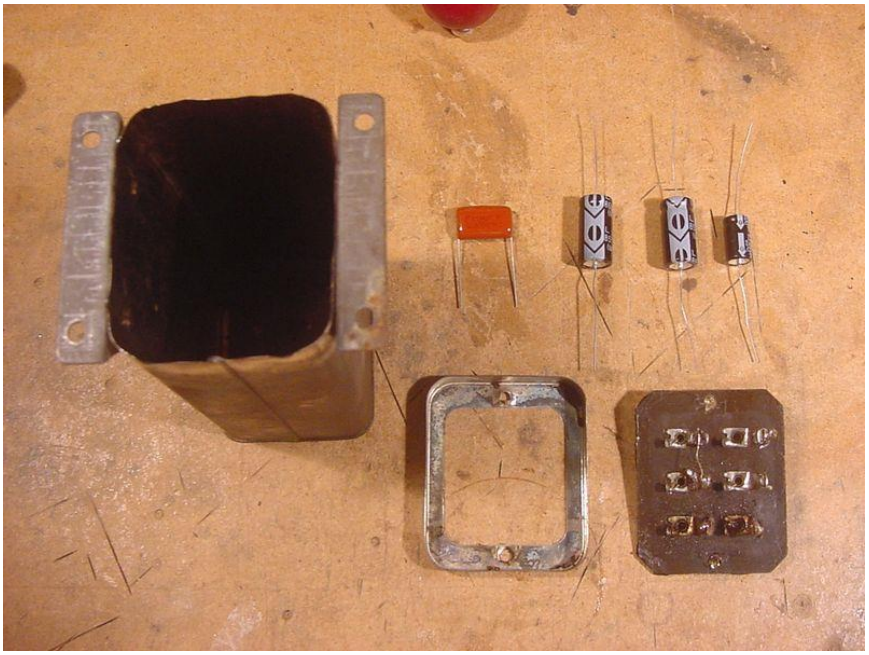




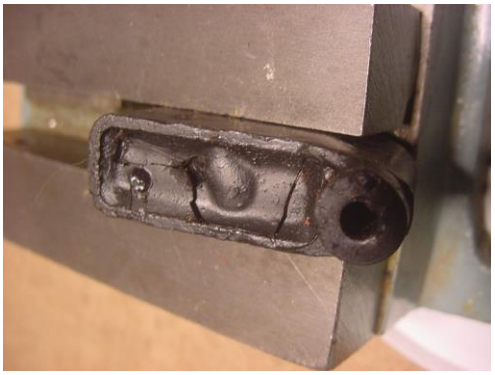


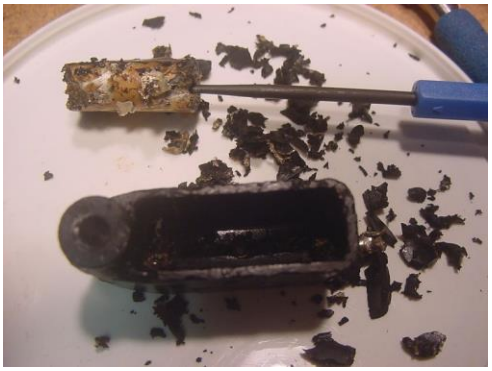
sharp cut-off screen grid tubes in the tuned RF stages, another #24 as a tuned-grid detector, a #27 triode as first the audio amplifier, a pair of #71A triodes in a push-pull output stage and a #80 rectifier in the power supply. A high level of metal screening was used to isolate the RF coils from each other and to screen the RF and detector tubes. The number of passive components is minimal: 7 fixed resistors (one a 5 section power resistor), volume control (twin variable resistors, one section on the aerial, the other varying the bias of the two RF tubes), 16 fixed capacitors, a 3-gang tuning capacitor, 3 RF transformers, 2 audio transformers, the power transformer, choke, loudspeaker, dial light and switch. Four of the fixed capacitors (power supply-related functions) are contained in a large tar-sealed metal can (visible above the chassis).

This particular Model 20 was an Ebay find at a reasonable price for a relatively clean example. The case



was only touched-up where needed (using a furniture touch-up pen) and then cleaned using lemon oil and polished with wax. However, inspection of the chassis revealed that it had several 'battle scars' where several previous repair attempts had been undertaken, testament to this being a well-used radio over the years. Replaced components included the push-pull driver transformer (replaced with a Thoradsen unit), the smoothing choke (replaced with one so large





that the inside of the wooden case bottom had been scooped out to accommodate it), the power supply filter capacitors (replaced with can and cardboard-cased units – one dated March, 1938), along with a couple of paper capacitors replaced with Mylar types.

The chassis was dusted and then cleaned-up using alcohol. It was decided to re-cap this set as an exercise in re-stuffing the Philco Bakelite style capacitors (see Philco Model 16B article). Four types of original fitment Philco fixed capacitor can be seen here: the large metal can originally contained four high voltage paper capacitors, sealed into the can with coal tar to keep moisture out. These were removed by applying a heat gun gently to the metal can for 15 minutes or so until the tar softened enough to allow the innards to be extracted. Re-stuffing the can with the four replacement modern components was easy. The second type present in this set is a paper capacitor(s) installed in a small metal can. These can easily be removed and re-stuffed with modern components. The third type is the Bakelite-cased capacitors mentioned above. These comprise a moulded Bakelite case into which a paper capacitor(s) and sometimes a low-wattage wire-wound resistor, were inserted and sealed-in with coal tar. These were re-stuffed by carefully prying out the tar and old component, cleaning out the vacated space and connections and installing the correct-value new components (there is no need to re-seal the unit as modern components are adequately protected against moisture and when re-installed in the receiver the new components face the chassis and so are hidden from view). Each Bakelite capacitor takes about 30 minutes to process in this way. The final capacity type is moulded silver mica – it is rare for these types to give problems (though not unknown) and those in this set tested fine.

In addition to removing the 'mongrel' replacement capacitors and re-stuffing most of the original-fitment capacitors, the large choke was replaced with one more in keeping with the under-chassis layout. The large multi-section power resistor was in good shape, however, all the

original ‘dog bone’ carbon resistors checked out of tolerance and so were replaced with modern metal-film types (no attempt was made to disguise these as ‘dog bone’ types). The volume control was removed and cleaned using De-Oxit. The tuning gang was carefully cleaned and re-lubricated with molybdenum grease and an in-line fuse was fitted into the power transformer primary winding to provide some protection.

Once the chassis work was completed, the radio worked well right from switch-on, with all the tubes as supplied with the set as-bought.