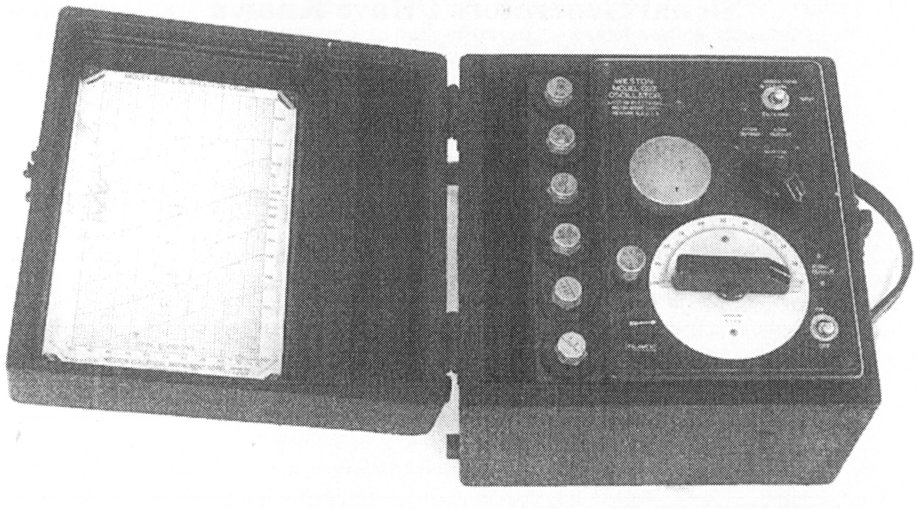
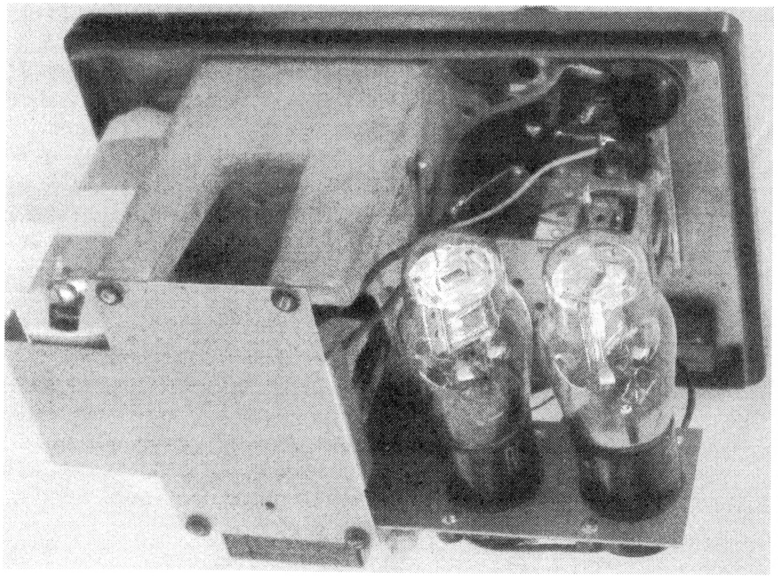


**Above : Weston Modulated Oscillator model 692 in its carrying case. The output lead (not shown) is carried in the slot alongside the six coils which, in use, are plugged in under the removable metal cap above the dial. The attenuator control is to the right of this cap.**

**Below: Interior of the Oscillator showing the cast aluminium box with HT Battery clamped at the back of it and LT battery to the left: both under the screwed on metal plate.**





My first contact with a purpose designed modulated oscillator was when I started work as a very junior trainee radio serviceman and the firm I worked for imported a shiny new Weston instrument. This was the pride and joy of the workshop manager and as we ran a "B" class broadcast station from the shop he decided to set our station on frequency using this hand calibrated oscillator as a frequency standard. Our station used a "master oscillator-tuned amplifier arrangement" and by dint of having one serviceman in the basement to tune the oscillator dial, one across the road but visible through the station doorway, one at the window of the workshop located on the second floor of the building and the manager at the workshop bench with the Weston oscillator coupled to a broadcast receiver we managed to zero beat the station onto frequency using a system of prearranged hand signals. I believe, some days later the local radio inspector with his calibrated wavemeter quietly made a correction of a few Kc/s (kHz) to our frequency. Today a radio station off frequency by a few 10s of Hertz would be rapidly detected but in the early 1930s accurate standards were few and far between.

This Weston Modulated Oscillator was quite advanced for its day and a few years ago I acquired one complete with instruction manual from the late Don Sutherland. As was his wont, Don had played with it but it was in fair order and a good cleanup plus some dull black paint on the carrying case saw it physically restored

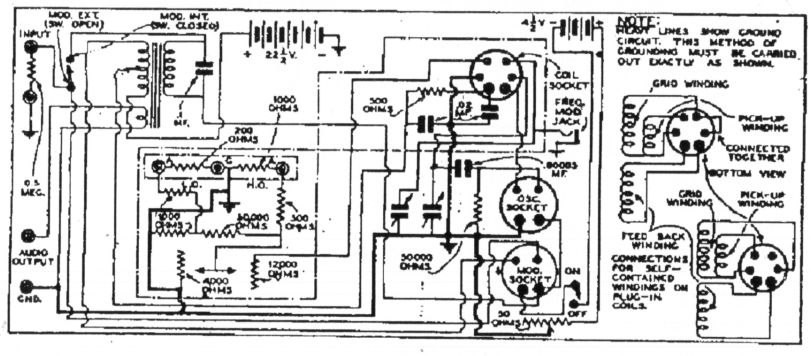
From a design point of view this 1930s modulated oscillator is remarkably good. A set of six plug-in coils cover the frequency range of 100 kHz to 21 MHz . These coils plug into a socket in a fully enclosing cast aluminium box with the output attenuator shielded within a separate compartment of this box. A two gang variable capacitor is used with both sections of the gang paralleled by a jumper on the lower frequency coils, one section only being brought into use on the short wave ranges. Two type 30 valves (RF oscillator and AF modulating oscillator), the two gang variable capacitor together with the cast aluminium box and the batteries are contained within a stout copper box thus reducing any stray coupling to a minimum. This box sits within a black wooden carrying case . While the dial is not directly calibrated, a set of graphs within the lid of the carrying case makes it reasonably easy to set the frequency.

The form used for the circuit schematic (shown at top overleaf) is rather different from that we use today. Note that it shows to some extent the destination of the wires which is probably sensible since an incorrectly run wire could lead to RF current traversing the copper shielding cabinet with the likelihood of stray radiation from the cabinet. A more modern version of this schematic is shown below overleaf.

The Company were quite adamant on the limitations of this instruments. Quoting from the operating manual put out by the manufacturers, Weston of Newark, New Jersey:

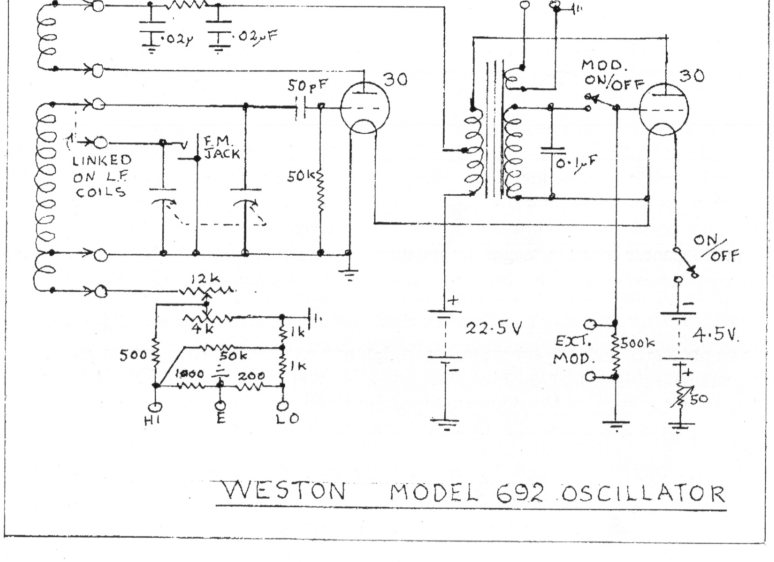
> It should be understood that oscillators of this general type can not be used as signal generators for laboratory measurement. The accuracy requirements for exact frequency and output calibration are extremely severe in such service and can only be met by rather elaborate equipment carrying compensating networks, control instruments, special balancing capacity adjustments and the like.

Nevertheless while this is obviously true, the instrument is a good example of the type used by radio servicemen in their daily work and the performance stands up well against many others of the same type including much later designs.




**Above : Schematic of Weston Model 692 Modulated Oscillator as drawn at the time of manufacture.**

**Below Above schematic redrawn in more modern form**






**Restoration**

As might be expected there were electric
modulation transformer had an open prim
the transformer and peeling off the top lay
resisted strongly and I had to cut through t
the primary which luckily were on top.. T
had no idea of the number of turns and the
and calculating gave me a rough idea of t
turns, connecting the transformer in circui
the modulator operated correctly, I manag
noting that when, afterwards, I discussed t
time I give the job to him as he had a chem
soften the enamel allowing the turns to be e

Having rewound and installed the modulat
to oscillate on some of the bands. The typ
determined that the coils were OK as they
some RF loss in the original wiring. I repl
were only two components left to cause
bakelite socket which took the coils. Q
culprit - it reduced the Q of the coils by s
is baseboard mounting and a replacement
modified aluminium standoff for the socke
had deteriorated with probably some absorp

In the next article of this series I propos
Generators of the 1930s which I had the go

# MODEL 692 OSCILLATOR TYPE 2

1. This device is a self-contained battery operated all-wave oscillator using plug-in coils. Two type 30 tubes are used, one being a radio frequency oscillator and the other a separate modulator. The oscillator itself is independent of frequency, the frequency range depending only on the plug-in coil.

2. To replace the tubes or batteries remove the four corner screws and lift the complete unit out of the metal case. Be sure that the ON-OFF switch is in the OFF position.

3. Two standard type 30 tubes are used in the four-prong sockets. The calibration on this oscillator was taken with RCA Radiotron tubes and because of minor internal capacity variation between tubes of different makes, tubes of this manufacture are recommended to maintain the original calibration.

4. Remove the four screws that hold the "T" shaped plate to the aluminum casting. Take off this plate and disconnect the battery leads. Replace the "B" battery with a 22.5 volt Burgess 4156 battery or equivalent, with its negative terminal next to the tube socket.
Connect the short black ground lead to the negative "B" battery terminal.
Connect the short red lead from the reactor to the positive "B" battery terminal.

5. Place on its end directly behind the B battery, a 4.5 volt Burgess No. 2370 battery or equivalent, with its negative terminal next to the modulation control switch.
Connect the long black lead from the ON-OFF switch to —4.5 volt battery terminal.
Connect long red lead from filament rheostat to positive filament battery terminal.

6. Place the T shaped battery clamp in position, clamping the batteries together; insert and screw down the four corner screws, clamping this plate to the casting. Drop the complete unit into its metal case, and replace the four panel screws.

7. The large bar handle operates the two gang variable condenser. The plug-in coil automatically selects either one or both of the gang sections of this condenser as required. Special frequency markings can be made in pencil on the blank section of the dial. The 100 divisions on this dial correspond to the markings from 0 to 100 at the bottom of the calibration card mounted in the cover. The calibration curves are drawn through points individually calibrated against a crystal controlled standard and should be read accurately for best results. The black curves are read with the black figures, covering frequencies from 100 to 1500 k.c.; the red curves are used with red figures for 1500 k.c. up.

8. To obtain outputs of approximately 1 to 100 microvolts use the LOW OUTPUT (L.O.) connection. For higher outputs up to 0.1 volt use the HIGH OUTPUT (H.O.) connection; always connect the outer cover of the shielded lead to the center or GROUND (G) jack. The "L" pad attenuator controls the signal with minimum reaction on the oscillator circuit; adjust this for the level desired.

9. Keep ON-OFF filament switch in the OFF position when not using the signal. Keep FILAMENT rheostat with the arrow on face of the knob pointing to small white dot on panel, this position being adjusted for 2 volts on tube filaments.

10. The MODULATION control switch in upper right-hand corner is placed in the INTERNAL position for a 400 cycle modulated R.F. signal. Two jacks marked AUDIO OUTPUT are connected for obtaining a 1 volt, 400 cycle signal for testing amplifiers and detector circuits, etc. Any impedance down to and including 500 ohms may be placed across these AUDIO OUTPUT jacks without materially affecting the modulator circuit. With the MODULATION switch in the INTERNAL position a pure R.F. signal is available. The two pin jacks beside this switch are used for external modulation from a beat frequency oscillator or phonograph pick-up. The input impedance is 500,000 ohms and a standard high impedance pick-up may be connected directly or through a 1 to 6 step-up transformer to these jacks, thus obtaining sufficient modulation from standard frequency records to run approximate fidelity curves on receivers.

11. To operate the oscillator on the broadcast band, the metal cap on the coil compartment should be removed, the "B.C." coil plugged into the coil socket, and the metal cap replaced. Place the lower right-hand toggle switch in the ON position, and the upper right-hand toggle switch in the INTERNAL position. Using the shielded lead connect from the oscillator output jacks to the antenna and ground posts of the receiver; a signal will immediately be available.

12. To operate on the intermediate bands, the intermediate coil covering the I.F. frequency of the receiver under test should be selected. With the plates of the receiver oscillator gang section short-circuited or the oscillator tube removed from the receiver, connection can be made to the grid of the first detector tube and alignment of the intermediate frequency transformers can be made. A jack mounted to left of the dial is provided for connection to frequency modulators for use with cathode ray oscillographs. Keep jack hole closed with cap nut when not using frequency modulator.

13. To operate on the short-wave bands, the coil covering the frequency required should be selected. The S.W. 1 coil covers a frequency from 1.5 to 4.0 m.c.—the S.W. 2 from 4.0 to 10 m.c.—S.W. 3 from 10 to 22 m.c. When aligning a receiver on the short wave bands, only those trimmers associated with the individual short-wave band under test should be adjusted.

14. This oscillator is supplied with six plug-in coils as standard equipment. When ordering replacement coils give the oscillator serial number and type numbers of coils desired.

15. Keep the filament switch turned off when not using the oscillator signal.

**Weston Electrical Instrument Corp.**
**Newark, N. J.**

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