INSTRUCTION SHEET for

THE NEW CARDWELL V. H. F. OSCILLATOR KIT

(Part List PL-20,024)

The oscillator assembly herein contained embodies many features all of which result in stability and reliability.

Care should be observed in the completion of the unit. Do not bend the rotor plates! Watch for solder splashes since they are very difficult to remove from the silver plated surfaces. Use only rosin-core solder.

Before starting assembly it would be wise to examine the general circuit diagram Fig. 1. Turn the unit over so that it rests on the socket and solder the small filament bypass capac-

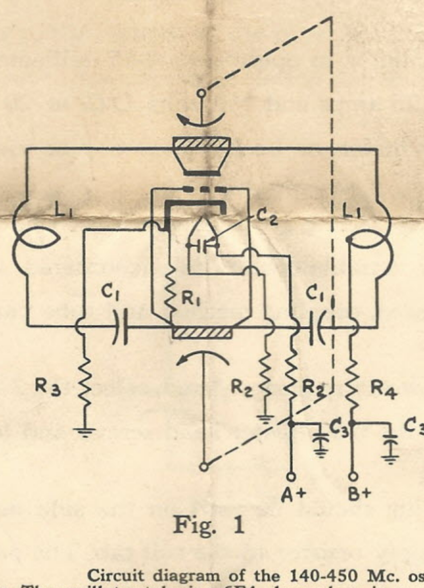


Fig. 1

Circuit diagram of the 140-450 Mc. oscillator. The oscillator tube is a 6F4, drawn here in unconventional fashion to show how the tube elements are tied in with circuit construction.

C_1 — 30 mmfd. mica
C_2 — 50 mmfd. midget Ceramicon
C_3 — 500 mmfd. (Erie Ceramicon)
R_1 — 0.22 megohms, ½ watt.
R_2 — 0.5 ohm, ½ watt.
R_3 — 56 ohm, ½ watt.
R_4 — 1000 ohm, ½ watt.
L_1 — 144 Mc.: 3-½ turns No. 12 silvered wire, ½ inch inside diameter, ½ inch long.
220 Mc.: 1-½ turns No. 12 silvered wire, ½ inch inside diameter, ¼ inch long.
420 Mc.: ½ turn No. 12 silvered wire, ½ inch inside diameter.

itor (50 MMF CERAMIC) to the outside lugs which are bolted to the filament clips. The leads should be as short as it is possible to make them. The 220,000 ohm grid leak should be soldered between the lug on the grid block and the center clip (cathode).

In order to allow the filaments to assume their own R.F. potential above ground, 1/2 ohm resistors which act as R.F. Chokes are placed between each filament terminal and the filament supply. One of the 1/2 ohm resistors is brought from the filament terminal to a lug on the ground plate. The other 1/2 ohm resistor is connected between the high side of the filament and the button bypass capacitor directly underneath it, for it is essential that the lead between each 1/2 ohm resistor and its Filament Clip be kept as short as possible.

The 56 ohm resistor is soldered between the center clip (cathode) and the lug on the ground plate. This acts as the cathode R.F. Choke.

The 1000 ohm resistor is soldered between the extreme right button ceramic capacitor and the tap on the coil. This acts as the Plate decoupling resistor.

The coils furnished with this kit are so proportioned that in conjunction with the proper padding they will cover the three "ham" bands; 144-148 MC, 220-225 MC, 420-450 MC.

In order to set the oscillator in operation a 0-25 milliameter and a power supply capable of supplying 6.3 volts A.C. at .25 amps and 150 volts D.C. at 20 milliamps will be required. A calibrated receiver, frequency meter, or Lecher lines may be used to set the bands.

Of course, any frequency setting given herewith is to be used to approximate the initial tuning range due to the many variable conditions encountered, such as type of chassis material, size and type of shield can if used, coupling method and tube variations.

Beginning with the lowest frequency band, select the 3-1/2 turn coils and bolt them to the stator blocks by means of the 6-32 filister head screws and lockwashers.

The coil carrying the lug should be used on the side nearest the plate supply bypass capacitor. Solder the plate supply resistor to the coil tab. The power supply is connected to the oscillator by means of three leads, one ground (B-A-), one filament, and one B+.

Check the wiring carefully to make sure all connections are tight. Insert a 0-25 milliameter in series with the B+ lead. Carefully insert the tube (6F4) until it seats properly in the clips. Turn on the power supply and watch the milliameter. At 150 volts and with a 220,000 ohm leak the tube should draw between 8 and 12 milliamps. If it draws only 2 or 3 milliamps, the circuit is parasitic, and the plate supply tap should be varied from turn to turn until the plate current is approximately between the figures mentioned. In the non-oscillate condition the tube draws over 25 Ma. With the capacitor in the minimum position and the gaps of the padding capacitors adjusted to approximately .010″, the frequency should be approximately

150 MC, and with the rotor in full mesh the frequency should be approximately 142 MC. Some juggling of the inductance and padding capacity may be necessary. All adjustments must be made very carefully and in small steps.

Using the one turn coils and a trimmer airgap of approximately .010" the tuning range will be approximately 219 MC at full capacity and 229 MC at minimum capacity of the rotor. The plate current runs between 10 and 14 milliamperes.

With an airgap of .050" the tuning range of the hairpin coils is 415-455 MC.

Should a calibrated receiver or wavemeter be unavailable the use of Lecher lines is recommended. See "ARRL" or "Radio" Handbook for details.

COUPLING METHODS

As a local oscillator sufficient coupling may be obtained by means of a small capacitor tied to the B+ tap on the coil or to the cathode of the tube. See Figs. 2 and 2A. All coupling wires must be absolutely rigid to prevent frequency modulation due to vibration.

Fig. 2
Cathode Coupling

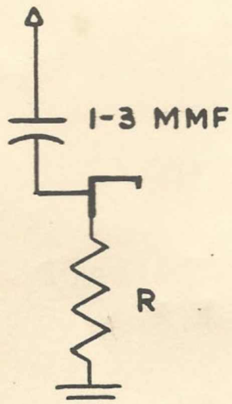


Fig. 2A
Plate Coupling

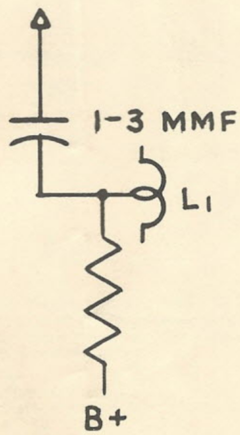
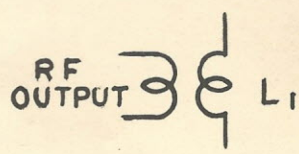


Fig. 3
Inductive Coupling



Inductive coupling by means of a hairpin loop or one turn coil coupled to either inductance will result in a greater power transfer to the driven circuit, such as, antenna or a power amplifier, Fig. 3. A single pole, double throw switch may be arranged to change the grid leak to a high value so that superregeneration will result, allowing the use of the oscillator as a transceiver. Leads to this switch should be very short and rigid so as not to impair the H.F. Characteristics of the oscillator. Use of a lower value of grid leak will result in appreciably greater power output (max. power output will be obtained with a value of approximately 25,000 ohms at some loss in stability).

By changing the size of the hairpin coils the oscillator may be made to cover the "Citizen Radio" band.

Again, repeating a former statement, the frequency ranges mentioned are very approximate and individual tailoring of the coils and padding capacitors will be necessary to fit individual conditions. However, with proper handling this oscillator will deliver a pure **CW** signal whose stability and drift characteristics equal the best low frequency E.C.O.'s available.

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