

THE 90711 VARIABLE FREQUENCY OSCILLATOR

The present crowded condition of the amateur bands make it increasingly important to be able to shift frequency within each band, by increments smaller than normally provided with crystal control. The 90711 Variable Frequency Oscillator is designed for this purpose.

The 90711 is a complete transmitter control unit with a stable gang-tuned electron-coupled oscillator and amplifier isolated by a buffer stage and a voltage-regulated power supply operating from 105-125 volt 50-60 cycles power source. Either high or low impedance output with sufficient power to excite a low power transmitter stage is available. Output is provided on the 160, 80, 40 and 20 meter bands with an accurately calibrated full vision bandspread scale for the 80, 75, 40, 20, 15, 11, and 10 meter amateur bands. The VFO output band and the oscillator bandspread tuning range are in no way inter-connected so that any bandspread range may be used with any output band, thus allowing the 90711 to be used with practically any transmitter. Switching on the front panel of the oscillator allows for either local or remote control.

Installation

Convenience of installation is another feature of the 90711. There is no complicated installation problem. The unit incorporates its own power supply. The output may be coupled to low impedance coupling link, or by means of the plug-in adaptor for conversion to high impedance, the output may be plugged into the transmitter crystal socket, or connected directly to the grid of one of the low power transmitter stages.

In order to provide the maximum convenience in use of the plug-in adaptor, this unit incorporates an output band selection switch. The adaptor is designed with removable pins so that it is possible to select pin sizes and pin spacing to allow for the plugging of this adaptor into any of the modern crystal sockets. The adaptor network is easily tuned for optimum performance by means of the variable condenser mounted therein. A 4' connecting cable is furnished with the output adaptor. However, if it is found desirable, additional RG58/U cable up to 20' in length may be added without affect on the performance of the unit.

Band change, including bandspread change, is accomplished by turning the band change switch on the oscillator panel. It is not necessary to change coils. The output selector switch on the front of the panel provided convenient and easy selection of the output band. Keying jacks for either oscillator or amplifier keying are mounted on the back of the unit as are terminal boards for remote switching.

Operation

The 90711 Variable Frequency Oscillator is factory tested and calibrated, and adjustment is unnecessary. The unit should be plugged into 115 volt 50/60 cycle power source. Connection should be made to the transmitter in the manner most convenient from the basis of the

transmitter construction. This can be either directly into the crystal socket when using the plug-in adapter, or to one of the low power stages through a coupling link. The output band will be determined by the transmitter, and the proper selection should be made by means of the switch on the panel of the oscillator. Outputs are available as follows: 160 meters, 80 meters, 40 meters with 20 meters available at reduced power output. If the output adapter is used, care must be taken to determine that the output band selection switch on the adapter is set for the same output band as the VFO.

Twenty Meter Output

Substitute a link-coupled 20 meter tuned circuit for the output coupling unit. This should make it possible to obtain enough twenty meter output from the VFO to excite an 807 amplifier on twenty meters.

Use With Pierce Oscillator

The crystal oscillator in some transmitters such as the TES-50D is a Pierce oscillator, therefore it cannot be used as a frequency doubler with VFO input. The VFO must be connected to the grid of the frequency multiplier in the transmitter. This is accomplished very easily.

Bandspread

Transmitter output frequency can be read directly from the calibrated scales on the VFO. The 90711 incorporates the following separate complete bandspread tuning ranges:

75 meters	-	3725	-	4,010	kc
80 meters	-	3490	-	3,725	kc
40 meters	-	6980	-	7,450	kc
20 meters	-	13975	-	14,425	kc
15 meters	-	20860	-	21,600	kc
11 meters	-	26960	-	27,430	kc
10 meters	-	27920	-	29,800	kc

The VFO covers the new 15 meter band of 21,000 to 21,450 kc. The vernier control is available for the extremely fine tuning and may be used as a zero set corrector for maximum band edge accuracy. The tuning dial has a mechanical vernier of 13 to 1, so that even for the highest frequency bands the tuning is very smooth and convenient, and zero beat is easily obtained with the main tuning dial.

Circuit

The circuit used in the 90711: 6SK7 oscillator, 6SK7 buffer, and a 6AG7 amplifier together with the voltage regulator and rectifier tubes. This unit is unusually stable and drift free because of its sturdy construction, high capacitance oscillator grid circuit, untuned oscillator plate circuit, broad band buffer stage, large oscillator grid coil, temperature compensated capacitor, regulated plate and screen voltages.

The availability of 160 meter output in addition to the usual 80, and 40 meter output makes it possible to use the 90711 to drive an un-neutralized stage with output on 80 and 75 meters. Even with 160 meters output there is little oscillator frequency shift between open circuit and short circuit of the VFO. This is accomplished by incorporating a fixed tuning isolating stage between the oscillator and output stage.

This isolating stage is broad banded and the output stage tuning is tracked with the oscillator for all bandspread ranges.

Controls

The main tuning control is mounted in the center of the panel and provides for accurate frequency setting on any of the bands. The oscillator local and remote control switch is mounted to the left and slightly above the tuning control. This control incorporates a means for turning on the oscillator separately so as to provide for checking the output with a receiver at a convenient volume level. The output band selector switch is mounted to the left and slightly below the main tuning control. The plug-in adapter also includes an output band selection switch. The band spread selection switch is mounted to the right and slightly below the main tuning control. The vernier control is operated by means of a lever extending through the front panel of the oscillator on the extreme right hand side of the panel. Output jack, fuse holder, switching terminals, and power lead all come out the back of the unit so that they will not interfere with the normal operation of the oscillator.

The output of the VFO is essentially constant over the "ham" bands. The output from maximum to minimum output on any one band is less than 2db except for 20 meter output where the output variation is within 3db. The output frequency varies only very slightly with any change in load impedance from open circuit to short circuit.

The oscillator itself is unusually stable and resistant to shock and vibration. The maximum frequency drift is approximately 174 cycles per megacycle from cold start to maximum operating temperature. The dial on the 90711 has seven full vision individually calibrated band spread scales in addition to a standard 0 to 100 division scale. The VFO's are individually calibrated to insure maximum accuracy in dial calibration.

Performance

V F C Output Band	Band- Spread Range	Output Variation db	Minimum Output Watts
160	80	0.3	0.92
160	75	0.98	0.99
80	40-10	1.2	1.26
80	20-15	1.2	1.48
80	11	0.6	1.18
40	40-10	1.95	0.6
40	20-15	1.15	0.76
40	11	0.98	0.42
20	10	1.9	0.11
20	11	2.8	0.05

Maximum output - 1.74 watts

Maximum frequency drift - 174 cycles / MC.

Maximum temperature of oscillator unit - 35 degrees C.

Keying:

When using amplifier keying the keying is perfectly clean.

It has no chirp, thump, click, or other objectionable characteristics. This type of keying should be used in all cases except where break in operation is essential. For those requiring break in operation the 90711 has been supplied with a jack for keying the oscillator. As in the case of any keyed oscillator there is a detectable click although this has been reduced to the minimum. There is, however, no noticeable chirp, or frequency shift with oscillator keying.

Power Requirements

105/225 volts 50/60 cycle power 60 watts

Physical Dimensions

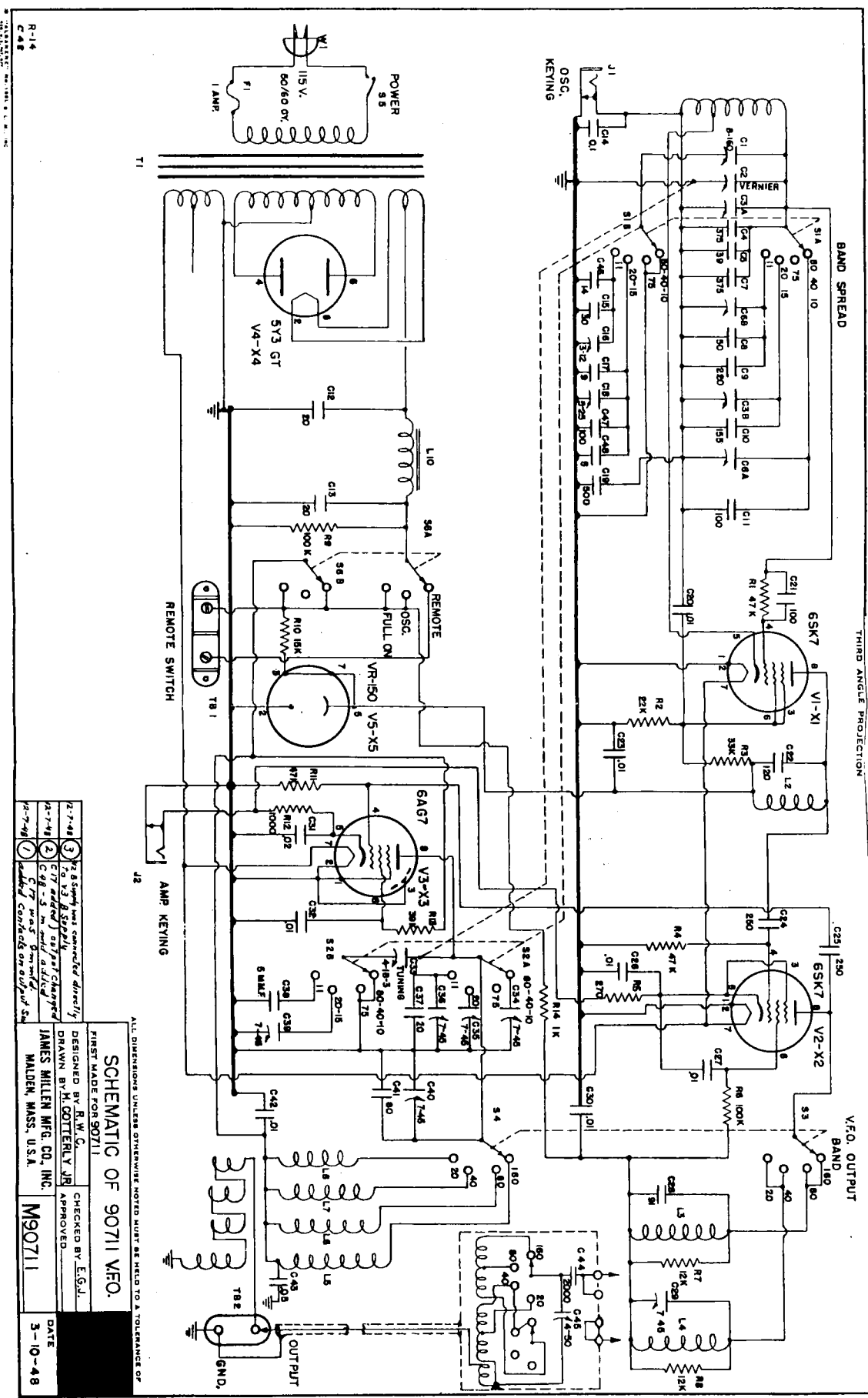
12 3/4" wide
12" deep
9 1/4" high

Weight - - 27 lbs.

Tubes

Tubes required:

One 6SK7 Oscillator
One 6SK7 Buffer
One 6AG7 Amplifier
One 5Y3-G^T Rectifier
One VR150 Voltage Regulator



R-14
C-48

POWER
9.5
115 V.
80/60 CY.
1 AMP

5Y3 GT
V4-X4

6AG7
V3-X3

6SK7
V1-X1
V2-X2

VR-150
VS-X5

AMP KEYING

OUTPUT

OSC.
KEYING

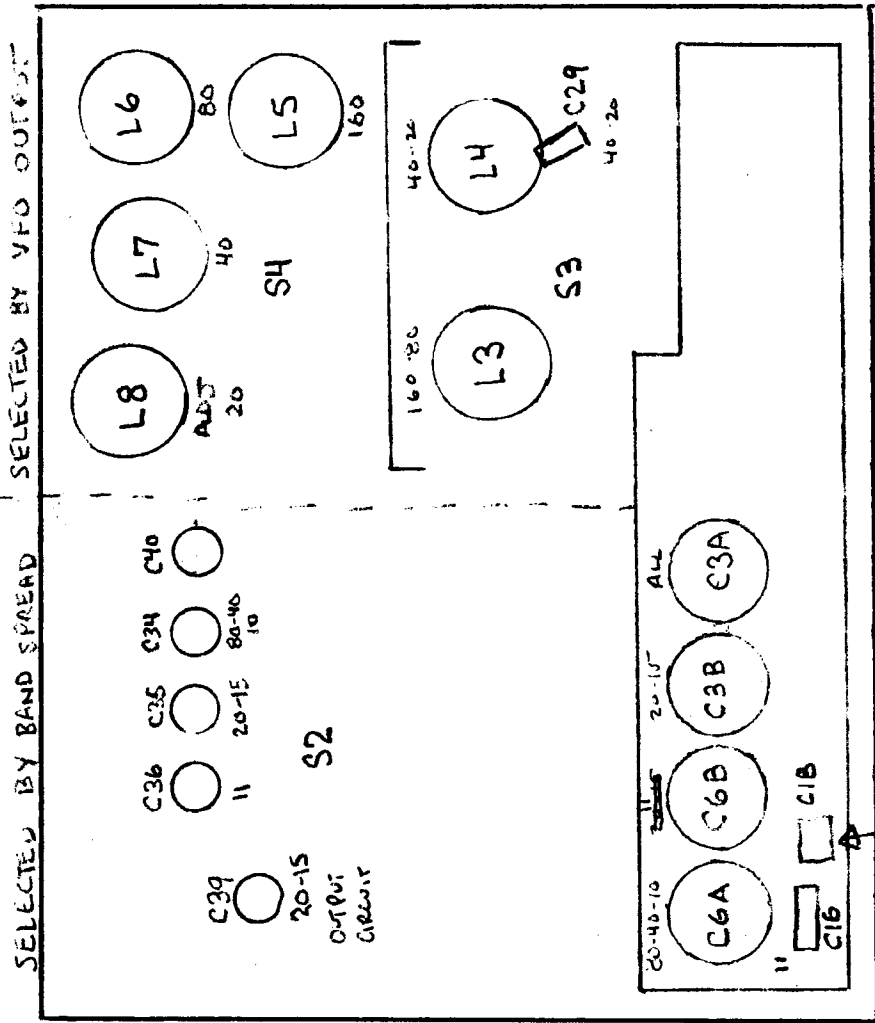
BAND SPREAD
THIRD ANGLE PROJECTION
VFO. OUTPUT
BAND

ALL DIMENSIONS UNLESS OTHERWISE NOTED MUST BE HELD TO A TOLERANCE OF
FIRST MADE FOR 90711
SCHEMATIC OF 90711 VFO.
DESIGNED BY R.W.G.
DRAWN BY H. COTTERLY JR.
APPROVED
JAMES MILLER MFG. CO., INC.
MALDEN, MASS., U.S.A.
M90711
DATE
3-10-48

- 1-7-48 ① 2-8 supply was connected directly
- 1-7-48 ② 1-2 V3 B supply
- 1-7-48 ③ C17 added; output changed
- 1-7-48 ④ C48 - 5 m. and added C49
- 1-7-48 ⑤ added C50, 40 p.f. on output S4

90711 BOTTOM

COILS + CAPS



DON BUSKA
N900

ADJUSTED
TOP SIDE