Preliminary Instruction for 90800 Transmitter - Exciter

1. General

The Millen 90800 transmitter-exciter is a commercial version of the "two-tube plug-in coil exciter" as described on pages 149 to 152 of the eighteenth edition of the ARRL Radio Amateur's Handbook and in the later editions of the ARRL Handbook. The transmitter consists of a 6L6 or 6L6-G tri-tet crystal oscillator-doubler or beam tetrode crystal oscillator, driving an 807 amplifier or frequency doubler. The 6L6 may also be used as a frequency doubler driven by a V.F.O., such as the Millen 90800-90701 Variarm.

The 90800 transmitter is capable of a power output of fifty to sixty-five watts in any amateur frequency band up to and including the 14,000-14,400 kc band. The transmitter may be used in the 28,000-30,000 kc V.H.F. band with an output of twenty to thirty watts.

The transmitter is supplied with one set of plug-in coils. Additional coil may be purchased in matched sets or singly from Millen distributors.

2. Description of Chassis

Looking at face of panel:

Five prong socket at left is for reception of crystal or V.F.O.

Switch above it shorts out cathode coil in "OUT" position, and leaves cathode coil in circuit for tri-tet operation in "IN" position.

Left dial tunes 6L6 plate tank condenser, C4.

(Symbols refer to attached schematic circuit diagram X-90800)

Right dial tunes 807 plate tank condenser, C10.

Both dials read zero when condenser plates are fully meshed.

Switch at right controls meter in center, reading 6L6 or 807 plate current, as indicated on panel.

Cathode coil, L1, plugs in 5 prong socket, X4, next to 6L6 socket.

Oscillator and amplifier coils are interchangeable between 6L6 and 807 tanks (for any given frequency coil) and plug into the jack strips adjacent to the 6L6 and 807 sockets. The 807 plate coil, L3, should be plugged in so that the link coil is near the bottom of the chassis.

Power supply leads attach to terminal board, TB1, at back left bottom of chassis. Terminals are labeled:

500 TO 750

"HV" - High Voltage "45" - 45 Volts C bias

"H" - Heater (6.3 volts) "G" - Ground, other heater+C.H.V

"K" - Key

3. Coils

Cathode coils available for the unit are: a coil for 160 meter crystals, a coil for 80 meter crystals, a coil for 40 meter crystals. The plate coils of the 6L6 and 807 are interchangeable. Coils are available for all amateur bands from 160 meters through 10 meters.

4. Operation

a. High Voltage Supply

High voltage can be any value between 500 and 750 volts, since the 807 plate tuning condenser, C10, is double spaced. An internal voltage divider furnishes proper plate and screen voltages for both the 807 and the 6L6; therefore, only one high voltage power supply is necessary.

b. Caution

1. Cathode coil switch, S1, at left MUST be thrown to the right or "OUT" position WHENEVER 6L6 PLATE CIRCUIT IS TUNED TO CRYSTAL FREQUENCY; otherwise, crystal fracture may result. Switch is thrown to left of "IN" position when using the 6L6 as a tritet oscillator-doubler.

2. Never operate the 807 without a load (either real or dummy antenna) since its screen current becomes excessive with insufficient plate load.

c. Excitation

Under all circumstances, with the 6L6 operating as a beam tetrode oscillator, as a doubler from a Variable Frequency Oscillator Exciter, or as a tri-tet crystal oscillator, the power output is more than sufficient to drive the 807 as an amplifier or as a doubler on all frequencies up to 15 mc. To get maximum output from the 807, it is often necessary to reduce the capacity of the variable coupling capacitor, C6, to avoid over-driving the 807 grid. Maximum output is obtained when the 807 grid current is approximately 5 milliamperes. A milliameter in series with the C bias on the 807 will aid in adjusting the 807 grid drive. In some cases, sufficient output from the 6L6 operating as a quadrupler may be obtained to excite the 807. The small coupling capacitor is installed to avoid damage to the 807 grid when operating straight through.

d. Input

The five prong socket on the panel, "CRYSTAL of V F O" is wired to receive the coupling coil of the Millen 90700 and 90701 Variarm-VFOs. The 6L6-807 transmitter operates very well when controlled by either of these Variarm units. It is necessary that the 6L6 be operated as a doubler when the Variarm is plugged into the grid circuit; otherwise, self-oscillation of the 6L6 will occur.

5. Performance

The 90800 transmitter may be operated from a 750 volt power supply for output on all amateur frequency bands up to and including the 14,000-14,400 kc band. The output is upwards of 50 watts when the 807 is loaded to 90 to 100 milliamperes. The transmitter may also be used in the 28,000-30,000 kc VHF band at reduced inputs. For this frequency band, the 807 is operated as a frequency doubler. The power supply voltage should be limited to 500 volts and the 807 plate current to 90 milliamperes. The 6L6 plate coil, L2, should operate on 20 meters. The grid

circuit of the 6L6 should be excited by a 40 meter crystal or a VFO with 40 meter output. The output from the 807 on 10 meters will be 20 to 30 watts.

6. Revisions

For specific applications of the 90800, it may be desirable to make small revisions in the transmitter.

a. Modulation
For plate and screen grid modulation of the 807, the 807 plate voltage should be limited to 600 volts and must be supplied from a separate power supply.

b. Oscillator Keying
90 volts fixed bias should be used on the 807 if it is desired to key the oscillator or a Variarm exciter and leave the 807 cathode connected to ground. With this type of keying, it is necessary that the power supply for the transmitter be well regulated to avoid "chirpy-keying."

c. Excitation
In operating the 6L6 as a frequency quadrupler, it may be necessary to get more excitation to the 807 grid. To increase excitation, shunt C6 with 200 mmf. Do not operate the 6L6 as a frequency-doubler or straight through with the 200 mmf. shunting C6. This would overdrive the 807 grid, reduce the power output from the 807, and damage the 807 grid.

d. Increased Bias Resistor
If it becomes desirable to increase the value of the 807 grid leak resistor, R6, insert the additional resistor in series with the external fixed bias supply connected to the "45" and "G" terminals on terminal board, TB1.