

SECTION I

GENERAL DESCRIPTION

1-1. GENERAL.

1-2. The WRL Globe King Transmitter Model 500A is made by World Radio Laboratories of Council Bluffs, Iowa. This transmitter is rated at 500 Watts input power to the R.F. Power Amplifier, either Radio Telegraphy (CW), Radio Telephony (AM) operation or 400 watts Single Sideband, peak D.C. plate input.

1-3. DESCRIPTION.

1-4. The Model 500A transmitter is completely self-contained in a metal relay rack cabinet. Dimensions are 31 inches high, 15 inches deep, and 22 inches wide. Weight is approximately 50 pounds. Ventilating louvers are provided in the cabinet to assure adequate ventilation and heat dissipation. Complete TVI precautions have been taken. The R.F. section of the transmitter is completely shielded, meter leads have been by-passed and all AC leads have been by-passed.

1-5. The components of the transmitter are so arranged that semi-unit construction is employed and are broken down into three units as follows;

- Exciter, Buffer and Power Amplifier.
- Modulator with Integral Power Supply.
- Main Power Supply.

Each unit may be removed from the cabinet independently for inspection and servicing. Power requirements are 115 volts, 50/60 cycles single phase alternating current. Tube complement is shown in Table I. The rear and top doors of the cabinet may be opened for additional ventilation in very hot climates. This will not affect TVI or BCI, as the R.F. section is individually shielded.

TABLE I. TUBE COMPLEMENT.

| Quan | Type | Function |
|------|--------|-----------------------------------|
| | 4-250A | RF Power Amplifier |
| | 6146 | Buffer-Doubler |
| 1 | 6V6 | Crystal Oscillator 6AG7 |
| 1 | 6SJ7 | Microphone Amplifier |
| 2 | 6C5 | Speech Amplifiers |
| 1 | 6L6G | Audio Driver |
| 2 | 811A | Modulators |
| 1 | 6X5 | Bias Rectifier |
| 1 | 5Y3GT | P.A. Screen Grid Rectifier |
| 2 | 816 | Modulator High Voltage Rectifiers |
| | 5Y3GT | Modulator Low Voltage Rectifier |
| | 866A | P.A. High Voltage Rectifiers |
| 1 | 504G | Exciter Voltage Rectifier |

1-6 THEORY OF OPERATION.

1-7. A 6V6 tube is employed in a regenerative crystal oscillator circuit. The oscillator has a substantial harmonic output and works very

well as a doubler or tripler with a minimum of crystal current; this allows the use of 160-80 and 40 meter crystals to cover all amateur bands up to 10 meters. A VFO with approximately 10 volts RF output will drive the oscillator stage easily, with cathode choke RFC-1 shorted. A switch on the panel selects crystal or VFO operation, and with this switch in the correct position either VFO or crystal may be used in the oscillator stage.

1-8. A type 6146 tube functions as a buffer or doubler stage. This stage is capacity coupled to the oscillator. A combination of fixed and excitation bias is applied to the buffer stage; this allows class "C" operation and also assures complete cut-off of buffer plate current when the oscillator is keyed, or in the event of excitation failure. R.F. drive to the power amplifier is controlled by a potentiometer in the buffer screen grid circuit. Bandswitching of the entire exciter section is simplified by a ganged switch. DC voltages are kept off the coil (L3) and the bandswitch by shunt feeding of the plate of the buffer tube. A SSB RF signal may be inserted by means of a link in the plate coil (L3). This same link may be used for VFO control and drive of the power amplifier stage. 10-15 watts drive are required for this method of operation. SSB operation requires the removal of low B plus voltages from the exciter section. A switch located on the rear of the RF section is provided for this purpose.

1-9. The power amplifier employs a type 4-250A tube which operates as a straight through class "C" AM, or class "B" SSB amplifier. Fixed and excitation bias are used in the power amplifier stage. Class of operation is determined by the switch on the rear of the RF chassis, which selects the proper fixed bias voltage. The plate circuit is tuned by a Pi network and an additional "L" section is used on 160 meters. It will match resistive loads of 50-600 ohms except on 160 meters where an external matching device may be used to match below 300 ohms. On 80 through 10 meters additional capacity (where needed) will match 50-600 ohms resistive, and reasonable reactive loads. When properly tuned, harmonic output of the power amplifier is reduced considerably. The plate of the power amplifier is high level modulated directly while the screen grid is self-modulated by means of a high inductance choke in series with the screen lead. The power amplifier is unique in that the screen grid voltage is self regulating. A rise of screen grid current automatically reduces voltage, and vice-versa. By this means the screen grid power rating is not exceeded, giving excellent tube protection, and tube life is extended. A 5Y3GT tube is employed as the low voltage rectifier for the power amplifier