



*Johnson Viking II*



**TRANSMITTER  
KIT  
T.V.I. SUPPRESSED  
INCREASED POWER**

E. F. JOHNSON COMPANY • WASECA, MINNESOTA



# Johnson TRANSMITTER

## FEATURES:

Amplitude Modulation  
Instant Band Switching  
VFO Input Provision

Dual Power Supplies  
Self Contained, No Plug-in  
Coils  
Pi-Network Coupling Out-  
put Amplifier

## RATINGS:

100 Watts Phone Output  
130 Watts CW Output

135 Watts Phone Input  
180 Watts CW Input

## TUBE LINE-UP:

6AU6 crystal oscillator  
6AQ5 buffer/doubler  
Parallel 6146s final amplifier  
6AU6 voltage amplifier

6AU6 driver  
807 pp modulators  
5R4GY HV rectifiers  
5V4G LV rectifier  
6AL5 bias rectifier

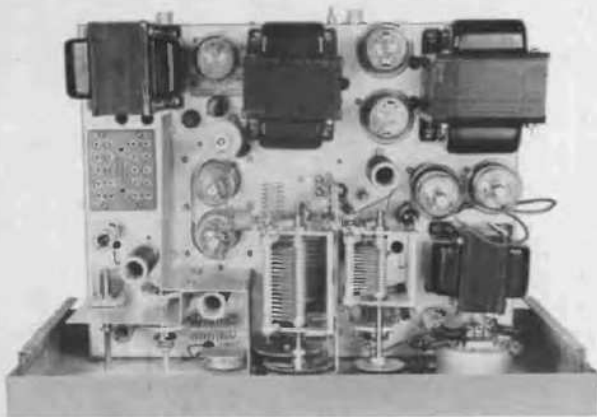


Figure 1. Chassis, Top View

**HERE IT IS!** The JOHNSON Viking II, successor to the Viking I, and the most versatile, most complete transmitter kit on the market. More than just a kit, the JOHNSON Viking II is an expertly designed and engineered transmitter, furnished unassembled but complete to the last detail.

Includes all necessary parts, hardware, tubes, wiring harness, cabinet and complete assembly instructions. The Viking II performs excellently on every amateur band from 10 to 160, including 15 meters. Output ratings of 100 watts phone, and 130 watts CW were established on the 10 meter band; efficiency on other bands is comparable. The Viking II provides full excitation to the final amplifier on all frequencies; the complete output range of the unit is listed below:

Band	Low Freq. Limit	High Freq. Limit	Band	Low Freq. Limit	High Freq. Limit
160	1.8 mcs.	2.4 mcs.	20	9.8 mcs.	15.0 mcs.
80	2.9 mcs.	4.4 mcs.	15	15.0 mcs.	21.8 mcs.
40	5.2 mcs.	8.0 mcs.	10	21.0 mcs.	30.0 mcs.

**POWER SUPPLIES**—The low voltage power supply furnishes 300 volts for exciter and speech amplifier plates. In addition to the 5V4G rectifier, a 6AL5 diode rectifying the tapped transformer secondary winding, furnishes well regulated fixed bias for the final amplifier, modulator, and the 6AQ5 buffer/doubler. The 600 volt supply with parallel 5R4GY rectifiers furnishes plate and screen voltage for the 6146s and 807 modulators. High vacuum rectifiers in both power supplies eliminate the need for hash suppression and time delay circuits. Line power consumption is approximately 375 watts when delivering full phone output, primary fusing protects the equipment from accidental overloads. Available for 115 volt 50/60 cycle ac operation only.

The output of the JOHNSON Viking II transmitter, for practical purposes, is uniform throughout its entire range, and the exciter design is such that a minimum number of crystals is required. The pi-section output stage enables the transmitter to be matched to unbalanced antennas with impedances from 50 to 600 ohms. Whether feeding antennas or antenna couplers, the pi-network can tune out several hundred ohms reactance as well. The final tank coil is a Steatite insulated, variable inductor with variable pitch winding maintaining high tank circuit Q throughout its range. The inductor and the band switching exciter entirely eliminate coil changing. Using a crystal microphone, sufficient audio gain and power are available for 100% modulation of the transmitter's maximum input.

**RF SECTION**—The rf section of the transmitter consists of a 6AU6 crystal oscillator driving a 6AQ5 buffer/doubler which in turn drives the parallel 6146's of the final amplifier. The oscillator utilizes a JOHNSON crystal selector assembly which permits the selection of any one of

# Viking II

## KIT

ten crystal frequencies from the front panel. An eleventh position on the crystal switch provides for use of an external VFO. The 6AQ5 buffer/doubler is "loafing" when driving the parallel 6146's to full output on all bands. A potentiometer in the screen of the 6AQ5 gives smooth front panel control of amplifier excitation. Parasitics have been effectively suppressed, amplifier neutralization is not required.

**KEYING**—Fixed bias voltages of the 6AQ5 buffer and the 6146 final amplifier are very near cut-off. Oscillator cathode keying may be used for either crystal controlled or VFO operation.

**METERING**—Transmitter metering is provided by a milliammeter used as a millivoltmeter and switched across permanently connected shunts. Prevents accidental circuit opening due to meter switching.

**AUDIO SYSTEM**—100% amplitude plate and screen grid modulation of the 6146 RF amplifiers is achieved with pp class AB<sub>1</sub> 807 modulators. The speech amplifier consists of a 6AU6 voltage amplifier and 6AU6 driver, designed for high impedance microphones. Frequency response is centered in the speech range for most effective voice communication. Degenerative feedback is used to smooth out the response curve and good audio quality is maintained through extremely simple modulator design. Full output of the audio system is also available at nominal 500 ohms impedance for driving a high powered modulator.

**EXCITER**—A unique crystal oscillator circuit is used in the Viking II. In this oscillator, a Pierce circuit uses the screen of the 6AU6 as a plate, and the oscillator output is electron coupled to the plate. The circuit is a good frequency multiplier, has low crystal current, and requires only a slight amount of excitation from a VFO.

The exciter design is extremely flexible even though only two tubes are used and the circuit is band-switching. On the 160, 80, and 40 meter bands the 6AQ5 is used as a buffer, as a doubler or tripler on 20, 15 and 10 meters. If crystals are used in the manner recommended and their frequencies properly chosen, there is almost no possibility of obtaining output from the exciter which falls outside the amateur band.

**VFO REQUIREMENTS**—When used with an external VFO the transmitter is easily driven. Less than six volts of



Figure 2. Pi-network Coupling System

7.5 mc. RF is required for full output at 30 mcs., less for the 14 and 7 mc. bands. Two volts of 1.75 mc. VFO output is ample excitation for 1.75 and 3.5 mc. output.

An octal socket on the rear of the chassis provides 6.3 volts ac at 0.6 amperes for VFO filaments and 30 milliamperes at 300 volts dc unregulated for VFO plate voltage. The 240-122 Viking VFO may be keyed from the transmitter, and simply plugs into the chassis for instant operation.

The variable inductor tuning of the amplifier saves space without appreciable loss of efficiency. Separate coils, sufficiently large to handle the amplifier circulating current, would consume a prohibitive amount of cabinet space. Plug in coils would compromise the transmitter's flexible design. The final tank tuning condenser is ganged to the variable inductor and maintains a nearly constant L/C ratio across the entire tuning range.

In order to cover the 160 meter band, additional series inductance is switched into the circuit. The output coupling capacitor consists of a 400 mmf. variable and additional fixed capacitors which can be switched in parallel to match low impedance loads to the amplifier. Maximum value of the coupling capacitor is 2,050 mmf.

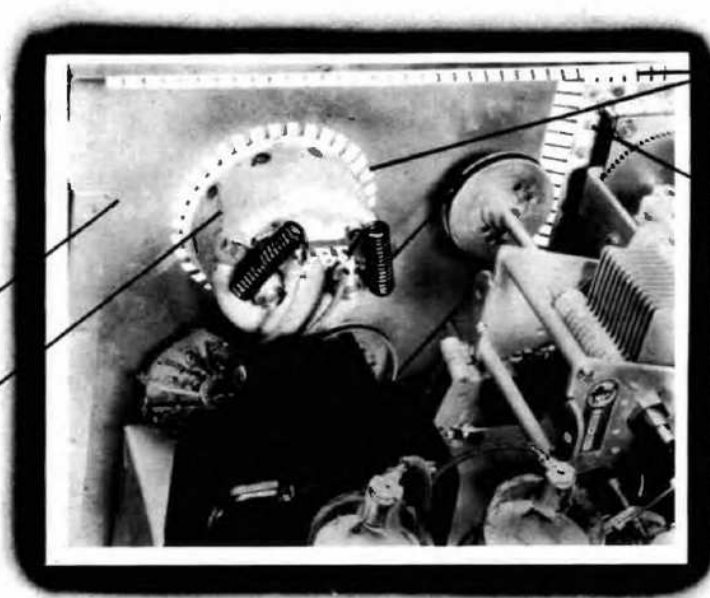
Xtal Freq.	Output Band						
	160	80	40	20	15	10	11
1.8-2.0 mc	✓	✓	✓				
3.5-4.0 mc		✓	✓	✓	✓		
7.0-7.3 mc			✓	✓	✓	✓	
14-14.4 mc				✓			
6.7-6.85 mc							✓

The chart above indicates the crystals which may be used for full output on the amateur bands covered by the transmitter.

# TVI Suppression Features

Copper Plated Steel Cabinet

Copper Plated Meter Shield



Silver Plated, Phosphor Bronze Bonding Fingers

Copper Plated Dial Window Shield

Filters, located at: Power-line, Keying Jack, Micro-Phone Connector, Antenna Relay Connector, and VFO Power Socket.

Figure 3. TVI Suppression Features

**TVI SUPPRESSION MEASURES**—The Viking II is completely enclosed in a steel cabinet, heavily copper plated. Top and bottom are perforated to permit free circulation of cooling air. The lid, easily removed as shown in Figure 4, is bonded with silver plated, phosphor bronze contact fingers. Special shields for meter, dial window, and VFO power receptacle maintain effective TV shielding. Filters, consisting of low inductance chokes and ceramic disc capacitors, are located at the: power line, keying jack, microphone connector and VFO power socket. The antenna relay connector, energized by the "plate" switch

is likewise filtered. Additional filters are used to suppress spurious output frequencies at their source. Coaxial output and VFO input connectors keep shielding intact.

**SCREEN VOLTAGE REGULATOR**—A triode connected 6AQ5 regulator protects the 6146 amplifiers by maintaining normal screen voltage under key up conditions or in the event of an excitation failure. This circuit affords the Viking II the advantages of a series screen dropping resistor with resultant good output under conditions of low line voltage, yet with perfect safety.

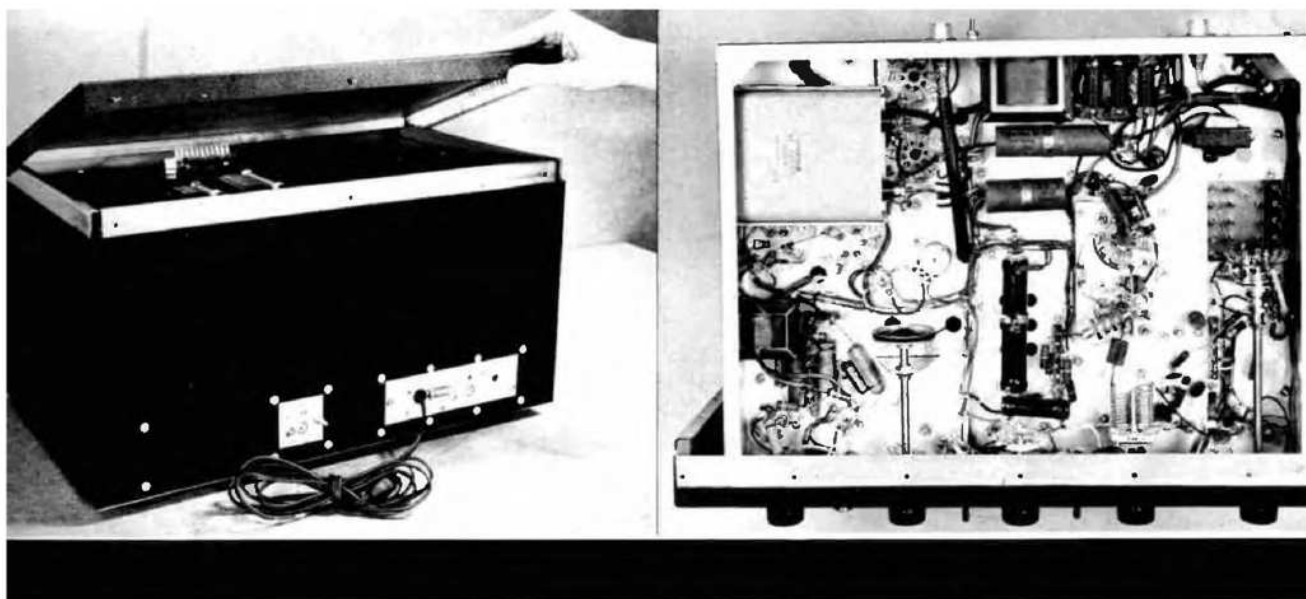
**ANTENNAS AND LOADING**—The pi-section tank circuit of the Viking II can be loaded into random length single wire antennas, permitting operation on several bands without any change in the antenna system.

In areas with television service, it may prove necessary to use a low pass filter, to avoid television interference. If so, then the load must be a "flat" coaxial line, the impedance of which is equal to the characteristic impedance of the filter. The pi-network tank circuit is capable of perfectly matching the impedance of any commonly used low pass filter at any amateur frequency throughout the range 1.8 - 29.7 mcs. The JOHNSON 250-20 Low Pass Filter is available as a separate accessory and when used can provide an additional 75 db harmonic attenuation.

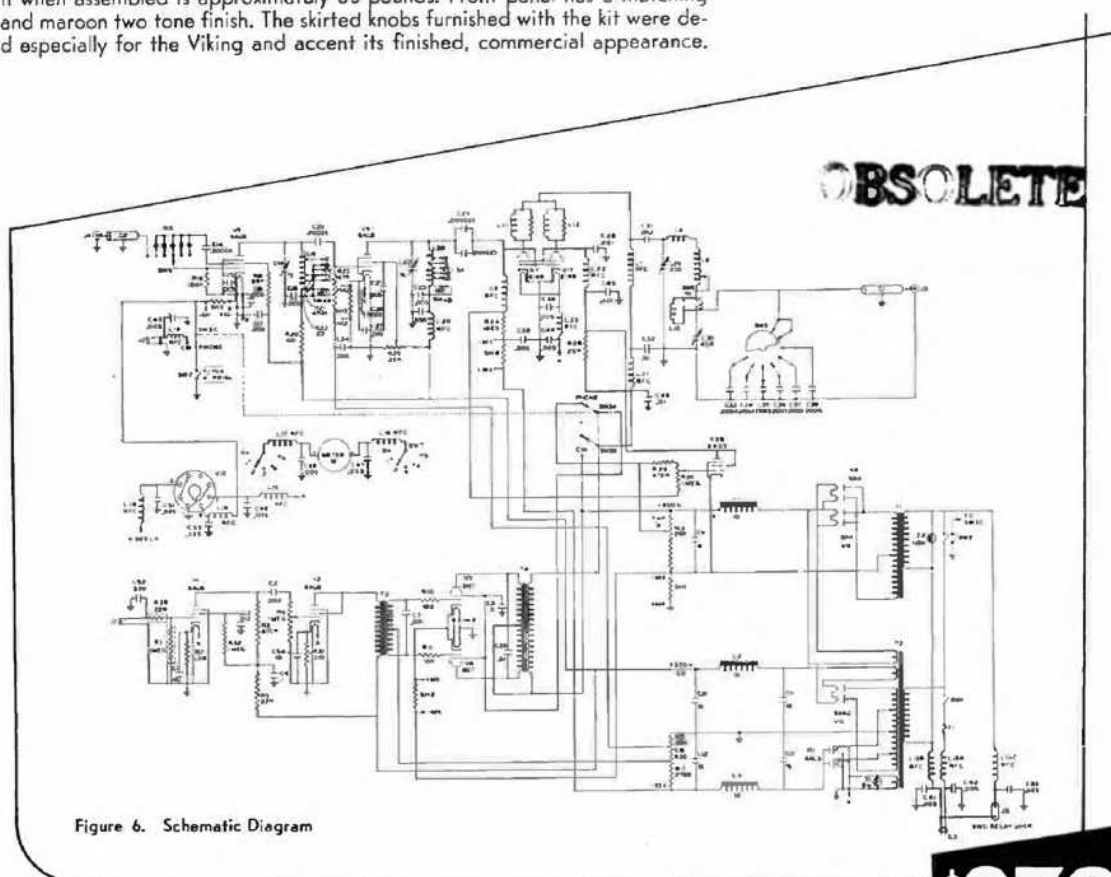
For novice operation, the final amplifier input may be reduced to 75 watts by means of the front panel "coupling" controls. Adjustment of the screen voltage or modification of the transmitter is not required.

**ASSEMBLY**—The Viking II was designed as a kit and can be assembled by a novice as well as the experienced amateur. Instructions include photographs of each stage of assembly, schematic diagram, wiring harness diagram, tube socket connections, codes used to mark components, test methods and data. No outside source of information is required. Thus the appearance and performance of the completed Viking II will be equal to that of our laboratory models.

The chassis, panel, and cabinet are formed and punched at the factory. No drilling or other metal work is required. Complete to the last detail, the parts kit includes brackets, dial, cord, solder, terminals, washers, spacers, wire, grommets and all other small hardware items. A wiring harness containing all ac and dc power leads is furnished, reducing the possibility of incorrect wiring and giving the appearance of a factory assembled unit.



**APPEARANCE**—Microphone input connector, keying jack and all controls are conveniently located on the front panel. The antenna relay connector, VFO input, and power receptacles are located on the rear of the chassis. The transmitter is housed in dark maroon wrinkle finished desk cabinet,  $10\frac{7}{8}'' \times 13\frac{3}{16}'' \times 20''$ , weight when assembled is approximately 65 pounds. Front panel has a matching gray and maroon two tone finish. The skirted knobs furnished with the kit were designed especially for the Viking and accent its finished, commercial appearance.



The Viking II is available wired and tested by factory-authorized wiremen. The cost is nominal, see your JOHNSON distributor.

Amateur Net Complete with  
tubes, less crystals, key and mike  
In Kit Form

**\$279<sup>50</sup>**

# JOHNSON *Viking* VFO KIT

*Ideal for Use with most Transmitters*

**COMPANION UNIT FOR THE  
VIKING II . . .**



The JOHNSON VFO is truly a precision instrument, engineered to the same high standards of appearance and performance which characterize the Viking II transmitter.

**OUTPUT**—VFO output is more than sufficient to drive the Viking or similar transmitters to full output on all amateur bands from 10 to 160 meters. Two entirely separate oscillator tanks are used, one delivering 8 to 10 volts on the 7.0 to 7.425 MC range, the other delivering 5.5 to 7.5 volts on the 1.75 to 2.0 MC range. Thus the maximum frequency multiplication required is 4X to cover the 10 meter band. The transmitter oscillator stage is utilized as an isolating RF amplifier or frequency doubler when driven by the VFO.

**TUBE COMPLEMENT**—The tube complement consists of a 6AU6 electron coupled oscillator and an OA2 regulator. Excellent isolation between oscillator and output circuits, and nearly perfect screen grid voltage regulation account for the clean keying and add to the overall stability of the VFO.

## KEYS IN THREE DIFFERENT WAYS

1. Keying VFO alone.
2. Keying the transmitter alone.
3. Keying both the VFO and transmitter simultaneously. The latter is highly satisfactory and provides perfect "break-in" operating conditions on all bands.

**POWER SUPPLY REQUIREMENTS**—All voltage requirements are amply supplied from the VFO supply socket on the Viking Transmitter. No other power supply required, all necessary cables and plugs furnished. If the JOHNSON VFO is used without the Viking II, power supply requirements are 250 to 300v, unregulated at 15 ma and 6.3 v at .3 amp., ac or dc, usually available from existing transmitter power supplies.

**ASSEMBLY**—Assembly and calibration are simple. A 5" dial, calibrated for transmitter output on all amateur bands from 10 to 160 meters is furnished. Instructions contain simple methods of alignment, insuring that output frequency agrees with dial calibration. A special tank assembly board is provided with the kit, to insure correct component mounting and wiring. The instruction manual contains complete details and schematics for operation with transmitters other than the Viking II.

## Factors contributing to the excellent stability of the Viking VFO are:

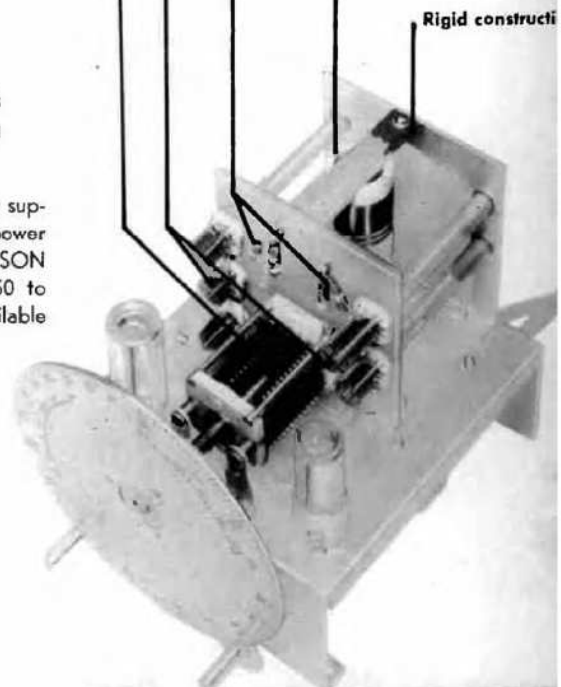
A special JOHNSON ceramic, soldered, tuning capacitor

Ceramic insulated air dielectric trimmers

Temperature compensated ceramic padders

Ceramic coil form

Rigid construction



# FOR INCREASED

# Harmonic Attenuation!

## JOHNSON 250-20 LOW PASS

## FILTER



BUILT-IN TILT BRACKET

### Features:

1. Accurate Frequency Calibration (All bands—160 thru 10 meters)
2. 5" Calibrated Dial with 6:1 Reduction
3. High Stability—Clean Keying
4. Simple Assembly
5. Perfect "Break-In" on all bands

JOHNSON VIKING VFO KIT, complete, less tubes, in dark maroon finished cabinet.

Size 7"x6 7/8"x6 9/16"  
Amateur Net

**\$42<sup>75</sup>**

The JOHNSON 250-20 low pass filter consists of four individually shielded sections capable of handling more than 1000 watts amplitude modulated RF. Cut-off frequency is 45 mcs. with "M" derived end sections adjusted to provide maximum attenuation at 57 mcs., the center of TV channel 2. Attenuation of harmonic and spurious frequencies above 54 mcs. is 75 DB or more. Insertion loss is less than .25 DB. The 250-20 is immediately adaptable to any transmitter with a 52 ohm output. When properly terminated, the maximum voltage developed across capacitors is nominal, even at 1 KW power. In designing the JOHNSON Low Pass Filter, consideration was given the fact that the RF voltage could rise to extremely high values if the load were accidentally removed. Therefore, to enable the user to service the unit, the interior of the filter case has been made readily accessible and fixed capacitors have replaceable Teflon insulation.

With the many amateur transmitters, using low impedance links to couple to balanced antenna systems, some type of antenna coupler is required and use of a fixed impedance filter does not unduly complicate antenna loading. The antenna coupling shown in diagram is simple and quite flexible.



Owners of transmitters such as the JOHNSON Viking will have no difficulty feeding a 52 ohm line since the pi-network amplifier can match this impedance throughout its tuning range. The pi-network is also capable of tuning out considerable reactance.



Standard SO-239 coaxial connectors are used for input and output terminals. Completely assembled, pre-tuned and equipped with convenient mounting hardware.

250-20 Amateur Net

**\$16<sup>50</sup>**