



JOHNSON ELECTRONIC EQUIPMENT

**E. F. JOHNSON COMPANY
WASECA MINNESOTA**

OPERATING MANUAL

**VIKING RANGER
TRANSMITTER/EXCITER**



Viking

RANGER

TRANSMITTER / EXCITER KIT



Built-in VFO—TVI Suppressed

75 Watts CW Input—65 Watts Phone Input

Instant Bandswitching—7 Amateur Bands



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Viking **RANGER**

TRANSMITTER / EXCITER KIT



Built-In VFO—7 inch dial
Instant Bandswitching
Self Contained, No Plug-in Coils
100% AM Modulated

TVI Suppressed
Transmitter or Exciter
Auxiliary power and modulator
provision
Pi-Network Output

65 Watts Phone Input
75 Watts CW Input

6AU6 variable frequency
oscillator
6CL6 crystal oscillator, VFO
isolator
6CL6 buffer/doubler
12AX7 dual triode speech
amplifier

12AU7 dual triode audio driver
0A2 voltage regulator
6146 final amplifier
6AQ5 clamper
1614 push-pull modulators (2)
6AX5GT low voltage rectifier
5R4GY high voltage rectifier

Effectively TVI suppressed, and completely self-contained, the Viking "Ranger" transmitter/exciter kit is designed for easy assembly by either novice or experienced amateur. A phone and CW transmitter on the 10 through 160 meter amateur bands, the "Ranger" may also be used as a flexible exciter without modification.

As a transmitter, the "Ranger" is a rugged and compact 75 watt CW input or 65 watt phone unit. 100% AM modulated, the "Ranger" has a pi-network coupling system that will match antenna loads from 50 to 500 ohms. Covering seven amateur bands, 160, 80, 40, 20, 15, 11 and 10 meters—built-in VFO or crystal control features high gain audio within the communications speech range.

As an exciter, the "Ranger" will drive any of the popular kilowatt level tubes and will provide a high quality speech driver system for high powered modulators. The "Ranger's" design permits basic control functions for the high power stage to be handled right at the exciter—no modification or internal change required to shift from transmitter to exciter operation with all connecting leads TVI filtered inside the "Ranger" cabinet.

A nine pin receptacle on the rear of the transmitter brings out TVI filtered control and audio leads for exciter operation. This receptacle also permits the "Ranger" to be used as a filament and plate power source and also as a modulator for operating auxiliary equipment such as a VHF transmitter. Available at the output receptacle are 6.3 V AC at 5.5 Amp., 500 V DC at up to 210 MA and 300 V DC at up to 50 MA along with the full 33 watts output of the modulator.

BUILT-IN VFO—The built-in VFO, patterned after the famous Johnson Model 122, is extremely stable. Separate calibrated bandspread dial scales for each of the seven bands and a new 6 to 1 planetary dial mechanism using a 2 $\frac{3}{8}$ " diameter knob result in exceptional tuning accuracy with velvet smooth control. The 28.0 to 29.7 MC calibration alone is nine inches long and 14.0 to 14.35 MC covers more than three inches on the dial. For permanent accuracy, dial pointer is connected directly to the frequency determining VFO element. Plexiglass dial is edge lighted; ruled Plexiglass pointer rides close against dial on metal bearing to insure a minimum of parallax. Precise 10 kc calibration increments on each band provide uniform and accurate dial interpretation.

KEYING—Excellent break-in keying characteristic, a special design aim in the "Ranger," is achieved by light loading, voltage regulation and careful circuit design.

Easy to tune, the "Ranger's" basic tuning controls are located on the VFO Dial escutcheon. QSY within the phone or CW portion of a band is usually possible by merely changing the VFO frequency setting. For larger frequency excursions, simply touch up the grid (Buffer) tuning, adjust loading, and dip the final. Simple as A B C. Other controls, used for initial tuning, changing bands or changing mode of transmission are as follows: Off-Tune-Phone-Standby-CW switch, Bandswitch, Crystal 1-Crystal 2-VFO-VFO Zero switch, Meter Off-Osc.-Buffer-Grid-Plate-Mod. switch, Audio Gain, RF Drive, Coupling and Auxiliary Coupling. The VFO frequency control, Final Plate tuning and Buffer tuning dials are located on the VFO dial escutcheon.

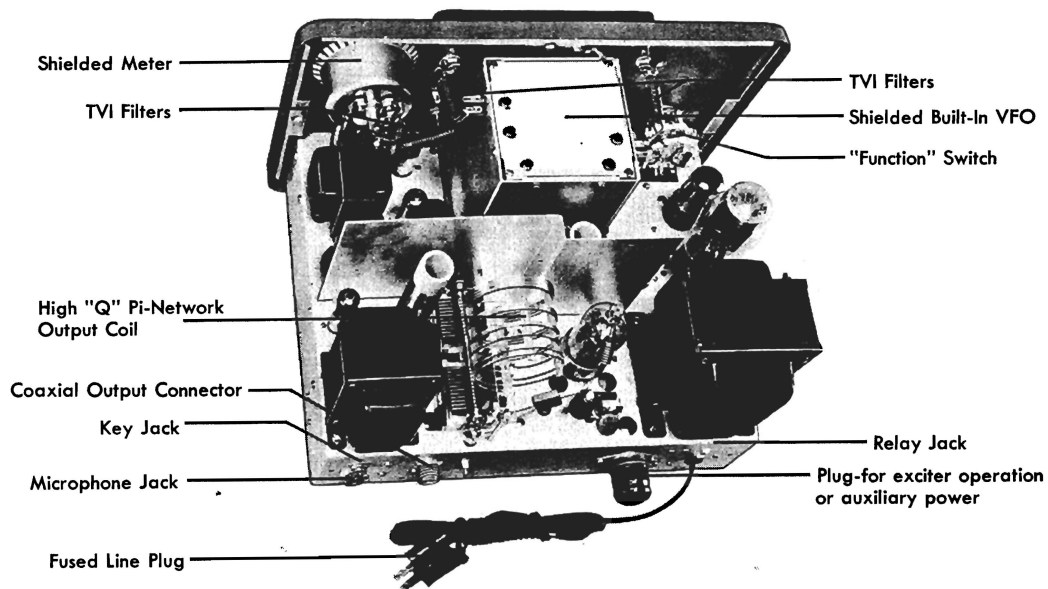
TVI SHIELDING AND FILTERING—Completely TVI Suppressed, the "Ranger" cabinet is sealed electrically, using flexible monel braid on the inside of the front panel and large cabinet overlap. A cup type shield seals the meter, and spring contact washers on the front panel shafts prevent possible radiation from shaft clearance openings.

Power line and relay jack have double L type filters, and all auxiliary socket, meter, dial lamp, key, meter, and meter lamp leads have L filter networks. To minimize chassis harmonics, interior harness leads and filaments are by-passed. Careful final by-passing plus special circuit techniques minimize harmonics in the output circuit.

GENERAL SPECIFICATIONS

VFO—EXCITER—The front panel bandswitch, switches all stages from the VFO through the final amplifier. The series-tuned Colpitts VFO circuit, with temperature compensation and voltage regulation, is designed to operate very lightly loaded for maximum stability.

The crystal oscillator/VFO isolator stage (6CL6) has broad tuned plate circuits to eliminate need for a separate tuning control. The buffer (6CL6) plate circuit tunes to the operating



frequency at all times, maintaining a relatively high C/L ratio to insure good harmonic and subharmonic rejection. A separate front panel drive control allows precise drive adjustment for optimum amplifier performance.

FINAL AMPLIFIER—An efficient pi-network tank circuit is designed to handle 50 to 500 ohm resistive antenna loads and is capable of tuning out large amounts of reactance. Plate circuit capacitor switching provides the best combination of variable and padding capacity for ease of tuning and proper loading. Final amplifier tube is a 6146.

SPEECH-MODULATOR SECTION—A three stage triode speech amplifier, with inverse feedback, provides exceptionally flat response and stable, low impedance drive to the modulators. The first two amplifier stages consist of cascade connected triode sections of a 12AX7 working into a parallel connected 12AU7 power driver. Extra high speech gain permits the use of virtually any communications type dynamic or crystal microphone. A three circuit microphone connector is provided to facilitate connection, if desired, for push-to-talk operation.

Push-pull 1614 transmitting type modulators operate within tube ratings to deliver more than sufficient audio power for 100% amplitude modulation. Plate saturation limiting prevents large swings beyond full modulation, at the same time providing some limiting of the waveform to reduce distortion and spurious output if transmitter is over-modulated.

A special feedback loop, using a tertiary winding on the modulation transformer, provides damping for exceptional stability and flat response in the speech stages and provides improved regulation for directly driving class B₂ modulators when the "Ranger" is used as an exciter. Frequency response is flat within 3db from 250 to 3000 cycles and falls off rapidly above and below these frequencies. Audio quality is very pleasing yet has the extra audio punch needed for communications effectiveness.

ASSEMBLY—Designed as a complete kit, the "Ranger" may be assembled by either novice or experienced amateur. Assembly instructions include photographs, diagrams and step-by-step wiring directions. All information needed including tube socket diagrams and component color coding is furnished with the kit—no outside source of information required. Chassis, panel, cabinet and all shields are formed and punched at the factory. No drilling or other metal work is necessary. Complete to the last detail, the "Ranger" kit includes cabinet, knobs, dials, pre-calibrated VFO dial, wiring harness, hardware, brackets, connectors, and all necessary electrical components. Complete operating instructions included. Shipping weight approximately 54 lbs.

Cat. No. 240-161 "Viking Ranger" Kit, less tubes

Cat. No. 240-161-2, "Viking Ranger", wired and tested. **\$258.00 Amateur Net.**

CLAMPER—The clamper circuit, using a pentode connected 6AQ5, protects the final tube in case of excitation failure, yet allows full modulation swings without danger of peak distortion.

POWER SUPPLY AND CONTROL—Self-contained low voltage and high voltage power supplies use choke input filtering—high voltage supply delivers 500 to 525V DC to the final and modulators—low voltage supply delivers 300 V DC for the exciter and speech stages.

A separate relay jack (with internal TVI filters to prevent harmonic radiation from connecting wires) provides 115 V AC for antenna change-over and control relays. The relay jack is energized by the Operate Switch on the front panel. Transmitter fuse is located in the 115 volt power plug for easy access.

Complete instructions for using the "Ranger" as a self-contained Transmitter, as an Exciter and Speech Driver, or as a Power and Modulator source for VHF-UHF transmitter are included in the instruction manual. No internal changes necessary when switching from transmitter to exciter operation—all functions handled at standard 9 pin power receptacle and matching plug at rear.

Crystal socket, located on front panel, accommodates two crystals and can be switched from front panel. Meter is illuminated and meters all stages with selector switch.

APPEARANCE—Extremely sturdy and compact, the "Ranger" measures only 15" x 11-5/16" x 9". The 18 gauge steel cabinet with drawn rounded corners is finished in rich maroon wrinkle enamel—with a smooth maroon and gray enameled front panel. Entire chassis and front panel slides out of cabinet after removing just two knurled tie bolts and 8 shield retaining screws. When removed, topside and under-chassis are completely accessible. Guide rails insure easy reinsertion of the chassis into cabinet.

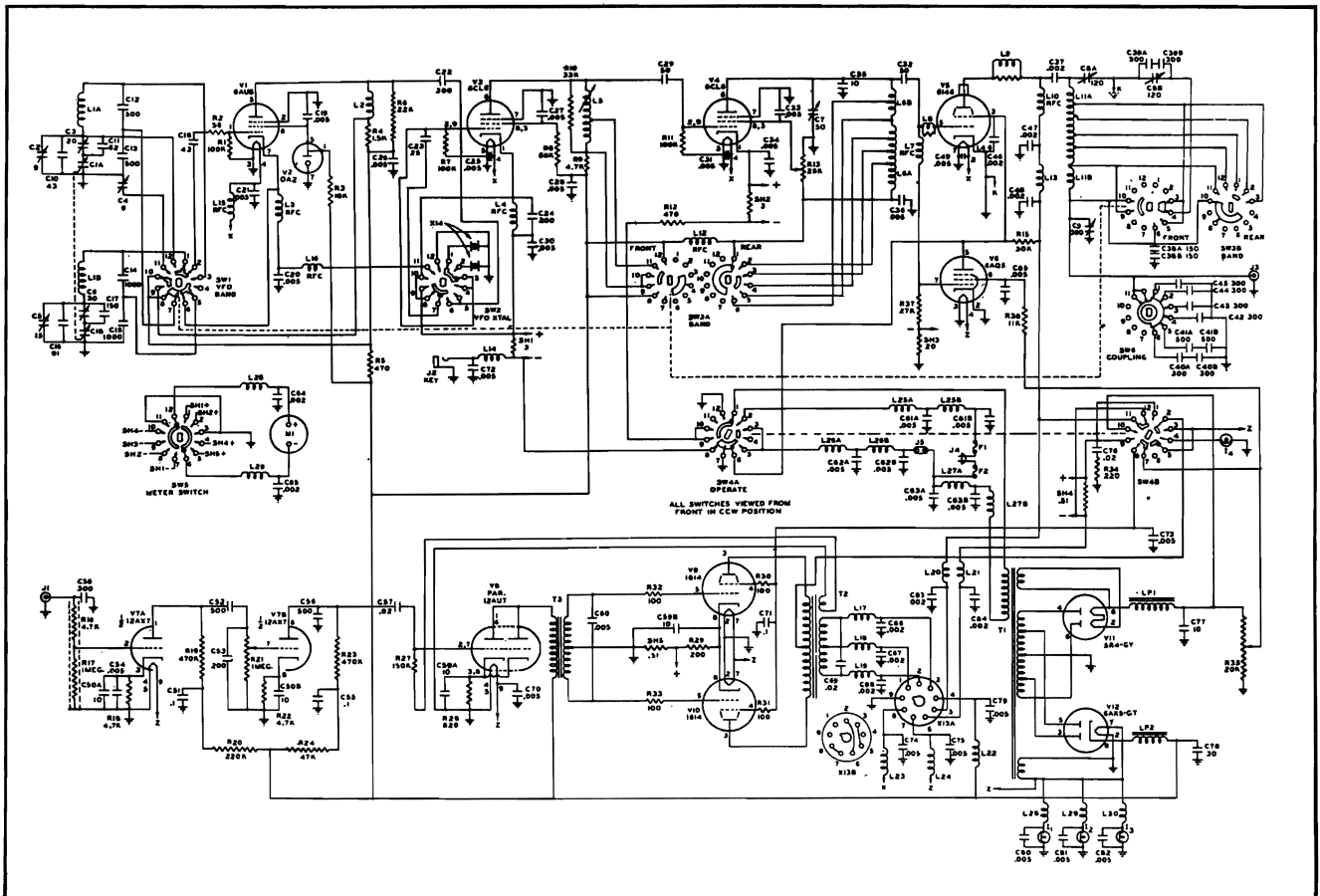
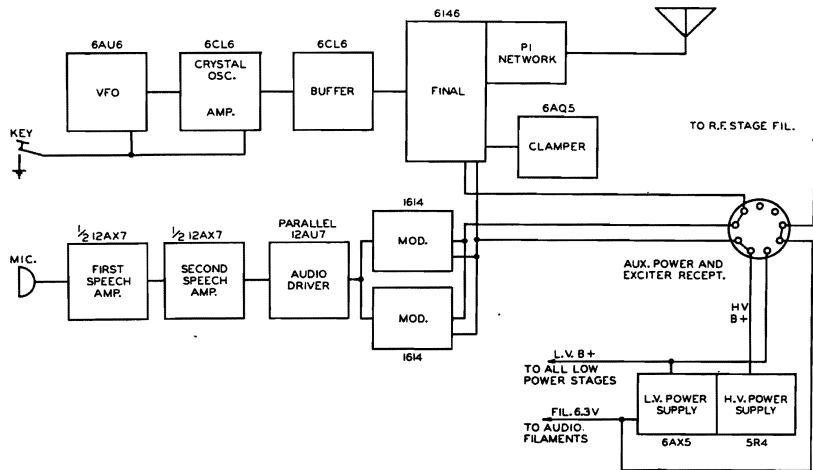
\$179⁵⁰

AMATEUR NET

CRYSTAL CHART, BLOCK, AND SCHEMATIC DIAGRAMS

| Crystal | Bands |
|-----------|----------------------|
| 160 meter | 160 80 |
| 80 meter | 80 40 |
| 40 meter | 40 20 15 10 |
| 6.5 Mc. | 11 |

Chart shows crystals which may be used full output on the amateur bands covered by the "Ranger."



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