

JOHNSON VIKING I / VIKING II  
AND  
VIKING MODEL 122 VFO  
KEYER MODIFICATION

A. Theory of Operation

Grid-block keying is used in the crystal oscillator and buffer stages of the Viking I and Viking II, and is also applied to the oscillator of the Model 122 Viking VFO when used as the frequency control. To avoid unnecessary interference with signals on adjacent channels, a wave-shaping filter consisting of R205, R206, and C205 is used on V5, the buffer tube and V6, the oscillator tube. To avoid a chirpy signal when keying the VFO, the keyer tube, V201, allows the VFO to start quickly (a few microseconds) before V5 and V6 start conducting - and then continues operating momentarily after V5 and V6 have stopped conducting.

The VFO keyer adjust control, R202, adjusts the "hold" time for VFO operation after the key is opened. This may be adjusted to cut off the VFO between marks of keyed characters and thus allows rapid CW break-in operation by enabling the operator to be aware of incoming signals while he is keying the transmitter.

When operating in this fashion, a slight sparking at the key may be noticed as a click in the associated receiver. It is not on the carrier and will only be noticed in the receiver used at the transmitter. The clicks can be reduced by installing a 2 1/2 millihenry rf choke (the ordinary receiver type) in each key lead making the connection as close to the key as possible, and connecting a .01 mf capacitor in series with a 500 ohm resistor across the key contacts. This reduces radiation of the spark energy by the key leads.

B. Viking I / Viking II Keyer Modification Assembly Instructions

1. Mount the following components referring to diagram, Fig. 21, making sure that the tube socket and variable resistor are oriented as shown.
  - a. Mount X201, the 9 pin miniature socket, using two 1/4 x 4-40 screws, two #4 lockwashers and two 4-40 hex nuts (use lockwashers between chassis and saddle of socket.)
  - b. Mount R202, 100,000 ohm potentiometer; using the 3/8-32 hex nut and 3/8 lockwasher. Place the lockwasher between the shoulder of the control mounting bushing and the keyer plate. Secure with the 3/8-32 hex nut, orienting the terminals as shown in Figure 21.
2. Make the following ground connections using a 3" length of black wire stripped of its insulation:
  - a. Pins 4 and 5 of X201 to ground lug adjacent pins 4 and 5 of X201. Solder.
  - b. Ground lug adjacent pin 9 of X201 and terminal 1 of R202, the 100,000 ohm potentiometer, do not solder.

Strip insulation from a 1" length of black wire and connect pins 3, 8 and center shield. Solder pin 3 and center shield only.

4. Cut an 11" length of black plastic covered wire, strip 1/4" on each end. Connect this lead to terminal 1 of R202 and solder.
5. Cut a 17 1/2" length of white plastic covered wire, strip 1/4" on each end. Connect one end to terminal 3 of R202. Do not solder.
6. Cut a 13 1/2" length of green plastic wire, strip 1/4" on each end. Connect one end to pin 6 of X201. Do not solder.
7. Cut a 9" length of brown plastic wire, strip 1/4" on both ends. Connect one end to pin 9 of X201 and solder.
8. Cut a 12 1/2" length of red plastic wire, strip 1/4" on both ends. Connect one end to pin 1 of X201 and solder.
9. Cut a 12 1/4" length of orange plastic wire, strip 1/4" on both ends. Connect one end to pin 2 of X201. Do not solder.
10. Cut both leads of R201, 22,000 ohm 1/2 watt resistor, to 5/8" length. Connect between pin 6 of X201 and ground lug opposite pin 9 of X201. Solder both ends.
11. Cut both leads of R204, 18,000 ohm 1/2 watt resistor, to 3/4" length. Connect between pin 8 of X201 and terminal 3 on R202. Solder pin 8 on X201 only.
12. Cut both leads of R205, 22,000 ohm 1/2 watt resistor, to 5/8" length. Connect one end to pin 2 on X201 and other end to terminal 3 of R202. Solder both connections.
13. Cut both leads of R203, 1 megohm 1/2 watt resistor, to 3/8" length. Connect one end to pin 7 of X201 and the other end to the center terminal, 2 on R202. Solder both connections.
14. Inspect entire unit for any unsoldered connections and solder at this time.
15. Dress the six wires as shown in Figure 21 and slip them through a 5" length of .208 inch I.D. spaghetti tubing. Push the tubing along the wires until it extends inside the edge of the keyer chassis.
16. This completes the assembly of the keyer.

#### C. Installation of Keyer Assembly in Viking I or Viking II.

1. Remove top cover and bottom plate of Viking transmitter.
2. Remove shield S4B, the larger shield adjacent to the final amplifier, by removing the five 6-32 nuts and lockwashers beneath the chassis and two 6-32 nuts and lockwashers which secure it to the small shield. (In Viking I the larger shield is called S4A).
3. Drill two 5/32 inch diameter holes in shield S4B in the locations shown in Figure 22.

4. Mount the keyer chassis to the shield S4B by means of the two aluminum spacers, the two #32 x 1" binder head screws, two lockwashers and nuts. The keyer will mount over the crystal board with the keyer leads toward the rear of the chassis.
5. Referring to Figure 10 in the Operation Instruction Manual, mount a two terminal strip, TS203, under the nut which secures the end of S4A, the shield which mounts the oscillator tuning capacitor. This nut is located to the right of shunt SH5 near the chassis side wall. (In Viking I the smaller shield is called S4B.)
6. Remove the grey wire and one lead of shunt SH5 from pin 2 of X5, leaving capacitor C27 connected. Do not solder.
7. Connect shunt SH5 and the grey lead to the ungrounded terminal of the terminal strip, TS203. Do not solder.
8. Cut the leads of R209, 470 ohm 1 watt resistor, to a length of 1/2". Connect the resistor between pin 2 of X5 and the ungrounded terminal of the terminal strip TS203. Solder both connections.
9. In following steps, note that terminals on terminal strips are numbered from the center of the chassis outward.
10. Remove the wire with the black and brown tracer from terminal #5 of X20. Tape the end and tuck it out of the way.
11. Remove the brown wire from the center terminal on X24. Tape the end and tuck it out of the way. (On Viking I there is no X24, so remove the brown lead from pin 8 of X12.)
12. Remove mounting screw and solder lug at the rear end of X20. In place of the lug, mount a two terminal strip, TS201, using the original hardware.
13. Remove the solder lug from C17 and connect C17 to the ground terminal of TS201. Do not solder.
14. Remove one lead of shunt SH3 and two brown wires from terminal 2 of X20.
15. Connect one lead of shunt SH3, just removed, to the ground terminal of TS201. Do not solder.
16. Remove the two brown wires from terminal 2 on SW3. (Terminal 1 in Viking I).
17. Set meter switch to "OFF" position.
18. Use a volt-ohm meter and check continuity of the two brown wires just removed from SW3. One wire should show continuity with one of the two brown wires previously removed from terminal 2 on X20. Connect this wire back on terminal 2 of SW3 and solder. Ground the remaining wire to the solder lug secured by the front end of terminal strip X21 and solder.
19. Connect the brown wire, which shows continuity with the one now on SW3, back on terminal 2 of X20. Tape the remaining brown wire and tuck it out of the way.

20. Mount a two terminal strip, TS202, under the nut and lockwasher which is between the two small rubber grommets near the buffer tuning capacitor, C22.
21. Cut a piece of orange wire 4" long. Strip both ends and connect the ungrounded terminals of TS201 and TS202 which were added. Do not solder.
22. Remove the resistor, R18, <sup>470K</sup> from the V6 grid and the ground terminal. Replace R18 with a new resistor, 100,000 ohm 1/2 watt, and connect between pin 1 of X6 and the ungrounded terminal of the terminal strip TS201. Do not solder at TS201. Solder at pin 1 of X6.
23. Cut the leads of R208, 150,000 ohm 1/2 watt resistor, to a length of 9/16". Connect one end to the ground lug on the two terminal strip TS202 and the other end to the ungrounded terminal. Solder the grounded terminal.
24. Cut the leads of R207, 47,000 ohm 1/2 watt resistor, to a length of 3/4". Connect one end to terminal 5 of X20, the other end to the ungrounded terminal of TS202. Solder at the two terminal strip, TS202, only.
25. Cut the leads of R206, 10,000 ohm 1/2 watt resistor, to a length of 3/4". Connect between terminals 5 and 2 on X20 being careful not to short to adjacent terminals. Do not solder.
26. Cut leads on C205, .22 mfd 200 V capacitor, to a length of 1 1/4". Connect between terminal 5 on X20 and the ground lug on the two terminal strip TS201. Solder terminal 5 on X20.
27. Cut leads on capacitor C201, .005 mf ceramic to a length of 1 1/2" and connect between ground terminal and ungrounded terminal of the two terminal strip, TS201. Solder both terminals.
28. Place a large rubber grommet into the hole directly in front of filter choke L3 (refer to Figure 10d in the Viking II Operation Instruction Manual). For the Viking I drill a 1/2" diameter hole located 3 9/16" from the rear of the chassis and 3 1/8" from the left hand edge of the chassis, being careful not to damage the small filter choke, L3, under the chassis. Refer to Figure 10 in the Viking I Operation Instruction Manual. Place a rubber grommet in this hole.
29. Guide the keyer cable through this grommet. Mount shield S4B with keyer assembly attached, back on chassis and secure it by means of the seven lockwashers and nuts previously removed from it.
30. Dress the green lead from the keyer cable toward the cable on the side of the chassis and connect it to the center terminal on X24. Solder this terminal. (On Viking I there is no X24, so connect the green lead to pin 8 of X12.
31. Dress the brown and black wires behind the fuse holder, X16, and connect the black wire to pin ~~3~~ on X11, the brown wire to pin ~~3~~ on X11. Solder both connections.
32. Dress the remaining wires in the cable toward the front, keeping clear of the crystal sockets. Run the white wire along side the bracket for X7 and X17 and connect to terminal 2 on X21. Solder this connection.

CHECK THIS FILE CONNECTION.  
 NINE WAS OPPOSITE. P.U.;

33. Connect the orange wire to terminal 2 on X20 and solder.
34. Connect the red wire to terminal 4 on X20 and solder.
35. Tape together the 3 wires just installed and secure them to the orange wire installed between TS201 and TS202.
36. Disconnect the center conductor of the small coaxial cable from terminal 2 on the crystal switch, SW8.
37. Remove the tie bolt nearest terminal 2 of the crystal switch, SW8, being careful to save the nut, washer, spacer and bolt.
38. Using the hardware just removed, mount a two-terminal strip, TS205, on the front side of the detent plate of the crystal switch SW8, where the tie bolt was just removed. Orient TS205 with the terminals pointing forward and the ungrounded terminal nearer to where the bottom plate would be. Be careful to replace the spacer between the detent plate and the phenolic wafer. Tighten securely.
39. Connect the center conductor of the small coaxial cable (just disconnected) to the ungrounded terminal of TS205. Do not solder.
40. Cut both leads of C203, .005 mf disc capacitor, to 3/4" length and connect between the ungrounded terminal of TS205 and terminal 2 of the crystal switch, SW8. Solder both connections.
41. Visually inspect all connections and solder any connections which may have been overlooked.
42. Replace V6 (6AU6) with a 6BA6 tube.
43. Install the 12AU7 tube, V201, in socket X201 on the keyer chassis.
44. Replace the bottom plate and top cover on the transmitter.
45. This completes the keying modification on the Viking I or Viking II. The transmitter will provide click-free keying with greatly reduced adjacent channel interference. However, if a VFO is used, it will be necessary to modify the VFO circuitry as described in the following section, D. VFO modification instructions are provided for the Johnson Model 122 VFO only - we cannot underwrite correct keying performance with other VFO units.

#### D. Viking VFO Model 122 Keying Modification

1. Remove bottom and top cover.
2. Disconnect R50, 47,000 ohm 1/2 watt resistor, and capacitor C70, .005 mfd. and pin 3 of X50 from the ground lug beside terminal 3 of X50.
3. Remove ground lug and replace it with a two terminal strip, TS204.
4. Connect R50, 47,000 ohm 1/2 watt resistor, to the ungrounded lug on terminal strip, TS204. Do not solder.
5. Cut the leads of C202, .005 mf capacitor, to a length of 1/2". Connect across the terminals of TS204. Do not solder.



6. Connect pin 3 of X50 and the end of C70 to the ground terminal on TS204. Solder.
7. Remove the white wire with black tracer from J50 and extend it by adding a piece of brown plastic wire 6" long. Cover the joint with a 2" length of .133 I.D. plastic tubing. Connect this wire to the ungrounded lug on the terminal strip, TS204. Solder.
8. Remove L52 from J50 and connect it to the ground lug directly in front of SW50, the bandswitch. Solder this connection.
9. Visually inspect all connections and solder any connections which have been overlooked.
10. Replace bottom and top cover.
11. This completes the modification of the Viking VFO.

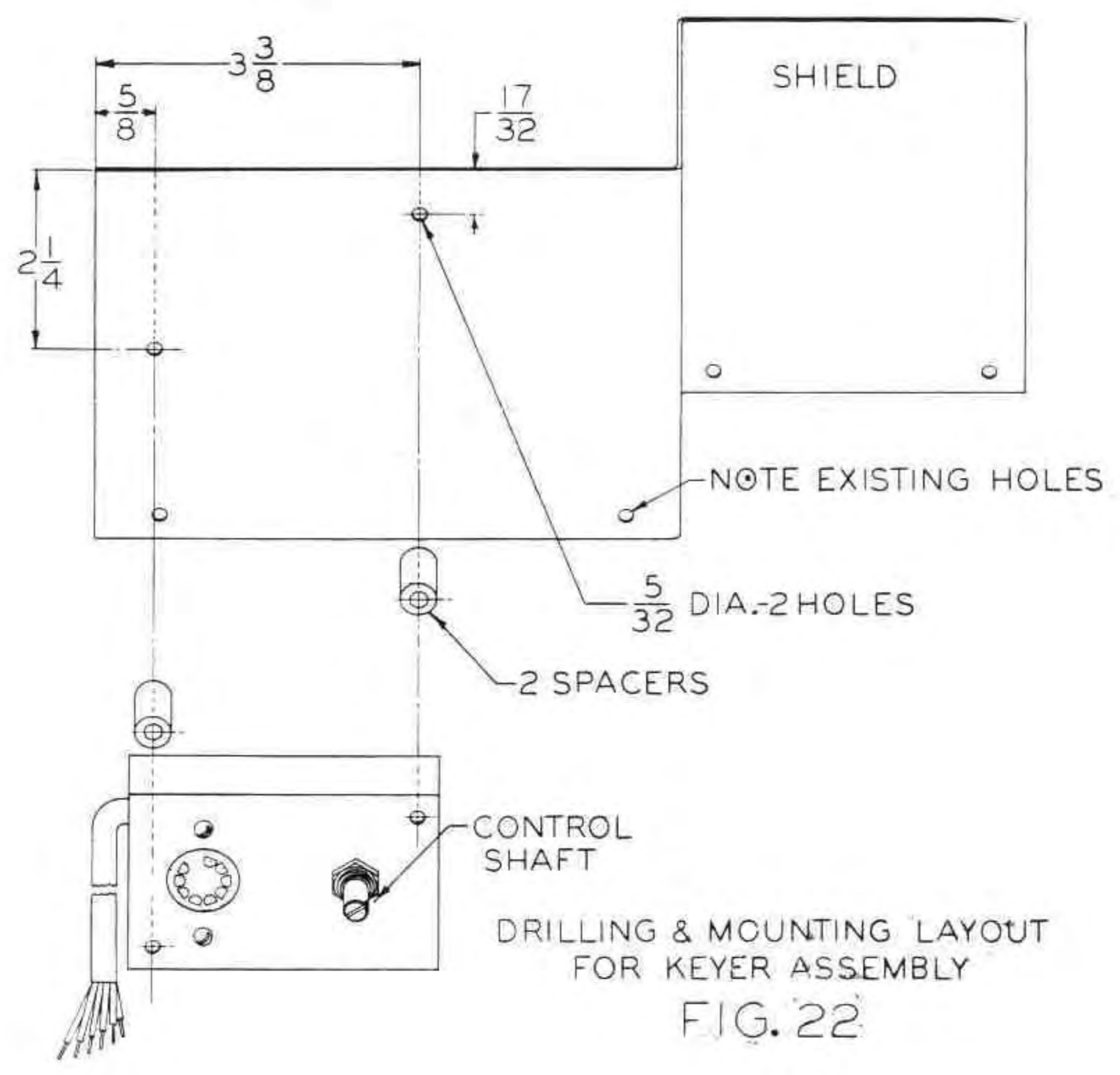
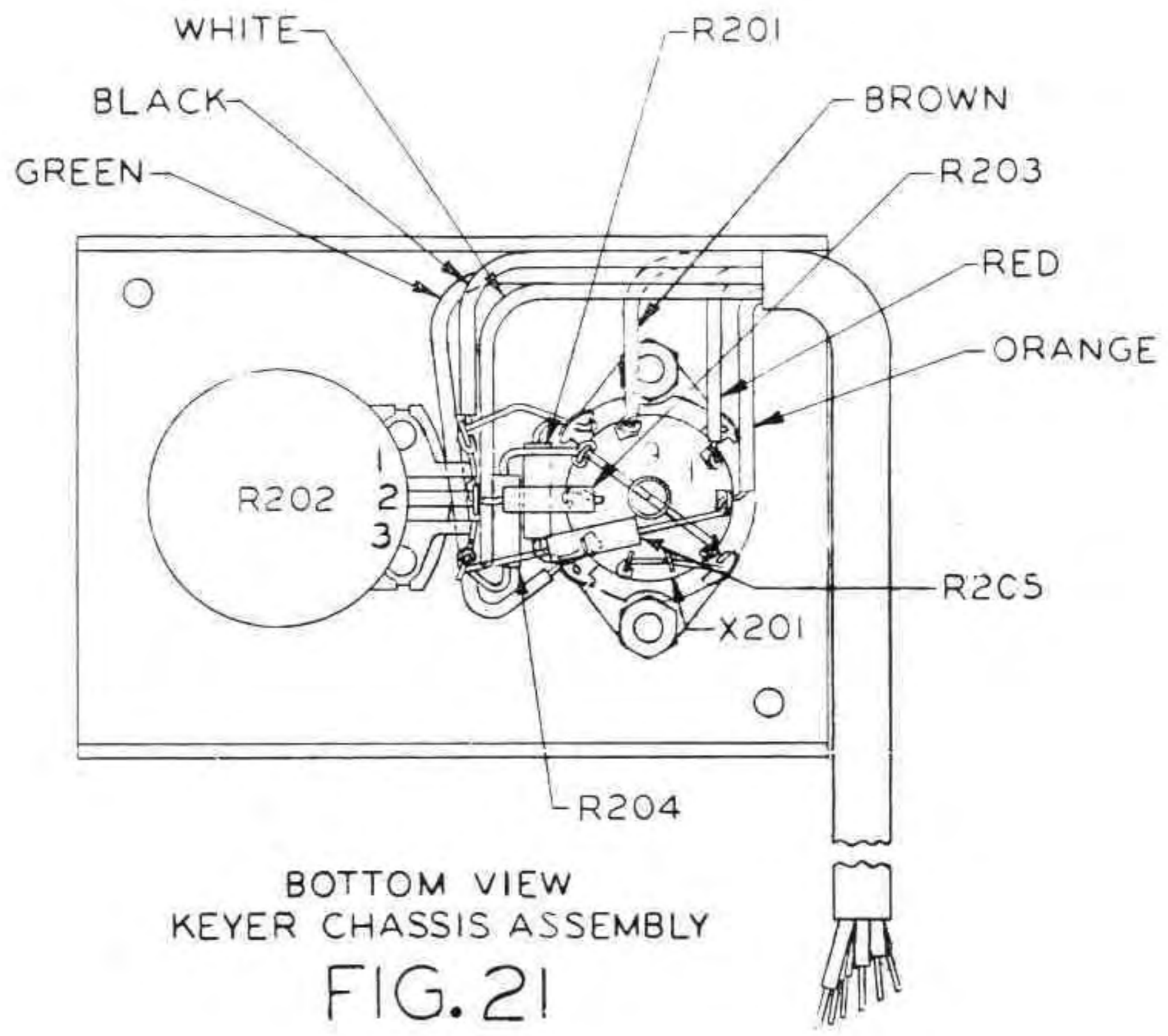
#### E. Adjustment

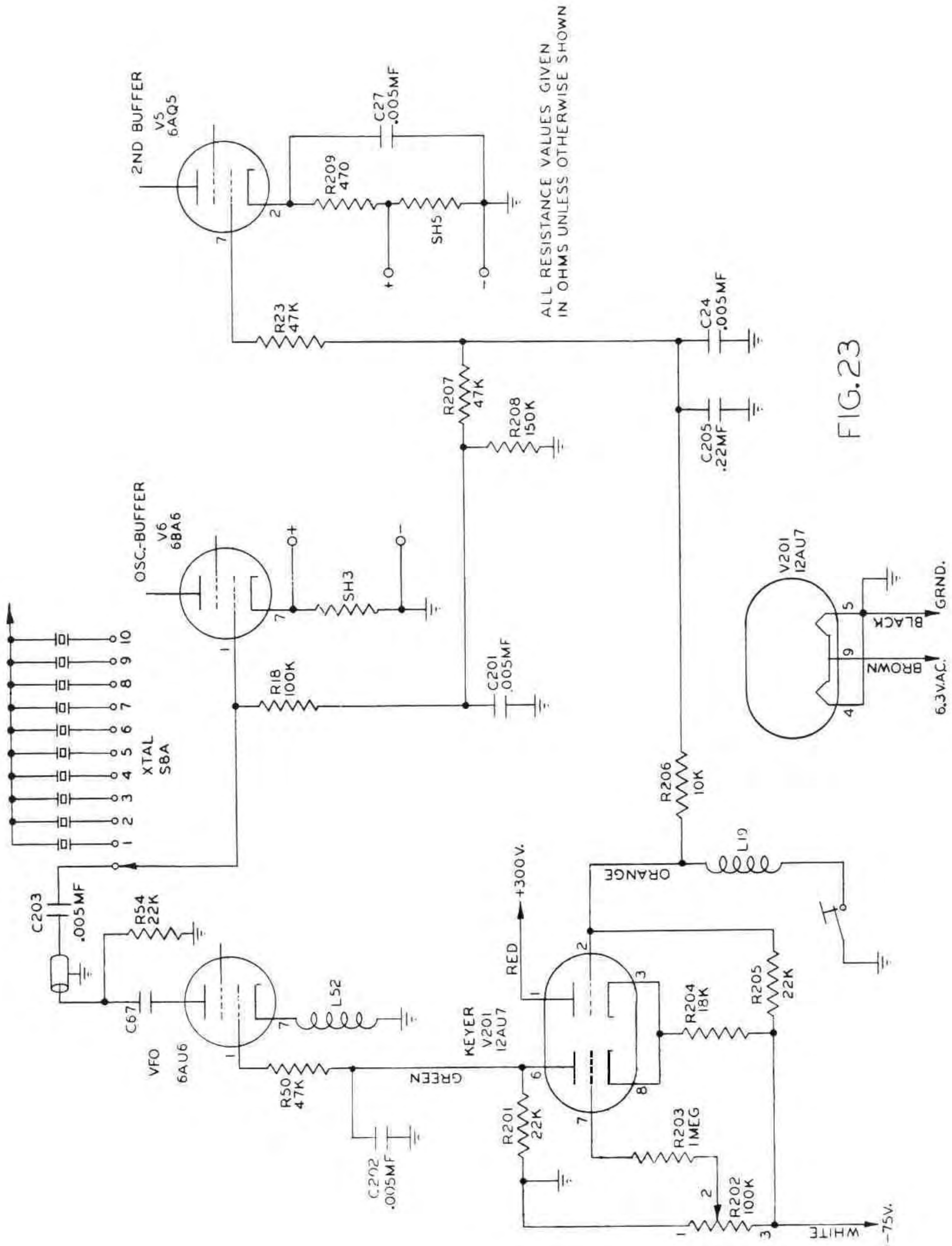
1. Couple the VFO output to a receiver by placing the open end of the coaxial cable connector (on the Viking VFO output cable) near the antenna terminals of the receiver.
2. Insert key in the key jack in the Viking I or Viking II. The key jack in the VFO will not be used.
3. Close key and tune receiver to VFO signal.
4. Open key.
5. Turn keyer adjust control; R202, clockwise until VFO signal starts.
6. Turn keyer adjust control counter-clockwise just slightly beyond the point at which the VFO signal stops. Adjustment in the extreme counter-clockwise position may cut off the VFO too soon and result in "squaring" or "sharpening" of the keying envelope at the break with attendant clicks.
7. Connect the VFO output coaxial cable to the input connector on the Viking II.

#### F. D.C. VOLTAGES TO GROUND - Measured with a 20,000 - ohms-per-volt Voltmeter

Keyer V201  
Type 12AU7

<u>Pin</u>		<u>Key Open</u>	<u>Key Closed</u>
1	Plate	+ 350	+ 320
2	Grid	- 68	0
3 and 8	Cathodes	- 41	+ 16
4	Heater	0	0
5	Heater	0	0
6	Plate	- 20	- 1
7	Grid	- 41	- 23.5
9	Heater	6.3 VAC	6.3 VAC





ALL RESISTANCE VALUES GIVEN IN OHMS UNLESS OTHERWISE SHOWN

FIG. 23



# **K4XL's** **BAMA**

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