



Sherwood Engineering Inc.

Four Filter Switch Kit

Installation of 2-, 3-, and 4-Filter Switch Kits

The four-filter switch kit consists of two PC boards with relays and sockets. The part numbers are 3-4B and SSB. See figures A, B, and C on page 7.

The four-filter system consists of the original 8-kHz filter, the CF-600/6 CW filter, and the two SSB filters. The CF-600/6 is mounted on the long replacement shield under the receiver chassis that separates the r-f and i-f sections. The CF-600/6 will be mounted on the r-f side, with its studs and pins protruding into the i-f area. The PC board mounts on the i-f side with two 7/16-inch spacers, allowing access to all connections. The component side of the board is mounted away from the shield so that the relays can be removed from the sockets should a failure occur. The relay switch kits automatically ground the unused filters to assure no degradation of the selected filter.

Mounting Components on the 3-4B Board:

Insert the sockets in the board, aligning the dot on the socket with the square positioning aid on the PC board. Note: two point up and two down. If only the CF-600/6 and 8-kHz filters are being switched, install the sockets in the inner positions, leaving the outer two empty. If only SSB and CF-600/6 or 8-kHz filters are being switched, install the sockets in the outer positions, leaving the inner two empty. In the two filter case, insert jumper wires between relay holes 2 and 4 on the input and 5 and 7 on the output. In the three-filter case, insert jumper wires between relay holes 5 and 7 for the CF-600/6 or 6 and 7 for the 8-kHz filter, counting clockwise from the marks on the circuit side. Solder these connections. A small-tipped, low-wattage soldering pencil is recommended to minimize solder bridges.

Place the board in front of you with the component side toward you, and the two large mounting holes in the upper left. There are three jumper wires to be inserted in the board. All go exactly up and down on the board, not left to right or on an angle. The first one is in the 5 o'clock position from the left-most relay (socket). The two holes are only 1/4-inch apart. The second one is in the corner where the board width decreases. This wire jumps over one trace, and the holes are less than 1/4-inch apart. The final jumper is to the right of the third relay (socket), and jumps over two traces, with holes about 1/2-inch apart. Solder these jumpers.

Four 0.01 uF disc capacitors are to be mounted next, one for each relay coil. The disc for the left-most relay mounts below it, with leads going left to right. The remaining discs mount with their leads top to bottom. Capacitor number two mounts in the 7 o'clock position. Number three in the 1 o'clock position, and the final one at 11 o'clock. Note: one lead of each disc goes to the ground bus on the board. Solder the connections. The diodes now have to be mounted. Note, either pair of duplicate pads may be used to mount

these diodes. Both anodes connect to the ground bus in the center of the board. The cathode (band) pad for the bottom diode is just below the ground bus at the bottom center of the board. The cathode pad for the top diode is to the right of the ground bus in the middle of the board.

Five bare wires now need to be soldered to the board for connection to the two filters and the transformer T-5. Use two-inch wires. Wire number one goes between the left two relays near the bottom. This wire protrudes from the component side. All others protrude from the circuit side of the board. Wire number two connects to the pad in the 7 o'clock position by relay number three. Wire number three is between relays three and four, near the bottom. These three wires will go straight down to the 8-kHz filter pins and T-5. Trim to length when the board is mounted.

Turn the board over so the circuit side is facing you. Two 1/2-inch wires remain to be mounted. These go to the CF-600/6 pins. Locate pins 3 and 5 of the inner two relays. Trace the circuit from these pins to the farthest pad away from the respective relays. Solder the 1/2-inch wires here. This completes 3-4B component wiring.

Removal of Existing Shield:

Remove the R-4C from its cabinet, and place it upside down with the front facing you. To allow more room for the CF-600/6 filter, bend the middle terminal of the terminal strip located on the front side of the middle band-switch shield 90 degrees toward the band-switch shaft.

Remove the wires from the Teflon insulator mounted on the long shield, the ground strap from the a-f gain-control housing, and the two shield-mounting sheet-metal screws or nuts. (Earlier-vintage receivers may not have some of these connections.) Take out the shield. Cut the wire from between the output of T-5 and the input of the original 8-kHz filter. Unsolder and discard these wires. Unsolder from the 8-kHz filter the output wire that goes to the following stage. This output wire will be re-attached later.

Mounting the CF-600/6 and 3-4B PC Board:

Insert the filter in the replacement shield from the 1/4-inch flange side. Secure the filter with a 4-40 lock washer and nut on the filter stud nearest the shield ground solder lug, and the other stud with a 7/16-inch threaded spacer. (Do not use a lock washer with this spacer.) Attach the other spacer to the shield with a 4-40 screw and lock washer (on screw side) in the hole 15/16 inch from the other spacer. Mount the PC board with two 4-40 screws and lock washers, with components away from the shield. Trim the leads to the CF-600/6 so they overlap the filter pins by an eighth inch. Adjust the screw-mounted spacer positions as needed to align the edge of the board parallel to the edge of the shield.

Installing the Completed Assembly:

Temporarily insert the shield assembly back in the radio. Trim the leads from the PC board to the proper length so they overlap the pins on the 8-kHz filter and the T-5 transformer by an eighth inch. Mount the new shield assembly in the R-4C, being sure not to pinch the white filament wire, nearby coax cables, or newly soldered bare-wire pigtails. Also, if necessary, bend the 0.005 uF capacitor at T-5 out of the way, and bend down the 2400-pF mica and 68 pF disc capacitors on the trimmer banks so they will be parallel to the chassis and allow more room for the CF-600/6 filter. Resolder the connections to the Teflon standoff, and solder the shield ground lug to the volume-control housing. Insert the wire from the original 8-kHz filter's output pin to the lower empty hole at the rear of the PC board. Solder these remaining six connections.

Solder a two-foot piece of hookup wire to each of the 3-4B DC relay control points. These two pads are in the top center of the board. See figure B. The A relays switch between the CF-600/6 or 8-kHz filter and the SSB pair, and this pad is towards the front of the radio. The B relay pad is towards the rear of the radio. See later instructions on attaching these wires to the custom front-panel switch.

Installation of the First-IF SSB Filter Switch Kit

SSB Filter Switching

The two SSB filters and switching hardware will be mounted on the PC board, and then attached to the left (cabinet) side of the preselector bracket using double-sided adhesive foam tape. Clean any dust or dirt from the side of the preselector bracket facing you. This completes the preparation of the R-4C.

SSB Filter PC Board:

Install the sockets by inserting them in the board with the socket dot aligned with the diamond positioning indicator on the PC board. Carefully solder the socket pins, being sure not to cause any solder bridges. [Note, the sockets (and relays) are positioned 180 degrees from each other.]

Mount the two filters on the board, (LSB on wide top, USB on narrower bottom) using supplied hardware, and solder the six pins. Insert a 0.01 uF disc capacitor for each relay coil in the holes nearest the diamond positioning indicators. With the circuit side of the board facing you, and the large side up, locate the suppressor diode pads in the upper right corner. Insert the diode with its cathode (band) towards the right edge of the board.

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Solder these remaining components. Trim the relay leads to 1/4 inch, and insert them in the sockets with the locator tab toward the dot. Attach two-inch strips of double-stick tape to each filter top. Remove the remaining protective paper, and mount the filters and board to the R-4C preselector bracket, positioning the USB filter and wide edge of the PC board so it is flush with the top of the bracket. Center the board left to right on the bracket, allowing room for the tube shield to be removed from V-1.

The filters now need to be grounded to the bracket. Locate a convenient place to spot solder a wire from either of the filters to the bracket. Tin a small place on the filter and bracket, and then solder a short wire between these two points. All that remains is connecting two short coax cables and the DC control wire.

If you are installing only the SSB filters and do not want to be able to use any other filter(s), mount two single-lug terminal strips on the existing 8- kHz filter studs. Use these terminal strips in place of 3-4B connections.

Note: Coax wiring has the filter input signal going to the rear end of the SSB filters and the signal output comes from the front end of the filters. This keeps the input and output coax cables similar in length. The filters are designed for 1000 ohm +22 pF terminations, thus the capacitance of the cable needs to be correct to minimize passband ripple.

Run a 13-inch length of the supplied low-capacitance cable from the 3-4B top front edge through the front chassis wiring-harness cutout toward the SSB PC board. Connecting the cable from the **mounting shield side** of the 3-4B board, ground the braid, at the 3-4B end to the square top edge pad with a large hole. Connect the center conductor to the round pad with a small hole just below the braid pad. Connect the center conductor of the SSB filter end of this cable to the rear PC-board hole that goes to pin 7 of the relay, and the braid to the nearby large hole that goes to the filter stud ground.

Use the same procedure for the filter output coax. From the **relay side of the 3-4B board, connect the remaining 13- inch low-C coax to the 3-4B top rear edge**. The braid goes to the larger square hole, and the center conductor to the round pad below it. Route the coax up through the chassis cutout and to the front of the SSB filters. The center conductor goes to the front edge of the PC board, connecting to the pad that goes to pin 7 of the relay, and ground to the nearby large hole that goes to the filter stud ground. If non-standard mounting and switching of these filters is used, proper C termination must be maintained in any alternate circuit layout. This completes the RF wiring for the SSB filters.

DC Connections:

Connect a 2-foot piece of hookup wire to the remaining vacant hole on the front edge of the SSB filter board. See figure B. Route this wire down through the center cable-harness cutout. Lay aside for later connection to the filter control switch.

With the existing screw, mount a single-lug terminal strip at the upper-left corner of the jack strip on the inside rear of the receiver next to the accessory power socket. Attach a dropping resistor between the 12- to 14- volt terminal of the accessory socket and the newly-installed terminal strip. (Note: If an unmodified 14-volt supply exists in the R-4C, and only two filters are being switched, up to 100 ohms may be used in series with the relay coils. As more relays are added, and if the DC supply has been modified to use a 12-volt 3-terminal regulator, then as little as 10 ohms is recommended to minimize voltage drop. Some resistance is needed, however, to protect the receiver and relays should a short or wiring error exist. Otherwise damage to expensive components could occur. The 1/4-watt resistor thus acts as a safety fuse.

DC Control Using Front-Panel AGC / DC Switch:

Note: The custom front-panel switch for controlling Sherwood i-f filter switch kits, and the receiver AGC has been available again since April 1988. Neither Sherwood nor its dealers will install systems without this switch. Front-panel DC toggle switches are no longer recommended. This custom switch now includes five AGC speeds plus AGC off to enhance receiver performance. These parts are included with the switch.

Installation of Custom Front-Panel Switch

Our dual-function switch assembly replaces the existing AGC control, providing both AGC and i-f filter selection. See figure F on last page.

To install, remove the bottom of the R-4C, and place the unit upside down with its front facing you. Turn the existing AGC switch to OFF. In this position, the two isolated switch lugs are shorted together. Record the wire color code for this OFF position, and clip off the wires at the switch wafer. Progressively rotate this switch to F, M, and S, recording the wire color code for each speed. Snip off the remaining three wires.

Remove the front panel, and then unmount the switch with a deep socket wrench. Mount the new switch with its lugs rotated so they are all easily accessible. When properly positioned, the plane of the switch struts will be parallel to the chassis, easily clearing the filter-capacitor lugs between the wafers. Re-mount the front panel, and re-install the

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knobs. Rotate the front (AGC) wafer to AGC OFF. In this position lugs 6 and 7 will be shorted together. Strip the AGC OFF wires, and solder them to these lugs, using solder sparingly. Don't let solder flow onto the switch contacts.

Switch the AGC to F, position 1. Connect the Fast wire to switch contact 1. If you wish to add the two new AGC speeds, connect the M wire to contact 3, and the S wire to contact 5. The new position 2 speed will use a .022 uF and a 560K resistor, and the position 4 speed will use a .10 uF and a 100K resistor.

To add the faster medium AGC speed, locate the existing medium AGC speed's .047 uF tubular capacitor on the AGC board near the second mixer. It is mounted vertical to the chassis and fastened to the board with insert lugs. The bottom of this capacitor, C74, is the AGC common to which a new RC network will be added. Mount a 3-lug terminal strip to the long shield that separates the r-f and i-f sections. Near its top rear is an unused hole in some shields. Drill or enlarge this hole as needed to mount the terminal strip. Solder the 560K resistor to the .022 capacitor with short leads, and then solder this RC network between the bottom lug of C74 and the front insulated lug on the new terminal strip. Do likewise with the .10 uF and 100K resistor, soldering it to the bottom of C74 and the rear insulated lug on the new terminal strip. Run wires from the two RC networks to the new AGC wafer, wiring the .022/560K to wafer lug 2, and the .10/100K to wafer lug 4. As an option, if you never use the present fast, you may wish to add a new RC network in parallel with the present F position. We recommend a .01 uF and 1 megohm network wired between the bottom of C74 and the 5.6 Meg resistor grid resistor of the second mixer. Connect to the AGC board side of the 5.6 Meg resistor. This will give a more usable fast than the present value.

DC control wiring.

Note: Instruction update not documented in Front Panel Switch (FPS-4) Schematic F. We are now recommending a different switch position layout. To make the small knob on the FPS-4 more consistent with the position of the passband tuning PBT knob, wire the "B" 8 kHz relays to position 3 on the switch. (12 o'clock). Wire the "A" relays to position 2. (11 o'clock). This makes 1 o'clock USB, and 11 o'clock LSB, as with the PBT knob. 12 o'clock is the stock 8 kHz filter that passes both sidebands.

The 12-volt line that feeds switch kit relays, (through a 10 to 100 ohm protection resistor), goes to the common rotor contact 6 on the rear wafer of the FPS-4 switch. Connect the "B" relays wire to the rear DC pad on the 3-4B to the rear FPS-4 wafer contact 3 for 8-kHz operation, the "C" relays to contact 4 for USB, and a diode between 2 and 4 as shown in figure F, and the "A" relays (front DC pad of 3-4B) to contact 2. This leaves contact 1 and 5 open for additional switching, such as the use of the AM filter socket (with optional kit) for a second filter in the 1500 Hz position. This would allow five SSB/CW filters rather than the stock four. Additional DC logic diodes may be needed for these special switch options.

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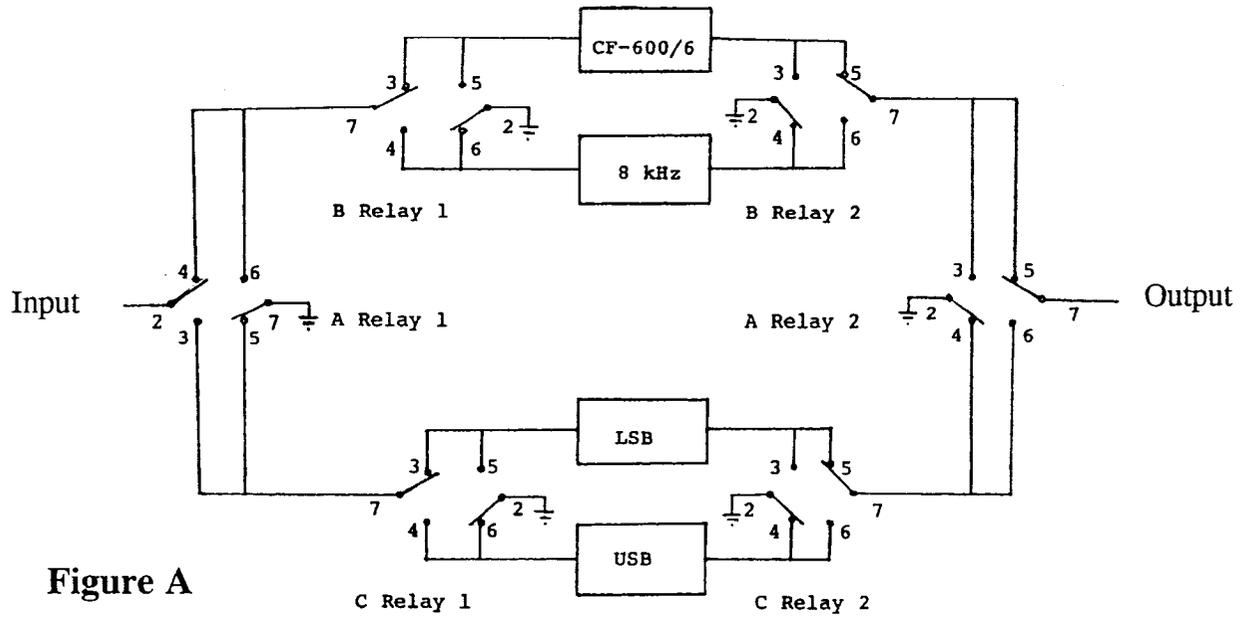


Figure A

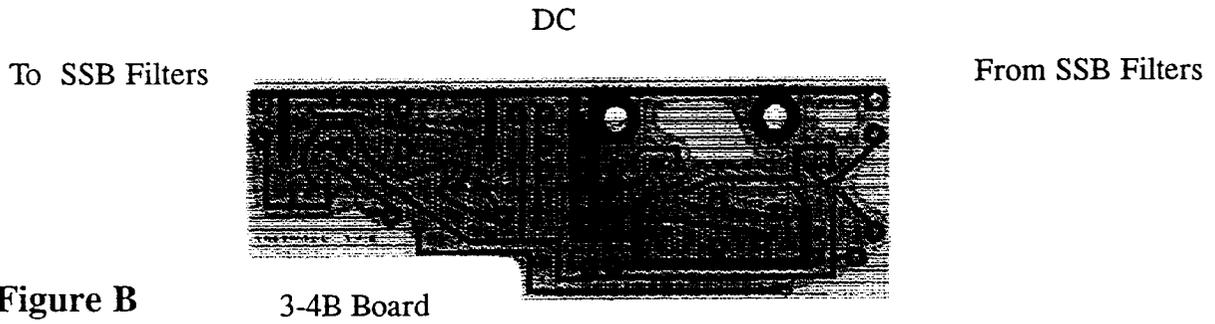


Figure B

3-4B Board

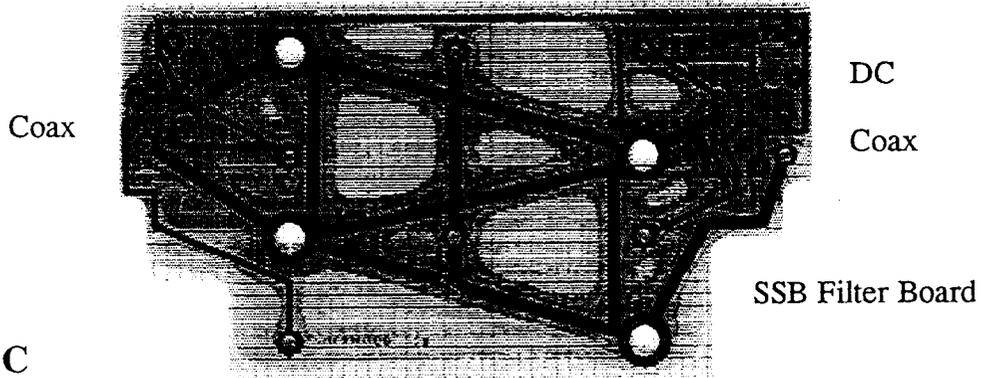


Figure C

SSB Filter Board

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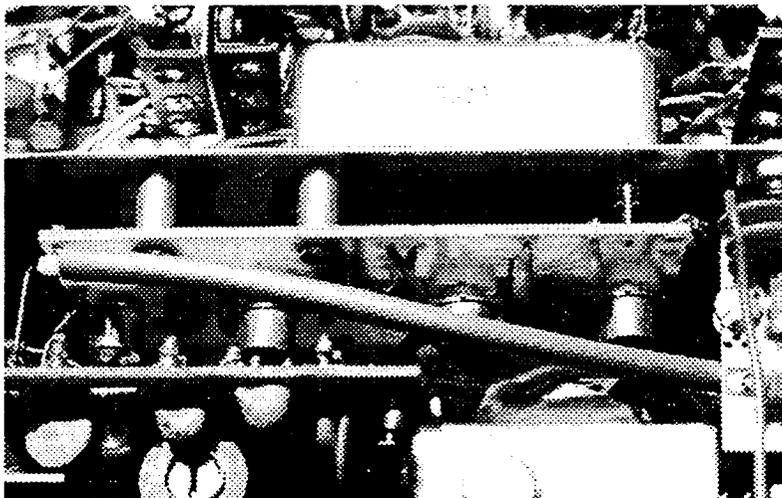


Figure D

3-4 B Relay Board

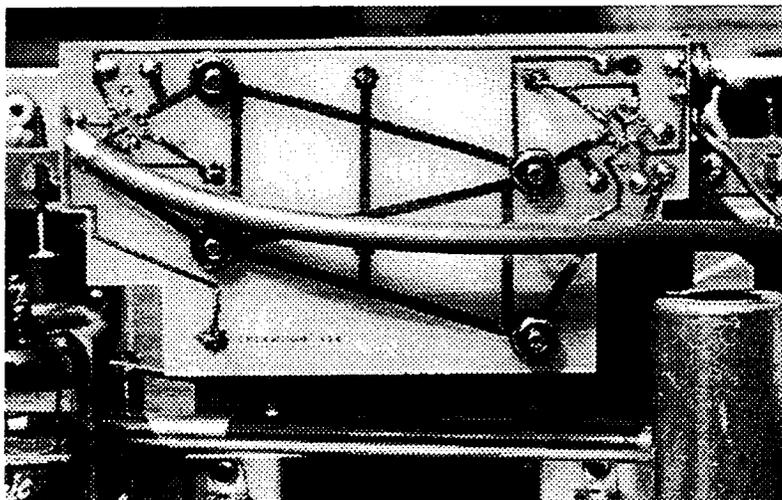


Figure E

SSB Relay Board

Custom AGC / I-F Filter DC Switch

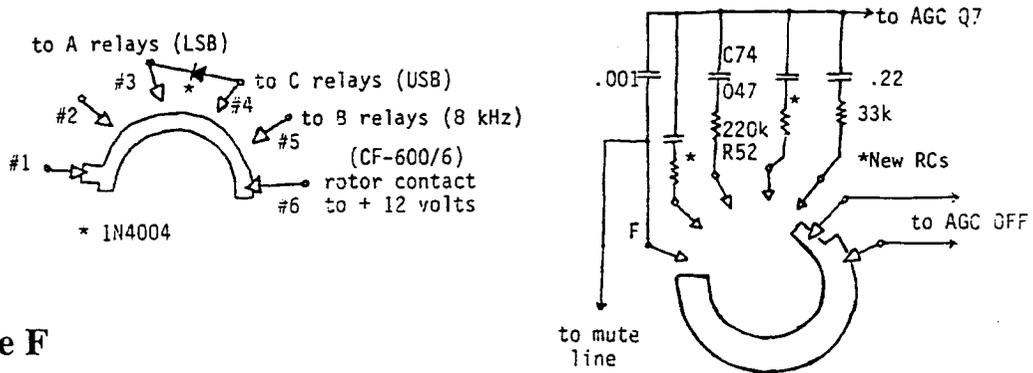


Figure F

View from front of switch