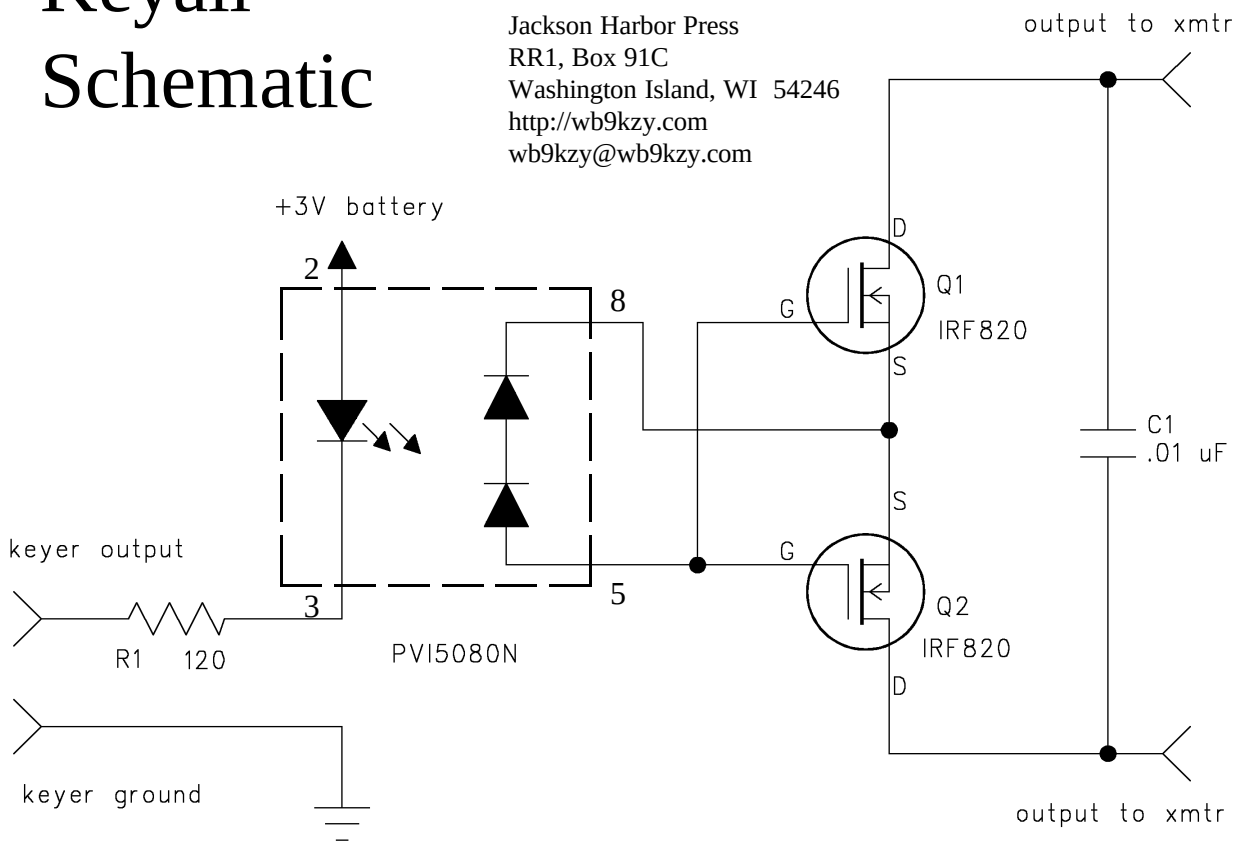
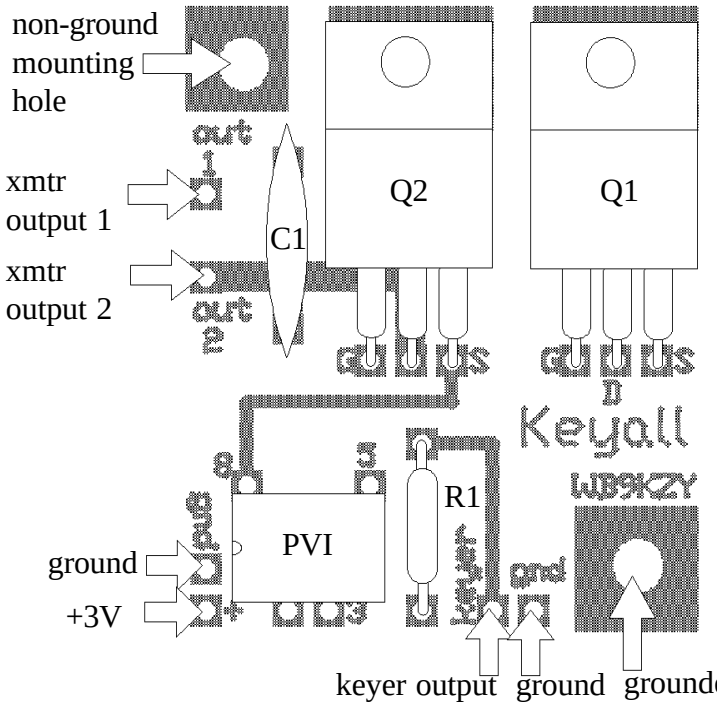
Keyall Schematic

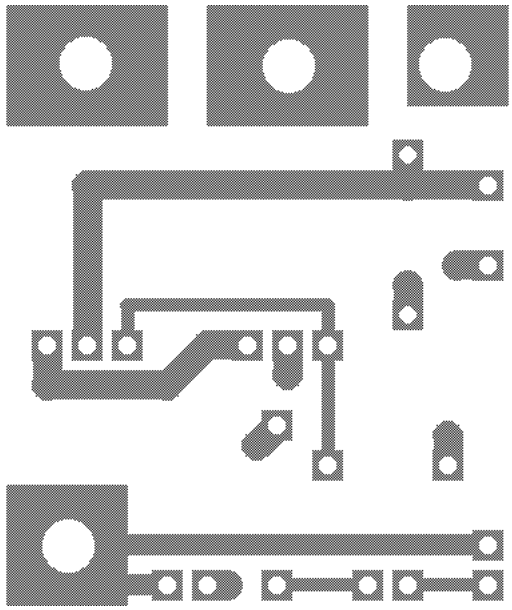
Jackson Harbor Press
RR1, Box 91C
Washington Island, WI 54246
http://wb9kzy.com
wb9kzy@wb9kzy.com



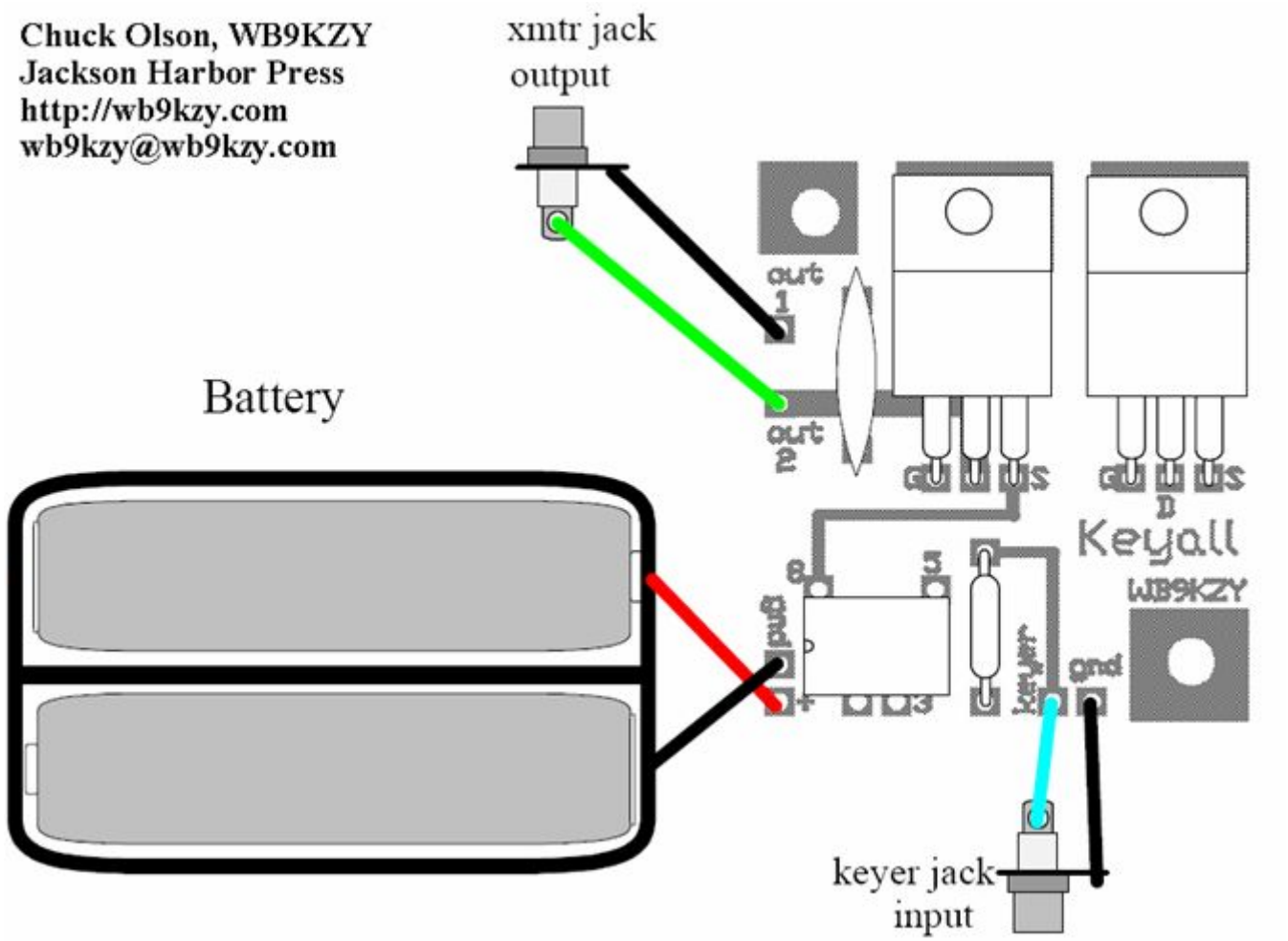
Circuit Board Top View
Parts Placement Diagram



Circuit Board Bottom View



Hookup diagram for Keyall 2/2/2012



Keyall

Introduction:

The Keyall is an accessory for a keyer, hand key or bug which will allow operation with nearly any transmitter. The circuit is a solid state relay which will key solid state (12V), cathode keyed tube rigs (high positive keying voltage) or grid block tube rigs (high negative keying voltage). The Keyall will even key transmitters like the original Tuna Tin 2 which requires a keying output which is isolated from ground. The Keyall output can be made fully optically isolated from the keyer input. The Keyall can even be used as a conventional solid state relay for DC or AC loads - appropriate protection devices such as an MOV and a series fuse should be added by the builder for these non-ham applications.

General notes on building the Keyall

The two MOSFET transistors should be handled as little as possible to prevent static damage. The builder should use a grounding strap and anti-static mat if available or at the very least, work on a grounded metal surface and be sure to touch ground prior to touching the MOSFETs.

One decision the builder should make before starting construction of the Keyall kit is how the project will be mounted in the case. Ideally, the Keyall should be mounted in an all metal case to minimize RF pickup - an Altoids tin will work fine. The circuit board can be mounted to the case with small standoffs fastened with 4-40 sized hardware. The holes for the two MOSFET transistors should NOT be used for mounting the board if the transistors are mounted horizontally because the transistor tabs are electrically connected to the drain of the transistor. The two diagonal mounting holes should be sufficient to mount the board to the case.

The components should be inserted a few at a time, soldered in place and then clip the leads. The pads and traces are small and delicate - a small tipped, low power (25 watts or less) soldering iron should be used.

Building the Keyall

Step 1) Get the parts together: All of the required board mounted components have been supplied but you will still have to provide off-board items to fully implement the kit. These items include:

Input connector, from keyer
Output connector, to transmitter, use a connector appropriate for the transmitter keying voltage
Metal case, an Altoids or other candy tin will work fine
Mounting hardware, 4-40 sized
a two cell battery holder, two AAA cells are fine.

Step 2) Identify and orient the components: Most of the components should be fairly easy to identify and place - see the parts list and the parts placement diagram for descriptions. The PVI chip cannot be inserted incorrectly as the pinout is keyed. The MOSFET transistors just need to be mounted with the tab side AWAY from the PVI chip (printed side towards the PVI).

Step 3) Place and solder the components on the main circuit board: Use the parts placement diagram for information on the placement and orientation of the parts. Clip the leads after soldering. I would recommend that the builder insert parts by their profile (or height) above the circuit board starting with the lowest and working up. The MOSFETs can be inserted either horizontally or vertically. An MOV could also be put across the output instead of C1 if the Keyall is used as a conventional solid state relay. A fuse should also be added to the Keyall (for conventional solid state relay service) in series with the output to prevent damage under overload conditions If using the Keyall as a relay, the builder should mount the transistors horizontally (form the leads carefully, a “rounded” right angle, so that the transistor holes match the holes on the board) and then connect the load to the transistor tabs (which are connected internally to the drain pin) making the connections by using the holes and 4-40 hardware.

Step 4) Check the board: Before proceeding, take the time to check the bottom of the board for solder bridges. Use the bottom view diagram as a guide to visually check for these shorts. It may help to clean the flux from the board and then use a strong light in conjunction with a magnifying glass to see these problems. Also, double check the orientation of the components.

Step 5) Solder the battery holder wires, input and output jacks to the board at the places indicated on the parts placement diagram.

Operation:

The batteries should be inserted in the holder - a VOM can then be connected (in current measuring mode) across the input to measure the active current - this current should be at least 5 mA and less than 25 mA. Connect the input (keyer, key, bug…) device to the Keyall input and the output to the transmitter. The polarity of the output isn't important, either one can be grounded and the other will switch positive, negative or AC voltages.

Modifications:

If the builder wants to completely isolate the keyer from the transmitter, do NOT ground either of the Keyall outputs. Instead, use either a stereo 1/4 inch or 1/8 inch jack (connecting the Keyall outputs to tip and ring) OR use another output connector such as two insulated binding posts and connect the two Keyall outputs to the binding posts. An appropriate cable will then need to be made for this isolated output configuration. This type of isolated output is useful for transmitters like the original Tuna Tin 2 which has the key connection between the positive supply voltage and the transmitter power supply input. If the voltages being switched are for a tube rig, be sure to use a jack and plug that can operate safely at the high (greater than the common 13.8 volts) voltage.

One thing that can be done is to use a different power source than the specified 2 AAA cells. The value of R1 will have to be changed to limit the current used by the PVI. For 5V, use a 240 ohm resistor. For 13.8V, use an 820 ohm resistor. To calculate your own resistor, use this formula: R1 = (V - 1.25) / .015. Don't exceed 25 mA - the minimum PVI current required is 5 mA.

Please feel free to email with any questions, comments, suggestion or problems with this kit. My email address is:

wb9kzy@wb9kzy.com

Thanks for choosing the Keyall kit and Best Regards,

Chuck Olson, WB9KZY

List of parts included with the Keyall kit

Ref	marking	Description
C1	103	.01 µf disc ceramic capacitor, orange
R1	brown red brown gold	120 ohm 1/4 watt resistor
PVI	PVI5080N	4 pin DIP, PVI (Photo Voltaic Isolator)
Q1, Q2	IRF820	IRF820, 500V, n-channel MOSFET
		Circuit board

Items you'll need to provide to complete the Keyall kit

Metal case (an Altoids tin is fine) 4-40 sized mounting hardware output jack to transmitter, high voltage input jack from keyer, key or bug 3V battery holder solder, wire

Optionally, for solid state relay service:

MOV of appropriate voltage rating and lead spacing series fuse of appropriate current rating