

K8IQY “Islander Audio Amp”

...a Manhattan-style audio amplifier kit



This Manhattan-style "bag-o-parts" kit contains all components and most materials needed to construct the K8IQY Audio Amplifier. Contents include:

- 1) all circuit components (resistors, caps, transformer, transistors)*
- 2) pre-cut copper-clad pcb material for the base board*
- 3) strips of pcb material for the builder to snip off to form the Manhattan pads, and*
- 4) a manual offering detailed technical description and construction information.*

Kit may be built using conventional Manhattan pads or with pads created with the new "NJ Islander" pad cutter (available separately for \$9 post-paid from the NJQRP Club)

Kit contains several surface mount parts, ideal for use with Island pads.

Kit may be wired into existing HF QRP rigs with user-supplied speaker.

Brought to you by the New Jersey QRP Club
www.njqrp.org

The K8IQY Islander Amp

... a homebrew audio amplifier

by Jim Kortge, K8IQY jokortge@prodigy.net

Here's a chance to try using a very neat new homebrewing tool called the "NJ Islander" pad cutter. Chuck up this inexpensive diamond-tipped end mill in your Dremel tool and cut 5mm-diameter pads that are isolated from the surrounding copper ground plane. Components can be soldered to these "islands" and you can easily build up all sorts of nifty Manhattan-style circuits in record time. Master homebrewer K8IQY illustrates the ease and benefit of using this new tool to create an incredibly useful project for your QRP operating bench. (Alternatively, you can use conventional "Manhattan Pads" ... just snip off a small piece of copper-clad material from the thin strips provided in the kit, glue them down at the appropriate places noted in the drawings, and solder the component leads in the conventional manner.)

Here is a small audio amplifier that I designed for use with the SW-30+ that is being built by numerous hams across the country as part of Chuck Adam's (K7QO) MH101 project. For those who aren't familiar with this effort, Chuck is leading a group of about 60 hams in the scratch building of the Small Wonders Lab SW-30+, 30 meter transceiver, using Manhattan-style

construction. Chuck's construction, along with some pictures from my efforts, are on his web site at: www.qsl.net/k7qo.

As some of you know, the SW-XX line of transceivers is designed for headphone operation, but I often like to listen to the bands using a speaker. That's especially true if I'm working in my lab, or doing something on

Parts List

References	Qty	Type	Value
C8	1	radial lead cap	0.01uF
C6,C9	2	radial lead cap	0.1uF
C7	1	radial lead electrolytic cap	100uF
C1	1	radial lead electrolytic cap	1uF
C2,C3	2	radial lead electrolytic cap	4.7uF
C4,C5	2	radial lead electrolytic cap	47uF
R12	1	axial "thru-hole" resistor	15
R1,R8,R9	3	axial "thru-hole" resistor	10K
R10,R11	2	chip resistor	1.2K
R2	1	chip resistor	6.8K
R4	1	chip resistor	82
R3	1	chip resistor	470
R6,R7	2	chip resistor	39
R5	1	chip resistor	390
Q1,Q2,Q3	3	Transistor	PN2222
T1	1	Transformer	1200CT-8
	2	copper-clad strips cut as needed for pads (if not using Islander pad cutter)	3/16" x 5"
	1	copper-clad baseboard	2" x 3"

the computer. The small amplifier that was designed and built is just the ticket for using outboard with the rig, adding inside, or directly on the substrate if building one of these rigs Manhattan-style. One could use an LM386 for this application, but I chose to use a discrete component approach, as it is quieter, and can be built by hams anywhere in the world. The basic design was lifted from the 2N2/15 transceiver that has been under development for the past year or so. (Yes, I know I'm slow sometimes!)

This amplifier lends itself to being easily reproduced using either conventional Manhattan-style construction using glued down pads, or built with a NJ Islander pad cutter. A pair of amplifiers has been built using each approach, and they are virtually identical in size and performance. The Islander Pad cutter results in a topology that is ideal for surface mount (SM) components.

Circuit Details

Overall, the amplifier circuit is quite conventional. Received incoming audio is split into 2 phases (equal amplitude and opposite polarity signals) by transistor Q1. The collector circuit uses a voltage divider, R5 and R4, so that the resulting signals from the collector and emitter are indeed equal in amplitude. Transistor Q1 is biased such that the emitter is about 4 volts above ground, and the collector is about 4 volts below the supply voltage at the junction of R12, R5, and R1. This biasing assures the stage will have a large linear range before being driven into distortion.

Transistors Q2 and Q3 form a push-pull, class AB2, audio amplifier that is transformer coupled to the speaker. Using a transformer in the output affords some degree of flexibility in mounting the speaker jack if one is used. Since the secondary of transformer T1 is floating, one side of the speaker jack can be grounded to the chassis with no ill effects. Q2 and Q3 are biased "on" and have about 20 milliamps of quiescent current flowing in their collector circuits. This level keeps the stage linear overall, even though one transistor may be driven into cutoff at high signal levels. Capacitor C6 serves two purposes. First, it rolls off the high frequency response of the amplifier,

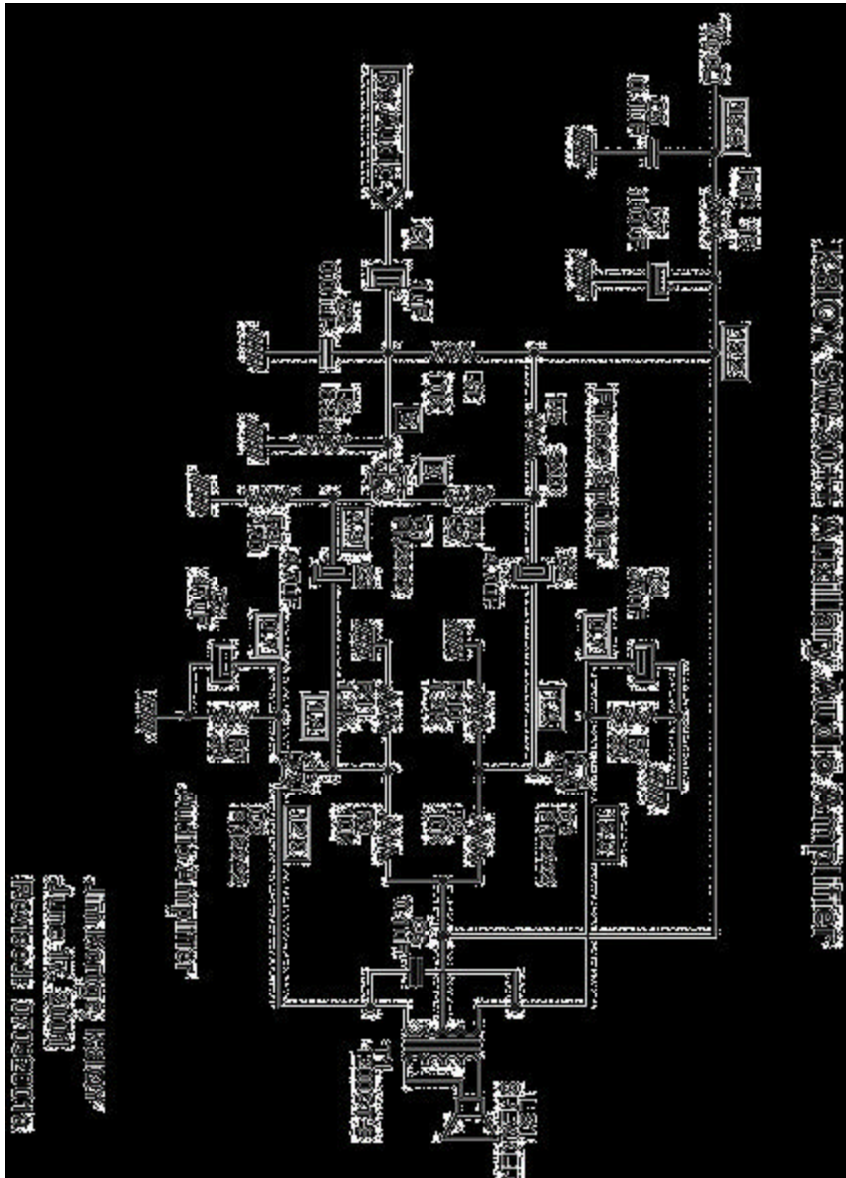
thereby reducing the background hiss. Its secondary function is to tune the primary inductance of T1 to resonate at approximately 750 Hz. The resonance peak is very broad, however.

Although plastic PN2222 transistors were used, any similar small signal transistor such as the 2N4401 or 2N3904 could be used. Virtually any small signal transistor you have in your junk box should work fine. As can be seen in the photograph(s), several surface mount resistors were used in construction the amplifier. However, leaded parts could be used throughout without any change in performance.

The power output from the amplifier has not been quantified. However, when attached to my SW-30+ rig, at full volume on an S9 signal, it produces ear splitting levels when driving a MFJ "ClearTone"™ speaker. It has plenty of volume capability!

Using the NJ Islander

Building the second amplifier using the new NJQRP Islander Pad cutter was a rewarding experience. I had seen and used briefly a larger version of this type of diamond cutter when Dov Rabinowitz, AD0V first discovered them and send me one in late May. I don't get excited over many things, but this cutter seemed to be the very best solution to making pads on PC board material to come along in my ham career. When a smaller, 5 mm version arrived, I had to try it out. The SW-30+ amplifier seemed like an ideal project for getting my feet wet using this new building approach. The bit is very easy to use. I chucked mine up in a floor-mounted drill press, and started putting pads on the PC board substrate. Wetting the surface using a bit of water with a small amount of detergent in it keeps the bit free of copper. With better lighting in the basement, I think I could have gotten the pads to line up better. But then, I don't always get them where I want them using super glue with conventional Manhattan-style construction either! Using the pad cutter begs for surface mount parts to be used in the construction. I've got a good supply of 1206 resistors; time to get some capacitors, transistors, and ICs too I believe!

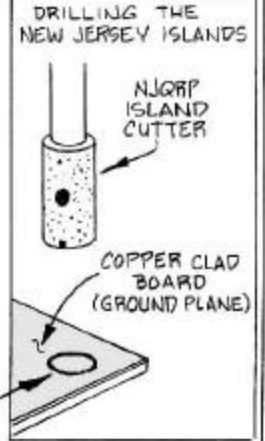
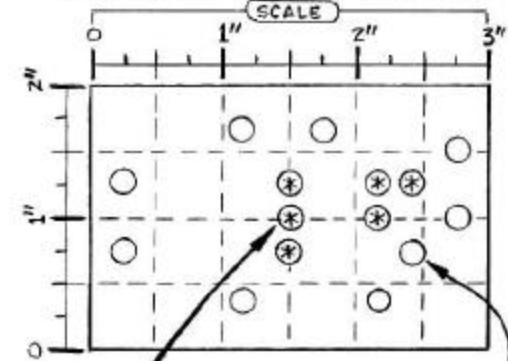


K8IQY SW-30++ AUXILLARY AUDIO AMPLIFIER

BUILT MANHATTAN STYLE USING THE NJQRP ISLANDS

1 PREPARE COPPER CLAD BOARD

Drill "Islands" as shown • Use Scale

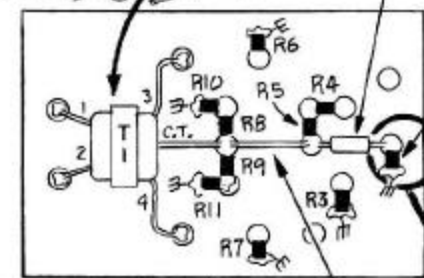
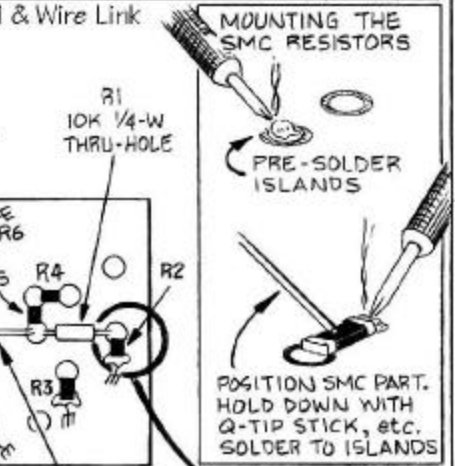
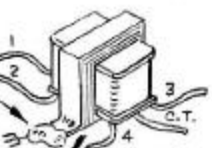


* DRILL THESE ISLANDS ON 0.25" CENTERS TO HOLD 0805 AND 1206 SIZE SMC RESISTORS
 NJQRP ISLANDS ISOLATED FROM GROUND PLANE

2 MOUNT SURFACE MOUNT COMPONENTS (SMC)

Plus Transformer T1, R1 & Wire Link

MOUNT T1 AS SHOWN
 SOLDER TO GROUND PLANE IF T1 HAS TAB

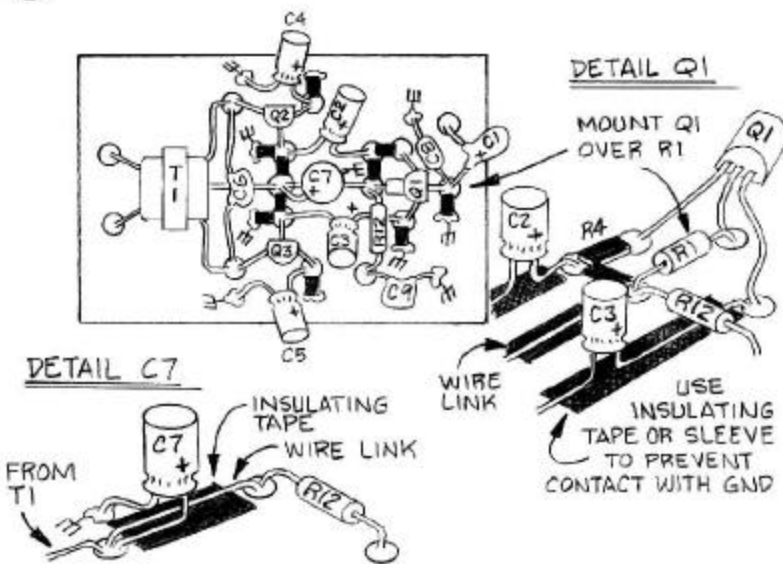


WIRE LINK WITH SLEEVE OR TAPE

DETAIL ISLAND
 GROUNDED RESISTOR

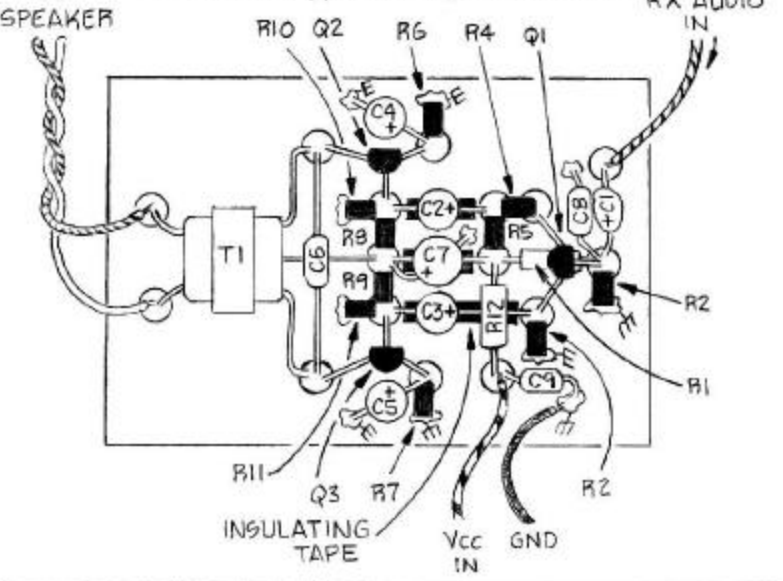
DESIGNED BY JIM KORTGE, K8IQY • ILLUSTRATED BY PAUL HARDEN, N4SN

3 MOUNT REMAINING COMPONENTS



4 FINAL ASSEMBLY

Drawn Approximately FULL SCALE

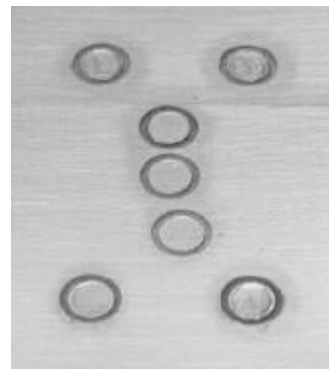
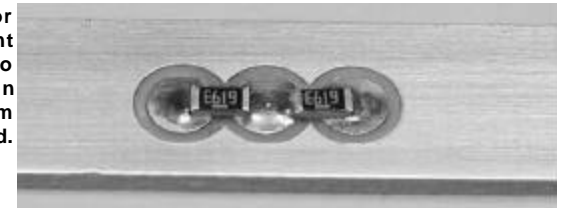


If you have any problems or questions regarding this NJQRP Club kit, please contact George Heron, N2APB at n2apb@amsat.org. Also check the Islander Amp project web page for late-breaking changes and other construction & usage tips at <http://www.njqrp.org/islanderamp>



The 5mm "islands" match pretty closely in size to the conventional Manhattan pad. Note how close the islands can be spaced.

The islands are ideal for mounting surface mount components. There is no "raised edge" as when placing a component from a Manhattan pad to ground.



The island pattern can be cut in advance ...



... and then components added to the board.



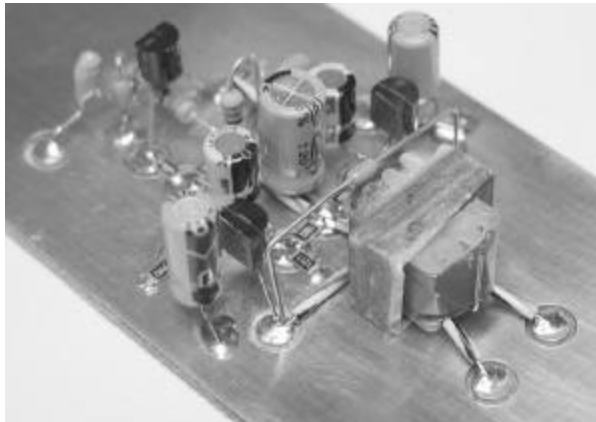
Close-up of the transformer and transistor mountings.



Then the islands are added for the next group of circuit components.



And the components are added. Note the recommended use of insulated jumper wires, in order to insulate from the close ground plane



Both radial and axial leaded components can easily be mounted to the islands.