Piezo Disks, Audio Schematics and a Condenser Mic

The schematics and diagrams here are provide the basis for sonic investigations using piezo disks and mics along with the construction of practical preamps and flexible compact audio mixers.

The diagram for making a 'plinky' describes the process for soldiering a piezo disk and attaching to it harpsichord wire which when plucked or heated will release an astonishing array of sounds. By choosing to not attach the small pieces of harpsichord wire to the disks, one will make a very sensitive contact microphone.

Piezo disks are available for many sources and have the virtue of being inexpensive, rugged and sensitive. They are incredible contact devices--they're use is limited only by imagination, and ingenuity. They may be taped to any surface--use care when attaching to instruments so as not to damage finished surfaces.

I have used them for more than twenty years to amplify (in live performances) and/or to record:

automobile antennae
bamboo
barbed wire fences
bowed bamboo tubes
bicycle wheels
boat gunwales
bridges
burning adhesive on metal tape
cactus thorns
credit cards
floppy disks
heartbeats and pulse
heated metal
insects
raindrops
plants
skateboards
slinkys
snowfall on grass mats
spider webs
toys
trees
tuning forks through steel wire
voices through paper
voices through metal cans
wind blowing over rocks
wind harps
window screens
.....

The condenser Microphone is small, fairly rugged and good for putting inside of small objects, guitars, violins, etc. When using them inside of instruments, I strongly advise to keep the levels low--just a bit above line level can be very effective. The diagrams and schematics may be freely shared. I would appreciate the acknowledgment when they have proven useful.

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How to Solder a Piezo Disk and make a Contact Microphone

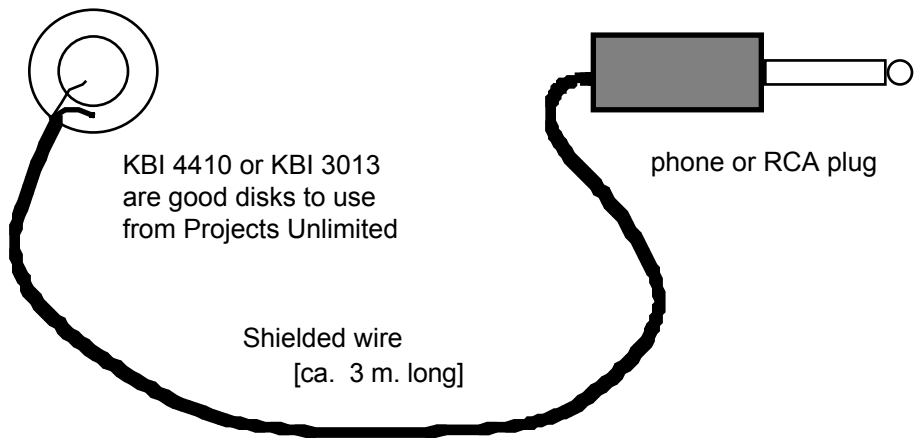
Richard Lerman

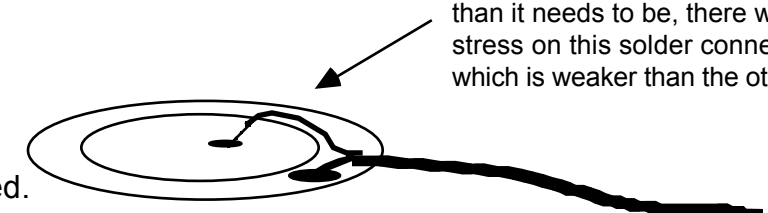
Note: Piezo Brass Disks or 'benders' are available as surplus

In the US, the best current source is:

Projects Unlimited
3680 Wyse Road
Dayton, OH 45414
513-890.1918

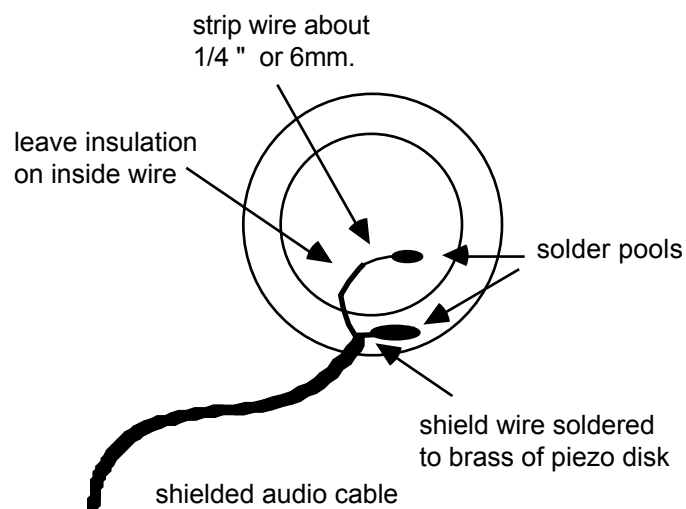
other sources are
All Electonics in L.A.
& Radio Shack/Tandy





SOLDERING DETAILS

1. Tin both the inside or "hot" wire and shield
2. Apply a small pool of solder about 12mm x 4 mm (1/2" x 1/4") to the brass for the shield wire
3. Hold tinned shield wire on this pool with soldering iron. Tinned shield will flow into the solder pool making both a very strong solder connection and strain relief
4. To solder onto piezo ceramic, you must use a very clean soldering iron--about 20 watts maximum
5. Apply very small pool of solder to the piezo disk
6. While holding insulated wire, reheat solder pool and put tinned end of wire into pool.



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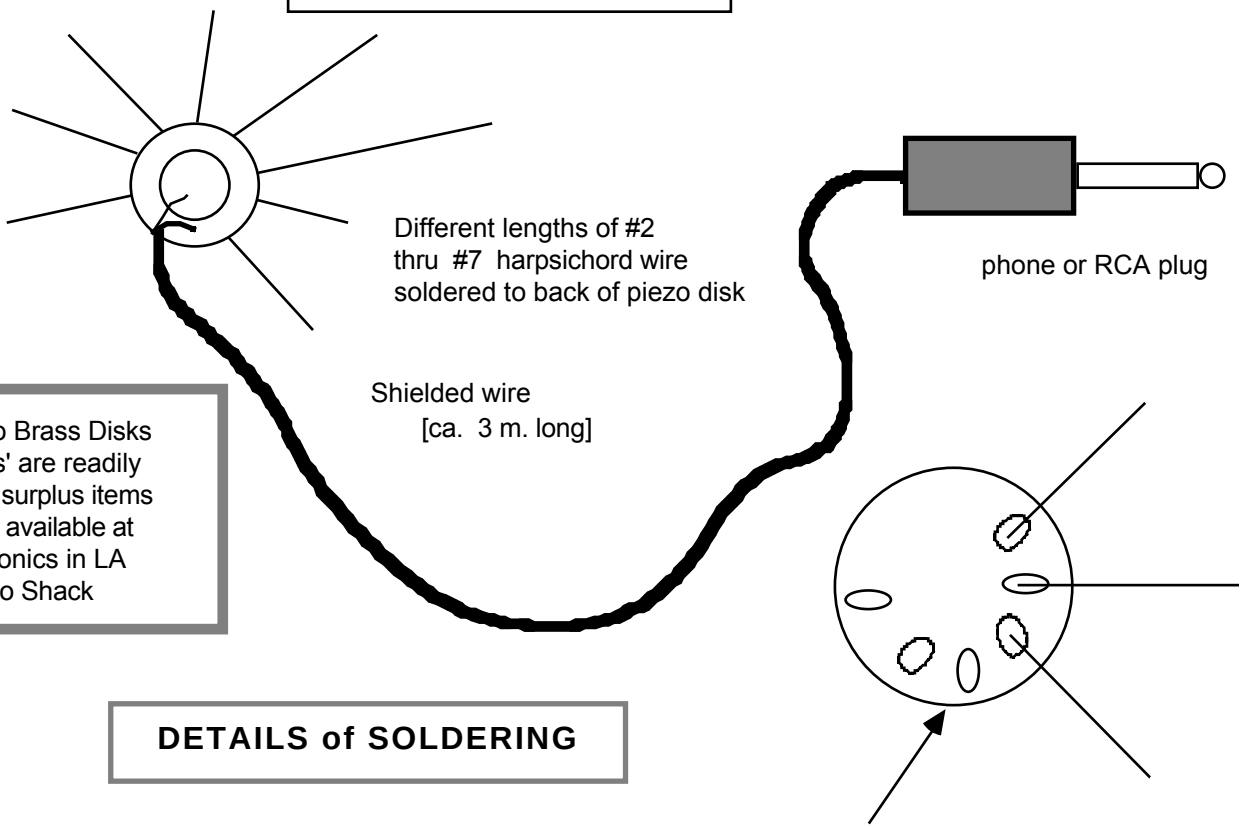
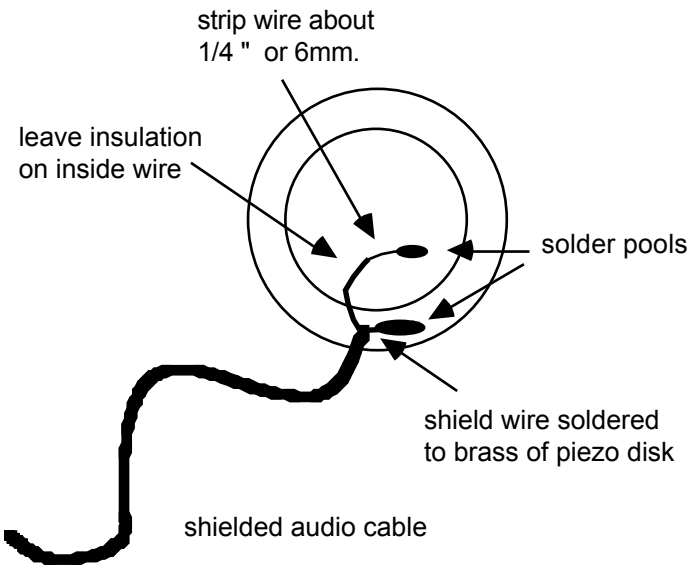
HOW TO MAKE A PLINKY

Richard Lerman



Note: Piezo Brass Disks or 'benders' are readily available as surplus items & are also available at All Electronics in LA & at Radio Shack

DETAILS of SOLDERING



1. Make solder pools on BACK of piezo disk
2. One at a time, hold soldering iron to solder pool while holding length of harpsichord wire in the pool--allow to cool
3. Tin both the inside or "hot" wire and the shield
4. Apply a small pool of solder about 12mm x 4 mm (1/2" x 1/4") to the brass for the shield wire
5. Hold tinned shield wire on this pool with soldering iron. Tinned shield will flow into the solder pool making both a very strong solder connection and strain relief
6. To solder onto piezo ceramic, you must use a very clean soldering iron--about 20 watts maximum
7. Apply very small pool of solder to the piezo disk
8. While holding insulated wire, reheat solder pool and put tinned end of wire into pool.

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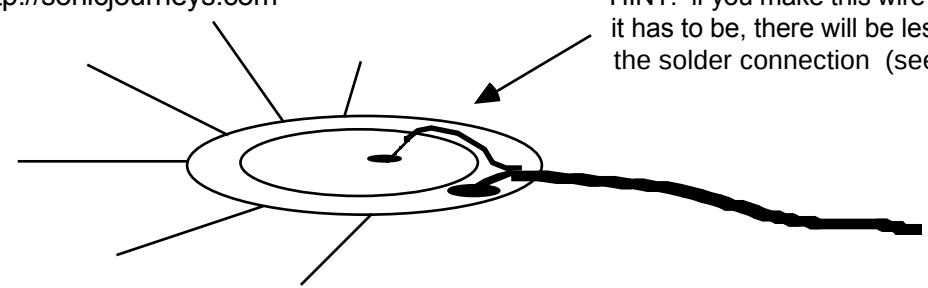

Schematic for preamps for piezo disks

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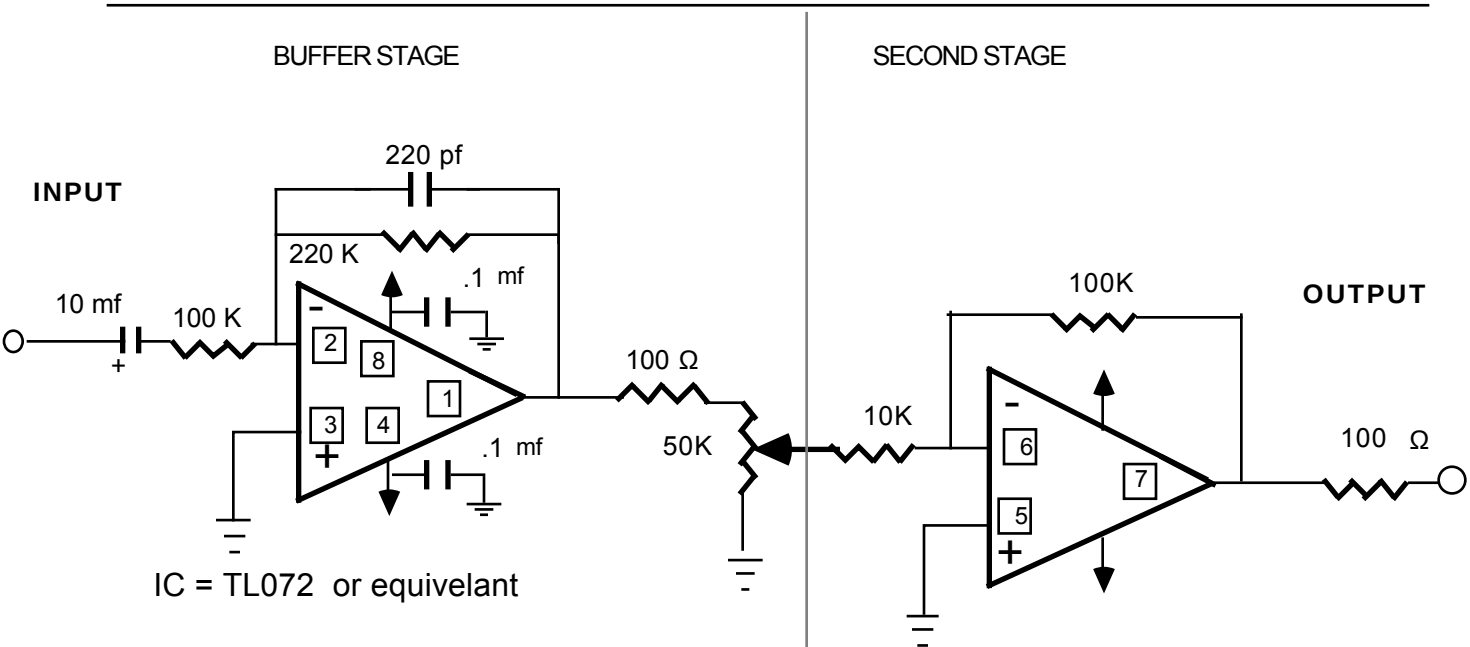
This is a good, and quiet preamp for any piezo disk applications. There are other variations and combinations that work better. A preamp made in a single stage will be quieter, but usually, electronic noise is not a factor in working with Piezo materials. The buffer stage here is basically an impedance changer. Because the gain is kept relatively low, the slew rate, (how fast the preamp can respond) works well with little distortion. Because the impedance has been changed by the first stage, the larger gain of the second stage is less of a problem.

Use any power supply from ±9 volts to ±18 volts. This can be run from two 9 volt batteries. Some of the newer chips on the market can be run with only one battery. Explore



IC = TL072 or equivelant

Gain 220K/100K = 2.2

GAIN 100K/10K = 10

TOTAL MAXIMUM GAIN is 2.2 x 10 = 22

□ = pin number of chip

▲ = positive voltage

▼ = negative voltage

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pin 1 = out amp a
pin 2 = inverting in amp a
pin 3 = non-inverting in amp a
pin 4 = negative voltage
pin 5 = non inverting in amp b
pin 6 = inverting in amp b
pin 7 = out amp b
pin 8 = positive voltage

NOTE: TL072 is from Texas Instruments. 5532 chips from Signetics are quieter, but the large voltage input from some piezo applications can destroy the inputs of these chips.

Preamp/Mixer

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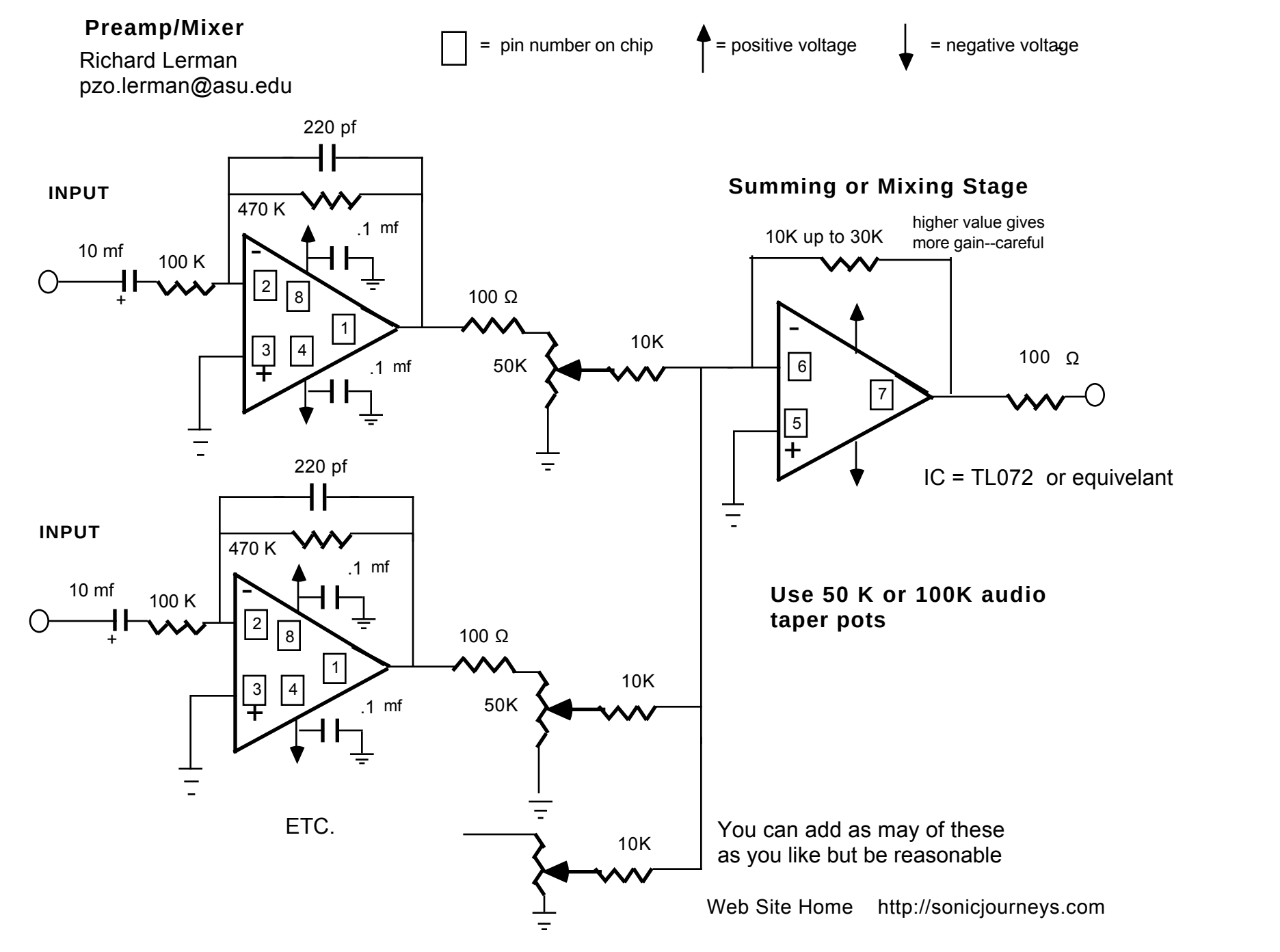

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HOW TO MAKE A small CONDENSER MIC

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mic capsules available from
Digi-Key: Part # P-9964-ND
http://digikey.com

Web Site Home
http://sonicjourneys.com

small microphone capsule--others also available

35 mm. plastic film can for wire, 2 electronic parts, and 3 to 9 volt battery to power mic capsule

phone or RCA plug

shielded wire [ca. 3m. long]

shielded wire [ca 4 cm. long]

twist the shield wire tightly

strip shielded wire about 6-8mm

strip inside or hot wire about 2 mm

bottom view of mic capsule showing the 2 solder pools

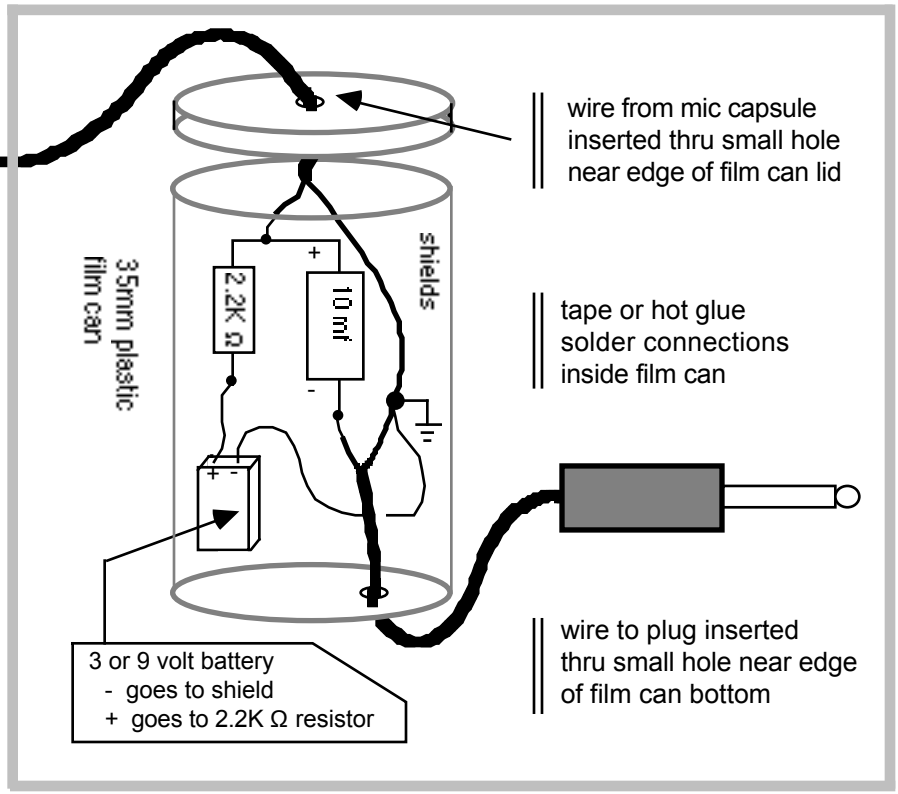
the side with tab is the ground

side without tab is both the audio and battery connection

and, this is about 4 times life-size

Soldering Details

-- Tin both shield wire and hot wire, then cut to same length
-- Carefully heat solder pool for the hot wire on the mic capsule and insert hot wire--allow to cool
-- Carefully heat solder pool for the ground, and insert shield wire--allow to cool
-- Apply hot glue or epoxy around mic capsule and wire



6 In 4 Out Matrix Mixer

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