M O C K I N G B O A R D

INTRODUCTION

1981 was the year of the sound card for the Apple II. Sweet Micro Systems releases a sound card for the Apple II. It was available in two major revisions, the first, the "Sound" series, having sound and or speech options, or both, the later revision, officially named Mockingboard, offered as A, B, C, and D.

The standard Apple II machines never had particularly good sound, especially when compared to competitors like the SID chip-enabled Commodore 64.

With the notable exception of the Apple IIGS, all an Apple II programmer could do was to form sounds out of single clicks sent to the speaker at specific moments, which made the creation of complex sounds extremely difficult to program and made it mostly impossible to do any other processing during the creation of sounds.

The Mockingboard allowed programmers to send complex, high-quality sound via its specialized hardware, without need for constant CPU attention. The Mockingboard required external speakers and could not use the Apple's built-in speaker.

The Mockingboard was available in various models for either the slot-based Apple II, Apple II Plus, Apple IIe systems or in one special model for the Apple IIc. Sound was generated through one or more AY-3-8910 or compatible sound chips, with one chip offering three square-wave synthesis channels. The boards could also be equipped with an optional speech chip (a Votrax SC-02 / SSI-263 compatible).

Some software products supported more than one Mockingboard. For example, Ultima V supported two boards, for a total of 12 voices, of which it used eight. Most other programs supported at most one board with six voices.

In 2005, ReactiveMicro.com, re-introduced the Mockingboard and offered it for sale online at www.reactivemicro.com, the latest release came with version 1a by Tom Arnold in 2010.

SYSTEM REQUIREMENT

Apple II, II+ or IIe
48K RAM
1 Disk Drive
Monitor
2 External 8 ohm Speakers

SETUP

1. Turn off your Apple computer and remove its top cover.
2. Discharge any static electricity by touching the metal power supply casing.
3. Remove MOCKINGBOARD and audio cable from the package. Hold MOCKINGBOARD by its edges. Avoid touching the gold plated edge connector. The oil from your hands may contaminate the connector and cause a poor electrical connection.
4. Extend the audio cable fully.
5. Connect the female mini-molex plug end of the cable to the audio cable connector located on MOCKINGBOARD.
6. Insert MOCKINGBOARD into slot 4 of the Apple's peripheral slots located at the rear of the Apple. Gently rock MOCKINGBOARD until it is properly seated. MOCKINGBOARD is not slot dependent. The MOCKINGBOARD can be configured for any slot except Slot 0.
7. Connect the RCA phono jack-ends of the audio cable to the speakers. MOCKINGBOARD has two ½ watt amplifier chips (6) on board to directly connect it to your speakers. You may use an external amplifier. If you do so, connect the RCA phono jack-end of the cable to the stereo amplifier auxiliary inputs.
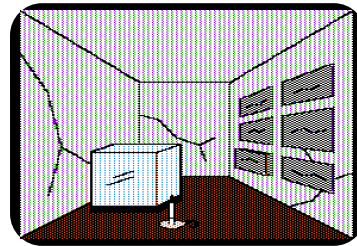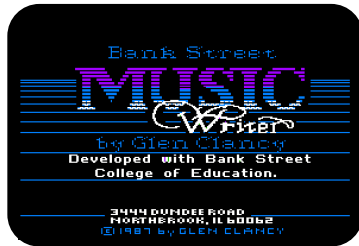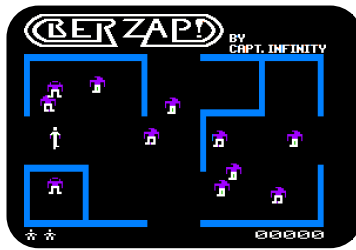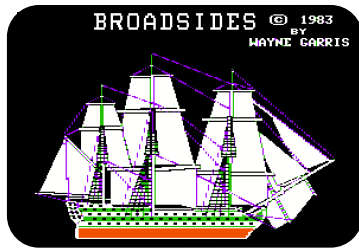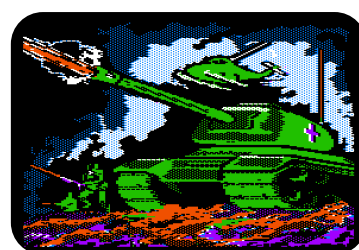
COMPATIBLE PROGRAMS

Adventure Construction Set
Airsim-3
Apple Cider Spider
Auto Gyro
Bank Street Music Writer
Berzap! (Clone of Berzerk)
Bouncing Kamungas
Broadsides (SSI)
Crimewave (Speech supported)
Clarinet Master
Crypt of Medea (Speech supported)
Cybernoid Music Disk
Flute Master
Guitar Master (Guitar tutoring)
GI Joe
Lady Tut (Specific Mockingboard Version)
Lancaster
Maze Craze
Mockingboard Software (Sweet Micro Systems)
Mockingboard Developers Kit
Mockingboard Speech Developers Kit
Music Construction Set (Different revisions do more as released)
Music Star (Patched by the underground to use the Mockingboard)
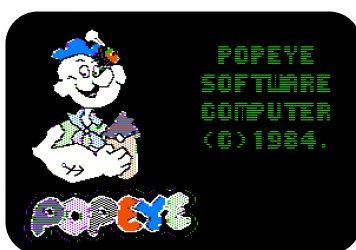
COMPATIBLE PROGRAMS

Night Flight
One on One (Opening sequence music only)
Phasor software (Applied Engineering)
Pitfall II
Popeye
Rescue Raiders v1.3 (SSI263 speech only)
Saxophone Master
Silent Service (Microprose)
Singing Master
Skyfox
Spy Strikes Back
Tactical Armor Command
Thunder Bombs
Trumpet Master
Ultima III (Upgraded to support the Mockingboard)
Ultima IV
Ultima V (Supported two Mockingboards)
Under Fire
Willy Byte
Window
Zaxxon (Specific Mockingboard version)
ZooKeeper

RELEASE MODELS

Early Models:
Sound I: one AY-3-8910 chip for three audio channels
Speech I: one SC-01 chip
Sound II: two AY-3-8910 chips for six audio channels
Sound/Speech I: one AY-3-8910 and one SC-01

Later Models:
Mockingboard A: two AY-3-8913 chips for six audio channels and
two open sockets for SSI-263 speech chips

Mockingboard B: SSI-263 speech chip upgrade for Mockingboard A

Mockingboard C: two AY-3-8913 and one SSI-263
(essentially a Mockingboard A with the upgrade pre-installed,
only one speech chip allowed)

Mockingboard D: for Apple IIc only, two AY-3-8913 and one SSI-263

Mockingboard M: Bundled with Mindscape's Bank Street Music Writer,
with two AY-3-8913 chips and an open socket for one speech chip.
This model included a headphone jack and a jumper to permit sound
to be played through the Apple's built-in speaker.
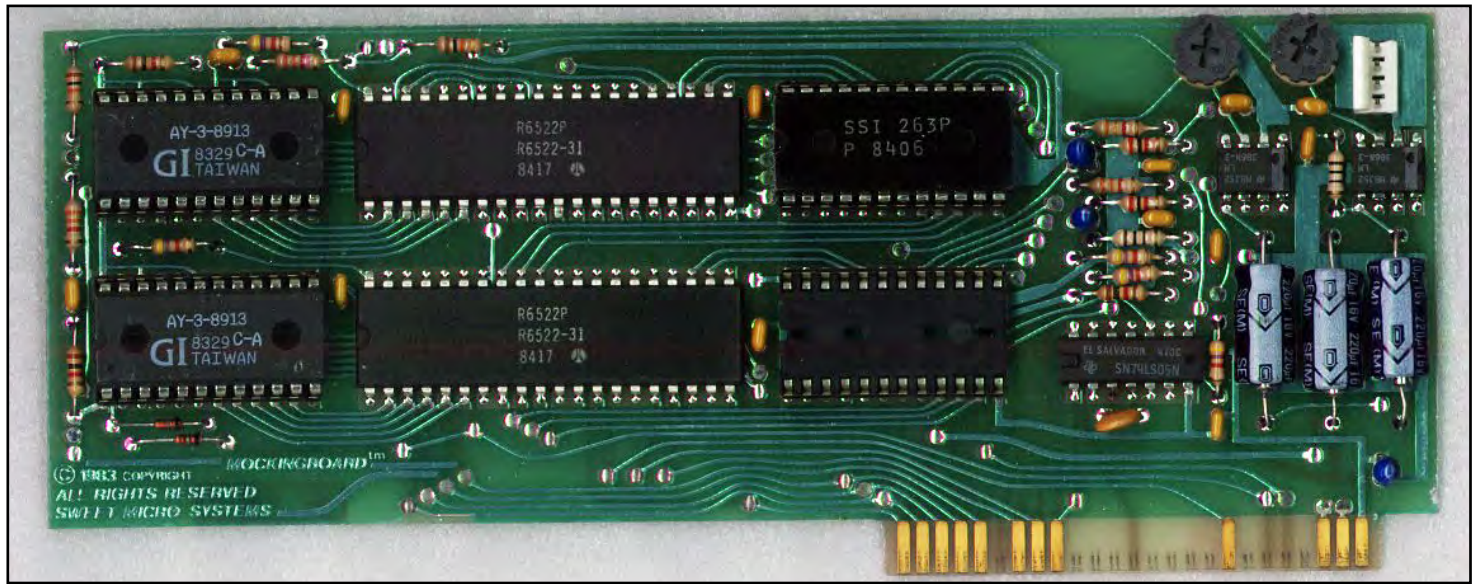
Mockingboard v1:
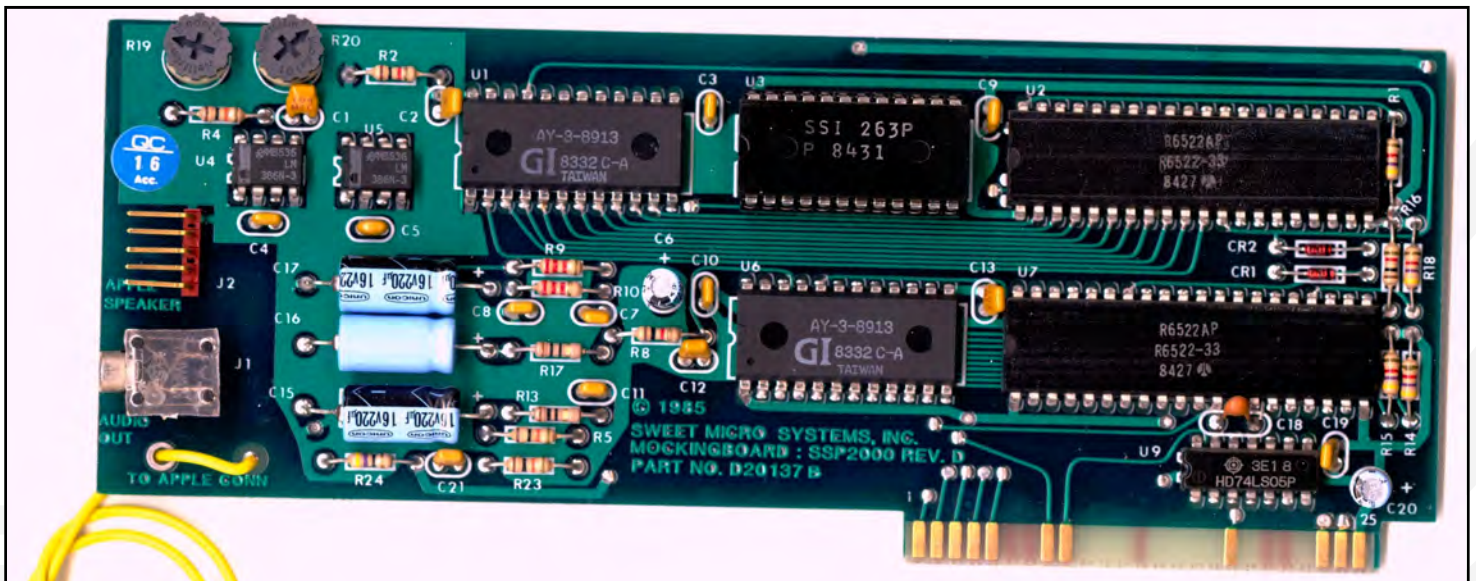From ReactiveMicro.com - 2005

Mockingboard v1a:
by Tom Arnold
Available from ReactiveMicro.com - 2010

THE MO**C**KINGBOARD
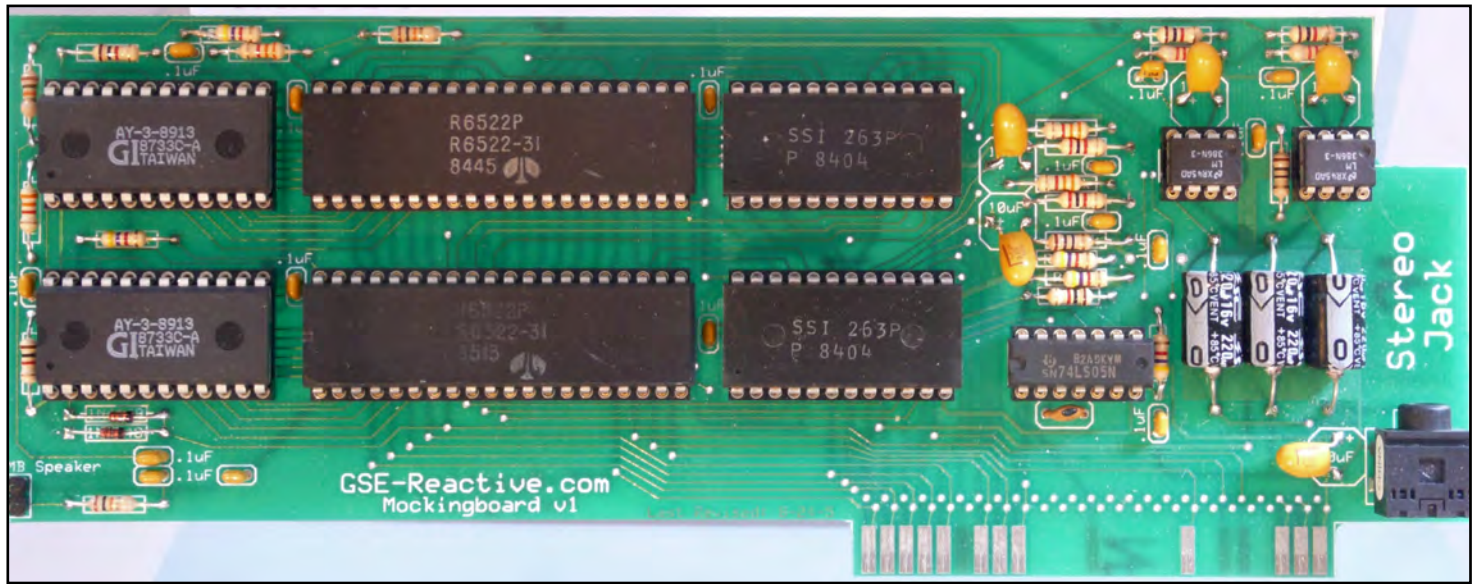Sweet Micro Systems, Inc. - 1983

THE MO**C**KINGBOARD
Sweet Micro Systems, Inc. rev. D - 1985

THE MOCKINGBOARD
Henry S. Courbis - ReactiveMicro.com v1 - 2005

THE MOCKINGBOARD
Tom Arnold and ReactiveMicro.com v1a - 2010

ReactiveMicro.com v1a

Mockingboard v1a BOM and construction notes.

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Qty Value                   Device              Parts
2   1N4148                  1N4148 Diode        D1, D2
2   6522                    6522                U2, U5
1   7405N                   7405N               IC1
2   AY-3-8913               AY-3-8913           U1, U4
2   LM386N-1                LM386N-1            IC2, IC3
2   SC-02/SSI-263/Artic263  SSI-263             U3, U6
5   1k0                     Resistor 1/4watt    R3, R4, R15, R16, R23
2   2k0                     Resistor 1/4watt    R11, R12
4   3k3                     Resistor 1/4watt    R5, R6, R13, R14
5   4k7                     Resistor 1/4watt    R1, R9, R10, R21, R22
2   8k2                     Resistor 1/4watt    R17, R18
2   10R                     Resistor 1/4watt    R19, R20
3   10k0                    Resistor 1/4watt    R2, R7, R8
1   5pf                     Ceramic Cap .1" Lead  C9
5   10uf                    Radial Tantalum 25v C1, C17, C23, C24, C25
16  100nf                   Ceramic Cap .1" Lead  C2, C3, C4, C5, C6, C7, C8, C10, C11,
                                                C12, C13, C14, C15, C16, C26, C27
3   220uf                   Axial Electrolytic 25v C20, C21, C22
1   MB Speaker              2pin Header         JP1
1   SJ1-3553NG              3.5mm Jack          JP2


Recommended
4   24 Pin .6" IC Sockets for U1, U3, U4, U6
2   40 Pin .6" IC Sockets for U2, U5
1   14 Pin .3" IC Socket for IC1
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Notes:

If you use IC sockets (which I recommend), only buy good quality ones. Machined Pin sockets or a good quality Dual-Wipe socket (AMP Diplomat) are suggested.
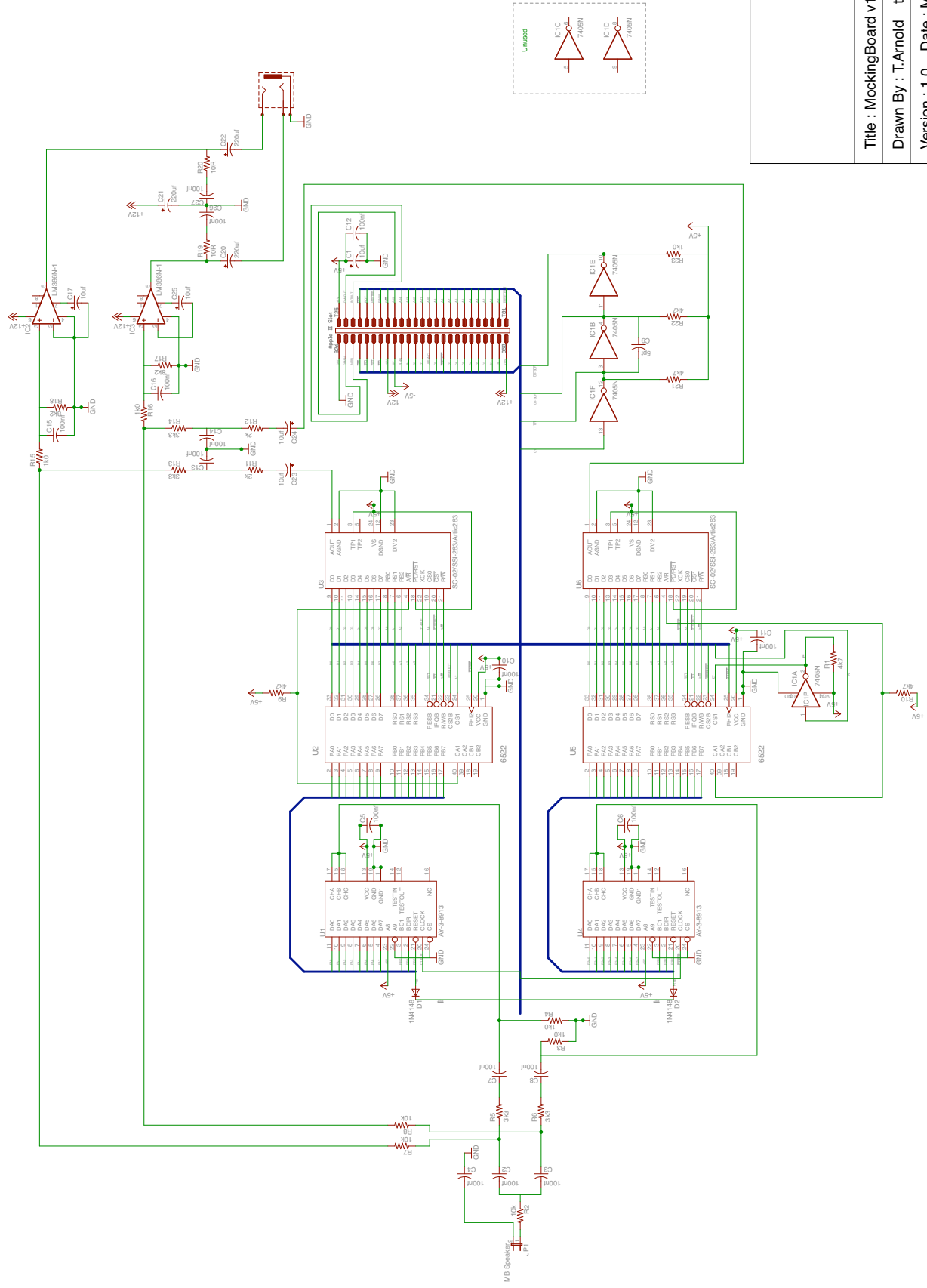
The 3.5mm jack is available from several sources. SJ1-3553NG is the Digikey part number. It is also available from Jameco as p/n 2081772 C20, C21, C22 are rather tight. Use a capacitor of no more then 8mm diameter. A 35v cap isn't going to fit very well.

The first rev of the v1a boards are missing quite a bit of silkscreen legend. Please refer to the board layout in this document. If you are stuffing a v1a board yourself you already have one with the fixed legend.

Credits:

Mockingboard v1a Schematic capture, board layout by Tom Arnold tom@philosophyofsound.com

Stereo Jack

C25 10uf
LM386N 1
1k0 + R16
8k2 + R17
C16 100nf
R19 + 10R
C26
C3

C17 10uf
LM386N 1
1k0 + R15
8k2 + R18
C15 100nf
100nf
C2

C20 220uf
C21 220uf
C22 220uf
C1 10uf

100nf C12
4k7 + R1

100nf C27
C13
C14

3k3 + R13
2k + R11
100nf
3k3 + R14
2k + R12
100nf
10R + R20
4k7 + R22
4k7 + R21
1k0 + R23

7405N
5pf C9
U3

C23 10uf
C24 10uf

SC-02/SSI-263/Art c263
13
12
U3

SC-02/SSI-263/Art c263
13
12
U6

24
1
24
1

C10 100nf
C11 100nf

10k+ R7

U2 6522
U5 6522

C5 100nf
C6 100nf

13
12
13
12

24
1
24
1

C4 100nf
IN4148
IN4148

4k7+R9
3k3+R5
C7 100nf

U1 AY-3-8913
4k7+R10

U4 AY-3-8913

C3 100nf
C2 100nf

1k0+R4
10k+R8
3k3+R6
C8 100nf
1k0+R3
10k+R2

D2
D1

MB Speaker 100nf

ReactiveMicro.com Mockingboard v1a

Unused

IC1C
7405N

IC1D
7405N