

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

SPEECH,  
STEREO  
MUSIC,  
SOUND  
EFFECTS



**MOCKINGBOARD**

**APPLE II+, IIe, IIc, IIgs**

2 External 8 ohm Speakers  
5 1/4 disk drive required  
48K RAM

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



Reactive*Micro*

[www.reactivemicro.com](http://www.reactivemicro.com)

## 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](http://www.reactivemicro.com), the latest release came with version 1a by Tom Arnold in 2010.

## COMPATIBLE PROGRAMS

Adventure Construction Set  
Airsim-3  
Apple Cider Spider  
Auto Gyro  
Bank Street Music Writer  
Berzap! - A clone of the arcade game, Berzerk!  
Bouncing Kamungas  
Broadsides (SSI)  
Crimewave - Speech supported  
Clarinet Master  
Crypt of Medea - Speech supported  
Cyberoid 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 - The OEM version did not support the Mockingboard, it was later patched by the underground to use the Mockingboard instead of the proprietary hardware that shipped with it.

Night Flight  
One on One - Opening sequence music only.

## COMPATIBLE PROGRAMS

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, original release did not support the Mockingboard

Ultima IV

Ultima V - Supported two Mockingboards

Under Fire

Willy Byte

Window

Zaxxon, (Specific Mockingboard version)

ZooKeeper



Ultima III: Exodus is the third game in the Ultima series. Exodus is also the name of the game's principal antagonist. Released in 1983, the game was upgraded to support the Mockingboard.

## 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:

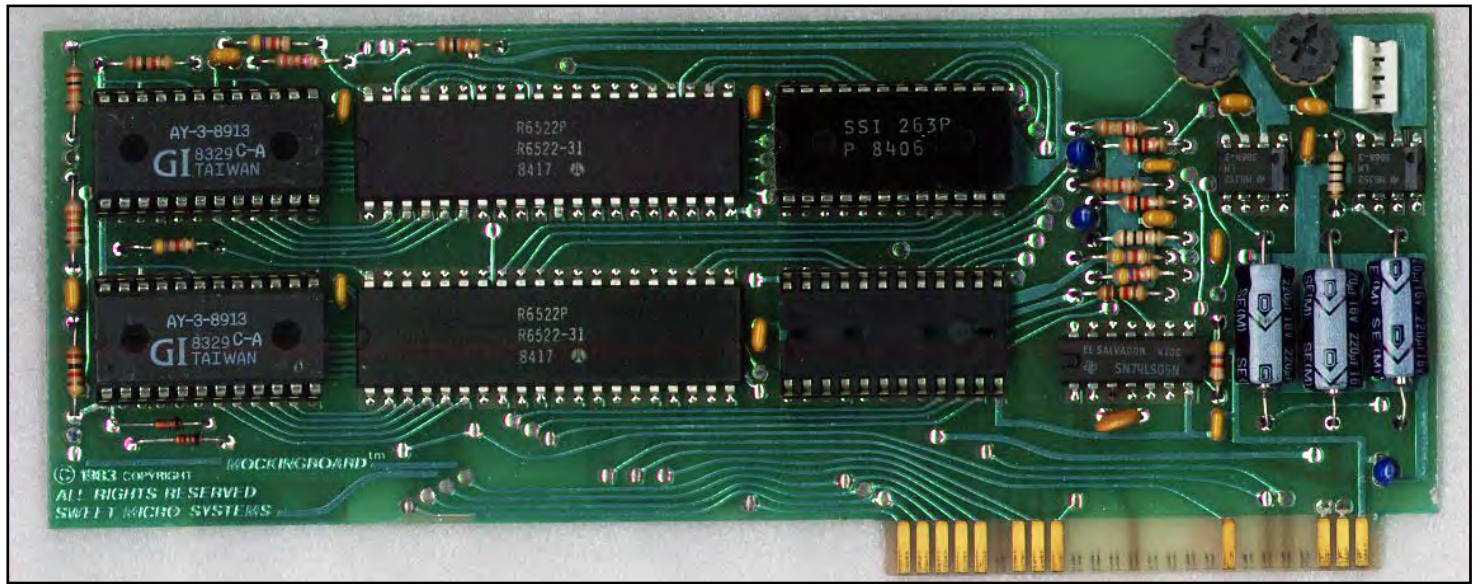
by Tom Arnold

Available from ReActiveMicro.com - 2010

### Mockingboard v2.1:

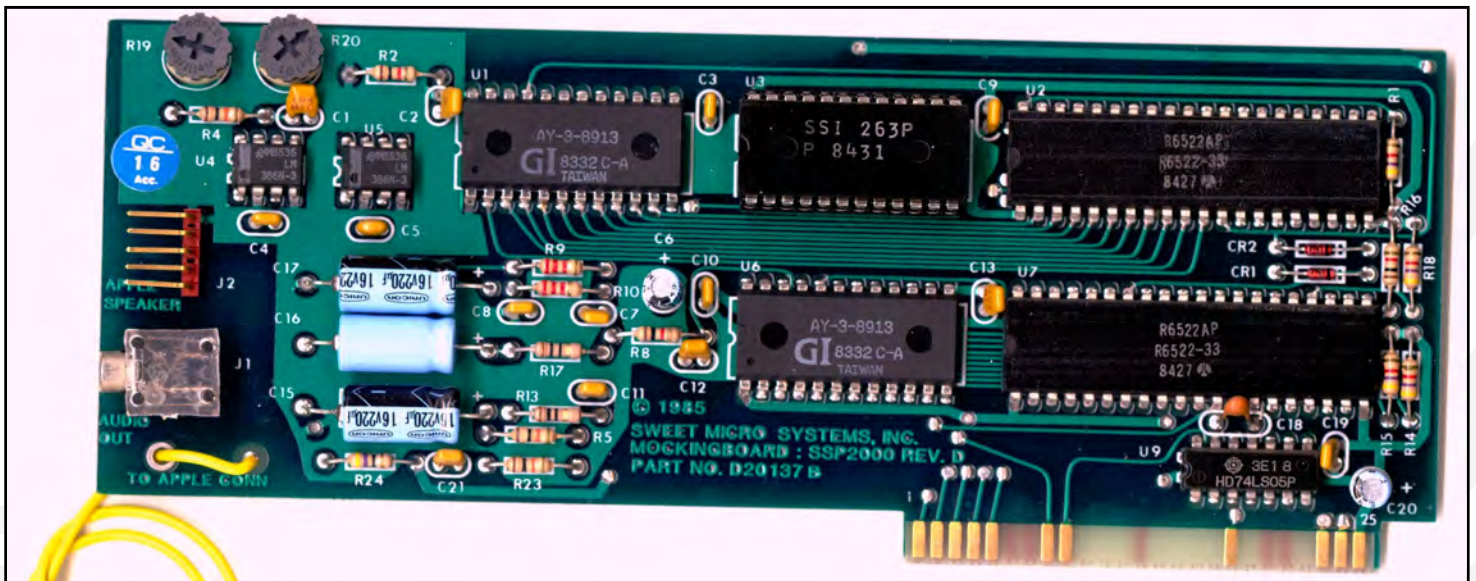
From ReActiveMicro.com - 2018





## THE MOCKINGBOARD

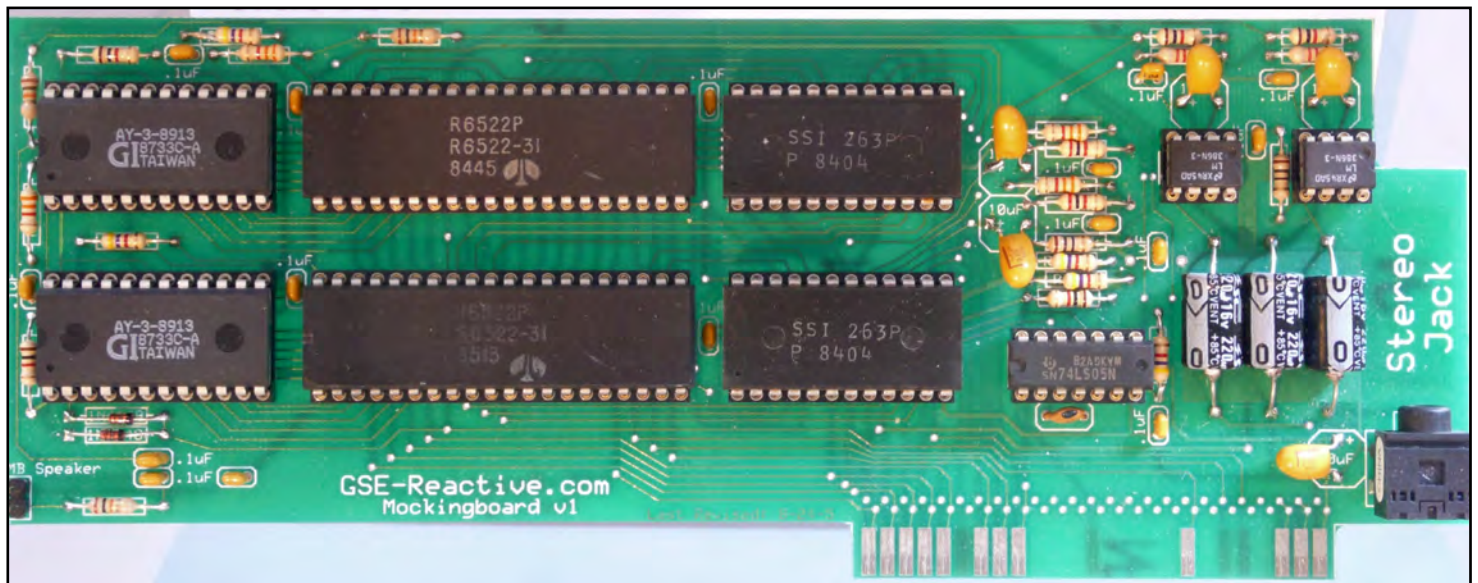
Sweet Micro Systems, Inc. - 1983



## THE MOCKINGBOARD

Sweet Micro Systems, Inc. rev. D - 1985





## THE MOCKINGBOARD

Henry S. Courbis - ReActiveMicro.com v1 - 2005



## THE MOCKINGBOARD

Henry S. Courbis - ReActiveMicro.com v2.1 - 2018



## ReActiveMicro.com v2.1

Mockingboard BOM and construction notes.

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

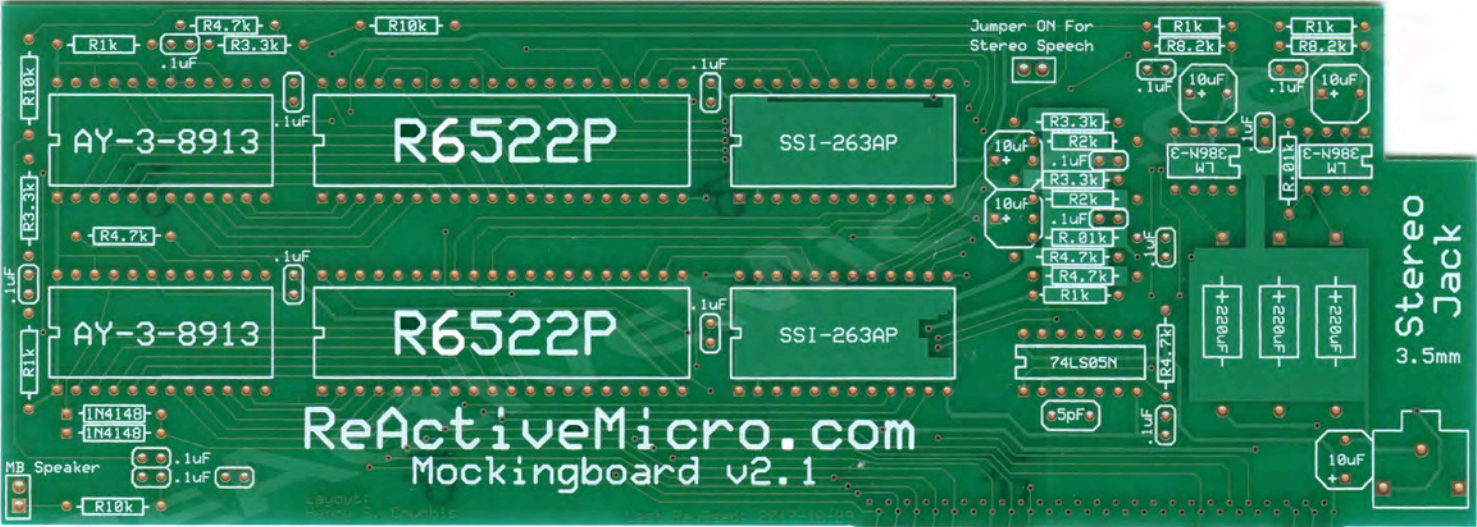
### Notes:

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 than 8mm diameter. A 35v cap isn't going to fit very well.

### Credits:

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



AY-3-8913

R6522P

SSI-263AP

AY-3-8913

R6522P

SSI-263AP

ReActiveMicro.com  
Mockingboard v2.1

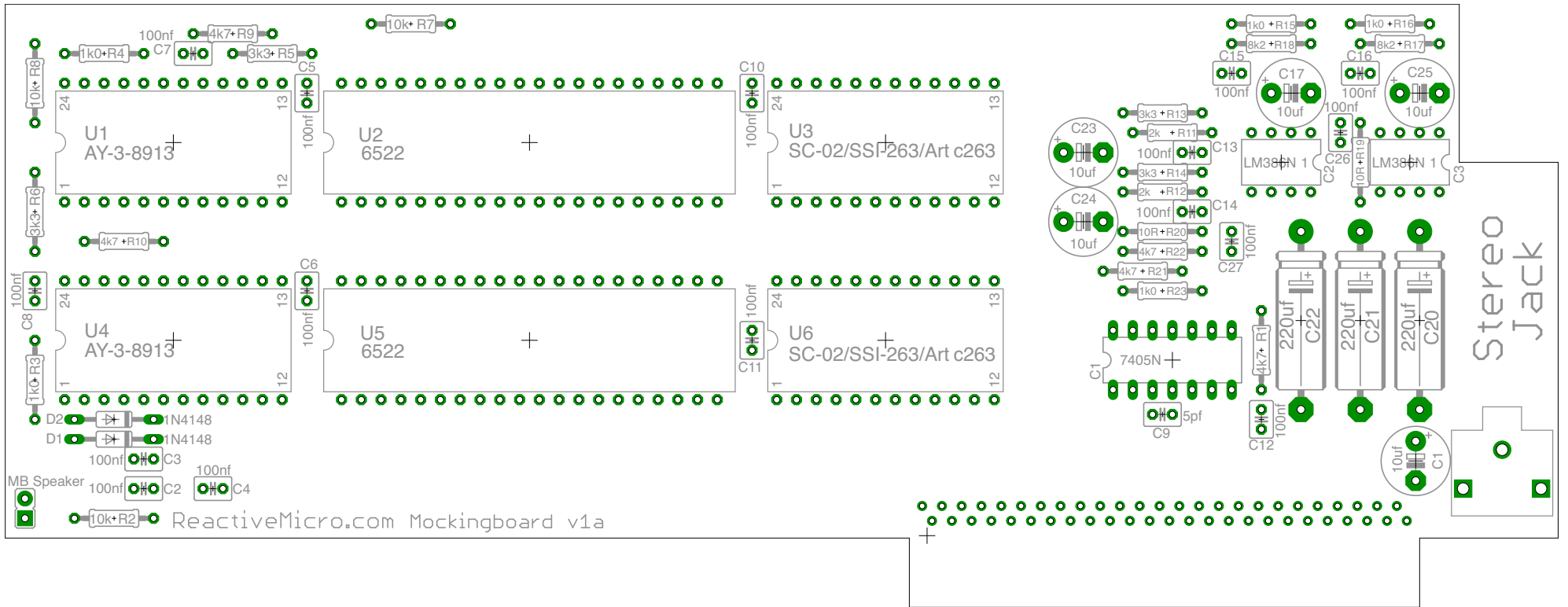
Layout:  
Henry S. Double

Last Revised: 2012-10-09

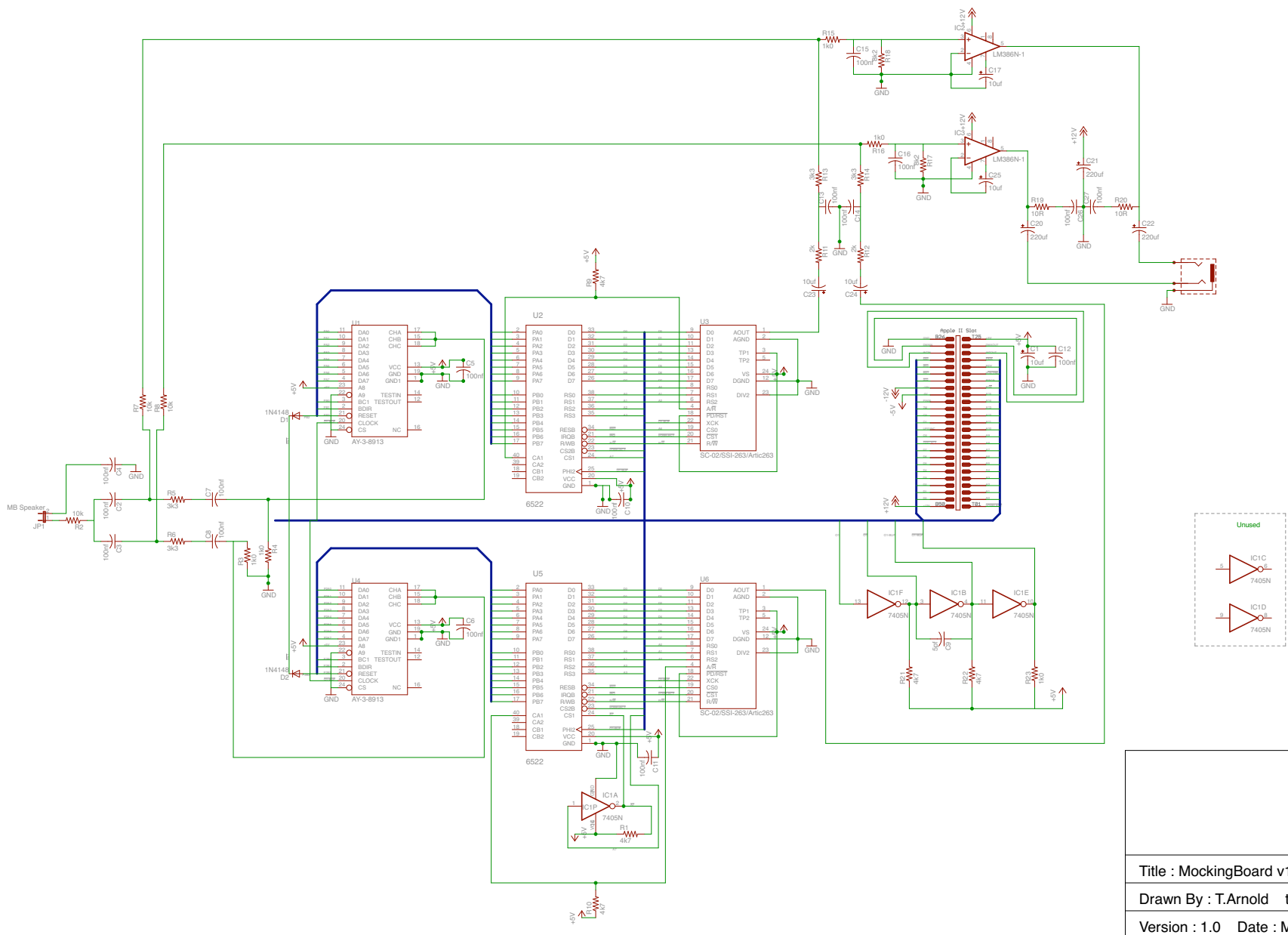
Jumper ON For  
Stereo Speech

Stereo  
Jack  
3.5mm

MB Speaker







Title : MockingBoard v1a  
 Drawn By : T.Arnold tom@philosophyofsound.com  
 Version : 1.0 Date : May 17, 2010