



Aria Soundcard FAQ v1.20

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===                THE ARIA FAQ VERSION 1.20                ===
===                                                        ===
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===                Released on February 13th 1997            ===
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=== 1 - INTRODUCTION ===
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1.0 - Why this FAQ ?

Aria is the name of a family of audio chipsets produced by Sierra Semiconductor Corporation (further referred to as Sierra). In this document soundcards based on one of the members of the Aria family will be called Aria soundcards. This document is aimed at everyone who already owns an Aria soundcard, or wants to learn more about Aria soundcards in general. It focuses on hardware related Aria information including developers information. See Appendix A for other documents of interest. The Aria Support List, by the same author, for example, focuses on software related Aria information.

1.1 - Some things you should know...

Some standard abbreviations:

- * FTP - File Transfer Protocol (A method for retrieving data via the Internet)
- * WWW - World Wide Web (A system for locating information on the Internet)
- * SDK - Software Development Kit (Product specific programming information)

The Aria Internet Department presently consists of:

- * The Aria FTP Departments (see appendix A)
- * The Aria Mailing List (see appendix B)
- * The Aria WWW Site (see appendix C)

1.2 - What's New !

Alas, Sierra seems to have ceased producing the Aria chipset. To my knowledge all manufacturers of soundcards based on the Aria chipset have also terminated production. If you can still find an Aria soundcard for sale you can probably get it at a real bargain price...

Upon many a request I have added complete installation archives for 16-bit Aria Windows drivers to the Aria FTP site (in the drivers directory). Thanks to a number of people who supplied me with the zip files.

Info concerning the use of the Prometheus Aria 16se SCSI controller under Win95 was added in this release thanks to Sharon Meigs.

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===                2 - ARIA SOUNDCARDS                ===
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2.0 - The Aria System
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```

There exist two generations of the Aria audio system. The old system utilised the SC18051/2/3/4 ROM chips and a discrete analog mixer. The new family utilises the SC18056/7/8/9 ROM chips and an integrated SC18075 mixer chip.

Both generations offer the following features:

- 32 Simultaneous voices
- General MIDI compliant with all patches defined by the General MIDI Specification
- AdLib and SoundBlaster compatibility is provided at the register level
- Joystick Port
- MPU-401 UART MIDI Port
- Full Duplex
- 16-bit DAC (distortion<0.1%, 92 dB typical signal-to-noise ratio)
- Mixer noise: -70 dB max
- DSP chip: A 42 MHz TMS320C25 (Texas Instruments)
- 32 MB RAM/ROM DSP address space

In addition the old system offered:

- 3 stereo inputs: DAC, auxiliary (CD-ROM) and external

- 8-bit linear level control on auxiliary and external inputs, independently adjustable
- DAC output level controlled by DSP
- external input is selectable for line level or microphone level
- 10 bit ADC (Except for the Sonic Sound made by Diamond which included a 16 bit ADC)
- frequency response: 20 Hz to 16 kHz - 3 dB
- distortion : 0.5% max

While the new system improved on that:

- 5 stereo inputs: DAC, auxiliary 1 (master output), auxiliary 2 (CD-ROM), external and microphone
- 6-bit logarithmic level control on all inputs, independently adjustable
- treble and bass tone controls
- 16 bit ADC
- frequency response: 20 Hz to 19 kHz - 3 dB
- distortion : 0.2% max

The DSP can execute multiple DSP applications simultaneously if enough DSP RAM is available and the load doesn't exceed its capabilities. Aria soundcards of both generations come basically in two flavors. Those with and those without speech recognition. The ones without speech recognition come with 8 kWords DSP RAM, the ones with usually have 40 kWords DSP RAM aboard. Also, the new Aria system generation offers reverb effects if enough DSP RAM is in place. In practice this means that only the more expensive Aria soundcards offering speech recognition also offer reverb effects, though the cheaper cards could also offer reverb effects if they were outfitted with more DSP RAM. To do this you'll need to fill the two empty DSP RAM sockets on your Aria soundcard with two 32 KB 20 ns SRAM cache chips.

The Aria ROM chips offer the following features:

Basic features: Aria PCM Audio, Aria Synthesizer, Sound Blaster Emulation

Feature Table :

OLD ROM's					NEW ROM's			
	SC18051	SC18052	SC18053	SC18054	SC18056	SC18057	SC18058	SC18059
RAM	-----							
8	0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0
40	0.5	1.0	0.5+L	1.0+L	0.5+R	1.0+R	0.5+R+L	1.0+R+L

Legend: 0.5=0.5 MB Samples,1.0=1.0 MB Samples,R=Reverb Effects,L=Listener

In addition there is a QSound DSP application available from the Aria FTP Departments for use with all the ROM's and a Reverb DSP application for the older ROM's.

2.1 - Product specific information: Features

Legend: AD=ADC resolution; J=JUMPERLESS

TMC-950=Future Domain TMC-950 SCSI-2 chip memory-mapped

A6960=Adaptec 6960 SCSI-2 chip (330 Kb/s)

Soundcard	Manufacturer	ROM	#MB	AD	SCSI	J
AltaPro/S	AVM Technologies	053	0.5		Adaptec	n
AltaPro/S1	AVM Technologies	054	1.0		Adaptec	n
AltaPro/SA	AVM Technologies	053	0.5		Adaptec	n
AltaPro/S1A	AVM Technologies	054	1.0		Adaptec	n
Aria 16	Prometheus	056	0.5	16	no	y
Aria 16se	Prometheus	058	0.5	16	TM-9C50	y
AudioBahn 16 Pro	Genoa Systems	054	1.0	10	6960	
CyberAudio	Alpha Systems					
Omnivox	Kingston Technologies					
Sound 2000	Add Tech	053	0.5	10	?	n
Sound Epitome Wave	DevitronicEngineering	051	0.5	10	yes	n

Sound Pilot	Cardinal Technologies					
Sonic Sound Rev.A5	Diamond	051 0.5 16 TMC-950 n				
With upgrade kit:		054 1.0 16 TMC-950 n				
Sonic Sound Rev.B2	Diamond	056 0.5 16 TMC-950 y				
TESS	Zoltrix					
ViVa Maestro 16	Computer Peripherals	051 0.5 10 Adaptec n				
ViVa Maestro 16 VR	Computer Peripherals	053 0.5 10 Adaptec n				
VR	Alpha Systems					

----- 2.2 - Advocacy -----

When I would recommend Aria:

- * If you are looking for a cheap wavetable synthesis soundcard with bullet proof SB emulation and digital recording and playback up to 16-bit 44.1kHz, try for example the Aria 16.
- * If you are looking for a cheap wavetable synthesis soundcard with bullet proof SB emulation, digital recording and playback up to 16-bit 44.1kHz, a SCSI-2 interface, reverb effects and speaker-independent non-continuous speech recognition capabilities, try for example the Aria 16se.

===== === 3 - VARIOUS TOPICS === =====

----- 3.0 - Troubleshooting -----

Aria soundcards, certainly the newer jumperless ones, are usually extremely easy to install and configure. And if there is a problem the trouble shooting sections in the operating manuals are pretty decent and often the problem can be solved without much complications. However, there is one undocumented feature of the jumperless cards which in rare cases can cause

problems. The configuration of IRQ's, DMA channels, etc. is done via a device line which is executed first in the CONFIG.SYS and reads as follows:

```
DEVICE=C:\ARIA\BIN\soundcfg.sys C:\ARIA\aria.cfg
```

Normally this should be sufficient, I had a case however where executing ARIATEST resulted in "DSP not responding" or something similar. The trick is to change the RBA port address, which is somehow used for the configuring of the jumperless cards, to a non-conflicting port address anywhere between 280 and 330 hexadecimal. Prometheus technical support informed me on this issue and suggested using port address 298, which worked fine. The device line was:

```
DEVICE=C:\ARIA\BIN\soundcfg.sys C:\ARIA\aria.cfg 298
```

Yes, it's that simple!

If you are experiencing problems using the SCSI adapter on your Aria soundcard try disabling shadow RAM. If this solves your problem then enable the various blocks of shadow RAM one by one until you spot the block causing the trouble. Leaving this block disabled should solve the problem.

3.1 - Supported operating systems

- * MS-DOS & MS-Windows 3.x (Native support, Adlib/SB compatibility mode)
- * Windows 95 (Windows 3.x drivers & native SCSI support)
- * OS/2 3.0 Warp (Native support)
- * Linux (Adlib/SB compatibility mode???)

Windows 95

If you installed Win95 over Win3.x you may already have sound working, if not, or you did a fresh install, these are the Aria installation instructions:

1. Go to "Control Panel", then "Add Hardware".
2. After the "Add Hardware Wizard" appears hit the "next" button.
3. Select "no" when asked if you want Win95 to search for installed hardware.

4. Select "Sound, video and game adapters" from the device list.
5. Hit the "have disk" button and then the "browse" button.
6. Select your Aria installation directory, then the subdirectory WIN.
(For example, C:\SONIC\WIN)
7. The file "oemsetup.inf" should now be highlighted. Select "OK".
8. The "Add Hardware Wizard" should now be able to complete installing the Aria drivers in Win95 and restart the system with sound working.

If you've got an Aria 16se you can use Win95's native support for the integrated SCSI controller. Just make sure all references to Aria's real mode SCSI drivers in your config.sys & autoexec.bat are removed. If SCSI support isn't automatically enabled you can do it manually by selecting the Future Domain TMC-850/M/MER/MEX SCSI Host Adapter via the Control Panel. Auto play works great!

HOW YOU CAN HELP: I suspect the SonicSound SCSI controller will also work fine with the native TMC-850 driver. Can anyone confirm?

OS/2 3.0 Warp

Native OS/2 Warp Aria drivers are available from the Aria FTP department as:

<ftp.wi.leidenuniv.nl:/pub/audio/aria/drivers/aria16.zip>

These drivers were made for IBM's Aptiva systems employing Aria 16 soundcards from Prometheus Products. For all those not in the possession of an IBM Aptiva just ignore the readme file included in aria16.zip and install as follows:

1. Open an OS/2 command line window
2. Switch (if necessary) to the partition from where you boot Warp
3. Execute the following command sequence:
 - a. cd os2/boot
 - b. attrib -r clock01.sys
 - c. attrib -r clock02.sys
4. Unzip aria16.zip into a directory
5. Enter the OS/2 Multimedia Folder and execute Multimedia Application Install
6. Specify as source the directory where you just unzipped aria16.zip

7. Select Aria Audio System 16 in the features list and then double click install.

You may need to change some of the associations, but basically, this is all!

Linux

HOW YOU CAN HELP: If you have gotten sound out of your Aria soundcard under Linux (for example in SB mode) then please contact me!

3.2 - General MIDI & DOS

This is probably the most frequently asked question I have received the last few months: "Why can't I select General MIDI in a DOS game like DOOM?"

The answer is that Aria supports all the patches defined by the General MIDI specification, but lacks a MIDI interpreter in hardware. The MIDI interpreter must therefore be emulated in software and that is why under DOS you always need Aria drivers to get General MIDI support. The issue of native Aria support under MS-DOS is the focus of the Aria Support List.

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=== 4 - ARIA PROGRAMMING MATERIALS ===

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4.0 - Software Development Kits

Sierra has produced in the past the following three Aria SDKs:

- * SSDK (Synthesizer Software Development Kit)
- * LSDK (Listener Software Development Kit)
- * LSDK Upgrade Kit (upgrades a SSDK to a LSDK)

These kits are however no longer being produced and, the stock having run

out, are not available from Sierra anymore. The newest version of the SSDK can be downloaded from the Aria FTP Department, subdirectory 'programming/ssdk'. Here you'll find the newest versions of the manual (v2.2) as well as the software (v2.5). Please read the accompanying text files prior to downloading the zip files. There are no royalties involved and there are no restrictions on the use of the materials included in the SDKs except that you may not make them public and distribution of source code is only allowed if a majority of the code is of your own creation, not simply copied from the development kit. So, for example, it is perfectly legitimate to write an audio driver for Aria using the SDK and distributing its source code as Public Domain, Shareware, on a commercial basis or any other way you see fit.

Following are the descriptions of the basic kit (SSDK and part of LSDK), the listener kit (rest of LSDK and LSDK Upgrade Kit), and some notes concerning Aria Listener source code.

Basic (SSDK/LSDK)

Contents: Manual (version 2.2) + 3.5" disk (version 2.5)

Disk contents:

- DOS Applications Interface Library Source Code (see manual; chapter 6)
- Interrupt handlers in assembly (Make files for Microsoft & Borland)
- User function calls in C (Make files for Microsoft & Borland)
- Source code for ARIATEST, CDVOL, ECHOMIDI, PLAYMIDI, PLAYWAVE, RECWAVE, SBVOL and VOLUME
- Synthesizer Patch Bank Editor

Manual contents:

Chapter 1: Introduction

Chapter 2: Installation

Chapter 3: Communication Interface

3.1 - Registers

- 3.1.1 DSP Registers
 - 3.1.2 Sound Blaster Registers
 - 3.1.3 MIDI Registers
 - 3.1.4 Joystick Registers
- 3.2 - Memory
 - 3.2.1 System ROM Configurations
 - 3.2.2 Memory Layout
- 3.3 - Music Synthesis
 - 3.3.1 Aria Synthesizer
 - 3.3.2 Sound Blaster Emulation
- 3.4 - Digital Audio
 - 3.4.1 Data Transfer Procedure
 - 3.4.2 Direct Input and Output
 - 3.4.3 Direct Memory Access
- 3.5 - DSP Commands
 - 3.5.1 System Configuration Commands
 - 3.5.2 Digital Audio Recording and Playback Commands
 - 3.5.3 Aria Synthesizer Commands
 - 3.5.4 Mixer Commands
 - 3.5.5 Audio Effect Commands

Chapter 4: Voyetra Sound Factory

Chapter 5: Microsoft Windows Multimedia Extensions

- 5.1 - Audio Driver Features
- 5.2 - Driver Configuration
- 5.3 - Waveform Output
- 5.4 - Waveform Input
- 5.5 - MIDI Output
- 5.6 - MIDI Input
- 5.7 - Auxiliary Audio
- 5.8 - Extended Aria Control Interface

Chapter 6: DOS Application Interface

Chapter 7: Tools

- 7.1 - Patch Editor

- 7.2 - Patch Bank Utility
- 7.3 - Play MIDI Utility
- 7.4 - Echo MIDI Utility
- 7.5 - Play Wave Utility
- 7.6 - Record Wave Utility
- 7.7 - Aria Board Test Utility

Appendix A: Patch Bank Formats

Appendix B: ROM Wave Libraries

Appendix C: Specifications

Glossary

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Listener (LSDK/LSDK Upgrade Kit)

Contents: Manual (version 1.1) + six 3.5" disks (version 1.00)

Disk contents:

Games API for DOS

Speech Recognition API for Windows (SRAPI)

Windows Developers Examples for SRAPI

SRAPI Step Debugger

Vocabulary Development System (2 disks)

Manual contents:

Section I: GoodListener Cookbook

Section II: Speech Recognition API Programmer's Guide

Section III: Speech Recognition API Functional Specifications

Section IV: Aria Listener Game API Functional Specifications

Section V: Vocabulary Development System Manual Version 3.1

Aria Listener source code

Though the Aria Listener manual states that the source code for the Games API is included, it isn't, nor can Sierra provide it. However, if you have a legitimate reason requiring this code you can contact Dave Corley, director of Customer Support at Voice Control Systems, Inc., and request a copy.

Contact information: E-mail address: dave@vcsi.com

Phone number : +1-214-386-0300

Address : 14140 Midway Road
Dallas, Texas 75244, USA

4.1 - Freely available programming materials

The Aria FTP Departments have a directory 'programming' with two subdirectories. In 'sdk' you'll find the Aria SSDK, see paragraph 4.0, and in 'contrib' you'll find:

- * ariainit.zip - initialization code replacing soundcfg.sys
- * ariawave.zip - digital audio playback programming example for DJGPP

The 'mother' of all programming FTP sites is:

[x2ftp.oulu.fi:/pub/msdos/programming](ftp://x2ftp.oulu.fi/pub/msdos/programming)

where you can also find in the subdirectory 'mxlibs':

- * dmkit150.zip - AIL, MIDPAK & DIGPAK driver libraries (Miles Design, Inc.)

4.2 - Commercial sound driver libraries

The DSMI (Digital Sound Music Interface) kit of Otto Chrons, author of DMP (Dual Mod Player), includes a digital sound driver for Aria. DSMI is used in such illustrious software as DMP and The Morgul Player. For more info see the DSMI document included in dmp400.zip which can be found at:

<ftp://ftp.wi.leidenuniv.nl/pub/audio/>

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=== 5 - PROFESSIONAL USERS OF ARIA ===

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5.0 - Software companies

Software based on the AIL and/or MIDPAK/DIGPAK libraries potentially supports Aria in native mode. As does software based on the DSMI (=Digital Sound Music Interface). The following companies have produced software specially crafted to take advantage of the speech recognition capabilities of Aria Listener:

- Globalink (VoicePower)
- Impressions (When Two Worlds War)
- Interplay (Startrek 25th Anniversary Special Aria Edition)

See the Aria Support List for more info on them.

If YOU know a company offering software specially crafted to take advantage of Aria Listener then please contact me so I can add it to the list.

The following sections are devoted to companies employing Aria themselves. If YOU know of such a company which not has been included below, then please contact me so I can add another paragraph.

5.1 - Mytec Technologies (Greg Schmidt)

Mytec Technologies is a Toronto, Ontario, Canada company developing a fingerprint verification device. Our president, George Tomko, requested that the prototype device be capable of recognizing voice input, as a way of adding some pizzazz to demonstrations (he envisioned the user stating his or her name, but that would require separate vocabulary training for each user, so we have settled on the user simply saying his or her PIN number, for

example "one two three"). As the software engineer, I was given the job of getting this working, as well as a deadline of about three weeks to find an appropriate product, order it, and implement the desired functionality.

I began by looking through several newsgroups, eventually discovering [comp.speech](#). I posted a short description of my situation, and Daniel R. Tauritz replied with a message about Aria. After an exchange of mail, I was convinced that Aria could handle my problem. I ordered the Aria 16SE from Prometheus Products as well as the Aria LSDK from Sierra Semiconductor Corp., which arrived shortly. I now had about a week to finish the implementation.

I ran into a bit of a problem, in that the provided library was only in medium memory model, and I needed large. Dave Corley at Voice Control Systems was very helpful, and I managed to get all the requisite tools, with one day to go. The API was so easy to use that I finished in time. (I feel like a commercial for laundry detergent!) A vocabulary trained by less than 20 utterances each of about twenty words (including four different people) was capable of recognizing any of the words spoken by anyone with a very high accuracy (it had problems with "eight", but more training solved that).

We are unsure as to whether customers will want this functionality in the product, but it is a possibility. If they do, it is very easy to add a couple of functions that allow speech recognition.

Greg Schmidt (gschmidt@hookup.net)

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===                               6 - CONTACT INFORMATION                               ===
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```

If you know more about one of the problems mentioned in the various paragraphs or can add insights not yet included in this document, then please

E-mail the information to:

`dtauritz@wi.leidenuniv.nl`

and hopefully it will be included in the next update of this document!

Note: If you have a question not directly related to this document then please post it to the appropriate newsgroup or mailing list and do not send it to me.

Appendix A: Aria FTP Departments

The original Aria FTP Department is at: `ftp://ftp.wi.leidenuniv.nl/pub/audio/`
it is also being mirrored at: `ftp://ftp.digiface.nl/pub/audio/`
In the subdirectory 'docs' you'll always find the newest editions of the
Aria FAQ (presently `aria1_12.faq`), the Aria Support List (presently
`aria2_09.lst`) and the Mailing List Archives.

The Aria FAQ and the Aria Support List are also being archived in the Usenet
Newsgroup Archives at: `rtfm.mit.edu:pub/usenet/comp.sys.ibm.pc.soundcard`
presently as 'Aria_Soundcard_Faq_v1.11' and 'Aria_Support_List_v2.09'.

Another FTP site of interest might be the FTP Soundcard Starting Point at:
`ftp.netcom.com:pub/jo/jonin/soundcards`

Appendix B: Aria Mailing List

You can subscribe to the Aria Mailing List by sending E-mail as follows:

To : aria-request@wi.leidenuniv.nl

Subject: subscribe

Leave the rest of the message (the body) empty!

To unsubscribe follow the same procedure but then with:

Subject: unsubscribe

To change your address simply unsubscribe from your old address and then subscribe from your new address.

To post to the Aria Mailing List send E-mail to: aria@wi.leidenuniv.nl

When you reply to a message from the list you reply as default to the list.

Appendix C: Aria World Wide Web Page

To access the Aria World Wide Web (WWW) page you'll need a WWW client such as Lynx, Mosaic or Netscape. Alternatively you can remote login to a WWW client via telnet. For example by telnetting to 'archie.funet.fi'. The Aria WWW page can be found at:

<http://www.wi.leidenuniv.nl/aria/>

This will give you access to all the messages ever sent to the Aria Mailing List. An automatic script adds new messages sent to the list within minutes to this page. You can also view and retrieve files from the Aria Internet Department such as the Aria FAQ & support list.

Appendix D: How to contact Aria soundcard manufacturers

Alpha Systems Lab Inc.

2361 McGaw Av.

Irvine, CA 92714, U.S.A.

(800) 998-3883

(714) 252-0117

(714) 252-0887

AVM Technologies Inc.

655 East 9800 South
Sandy, UT 84070, U.S.A.
(800) 880-0041
(801) 571-0967

Cardinal Technologies Inc.

1827 Freedom Rd.
Lancaster, PA 17601, U.S.A.
General: (717)293-3000
Customer service: (717)293-3049
FAX: (717)293-3055
BBS: (717)293-3043
Tech Support: (717)293-3124, 9-5 EST Mon.-Fri.

Computer Peripherals Inc.

67 Rancho Conejo
Newbury Park, CA 91320, U.S.A.
(800) 854-7600 (Sales Department)
(805) 499-5751
(805) 499-6021 (Technical Support)
Computer Peripherals BBS (+1 805 499 9646, FYI)

Devitronic Engineering Pte Ltd

605-B Macpherson Road
#04-12
Citimac Industrial Complex
Singapore 1336
Tel : (065)281-3533

Fax : (065)281-1827
Telex : DEVICE RS 33250
Cable : DEVITRONIC

Diamond Computer Systems, Inc.

1130 East Arques Avenue
Sunnyvale, CA 94086, U.S.A.
Phone: +1-408-325-7000
Fax : +1-408-730-5750
WWW : <http://www.diamondmm.com/>

Technical Support

Phone : +1-408-325-7100
CompuServe : 75300,3673
America OnLine: GO DIAMOND
Internet : 75300.3673@compuserve.com

Software Updates

CompuServe : GO GRAPHBVEN
Diamond BBS: +1-408-730-1100 (2400 Baud)
 +1-408-524-9301 (9600+ Baud)
Diamond FTP: [ftp.diamondmm.com](ftp://ftp.diamondmm.com)

Genoa Systems Corp.

75 East Trimble Rd.
San Jose, CA 95131, U.S.A.
(800) 934-3662
(408) 432-9090

Prometheus

Technical Support: (503) 692-9601
BBS : (503) 691-5199
E-mail : CompuServe 76004,527
America Online Promethean
Internet 76004.527@compuserve.com

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*Send corrections/additions to the FAQ Maintainer:
dtauritz@wi.leidenuniv.nl (Daniel R. Tauritz)*

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