

Texas Instruments TI-99/4a

Emulators

JavaScript TI-99/4a can be found at <http://js99er.net/#/>

Fil	Tilrettet
ZIP-arkiv v9t9.zip	17-08-2019 by Normann P. Nielsen
ZIP-arkiv ti99_4a.zip	17-08-2019 by Normann P. Nielsen
ZIP-arkiv ti99sim-0.0.11.win32.zip	17-08-2019 by Normann P. Nielsen
ZIP-arkiv classic99.zip	17-08-2019 by Normann P. Nielsen
ZIP-arkiv v9t9-170305.zip	17-08-2019 by Normann P. Nielsen
ZIP-arkiv Win994a_Install_V3010_(x64).zip	17-08-2019 by Normann P. Nielsen
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Github

Last updated: 05 March 2017 06:08 PM

V9t9 emulates the TI-99/4A on your computer.

It supports:

- Configurable PC controller to joystick mapping
- RS232/PIO output and TI Impact Printer emulation
- Reading/writing cassette recordings to files
- Drag and drop / auto-detection of modules, disks, demos, 99/4A files
- Ability to save/restore sessions
- Module formats: V9t9, MESS (.rpkl.zip), PBX banked modules
- Disk support (files in native filesystem, sector images, track images)
- TMS 9918A video
- TMS 9919 sound
- TMS 5220 speech
- Demo playback and recording support
- UCSD P-Code System
- Rudimentary debugger
- Image import
- "Realistic" rendering of the monitor

(Some features here are [advanced](#).)

Examples

Sound samples:

- [Jawbreaker theme \(45s\)](#)
- [Cassette recording \(11s\)](#)
- [Parsec speech](#)
- [Terminal Emulator II speech](#)

Recent Changes

Last updated: 05 March 2017 06:08 PM

2017/03/05 ([download](#))

New/published features:

- Allow configuring PC controller to joystick mappings
- Extract image importer into its own tool (v9t9.sh -tool ConvertImages), with enhanced support for various 4/8/15/16 bit depth modes and palettes

Bug fixes:

- Allow editing the way controllers map to joysticks ([bug #13](#))
- Fix detection of keyboard in certain modules ([bug #9](#))
- Find P-Code binaries more reliably ([bug #8](#))
- Improve keyboard mapping for joysticks ([bug #6](#))
- Add help to v9t9.sh
- If v9t9 crashes on Linux, due to PulseAudio issues, you can pass -Dv9t9.sound.java=true to use Java implementation
- Avoid cases where configuration settings are lost on macOS
- Fix bug in X instruction
- Various disassembler/assembler fixes

2015/07/21 ([download](#))

New/published features:

- Add RS232/PIO configuration -- for now, just determining whether the printer dialog opens or not
- Improve printer dialog UI, allowing saving images to disk, and using less memory when multiple pages are printed
- Add cassette reading/writing configuration button
- Support PgUp/PgDn and Ctrl Home/End in debugger CPU instruction view

Bug fixes:

- Improve emulation speed significantly (for lower-end machines) ([related to bug #2](#))
- Improve video updating synchronization for less tearing ([bug #3](#))
- Fix keyboard buffering that interfered with gameplay ([bug #4](#))
- Fix cataloging and distinguishing of modules which are named the same ([bug #5](#)).
V9t9 knows about a large number of unnamed (auto-start) and ambiguously named modules ("Milliken", "For English") and names them for you. V9t9 now also identifies and filters out duplicate modules.
NOTE: the format of the modules.xml file has changed, so saving any changes with this version may not work with older releases.
- Improve setup wizard load speed and make modules page simpler.
- Fix disk/device selector history (can easily swap directories/images between DSKx entries without opening/closing dialog)
- Ship v9t9render libraries. **If V9t9 crashes on startup** for you, especially when running under VirtualBox, try passing --client SWTAWT to v9t9.sh or v9t9.bat to work around it.

Site features:

- Added archives of older V9t9 builds.

2015/07/02 ([download](#))

- add -Djna.nosys=true to v9t9.sh by default.
- allow VMARGS to be set outside v9t9.sh.
- allow -Dv9t9.sound.rate=... to change ALSA rate and -Dv9t9.sound.java=true to bypass custom sound usage for Linux and Windows (possible fixes for [bug #2](#))
- fix problem with USCD P-System option no longer being available (thanks to RvK for noticing)
- try again to fix OS X class loading issues (thanks Scott S. and Michael R. for reminding me)
- revamped device configuration -- one button for selecting devices, then each device icon allows individual configuration
- other GUI tweaks

2014/05/19 ([download](#))

- fix OS X support (for real?)
- added initial RS232 "PIO support with TI Impact Printer emulation (try the "Printer Example" demo)
- fix Windows XP (pre-OpenGL 1.5) support

2013/10/20 ([download](#))

- fix bug with joystick 'fire' detection in hand-coded assembly
- add breakpoint support to debugger (right-click on an instruction to set/reset)
- fix bug using numeric keypad as joysticks (use Num Lock + Scroll Lock)
- fix launching for Win 7

2013/06/17 ([download](#))

- added support for Corcomp double-density disk controller
- make audio gate more consistent
- fix double-sided disk detection with *.dsk files
- add EA/8K Super Cart support
- fixed bug losing history from disk selector dialog

- fixed bug leading to appearance that module list setup could not find all the required files
- changed module list setup. Instead of showing only modules registered in a central database, V9t9 will prompt you to establish a modules.xml file containing a custom list of modules detected on your ROM paths.
- more accurate DIV cycle counting

Older releases

Well, I don't have any and can't rebuild them, since they use Java Web Start, which is essentially obsolete now and apparently impossible to build or use in new Java releases.

Running

Setup

Have Java 6 or newer installed on your system.

You will need ROMs to actually use the emulator. I don't provide these but [this page](#) will give you some instructions.

Installation

Download the v9t9.zip archive and unzip it somewhere on your system.

Running from Windows

Launch V9t9 by double-clicking the v9t9.bat file.

If this exits immediately, be sure java is on your PATH. If it crashes under a VM, try passing -client SWTAWT.

Alternately, run a Command Prompt and type:

```
cd \path\to\extracted\v9t9
v9t9.bat
```

Running from OS X or Linux

Launch V9t9 by double-clicking the v9t9.sh file.

If this exits immediately, be sure java is on your PATH. If it crashes under a VM, try passing -client SWTAWT.

Alternately, run a Terminal and type:

```
cd /path/to/extracted/v9t9
./v9t9.sh
```

Keyboard Mappings

The 99/4A keyboard has 40 keys and your keyboard has more. The 99/4A formed the rest of the ASCII character set using the "Fctn" key with other alphanumeric keys. Also, 99/4A programs often refer to symbolic key names like "REDO" and "PROC'D", which map to "Fctn" plus number keys.

In V9t9, use "Alt" for "Fctn".

These are the Fctn-+number mappings:

- Fctn-1 = DELETE
- Fctn-2 = INSERT
- Fctn-3 = ERASE
- Fctn-4 = CLEAR (this also stops BASIC programs and some RS232/PIO device operations; hold it down)
- Fctn-5 = BEGIN
- Fctn-6 = PROC'D
- Fctn-7 = AID (often used for help)
- Fctn-8 = REDO
- Fctn-9 = BACK (like Esc)

These keys that don't exist on the 99/4A are automatically mapped as follows by V9t9.

These choices try to align with the patterns of typical 99/4A software. If you object, please file a feature request!

- Arrow Down = Fctn-X
- Arrow Up = Fctn-E

- Arrow Left = Fctn-S
- Arrow Right = Fctn-D
- Home = Fctn-5 (BEGIN)
- End = Fctn-0
- Insert = Fctn-2 (INSERT)
- Delete = Fctn-1 (DELETE)

(The keys above are the same for the numeric keypad when Num Lock is enabled and joystick mode is not enabled.)

- Page Up = Fctn-6 (PROC'D)
- Page Down = Fctn-4 (CLEAR)
- Fnumber = Fctn-number

Joystick Mappings

The standard 99/4A system came with two joysticks – aka “handheld controllers”.

V9t9 provides several ways to emulate the 99/4A joysticks.

PC Controllers

V9t9 can use connected PC controllers or joysticks and map them to 99/4A joysticks.

- V9t9 only selects controllers with X and Y controls which don't act like mice.
- You must restart V9t9 for it to detect and use changes in connected joysticks.
- Select the “Joystick” icon in the left-hand toolbar to configure how the connected controllers map to the TI Joystick.
- This dialog (in Interactive mode) shows live updates of whichever controllers were detected at startup and allows you to assign their components to Joystick 1 or 2 (or neither) and then choose how each component contributes to the joystick.
 - IGNORE: the component is not used (handy for buggy USB controllers with stuck values)
 - X_AXIS, Y_AXIS: map an analog control to the X or Y axes
 - DIRECTIONAL: map a single analog control to X and Y axes
 - UP, DOWN, LEFT, RIGHT: map buttons to these directions (useful for Playstation 3 directional-pad buttons)
 - BUTTON: map the button to Fire
- You may also edit the configuration (Edit mode). The syntax should be somewhat obvious.

V9t9 will keep track of various combinations of detected controllers, but may not migrate settings from e.g. controller A if you run with controllers A and B the next time.

Whatever edits you make in the Interactive or Edit modes applies only for the specific controller setup active when you run V9t9.

See `~/v9t9j/config` and `ControllerConfig` and `Joystick1Config` and `Joystick2Config` for details if you want to copy settings between controller configurations without doing this by hand.

Emulating with host keyboard

V9t9 can use the keyboard's numeric keypad as “joystick #1” (and also “joystick #2” if you enjoy a difficult challenge).

Press *Scroll Lock* to toggle between modes.

By default the numeric keypad is used for ASCII numbers or 99/4A keyboard arrows (whatever Num Lock indicates). You'll see a notification to the lower-right telling you the current mode.

When you see “Using numpad for joystick #1 (shift for #2)”, you can use the numeric keypad.

```
8
4 5 6      fire = 'Enter', '+', or '-'   reset = 5 (in case something's stuck)
2
```

If you need to emulate “joystick #2”, hold down Shift. (I told you it'd be a challenge.)

Standard keyboard mappings

99/4A programs usually support keyboard-only setups:

Player 1:

```
E
S      D      fire = Q
X
```

Player 2:

```
I
J      K      fire = Y
M
```

Contact

Please see [this page](#) for details.

History

I've been working on this in various forms since 1992, when I started working on the idea in Turbo Pascal as "tiemul.pas" in the computer lab, and once crashed the computer's server when I ran it there without permission.

That next summer, I started rewriting the emulator in assembly for DOS and soon made the emulator into a product: "TI Emulator!" (yes, with the exclamation point). It was my first venture into the world of business – and copyright infringement. (I had been shipping ROMs around, and TI reminded me that I should have a license agreement and be paying royalties.)

This was an exciting time, interacting with people all over the world through letters and emails. A loyal user suggested the name "V9t9" and the product was renamed and a few more versions were released.

I got several requests to support then-current custom hardware for the aging TI-99/4A, but unfortunately was not experienced enough to infer the operation of hardware without having it in person, so those efforts never got off the ground.

A few years later, I moved from DOS to Linux and started porting V9t9 to C. This project was exciting, since it involved making the thing portable and capable of supporting multiple kinds of graphics, sound, and input APIs. This port never really saw the light of day (it was a bit way too geeky for the average user to understand, and only built against GNU C in Linux and Metrowerks Codewarrior in Windows).

Many years later, I started porting V9t9 to Java in 2005. The Java port was originally quite nastily ported directly from the C port, and I've been gradually rewriting chunks in a proper object oriented format ever since.

I would be remiss not to mention the driving motivation for continuing to work on the emulator at all in the 2000's, after my original TI-99/4A became mostly unusable (no access to a TV or monitor with RCA connectors, for example) – Thierry Nospikel's excellent compendium of technical data, [The TI-99/4A Tech Pages](#).

I have gone back to this site again and again over the years to refine my understanding of hardware I've not used in years.

Advanced

Please see [this page](#) for advanced usage and configuration.

License

The V9t9 Java codebase is licensed under EPL v1.0, with the exception that *no commercial redistribution is allowed*.

This software includes content licensed under [EPL v1.0](#); code from [the Base64 library](#); [Vlad Roubtsov's HRTimer library](#); LWJGL utilities from Kevin Glass and Brian Matzon; and the various packages from Apache Commons.

TI Cartridges

Expand to see files...

File	Size
4aFlyer.TICart 	25896
A-Maze-ing.TICart 	234111
Addition and Subtraction 1.TICart 	270879

TI Tapes

Expand to see files...

File	Size
AC Circuit Analysis Library.TITape 	15276
Beginner's Basic Tutor.TITape 	84938
Bridge Bidding I.TITape 	45915

Addition and Subtraction 2.TICart 	231489
Addition.TICart 	216555
Adventure.TICart 	246302
Alien Addition.TICart 	225553
Alligator Mix.TICart 	272418
Alpiner.TICart 	288163
Ant Colony.TICart 	20886
Ant Eater.TICart 	20039
Beginning Grammar.TICart 	274377
Beyond Parsec.TICart 	21376
Black Hole.TICart 	19601
Blackjack & Poker.TICart 	220188
Blasto.TICart 	244174
Boxer.TICart 	16409
Break Thru!.TICart 	20156
Buck Rogers.TICart 	252397
Burger Builder.TICart 	20086
BurgerTime.TICart 	268957
Car Wars.TICart 	222898
Centipede.TICart 	19675
Chicken Coop.TICart 	20774
Chisholm Trail.TICart 	241019
Circuit Analysis 1.TICart 	117460
Computer Math Games I.TICart 	40797
Computer Math Games II.TICart 	167376
Computer Math Games III.TICart 	268261
Computer Math Games IV.TICart 	35999
Computer Math Games VI.TICart 	256475
Computer War.TICart 	27115
Congo Bongo.TICart 	237509
Connect Four.TICart 	243415
Crossfire.TICart 	19258
Database Management.TICart 	123577
Decimal Deli 2.TICart 	47420
Decimals.TICart 	256327
Defender.TICart 	20881
Demolition Division.TICart 	273710
Demonstration.TICart 	166258
Diagnostic.TICart 	200413
DigDug.TICart 	27820
Disk Duplicator.TICart 	19939
Disk Manager 1.TICart 	182884
Disk Manager 2.TICart 	156371

Bridge Bidding II.TITape 	34490
Bridge Bidding III.TITape 	36952
Checkbook Manager.TITape 	15674
Computer Music Box.TITape 	16113
Electrical Engineering Library.TITape 	20972
Graphing Package.TITape 	17782
Inventory Management.TITape 	45771
Invoice Management.TITape 	42236
Lease-Purchase Decisions.TITape 	33783
Mailing List.TITape 	30811
Market Simulation.TITape 	11454
Math Routine Library.TITape 	26690
Music Skills Trainer.TITape 	5625
Mystery Melody.TITape 	6882
Oldies But Goodies Games I.TITape 	45536
Oldies But Goodies Games II.TITape 	36812
Personal Financial Aids.TITape 	22401
Programming Aids I.TITape 	22811
Programming Aids II.TITape 	16011
Programming Aids III.TITape 	10582
Saturday Night Bingo.TITape 	9476
Speak & Math Program.TITape 	16661
Structural Engineering Library.TITape 	43208
TI-Trek.TITape 	8916
Teach Yourself Basic.TITape 	99395
Teach Yourself Extended Basic.TITape 	75094

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Disk Manager 3.TICart 	156469
Division 1.TICart 	207849
Divison.TICart 	168713
DonkeyKong.TICart 	24675
Dragon Mix.TICart 	244503
Driving Demon.TICart 	20490
Early LOGO Learning Fun.TICart 	265981
Early Learning Fun.TICart 	268456
Early Reading.TICart 	293793
Editor Assembler.TICart 	97283
Equations.TICart 	243479
Escape.TICart 	17627
Facemaker.TICart 	266532
Fantastic Fractions 1.TICart 	52775
Fantasy.TICart 	36336
Fathom.TICart 	266017
Football.TICart 	212782
Fractional Numbers.TICart 	249111
Germ Patrol.TICart 	45888
Hangman.TICart 	201613
Home Financial Decisions.TICart 	256205
Hopper.TICart 	251365
Household Budget Management.TICart 	257746
Hunt the Wumpus.TICart 	256614
Hustle.TICart 	189012
Individual Accounting.TICart 	37471
Indoor Soccer.TICart 	177483
Integers.TICart 	245156
Jawbreaker II.TICart 	242930
Laws of Arithmetic.TICart 	261734
Lobster Bay.TICart 	34191
MASH.TICart 	287844
Measurement Formulas.TICart 	263656
Mechatronic Extended Basic II Plus.TICart 	59172
Meteor Multiplication.TICart 	240055
Micro Pinball II.TICart 	27119
Micro Tennis.TICart 	27908
Microsoft Multiplan.TICart 	253180
Microsurgeon.TICart 	274569
Milton Bradley Games.TICart 	43004
Mind Challengers.TICart 	268089
Mini Memory.TICart 	175500
Mini Writer.TICart 	20109

Minus Mission.TICart 	247356
Moon Mine.TICart 	271940
Moonsweeper.TICart 	280128
Mouse Attack.TICart 	35913
Ms Pacman.TICart 	26549
Multiplication 1.TICart 	160350
Multiplication.TICart 	218585
Munch Man II.TICart 	20966
Munch Man.TICart 	253481
Munchmobile.TICart 	251916
Music Maker SDA.TICart 	185602
Music Maker.TICart 	177938
Number Magic.TICart 	185290
Number Readiness.TICart 	264254
Numeration 1.TICart 	278255
Numeration 2.TICart 	270526
Othello.TICart 	222746
Pacman.TICart 	24235
Parsec.TICart 	266967
Percents.TICart 	253332
Personal Real Estate.TICart 	241308
Personal Record Keeping.TICart 	278969
Personal Report Generator.TICart 	230646
Peter Pan's Space Odyssey.TICart 	45702
Physical Fitness.TICart 	219296
Picnic.TICart 	26800
Picture Parts.TICart 	41457
Pinocchio's Great Escape.TICart 	44883
Plato.TICart 	260737
Pole Position.TICart 	29155
Popeye.TICart 	32613
Princess & Frog.TICart 	20389
ProTyper.TICart 	20637
Pyramid Puzzler Multiplication.TICart 	47999
Qbert.TICart 	26157
Rabbit Trail.TICart 	21308
Reading Cheers.TICart 	55310
Reading Flight.TICart 	300243
Reading Fun.TICart 	244395
Reading On.TICart 	294792
Reading Power.TICart 	55311
Reading Rally.TICart 	262991
Reading Round-Up.TICart 	272204

Reading Wonders.TICart 	56054
Return to Pirate's Isle.TICart 	290350
Rotor Raiders.TICart 	18933
SF Accounting Assistant.TICart 	50510
SF Activity Accountant.TICart 	35710
SF Attendance Recorder.TICart 	51046
SF Class Data Recorder.TICart 	37831
SF Course Manager.TICart 	49638
SF Payroll Assistant.TICart 	50121
SF Salary Planner.TICart 	38262
SF School Mailer.TICart 	43911
Saint Nick.TICart 	22811
Schnoz-ola.TICart 	21089
Scholastic Spelling - Level 3.TICart 	48415
Scholastic Spelling - Level 4.TICart 	49866
Scholastic Spelling - Level 5.TICart 	50339
Scholastic Spelling - Level 6.TICart 	50765
Securities Analysis.TICart 	205312
Simon Says.TICart 	14451
Slymoids.TICart 	262983
Sneggit.TICart 	242165
Sorgan II.TICart 	27267
Space Journey Percent.TICart 	44521
Speech Editor.TICart 	172336
Speed Reading.TICart 	20469
Spys Demise.TICart 	17542
Star Maze Division.TICart 	46013
Star Runner.TICart 	29131
Star Trek.TICart 	264412
Starship Pegasus.TICart 	25704
Statistics.TICart 	231048
Story Machine.TICart 	286194
Strike Three!.TICart 	24085
Subtraction.TICart 	225922
Super Demon Attack.TICart 	237161
Super Extended Basic.TICart 	60664
TI Extended Basic V2.5.TICart 	189705
TI Extended Basic.TICart 	160146
TI Invaders.TICart 	254469
TI Logo II.TICart 	242529
TI Logo.TICart 	178360
TI Planner.TICart 	21056
TI Toad.TICart 	19757

TI Writer.TICart 	220365
Tax-Investment Record Keeping.TICart 	261590
Terminal Emulator I.TICart 	204714
Terminal Emulator II.TICart 	236354
The Attack.TICart 	244228
The Extra-Terrestrial.TICart 	29015
Tombstone City.TICart 	269266
Topper.TICart 	21056
Touch Typing Tutor.TICart 	278731
Treasure Island.TICart 	259126
Tunnels of Doom.TICart 	239789
Typo Man.TICart 	20559
Verb Viper.TICart 	23576
Video Chess.TICart 	273254
Video Games 1.TICart 	228880
Video Vegas.TICart 	19453
Video-Graphs.TICart 	206943
Von Drake's Molecular Mission.TICart 	49660
Weight Control & Nutrition.TICart 	233671
Wing War.TICart 	35333
Word Invasion.TICart 	252130
Word Radar.TICart 	218945
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