

**SAILDART
Archive
Preview
2019**

Bruce Guenther Baumgart

Inside Front Cover

S A I L D A R T

Archive Preview 2019

Bruce Guenther Baumgart

SAIL was the lab.

SAIL — The first Stanford Artificial Intelligence Lab.

DART was the backup program.

**DART — Dump And Restore Tape program, wrote fifty
gigabytes on a final set of 229 reels of magnetic tape.**

SAILDART is a digital archive

promulgating records from SAIL.

The DART backup tapes span from 1972 to 1990.

The year 1974 is convenient for re-enacting the software.

Computer expertise is required to run the simulation.

Computer enthusiasm suffices to read this history.

Table of image credits:

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David Baumgart drawing on page 6.
Les Earnest photo of librascope coffee table and the aerial photo of the D.C.Power Lab.
Albrecht Dürer fragment from Melancholia, page 4.
Dave Sieg Foonly F1 picture on page 5.
Clem Smith GEOMED plot of Hacker at Ill console pg17

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Larry Tesler PUB manual cover is a “cut-and-paste” from some Thomas Rowlandson 1756-1827 woodcut print. Others like this one are titled “Rainbow Tavern Room in Fleet Street 1800” and “Wheatsheaf Eating House Salisbury Court Fleet Street 1815”. Page14.

The MPFU catalog nudes with cap and gown people on page 7. The image was donated for the catalog to the Free University which we closed in a somewhat messy fashion. Fair use - I do not know of any claims on this body of material. Pg7.

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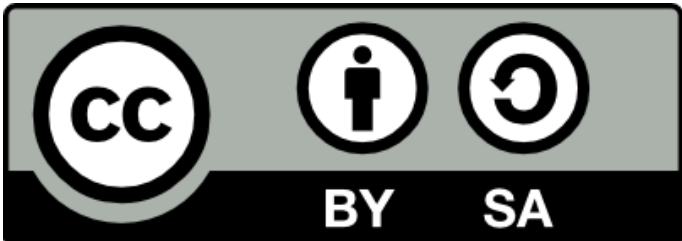
2019-12-31

References:

[Earnest 1973] Final Report - First Ten Years of A.I. Research at Stanford. AIM-228.
[Knuth 1992] Literate Programming
[Knuth 1999] Digital Typography

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by Bruce Guenther Baumgart
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Share Alike 4.0 International License. Based on a
work at [www.saildart.org / book / 2019](http://www.saildart.org/book/2019)



ISBN:
978-1-7347246-0-8

Colophon:

This document was written and designed using Apple Pages.

Apologia:

I know that you are not suppose to use **Helvetica Neue**.

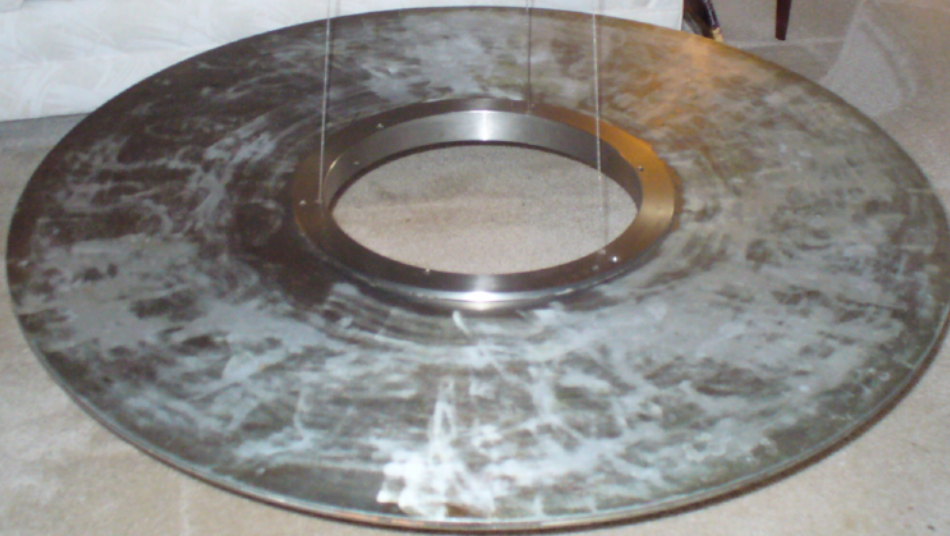
I have tried to use TeX, Latex, Lyx as well as well as Adobe Creative Suite tools like InDesign, emacs, atom, and Libre open office. Someday I want to learn **Graphics Design** and then I shall be able to write about the primitive digital font technologies that I have participated in.

Bruce Guenther Baumgart
BgBaumgart @ mac.com

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TOC diagram

In 1974
disks were huge
capacity was tiny



Four feet in diameter
Five megabytes per side

When

Once upon a time
near the dawn of A.I.

I was one of the crew at a lab
named *SAIL*. On a voyage of discovery,
for six years, 1969 to 1974, I worked at SAIL.

It was the springtime of A.I. Then a quarter century
later, in 1998, our captain leader JMC, John McCarthy,
essentially pleaded, “The tapes ! The tapes !

Bruce, please save all the data on the DART tapes !”

Time Line Table

1958	M . I . T . A I project started by John McCarthy and Marvin Minsky.
1963	Stanford A I project started by John McCarthy.
1966	Stanford A I project moved off campus into D.C.Power Lab. PDP-6 computer installed.
1968	PDP-10 KA computer installed.
1972	Spacewar competition at SAIL reported in the Rolling Stone magazine. ● First DART tape is written.
1974	Software re-enactment for a typical day at SAIL, Friday 26 July 1974.
1976	PDP-10 KL computer installed. A photographer visits SAIL, Wed 21 April 1976.
1979	SAIL moved to Margaret Jacks Hall on the Stanford campus. SAIL merged with Stanford Computer Science Department.
1986	D C Power Lab building is demolished.
1990	● Final DART tape is written.
1991	Final E-mail message from SAIL-WAITS Timesharing System sent.
1998	SAILDART started by John McCarthy with Baumgart, Selker, Earnest & Frost.

Where

**1600 Arastradero Road
Palo Alto, California**

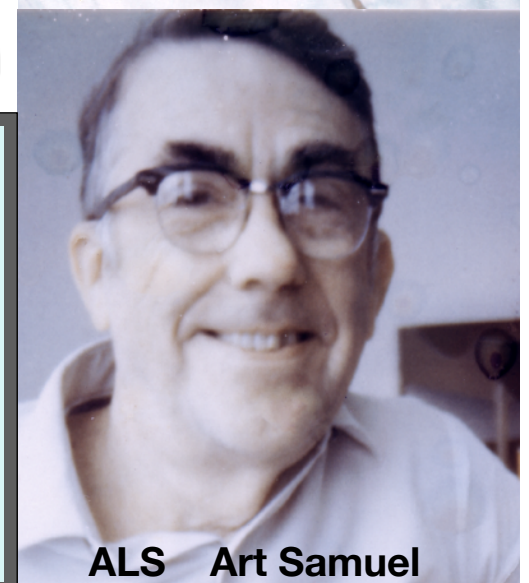
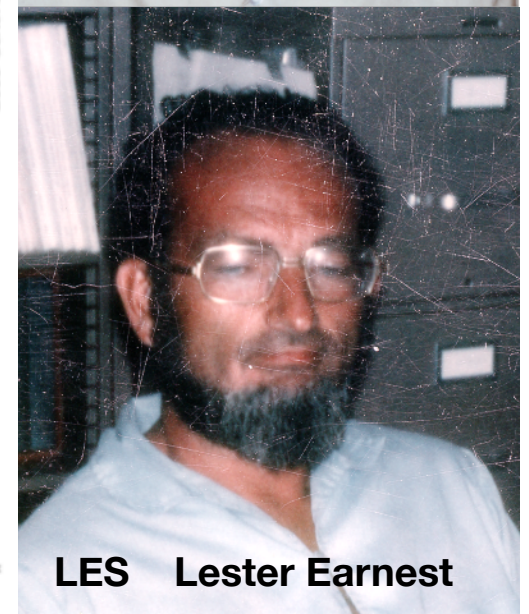
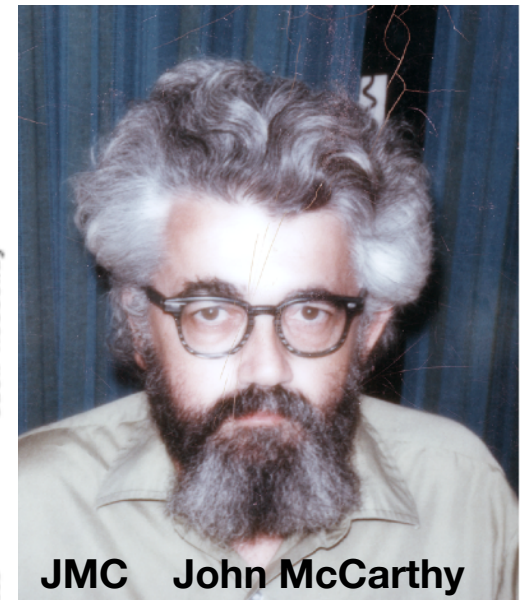


**The first Stanford A.I. Lab resided in the D.C. Power Lab
from June 1966 to November 1979.**

**"Hackers thought this was very funny, because the obvious
connection to electrical engineering was non-existent, the
building had been named for a telephone company executive
Donald Clinton Power."**

- Hackers Dictionary.

Who



For the 18 years of SAIL that are visible via the DART tapes, user login access to the computer system required a 1 to 3 alphanumeric programmer code.

When I was a grad student the lab leaders were JMC John McCarthy, LES Lester Earnest , and ALS Arthur Samuel.

— I took the three snapshots in 1970.

The top 200 names in the word cloud are ranked by quantity of data in the SAILDART archive. A table of these names is on the last page.

What + Why

What is in the SAILDART Archive is like what is found in an ancient kitchen midden where broken shards of pottery and tool fragments are embedded in heaps of trash. The bulk of the data on the DART tapes is not Artificial Intelligence Research.

Nevertheless, the *born-digital* originals of half the AIM technical reports published between March 1963 and June 1984 can be found in the SAILDART archive. Some of the 1970s software can be demonstrated.

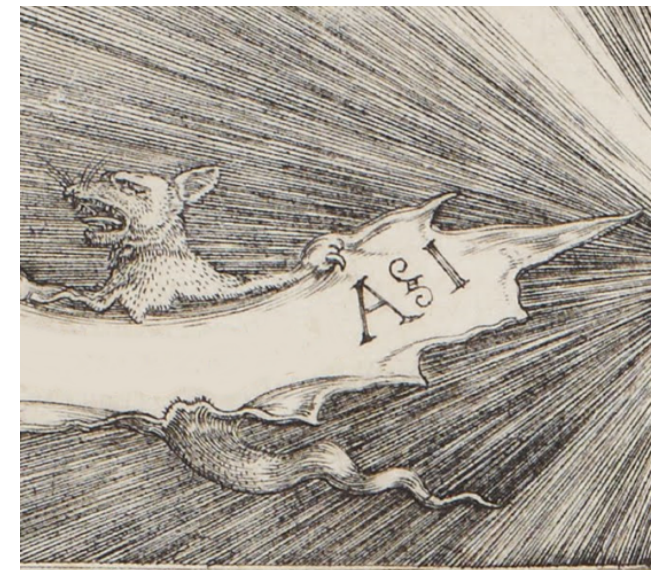
* * *

Why SAIL ? The simple answer is because WW2 advanced electro mechanical computation, John McCarthy coined the label '**Artificial Intelligence**' for a 1956 conference, the label stuck. The Sputnik surprise of October 1957 led to the creation of ARPA where one person, J.C.R. Licklider, funded the A.I. research proposed by John McCarthy at MIT and then at Stanford.

* * *

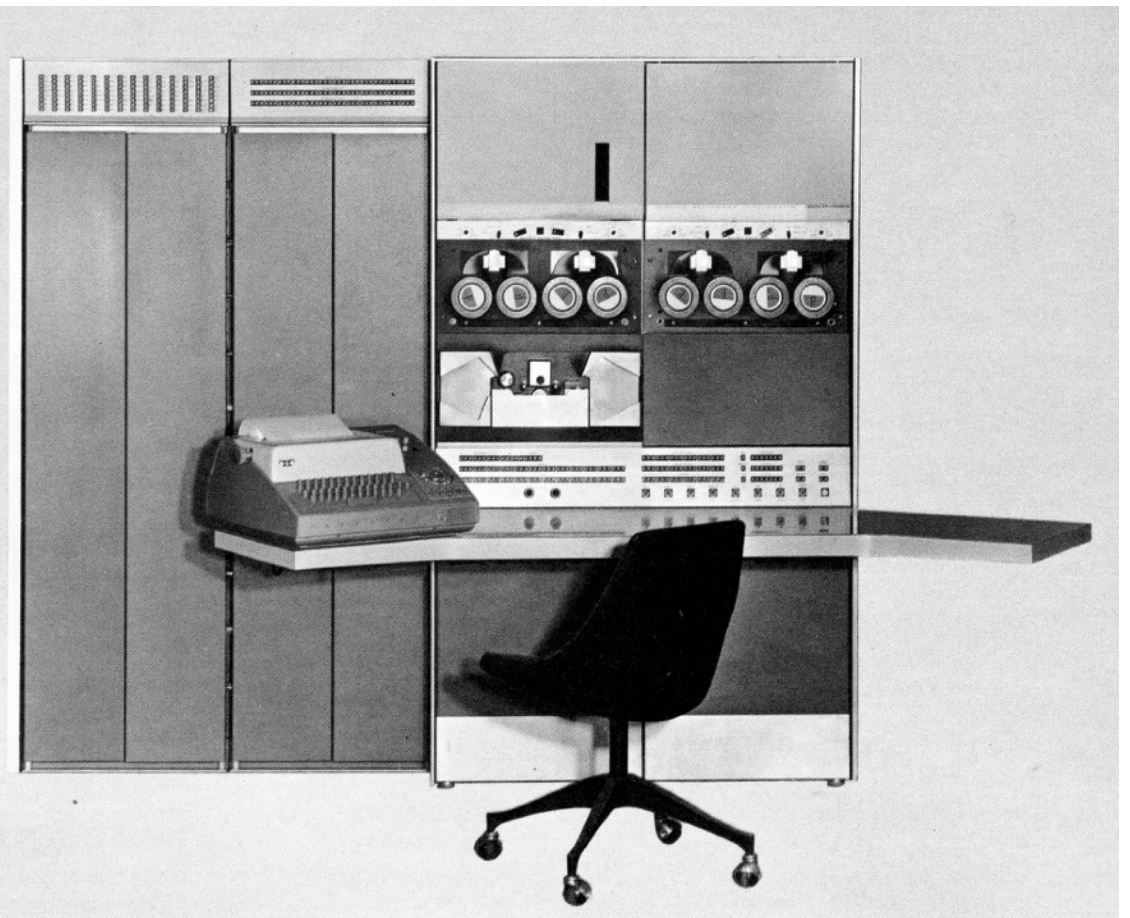
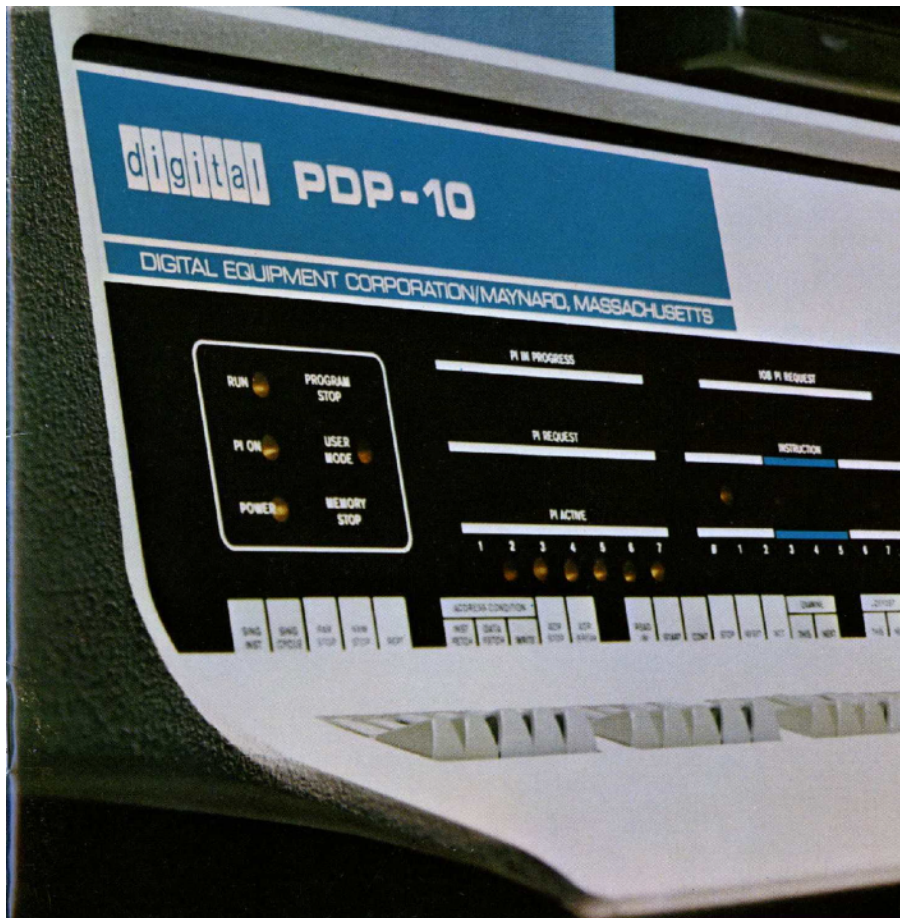
The official SAIL Research Topics [Earnest73] were

- * Robotics: Vision + Mechanical assembly + Vehicle navigation.
- * Heuristic programming: Theorem proving
 - + Automatic program generation
 - + Symbolic computation + Board games + DENDRAL.
- * Theory: Mathematical theory of computation
 - + Representation theory + Grammatical inference.
- * Natural language: Speech recognition + Semantics
 - + Machine translation.
- * Planetary (Mars) image processing.
- * Computer music synthesis.



Banner with a strange device - A.I.





Two machines shared by 100 people in 1974 were the PDP-10 KA at a half MIP and the PDP-6 at a quarter MIP. The machine I am using to write this sentence in 2019 has 120 thousand bogo MIPs.

Hardware

SAIL Computer Room, *named Mordor*, 1972 left-to-right is the LPT drum printer, 7 Track tape drives, back wall of tapes, the Stanford Cart, Librascope disk, the PDP-10 is behind FW, BgB then XGP.



The fastest PDP-10 was the Foonly F1 at five MIPs. It was operational by 1980.

FOONLY

Read Gordan Bell, then let's talk about 6/10 vs x86, ARM, and Berkeley RISC-V.



Computer programs are fun to write, and well-written computer programs are fun to read. One of life's greatest pleasures can be the composition of a computer program that you know will be a pleasure for other people to read, and for yourself to read.

— Donald Ervin Knuth

The farther back you can look,
the farther forward you are likely to see.

— Winston Churchill

SAILDART is a raw storage basement for a software museum. The old SAIL files are a heap of shattered pottery shards. The software pottery fragments need to be inspected, sorted and re-glued together to form program vessels that have enough shape to be assembled, compiled, loaded and executed in the present. Professor Knuth pioneered <<Literate Programming>> while working on the SAIL system. Unfortunately most of the software to be read in the SAILDART is painfully primitive and requires a level of expertise similar to that of an Egyptologist who can read 2nd Dynasty Hieroglyphics. I believe there are fewer than 1K persons alive now who can easily read PDP-10 assembly language. For that narrow readership, the SAIL table of programs is available at all the old file names some of which are:



Time Sharing **Operating System:** SYSTEM.DMP[J17,SYS] WAITS.DMP[S,SYS]

Assembly: Macro FAIL Midas DDT RAID RPG

Programming Languages: LISP SAIL Fortran Pascal Prolog Basic

Design (aka CAD): SUDS GEOMED SCORE

Games: Chess Checkers Go Spacewar Adventure Life

Mathematics: Reduce LCF **Music:** Score **Publication:** XGP PUB TeX

Robotics: Hand/Eye and Cart **Text Editors:** Teco SOS TVED E.

Software

LISP eval in LISP

```

apply[fn;x;a] =
  [atom[fn] → [eq[fn;CAR] → caar[x];
               eq[fn;CDR] → caddr[x];
               eq[fn;CONS] → cons[car[x];caddr[x]];
               eq[fn;ATOM] → atom[car[x]];
               eq[fn;EQ] → eq[car[x];caddr[x]];
               T → apply[eval[fn;a];x;a]];
  eq[car[fn];LAMBDA] →
    eval[caddr[fn];pairlis[caddr[fn];x;a]];
  eq[car[fn];LABEL] → apply[caddr[fn];x;
                             cons[cons[caddr[fn];caddr[fn]];a]]

eval[e;a] =
  [atom[e] → cdr[assoc[e;a]];
   atom[car[e]] → [eq[car[e];QUOTE] → cadr[e];
                   eq[car[e];COND] → evcon[cdr[e];a];
                   T → apply[car[e];evlis[cdr[e];a];a]];
  T → apply[car[e];evlis[cdr[e];a];a]
evcon[c;a] = [eval[caar[c];a] → eval[cadar[c];a];
              T → evcon[cdr[c];a]]
evlis[m;a] = [null[m] → NIL;
              T → cons[eval[car[m];a];evlis[cdr[m];a]]]
pairlis[x;y;a] = [null[x] → a;
                  T → cons[cons[car[x];car[y]];
                             pairlis[cdr[x];cdr[y];a]]]
assoc[x;a] = [equal[caar[a];x] → car[a];
              T → assoc[x;cdr[a]]]
  
```

SPACEWAR



Ralph Gorin nearest the display tube warms up Spacewar contestants. Rocket controls are visible on knee of player at left—four buttons one for thrust, one for torpedoes one each for turn to the left and to the right.



Access

Portions of SAILDART are visible on public web sites. The full SAILDART archive is curated as a private research collection by former SAIL personnel at the 1998 request of the Principal Investigator, professor John McCarthy.

All DART records will be out-of-copyright by the year 2100.

The meme I wish to illustrate, using a Mid Peninsula Free University catalog photo, is that during the 1970s the computer research culture at Stanford A. I. changed from left to right, from hippie hackers into entrepreneurial geeks. The anti war protests of 1969 forced classified government research off campus to SRI, and meanwhile at Xerox PARC, computer knowledge sharing became NDA secret keeping.

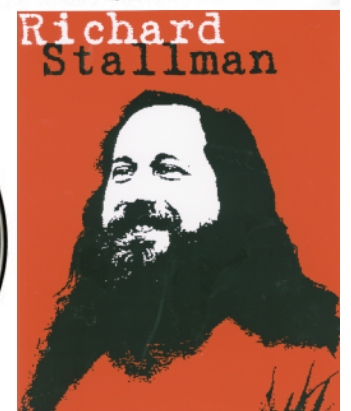
Some hackers (e.g. Richard Stallman) in the A. I. community responded with the GNU Copy Left license, FSF, EFF, and later Creative Commons. Other A. I. hackers muddled ahead into startups, some achieved extremely great commercial success. Railroad Robber Baron Leland Stanford, Sr. would be proud. The Silicon Gold Rush was on.

One notorious story from the 1980s portion of the SAILDART archive, concerns the origin of Sun Microsystems founded by Andy Bechtolsheim and Cisco Systems founded by Leonard Bosack and Sandy Lerner when they were at Stanford University. The circuit board for both the first Sun work station and for the first Cisco Router is one and the same as designed by Bechtolsheim using SUDS. The Sun-1 board was then used in Stanford "blue box" routers which are nearly identical to the first routers sold by Cisco.

"On July 11, 1986, Bosack and Loughheed were forced to resign from Stanford and the university contemplated filing criminal complaints against Cisco and its founders for the theft of its software, hardware designs, and other intellectual properties." - Wikipedia



WHICH UNIVERSITY ARE YOU GOING TO THIS FALL?



Provenance

PROVENANCE of a digital archive has two parts, first is the chain of custody of the media, and second is the fidelity of the data transcriptions into working copies for preservation, circulation and presentation.

CUSTODY - The final high density tapes have never left the Stanford campus. On 26 April 2011 we (Baumgart, Earnest, Frost and Hartwig) moved the 229 reels of DART tape from the Computer Science Department at Gates to the special collections at Green Library.

The low density tapes, reel#1 to reel#1583, were written in the computer room at SAIL in the D.C. Power Lab. Those tapes were moved to MJH, Margaret Jacks Hall, in November 1979. Tape reel#1584 to reel#2984 were written in MJH.

The MCOPY tape conversion software was developed and tested in early 1988, but not used until May 1990. Only the first three high density tapes were written in 1988, the remaining 226 reels were written in 1990. There was no tape conversion work done in 1989. The 229 high density tapes were moved from MJH to the William Gates Building, in December 1995 or January 1996, then moved again to the Green Library in April 2011.

Authenticity

FIDELITY - The bytes found on each high density tape in 1998 were read using the Unix 'dd' utility and were aggregated into 229 compressed tar balls and MD5 hashed. The hash numbers assure that the present 229 tar balls are the same as the 1998 ones. In 2015, the GNU/Linux 'tar' dependency was removed and one long DART byte string written into a single file.

***Farb** is a derogatory term used in the hobby of historical re-enacting in reference to participants who are perceived to exhibit indifference to historical authenticity.*

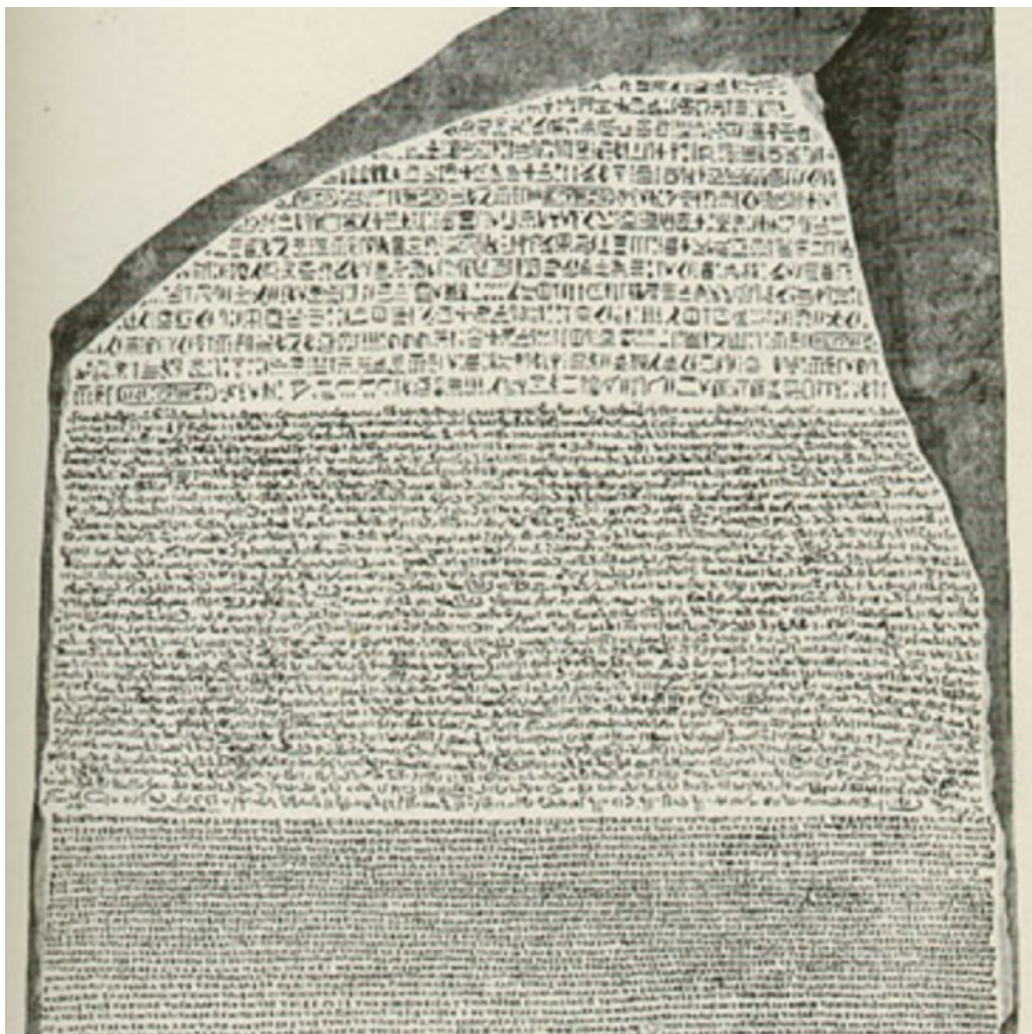
My new **Farb definition** is that Farb is an authenticity scale #0 to #9, so Farb level #0 is the original media as-is.

Farb level #1 is data that is a bitwise exact copy, hash MD5 checked.

Farb level #2 to #5 are curated interpretations.

Farb level #6 to #9 are for shades of re-enactment up to steam punk historical fiction.

Farb Level



Remix

UNDART and REMIX generate database CSV (Comma String Value) tables for SAIL content blobs (sn, hash) and for the SAIL name tags (pathname, date time, word count and prot_mod).

There are fewer than one million unique DART content blobs, serial numbered, sn, from 000001 to 999999. There are fewer than two million name tags. Content blobs with many names are boiler plate (or software farts) that appear in many user file directories over many years.

Further REMIX does four-D — de-dup, de-damage, de-flate and de-tox to remove duplicates, damaged copies, excessive record padding, ephemera, and obvious legal / ethical hazards.

Final REMIX steps assist digital curation to provide T-Shirt sized corpora for the Large, Medium and Small collector; which are translated into au courant formats for presentation.

TIME-CAPSULE

The original SAILDART was 50 Gigabytes.
A convenient DATA8 flat file copy packing
36 bits into 64 bits comes to 85 Gigabytes.

That file is named:

`flat_DART_data8`

Its MD5 hash is now and forever:

`3adbff17fd7f9f6eb9107755594ae0b9`

so you will know it when you find it.

UNDART

Regular DART wrote to low-density 7 track tape.
In 1990, MCOPY re-wrote the data to 9 track tapes.
In 1998, DD/TAR copied the 9 track tapes into
Unix "tar-ball" tgz files, which UNDART writes
into Unix files as DATA8 and UTF8 for conversion into
html / js / css / pdf / svg / png / csv / json / yaml

EXEGESIS

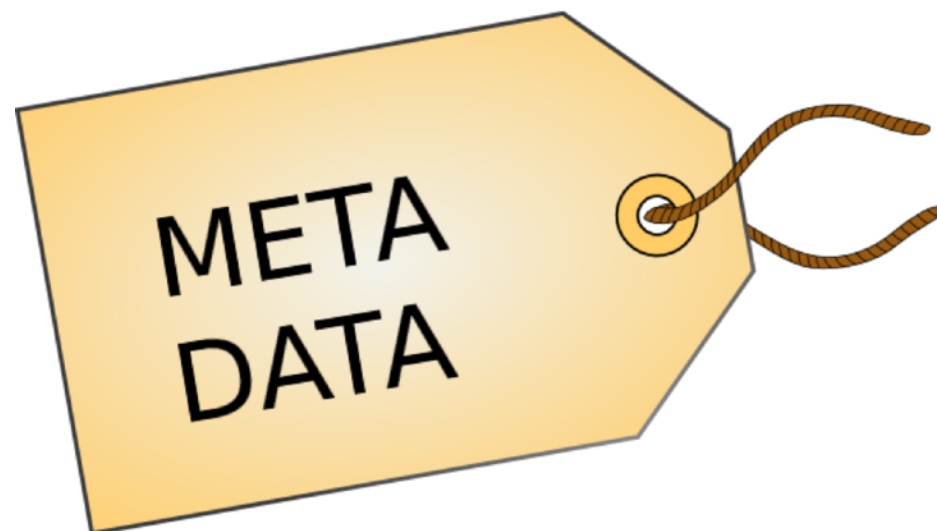
DART text is encoded
in a modified 7-bit ASCII
packed into 36-bit words.

Octal	code	STANFORD	ASCII	
00	nul	10 λ	20 c	030
01	↓	11 tab	21 >	031 →
02	α	12 lf	22 n	032 ~
03	β	13 vt	23 u	033 ≠
04	Λ	14 ff	24 v	034 ≤
05	¬	15 cr	25 ∃	035 ≥
06	ε	16 ∞	26 ⊗	036 ≡
07	π	17 ∂	27 ↔	037 v
175	Stanford-ALT-\$		176 }	

Converted to GNU / Linux the one million content blobs are encoded as both UTF8 text files and as DATA8 binary with the 36-bit PDP-10 words packed right justified into eight byte 64-bit words.

FILNAM [PRJ , PRG]
or
FILNAM . EXT [PRJ , PRG]
or
FILNAM . EXT [PRJ , PRG] {version}
FILNAM . EXT [yym , PRG]

'ymm' is a hack to pack version date-time inside the limited SAIL Ralph UFD notation for re-enactment.



The SAIL-WAITS file system is primitive. It was a tool for pioneers at the frontier. It stayed the same for 25 years, it could not be changed — which benefits the archivist, but was a fatal limitation for SAIL-WAITS.

File names were one to six characters long, optionally followed by dot and a one to three character extension.

Only the 26 uppercase letters and 10 digits were widely used. Special infrequent hacks used punctuation or spaces in file names (*delimited by down arrows ↓*F00*↓.TXT*).

Each file belonged to a User File Directory, its UFD, specified by left square bracket project code comma programmer code right square bracket. The project and the programmer codes where each one to three characters long. UFD is aka PPN. My home SAIL user directory is at [1,BGB] now and forever.

The explicit DART meta data is just FILNAM.EXT [PRJ, PRG], date-time, word count, a nine bit protection code and a four bit write mode code.

Additional meta data, from *in-band* content analysis derives attributes such as Text vs Binary, Public vs Private, copyright status, MIME-like content-type and a redaction code.

Redactions remove duplicate content, damaged copies and toxic material that legally or ethically does not need to be included in the SAILDART archive. Go look for it at Stanford in the year 2100 or so.

Computers were very expensive, so research funding required bookkeeping. Detailed records of computer usage, login sessions and personnel records are all within the SAILDART !

Meta Data

In round numbers, there are
52 thousand TeX files,
44 thousand MSG email/bulletin board
27 thousand DMP files
in the SAILDART.

The PDP-10 assembly languages are FAIL, MACRO and MIDAS with extensions FAI, MAC and MID.

The data formats can be re-captured and decoded by reading the source code that generated the files.

* * *

11

Non DART

The Non-DART collection is simply archival items that were not on the DART tapes, but which are included in the SAILDART archive such as scanned documents, digitized film, re-union videos, plus story telling and new writing about the era.

The size of non-DART material exceeds the 50 GB of the original DART tapes. Latter day videos of us SAIL survivors, are parked on Youtube as well as at Archive dot org.

The digitized films and videos include:

- 16 mm Titles such as
 - *Ellis D. Kropotechnev* about a pre-SAIL time sharing system named Zeus.
 - *Hear-Hear* about speech recognition
 - Water Pump Assembly.
- And videos
 - a SAIL volley ball game in the 1970s.
 - re-union 2009 talks.
 - Hans Moravec cart demonstrations 1979.

Scanned paper documents include:
AIMS the A.I. Memos,
SAILONS the Operating Notes
PhD Thesis work





Archival digital data preservation is now easy and cheap; since you can afford to make many copies of it. More difficult is curating the archive to be attractive and legible and not forgotten.

- Store copies in places accessible to readers.
- Provide mechanism for reading the message.
- Tell your peers and successors about your archive.

Find communities or institutions to house full or partial copies. Verify their performance. Leave copies on cloud servers. Verify copy existence. LOCKSS = Lots of Copies Keeps Stuff Safe. Mention Stanford, IA, CHM, LCM and even DOD, NARA and dot GOV and dot MIL archives. Cross link them.

Preservation

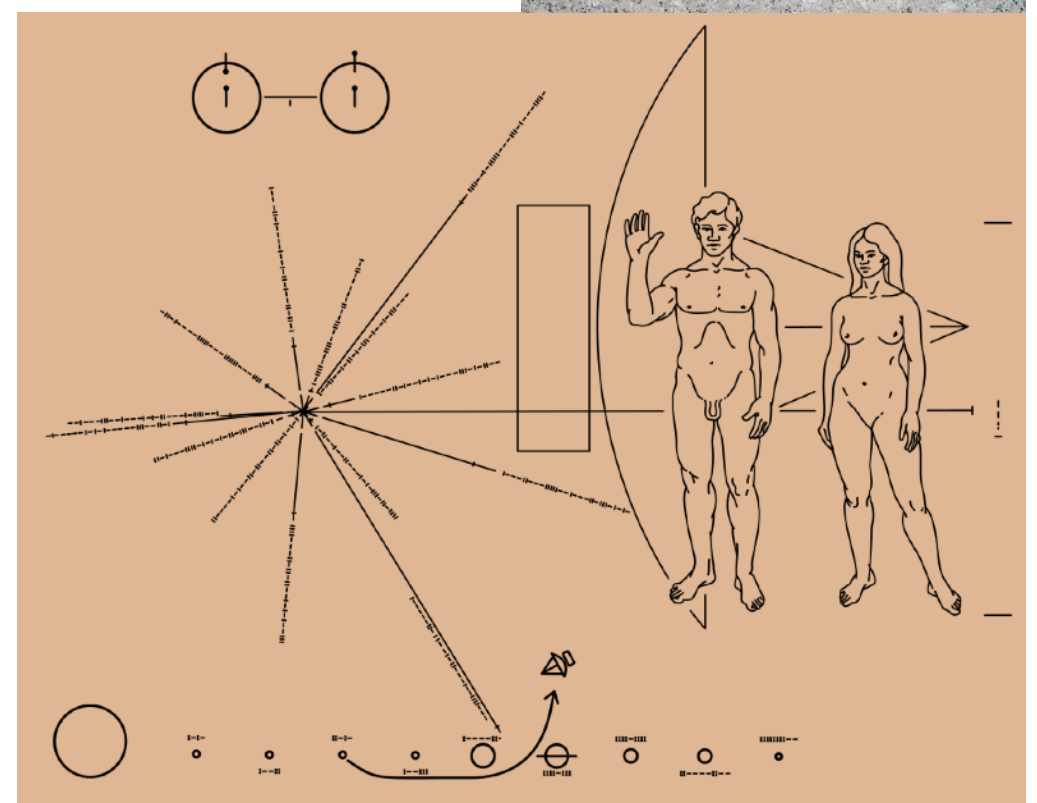
Preservation methods include

Narrow-casting: Time Capsules. Space-plaques. Write your archive on permanent media and bury it in the desert or launch it into outer space or leave it on cloud servers.

Broad-casting: Write your message on cheap media, make zillions of copies, send it in every direction.

Baton-passing: like in a relay race. Carry / remix / improve your archive during your lifetime. Hand it off, early and often.

Story-telling: The first library of Alexandria was lost to neglect; not fire, nor water, nor censorship. Bib-Alex in Egypt has been rebuilt at <https://www.bibalex.org>



Publication

SAIL made more progress in publication technology than it did in Artificial Intelligence. This was both beneficial serendipity for printing as well as crass over promotion of our modest A. I. results.

This story starts with SAIL going it alone to extend its computer character set, which required special custom LPT mechanical drum printer, keyboards and graphics terminals; and these in turn required software for font design, document layout, and the nearly first laser XGP printer. The two famous programs are named PUB and TeX.

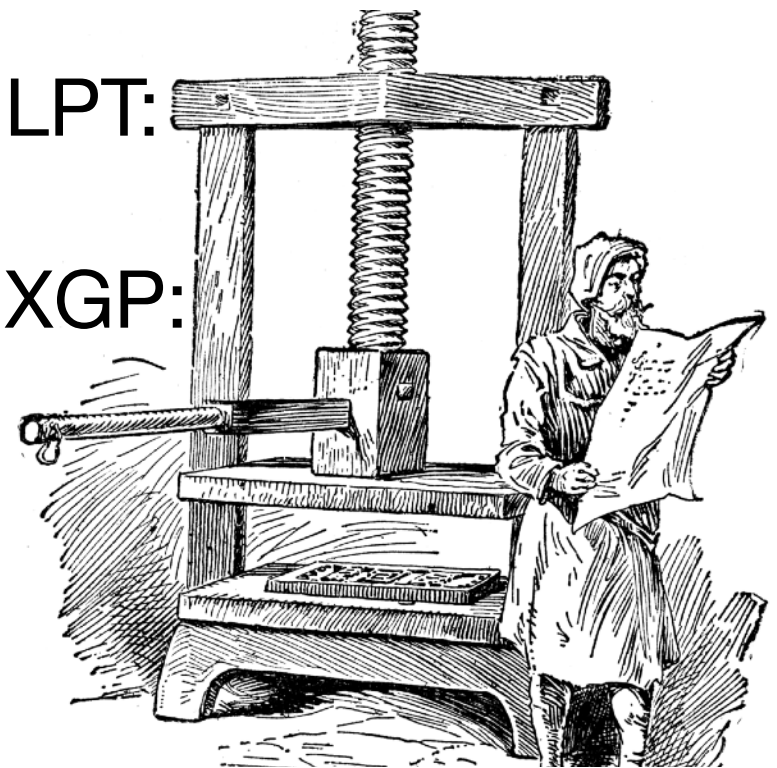
The story continues with SAIL spin-outs, graduates and drop-outs applying the publication research and development at other institutions: Ill, Xerox, Adobe, Apple, Imagen, HP, Japan and so on.

Now the story is about how to publish a digital archive in the 21st century. The SAILDART archive itself was launched and has survived for two decades, as our civilization re-implements the institutions for preserving and publishing knowledge. Review DIKW (Data Information Knowledge Wisdom) and block chain re Diffie, Lampson, Merkel.

The archival A.I. representation of knowledge, aka "Ontology", is still in flux, 2019.

LPT:

XGP:



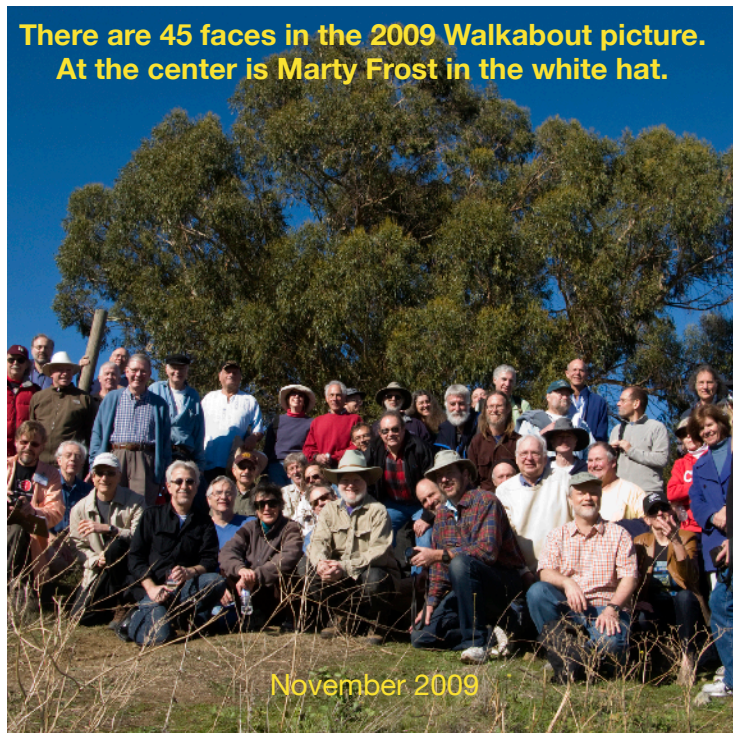
PUB



TeX



There are 45 faces in the 2009 Walkabout picture.
At the center is Marty Frost in the white hat.



Participation

Participation in the SAILDART Archive work is nearly zero.

Setting up the SAILDART Archive and running it for twenty years, 1998 -2018, has taken me one mythical man year, 2000 hours, of part time effort. But that guess counts time I have spent as a user of the SAILDART, rather than simply as its maintainer.

At my final three job sites: IBM Research at Almaden, Internet Archive, and the search engine named Cuil - each tolerated the SAILDART archive as slightly relevant to the work I was paid to be doing. At IBM in 1998, John McCarthy consulted for Ted Selker re data-mining 'Elephant' big-data.

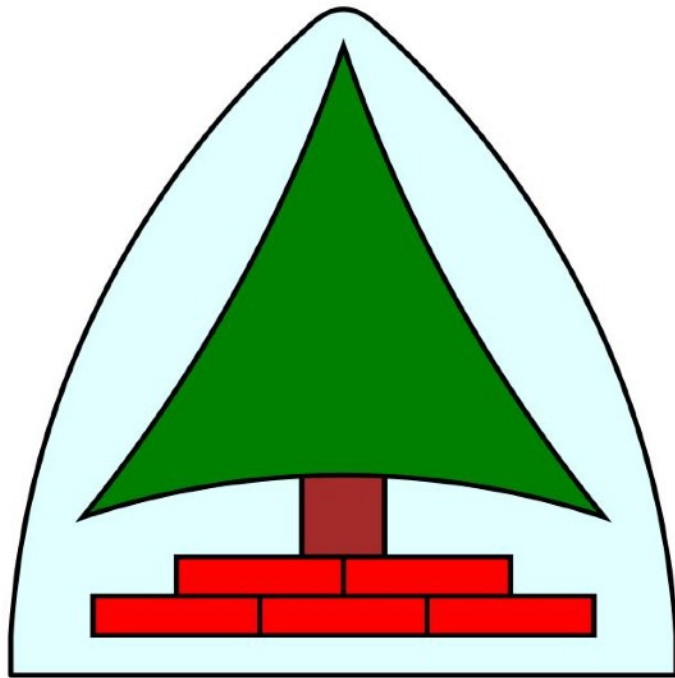


Rogues gallery collage portraits on the web site at

<https://www.saildart.org/walkabout>



Web Sites



BgBaumgart.org

Internet Archive is at

<https://Archive.org>

Stanford Libraries A.I. exhibit at

<https://exhibits.stanford.edu/ai>

Stanford Computer Science Department and A. I. Lab

<http://csd.stanford.edu>

<http://ai.stanford.edu/>

Computer History Museum, example at

<http://www.softwarepreservation.org/projects/LISP/>

Living Computer Museum

<https://livingcomputers.org>

 **Secure |**
https://
WWW.
Saildart
.ORG



SAILDART.org

The scanned hardcopy of SAIL publications can be found on government sites as well as PhD Thesis *microfilm* sites. ProQuest has replaced University Microfilm.

My thesis title is on sites like the ACM, Google Books, dot MIL and dot GOV sites. For example:
<https://apps.dtic.mil/dtic/tr/fulltext/u2/a002261.pdf>

The SAILDART material is *born-digital* and can provide improved "OCR" and/or "page images" as well as the draft material and software that went into the SAIL work, all will be available to everyone when all the copyrights run out around 2100 and personal privacy issues become moot.



The SAIL PDP-10 KA with its time sharing system for 26 July 1974 is re-enacted in Java Script on public web sites with access to a curated set of disk files from the 1970s and 1980s.

The Re-enactment is a work-in-progress, which gets stalled for months at a time by other retirement activities as well as problems with the fantasy implementation for long lost hardware and software details. Also there are many interesting matters which can be directly handled without a general solution.

In addition to a large shaggy Javascript version, there are pieces in C, D, Python, Perl and Lisp as well as custom keyboards and user-mode only projects.

Re-enactment

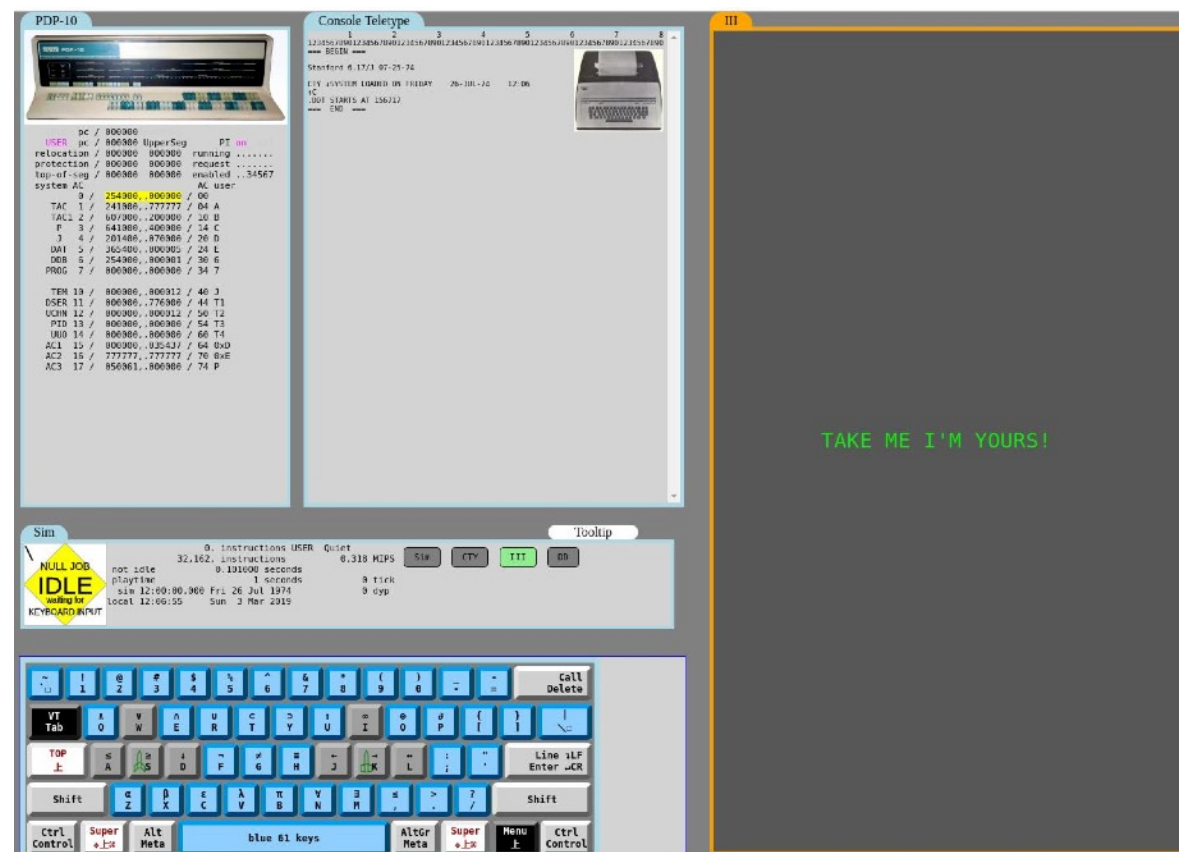
Farb level #0 (Earnest ordered from Microswitch Keyboards)
Lester's original SAIL
keyboard has green keys.
keycap-Zero is left of keycap-One



Farb level #2 (Baumgart ordered from WASD Keyboards)
Re-enacted keyboards
have blue keys.
keycap-Zero is right of keycap-Nine.



TAKE ME I'M YOURS!



My current action items:

- # Curate the SAIL Ralph SYS: file system
- # Hand out hard copy booklets
titled "SAILDART Preview 2019"
- # Convert data from XGP files into PDF / A
- # Put my PDP10 / BGB10 code on Github.
- # Visit Stanford CSD, Stanford Libraries,
computer museums, the Internet Archive
and SAIL survivors.
- # End-of-May Spring-Orgy walk-about.
- # End-of-November Chinese Banquets.



Road Map Atlas

MAP : for going from flat DART data8 into 64-bit words, UTF-8, html, svg, png, ogg, pdf

MAP : for validating/regression-testing PDP-10KA implementations,
with simulated I/O devices, to run the SAILWAITS time sharing `SYSTEM.DMP [J17, SYS]`
including most of its executable DMP files.

MAP : for new publication concerning the SAILDART archive.

MAP : for renewing my computer skills each year.

MAP : for upgrading my home office computer environment.

MAP : maps for other retirement hobby projects: EFE wall paper. GEOMED / Blender. etc.

rank	code	name	rank	code	name	rank	code	name	rank	code	name	rank	code	name
1	LCS	Leland Smith	41	YM	Yonatan Malachi	81	JJM	Jorge Morales	121	GLB	Gianluigi Bellin	161	PAT	Patte Wood
2	JMC	John McCarthy	42	DRB	David Barstow	82	RCB	Bob Bolles	122	DRF	David Fuchs	162	TJW	Todd Wagner
3	RWW	Richard Weyhrauch	43	JK	Jussi Ketonen	83	WD	Whit Diffie	123	AAM	Allan A Miller	163	RWF	Robert W Floyd
4	CLT	Carolyn Talcott	44	REG	Ralph Gorin	84	DON	Don Woods	124	RSF	Ross Finlayson	164	CGN	Greg Nelson
5	DEK	Don Knuth	45	RDG	Russell Greiner	85	MJH	Jo Hannah	125	OK	Oussama Khatib	165	RSC	Corky Cartwright
6	LCW	Curt Widdoes	46	WP	Wolfgang Polak	86	BIS	Barry Soroka	126	SJF	Shel Finkelstein	166	PAW	Patte Wood
7	LES	Les Earnest	47	JBR	Jeff Rubin	87	DWP	Dave Poole	127	RWG	Bill Gosper	167	MA	Martin Abadi
8	JAM	Andy Moorer	48	JLS	Juan Ludlow	88	TAG	Tom Gafford	128	RPH	Dick Helliwell	168	MWK	Mark Kahrs
9	TVR	Tovar	49	BPM	Brian McCune	89	FC	Frederick Chow	129	SL	Sidney Liebes	169	PTZ	Polle Zellweger
10	ZM	Zohar Manna	50	PMF	Mike Farmwald	90	DBG	Don Gennery	130	KIP	Kip Sheeline	170	HJL	Howard Larsen
11	RFN	Rosemary F Napier	51	PHY	Phyllis Winkler	91	ND	Nachum Dershowitz	131	ML	Michael R Lowry	171	MAS	Marianne Siroker
12	HPM	Hans Moravec	52	MUZ	Loren Rush	92	BRG	John Berger	132	WLS	Bill Scherlis	172	MLB	Marc Lebrun
13	REM	Robert Maas	53	CG	Chris Goad	93	BES	Bruce Shimano	133	LIS	Louis Steinberg	173	VDS	Vic Scheinman
14	FWH	Friedrich VonHenke	54	JP	Jorge Phillips	94	RDA	Dave Arnold	134	JKS	Ken Salisbury	174	JEG	Johannes Goebel
15	RPG	Dick Gabriel	55	MUS	John M Chowning	95	ROB	Robert Poor	135	ROZ	Martin Morf	175	IAZ	Ignacio Zabala-Salelles
16	JMG	John Grey	56	JJ	Jerrold Ginsparg	96	HYS	Yung Shen	136	SGK	Stan Kugell	176	JRM	Jan Mattox
17	TOB	Tom Binford	57	JOS	Julius Smith	97	FML	Frank Liang	137	SJG	Matthew Ginsberg	177	LOU	Lou Paul
18	ME	Martin Frost	58	DAV	Dave Smith	98	EK	Elaine Kant	138	SJW	Stephen Westfold	178	AB	Avron Barr
19	GFS	George Schnurle	59	DCL	David Luckham	99	MFB	Martin Brooks	139	BIL	Bill Schottstaedt	179	ELM	Ed McGuire
20	PN	Peter Nye	60	DPB	Denny Brown	100	HJS	Hanan Samet	140	JFS	Joachim Schreiber	180	LGC	Lewis Creary
21	SEK	Scott Kim	61	ARG	Ron Goldman	101	MRC	Mark Crispin	141	JRD	Jacques Desarmenie	181	REP	Richard Pattis
22	ALS	Arthur Samuel	62	RBA	Rosemary Brock	102	RAK	Dick Karp	142	STT	Steve Tappel	182	NMG	Neil Goldman
23	ARK	Arthur Keller	63	LYN	Lynne Toribara	103	NWD	David Siegel	143	BO	Bo Eross	183	CCG	Cordell Green
24	AVB	Andy Bechtolsheim	64	JJC	John J Craig	104	DES	David Shaw	144	DCS	Dan Swinehart	184	MFP	Michael Plass
25	REF	Bob Filman	65	SUZ	Nori Suzuki	105	AH	Annette Herskovits	145	TM	Tom McWilliams	185	CJS	Connie Stanley
26	BGB	Bruce Baumgart	66	JJW	Joe Weening	106	KIC	Kicha Ganapathy	146	LTP	Luis Trabb-Pardo	186	RP	Robert Poor
27	TW	Terry Winograd	67	HHB	Harlyn Baker	107	MLM	Mitch Model	147	HWC	Hon Wah Chin	187	FRM	Dick Moore
28	MSM	Shahid Mujtaba	68	JRA	John Allen	108	JJK	Jonathan King	148	DML	David Levy	188	JRG	John C Gilbert
29	KRD	Randy Davis	69	AJT	Arthur Thomas	109	RV	Richard Vistnes	149	PMP	Phil Petit	189	BRP	Bruce Pennycook
30	PAM	Paul Martin	70	JED	Jim Davidson	110	H	Jack Holloway	150	RCP	Roger Parkison	190	YOM	Yoram O Moses
31	PW	Paul Wieneke	71	DBL	Doug Lenat	111	EHS	Bridge Stuart	151	CJR	Charles Rieger	191	GFF	Geoff Goodfellow
32	DEW	David E Wilkins	72	SMG	Steven German	112	GIO	Gio Wiederhold	152	JMS	John Strawn	192	LMM	Larry Masinter
33	GHB	Garrett Bowles	73	BH	Brian Harvey	113	PB	Peter Blicher	153	KS	Ken Shoemake	193	BG	Bill Glassmire
34	DCO	Derek Oppen	74	KMC	Ken Colby	114	RF	Raphael Finkel	154	JDH	John Hobby	194	KKP	Karl Pingle
35	EJG	Erik Gilbert	75	DLO	David Lowe	115	DBA	Bruce Anderson	155	RXM	Rick McWilliams	195	MAL	Malcolm Newey
36	ROD	Rodney A Brooks	76	MJC	Mike Clancy	116	JWG	John Gordon	156	UW	Bill Menkin	196	RLD	Robert Drysdale
37	TED	Ted Panofsky	77	PDQ	Lynn Quam	117	JRL	Jim Low	157	LEE	Dan Lee	197	YAW	Yorick Wilks
38	BLF	Bill Faught	78	RHT	Russ Taylor	118	JC	John Chowning	158	JOE	Joe Zingheim	198	DMC	David M Chelberg
39	DGL	Garreth Loy	79	RKN	Ram Nevatia	119	NJM	Neil Miller	159	RAS	Randy Strauss	199	RJB	Richard Beigel
40	MMM	Mike McNabb	80	JB	Juan Bulnes-Rozas	120	BLB	Bruce Bullock	160	YYY	Yoram Yakimovsky	200	SM	Scott McGregor

Gray background indicates deceased.

Inside back cover

