User's Guide for the vintageTEK 4051 RAMPACK

The vintageTEK 4051 RAMPACK emulates the built-in tape drive. It has 2MB of rewritable FLASH memory, so it can hold the equivalent of 7 DC-300 tapes. The FLASH memory is rated for 100,000 erase/write cycles, and 100 years data retention (typical), so it would outlast a conventional tape by many times.

The RAMPACK uses many of the same commands as the internal mag tape, but it has a few unique commands. Space in the RAMPACK is always allocated in multiples of 4,096 (4K) bytes, the page size of the flash memory devices. Most RAMPACK commands include a *port address*, 41 if the RAMPACK is in the left rompack slot, or 51 in the right slot. The port address appears in commands as "@PA:", where "PA" is either explicitly 41 or 51, or a variable whose value is 41 or 51. Some commands have a secondary address, so the device address is of the form "@PA,n:". Also, note that most command keywords can be shortened to 3 characters. In the descriptions below, if the primary or secondary address is shown in brackets, it is optional.

The most frequently used commands will likely be FIND, SAVE, and OLD. To run a sample program, use something like the follow sequence, where "PA" is 41 or 51, as appropriate, and "43" is the number of a sample drawing program. However, many of the sample programs are coded to read data from device 51, so the Rampack must reside in the right slot, and "PA" will be "51".

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FIN@PA: 43
OLD @PA:
RUN
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If a command cannot be carried out, an error message referring to the tape drive may appear because the RAMPACK appears to be a virtual tape drive to the 4051 system.

Tape-drive-like commands:

INPUT @PA,0:F,S,M,U,P Input the file number, file status, marked length, used length, and the current pointer position in the currently opened RAMPACK file. Since each file has a 32 byte header the current pointer position always starts at 32 (the pointer position is zero based).

SAVE @PA[,1]:[1[,100]] Save the specified basic program lines into the currently opened RAMPACK file as an ASCII program file type.

PRINT @PA,1:A$ Save the ASCII string into the currently opened RAMPACK file as an ASCII program file type. This is useful when duplicating or saving RAMPACK program files. It is also useful for running user BASIC programs that create other BASIC programs while saving them in RAMPACK ASCII data files. Note that the file automatically closes when two consecutive <CR> characters are detected. Also note that in order for the file to be OLDed or APPENDed correctly as a program file it must always be terminated with two consecutive <CR> characters.

CLOSE [@PA[,2]:] Close the currently opened RAMPACK file. Since the 4051 handles this globally the primary address gets ignored and all 4051 system files get closed.

OLD @PA[,4]: Read the ASCII program lines from the currently opened RAMPACK file. Note that this program can be read from an ASCII program or an ASCII data file that has been created with the PRINT @PA,1: command and terminated with two consecutive <CR> characters.

APPEND @PA[,4]:1000[,10] Append the ASCII program lines from the currently opened RAMPACK file. Note that this program can be read from an ASCII program or an ASCII data file that has been created with the PRINT @PA,1: command and terminated with two consecutive <CR> characters.

KILL @PA[,7]:F Erase the specified RAMPACK file. If the file is protected (SAFE) it will not be erased.

PRINT @PA,9:[S[,E]] Print the RAMPACK file directory on the 4051 display; complete file details are shown. If S is omitted the entire RAMPACK directory will be shown. The directory listing starts at file S if it exists and ends at file E if it is encountered. An invalid value for S results in an error message. An invalid value for E results in the S through last files being shown.

INPUT @PA,10:S$ Input the fast graphics image string from the currently open RAMPACK file.

PRINT @PA,10:S$; Print the fast graphics image string into the currently open RAMPACK file. Note that a standard print statement should not be used with fast graphics image strings, unlike the internal mag tape drive. This is because RAMPACK supports multiple image strings in a single file unlike the mag tape drive. Also note that the trailing semicolon is absolutely required or else basic will add a <CR> character to the end of the string, messing up your image string.

INPUT @PA,11:S$ Read the currently open RAMPACK file label. A spaced string means no label exists for this file.

PRINT @PA,11:"<NAME>" Label the currently open RAMPACK file. The file name will be truncated to 24 characters and each file can only be labeled once; only killing the file will allow for changing the label. Note that when the file is new, printing data or saving a program to the file will not remove the label. Previously written files without labels can be named without losing the file contents and similarly, an empty file can be labeled before being written.

PRINT @PA[,12]:F,S$ Print the specified information into the currently open RAMPACK ASCII data file.

INPUT @PA[,13]:F,S$ Input the specified information from the currently open RAMPACK ASCII data or ASCII program file.

READ @PA[,14]:F,S$ Read the specified information from the currently open RAMPACK binary data file.

WRITE @PA[,15]:F,S$ Write the specified information into the currently open RAMPACK binary data file.

LIST @PA[,19]:[1[,100]] List the specified program lines in a printer compatible format into the currently open RAMPACK ASCII data file.

INPUT @PA,24:L,M,F Input the last file number, total marked and free bytes in the RAMPACK.

FIND @PA[,27]:F Find the specified RAMPACK file and open it for marking, reading, or writing.

MARK @PA[,28]:N,S Mark the specified number of RAMPACK files N with a size of S bytes each. The actual marked file size will always be in multiples of 4096 since that is the inherent RAMPACK memory page size. Note that marking a RAMPACK file that is currently protected will not mark the file. If previously written files follow this file the user will be warned with a message and a user keyboard input response will be required. Marking a file when a previously existing protected file follows it will also not mark the file. Protected files are always protected from erasure, being rewritten, or any kind of file marking. Also note that marking files when there is insufficient room in the RAMPACK will result in no file marking and an error message.

4051 Global System Commands:

INIT Close all RAMPACK files.

DELETE ALL Close all RAMPACK files. This command also prints the RAMPACK I/O address on the display.

CLOSE Close all RAMPACK and 4051 system files.

SECRET This 4051 command identifies a program as secret prior to saving it. When a secret program is read in it will not be displayable, identical to what occurs on mag tape secret program files. Use cautiously or else you may not be able to read a program that you saved.

RAMPACK-SPECIFIC CALLS – Use with caution!

These calls should be preceded by a "FIND" command.

CALL "RPSAFE",A$
CALL "RPSAFE","@PA:"
Allows enabling and disabling the RAMPACK file write protection (SAFE) locking mechanism by toggling the current file protected status in ram. Any subsequent file print, write or save will then affect the physical file SAFE status. A subsequent find without writing the current file will always reset the SAFE toggling. If the first four characters in A$ are "@PA:", where PA is a two-digit primary address the current RAMPACK file physical status at primary address PA will be altered on the next file print, write or save. The 4051 mag tape system had the ability to mechanically write protect (SAFE) the entire mag tape. The RAMPACK extends that ability to electronically write protect individual files by using "RPSAFE" prior to writing the open file.

CALL "RPKILL",A$
CALL "RPKILL","@PA:"
Allows killing a write protected RAMPACK file. If the first four characters in A$ are "@PA:", where PA is a two-digit primary address, then the current RAMPACK file at primary address PA will be killed (erased). Note that erasures are permanent; the original file contents cannot be recovered, unlike a mag tape file. If you "RPKILL" any of the RAMPACK distribution files you are strictly out of luck.

CALL "RPWIPE",A$
CALL "RPWIPE","@PA:"
Allows wiping the current and all following RAMPACK files. if the first four characters in A$ are "@PA:", where PA is a two-digit primary address, then the current RAMPACK file at primary address PA and all following files will be wiped. If the current file or any following files are written the user will be shown a warning message and a user keyboard input response is required. Wiping any previously existing protected (SAFE) file will not wipe any files. Protected files are always protected from normal basic erasures like kill. Like "RPKILL", "RPWIPE" is permanent; the file contents cannot be recovered. Do not be alarmed if "RPWIPE" takes a long time since it examines every byte from the currently open file clear to the end of the RAMPACK memory, erasing any written pages encountered.

vintageTEK 4051 RAMPACK Directory

					Alloc	Actual
1	R12 GRAPHICS ENHANCEMENT	ASCII	PROGRAM	SAFE	4096	2862
2	4051R12 TUTORIAL PROGRAM	ASCII	PROGRAM	SAFE	4096	2302
3	4051R12 DEMO PROGRAM	ASCII	PROGRAM	SAFE	8192	5628
4	4050 SERIES PICTURE	ASCII	DATA	SAFE	4096	375
5	GRAPHICS AND TEXT DEMO	ASCII	PROGRAM	SAFE	4096	1011
6	4051R12 SCHEMATIC DEMO	ASCII	PROGRAM	SAFE	4096	3253
7	SCHEMATIC SYMBOLS	ASCII	DATA	SAFE	4096	423
8	4051R12 PICTURE PROGRAM	ASCII	PROGRAM	SAFE	4096	2640
9	SIN(X)/X	ASCII	DATA	SAFE	20480	18462
10	GOTHIC FONT (MDC)	ASCII	DATA	SAFE	12288	10875
11	WHEEL SECTION	ASCII	DATA	SAFE	8192	6087
12	DISH ANTENNA	ASCII	DATA	SAFE	4096	3174
13	NUKE COOLING TOWER	ASCII	DATA	SAFE	8192	6513
14	WORLD MAP	ASCII	DATA	SAFE	8192	7638
15	EXPANDING CIRCLE	ASCII	DATA	SAFE	16384	13668
16	3D WAVE	ASCII	DATA	SAFE	8192	4842
17	BOUNCING BALL	ASCII	DATA	SAFE	20480	17628
18	BILLIARDS	ASCII	DATA	SAFE	20480	17439
19	NEBULA (MDC)	ASCII	DATA	SAFE	16384	16353
20	FIREWORKS	ASCII	DATA	SAFE	24576	24033
21	SOLAR SYSTEM (MDC)	ASCII	DATA	SAFE	28672	26430
22	DRAGON (MDC)	ASCII	DATA	SAFE	4096	3990
23	MICKEY MOUSE (MDC)	ASCII	DATA	SAFE	4096	936
24	TEKTRONIX BUG	ASCII	DATA	SAFE	4096	2427
25	SNOOPY	ASCII	DATA	SAFE	4096	438
26	TEK WIZARD	ASCII	DATA	SAFE	4096	2385
27	R2D2 (MDC)	ASCII	DATA	SAFE	8192	6396
28	CHESHIRE CAT	ASCII	DATA	SAFE	4096	1863
29	GRINCH (MDC)	ASCII	DATA	SAFE	4096	2691
30	TEK 465	ASCII	DATA	SAFE	4096	1464
31	ROCKET (MDC)	ASCII	DATA	SAFE	4096	162
32	DEATH STAR (MDC)	ASCII	DATA	SAFE	12288	9882
33	LASER CANNON (MDC)	ASCII	DATA	SAFE	8192	7095
34	BUMP	ASCII	DATA	SAFE	12288	8931
35	EAGLE (MDC)	ASCII	DATA	SAFE	4096	1929
36	3D SURFACE PLOT (MDC)	ASCII	DATA	SAFE	8192	6021
37	DARTH VADER	ASCII	DATA	SAFE	8192	4206
38	COMPLEX CURVE (MDC)	ASCII	DATA	SAFE	12288	9507
39	4051R12 MUSICAL DEMO	ASCII	PROGRAM	SAFE	20480	18796
40	OLD MUSIC PLAYER (MDC)	ASCII	PROGRAM	SAFE	4096	4012
41	MUZAK EDITOR PROGRAM K^2	ASCII	PROGRAM	SAFE	8192	6703
42	RAMPACK EXAMINATION DEMO	ASCII	PROGRAM	SAFE	4096	2011
43	PATTERNS I	ASCII	PROGRAM	SAFE	4096	718
44	PATTERNS II (MDC)	ASCII	PROGRAM	SAFE	4096	694
45	PATTERNS III (MDC)	ASCII	PROGRAM	SAFE	4096	2077
46	PATTERNS IIII (MDC)	ASCII	PROGRAM	SAFE	4096	3340
47	LUNAR LANDER I (JGT)	ASCII	PROGRAM	SAFE	8192	7492
48	LUNAR LANDER II (JGT)	ASCII	PROGRAM	SAFE	24576	16522
49	LUNAR LANDER III (JGT)	ASCII	PROGRAM	SAFE	24576	20602
50	INVADER I USING EB (MDC)	ASCII	PROGRAM	SAFE	8192	7430
51	INVADER I EB DATA (MDC)	ASCII	DATA	SAFE	4096	3015
52	INVADER I USING FG (MDC)	ASCII	PROGRAM	SAFE	8192	4966
53	INVADER I FG DATA (MDC)	ASCII	DATA	SAFE	4096	3680
54	ARTILLERY I (DJU)	ASCII	PROGRAM	SAFE	4096	3018
55	ARTILLERY II	ASCII	PROGRAM	SAFE	8192	4293
56	ARTILLERY III	ASCII	PROGRAM	SAFE	8192	6281
57	ARTILLERY IIIII	ASCII	PROGRAM	SAFE	12288	8618
58	SALVO	ASCII	PROGRAM	SAFE	4096	2803
59	BOMBER	ASCII	PROGRAM	SAFE	4096	2142
60	BOMBER II	ASCII	PROGRAM	SAFE	4096	3977
61	TANK WAR	ASCII	PROGRAM	SAFE	4096	3886
62	WEATHER WAR	ASCII	PROGRAM	SAFE	4096	3963
63	SPACE WAR	ASCII	PROGRAM	SAFE	8192	4643
64	SPACE WAR II (RWP)	ASCII	PROGRAM	SAFE	24576	23252
65	BATTLESHIP	ASCII	PROGRAM	SAFE	4096	2532
66	SKEET SHOOT	ASCII	PROGRAM	SAFE	4096	3469
67	SHOOTING GALLERY	ASCII	PROGRAM	SAFE	4096	2210
68	OTHELLO	ASCII	PROGRAM	SAFE	4096	3272
69	OTHELLO (ROD)	ASCII	PROGRAM	SAFE	8192	8028
70	REVERSE	ASCII	PROGRAM	SAFE	4096	2045
71	CHESS	ASCII	PROGRAM	SAFE	8192	7724
72	POOL	ASCII	PROGRAM	SAFE	8192	4585
73	PINBALL (K^2)	ASCII	PROGRAM	SAFE	4096	2430
74	ROAD RALLY	ASCII	PROGRAM	SAFE	4096	3620
75	ROAD RACE	ASCII	PROGRAM	SAFE	8192	4319
76	ROAD RACE II	ASCII	PROGRAM	SAFE	8192	4573
77	HORSE RACE	ASCII	PROGRAM	SAFE	8192	4938

78	STAR TREK	ASCII	PROGRAM	SAFE	8192	4341
79	MUGWUMP HUNT	ASCII	PROGRAM	SAFE	8192	5638
80	WUMPUS HUNT	ASCII	PROGRAM	SAFE	8192	7604
81	SUBMARINE HUNT	ASCII	PROGRAM	SAFE	4096	3347
82	SEA DOG	ASCII	PROGRAM	SAFE	4096	2078
83	MINE FIELD	ASCII	PROGRAM	SAFE	8192	4479
84	DEATH STAR	ASCII	PROGRAM	SAFE	8192	4895
85	SWORDS AND SORCERY	ASCII	PROGRAM	SAFE	16384	14311
86	CHOMP	ASCII	PROGRAM	SAFE	4096	2847
87	GOLF I	ASCII	PROGRAM	SAFE	12288	10125
88	GOLF II	ASCII	PROGRAM	SAFE	12288	12083
89	FOOTBALL	ASCII	PROGRAM	SAFE	8192	7496
90	BLACKJACK (KH)	ASCII	PROGRAM	SAFE	8192	6711
91	BLACKJACK	ASCII	PROGRAM	SAFE	12288	10900
92	ACEY DUCEY	ASCII	PROGRAM	SAFE	4096	3527
93	KENO	ASCII	PROGRAM	SAFE	8192	5155
94	NIM	ASCII	PROGRAM	SAFE	4096	3546
95	SLOT MACHINE	ASCII	PROGRAM	SAFE	4096	2659
96	SLOT MACHINE II	ASCII	PROGRAM	SAFE	8192	4658
97	TIC TAC TOE (JC)	ASCII	PROGRAM	SAFE	4096	3781
98	TIC TAC TOE II (JC)	ASCII	PROGRAM	SAFE	8192	7622
99	TIC TAC TOE II DATA (JC)	ASCII	DATA	SAFE	4096	584
100	CUBIC	ASCII	PROGRAM	SAFE	8192	6469
101	HAMURABI	ASCII	PROGRAM	SAFE	8192	4985
102	HANGMAN I	ASCII	PROGRAM	SAFE	4096	3912
103	HANGMAN II	ASCII	PROGRAM	SAFE	8192	6154
104	MASTERMIND	ASCII	PROGRAM	SAFE	4096	2680
105	INTELLIGENCE TEST	ASCII	PROGRAM	SAFE	8192	6221
106	STATE CAPITAL TEST (PAC)	ASCII	PROGRAM	SAFE	4096	3550
107	MATH TEST	ASCII	PROGRAM	SAFE	4096	1033
108	MORSE CODE TEACHER (WC)	ASCII	PROGRAM	SAFE	4096	3109
109	FG MORSE CODE TRAINER	ASCII	PROGRAM	SAFE	4096	2961
110	PING PONG	ASCII	PROGRAM	SAFE	4096	4000
111	FIREWORKS (MDC)	ASCII	PROGRAM	SAFE	4096	2565
112	DRAW BICYCLE (MDC)	ASCII	PROGRAM	SAFE	4096	1795
113	3D SURFACE PROGRAM (MDC)	ASCII	PROGRAM	SAFE	16384	12372
114	SHOW RAMPACK DIFFERENCES	ASCII	PROGRAM	SAFE	4096	1384
115	FAST GRAPHICS IMAGE EDIT	ASCII	PROGRAM	SAFE	4096	1962
116	SHERRI'S PROGRAMS (SDC)	ASCII	PROGRAM	SAFE	4096	349
117	SHERRI'S FG IMAGES (SDC)	ASCII	DATA	SAFE	4096	3646
118	RAMPACK DIRECTORY LISTER	ASCII	PROGRAM	SAFE	4096	1634
119	PLOT-10 TO FAST GRAPHICS	ASCII	PROGRAM	SAFE	4096	1423
120	DRAW FAST GRAPHICS FILES	ASCII	PROGRAM	SAFE	4096	797
121	STREET MAP	ASCII	DATA	SAFE	4096	984
122	SNOOPY RED BARON	ASCII	DATA	SAFE	4096	1416
123	SIMPLE BAR CHART	ASCII	DATA	SAFE	4096	2013
124	TEK THE BIG PICTURE	ASCII	DATA	SAFE	4096	2727
125	SIX GRAPHIC CHARTS	ASCII	DATA	SAFE	4096	3156
126	SLINKY	ASCII	DATA	SAFE	4096	3288
127	USA STATES MAP	ASCII	DATA	SAFE	8192	4908
128	FACTORY	ASCII	DATA	SAFE	8192	5148
129	TWO SWIMMING NUDES	ASCII	DATA	SAFE	8192	5742
130	REFINERY	ASCII	DATA	SAFE	8192	7899
131	VORTEX FLOWS	ASCII	DATA	SAFE	16384	14430
132	3D TILTED SINC MESH	ASCII	DATA	SAFE	20480	16743
133	PLUTO OCCULTATION A19.85	ASCII	DATA	SAFE	20480	17157
134	DISSPLA EXAMPLE FONTS	ASCII	DATA	SAFE	20480	17946
135	PARTICLE CLOUD MAP	ASCII	DATA	SAFE	20480	18654
136	NESTED CARDIOIDS	ASCII	DATA	SAFE	20480	18933
137	VECTOR GRAPHICS SAMPLES	ASCII	DATA	SAFE	28672	25623
138	SKIDMORE,OWINGS,&MERRILL	ASCII	DATA	SAFE	32768	30226
139	COMPLEX 3D TERRAIN	ASCII	DATA	SAFE	73728	73247
140	SIMPLE IC MASK	ASCII	DATA	SAFE	81920	79295
141	PDP-11/34A COMMUNICATION	ASCII	PROGRAM	SAFE	4096	123
142	BASIC DRAW FAST GRAPHICS	ASCII	PROGRAM	SAFE	4096	1114
143		LAST			0	0

RAMPACK LAST FILE NUMBER = 143
RAMPACK TOTAL MARKED LENGTH 1327104 BYTES
RAMPACK REMAINING FREE FILE SPACE 765952 BYTES