

## SORCERER MONITOR, VERSION 1.1, UPDATE

Bug [SA 4(1):16]: TEST program - Bad response

A new Sorcerer Monitor program has been developed to fix the various and sundry bugs of the original Monitor. This new Monitor will be called Version 1.1. This document is intended to describe the bugs that existed in Version 1.0, their symptoms, the fixes implemented in Version 1.1, and any ramifications these modifications will have. All known bugs in Version 1.0 have been fixed.

**Important note:** These modifications were made without moving any major routine or subroutine in the Monitor. All code which was added had a corresponding compression of existing code. The only exception to this is the subprocessor which supports the "T=n" parameter of the "SET" command, which was moved 2 bytes. Thus the new Monitor should be totally upward compatible with existing software such as ROM PACs, CP/M, etc.

1. **SYMPTOM:** Neither Sorcerer I or II seem to work with an RS232 device on the serial port. For example, serial printers appear to hang or print garbage, at any baud rate.

**BUG:** The 1.0 keyboard scan routine reset the serial port from RS232 mode to cassette mode every time it was invoked to get a character. Thus the RS232 signal was immediately set to idle state, and the UART was shut down. So, in Sorcerer I, due to a problem in the UART control hardware which caused RS232 idle to be a space (+9V) and not a mark (-9V), the serial device was sent a long string of invalid inverted bits, hanging it up. Sorcerer I's required a hardware mod to reverse this idle state logic (see 30-3160, pin 8B-9). In Sorcerer II, the above hardware problem was fixed, but the reset of the port to cassette still shut the UART down before a byte could be completely sent, causing lost characters and framing errors. This occurred at 300 or 1200 baud. Note the Dumb Terminal Program and the Word Processor work correctly (with hardware mod to Sorc. I) because they contain their own keyboard routine.

**FIX:** The 1.1 keyboard routine maintains the RS232/cassette mode in its proper state. With this, Sorcerer I's no longer require the above hardware mod.

2. SYMPTOM: 1200 baud sometimes loses characters or does not work at all, even with above hardware mod to Sorc I.

BUG: 1.0 keyboard routine, error processing, motor control and elsewhere always reset baud rate to 300 baud when invoked. Dumb Term Prog and WP Pac work again because they do not use these routines.

FIX: 1.1 routines maintain baud rate at all times.

Note: 1200 baud still cannot work with printers with slow carriages due to data overruns unless application program sends nulls at end of line or Sorcerer is redesigned to handshake on the serial port. Using the SET S=6 command can be an expedient circumvention.

3. SYMPTOM: There is no convenient way to set RS232 mode from the monitor command level to use serial devices assuming serial devices work correctly.

BUG: 1.0 SET T=n command only sets baud rate. There is no command for choosing RS232 or cassette mode.

FIX: 1.1 SET T=n has two new parameters for this purpose, as follows:

- SET T=0 - 1200 baud cassette (unchanged) 4φ
- SET T=1 - 300 baud cassette (unchanged) φφ
- SET T=2 - 1200 baud RS232 (new) Cφ
- SET T=3 - 300 baud RS232 (new) 8φ

Note that the baud rate and the mode is now set immediately upon completion of these commands, not later when the motor is turned on as in 1.0

*Address of  
Subroutine  
changed. (P1)*  
@ BFCE H  
" (1Y+3DH)  
" +  
" BFDE H  
" (1Y+4s)

4. SYMPTOM: SET O=S (serial) only works at 300 baud, no matter what SET T=n parameter was used.

BUG: SET T=n did not actually set the baud rate, just "remember" it. Turning motor on did. Motor is never turned on unless cassette is used.

FIX: See #3 above. New SET T=n now actually sets the mode and baud rate. Thus to use a serial printer from the new Monitor, only the following sequence of commands is necessary:

- >SET T=2 (1200/RS232, or T=3 for 300)
- >SET O=S (all output now goes to printer)

Note that RS232 and cassette operations are mutually exclusive. Note also that the 1.1 Monitor together with Exidy CP/M Versions 1.42/3 and higher will allow CP/M communication with the serial RS232 port. Use the Monitor SET T=2 or 3 command, and then simply use the CP/M standard punch device PUN:. Eg, to list a file on CP/M, SET T=2 or 3, boot CP/M, and issue  
A>PIP PUN:=FILENAME.EXT.

5. SYMPTOM: A user program initiated by the GO command hangs 1.0 Monitor on RETURN if reg IY modified.

BUG: Command completion processing assumes IY is ok.

FIX: 1.1 will do a full warm start after all command completion (including GO) to reset IY correctly.

6. FIX: Logo updated to indicated Version 1.1 and new copyright date of 1979

7. SYMPTOM: Tape read with tape positioned in middle of file containing a string of 00's incorrectly gives CRC ERROR instead of skipping file to next file leader.

BUG: "TAPWT" file leader finder looks for at least 10 00's, but allows any character following as an indication of the file leader (not just a 01).

FIX: 1.1 routine only allows a 01 after at least 10 00's.

8. SYMPTOM: Standard graphics refreshed when CLEAR key depressed. Eg, this incorrectly destroys any programmed graphics when the screen is cleared.

BUG: Refresh should only occur during a Monitor Cold Start not for a FORMFEED (CLEAR key).

FIX: Video processing fixed not to refresh on screen clear, only on cold start.

9. FIX: "PR" command removed from Monitor (allows changing prompt character ">"). Replaced by subroutine called "FOLD" at ROM address E845 hex. This routine, used by 1.1 Monitor and available for external software use, takes a character in register A, and if lower case alpha, converts it to upper case.

10. SYMPTOM: 1.0 command level keyboard input does not allow lower case. Very inconvenient, esp if using the WP PAC.

BUG: 1.0 line input routine did not fold lower case.

FIX: 1.1 routine now uses "FOLD" routine. Note lower case now echoes as upper case also.

11. SYMPTOM: "TAB/SKIP" key only generates horizontal tab character (HT, Control-I, 09 hex) if shifted. Lower case use incorrectly generates vertical tab (VT, Control-K, 0B hex). Very inconvenient since VT is seldom used (not supported by any current Exidy software) while HT is used heavily in editors, etc.

BUG: 1.0 key font definition table incorrect for non-shifted TAB/SKIP position

FIX: 1.1 table should be updated from 0B to 09 codes. It cannot because then WP PACs which look for ^K will no longer

work. Bug not fixed.

12. FIX: 1.1 cassette motor on and motor off processing updated and fixed to correctly maintain serial port baud rate and RS232/cassette modes

13. SYMPTOM: Cannot rubout graphics on Monitor command line.  
FIX: Not actually a bug. The graphics are only on the screen, not in the command (ie, they are not "there" to rub out). They are ignored, and rubouts are not needed.

????????  
>DU E000 EFFF

MONITOR VER5 1.1  
© 1979

*Changes from Ver 1.0  
have been entered  
in software manual.  
in KEYBOARD routine.*

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E000:	C3	62	E0	C3	E8	E0	C3	77	E0	C3	30	E0	C3	45	E0	C3
E010:	DA	E2	C3	EE	E2	C3	D1	EA	C3	1C	EB	C3	F0	E9	C3	76
E020:	E7	C3	7F	E7	C3	8A	E2	C3	AF	E2	C3	5A	E6	C3	99	E7
E030:	FD	E5	E5	CD	A2	E1	21	41	E0	E5	FD	6E	41	FD	66	42
E040:	E9	E1	FD	E1	C9	FD	E5	E5	F5	CD	A2	E1	FD	66	3E	2E
E050:	01	2B	7C	B5	20	FB	F1	21	41	E0	E5	FD	6E	3F	FD	66
E060:	40	E9	3E	FF	D3	FD	16	00	21	00	00	7E	46	2F	77	BE
E070:	70	23	28	F7	2B	2B	01	16	01	22	00	F0	FD	2A	00	F0
E080:	01	92	FF	FD	09	FD	F9	CD	D1	EA	C2	FA	DF	7D	FD	E5
E090:	E1	36	00	23	BD	20	FA	FD	36	44	3E	FD	36	3D	40	D5
E0A0:	CD	B1	E9	D1	21	1C	EB	FD	75	41	FD	74	42	21	F0	E9
E0B0:	FD	75	3F	FD	74	40	3A	FD	DF	FE	C3	20	0B	3A	FA	DF
E0C0:	FE	C3	20	04	15	C3	8D	E9	21	62	E3	CD	BA	E1	ED	5B
E0D0:	00	F0	CD	E8	E1	21	BC	E3	CD	BA	E1	FD	E5	D1	1B	CD
E0E0:	E8	E1	21	D5	E3	CD	BA	E1	CD	A2	E1	FD	F9	CD	05	E2
E0F0:	FD	7E	44	CD	45	E0	CD	3A	E1	FD	E5	E1	CD	25	E2	CA

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E100:	34	E1	DD	21	12	E3	E5	DD	E5	06	02	DD	7E	00	BE	20
E110:	12	23	DD	23	10	F5	D1	D1	01	E8	E0	C5	DD	6E	00	DD
E120:	66	01	E9	DD	E1	E1	DD	23	DD	23	DD	23	DD	23	DD	7E
E130:	00	B7	20	D2	21	E6	E3	C3	C9	E1	FD	E5	E1	3E	3C	85
E140:	4F	45	FD	7E	43	B7	20	39	CD	30	E0	28	FB	FE	7F	28
E150:	24	30	18	FE	0D	28	0D	FE	20	38	13	FE	40	20	05	CD
E160:	05	E2	18	D6	CD	45	E8	77	23	FE	0D	CA	05	E2	CD	45
E170:	E0	79	BD	20	D3	78	BD	28	CF	3E	08	CD	45	E0	2B	18
E180:	C7	06	01	E5	CD	8A	E2	CD	59	E7	CD	DA	E2	CA	D4	E1
E190:	77	23	FE	0D	20	F4	CD	4E	E7	CD	AF	E2	36	00	E1	C3
E1A0:	BA	E1	C5	F5	DB	FE	CB	6F	28	FA	F1	06	08	10	FE	FD
E1B0:	2A	00	F0	01	92	FF	FD	09	C1	C9	7E	B7	C8	23	CD	45
E1C0:	E0	FE	0D	20	F5	3E	0A	18	F5	E5	21	DD	E3	CD	BA	E1
E1D0:	E1	CD	BA	E1	FD	36	43	00	CD	B4	E2	C3	EB	E0	21	F6
E1E0:	E3	18	E6	21	08	E4	18	E1	7A	CD	ED	E1	7B	F5	E6	F0
E1F0:	0F	0F	0F	0F	CD	FA	E1	F1	E6	0F	FE	0A	38	02	C6	07

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E200:	C6	30	C3	45	E0	3E	0D	CD	45	E0	3E	0A	C3	45	E0	CD
E210:	E8	E1	3E	3A	CD	45	E0	3E	20	C3	45	E0	F5	3E	20	CD
E220:	45	E0	F1	18	C8	7E	FE	0D	C8	FE	2E	D0	23	18	F6	FD
E230:	E5	E1	7E	FE	0D	C8	FE	30	38	EB	23	18	F5	11	00	00
E240:	7E	FE	30	D8	23	FE	47	D2	DE	E1	FE	3A	38	07	FE	41
E250:	DA	DE	E1	C6	09	07	07	07	07	06	04	07	CB	13	CB	12
E260:	10	F9	18	DC	CD	2F	E2	C8	FE	41	D8	FE	5B	3F	D8	E5
E270:	FD	E5	D1	21	47	00	19	D1	06	05	FE	30	13	30	03	1B
E280:	3E	20	77	23	1A	10	F3	B7	EB	C9	FD	E5	CD	A2	E1	FD
E290:	7E	3D	05	28	02	C6	10	C6	10	D3	FE	FD	77	45	FD	E1
E2A0:	06	04	E5	21	00	00	2B	7C	B5	20	FB	10	F6	E1	C9	06
E2B0:	01	CD	A2	E2	FD	E5	CD	A2	E1	C3	4E	E8	FD	77	45	FD
E2C0:	E1	C9	06	64	AF	CD	EE	E2	10	FA	3C	CD	EE	E2	FD	70
E2D0:	46	C9	3E	20	CD	45	E0	10	F9	C9	FD	E5	CD	A2	E1	CD
E2E0:	D1	EA	20	2B	DB	FD	CB	4F	28	F5	DB	FC	18	0F	FD	E5
E2F0:	CD	A2	E1	F5	DB	FD	CB	47	28	FA	F1	D3	FC	C5	F5	FD

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E600:	FE	50	20	03	11	21	E0	FE	53	20	03	11	12	E0	FE	4C
E610:	20	03	11	93	E9	FD	73	3F	FD	72	40	C9	FE	4B	20	03
E620:	11	18	E0	FE	50	20	03	11	1E	E0	FE	53	20	03	11	0F
E630:	E0	FD	73	41	FD	72	42	C9	CD	64	E2	CA	DE	E1	DA	DE
E640:	E1	CD	32	E2	CA	DE	E1	CD	3D	E2	D5	FD	73	50	FD	72
E650:	51	CD	25	E2	CA	DE	E1	CD	3D	E2	EB	C1	C5	37	3F	ED
E660:	42	23	E5	FD	75	4E	FD	74	4F	FD	36	4C	55	EB	06	01
E670:	CD	25	E2	28	04	CD	3D	E2	43	CD	8A	E2	CD	C2	E2	FD
E680:	E5	DD	E1	06	10	DD	7E	47	CD	EE	E2	DD	23	10	F6	CD
E690:	9B	E8	CD	C2	E2	D1	E1	CD	A9	E6	CA	AF	E2	7E	CD	EE
E6A0:	E2	23	10	F9	CD	9B	E8	18	EE	AF	FD	77	46	47	B2	20
E6B0:	05	B3	C8	43	5A	C9	15	B7	C9	CD	2F	E2	06	01	28	04
E6C0:	CD	3D	E2	43	21	53	E4	CD	BA	E1	CD	8A	E2	CD	1B	E7
E6D0:	CD	DE	E6	FD	7E	5C	B7	28	F4	CD	34	E7	18	EF	FD	E5
E6E0:	DD	E1	06	05	DD	7E	57	CD	45	E0	DD	23	10	F6	06	03
E6F0:	CD	D2	E2	DD	23	DD	7E	57	CD	45	E0	06	03	CD	D2	E2

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E700:	DD	23	06	03	DD	5E	57	DD	56	58	DD	23	DD	23	CD	E8
E710:	E1	3E	20	CD	45	E0	10	EC	C3	05	E2	CD	59	E7	FD	E5
E720:	DD	E1	06	10	CD	DA	E2	CA	D4	E1	DD	77	57	DD	23	10
E730:	F3	C3	4E	E7	CD	59	E7	FD	5E	5E	FD	56	5F	CD	A9	E6
E740:	C8	CD	DA	E2	CA	D4	E1	10	F8	CD	4E	E7	18	EF	FD	46
E750:	46	CD	DA	E2	B8	C2	E3	E1	C9	C5	06	0A	CD	DA	E2	28
E760:	E3	B7	20	F6	10	F6	CD	DA	E2	28	D9	FE	01	38	F7	20
E770:	E9	FD	70	46	C1	C9	DB	FE	CB	7F	28	FA	DB	FF	C9	F5
E780:	DB	FE	CB	77	28	FA	F1	D3	FF	C9	CD	2F	E2	2B	7E	FE
E790:	30	38	FA	FE	47	F5	CD	64	E2	F5	06	01	F5	28	19	F1
E7A0:	38	07	CD	32	E2	F5	28	10	F1	CD	3D	E2	43	CD	25	E2
E7B0:	F5	28	05	C5	CD	3D	E2	C1	CD	05	E2	CD	8A	E2	D5	CD
E7C0:	1B	E7	FD	7E	5C	B7	28	0B	E5	21	CA	E4	CD	BA	E1	CD
E7D0:	DE	E6	E1	D1	F1	F5	20	06	FD	5E	60	FD	56	61	E1	F1
E7E0:	F5	E5	28	14	38	12	FD	E5	DD	E1	06	05	DD	7E	47	DD
E7F0:	BE	57	DD	23	20	49	10	F4	FD	7E	5C	B7	28	09	21	6F

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E800:	E4	CD	BA	E1	CD	59	E7	EB	FD	5E	5E	FD	56	5F	CD	A9
E810:	E6	28	0F	CD	DA	E2	CA	D4	E1	77	23	10	F6	CD	4E	E7
E820:	18	EC	CD	AF	E2	21	53	E4	CD	BA	E1	CD	DE	E6	F1	F1
E830:	F1	C0	FD	7E	5D	E6	80	C0	FD	6E	62	FD	66	63	E9	CD
E840:	34	E7	C3	BE	E7	FE	61	D8	FE	7B	D0	E6	DF	C9	FD	7E
E850:	45	E6	C0	D3	FE	C3	BC	E2	FD	70	43	C9	3E	2A	CD	45
E860:	E0	CD	3A	E1	FD	E5	E1	7E	FE	0D	C8	06	01	CD	8A	E2
E870:	CD	C2	E2	7E	23	CD	EE	E2	FE	0D	20	F7	CD	9B	E8	CD
E880:	AF	E2	18	D8	06	01	CD	8A	E2	CD	05	E2	CD	59	E7	CD
E890:	DA	E2	FE	0D	28	F3	CD	45	E0	18	F4	FD	7E	46	C3	EE
E8A0:	E2	CD	2F	E2	CA	DE	E1	CD	3D	E2	D5	CD	25	E2	CA	DE
E8B0:	E1	CD	3D	E2	D5	CD	25	E2	D1	E1	01	01	00	FE	43	F5
E8C0:	D5	E5	C5	06	00	08	AF	08	CD	2F	E9	70	23	CD	3C	E9
E8D0:	20	F9	CD	D1	EA	CD	81	E9	C2	D4	E1	CD	2F	E9	78	BE
E8E0:	C4	42	E9	23	CD	3C	E9	20	F5	CD	85	E9	04	20	D9	0E
E8F0:	00	41	CD	2F	E9	70	23	04	CD	3C	E9	20	F8	41	CD	D1

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E300:	46	46	90	47	A8	2F	90	FD	77	46	F1	C1	FD	E1	C9	AF
E310:	18	FA	44	55	D3	E4	45	4E	38	E5	53	41	38	E6	4C	4F
E320:	8A	E7	46	49	B9	E6	47	4F	97	E5	43	52	5C	E8	53	45
E330:	A2	E5	4D	4F	62	E5	54	45	A1	E8	42	41	58	E8	4C	49
E340:	84	E8	40	40	00	00	4F	56	D4	E1	50	50	8A	E9	00	54
E350:	DC	E5	53	EA	E5	58	F2	E5	46	EE	E5	4F	F9	E5	49	1C
E360:	E6	00	0D	45	58	49	44	59	20	53	54	41	4E	44	41	52
E370:	44	20	4D	4F	4E	49	54	4F	52	0D	0D	56	65	72	73	69
E380:	6F	6E	20	31	2E	31	0D	43	6F	70	79	72	69	67	68	74
E390:	20	28	43	29	20	31	39	37	39	20	62	79	20	45	58	49
E3A0:	44	59	20	49	4E	43	2E	0D	0D	54	48	45	20	54	4F	50
E3B0:	20	4F	46	20	52	41	4D	20	49	53	20	00	20	48	45	58
E3C0:	2E	0D	53	54	41	43	4B	20	42	45	47	49	4E	53	20	46
E3D0:	52	4F	4D	20	00	20	48	45	58	2E	0D	0D	00	45	52	52
E3E0:	4F	52	20	2D	20	00	49	4E	56	41	4C	49	44	20	43	4F
E3F0:	4D	4D	41	4E	44	00	49	4E	56	41	4C	49	44	20	50	41

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E400:	52	41	4D	45	54	45	52	00	54	41	50	45	20	43	52	43
E410:	20	45	52	52	4F	52	00	0D	41	44	44	52	20	20	20	30
E420:	20	20	31	20	20	32	20	20	33	20	20	20	34	20	20	35
E430:	20	20	36	20	20	37	20	20	20	38	20	20	39	20	20	41
E440:	20	20	42	20	20	20	43	20	20	44	20	20	45	20	20	46
E450:	0D	0D	00	0D	0D	4E	41	4D	45	20	20	20	46	49	4C	45
E460:	20	42	4C	43	4B	20	41	44	44	52	20	47	4F	41	44	44
E470:	52	53	0D	0D	00	0D	41	44	44	52	20	20	20	42	49	54
E480:	20	30	20	20	20	31	20	20	20	32	20	20	20	33	20	20
E490:	20	34	20	20	20	35	20	20	20	36	20	20	20	37	0D	0D
E4A0:	00	42	41	44	20	00	4F	4B	20	20	00	20	20	50	41	53
E4B0:	53	20	43	4F	4D	50	4C	45	54	45	44	2E	0D	0D	00	0D
E4C0:	4C	4F	41	44	49	4E	47	20	2D	00	46	4F	55	4E	44	20
E4D0:	2D	20	00	CD	05	E2	CD	2F	E2	CA	DE	E1	CD	3D	E2	CD
E4E0:	25	E2	28	46	7B	E6	F0	5F	D5	CD	3D	E2	13	D5	21	17
E4F0:	E4	CD	BA	E1	06	10	E1	D1	CD	D1	EA	C2	D4	E1	CD	0F

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E500:	E2	1A	CD	1C	E2	13	E5	B7	ED	52	E1	CA	05	E2	7B	E6
E510:	0F	FE	04	28	1C	FE	08	28	18	FE	0C	28	14	FE	00	20
E520:	E0	CD	05	E2	10	D2	D5	E5	18	C4	CD	0F	E2	1A	C3	1C
E530:	E2	3E	20	CD	45	E0	18	C9	CD	05	E2	CD	2F	E2	CA	DE
E540:	E1	CD	3D	E2	CD	0F	E2	D5	CD	3A	E1	FD	E5	E1	D1	CD
E550:	25	E2	CA	44	E5	FE	2F	C8	D5	CD	3D	E2	7B	D1	12	13
E560:	18	ED	CD	2F	E2	CA	DE	E1	CD	3D	E2	D5	CD	25	E2	CA
E570:	DE	E1	CD	3D	E2	D5	CD	25	E2	FE	53	28	11	CD	3D	E2
E580:	37	3F	E1	C1	C5	ED	42	E5	C1	E1	03	ED	B0	C9	23	CD
E590:	3D	E2	D5	C1	D1	18	F2	CD	2F	E2	CA	DE	E1	CD	3D	E2
E5A0:	EB	E9	CD	2F	E2	CA	DE	E1	DD	21	4F	E3	DD	BE	00	28
E5B0:	11	DD	23	DD	23	DD	23	F5	DD	7E	00	B7	CA	DE	E1	F1
E5C0:	18	EA	23	CD	25	E2	FE	3D	C2	DE	E1	23	CD	25	E2	CA
E5D0:	DE	E1	FE	47	DC	3D	E2	DD	23	C3	1C	E1	7B	E6	03	EE
E5E0:	01	0F	0F	FD	77	3D	F5	C3	53	E8	FD	73	3E	C9	FD	73
E5F0:	4D	C9	FD	73	52	FD	72	53	C9	FE	56	20	03	11	1B	E0

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E900:	EA	CD	81	E9	C2	D4	E1	CD	2F	E9	78	BE	C4	42	E9	23
E910:	04	CD	3C	E9	20	F4	CD	85	E9	0C	20	D5	D1	D5	C1	CD
E920:	0F	E2	21	AB	E4	CD	BA	E1	E1	D1	F1	C0	03	18	8E	D9
E930:	E1	D1	D9	E1	D1	D5	E5	D9	D5	E5	D9	C9	7A	BC	C0	7B
E940:	BD	C9	08	20	0B	E5	21	75	E4	CD	BA	E1	E1	3E	55	B7
E950:	08	C5	D5	EB	CD	D1	EA	C2	D4	E1	CD	0F	E2	06	05	CD
E960:	D2	E2	EB	D1	0E	01	7E	A8	A1	E5	20	10	21	A6	E4	CD
E970:	BA	E1	E1	CB	21	30	EF	C1	CD	05	E2	C9	21	A1	E4	18
E980:	EE	3E	2A	18	02	3E	08	C3	0C	E0	CD	2F	E2	C2	FD	DF
E990:	C3	FA	DF	F5	CD	1B	E0	FE	0A	28	14	F5	DB	FF	CB	7F
E9A0:	20	FA	F1	F6	80	D3	FF	E6	7F	D3	FF	F6	80	D3	FF	F1
E9B0:	C9	CD	10	EB	21	80	F0	3E	F8	36	20	23	BC	20	FA	65
E9C0:	FD	75	68	FD	74	69	FD	75	6A	FD	74	6B	CD	D6	E9	7E
E9D0:	FD	77	67	36	5F	C9	21	80	F0	FD	5E	68	FD	56	69	19
E9E0:	FD	5E	6A	FD	56	6B	19	C9	CD	D6	E9	FD	7E	67	77	C9
E9F0:	FD	E5	CD	A2	E1	F5	C5	D5	E5	4F	CD	E8	E9	79	FE	0C

KEYBRD  
 PUSH IX  
 CALL GBTIX  
 PUSH BC  
 PUSH DE  
 PUSH HL  
 PUSH IX

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
EA00:	28	43	FE	00	28	44	FE	0A	28	45	FE	17	CA	A3	EA	FE
EA10:	1A	28	3C	FE	01	CA	BA	EA	FE	13	28	18	FE	08	28	72
EA20:	FE	11	CA	C3	EA	FE	20	30	0A	CD	CC	E9	E1	D1	C1	F1
EA30:	FD	E1	C9	71	13	7B	E6	3F	28	06	FD	73	6A	FD	72	6B
EA40:	CD	CC	E9	18	E7	CD	B4	E9	18	E2	11	00	00	18	EB	FD
EA50:	5E	68	FD	56	69	7B	E6	C0	CB	07	CB	07	CB	22	CB	22
EA60:	B2	FE	10	28	15	FD	6E	68	FD	66	69	11	40	00	19	FD
EA70:	75	68	FD	74	69	CD	CC	E9	18	B2	11	80	F0	21	C0	F0
EA80:	01	40	07	ED	B0	3E	BF	36	20	2B	B0	20	F8	CD	CC	E9
EA90:	18	9A	3E	01	CD	45	E0	3E	20	CD	45	E0	3E	01	CD	45
EAA0:	E0	18	89	FD	5E	68	FD	56	69	7B	B2	28	E3	EB	11	C0
EAB0:	FF	19	FD	75	68	FD	74	69	18	86	7A	B3	CA	2C	EA	1B
EAC0:	C3	3A	EA	FD	36	68	00	FD	36	69	00	11	00	00	C3	3A
EAD0:	EA	FD	E5	CD	A2	E1	FD	7E	45	F6	01	D3	FE	DB	FE	CB
EAE0:	67	28	13	FD	7E	45	E6	F0	D3	FE	DB	FE	CB	47	28	06
EAF0:	CB	57	28	06	18	11	3E	1B	18	12	FD	7E	45	F6	03	D3

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
EB00:	FE	DB	FE	CB	47	28	03	AF	18	02	3E	03	B7	FD	E1	C9
EB10:	21	FE	ED	11	00	FC	01	00	02	ED	B0	C9	FD	E5	CD	A2
EB20:	E1	C5	D5	E5	DD	E5	FD	7E	45	F6	01	D3	FE	DB	FE	CB
EB30:	4F	20	0E	01	88	13	0B	78	B1	20	FB	FD	7E	6C	C3	10
EB40:	EC	AF	0E	FE	1E	80	16	00	42	FD	7E	45	E6	F0	67	DD
EB50:	21	1E	EC	ED	61	2E	01	ED	78	A5	C2	E2	EB	E5	21	00
EB60:	01	2D	20	FD	25	20	FA	E1	ED	78	A5	C2	E2	EB	DD	56
EB70:	00	CB	7A	28	1A	CB	62	28	02	CB	F0	CB	5A	28	02	CB
EB80:	E8	CB	52	28	02	CB	E0	CB	4A	28	57	CB	D8	18	53	E5
EB90:	D5	DD	E5	E1	11	1E	EC	B7	ED	52	D1	CB	70	28	15	CB
EBA0:	72	28	11	D5	11	6E	EC	19	7E	CB	FF	D1	CB	60	28	26
EBB0:	CB	F7	18	22	D5	CB	68	28	05	11	BE	EC	18	15	CB	60
EBC0:	28	05	11	0E	ED	18	0C	CB	58	28	05	11	5E	ED	18	03
EBD0:	11	AE	ED	19	D1	7E	1E	1C	E1	F5	ED	78	A5	28	FB	F1
EBE0:	18	0B	CB	05	3E	20	BD	20	02	CB	D3	DD	23	CB	53	CA
EBF0:	57	EB	CB	93	CB	5B	20	07	24	7C	E6	0F	C2	53	EB	CB

KEYBD  
 LD (Y+4), A / OR 01  
 LD E, 80 / LD (Y+4), A / AND FP / LD A, A  
 LD E, 1C H  
 LD A, H / AND 0FH

EB 6A

EB 3A



ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
EC00:	9B	37	CB	7B	28	03	AF	CB	E3	CB	63	20	03	C3	46	EB
oh-EC10:	DD	E1	E1	D1	C1	B7	28	03	FD	77	6C	FD	E1	C9	00	90
EC20:	88	82	84	40	80	00	40	00	40	40	40	40	40	40	40	40
EC30:	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
EC40:	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
EC50:	40	40	40	40	40	40	00	00	40	40	40	40	40	40	00	40
EC60:	40	40	40	40	40	40	00	40	40	00	00	00	40	40	00	00
EC70:	00	00	00	0C	00	00	0D	00	28	27	1A	0E	00	29	1C	1B
EC80:	0F	01	1D	11	10	03	02	2B	2A	1E	12	04	2D	2C	1F	13
EC90:	05	21	15	20	14	06	2E	22	16	08	07	30	2F	23	17	09
ECA0:	25	24	19	18	0A	26	00	00	0C	0B	3C	38	35	31	00	3D
ECB0:	39	36	33	32	3E	3A	00	37	34	00	00	00	3F	3B	03	00
ECC0:	00	00	00	0C	00	20	0B	1B	18	1A	01	11	31	03	04	13
ECD0:	17	32	06	12	05	34	33	02	16	07	14	35	0D	0E	08	19
ECE0:	36	0B	09	0A	15	37	2C	0C	0F	39	38	2F	2E	3B	10	30
ECF0:	1C	00	1D	1B	3A	1F	0D	0A	1E	2D	2B	2A	2F	2D	20	30

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ED00:	31	01	17	37	2E	1A	11	13	39	00	00	00	3D	33	03	00
ED10:	00	00	00	0C	00	20	09	1B	58	5A	41	51	21	43	44	53
ED20:	57	22	46	52	45	24	23	42	56	47	54	25	4D	4E	48	59
ED30:	26	4B	49	4A	55	27	3C	4C	4F	29	28	3F	3E	2B	50	30
ED40:	7C	60	7D	7B	2A	7F	0D	0A	7E	3D	2B	2A	2F	2D	20	30
ED50:	31	01	17	37	2E	1A	11	13	39	00	00	00	3D	33	1B	00
ED60:	00	00	00	0C	00	20	0B	1B	58	5A	41	51	31	43	44	53
ED70:	57	32	46	52	45	34	33	42	56	47	54	35	4D	4E	48	59
ED80:	36	4B	49	4A	55	37	2C	4C	4F	39	38	2F	2E	3B	50	30
ED90:	5C	40	5D	5B	3A	5F	0D	0A	5E	2D	2B	2A	2F	2D	20	30
EDA0:	31	34	38	37	2E	32	35	36	39	00	00	00	3D	33	1B	00
EDB0:	00	00	00	0C	00	20	0B	1B	78	7A	61	71	31	63	64	73
EDC0:	77	32	66	72	65	34	33	62	76	67	74	35	6D	6E	68	79
EDD0:	36	6B	69	6A	75	37	2C	6C	6F	39	38	2F	2E	3B	70	30
EDE0:	5C	40	5D	5B	3A	5F	0D	0A	5E	2D	2B	2A	2F	2D	20	30
EDF0:	31	34	38	37	2E	32	35	36	39	00	00	00	3D	33	00	00

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
EE00:	80	80	80	80	80	80	40	40	40	40	40	40	40	40	20	20
EE10:	20	20	20	20	20	20	10	10	10	10	10	10	10	10	00	3C
EE20:	7E	FF	FF	7E	3C	00	04	04	04	04	04	04	04	04	02	02
EE30:	02	02	02	02	02	02	01	01	01	01	01	01	01	01	00	3C
EE40:	42	81	81	42	3C	00	FF	00	00	00	00	00	00	00	00	FF
EE50:	00	00	00	00	00	00	00	00	FF	00	00	00	00	00	00	00
EE60:	00	FF	00	00	00	00	00	00	00	71	BE	24	24	24	81	42
EE70:	24	18	18	24	42	81	00	00	00	00	01	06	08	08	00	00
EE80:	00	00	C0	30	08	08	FF	80	80	80	80	80	80	80	FF	01
EE90:	01	01	01	01	01	01	FF	FE	FC	F8	F0	E0	C0	80	FF	7F
EEA0:	3F	1F	0F	07	03	01	00	00	00	00	0F	0F	0F	0F	00	00
EEB0:	00	00	F0	F0	F0	F0	00	00	00	00	FF	00	00	00	10	38
EEC0:	7C	FE	FE	7C	10	38	00	66	FF	FF	7E	3C	18	00	08	08
EED0:	08	06	01	00	00	00	08	08	08	30	C0	00	00	00	80	80
EEE0:	80	80	80	80	80	FF	01	01	01	01	01	01	01	FF	80	C0
EEF0:	E0	F0	F8	FC	FE	FF	01	03	07	0F	1F	3F	7F	FF	0F	0F

ADDR	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
EF00:	0F	0F	00	00	00	00	F0	F0	F0	F0	00	00	00	00	08	08
EF10:	08	08	08	08	08	08	18	3C	7E	FF	7E	3C	18	00	1C	1C
EF20:	6B	7F	6B	08	08	1C	F0	F0	F0	F0	0F	0F	0F	0F	0F	0F
EF30:	0F	0F	F0	F0	F0	F0	F0	F0	F0	F0	F0	F0	F0	F0	0F	0F
EF40:	0F	0F	0F	0F	0F	0F	FF	FF	FF	FF	00	00	00	00	00	00
EF50:	00	00	FF	FF	FF	FF	01	02	04	08	10	20	40	80	80	40
EF60:	20	10	08	04	02	01	08	08	08	08	FF	08	08	08	00	00
EF70:	00	00	00	FF	00	00	00	00	00	00	00	00	FF	00	00	00
EF80:	00	00	00	00	00	FF	55	AA	55	AA	55	AA	55	AA	08	08
EF90:	08	08	FF	00	00	00	FF	FF	00	00	00	00	00	00	08	08
EFA0:	08	08	0F	08	08	08	50	AA	50	AA	50	AA	50	AA	C0	C0
EFB0:	C0	C0	C0	C0	C0	C0	03	03	03	03	03	03	03	03	00	00
EFC0:	00	00	55	AA	55	AA	08	08	08	08	F8	08	08	08	00	00
EFD0:	00	00	00	00	FF	FF	00	00	00	00	FF	08	08	08	00	00
EFE0:	00	00	0F	08	08	08	00	00	00	00	F8	08	08	08	08	08
EFF0:	08	08	0F	00	00	00	08	08	08	08	F8	00	00	00	00	00