KIM-1 Quick Reference
For the MOS Technology KIM-1 Microcomputer Module
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NMI Initialization for Single Step and Stop:

```
17FA 00                          17FB 1C
```

IRQ Initialization for BRK:

```
17FE 00                          17FF 1C
```

Machine Context (saved/restored by ST/GO):

```
00EF PC low                   00F0 PC high
00F1 Status Register (flags)  00F2 Stack Pointer
00F3 A                        00F4 Y
00F5 X
```

Breakpoints: Write BRK instruction ($00) at desired address.
ST button: Pressing will invoke NMI interrupt.
Single Step: Set SST switch to on, press GO button to step one instruction.

Cassette Load and Save

Successful save or load indicated on display with **0000 XX**, bad load with **FFFF XX**.
12 Volt power source is required when reading tapes.

To save:
1. Store $00 in $00F1 (to ensure CPU is in binary mode).
2. Save start address (low/high) in $17F5, $17F6.
3. Save end address+1 (low/high) in $17F7, $17F8.
4. Write tape ID ($01-$FE) in $17F9.
5. Start tape in record mode.
6. Run address $1800 (DUMPT) to save.

To load:
1. Store $00 in $00F1 (to ensure CPU is in binary mode).
2. Write tape ID ($01-$FE, $00 loads any ID, $FF loads using start address values) to $17F9.
3. Run address $1873 (LOADT) to load.

Teleprinter Commands

Serial port settings 9600 bps (or less) 8N2. Press <Rubout> or <Delete> after Reset to initialize serial bit rate.

<hex address> <space>	Show data at address
<hex data> .	Write to current address
<Return>	Advance to next address
<Line Feed>	Move to previous address
<Rubout>	Terminate memory edit
L	Load program from paper tape
Q	Save memory to paper tape (saves from current address to $17F7, $17F8)
G	Go from current address

Memory Map

Range	Comments
$0000 - $00FF	RAM - page zero ($00EF - $00FF are reserved)
$0100 - $01FF	RAM - stack
$0200 - $03FF	RAM - user programs
$1700 / $1740	I/O Register A
$1701 / $1741	Direction Register A
$1702 / $1742	I/O Register B
$1703 / $1743	Direction Register B
$1704 / $1744	Write: Timer, 1 usec, no interrupt
$1705 / $1745	Write: Timer, 8 usec, no interrupt
$1706 / $1746	Write: Timer, 64 usec, no interrupt. Read: timer count, disable interrupt.
$1707 / $1747	Write: Timer, 1024 usec, no interrupt. Read: timer status, Bit 7 = 1 on timeout.
$170C / $174C	Write: Timer, 1 usec, interrupt
$170D / $174D	Write: Timer, 8 usec, interrupt
$170E / $174E	Write: Timer, 64 usec, interrupt. Read: timer count, enable interrupt.
$170F / $174F	Write: Timer, 1024 usec, interrupt
$1780 - $17E6	Application RAM
$17E7 - $17FF	KIM RAM
$1800 - $1FFF	KIM ROM (2K)
$FFF8 - $FFFF	Reset, NMI, IRQ, and BRK vectors (in ROM).

Useful ROM Routines

Name	Address	Description
DUMPT	$1800	Write (Dump) to audio tape.
LOADT	$1873	Read (Load) from audio tape.
ONE	$199E	Send 3700 Hz tone to tape.
ZRO	$19C4	Send 200 Hz tone to tape.
PLLCAL	$1A6B	Send 300 Hz PLL reference tone to tape.
AK	$1EFE	Check for key depressed. A non-zero: no key down. A equal 0, key down.
SCAND	$1F19	Display address and contents.
SCANDS	$1F1F	Output six hex characters on display. Stored in $00F9, $00FA, $00FB.
KEYIN	$1F40	Open up keyboard channel. Call before using GETKEY (or call SCANDS).
INCPT	$1F63	Increment display address.
GETKEY	$1F6A	Return key from keyboard. Value 0-F, 10(AD), 11(DA), 12(+), 13(GO), 14(PC), 15 (no keypress).
TABLE	$1FE7	Table of 7-segment patterns.
	$1C2A	Set TTY baud rate.
PRTPNT	$1E1E	Prints contents of $00FB, $00FA on TTY.
CRLF	$1E2F	Send CRLF to TTY.
PRTBYT	$1E3B	Prints A as two hex characters on TTY.
GETCH	$1E5A	Get one ASCII character from TTY and return in A.
OUTSP	$1E9E	Print space on TTY.
OUTCH	$1EA0	Print ASCII character in A on TTY.
GETBYT	$1F9D	Get two hex characters from TTY and return them packed in A.
SAVE	$1C00	Normal interrupt entry point.
RST	$1C22	Reset return to monitor.
START	$1C4F	Return to monitor entry.

Connector Pinouts

Pin	Signal	Pin	Signal
Connector B (upper) Expansion Connector. Pins 1-22 ontop, A-Z on bottom.			
Pin	Signal	Pin	Signal
1	SYNC	A	AB0
2	RDY	B	AB2
3	Ø1	C	AB2
4	IRQ	D	AB3
5	RO	E	AB4
6	NMI	F	AB5
7	RST	H	AB6
8	DB7	J	AB7
9	DB6	K	AB8
10	DB5	L	AB9
11	DB4	M	AB10
12	DB3	N	AB11
13	DB2	P	AB12
14	DB1	R	AB13
15	DB0	S	AB14
16	K6	T	AB15
17	SST OUT	U	Ø2
18		V	R/W
19		W	$\overline{R/W}$
20		X	PLL TEST
21	VCC +5V	Y	$\overline{Ø2}$
22	VSS GND	Z	RAM/R/W

Pin	Signal	Pin	Signal
Connector A (lower) Application Connector. Pins 1-22 on top, A-Z on bottom.			
Pin	Signal	Pin	Signal
1	VSS GND	A	VCC +5V
2	PA3	B	K0
3	PA2	C	K1
4	PA1	D	K2
5	PA4	E	K3
6	PA5	F	K4
7	PA6	H	K5
8	PA7	J	K7
9	PB0	K	DECODE ENAB
10	PB1	L	AUDIO IN
11	PB2	M	AUDIO OUT LO
12	PB3	N	+12V
13	PB4	P	AUDIO OUT HI
14	PA0	R	TTY KYBD RTRN(+)
15	PB7	S	TTY PTR RTRN(+)
16	PB5	T	TTY KYBD
17	KB Row 0	U	TTY PTR
18	KB Col F	V	KB Row 3
19	KB Col B	W	KB Col G
20	KB Col E	X	KB Row 2
21	KB Col A	Y	KNB Col C
22	KB Col D	Z	KB Row 1