**Fred II Hardware**

*Derived from information provided courtesy of the Hagley Museum and Library from documents on "FRED" developments at RCA, dated 1974-75; "Fred Folder 1", Acc. 2464, Box 919 described as the "Billie Joe Call" Collection, accession no. 2464.54. Hagley Museum & Library, Wilmington, DE 19807*

Information from FEL-1 Disassembly

EF1 is 1 when a keypad byte is available. It is read from INP 0. There is a shift switch. EF2 and EF3 are external tests. EF2 detects tape stop. EF4 In ? Error ?

Port 1 is a device selector. 1 Keypad, 2 TV, 3 Tape Device. Port 2 is device control for keypad it is set to 0 /1 for TV to 0/3, for Tape $20 is read. Port 3 is a control register bit 2 (4) speaker bit 1 (2) enable tape out and bit 0 (1) is run. Port 4 is the external control register. Port 6 is an extension port (in and out). Clock Frequency can be derived from the tone code. In BJC notes 04 is 360us. This is 160 + 40 + 40 \*4 cycles. Hence it is clocked at 1Mhz. All the products in the table (kc x us) come to 1000.

CPU

Clock 1.0 Mhz (derived from tone and tape frequency information, FEL-1 source code). Appears to be 1801.

RAM

1 or 2k of RAM (layout). The RAM card (A12) is on board decoded (e.g. A8-A11 are latched) but nothing is done with A11 nor are A12-15 decode. Hence the 2k of RAM is repeated 32 times in the 64k address space, but if only 1k RAM is present that is followed by an empty 1k. (see 2602 based RAM card schematic)

Hex Utility Display

See Folder 2 Page 22 ?

Panel 1

* S (Push switch connected to CA) - **SHIFT**
* L Load (toggle connected to LD) – Load Mode **1801 STD**
* R Run (toggle connected to RS RN) – Run Mode **1801 STD**
* E (RED lamp) – **TAPE ERROR**
* T (RED lamp) – **TAPE LIGHT**

A12 note INH.LO (N) A12 and Lamp HI-M (High Memory), option of upper/lower 2k working on A12 ? 4/82. Maybe Load in High Run in High ?

Back Panel

TV RUN IN WR FF Plugs T Y X H K ? Older version H is Byte (S5) K Tape (S6/8) YX S1/2/3

Panel 2

* LHI (on TV/MSC card 3 – loads high address ?)
* RHI (on TV/Musc card 3) connects to 83/B3 purpose unknown.

External Panel (P52 Folder 4)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Power (T)* |  | Volume (R) | *Hex Keypad* | | |
| SX (P) | LHI (T) | RHI (T) |
| Step (P) | Key (T) | *Hex (T)* |
| *Shift (P)* | *Load (T)* | *Run (T)* |
| Addr (LED) | Addr (LED) | Byte (LED) | Hi-M (Lamp) | *Tape (Lamp)* | *Error (Lamp)* |

Video

Video Switch on 1/29 selects video type 32/64 bit. Dot clock for 74166 pin 15 is derived from clock unaffected by this switch, which selects either the dot clock or Q9 (QB) as the A/B clock Y mode halves the clock. QBCD are Nored and this switches the shift register between shift/load mode via Pin 15.

QA 14 A 12 clocked by the slow clock, this clocks the SR

TV sync is still generated when TV off unlike the emulator ☺

Study 1/37-39 and 1/46-7

1/50 is circuit to handle alternate latch uses HC from keyboard f/f and CA from input and HEX input. Gates CA , so Hex switch provides alternate modes for key press.

More research on 49-51 on how hex keypad generates EF1

What Is CB ?

From System00 Documentation

Hex keypad mode is 00 (programmed) 01 (byte mode). In byte mode it functions Elf-style and N4 is used to detect a key pair presence. If in ‘direct’ mode (via switch panel) then it is loaded into memory directly.

Control bits for memory : 01 32x32 10 64x16 11 64x32