1. Software problem #1 (our best guess)

A. Three threads:

− Hand: sets the collimator/turntable position
− Treat: sets a bunch of other parameters. Part of its job takes eight seconds, during which time it’s ignoring everything else.
− Vtkbp (keyboard handler): invoked when user types. It parses the input, and writes to a two-byte shared variable, "MEOS" (mode/energy offset)

B. Pseudocode:

Vtkbp (gets and parses keyboard input):

```plaintext
data_completion_flag = 0
while (1) {
    wait_for_keyboard_activity();
    /* there was some keyboard activity; let’s check it */
    if (cursor_in_bottom_right) {
        parse_the_input();
        set the MEOS variable
        set data_completion_flag = 1;
        signal hand thread
        signal treat thread
    } else {
        /* operator still typing */
        data_completion_flag = 0;
        yield();
    }
}

Hand (sets the turntable position):

```plaintext
while (1) {
    wait until signalled
    read bottom byte of MEOS variable
    /* next line executes quickly */
    set turntable position
    yield();
}
```

Treat (sets a bunch of parameters and delivers treatment):

```plaintext
dataent() { /* this is a subroutine that was called */
while (1) {
    wait until signalled
    read top byte of MEOS variable
    set_energy_and_current(); /* this takes eight seconds */
    set_bending_magnets(); /* this takes eight seconds */
    if (data_completion_flag == 1)
        break;
}
/* now we leave the subroutine and progress to a state in which the machine will accept a "beam on" command */
return;
```
- Turntable: rotates the turntable
- Treat: sets magnets, sets energy, sets current

Keyboard Handler (Vth/kbp)

Turntable Thread (Hard)

MEOS (mode energy offset)

Parameter setting/Treatment (Treat)