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NETRONICS FULL BASIC AND THE INFAMOUS $\overline{EF\ 2}$ LINE

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After reading the last several issues of Ipso-Facto, I almost regretted that I ordered Netronics Full BASIC last Winter. Well, Full BASIC LEV III A1 arrived a couple weeks ago, complete with a user manual, chock full of errors (including the ending address of the program). My two biggest complaints about this system are: 1, The RPN format is not identical to HP calculators and 2, The modifications to the GIANT BOARD significantly degrade the performance of the cassette read hardware. Problem 1 can be evidenced by solving the equation:

$$X=5^2+6^2 .$$

Quickly you can see the difference in stack operations. Unfortunately I do not have a solution to this problem.

Problem 2 , which, I believe is actually two sub-problems, can be neatly solved. The first, as described by Mr. M.E. Franklin in Issue #17, where the math chip holds the $\overline{EF2}$ line low, occurs only when an error is detected by the math chip and the program is terminated or when the user terminates the program during math function execution. The capacitor / diode modification to the GIANT BOARD is not actually intended to and will not solve this problem. I believe, however, that the degradation of the cassette read hardware as a result of this modification is a far more significant problem. Figure 1 is a block diagram of the affected portions of the system when Full BASIC is installed. Capacitor Ca is added to the GIANT BOARD because the output of A12 (Pin 4) is normally low. Diode Db is a clamp on the output signal during cassette read and maintains the proper dc operating level. The problem with this modification, is that it partially defeats the purpose of the cassette read circuit (A12). This amplifier is intended to "square-up" the cassette signal, but capacitor Ca reduces the effectiveness of this circuit. Diodes Da (GIANT BOARD), D1, and D3 (BASIC board) comprise a "wired OR" so that the $\overline{EF2}$ line may be shared.

AUTO-SWITCH CIRCUIT OPERATION

Figure 2 is a block diagram of the system where the Full BASIC GIANT BOARD modifications are removed and the Auto-Switch modifications added to the Full BASIC board. This circuit (Figure 3) is essentially an automatic switch that connects either the cassette read or the Full BASIC $\overline{EF2}$ signals to the buss. The basic circuit consists of four components; U1 CD 4066 (quad bi-lateral switch), R1, R2, and C1. R3 and the LED are optional.

AUTO-SWITCH CIRCUIT OPERATION continued

SW1 acts as a buffer for the A12 GIANT BOARD $\overline{EF2}$ signal. When a cassette signal is present, C1 is charged to 5 volts which enables SW3 to put the cassette signal on the buss. SW2 is simply an inverter of the output of SW1 and turns off the Full BASIC $\overline{EF2}$ signals. (SW4). The optional LED turns on when the cassette line takes control. When no cassette signal is present, SW4 is turned on, and the Full BASIC board has control of the EF2 line.

This modification eliminates the ac coupling of the cassette signal to the buss and allows a cassette read even when the Full BASIC board would be holding EF2 low. It should be noted, however, that after the program is loaded, it still may be necessary to enter "PR CL#" to resume normal operation of Full BASIC. This is because the "LOAD" routine does not reset the math chip.

This circuit does give priority to cassette operations and therefore the cassette recorder should not be operated during Full BASIC program execution.

CONSTRUCTION DETAILS

The circuit shown in Figure 3 may be readily added to the Full BASIC P.C. board in the area reserved for user hardware in the lower right hand corner of the board. The following modifications are necessary.

1) Remove the .1uf capacitor and the two diodes that were added to the GIANT BOARD for Full BASIC.

2) Connect a wire from A12 Pin 4 (where the capacitor was) to Pin 84.

3) Connect a wire on the mother board between pins 84 of the GIANT and Full BASIC board sockets.

4) On the Full BASIC board, cut the trace to Pin 70 after the junction of D1 and D3.

5) Wire up the Auto-Switch circuit as shown in Figure 3.

6) The total system should now be wired as shown in Figure 2.

At this point, one note of caution is in order. If the Full BASIC board is removed from the system, Pin 70 on the GIANT BOARD must be reconnected for cassette read operation. I have been using Full BASIC with this modification for several days now and have encountered no problems. As long as one remembers that the cassette will take priority over the math chip (as described earlier) there should be no problems. One interesting side effect of this modification is that the LED acts as a cassette signal present indicator, which is cute if not functional.

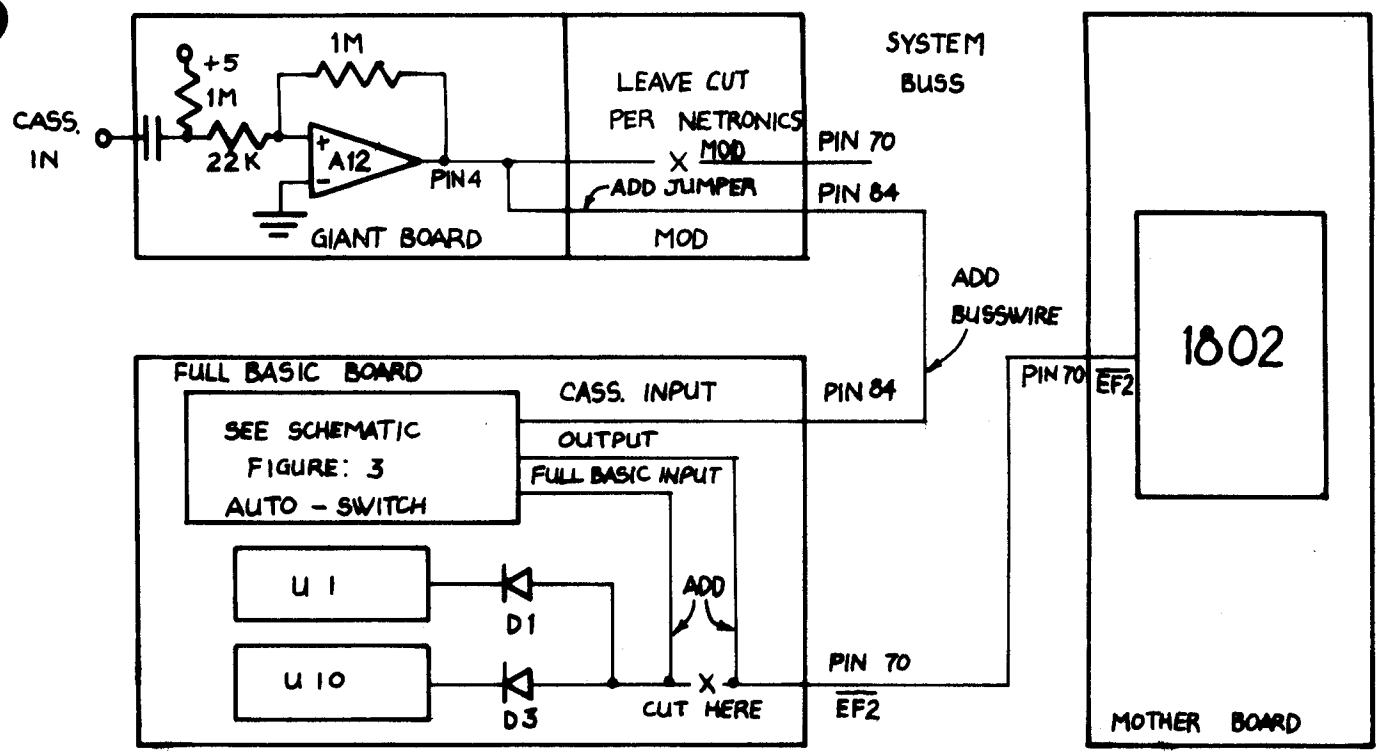

FIGURE 2: SYSTEM WITH AUTO - SWITCH MOD

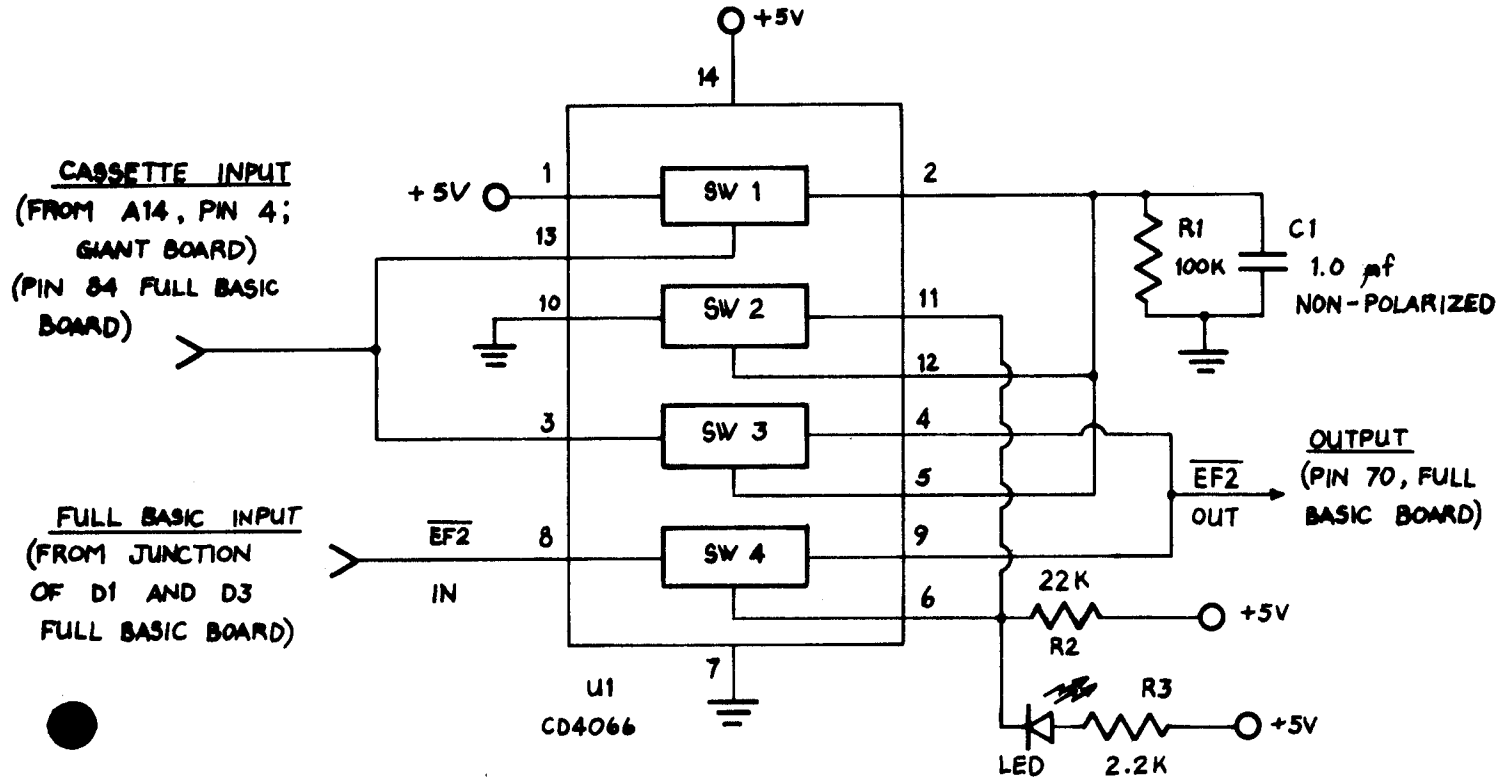

FIGURE 3: $\overline{EF2}$ LINE AUTO-SWITCH

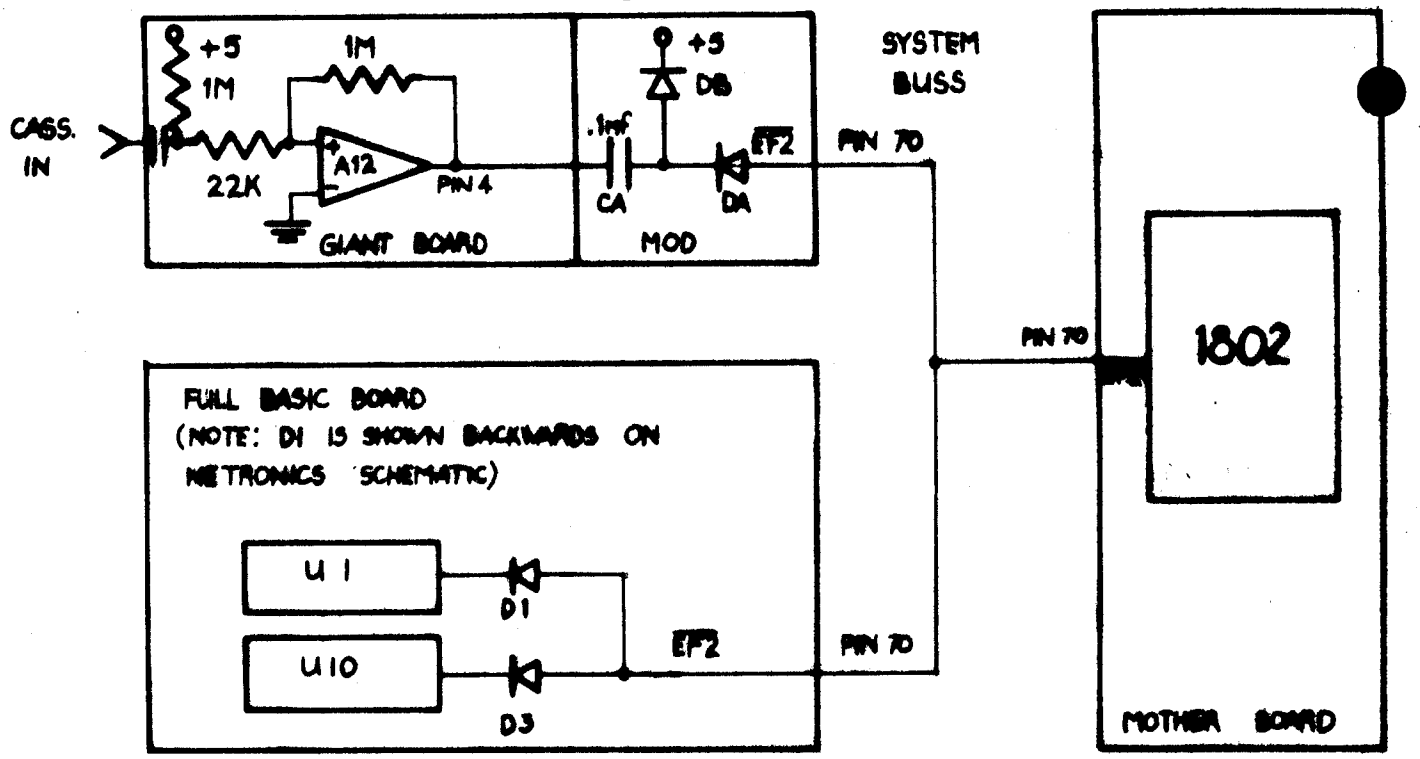

FIGURE 1: SYSTEM WITH METRONICS MOD

TINY BASIC PROGRAMS

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DECIMAL TO HEX CONVERSION ROUTINE

```
10 REM INPUT DECIMAL VALUE AND THIS ROUTINE WILL
20 REM CONVERT IT TO AN EQUIVALENT HEX VALUE
100 INPUT X
110 LET I=X/16
120 U=X-16*I
130 LET J=I/16
140 T=I-16*J
150 LET K=J/16
160 S=J-16*K
170 LET L=K/16
180 R=K-16*L
400 LET V=R
410 GOSUB 500
420 LET V=S
430 GOSUB 500
440 LET V=T
450 GOSUB 500
460 LET V=U
465 GOSUB 500
470 GOSUB 1000
```