OSI **AARDVARK** OSI

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1) A tutorial on Machine Code for BASIC programmers.
2) Complete listings of two word processors for BASIC IN ROM machines.
3) Moving the Directory off track 12.
4) Listings for 20 game programs for the OSI.
5) How to write high speed BASIC — and lots more —

Vol. 1 (1980) 6 back issues - $9.00
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ACCOUNTS RECEIVABLE — This program will handle up to 420 open accounts. It will age accounts, print invoices (including payment reminders) and give account totals. It can add automatic interest charges and warnings on late accounts, and can automatically provide and calculate volume discounts.

24K and 0S65D required, dual disks recommended. Specify system.
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A complete business package for OSI small systems — (C1, C2, C4 or C8). Includes MAXI-PROS, GENERAL LEDGER, INVENTORY, PAYROLL AND ACCOUNTS RECEIVABLE — ALL THE PROGRAMS THE SMALL BUSINESS MAN NEEDS. $299.95

P.S. We're so confident of the quality of these programs that the documentation contains the programmer's home phone number!

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This disk contains a new BEXEC* that boots up with a numbered directory and which allows creation, deletion and renaming of files without calling other programs. It also contains a slight modification to BASIC to allow 14 character file names.

The disk contains a disk manager that contains a disk packer, a hex/dec calculator and several other utilities.

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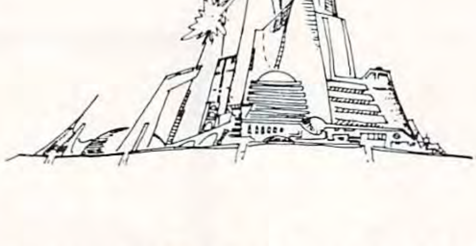
SUPERDISK II $29.95 (5 1/4") $34.95 (8").

AND FUN, TOO!



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NEW — NEW — NEW

LABYRINTH - 8K - This has a display background similar to MINOS as the action takes place in a realistic maze seen from ground level. This is, however, a real time monster hunt as you track down and shoot mobile monsters on foot. Checking out and testing this one was the most fun I've had in years! — $13.95.

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Please specify system on all orders

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OSI OSI

THE OSI GAZETTE

OSI RS232 Port And The High Speed Printer Interface

Paul Lilly
Pelham, AL

What About It?

I believe the thing I like most about my Superboard II is that it is full of surprises. Whatever OSI lacked in documentation they made up for it in utility, you just have to find it. While users of other systems pay upwards from $100 for a serial interface, you can put one on a Superboard II for around $5. And that includes a software selectable baud rate with handshaking. This article will show you how to install the port, and how to use it as a high speed printer interface.

How To Do It

OSI shows the schematic for this interface in their user manual, and, although the board has the runs etched in it, the parts were not installed by OSI. But don't try going by the board layout to plug in your parts, it's not exactly correct. Figure 1 is a correct board layout. If you only need a one-way port, you can omit Q2,D16,R62 and R66. If you want true RS232 voltage swings, you can cut between the 2 pads shown in the Note, and hook the high end (pin 7 of J3) to your negative supply. I have an Anadex DP8000 printer hooked up to my Superboard and although the manual for it says it needs a minimum of -3 volts for its RS232 input, I've left the 2 pads connected (voltage to printer swings +5 to 0 volts) and the printer works just fine anyway. Of course that doesn't mean yours will, so you may want to add the negative supply. If you don't need or want the extra speed from your printer, you need not hook up the handshake signals. This way you would be transferring information to your printer at 300 baud, which would allow you to LIST a program on your printer and tape at the same time. But if you want or need to run your printer at high speed (we can run 4800 baud with no hardware changes), for printing reports, making listings of one program, etc., then you will need the handshake capability. For the handshake capability, we can connect one of four different ways (depending on our printer), to the Superboard's CTS (Clear to Send) bus. If your printer uses an RS232 compatable BUSY/READY signal, then connect it to pin 3 of J3 and:

1) If the signal is high (+) when the printer is ready, connect pin 6 of J3 to pin 9 of J3. See figure 3.

2) If the signal is low (-) when the printer is ready, connect pin 10 of J3 to pin 9 of J3. See figure 3.

If your printer uses a TTL compatable BUSY/READY signal (here we can omit Q2,D16,R62,R66) and;

1) If the signal is high (+) when the printer is ready, connect the signal to pin 6 of J3, the connect pin 10 of J3 to pin 9 of J3.

2) If the signal is low (-) when the printer is ready, connect the signal to pin 9 of J3. See figure 3.

Then in all cases, in figure 2 cut one foil and connect between 2 pads as shown, to route this CTS signal to the ACIA. That's it for the hardware. You now have your serial port, ready to run your printer. Although this article describes a hook-up to a printer we can also hook up to a terminal, and use the serial port as an audio port. (More on the audio port at the end of this article).

A little about the ACIA

Before going further, some understanding of the ACIA is necessary. OSI uses the Motorola 6850 ACIA chip, which has 4 registers in it. Two registers we can read from only; the Receive Data Register (read hex addr. F001), and the Status Register (read hex addr. F000). The other two registers we can only write into; the Transmit Data Register (write hex addr. F001), and the Control Register (write hex addr. F000). The Control and Status registers are what give us the programmable flexibility to get the most out of our $5 interface. The control Register allows us to select the format we use to transmit and receive bits, select our transmit rate (baud), enable or disable control and interrupt signals, and reset the ACIA. Bits D0 and D1 are the counter divide and reset bits. Table 1 shows the usage for these bits.

As shown in the table we can select 1 of 3 possible divisions of our transmit clock merely by programming it. If you have a stock Superboard II, the TX clock input is approx. 4800 Hz. The monitor ROM (during system initialization) sets the clock divide to 16, which gives us our baud rate of 300 for our cassette interface. Now here's the trick, prior to outputting to our printer, we write zeros into D0 and D1, setting our clock divide to 1. With our existing TX clock input of 4800 Hz, this will give us a baud rate of 4800. Now we have 300 baud for our cassette, and 4800 baud for our printer, with no hardware changes to go back and forth between them. Bits D2, D3, and D4 select different combinations of word length, parity, and stop bits, Table 2 gives their usage. The monitor sets these bits such that we transmit 8 bits, then 2 stop bits. That setup works fine with my printer so I kept that format in my programming. You will want to check the manual for your printer, determine what format in which it needs to receive bits, and program the ACIA accordingly. Bits D5,D6 and D7 are used to program the IRQ and RTS functions, which are not needed at this time, so we will leave these bits cleared. Therefore when you want to set up the ACIA to run the printer at 4800 baud you will first want to write the binary word 00000011 into hex addr, F000 (POKE61440,3) top reset the ACIA, then write the binary word 00010000 into F000 (POKE61440,16), to select the format and baud rate.

The Status Register will (among many other things) let us know when the Transmitter Register is ready to accept another word. Bit 1 of the Status Register is the Transmistter Register Ready bit. If it is set to 1, we can send another word to the Transmit Register (F001). Two things will keep this bit from being set; 1) If the ACIA has not yet transferred the last word that was written and 2) If the CTS line to the ACIA is high, indication the peripheral cannot accept a word. Although the Status Register has a bit (D3) reserved to indicate the condition of the CTS line, it will not be necessary to check it since it is going to inhibit D1 bit anyway. The monitor ROM checks the Status Register prior to loading a word into the Transmit Register, and will continue looping to check D1 in the Status Register until it finds it set, then the monitor will load the word we want to transfer into the Transmit Register. We need no extra programming to support our handshake signal, as the monitor is already taking care of this for us.

How To Test

We can now test our system to see if it is working properly. We don't need to hook the printer up to make these checks, in fact it will probably be better if we don't. The first thing we should do is load a fairly long program into the system. As it's loading, notice the speed it is listing on the screen, that's 300 baud. Now from the keyboard, type POKE71440,3 (reset ACIA) then type POKE61440,16 (program ACIA). Next type SAVE, then LIST. Now you should see the program listing at a speed 16 times faster than it is loaded at, or 4800 baud. Now, as the program is listing, connect your CTS input to either +5 volts or ground (depending on how we configured it earlier) such that you simulate a peripheral BUSY state. The program should stop listing and not continue until we remove the input. If these tests pass then we are ready to hook up our printer; if the tests fail, you will need to go back and recheck the hardware modifications and programming. Check the manual for your printer and see what is necessary to set it up for an RS232 input at 4800 baud. The Anadex printer has 3 sets of dip switches that can be set for a wide range of baud rates, different types of interfaces, paper length, number of lines to skip over perforation etc. Hook the BUSY/READY output from the printer to J3 of your Superboard as described earlier for your system. Hook the RS232 output from your Superboard J3 pin 2 to the printer input. Hook pin 1 of J3 to the printer COM line (ground). Turn on your printer and away you go.

Add A Speaker

If you don't have a printer at this time but want to go ahead and make the hardware addition anyway, you can use this port to hook up a speaker. You can connect an 8 ohm speaker between pins 1 and 2 of J3. Now set up for 4800 baud and see how your program sounds when you LIST it. You can expand on this idea, and add some interesting effects to your existing programs. Remember, when you are in SAVE mode, any PRINT argument goes to the ACIA as well as your screen when you LIST it.

Some Finals

You should be careful not to program the ACIA while you are in the SAVE mode. I don't know why, but it hangs up the system sometimes when you try to do it. POKE517,1 will put you in SAVE mode and POKE517,0 will take you out of it. Although you can now run your printer at 4800 baud, you are still limited to 300 baud for your cassette due to the audio frequencies generated in the cassette portion of your Superboard. Since the PRINT statement sends its argument to the ACIA when in the SAVE mode, we can output to the printer any results we normally send to the video screen. Most small system printers provide 80 columns per line. The Superboard software is set up to force a LF/CR, after 72 consecutive characters to the ACIA. During a cold start, the system defaults to a terminal width of 72 characters per line if you try to request a larger line length. This can be fixed by writing 80 (Hex 50) in the terminal width storage location (hex F) after initialization, by the statement POKE15,80.

Table 1 – Control Register Usage, Bits D0 & D1

D1	D0	RESULTS
0	0	TX Clock input equals the transmit rate (baud)
0	1	TX Clock input is divided by 16 to give transmit rate (baud)
1	0	TX Clock input is divided by 64 to give transmit rate (baud)
1	1	Reset ACIA

Table 2 – Control Register Usage, Bits D2, D3, D4

D4	D3	D2	RESULTS (TRANSMIT FORMAT)
0	0	0	7 bit word, 1 parity bit (even), 2 stop bits
0	0	1	7 bit word, 1 parity bit (odd), 2 stop bits
0	1	0	7 bit word, 1 parity bit (even), 1 stop bit
0	1	1	7 bit word, 1 parity bit (odd), 1 stop bit
1	0	0	8 bit word, 2 stop bits
1	0	1	8 bit word, 1 parity bit (even), 1 stop bit
1	1	1	8 bit word, 1 parity bit (odd), 1 stop bit

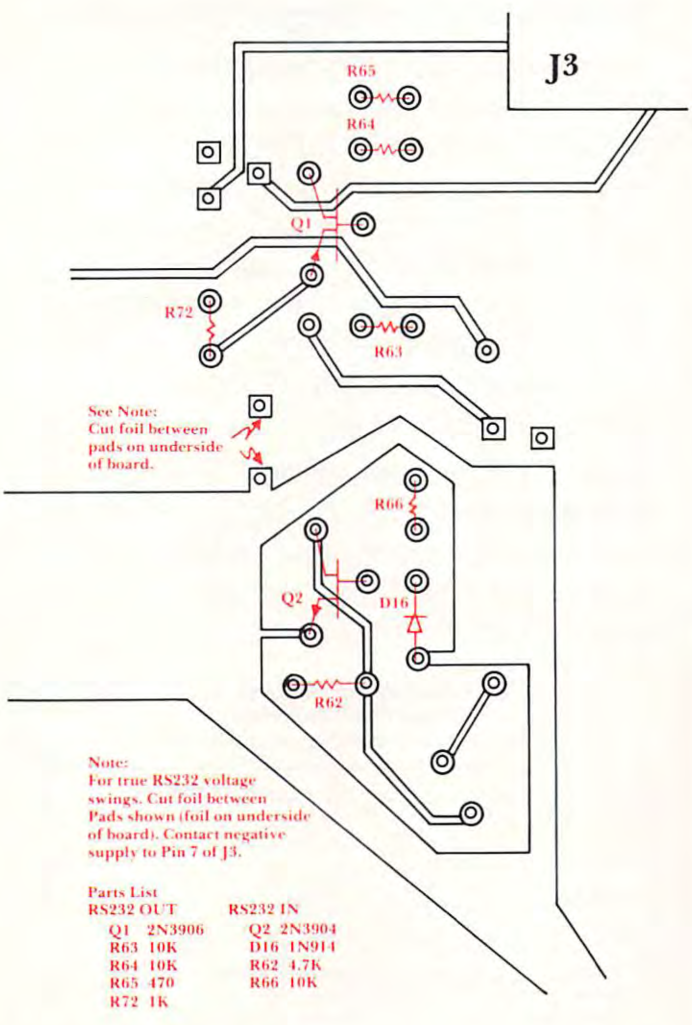

Figure 1

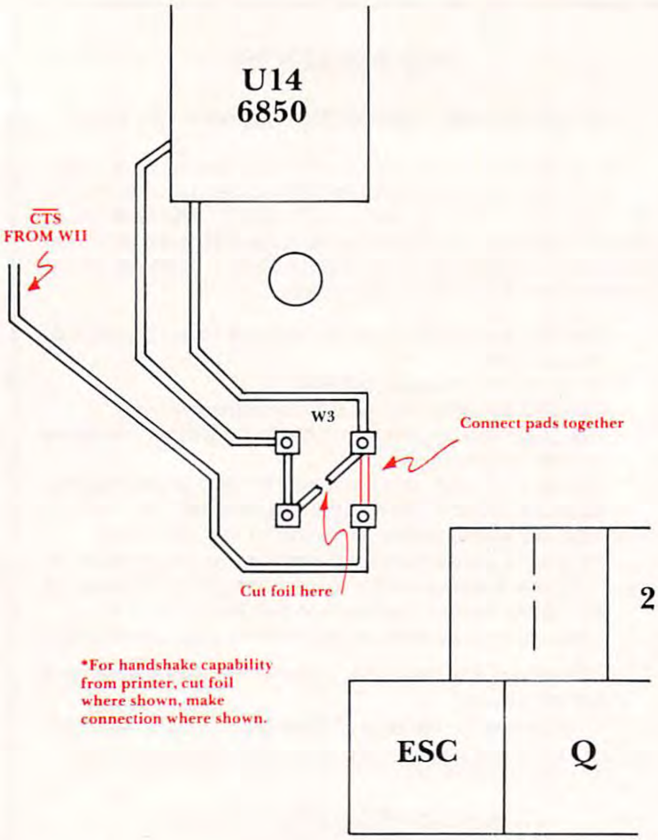

Figure 2

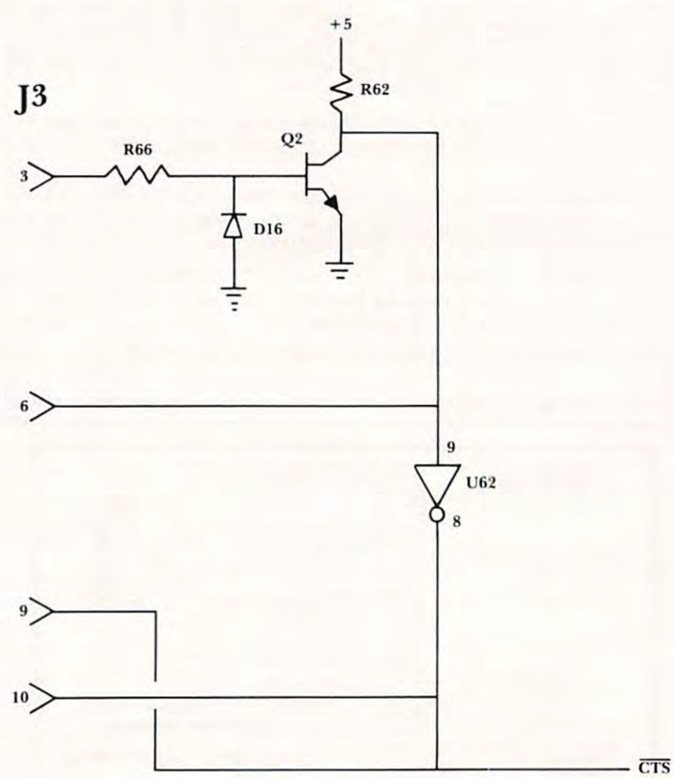

Figure 3

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