

Description

The controller is based on an Intel 386Ex processor running at 25Mhz. The controller is equipped with 1 megabyte of static ram organized as 512K 16-bit words. 768K bytes of the 1 megabyte is directly accessible by DOS. Also included is 512K bytes of flash memory organized as DOS drives A and B. An M-Systems DiskOnChip can added to the 32 pin DIP socket on the controller board.

The controller supports 10Base-T and optionally 10Base-2 Ethernet. The NE2000 Ethernet controller will automatically select the media that is active. When connected to both 10Base-T and 10Base-2 networks, the 10Base-2 media will be used.

There is a switching power converter on the controller, which can accept 7-34 volts DC. Nominal current consumption is 250mA at 12 volts with 10Base-T Ethernet selected. With 10Base-2 Ethernet the nominal current consumption is 500mA.

Getting Started

Connect the console cable to the COM2/Console connector and to the serial port of your host computer. Run a telecommunications program on the host with the serial port set to 9600 baud, 8, N, 1, and no flow control. Power up the controller. You should see a welcome message and a B:/> prompt. You may now run the various utilities and upload and download files programs.

NOTE: Flow control for the host serial port must be set to none.

Serial Ports

The controller is equipped with a total of 6 serial ports. Ports COM1 and COM2 come from the on-chip UART in the 386Ex processor chip. Ports COM3-COM6 come from a 16C554 Quad UART chip and each port has a 16 byte FIFO. Each serial port has a unique hardware interrupt associated with it. See the figure below for port address and interrupt assignments.

The COM1 port can be software-configured to connect either to the optional internal 33Kbaud modem or to the RJ-45 connector on the rear panel. To connect COM1 to the internal modem, clear I/O pin P3.2 or run the program INT_MOD.COM. To connect COM1 to the RJ-45 connector, set I/O pin P3.2 or run the program EXT_MOD.COM. The port 3 data register is located at 0xF872.

```
outportb( 0xF872, (inportb(0xF872) | 0x04 ) );      // set bit 2, external connector
outportb( 0xF872, (inportb(0xF872) & ~0x04 ) );    // clear bit 2, internal modem
```

Port COM2 is normally used as the DOS console. Alternately, it can be software configured for RS-485. In order to avoid conflicts with DOS and the BIOS, it is first necessary to move the console to COM1. This is done using the utility program CON2COM1.

To enable RS-485 operation (and disable RS-232) on COM2, clear bit 6 of I/O port F872 hex.

```
#define EN485_MASK 0xBF
#define EN485_REG 0xF872
outportb(EN485_REG, (inportb(EN485_REG) & EN485_MASK) );      /* change to RS-485 */
```

Bit 0 of the PINCFG register must be set to allow control of the RS-485 transmit enable pin. The PINCFG register is located at I/O port F826 hex.

```
#define PINCFG 0xF826
outportb(PINCFG, (inportb(PINCFG) | 0x01) );          /* connect TE control to chip pkg */
```

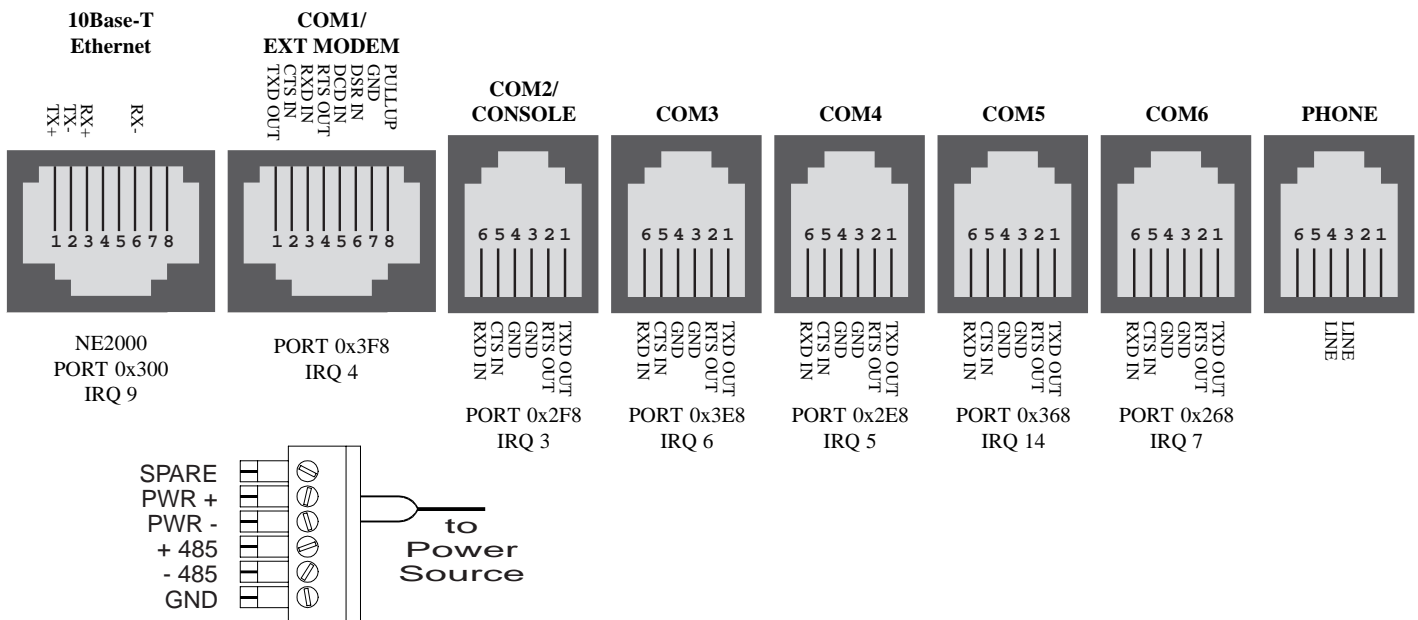
The RTS line on COM2 is used to control the RS-485 transmitter. To transmit RS-485 data, set bit 1 of I/O port 2FC hex (mirrored at F8FC hex). To receive RS-485 data, clear bit 1. Note that the state of the chip pin is the inverse of the bit in the register (register=1, pin=0).

```
#define TX_MASK 0x02
#define TX_MASK_REG 0xF8FC
outportb(TX_MASK_REG, (inportb(TX_MASK_REG) | TX_MASK) ); /* enable transmitter */
outportb(TX_MASK_REG, (inportb(TX_MASK_REG) & ~TX_MASK) ); /* disable transmitter */
```

The RS-485 driver is internally looped back. Characters transmitted will appear in the UART receiver. Software will need to be written to handle this condition.

Connector Pinouts, Port and Interrupt Assignments

The following illustrations show the pinouts, I/O port assignments and Interrupt assignments for the serial ports, 10Base-T Ethernet and the power/RS-485 connector.



Console Cable

Connecting the controller to a PC requires a cable with a RJ-12 connector on one end and a DB-9F connector on the other end. This cable can be purchased from JK microsystems as part number 86-0032 or fabricated using the following pinout:

RJ-12	Signal name/direction	DB-9F
N/C	Data Carrier Detect	1
1	Transmit Data (out)	2
6	Receive Data (in)	3
N/C	Data Terminal Ready	4
3,4	Ground	5

The signal direction is with respect to the controller, ie: out = transmitted by the controller and received by an external device. Some terminal programs require DCD to be true before they will allow file transfers. To insure that DCD is true, tie DCD to DTR as outlined above.

Power Cable

Connect the unit to a clean source of DC power between the range of 7 and 34 volts. A 15 volt, one ampere AC adapter is available from JK microsystems under part number 70-0009. When using the JK microsystems AC adapter, connect the lead with the faint lettering to the PWR+ terminal. A mounting bracket is available for the AC adapter under part number 66-0006.

Internal Modem (optional)

The Ether6-M and Ether6-M2 are fitted with a Cermetek CH1799 33Kbaud modem module. The module is a standard AT command set modem. The program MTEST.COM is supplied to test the modem and telephone line connection. MTEST connects the modem to the console, allowing the operator to use AT commands to dial out and connect to a remote computer. Additional information specific to the modem can be obtained from Cermetek or JK microsystems.

User LED

The Ether6 is equipped with an LED for user status output. This LED is connected to the 386Ex port 3 pin 0. The state of the LED is opposite of the value in the port register. To turn on the LED, clear bit 0 of port 3, to turn off the LED, set bit 0 of port 3. Port 3 is located in I/O space at 0xF872. When changing the state of port 3 bits, use a read/modify/write procedure as the remaining bits on this port control other onboard functions.

```
outportb( 0xF872, (inportb(0xF872) | 0x01 ) ); // set bit 0, turn off LED
outportb( 0xF872, (inportb(0xF872) & ~0x01 ) ); // clear bit 0, turn on LED
```

Watchdog

There are two watchdog circuits on the Ether6 controller. The first uses the 386Ex internally generated watchdog signal to generate an NMI. We do not recommend use of this watchdog and have no drivers to support it.

The second and preferred watchdog circuit uses the ADM691 IC. If JP3 is installed, the user application must reset the watchdog timer at intervals of 1.6 seconds or less. Performing an OUT instruction to port 0x278 with any value of data resets the watchdog timer.

```
outportb( 0x278, 0xFF );
```

Failure to reset the watchdog timer will result in a controller-wide reset and reboot. The BIOS will reset the Hardware Watchdog for approximately 5 seconds after power up giving the user application enough time to load. More information on the watchdog timer can be found in the ADM691 data sheet available from Analog Devices.

Jumpers

JP2 - NMI Watchdog

This jumper enables the internal 386Ex watchdog. This watchdog can be jumpered to generate a non-maskable interrupt (NMI) on timeout. Jumper pins 1-2 to enable the 386Ex watchdog, jumper pins 2-3 to disable the 386Ex watchdog.

Default Position: 2-3, 386Ex watchdog is disabled.

JP3 - Hardware Watchdog

This jumper enables the hardware watchdog. When enabled, this watchdog will generate a board wide reset on timeout. Jumper pins 1-2 to enable the hardware watchdog, leave the jumper open to disable the watchdog.

Default Position: Open, Hardware watchdog is disabled.

JP4 - Boot Memory Select

This jumper selects the memory from which the board will boot. Jumper pins 1-3 and 2-4 to boot from the onboard flash. Jumper pins 3-5 and 4-6 to boot from the expansion socket.

Default Position: 1-3 and 2-4, Boot from onboard Flash.

Utility Programs

The following utilities are supplied:

CLONE.COM	Clones the contents of the boot memory device into the alternate memory
CONFIG.EXE	Configures the TCP/IP parameters for the controller
CON2COM1.COM	Moves the console to the COM1 port
DOWN.COM	Downloads a file from the controller to the host with X-Modem protocol
EDIT.COM	A basic text editor
EXT_MOD.COM	Connects COM1 to external connector
FORMAT.COM	Formats drive B
INT_MOD.COM	Connects COM1 to internal 33Kbaud modem
MODEM.COM	A terminal program for the modem, connects it to console
NE2000.COM	Ethernet packet driver TSR, normally run from STARTUP.BAT
NOQUIET.COM	Disables persistent quiet console, see QUIET.COM
PING.COM	TCP/IP Ping program
REPEAT.EXE	Repeat a command, example - B:>repeat ping jkmicro.com
QUIET.COM	Disables console out on bootup. Hit CNTL-C on boot to remove
UP.COM	Uploads a file from host to controller using X-Modem protocol
USR_OFF.COM	Turns off USR LED on front panel
USR_ON.COM	Turns on USR LED on front panel
WATCHDOG.COM	TSR to reset watchdog from timer tick

Revision	Date	Author	Changes
C	22 Jan 2002	EW	Clarify/elaborate on RS-485, User LED, Console Cable, WD, INT vs EXT Modem, Port Locations.
B	20 Sep 2001	JDS	Fix COM1 pinout on Figure
A	28 Jun 2001	JDS	First Issue
