# Chase AT Range
# Serial I/O Controllers
# User Guide

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# Chase AT Range Serial I/O Controllers User Guide

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**Abstract**

This document is a guide to the installation and use of the Chase Research Serial I/O Controller cards for IBM PC-AT's and compatibles under Xenix and Unix.

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# Chapter 1

# Introduction

The Chase AT4, AT8 and AT16 Serial I/O Controllers are
intelligent peripheral cards for the IBM PC/AT or compatibles.
Each card is equipped with its own iAPX186 processor, RAM,
ROM and four, eight or sixteen RS232 serial ports. The cards
are designed specifically to remove the burden of serial I/O
management from the operating system, to allow the full multi-
user potential of the PC/AT to be realised.

This document is a guide to the correct installation and operation
of the Serial Controllers in an IBM PC/AT or compatible
machine, running many varieties of Xenix and Unix. Consult the
labels of the disks included with this package for a complete list
of the supported operating systems.

This document is not a description of how to operate or install
the standard Unix or Xenix system, for this you are referred to
the documentation supplied with the Operating system. The
document assumes that you are familiar with the day to day use
of your operating system and know how to log in as the super-
user and issue commands. For special requirements you will find
it useful to be able to edit text files. If you are not familiar with

any of these then you should spend some time using the standard system in order to acquaint yourself with these operations.

# Chapter 2

# Pre-Installation Checklist

The following items should have been supplied with your Chase board.

– The Serial Controller Card

– External four eight or sixteen Terminal Connection Block

– One or more Installation Disks

– User Guide (This document)

– A two wire link, used to connect multiple cards

In addition you will need the following items and abilities.

– The manual for your computer, detailing how to get access to the interior in order to install plug-in cards.

– Screwdrivers etc for access to interior of computer.

- A correctly installed Unix or Xenix operating system on
  the hard disk.

- Super user access to the operating system.

# Chapter 3

# Software Installation

The first part of the installation procedure is to load and run the installation software. It is preferable but not essential to do this before hardware installation. The same software can control any number of the Chase I/O boards in any combination up to a maximum of 64 ports. The same installation procedure should be followed regardless of how many and what type of boards you will be using.

# Login As The Super-User

Firstly, you must log in to the computer system as the super-user (root). This can be done from any terminal but it is most convenient if you log in on the main console terminal because you will have to shut the system down.

## Extract the Installation Program

You will have been supplied with one or more floppy disks containing the device drivers for the Chase cards. You must consult the lists of supported operating systems that are printed on the disk labels to find the Operating and system and version that yoy require. Insert this disk in your first floppy drive. Follow the instructions below, depending on the operating system that you are using. Then consult the section following on general installation notes.

# Xenix Installation

If you are using the Xenix operating system then you must use the **Custom** program. You should be familiar with this program from the original installation of your Xenix system. If you are not then consult the manual page for 'custom' in section (ADM) of the System Administrators Guide.

When you run the 'custom' program you should select the option to "Add a supported product". The program will then prompt you for a list of packages to install. The only package supplied is called ATIO. Type this name in and press enter.

## Microport Unix Installation

If you are using Microport Unix then you should type the following commands, depending on which type of board you intend to install.

AT4      tar xvf /dev/dsk/fd048 /etc/at4.install

AT8      tar xvf /dev/dsk/fd048 /etc/at8.install

AT16     tar xvf /dev/dsk/fd048 /etc/at16.install

Remember to press the <enter> key at the end of the command.

Once the installation program has been extracted from the floppy disk then it must be run. Type the following command, depending on which type of board you are going to install.

AT4            /etc/at4.install

AT8            /etc/at8.install

AT16           /etc/at16.install

## Interactive Unix Installation

If you are using Interactive Unix then you should type the following commands, depending on which type of board you intend to install.

AT4        tar xvf /dev/dsk/f0d9dt /etc/at4.install

AT8        tar xvf /dev/dsk/f0d9dt /etc/at8.install

AT16       tar xvf /dev/dsk/f0d9dt /etc/at16.install

Remember to press the <enter> key at the end of the command.

Once the installation program has been extracted from the floppy disk then it must be run. Type the following command, depending on which type of board you are going to install.

AT4              /etc/at4.install

AT8              /etc/at8.install

AT16             /etc/at16.install

# General Installation Notes

A variety of messages will occur during the installation describing the progress. It may be necessary to install other parts of the operating system. If so you will be instructed how to do this by the installation program.

You will be asked some questions during the installation process. Answer 'y' or 'n' and remember to press the <enter>

key. Sometimes you will have to press the <enter> key to confirm that you have done some action, such as inserting a disk.

You may see some error messages during the installation process. Some of these can be ignored. If you see a message of the form:-

```
ar: cannot extract at8.o
```

then it can be ignored. This message may occur when the installation is ensuring that no older versions of the device driver are installed on the system. Also, at the end of the installation process the computer will be shutdown. You may see a message of the form:-

```
tty8a: cannot open.
```

This is caused by the shutdown program sending a signal to the card which is not yet installed. This message also can be ignored.

When installation is complete you will see the message "Installation Completed" appear. If this message is not present then you may have an incorrectly installed operating system. Consult the screen messages and your operating system manuals if such a problem occurs.

# Chapter 4

# Hardware Installation

The Chase cards are supplied with all the links correctly installed. You should not change any of these unless you were told to do so by the installation program.

# Card Installation

1. Ensure that the computer is powered off and disconnected from the mains. Remove the system cover following the instructions given in the manual for your computer.

2. Locate an empty 16 bit expansion slot. The 16 bit slots have two connectors: a 62-pin connector and a 36-pin connector.

3. Using a suitable screwdriver remove the expansion slot cover from the rear panel of the computer. Retain the cover screw for use later.

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4. Locate the Chase card in the expansion slot with the metal end bracket against the rear panel and the other end in the guide slot of the mounting frame. Push the card down in the connectors and make sure it is securely seated.
Use the screw retained from step 2 to hold the card in place.

5. Replace the system cover, following the instructions in your computer's manual.

You should now be left with the expansion slot cover removed to install the Chase card and all your tools, do not leave any tools or screws loose in the computer. Keep the expansion slot cover safe in case you ever require to remove the card.

# Expansion Box Connection

Place the expansion box at the rear of the computer and push the connector on the end of the cable firmly onto the connector on the end of the card. Tighten the two locking screws on the connector to hold it in position.

Both the AT4 and the AT8 have a 37 way connector, it is important to connect the right expansion box to each. The AT4 cards have a small sticker on the end bracket to help in identification from the outside of the computer.

Always ensure that excessive strain is not placed on the card or expansion box by the weight of cables connected.
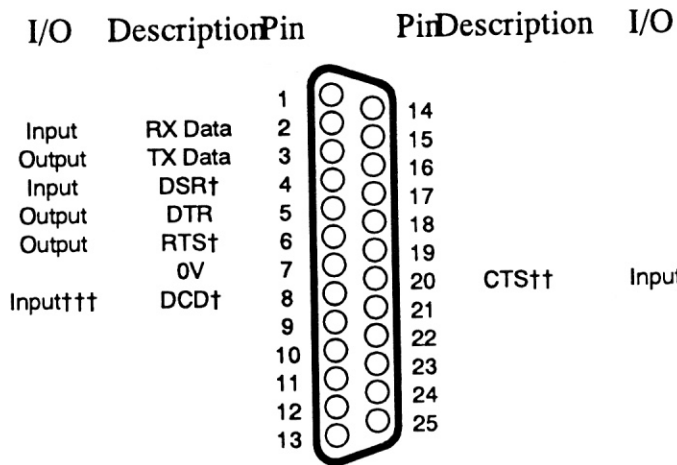
# Chapter 5

# Terminal Cabling

All the Chase cards are supplied with an external expansion box to enable standard RS232 cabling to be used for the connection of terminals. The supplier of your Chase card or terminals should be able to advise you on ready-made cables for use with the box. However, if you wish to make your own cables, the following information will be useful.

The 25 way D-type connectors on the expansion box are wired as RS232 Data Communications Equipment (DCE). This will allow a straight (Pin 1 to Pin 1 etc) cable to be used for connection to RS232 Data Terminal Equipment (DTE). When connecting to other DCE devices such as modems, however, a "cross over" device or cable will have to be used. (Some terminals curiously are wired as DCE, check in the terminal manual).

The AT8 and AT16 only support those RS232 lines that are used for communications with a terminal. Most modern modems will work with the Chase AT8 and AT16 boards using escape sequences for the additional controls. If you wish to use a primitive modem or similar device that requires modem control then you should use the Chase AT4 card.

| I/O | Description | Pin | | Pin | Description | I/O |
|-----|-------------|-----|---|-----|-------------|-----|
| Input | RX Data | 2 | | | | |
| Output | TX Data | 3 | | | | |
| Input | DSR† | 4 | | | | |
| Output | DTR | 5 | | | | |
| Output | RTS† | 6 | | | | |
| | 0V | 7 | | | | |
| Input††† | DCD† | 8 | | 20 | CTS†† | Input |

(25-way connector diagram, pins 1–13 left column, 14–25 right column)

Notes:
†    Signal only provided on AT4
††   Weak pullup provided on AT8 and AT16
†††   Signal direction is that of DTE

**Figure 5.1**: 25 Way Connector Pinout

The names used in this table use the RS232 naming convention of labelling the signals with respect to the DTE end of the line. Thus pin 2 is for the data transmitted by the terminal and is an input to the AT8 card.

It is not essential to connect all the lines to the AT8. In many applications only lines 2, 3 and 7 will be required provided the terminal is fast enough to handle the data at the maximum baud rate used. If not connected the data terminal ready input (Pin 20) appears active to the AT8 card thus relieving the requirement of a pull-up or loop-back of some form being installed.

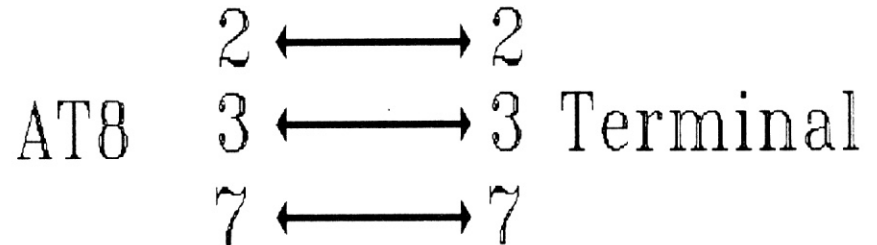Connections for a standard terminal (DTE) will be as follows.

AT8
2 ⟷ 2
3 ⟷ 3 Terminal
7 ⟷ 7

**Figure 5.2**: Software flow control Cable

For a slow terminal, operating at baud rates higher than 9600 baud or where the terminal cannot use XON / XOFF software flow control the following connections are required.

$$
\text{AT8}
\begin{array}{ccc}
2 & \longleftrightarrow & 2 \\
3 & \longleftrightarrow & 3 \\
5 & \longleftrightarrow & 5 \\
7 & \longleftrightarrow & 7 \\
20 & \longleftrightarrow & 20
\end{array}
\text{Terminal}
$$
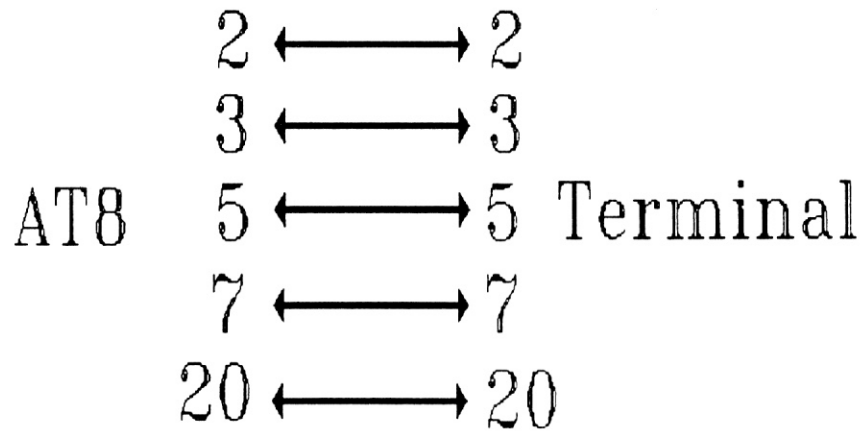
**Figure 5.3**: Hardware Handshake Cable to DTE

For connection to DCE devices the cross-over should be as follows.

$$
\text{AT8}
\begin{array}{ccc}
2 & \times & 2 \\
3 & & 3 \\
7 & \longleftrightarrow & 7 \\
5 & \times & 5 \\
20 & & 20
\end{array}
\text{Terminal}
$$

**Figure 5.4**: Cross over cable to DCE

Some early terminals require that additional signals should also be present on the connector. The normal way to overcome this is to loop-back one of the terminals own output lines to the

required input. You should check the terminal documentation to find out what loop-backs may be required if problems arise.

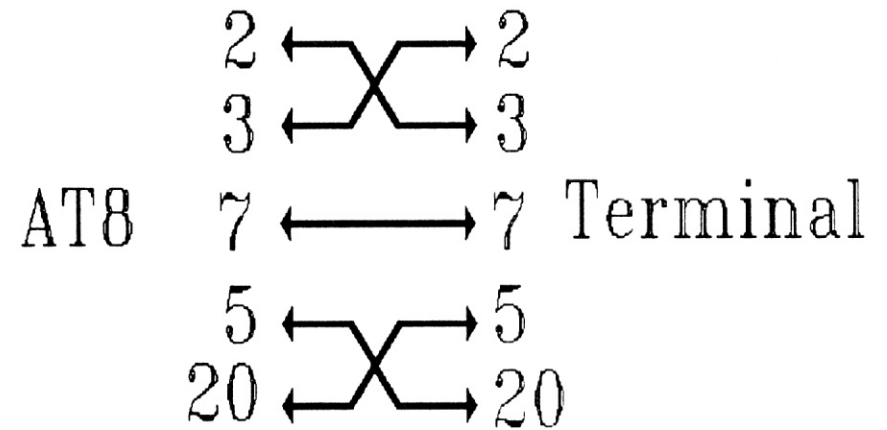The RS232 specification only allows for operation over a maximum of 50 feet and for baud rates of up to 9600 baud. The Chase cards will operate at baud rates of up to 38400 baud with cables longer than this. However if transmission problems do become apparent a lower baud rate should be tried. Chase Research do not guarantee any transmission distance or baud rate outside of the RS232 specification.

Chapter 10 contains details of the end connector pin-out of the cards for those users who do not wish to use the standard terminal connection box provided.

# Chapter 6

# Preparing For Users

The Chase serial I/O cards provide serial ports that operate in the same way as the standard serial lines. This chapter is a quick guide to the operations that may be required to allow users to log in on your system. The first step is to connect the terminal following the cabling guide in the previous chapter. Then follow the steps shown below.

## Setting the Terminal Type

The type of terminal connected to each serial channel is defined in the file /etc/ttytype. This file contains a list of each serial device file and the type of the terminal attached to that device. When the Chase install program is run the new devices that are created will be added to the list in this file. The terminal type will be set to "unknown".

The terminal type indicates which entry in the terminal handling database should be used. This database is usually held in a file

called */etc/termcap*. The latest Xenix and Microport Unix may use an alternate database called "terminfo". When a new terminal is added to the system the file */etc/ttytype* should be edited and the type of the new terminal should be inserted in place of "unknown".

If the terminal type is not already contained in the "termcap" or the appropriate "terminfo" file then it must be added. This can be done by editing the file */etc/termcap* or using the **tic** command for "terminfo". For more information see the sections termcap(M) or terminfo(M) in the User's Reference manual.

# Setting the Line Speed

The line speed and other hardware characteristics of the serial lines are specified by the file */etc/ttys* or */etc/inittab* on Microport Unix V. This file contains a list of serial devices and a code letter which corresponds to a section of the file */etc/gettydefs*. The Chase installation program will have used the standard contents of these files, which normally are set at 9600 baud.

To change the linespeed it will be necessary to edit the file */etc/ttys* and possibly the file */etc/gettydefs*. Details of the structure of the ttys and gettydefs files are contained in the User's Reference sections ttys(M) and gettydefs(F).

Some operating systems do not normally support the higher baudrates of 19200 baud and 38400 baud. This has been

overcome with the Chase cards by using the external clock settings of EXTA and EXTB to represent these speeds.

# Allowing Users to Log In

The final step is to enable "logins" on the serial line. This is done on Xenix and Interactive Unix systems by using the command **enable**. You must log in as 'root', the superuser to use this command. Type `enable ttyname` where "ttyname" is the name of the serial device to be enabled. On Chase boards the serial devices are named tty8a, tty8b, tty8c and so on, up to the number of boards installed. For example the command `enable tty8a` will enable the first serial line on the Chase board. A "login" prompt should appear on the terminal attached to this line.

To disable further Logins on a serial line use the command "disable ttyname" in a similar fashion. If you are using serial lines with modem control then these will have device names with upper case letters, e.g. "tty8A". Note that the upper and lower case devices for the same serial line should never be enabled at the same time.

When enabling or disabling terminals you should be careful not to exceed the number of users specified in your Operating system software licence. Any enquiries about increasing this number should be directed to the company who issued the software licence. Some versions of the operating systems

contain checks to physically limit the number of users to that contained in the licence.

# Chapter 7

# Adding Additional Cards

It is possible to link two or more of the Chase cards together in order to provide more serial lines. If you have two AT8 cards with Version 1 firmware refer to the user manual supplied with the cards. The procedure described here refers to the AT4, AT16 and AT8 cards with version 3 firmware.

In order to produce a multiple card system proceed as follows:

## Install Single Card

Install and check a single card system as normal. If you have two cards of differing versions install the newer (higher serial number) card and device driver.

# Prepare Master Card

Locate the two wire link that is used to connect cards together. This link may be taped to the lid of box which contained the card, or it may be packed loose. Plug one end of this link into the two pins of LK3 labelled MASTER 2&3. On the AT16 LK3 is located near the top edge, at the end away from the 78 way connector. On the AT4 and AT8 LK3 is located above and two the right of the largest square integrated circuit.

This card will be the "master" card providing the lowest numbered ports , starting from tty8a.

# Prepare a Slave Card

Before installing the second card, some header links must be altered. The header links should be removed from LK2. On the AT16 these are located just above the edge connector at the bottom of the board. On the AT4 and AT8 they are near the top edge of the board in the centre.

Now locate LK1, this should normally have two header links on the line of pins marked '5'. Move these two header links onto the line of pins marked '6'.

Next, plug the card into the computer. Now connect the free end of the two wire link into the two sockets of LK3 labelled SLAVE 2&3. You may find it easier to leave the card inserted into the card holder but raised above the motherboard while you

insert the linking wire.  When it is firmly installed the card be lowered down and inserted into the motherboard.

This card will be the a "slave" card and will provide the next set of serial lines. These lines will be named 'tty9a' upwards.

# Adding Further Cards

If you only wish to install two cards the skip to the section named "Restart System".

To add a third card, a similar procedure is followed. Take another two wire link and insert it into LK3 on the second card. It should go into the sockets labelled MASTER 2&3. Follow the instructions for adding a second card, except for LK1. For the third card the two header links should be placed on the pins marked '7'. The two wire link from LK3 MASTER of card 2 goes into the socket of LK3 SLAVE of card 3.

For the fourth and final card the procedure is the same as for the third card except that the two header links on  LK1 should be placed on the pins marked '0'. The ports on the third card will be named 'ttyAa' upwards, those on the fourth card will be named 'ttyBa' upwards.

# Summary of Links

The complete list of links for each card is as follows:

| Card | LK1 | LK2 |
|------|-----|-----|
| 1 | headers on column 5 | headers on columns 11 & 12 |
| 2 | headers on column 6 | no header links fitted |
| 3 | headers on column 7 | no header links fitted |
| 4 | headers on column 0 | no header links fitted |

**Figure 7.1**: Link Settings for Multiple Cards

The two wire links should connect from **LK3 MASTER** on each card to **LK3 SLAVE** on the next card in the chain.

# Restart System

Once the required number of cards have been set up and installed, reboot the system. During the start up sequence you should see a message listing the Chase Cards that are installed. Check this list with the cards that you have installed.

If you do not see this list, make sure the link settings are as shown in the above table. If one or more of the cards appears to be missing from the list then check the two wire links. It is possible that these have been not correctly inserted.

# Running the config Program

You must know tell your operating system that you have installed these extra cards. This is so that the extra devices for the new serial lines can be created. Also, the entries in the terminal description files must be updated.

All this can be done for you by a program that will have been copied to your system during the Chase installation process. The name of this program depends on the type of the board that installed first, and is as follows.

AT4    /etc/at4.config

AT8    /etc/at8.config

AT16   etc/at16.config

Run this program by typing the name and pressing the <enter> key. You will be asked to describe the type of each board that you have installed. You must describe all of the boards, with the Master card first. Then describe the each card in the chain in turn. Follow the instructions that are given on the screen. You will also be asked whether you wish to install the modem ports. These have upper case device names and use hardware flow control by default.

This program will create all the new devices and edit all the terminal configuration files required. See Chapter 6 for full details of this process.

# Chapter 8

# Additional Facilities

If you are simply using your Chase cards to connect serial terminals to your computer then this chapter should not concern you. Users with special needs however should be aware of the additional features of the Chase Research Unix and Xenix device drivers. These features are in addition to those provided in the standard serial line drivers. Chase drivers are downward compatible with the standard serial line drivers so applications written for standard devices will work correctly.

It is most likely that software to use these additional features will be written in the C language and so the examples given below are in that language.

# Alternate Baud Rates

Version 1.03 and later firmware supports a second baud rate table containing a different range of less frequently used line

speeds. The 11 added rates are 45, 55, 57, 66, 80, 1050, 2000, 3600, 7200, 14400 and 31250 baud. The alternate baud rate table can be selected by issuing the ioctl call:

```
word = 1; ioctl ( fd, TCSETB, &word
);
```

and the original table restored with the call

```
word = 0; ioctl ( fd, TCSETB, &word
);
```

The currently selected table can be obtained by using the call

```
ioctl ( fd, TCGETB, &word );
```

which will set the word argument to 0 if the original table is being used and 1 if the new table is selected. The values of TCSETA, TCSETB and those required to select the baud rates are contained in the header file /usr/include/sys/at8.ioctl.h.

# Character Dumping

When the standard Unix or Xenix device driver input queue reaches 256 characters the entire input is discarded. The driver attempts to prevent this by sending XOFF characters when the buffer is nearly full, but only if this feature is enabled.

The Chase cards buffer $511^1$ characters (or 10 lines in ICANON mode) but do not discard them when the input buffer is full. Again attempts are made to stop input by sending an XOFF character if this is enabled. As a final resort the DTR handshaking line will be dropped, if this is enabled. Any further input is still monitored if the channel is in ICANON or ISIG mode in case any special conditions requiring the flushing of the buffer are encountered.

---

1. 1023 characters on the AT4.

# Chapter 9

# Problem Solving

If your Chase card fails to perform correctly please check the following points.

## Is the terminal plugged in ?

Check that the terminal is connected to the mains supply and turned on.

Check that the terminal keyboard is plugged in.

Check that the serial cable is connected to the terminal and the correct computer port.

Check the expansion box is plugged into the correct card.

# Is the Chase card correctly installed ?

If the Chase Controller and Unix or Xenix device driver is installed correctly the operating system will indicate the number of available controllers and ports during the power up sequence. If the card is not correctly installed then a fault will be indicated by the following message at power up and *none* of the terminals connected to the Chase board will operate.

```
Chase Serial I/O controller version
?.??: card not responding.
```

Check that the card is plugged in and that the two links in the field labelled LK1 on the card are installed in position 5. Two links should be installed in field LK2 at positions 11 and 12. Link LK4 should not be installed.

```
device driver version older than
cards.
```

The device driver installed on the machine is older than the card that has been installed, install the new device driver software that was provided with the new card.

# Is the terminal enabled ?

A non-echoing terminal may not be enabled. Check the Xenix Operations Guide section on adding terminals. Also check the section in the manual on restoring a non-echoing terminal.

# Is the system running in Multi-User mode ?

Only the console terminal is enabled when the system is in single user (System Maintenance) mode. You can check which mode you are in by using the command **who am i** if no response is given then you are in single user mode, type ^D to switch to multi-user mode.

This section applies only to Xenix systems, Unix has a different concept of "run levels", see the Unix documentation.

# Is terminal correctly configured ?

A terminal that displays garbage when output is directed to it is probably due to incorrect line settings.

Check that the terminal settings for baud rate, parity and character length match those set by the operating system.

# Is the terminal type correctly configured ?

A terminal that appears to operate correctly and only gives strange results when using programs that move the cursor around the screen probably has an incorrect terminal type specified.

Check the Operations Guide section on changing terminal types and also the application program's documentation on the same subject.

# Chapter 10

# Connector Pinouts

The distribution boxes supplied with the Chase serial I/O cards provide standard 25way D-type connectors wired as RS-232 DCE. The following pinouts are provided for those users with special requirements who may wish to connect directly to the connector on the cards bypassing the standard box. The labelling used here does not follow the RS232 convention used in Chapter 5 of this manual but instead refers to the pin designation on the cards UARTs.

| Name | Pin | Pin | Name | Dir. |
|======|=====|=====|======|======|
| TXD_0 | 1 | | | O |
| | | 20 | DSR_0 | I |
| DTR_0 | 2 | | | O |
| | | 21 | DCD_0 | I |
| RTS_0 | 3 | | | O |
| | | 22 | CTS_0 | I |
| 0V | 4 | | | - |
| | | 23 | RXD_0 | I |
| TXD_1 | 5 | | | O |
| | | 24 | DSR_1 | I |
| DTR_1 | 6 | | | O |
| | | 25 | DCD_1 | I |
| RTS_1 | 7 | | | O |
| | | 26 | CTS_1 | I |
| 0V | 8 | | | - |
| | | 27 | RXD_1 | I |
| TXD_9 | 1 | | | O |
| | | 28 | DSR_2 | I |
| DTR_1 | 10 | | | O |
| | | 29 | DCD_2 | I |
| RTS_2 | 11 | | | O |
| | | 30 | CTS_2 | I |
| 0V | 12 | | | - |
| | | 31 | RXD_2 | I |
| TXD_3 | 13 | | | O |
| | | 32 | DSR_3 | I |
| DTR_3 | 14 | | | O |
| | | 33 | DCD_3 | I |
| RTS_3 | 15 | | | O |
| | | 34 | CTS_3 | I |
| 0V | 16 | | | - |
| | | 35 | RXD_3 | I |
| 0V | 17 | | | - |
| | | 36 | +5V | O |
| +12V | 18 | | | O |
| | | 37 | | O |
| -12V | 19 | | | O |

**Figure 10.1:** AT4 Connector Pinout

| Name | Pin | Pin | Name | Dir. |
|======|=====|=====|======|======|
| TXD 0 | 1 | | | O |
| DTR 0 | 2 | 20 | RXD 0 | I |
| | | 21 | CTS 0 | I |
| TXD 1 | 3 | | | O |
| DTR 1 | 4 | 22 | RXD 1 | I |
| | | 23 | CTS 1 | I |
| TXD 2 | 5 | | | O |
| DTR 2 | 6 | 24 | RXD 2 | I |
| | | 25 | CTS 2 | I |
| TXD 3 | 7 | | | O |
| DTR 3 | 8 | 26 | RXD 3 | I |
| | | 27 | CTS 3 | I |
| TXD 4 | 9 | | | O |
| DTR 4 | 10 | 28 | RXD 4 | I |
| | | 29 | CTS 4 | I |
| TXD 5 | 11 | | | O |
| DTR 5 | 12 | 30 | RXD 5 | I |
| | | 31 | CTS 5 | I |
| TXD 6 | 13 | | | O |
| DTR 6 | 14 | 32 | RXD 6 | I |
| | | 33 | CTS 6 | I |
| TXD 7 | 15 | | | O |
| DTR 7 | 16 | 34 | RXD 7 | I |
| | | 35 | CTS 7 | I |
| 0V | 17 | | | - |
| +12V | 18 | 36 | | O |
| -12V | 19 | 37 | | O |

**Figure 10.2:** AT8 Connector Pinout

| Name | Pin | Pin | Pin | Pin | Name |
|------|-----|-----|-----|-----|------|
| +12V | 1 | | 40 | | −12V |
| RXD 15 / TXD 15 | 2 | 21 | 41 | 60 | CTS 15 / DTR 15 |
| RXD 14 / TXD 14 | 3 | 22 | 42 | 61 | CTS 14 / DTR 14 |
| RXD 13 / TXD 13 | 4 | 23 | 43 | 62 | CTS 13 / DTR 13 |
| RXD 12 / TXD 12 | 5 | 24 | 44 | 63 | CTS 12 / DTR 12 |
| 0V / 0V | 6 | 25 | 45 | 64 | 0V / 0V |
| RXD 11 / TXD 11 | 7 | 26 | 46 | 65 | CTS 11 / DTR 11 |
| RXD 10 / TXD 10 | 8 | 27 | 47 | 66 | CTS 10 / DTR 10 |
| RXD 9 / TXD 9 | 9 | 28 | 48 | 67 | CTS 9 / DTR 9 |
| RXD 8 / TXD 8 | 10 | 29 | 49 | 68 | CTS 8 / DTR 8 |
| +5V / +5V | 11 | 30 | 50 | 69 | +5V / +5V |

**Figure 10.3:** AT16 Connector Pinout
Part 1 of 2

| Name | Pin | Pin | Pin | Pin | Name |
|------|-----|-----|-----|-----|------|
| RXD 7 / TXD 7 | 12 | 31 | 51 | 70 | CTS 7 / DTR 7 |
| RXD 6 / TXD 6 | 13 | 32 | 52 | 71 | CTS 6 / DTR 6 |
| RXD 5 / TXD 5 | 14 | 33 | 53 | 72 | CTS 5 / DTR 5 |
| RXD 4 / TXD 4 | 15 | 34 | 54 | 73 | CTS 4 / DTR 4 |
| 0V / 0V | 16 | 35 | 55 | 74 | 0V / 0V |
| RXD 3 / TXD 3 | 17 | 36 | 56 | 75 | CTS 3 / DTR 3 |
| RXD 2 / TXD 2 | 18 | 37 | 57 | 76 | CTS 2 / DTR 2 |
| RXD 1 / TXD 1 | 19 | 38 | 58 | 77 | CTS 1 / DTR 1 |
| RXD 0 / TXD 0 | 20 | 39 | 59 | 78 | CTS 0 / DTR 0 |

**Figure 10.4:** AT16 Connector Pinout
Part 2 of 2

# Chapter 11

# Hardware Interface

# Reserved Hardware

The Chase Serial I/O cards use several hardware lines and addresses for communication with the computer. It is important that a check is made to insure that no conflicts occur with any other hardware that is installed. If a conflict does occur then it is likely that both devices causing the conflict will fail to operate.

The Chase cards use the following hardware:

A single Chase card if installed will use DMA Channel 5 as indicated by the placing of two links in column 5 of the link field LK1. If a second card is installed then it should be configured to use DMA channel 6 by moving these links to column 6. The third card should use DMA channel 7 and the fourth channel 0.

The first card installed uses interrupt lines 11 and 12 as indicated by the links installed in field LK2. When a second or further

card is installed these links should be removed as the second card will pass its interrupts via the first card.

The Chase I/O cards reserve eight consecutive bytes of I/O space starting at the hexadecimal address 0x1F8 as indicated by the links in field LK6. When multiple Chase cards are installed they will correctly share this region but no other cards should overlap with this.

# Link Fields

The Chase cards contain six link fields numbered LK1 through LK6 used to configure the IBM PC/AT hardware used. The default values used are described in the previous section. Changing these links in order to add further cards is described in section 7 of this manual.

The descriptions of the link fields contained here is for information only, any changes made beyond those detailed in section 7 must be made by an authorised technician and could result in damage both to the Chase AT8 card and the host computer unless performed correctly.

Any changes to the links will require the corresponding changes to be made to the device driver software. You should consult your distributor for information on how to make the necessary changes to the software or to obtain a new device driver.

The purpose of each of the link fields is as follows:

LK1     This field selects one of the seven available DMA channels. Two links should be placed in the required column.

LK2     Field two is used to select the two interrupts required by the card. A link between the upper two rows specifies the first interrupt used and between the lower two rows the second interrupt.

LK3     This is not really a link field, it is used to connect two card together for dual card operation. The three pins marked master on the master card are connected to the corresponding slave pins on the slave card using the three wire link provided. With version 3 firmware only links 2 and 3 are used and it is possible to daisy chain several cards together.

LK4     This link if installed forces the card into test mode and should not normally be used.

LK5     This link is no longer used.

LK6     Finally this field specifies the I/O address used by the card. If a link is installed in a location then the corresponding address bit must be a zero when accessing the card.

# Appendix A

# Manual Pages

The following pages represent the manual pages for the special device files. They form part of Miscellaneous section of the Xenix or Unix User's Reference Manual.

If the facility exists on your system a copy will be placed in the on-line manual of your system by the installation program.

**Name**

tty[89AB][a-p] - Interface to intelligent
serial ports.

**Description**

These special files provide access to the
serial ports provided by the Chase Research
AT range of intelligent serial I/O cards.
The files beginning 'tty8' correspond to
the ports of the first card, those
beginning 'tty9' correspond to the ports of
the second card and so on, up to a maximum
of four cards. The final letter of the
device name corresponds to the actual port
on the card. So device names ending in 'a'
are the first port of that card, those
ending in 'b' correspond to the second and
so on. Names run from 'a' to 'd' for the
AT4, 'a' to 'h' for the AT8 and 'a' to 'p'
for the AT16. If this final letter is an
upper case character then that port has its
modem control lines enabled.

Some examples of these device naming
conventions follow. The special file
'tty8a' refers to the first port on the
first card installed. 'tty9a' refers to the
first port on the second card installed.
'tty8B' refers to the second port on the

second card and has its modem control lines enabled.

The ports are software compatible with the operation of the standard serial ports 'ttyla'and 'tty2a' with the exception that the extra baud rates of 19200 and 38400 are supported as speeds EXTA and EXTB respectively.

The minor device numbers used for the ports correspond to the lettering of the ports directly, 0 for tty8a, 1 for tty8b and so on.

The interrupt and DMA lines used by the card are described in the Chase AT range users manual together with the I/O addresses used.

**Access**

The serial channels may only be accessed if the corresponding card has been installed together with the kernel device driver. (See the Chase AT Range Users Guide for details of how to install the device driver and cards).

The connections on the 25 way D-type connectors on the 8 way expansion block correspond to RS232 DCE (Data

Communications Equipment) and are as follows.

| Pin | Description | Direction |
|-----|-------------|-----------|
| 2 | Receive Data | Input |
| 3 | Transmit Data | Output |
| 5 | Clear To Send | Output |
| 7 | Signal Ground | – |
| 20 | Data Terminal Ready | Input |

All that is required for connection to a terminal wired as DTE (Data Terminal Equipment) is a straight lead (Pin 1 connected to Pin 1, Pin 2 to Pin 2 and so on).

Only pins 2, 3 and 7 are necessary for a terminal or direct connection the other lines being designed to "float" to their active state. At the higher baud rates it is advisable to connect the remaining two lines to provide hardware handshake.

The type of terminal connected to each serial channel is defined in the file **/etc/ttytype** which defines which section of the **termcap(M)** or **terminfo(M)** databases to use. This file should be checked as new terminals are installed to see that it contains the correct terminal type and altered if needed.

The initial speed and mode of operation of
a given serial line is contained in the
file **/etc/ttys** cross referenced to the file
**/etc/gettydefs**. Again this should be
checked as terminals are installed.

Finally the commands **enable(C)** and
**disable(C)** are used to enable and disable
user access to a given terminal, their
operation being described in the Xenix
Reference Manual and User Guides.

**Files**

```
/dev/tty8[a-p]   The serial channels
/etc/ttys        Line speed and status
information
/etc/gettydefs   Line speed and setup
reference
/etc/ttytype     Terminal type information
/etc/termcap     Default terminal type
database
```

**See Also**

```
enable(C),
disable(C),
gettydefs(F),
termcap(M),
terminfo(M),
ttys(M)
```

# NOTES