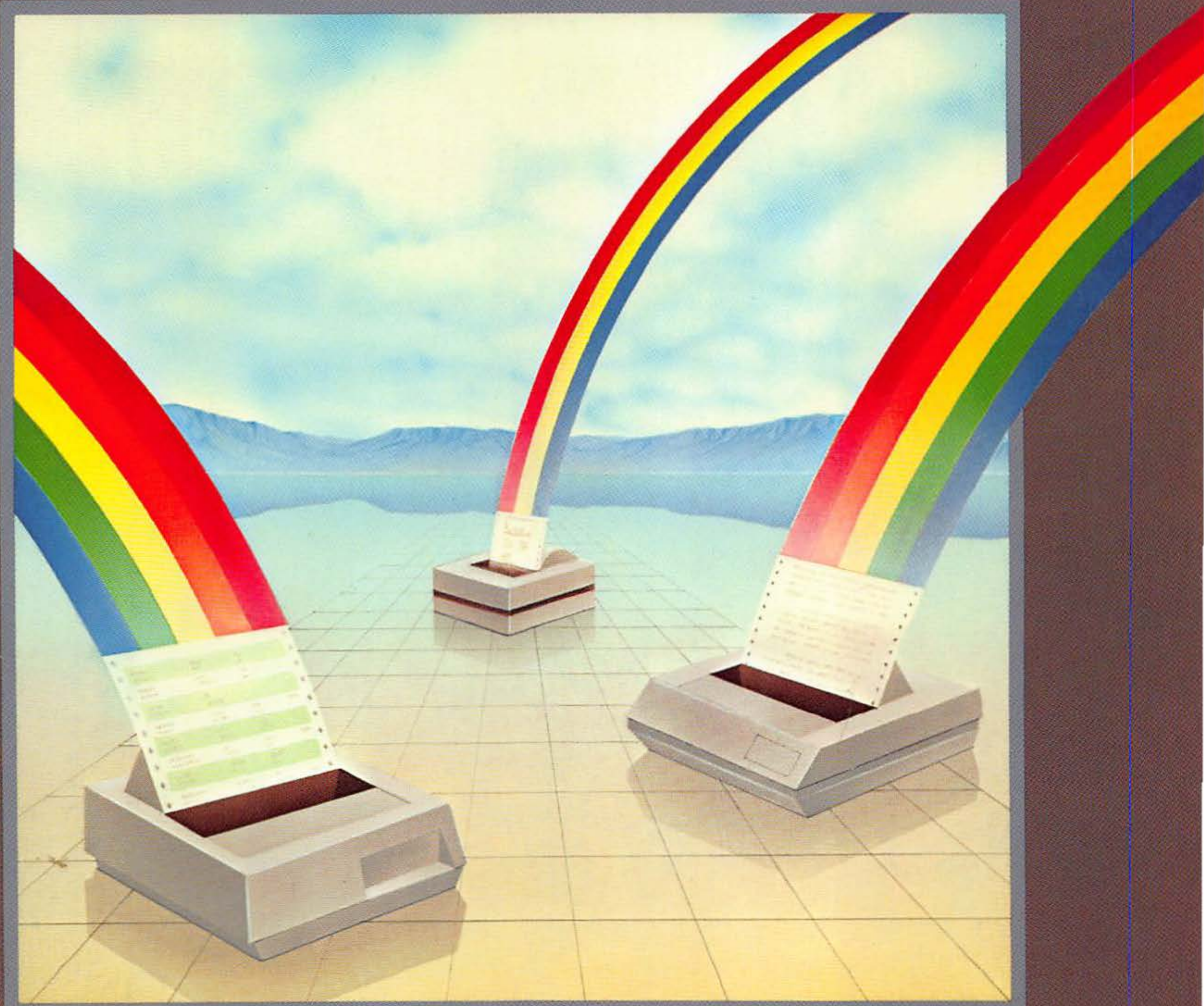
SAMS

22406

The Waite Group

Printer Connections Bible

Kim G. House • Jeff Marble



Printer Connections Bible

Kim G. House and Jeff Marble

Printer Connections Bible

HOWARD W. SAMS & COMPANY
A Division of Macmillan, Inc.
4300 West 62nd Street
Indianapolis, Indiana 46268 USA

The Waite Group has made every attempt to supply trademark information about company names, products, and services mentioned in this book. The trademarks indicated below were derived from various sources. The Waite Group cannot attest to the accuracy of this information.

Apple IIc, Apple Macintosh are registered trademarks of Apple Computer, Inc.
AT&T 6300 is a trademark of AT&T Technologies
Centronics is a registered trademark of Centronics
DEC, DEC Rainbow are trademarks of Digital Equipment Corporation
Diablo is a registered trademark of Xerox Corp.
Epson, FX/MX, LQ 1500 are trademarks of Epson America, Inc.
Fujitsu is a registered trademark of Fujitsu Microelectronics, Inc.
Hewlett Packard Laser Printer, Thinkjet, HP 150 are registered trademarks of Hewlett Packard
IBM, IBM-PC, PCjr, IBM-XT, IBM-AT are registered trademarks of International Business Machines, Inc.
Kaypro is a registered trademark of Kaypro Corporation
NEC is a registered trademark of NEC Information Systems
Okidata is a registered trademark of Okidata
Osborne Exec is a trademark of Osborne Computer Corporation
Qume is a registered trademark of Qume Corporation
RS Model 100/200 are registered trademarks of Radio Shack, Tandy Corporation
Smith Corona, Brother are trademarks of Smith Corona Corporation
TI Professional Computer is a trademark of Texas Industries, Inc.

FIRST EDITION
THIRD PRINTING — 1988

International Standard Book Number: 0-672-22406-2
Library of Congress Catalog Card Number: 85-72104

Illustrations by Kim G. House, Jeff Marble, and Mary Johnson
Typography by Graphic Typesetting Service
Production Support by Bookman Productions

Printed in the United States of America

Dedication

This book is lovingly dedicated to our goddaughters:
Alexandra and Jessica Lea

Acknowledgments

We would like to thank Mitchell Waite for his insightful vision of what a "connections" book should be. Our very special thanks to Robert Lafore for contributing Chapter 3 on the general theory of how printers and computers work together, as well as his helpful editing. And finally our thanks go to Amy Haines, Barry Richman, Charles Stevenson, John Obst, and Jim Rounds for providing patient enthusiasm throughout.

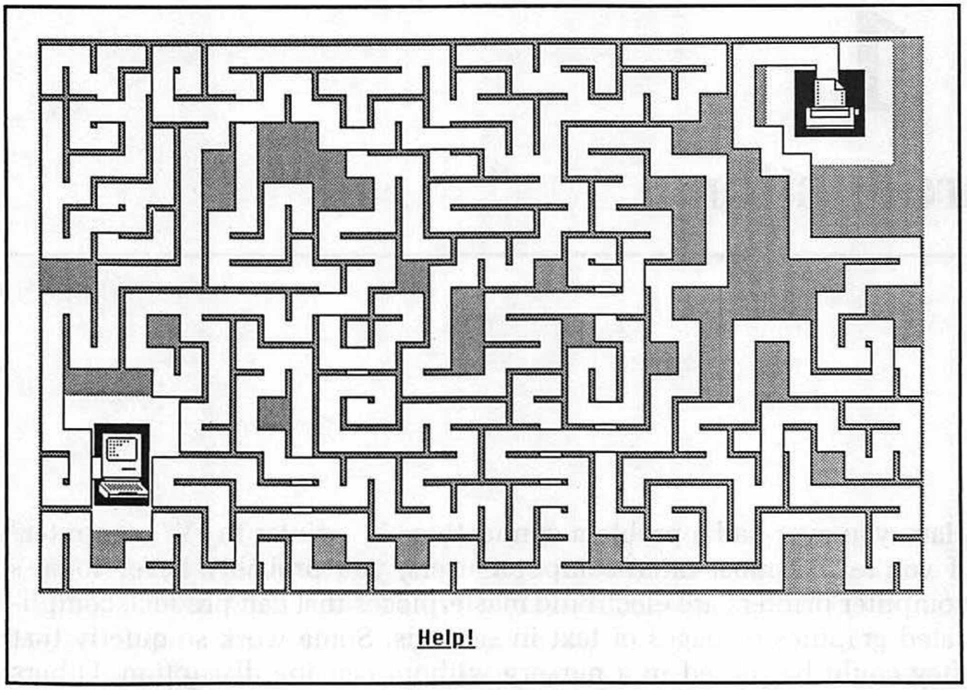
Contents

1
Introduction

Have you ever had a problem connecting "X" printer to "Y" computer? If you're like most microcomputer users, you probably have. Today's computer printers are electronic masterpieces that can produce complicated graphics or pages of text in seconds. Some work so quietly that they could be placed in a nursery without causing disruption. Others can interpret various fonts and high-resolution pictures and yield near typeset quality. Unfortunately, none of these printers can manage to connect itself properly to a computer. To do so, you must go through a great deal of technically difficult and often tiresome research.

This "digging" can mean hours of frustration for the user, reading through complex and often inaccessible manuals, trying to make a cable that may or may not perform after hours of work. The hardware side of these connections can be baffling. Our own frustration in attempting to attach "X" peripheral to "Y" computer led to the idea of a "connections" series (*Printer Connections Bible* and its companion, *Modem Connections Bible*, are just the beginning). Unnecessarily "techy" manuals and close-mouthed manufacturers spurred us on. We wanted to present arcane information about connecting expensive equipment in an inexpensive and easy-to-understand format.

We tried to come up with a way to talk about cables and connections that wouldn't be intimidating to a nontechnical user. Electronic schematics and reference charts seemed overly imposing and often hid information rather than making it accessible. We wanted to include all the hardware information needed to get a printer printing, from pinouts for cables to DIP switches for the printer. Finally, quite naturally, we chose a visual format for the book. At first we tried sketches, but then we decided to use current microcomputer technology for our drawings. The



The maze of printer/computer connections

Apple Macintosh® seemed well suited to our purposes. By using MacPaint and "Fatbits," along with all the cutting and pasting tricks we could discover, we drew every diagram (and a good number of the chapter figures) in this book. These numerous connection diagrams represent many, many person hours, not only in drawing time but also in technical research. Again, the idea behind all this labor is to give you information that is clear and easy to use.

The Contents and Scope of This Book

Printer Connections Bible is designed to help you manage the maze of connecting nightmares. Because printers are an expensive resource that should be and often are necessarily shared, we want our readers to be able to readily hook them up to various computers. We have focused on the hardware side of connecting printers and computers, particularly the main interface, the cable itself. Though a brief discussion about how computer software "drives" printers is included in Chapter 3, we could not possibly discuss all the variations of software for each printer. The main part of this book consists of easy-to-read diagrams that have all the information you'll need for hardware connections for a wide variety of printers and computers (if you look at the Jump Table in Chapter 4, you'll see exactly which printers and computers are discussed). In reading this book you'll also find a good deal more about printer technology, cables, and connectors than you were told about at the local computer store.

We have arranged information in a way that should be useful for the most readers. If you are just beginning to explore the world of "connections," we recommend that you start here and work your way through the text portions of the book. You'll find many helpful connecting tips and information on the general theory of printer/computer communications. Chapter 4 is a must for all readers because it explains how the table and diagrams are organized. Appendices A and B will be helpful for occasional reference as you use the connection diagrams, whereas Appendices C and D should be used for general reference. Readers who need immediate information for particular printer/computer connections and who already have a good grasp of hardware wiring may simply want to use this book for a handy reference.

We have presented information in the connection diagrams on a number of popular printers and computers, but it is beyond the scope of this book to cover *all* the possible combinations of the myriad printers and computers on the market. At the end of 1985, there were more than 250 printers compatible with the IBM PC® alone. So we have tried to cover printers that represent a range of uses, from dot matrix to laser.

Types of Printers

Printers come in two main varieties: fully formed character and matrix. In the past few years many variations on these two basic technologies have been produced, and the distinctions between the two have melted considerably. An old-style printer, the thermal-transfer, has some new wrinkles. The most recent arrivals, and the most technically fascinating, are the laser printers. By way of introduction, we'll briefly review the kinds of printers available today.

Fully Formed Character Printers

In the past the term *letter quality* was often used for printers whose output was similar to that of a typewriter. Today this term has been expanded to include any printout that is clear and easily read. Therefore, we have chosen the term *fully formed character* to better distinguish a certain type of printer. As the name implies, these printers produce a single complete character when printing by means of a "strike" mechanism that hits a ribbon and then the paper. This impact produces a fully formed character. These printers fall into two basic categories: daisywheel and thimble (typewriters functioning as printers would also be considered fully formed character printers).

Daisywheels are the more popular of the two kinds. The term *daisywheel* is derived from the fact that the print wheel (akin to the ball on an electric typewriter) looks something like a flower. Each "petal" radiates out from the central hub and has a single character on its tip. When printing, the daisywheel rotates to the proper character. A hammer strikes the character against the ribbon and then the paper, creating a fully formed letter or symbol.

Thimble printers may be considered variations of daisywheel printers. The spokes of the wheel are bent at 90 degrees so that the wheel looks something like a thimble. Again a hammer hits the appropriate spoke and imprints the paper with the proper character.

The wheels on both daisywheel and thimble printers may be interchanged, so various fonts are possible. The main advantage of these fully formed character printers is the excellent quality text they produce. However, producing graphics with these printers is almost impossible. They also tend to be rather noisy (understandable, with all the hitting that goes into producing one line of text), and are often slow. On the other hand, graphics and silence are not what these printers were designed for; rather they're made to produce very steady, readable text. And they do a very fine job indeed.

Matrix Printers

Matrix printers form characters, symbols, and graphics from a series of tiny dots, much as the video display characters on a computer screen are formed by a series of pixels. By far the most popular printer for microcomputers is the dot matrix printer (or impact dot matrix printer), which is an impact printer that puts dots on paper with fine wires or pins that strike the page. Another matrix printer, the ink jet, sprays tiny dots of ink on paper, while the older style "thermals" use heat to burn dots into specially treated paper.

The tiny size of the dots used by matrix printers makes them extremely flexible. Almost any character or symbol can be created by variations on the dot patterns. The patterns that make up the main character sets are often programmed into the printer's ROM (Read Only Memory). New interchangeable ROM chips give these printers the same kind of font choice that is available on the wheels of daisywheel printers. Software control via the computer can also be used to change the style of characters printed (as is so easily apparent and readily available with computers like the Apple Macintosh). The dot patterns can also be controlled via software to provide nearly limitless graphics capabilities, everything from charts to reproductions of photographs.

The old gripe against these matrix printers was the poor quality of their output. Spaces between the dots that form the characters produced the dreaded "dot matrix look," which was long spurned by business users. New technology has moved into something called "correspondence" quality, generated by very high dot densities (via more pins, printer head passes, or both) and new font designs that mimic those produced by fully formed character printers.

The main advantages of these dot matrix printers are price and versatility. They are considered the workhorses of the printer world. Understandably, most of the printers covered in this book are matrix printers.

The Laser

Laser printers have actually been available for some time, but their price has kept them out of the league of microcomputer users. Recently, however, prices have dropped dramatically, and the technology and quality of lasers are now firmly in the microcomputer realm.

All laser printers work on the same principle as a small copying machine. Simply put, the copying machine reproduces a complete image on a special rotating, photosensitive drum, which is in turn transferred to paper via a heating unit that fuses sensitized toner to the paper's surface. Similarly, a laser printer reproduces an image against a rotating, multifaceted mirror. The image is created dot by dot (not photographically) as the laser flashes on and off against the mirror, which reflects against the surface of a drum and then employs the same copier technique for transferring toner to the paper.

The number of dots per inch that the laser can produce is staggering when compared to the average dot matrix—300 (or more) vertically and horizontally, as compared to an average of 80 by 100. The laser's printouts are of extremely fine quality. (All the diagrams in this book were first printed on a laser printer and then reduced to the proper size for printing.) However, the arranging of all the dots requires huge amounts of memory. Laser printers usually come with large memories; if they didn't, they wouldn't be able to "remember" all the dots. The advantages of laser printers are the excellent quality, versatility, and quietness (there's no impact noise); the main disadvantage is still price.

Summary

We have presented the various types of printers to give an overview of the hardware available. No matter what kind of printer you have, we want you to be able to hook it up to whatever computer is available (within reason). We offer this book as a valuable, hope-filled first step toward that "connecting" desire.

2

Connectors and Cablemaking

You likely got this book because you want to make a particular connection. This book is designed to help you make your own cables, which will free you from having to track down expensive, and often scarce, ready-made cables and adaptors. In this chapter we will describe several ways to make cables by examining different types of connectors, including those for ribbon cables, as well as the grabber, crimp, and solder types.

Cable and Connector Types

Connector Types

The illustration in Figure 2-1 shows all the different kinds of connectors referenced in this book. You'll learn to recognize these connectors as you become familiar with the cabling diagrams. The cable connectors for each printer/computer combination correspond to the connector on the printer and the computer. For example, if the printer has a standard female DB-25 pin connector, the corresponding cable end will require a DB-25 pin male. Notice that the genders must be *opposite* for a connection.

Figure 2-2 details the basic components that make up a connector. The pins (or sockets in female connectors) are the contacts for the connection, and each is numbered. The face plate has holes for screws to

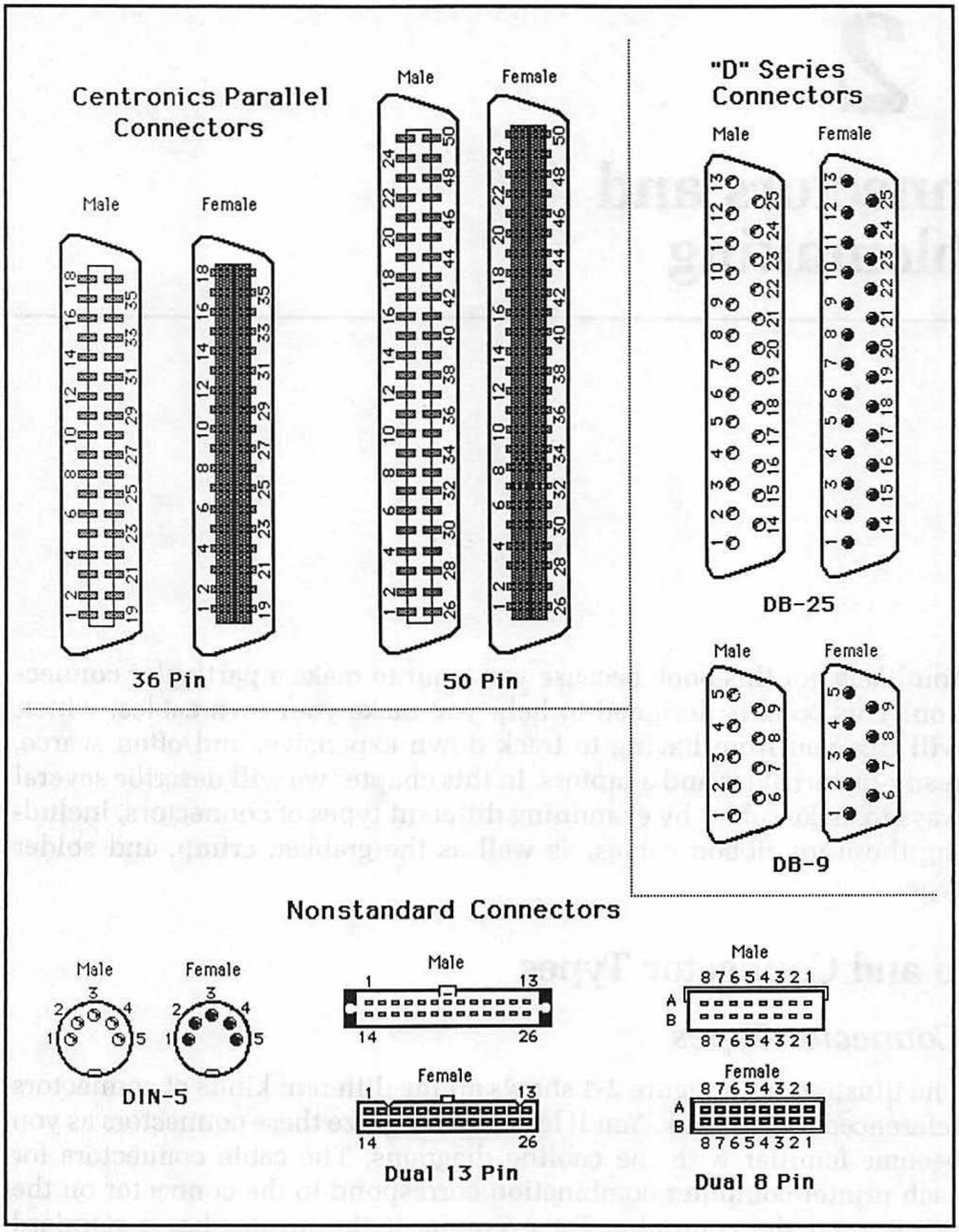


Figure 2-1 Varieties of connectors

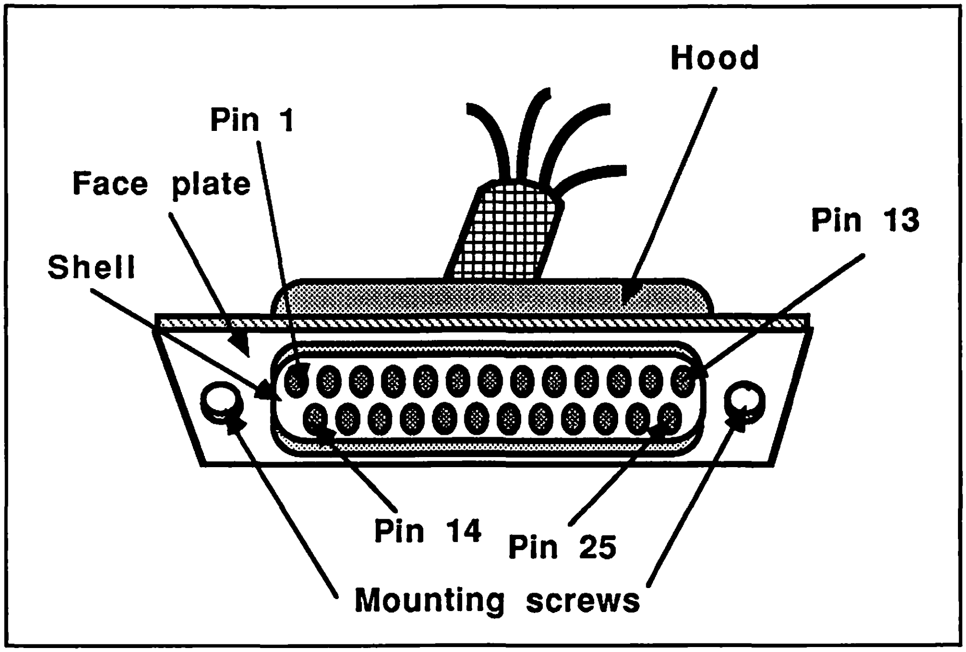


Figure 2-2 Basic components of a connector

attach the cable to the printer or computer. The connector itself is often referred to as a shell. The shell is in turn surrounded by a hood or jacket to protect the somewhat fragile connections to the pins.

Ribbon Cable

The type of cable you'll need for your cablemaking will depend somewhat upon the type of connector that's required for your particular printer/computer combination. If your printer/computer combination requires a dual 13-pin-type connector, you may want or need to use ribbon-type cable as illustrated in Figure 2-3. Ribbon cable is used almost exclusively (there are rare exceptions) with crimping-type connectors that actually pierce the insulation of the individual strands of wire to make the proper connection. Because the tiny "daggers" that make contact are necessarily lined up in a row, your connections must be straight across. In other words, pin 1 goes to pin 1, pin 2 to pin 2, and so on. Therefore, ribbon cable has a limited number of applications.

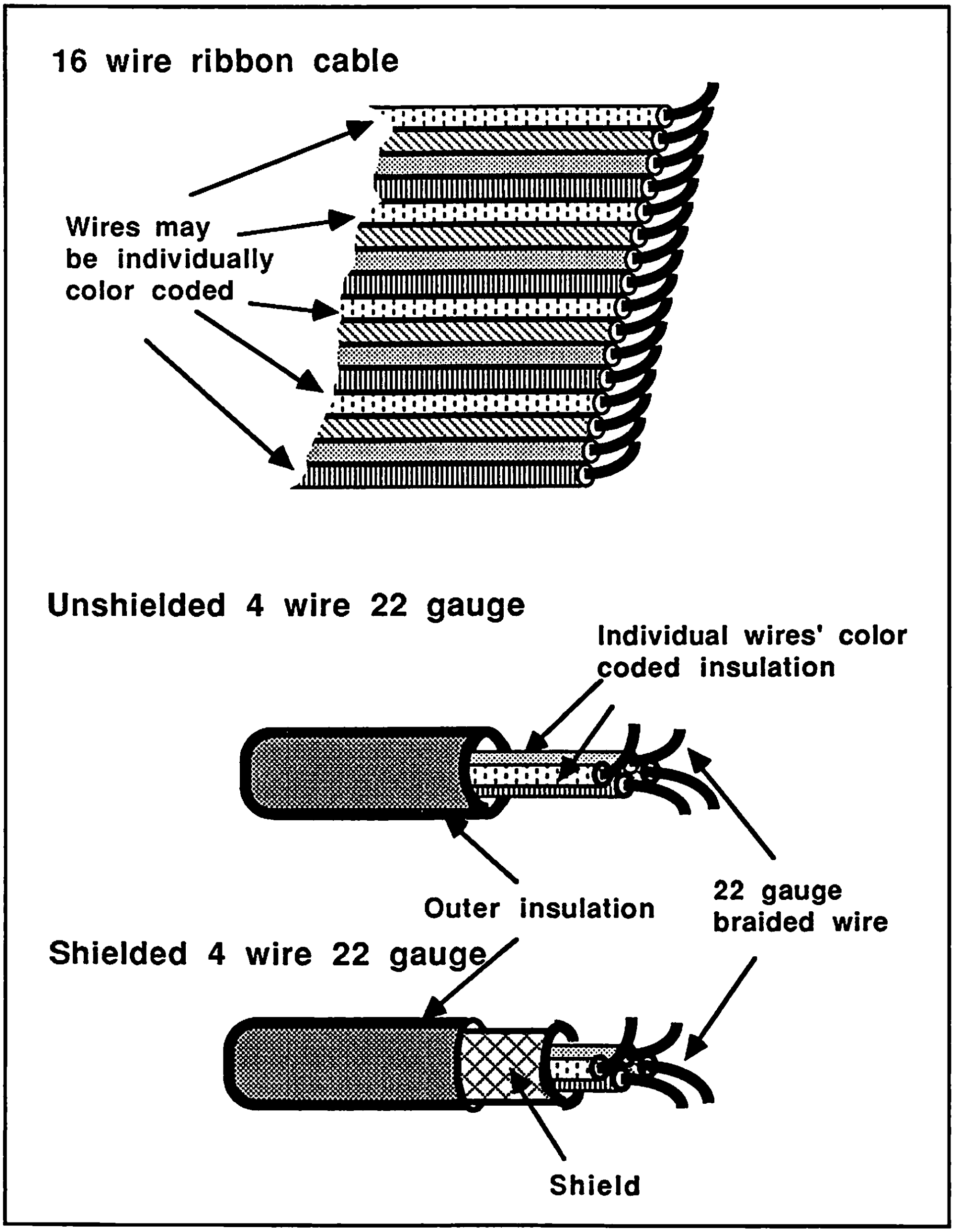


Figure 2-3 Varieties of cables

Unshielded and Shielded Cable

For most connections, standard 22-gauge (the gauge determines the size of the cable; the higher the number, the smaller the diameter of the cable) unshielded cable is suitable. The number of conductors per cable ranges from 4 to 40, though 4, 7, 10, 15, and 25 "wire" are the standard sizes.

In certain environments a "shielded" cable may be required. An aluminum mylar shield wraps the conductors to provide protection from radio and electronic noise. Large amounts of radio noise (from ham radio transmitters and so on) can interfere with the data transmissions from your computer to your printer. In Chapter 3 we will explore the theory of how computers and printers communicate. For now, suffice it to say that *unshielded* cable will work well in most environments. Because shielded cable is more expensive and sometimes difficult to obtain in odd sizes, it's best to use unshielded cable unless you know that your application will require the protection of shielded cable.

The length of cable you buy will depend upon your particular needs. Be sure to have enough extra cable to make a comfortable connection. However, too much cable may result in tangled connections and make moving equipment a nightmare. A good rule of thumb is to make your cables about 3 feet longer than your anticipated need. For parallel cables, anything longer than 25 feet will require special low-capacitance cable; for serial cables, the same is true at 50 feet.

Cablemaking

Now that we have looked at the kinds of connectors and cables available, we can begin to discuss how to actually make a cable.

Earlier we stated that you wouldn't have to do any soldering in order to make the cables described in this book. It's true! You really don't have to know how to solder to make functioning cables, but it will help immensely. In fact for certain nonstandard connectors, crimping or grabbing kits aren't available, so soldering is essential. Besides, soldering really isn't difficult (as you'll see in this chapter). You may find it easier and less expensive to make a cable with a solder-type connector than with the solderless methods available.

Solderless Cables

One of the solderless methods for making cables employs a "grabber," which can be found at most electronic supply stores (see Figure 2-4). A grabber is used on special "wire wrap" connectors, which have long pins

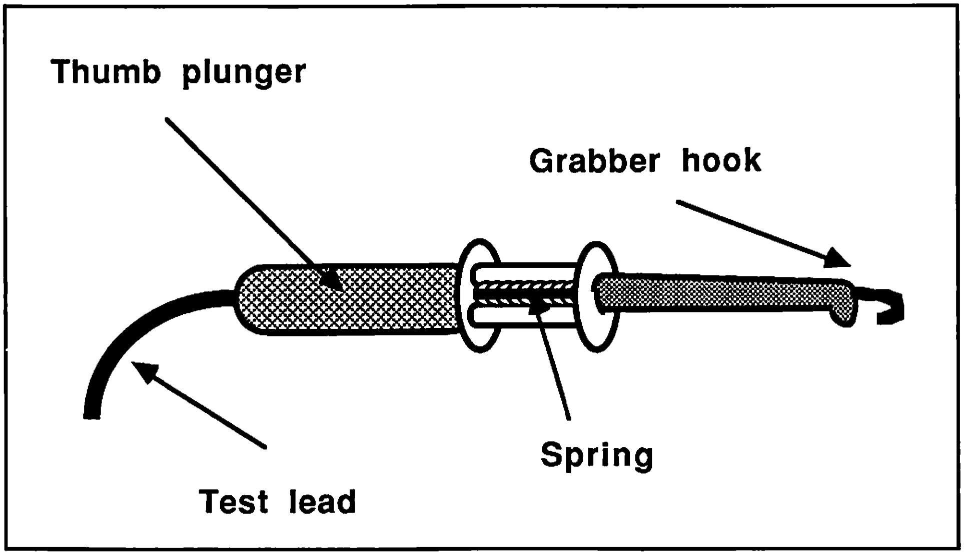


Figure 2-4 Grabber

so that the wires can be wrapped and crimped on. This crimping is accomplished with the grabber. Because there are different-sized connectors and wires, there are many different-sized grabbers, though for computer cablemaking one or two sizes of grabbers should be sufficient.

Crimp-Type Connectors

Another solderless connector that is even easier and less expensive to build is a crimp-type connector, which uses pins that are crimped (or soldered) to the cables and then inserted into the connector at the proper location. This style connector can mean easier assembly because each pin is crimped (or soldered) away from the shell where there is sufficient workspace. You just insert the stripped cable end into the open end of the crimp-style pin and "crimp" it down with pliers or a special crimping tool. Then you insert the pins in the proper location on the shell. This type of connector also allows for the possibility of revising pin assignments without having to desolder. You simply extract the pins and relocate them to suit the new configuration. You may want to purchase a special "pin insertion/extraction tool" for mounting the pins in the connector, though a good pair of long-nose or needlenose pliers will work just as well. Crimp-type connectors usually come in kits consisting of 25 or more pins (either crimp or solder type), connector, hood, and

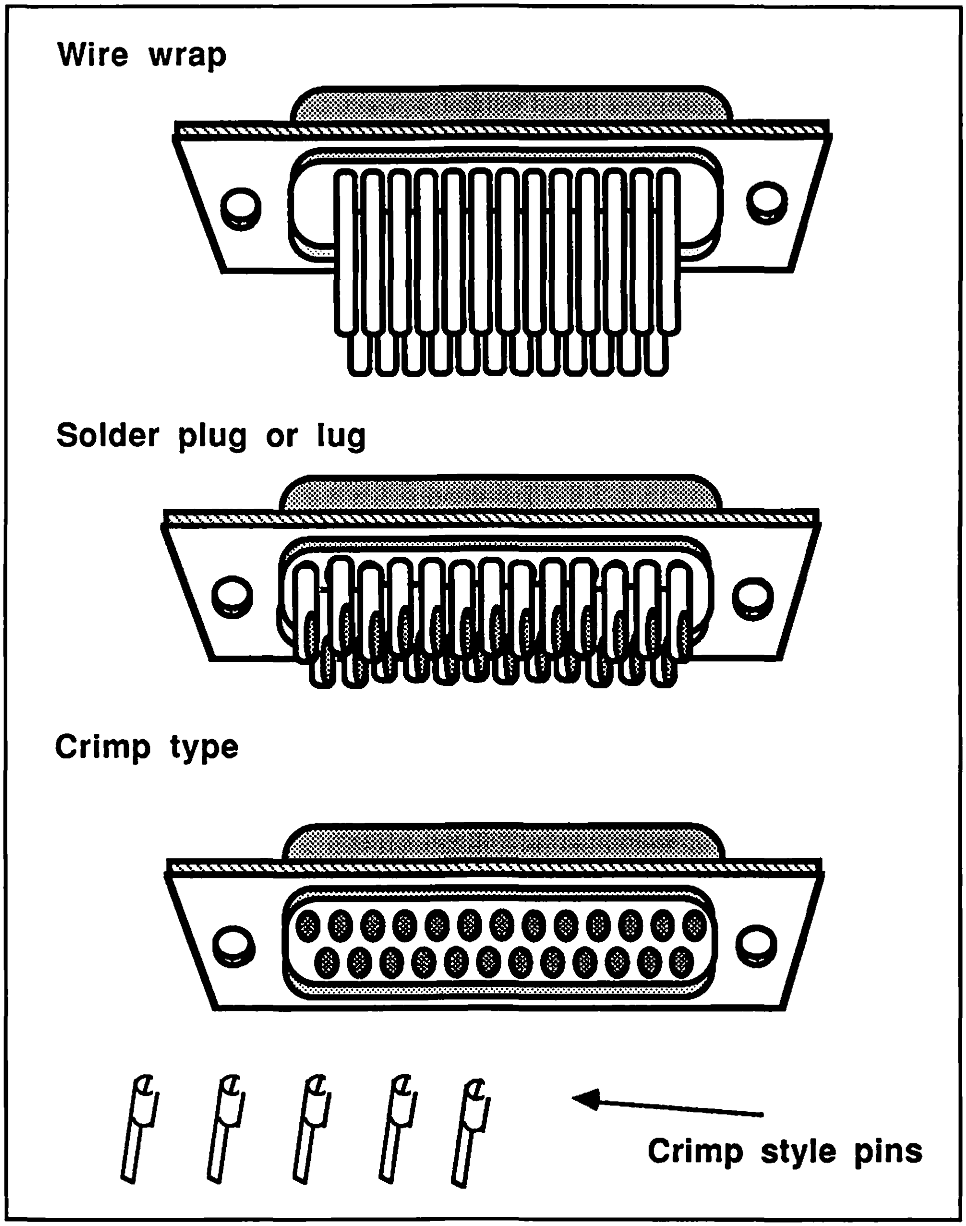


Figure 2-5 RS-232 DB-25 connector types

mounting screws and are readily available for all "D"-type connectors (see Figure 2-1).

If you are a beginner and your cable requires standard D series connectors (such as DB-9 or DB-25 pin RS-232-C connectors—see Figures 2-1 and 2-5), then using the crimp-type connectors with crimp-style pins may be a very good way to go. However, if you have a nonstandard or a Centronics parallel connector, you will need to solder or be forced to buy your cable ready made, if it's available. (Appendix C lists various mail order suppliers that deal in ready-made cables.)

Soldering

Let's say that you've decided to give soldering a try. You'll need the following items: a soldering iron (we don't recommend the use of soldering guns), solder, a wire stripper, a screwdriver, a sponge, flux, electrical tape, and a pair of pliers. A small vice and soldering iron holder will also be helpful, though you can do without them. You can get all of these supplies at an electronics or even a hardware store (Appendix C lists mail order vendors that deal in cable components and tools). You may have most of this equipment already. The main ingredients are of course solder and the soldering iron (along with your patience). Remember that soldering is easy; there are only three requirements: (1) everything must be clean; (2) a proper solder must be used (more about this in a bit); and (3) there must be sufficient heat. Sounds easy, right?

Before we get started, a bit of background to soldering will be helpful. Soldering can be defined as the process of uniting two clean pieces of metal with a thin layer of a third metal applied in a molten state. There are three types of soldering in metal work: brazing, silver soldering, and soft soldering. Soft soldering is the method practiced in electrical and electronics work. The solder alloy used in electronics work is usually 60 percent tin and 40 percent lead and comes in wire form. The ratio of tin and lead content determines the hardness, strength, and melting point of the solder.

Preparation

Now you're ready to start your preparations for soldering. Use the Jump Table to determine which cable connection diagram you should use for your particular printer/computer combination (see Chapter 4 for an explanation of how to use the Jump Table and charts). Once you've found the proper diagram, you will be able to detemine which type of connectors and cable you need to purchase.

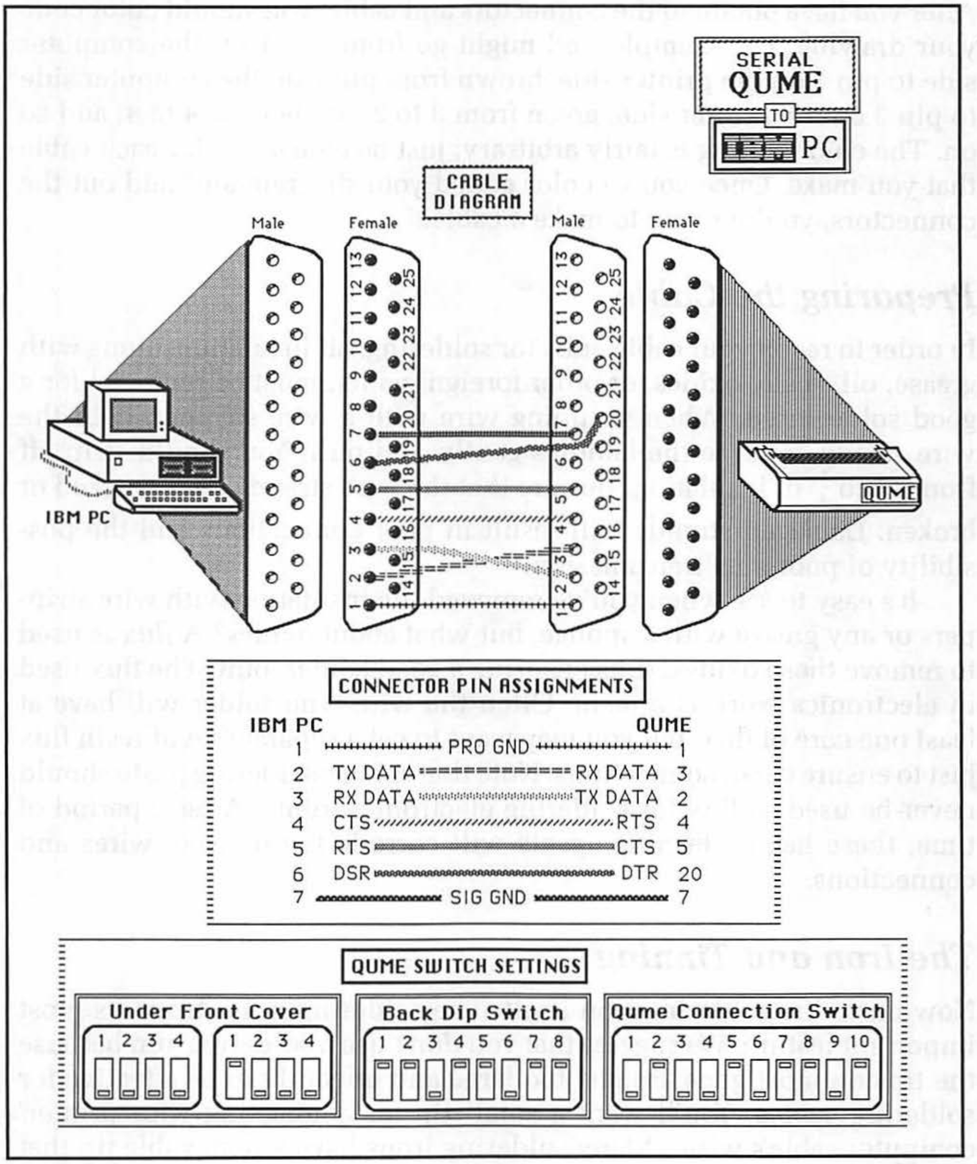


Figure 2-6 Serial Qume to IBM PC

For instance, let's assume that you want to connect an IBM PC to a serial Qume® printer (see Figure 2-6). You'll find this drawing referenced in the Jump Table.

You examine the drawing and determine that you need a male DB-25 connector, a female DB-25 connector, and 7-wire unshielded cable.

After you have obtained the connectors and cable, you should color code your drawing. For example, red might go from pin 1 on the computer side to pin 1 on the printer side, brown from pin 2 on the computer side to pin 3 on the printer side, green from 3 to 2, white from 4 to 4, and so on. The color coding is fairly arbitrary; just be consistent for each cable that you make. Once you've color coded your diagram and laid out the connectors, you're ready to make a cable.

Preparing the Cable

In order to ready your cable ends for soldering, all insulation, along with grease, oil, scale, oxides, or other foreign matter, must be removed for a good solder hold. When stripping wire with a wire stripper, hold the wire steady, squeeze the handles gently, and pull. You should strip off from $\frac{3}{16}''$ to $\frac{1}{4}''$ of insulation. Be sure that the wire strands aren't nicked or broken. Damaged strands will result in poor connections and the possibility of poor data transmission.

It's easy to see when you've removed the insulation with wire strippers or any grease with a sponge, but what about oxides? A *flux* is used to remove these oxides, thus ensuring a good solder joint. The flux used in electronics work is a *resin*. Often the wire-type solder will have at least one core of flux, but you may want to get a separate tin of resin flux just to ensure clean connections. Note that acid or soldering paste should never be used as flux for soldering electronics joints. After a period of time, these harsh cleaning agents will corrode the delicate wires and connections.

The Iron and Tinning

Now on to the soldering iron itself. The soldering iron's tip is its most important feature. We suggest that you *don't* use a soldering gun because the tips on most guns are just too large and ungainly to be effective for soldering cables. You'll want a small tip for connecting your printer/computer cable's wires. Many soldering irons have a removable tip that may be unscrewed and replaced with another, more convenient size later. The tip must be *tinned* (some tips do come pretinned). Tinning is accomplished by spreading a thin layer of molten solder over the metal tip (see Figure 2-7). This solder penetrates the surface of the tip to a molecular depth, forming a thin cushion of molten solder through which heat can be transferred.

Whenever possible, the wire ends of your cable should be tinned first (don't try to tin the connector ends). This tinning enables the solder

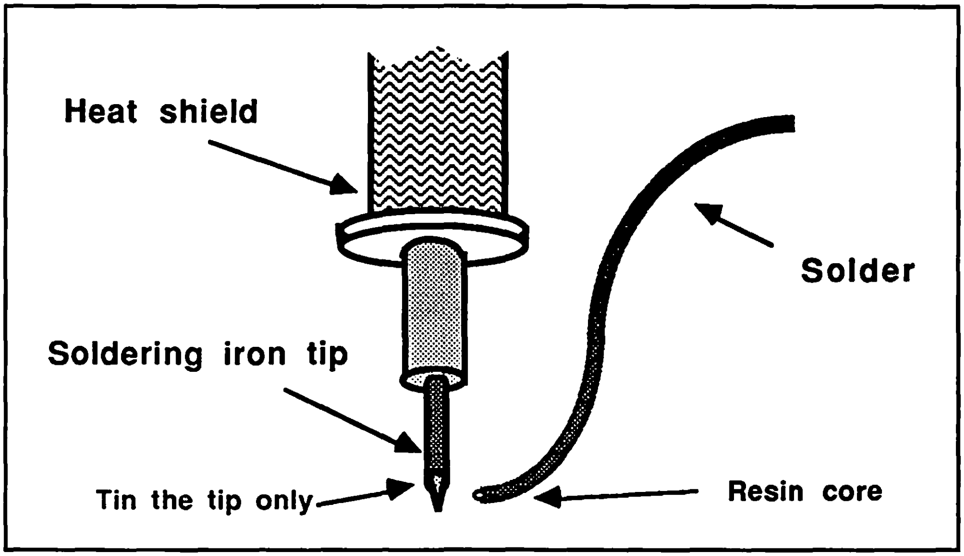


Figure 2-7 Tinning the soldering iron tip

to penetrate to a molecular depth, thus allowing a thorough bond between the solder, the wire end, and connector. Some cable comes pretinned, which saves you preparation time and ensures a good connection. Usually, pretinned cable isn't much more expensive than regular cable.

Making Solder-Type Connectors

Assuming that your wire ends are stripped and cleaned, your connectors are marked and ready, and you have at hand the proper cabling diagram for your printer/computer combination, you're ready to solder. Plug in your soldering iron and make sure that the tip is not resting on anything flammable. If you have a soldering iron holder, use it. Let the iron heat sufficiently so that it will easily melt the solder.

The cable connectors we recommend for solder-type connections have *solder pots* or *lugs*, which are actually the rear end of the contact pins for your printer/computer cable. The wire ends of your cable are inserted into the pots with numbers corresponding to the Connector Pin Assignment chart in the diagram and soldered. However, before the actual soldering can begin, you must prepare the pots by partially filling them with a small amount of molten solder, as shown in Figure 2-8.

If you have a vice, clamp the cable connector in the vise and then partially fill the pots that correspond to your printer/computer's cable

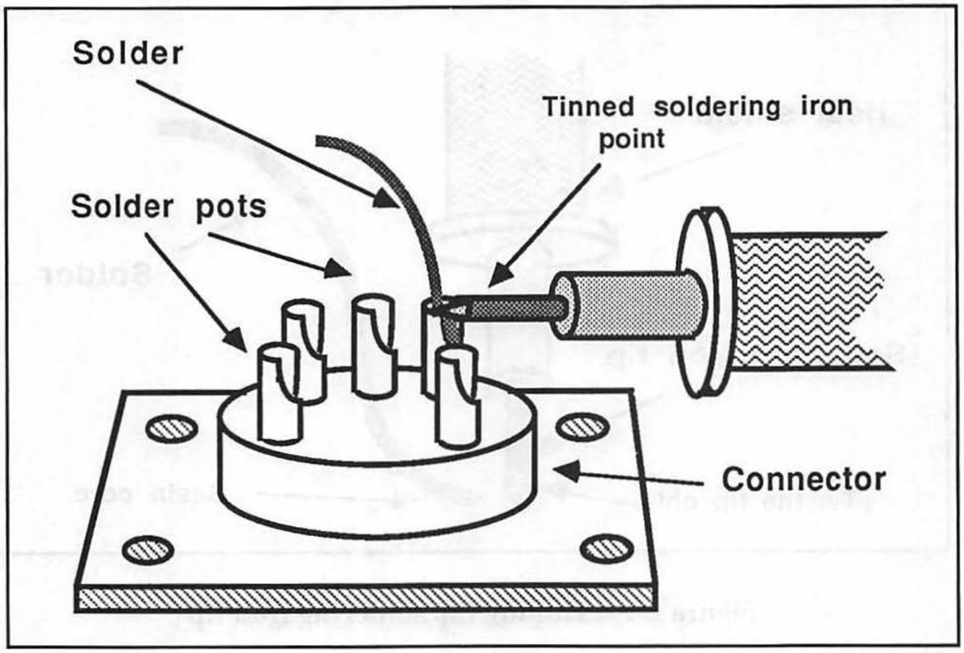


Figure 2-8 Correct method for soldering with solder lug-type connectors

diagram. The vise frees up one hand and enables you to make your cables much more quickly. If you plan to make more than one or two cables, seriously consider purchasing a small vise. If you don't have a vise, you'll have to use pliers.

Another way to place solder in the solder pot is to cut a piece of solder to a length shorter than the height of the pot and drop it into the pot. The solder pot may then be heated; the solder inside will melt. The amount of solder in the pot should *never* completely fill the pot (at least until the wire end is in place). Remember, a little solder is much better than a lot.

A wire that was previously cut to size and tinned may now be inserted in the solder pot by reheating and melting the solder in the pot. A properly soldered connector is illustrated in Figure 2-9.

Repeat this procedure for each connection required for your particular printer/computer combination. Be sure that you don't hold the soldering iron tip to the soldering pot for too long or you might melt the plastic that holds the contact pin and solder pot in place. Solder remelts quickly, so a delicate touch to the pot is all that's required to make the

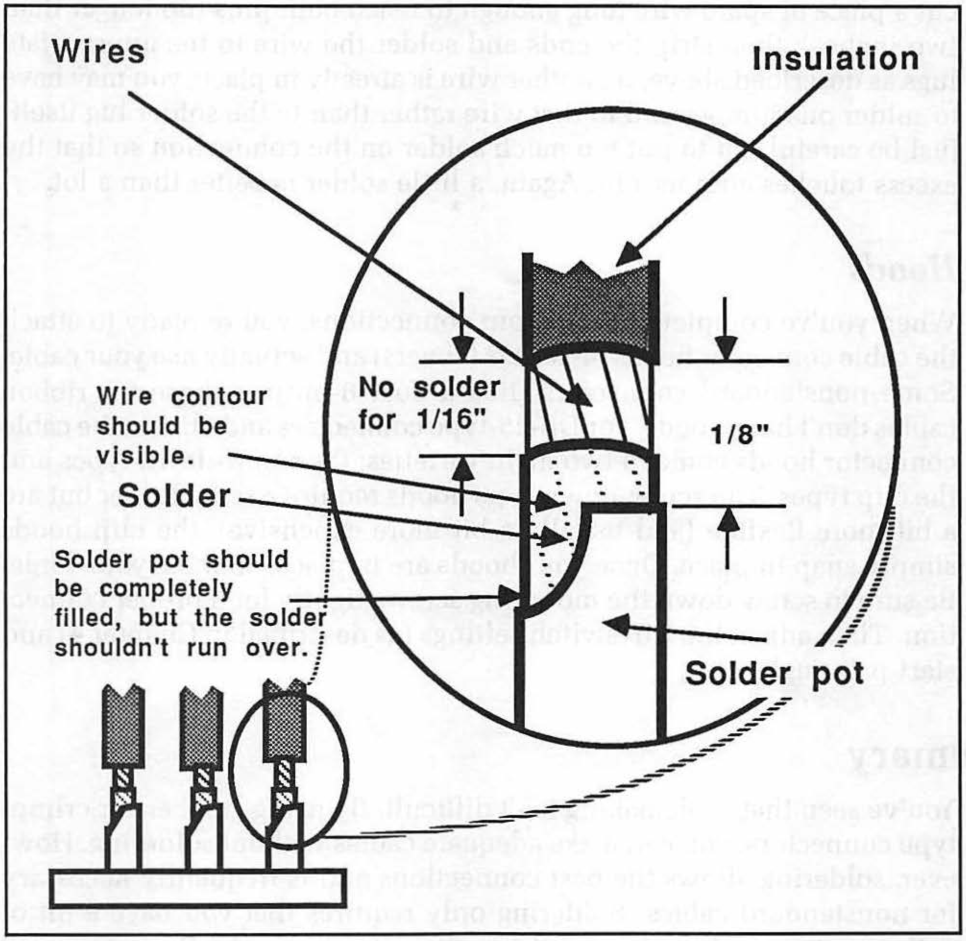


Figure 2-9 Correctly soldered lug

solder in the pot liquid again. Between soldering connections, you'll occasionally want to wipe the tip of the soldering iron with a damp sponge. The tip will build up material, mostly burnt resin, that will interfere with your soldering.

Jumpers

You may have a cable that requires you to make a "jumper" from one pin to another. (See the NEC serial to Kaypro® connection diagram on page 167 for an example of a cable that requires a jumper.) To make a jumper, cut a piece of spare wire long enough to reach both pins (no longer than two inches); then strip the ends and solder the wire to the appropriate lugs as described above. If another wire is already in place, you may have to solder one jumper end to that wire rather than to the solder lug itself. Just be careful not to put too much solder on the connection so that the excess touches another pin. Again, a little solder is better than a lot.

Hoods

When you've completed all the pin connections, you're ready to attach the cable connector hoods or jackets (covers) and actually use your cable. Some nonstandard connectors (like a dual 8-pin) or those for ribbon cables don't have hoods. For DB-25-type connectors and others, the cable connector hoods come in two main varieties: the screw-down types and the clip types. The screw-down-type hoods require a screwdriver but are a bit more flexible (and usually a bit more expensive); the clip hoods simply snap in place. Once your hoods are in place, connect your cable. Be sure to screw down the mounting screws tightly for a proper connection. Then adjust the DIP switch settings (as described in Chapter 4) and start printing!

Summary

You've seen that cablemaking isn't difficult. By using grabbers or crimp-type connectors, you can make adequate cables without soldering. However, soldering allows the best connections and is frequently necessary for nonstandard cables. Soldering only requires that you have a bit of patience, thoroughly clean and tin all surfaces, prudently use a good soldering iron with a small tip, and use a solder with the proper tin-to-lead content along with the proper flux.

By using the connecting tips in this chapter and the general knowledge about how printers and computers function together from the next chapter, you'll be ready to make any of the cables described in the numerous cabling diagrams in this book and even go on to figure out your own.

3

Hardware and Software Basics

When a computer tells a printer to print something, what happens? How do the characters get from the computer to the printer? In this chapter we describe some of the basic ideas involved in transmitting information from computers to printers. We do not try to present the whole story—that would take several large books. Rather we try to present those basics that will be immediately helpful to someone trying to make a printer-to-computer connection.

This chapter is intended for the reader with no previous knowledge of the theory and practice of interfacing computers to printers. If you already know all about RS-232, Centronics parallel, and similar topics, skip over this material. You can probably also skip over it if you have a printer/computer combination that is detailed in this book and all you want to do is to get them talking to each other as quickly as possible.

However, if you have no idea what happens to make a computer talk to a printer and are curious, you should read this chapter. More importantly, if you are faced with anything a little different than the specific situations described in this book, such as a printer or computer not covered in these pages, or a situation where you *seem* to have done everything correctly but the connection still doesn't work, then you may find this information useful.

The ASCII Code

Many aspects of connecting computers to printers are not standardized. In fact, if there were a single standard way of making connectors and cables and of providing an electrical link between the computer and the printer, this book wouldn't be necessary. Unfortunately, there are enough standards, variations of standards, lack of standards, and nonadherence to standards to try the patience of a saint.

However, one aspect of data communication is more or less standard, so let's start with it. Characters ("characters" means letters, numbers, punctuation marks, and sometimes other things) are understood by the computer and transmitted to external devices such as the printer by means of a simple code called the ASCII code. ASCII stands for "American Standard Code for Information Interchange," a name that describes very well what the code is intended to do.

The need for the code arises because computers can't store characters as such; they can only store *numbers*. So the ASCII code provides a means of relating each character to a number that the computer can store. Appendix D shows the ASCII code. Notice how the capital letters run from 65 to 90, the lower-case letters from 97 to 122, and punctuation and numbers from 32 to 64. These codes, from 0 to 127, are more or less standard. Many computers and printers also use codes from 128 to 255. These are not standardized—many computer systems have their own set of characters that match these numbers. On the IBM PC, for example, some of these characters are devoted to foreign languages, some to mathematical and Greek characters, and some to graphics characters such as boxes and lines.

Your computer and printer may use the same set of characters for these codes from 127 to 255. However, if you don't, you'll see one thing on the screen and another on the printer when you try to print them out. You may be able to solve this problem if your printer can have a custom set of characters loaded into it from the computer. Otherwise, you'll have to live with the problem.

Binary Numbers

An important thing to notice about the ASCII code is how each character is represented in *binary* form. Every decimal ASCII code number, from 0 to 255, can be represented by a binary number, from 00000000 to 11111111. (Those from 10000000 to 11111111 are similar to those from 00000000 to 01111111, except that the bit on the left is 1 instead of 0.)

What are binary numbers? They are simply a way of counting that uses only two symbols, 0 and 1, rather than the ten symbols (0 to 9) that we use in normal decimal arithmetic. Binary numbers are easy for computers to understand, because computers typically use transisterized switches that can be either "on" or "off." Thus a binary "1" can stand for "on," and a binary "0" can stand for "off."

When a computer stores the character "M," for example, it actually stores a number, which *we* can think of as either the decimal number 77 or the binary number 01001101. However, the *computer* always thinks of this character (and all other characters) in binary form. Notice that it takes seven binary digits (called "bits" for short) to represent any one of the ASCII codes. If you want to represent the special characters from 128 to 255, you need eight binary digits. These numbers, seven and eight, turn out to be important ones in data communications, as you'll see.

Not surprisingly, when a computer needs to send a character somewhere—to a printer, for example—it transmits the character in binary form. So when your computer wants to send the letter *M* to your printer, it sends the eight binary digits 01001101.

Serial and Parallel

A major difference between different types of printer connections has to do with whether the binary numbers representing the characters are sent in parallel or serially. If a character is sent in parallel, all eight bits that make up the character's code are sent at the same instant of time over eight different wires. Thus if the letter *M* is being transmitted, the first wire will carry a 0, the second a 1, and so on, until all the bits in 01001101 are represented.

If the character is sent serially, each bit is sent one at a time, over a single wire. There is an added complication here. Largely for historical reasons, it is common in serial communications to send only *seven* bits, so only 128 characters can be represented (this is why the ASCII code only goes up to 127). In this case the character "M" is represented by the seven-bit binary number 1001101, with the initial 0 dropped.

Figure 3-1 shows, rather fancifully, the difference between parallel and serial communications.

What are the advantages and disadvantages of serial versus parallel? Roughly speaking, if you are only going a short distance, parallel is better because it's faster and less complicated. If you're farther away (in the next building, or the next state, for example), then having a cable with eight parallel signal lines is too complicated and expensive, so serial is better.

Since printers are usually located close to computers, why aren't parallel connections always used? The probable answer is that some

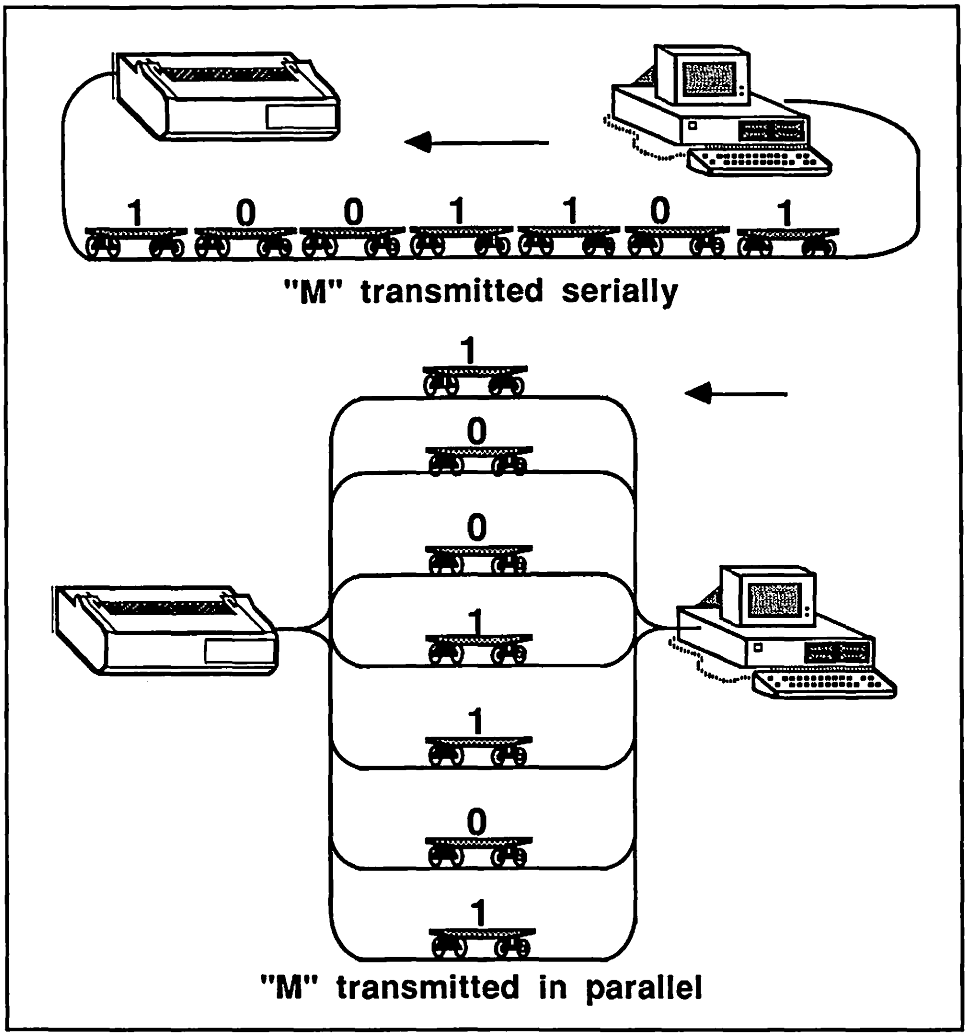


Figure 3-1 The character "M" transmitted serially and in parallel

computer manufacturers have tried to standardize on a single transmission method and have chosen serial for everything.

If you look through the interface diagrams in this book, you'll see that some connections have relatively few lines (7 or so) while others have many more (25 or so). As you may have guessed, the connections with few wires are serial and those with more wires are parallel. Why are there so many wires? You might think that a serial connection would require only 1 wire and a parallel connection only 8. We'll spend much of the rest of this chapter explaining the functions of these extra wires.

Centronics Parallel and RS-232 Serial

There are many different ways of implementing both serial and parallel connections. Fortunately, the common computer/printer connections, and all those detailed in this book, are of two kinds: the serial type called "RS-232" and the parallel type called "Centronics parallel." We'll discuss each type in turn. This will give you an idea of how these particular types work and how serial and parallel data transmission work in general. We'll start with Centronics parallel because it is, at least conceptually, somewhat simpler.

Centronics Parallel

The Centronics corporation was one of the first manufacturers to make printers for microcomputers. They invented their own way of relating to the computer, and because they were in on the ground floor, their way of doing things became a de facto standard. A major part of the standard consists of specifying which wires in the cable between the computer and the printer will carry which signals.

Figure 3-2 shows the wires in a cable between the Osborne™ computer and a Centronics™ printer. It is one of the simplest ways that a parallel connection can be implemented; we'll look at more complicated variations later. Each line represents an actual physical wire in the cable connecting the printer to the computer.

Let's look at these wires in turn and figure out what they all do. The top eight wires are fairly obvious: they represent the eight data lines, which simultaneously carry the eight bits that make up a single character. What about the other lines?

Ground

Let's look first at the two called "ground." Electrical signals sent along any sort of wire consist of electrons moving along. This is what an electrical current is. In order for the electron current to flow, there must be a return path so that the electrons don't accumulate at one end of the circuit. In the early days of the telegraph, this return path was provided by the earth ("ground") itself, and only a single wire was strung on the telegraph poles to carry the signal. However, it's more reliable to use an

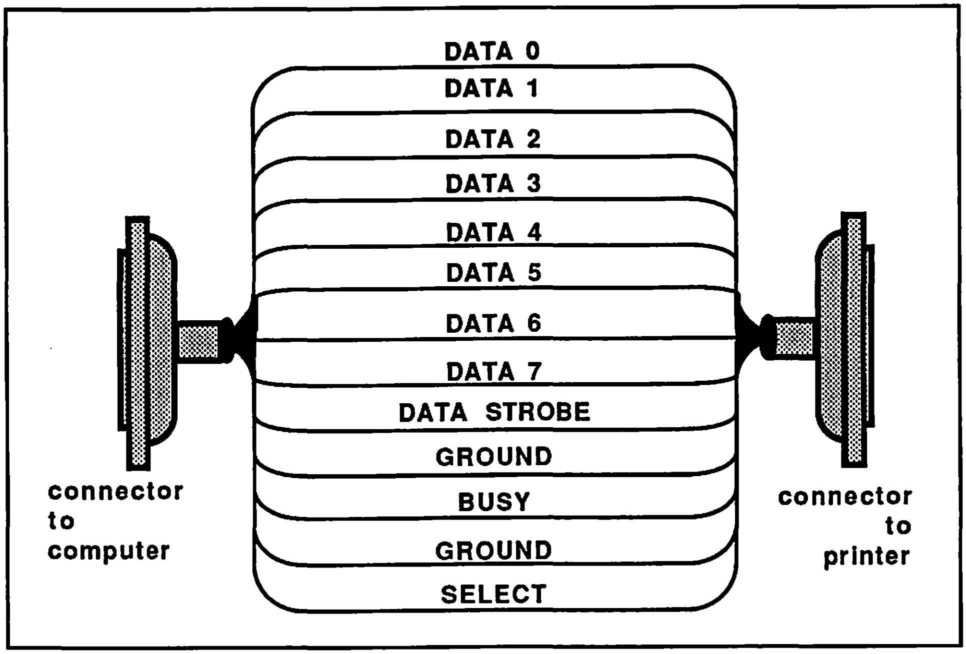


Figure 3-2 Simple parallel printer-to-computer connection

actual wire to carry the return path for the electrons. Your telephone, for example, is connected to the outside world with two wires that form what's called a "twisted pair," one wire to carry the signal and one to provide a return path.

In computer communications there can be many signal wires, but a single ground wire will provide a return path for all of them. This ground is called the "signal ground" or "logic ground." Sometimes more than one wire is used for logic ground, and sometimes every data line has its own ground. However, no matter how many of these ground wires there are, they all perform the same function: to complete a circuit so that current can flow and the signal will be transmitted.

There is sometimes another ground, called "chassis ground." There can even be three different kinds of ground: a signal ground, a chassis ground, and a twisted pair ground for each of the data lines. However, it would lead us too far from our topic to explore the relationship between the different kinds of ground.

Data Strobe

The next signal line carries the data strobe signal, which is sent from the computer to the printer. This signals the printer that the character is ready to be read from the data lines. The computer first puts the signals for all the data bits on the data lines, waits briefly to be sure that the signal is stable, and then activates the data strobe line. When the printer sees that the data strobe signal has been sent, it accepts the character from the eight data lines. This is an essential signal, used in all versions of the Centronics parallel standard.

Busy Signal

The busy signal is sent from the printer to the computer. As its name implies, its purpose is to tell the computer, "I'm busy, don't send any more data." The printer may be busy for various reasons: it may still be in the process of receiving a character; it may be out of paper; or its *buffer* may be full. Let's digress for a minute and explain what a printer buffer is.

Printer Buffers

A printer usually prints characters at a much slower rate than the computer can send them. Many computers don't like to be kept waiting while the printer is slowly printing out a string of characters—the computer has better things to do. What's needed is a way for the computer to send its characters at a rapid rate and for the printer to store them and then print them out while the computer goes about other business. The buffer is the area in the printer where characters are stored until they can be printed. It is a small-scale version of the random access memory in the computer; it can usually hold several thousand characters.

When the computer has a message it needs printed, it starts sending it to the printer at a rapid rate. The printer stores these characters in its buffer. It starts printing them, but new ones arrive much too fast to print, so the buffer soon fills up. When the buffer is full, the printer needs a way to tell the computer, "Stop, I'm full." This is one function of the busy signal. Whenever the printer sends a busy signal, the computer immediately stops sending data.

Select Signal

The select signal usually corresponds to the select switch found on most printers. If this switch is not turned on or if the printer is not connected to the computer at all, this signal will not be sent and the computer will know that something is wrong. The signal in effect says, "Yes, I'm home, you can send me something (unless I'm busy)." It is sometimes called the "on-line" signal.

More Complex Parallel Interfaces

The signals described above provide the simplest workable implementation of the parallel interface. However, in order to achieve more reliability, provide a more versatile interface, or speed the rate of data transmission, many manufacturers add various other signals and lines. We've already mentioned that there can be many different kinds of ground lines. There can be many other signals as well. We'll briefly mention some of them here so that if you run across them in a particular interface situation, you won't be completely mystified.

Handshaking

The arrangement described above, in which the computer sends data to the printer as fast as it can until the printer sends back a busy signal, is a simple form of "handshaking." Handshaking simply means the system of signals used to control the flow of data between the computer and the printer.

There can be more complicated handshaking methods used than simply the busy signal and the data strobe. For instance, an "acknowledge" ("ACK") signal may be used.

Acknowledge Signal

The acknowledge signal is sent from the printer to the computer to say that it has successfully received a character. Thus instead of sending data at a constant rate, the computer waits for a positive indication that each character has been received before sending the next one. The sequence of events would be as follows. The computer puts the character on the data lines and sends the data strobe signal to tell the printer it's there. As soon as it sees the data strobe, the printer turns on the busy signal, telling the computer to wait while it reads the character from the data lines into its buffer. Once the printer has digested the character, it sends the acknowledge signal and simultaneously removes the busy signal. This tells the computer that it's all right to send another character, and the process is repeated.

Other Signals

Various specific signals are sometimes used so that the computer can find out the details of what's going on in the printer. For instance, some interfaces use a "paper out" signal. If this signal is available, the computer's operating system can check this line and report to the user on the computer screen that the printer is out of paper.

Another signal is "auto feed." Some interfaces assume that every time a carriage return is sent to the printer, the printer will both go back to the beginning of the line and automatically perform a linefeed, so it won't overprint the previous line. Other interfaces assume that if the computer wants a linefeed to be used, it will send one following the carriage return. There are several ways to tell the printer which of these options is expected. One is to set a switch inside the printer (we'll talk more about DIP switches later). Another is to use a separate signal line. That's the purpose of the auto feed signal.

S-232 Serial Interface

Now that you know something about parallel interfaces, let's go on to the second major category of printer interface technique, the RS-232 serial interface.

The RS-232 serial interface started out as a large and carefully defined standard created by the Electronic Industry Association. "RS" stands for Recommended Standard. Strictly speaking it's RS-232-C, for revision C, but it's commonly referred to simply as RS-232, so we'll call it that in this book. The standard is very large and complicated, but most manufacturers don't need to use all the features of the complete standard, so they select those that they think will work well with their equipment. Unfortunately, because different manufacturers select different features, there are many different implementations of the RS-232 standard. Though most implementations share some common features, other features vary widely from one implementation to another.

Putting Characters in Serial Form

A character is stored in the computer in parallel form, eight bits sitting side by side. But as we've discussed, in serial transmission it is taken apart into eight (or more usually seven) individual bits, each of which is sent separately. What accomplishes this disassembly of the character? A special electronic circuit called a UART (for Universal Asynchronous Receiver/Transmitter) does the job. The UART is either built into the computer or added as part of a serial interface board. Modern UARTs usually consist of a single integrated circuit chip, so that although they perform a complex function, they are small and no longer very expensive.

The computer's UART receives an eight-bit character, takes it apart, and sends the individual bits out at a preset rate (we'll discuss baud rates later). The printer also has a built-in UART, which receives the stream of individual bits and reassembles them into a character. In addition to the seven data bits, the UART also sends an eighth bit, which is often a parity bit, and two other bits, called start and stop bits.

The Parity Bit

The eighth bit sent by the UART, following the seven bits that make up the character, is often a parity bit, which is a simple means of error checking. There are two ways to use a bit for parity checking, odd parity and even parity. Assuming odd parity, the process works like this. If there are an even number of bits set to 1 in the seven-bit character, then the parity bit is set to 1. The result is an odd number of bits. If there are an odd number of bits set to 1, then the parity bit is set to 0, again resulting in an odd number of bits being set. Thus every character sent down the line has an odd number of bits. The UART in the printer checks to see if each character consists of an odd number of bits. If, during transmission, one of the bits that form the character is altered, the parity bit will no longer correspond with the character, and the UART will deduce that an error has occurred. The even parity system is similar, except that each carry is sent with an even number of bits set.

In many systems the eighth bit is not used for parity checking. Another common use for this bit is to indicate that the printer should use an optional character set, thus in effect permitting the use of 256 characters rather than the 128 that are possible with seven bits.

The Start and Stop Bits

The UART in the printer is never sure when a character is going to arrive. So that it can have time to get ready, a start bit is sent, just before the bits that represent the actual character begin to come down the line. When the character has been transmitted, another bit (called the stop bit) is sent so that the circuitry in the printer's UART can be sure that transmission is over. The use of start and stop bits is necessary because the transmission is "asynchronous," or not synchronized. Some transmission systems are synchronized and depend on both the computer

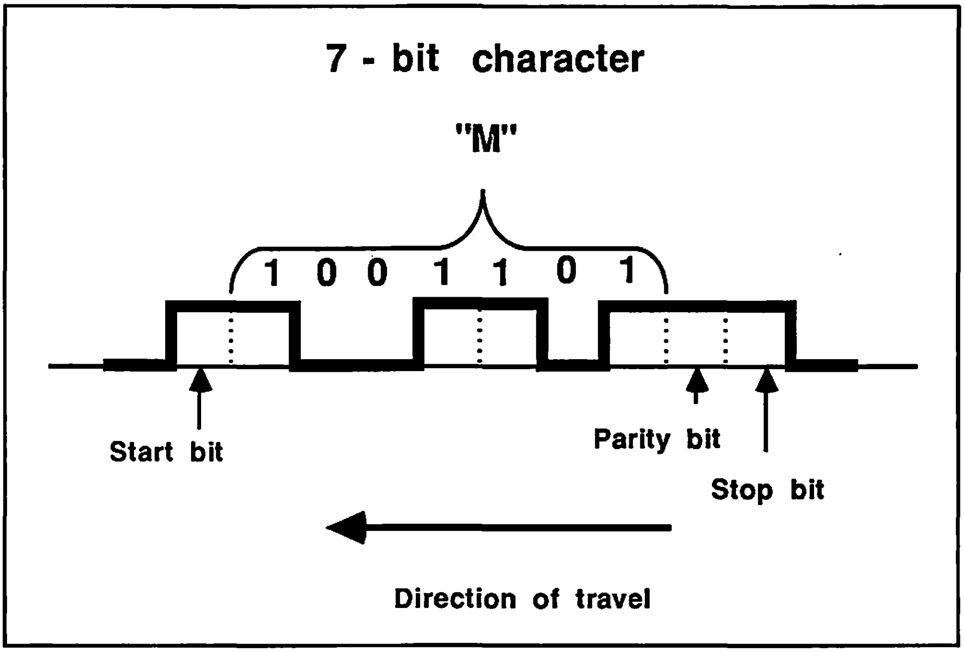


Figure 3-3 The character "M" in RS-232 format

and printer knowing exactly when a character is to arrive, but we won't be concerned with such systems in this book.

Figure 3-3 shows how a train of pulses representing the character "M" would look traveling down an RS-232 serial line.

Transmit Data Line

The bits described above—seven data bits, a parity bit, and the start and stop bits—are all sent over one line called the "transmit data" line (often called TX DATA). At least, this line is called the transmit data line on the *computer* end of the line. To keep everyone on their toes, RS-232 uses different names for the same line depending on which end of the line you're on. Not surprisingly, the *printer* end of this line is called the "receive data" (RX DATA) line. Usually pin 3 of the connector is used on both the computer and the printer for this line.

The standard way of looking at lines that have different names at each end is from the computer end of the line. Thus the line we're describing here is called the transmit data line, even though, from the

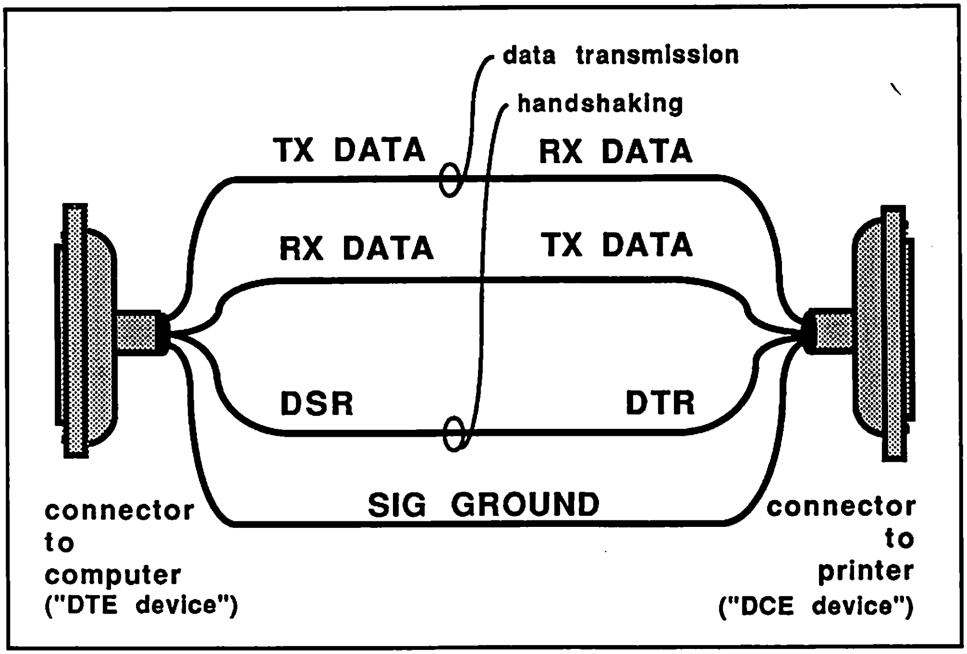


Figure 3-4 Typical RS-232 connections

printer's perspective, it's the receive data line. (Many people find the conventions used in RS-232 difficult to understand, and now you're beginning to see why.)

If you look at the interface diagrams of serial connections, you'll see that, like parallel connections, there are other lines besides those used for carrying data. Figure 3-4 shows the signal lines used in a typical RS-232 implementation. Let's look at these extra lines.

Signal Ground Line

This line is one of the few universals in RS-232. It is always present and always connected to pin 7 of both the printer and the computer. This line is also called "circuit common." A nice thing about this line is that it is called the same thing at both ends.

As in parallel interfaces, various other grounds may be used as well, notably the "protective ground," which serves the same purpose as the "chassis ground" mentioned earlier.

Data Set Ready Line

This line is called "data set ready" (or DSR) on the computer end and "data terminal ready" (DTR) on the printer end. These names don't really mean much when applied to computer/printer connections. This is usually the handshaking line, equivalent to the busy line in parallel connections. That is, when its buffer is full, the printer uses this line to signal the computer not to send any more data. It often goes from pin 6 on the computer to pin 20 on the printer.

Receive Data Line

This line is called "receive data" at the computer end and "transmit data" at the printer end. But since the computer always sends data to the printer, and not the other way around, what does this line do? Often, not very much. It's usually not used for sending any kind of data when connecting a computer to a printer, although it has a well-defined use when two-way devices, such as modems, are connected to the computer. However, although it is not used for data transmission, this line usually needs to be connected. It thus serves a purpose somewhat like the select line in parallel interfaces: it lets the computer know that the printer is connected, turned on, and ready to receive data.

The four lines described above—transmit data, receive data, signal ground, and data set ready—are the essential ones in many of the printer connections described in this book. However, there are a few others.

Clear to Send and Data Terminal Ready

These lines are necessary on some interfaces. Sometimes they carry the same handshaking information that is usually carried on the data set ready line. In other interfaces the UART on the printer or the computer simply wants to see that these lines are connected. It doesn't use them for handshaking, but the lines must be connected to make the interface work. The reasons for this are historical, but the moral is that if you're having trouble getting a particular interface to work, try connecting these lines.

Clear to send (CTS) usually goes from pin 4 of the computer to pin 5 of the printer (where it is called RTS). RTS usually goes from pin 5 of the computer to pin 4 of the printer (where it is called CTS). These lines are thus the inverses of each other. If one is used in a particular interface, it's likely that the other one is too.

Speed Considerations in RS-232

In parallel interfacing we don't need to worry about the rate at which the individual bits are transmitted, because they all go at once. However, in serial interfacing it's important that the computer and printer agree on a speed so that the printer knows when to expect each individual bit to arrive. Accordingly, it is usually possible to adjust the speed of transmission—called the "baud rate"—on both the printer and the computer.

The baud rate is simply the number of bits per second being sent by the UART. Because each character requires about 10 bits (7 data and 1 each of parity, start, and stop), dividing the baud rate by 10 gives the number of characters per second. Thus at 300 baud, you can send about 30 characters per second. The usual baud rates used between computers and printers are 300, 1200, 2400, 4800, and 9600. DIP switches are usually used to set the rate on the printer, while software sets the rate on the computer. The kind of software used varies. Sometimes the baud rate can be changed from the operating system, but on other systems a special program must be executed.

In any case, the moral is that if you are having trouble getting a serial connection to work, check to see if the baud rate settings are compatible.

Sometimes in serial connections the handshaking procedure doesn't work for one reason or another. In this case it may be useful to slow the baud rate down to 300. At this speed the printer can often keep up with the rate of data transmission from the computer. Thus the printer buffer never gets full, so there is no need for handshaking signals. Of course, you may not achieve maximum printer speed this way, but in some circumstances it provides a quick and dirty way to get a printer working.

Printer Drivers

The printer driver is the software that the computer uses to communicate with the printer. It contains the actual machine language instructions that check the status of the printer and send a character to the printer port for transmission. When an applications program such as a spreadsheet program or a word processor decides to send a character to the printer, this request ends up at the printer driver. Some printer drivers, like that on the IBM PC, are built into the computer's ROM. Others are loaded from the disk along with the operating system. Some applications programs, such as Wordstar®, contain their own printer drivers, which are used instead of the standard driver.

You don't need to worry too much about your printer driver, unless it doesn't do what you want it to. For instance, if your computer has only a driver for parallel printers and you want to use a serial printer, you'll be out of luck. Or you may have a situation in which the computer and printer don't agree on the meaning of certain characters. One special character (such as a box) may appear on the computer screen, while another (say, a pound sign) is printed out. Sometimes the printer driver can be modified to prevent this sort of inconsistency.

However, writing a printer driver requires considerable understanding of the operation of the computer and printer, as well as a knowledge of assembly language, and is therefore not a skill that can be picked up overnight. If you have a problem that looks as if it can be solved with a new printer driver, you'll need to talk to someone with this kind of experience.

Hardware Versus Software Handshaking

What we've described so far are examples of hardware handshaking; that is, hard-wired electronic circuits take care of figuring out when it's all right to send another character, when the printer buffer is full, and so on, and communicating this information with signals on particular lines. The connections described in this book all use hardware handshaking.

However, there are also schemes whereby software in the printer driver can take over the handshaking role. Thus instead of sending a signal to indicate that the buffer is full, the printer can send a special character. The printer driver will intercept this character and take appropriate action. (This is one use for the receive data line in RS-232.) There are two main schemes for software handshaking: XON/XOFF and ETX/ACK. These schemes are called "protocols," which simply means the particular data transmission rules that the printer and computer agree on.

DIP Switches

When you first take your printer out of the box, there are many choices to be made about how it will operate in a particular system. We've already mentioned some of these. Depending on the type of printer, you may be able to choose whether you want the "paper out" signal sent to the computer and whether you want auto linefeed. You may also be able to select from different character sets and choose whether you want to use the printer in serial or parallel mode. On some printers several different styles of printing—compressed, emphasized, "near letter quality," and so on—can be selected with switches. On serial printers you can specify the baud rate, and you may be able to change the way the UART expects to receive characters: with seven or eight data bits and with one or two stop bits.

The switches used for these purposes are usually DIP switches (DIP stands for "Dual Inline Package"). A DIP switch looks like an integrated circuit chip and has two rows of pins coming out the back, so it can be soldered into a printed circuit board. These switches are easy to design and manufacture because they can be inserted in the printed circuit board just like an integrated circuit, without the necessity for special mounting hardware and wiring. However, because they are so small, they are often difficult to set. Often fingers are too big, and a small instrument like a paperclip must be used.

If your printer doesn't work, check the DIP switch settings; maybe one of them is incorrectly set. This book provides detailed instructions for DIP switch settings for each of the computer/printer connections described.

4

How to Use the Jump Table and Connection Diagrams

We have covered how to make cables and the general concepts of how printers and computers work together. Now we'll look closely at how this book is arranged, especially at how the Jump Table and diagrams are organized.

Much of the material covered so far has been introductory. The chapter on cablemaking is important for reference when actually building your own cables. But how do you find the proper drawing for your particular printer/computer combination? That's what we'll explain now.

The Jump Table

Following this section of text, you'll find a Jump Table arranged in alphabetical order by printer and within that by computer. A Jump Table is nothing more than a special annotated index. There is a section in the Jump Table for each printer. Each section begins with a listing for an external drawing of the printer and perhaps a DIP switch diagram (we'll describe each of the different kinds of diagrams in detail in this chapter). After the external drawing, many printer/computer combinations are listed along with a page number for the corresponding diagram.

Jump Table

Printers	Drawing Type	Computers	Page No.
Epson X Series	EXTERNAL*		103
Epson LQ 1500	EXTERNAL*		104
Epson DIP switches	SWITCH*		105
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	AT & T 6300	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	Fujitsu	107
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	Kaypro	107
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	NEC	107
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	Olivetti M24	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	Osborne Exec	108
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	RS Model 100/200	109
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	TI Professional Computer	106
Epson X Series & LQ 1500 SERIAL	CONNECTOR	AT & T 6300	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Apple IIc	110
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Apple Macintosh	111
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Fujitsu	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	HP 150	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	112

Figure 4-1 Epson section of the Jump Table

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC AT	113
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC jr	114
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Kaypro	115
Epson X Series & LQ 1500 SERIAL	CONNECTOR	NEC	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Olivetti M24	112
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Osborne Exec	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	RS Model 100/200	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	TI Professional Computer	116

Many of the printer/computer combinations reference the same page number and thus the same diagram, because many combinations use exactly the same "pinouts" as several other printer/computer combinations. In Figure 4-1 you'll notice that the cable you make for a parallel Epson® printer and an IBM PC computer will also work for a parallel Epson printer attached to Texas Instruments Professional® computer, and so on. Even though the connection diagram for a parallel Epson to an IBM PC references only Epson and IBM, you can determine the other computers that use the same cable by examining the Jump Table. The asterisk (*) indicates which of these diagrams is a key, such as the Epson to IBM PC.

Let's demonstrate how you can find your printer/computer combination. Let's say that you own an Epson serial RX-100® printer that you want to attach to a friend's Kaypro computer. First, page through the Jump Table until you find the section for Epson printers. Then go down the list until you find the Epson serial subsection (the serial subsections always follow the parallel subsections). Now look for the Kaypro line, which tells you that the drawing you need is on page 115. It's easy!

The Diagrams

Numerous diagrams follow the Jump Table and are organized exactly like the Jump Table. The diagrams are divided into sections, one for each printer, and then within the section are organized alphabetically by computer.

The Connection Diagrams

Let's continue with our example and explain the various features of the diagrams. Turn to the serial Epson X-Series® Kaypro diagram (see Figure 4-2). The upper right-hand corner of the drawing always lists the "main" printer/computer combination (remember, one diagram can represent many printer/computer combinations). You can use this logo to page through the various connection diagrams.

The rest of the connection diagram is divided into three portions: cable diagram, connector pin assignment chart, and DIP switch settings chart. The cable diagram gives information about the cable connectors, both the gender and type (see Figure 4-3 for specifics on the connector types), lays out a cabling schematic for easy reference (unless there are too many connecting lines to be seen clearly), and shows approximately where the connectors on the printer and computer are located by "zooming" out. The printer information is always on the right and the computer information on the left.

The connector pin assignment chart gives detail about the cabling schematic (or functions as a cabling schematic when connections require more than ten cables). It should be used in conjunction with Appendix B (Glossary) to define the various abbreviations associated with the individual connections. Again the printer information is always on the right and the computer information on the left. For an explanation of the abbreviations associated with each wire, refer to Appendix B.

The cable schematics and connector pin assignment charts utilize patterns for individual wires. The patterns shown in Figure 4-4 are meant to provide a basis for color coding your charts, as we explained in Chapter 2.

The DIP switch settings shown at the bottom of the connector diagram represent the recommended settings for the printer in the particular printer/computer combination being illustrated. Other settings may work (and perhaps work better for a particular configuration or software package), but it is beyond the scope of this book to provide detailed information on all the possible DIP switch settings for each individual printer.

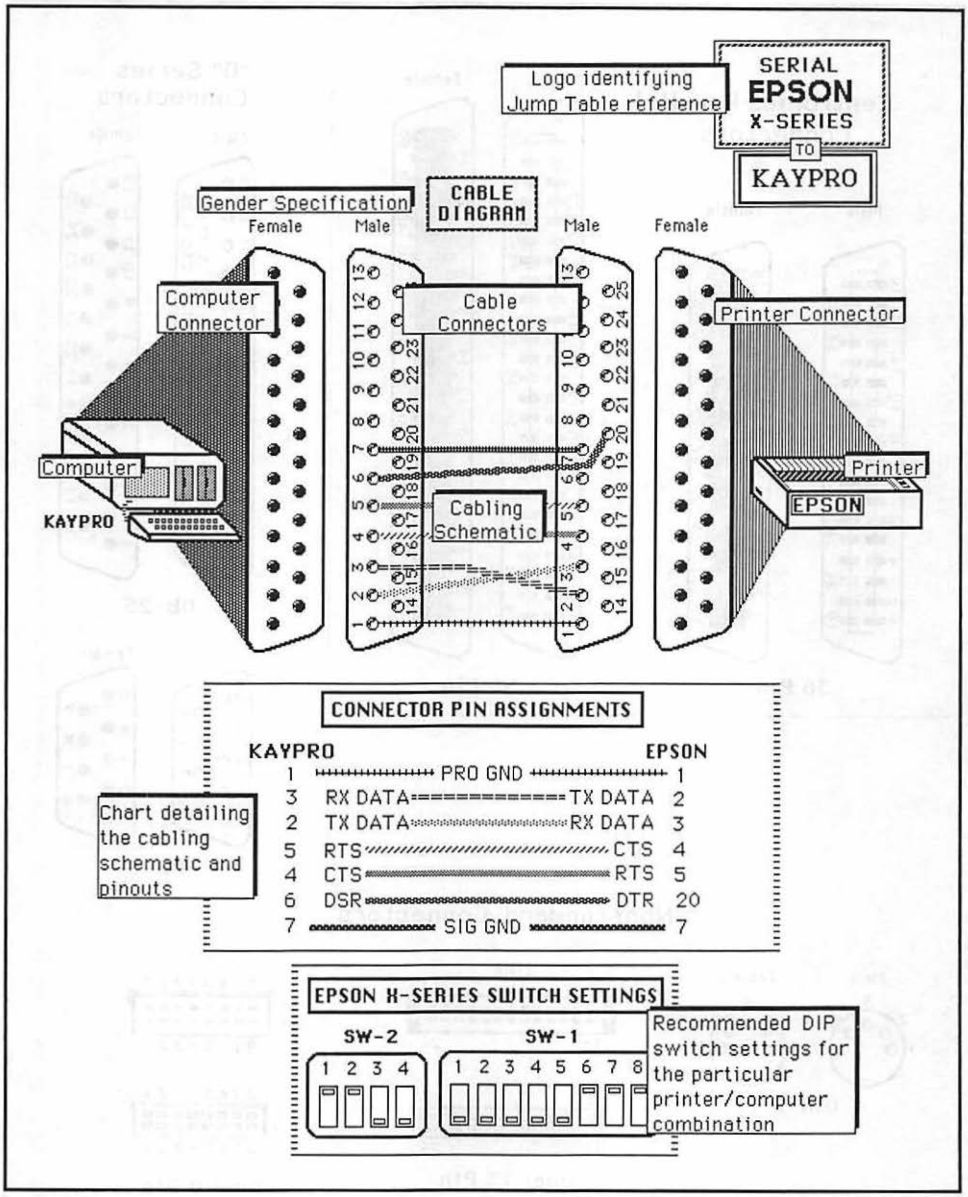


Figure 4-2 Annotated serial X-series Epson to Kaypro diagram

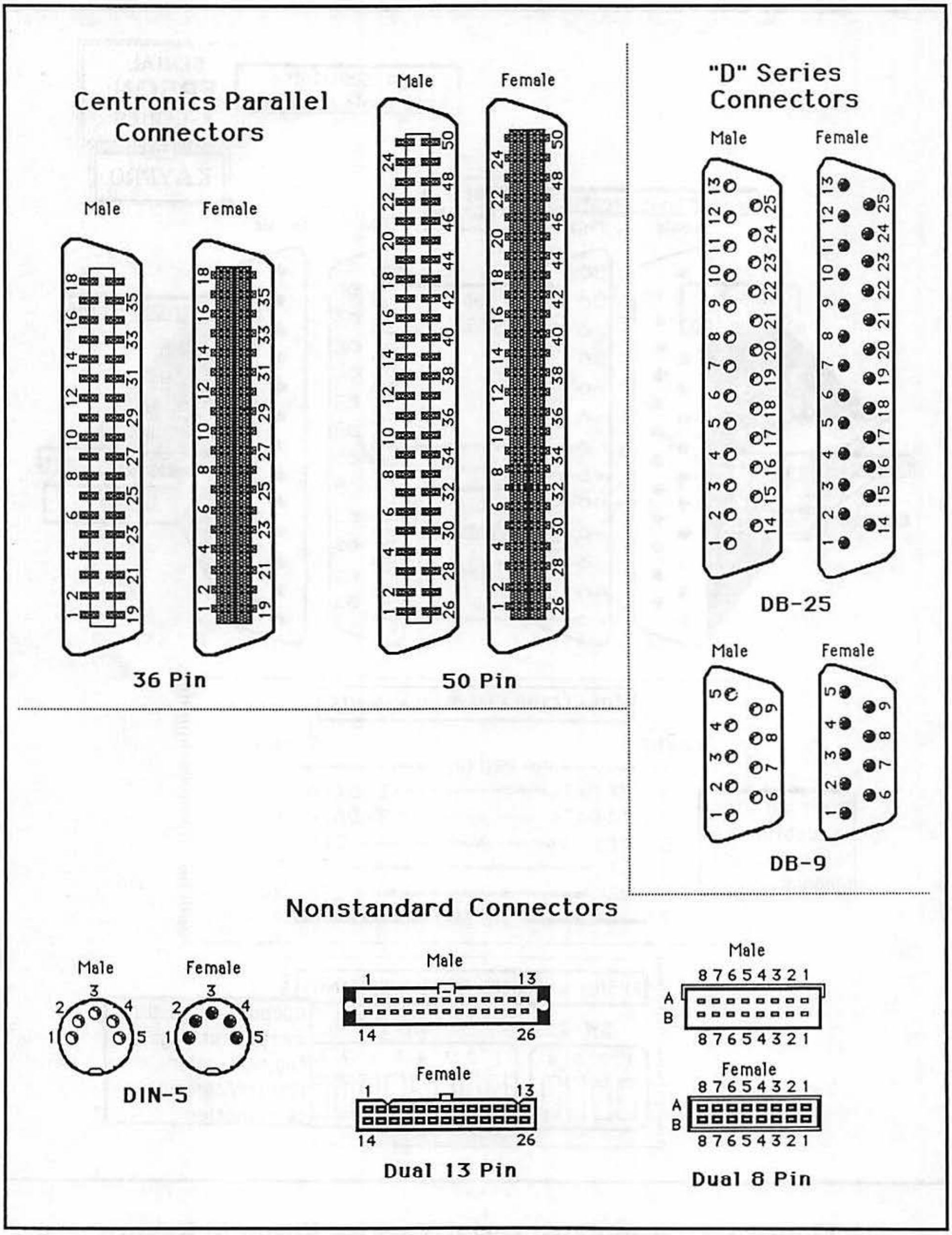


Figure 4-3 Varieties of connectors

These are just recommended settings; refer to your printer's manual for a thorough explanation of the functions of the DIP switches on your printer.

Occasionally, the DIP switch settings charts are so varied that because of size considerations, they must appear on a separate page. When this does occur (as it does for Okidata™ and NEC printers), these drawings will come at the beginning (right after the external drawing) of that printer's section of diagrams and will be listed in the Jump Table separately at the appropriate location. These general DIP switch settings charts are meant to correspond to the generic settings necessary for a particular printer, *not* for a particular printer/computer combination.

The External Diagrams

The external diagrams are located at the beginning of each printer section. They are meant to illustrate and locate the main features of the printer: the power switch, DIP switches, connector, and so on. These drawings are designed to be used for quick reference when connecting your printer and computer. For detailed information about your printer, refer to your printer's manual.

Making Your Own Connection Diagrams

Though we have covered a wide variety of printers and computers in the connection diagrams, given the number of new model microcomputers and printers that arrive each year, at some point you will probably encounter a combination that is not referenced in this book. If so, you'll just have to get out the manuals and start digging.

In the technical documentation for your printer and computer, you should find a "pinout" chart (like one side of the connector pin assignment chart in this book) describing the function and location of each active pin in the connector. If you can find one half of your printer/computer combination in this book, so much the better. (Look briefly at Appendix A; the notes there on various computers and printers may help with your particular printer/computer combination.) For instance, you may want to hook up your good old reliable parallel Epson MX-80® to your new Zeta-Deluxe computer with Zyperdrives and the super new Zarp-style memory. You'll be able to look at the Epson parallel drawings and see what the pinouts are for your printer. You'll have to have a

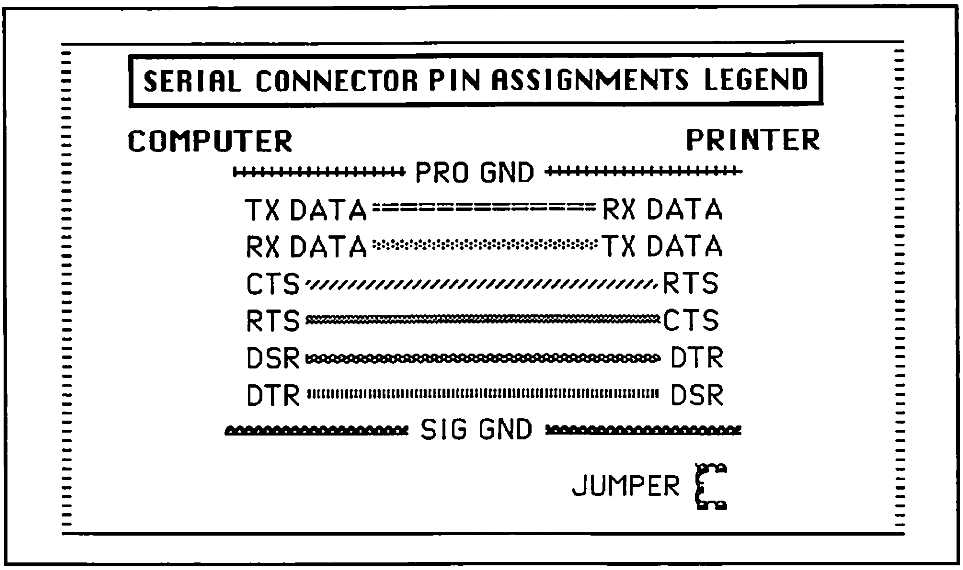


Figure 4-4 Serial connector pin assignments legend

parallel port on your Zeta-Deluxe and get the information about its pinouts either directly from the manufacturer or from the computer's documentation. If this information is available, you should be able to construct your own cable as described in Chapter 2.

Breakout Testers and Intelligent Cables

Unfortunately, good technical documentation is often not readily available. Manufacturers sometimes even withhold this technical information so that consumers will be forced to buy cables from the same manufacturers. Nasty! Without this valuable information, the consumer must use expensive interfacing equipment or intelligent cables. Breakout testers or boxes are so named because they enable the user to "breakout" the details of a specific cable (usually for serial communications). We recommend this kind of equipment (which can run from $45.00 to $500.00) only if you must do a lot of odd and difficult connections. A better and cheaper solution for those who have a single difficult connection (or only a few) is an intelligent cable. These cables cost between $50 and $80 and automatically interface two unknown RS-232 serial devices;

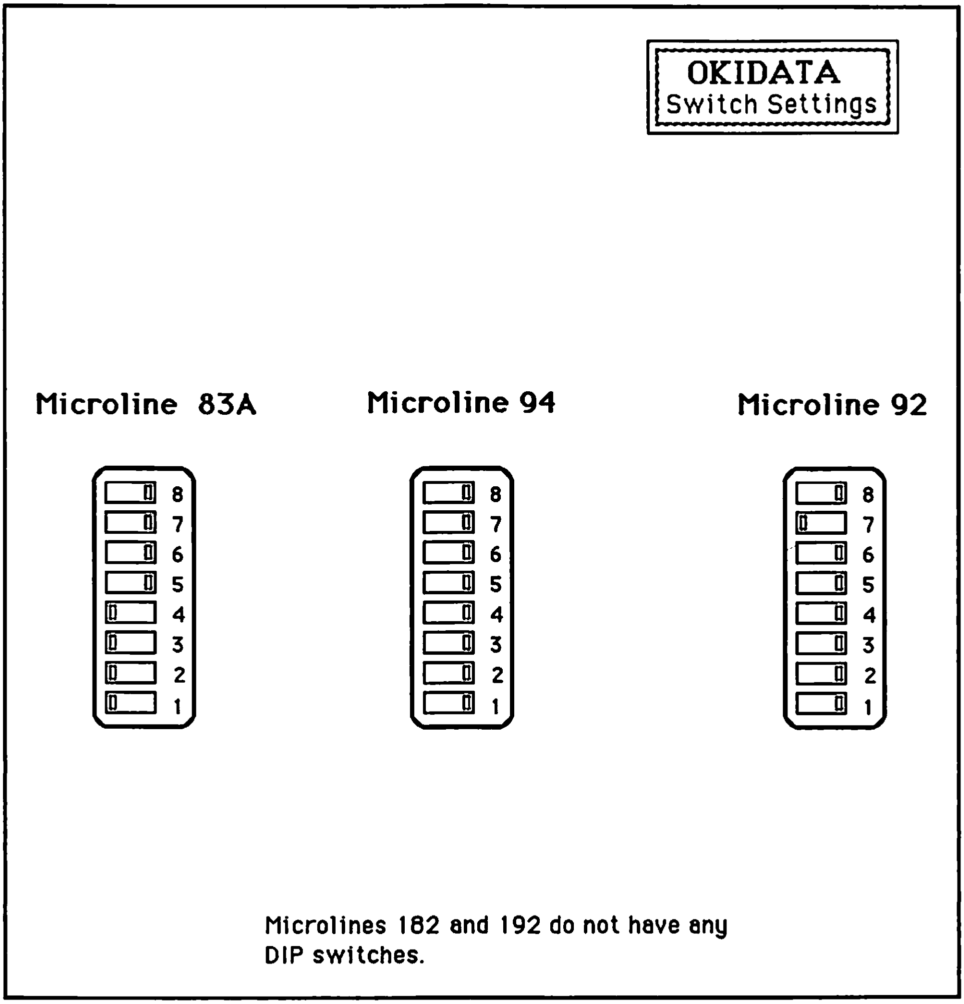


Figure 4-5 Okidata switch settings chart

they even take care of handshaking. The user only needs to make sure that both devices are set at the same data rate and format.

Whatever type of printer you have, this book should help you connect it to your computer. Read through the text, follow the instructions, and in no time you'll have your printer doing just what it's supposed to—printing what your computer tells it.

Jump Table

Printers	*Drawing Type*	*Computers*	*Page No.*
Apple Imagewriter	EXTERNAL*		65
Apple Imagewriter	CONNECTOR	AT & T 6300	70
Apple Imagewriter	CONNECTOR*	Apple Macintosh	66
Apple Imagewriter	CONNECTOR	DEC Rainbow	70
Apple Imagewriter	CONNECTOR	Fujitsu	70
Apple Imagewriter	CONNECTOR	HP 150	70
Apple Imagewriter	CONNECTOR*	IBM PC, IBM PC XT & Clones	67
Apple Imagewriter	CONNECTOR*	IBM PC AT	68
Apple Imagewriter	CONNECTOR*	Kaypro	69
Apple Imagewriter	CONNECTOR	NEC	70
Apple Imagewriter	CONNECTOR	Olivetti M24	67
Apple Imagewriter	CONNECTOR	Osborne Exec	70
Apple Imagewriter	CONNECTOR*	RS Model 100/200	70
Apple Imagewriter	CONNECTOR	TI Professional Computer	70
Centronics	EXTERNAL*		71
Centronics PARALLEL	CONNECTOR	AT & T 6300	72
Centronics PARALLEL	CONNECTOR	Fujitsu	73
Centronics PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	72
Centronics PARALLEL	CONNECTOR*	Kaypro	73
Centronics PARALLEL	CONNECTOR	NEC	73
Centronics PARALLEL	CONNECTOR	Olivetti M24	72
Centronics PARALLEL	CONNECTOR*	Osborne Exec	74
Centronics PARALLEL	CONNECTOR*	RS Model 100/200	75
Centronics PARALLEL	CONNECTOR	TI Professional Computer	72

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Centronics SERIAL	CONNECTOR	AT & T 6300	81
Centronics SERIAL	CONNECTOR*	Apple Macintosh	76
Centronics SERIAL	CONNECTOR	DEC Rainbow	81
Centronics SERIAL	CONNECTOR	Fujitsu	81
Centronics SERIAL	CONNECTOR	HP 150	81
Centronics SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	77
Centronics SERIAL	CONNECTOR*	IBM PC AT	78
Centronics SERIAL	CONNECTOR*	IBM PC jr	79
Centronics SERIAL	CONNECTOR*	Kaypro	80
Centronics SERIAL	CONNECTOR	NEC	81
Centronics SERIAL	CONNECTOR	Olivetti M24	77
Centronics SERIAL	CONNECTOR	Osborne Exec	81
Centronics SERIAL	CONNECTOR*	RS Model 100/200	81
Centronics SERIAL	CONNECTOR	TI Professional Computer	81
Diablo API	EXTERNAL*		82
Diablo API & SERIAL	INTERNAL*		83
Diablo 620/630 API PARALLEL	CONNECTOR	AT & T 6300	84
Diablo 620/630 API PARALLEL	CONNECTOR	Fujitsu	85
Diablo 620/630 API PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	84
Diablo 620/630 API PARALLEL	CONNECTOR*	Kaypro	85
Diablo 620/630 API PARALLEL	CONNECTOR	NEC	85
Diablo 620/630 API PARALLEL	CONNECTOR	Olivetti M24	84
Diablo 620/630 API PARALLEL	CONNECTOR*	Osborne Exec	86
Diablo 620/630 API PARALLEL	CONNECTOR*	RS Model 100/200	87

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Diablo 620/630 API PARALLEL	CONNECTOR	TI Professional Computer	84
Diablo 620/630 API SERIAL	CONNECTOR	AT & T 6300	94
Diablo 620/630 API SERIAL	CONNECTOR*	Apple IIc	88
Diablo 620/630 API SERIAL	CONNECTOR*	Apple Macintosh	89
Diablo 620/630 API SERIAL	CONNECTOR	DEC Rainbow	94
Diablo 620/630 API SERIAL	CONNECTOR	Fujitsu	94
Diablo 620/630 API SERIAL	CONNECTOR	HP 150	94
Diablo 620/630 API SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	90
Diablo 620/630 API SERIAL	CONNECTOR*	IBM PC AT	91
Diablo 620/630 API SERIAL	CONNECTOR*	IBM PC jr	92
Diablo 620/630 API SERIAL	CONNECTOR*	Kaypro	93
Diablo 620/630 API SERIAL	CONNECTOR	NEC	94
Diablo 620/630 API SERIAL	CONNECTOR	Olivetti M24	90
Diablo 620/630 API SERIAL	CONNECTOR	Osborne Exec	94
Diablo 620/630 API SERIAL	CONNECTOR*	RS Model 100/200	94
Diablo 620/630 API SERIAL	CONNECTOR	TI Professional Computer	94
Diablo 630 Straight SERIAL	EXTERNAL*		95
Diablo 630 Straight SERIAL	CONNECTOR	AT & T 6300	102

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Diablo 630 Straight SERIAL	CONNECTOR*	Apple IIc	96
Diablo 630 Straight SERIAL	CONNECTOR*	Apple Macintosh	97
Diablo 630 Straight SERIAL	CONNECTOR	DEC Rainbow	102
Diablo 630 Straight SERIAL	CONNECTOR	Fujitsu	102
Diablo 630 Straight SERIAL	CONNECTOR	HP 150	102
Diablo 630 Straight SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	98
Diablo 630 Straight SERIAL	CONNECTOR*	IBM PC AT	99
Diablo 630 Straight SERIAL	CONNECTOR*	IBM PC jr	100
Diablo 630 Straight SERIAL	CONNECTOR*	Kaypro	101
Diablo 630 Straight SERIAL	CONNECTOR	NEC	102
Diablo 630 Straight SERIAL	CONNECTOR	Olivetti M24	98
Diablo 630 Straight SERIAL	CONNECTOR	Osborne Exec	102
Diablo 630 Straight SERIAL	CONNECTOR*	RS Model 100/200	102
Diablo 630 Straight SERIAL	CONNECTOR	TI Professional Computer	102
Epson X Series	EXTERNAL*		103
Epson LQ 1500	EXTERNAL*		104
Epson DIP Switches	SWITCH*		105
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	AT & T 6300	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	Fujitsu	107

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	Kaypro	107
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	NEC	107
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	Olivetti M24	106
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	Osborne Exec	108
Epson X Series & LQ 1500 PARALLEL	CONNECTOR*	RS Model 100/200	109
Epson X Series & LQ 1500 PARALLEL	CONNECTOR	TI Professional Computer	106
Epson X Series & LQ 1500 SERIAL	CONNECTOR	AT & T 6300	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Apple IIc	110
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Apple Macintosh	111
Epson X Series & LQ 1500 SERIAL	CONNECTOR	DEC Rainbow	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Fujitsu	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	HP 150	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	112
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC AT	113
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	IBM PC jr	114
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	Kaypro	115
Epson X Series & LQ 1500 SERIAL	CONNECTOR	NEC	116

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Olivetti M24	112
Epson X Series & LQ 1500 SERIAL	CONNECTOR	Osborne Exec	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR*	RS Model 100/200	116
Epson X Series & LQ 1500 SERIAL	CONNECTOR	TI Professional Computer	116
Hewlett Packard Laser Printer	EXTERNAL*		117
Hewlett Packard Laser Printer SERIAL	CONNECTOR	AT & T 6300	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	Apple Macintosh	118
Hewlett Packard Laser Printer SERIAL	CONNECTOR	DEC Rainbow	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR	Fujitsu	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR	HP 150	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	119
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	IBM PC AT	120
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	IBM PC jr	121
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	Kaypro	122

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Hewlett Packard Laser Printer SERIAL	CONNECTOR	NEC	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR	Olivetti M24	119
Hewlett Packard Laser Printer SERIAL	CONNECTOR	Osborne Exec	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR*	RS Model 100/200	123
Hewlett Packard Laser Printer SERIAL	CONNECTOR	TI Professional Computer	123
Hewlett Packard Thinkjet	EXTERNAL*		124
Hewlett Packard Thinkjet PARALLEL	CONNECTOR	AT & T 6300	125
Hewlett Packard Thinkjet PARALLEL	CONNECTOR	Fujitsu	126
Hewlett Packard Thinkjet PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	125
Hewlett Packard Thinkjet PARALLEL	CONNECTOR*	Kaypro	126
Hewlett Packard Thinkjet PARALLEL	CONNECTOR	NEC	126
Hewlett Packard Thinkjet PARALLEL	CONNECTOR	Olivetti M24	125
Hewlett Packard Thinkjet PARALLEL	CONNECTOR*	Osborne Exec	127
Hewlett Packard Thinkjet PARALLEL	CONNECTOR*	RS Model 100/200	128
Hewlett Packard Thinkjet PARALLEL	CONNECTOR	TI Professional Computer	125

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Hewlett Packard Thinkjet SERIAL	CONNECTOR	AT & T 6300	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	Apple Macintosh	129
Hewlett Packard Thinkjet SERIAL	CONNECTOR	Fujitsu	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR	HP 150	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	130
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	IBM PC AT	131
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	IBM PC jr	132
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	Kaypro	133
Hewlett Packard Thinkjet SERIAL	CONNECTOR	NEC	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR	Olivetti M24	130
Hewlett Packard Thinkjet SERIAL	CONNECTOR	Osborne Exec	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR*	RS Model 100/200	134
Hewlett Packard Thinkjet SERIAL	CONNECTOR	TI Professional Computer	134
JUKI	EXTERNAL*		135
JUKI PARALLEL	CONNECTOR	AT & T 6300	136
JUKI PARALLEL	CONNECTOR	Fujitsu	137
JUKI PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	136
JUKI PARALLEL	CONNECTOR*	Kaypro	137
JUKI PARALLEL	CONNECTOR	NEC	137
JUKI PARALLEL	CONNECTOR	Olivetti M24	136

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
JUKI PARALLEL	CONNECTOR*	Osborne Exec	138
JUKI PARALLEL	CONNECTOR*	RS Model 100/200	139
JUKI PARALLEL	CONNECTOR	TI Professional Computer	136
JUKI SERIAL	CONNECTOR	AT & T 6300	145
JUKI SERIAL	CONNECTOR*	Apple Macintosh	140
JUKI SERIAL	CONNECTOR*	DEC Rainbow	145
JUKI SERIAL	CONNECTOR	Fujitsu	145
JUKI SERIAL	CONNECTOR	HP 150	145
JUKI SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	141
JUKI SERIAL	CONNECTOR*	IBM PC AT	142
JUKI SERIAL	CONNECTOR*	IBM PC jr	143
JUKI SERIAL	CONNECTOR*	Kaypro	144
JUKI SERIAL	CONNECTOR	NEC	145
JUKI SERIAL	CONNECTOR	Olivetti M24	141
JUKI SERIAL	CONNECTOR	Osborne Exec	145
JUKI SERIAL	CONNECTOR*	RS Model 100/200	145
JUKI SERIAL	CONNECTOR	TI Professional Computer	145
Mannesmann Tally 160	EXTERNAL*		146
Mannesmann Tally 160 PARALLEL	CONNECTOR	AT & T 6300	147
Mannesmann Tally 160 PARALLEL	CONNECTOR	Fujitsu	148
Mannesmann Tally 160 PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	147
Mannesmann Tally 160 PARALLEL	CONNECTOR*	Kaypro	148
Mannesmann Tally 160 PARALLEL	CONNECTOR	NEC	148
Mannesmann Tally 160 PARALLEL	CONNECTOR	Olivetti M24	147

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Mannesmann Tally 160 PARALLEL	CONNECTOR*	Osborne Exec	149
Mannesmann Tally 160 PARALLEL	CONNECTOR*	RS Model 100/200	150
Mannesmann Tally 160 PARALLEL	CONNECTOR	TI Professional Computer	147
Mannesmann Tally 160 SERIAL	CONNECTOR	AT & T 6300	156
Mannesmann Tally 160 SERIAL	CONNECTOR*	Apple Macintosh	151
Mannesmann Tally 160 SERIAL	CONNECTOR	DEC Rainbow	156
Mannesmann Tally 160 SERIAL	CONNECTOR	Fujitsu	156
Mannesmann Tally 160 SERIAL	CONNECTOR	HP 150	156
Mannesmann Tally 160 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	152
Mannesmann Tally 160 SERIAL	CONNECTOR*	IBM PC AT	153
Mannesmann Tally 160 SERIAL	CONNECTOR*	IBM PC jr	154
Mannesmann Tally 160 SERIAL	CONNECTOR*	Kaypro	155
Mannesmann Tally 160 SERIAL	CONNECTOR	NEC	156
Mannesmann Tally 160 SERIAL	CONNECTOR	Olivetti M24	152
Mannesmann Tally 160 SERIAL	CONNECTOR	Osborne Exec	156
Mannesmann Tally 160 SERIAL	CONNECTOR*	RS Model 100/200	156
Mannesmann Tally 160 SERIAL	CONNECTOR	TI Professional Computer	156
NEC	EXTERNAL*		157

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
NEC	SWITCHES*		158
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR	AT & T 6300	159
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR	Fujitsu	160
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	159
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR*	Kaypro	160
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR	NEC	160
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR	Olivetti M24	159
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR*	Osborne Exec	161
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR*	RS Model 100/200	162
NEC 2030, 2050, 3550 PARALLEL	CONNECTOR	TI Professional Computer	159
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	AT & T 6300	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	Apple Macintosh	163
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	DEC Rainbow	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	Fujitsu	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	HP 150	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	164
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	IBM PC AT	165
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	IBM PC jr	166

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	Kaypro	167
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	NEC	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	Olivetti M24	164
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	Osborne Exec	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR*	RS Model 100/200	168
NEC 2030, 2050, 3550 SERIAL	CONNECTOR	TI Professional Computer	168
NEC 7700 SERIAL	CONNECTOR	AT & T 6300	174
NEC 7700 SERIAL	CONNECTOR*	Apple Macintosh	169
NEC 7700 SERIAL	CONNECTOR	DEC Rainbow	174
NEC 7700 SERIAL	CONNECTOR	Fujitsu	174
NEC 7700 SERIAL	CONNECTOR	HP 150	174
NEC 7700 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	170
NEC 7700 SERIAL	CONNECTOR*	IBM PC AT	171
NEC 7700 SERIAL	CONNECTOR*	IBM PC jr	172
NEC 7700 SERIAL	CONNECTOR*	Kaypro	173
NEC 7700 SERIAL	CONNECTOR	NEC	174
NEC 7700 SERIAL	CONNECTOR	Olivetti M24	170
NEC 7700 SERIAL	CONNECTOR	Osborne Exec	174
NEC 7700 SERIAL	CONNECTOR*	RS Model 100/200	174
NEC 7700 SERIAL	CONNECTOR	TI Professional Computer	174
Okidata	EXTERNAL*		175
Okidata	SWITCHES*		176
Okidata 82/83/84/92/93/94/182/192 PARALLEL	CONNECTOR	AT & T 6300	177

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR	Fujitsu	178
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	177
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR*	Kaypro	178
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR	NEC	178
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR	Olivetti M24	177
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR*	Osborne Exec	179
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR*	RS Model 100/200	180
Okidata 82/83/84/92/ 93/94/182/192 PARALLEL	CONNECTOR	TI Professional Computer	177
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	AT & T 6300	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	Apple IIc	181
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	Apple Macintosh	182
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	DEC Rainbow	187

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	Fujitsu	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	HP 150	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	183
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	IBM PC AT	184
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	IBM PC jr	185
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	Kaypro	186
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	NEC	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	Olivetti M24	183
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	Osborne Exec	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR*	RS Model 100/200	187
Okidata 82/83/84/92/ 93/94/182/192 SERIAL	CONNECTOR	TI Professional Computer	187
Qume	EXTERNAL*		188
Qume PARALLEL	CONNECTOR	AT & T 6300	189
Qume PARALLEL	CONNECTOR	Fujitsu	190

Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Qume PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	189
Qume PARALLEL	CONNECTOR*	Kaypro	190
Qume PARALLEL	CONNECTOR	NEC	190
Qume PARALLEL	CONNECTOR	Olivetti M24	189
Qume PARALLEL	CONNECTOR*	Osborne Exec	191
Qume PARALLEL	CONNECTOR*	RS Model 100/200	192
Qume PARALLEL	CONNECTOR	TI Professional Computer	189
Qume SERIAL	CONNECTOR	AT & T 6300	198
Qume SERIAL	CONNECTOR*	Apple Macintosh	193
Qume SERIAL	CONNECTOR	DEC Rainbow	198
Qume SERIAL	CONNECTOR	Fujitsu	198
Qume SERIAL	CONNECTOR	HP 150	198
Qume SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	194
Qume SERIAL	CONNECTOR*	IBM PC AT	195
Qume SERIAL	CONNECTOR*	IBM PC jr	196
Qume SERIAL	CONNECTOR*	Kaypro	197
Qume SERIAL	CONNECTOR	NEC	198
Qume SERIAL	CONNECTOR	Olivetti M24	195
Qume SERIAL	CONNECTOR	Osborne Exec	198
Qume SERIAL	CONNECTOR*	RS Model 100/200	198
Qume SERIAL	CONNECTOR	TI Professional Computer	198
Smith Corona	EXTERNAL*		200
Brother	EXTERNAL*		199
Smith Corona/ Brother PARALLEL	CONNECTOR	AT & T 6300	201
Smith Corona/ Brother PARALLEL	CONNECTOR	Fujitsu	202
Smith Corona/ Brother PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	201

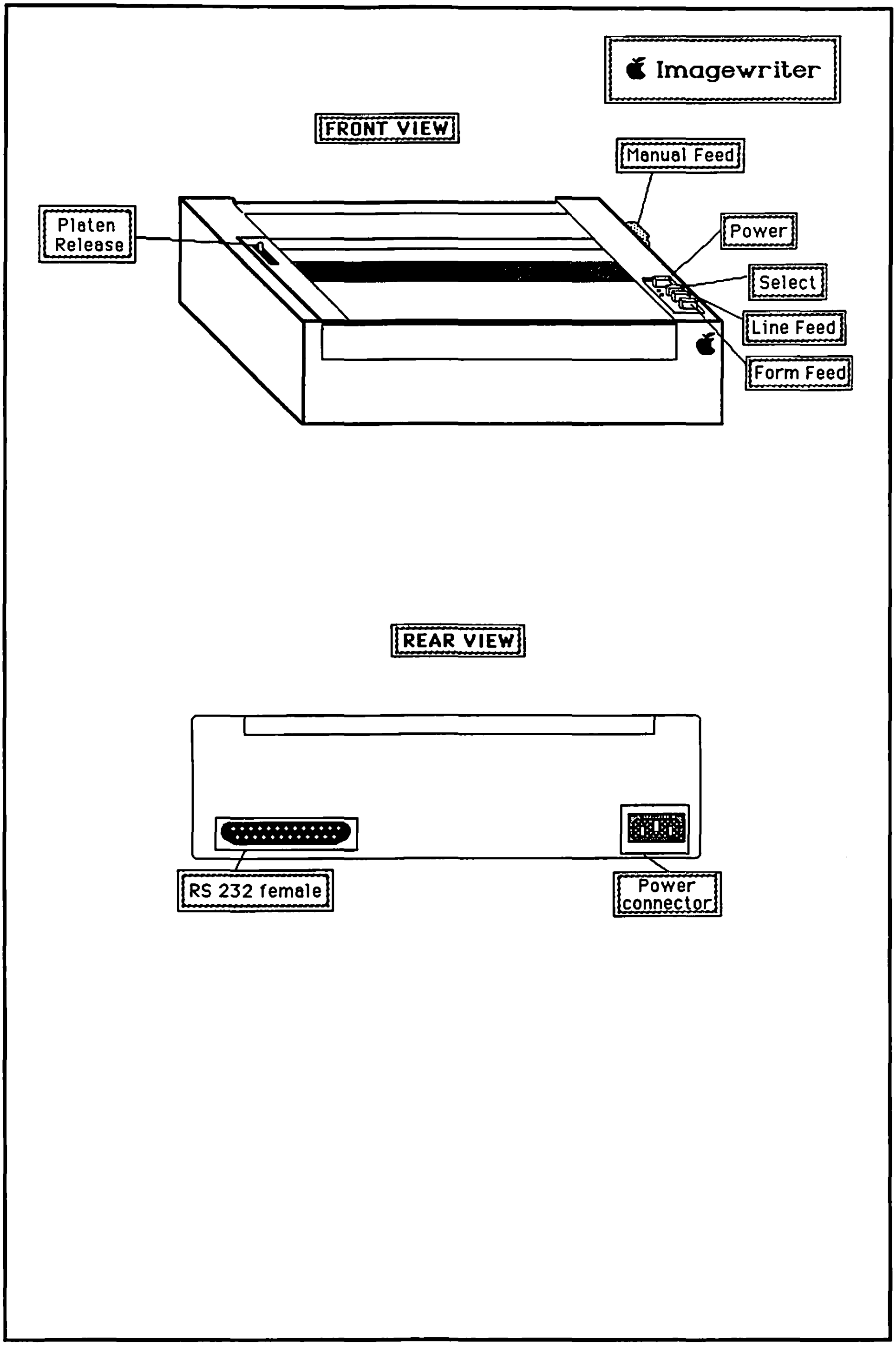
Jump Table (continued)

Printers	*Drawing Type*	*Computers*	*Page No.*
Smith Corona/ Brother PARALLEL	CONNECTOR*	Kaypro	202
Smith Corona/ Brother PARALLEL	CONNECTOR	NEC	202
Smith Corona/ Brother PARALLEL	CONNECTOR	Olivetti M24	201
Smith Corona/ Brother PARALLEL	CONNECTOR*	Osborne Exec	203
Smith Corona/ Brother PARALLEL	CONNECTOR*	RS Model 100/200	204
Smith Corona/ Brother PARALLEL	CONNECTOR	TI Professional Computer	201
Smith Corona/ Brother SERIAL	CONNECTOR	AT & T 6300	211
Smith Corona/ Brother SERIAL	CONNECTOR*	Apple IIc	205
Smith Corona/ Brother SERIAL	CONNECTOR*	Apple Macintosh	206
Smith Corona/ Brother SERIAL	CONNECTOR	DEC Rainbow	211
Smith Corona/ Brother SERIAL	CONNECTOR	Fujitsu	211
Smith Corona/ Brother SERIAL	CONNECTOR	HP 150	211
Smith Corona/ Brother SERIAL	CONNECTOR*	IBM PC, IBM PC XT & Clones	207
Smith Corona/ Brother SERIAL	CONNECTOR*	IBM PC AT	208
Smith Corona/ Brother SERIAL	CONNECTOR*	IBM PC jr	209
Smith Corona/ Brother SERIAL	CONNECTOR*	Kaypro	210
Smith Corona/ Brother SERIAL	CONNECTOR	NEC	211
Smith Corona/ Brother SERIAL	CONNECTOR	Olivetti M24	207

Jump Table (continued)

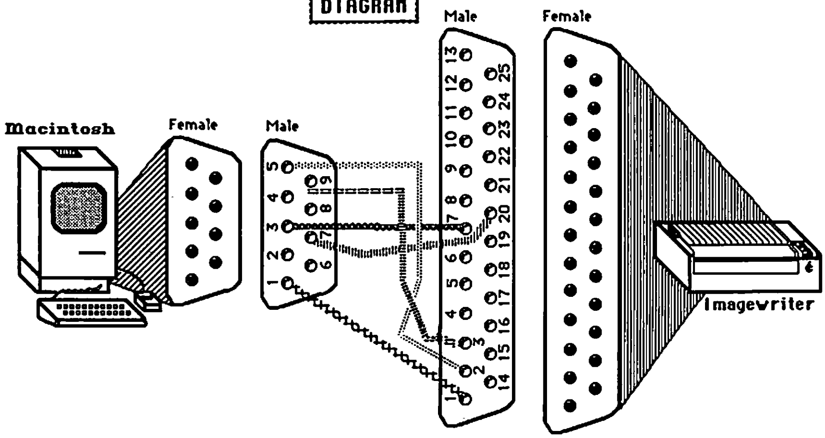
Printers	*Drawing Type*	*Computers*	*Page No.*
Smith Corona/ Brother SERIAL	CONNECTOR	Osborne Exec	211
Smith Corona/ Brother SERIAL	CONNECTOR*	RS Model 100/200	211
Smith Corona/ Brother SERIAL	CONNECTOR	TI Professional Computer	211
Star Micronics PARALLEL	EXTERNAL*		212
Star Micronics PARALLEL	CONNECTOR	AT & T 6300	213
Star Micronics PARALLEL	CONNECTOR	Fujitsu	214
Star Micronics PARALLEL	CONNECTOR*	IBM PC, IBM PC XT, AT, jr & Clones	213
Star Micronics PARALLEL	CONNECTOR*	Kaypro	214
Star Micronics PARALLEL	CONNECTOR	NEC	214
Star Micronics PARALLEL	CONNECTOR	Olivetti M24	213
Star Micronics PARALLEL	CONNECTOR*	Osborne Exec	215
Star Micronics PARALLEL	CONNECTOR*	RS Model 100/200	216
Star Micronics PARALLEL	CONNECTOR	TI Professional Computer	213

Connection Diagrams


Imagewriter
FRONT VIEW
Manual Feed
Platen Release
Power
Select
Line Feed
Form Feed
REAR VIEW
RS 232 female
Power connector

SERIAL Imagewriter TO Macintosh

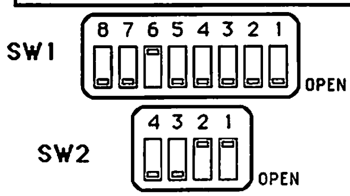
CABLE DIAGRAM

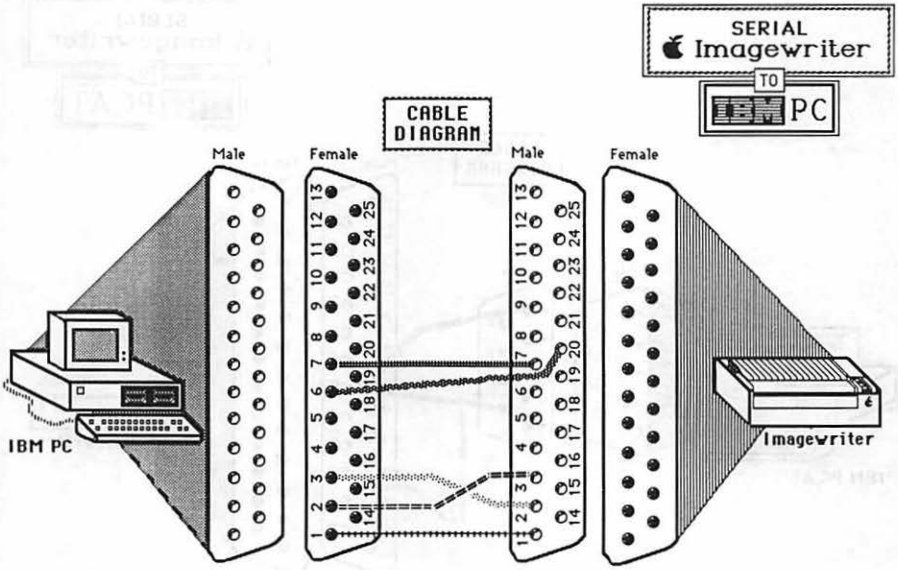


CONNECTOR PIN ASSIGNMENTS

Macintosh			Imagewriter
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7

IMAGEWRITER SWITCH SETTINGS

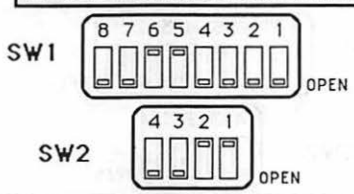




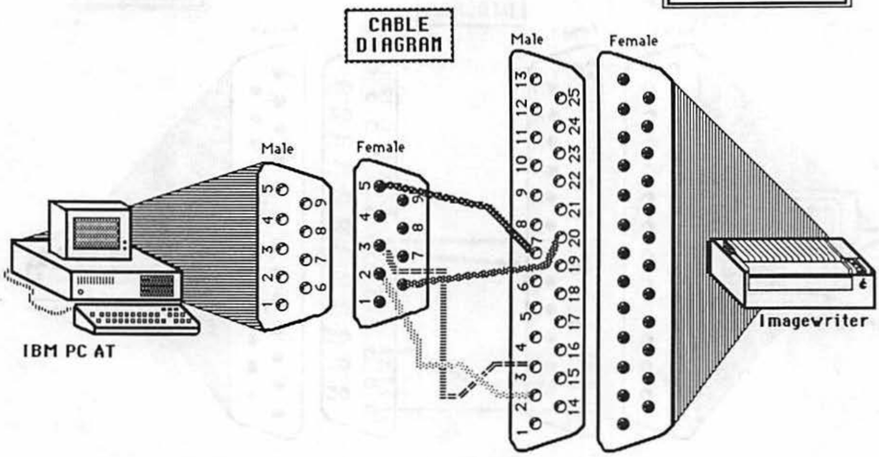
CONNECTOR PIN ASSIGNMENTS

IBM PC				Imagewriter
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
6	DSR		DTR	20
7		SIG GND		7

IMAGEWRITER SWITCH SETTINGS



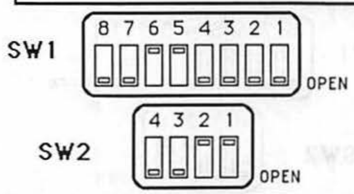
SERIAL Imagewriter TO IBM PC AT

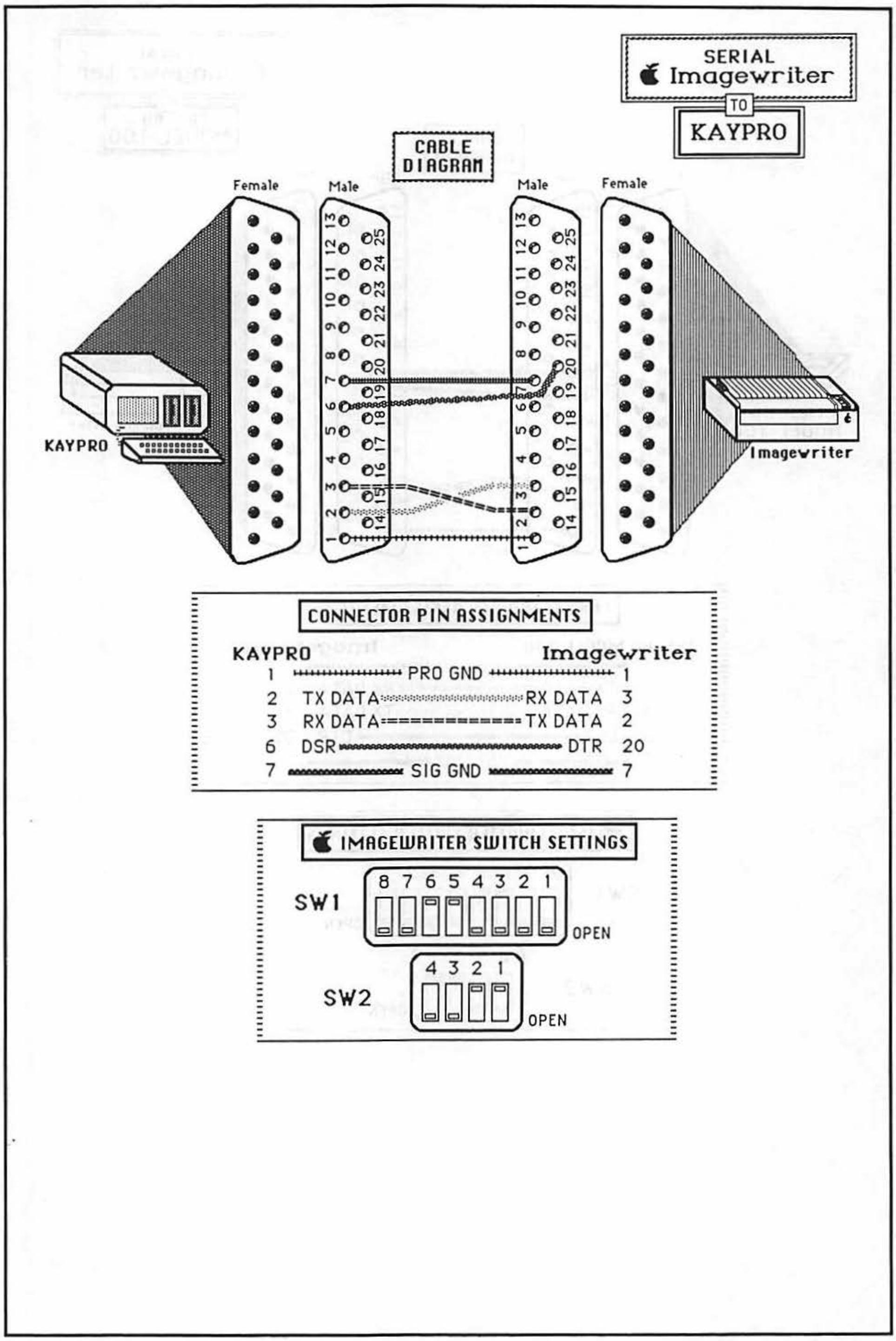


CONNECTOR PIN ASSIGNMENTS

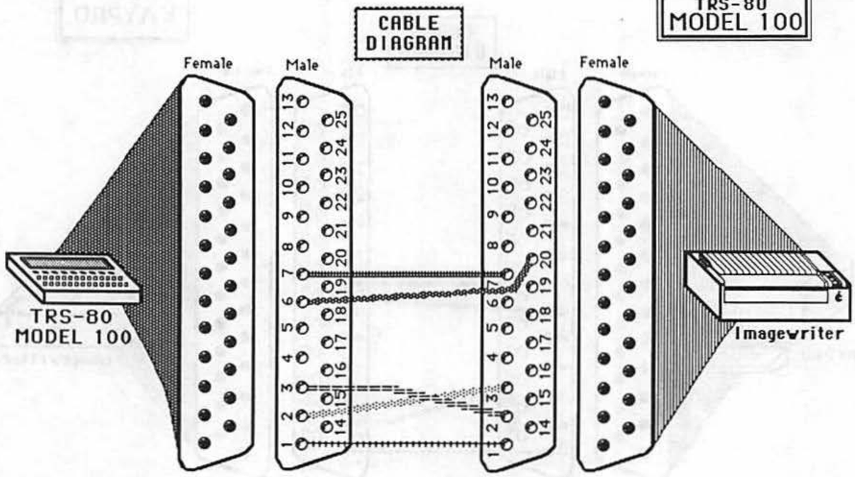
IBM PC AT			Imagewriter
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20

IMAGEWRITER SWITCH SETTINGS




SERIAL
Imagewriter
TO
KAYPRO
CABLE DIAGRAM
Female
Male
Male
Female
KAYPRO
Imagewriter
CONNECTOR PIN ASSIGNMENTS
KAYPRO
Imagewriter
1 PRO GND 1
2 TX DATA RX DATA 3
3 RX DATA TX DATA 2
6 DSR DTR 20
7 SIG GND 7
IMAGEWRITER SWITCH SETTINGS
SW1
8 7 6 5 4 3 2 1
OPEN
SW2
4 3 2 1
OPEN

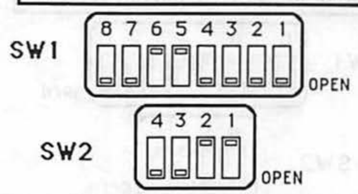
SERIAL Imagewriter TO TRS-80 MODEL 100

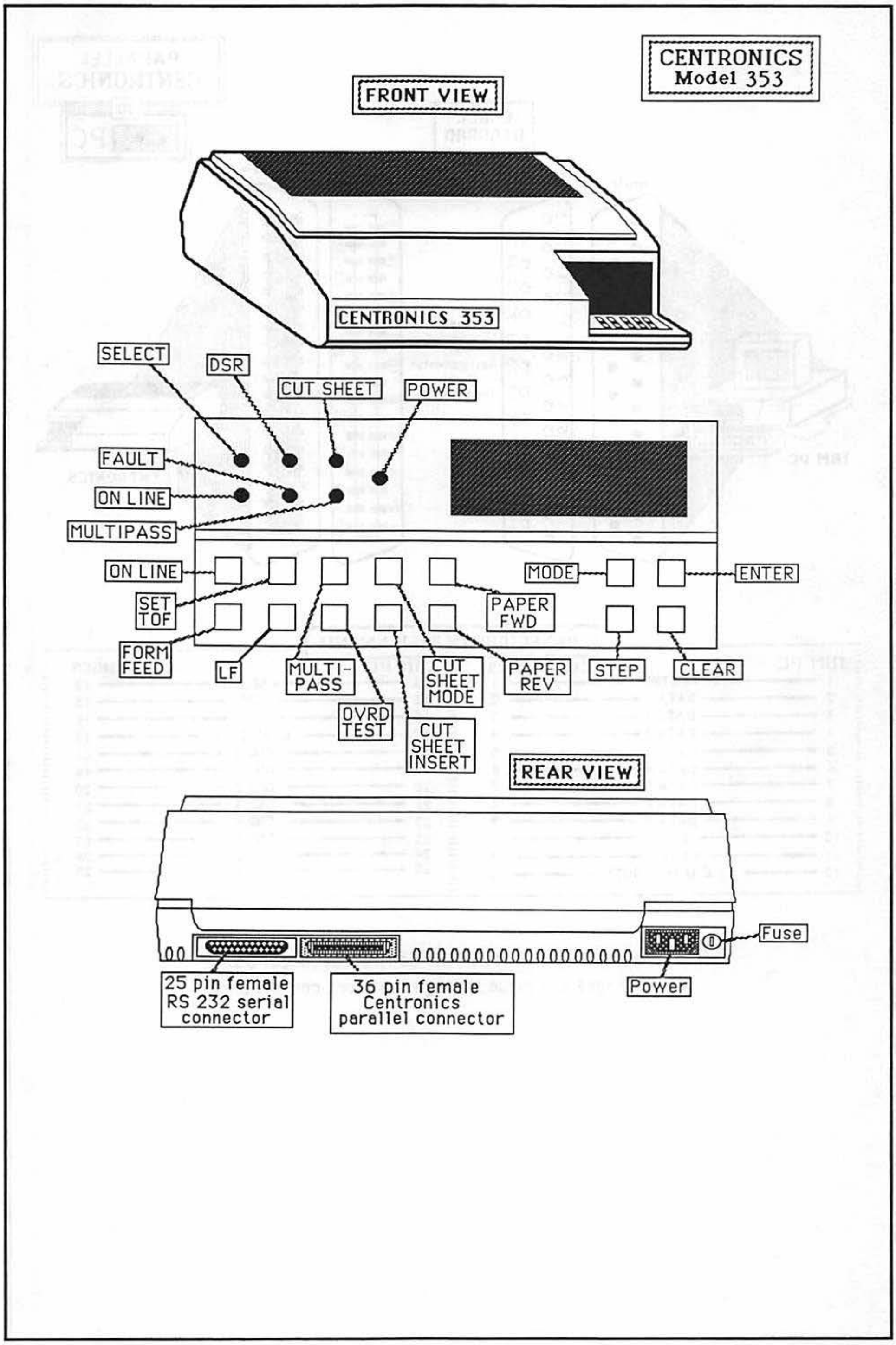


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			Imagewriter
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
6	DSR	DTR	20
7	SIG GND	SIG GND	7

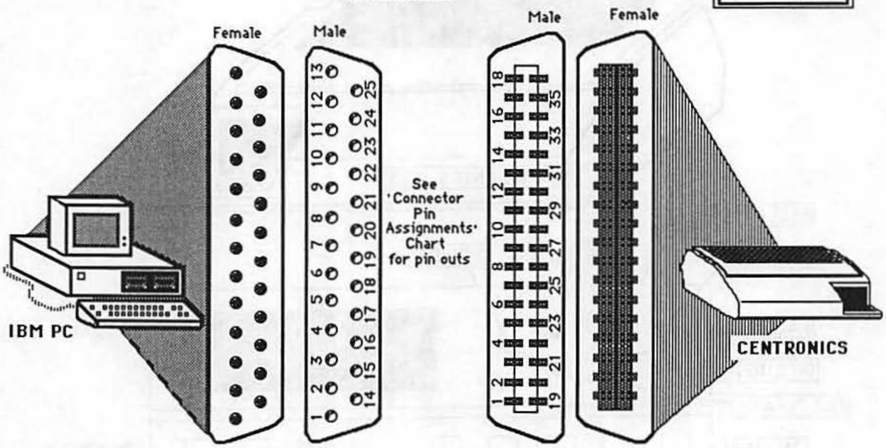
IMAGEWRITER SWITCH SETTINGS




CENTRONICS
Model 353
FRONT VIEW
CENTRONICS 353
SELECT
DSR
CUT SHEET
POWER
FAULT
ON LINE
MULTIPASS
ON LINE
SET TOF
FORM FEED
LF
MULTI-PASS
OVRD TEST
CUT SHEET MODE
CUT SHEET INSERT
PAPER FWD
PAPER REV
MODE
ENTER
STEP
CLEAR
REAR VIEW
Fuse
Power
25 pin female RS 232 serial connector
36 pin female Centronics parallel connector

PARALLEL CENTRONICS TO IBM PC

CABLE DIAGRAM

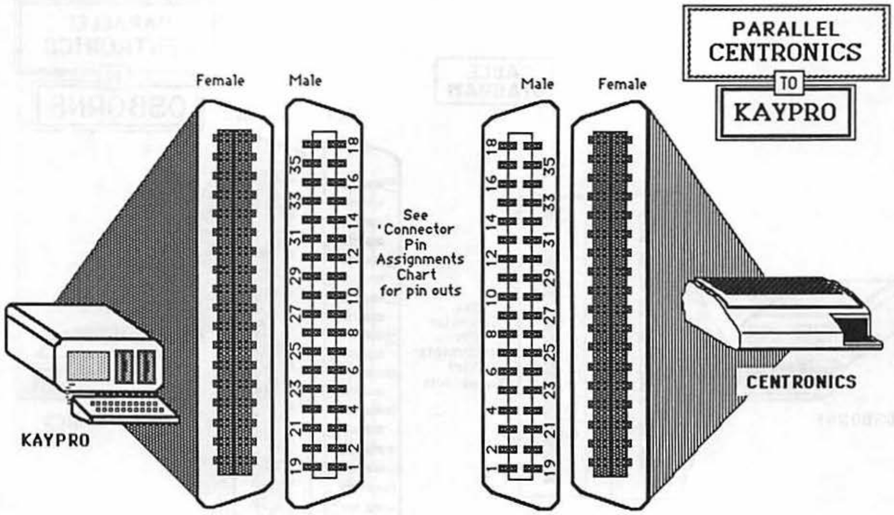


CONNECTOR PIN ASSIGNMENTS

IBM PC		CENTRONICS
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12

IBM PC		CENTRONICS
13	+ SELECT	13
15	0V	15
16	0V	16
17	CHASIS GND	17
18	GND 0	26
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

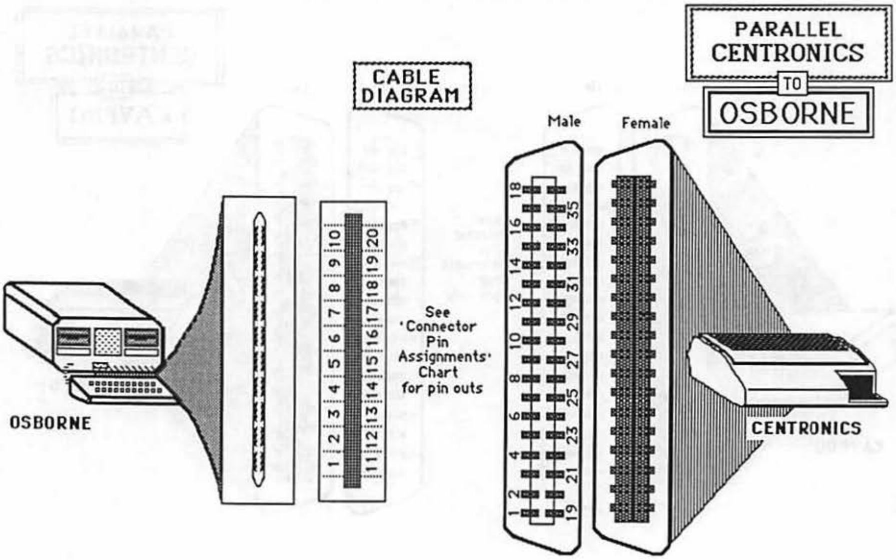
There are no switches in the Centronics model 353.
Any changes are made through the front control panel.



CONNECTOR PIN ASSIGNMENTS

KAYPRO		CENTRONICS
1	$\overline{\text{STROBE}}$	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

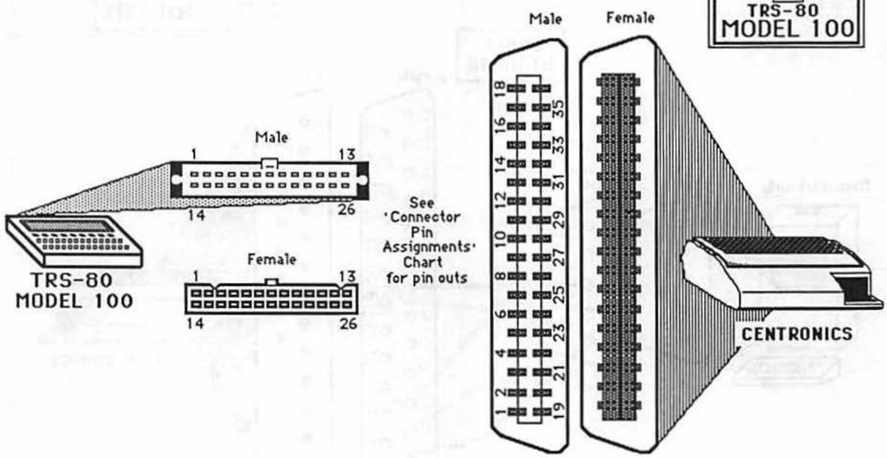


CONNECTOR PIN ASSIGNMENTS

OSBORNE		CENTRONICS
1	DATA 0	2
2	DATA 4	3
3	DATA 1	4
4	DATA 5	5
5	DATA 2	6
6	DATA 6	7
7	DATA 3	8
8	DATA 7	9
11	DATA STROBE	1
12	GROUND	19
15	BUSY	11
17	GROUND	20
19	SELECT	13

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

PARALLEL CENTRONICS TO TRS-80 MODEL 100



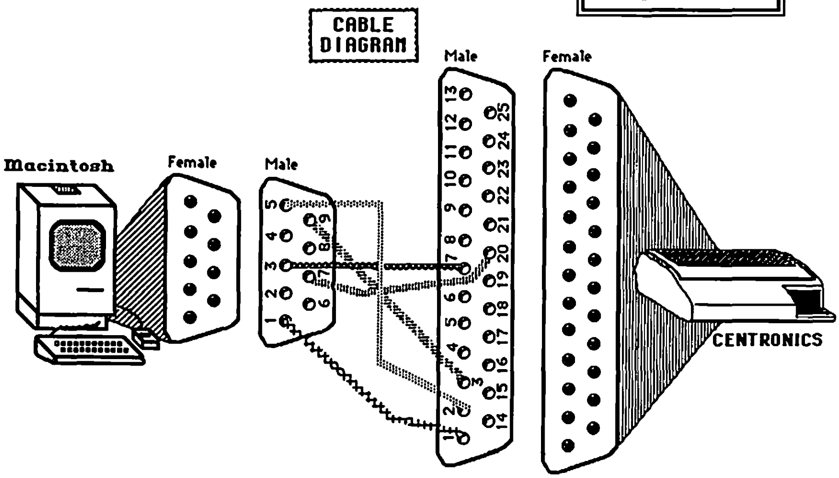
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		CENTRONICS
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7

TRS-80 MODEL 100		CENTRONICS
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

SERIAL CENTRONICS TO Macintosh



CONNECTOR PIN ASSIGNMENTS

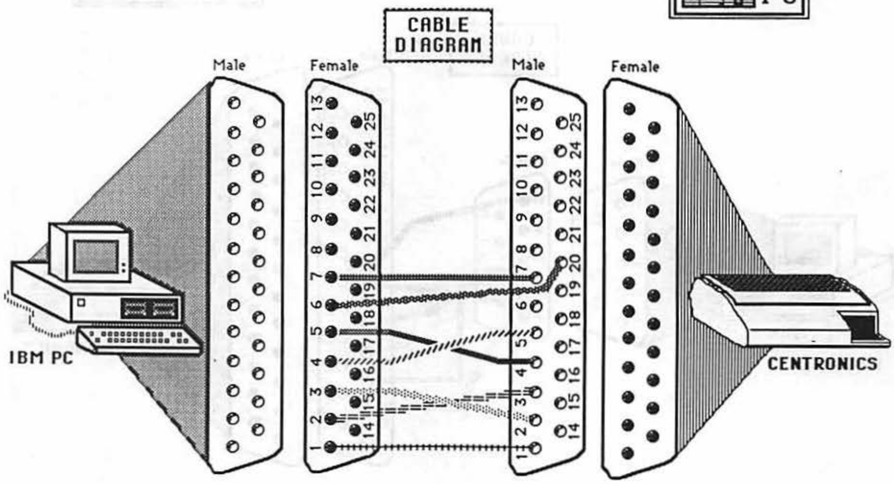
Macintosh		CENTRONICS
1	PRO GND	1
9	TX DATA — RX DATA	3
5	RX DATA — TX DATA	2
7	DSR — DTR	20
3	SIG GND	7

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

SERIAL CENTRONICS

TO

IBM PC

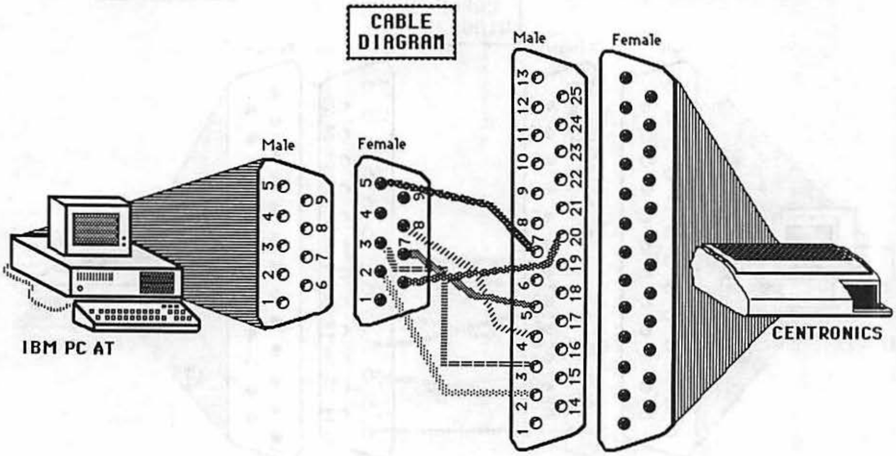


CONNECTOR PIN ASSIGNMENTS

IBM PC			CENTRONICS
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND		7

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

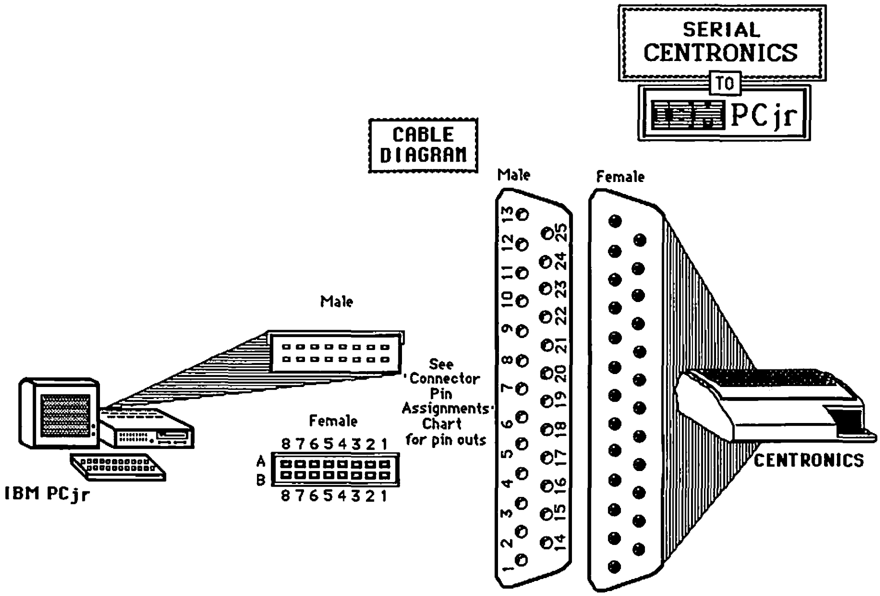
SERIAL CENTRONICS TO IBM PC AT



CONNECTOR PIN ASSIGNMENTS

IBM PC AT			CENTRONICS	
2	RX DATA		TX DATA	2
3	TX DATA		RX DATA	3
5		SIG GND		7
6	DSR		DTR	20
7	RTS		CTS	5
8	CTS		RTS	4

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

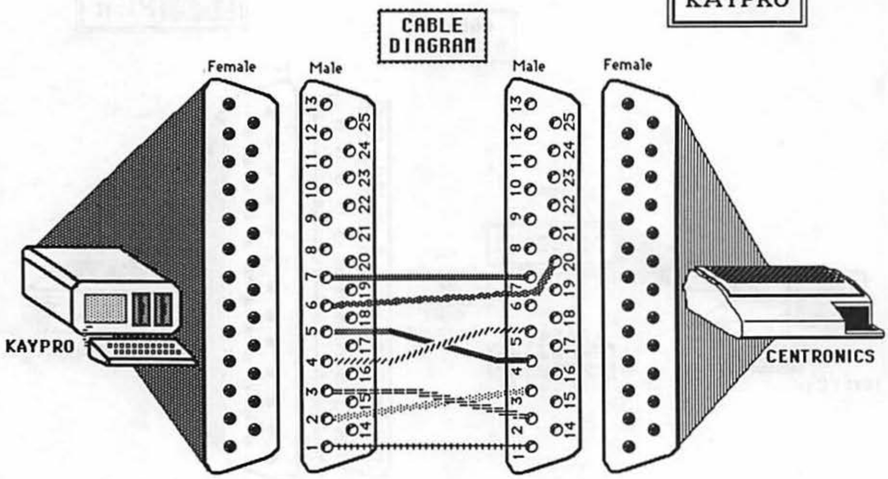


CONNECTOR PIN ASSIGNMENTS

IBM PCjr			CENTRONICS
A3	CTS	RTS	4
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A7	RTS	CTS	5
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

SERIAL
CENTRONICS
TO
KAYPRO



CONNECTOR PIN ASSIGNMENTS

KAYPRO			CENTRONICS
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

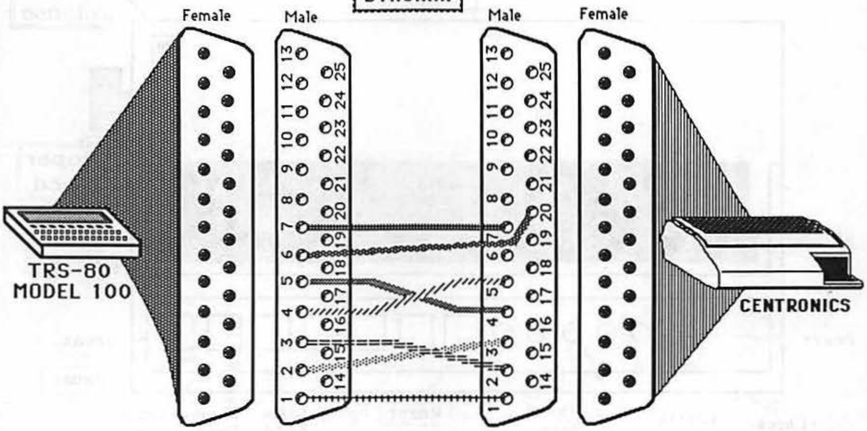
There are no switches in the Centronics model 353.
Any changes are made through the front control panel.

SERIAL CENTRONICS

TO

TRS-80 MODEL 100

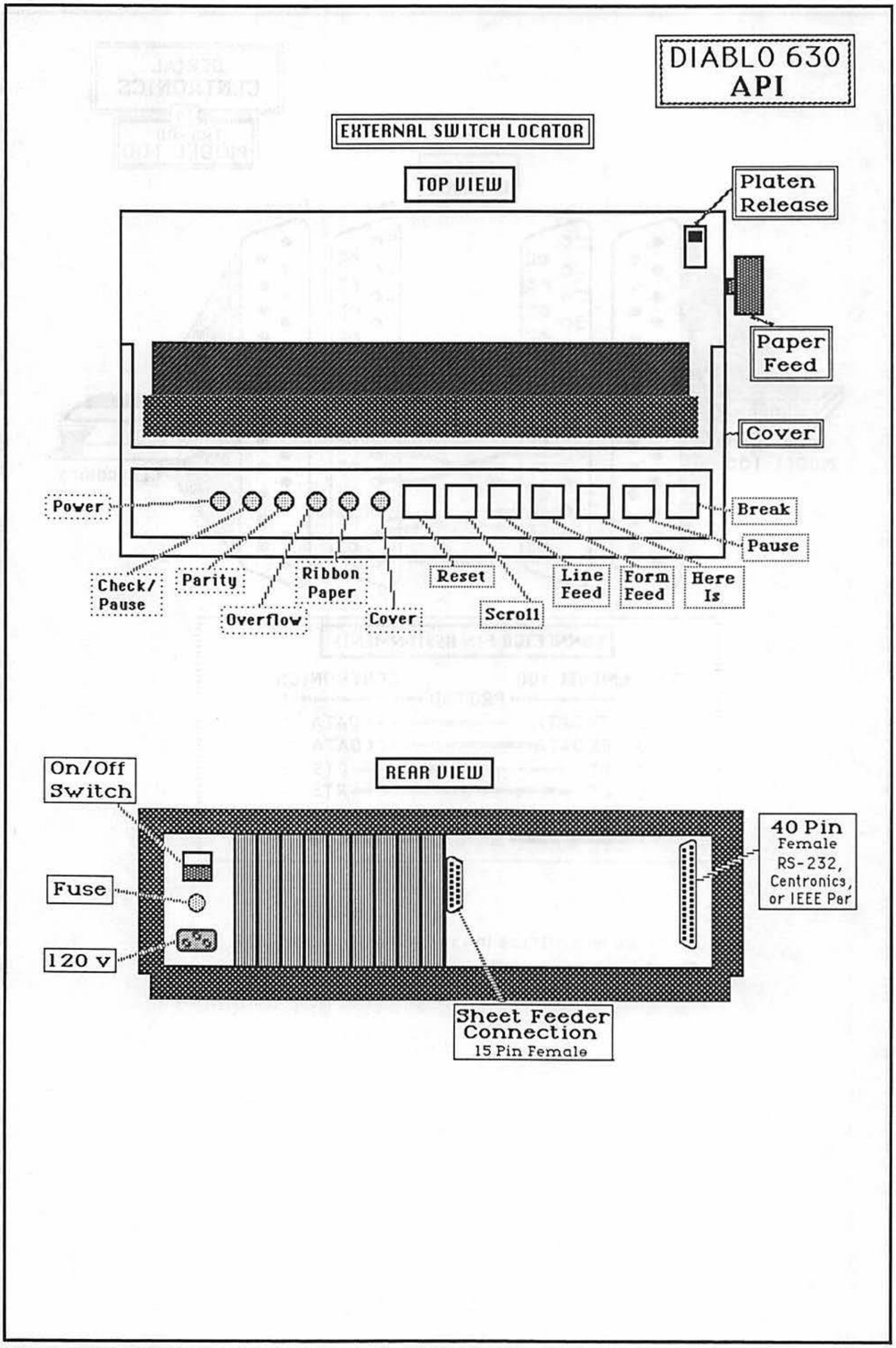
CABLE DIAGRAM

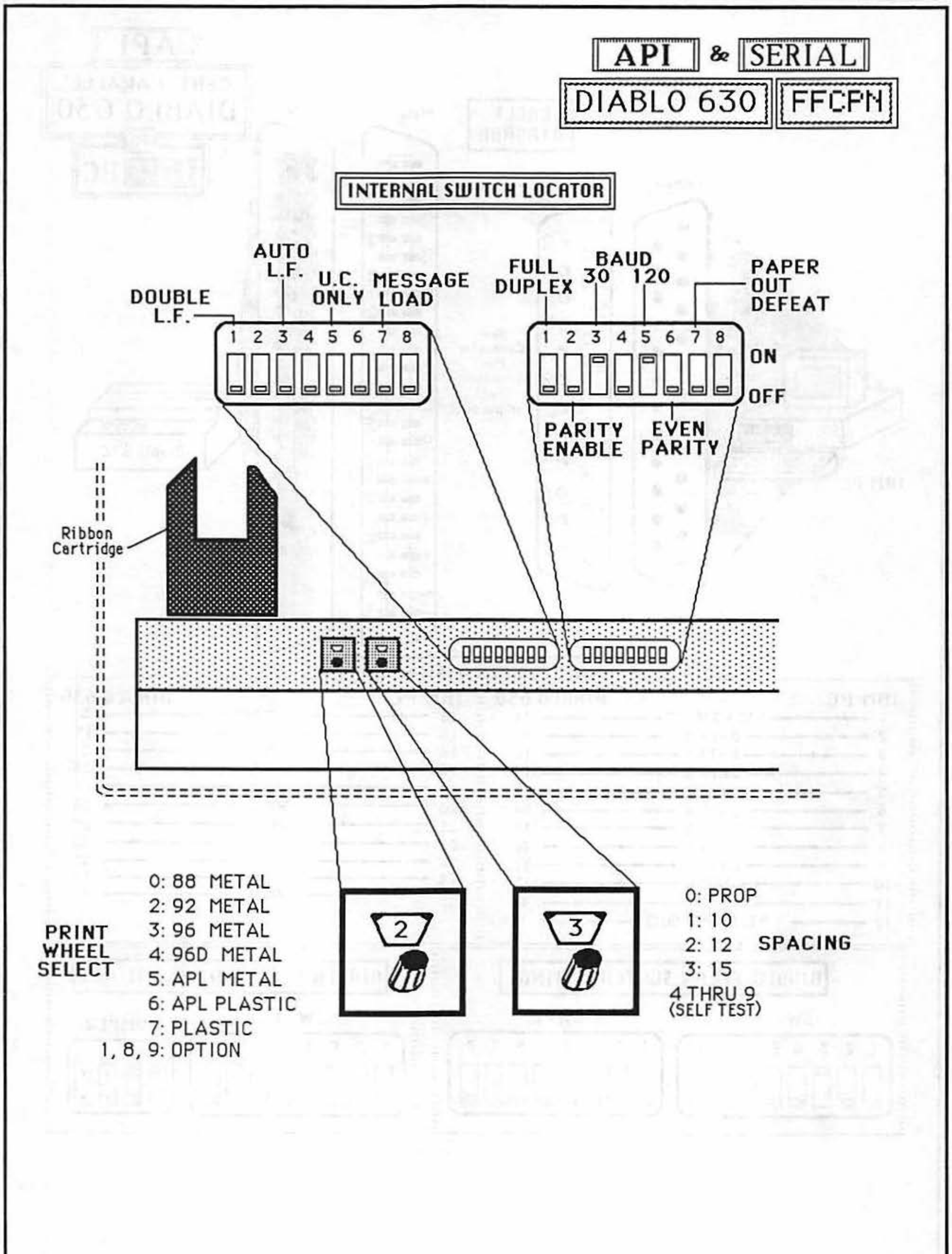


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100				CENTRONICS
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
4	RTS		CTS	5
5	CTS		RTS	4
6	DSR		DTR	20
7		SIG GND		7

There are no switches in the Centronics model 353.
Any changes are made through the front control panel.


DIABLO 630
API
EXTERNAL SWITCH LOCATOR
TOP VIEW
Platen Release
Paper Feed
Cover
Power
Break
Pause
Check/ Pause
Parity
Ribbon Paper
Overflow
Cover
Reset
Scroll
Line Feed
Form Feed
Here Is
REAR VIEW
On/Off Switch
Fuse
120 v
40 Pin
Female
RS-232,
Centronics,
or IEEE Par
Sheet Feeder
Connection
15 Pin Female


API
&
SERIAL
DIABLO 630
FFCPN
INTERNAL SWITCH LOCATOR
DOUBLE L.F.
AUTO L.F.
U.C. ONLY
MESSAGE LOAD
1 2 3 4 5 6 7 8
FULL DUPLEX
BAUD
30
120
PAPER OUT DEFEAT
ON
OFF
PARITY ENABLE
EVEN PARITY
Ribbon Cartridge
PRINT WHEEL SELECT
0: 88 METAL
2: 92 METAL
3: 96 METAL
4: 96D METAL
5: APL METAL
6: APL PLASTIC
7: PLASTIC
1, 8, 9: OPTION
2
3
0: PROP
1: 10
2: 12
3: 15
4 THRU 9 (SELF TEST)
SPACING

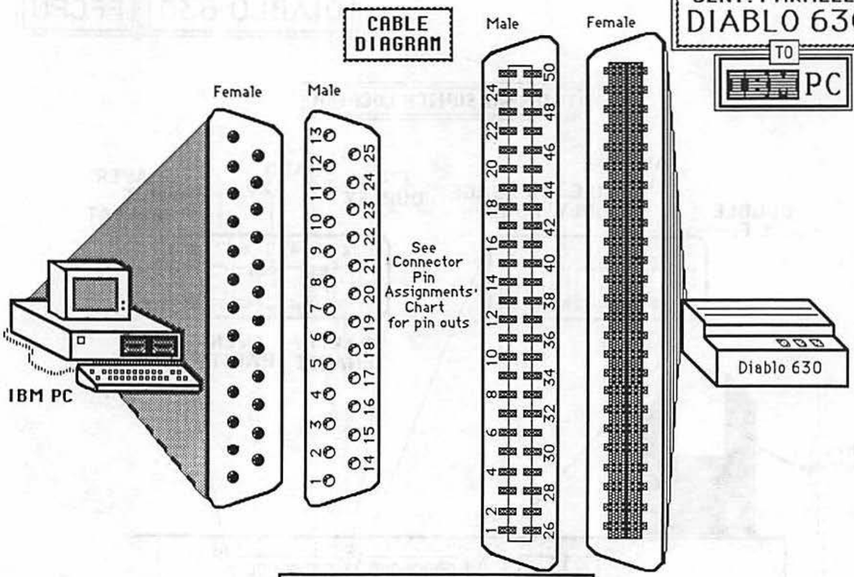
API

CENT. PARALLEL

DIABLO 630

TO

IBM PC

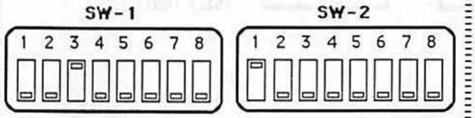


CONNECTOR PIN ASSIGNMENTS

IBM PC		DIABLO 630	IBM PC		DIABLO 630
1	DATA STROBE	14	13	+ SELECT	5
2	DATA 0	9	15	- ERROR	18
3	DATA 1	10	16	-INIT	2
4	DATA 2	11	18	GND 0	26
5	DATA 3	12	19	GND 1	27
6	DATA 4	34	20	GND 2	28
7	DATA 5	35	21	GND 3	29
8	DATA 6	36	22	GND 4	30
9	DATA 7	37	23	GND 5	31
10	$\overline{ACK}$	15	24	GND 6	39
11	+ BUSY	6	25	GND 7	40
12	+ P.E. (PAPER OUT)	1			

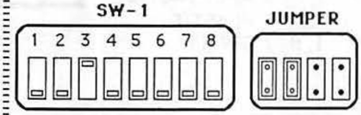
DIABLO FFCPN SWITCH SETTINGS

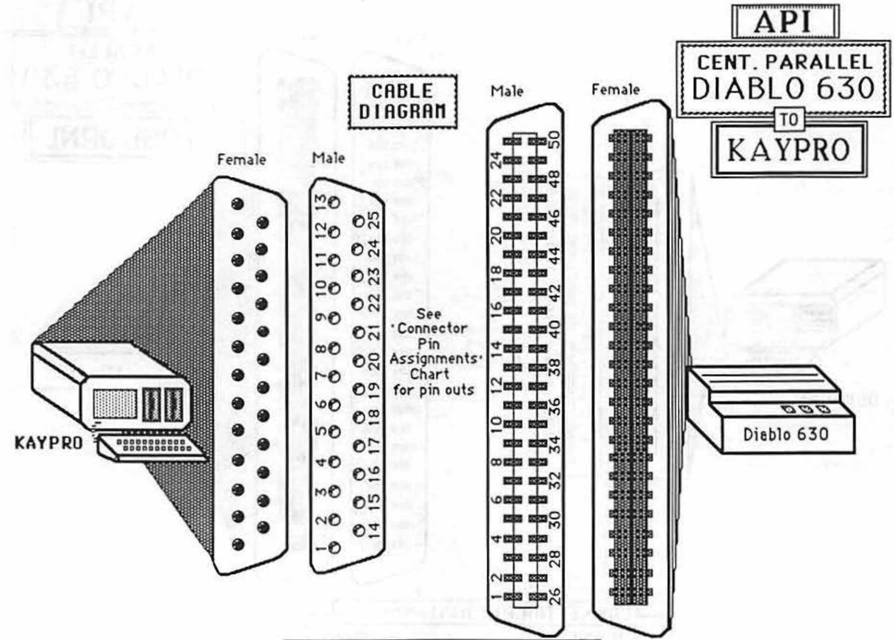
SW-1 SW-2



DIABLO LCPN SWITCH SETTINGS

SW-1 JUMPER



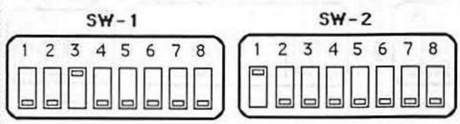


CONNECTOR PIN ASSIGNMENTS

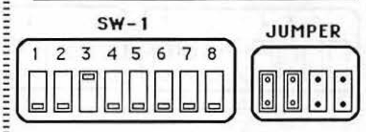
KAYPRO		DIABLO 630
1	DATA STROBE	14
2	DATA 0	9
3	DATA 1	10
4	DATA 2	11
5	DATA 3	12
6	DATA 4	34
7	DATA 5	35
8	DATA 6	36
9	DATA 7	37
10	$\overline{\text{ACK}}$	15
11	+ BUSY	6
12	+ P.E. (PAPER OUT)	1

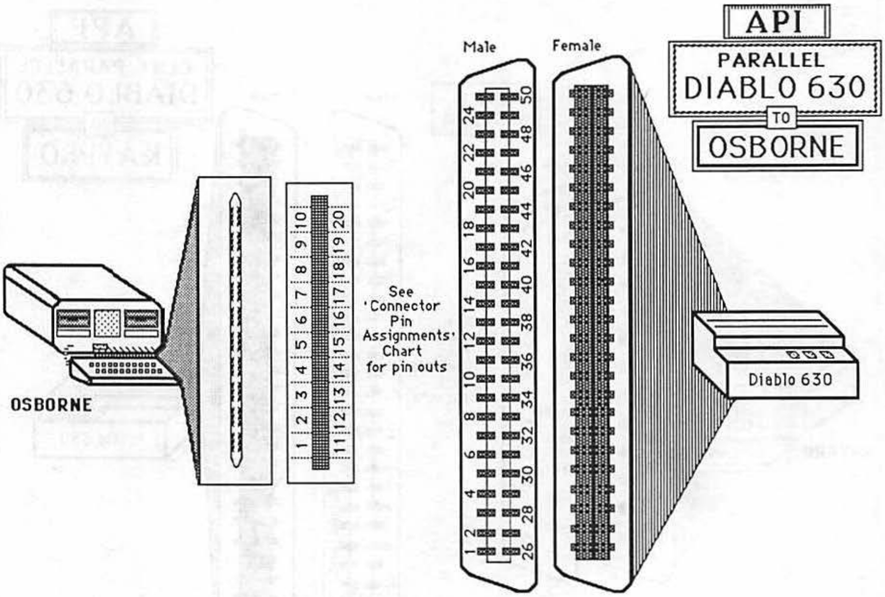
KAYPRO		DIABLO 630
13	+ SELECT	5
16	-INIT	2
18	GND 0	26
19	GND 1	27
20	GND 2	28
21	GND 3	29
22	GND 4	30
23	GND 5	31
24	GND 6	39
25	GND 7	40
32	- ERROR	18

DIABLO FFCPN SWITCH SETTINGS



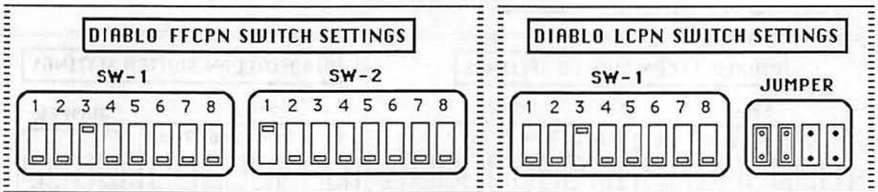
DIABLO LCPN SWITCH SETTINGS

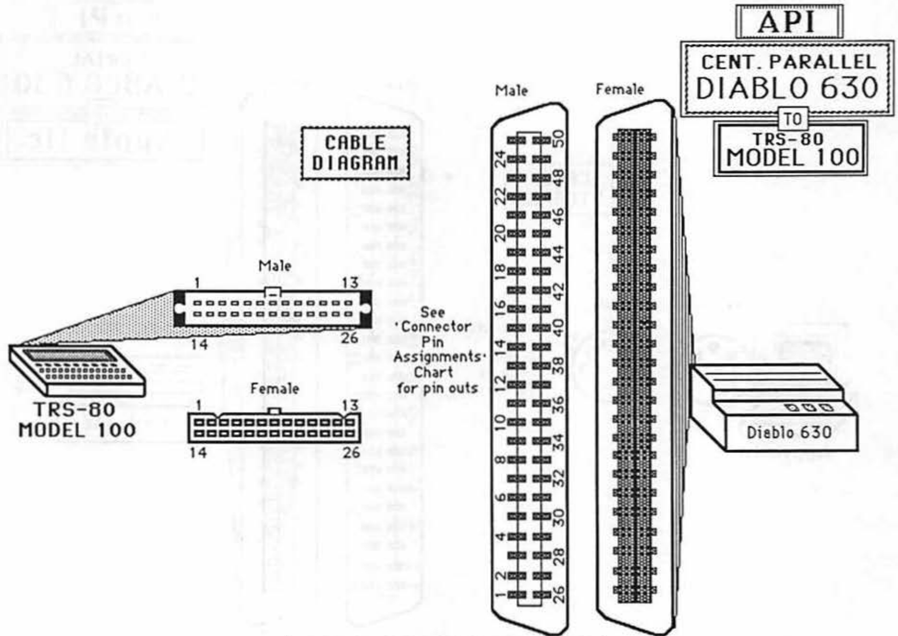




CONNECTOR PIN ASSIGNMENTS

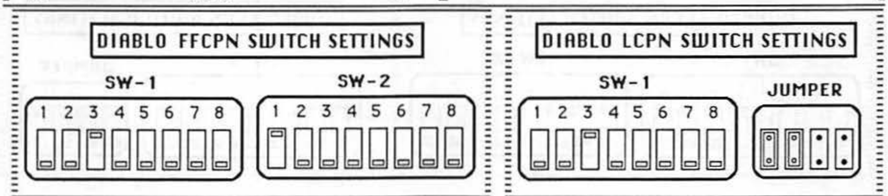
OSBORNE		DIABLO
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5





CONNECTOR PIN ASSIGNMENTS

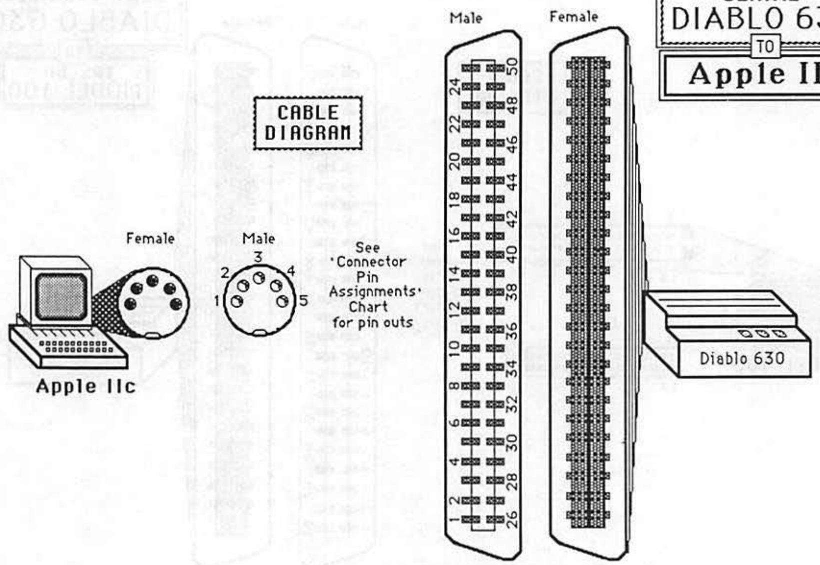
MODEL 100		DIABLO 630
1	DATA STROBE	14
2	STROBE GND	26
3	DATA 1 — DATA 2	9
4	GND 1 — GND 2	27
5	DATA 2	10
6	GND 2	28
7	DATA 3	11
8	GND 3	29
9	DATA 4	12
10	GND 4	30
11	DATA 5	34
12	GND 5	31
13	DATA 6	35
14	GND 6	39
15	DATA 7	36
16	GND 7	40
17	DATA 8	37
18	GND 8	41
21	BUSY	6
22	BUSY GND	43
25	SELECT	44



API

SERIAL DIABLO 630 TO Apple IIc

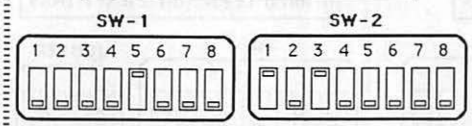
CABLE DIAGRAM



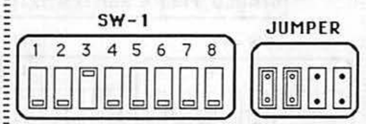
CONNECTOR PIN ASSIGNMENTS

Apple IIc			DIABLO 630
2	TX DATA	RX DATA	48
4	RX DATA	TX DATA	24
1	CTS	RTS	23
5	DTR	DSR	49
3	SIG GND		47

DIABLO FFCPN SWITCH SETTINGS

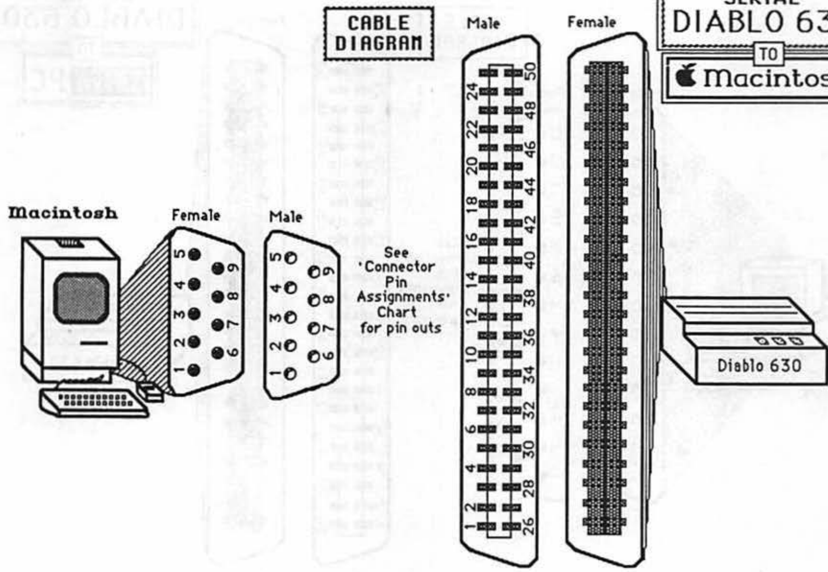


DIABLO LCPN SWITCH SETTINGS



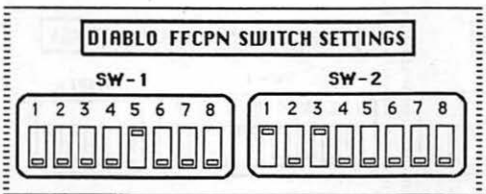
API

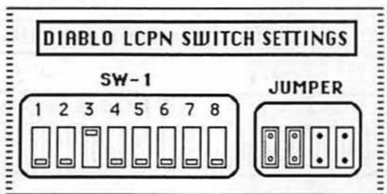
SERIAL DIABLO 630 TO Macintosh

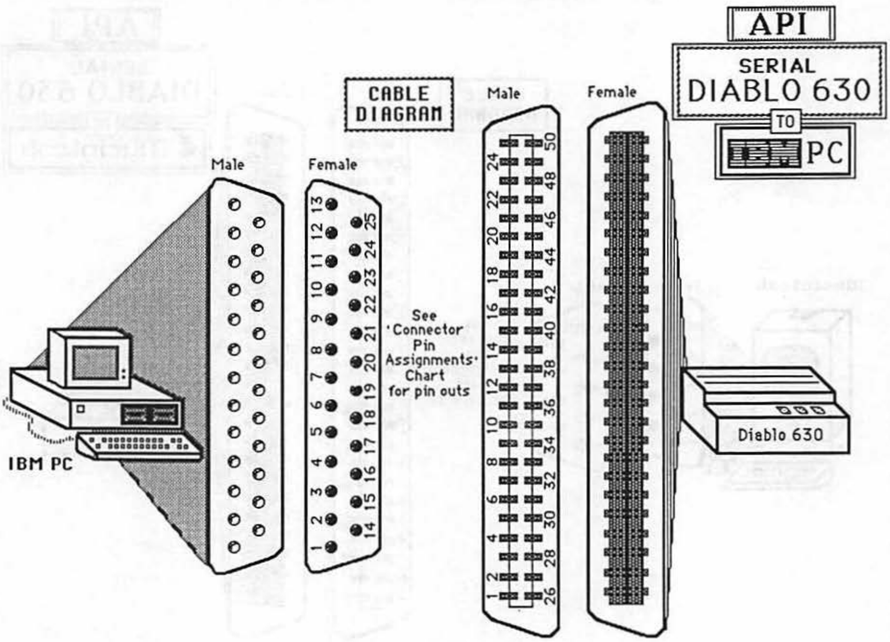


CONNECTOR PIN ASSIGNMENTS

Macintosh	Signal	DIABLO 630
1	PRO GND	1
9	TX DATA — RX DATA	48
5	RX DATA — TX DATA	24
7	DSR — DTR	25
3	SIG GND	47
	JUMPER	23, 49

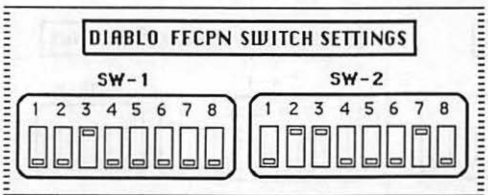


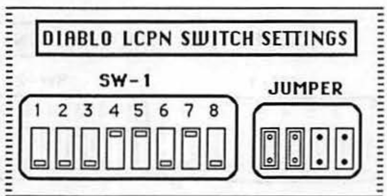


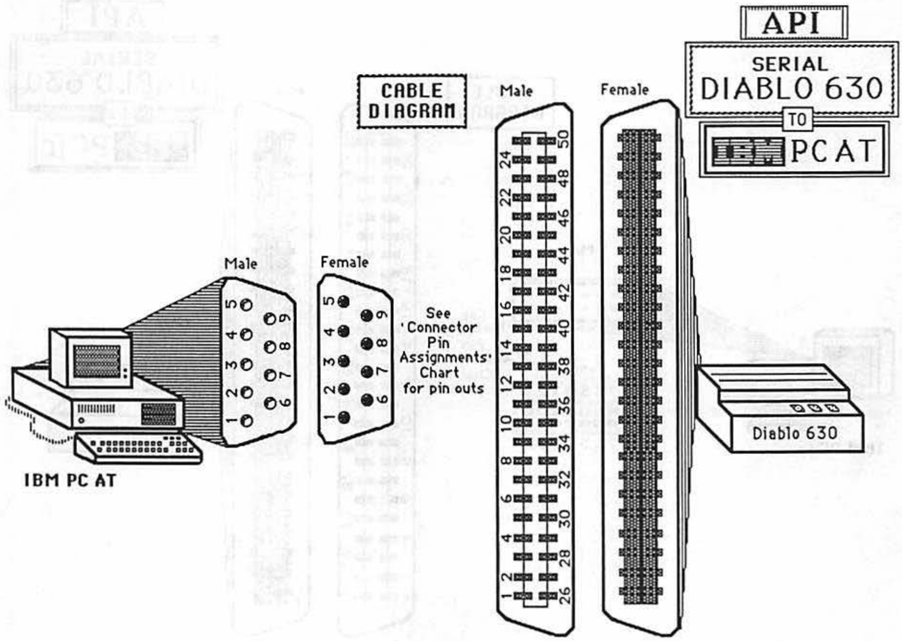


CONNECTOR PIN ASSIGNMENTS

IBM PC		DIABLO 630
1	PRO GND	1
2	TX DATA — RX DATA	48
3	RX DATA — TX DATA	24
5	CTS — RTS	23
6	DSR — DTR	25
7	SIG GND	47
20	DTR — DSR	49

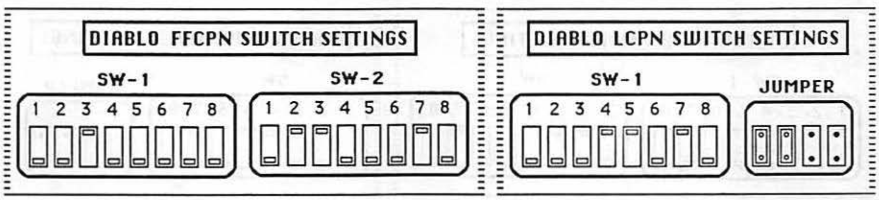


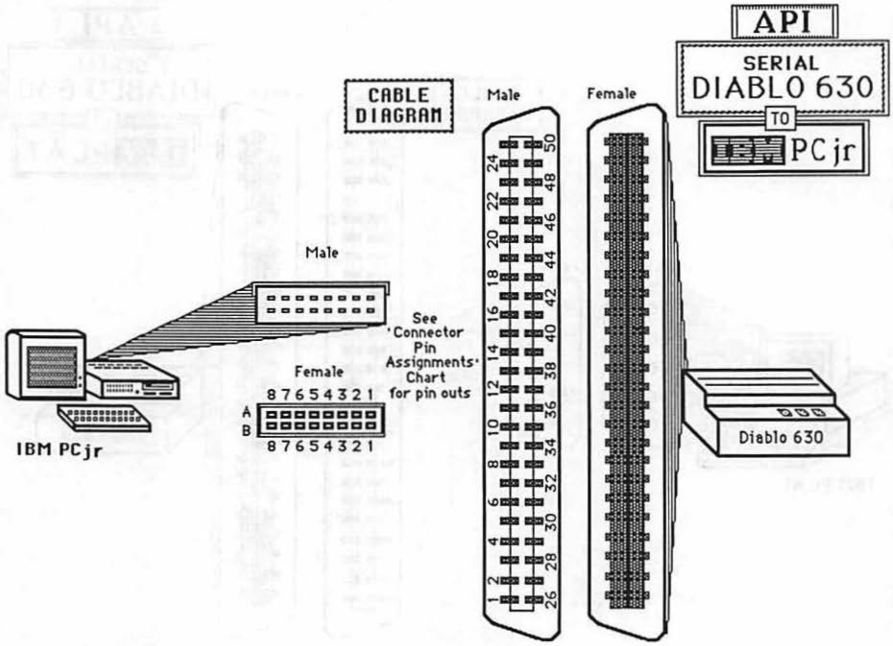




CONNECTOR PIN ASSIGNMENTS

IBM PC AT		DIABLO 630	
2	RX DATA	TX DATA	24
3	TX DATA	RX DATA	48
4	DTR	DSR	49
5	SIG GND	SIG GND	47
6	DSR	DTR	25
8	CTS	RTS	23

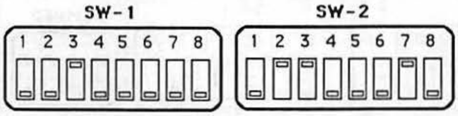




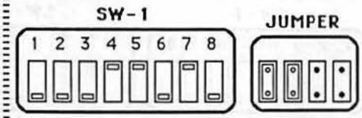
CONNECTOR PIN ASSIGNMENTS

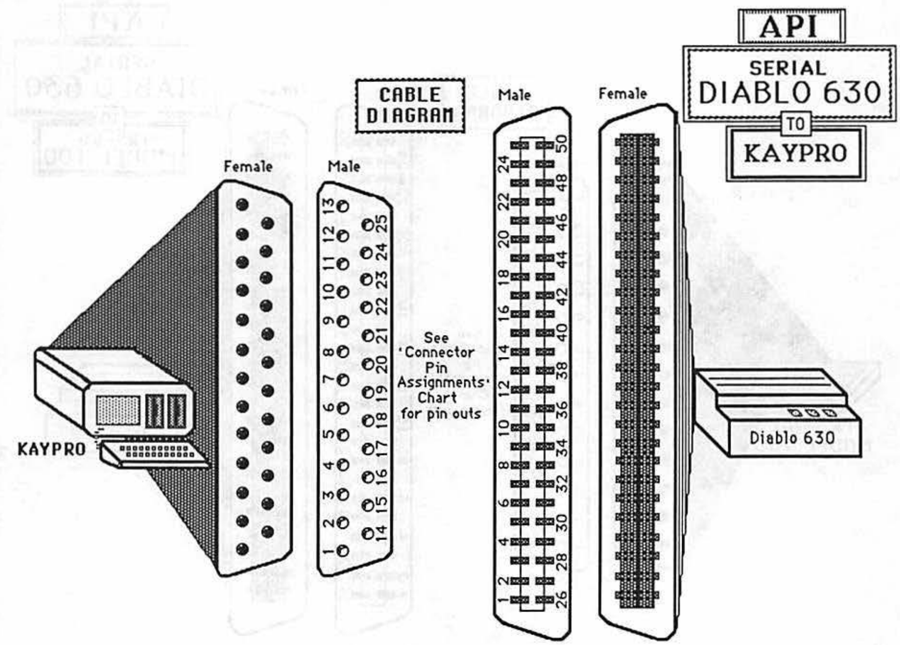
IBM PCjr			DIABLO 630
A2	DTR	DSR	49
A4	TX DATA	RX DATA	48
A6	DSR	DTR	25
A7	CTS	RTS	23
A8	RX DATA	TX DATA	24
B1	PRO GND		1
B2	SIG GND		47

DIABLO FFCPN SWITCH SETTINGS



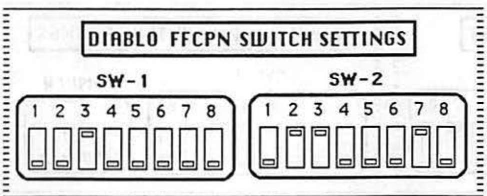
DIABLO LCPN SWITCH SETTINGS

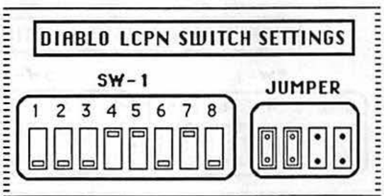




CONNECTOR PIN ASSIGNMENTS

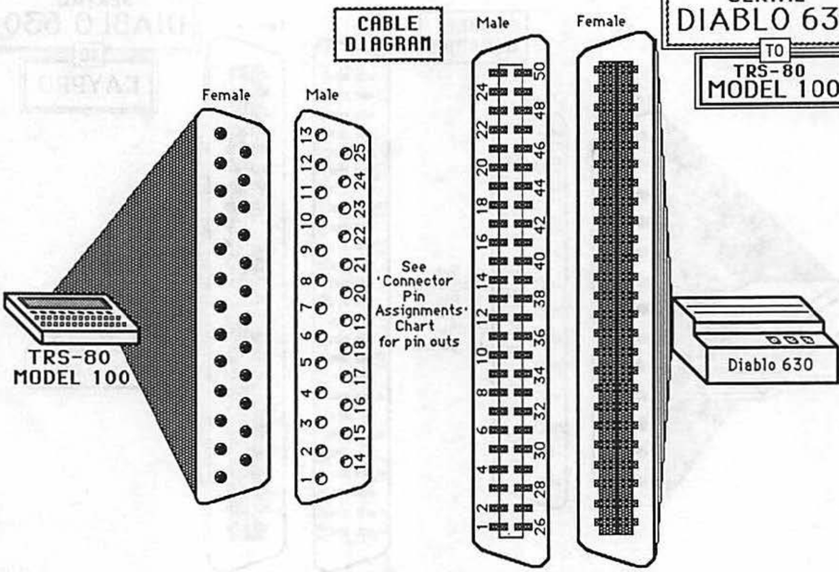
KAYPRO			DIABLO 630
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	48
3	RX DATA	TX DATA	24
5	CTS	RTS	23
6	DSR	DTR	25
7	SIG GND	SIG GND	47
20	DTR	DSR	49





API

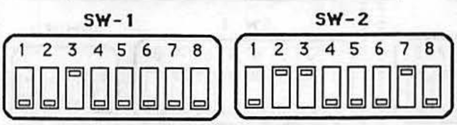
SERIAL DIABLO 630 TO TRS-80 MODEL 100



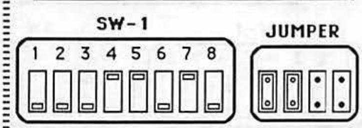
CONNECTOR PIN ASSIGNMENTS

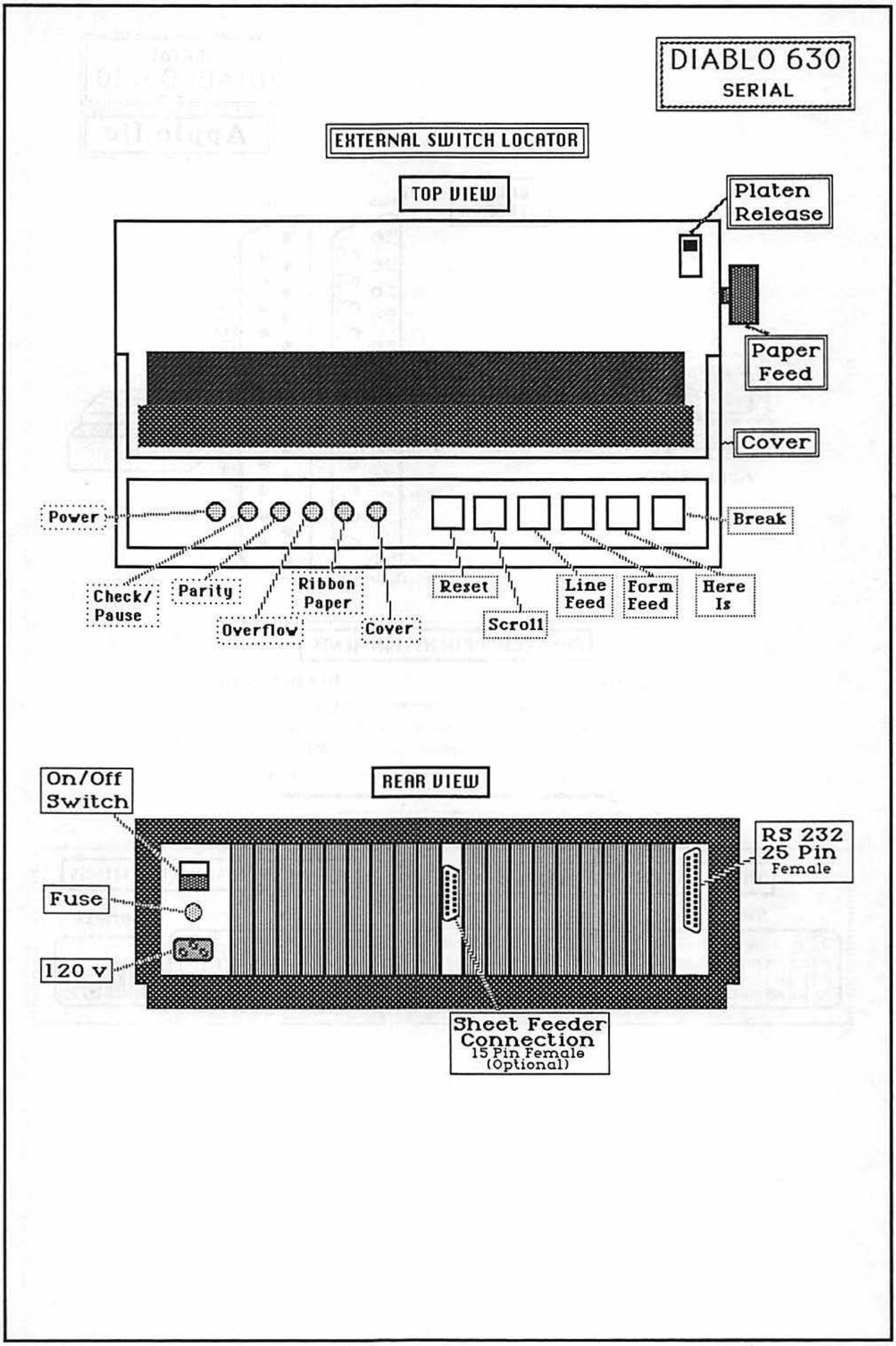
TRS-80 MODEL 100				DIABLO 630
1		PRO GND		1
2	TX DATA		RX DATA	48
3	RX DATA		TX DATA	24
5	CTS		RTS	23
6	DSR		DTR	25
7		SIG GND		47
20	DTR		DSR	49

DIABLO FFCPN SWITCH SETTINGS



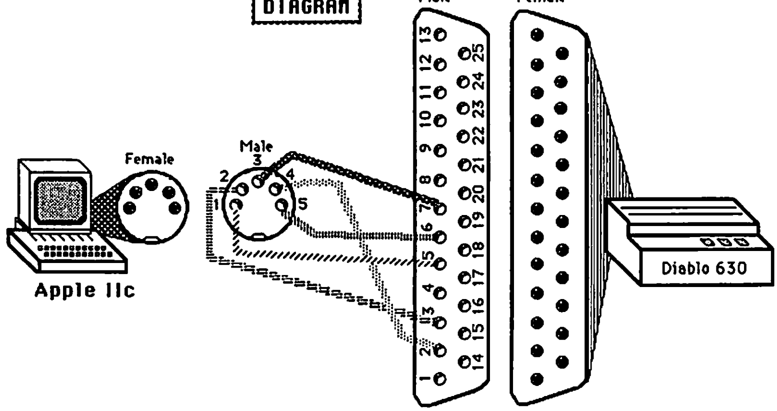
DIABLO LCPN SWITCH SETTINGS




DIABLO 630
SERIAL
EXTERNAL SWITCH LOCATOR
TOP VIEW
Platen Release
Paper Feed
Cover
Power
Break
Check/ Pause
Parity
Ribbon Paper
Overflow
Cover
Reset
Scroll
Line Feed
Form Feed
Here Is
REAR VIEW
On/Off Switch
Fuse
120 v
RS 232 25 Pin Female
Sheet Feeder Connection 15 Pin Female (Optional)

SERIAL
DIABLO 630
TO
Apple IIc

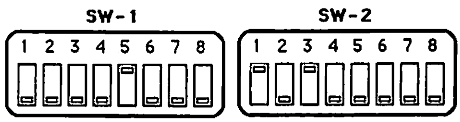
CABLE DIAGRAM



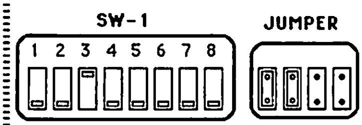
CONNECTOR PIN ASSIGNMENTS

Apple IIc			DIABLO 630
2	TX DATA	RX DATA	3
4	RX DATA	TX DATA	2
1	CTS	RTS	5
5	DTR	DSR	6
3	SIG GND		7

DIABLO FFCPN SWITCH SETTINGS

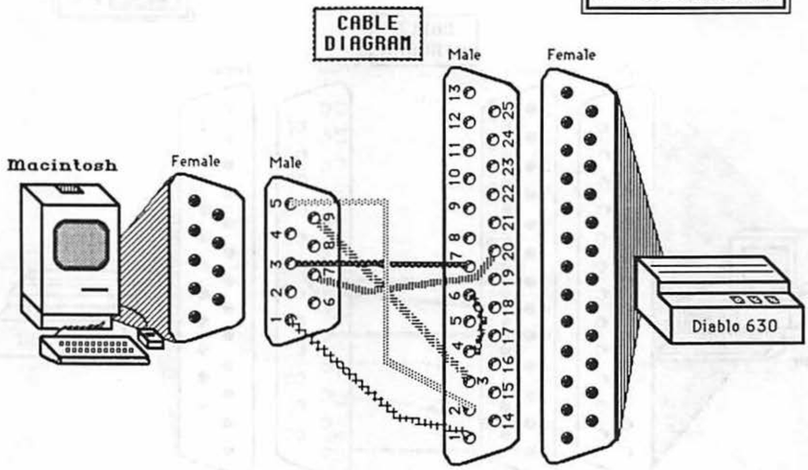


DIABLO LCPN SWITCH SETTINGS



SERIAL DIABLO 630 TO Macintosh

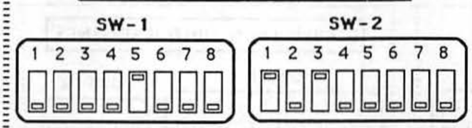
CABLE DIAGRAM



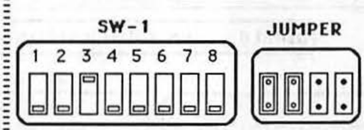
CONNECTOR PIN ASSIGNMENTS

Macintosh			Diablo 630
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7
		JUMPER	6, 4

DIABLO FFCPN SWITCH SETTINGS

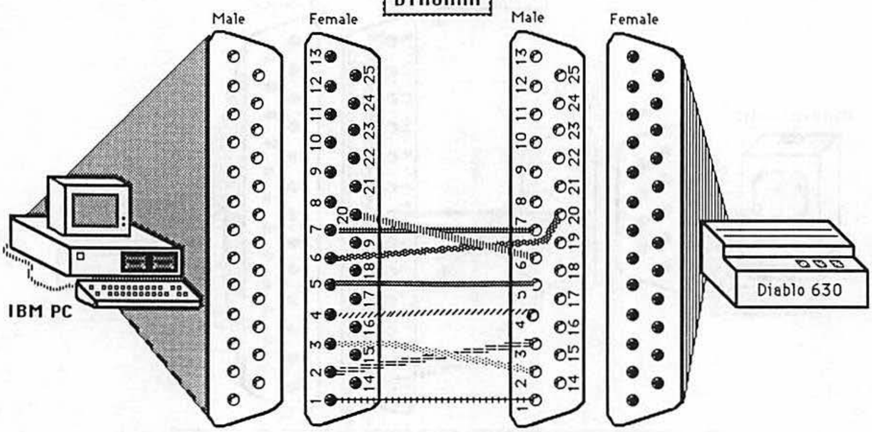


DIABLO LCPN SWITCH SETTINGS



SERIAL
DIABLO 630
TO
IBM PC

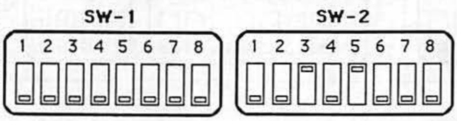
CABLE DIAGRAM



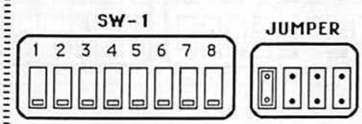
CONNECTOR PIN ASSIGNMENTS

IBM PC			Diablo 630
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	4
5	CTS	RTS	5
6	DSR	DTR	20
7	SIG GND	SIG GND	7
20	DTR	DSR	6

DIABLO FFCPN SWITCH SETTINGS

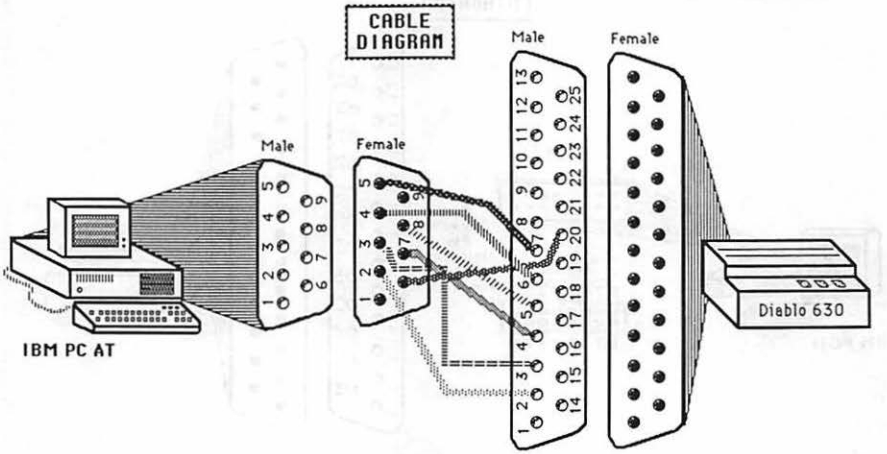


DIABLO LCPN SWITCH SETTINGS



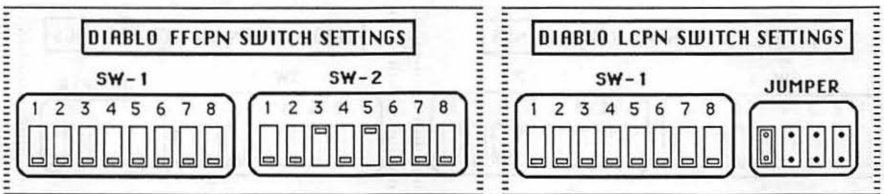
SERIAL
DIABLO 630
TO
IBM PC AT

CABLE DIAGRAM

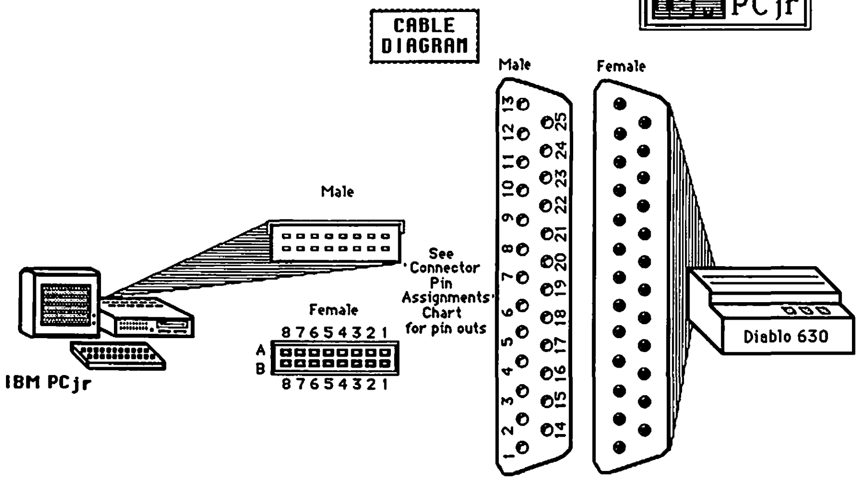


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			Diablo 630
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
4	DTR	DSR	6
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	4
8	CTS	RTS	5



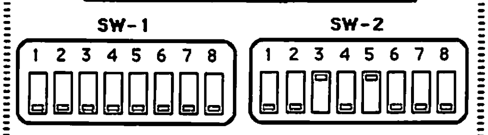
SERIAL DIABLO 630 TO IBM PCjr



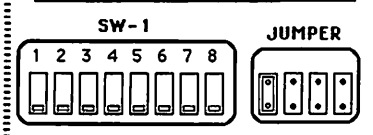
CONNECTOR PIN ASSIGNMENTS

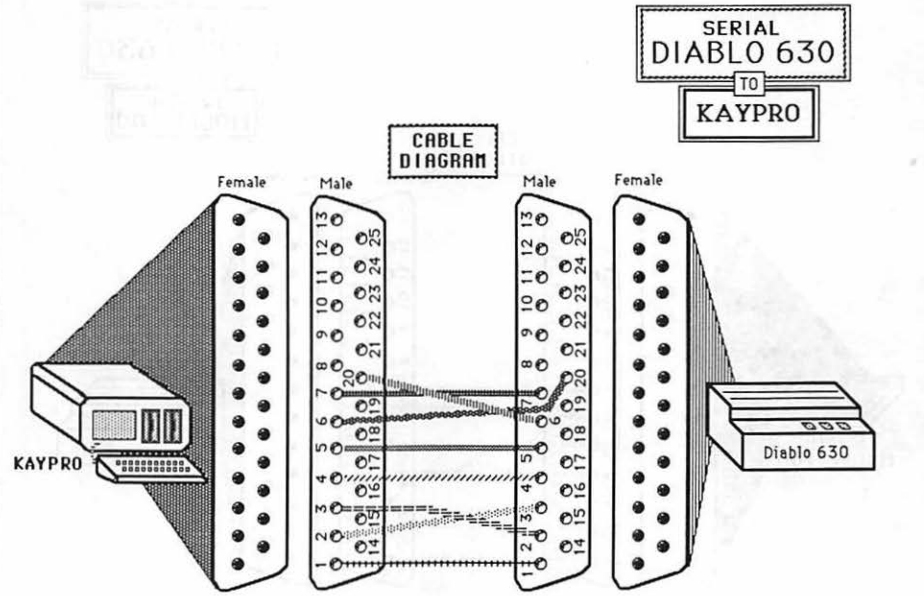
IBM PCjr			Diablo 630
A3	CTS	RTS	5
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A7	RTS	CTS	4
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

DIABLO FFCPN SWITCH SETTINGS



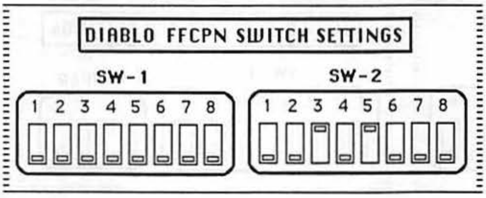
DIABLO LCPN SWITCH SETTINGS

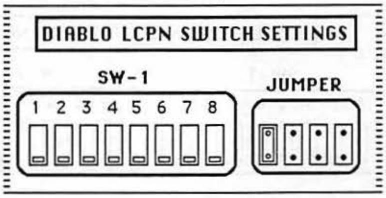




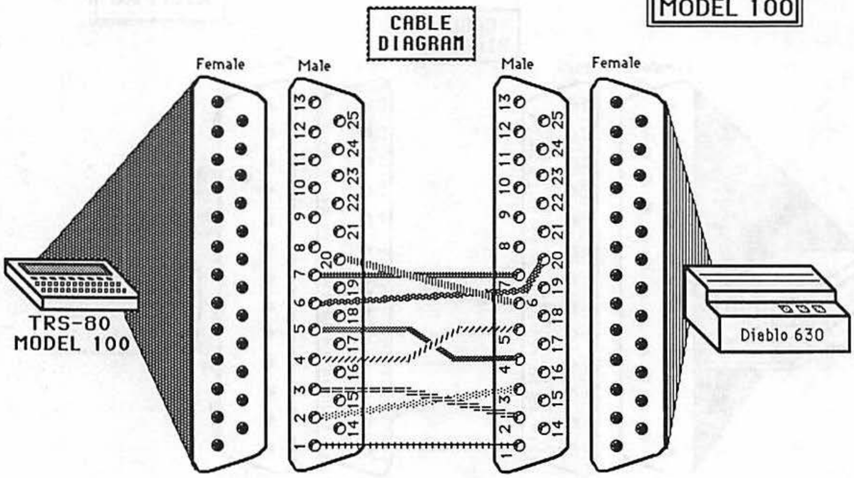
CONNECTOR PIN ASSIGNMENTS

KAYPRO			Diablo 630
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	2
3	RX DATA	TX DATA	3
4	CTS	RTS	4
5	RTS	CTS	5
6	DSR	DTR	20
7	SIG GND	SIG GND	7
20	DTR	DSR	6





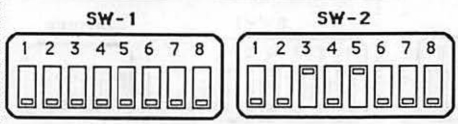
SERIAL
DIABLO 630
TO
TRS-80
MODEL 100



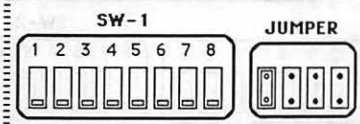
CONNECTOR PIN ASSIGNMENTS

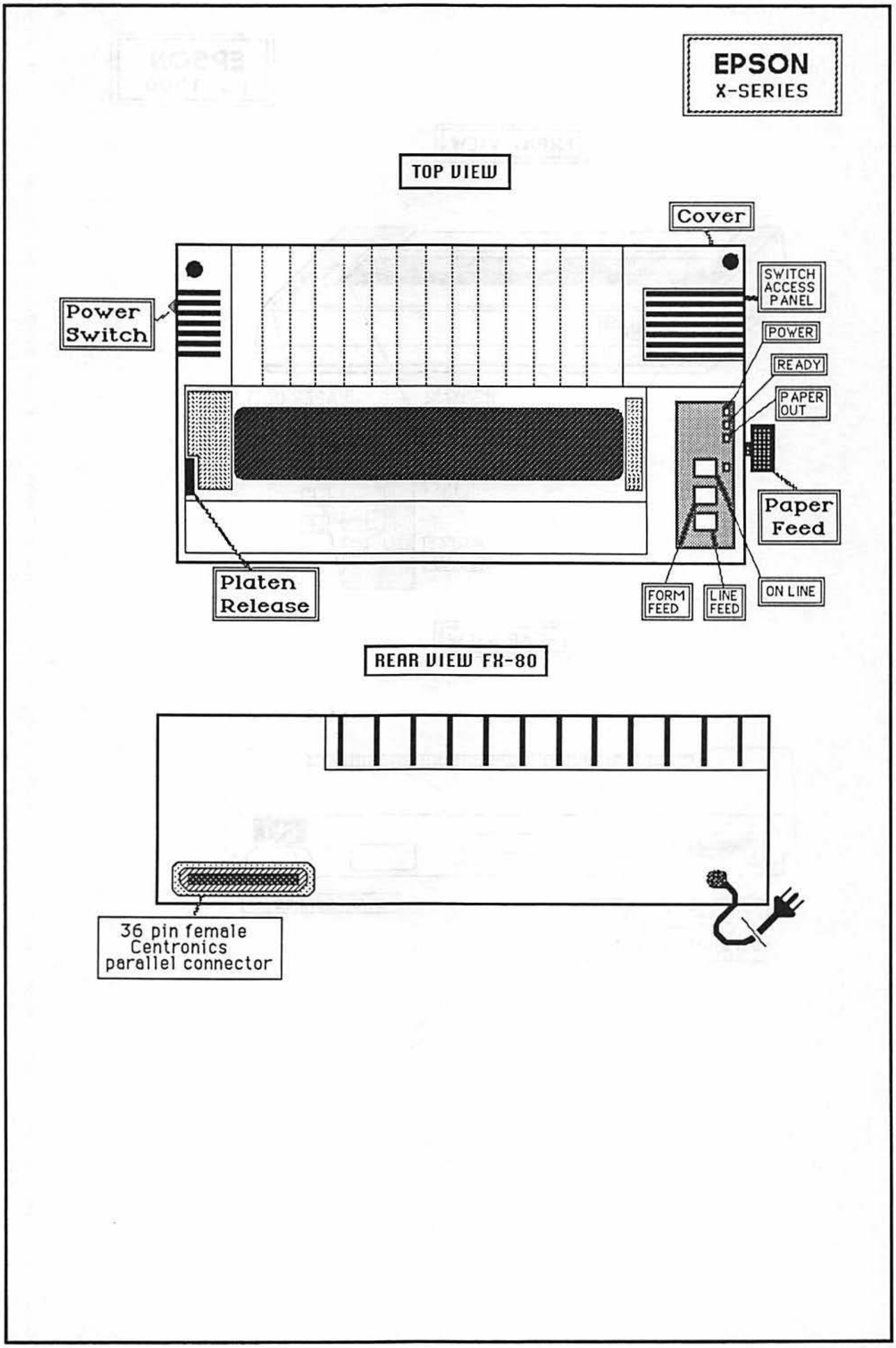
TRS-80 MODEL 100				Diablo 630
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
4	RTS		CTS	5
5	CTS		RTS	4
6	DSR		DTR	20
7		SIG GND		7
20	DTR		DSR	6

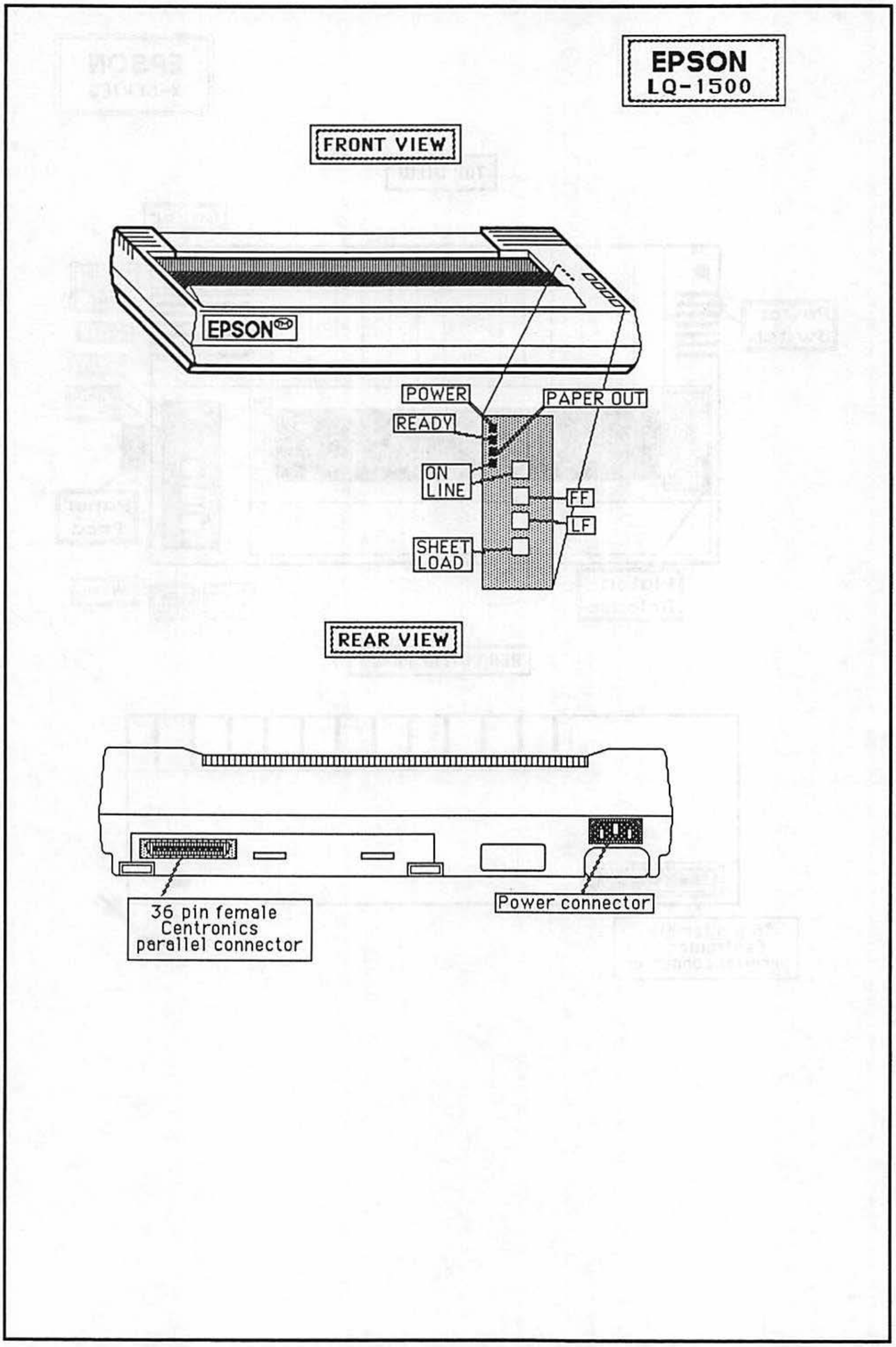
DIABLO FFCPN SWITCH SETTINGS



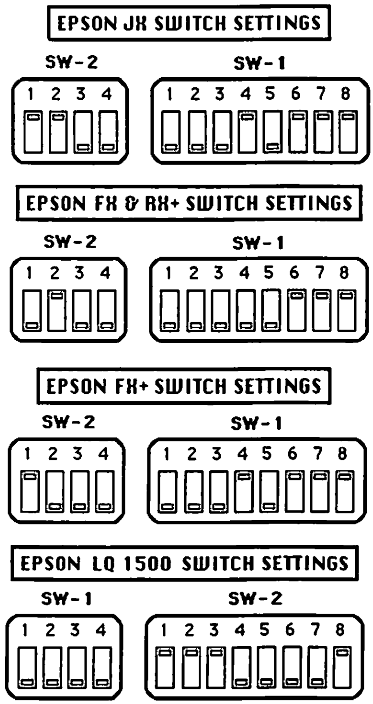
DIABLO LCPN SWITCH SETTINGS




EPSON
X-SERIES
TOP VIEW
Cover
SWITCH ACCESS PANEL
Power Switch
POWER
READY
PAPER OUT
Paper Feed
Platen Release
FORM FEED
LINE FEED
ON LINE
REAR VIEW FX-80
36 pin female Centronics parallel connector

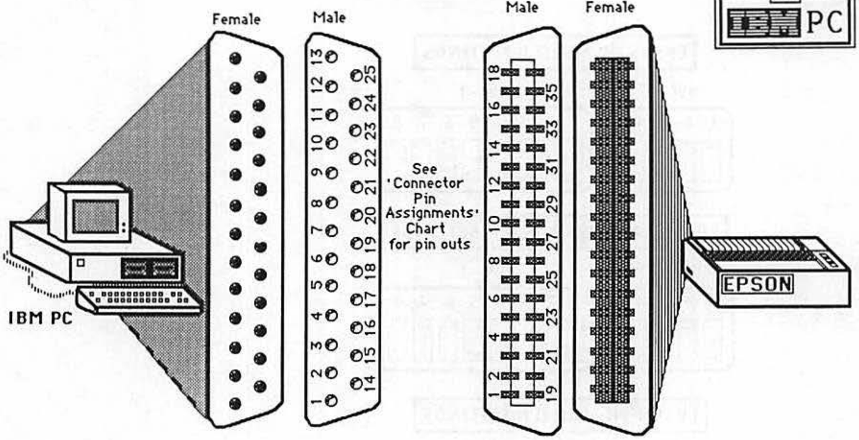

EPSON
LQ-1500
FRONT VIEW
EPSON
POWER
PAPER OUT
READY
ON LINE
FF
LF
SHEET LOAD
REAR VIEW
36 pin female Centronics parallel connector
Power connector

EPSON
Switch Settings



PARALLEL EPSON X-SERIES TO IBM PC

CABLE DIAGRAM

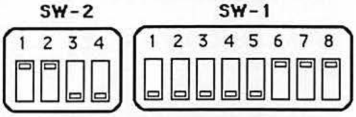


CONNECTOR PIN ASSIGNMENTS

IBM PC		EPSON
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12
13	+ SELECT	13
14	- AUTO FEED	14
15	N/U	15
16	0V	16
17	CHASIS GND	17
18	GND 0	18
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

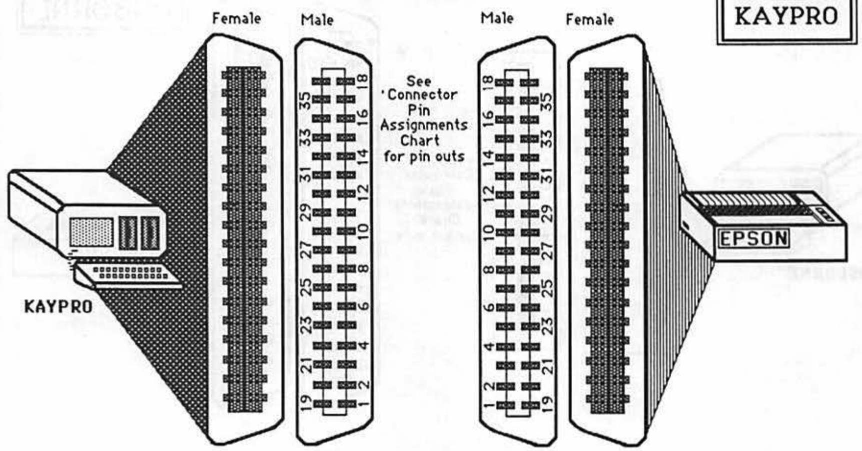
EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



PARALLEL
EPSON
X-SERIES
TO
KAYPRO

CABLE DIAGRAM

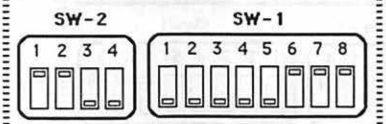


CONNECTOR PIN ASSIGNMENTS

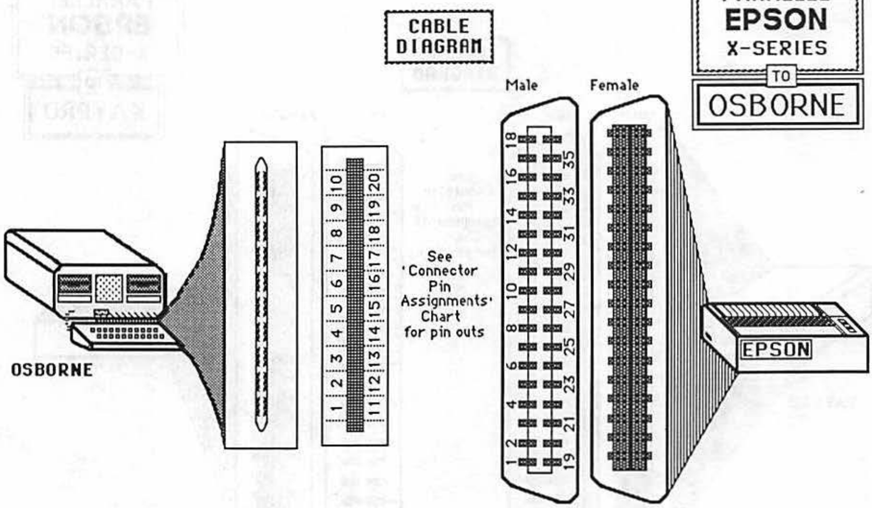
KAYPRO		EPSON
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



PARALLEL EPSON X-SERIES TO OSBORNE

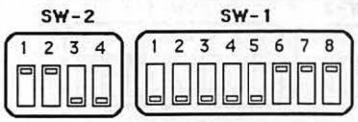


CONNECTOR PIN ASSIGNMENTS

OSBORNE		EPSON
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5

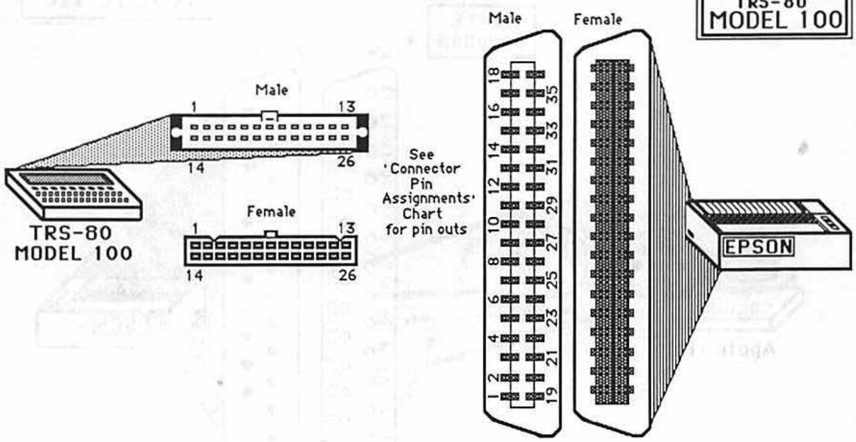
EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



PARALLEL
EPSON
X-SERIES
TO
TRS-80
MODEL 100

CABLE DIAGRAM

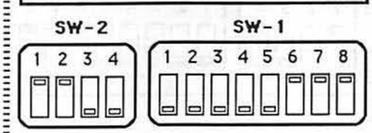


CONNECTOR PIN ASSIGNMENTS

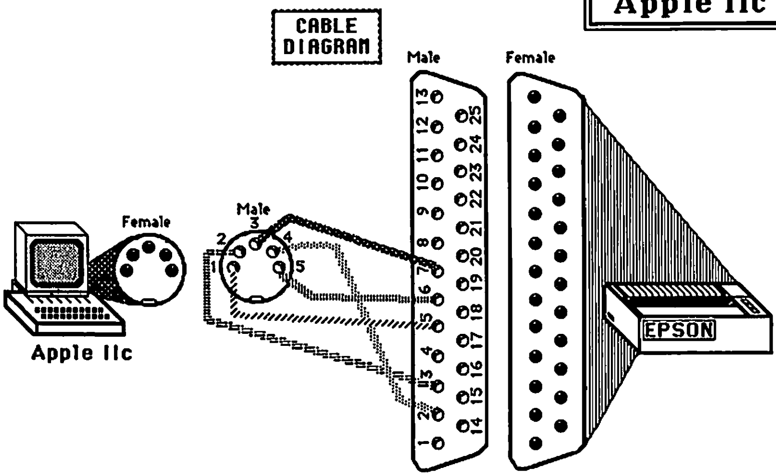
TRS-80 MODEL 100		EPSON
1	STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.

EPSON X-SERIES SWITCH SETTINGS



SERIAL
EPSON
X-SERIES
TO
Apple IIc

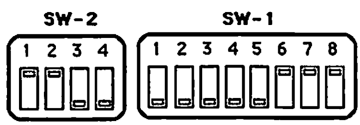


CONNECTOR PIN ASSIGNMENTS

Apple IIc			EPSON
2	TX DATA	RX DATA	3
4	RX DATA	TX DATA	2
1	CTS	RTS	5
5	DTR	DSR	6
3	SIG GND	SIG GND	7

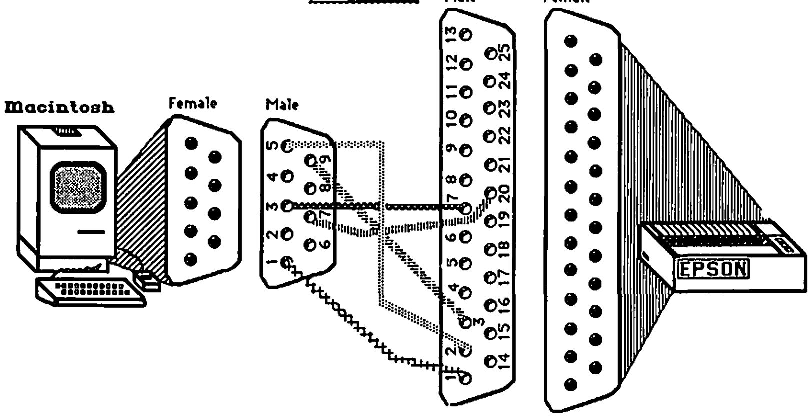
For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.

EPSON X-SERIES SWITCH SETTINGS



SERIAL
EPSON
X-SERIES
TO
Macintosh

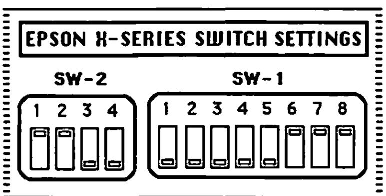
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

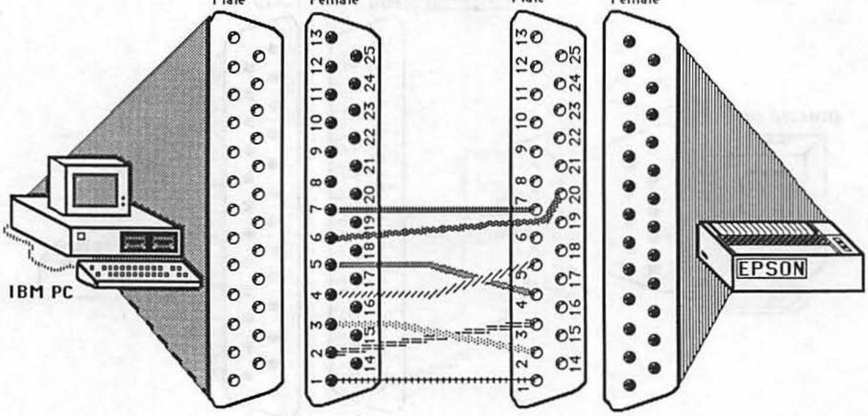
Macintosh			EPSON	
1		PRO GND		1
9	TX DATA		RX DATA	3
5	RX DATA		TX DATA	2
7	DSR		DTR	20
3		SIG GND		7

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



SERIAL
EPSON
X-SERIES
TO
IBM PC

CABLE DIAGRAM

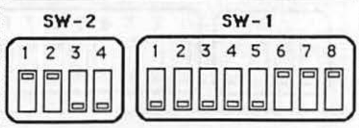


CONNECTOR PIN ASSIGNMENTS

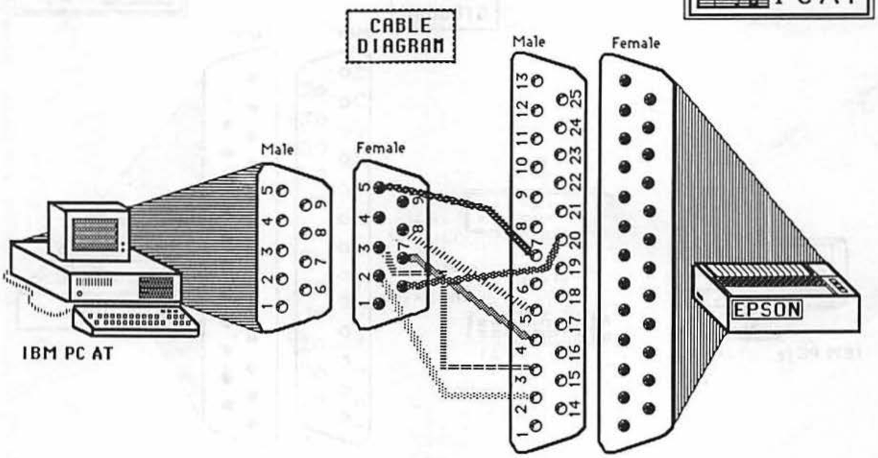
IBM PC			EPSON
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	CTS	RTS	5
5	RTS	CTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



SERIAL
EPSON
X-SERIES
TO
IBM PC AT

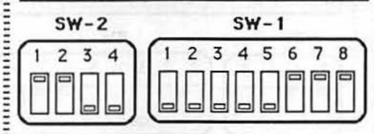


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			EPSON
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND		7
6	DSR	DTR	20
7	RTS	CTS	4
8	CTS	RTS	5

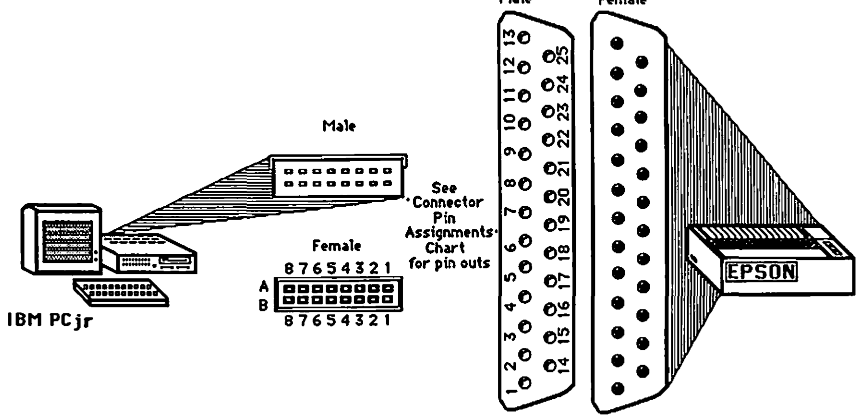
EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



SERIAL EPSON X-SERIES TO IBM PCjr

CABLE DIAGRAM

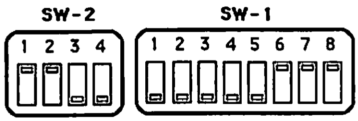


CONNECTOR PIN ASSIGNMENTS

IBM PCjr			EPSON
A3	CTS	RTS	5
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A7	RTS	CTS	4
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.

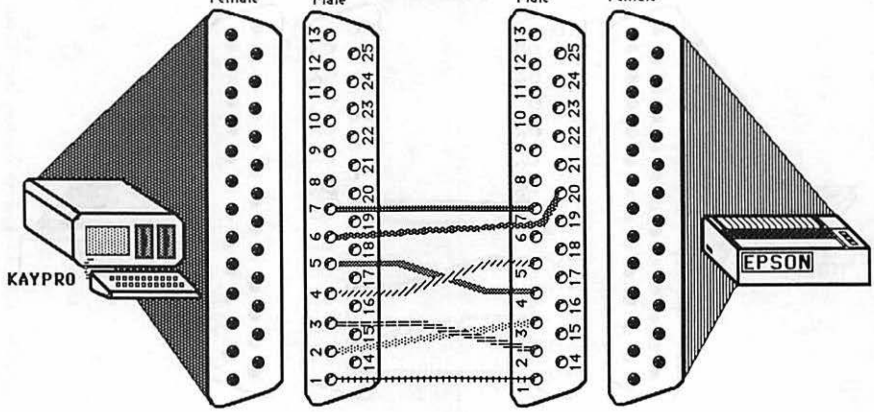


SERIAL
EPSON
X-SERIES

TO

KAYPRO

CABLE DIAGRAM

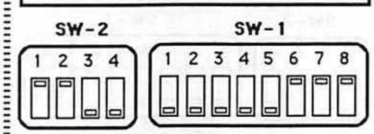


CONNECTOR PIN ASSIGNMENTS

KAYPRO			EPSON
1	PRO GND	PRO GND	1
3	RX DATA	TX DATA	2
2	TX DATA	RX DATA	3
5	RTS	CTS	4
4	CTS	RTS	5
6	DSR	DTR	20
7	SIG GND	SIG GND	7

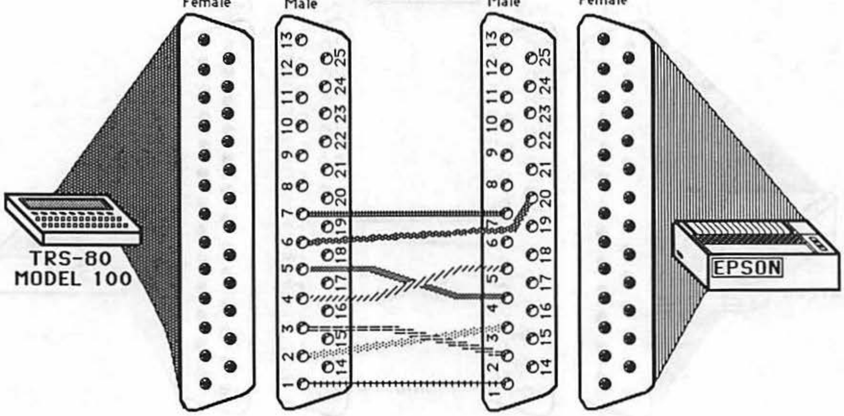
EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.



SERIAL
EPSON
X-SERIES
TO
TRS-80
MODEL 100

CABLE
DIAGRAM

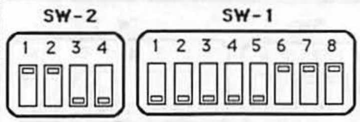


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			EPSON
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	4
5	CTS	RTS	5
6	DSR	DTR	20
7	SIG GND	SIG GND	7

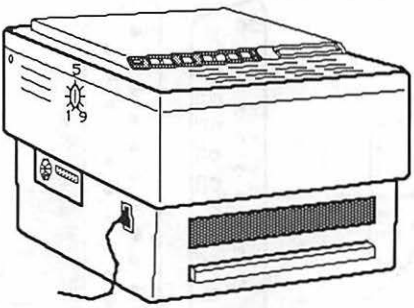
EPSON X-SERIES SWITCH SETTINGS

For detailed switch settings see the Epson Switch Setting Diagram at the beginning of the Epson section.

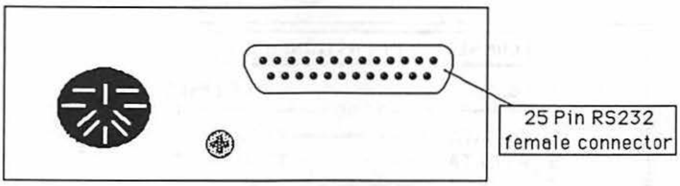


HP LASER

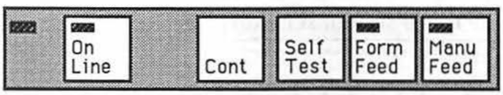
FRONT VIEW



Side Panel

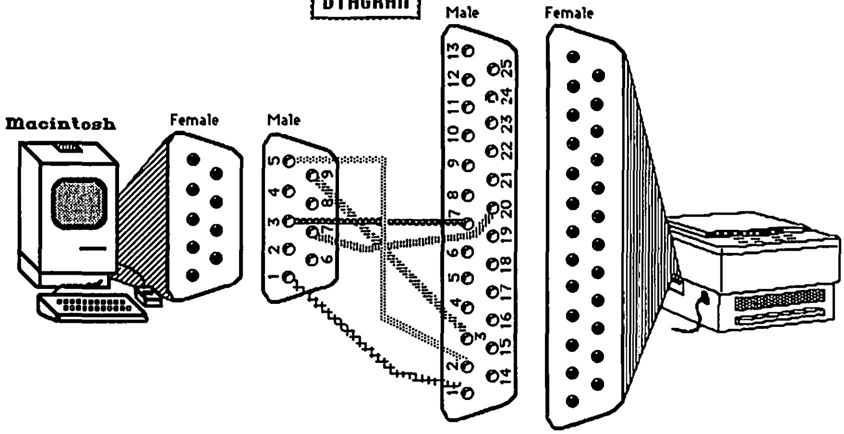


Control Panel



SERIAL HP LASER TO Macintosh

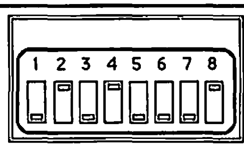
CABLE DIAGRAM



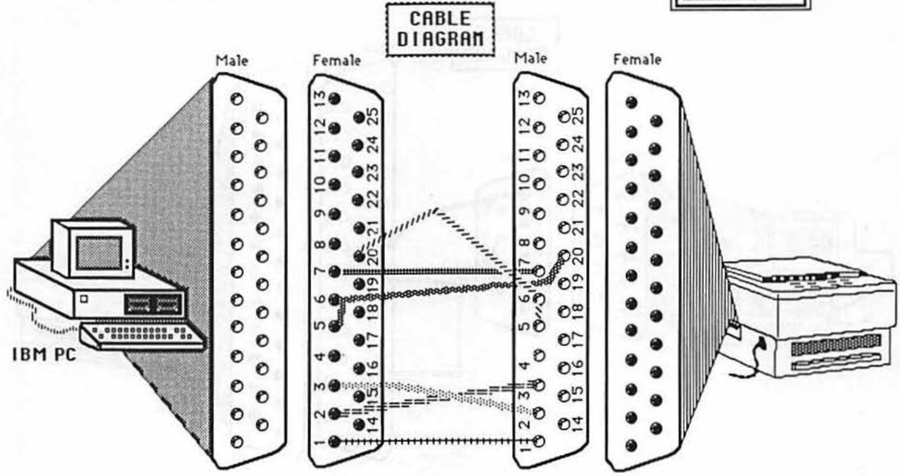
CONNECTOR PIN ASSIGNMENTS

Macintosh			HP LASER
1	PRO GND	PRO GND	1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND	SIG GND	7

HP LASER SWITCH SETTINGS



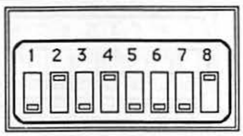
SERIAL
HP LASER
TO
IBM PC



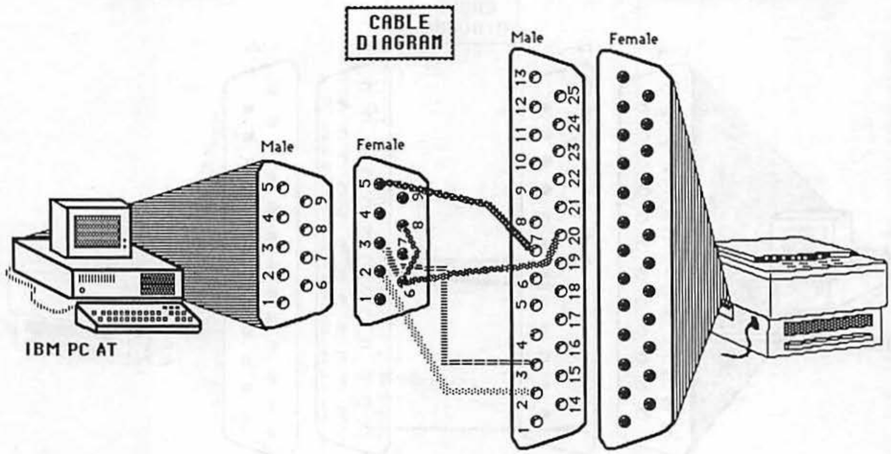
CONNECTOR PIN ASSIGNMENTS

IBM PC			HP Laser
1		PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
5,6	RTS, DSR	DTR	20
7		SIG GND	7
20	DTR	CTS, DSR	5,6

HP LASER SWITCH SETTINGS



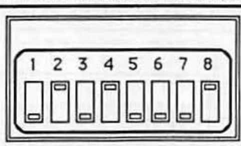
SERIAL HP LASER TO IBM PC AT



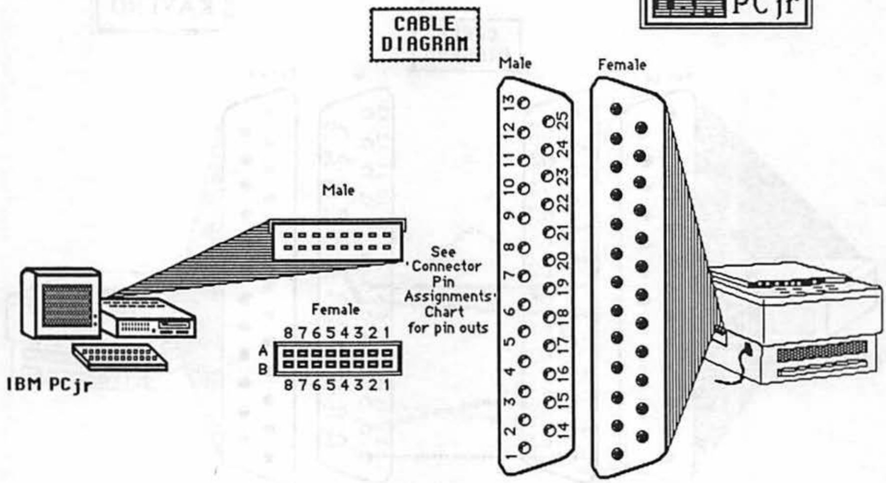
CONNECTOR PIN ASSIGNMENTS

IBM PC AT				HP LASER
2	RX DATA		TX DATA	2
3	TX DATA		RX DATA	3
5		SIG GND		7
6,8	DSR,RTS		DTR	20

HP LASER SWITCH SETTINGS



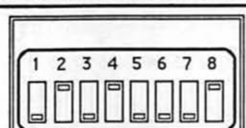
SERIAL HP LASER TO IBM PC jr



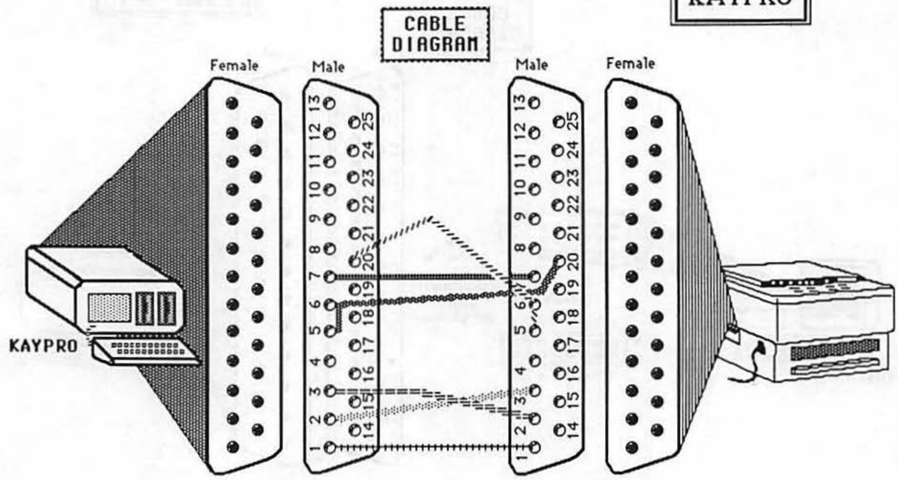
CONNECTOR PIN ASSIGNMENTS

IBM PCjr			HP LASER
A4	TX DATA	RX DATA	3
A6, A7	RTS, DSR	DTR	20
A3	CTS	RTS	4
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

HP LASER SWITCH SETTINGS



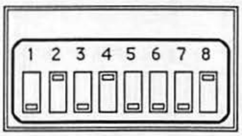
SERIAL HP LASER TO KAYPRO



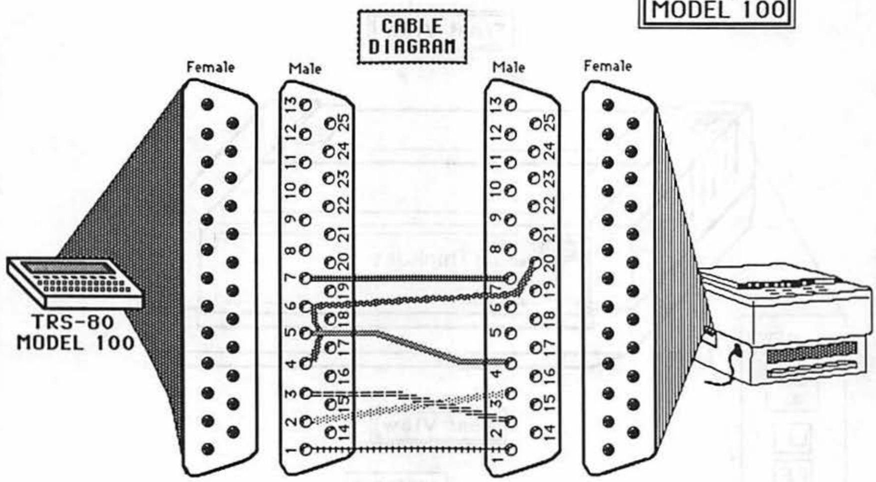
CONNECTOR PIN ASSIGNMENTS

KAYPRO				HP LASER
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
5, 6	CTS, DSR		DTR	20
7		SIG GND		7
20	DTR		CTS, DSR	5,6

HP LASER SWITCH SETTINGS



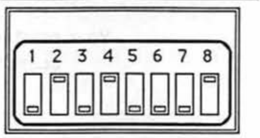
SERIAL
HP LASER
TO
TRS-80
MODEL 100

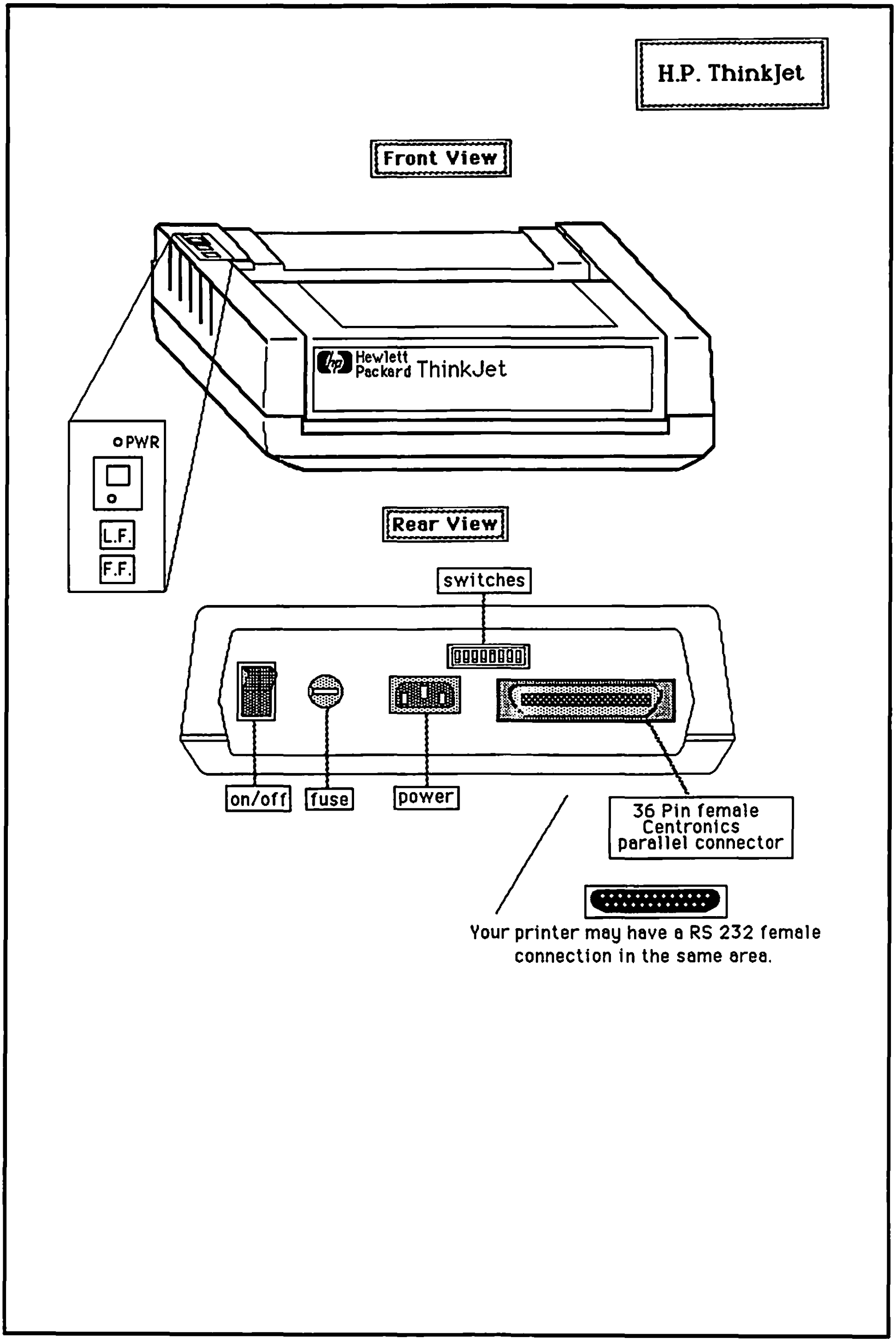


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			HP LASER
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
5	CTS	RTS	4
4,6	RTS, DSR	DTR	20
7	SIG GND	SIG GND	7

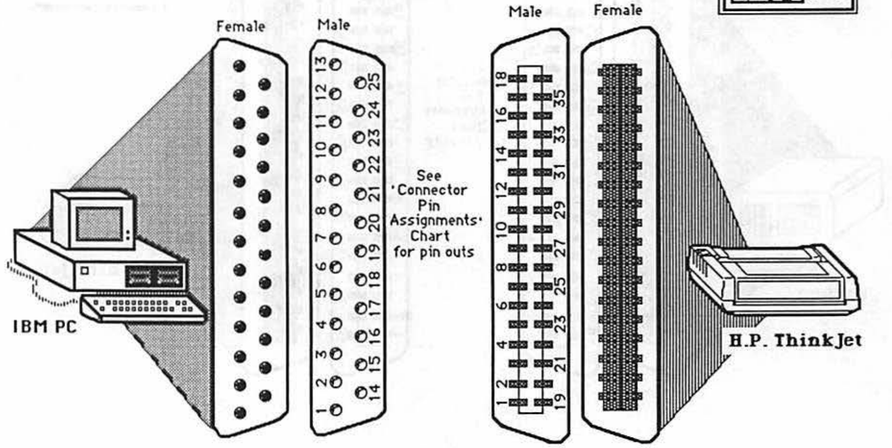
HP LASER SWITCH SETTINGS




H.P. ThinkJet
Front View
Hewlett Packard ThinkJet
PWR
L.F.
F.F.
Rear View
switches
on/off
fuse
power
36 Pin female Centronics parallel connector
Your printer may have a RS 232 female connection in the same area.

PARALLEL
H.P. ThinkJet
TO
IBM PC

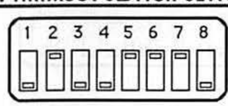
CABLE DIAGRAM



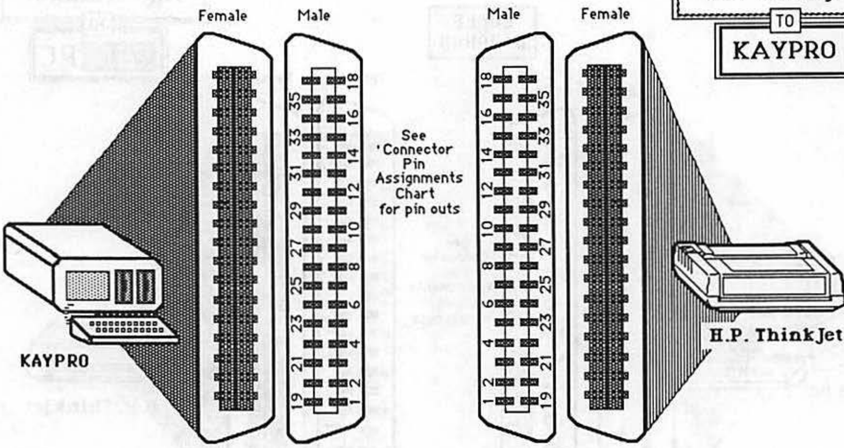
CONNECTOR PIN ASSIGNMENTS

IBM PC		H.P. ThinkJet
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12
13	+ SELECT	13
14	- AUTO FEED	14
15	N/U	15
16	0V	16
17	CHASIS GND	17
18	GND 0	18
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

H.P. ThinkJet SWITCH SETTINGS



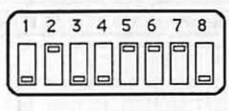
PARALLEL H.P. ThinkJet TO KAYPRO

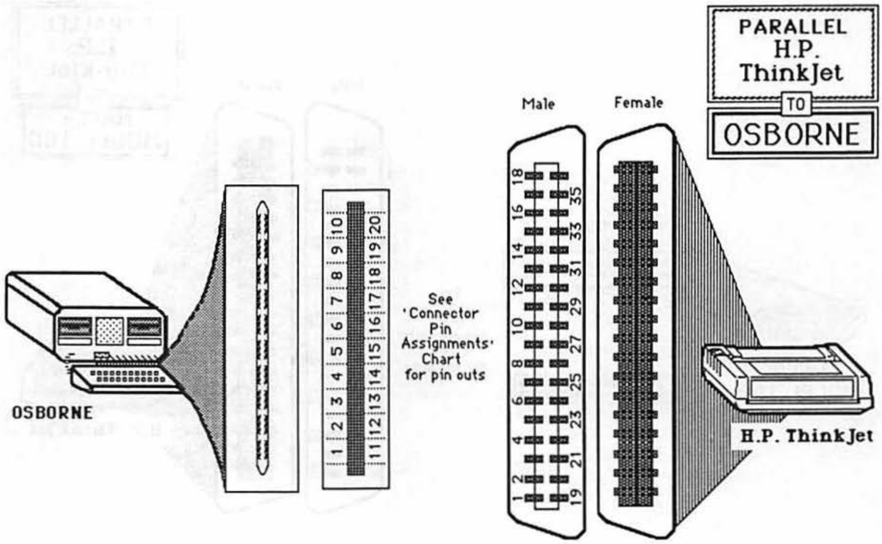


CONNECTOR PIN ASSIGNMENTS

KAYPRO		H.P. ThinkJet
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

H.P. ThinkJet SWITCH SETTINGS

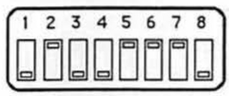


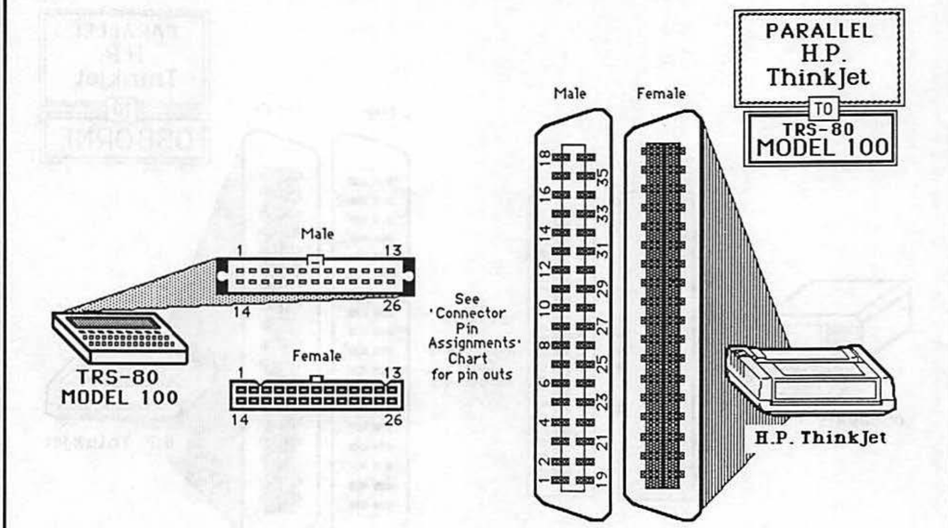


CONNECTOR PIN ASSIGNMENTS

OSBORNE		H.P. ThinkJet
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5

H.P. ThinkJet SWITCH SETTINGS

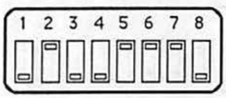




CONNECTOR PIN ASSIGNMENTS

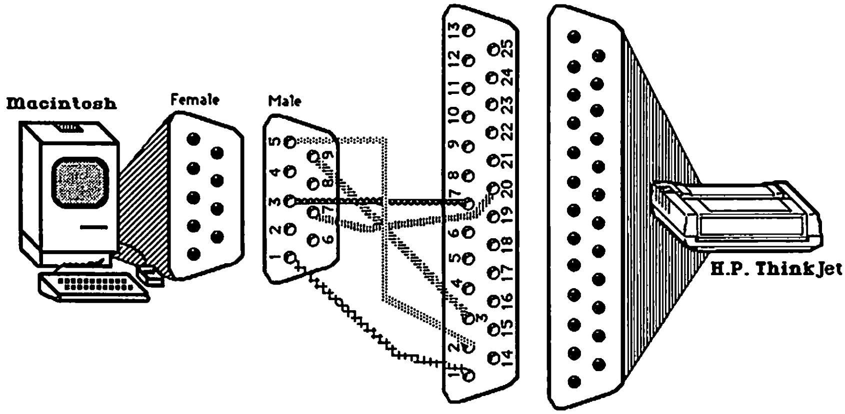
TRS-80 MODEL 100		H.P. ThinkJet
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

H.P. ThinkJet SWITCH SETTINGS



SERIAL
H.P. ThinkJet
TO
Macintosh

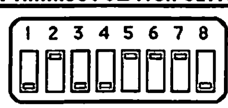
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

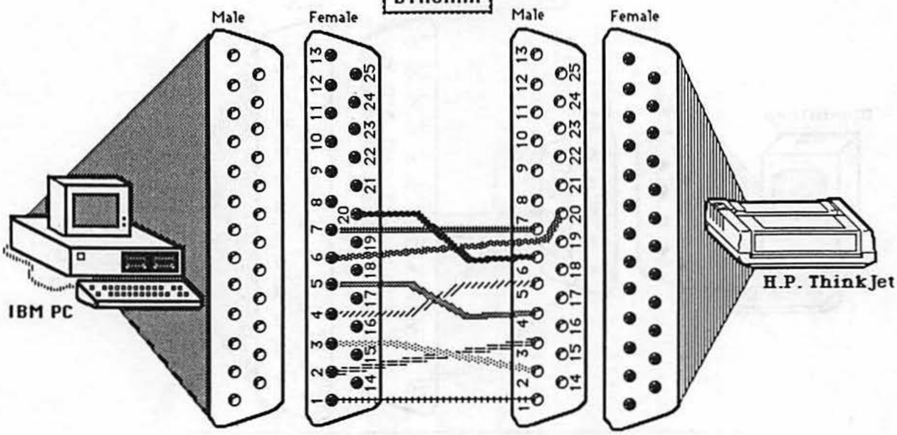
Macintosh				H.P. ThinkJet
1		PRO GND		1
9	TX DATA		RX DATA	3
5	RX DATA		TX DATA	2
7	DSR		DTR	20
3		SIG GND		7

H.P. ThinkJet SWITCH SETTINGS



SERIAL
H.P. ThinkJet
TO
IBM PC

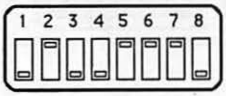
CABLE DIAGRAM



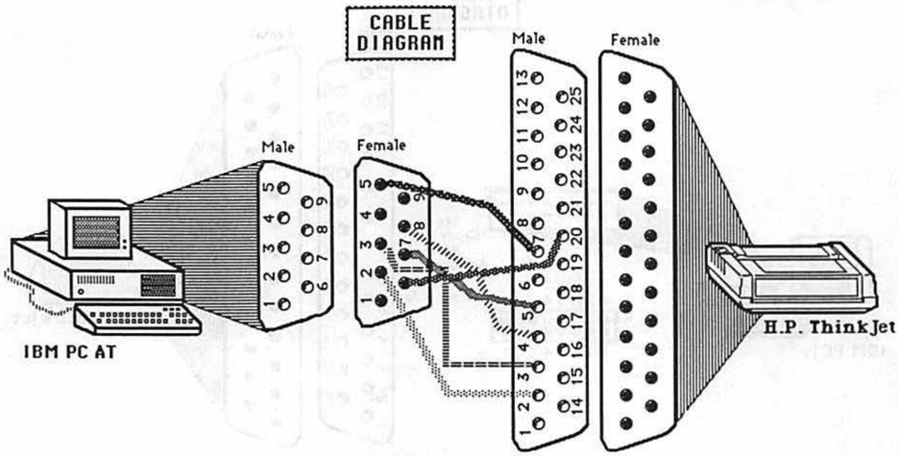
CONNECTOR PIN ASSIGNMENTS

IBM PC			H.P. ThinkJet
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	CTS	RTS	5
5	RTS	CTS	4
6	DSR	DTR	20
7	SIG GND		7
20	DTR	DSR	6

H.P. ThinkJet SWITCH SETTINGS



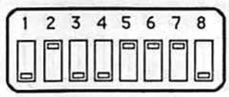
SERIAL
H.P. ThinkJet
TO
IBM PC AT



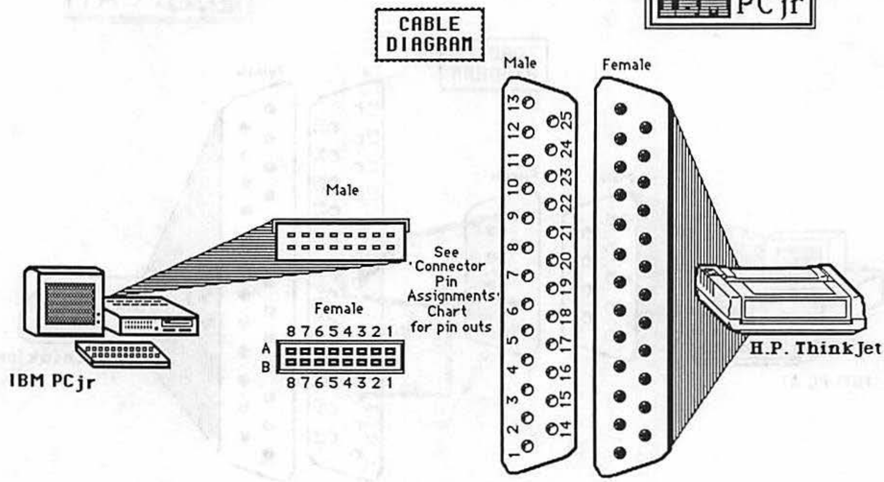
CONNECTOR PIN ASSIGNMENTS

IBM PC AT			H.P. ThinkJet
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND		7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

H.P. ThinkJet SWITCH SETTINGS

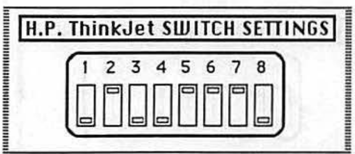


SERIAL H.P. ThinkJet TO IBM PCjr



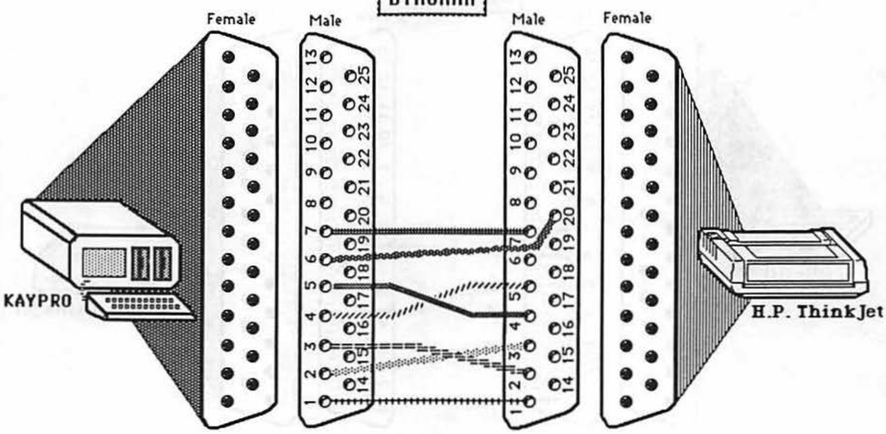
CONNECTOR PIN ASSIGNMENTS

IBM PCjr			H.P. ThinkJet	
A3	CTS		RTS	4
A4	TX DATA		RX DATA	3
A6	DSR		DTR	20
A7	RTS		CTS	5
A8	RX DATA		TX DATA	2
B1		PRO GND		1
B2		SIG GND		7



SERIAL
H.P. ThinkJet
TO
KAYPRO

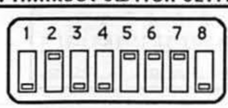
CABLE DIAGRAM



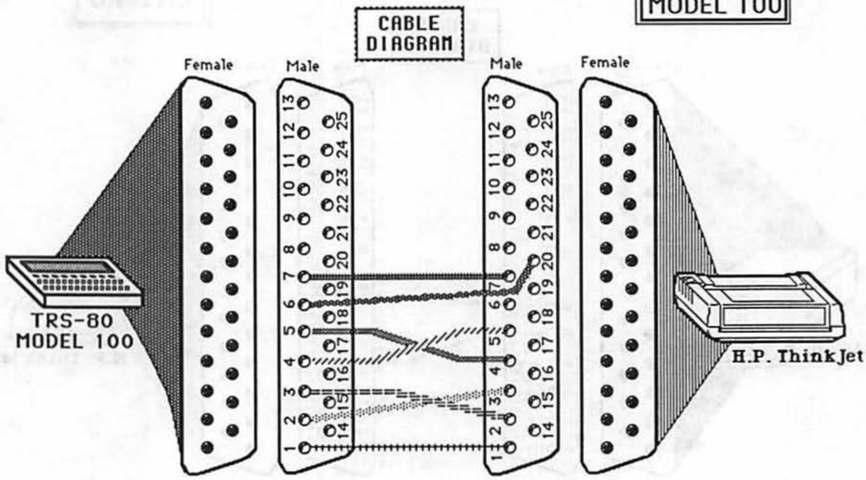
CONNECTOR PIN ASSIGNMENTS

KAYPRO			H.P. ThinkJet
1		PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7		SIG GND	7

H.P. ThinkJet SWITCH SETTINGS



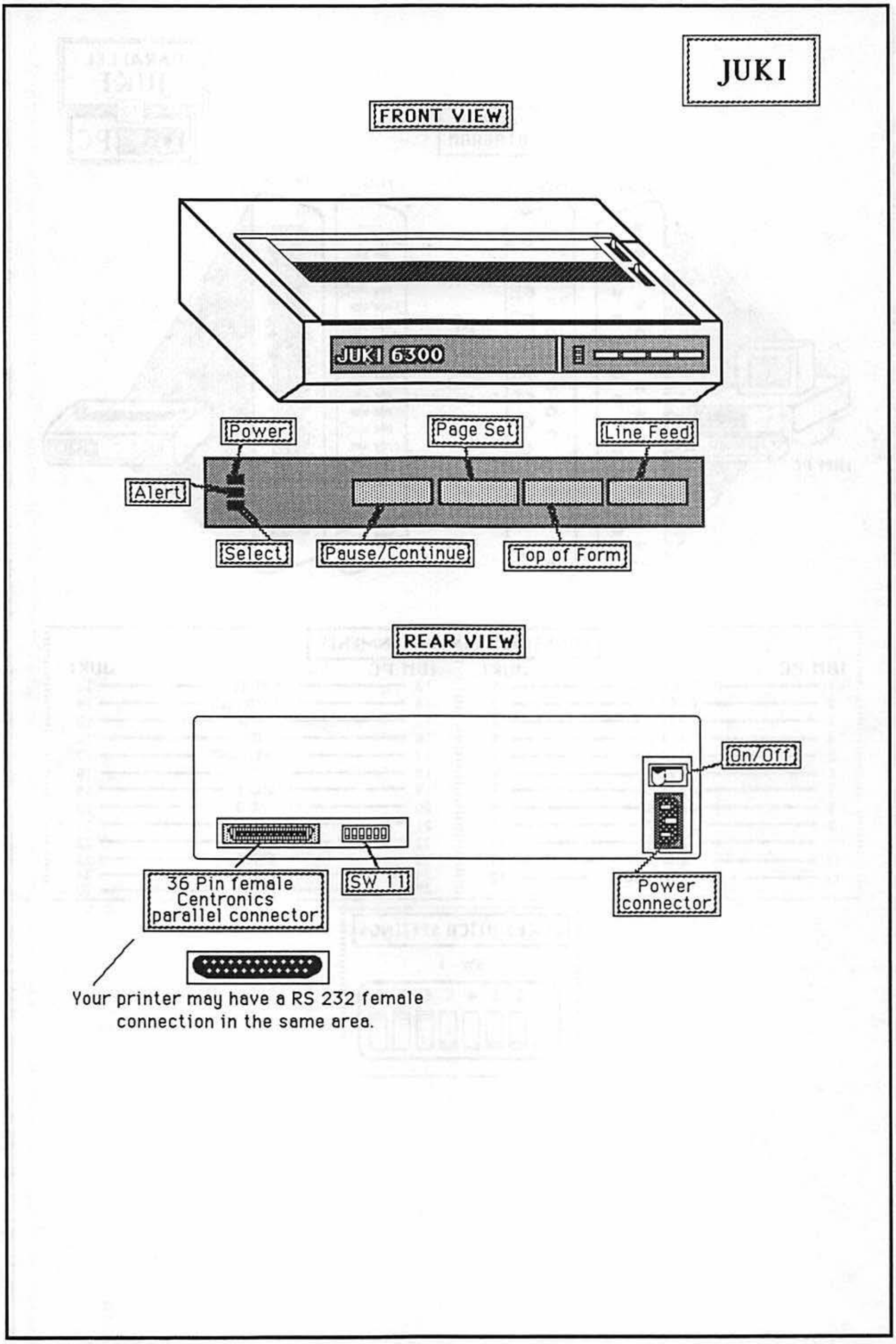
SERIAL H.P. ThinkJet TO TRS-80 MODEL 100



CONNECTOR PIN ASSIGNMENTS

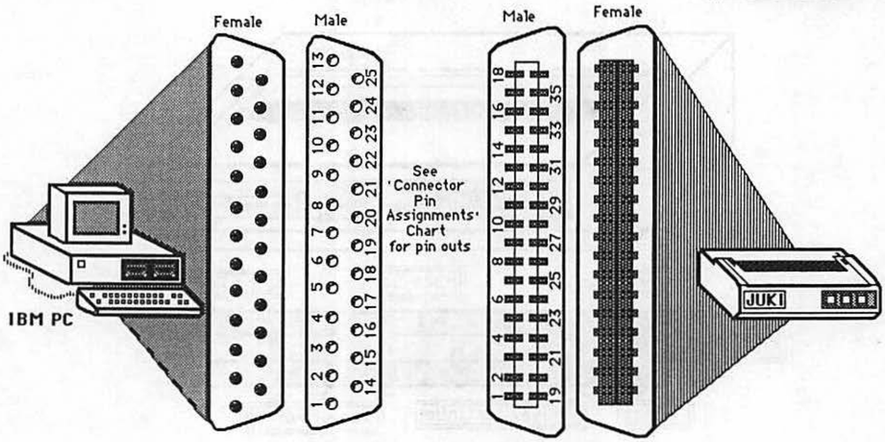
TRS-80 MODEL 100			H.P. ThinkJet
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

H.P. ThinkJet SWITCH SETTINGS


JUKI
FRONT VIEW
JUKI 6300
Power
Page Set
Line Feed
Alert
Select
Pause/Continue
Top of Form
REAR VIEW
On/Off
36 Pin female
Centronics
parallel connector
SW 11
Power
connector
Your printer may have a RS 232 female
connection in the same area.

PARALLEL
JUKI
TO
IBM PC

CABLE DIAGRAM

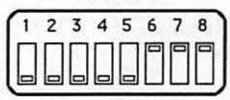


CONNECTOR PIN ASSIGNMENTS

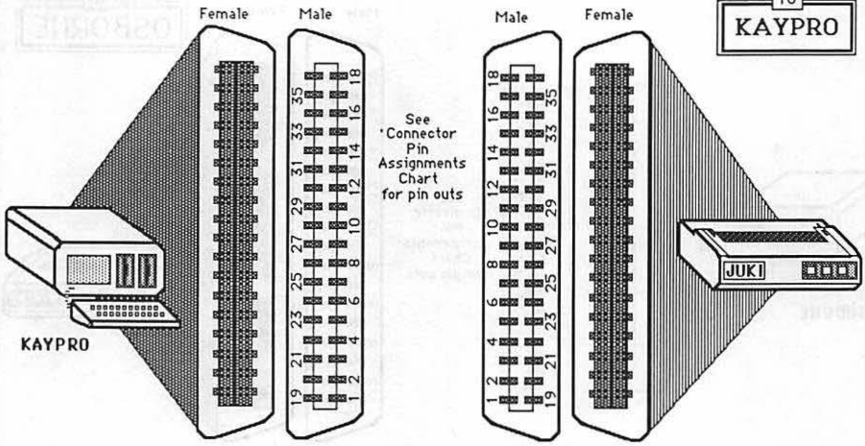
IBM PC		JUKI	IBM PC		JUKI
1	DATA STROBE	1	13	+ SELECT	13
2	DATA 0	2	14	- AUTO FEED	14
3	DATA 1	3	15	N/U	15
4	DATA 2	4	16	OV	16
5	DATA 3	5	17	CHASIS GND	17
6	DATA 4	6	18	GND 0	18
7	DATA 5	7	19	GND 1	19
8	DATA 6	8	20	GND 2	20
9	DATA 7	9	21	GND 3	21
10	$\overline{ACK}$	10	22	GND 4	22
11	+ BUSY	11	23	GND 5	23
12	+ P.E. (PAPER OUT)	12	24	GND 6	24
			25	GND 7	25

JUKI SWITCH SETTINGS

SW-1



PARALLEL JUKI TO KAYPRO

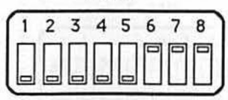


CONNECTOR PIN ASSIGNMENTS

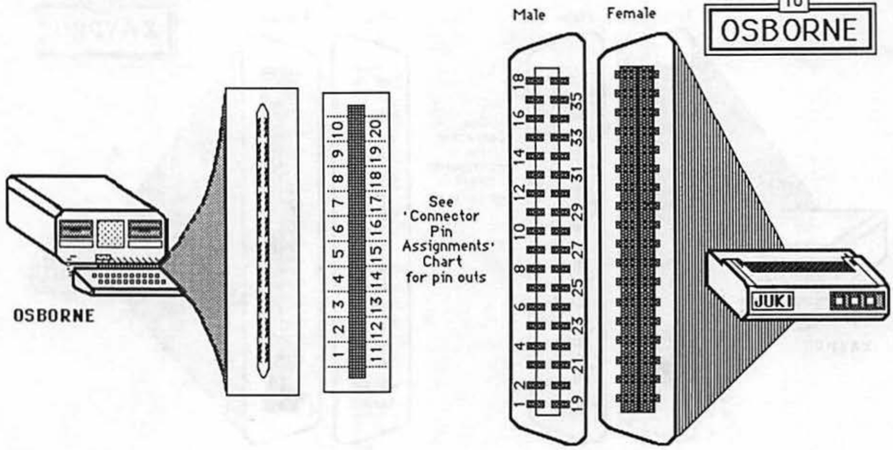
KAYPRO		JUKI
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

JUKI SWITCH SETTINGS

SW-1



PARALLEL
JUKI
TO
OSBORNE

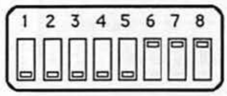


CONNECTOR PIN ASSIGNMENTS

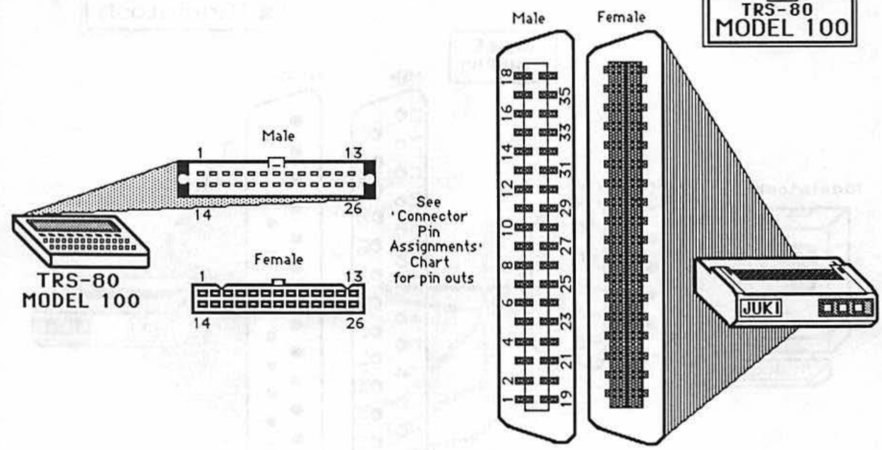
OSBORNE		JUKI
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5

JUKI SWITCH SETTINGS

SW-1



PARALLEL
JUKI
TO
TRS-80
MODEL 100



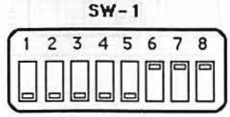
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		JUKI
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7

TRS-80 MODEL 100		JUKI
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

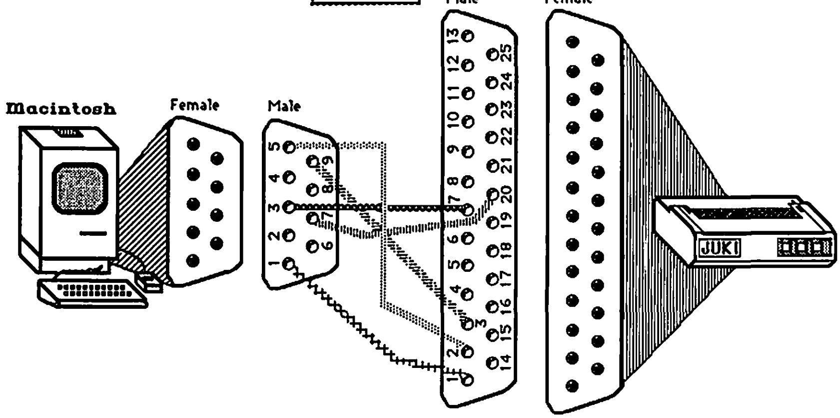
JUKI SWITCH SETTINGS

SW-1



SERIAL
JUKI
TO
Macintosh

CABLE DIAGRAM

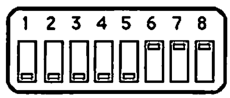


CONNECTOR PIN ASSIGNMENTS

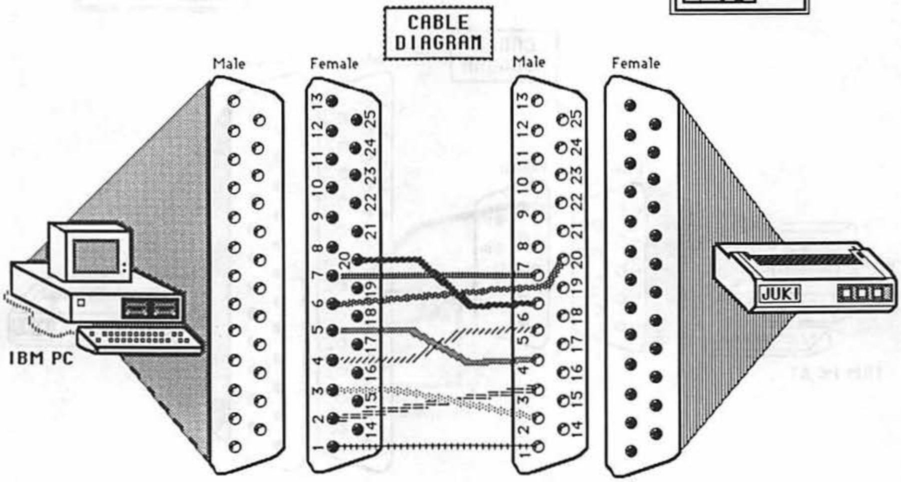
Macintosh			JUKI
1	PRO GND	PRO GND	1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND	SIG GND	7

JUKI SWITCH SETTINGS

SW-1



SERIAL
JUKI
TO
IBM PC

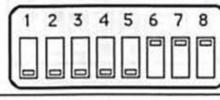


CONNECTOR PIN ASSIGNMENTS

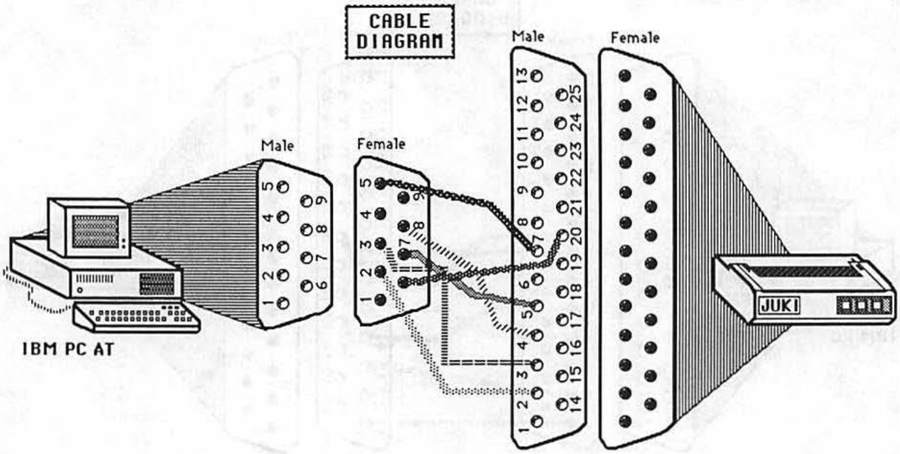
IBM PC			JUKI
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	CTS	RTS	5
5	RTS	CTS	4
6	DSR	DTR	20
7	SIG GND		7
20	DTR	DSR	6

JUKI SWITCH SETTINGS

SW-1



SERIAL
JUKI
TO
IBM PC AT

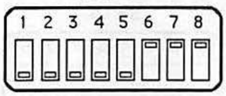


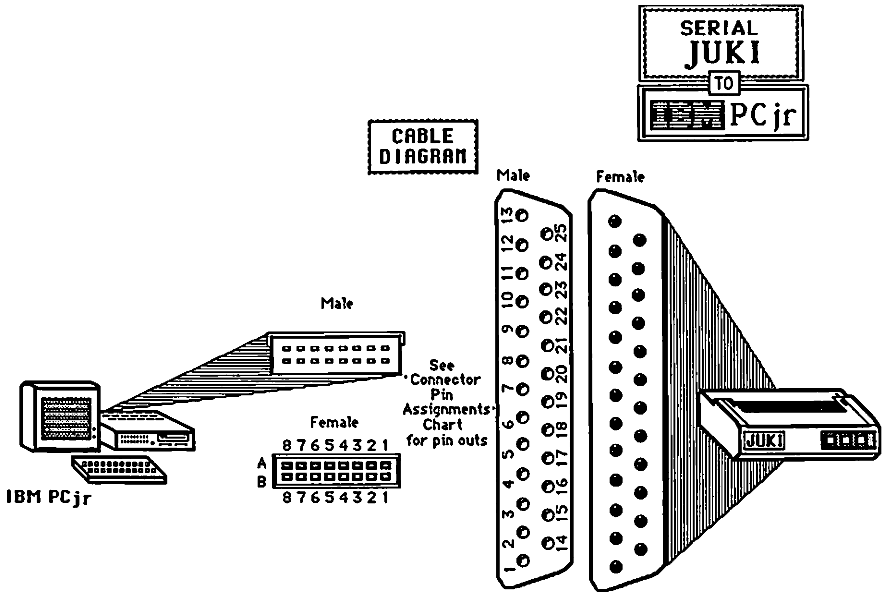
CONNECTOR PIN ASSIGNMENTS

IBM PC AT			JUKI
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

JUKI SWITCH SETTINGS

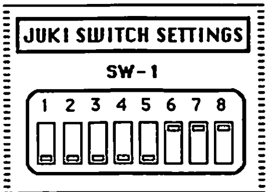
SW-1

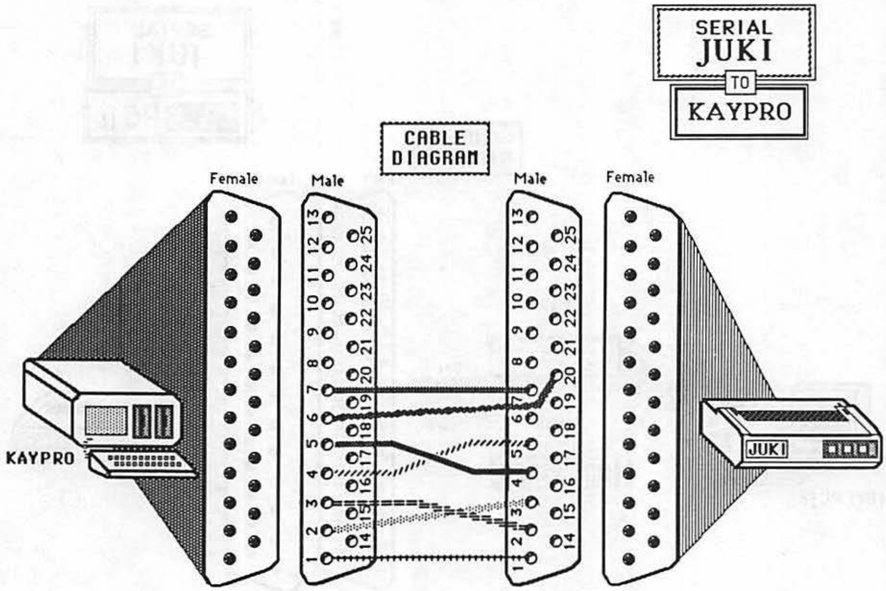




CONNECTOR PIN ASSIGNMENTS

IBM PCjr			JUKI	
A3	CTS		RTS	4
A4	TX DATA		RX DATA	3
A6	DSR		DTR	20
A7	RTS		CTS	5
A8	RX DATA		TX DATA	2
B1		PRO GND		1
B2		SIG GND		7

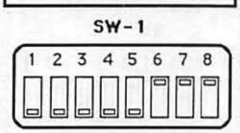


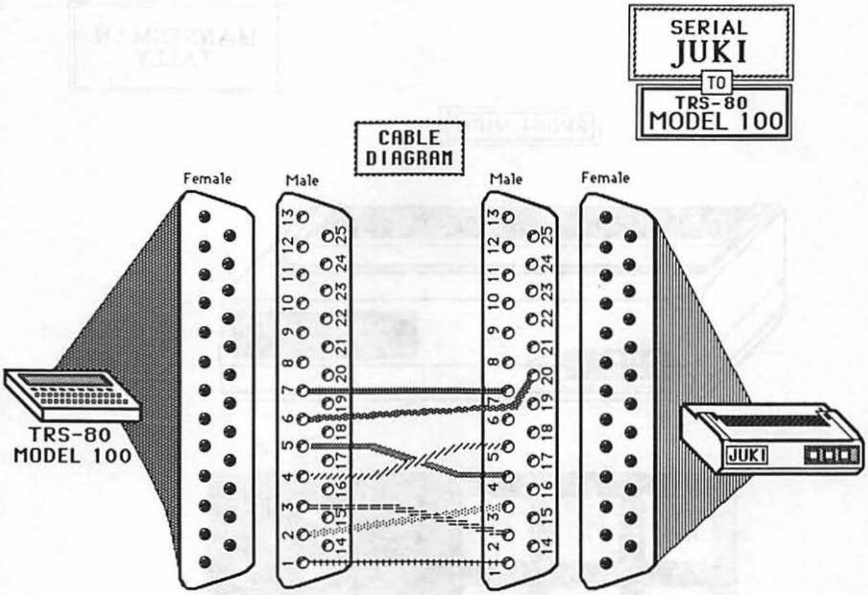


CONNECTOR PIN ASSIGNMENTS

KAYPRO			JUKI
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

JUKI SWITCH SETTINGS



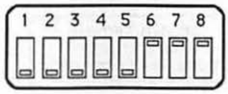


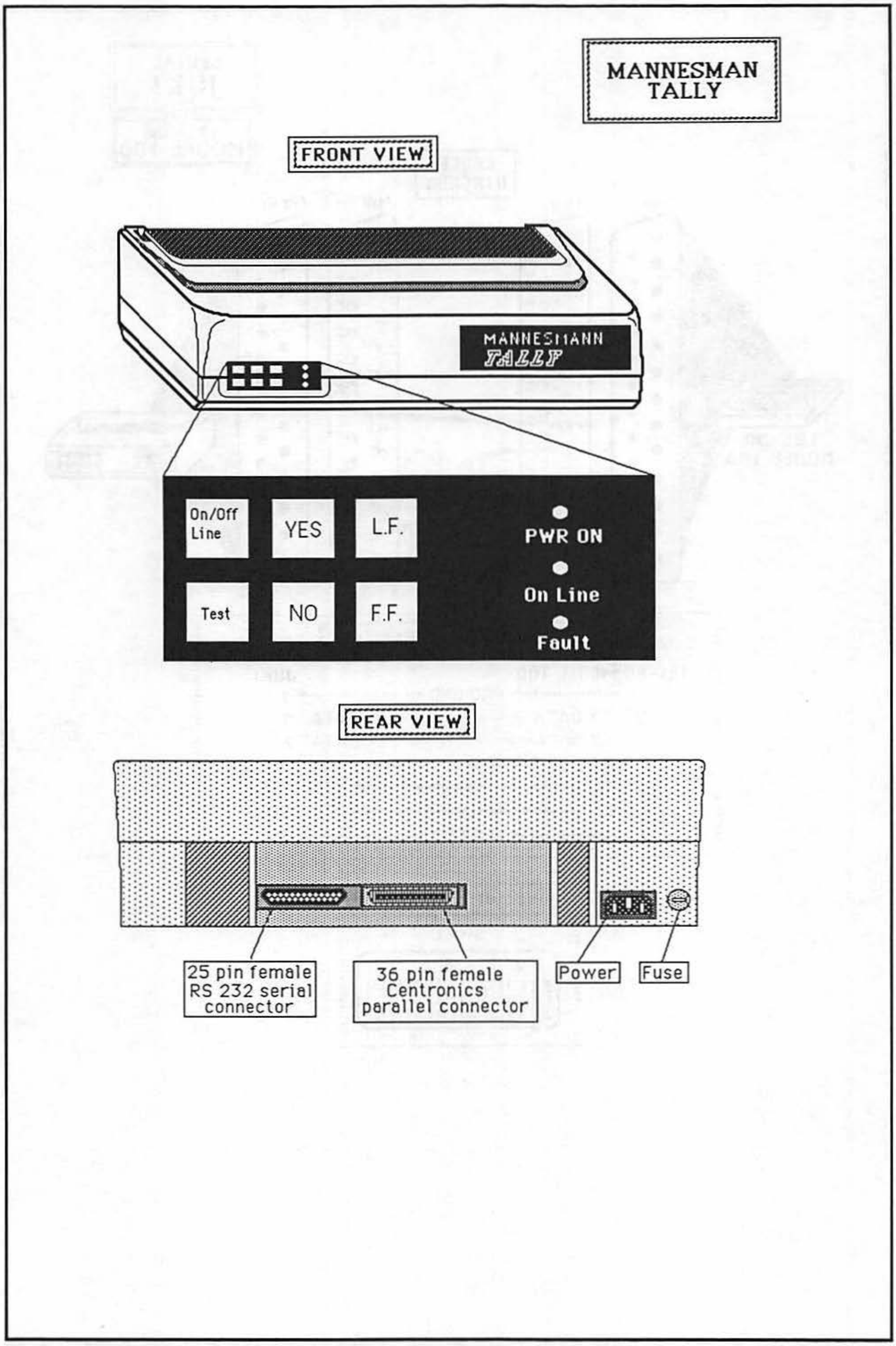
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			JUKI
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

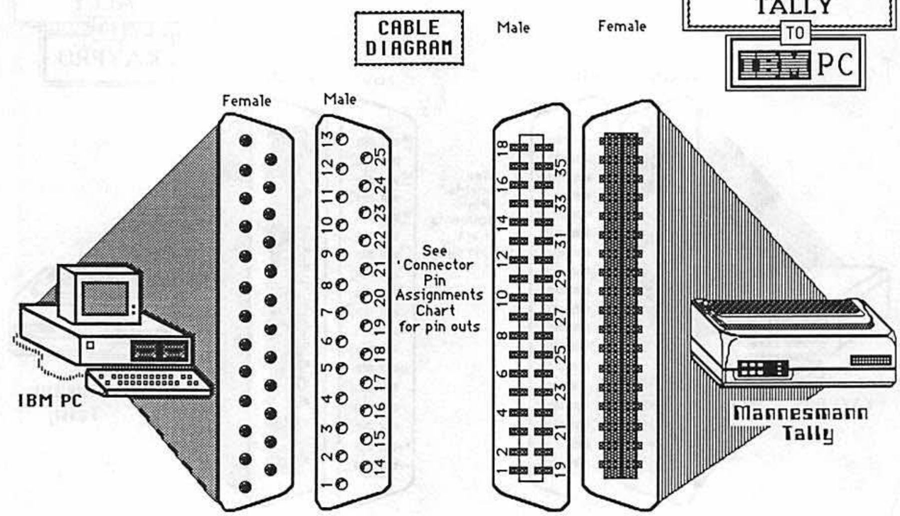
JUKI SWITCH SETTINGS

SW-1




MANNESMAN TALLY
FRONT VIEW
MANNESMANN TALLY
On/Off Line
YES
L.F.
PWR ON
Test
NO
F.F.
On Line
Fault
REAR VIEW
25 pin female RS 232 serial connector
36 pin female Centronics parallel connector
Power
Fuse

PARALLEL
MANNESMAN
TALLY
TO
IBM PC

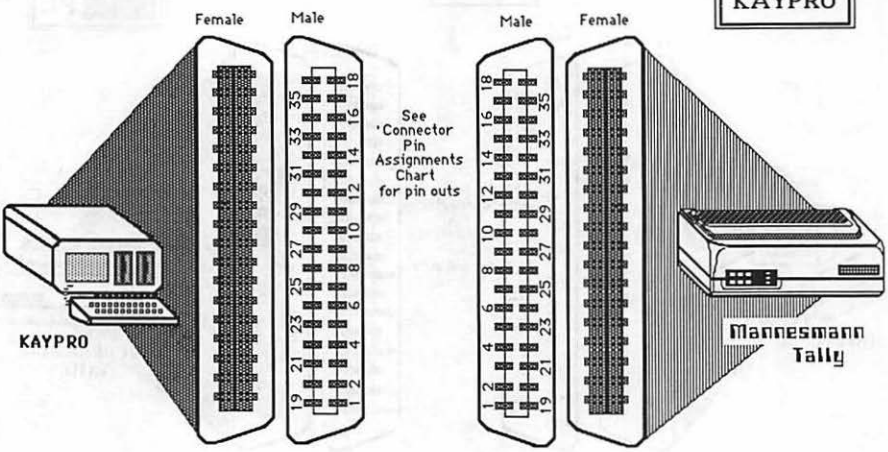


CONNECTOR PIN ASSIGNMENTS

IBM PC		MANNESMAN TALLY
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12
13	+ SELECT	13
14	- AUTO FEED	14
15	N/U	15
16	OV	16
17	CHASIS GND	17
18	GND 0	18
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

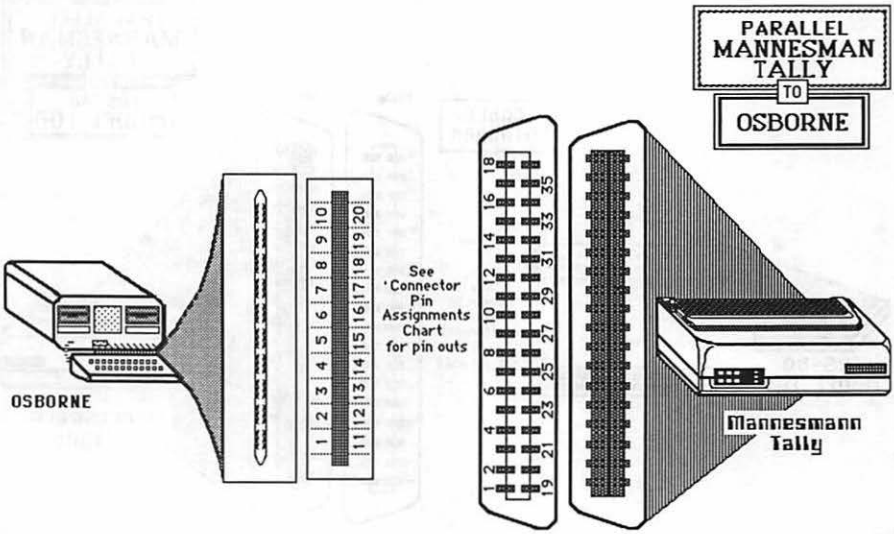
PARALLEL
MANNESMAN
TALLY
TO
KAYPRO



CONNECTOR PIN ASSIGNMENTS

KAYPRO		MANNESMAN TALLY
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

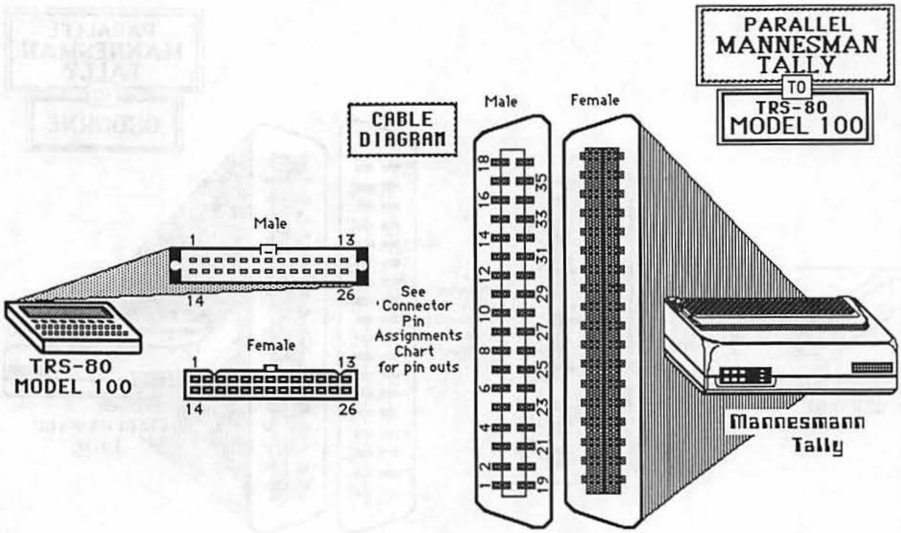
There are no switches in the Mannesmann Tally MT-160. Any changes are made through the front control panel.



CONNECTOR PIN ASSIGNMENTS

OSBORNE		TALLY
1	DATA 0	2
2	DATA 4	3
3	DATA 1	4
4	DATA 5	5
5	DATA 2	6
6	DATA 6	7
7	DATA 3	8
8	DATA 7	9
11	DATA STROBE	1
12	GROUND	18
15	BUSY	11
17	GROUND	19
19	SELECT	13

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

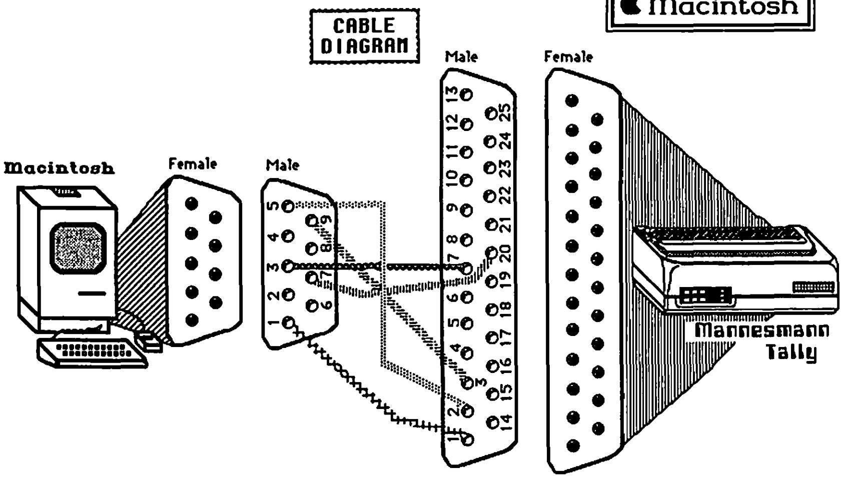


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		MANNESMAN TALLY
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

There are no switches in the Mannesmann Tally MT-160. Any changes are made through the front control panel.

SERIAL MANNESMAN TALLY TO Macintosh

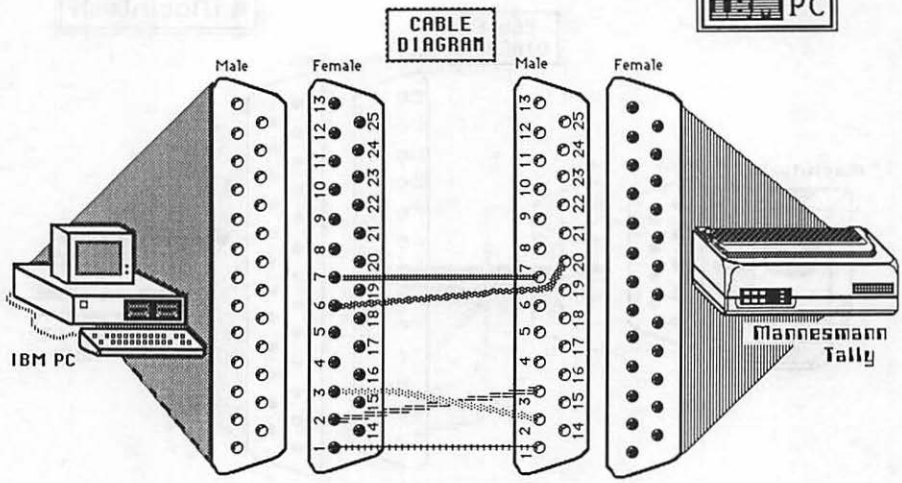


CONNECTOR PIN ASSIGNMENTS

Macintosh	Signal	Signal	TALLY
1	PRO GND	PRO GND	1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND	SIG GND	7

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

SERIAL MANNESMAN TALLY TO IBM PC

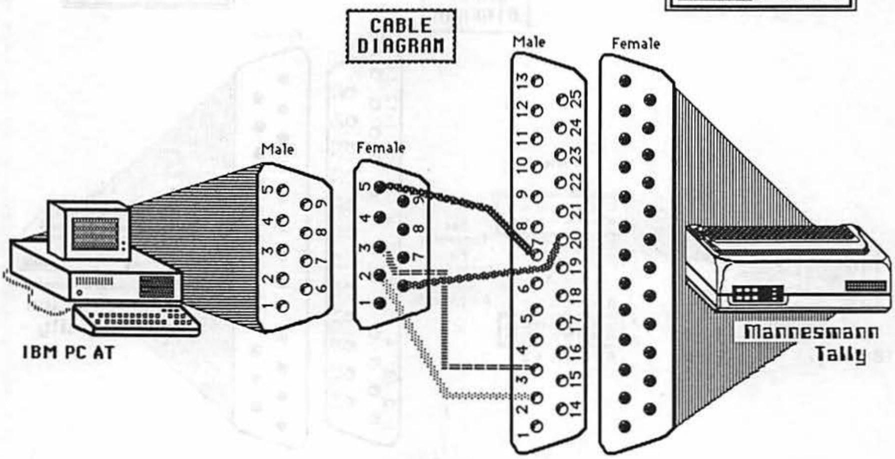


CONNECTOR PIN ASSIGNMENTS

IBM PC				TALLY
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
6	DSR		DTR	20
7		SIG GND		7

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

SERIAL MANNESMAN TALLY TO IBM PCAT



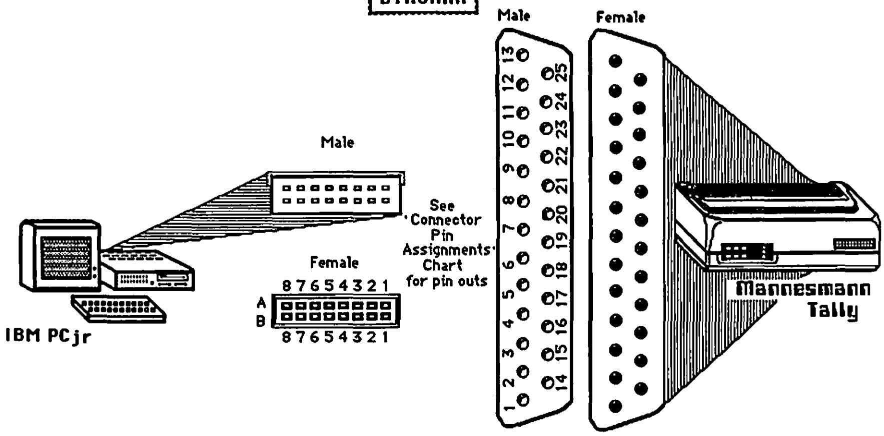
CONNECTOR PIN ASSIGNMENTS

IBM PC AT			TALLY
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

SERIAL MANNESMAN TALLY TO IBM PCjr

CABLE DIAGRAM

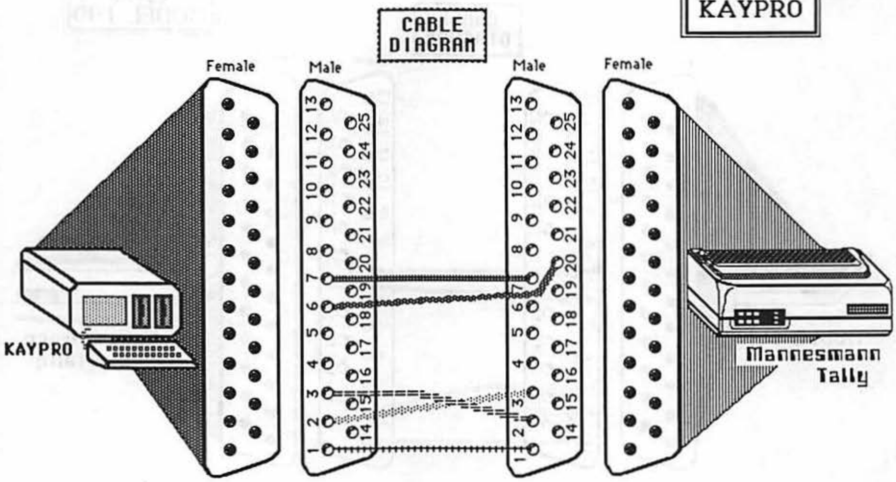


CONNECTOR PIN ASSIGNMENTS

IBM PCjr				TALLY
A4	TX DATA		RX DATA	3
A6	DSR		DTR	20
A8	RX DATA		TX DATA	2
B1		PRO GND		1
B2		SIG GND		7

There are no switches in the Mannesmann Tally MT-160.
Any changes are made through the front control panel.

SERIAL
MANNESMAN
TALLY
TO
KAYPRO

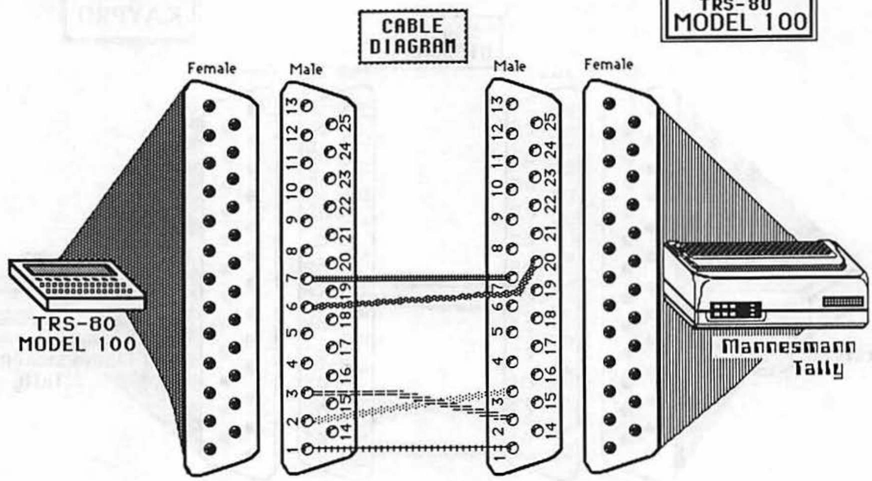


CONNECTOR PIN ASSIGNMENTS

KAYPRO			TALLY
1	PRO GND		1
3	RX DATA	TX DATA	2
2	TX DATA	RX DATA	3
6	DSR	DTR	20
7	SIG GND		7

There are no switches in the Mannesmann Tally MT-160. Any changes are made through the front control panel.

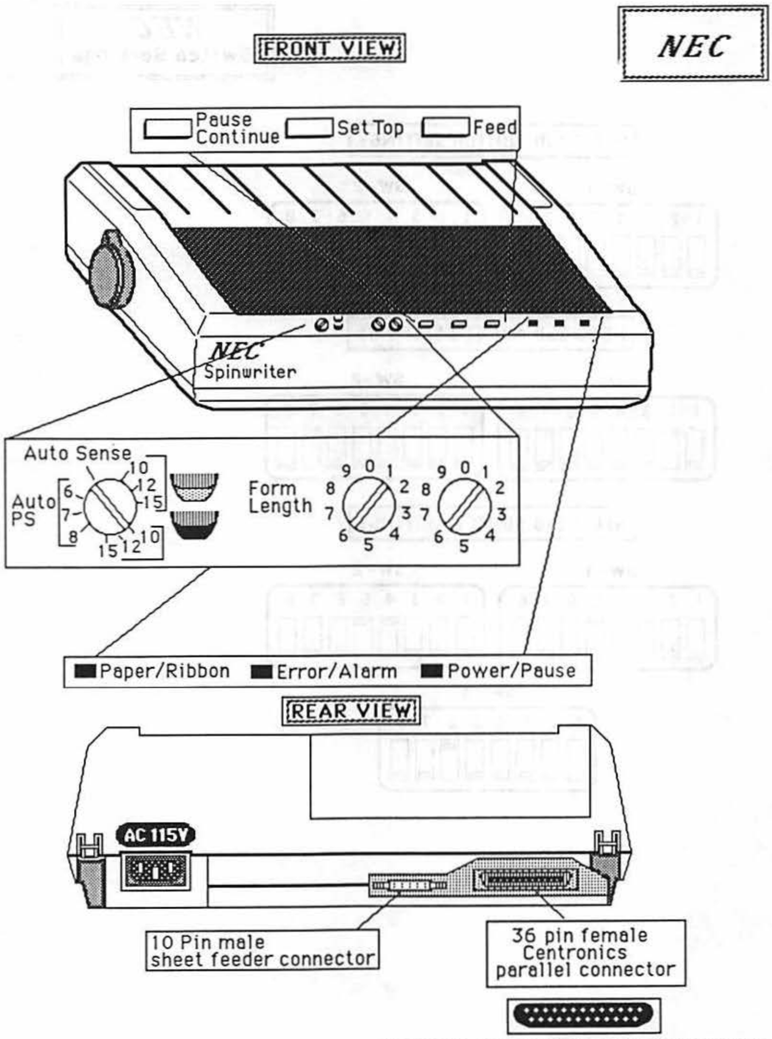
SERIAL MANNESMAN TALLY TO TRS-80 MODEL 100



CONNECTOR PIN ASSIGNMENTS

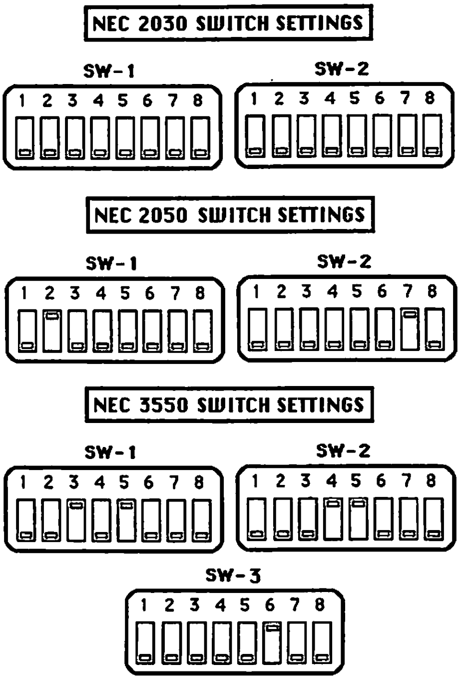
TRS-80 MODEL 100			TALLY
1	PRO GND		1
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
6	DSR	DTR	20
7	SIG GND		7

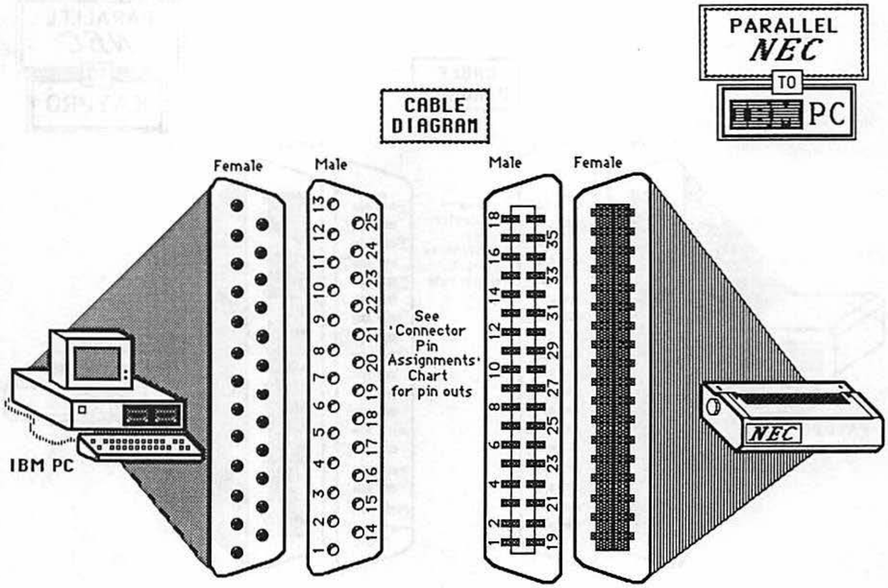
There are no switches in the Mannesmann Tally MT-160. Any changes are made through the front control panel.



Your printer may have a RS 232 female connection in the same area.

NEC
Switch Settings





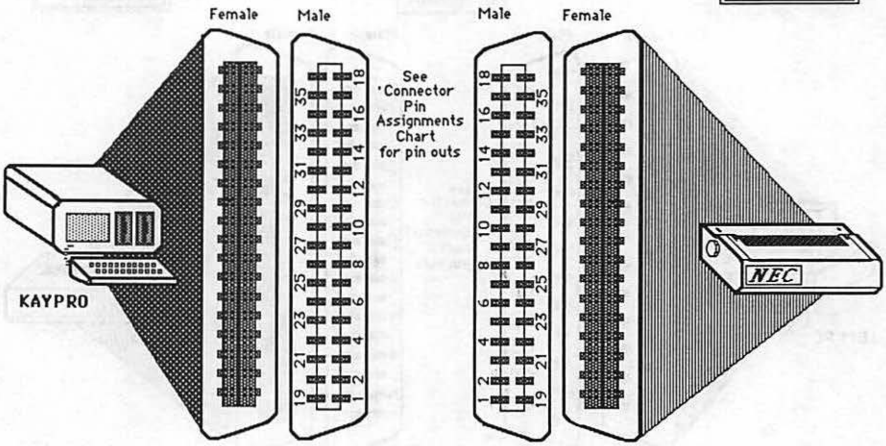
CONNECTOR PIN ASSIGNMENTS

IBM PC	Signal	NEC	IBM PC	Signal	NEC
1	DATA STROBE	1	13	+ SELECT	13
2	DATA 0	2	14	- AUTO FEED	14
3	DATA 1	3	15	N/U	15
4	DATA 2	4	16	OV	16
5	DATA 3	5	17	CHASIS GND	17
6	DATA 4	6	18	GND 0	18
7	DATA 5	7	19	GND 1	19
8	DATA 6	8	20	GND 2	20
9	DATA 7	9	21	GND 3	21
10	$\overline{\text{ACK}}$	10	22	GND 4	22
11	+ BUSY	11	23	GND 5	23
12	+ P.E. (PAPER OUT)	12	24	GND 6	24
			25	GND 7	25

See the NEC Switch Settings Diagram at the beginning of the NEC section.

PARALLEL *NEC* TO KAYPRO

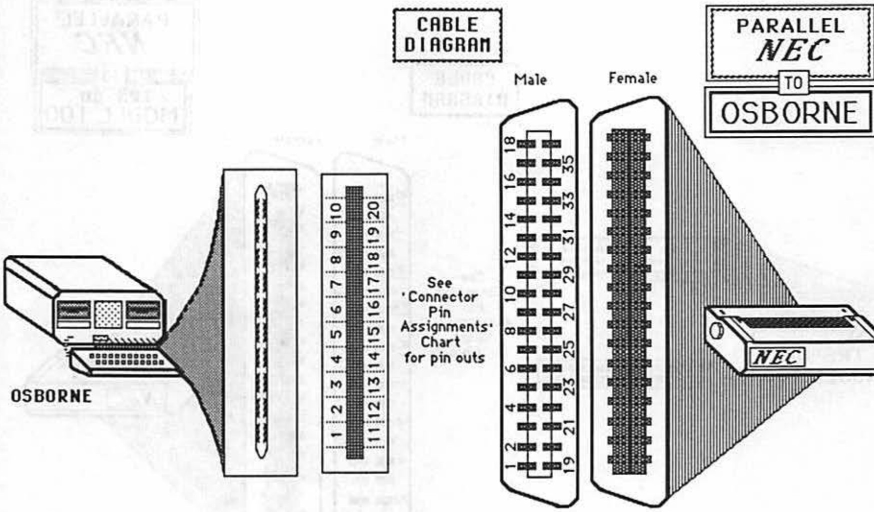
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

KAYPRO		*NEC*
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

See the NEC Switch Settings Diagram at the beginning of the NEC section.



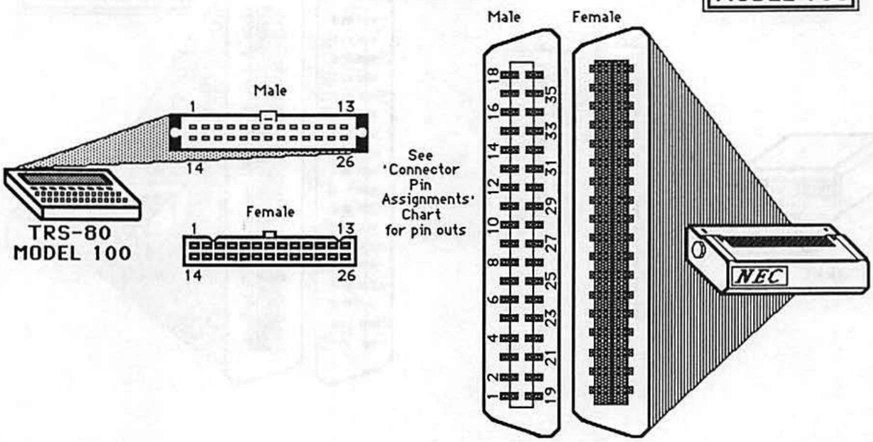
CONNECTOR PIN ASSIGNMENTS

OSBORNE		NEC
1	DATA 0	2
2	DATA 4	6
3	DATA 1	3
4	DATA 5	7
5	DATA 2	4
6	DATA 6	8
7	DATA 3	5
8	DATA 7	9
11	DATA STROBE	1
12	GROUND	16
15	BUSY	11
17	GROUND	17
19	SELECT	13

See the NEC Switch Settings Diagram at the beginning of the NEC section.

PARALLEL *NEC* TO TRS-80 MODEL 100

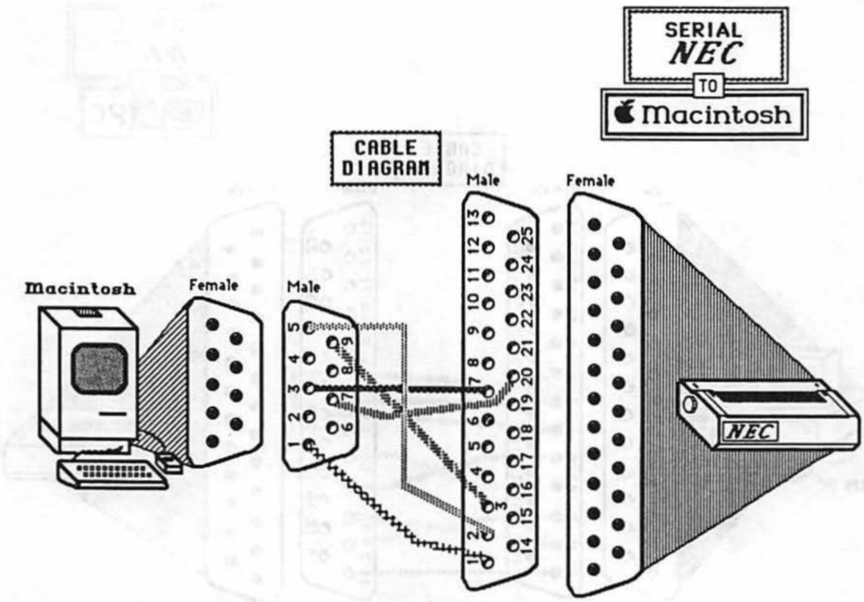
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		*NEC*	TRS-80 MODEL 100		*NEC*
1	DATA STROBE	1	14	GROUND	25
2	GROUND	19	15	DATA 6	8
3	DATA 0	2	16	GROUND	26
4	GROUND	20	17	DATA 7	9
5	DATA 1	3	18	GROUND	27
6	GROUND	21	21	BUSY	11
7	DATA 2	4	22	GROUND	28
8	GROUND	22	24	GROUND	29
9	DATA 3	5	25	SELECT	13
10	GROUND	23			
11	DATA 4	6			
12	GROUND	24			
13	DATA 5	7			

See the NEC Switch Settings Diagram at the beginning of the NEC section.

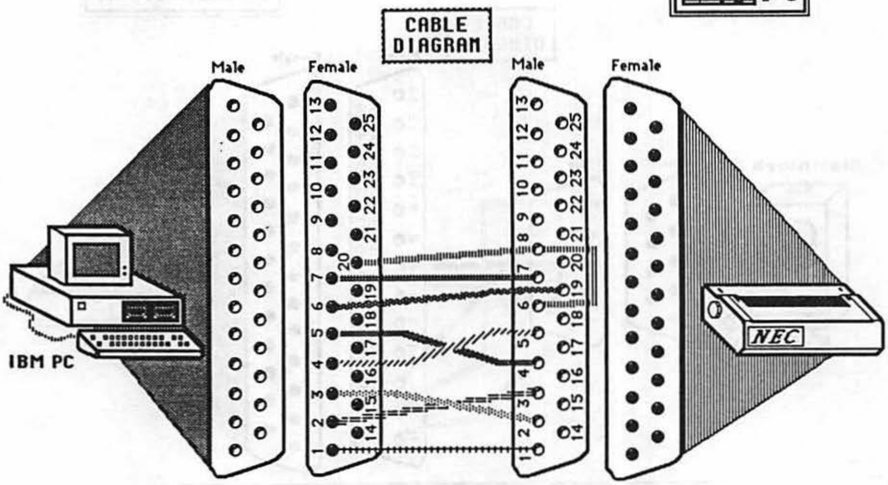


CONNECTOR PIN ASSIGNMENTS

Macintosh			NEC
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7

See the NEC Switch Settings Diagram at the beginning of the NEC section.

SERIAL
NEC
TO
IBM PC

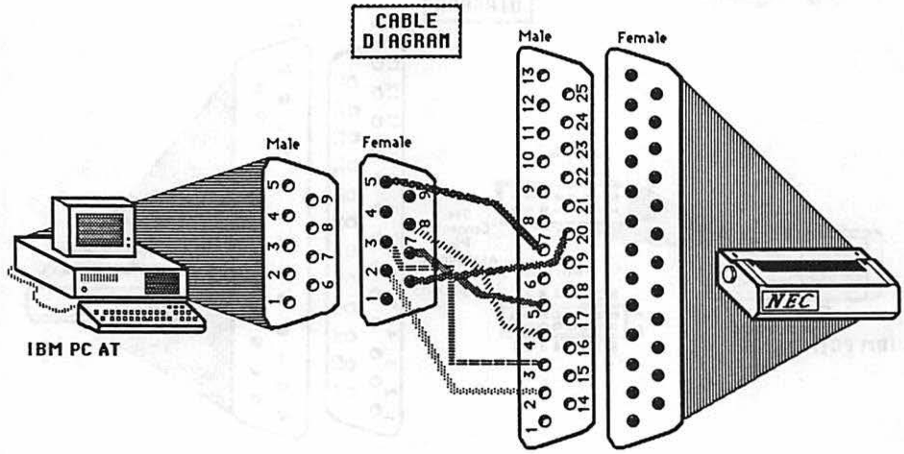


CONNECTOR PIN ASSIGNMENTS

IBM PC			***NEC***
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	CTS	RTS	4
5	RTS	CTS	5
6	DSR	DTR	19
7	SIG GND		7
20	DTR	DSR,DCD	6,8

See the NEC Switch Settings Diagram at the beginning of the NEC section.

SERIAL NEC TO IBM PC AT

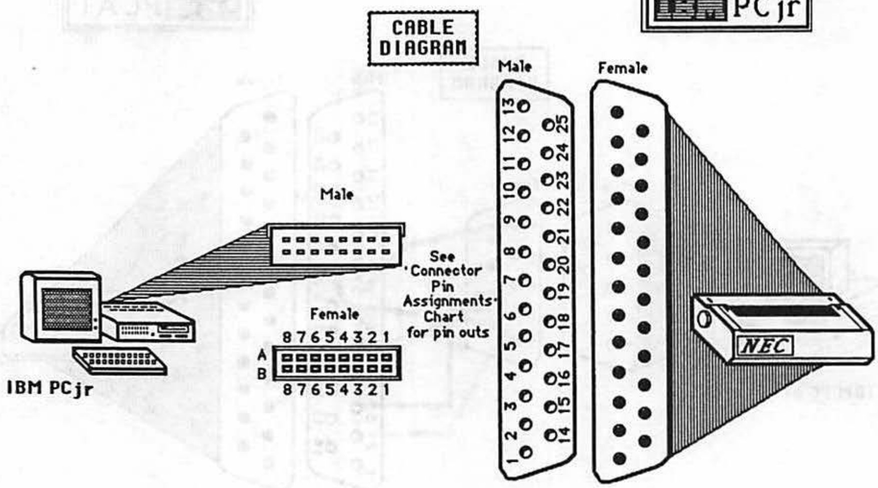


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			NEC
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

See the NEC Switch Settings Diagram at the beginning of the NEC section.

SERIAL *NEC* TO IBM PCjr

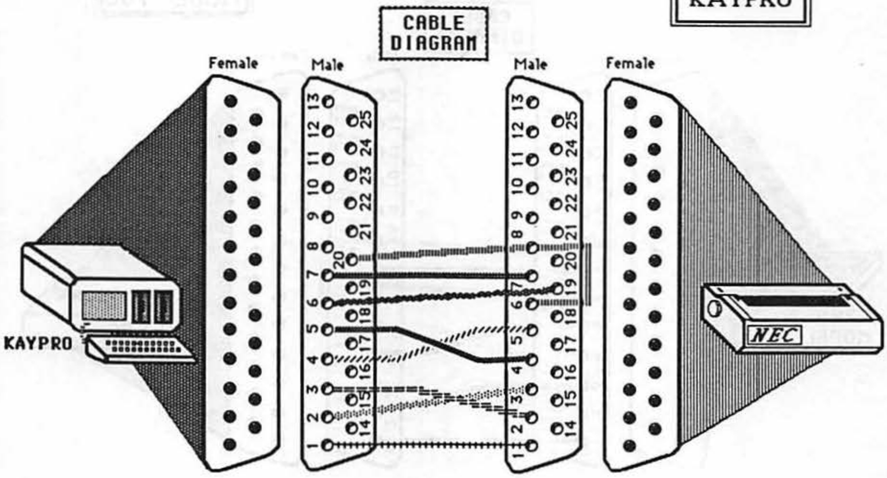


CONNECTOR PIN ASSIGNMENTS

IBM PCjr			*NEC*
A3	CTS	CTS	5
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A7	RTS	RTS	4
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

See the NEC Switch Settings Diagram at the beginning of the NEC section.

SERIAL
NEC
TO
KAYPRO

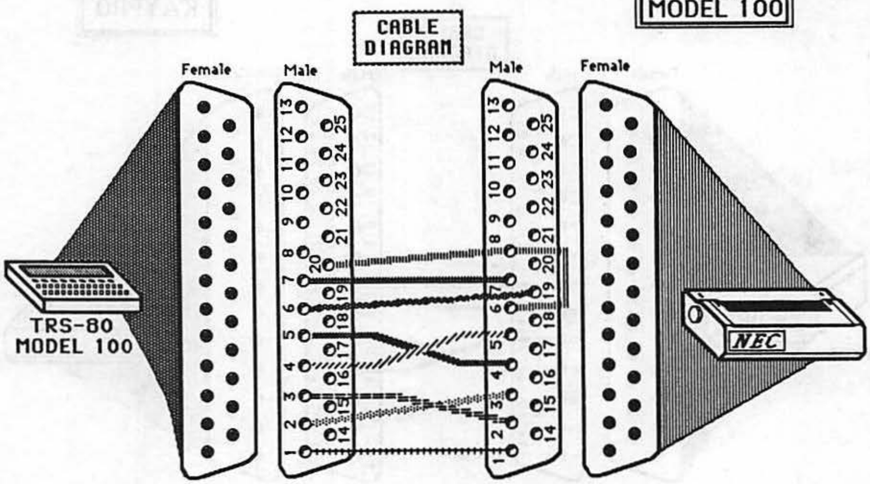


CONNECTOR PIN ASSIGNMENTS

KAYPRO			*NEC*
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	19
7	SIG GND	SIG GND	7
20	DTR	DSR,DCD	6,8

See the NEC Switch Settings Diagram at the beginning of the NEC section.

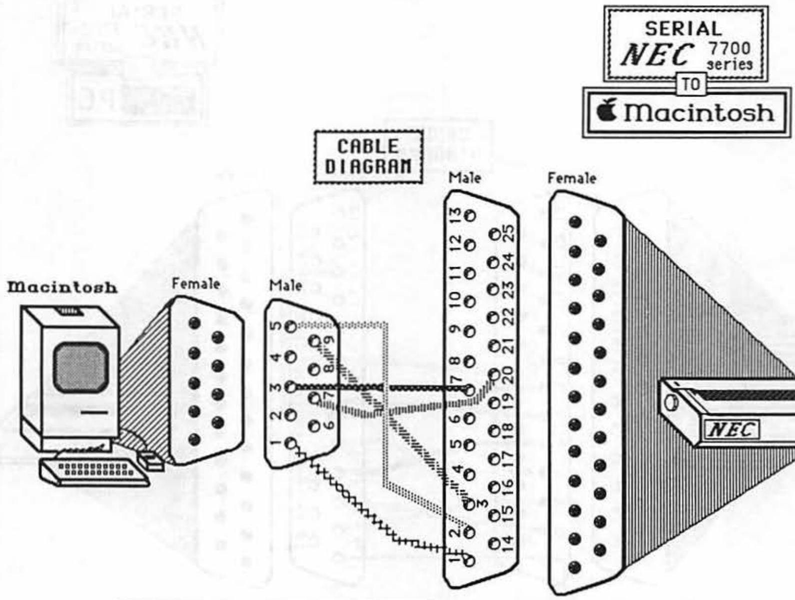
SERIAL
NEC
TO
TRS-80
MODEL 100



CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100				*NEC*
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
4	RTS		CTS	5
5	CTS		RTS	4
6	DSR		DTR	19
7		SIG GND		7
20	DTR		DSR,DCD	6,8

See the NEC Switch Settings Diagram at the beginning of the NEC section.

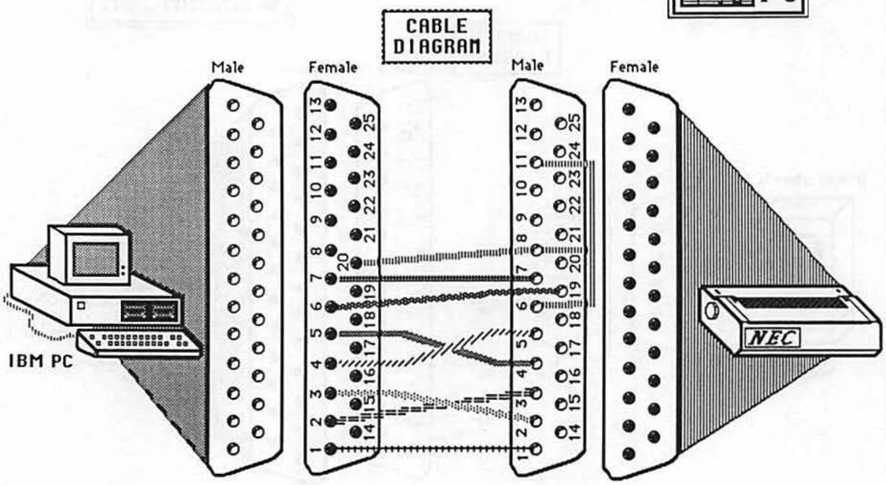


CONNECTOR PIN ASSIGNMENTS

Macintosh			NEC
1		PRO GND	1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3		SIG GND	7

See the NEC Switch Settings Diagram at the beginning of the NEC section.

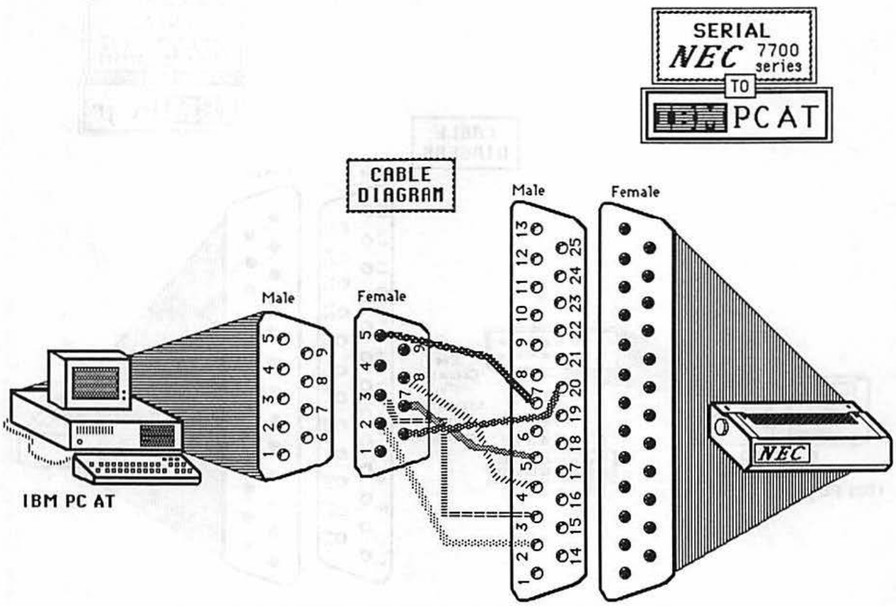
SERIAL NEC 7700 series TO IBM PC



CONNECTOR PIN ASSIGNMENTS

IBM PC			NEC
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	CTS	RTS	4
5	RTS	CTS	5
6	DSR	DTR	19
7	SIG GND		7
20	DTR	DSR,DCD,BUSY	6,8,11

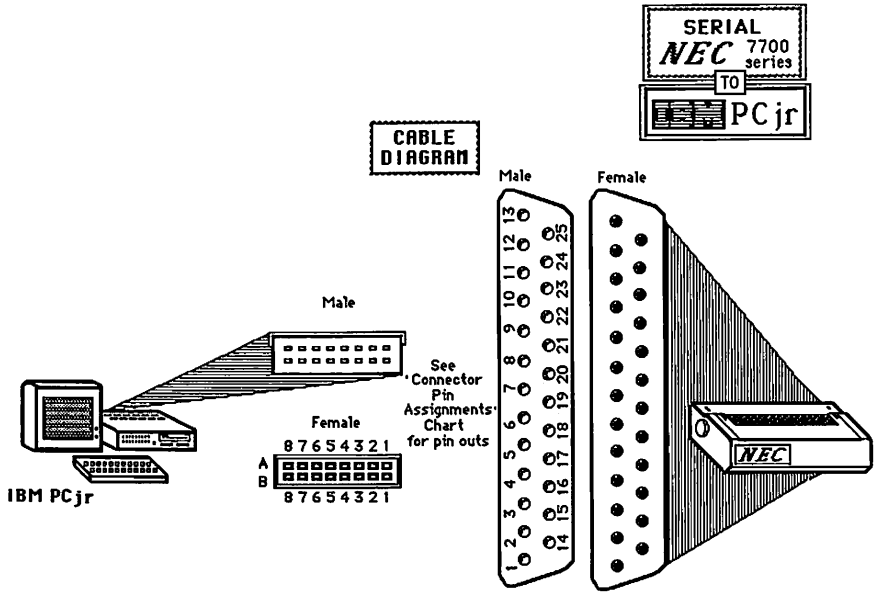
See the NEC Switch Settings Diagram at the beginning of the NEC section.



CONNECTOR PIN ASSIGNMENTS

IBM PC AT			NEC
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

See the NEC Switch Settings Diagram at the beginning of the NEC section.

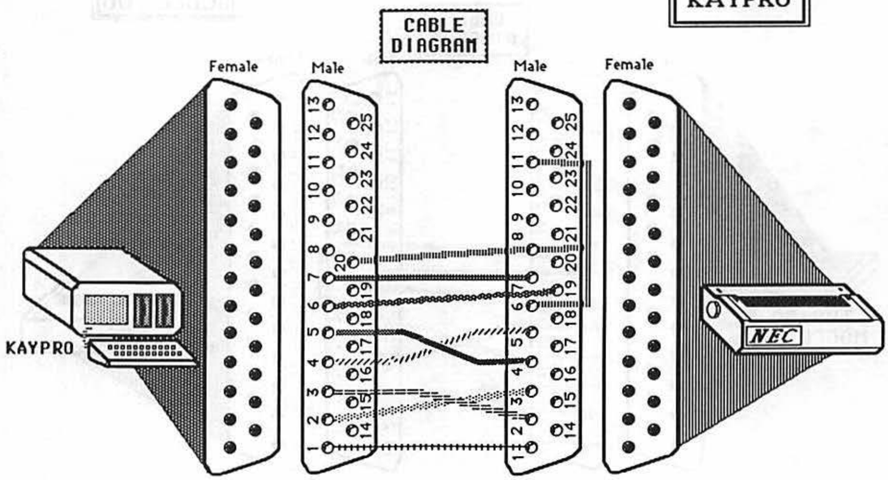


CONNECTOR PIN ASSIGNMENTS

IBM PCjr			NEC	
A3	CTS		CTS	5
A4	TX DATA		RX DATA	3
A6	DSR		DTR	20
A7	RTS		RTS	4
A8	RX DATA		TX DATA	2
B1		PRO GND		1
B2		SIG GND		7

See the NEC Switch Settings Diagram at the beginning of the NEC section.

SERIAL NEC 7700 series TO KAYPRO

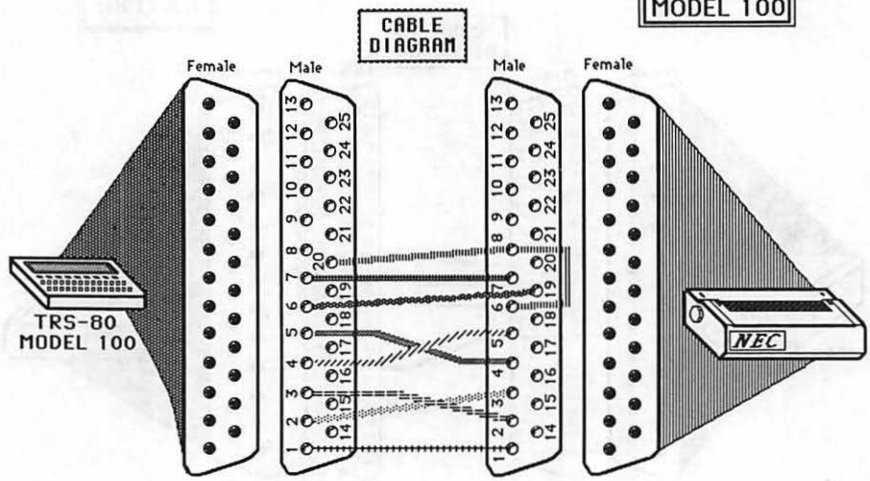


CONNECTOR PIN ASSIGNMENTS

KAYPRO			NEC
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	19
7	SIG GND		7
20	DTR	DSR,DCD,BUSY	6,8,11

See the NEC Switch Settings Diagram at the beginning of the NEC section.

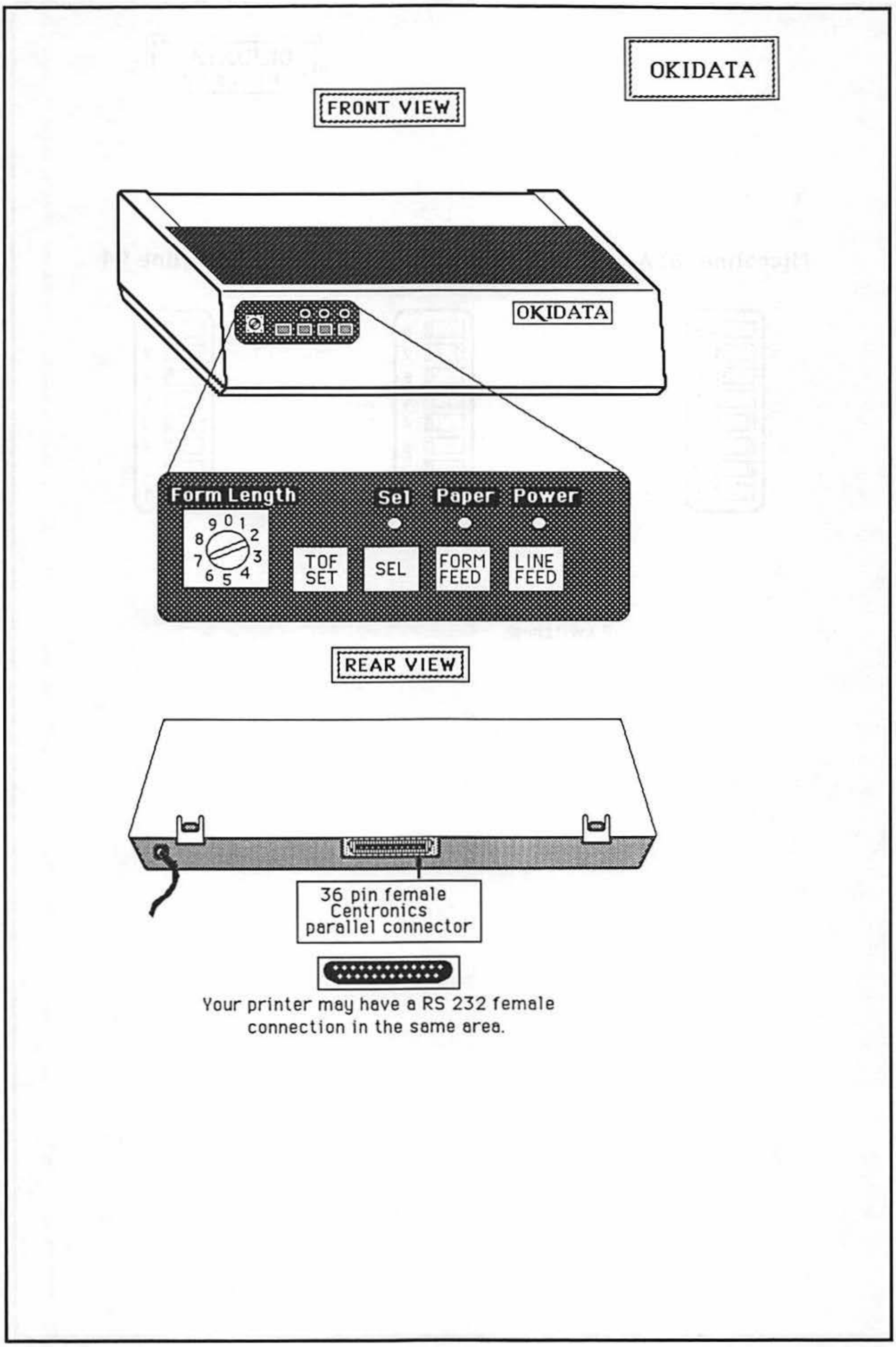
SERIAL
NEC 7700 series
TO
TRS-80
MODEL 100



CONNECTOR PIN ASSIGNMENTS

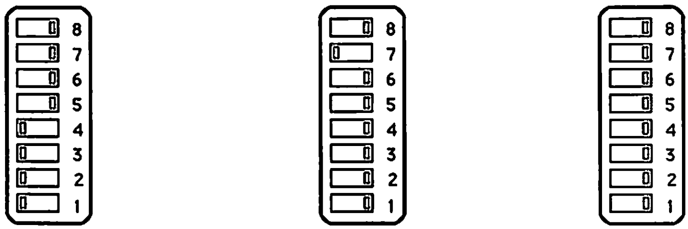
TRS-80 MODEL 100			***NEC***
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	19
7	SIG GND		7
20	DTR	DSR,DCD	6,8

See the NEC Switch Settings Diagram at the beginning of the NEC section.


OKIDATA
FRONT VIEW
OKIDATA
Form Length
Sel
Paper
Power
9 0 1
8 2
7 3
6 5 4
TOF SET
SEL
FORM FEED
LINE FEED
REAR VIEW
36 pin female Centronics parallel connector
Your printer may have a RS 232 female connection in the same area.

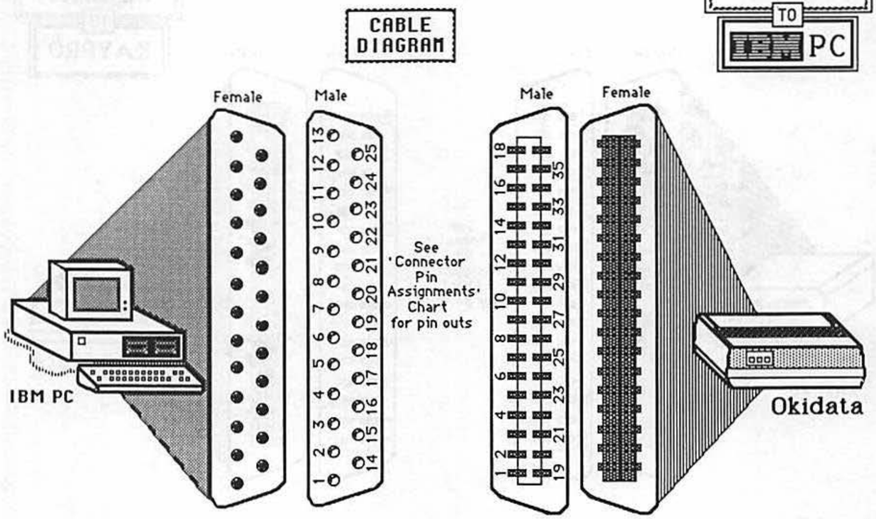
OKIDATA
Switch Settings

Microline 83A | Microline 92 | Microline 94



Microlines 182 and 192 do not have any DIP switches.

PARALLEL OKIDATA TO IBM PC



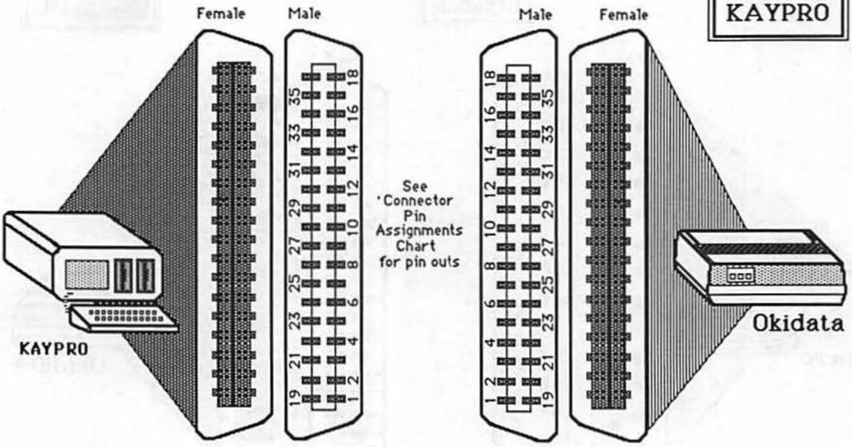
CONNECTOR PIN ASSIGNMENTS

IBM PC		OKIDATA
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12
13	+ SELECT	13
15	OV	15
16	OV	16
17	CHASIS GND	17
18	GND 0	26
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

See the Okidata switch settings diagram at the beginning of the Okidata section.

CABLE DIAGRAM

PARALLEL OKIDATA TO KAYPRO

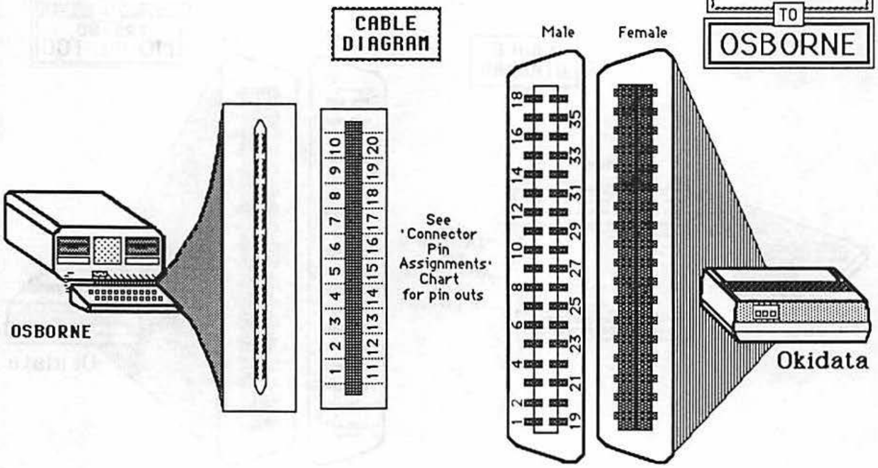


CONNECTOR PIN ASSIGNMENTS

KAYPRO		OKIDATA
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

See the Okidata switch settings diagram at the beginning of the Okidata section.

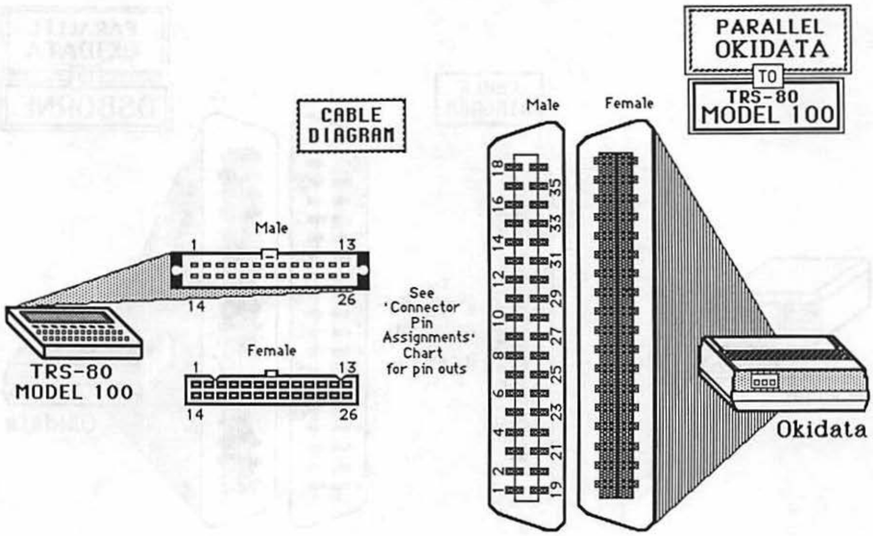
PARALLEL OKIDATA TO OSBORNE



CONNECTOR PIN ASSIGNMENTS

OSBORNE		OKIDATA
1	DATA 0	2
2	DATA 4	3
3	DATA 1	4
4	DATA 5	5
5	DATA 2	6
6	DATA 6	7
7	DATA 3	8
8	DATA 7	9
11	DATA STROBE	1
12	GROUND	19
15	BUSY	11
17	GROUND	20
19	SELECT	13

See the Okidata switch settings diagram at the beginning of the Okidata section.



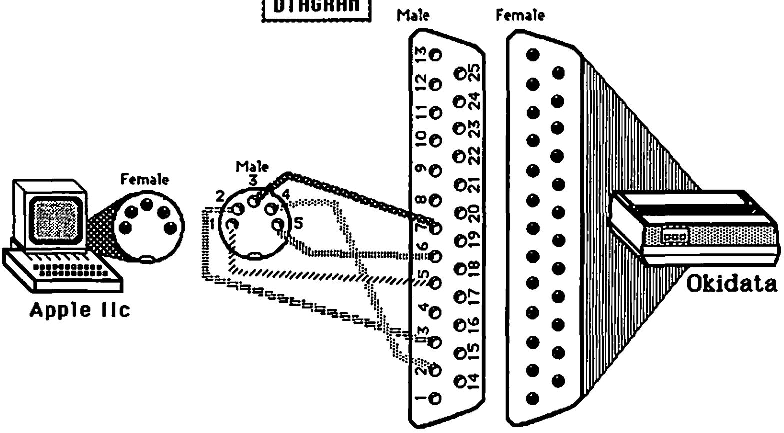
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		OKIDATA	TRS-80 MODEL 100		OKIDATA
1	DATA STROBE	1	14	GROUND	25
2	GROUND	19	15	DATA 6	8
3	DATA 0	2	16	GROUND	26
4	GROUND	20	17	DATA 7	9
5	DATA 1	3	18	GROUND	27
6	GROUND	21	21	BUSY	11
7	DATA 2	4	22	GROUND	28
8	GROUND	22	24	GROUND	29
9	DATA 3	5	25	SELECT	13
10	GROUND	23			
11	DATA 4	6			
12	GROUND	24			
13	DATA 5	7			

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
Apple IIc

CABLE DIAGRAM



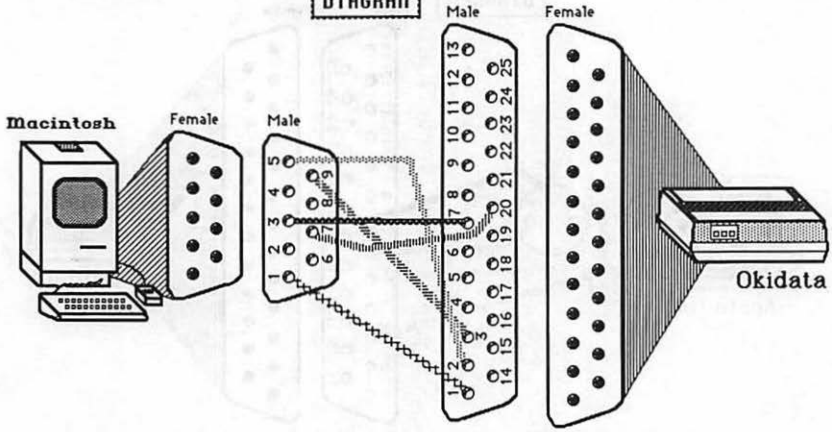
CONNECTOR PIN ASSIGNMENTS

Apple IIc			OKIDATA
2	TX DATA	RX DATA	3
4	RX DATA	TX DATA	2
1	CTS	RTS	5
5	DTR	DSR	6
3	SIG GND		7

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
Macintosh

CABLE DIAGRAM

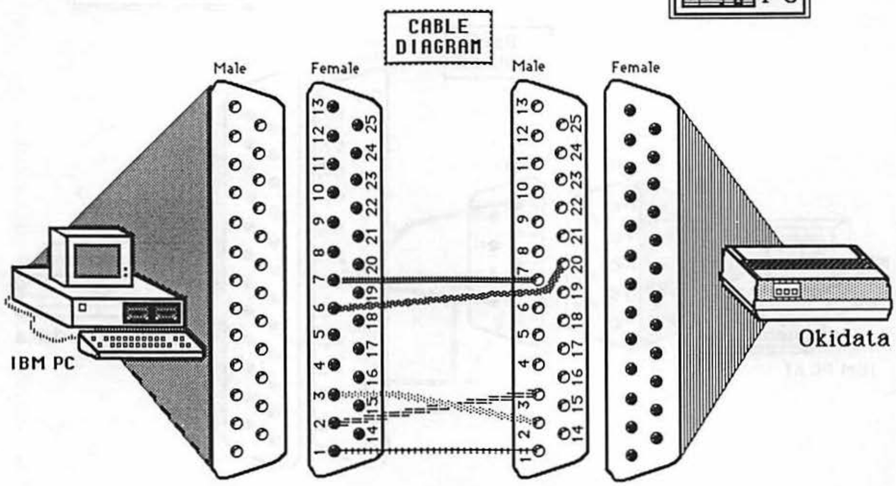


CONNECTOR PIN ASSIGNMENTS

Macintosh			OKIDATA
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL OKIDATA TO IBM PC

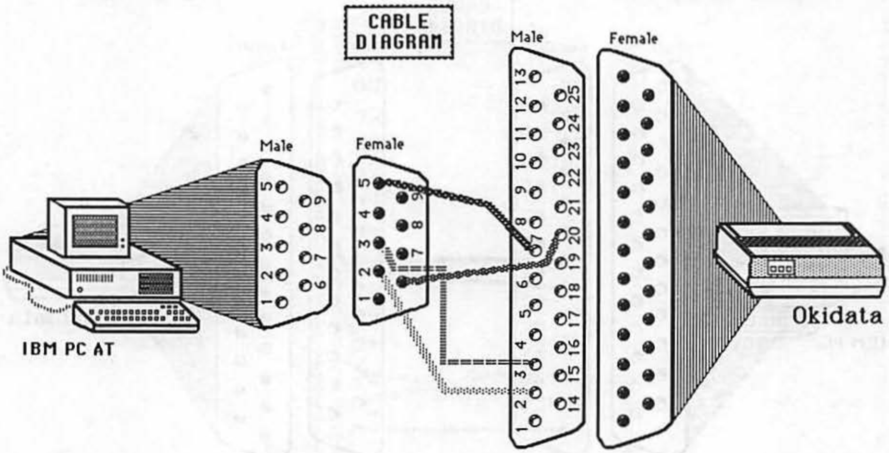


CONNECTOR PIN ASSIGNMENTS

IBM PC			OKIDATA
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
6	DSR	DTR	20
7	SIG GND	SIG GND	7

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
IBM PC AT

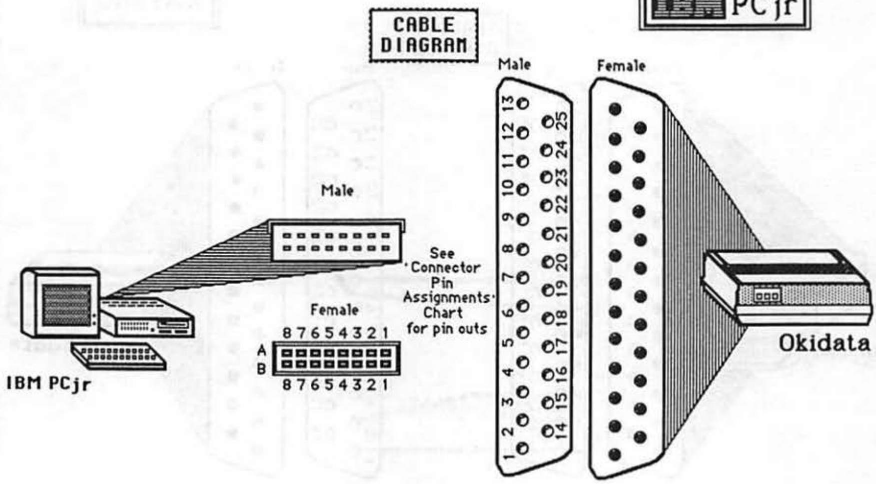


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			OKIDATA
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
IBM PCjr

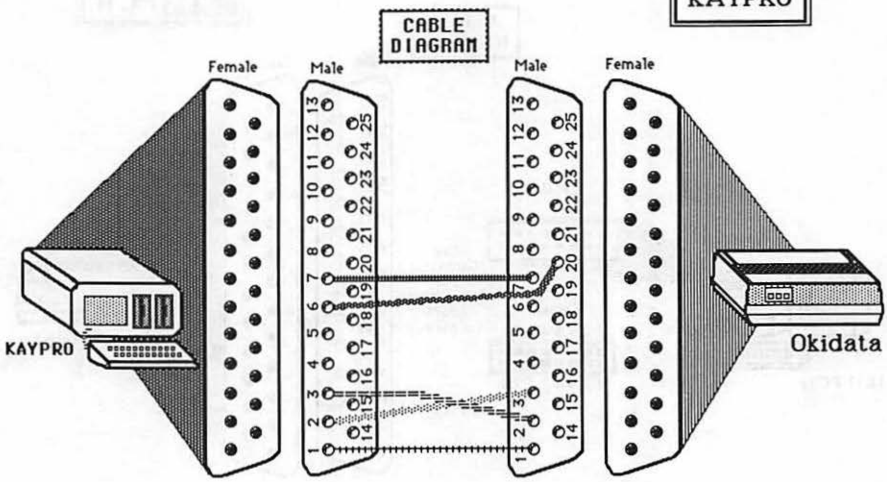


CONNECTOR PIN ASSIGNMENTS

IBM PCjr			OKIDATA
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
KAYPRO



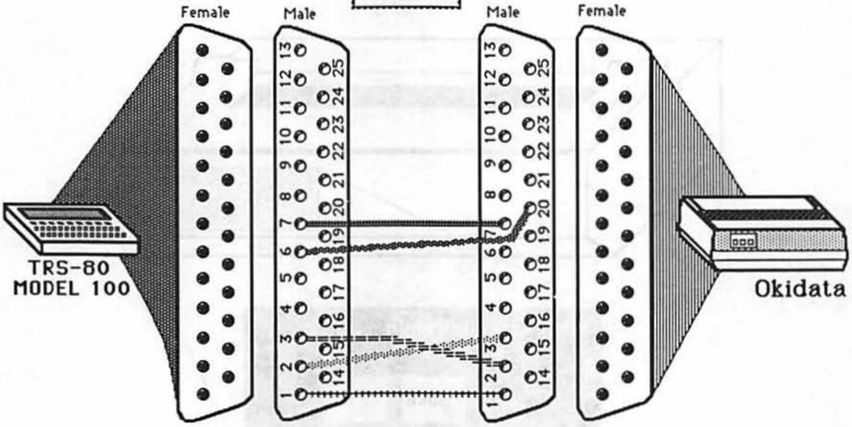
CONNECTOR PIN ASSIGNMENTS

KAYPRO		OKIDATA
1	PRO GND	1
3	RX DATA — TX DATA	2
2	TX DATA — RX DATA	3
6	DSR — DTR	20
7	SIG GND	7

See the Okidata switch settings diagram at the beginning of the Okidata section.

SERIAL
OKIDATA
TO
TRS-80
MODEL 100

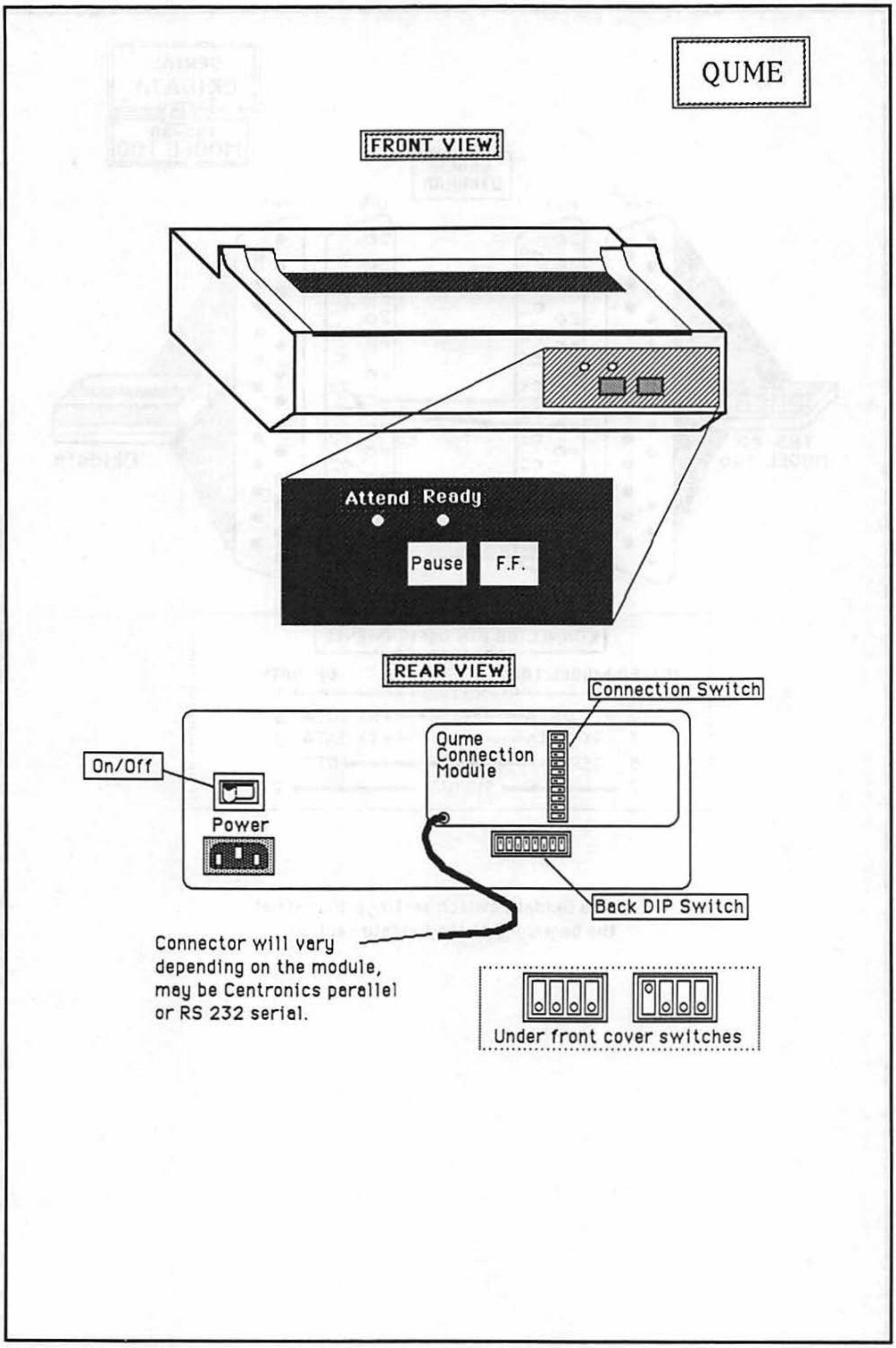
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100				OKIDATA
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
6	DSR		DTR	20
7		SIG GND		7

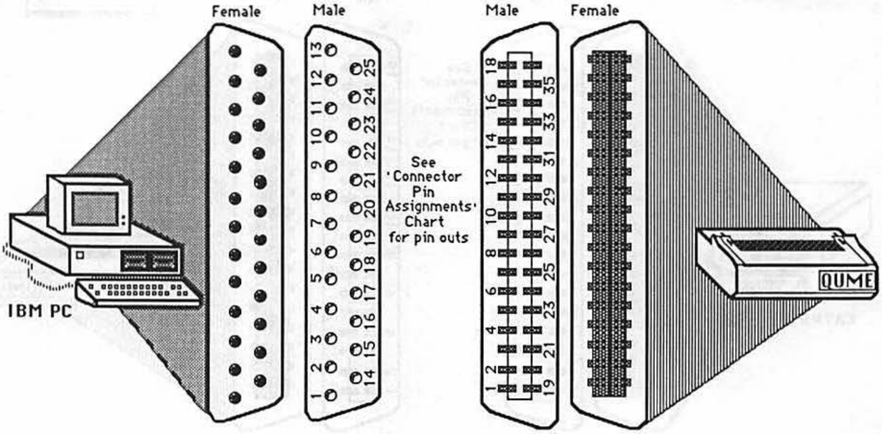
See the Okidata switch settings diagram at the beginning of the Okidata section.


QUME
FRONT VIEW
Attend
Ready
Pause
F.F.
REAR VIEW
Connection Switch
Qume
Connection
Module
On/Off
Power
Back DIP Switch
Connector will vary
depending on the module,
may be Centronics parallel
or RS 232 serial.
Under front cover switches

*Note that all Qume Parallel diagrams assume the use of the Centronics/Qume parallel connection board.

PARALLEL QUME TO IBM PC

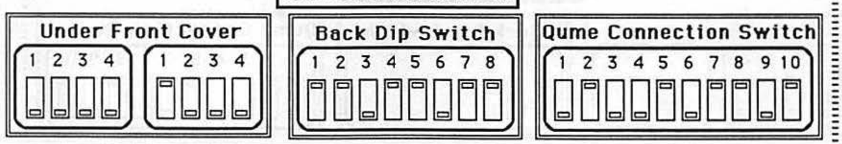
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

IBM PC	Signal	QUME	IBM PC	Signal	QUME
1	DATA STROBE	1	13	+ SELECT	13
2	DATA 0	2	14	- AUTO FEED	14
3	DATA 1	3	15	N/U	15
4	DATA 2	4	16	OV	16
5	DATA 3	5	17	CHASIS GND	17
6	DATA 4	6	18	GND 0	18
7	DATA 5	7	19	GND 1	19
8	DATA 6	8	20	GND 2	20
9	DATA 7	9	21	GND 3	21
10	$\overline{ACK}$	10	22	GND 4	22
11	+ BUSY	11	23	GND 5	23
12	+ P.E. (PAPER OUT)	12	24	GND 6	24
			25	GND 7	25

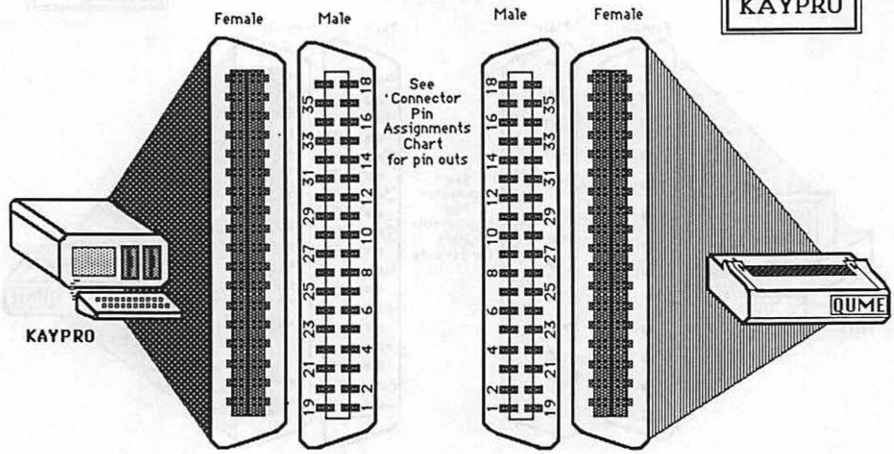
QUME SWITCH SETTINGS



*Note that all Qume Parallel diagrams assume the use of the Centronics/Qume parallel connection board.

PARALLEL QUME TO KAYPRO

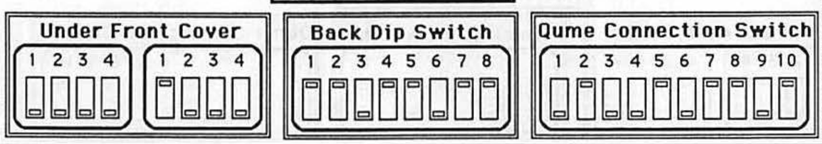
CABLE DIAGRAM



CONNECTOR PIN ASSIGNMENTS

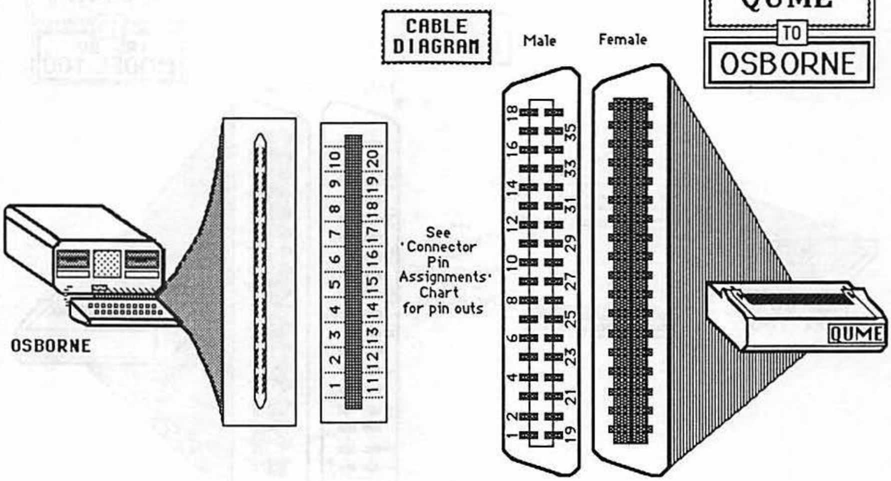
KAYPRO		QUME
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

QUME SWITCH SETTINGS



*Note that all Qume Parallel diagrams assume the use of the Centronics/Qume parallel connection board.

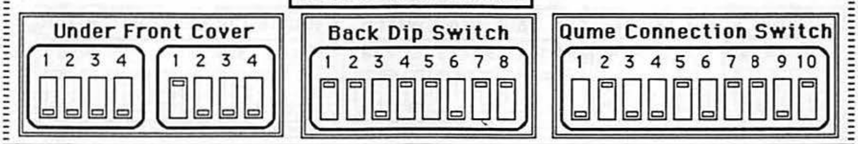
PARALLEL QUME TO OSBORNE



CONNECTOR PIN ASSIGNMENTS

OSBORNE		QUME
1	DATA 0	2
2	DATA 4	3
3	DATA 1	4
4	DATA 5	5
5	DATA 2	6
6	DATA 6	7
7	DATA 3	8
8	DATA 7	9
11	DATA STROBE	1
12	GROUND	16
15	BUSY	11
17	GROUND	17
19	SELECT	13

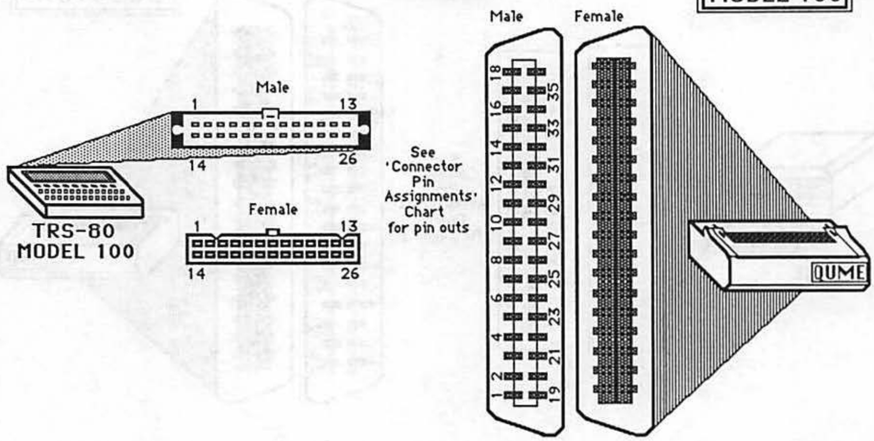
QUME SWITCH SETTINGS



*Note that all Qume Parallel diagrams assume the use of the Centronics/Qume parallel connection board.

PARALLEL QUME
TO
TRS-80 MODEL 100

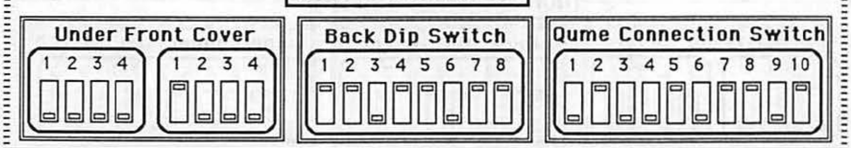
CABLE DIAGRAM



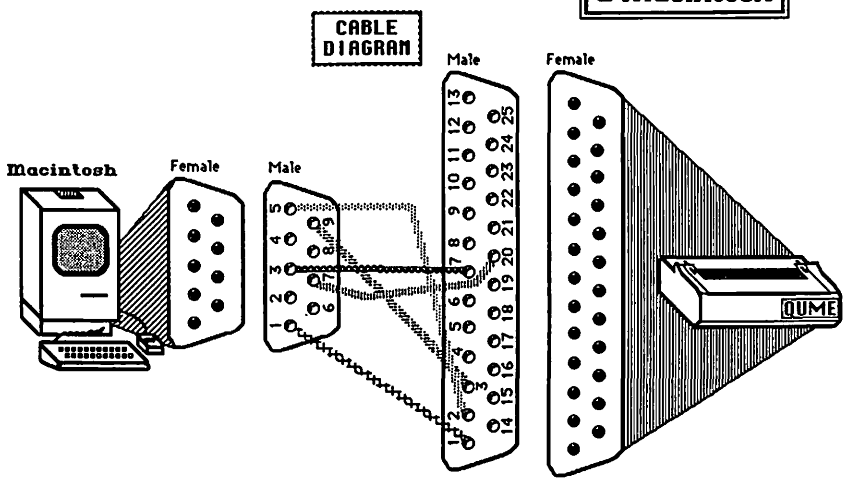
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		QUME
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

QUME SWITCH SETTINGS

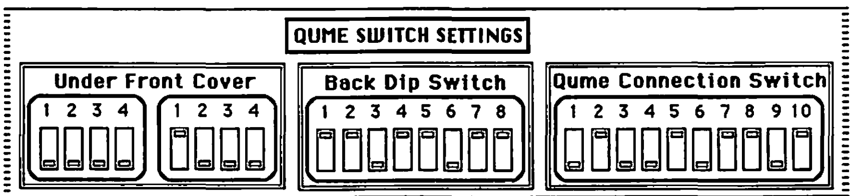


SERIAL QUME TO Macintosh

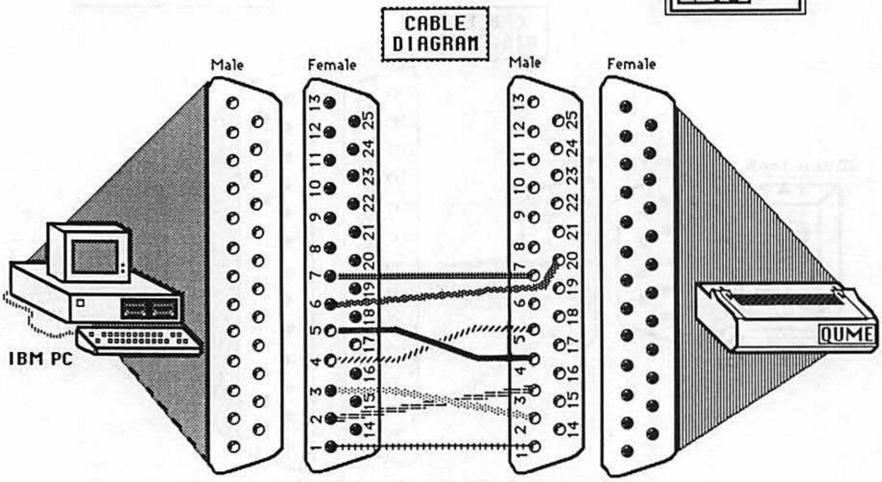


CONNECTOR PIN ASSIGNMENTS

Macintosh			QUME
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7



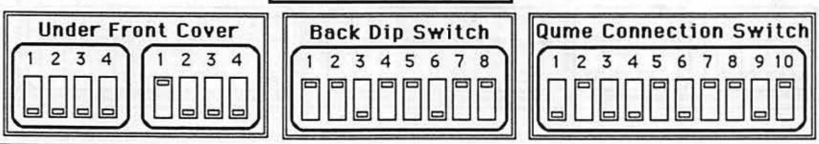
SERIAL QUME TO IBM PC



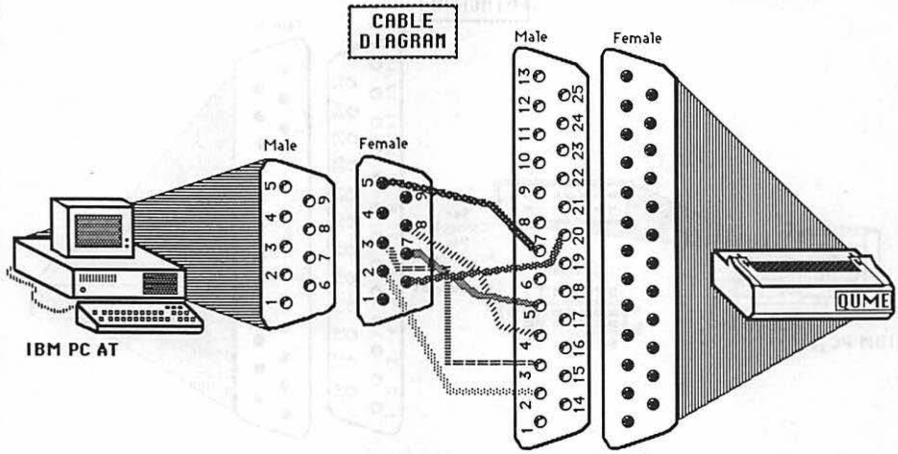
CONNECTOR PIN ASSIGNMENTS

IBM PC			QUME
1		PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7		SIG GND	7

QUME SWITCH SETTINGS



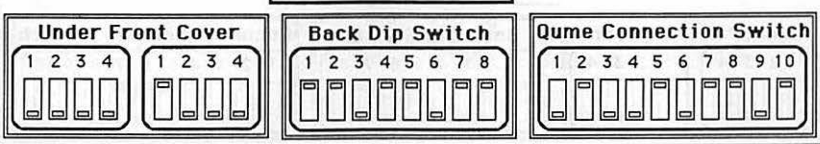
SERIAL
QUME
TO
IBM PC AT

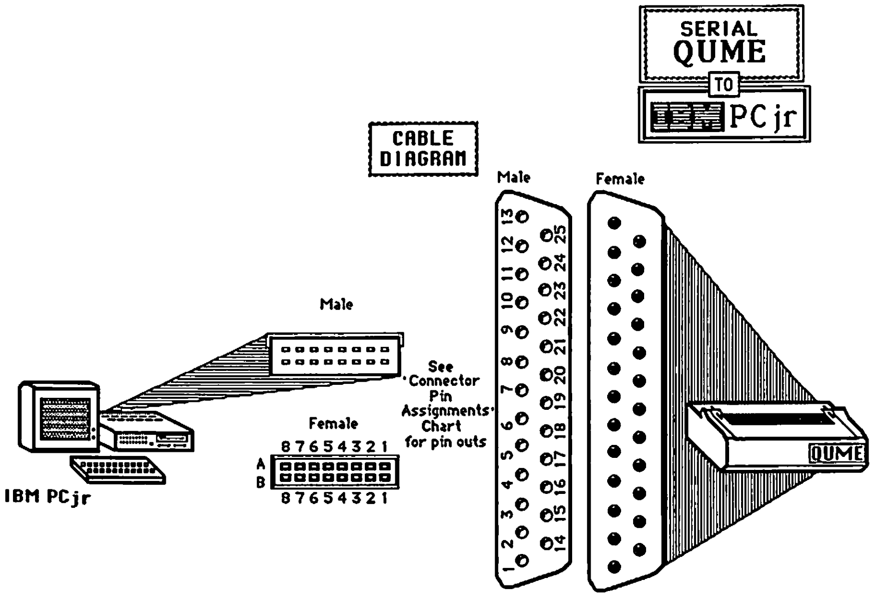


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			QUME
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

QUME SWITCH SETTINGS

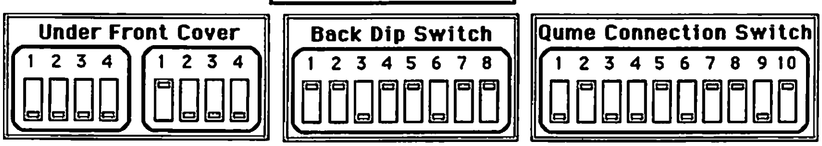




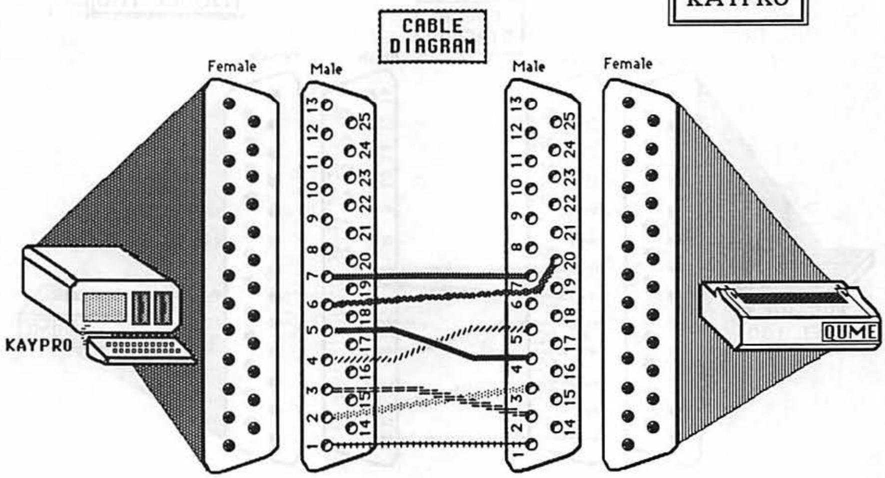
CONNECTOR PIN ASSIGNMENTS

IBM PCjr			QUME
A3	CTS	RTS	4
A4	TX DATA	RX DATA	3
A6	DSR	DTR	20
A7	RTS	CTS	5
A8	RX DATA	TX DATA	2
B1	PRO GND		1
B2	SIG GND		7

QUME SWITCH SETTINGS



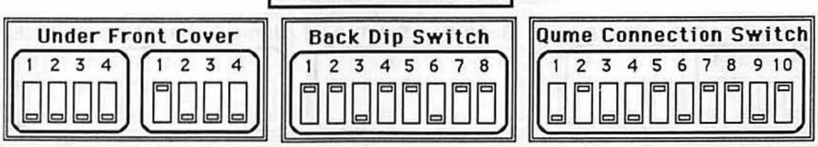
SERIAL
QUME
TO
KAYPRO

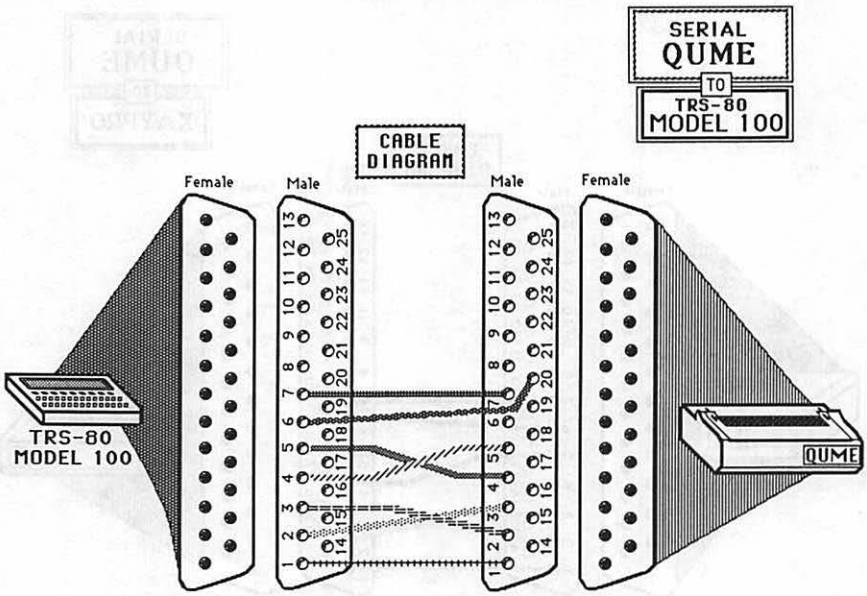


CONNECTOR PIN ASSIGNMENTS

KAYPRO			QUME
1	PRO GND	PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND	SIG GND	7

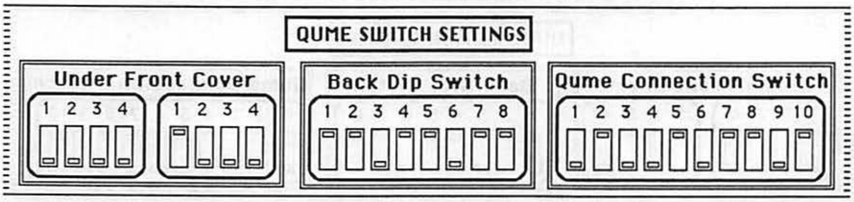
QUME SWITCH SETTINGS

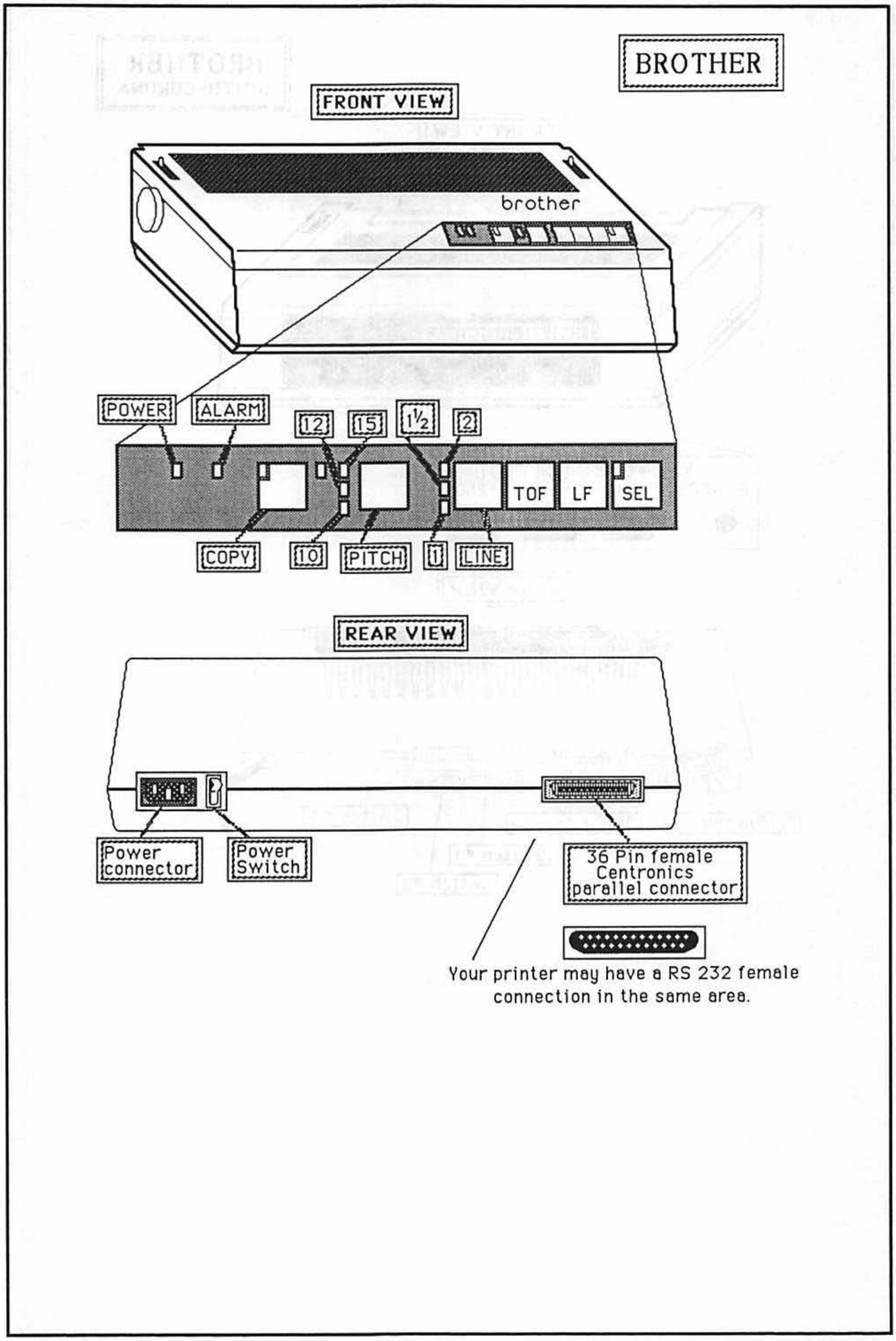


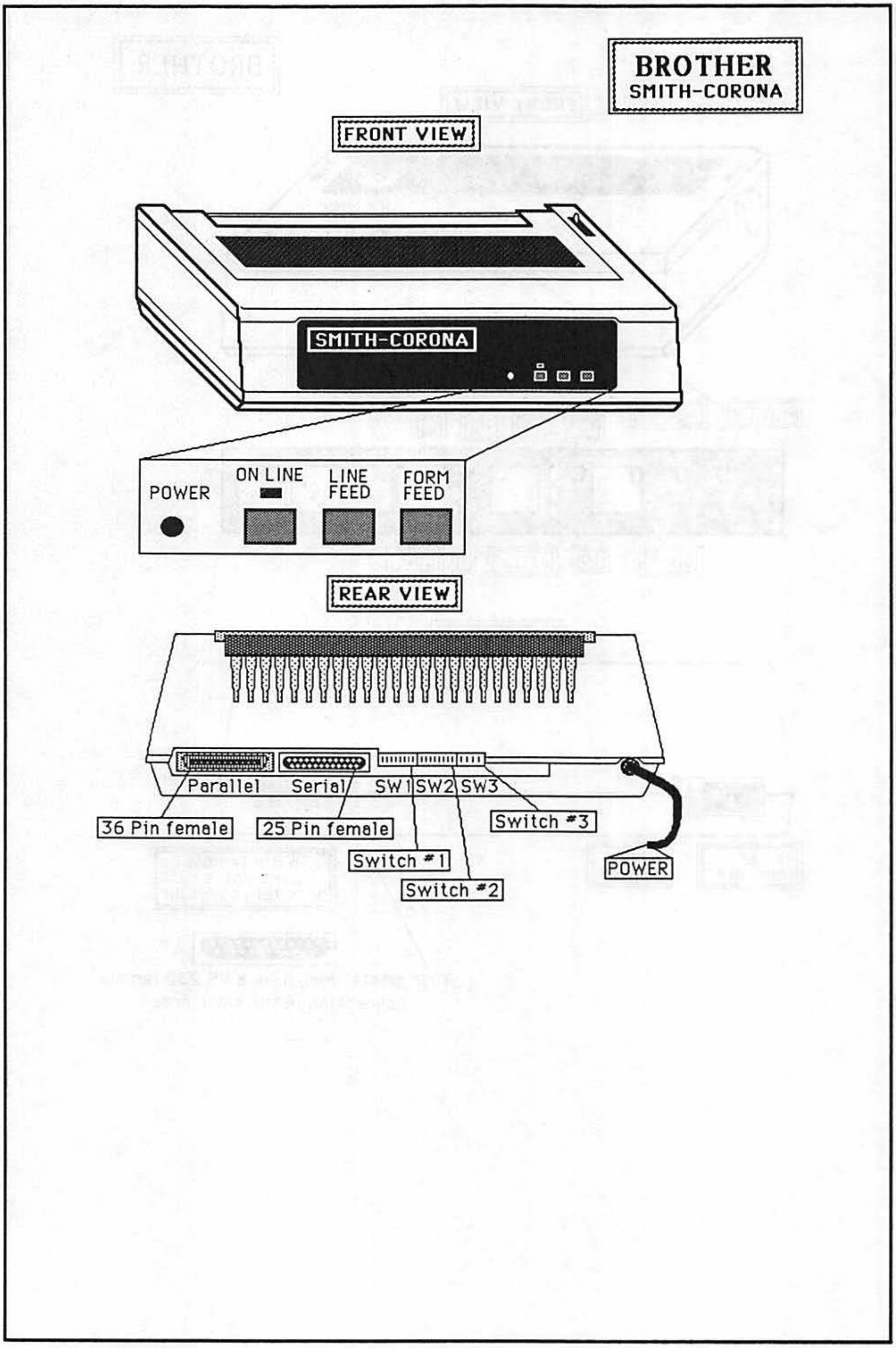


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			QUME
1	PRO GND		1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7	SIG GND		7

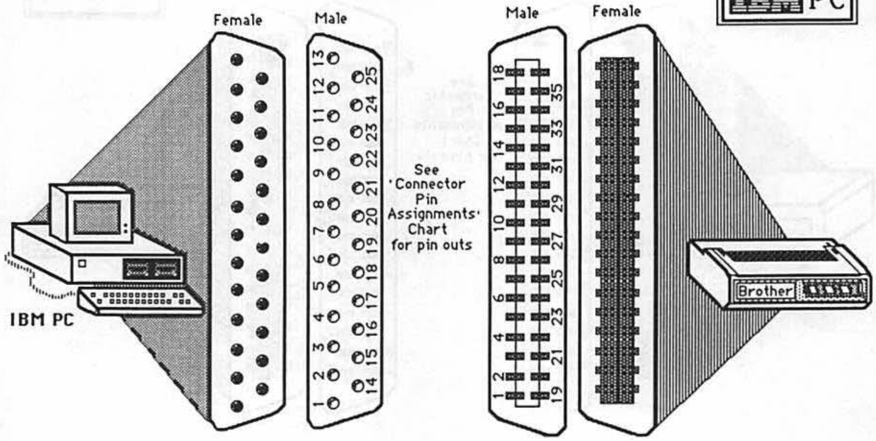



BROTHER
FRONT VIEW
brother
POWER
ALARM
12
15
1½
2
TOF
LF
SEL
COPY
10
PITCH
1
LINE
REAR VIEW
Power connector
Power Switch
36 Pin female Centronics parallel connector
Your printer may have a RS 232 female connection in the same area.


BROTHER
SMITH-CORONA
FRONT VIEW
SMITH-CORONA
POWER
ON LINE
LINE FEED
FORM FEED
REAR VIEW
Parallel
Serial
SW1
SW2
SW3
36 Pin female
25 Pin female
Switch #3
Switch #1
Switch #2
POWER

PARALLEL BROTHER TO IBM PC

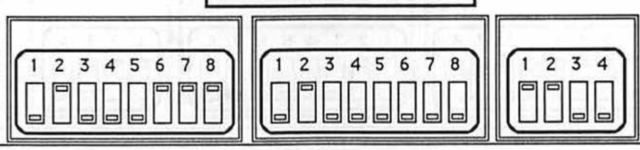
CABLE DIAGRAM



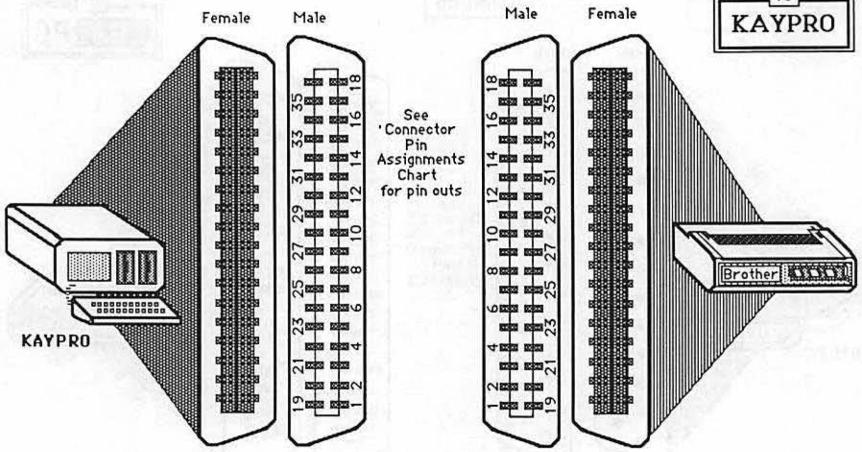
CONNECTOR PIN ASSIGNMENTS

IBM PC		BROTHER	IBM PC		BROTHER
1	DATA STROBE	1	13	+ SELECT	13
2	DATA 0	2	15	N/U	15
3	DATA 1	3	16	OV	16
4	DATA 2	4	17	CHASIS GND	17
5	DATA 3	5	19	GND 1	19
6	DATA 4	6	20	GND 2	20
7	DATA 5	7	21	GND 3	21
8	DATA 6	8	22	GND 4	22
9	DATA 7	9	23	GND 5	23
10	$\overline{\text{ACK}}$	10	24	GND 6	24
11	+ BUSY	11	25	GND 7	25
12	+ P.E. (PAPER OUT)	12			

BROTHER SWITCH SETTINGS



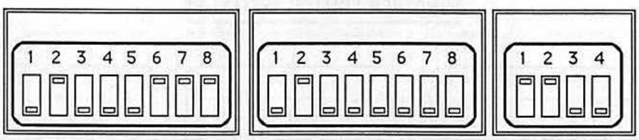
PARALLEL
BROTHER
TO
KAYPRO

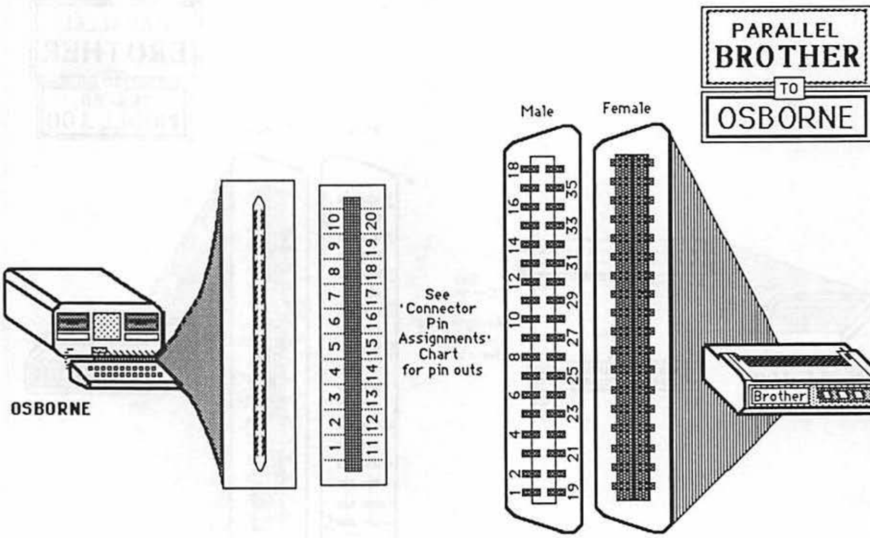


CONNECTOR PIN ASSIGNMENTS

KAYPRO		BROTHER
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

BROTHER SWITCH SETTINGS

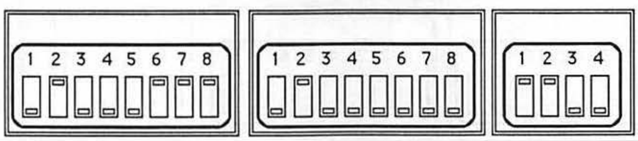




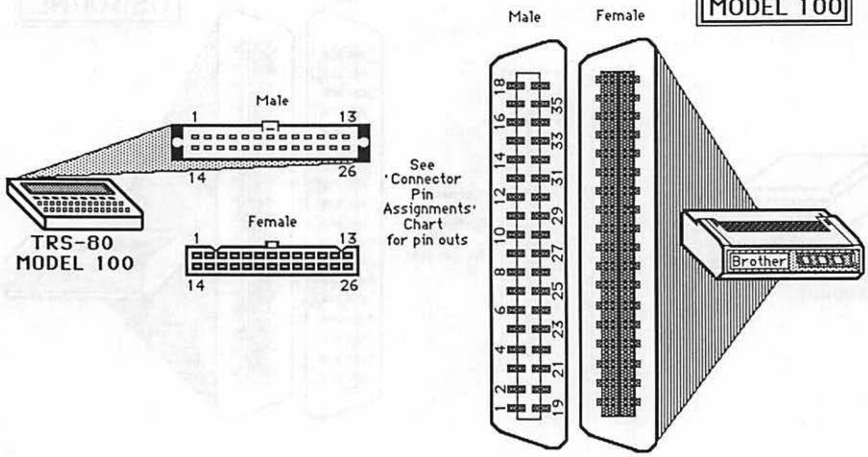
CONNECTOR PIN ASSIGNMENTS

OSBORNE		BROTHER
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5

BROTHER SWITCH SETTINGS



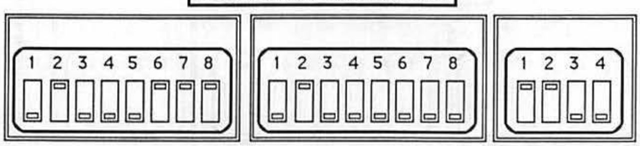
PARALLEL BROTHER TO TRS-80 MODEL 100



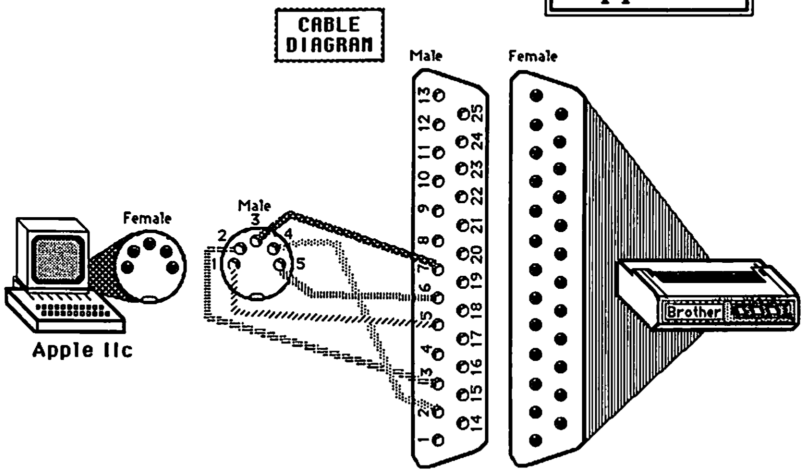
CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		BROTHER
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

BROTHER SWITCH SETTINGS



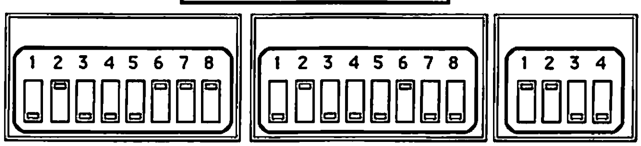
SERIAL BROTHER TO Apple IIc



CONNECTOR PIN ASSIGNMENTS

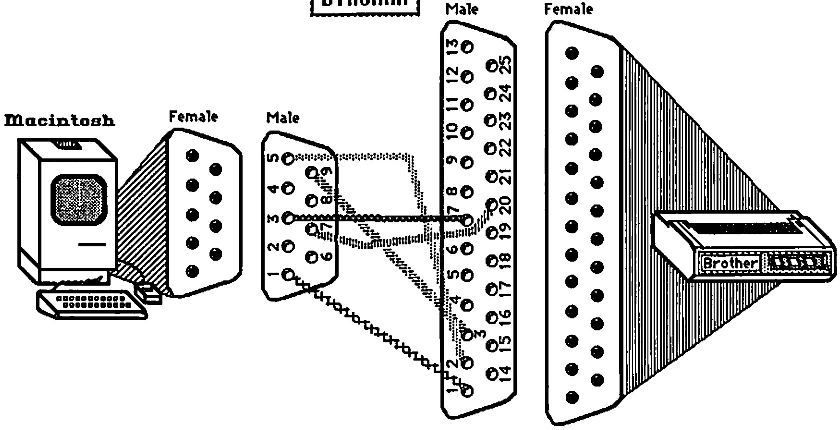
Apple IIc			BROTHER
2	TX DATA	RX DATA	3
4	RX DATA	TX DATA	2
1	CTS	RTS	5
5	DTR	DSR	6
3	SIG GND	SIG GND	7

BROTHER SWITCH SETTINGS



SERIAL BROTHER TO Macintosh

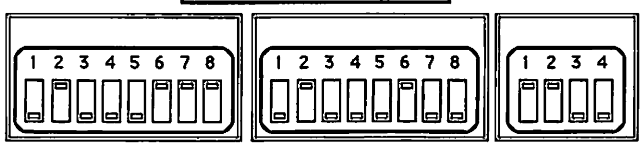
CABLE DIAGRAM



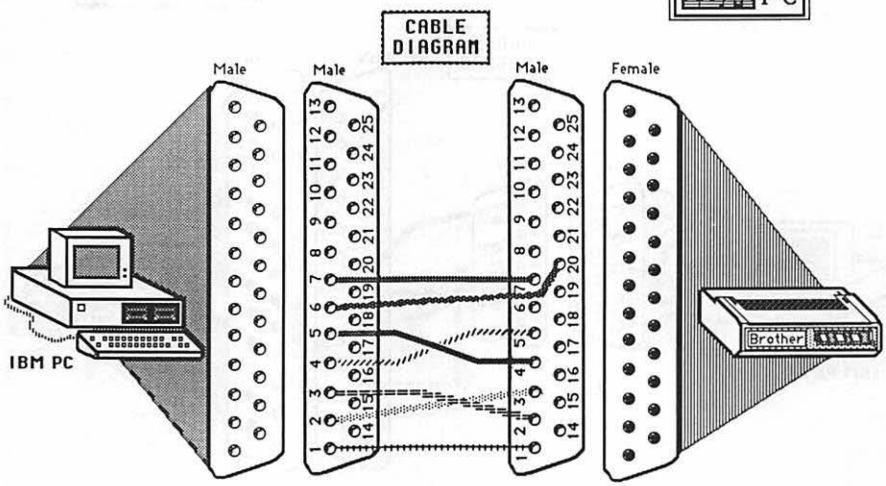
CONNECTOR PIN ASSIGNMENTS

Macintosh	Signal		BROTHER
1	PRO GND		1
9	TX DATA	RX DATA	3
5	RX DATA	TX DATA	2
7	DSR	DTR	20
3	SIG GND		7

BROTHER SWITCH SETTINGS



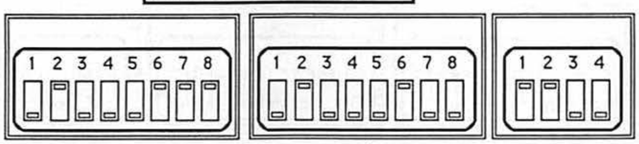
SERIAL
BROTHER
TO
IBM PC



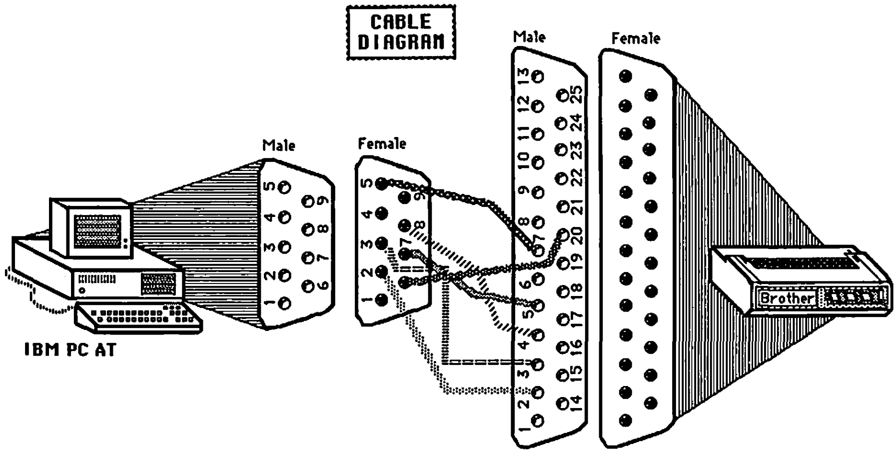
CONNECTOR PIN ASSIGNMENTS

IBM PC				BROTHER
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
4	RTS		CTS	5
5	CTS		RTS	4
6	DSR		DTR	20
7		SIG GND		7

BROTHER SWITCH SETTINGS



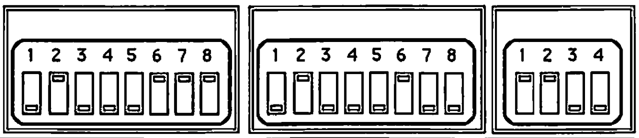
SERIAL
BROTHER
TO
IBM PC AT

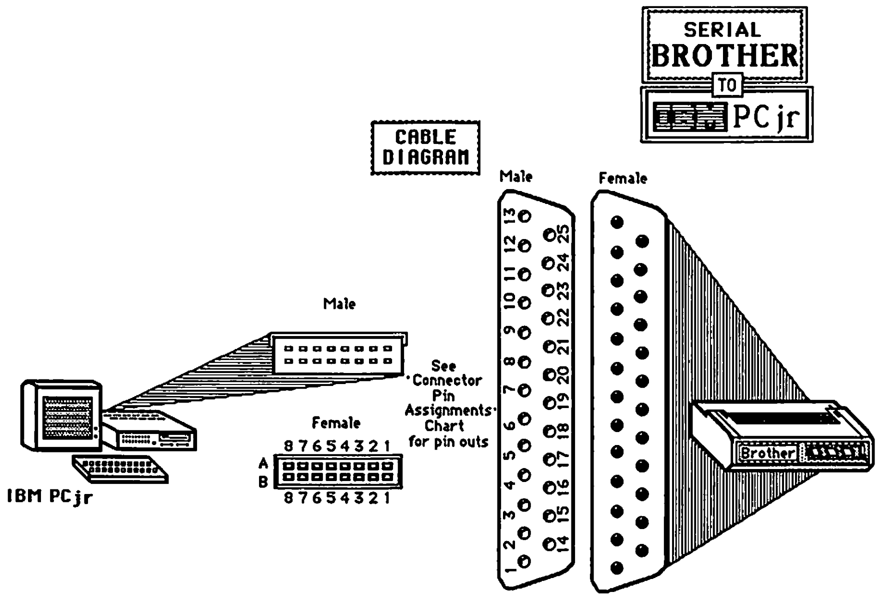


CONNECTOR PIN ASSIGNMENTS

IBM PC AT			BROTHER
2	RX DATA	TX DATA	2
3	TX DATA	RX DATA	3
5	SIG GND	SIG GND	7
6	DSR	DTR	20
7	RTS	CTS	5
8	CTS	RTS	4

BROTHER SWITCH SETTINGS

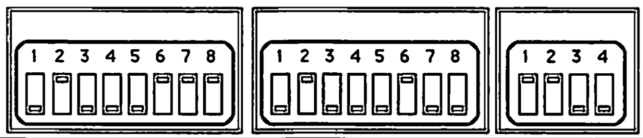




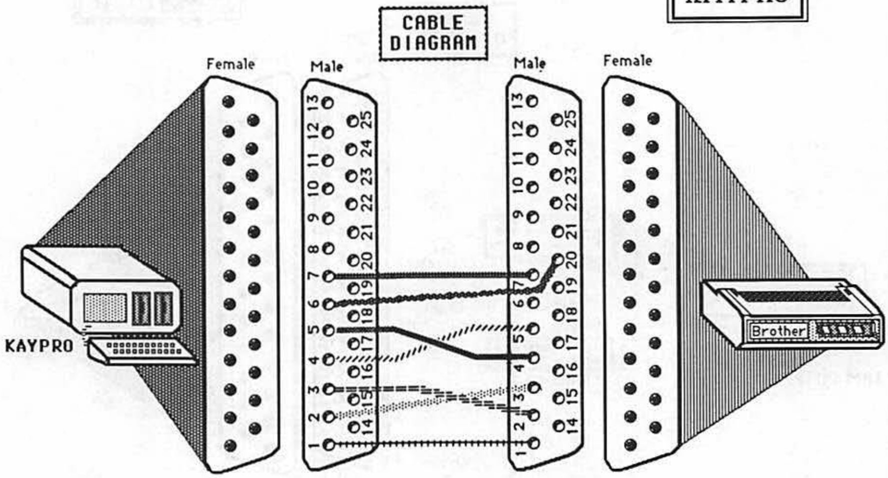
CONNECTOR PIN ASSIGNMENTS

IBM PCjr			BROTHER	
A3	CTS		RTS	4
A4	TX DATA		RX DATA	3
A6	DSR		DTR	20
A7	RTS		CTS	5
A8	RX DATA		TX DATA	2
B1		PRO GND		1
B2		SIG GND		7

BROTHER SWITCH SETTINGS



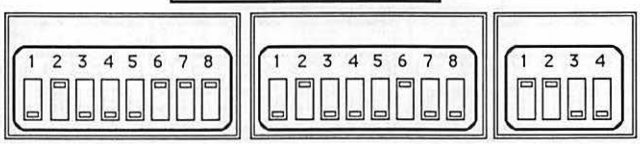
SERIAL
BROTHER
TO
KAYPRO



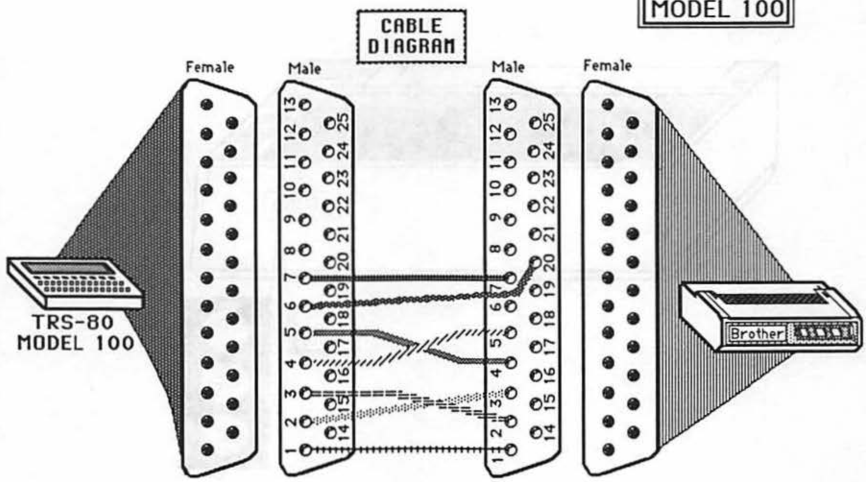
CONNECTOR PIN ASSIGNMENTS

KAYPRO				H.P. ThinkJet
1		PRO GND		1
2	TX DATA		RX DATA	3
3	RX DATA		TX DATA	2
4	RTS		CTS	5
5	CTS		RTS	4
6	DSR		DTR	20
7		SIG GND		7

BROTHER SWITCH SETTINGS



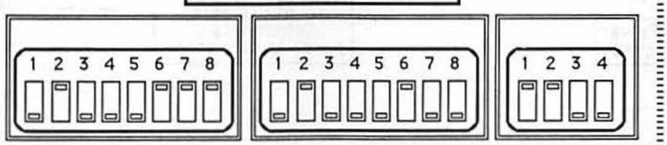
SERIAL BROTHER TO TRS-80 MODEL 100

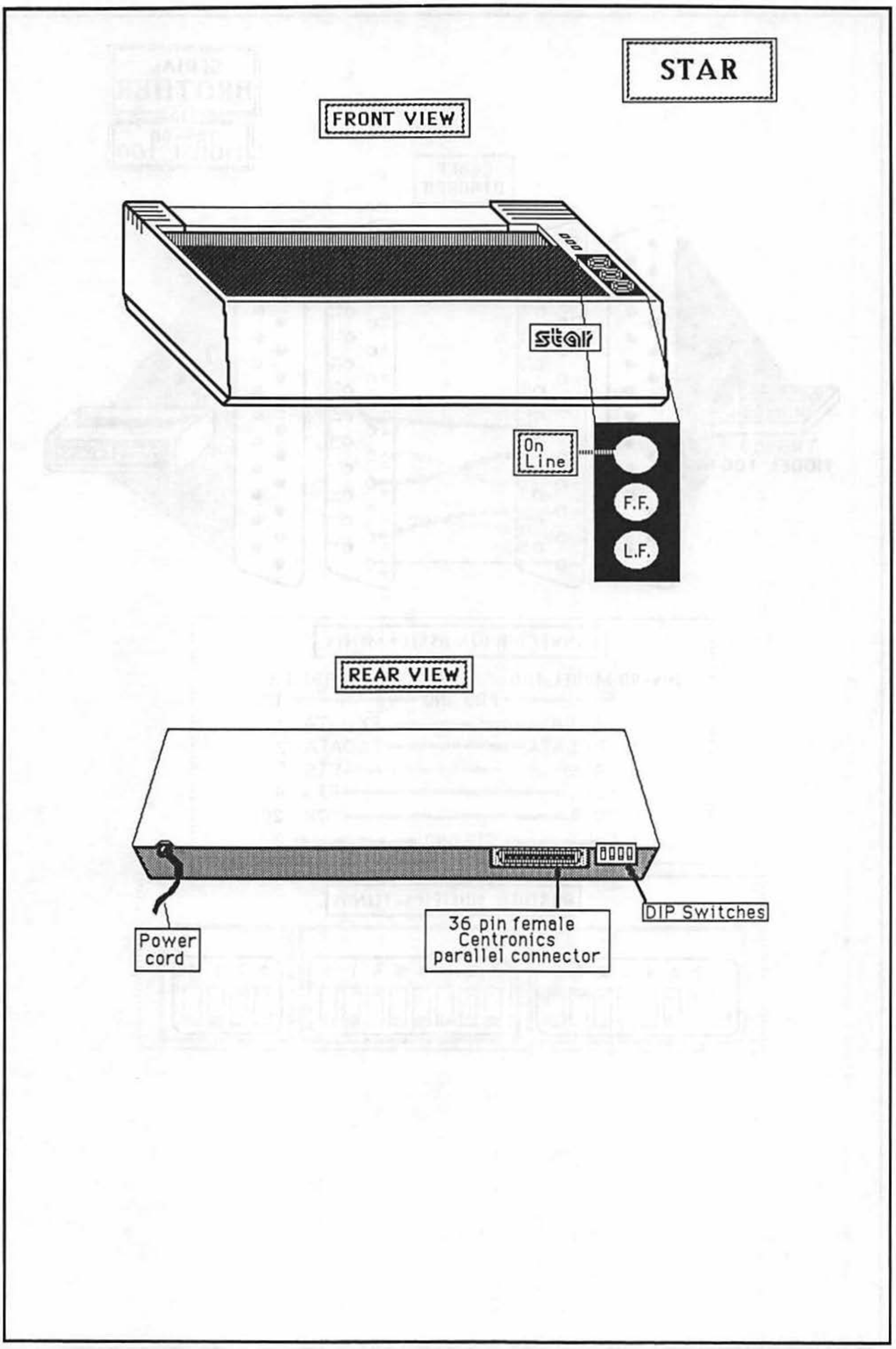


CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100			BROTHER
1		PRO GND	1
2	TX DATA	RX DATA	3
3	RX DATA	TX DATA	2
4	RTS	CTS	5
5	CTS	RTS	4
6	DSR	DTR	20
7		SIG GND	7

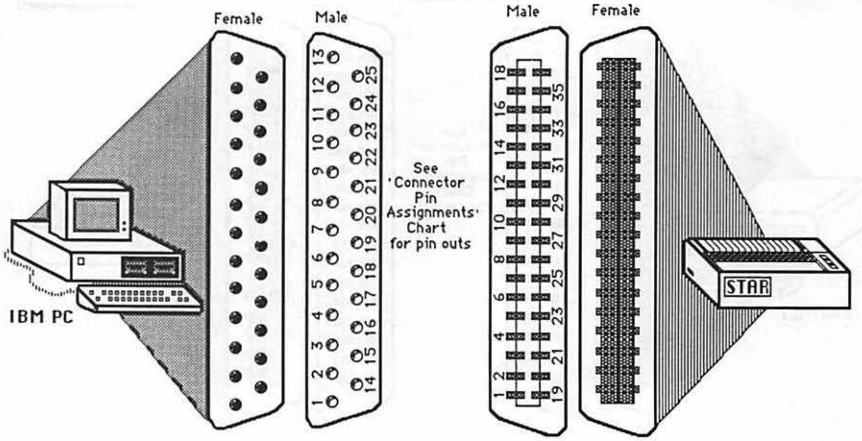
BROTHER SWITCH SETTINGS




STAR
FRONT VIEW
star
On Line
F.F.
L.F.
REAR VIEW
Power cord
36 pin female Centronics parallel connector
DIP Switches

PARALLEL STAR TO IBM PC

CABLE DIAGRAM

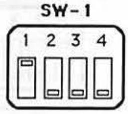


CONNECTOR PIN ASSIGNMENTS

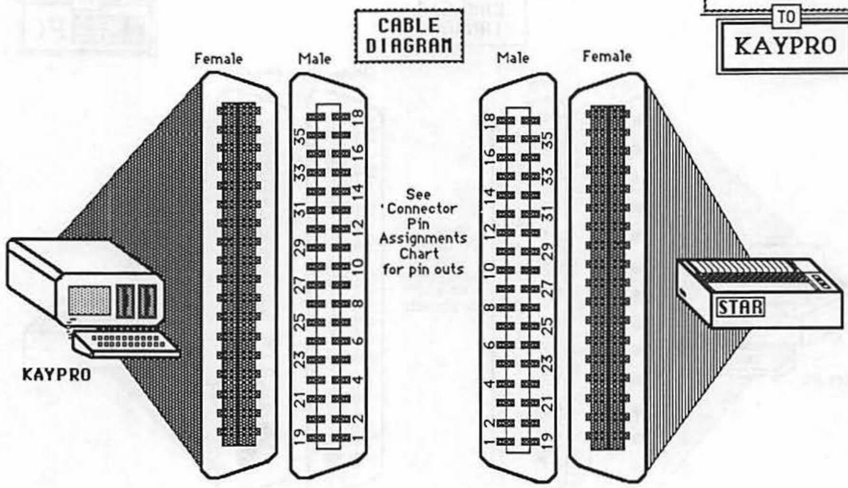
IBM PC		STAR
1	DATA STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	$\overline{\text{ACK}}$	10
11	+ BUSY	11
12	+ P.E. (PAPER OUT)	12
13	+ SELECT	13
14	- AUTO FEED	14
15	N/U	15
16	OV	16
17	CHASIS GND	17
18	GND 0	18
19	GND 1	19
20	GND 2	20
21	GND 3	21
22	GND 4	22
23	GND 5	23
24	GND 6	24
25	GND 7	25

STAR SWITCH SETTINGS

SW-1



PARALLEL STAR TO KAYPRO

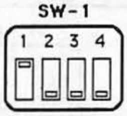


CONNECTOR PIN ASSIGNMENTS

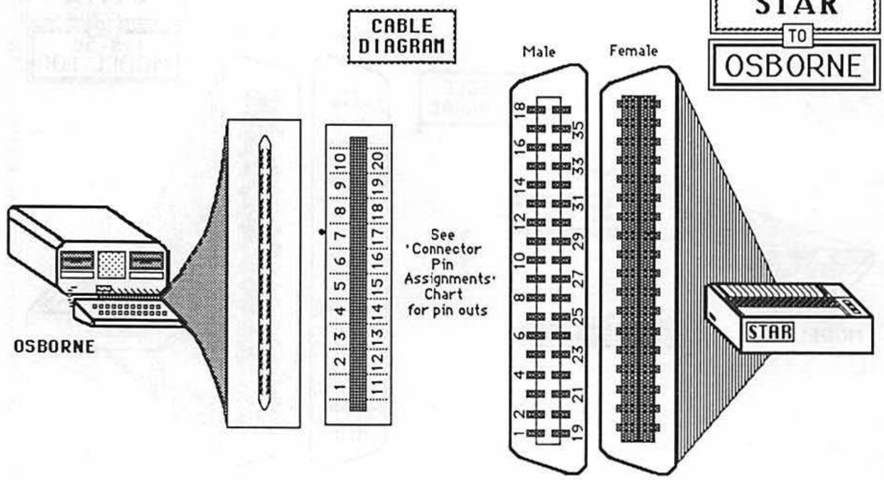
KAYPRO		STAR
1	STROBE	1
2	DATA 0	2
3	DATA 1	3
4	DATA 2	4
5	DATA 3	5
6	DATA 4	6
7	DATA 5	7
8	DATA 6	8
9	DATA 7	9
10	ACKNLG	10
11	BUSY	11
16-17	GROUND	16-17
19-30	GROUND	19-30
33	GROUND	33

STAR SWITCH SETTINGS

SW-1



PARALLEL STAR TO OSBORNE

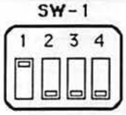


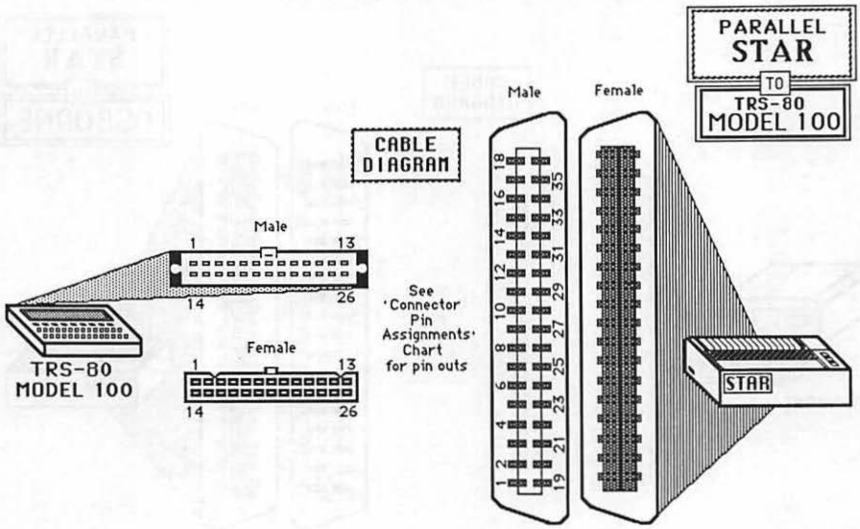
CONNECTOR PIN ASSIGNMENTS

OSBORNE		STAR
1	DATA 0	9
2	DATA 4	34
3	DATA 1	10
4	DATA 5	35
5	DATA 2	11
6	DATA 6	36
7	DATA 3	12
8	DATA 7	37
11	DATA STROBE	14
12	GROUND	26
15	BUSY	6
17	GROUND	27
19	SELECT	5

STAR SWITCH SETTINGS

SW-1

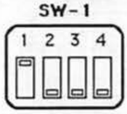




CONNECTOR PIN ASSIGNMENTS

TRS-80 MODEL 100		STAR
1	DATA STROBE	1
2	GROUND	19
3	DATA 0	2
4	GROUND	20
5	DATA 1	3
6	GROUND	21
7	DATA 2	4
8	GROUND	22
9	DATA 3	5
10	GROUND	23
11	DATA 4	6
12	GROUND	24
13	DATA 5	7
14	GROUND	25
15	DATA 6	8
16	GROUND	26
17	DATA 7	9
18	GROUND	27
21	BUSY	11
22	GROUND	28
24	GROUND	29
25	SELECT	13

STAR SWITCH SETTINGS



A

Notes on Computers and Printers

Apple Macintosh

When connecting any printer other than the Apple Imagewriter® to the Apple Macintosh, you may need a special software driver to print with your printer. (See the section on software drivers in Chapter 3.) These drivers are necessary with non-Apple products because of the many special fonts available on the Macintosh. Most printers aren't set up to handle these fonts without a special hardware or software interface. If for some reason a driver isn't available, you can still print Text Only files using MacWrite. Simply save the file that you want to print as a Text Only file using the Save As item under the File menu. Be sure to use a new name for the Text Only file; adding a ".txt" extension is a good idea. Then print the ".txt" file. None of the "highlighting" (boldfacing, underlining, and so on) or special characters (such as é, î, ü, etc.) will print, but you'll have hard copy of the text.

Epson X Series

The Epson X Series includes MX, FX, and RX models.

IBM PC Clones

These clones include Compaq's™ various models and Eagle's Spirit.® If you are trying to connect some other IBM "compatible," be sure to check the documentation for that computer's connectors to see that they really are the same.

IBM PC jr

The IBM PC jr® has a built-in serial connection. Unfortunately, due to size considerations, it is nonstandard. The dual 8-pin female connector may be difficult to purchase. An adaptor is available from IBM, or, if you can find the dual 8 connector, you can make your own adaptor. To make your own adaptor, simply follow the connector pin assignment chart for your printer. Instead of going directly to the connector on the back of your printer, use about six to eight inches of cable and use a female DB-25 pin connector. Then you can make another cable using only DB-25 pin connectors. This adaptor may allow you to use certain other serial devices, such as modems, without having to make more nonstandard cables with a dual 8 connector.

For parallel connections, an add-on "side" board from IBM is required. This board's connector has the same pinouts as the IBM PC parallel connector.

Qume

Qume printers have a module connector board that varies for several parallel boards that they supply. The module assumed in each of the Qume parallel connection diagrams is the board for connecting an IBM PC. If you have a different Qume parallel board, look closely at the pinout chart in the documentation for your particular board.

B

Glossary of Connector Terms

"+" or no line above—Active "high" signal.

"−" or line above—Active "low" signal.

ACK AND ACKNLG—Acknowledge that the signal has been received.

AUTO FEED—Automatic linefeed upon receipt of a carriage return.

BUSY—This line lets the computer know that the printer is busy and cannot handle any more data.

CHASSIS GND—Wire to ground connection to chassis (constant).

CTS—Clear to send.

DATA—Data line.

DATA STROBE—Signal that initiates the reading of the data lines by the printer in a parallel connection.

DCD—Data carrier detect.

DSR—Data set ready.

DTR—Data terminal ready.

ERROR—This line indicates that a printer or communication error has occurred.

GROUND—Ground line for data lines.

INIT—This line indicates that the printer should go through an initialization (power on/reset) sequence.

N/U—Line not in use.

OV—The line is set to zero volts to provide a reference point for signal strength.

P.E.—This line indicates that the printer is out of paper (often referred to as paper out).

PRO GND—Line that provides protective (constant) ground (similar to chassis ground).

RTS—Request to send.

RX DATA—Receive data line.

SELECT—Hardware line that selects or deselects the printer (similar to an on/off line).

SELECT INP—Line that's used to select input (used infrequently).

SIG GND—Signal ground (relative ground).

STROBE GND—Line to ground (relative) the strobe line.

TX DATA—Transmit data.

C

List of Suppliers and Vendors

The following companies are mail order suppliers for connectors, cables, and interfacing tools and equipment:

Black Box Corporation
Box 12800
Pittsburgh, PA 15241

Global Computer Supplies
9133 Hemlock Drive
Hempstead, NY 11550

Inmac
2465 Augustine Drive
Santa Clara, CA 95051

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002

JDR Microdevices
1224 S. Bascom Ave.
San Jose, CA 95128

Misco
One Misco Plaza
Holmdel, NJ 07733

Products Inc.
P. O. Box 17329
Irvine, CA 92713

The following companies supply ready-made cables in standard lengths:

Black Box Corporation
Box 12800
Pittsburgh, PA 15241

Cablelink Inc.
311 Childers St.
Kings Mountain, NC 28086

Global Computer Supplies
9133 Hemlock Drive
Hempstead, NY 11550

In-House Systems
1326 Lakeview Drive
Tomah, WI 54660

Inmac
2465 Augustine Drive
Santa Clara, CA 95051

Misco
One Misco Plaza
Holmdel, NJ 07733

Products Inc.
P. O. Box 17329
Irvine, CA 92713

D

The ASCII Code

Decimal (ASCII)	Character	Binary	Decimal (ASCII)	Character	Binary
0	NUL	00000000	23	ETB	00010111
1	SOH	00000001	24	CAN	00011000
2	STX	00000010	25	EM	00011001
3	ETX	00000011	26	SUB	00011010
4	EOT	00000100	27	ESC	00011011
5	ENQ	00000101	28	FS	00011100
6	ACK	00000110	29	GS	00011101
7	BEL	00000111	30	RS	00011110
8	BS	00001000	31	VS	00011111
9	HT	00001001	32	(space)	00100000
10	LF	00001010	33	!	00100001
11	VT	00001011	34	"	00100010
12	FF	00001100	35	#	00100011
13	CR	00001101	36	$	00100100
14	SO	00001110	37	%	00100101
15	SI	00001111	38	&	00100110
16	DLE	00010000	39	'	00100111
17	DC1	00010001	40	(	00101000
18	DC2	00010010	41	)	00101001
19	DC3	00010011	42	*	00101010
20	DC4	00010100	43	+	00101011
21	NAK	00010101	44	,	00101100
22	SYN	00010110	45	-	00101101

Decimal (ASCII)	Character	Binary	Decimal (ASCII)	Character	Binary
45	–	00101101	87	W	01010111
46	.	00101110	88	X	01011000
47	/	00101111	89	Y	01011001
48	0	00110000	90	Z	01011010
49	1	00110001	91	[	01011011
50	2	00110010	92	\	01011100
51	3	00110011	93	]	01011101
52	4	00110100	94	Λ	01011110
53	5	00110101	95	←	01011111
54	6	00110110	96	‘	01100000
55	7	00110111	97	a	01100001
56	8	00111000	98	b	01100010
57	9	00111001	99	c	01100011
58	:	00111010	100	d	01100100
59	;	00111011	101	e	01100101
60	<	00111100	102	f	01100110
61	=	00111101	103	g	01100111
62	>	00111110	104	h	01101000
63	?	00111111	105	i	01101001
64	@	01000000	106	j	01101010
65	A	01000001	107	k	01101011
66	B	01000010	108	l	01101100
67	C	01000011	109	m	01101101
68	D	01000100	110	n	01101110
69	E	01000101	111	o	01101111
70	F	01000110	112	p	01110000
71	G	01000111	113	q	01110001
72	H	01001000	114	r	01110010
73	I	01001001	115	s	01110011
74	J	01001010	116	t	01110100
75	K	01001011	117	u	01110101
76	L	01001100	118	v	01110110
77	M	01001101	119	w	01110111
78	N	01001110	120	x	01111000
79	O	01001111	121	y	01111001
80	P	01010000	122	z	01111010
81	Q	01010001	123	{	01111011
82	R	01010010	124	¦	01111100
83	S	01010011	125	}	01111101
84	T	01010100	126	~	01111110
85	U	01010101	127	DEL	01111111
86	V	01010110			

Index

MORE FROM SAMS

☐ Mastering Serial Communications
This intermediate/advanced book is written for technicians and programmers interested in asynchronous serial communications. Part One explains the history and technical details of asynchronous communications, while Part Two addresses the specifics of the technical programmer with an emphasis on popular UARTS and pseudo-assembly language. Contents: Introduction, ASCII, The Serial World View, The UART, The Serial Interface, Modems, Applications Software, Serial Communications Programming. Joe Campbell.
ISBN 0-672-22450-X $21.95

☐ Personal Computer Troubleshooting and Repair Guides
If you have some knowledge of electronics, these easy-to-understand repair and maintenance guides provide the instructions you need to repair your Apple® II+/IIe, IBM® PC, or Commodore 64™ computer. Contains schematic diagrams, block diagrams, photographs and troubleshooting flowcharts to trace the probable cause of failure. A final chapter on advanced troubleshooting shows you how to perform more complicated repairs.
APPLE II+/IIe
ISBN 0-672-22353-8 .... $19.95
IBM PC
ISBN 0-672-22358-9 .... $19.95
COMMODORE 64
ISBN 0-672-22363-5 .... $19.95

☐ 68000, 68010, 68020 Primer
The newest 68000 family of chips, found in Apple's Lisa® and Macintosh™ and IBM's 3270 PC, is covered in this timely and up-to-date primer. This user-friendly guide gives you a complete understanding of Motorola's powerful microprocessor chip and features actual programming examples, such as file locking and data handling techniques. For the beginner as well as the more experienced programmer.
Kelly-Bootle and Fowler.
ISBN 0-672-22405-4 .... $21.95

☐ Modem Connections Bible
Put what where? This comprehensive volume describes modems and how they work. Detailed diagrams explain how to hook up major brands of microcomputers. Find out what happens with the RS-232C interface. A must for microcomputer users and technicians. Curtis and Majhor.
ISBN 0-672-22446-X $16.95

☐ Crash Course in Artificial Intelligence
A detailed self-study course in Artificial Intelligence. Discusses AI principles and methods, and provides introductory applications of AI through sample programs in Prolog and Lisp. An excellent book for programmers, students, and engineers who need a thorough understanding of AI. Louis Frenzel.
ISBN 0-672-22443-7 .... $21.95

☐ C Primer Plus
Who better to explain the intricacies of C and UNIX than the master of systems? It's Waite at his best. Provides a clear and complete introduction to the C programming language and guides you in the proper use of C programming methodology. Interfacing C with assembly language is included, as well as many sample programs usable with any standard C compiler. Build a sound working knowledge of the language with *C Primer Plus*. Waite, Prata, and Martin.
ISBN 0-672-22090-3 .... $22.95

☐ CP/M® Bible: The Authoritative Reference Guide to CP/M
Already a classic, this highly detailed reference manual puts CP/M's commands and syntax at your fingertips. Instant one-stop access to all CP/M keywords, commands, utilities, and conventions are found in this easy-to-use format. If you use CP/M, you need this book. Waite and Angermeyer.
ISBN 0-672-22015-6 .... $19.95

☐ CP/M Primer (2nd Edition)
This tutorial companion to the *CP/M Bible* is highly acclaimed and widely used by novices and advanced programmers alike. Includes the details of CP/M terminology, operation, capabilities, internal structure, plus a convenient tear-out reference card with CP/M commands. This revised edition allows you to begin using new or old CP/M versions immediately in any application. Waite and Murtha.
ISBN 0-672-22170-5 .... $16.95

☐ Soul of CP/M: How to Use the Hidden Power of Your CP/M System
Recommended for those who have read the *CP/M Primer* or who are otherwise familiar with CP/M's outer layer utilities. This companion volume teaches you how to use and modify CP/M's internal features, including how to modify BIOS and use CP/M system calls in your own programs. Waite and Lafore.
ISBN 0-672-22030-X $19.95

HOWARD W. SAMS & COMPANY

The Waite Group

Tricks of the MS-DOS® Masters
Angermeyer, Jaeger, Fahringer, and Shafer, The Waite Group

This reference provides the personal user with advanced tips and tricks about the operating system, including advanced tips on using popular software packages such as dBASE III®, Lotus 1-2-3®, and WordStar®.
ISBN: 0-672-22525-5, $24.95

Soul of CP/M®: How to Use the Hidden Power of Your CP/M System
Waite and Lafore, The Waite Group

Recommended for those who have read the *CP/M Primer* or who are otherwise familiar with CP/M's outer layer utilities. It teaches how to use and modify CP/M's internal features, including how to modify BIOS and use CP/M system calls in your own programs.
ISBN: 0-672-22030-X, $19.95

CP/M® Bible: The Authoritative Reference Guide to CP/M
Waite and Angermeyer, The Waite Group

Already a classic, this highly detailed manual puts CP/M's commands and syntax at your fingertips. Instant one-stop access to all CP/M keywords, commands, utilities, and conventions are found in this easy-to-use format.
ISBN: 0-672-22015-6, $19.95

CP/M® Primer, Second Edition
Waite and Murtha, The Waite Group

This companion to the CP/M *Bible* is widely used by novices and advanced programmers. It includes the details of CP/M terminology, operation, capabilities, and internal structure, plus a convenient tear-out reference card with CP/M commands.
ISBN: 0-672-22170-5, $16.95

Desktop Publishing Bible
The Waite Group

A collection of essays by experts in their subject areas, these are the nuts and bolts of desktop publishing. Concentrating primarily on the technical aspects of the hardware and software, this book will be useful to anyone planning to buy a personal publishing system.
ISBN: 0-672-22524-7, $22.95

PC LAN Primer
Kleeman, Anderson, Angermeyer, Fisher, McCoy, The Waite Group

PC LAN Primer explores the Token Ring — IBM's grand strategy to tie together IBM micros, minis, and mainframes with Local Area Networks providing the communication feature.
ISBN: 0-672-22448-8, $22.95

68000, 68010, 68020 Primer
Kelly-Bootle and Fowler, The Waite Group

Beginning with an introduction to the 68000 chips, this book is written to introduce novice or experienced programmers to the instruction set and addressing modes common to the 68000 family.
ISBN: 0-672-22405-4, $21.95

Pascal Primer
Waite and Fox, The Waite Group

This primer will swiftly guide you through Pascal program structure, procedures, variables, decision-making statements, and numeric functions.
ISBN: 0-672-21793-7, $17.95

Printer Connections Bible
Marble and House, The Waite Group

This book contains all the information necessary to make the proper connections to get a printer printing. It focuses on the hardware side of connecting, particularly the main interface — the cable itself.
ISBN: 0-672-22406-2, $16.95

Modem Connections Bible
Curtis and Majhor, The Waite Group

This book describes modems, how they work, and how to hook ten well-known modems to nine name-brand microcomputers. It also features a "Jump Table" and an overview of communications software, the RS-232c interface, and a section on troubleshooting.
ISBN: 0-672-22446-1, $16.95

Inside the Amiga™ With C
John T. Berry, The Waite Group

This book is written for the experienced computer user who wants to put the powerful programming features of the Amiga to work using the C language.
ISBN: 0-672-22468-2, $22.95

Artificial Intelligence Programming on the Macintosh™
Dan Shafer, The Waite Group

Those with a basic understanding of computers and programming will be fascinated by the possibilities of music generation, robotics, and problem-solving available on microcomputers, and this book will show you how.
ISBN: 0-672-22447-X, $24.95

BASIC Programming Primer, Second Edition
Waite and Pardee, The Waite Group

A cornerstone of the Sams/Waite Primer series, this classic text contains a complete explanation of the fundamentals of the language, program control, and organization.
ISBN: 0-672-22014-8, $17.95

The Official Book for the Commodore 128® Personal Computer
Waite, Lafore, and Volpe, The Waite Group

This book examines Commodore's powerful computer with its three different operating modes, details how to create graphics and animation, and how to use the 64 mode to run thousands of existing Commodore 64 programs.
ISBN: 0-672-22456-9, $12.95

These and other Sams books are available from your local bookstore, computer store, or electronics distributor. If there are books you are interested in that are unavailable in your area, order directly from Sams by calling toll-free 800-428-SAMS (in Alaska, Hawaii, or Indiana, call 317-298-5699).

PLACE
STAMP
HERE

Howard W. Sams & Company
Department DM
P.O. Box 7092
Indianapolis, IN 46206

SAMS

The Waite Group

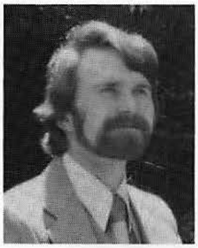
Printer Connections Bible

Have you ever had to connect brand X printer to brand Y microcomputer? With more than 500 different printers on the market, at least two dozen widely used personal computers, up to 36 wires in any given connection, and obscure technical manuals, making printer-computer connections is often a frustrating task.

This book is the first to bring order to the chaos of printer-computer connections. In it, you will find the information you need to make a wide variety of successful connections, including:

- Extensive diagrams specifying exact wiring, DIP switches, and external printer details
- An easy-to-read Jump Table for quick reference to various printer-computer combinations
- Clear instructions on how to make your own cables
- Reviews of data communications and the various types of printers and how they function

Printer Connections Bible's graphic presentation will save time and money for *anyone* who needs to connect printers to microcomputers.



Jeff Marble is a programmer in the Product Development Division of MicroPro International Corporation, a software company based in San Rafael, California. He has installed more than 100 system configurations for microcomputers and printers and currently researches the latest printer technology for MicroPro software.

Kim G. House is an active member of The Waite Group. He has worked with microcomputers for over five years as a programmer, financial consultant, editor, author, and instructor.

Howard W. Sams & Co.
A Division of Macmillan, Inc.
4300 West 62nd Street, Indianapolis, IN 46268 USA

0 81262 22406 9

$16.95/22406

ISBN: 0-672-22406-2