

PERSONAL COMPUTER

*Dx Help 9-5  
trouble sheet  
service*

*201-512-0055*

**SERVICE CENTER ADDRESS**

**SHARP ELECTRONICS CORPORATION**

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Mahwah, New Jersey 07430-2135  
Phone: (201) 529-9263

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*Parts*

*201-512-0055 4:4 pm*

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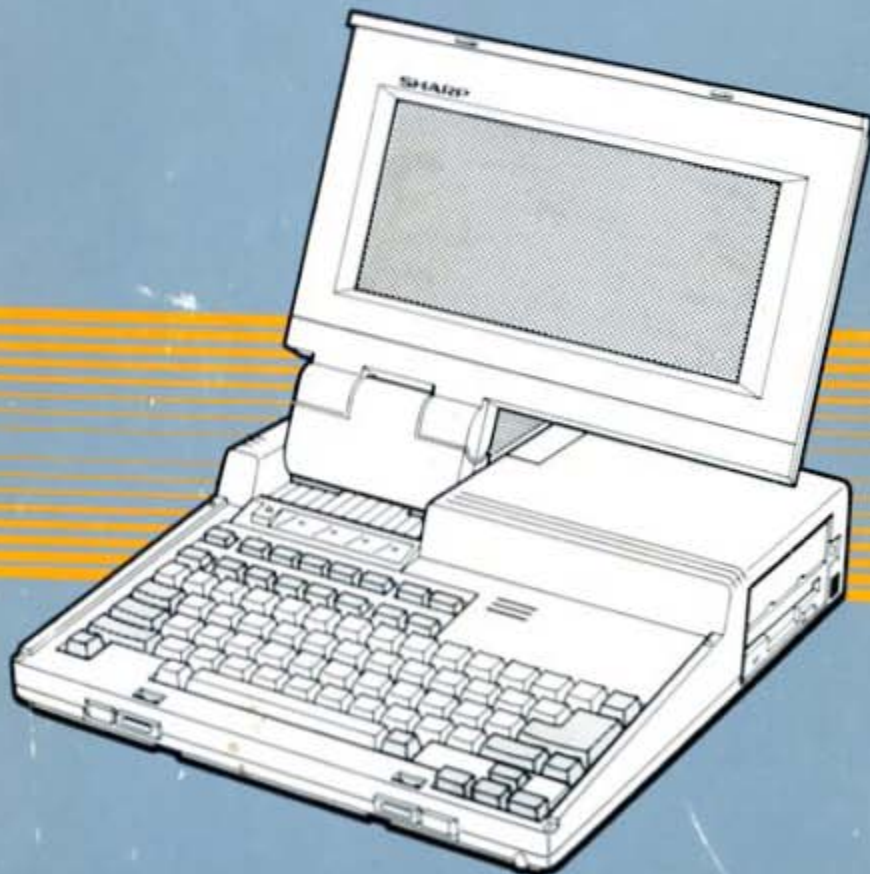
Phone: (213) 637-9488

**SHARP**

**PERSONAL COMPUTER**

**PC-4501**

**OPERATION MANUAL**



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SHARP

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# OPERATION MANUAL

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## WARNING

THIS EQUIPMENT HAS BEEN CERTIFIED TO COMPLY WITH THE LIMITS FOR A CLASS B COMPUTING DEVICE, PURSUANT TO SUBPART J OF PART 15 OF FCC RULES. ONLY PERIPHERALS (COMPUTER INPUT/OUTPUT DEVICES, TERMINALS, PRINTERS, ETC.) CERTIFIED TO COMPLY WITH THE CLASS B LIMITS MAY BE ATTACHED TO THIS COMPUTER. OPERATION WITH NON-CERTIFIED PERIPHERALS IS LIKELY TO RESULT IN INTERFERENCE TO RADIO AND TV RECEPTION.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ▲ Reorient the receiving antenna.
- ▲ Relocate the computer with respect to the receiver.
- ▲ Move the computer away from the receiver.
- ▲ Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from:

U.S. Government Printing Office  
Washington, D.C.  
Stock No. 004-000-00345-4  
BILLING CODE 6712-01-M

A shielded I/F cable is required to insure compliance with FCC regulation for Class B computing equipment.

# SHARP®

## SHARP ELECTRONICS CORPORATION

Sharp Plaza - P.O. Box 650 Mahwah, N.J. 07430  
Corporate Number (201) 529-8200 - Telex 134-327

Writer's Telephone Number (201) 529-8200

Dear New Customer:

Welcome to the exciting world of Personal Computing. You certainly made a wise decision when you selected Sharp's PC-4500. All the service information you need is contained in the Operation Manual.

Now I would like to take the opportunity to let you know about a great new idea to protect your investment against the high price of service.

It's called **EXTRA** - **EX**tended **T**ime **R**epair **A**greement.

These plans provide that:

**PLAN 1:** Upon receipt of the defective Equipment at a Sharp Repair Depot, Sharp will repair or exchange the Equipment or any option covered by **EXTRA** on a priority basis and return the Equipment via next day courier service.

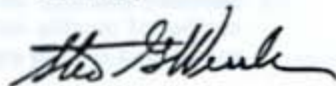
**PLAN 2:** Upon receipt of the defective Equipment at a Sharp Repair Depot, Sharp will repair or exchange the Equipment or any option covered by **EXTRA** on a priority basis and return the Equipment via regular shipping service.

**PLAN 3:** Upon receipt of the defective equipment at a Sharp Repair Depot, Sharp will repair the Equipment or any option covered by **EXTRA** and return the Equipment via regular shipping service.

The plans cover parts and labor for one full year. They offer you direct access for a full range of post-sale support from our Technical Action Center (TAC) as well as a fixed, known charge for service of your equipment and assurance of quality service performed by Sharp Electronics Corporation technicians.

Sharp is committed to supporting this fine product with high quality service. We urge you to take this opportunity to protect your wise investment. Acceptance of this agreement is automatic if you complete and return the enclosed **EXTRA** agreement during the standard warranty period.

Sincerely,



Steve G. Wessler,  
National Service Manager  
Office Automation Systems

**PC-4501  
EXTRA PRICE SHEET**

MODEL	PLAN 1		PLAN 2		PLAN 3	
	ANNUAL	SEE NOTE*	ANNUAL	SEE NOTE*	ANNUAL	SEE NOTE*
PC-4501	\$102.00	\$8.50	\$90.00	\$7.50	\$78.00	\$6.50
CE-451M MODEM CARD	\$30.00	\$2.50	\$24.00	\$2.00	\$18.00	\$1.50
CE-451B SIO CARD	\$9.00	\$0.75	\$6.00	\$0.50	\$3.00	\$0.25
CE-451R 128KB RAM CARD	FREE	FREE	FREE	FREE	FREE	FREE
CE-451A CRT ADAPTOR	\$21.00	\$1.75	\$18.00	\$1.50	\$15.00	\$1.25
CE-452F 5.25" OPTION FDD	\$42.00	\$3.50	\$36.00	\$3.00	\$30.00	\$2.50
CE-451F 3.5" OPTION FDD	\$18.00	\$1.50	\$15.00	\$1.25	\$12.00	\$1.00
CE-453B EMS CARD	\$48.00	\$4.00	\$42.00	\$3.50	\$36.00	\$3.00

Make check or money order payable to SHARP ELECTRONICS CORPORATION and attach proof of purchase to contract form. A self addressed, stamped envelope has been provided in this packet. A copy of the contract will be returned to you for your records. If the unit has been purchased in the name of a business, be sure to indicate such on the contract.

If you select Plan 3 only at the time of equipment purchase, Sharp will make such contract effective the first day following the 1 year limited warranty. Proof of purchase required.

**NOTE\*** If you are adding one of the options to your PC-4501 and you already have a contract and wish both the main contract and the add-on to expire at the same time, please use the pro-rated monthly contract price shown multiplied by the number of months until the main contract expires. Be sure to include a copy of your original EXTRA Contract.

**SHARP ELECTRONICS CORPORATION  
EXTENDED TIME REPAIR SERVICE AGREEMENT**

**THIS SERVICE AGREEMENT PROVIDES YOU WITH:**

- \* Service as near as your phone via Sharp's Technical Action Center (TAC) during our normal business hours.
- \* Service performed by Sharp's own Trained Technicians (see the reverse side).
- \* Parts replaced without charge on an exchange basis (see the reverse side for exceptions).
- \* Multi-option Plans to fit your needs (see the reverse side for details).

**PLAN #1 -**

Upon receipt of the defective Equipment at a Sharp Repair Depot, Sharp will repair or exchange the Equipment or any option covered by EXTRA on a priority basis and return the Equipment via next day courier service.

**PLAN #2 -**

Upon receipt of the defective Equipment at a Sharp Repair Depot, Sharp will repair or exchange the Equipment or any option covered by EXTRA on a priority basis and return the Equipment via regular shipping service.

**PLAN #3 -**

Upon receipt of the defective Equipment at a Sharp Repair Depot, Sharp will repair the Equipment or any option covered by EXTRA and return the Equipment via regular shipping service.

Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_  
 \_\_\_\_\_ / \_\_\_\_\_  
 \_\_\_\_\_ / \_\_\_\_\_  
 \_\_\_\_\_ / \_\_\_\_\_  
 \_\_\_\_\_ / \_\_\_\_\_

I have selected EXTRA Plan # \_\_\_\_\_. Enclosed is my check for \$ \_\_\_\_\_

Contract Number \_\_\_\_\_

**CUSTOMER INFORMATION**

Full legal name of customer (DBA, if any) \_\_\_\_\_  
 Corporate/Principal Address \_\_\_\_\_  
 Street & Number \_\_\_\_\_

Selling Dealer \_\_\_\_\_  
 Sharp Account No. \_\_\_\_\_

**CUSTOMER**

By: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Date: \_\_\_\_\_

**SHARP ELECTRONICS CORPORATION**

By: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Date: \_\_\_\_\_

**THE TERMS & CONDITIONS ON THE REVERSE ARE PART OF THIS AGREEMENT**

**1. MAINTENANCE SERVICES**

During the term hereof Sharp will repair, in accordance with the service plan indicated on the face hereof and the other terms and conditions of this Agreement, the Equipment or any part of the Equipment (other than accessories, attachments or other devices not furnished by Sharp) which becomes unserviceable due to normal usage (other than consumable supplies, batteries and disk media). Equipment and parts will be furnished on a repair basis and will at Sharp's option be remanufactured or used; Equipment and all parts removed due to repairs will become the property of Sharp. Maintenance services provided by Sharp under this Agreement do not include the following:

- a. repairs resulting from misuse (including without limitation improper voltage or the use of accessories or supplies that do not conform to the manufacturer's specifications) or from damage (including without limitation transportation damage due to improper packing)
- b. such repairs as may be necessary to bring the Equipment within specifications at the beginning of this Agreement if this Agreement does not begin during or immediately after the period of Sharp's limited warranty with respect to the Equipment.
- c. repairs made necessary by service performed by persons other than Sharp.
- d. reconditioning, rebuilding, overhaul or modification of the Equipment.
- e. provision or replacement of consumable items such as floppy disks.

Maintenance services as described above will be provided Monday through Friday except holidays during Sharp's normal business hours. In the case of plans which provide for the priority repair or exchange of Equipment, such priority repair or exchange will be made during normal business hours at Sharp's service locations and returned to the Customer's location indicated on the face hereof; other maintenance will be provided at Sharp service locations designated from time to time.

**2. CHARGES**

The charges hereunder as set forth in Sharp's EXTRA price list will be payable by the Customer in advance in respect of the term of this Agreement; in the event of termination such charges will be prorated and the unearned portion thereof will be refunded to Customer. Repairs not included in maintenance services as described above will be at Sharp's prevailing rates for parts and labor and will be payable upon invoice. In the event Customer fails to pay any amount due hereunder Sharp may offset the unearned portion of maintenance charges hereunder. Taxes (other than taxes measured by income) with respect to this Agreement and the services performed hereunder will be the responsibility of Customer.

**3. TERM AND TERMINATION**

This Agreement, which replaces the unexpired period, if any, of Sharp's limited warranty with respect to the Equipment, becomes effective as of the date it is signed by Sharp and continues in effect for each unit of Equipment for a period of one year. At such expiration this Agreement will renew automatically, at the prevailing rates for maintenance charges at the time of such renewal, unless terminated by Customer in writing. This Agreement may be terminated by either Customer or Sharp at any time upon 30 days written notice to the other.

#### 4. CUSTOMER OBLIGATION

Customer agrees to perform normal operator functions as described in the Operator's Manual for the Equipment. Supplies for use with the Equipment will meet the manufacturer's specifications. Customer represents to Sharp that any Equipment shipped to Sharp for repair or exchange is owned free and clear of any agreements, claims or encumbrances and has not been subjected to misuse or damage. Customer will indemnify Sharp against any claim asserted by a third party with respect to Customer's Equipment and will be responsible for the cost of repairing, at Sharp's prevailing rates, misused or damaged exchange Equipment.

#### 5. LIMITATIONS

There are no warranties, including the implied warranties of merchantability and fitness for a particular purpose, not specified herein respecting the parts and maintenance services provided under this Agreement. Sharp shall not be liable for non-performance caused by circumstances beyond its control including but not limited to, work stoppages, fire, civil disobedience, riots and act of God. In no event will Sharp be liable for any indirect, special or consequential damages arising out of this Agreement or services provided under this Agreement. Customer's exclusive remedy and Sharp's entire liability in contract, tort or otherwise, is the repair or exchange of Equipment or parts thereof which Sharp determines are defective.

#### 6. GENERAL

This Agreement is not assignable by Customer. Any attempt to assign or transfer any of the rights, duties or obligations hereof is void.

The headings and titles of this Agreement are inserted only for convenience and shall not affect the interpretation or construction of any provisions.

Any failure by either party to require conformity to all provisions hereof shall not be deemed a waiver of future conformity to such provisions.

This Agreement shall be governed by, and construed according to, the laws of the state of New York.

The foregoing terms and conditions and those contained in prevailing price lists described herein constitute the entire Agreement between Customer and Sharp with respect to its subject, irrespective of inconsistent or additional terms and conditions in Customer's purchase orders or other documents of Customer. Any limited warranty of Sharp outstanding with respect to the Equipment and all other prior agreements, proposals, and understandings with respect to the subject matter of this Agreement are merged herein, and there are no promises, terms, conditions or obligations with respect thereto other than those contained herein. This document is not a contract until signed by Sharp; it may be amended only by written instrument executed by both parties.

Written notice required by this Agreement shall be addressed to the parties at the addresses indicated on the face hereof or such other addresses as either party shall have previously furnished from time to time in writing to the other.

#### SHARP REPAIR DEPOT

Sharp Plaza  
Mahwah, NJ 07430

## Limited Warranty Main unit and peripherals

Sharp Electronics Corporation warrants to the first consumer purchaser, for a period of one (1) year from the date of purchase, that these products (the "Product"), when shipped in their original containers, will be free from defective workmanship and materials, and agrees that it will, at its option, either repair the defect or replace the defective Product or part thereof at no charge to the purchaser for parts or for labor.

This warranty does not apply to any appearance items of the Product, any consumable items such as paper, ribbon, batteries or disk media supplied with the Product or to any equipment or any hardware, software, firmware, electro-luminescent panel, power cords, motors, covers, or rubber parts other than the Product. This warranty does not apply to any Product the exterior of which has been damaged or defaced, which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design, construction or interfacing.

In order to enforce the rights under this limited warranty, the purchaser should mail, ship or carry the Product, together with proof of purchase, to a Sharp Service Center. To find out the location of the nearest Sharp Service Center see the back of this manual. This warranty does not apply to any product purchased outside of the United States, its territories, or possessions.

The limited warranty described above is in addition to whatever implied warranties may be granted to purchasers by law. To the extent permitted by applicable law, **ALL IMPLIED WARRANTIES INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE ARE LIMITED TO THE PERIOD FROM THE DATE OF PURCHASE SET FORTH ABOVE.** Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

Neither the sales personnel of the seller nor any other person is authorized to make any warranties other than those described above, or to extend the duration of any warranties beyond the time period described above on behalf of Sharp Electronics Corporation.

The warranties described above shall be the sole and exclusive remedy available to the purchaser. Correction of defects, in the manner and for the period of time described above, shall constitute complete fulfillment of all liabilities and responsibilities of Sharp Electronics Corporation to the purchaser with respect to the Product, and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise. In no event shall Sharp Electronics Corporation be liable, or in any way responsible for any damages or defects in the Product which were caused by repairs or attempted repairs performed by anyone other than a Sharp Service Center technician. Nor shall Sharp Electronics Corporation be liable or in any way responsible for any incidental or consequential economic or property damage. Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.

**THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.**

## Trademarks

IBM™ is a trademark of International Business Machines Corporation.

IBM™ PC™ is a trademark of International Business Machines Corporation.

Microsoft™ is a trademark of Microsoft Corporation.

MS-DOS™ is a trademark of Microsoft Corporation.

Smartmodem 1200™ is a trademark of Hayes Microcomputer Products, Inc.

Intel is a trademark of Intel Corporation.

Lotus is a trademark of Lotus Development Corporation.

Note: The above trademarks are indicated by an asterisk (\*) throughout this manual.

## For Your Records

Please record below the model number and serial number, for easy reference, in case of loss or theft. These numbers are located on the back of the unit. Space is provided for further pertinent data.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

Place of Purchase: \_\_\_\_\_

## Contents

## Welcome

If you are new to the family of Sharp products, welcome. To all new owners of this computer, congratulations. You have purchased one of the most powerful – and easy to use – personal computers available today.

By using advanced technology, we were able to pack the power of larger personal computers into this compact system. On the job or at home, you will find this to be an exceptional computer.



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## Introduction

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# Overview

## This Manual

This chapter is an introduction to the Operation Manual.

The first section describes how to use this manual and includes a summary of each chapter.

The second section is an introduction to the system.

Chapter 1 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 2 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 3 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 4 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 5 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 6 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

Chapter 7 describes how to use the system. It includes information on how to use the system, how to use the system, and how to use the system. It also includes information on how to use the system, how to use the system, and how to use the system.

## How to Use This Manual

This manual describes the operation of the Sharp personal computer. In it, you will find all the information you need to become an accomplished user of this powerful computer.

We have designed the Operation Manual so that you can locate information quickly and easily. Each chapter begins with a title page that shows the major sections in the chapter. Titles at the top of each page help you to locate sections within chapters.

Here is an overview of what to expect in each chapter:

Chapter 1 is the introduction to the manual. It tells you how to use the manual and provides an overview of the system.

Chapter 2 describes how to set up the system as well as how to close down the system for travel.

Chapter 3 tells you how the system works together. You will see how the basic hardware and software of the computer combine to give you powerful computing capabilities.

Chapter 4 describes how to use the system to accomplish your computing needs.

Chapter 5 provides an overview of the MS-DOS\* features that are used on a regular basis when operating the computer.

Chapter 6 describes the internal options – RAM expansion, CE-451A color/monochrome CRT adaptor, CE-451B serial I/O card, CE-451M modem card and CE-451F second 3-1/2" floppy disk drive.

Chapter 7 describes the CE-452F external 5-1/4" floppy disk drive unit.

Appendices cover a variety of topics such as general maintenance, diagnostics, glossary and specifications.

Index helps you locate specific information quickly.

## What to Read

If you plan on performing one of the tasks below, we recommend you read the corresponding chapters.

Of course, you may perform more than one of these tasks.

- ▲ Set up the system – Chapters 1 and 2
- ▲ Run an application – Chapters 1, 3, 4 and 5
- ▲ Use internal options – Chapters 1 and 6
- ▲ Use external floppy disk drive – Chapters 1 and 7
- ▲ Perform maintenance – Chapter 1 and Appendices

## Documentation Conventions

Throughout this manual we have used a set of style conventions. These conventions are described below.

**Keyboard Keys.** When referring to specific keys on the keyboard, the key label appears in boldface as shown below.

Example:

Press **Enter** to end the command.

**Sample Screens.** This manual contains sample screens. These samples include prompts (text generated by the system) and entries that you type on the keyboard.

As shown below, prompts are shown in normal type and your entries are shaded.

```
A>DIR A:
```

```
Volume in drive A has no label
Directory of A:
```

```
SALESREP DOC 104960 11-11-87 12:00a
MEMO DOC 3072 11-11-87 9:15a
2 File(s) 611968 bytes free
```

**Command Names.** When referring to MS-DOS\* commands, the command name is written in uppercase as shown below.

Example:

Use **COPY** to move the file from one disk to another.

**Notes.** Notes are used to give you helpful hints or suggestions on ways of doing certain operations.

**Cautions.** Cautions are used to alert you that damage to the equipment or loss of data might occur if certain procedures are not followed carefully.

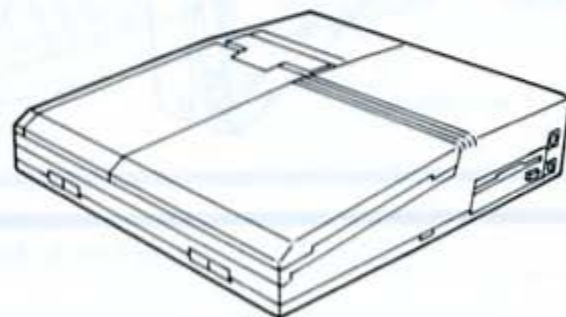
**Warnings.** Warnings are used to warn you that bodily injury might occur if precautions are not taken. Warnings always appear in italic.

## Overview of the System

Your system is made up of hardware and software. Let's begin with the hardware.

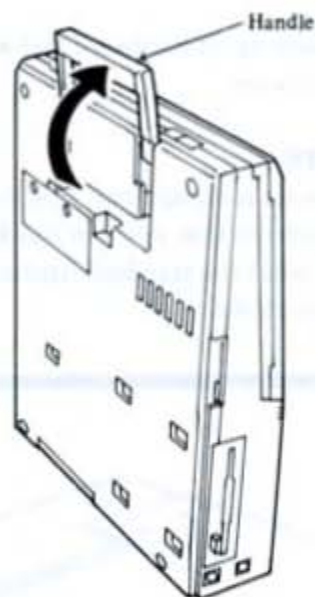
### The Hardware

Simply put, hardware is equipment. It is the physical part of the computer system that you can touch. The illustration below shows you what the standard hardware looks like when the system is closed.



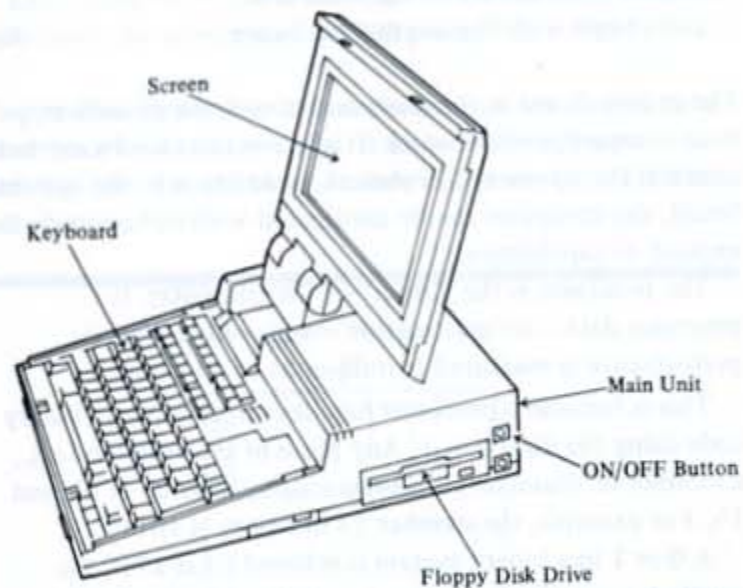
As you can see, the entire system can be carried by the handle.

---



Here's how the standard hardware looks when the system is set up.

---



Let's look at each piece.

**The Main Unit.** The main unit houses the keyboard, screen, one floppy disk drive, one parallel I/O (input/output) port, one port for the external floppy disk drive unit, and internal hardware needed to run your computer. All other hardware is connected to the main unit.

Let's begin with the internal hardware.

The system board in the main unit houses the processor, main memory, and the clock. It also contains hardware that controls the screen and keyboard. In addition to the system board, the computer can be configured with option cards to expand its capabilities.

The processor is the "brain" of the computer. It processes data – or information – at speeds so fast its performance is measured in millionths of a second.

This is because a processor handles information in binary code using the digit 0 or 1. Any piece of information (e.g., a number or character) is represented by a string of 0's and 1's. For example, the number 23 in binary is 10111.

A 0 or 1 in a binary system is referred to as a bit, the smallest piece of information handled by the processor. A byte is a group of bits representing a single character or number such as "H" or "9".

The standard processor for this computer is an 80188 compatible processor.

Main memory, usually referred to as RAM (Random Access Memory), stores data and applications software for the processor.

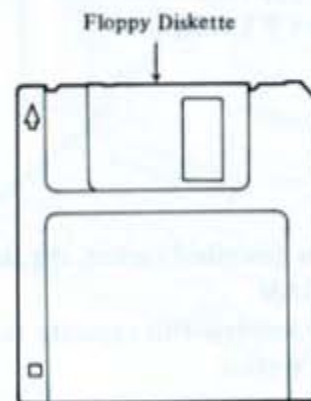
RAM is measured by the amount of information (bytes) it can store. A symbol often used for this measurement is "K". One K represents 1024 bytes.

The standard system guarantees a minimum of 256K usable memory (approximately 256,000 characters).

Also inside the system is a clock that keeps track of the date and time, even when the system's power is turned off, and a speaker that provides audio feedback during certain operations.

Let's move on to the remaining system hardware – the disk drive, the screen, and the I/O ports.

**Floppy Disk Drive.** The computer contains one floppy disk drive for storage and retrieval of information. Floppy diskettes like the one shown below can store up to 720K of information.



**Screen.** The screen acts as a window where the processor sends information for you to view. Information typed at the keyboard, read from a floppy diskette, or sent via a modem, etc. is displayed here.

The computer displays 80 characters x25 lines or 640 dots horizontally x200 dots vertically on a supertwist liquid crystal display.

**I/O Ports.** The computer has two I/O (input/output) ports for connecting external devices to the system – a parallel port, used to connect a printer, and a port for connecting an external 5-1/4 inch floppy disk drive unit.



**Keyboard.** You communicate with the main unit by typing at the keyboard. Many of the keys work just like those on a regular typewriter. However, as you will see, some of the keys have special functions not available on a typewriter.

## Hardware Options

The hardware described above comprises the standard system. The following hardware options can be used with the standard system to expand capabilities:

- ▲ Additional RAM
- ▲ Internal 3-1/2" Floppy Disk Drive
- ▲ External 5-1/4" Floppy Disk Drive Unit
- ▲ Color/Monochrome CRT Adaptor
- ▲ Serial I/O Card
- ▲ Modem Card
- ▲ ROM Disk Board
- ▲ EMS Card

**Additional RAM.** As described earlier, the standard unit comes with 256K RAM.

You may need to increase this capacity to accomplish certain tasks on the system.

You can increase the memory by installing the CE-451R RAM card and the CE-700R RAM expansion kit in the main unit in increments of 128K up to a total of 640K.

**Internal 3-1/2" Floppy Disk Drive.** The standard system has one 3-1/2" floppy disk drive. By installing the CE-451F, you can use the computer as a dual drive system.

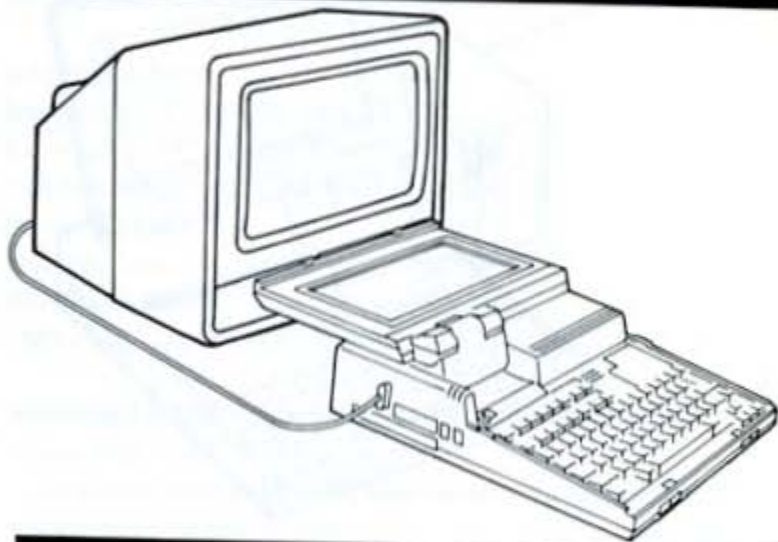
**External 5-1/4 inch Floppy Disk Drive Unit.** The computer has one port for connecting a 5-1/4 inch floppy disk drive to the system. You can easily connect the drive unit CE-452F to the system.

CE-452F 5-1/4" Floppy Disk Drive Unit



**Color/Monochrome CRT Adaptor.** A color or monochrome CRT (short for Cathode Ray Tube) can be used in addition to the standard screen. In order to use a CRT, the CE-451A color/monochrome CRT adaptor must be installed in the main unit.

- Here's how the system looks when a CRT is attached to the main unit.



**Serial I/O Card.** By installing the CE-451B serial I/O card, the computer can communicate with external devices such as a serial printer, external modem, and mouse pointing device.

**Modem Card.** A modem (short for MOdulator DEModulator) is a device that converts computer data into data that can be transmitted over telephone lines.

The CE-451M modem card can be installed inside the computer. With the CE-451M modem card, you can send and receive information at speeds up to 120 characters

per second (i.e., 1200 baud). The CE-451M contains a serial I/O adaptor for alternate use.

**ROM Disk Board.** This board can be customized to store software programs for easy execution. For details, contact your Sharp dealer.

**EMS Card.** The CE-453B EMS card is a 1M byte memory board which conforms to the Lotus\*/Intel\*/Microsoft\* expanded memory specifications.

## The Software

In order to use computer hardware for tasks like writing memos or balancing a checking account, software is required.

Software is a series of instructions that direct the computer to perform specific tasks. It is generally loaded into main memory from a floppy diskette where it remains until the system is turned off or other software is loaded.

Software (sometimes referred to as programs) can be divided into two categories – operating system software and applications software.

**Operating System Software.** Operating system software manages the computer's resources such as disk drives and printers. By performing these general routines, operating system software forms the base on which applications software can run.

The operating system software for this computer is MS-DOS\*, version 2.11. The diskette packaged with the computer contains this software.

**Applications Software.** Applications software helps you perform business and personal tasks such as word processing, spreadsheet analysis, and graphics presentations.

Many of the applications written to run with MS-DOS\* can be used on this computer.

*Douglas Cobb - Books*  
*on Lotus, Symph*  
*only*  
*128*  
*Microsoft*  
*Word*  
*Excel*  
*Spread*  
*Sheet*  
*Big*  
*Book*  
*Base*

## Set Up and Close Down

Overview 2-1

Picking a Location 2-3

Setting Up 2-5

Closing Down 2-13

## Overview

This chapter describes how to set up and close down the standard system.

- The first section shows you how to pick the right location for setting up the system.

- The second section provides instructions on how to set up the system.

- The third section describes how to close the system for transportation.

- If you are setting up any of the options such as the color/monochrome CRT adaptor, turn to the appropriate chapter for installation instructions once the standard system is set up.

## Picking a Location

You will want to begin setting up your system by picking the right location for its use. While this computer is small enough to be used almost anywhere, certain guidelines should be followed so that you can operate the system comfortably and safely.

### Environmental Requirements

**Surface.** Pick a hard, flat surface on which to set up and operate the system. Using the system on a bed or rug restricts the air circulation and could result in static electricity affecting the performance of the system.

A table or desk with room to spread out materials such as manuals, diskettes, and papers is the best choice. If you are using a printer with the system, be sure you have enough room for this piece of equipment as well.

**Temperature.** This computer does not require any external cooling system such as air conditioning in a normal environment. However, do not operate the system in extreme temperatures below 10 degrees C (50 degrees F) or above 35 degrees C (95 degrees F).

**Humidity.** Like any electrical device, the computer can be damaged by extreme moisture or humidity. Do not operate the system in humidity above 80 percent.

## Electrical Requirements

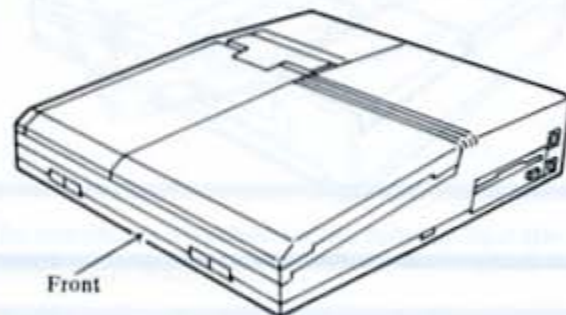
The following electrical requirements must be considered when picking a spot for the computer.

**Power Supply.** This computer is powered by a built-in lead battery. The lead battery is recharged by using the AC adaptor. It is fully charged in approximately 8 hours when the computer is turned off. The fully charged battery allows the computer to run for approximately 7 hours when the floppy disk drive is not used or for approximately 5 hours when the floppy disk drive is used at the rate of 10 percent.

**Interference.** It is possible that radio and television interference can occur when running the system, even if the equipment is installed properly. Therefore, use the equipment away from radios and televisions.

## Setting Up

Begin by placing the system on a flat surface with the front facing you as shown below. Be sure to fold down the handle so that it is out of your way.



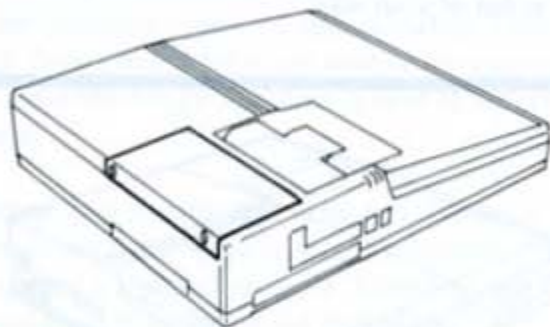
There are four basic steps to setting up your computer:

1. Install the lead battery.
2. Press the two buttons at the front of the main unit to open the unit.
3. Adjust the screen angle.
4. Install the options as necessary.

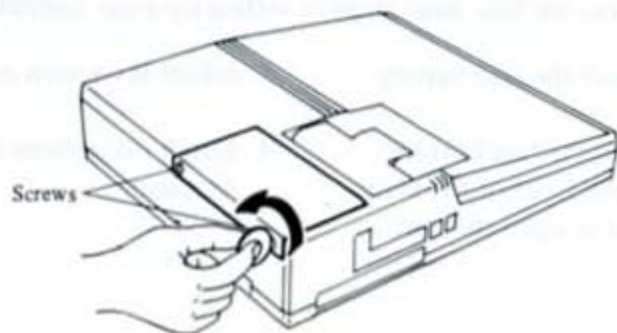
## Install the lead battery

When you purchase the computer, you must install the lead battery into the computer in the following manner:

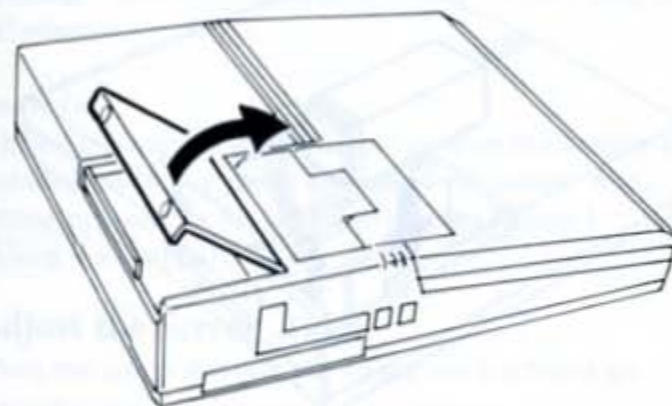
First, place the unit as shown below.



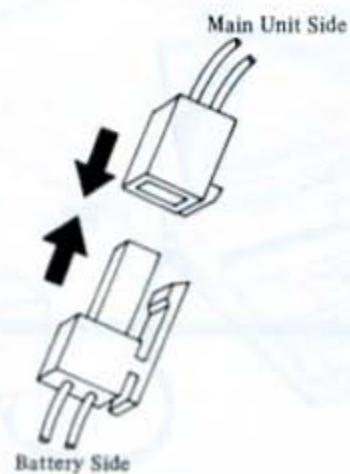
1. Using a coin, loosen, but do not remove, the two screws.



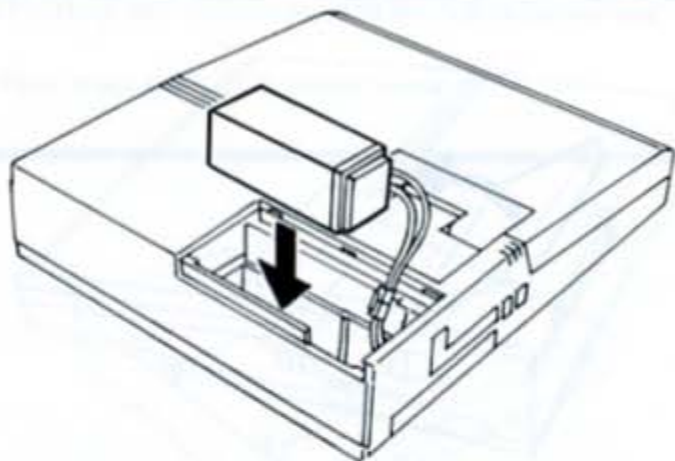
2. Remove the cover.



3. Plug the connector attached to the battery into the connector in the main unit.

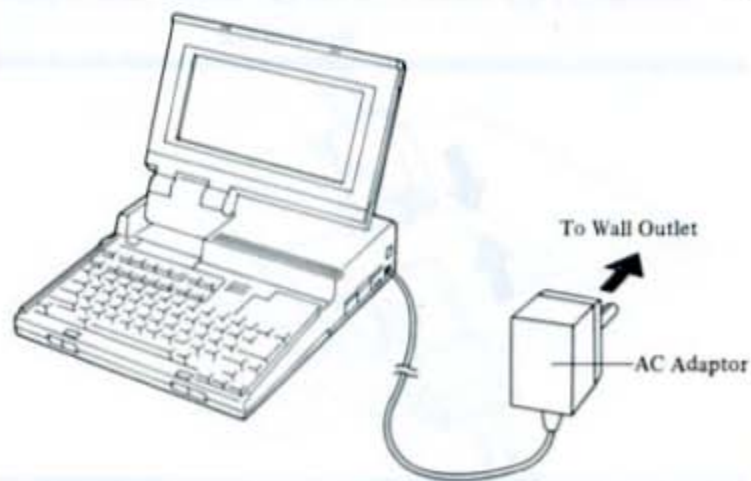


4. Set the battery carefully in the main unit as shown below.



5. Replace the battery cover.

6. Charge the battery using the AC adaptor.



**Note:** The AC adaptor may be different in some countries.

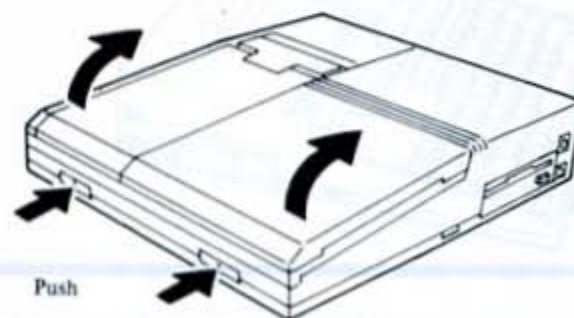
**Note:** The lead battery is fully charged before shipping from the manufacturer. However, battery life may be reduced as a result of spontaneous discharge during transit. Be sure to charge the battery for approximately 8 hours using the AC adaptor.

7. Power On

When the computer is first turned on after the battery is installed, the set up menu appears on the screen. When setting up, refer to Set Up Functions in Chapter 4 "Using the Computer".

### Adjust the Screen Angle

When the unit is opened, the screen and keyboard are ready for use.





To adjust the screen angle, follow the procedure below.

1. Locate and press the release buttons at the front of the unit.
2. Open the screen panel until it stands upright.
3. You can set the screen panel at any viewing angle.



**Note:** When you use a CRT display attached to the color/monochrome CRT adaptor, tilt the screen panel fully back to a horizontal position so that it does not block the CRT display.

## Install Hardware Options

If you are using options such as the EMS card, see the installation instructions supplied with the option.

**Note:** Installation instructions for the CE-451R/CE-700R RAM expansion, CE-451A color/monochrome CRT adaptor, and CE-452F 5-1/4 inch floppy disk drive unit are supplied as standard sections in this manual.

If you are not using any options, proceed to Chapter 3 for instructions on operating the computer or to the last section of this chapter for instructions on how to close the system.

## Closing Down

This computer is easily transported. It folds up in seconds and is light enough to carry from one location to another. An optional carrying case is available for extensive travel use.

There are four basic steps to closing down the system for transportation:

1. Disconnect any options such as a printer or CRT.
2. Disconnect the AC adaptor plug (if the battery has been charged).
3. Close the screen panel.
4. Pull out the handle.

**CAUTION:**

Be sure that the power to all equipment is turned off before you begin to close down the system for transportation.

**Disconnect Options**

Begin by disconnecting any external options such as a printer or CRT. Turn to the appropriate chapter for these instructions.

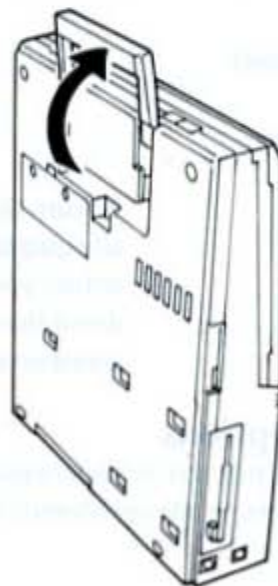
**CAUTION:**

If you attempt to close the screen panel without turning off power, an alarm beep sounds for about 15 seconds. Whenever you hear a beep, press the ON/OFF button to turn power off.

**Take out Handle**

The computer's carrying handle can be set as shown below.

**Note:** When operating the computer, put the handle into the computer's bottom panel.



**Note:** When transporting the computer, the CE-451C optional carrying case should be used.

**Storage**

If you are planning to store the computer, follow these environmental requirements.

**Temperature.** Do not store the system in temperatures below  $-20$  degrees C ( $-4$  degrees F) or above  $60$  degrees C ( $140$  degrees F).

**Humidity.** Do not store the system in humidity greater than 90 percent.

**Note:** If you plan to store the system for an extended period of time, the built-in battery will discharge and the clock and set up selections will be lost. For longer service life of the lead battery, recharge it every 6 months.

## How It Works

Overview

3-1

The Main Unit

3-3

The Keyboard

3-19

The Software

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The Diskettes

3-27

Character Set

3-31

## Overview

This chapter describes how to operate and control the computer.

The first section describes how to operate the main unit's screen and floppy disk drive.

The second section describes how to use the keyboard.

The third section provides an overview of how software is used with the system.

The fourth section describes how to properly handle floppy diskettes.

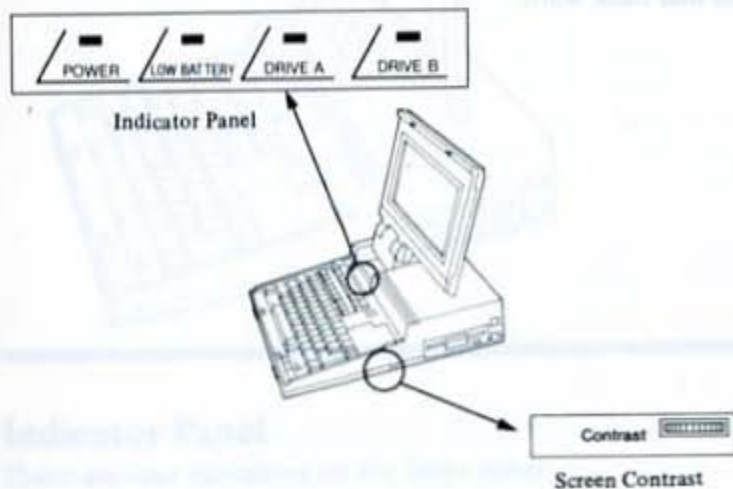
The fifth section shows the character set of this computer.

## The Main Unit

The main unit is the heart of the system. In addition to processing, displaying and storing data, it also serves as the connector point for external devices such as a printer, telephone, and CRT. Let's take a closer look at the main unit.

First, if you have not already done so, set up the computer as described in Chapter 2. Next, sit down in front of the system while we take a quick tour.

The indicator panel and the screen contrast of the main unit are illustrated below.



## The Screen

The screen displays text and graphics on a flat panel supertwist liquid crystal display. Normally, information displays as dark characters on a light background. You can also configure the screen to display light characters on a dark background.

There are two important features for controlling the screen:

- ▲ Contrast
- ▲ Tilt

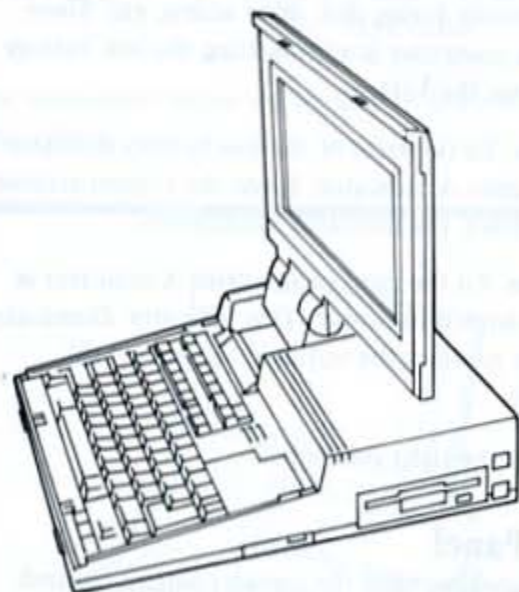
**Contrast.** The contrast between the information that appears on the screen and the background can be adjusted by turning the contrast control located on the right side panel. To lighten the display, locate the contrast control and turn the dial forward. To darken the display, turn the dial back ward.

**Tilt.** To easily view the screen in many sitting positions, the tilt of the screen can be adjusted.

First open the screen so that it stands upright. The screen is locked. After that, you can set the screen at any angle backward.

When you use a CRT display through the color/monochrome CRT adaptor, the screen can be folded down so that view to the CRT display is not hindered.

The illustration below shows the screen in an upright position.



## Indicator Panel

There are four indicators on the front panel.

**Power.** When power is turned on to the main unit, this indicator illuminates.

**Low Battery Indicator.** To the right of the power indicator is the low battery indicator. When battery voltage drops, the low battery indicator lights and an alarm beep sounds for approximately 15 seconds, alerting you to charge with the AC adaptor. If you fail to recharge the battery when the low battery indicator lights, the computer is automatically turned off after approximately one hour when the floppy disk drive is used at the rate of 10 percent to protect the hardware. If this occurs, recharge the battery immediately. Otherwise the clock and set up selections will be lost.

**Note:** Occasionally, the low battery indicator blinks and an alarm beep sounds during disk drive access, etc. Since this indicates the computer is approaching the low battery condition, recharge the battery.

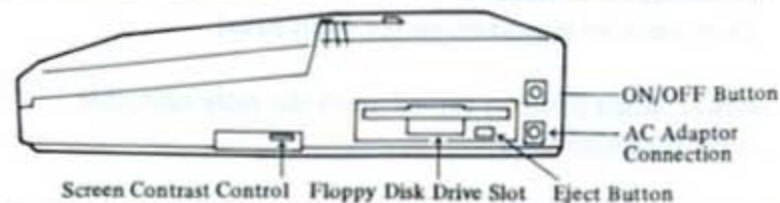
**Drive A Indicator.** To the right of the low battery indicator is the floppy disk drive A indicator. When the system accesses the floppy disk drive, the indicator illuminates.

**Drive B Indicator.** To the right of the drive A indicator is the floppy disk drive B indicator. This indicator illuminates when the system accesses the optional second 3-1/2" floppy disk drive.

Let's move on to the right side panel.

## Right Side Panel

The right side panel contains the screen contrast control, disk drive slot, disk drive eject button, AC adaptor connection and ON/OFF button.



**Screen Contrast Control.** There is a control to adjust the liquid crystal display contrast. Its function is explained in Section "Screen".

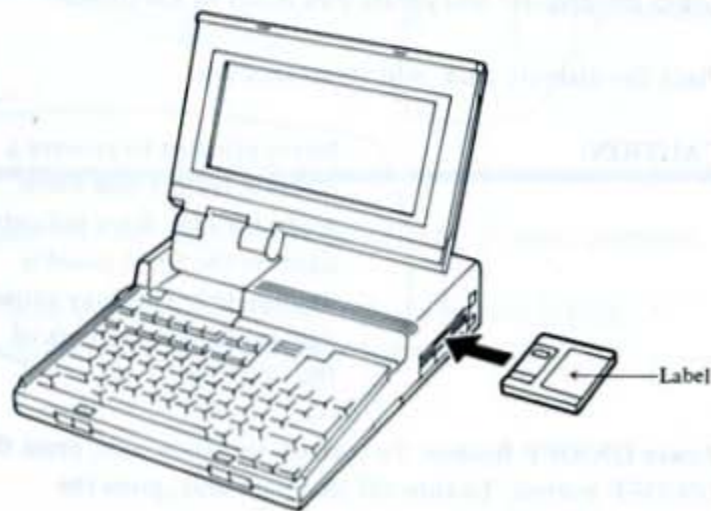
**Disk Drive Slot.** To the right of the screen contrast control is one floppy disk drive.

**Eject Button.** There is an eject button for the disk drive. It is used to eject the diskette when finished.

### CAUTION:

Never push the eject button with no diskette in the disk drive.

The illustration below shows how to insert a floppy diskette into a drive.





To insert a diskette, do the following:

1. Remove the diskette from its storage case.
2. Grasp the diskette by the top and insert into the drive slot so that the diskette label is facing upward.
3. Gently push the diskette into the slot until it comes to a stop.

**Note:** Be sure to read the section in this chapter about how to handle floppy diskettes.

To remove a diskette, do the following:

1. Press the eject button to partially eject the diskette from the drive.
2. Grasp the diskette and gently pull it out of the drive.
3. Place the diskette back into its storage case.

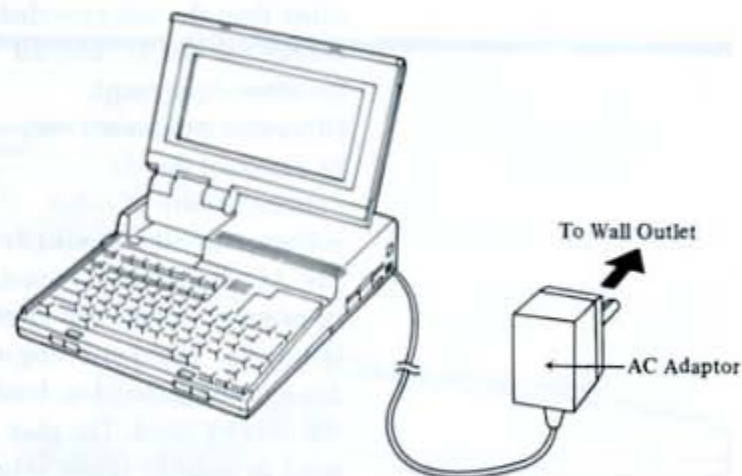
**CAUTION:**

Never attempt to remove a diskette from a disk drive when the disk drive indicator light on the front panel is illuminated. This may cause damage to the contents of the diskette.

**Power ON/OFF Button.** To turn on the main unit, press the ON/OFF button. To turn off the main unit, press the ON/OFF button again.

**AC Adaptor Connection.** The computer can be powered from battery only, AC adaptor only, or can be used while being charged. When the low battery indicator lights while the computer is running, recharge the battery with the AC adaptor.

The illustration below shows how to connect the AC adaptor.



**Note:** The AC adaptor may be different in some countries.

With the computer turned off, the battery is fully recharged after approximately 8 hours.

**AC Adaptor.** The AC adaptor can serve either as the lead battery recharger or as the computer power source. This adaptor can be used without the lead battery or when the battery has been discharged significantly. Note that the content of clock/calendar and set up function will be lost if the AC adaptor is removed when no battery or a discharged battery is present.

**CAUTION:**

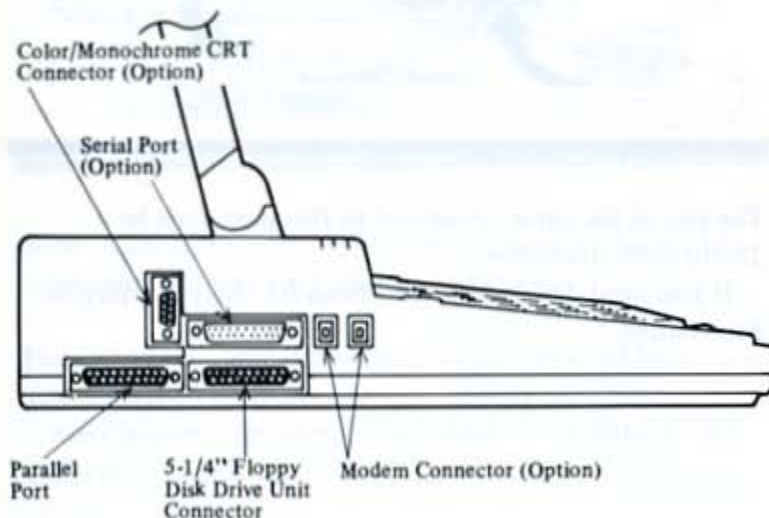
Never use any AC adaptor other than the one provided. Do not use the AC adaptor for other equipment. Otherwise equipment may be damaged due to nonconformity of rated voltage, current and polarity. The AC adaptor input must be of rated voltage and rated frequency. When inserting or disconnecting the plug, hold the plug by hand. The plug must be inserted firmly into the socket. When not using the AC adaptor, be sure to disconnect the plug from the plug socket.

Let's move around to the left side panel.

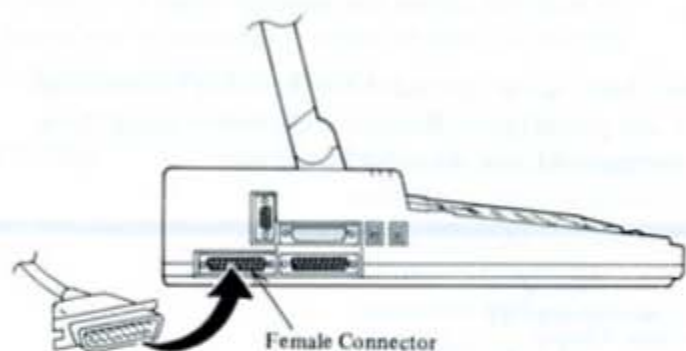
**Left Side Panel**

As shown in the following illustration, there are several connectors located on the left side panel. Let's look at each one, starting at the left side of the panel and moving to the right.

**Note:** Dust caps are provided for the 5-1/4" floppy disk port and parallel port. Remove them before using these connectors and save them for future use.



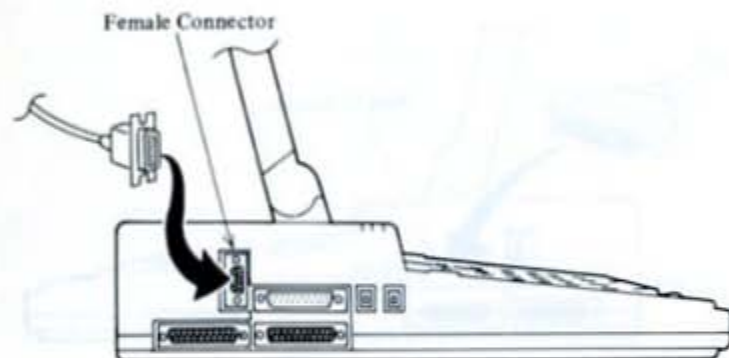
**Parallel (Printer) Port.** The first connector is the parallel port, used to connect parallel printers to the main unit.



The end of the cable connected to this port must be a 25-pin male connector.

If you need detailed specifications for this port, turn to Appendices.

**Color/Monochrome CRT Connector.** The next connector is used to attach a color or monochrome CRT to your computer.

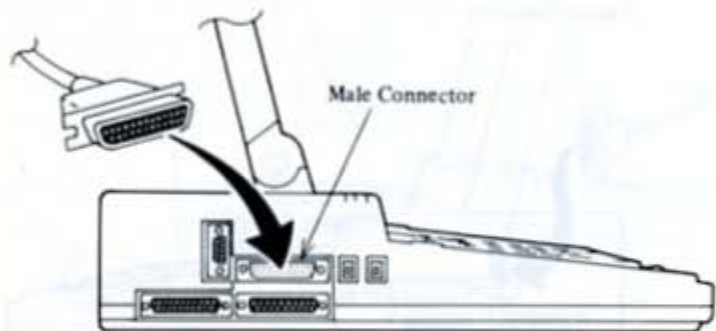


**Note:** A protective cap covers this slot until the CE-451A color/monochrome CRT adaptor is installed.

The end of the cable connected to this port must be a nine-pin male connector.

See Chapter 6 for more information about using a CRT with your system.

**Serial (RS-232C) Port.** The next connector is the serial RS-232C port. It is used to connect devices such as serial printers and external modems to the main unit.

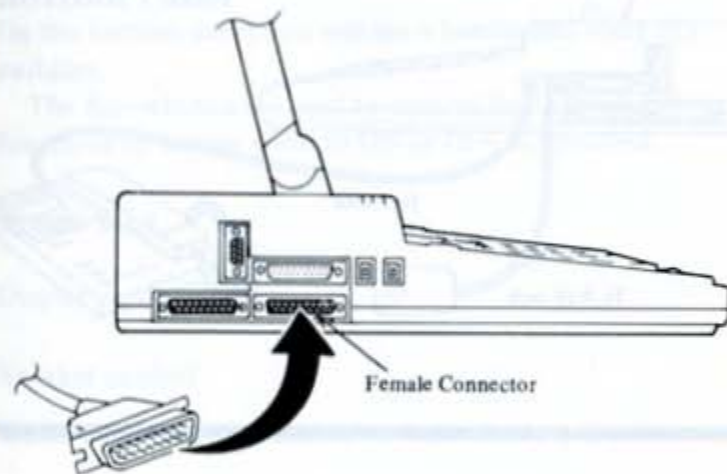


**Note:** A protective cap covers this port until the CE-451B serial I/O card or the CE-451M modem card is installed.

The end of the cable connected to this port must be a 25-pin female connector.

If you need detailed specifications for this port, see Appendices.

**5-1/4" Floppy Disk Drive Unit Port.** The next connector is the external floppy disk drive unit port. It is used to connect a 5-1/4" floppy disk drive unit to the computer.

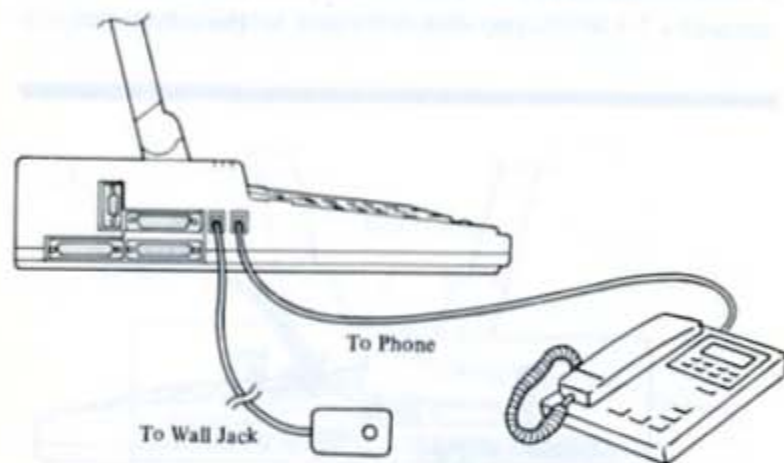


The end of the cable connected to this port must be a 25-pin male connector.

If you need detailed specifications for this port, see Appendices.

**Modem Connectors.** The next two sets of connectors are used to make telephone connections to the CE-451M modem card.

**Note:** Protective caps cover the slots where the modem connections are made. During modem installation, these caps are removed.



One connects a standard telephone line to the modem. The other connects the telephone to the modem. The two connectors are interchangeable.

**Note:** The wall jack must be one of the following standard connectors:

- ▲ USOC-RJ11W
- ▲ USOC-RJ12W
- ▲ USOC-RJ13W
- ▲ USOC-RJ11C
- ▲ USOC-RJ12C
- ▲ USOC-RJ13C

See Chapter 6 for information about using the CE-451M modem card with the system.

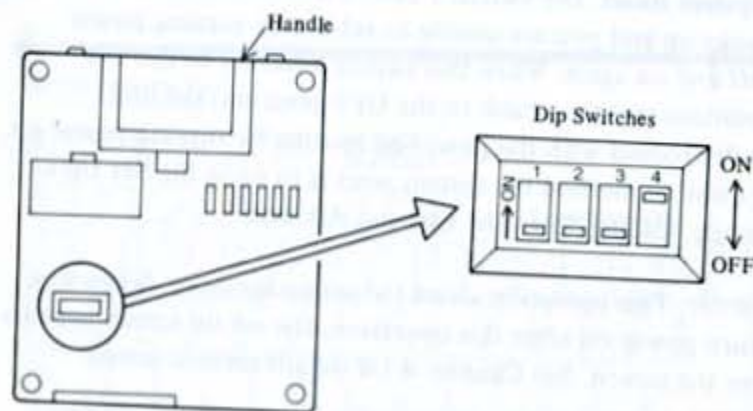
Let's look at the bottom panel.

### Bottom Panel

On the bottom panel you will see a handle and some dip switches.

The dip switches are used to control the following functions by setting them to ON or OFF as specified.

- ▲ System reset
- ▲ Display mode selection
- ▲ Speaker control



Each dip switch has two settings, ON and OFF. To set the dip switches, first put the computer face down.

**Note:** Remember to turn off power to the computer before setting dip switches. Dip switch settings do not take effect until the computer is turned back on.

To set any dip switch, push it using a ballpoint pen to the desired position.

The available dip switch settings are as follows:

Dip Switch Label	Feature	Setting		
1	System reset	ON: Reset	OFF: Normal	
2, 3 (Combination)	Display mode select	2	3	
		ON	ON	Not used
		ON	OFF	40 x 25 Graphics adaptor
		OFF	ON	80 x 25 Graphics adaptor
OFF	OFF	80 x 25 monochrome adaptor		
4	Speaker control	ON: Speaker ON. OFF: Speaker OFF.		

**System Reset.** Dip switch 1 can be used if the system locks up and you are unable to reboot by turning power off and on again. When this switch is moved to the ON position and then back to the OFF position, the unit will proceed with the power-on routine by turning power on. (Another method for system reset is to press the **Set Up** key while holding down the **Ctrl** and **Alt** keys.)

**Note:** This operation clears the set up memory. When you turn power on after this operation, the set up screen appears on the screen. See Chapter 4 for details on this screen.

**Display Mode Select.** Dip switches 2 and 3 determine the initial display mode to certain applications. See Chapter 6 for more information on this feature.

**Speaker Control.** Dip switch 4 enables you to turn the speaker off if desired.

Let's move on to the keyboard.

## The Keyboard

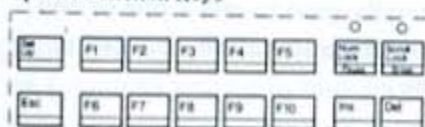
The keyboard allows you to communicate with the main unit.

The description below provides an overview of keyboard usage. When using applications software, however, certain keys may take on different meanings.

For example, in a word processing application a certain key might be used to insert text in a line, while in a spreadsheet application, the same key might not have any use. Be sure to read your application documentation for specific use of keys.

The keyboard is divided into three basic groups – typewriter keys, special function keys, and cursor control keys.

### Special Function Keys



### Typewriter Keys



### Cursor Keys



## Typewriter Keys

The typewriter keys are similar in function and appearance to those found on a standard typewriter. There are some keys in this group, however, that you might not be familiar with.



**Enter.** The **Enter** key is generally used to end a line or end an entry. In some application documentation, this key is referred to as the **Return** key.

**Shift.** There are two **Shift** keys located on the left and right sides of the typewriter keys. Pressing a key while holding down **Shift** gives you uppercase.

**Caps Lock.** The **Caps Lock** key allows you to type all the letters in uppercase. It is a toggle key which means pressing it once turns it on and pressing it again turns it off. When **Caps Lock** is on, the indicator light on the right of the key illuminates.

✕ **Caps Lock** affects letter keys only. **Shift** is used when **Caps Lock** is on to type uppercase symbols and punctuation marks.

**Shift** also reverses the action of **Caps Lock** when typing letters. If you press **Shift** when the **Caps Lock** key is on and type a letter, you get a lowercase letter.

✕ **Tab.** The **Tab** key works like the tab key on a regular typewriter. In certain applications, you can return to the last tab in a line by pressing **Tab** while holding down **Shift**.

**Backspace.** The **Backspace** key works like the backspace key on a typewriter, backing up one character position at a time. In some applications, **Backspace** erases characters as it backs up.

✕ **Control.** The **Ctrl** key, when used with another key, sends a special instruction to the system. For example, in a word processing application, pressing **Ctrl** and **P** together might tell the system to stop printing a document.

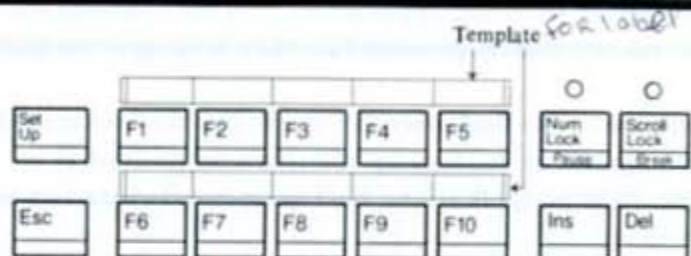
✕ **Alternate.** Like **Ctrl**, **Alt** provides an alternate function or accesses characters from the extended character set. (See "Character Set" in this chapter.)

✕ **Function.** The **Fn** key is used to access numbers, characters or functions printed in blue on the front of keys.

✕ **Print Screen.** Pressing **PrtSc** while holding down **Shift** prints whatever is on the screen. Pressing **PrtSc** alone results in an asterisk.

## Special Function Keys

At the top of the keyboard are 10 function keys labeled F1 through F10 and 6 other keys as shown in the illustration below.



**Function Keys.** These keys perform editing functions in MS-DOS\* and have application defined functions at other times. Refer to your application documentation for a description of these keys.

**Note:** Directly above the function keys are blank templates. You can write labels on the template to identify functions for each key.

### Other Keys

**Set Up.** Pressing **Set Up** accesses the set up screen where you can define certain characteristics of the system. See Chapter 4 for more information about this screen.

**Escape.** The **Esc** key is frequently used in applications to cancel a command or exit the application.

**Number Lock.** The **NumLock** toggle key allows you to enter numbers and characters printed in blue on the front face of keys.

✖ When **NumLock** is on, pressing keys with numbers or characters printed in blue on their front results in the

number or character. When **NumLock** is on, the **Fn** key can be used to activate the characters on the keytops.

✖ When pressed with **Ctrl**, **NumLock** suspends the system operation, pausing the display of text on the screen. To restart, press any key.

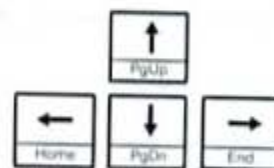
**Scroll Lock.** This key has no function when used alone. When pressed together with Ctrl, **Scroll Lock** provides a break function, stopping programs that are running.

✖ **Insert.** The **Ins** key is used to insert text.

✖ **Delete.** The **Del** key is used to delete text.

## Cursor Control Keys

Beneath (to the right) of the typewriter keys are the cursor control keys.



These keys control the movement of the cursor – the underline or block character that you move around the screen.

The arrow keys move the cursor up or down one line at a time and to the right or left one character at a time.

✖ When used with the **Fn** key, these keys serve as the **Home**, **PgUp**, **PgDn**, and **End** keys.



In general:

The **Home** key moves the cursor to the upper left corner of the screen.

The **PgUp** key moves the cursor back one full screen.

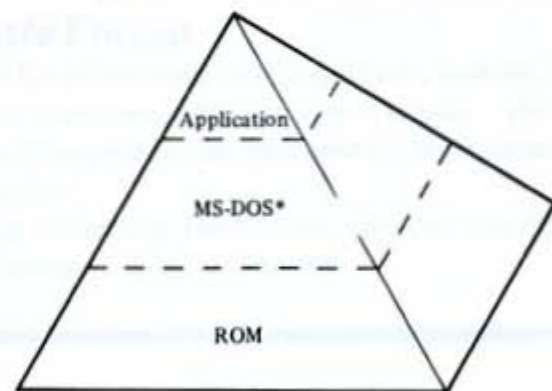
The **PgDn** key moves the cursor ahead one full screen.

The **End** key moves the cursor to the last character in a file.

## The Software

As you learned in Chapter 1, a computer system needs software to be useful. Without software, your computer is just a collection of electrical components.

In order to understand how software functions on the computer, think of it in three levels.



When power is turned on to the system, software and hardware begin to interact.

Software stored in ROM (read only memory) is installed into the computer at the factory. Sometimes referred to as firmware, it performs three basic functions when the system is first turned on:

- ▲ Checks performance of hardware components
- ▲ Determines what external devices (e.g., CRT, printer) are connected to the main unit
- ▲ Loads (reads) MS-DOS\* from a diskette in drive A into main memory

Once MS-DOS\* is loaded into main memory, you can enter various MS-DOS\* commands.

You can also instruct MS-DOS\* to load an application such as word processing into main memory. Chapter 4 describes in detail how to load and run an application.



## The Diskettes

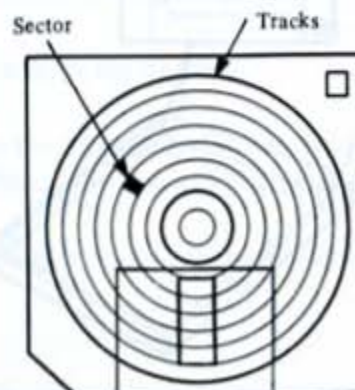
A diskette is a magnetic device that stores information created on a computer. Once information is stored on a diskette, it can be re-used whenever necessary or replaced when no longer needed.

The computer uses 3-1/2-inch, double-sided, double density diskettes that store up to 720K (approximately 720,000 characters) of information.

### Diskette Format

In order for information to be stored on a diskette, the operating system must first prepare – format – the diskette. This process enables stored information to be easily located.

During formatting, the diskette is divided into 80 circular tracks, similar to those on a record.



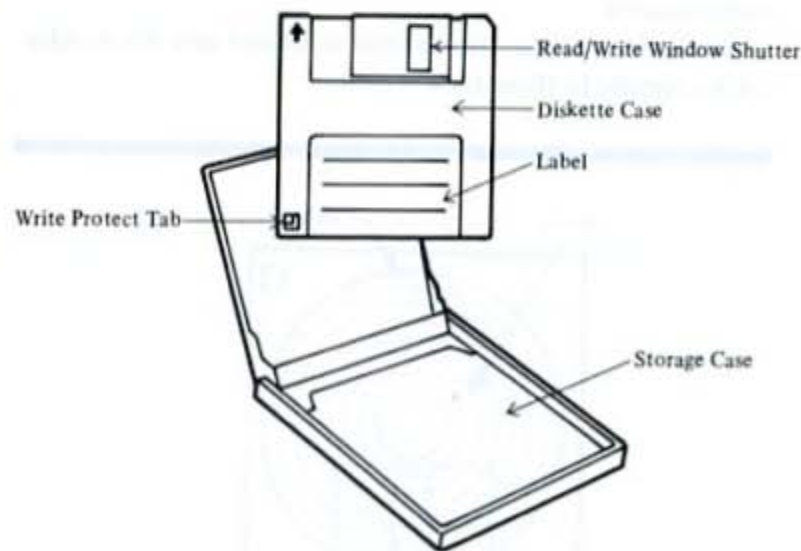
Each track is further divided into sectors that identify information stored within the track. The track number and sector number act like addresses to the computer, making access to information an automatic and rapid process.

During operation, the diskette rotates inside its protective jacket. As it rotates, the read/write head of the drive moves from one track to another, locating information or finding space available for new information. You need not be concerned where information is stored on a diskette. MS-DOS\* will manage that function automatically.

### Diskette Handling Procedures

To safeguard information stored on diskette, it is important that you handle diskettes with care.

The illustration below shows what a typical diskette looks like.



**Storage Case.** Some diskettes come with a storage case to protect the diskette. Return the diskette to its storage case after use.

**Diskette Case.** The diskette itself is permanently encased in a plastic jacket to protect its magnetic surface. This jacket can not be removed.

**Label.** The label identifies the content of the diskette. For example, the operating system diskette label for your computer is "MS-DOS\*." The label should be placed over the recessed area of the diskette.

**Read/Write Window Shutter.** The read/write window shutter allows the disk head to read from and write to the diskette.

**Write Protect Tab.** The write protect tab can be positioned to prevent changes to important files. **To protect a diskette, slide the write protect tab to the open position; to allow the computer to write on the diskette, slide the tab to the closed position.**

Follow these procedures when handling diskettes:

- ▲ Return the diskette to its storage case after use.
- ▲ Never bend or twist the diskette.
- ▲ Never expose the diskette to liquids. **If you spill a liquid on the diskette, throw the diskette away.**
- ▲ Never expose diskettes to excessive heat or direct sunlight.

- ▲ Always keep diskettes at least 3 meters (10 feet) away from magnetic fields such as those in electronic equipment and telephones.
- ▲ Always store diskettes in a cool, dry, dust free area, in an upright position.
- ▲ Never place heavy objects such as books on the diskettes.

Using the  
ComputerCharacter  
Set

The following table shows the character set along with decimal and hex codes.

	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
Hex	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
1	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
4	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
5	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
6	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
7	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
8	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
9	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
10	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
11	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
12	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
13	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
14	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
15	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

**Note:** Some of the characters in the character set (32 to 126 and 128 to 255) can be entered in the MS-DOS command line. To enter the character, type its decimal code using the numbers printed in blue on the front of keys while holding down the Alt key.

When you release the Alt key, the character will be displayed on the screen.

## Using the Computer

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## Overview

### Startup

This chapter describes how to use the resources of the computer to accomplish your computing needs.

- The first section describes system start-up procedures.

- The second section shows how to use the set up functions.

- The third section describes how to run an application such as word processing or spreadsheets on the computer.



## System Start-up

To start up the system, begin by locating the MS-DOS\* diskette supplied with the computer and remove it from its storage case.

Next, do the following:

1. Insert the MS-DOS\* Master diskette into floppy disk drive A.
2. Turn on power to the main unit. The system will go through its internal check procedures and display the following text on the screen:

```
The Sharp Personal Computer System  
Firmware Version x.xx  
Copyright (C) 1987 by Sharp Corporation  
Copyright (C) 1986, 1987 by Vadem, Inc.
```

```
Processor      Passed.  
Firmware ROM  Passed.  
Keyboard      Passed.  
Clock         Passed.  
Setup RAM     Passed.  
xxxK Memory.
```

```
Loading A:
```

**Note:** If you are using the computer for the first time or just replaced the battery, turning power on to the main unit displays the set up screen. For details about this screen, see the next section. If the system does not power on or the screen displays garbage, reset the system using dip switch 1 on the bottom panel. For this setting, see Chapter 3.

3. After a few seconds, the system begins to load MS-DOS\* from the floppy diskette in drive A into main memory. Once MS-DOS\* is loaded, the following message displays indicating that the system has started up (sometimes called "booted"):

```
The Sharp Personal Computer System
I/O Subsystem Version X.XX
Copyright (c) 1985, 1986, 1987 by Vadem Inc.
All Rights Reserved.
```

```
Microsoft MS-DOS version 2.11
Copyright 1981, 82, 83 Microsoft Corp.
```

```
Command v. 2.11
```

```
A> PATH \
```

```
A>
```

```
A>
```

## Copying MS-DOS\*

It is recommended that you make a copy of the MS-DOS\* diskette in drive A. The diskette supplied with the system becomes your backup and the second diskette becomes your working copy.

To copy the MS-DOS\* diskette in drive A, do the following:

1. Enter the command shown as follows, then press **Enter**. (Remember, your entries are shaded in this manual.)

**Note:** MS-DOS\* commands such as DISKCOPY can be typed in lowercase or uppercase. Be sure to leave one blank space between the command and the letter A and a space between the first colon and the second A. Don't forget to press **Enter** after it has been typed.

```
A>DISKCOPY A: A:
```

```
Insert the Source Diskette in Drive A:
```

```
Strike any Key when Ready ...
```

```
Copying... 80 tracks, 9 sectors per track, 2 sides...
```

```
Track : xx
```

```
Insert the Target Diskette in Drive A:
```

```
Strike any Key when Ready ...
```

```
Track : 00
```

```
Formatting while Copying...
```

```
Track : xx
```

```
Insert the Source Diskette in Drive A:
```

```
Strike any Key when Ready ...
```

```
Track : xx
```

```
Insert the Target Diskette in Drive A:
```

```
Strike any Key when Ready ...
```

```
Track : xx
```

```
Copy Complete
```

```
Copy Another (Y/N)?_
```

2. After the DISKCOPY command is entered, the system instructs you to insert the source diskette in drive A. Since the MS-DOS\* diskette is already in drive A, simply press any key on the keyboard. Once you press any key, the system begins reading the contents of the diskette in drive A.
3. When reading is completed, the system instructs you to insert the target diskette in drive A. Replace the diskette in drive A with a blank diskette and press any key on the keyboard. The system begins writing the contents read from the source diskette while formatting the diskette, if not formatted. The computer repeats steps 2 and 3.

**Note:** If your computer's memory is expanded, the diskette copy may be completed with less diskette exchange operation. If you have the optional second floppy disk drive, you may copy the diskette directly onto floppy disk drive B. With the MS-DOS\* diskette in drive A and the target diskette in drive B, enter DISKCOPY A: B:.



- When writing is completed, the system asks if you want to copy another diskette. Enter N.
- The next step is to enter the command as shown below. This is done to insure that the copy was successful.

```
A>DISKCOMP A: A:
Insert the First Diskette in Drive A:
Strike any Key when Ready ...
Comparing... 80 tracks, 9 sectors per track, 2 sides...
Track : xx
Insert the Second Diskette in Drive A:
Strike any Key when Ready ...
Track : xx
Insert the First Diskette in Drive A:
Strike any Key when Ready ...
Track : xx

Diskette compare OK
Compare more diskettes (Y/N)?
```

- Replace the diskette in drive A with the MS-DOS\* diskette, and simply press any key on the keyboard. The system then begins reading the contents of the diskette.
- When reading is completed, the system instructs you to insert the second diskette in drive A. Replace the diskette with the one onto which you have copied the MS-DOS\* diskette, and press any key. The system begins comparing the contents of the diskette with that of the MS-DOS\* diskette. The computer repeats steps 6 and 7, this time first reading the second diskette then comparing it with the first diskette.

**Note:** If your computer's memory is expanded, the diskette comparison may be completed with less diskette exchange operation. If the optional second floppy disk drive is installed, you may compare the two diskettes directly by entering DISKCOMP A: B:.

If the two diskettes do not compare properly, error messages appear. Perform the DISKCOPY again.

- Once the DISKCOPY is completed, the system asks if you want to compare more diskettes. Enter N.

Store the MS-DOS\* diskette in a safe place. Next, remove the diskette from drive A and label it.

You can then return the diskette into drive A to continue, or you can turn off the system.

## System Restarts

In certain instances, you may want to return the system to its start-up state – with only MS-DOS\* in memory. For example, this can be used when a new application program diskette is inserted in drive A.

This procedure is called restart (sometimes called "warm boot").

### CAUTION:

Any information in main memory will be lost when this procedure is performed. Be sure to do a file save first.

To perform this procedure, be sure the NumLock key is off, press and hold down the Ctrl, Alt, and Del keys simultaneously, then release. The system reacts as if power was just turned on, except that it bypassed an internal check.

If there is no diskette in drive A, the system displays the following:

```
Loading A: ... Error 1
Diskette Drive Empty...
Please Insert a System Disk and Press any Key:_
```

If this occurs, insert a diskette containing MS-DOS\* in drive A, then press any key.

The system can be restarted under most operating conditions.

If a situation occurs where you are unable to restart the system with this procedure, turn power off to the computer, wait five seconds, then turn power on, or perform a system reset by:

- pressing **Ctrl/Alt/Set Up**
- or
- setting dip switch 1 on the bottom of the unit to the ON and then OFF position.

See Chapter 3 for further information.

## Set Up Functions

The computer allows you to customize the configuration of your system through the functions on the set up screen.

**Note:** This screen provides an alternative to the MS-DOS\* DATE, TIME, and MODE commands.

### Accessing Set Up

Once your system is turned on, you can access these configuration settings by pressing the **Set Up** key located in the upper left corner of the keyboard.

**Note:** When you are running an application, the set up function may not be accessible. If this occurs, exit the application, then press **Set Up**. In some rare cases, the application will not accept the settings specified by the set up function.

Here's what the standard set up screen looks like:

```

SHARP PERSONAL COMPUTER SYSTEM SET-UP MENU (Version 1.00 02/02/87)
----- Clock -----
Time: 03:14:34
Date: Sat March 21 1987
----- Power -----
On Condition: None

----- Communication-----
COM1: Not Present
COM2: Not Present

----- Printer -----
Interface: Parallel
Port Address: 18Ch

----- Display -----
Display Mode: Graphics
Cursor Blink: 2/second
Cursor Type: Underline
Character Blink: 1/second
Background: Standard

----- System -----
Speed: Standard
Key Click: Off
Console: CGA
Drive A: Internal 3.5"

Default Setup: F1

1. Position Cursor using cursor keypad
2. Press Spacebar to change
3. Press Set Up key to Update and Exit

```

This screen displays six set up function categories – clock, power, display, communication, printer, and system – with the default settings for each field. Default means the setting that the system assumes unless you tell it otherwise.

If you have installed the CE-451M modem card, CE-451B serial I/O card, or CE-451A CRT adaptor, additional categories display. See Chapter 6 for more information about these settings.

## Making Selections

When you first access this screen after turning on the computer, the cursor is positioned in the first field. There are several ways to move the cursor from field to field on this screen.

To move forward through each field, use the **Right Arrow** or **Down Arrow** key. To move backward through each field, use the **Left Arrow** or **Up Arrow** key.

Once you are in a field, press the **Space Bar** to cycle through the possible settings for the field. Once the desired setting appears, go to another field or press **Set Up** to exit the screen.

If you change any settings, then decide you want to return all fields to their default settings, press the **F1** key. The system then restores all fields, except date, time and alarm time, to their default settings.

When you press **Set Up** to exit the screen, the system saves your entries.

If you changed a setting that requires system restart, the system prompts you to press **Enter** after pressing the **Set Up** key.

When you press **Esc**, the system exits the set up screen without saving your entries.

**Note:** A limited number of keys are active in the set up screen. A beep will sound if you press any key other than those described above.

The set up screen is backed up by lead battery. All selections are maintained even when power is turned off. If the system is stored for an extended period of time, however, it may be necessary to reset the values. For recharging battery, see “AC Adaptor Connection” in Chapter 3.

The following is a description of each field.

## Clock

The computer contains a battery operated clock that keeps track of the time and date. When you first purchase the system, the current time and date must be set.

**Time.** This field is divided into three parts – hours, minutes, and seconds. Time is set in a 24-hour clock format. For example, 6 p.m. would be 18 hours.

**Date.** This field is divided into three parts – month, day, and year. The day of the week (i.e., Mon, Tue, Wed, etc.) is set automatically after the month, day, and year have been entered.

**Note:** This is equivalent to entering the DATE and TIME commands in MS-DOS\*.

## Power

This category contains the setting for power control. Power is usually turned on and off by pressing the ON/OFF button provided at the right side panel.

If you select Alarm in the On Condition field and specify time in the next field, power is automatically turned on to the computer when the specified time comes.

**On Condition.** The possible settings are: None or Alarm.

**Alarm Time.** This field appears when you select Alarm in the On Condition field. Specify the alarm time in the same format as Time in the Clock category.

**Note:** If you have installed the CE-451M modem card, additional selections can be made. See Chapter 6 for more information about these settings.

## Display

This category contains the settings that control the screen. These settings have no effect on a CRT connected to the system except for the cursor type.

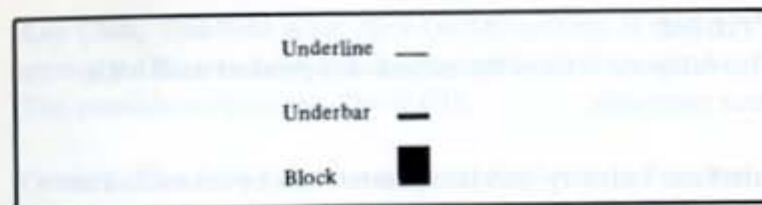
**Display Mode.** Certain applications require the screen to operate in graphics or monochrome mode. The display mode can be set to emulate a color/graphics adaptor or monochrome display adaptor.

The possible settings are: Graphics, or Monochrome.

**Note:** Display mode only controls the computer's screen – it does not control a CRT connected to the system. For the mode setting for a CRT, see Chapter 6.

**Cursor Blink.** The cursor blink rate is the number of times per second that the cursor blinks on the screen. Possible settings are: No Blink, 1/second, 2/second, or 4/second.

**Cursor Type.** The cursor's appearance can be changed. The possible settings are: Underline, Underbar or Block.



**Character Blink.** Some applications cause characters to blink on the screen. For example, in word processing, an entire word might blink if it is spelled incorrectly. The possible settings are: 1/second, 2/second, or 4/second.

**Background.** The screen background can be set to display in standard – dark characters on a light background – or inverse – light characters on a dark background. The possible settings are: Standard or Inverse.

## Communication

This category contains the settings allowing you to define the use of two channel (COM1, COM2) communication ports for the internal modem or internal SIO.

**Note:** Only one of the two settings, Internal Modem or Internal SIO, can be supported. For details, see Chapter 6.

## Printer

This category defines the settings for printers used with your computer.

**Interface.** Industry standard printers can be connected to either the parallel or serial port. If a printer is connected to the parallel port, select parallel. If a printer is connected to the serial port, select serial. The possible settings are: Serial or Parallel.

**Port address.** The port address parameter allows you to change the printer port address to match the address used by your software application. In the vast majority of applications, the default address, 3BCH should be used.

**3BCH:** Represents the port address of the parallel port on the IBM\* monochrome display and printer adaptors. This address is used by most applications.

**378H:** Represents the address of another parallel port. Some applications may be written to directly address this port. Try this address when your application does not address the default port address.

## System

There are five miscellaneous fields in this category.

**Speed.** This field determines the speed of the processor. The standard processor can run at an efficient 7.16 MHz or at a slower speed required by some applications. The possible settings are: Standard or Slow.

**Key Click.** This field is for click On/Off setting. If this setting is ON, you hear a click whenever you press any key. The possible settings are: On or Off.

**Console.** This field determines which display type becomes the system console upon boot when the optional CRT adaptor is attached.

Since the liquid crystal display or the CRT can be either monochrome or color graphics, this selection tells the system which display should be the console. The display console can also be changed by using the MODE command. The possible settings are: CGA (color graphics adaptor) or MDA (monochrome display adaptor).

**Note:** The set up screen appears only on the console which is in the same display mode as specified in this field.

**Drive A.** This field is used to assign Floppy Disk Drive A to Internal 3-1/2" FDD or External 5-1/4" FDD. If External 5-1/4" is selected, DOS can be run from 5-1/4" diskette. The possible settings are: Internal 3.5" or External 5.25".

**Default.** If you change any fields on this screen, then decide you want to return all entries to the default values, press the F1 key in any field. Time and date are not affected.

## Running an Application

The computer allows you to run a wide variety of application software. This section provides a general overview of the steps involved in installing and running an application on the system.

In general, application software must be installed before it can be used. Installation procedures vary greatly from one application to another depending upon such factors as software copy protection.

In order to properly install a specific application, follow the instructions provided with the software.

To illustrate a typical session, we will describe sample procedures for running a word processing application. These steps provide a conceptual overview only.

**Note:** MS-DOS\* commands that are discussed in this chapter are described in more detail in Chapter 5.

### Getting Started

In this example, the word processor is supplied on two diskettes:

- ▲ Master word processing diskette
- ▲ Master spell checker diskette

The master word processing diskette contains the word processing software. The master spell checker diskette contains the spell checker software. Since neither of these diskettes contain MS-DOS\*, they could not be used to start up – or boot – the system.

Before running our example word processor, two steps must be completed:

1. Create boot diskettes.
2. Create data diskettes.

**Create Boot Diskettes.** We need to create two new diskettes. One diskette will contain MS-DOS\* plus the word processing software. The other will contain MS-DOS\* plus the spell checker software.

The following is an example of how to create a boot diskette.

1. Insert your working copy of MS-DOS\* in drive A.
2. Turn power on to the system. (If the power is already turned on and you are in MS-DOS\*, you can press **Ctrl/Alt/Del** to restart the system.)
3. Once the MS-DOS\* prompt appears (A>), enter the command shown below:

```
A>FORMAT A:/S
```

You will be asked to remove the MS-DOS\* diskette from drive A and replace with the blank diskette.

This will format and copy MS-DOS\* to the blank diskette in drive A.

4. Remove the MS-DOS\* diskette in drive A and replace with the master word processing diskette.

5. Enter the command shown below.

```
A>COPY A:*. * B:
```

When copying files from one diskette to another, use the drive designator B: for the target diskette.

This will copy all the files from the diskette in drive A to the target diskette. You will be asked to replace the master diskette with the target diskette during the copy. Repeat replacement as many times as the system requires.

6. Once this process is completed, remove the diskette and label it as the word processor boot diskette.

The same process would be followed for creating the spell checker boot diskette.

The boot diskettes are now created. In the process, the master diskettes can now be stored in a safe place as backups.

**Create Data Diskette.** There is one last step to perform before the application can be used. A data diskette needs to be created for the permanent storage of files created in word processing.

The following is an example of how to create a data diskette.

1. Insert your working copy of MS-DOS\* in drive A.
2. Enter the command shown below.

```
A>FORMAT A:
```

You will be asked to replace the MS-DOS\* diskette with a target diskette.

This prepares – or formats – a blank diskette to store files created by the word processor.

## Using the Application

You now are ready to use the application.

Suppose you now want to write a memo to your sales staff on the word processor. Here's what to do.

1. Insert the word processing boot diskette in drive A.
2. If the system's power has been turned off, turn on the power.
3. Once MS-DOS\* is loaded from the boot diskette in drive A, you can enter a command – defined by the system – to start the application. In our example, this command is the following:

```
A>WP
```

The application is then read into main memory. Once fully loaded, the application software displays on the screen. You can then follow the application software's documentation to complete the desired task – in this case, create a memo.

Once the memo is created, it is saved through the application onto a data diskette. The memo can then be printed, retrieved for future editing, or sent via the modem to another computer.

When finished with the word processor, the system returns you to MS-DOS\* where you can load another application, use MS-DOS\* commands, or remove the diskette and turn off the system.

## Backing Up Data

When important files have been created on a data diskette, the diskette should be copied to insure that data is not lost if something should happen to the diskette.

This process is called backing up your data. It is performed by using the DISKCOPY command. See Chapter 5 for more information about this command.

## Device Indicator

When installing applications software, you may be asked to identify the type of hardware being used. If specific selections for this computer are not listed, you may select other hardware settings that provide similar features. Use the following guidelines when making these selections:

**Display.** When identifying the display, select IBM\* color/graphics adaptor mode (when in Graphics mode) or IBM\* monochrome display adaptor mode (when in Monochrome mode).

**Keyboard.** When identifying the keyboard, select IBM\* PC layout.

**Optional Color Monitor.** When identifying the color monitor, select 640 x 200 two-color black and white mode or 320 x 200 four-color mode.

**Optional Monochrome Monitor.** When identifying the monochrome monitor, select IBM\* monochrome display adaptor mode.



**CE-451M Modem.** When identifying the CE-451M modem, the closest selection is Hayes Smartmodem 1200\*.

In some cases, more than one suitable selection may be available. It may be necessary to experiment with these settings to determine the best choice.

## Operating Addendum

In a limited number of cases, when installing or running application software, it may be necessary to follow some special operating procedures.

The following guidelines are supplied for your use.

**System Files on the DOS diskette.** In certain cases it may not be possible to transfer the system files from the DOS diskette onto a program diskette using the SYS command. If this occurs, do not attempt to create a bootable diskette; instead, load the DOS diskette in drive A then remove, and place the program diskette in drive A.

Even when you succeed in creating a bootable diskette, do not attempt to transfer system files on the bootable diskette to another diskette using the SYS command or using the FORMAT command with the /S option.

**Cursor Type and Blink Rate.** The computer allows you to select underline, underbar, or block cursor types as well as cursor blink rate for the liquid crystal display. Certain application software, however, does not support changes to cursor type or blink rate and will either ignore those settings in the set up menu or cause unpredictable results on the display.

**Aspect Ratio.** Graphics, e.g., a circle, on the CRT display will appear slightly elongated in the horizontal direction when displayed on the liquid crystal display. This is because the aspect ratio of the liquid crystal display differs from that of the CRT display.

**System Reaction When Running Application.** In some rare cases when running certain application programs, the ON/OFF button and/or the key lock indicators may react slowly. If the ON/OFF button does not function at all, return to MS-DOS\*, then press the button again. If the problem continues, execute the system reset by pressing the Set Up key while holding down the Ctrl and Alt keys.

## More on MS-DOS\*

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Files

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MS-DOS\* Prompt

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MS-DOS\* Commands

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## Overview

This chapter is an introduction to the operating system software – MS-DOS\*. It provides you with enough information to perform basic MS-DOS\* file management activities.

- The first section describes the role of files in MS-DOS\*.
- The second section defines some basic keyboard rules when using MS-DOS\*.
- The third section describes the MS-DOS\* prompt.
- The fourth section describes some common MS-DOS\* commands.

## Files

In addition to managing system resources, the MS-DOS® operating system manages files created on the computer.

### What are Files?

A file is related information created on the computer and saved on a diskette for future use.

Typically, files are created through the use of application programs. For example, in a word processing application, you may create a file that contains a letter to prospective clients. Similarly, a spreadsheet application may be used to create a cash flow analysis.

Files created through applications are usually referred to as data files since they contain information – or data.

### How are Files Used?

Once a file is created, it is identified by a file name and saved on a floppy diskette.

At a later time, the file can be retrieved and edited to reflect changes, sent to the printer to create a paper copy, or sent to the modem for transmission to another computer via telephone lines.

For the most part, you create, name, save, and retrieve files through the application software which actually instructs MS-DOS® to perform these tasks.

Certain file management activities are handled directly through MS-DOS®. For example, suppose you have saved several spreadsheets on a diskette, and now want to make a copy of the diskette for backup. The MS-DOS® command DISKCOPY is used to perform this task.

## Naming Files

Files must be identified by a unique name before they can be saved on a diskette or hard disk. Let's cover a few important MS-DOS\* requirements for naming files.

First, a file name generally has two parts — the name and the extension.

The name typically identifies the file. For example, MEMO could be the name of a word processing file containing a memo.

The extension typically categorizes the file. For example, the MEMO file might have the extension DOC to indicate that the file is a document. The file extension is optional; however, it is useful for identifying files in the same category.

The name and extension are separated by a period (e.g., MEMO.DOC). If an extension is used, it becomes a permanent part of the file name.

The name can be up to eight characters and the extension up to three characters.

**Note:** All files stored in the same directory on a diskette must have unique names.

**Acceptable Characters.** The following are acceptable characters in file names:

Any letter in the alphabet. MS-DOS\* makes no distinction between upper and lower case, so either case is acceptable.

Numerals (i.e., 0 through 9)

Punctuation marks as follows:

! @ # % & ' ( ) - - ' { } ~

**Unacceptable Characters.** Characters other than those shown above are unacceptable characters in a file name. For example, commas, double quotation marks, and spaces are not acceptable.

**Note:** Remember, extensions begin with a period, so be careful where you use them.

## Saving Files

When a file is saved on a diskette, information about the file is stored in the directory. Information such as the file name, size (number of bytes), and date last updated appears in the directory.

When files are added, deleted, or renamed, the directory is automatically updated to reflect the current status of the diskette (see DIR command).

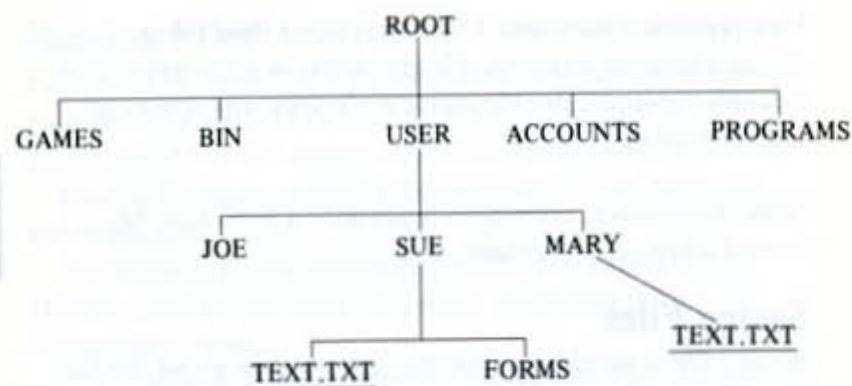
## Directory

A directory is a group of files. At the time of power on, you are in the directory called "root directory". You can create subdirectories under the root directory, as well as subdirectories under each subdirectory using the MKDIR command. In this way, you can construct a "tree" structure of directories on a diskette.

You can "travel" around this tree; for example, you can find any file in the system by starting at the root directory and traveling down any of the subdirectories to the desired file, or vice versa.

The directory you are in is called "working directory". You can change your working directory to any directory using the CHDIR command. Unless you take special action when you create a file, the new file is created in your working directory. You can have files of the same name in different directories.

The illustration below shows a typical tree structure of directories.



Note: Those with underline are files.

To identify a file in a different directory from your working directory, specify the file name following each directory name from the root directory. For example, if you want to identify the TEXT. TXT file in the MARY directory, specify,

`\USER\MARY\TEXT.TXT`

This name, optionally preceded by the drive specifier, is called "pathname", and the pathname which contains no file name is called "path".

Notice each directory name is separated by back slash (\).

## Keyboard Usage

When MS-DOS\* is in effect, the keyboard functions as described below.

**Enter.** This key is used to send a command to the operating system. Always remember to press **Enter** once you have typed the command.

**Esc.** This key is used to cancel a line. If you have typed a command incorrectly and want to start over, press **Esc**. The command is then cancelled and a backslash appears on the cancelled line.

**Backspace.** This key moves the cursor backwards, erasing one character at a time. If you discover a typing error while typing a command, press **Backspace**, then re-type the command.

**Ctrl/Scroll Lock.** Pressing **Scroll Lock** while holding down **Ctrl** stops a command that is currently being processed. Sometimes called "Break", this key is used to abort a program that is running on the system. **Ctrl/C** performs the same function except that it is ineffective if some key is pressed before **Ctrl/C**.

**Ctrl/NumLock.** Pressing **NumLock** while holding down **Ctrl** stops the display of data on the screen. To continue displaying, press any key. **Ctrl/S** performs the same function except that it is ineffective if some key is pressed before **Ctrl/S**.

**PrtSc.** This key is used to send information to the printer in MS-DOS\*. To print what appears on the screen, press **PrtSc** while holding down **Shift**. (Be sure the printer is connected before you use **PrtSc**.) To print a line every time you press **Enter**, press **Ctrl** and **PrtSc** together. To stop printout, press **Ctrl/PrtSc** again.

**F1** or **→**. This key copies and displays one character from the retained line.

**F2.** This key copies and displays all characters up to (not including) the specified character.

**F3.** This key copies all remaining characters from the retained line.

**F4.** This key skips all characters in the retained line up to (not including) the specified character.

**F5.** This key accepts the new line as a retained line for more editing.

**F6.** This key puts a **Ctrl/Z** (^Z) end-of-file character.

**Del.** This key skips one character in the retained line.

**Ins.** This toggle key enters and exits the insert mode as it is pressed.

**Note:** On most typewriters, number one (1) and the lower case letter "l" can be used in place of each other. The same applies to zero (0) and the letter "O." On the computer, however, these keys have unique meanings and must be used appropriately.

## MS-DOS\* Prompt

Since you will be working with both the operating system and application software, you need to recognize when MS-DOS\* is in effect.

Under MS-DOS\*, the system displays the prompt like this:

```
A>
```

There are three typical ways to get to the MS-DOS\* prompt:

- ▲ System start-up
- ▲ Exit an application
- ▲ System restart

**System Start-up.** When you turn on the system with an MS-DOS\* diskette in drive A, the MS-DOS\* prompt is displayed after the software is loaded into main memory.

**Exit an Application.** When you exit an application such as word processing, you are returned to MS-DOS\*.

**System Restart.** Pressing **Ctrl/Alt/Del** clears main memory and re-loads MS-DOS\*. Remember, you could lose data if you perform this step without first saving your file.

## Drive Specifier

The MS-DOS\* prompt also identifies the current default disk drive. Look at the following example.

```
A>
```

The "A" tells you that the default drive is drive A. In other words, unless instructed otherwise, all reading and writing will be done to drive A. If you wanted to delete a file on the diskette in drive A, you would only need to enter the MS-DOS\* command and the file name as shown in the example below.

```
A>DEL BUDGET.DOC
```

The operating system will look for the file "BUDGET.DOC" on the diskette in drive A. But what if the file is on another drive? You have two options – you can specify the drive location as part of the command or you can change the default drive to the one you like before issuing the command.

**For user with an additional 3-1/2 inch floppy disk drive**  
The example below shows how you would include the drive location as part of the command.

```
A>DEL B:BUDGET.DOC
```

The "B:" tells MS-DOS\* to look for the file "BUDGET.DOC" on the diskette in drive B.

The example below shows how to change the default to drive B before entering the command to delete the file.

```
A>B:
B>DEL BUDGET.DOC
```

First, "B:" is entered to change the default drive from A to B. Notice how the prompt on the second line is "B>". Once the default has been specified, the command can be entered without the drive being specified.

## Logical Drive B

When using the computer with a single disk drive, the drive B designator should be used in certain MS-DOS\* operations. For example, when copying files from one diskette to another, you will need to signal the system that a new diskette will be inserted into drive A. To do this, use B: to designate the target diskette:

```
A>COPY FILENAME.DOC B:
```

**Note:** If you are using the optional CE-452F external floppy disk drive with your computer, you cannot use logical drive B.



## MS-DOS\* Commands

Below is the list of command names contained on the diskettes. Use this as a quick reference to determine the command you want to use.

<b>COMMAND</b>	MS-DOS command processor
<b>ASSIGN</b>	Drive assignment
<b>BREAK</b>	Sets Ctrl/C check
<b>CHDIR</b>	Changes directories; prints working directory (CD)
<b>CHKDSK</b>	Scans the directory of the default or designated drive and checks for consistency
<b>CLS</b>	Clears screen
<b>COPY</b>	Copies file(s) specified
<b>CTTY</b>	Changes console TTY
<b>DATE</b>	Displays and sets date
<b>DEBUG</b>	Debugger
<b>DEL</b>	Deletes file(s) specified (ERASE)
<b>DIR</b>	Lists requested directory entries
<b>DISKCOMP</b>	Compares diskettes
<b>DISKCOPY</b>	Copies diskettes
<b>EDLIN</b>	Line editor
<b>EXE2BIN</b>	Converts executable files to binary format
<b>EXIT</b>	Exits command and returns to lower level
<b>FC</b>	Compares files
<b>FIND</b>	Searches for a constant string of text
<b>FORMAT</b>	Formats a diskette to receive MS-DOS files
<b>GRAPHICS</b>	Prints graphics
<b>LINK</b>	Linker
<b>MKDIR</b>	Makes a directory (MD)

<b>MODE</b>	Mode selector
<b>MORE</b>	Displays output one screen at a time
<b>PATH</b>	Sets a command search path
<b>PRINT</b>	Background print
<b>PROMPT</b>	Changes the MS-DOS command prompt
<b>RECOVER</b>	Recovers a bad diskette
<b>REN</b>	Renames first file as second file (RENAME)
<b>RMDIR</b>	Removes a directory (RD)
<b>SET</b>	Sets one string value to another
<b>SORT</b>	Sorts data alphabetically, forward or backward
<b>SYS</b>	Transfers system
<b>TIME</b>	Displays and sets time
<b>TREE</b>	Displays all the paths on the specified drive
<b>TYPE</b>	Displays the contents of file specified
<b>VER</b>	Prints MS-DOS version number
<b>VERIFY</b>	Verifies writes to diskette
<b>VOL</b>	Prints volume identification number

#### BATCH PROCESSING COMMANDS

<b>ECHO</b>	Allows or inhibits the screen display of DOS commands executed from a batch file.
<b>FOR</b>	Allows iterative execution of DOS commands.
<b>GOTO</b>	Transfers control to the appropriate label.
<b>IF</b>	Conditional execution of DOS commands.
<b>PAUSE</b>	Suspends system processing.
<b>REM</b>	Displays remarks from within a batch file.
<b>SHIFT</b>	Allows command lines to make use of more than ten replaceable parameters.

### Syntax

MS-DOS\* commands must be entered in a specific sequence and must include certain parameters such as file name and drive designator. The syntax or rules for entering these commands are described below.

Commands always begin with the command name, followed by one blank space. Following the blank space are the parameters for the command. Parameters are additional information you supply with the command.

Two common parameters are file name and disk drive specifier. In command syntax, file name is shown as "filename" and disk drive specifier is shown as "d:".

When you enter the file name, be sure to include the file extension if one exists. When you specify a disk drive, enter the disk drive letter (e.g., A, B, C), followed by a colon.

Some parameters are optional while others are required. Optional parameters are shown in brackets (e.g., [filename]).

The following syntax notation is used in descriptions of commands:

- [ ] Square brackets indicate that the enclosed entry is optional.
- < > Angle brackets indicate data you must enter. When the angle brackets enclose lowercase text, you must type in an entry defined by the text; for example, < filename >.
- { } Braces indicate that you have a choice between two or more entries. At least one of the entries enclosed in braces must be chosen unless the entries are also enclosed in square brackets.
- ... Ellipses indicate that an entry may be repeated as many times as needed or desired.
- | A bar indicates an OR statement in a command.

Below is the table of syntaxes for DOS commands.

```
COMMAND
ASSIGN [x = y [...] ]
BREAK [ON|OFF]
```

CHDIR [<path>]  
 CHKDSK [<d:>] [<filename>] [/F] [/V]  
 CLS  
 COPY [/A] [/B] <pathname> [/A] [/B] [<pathname>]  
     [/A] [/B] [/V]  
 CTTY <device>  
 DATE [<mm>-<dd>-<yy>]  
 DEL <pathname>  
 DIR [<pathname>] [/P] [/W]  
 DISKCOMP <d:> <d:> [/1] [/8]  
 DISKCOPY <d:> <d:>  
 EXE2BIN <pathname> [<d:>] [<filename>] [<.ext>]  
 EXIT  
 FC [/# /B /W /C] <filename 1> <filename 2>  
 FIND [/V /C /N] <string> [<filename ...>]  
 FORMAT [<d:>] [/1] [/2] [/8] [/9] [/S] [/C]  
 GRAPHICS  
 MKDIR <path>  
 MODE [n] [,m [,T] ]  
     or  
 MODE COMn: <baud rate> [,<parity>  
     [,<data bit> [,<stop bit> [,P] ] ] ]  
     or  
 MODE LPT#: = COMm  
     or  
 MODE LPT#: = [n] [,m] [,P]  
 MORE  
 PATH [<path> [<path>] ...]  
 PRINT [[<filename>] [/T] [/C] [/P] ] ...  
 PROMPT [<prompt-text>]  
 RECOVER [<filename>|<d:>]  
 REN <filename> <filename>  
 RMDIR <path>  
 SET [<string> = [<string> ] ]  
 SORT [/R] [/+n]

SYS <d:>  
 TIME [<hh> [[:<mm> ] ] ]  
 TYPE <pathname>  
 VER  
 VERIFY [ON|OFF]  
 VOL [<d:>]

### BATCH PROCESSING COMMANDS

ECHO [ON|OFF|message]  
 FOR %%<C> IN <set> DO <command>  
     – for bath processing  
     or  
 FOR %<C> IN <set> DO <command>  
     – for interactive processing  
 GOTO <label>  
 IF [NOT] <condition> <command>  
 PAUSE [comment]  
 REM [comment]  
 SHIFT

### EDLIN COMMAND

[<line>]	(Edits line no.)
[<n>] A	(Appends lines)
[<line>], [<line>], <line> [,<count>] C	(Copies lines)
[<line>] [,<line>] D	(Deletes lines)
E	(Ends editing)
[<line>] I	(Inserts lines)
[<line>] [,<line>] L	(Lists text)
[<line>], [<line>], <line> M	(Moves lines)
[<line>] [,<line>] P	(Pages text)
Q	(Quits editing)

[<line>] [,<line>] [?] R (Replaces lines)  
 [<string 1>] [Ctrl/Z]  
 [<string 2>]  
 [<line>] [,<line>] [?] S (Searches text)  
 [<string>]  
 [<line>] T <filespec> (Transfers text)  
 [<n>] W (Writes lines)

### DEBUG COMMAND

A [<address>] (Assemble)  
 C <range> <address> (Compare)  
 D [<range>] (Dump)  
 E <address> [<list>] (Enter)  
 F <range> <list> (Fill)  
 G [=<address> [<address>...]] (Go)  
 H <value> <value> (Hex)  
 I <value> (Input)  
 L [<address> [<drive> <record> <record>]] (Load)  
 M <range> <address> (Move)  
 N <filename> [<filename>] (Name)  
 O <value> <byte> (Output)  
 Q  
 R [<register-name>] (Register)  
 S <range> <list> (Search)  
 T [=<address>] [<value>] (Trace)  
 U [<range>] (Unassemble)  
 W [<address> [<drive> <record> <record>]] (Write)

The rest of this section provides a more detailed description of the most commonly used commands.

### CHDIR

This command changes your working directory to the specified one. You can specify the directory by typing from the root directory (\) or working directory down to the one you like. You must separate directories with the backward slash mark (\). Entering this command without directory name displays the current working directory.

Example:

```
A>CHDIR \WP\SHARP\ABC
```

### CHKDSK

This command is used to check and report on the status of the diskette and memory. It scans the directory of the default or specified drive and checks it for any structural errors. Once the diskette has been checked, the system displays any error messages followed by a status report.

Example:

```
A>CHKDSK A:
Volume SHARP created Jan 1, 1987 9:00a

730112 bytes total disk space
 25600 bytes in 3 hidden files
  1024 bytes in 1 directory
159744 bytes in 27 user files
543744 bytes available on disk

262144 bytes total memory
231152 bytes free
```

## COPY

This command copies a file from one diskette to another or onto the same diskette. The /V parameter can be included to instruct the system to verify the copy was successful.

Example:

```
A>COPY MEMO.DOC B:MEMO.B5
1 File(s) copied
```

**Note:** All files in the same directory must have a unique name. When copying a file in the same directory, rename the copy.

```
A>COPY MEMO.DOC NEWMEMO.DOC
1 File(s) copied
```

## DEL

This command deletes files that are no longer needed from the diskette. The process removes the file name from the directory and makes space available for new files.

**CAUTION:**

Use this command only when you are certain you want to delete the file. Data is lost once this command is used.

Example:

```
A>DEL MEMO.DOC
```

## DIR

This command lists file names, file sizes, and date files were last updated. If a file name is not specified, all directory entries on the diskette in the default drive display. The parameter /P can be added to cause the system to pause once a screen is full. Press any key to continue. The parameter /W can also be added to list only file names in five columns across the screen.

Example:

```
A>DIR
Volume in drive A has no label
Directory of A:\

COMMAND  COM   15957    8-01-85 12:00p
AUTOEXEC BAT    26      7-26-86 12:07a
CONFIG   SYS    27      4-28-87  1:59p
BIN      directory 7-26-86 12:00a
4 File(s) 543744 bytes free
```

## DISKCOMP

This command compares one diskette to another on a track-by-track basis. If any tracks are unequal, error messages are issued.

Example:

```
A>DISKCOMP A: A:
Insert the First Diskette in Drive A:
Strike any Key when Ready ...
Comparing... 80 tracks, 9 sectors per track, 2 sides...
Track : xx
Insert the Second Diskette in Drive A:
Strike any Key when Ready ...
Track : xx
Insert the First Diskette in Drive A:
Strike any Key when Ready ...
Track : xx
Insert the First Diskette in Drive A:
Strike any Key when Ready ...
Track : xx

Diskettes compare OK
Compare more diskettes (Y/N)? N
```

## DISKCOPY

This command copies all files on one diskette to another. If a new diskette is used as the destination diskette, DISKCOPY automatically formats the diskette before copying.

Example:

```
A>DISKCOPY A: A:
Insert the Source Diskette in Drive A:
Strike any Key when Ready ...
Copying 80 tracks, 9 sectors per track, 2 sides...
Track : xx
Insert the Target Diskette in Drive A:
Strike any Key when Ready ...
Track : 00
Formatting while Copying...
Track : xx
Insert the Source Diskette in Drive A:
Strike any Key when Ready ...
Track : xx
Insert the Target Diskette in Drive A:
Strike any Key when Ready ...
Track : xx

Copy complete
Copy Another (Y/N)? N
```

## FC

This command compares individual files on the same diskette or different diskettes on a byte by byte basis. Any unequal bytes result in error messages. It is frequently used after copying to verify that the copy was successful.

Example:

```
A>FC MEMO.DOC B:MEMO.DOC
```

## FORMAT

This command prepares a diskette for use with MS-DOS\*. In addition, this command checks for defective tracks on the diskette. The /S parameter can be added to copy the internal operating system programs after formatting the diskette.

**CAUTION:** FORMAT will erase any files stored on the diskette.

**Note:** The DISKCOPY command formats a diskette as part of the copy operation.

Example:

```
A>FORMAT A:
Insert the New Diskette in Drive A:
Strike any Key when Ready...
Formatting...
Track : 79
Testing for Bad Sectors...
Track : 78
Volume label (11 characters, ENTER for none)? SALESREP
730112 bytes total disk space
730112 bytes available on disk
Format another (Y/N)? N
```

## MKDIR

This command makes a new directory at the location and with the name you specify.

Example:

```
A>MKDIR \WP\SHARP\ABC
```

## RENAME

This command changes the name of existing files.

Example:

```
A>REN MEMO.DOC LETTER.DOC
```

## TYPE

This command displays the contents of a file.

Example:

```
A>TYPE SALESRPT.DOC
```

Once the command is entered, the system then displays the file contents. If you need to stop a file as it displays on the screen, use **Ctrl/NumLock**.

## Global Commands

Global commands are commands that are carried out on a group of related files.

Instead of specifying a specific file name to be copied, deleted, renamed, etc., all file names in a given category can be specified. Two characters, the question mark (?) and the asterisk (\*), are used as wild cards when specifying file names.

Let's look at the ? character first. The example below shows how the ? character can be used to mask one character in the file name.

```
A>DEL BUDGET.7?
```

The ? character means that any character may occupy the ? position in the file name. All other characters in the file name must match.

In this example, the files BUDGET.77, BUDGET.78, and BUDGET.79 would all be deleted. The file BUDGET.80 would not be deleted.

Let's look at the \* character. The example below shows how the \* character is used to mask many characters in the file name.

```
A>DIR *.DOC
```

The \* character, when used as part of a file name, means that any characters can occupy the position of the \*, and the remaining positions up to the file extension.

In this example, the files MEMO.DOC, LETTER.DOC, and SALES.DOC would display in the directory. In other words, all file names with the extension .DOC would display.

Note: Using \*. \* in a command means all files are affected.

### CAUTION:

Although global commands are time savers, they should be used carefully, especially with DEL. Entering a sequence such as DEL \*.\* would delete all files on the diskette.

## Automatic Program Execution

If you want to run a specific program automatically each time you start MS-DOS\*, you can do so with Automatic Program Execution.

When you start MS-DOS\*, the command processor searches for a file named AUTOEXEC.BAT on the MS-DOS\* diskette. This file is a program that MS-DOS\* will run each time MS-DOS\* is started.

If MS-DOS\* finds the AUTOEXEC.BAT file, the file is immediately executed by the command processor and the date and time prompts are bypassed.

If MS-DOS\* does not find an AUTOEXEC.BAT file when you first load the MS-DOS\* diskette, then the date and time prompts will be issued.



**Example:**

If you wanted to automatically display the directory of the diskette in drive A each time you started MS-DOS\*, you could create an AUTOEXEC.BAT file as follows:

**Note:** The MS-DOS\* diskette provided with the computer contains important data in the AUTOEXEC.BAT file. Since the example below destroys the original AUTOEXEC.BAT file, use a diskette which does not contain an AUTOEXEC.BAT file.

## 1. Type:

```
COPY CON AUTOEXEC.BAT
```

and press **Enter**.

This statement tells MS-DOS\* to copy the information from the console (keyboard) into the AUTOEXEC.BAT file. Note that the AUTOEXEC.BAT file must be created in the root directory of your MS-DOS\* diskette.

## 2. Now type:

```
DIR
```

and press **Enter**.

This statement goes into the AUTOEXEC.BAT file. It tells MS-DOS\* to display the directory whenever MS-DOS\* is started.

3. Type **Z** while holding down the **Ctrl** key and then press the **Enter** key to put the command **DIR** in the AUTOEXEC.BAT file.

4. The directory will now be automatically displayed whenever you start MS-DOS\*.

**Command Piping**

If you want to give more than one command to the system at a time, you can "pipe" commands to MS-DOS. For example, you may occasionally need to have the output of one program sent as the input to another program. A typical case would be a program that produces output in columns. It could be desirable to have this columnar output sorted.

Piping is done by separating commands with the pipe separator "|". For example, the command

```
DIR |SORT
```

will give you an alphabetically sorted listing of your directory. The character "|" causes all output generated by the left side of this character to be sent to the right side of this character for processing.

Piping can also be used when you want to output to a file. If you want your directory sorted and sent to a new file (for example, DIREC.FIL), you could type:

```
DIR |SORT >DIREC.FIL
```

MS-DOS will create a file named DIREC.FIL on your default drive. DIREC.FIL contains a sorted listing of the directory on the default drive, since no other drive was specified in the command. To specify a drive other than the default drive, type:

```
DIR |SORT >B:DIREC.FIL
```

This sends the sorted data to a file named DIREC.FIL on drive B.

A pipeline may consist of more than two commands. For example,

```
DIR |SORT |MORE
```

will sort your directory, show it to you one screen at a time, and put `-- More --` at the bottom of your screen when there is more output to be seen.

## CONFIG.SYS File

In many cases, there are installation-specific settings for MS-DOS\* that need to be configured at system startup. An example of this is a standard device driver, such as an online printer.

The MS-DOS\* configuration file (CONFIG.SYS) allows you to configure your system with a minimum of effort. With this file, you can add device drivers to your system at startup. The configuration file is simply an ASCII file that has certain commands for MS-DOS\* startup (boot). The boot process is as follows:

1. The diskette boot sector is read. This contains enough code to read MS-DOS\* code and the installation's BIOS (machine-dependent code).
2. The MS-DOS\* code and BIOS are read.
3. A variety of BIOS initializations are done.
4. A system initialization routine reads the configuration file (CONFIG.SYS), if it exists, to perform device installation and other user options. Its final task is to execute the command interpreter, which finishes the MS-DOS\* boot process.

If there is not a CONFIG.SYS file on the MS-DOS diskette, you can use the MS-DOS\* editor, EDLIN, or COPY command to create a file; then save it on the MS-DOS\* diskette in your root directory.

The following is a list of commands for the configuration file CONFIG.SYS:

**BUFFERS = <number>**

This is the number of sector buffers that will comprise the system list. It is installation-dependent.

If not set, 2 is a reasonable number.

**FILES = <number>**

This is the number of open files that the XENIX system calls can access. It is installation-dependent.

If not set, 8 is a reasonable number.

**DEVICE = <filename>**

This installs the device driver in <filename> into the system list.

**BREAK = <ON or OFF>**

If ON is specified (the default is OFF), a check for Ctrl/C as input will be made every time the system is called. ON improves the ability to abort programs over previous versions of the MS-DOS\*.

**SHELL = <filename>**

This begins execution of the shell (top-level command processor) from <filename>.

A typical configuration file might look like this:

```

Buffers = 10
Files = 10
Device = \BIN \NETWORK.SYS
Break = ON
Shell = A: \BIN \COMMAND.COM A: \BIN
  
```

Note here that the Buffers and Files parameters are set to 10. The system initialization routine will search for the filename \BIN \NETWORK.SYS to find the device that is being added to the system. This file is usually supplied on diskette with your device. Make sure that you save the device file in the pathname that you specify in the Device parameter.

This configuration file also sets the MS-DOS\* command EXEC to the COMMAND.COM file located in the \BIN directory on diskette A. The A: \BIN tells COMMAND.COM where to look for itself when it needs to re-read from diskette.

## Internal Options

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Second 3-1/2" Floppy Disk Drive	6-33

## Overview

This chapter describes options that are installed as part of the internal hardware.

The first section describes how to install the CE-451R RAM card and CE-700R RAM expansion kit.

The second section describes how to install the CE-451A color/monochrome CRT adaptor.

The third section describes the CE-451B serial I/O card.

The fourth section describes the CE-451M modem card.

The fifth section describes the CE-451F second 3-1/2" floppy disk drive.

## Memory

This computer is configured with a total of 256K of main memory (RAM).

If you need to expand RAM, you can install the CE-451R RAM card to increase memory to 128K. The CE-451R also contains two rows of RAM chip sockets, four sockets per row. This is where the CE-700R RAM chips can be installed in increments of 128K (or one row) up to a total of 640K.

### Installation

The CE-451R optional RAM card is installed on the underside of the main unit.

To begin installation, turn off power to the main unit and disconnect the AC adaptor cord and external devices connected to the main unit.

Next, disconnect the battery as described below.

#### WARNING:

*This equipment contains electrical circuits that can cause bodily injury. Never remove the battery cover unless the main unit is turned off and the AC adaptor cord disconnected.*

Close the unit and place face up as shown on the next page.

Sharp Accessory  
Supply Company  
1800  
642  
2122

Sharp Sales  
312-  
759-8555

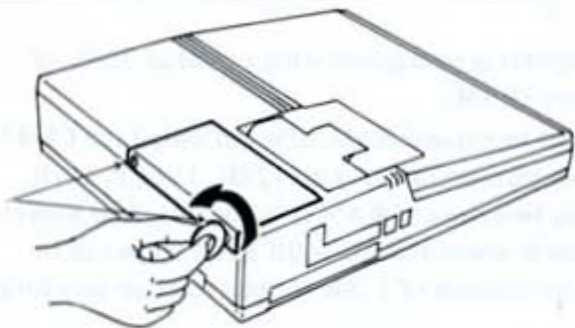
99.95 RAM card  
79.00/125

\$106.50

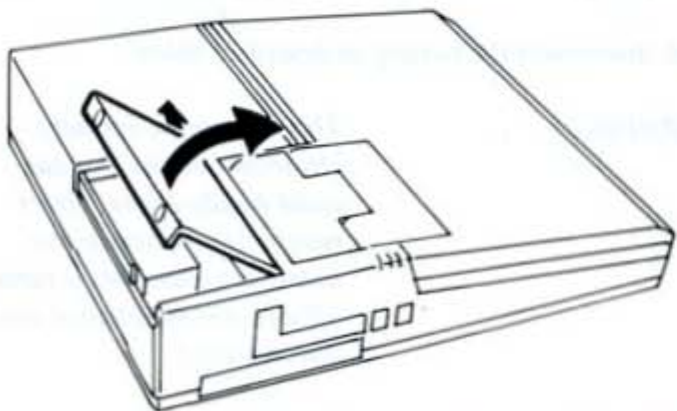
12  
1-10  
4-10  
2

Next, using a coin, do the following:

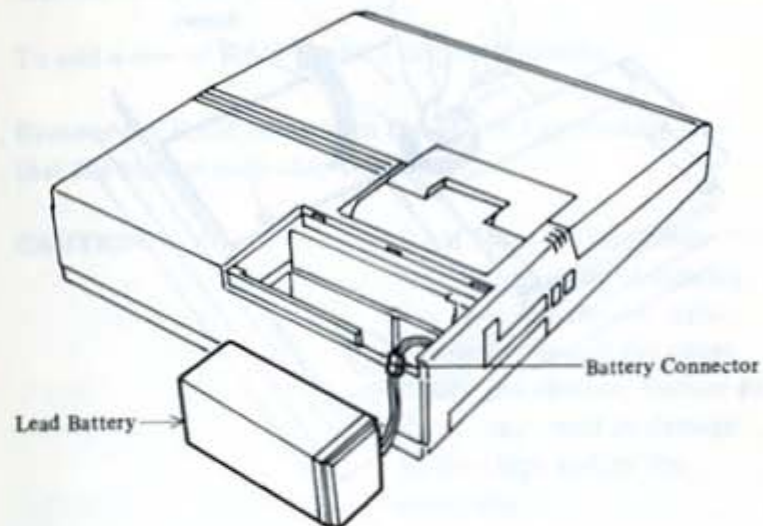
1. Unscrew, but do not remove, the two screws.



2. Remove the cover.



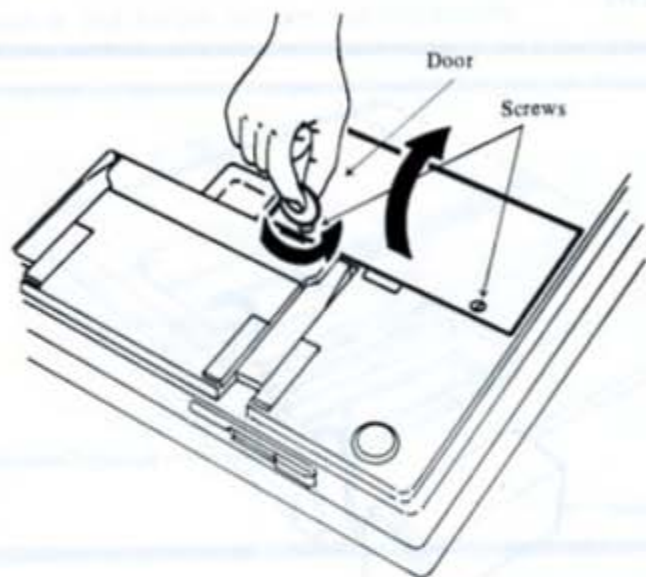
3. Take out the lead battery, and disconnect the battery connector.



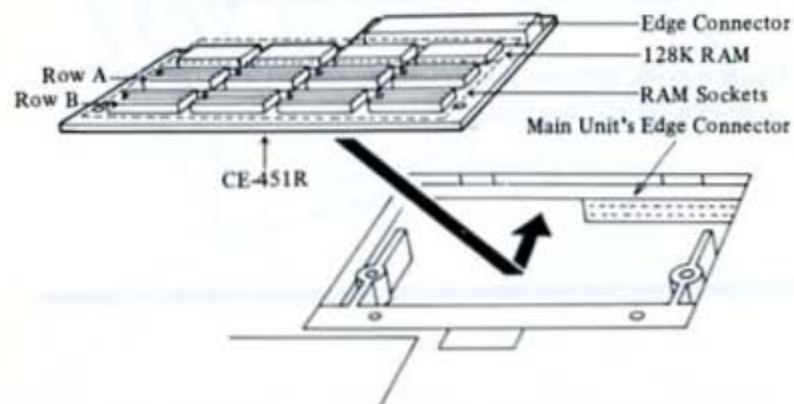
4. Replace the cover and tighten the screws.

Next, do the following:

1. Turn the main unit over so that it is face down.
2. Using a coin, remove two retaining screws and the door as shown on the next page.



3. Insert the optional RAM card's edge connector into the main unit's edge connector.



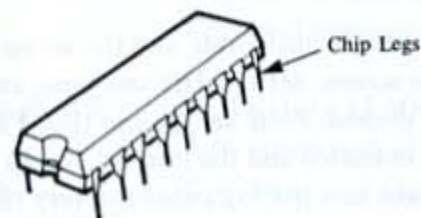
To further increase memory, install additional CE-700R RAM kits on the RAM sockets on the CE-451R in rows A and B. Each additional kit increases the capacity of main memory by 128K.

To add a row of RAM (128K), do the following:

1. Remove the RAM chips from the plastic bag, making sure that the legs on each chip are straight.

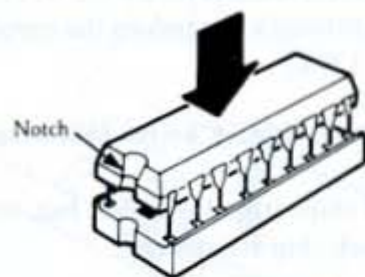
**CAUTION:**

RAM chips are extremely sensitive to static electricity. Try to eliminate any static between you and the chips during installation. Failure to do so may result in damage to the chips and/or the computer.



2. Insert one chip into the first socket in row A, making sure that the notch is facing the same direction as the standard RAM chips. Press down on both edges to make certain the chip is fully inserted.

**Note:** When inserting, be careful not to bend the legs on the RAM chips.



3. Insert the remaining three chips for the row in the same fashion.
4. If desired, do the same for row B.

After installing the additional RAM, fit the door in place, and tighten the screws to secure. Then replace the battery as described in Chapter 2.

This completes installation of additional RAM.

Turn power on to the main unit, and the set up menu appears on the screen. Set the date and time, and modify other fields if desired. Press **Set Up** and then **Enter**. The system is re-loaded and the internal checks are performed. Make sure the expanded memory capacity appears on the screen.

**Note:** One of the following types of RAM chips can be used for the CE-700R:

Hitachi	HM50464P-15
Fujitsu	MB81464-15
NEC	$\mu$ PD41464C-15
Toshiba	TMM41464P-15

Be sure not to insert different types of RAM chips in one row.

## Color/ Monochrome CRT Adaptor

This section describes how to install the CE-451A color/monochrome CRT adaptor in the computer to enhance display capabilities. Once the adaptor is installed, a color CRT with specifications conforming to IBM\* Color Display or a monochrome CRT with specifications shown on the next page can be connected to the system.

**Note:** Composite monitors and color televisions can not be used with your computer.

### Specifications for connectable color CRT

Interface:	R(red), G(green), B(blue), and I(intensity), V-synch, H-synch, completely separate, TTL level interface.
Video signal	
Video amp bandwidth:	15.7 KHz to 15 MHz
Signal level:	2.4V (min) to 5.25V (max)
Signal polarity:	Positive
Horizontal synch signal	
Horizontal scan frequency:	15.7 KHz
Signal level:	2.4V (min) to 5.25V (max)
Signal polarity:	Positive
Vertical synch signal	
Vertical scan frequency:	60 Hz
Signal level:	2.4V (min) to 5.25V (max)
Signal polarity:	Positive
Scan method:	Non-interlaced
Interfacing connector:	9-pin D-SUB connector, male



Pin Number	Signal Name	Input/Output
1	Ground	
2	Ground	
3	Red	Output
4	Green	Output
5	Blue	Output
6	Intensity	Output
7	Not used	
8	Horizontal synch	Output
9	Vertical synch	Output

### Specifications for connectable monochrome CRT

Interface: Video and I(intensity), V-synch, H-synch, completely separate, TTL level interface.

Video signal  
 Video amp bandwidth: 18.432 KHz to 16.27 MHz  
 Signal level: 2.4V (min) to 5.25V (max)  
 Signal polarity: Positive  
 Horizontal synch signal  
 Horizontal scan frequency: 18.432 KHz  
 Signal level: 2.4V (min) to 5.25V (max)  
 Signal polarity: Positive  
 Vertical synch signal  
 Vertical scan frequency: 50 Hz  
 Signal level: 2.4V (min) to 5.25V (max)  
 Signal polarity: Negative  
 Scan method: Non-interlaced  
 Interfacing connector: 9-pin D-SUB connector, male

Pin Number	Signal Name	Input/Output
1	Ground	
2	Ground	
3	Not used	
4	Not used	
5	Not used	
6	Intensity	Output
7	Video	Output
8	Horizontal synch	Output
9	Vertical synch	Output

### Installation

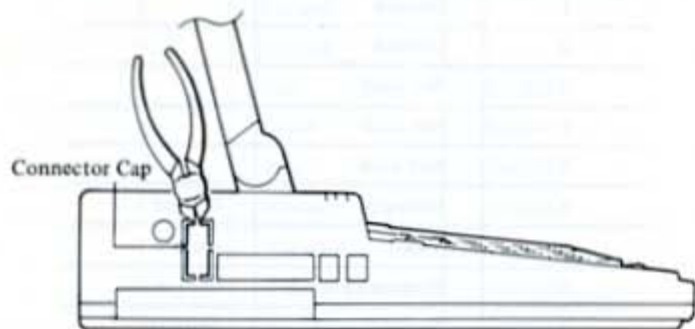
The CE-451A color/monochrome CRT adaptor is installed inside the battery cover.

To begin, close down the system as if you were getting ready for travel. This includes turning off power and disconnecting the AC adaptor cord and external devices connected to the main unit.

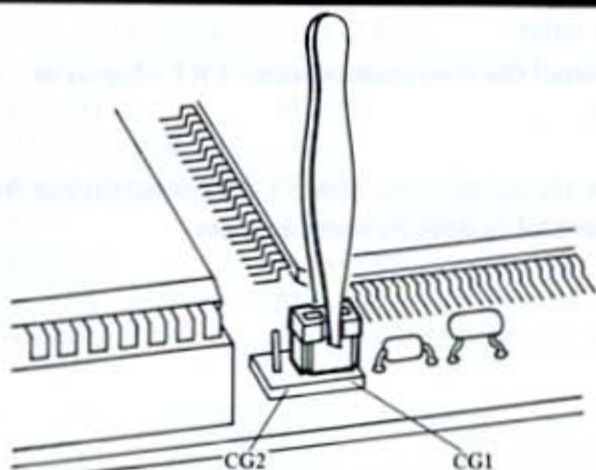
Next, remove the battery cover and battery as described in the first section of this chapter. Do not replace the battery cover.

Then install the color/monochrome CRT adaptor as follows:

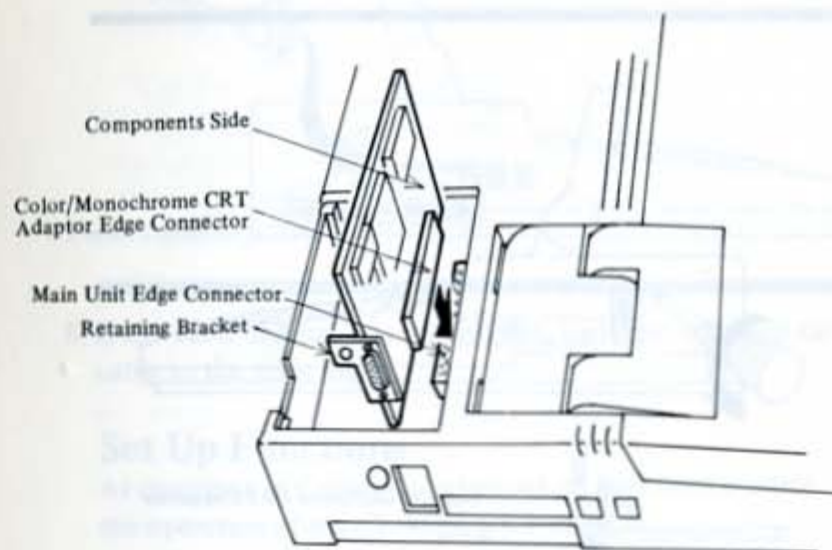
1. Remove the color/monochrome CRT connector cap from the main unit cabinet by using a nipper.



2. Before inserting the adaptor card, set the jumper plug according to the type of character set (CG1 or CG2). The original setting is for CG1. The character setting should remain at CG1 unless you are using the character set for Denmark/Norway. In that case, set the jumper switch to CG2.

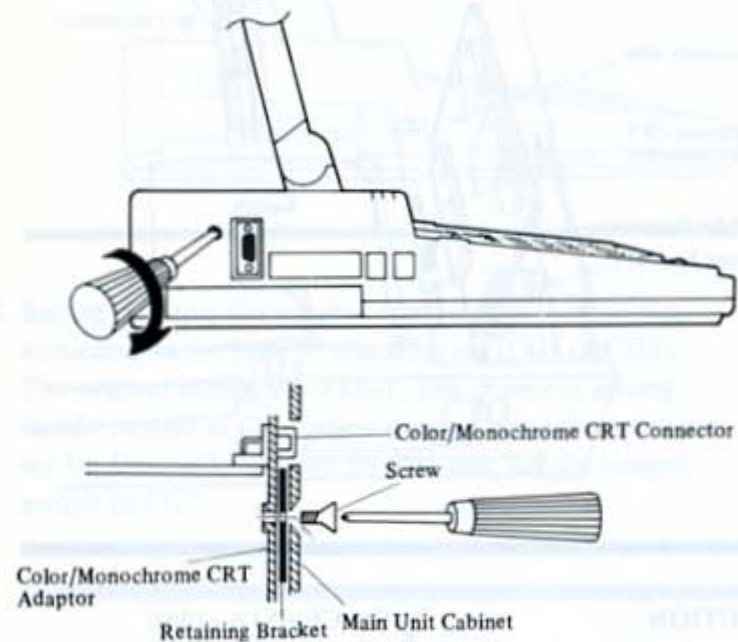


3. Insert the edge connector of the color/monochrome CRT adaptor into the edge connector of the main unit.

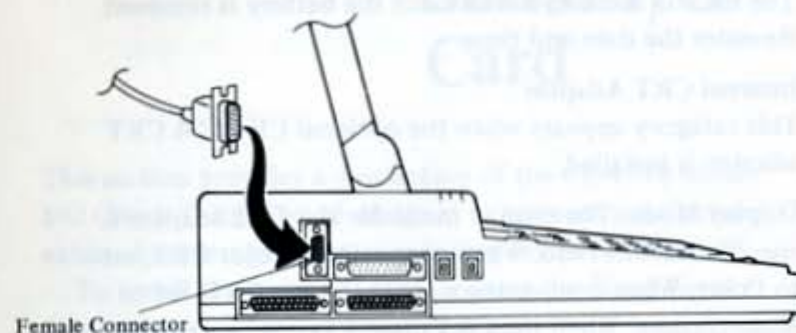
**CAUTION:**

The CE-451A color/monochrome CRT adaptor is very sensitive to static electricity. Be extremely careful when handling it. The bag containing the color/monochrome CRT adaptor protects it from static electricity. Keep the adaptor inside the bag until it is installed.

4. Secure the retaining bracket of the adaptor to the main unit by tightening one screw with a Phillips head screwdriver.



5. Connect the battery connector, and replace the battery.
6. Replace the battery cover, and tighten the two screws with a coin.
7. Connect the CRT to the main unit's color/monochrome CRT port on the rear panel with the CRT cable.



8. If the cable end has retaining screws, use them to fasten the cable to the main unit.

## Set Up Functions

As described in Chapter 4, certain set up functions control the operation of the CE-451A CRT adaptor.

Once you have installed the CRT adaptor, it is necessary to modify the set up screen.

Since you removed the battery during the installation process, the set up screen appears just by turning power on to the computer.

```

SHARP PERSONAL COMPUTER SYSTEM SET-UP MENU (Version 1.00 02/02/87)
----- Clock -----          -----Communication-----
Time: 03:16:54                  COM1: Not Present          Printer Interface: Parallel
Date: Sat March 21 1987        COM2: Not Present          Port Address: 3BC8

----- Power -----
On Condition: None

----- Display -----
Display Mode: Graphics
Cursor Blink: 2/second
Cursor Type: Underline
Character Blink: 1/second
Background: Standard

----- System -----
Speed: Standard
Key Click: Off
Console: CGA
Drive A: Internal 3.5"
Default Setup: F1

---- Internal CRT Adaptor ---
Display Mode: Monochrome

1. Position cursor using cursor keypad
2. Press Spacebar to change
3. Press Set Up key to Update and Exit
  
```

**Clock**

The backup memory is lost once the battery is removed. Re-enter the date and time.

**Internal CRT Adaptor**

This category appears when the optional CE-451A CRT adaptor is installed.

**Display Mode.** The display mode for the CRT adaptor is specified in this field. When connecting a color CRT, set to Color. When connecting a monochrome CRT, set to Monochrome. When the CRT display is not being used, select "OFF" to save power consumption of the main unit. The possible settings are: Monochrome, Color or OFF.

**Note:** Always set the CRT display mode to "OFF" when you disconnect the CRT.

**CAUTION:**

Be sure the CRT display mode setting in the set up screen is appropriate. If the setting is wrong, the CRT may be damaged.

**Dip Switch Settings**

Dip switches on the bottom panel of the unit are used in certain applications to indicate the type of display being used. Normally, this setting has no effect. See Chapter 3 for further information on these settings.

**Device Indicator**

When installing certain application software, you may be asked to identify the type of screen being used. When set to the color mode, the CE-451A color/monochrome CRT adaptor has the same functions as the IBM\* color graphics adaptor except that the CE-451A has no composite video output. When set to the monochrome mode, the CE-451A has the same function as the IBM\* monochrome display adaptor except that the CE-451A has no parallel printer interface.

# Serial I/O Card

This section provides a description of the CE-451B serial I/O (Input/Output) card designed to connect serial printer, external modem and mouse pointing device to main unit.

To install the serial I/O card, contact the Sharp Service Center or an authorized Sharp dealer.

**Set Up Functions**

As described in Chapter 4, certain set up functions control the operation of the CE-451B serial I/O card.

Once you have installed the serial I/O card, these functions appear on the set up screen.

To access the set up screen, turn on the main unit, then press the Set Up key. The set up screen then displays as shown in the example below.

```

SHARP PERSONAL COMPUTER SYSTEM SET-UP MENU (Version x.xx.xx/xx/xx)

----- Clock -----
Time: 03:16:54
Date: Sat March 21 1987

----- Power -----
On Condition: None

----- Display -----
Display Mode: Graphics
Cursor Blink: 7/second
Cursor Type: Underline
Character Blink: 1/second
Background: Standard

----- Communication -----
COM1: Internal SIO
COM2: Not Present

-COM1: Internal SIO-
Baud Rate: 1200
Data Bits: 8
Stop Bits: 1
Parity: None

----- Printer -----
Interface: Parallel
Port Address: 30Ch

----- System -----
Speed: Standard
Key Click: Off
Console: CGA
Drive A: Internal 3.5"

Default Setup: #1

1. Position Cursor using cursor keypad
2. Press Spacebar to change
3. Press Set Up key to Update and Exit

```

Notice the setting for Internal SIO in the middle of the screen.

Also, notice the COM1 or COM2 setting is "Internal SIO".

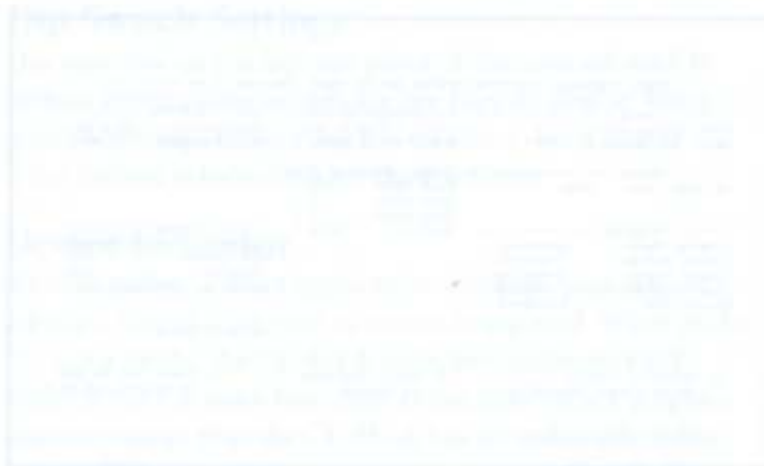
The following is a description of the internal SIO settings that control the CE-451B serial I/O card. (If you need instructions on moving around this screen and making changes, see Chapter 4.)

**Baud Rate.** The possible settings are: 110, 150, 300, 600, 1200, 2400, 4800, or 9600.

**Data Bits.** The possible settings are: 7 or 8.

**Stop Bits.** The possible settings are: 1 or 2.

**Parity.** The possible settings are: None, Even, or Odd.



## Modem Card

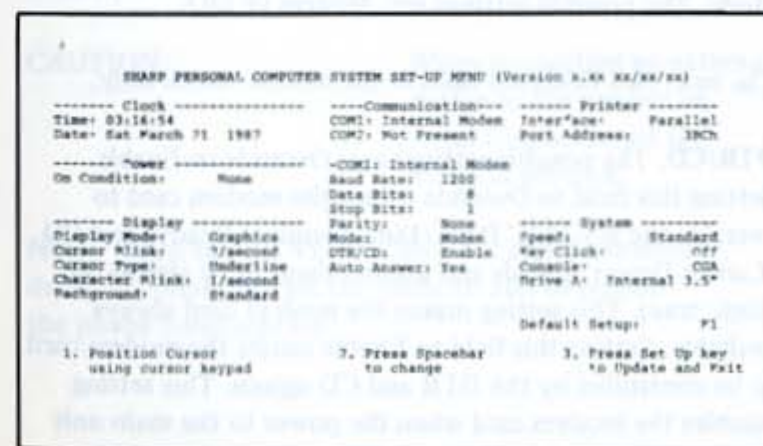
This section describes the CE-451M modem card. This card contains a serial I/O adaptor for alternate use. To install the modem card, contact Sharp Service Center or authorized Sharp dealer.

### Set Up Functions

As described in Chapter 4, certain set up functions control the operation of the CE-451M modem card.

Once you have installed the modem card, these functions appear on the set up screen.

To access the set up screen, turn on the main unit, then press the **Set Up** key. The set up screen then displays as shown in the example below.



Notice the setting for the modem in the middle of the screen.

Also, notice the COM1 or COM2 setting is "Internal Modem".

The selection for the function, modem or serial I/O, can be made in the Mode field.

The following is a description of the internal modem/internal SIO settings that control the CE-451M modem card. (If you need instructions on moving around this screen and making changes, see Chapter 4.)

**Baud Rate.** The possible settings are: 110, 150, 300, or 1200 (Modem mode), or 110, 150, 300, 600, 1200, 2400, 4800, or 9600 (SIO mode).

**Data Bits.** The possible settings are: 7 or 8.

**Stop Bits.** The possible settings are: 1 or 2.

**Parity.** The possible settings are: None, Even, or Odd.

**Mode.** The possible settings are: Modem or SIO.

The next two fields are valid in the modem mode only.

**DTR/CD.** The possible settings are: Override or Enable. Setting this field to Override causes the modem card to override the RS-232C DTR (Data Terminal Ready) and CD (Carrier Detect) signals and assume them to be always on (logic true). This setting makes the modem card always available. Setting this field to Enable causes the modem card to be controlled by the DTR and CD signals. This setting disables the modem card when the power to the main unit is turned off, or makes it hang up when the DTR or CD signal is set to off (false logic).

**Auto Answer.** This field indicates if the automatic answer feature is on or off. The possible settings are: Yes or No.

Also, you can get additional selections in the On Condition field in the Power category.

**Ringin.** Power is automatically turned on to the computer when the telephone rings.

**Alarm RI.** Power is automatically turned on to the computer when the telephone rings or when the specified time comes.

## Device Indicator

When installing communications software, you may be asked to identify the type of modem being used. The CE-451M modem card has basically the same functions as the Hayes Smartmodem\* and utilizes the COM1 or COM2 port.

### CAUTION:

When connecting an external device to the modem or serial connector, set the mode in advance.

**Note:** When the CE-451M is installed and no external device is connected, set the mode to SIO to reduce the power consumption.

## Using the Modem

Once the modem card is properly installed, you can begin to use the modem to communicate with remote devices. In order to access the modem, you must use an appropriate communications software application. The software provides specific instructions for data transmission.

Some communications applications provide a series of menus that simplify the set up and transmission procedure. Other applications allow you to access the modem directly using command set conforming to that of Hayes\*.

**Data/Command Mode.** Once the modem is activated, it is ready to perform in one of two modes – data or command. In the data mode, information is transferred across telephone lines to a remote device. In the command mode, commands are sent to the modem. When the system is in a terminal state and a telephone connection has not been made, commands may be entered from the keyboard or under program control.

When the system is placed online, the data mode is in effect until the telephone connection is terminated or an escape code is entered. See command summary and registers for more information on changing modes.

**Command Lines.** In the command mode, you can enter a command line to instruct the modem to carry out various tasks. Observe the following rules when entering command strings:

- \* Always begin a command line with "AT" except "A/".
- \* "AT" must be entered in uppercase; all other portions of the command line can be in upper or lower case.
- \* Always leave one blank space after "AT" in a command line.
- \* A backspace character (determined by register 5) deletes the previous character in a command line.
- \* A carriage return character (determined by register 3) must always be entered at the end of a command line.
- \* The maximum length for a command line 40 characters. The "AT," control characters, and spaces are not counted.

**Result Codes.** Result codes are responses that the modem provides to your commands. The following is a list of possible result codes:

- \* OK – Command executed without error (digit code 0).
- \* CONNECT – Connection established (digit code 1).
- \* RING – Incoming ring detected (digit code 2).
- \* NO CARRIER –
  - a) Failure to connect or loss of carrier.
  - b) User aborts during dialing. (digit code 3)
- \* ERROR – Error detected in command line (digit code 4).
- \* CONNECT 1200 – Connection established 1200 baud (digit code 5).
- \* BUSY – Called number is busy (digit code 6).
- \* RINGING – Called number is ringing (digit code 7).
- \* DISCONNECTING – Long space disconnect is being sent (digit code 8).
- \* RDL FAILURE – Attempt to enter RDL mode failed (digit code 9).
- \* RDL READY – RDL mode entered (digit code 10).
- \* REMOTE LOOP – Looping received data back to remote modem (digit code 11).
- \* DIAL TONE – Dial tone detected (digit code 12).

**Dialing.** Dialing a remote device is started in the command mode using the "D" command. Observe the following rules when dialing a remote device:

- \* The character “,” in a dialing command is used to pause between digits of a telephone number.
- \* The character “;” in a dialing command is used to return to the command mode after dialing.
- \* The characters ( ) – . and <SPACE> are ignored by the modem, but may be used for readability.

The following is an example of a command line to dial a remote modem:

```
AT DT 1-617-555-1212;
```

In this example, the modem is instructed to dial (D) in a touch-tone (T) and return to the command mode (;) after dialing the telephone number (1-617-555-1212).

**Command Summary.** The following is a summary of all commands available in the command mode:

**\* A – Answer**

This command causes the modem to answer an incoming call.

**\* A/ – Re-execute last command**

This command is used to repeat the previous command line. Do not start this command with "AT".

**\* C – Carrier Control**

This command controls the carrier.

CO: Carrier disabled.

C1: Carrier enabled, (default)



**\* D – Dial Command**

This command instructs the modem to begin dialing. It is usually followed by dialing instructions.

**\* E – Command Echo**

This command controls the command echo.

E0: Disables any local echo (characters displayed on the screen) while in the command mode.

E1: Enables a local echo while in the command mode, (default)

**\* F – Duplex Command**

This command enables the half duplex or full duplex.

F0: Echo transmit data when online. (half duplex)

F1: Full duplex (default)

**\* H – Hook Command**

This command instructs the modem to place the telephone hook on and off.

H0: Go on-hook (default)

H1: Go off-hook

H2: Go off-hook (same as H1)

**\* I – Identification Command**

I0: Sends "123" identification.

I1: Sends a check sum value.

I2: Same as I1.

**\* M – Speaker Control**

M0: Speaker always off

M1: Speaker on until carrier detected (default)

M2: Speaker always off

**\* O – Online or Originate**

This command instructs the modem to return to the data mode, after an escape code was entered.

**\* P – Select Pulse Dial**

This command causes all subsequent digits to be pulse-dialed.

**\* Q – Result Code Control**

Q0: Result code enabled, (default)

Q1: Result code disabled.

**\* Sr? – Inquire S Register Command**

This command displays the contents of register "r" as a decimal number.

**\* Sr = n – Set Register Command**

This command sets the contents of register "r" with the decimal value "n".

**\* T – Select Tone Dial**

This command causes all subsequent digits to be dialed in touch-tones.

**\* V – Verbose or Terse Response codes**

V0: Result code is digit.

V1: Result code is word. (default)

**\* X – Response codes enable**

X0: AT 300 compatible responses. (default)

X1: Extended responses enabled.

**\* Z – Modem reset**

This command instructs the modem to restart the software, return to power-on values, and clear the command line.

**Registers.** When the modem is in the command mode, there are 19 registers that can be accessed to control certain aspects of the modem.

These registers are labeled S0 through S18 and control the following functions:

**\* S0 – Rings to Answer**

Controls the number of rings on which the modem automatically answers an incoming call. Acceptable entries range from 0 to 255. A 0 disables automatic answering. The default entry is 0.

**\* S1 – Ring count**

Indicates the number of rings that have occurred. Acceptable entries range from 0 to 255. The default is 0.

**\* S2 – Escape Code Character**

Determines the character used to change from data mode to command mode. Acceptable entries range from 0 to 255 decimal. Values greater than 127 decimal will disable the function. The default is 43 decimal, the "+".

**\* S3 – Carriage Return Character**

Determines the character used to end a command line. Acceptable entries range from 0 to 127 decimal. The default is 13 decimal.

**\* S4 – Line Feed Character**

Automatically adds line feed character after result codes. Acceptable entries range from 0 to 127. The default is 10 decimal.

**\* S5 – Back Space Character**

Determines the backspace character used to delete a character in the command line. Acceptable entries range from 0 to 32 and 127. The default is 8 decimal.

**\* S6 – Wait for Dial Tone**

Determines the number of seconds between taking the phone off the hook and dialing the first digit of the telephone number. Acceptable entries range from 2 to 255. The default is 2.

**\* S7 – Wait for Carrier after Dial**

Determines the delay in seconds between finishing dialing and failing to detect a carrier. If the modem does not detect a carrier within the delay period, the modem hangs up and returns a no carrier result code. Acceptable entries range from 1 to 255. The default is 30.

**\* S8 – Dial Pulse Time**

Determines the delay in seconds when a ", " is added to the telephone number. Acceptable entries range from 0 to 255. The default is 2.

**\* S9 – Carrier Detect Response Time**

Determines the time in tenths of a second a carrier must be present before it is recognized by the modem. This value is 6 (600 mS) and is not programmable.

**\* S10 – Loss of Carrier Response Time**

Determines the time in tenths of a second between loss of a carrier and a disconnect by the modem. Acceptable entries range from 1 to 255. The default is 14.

**\* S11 – Touch Tone Duration**

Determines the dialing rate in milliseconds. Acceptable entries range from 50 to 255. The default is 70.

**\* S12 – Escape Code Guard Time**

Determines the guard time in fiftieths of a second required before and after entering the escape sequence. If the guard time is not met, the escape sequence is assumed to be part of the message being sent. Acceptable entries range from 20 to 255. The default is 50.

**\* S13 – Bit Mapped Register**

- Bit 0: 9th data bit value
- Bit 1: Extended result code status (ATX)
- Bit 2: 0 = Parity disabled  
1 = Parity enabled
- Bit 3: 0 = Odd parity  
1 = Even parity
- Bit 5, 4: 00 = 7 data bits  
01 = 8 data bits  
10 = 9 data bits
- Bit 6: 0 = Buffer not full  
1 = Buffer overflow detected
- Bit 7: 0 = Space parity  
1 = Mark parity

**\* S14 – Bit Mapped Register**

- Bit 0: Not used
- Bit 1: 0 = No echo (ATE0)  
1 = Echo (ATE1)
- Bit 2: 0 = Result code enabled (ATQ0)  
1 = Result code disabled (ATQ1)
- Bit 3: 0 = Result code is digit (ATV0)  
1 = Result code is word (ATV1)
- Bit 4: Always zero
- Bit 5: 0 = Pulse dialing  
1 = Tone dialing
- Bit 7, 6: 00 = Speaker always off (ATM0)  
01 = Speaker on until carrier detected (ATM1)  
10 = Speaker always on (ATM2)

**\* S15 – Bit Mapped Register**

- Bit 0: Same as bit 4
- Bit 1: Same as bit 5
- Bit 2: 0 = Answer  
1 = Originate
- Bit 3: 0 = Half duplex (ATF0)  
1 = Full duplex (ATF1)

- Bit 5, 4: 00 = Undefined  
01 = 110 baud  
10 = 300 baud  
11 = 1200 baud
- Bit 6: 0 = Carrier off  
1 = Carrier on
- Bit 7: Not used

**\* S16 – Test Register**

- S16 = 0: Normal operation
- S16 = 1: Enables analog loopback
- S16 = 2: Enables DTMF tone test
- S16 = 3: Invoke digital loopback mode
- S16 = 4: Requests remote digital loopback

**\* S17 – Bit Mapped Register**

- Bit 0: Not used (must be zero)
- Bit 1: Not used (must be zero)
- Bit 2: 0 = Force CXR always on  
1 = Normal CXR  
This bit controls the CXR status line. If this bit is set to 0 then the CXR status line will always be on. If this bit is set to 1 then the CXR status line will follow the true carrier status. For normal operation, this bit should be set to 1.
- Bit 3: Not used
- Bit 4: 0 = Force DTR always on  
1 = Normal DTR  
This bit controls function of the DTR line. If this bit is set to 0 then DTR is not required to go ONLINE. If this bit is set to 1 then DTR must be ON to go ONLINE. For normal operation, this bit should be set to 1.
- Bit 5: Enables Call progress monitoring  
This bit controls the call progress monitoring function. If this bit is equal to 1 then call progress monitoring is enabled.

**Bit 6:** Enables Send long space on disconnect  
This bit controls the Send long space disconnect option. If this bit is equal to 1 then upon disconnect, the modem will send 4 seconds of space prior to disconnect. This bit is normally set to 0.

**Bit 7:** Enables disconnect on long space receipt  
This bit controls the receive Long space disconnect option. If this bit is equal to 1 then upon receiving 1.5 seconds of space, the modem will disconnect the call. This bit is normally set to 0.

#### \* S18 – Bit Mapped Register

**Bit 0:** Modem transmit disable

This bit shows the status of the ATC command.

**Bit 1:** Disable low speed operation on answer

If this bit is set to 1, the modem will only connect with another 1200 baud modem in answer mode. This bit is normally set to 0.

**Bit 2:** CXR internal state

**Bit 3:** CTS internal state

**Bit 4:** Enable Response to remote test

If this bit is set to 1 then the modem will respond to a remote digital loopback request. This bit is normally set to 0.

**Bit 5:** Not used

**Bit 6:** Not used

**Bit 7:** Not used

To make an entry into a register, in the command mode, enter "Sr = n" where "r" is the register number and "n" is the new value. For example, the entry shown below would result in an automatic answer on the fourth ring.

```
AT S0=4
```

## External Floppy Disk

## Second 3-1/2" Floppy Disk Drive

This section provides information on second 3-1/2" floppy disk drive CE-451F.

To install the second 3-1/2" floppy disk drive, contact the Sharp Service Center or an authorized Sharp dealer.

The CE-451F floppy disk drive has the same specifications as the standard internal floppy disk drive.

By installing the CE-451F, you can use the computer as a dual-drive system. The CE-451F is installed over the standard drive and referred to as drive B.

# External Floppy Disk Drive Unit

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## Overview

This chapter describes how to use the CE-452F external 5-1/4" floppy disk drive unit with your computer.

- The first section describes how to set up the CE-452F.
- The second section describes how to use the CE-452F.
- The third section describes 5-1/4 inch floppy diskettes.

## Setting Up

### Picking a Location

Begin setting up the CE-452F by picking a location for its use. While the CE-452F can fit in a very small area, certain guidelines should be followed so that it can be operated comfortably and safely.

Be sure the spot you pick to set up and run the CE-452F meets the following environmental requirements.

**Surface.** Pick a hard, flat surface on which to set up and operate the CE-452F. Using the CE-452F on a bed or rug restricts the air circulation and could result in static electricity affecting the performance of the system. A table or desk near the main unit is the best choice.

**Temperature.** Operate the CE-452F in temperatures between 10 degrees C (50 degrees F) and 35 degrees C (95 degrees F). Operating in extreme temperatures could damage the CE-452F.

**Humidity.** Operate the CE-452F in humidity levels under 80 percent. Excessive moisture can damage the CE-452F.

The following electrical requirements must be considered when picking a spot for the CE-452F.

**Power Supply.** The CE-452F runs on the AC current of local voltage. It must be plugged into a grounded outlet.

**WARNING:**

*This equipment must be electrically grounded. It is equipped with a power cord that is plugged into a grounded outlet. You could severely damage the CE-452F if you fail to use an appropriately grounded outlet.*

**Interface Cable.** The CE-452F comes with an interface cable to be connected to the computer.

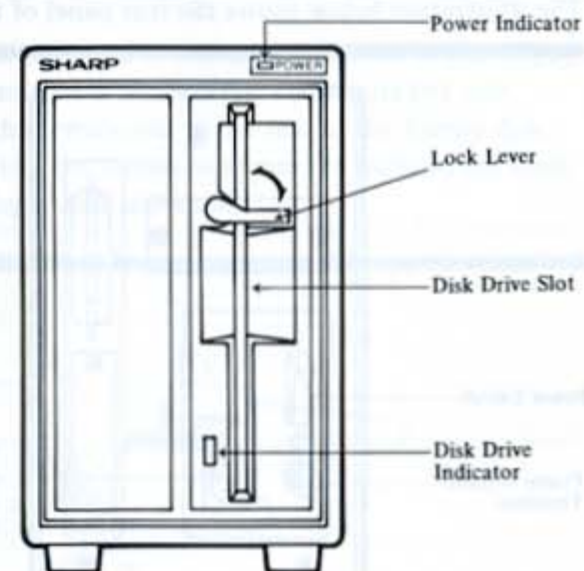
It is approximately 1 m (3-1/4 feet) long. Be sure you are within reach of the computer's left side panel when you pick a location.

**Interference.** It is possible that radio and television interference can occur when running the CE-452F, even if it is installed properly. Therefore, use the equipment away from radios and televisions.

If you suspect that the equipment is still causing interference, try plugging the equipment into an electrical circuit other than the one used for the radio and television.

### Front Panel

The illustration below shows the front panel of the CE-452F floppy disk drive unit.



**Disk Drive Slot.** Insert a 5-1/4" floppy diskette into this slot.

**Lock Lever.** Turn this lever horizontally to lock a diskette into the drive unit. To remove the diskette turn it back to the vertical position.

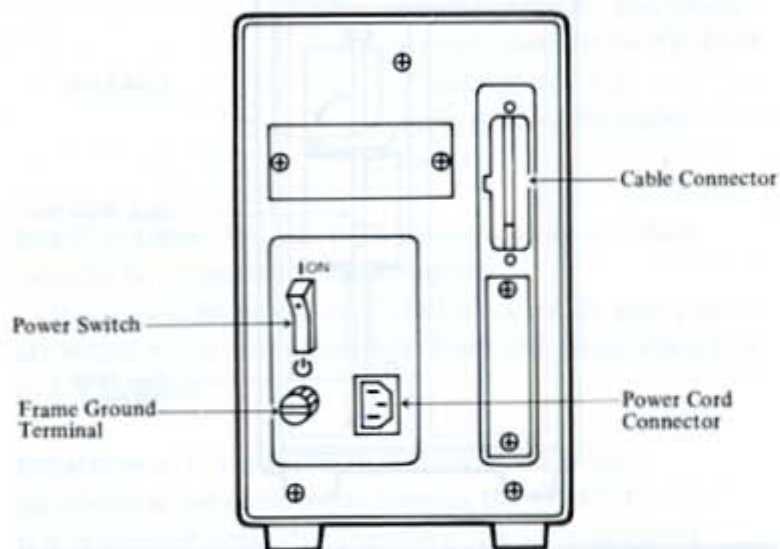
**Disk Drive Indicator.** To the lower left of the disk drive slot is a disk drive indicator. It illuminates when the system is accessing the external floppy disk drive unit.



**Power Indicator.** Located at the top of the front panel is the power indicator. When power is turned on to the CE-452F, this indicator illuminates.

## Rear Panel

The illustration below shows the rear panel of the CE-452F.



**Cable Connector.** On the upper right of the rear panel is the cable connector, used to connect the interface cable.

**Power Cord Connector.** Connect the female end of the power cord to this connector and male end to the grounded wall outlet.

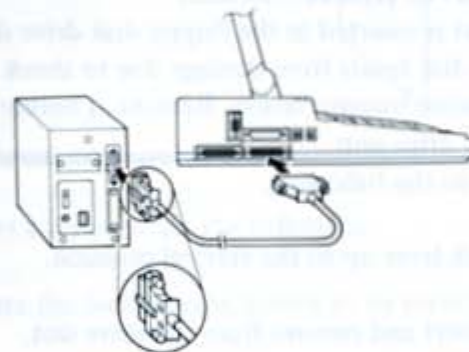
**Power Switch.** To turn on the CE-452F, press this switch to the "ON" position. To turn off the CE-452F, press the switch to the "OFF" position.

**Frame Ground Terminal.** If a ground is necessary, connect a ground wire to this terminal.

## Setting Up

To set up the CE-452F external 5-1/4" floppy disk drive unit for operation, do the following:

1. Turn off power to the main unit.
2. Connect the male end of the interface cable to the floppy disk drive unit connector on the main unit's left side panel and the female end to the rear of the floppy disk drive unit. Use the screws to secure the cable to the main unit and floppy disk drive unit.

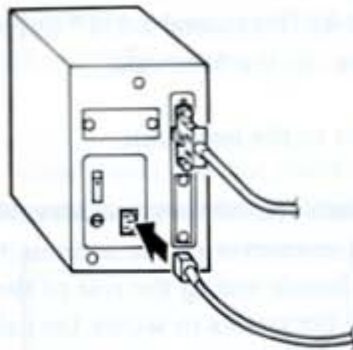


**Note:** Before connecting the cable, remove the dust cap from the floppy disk drive unit connector and save it for future use.

3. Connect the female end of the floppy disk drive power cord into the rear panel of the floppy disk drive unit and the male end to the grounded AC outlet.

### CAUTION:

Before connecting the power cord, be sure that both the main unit and the floppy disk drive unit are turned off.



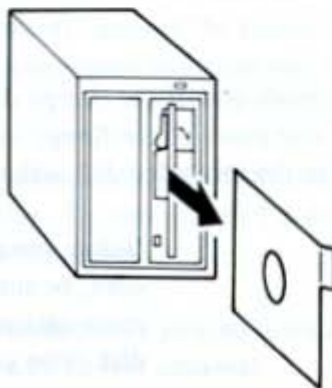
### Remove Travel Insert

The travel insert is inserted in the floppy disk drive slot. It protects the disk heads from damage due to shock or vibration during transportation. Remove it before using the floppy disk drive unit.

To remove, do the following:

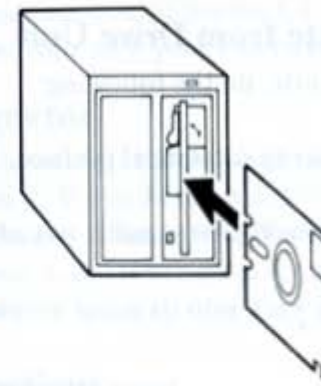
1. Turn the lock lever up to the vertical position.
2. Grasp the insert and remove from the drive slot.

**Note:** Be sure to save the insert. You will need to use it again whenever you transport the CE-452F.



### Insert Diskette into Drive Unit

The illustration below shows how to insert a floppy diskette into a drive.



To insert a diskette, do the following:

1. Be sure the lock lever is turned to its vertical position.
2. Remove the diskette from its paper envelope.
3. Grasp the diskette by the top and insert into the drive slot so that the diskette label is facing the left.
4. Gently push the diskette into the slot until it comes to a stop.
5. Turn the lock lever to its horizontal position to lock the diskette in place.

Your CE-452F is now ready for operation. When using, turn on the CE-452F first, then the computer. When you finish working, turn off the computer first, then the CE-452F.

If you power on or off in the wrong order, the floppy disk drive unit may not work properly.

### Remove Diskette from Drive Unit

To remove a diskette, do the following:

1. Turn the lock lever to its vertical position.
2. Grasp the diskette and gently pull it out of the drive unit.
3. Place the diskette back into its paper envelope.

#### CAUTION:

Never attempt to remove a diskette from a disk drive when the disk drive indicator light on the CE-452F is illuminated. This may cause damage to the contents of the diskette.

## Using the CE-452F

This section describes how to use the CE-452F external floppy disk drive unit with your computer.

### Drive Designator

Usually, the external 5-1/4 inch floppy disk drive is assigned as drive C. If you have no diskette in drive A, the system can be loaded from drive C. You can change the drive assignments A and C using the set up function described below.

### Set Up Functions

If you want to change the drive assignment, a certain set up function setting needs to be made. First, turn on power to the CE-452F, then the computer. Then access the set up screen and locate the Drive A field in the System category.

```

SHARP PERSONAL COMPUTER SYSTEM SET-UP MENU (Version x.xx xx/xx/xx)

----- Clock -----
Time: 03:14:34
Date: Sat March 21 1987

----- Communication -----
COM1: Not Present
COM2: Not Present

----- Printer -----
Interface: Parallel
Port Address: 3BCh

----- Power -----
On Condition: None

----- Display -----
Display Mode: Graphics
Cursor Blink: 2/second
Cursor Type: Underline
Character Blink: 1/second
Background: Standard

----- System -----
Speed: Standard
Key Click: Off
Console: CGA
Drive A: Internal 3.5"

Default Setup: F1

1. Position Cursor using cursor keypad
2. Press Spacebar to change
3. Press Set Up key to Update and Exit

```

Press **Space Bar** to change this field to "External 5.25" ". Then press **Set up** and then **Enter**. The computer will be re-started and load MS-DOS\* from the CE-452F external floppy disk drive unit.

Note the internal 3-1/2 inch drive is assigned as drive C and the external 5-1/4 inch drive as drive A.

## Transferring Data

Data can be transferred to or from the 5-1/4 inch floppy disk drive. When transferring data, however, do not use the DISKCOPY command. Instead, format the target diskette and then use the COPY command to transfer data.

To copy an entire diskette from 3-1/2 inch to 5-1/4 inch, the MS-DOS\* command would be:

```
A>COPY *.* C:
```

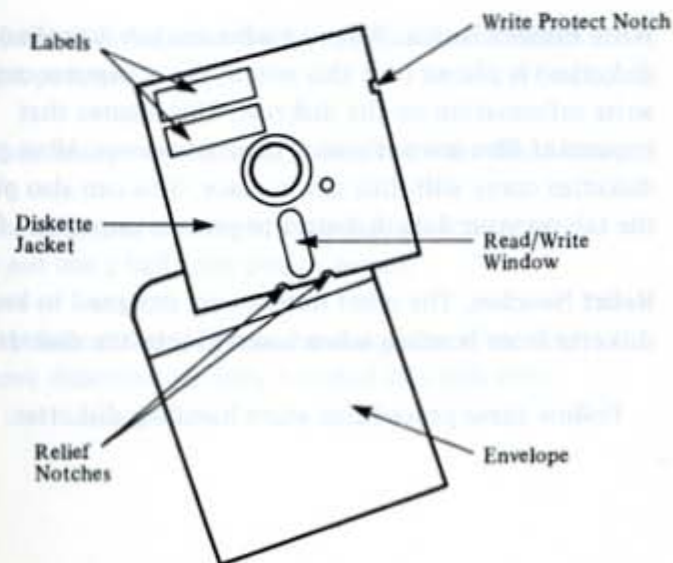
# The Diskettes

The CE-452F uses 5-1/4 inch, double-sided, double density diskettes that store up to 360K of information.

## Diskette Handling Procedures

To safeguard information stored on diskette, it is important that you handle diskettes with care.

The illustration below shows what a typical diskette looks like.



**Envelope.** The envelope protects the exposed areas of the diskette. Always return the diskette to its envelope after use.

**Diskette Jacket.** The diskette itself is permanently encased in a jacket to protect its magnetic surface. Never remove this jacket.

**Label.** The label identifies the content of the diskette. When you purchase blank diskettes, there is usually a place provided on the label for identifying the content of the diskette.

**Read/Write Window.** The read/write window allows the disk head to read from and write to the diskette. Never touch this area.

**Write Protect Notch.** When an adhesive tab (supplied with diskettes) is placed over this notch, the computer can not write information on the diskette. This insures that important files are not erased or written over. Most program diskettes come with this tab in place. You can also place the tab on your data diskettes to protect important files.

**Relief Notches.** The relief notches are designed to keep the diskette from bending when inserted into the disk drive unit.

Follow these procedures when handling diskettes:

- ▲ Never touch any exposed area of the diskette.
- ▲ Always return the diskette to its paper envelope after use.
- ▲ Never bend or twist the diskette.
- ▲ Never expose the diskette to liquids. If you spill a liquid on the diskette, throw the diskette away.
- ▲ Never expose diskettes to excessive heat or direct sunlight.
- ▲ Always keep diskettes at least 3 meters (10 feet) away from magnetic fields such as those in electronic equipment and telephones.
- ▲ Always store diskettes in a cool, dry, dust free area, in an upright position.
- ▲ Never place heavy objects such as books on the diskettes.
- ▲ When labelling your diskettes, always use a felt-tipped pen. Do not use a ballpoint pen or pencil.
- ▲ Always remove diskettes from the disk drive after use. Never leave diskettes partially inserted in a disk drive.

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## Overview

This chapter contains five appendices covering a wide range of information.

The first appendix describes general maintenance activities you can perform to keep the system functioning at peak performance.

The second appendix describes how to diagnose problems on the computer including using the Diagnostic Diskette.

The third appendix is a troubleshooting chart to help you quickly solve problems.

The fourth appendix contains detailed specifications of the system including pin layout descriptions.

The fifth appendix is a glossary of terms used in this manual.

## General Maintenance

There are certain general maintenance activities you can perform from time to time to keep your computer clean and operating at its utmost efficiency.

### Preventative Maintenance

The computer is a sophisticated instrument containing many sensitive components. It should be handled with care. Here are some steps you can take to prevent damage to the system:

- ▲ Never expose the system to a harsh environment such as those containing rapid temperature changes or excessive dust.
- ▲ Never expose the system to excessive vibration.
- ▲ Prevent overheating by keeping the system's air vents clear of any obstructions. Never place anything on top of the system because this can also cause overheating.

#### CAUTION:

If there is any evidence of overheating (smoke, abnormal smell, etc.), immediately unplug the main unit's AC adaptor plug and contact your Sharp dealer.

- ▲ Do not use a power source where currents excessively fluctuate.



## Dusting

It is important to keep the system free from dust. To dust the system, apply a small amount of dust remover to a dry, lint-free cloth. Rub the outside surfaces with the cloth, making especially certain that the air vents on the left side and rear panels are clear of dust.

Never use alcohol, benzine, thinner or other powerful substances that could damage the system's surface.

## Cleaning Screen

The glass screen may smudge or get dusty. To clean the screen's surface, gently rub it with a dry, lint-free cloth. Never use alcohol, benzine, thinner or other powerful substances, or a wet cloth to clean the screen's surface.

**Notes:** 1. Avoid touching the screen with your fingers when using the computer.

2. Do not spray cleaning fluid directly onto the casing or screen.

## Battery Maintenance

To maintain the lead battery, observe the following requirements.

1. The battery charge may be lost due to self-discharge during transit.

Charge the battery for about 8 hours before use.

2. Whenever the low battery indicator lights during use, recharge the battery as soon as possible.
3. If you use the computer without recharging the battery after the low battery indicator lights, the computer is automatically turned off to prevent overdischarge of battery and to protect the computer hardware.

4. If the computer is stored for a long time, recharge the battery every 6 months so as to prevent deterioration due to self-discharge.

### CAUTIONS:

1. Do not place the battery near excessive heat or fire. Do not short-circuit the battery. The battery may burst if these conditions occur.
2. Do not disassemble the battery. Whenever the battery casing is broken and its electrolyte contacts your skin or clothes, wash away with water. If electrolyte enters your eye, wash your eye with fresh water, and consult a doctor without delay.
3. To clean the battery, wipe it with dry cotton cloth. Never use chemical fiber cloth.
4. Keep the battery from organic solvent, such as gasoline and thinner, and plasticizer for synthetic resins, oils, etc.

## Diagnostics

This section describes procedures you can follow if you suspect that one of the components of your computer is malfunctioning.

### Power-On Diagnostics

When the system's power is turned on, an automatic self-test routine is started. The system does the following:

1. When power is turned on, the following message displays on the screen:

```
The Sharp Personal Computer System
Firmware Version x.xx
Copyright (C) 1987 by Sharp Corporation
Copyright (C) 1986, 1987 by Vadem, Inc.
```

```
Processor      Passed.
Firmware ROM   Passed.
Keyboard       Passed.
Clock          Passed.
Setup RAM      Passed.
xxxK Memory.
```

```
Loading A:
```

2. After a few seconds, MS-DOS\* is loaded, and the following displays:

```
The Sharp Personal Computer System
I/O Subsystem Version x.xx
Copyright (c) 1985, 1986, 1987 by Vadem Inc.
All Rights Reserved.
```

```
Mocrosoft MS-DOS version 2.11
Copyright 1981, 82, 83 Microsoft Corp.
```

```
Command v. 2.11
```

```
A>PATH \
```

```
A>
```

```
A>
```

If the system cannot load MS-DOS\*, the following message appears:

```

Loading A: ..... Error !

Diskette Drive Empty...
Please Insert a System Disk and Press any key:_
  
```

Simply insert an MS-DOS\* diskette in drive A and press any key.

If the power-on diagnostics routine does not function as described above, call your Sharp dealer.

## Diagnostics Program

If the power-on diagnostic routine functions correctly, but you still suspect problems, use the diagnostic program on the MS-DOS\* diskette.

The diagnostics program contains the following segments:

- ▲ Real Time Clock & Setup RAM
- ▲ Memory
- ▲ Keyboard
- ▲ Monochrome Adaptor
- ▲ Color Graphics Adaptor
- ▲ Floppy Disk Drive
- ▲ Printer

Also the diagnostic program contains the hardware installation program to judge whether the reserved devices are attached to the main unit.

During these segments, text and graphics appear on the screen. If the program finds any problems, error messages are displayed. If an error message appears, call your Sharp dealer.

**Diagnostic Program Start Up.** To run the diagnostic program, insert the MS-DOS\* diskette in drive A and turn on the power to the main unit. Then enter the command as shown below at the MS-DOS\* prompt and press the **Enter** key.

```
A>DIAG45U
```

After several seconds, the diagnostic program is started and the following message appears on the screen:

```

DIAGNOTIC PROGRAM V-x.xx

1 --- Real Time Clock & Setup RAM
2 --- Memory
3 --- Keyboard
4 --- Monochrome Adaptor
5 --- Color/Graphics Adaptor
6 --- Floppy Disk Drive
7 --- Printer
8 --- Run all above tests

0 --- Hardware Instillation

Enter your selected number:
  
```

Type the number of the item you want to test and press the **Enter** key.

**Real Time Clock & Setup RAM.** This section automatically checks the real time clock and setup RAM. This test checks if the clock works correctly, and reads/writes the data from/ to the battery backed-up memory for the set up function.

**Memory.** This section automatically begins a test of the main memory. If a memory error is detected, an error message displays.

**Keyboard.** This section is the keyboard test that begins with an image of the keyboard displaying on the screen. To test the performance of a key, simply press the key in question. A square should display on the keytop image for each key depressed.

**Monochrome Adaptor.** This section checks the monochrome display adaptor board. When this section is selected, the following appears on the screen:

```

Monochrome Adaptor Check
1 --- Monochrome display buffer check
2 --- Attribute check
3 --- Character set check
4 --- B/W mode check
5 --- Run all above checks

0 --- Exit

Enter your selected number: _

```

**Note:** When you select this test without setting the console on the set up screen to MDA, a warning message appears.

1. Monochrome Display Buffer Check  
Checks the buffer in the monochrome adaptor.
2. Attribute Check  
Displays the possible attributes in the monochrome mode: Normal, Intensity, Reverse, Blink, and Underline.
3. Character Set Check  
Displays characters on the screen normally and then highlighted.
4. B/W Mode Check  
Displays the black and white mode of the monochrome adaptor. Two patterns, all black and then all white, appear on the screen.
5. Run All Above Check  
Checks all the items from 1 to 4 in sequence.

Press 0 to exit this section and return to the menu. If a defect is detected, call your Sharp dealer.

**Color/Graphics Adaptor.** This section checks the color/graphics adaptor. When this section is selected, the following appears on the display:

## Color/Graphics Adaptor Check

```

1 --- Color/graphics display buffer check
2 --- Attribute check
3 --- 80x25 alphanumeric mode check
4 --- 40x25 alphanumeric mode check
5 --- 320x200 graphics mode check
6 --- 640x200 graphics mode check
7 --- Screen paging check
8 --- Color CRT check
9 --- Run all above checks

0 --- Exit

```

Enter your selected number: \_

**Note:** When you select this test without setting the console to CGA, a warning message appears.

1. Color/Graphics Display Buffer Check  
Checks the buffer in the color/graphics adaptor.
2. Attribute Check  
Displays 16 colors for the characters, 8 colors for background, and also displays 8 colors in blink.
3. 80 x 25 Alphanumeric Mode Check  
Displays characters on the screen normally and then highlighted in the 80 x 25 alphanumeric mode.
4. 40 x 25 Alphanumeric Mode Check  
Displays characters on the screen normally and then highlighted in the 40 x 25 alphanumeric mode.

5. 320 x 200 Graphics Mode Check  
Displays two patterns of color graphics in the 320 x 200 graphics mode.
  6. 640 x 200 Graphics Mode Check  
Displays a pattern of monochrome graphics in the 640 x 200 graphics mode.
  7. Screen Paging Check  
Displays the 8 pages of the color/graphics adaptor. Each page is filled with numbers from 0 to 7 corresponding to the page number and the number changes by pressing any key.
  8. Color CRT Check  
Displays each of the 16 colors painted on the entire screen one by one. The color changes by pressing any key.
  9. Run All Above Check  
Checks all the items from 1 to 8 in sequence.
- Press 0 to exit this section and return to the menu.  
If a defect is detected, call your Sharp dealer.
- Floppy Disk Drive.** This section is a test to determine any defects in the read/write operation of your floppy disk drive.
- CAUTION:** Data on the diskette in the drive you check may be erased during this section. Be sure the diskette to be tested contains no important files.

When this test is selected, the following appears on the display:

```
Floppy Disk Drive Check
```

```
1 --- Seek check
2 --- Write, read check
```

```
0 --- Fxit
```

```
Enter your selected number: _
```

When a number is entered, the system asks you which drive to be tested. Insert a formatted diskette in the drive to be tested, type **A**, **B**, or **C** and then press **Enter**.

#### 1. Seek Check

Checks if the read operation is performed correctly while increasing/decreasing the track counter.

#### 2. Write, Read Check

Checks if the floppy disk drive read/write operation is performed correctly by comparing data written to the diskette with data read from the diskette. This test destroys all the data on the diskette.

If a problem is detected during the test, an error message displays.

**Printer.** This section tests the printer attached to the main unit. When this section is selected, the following appears on the display:

```
Printer Check
```

```
1 --- Printer status check
2 --- Character set check
```

```
0 --- Exit
```

```
Enter your selected number: _
```

When you select 1, the printer status is displayed on the screen. The following status categories are checked:

- ▲ Bsy – indicates if the printer is not busy
- ▲ Ack – indicates if the printer can communicate with the main unit
- ▲ Pe – indicates if paper is loaded into the printer
- ▲ Sel – indicates if the printer selection signal is on
- ▲ Ioe – indicates if the printer is free of mechanical problems
- ▲ Toe – indicates if the printer interface is functioning properly

In order to execute the character set check, an asterisk must appear below each category. Otherwise, an error message appears and the printer status appears on the screen. For example, if there is no asterisk under Pe, load paper into the printer. The asterisk should then display. If a true hardware malfunction is detected, you will not be able to obtain an asterisk in that category. Note the problem and contact your dealer.

Once all categories contain asterisks, press any key. The system returns to the menu shown above. Retry the character set check again. A test pattern is printed. If a problem is detected, an error message displays and the test is stopped.

**Run all above tests.** When this item is selected, all the tests from 1 to 7 are performed sequentially.

**Hardware Installation.** When this item is selected, all the installed devices appear on the screen. The following are the names of possible devices:

#### Hardware Installation

System Board  
 Real Time Clock & Setup RAM  
 Main Memory (indicated by kilobytes)  
 EMS Memory  
 ROM File Memory  
 Keyboard  
 Liquid Crystal Display  
 Monochrome CRT Adaptor  
 Color/Graphics CRT Adaptor  
 1, 2, or 3 Floppy Disk Drive(s), Adaptor  
 Printer Adaptor  
 Serial Port Adaptor

If a device is connected to the main unit and it does not appear in the list, that device may be faulty.

## Troubleshooting

Below is a chart to help solve problems that might occur while running your computer. If you can't locate the problem you are experiencing on the system, call your Sharp dealer.

Problem	Suspect Area	Solution
No power to the main unit	Power switch button	Push on the power switch button
	Lead Battery	Charge with AC adaptor
	AC Adaptor	Plug one end into main unit and the other end into outlet. Be sure ends are plugged in all the way
	Faulty outlet	Plug power cord into a different outlet
	Faulty system	Call your Sharp dealer
Computer's screen is blank	Display mode	Be sure the display mode on the set up screen is not set to off
	Main unit power	Make sure AC adaptor plug is properly attached to main unit and plugged into an outlet - Make sure main unit is turned on
		Set dip switch 1 to ON and then OFF
	Faulty screen power supply	Call your Sharp dealer
Computer's screen is dim	Contrast control	Adjust the control

Problem	Suspect Area	Solution
System unable to read floppy diskette	Disk drive is not locked	Insert diskette to the end
	Diskette inserted improperly	Re-insert diskette with the label side facing upward
	Bad diskette	Use another diskette
	Faulty disk drive	Contact Sharp dealer
No data printed by printer	Power	Be sure power cord is connected and power is turned on
	Online	Be sure printer is online
	Cable	Be sure printer cable is connected
	Supplies	Be sure you are using appropriate paper and ribbons
Nothing displays on the CRT	Power	Check that CRT power is turned on
	Brightness	Check that the CRT brightness control is adjusted appropriately
	Contrast	Check that the CRT contrast is adjusted appropriately
	Cable	Check that the CRT cable is connected
	CE-451A	Check that the CRT adaptor is installed properly
CE-451M modem card does not function	Set up function	Check set up function See Chapter 6
	Cables	Check that the phone cable is connected to the phone and the wall cable is connected to the wall jack
	CE-451M	Check that the modem card is properly installed
CE 451B serial I/O card does not function	Set up function	Check set up function See Chapter 6
	Cables	Check that SIO cable is connected to other equipment.
	CE-451B	Check that the serial I/O card is properly installed.

Problem	Suspect Area	Solution
CE-452F 5-1/4" floppy disk drive	Power	Check that disk drive power is turned on.
	Cable	Check that the 5-1/4" floppy disk drive cable is connected
	Disk drive is not locked	Turn the lock lever horizontally.
	Diskette inserted improperly	Re-insert diskette with the relief notch side first and the label side facing the left side of the disk drive
	Bad diskette	Use another diskette
	Faulty disk drive	Contact Sharp dealer



## Specifications

The table below provides technical information about the components that make up the computer.

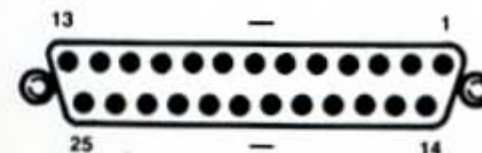
Item	Specification
Color/monochrome CRT adaptor card (optional)	Size: 60mm (W) x 134mm (H) (2-3/8" (W) x 5-3/8" (H)) Weight: Approx. 0.075 kg (0.17 lbs) Emulation: CGA/MDA mode selectable Interface: Direct connection to bus Main Unit Connector: 50-pin female connector Color CRT connector: 9-pin female connector
External 5-1/4" floppy disk drive (optional)	One 5-1/4 inch drive with the following: Capacity: 500K unformatted Size: 118mm (W) x 331mm (D) x 189mm (H) (4-3/4" (W) x 13" (D) x 7-1/2" (H)) Weight: Approx. 5.1 kg (11.3 lbs) Power source: 120V AC, 60 Hz Operating Temperature: 10 to 35 degrees C (50 to 95 degrees F) Storage Temperature: -20 to 60 degrees C (-4 to 140 degrees F) Operating Humidity: 20 to 80% Storage Humidity: 10 to 90%
External 5-1/4" floppy disk port	Interface: CE-452F 5-1/4" floppy disk drive unit exclusive-use
Internal Floppy disk drive	3-1/2 inch with the following: Capacity: 1M unformatted
Keyboard	78 keystrokes including: 10 programmable function keys; 57 typewriter keys; 4 separated cursor keys; 4 control keys (Set Up, Esc, Ins, Del); 3 lock keys (NumLock, Scroll Lock, CapsLock)

Item	Specification
Main unit	Size: 307mm (W) x 348mm (D) x 76mm (H) (12-1/8" (W) x 13-3/4" (D) x 3" (H)) Weight: Approx. 4.3 kg (9.5 lbs) without AC adaptor Power source: Lead battery, AC adaptor Operating temperature: 10 to 35 degrees C (50 to 95 degrees F) Storage temperature: -20 to 60 degrees C (-4 to 140 degrees F) Operating humidity: 20 to 80% Storage humidity: 10 to 90%
Modem card (optional)	Size: 95mm (W) x 140mm (H) (3-3/4" (W) x 5-1/2" (H)) Weight: Approx. 0.15 kg (0.33 lbs) Modem/Serial I/O mode selectable <b>Modem</b> Transmission method: Asynchronous Baud rate: 110, 150, 300, 1200 Modulation method: FSK (110, 150, 300, baud), PSK (1200 baud) Interface: Direct connection to bus Main unit connector: 34-pin female connector Phone connector: 4-pin female connector <b>Serial I/O:</b> Interface: RS-232C Transmission method: Asynchronous full or half duplex Baud rate: 110, 150, 300, 600, 1200, 2400, 4800, 9600 Data length: 7 or 8 bits Parity check: None, even or odd Stop bit: 1 or 2 bits Connector: 25-pin male, type D-shell
Parallel I/O port	Interface: Centronics Connector: 25 pin female, type D-shell
Processor	80188 compatible with 7.16 MHz clock
RAM (optional)	<b>RAM Card</b> Size: 44 mm (W) x 121mm (H) (1-3/4" (W) x 4-3/4" (H)) Weight: Approx. 0.05 kg (0.11 lbs) Interface: Direct connection to bus Main unit connector: 40-pin female connector 128K RAM standard Up to 384K memory

Item	Specification
RAM (optional)	Optional chips: CE-700R Hitachi (HM50464P-15) Fujitsu (MB81464-15) NEC ( $\mu$ PD41464C-15) Toshiba (TMM 41464P-15)
RAM (standard)	256K memory
ROM	32K EP-ROM with IPL, BIOS, selfcheck, CG, and set up functions
Screen	Screen type: Super twist liquid crystal display View area: 25 lines by 80 characters Graphics: 640 by 200 pixels bit-mapped Character size: 8 by 8 dots
Serial I/O card (optional)	Size: 95mm (W) x 140mm (H) (3-3/4" (W) x 5-1/2" (H)) Weight: Approx. 0.08 kg (0.18 lbs) Interface: RS-232C Transmission method: Asynchronous full or half duplex Baud rate: 110, 150, 300, 600, 1200, 2400, 4800, 9600 Data length: 7 or 8 bits Parity check: None, even, or odd Stop bit: 1 or 2 bits Connector: 25-pin male, type D-shell

## Pin Layout

**Parallel Connector.** The following is a pin location diagram for the parallel connector port on the computer:

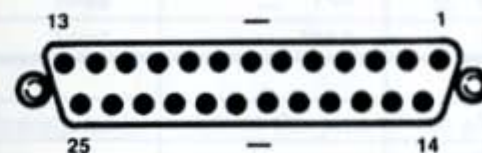


The following table describes the pins for the parallel connector:

Pin Number	Signal Name	Input/Output
1	Strobe	Output
2	Data 0	Output
3	Data 1	Output
4	Data 2	Output
5	Data 3	Output
6	Data 4	Output
7	Data 5	Output
8	Data 6	Output
9	Data 7	Output
10	Acknowledge	Input
11	Busy	Input
12	Paper-end	Input
13	Select	Input
14	Auto feed	Output
15	Printer error	Input
16	Initialize printer	Output
17	Select input	Output
18-25	Ground	

### 5-1/4" Floppy Disk Drive Unit Connector

The following is a pin location diagram for the 5-1/4" floppy disk connector port on the computer:

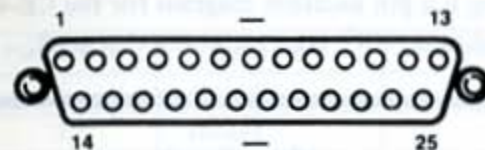


The following table describes the pins for the 5-1/4" floppy disk connector:

Pin Number	Signal Name	Input/Output
1		
2	IDX	Input
3	TK00	Input
4	WPT	Input
5	RD02	Input
6		
7		
8		
9	DS3	Output
10	DS2	Output
11	MON	Output
12	WDT2	Output
13	WTG2	Output
14		
15	HSL2	Output
16	DRTN2	Output
17	STP2	Output
18-25		

### Serial Connector

The following is a pin location diagram for the connector port CE-451B serial I/O card or the serial I/O adaptor on the CE-451M modem card:

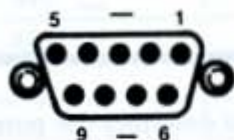


The following table describes the pins of the serial connector:

Pin Number	Signal Name	Input/Output
1	Frame ground	
2	Transmit data	Output
3	Receive data	Input
4	Request-to-send	Output
5	Clear-to-send	Input
6	Data-set-ready	Input
7	Signal ground	
8	Carrier detect	Input
20	Data terminal ready	Output
22	Calling indicator	Input

**Color/Monochrome CRT Connector**

The following is a pin location diagram for the CE-451A color/monochrome CRT adaptor connector port:



The following table describes the pins for the color/monochrome CRT connector:

In the color mode:

Pin Number	Signal Name	Input/Output
1	Ground	
2	Ground	
3	Red Output	
4	Green Output	
5	Blue Output	
6	Intensity	Output
7	Not used	
8	Horizontal synch	Output
9	Vertical synch	Output

In the monochrome mode:

Pin Number	Signal Name	Input/Output
1	Ground	
2	Ground	
3	Not used	
4	Not used	
5	Not used	
6	Intensity	Output
7	Video	Output
8	Horizontal synch	Output
9	Vertical synch	Output

## Glossary

The following is a list of terms used in the Operation Manual.

**application software:** A series of inter-related programs designed to carry out a specific task such as word processing or graphics.

**asynchronous:** A mode of computer operation in which information is processed in a line or string preceded by a start bit and ended by stop bits.

**baud rate:** The transmission rate of information; typically used when describing data communications.

**binary:** A numbering system based on 1's and 0's widely used in computer processing.

**bit:** A binary digit; the smallest piece of information handled by computers.

**byte:** Unit in which data is processed; usually 8 bits.

**card:** An internal plug-in containing printed circuits and electrical components.

**CPI:** Characters per inch.

**CPS:** Characters per second.

**CRT:** Cathode ray tube; output device on which information is displayed.

**data bits:** Indicates length of a character (7 or 8 bits).

**diskette:** A flexible, magnetized, disk-shaped platter housed in a square jacket. It is inserted into a floppy disk drive to read/write information.

**hardware:** The equipment and components that comprise a computer system, i.e., keyboard, memory chips, printer.

**I/O:** Input/Output.

**K:** A symbol that represents capacity; i.e., 1K 1024 bytes.

**modem:** An acronym for MODulator DEModulator, the device is used primarily in sending and receiving data from one computer to another via telephone lines.

**operating system software:** Software that controls system resources such as memory, disk drives, processor, etc.

**parallel I/O port:** The connector point for external parallel devices, usually printers. Bits are transmitted simultaneously.

**parity:** A method of checking the accuracy of data.

**RAM:** Random Access Memory, a temporary storage space for information being worked on by the processor.

**ROM:** Read Only Memory, a permanent storage space for software.

**serial I/O port:** The connector point for external serial devices such as modems. Bits are transferred one by one.

**spreadsheet application:** Software that uses entries made into columns and rows to perform calculations.

**software:** Programs that contain coded instructions to direct a computer system to perform various operations.

**stop bits:** The number of bits that mark the end of a character.

**word processing application:** Software that is used to create and edit text documents.

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