Franklin
Computer

ACE 2000
2100
2200

User Reference Manual

Franklin
Computer

ACE 2000 SERIES COMPUTER
USER'S REFERENCE MANUAL

ACKNOWLEDGEMENTS:

Franklin Computer Corporation acknowledges the assistance of the following in the development of the ACE 2000 Series:

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FCC Statement

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, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user 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 the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

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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. In particular, components other than Franklin Joystick (Part Number JS 200), Franklin Video Cable (Part Number VC 200), and Franklin Printer Cable (Part Number PTR 2200) are not certified to comply with Class B interference limits and may result in interference.

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Chapter 1

Getting Started

Congratulations on your purchase of an ACE 2000 Series personal computer. The ACE 2000 Series Computer is an excellent choice because it is easy to operate and has all the power and capability you need for personal, business, home, and educational computing applications.

Features Of The ACE 2000 Series Computer

Your Franklin ACE 2000 Series Computer incorporates the advanced design features of other Franklin computers as well as extensive compatibility with two of the most widely available computers available today, the Apple IIe and the Apple IIc. It also includes a number of additional features that make it an exceptional value in microcomputers. It is an excellent choice
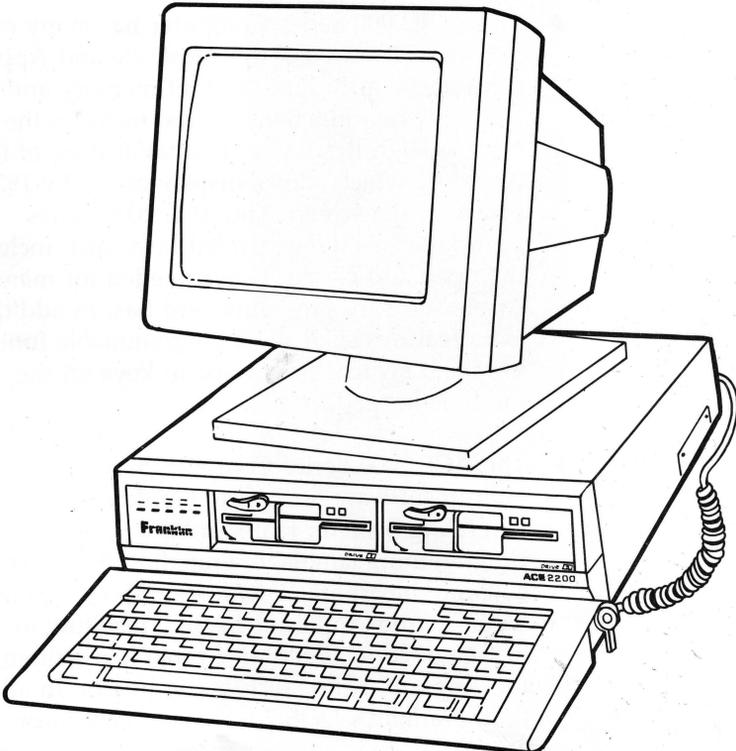
ACE 2200 With Monitor

for ease of use, the variety of software available, and versatility for applications in the home, education, and small business. Although the ACE 2000 Series Computer is simple enough to be a first computer for many people, it is still powerful enough to meet the advanced needs of experienced users.

The following list is a brief discussion of some of the features of the Franklin ACE 2000 Series Computer. It is intended to help you become acquainted with your new computer. The features presented here are things that set the ACE 2000 Series Computer apart from other computers and may be of particular interest for that reason.

- The ACE 2000 Series Computer has many of the enhanced features of the Apple IIe and Apple IIc computers, including 128 K of memory and 80 column video functions. It also includes the Double High Resolution Display feature of the Apple IIc which allows display of 560 by 192 pixels on the screen. The ACE 2000 Series Computer has the expanded keyboard, including the open and closed F keys needed for many Apple software programs, and has, in addition, extra features such as 12 programmable function keys and switchable command keys on the numeric keypad.

- The ACE 2000 Series Computer has advanced built-in software, including Franklin's own Disk Operating System, Franklin DOS 2, and BASIC programming language, Franklin BASIC. This software incorporates features of both Apple's DOS 3.3 and Applesoft BASIC, resulting in a high degree of compatibility for programs written for the Apple II+, IIe, and IIc computers. In addition, Franklin's DOS 2 includes many improvements. There is also enhanced video software for

80 column video and graphics display and printer control software for four popular printers. Several utility programs for diskette and file management are included on the Franklin DOS 2 diskette to help you use the ACE 2000 Series Computer efficiently.

- The ACE 2000 Series Computer uses the new 65SC02 microprocessor for its main processing unit. This new chip is available as an upgrade for the Apple IIe computer. It offers extra power for general computer operation and a number of additional commands for advanced programmers.

- The ACE 2000 Series Computer has built-in 80 column text display capability and additional bank-switched 64 K memory. This is known as "IIe text card" and "IIe extended text card" capability. It is included with the ACE 2000 Series Computer as standard equipment.

- The ACE 2000 Series Computer is hardware and software compatible with programs and equipment requiring the "IIe extended text card" or the IIc 128 K memory requirements.

- The ACE 2000 Series Computer, depending on the model, has compact half-height disk drives built into the computer housing for convenience and security. These special drives, together with Franklin's DOS 2 operating system, have the capability of using diskettes in 40 track format in addition to those in standard Apple 35 track format. This option allows you to increase your diskette storage capacity by 15% while still maintaining the ability to use standard Apple diskettes. The ACE 2000 has no disk drives, the ACE 2100 has one disk drive, and the ACE 2200 has two disk drives.

- The ACE 2000 Series Computer has 12 program-mable function keys that can make computer operation easier and more efficient. The keys are easily programmed to your own specifications by using a simple Franklin BASIC command. The switchable command keys on the numeric keypad make programming faster and easier. The detached keyboard uses an advanced ergonomic design with many features and enhancements found only on more expensive computers.

- The ACE 2000 Series Computer has built-in inter-face hardware and software for four of the most common printers, including graphics printing capability. The computer also has software controls for many printer functions and features included for easy user control of printing.

How To Use This Manual

Using your ACE 2000 Series Computer computer effec-tively doesn't depend on mastering all the material in this manual. Using a computer doesn't have to be an exhausting or intimidating experience. On the other hand, using this powerful tool can be very rewarding in creating solutions to problems, or beginning to understand the way these fascinating machines operate.

This manual, and the optional *ACE 2000 Technical Reference Manual*, describe the way the ACE 2000 Series Computer works. If you're interested in the computer itself, or writing programs that utilize its features, these manuals contain all you need to know. If you use your ACE 2000 for application programs, such as word processing, accounting, or education, you'll probably know a lot about those programs and less about the ACE 2000 Series Computer itself, except how to prepare diskettes for the computer to use, copying files, etc. This manual is designed to let you find the material you want quickly, and then go on to something else.

Read, or scan, the manual so you'll know what things are here. If you need those things, now or later, you'll be able to find them quickly. The chapters are arranged with more technical material in the latter sections, so you can stop reading if you get stuck. The User's Manual describes features of the computer that you'll use all the time, and also features you may never need. The manual is a continuing source of reference information for you.

Other Manuals And Sources Of Information

The *ACE 2000 Technical Reference Manual* contains more detailed information about how the ACE 2000 Series Computer works, including lists of Franklin DOS 2 and Franklin BASIC commands, memory maps, and video display techniques. This reference manual is designed for programmers and experienced computer users, though it can be helpful to anyone interested in applying the power of the ACE 2000 Series computer.

Since the Franklin ACE 2000 Series Computer is designed to be extensively compatible with the Apple IIe, IIc, and other Apple II series products, some Apple reference materials might be of interest to experienced computer users. You should use these materials carefully, and in conjuction with the *ACE 2000 Technical Reference Manual*, so you can tell which parts of the material represent similarities and which are differences from the ACE 2000 operating characteristics.

Computer user groups are gatherings of people of varied backgrounds with varied interests. They are always a good source of practical information, whether answering questions or locating software to do a particular job, or evaluating peripheral equipment, or acquiring public domain programs. Your Franklin dealer can probably help you locate a users group in your area.

Another popular source of communication among computer users is the electronic bulletin board. If you have a modem (a device that connects your computer to a telephone) you can call up a bulletin board, which is usually operated by an experienced computer user, and ask (or answer) questions about just about anything, or just follow someone else's discussions.

Getting Acquainted With The ACE 2000 Series Computer

If you haven't done so already, take the computer out of its packing carton. Before you explore too far, read a little of the manual to get an idea of how things are supposed to work.

There are some important items packed with the computer, like the Warranty Card, the power cord, the video cable, this manual, and the Franklin DOS 2 diskette. Take a minute to fill out the card and, for the moment, find a safe place for the diskette.

Unpack the computer and the keyboard. Save the packing materials so you can transport or store your computer safely if the need arises. Place the computer on your work surface carefully. There should be enough room to turn the computer and monitor to make the necessary connections.

Take a minute and look at the computer and especially the back panel to orient yourself to some of the computer's features.
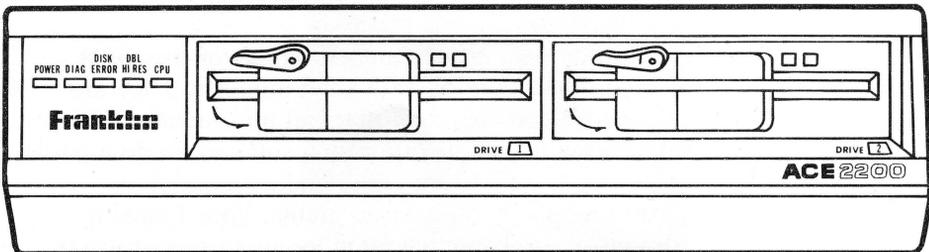
ACE 2200—Front View

Here are some of the things on the back panel and
what they're used for:
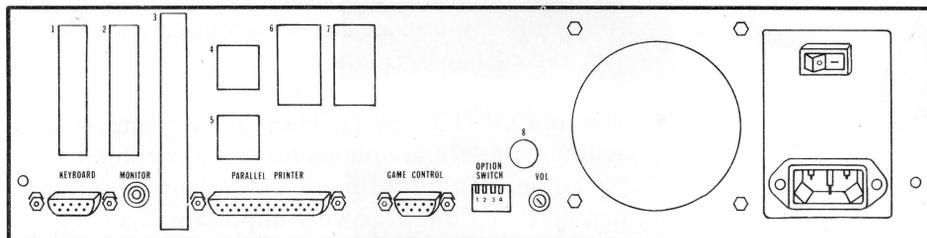
ACE 2000 Series—Back Panel

- The power switch and the power cord connector
  are built into the ACE 2000 Series Computer
  power supply, a high capacity power supply
  which generates 67.1 watts of power. This is
  much more power capacity than most microcom-
  puters and means that your computer operations
  aren't jeopardized by transient power demands. It
  also means that you have a lot of expansion capa-
  bility with your ACE 2000 Series computer
  system.

- The large round cutout with the metal grill is the
  built-in fan, a standard feature of the ACE 2000
  Series Computer that you often have to purchase
  separately with other microcomputers.

- Most common cable connections are available
  with the connectors installed in the back panel.
  The covered slots 1 through 7 are for cables that
  connect peripheral cards inside the computer with
  devices outside. If you need to connect a cable
  through one of these slots, the covers are
  removed easily from the inside.

- The hole marked "VOL" contains an adjusting
  screw for the volume of the computer's speaker.
  The speaker makes a beep when there is an

important event for you to notice, like the
computer is ready to use, or you've entered an
incorrect command. Application programs
frequently use the speaker as accompaniment as
you zap cosmic invaders.

- The four OPTION SWITCHES are very important
settings for several options for the computer's
operation. You'll read more about them later, but
just note that these are very important switches
and should be used carefully. Set or change them
only when necessary.

- The four connectors for the most common periph-
eral devices are labelled with their functions. The
KEYBOARD connector and the MONITOR
connector will always be used since the computer
can't operate without them. Most users will
connect a printer to their computer using the
PARALLEL PRINTER connector. Some users will
need the GAME CONTROL connector, depending
on the computer's application.

Setting Up Your
ACE 2000 Series
Computer

Connecting The Keyboard

The first thing to do is unwrap the keyboard and plug
it in. The keyboard cable plugs into a connector on the
back panel. Note that the cable connector fits only one
way. Attach the connector with the screws provided.
The joystick connects the same way.

The keyboard and the joystick use connectors of the
same type. If you accidentally connect the joystick to
the keyboard port (or vice versa) you won't harm
anything, but the computer won't work. There is also a
16 pin connector for joysticks which don't use the DB-9
connector provided on the back panel. This connector
is located inside the computer case on the main elec-

tronics board. Installation instructions for the special 16 pin connector are in the latter part of this chapter.
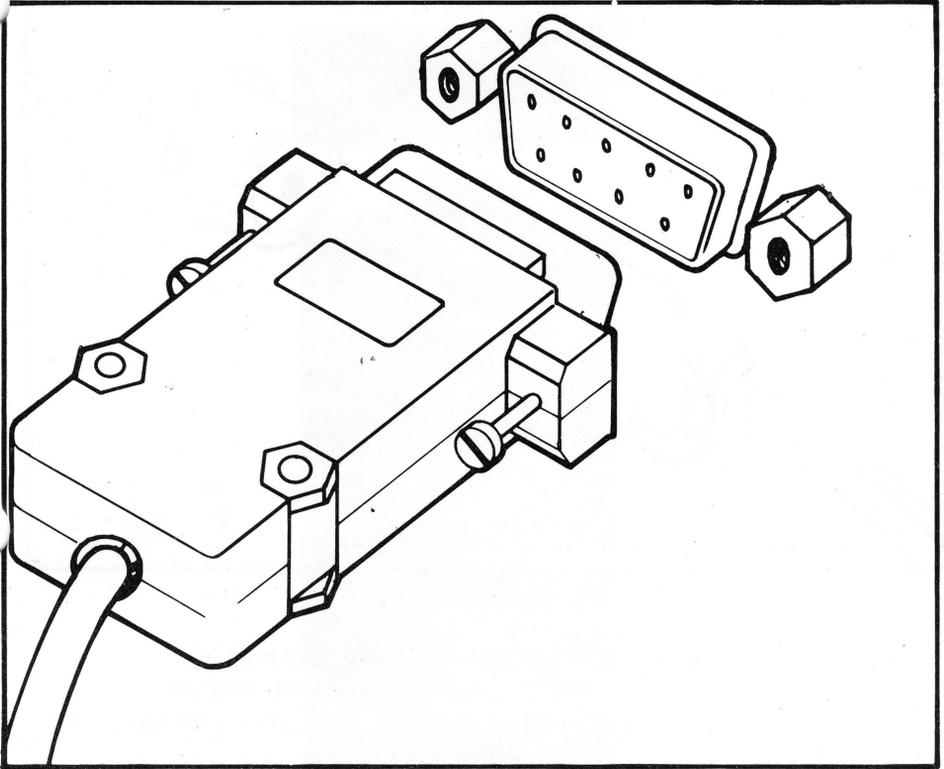
Keyboard (Game Control) Cable And Connector

Connecting The Video Monitor

Now connect the video monitor to the computer. If you're using a monochrome monitor, or a composite color monitor, take the cable provided with the ACE 2000 Series Computer and plug it into the connector on the back panel. Connect the other end to the monitor itself. (If you want to connect the computer to a television set, you need a special connector called an RF modulator. Your dealer can help you get one. Instruc-

tions for connecting an RF modulator are in Chapter 7, *The Display*, of this manual.)
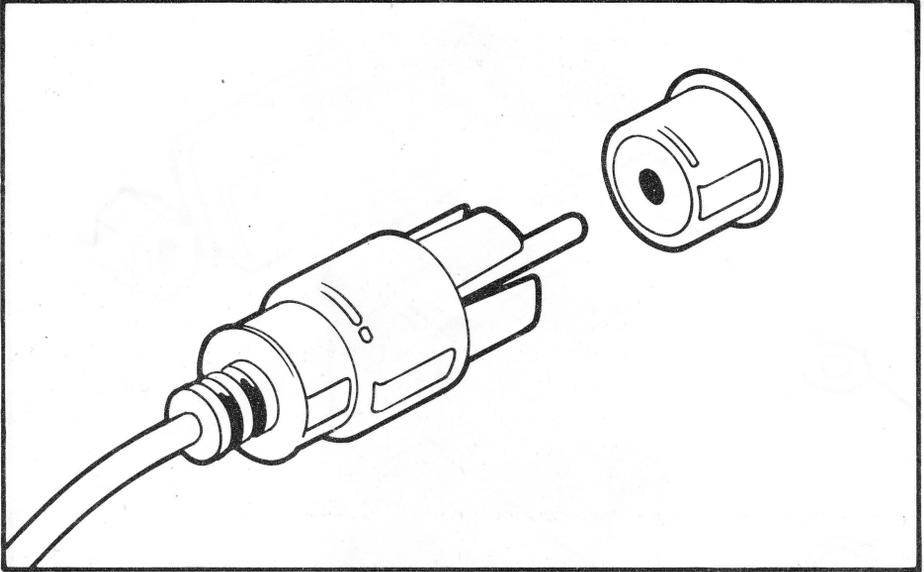
Video Cable And Connector

Now you're ready to go. Make sure both the computer and the video monitor are turned off, and plug in the power cords. Make sure you use a grounded outlet for the computer's power source.
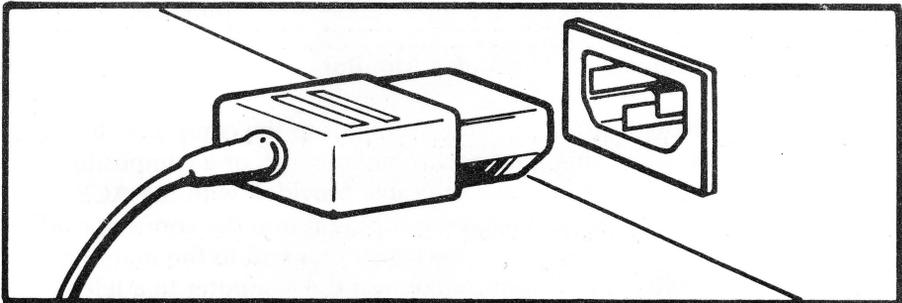
Power Cable And Connector

Although the computer uses relatively little electrical power (about the same as a desk lamp), it is sensitive to changes in the power it receives. You won't get the best results from your computer if you use it in the same circuit with appliances (like air conditioners or electric motors) that make heavy or periodic demands on the electrical power.

Turning On The Computer

Turn on the video monitor first, then turn on the computer using the switch on the back panel. The green light on the left side of the front panel of the computer should go on and the disk drive light should go on as the computer tries to read the diskette. You should also see a single character (a] , which is called a prompt) and a flashing block, called a cursor on the video screen. Turn off the computer and the monitor.
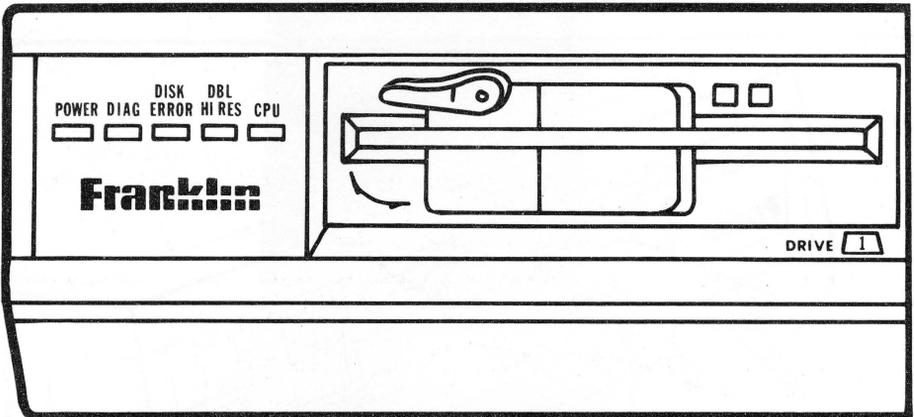
Front Panel—LEDs And Disk Drive Lights

For now, that's all you need to do. The computer is getting power and is connected to the video display, and that was the purpose of this test. If the lights didn't go on, check the connections of the power cords and the power outlets. Check the brightness and

contrast adjustments on the monitor, or the connections and adjustments to the television set if that's what you're using. If it still doesn't work, check with your dealer.

Turning On The Computer With Disk Drives

The ACE 2000 Series Computer computer can have one, two, or no disk drives. If you have one or two disk drives, follow this procedure. If you have no disk drives with your ACE 2000 Series Computer (for instance, if it's used in a networking situation with other sources of memory access and storage), the preceding test to produce the prompt and cursor are your only start up steps.

You'll learn more about disk drives and diskettes in later chapters. For now, just follow this procedure to test your computer.
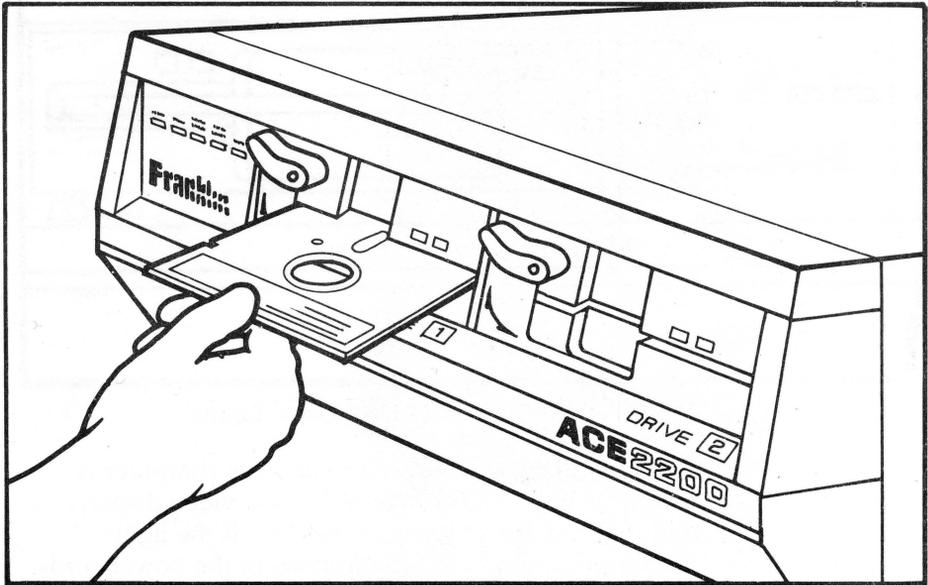
Disk Drive—Inserting Diskette

To test your ACE 2000 Series Computer computer and its disk drives, first make sure the computer is turned off. Then take the Franklin DOS 2 System Diskette, holding it carefully by the top edge, and insert it label side facing up into Drive 1, the left disk drive.

Now turn on the video monitor and the computer. You should see the power light on the computer and the red light on the disk drive go on. Now close the disk drive latch. It is a good habit to keep the disk drive latch open whenever you turn the power on or off. This helps protect the diskette against power surges.
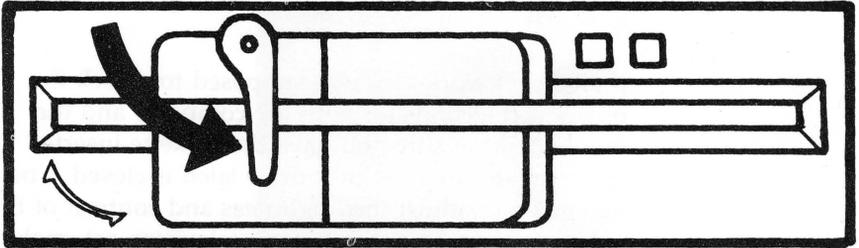
Disk Drive—Closing Drive Latch

You'll hear a whirring noise as the drive reads the diskette. This message will appear on the screen:

```
        ACE 2000 System Diskette
        Copyright 1984, 1985 by

        FRANKLIN COMPUTER CORP
You can run any of these programs:

      1  COPY            4  ONE DRIVE COPY
      2  FUD             5  DIAGNOSTICS
      3  VERIFY

You can run a program just by typing
      its number (1 thru 5).
```

```
You can find out what each program
   does by typing the 'H' key.

You can stop this program by typing
   the 'Q' key.

Which would you like?
```

This is the HELLO program which runs automatically whenever you read the Franklin DOS 2 diskette. It means that everything is working well. Open the disk drive latch and turn off the computer for a while until you learn a little more about how it works and things to watch out for.

If all didn't work as it was supposed to, check the power connections for both the computer and the monitor, make sure you have the diskette inserted correctly and that the disk drive latch is closed. You may need to adjust the brightness and contrast of the video monitor. If you're using a television set, make sure the computer's connections with it are correct.

There is another possible source of problems if the disk drive doesn't work. Check the setting of the OPTION SWITCH group on the back panel of the computer. Switch 1 on the left should be in the down position. Make sure this switch is set correctly.
If the computer still doesn't work, check with your dealer.

Other ACE 2000 Series Computer Features

Some of the other features of the ACE 2000 Series Computer may be of interest to you but may involve a little more technical information than you are comfortable with. If you're interested about these things, read on, but realize that it's not necessary for you to understand all these details to use the computer effectively.

Front Panel Indicator Lights

The LED (Light Emitting Diode) indicator lights on the front panel of the computer are green and red and show:

#1–Power is on (green light)

#2–Computer is performing internal memory and diagnostic tests

#3–Disk error or faulty diskette. Franklin DOS 2 activates this LED if the software needs to retry reading a sector of the diskette.

#4–Double hires graphics is in use. This indicator is active any time the 560×192 pixel screen display is used.

#5–The CPU LED registers any I/O activity of the computer CPU. This activity includes keyboard, disk drive, printer activity, and optional peripheral cards.
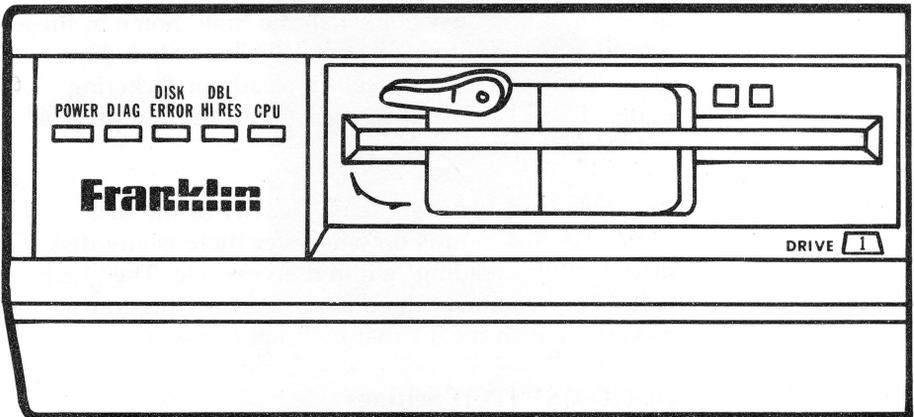
These lights show the state of activity of your computer and can be helpful to you. When you turn on the computer, it automatically runs an internal memory and diagnostic test before it boots the diskette. LED #2

is active while these tests are running, usually only a few seconds.

When a diskette is difficult for the disk drive to read, LED #3 will probably show some intermittant flickering. Franklin DOS 2, the Disk Operating System software, detects this difficulty and tries to read the diskette six times before displaying an error message. Usually this is an early warning and you can copy the data on the diskette to another one before the diskette becomes totally unreadable.

The double hires graphics indicator, LED #4, lets you know when you're operating in double hires mode, the 560×192 screen display, whether from an application program, or from your own program commands.

LED #5 shows that the central processing unit is performing some I/O activity, which includes keyboard, disk drive, printer, or peripheral card activity. This means that it is busy almost all the time. Some of these activities are very brief, so the LED has only a dim glow. Other processes result in steady or flickering lights. This LED is a good measure of the computer's central processing unit's activity.

The disk drive lights show the activity of the disk drive. The red light is on whenever there is any disk drive activity, reading, writing, access, etc. The green light is on whenever the disk drive is writing to the diskette (which means that both lights are on).

OPTION SWITCH Settings

The OPTION SWITCH group on the back panel has a number of settings, some of which involve concepts and procedures you'll encounter later, others which are fairly technical. The operation of these switches is

described here for your reference. Don't set the Option Switches without further information.
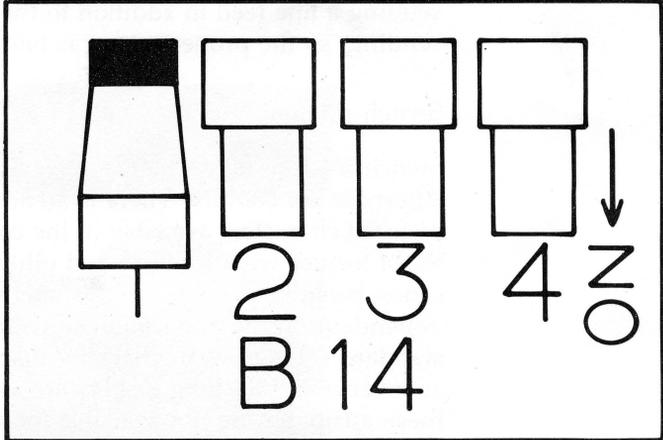
Back Panel—Option Switch # 1

Switch #1 Enable/disable logical internal slot 6, DOWN enables slot 6, UP disables slot 6. This switch activates or deactivates the computer's connection with the disk drive, which is a connector on the main electronics board known as slot 6. This switch must always be DOWN for the disk drives to work. If you purchase an expansion box for your ACE 2000 Series Computer, the box contains a number of expansion slots and the disk drives are connected to the main electronics board through the expansion slots. In that case the internal slot 6 must be disabled. Further instructions are included with the expansion box.

Switch #2 Auto Line Feed for printer. UP is LF, DOWN is no LF. This switch determines whether the computer sends a line feed command to the printer at the end of each line or not. Some printers expect the computer to supply the command to move down a line, other printers supply the command themselves. Consult your printer manual to see what your printer requires for the line feed command. If you can't tell, set

the line feed switch DOWN and try printing some-
thing. If the lines are double spaced, the printer is
sending a line feed in addition to the one you're
sending, so the proper setting is line feed OFF.

Switch #3 unused

Switch #4 Alternate Character Set–Standard Set UP,
Alternate Set DOWN. There is an additional set of
pictorial characters available in the computer's video
ROM for use with a mouse and other icon-based appli-
cation programs. Access to this alternate character set is
dependent on the application software. When the
standard set is chosen, character display attributes such
as inverse and flashing display are available. Some of
these attributes are not available for standard characters
when the alternate character set is chosen.

Connecting
Peripheral
Devices

The Franklin ACE 2000 Series Computer has the capa-
bility to expand to meet special needs of a number of
peripheral devices. These devices are attached to the
computer by means of connectors, called slots, built
into the main electronics board.

The ACE 2000 Series Computer has the standard
Apple-compatible logical slots #1 (for the parallel
printer), #3 for 80 column display, and #6 (for the disk
drive) built into the main electronics board. There are
two additional slots available for peripheral cards inside
the computer case.

If you need to use these slots to connect peripheral
devices to the computer, follow these instructions for
opening the computer case and plugging in the periph-
eral cards.

First, remove the power cord from the computer. Turn the computer so you have some free space on the left side of the computer so you can lay the top down easily while the cables are still attached. Facing the back panel, remove the two screws, slide the top of the case away from you, and tip it to the left. Be careful because the top may appear heavier than you expect. The disk drives are mounted in the top of the case and the disk drive cables are long enough to remain connected while the top is off.
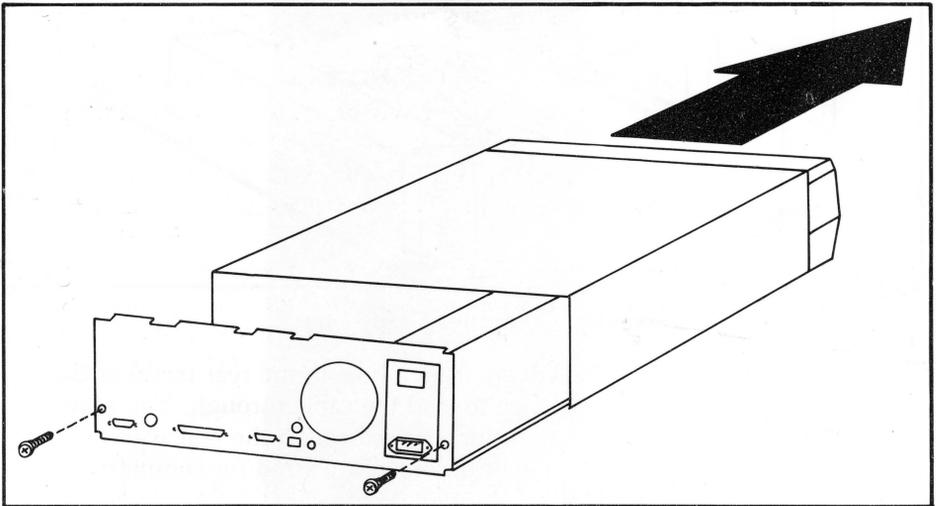
Removing Computer Case—Step 1

The two long connectors at the rear of the main electronics board are the slots. The rearmost slot is designated slot 2.

Slot 2 is used for a serial printer or modem port. If you want to use slot 2 for a serial card, simply insert the edge connector of the card into the slot. Make sure it is seated securely. Consult the manual with the serial card for any other instructions about installing the card. If you need to attach a cable to the serial card, remove
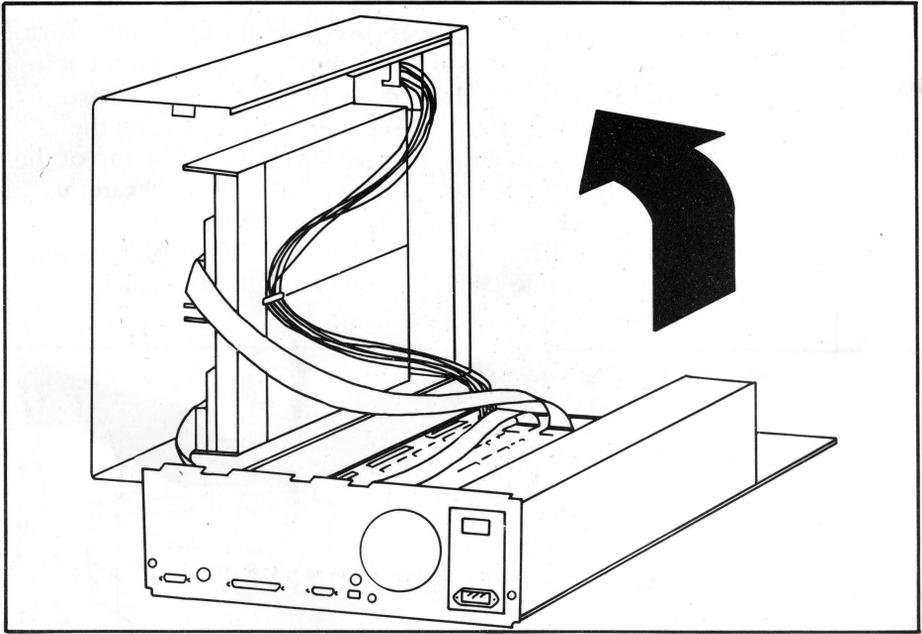
Removing Computer Case—Step 2

one of the covers from a hole in the rear panel of the
appropriate size to lead the cable through. You may
want to mount the connector onto the rear wall
directly. Some of the holes are sized for common
connectors.
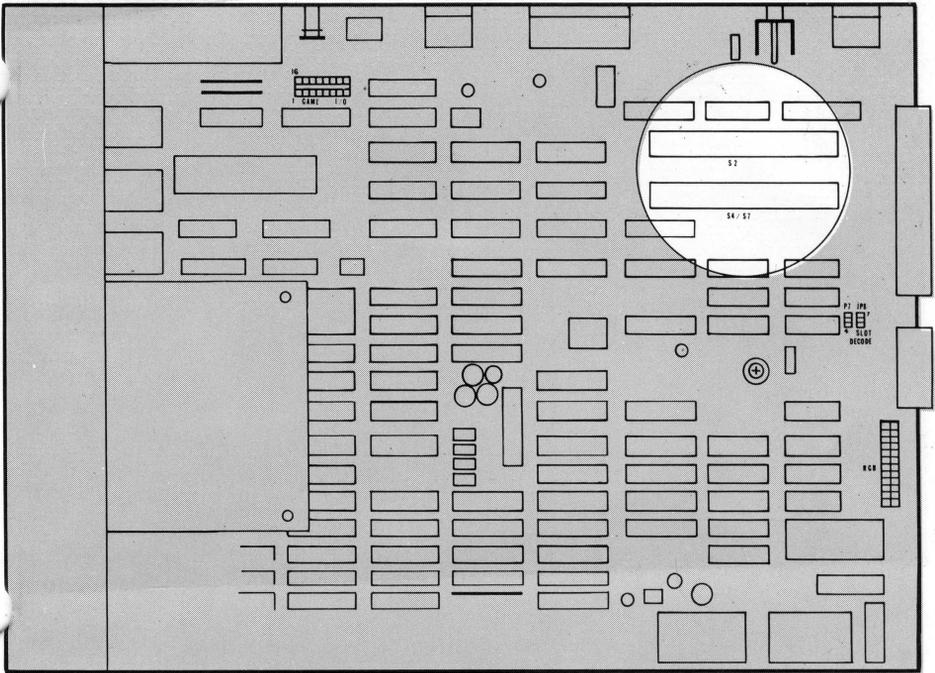
ACE 2000 Series—Main Board—Slot Location

The other slot may be used either as slot 4 or as slot 7. Slot 4 is often used for connecting additional disk drive units, or for adding a CP/M (another operating system) peripheral card. Slot 7 is generally used for adding a hard disk drive to the computer.
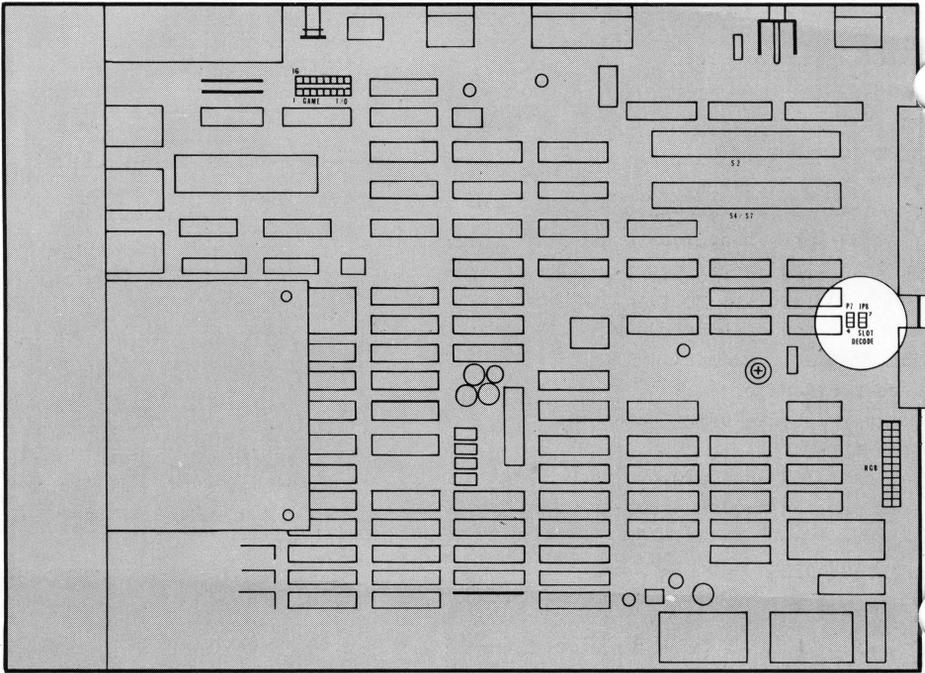
Main Board—Jumper Location

The choice of slot 4 or slot 7 is made by setting two jumpers on the main electronics board. The current setting is for slot 4. If you want to use the slot as slot 7, remove the jumpers from the pins and slip them down on the neighboring pins.
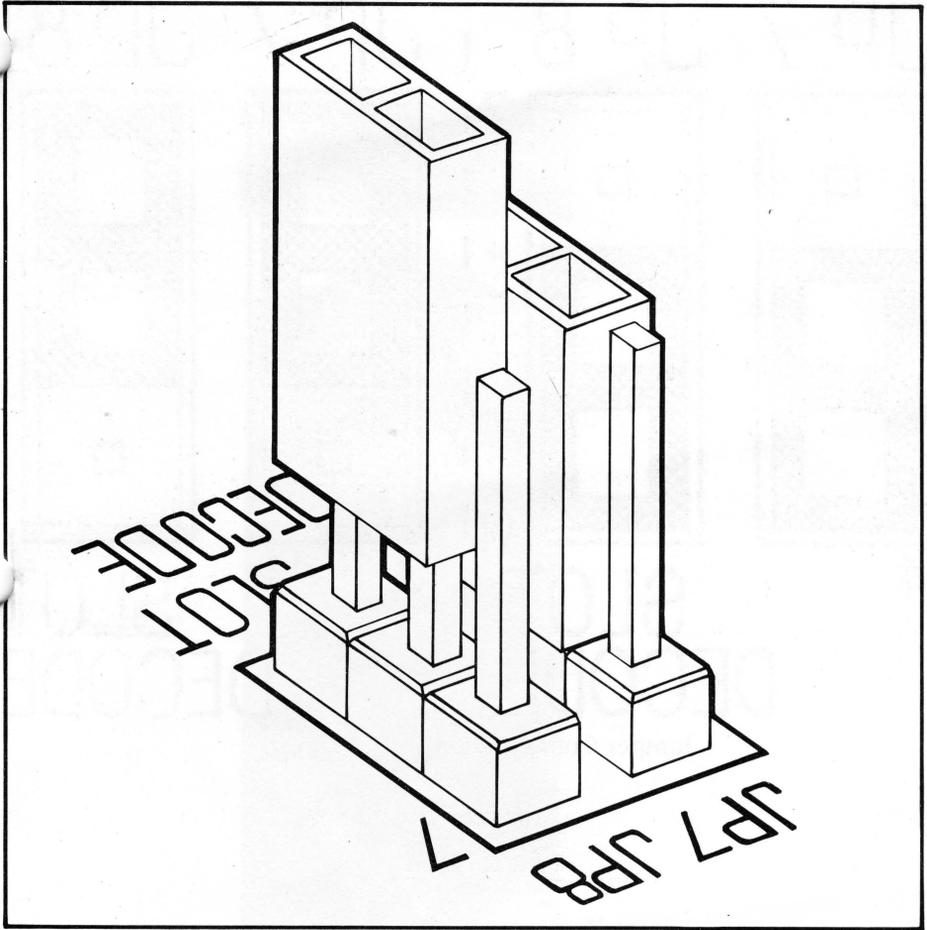
Lifting Off Jumper Connectors

JP 7 JP 8 JP 7 JP 8

7

4

4
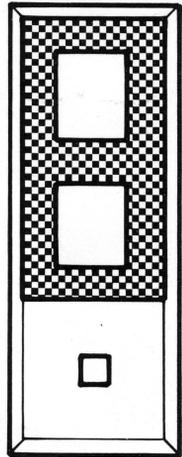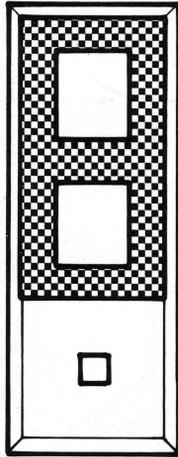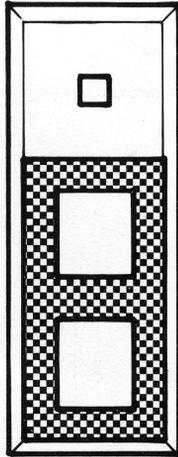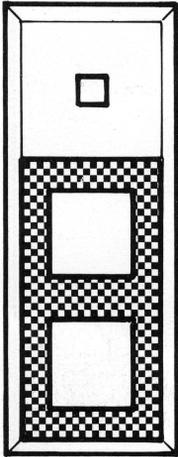
SLOT
DECODE

SLOT
DECODE

Jumper Configuration
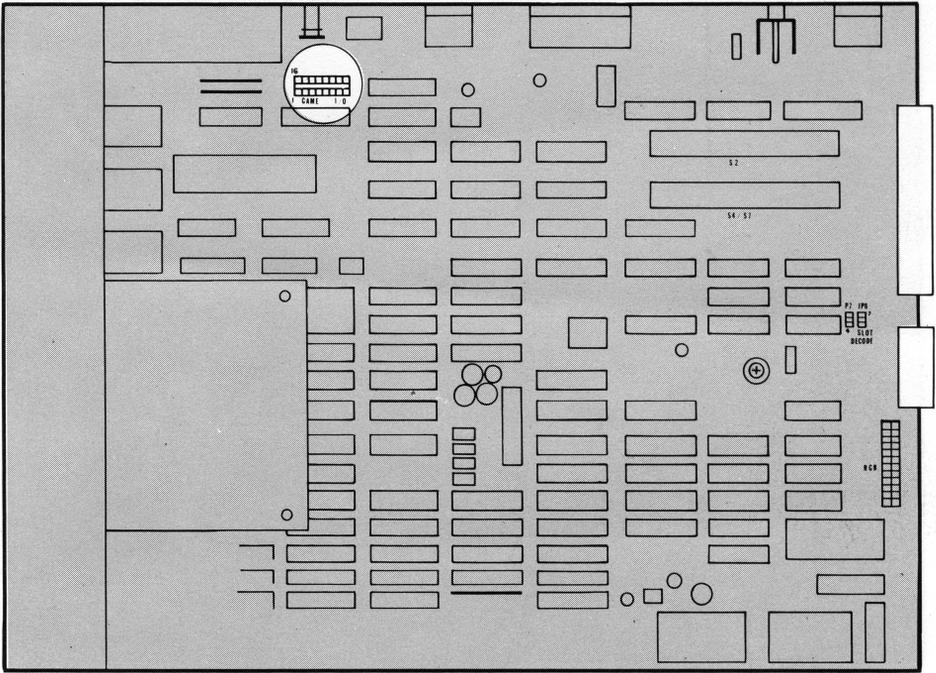
Main Board—16 Pin DIP Socket Location

Connecting A 16 Pin Joystick Cable

If the joystick you have uses a 16 pin connector instead of the DB-9 connector provided on the rear panel, you have to install it through one of the holes in the rear panel to a DIP socket on the main electronics board. The socket is located just below the RF modulator board and behind the OPTION SWITCH box and is labelled "Game I/O." Be sure to locate Pin 1 on the plug and match it to Pin 1 on the socket as marked in the illustration. Be careful not to bend any of the pins as you insert them into the socket.
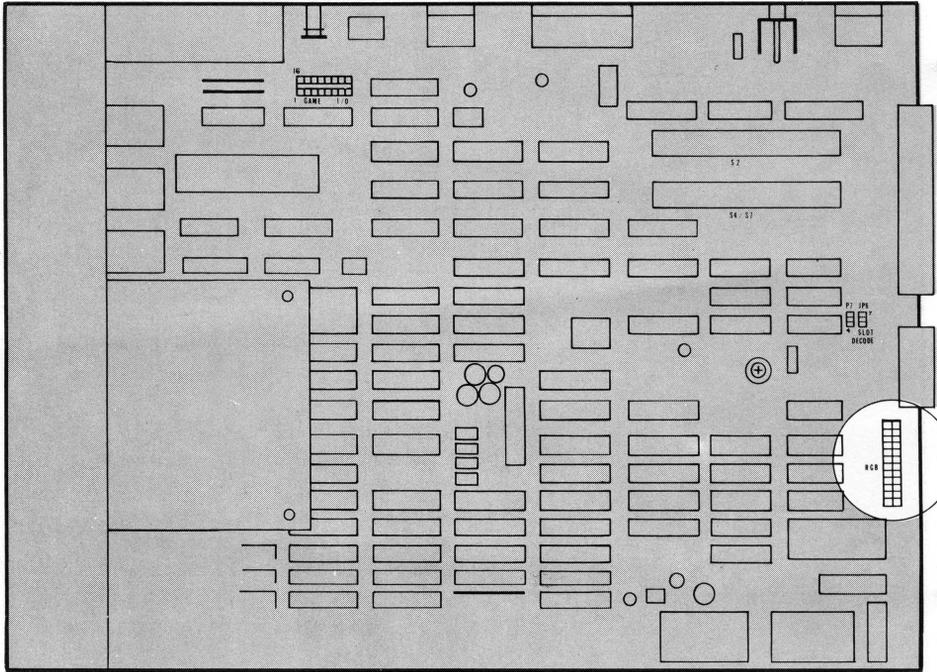
Main Board—RGB Connector Location

Connecting An RGB Video Monitor

If you use an RGB video monitor it has to be connected to a 24 pin socket on the main electronics board with an electronics adaptor board. The position of the connector is shown in the illustration. The RGB connector is marked "J11 RGB." Your dealer can help you with the cables and adaptor board.

ACE 2000 Series Computer Expansion Chassis

The ACE 2000 Series Computer has an expansion connector on the right side which is covered by a small plate. This connector is designed for the Expansion Chassis which has four additional physical slots for peripheral card expansion.

Chapter 2
The Keyboard

The ACE 2000 Series Computer keyboard is one of the most important features of the computer because it provides your interface with the computer. The keyboard has a number of design features that benefit you while you use the computer.
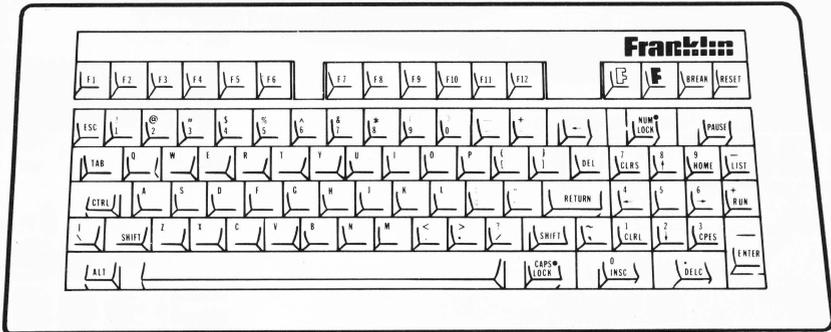
ACE 2000 General Keyboard Drawing

- The keyboard is compact, light, and detached, with a coiled cable so you can use the keyboard where you want it.

- The keyboard has adjustable feet to change the typing angle and fit your typing preference.

- Keytouch, shaped keytops, auto-repeat, and other built-in features make the keyboard comfortable and easy to use.

- The key arrangements follow ergonomic design standards to give maximum convenience for location of commonly used keys, like SHIFT and RETURN. The numeric keypad is designed for easy entry of numeric data, including the duplication of the RETURN function on the ENTER key.

- Twelve easily programmed function keys in convenient groupings allow custom application of many commands and functions.

Typewriter Functions Of The Keyboard

The keyboard on your ACE 2000 Series Computer is very similar to the keyboard of a typewriter, but it has some keys usually only found on computers that you may not recognize.

This chapter will discuss each of the keyboard groups in turn, pointing out the similarities and differences between the computer keyboard and the typewriter keyboard.

Keyboard—Main Keypad

Your ACE 2000 Series Computer has two main keyboard groups, the main keypad with the alphabetic and punctuation keys, and the numeric keypad on the right side. The design of these keyboard groups is as close as possible to the layout of a typewriter and a calculator so you can use your keyboard skills as you work with your computer.

The main keypad generates upper and lower case letters with the use of the SHIFT keys, dark gray keys at lower left and lower right marked with large up arrows. If a key has two symbols on it, the upper one is generated by SHIFT with the key and the lower symbol is produced by pressing the key alone. That's all just like using a typewriter.

Other keys usually found on a typewriter, like the BACKSPACE (shown as a left arrow), TAB, and SPACE

BAR keys work in their usual way. The DEL key generates a special computer signal (a RUBOUT character, ASCII 127). Only users with technical applications are likely to use DEL.

Shift Keys

The illustration shows the different Shift keys available on the keyboard and their location.
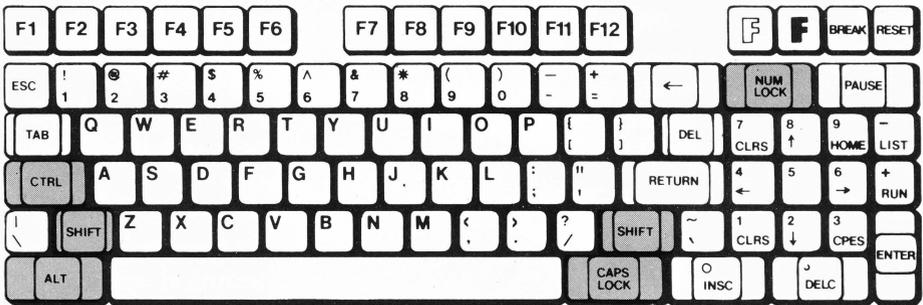
Keyboard—Shift Keys

The familiar SHIFT key produces an uppercase letter when it is used with another key. There are other shift keys available on a computer that work in the same way.

The CTRL (for CONTROL) key, located at the lower left of the keyboard, is another shift key. If you hold down the CTRL key while you press another key, you generate a special control code. These control codes are often used for special commands to the computer but aren't printed or displayed on the screen. You'll use control codes often as you operate the computer. They are written as CTRL A, which means that you hold down the CTRL key while you press A. Sometimes a frequently used control code is given its own key. For instance, the RETURN key produces CTRL M.

The CAPS LOCK key is similar to the shift-lock key on a typewriter except it works only with the alphabetic characters on the computer. The indicator light on the

CAPS LOCK key is on when the key is in upper case mode. You can turn it on and off by pressing it successively.

The NUM LOCK key controls the action of the keys in the numeric keypad, whether they generate the numbers and symbols marked on their keytops or the other characters, either cursor movement arrows or editing commands. You'll learn more about these functions later in this chapter. For now, the object is to understand the operation of the NUM LOCK key in shifting from one mode of operation to another. The LED indicator light on the NUM LOCK key shows the numeric keypad is in "number mode."

The ALT key is also a shift key, but it generates special codes that are used only in special technical applications that are discussed in the *ACE 2000 Technical Reference Manual*. It is also used for some special commands, as you'll see later.

Command Keys   The illustration shows the various command keys available on the keyboard and their location.

Keyboard—Command Keys

The RETURN (for Carriage Return) key is shown with an arrow going down and then to the left to indicate the movement of a carriage return. There is one RETURN key at the right side of the main keypad and

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another one (labelled ENTER) at the right side of the numeric keypad for your convenience. For many operations, the RETURN key is just a carriage return. It can serve an additional function on a computer, and that is as a command key. When you enter a command on the computer, you conclude it by pressing RETURN. In this sense RETURN is a way of saying "This is my command, execute it." RETURN is one of the most powerful and most frequently used keys on the keyboard.

The ENTER key on the numeric keypad is the same as the RETURN key. It performs the same function and is repeated in that position as a convenience to you when you're entering a lot of numeric data.

The ESC (for Escape) key is often used for commands, either as an introducing character for a command sequence, or as a response to a question by the computer. An example might be ESC A, in which you press ESC and then you press A. Sometimes ESC means special things to some software applications, and it's best to use it carefully.

The PAUSE key sends a signal to the computer to stop the display. For instance, if the computer puts a large piece of text on the screen and it moves off faster than you can read it, press the PAUSE key to stop the display. Press it again to resume the display. PAUSE sends a signal (CTRL S, also called XOFF, which in computer language is "transmit off") to the computer to stop sending data to the screen, then sends another signal (CTRL Q, also called XON, for "transmit on") to resume sending data. This pair of signals is called the XON/XOFF transmission protocol.

The BREAK key sends a signal to the computer to stop the execution of a BASIC program you're running. This is a fairly drastic step and may cause some data to be

lost. BREAK is the same as CTRL C, which is some-
times used as a special computer command.

The RESET key represents a very drastic step. When
you reset the computer you clear the memory and
therefore almost always lose the program you're
working on. On the other hand, sometimes the
computer seems to get stuck in some process and you
can't regain control. Resetting the computer is the way
to stop the computer's activity and start it again.
Because the reset function is so powerful you have to
press CTRL RESET to activate it. This two-key proce-
dure prevents accidental pressing of the RESET key.
Reset is also called a "warm start."

The "open F," ⊏, and "closed F," ∎, keys are special
keys that don't actually do much themselves but are
used together with other keys in special commands.
They are sometimes used in application programs and
correspond to the "open Apple" and "closed Apple"
keys on Apple computers.

Function Keys   The illustration shows the location of the 12 function
keys on the keyboard.

Keyboard—Function Keys

Function keys get their name because they generate a
function, such as a command, or a series of characters,
instead of just a single character or control code like

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other keys. They are also called "programmable" keys because they can be programmed to generate any command or definition you want. Specific instructions on controlling the function keys and programming their contents is contained in Chapter 6, *Function Keys*. The definitions the keys have when you boot the Franklin DOS 2 diskette are given below.

Default Function Key Definitions

The Franklin DOS 2 diskette contains a set of definitions for the function keys in the start up file that is loaded each time you boot the diskette. The definitions are:

Key	Definition	Description
F1	CATALOG,D1 (RETURN)	Catalog of drive 1
F2	CATALOG,D2 (RETURN)	Catalog of drive 2
F3	PR#3 (RETURN)	Turn on 80 columns
F4	PR#1 (RETURN)	Turn on printer output
F5	(ESC) 4	Switch from 80 to 40 columns
F6	(ESC) 8	Switch from 40 to 80 columns
F7	COPY	Copy a diskette file
F8	TYPE	List a diskette file
F9	LOCK	Lock a diskette file
F10	UNLOCK	Unlock a diskette file
F11	DELETE	Delete a diskette file
F12	RENAME	Rename a diskette file

Note that (RETURN) and (ESC) in the definitions are single keys, not the spelled out versions of the commands. The definitions are shown here in uppercase letters, but Franklin DOS 2 could process them just as well as lowercase letters. Note also that the

commands that require **(RETURN)** for execution have it included in their definition. For other commands that require additional input, like COPY, you have to supply the additional information and **(RETURN)**. For instance, the command line

```
COPY filename (RETURN)
```

would be typed:

```
F7 filename (RETURN)
```

The operation of the Franklin DOS 2 commands themselves are given in the Franklin DOS 2 chapters and the video display chapter. As far as the function keys are concerned, all you have to remember is that the key produces the sequence of characters shown in the definitions whenever it is pressed.

Numeric Keypad Operation

The illustration shows the numeric keypad. The functions and operation of its keys are described below.
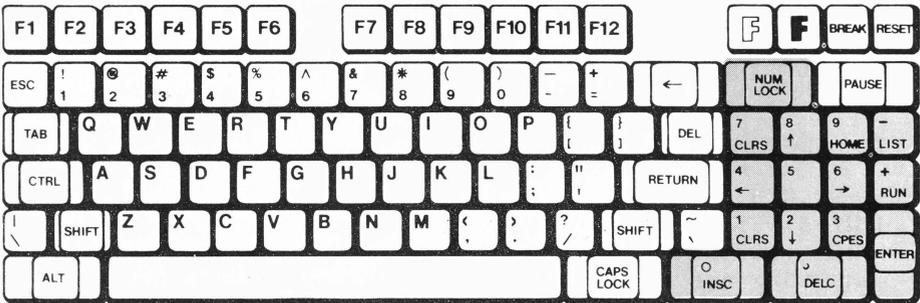
Keyboard—Numeric Keypad

The numeric keypad operates in two modes, the numeric mode in which the keys generate numbers and arithmetic symbols, and an editing mode in which the keys generate the cursor movements and the various BASIC editing commands shown on their keytops. The

NUM LOCK key controls the choice between these two modes, with the LED on the NUM LOCK key showing the numeric mode operation.

Numeric Mode Commands

When the numeric keypad is in numeric mode (NUM LOCK on), the keys generate numerals 0 through 9, ., +, −, and ENTER (which is the same as RETURN).

Numeric Keypad Editing Commands

When the numeric keypad is in editing mode (NUM LOCK off), the keys generate the commands listed below. Some of the editing commands are part of the enhanced video software. They are available only when that software is activated. You may need to try each application program you use to see if the enhanced video software is activated by it, and therefore if the editing commands on the numeric keypad are operational. If you are using your own programs, remember to turn on the enhanced video software before using these commands.

The arrow keys, RUN, LIST, and ENTER do not require the enhanced video software and should be available for general use any time.

RUN issues the BASIC command to RUN a program.

LIST issues the BASIC command to LIST a program.

ENTER is the same as the RETURN key.

The arrow keys move the cursor on the screen.

The other editing keys listed below are functional only when the enhanced video software is active.

CLRS   Clear The Screen

This command clears the entire screen and moves the cursor to the home position, column one of line one.

HOME   Home The Cursor

This command moves the cursor to the home position, which is the first column of the first line.

CLRL   Clear The Line

This command clears the entire line designated by the cursor position. The cursor position itself is unaffected.

INSC   Insert A Character

This command inserts a space character at the current cursor position and pushes other characters on the line one position to the right to make room for it. Only characters to the right of the cursor column are affected. If there is a character in the last column of the line, that character is lost.

DELC   Delete A Character

This command deletes the character at the current cursor position and moves all the columns on the right side one space from the right to close up the line. A space character appears in the last column of the line.

CPES   Copy Entire Screen Line

This command is useful in editing BASIC programs and has a very specialized operation. This command sends all the characters on the cursor line to the current program for processing or execution. This is equivalent to moving the cursor to the end of the line and then hitting (RETURN). The CPES command works regard-

less of the cursor position on the line.

CPES is designed for editing BASIC statements. Suppose you had typed a line of a program that had a mistake in it. First, you would LIST the line, then use the escape mode cursor movement keys to locate the section of the line that needed correction, then make the changes with the INSC and DELC keys. When the changes are complete, just press CPES. The corrected line is sent to BASIC with a (RETURN) without any additional cursor movement required.

If you use the CPES command on a full line (all 40 or all 80 characters are used), you may notice that the last character on the line is cleared to a space character after CPES executes. Don't worry, this is only the display screen's processing of the command. The correct and complete line was sent to the running program.

Chapter 3

Franklin DOS 2 (Disk Operating System)

The Franklin Disk Operating System, known as
Franklin DOS 2, allows your ACE 2000 Series
Computer to use the thousands of application programs
available on diskette. The Disk Operating System is
software that handles interactions with diskettes and
disk drives. It's used whenever you use the disk drive.

The disk operating system, Franklin DOS 2, and
Franklin BASIC (Franklin BASIC programming
language) are sometimes thought of as a single
program. They are not, but they work closely together
and you probably don't need to be concerned about the
differences. Whenever you turn on the computer with
the Franklin DOS 2 diskette in drive 1, Franklin DOS 2
goes from the diskette to the computer's memory
where it's available for your use until you turn the
computer off, or load an application program.

You'll do well to start your computer with the Franklin
DOS 2 diskette or an exact duplicate each time you turn
on the power (unless you're using another operating
system, such as CP/M or Pascal, exclusively).

**Buying Franklin
DOS 2
Application
Programs**

Your ACE 2000 Series Computer will run virtually any
Apple DOS 3.3, Franklin DOS, or Floating Point BASIC
programs, with three major exceptions:

1. Programs written in Integer BASIC. If a listing of
   the Integer BASIC program is available, you may
   be able to alter the program so it can be entered as
   a Floating Point BASIC program.

2. Older programs for Apple computers that produce
   lowercase characters unconventionally (sometimes
   referred to as the "shift mode" option).

3. Programs that interact with the operating system
   in nonstandard ways.

Many application program diskettes come with an operating system on the diskette, so you may not be obliged to boot with the Franklin DOS 2 diskette first. The best way to find out is to try it and see. Be aware, however, that the special features of Franklin DOS 2 will not be available to you if you rely on the operating system provided on the application program diskette. Even if you do boot first with the Franklin DOS 2 diskette, you may find that the application program's operating system overrides Franklin DOS 2 by overwriting it in memory (this generally doesn't happen with Franklin BASIC).

If you're not sure a program will run on your ACE 2000 Series Computer, check with your dealer or perhaps your local user's group, or try it out before you buy it.

Disk Drives For Your Computer Disk drives are vital parts of a computer system because they allow easy movement of programs or data into and out of the computer. When you run an application program, the program is read from the diskette by the computer on your command, and loaded into the computer's internal memory for operation. When you write a program, or a letter, or make a mailing list, that data is taken from the computer's internal memory and stored on a diskette so it will be available to you when you want it. Without this storage facility, the computer alone is a limited tool.

Your ACE 2000 Series Computer may have one, two, or no disk drives. These instructions for using Franklin DOS 2 and the computer depend on using the disk drive(s). You may need to adjust these procedures to the configuration of your computer.

If you have no disk drives (the ACE 2000 model) these instructions and Franklin DOS 2, which controls operations with disk drives, have little immediate use. ACE 2000 computers with no disk drives are almost always

used in networking applications, and some of the computers in the network will have disk drives.

If you have one disk drive (the ACE 2100 model), you can use all the features of Franklin DOS 2, but you may need to adjust the procedures slightly, particularly the procedures to copy diskettes.

If you have two disk drives (the ACE 2200 model), you'll be able to use all the features of the computer easily. You'll also need to be aware of the conventions Franklin DOS 2 uses to designate each drive and the ways to use them both.

Diskettes For Your Computer

You'll need a supply of diskettes to use your ACE 2000 Series Computer effectively. You'll use them to make copies of your operating system diskettes, as well as for data storage and programs.

When you purchase blank diskettes, buy 16-sector or soft-sectored 5¼ inch single sided, single density diskettes. These are the most common diskettes available.

The diskettes you fill with data or programs are relatively inexpensive compared to the price of the computer, but they represent a lot of time and effort, so you need to take good care of them to protect this investment. Be careful with your diskettes.

Here are some suggestions for protecting your diskettes.

- Always make backup copies of important diskettes, especially diskettes that hold your data, operating system, or programs.

- Handle the diskettes carefully. Always keep them in their protective envelopes. Store them flat and protected; keep and use them at normal room temperature.

- Diskettes are made of a plastic medium with a magnetic coating enclosed in an envelope. The diskette is sensitive to dirt, to smoke, and to the oil on your fingers, so don't touch the exposed areas of the diskette. Keep diskettes away from any magnetic and electrical disturbances, such as electric motors, magnets, video monitors, etc.

The ACE 2000 Franklin DOS 2 System Diskette

The ACE 2000 System diskette contains Franklin DOS 2 as well as a number of useful programs for copying diskettes, for handling files you use, and other general computer tasks.

Chapter 1, *Getting Started*, of this manual showed you how to boot the ACE 2000 Series Computer using the Franklin DOS 2 diskette. This procedure reviews that sequence to remind you how to start the computer.

1. Insert the Franklin DOS 2 diskette into the horizontal slot of drive 1 (the left hand disk drive). Push it all the way in but don't force it after it stops.

2. Turn on the power to the monitor. Then turn on the power to the computer with the power switch on the back panel.

3. Turn the latch on the disk drive down across the disk drive slot. This puts the reading mechanism down onto the surface of the diskette (think of putting the stylus of a record player down onto the surface of the record). It's a good idea always to open the disk drive latch whenever you turn the power on or off as a protection against power surges that could harm your diskettes.
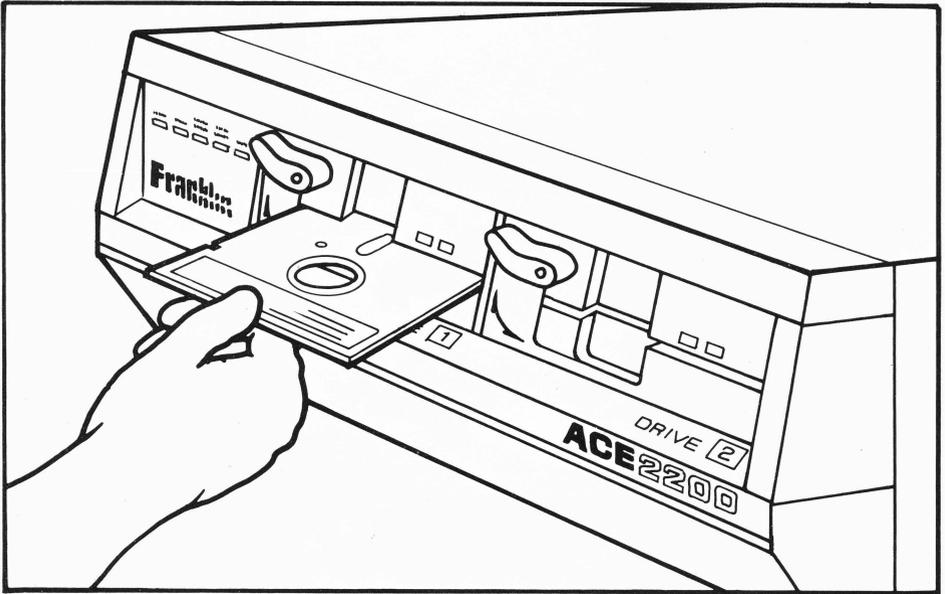
Disk Drive—Inserting Diskette
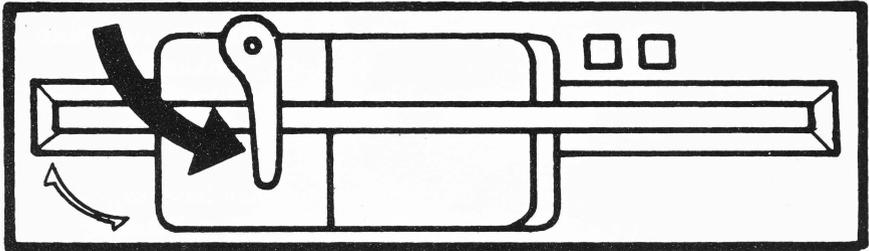
Disk Drive—Closing Drive Latch

The computer now starts to read the diskette. There may be a little noise as the disk drive adjusts itself and then reads Franklin DOS 2 into its internal memory. You'll see a message appear on the screen, something like this:

```
          ACE 2000 System Diskette
          Copyright 1984, 1985 by

          FRANKLIN COMPUTER CORP
You can run any of these programs:

     1  COPY          4  ONE DRIVE COPY
     2  FUD           5  DIAGNOSTICS
     3  VERIFY

You can run a program just by typing
     its number (1 thru 5).

You can find out what each program
     does by typing the 'H' key.

You can stop this program by typing
     the 'Q' key.

Which would you like?
```

This message is the HELLO program that runs auto-matically each time you boot the Franklin DOS 2 diskette. It tells you (among other things) that every-thing is ready to go.

Other Franklin DOS 2 diskettes may have slightly different contents or screen displays as Franklin updates the software contents of the ACE 2000 Series system software. The "H" selection is a kind of help message which describes the operation of each of the programs listed in the menu. If you don't want to use any of those programs, press the "Q" key to quit the menu and go into BASIC.

Making Backup Copies Of Your Franklin DOS 2 Diskette

Before you use your Franklin DOS 2 diskette (or any new diskette) you should make a backup copy of it. Use the copies for everyday use and keep the original diskette in a safe place. This is a good habit to estab-

lish, and one you'll be grateful for if you ever "crash" an important diskette.

The Franklin utility programs, COPY and ONE DRIVE COPY, make it easy to make backup copies of diskettes. Before you proceed, get a few blank diskettes to make your copies.

Two Disk Drive Systems

If you have a two drive system, follow this procedure:

Use the HELLO program to help you make backup copies. Just select option 1, by pressing 1. You could also exit the HELLO program, get the Franklin DOS 2 prompt,], and type:

```
RUN COPY (RETURN)
```

Either procedure loads the copy program into the computer's memory. The screen displays:

```
Fast Copy  Vx.x

Franklin Computer Corp.

Insert the disk to be copied into drive
one, and a blank disk into drive two.
Press:
    1  for a 35 track copy
    2  for a 40 track copy
       or ESC to return to Franklin DOS 2
```

Insert the diskettes in the disk drives as instructed. Since your Franklin DOS 2 diskette is in 35 track format (you'll learn more about that later), press 1. There is no need to press (RETURN) to start the copying. When the copy is finished, you'll see the message:

```
The copy has been written and verified.
```

Make two copies of your Franklin DOS 2 diskette. The COPY program asks if you want to make another copy, and all you have to do is replace the first copy with another blank diskette and run COPY again. When you're finished, remove the original Franklin DOS 2 diskette from drive 1 and store it in a safe place.

Replace the original Franklin DOS 2 diskette in drive 1 with one of the duplicates and press (ESC) to exit from the COPY program. The exit message says:

```
Place a disk with a copy of DOS or
CP/M on it into drive one, then
press any key to re-boot.
```

This reboots the operating system and gives you a chance to test your duplicate Franklin DOS 2 diskette. Press any key to proceed.

One Disk Drive Systems

If you have a one drive system, the procedure is very similar, just a bit slower. You can choose to run ONE DRIVE COPY from the HELLO program (selection 4), or exit HELLO and get the Franklin DOS 2 prompt. When you see the Franklin DOS 2 prompt] and the cursor, type:

```
RUN ONE DRIVE COPY (RETURN)
```

Either procedure loads the program. The screen displays:

```
Copy Program  Vx.x

Franklin Computer Corp.

This program copies any DOS disk.
Which drive is the original disk in?
Press 1, 2, or ESC to exit.
```

ONE DRIVE COPY asks you to identify the drive
which holds the original diskette, and next, which
drive has the duplicated diskette. Because you only
have one drive, you have to respond with drive 1 for
both the source and the destination diskettes. Press 1 to
show drive 1 for the original diskette. The program
then asks:

```
Which drive is the blank disk in?
Press 1, 2, or ESC to exit.
```

Press 1 to show drive 1 for the destination diskette.
This signals the program to prompt you on the screen
when it's time to swap the source and destination
diskettes back and forth in drive 1. The next screen
shows:

```
Please insert the source disk and
press RETURN to continue or ESC
to quit.
```

The program reads part of the source diskette into
memory, then asks you to insert the destination
diskette, writes the contents of memory to the destina-
tion diskette, then asks you to put the source diskette
back in so it can start the process again. The process is
repeated until the entire diskette has been copied. The
closing message is:

```
The disk has been copied.  Press any
key to continue.
```

When you've made a few copies, put the original
Franklin DOS 2 diskette in a safe place and proceed
with a duplicate Franklin DOS 2 diskette. When you're
finished with copying, press (ESC) to leave the copy
program. You're now back in Franklin DOS 2, and
should have the Franklin DOS 2 prompt,] , and
flashing cursor.

**Catalog Of A
Diskette**

Franklin DOS 2 has a command that will give you a list of files and programs contained on any diskette in the Franklin DOS 2 format. This catalog gives you a lot of useful information about your files and their status on the diskette. You can learn a lot about Franklin DOS 2 by looking at the catalog of the Franklin DOS 2 diskette.

You can use the CATALOG command by typing CATALOG and then (RETURN), or you can use an Franklin DOS 2 abbreviation. In Franklin DOS 2, typing / and then (RETURN) is the same as the CATALOG command.

Try the CATALOG command. Type:

/ (RETURN)

You'll see a listing something like this:

```
Franklin DOS 2 5.XX, Vol 0, 35T,
      Free secs: 396

*D    2 ----------BOOT FILES
*F   20 HELLO
*D    2 ----------PROGRAM FILES
*B   21 FUD
*B   22 COPY
*B   11 ONE DRIVE COPY
*B   22 VERIFY
*B    6 DIAGNOSTICS
*B    7 BOOT13
*B    3 CHAIN
*D    2 ---------DATA FILES
*B    4 BASIC.DIAG
*B    8 DISKDRIVE.DIAG
*B    5 HIRES. DIAG
*B   34 HIRES.DIAG.DATA
*B    8 KEYBOARD.DIAG
*B    8 MEMORY.DIAG
*B    4 PADDLES.DIAG
```

If the catalog is too long for the display screen, you can stop it by pressing PAUSE, the space bar, or by pressing the (CTRL) and S keys simultaneously. To see the rest of the display, press any other key. If you press (ESC) or (CTRL) C, the display will stop but you won't be able to restart it.

35 And 40 Track Diskette Formats

The legend 35T in the top line of the catalog refers to the 35 track single sided format of the diskette. Franklin DOS 2 will run several other diskette formats automatically, but most disk drives are not mechanically capable of using them. The ACE 2000 Series Computer disk drives are capable of using either 35 track or 40 track diskette formats. Most disk drives on Apple and some older Franklin systems can use only 35 track formats.

Franklin DOS 2 analyzes diskettes to determine which format is used on them. CATALOG is a quick way to find out which format a diskette has. This is important, especially when you make copies of diskettes. Some copy programs, like ONE DRIVE COPY, only copy diskettes of the same format so the copies automatically have the same format as the original. Other programs, like COPY, the Franklin DOS 2 COPY command and the FUD utility program (which you'll learn about shortly) do permit copying from dissimilar formats.

The copies of the Franklin DOS 2 diskette you made are in the same 35 track format as the original. You remember that COPY asked you for the format of the diskette before it made the copy. Many copy programs select the format automatically, others ask you to select it specifically.

Franklin DOS 2 divides each track on the diskette into 16 sectors, each containing the equivalent of 256 characters (about as many characters as this paragraph contains). The legend "Free secs" in the top line refers to the number of unused sectors on the diskette, and is

a measure of the space remaining for additional storage on that diskette.

It's good advice to stick to one format for your diskettes. If you have diskettes written in different formats Franklin DOS 2 will recognize them, but you might not always remember which is which. The commands to move files from diskette to diskette are very specific about whether they're going from similar to dissimilar formats. There are a few things to consider when you choose a diskette format.

35 track diskettes are much more common than 40 track diskettes. On the other hand, 40 track diskettes have about 15% more storage on each diskette. If you have little interaction with other users and diskette formats, it makes sense to choose the 40 track format because of the added storage. If you encounter 35 track diskettes frequently, at user's groups or software exchanges, you'll avoid confusion if your own diskettes are 35 track too.

Diskette File Names

Each of the entries in the catalog list is a "file." To the computer, anything with a unique name is a file. This can be used loosely to mean a program (which is a set of commands), or lists of data the computer uses in diagnostic tests, or a letter or list of addresses that corresponds more closely to the ordinary definition of a file you might use in an office setting.

The catalog of the Franklin DOS 2 diskette has been divided with lines of dashes into categories of files so you can identify them more easily. The first group of files are BOOT FILES. These are files essential for getting the computer running. You'll use them to create diskettes that allow you to boot from a cold start (more about that in a moment). The next group of files are PROGRAM FILES. These are utility programs that help you by doing various file management tasks, like

making backup copies of diskettes and so on. The third group of files are DATA FILES, which are just raw data that can't be used except by the diagnostic programs for testing procedures.

The asterisk at the beginning of each line means that the file is locked to protect it against accidental changes. You'll learn more about locking, and unlocking, files shortly.

The letter next to it indicates the type of file:

F = Floating Point BASIC programs
B = Binary files (machine language programs)
T = Text files
S = Assembly language source files
R = Relocatable object files
O = Binary object files
D = Binary data files

You don't have to worry about understanding all these terms. Most of them are used only in technical situations where their meaning is clear.

The next number is the size of the file, given in the numbers of sectors it takes up on the diskette.

The last entry is the name of the file. Franklin DOS 2 file names have from one to thirty characters. Spaces may be used within a name. The first character must be a letter, but then any other characters (including non-printing control characters) may be used except the comma.

Slots, Drives, and Volumes

Franklin DOS 2 uses three more numbers to identify diskettes and locations for information. The three numbers are slot number, drive number, and volume number.

The slot number identifies the slot on the computer's main electronics board for the device you're using. For the disk drives, the slot is number 6. If you added a hard disk drive (a Winchester drive) it would probably go in slot 7 on the main board.

The drive number identifies the number of the disk drive in the particular slot. Each slot can accomodate two disk drives, number 1 and number 2. A slot can accomodate only one hard disk drive.

The volume number designates a particular diskette if it has been labelled with a volume number, or it identifies a portion of the Franklin DOS 2 part of a hard disk. The volume number is seldom used except on hard disks. The volume number may be from 0 to 254. If you don't use a volume number, Franklin DOS 2 won't care and will use the diskette in the drive you specified. If you do use a volume number, it must match the volume number on the diskette. To avoid potential confusion, most people leave out the volume number specifications.

Slots, drives, and volumes are identified with S, D, and V followed by the appropriate numbers (without a space). All three numbers are set off by commas after the file name. Thus ,S6,D2,V254 is a complete diskette identification to Franklin DOS 2. The slot, drive, and volume designations may be given in any order, e.g. ,D2,V22,S6.

According to the way Franklin DOS 2 sees things in the ACE 2000 Series computers, the first two disk drives connected to the computer are controlled through slot 6 and the next two through slot 4. Therefore, you would designate the first four disk drives as: S6,D1; S6,D2; S4,D1; S4,D2.

If you don't use slot or drive numbers in a command,

Franklin DOS 2 uses the last slot and drive numbers you did specify (called the default values). Of course, if you only have two disk drives, they are always in slot 6, so that is always your default slot value and you don't have to specify it at all. (There are other times when you do need to tell Franklin DOS 2 about slot numbers you're using, for instance, that the printer is in slot 1, but that's another chapter.)

If you booted your computer with the Franklin DOS 2 diskette in drive 1, your default values are S6, D1. If you always use that disk drive for your diskettes, you don't have to specify any slot or drive numbers. If you want to use a diskette in drive 2, all you have to do is put ,D2 (slot 6 is still the default) after the command or file name you want to use on drive 2. Then drive 2 becomes your default drive. If you don't use volume numbers, V0 is always your default value.

Here's another example. Suppose you have a file called DATA ONE on a diskette with volume number 1 and a file called DATA TWO on a diskette with volume number 2. When the first diskette is in drive 1 and the second diskette is in drive 2, the full Franklin DOS 2 names of these two files would be:

> DATA ONE, S6, D1, V1 and
> DATA TWO, S6, D2, V2

If you switched the diskettes from drive to drive, their identifications would be:

> DATA TWO, S6, D1, V2 and
> DATA ONE, S6, D2, V1

Suppose you wanted to LOCK (or some other Franklin DOS 2 command) one of the files. Just put the diskette with the file on it in the disk drive, then specify:

> LOCK DATA ONE, S6, D2, V1

In actual practice, you'll probably only use drive numbers frequently because slot numbers will almost always be 6, and volume numbers are seldom used.

Starting Franklin DOS 2

Now that you know how to use different kinds of diskettes, there are a few things you should know about disk operating systems and how they work with the computer.

If you try to turn on the computer without a diskette in the disk drive, the drive spins without result. If you press (CTRL)(RESET) the processing cycle stops and you see a prompt and flashing cursor on the screen. At this point the computer is operating with software it has in its permanent memory (called ROM, for Read Only Memory). This software includes Franklin BASIC so you could write some programs if you wanted to, but you couldn't store them on diskette because Franklin DOS 2, the disk operating system, isn't available. Franklin DOS 2 controls all the interaction with the diskettes and disk drives.

Some application programs equipped with their own disk operating systems (or customized versions of Franklin DOS 2) will replace all or part of Franklin DOS 2 with their own commands. You seldom know anything about it until you try to use an Franklin DOS 2 command and find it doesn't work. If you want to restore Franklin DOS 2 to the computer's memory, there's an easy way to do it, called a reboot command. The reboot command is the same as turning the computer off and then on again.

First, make sure all operations of the previous program are finished and the disk drive lights are off. Then place the Franklin DOS 2 diskette in drive 1 and close the latch.

Now hold down the (CTRL) and (F) keys while you

press and release (RESET). This command makes the computer read the diskette in drive 1.

This is a very powerful command because it overrides all other computer processes or programs. It replaces any programs in memory with the contents of the new diskette. This feature makes it very useful for changing programs or changing diskettes, but it is a command to use carefully.

The reboot command is a convenient way to start an application program or to change from one diskette or operating system to another.

Making Bootable Diskettes

When you prepare diskettes for your own use, there are two different types you can make. Each uses a different configuration of the operating system, whether Franklin DOS 2 or some other DOS, and each has its own purpose. As you use your computer your work patterns will lead you to select these different types according to your needs. If what follows seems somewhat technical, don't be discouraged. Try to recognize the practical use of each kind of diskette, even if you don't completely understand how or why the software works like this.

The first type of diskette is the "absolute minimum" diskette which you would use for data storage. This diskette provides a format suitable for receiving data, but it has no operating system so it can't be used as a boot diskette. The Format selection in the FUD utility program on your Franklin DOS 2 diskette prepares these "absolute minimum" diskettes.

Generally, you'll use formatted diskettes for text files or as storage diskettes because they have the largest amount of available space on them. You'll use them only with some other program or diskette that makes Franklin DOS 2 commands available to you.

The second kind of diskette is the "boot" diskette, which has a copy of Franklin DOS 2 on it. This allows you to use Franklin DOS 2 commands whenever you need them, but more importantly, the (CTRL)(F) (RESET) command will work with this diskette. If you have an application program in the computer and want to change to a new program, a new diskette, or to Franklin DOS 2, the (CTRL)(F)(RESET) command with a boot diskette is a quick and easy way to do it. This procedure won't work on a diskette that is formatted but doesn't have Franklin DOS 2 on it. You can make boot diskettes by using the INIT command discussed later.

Boot diskettes are useful for application programs that you use frequently because they are easy to boot and because Franklin DOS 2 provides many useful file management commands.

The INIT Command

The INIT command (short for "initialize") prepares blank diskettes for use as boot diskettes. The initialization process consists of three separate operations, but it is an automatic process that's easy to do.

First, the command formats the diskette. This means that it clears all the storage space on the diskette, prepares a catalog space, and readies the diskette for 35 or 40 track data storage.

Next, it adds Franklin DOS 2 to the diskette. Last, it specifies a file that runs automatically when the diskette is booted.

Suppose you wanted to initialize a blank diskette so that a file named HELLO ran each time you turned on the computer and booted Franklin DOS 2. This file could contain a label for the diskette, perhaps a

command to display the catalog of the diskette, or some other useful things. The Franklin DOS 2 diskette, for instance, runs the HELLO program automatically. The procedure to create a boot diskette is simple.

1. Take a blank diskette, or one you're ready to erase. Initializing a diskette destroys everything on it, even locked files. Make sure you've removed the write-protect tab and insert the diskette in drive 1.

2. Type this command:

   INIT HELLO (RETURN)

Franklin DOS 2 takes care of each different step of the process and finishes the initialization in about 15 seconds. INIT chose the 35 track format because that's the format of the Franklin DOS 2 diskette. If you wanted to use another diskette format, such as 40 track, you would use this command:

   INIT HELLO, T40 (RETURN)

If you wanted to initialize a diskette in drive 2, you would use this command:

   INIT HELLO, D2 (RETURN)

or, you could use both command parameters together:

   INIT HELLO, D2, T40 (RETURN)

The next step in creating a bootable diskette is to transfer the file HELLO onto the diskette. Right now Franklin DOS 2 on the new diskette knows it's supposed to run the file HELLO as part of the boot process, but it can't run a file that isn't on the diskette.

The next chapter describes Franklin DOS 2 commands and utility programs on the Franklin DOS 2 diskette. It tells you how to copy individual files from one diskette to another. But at this point you have an opportunity to do a little customizing of your diskettes, because INIT will take a program currently in the computer's memory and put it onto the diskette as the HELLO program. What that means is that if you've written an Franklin BASIC program for this purpose, it's automatically put on the diskette. Similarly, if there's some other program or programs in memory that you don't want, they get put on the diskette too. Just be a little careful and be aware of what's in memory.

If you're familiar with BASIC programming, you can clear the computer's memory by using the command NEW, or by rebooting the computer. Clearing the memory and transferring the desired program individually is a more certain procedure than using INIT. You'll want to use INIT's automatic load feature with the LOAD and SAVE commands of BASIC to create your own boot files. Refer to Chapter 5, *Franklin BASIC*, of this manual for some suggestions on programming and boot files.

The Franklin DOS 2 COPY Command

The Franklin DOS 2 COPY command, like the COPY program on the Franklin DOS 2 diskette, works only in a two drive system. If you don't have two disk drives, you must use the COPY selection of the FUD utility program to transfer the files. That procedure is outlined in the next chapter. It's very similar to the COPY command procedure that follows.

To copy HELLO from the Franklin DOS 2 diskette in drive 1 to the diskette you've just initialized in drive 2, type the following command:

```
COPY HELLO, D2 (RETURN)
```

If the destination diskette already contains a file called HELLO, Franklin DOS 2 deletes the file by writing the new one over it. At this point you have a new diskette with Franklin DOS 2 and the HELLO file on it.

To verify that all these procedures went as planned, use a catalog command for the new diskette. Type:

```
CATALOG, D2 (RETURN)
```

You should see the HELLO file listed as the only file in the catalog. Now move the new diskette to drive 1 and try rebooting with the (CTRL)(F)(RESET) command.

Chapter 4

Franklin DOS 2 Commands And Programs

**Franklin DOS 2
Commands**

This chapter presents some of the most commonly used commands and Franklin utility programs associated with Franklin DOS 2. A detailed listing of all the Franklin DOS 2 commands is available in the *ACE 2000 Technical Reference Manual*. The utility programs discussed here are not part of Franklin DOS 2, the Franklin Disk Operating System, but they are contained on the Franklin DOS 2 diskette and will be used closely with Franklin DOS 2 in managing your diskettes and files.

**RUN And
BRUN
Commands**

Franklin DOS 2 offers a feature that simplifies using most programs. Most operating systems oblige you to specify the type of program you want to run, that is, you have to know whether the program is written in BASIC or binary language, or in some other kind of file format. Each file format then requires a specific RUN command for its type of files.

Traditionally, the RUN command is reserved for type F or BASIC files, and the BRUN command for type B or binary files. Franklin DOS 2 takes all that uncertainty out of the RUN command by substituting a single abbreviated RUN command, which is just – and the filename. The Franklin DOS 2 – command may be used instead of any RUN, BRUN, or EXEC command. For example, you can run the HELLO program by typing:

```
–HELLO (RETURN)
```

You'll see the same messages that appeared on the screen when you booted the Franklin DOS 2 diskette.

This command has eliminated all the technical vocabulary and jargon associated with trying to figure out which of the RUN commands to use with each file. This is especially helpful to people who don't really want or need to know what the differences between different kinds of files are.

CATALOG Command

The Franklin DOS 2 CATALOG command is one you know already. It lists the contents of the diskette you specify, along with the space available on the diskette and other useful information.

Franklin DOS 2 has an abbreviation for the CATALOG command. You can just type / instead of CATALOG. Try the abbreviation to get a catalog of the diskette in drive 2 by typing:

/,D2 (RETURN)

LOCK And UNLOCK Commands

The LOCK command protects files so you can't accidentally add to, delete, rename, or change them in any way. All the files on the Franklin DOS 2 diskette are locked. The asterisk in the catalog listing showed the locked status of the files.

The UNLOCK command removes this protection from a file so that you can make changes to it.

You can try out these commands with a copy of the Franklin DOS 2 diskette that doesn't have a write-protect tab on it. Type:

UNLOCK HELLO (RETURN)

Now type:

/ (RETURN)

You'll see that HELLO no longer has an asterisk in front of it. You can lock the HELLO file again by typing:

LOCK HELLO (RETURN)

**REN And
RENAME
Commands**

The RENAME command lets you change the name of a file. Franklin DOS 2 lets you abbreviate RENAME to REN. For example, to change the name of HELLO to BEGINNING PROGRAM, you would type:

    REN HELLO, BEGINNING PROGRAM (RETURN)

Now type:

    / (RETURN)

to see the changed catalog.

Change the file back to its original name by typing:

    REN BEGINNING PROGRAM, HELLO (RETURN)

If you try to rename a locked file, you'll get a LOCKED FILE error message. If you really want to rename the file, you have to unlock it first.

(If you remember the INIT procedure to initialize a diskette, you were asked to name a file to run whenever the diskette was booted. The file you named was HELLO. If HELLO isn't on the diskette under the name HELLO, the boot procedure won't work, so it's important to change the file name back to HELLO.)

**DEL And
DELETE
Commands**

The DELETE command lets you remove unwanted files from your diskettes permanently. Franklin DOS 2 lets you abbreviate DELETE to DEL. Since Franklin DOS 2 contains no provision for restoring files, be careful when you use DELETE. All the files on your Franklin DOS 2 diskette are needed, so you don't have a practice file to delete, but the command is simple enough you don't need a test. The form of the command is:

    DEL filename (RETURN)

If you try to delete a locked file, you'll get a FILE LOCKED error message. If you really want to delete the file, you have to unlock it first.

INIT Command   INIT is the initializing command in Franklin DOS 2 that you already used in preparing bootable diskettes. If you want to know the explicit procedures for using INIT, refer to the preceding chapter of this manual or the *ACE 2000 Technical Reference Manual*.

COPY   COPY is the Franklin DOS 2 command you used to
Command   copy individual files when you prepared bootable diskettes. The COPY command is similar to the Copy selection in FUD, though the COPY command requires a two disk drive system while the FUD utility program can use a double or a single drive procedure. Neither of these copy commands should be confused with the COPY and ONE DRIVE COPY programs which are individual utility programs used to copy entire diskettes.

Franklin DOS 2 Utility Programs

Franklin DOS 2 programs are different from Franklin DOS 2 commands. Programs are separate files; Franklin DOS 2 commands are always part of Franklin DOS 2. Franklin DOS 2 programs are listed separately on the catalog of the diskette, the commands are not. Franklin DOS 2 programs have to be executed with the Franklin DOS 2 – command, while Franklin DOS 2 commands need a particular kind of command line, as with REN for renaming files. It doesn't really make a lot of difference to you whether an Franklin DOS 2 function is a command or program, except that programs have to be specifically copied onto diskettes, while commands are included automatically with Franklin DOS 2.

There are a number of utility programs on the Franklin DOS 2 diskette. You've already used two of them, COPY and ONE DRIVE COPY.

The Franklin DOS 2 COPY Program

COPY will copy any Franklin DOS 2 (or other DOS, CP/M, or Pascal) diskette on a two disk drive computer. It works with any diskette format, but the source and destination diskette formats must be the same. All you have to do is put the original in one drive, a blank diskette in the other drive, and hit the proper key. COPY formats the destination diskette, copies the entire contents of the source diskette onto it, and then verifies that the copy is a good one.

The Franklin DOS 2 ONE DRIVE COPY Program

The ONE DRIVE COPY program is slower than COPY, but it works on computers with only one disk drive. It works with any diskette format, but the source and destination diskette formats must be the same. It also performs three functions, formatting, copying, and verifying at the same time.

Other copy programs can copy single files, like the Franklin DOS 2 COPY command or FUD's Copy. Some programs, like FUD, can also work with unlike diskette

formats, so you can copy a file (or a whole diskette) from 35 track to 40 track format diskettes.

**FUD—A
General File
Management
Program**

The letters FUD stand for Franklin Utility for Diskettes. FUD lets you remove unused files, make copies of files, determine if your files are still readable, and perform other mundane but essential functions.

To run the FUD program, boot a copy of an Franklin DOS 2 diskette and type:

-FUD (RETURN)

After a few seconds, you'll see the FUD opening screen:

```
        FUD   version x.x
                 by
        Franklin Computer Corp.


              MAIN MENU

        S-Show files on diskette
        C-Copy files
        D-Delete files
        L-Lock files
        U-Unlock files
        V-Verify files
        F-Format diskette
        Q-Quit


        Please press letter for
        function desired:
```

This is FUD's main menu, the list of options open to you. The screen line where the words MAIN MENU now appear always lets you know what you're doing. As you use each of the options, the information displayed on this line changes so that it corresponds to the function you're performing.

To choose one of FUD's options, just type the letter to the left of the hyphen for the option that you want. You don't have to press (RETURN) to begin the procedure.

Diskette Management Commands

Selection F (Format Diskette)

Every diskette must be initialized or formatted before you can use it. The COPY program you used to make your backup diskettes formatted the diskettes automatically as part of the copying procedure. INIT also formatted the diskette as part of its job. Each of those functions did formatting as part of a larger task with other functions that you may not want or need. This formatting command performs only the formatting function.

Formatting prepares a diskette so you can store data files on it. This option gives you the maximum storage space for a diskette because it adds no other files, such as Franklin DOS 2 boot files. The computer can use formatted diskettes but cannot boot from them.

The F formatting option allows you to choose the diskette format you want, either 35 or 40 track.

Select F from the MAIN MENU by pressing (F). The screen displays the Format title and asks for the disk drive you want to use for the formatting operation:

```
FORMAT

Which drive has diskette to format?
enter 1, 2, or RETURN:
```

The Default selection is shown under the blinking cursor and will be chosen if you press RETURN. Be careful because the default drive is probably the drive you used to run the FUD program and probably still

contains your Franklin DOS 2 diskette. You have an opportunity later to stop the procedure, or you can remove your Franklin DOS 2 diskette now, since the FUD program has been loaded into memory.

After you respond with the disk drive number, FUD asks for the diskette format you want:

```
Which disk format would you like?
1) 35 track, single sided
2) 40 track, single sided
3) 40 track, double sided
enter 1, 2, or 3:
```

Press the number corresponding to the diskette format you want, either 1 or 2. Option 3 doesn't apply to ACE 2000 Series Computer disk drives.

FUD then asks for a diskette volume number:

```
What volume number would you like on
the diskette?   enter 0 - 254 :
```

The volume number is an identification number placed on each diskette when it's formatted. Although the number can range from 1 to 254, most people just use 0 to avoid confusion because Franklin DOS 2 accepts 0 to mean any volume number. The Default choice, which is shown under the blinking cursor, is 0 and can be chosen by pressing RETURN.

This message now appears on the screen:

```
Please place the diskette to be
formatted into slot 6, drive #x
then press RETURN to continue.
Press CTRL-C if you wish to quit:
```

If you've changed your mind about formatting this

diskette, you can hit (CTRL) C and you'll see FUD's MAIN MENU again. Otherwise, be sure that you put the correct diskette into the drive specified. Formatting a diskette destroys all the information on it. It's a good idea to see a catalog of each diskette before you start the formatting procedure.

When you're sure that everything is ready, press (RETURN). The formatting operation takes about 15 seconds. You see this message on the screen below the previous message:

```
Formatting a diskette, relax a minute
```

You get this message when the format operation is finished:

```
The diskette has been formatted.
Press RETURN to format another
diskette or CTRL-C to exit.
```

The diskette is now ready to store programs or data. You can press (RETURN) to format another diskette or (CTRL) C to return to FUD's MAIN MENU.

File Management Commands

FUD has six file management commands:

S   (show the files on a diskette)
C   (copy files)
D   (delete files)
L   (lock files)
U   (unlock files)
V   (verify files)

Each option can operate either on single files or on groups of files. Whenever a file management function requires a file name, you can enter either a single file name so the command operates on that file alone, or you can enter what's known as an ambiguous file name

which can stand for a group of individual files.

A file name is ambiguous if it has either of the charac-
ters ? or = in it. The ? character means "any character
is acceptable." For instance, the ambiguous file name
A?E refers to all file names three characters long begin-
ning with A and ending with E. It could refer to ACE,
APE, and AXE, but not ICE or APPLE.

The = character means "any group of characters is
OK." For example, a file name of A= means any file
name starting with the letter A. The hypothetical file
name JOHN'S=STUFF could refer to files like JOHN'S
OLD STUFF or JOHN'S VALUABLE STUFF or even
JOHN'SSTUFF, in which = refers to no characters at
all.

Any number of ?s and =s can be used in a file name,
as long as you can keep straight what the name you've
created really refers to. It's possible to create an
ambiguous file name that includes more file names
than you intended. For example, by using an overly
ambiguous file name when deleting files, you could
eliminate files you really wanted to save.

FUD tries to protect you from such calamities. When-
ever you use an ambiguous file name, FUD poses the
question: "Ask before processing each file?" before it
begins to execute the command. If you answer Y, a
question mark will appear to the right of each file name
included in the ambiguous file name you've specified.
Three options are open to you: press Y and the
command will be performed for that file, press N and
the command will not be performed on that file, or
press (CTRL) C to end the command.

FUD also usually tries to perform all operations to the
diskette in the last drive that you specified. The last
drive you used is called the default drive. If you want

the command to use a diskette or file in another drive,
simply type ,D1 or ,D2 after the file name to select the
correct drive for that file.

Selection S (Show The Files On The Diskette)

This option is like the CATALOG command. It lets you
see what files are on the diskette, and it's convenient to
have this command in FUD because you can use it with
the other file management commands. The other
advantage of the Show Files command is that you can
use ambiguous file names to restrict the list to a specific
group of files so you can handle groups of files as
units.

When you select S, the screen clears and then displays
this message:

```
        Show diskette catalog
which file(s)?
RETURN for all files
CTRL-C to abort
ESC for help
Defaults:   Slot 6, drive 1, volume 0
:
```

Start by pressing (RETURN). Disk drive 1 should start
up, since you haven't specified anything otherwise.
The names of the files on the diskette in drive 1 appear
on the screen. The display is very similar to the one
you saw when you typed / (RETURN) or CATALOG
(RETURN). To see all the files on drive 2, you could
type:

```
=,D2 (RETURN)
```

If you type an ambiguous file name, FUD will display
all files on the diskette that match that description. If
the file name you type is not on the diskette, or if no

files match the ambiguous file name description, you'll get the message:

no files found

The (ESC) selection on the menu shows a help message that reminds you of the rules for file names, identification parameters, and ambiguous file name symbols.

If FUD must display more files than will fit on the screen at one time, the flashing cursor appears at the bottom of the list that is displayed as a signal that there is more to come. You can display the rest by pressing any key, or press (CTRL) C to stop the display.

After all the files are displayed, the total of all their file sizes is shown, along with the number of unused sectors (256 characters each) remaining on the diskette. The question

all done?

appears. If you answer N, you're asked which files to display. If you answer Y, the main menu of FUD appears on the screen.

The other five selections in FUD work much the same way.

Selection D (Delete Files)

The D option in FUD performs the same function as the DELETE command described in the Franklin DOS 2 section, except that with D, you can specify ambiguous file names.

The D option will not delete locked files. If you try to do so, you'll get an error message.

WARNING: Be particularly careful when using this command with ambiguous file names. It's easy to wipe out entire diskettes this way. FUD will give you a chance to decide whether you want the files displayed individually so you can decide in each case if you really want to delete that file.

Selection L (Lock Files)
Selection U (Unlock Files)

The L and U options perform the same functions on files as the LOCK and UNLOCK options described in the Franklin DOS 2 section. The FUD versions have the advantage of using ambiguous file names.

Selection V (Verify Files)

The V option checks whatever files you select to make sure that they're still readable. If the FUD program can read all your files without any errors occurring, you can be fairly confident that all the data is still in good condition.

Selection C (Copy Files)

The C option lets you copy a file or group of files from one diskette to another. You're first asked which files you want to copy. If you enter a single file name, only that file is copied. If you specify an ambiguous file name, all files that match the ambiguous description are copied. You're then asked which drive you want to copy the file or files to. If you want to change the drive number from the one that the screen displays, simply enter the appropriate number (e.g. ,D2) before you press (RETURN).

You can also change the normal slot number or volume number at this point. Should that ever be necessary, just enter the information after the file name. For

example, ,S4,D2,V33 would specify a copy of the file to slot 4, drive 2, volume 33.

If your source drive, the one holding the diskette you're copying from, is different from the destination drive, the drive holding the diskette you're copying to, then the copying process goes on without any diskette changes.

If you only have one disk drive, you must specify that drive as both the source and the destination drive. FUD guides you through the diskette exchange procedure, but you have to make sure you don't accidentally place the wrong diskette in the drive. You'll definitely ruin the copy of the file you're making, and you may ruin the entire diskette.

FUD recognizes all the Franklin DOS 2 formats automatically, so you can copy from a diskette of one format to another diskette of another format. In fact, option C and the Franklin DOS 2 COPY command are the most convenient way to do this. Because FUD allows the use of ambiguous file names, you can copy the entire contents of a diskette by using = as the file name to be copied.

If a file with the same name as the file to be copied already exists on the destination diskette, the message:

```
already exists, replace it?
```

appears. If you answer N, no copy is made. If you answer Y, the copy is made and the new file writes over the old file, deleting it permanently, even if it's locked. Be careful.

BOOT13 Program

This utility program allows you to boot the older format 13-sector DOS 3.2 diskettes. If you have some of these older format diskettes, you can run BOOT13 by typing:

```
-BOOT13 (RETURN)
```

Then insert the 13-sector diskette in drive 1 and respond to the screen prompt with (RETURN). The diskette will boot.

CHAIN Program   The CHAIN program is used by programmers to chain programs together into a single program. The programs must be in Floating Point BASIC language.

VERIFY Program   The VERIFY Program reads an entire diskette to determine the integrity of the data stored on it. If you are having difficulty using a particular diskette, use VERIFY to determine whether or not the diskette is faulty.

With the Franklin DOS 2 diskette in drive 1, type:

```
-VERIFY (RETURN)
```

and follow the instructions. VERIFY will not affect the data stored on the diskette.

DIAGNOSTICS Programs   The diagnostics programs are used for analyzing problems you may have with your computer. There are separate diagnostic programs entitled BASIC, DISKDRIVE, HIRES (high resolution graphics), KEYBOARD, MEMORY, and PADDLES. Each of these individual diagnostic tests is entered through the DIAGNOSTICS program. Type:

```
-DIAGNOSTICS (RETURN)
```

Then select the test you want from the menu displayed.

Chapter 5
Franklin BASIC

Writing a program simply means giving the computer some instructions to do something. You can think of an Franklin DOS 2 command like CATALOG as a program, although Franklin DOS 2 does the work and all you do is type CATALOG to run it. As you need to solve more complicated and personalized problems, your need for more complicated commands increases. Running CATALOG, deleting old files, renaming some files, etc. could be thought of as a program (that is, a list of instructions) that you're doing one step at a time. Programming is really a fairly common experience.

Some people think that using a computer requires the ability to write programs for it. They've heard that programming is a difficult job, and so they're hesitant to go near a computer. In fact, that's not true at all. You've seen that there are many things you can do with your ACE 2000 Series Computer by using a few simple commands. Thousands and thousands of application programs are already written for you. They use the same techniques of menus and questions to help you along. None of that involves programming at all.

On the other hand, programming can be fun. You don't have to become an expert programmer or devote a lot of time to it if you don't want to, but you might find that it's rewarding to create your own solution to a problem, or generate something of your own.

Franklin BASIC Programming

This chapter tells you a little about programming with Franklin BASIC and Franklin DOS 2. The aim is to remove a little of the fear of programming and to suggest a few simple things to do. This chapter cannot substitute for a course in programming or an instructional book on the subject.

For those who are familiar with computers and have some experience in programming, this chapter will point out a few things you need to know about

Franklin BASIC. The details, including the command listings for Franklin DOS 2 and Franklin BASIC, are available in the *ACE 2000 Technical Reference Manual*.

The BASIC Programming Language

The first thing to recognize is that BASIC programming language is just that, a language. The language takes one word and translates it into another word or group of words. It takes familiar English vocabulary, uses it in particular ways with a kind of grammar that specifies correct and incorrect forms for statements, and turns it into computer language.

For instance, a command like PRINT is interpreted by BASIC as a series of operations, something like "Search for the thing to be printed. Take the thing to be printed; store it in this part of memory. Take it from memory at the right time; send it to the printer at the designated output location in such and such a format." The advantage of BASIC as a programming language is that it allows you to ignore all those intermediate steps and simply write PRINT, a command you understand as plain English.

Franklin BASIC

Franklin's Franklin BASIC is designed to be compatible with most common BASIC programs, especially Applesoft BASIC programs. Franklin BASIC differs from Applesoft BASIC in that it supports and displays lowercase letters, which Applesoft does not. Franklin BASIC doesn't have the commands found in Applesoft BASIC that control cassette tape drive storage. In all other ways, Franklin BASIC and Applesoft BASIC are the same, so any programs or materials using one language will work with the other.

Unfortunately, not all BASIC languages are so compatible. There are many dialects of BASIC, some that are linked to other kinds of hardware, some that are from

different manufacturers. In many of these BASIC languages some things are the same, like LOAD and SAVE commands. Some things are only slightly different, like using "?" to abbreviate PRINT in Franklin BASIC. Other things, like "clear screen" commands, vary greatly depending on the BASIC and on the computer hardware.

When you see a BASIC program, or want to purchase programs or books on BASIC, you should be aware of the different dialects of BASIC. Use the same compatibility criteria that you use for application software.

Using The Franklin BASIC Programming Language

To program successfully, you have to realize that the computer and Franklin BASIC are very literal in interpreting your statements. The computer doesn't know that Bill's name doesn't really have three L's in it, or that you meant to put a comma where you typed a period. The computer takes things exactly as it finds them, so be careful and follow Franklin BASIC grammar and syntax carefully.

The other key concept in programming is the idea of sequence. Commands must be given in order, and the computer worries a lot about finishing one thing before going on to another, so it wants all commands in a program to be numbered in order. You'll learn how to do that shortly.

The only other thing to programming is learning the commands, and they're mostly simple words you've seen before. Putting the commands in proper order to solve a problem is the creative task for you.

Creating A Simple Program

Try writing a simple program. Just follow the instructions exactly as they're given, without inserting any punctuation or typing errors, and you'll do fine.

Make sure you've booted a backup copy of your

Franklin DOS 2 diskette (without a write-protect tab, so you can write to it) in drive 1 of your ACE 2000 Series Computer.

When you see the prompt and cursor on the screen, type:

NEW (RETURN)

The NEW command clears any programs out of memory so you are ready to type in a new program. Now type:

```
10 PRINT "This Disk Belongs To" (RETURN)
20 PRINT "Franklin User" (RETURN)
```

You can substitute your name within the quotation marks in line 20. Then continue typing:

```
30 PRINT "Its Contents Are" (RETURN)
40 PRINT "(CTRL) (D)"; "CATALOG" (RETURN)
```

Make sure you hold down the (CTRL) while you press the (D) key. You shouldn't see anything between the quotation marks because (CTRL) (D) is a non-printing character. By typing the (CTRL) (D) in line 40, you tell Franklin BASIC that the rest of the line is an Franklin DOS 2 command, which is CATALOG in this case.

That's your program. When you see the prompt and cursor, type LIST to see what you've typed appear on the screen. Retype any line that contains an error, then type:

-(RETURN)

to RUN the program. It's fun to see how these simple commands produce a customized diskette title, or label if you want to print it.

To store this program on the Franklin DOS 2 diskette (using the name A BASIC PROGRAM), type:

```
SAVE A BASIC PROGRAM (RETURN)
```

You'll see the disk drive work for a few seconds. Then when the prompt and cursor reappear, type:

```
LIST (RETURN)
```

Your program will reappear, so you know it's still in memory. Also, Franklin DOS 2 has saved a copy of it and stored it on the Franklin DOS 2 diskette. Now type:

```
SAVE ANOTHER BASIC PROGRAM (RETURN)
```

This command saves the identical program on the diskette. It doesn't matter to Franklin DOS 2 that there are two identical programs on the diskette, as long as their names are different.

When the prompt and cursor reappear, type:

```
/ (RETURN)
```

The CATALOG command shows the diskette has both A BASIC PROGRAM and ANOTHER BASIC PROGRAM stored on it. Now type:

```
NEW (RETURN)
LIST (RETURN)
```

The NEW command has removed the program from memory, so the LIST command had no program to list, and nothing appeared. To put the program back in memory again, you have to read it from the diskette. Type:

```
LOAD A BASIC PROGRAM (RETURN)
LIST (RETURN)
```

And your program is back in memory. If you only wanted to run the program, you could have used an Franklin DOS 2 command (– A BASIC PROGRAM (RETURN)) to run it directly from the diskette. If you want to change the program, you have to load it into memory with the LOAD command.

This exercise has given you some idea about how a program is constructed. First, you've seen the difference between having a program in memory, where it's temporary, and having it stored on the diskette. You've learned how to use the Franklin BASIC commands NEW, LOAD, SAVE, and LIST. You have a little familiarity with using PRINT statements and using Franklin DOS 2 commands in programs.

You've also seen how the structure of the program plays an important part in its operation. The line numbers you put on the left side of the line give the correct sequence of operation of the program commands. If you wanted to add a line, you could type it out of sequence with a line number that showed its correct order and Franklin BASIC would place it in the proper place when you gave a LIST command. A technique useful to programmers is having a command in one line refer to an earlier line, thus creating a loop of commands that process data through the same operation at the computer's speed.

If you made any typing mistakes, you've also seen how fussy Franklin BASIC is that the grammar of your statements is correct. The SYNTAX ERROR reply is very familiar to programmers.

This example showed you how Franklin BASIC and Franklin DOS 2 are related and interconnected, but still

separate parts of the computer's operations. Using an Franklin DOS 2 command is permitted in Franklin BASIC, but it must be identified as such.

Some Programming Suggestions

You may think that this little program is really too simple for any practical use, but it can be modified into a handy tool. You can see how to change the actual display—just change the PRINT lines, either in number or in content, to say whatever you want.

Next, when you create bootable diskettes, use this little program as your HELLO program. All you have to do is name it HELLO (deleting the other HELLO program first) and put it on the diskette when you initialize it. Franklin DOS 2 will run it each time the diskette is booted.

A further refinement is to use this little program to run another program, such as an application program on a particular diskette, or a function key definition program. In this case, you would use the (CTRL) (D) sequence to identify an Franklin DOS 2 command, but instead of CATALOG, the command could be something like " – A Function Key Definition Program." This way you could load your function key definitions for each diskette automatically each time Franklin DOS 2 boots the diskette. Refer to Chapter 6, *Function Keys*, for some suggestions on such a program.

This introduction to programming has taken a program which was simple in design and execution and shown you how effective it can be in the way you operate your computer. Of course there is much more to Franklin BASIC and to writing programs than this, but this exercise should show you how easy and rewarding programming can be.

Special ACE 2000 Series Computer Programming Features

The Franklin ACE 2000 Series Computer has some special features that make programming a little bit easier for you. In addition to the user features in Franklin BASIC and Franklin DOS 2, there are a number of special keys on the keyboard which are useful for BASIC program editing, specifically those special keys marked on the numeric keypad.

These editing functions for BASIC programs are part of the enhanced video software, which is discussed in detail in Chapter 7, *The Display*. The editing functions of the special keys are listed below.

One Key Editing Commands

The special editing keys are located on the numeric pad.

The keys are active as editing keys when the NUM LOCK key is off, and when the enhanced video software is activated. The enhanced video software can be activated by turning on 80 column mode video display, which can be done with function key F3, or the command PR #3 (RETURN). These commands are marked on keytops in the cursor keypad where they are convenient for editing. In a way, these keys are like special function keys in that they have special definitions but they are different because they are functional only when the enhanced video software is active.

RUN   Run A Program

This command is a one key command identical to the Franklin DOS 2 – command or the Franklin BASIC RUN command.

LIST   List A Program

This command is a one key command to display the program listing.

ENTER   Return

This command is the same as the RETURN key.

CLRS   Clear The Screen

This command clears the entire screen and moves the cursor to the home position, column one of line one.

HOME   Home The Cursor

This command moves the cursor to the home position, which is the first column of the first line.

CLRL   Clear The Line

This command clears the entire line designated by the cursor position. The cursor position itself is unaffected.

INSC   Insert A Character

This command inserts a space character at the current cursor position and pushes other characters on the line one position to the right to make room for it. Only characters to the right of the cursor column are affected. If there is a character in the last column of the line, that character is lost.

DELC   Delete A Character

This command deletes the character at the current cursor position and moves all the columns on the right side one space from the right to close up the line. A space character appears in the last column of the line.

CPES   Copy Entire Screen Line

This command is useful in editing BASIC programs and has a very specialized operation. This command sends

all the characters on the cursor line to the current program for processing or execution. This is equivalent to moving the cursor to the end of the line and then hitting (RETURN). The CPES command works regardless of the cursor position on the line.

CPES is designed for editing BASIC statements. Suppose you had typed a line of a program that had a mistake in it. First, you would LIST the line, then use the escape mode cursor movement keys to locate the section of the line that needed correction, then make the changes with the INSC and DELC keys. When the changes are complete, just press CPES. The corrected line is sent to BASIC with a (RETURN) without any additional cursor movement required.

If you use the CPES command on a full line (all 40 or all 80 characters are used), you may notice that the last character on the line is cleared to a space character after CPES executes. Don't worry, this is only the display screen's processing of the command. The correct and complete line was sent to the running program.

Chapter 6

Function Keys

ACE 2000 Series Computers have twelve special keys
that are sometimes called Function Keys, Programmable
Keys, or User Defined Keys. They are labelled F1 to F12
and are located at the top of the keyboard.

These keys are called programmable because you can
give them any definition you want, though the word
"programmable" implies a little more effort than is
required to enter your definitions. They are called func-
tion keys because they can perform a "function," such
as a command, or enter several characters at once
instead of a single character or control code like the
other keys on the keyboard.

**Using The
Function Keys**

Using a function key is like using any other key except
you produce the key definition instead of the key char-
acter. The function keys have definitions assigned to
them that are entered each time you boot the Franklin
DOS 2 diskette. To see how the function keys work,
boot the Franklin DOS 2 diskette if you haven't done so
already, and press F1. You'll see

```
CATALOG, D1
```

appear on the cursor line, and then you'll see the
catalog of the diskette displayed. You may have
guessed that the function key definition included
(RETURN) since the CATALOG command was
executed automatically, even though (RETURN) doesn't
appear on the screen.

That's all there is to using a function key. Just press the
key and it works as if you had typed in the characters
that make up its definition. The list of the assigned
definitions follows and instructions for entering your
own definitions are given later in this chapter.

There is a caution about using the function keys that
you should know about. The function key definitions

are stored on the Franklin DOS 2 diskette and read into
memory each time you boot the diskette. They will
always work correctly when Franklin DOS 2, Franklin
BASIC, or the MONITOR program are running.
However, if you run another program, perhaps an
application program which uses its own operating
system, the function key definitions may be destroyed
or unavailable because of that program's use of
memory. In these cases the function keys generate
strange (or "garbage") characters when you press
them. The function keys also generate strange charac-
ters when you use them together with the CTRL and
ALT keys.

If you start the computer without booting the Franklin
DOS 2 diskette, or don't have the Function Key defini-
tions loaded for some reason, pressing the function
keys simply produces a space, just as if you had
pressed the space bar of the keyboard.

**Default
Function Key
Definitions**

The Franklin DOS 2 diskette contains a set of defini-
tions for the function keys in the start up file that is
loaded each time you boot the diskette. The definitions
are:

Key	Definition	Description
F1	CATALOG,D1 (RETURN)	Catalog of drive 1
F2	CATALOG,D2 (RETURN)	Catalog of drive 2
F3	PR#3 (RETURN)	Turn on 80 columns
F4	PR#1 (RETURN)	Turn on printer output
F5	(ESC) 4	Switch from 80 to 40 columns
F6	(ESC) 8	Switch from 40 to 80 columns
F7	COPY	Copy a diskette file
F8	TYPE	List a diskette file

F9	LOCK	Lock a diskette file
F10	UNLOCK	Unlock a diskette file
F11	DELETE	Delete a diskette file
F12	RENAME	Rename a diskette file

Note that (RETURN) and (ESC) in the definitions are single keys, not the spelled out versions of the commands. The definitions are shown here in upper-case letters, but Franklin DOS 2 could process them just as well as lowercase letters. Note also that the commands that require (RETURN) for execution have it included in their definition. For other commands that require additional input, like COPY, you have to supply the additional information and (RETURN). For instance, the command line

```
COPY filename, D2 (RETURN)
```

would be typed:

```
F7 filename, D2 (RETURN)
```

The operation of the Franklin DOS 2 commands themselves are given in Chapter 3, *Franklin DOS 2*, and Chapter 7, *The Display*. As far as the function keys are concerned, all you have to remember is that the key produces the sequence of characters shown in the definition whenever it is pressed.

Programming The Function Keys

It's easy to put your own definitions on the function keys. There is a special Franklin BASIC command, FKEY, to do it for you. You can use this command any time you see the] prompt. The command has the function key number and definition in this form:

FKEY number, "definition"

For instance, to program key F7 to enter a command to clear programs from memory, you would type:

```
FKEY 7, "NEW" + CHR$(13)  (RETURN)
```

In this definition NEW is the BASIC command and CHR$(13) is the BASIC representation for CTRL M, which is RETURN. The second (RETURN) is the keystroke for execution of the FKEY command.

You might want to use one of the function keys for a name or number you used frequently, such as:

```
FKEY 8, "Donaudampffahrtschiffsleutenantsassistenten"
```

which would save you a lot of typing.

A new definition for a key automatically replaces the previous definition. The total number of characters for all function key definitions is 233, but be aware that Franklin BASIC doesn't check this number for you. If you exceed 233 characters in your definitions you'll destroy the contents and/or the numbering of all the definitions.

There are a few more remarks needed for users who know a little about programming. The FKEY command is unique to Franklin BASIC and is used specifically for the Franklin ACE 2000 Series computers. The arguments for the FKEY command are any valid BASIC numeric expression in the range 1 to 12, and any valid BASIC string expression for the definition. For instance,

```
FKEY 6, "Make my day!"
```

is equivalent to:

```
A$="Make ":B$="my ":C$="day!"
x= 3*2
FKEY X, A$+B$+C$
```

Using A Start Up File   When you initialize a new diskette the INIT command asks you to name a start up file that will run automati-

cally each time that diskette is booted. One of the things most frequently put into a start up file is definitions of the function keys.

Suppose you were creating boot diskettes for several different application programs, one for your word processor, one for your children's math tutor, and one for your kitchen recipe planner. Each program has commands you use frequently and it would be very convenient to have those commands readily available on the function keys. By making a separate start up file for each boot diskette with individual function key definitions for each application program, you personalize your computer operations and make them more efficient and convenient.

Here are a few suggestions before you get started:

- Use the application program for a while before you choose the commands to put on the keys. Then you'll want to think about which commands are most important, which function key locations are most convenient for you, etc. Some of the default definitions on the Franklin DOS 2 diskette may still be useful to you.

- Write out a list of the commands you want and make a careful count of the total number of characters. Make adjustments as needed while your list is still in the planning stage.

- Keep careful notes or labels for your diskettes so your different boot files and definitions are clear. It's always possible to LIST the start up file to find out what's in it and what definitions have been made, but that's not always convenient.

When you're ready to make your start up file, named HELLO in this example, just include an FKEY defini-

tion for each function key you want to define. Refer to the Chapter 5, *Franklin BASIC Programming*, for some suggestions. For instance, this procedure will create a sample start up file.

```
NEW (RETURN)
10 FKEY 1, "Definition 1"
20 FKEY 2, "Definition 2"
   .       .              .
   .       .              .
   .       .              .
120 FKEY 12,"Definition 12" .
END (RETURN)
SAVE HELLO (RETURN)
```

This program, which could include other things you might want, will define the function keys as shown each time you boot the diskette.

Chapter 7

The Display

Your ACE 2000 Series Computer can be connected to a number of different display devices. It has the capability of using a wide variety of display software for color, animation, graphics, and text presentation. Its display can function in many ways, but most of the techniques for video presentation depend on the software you're using, so much of this chapter is for reference and for those interested in programming the ACE 2000 Series Computer.

Choosing A Video Display Device

The type of display device you choose depends on the use you want from your computer. There are three basic types of display monitors.

- Monochrome display monitors are fairly inexpensive display devices that are designed to produce very sharp letters and graphics. They are excellent for 80 column display, such as you might use with word processing or spreadsheet programs. On the other hand, they don't display color. Color is often used with games or educational software, so this may be a disadvantage. Monochrome monitors are usually available with either amber or green screens.

- Color display monitors are somewhat more expensive and come in two fundamentally different types, composite color display monitors and RGB display monitors. The composite monitors produce color in a simple way and are less expensive than the RGB (for Red–Green–Blue) monitors which control the generation of each color signal independently and produce very sharp color images.

  The composite color monitor uses the signal (a standard NTSC composite color signal) from the video output on the back panel of the ACE 2000 Series Computer. The RGB monitors need a different signal which requires special installation

of an adaptor board and cable to a 24 pin connector on the main electronics board of the computer. Refer to the latter part of the Chapter 1, *Getting Started*, for installation instructions.

- A television set, either black and white or color, can be used to display the computer's output. Because the resolution of the television screen is relatively poor, it doesn't work well for displaying text. Animation and color are displayed effectively by a television set.

Connecting the computer to a television set requires a special device, called an RF modulator. You can obtain an RF modulator from your Franklin dealer. General instructions for connecting an RF modulator are summarized below. Specific installation instructions are included with the RF modulator.

The type of display you choose should balance factors like the applications you'll use on your computer, your personal preference, your budget, etc. Discuss the matter with your Franklin dealer and look at the different display monitors available.

Connecting The Monitor

Connecting the display monitor is very simple. You've probably done it already in Chapter 1, *Getting Started*, but here's a brief review.

Plug the monitor cable provided into the connector labelled "monitor" on the back panel of the ACE 2000 Series Computer. This connector provides signals for either monochrome monitors or composite color monitors.

Then plug the other end of the monitor cable into the display monitor. The display monitor has controls for controlling the contrast and brightness of the display.
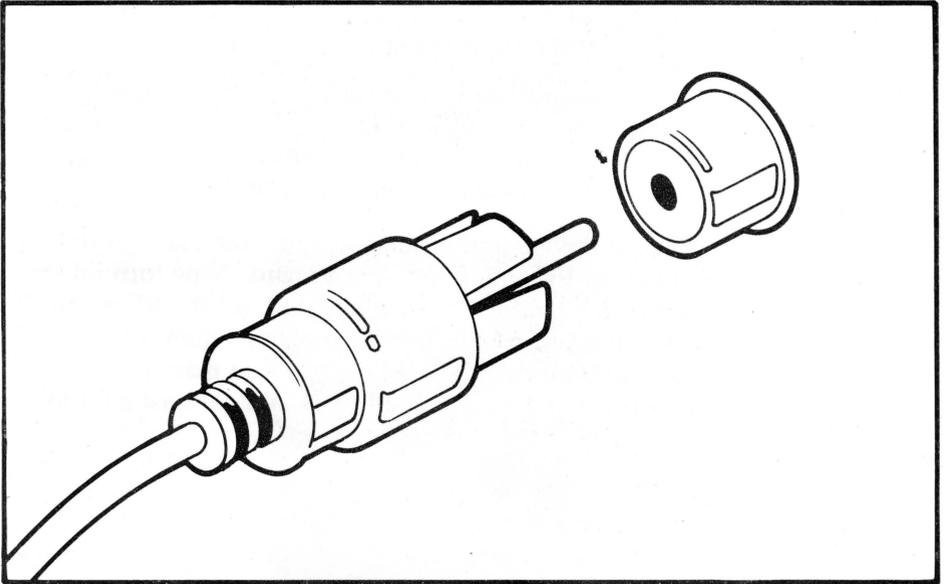
Video Cable And Connector

Adjust these to your preferences and to the room lighting. If you leave the computer on for long periods of time without using it, you should turn down the brightness of the display. The unchanging display very gradually burns into the phosphor, making a permanent mark. When you're working with the computer, the display keeps changing so burning in an image is not a problem.

Connecting A Television Set

The computer's signal must be converted into a form the television set can use. This conversion is done by a device called an RF modulator (Radio Frequency Modulator, which means it converts the computer's signal to a signal like the television receives on its antenna).

If you're using a television set for the computer's video display, connect the video cable provided with the ACE 2000 Series Computer to the RF modulator, then

connect the RF modulator's antenna leads to the television set.

The RF modulator has two settings, one to view the input from the computer and one to view the regular television input. Be sure to select the computer input whenever you want to use the computer.

Plug in the computer, making sure you use a grounded outlet for the computer's power cord. Now turn on the television, set the channel correctly, set the RF modulator to receive the computer's signals, then turn on the computer and you're ready to go. You may need to adjust the television's brightness and contrast a bit to correspond to the computer's signal.

**Standard
Display Features**

Your Franklin ACE 2000 Series Computer has a number of standard features that enhance the display capability of the computer. Both 40 and 80 column display widths are standard. The 40 column display can show 40 characters on each line; the 80 column display shows up to 80. Both display widths use 24 lines on the screen.

The 80 character line is very convenient for word processing because it shows the length of the line you type on a typewriter, usually with a little to spare. That means the lines and paragraphs you type on the computer appear on the screen just about the same way they will appear on paper when you print them.

On the other hand, many educational and entertainment programs use a 40 column display. There are some good reasons for this. First, these programs are written so they can be used with the poorer resolution of a television set as the display screen. Second, the attractive graphics and animated cartoons employ a graphics capability of the computer that is directly related to the 40 column display. You'll learn more about that shortly.

Computer programs choose the correct display automatically. You don't have to worry about choosing the 40 or 80 column displays until you want to write your own programs.

**Additional
Display Features**

There are a number of additional features built into the display capability of your ACE 2000 Series Computer.

Almost all of them are fairly technical and are generally used only by programmers. You may want to read further to see what possibilities exist with your computer, but you don't have to understand this information to use the computer effectively. The software you use, whether an application program or a video game, controls the display directly; you're just an observer.

If you're interested in programming and creating graphic displays, this information will be of interest to you. You can obtain additional information from the *ACE 2000 Technical Reference Manual.*

Character Sets

The monitor screen displays uppercase letters, lowercase letters, numbers, punctuation marks, and a few uncommon symbols. These characters, and 32 more that aren't usually shown on the screen, make up the 128 characters of the ASCII character set. ASCII (pronounced "ASK ee") is the acronym for American Standard Code for Information Interchange. You can learn more about the ASCII character set by referring to the appendix of this manual that lists the ASCII characters, and the *ACE 2000 Technical Reference Manual.*

Generating a character with a computer involves an ASCII code. When you press a key on the keyboard you generate a signal called an ASCII code. It is a number between 0 and 127 that is a unique computer signal. Different keys generate different ASCII codes, some generated by the key or some only with the (SHIFT), or (CTRL) keys in addition to the key itself. This signal is then processed by the computer, stored, etc. as instructed. When the computer sends the signal to the display for you to see, it checks the signal in the character set to see what pattern of dots that signal represents. For example, pressing a (SHIFT) A

produces an ASCII code 065. This 065 is moved through the computer, perhaps stored on the diskette, and at some point it is sent to the screen. The computer looks in the character set and says "ASCII 065 means display this dot pattern, uppercase A."

This concept is important because the ACE 2000 Series Computer has a second character set available to you when you use 80 column mode. This alternate character set has graphics characters, such as the icons used with a mouse and mouse-controlled software. Refer to the *ACE 2000 Technical Reference Manual* for details on this other character set. This manual simply explains its presence in case you run across it accidentally. When you use this other character set, the ASCII codes generated by the keyboard are used to produce the dot patterns of the alternate graphics character set.
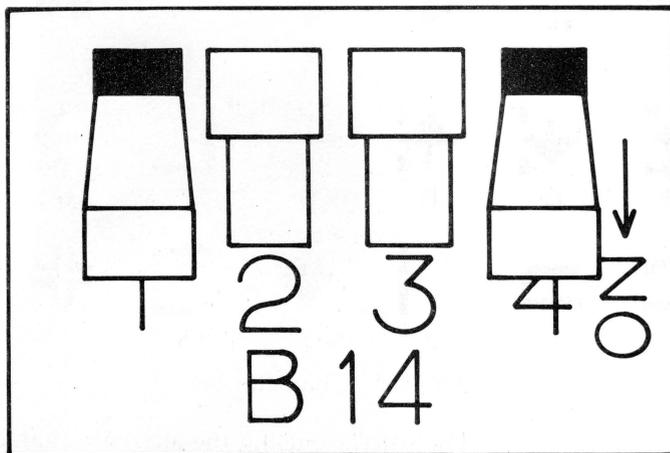

Back Panel—Option Switch # 4

The Graphics Character Set

To use the graphics character set, you set the OPTION SWITCH #4 in the DOWN position, and execute a number of software commands to activate the alternate

character set. This character set is used only under software control. It has no utility for you unless you want to write your own programs with it. If you're in 80 column mode, using INVERSE display, and these characters appear, they've come from the alternate character set. Make sure the OPTION SWITCH #4 is set in the UP position for normal character display.

The following graphics characters are generated in the alternate character set by typing the character shown at the lower left corner of each diagram.

F	F	▲	⊠	✓	☑	⊐	⊏
@	A	B	C	D	E	F	G

←	⋯	↓	↑	—	↵	■	⇤
H	I	J	K	L	M	N	O

⇄	↓	↑	—	∟	→	▨	▨
P	Q	R	S	T	U	V	W

⊏	⊐		◆	⎓	╬	⊐		
X	Y	Z	[	\	]	^	_
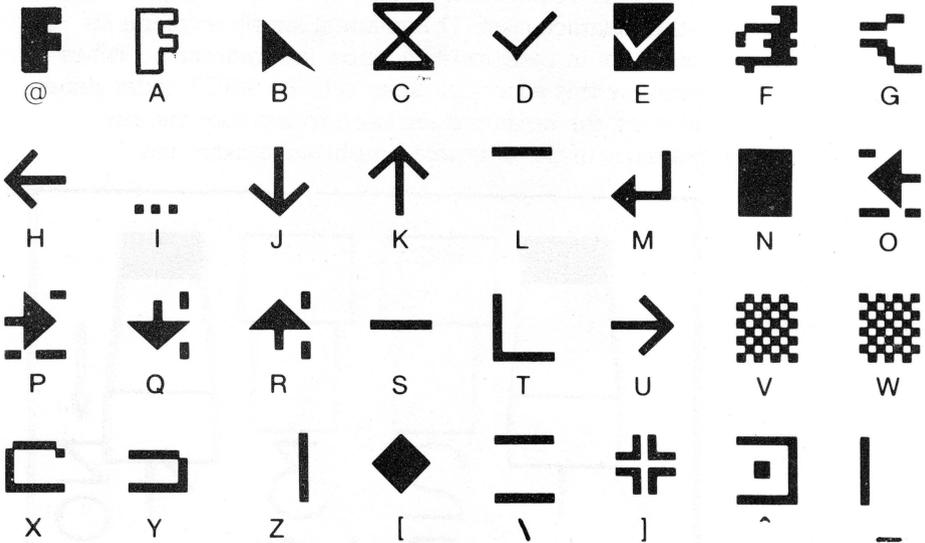
Alternate Character Set

The software using the alternate character set takes care of the access and control of the characters in the graphics character set.

Additional Display Techniques

Any character or graphic can be displayed in inverse video so it stands out as a dark character on a light background. Graphics characters and inverse video can be combined to enhance any screen display. In 40

column mode the ACE 2000 Series Computer has the capability to display regular characters, inverse video characters, or flashing characters. The commands for these display features are in BASIC. INVERSE, FLASH, and NORMAL are display commands described in the *ACE 2000 Technical Reference Manual*.

Generally Franklin DOS 2 and Franklin DOS 2 programs use 40 column mode for video display. The 80 column mode has other capabilities, and there are other 80 column graphic display modes, such as lores, hires, and double hires display modes that are discussed briefly below.

Mixed Text Displays

The ACE 2000 Series Computer has two display modes that mix text and graphics display modes. These mixed modes are available in both lores and hires graphics display modes and display four lines of text at the bottom of the screen.

Low Resolution Graphics

Low resolution graphics (usually called lo-res, or lores) uses a screen composed of a grid of blocks 40 wide and 24 high. The grid has no spacing between blocks, so contiguous blocks merge to form a single large block.

The blocks can use any of 16 different colors. The lores colors are:

Black	Magenta	Dark Blue	Purple
Dark Green	Gray 1	Medium Blue	Brown
Light Green	Gray 2	Light Blue	Orange
Pink	Yellow	Aquamarine	White

High Resolution Graphics

High resolution graphics (usually called hi-res, or hires) uses a screen composed of a grid of points 280 wide by 192 high. Contiguous dots of the same color merge to form a larger image.

These points can use any of 6 different colors. The hires colors are:

Black   White   Purple   Green
Orange   Blue

The graphics screen has two pages of memory allocated to it. This means that two graphics images can be stored at the same time. You may have noticed this when you switched from 40 to 80 column text modes and observed that the text for each mode was preserved even while the other mode was operating. That storage demonstrated the two-page storage system used by the display. That same two-page storage system is used for graphics images. One graphics image can be stored in page one and another in page two. Other memory management techniques allow you to use some of the screen for graphics and some for text. Refer to the *ACE 2000 Technical Reference Manual* for further details.

Double High Resolution Graphics

A further display mode is available which allows you to display 560×192 dots on the screen. This is called "double" high resolution because it effectively doubles the horizontal resolution of the screen by interleaving the memory of page one and page two for alternate points on the screen.

Double hires graphics uses a different color generation technique which can produce one color for each four

screen dots, so the color resolution is 140 color groups per horizontal line. There are 16 colors available, the same ones as available with lores graphics color display, listed below:

Black	Magenta	Dark Blue	Purple
Dark Green	Gray 1	Medium Blue	Brown
Light Green	Gray 2	Light Blue	Orange
Pink	Yellow	Aquamarine	White

Using lores, hires, and double hires graphics requires some programming skill and experience. Refer to the *ACE 2000 Technical Reference Manual* for further details about these graphics display techniques and methods for using them.

Enhanced Video Software

The Franklin ACE 2000 Series Computer has some additional software built into the video section of its controls. This software is generally associated with the 80 column and keyboard control of the computer, but it is of general use and interest for advanced use of the computer and its capability. This software includes several general enhancements and keyboard control commands as well as some new commands that operate in either 40 or 80 column mode.

The special features of the enhanced video software are available only if you turn them on with the 80 column command, PR #3 (RETURN), which you can also do by pressing the function key F3. The screen will clear and characters you type will appear in 80 column mode.

The enhanced video software is always available in 80 column mode. However, it is also available in 40 column mode if you've switched back and forth from 80 to 40 column modes. The best way to tell if the video software is active is to look at the cursor. The enhanced video software always uses a solid, unblinking block cursor in either 40 or 80 column

mode. If you see a blinking dot pattern cursor, the enhanced video software is not active and the commands described here aren't available.

There are three different command groups available in the enhanced video software, control codes, escape sequences, and one key commands. All these commands can be given from the keyboard but only the control codes can be given from a program, and then only if the enhanced video software has been activated. A program can execute these control codes by means of the appropriate PRINT statements after a PR #3, or equivalent command, has been given.

Control Code Commands

Control codes are executed by holding down the CTRL key while you press the other key. The Control code commands are given, with a brief explanation, below. If an invalid command is given, it is ignored.

CTRL G   Bell

This command sounds the computer's bell.

CTRL H   Cursor left

This command moves the cursor one position to the left. If the cursor is at the first column of a line, it will wrap around to the end of the previous line. If the cursor is in the first column of the first line, the command is ignored.

CTRL J   Cursor down

This command moves the cursor down one line on the screen in the same column. If the cursor is on the last line of the screen, the whole screen will scroll up one line, with the top line of the screen disappearing off the top and a new bottom line appearing.

CTRL K   Clear to end of screen

This command clears the screen starting at the current cursor position and continuing to the end of the screen. The cursor remains in the same position.

CTRL L   Clear entire screen and home cursor

This command clears the entire screen and positions the cursor in the first column of the first line.

CTRL M   Carriage return

This command is the same as a carriage return. This is equivalent to pressing (RETURN).

CTRL N   Reverse video off

This command turns off reverse video display mode.

CTRL O   Reverse video on

This command turns on reverse video display mode, which means that characters are displayed as dark characters on a light background.

CTRL Q   Switch to 40 columns, keep enhanced video software

This command switches the video to 40 column mode. This command does not deactivate the enhanced video software. If you had data on the screen in the previous 80 column mode operation, the data would be displayed but truncated to the first 40 columns.

CTRL R   **Switch to 80 columns, keep enhanced video software**

This command switches the video to 80 column mode. This command doesn't deactivate the enhanced video software. If you had data on the screen from the previous 40 column mode, it will appear in the first 40 columns of the 80 column display. Columns 41 through 80 will be blank.

CTRL U(kybd)   **Cursor right (from keyboard only)**

This command moves the cursor one position to the right when it is executed from the keyboard.

CTRL U(prgm)   **Switch to 40 columns, exit enhanced video software**

This command switches the video display to 40 column mode and deactivates the enhanced video software when the command is executed from a program.

CTRL V   **Scroll down**

This command scrolls the screen down one line. The new top line will be cleared and the bottom line disappears.

CTRL W   **Scroll up**

This command scrolls the screen up one line. The new bottom line will be cleared and the top line disappears.

CTRL Y   **Home cursor**

This command moves the cursor to the home position, line one, column one.

CTRL Z   Clear line

This command clears the entire line marked by the cursor. The cursor position is unchanged.

CTRL \   Cursor right

This command moves the cursor one position to the right. If the cursor is in the last column of the line, it is moved to the first column of the next line. If the cursor is in the last column of the last line, the screen scrolls up one line and the cursor moves to the first column of the new last line.

CTRL]   Clear to end of line

This command clears the cursor line starting from the cursor column and continuing to the end of the line. Data in columns in front of the cursor are not affected.

CTRL ^   Position cursor to X,Y

This command positions the cursor to any location on the screen. The command interprets the next two characters typed (or PRINTed from a program) after this command as the column number and the line number of the new cursor location. The numbers are determined by subtracting 32 from the ASCII value of the characters. Remember that lines and columns start their numbering at 0, not at 1. Therefore the command CTRL ^ !! (the ! is ASCII 33) positions the cursor in the second column of the second line.

Escape Sequence Commands

Escape sequences are special commands. You execute an escape sequence by pressing the ESC key, releasing it, then pressing the next key in the sequence. In this way, ESC is not used like a SHIFT or CTRL key

because it is not held down while the second key is pressed. An escape sequence is also different in that it is not executed except when entered from the keyboard.

Escape sequences are used frequently by the enhanced video software for multiple commands in "escape mode." Many control code cursor movement commands have limited utility because they result in one movement for each command and make it difficult to move long distances. Escape mode commands allow simpler commands that don't have this restriction. Escape mode is marked by a special cursor, a solid block with a plus sign in it. Whenever you see the escape mode cursor it means that the enhanced video software is expecting the second character of an escape sequence.

The escape sequences used by the enhanced video software are described below. If an invalid character or sequence is entered, it is ignored. Those sequences which use escape mode are marked.

ESC @   Clear screen and home cursor

This sequence clears the entire screen and moves the cursor to the first column of the first line.

ESC A   Cursor right

This sequence moves the cursor one position to the right. If the cursor is in the last column of the line, it moves to the first column of the next line. If it is in the last column of the last line, the screen scrolls up one line and the cursor moves to the first column of the new bottom line.

ESC B   Cursor left

This sequence moves the cursor one position to the left. If the cursor is in the first column of a line, it moves to the last column of the preceding line. If the cursor is in the first column of the first line on the screen, the command is ignored.

ESC C   Cursor down

This sequence moves the cursor down one line staying in the same column. If the cursor is in the last line, this command causes the screen to scroll up one line, with a cleared bottom line appearing in the last position and the top line disappearing from the top position.

ESC D   Cursor up

This sequence moves the cursor up one line staying in the same column. If the cursor is in the top line of the screen, the command is ignored.

ESC E   Clear to end of line

This sequence clears the line, starting from the cursor position and continuing to the end of the line. Data on the line in front of the cursor is unaffected.

ESC F   Clear to end of screen

This sequence clears the screen, starting at the current cursor position and continuing to the end of the screen. The cursor position is unaffected.

ESC I   Cursor up, stay in escape mode

This sequence moves the cursor up one position, like the ESC D command, except this command stays in Escape mode.

ESC J   Cursor left, stay in escape mode

This sequence moves the cursor left one position, like
the ESC B command, except this command stays in
Escape mode.

ESC K   Cursor right, stay in escape mode

This sequence moves the cursor right one position, like
the ESC A command, except this command stays in
Escape mode.

ESC M   Cursor down, stay in escape mode

This sequence moves the cursor down one position,
like the ESC C command, except this command stays in
Escape mode.

ESC 4   Switch to 40 columns, keep enhanced
                  video software

This sequence switches the video display to 40 column
mode. The enhanced video software remains active in
40 column operation. If there was 80 columns of data
previously displayed, the first 40 columns would be
displayed and the last 40 columns would be truncated.
This command is the default definition of function key
F5.

ESC 8   Switch to 80 columns, keep enhanced
                  video software

This sequence switches the video display to 80 column
mode. The enhanced video software remains active. If
the previous display mode was 40 columns, the data
displayed will appear in the first 40 columns of the new
80 column display, with columns 41 to 80 cleared. This
command is the default definition of function key F6.

ESC CURSOR RIGHT
Cursor right, stay in Escape mode
ESC CURSOR LEFT
Cursor left, stay in Escape mode
ESC CURSOR UP
Cursor up, stay in Escape mode
ESC CURSOR DOWN
Cursor down, stay in Escape mode

The cursor arrow keys in the numeric keypad are active in escape mode. When the escape mode cursor (solid block with the plus sign) is present, you can move the cursor by using the arrow keys on the cursor keypad.

ESC CTRL Q
Switch to 40 columns, exit enhanced video software

This sequence switches the video display to 40 column mode and deactivates the enhanced video software.

One Key Editing Commands

These commands are included with this group because they are part of the enhanced video software. They are available when that software is activated. They also require that the NUM LOCK key be off. These commands are marked on keytops in the cursor keypad where they are convenient for editing. In a way, these keys are like special function keys in that they have special definitions but they are different because they are functional only when the enhanced video software is active. Related keys, RUN, LIST, and ENTER, are adjacent and are also convenient for editing, but their functions are not part of the enhanced video software.

CLRS
Clear The Screen

This command clears the entire screen and moves the cursor to the home position, column one of line one.

HOME   Home The Cursor

This command moves the cursor to the "home" posi-
tion, which is the first column of the first line.

CLRL   Clear The Line

This command clears the entire line designated by the
cursor position. The cursor position itself is unaffected.

INSC   Insert A Character

This command inserts a space character at the current
cursor position and pushes other characters on the line
one position to the right to make room for it. Only
characters to the right of the cursor column are
affected. If there is a character in the last column of the
line, that character is lost.

DELC   Delete A Character

This command deletes the character at the current
cursor position and moves all the columns on the right
side one space from the right to close up the line. A
space character appears in the last column of the line.

CPES   Copy Entire Screen Line

This command is useful in editing BASIC programs and
has a very specialized operation. This command sends
all the characters on the cursor line to the current
program for processing or execution. This is equivalent
to moving the cursor to the end of the line and then
hitting (RETURN). The CPES command works regard-
less of the cursor position on the line.

CPES is designed for editing BASIC statements.
Suppose you had typed a line of a program that had a
mistake in it. First, you would LIST the line, then use

the escape mode cursor movement keys to locate the
section of the line that needed correction, then make
the changes with the INSC and DELC keys. When the
changes are complete, just press CPES. The corrected
line is sent to BASIC with a (RETURN) without any
additional cursor movement required.

If you use the CPES command on a full line (all 40 or
all 80 characters are used), you may notice that the last
character on the line is cleared to a space character after
CPES executes. Don't worry, this is only the display
screen's processing of the command. The correct and
complete line was sent to the running program.

Enhanced Video
Software
Command
Summary   **Control Codes**

CTRL G	Sound bell
CTRL H	Cursor left
CTRL J	Cursor down
CTRL K	Clear to end of screen
CTRL L	Clear the screen
CTRL M	Carriage return
CTRL N	Turn off reverse video
CTRL O	Turn on reverse video
CTRL Q	Switch to 40 column mode
CTRL R	Switch to 80 column mode
CTRL U(kybd)	Cursor right
CTRL U(prgm)	Switch to 40 column mode and deactivate enhanced video software
CTRL V	Scroll down
CTRL W	Scroll up
CTRL Y	Home the cursor
CTRL Z	Clear the line
CTRL \	Cursor right
CTRL]	Clear to end of line
CTRL ^	Position the cursor

Escape Sequence Commands

ESC @	Clear the screen
ESC A	Cursor right
ESC B	Cursor left
ESC C	Cursor down
ESC D	Cursor up
ESC E	Clear to end of line
ESC F	Clear to end of screen
ESC I	Cursor up (stay in Escape mode)
ESC J	Cursor left (stay in Escape mode)
ESC K	Cursor right (stay in Escape mode)
ESC M	Cursor down (stay in Escape mode)
ESC 4	Switch to 40 column mode
ESC 8	Switch to 80 column mode
ESC CURSOR RIGHT	Cursor right (stay in Escape mode)
ESC CURSOR LEFT	Cursor left (stay in Escape mode)
ESC CURSOR UP	Cursor up (stay in Escape mode)
ESC CURSOR DOWN	Cursor down (stay in Escape mode)
ESC CTRL Q	Switch to 40 column mode and deactivate enhanced video software.

One Key Editing Commands

CLRS–Clear The Screen
HOME–Home The Cursor
CLRL–Clear The Line
INSC–Insert A Character
DELC–Delete A Character
CPES–Copy Entire Screen Line

Chapter 8

Input and Output

Input and output refer to communication between the computer and a peripheral device. The term "peripheral" describes any device outside the computer itself which sends or receives information to or from the computer. The peripheral device and the computer are usually connected by cables of different kinds. A disk drive is a common computer peripheral. In fact, a connection can be made between two computers, so that each becomes a peripheral of the other. More commonly, peripheral devices mean printers and modems. Printers give you permanent and readable output. Modems convert computer signals into audible tones for transmission over telephone lines.

Parallel And Serial Communication

There are two techniques for sending information along a cable: parallel and serial. In parallel transmission, eight signals are sent simultaneously on eight parallel wires. This is fast and efficient, but it works well only over short distances (say 10 to 20 feet). Serial transmission sends the eight character signals one after the other along a single line. This is somewhat slower (though still very fast), but much more dependable over long distances.

Most simple printers use a parallel connection because it is easy to connect and its communication procedures are well established. In the office or home environment, it is the preferred method of connecting a peripheral device, such as a printer, to a computer. More complicated printers, longer distances to the printer, or problems with radio frequency interference sometimes require a serial interface connection.

Your Franklin ACE 2000 Series Computer has a parallel interface built in and can accept a peripheral card to provide a serial interface. It is easier to connect the parallel interface, both physically and electronically, so that is recommended. The procedure for connecting the parallel interface is given below. Procedures for

connecting the serial interface depends on the periph-
eral card you use and are given in the manual with the
serial card you purchase and install.

If you have a printer with a parallel interface, follow
the instructions below. You should have your printer
manual to help you.

**Making The
Parallel
Connection**

Connecting the computer to the printer is a simple
task. Plug the printer cable into the outlet on the rear
panel of the computer. The cable is a standard parallel
cable connecting a DB-25 connector to an Centronics
edge connector on the printer.
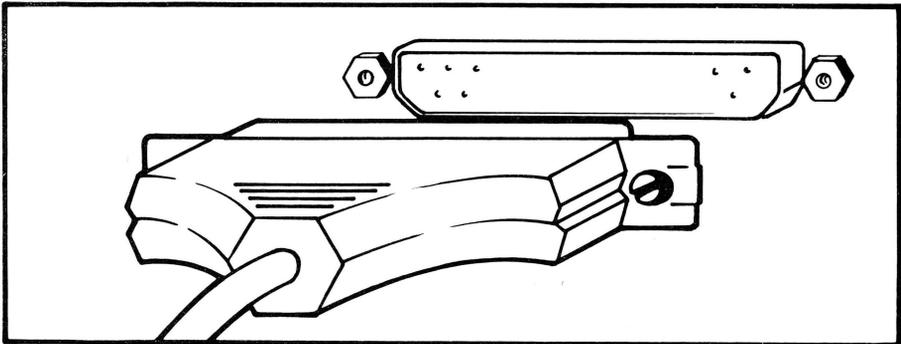
Printer Cable And Connector

Different printers have different features and options.
Your ACE 2000 computer has been designed to utilize
the features of four popular printers, the Epson printer,
the Okidata printer, the C. Itoh printer, and the Star
Micronics printer. The computer has built-in software
commands and controls to make using these printers
easy for you.

Now consult the printer manual and make the connec-
tions needed there. The cable should plug into a
connector on the back of the printer, then plug in the
printer's power cord, insert the paper, check the
ribbon, etc.

Now try a little test to see if the printer is working properly. Boot the ACE 2000 Series Computer with the Franklin DOS 2 diskette. Exit the HELLO program, and when you see the Franklin DOS 2 prompt], type PR#1 (RETURN). (You could also press F4 which has this command as its definition.) This turns on the computer's connection to the device in slot # 1, which is the printer. Your printer should make some sort of response to this connection, like resetting the print head or adjusting the paper feed. Then type a sentence on the computer and press (RETURN). The printer should print the sentence you typed.

If the printer responded as indicated, you're all set. If it didn't, check all your connections. Consult your printer manual for suggestions. If it still doesn't work, check with your dealer.

There is one additional setting you need to make before you use your printer. OPTION SWITCH #2 on the back panel controls whether the computer sends a line feed command to the printer at the end of each line or whether the printer generates the line feed command itself. The OPTION SWITCH #2 setting is DOWN for sending an automatic line feed, and UP for no line feed command. Consult the printer manual to see which setting your printer requires.

If you can't locate the information, you can try a simple experiment when you've got your printer running to see whether the printer needs the line feed command or whether it generates its own line feed commands. Set the OPTION SWITCH #2 to the DOWN position so the computer sends a line feed at the end of each line. Then print out a few lines of text. If the text appears on the printer double-spaced, you can conclude that the printer sent line feed commands in addition to those of the computer and you should turn off the line feed switch, which is OPTION SWITCH #2 UP.
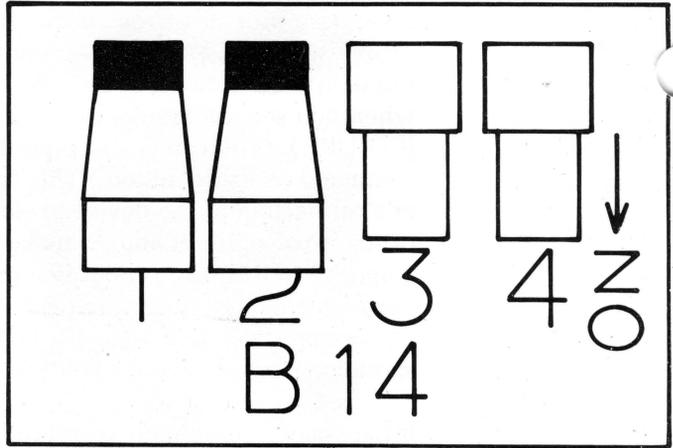
Back Panel—Option Switch # 2

Making The Serial Connection

Conventions for using a serial interface are not well standardized. Signals to control the transfer of data are handled in different ways by different devices and manufacturers. Refer to the instructions with the serial interface card you have. As far as the computer is concerned, all you have to do is plug in the peripheral card. All the other settings and adjustments are determined by the card.

Refer to the latter part of Chapter 1, *Getting Started*, for instructions and illustrations showing how to open the computer case. The serial interface card you purchased should be inserted into slot #2, which is the slot closest to the rear panel. Refer to the illustrations and the slot labels on the main electronics board. If necessary, lead any cables from the serial card through one of the rear panel openings, or install a cable connector in the rear panel.

When the serial card is installed, make all the interface settings as the card and device require. You can test the serial card by using the same simple test procedures suggested above for the parallel printer except substi-

tuting the Franklin DOS 2 command PR #2 because the serial card is in slot 2.

Input/Output Commands In Franklin DOS 2

The information that follows is for more experienced users and relies on some familiarity with computer terminology and software design. If you're interested in how Franklin DOS 2 and the ACE 2000 Series Computer works, you may find this information helpful, otherwise, you can ignore it. You don't have to understand these commands or procedures to operate your computer successfully.

For Franklin DOS 2, the printer interface appears as slot number 1 and the modem interface appears as slot number 2. The printer is activated with the Franklin DOS 2 command PR#1. This directs all output to both the screen and the printer until (CTRL)(RESET) is pressed or until another PR# is given with another slot number. Entering PR#0 is recommended since slot 0 is unoccupied and thus will not create a conflicting command. Note that by default, output will go to both the screen and the printer (screen echo is on). You can send data to the printer only (screen echo off) by using a software control command as described in the next section.

The Franklin DOS 2 command PR#2 directs output to the modem port as well as to the display screen. The additional Franklin DOS 2 command IN#2 causes all input to be taken from the modem serial port rather than the keyboard. (CTRL)(RESET) or an IN# command to another slot number will deactivate modem input. Note that a new IN# command (such as IN#0) must come through the modem port to be effective.

Software Control Of Input And Output

Most of the time you will probably use the printing commands of the application programs you're using. But for your own programs and needs the ACE 2000 Series Computer has a number of built-in software

commands and controls for printers. These commands and descriptions of how to use them follow. Understanding these commands is not necessary to use your computer or printer effectively, though they make some processes easier.

When you send data from the computer to the printer you can change some of the interface options for the appearance of the printout with commands from the keyboard. These commands are preceded by a "command character" which informs the computer that a command follows. By default, this command character is (CTRL I), the TAB character, (ASCII 9). In BASIC programs you would use CHR$(9). The individual commands are letters preceded by this command character.

Because the command character is the TAB character, which you may need to use in your text, you may want to change the command character to something else. The command for changing the command character is the last command in the following list. Note that (CTRL I) in the list stands for the command character and could be changed to any other ASCII character you have selected.

Printer Control Commands

Command	Function
(CTRL I) A	Epson screen dump
(CTRL I) B	Okidata screen dump
(CTRL I) C	C. Itoh screen dump
(CTRL I) D	Gemini screen dump
(CTRL I) E	Turn screen echo on
(CTRL I) F	Turn screen echo off
(CTRL I) H	Select hires graphics dump
(CTRL I) I	Select inverse image dump
(CTRL I) J	Select normal image dump
(CTRL I) L	Turn on auto line feed

(CTRL I) M	Turn off auto line feed
(CTRL I) P	Select primary page dump
(CTRL I) Q	Select non-rotated dump
(CTRL I) R	Select rotated dump
(CTRL I) S	Select secondary page dump
(CTRL I) T	Select text dump
(CTRL I) U	Allow character codes 0-255
(CTRL I) V	Restrict character codes to 0-127
(CTRL I) X	Enter transparent mode
(CTRL I) Z	Change command designator character

These individual commands are explained in more detail below. In general, these commands allow you to send the contents of the screen to the printer. This is called a screen "dump." There are commands that allow you to modify the characteristics of the printed screen, such as rotating it, or showing it in reversed video. Commands to change these characteristics are given before the screen dump command.

Printer Software Default Settings

The following settings are the default values for the printer screen dump characteristics.

**Output
Characteristic**   **Default Setting**

Screen Echo	On
Screen Dump	Hires graphics
Memory Page	Primary page
Video Display	Normal video
Rotation	Not rotated
Auto Linefeed	Same as OPTION SWITCH #2
Code Range	0 to 127 only

Printer Software Commands

(CTRL I) A   **Epson screen dump**

This command sends a screen of data in the format needed for an Epson printer. Set the parameters for the printing characteristics before you use this command.

After it has started, the screen dump can be stopped by pressing ESC. If you want to print out a hires graphics screen you must have the Graftrax option installed on your Epson printer.

(CTRL I) B   Okidata screen dump

This command sends a screen of data in the format needed for an Okidata printer. Set the parameters for the printing characteristics before you use this command. After it has started, the screen dump can be stopped by pressing ESC. If you want to print out a hires graphics screen you must have the Oki-Plot option installed on your printer.

(CTRL I) C   C. Itoh screen dump

This command sends a screen of data in the format needed for a C. Itoh printer. Set the parameters for the printing characteristics before you use this command. After it has started, the screen dump can be stopped by pressing ESC.

(CTRL I) D   Gemini screen dump

This command sends a screen of data in the format needed for a Star Micronics Gemini printer. Set the parameters for the printing characteristics before you use this command. After it has started, the screen dump can be stopped by pressing ESC.

(CTRL I) E   Turn screen echo on
(CTRL I) F   Turn screen echo off

These commands turn the screen echo on and off. Screen echo means that each character that is printed is also displayed on the screen. Normally screen echo is on so you can follow the progress of the data being printed. Printing is not affected if you turn off the screen echo.

(CTRL I) H   Select hires graphics dump

This command informs the printer software that the next screen dump is for a hires graphics screen. The software will assume all subsequent commands apply to hires graphics screens until it receives a command for a text screen dump (CTRL I T). The hires graphics screen dump is the default setting.

(CTRL I) I   Select inverse image dump

The screen dump can be printed either as normal printing (the light dots on the screen will be printed as black dots by the printer) or as inverse printing (the light dots are printed as the non-printed dots by the printer). This command informs the printer software that all subsequent screen dumps are to be printed in inverse mode.

(CTRL I) J   Select normal image dump

This command returns the printer software to normal printing mode from inverse printing mode. It is the reverse of the CTRL I I command. This printing mode remains in effect until another command is given to change it.

(CTRL I) L   Turn on auto line feed
(CTRL I) M   Turn off auto line feed

These commands duplicate and override the setting of OPTION SWITCH #2 on the back panel of the computer. This switch controls whether the computer sends a line feed command at the end of every line, or not. Refer to the section of this chapter on connecting the printer for further discussion of the line feed commands and determining the requirements of your printer.

⟨CTRL I⟩ P   **Select primary page dump**
⟨CTRL I⟩ S   **Select secondary page dump**

The ACE 2000 Series Computer computer has video memory allocated for two separate "pages" of display for each display mode. That means there are two pages of text screens and two pages of graphics screen data stored in memory at the same time. These commands select either the primary (page 1) or the secondary page (page 2) as the page to be sent to the printer. This assignment remains in place until another page assignment command is given. The memory is unaffected by the printing operation.

⟨CTRL I⟩ Q   **Select non-rotated dump**
⟨CTRL I⟩ R   **Select rotated dump**

The data on the screen can be printed exactly as it appears on screen or it can be rotated 90 degrees so the contents of the display screen appears on the long axis of the printed page. These commands allow you to set the rotation of the screen dumps. The rotation assignment remains in place until another rotation assignment is given.

⟨CTRL I⟩ T   **Select text dump**

This command informs the printer software that subsequent screen dumps are text data. This is the complementary command to the Select hires screen dump command (CTRL I H). This assignment remains in place until a hires graphics dump command is given.

⟨CTRL I⟩ U   **Allow character codes 0-255**
⟨CTRL I⟩ V   **Restrict character codes to 0-127**

The data transmitted to the printer is normally sent as character codes in the range of 0 to 127, corresponding to ordinary text characters. If codes between 128 and

255 are received in normal printer operation, the printer software subtracts 128 from each character code to make it correspond to normal range characters. In some situations, such as printing graphics characters, you may need to use character codes 128 to 255 and the printing characters they represent. These commands allow you to control the transmission of these character codes.

(CTRL I) X   Enter transparent mode

Transparent mode is an operating environment of the computer in which characters are not analyzed or interpreted but treated transparently and passed through to the printer. This is useful because control codes, commands, command designator characters (like the TAB character), don't complicate the printing of a document.

For example, if you use the command designator character (CTRL I) (TAB, the default value) and try to print a document which has TAB characters in it, the printer software won't know how to interpret the TAB characters it finds, whether to interpret them as printing commands or to interpret them as TABs in the text. One solution to this problem is to change the command designator character to something not used in the document. If the document has a lot of control characters in it, such as a program, this solution may not be feasible and the only remaining option may be to put the printer software into transparent mode so it treats all characters as pure data.

There is a problem with transparent mode. Because transparent mode doesn't recognize commands, there isn't a way to issue a command to exit from transparent mode. Your only choices are to reset the computer or issue a PR #1 command, both of which reinitialize the printer software and exit transparent mode. Be careful

when you use transparent mode and be sure you execute all the commands needed to print your document correctly before you enter it.

(CTRL I) Z   Change command designator character

This command allows you to change the command designator character to some character other than (CTRL I). Just enter the new command designator character after the (CTRL I) Z. For instance, (CTRL I) Z (CTRL K) would make the new command designator character (CTRL K), which you would have to use to enter commands.

GLOSSARY

Acoustic coupler   A device into which you place the handset of a telephone to allow transfer of information between computers. See Modem.

ALT key   A shift key generally used only in technical applications that produces special ASCII codes with other keys.

Ambiguous file name   A file name that refers to more than one file. See Wildcard characters.

Application program   A program such as a word processor or spreadsheet that allows you to apply your computer's power to a particular task.

ASCII   *American Standard Code for Information Interchange.* A set of 128 numerical codes for printed characters and control characters.

ASCII file   A text file in which data is recorded in ASCII code form, that is, character by character.

Backup   A copy of a diskette.

BASIC   *Beginner's All-purpose Symbolic Instruction Code.* A computer language.

Baud rate   The speed of data transmission between a computer and a peripheral.

Binary file   A file, usually on diskette, that holds data in binary form. See ASCII file.

Boot   To insert a diskette and start a computer so that an operating system is loaded into memory from the diskette.

Buffer   A quantity of memory where data temporarily waits. A buffer is used as a holding point until the preceding process is completed.

CAPS LOCK key   A special kind of shift key that shifts all alphabetic characters to uppercase when the LED is on. Other uppercase symbols and punctuation marks are unaffected.

Caret   Typographic character; an arrow head pointing up. An ASCII character, also called up-arrow, used with the corresponding letter to symbolize a control code. For example, (CTRL) N is also written ^N. See Control code.

Central Processing Unit   The CPU stores and retrieves data in memory and executes logical and arithmetic operations on it. The simple operations performed by the CPU are combined with each other to make higher level operations. The CPU includes the microprocessor and supporting circuits.

Character   A symbol on the keyboard, including the space and control keys like (TAB) and (RETURN). See ASCII, Control codes.

Character Set   The collection of characters corresponding to the ASCII codes 0 to 127. Generally this is a standard set of alphabetic characters, but it may also be any group of graphic or other characters.

Cold boot   Starting a computer, usually from a power off state, so that all memory is erased and the operating system is read in from scratch. See also Warm boot.

Command   An instruction from the user to the operating system or application program.

Compatibility   Similarity between one computer and another that allows the same program or diskette to be used on both of them.

Control codes   The ASCII codes generated by certain keys when used with (CTRL). For convenience, some control codes are produced by special keys, such as (ESC) and (RETURN). See ASCII and Caret.

CPU   See Central Processing Unit.

Cursor   A mark on the screen which shows where the next character will appear, or which designates the next function that will be performed. Usually an underline or solid rectangle blinking on and off.

Data   A very general term for information that is available in a machine readable form so it can be processed by a computer.

Default, Default value   The choice among many options the computer will use if you don't specify otherwise.

Destination   The diskette or other device to which data will be sent, especially the diskette, or drive containing the diskette, on which a copy is being made. See Source.

Device   A very general term for something attached to a computer to perform a specific task. Modems, printers, and disk drives are devices.

Direct-connect modem   A modem which is wired directly into the telephone system. An acoustic modem produces sounds that are received by the telephone microphone and converted into electrical signals. A direct connect modem generates the signals itself and connects directly into the telephone network. See Modem.

Disk, diskette   A magnetic recording medium used to store data, especially in personal computers. A diskette consists of a flexible disk which spins inside a protective envelope.

Disk drive   The mechanism which spins the diskette and records or plays back the data stored on the diskette.

Display   The characters and graphics which appear on the computer's monitor. See Monitor.

DOS   *Disk Operating System.* Several different proprietary operating systems use the generic term DOS. Franklin DOS 2, used on Franklin computers, is compatible with DOS 3.3, used on Apple computers of the II/IIe family. See Operating system.

Enter   To type data into the computer.

Error message   A report from a computer program (operating system or application) that something has failed to go as planned.

Escape key, escape sequence   A command that is initiated with the (ESC) key, followed by one or more other keys.

File   An organized and named collection of data in memory or on a diskette. Either individual information items or a program.

File name   The name which identifies a file to the operating system for storage and retrieval.

File type   A classification of files according to purpose. Each operating system has different conventions for naming these classifications, but the names are important to identify for the computer what handling and interpretation is required of each file.

Floating Point BASIC   A version of the BASIC language in which decimal points are permissible in numbers. Used with Franklin DOS 2. Similar to other popular versions of BASIC.

Floppy diskette   A reference to the flexibility of the diskette, though you should still be careful about handling the diskette and not bending it. See diskette.

Format   To make a diskette ready for use by recording an organizational scheme upon it.

Function Key   A key which can produce a function, command, or group of characters, instead of just a single character. This function is a stored definition entered by the keystroke.

Graphics mode   A feature of ACE 2000 Series computers which allows pictures to be drawn on the screen.

Handshaking   Control signals transmitted between two devices to coordinate receiving and transmitting data, especially in serial interface communications. The signals may be on data lines or on separate communication lines depending on the handshaking controls chosen.

Hardware   The electronic circuits and mechanical components that make up a computer.

Hard disk   A data storage system using one or more rigid magnetic disks as media for recording data. The storage capacity of a hard disk is very much larger than a floppy disk.

Hex   Hexadecimal refers to a base 16 number system, used for convenience in programming. The numbers 10 through 15 are represented by the letters A through F, thus 1E is 31, FF is 255, etc.

Initialize   To format a diskette. More generally, to make a device or a program ready for use by clearing its contents.

Interface   The logic circuits which transmit data between the computer and the peripheral device, including keyboard and disk drive as well as external devices like printers and modems.

Inverse (Reverse) video   A type of video display in which characters appear as dark objects on a light background.

I/O (Input/Output)   A very general term for the communication between the computer and external peripheral devices.

Joystick   A game controller.

LED   *Light Emitting Diode.* A small light used as an indicator of activity. The disk drive lights, the keyboard, and main computer lights are all LED's.

Load   To bring a program or data from a diskette or other location into computer memory.

Machine   Computer.

Main electronics board   The large board on which are mounted the memory circuits, the CPU and other processing circuits of a computer. In most microcomputers, the main electronics board has sockets for mounting other circuit boards to extend the capabilities of the computer.

Media   The physical material used by a storage device to record data. Usually magnetic tape or magnetic coatings on a diskette.

Memory   Data storage circuits that are directly available to the CPU. See CPU, RAM, ROM.

Menu   A popular method of control used in programs. A list of options is presented on the screen for the user to view and make a choice.

Microprocessor   The principal component of the CPU. It performs mathematical and logical operations on data stored in memory. See Central Processing Unit, Operating System.

Modem   *Modulator/Demodulator.* Converts data from a computer representation to another kind of signal, either electrical impulses or audible tones, for reception and transmission through telephones. See Acoustic coupler, Direct-connect modem.

Monitor   An output device for a computer, smaller than a television set, but designed for the display of characters.

Motherboard   The colloquial name for the main electronics board. Derived from its ability to accept and support other circuit boards.

Mouse   A hand-held serial communications device you slide around the desk surface to control movement of the cursor and other computer operations.

NUM LOCK key   A key that controls the operation of the numeric keypad either to produce the numbers on its keytops or the editing functions marked there. The LED indicates number mode.

Operating system   A program which performs often-used tasks such as disk drive and keyboard access so that those commonly used instructions will not have to be written into every program. Operating systems are specific to microprocessors or families of them. Franklin DOS 2 runs only on the 65SC02, or 6502 microprocessor.

Paddles   A game controller.

Parallel interface   A communications circuit used to transmit data over multiple lines.

Parameter   Data value transmitted as part of a command to a device or program to make it perform a specific function or in a specific way.

Parity bit   A signal added to the data in serial communications. Used as a check on the accuracy of transmission.

Pascal   A high-level computer language.

Peripherals   Devices which serve as storage for or means of communicating with the CPU.

Pixel   A tiny point on the display screen.

Port   A memory location through which the CPU communicates with peripheral devices or a connection from the computer to some external device. Thus a printer has a physical port where it attaches to the computer and a memory port where the computer sends it data to be printed.

Program   A set of instructions which directs the operation of the computer. Also, to write these instructions.

Programmable keys, also Function keys   These are keys which can receive, store, and generate a definition you program onto the key.

PROM   *Programmed Read Only Memory*. Memory circuits which hold data with power off and cannot be changed after the original storage of data. Differs from ROM in that a PROM is empty and data is stored by a relatively inexpensive device when needed.

Prompt   A character, word, phrase, or statement that tells the user to supply input for a program.

RAM   *Random Access Memory*. Memory circuits in a computer which hold data only while power is on, but which can be rapidly changed, read, and erased. Random access really means direct access. Any memory cell can be read or changed without reference to any other.

Read   The computer operation of securing previously recorded data from a diskette.

Reset A command that interrupts whatever process the computer is involved in. The results of the interruption depend on the software instructions for reset currently being used. Also a key on the keyboard.

RF modulator A device that turns computer display output into a simulated TV broadcast, so it can be displayed on a TV set.

ROM *Read Only Memory.* Memory circuits which can be accessed directly, but which hold data even with power off and cannot be changed after data is originally stored.

RS-232 An engineering standard for the transmission of data. Used with the serial interface of almost all personal computers.

Run To execute a program in a computer.

Save To store data or a program in a diskette file.

Sector A subdivision of a track on a diskette. See Track.

Serial interface A data transmission circuit using a single line for data.

Slot An elongated socket on the main electronics board which holds a peripheral board.

Software handshaking Status information exchanged between computer and peripheral as control codes in the data stream.

Source The diskette, or the disk drive holding it, from which data is being read. Especially, the diskette from which a copy is being made.

Stop bits The signal used in serial communications to indicate that an entire character has been transmitted.

Terminal A combination of keyboard and display screen which communicates with a computer (usually CPU and memory functions) in another location.

Toggle   A command to the computer which is always given in the same format, but which has alternate effects. Equivalent to a push button light switch, which is always pushed, but turns the light on or off depending on the previous state of the light.

Track   One of the concentric circles that divides diskettes for storage purposes. The ACE 2000 disk drives can use 35 or 40 track diskette formats.

Transparent mode   A processing mode of the computer where all characters, even command characters, are treated as data and displayed or printed. Setting transparent mode eliminates almost all normal command control of the computer, since all commands except reinitializations like PR#n, are treated as data only.

Utility   A program or series of programs that sort through files, reorganize the contents of a diskette, and perform a number of other housekeeping or maintenance functions.

Wildcard character   In a file name, a character used to represent another character or string of characters.

Write   To record data onto a storage medium such as a diskette. Also, to send data to a peripheral.

Write-protect tab   A piece of adhesive paper which covers a notch on the side of a diskette envelope. A disk drive will not write or make any change to a diskette with this notch covered. Note, this applies to 5 1/4" diskettes only. Other size diskettes use other write-protect methods.

Appendix

ASCII Character Set

000 N_L	001 S_H	002 S_X	003 E_X	004 E_T	005 E_Q	006 A_K	007 B_L	008 B_S	009 H_T	010 L_F	011 V_T	012 F_F	013 C_R	014 S_O	015 S_I
016 D_E	017 D_1	018 D_2	019 D_3	020 D_4	021 N_K	022 S_N	023 E_B	024 C_N	025 E_M	026 S_B	027 E_C	028 F_S	029 G_S	030 R_S	031 U_S
032	033 !	034 "	035 #	036 $	037 %	038 &	039 '	040 (	041)	042 *	043 +	044 ,	045 −	046 .	047 /
048 0	049 1	050 2	051 3	052 4	053 5	054 6	055 7	056 8	057 9	058 :	059 ;	060 <	061 =	062 >	063 ?
064 @	065 A	066 B	067 C	068 D	069 E	070 F	071 G	072 H	073 I	074 J	075 K	076 L	077 M	078 N	079 O
080 P	081 Q	082 R	083 S	084 T	085 U	086 V	087 W	088 X	089 Y	090 Z	091 [	092 \	093]	094 ^	095 _
096 '	097 a	098 b	099 c	100 d	101 e	102 f	103 g	104 h	105 i	106 j	107 k	108 l	109 m	110 n	111 o
112 p	113 q	114 r	115 s	116 t	117 u	118 v	119 w	120 x	121 y	122 z	123 {	124		125 }	126 ~	127 ■

Graphics Character Set

@	A	B	C	D	E	F	G
H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W
X	Y	Z	[	\	]	^	_

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NOTES

Franklin
Computer

Ace 2000 Series Computer
Extended Memory Card Manual

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Franklin Extended Memory Card

Some Franklin ACE 2200 computers, referred to as "Extended Memory" or "384K" machines, are manufactured with the Extended Memory Card installed. The Extended Memory Card is also available as an upgrade kit for any Franklin ACE 2000 Series computer. This manual supplement includes installation and operation instructions for the Extended Memory Card. If your computer has the card already installed, skip over the installation sections. If you are installing it yourself, follow the instructions as outlined. This supplement contains a number of suggestions for using the programs and features of the card.

What Is The Franklin Extended Memory Card?

The Franklin Extended Memory Card is a peripheral card which replaces the 64 K expansion memory card already present in the ACE 2000 Series computers. The computer also has 64 K of memory on the main electronics board. The normal configuration of the Extended Memory Card is 320 K of memory, giving 384 K total memory available. The Extended Memory Card can be configured to use up to 512 K for a total of 576 K of RAM memory in the computer.

The Extended Memory Card gives you additional computer memory which can be used by some software programs for faster and more powerful computing applications. This extended memory can also be used as a high speed disk drive (called a RAM disk) for temporary storage of programs or data as you work. Other, more technical applications, can use bank switching of these memory groups for special video and programming effects.

These instructions show you how to install the Extended Memory Card in the Franklin 2000 Series computer and how to use the programs on the Extended Memory Card diskette.

Installation Of The Extended Memory Card

Take a minute and look at the Extended Memory Card and plan a strategy of things that you'll be doing. The card is similar to the expansion memory card it replaces but is larger and has more chips on it. Its installation also requires attaching a cable between a socket on the card and one on the main board.

The standard configuration has a row of eight 256 K chips and a row of eight 64 K chips for a total memory of 320 K. If you replace the set of 64 K chips with the higher capacity 256 K chips, the Extended Memory Card will have the optional 512 K configuration. Your Franklin Dealer, or any electronics store can help you buy and install 256 K memory chips with 150 nanoseconds access time on the card if you want the additional memory. Installation is simply a matter of removing the set of 64 K chips and inserting a set of 256 K ones, but be careful not to bend any of the pins, and orient the chips so the notch on the end of the chip (the notch marks pin 1) is in the same position.
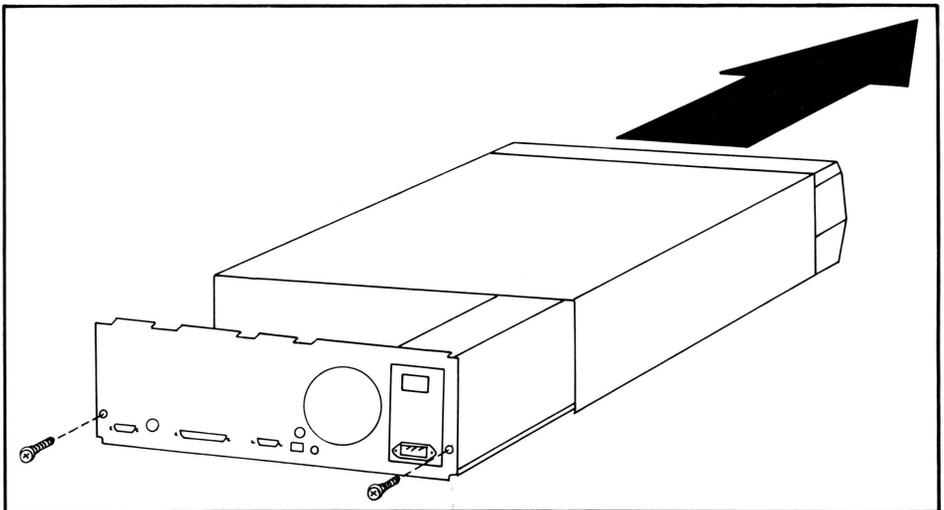
If you replace the memory chips on the Extended
Memory Card to use the optional 512 K configuration,
you should do it before you install the card.

The first step is to open the Franklin ACE 2000 Series
computer case and remove the 64 K expansion memory
card installed in it. Then you'll install the new card in
the computer, connect the cable to the main board, and
run a quick test of its operation before closing the
computer case.

Open the computer case by following this simple
outline. First, make sure the power is off by removing
the power cord from the computer. Turn the computer
so you have some free space on the left side of the
computer in which to lay down the top of the case.
Facing the back panel, remove the two screws, slide the
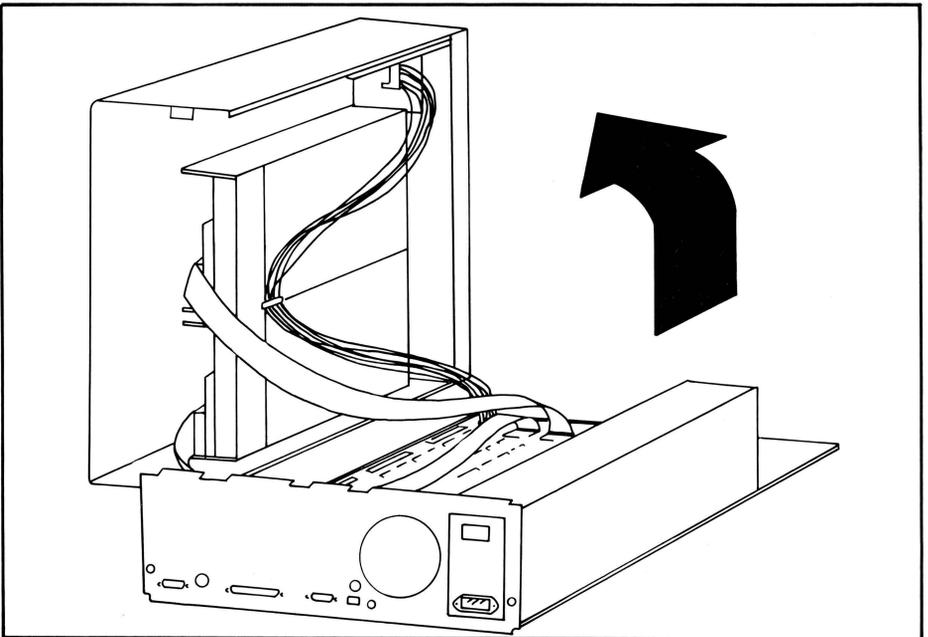
top of the case away from you, and tip it to the left. Be careful because it may be heavier than you expect. The disk drives are mounted in the top of the case and the disk drive cables are long enough to remain connected while the top is off.

Now locate the memory expansion board mounted on top of the main electronics board near the power supply.
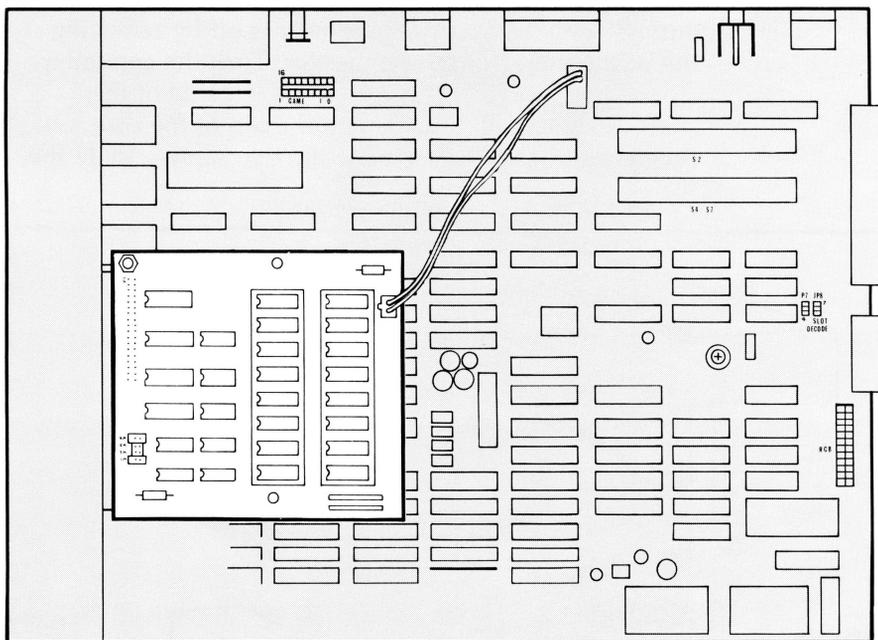
Remove the nut holding the board in place and lift it carefully off the posts supporting it and remove its connecting pins from the socket on the main board. Be careful with the nut and the threaded post and the

nylon supports because you'll use them to install the new card in the same place. You may have to squeeze the tops of the nylon posts to slip the board off.

Now install the new card in the same place you removed the old memory expansion card. The connecting pins on the card fit into the socket only one way, but be careful not to shift it one row of pins left or right. The nylon supporting posts fit into the holes on the card and the nut fastens the card to the supporting post.

Locate the two-pin connector P2 on the right side of the Extended Memory Card and plug in the two-wire plug on the cable. Then locate the five-pin connector J5 on the main electronics board just behind the Parallel Printer connector and plug in the other end of the cable. Both sockets are keyed so the plugs fit only one way.

When the board is installed and connected, run a quick test to check the operation of its RAM memory before you close the computer case.

Slide the top of the computer case back into place, then plug in the power cord. Insert the Extended Memory Card diskette and run the RAMTEST program. This program tests the RAM memory on the Extended Memory Card and displays the results for individual 64 K banks of memory. The screen displays a group of numbers (the banks available in the configuration of your card) and beneath each number a status indicator, either OK, BAD, or "---". The OK designates no memory errors, BAD indicates an intermittent or "soft" memory error in that bank, and "---" means either that that bank is not present in this memory configuration or that there is a "hard" memory error so the test fails completely. For more details, refer to the RAMTEST description below. The test runs continuously until you

stop it by pressing (ESC).

After you've run the test for about 30 minutes, turn off the computer, remove the power cord, and reassemble the computer case.

If you have a problem there are a few simple things you can check on the Extended Memory Card. First, examine the chips to see that there are no pins bent out or under and that all the chips are firmly seated in their sockets. Second, check that the chips are not installed backwards, which means that the notches on one end of the chips are correctly positioned. Corresponding notches appear on the sockets and on the outline markings on the board. All the chips should be oriented the same way. Next, make sure that the chips meet the correct timing specification, which is 150 nanoseconds. If all those things seem correct but there is still a problem with the memory card, call your Franklin dealer.

The Extended Memory Card Diskette

The diskette which accompanies the Franklin Extended Memory Card contains five programs: RAMTEST, FRAMDISK, PRAMDISK, and the AWSTARTUP11 and AWSTARTUP12 programs. Each of these will be considered in turn.

The RAMTEST Program

RAMTEST is a diagnostic program to test the RAM memory on the Extended Memory Card. The program automatically detects the amount and configuration of the memory on the card and tests all of it until stopped by your command. When you run RAMTEST the screen displays all the possible banks of RAM memory (these are hexadecimal numbers corresponding to 64 K banks of memory) with the tested status of each bank displayed below:

```
          Franklin Expansion RAM Card Test

Pass no.        =  0B    Current page      = 1F
Current bank    =  0     Error count       = 0000
No. of banks    =  5     Mode              = Read
                                             (Write)

------------------------------------------------------------

BANK 0          BANK 3          BANK 4          BANK 7

 OK              OK              OK              - - -

BANK 8          BANK B          BANK C          BANK F

 OK              - - -           OK              - - -

------------------------------------------------------------

Last error info:
        Bank          =
        Byte written  =
        Byte read     =
        Byte address  =

Hit space to stop/start,  ESC to quit.
```

The status indicators are OK, meaning there is no error;
BAD, meaning an error has been detected in that RAM
bank; or "---" which indicates that that bank is not
available on this card. The illustration above is for the
standard 320 K configuration of the card which has
eight 256 K chips and eight 64 K chips. Intermittent or
"Soft" errors are usually shown as BAD, while more
persistent or "Hard" errors will be shown as the
absence of that bank of memory even though the chips
are installed.

The screen display also shows the total number of
errors found in all the RAM banks. The test shows

specific information about the last memory error detected, but this information usually has to be deciphered by an engineer. You can make the test pause and hold the error display by pressing the space bar. The test resumes when you press the space bar again.

The test runs continuously until you press the (ESC) key to stop the RAMTEST program.

The FRAMDISK Program

FRAMDISK is a program to create a RAM disk (a high speed disk drive using the extra memory available on the Extended Memory Card) to use with the FDOS operating system.

With some important exceptions, the RAM disk you create with the FRAMDISK program behaves just like a regular disk drive which you access by using normal operating system commands like CATALOG, etc. with the designated slot number.

The most important difference between RAM disks and regular disk drives is that RAM disk storage is temporary. Data or programs stored on the RAM disk are lost whenever the power is turned off or when the operating system is changed. Information stored on the RAM disk must be saved to a permanent storage medium before it is lost by one of those events. Since many commercial application programs use their own operating systems, it is necessary to take care of the contents of the RAM disk before turning off the power or changing an operating system.

You can create a RAM disk simply by running the FRAMDISK program:

```
-FRAMDISK
```

The screen then displays:

```
     DOS 5.X RAM disk driver V1.0
  Installed successfully-now using
  RAM card for a RAM disk in slot 3.
```

When you run the FRAMDISK program you can
include some additional parameters on the FDOS
command line, such as:

```
-FRAMDISK {3{file1{file2}
```

This command line creates a RAM disk by running the
FRAMDISK program and installs it in slot 3. It also
interprets the parameters as commands to copy file1
and file2 onto the RAM disk from the diskette that
contained FRAMDISK.

The command line may be used with or without
parameters. If you don't specify a slot number, the
command uses slot 3 (called the default value).
Obviously, you can't use a slot number which already
has an assigned peripheral device, or a slot number
greater than 7. If you don't list file names on the
command line, none are loaded at that time. If you do
use parameters, you must use the curly brackets as
separators. No spaces are allowed in the parameter
string except where they occur in filenames. Here are
some other examples:

-FRAMDISK   installs the RAM disk in slot 3 and loads
    no files.

-FRAMDISK {ED}   installs the RAM disk in slot 3 and
    loads the ED file.

-FRAMDISK {4}   installs the RAM disk in slot 4 and
    loads no files.

-FRAMDISK {5{ED{BUG{ASM}   installs the RAM disk
    in slot 5 and loads the ED, BUG, and ASM files.

The FRAMDISK program automatically calculates the amount of memory available for the RAM disk (which is the amount of RAM installed on the card less 64 K, since bank 0 is not used for the RAM disk, up to a maximum of 384 K). A CATALOG of the RAM disk will show the number of free sectors which you can multiply by 256 to obtain the number of bytes of RAM available on the RAM disk. The RAM disk catalog allows only 56 filenames; any more filenames will produce a "disk full" error message even if there is memory space available for the files.

When you run the FRAMDISK program, the RAM disk is cleared (initialized). If the RAM disk is somehow disconnected but not initialized, for instance by loading an application program which destroyed FDOS, it is sometimes possible to call or logically select the RAM disk without initializing or losing the data stored on it. This is done by running the FRAMDISK program but specifying a slot number of zero. This will connect the RAM disk to the operating system but not initialize the memory banks in slot 3. Then try to access slot 3, for instance with the CATALOG command, to see if you can get access to the data. Obviously, the success of this operation depends on what kind of event broke the connection with the RAM disk.

It is a prudent practice to use the RAM disk for storing programs that you have stored elsewhere on diskettes rather than using it to store data. The advantage of the RAM disk is its speed of access and loading. Its disadvantage is the temporary nature of its storage. Both of these situations recommend the RAM disk for storage of frequently used programs rather than for storage of data.

The next three programs on the Extended Memory Card diskette work only under the Apple ProDOS operating system and cannot be used under FDOS. In

order to use these programs they must first be transferred to diskettes with the ProDOS format. The ProDOS program called CONVERT can do this.

The PRAMDISK Program

This program creates a RAM disk under the ProDOS operating system. PRAMDISK automatically installs the RAM disk as slot 1, drive 1, and gives it a volume designation of /ACERAM. It does not use parameters in its command line and won't accept other slot, drive, or volume designations. PRAMDISK must have at least 128 K of RAM on the Extended Memory Card to run. It uses the amount of RAM available on the card for the RAM disk less 64 K (bank 0 of the memory is used for other purposes).

The volume directory of the RAM disk created can contain a maximum of 51 files, any or all of which can be used as subdirectory files if desired. Files may be copied to or from the RAM disk by means of the ProDOS FILER program or some other copy program, or by a start up program like the AWSTARTUP program described in the following section.

The AWSTARTUP Programs

There are two versions of the AWSTARTUP program on the Extended Memory Card diskette, AWSTARTUP11 and AWSTARTUP12, which correspond to Versions 1.1 and Versions 1.2 of the Appleworks program. Use the program which corresponds to the version of Appleworks you have. The following procedure will treat them as the same program.

AWSTARTUP is a BASIC program which runs under ProDOS that automatically runs the PRAMDISK program to create a RAM disk, and then loads and runs all the Appleworks files from the RAM disk. This

technique allows you to run the Appleworks programs from the RAM disk and have a disk drive available for your data diskette. Using the RAM disk also significantly increases the execution speed of the programs.

In order to use the AWSTARTUP program, you must first transfer it to a ProDOS diskette. Then you must make a start up diskette. You can make a start up diskette by making a copy of the Appleworks start up diskette, then add the following files to the new diskette: BASIC.SYSTEM, PRAMDISK, and AWSTARTUP. Then rename the APPLE-WORKS.SYSTEM file on the diskette AW and rename the AWSTARTUP program STARTUP. This completes the process. You can use this diskette as a start up diskette. It will create a RAM disk automatically and load the Appleworks programs on it.

To run the Appleworks programs, insert this start up diskette in drive 1 and the Appleworks program diskette in drive two, and press (CTRL) (F) (RESET), or (IN#6), which will boot the system, and you'll see the Appleworks opening screen. You can then remove both diskettes, since the Appleworks files needed from them are stored on the RAM disk.

There is an important thing to notice about this technique. Any changes you make in the Appleworks configuration (for printer settings, for instance) are only made in the RAM disk version, and thus are only temporary. If you want to make these changes permanently, you must make the changes in the diskette version of the file, or copy the modified printer configuration file SEG.PR from the RAM disk to the Appleworks diskette.

Additional Technical Information

The following information is technical and intended for those users who are interested in particular operations of the Extended Memory Card.

The Franklin Extended Memory Card emulates several of the popular RAM cards available. The Franklin Card can be switched from one operating mode to another so it has the capability to function as more than one type of memory board.

The available RAM memory is divided into 64 K banks which can be addressed one at a time by writing the active bank number (refer to the RAMTEST table for the active banks available in your memory configuration) to any one of these hexadecimal addresses, $C071, $C073, $C075, or $C077, called the bank register. The bank register is initialized on power up but not on Reset.

There are three operating modes available:

1. CPU Banking Only. In this operating mode the ACE 2000 Series computer uses memory bank 0 for its video phase and the active memory bank specified in the bank register for Read/Write operations during its CPU phase. Since bank 0 is selected during the video phase, this means that 80 column and double Hi Res graphics use bank 0 of the auxiliary RAM memory. The lower four bits of the bank register select the active bank, the upper four bits of the register are unused.

2. CPU/Video Combined Banking. In this operating mode both the video and CPU phases of the ACE 2000 Series computer use the active bank of auxiliary memory selected in the bank register for Read/Write operations and video information. The four lower bits of the bank register select the active bank, the upper four bits are unused.

3. CPU/Video Separate Banking. In this operating mode the four lower bits of the bank register select the active memory bank for the CPU phase

of the ACE 2000 Series computer and the four upper bits select the active memory bank for the video phase of the computer.

These operating modes are selected by changing the configuration of a group of shorting pins located on the
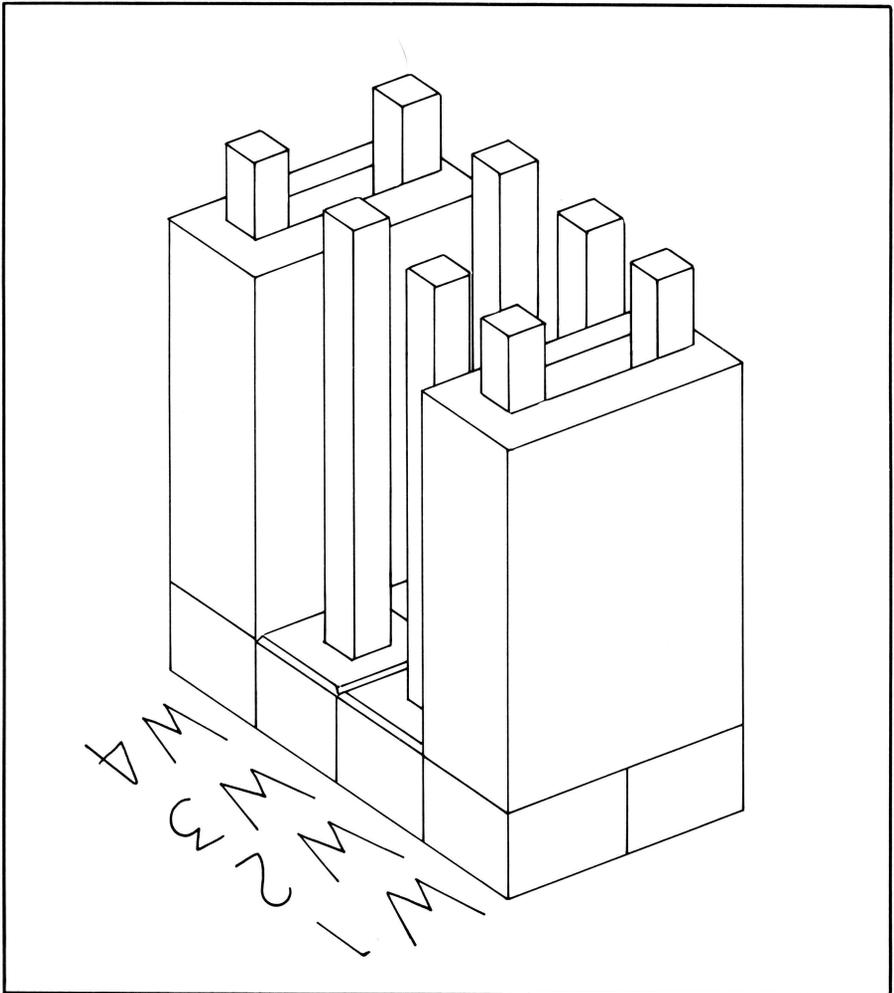
left side of the Extended Memory Card near the connecting pins. The Extended Memory Card is set at the factory in operating mode 1, CPU Banking Only.

The four sets of pins have two shorting sleeves. The operating modes are selected according to this arrangement of the shorting sleeves. Mode 1 has the sleeves on sets 1 and 4.

	W 1	W 2	W 3	W 4
Mode 1 CPU Only	XXX			XXX
Mode 2 CPU/Video Combined	XXX		XXX	
Mode 3 CPU/Video Separate		XXX	XXX	

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ACE 2000 Series Computer
RGB Interface Manual Supplement

RGB Interface Card

All Franklin ACE 2000 Series computers can use a composite color monitor. With installation of the RGB Interface card, either at the factory or by the user, the ACE 2000 Series computer can also use an RGB (Red-Green-Blue) monitor. Refer to Chapter 7, *The Display*, of the *ACE 2000 Series Computer User Reference Manual* for a more detailed discussion of these monitor types.

This manual supplement contains information on installing the RGB Interface card and instructions on setting its configuration to work with different kinds of RGB monitors. If your ACE 2000 Series computer already has the RGB Interface card installed, you can skip the installation instructions, but you must check the requirements of your RGB monitor and set the configuration of the card accordingly.

Installing The RGB Interface Card

The installation of the RGB Interface card is simple but involves several steps. First, open the computer case. Detailed instructions for doing this appear in the *User's*

Reference Manual, pages 1-19 through 1-20. When the computer is open, locate the RGB connector on the right side of the main board.

Before you insert the card's connectors into the RGB socket, connect the ribbon cable to the connector on the card. The 20-pin connector is keyed so the plug fits only one way.
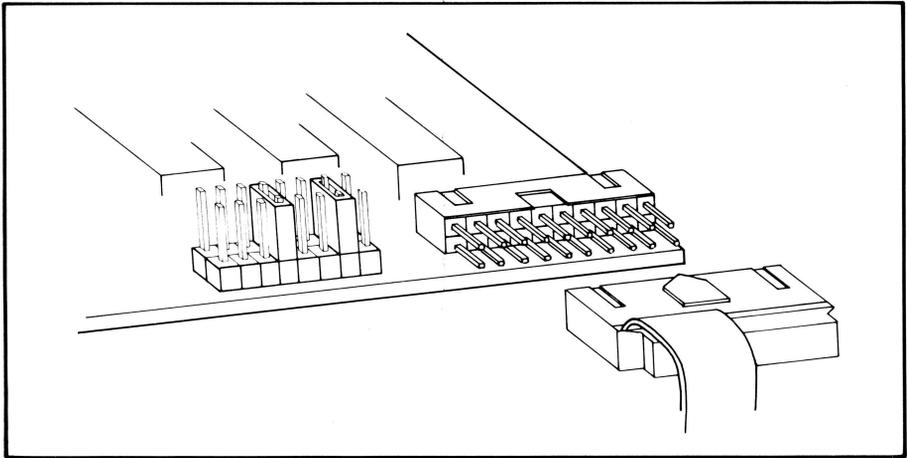
Now look at the supports for the card. The tab on the edge of the card opposite the cable is held on the main board by a plastic support, as shown. Insert the large end of the plastic support into its hole on the main board first.

Then remove the screw holding the edge of the main board to the computer case and replace it with the metal standoff piece provided that acts as an extension screw. Now insert the RGB Interface card connectors into the socket on the main board, making sure you don't shift the pins one row right or left. If the pins are not aligned, the holes for the supports won't line up. Then attach the RGB Interface board with the nut

provided to the top of the metal standoff and snap the
plastic support into the hole on the card's tab.
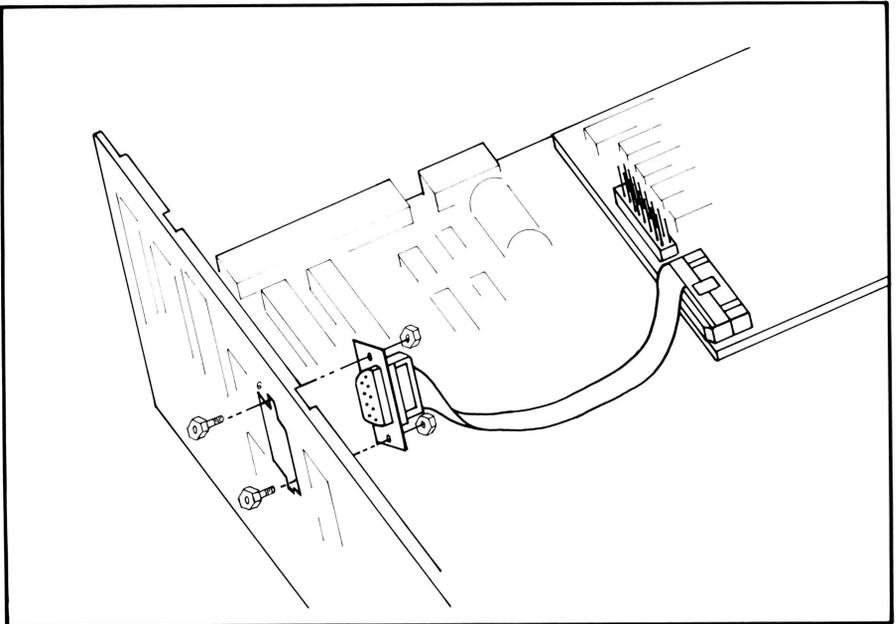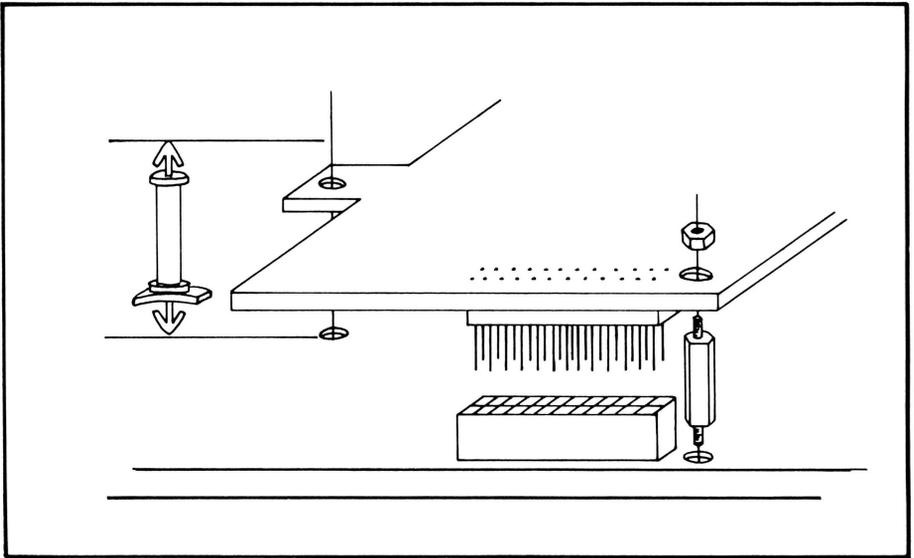
Lay the cable flat along the main board (it must lie flat to pass under any peripheral cards which may be resident in the expansion slots) and lead the cable connector, called a DB-9 connector, up to hole #6 in the back panel. The metal tabs covering the holes are easily removed from the inside. This hole is sized for the DB-9 connector and has slots for the attaching bolts.

Secure the DB-9 connector to the back panel and connect your RGB monitor to it.

Choosing The RGB Monitor Configuration

RGB monitor manufacturers often use different conventions for their signal requirements. In general, there are two configurations for monitors, the Apple and the
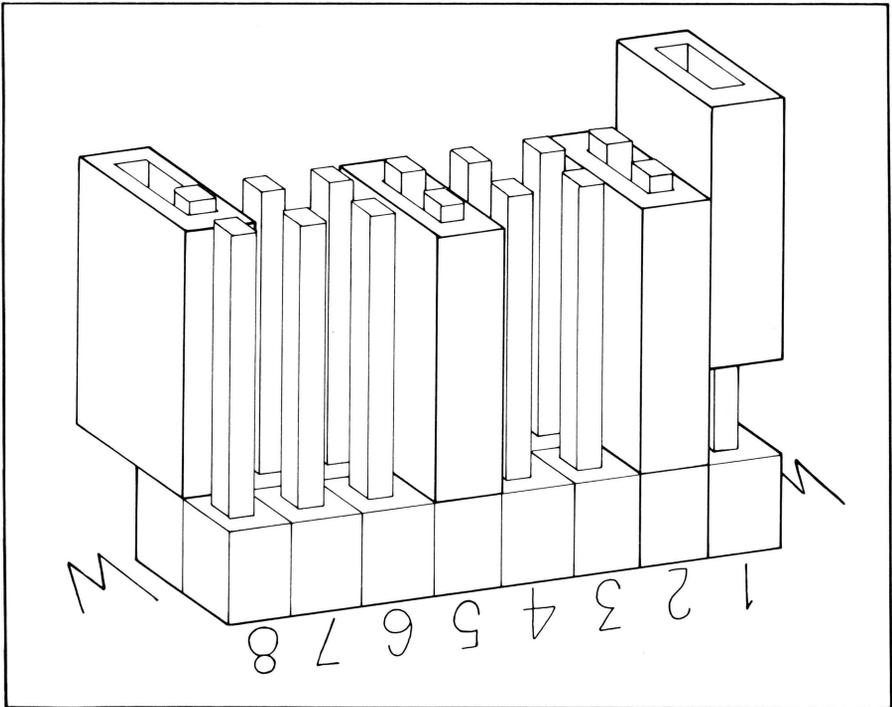
IBM, which will be discussed in more detail below. Consult the monitor's manual to see which settings on the RGB Interface card are required, and whether the Apple or the IBM configuration meets the needs of your RGB monitor.

The RGB Interface card has a set of 8 jumpers with shorting pins which select the configuration used by the computer. Six shorting pins are included for choosing different configurations. The shorting pins can be stored by slipping them over ONE of the posts. The pins have the following assignments:

Jumper	Jumper Clip On	Clip Off
W1	Negative Vert. Sync.	Off
W2	Positive Vert. Sync.	Off
W3	Monochrome Dbl. Hires	RGB
W4	Positive Horiz. Sync. (or Composite Sync.)	Off
W5	Negative Horiz. Sync. (or Composite Sync.)	Off
W6	Text Color Selection	
W7	Text Color Selection W6, W7 Off = White W6 On, W7 Off = Amber W7 Off, W7 On = Green W6, W7 On = Blue	
W8	IBM Mode	Apple Mode

Jumper W1—Negative Vertical Sync. should be set On for monitors that specify this requirement.

Jumper W2—Positive Vertical Sync. should be set On for monitors that specify this requirement. This is generally the more common setting.

Jumper W3—Monochrome Double High Resolution This jumper selects a single color (the text color selected with W6 and W7) on a black background with

double high resolution. This is generally only used with specific software applications, such as Computer Assisted Design, where the 4 color pixels normally used for RGB are traded for maximum screen resolution.

Jumper W4—Positive Horizontal Sync. should be selected On for monitors that specify this requirement. This is sometimes called Composite Sync, which means that the (positive) vertical and the horizontal sync signals are together.

Jumper W5—Negative Horizontal Sync. should be selected On for monitors that specify this requirement. This is sometimes called Composite Sync, which means that the (negative) vertical and the horizontal sync signals are together.

Jumpers W6 and W7—Text Color Selection These jumpers select the color of the text displayed on the black background according to the following arrangement:

> W6, W7 Off = White
> W6 On, W7 Off = Amber
> W6 Off, W7 On = Green
> W6, W7 On = Blue

The factory setting has white text selected.

Jumper W8—Apple/IBM Mode This jumper selects the configuration of the color matrix that the computer uses, either according to the Apple or the IBM formats.

If your RGB monitor says "Apple compatible" or "IBM compatible", or has some other indication that it is designed to work with one of those computers, try the configuration suggested for that computer.

Suggested Configuration:

Apple	IBM
W1 – Off	W1 – Off
W2 – On	W2 – On
W4 – Off	W4 – On
W5 – On	W5 – Off
W8 – Off	W8 – On

The other jumpers (W3, W6, and W7) are user preferences.

If these configurations don't work, consult the manual of the monitor to determine the settings needed. If you still have problems, consult your dealer or the monitor manufacturer.

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EXPANDED FRANKLIN RAM ADDENDUM REV 1.0

The orginal Extended Memory Card Manual was written based on a utility disk containing the following files:

> Hello
> Framdisk
> Pramdisk
> Ramtest
> Awstartup11
> Awstartup12

Current products will be shipped with the files "Framdisk and Ramtest" added to the Franklin DOS disk. These DOS disks can easily be indentified by an orange dot attached to the label or doing a disk catalog.

The utility disk supplied with the Extended Memory Card contains the following files:

> Hello
> Pramdisk
> Awstartup11
> Awstartup12

NOTE: This new utility has its files saved in "PRO-DOS" format. As a result, you can **NOT** catalog or access files on this disk with FDOS.

A PRO DOS utility disk is required to use the programs on this disk. The utility disk is in PRO DOS format to eliminate the need to convert these files from FDOS to PRO DOS.

Because of these changes it is no longer required for the user to convert these files as stated at the bottom of page 11-10 and continued to the top of page 11-11.

On page 11-12, 2nd paragraph, it specifies renaming "Appleworks. System" file to "AW". The actual name on the disk is "Aplworks.System".

Both "Awstartup11 and 12" files will work on single drive computers. These programs will **NOT** increase desktop space.

1/31/86