

FRANKLIN ACE DUAL INTERFACE™ User Reference Manual



Prepared by the Publications Department,
Franklin Computer Corporation

This Manual is Franklin Part Number 7007009 rev. B

FRANKLIN ACE DUAL INTERFACE™
Copyright © 1983 by Franklin Computer Corp.
2128 Route 38
Cherry Hill, NJ 08002
609/482-5900

This manual is copyrighted by Franklin Computer Corporation. All rights are reserved. This document may not, in whole or in part, be copied, photocopied, reproduced, translated or reduced to any electronic medium or machine-readable form without prior consent, in writing, from Franklin Computer Corporation.

This cartoon character of Ben Franklin appearing throughout this publication constitutes a trademark of Franklin Computer Corporation.

Franklin ACE and ACE Dual Interface™ are trademarks of Franklin Computer Corporation.

Centronics is a trademark of Data Computer Corporation.

CP/M is a trademark of Digital Research, Inc.

Qume is a trademark of the Qume Corporation, a subsidiary of ITT.

Let Your Interface Do The Talking

Whether you want your personal computer to help you trade soybean futures in New York from the comfort of your living room, send a novel across a continent in electronic form, or just print out a household budget, you need some means of sending and receiving data. In most cases, you'll use a printer or a modem.

Since these devices have different ways of handling data, they would be virtually useless as communication tools without some standard method of transferring intelligible data between them and your computer. Computer scientists have devised two such methods: parallel and serial interfaces. Some printers need a parallel interface to communicate with computers. Other printers, and most modems, need a serial interface. The Franklin ACE Dual Interface Card will let your computer communicate with almost all printers and modems.

Parallel and serial interfaces and, for that matter, computers operate on the principle that each keyboard character (letter, number, punctuation mark, or function key such as RETURN) can be broken down into eight very simple electronic signals and can then be reassembled back into characters when needed.

Because parallel interfaces send these eight signals out over eight different lines, all at once, they can transfer data very quickly. However, the printer also has to receive all eight signals at exactly the same time. If the printer is more than ten feet from the computer, the printer may receive the signals at slightly different times and may not be able to reconstruct the characters it's supposed to print.

Although serial interfaces aren't quite as fast, they can operate over longer distances. Instead of using parallel lines, serial interfaces send signals one at a time over a single wire. The ACE Dual Interface Card also sends the printer or modem special signals to indicate the start and end of each character and can send a signal which allows the printer or modem to determine whether the character has been accurately transmitted.

Since computers can send out signals much faster than printers can print, both parallel and serial interfaces need extra lines to carry messages such as, "The printer is ready to receive data," "The printer is busy," "The line's disconnected," or "What?" Generally, messages of this type are called "handshaking." There are all sorts of different specific signals which convey handshaking messages. You can set some of the miniature switches on the ACE Dual Interface Card to compensate for some of these differences, and your dealer can easily modify it to handle others.

Some printers also have switches which allow you to select one of several speeds for transferring data (generally, the faster the better) or to interpret certain data or handshaking signals. If you have a choice, make sure the speed and signals are set the same way on the interface and the printer.

What You've Got

Your ACE Dual Interface Card box should contain:

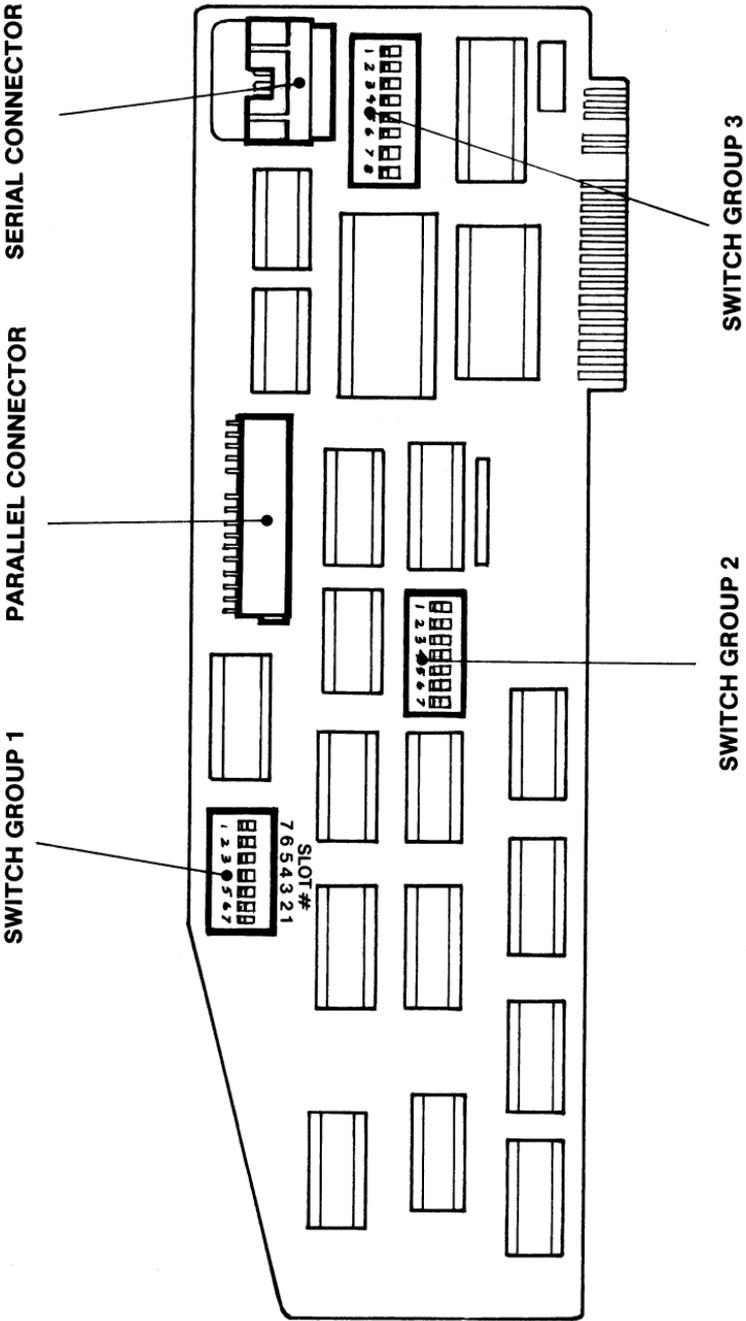
- The ACE Dual Interface Card
- A ten-inch-long rainbow-colored cable with a metal grounding receptacle on one end and a small plastic female plug on the other end (this is the parallel interface cable)
- A nine-inch-long gray ribbon cable with a metal grounding receptacle on one end and a small plastic female plug on the other end (this is the serial interface cable)
- This manual.

You'll probably need some extension cables to connect the back of your computer with your printer or modem. It is strongly recommended that you use shielded cables. Properly shielded cables (available from your Franklin dealer) are covered with thicker insulating material than the short cables you got with the ACE Dual Interface Card. If you don't use shielded cables, you may get interference on nearby radios and television sets when you use your computer.

Finding Your Way Around The Card

First, take a good look at the ACE Dual Interface Card. Turn it so that the diagonally trimmed corner is at the upper left and the components face up.

One of the first things you'll notice is that five of the components on the card don't look like most of the other electronic components on the main electronics board of your



ACE DUAL INTERFACE CARD

computer or, for that matter, on the other cards you probably have already installed in your machine.

Three of the components are groups of mini-switches that, when properly set, tell the ACE Dual Interface Card how to interpret the multitude of signals that your computer and your communications devices send through it.

The other two components are connectors for the two cables that you'll hook up later. The rainbow-colored cable, which connects your ACE Dual Interface Card to parallel printers, will attach to the single row of pins in the center of the upper edge. The gray cable, which connects the card to serial printers and modems, will attach to the double row of pins in the upper right corner of the Card.

The small plugs on each of these cables will attach to the ACE Dual Interface Card. The large plugs will connect to the extension cables. The metal brackets around the large plugs on the ends of each of these cables are grounding boxes. You'll insert them into the vertical slots in the back wall of the computer case.

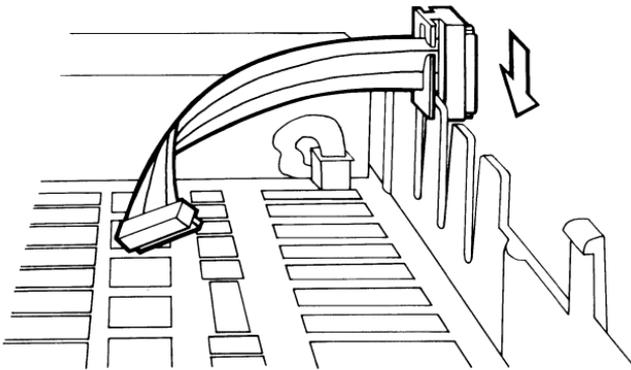
Installing The Grounding Boxes

It's important that you properly install the metal grounding boxes that come on the ends of the two ribbon cables because they eliminate radio frequency interference that might disturb signal reception on nearby radios or televisions.

Take a look at the grounding box. The front side has an open connector for the extension cable and a ribbon cable extends out

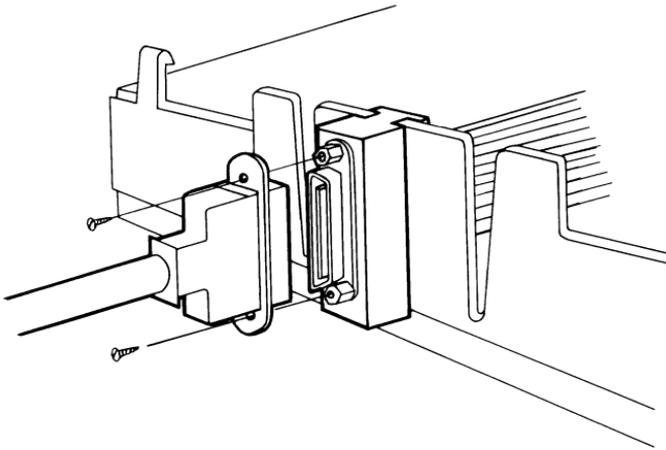
the rear side of the box. The narrower base at the bottom of the box slips most of the way down into the V-shaped slot. The top of the box is wider to fit the wider opening at the top of the V. The top of the box should be flush with the top of the back wall of the computer case.

The computer case has three V-shaped vertical slots in the back wall. This is where you'll locate the grounding boxes. Choose the cable (either the parallel or the serial or both) you'll use with your printer or modem. If you use both cables, you'll want the parallel cable in the V-shaped slot closest to the power cord of the computer so the parallel cable doesn't have to cross over the serial cable when you install the card. If you're only using one cable, you can leave the other in the box or you can slip it onto the computer case, but don't connect the unused cable to the card.



When you slide the grounding boxes into the V-shaped slots, you may need to loosen the two nuts on the front side of the box a little so the box can slide all the way down. The ribbon cable should be inside the computer case to connect to the card. When you're sure the grounding box is all the way down and the lid will close, tighten the two nuts on the front of the grounding box so it's securely fastened to the computer case.

The grounding boxes have the necessary fittings for the extension cables you'll use. The parallel cable may have spring clips that you'll have to remove before you can connect the cable to the grounding box. If that's the case, use the two screws provided with the parallel cable grounding box to attach the extension cable. The serial cable usually has a pair of screws with it. Don't put the extension cables on until you've installed the card.



Before you connect any of the cables to the card or set any of the switches, put the card and the cables down and pick up the manual that came with your printer or modem. For the next few minutes, your most important tools will be that manual, a piece of paper, and a pencil.

The manual for your communications device is the only place to find out how to set the mini-switches on the ACE Dual Interface Card. Since the questions you need to ask in order to set switches and connect the device properly depend somewhat on the type of equipment you're hooking up to your ACE, they'll be addressed in separate sections of this manual.

Connecting The Serial Printer

Setting the mini-switches properly for serial printer operation requires some investigating. The questions you have to answer before you hook up the serial cable are:

- How fast can the printer receive data from a computer?
- How many signals does the printer need to define a particular character?
- Does the printer need an additional signal to determine whether a character has been sent accurately?
- Which communications lines does the printer use for handshaking?
- Which slot on the motherboard will be left vacant?

Fortunately, most of the answers to these questions are easy to find in printer manuals, once you know what to look for.

How Quickly Can The Printer Receive Data?

Most serial printer manuals won't phrase this question in such a simple way. Instead, they'll talk about something called a "baud rate." All you really need to know about the baud rate is that it's a number which reflects the speed at which machines can send data over a line. The higher the baud rate, the faster the transmission.

The ACE Dual Interface Card lets you send data at any of 16 different speeds. You can adjust the speed by setting switches on

the Dual Interface Card itself or by running a program (more about this later).

First, find out how quickly your printer can receive data. If it can receive data at only one speed, write that speed down. Check the table in the back of this manual to make sure the Dual Interface Card can also operate at that speed. If so, you're in business. If not, go back to your dealer for help with the problem.

Most serial printers, however, will accept data at any of several speeds. Some of them even have little switches of their own, just like the ones on the interface card, to adjust the speed. Compare the speeds at which the serial printer and the Dual Interface Card operate and write down the ones that are the same.

With luck, the Dual Interface Card and the serial printer will work flawlessly at the highest speed at which they both operate. You're writing down those slower speeds too because you may need them later if problems arise using the faster speed.

What Else Does The Printer Need To Know?

You'll need to know two other things about the way your printer interprets incoming data:

- Does the printer require a signal (a "parity bit" in computerese) which lets it determine whether or not a character has been sent accurately? If so, does it require even parity or odd parity?

Your printer may allow you to select either even or odd parity or none at all. If so, it really doesn't matter which one you select, because your ACE Dual Interface Card also lets you select even, odd, or no parity. It also doesn't matter whether you understand what even and odd parity are. Just make sure you've specified the same sort of parity on both the printer and the card.

- Does the printer require seven or eight signals to assemble a character? (Computer people ask, "How many bits are there per character?")

It's essential that you find the right answer to this question. Otherwise, your printer will never produce anything but error signals and gibberish. Unfortunately, many printer manuals don't contain this information. If yours doesn't say how many signals are required, you'll have to resort to trial and error to find the answer. It will probably turn out to be one of these three:

- Eight bits and no parity
- Seven bits and odd parity
- Seven bits and even parity.

If you're in doubt, write down all three of these choices. Select eight bits, no parity first when setting the switches in the middle of the card.

What About Handshaking? (A Standard That Isn't, Really)

Imagine, if you will, that there exists a nationwide, semi-secret organization called, for argument's sake, the Honorable Order of Wombats.



Further imagine that the Wombats once had a foolproof method of identifying members of the order: a secret and extremely complicated handshake which let every Wombat in the country know who was a Wombat and who wasn't.

And, as long as your imagination is turned on, try this: the national Wombat organization, having fallen on hard times, hasn't held a national meeting for years. Gradually, the local Wombat chapters took it upon themselves to simplify the handshake, but each chapter did it differently. Now a Wombat from Massachusetts can't recognize a Wombat from California because they don't recognize each other's new, simplified handshakes.

Something like that hypothetical Wombat handshake exists in the world of serial communications: it's called the RS-232 interface, and it's a serial printer's way of exchanging data with the outside world.

A serial printer really only needs two communications lines: a line to receive data and a "Printer Ready" line, which sends the computer one of these two messages: "I can receive data now" or "I'm receiving data faster than I can print it. Don't send any more data until I tell you I'm ready."

However, because devices other than serial printers also use the RS-232 interface, the official design for the interface includes many additional lines and messages required by modems and other communications devices.

The manufacturers of serial printers all realized this and devised different shortcuts to take in setting up their communications lines so that their equipment would appear to be compatible with the RS-232 interface.

Did the shortcuts work? More or less. Serial printers all use the same type of connector and they all receive data on the same line. However, they all seem to have chosen different lines on which to send "Printer Ready" messages.

What does all this mean to you, the impatient reader? It means you'll have to search through your printer manual for an illustration that looks somewhat like the one on the facing page.

Look for the line that says "Printer Ready." If you don't see one, look for the line that says "Data Terminal Ready" and read the explanation.

The ACE Dual Interface Card will accept "Printer Ready" messages on either line 5 or line 20 of the RS-232 interface.

If the printer puts out a "Printer Ready" signal on some other line or doesn't provide one at all, the Dual Interface Card can

still send it data, but it won't know when to stop and wait so that the printer can catch up. You'll have to set both a slower baud rate on both the Dual Interface Card and the printer.

Write down the number of the "Printer Ready" line, if your printer provides one.

Setting The Switches

The switch groups on the card now need to be set to give the computer the handshaking information about your serial interface printer or modem that you learned from your other manual. If you aren't using the serial interface, you can ignore this section, although you might find it useful to glance through it.

First, turn the card around so the gold-plated tab is at the upper left, and the diagonally cut corner is at the lower right. If you imagine the card the way it will be in the computer, you're currently holding the ACE Dual Interface Card upside down.

The group of switches at the left select the communications lines the Dual Interface Card will use. This is switch group 3.

If the ACE Dual Interface Card will be connected to a modem, set this group of switches as follows:

1	2	3	4	5	6	7	8
ON	OFF	ON	OFF	ON	OFF	OFF	ON

If you're going to connect the Dual Interface Card to a serial printer, set this group of switches as follows:

If your printer puts out a "Printer Ready" signal on line 5:

1	2	3	4	5	6	7	8
OFF	OFF	ON	OFF	OFF	ON	ON	OFF

If your printer puts out a "Printer Ready" signal on line 20:

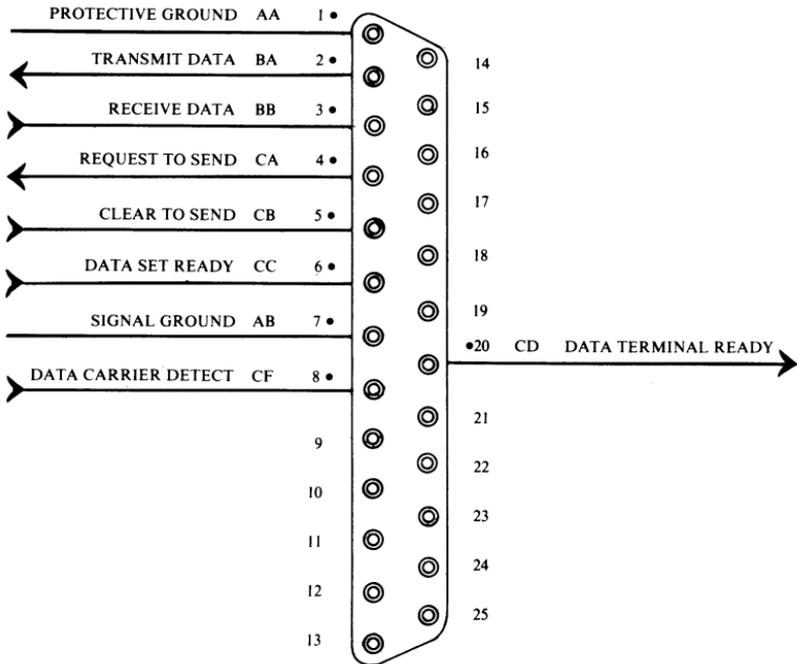
1	2	3	4	5	6	7	8
OFF	ON	OFF	OFF	OFF	ON	ON	OFF

If your printer uses another line for the "Printer Signal" or if it doesn't provide one:

1	2	3	4	5	6	7	8
OFF	OFF	OFF	ON	OFF	ON	ON	OFF

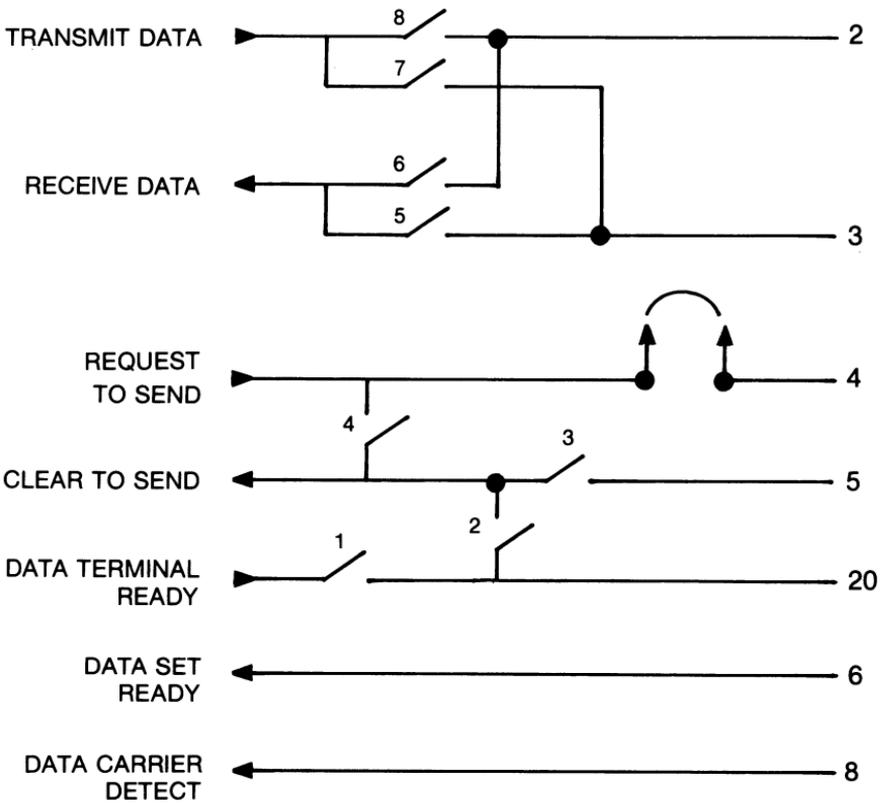
If these handshaking settings don't fit the requirements of your peripheral device, you'll have to devise some settings of your own. The diagrams that follow will help.

The first diagram shows how the ACE Dual Interface Card uses the RS-232 interface. The arrows indicate the data flow from the computer to the interface. The second group of wiring diagrams indicate the relationships between the switches of switch group 3 and the RS-232 interface lines. The numbers at the far right are the RS-232 pin numbers, and the numbers beside the switches in the diagrams are the numbers on switch group 3, below the serial connector on the ACE Dual Interface Card.



Look at the first two lines of the wiring diagrams and follow this example. The ACE Dual Interface Card uses line 2 of the RS-232 to transmit data and line 3 to receive data. The normal switch settings for this arrangement are switches 5 and 8 closed and switches 6 and 7 open. If, on the other hand, your RS-232 uses the opposite arrangement (receives data on line 2 and transmits it on line 3), you'll have to close switches 6 and 7 and open switches 5 and 8. The ON position is switch closed.

You may encounter another problem. Sometimes both your computer and your printer produce similar or simultaneous signals. For instance, the ACE Dual Interface Card sends out a

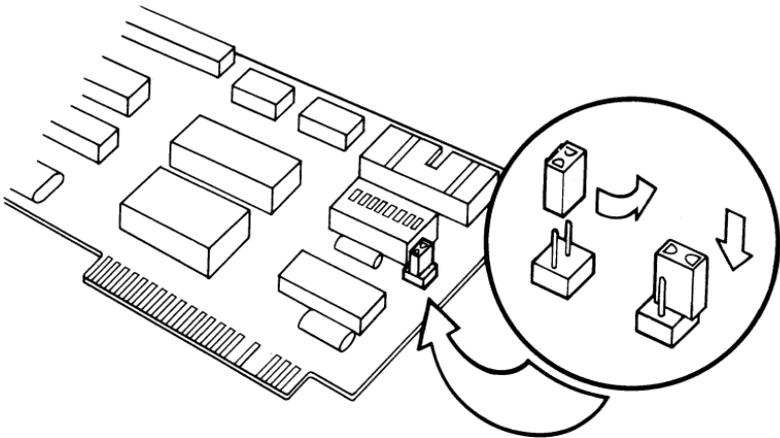


signal “Request to send”, usually just RTS, on line 4 of the RS-232 interface. This is where most printers expect to see it. However, some printers (some models of the Qume™ printers) send out their own RTS signals.

The manual of the Qume printer should mention whether or not the printer generates its own RTS signal. One way to determine if this is a problem is to turn the printer on before the computer is on. If the ACE computer is receiving the RTS signal when it tries to turn on, it won't go on. If you turn the computer on first, the printer will go on, but both machines will

be generating the RTS signals and data won't be transferred reliably from one to the other.

To eliminate the duplicate signals, consult your printer's manual to see if you can suppress the RTS signal or make this simple adjustment on your ACE dual Interface Card.



At the upper right corner of the card, below the serial connector and just to the right of switch group 3 there is a pair of prongs perpendicular to the board. They have a black plastic sleeve or plug on them. Slide it off carefully, turn it to the side, and slip it back down on one of the posts. This way one post is bare and there is no longer any electrical connection between the two posts. You'll also have the plug in a convenient place if you want to close the connection later. Breaking this electrical contact will eliminate the RTS signal from the ACE Dual Interface Card.

Switch group 2, in the middle of the card, sets parity, character length, and transmission speed. Switches 1, 2, and 3 control parity and character length. Set them according to the following chart.

No parity,
seven bits

1	2	3
ON	ON	ON

OR

1	2	3
ON	OFF	ON

No parity,
eight bits

ON	ON	OFF
----	----	-----

OR

ON	OFF	OFF
----	-----	-----

Odd parity,
seven bits

OFF	ON	ON
-----	----	----

Odd parity,
eight bits

OFF	ON	OFF
-----	----	-----

Even parity,
seven bits

OFF	OFF	ON
-----	-----	----

Even parity,
eight bits

OFF	OFF	OFF
-----	-----	-----

Switches 4, 5, 6, and 7 control the data transmission speed (baud rate). Set them as follows, specifying the highest rate common to both card and printer or modem.

Baud

4	5	6	7
ON	ON	ON	ON

45.5

Baud

4	5	6	7
OFF	ON	ON	ON

1200

50

ON	ON	ON	OFF
----	----	----	-----

1800

OFF	ON	ON	OFF
-----	----	----	-----

75

ON	ON	OFF	ON
----	----	-----	----

2000

OFF	ON	OFF	ON
-----	----	-----	----

110

ON	ON	OFF	OFF
----	----	-----	-----

2400

OFF	ON	OFF	OFF
-----	----	-----	-----

134.5

ON	OFF	ON	ON
----	-----	----	----

4800

OFF	OFF	ON	ON
-----	-----	----	----

150

ON	OFF	ON	OFF
----	-----	----	-----

9600

OFF	OFF	ON	OFF
-----	-----	----	-----

300

ON	OFF	OFF	ON
----	-----	-----	----

19200

OFF	OFF	OFF	ON
-----	-----	-----	----

600

ON	OFF	OFF	OFF
----	-----	-----	-----

38400

OFF	OFF	OFF	OFF
-----	-----	-----	-----

Don't throw away your list of other shared baud rates just yet. Keep it with your manuals. It may come in handy latter.

A Final Question

The final question is "Where does the ACE Dual Interface Card go in my computer?" It's a very important question, and one that you'll need to consider carefully. It comes down to balancing the needs of the computer and the particular requirements of the peripheral equipment you have.

It will help if you think of the ACE Dual Interface Card as two cards in one, that is, a parallel card and a serial card. Because of the way ACE and ACE-compatible computers are designed, the computer has to be told that they are separate cards. Each card has its own requirements and slot assignments. What it means in practical terms is that one of the cards (the serial interface) is given a phantom slot assignment: the computer is told that the serial interface is located in an empty slot. This may sound tricky, but the circuits and built-in programs handle all that. It sounds confusing, but there's a good reason.

In actual practice, this really is a lot handier than it seems right now. Suppose you have both a parallel printer and a serial modem connected to your ACE Dual Interface Card. Let's say your ACE is communicating with someone's computer in another state and you want a paper copy of this conversation.

If your parallel printer and modem both acted as if they were in slot 1, you couldn't use them at the same time. However, most modem control programs will let you telecommunicate and print at the same time, as long as the program thinks the printer

and modem are in different slots.

There are two rules that should be observed when you are planning your slot assignments:

1. Almost all programs expect to find the printer in slot 1, whether it's a parallel or a serial interface printer. This can't be changed.

2. The ACE Dual Interface Card is designed so that the computer is notified of the parallel interface location by the position of the card itself. The computer is told the location of the serial interface by the settings of some switches on switch group 1 (you'll learn how to do that a little later.) This can't be changed either.

If your printer has a parallel interface, the installation is easy. Simply put the ACE Dual Interface Card in slot 1 (this will meet the requirements of Rule 1 and Rule 2) and adjust the switches on switch group 1 to designate the open slot for the phantom serial interface card. You'll see a chart for the switch settings shortly. If you're not using the serial interface, you'll turn them all off.

If your printer has a serial interface, you'll have to put the ACE Dual Interface Card in slot 2 or some other open slot so the parallel interface is designated according to Rule 2. Then you're free to set switch group 1 to tell the computer that the phantom serial interface card is in the open slot 1 to conform to Rule 1.

If you're still not sure where you want to put the ACE Dual Interface Card, and your other peripheral cards, consult the following chart. If you install the cards in the locations suggested below, you won't run into any problems with **DOS**, **CP/M™**, or the **Pascal** computer language.

SLOT	TYPE OF PERIPHERAL CARD
0	Memory Expansion. If the ACE Dual Interface Card is used here it will temporarily disable the parallel interface.
1	Printer Access. Use the ACE Dual Interface Card here for parallel interface printers OR designate it as the phantom slot for serial interface printers with the card in some other slot.
2	Open. This may be the phantom slot for a ACE Dual Interface Card serial interface modem OR the actual location of the Dual Interface Card when used with a serial interface printer, with slot 1 designated for the serial interface by the switch setting on switch group 1.
3	ACE Display Card.
4	ACE 80 CPU Card. Or disk controller card for drives 5 and 6, if you have them.
5	Open. Or disk controller card for drives 3 and 4, if you have them.
6	Disk controller card for drives 1 and 2.
7	Open. This may be the location of the ACE Dual Interface Card if you want the parallel interface here, OR this could be the assigned location of the phantom serial interface card if the card is located elsewhere.

The last group of switches, switch group 1, which is next to the diagonally cut corner of the card, determines the location of your imaginary serial card. This must be an unoccupied slot from 1 to 7 as you learned in the previous discussion "A Final

Question.” You might want to refer back to it if you aren’t certain which slot should be your phantom serial interface slot.

If you turn more than one of these switches on or turn on a switch with the number of an occupied slot, unimaginable chaos will be the result. Don’t do it. If you turn all these switches off you’ll temporarily disable your serial interface because you’ve told the computer that none of its slots has a serial interface.

These switches actually work in the order shown on the following chart:

Switch number		ACE slot number
1	corresponds to	7
2	corresponds to	6
3	corresponds to	5
4	corresponds to	4
5	corresponds to	3
6	corresponds to	2
7	corresponds to	1

The space just below the switch box on the card should have a label giving these correct slot number assignments. Be sure that you’ve chosen the switch correctly. This is very important.

You could damage the ACE Dual Interface Card, one of your other cards, or the computer itself if this switch is set incorrectly.

The on and off positions are marked correctly on the switch group box.

Although the phantom serial interface slot may be any unoccupied slot on your computer, the ACE Dual Interface

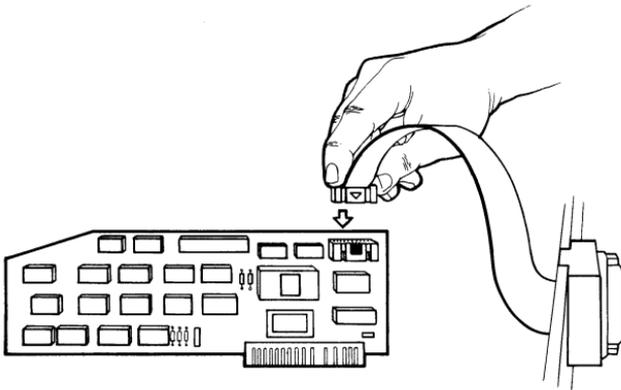
Card is usually placed in slot 1 and the unoccupied slot usually designated as slot 2. If that is the case, you would turn on switch 6. Turn off all other switches. If your unoccupied slot is a different one, turn on only that switch whose number corresponds on the chart above to the empty slot on your ACE. Turn off all other switches.

Connecting The Serial Cable

Now that you've set all the switches, you're now ready to plug the gray serial cable into the card. Its grounding receptacle has already been attached to the back wall of the computer case.

Take a look at the smaller plug on the serial cable. You'll see a little projection in the center of one side of the plug. (For you baseball fans, it's the one shaped like a home plate.)

Now, find the serial connector in the upper right corner of the ACE Dual Interface Card. It's a plastic box with a double row of pins inside it. You'll see a gap in the center of one side of the box. Insert the plug so that the cable hangs over the component side



of the card, the plug goes into the plastic box, and home plate shows through the gap on one side of the box. (The plug really won't fit any other way.)

Make sure you haven't accidentally disturbed the switch settings.

Connecting The Parallel Printer

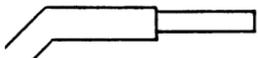
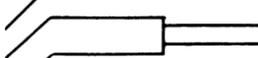
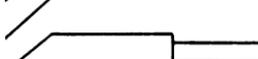
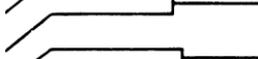
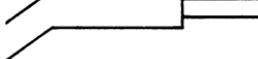
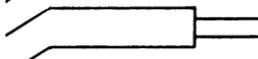
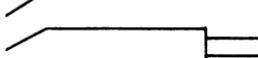
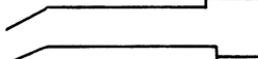
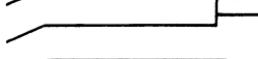
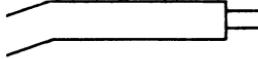
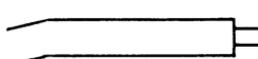
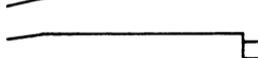
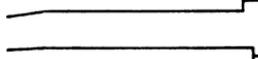
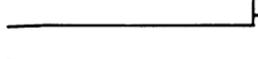
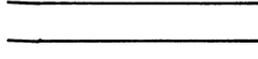
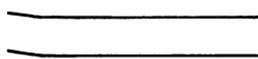
This is an easy one.

Read the installation section of your parallel printer manual and look for the word Centronics™. If your printer, like most, uses the standard Centronics interface, all you have to do is connect the ten-inch rainbow cable to the plug in the top center edge of the card and install the card itself, a process which will be explained later on.

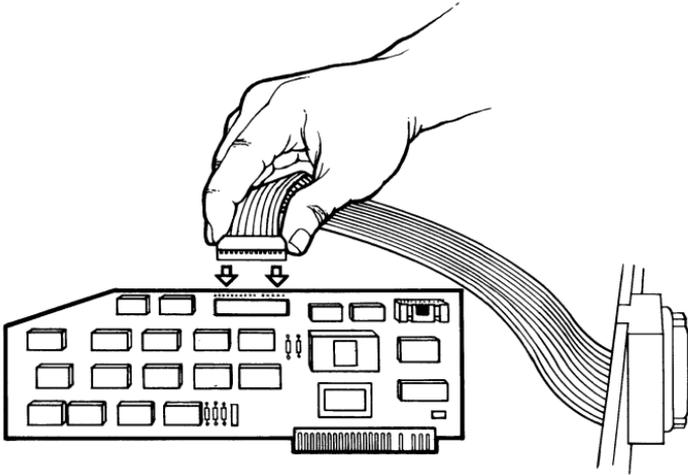
If your parallel printer doesn't use the Centronics interface, you'll have to modify either the card or the cable to use the interface. You'll find information in the back of this manual about connecting the card to non-Centronics interfaces. Since it's hard to disconnect the cable from the card once it's attached, make the modifications before you plug in the cable.

The plugs at each end of the rainbow cable are of different sizes and the larger one is already installed in the grounding box you've attached to the back of the computer case. The smaller plug hooks up to the interface card. Look at the illustration and you'll see that the cable comes up over the top of the card from behind. This is the easiest way to keep the two cables from getting tangled. When you align the plug over the receptacle,

LINE ASSIGNMENTS PARALLEL CABLE

	1 BROWN	STROBE
	2 RED	PD 0 (LOW BIT)
	3 ORANGE	PD 1
	4 YELLOW	PD 2
	5 GREEN	PD 3
	6 BLUE	PD 4
	7 PURPLE	PD 5
	8 GREY	PD 6
	9 WHITE	PD 7 (HIGH BIT)
	10 BLACK	ACK
	11 BROWN	NO PIN
	12 RED	NOT USED
	13 ORANGE	NOT USED
	14 YELLOW	NOT USED
	15 GREEN	NOT USED
	16 BLUE	GROUND

make sure each of the pins of the connector fits into one of the holes in the plug. (There's really only one way that the plug will fit without forcing it.) Gently push the plug onto the pins until you hear a click.



If you ever have to disconnect the parallel printer cable from the card, remove the card from the computer and then use a credit card or some other equally thin plastic object to pry back the locking tab of the card for a moment as you loosen the plug. It's a tight fit. **NEVER** try to remove the parallel printer cable by pulling on the ribbon cables. You'll wind up with half a cable in one hand and a plug, still snugly attached to a card, in the other.

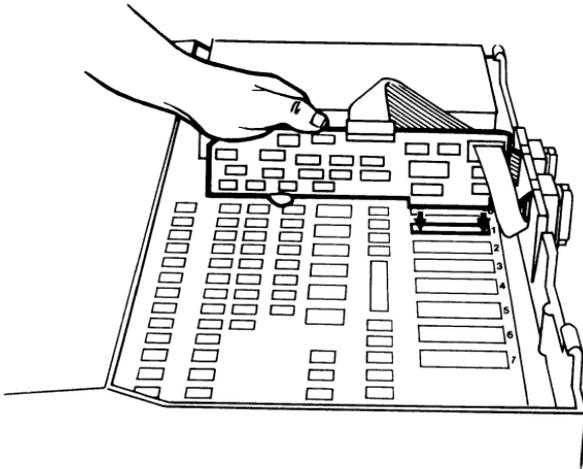
If you don't intend to hook your serial connector up to a printer, a modem, or some other device, make sure all seven switches in switch group 1, the group next to the diagonally cut corner of the card, are turned off. It doesn't matter how you set the other two groups of switches. Put the serial cable and its grounding box away someplace where you can locate it later if you need it. To minimize any radio or television interference problems, you shouldn't hook up the cable if you're not going to use it.

Installing The Card (At Last!)

You're finally ready to install the ACE Dual Interface Card in your computer. It's an easy procedure, but do it carefully. A mistake in installation could damage the ACE Dual Interface Card, your computer, or both.

First, double-check to make sure the power to your computer is off.

Hold the card so that the cable connections are at the top. Slowly insert the tab with the gold-plated electrical contacts into the slot you've chosen for your parallel interface. Rock the card back and forth a little to ensure that it seats properly.



Connect the parallel cable, serial cable, or both to your printer, modem, or other communications device, following the directions that came with the device. Use extension cables if you have to. Again, you're strongly advised to use shielded cables such as those available from your Franklin dealer.

A Quick Test

Before you do this test, make sure you've installed the ACE Dual Interface Card, connected it to your communications devices, and hooked up the power connections to all of them.

When you flip the power switch of the ACE computer, the following things should happen:

1. The red light at the top right corner of the keyboard comes on.
2. The display screen clears.
3. On the screen you see something like:
ACE XXXX vx.X
4. You hear a beep.
5. The red light on the front of disk drive 1 lights up and the disk drive makes a noise.

Hit the **RESET** switch to silence the disk drive. In the bottom left corner of the screen, you'll see the prompt character `]` followed by the blinking cursor.

If something different happens and you hear funny noises, turn the power off. Check the connections to all the cards and cables, and try turning on the power again. If you hear the noise again, shut off the power and take the card, the computer, and the printer or other communications device back to the dealer who sold them to you.

If everything is all right, you can proceed.

To test a device attached to your parallel interface, turn on the

power to that device. Now use the number of the slot where your parallel interface is located and type:

pr#n (where n is your slot number)

and hit **RETURN**. Usually that would be slot 1, so type pr#1.

If everything is working properly, you've just activated the other device. Now, type about 20 to 30 characters and hit **RETURN**. You'll see the characters appear on the other device. You'll probably also get an error message from the computer. If you don't see anything, make sure you've connected everything properly and installed the card in the correct slot.

To test a device attached to your serial interface, turn on the power to that device. Now use the number of the phantom slot you designated as the location of your serial interface and type:

pr#n (where n is your phantom slot number)

and hit **RETURN**. If, as previously described in the examples, this is slot 2, you would type pr#2.

Now type a few letters and hit **RETURN**. You should see the characters appear on the other device. If you don't, check the connections and the power. If you're communicating with a printer, make sure there is paper in it. If all those things are OK and your printer isn't printing, you may need to change the switch settings.

First, make sure only one switch in the group near the diagonally cut corner of the card, switch group 1, is turned on. The number of that switch should correspond to the slot number of your phantom slot according to the chart on page 5-22. Also

be sure the number you typed after *pr#* to activate the serial device is the number of your phantom slot.

Next, make sure the baud rates on the printer and the ACE Dual Interface Card match. If not, change the switch settings and try the test again. If the device still doesn't work, you may have made a wrong guess when you set the character length and parity switches. Try the two other possible settings and see what happens.

If this doesn't solve the problem, get some help from your dealer.

One other point — if you have an ACE Display Card or other 80 column card in your computer, you can't use it at the same time you use the parallel or the serial interface. The **BASIC** computer language and **DOS** operating system that are built into your computer allow you to use only one of those devices at one time.

However, the **CP/M** operating system and the **Pascal** language do let you use these capabilities simultaneously. In fact, both **CP/M** and **Pascal** will automatically activate the 80 column card if you've installed it in your computer.

Parallel Operations

Once your parallel interface is working, you may want or need to take advantage of some of its features.

Ordinarily, when you're looking at a 40 column screen display and you turn on your printer with a *pr#n* command, your

computer transmits information simultaneously to the screen and to the printer. If you don't want the information to appear on the screen, just type **CTRL** **I** **N** or **TAB** **N**. The ACE sees no difference between these two messages; either command tells the ACE Dual Interface Card to turn off the screen display.

When the ACE Dual Interface Card is activated, it interprets **TAB** or **CTRL** **I** as a signal that the next character may be a command. However, some programs use the **TAB** key to jump forward to a pre-selected column, just as would happen on most typewriters.

However, if such a program sends the printer this paragraph, for example, the Dual Interface Card will interpret the initial **TAB** **H** as a command, even though you really want it to be a **TAB** **H**. Therein lies chaos and confusion. To avoid this, you can tell the computer to start parallel interface commands with another character. You'll be creating a command signal of your own. For instance, let's say you want to start printer commands with **CTRL** **Q** instead of **CTRL** **I**. Simply type:

TAB **CTRL** **Q** **RETURN**

Now the printer will interpret **CTRL** **Q** as the first part of a command. You can change it again, to **CTRL** **D** for example, by typing:

CTRL **Q** **CTRL** **D** **RETURN**

The following list contains all the parallel printer commands for the Dual Interface Card. The "+" indicates whatever control character you've created. Use it first and then the letter command you want (upper or lower case.)

COMMAND	WHAT THE COMPUTER DOES
+N	Turns off the monitor display and sends data to the printer only.
+(number) N	Same command as +N (Don't type the parentheses.)
+I	Sends data to the 40 column screen and the printer.
+K	Eliminates the line feed code, a signal which tells the cursor or printer head to move to the next line. The ACE automatically sends this after each carriage return code it sends. However, some printers also automatically generate a line feed character when they receive a carriage return code, and thus all copy is double-spaced. If the ACE's line feed code has already been eliminated, +K restores it.
+H	Extends the range of character codes transmitted by the Dual Interface Card. Entering +H allows the parallel interface to send character codes between 0 and 255. Normally, the ACE keyboard produces character codes between 128 and 255, but some printers use those codes to produce graphics, italics, or other special effects. If +H is not pressed (or pressed twice), the interface subtracts 128 from codes between 128 and 255, yielding standard ASCII character codes. Codes from 0 to 127 are passed to the printer without change.

Serial Operations

Suppose you've found a new use for your serial interface — a new modem, a new terminal, or even a program that produces data faster than anything you're used to. The data speed, parity, or other factors you considered when you set up the ACE Dual Interface Card suddenly don't apply anymore. You'd like to find the optimum new settings without going through the hassle of turning the power off and taking the card out of the machine.

A feature called the "serial port setup menu" allows you to change those variables, normally controlled by the middle group of switches on the ACE Dual Interface Card, from your keyboard. The changes will stay in effect until you turn the computer's power off or press the **RESET** switch, so they're not permanent changes. You can even use the menu to select features you can't get by setting the switches.

Let's assume you've assigned the phantom serial interface to slot 2. If you're using another slot, multiply the number of the phantom serial slot by 256 and then add 49202. Type that number instead of 49714 in the following example. What you've done is to find the decimal equivalent of the HEX address $\$Cn32$, where n is the serial interface slot number. For $n = 2$, $\$Cn32$ is 49714.

You can use the serial port setup menu anytime you see the prompt. Just type **CALL 49714** and hit **RETURN**. (If you're in Integer **BASIC**, you may have to type **CALL -15822**.) After the screen clears, you'll see:

If you don't want to change the baud rate, hit **RETURN** and the computer will move the cursor to the next line. If you want a new baud rate, just type in the first two digits of the rate you've selected. The computer will automatically fill in the rest of the number and move the cursor to the next line.

To change the number of bits per character, type the number between 5 and 8 which is correct for your serial device, or **RETURN** if you don't want to change the existing number. The computer will move the cursor to the next line.

To set the parity, type **O** for odd parity, **E** for even parity, **N** for no parity, or **RETURN** for no change.

The cursor then goes to the last line, which registers the setting of stop bits. The computer automatically ends each character with one stop bit if it is transmitting data at 300 baud or any slower rate and it ends the character with two stop bits if the speed is higher than 300 baud. The menu is the only way to change the number of stop bits. Type **1** or **2** if you want to change the number of stop bits, or hit **RETURN**.

After you make the last entry, the computer automatically switches control back to the program you were using before you called the menu.

Poking Around

If you don't program in **BASIC**, the **POKE** command, and the programming features described in the following pages, probably won't make sense to you. Don't worry. You've already acquired enough information by now to use the ACE Dual Interface Card without understanding these features.

If you do program in **BASIC**, you'll find the **POKE** command useful for changing the output features of both the serial and parallel interfaces.

For instance, if the phantom serial card is assigned to slot 2, then,

POKE 1914, 2

will turn off the screen display and automatic line feed. More generally, you can use the formula

POKE 1912+n, x

where n is the slot number of the card (for parallel) or the location of the phantom interface (for serial) and x is the line number in the chart below that gives the desired characteristics. If, for example, you wanted no auto line feed, no display to screen, and you wanted to send keyboard codes only as numbers less than 128, you would choose line 2 and use $x = 2$.

X	Auto Line Feed	Display to Screen	Send Codes > 128
	(Serial and Parallel)		(Parallel Only)
0	No	No	Yes
1	Yes	No	Yes
2	No	No	No
3	Yes	No	No
128	No	Yes	Yes
129	Yes	Yes	Yes
130	No	Yes	No
131	Yes	Yes	No

The Mini-Terminal Program

First, start up the mini-terminal by typing:

CALL 256*n+49208

where n is the slot number of the serial interface. This is the decimal value of the HEX address \$Cn38 of the mini-terminal. Just type CALL 49720 if your serial interface is in slot 2.

The mini-terminal allows you to use your serial port to communicate with a printer or terminal called a "host" when the ACE is using its 40 column screen display. (As with many communications functions, it won't work when the screen is in 80 column mode.)

The program will send all the characters you type to the screen. It's useful in setting up remote video displays or testing your serial printer.

It can display each character sent to the host on the screen (called half-duplex mode) or not (full-duplex mode). It always starts out in half-duplex mode.

Activate special functions by first pressing **CTRL** **SHIFT** **@** and then typing the character for the desired function. The available functions are:

CHARACTER	FUNCTION
-----------	----------

Type **CTRL** **SHIFT** **@**, then type:

CTRL SHIFT @	, Sends null character
F	Sets full duplex (no-echo) mode
H	Sets half-duplex (echo) mode.
P	Activates and deactivates printer
X	Exits from the mini-terminal back to the program from which you called it.
M	Runs the serial port setup menu. Control returns to the mini-terminal after the menu is completed.

Controlling The Dual Interface Card With Machine Language

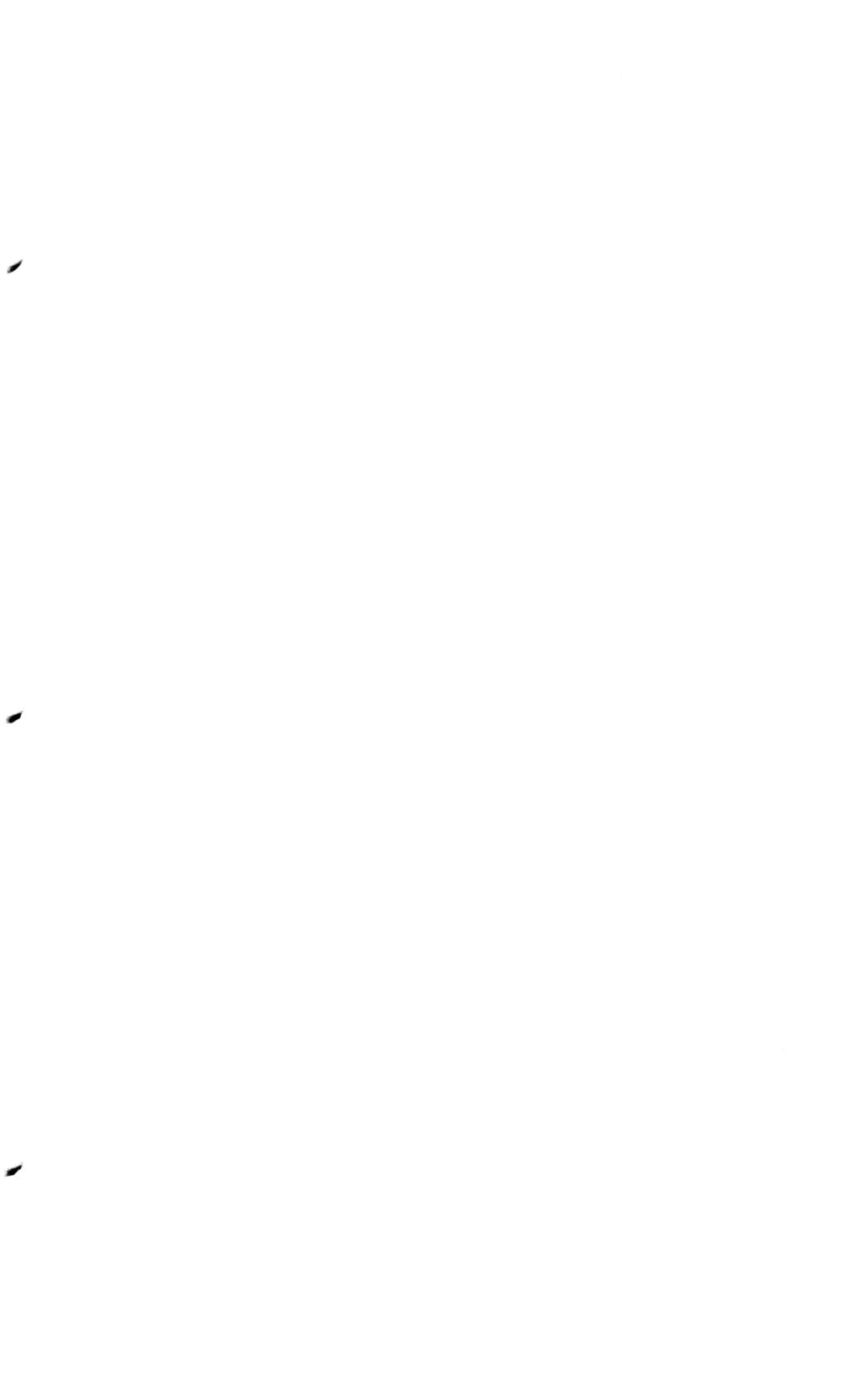
Machine language programmers can call the following machine language routines on the ACE Dual Interface Card by using a JSR instruction.

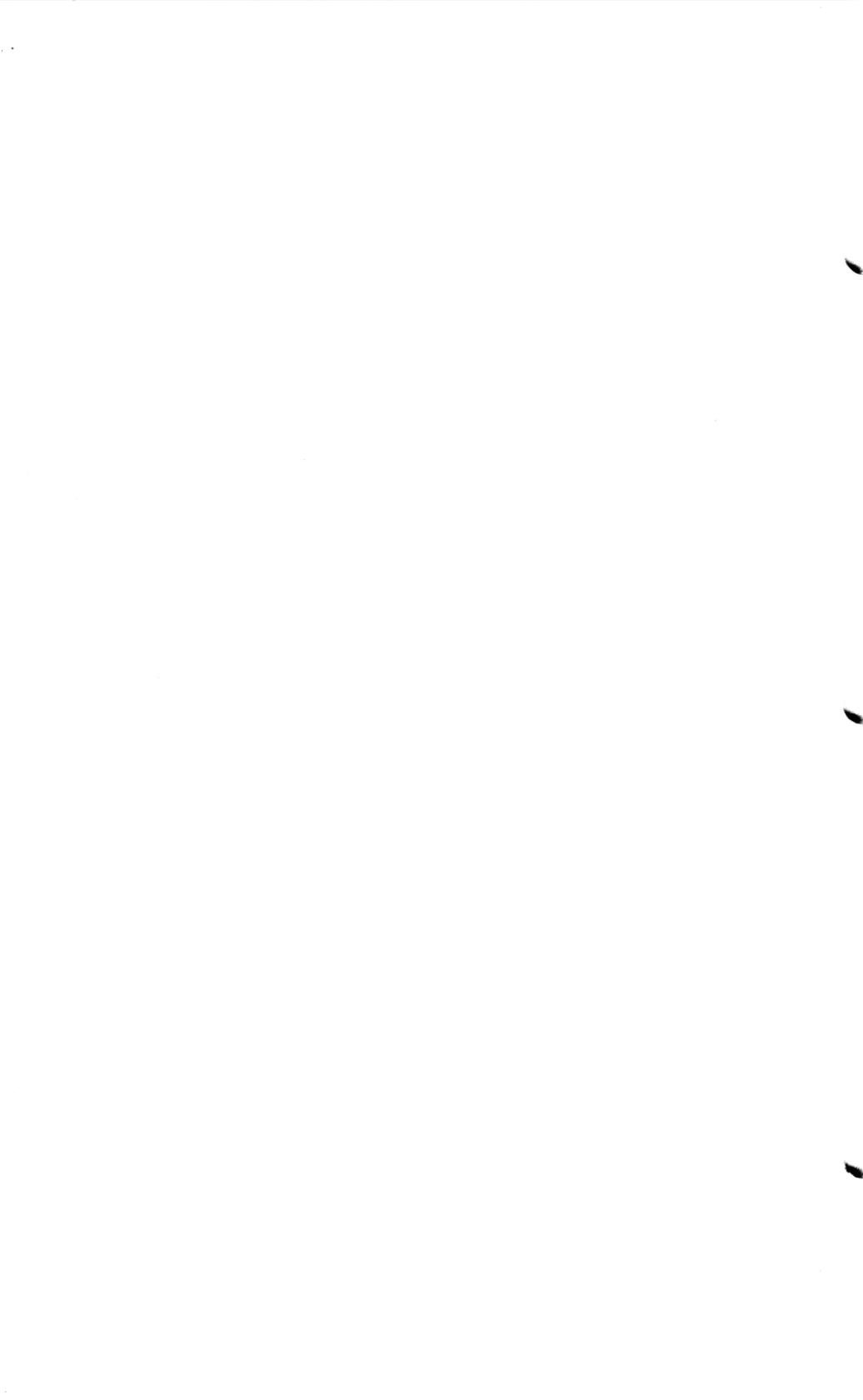
The first two routines control parallel port functions. Replace n with the number of the slot where you've installed the Dual Interface Card.

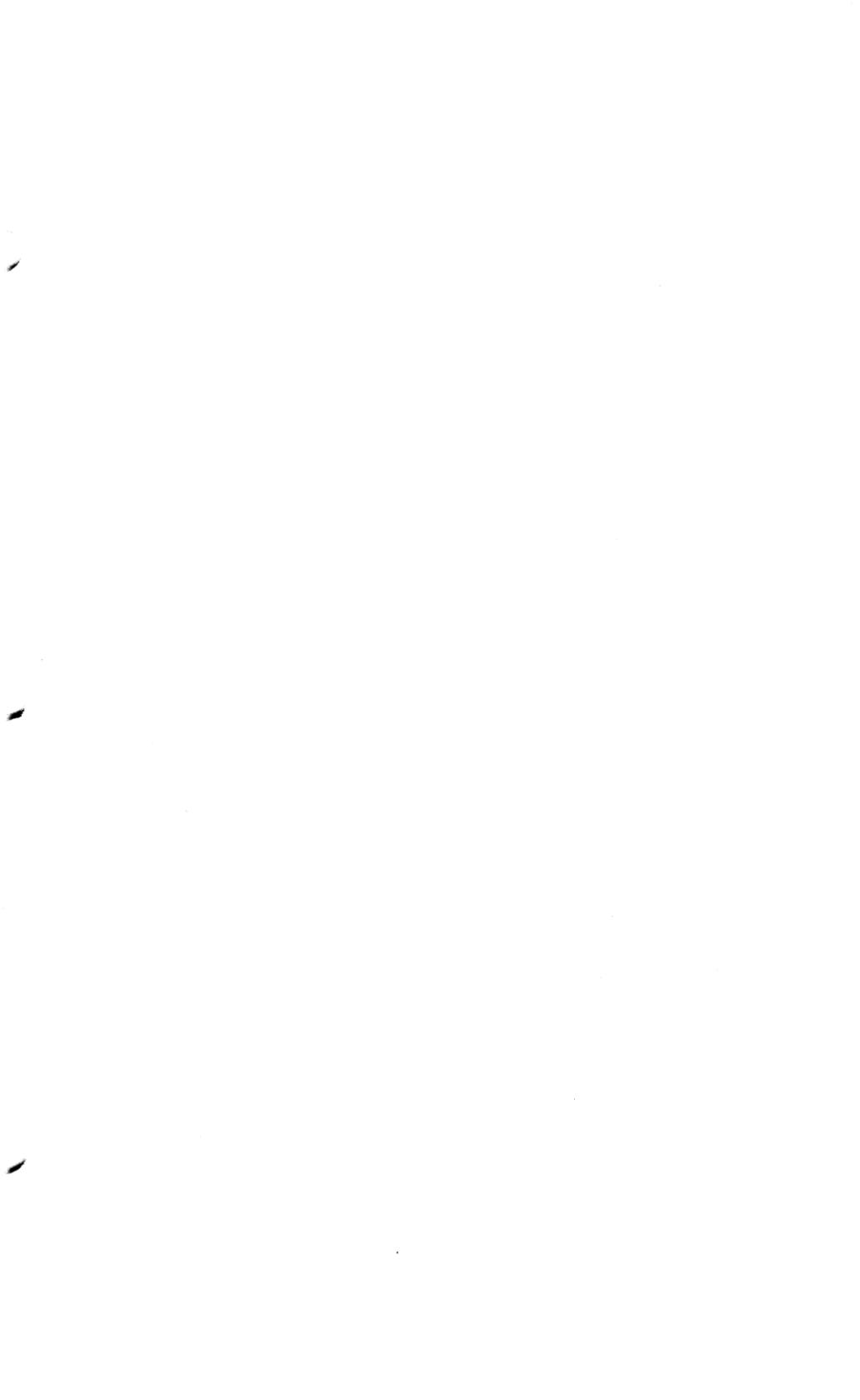
HEX ADDRESS	FUNCTION
\$Cn20	Initializes parallel port software.
\$Cn2C	Sends the character to parallel port.

The remaining routines control the serial port. Replace n in the following addresses with the imaginary slot number of the serial card.

HEX ADDRESS	FUNCTION
\$Cn20	Initializes the serial port software. Resets the serial port controls to switch settings if RESET has been pressed.
\$Cn26	Places the character from the serial port into register A.
\$Cn2C	Sends the character from register A to the serial port.
\$Cn32	Runs the setup menu for serial port parameters.
\$Cn38	Runs the mini-terminal.









FRANKLIN
COMPUTER CORPORATION

2138 Route 38
Cherry Hill, NJ 08002
Telephone: 609-482-5900
Telex: 837-385