

**Personal Computer News Letter
For On-the-Job Computing**

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ABSTRACT

This document is an IBM Internal newsletter dealing with matters of interest to users of personal computers for IBM business reasons. It contains articles, written by the user community within IBM, that

- announce programs and techniques relating to personal computers
- query for existence of a program or process
- describe current Work In Progress(WIP)
- give early warning of problems
- express an individual's point of view (letter to the editor)

Articles may be submitted by anyone within IBM as long as they address one of the above areas and are not:

- confidential
- more than two pages in length
- anonymous

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This document is published on the first working day of each month. Please submit your input to the editor as early as possible for editing, but not later than five working days before the end of the prior month.

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EDITORIAL

Well, I'm finally back after 3 weeks away at school plus 2 weeks of vacation. It was a good break for me and it feels good to "have at it" again. Mr. Mike Engelberg sat in for me during my absence and did a superior job of handling communications for me. Thank you Mike!!!

I received several responses to my thoughts about finding a new name for this newsletter. Although the suggestions were good, nothing really struck my fancy. For the time being, I have simply added a qualifying line to the title to point out that this newsletter can only address the on-the-job environment.

THIRST FOR EDUCATION

The arrival of the IBM PC has created a great demand for education. In the San Jose area there will be 3 classes offered during 1982, but the requests far exceed the capacity. For example, I will be teaching a voluntary education class on Beginning BASIC. Currently there are two sessions of 40 people and a wait list of 180. I suspect that every location is facing the same situation.

One of the major hindrances to quickly getting classes going is the lack of any official teaching material. For the BASIC class, I have taken 4 of the 7 manuals from the Learning System/23 BASIC series and marked them up to reflect the IBM PC syntax. Three of the manuals were very different from the PC BASIC and I will have to provide these missing pieces.

As soon as the first couple of classes have been completed, we will have material that we can share with other locations. Later in this issue you will see that Endicott is also putting classes together and I suspect they will have materials to share too.

Yet another area of need is for instructors. I encourage any of you that have micro computer experience of any kind to consider working with your education department to teach classes. Obviously, people with IBM PC experience will be preferred.

BOCA RATON STYLE

The Entry Systems Business(ESB) group in Boca Raton, home of the IBM PC, is structured to maximize efficiency. They have taken steps to eliminate unnecessary procedures with the goal of producing price competitive products for our customers. One of their central themes is to seek volume business through a few retailers, which cuts costs significantly.

This style carries over to how they interface with IBM internally. Twenty major development and manufacturing sites were chosen to receive machines in 1981. Each of these sites were asked to identify an individual to handle administrative functions and one or two to be the technical liaison. All interface with ESB is handled by these people including ordering, answering technical questions, and problem resolving. At our location, the internal branch office manager is the site coordinator, Stan Rosenfeld and myself are the technical liaison people.

HOW TO ORDER A PC

If you are at one of the 20 selected sites, you must obviously work through these people. If you are not, I suspect you will end up working through whoever it is that normally handles DP equipment orders for your location.

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At our location, department managers fill out the normal forms for ordering DP equipment. This includes a justification statement for spending the money and a statement indicating that the department has sufficient capital equipment funds to cover the purchase. Yes, these machines are purchased; there is no provision for rental.

The site coordinator will accumulate the orders and arrange with ESB for purchase and delivery. The reason for the accumulation goes back to the streamlining of procedures in Boca Raton. For example, system units are orderable only in units of 12. That's how many fit on a pallet.

There are some limitations on how many units are being allocated for internal use. The ESB team has been trying to make an equitable distribution among the sites.

DOCUMENTATION

I have received many inquiries from people wanting to get copies of the documentation for the IBM PC. At the 20 sites, this is handled through the normal process when systems are ordered. Quantities of documentation and software needed are part of the standard input to ESB.

For all other cases, it is a bit sticky. All of the documentation and software have "part" numbers and are distributed from Dayton rather than Mechanicsburg. In addition, as far as I can determine, most of the documentation is not separable from the software; if you want the PASCAL manual you must get the software. A rumor I heard recently indicated that the IBM Product Centers are selling the documentation separately. I checked it out and of the manuals that accompany software, only the DOS manual is available by itself from the product center. Manuals that are not part of a software package include the Technical Reference Manual, the Guide to Operations, and the BASIC manual (the BASIC software comes with DOS and in the system ROM).

Finally I talked with my contact in ESB and learned that there truly is no way to order just the documentation. The reason for my concern is primarily education, where the number of manuals needed greatly exceeds the number of machines with their software packages.

THE IBM PC NEEDS SUPPLIES

The moment the PC arrives you will need some diskettes. You will probably solve your immediate problem like we did by going to a local microcomputer store and buying a few. Quality definitely follows price and you should expect to pay \$4-\$5 each. The \$1.95 specials are not the ones to get started on. The Information Records Division of IBM has quality diskettes available for the longer term, along with printer ribbons. Most sites already have a process for ordering printer paper.

Shortly GPD will be investigating the possibility of stocking the diskettes and ribbons through our stationary stores department. I feel this a good way to handle the supplies on a volume basis. My only recommendation for special handling is to not put the spares in open cabinets, but to keep them with each unit.

Keith Eckhardt

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EXTERNAL PRESS

Listed below are excerpts of some recent articles about the IBM Personal Computer that show its value or provide additional information on how it can be used.

THE IBM PERSONAL COMPUTER

From BYTE Magazine, January 1982

"What microcomputer has color graphics like the Apple II, an 80-column display like the TRS-80 Model II, a redefinable character set like the Atari 800, a 16-bit microprocessor like the Texas Instruments TI 99/4, an expanded memory space like the Apple III, a full-function uppercase and lowercase keyboard like the TRS-80 Model III, and BASIC color graphics like the TRS-80 Color Computer? Answer: the IBM Personal Computer, which is a synthesis of the best the microcomputer industry has offered to date. It has a number of interesting features and a few flaws, but it is easily the best-designed microcomputer to date. In this article, I will take a closer look at the IBM Personal Computer, inside and outside."

...

"When I look at the several inches of IBM Personal Computer manuals that fill my bookshelf, I am reminded that there is so much about this system that I have left out. Still, I have tried to talk about the most exciting and most important aspects of the system. The genius of the people who designed the IBM microcomputer is that they managed to do everything conventionally, but well - the IBM Personal Computer doesn't have any startling innovations, but it also lacks the moderate-to-fatal design problems that have plagued other microcomputers.

The IBM Personal Computer isn't as well supported as the Radio Shack TRS-80 family or the Apple II, but then it hasn't been around very long. In two years or so, I think the IBM microcomputer will be one of the most popular and best-supported microcomputers around. This microcomputer is as close as I've ever seen to being all things to everybody. IBM should be proud of the people who designed it."

TITLE UNKNOWN

From Computer Business News, November 30, 1981. Page 2

". IBM is increasing manufacturing capacity for the Personal Computer and sources now estimate it will sell 175,000 units by Christmas '82-- a number that was previously bandied about as a target IBM had to meet to be taken seriously in this segment of the market."

TITLE UNKNOWN

From ad in a recent INFOWORLD

Another newsletter on the IBM Personal Computer was announced last month. It will contain Hardware and Software reviews, technical articles, a discussion forum, etc.

It is published by CRC Publishing, 10057 Commerce Avenue, Tujunga, California 91042, (800) 227-2400 x1000, in Calif (800) 772-2666 x1000.

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LETTERS TO THE EDITOR

EDITOR,

It seems that your editorial on security was to no avail. I have received many requests for ESPF/PC and fully a third of them were for employee-owned PCs. The programs announced in your newsletter will almost invariably be written on IBM equipment and IBM time. They will therefore be the property of IBM to be used for IBM business use only. I would like to ask your readers to remember that 'IBM Internal Use Only' means 'IBM INTERNAL use only'. It does not mean 'For use by IBMers only'.

Chuck Tribolet, MVS(STLMVS1/T811329), Santa Teresa, 8+543-3337

(Editor: ESPF/PC is the full screen editor announced in article 8103-11.)

EDITOR,

"Creative Computing" magazine has started a new regular article about the IBMPC. This article joins other monthly articles in the magazine that are devoted to the TRS-80 (TRS-80 Strings) and Atari (Outpost:Atari). The name of the article is "IBM Images" and is authored by Will Fastie, the same person who wrote the in-depth review of the IBMPC in the December issue of this magazine. As he did not have a computer at the time of the first article, it was devoted to how and where the general public could buy one. The coverage was very good. He included prices, and talked about the IBM Product Centers, Sears, and ComputerLand outlets.

Stan Berlin, VM(MSNVM2/BERLIN), Dallas

EDITOR,

Thanks for the PC Newsletters. Please consider me the Site Coordinator for our Vienna Lab (which means nodes BOEVM3 and VABVM1 at the moment). My PC works already, apparently the 50 Hz current here makes no difference for the system, the diskette drive, or the monitor and I'm slowly gaining experience with it all (though terribly loaded down at the office at the moment trying to get a product ready for shipment).

Thanks once again, ...more when I get a chance!

Don Bourdage, VM(BOEVM3/BOURDAGE), IBM Lab Vienna, Austria,
43-222-528611-453

EDITOR,

I have some questions which I sent to Dick Dievendorf which he couldn't answer. Perhaps you can.

1. The technical reference manual describes a Low Resolution Graphics mode (unsupported by the software) but there is no definition of the parameters to the graphics chip nor the memory map used. Could you describe these, and if not - when and how will we find out about this rather nice sounding facility (since it's not in the current technical manual)?

(Editor: I have no details on how to access this mode of graphics. Perhaps one of you readers will investigate and write an article for publication here.)

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- Both display adapters have warnings related to invalid initialization in the technical reference manual. These sound as if hardware could be damaged via software (even the OUT instruction in BASIC). What actually happens and how can we avoid problems?

(Editor: See this months Hints and Kinks article by Stan Rosenfeld. If the DIP switches are set wrong, it may cause serious damage in certain situations.)

In particular, I believe question 2 represents a potentially very significant problem.

Rod Cowan, VM(PLKSK/K57MCRCC), Kingston, 8+373-5293

EDITOR,

I spent all Thanksgiving weekend playing with an IBMPC. My brother had bought one and accepted delivery the weekend before. At my recommendation, he had bought a 64K system with mono adapter. The computer is to be used primarily as a business system. The only other thing -memory- that he could have wanted we decided to wait upon, as memory prices are still rapidly falling.

For software, he had BASIC, of course, and had ordered Visicalc and Easy-Writer, neither of which was available on his delivery date. For that matter, neither was DOS. The Computerland man had to loan him a copy of the floor demo.

So, I spent 4 days playing with the BASIC available. By and large, the BASIC is pretty good, as BASICs go. I encountered two peculiarities with disk I/O. Since they are both undocumented as far as I can tell, they could cause the neophyte some difficulty.

Record blocking on random files: If I write exactly one, say 32 byte, record into a random file, close the file and read it back, sequentially specifying the record numbers, the end of file indicator is not set until a whole block worth of records are read. At least, the extraneous records are all zero. This makes it quite difficult to append a random file without leaving blank records in it.

End of File Testing: End of file indicator is normally set upon successfully reading the last record of a random file...not as is usual upon unsuccessfully reading a record. This causes an anomaly on reading an empty file. You get the EOF immediately, which could mean that you have either zero or one record(if only 1 fits in a block) in the file. Thus, the detection of a null file becomes data sensitive.

Tim Kemp, VM(LSGVMB/KEMP), A52/029, Los Gatos, 8+273-4275

EDITOR,

Once again, congratulations on an excellent newsletter, and thanks for the info on the OEM equipment for the PC; we were anxiously awaiting the first shot of that war.

I have a question about the limit of 256K RAM in the PC. We always read that that's the maximum, but we also all know that the 8088 has 20 address bits (1M worth) and they're all out on the bus. Some of us here were hypothesizing that the 256K number is using IBM's biggest remembery(sic) boards (64K). If you have a display controller in one slot, and a diskette controller in another, you have three slots left for a total of 192K. Add that to the 64K on the system board and that's a practical maximum of 256K. Already, the OEM's are talking 192K AND 256K memory cards for the PC. Is there any reason why we can't take advantage of most of the 8088's addressing space rather than 1/4 of it, as we are told now?

Keep up the good work.

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I just noticed in Mr. Dievendorff's Q/A's that the arithmetic games that SRA is marketing:

1. Don't support the monochrome display, which seems strange, since that's the basic machine we're trying to sell. Now the user has to go buy a whole new set of hardware.
2. More importantly to us as internal users, the program diskettes can't be copied (at least by IBM DOS). Using an expensive program without a backup is like driving at night with no headlights - you're ASKING for trouble. Is the non-Microsoft software going to be the same way? Do they expect us to use expensive software packages with no backup?!?!?!? What will the official internal policy be towards that kind of thing. Considering the amount of time it has taken us to get software here, I don't relish the thought of waiting 2-3 weeks for a new copy of something if the original gets clobbered somehow.

Lee Jones, VM(MANVM1/MPF5LFJ), D97/120-023, Manassas, 8+725-5685

(Editor: Regarding memory addressing, the Technical Reference Manual has a memory map (see TRM 2-27) that shows RAM memory to be expandable to 640K (ten 64K segments). A number of OEM's have announced memory cards that put the installed memory above the stated limit of 256K. ????)

The SRA programs are intended for use at home and school. I suspect the assumption is that this market will primarily be using a TV set.

Many of the non-Microsoft programs will be copy protected. The piracy rate of microcomputer programs in the USA is quite high. I have met people that feel the copyright laws are bunk and that they should have the right to make copies for all of their friends. It is people like this that make it hard on the honest ones that would like a simple way of doing their job.)

CONTRIBUTIONS

8201-01 DOWNLOADING AND UPLOADING OF PC CODE USING GRAPHICS ATTACHMENT

I have successfully connected a Personal Computer to a Graphics Attachment RPQ R5232 line and can send data both ways. The host code is written in APL but can be used to read and write CMS files (such as TEXT decks and SCRIPT files) and send the data to a PC file. I am not sure of all the ways this could be used so will implement only simple stuff for now. This will obviously give us a way to distribute code over the network. The main question is the availability of GA's. Our lab has over 60 of them.

Suggestions for what should be included are solicited.

Alan Jones, VM(GDLS2/JONESAL), Endicott, 8+252-4344

8201-02 NOTES ON CONNECTING A PERSONAL COMPUTER TO A SERIES/1

We got our first machine about 2 weeks ago and are very impressed with it. Our first trial at communications was to attach it to a local Series/1. We were using the Asynchronous Communication Control Adapter (feature number 1610). We found that a product cable for the Series/1 works without any problem. The cable is feature number 2056. This cable doesn't have a wire for pin 20, Data Terminal Ready, but this didn't seem to cause any problems. The attachment card in the Series/1 was jumpered as follows.

Data Terminal Ready	- on
Request To Send	- on
Low speed range	- off
High speed range	- on

We were able to run at 9600 baud without hardware problems, and more sophisticated software on both ends should be able to cope with the buffer overrun problems. The ACCA attachment does have one peculiarity. It serializes data out in reverse order so all the bytes are backward, i.e. a x'01' in Series/1 memory becomes a x'80' in the Personal Computer. Since the data is translated from EBCDIC before being sent this is not a problem at present but could become one. Now a question. Is anyone out there planning on implementing an interface to the Series/1 Communication Monitor or Communication Facility/II? And another, keeping track of all this information can become a full time job. Would it be possible to include the information in one of the information data bases so we can search for pertinent information?

Ken Aaker, MVS(RCHIS1/D568KDA), Rochester, 8+456-6086

8201-03 NOTES ON IBM PERSONAL COMPUTER COMMUNICATIONS

OPERATION OF CONTROL SIGNALS WITH BUILT-IN BASIC COMMUNICATIONS:
The output from the Asynchronous Communications Adapter on the IBM Personal Computer conforms to the EIA RS232-C standard for Interface between Data Terminal Equipment and Data Communications Equipment. This standard defines a number of control signals that are either transmitted or received by the terminal (i.e., your Personal Computer) to control the interchange of data with a remote computer. These signals are DC voltages that are either ON (greater than +3 volts) or OFF (less than -3 volts). This section describes the interaction of these signals with the IBM Personal Computer when the communications function built into the BASIC language is being used.

Note: The use of control signals with the Asynchronous Communications Support program is different than what is described here. See the Asynchronous Communications Support Users Manual, Chapter 4, for its use of control signals.

CONTROL OF OUTPUT SIGNALS: When you start up your IBM Personal Computer, the RTS (Request to Send) and DTR (Data Terminal Ready) lines are held OFF. When an OPEN COM statement is executed, both

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of these lines are turned ON. These lines stay ON until the file that is open on the communications line is closed. The file will be closed by a CLOSE filenum statement, when an END, NEW, RESET, or SYSTEM command is executed, or when a RUN command is executed without the R option.

Note that RTS is held ON all the time when communications is activated. Operation with a half duplex protocol modem is thus not possible without controlling the bits in the MODEM Control Register on the Asynchronous Communications Adapter from your BASIC program. In any case, a half duplex modem with reverse channel cannot be operated from the IBM Personal Computer as the interface lines (pins 11 and 12) are not supported in the Asynchronous Communications adapter.

USE OF INPUT CONTROL SIGNALS: If either the CTS (Clear to Send) or DSR (Data Set Ready) lines are OFF, then an OPEN COM statement will not execute. The statement will wait for a few seconds and then return with a Device Timeout (No. 24) Error. The Receive Line Signal Detect line (sometimes called Carrier Detect) has no effect on the operation of the program. (It can be either ON or OFF).

If either the CTS or DSR signal is turned OFF during program operation, I/O statements associated with the communications line will fail to operate. For a PRINT#n statement, a Device Fault error (No. 25) will occur the first time the statement is executed after the CTS or DSR line is turned OFF. Thereafter, a Device Timeout error (No. 24) will occur each time execution of a PRINT#n statement is attempted.

Equivalent errors will also occur if an INPUT statement on the communications line is attempted until both CTS and DSR are ON. However, if there are no characters in the buffer when CTS or DSR are turned OFF, there appears to be no way to determine these lines are OFF with a BASIC INPUT or EOF statement. Being able to check these signals is important if you wish your program to detect a line disconnect when the Personal Computer is waiting for input from the communications line.

The following are possible ways in which this check might be made, none of which seem to work. An EOF statement does not return an error if one of these lines is OFF. An INPUT\$(0,#n) statement is illegal. An INPUT\$(1,n) statement will go off to look for a character in the receive buffer. If there is no character there, it will hang waiting for the character to appear even if either the CTS or DSR line are OFF. Executing a PRINT#n,""; does not test for line failure.

There is one way you can test for a line disconnect. The CTS and DSR lines (and the Receive Line Signal Detect line) can be tested directly using an INP(&H3FE) statement to access the MODEM Status Register on the Asynchronous Communications Adapter. You can then inspect the bits in the returned byte. (See the Technical Reference Manual Page 2-143 for details on these bits.) The Delta bits in the MODEM Status Register can also be used to determine if a temporary loss of a control signal has occurred.

REQUIRED CABLE CONNECTIONS: Obviously, in order to operate communications using the communications function built into BASIC, the CTS and DSR lines must be held ON. It is probably best to have these lines controlled by the modem to which the IBM Personal Computer is attached so the Personal Computer will have an indication of a line drop or computer disconnect. To provide this control, the cable connecting to the outside world should have wires in it connecting pins 5 (CTS) and 6 (DSR) on one connector to pins 5 and 6 on the other connector.

The modem to which you connect may also need to be informed that your Personal Computer is connected. It will look for the DTR and/or the RTS signals for this information. Thus your cable should contain wires connecting pins 20 (DTR) and 4 (RTS) on one connector to pins 20 and 4 on the other connector.

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The lines on which the data is transmitted and received should also be present in the cable. These are pins 2 and 3 of the connectors.

In some applications it may be necessary to test for Received Line Signal Detect (Carrier Detect). This is pin 8 on the connectors. If a wire is available in the cable, these pins should also be connected in the cable. In addition, the signal ground wire (pin 7) should be in the cable.

In summary, connector pins 2, 3, 4, 5, 6, 7, 8, and 20 should be connected end-to-end in the cable.

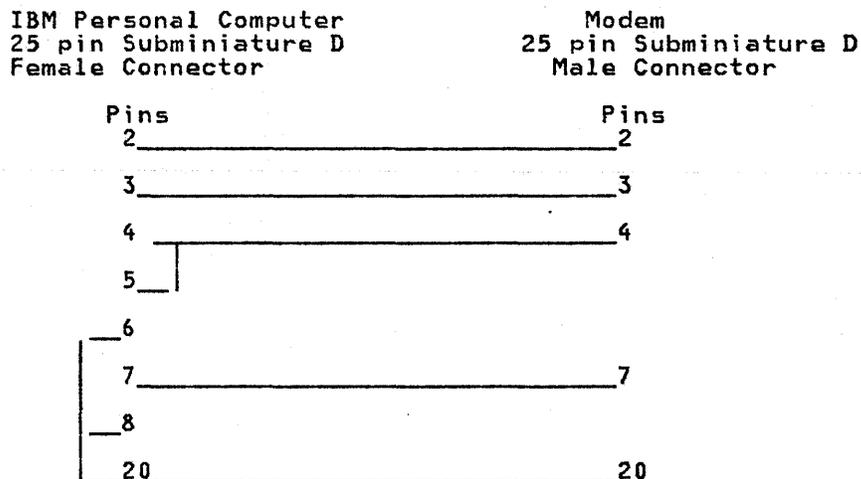
WIRING A CHEATER CABLE: There are, however, some instances where the Personal Computer communications will not work with the cable described above. If the modem to which you are connected does not control the CTS and DSR lines, these lines may be left floating (unconnected). In this case, action of the Personal Computer communication will be unpredictable. To bypass this problem, you can use the RTS and DTR output signals from your Personal Computer to control the CTS and DSR inputs to your Personal Computer. RTS (pin 4) should be wired to CTS (pin 5) on the connector that plugs into your IBM Personal Computer. No connection should be made to CTS (pin 5) on the other end of the cable. You may wish to connect the RTS signal (pin 4) through the cable to pin 4 on the other connector as the modem to which you are connected may need to see the RTS signal turned ON before it will transmit information to you.

In a similar fashion your cheater cable should have the DTR signal (pin 20) connected to the DSR input (pin 6) and RLSD (pin 8) on the connector that plugs into the IBM Personal Computer. No connection should be made to the DSR pin (No. 6) or the RLSD pin (No. 8) on the connector on the other end of the cable. Again, you may wish to connect the DTR signal (pin 20) through the cable to pin 20 on the other connector in case the computer or modem requires that signal for operation.

Your cheater cable should also have pins 2, 3, and 7 connected through the cable. This cable should work with all systems. However, for modems that control the CTS and DSR lines, you will have lost the ability to sense when a line has been dropped or the computer has gone down. As you are controlling these lines yourself, it will always appear that the computer is present, even if the cable is disconnected!

Note: The connector that plugs into your IBM Personal Computer is a Female 25 pin Subminiature D connector. The one on the modem end of the connector is usually a Male 25 pin Subminiature D connector.

The wiring diagram of the cheater cable is as follows:



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DIRECT CONNECTION TO A COMPUTER: If you work in a facility that has direct wire connections to a computer, then the computer may, or may not, control the CTS and DSR signals when you are connected. In some cases where a cable drop to the computer is provided in your office, wires to these signals may not be present in the cable. In this case you should be able to connect to the drop cable using the cheater cable described above. (Be sure to check whether the drop cable has a male or female connector before making a cheater cable.)

If you are connecting directly to a computer (another IBM Personal Computer, for example), you may have to cross over the send and receive lines in your cable. (Pin 2 on the connector on your end of the cable goes to Pin 3 on the connector on the other end. Pin 3 on your end goes to Pin 2 on the other end.) This crossover is necessary because the line the computer sends data on is the one on which you receive data and vice versa.

In addition, when connecting directly to a computer, special wiring of the control signals may be necessary. A good reference for how to connect to various computers is the IBM 3101 Display Terminal Description manual (GA18-2033) Section 6.4.9. For full duplex communications, the IBM Personal Computer using the BASIC built-in Communications should use the control signals in a fashion very similar to a 3101.

For connecting two IBM Personal Computers, the following crossover cable can be used:

Connector 1 Pin		Connector 2 Pin
2	to	3
3	to	2
5,6,8	to	20
7	to	7
20	to	5,6,8

Note that pins 5, 6, and 8 are jumpered together on each connector. The cable is symmetrical; either end can go to either computer. The cable has a 25 pin female subminiature D connector at each end.

TESTING FOR OTHER MODEM CONTROL SIGNALS: There are two input control signals picked up by the Asynchronous Communications Adapter that are not used by the communications function in BASIC. These are the Received Line Signal Detect (often called Data Carrier Detect) (Pin 8) and Ring Indicator (Pin 22). If you need to test for these signals in a program you are writing, you can check the bits corresponding to these signals by using a INP(&H3F) function call to access the Modem Status Register and then testing for the bits in the byte returned by the call. See the Technical Reference Manual page 2-143 for a listing of the bits in the Modem Status Register. Obviously, for these bits to have any meaning, they must be controlled by the modem or computer to which you are connected and the cable making that connection must have wires connecting pins 8 and 22 between its connectors.

Frank Bequaert, VM(CAMBRIDG/FRANKBEQ), Cambridge, 8+249-9279

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8201-04 APL & BASIC FOR PLANNERS

I started using VS BASIC last January for analysis programs in lieu of APL. I have experienced no problems, though the 2-dimension limit of VS BASIC is frustrating! I plan to convert all planning programs to PC BASIC, and probably VISICALC where applicable. I have used the PC with a TV output for graphics as part of internal management briefings, and found it extremely well received!

Randy Cabell, VM(DPDBVM/513909), Bethesda, MD, 8+727-3246

8201-05 INTERACTIVE INSTRUCTION ON THE PC

We have experimented with the Course Structuring Facility of IIS on the PC. I would be interested in anyone else who has an interest in this. At this point, I have implemented the TEXT, QUES, MATCH, and TF macros. The program will allow you to enter GO TO LABEL ... and you may have branching, beeping, highlighting, and complex answer analysis (use the * and & mask characters.) Sorry, no glossary, or GOTO list, messages.!!! Response time seems adequate to the student. It appears that about 70 screens (50% TEXT / 50% QUES) could be held on a single diskette. I do not plan to take this effort any further, but will be glad to talk to anyone interested in IIS on the PC, particularly internal IBM applications for it.

Randy Cabell, VM(DPDBVM/513909), Bethesda, MD, 8+727-3246

8201-06 WORK IN PROGRESS ON FULLSCREEN EDITOR FOR THE IBM PC

ED is a full-screen editor for the IBM Personal Computer that edits standard DOS files. It does not attempt to make the PC emulate any of the existing 3270 editors, but instead tries to take advantage of the unique characteristics of the PC to provide a more powerful editing environment. For example, when the cursor is positioned on the top line of the screen and the up arrow key is pressed, the cursor does not wrap around to the bottom of the screen, but rather remains stationary and the data on the screen scrolls down one line, bringing one more line of data into view. As many functions as possible have been assigned to single key-strokes to improve the efficiency of a skilled user.

The user's guide for ED is located on the Yorktown IBMPC disk under the name 'ED SCRIPT'. There is also a file on that disk called 'ED MAIL' which contains comments, criticisms, bug reports, etc. You are invited to add your comments using the new APPEND function of the IBMPC exec. Once the asynchronous communication program is generally available, ED will be distributed exclusively over the network. In the meantime, to obtain a copy of version 0.1 of the ED program for IBM internal use, mail a formatted diskette to Jim Wyllie or contact him at WYLLIE on SJRLVM1 for the name of someone at your site who already has the program. My internal address is

Jim Wyllie
K61/282
IBM Research
San Jose

My external address is

Jim Wyllie
K61/282
IBM Research
5600 Cottle Road
San Jose, Calif. 95193

If you already have a communication program capable of downloading files and PC Pascal, you may obtain ED through the network, although not in the most convenient way. You will first need to obtain the IMPORT/EXPORT programs from the IBMPC disk. The procedure for generating these programs is documented in file EXPORT SCRIPT on the same disk. Next you must retrieve the following

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files from the IBMPC disk and download them onto an empty diskette, changing file names as shown in parentheses: EDGEN BAT (edgen.bat), EDLINK ARF (edlink.arf), EDMAIN EXPORT (main.exp), EDZAP EXPORT (zap.exp), EDM1 EXPORT (m1.exp), EDM2 EXPORT (m2.exp), EDM3 EXPORT (m3.exp), and EDM4 EXPORT (m4.exp). Copy import.exe (which you just built) onto the disk containing the .exp files, then run edgen. It will prompt you for the correct disk to be mounted, then will reconstitute the ED object files, then finally link together an executable version of ED. The reason for sending object files and then linking them locally is to avoid transferring 25K bytes or so of Pascal runtime code, probably at 300 baud.

Version 0.2 of ED should be available early in January. It will include the command line commands save, quit, file, search, and edit. Up to 10 files may reside in memory at once, with file switching controlled by the edit command or by a function key. Version 0.2 also includes enhancements that allow the display to keep up with the typamatic action of all control keys, including those which scroll the display.

Jim Wyllie, VM(SJRLVM1/WYLLIE), San Jose, 8+276-7861

8201-07 MORE EXPERIENCES WITH CASSETTE I/O

I used a cassette as output from BASICA. The volume on both recorders I tried had to be set low on record from the PC. The PC puts out a strong signal. On a old (vintage 1965) CRAIG with remote mic capability but only volume control on playback (AVC on record), there was a moderately reliable record/read back ability. On a brand new Panasonic RQ 337 with volume control on both record and playback, I got reliable record and playback only on low volume (3 out of a possible 10 where 5 is comfortable for dictation).

I was using the standard computer/recorder cable sold by Radio Shack. Its 5 pin DIN connector fits the PC. The two grey pins (one large and one small) go into the remote and mic holes. The 'remote' hole is for the remote control. The black pin goes into the monitor or ear phone hole for playback.

Note: The DIN connector here has nothing to do (in size) with the 5 pin DIN connector for the joy sticks that are sold by Radio Shack. More on joy sticks later.

Comment on the Panasonic portable recorder: It has a +20 to -10 percent playback speed variation control that might be useful to correct for some poorly recorded tapes used to transmit code.

Ron Frank, VM(CAMBRIDG/ROFRANK), Cambridge Scientific Center,
8+249-9232

8201-08 IBM ELECTRONIC TYPEWRITERS MODELS 50, 60, 75 ON THE IBM PC

The IBM Electronic Typewriter Models 50, 60 or 75 do not require any modification to the typewriter for use as a correspondence quality printer. One company, California Micro Computer of 9323 Warbler Ave., Fountain Valley, CA 92708, markets an RS232C interface for attaching this typewriter to a personal computer.

Has anyone attempted to adapt this typewriter to the Centronics interface so that it can be used on the standard IBM printer adapter on the IBM Personal Computer? I suspect that there may be problem with the automatic line feed on a carriage return in the programming package (BIOS?) as well as the necessary hardware interfacing. Hoping that IBM Boca Raton will include an interface to this typewriter in their offering, I suggest it would make an excellent addition to the PC family.

Ken Hales, VM(TUCVM2/HALES), Tucson, 8+562-7248

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8201-09 QUERY FOR SUGGESTED PC APPLICATIONS WITHIN A DP CENTER

I would appreciate hearing from any users who have implemented applications using a PC within a Computer Center environment. A typical question I hear is 'Why can't you do it with VM or TSO?'. I have identified several applications myself (especially using Visicalc), but would be interested in the ideas of others.

Mike Hammock, VM(DBSVM1/MIKE), GSDHQ, Atlanta, 8+331-3372

8201-10 CONVERTING PC FILES FROM HEX TO COM

The Native Debug Tool (NDT) by Earl J. Franklin, Austin, which was modified for the PC by Guy G. Sotomayor, Jr. of Boca Raton, has been circulating on the network. Several people have tried to download it and run it, but have run into problems. The file is stored in HEX and when it is brought down using the communication program, line feed - carriage returns (LF CR) get inserted at the end of each record. Apparently the DEBUG program (which is supposed to load HEX files) stumbles on these and hangs up. We got around this by writing a small BASIC program to read the file two characters at a time and convert to binary. The LF,CR's are deleted. It took a few minutes to download the code and a few more minutes to convert it using the following program.

The debug tool is really great.

BASIC program:

```
10 REM ALAN L. JONES, 12-16-81
20 REM READ HEX FILE AND CONVERT TO BINARY
30 H$="0123456789ABCDEF"
40 DEFINT I
50 I=1
60 INPUT "What is the name of the file you want converted? ",F$
70 OPEN F$+".HEX" FOR INPUT AS #1
90 OPEN F$+".COM" FOR OUTPUT AS #2
100 IF EOF(1) THEN 200
110 REM READ TWO CHARACTERS
120 A$=INPUT$(2,1)
130 REM CONVERT TO BINARY
140 B=16*(INSTR(H$,LEFT$(A$,1))-1)
150 B=B+(INSTR(H$,RIGHT$(A$,1))-1)
160 IF B>=0 THEN 200
170 PRINT "RECORD: ",I
180 I=I+1
190 GOTO 100
200 B$=CHR$(B)
210 PRINT#2,B$;
220 GOTO 100
230 END
```

Alan L. Jones, VM(GDLS2/JONESAL), Endicott, 8+252-4344

8201-11 QUERY FOR PC CONNECTION TO HOST PORT WITH CORRESPONDENCE CODE

We have been making good use of the PC Asynchronous Communications Program. It is a high quality piece of software. However, it has an unfortunate limitation: it can not communicate in Correspondence or EBCD code.

We need this option so our PC users here can access a PC software library in a VM system through existing dial-up ports -- almost all of which are configured for correspondence code.

Is anyone working on it?

Blair Martin, VM(GDLS2/MARTIN), U05/032, Endicott, 8+252-8680

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8201-12 COURSES ON THE IBM PERSONAL COMPUTER AT ENDICOTT

Starting In January, Endicott will be offering four courses under the auspices of the Programming Education and Voluntary Education departments:

1. INTRODUCTION TO THE IBM PERSONAL COMPUTER

Instructor: Jay A. Tunkel -
GDLIS2(TUNKEL) or T/L 252-5388
Course Length: 28 hours (one 2-hour class per week)
Prerequisites: None

This will be a beginner's introduction to personal computer concepts, a thorough but non-technical explanation of the features and capabilities of the PC, and an introduction to DOS operations and BASIC programming.

2. ADVANCED BASIC AND PROGRAMMING TECHNIQUES FOR THE PC

Instructors: Jim Feeney and Cliff Spinac -
GDLIDAT1(FEENEYJW) or T/L 252-6560
GDLDPD(SPINAC) or T/L 252-4791
Course Length: 28 hrs. (one 4-hour class per week)
Prerequisites: Knowledge of at least one programming language and familiarity with processor operations

This course is intended for internal users of the IBM Personal Computer who are already familiar with computer programming and operations. Therefore, the fundamental operation and programming of the PC will be covered lightly. The course will focus on the Advanced BASIC language and on features of the PC that will make it a useful internal tool.

3. PASCAL PROGRAMMING FOR THE PC

Instructor: Leo O'Leary -
GDLIDAT1(OLEARYLR) or T/L 252-6576
Course Length: 24 hrs. (one 4-hour class per week)
Prerequisites: Knowledge of at least one programming language

This course is also intended for users who are already familiar with computer programming and operations. The course will focus on the Pascal language and the IBM enhanced compiler. UCSD systems will be discussed briefly.

4. VISICALC

Course Number: 2335
Instructor: Blair Martin -
GDLIS2(MARTIN) or T/L 252-8680
Course length: 7 hours (2 sessions of 3-1/2 hours)
Prerequisites: None

Visicalc is a computer tool for anyone whose work calls for creation of spreadsheets (tables of words, numbers, and arithmetical results). It provides unique capabilities to process, display, and file tabular data. It is easy to use, and can be learned in a few hours. No prior knowledge of programming is required. The course will cover all the features of Visicalc, and will include examples of how to use it on typical IBM spreadsheets.

We also hope to offer a course on 8088 assembly language programming later in 1982.

Blair R. Martin, VM(GDLIS2/MARTIN), U05/032-2, Endicott,
8+252-8680

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8201-13 WORK NO LONGER IN PROGRESS -- TNE (THE NAMELESS EDITOR)

There are already several full-screen editors available for the PC which are written in Pascal, so I see no reason to continue to develop a BASIC-language editor which will be inherently slower and clumsier than an editor which can be invoked directly from DOS.

Despite this, if anyone would like a copy of TNE in its current (and FINAL) state, I'll be happy to send it to you over the network, on an "as is" basis. Caveat Requestor!

David Singer, VM(BCRVM1/VM883623), Boca Raton, 8+443-7908

8201-14 EXPORT/IMPORT -- CONVERT PC FILES TO AND FROM TRANSPORTABLE FORMAT

Export is a program which converts any IBM Personal Computer DOS file into a format which you can then transmit to another IBM Personal Computer, either directly or through the Corporate Job Network. Import takes a file produced by Export and converts it back into its original format. Export and Import are written in IBM Personal Computer Pascal, and are supplied in source form.

The user's guide and source for the programs are on the IBMPC disk at YKTVMV, under the following filenames:

- EXPORT PASCAL (source for Export)
- IMPORT PASCAL (source for Import)
- EXIM INC (include file for both programs)
- EXPORT SCRIPT (user's guide for both programs)

David Singer, VM(BCRVM1/VM883623), Boca Raton, 8+443-7908

8201-15 8086/8088 ARCHITECTURE DESCRIPTION

Having scoured all the IBM documentation I could get my hands on, in an unsuccessful attempt to learn something of the architecture of the PC's processor, I turned to the outside world and found an absolutely delightful book written by the man responsible for the architectural definition of the 8086 processor. The book treats the 8086/8088 architecture in detail, with emphasis on the reasons why things were done the way they were, and includes a good section on system design considerations using the 8086/8088 processor chip.

For all who would like to learn about the architecture of the PC, I highly recommend "The 8086 Primer" by Stephan P. Morse, Hayden Book Company, 1980.

Bill Thompson, VM(STLVM1/THOMPSON), Santa Teresa

8201-16 SOFTWARE TOOLS IN PASCAL

There is a new book available from Addison-Wesley called Software Tools in Pascal, by Brian Kernighan and P. J. Plauger. It includes complete source code and documentation for hundreds of software development tools such as file inclusion, comparison, and printing aids, sorting programs, pattern finding and replacement programs, a macro processor, and a simple line-oriented text editor and text formatter. All programs are written in standard Pascal, so they should run on any machine with a Pascal compiler (including the IBM PC).

Even if you don't know Pascal, you should have no trouble following the programs in this book, if you're familiar with some structured programming language such as PL/I or PL/S.

Software Tools in Pascal can be purchased for \$14.50 from: Addison-Wesley Publishing Co., 2725 Sand Hill Road, Menlo Park, CA 94025, TEL (415) 854-0300, or Addison-Wesley Publishing Co.,

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Jacob Way, Redding, MA 01867, TEL (617) 944-3700. I ordered mine by phone with my VISA card, and it arrived within two weeks.

All the programs are available in machine readable form on a 9-track 800 BPI tape (which is copyrighted). The tape costs \$45.00 plus \$2.50 for postage, and it must be ordered from the Redding office.

I'm planning to get most of these programs up and running on my Personal Computer and would be interested in hearing from other users of these software tools.

Robert A. Wilson, VM(STLVM3/RAWILSON), Santa Teresa, 8+543-5511

8201-17 HINTS AND KINKS FROM STAN

COLOR/MONO CAUTION: Flash...DO NOT set dip switch 1 position 5 on with an IBM monochrome display connected. You will blow a non-accessable fuse in the monochrome display. Boca is aware of the situation and had previously noted it in the TRM as a warning to "insure that both adapters are properly initialized"

VISICALC: I have been receiving both inquiries for, and offers of, specific Visicalc models. It seems to me that a central repository of Visicalc models would be very useful. I would like therefore to solicit information on what you need or have to offer in the way of Visicalc models. To start off the pool I have been sent a manufacturing model to perform what is known (in manufacturing) as a waterfall model. Work is also being done locally on function budgets and staffing. Sooooo, let me know what you have or need and I'll publish the pool status monthly.

APPLICATIONS: As promised, here are recently received PC application haves and needs.

Bruce, at the Advanced Marketing Institute in La Hulpe, Belgium is working with video disc players and the PC to create an education delivery system that has a 10 or 12 language capability for both audio and text. IBM IEC, b-1310 La Hulpe, Belgium, VM(IECVMI/0700049), Tel: (02) 657 90 80 x4633

Craig Newmark, Boca Raton, is working on both IEEE interfaces as well as full duplex 3101 emulation. VM(BCRVM1/VM569674), MVS(BCR68A/#569674), tel:8-443-7470

M.T. Stevens is also looking for or will build an IEEE interface. VM(MHVSPA/A33-MTS), tel:8-253-8546 (Gentlemen, don't forget Tecmar.)

Dave Schwaderer is looking for program development tools e.g. editors, debuggers, BASIC program cross reference generators etc. VM(SPPVM1/TA93G13) tel: 8- 438-3018

Jim Panttaja at STL lab is leading an effort to produce a Pascal based Programmer Work Station. VM(STLVM1/PANTTAJA)

CONNECTORS AND CABLES: Cables for async cards (as mentioned in PCN8102) must be fabricated or obtained by you. I have heard that ComputerLand is providing this "service". Also there is a San Jose firm which has quoted IBM a price of \$18 for a 6 ft. cable. (Dicar, 6259 Shadelanes Dr., San Jose 408-268-2811)

Jack Woodson is researching sources of connectors e.g. the shell connector needed for the A/D card. Following is some initial input from Jack:

ITT CANNON pn format is Dxny where:

- D means D shell
- x is hood size (9pin=E, 15pin=A, 25pin=B, 37pin=C)
- nn is pins (9,15,25,37)

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- y is S for socket or P for plug.

ITT numbers and hood numbers came out of a Souriau, Inc catalog which purported to show Souriau equivalence to ITT parts. The catalog showed an address for Souriau of 7765 Kester Ave..Van Nuys, Ca 91405, Phone (213)+787-5341.

Jack says "Got my info from a local PC store (not Computer-Land) bought 1 of each (except 37 pin)...Works like a champ!...got a CINCH hood for the 15...They didn't have a Souriau hood".

Jack Woodson, VM(TUCVM1/WOODSON), Tucson, 8+562-7594

MONITORS: Here is what I see the situation is for ordering high resolution color monitors for business purposes (refer to PCN8102 for specs). There are 4 monitors which I have personally seen work and for which I have obtained prices. Three of the 4 you may order direct from the manufacturer/distributor, the other (RGB Display Inc.) we will probably have to buy en masse. Your purchasing person will need to order directly from the following:

Amdek II	\$570	Amdek Corp. 2420 E. Oakton St. Suite "E" Arlington Heights, Il 60005 Attn. Go Sugiura (President) (312) 364-1180
Electrohome 1302-2	\$530	Anthem Systems Corp. 1050 Edwards Rd. Burlingame, Ca 94010 Attn. Mike Paul (President) (415) 342-9182
Barco CD33	\$1425	Information Mgmt.International 1101 S. Winchester Blvd. San Jose, Ca 95128 Attn. Joy Stone (408) 248-8250

RGB Display Corp.

Hang tight!

KINKS: The mode command syntax in the DOS manual is incorrect. There is no comma after the device field (ie. "mode lpt1: 132" will work).

If you are using the COMM.BAS program on the DOS disk, be sure to use BASIC and not BASICA. BASICA does not appear to properly pass control characters.

A CHALLENGE: While using my PC the other day to perform a LIST, the speed of the listing far exceeded anything I had previously experienced. I could not reproduce this "fastlist". I did NOT POKE any where. Any answers?!

That's all I have time for now..let's hear from you.

Stan Rosenfeld, VM(STLVM3/ROSENFEL), Santa Teresa, 8+543-3690

8201-18 INTEL 8086 SIMULATOR OPERATES UNDER MVS

The simulator is a programmed model of the Intel 8086 micro-processor and its environment and operates under MVS. Through the use of commands and features called facilities, a user can examine, modify, and generally control the pseudo microprocessor and its environment. The simulator is designed to be a productive test tool and as such, it allows a user to test load modules. In most cases, testing of program modules can be accomplished without writing 'scaffold' drivers. This technique can significantly reduce the time required to test a program module. Using TSO, a test session can be fully interactive. The simulator provides:

- Single step mode
- Setting of breakpoints
- Error reporting
- Instruction tracing
- Statistics

The 8086 software interrupts are simulated just as they are defined. Such features as diskette input/output functions and hardware interrupts are not supported. However, I/O functions from/to ports are simulated. The simulator supports ports 0-255. All port numbers greater than 255 are treated as modulo 255 port numbers (ie. $257 = 2$). The maximum storage size simulated is 64K bytes. The simulator is currently being used by a development group in Boca Raton.

Lai Le, VM(BCRV1/VM413085), Boca Raton, 8+443-0822

8201-19 INVESTIGATION OF THE ANALOG/DIGITAL INPUT CARD (P/N 1501300)

This article is a report of a comprehensive investigation of the PC's A/D input card (P/N 1501300). First the hardware aspects. Suitable control devices were constructed using a pair of double 100K ohm potentiometers and four momentary contact push button switches. For appearances sake, the components were mounted in two model kit boxes. All components except for a 15 pin D-shell connector (ITT/CANNON DA15P) were purchased at a nearby Radio Shack. The potentiometers are RS part number 271-1705 and go for \$4.95 each. Connections were made following the pinout shown on Tech Ref page 2-121/122 except +5V from pins 8 & 15 were not used. Each pair of pots were fed by the same +5V (either pin 1 or pin 9). The digital switches in each box were tied to the same ground (either pin 4 or 12).

ROM BASIC supports four analog inputs and 2 digital inputs. The analog support consists of sampling the port when a STICK(0) function and loading 4 resistance values. The first resistance value is return with the STICK(0) function, and the remaining three values are returned to STICK(n) (n=1,2,3) function calls. These resistance values could be used in a scaling operation to position a cursor on a monitor. The units I constructed presented values ranging from between 3 and 111; however, each potentiometer had its own range within these constraints. The first program I wrote positioned a cross-hair cursor on a medium resolution color graphics screen. This code used an assumption that the resistive values returned would range between 0 and 100. The code scaled these values to an Xrange of 0-319 and a Yrange of 0-199. High resolution graphics would have to scale the resistance values to an Xrange of 0-639 and a Yrange of 0-199. After getting blown out of the water a few times by scaled numbers outside of the allowable range, I placed a simple calibration loop at the front of the program that captured min-max values for each pot while they were being moved through their full ranges.

Conclusion on analog inputs is that in medium res graphics you can get a granularity of about three pixels in the X direction and 2 pixels in the Y direction. High res gets a little sloppier with 6 in the X and the same 2 pixels in the Y direction. Anybody going

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to try a 320K ohm pot for medium res X, a 640K ohm pot for high res X, or a 200K ohm pot for Y? On to digital inputs. First the Tech Ref talks about 4 digital inputs and BASIC only supports 2. BASIC's support is kinda tricky in that the STRIG function will poll 4 different values; however, you're only getting data on the status of 2 buttons. The data you get for each is 1. is it currently pushed or 2. was it pushed since the last time I asked? You should pay close attention to the TRM's statement that software should be aware of the fact that the hardware DOES NOT debounce the switches for you. What this all means is that unless you've got some awfully clean switches, your program will most likely be told that a button was pressed more times than it actually was. Advanced BASIC provides some remedies in form of STRIG(n) ON|OFF|STOP and the ON STRIG(n) function.

One final note on digital inputs. All four button states are presented to the system (I wrote a tiny machine language program to prove it) it's just that BASIC only wants to talk with 2 of them. If you really want 4 buttons in your BASIC program, you should be able to determine the state of the buttons by using the BASIC statement `BUTTON=INP(&H201)`. Following that the variable `BUTTON` will have the port byte in it and you can go to work on it to see which bits are on. Using BASIC's `OUT &H201,0` followed by a series of `INP`'s didn't turn around fast enough to capture anything on the analog lines.

Jack Woodson, VM(TUCVM1/WOODSON), 83A/060, Tucson, 8+562-7594

8201-20 TYPO FOUND IN VISICALC EXAMPLE

If you code up the examples in the back of the manual that deal with exchanging files into and out of VISICALC, there's a typo you oughta be aware of. Page B-10, line 100, reads:

```
100 DIM WORKSHEET(50,50)
```

It should read

```
100 DIM WORKSHEET$(50,50)
```

Jack Woodson, VM(TUCVM1/WOODSON), 83A/060, Tucson, 8+562-7594

8201-21 TERMINAL ERROR FOUND IN DOS EDLIN COMMAND

The EDLIN editor in PC DOS terminates and returns to DOS without saving if the disk is too full to hold the updated version of the file. Before using EDLIN to edit an ASCII file, use `CHKDSK` to be sure there is room on the disk for an additional copy of the file, plus whatever you will be adding. If you will be adding 200 characters to a 1000 character file, be sure the disk has at least 1200 characters available.

Keith Eckhardt, VM(STLVM3/ECKHARDT), Santa Teresa, 8+543-3121

8201-22 SIMPLE BASIC PROGRAM TO PRINT FOILS

I wrote the program below to create foils for a class I am teaching on PC BASIC. The program requires the user to prepare an ASCII file with an editor such as EDLIN or ESPF/PC. A line composed of a single backslash causes an eject. The first line on each page is centered. All lines are printed in expanded mode which gives 40 characters to a line and are double spaced to give 30 lines to a page. The program uses compressed mode to print the users initials, date, time, and page number at the bottom of each page.

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```

10 CLS
20 PRINT "FOIL PRINTING PROGRAM":PRINT:PRINT
30 INPUT "Enter filespec of file to be printed as foils";FILE$
40 INPUT "Enter 1 for single, 2 for double strike";S$
50 INPUT "Enter authors name or initials";AUTH$
60 IF S$ ="2" THEN LPRINT CHR$(27)+"G" 'set double strike
70 PRINT "Align paper and press any key"
80 K$=INKEY$:IF K$ = "" THEN GOTO 80 'wait for a key
90 ON ERROR GOTO 500
100 OPEN FILE$ FOR INPUT AS #1
110 LINE INPUT#1,REC$ 'read a record
120 RNUM = RNUM + 1 'count records
130 LNUM = LNUM + 1 'count lines on page
140 IF LNUM <> 1 THEN 170 'skip if not line 1
150 PAD = (40 - LEN(REC$))/2 'find length for centering
160 REC$ = STRING$(PAD," ") + REC$ 'pad record to center it
170 IF REC$ = CHR$(92) THEN GOSUB 1000 'if backslash, go eject
    ELSE LPRINT CHR$(14);LEFT$(REC$,40):LPRINT 'else print line
180 IF EOF(1) = 0 THEN GOTO 110 'if not eof, gofor more
190 GOSUB 1000 'do final eject
200 SYSTEM
500 IF ERR = 53 THEN PRINT "File "+FILE$+" not found"
510 SYSTEM
1000 REM Print footing and eject to next page
1010 IF LNUM > 29 THEN 1050 'if page is full
1020 FOR LNUM = LNUM TO 30 'find end of page
1030 LPRINT:LPRINT
1040 NEXT LNUM
1050 LPRINT CHR$(20)+CHR$(27)+"H"; 'drop expanded mode
1060 PNUM = PNUM + 1 'count pages
1070 LPRINT CHR$(15);AUTH$,DATE$,TIME$,"Page";PNUM
1080 LPRINT CHR$(18); 'drop compressed mode
1090 IF S$="2" THEN LPRINT CHR$(27)+"G"; 'set double strike
1100 LPRINT CHR$(12) 'eject to next page
1110 LNUM = 0 'reset line count
1120 RETURN

```

Keith Eckhardt, VM(STLVM3/ECKHARDT), Santa Teresa, 8+543-3121