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# HP150 vs IBM PC

by

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## 1. Introduction

This paper compares and contrasts the HP150 and the IBM PC. They are considered as both computers and as terminals to an HP3000.

In order to facilitate readability, I shall refer to the HP 150 as "the 150" and to the IBM PC as "the PC".

## 2. Two Computers

Both the 150 and the PC are 16 bit micro-computers running MSDOS on an Intel 8088 cpu. The 150 is not a "PC-compatible" machine. Because of the different disc-media, it cannot quite qualify as a "work-alike". It is classified merely as an MSDOS computer.

### 2.1 Vital Statistics

They come as similar, but not identical, computers. The following are their respective vital statistics:

	150	PC	Notes
processor speed (Mhz)	8	4.77	#1
disc speed			
50 reads (seconds)	16	12	
memory capacity (K-bytes)			
usual	256	128 / 256	
max	640	544 / 1024	#2
disc drives			
usual	2	1 / 2	#3
maximum	12	4	#4
disc storage (K-bytes per drive)			
MSDOS 2.0/2.01	258	351	
MSDOS 1.0/1.1	--	315	
disc sides	1	2	
disc media	3.5"	5.25"	#5

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serial ports	2	0 / 2	
parallel ports	0	0 / 2	
HPIB ports	1	0 / 1	
integral printer port	1	0	
display screen	integral	separate	#6
Text display			
rows	24+2	24 / 25	#7
columns	80	80	#8
quality	excellent	very good	to low
graphics			
Color	no	(no)	#9
Horizontal dots	512	512 ?	
Vertical dots	390	256 ?	
Quality	high	low-high	
Access			
from BASIC	no	yes	
Memory map	(no)	yes	#10
Escape codes	yes	no	
AGIOS	yes	no	
Tektronix emulation	yes	no	
sound	no	yes	

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# Notes:

"K-bytes" means 1024 bytes.

#1 Despite the 150's faster processor, timing tests show a timing improvement noticeably less than the ratio of 8/4.77. This is probably attributable to the similarity of memory speeds on the two machines (the cpu is often bound by memory access times).

#2 The official maximum for the PC is 544k. Techniques exist that allow nearly one megabyte of memory on a PC.

#3 Most PCs come with one disc drive. Most 150s come with either two 3.5" drives or one 3.5" and one hard disc.

#4 Few PC users seem to have more than two discs. Those with three usually have two 5.25" drives and one hard drive. Although it is possible to configure up to 4 drives on a PC, the lack of advertisements for add-on floppy drives implies that few users do this.

#5 The PC 5.25" is a defacto industry standard. The 150 3.5" drive has no standard. Apple's Macintosh 3.5" has more bytes per disc and ACT's Apricot 3.5" has fewer bytes per disc, even though all three 3.5" drives are made by Sony.

#6 The 150's display is a high quality integral display. The physical size, 8 inches diagonally, is a little small. The PC is harder to analyze because a PC can run with a monochrome display (25 by 80, high quality), a color display (25 by 80, or 25 by 40, low to high quality), or both. To further complicate matters, add-on cards exist to provide graphics capability on the monochrome display.

#7 The 150 has 24 lines, 2 soft-key lines, and one terminal status line. It comes with two pages of alphanumeric display memory. The PC, as a computer, has one page of display memory with the monochrome monitor, and up to four pages with the color monitor. The PC's pages do NOT correspond to the scrolling memory of the 150. With PC2622, dozens of pages of memory are available in terminal mode.

#8 The PC, with a graphics card, has 40 or 80 character lines. The PC, with PC2622 (an HP2622 terminal emulator program), can handle lines of up to 9999 characters in length, with horizontal scrolling.

#9 A PC can be setup with a monochrome display AND graphics via the use of a non-IBM graphics card like the one from Hercules. The standard color graphics produces a distinctly inferior display of text, therefore the monochrome monitor is the monitor of my choice.

#10 The graphics memory of the 150 IS available through a memory map, but not supported or documented by HP!

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## 2.2 Real Life

As is usual in the real world, the statistics above do not completely or truly reflect reality.

Memory on the two computers is shared between MSDOS and a user's application. Thus, the amount of memory used by each computer's MSDOS and/or PAM (the 150's Personal Application Monitor) is important to consider:

	150	PC	(K-bytes)
memory used by:			
MSDOS 1.1	--	12	
MSDOS 2.0	--	24	
MSDOS 2.01	61		
PAM + MSDOS 2.01	118		#1

These figures, subtracted from a total memory of 262144 (256k), result in the following amount of usable memory:

	150	PC	(K-bytes)
memory available for user:			
MSDOS 1.1	--	244	
MSDOS 2.0	--	232	
MSDOS 2.01	195	--	
PAM + msdos 2.01	138	--	

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### 3. Hardware

This section discusses the PC and 150 hardware: costs, environmental aspects, peripherals, and availability & support.

#### 3.1 Cost

At first glance, the PC looks a lot less expensive than a 150. However, the true comparison comes when looking at reasonably configured machines.

A "usable machine" has at least: 2 disc drives, 256k, a display, a serial interface, and a printer interface.

Some prices are aggressive, reflecting mail-order or discount houses.

	150	PC	Handwell-PC	#1
basic machine	3700	1355*	2000	#2
usable machine:	3700	2633*	2000	#3
to 256k	0	150	100 ?	
second disc drive	0	0	0 ?	
printer	500	500	500	#4
monochrome interface	0	250 *	0	
display	0	335 *	400	
RS232 interface	0	120 *	0	
total:	4200	3988	3000	

#### Notes:

#1 The Handwell PC is presented as a low-cost PC-compatible alternative to the PC (PC WORLD, April 1984, page 85). Other low cost alternatives would include COMPAQ and other portables.

#2 It is difficult to find the 150 discounted, but possible. The list price is 3995. The PC seems to never be discounted. The basic PC has no disc or display and only 64k bytes of memory. Costs in the PC column flagged with an asterisk represent IBM list price...these can be beaten, but at (subjectively) a loss of quality.

#3 IBM product number 5150174.

#4 Thinkjet (2225A for the 150, 2225C for the PC/Handwell).

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### 3.2 Environment

The physical characteristics of the two machines are strikingly different in size, weight, and noise:

	150	PC
size	small	medium
weight	medium	high
noise	medium	low-medium

(The ratings are my subjective evaluations.)

The small "footprint" of the 150 is somewhat misleading. The computer takes about 1 square foot, and the disc drive can be stacked underneath, but the keyboard is 17.5 by 8.5 inches, which is rather large and unwieldy.

One feature of the 150 I particularly like is that the top of the display is NOT vented for cooling. This means that I can place papers on top without the fear of overheating the computer. The PC display has heat venting on the top.

#### 3.2.1 Transporting the 150

The small size of the 150, plus the optional internal thermal printer, makes it easy to find room for it anywhere. Because of thoughtful engineering, it requires only one power outlet even when the internal printer is installed.

A carrying case for the 150 is available. I purchased one and discovered that the 150 is better left in one place. Nevertheless, when you MUST move a computer, the 150 is a joy to move compared to the PC! The few cables disconnect and reconnect easily and with no confusion. The 150 can be moved in 3 pieces: the 150 (display unit), the disc drive, and the keyboard. It is possible to grab the entire computer in one awful, but only if you have a strong back!

#### 3.2.2 Transporting the PC

The PC is heavy and cumbersome to transport. On mine, I fear that the keyboard connector (a DIN plug) will break when I disconnect the keyboard. There are more cables to play with on a PC, some which require thought before reconnecting.

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### 3.3 Peripherals

The two computers handle peripherals differently, and have different (partially overlapping) sets of peripherals available.

	150	PC
configuration	easy	hard #1
hardware connections	easy	easy/hard
max # of peripherals		
discs	12	4 ?
printers	6 ?	2 ? #2

#### Notes:

- #1 To logical add a new peripheral ("configure") to the PC usually requires you to open the case of the machine and change a "dip-switch".
- #2 The maximum combined number of EASILY addressable printers, plotters, and communication lines on a 150 is 6. They have the MSDOS names: PRN, LST, AUX, PLT, COM1 and COM2.

#### 3.3.1 Available Peripherals

The PC has the widest set of available peripherals ... the PC could theoretically use EVERY 150 peripheral except the internal printer! This is due to the availability of an HP-IB interface for the PC.

In practice, the most important peripherals are:

modems  
printers  
hard discs  
clock/calendars  
plotters

Each of the computers has a set of these available, with the PC having the largest set.

Modems typically come in two varieties: serial (RS232) interface, and built-in. Both the PC and the 150 should run with any serial interface modem (e.g: HAYES Smartmodem 1200). The PC has a small number of internal (built-in modems) from outside vendors. I strongly recommend the external, serial interface modem. The internal modems require a valuable PC expansion slot.

Printers come in four interfaces: parallel, serial, HP-IB, and (for the 150) internal. The 150 does not have a parallel interface. This means that most printers on the market either will not work with it, or will have to be ordered in the (sometimes) more expensive serial interface version, or will have to be used with a serial-parallel interface. In practice, this means

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that most users will probably stick to the more expensive HP-IB interface printers from HP.

Hard discs are available on both computers as standard options. I cannot review the hard disc drives, not having used either myself. I caution AGAINST buying (and using) a hard disc drive unless the subject of backing up the disc has been carefully thought out. I personally refuse to buy a hard disc until a convenient and low-cost backup mechanism exists. I consider the hard disc versus backup question to be a parallel to the nuclear reactor versus waste fuel disposal problem...you had better know what you are doing, and why you are doing it, before you pursue one without the other!

Clock/Calendars are an add-on option on the PC and are standard on the 150. If you are buying a PC, buy a non-IBM memory expansion card with a clock/calendar...it is a must!

The popularity of plotters is growing. HP makes some excellent plotters, two of which are actually priced very competitively! The 7470A lists for \$1095, and the 7475A for \$1895. (Both can often be found discounted in the back pages of Byte magazine.) Any HP-IB or serial interface plotters should work with the 150, but probably only those looking like HP plotters will be supported by HP software on the 150.

#### 3.3.2 Adding Peripherals

There are two aspects to adding a peripheral to most computers: physically connecting it (hardware), and logically connecting it (software).

##### 3.3.2.1 Adding to the 150

It is extremely easy to add peripherals to the hardware of the 150. Serial devices (e.g: modem) are plugged into either of the two serial ports on the back of the machine.

HP-IB devices are connected either to the back of the machine, or to the back of some other already-connected HP-IB device (your choice!). For an HP-IB device, the device number (from 0 to 7) must be selected on the peripheral.

Once a peripheral is added, the 150 and/or MSDOS must be told that it is there. For a serial device like a modem, usually nothing needs to be done. For devices known to MSDOS (PRN, LST, PLT, COM1, COM2, AUX, or disc drives), the MSDOS Device Configuration application must be entered. This PAM-application is on the main MSDOS disc. It allows the new device to be specified very easily.

NOTE: on the 150, if non-existent discs are configured in, PAM's attempt to show what applications are available will take up to 30 seconds longer than it should!

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### 3.3.2.2 Adding to the PC

It varies from easy to hard to add peripherals to the hardware of the PC. Some are plugged into existing interface connections (if available), while some require the case of the machine to be opened up.

Once a peripheral is added, the PC and/or MSDOS must be told that it is there. For a serial device like a modem, usually nothing needs to be done. An internal dip-switch on the motherboard of the PC tells MSDOS how many disc drives, printers, and serial interfaces exist. Thus, to add a first printer, the computer must be opened up and the dip-switch changed.

### 3.4 Hardware Availability & Support

The PC seems is available at a number of places: IBM Product Centers, Sears Business Centers, Computerland, and others. PC compatibles are available everywhere.

The 150 is available from a considerably smaller number of dealers. Some vendors carrying the 150 are less than enthusiastic because of ambivalent HP marketing strategies that often result in HP competing with the dealers for end user sales.

Hardware support for the PC is available from IBM, dealers, and a number of independent repair chains.

Hardware support for the 150 is essentially available only from HP.

HP does provide a nation-wide toll free number, (800) HP-COACH, for users to call with questions. However, the quality of support available at this number is low.

HP also provides a nation-wide toll free number, (800) FOR-HPCC, to provide pre-sales support to users.

### 4. Future HP Computers

On May 10, 1984, HP is due to announce a new computer, codenamed NOMAD. This computer will probably be called "The PORTABLE" and be an MSDOS machine with a 16 line by 80 character flip up LCD display without a touchscreen.

### 5. Problems

The 150 has a number of problems with it today, which seem to reflect a "rush to release" on the part of HP. Some of these problems are hardware, some are software, and some are documentation problems. Some of the more serious are discussed below.

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The first set of internal SE Technical Notes on the 150 report about five problems. The most serious two are:

#### -- power up failures

Apparently most, if not all, 150s suffer from sporadic failures to boot up when reset or powered on. The error message displayed on the screen is often:

Load Op Sys failed, Op Sys device not found

In this case, it is necessary to reset the machine a second (or third) time.

In some cases, the disc drive doesn't appear to realize that a disc has been inserted. My solution to this is to turn the drive off and then on, then reset the 150.

NOTE: to reboot the computer, a SHIFT-STOP key combination is usually sufficient.

#### -- RS422

When the 150 was announced, it was said to have RS422 capability. The technical notes say that 150s with serial number prefixes or 2339 or less (like mine) were shipped WITHOUT RS422 because the parts were not available.

A persistent problem with my 150 is that the clock always loses time, on the order of 10 minutes per hour, when the 150 is not turned on. (I have not kept the 150 on long enough to notice if there is any loss while turned on.)

The documentation available for the 150 is very poor. For example, how to program the touchscreen, the major feature of the 150, IS COMPLETELY UNDOCUMENTED! I bought the BASIC interpreter because the outside blurb said "program the touchscreen"! Naturally, there was no information inside! (For those of you with a 150 who have not yet latched onto the touchscreen information, contact me or look at the 150 issue of Byte ... it has a sample BASIC program to control the touchscreen!)

The documentation about MSDOS commands is atrocious. The PC devotes about 40 pages just to the commands. The 150 has 4 pages.

All of the manuals seem to come with nice divider tabs for the chapters and appendices...but on some manuals, the tabs have been inserted already, and on some the buyer must insert them. I rebel at the thought of paying \$300 or more for a program & manual and then wasting \$50 of my time inserting the tabs into the manual!

There is no technical information currently available to users concerning: touchscreen programming, AGIOS, MSDOS internals, advanced graphics escape sequences. HP announced at the Anaheim SCRUG meeting that the Advanced Programmers Package (previously known of only due to an accidental mention

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of it in the Owners Guide) has been delayed until late 1984. This package should go a long way towards resolving the technical documentation shortage.

The major complaint I have about 150 problems is that my knowledge of the above problems came from underground sources ... four months later, I have still received no official word about any problems from HP. My 150 was purchased in October of 1983, and I have received the only issue of the Communicator issued since then.

#### 6. Software Availability & Compatibility

There are thousands of programs available for the PC, and tens of programs available for the 150.

Certainly, a few hundred SIMPLE programs can probably be trivially transported to the 150 ... for these, only the disc media is a barrier. Unfortunately, simple programs are usually not very interesting.

The primary areas where the 150 differs from the PC in terms of compatibility are:

##### -- Display-screen handling

Most PC programs that do ANYTHING at all with text usually use either or both of two special techniques: memory mapped access, and the VIDEO BIOS.

(BIOS stands for: Basic Input/Output System, and is a layer of software below MSDOS.)

PC programs that want to put text up FAST do so by writing the text directly into the video display memory area. Since this area on the 150 is at a different address AND layed out in a different manner, such programs will not run and could take a long time and a lot of work to convert.

Programs that want to do such basic operations as "clear the screen" or "home the cursor" must use a special BIOS interrupt called the VIDEO interrupt. (Says something about a basic lack in MSDOS, doesn't it!) Incredibly, the 150 does NOT provide this interrupt, thus, programs using it will not run on a 150.

(Yes, it is not part of the definition of MSDOS. Yes, there are other (HP standard) ways of doing these things. B-U-T it would have been simple to provide this interrupt and map most (not all) of the VIDEO interrupt functions into standard HP escape sequences!!!)

##### -- graphics differences

Programs that use color or monochrome graphics on a PC do so in either of two ways: direct hardware access (e.g: memory mapped video) or from BASIC with the graphics statements. The hardware access technique will not work on a 150 as the graphics are at a different address and in a different (and undocumented) format.

BASIC on the 150 has NO graphics statements! (Another indication of rushing to get the 150 on the market!!)

##### -- MSDOS differences

The PC runs a slightly different version of MSDOS. This could conceivably trip-up a program.

##### -- BIOS differences

Programs that make use of any BIOS calls on a PC will probably hang and/or die on the 150. The most visible BIOS call is the VIDEO interrupt.

##### -- ROM differences

Programs that make use of any ROM addresses on a PC will not run on the 150 (or on most PC-compatibles). Indeed, this is a bad technique for programmers to use.

##### -- disc media

The real killer, for now, is the disc media. Few manufacturers are distributing software on 3.5 inch discs.

In addition to the above differences, at least three minor and unnecessary differences exist:

##### -- typeahead

On a PC, when the 16 character type-ahead buffer fills up, subsequent input will result in beeps, informing you of the situation. On the 150, nothing is done to indicate that the type-ahead buffer has filled up. My favorite public domain PC program, called BUF1023, increases the type-ahead buffer on a PC to 1023 characters. If/when a MSDOS 2.0 version of this program becomes available, I will test it on the 150.

##### -- line delete

On a PC, the MSDOS line-delete character is the escape key. On the 150 (as on the 3000), it is the control-X. I have no complaints with this as a default or as an option, but it should not have been the only choice. It would have been simple to have this be a configurable character, specified in the DEVICE CONFIG application.

##### -- input editing

On the PC, MSDOS provides a powerful form of re-editing the last line of input (using the function keys). The 150 version of MSDOS lacks this capability. Additionally, if you wish to re-enter the last input line again, a simple "cursor-up" followed by "enter" will not work if the line had started with "A>" or "B>". (In other words: MSDOS cannot "eat its own prompt", like friendlier programs such as QEDIT.)

BASIC on the PC provides a method of editing and re-entering data on the screen which is fairly powerful, if sometimes confusing. BASIC on the 150 provides something, but I gave up on it after one very cursory reading of it.

## 7. A Tale of Two Terminals

The second half of this comparison of the 150 and the PC must reflect the fact that many 150s will probably be purchased by sites owning HP3000 computers. These sites will want to use the 150 as a terminal as well as a computer. This section will review using the PC and the 150 as terminals to HP3000.

### 7.1 The 150 As A 2623A

The 150 works as a terminal, right out of the box and without a disc drive. It theoretically looks like a 2623 to the 3000 and can be configured to return a terminal id of either "2623A" or "150A".

I have not had the chance to do exhaustive testing of the 150 to see if it truly looks like a 2623. It seems to fool all of the software I have tried, but ... HP has had a lousy record of releasing "compatible" terminals in the past, so be wary of unforeseen incompatibilities.

### 7.2 The PC As A 2622

The PC can be used as a terminal on the 3000 by running any of several HP-terminal emulator programs. The program I am most familiar with is PC2622 from Walker Richer and Quinn, and shall refer to as PC2622 for the rest of this paper.

PC2622 allows the PC to look like a 2622A terminal. In practice, every test I have run succeeds. The warning about compatibility issued for the 150 above applies here as well: be wary!

In addition to providing basic 2622 emulation, PC2622 provides a number of powerful features utilizing the PC as a computer. These will be seen in the following section.

### 7.3 Nuts And Bolts

There are a number of categories in which to compare the 150 and PC2622. For each category, first the 150 and then PC2622 will be discussed.

#### -- display memory

The 150 has two screens of display memory, regardless of the total amount of memory.

PC2622 uses all of the PC's memory...providing potentially dozens upon dozens of screens of memory. The memory appears to be linked

intelligently, ala the late & great 264x family of terminals, thereby providing room for an awesome number of display lines.

#### -- speed

The 150 appears slightly slower than a 264x terminal in performing many of its functions.

PC2622 appears to be equivalent to a 264x in speed.

#### -- simulate hp26xx

The 150 appears to simulate the 2623 correctly (see section above).

PC2622 appears to simulate a 2622 correctly. I believe that a forthcoming version of PC2622 will provide 2623 graphics emulation. VDTE 2, from Inner Access Software, currently provides 2623 simulation.

#### -- keyboard (feel and layout)

The 150 has a good keyboard. The feel of the keys is nice, and the key-press "click" can be turned off or on. The keyboard DOES have two design flaws:

- the cursor keys are layed out as a squashed diamond, rather than as the more obvious full diamond found on a 264x. This flaw really hurts...it would have been so EASY to swap "cursor left" with "select" and "cursor right" with "next", and "home" with "cursor up" to result in a true diamond. I consider this to be a glaring flaw!

- The "enter" key (not the "return" key) is at the lower left of the keyboard and is absurdly easy to press by accident with the palm of the left hand. The 264x, with the "enter" key in the upper center is, to me, preferable.

PC2622 has done a good job of implementing the various 2622 keys that are physically not available on the PC's keyboard. Most functions are available by pressing ALT and a letter key. For example, the clear key is ALT-J. When in doubt, an ALT-H puts displays a screen of help text (non-destructively!) to remind you of the various keys. Two keys actually on the PC's keyboard were, surprisingly, implemented incorrectly. The "home" and "end" keys require the simultaneous pressing of "CTRL" for them to be used like a 2622's home and homedown keys. If these keys are pressed by themselves, they move to the start or end of the current line. While this is a nice added feature, the proper implementation choice would have been to have CTRL-home and CTRL-end do the new actions, and "home" and "end" the expected actions! The "enter" key is available both as F10 and the "+" of the numeric pad. It would be nice to have an option to make the numeric pad "+" be a normal "+" key.



-- upload/download

This topic is covered in the next section.

-- peripherals (cartridge tapes, printer)

Neither the 150 nor PC2622 make any attempt to provide a simulation of the 264x cartridge tape or floppy devices.

The 150, as a terminal or at the command level of MSDOS, provides the normal 2622 internal printer support. Within programs, it is up to the program to allow or disallow access to the printer. For example, VISICALC allows only restricted access to the printer.

PC2622 also simulates an internal printer.

-- touch

Only the 150 provides a touchscreen.

-- dual ports

The 150 provides two datacom ports, but appears able to accept data from only one at a time.

PC2622 also seems to accept data from only one port at a time.

DUAL/150 from Computing Capabilities Corporation and VDTE 2 from Inner Access Software, both appear to provide a dual port capability similar to that of a 2626.

-- display enhancements

The 150 provides the full gamut of display enhancements, unlike the unlamented 125.

PC2622, due to hardware limitations on the PC, cannot provide all combinations of the 2622's display enhancements. However, it allows the user to specify combinations should be displayed.

-- line drawing character set

The 150 may match the 2623, but has one mistake when compared to the 2645: the line drawing character for "H" is backwards!!! (At press time, a true 2623 has not been found for testing this character.)

PC2622, again, is limited by the PC's hardware. Nevertheless, it does an amazingly good job at simulating the 2622 line drawing character set. Some characters are not available on the PC ("V", "B", "N", and "M"), but the substitutes chosen are excellent and should probably suffice to run existing applications with no changes.

PC2622 suffers from one major incompatibility with the line drawing character set. On a 264x, and the 150, if a line of base character

set text is displayed, and then the cursor is positioned back along that line somewhere, and then a control-N is sent to the terminal, the entire rest of the line (from the cursor to the end of the line, or to the first character where a control-N or control-O was found) is instantly converted to the current alternate character set! With PC2622 this does not happen!

-- display functions

The 150 appears to have the complete set of display function characters. Unlike a 264x, nulls are displayed when display functions is turned on. (On a 264x, monitor mode must be turned on to see nulls, incs, and acks.)

PC2622 provides a unique set of characters for the display function characters. The only character not found is one for null. Two characters should have been switched: a control-M appears as a musical note, and a control-G appears as a bullet.

-- lines per screen

The 150 has the full 24 lines for text, 2 lines for softkey labels, and one status line.

PC2622 had a dilemma: the PC screen only has 25 lines. Its solution was the best possible: offer all three choices: 25 lines of text and 0 lines of softkey labels, OR 24 lines of text and 1 line of softkey labels, OR 23 lines of text and 2 lines of softkey labels! When 1 or 2 lines of softkey labels are chosen, the characters between labels 1.4 and 5.8 are used as a status display area. The user can switch between modes at any time with a single keystroke (by pressing F9).

-- characters per line

The 150 displays 80 characters per line, maximum.

PC2622 displays 80 characters per line, but can horizontal scroll for line widths of up to 9999 characters!

-- locked in approach (e.g: terminal code in row or ram)

With the 150, errors in the row code are VERY unlikely to ever be fixed. (E.g: the line drawing character "H".)

With PC2622, errors can be fixed by creating a new floppy with the revised code.

-- typeahead

The 150 provides no typeahead when used as a 3000 terminal.

PC2622 provides, at the user's option, a simple form of typeahead. This typeahead, while not as usable as the excellent TypeAhead Engine from Telamon, can be quite helpful. Unfortunately, unlike the TAE,

PC2622's typeahead cannot be turned off or on from the 3000. Perhaps a future enhancement?

#### 7.4 Upload And Download

The 150 and PC2622 both have upload and download capabilities. Each has some features that the other does not. This section shall briefly outline the two, and then compare them.

##### 7.4.1 150 Upload/Download

The 150 can upload and download files via an application called DSN/Link (not cheap!). DSN/Link can: transfer files, "record interaction to a local printer, a local file, or both", "create and execute command files", and transfer files between two 150s.

Uploads and downloads function by running a host program called LINK100.PUB.SYS. The name of this program may be changed.

Multiple files may be transferred easily by submitting a command file with commands like:

&DSCOPY a to newa, remote

&DSCOPY b to foo, remote

The command file mechanism provides a very rich set of capabilities.

##### 7.4.2 PC2622 Upload/Download

PC2622 provides a mechanism to: transfer files, copy local files to the display screen (for later transmission), and record incoming data to a disc file and/or printer.

Uploads and downloads function by running a host program called PCLINK.PUB.SYS. The name of this program is easily changed.

Multiple files must be transferred one at a time.

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#### 7.4.3 Comparing Upload/Download

	150 DSN/Link	PC PC2622
Ease of use		
overall	low/high	medium/high
single file transfer	medium	high
multiple files transfer	high	low
Speed of transfer	1	1.1
cost	200?	289 (price for PC2622)
using different host program	medium	easy
upload host program	medium	easy
command files	good	none

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## 8. Miscellaneous Notes

This section contains miscellaneous notes about the 150 that may be of interest to 150 users.

### -- shift-stop to return from terminal mode

When "terminal mode" is entered from the PAM menu, it is not at all obvious how to return back to "computer mode". Although this information may be in some manual, I finally discovered it through PAM's online help...press SHIFT-STOP to return to computer mode.

### -- Extend-L for pound sign

The British pound sign may be easily typed from the keyboard by pressing EXTEND-L. Experimentation with the EXTEND key and other keys shows some interesting extended character set characters...but, how does one generate the Spanish n-tilde?

### -- Ctrl-P

An undocumented MSDOS feature revolves around pressing CTRL-P. This is a toggle: when turned on, all subsequent characters sent to the terminal's display memory will be copied to the printer. If you don't have a printer, you will get a strange error...the easiest way to get out of this is: (optionally press return), type control-P, then an A. To turn the toggle off, hit CTRL-P again. This corresponds to the little-known CTRL-P in the PC's PCDOS, which is equivalent to pressing CTRL-PRTS on the PC.

### -- ctrl-number, number, number

The PC has a method of "faking" the typing of any arbitrary 8 bit character by using the ALT key. The 150 has a similar feature: hold the CTRL key and hit three numeric keys. That character code will be "sent". For example, a null can be entered by typing: CTRL-0 CTRL-0 CTRL-0.

### -- Configuration of discs

I have seen some 150s whose default configuration has three discs (A, B, and C). Your configuration should NOT say that you have more discs than you do! If it does, then an extra delay of 10 to 30 seconds will occur whenever PAM tries to determine what applications are available. Use the DEVICE CONFIG application to check (and correct) this problem.

### -- Don't need to open discs

For the first few days I had my 150, I was manually opening and closing the covers on the discs. The manual for my 9121 disc drive (dual 3.5 inch drive) implied this was needed. I accidentally discovered that most (if not all) 9121 drives open the discs for you.

### -- Graphics pad/Numeric pad

To shift from numeric pad to graphics pad, and back again, press CTRL and - (the "-" on the numeric pad) at the same time.

### -- 2648 Compatibility

Just in case you were hoping, as I was, the graphics on a 150 (and on a 2623) are NOT compatible with a 2648/2847. The 264x terminals had a larger graphics area, the 150/2623 simply do not display out of range points.

### -- Auto-LF

The Auto-LF mode can cause a wide number of problems on the 150 and should probably never be turned on.

### -- PAM selection

In PAM, a carriage return selects the highlighted application.

#### 9. Summary

The 150 is a nice little computer and a good terminal. The PC is a very nice computer which, with PC2622, makes a great terminal.

Keep an eye open for rumored future HP enhancements to the 150: bigger screen, color, portable. Any of these, coupled with a minor price cut, could put the 150 back into direct contention with the PC. For now though, I would tend to choose a PC (or compatible) over a 150 UNLESS my application would benefit greatly from the touchscreen.

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