



INNOVATIVE PC Data Acquisition and Collection Solutions

LANpoint PLUS and LANpoint TIME Terminals - Terminal Emulation Software QuickStart Guide

855M532 Rev. 3
May 9, 2008

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License Type:	S/N:
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The Serial Number (S/N) is required when obtaining Software Authorization Code – see instructions inside for further information

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INSTRUCTIONS

There are three steps to configure the terminal and set the various IP addresses. Before you start, you may want to note the terminal's hardware address (MAC) address and contact apps_eng@lanpoint.com, or call Intelligent Instrumentation Application Engineering for an authorization code (see FAQ#1 below).

You can use the terminal emulation without an authorization code (also known as the *License Key*), in evaluation mode, any time. It will have an extra "nuisance" message and will time-out every 30 minutes; it is full-featured in every other respect. See FAQ#5 for instructions to un-install the terminal emulation software.

Step 1 – Setup the hardware – ON A LANPOINT TIME terminal YOU WILL NEED AN EXTERNAL KEYBOARD FOR INSTALLATION TASKS

- A) If instructions are needed, see *LANpoint PLUS (or TIME) Installation and Maintenance Manual* and/or the *Quickstart Guide* that comes with the terminal. You'll need at least:
- 1) a LANpoint PLUS or LANpoint TIME data collection terminal with power supply
 - 2) if you are using a wireless RF Ethernet card, you may also need your network with a wired 10/100Base-T connection, a host PC, and the program *CERHOST.EXE* which can be found on the diskette shipped with this product, among other places. These will be used once only, to configure the wireless IP address and other wireless parameters.

Step 2 –Set terminal's IP address and install the Terminal Emulation Software

- A) Press the '2nd' key and then the F8 key to launch the *setup* utility
- 1) if you are using wired Ethernet with DHCP, go to step 2B
 - 2) If you are not using DHCP, at the *Setup>* prompt, type *nixxx.xxx.xxx.xxx*, where xxx.xxx.xxx.xxx is the hardcoded IP address. Likewise, you can use the *ng* and *ns* setup commands (FAQ#10) to set the gateway and/or subnet mask.
 - 3) for wireless Ethernet, you will use the remote display capabilities and a networked PC to set wireless address and other parameters. Complete instructions can be found in the *LANpoint PLUS / TIME QuickStart Guide* that ships with each terminal
- B) At the *Setup>* prompt, type *installte* and press *ENTER*. Press the function key that corresponds to the type of install or un-install you desire. Verify that you wish to install the software, and when done a success message will momentarily be displayed.
- C) Reboot the terminal by re-powering or pressing the *F6* key. When reboot is done you will see the initial terminal emulation screen that shows *TwinClient xx*.

Step 3 – Terminal Emulation Configuration – assign Host IP address(es)

- A) At the *TwinClient xx* screen, press *SHIFT* and then *C* on the terminal's keyboard. This takes you into the emulator's configuration menu with *Edit Menu Options* on line 1 and the menu name (i.e. *Edit Server/Host IPs*) on line 2.
- B) At the *Edit Server/Host IPs* menu, press *ENTER*. You will see a host name and the cursor will be positioned for you to enter the host computer's IP address. Enter this value and press *ENTER*. At the prompt for *Port* (number), enter the port number (usually 23 for telnet sessions) and press *F3* to save the changes. Note that you can enter another (failover) host address (up to 4) by pressing the *ENTER* key after entering the port number, if you wish. Skip to Step 3D if you want to run in demonstration mode only.
- C) arrow down (press 2nd, then *L*) to *Edit License Key* and press *ENTER*. You will see a 12-character MAC address at the left side of line 1 on the display. You must know this MAC address when you contact Intelligent Instrumentation for the license key (also known as *Authorization Code*). Enter the code assigned, capitalization and dashes exactly as given, and press *F3* to save.
- D) reboot the terminal for the IP addresses and other menu configuration items to take effect.
- E) When the *TwinClient xx* screen is shown, press the *ENTER* key to attach to your host.

FREQUENTLY ASKED QUESTIONS

NOTE: Some of the FAQ's mention running a program or utility like the *cepad.exe* text editor. To get to other programs, utilities and any of the basic functionality of the terminal, you will need to exit the terminal emulation software as described in FAQ#4 below. Then you will be able to run the remote display utility to see the Windows CE.NET desktop and toolbar that is very familiar to desktop PC users.

Frequently Asked Questions – Startup and Shutdown

- Q1:** My terminal shows a “Recoverable error” message upon startup of the terminal emulation software, and also exits the emulation functions every 30 minutes. What’s going on?
- A1:** For demonstration and evaluation purposes, the terminal emulation software has the capability to run in evaluation (unlicensed) mode. The symptoms described are what is seen when there is no valid “authorization code”, also called “license key”, known to the emulation software. Contact Intelligent Instrumentation (see the second paragraph of this document) for the assignment of an authorization code. **IMPORTANT:** You will need the serial number affixed to the cover of this document when calling for the authorization code. Then follow the instructions given in installation instructions, step 3C above.
- Q2:** You have mentioned manuals several times, but I don’t find some of the manuals in the product package I received, and I don’t see them on the price list. Where can I get these manuals?
- A2:** The documentation for the Twin Client software is downloadable at <http://www.connectrf.com/Documents/lanpointplus.pdf>.
- Q3:** You have mentioned the Internet for downloads several times. What if I can’t download for some reason?
- A3:** Just contact our technical support people by phone, email, or FAX and we will be glad to get you whatever you need in a format that you can easily use.
- Q4:** Some answers and the appendix have said that I should edit files on the terminal. It’s always running the terminal emulator, so how do I do that?
- A4:** There are many ways, but the quickest way is to use *cepad.exe* on the terminal (*cepad.exe* is very much like *notepad.exe* on a desktop PC), via the remote display utility. To do this, you must a) exit to the operating system, b) run a remote display host utility on a desktop PC, c) run a remote display client utility on the LANpoint PLUS, and d) use the CEPad utility, *cepad.exe* on the LANpoint PLUS, to edit the file.

a) Exit to the operating system:

Exit the terminal emulation software: go into the configuration menu (see step 3B in the installation instructions above), and arrow-down to the *Exit to OS* selection and press *ENTER*. This will exit you to a blank display on the terminal.

b) Launch remote display host utility:

On a "development" PC connected to the same network as the LANpoint PLUS, copy and launch *CERHOST.exe* (from the “Terminal Emulation Software Configuration Utilities” download file at <http://www.lanpoint.com/downloads.asp#term>, or from the LANpoint PLUS’ SDK). A blank window titled *Remote Display Control for Windows CE* will open. Now, find and note the IP address of this development PC.

c) Launch remote display client utility:

On the LANpoint PLUS terminal, press the 2nd key followed by the F8 key. You will see the prompt *Setup>*.

At the *Setup>* prompt, type *rdhost xxx.xxx.xxx.xxx* where *xxx.xxx.xxx.xxx* is the IP address of your development PC. On the 2nd line of the display, you will see verification like *Host xxx.xxx.xxx.xxx*.

At the *Setup>* prompt, type *rdstart* and press the *ENTER* key; then press F8 to exit the setup utility. You will now see the LANpoint Plus' Windows CE.NET desktop in the *CERHOST* window on the development PC (you may have to use your PC's mouse to close an informational dialog that is shown there).

d) Edit the file on the LANpoint PLUS:

Through the development PC's *CERHOST* window, you can now run *\Flash\cepad.exe* from the *Run* selection under the *Start* menu, or find it through the *My Computer* icon. Open the file of your choice, edit it, and save it, just as you would with Notepad on a desktop PC. Now reboot the LANpoint PLUS for the changes to take effect.

Q5: I've installed the terminal emulation software to evaluate it. Now, how do I un-install it?

A5: Exit the terminal emulation software to the blank display (see FAQ #A4a), then run the install program again (see installation step #2B), choosing the *Remove Terminal Emulation* (F4 key) selection. Then reboot the terminal.

Frequently Asked Questions – Configuration

Q10: The *Setup* utility that is referenced for use in the initial setting of the IP address seems handy. What commands does it support?

A10: The commands most important to using terminal emulation software are described in the installation instructions and in these FAQs. Generally, these set or display Ethernet addresses, launch the remote display utility, set time/date, and launch programs (such as *installte.exe*). For a complete list, see the *LANpoint PLUS / TIME Installation and Maintenance Manual*.

Q11: I don't want to stop work if my host is down. Is there a way to attach to a secondary host if the primary one is down?

A11: Yes, you can define up to 4 different hosts. In the configuration menu (see step 3B above), you can define multiple hosts. When the emulation software begins to run and there are multiple hosts defined, the user will be asked which host to connect to.

Q12: I am not planning on using the integral Ethernet connector on my LANpoint PLUS. Instead I'm going to use an RF Ethernet PCMCIA card and access points for wireless connectivity to my network. Can this be done with the terminal emulation software?

A12: Yes. Once the RF card is installed in the terminal and the IP address is configured properly, the fact that the terminal is wired or wireless is immaterial, **as long as you disable the wired Ethernet adapter in Control Panel. If you do not disable the wireless port, the host may reject the connection, even though you can ping the host and ping the LANpoint PLUS.** For complete wireless IP addressing instructions, see the *LANpoint PLUS QuickStart Guide* that ships with each LANpoint PLUS terminal, or the *LANpoint PLUS Installation and Maintenance Manual*.

Q13: I purchased VT220 emulation, but what would really work better is HP700 emulation (or VT100 emulation). Do I have to purchase something different?

A13: No, you do not have to purchase something different. Use *cepad.exe* to edit the file called *\flash\twinclient\tnvt.cf* (see FAQ#4 for instructions to run *cepad.exe*). Find a line that says “emul=vt220;” and change it to “emul=hp700;” (or “emul=vt100;”) and re-boot. That’s all there is to it.

Q14: Can I use DNS rather than having to hard-code IP addresses?

A14: Yes. Simply use IP address 0.0.0.0 when configuring the host IP address. **Be sure to specify the host name.** You may have to do this by *cepad.exe* to edit the file *\flash\twinclient\power.net* (see FAQ#4 for instructions to run *cepad.exe*), changing the host name from *Primary Host* to your host’s name.

Q15: The telnet information on my host lists the device name for the attached terminal as “EmulDev”. How can I make this more meaningful for our network management personnel?

A15: The quickest way is to use *cepad.exe* on the terminal to edit the file *\flash\twinclient\tnenvcom.cf* (see FAQ#4 for instructions to run *cepad.exe*). Change the line *DEVNAME=EmulDev;* to *DEVNAME=xxx;* where *xxx* is your desired device name.

Q16: Some of the warning or error messages should be accompanied by an audible warning and remain displayed for a longer period of time. What can I do about this?

A16: You can use an editor to modify the file on your terminal called *u_msgs.txt*. You can find the format of this file at <http://www.lanpoint.com/downloads.asp#umsgs>, where you can also find a description of the meaning of the messages.

Q17: When the terminal first starts, I see an “AirLoad” dialog open, then a dialog that is titled *Enter Server IP Address*. I enter my host server’s IP address here but it doesn’t seem to have anything to do with that server. What’s going on?

A17: The Airloader server is not (necessarily) your host application server. This dialog is to identify the “Airload server” PC that is part of the optional advanced *Airloader* feature. Use *cepad.exe* to edit *\flash\twinclient\tnconfig.txt* (see FAQ#4 for instructions to run *cepad.exe*) and change the line that says *RunAirloader=1;* to *RunAirloader=0;*. Airloader is an advanced feature for automatically updating terminals with configuration and program file updates. If you want to activate Airloader, you may purchase a license for it. See FAQ#22.

Frequently Asked Questions – Keyboard & Display Re-Mapping, Advanced Features

Q20: I’ve got an application for which I want the tab character to be mapped to the F4 key. Can this be done easily?

A20: Yes, keyboard re-mapping is supported by the emulation software. It is beyond the scope of this QuickStart Guide. Contact Applications Engineering at Intelligent Instrumentation, Inc, or see the documentation for the Twin Client software, downloadable at <http://www.connectrf.com/Documents/lanpointPLUS.pdf>. This functionality (as well as display re-mapping – a.k.a. “screen scraping” and many of the other advanced features) requires the Windows-based utilities to be downloaded and installed from <http://www.lanpoint.com/downloads.asp#term>. Some require optional licensing.

Q21: I’d like larger text on the LCD screen. Is it adjustable?

A21: On the LANpoint terminals that have graphic displays, the font size can change. That is not possible with the text display on the LANpoint PLUS, however.

Q22: I want to use some of the advanced features of the terminal emulation software. I've downloaded the utilities from Intelligent Instrumentation's website - <http://www.lanpoint.com/downloads.asp#term> - and configured all the files as I want them. Now, what's the easiest way to get them to the terminal?

A22: Airloader is a very good way to do this. Airloader can automatically attach to the Windows PC that you used to configure your files and copy all the appropriate ones to the terminal next time it reboots. It is beyond the scope of this document to describe the steps necessary to do this, but it is simple and quick. Give Applications Engineering a call and we'll be glad to explain how to license and activate this optional feature.

Q23: My user typed 2nd-F8 on the terminal and found the *Setup* utility. How do I disable the Setup utility?

A23: Remove or modify the Programmable Function Key definition (in *\Flash\Startup*) that defines 2nd-F8. See the *LANpoint PLUS Developer's Manual* for information about creating and modifying Programmable Function Keys.

Frequently Asked Questions – Troubleshooting

Q30: When I'm using my emulator, I don't see my regular logon prompt – the screen is blank or only shows portions of some logon messages. How do I log onto my host?

A30: If you see a familiar part of your logon screen, you may be able to solve this as described in FAQ#31 below. If you are not seeing a connection to your host, check to see if you can see a session starting on port 23 (or whatever telnet port you specify in the *power.net* file or the configuration menu – step 3B above); AS400 hosts must have a "5291" device defined (AS400 has this by default – it may be disabled). This and other tech notes can be found on the product diskette, our web site www.lanpoint.com, or by contacting Tech Support.

Q31: I see only part of a user prompt on my terminal's LCD screen. It looks like the screen has shifted to the right, showing only the last part of the prompt. What's going on?

A31: This is due to special functionality built into the software. Basically, the emulator can be set so that the terminal's LCD "window" is at a fixed position on the full terminal screen, or allowed to move. As such, it may shift the LCD display somewhere you do not wish it to be. Use the *cepad.exe* utility to edit the *\flash\twinclient\tnvt.cf* file (see FAQ#4 for instructions to run *cepad.exe*) to be sure it has the line *quad=off;* within it. Other values you can try include *quad=on;*, *quad=lock;*, *quad=hard;*, and *quad=soft;*.

Q32: I changed the terminal's IP address, subnet mask and gateway address in the setup menu, but it doesn't seem to work. What's going on?

A32: If you are running the Windows CE.NET version 4.2 OS, make sure you run the program *\flash\ceflush.exe* to permanently update the registry. Then reboot the unit. This has to be done for the changes to take effect. With Windows CE 5.0, registry changes are permanent after a warm re-boot and CEFlush is not necessary.

Q33: The terminal does not seem to connect to my host and I'm getting an *NCU packet error* message. Why doesn't it work?

A33: In the emulator's *Edit Functions* configuration menu (see step 3A above), arrow down to the *Switch Modes* menu selection item and hit enter. This will change the mode message to *Switched to TNClient Mode* instead of *Switched to Server Based Mode*. The TNClient mode connects directly to your host rather than through a pre-processor.

Also, if you are using wireless Ethernet and the terminal does not connect to the host or if the host rejects the connection you may need to disable the wired Ethernet adapter. See FAQ#12.

Q34: I see a DNS error message and I don't want to use DNS. How can I fix this?

A34: See also FAQ#14. You have a host IP address set to 0.0.0.0. Change this to the correct IP address for your host. NOTE: The value in the host name field is not important when there is a hard-coded host IP address.

Q35: I have a slot reader that is returning different characters than what is coded on the card being read. What's going on?

A35: Some slot readers are connected to the terminal as a "wedge". These slot readers have a PS/2 mini-DIN6 connector on them and are plugged into the external Keyboard (*KYBD*) port. If that is the case, and you have some keys re-mapped to other than the standard characters, this slot reader input is also re-mapped. For instance, if you re-map the 8 key to be a D, all 8's in the scanned data will be changed to a D. The solution is to re-map the keyboard using different keys/characters, or use a slot reader that connects through a different port on the terminal.

Q36: I have one host that I connect to, but made a mistake and did not press F3 when configuring my host IP address and port number. The menu asked for the next host, at which time I pressed F3 and saved the settings. Now I have a backup host with IP address 0.0.0.0 that I can't seem to get rid of. The emulator asks which host to connect to every time it begins execution. What do I do now?

A36: You can edit the file called *\flash\twinclient\power.net* (see FAQ#4 for instructions to run *cepad.exe*). Remove the second host line. Another way to do this is to press F9 (Shift-F1) while in the configuration menu, which clears out the entire *power.net* file and allows you to start over again.

Q37: I have a user who says the arrow and delete keys don't work on data in a field shown on the screen – the cursor won't move past the first character in the field with the arrow key, and the delete key does nothing. He has to type over the entire string of data to replace one character that is in error. Does it have to act this way?

A37: This happens after you leave the field (say, tabbing to the next field), and then noticing the erroneous data, or when some data is re-displayed by the host. You can change this by editing the *\flash\twinclient\tnvt.cf* file (see FAQ#4 for instructions to run *cepad.exe*) and changing the line that says *dflt_d=off;* to *dflt_d=on;*.

Q38: I've attached a serial scanner to COM1 on the terminal, and it appears to be working because it beeps as if the data is decoded, and when I run *WedgeCE.exe* on the terminal, I see data show-up in the *cepad.exe* window. But when I run the terminal emulation software, I don't see any data. What's going on?

A38: The terminal emulation software depends on a carriage-return/line-feed to determine that the whole character string has been received from serial devices before it acts on that data. Connect's Technical Note Number T1215 (www.connectrf.com in the technical support area) explains how to configure a Symbol scanner to do that. All serial scanners will have similar configuration abilities. For the Symbol scanner mentioned in that Technical note (a Symbol model number 8946), the particular instructions with the scanner's configuration manual page numbers are:

- 1 - (SET RS-232C DEFAULTS) pg3-3 (set RS232 parameters to factory defaults)
- 2 - (SET ALL DEFAULTS) pg3-3 (set all other parameters to factory defaults)

- 3 - RS-232 HOST BAUD RATE (9600) pg3-28
- 4 - RS-232 HOST PARITY (NONE) pg3-29
- 5 - RS-232 HOST DATA TRANSMISSION FORMATS (<DATA><SUFFIX>) pg3-21
- 6 - RS-232 HOST PREFIX/SUFFIX VALUES (SUFFIX) pg3-22
- 7 - RS-232 HOST PREFIX/SUFFIX VALUES (<1><0><1><3>) pg3-23 (set the suffix to carriage-return/line feed – ASCII character 10/ASCII character 13)

APPENDICES

Appendix A – Manually Editing Configuration Variables

The terminal emulation software supplied by Intelligent Instrumentation for the LANpoint PLUS data collection terminal communicates to the host system via TCP/IP. The host's IP address is stored and retrieved from an ASCII file named *power.net*.

For full operation, the software requires an Authorization Code that is assigned based on the terminal's MAC address. This eliminates an initial "nuisance" message and removes a 30-minute time-out limitation. This code is unique and is keyed to the MAC address of the unit's integral Ethernet MAC address. The authorization code is stored in an ASCII file, called *crfauth* (no extension).

Many configuration variables are also stored in a file called *tnvt.cf*. Do not change any of these variables with a text editor unless specifically instructed to do so.

These ASCII files all reside in the folder *\flash\twinclient*. They are modified by the configuration menu within the terminal emulation software, or may be edited with any standard file editor such as *\flash\cepad.exe*.

If you intend to use the *cepad.exe* text editor, you may have to exit the terminal emulation software to access it. Those instructions are given in FAQ#4 above.

POWER.NET

The contents of the file *\flash\twinclient\power.net* look something like the following.

```
198.182.118.169,23,Primary Host;
```

There are 3 fields, comma-delimited. There are no spaces except perhaps in computer name. The line is terminated with a semicolon.

The first field is the IP address of the host where the client terminal will attach. The second field is a valid host port number - 23 is standard for a Telnet session. The third field is the host computer name that you make up to easily identify the host, or the host name if DNS is used. For backup servers, additional lines, up to 5 total, can be added.

CRFAUTH

The terminal authorization code may be edited manually. Contact Intelligent Instrumentation apps_eng@instrument.com, or call 1-800-685-9911 for a valid code. You will need the serial number on the cover of this document in order to have an authorization code assigned.

The codes are related directly to the MAC address for proper activation, so e-mail is the preferred method to reduce errors. You will find the wired MAC address on labels inside the unit or on the back of the case (the last 6 hex characters; the first 6 are always 00C052). If you are using wireless Ethernet, you will find the MAC address on the wireless PCMCIA card usually. You will always see the correct MAC address in the terminal emulation menu *Edit License Key* (see installation step 3C). Provide the unique MAC address and the unique terminal emulation software serial number(s) for each authorization code requested.

In turn, a unique authorization code will be assigned for each MAC address you provide. It must be edited into *\flash\twinclient\crfauth* (no filename extension) exactly as specified – capitalization and dashes included.

LANpoint PLUS Vterm Default Keyboard Map

Key	VT	3270	5250
a	<a>	<a>	<a>
b			
c	<c>	<c>	<c>
d	<d>	<d>	<d>
e	<e>	<e>	<e>
f	<f>	<f>	<f>
g	<g>	<g>	<g>
h	<h>	<h>	<h>
i	<i>	<i>	<i>
j	<j>	<j>	<j>
k	<k>	<k>	<k>
l	<l>	<l>	<l>
m	<m>	<m>	<m>
n	<n>	<n>	<n>
o	<o>	<o>	<o>
p	<p>	<p>	<p>
q	<q>	<q>	<q>
r	<r>	<r>	<r>
s	<s>	<s>	<s>
t	<t>	<t>	<t>
u	<u>	<u>	<u>
v	<v>	<v>	<v>
w	<w>	<w>	<w>
x	<x>	<x>	<x>
y	<y>	<y>	<y>
z	<z>	<z>	<z>
A	<Shift><a>	<Shift><a>	<Shift><a>
B	<Shift>	<Shift>	<Shift>
C	<Shift><c>	<Shift><c>	<Shift><c>
D	<Shift><d>	<Shift><d>	<Shift><d>
E	<Shift><e>	<Shift><e>	<Shift><e>
F	<Shift><f>	<Shift><f>	<Shift><f>
G	<Shift><g>	<Shift><g>	<Shift><g>
H	<Shift><h>	<Shift><h>	<Shift><h>
I	<Shift><i>	<Shift><i>	<Shift><i>
J	<Shift><j>	<Shift><j>	<Shift><j>
K	<Shift><k>	<Shift><k>	<Shift><k>
L	<Shift><l>	<Shift><l>	<Shift><l>
M	<Shift><m>	<Shift><m>	<Shift><m>
N	<Shift><n>	<Shift><n>	<Shift><n>
O	<Shift><o>	<Shift><o>	<Shift><o>
P	<Shift><p>	<Shift><p>	<Shift><p>
Q	<Shift><q>	<Shift><q>	<Shift><q>
R	<Shift><r>	<Shift><r>	<Shift><r>
S	<Shift><s>	<Shift><s>	<Shift><s>
T	<Shift><t>	<Shift><t>	<Shift><t>
U	<Shift><u>	<Shift><u>	<Shift><u>
V	<Shift><v>	<Shift><v>	<Shift><v>
W	<Shift><w>	<Shift><w>	<Shift><w>
X	<Shift><x>	<Shift><x>	<Shift><x>
Y	<Shift><y>	<Shift><y>	<Shift><y>
Z	<Shift><z>	<Shift><z>	<Shift><z>
1	<1>	<1>	<1>
2	<2>	<2>	<2>
3	<3>	<3>	<3>
4	<4>	<4>	<4>
5	<5>	<5>	<5>

6	<6>	<6>	<6>
7	<7>	<7>	<7>
8	<8>	<8>	<8>
9	<9>	<9>	<9>
0	<0>	<0>	<0>
F1	<F1>	<F1>	<F1>
F2	<F2>	<F2>	<F2>
F3	<F3>	<F3>	<F3>
F4	<F4>	<F4>	<F4>
F5	<F5>	<F5>	<F5>
F6	<F6>	<F6>	<F6>
F7	<F7>	<F7>	<F7>
F8	<F8>	<F8>	<F8>
F9	<2nd><F1>	<2nd><F1>	<2nd><F1>
F10	<2nd><F2>	<2nd><F2>	<2nd><F2>
F11	<2nd><F3>	<2nd><F3>	<2nd><F3>
F12	<2nd><F4>	<2nd><F4>	<2nd><F4>
F13	<2nd><F5>	<2nd><F5>	<2nd><F5>
F14	<2nd><F6>	<2nd><F6>	<2nd><F6>
F15	<2nd><F7>	<2nd><F7>	<2nd><F7>
F16	<2nd><F8>	<2nd><F8>	<2nd><F8>
F17	<Alt><F1>	<Alt><F1>	<Alt><F1>
F18	<Alt><F2>	<Alt><F2>	<Alt><F2>
F19	<Alt><F3>	<Alt><F3>	<Alt><F3>
F20	<Alt><F4>	<Alt><F4>	<Alt><F4>
F21	<Alt><F5>	<Alt><F5>	<Alt><F5>
F22	<Alt><F6>	<Alt><F6>	<Alt><F6>
F23	<Alt><F7>	<Alt><F7>	<Alt><F7>
F24	<Alt><F8>	<Alt><F8>	<Alt><F8>
. period	<.>	<.>	<.>
! exclamation	<2nd><1>	<2nd><1>	<2nd><1>
@ at sign	<2nd><2>	<2nd><2>	<2nd><2>
# pound	<2nd><3>	<2nd><3>	<2nd><3>
\$ dollar	<2nd><4>	<2nd><4>	<2nd><4>
% percent	<2nd><5>	<2nd><5>	<2nd><5>
^ carat	<2nd><6>	<2nd><6>	<2nd><6>
& ampersand	<2nd><7>	<2nd><7>	<2nd><7>
* asterisk	<2nd><8>	<2nd><8>	<2nd><8>
(left parenthesis	<2nd><9>	<2nd><9>	<2nd><9>
) right parenthesis	<2nd><0>	<2nd><0>	<2nd><0>
` grave accent	<2nd>	<2nd>	<2nd>
? question mark	<2nd><c>	<2nd><c>	<2nd><c>
broken vertical bar	<2nd><d>	<2nd><d>	<2nd><d>
> greater-than sign	<2nd><e>	<2nd><e>	<2nd><e>
{ left brace	<2nd><f>	<2nd><f>	<2nd><f>
} right brace	<2nd><g>	<2nd><g>	<2nd><g>
' apostrophe	<2nd><h>	<2nd><h>	<2nd><h>
/ forward slash	<2nd><i>	<2nd><i>	<2nd><i>
“ quotation mark	<2nd><j>	<2nd><j>	<2nd><j>
← left arrow	<2nd><k>	<2nd><k>	<2nd><k>
↓ down arrow	<2nd><l>	<2nd><l>	<2nd><l>
- hyphen	<2nd><m>	<2nd><m>	<2nd><m>
, comma	<2nd><n>	<2nd><n>	<2nd><n>
↑ up arrow	<2nd><o>	<2nd><o>	<2nd><o>
[left bracket	<2nd><r>	<2nd><r>	<2nd><r>
\ backward slash	<2nd><s>	<2nd><s>	<2nd><s>
] right bracket	<2nd><t>	<2nd><t>	<2nd><t>
= equal sign	<2nd><u>	<2nd><u>	<2nd><u>
: colon	<2nd><v>	<2nd><v>	<2nd><v>

< less-than sign	<2nd><w>	<2nd><w>	<2nd><w>
~ tilde	<2nd><x>	<2nd><x>	<2nd><x>
+ addition sign	<2nd><y>	<2nd><y>	<2nd><y>
_ underscore	<2nd><z>	<2nd><z>	<2nd><z>
→ right arrow	<2nd><Ctrl>	<2nd><Ctrl>	<2nd><Ctrl>
; semicolon	<2nd><blankkey>	<2nd><blankkey>	<2nd><blankkey>
2nd	<2nd>	<2nd>	<2nd>
Alt	<Alt>	<Alt>	<Alt>
Attention	---	---	<Alt><Enter>
Backspace	<2nd><p>	<2nd><p>	<2nd><p>
Backtab	<Alt><a>	<Alt><a>	<Alt><a>
Caps lock	<2nd><Shift>	<2nd><Shift>	<2nd><Shift>
Clear	---	<Alt><7>	<Alt><7>
Del	<2nd><Alt>	<2nd><Alt>	<2nd><Alt>
Dup	---	---	<Alt><0>
Eeof	---	<Alt><6>	---
Enter	<Enter>	<Enter>	<Enter>
Erase	---	---	<Alt><6>
Esc	<2nd><q>	<2nd><q>	<2nd><q>
Field exit	---	---	<Shift><Enter>
Field-	---	---	<Alt><3>
Field+	---	---	<Alt><4>
Find	<Alt><1>	---	---
Help	---	---	<Alt><8>
Home	<Alt><k>	<Alt><k>	<Alt><k>
Ins	<2nd><. >	<2nd><. >	<2nd><. >
Pa1	---	<Alt><8>	---
Pa2	---	<Alt><9>	---
Pa3	---	<Alt><0>	---
Page up	<Alt><o>	---	---
Page down	<Alt><l>	---	---
Print	---	---	<Alt><2>
Reset	---	<Esc>	<Esc>
Remove	<Alt><3>	---	---
Roll up	---	---	<Alt><5>
Roll down	---	---	<Alt><9>
Select	<Alt><2>	---	---
Shift	<Shift>	<Shift>	<Shift>
Sys req	---	<Alt><1>	<Alt><1>
View up	<Shift><F1>	<Shift><F1>	<Shift><F1>
View down	<Shift><F3>	<Shift><F3>	<Shift><F3>
View left	<Shift><F5>	<Shift><F5>	<Shift><F5>
View right	<Shift><F6>	<Shift><F6>	<Shift><F6>
Tab	<2nd><a>	<2nd><a>	<2nd><a>