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Stepper Equipment Inc. Version 2.1.1

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Stepper Equipment Inc
6284 San Ignacio Ave
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(408)-281-0996

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End of Agreement

STEPNET HARDWARE INSTALLATION

SERVER HARDWARE

PACKING LIST

The Stepnet server consists of the following items:

- IBM compatible Personal Computer housed in a 300 Watt tower case
- Pentium class processor, minimum 300mhz
- UltraDMA hard disk, minimum 5 gigabytes
- SuperVGA monitor
- Display card, set to 800 x 600 pixels
- Ethernet card with RJ11 connector, minimum 10MB/sec
- GTEK 8 port smart serial card, 1 card per 8 steppers
- Keyboard with integrated touchpad
- Stepnet security key

UNPACKAGING

The Stepnet server is assembled and tested at Stepper Equipment Inc, and is fully tested. For shipping, the legs are removed from the tower case. All other accessory cards are installed and ready for production.

FACILITIES REQUIREMENTS

The Stepnet server requires the following facilities:

- 120 VAC, minimum 15 amps
- UPS with built in surge suppression and battery backup

STEPPER HARDWARE

PACKING LIST

Each stepper to be connected to the Stepnet server requires the following items:

- (1 each) Hewlett Packard RS-232 card, PN 98626-66501
- (1 each) Worthington Laser Scanner, PN LZ-200
- (1 each) Worthington WDR RS-232 reader (w pwr), PN R11/12
- (1 each) Worthington In-Line DB25 Cable group (a), PN F32/3
- (2 each) Telebyte Auto-powered short haul modem, PN 201M
- (1 each) Stepnet cable package, PN SN-C-A
- (1 each) RS-232 cable, 2 pair, 4 conductor, 26 gauge, each pair individually shielded

INSTALLATION

The following describes the physical attachments necessary to connect the HP-9826 computer, located at the stepper, to the Stepnet server. Refer to Appendix A for a pictorial of all cable connections.

HEWLETT PACKARD RS-232 CARD

The HP RS-232 card gives the HP9826 computer serial communications capabilities, with speeds up to 19.2Kilobits per second. Set the dip switches on this card to the following parameters before installing in the stepper computer:

- Baud Rate: 19,200 bits per second
- Interrupt Level 0
- Address 5
- Line Control No parity, 1 stop bit, 8 bit chars
- Handshaking Disabled

Refer to Appendix B for a pictorial of the RS-232 card, with dip switch settings

Remove one of the 4 covers on the back of the 9826, which shield the accessory board backplane. Each cover protects 2 card slots. Insert the RS-232 card into the bottom slot of a slot pair. Tighten the thumbscrews attached to the card so the card sits snugly, and completely, in the slot. You may discard the unused cover.

RS-232 TRANSMISSION CABLE

This cable is used to connect the stepper computer to the Stepnet server. Using the Telebyte short haul modems, data can be reliably transmitted over distances of up to 1.5 miles. The user may supply this cable, as long as it adheres to the following specifications:

- 2 pair, 4 conductor
- 26 gauge
- each pair individually shielded

You should check with your facilities department to determine the proper type of insulation to order for your cable. At the stepper, the cable should reach the back frame, with an additional 3 feet for hookup. At the Stepnet server, the cable should reach within 5 feet of the back of the server. Additional cables included in the Stepnet cable package will cover the remaining distance.

The RS-232 transmission cable is a 4 conductor, 2 twisted pair cable. Using the color or markings on the wire insulation, determine what wire pair you want to identify as Pair#1 and Pair#2. Within each pair, using the color or markings on the wire insulation, determine which wire you would like to identify as #1 and #2. This information will be used in the next section when attaching the Telebyte short haul modems to the transmission cable.

TELEBYTE SHORT HAUL MODEMS

The Telebyte short haul modems are used to amplify the RS-232 signal, to permit transmitting RS-232 signals over distances of up to 1.5 miles. Each stepper connected to Stepnet uses 2 modems, one on each side of the RS-232 transmission cable. Each modem has a DB-25 Male connector on one end, and a 4 connector terminal strip on the other. The terminal strip is marked +T, -T, +R, -R.

CONNECTING AT THE STEPPER

Attach the RS-232 transmission cable to the 4 connector terminal strip on the modem as follows:

T+ Pair#1, Wire#1
T- Pair#1, Wire#2
R+ Pair#2, Wire#1
R- Pair#2, Wire#2

Secure the modem to the bottom frame of the stepper, preferably near the back right, using tie-wraps, double stick tape, or Velcro.

CONNECTING AT THE STEPNET SERVER

Attach the RS-232 transmission cable to the 4 connector terminal strip on the modem as follows:

T+ Pair#2, Wire#1
T- Pair#2, Wire#2
R+ Pair#1, Wire#1
R- Pair#1, Wire#2

Secure the modem to a non-conductive surface, within 5 feet of the back of the Stepnet Server.

STEPNET CABLE PACKAGE

The Stepnet cable package consists of 4 cables / connectors. They are marked #1, #5, #7, and #8. These are used to connect the HP9826 to the barcode reader, connect the barcode reader to the Telebyte line modem at the back of the stepper, and to connect the Telebyte line modem at the Stepnet server, to the GTEK multiport serial card at the back of the Stepnet server.

CABLE # 1, CENTRONICS 50 PIN MALE TO DB-25 FEMALE

Connect the centronics 50 pin male connector to the HP-RS-232 board installed in the HP9826 computer. Route this cable up to the right front portion of the stepper frame, securing with tie-wraps.

CABLE # 5, DB-25 FEMALE TO DB-25 MALE

Connect the DB-25 Female connector to the DB-25 Male connector on the Telebyte line modem, located at the back of the stepper. Route the other end of the cable to the front right portion of the stepper frame, securing with tie-wraps.

CONNECTOR # 7, DB-25 FEMALE TO RJ-11 FEMALE

Connect the DB-25 Female connector to the DB-25 Male connector on the Telebyte line modem, located near the Stepnet server.

CABLE # 8, RJ-11 MALE TO RJ-11 MALE

Connect one end of this cable to the Female RJ-11 connector on Connector #7, located near the Stepnet server. Attach the other end of this cable to one of the Female RJ-11 jacks located on the GTEK multiport serial board, at the back of the Stepnet server.

Hardware Installation

BARCODE PACKAGE

The Barcode package gives the user the ability to download reticle data, from the Stepnet server, using barcode labels on reticle boxes, run datasheets, product wafer containers, etc. This eliminates process errors due to loading incorrect recipes from floppy disks. The following items are contained in this package. Please install in the following order:

WORTHINGTON WDR RS-232 READER (W PWR)

The WDR-RS-232 reader comes with a DC power transformer. This reader is usually mounted on the front right top of the rock surface, using double-back tape. Alternately, you may mount this unit on the table. The power supply may be plugged in the 120vac power strip, inside the drawer assembly. Route the power cable such that the power line, and the reader, are not disturbed as the drawer is opened and closed.

WORTHINGTON LASER SCANNER

The LZ-200 laser scanner is used to input product and recipe data from reticle boxes and run packets. The scanner comes with a mounting bracket, which has double-back tape applied. Mount the bracket anywhere near the right front of the stepper, preferably on the right side of the table. Insure that the laser gun fits securely in the bracket, at the mounting position, before applying the tape. Plug the laser scanner into the front RJ-11 jack on the WDR reader, marked “Wand”.

WORTHINGTON IN-LINE DB25 CABLE GROUP (A)

The In-line DB-25 cable group is used to attach the WDR Reader to the Stepnet cable package. There are two cables in this group.

The first cable is a DB-25 Male to RJ-11 Male. Attach the DB-25 Male cable (#2 in pictorial, Appendix A) to the DB-25 Female end of the cable coming from the RS-232 board in the HP9826 computer (#1 in pictorial, Appendix A). Attach the RJ-11 Male end of this cable to the WDR Reader, RJ-11 Female port marked “Terminal”.

The second cable is a DB-25 Female to RJ-11 Male. Attach the DB-25 Female cable (#2 in pictorial, Appendix A) to the DB-25 Male end of the cable coming from Telebyte line modem at the back of the stepper (#4 in pictorial, Appendix A). Attach the RJ-11 Male end of this cable to the WDR Reader, RJ-11 Female port marked “Host”.

Secure all loose cables with tie-wraps. Insure that opening and closing the drawer does not interfere with any of the Stepnet cables.

PROGRAMMING THE BARWAND

The Worthington scanner supports multiple rs-232 speeds, and various barcode protocols. Before first use, the scanner must be configured to work within the Stepnet RS-232 parameters. To configure the scanner for use with the Stepnet system, scan in the configuration parameters as outlined in Appendix C. Note that this setup also programs the barcode pattern as Code 3 of 9.

STEPNET SOFTWARE INSTALLATION

SERVER SOFTWARE

INSTALLING

Your Stepnet software package comes pre-installed on the Stepnet server. It is configured to start automatically when Windows is started. In addition, a quick launch button  to manually start the Stepnet server software has been installed in the taskbar, at the bottom of the screen. If, for any reason, you need to re-install this package, please follow these instructions:

STEPNET SOFTWARE

- Place diskette 1 in the 3.5" floppy drive
- Select START / SETTINGS / CONTROL PANEL
- Select ADD / REMOVE PROGRAMS
- Click on the INSTALL button
- Click on the NEXT button
- When "A:\SETUP.EXE" appears in the selection box, click on the FINISH button
- Follow the on-screen prompts from the installation program

STEPNET SOFTWARE KEY

Included in the Stepnet software package is a parallel port security key. This key must be plugged into the parallel port on the Stepnet server for the Stepnet software to boot properly.

SETTING UP AUTOSTART

As the Stepnet server's primary duty is to execute the Stepnet server software package, it is desirable to have this program start automatically, when windows 98 is started. Follow these instructions to program the Stepnet software to start automatically:

- Right click on a clear area of the taskbar, at the bottom of the screen
- Select PROPERTIES
- Select the START MENU PROGRAMS tab
- Click the ADD button
- Click the BROWSE button
- Select the file "Pstepnet.exe", in the "C:\PROGRAM FILES\STEPNET" directory
- Click on the NEXT button
- Select the START MENU / PROGRAMS / STARTUP directory
- Click on the FINISH button

The Stepnet program is now set to start up automatically, whenever Windows 98 is started.

SETTING UP TASKBAR QUICK LAUNCH BUTTON

At times, it may be necessary to manually start the Stepnet software package. By placing a shortcut button in the system taskbar, the Stepnet program can be launched manually.

- Select START / PROGRAMS / WINDOWS EXPLORER
- Navigate to the C:\PROGRAM FILES\STEPNET directory
- Press the left mouse button, and hold down, on the file PSTEPNET.EXE
- Drag this file to the bottom left portion of the taskbar
- Release the mouse button, and the Stepnet icon will appear in the quick launch area of the taskbar.

By clicking on this button, you may manually launch the Stepnet server software.

STEPPER SOFTWARE

OVERVIEW

The Stepnet HPL driver software contains the drivers necessary to interface with the Stepnet server. These drivers permit the uploading and downloading of recipe, variable, and SPC data. In addition, several utility programs reside in the HPL driver program to streamline recipe file uploading to the server, as well as diagnostics to test all components in the RS-232 link.

The Stepnet HPL driver program can run as a stand-alone program, or run concurrently with your stepper operating software. **NO CHANGES ARE MADE TO YOUR STEPPER-OPERATING PROGRAM, THUS PRESERVING ALL LEGAL COPYRIGHTS AND SOFTWARE CONTRACTUAL OBLIGATIONS WITH THE STEPPER OPERATING SOFTWARE PROVIDER.**

INSTALLING

The Stepnet system is shipped with a copy of the Stepnet HPL driver software for each licensed stepper. There is no ‘installation’ necessary, other than to place a copy of this software at each stepper. Please refer to the Users Guide section of this manual, for a description of how to load and operate this software.

USERS GUIDE

STEPNET OVERVIEW

DESCRIPTION

The Stepnet Network System is a software / hardware package which gives your steppers the ability to transmit and receive data files from a centrally located server. The system consists of an IBM PC computer, complete with multiport serial cards and server software to enable and control the data flow to and from each linked stepper. Up to 32 steppers may be linked at any one time.

Also included is an HPL program containing the drivers necessary to communicate with the Stepnet server from the HP9826 computer. These drivers reside in memory with, or without, your stepper-operating program, on the HP9826 computer. Since the Stepnet HPL program is a stand-alone program, and does not use or call any functions in your stepper program, NO MODIFICATIONS ARE NECESSARY TO YOUR STEPPER OPERATING PROGRAM, AND ALL LICENSE AGREEMENTS WITH THE OEM REGARDING SOFTWARE MODIFICATION REMAIN INTACT AND IN FORCE.

In addition, all of the hardware necessary to link each stepper to the server is included. RS-232 line amplifiers enable communication from distances up to 1.5 miles. An in-line barcode reader for each stepper allows the automatic selection of recipe data to retrieve from the server.

The Stepnet server package is written in Microsoft Visual Basic, Rev 5.0. It is designed to run in the Microsoft Windows 98 environment. The Stepnet HPL driver program is written in Hewlett Packard HPL language, Rev 2.0. It is designed to run on a Hewlett Packard 9826 or 9836 computer, in the Hewlett Packard HPL environment.

CAPABILITIES

The Stepnet server has the capability to perform the following data transfer actions with each linked stepper:

- Reticle data transfer from the server to each linked stepper, via keyboard input
- Reticle data transfer from the server to each linked stepper, via barwand input
- Reticle data transfer from each linked stepper, to the server
- Modifying exposure and alignment offsets in reticle data from a text lookup table, prior to sending the reticle data to the stepper.
- Archiving stepper variable files from each linked stepper, to the server
- Retrieving archived stepper variable files from the server, to each linked stepper
- Archiving SPC data from each linked stepper, to the server

Logfiles are maintained on the server for all stepper and system interactions. The following data files and Logfiles stored on the server may be viewed at the server.

- Reticle data files

- Stepper variable data files
- Stepnet system Logfiles
- Individual transaction Logfiles, for each stepper
- Individual SPC Logfiles, for each stepper
- Individual “Changed Variables” Logfiles, for each stepper.

BENEFITS

RETICLE DATA

- Central location for all reticle data files to reside
- Reticle database can be backed up easily over a network linked to the Stepnet server.
- Automatic exposure and alignment variable substitutions via lookup table allows process wide changes to be enforced within minutes, without modifying each reticle data diskette.
- Barwand loading of recipe files eliminates operator error and costly reworks due to incorrect recipe being loaded at the stepper.

VARIABLES

- Stepper variable archival allows the user to restore latest stepper variables upon machine diskette failure.
- Automatic archival of stepper variable files. Frequency configurable at the Stepnet Server.
- Changed variable Logfiles, for each stepper, allows technicians to quickly trace problems due to incorrect variable settings.
- Changed variable Logfiles, for each stepper, allows users to track changes in stepper operating parameters, such as focus dac counts, lens temperature, exposure calibration variables, etc

MISCELLANEOUS

- Up to 90% decrease in floppy disk drive usage on HP9826. This drive is currently obsolete, and is very expensive to repair.
- SPC Logfiles, for each stepper, logs reticle data downloaded and lens temperature at time of download
- All Logfiles are in ASCII Text format, for easy importing into your in-house database for analysis

STEPNET SERVER SOFTWARE

OVERVIEW

The Stepnet server program is designed to manage the uploading and downloading of data files from 1 to 32 steppers. The types of files that it handles are:

- Reticle data files
- Stepper variable files
- SPC data collection files

In addition, it can download reticle data files based on barcode input at the stepper. The server program is designed to run in the Windows 98 environment, on a Pentium class, 300mhz or faster computer.

STARTUP

The following methods may be employed to start up the Stepnet server software.

AUTOSTART

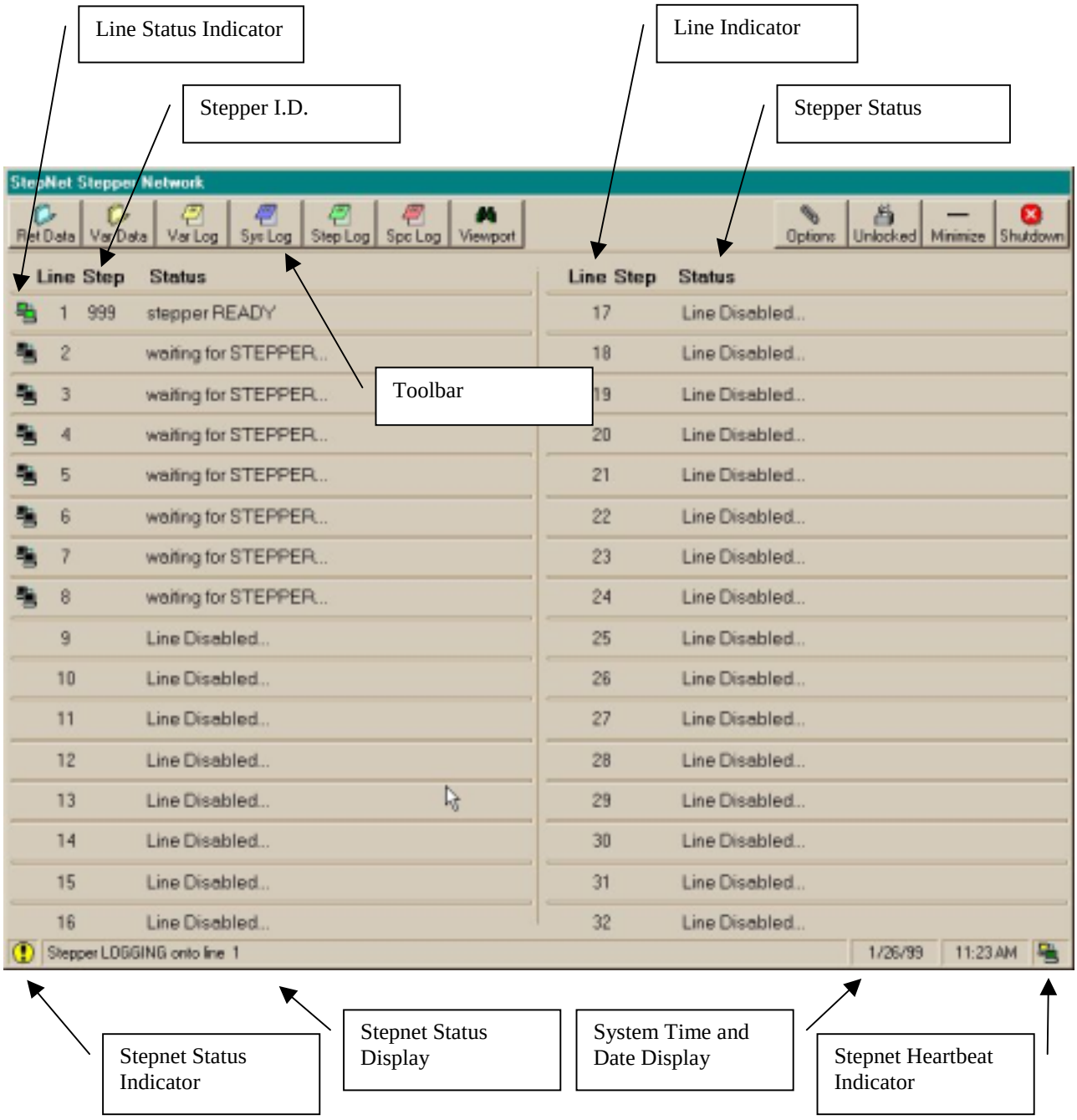
The Stepnet server software is configured at Stepper Equipment Inc to automatically start up when the computer is booted. To disengage this feature, you must remove the “PSTEPNET.EXE” program from the START / PROGRAMS / STARTUP folder. Refer to your windows' manual for instructions on how to remove this item from the startup menu.

MANUAL START

At times, it may become necessary to start the Stepnet server software manually. A quick launch button to start the Stepnet software has been installed in the taskbar, at the bottom of the screen. Simply move the cursor down to the taskbar, and click on the Stepnet icon, in the taskbar.

USER INTERFACE

The following picture describes the user interface for the Stepnet server program:



TOOLBAR

The Stepnet toolbar is your interface to controlling Stepnet and displaying data and Logfiles maintained by the Stepnet program. For a complete description of each toolbar button, and its function, refer to the "Toolbar Functions" section of this manual.

LINE STATUS INDICATOR

The Line Status Indicator is an icon which displays two computer screens. This indicator provides a visual quick reference as to the current activity for that particular line. Please refer to the following table for the Line Status Indicator states:

LINE STATUS INDICATOR STATES:

	INDICATOR STATE	DESCRIPTION
	No indicator present	Serial port for line XX not present
	Left BLACK, right BLACK	Serial port detected and initialized
	Left RED, right RED	Stepper reports BUSY state, running stepper program
	Left GREEN, right GREEN	Stepper reports READY state, running Stepnet program
	Left YELLOW, right GREEN	Stepnet server RECEIVING data from stepper
	Left GREEN, right YELLOW	Stepnet server SENDING data to stepper

LINE INDICATOR

The Line Indicator displays the GTEK serial port # linked to that line. Each GTEK multiport serial card has 8 ports. Each card is assigned a unique hardware address, which is used by Stepnet to communicate with the card. The order in which each card is detected, and initialized determines the Line number range associated with a card. Please refer to the following table for card addresses, order of initialization, and associated line number ranges:

Card #	Address	Line number range
1	0x2E0	1-8
2	0x2E4	9-16
3	0x210	17-24
4	0x214	25-32

STEPPER I.D.

The Stepper I.D. display shows the serial number of the stepper currently attached to the line. The number displayed is contained in the stepper variable G[19]. This number is transmitted to Stepnet whenever communications occur between the stepper and the Stepnet server. Valid ranges for the variable G[19] are 0 to 998. Serial number 999 is reserved for the Stepnet program, when it is running in 'stand-alone' mode.

STEPPER STATUS

The Stepper Status display describes the current state, and any activity occurring on the line. Appendix H lists all of the Stepper Status messages, and their meaning

STEPNET STATUS INDICATOR

The Stepnet Status Indicator is used to indicate the priority and urgency of any system messages displayed in the Stepnet Status Display area. Please refer to the following table for a description of the indicator states:


Indicates that an error has occurred

Indicates a high priority message is being displayed


The message in the Stepnet status display is informational only


The Stepnet status display is posing a question to the user

STEPNET STATUS DISPLAY

The Stepnet Status Display is used to convey messages from the Stepnet program, to the user. Refer to the Stepnet Status Indicator to determine what type of message is being displayed.

SYSTEM TIME AND DATE

The System Time and Date reflects the current computer time and date. The Stepnet computer time and date is used to timestamp all Logfiles data. The time and date on the stepper is not used.

SYSTEM HEARTBEAT INDICATOR

The System Heartbeat Indicator is a visual indicator to the user, that the Stepnet program, and the Windows98 Environment, is running and active. The dual computer screens should change colors once per second to indicate proper program operation. (during large file transfers, this indicator will not change states until the transfer is completed)

TOOLBAR FUNCTIONS

VIEWING DATA FILES

When you select a data file for viewing on the Stepnet server, the following sequence takes place:

- A text file is created in the “C:\stepnet\temporary” directory on the server
- The filename is constructed with the date and time the file was created
- All data elements in the selected file, along with a description of each element, is written to the text file.
- The text file is automatically opened in the Wordpad editor that comes with Windows 98.

Therefore, all data files that are viewed on the Stepnet server are copies of the original file. Any changes you make to the Wordpad document will have no effect on the original data file. If you wish to save the Wordpad document, you should copy it to a directory outside of the “C:\stepnet\temporary” directory, as all files in this directory are deleted at midnight, on a daily basis.

RETICLE DATA 

All reticle data files stored on the Stepnet server are available for viewing and printing. To view a reticle data file:

- Click on the “Ret Data” icon on the toolbar
- Double click on the product directory, in the left pane, containing the data file you wish to view
- Select the reticle data file, in the right pane, you wish to view by double clicking on it, OR Select the reticle data file by single clicking on it, and then clicking the “OK” button

At this point, a text file containing a description and value for each element in the reticle data file is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

STEPPER VARIABLE DATA 

All stepper variable files archived on the Stepnet server are available for viewing and printing. To view a stepper variable file:

- Click on the “Var Data” icon on the toolbar
- Select the stepper variable file, in the right pane, you wish to view by double clicking on it, OR Select the stepper variable file by single clicking on it, and then clicking the “OK” button

At this point, a text file containing a description and value for each element in the stepper variable file is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

VIEWING STEPNET LOGFILES

All Stepnet Logfiles are ASCII text files, and can be opened and read with any word processor or text editor capable of handling the file size. When you select a log file for viewing on the Stepnet server, the following sequence takes place:

- A text file is created in the “C:\stepnet\temporary” directory on the server
- The filename is constructed with the date and time the file was created
- All data in the selected log file is written to the text file.
- The text file is automatically opened in the Wordpad editor that comes with Windows 98.

Therefore, all log files that are viewed on the Stepnet server are copies of the original file. Any changes you make to the Wordpad document will have no effect on the original log file. If you wish to save the Wordpad document, you should copy it to a directory outside of the “C:\stepnet\temporary” directory, as all files in this directory are deleted at midnight, on a daily basis.

SYSTEM LOG 

All Stepnet system events are logged into the System Log.. To view the System Logfiles:

- Click on the “Sys Log” icon on the toolbar
- Select the system Logfiles, in the right pane, you wish to view by double clicking on it, OR Select the system Logfiles by single clicking on it, and then clicking the “OK” button

At this point, a text file containing all data in the System Logfiles is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

System Logfiles are created and archived, based on the parameters specified in the FILE MANAGEMENT / SYSTEM LOG section of the OPTIONS window. The current System Log will be named “System.log”. Archived system logs will have the word “ARCHIVED”, and the time and date the file was archived, appended to the filename.

STEPPER LOGS 

All Stepper events are logged into the Stepper Log.. To view the Stepper Logfiles:

- Click on the “Step Log” icon on the toolbar
- Select the stepper Logfiles, in the right pane, you wish to view by double clicking on it, OR Select the stepper Logfiles by single clicking on it, and then clicking the “OK” button

At this point, a text file containing all data in the Stepper Logfiles is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

Stepper Logfiles are created and archived, based on the parameters specified in the FILE MANAGEMENT / STEPPER LOG section of the OPTIONS window. The current Stepper Log will be named “XXX.log”, where “XXX” is the 3 digit Stepper I.D. Archived stepper logs will have the word “ARCHIVED”, and the time and date the file was archived, appended to the filename.

CHANGED VARIABLE LOG 

When stepper variables are uploaded to the Stepnet server, a comparison is made with the most recent variable file stored on the Stepnet server for that stepper. Any changes detected are logged into the Changed Variable Log. To view the Changed Variable Logfiles:

- Click on the “Var Log” icon on the toolbar
- Select the Changed Variable Logfiles, in the right pane, you wish to view by double clicking on it, OR Select the Changed Variable Logfiles by single clicking on it, and then clicking the “OK” button

At this point, a text file containing all data in the Changed Variable Logfiles is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

Changed Variable Logfiles are created and archived, based on the parameters specified in the FILE MANAGEMENT / VARIABLE LOGS section of the OPTIONS window. The current Changed Variable Log will be named “XXX_variable.log”, where “XXX” is the 3-digit stepper I.D. Archived Changed Variable logs will have the word “ARCHIVED”, and the time and date the file was archived, appended to the filename.

SPC LOG 

When a reticle data file is sent from Stepnet to the stepper, SPC variables will be automatically uploaded to the Stepnet server. (Assuming the OPTIONS / CONTROL WORD / ENABLE SPC TRANSFER option is checked) SPC data that is transferred consists of:

- Product

- Layer
- Lens Temperature

The Stepnet server time and date is appended to the above data. To view the SPC Logfiles:

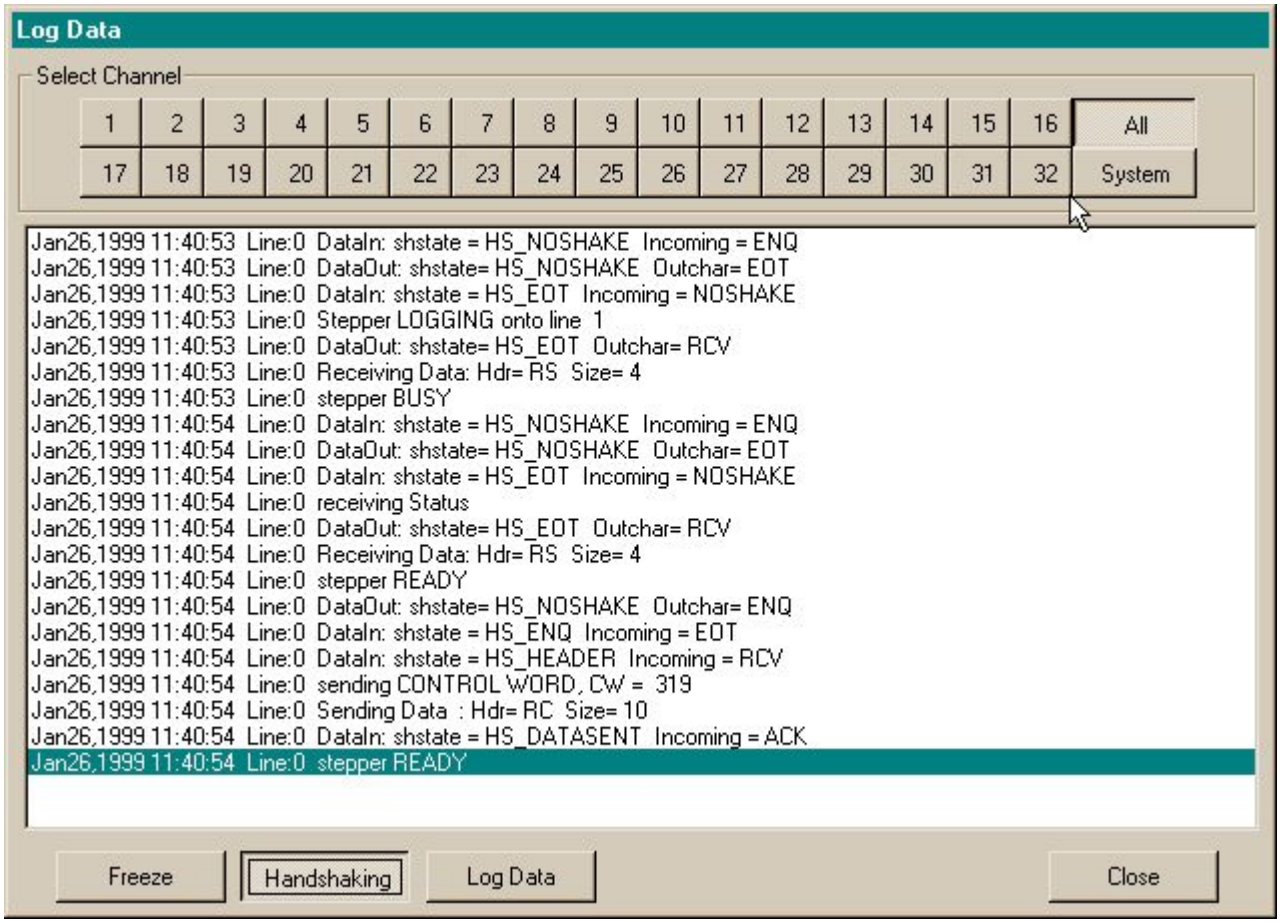
- Click on the “Spc Log” icon on the toolbar
- Select the SPC Logfiles, in the right pane, you wish to view by double clicking on it, OR Select the SPC Logfiles by single clicking on it, and then clicking the “OK” button

At this point, a text file containing all data in the SPC Logfiles is created, and opened in the Wordpad editor. You may alter, view, and print this text file without changing the original file.

SPC Logfiles are created and archived, based on the parameters specified in the FILE MANAGEMENT / SPC LOGS section of the OPTIONS window. The current SPC Log will be named “XXX.log”, where “XXX” is the 3-digit stepper I.D. Archived SPC logs will have the word “ARCHIVED”, and the time and date the file was archived, appended to the filename.

VIEWPORT 

The Viewport window gives the user an in-depth tool to monitor Stepnet activities with each linked stepper. Proper handshaking, data transfers, and message logging can be observed while the system is running. The Viewport is valuable in diagnosing line interference or abnormal data errors.



SELECT CHANNEL

- 1 – 32 : Displays activities occurring on the selected line
- ALL : Displays activities occurring on all lines
- SYSTEM : Displays system activities only

FREEZE

The Freeze button is a two-state button. When depressed, the window will not be updated with any new activity. When not pressed, all activity on the selected channel will be posted in the window.

HANDSHAKING

The Handshaking button is a two state button. When depressed, additional, low-level communications activity between the stepper and Stepnet will be posted in the window

LOG DATA

The Log Data button is a two-state button. When depressed, all data displayed in the Viewport window will be logged in the appropriate Logfiles. For Channels 1-32, and ALL, data will be logged into the stepper Logfiles that is linked to that channel. For SYSTEM, data will be logged into the system Logfiles

CLOSE

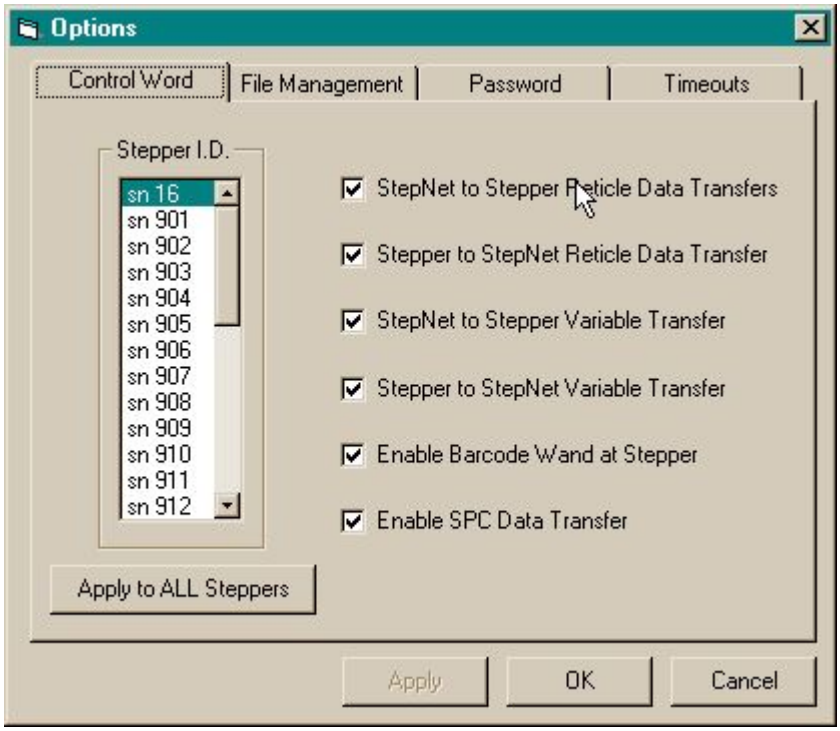
The Close button will close the Viewport window. When this window is closed, no logging of Viewport data to the Viewport screen, or the log files, will occur. Each time the Viewport window is opened, the list of events is cleared.

OPTIONS

The Options button opens up the Stepnet configuration window, where you can control how Stepnet interacts with each linked stepper. The following configuration topics are available:

STEPPER CONTROL WORD

The Stepper control word is used to disable or enable different data transfer types between Stepnet and each linked stepper. Each stepper has a unique control word. This control word is sent to each stepper whenever the user activates the Stepnet HPL program, on the HP9826, via the “k0” function key. To modify a control word for a particular stepper, click on the stepper I.D. number. The current settings for that stepper will be displayed.



STEPNET TO STEPPER RETICLE DATA TRANSFERS

When checked, enables downloading of reticle data from Stepnet to the linked stepper. Uncheck to disable this function for the selected stepper.

STEPPER TO STEPNET RETICLE DATA TRANSFERS

When checked, enables uploading of reticle data from the stepper, to the Stepnet server. Uncheck to disable this function for the selected stepper.

STEPNET TO STEPPER VARIABLE TRANSFER

When checked, enables downloading of stepper variable data from the Stepnet server to the selected stepper. Uncheck to disable this function for the selected stepper.

STEPPER TO STEPNET VARIABLE TRANSFER

When checked, enables uploading of stepper variable data from the Stepper to the Stepnet server. Uncheck to disable this function for the selected stepper.

ENABLE BAR WAND AT STEPPER

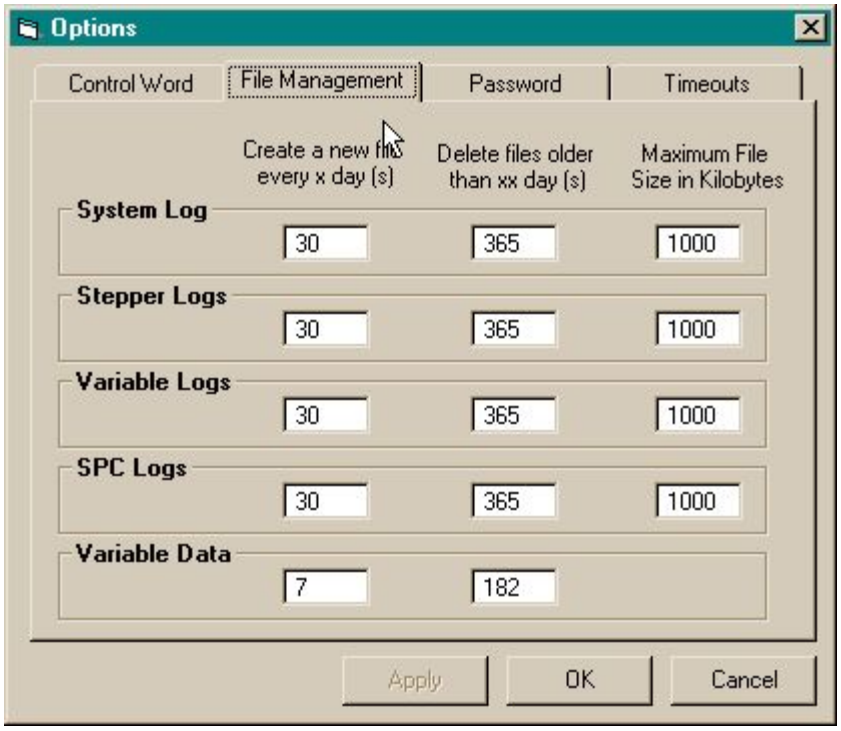
When checked, enables downloading of reticle data from the Stepnet server, to the selected stepper, via barwand input. Note that the *STEPNET TO STEPPER RETICLE DATA TRANSFER* box must also be checked for this function to be enabled. Uncheck to disable this function for the selected stepper.

ENABLE SPC DATA TRANSFER

When checked, enables uploading of SPC data from the selected stepper to the Stepnet server. SPC data transfers occur automatically whenever a new reticle data file is downloaded from the Stepnet server to the linked stepper. Uncheck to disable this function for the selected stepper.

FILE MANAGEMENT

The File Management configuration window is used to manage the size and number of log files and variable data files that reside on the Stepnet server. The following parameters are available for customization:



CREATE A NEW FILE EVERY X DAY (S)

This field sets the maximum number of DAYS that the specified LOGFILE will be written to. When this time expires, the Logfiles is archived, and a new log file is created. Note that this check occurs once a day, at midnight.

For VARIABLE DATA files, this field determines how often a stepper's variable file is automatically retrieved, and archived, for the selected stepper.

DELETE FILES OLDER THAN XX DAY (S)

This field sets the maximum number of days that the specified LOGFILE, or VARIABLE DATA FILE, can reside on the Stepnet server. When this time expires, the file is automatically deleted. This parameter also applies to all archived Logfiles and stepper variable data files. Note that this check occurs once a day, at midnight.

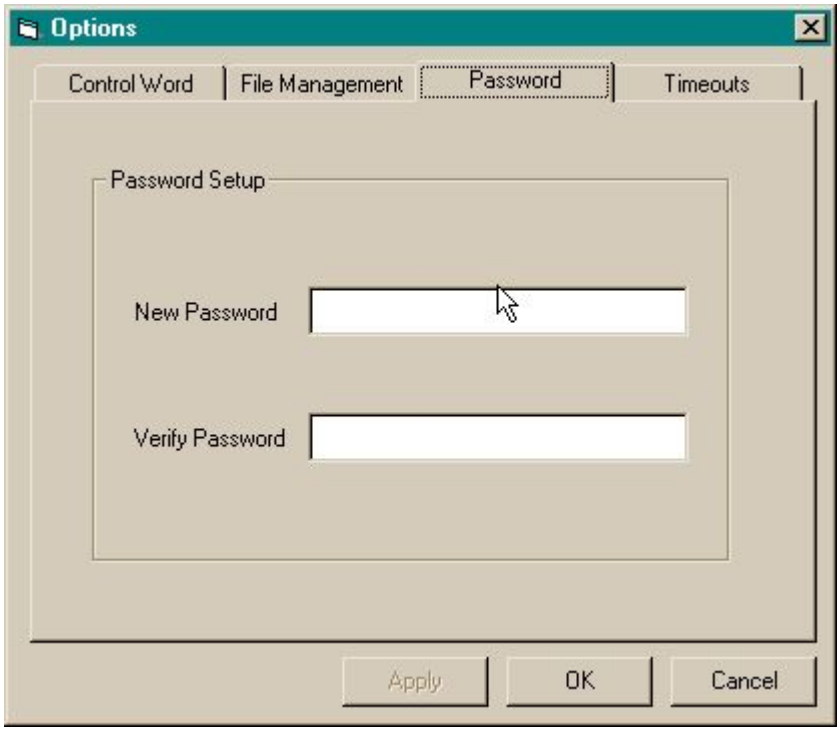
MAXIMUM FILE SIZE, IN KILOBYTES

This field sets the maximum size for the specified Logfiles. When reached, the Logfiles is archived, and a new Logfiles is created. Since this check occurs once a day, at midnight, it is possible that a file's final size might be a little over this setting.

NOTE: When files are archived, Stepnet will rename the file, adding the word "ARCHIVED", and the current date and time, to the filename. The files are kept in their original directory, and can be viewed and printed at any time.

PASSWORD

The Password configuration window allows the user to set up a password to unlock the toolbar functions.



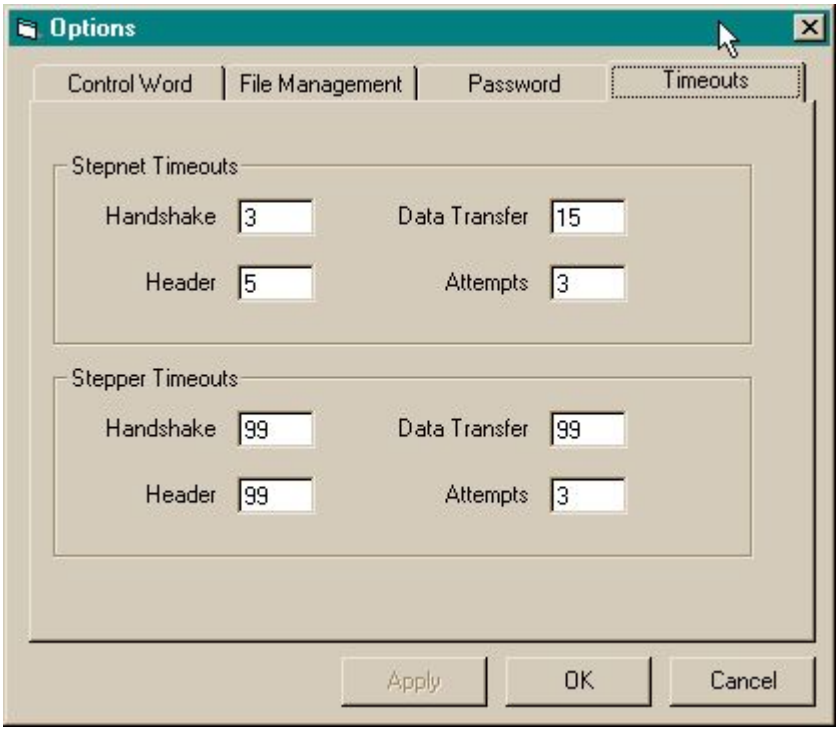
To set up a password, type in any amount of alphanumeric characters in the NEW PASSWORD and VERIFY PASSWORD text boxes and click APPLY or OK.

To remove a password, delete all characters in the NEW PASSWORD and VERIFY PASSWORD text boxes and click APPLY or OK.

NOTE: if a password has been established, then the Stepnet program will always boot up with the toolbar LOCKED. If no password has been established, then the Stepnet program will always boot up with the toolbar UNLOCKED.

TIMEOUTS

The Timeouts configuration window is used to set up timing parameters used during data transfers between the Stepnet server, and each linked stepper. Under normal conditions, you should not have to change any values here. However, this option is provided in case you should desire to connect the Stepnet server to a computer other than the Hewlett Packard 9826, or the HP9836.



HANDSHAKE

The Handshake timeout determines the total amount of seconds that the host (Stepnet), or the terminal (Stepper), will wait to receive one of the single character handshaking characters, before reporting an error. These characters are outlined in Appendix E, Stepnet Control Summary, theory of operation

HEADER

The Header timeout determines the total amount of seconds that the host (Stepnet), or the terminal (Stepper), will wait to receive the 6 character Header code required for a data transfer, before reporting an error. Please refer to Appendix E, Stepnet Control Summary, Message Header Codes, for more details.

DATA TRANSFER

The Data Transfer timeout determines the total amount of seconds that the host (Stepnet), or the terminal (Stepper), will wait to start receiving the data packet requested, before reporting an error. This timer starts after the requestor has successfully sent the 6 character Header code.

ATTEMPTS

This field determines the number of attempts the requestor makes for a data packet, before reporting an error.

SYSTEM LOCK 

The System Lock toolbar button either ENABLES or DISABLES all toolbar buttons. Please refer to the OPTIONS / PASSWORD section for more detail on enabling and disabling the toolbar password.

TOOLBAR PASSWORD PROTECTION

To lock the toolbar from unauthorized use:

- Go to OPTIONS / PASSWORD, and type in the desired system toolbar password
- Close the OPTIONS window
- Click on the System Lock button, on the toolbar.

To unlock the toolbar:

- Click on the System Lock button, on the toolbar
- Enter the correct password

If the toolbar is locked, and you have forgotten or misplaced the password, contact Stepper Equipment Inc for information on how you can manually unlock the system. This information will only be given to authorized personnel.

STARTUP MODE

When the Stepnet program is started, the state of the toolbar depends on the current password:

- NO PASSWORD SAVED : Toolbar is enabled upon startup
- USER PASSWORD SAVED: Toolbar is disabled upon startup

SHUTDOWN 

The Shutdown toolbar button terminates the Stepnet server program. To prevent accidental termination of the server program, you should leave the toolbar in the “disabled” state when you are not at the console. To disable the toolbar, click on the LOCK toolbar button.

EXPOSURE LOOKUP TABLE

OVERVIEW

Each reticle data file stored on the Stepnet server contains variables for exposure, focus offset, and alignment offset information. Sometimes, it may be desirable to change these parameters for a particular reticle, ROM code, layer, level, product, or process. The Stepnet server program has built-in support for exposure and alignment offset substitutions before transmitting reticle data to each stepper. Before sending the data, the server will load and examine a user-supplied "lookup table". This table is a regular text file, and can contain information such as Reticle I.D., ROM codes, Process, Layer, Level, Product, etc, along with substitute exposure, focus, and alignment variables. The first line in the file is used as a header line for the rest of the file. As shipped, the Stepnet Exposure lookup table is set up to match on the PRODUCT and LAYER fields of a lookup table. This can be customized at the time of installation. The lookup file must be set up in the following manner:

- The name must be "Lookup Table". It must reside in the "c:\stepnet\reticle data" directory
- The file must be a text file
- The first line in the file should contain header or comment information
- Each line thereafter is a record, and must have the following fields, separated by a comma

PRODUCT, LAYER, FOCUS, EXPOSURE, X OFFSET, Y OFFSET

- All comma's must be present (5 in this example). For no data substitution, enter a comma only. In the following record example, there is no exposure information

SYSTEM, TL1.6, -.001,, 0.0002,-0.0003

- The FOCUS, X OFFSET, and Y OFFSET fields are in millimeters, so a 1 micron offset would look like this: .001
- The Exposure field is in Millijoules

The server will try to match the first 2 key fields with the information stored in the reticle data title. If a match occurs, the server will substitute the exposure, focus, and/or alignment offsets in the matching record, for the exposure, focus, and/or alignment offsets in the reticle data file, before transmitting.

CUSTOMIZING

Included in the Stepnet software license fee, is 1 week of free programming to change and test the exposure table, matching fields, and various variable substitutions required by your fab.

STEPNET HPL PROGRAM FOR THE HP9826

OVERVIEW

The Stepnet HPL program, for the HP9826 and HP9836 computers provides the drivers necessary to perform data file uploads and downloads from the Stepnet server computer. The types of files that it can transfer are:

- Reticle data files
- Stepper variable files
- SPC data collection files

In addition, the Stepnet HPL program can download reticle data files from the Stepnet server based on barcode input at the stepper.

LOADING

The Stepnet HPL program is designed to run either as a stand-alone program, or with another HPL program residing and executing in memory.

LOADING WITH STEPPER OPERATING PROGRAM

- Insert the Stepnet HPL boot diskette into the 9826 floppy drive
- Type "ldp" and press EXECUTE. The Stepnet HPL boot program will load
- After loading, the display will read "Run in stand-alone mode?" . Either
  - Press CONTINUE, or
  - Wait about 3 seconds, and the prompt will default to "NO".
- The display will read "Insert MACHINE disk, press CONTINUE…" Insert the stepper operation diskette, and press the 'CONTINUE' key.
- The stepper-operating program will load and execute. Allow the stepper to fully initialize. When the display reads "What may I do for you next?", press "SHIFT + PAUSE" simultaneously (RESET), and then press CONTINUE.
- At this time, the "k0" function key will be programmed to vector into the Stepnet HPL program, when pressed.
- The stepper is ready to operate in the normal fashion.

ACCESSING THE STEPNET MENU

To access the Stepnet program, simply press the "k0" function key. You will stop executing the stepper-operating program, and be transferred into the Stepnet HPL boot program. From here, you can perform all data uploads and downloads, from diskette, or from the Stepnet server.

STANDALONE MODE

- Insert the Stepnet HPL boot diskette into the 9826 floppy drive
- Type "ldp" and press EXECUTE. The Stepnet HPL boot program will load
- After loading, the display will read "Run in stand-alone mode?" . Within 3 seconds, press the 'Y' key
- The Stepnet program will load additional stand alone drivers and utilities. It will then attempt to connect with the Stepnet server. After connecting, the main Stepnet menu will be displayed.

The "stand-alone" mode provides additional utilities, which are not present when running the Stepnet HPL program with the stepper operating program. They are:

- Create Stepnet Boot Diskette
- Fast Upload Utility
- Tune-up Cycle
- Toggle Stepper Status

These utilities are described in more detail in UTILITIES section of this manual.

RETICLE DATA

The Stepnet HPL Program provides utilities for transferring reticle data between the stepper and the Stepnet server. The following paragraphs describe the methods available to upload and download reticle data. It is assumed that the Stepnet HPL Program menu is being displayed, and that reticle data transfers have been enabled at the Stepnet server, for the stepper you are using. In stand-alone mode, the menu will be displayed upon starting the Stepnet HPL Program. When running with the stepper operating software, you must press the "k0" function key from the "What may I do for you next?" prompt.

LOADING FROM DISKETTE

To load reticle data from floppy diskette:

- Place the reticle data diskette in the HP9826 floppy drive
- Select "LOAD RETICLE DATA FROM A DISK", from the Stepnet menu.
- Enter the filename of the reticle data you wish to load, and press CONTINUE
- The reticle data file will be loaded, and:
  - (**Stand-alone Mode**) The Stepnet HPL Program menu will be displayed
  - (**Normal Mode**) Program control will return to the stepper operating program

LOADING FROM STEPNET

USING KEYBOARD INPUT

To load reticle data from the Stepnet server, using keyboard input:

- Select "LOAD PRODUCT RETICLE DATA FROM STEPNET", from the Stepnet menu.
- Enter the PRODUCT and LAYER of the reticle data you wish to load. Make sure to separate the two parameters with a hyphen. I.e. "PRODUCT-LAYER". Press CONTINUE.
- Verify that the correct product and layer has been entered by answering the prompt "Is Reticle Info Correct?"
  - To continue, press 'Y'
  - To re-enter the product and layer, press CONTINUE
  - To abort, press 'k9'
- After answering 'Y', the reticle data file will be loaded, and:
  - (**Stand-alone Mode**) The Stepnet HPL Program menu will be displayed

- (**Normal Mode**) Program control will return to the stepper operating program

USING BARCODE WAND

To load reticle data from the Stepnet server, using the barwand at the stepper:

- Ensure that the HP9826 is displaying the Stepnet HPL Program main menu. If you are in Stand-alone mode, the menu should be displayed. If you are running the stepper operating program, press the 'k0' function key, from "What may I do for you next?" to access the Stepnet HPL Program main menu.
- Scan in the barcode, containing the Product and Layer information
- After a successful scan, (1 beep from the wand indicates a successful scan) the reticle data file will be loaded, and:

  - (**Stand-alone Mode**) The Stepnet HPL Program menu will be displayed
  - (**Normal Mode**) Program control will return to the stepper operating program

SAVING RETICLE DATA TO STEPNET

To save reticle data from the stepper, to the Stepnet server:

- Select "VIEW EXTENDED MENUS" from the Stepnet HPL Program main menu
- Select "SAVE RETDATA TO STEPNET"
- Verify that the Product and Layer information is correct. If it is, press CONTINUE. Otherwise, enter the PRODUCT and LAYER of the reticle data you wish to load. Make sure to separate the two parameters with a hyphen. I.e. "PRODUCT-LAYER". Press CONTINUE.
- Verify that the correct product and layer has been entered by answering the prompt "Is Reticle Info Correct?"

  - To continue, press 'Y'
  - To re-enter the product and layer, press CONTINUE
  - To abort, press 'k9'

- After answering 'Y', the reticle data file will be saved to the Stepnet server, and:

  - (**Stand-alone Mode**) The Stepnet HPL Program menu will be displayed
  - (**Normal Mode**) Program control will return to the stepper operating program

STEPPER VARIABLES

The Stepnet HPL Program provides utilities for transferring stepper machine variables between the stepper and the Stepnet server. The following paragraphs describe the methods available to upload and download stepper variables. It is assumed that the Stepnet HPL Program menu is being displayed, and that variable data transfers have been enabled at the Stepnet server, for the stepper you are using. In stand-alone mode, the main menu will be displayed upon starting the Stepnet HPL Program. When running with the stepper operating software, you must press the "k0" function key from the "What may I do for you next?" prompt.

MANUALLY SAVING STEPPER VARIABLES

To upload the stepper machine variables from the stepper, to the Stepnet server:

- Select “VIEW EXTENDED MENUS” from the Stepnet HPL Program main menu
- Select “SAVE VARIABLES TO STEPNET”. The current stepper machine variables will be sent to the Stepnet server.
- Upon successful completion of the upload, you will be returned to the Stepnet HPL Program main menu. The message “Variables saved on Stepnet for s/n XXX” will be displayed.

AUTOMATICALLY SAVING STEPPER VARIABLES

Stepper machine variables can automatically be uploaded to the Stepnet server, on a periodic basis. Refer to the TOOLBAR / OPTIONS / FILE MANAGEMENT / CREATE A NEW FILE EVERY XXX DAYS section of this manual for details on setting up the frequency of automatic stepper variable uploads.

RESTORING STEPPER VARIABLES

To download an archived set of variables that reside on the Stepnet server, to the stepper:

- Select “VIEW EXTENDED MENUS” from the Stepnet HPL Program main menu
- Select “LOAD VARIABLES FROM STEPNET”. A directory of archived variable files, for the stepper you are at, will be downloaded and displayed on the screen
- Enter the index number of the variable file that you wish to load, and press CONTINUE
- The chosen variable file will be downloaded to the stepper, and the data in the file will be assigned to the correct stepper machine variables.
- Upon successful completion of the download, you will be returned to the Stepnet HPL Program main menu. The message “Successfully received variables!” will be displayed.

SPC DATA

The Stepnet HPL Program collects SPC data (statistical process control) every time a reticle data file is downloaded from the Stepnet server. The following items are currently collected:

- Current product running
- Current layer running
- Current lens temperature

This data can be transferred to the Stepnet server by the following methods: (Assuming that the TOOLBAR / OPTIONS / CONTROL WORD / ENABLE SPC DATA TRANSFER checkbox is enabled)

MANUALLY SAVING SPC DATA

- Select “VIEW EXTENDED MENUS” from the Stepnet HPL Program main menu
- Select “SAVE SPC DATA TO STEPNET”.
- SPC data will be collected, and sent to the Stepnet server
- Upon successful completion of the upload, you will be returned to the Stepnet HPL Program main menu. The message “SPC data uploaded successfully!” will be displayed.

AUTOMATICALLY SAVING SPC DATA

To automatically save SPC data whenever a reticle data file is downloaded to the stepper, make sure that the TOOLBAR / OPTIONS / CONTROL WORD / ENABLE SPC DATA TRANSFER checkbox is enabled on the Stepnet server.

UTILITIES

The following utilities are available only when the Stepnet HPL Program is run in the STAND-ALONE mode. Refer to the STEPNET HPL PROGRAM FOR THE HP9826 / LOADING / STAND-ALONE MODE for more information on running the program in this mode.

CREATE STEPNET BOOT DISKETTE

The Stepnet boot disk creator utility formats and creates a Stepnet HPL Program diskette. These diskettes are not stepper dependent, so you can use any Stepnet HPL Program diskette on any stepper. To create a diskette:

- Select "VIEW EXTENDED MENUS" from the Stepnet HPL Program main menu
- Select "CREATE STEPNET BOOT DISKETTE".
- Press 'Y' to the prompt "Create Stepnet HPL boot diskette?"
- Insert a blank, 5.25", double sided, double density diskette in the floppy drive on the HP9826
- Press CONTINUE
- The utility will format the diskette, and copy the necessary files to create a Stepnet HPL Program boot diskette.
- When finished, the disk catalog will be displayed, and the prompt "Finished…" will be displayed. Press CONTINUE to return to the prompt "Create Stepnet HPL boot diskette?". Press CONTINUE again if you wish to return to the Stepnet menu.

FAST UPLOAD UTILITY

The Fast Upload utility is designed to upload all reticle data files on a diskette, with minimal operator intervention. Product and Layer filenames are formed using data contained in the Reticle Title fields of each file, or using operator input. Based on this information, each file is then assigned a Product directory, and a unique filename, where the file will be stored on the Stepnet server. Due to differences in reticle title naming conventions between different companies, this utility is customized for your particular reticle title format.

To start a Fast Upload for a reticle data diskette:

- Select "VIEW EXTENDED MENUS" from the Stepnet HPL Program main menu
- Select "FAST UPLOAD UTILITY".
- Place the reticle data diskette in the floppy drive on the HP9826 computer, and press CONTINUE
- The prompt "Save in Product directory xxxxxxx" will be displayed.
  - To save all files on the disk in the displayed directory, press 'Y'
  - To specify a different product directory, press CONTINUE and enter the name of the directory you wish the files to be saved in
- As each file is successfully uploaded, the screen will be updated, and the next file will be loaded from diskette and sent.

TUNEUP CYCLE

The Tune-up Cycle utility is designed to fully test the reliability of all functions of the Stepnet HPL Program. It will automatically and repeatably perform the following data transactions, until the test is aborted with the 'k9 function key:

- Send stepper status
- Send reticle data
- Receive reticle data

- Send variable data
- Send SPC data

To start the Stepnet HPL Program Tune-up test:

- Select “VIEW EXTENDED MENUS” from the Stepnet HPL Program main menu
- Select “TUNEUP CYCLE”.

The test will start, and continue to run, until the user aborts by pressing the ‘k9’ function key.

TOGGLE STEPPER STATUS

The Toggle Stepper Status function is used to test the hardware connecting the Stepnet server, and the stepper. When pressed, the Stepnet HPL Program will alternately send a STEPPER READY, or STEPPER BUSY status message to the server.

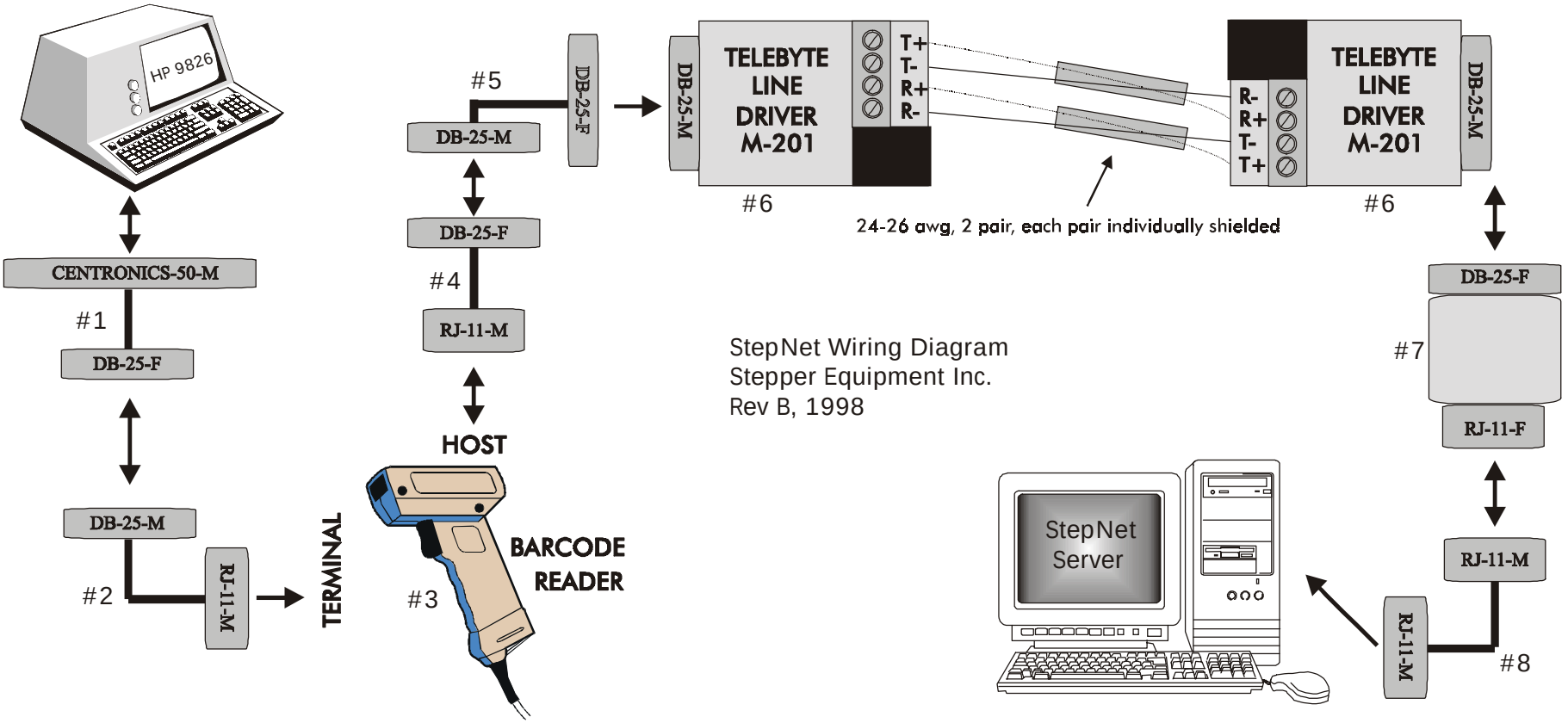
To start the Stepnet HPL Program Tune-up test:

- Select “VIEW EXTENDED MENUS” from the Stepnet HPL Program main menu
- Select “TOGGLE STEPPER STATUS”.

The new status is then sent to the Stepnet server. It should be reflected in the Stepper Status area of the user interface on the Stepnet server.

APPENDIX

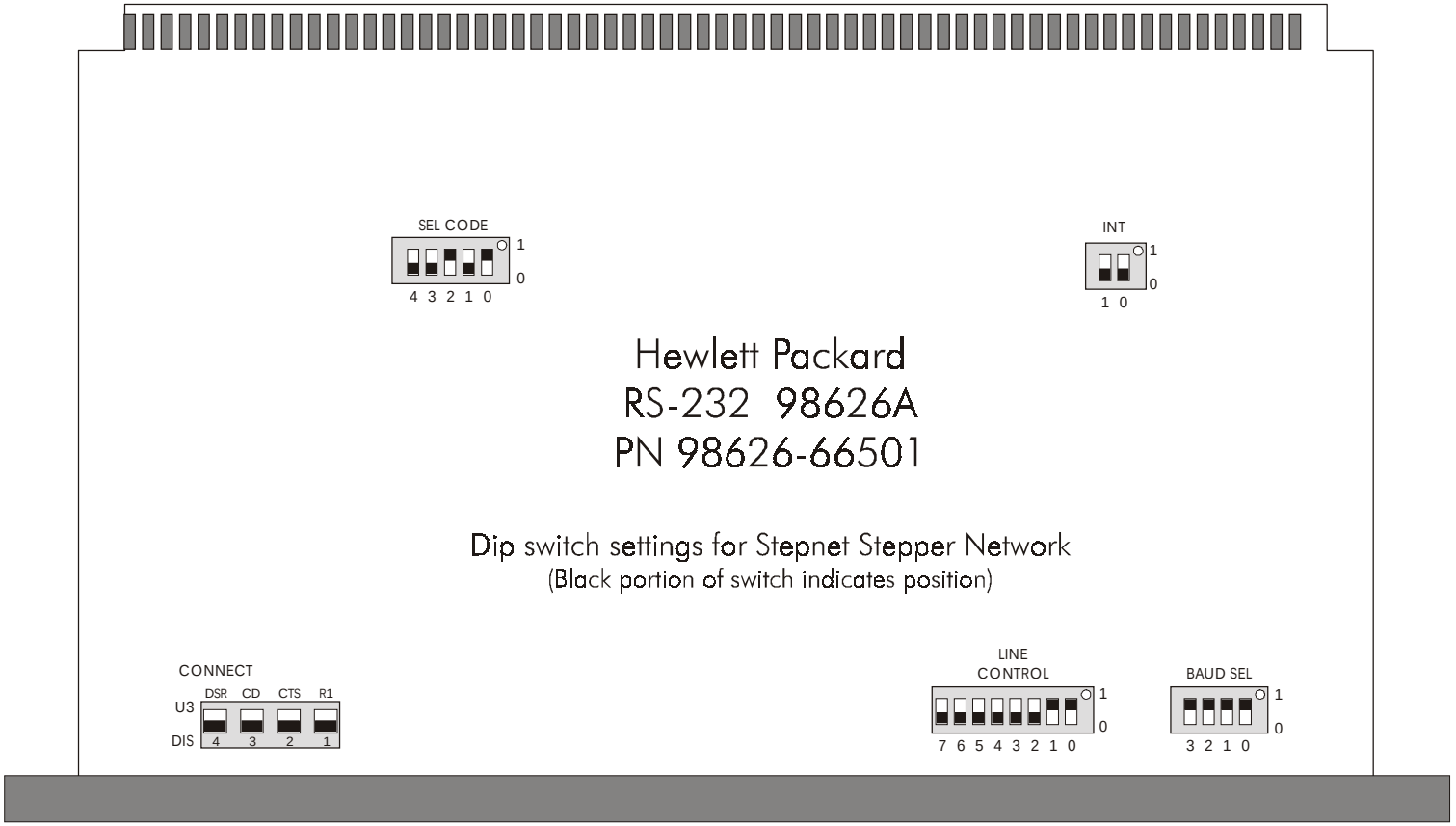
APPENDIX A, STEPNET CABLE LAYOUT



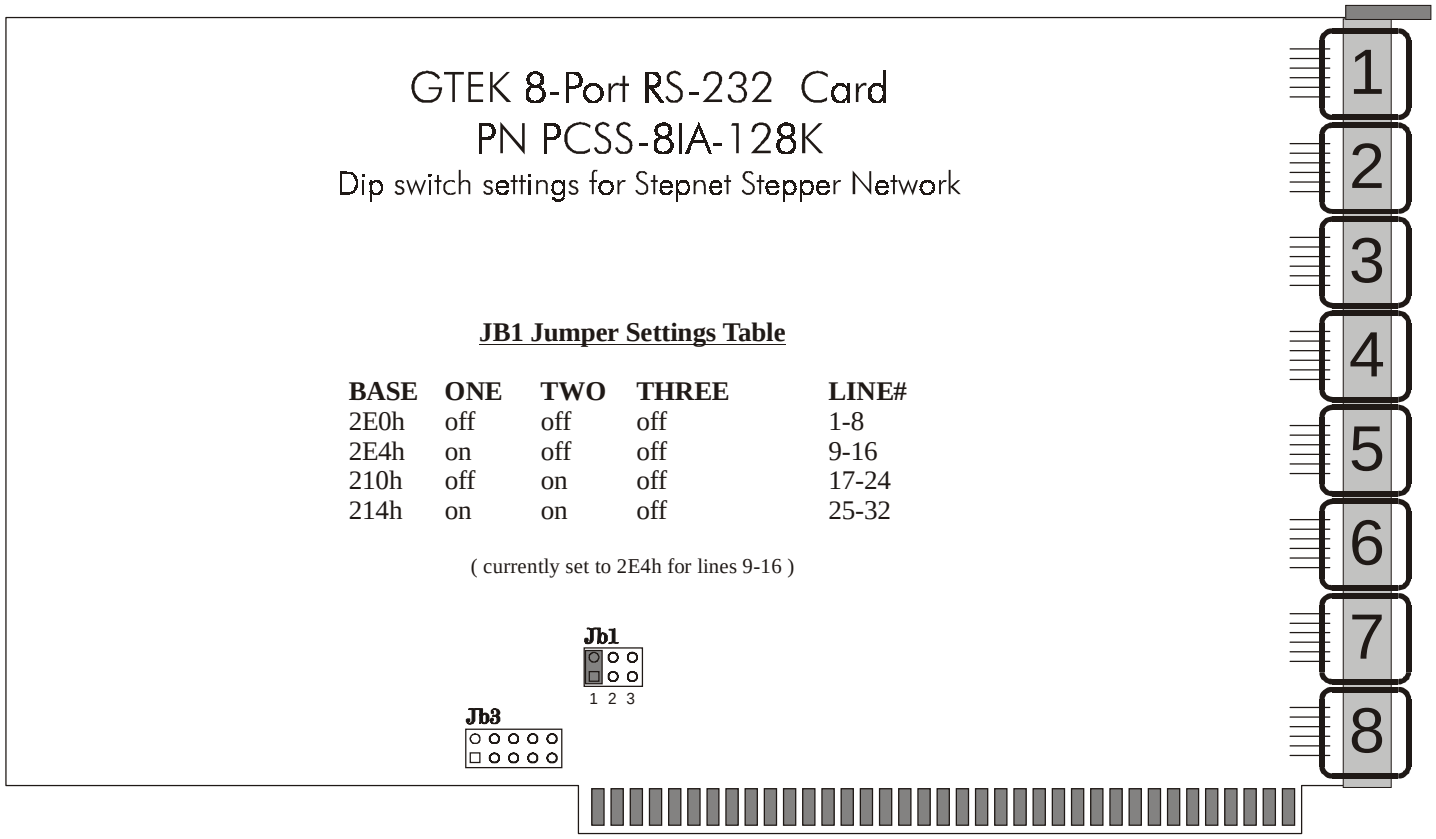
ITEM	QTY	PART NUMBER	DESCRIPTION	REMARKS	CABLE SET
1	1	SN-50C-DB25F-48	50 pin centronics M to Db25 F	Connects RS232 on 9826 to Bar Code Terminal extension	Stepnet Cable Set
2	1	W-F32-0	Db25 M to Rj11 M (Terminal on BC Terminal)	Bar Code Terminal extension cable, to terminal on BCT	Barwand Cable Set
3	1	WDR-RS232	Bar Code Terminal	Bar Code Terminal	Barwand Cable Set
4	1	W-F33-0	Rj11 M (Host on BC Terminal) to Db25 F	Bar Code Terminal extension cable, to host on BCT	Barwand Cable Set
5	1	SN-DB25M-DB25F-84	Db25 M to Db25 F	Extension cable to back of stepper frame	Stepnet Cable Set
6	2	M-201	Telebyte Line Amplifier	Line amplifier allow extensions up to 1.2 miles	Stepnet Cable Set
7	1	SN-DB25F-RJ11F	Db25 F to Rj11 F	Connects line amplifier at Stepnet to Rj11	Stepnet Cable Set
8	1	SN-RJ11M-RJ11M	Rj11 M to Rj11 M	Final connection to GTEK board in server	Stepnet Cable Set

APPENDIX B, ACCESSORY BOARD CONFIGURATION

HEWLETT PACKARD RS-232 BOARD FOR THE HP9826 COMPUTER



GTEK 8 PORT RS-232 CARD FOR THE STEPNET SERVER



Model LZ200 Programming Chart

(To program barwand, scan the barcodes, top to bottom, starting with the left column, then center column, and then right column)

Start Setup

RESET

Intercharacter Delay

1

Baud Rate

6

← Scan the left column first, top to bottom, then the middle column and far right column, top to bottom, in order.

Terminator Character

3

Preamble

RS(Alt ON)

RS(Alt ON)

RS(Alt ON)

SET

Postamble

US(Alt OFF)

US(Alt OFF)

US(Alt OFF)

SET

End Here →

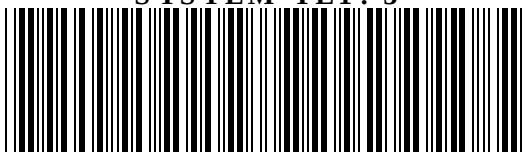
End Setup

Sample Test Reticle Data Barcodes

This sample chart supports the following barcode format: (PRODUCT-LAYER)

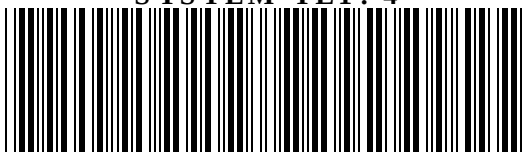
Your barcode format may be different.

SYSTEM-TL1.3



SYSTEM-TL2.3

SYSTEM-TL1.4



SYSTEM-TL2.4

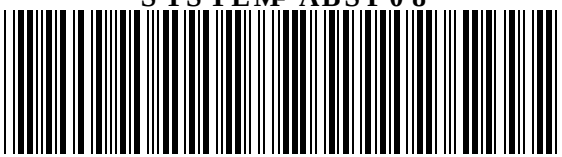
SYSTEM-TL1.5

SYSTEM-TL2.5

SYSTEM-TL1.6

SYSTEM-TL2.6

SYSTEM-ABSP08



SYSTEM--SCAN08

APPENDIX D, STEPNET INTERFACING CONCEPTS

COMMUNICATING WITH THE STEPNET SERVER

Valid data files can be stored and retrieved from the Stepnet server (SERVER) using any computer that has RS-232 communications capabilities. The HP9826, or another computer, (HOST) must use the following RS-232 setup parameters:

- Baud Rate: 19,200 bits per second
- Line Control No parity, 1 stop bit, 8 bit chars
- Handshaking Disabled

TO SEND DATA TO, OR REQUEST DATA FROM, THE STEPNET SERVER:

1. HOST sends 1 byte, a decimal (5) to the SERVER, to determine if the server is on-line
2. SERVER sends 1 byte, a decimal (4) to the HOST, affirming that the server is on-line and listening
3. HOST sends a 6 byte Header string to the SERVER, made up of the following:

    - Bytes 1+2 contain the DATA SIZE, in 16 bit signed binary integer format (see data conversions)
    - Bytes 3+4 contain the HEADER CODE, describing the type of data the HOST is sending
    - Bytes 5+6 contain the SENDER I.D., in 16 bit signed binary integer format

4. SERVER sends 1 byte, a decimal (20) to the HOST, signaling that it is ready to receive the data packet
5. HOST sends the data packet, and a 2 byte Checksum appended to the end of the data packet (Note that the 2 byte checksum is not included in the DATA SIZE field of the Header string sent to the SERVER)
6. After receiving all of the data, the SERVER performs a checksum on all of the received bytes.

    - If the calculated checksum matches the 2 byte checksum appended to the data packet, the SERVER sends 1 byte, a decimal (6), signaling that the data was received successfully
    - If the calculated checksum does not match the 2 byte checksum appended to the data packet, the SERVER sends 1 byte, a decimal (21), signaling that an error occurred in the data transmission

TO RECEIVE DATA FROM THE STEPNET SERVER:

1. SERVER sends 1 byte, a decimal (5) to the HOST, to determine if the host is on-line
2. HOST sends 1 byte, a decimal (4) to the SERVER, affirming that the host is on-line and listening
3. SERVER sends a 6 byte Header string to the HOST, made up of the following:

    - Bytes 1+2 contain the DATA SIZE, in 16 bit signed binary integer format (see data conversions)
    - Bytes 3+4 contain the HEADER CODE, describing the type of data the SERVER is sending
    - Bytes 5+6 contain the SENDER I.D., in 16 bit signed binary integer format (0 when the SERVER is the sender, the value in G[19] on the HOST, when the HOST is the sender)

7. HOST sends 1 byte, a decimal (20) to the SERVER, signaling that it is ready to receive the data packet
8. SERVER sends the data packet, and a 2 byte Checksum appended to the end of the data packet (Note that the 2 byte checksum is not included in the DATA SIZE field of the Header string sent to the HOST)
9. After receiving all of the data, the HOST performs a checksum on all of the received bytes.

    - If the calculated checksum matches the 2 byte checksum appended to the data packet, the HOST sends 1 byte, a decimal (6), signaling that the data was received successfully

- ❖ If the calculated checksum does not match the 2 byte checksum appended to the data packet, the HOST sends 1 byte, a decimal (21), signaling that an error occurred in the data transmission

Before the HOST makes any requests for data to the SERVER,, the HOST must first send a "Ready" status message to the SERVER. The Server will not send data to the HOST, if the HOST is not in the "Ready" state. (See "Valid Header Codes" later in this section)

Upon sending a successful "Ready" status message to the SERVER, the HOST should expect to receive a Control Word message within 1-2 seconds. This control word determines the data sending and receiving capabilities permitted the HOST, by the SERVER. (See Stepper Control Word, later in this section)

DATA CONVERSIONS

Data is transmitted between the HOST and the SERVER, packed in one of three number formats.

Integer numbers are sent in 2 byte binary format, MSB + LSB. Bits 0-14 represent an integer between -32767 and 32767. Bit 15 is the sign bit, 1=negative, 0=positive. For example, ASCII characters "ab" = DECIMAL "97,98" = BINARY "01100001" + "01100010" = HEX 0x6162 = INTEGER 24930

Floating point numbers are sent in 4 byte binary format, which represents a 6 digit floating point value in the range from –9.99999e-63 to 9.99999e+63. The breakdown is as follows:

- Byte 1:

Bit 0	Sign bit
Bit 1-7	7 bit 2's complement binary exponent, -63 to 63

- Byte 2:

Bit 0-3	First digit, binary 0-9
Bit 4-7	Second digit, binary 0-9

- Byte 3:

Bit 0-3	Third digit, binary 0-9
Bit 4-7	Fourth digit, binary 0-9

- Byte 4:

Bit 0-3	Fifth digit, binary 0-9
Bit 4-7	Sixth digit, binary 0-9

Extended Floating point numbers (numbers requiring more that 6 significant digits) are sent as 18 character strings, in exponential format. For example, the number –345.678912 would be sent as "-3.456789120000e+2"

STEPPER CONTROL WORD

This section describes the 10-byte stepper control word. This control word is sent by the Stepnet server to each stepper, immediately after the stepper has sent a "Ready" status message to the server. The user at the Server terminal can modify this control word. The modified control word is then sent to the stepper the next time a "Ready" status message is received. Each stepper has it's own individual control word, which allows each stepper to be uniquely configured.
Once the stepper receives the control word, it is stored in the following variables:

1. Byte 0+1 stored in M[1,1]

   Bit 0 : 1 = Enable Lens Temperature transfer
   Bit 1 : 1 = Enable Stepper to Stepnet reticle data transfer
   Bit 2 : 1 = Enable barcode input from stepper
   Bit 3 : 1 = Enable Stepnet to Stepper reticle data transfer
   Bit 4 : 1 = Enable Stepnet to Stepper variable transfer
   Bit 5 : 1 = Enable Stepper to Stepnet variable transfer
   Bit 8 : 1 = Command stepper to send variables upon exiting the Stepnet HPL Program

2. Byte 2+3 stored in M[3,1] : Handshaking timeout in Binary integer format
3. Byte 4+5 stored in M[3,2] : Header timeout in Binary integer format
4. Byte 6+7 stored in M[3,3] : Data timeout in Binary integer format
5. Byte 8+9 stored in M[3,4] : Data transfer retries, in Binary integer format

For more information on configuring the Stepper control word, refer to TOOLBAR FUNCTION / OPTIONS / STEPPER CONTROL WORD

MESSAGE HEADER CODES

Message headers contain six bytes of header information in the following format:

- Bytes 1+2 contain the DATA SIZE, in 16 bit signed binary integer format (see data conversions)
- Bytes 3+4 contain the HEADER CODE, describing the type of data the SERVER is sending
- Bytes 5+6 contain the SENDER I.D., in 16 bit signed binary integer format (0 when the SERVER is the sender, the value in G[19] on the HOST, when the HOST is the sender)

The following describes the header codes supported by the Stepnet server:

Code	Description	Sender	Data Sent
"RS"	Receive Status	Stepper	Stepper Status, 10=READY, 11=BUSY Integer format, 2 bytes
"RC"	Receive Control Word	Server	10 byte Control word
"DM"	Display Message	Server	Message as string data
"RR"	Receive Reticle Data	Stepper/Server	Reticle data file
"SR"	Send Reticle Data	Stepper	Reticle data file requested Bits 1-15 = reticle I.D. Bits 16-30 = ROM code

			Bits 31-45 = Layer Bits 46-60 = Product String format, null or space terminated
"DR"	Send Reticle Data Directories	Stepper	None
"DR"	Send Reticle Data Directories	Server	Current list of reticle data directories Bit 1-15 1st directory Bit 16-30 Next….. Etc…
"FR"	Send Reticle Data Filenames	Stepper	None
"FR"	Send Reticle Data Filenames	Server	Current list of reticle data filenames Bit 1-15 1st filename Bit 16-30 Next….. Etc…
"SP"	Receive SPC data	Stepper	SPC data as follows: Bits 1-15 = reticle I.D. Bits 16-30 = ROM code Bits 31-45 = Layer Bits 46-60 = Product Bits 61-62 = Lens temperature (float)
"RV"	Receive Variables	Stepper/Server	Variable data file (extended float fmt)
"SV"	Send Variables	Stepper	Name of Variable data file
"FC"	File check	Stepper	Name of file
"FC"	File check	Server	0 = no file, 1 = file exists (int)
"FV"	Send Variable directory	Server	Current list of variable data files for stepper XXX Bit 1-2 Variable filename size (VFS) Bit 3-3+VFS Bit VFS+4 Next….. Etc…
"FV"	Send Variable directory	Stepper	None

APPENDIX E, STEPNET VENDORS

GTEK MULTIPORT RS-232 CARD

GTEK
P.O. Box 2310, 399 highway 90
Bay St. Louis, Ms 39520 (228)-467-8048 voice 467-0935 fax
Part Number PCSS-8IA-128K, 8 port ISA serial card, 1 each per 8 lines, installed on Stepnet server

TELEBYTE LINE MODEM

Telebyte
270 East Pulaski Road, Greenlawn, NY, 11740
Voice 800-835-3298
Part Number M-201, line modem, 2 each per stepper

WORTHINGTON BARCODE PACKAGE

Worthington Data Solutions
623 Swift Street, Santa Cruz, Ca 95060
Voice (831)-458-9938
(1) PN WDR-RS232 Reader , (1) F32/3 Inline DB25 cable group (a), (1) LZ200 Laser Scanner

STEPNET SERVER PC COMPUTER

Frys Electronics
550 East Brokaw Road, San Jose, Ca, 95112
Voice (408)-487-1000 Fax 487-1018
Stepnet server, AMD 350 w/4 isa slots, 5 Gigabyte hard drive, 17” monitor

STEPNET CABLE PACKAGE

Stepper Equipment Inc
6284 San Ignacio Ave, Suite E, San Jose, Calif. 95119
(408)-281-0996
Part Number SL-CGA, 1 each per stepper

HP9826 RS-232 BOARD

Hewlett Packard
M/S 5620, 8000 Foothills Blvd, Roseville, Ca 95747-6588
Voice (800)-227-8164
Part Number 98626-66501, RS-232 board assy for HP9826 computer, 1 each per stepper

APPENDIX F, STEPNET HPL PROGRAM VARIABLES

Variable	Description
R601	1 = standalone mode
R602	1 = steplink variables initialized
R603	0 = ret menu, 1 = Extended menu
R604	1=redraw menu
R605	1 = stepper program loaded
R606	TrapErr: Error Line #
R607	TrapErr: Error number
R608	TrapErr: ROM #
R609	Reticle data downloaded, flag for SPC upload upon exit
R621	Flag for link_SET to return, rather than go to “sl_Menu”
R623 (flag 23)	Expected handshaking char received from stepper(receive services)
R624 (flag 24)	Expected handshaking char received from stepper (send services)
R625	Flag for display line prompt, or incoming message 1 = message
R626	“Waiting for Control Word” flag when entering slboot menu
M[1,1]	Control Word, 16 bit Integer Bit 0 = Enable SPC data xfer Bit 1 = Enable Stepper to Stepnet ret data xfer Bit 2 = Enable barcode input from stepper Bit 3 = Enable Stepnet to Stepper ret data xfer Bit 4 = Enable Stepnet to Stepper variable transfer Bit 5 = Enable Stepper to Stepnet variable transfer Bit 8 = Command stepper to send variables upon exit
M[2,1]	Status
M[3,1]	Handshake timeout (sec.)
M[3,2]	Header timeout (sec.)
M[3,3]	Data timeout (sec.)
M[3,4]	Send retries
W$[7,1-15]	Product directory, stored when file is uploaded to Stepnet
W$[7,16-30]	Layer Filename, stored when file is uploaded to Stepnet