LAVA HQ-ST Link
System Manual
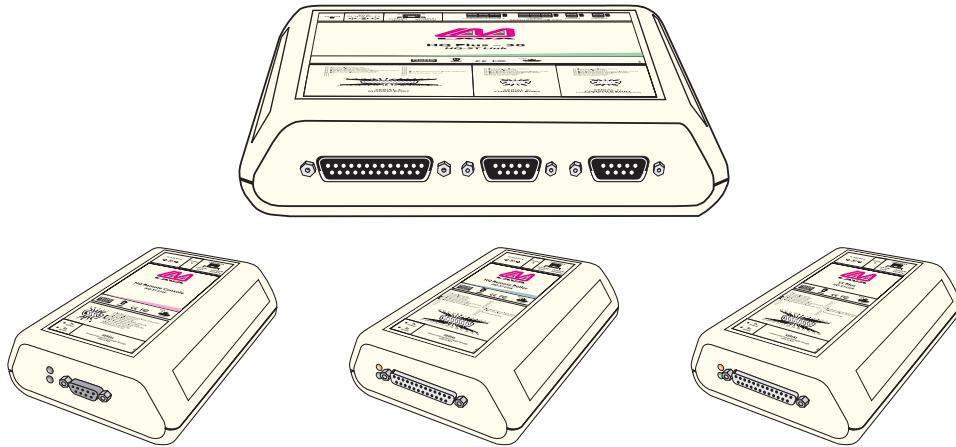
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Introduction

System Design

The LAVA HQ-ST Link consists of ST Plus devices installed at each store. The ST Plus devices communicate with an assigned and dedicated HQ-Plus device at the head office. The ST Plus devices are attached to the cash register(s) in each store, and to the store's Internet connection. Polling software running on a head office computer can poll each cash register, via the HQ Plus.

The system is supported by the included ST Plus Configuration Console application, which makes configuring ST Plus units simple, and at the head office by the HQ Basic application, which shows the connection status of ST Plus devices in stores.

The system is also enhanced by the HQ Plus Remote Console and the HQ Plus Remote Poller, hardware interfaces that enable an installer or owner to perform head office tasks from other locations.

Theory of Operation of the LAVA HQ-ST Link

A LAVA HQ-ST Link provides reliable "always on-line" communication path between remote/distributed ST Plus devices and a centrally located HQ Plus device. The ST Plus establishes a TCP/IP connection to the IP address:TCP port of a designated HQ Plus. This connection then provides the HQ Plus with the current IP address:TCP port of the ST Plus.

Whenever the ST Plus is reset or powered up, the ST Plus establishes this connection, and expects the HQ Plus to send an "I (HQ Plus) still see You (ST Plus)" packet to the ST Plus once every three minutes at a minimum. If the ST Plus does not receive this "keep-alive" message from the HQ Plus, the ST Plus will reset and try to re-connect to the HQ Plus. Similarly, in the event of some change at the ST Plus's site, the ST Plus will re-connect to the HQ Plus. Typical incidents could be: power cycling off and on, an IP address change of the ST Plus due to dynamic IP address re-assignments , re-location of the ST Plus, initial installation of the ST Plus, interruption of Internet service, and so on.

The HQ-ST System provides a "telephone modem-like communications environment" to the equipment connected at both ends. However, the data path between the ST Plus and HQ Plus is over Ethernet using TCP/IP communications. The Ethernet TCP/IP communications are used only as the communications medium between the HQ Plus and the ST Plus devices, and are "invisible" to the serial side data I/O activities at the HQ Plus and ST Plus devices.

Figure 1: HQ-ST Layout
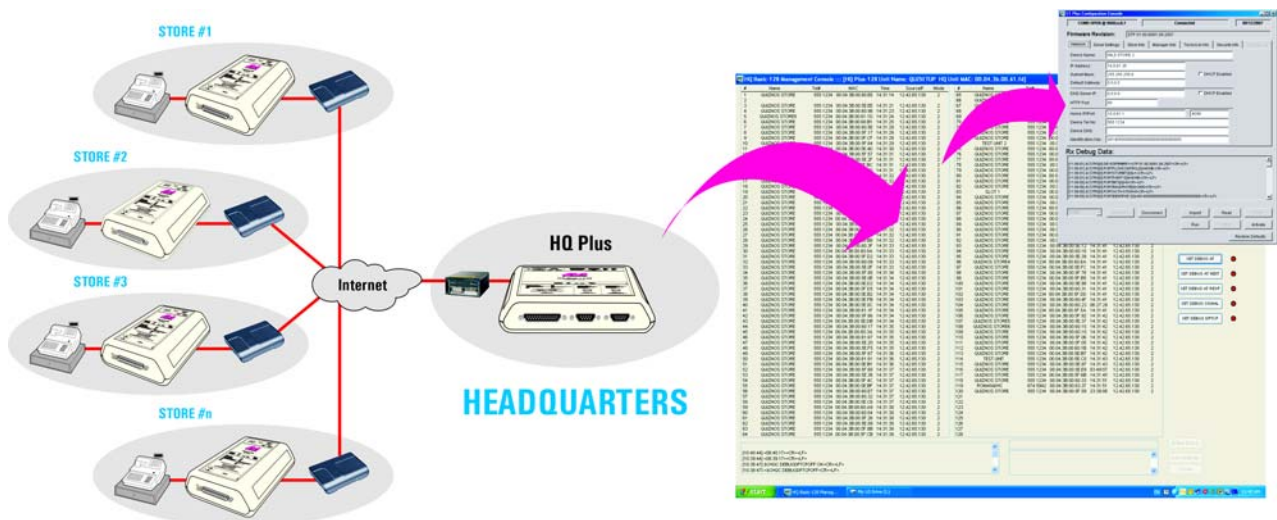
Primary Hardware Components of the HQ-ST System

The ST Plus and HQ Plus are the two essential hardware components in an HQ-ST Link. ST Plus devices, attached to ECRs in stores, connect to their assigned HQ Plus device located at a head office.

ST Plus

The ST Plus is a device operates as a TCP/IP Raw Client, with the intention of providing a store-side serial-to-Ethernet interface to an ECR or other similar device.

The ST Plus provides a serial port with the I/O characteristics and pin-out of a USR-type modem with a DB-25F connector. To make a serial-to-serial connection from the HQ Plus's serial port to the ST Plus's serial port the originating equipment connected to HQ Plus (typically a computer running ECR polling software) sends a dialing string (ATDT5551234, for example) that causes a connection to be made to the serial port of the specific ST Plus (in this example, known as 5551234) to which the receiving equipment (the ECR to be polled) is connected.

Figure 2: ST Plus
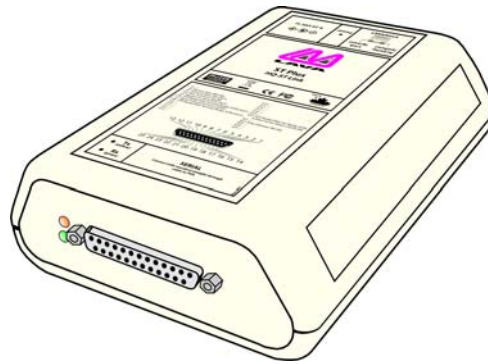
Figure 3: ST Plus: front connections
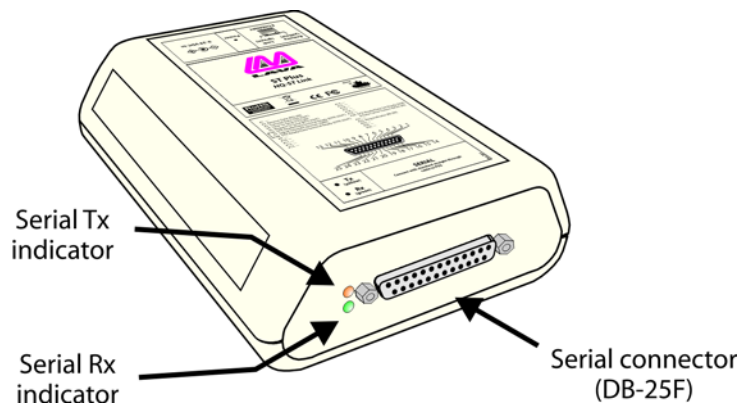
Figure 4: ST Plus: rear connections
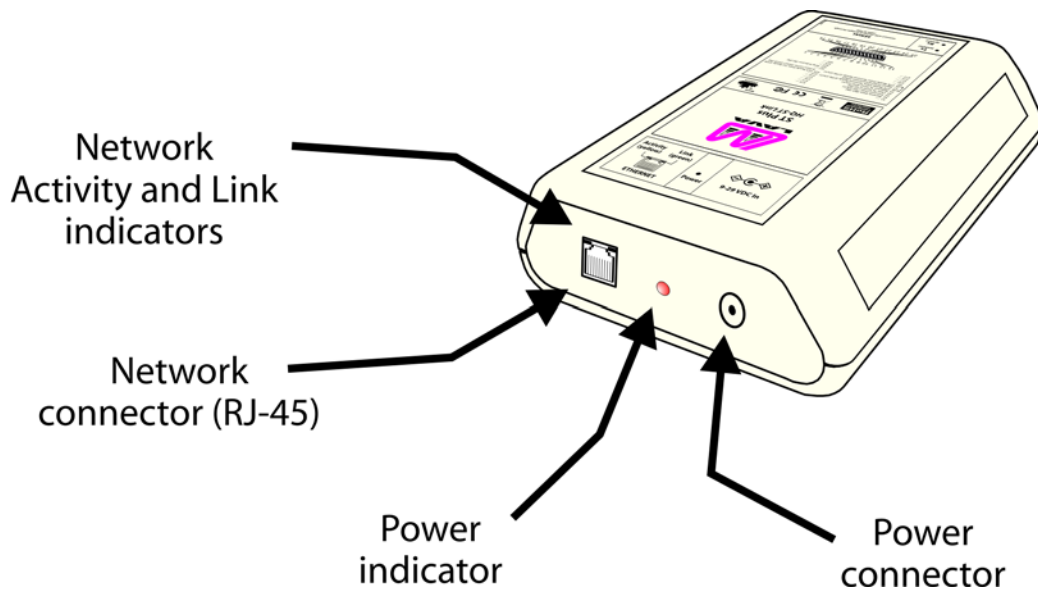
HQ Plus

The HQ Plus operates as a TCP/IP Raw Server, with a known IP:Port address. The HQ Plus is intended to provide a head-office serial-to-Etherenet interface for a polling application to access remotely located device to be polled.

The HQ Plus provides a modem-like serial interface (US Robotics (USR) command set, DB-25F connector), that is used by an external device such as a PC to make a "telephone - modem" call (that is, using a conventional modem dialing string of the format: ATDT5551234).

The HQ Plus comes in versions that support up to 126, 30, or 8 ST sites.

Figure 5: HQ Plus-126, HQ Plus-30, HQ Plus-8
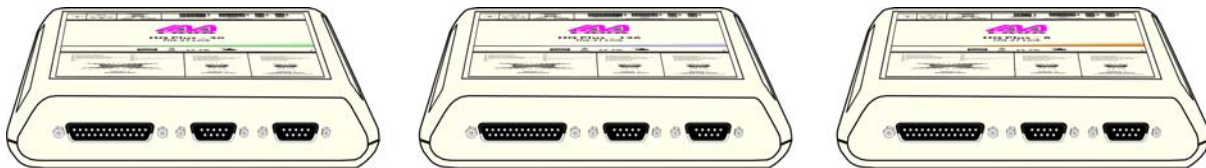
A set of LEDs on the HQ Plus indicates the status of the serial ports of the device, and the number of active ST Plus connections.

Figure 6: HQ Plus LEDs
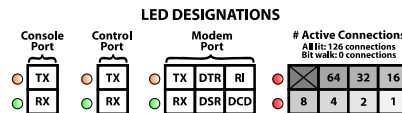
The number of active connections has a binary representation. When there are no active connections, the connection LEDs light and unlight in sequence, creating a "bit walk". When connections exist, the number of connections is represented by the sum of the values in each box above. For example, if the "64", "4", and "1" LEDs were lit, the number of active connections would be 69.

Secondary Hardware Components of the HQ-ST System

The HQ Remote Console and HQ Remote Poller provide the capability to locate a parallel "HQ site" which can be readily re-located. The HQ Remote Console and the HQ Remote Poller can be deployed as standalone devices, at the same or at separate sites. Enabling and disabling of the remote devices is controlled from the main HQ Plus through the HQ Basic software control to allow or disallow remote console and remote poller functions accesses.

HQ Remote Console

Figure 7: HQ Remote Console: DB-9F serial connector

The HQ Remote Console provides an output of the "current connection status" of the system, via the serial port on the HQ Remote Console device.

The data output is a "duplicate" of the output from the main HQ Plus, which may be located elsewhere on the WAN, LAN, or Internet.

The PC that is connected to the serial port of the HQ Remote Console runs the HQ Basic utility. The same control capabilities exist at the HQ Remote Console site at the main HQ Plus.

The HQ Remote Console can be located anywhere where there is an Internet communication capability available. Only one HQ Remote Console may be associated with any one HQ Plus, and the site LAN requirements are the same as for an ST Plus installation.

The HQ Remote Console communicates with the main HQ Plus in a way similar to that used by a standard ST Plus.

HQ Remote Poller

Figure 8: HQ Remote Poller: DB-25F serial connector
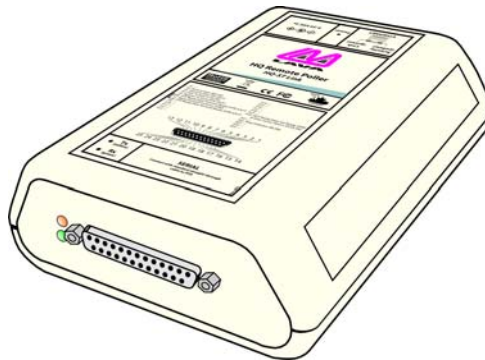
The HQ Remote Poller hardware provides the capability to use polling software applications to poll and communicate with the ST Plus devices that are "connected" to the main HQ Plus.

Only one HQ Remote Poller may be associated with any one HQ Plus.

The site LAN requirements are the same as for an ST Plus installation.

Software Components of the HQ-ST Link System

While not essential to the main task of polling over IP, the following components supplement the basic HQ-ST Link and and assist installation or are required for device configuration .

HQ Basic Software

This system management utility, supplied with HQ Plus hardware, provides configuration interfaces for HQ Plus and ST Plus devices, and presents a tabular view of the state of all ST Plus connections current on a given HQ Plus. It also provides rudimentary connection logging and debugging information, and a live "chat" interface for HQ-ST system administrators to communicate with installers in the field.

HQ Basic resides on the host PC, which is connected to the Console port of the HQ Plus. It is loaded from the LAVA Installation CD.

See "HQ Basic: Operation" on page 19.

ST Plus Configuration Console

This application, supplied with ST Plus hardware, provides a configuration interface for ST Plus devices, and a live "chat" interface for installers to communicate with a head office.

This utility resides on a PC host and is used via the serial port of the ST Plus. It is loaded from the LAVA Installation CD.

Connect the serial port of the host PC to the serial port of the ST Plus, start the utility, select the COM port, then cycle the power to the ST Plus. The ST Plus Configuration Console communicates with and is ready to configure the ST Plus.

Note: there is a five second access-to-start window, after ST Plus power-up.

See "ST Configuration Console: Operation" on page 16.

LAVA Ether Link Manager Utility

This device management utility is used to locate, display, and configure the current network settings of the LAVA HQ Plus and ST Plus devices, and to indicate the network settings of the Host PC that is connected to the LAN. The Host PC network settings can be used to assist in selecting the static IP settings that may be required by the HQ Plus and ST Plus (if DHCP is not available) for operation on the LAN.

This utility operates on a LAN only. The LAN must not block UDP broadcast packets. Network security programs/firewall may need to be disabled or edited to allow the UDP broadcast packets on the LAN.

The Host PC may be connected directly to the HQ Plus or ST Plus via a standard Ethernet cross-over cable, in order to bypass using the LAN environment.

The utility is downloaded from www.lavalink.com.

LAVA HQ Plus Install

Equipment Needed

To set up an HQ Plus for polling you will need:

- polling software [not supplied]
- LAVA HQ Basic software (See "HQ Basic: Operation" on page 19.)
- LAVA HQ Plus with power supply (do not confuse power supply with that of ST Plus)
- Windows-based PC with 2 available COM ports (2 x DB-9) [not supplied] (two separate computers could also be used for polling software and HQ Basic software if desired)
- one Ethernet cable (CAT-5 UTP with RJ-45 connectors) [not supplied]
- one straight-through serial cable (DB-25M to DB-9F) [not supplied]
- one straight-through serial cable (DB-9M to DB-9F) [not supplied]

General

HQ Plus devices communicate over Ethernet LAN/WAN facilities. The devices must be configured with the appropriate IP addresses and port numbers for the specific LAN onto which these devices are to be connected.

The installer must know the correct network parameters to configure HQ Plus devices for operation.

METHOD #1: Headquarters Installation using HQ-Basic (recommended method)

Before Proceeding: Complete the relevant network parameters checklists on the LAN

- See "Verify Access to the Internet from the LAN" on page 23.
- See "Check that the LAN Provides DHCP Setting Configurations to Devices on the LAN" on page 24.
- See "Check that the Selected HQ Site has a STATIC WAN IP Address" on page 25.

Important: The headquarters site requires static IP addresses — the HQ LAN IP address must be static, AND the WAN address of the HQ LAN site device must be static.

The WAN/Internet IP address must be a known STATIC IP address (or an assigned DNS name). Use Internet Explorer to access www.whatismyip.com to verify the address. Also verify that this is so by accessing the setup parameters of the gateway/router that is to be used to provide the access to the Internet for the LAN.

Note: The HQ site may (as an option) have a DNS name, which can be used by Internet users instead of the STATIC IP, to connect to the HQ site.

Important: Port forward the two port numbers associated with each HQ Plus on the LAN.

1. Connect the HQ Plus "Console" port to a PC's COM port using the DB-9M to DB-9F cable. Supply power to the HQ Plus.

2. Install and run the HQ Basic management software on the computer attached to the HQ Plus.

3. Choose the COM port to which the HQ Plus is attached and click "Connect".

4. Once connected, double-click on the last entry in the table (the entry is named "CONSOLE LOCAL" and denotes the HQ Plus that is currently connected).
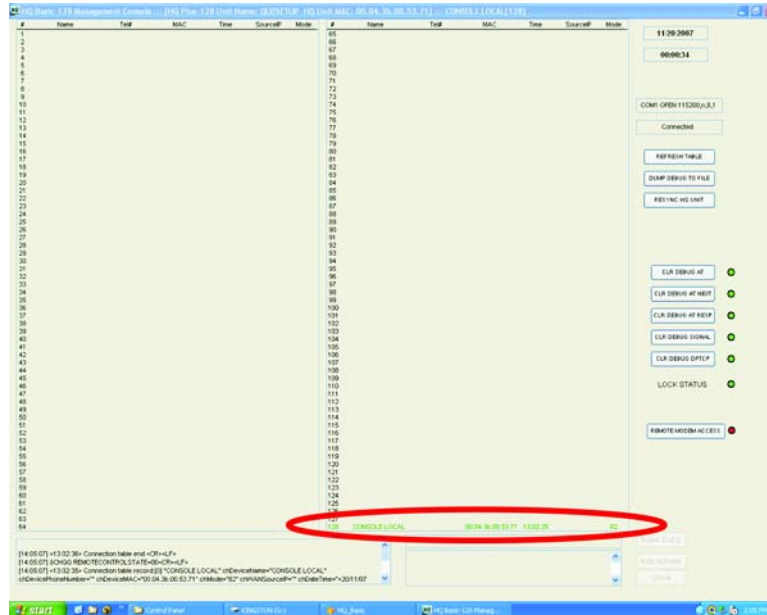
5. In the Network Settings screen that appears, enter at least the following: the IP address of this HQ Plus (factory default is 192.168.0.35) and an Identification Key matching that used by ST Plus units targeting this HQ Plus (factory default is a string of zeros). LAVA recommends changing the Identification Key from this factory default to one personalized to your system for full security.
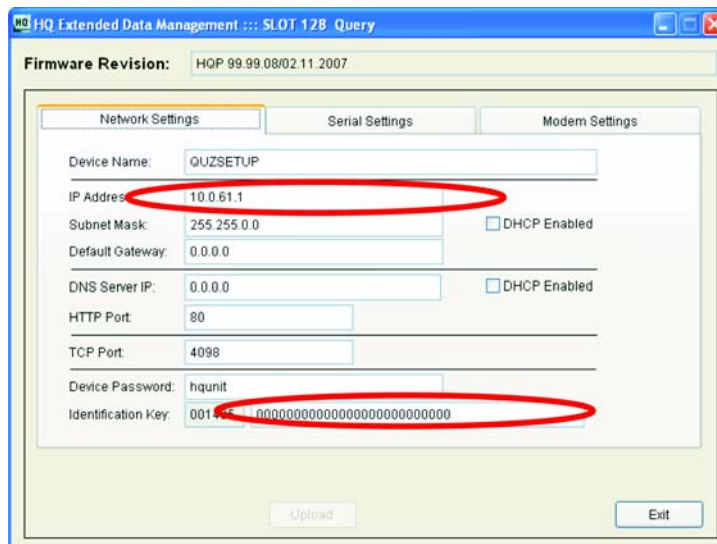
6. The default values in the Serial Settings tab are for display only and cannot be changed.
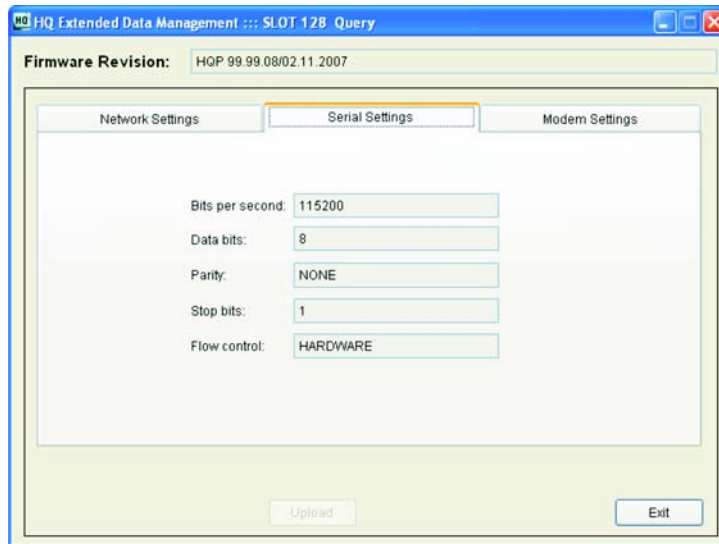
7. The serial settings in the "Modem Settings" tab must be set to match those used in the polling generally (that is, those of the ECR, ST Plus, and polling software).
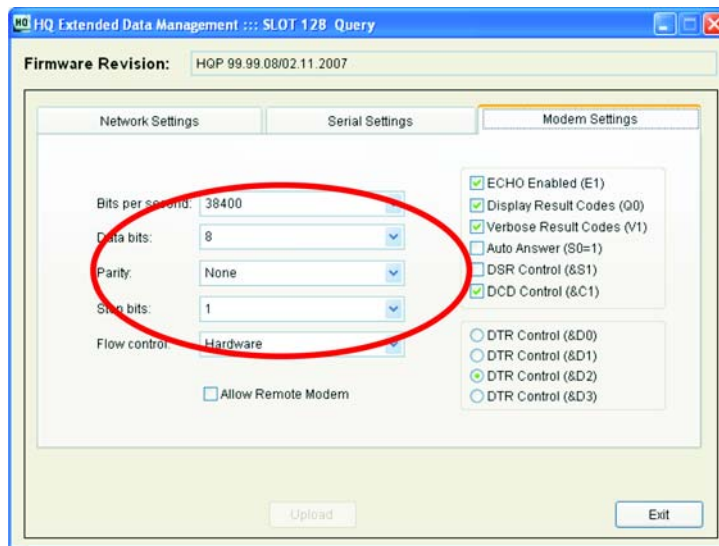
8. The modem settings on the right hand side of this tab may not need to be changed, depending on the particular modem requirements of the polling software. LAVA suggests starting with them at their default values.
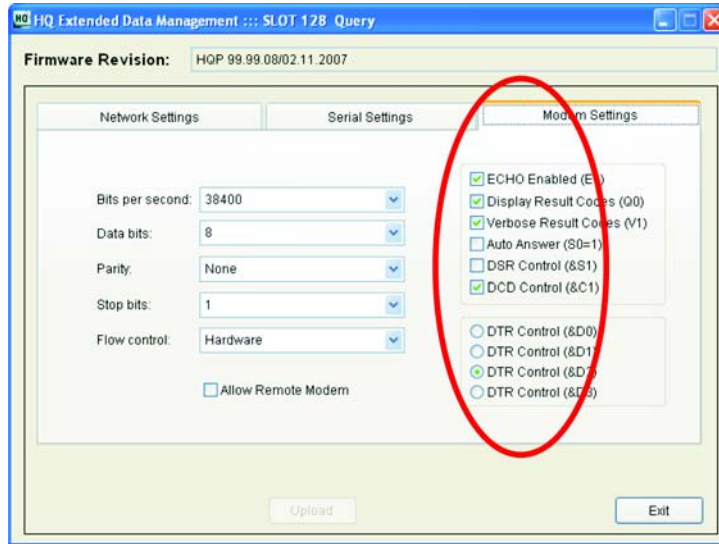
9. Connect the HQ Plus "Modem" port to the PC's second COM port using the DB-9F to DB-25M serial cable.

10. Connect the HQ Plus's Ethernet port to the store LAN on which the "Default Gateway" is located.

11. Map a TCP port nnnn (default port number is 4098) on the headquarter's gateway to allow control and negotiation data to pass to remote units. Consult your router's documentation for this step.

12. Map a TCP port nnnn+1 (default port number is 4099) on the headquarter's gateway to allow modem data to pass to remote units. Consult your router's documentation for this step.

13. Test the link.

   See "Test that the HQ Site is Properly Set Up and Working: HQ Plus Installed" on page 26.

   See "Test the End-to-End HQ-ST Link Communications: HQ and ST Installed" on page 27.

14. Attach the PC that will host the polling software. The serial port of the polling host PC should be connected to the "Modem" port of the HQ Plus. In general, it is most trouble-free to configure the serial port of the polling host PC to match the serial port of the HQ Plus, and to ensure that serial settings and connections end-to-end (from polling software to polled device) are consistent.

15. If necessary, troubleshoot the link using the troubleshooting chart:

   See "Troubleshooting" on page 28.

16. POLL AWAY!

METHOD#2: Headquarters Installation using Ether Link Manager and the Web Page

Before Proceeding: Complete the relevant network parameters checklists on the LAN

- See "Verify Access to the Internet from the LAN" on page 23.
- See "Check that the LAN Provides DHCP Setting Configurations to Devices on the LAN" on page 24.
- See "Check that the Selected HQ Site has a STATIC WAN IP Address" on page 25.

Important: The headquarters site requires static IP addresses — the HQ LAN IP address must be static, AND the WAN address of the HQ LAN site device must be static.

The WAN/Internet IP address must be a known STATIC IP address (or an assigned DNS name). Use Internet Explorer to access www.whatismyip.com to verify the address. Also verify that this is so by accessing the setup parameters of the gateway/router that is to be used to provide the access to the Internet for the LAN.

Note: The HQ site may (as an option) have a DNS name, which can be used by Internet users instead of the STATIC IP, to connect to the HQ site.

Important: Port forward the two port numbers associated with each HQ Plus on the LAN.

1. Assign STATIC Network IP parameters to each HQ Plus

   Use the LAVA Ether Link Manager utility (See "LAVA Ether Link Manager Utility" on page 5.) to configure the LAN NETWORK settings of the HQ Plus, then (on knowing the IP address of the HQ Plus) use the web page (See "Web Page Interface on HQ Plus and ST Plus" on page 32.) to configure any parameters on the HQ Plus.

2. Confirm that two TCP socket ports are assigned to each HQ Plus

   The default ports are 4098 and 4099, (that is, a base port and a base+1 port). Use the web page interface to the HQ Plus to configure the base port number of the HQ Plus. The second port number is computed automatically based on this first value.

3. Forward the HQ Plus IP address base and base+1 ports

   Port Forward the HQ Plus IP address base and base+1 ports, through the gateway to allow access to the HQ Plus's IP address:ports from the Internet. Use the information provided on www.portforward.com to accomplish the "port forwarding" procedure on your particular installed gateway/router.

4. Configure the serial I/O parameters

   Configure the serial port of the HQ Plus to match the requirements of the equipment that is to be connected to the serial port of the HQ Plus.

SPECIAL NOTE: Some application software programs that communicate with a serial modem expect that the "modem" is installed as a TAPI device under Windows. In this case follow the procedure to install the HQ Plus as a Generic 56K Modem on a selected Com:n port, set the baud rate as required for the equipment, and set the option to operate WITHOUT waiting for Dial Tone. Once the device is "installed", re-boot the PC then do a test by querying the modem to verify the correctness of the "modem installation". See "Installing the HQ Plus on the PC as a (TAPI) Modem" on page 31.

Some application software programs only expect that an external modem is connected to a serial port on the PC. In this case connect the HQ Plus to the appropriate Com:n serial port. The application program will send AT commands through the serial (com:n) port to the HQ Plus.

5. Record important settings

   Information to be noted: Keep this information on hand for reference when setting up the ST Plus devices, and for test/troubleshooting purposes.

Internet (WAN) IP address of the HQ site. This is the "call home" IP address that will be entered into all ST Plus devices that are to communicate with this HQ Plus on IP(WAN):port/s.

Base and Base+1 Ports assigned. The Base Port number will be entered into all ST Plus devices, as part of the unique "call home" IP address information, of the HQ Plus. Note several HQ Plus devices can be located at the site, but each HQ Plus will be uniquely identified by its assigned Base Port number.

6. Test the link.

   See "Test that the HQ Site is Properly Set Up and Working: HQ Plus Installed" on page 26.

   See "Test the End-to-End HQ-ST Link Communications: HQ and ST Installed" on page 27.

7. Attach the PC that will host the polling software. The serial port of the polling host PC should be connected to the "Modem" port of the HQ Plus. In general, it is most trouble-free to configure the serial port of the polling host PC to match the serial port of the HQ Plus, and to ensure that serial settings and connections end-to-end (from polling software to polled device) are consistent.

8. If necessary, troubleshoot the link using the troubleshooting chart:

   See "Troubleshooting" on page 28.

LAVA ST Plus Install

Equipment Needed

To set up an ST Plus for polling you will need:

- LAVA ST Plus Configuration Console software
- LAVA ST Plus with power supply (do not confuse power supply with that of HQ Plus)
- Windows-based PC with 1 available COM port (1 x DB-9) [not supplied]
- one Ethernet cable (CAT-5 UTP with RJ-45 connectors) [not supplied]
- one straight-through serial cable (DB-25M to DB-9F) [not supplied]

General

ST Plus devices communicate over Ethernet LAN/WAN facilities. The devices must be configured with the appropriate IP addresses and port numbers for the specific LAN onto which these devices are to be connected.

The installer must know the correct network parameters to configure ST Plus devices for operation.

In general the ST Plus is very easy to install on a LAN that has DHCP support. If the LAN does not provide DHCP, then determine or obtain the set of static IP addresses that are to be used by the ST Plus on the LAN:

- IP address of the ST Plus
- NetMask IP
- Gateway IP
- DNS IP (required if DNS is used to contact HQ site)

Make a note of these IP addresses. They will be entered as part of the network settings of the ST Plus.

The essential operating parameters will typically be pre-configured before installation at the remote location.

1. Use the ST Configuration Console or web page interface to set up the ST Plus for the HQ-ST Link operating requirements. The essential parameters are:

- Network settings - either DHCP or static IP settings
- Call Home IP address and port - these are the IP:(base) port of HQ Plus

2. Use the ST Configuration Console or web page interface to set up the ST Plus optional parameters.

   Optional parameters include:

- Device Name: for location identification
- Store Telephone: ID, "tel" number used by the polling software

Installation of ST Plus Devices at the ECR Equipment Sites

Before Proceeding: Complete the relevant network parameters checklists on the LAN

- Complete the site Installation Checklist. See "Installation Checklist" on page 21.
- See "Verify Access to the Internet from the LAN" on page 23.
- See "Check that the LAN Provides DHCP Setting Configurations to Devices on the LAN" on page 24.

1. Install the ST Plus Configuration Console software on the computer and open the application.

2. Connect a straight-through serial cable to the serial port of the ST Plus and to the computer with the ST Plus Configuration Console software. Choose the COM port to which the ST Plus is attached and click "Connect".

3. Cycle power on the ST Plus. On ST Plus boot-up, the data fields of the ST Plus Configuration Console will be populated with the settings of the ST Plus.

4. In the screen that appears, DHCP should be checked on (unless you are manually configuring network settings).
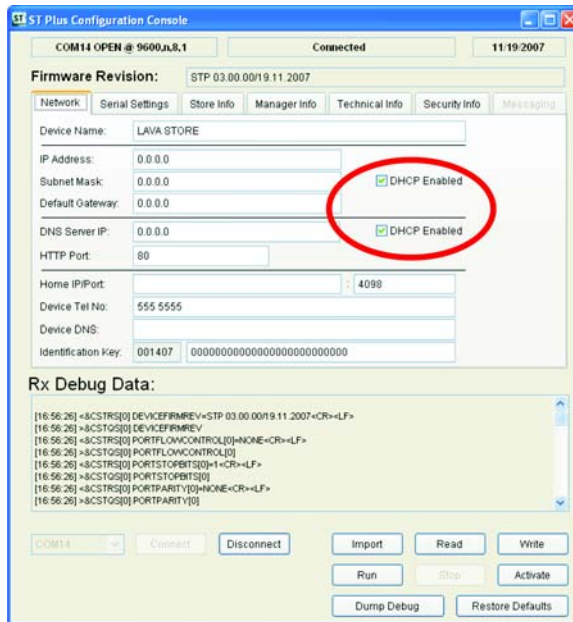
5. The fields "Home IP/Port" and "Device Tel No." must be completed.
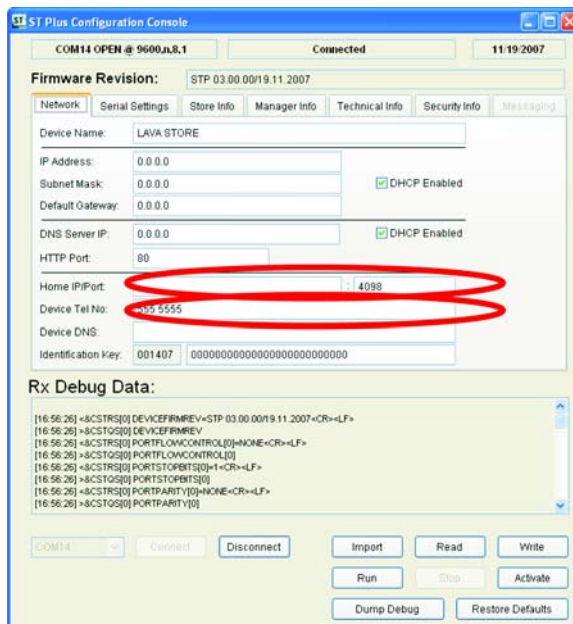
6. The Identification Key must match that of the HQ Plus to which you are connecting.
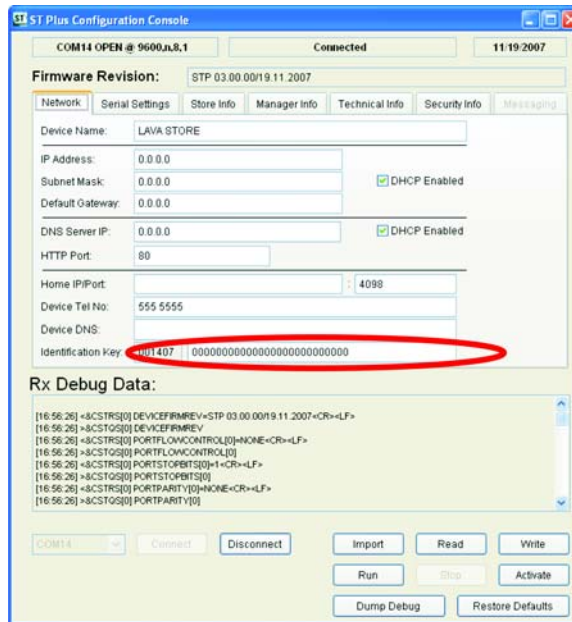
7. Set the correct serial port settings. They should match the settings of the polling software, the ECR's communications port, and the HQ Plus modem port.
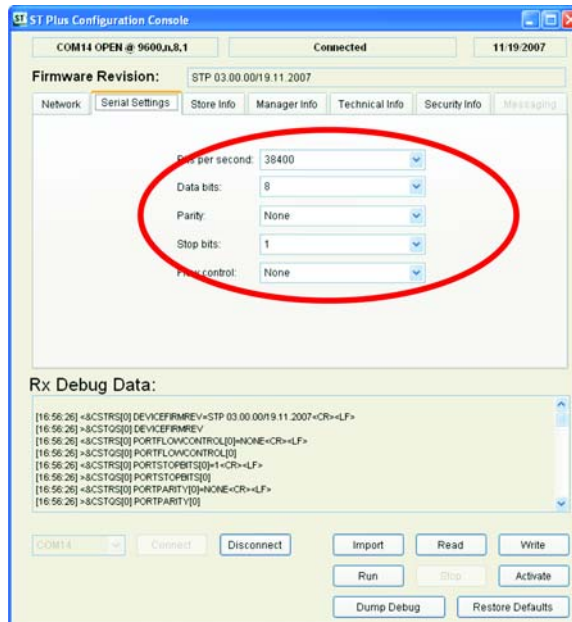
8. Connect the Ethernet port of the ST Plus to the store's LAN. Click "Write" and then click "Run". You should see a time stamp and a "Connected to Unit: [device name]" message in the Message dialog window.

9. Select the mode of ST Plus operation: STOP, RUN, ACTIVATED.

   Operating modes are as follows:

STOP. In this mode the ST Plus is not communicating to an HQ Plus. The ST Plus can be fully re-configured using the ST Config utility or the web page interface, and LAVA Ether Link Manager.

RUN. Enter this mode after the ST Plus is set up, to test if it can open a connection to the designated "call home" IP:port of an HQ Plus. In this mode the ST Plus will connect to the HQ Plus, and remain connected and fully operating, until the ST Plus is reset or power cycled . After a reset or power cycling, the ST Plus will revert to STOP mode.

Run mode is typically used for testing the setup configuration or re-configuration, prior to placing the ST Plus into fully operational mode.

Access the web page of the ST Plus to check its connection status.

When the ST Plus is in Run mode the LAVA Ether Link Manager will not "locate/find" the ST Plus.

ACTIVATED. This mode is the normal operating mode for the ST Plus. The device will always attempt to re-connect to the HQ Plus's IP:port as designated by the "Home IP" entry of the ST Plus.

Select this mode only if all ST parameters are set, and correct.

Access the web page of the ST Plus to check its connection status.

When the ST Plus is in Activated mode, the LAVA Ether Link Manager will not "locate/find" the device. In this case, use the ST Configuration Console to make any changes. The user may also make changes to the ST Plus's configuration by using the HQ Basic software utility running at the head office site, or by using an HQ Remote Console device at any location.

NOTE: As an option, the basic network parameters can be set using the ST Configuration Console, and STOP mode selected, thereby allowing the installer to access the web page interface of the ST Plus to complete configuring the ST Plus for operation.

10. Test the link.

    See "Test the End-to-End HQ-ST Link Communications: HQ and ST Installed" on page 27.

11. Attach the device to be polled (ECR or POS station). In general, it is most trouble-free to configure the serial port of the ST Plus to match the serial port of the ECR or POS station.

12. If necessary, troubleshoot the link using the troubleshooting chart:

    See "Troubleshooting" on page 28.

13. POLL AWAY!

ST Configuration Console: Operation

The ST Configuration Console provides a Windows-based interface for users to configure the network and serial port settings of an ST Plus device. These settings are required for the operation of the ST Plus in an HQ-ST Link.

It also provides an interface for supplying store-specific information for storing in an ST Plus. These details are not used for connectivity, but may be used as contact information or for store identification from the head office.

Hardware Connection

The ST Configuration Console software runs on a host PC that has a serial port connected to the serial port of the ST Plus device, using a straight-through serial cable. The ST Plus end of the cable will need a DB-25 male connector; the host PC end of the cable will probably need a DB-9 female connector (depending on the serial port connector being used on the host PC).

Software Connection

NOTE: The ST Plus Configuration Console software can only establish a connection to the attached ST Plus in the five second interval following the powering on of the ST Plus device. The serial port of an ST Plus device is designed to fall back to an operational mode after this five-second window.

To establish a connection between the ST Plus and the ST Plus Configuration Console, follow the following steps:

1. Connect the serial port of the ST Plus to the serial port of the host PC that the ST Plus Configuration Console will use.

2. Start the ST Plus Configuration Console software.

3. Ensure that the serial port selected in the dialog box at the bottom left of the ST Configuration Console screen matches the physical port that is cabled to the ST Plus device.

4. Click on the "Connect" button.

5. Cycle the power on the ST Plus device. The ST Plus Configuration Console will detect that an ST Plus is attached and available, and query the device.

6. Data from the ST Plus will populate the fields of the ST Plus Configuration Console, and the word "Connected" will appear at the top of the ST Plus Configuration Console screen (see below).

Figure 9: ST Configuration Console: Network configuration screen
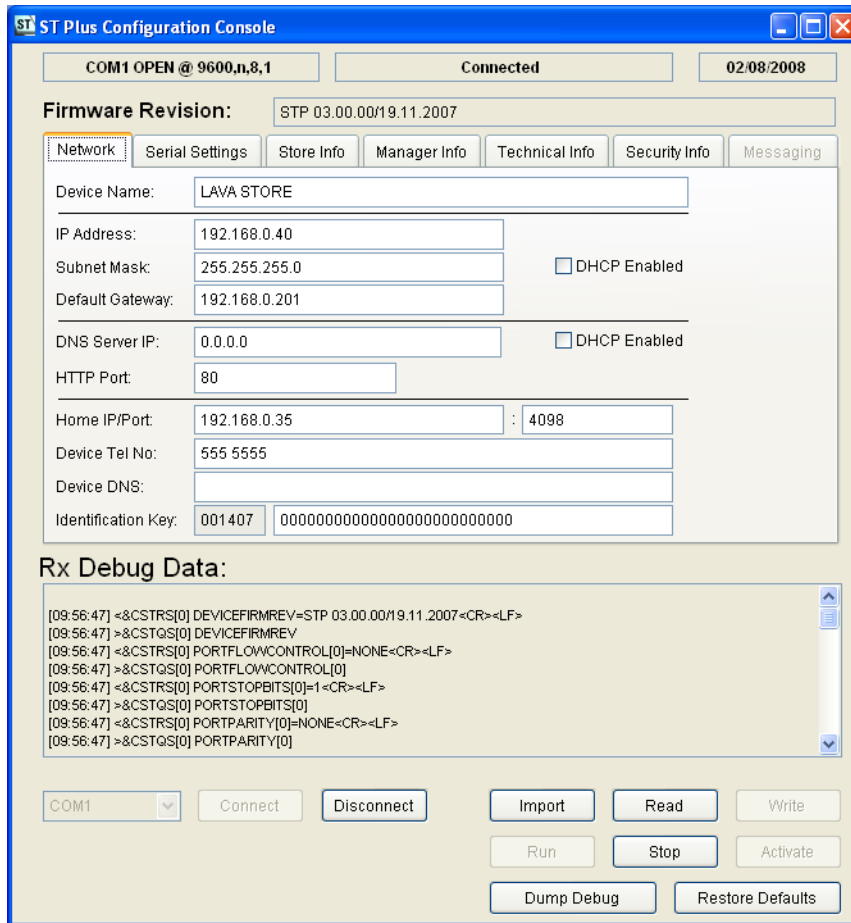
7. At a minimum, you will need to set up the network connectivity, the home IP/port, and the identification key.

• LAVA recommends using DHCP at the store, to simplify connectivity. If you are configuring the network manually, you wil need to supply the ST Plus with an IP address (IP Address) , a subnet mask (Subnet Mask), and an address for the network's gateway (Default Gateway).

• The "Home IP/Port" settings are the IP address and port for the HQ unit that will be used to poll this ST Plus.

• The Identification Key is a user-configurable security value that ensures that only HQ Plus devices and ST Plus devices with matching identification keys will communicate with each other.

8. Optionally, you can supply the device telephone number (Device Tel No), which is the number that the polling software will use when "dialing" to the ST Plus.

9. Screens are available to configure the ST Plus serial port to the requirements of the ECR and polling software that will be used, and to input store-specific information.

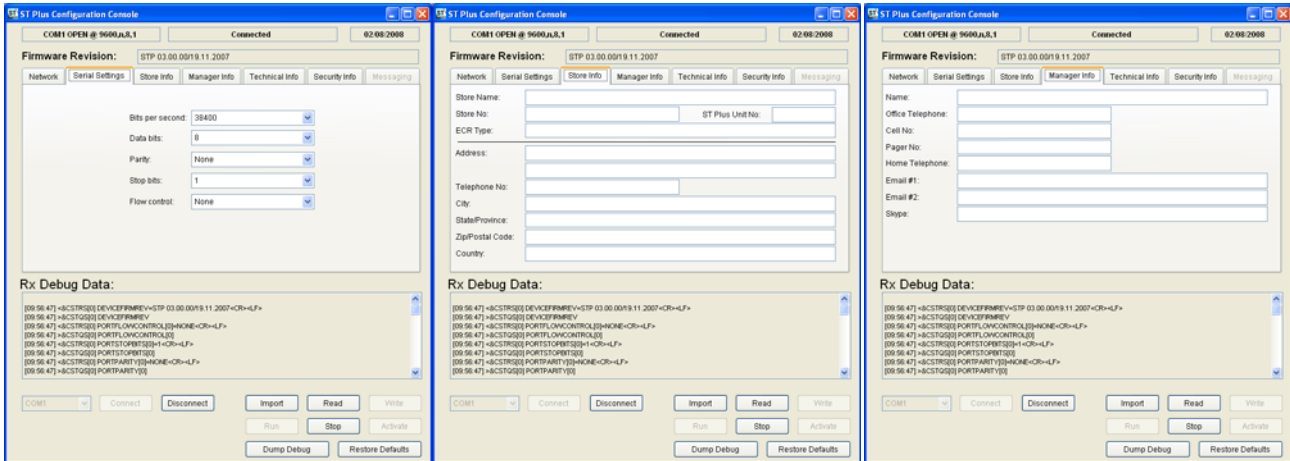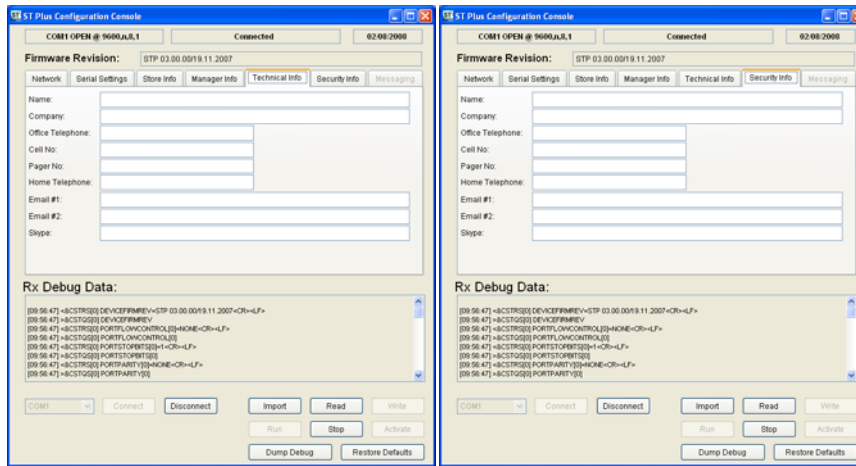**Figure 10: ST Configuration Console screens: Serial Settings, Store Info, Manager Info**

Figure 11: ST Configuration Console screens: Technical Info, Security Info

HQ Basic: Operation

HQ Basic provides a Windows-based interface for users to configure the network and serial port settings of an HQ Plus device or ST Plus device. These settings are required for the operation of the HQ Plus and ST Plus in an HQ-ST Link.

It also provides an interface for supplying and displaying store-specific information in an ST Plus. These details are not used for connectivity, but may be used as contact information or for store identification from the head office.

Hardware Connection

The HQ Basic software runs on a host PC that has a serial port connected to the "Console" port of the HQ Plus, using a straight-through serial cable. The HQ Plus end of the cable will need a DB-9 male connector; the host PC end of the cable will probably need a DB-9 female connector (depending on the serial port connector being used on the host PC).

Software Connection

To establish a connection between the HQ Plus and the HQ Basic software, follow the following steps:

1. Connect the "Console" serial port of the HQ Plus to the serial port of the host PC that the HQ Basic utility will use.

2. Start the HQ Basic software.

3. Ensure that the serial port selected in the dialog box at the bottom left of the HQ Basic screen matches the physical port that is cabled to the HQ Plus device.

Figure 12: HQ Basic: connections table
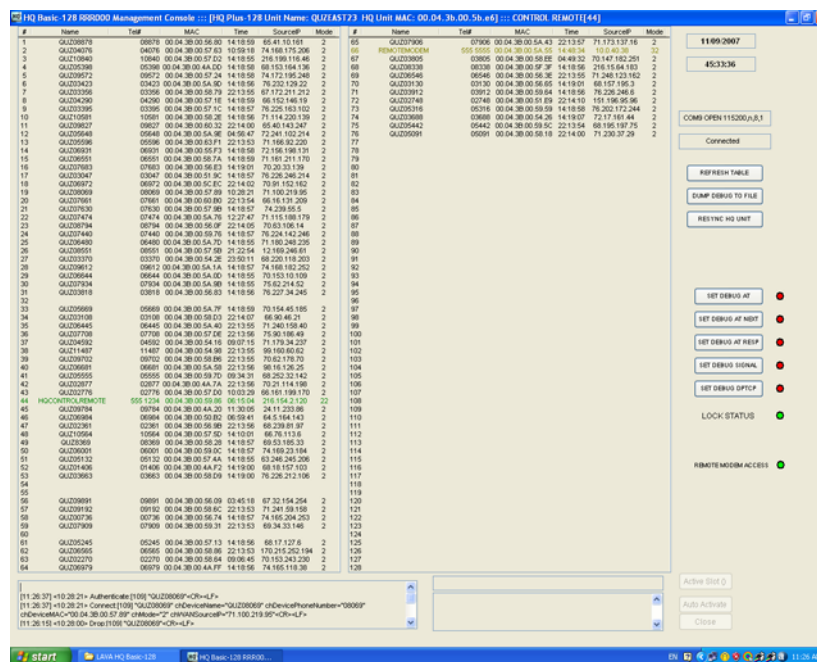
The HQ Basic connections table (shown above) reserves two connection slots for the console and control ports of the HQ Plus. These ports can be used by the HQ Remote Poller and HQ Remote Console to connect to the HQ Plus.

The HQ Basic connections table also provides access to a variety of debugging log filters, shown on the right.

Double-clicking on an ST Plus entry in the connection table opens screens for that ST Plus, and makes it possible to make and upload changes to a remote ST Plus device. Similarly, double-clicking on the Console port or Control port entry in the connection table allows configuration of these ports.

Figure 13: HQ Basic: network connections, serial port settings
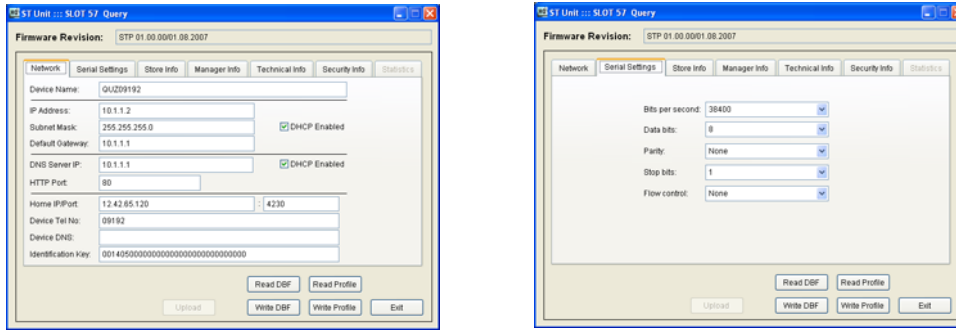
Figure 14: HQ Basic: store info, manager info
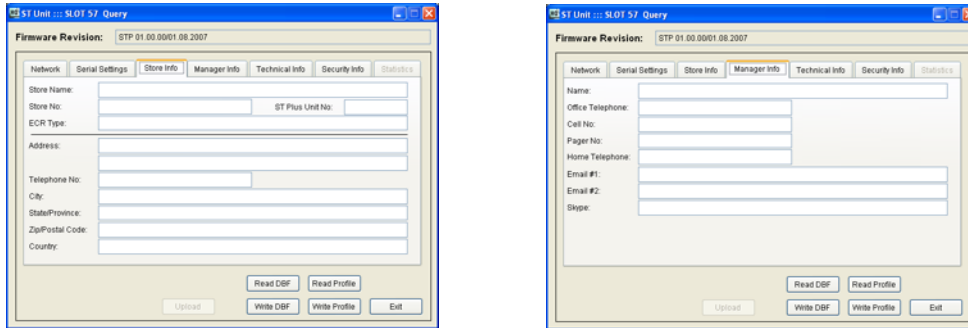
Figure 15: HQ Basic: technical info security info
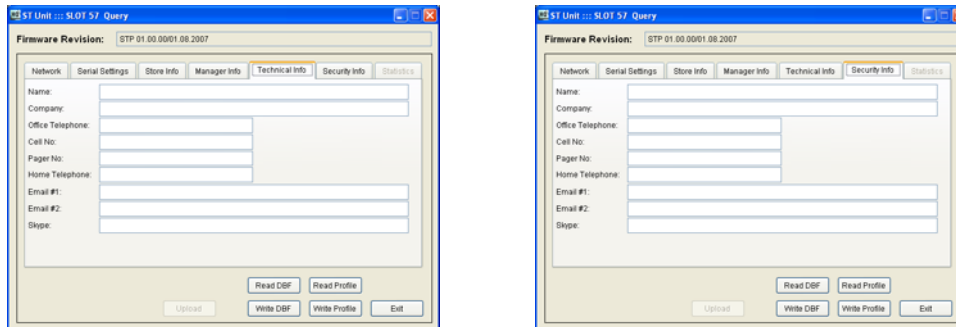
APPENDIX A: Installation Checklist

This installation checklist will assist installers of ST Plus devices when planning a store installation of an HQ-ST Link. It exists as a PDF on the Installation CD, from which it can be printed in any desired quantity.

LAVA COMPUTER MFG. INC. **2 VULCAN STREET, TORONTO, ONTARIO M9W 1L2** **TEL: (416) 674-5942 FAX: (416) 674-8262** **www.lavalink.com**	**ST PLUS UNIT INSTALLATION WORKSHEET** **Rev. A00**

LAVA recommends completing this worksheet before attempting to install an ST PLUS to ensure that all necessary configuration parameters are known.

SITE INFORMATION	
Store name:	
Store no.:	
Address:	
Voice telephone no.:	
City:	
State/province:	
Zip/postal code:	
Country:	

ROUTER INFORMATION	
ST Plus unit no. (if site has more than one):	
Default gateway:	
DNS server IP:	
HTTP port:	
Assigned local TCP port:	

ST PLUS DEVICE NETWORK INFORMATION	
Device name:	
Home IP/port:	
Device telephone no.:	
Device DNS:	
Identification key:	
DHCP enabled?:	☐ Yes (DHCP server required)
If not using DHCP, supply the following:	
IP address:	
Subnet mask:	
Default gateway:	
DNS server IP:	
HTTP port:	

LAVA recommends completing this worksheet before attempting to install an ST PLUS to ensure that all necessary configuration parameters are known.

ST PLUS DEVICE SERIAL INFORMATION (match serial port settings to ECR)

Bits per second:	o 115200	o 57600	o 38400 (default)	o 19200
	o 9600	o 4800	o 2400	o 1200
	o 300	o 110		
Data bits:	o 8 data bits (default)	o 7 data bits		
Stop bits:	o 1 stop bit (default)	o 2 stop bits		
Parity:	o No parity (default)	o Even parity	o Odd parity	
Flow control:	o None (default)	o Hardware	o XON/XOFF	

ECR CONNECTOR AND SERIAL INFORMATION (match serial port settings to ST Plus unit)

ECR type:		ECR serial connector (DB-9, DB-25, RJ-45):		
Bits per second:	o 115200	o 57600	o 38400	o 19200
	o 9600	o 4800	o 2400	o 1200
	o 300	o 110		
Data bits:	o 8 data bits	o 7 data bits		
Stop bits:	o 1 stop bit	o 2 stop bits		
Parity:	o No parity	o Even parity	o Odd parity	
Flow control:	o None	o Hardware	o XON/XOFF	

ADDITIONAL CONSIDERATIONS

APPENDIX B: Verify Access to the Internet from the LAN

TO VERIFY:

1. Connect a PC/laptop to the LAN.

2. Open a connection to www.lavalink.com.

3. Open a connection to www.whatismyip.com. A WAN (Internet) IP address will be displayed.

4. If this is the HQ LAN site, make a note of this IP address. It will need to be entered into the ST Plus devices. This IP address must be an assigned STATIC IP address.

5. If Internet connection cannot be established, then verify if Internet communications are available from the LAN.

6. If Internet connections are available, then set up the PC/laptop TCP/IP network parameters as required to use either STATIC or DHCP (automatic) assigned network parameters - see next step for assistance.

7. If Internet access cannot be established, HQ-ST System will NOT work.

APPENDIX C: Check that the LAN Provides DHCP Setting Configurations to Devices on the LAN

TO VERIFY:

1. On the PC/laptop open a COMMAND LINE box, ie. Start>Run>cmd.

2. Enter the command ipconfig /all parameters will be displayed.

3. Check if the DHCP is ON/ENABLED or OFF (Static IP setting operation). If OFF, make a note of the network parameter IP settings for IP address, netmask, gateway, and DNS.

4. Make a note if DHCP is available on the LAN.

5. If DHCP is not available on the LAN make a note of the STATIC IP parameters that must be used on the LAN in order to access Internet.

Alternative method to check if the PC/laptop is operating using STATIC IP settings or DHCP

1. Navigate to Start>Settings>Network & Dial-Up Connections>Local Area Connection>Properties>Internet Properties>TCP/IP>Properties.

2. If automatic settings are in use then the PC is using DHCP from the LAN, rather than STATIC settings (which would be indicated by the IP address fields being empty).

APPENDIX D: Check that the Selected HQ Site has a STATIC WAN IP Address

Determine if the selected HQ Plus site has a STATIC WAN IP address or a registered DNS name, that can be used by an Internet user to access devices (HQ Pluses) that are located behind the gateway/router at the HQ Plus site.

TO VERIFY:

1. Check with the ISP. An assigned Static IP is provided at extra cost to the user. Business operations that provide outside customers with access to company servers have a static IP or a registered DNS name for this purpose.

2. To confirm that the WAN IP address is STATIC, log into the gateway/router and check that the WAN IP setup is set for static operation.

3. Determine that a static IP is entered (for example, 67.123.45.76).

4. Make a note of this IP, then log out. Reset the gateway/router if possible.

5. Access the site www.whatismyip.com .The result from www.whatismyip.com must match the IP address that is entered as the static IP in the gateway/router — these results should ALWAYS come back the same.

APPENDIX E: Test that the HQ Site is Properly Set Up and Working: HQ Plus Installed

1. From the Internet, open a TCP/IP connection to the two ports that are associated with the HQ Plus. If authentication is enabled the TCP/IP connection will be established, and dropped upon a character being sent.

2. Method - Use HyperTerminal Winsock (See "HyperTerminal" on page 32.) or Telnet (See "TELNET" on page 32.) to connect to the (WAN) IP: Port (Base). Connection will be for a short time only before Hyperterminal drops the connection. The (WAN) IP: Port (Base +1) is tested in "Test the End-to-End HQ-ST Link Communications: HQ and ST Installed" on page 27.

3. This verifies that ST Plus devices should be able to connect and communicate with the HQ Plus, and the HQ Plus ports are forwarded through the gateway/router.

APPENDIX F: Test the End-to-End HQ-ST Link Communications: HQ and ST Installed

1. Have the "tel" number of the ST Plus available (for example, 5551234).

2. Place a loopback connector on the serial port of the ST Plus. (Serial port pin 2 is connected to pin 3 on the DB-25F connector, and the TX pin is connected to the RX pin).

3. Connect a com:n serial port from the host PC to the modem connection of the HQ Plus. The cable from the PC to the HQ Plus is a standard straight-through cable (DB9F - DB25M).

4. Open a HyperTerminal com:n connection using serial I/O parameters that are compatible with the serial port setup at the HQ Plus and ST Plus devices (See "HyperTerminal" on page 32.).

5. Enter AT, ATZ, and ATH0 commands:

• Enter "AT". The response should be "OK". This response indicates that the HQ (modem) is ready and operating normally.

• Enter the "tel" number of the ST Plus to which the HQ Plus is to connect, (for example, ATDT5551234). The response should be "CONNECTED ...".

6. Type some ASCII Text - the characters that are typed will be echoed back, as long as the loopback termination is in place on the ST Plus. Also, the TX and RX LEDs on the HQ Plus and ST Plus devices will both flicker to indicate that data is being transmitted and received. Lower baud rates will be indicated by longer LED "on" times.

APPENDIX G: Troubleshooting

Problem	Solution
The ST Plus device cannot connect to the HQ Plus.	
At the store location:	Ensure power is supplied to the ST Plus.
	Check that the LAN to which the ST Plus is connected has access to the Internet.
	Check that the ST Plus is connected to the store's LAN with a Cat 5 UTP cable, with an RJ-45 connector.
	Check that the ST Plus has been given the IP address and port of the HQ Plus to which you want to connect.
	Check that DHCP is enabled on the store's LAN, or if not, that the ST Plus has been supplied with a unique IP address, appropriate net mask, and gateway address.
	Ensure that the ST Plus has an Identification Code that matches that of the HQ Plus to which you want to connect.
At the head office location:	Ensure power is supplied to the HQ Plus.
	Check that the LAN to which the HQ Plus is connected has access to the Internet.
	Check that the HQ Plus is connected to the LAN with a Cat 5 UTP cable, with an RJ-45 connector.
	Check that the HQ Plus has been given the IP address of the gateway/router it will use for Internet access.
	Check that the two ports that the HQ Plus will use for communication to the ST Plus have been mapped on the gateway/router of the head office.
	Ensure that the HQ Plus has a static IP address.
	Ensure that the HQ Plus has an Identification Code that matches that of the ST Plus that will be contacting it.
The ST Plus and the HQ Plus "see" each other, but polling does not work.	
At the store location:	Ensure that power is supplied to the ECR or POS station that you want to poll.
	Ensure that the ECR or POS station's serial port is connected to the ST Plus with a straight-through serial cable.
	Ensure that the ST Plus has been assigned a "telephone number" that polling software at the head office can use to poll, as if it were dialing a modem.
	Ensure that all parameters of the serial port on the ECR or POS station are configured for polling according to the manufacturer's directions (baud rate, parity, stop bits, flow control, etc.).
	Ensure that all parameters of the serial port on the ST Plus are configured to match those of the ECR or POS station (baud rate, parity, stop bits, flow control, etc.)
At the head office location:	Ensure that the polling software is properly installed on the host PC.
	Ensure that the polling software is compatible with the ECR or POS station that you wish to poll.
	Ensure that the polling software is configured to use a serial port with the parameters to which the host PC's port has been set.
	Ensure that the polling software is configured with the "telephone number" of the ECR or POS station that you want to poll.
	Ensure that the polling software is configured to use the serial port on the host PC that is connected to the HQ Plus.
	Ensure that the correct serial port of the host PC is connected to the "Modem" port of the HQ Plus using a straight-through serial cable.
	Ensure that all parameters of the serial port on the host PC are configured for polling according to the manufacturer's directions (baud rate, parity, stop bits, flow control, etc.).
	Ensure that the correct serial port of the host PC is connected to the "Modem" port of the HQ Plus.

Problem	Solution
At both store and head office locations:	IDEALLY, the serial ports and software along the entire polling path from ECR or POS station to the head office polling software should be set the same. These include: • any software in the ECR or POS station that permits polling access • the ECR or POS station's polling serial port • the ST Plus's serial port • the "Modem" port on the HQ Plus • the serial port on the host PC that is connected to the "Modem" port on the HQ Plus • the polling software on the host PC at the head office
HQ Basic does not show active HQ Plus to ST Plus connections	
At the head office:	Ensure that HQ Basic is properly installed on its host PC. This PC might or might not be the same PC that is hosting the polling software, but if these two applications are sharing one host PC then ensure that the joint host PC has two distinct serial ports, one for each application to use.
	Ensure that HQ Basic is configured to address the same serial port that is connected to the "Console" port of the HQ Plus.
	Ensure that the serial port that HQ Basic is addressing is connected to the "Console" port of the HQ Plus using a straight-through serial cable.
HQ Remote Console and HQ Remote Poller initial setup	
At the head office and store locations:	Ensure that a working HQ-ST Link setup is already in place before attempting to add an HQ Remote Console or HQ Remote Poller to the mix. Polling software at the head office should be able to successfully poll an ECR or POS station at a remote store location, to verify connectivity.
HQ Remote Console does not show ST Plus connections on the HQ Plus	
At the head office location:	Ensure that HQ Basic running at the head office has been configured to permit remote accesses.
At the location of the HQ Remote Console:	Ensure that HQ Basic is properly installed on the host PC at the remote location. This PC might or might not be the same PC that is hosting an HQ Remote Poller, but if these two devices are sharing one host PC then that PC needs two distinct serial ports, one for each device to use.
	Ensure that HQ Basic at the remote location is configured to address the same serial port that is connected to the serial port of the HQ Remote Console.
	Ensure that the serial port that HQ Basic is addressing is connected to the serial port of the HQ Remote Console using a straight-through serial cable.
	Ensure power is supplied to the HQ Remote Console.
	Check that the LAN to which the HQ Remote Console is connected has access to the Internet.
	Check that the HQ Remote Console is connected to the LAN with a Cat 5 UTP cable, with an RJ-45 connector.
HQ Remote Poller does not poll the ECR/POS station	
At the head office location:	Ensure that HQ Basic running at the head office has been configured to permit remote accesses.
At the location of the HQ Remote Poller:	Ensure that the polling software is properly installed on the host PC at the remote location. This PC might or might not be the same PC that is hosting an HQ Remote Console, but if these two devices are sharing one host PC then that PC needs two distinct serial ports, one for each device to use.
	Ensure that the polling software at the remote location is configured to address the same serial port that is connected to the serial port of the ECR/POS station.
	Ensure that the serial port that the polling software is addressing is connected to the serial port of the HQ Remote Poller using a straight-through serial cable.
	Ensure power is supplied to the HQ Remote Poller.
	Check that the LAN to which the HQ Remote Poller is connected has access to the Internet.
	Check that the HQ Remote Poller is connected to the LAN with a Cat 5 UTP cable, with an RJ-45 connector.
NOTE: An operating HQ Remote Poller setup is in fact an exercise of most aspects of the HQ-ST Link system. This is because a poll directed from an HQ Remote Poller must successfully pass from the location of the HQ Remote Poller, over the Internet to the HQ Plus running at the head office, out to the Internet again and over to the ST Plus at its store location, through to the ECR or POS station being polled, then back to the ST Plus again and out to the Internet again and over to the HQ Plus, then out to the Internet yet again and back to the HQ Remote Poller, then finally to the remote host PC . This will only happen when all aspects of the full HQ-ST system are working (with the exception of the HQ Remote Console).	

APPENDIX H: Master Reset to Factory Defaults

In the event that the HQ Plus or ST Plus must be reset to the factory default settings, use the following procedure:

1. With power OFF, remove the cover (unscrew 4 screws).

2. Properly install a jumper across the pins marked J15. On the HQ Plus use the first two pins closest to the J15 mark. [Additional option - connect the Ethernet cable to the LAN].

3. Power ON the device.

4. Wait about 30 seconds. If the Ethernet cable is connected from the device to the LAN, wait until the Green LED (Link Light) at the RJ connector of the device turns ON.

5. Power OFF.

6. REMOVE the jumper from J15.

7. The device is now at factory default settings. Verify if required.

8. Re-fit the cover onto the device.

APPENDIX I: Installing the HQ Plus on the PC as a (TAPI) Modem

1. Verify that a COM:n serial port is available for the exclusive use of the modem that is to be installed.

2. Go to the CONTROL PANEL, and select the "Phone & Modem" icon.

3. Select the "Modems" tab.

4. Press the "Add" button to go to the "Install new Modem" wizard.

5. Choose the option to select the modem from a list.

6. Press "Next". Select the modem type as "Standard 56000 bps Modem".

7. Press "Next". Select the COM port that will be used by the modem (this COM port will be reserved for modem use only).

8. Press "Next". After installing, go to the "Properties" of the modem, and set the properties.

9. Set the properties of the modem as follows:
   - Maximum Port Speed: 115K or as required for communicating with the ECR serial port.
   - Dial Control: leave the option unchecked (no D/T signal from HQ)
   - Speaker volume: n/a

10. REBOOT the PC, then go back in to run the diagnostics to verify (Query Modem) that the modem is operating properly.

This completes the installation of the "modem". This "modem" will be selected for use when setting up the application polling software in the operating parameters.

APPENDIX J: Windows Installation Tools for Use with HQ Plus and ST Plus Devices

Web Page Interface on HQ Plus and ST Plus

Use Windows Internet Explorer (or similar web browser) to access the HQ Plus or ST Plus to configure the device for operation.

To use the web page, the user must know the IP address (ie http://192.168.0.35) of the HQ Plus or ST Plus, and the Host PC must be on the same LAN IP segment as the HQ Plus or ST Plus.

Setup of the HQ Plus is performed using the web page interface.

If an ST Plus is operating in "activated" mode, only the web page status page will be available - no changes can be made via the web page.

PING Function

Enter the Windows command line utility (Start>Run>cmd>).

Enter the command "ping 192.168.0.35" to test if the Host PC can communicate with the device at IP address 192.168.0.35.

The ping test must come back with a positive reply, to indicate that the PC can communicate with the device at the specified IP address.

IPCONFIG Function

Enter the Windows command line utility (Start>Run>cmd>).

Enter the command "ipconfig" to get the immediate IP settings of the Host PC.

Enter the command "ipconfig /all" to get more information about the LAN settings on which the Host PC is communicating, including whether the PC is operating under LAN DHCP or static IP address parameters.

HyperTerminal

This utility is available under Windows (Start>Programs>Accessories>Communications>HyperTerminal). Use this utility to test the serial I/O communications, when using Com:n selections. Note: may not be available on all Windows systems.

Use this utility to test Ethernet TCP/IP communications to an IP:Port on the LAN or over Internet, when using the WINSOCK selection.

TELNET

This has similar utility to the HyperTerminal WINSOCK utility. Note: may not be available on all Windows systems.

Enter the Windows Command Line utility (Start>Run>cmd>).

Enter the command "telnet 67.123.45.127 4098" to establish a TCP/IP connection to the device at IP address 67.123.45.127 with port 4098. A message will be returned if the connection cannot be established.