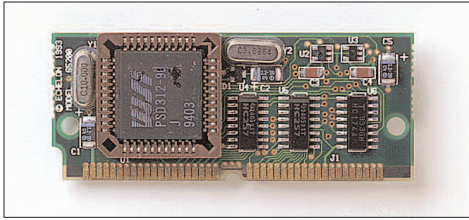


## LTS-20 Serial Adapter Core Module Models 65202 and 65202R



### Description

The LTS-20 Serial Adapter Core Module is a compact module used to build serial LonTalk<sup>®</sup> adapters (SLTAs) that require an LNS Network Services Interface (NSI) or Microprocessor Interface Program (MIP)-compatible network interface. A serial adapter is a device that enables any host processor with an EIA-232C (formerly RS-232C) serial interface to implement LNS or LONWORKS applications and to communicate with other devices using the LONWORKS protocol. The host processor may be directly connected to the serial adapter or may be connected over a telephone line using a modem.

Model 65202R is compliant with the European Directive 2002/95/EC on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.

The LNS network operating system allows any number of installation, maintenance, monitoring, and control devices to exist in a system and to adapt to network configuration changes automatically. Users can reconfigure the system from any user interface device anywhere on the network and ensures that all monitoring and control stations are always up-to-date with respect to the system's configuration. When used with the appropriate software, the LNS Network Services Interface functionality of the LTS-20 adapter allows the attached host to run LNS applications.

In both NSI mode and MIP mode, a serial adapter also allows any host to implement the upper layers of the LONWORKS protocol, so applications on the host can send and receive network variable updates and explicit messages, as well as poll network variables. This capability extends the reach of LONWORKS technology to a variety of hosts including desktop and embedded microprocessors.

Typical applications for the LTS-20 module include monitoring and control devices based on computers running Windows 95/98/2000/XP, or Windows NT 4.0. The module incorporates an LNS NSI that permits the module to be used as the network interface for LNS applications. A cuttable jumper selects between the NSI mode (default) and MIP modes of operation.

- ▼ Compact single in-line module (SIM) form factor
- ▼ LNS<sup>®</sup> Network Service Interface (NSI) supports LNS applications
- ▼ Opens the LONWORKS<sup>®</sup> protocol to any host with a standard EIA-232C serial interface
- ▼ Transceiver-independent design
- ▼ 1200 to 115,200bps serial bit rate to the host
- ▼ Dial-in and dial-out operation
- ▼ Optional password protection
- ▼ Network drivers for Windows<sup>®</sup> 95/98/2000 and Windows NT<sup>®</sup>

The LTS-20 consists of the core electronics and firmware in a compact single in-line module (SIM) form factor. Vertical SIM sockets are available to minimize footprint; right-angle SIM sockets are also available to minimize component height. The LTS-20 has the identical pinout and physical size of the LTS-10 module it replaces, and operates identically when set in the MIP mode (jumper cut).

The LTS-20 module comes preconfigured with many common LONWORKS transceiver parameters. Five transceiver identification (XID) pins on the LTS-20 module select the appropriate transceiver type. The transceiver ID inputs simplify the host software by automatically configuring the LTS-20 module for most transceivers. A special transceiver ID is reserved for programming custom transceiver parameters.

The LTS-20 module has a fixed input clock rate of 10MHz. The module can be used with LONWORKS transceivers running at interface rates from 9.8kbps to 1.25Mbps.

When used with a modem, a serial adapter based on the LTS-20 can be used to implement applications with a host computer that is located remotely from the LONWORKS network in a manner that is identical to that of Echelon's SLTA-10 Serial LonTalk Adapter. Any LONWORKS device can initiate a call to the remote host. Therefore, a device detecting an alarm condition can dial out to a remote host to inform the host of the condition. The modem can also be set up for automatic answer mode so that a remote host can dial into a LONWORKS network for remote network monitoring and control.

The LTS-20 module includes a Neuron<sup>®</sup> 3150<sup>®</sup> Chip, high-speed UART, PROM with high-performance firmware, and buffer RAM. Example software for developing NSI-mode applications is included with the LNS Application Developer's Kit.

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## Protocol Processing

LONWORKS devices using an LTS-20 separate LONWORKS protocol processing between the host processor and the serial adapter. The serial adapter and NSI handle layers 1 through 5 of the LonTalk protocol. This significantly reduces overhead in the host processor since it does not have to deal with lower layer network services such as media access control, collision avoidance, acknowledgments, retries, duplicate message detection, message validation, authentication, and priority processing. The host processor is left to run the application program and handle the layer 6 and 7 protocol services, i.e., network variable processing and explicit message processing. The host can easily send and receive network variable updates and explicit messages through these services.

Separating the upper two layers of the LONWORKS protocol from the lower five layers has the added benefit of making a serial adapter independent of its host application. The host application and its network variables can be changed at any time without modifying the adapter. This lowers development and maintenance costs since a serial adapter does not have to be tailored to an application.

Devices based on an LTS-20 can have up to 4096 network variables, each potentially connecting to more than 32,000 network variables on other devices. This limit is higher than the Neuron Chip-hosted node limit of 62 bound network variables because the network variable configuration is managed by the host instead of the Neuron Chip inside the serial adapter. The use of bound network variables reduces network loading and increases system capacity by allowing values to be updated over the network only when necessary without the need for constant polling.

## Modem Support

A serial adapter implemented with an LTS-20 module can be used with a pair of modems to provide remote access to a LONWORKS network. The local LTS-20 is connected to the LONWORKS network and a local modem, while the remote host is connected to a remote modem.

An adapter implemented with the LTS-20 module supports the LonTalk network management messages for controlling an attached modem in a manner identical to that of the SLTA-10 adapter. Any device can initiate an outgoing call to a remote host by sending network management dialing messages to the adapter. Network management messages can be used to define a dialing directory stored in the adapter, enabling application devices to dial out to remote hosts without requiring host phone numbers to be maintained in every device.

LONWORKS devices, including the host, can use network management messages to configure the adapter to automatically answer incoming calls to permit remote hosts to monitor or control the network at any time. Any device can use network management messages to install a password in the adapter so that a remote host must enter the password before accessing any devices on the network.

The LTS-20 can be used with any modem recognizing the Hayes AT-command set. Compatible modems are readily available worldwide, making the LTS-20 a universal solution for remote access to LONWORKS networks.

## Usage

The LTS-20 module includes NSI functionality required for use with an LNS Server for Windows, allowing LNS applications to use the LTS-20 module. The LTS-20 can be used with LNS applications such as the LonMaker™ Integration Tool, as well as other LNS tools.

A complete serial adapter requires an LTS-20 SLTA Core Module, LONWORKS transceiver, EIA-232 driver/receiver, and a motherboard with power supply. The LTS-20 module is compatible with all LONWORKS transceivers with interface rates of 9.8kbps or higher including standard transceivers for twisted pair, link power, and power line.

A simple network driver is implemented on the host processor to manage the interface with the serial adapter. This allows the same host application to be used with multiple network interfaces, preserving any investment in host application development. Complete specifications for the network driver are included in the LTS-20 Serial LonTalk Adapter and Serial Gateway User's Guide. Network drivers are available for Windows 95/98/2000 and Windows NT 4.0.

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## Module Socket Suppliers

| Connector                           | Supplier | Part Number              |
|-------------------------------------|----------|--------------------------|
| SIMM Socket:                        |          |                          |
| 40-position vertical 50mil pitch    | Molex    | 15-82-1175 or 15-82-0793 |
| 40-position right angle 50mil pitch | Molex    | 15-82-1390               |

*These connectors are now available for purchase from Echelon in the same quantity as LTS-20 purchased.*

## Module Specifications

### MIP-mode Throughput (Direct Connect)

|                |               |                            |
|----------------|---------------|----------------------------|
| Unacknowledged | 1-byte data   | 71 packets/sec (571bps)    |
|                | 8-byte data   | 71 packets/sec (4,571bps)  |
|                | 32-byte data  | 56 packets/sec (14,222bps) |
|                | 228-byte data | 22 packets/sec (39,652bps) |
| Acknowledged   | 1-byte data   | 77 packets/sec (615bps)    |
|                | 8-byte data   | 71 packets/sec (4,571bps)  |
|                | 32-byte data  | 59 packets/sec (15,059bps) |
|                | 228-byte data | 22 packets/sec (40,533bps) |

Note: Embedded 386 host, 25MHz; TP/XF-1250 transceiver, 115,200bps EIA-232 interface; MIP-mode protocol overhead of 9 bytes per message.

### Custom Network Management Commands

Send Modem String  
Modem Status Readback  
Modem Response Query  
Connection Status Query  
Install Directory Entry  
Dial From Directory  
Hang Up  
Install Password  
Install Start-Up Configuration String  
Install Dial Prefix  
Install Hang-Up String  
Install Hang-Up Timer

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|                            |   |
|----------------------------|---|
| Processor                  | Neuron 3150 Chip  |
| Processor Input Clock      | 10 MHz  |
| Operating Modes            | NSI (default), and MIP, cutting jumper selects mode                                       |
| Buffers                    |   |
| MIP Mode                   | 25.75K bytes RAM for buffers and transaction buffers                                      |
| NSI Mode                   | 2955 bytes RAM for buffers and transaction buffers  |
| Serial Communications Type | EIA-232, TTL signal levels  |
| Serial Bit Rate            | 1200, 2400, 9600, 14.4k, 19.2k, 38.4k, 57.6k, or 115.2kbps                                |
| Serial Modem Control       | Optional RTS, CTS, DSR, DCD, DTR, and RI  |
| SIM Connector              | 40-position SIM or SIM II 0.050" centerline single row connector, vertical or right angle |
| Operating Input Voltage    | +5VDC $\pm$ 10%   |
| Operating Input Current    | 150mA max   |
| Temperature                |   |
| Operating                  | -40 to +85°C  |
| Non-operating (12 hours)   | -40 to +85°C  |
| Humidity (non-condensing)  |   |
| Operating (24 hours)       | 25 to 90% RH @ 50°C   |
| Non-operating (24 hours)   | 95% RH max @ 50°C   |
| Dimensions                 | 67mm x 27mm x 7mm<br>(2.65" x 1.06" x 0.3")   |
| EMI Compliance             |   |
| FCC                        | Designed to comply with Part 15 Level B   |
| CE                         | Designed to comply with EN55022 Level B   |

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## Documentation

The *LTS-20 Serial LonTalk Adapter and Serial Gateway User's Guide* may be downloaded from Echelon's web site.

| Document  | Echelon Part Number |
|---|---------------------|
| LTS-20 LonTalk Serial Adapter and PSG-20 User's Guide | 078-0181-01         |

## Ordering Information

| Product                                    | Echelon Model Number           |
|--|--------------------------------|
| LTS-20 Serial Adapter Core Module          | 65202, 65202R (RoHS-compliant) |
| LNS Application Developer's Kit            | 34309                          |
| Molex SIMM Socket (Molex Part #15-82-0793) | 61101R (RoHS-compliant)        |
| Molex SIMM Socket (Molex Part #15-82-1390) | 61102R (RoHS-compliant)        |

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