# ROUTE-HDLC

## HDLC to I.P. CONVERTER


**USER MANUAL**

**REV. 1.3**
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## Document Revision Record

- Rev. 1.0 first release.
- Rev. 1.1 New section on RS-485, updated section on front panel switches, made some corrections.
- Rev. 1.2 Added clarification to configuration using Telnet.
- Rev. 1.3 Added Amtrak version of firmware under ordering information, added adapter P/N 51-237-9

# INTRODUCTION

The ROUTE-HDLC enables legacy equipment using HDLC protocols to communicate over standard TCP/IP infrastructure, allowing complex dendritic cabling systems including costly leased lines to be rationalized into a simple TCP/IP LAN with a network switch.

The network QOS requirements of the unit are flexible and it operates well on high latency/low bandwidth infrastructure. The units were specifically designed for the upgrade of the U.K.'s various traffic related networks such as NMCS2 MIDAS ( Motorway Incident Detection and Automated Signaling ), NMCS2 Signals LCC to Signals Transponders and NMCS2 First Generation CCTV Controllers.

By adding an optional RS485 interface module, the modem can also replace the bulky MIUs (Media Interface Units) typically used in UK traffic systems.

The product lends itself equally well to any application which uses HDLC protocol. A Master configured Route-HDLC can communicate with up to 10 Slave configured units and each slave can support up to 50 attached devices.

**Features**

- Converts HDLC and HDLC-M protocols to IP
- Fully configurable from network or serial port
- Configurable as Master or Slave
- Up to 10 Slaves per Master
- DCE or DTE selectable HDLC port
- Extensive status indicators
- Wide temperature range (-40 C to +75 C)
- 5 year warranty

# SPECIFICATIONS[1]

## Electrical

| | |
|---|---|
| Configuration Port | RS232 DCE, RJ-45 |
| Configuration Port data rate | 57.6 Kb/s |
| HDLC Primary port | HDLC/HDLC-M RS232 DCE/DTE , RJ-48 (10 pin RJ-45) |
| HDLC Primary port data rate | 300b/s to 100+ Kb/s |
| HDLC Secondary port | HDLC/HDLC-M RS232 DTE, RJ-48 |
| HDLC Secondary port data rate | 300b/s to 100+ Kb/s |
| RS-485 Port (Optional) | Shares config. RJ-45 connector |
| Network port | 10/100 Ethernet, RJ-45 |
| Power source | 5V DC universal power cube (supplied LTIPS-5-2.5-U) |
| | 12V DC Isolated (optional) |
| | 24V DC Isolated (optional) |
| | 48V DC isolated (optional) |
| Power consumption | < 2 Watts |

## General

| | |
|---|---|
| Operating temperature | -40°C to +75°C |
| Humidity (RH) | 10% to 95% |
| MTBF | > 50,000 hours |
| Dimensions (W*H*D) | 11.2cm * 2.3cm * 16.0cm |

[1] Specifications subject to change without notice

# OPERATING INSTRUCTIONS

## General

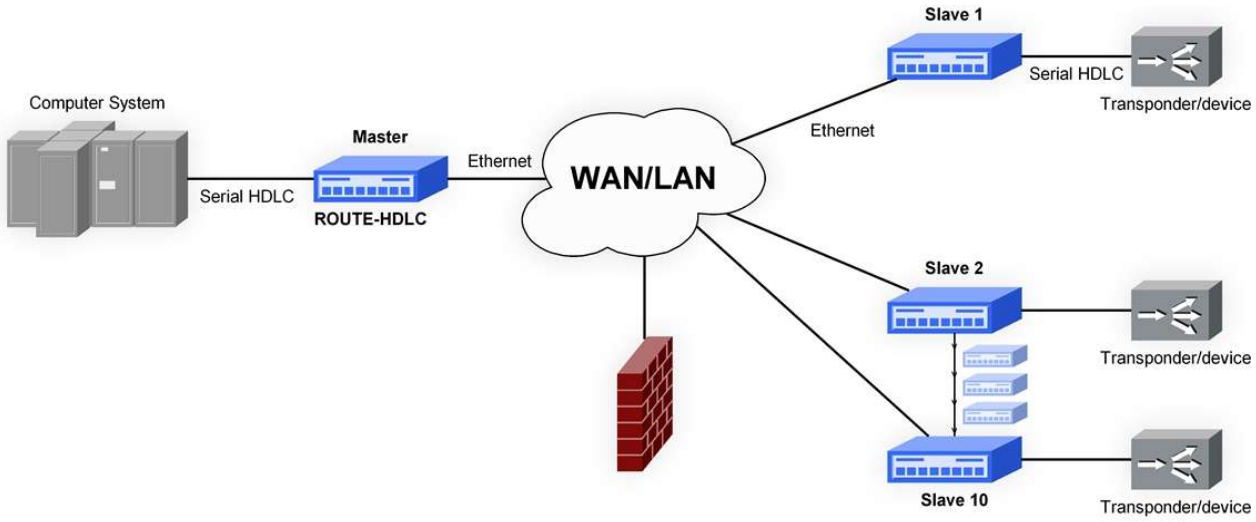
The ROUTE-HDLC Serial Data to 10/100Base-T/TX Ethernet converter was designed to permit the point to point and point to multipoint transmission of HDLC data over an Ethernet network.

Any unit can be configured as master or slave and can be configured as DCE (provide clock) or DTE (accept clock), with pin assignments changed accordingly.

A master unit would be connected to the master system and slave would be connected directly to a transponder/device or to a modem for multi-drop operations.

A master unit can communicate with up to 10 slaves and support up to 500 transponders/devices.

A typical topology is shown in the diagram below.




**The system can support up to 10 Slaves and 500 Transponder/devices.**

In applications where low latency is desired, it may be necessary to partition the HDLC packets into multiple Ethernet packets. To accomplish this, set the first Ethernet packet (SET FIRST PACKET) to a small number of bytes (i.e. 20 bytes) and the data buffer size (SET MIN BUFFER SIZE) to 5 bytes.

This is not a fixed number, as the actual setting is tailored to the specific application.

If latency is not critical, then these settings can be set to larger number of bytes.

## Setting the Configuration Port

The CONFIG or Configuration Port is used to initially configure the ROUTE-HDLC. Use a simple terminal program, such as HyperTerminal set to the operating parameters shown below.

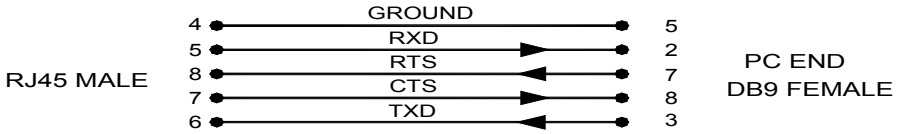
| | |
|---|---|
| Baud Rate | 57,600 |
| Data | 8 bits |
| Parity | None |
| Stop Bits | 1 |
| Flow Control | None |

The pin assignments to this port are listed on the next page. With the adapter supplied (P/N 51-237-9) and a ethernet cable a connection can be established between the ROUTE-HDLC configuration port and a PC serial port.

| *RJ-45 Pin#* | *Circuit Description* | *Direction* |
|---|---|---|
| 1 | Used for HDLC RS-485 | I/O |
| 2 | Used for HDLC RS-485 | I/O |
| 3 | NC | |
| 4 | Signal Common (Gnd) | I/O |
| 5 | Received Data | Out |
| 6 | Transmitted Data | In |
| 7 | CTS | Out |
| 8 | NC | |

## RS232 Interface Port Adapter (P/N: 51-237-9)

Typically this port connects to the DB9 male serial port on a computer. An adapter (P/N 51-237-9) is supplied with the each modem for use with the Configuration V26 port, optionally a console port cable (EIA561 DCE) can be purchased P/N: 96-161-9. The adapter is used in conjunction with any standard straight through ethernet cable. The pinout of this adapter is shown below.




## Configuring the Modem

Before the ROUTE-HDLC can be used, a number of operating parameters must be set, using a terminal connected to the CONFIG (configuration) port.
Once the modem is powered up and the terminal connection is established, you can review the current settings by the command ***show→RTN***. You can also get a listing of the available configurable settings by typing ***help→RTN.***

***show→RTN***
Current configuration:

Configuration Port Baud rate: 57600

HDLC Bit Rate = 38400 NRZ Encoding
Idle is set to FLAGS
Device is configured as DCE
Handshake is on Lead DCD = 20 Trail DCD = 2

First Stream Packet size = 1000
Min Buffer size after first packet = 5

TCP no activity connection timeout = 99 Sec

IP Address: 192.168.0.70
Netmask: 255.255.240.0
Gateway: 192.168.0.1

This Unit is set as a Master and listening on IP port 5001

OK

***help→RTN***

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HDLC Converter Help
Available commands:

| | |
|---|---|
| SHOW | (to display current settings) |
| SET BIT RATE | (to set HDLC bit rate i.e. Set bit rate 2400) |
| SET IP | (i.e. set ip 192.168.0.44) |
| SET NETMASK | (i.e. set netmask 255.255.255.0) |
| SET GATEWAY | (i.e. set gateway 192.168.0.1) |
| SET AS MASTER | (to set the unit in Master mode i.e. set as Master) |
| SET AS SLAVE | (to set the unit in Slave mode i.e. set as Slave) |
| SET DESTINATION | (destination ip to connect to when in a slave mode i.e. set destination 192.168.0.55) |
| SET IP PORT | (IP port to listen to in master mode or to connect to in Slave mode i.e. set ip port 5001) |
| SET TIMEOUT | (to set tcp connection timeout in Seconds when no activities on both HDLC or ethernet port) |
| SET AS DCE | (to use the DCE port, in DCE mode the clock will output) |
| SET AS DTE | (to use the DTE port, in DTE mode the clock is input from external source) |
| SET HANDSHAKE ON | |
| SET HANDSHAKE OFF | |
| SET LEAD DCD | (to set the minimum time in milliseconds for the DCD line high before the HDLC packet is sent) |
| SET TRAIL DCD | (to set the minimum time in milliseconds for the DCD line to stay high after the HDLC packet is sent) |
| SET FIRST PACKET | (to set the minimum number of bytes written to the packet before the packet is sent (Stream Data) If stream data not required then set this to 1000) |
| SET MIN BUFFER SIZE | (to set number of bytes to stream after the first packet) |

Available Encoding:
SET ENCODING NRZ
SET ENCODING NRZI
SET ENCODING MANCHESTER
SET ENCODING BIPHASE SPACE
SET ENCODING BIPHASE MARK

| | |
|---|---|
| SET IDLE AS ONES | (the idle HDLC pattern is set to all highs) |
| SET IDLE AS FLAGS | (the HDLC idle pattern is set to 7E) |
| HELP or ? | (to display this help) |
| REBOOT | (to reboot) OK |
| LIST SLAVES | Displays devices paired with this unit |

## Configuring the Modem Using Telnet

Once the IP address is set to be compatible with the computer or network, all other configurations can be accessed through the network connection using Telnet or some other similar terminal application. Use the assigned IP address for the **Hostname** and 23 for the **Port**.

## Data Ports

The rear of the modem contains three ports; Primary Port, Secondary Port and Network Port. In this version of the product the Secondary Port is not used. The Network Port is a standard 10/100 network port.

### Primary Port

The PRIMARY PORT (RJ48) is used for the HDLC signal I/O. This port can be configured as a DCE port (sourcing clock) or a DTE (Requiring clock). Data rate can be set between the range of 300 baud to 100 Kbd. Pin assignments are shown in the following table.

| ***RJ48 Pins*** | ***Signal Name*** | ***DB25 Pins*** |
|---|---|---|
| 1 | Data Set Ready (DSR) | 6 |
| 2 | Carrier Detect (CD) | 8 |
| 3 | Data Terminal Ready (DTR) | 20 |
| 4 | Signal Ground | 7 |
| 5 | Receive Data (RXD) | 3 |
| 6 | Transmit Data (TXD) | 2 |
| 7 | Clear to Send (CTS) | 5 |
| 8 | Request to Send (RTS) | 4 |
| 9 | Receive Clock (RXC) | 17 |
| 10 | Transmit Clock (TXC) | 15 |
| Shield | Chassis Ground | 1 |

### Secondary Port

The secondary port is used in special applications, such as the UK traffic system. This port is strictly DTE and its function is to allow simultaneous routing of the HDLC packets over both the existing legacy TDM network and the new high speed IP based network. Pin assignments of this port are identical to those of the primary port.

### RS-485 Port

Pins 1 and 2 of the front panel Config. Port are used as signal I/O when the RS-485 option card is installed.

## Front Panel DIP Switches

Three of the front panel DIP switches are assigned functions. The setting of switches 1 and 2 determine which data port's status is being displayed on the front panel LEDs.

The position of switch 6 enables or disables the front panel RS-485 port.

| SW1 | SW2 | FUNCTION |
|---|---|---|
| Up | Up | Displays Primary (DCE/DTE) port status |
| Down | Up | Displays Secondary (DTE) port status |
| UP | Down | Displays Config. port status |
| Down | Down | No display |

| SW6 | FUNCTION |
|---|---|
| Up | Rear panel serial data ports are used as HDLC I/O |
| Down | Front panel Config port (Pins 1 and 2) used as HDLC RS-485 I/O |

# INSTALLATION

## Modem Mounting

The ROUTE-HDLC can be left on a desktop or mounted to any surface using the optional MB-1 mounting bracket. The bracket is designed for simple modem insertion and removal, without the need for demounting of the bracket.

The mounting bracket is shown in the *ACCESSORIES* section.

## Connecting the Power Supply

The standard voltage modem is supplied with an international power cube LTIPS-6-1-MP (6 volt DC 1.0A centre positive). It accepts input voltages from 90Vac to 264Vac at 50 or 60 Hz. The adapter comes with multiple plugs, therefore install the appropriate one unto the body of the adapter. Plug the adapter into the mains and insert the DC plug from the power cube into the modem. All front panel lights will go green for approximately 5 seconds. After that, the power light will stay green and the other lights will change to the state which corresponds to the state of the pin monitored by the indicator.

# WARRANTY & REPAIRS

## Warranty

This Luxcom Technologies Inc. product is warranted against defects in materials and workmanship for a period of five years from the date of shipment. Luxcom Technologies Inc. will, at its option, repair or replace products which prove to be defective during the warranty period, provided that they are returned to Luxcom Technologies Inc. Repairs necessitated by misuse of the product are not covered by this warranty. No other warranties are expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Luxcom Technologies Inc. is not liable for consequential damages.

## Claims

If physical damage to the modem is found when the product is received, notify the carrier and Luxcom Technologies immediately. Luxcom Technologies will arrange for repair or replacement.

### Repacking For Shipment

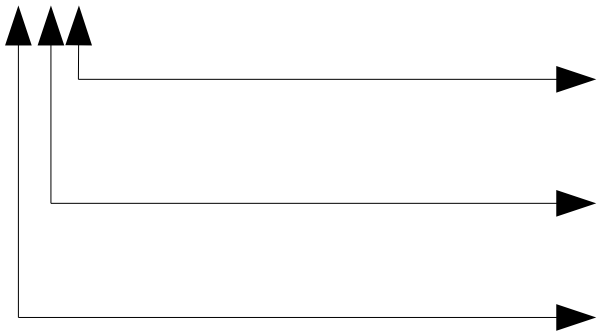
If the modem needs to be shipped by commercial transportation for service or repair, the sender must request a Return Material Authorization number (RMA) from Luxcom Technologies Inc. Before returning the item, paperwork indicating the name, department, company and telephone number of the sender, model and serial number of the product and a brief description of the problem must be enclosed.

### Certification

Luxcom Technologies Inc. certifies that this modem met its published specification at the time of shipment from the factory.

## ORDERING INFORMATION

**ROUTE-HDLC-X-X-X**



0 = 5V input DC supply (default)
1 = 12V input DC supply (optional)
2 = 24V input DC supply (optional)
3 = 48V input DC supply (optional)

0 = No RS485 module
1 = Equipped with RS485 module

1 = Standard version
2 = UK Midas/LCC version
3 = UK LCC high speed version
4 = Amtrak version

LTIPS-5-2.5-U..... Input 100Vac to 240Vac @ 50 or 60 Hz.
Output 5Vdc 2.5A centre positive (supplied)
LTIPS-5-1-MP..... Input 100Vac to 240Vac @ 50 or 60 Hz.
Output 5Vdc 1.0A centre positive (optional)

## ACCESSORIES

### MOUNTING BRACKET

The ROUTE-HDLC may be desktop mounted, or it may be mounted in Luxcom's MB1 mounting bracket shown below. The modem slides into the MB1 and is held in place with two thumb lock screws. Ideally the MB1 is bolted to “earth” ground to give optimum lightning protection and minimum EMI.

Part number..... MB1

## RACK MOUNT HARDWARE

This is a 19 inch, 1RU mounting panel for 3 modems. The basic unit comes complete with all necessary mechanical hardware, with the exception of the mounting screws necessary to attach the panel to the 19” rack.

Part number..... MP14