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1. DESCRIPTION

The DL-64 DSU/CSU is designed for 56 or 64 Kbps synchronous operation over 4-wire point-to-point or multi-point digital leased lines. The DL-64 can also be used as a line driver over customer owned wire for links up to 5 miles. The DL-64 is very simple to set up. For the typical application, the DL-64 can be attached to the phone line, plugged in and be in operation in minutes.

Special features of the DL-64 series DSU/CSU include the following:

- Easy setup
- 56 or 64 Kbps operation
- Telephone company digital line use or local line driver

NOTE

Line driver and multi-point functions are only available in 56 Kbps mode.
2. SPECIFICATIONS

2.1 Data Signaling Rates and Modulation

   Digital line rate of 56 or 64 Kbps
   Bi-polar non-return-to-zero modulation
   135 ohm ± 10% transmit impedance
   Transmit level @ 135 ohm load, 56 kbps, 1.4v peak
   135 ohm ± 10% receive impedance
   Receive level sensitivity, -49 dB
   Automatic equalization

2.2 Operating Mode

   Full duplex
   Constant carrier
   Point-to-point

2.3 DTE Timing

   Synchronous rate of 56 or 64 Kbps

2.4 Transmission Line

   4 wire leased line, telephone company digital line (DDS)
   4 wire in-house, 2 twisted pair, for line driver

2.5 Loopbacks

   Local Bidirectional (toward terminal and toward phone line)
   Telco initiated CSU or DSU loopback.

2.6 Connectors

   Telco:    RJ-48S
   RS-232D:  DB-25 female
   V.35:     M34 female
2.7 Physical/Electrical

10¾” W x 9¾” D x 2½” H
1 pound
120 VAC, 18 Watts
External 9 VDC, 500 ma power supply

2.8 Environmental

Operation: 0 to 75° C, non-condensing humidity
Storage: -40 to 85° C, non-condensing humidity
3. INSTALLATION

3.1 Unpacking

The following is included with all DL-64 DSU/CSU's:

- DL-64 DSU/CSU and external power supply
- RJ-45 cable to connect to the phone line
- manual
- information regarding warranty, maintenance contract and repair

3.2 Location

Place the DSU/CSU in an uncluttered area where you can reach the rear panel to connect the cables. The DL-64 has an external power supply that is plugged into a 120 VAC outlet. The power cord length is about 6 feet.

3.3 Setup

The DL-64 will typically work in point-to-point or multi-point applications right out of the box. The default configuration covers 90% of typical applications. The defaults are as follows:

- 56 Kbps
- Slave Clock (phone company timing)
- Internal Transmit Clock
- RTS Normal

For in-house line driver applications, set the host DL-64 for 56 Kbps (switch position 1 DOWN) and Master Clock (switch position 2 UP).

The switches are located behind an access door on the right side of the unit. See paragraph 4.1.3 for more information.
3.4 Telephone Line Connections

The phone line cable supplied with the DL-64 has an RJ-45 plug at both ends. Positions 1 and 2 are the transmit pair, positions 7 and 8 are the receive pair.

3.5 Installation Steps

1. Connect the RJ-48S cable between the phone line demarc and the DSU/CSU.
2. Connect the DTE device cable. Refer to Section 6 for information about the DTE interface.
3. Connect the round power supply connector to the DSU/CSU and plug the power supply into a convenient AC outlet.
4. CONTROLS AND INDICATORS

DL-64 Front Panel

4.1 Controls

4.1.1 Loopback Switch

The Loopback switch initiates a bi-directional loopback. When loopback is active, the TEST indicator is on.

4.1.2 Reset Switch

The Reset (pushbutton) switch is located behind the access panel on the right side of the unit next to the DIP switches.

4.1.3 DIP Switches

The DIP switches are located behind an access panel on the right side of the unit. To remove the panel, slide the latch toward the front of the unit and pull out on the latch end of the panel.

The switch functions are shown in the following table:

<table>
<thead>
<tr>
<th>Switch</th>
<th>Down</th>
<th>Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>56K</td>
<td>64K</td>
</tr>
<tr>
<td>2</td>
<td>Slave Clock</td>
<td>Master Clock</td>
</tr>
<tr>
<td>3</td>
<td>Internal TX Clock</td>
<td>External TX Clock</td>
</tr>
<tr>
<td>4</td>
<td>RTS Normal</td>
<td>RTS Forced ON</td>
</tr>
<tr>
<td>5</td>
<td>Normal</td>
<td>Local Loop ON</td>
</tr>
<tr>
<td>6</td>
<td>Not Used</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

**NOTE**

RTS mode (sw 4) is active in 56Kbps mode only. In 64Kbps mode, RTS is forced on.

If external TX clock (sw 3) is selected in 64K mode, a “gapped” clock must be supplied.
4.2 Indicators

POWER
   On when the DSU/CSU has power.

TRANSMIT DATA
   Flashes when data is being sent.

RECEIVE DATA
   Flashes when data is being received.

REQUEST TO SEND
   Follows RTS from interface unless forced on.

CLEAR TO SEND
   Follows RTS.

CARRIER DETECT
   Normally ON.

TEST
   ON steady when the loopback switch is depressed.
   FLASHING when the unit receives a phone company initiated loopback.
### 5. INTERFACE SIGNALS

#### 5.1 TELCO Jack (RJ-48S)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>7</td>
<td>Receive Data</td>
</tr>
<tr>
<td>8</td>
<td>Receive Data</td>
</tr>
</tbody>
</table>

#### 5.2 RS-232D / V.24 Interface (DB-25S)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>In/Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frame Ground</td>
<td>...</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data IN</td>
<td>IN</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>4</td>
<td>Request to Send IN</td>
<td>IN</td>
</tr>
<tr>
<td>5</td>
<td>Clear to Send OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>6</td>
<td>Data Set Ready OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>...</td>
</tr>
<tr>
<td>8</td>
<td>Data Carrier Detect OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>15</td>
<td>Transmit bit clock OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>17</td>
<td>Receive bit clock OUT</td>
<td>OUT</td>
</tr>
<tr>
<td>24</td>
<td>External Transmit Clock IN</td>
<td>IN</td>
</tr>
</tbody>
</table>

#### 5.3 V.35 Interface (M34 female)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Signal Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Frame Ground</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>B</td>
<td>Request to Send Terminal (unbalanced)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Clear to Send DSU (unbalanced)</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Data Set Ready DSU (unbalanced)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Data Carrier Detect DSU (unbalanced)</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Transmit Data A Terminal (balanced)</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Transmit Data B Terminal (balanced)</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Receive Data A DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Receive Data B DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Transmit Clock A DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Transmit Clock B DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Terminal Timing A DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>Terminal Timing B DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Receive Clock A DSU (balanced)</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Receive Clock B DSU (balanced)</td>
<td></td>
</tr>
</tbody>
</table>
6. TROUBLESHOOTING

6.1 General Approach

When troubleshooting problems, a rational plan can save you many hours of frustration. The following is a brief outline of standard troubleshooting procedures.

1. Gather the facts to determine the exact nature of the problem.

2. Draw a picture of the system showing the host computer, the DSU/CSU, the phone line, the remote DSU/CSU and the terminal/controller/computer at the far end. Use this as reference to note your observations, test steps and test results. A picture keeps you focused and often saves duplicate test steps.

3. Record the front panel indicators before changing anything. This is an important part of fact gathering.

4. If you change anything, change only one thing at a time.

5. Use loopbacks and record your results.

6.2 Loopback Tests

Use progressive loopbacks, starting at one end and working toward the other end of the link. As each loopback is enabled, press keys on the local DTE (terminal) and note if the characters are displayed on the screen. If your keypresses are displayed, the test passed. Use your system diagram to keep track of the loopbacks and the results.

Perform loopback tests working from the local end to the far end of the line.

Local DTE ─── DL-64 ─── DL-64 ─── Remote DTE

Local Loopback → ←

Remote Loopback → →
DCB DSUs are warranted to be free of defects in materials and workmanship for five years. Data Comm for Business, Inc. will repair or replace any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Dewey, IL. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. DCB liability shall not exceed the original purchase price.

All equipment returned for repair must be accompanied by a Returned Material Authorization (RMA) number. To receive an RMA number, call (217) 897-6600 between the hours of 8 AM and 5 PM central time. Equipment must be shipped prepaid to DCB and will be returned at DCB’s expense.

Ship returned items to:

Data Comm for Business
2949 CR 1000E
Dewey, IL 61840

Data Comm for Business, Inc.
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