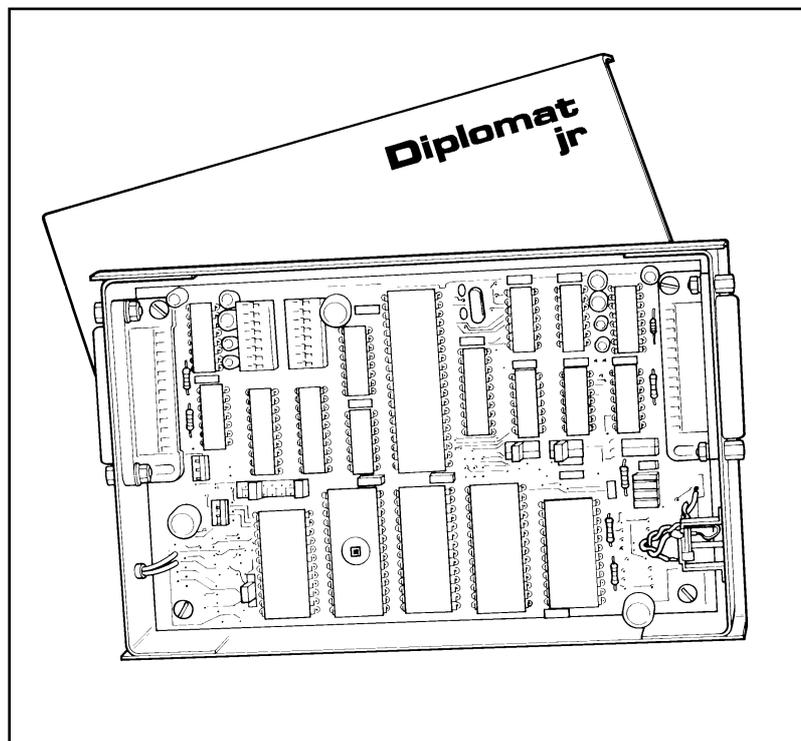


Lucidata Diplomat jr User Guide Model IB80



Lucidata House
Selwyn Close
Great Shelford
CAMBRIDGE CB2 5HA

tel: +44 (0)1223 846100
fax: +44 (0)1223 846200
email: docs@lucidata.com

Publication Details

All possible care has been taken in the preparation of this publication, but Lucidata accepts no liability for any inaccuracies that may be found.

Lucidata reserves the right to make changes without notice to both this publication and to the product which it describes.

If you find any errors in this publication or would like to make suggestions for improvement, please write to the Company at the address below.

Lucidata House
Selwyn Close
Great Shelford
CAMBRIDGE CB2 5HA
England

tel: +44(0)1223 846100
fax: +44(0)1223 846200

Diplomat™ is a registered trademark of Lucidata Limited.

© **Lucidata Limited 1993**

No part of this publication may be reproduced, transmitted, transcribed, stored in any retrieval system or translated into any human or computer language without the prior written permission of Lucidata Limited.

Publication number IB80 UG1 Issue number 2 (First Issued 12/90)

Revision Details

| <i>Date</i> | <i>Pages</i> |
|-------------|---|
| 5/91 | 3, 16, 17, 18, 19, 20, 22, 23 |
| 8/91 | 2 |
| 4/92 | 2, 17, 24, 25, 26, 27, 28 |
| 1/93 | 1, 2, 8 |
| 2/94 | 2, 3, 4, 5, 7, 12, 16, 17, 18, 19, 24, 25, 26, 27, 28 |
| 10/94 | 1, 2, 8 |
| 1/97 | Issue 2.1 |
| 6/97 | 2, 4, 7, 13, 23, 24 |
| 4/98 | 2, 3, 4, 25, 27, 28, 29 |
| 09/00 | 2, 8, 9, 10 |

| | |
|-----------|-----------------------------------|
| 1 | Title page |
| 2 | Publication Details |
| 3 | Contents |
| 4 | Warranty/Product Details |
| | |
| 5 | Introduction |
| 5 | About this Guide |
| 5 | About the Diplomat jr |
| 7 | Technical Data |
| 8 | Service and Support |
| 8 | Product Upgrades |
| | |
| 9 | Installation |
| 9 | Checking the product |
| 9 | Checking the configuration |
| 9 | Connecting the host port |
| 10 | Connecting the terminal port |
| 10 | Connecting to the power supply |
| 10 | Product registration |
| 11 | Switching on |
| 11 | Switching off |
| | |
| 12 | Configuration |
| 12 | Introduction |
| 12 | Clock rates |
| 14 | Clock sources |
| 16 | Terminal port transmitter control |
| 16 | RS232/RS422 option |
| 16 | DTR control option |
| 17 | Asynchronous echo |
| 17 | Append LF to CR |
| 18 | Parity checking |
| 18 | Host code selection |
| 19 | Code translation |
| 19 | Filter translated characters |
| 20 | Line format |
| 20 | End of data prompt |
| 20 | Emulate IBM2780 or 3780 |
| 21 | Record length |
| 21 | Pad/clip 2780 records |
| 22 | Configuration summary |
| | |
| 24 | Technical Description |
| 24 | Communications |
| 24 | Host Port |
| 24 | Terminal Port |
| 25 | Operating Modes |
| 25 | ASCII/EBCDIC |
| 25 | Translation |
| 25 | Filtering |
| 25 | Binary Mode |
| 25 | Formatting |
| 25 | Logon/Logoff on DTR |
| 26 | Control by the Terminal |
| 26 | Collection of statistics |
| 26 | Record termination |
| 26 | Clear down the line |
| 26 | Variable length records |
| 26 | Reset to initial state |
| 26 | Buffer status |
| 27 | Binary Transmission |
| 27 | Poll and Select Frame Generation |
| 27 | Electrical interfaces |

Warranty

Lucidata Limited warrants that this product is free from defects in manufacture and that it meets the specifications outlined in this User Guide for a period of one year following purchase provided that the product has only been used in the manner and for the purpose described in this User Guide. This Warranty does not affect your statutory rights.

PRODUCT DETAILS

Product name *Diplomat™ jr*

Model IB80-A1

Serial Number

Configuration Code

Firmware Reference 4.26

Issue Date

Special features/notes

About this Guide

This User Guide is intended to assist in the safe and efficient operation of the Lucidata *Diplomat jr* IB80 protocol converters.

The Guide is split into a number of logical sections, so you can find the information you need quickly - in conjunction with the Contents page.

Introduction (this section) describes the scope and purpose of this Guide. A brief description of the unit is given, together with technical data, product support details and servicing information.

Installation describes how the unit is checked, connected into a computer system, and connected to the mains supply.

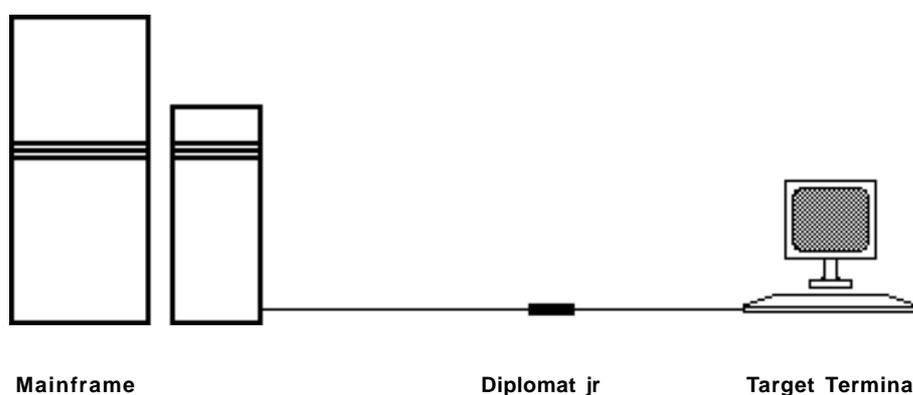
Configuration describes how the *Diplomat jr* can be re-configured for different operating environments.

Technical description describes the functioning of the unit.

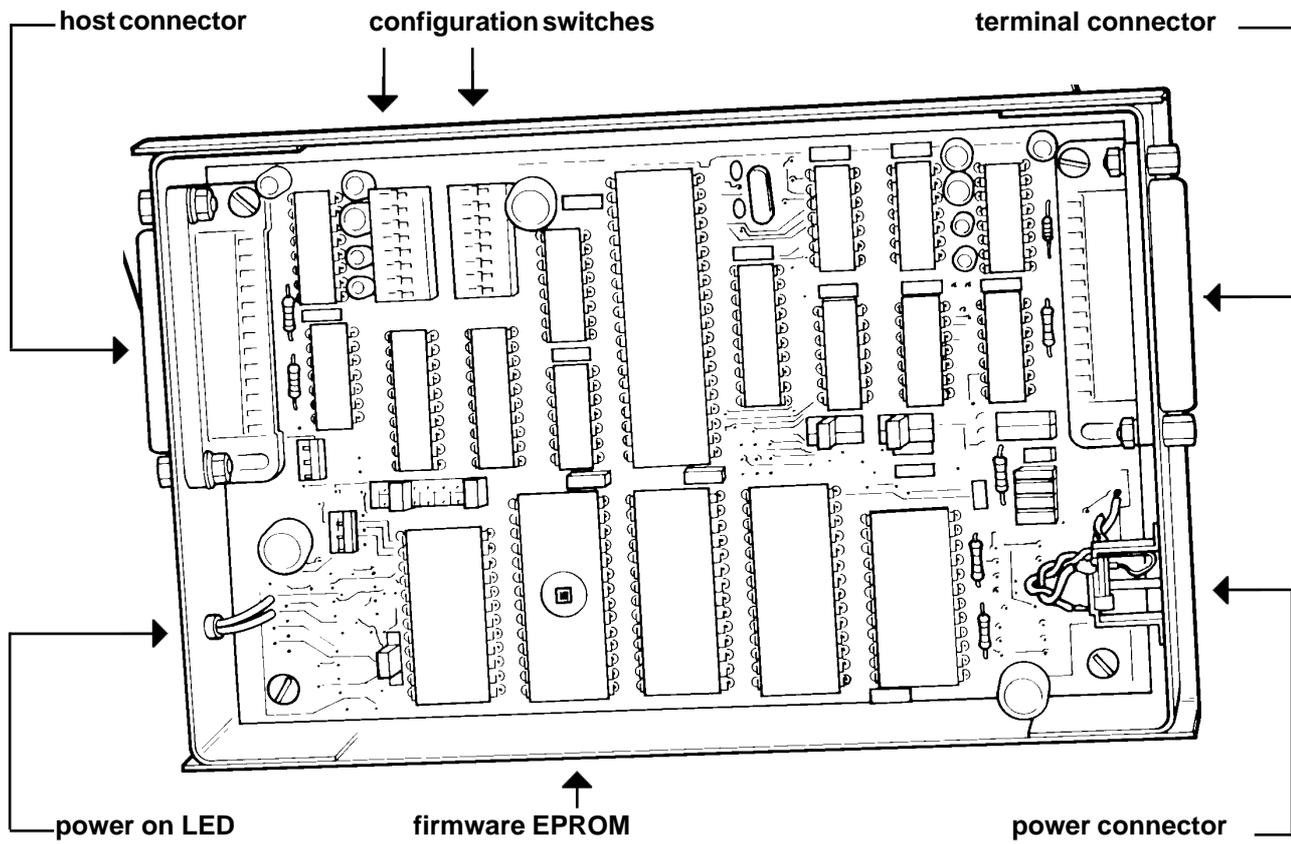
About the Diplomat jr

Lucidata *Diplomat* protocol convertors enable interconnection of computer equipment from different manufacturers.

The IB80 models are designed to connect a single target asynchronous peripheral - such as a terminal, micro computer or a printer to a computer operating the IBM 2780 or 3780 BSC protocol.



The *Diplomat jr* can be configured to operate as either an IBM 2780 or IBM 3780 remote station. The *Diplomat jr* can also be configured to use ASCII or EBCDIC transmission code with text or binary data, perform code conversion, work with variable length records and perform space suppression. It is easily controlled from the asynchronous port via the data stream. (See *Operating Modes* in the *Technical Description* section.)



Diplomat jr IB80 with top cover removed

The *Diplomat jr* is housed in a black aluminium case and is powered from a plug-in mains adaptor which is supplied with the unit. On either end of the unit are 25 pin female D-type connectors for the host (synchronous) and terminal (asynchronous) ports respectively. Both these connectors are fitted with a dust covers supplied with the unit. Next to the terminal connector is a DC power socket which accepts the jack-terminated lead from the plug in mains adaptor.

The unit contains advanced digital electronic circuitry which performs the required protocol emulation under the control of the software, known as **firmware**, contained in a single integrated circuit (EPROM). It is possible to change the configuration of the unit by altering the position of the switches and links within the unit.

Each *Diplomat jr* is supplied to meet the particular requirements stated by the purchaser at the time of ordering. The details of this specific unit are given on page 4, together with a description of any special features.

Technical Data

Weight & Dimensions

| | |
|------------------------|----------------------|
| Height x width x depth | 25mm x 175mm x 110mm |
| Weight | 390g |

Electrical Requirements

| | |
|----------------------|------------------------|
| Power to Diplomat jr | +5V, 500 mA regulated |
| Power to adaptor | 220-240V a.c. 50-60 Hz |
| Mains adaptor | BS 5850 approved |

Operating environment

| | |
|-------------|----------------------|
| Temperature | 0-50°C |
| Humidity | 0-90% non-condensing |

External connectors

| | |
|-------------------------|--|
| Power | 3.2mm jack socket |
| Host (synchronous) | 25-way D-type female connector (DTE) RS232 |
| Terminal (asynchronous) | 25-way D-type female connector (DCE) RS232 |

External Indicators

| | |
|----------|----------------------------|
| Power on | LED indicating +5V present |
|----------|----------------------------|

Configuration

| | |
|-------------|---|
| At power up | Internal switches and links set by the user |
|-------------|---|

Data rates

| | |
|----------|--|
| Host | 1200-153600 bps in eight steps or external |
| Terminal | 150 - 19200 bps in eight steps or external |

NOTE: *Data rates greater than 19200 bps are NOT guaranteed for use with the standard RS232 interface.*

Service and Support

All *Diplomat* units are guaranteed as stated in the Warranty on page 4.

If a unit fails, and you have bought it from a Lucidata appointed dealer, you should return it to that dealer. If bought from the manufacturer, return the unit in its original packing to:

Service Department

Lucidata House
Selwyn Close
Great Shelford
CAMBRIDGE CB2 5HA
England

tel:(01223) 846100
int:+44 1223 846100
fax:(01223) 846200

You should telephone, fax or telex Lucidata prior to returning the unit to ascertain whether an apparent fault is due to mis-operation rather than to a technical fault within the unit.

Lucidata reserves the right to charge for any investigation of an apparent fault that is found to be due to incorrect operation, or for the repair of a fault that is due to the unit not being used in accordance with the instructions in this User Guide.

Maintenance

Faults that occur outside the warranty period will be repaired on a time-and-materials basis. Please send your unit to Lucidata. You will be given an estimate of the repair costs.

Support

Telephone support will be provided to all registered users of *Diplomat* units, during normal working hours. Support provided in person will be chargeable at a time-and-materials rate. Please contact Lucidata for details.

Product Upgrades

From time to time Lucidata may offer upgrades of firmware to existing users of *Diplomat* units.

Full instructions for implementing any such upgrade will accompany the upgrade pack.

Checking the product Before attempting to install your *Diplomat jr*, you should check the contents of the package. You should have:

Diplomat jr IB80-A1 unit
plug-in power supply
User Guide
screwdriver
plastic bag containing two jumpers (inside *Diplomat jr*)

If any of these are missing, contact Lucidata or your Lucidata appointed dealer.

Checking the configuration

On receiving your unit, you may like to check and record the default settings.

Remove the four cross-head screws securing the cover to the base of the unit, using the supplied screwdriver. Carefully remove the cover to expose the circuitry.

CAUTION!

This unit contains devices which are static sensitive. Great care should be taken when adjusting switches and links to avoid touching any connections. Whenever possible, anti-static precautions should be taken, such as the use of an earthed wrist-strap and anti-static mat.

Connecting the host port The host (synchronous) port can be found at one end of the unit, adjacent to the POWER ON LED. It is a 25-pin female D-type, and is supplied fitted with a protective cover.

It may be connected directly to the mainframe's Integrated Communications Adaptor (TCU). Alternatively, the connection may be made via a modem or line driver. Other connections may require the use of cross-over cables. Details of the pin assignments will be found in the *Technical Description* section on Page 25.

Installation

Connecting the terminal port

The terminal (asynchronous) port can be found at the other end of the unit, adjacent to the power-in jack socket. It is a female D-type, and is fitted with a protective cover.

It may be connected directly to a suitable peripheral - such as a terminal, printer, micro computer, modem or any other asynchronous device. DCE pin assignments make for plug compatibility with many terminal type devices. Connection to other devices may require the use of cross-over cables. Details on the pin assignments may be found in the *Technical Description* section on Page 26.

Connecting the power supply

Connect the jack plug on the flying lead into the jack socket at the end of the unit. Plug the power lead into a suitable 13A three-pin mains supply socket.

Switching on

Switch on the unit by switching on the mains socket powering the plug-in mains adaptor. The red Power On LED should light. If it does not, check the mains supply by substituting another working electrical appliance. If the *Diplomat jr* is thought to be faulty, see *Service and Support* in the *Introduction*.

Switching off

To switch off the *Diplomat jr*, switch off the mains supply to the plug-in mains adaptor. The red POWER ON LED will extinguish.

Introduction

Upon receipt, the *Diplomat jr* will already have been configured to your requirements. However, you may re-configure your unit, should your requirements change. Such a task is best undertaken by a person who is familiar with data communications products and terminology.

note *If you re-configure your unit, you are advised to note the original switch settings in the Switch summary at the end of this section.*

Disconnect the *Diplomat jr* from the mains power supply!

Remove the four cross-head screws securing the cover to the base of the unit, using the supplied screwdriver. Carefully remove the cover to expose the circuitry.

CAUTION!

This unit contains devices which are static sensitive. Great care should be taken when adjusting switches and links to avoid touching any connections. Whenever possible, anti-static precautions should be taken, such as the use of an earthed wrist-strap and anti-static mat.

You will observe that there are two white switch assemblies, with individual coloured sliders numbered 1 to 8. In addition there are a number of linking points which can be connected with jumpers. The position of all these is shown in the diagram on the summary pages at the end of this section.

All re-configuration takes place using these switches and links as described in this section. Both sets of switches are used, but a number of the links are only set during manufacture and are not used during re-configuration.

Clock Rates

Switch S1, slider 1,2,3 and 4 are used to determine the frequencies of the two internal clocks T1 and T2 which can be used to determine data transmission speeds. T1 and T2 can each take four values, dependent on the settings of the sliders.

When a clock is used for synchronous communication, the bit rate will be the same as the clock rate. When used for asynchronous communication the bit rate will be one sixteenth of the clock rate selected.

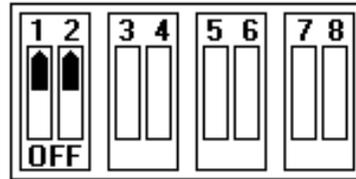
Links L8, L9, L11 and L12 are used to determine which internal clocks (if any) are used. Links L1, L2, L3 and L10 determine which internal clocks (if any) are passed to the host port and on which pin(s).

The diagrams below summarise the data rates for both synchronous and asynchronous communication obtainable with T1 and T2 for different settings of switch S1 sliders 1,2,3 and 4.

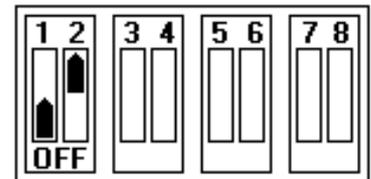
It should be noted that speeds above 19200(sync) are not guaranteed on the standard RS232 interface.

S1

S1



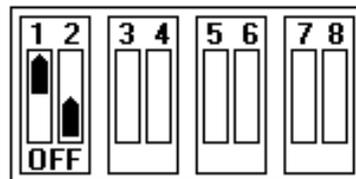
T1 307200(sync) 19200(async)



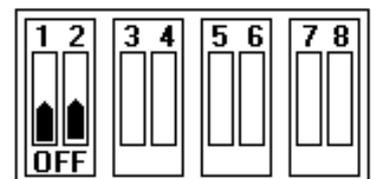
T1 2400(sync) 150(async)

S1

S1



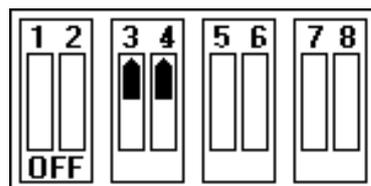
T1 4800(sync) 300(async)



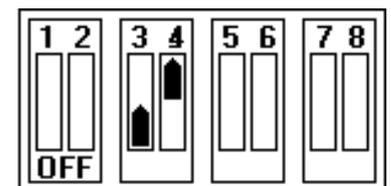
T1 9600(sync) 600(async)

S1

S1



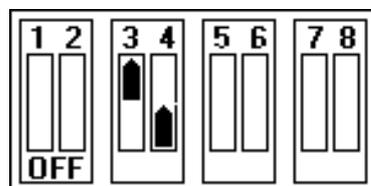
T2 19200(sync) 1200(async)



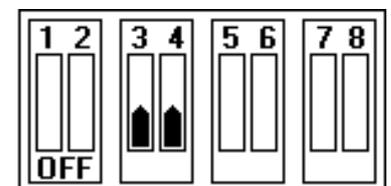
T2 38400(sync) 2400(async)

S1

S1



T2 76800(sync) 4800(async)



T2 153600(sync) 9600(async)

Configuration

Clock Sources

Links A, B, C and D on the link blocks L8, L9, L11 and L12 are used to select the clock sources. The diagram on Page 16 shows how these link blocks are connected. Only one clock can be selected on a link at any one time.

Link L8

Link 8 is used to select the source of the Receive Clock for the host port. The following options are available.

-
- A connect to internal clock T1 (as set on switch S1, sliders 1 and 2)
 - B connect to internal clock T2 (as set on switch S1, sliders 3 and 4)
 - C connect to host port pin-17 (Receive Clock RXC)
 - D not used on standard model
-

Link L9

Link L9 is used to select the source of the Transmit Clock for the host port. The linking options are as follows:

-
- A connect to internal clock T1 (as set on switch S1, sliders 1 and 2)
 - B connect to internal clock T2 (as set on switch S1, sliders 3 and 4)
 - C connect to host port pin-15 (Transmit Clock TXC)
 - D not used in the standard model.
-

Link L9 is usually linked the same as Link L8 in option C, so as to use the synchronous clock present at the V24 interface on the host connector.

Link L11

Link L11 is used to select the source of the Receive Clock for the terminal port. The linking options available are as follows:

-
- A connect to internal clock T1 (as set on switch S1, sliders 1 and 2)
 - B connect to internal clock T2 (as set on switch S1, sliders 3 and 4)
 - C connect to terminal port pin-17 (external receive clock)
 - D not used in the standard model.
-

Link L11 is usually linked the same as Link 12 in option A or B. However, if a split receive/transmit speed is used, L11 could be linked in option A with Link L12 in option B. Switch S1 is used to define the clock rates.

Option C should not, in general, be used. If it is remember that the external clock must be 16 times the desired data rate.

Link L12

Link L12 is used to select the source of the Transmit Clock for the terminal port. The linking options are as follows:

-
- A connect to internal clock T1 (as set on switch S1, sliders 1 and 2)
 - B connect to internal clock T2 (as set on switch S1, sliders 3 and 4)
 - C connect to terminal port pin-15 (external transmit clock)
 - D not used in the standard model
-

Link L12 is usually linked the same as link L11, in option A or B. However, if a split receive/transmit speed is used, L12 could be linked in option B with Link L11 in option A. Switch S1 is used to define the clock rates.

Option C should not, in general, be used. If it is remember that the external clock must be 16 times the desired data rate.

Link L10

Internal clock to outside world.

If L10 is set so that the centre pin is connected to the pin nearest to the host port, internal clock T1 will be available to pass to the host port.

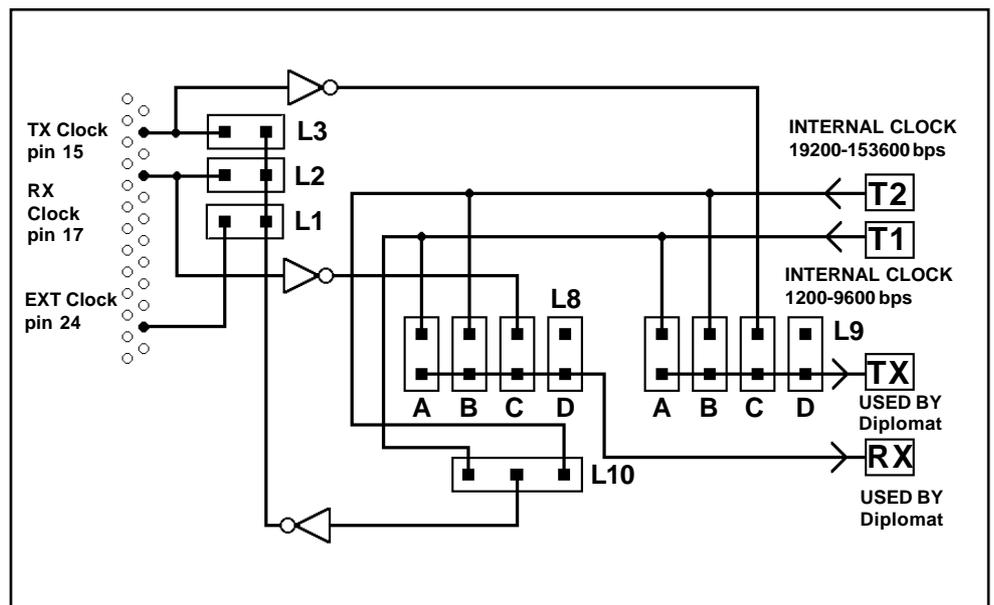
If L10 is set so that the centre pin is connected to the pin nearest to the terminal port, internal clock T2 will be available to pass to the host port.

Links L1, L2 and L3 control which pin(s) of the host port the selected internal clock will be output on:

link made host port destination

-
- L1 pin-24 (internal clock output)
 - L2 pin-17 (receive clock)
 - L3 pin-15 (transmit clock)
-

The following diagram illustrates the synchronous clock selection.



Configuration

Terminal port transmitter control

Link L22 selects the source of the enabling signal for the asynchronous transmitter.

If L22 is left unstrapped, the transmitter is permanently enabled.

If L22 is connected from the centre pin to the pin nearest to the host port, then pin-20 of the terminal port exercises control to the transmitter.

If L22 is connected from the centre pin to the pin nearest to the terminal port, then pin-19 of the terminal port exercises control of the transmitter.

Certain printers use pin-19 for a Ready/Busy signal. While this input can be used, Lucidata recommends the use of XON/XOFF in-band signalling to control the data flow.

RS232/RS422 option

Link L7 is used to select the RS232 or RS422 receivers and transmitters for the synchronous port. If the upper two pins of L7 are linked (see diagram on Page 22) the RS232 receiver is enabled. If the bottom two pins are linked, the RS422 receiver is enabled.

DTR control option

If the link on DTR (see diagram on Page 22) is connecting the left two pins, then pin 20 on the host connector is held high as long as power is applied to the *Diplomat jr*. If the link is in the other position, then pin 20 on the host connector follows the state of either pin 19 or 20 on the terminal connector, depending on how Link 22 is set.

Asynchronous echo

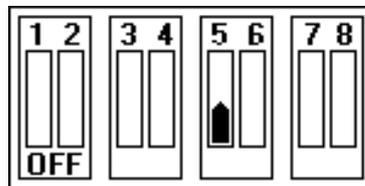
When a vdu is connected to the terminal port on the *Diplomat jr*, it is usually necessary for the unit to echo back all characters received in order for them to be displayed. However, if a port is connected to another host computer, echo would not be required.

When echo is selected, the backspace character (ASCII value 8 or CTRL/H) is interpreted as a destructive backspace and will cause the *Diplomat jr* to delete the last character in the buffer. As the buffer contents are not transmitted until a string is terminated, backspacing up to the beginning of the current line is possible. In addition, the CAN character (ASCII value 24 or CTRL/X) is interpreted as a line delete character and causes all the characters since the last terminator to be discarded.

If echo is not selected, then the CAN character (ASCII value 24) causes a total reset of all buffers and any data held within the *Diplomat jr* is lost. Nothing is output to the terminal. A delay of two seconds should occur before sending new data to the *Diplomat*.

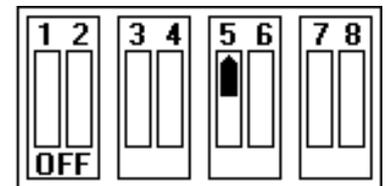
The diagrams below show the correct positions for Echo selected and Echo not selected.

S1



Echo Selected

S1



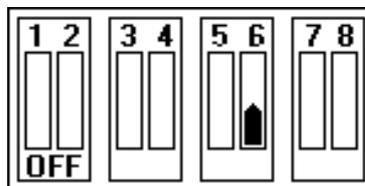
Echo Not Selected

Append LF to CR

The *Diplomat jr* can be set to append a line feed (ASCII value 10) whenever a carriage return (ASCII value 13) is input and **echoed** back to the asynchronous port. This setting allows for proper screen formatting on a VDU and is **not** sent to the host computer.

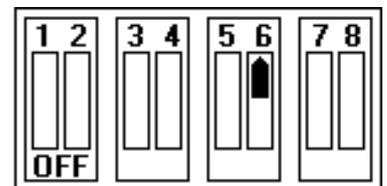
The diagrams below show the correct switch positions for selecting the option.

S1



LF Appended to CR

S1

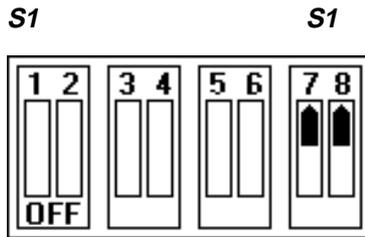


No LF Appended

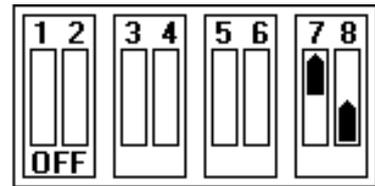
Configuration

Parity checking

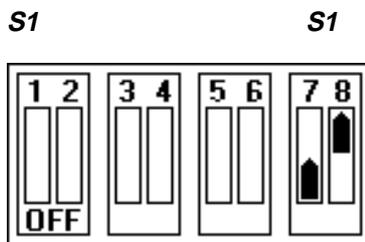
Asynchronous data is transmitted as 7 data bits plus an 8th bit and one stop bit. For speeds less than 300 bps, two stop bits are used. Switch S1 sliders 7 and 8 are used in combination to set whether or not parity checking is required, and the polarity of the eighth bit. When operating the *Diplomat jr* in Binary mode it is required to set the character format to 8 data bits and no parity. This is achieved by selecting No parity check, bit8=0. The possible combinations are as follows:



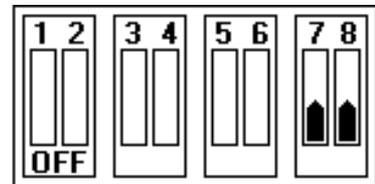
No parity check, bit 8=0



No parity check, bit 8=1



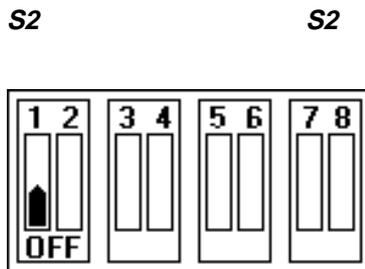
Parity check, even parity



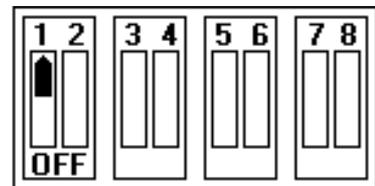
Parity check, odd parity

Host Code Selection

The *Diplomat jr* can be told what communication code the host computer is using by setting slider 1 of switch 2. The two communication codes used are EBCDIC and ASCII. The diagrams below show the settings for the communication types.



EBCDIC

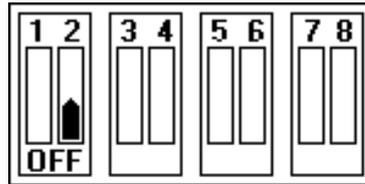


ASCII

Code Translation

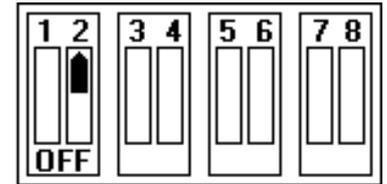
If the characters received from the synchronous port are in EBCDIC, then they can be translated into ASCII before being passed on to the filter section for output to the asynchronous port. This feature is enabled by setting slider 2 of S2. If no translation is selected then the raw data is passed on without change.

S2



Translation

S2

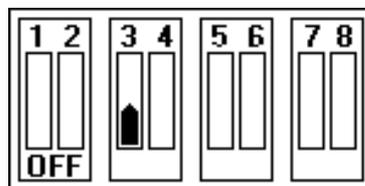


No Translation

Filter Translated Character

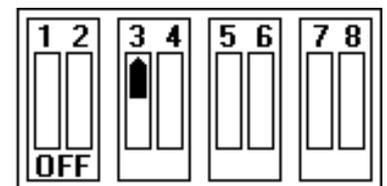
This option is selected by setting slider 3 according to the diagrams below.

S2



Filter

S2



No Filter

Filter selected If Code Translation has been selected, then record separators and other unrecognised control characters can be converted to ASCII CR or CR/LF pairs (as determined by slider 4 of S2).

If No Translation has been selected then the filter only deletes the ETB (EBCDIC value 38/ASCII value 23) or ETX (EBCDIC/ASCII value 3) character at the end of the data stream. In the case of ETX, the End of Data Prompt selected will be substituted.

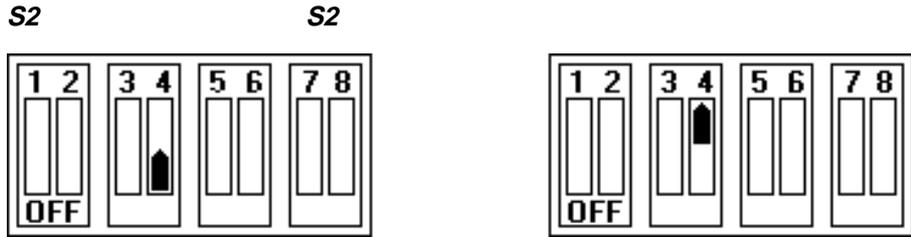
Filter not selected If Code translation is selected, the Diplomat jr performs pure EBCDIC to ASCII conversion. If an ITB mark is encountered, it is ignored and the text on either side is concatenated without inserting any other characters.

If No Translation has been selected the Diplomat jr operates in Binary Transmission Mode. (See *Operating Modes* in the *Technical Description* section)

Configuration

Line Format

The *Diplomat jr* can be configured so that all record separators received from the host are converted to CR LF pairs prior to sending to the asynchronous port. If not configured in this fashion, they are only translated to a single CR. Switch settings for this configuration are shown below.

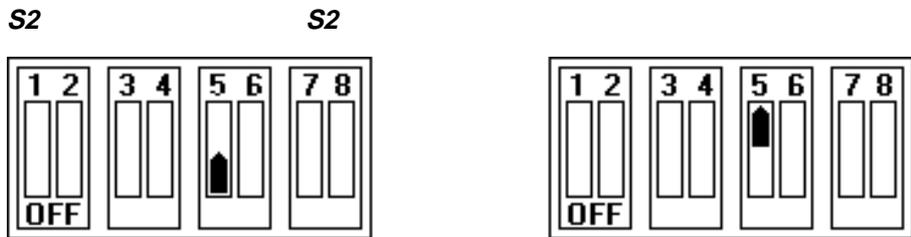


CRLF

CR Only

End of Data Prompt

If (and only if) Filtering has been selected then the *Diplomat jr* will give an indication that it has received an End of Transmission frame from the host computer. Either the English text ***** END OF DATA ***** or a SUB character (ASCII value 26 or CTRL/Z) is sent to the asynchronous port. The settings for these configurations are shown below.

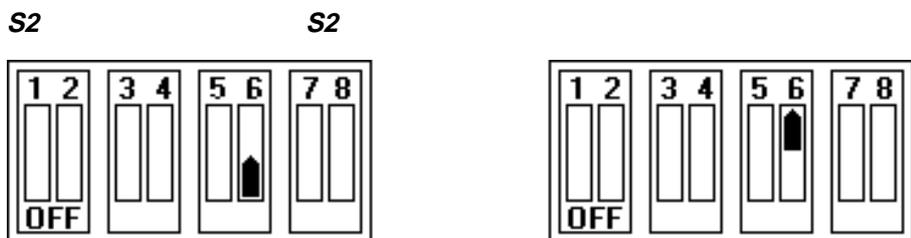


***** END OF DATA *****

CTRL/Z

Emulate IBM 2780 or IBM 3780

The *Diplomat jr* can be configured to expect and generate data formatted like a 3780 device. In particular, it will recognise the space compression code GS (EBCDIC value 29) used by the 3780 and expand it to the appropriate number of spaces. On transmission to the host, the record separator character RS (EBCDIC value 30) is used to delimit records. Alternatively, the *Diplomat jr* can be configured so that the 2780 format is expected. The switch settings are shown below.

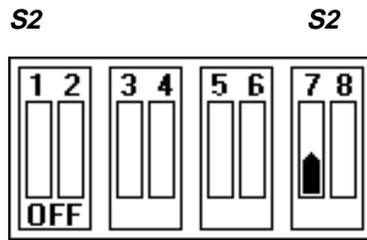


3780 Device

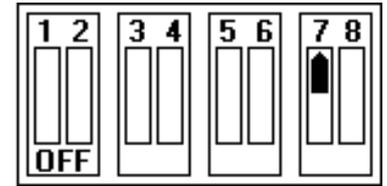
2780 Device

Record Length

The *Diplomat jr* can be configured for record sizes of either 80 characters or 132 characters as shown below.



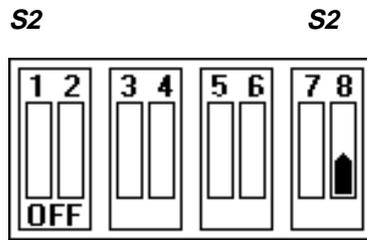
Record length=132 chars



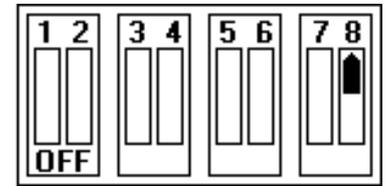
Record length=80 chars

Pad/Clip 2780 Records

If padding is selected, each line of text that is received from the asynchronous port that contains less than the selected record length, is padded out with spaces before sending to the host. Equally, long lines are blocked at the selected record length. Trailing spaces on lines sent to the asynchronous port are always stripped away. The switch settings for this configuration are shown below.

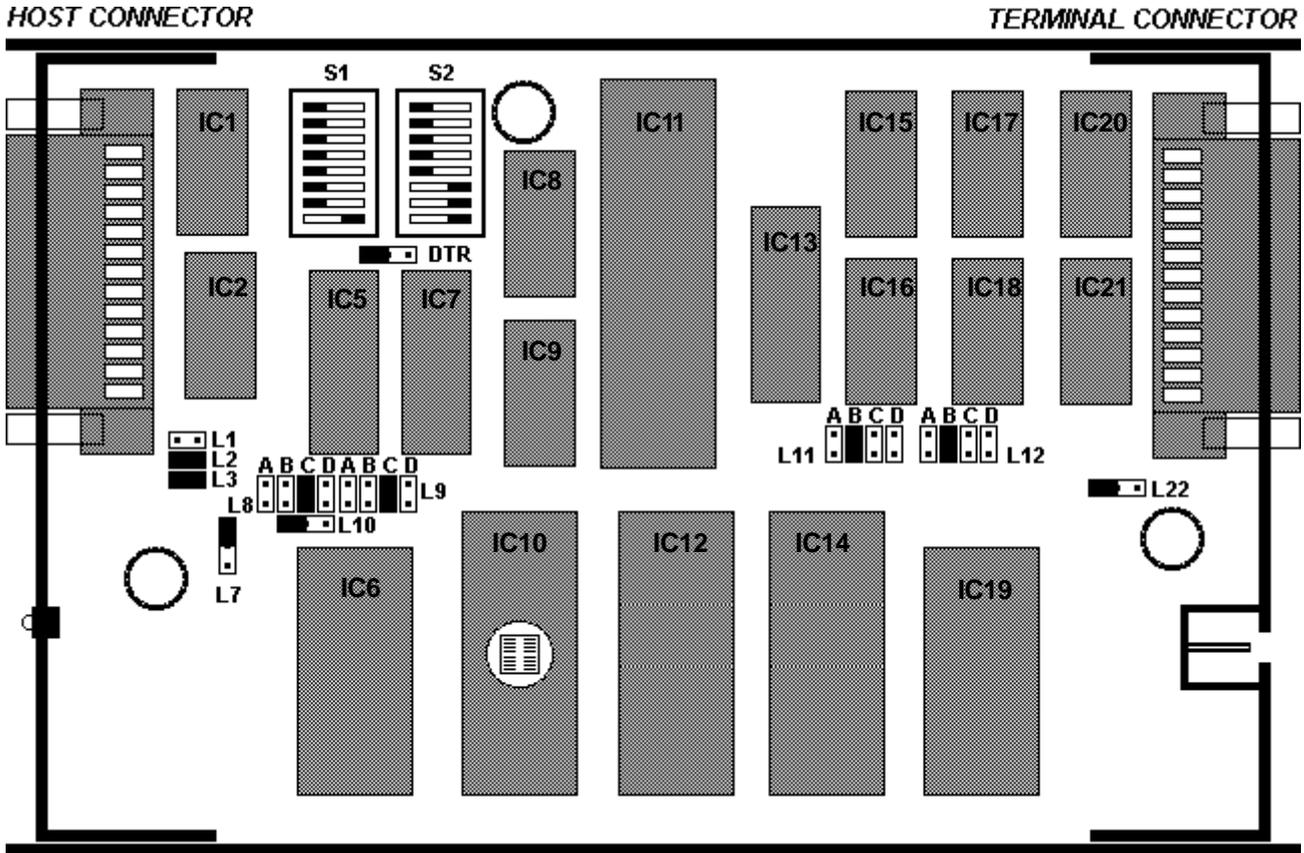


Padding



No Padding

Configuration Summary



JR IB80

Links L1, L2 and L3 - internal clock to host port

- L1 pin-24 (internal clock output)
- L2 pin-17 (receive clock)
- L3 pin-15 (transmit clock)

Link L8 - select source of RX Clock for host port

- A connect to internal clock T1 (as set on switch S1)
- B connect to internal clock T2 (as set on switch S1)
- C connect to host port pin-17 (Receive Clock RX)
- D not used on standard model

Link L9 - select source of TX Clock for host port

- A connect to internal clock T1 (as set on switch S1)
- B connect to internal clock T2 (as set on switch S1)
- C connect to host port pin-15 (Transmit Clock TX)
- D not used in the standard model.

Link L10 - Internal clock to outside world

If L10 is set so that the centre pin in connected to the pin nearest to the host port, internal clock T1 will be available to pass to the host port.

Link L11 - select source of RX clock for terminal port

- A connect to internal clock T1 (as set on switch S1)
- B connect to internal clock T2 (as set on switch S1)
- C connect to terminal port pin-17 (external receive clock)
- D not used in the standard model

Link L12 - select source of TX clock for terminal port

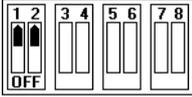
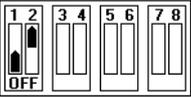
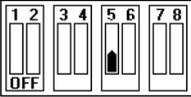
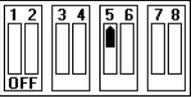
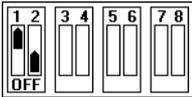
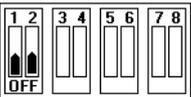
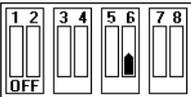
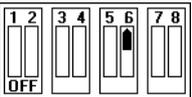
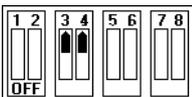
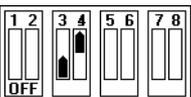
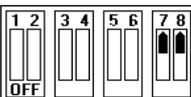
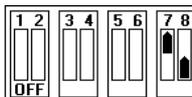
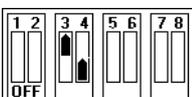
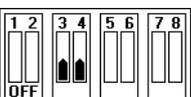
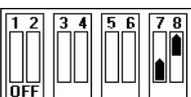
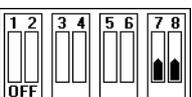
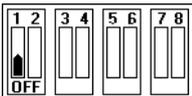
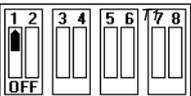
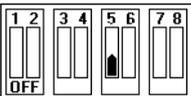
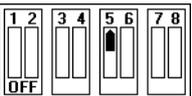
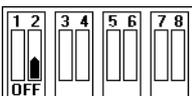
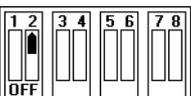
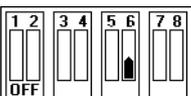
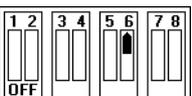
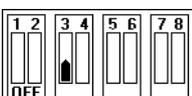
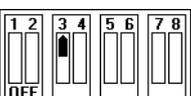
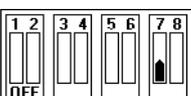
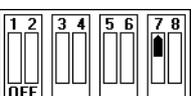
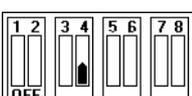
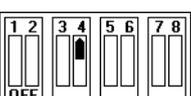
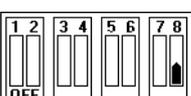
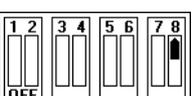
- A connect to internal clock T1 (as set on switch S1)
- B connect to internal clock T2 (as set on switch S1)
- C connect to terminal port pin-15 (external transmit clock)
- D not used in the standard model

Link L22 - select source of the enabling signal for the terminal port

If L22 is left unstrapped, the transmitter is permanently enabled. If L22 is connected from the centre pin to the pin nearest to the host port, then pin20 of the terminal port exercises control on the transmitter. If L22 is connected from the centre pin to the pin nearest to the terminal port, then pin-19 of the terminal port exercises control on the transmitter.

DTR control option

If the link on DTR is connecting the left two pins, then pin 20 on the host connector is held high as long as power is applied to the Diplomat jr. If the link is in the other position, then pin 20 on the host connector follows the state of either pin 19 or 20 on the terminal connector, depending on how Link 22 is set.

| | | | |
|---|--|---|---|
| <p>S1</p>  <p><i>T1 307200(sync) 19200(async)</i></p> | <p>S1</p>  <p><i>T1 2400(sync) 150(async)</i></p> | <p>S1</p>  <p><i>Echo Selected</i></p> | <p>S1</p>  <p><i>No Echo</i></p> |
| <p>S1</p>  <p><i>T1 4800(sync) 300(async)</i></p> | <p>S1</p>  <p><i>T1 9600(sync) 600(async)</i></p> | <p>S1</p>  <p><i>LF Appended</i></p> | <p>S1</p>  <p><i>No LF Appended</i></p> |
| <p>S1</p>  <p><i>T2 19200(sync) 1200(async)</i></p> | <p>S1</p>  <p><i>T2 38400(sync) 2400(async)</i></p> | <p>S1</p>  <p><i>No parity check, bit 8=0</i></p> | <p>S1</p>  <p><i>No parity check, bit 8=1</i></p> |
| <p>S1</p>  <p><i>T2 76800(sync) 4800(async)</i></p> | <p>S1</p>  <p><i>T2 153600(sync) 9600(async)</i></p> | <p>S1</p>  <p><i>Parity check, even parity</i></p> | <p>S1</p>  <p><i>Parity check, odd parity</i></p> |
| <p>S2</p>  <p><i>EBCDIC</i></p> | <p>S2</p>  <p><i>ASCII</i></p> | <p>S2</p>  <p><i>***END OF DATA***</i></p> | <p>S2</p>  <p><i>CTRL/Z</i></p> |
| <p>S2</p>  <p><i>Translation</i></p> | <p>S2</p>  <p><i>No Translation</i></p> | <p>S2</p>  <p><i>3780 Device</i></p> | <p>S2</p>  <p><i>2780 Device</i></p> |
| <p>S2</p>  <p><i>Filter</i></p> | <p>S2</p>  <p><i>No Filter</i></p> | <p>S2</p>  <p><i>Record length = 132 chars</i></p> | <p>S2</p>  <p><i>Record length = 80 chars</i></p> |
| <p>S2</p>  <p><i>CR+LF</i></p> | <p>S2</p>  <p><i>CR Only</i></p> | <p>S2</p>  <p><i>Padding</i></p> | <p>S2</p>  <p><i>No Padding</i></p> |

Technical Description

Communications

The *Diplomat jr* provides an interface between a single synchronous communications line and an asynchronous device - usually a terminal. In the following description, as throughout the rest of this Guide, the term host port is synonymous with synchronous port and terminal port with asynchronous port.

Host Port

The synchronous connection can be made directly to the mainframes Integrated Communications Adaptor (TCU) or via a modem or line driver. The pin connections on the host port (DTE) allow the *Diplomat jr* to be directly connected to a modem. Other connections may require the use of cross-over cables.

The *Diplomat jr* can either use an external clock for timing, or use one of the two internal clocks. The protocol used on the host port is the IBM Binary Synchronous Communications (BSC) protocol operating in the Point to Point Data Link mode. Flow control and error correction are inherent in the protocol.

In EBCDIC mode, data is transmitted as 8 bit characters with a 16 bit CRC16 Block Check Character (BCC) appended to the text blocks. In ASCII mode, characters are transmitted as 7-data bits plus odd parity with an end of block LRC8 checksum. The unit can operate with controlled or constant carrier, which it determines automatically, and with any data rate up to 19200 bps. Line turn-around will not occur in less than 40mS when operating with constant carrier. With controlled carrier the external CTS signal will determine when transmission starts.

The *Diplomat jr* will synchronise on one SYN character, but always sends six SYN characters preceding transmissions. In order to avoid being hung on a defective communications line, the unit has a 20 second watchdog timer. All receptions or transmissions must complete within this time. If they do not, the host port will reset and the *Diplomat jr* will wait for the next message or send up to three Enquiry (ENQ) frames before aborting the link. Full support of Reverse Interrupt (RVI) is included.

When the *Diplomat jr* is bidding for the line it will try 15 times and if still unsuccessful, it will issue an End of Transmission (EOT) frame. It will then start rebidding. An End of Transmission (EOT) received on the host port will cause the DCD signal on the terminal port to drop for two seconds.

Terminal Port

The asynchronous connection can be made directly to a terminal, printer, micro computer, modem or other asynchronous device. The pin connections on the terminal port (DCE) enable terminal-type devices to be plugged in directly. Connection to other devices may require the use of cross-over cables.

Data rate is selectable within the range 150 to 19200 bps from the internal clocks. Control of local echo and parity checking are provided. Data flow control is performed by XON/XOFF in-band signalling and operates in both directions. The unit will send DC3(ASCII value 19 or CTRL/S) characters back to the asynchronous device if it has space for less than 100 characters in its buffer. It will send a DC1(ASCII value 17 or CTRL/Q) character when it has 500 characters left spare. If the *Diplomat jr* receives a DC3 character, no more than two further characters should be received by the asynchronous device.

| | |
|----------------------------|---|
| Operating Modes | <p>The <i>Diplomat jr</i> can operate as either an IBM 2780 or IBM 3780 remote station. In 3780 mode, space compression sequences found in the host data stream are expanded before being sent to the terminal port. If the unit is configured for code conversion, both RS (EBCDIC value 30) and US (EBCDIC value 31) characters are translated to CR or CR,LF sequences before being sent to the terminal port. Similarly, when outputting to the host port, short records will be terminated with a RS character in 3780 mode or padded out to 80 characters in 2780 mode.</p> <p>IBM2780 mode may be selected by sending an SI(ASCII value 15) character to the terminal port. IBM3780 mode may be selected by sending an SO(ASCII value 14) character. Any condition that causes a reset of the <i>Diplomat jr</i> will reset the mode to the value selected by the switches.</p> |
| ASCII/EBCDIC | <p>The host computer can operate with either ASCII or EBCDIC code on the synchronous data link. The <i>Diplomat jr</i> can operate with either code.</p> |
| Translation | <p>When using EBCDIC code, the <i>Diplomat jr</i> may be configured to translate data to ASCII code before sending it to the terminal port. The unit can be configured to bypass this translation.</p> |
| Filtering | <p>If filtering has not been selected then all control characters within the data frame are translated and passed on to the terminal port except the Intermediate Transmission Block (ITB), End of Transmission Block (ETB) and End of File (ETX) characters. The ETX character is converted to a SUB (ASCII value 26 or CTRL/Z) character or the plain text *** END OF DATA *** is sent to the terminal port subject to switch settings.</p> <p>If filtering has been selected, the device control characters DC1, DC2, DC3, DC4 and NUL are removed from the data stream. The characters HT, BEL and FF are translated and passed on but all others except ESC are converted to CR (CR/LF).</p> <p>The two character sequence ESC A is translated to Form Feed and the sequences ESC \, ESC S and ESC T cause 1,2 or 3 CR (CR/LF) characters to be output at the end of the record. ESC M causes a CR only to be output at the end of the record with no LF so that overprinting is possible.</p> |
| Binary Mode | <p>If neither Translation or Filtering are selected, the <i>Diplomat jr</i> operates in binary transmission mode.</p> |
| Formatting | <p>The unit allows the choice to convert record separators to CR, or to CR/LF pairs for line formatting.</p> |
| Logon/Logoff on DTR | <p>It is possible to define fixed message strings that are sent to the host whenever the DTR signal on the Terminal Port is raised or lowered. Thus on seeing DTR rise for the first time the <i>Diplomat</i> would send a Login record to the host. Similarly when DTR dropped, a Logoff record would be sent. Details of this feature should be discussed with Lucidata Technical Staff.</p> |

Technical Description

| | |
|---------------------------------|---|
| Control by the Terminal | A high degree of control over the <i>Diplomat jr</i> and the communication link can be exercised through the terminal port. The specific functions provided are described below. |
| Collection of statistics | During operation, the <i>Diplomat jr</i> will keep a count of all the message types it has handled. Thus the number of NAK, WACK or ENQ responses it has received as well as the number of text blocks sent or received are available for interrogation. Sending the <i>Diplomat jr</i> an ENQ character (ASCII value 5 or CTRL/E) to the terminal port causes a message summary to be output. All the counts are reset to zero once interrogated. Counts are all modulo 65536. After displaying the report the <i>Diplomat jr</i> resets itself and any data held in the buffers is lost. |
| Record Termination | Data input at the terminal port is buffered internally until a terminator character is received. There are two defined terminator characters, CR (ASCII value 13) the primary terminator and SUB (ASCII value 26 or CTRL/Z) the secondary one. If the <i>Diplomat jr</i> is idle, (i.e. not sending or receiving) input of a line of text terminated by a CR will cause the <i>Diplomat jr</i> to start bidding for the line on the synchronous port. Blocks transmitted to the host will be terminated with ETB (EBCDIC value 38) and the CR will be translated to the appropriate record separator. The last line to be input is terminated by CTRL/Z which causes the line to be sent as an ETX (EBCDIC value 3) terminated block. The line is then dropped by issuing an End of Transmission (EOT) frame. |
| Clear Down the Line | Under some circumstances, particularly when the host is also emulating the IBM protocol, the data link can get stuck. The <i>Diplomat jr</i> can be forced to issue an End of Transmission (EOT) frame by entering the EOT character (ASCII value 4 or CTRL/D) at the terminal port. Any data held in the <i>Diplomat jr</i> 's internal buffers is preserved and may result in the <i>Diplomat jr</i> starting to bid for the line again after a time out of 20 seconds. |
| Variable length Records | A variety of record formats are supported from totally variable length to fixed lengths, padded if necessary, of 80 or 132 characters. The length of variable length records is under control of the data source connected to the terminal port. |
| Reset to Initial State | If ECHO is disabled, (S1(5) to the right) entering the CAN (ASCII value 24) character will cause the <i>Diplomat jr</i> to reset itself to the power up state and any data held in the buffers will be lost. |
| Buffer Status | The <i>Diplomat jr</i> will hold data in its buffers until it has completed transmission to the host. The status of the buffers can be determined by sending an EM character (ASCII value 25). The <i>Diplomat jr</i> will respond with an ACK (ASCII value 6) if its buffers are empty or NAK (ASCII value 21) if there is still data to be transmitted. |

Binary Transmission

If binary mode has been selected on the switches, data coming from the host is sent without translation and formatted as 8 data bits with no parity. The *Diplomat jr* will not attempt any interpretation of the data stream with the exception that End of File will still be indicated according to S2(5). The asynchronous device may still use XON/XOFF flow control to control the received data but if it is sending data to the *Diplomat jr* at the same time the *Diplomat* will be unable to exercise flow control over the input data from the terminal port.

When sending binary data to the *Diplomat jr* all Text and Control characters have their normal meaning as regards control of the *Diplomat*. If it is necessary to send a binary value that is less than ASCII value 32 then the character must be preceded with the DLE(ASCII value 16 or CTRL/P) character. The *Diplomat jr* may still use XON/XOFF to control the flow of input data from the terminal port.

Poll and Select Frame Generation

The IBM2780/3780 protocol provides for Poll and Select information to be included in the frame immediately after the SYN characters. It also allows a Terminal ID string of up to seven graphic characters to be sent prior to an ENQ and a response of up to fifteen characters to appear before an ACK or NAK. The *Diplomat* supports both these features in a similar way. If a string of between 2 and 7 printable characters are terminated with an SOH character (ASCII value 1 or CTRL/A)

A,B,C,D,E,F,SOH

they are immediately transmitted from the Host Port in the following format:

SYN SYN SYN SYN EOT SYN SYN SYN SYN A B C D E F ENQ \$FF

If translation is selected they will be translated to EBCDIC prior to transmission.

A Terminal ID will be returned in the following format:

SYN SYN SYN SYN Terminal ID ACK0 \$FF

This Terminal ID will be translated if required and sent to the Terminal Port. It may or may not have an appended CR (CR/LF) dependant on switch settings.

If a General Poll frame is generated by sending space space SOH to the Terminal Port then the poll generated in an EBCDIC environment will be

SYN SYN SYN SYN EOT SYN SYN SYN SYN \$40 \$40 ENQ \$FF

If the remote device has data to send it will carry on by sending it otherwise it will simply respond with an EOT frame

SYN SYN SYN SYN EOT

If a select frame is generated the data to be sent should follow immediately after the SOH character is input to the Terminal Port.

Technical Description

Electrical Interfaces

Three connections are made to the *Diplomat jr* unit.

Power at a regulated +5V is input to the unit via a jack socket at one end of the unit.

Connections at the host and terminal sides are made by means of connectors at either end of the unit. Normally these are 25 pin female D-type sockets unless notified otherwise under *Product Details* on Page 4. Both sockets are fitted with screwlock pillars so that the data cables can be securely fixed. On a new *Diplomat jr* the 'D' sockets are normally fitted with protective dust covers.

Host Port

The table below shows the pin connections to the host port connector. This port is normally connected to a host computer, and is a female 25-pin D-type configured as a serial synchronous DTE.

PIN NO.

| | |
|----|---|
| 1 | Protective Ground connects to chassis and power supply ground. |
| 2 | Synchronous Transmitted Data from the Diplomat |
| 3 | Synchronous Received Data going into the Diplomat |
| 4 | Request to Send is held high by the Diplomat when transmitting |
| 5 | Clear to Send must be high to enable the Diplomat's transmitter |
| 7 | Common signal return is connected to power supply ground |
| 8 | Data Carrier Detect must be high during sending to the Diplomat |
| 13 | RS422 T(A) |
| 14 | RS422 T(B) |
| 15 | Transmit Clock required to strobe data out of the Diplomat |
| 16 | RS422 R(A) |
| 17 | Receive Clock required to strobe data into the Diplomat |
| 19 | RS422 R(B) |
| 20 | Data Terminal Ready held high by the Diplomat when powered up |
| 24 | Local clock output dependant on straps |

All control signals required for the proper operation of the *Diplomat* are pulled high by means of an internally generated +10V supply, via internal 3K3 resistors.

note: *In RS232 mode no connections should be made to pins 13, 14, 16 and 19. In RS422 mode, connections should only be made to pins 1, 7, 13, 14, 16 and 19.*

The use of screened cable with the screen connected to pin 1 is recommended.

Terminal Port

The table below shows the pin connections to the terminal port connector. This port is normally connected to a terminal or other asynchronous peripheral and is a female 25-pin D-type configured as a serial asynchronous DCEs.

PIN NO.

| | |
|----|--|
| 1 | Protective Ground connects to chassis and power supply ground |
| 2 | Asynchronous Received Data going into the Diplomat |
| 3 | Asynchronous Transmitted Data from the Diplomat |
| 4 | Request To Send is held high if left open or controlled by terminal ¹ |
| 5 | Clear to Send will be held high if pin 4 is high |
| 6 | Data Set Ready held high whilst power on |
| 7 | Common signal return is connected to power supply ground |
| 8 | Data Carrier Detect held high if Diplomat ready to receive |
| 15 | *** Reserved *** Do NOT make any connection |
| 17 | *** Reserved *** Do NOT make any connection |
| 19 | If low ² will disable Diplomat's transmitter |
| 20 | If low ² will disable Diplomat's transmitter |

¹ If pulled down by the terminal will cause the Diplomat jr to reset to its initial state and to flush any data in its buffers

² **Depends on link L22**