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D90-ASR MODULE

***Asynchronous
terminal interface
module***

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Introduction

Like all Lucidata Diplomat data communications products, the D90-ASR has been designed to be easy to use in most normal applications whilst retaining a large degree of flexibility.

It is Lucidata's policy to try and find out as much about the intended application of its products before shipment so that the unit can be pre-configured at the factory for easy installation. In this case you may skip many sections of this manual. If the application changes with time then you will need to refer to those sections to reconfigure the unit.

In the event of difficulty, please contact Lucidata's technical staff who will be able to guide you through the process.

The configuration switches are not normally changed once a unit is installed and it is outside the scope of this manual to describe the behaviour of the module for every combination of switches in all circumstances.

This first part of this manual restricts itself to the functional characteristics of the D90-ASR. A fuller description will be found under the heading *Operation in Detail.*

Description

The D90-ASR module is implemented on an SA2 hardware module which is fitted with dual asynchronous channels and forms the main asynchronous terminal interface module. In normal operation, these modules are slaves to a network connection or host connection module which is known as the Local Server. They can also be controlled and configured via the Diplomat Network Monitor if one is installed. The two D9 female connectors are configured as DCE and are compatible with an IBM PC COM port.

Within the module there is an EPROM which contains the program (Firmware) for terminal emulation. The firmware also contains the various communication parameter defaults (speed, parity etc) which are set when the module is powered up. These defaults can only be changed by inserting new firmware or by means of a Diplomat Network Monitor (DNM) if one is present in the rack. The defaults for these parameters will be found in the *Customer Specification* section of this manual which is specific to each customer.

The functional characteristics are controlled by certain parameters which can be changed by means of the Configuration Byte and Control Codes which are described later in this section.

Data Communications

Each module has two 9 pin D-type connectors on the front which are labelled A and B. Signalling levels are RS232. The use of screened cable with the outer conductor grounded to the connector shell is recommended when making connections to the SA2 module in order to guarantee immunity to external electromagnetic interference. Ensure that the cables are securely fixed to the screwlock pillars.

Pin Assignments

(Female 9-pin D-Type)

Both ports are configured as asynchronous DCE and are normally connected to a terminal or other asynchronous peripheral. Details of the pin assignments are given below. The pin ordering is directly compatible with the COM port of an IBM PC.

PIN NO.		
1	CD	Carrier Detect asserted high by SA2 during normal operation
2	RXD	Received Data – SA2 transmits data on this pin
3	TXD	Transmitted Data – SA2 receives data on this pin
4	DTR	Data Terminal Ready – Enables SA2 transmitter if high
5	SG	Signal Ground
6	DSR	Data Set Ready asserted high by SA2 if D90 rack powered-up
7	RTS	Request to Send – sensed by SA2
8	CTS	Clear to Send – internally connected to pin 7
9	RI	Ring Indicator – not used

If a simple three wire connection is to be made to pins 2,3 and 5, then pins 4 and 7 should be connected to pin 6 to enable the port permanently.

LED Indicators

There are three Red(R) and one Green(G) light emitting diodes for each Port. When they are illuminated, the following conditions are true.

A   O   (R) Port A is connected to Local Server
     O   (R) Device on Port A present (Pins 4 & 7 signalling ON)
     O   (R) Data received by Port A (Pin 3 toggling)
     O   (G) Dialogue with another module (eg: DNM)

B   O   (R) Port B is connected to Local Server
     O   (R) Device on Port B present (Pins 4 & 7 signalling ON)
     O   (R) Data received by Port B (Pin 3 toggling)
     O   (G) Dialogue with another module (eg: DNM)

Configuration Options

There are no mechanical switches in D90 modules. Configuration is accomplished by setting "Silicon Switches" that are programmed into the *Configuration Bytes*. There is one *Configuration Byte* for each port and this section is a summary of the options available. Please refer to the D90 DNM section for an explanation of how to change the *Configuration Byte*.

By convention the switches or bits of a configuration byte are numbered as follows

7	6	5	4	3	2	1	0

The meaning of the bits in Configuration Byte A and Configuration Byte B is the same but they apply to their respective port.

Bit	Name	Description
0	BXON	[0] – Use the state of pin DTR, pin 4, to perform flow control on data going from the SA2 module [1] – Use XON/XOFF flow control in both directions.
1	BTRANS	[0] – Interpret and act on some control characters [1] – Transparent Mode – treat all characters as data, do not interpret.
2	BTERM	[0] – Send on Terminator characters CR and SUB [1] – Send on Terminator characters LF and SUB
3	BSEND	[0] – Send on a Termination character, CR, LF or SUB [1] – Send buffer 50msec after last received character if no Termination character received.
4	BSCHAR	[0] – Wait for Termination character or timeout to send [1] – Send each character as it arrives at port.
5	BCRLF	[0] – Do not add anything to echoed characters [1] – Follow echoed CR with LF, or echoed LF with CR
6	BECHO	[0] – Do not echo input characters from port [1] – Echo input characters from port
7	BEXREP	[0] – Do not report local errors as text to port [1] – Report local errors to port as text messages

Note: *Some serious error conditions are reported directly to the rack's DNM module if one is present whether or not BEXREP is set. The DNM's Configuration Byte will determine what is done with them.*

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Special Control Codes

The following characters have special meaning if they are enabled by the appropriate Silicon Switch

Mnemonic	ASCII Value	Interpretation
CR	13	Forward collected data including CR to local server
LF	10	Forward collected data including LF to local server
SUB	26	Forward collected data only to local server
DC1	17	XON command to resume sending data. The SA2 sends this when it had previously been stopped sending but now has at least 1500 bytes free in its buffer.
DC2	18	Treated as a Reset Connection – command sent to local server
DC3	19	XOFF command to stop sending data. The SA2 sends this whenever it has less than 100 bytes spare space in its buffer and receives another character.

Operation

During power-up initialisation the ASR module will determine all the Local Servers in the rack and ask them to describe their services. It then selects the nearest Local Server, starting from the left of its own slot, which provides the required service. i.e. a LAN module offering TCP.

It notifies the Local Server of the state of its Ports; Ready if both DTR and RTS are high, or Not Ready if either or both are low. If BXON=0 then the DTR signal being low is considered flow control and the Ready condition is determined solely by the RTS signal being high.

Approximately every 15 seconds the ASR updates the Local Server with the status of its ports. If a status changes the change is notified immediately.

When a connection is made via the Local Server to a remote system the Local Server notifies the ASR module and the appropriate Red LED is illuminated. Similarly if a connection is broken the LED is extinguished. The ASR module may break down a connection by sensing RTS (and/or DTR if BXON=1) dropping. If BTRANS=1 this is the only way the ASR may control the state of a remote connection. If BTRANS=0 then receiving a DC2 character causes the ASR module to drop a connection and tidy up. When an ASR module is notified of confirmation of a broken connection, as well as extinguishing the LED it will drop the DCD signal (pin 1) for 1 second.

Data received on a port are forwarded to the Local Server according to the settings in the Configuration Byte for that port. If data is input continously and no explicit forwarding condition occurs, automatic forwarding of the collected data will occur when there are 1500 bytes in the buffer. Data received from the Local Server are output as soon as they are received. If data received from the port are unable to be delivered to the Local Server within about 7 seconds of retrying the connection is broken down and the data discarded to facilitate recovery.

If the D90 rack as a whole is configured as a Client then the first character forwarded to the Local Server is used to iniate a connection to the remote system and is discarded. Any data sent to the Local Server before a proper connection is set up is also discarded. Error messages may be sent back to the ASR port dependent on the configuration of the Local Server.

If the rack as a whole is configured as a Server then any data sent to the Local Server prior to a connection being established from a remote system is discarded, silently or with error messages.