Connection to Host

APPENDIX 3

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1. Introduction



Connection to the ***Host*** *computer* is available from the *Diana System* software Version 2.03 CD-ROM onwards

The connection of the *Diana System* to the *Host Computer* has been effected in accordance with the *ASTM E 1394 91* and *ASTM E-1381 95* standard. The *ASTM E 1394* standard establishes a format for the messages that must be sent from the *Host* to the instrument and vice versa, but does not specify the way in which they must be sent. The *ASTM E-1381* standard explains the way in which messages should be physically sent to the *Host*, but does not specify a format.

The *Diana System* can send messages to the *Host* in 2 ways:

- **Following the *ASTM E-1381* standard, where the PC's serial channel is used.**
- **By saving messages in files on local or remote disk units, which can be accessed by both the *Host* and the *Diana System*.**

The *Diana System* may consist of one or various computers connected in a network, interconnecting different instruments (*WADiana Compact* 1, *WADiana Compact* 2, *Diana Reader*, etc.). Each of these is controlled in turn by the its applications (*WADiana C Software*, *Diana O Software*, *Diana R Software*, *Diana P Software*).

Note: the *Diana System* uses the *Borland Database Engine*, which means that if there is any other application using the same system, it will have to be installed according to the instructions indicated by the *BDE*.

For ease of communication between the *Diana System* and the *Host*, the latter is housed in a single computer within the *Diana System*. Thus, the *DianaServer* program acts as a server and channels all the communication between the *Host* and each of the applications corresponding to the instruments connected to the *Diana System*.

2. Operation of the *DianaServer* program

This application must be installed in the *Diana System* server computer, and must be executed before the *Diana System* software applications. The program must not be shut down while connection to the *Host* is to be maintained. Upon executing the *DianaServer*, an icon appears in the bottom right hand corner of the screen, indicating that the program is active (*see Fig. 1*).



Fig. 1

Right clicking with the mouse brings up a context menu with the options *Configuration* and *Close*. Clicking on the configuration option opens the following window:

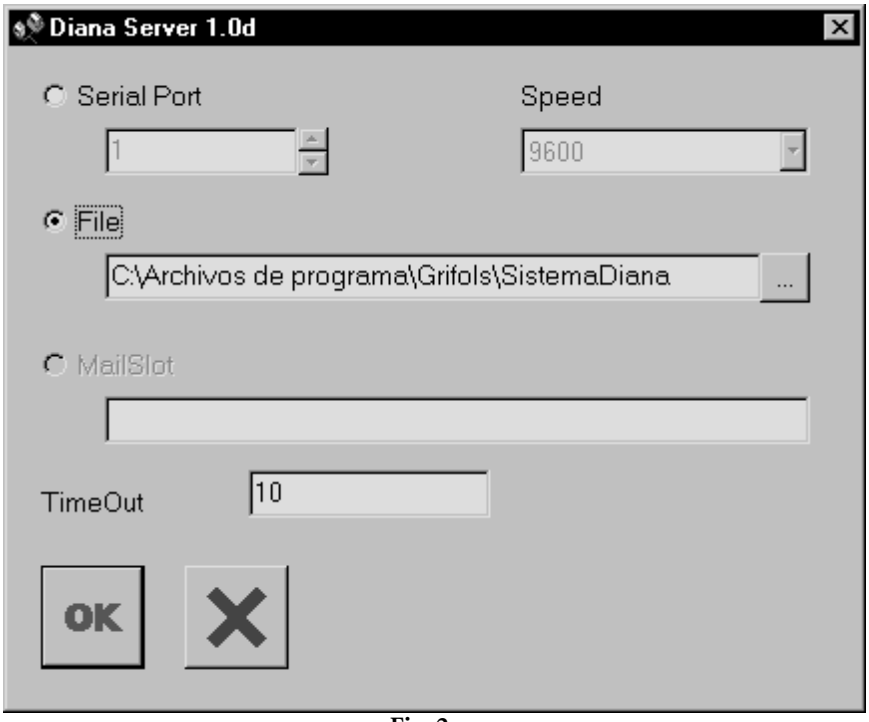

Fig. 2

In this window, we can configure the settings for communication between the *Diana System* and the *Host.* Thus, we have:

- **Serial communication system (Serial Port/Speed).**

Using the serial channel system, messages are sent to the *Host* using the *ASTM E-1381* standard. The following settings may be selected:

- **Serial port of a PC in the *Diana System* which connects the PC to the *Host.***
- **Transmission speed in bauds.**

The rest of the settings are fixed:

- **Parity not used.**
- **1 start bit.**
- **1 stop bit.**
- **8 data bits.**

To improve the connection at high speed, the transmission and reception buffers should be set to minimum. To do this, go to the *Windows* 'Control Panel,' open the System folder, click on the 'Device Manager' tab, select the communication port where the *DianaServer* is installed, and click the Properties button. Another window will open; select the 'Configure port' tab and click the 'Advanced' button. A window like that in Fig. 3 will appear 3.

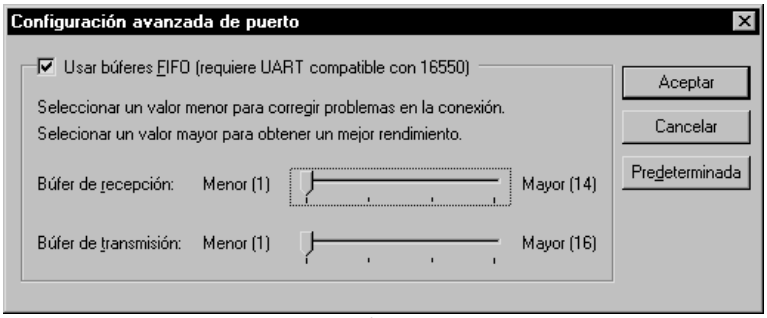

Fig. 3

Set the buffers to minimum and press Accept in the following windows, until the 'Control Panel' closes.

File communication system

The protocol is as follows: When the user makes a request, the *Diana System* software puts the 'Out.dat' file (following the *ASTME E 1394 91* standard) in the configured directory. Said message must be read and erased by the *Host* within the time limit established in the 'TimeOut' configuration (default time 10 seconds). The *Host* must replace it with a file named 'In.dat,' containing the work to be carried out. Said file will be read and erased by the *DianaServer* within the established Time-out.

The *DianaServer* temporarily stores the information in its own database - this being updated during the various stages of the process - for each and every application of the machines controlled by the *Diana System* software.



The *Diana System* generates an output file 'Out.dat,' following the *ASTM E 1394 91* standard, when it has validated results.

The location of said file must be configured when this option is used. It must be located in a shared directory with total access (read and write), and connected to a network unit.

Timeout
This setting is the time in seconds that the *DianaServer* should wait to receive data once a request has been made of the *Host.*

Only one *DianaServer* application is allowed to be open in the same network domain, even when different computers are involved.



The *DianaServer* program communicates with the rest of the *Diana System* applications by way of network protocols, and this implies that the computer on which the *DianaServer* is housed must have at least one of these protocols installed. In the case of a computer connected to a network, these protocols will have already been installed. If this is not the case, proceed as follows:

1. Open the Windows 'Control Panel'.
2. Click on the 'Add or Remove programs' icon".
3. Select the 'Windows Installation' tab".
4. Select the 'Communication' icon and press the 'Details' button".
5. Tick ' Dial-up networking' and 'Direct cable connection' and press 'Accept'".

***At this point, Windows* will ask you to insert a Windows installation CD-ROM. Once the protocols have been installed, you will be asked for confirmation before rebooting Windows.**

To check that the installation has been carried out correctly, once Windows has rebooted, the 'Network environment' icon should appear on the desktop. If so, examine the 'Network environment' icon's properties (right click) - a window like that in Fig. 4 should open.



Fig. 4

Check that the installed Protocols, Clients and Adapters are the same. If so, the *DianaServer* will function correctly.

3. Performance of *WADiana C Software* and *Diana O Software* with *DianaServer 1.0.*

When the *DianaServer* is open, a button called *Host* appears in the *WADiana C Software* worksheet folder. This button sends a data request to the *Host*, which responds by sending all the outstanding samples in the *Host*, together with the tests to be carried out and the interpretation template for each of them. Optionally, the *Host* may also send the *Diana C Software* samples with tests to be carried out, but without the interpretation template, the latter being sent afterwards to the *Diana O Software*.

The worksheets for all those samples previously loaded onto the carousel will then be filled in automatically (*) and identified by the Test folder 'Identify' command.

(*) The samples may be loaded at random (Random Access), i.e. the user simply loads the tubes onto the carousel in any order.

Most relevant operating points:

- **The user may change the content of the worksheet (adding or deleting samples), something which is his/her own responsibility). In any case, the only results sent to the *Host* will be those belonging to the samples requested by the user, subject to user validation.**
- **The *WADiana C Software* program will automatically reorganise and group the samples into work batches to optimise their processing according to the established criteria.**
- **More than one 'load' of cards/reagents may be needed to process the identified samples already present on the worksheet. The *WADiana C Software* will, for each load, ask for the material necessary for the programmed process. Each time the *WADiana C Software* finishes a batch it will inform the *DianaServer*, which will, in turn, inform the *Diana O Software*.**
- **Once the *WADiana C Software* has started on the tests, it will send a message to the *Host*, telling it which samples are being processed.**
- **The *Diana System* cannot contain two samples with the same ID on which the same test is to be carried out (this also applies to a single machine), although there may be a repeated sample on different machines carrying out different tests.**

- **Should the worksheet be aborted during processing, the *DianaServer* will inform the *Host* that the samples have not been completed.**

- **Crossmatch tests: requests for crossmatch tests can be made from the *Host*. In order to do so, the Host must send the *WADiana C Software* (when the command *Host* is activated from its the 'Worksheet' folder) the ID of the receiver on whom the crossmatch test is to be carried out, the name of the crossmatch test and the interpretation template. The user can crossmatch said receiver with as many donors as wished. The *Diana O Software* will subsequently send, in the format indicated in previous sections of this document, as many Receiver/Donor pairs as the number of donors the user has set for the receiver in question. In future versions, the *WADiana C Software* will be able to receive the donors to be crossmatched with a particular sample directly from the *Host*.**

If the *DianaServer* is open, there will be a button in the main window of the *Diana O* program, symbolising the *Host*: When the user clicks on this button, a connection is established with the *Host* as a virtual instrument called *REPORT* in case interpretations of previously processed samples are needed, and therefore the *Host* should only send samples and templates (without tests). The window that opens next contains the templates pending sending, together with their samples and the numbers of samples already processed (these may come from one or various batches). These templates allow the user to tell if the samples have been processed by an instrument, or whether it is a request for results without tests or associated batches (in this case the interpretation would be carried out on all the available batches in the system). Once the template has been selected, a report is generated. Once the user has validated (**) the data and clicked the *Host* icon, the *Diana O Software* will send the *Host* the results by sample for the template selected.

(**) The *Diana O Software* validation wizard informs the user of any discrepancies existing in the samples requested by the *Host* (discrepancies detected in the batches processed with samples requested by the *Host*). The validation wizard also makes it necessary to resolve said discrepancies prior to sending, i.e. no discrepancy will ever be sent to the *Host*.

The *Diana O Software* also offers the possibility of exporting the *Lists* file in *ASTM* format (sending results in single direction mode).

4. Brief description of the *HostDemo*

This is a technical support tool, the aim of which is to check that the connection is functioning correctly.
Upon opening the program, the following window will appear:

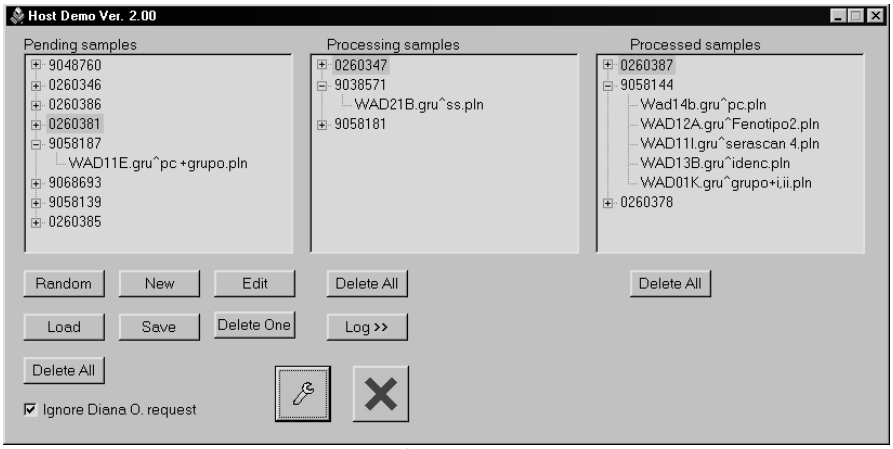

Fig. 5

The program consists of 3 windows. In the first, the samples sent to the *DianaServer*, or those which have been cancelled, are displayed; the second shows the samples currently being processed and the third shows those which have been processed. The samples can be moved from one window to another by dragging and dropping using the mouse. Each sample has the different test-template groupings and the sample status with possible results attached. Pressing the Log button reveals or hides an extra window, which shows the communication and error message status.

Description of the buttons

Random: Generates a random grouping of samples, tests and templates from the *Diana System* work directory.

Load: Adds samples from an ASTM format file with an *.hst extension.

Save: Save the samples in a file with ASTM format

Log: Show or hide the window with the state of the communication or the error messages

Delete One: Deletes the element selected in the samples window.

Delete All: Deletes the content of the window above the button.

5. *Diana System* to *Host communication*

The *Diana System* initiates communication, asking the *Host* for all the outstanding samples. The message consists of three fixed entries: Heading, information request and end.

Heading

Field	Type	Length	Value	Comments	
Type of entry	Text	1	H		
Delimiters	Text	4	\ ^&|		
	Null				
Diana System ID	Text			Multiple field separated by ^	
				Name	Diana System
				Description	Serial number of the equipment
				Software version	
	Null				
	Null				
	Null				
	Null				
	Null				
	Null				
Process ID	Text	1	P		
ASTM version	Number	1	1		
Date - time	Number	14		Format: AAAAMMDDHHMMSS	

Request for information

Field	Type	Length	Value	Comments
Type of entry	Text	1	Q	
Number Sequence	Number	1	1	
Start rank	Text	3	ALL	All samples requested
End rank	Null			
Test ID	Text	3	ALL	All tests requested
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			

Request status	**Text**	**1**	**I**	**Samples not in process requested**

End of entry

Field	Type	Length	Value	Comments
Type of entry	Text	1	L	
Number Sequence	Number	1	1	
Finish	Text	1	N	

Example

H|\^&|||WADIANA^0501^3|||||||P|1|20000105091107
Q|1|ALL||ALL|||||||||I|
L|1|N

6. *Host* to *Diana System* communication

The reply consists of a heading register followed by a group of entries for each patient. Each group is made up of a patient ID entry and of as many test request entries as there are tests requested for this patient. In addition, each patient ID is preceded by a sequential number, beginning at 1, and for each patient, each test is preceded by a sequential, beginning at 1.

Heading
Patient 1
Test 1
Test 2
...
Patient 2
Test 1
End of entry

Heading

Field	Type	Length	Value	Comments
Type of entry	Text	1	H	
Delimiters	Text	3	\ ^&	

Patient ID

Field	Type	Length	Value	Comments
Type of entry	Text	1	P	
Number Sequence	Number			Patient order number within test request
Patient ID	Text			In *Diana System* it always works at sample level, never at patient level, which is why this field is ignored, except in a unidirectional dispatch. When a work sheet is sent to *Diana System*, the programme remembers patient identification in each sample. Thus, if the test results are sent back, this ID can also be sent.
	Null			
	Null			
Patient name	Text	100		Field used in the list *Result per patient* in *Diana O Software*, if option *See Demographic Data* is activated

	Null			
Birth date	Date	8		Field used in the list *Result per patient* in *Diana O Software*, if option *See Demographic Data* is activated Format in accordance with *ASTM E 1394, point* 6.6.2. YYYYMMDD.
Patient sex	Text	1		Field used in the list *Result per patient* in *Diana O Software*, if option *See Demographic Data* is activated Format in accordance with *ASTM E 1394, point 8.1.9.* O.

Test request to the *Diana System*

Field	Type	Length	Value	Comments	
Type of entry	Text	1	O		
Number Sequence	Number			Test order number within specimen tests	
Specimen ID	Text			Sample number	
	Null				
Test ID	Text			Multiple field separated by ^	
					Null
					Null
					Null
				Test Name.	Names defined in the *Diana System*
				Template name	Names defined in the *Diana System*

End of entry

Field	Type	Length	Value	Comments
Type of entry	Text	1	L	
Number Sequence	Number	1	1	
Finish	Text	1	N	

Example

Two receivers to carry out a cross test (WAD14B.gru) with the template Crossmatch.pln containing the fields X.X and PC C.

H|\^&|||WADIANA^0501^3|||||||P|1|20000105092112
P|1| Hospital ID: Receiver1|||Frank||19730401|H|
O|1|Receiver1||^^^Wad14B.gru^Crossmatch.pln
P|2| Hospital ID: Receiver2|||Jean||19561201|H|
O|1|Receiver2||^^^WAD14B.gru^Crossmatch.pln
L|1|N

7. Sending results

The *Diana System*, will send results to the *Host* in the following cases:

- **When beginning to execute a test: The *Diana System* will inform the *Host* that all the results are have "pending" status, i.e. with the *Report type* field containing the value "I"; in such a way that the "*Host*" will know that these requests are already being processed**
- **When the results are validated: the results of the test will be sent to the *Host* as the user finishes validating each one.**
- **The *Diana System* will send the *Host* each test (together with its samples and results) separately (*Type of report* field with value "F" for the results obtained and "X" for unobtainable results).**
- **When a test is cancelled: the *Host* will be informed that it has NOT been possible to carry out the request. *Type of report* field with value "X").**
- **After restarting the *Diana System* software following an incident, a check will be performed to see if any tests have not been properly finished and for which the results have not been sent to the *Host*. If any are detected, they will be sent with the *Type of report* field containing an "X."**

The process consists of a heading and a patient entry, followed by as many entries as there are results. A number in sequence is assigned to each patient, each order and each result.

Heading
Patient 1
Order 1
Result 1
Result 2
Order 2
Result 1
...
...
Patient 2
Order 1
Result 1
...
...
...

End of entry

Heading

Field	Type	Length	Value	Comments	
Type of entry	Text	1	H		
Delimiters	Text	4	\ ^&|		
	Null				
Diana System ID	Text			Multiple field separated by ^	
				Name	Diana System
				Description	Equipment Serial No.
				Software version	
	Null				
	Null				
	Null				
	Null				
	Null				
	Null				
Process ID	Text	1	P		
ASTM version	Number	1	1		
Date - time	Number	14		Format: YYYY*MMDDHHMMSS*	

Patient ID

Field	Type	Length	Value	Comments
Type of entry	Text	1	P	
Number Sequence	Number			Patient order number within test request
Patient ID	Text			Patient for the specimen about to be sent
	Null			
	Null			
Patient name	Text	100		Field used in the list ***Result per patient*** in ***Diana O Software***, if option See ***Demographic Data*** is activated
	Null			
Birth date	Date	8		Field used in the list ***Result per patient in Diana O Software***, if option See ***Demographic Data*** is activated Format in accordance with *ASTM E 1394*, point 6.6.2. YYYYMMDD.

Patient sex	Text	1		Field used in the list ***Result per patient*** in ***Diana O Software***, if option See ***Demographic Data*** is activated Format in accordance with *ASTM E 1394*, point 8.1.9. O.

In the case of crossmatch tests, each donor-receiver group will be treated as if it were a single sample with a <receiver ID><donor ID> identification type.

Tests done

Field	Type	Length	Value	Comments	
Type of entry	Text	1	O		
Number Sequence	Number			Test order number within specimen tests	
Specimen ID	Text			Sample number	
Instrument ID	Text	7		*The Diana System* records the position of the sample on the carousel, with the format TTTT-PP, with: TTTT: Batch number. PP: Position of sample on the carrusel	
Test ID	Text			Multiple field separated by ^.	
					Null
					Null
					Null
				Test Name.	Name defined in the *Diana System*
				Template name	Name defined in the *Diana System*
Priority	Text	1	R		
Date - time	Number	14		Format: YYYYMMDDHHMMSS	
	Null				
	Null				
	Null				
	Null				
	Null				
	Null				

Relevant Clinical Information	Text			In this field the *Diana System* sends the barcodes of reagents and cards used in the test and the associated number of batch. The number of batch is sent in the first place, followed of barcode the reagents and cards, using as separator the symbol ^.
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
	Null			
Diana System ID	Text			Multiple field separated by ^. Name: *Diana System* Description: Equipment Serial No. Software version:
Report type	Text	1		The following characters may be sent: F Final Result, validated. X Result not available due to the test being cancelled. I No result available yet, but being processed. C Modification of a result sent previously.

Results

Field	Type	Length	Value	Comments
Type of entry	Text	1	R	
Number Sequence	Number			Result order number within specimen test
Test ID	Text			Multiple field separated by ^ Null Null Null Test name. Name defined in the *Diana System*

				Template name	Name defined in the *Diana System*
Result	Text			For each specimen (Sample or receiver-donor pair) the list of all the template fields, separated by ^, is sent ^.	
Units	Text			Name of the fields in the template separated by ^, according to the alias defined in the system (option *Alias* activated) or by default according to the*interp.def.*	
	Null				
Normality flag	Text	2		Above all the template fields, if: There is a NI,H,E,# = H 'above high normal'. Others = 0 N 'normal'	
	Null				
Result status	Text	1		The following characters may be sent: F Final Result, validated. X No result available due to test being cancelled. I No result available yet, but being processed. C Modification of a result sent previously	
	Null				
Operator ID	Text			Name of the user who has carried out the validation	
Date-time test started	Text	14		Format AAAAMMDDHHMMSS	
Date-time test finished	Text	14		Format AAAAMMDDHHMMSS	
Diana System ID	Text			Multiple field separated by ^	
				Name	Diana System
				Description	Equipment Serial No.
				Software version	

End of entry

Field	Type	Length	Value	Comments
Type of entry	Text	1	L	
Number	Number	1	1	

Sequence				
Finish	Text	1	N	

Example 1: Updating partial results

```
H|\^&|||WADIANA^0501^3|||||||P|1|20000105093941
P|1| Hospital ID: Receiver1|||Frank||19730401|H|
O|1|Receiver1||^^^Wad14B.gru^Crossmatch.pln|R|20000105094301
                                        ||||||||||||||||||WADIANA^0501^3|I|
P|2| Hospital ID: Receiver2|||Jean||19561201|H|
O|1|Receiver2||^^^WAD14B.gru^Crossmatch.pln|R|20000105094301
                                        ||||||||||||||||||WADIANA^0501^3|I|
L|1|N
```

Example 2: Final results (each receiver has been crossmatched with two donors)

```
H|\^&|||WADIANA^0501^3|||||||P|1|20000105095114
P|1| | Hospital ID: Receiver1|||||||
O|1|Receiver1^donor1.1|1018-1|^^^Wad14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^Wad14B.gru^Crossmatch.pln|-^Comp|X^PC C||N||F||
                        |20000105094301|20000105100137|WADIANA^0501^3|
P|2| | Hospital ID: Receiver1|||||||
O|1|Receiver1^donor1.2|1018-1|^^^Wad14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^Wad14B.gru^Crossmatch.pln|4+^Incom|X^PC C||N||F||
                        |20000105094301|20000105100137|WADIANA^0501^3|
P|3| Hospital ID: Receiver1|||Frank||19730401|H|
O|1|Receiver1|1018-1|^^^Wad14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^Wad14B.gru^Crossmatch.pln|^|X^PC C||N||F||
                        |20000105094301|20000105100137|WADIANA^0501^3|
P|4| | Hospital ID: Receiver2|||||||
O|1|Receiver2^donor2.1|1018-2|^^^WadD14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^WAD14B.gru^Crossmatch.pln|-^Comp|X^PC C||N||F||
                        |20000105094301|20000105100137|WADIANA^0501^3|
P|5| | Hospital ID: Receiver2|||||||
O|1|Receiver2^donor2.2|1018-2|^^^WAD14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^WAD14B.gru^Crossmatch.pln|3+^Incom|X^PC C||N||F||
                    |20000105|||20000105094301100137|WADIANA^0501^3|
P|6| Hospital ID: Receiver2|||Jean||19561201|H|
O|1|Receiver2|1018-2|^^^WAD14B.gru^Crossmatch.pln|R
                                |20000105094301||||||||||||||||||WADIANA^0501^3|F|
R|1|^^^WAD14B.gru^Crossmatch.pln|^|X^PC C||N||F||
                        |20000105094301|20000105100137|WADIANA^0501^3|
L|1|N
```

8. Error Control

The following is a list of errors that may arise during communication between the *DianaServer* and the *Host*. These errors will be displayed in the program that has made the request, be it the *WADiana C Software* or the *Diana O Software*.

Errors when following the ASTM-1394 standard

***Host* format error #1**	**Heading error: Wrong separators**
***Host* format error #2**	**Heading error: The first line of the message does not begin with 'H'**
***Host* format error #3**	**Error Reading Patient No patient ID**
***Host* format error #4**	**Test: Not enough fields**
***Host* format error #5**	**Test: No specimen field**
***Host* format error #6**	**Test: No test name fields**
***Host* format error #7**	**Error, an O field before a P field**
***Host* format error #8**	**Error, an R field before an O field**
***Host* format error #9**	**Results: Not enough fields**
***Host* format error #10**	**File received has no lines, it is empty.**

File communication errors

To ensure that files are sent and received correctly, the existence of DAT files is checked before and after sending, in the following way:

- **The *Host* is expected to eliminate the OUT.DAT file. Thus, when the Diana System finishes the transmission it has to confirm that this file no longer exists. If it still exists, this is considered to be a transmission error. The following text appears on the screen "*Host* file error #4".**
- **When the *Host* wishes to send information, it firstly creates the file IN.DAT. If the Diana System collects the information from this file, it is deleted when the information has been completely received. If the IN.DAT file does not exist when the Diana System requires information from the *Host*, an error message with the following text appears on the screen: "*Host* file error #2".**

<u>List of possible errors in sending to the *Host*</u>:
1) The OUT.DAT file still exists when the transmission has ended.

<u>List of possible errors in the reception from the *Host*</u>:
1) IN.DAT file not found.

Host **file error #1**	**Writing error in the exchange file**
Host **file error #2**	**Writing error in the exchange file**
Host **file error #3**	**Exchange file cannot be deleted**
Host **file error #4**	**The exchange file still exists after concluding the transmission**

Serial communication errors, ASTM- 1394 standard

Host **serial error #1**	**Time-out when receiving frame.**
Host **serial error #2**	**Incorrect frame received.**
Host **serial error #3**	**Incorrect frame received, STX fault**
Host **serial error #4**	**Neither ETB or ETX being received in the frame**
Host **serial error #5**	**Frame received without checksum**
Host **serial error #6**	**Frame received with wrong ck**
Host **serial error #7**	**Frame received with wrong ID**
Host **serial error #8**	**Communication error in establishing the connection while awaiting reception.**
Host **serial error #9**	**Undetermined error**
Host **serial error #10**	**Frame sent 6 times and returned by *Host* as faulty. (NAK).**
Host **serial error #11**	**ENQ received while establishing communication.**
Host **serial error #12**	**Strange character received while establishing communication.**
Host **serial error #13**	**EOT missing**

9. Comments on the ASTM E 134 91 standard

A list of all the *ASTM* format registers that the D+G appliances use is shown below (see the *ASTM* E- 1349 standard). If a register is not used, it will either not be included on the list, or it will be included with an explanation for why it is not used. If a register is used, its name will be included on the list, and descriptions will sometimes be provided.
The numeration used, refers to the *ASTM E 1394 91* standard.

7. Message Header Record.
7.1.1. General
7.1.2. Record Type ID
7.1.3. Delimiter Definition
7.1.4. Message Control ID
Not used.
7.1.5. Sender Name or ID
An identifier of the apparatus must go here.
7.1.12. Processing ID
A 'P' is sent here
7.1.13. Version No..
Here we enter 1, which is the version of the ASTM standard we are currently using.
7.1.14. Date and Time of Message
Here, the date of this message is sent.
8. Patient Information Record
8.1.1. Record Type
8.1.2. Sequence Number
8.1.3. Practice Assigned Patient ID
In *Diana System* it always works at sample level, never at patient level, which is why this field is ignored, except in a unidirectional dispatch.
When a work sheet is sent to *Diana System*, the programme remembers patient identification in each sample. Thus, if the test results are sent back, this ID can also be sent.
8.1.6 Patient Name
Field used in the list* Result per patient *in Diana O Software, if option* See *Demographic Data is activated.
8.1.8 Birth date
***Field used in the list* Result per patient *in Diana O Software, if option* See *Demographic Data* is activated Format in accordance with *ASTM E 1394, point* 6.6.2. YYYYMMDD.**
8.1.9 Patient sex
***Field used in the list Result per patient in Diana O Software, if option* See *Demographic Data* is activated Format in accordance with *ASTM E 1394, point 8.1.9.* O.**

9. Test Order Record
9.4.1. Record Type ID
9.4.2. Sequence Number
9.4.3. Specimen ID
In this field, the sample ID is specified.
9.4.4. Instrument Specimen ID
In this field, the Diana System returns the position of the sample on the carousel, with the following format:
TTTT-PP
TTTT: Batch number.
PP: Position of sample on the carousel
9.4.5. Universal test ID
Name of the test. This field is defined in section 6.6.1 of the ASTM standard. It is divided into 4 sub-fields, separated by the sign ^. (The ^ sign is the 'delimiter component' defined in 6.4.5.)
The first three fields are left empty, and only the fourth field is used. Here, the name of the test and template are inserted, separated by a delimiter, which must coincide with the test and template filenames defined in the *Diana System.*
Value identical to that of the field 10.1.3.
9.4.6. Priority
The *Diana System* will ignore this flag for the time being. But in the future, if the priority is high, the sample can be regarded as urgent. It is then up to the user to perform that sample or not.
***When results are sent from the* Diana System *to the* Host, this value is always sent with an 'R,' indicating normal priority.**
9.4.7. Request/Ordered Date and Time
The time the batch was created is saved here.
9.4.8. Specimen Collection Date and Time
Not used. This is the time the sample was obtained
9.4.9. Collection end Time
not used. This tells us the time left before the sample expires. Not returned to the *Host.*
9.4.12. Action Code
In this field, some information about the type of specimen seems to be indicated. However, it is a field that we send empty.
9.4.14. Relevant Clinical Information
In this field the *Diana System* sends the barcodes of reagents and cards used in the test and the associated number of batch, The number of batch is sent in the first place, followed of barcode the reagents and cards, using as separator the symbol ^.
9.4.25. Instrument Section ID
An instrument identifier must go here, as described in A2.
9.4.26. Report types
Here, the same is sent as for field 10.1.9. The following characters may be sent:
F Final Result, validated.
X Result not available due to the test being cancelled.

I No result available, however the instrument is carrying out the test, and the result will be available shortly.
C Modification of a result sent previously.
10. Result Record
10.1.1. Record Type ID
10.1.2. Sequence Number
10.1.3. Universal test ID
Value identical to that of the field 9.4.5.
10.1.4. Data or Measurement Value:
The results corresponding to the template's fields go here, separated by ^.
10.1.5. Units
The units to which the results of the previous field refer
10.1.7. 'Result of Abnormal Flags'.
In this field, the *Host* is sent the interpretation incidents for a sample:
There are some NI,H,E<>,#=H 'above high normal' Others=N 'normal'
10.1.9. Result status.
Idem for field 9.4.26. The following characters may be sent:
F Final Result, validated.
X Result not available due to the test being cancelled.
I No result available, however the instrument is carrying out the test, and the result will be available shortly.
C Modification of a result sent previously.
10.1.11. Operator ID
Name of the user who has carried out the validation.
10.1.12. Date/Time Test Started
10.1.13. Date/Time Test Completed
10.1.14. Instrument Identification
An instrument identifier must go here, as described in A2.
12. Request Information Record
This message is sent to the *Host* from the *Diana System* when it is going to request samples for a new worksheet.
12.1.1. Record Type ID.
12.1.2. Sequence Number
12.1.3. Starting Range ID Number
Desired patient IDs can be specified here. The *Diana System* will always request all the samples. Therefore, the text 'ALL' is sent here.
12.1.4. Ending Range ID Number
12.1.5. Universal test ID
Desired test IDs can be specified here. The *Diana System* will always request all the tests. Therefore, the text 'ALL' is sent here.
12.1.13 Request Information Status Code
Here the *Diana System* indicates to the *Host* that it wants it to send the results that are still not being processed. Therefore, an 'I' is sent.
13. Message Terminator Record
13.1.1. Record Type ID
13.1.2. Sequence Number
13.1.3. Termination Code
Here, the *Diana System* sends the *Host* an ' N.'

10. Considerations for connection to the *Host*

1. The results field is a multiple field, which presents as many sub-fields (separated by the multiple field separator character) as there are fields (wells and/or interpretation segments) in the template selected. Template fields for which there are no sample results are sent empty.

2. When the ***WADiana C Software*** accepts requests to perform crossmatch tests on a sample with one or various donors, in each request (Order) the specimen in question will be the receiver-donor pair (both IDs separated by the multiple field separator character).

3. Sending results of a crossmatch test.

For each receiver, as many result lines are sent as there are donors crossmatched with him. In these lines, the specimen in question is the receiver-donor pair (both IDs separated by the multiple field separator) and the associated result, corresponding to the crossmatched wells or segments derived from the wells present in the template selected. Together with the previously described lines, a line of results is sent in which the specimen in question is only the receiver and in which the results obtained by the receiver are sent, in non -crossmatched wells or segments derived from the wells present in the selected template.
Example: The results of a crossmatch test involving 2 receivers, each with 2 donors, are sent, in which the second receiver also has group ABO and Rh determined.

The list looks like this:

Results by sample							
27-1-2000 16.49							
Batches: 8-9							
Template: Cross&Group.pIn							
Samples		X	PC C	Dir Gr	RevGr	Bloodgroup	
Receiver1							*Line 1*
Patient name: Frank							
Patient sex: H							
Patient birth date: 1/4/73							
	donor1.1	M1+	Incom				*Line 2*
	donor1.2	-	Comp				*Line 3*
Receiver2				B	A	Dis	*Line 4*
Patient name: Jean							
Patient sex: H							
Patient birth date: 1/12/56							
	donor2.1	-	Comp				*Line 5*
	donor2.2	-	Comp				*Line 6*

In ASTM format:

H|\^&|||REPORT^000^2.03b|||||||P|1|20000127165250
P|1| |Hospital ID: Receiver1|||||||
O|1|Receiver1^donor1.1||^^^^Cross&Group.pln|R|20000127165250
|||||||#8^031551510085^0130090500700236|||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|M1+^Incom^ ^ ^|X^PC C^Dir Gr^Rev Gr **Line 2**
^Bloodgroup||N||F||Servicio T
|20000127165250|20000127165250|REPORT^000^2.03b|
P|2| Hospital ID: Receiver1|||||||
O|1|Receiver1^donor1.2||^^^^Cross&Group.pln|R|20000127165250
|||||||#8^031551510085^0130090500700236|||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|-^Comp^ ^ ^|X^PC C^Dir Gr^Rev Gr **Line 3**
^Bloodgroup||N||F||Servicio T
|2000127165250|20000127165250|REPORT^000^2.03b|
P|3| Hospital ID: Receiver1|||Frank||19730401|H|
O|1|Receiver1||^^^^Cross&Group.pln| R|20000127165250
||||||||||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|^ ^ ^ ^|X^PC C^Dir Gr^Rev Gr **Line 1**
^Bloodgroup||N||F||Servicio T
|20000127165250|20000127165250|REPORT^000^2.03b|
P|4| Hospital ID: Receiver2|||||||
O|1|Receiver2^donor2.1||^^^^Cross&Group.pln|R|20000127165250
|||||||#8^031551510085^0130090500700236|||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|-^Comp^ ^ ^|X^PC C^Dir Gr^Rev Gr **Line 5**
^Bloodgroup||N||F||Servicio T
|20000127165 250|20000127165250|REPORT^000^2.03b|
P|5| Hospital ID: Receiver2|||||||
O|1|Receiver2^donor2.2||^^^^Cross&Group.pln|R|20000127165250|
|||||||#8^031551510085^0130090500700236|||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|-^Comp^ ^ ^|X^PC C^Dir Gr^Rev Gr **Line 6**
^Bloodgroup||N||F||Servicio T
|20000127165 250|20000127165250|REPORT^000^2.03b|
P|6| Hospital ID: Receiver2|||Jean||19561201|H|
O|1|Receiver2||^^^^Cross&Group.pln|R|20000127165250
|||||||#9^031051510026^021063810048^021163810042^0111090500700126
||||||||||REPORT^000^2.03b|F|
R|1|^^^^Cross&Group.pln|^ ^B^A^Dis| X^PC C^Dir Gr^Rev Gr **Line 4**
^Bloodgroup||N||F||Servicio T
|200001271652 50|20000127165250|REPORT^000^2.03b|
L|1|N

4. The results sent are highly dependent upon the template selected to compose the listing. Thus, if a *Result by sample* report is sent, samples that do not show results for the template and batch selected will be sent with the results field empty.

Example:

Batch 27: A determination of the *ABO* and *Rh* group is carried out on the sample *sample1*.
Batch 28: An antibody study is carried out on the sample *sample2*

A list of both batches is made jointly by using three different templates

Groups.pln: **For interpreting the ABO group.**
Ab_screening.pln: **For interpreting the antibody screening.**
Complete.pln: **For the joint interpretation of ABO and Rh group and for the antibody study.**

a -) Report 1: Note that the results field corresponding to the specimen *Sample 2* is sent empty.

```
Results by sample
28-1-2000 15.32
Batches:  27-28
Template:  Groups.pln
Samples              Dir Gr    Rev Gr    Bloodgroup
sample1               AB         AB          AB
Patient name:  Frank
Patient sex:  H
Patient birth date: 1/4/73
```

In ASTM:

```
H|\^&|||REPORT^000^2.03b|||||||P|1|20000128160517
P|1|Hospital ID: sample1|||Frank||19730401|H|
O|1|sample1||^^^^Groups&Rh.pln|R|20000128160517
        ||||||#27^031051510026^021063816320^021163816328^0111090500451268
                                                    ||||||||||REPORT^000^2.03b| F|
R|1|^^^^Groups&Rh.pln|AB^AB^AB|Dir Gr^Rev Gr^Bloodgroup||N||F||Servicio T
                            |20000128160517|20000128160517|REPORT^000^2.03b|
P|2|Hospital ID: sample2|||Jean||19561201|H|
O|1|sample2||^^^^Groups&Rh.pln|R|20000128160517
                                                  ||||||||||||||||REPORT^000^2. 03b|F|
R|1|^^^^Groups&Rh.pln||Dir Gr^Rev Gr^Bloodgroup||N||F||Servicio T
                            |20000128160517|20000128160517|REPORT^000^2.03b|
L|1|N
```

b.-) Report 2: In this case, it is the results field corresponding to *Sample 1* which is sent empty*.

```
Results by sample
28-1-2000 15.32
Batches:  27-28
Template:  Ab_screening.pln
Samples              I          II         IA C
sample2              -          -          Neg
Patient name:  Jean
Patient sex:  H
Patient birth date: 1/12/56
```

In ASTM:

```
H|\^&|||REPORT^000^2.03b|||||||P|1|20000128153029
P|1|Hospital ID: sample1|||Frank||19730401|H|
O|1|sample1||^^^^Ab_screening.pln|R|20000128152944
                                                  ||||||||||||||||REPORT^000^2.03b|F|
```

R|1|^^^^Ab_screening.pln|| I^II^IA C ||N||F||ServicioT
|20000128152944|20000128152944| REPORT^000^2.03b|
P|2|Hospital ID: sample2|||Jean||19561201|H|
O|1|sample2||^^^^Ab_screening.pln|R|20000128152944
|||||||#28^022063819632^022163819637^0130090500562314
||||||||||REPORT^000^2. 03b|F|
R|1|^^^^Ab_screening.pln|-^-^Neg| I^II^IA C||N||F||Servicio T
|20000128152944|20000128152944|REPORT^000^2.03b|
L|1|N

c.-) **Report 3: The template has the necessary fields to interpret both samples thus results are sent for both *.**

Results by sample
28-1-2000 15.32
Batches: 27-28
Template: Complete.pln

Samples	Dir Gr	Rev Gr	Bloodgroup	Rh	I	II	IA C
sample1	AB	AB	AB	Pos			
Patient name: Frank							
Patient sex: H							
Patient birth date: 1/4/73							
sample2					-	-	Neg
Patient name: Jean							
Patient sex: H							
Patient birth date: 1/12/56							

In ASTM:
H|\^&|||REPORT^000^2.03b|||||||P|1|20000128160827
P|1|Hospital ID: sample1|||Frank||19730401|H|
O|1|sample1||^^^^Completa.pln|R|20000128160827
|||||||#27^031051510026^021063816320^021163816328^0111090500451268
||||||||||REPORT^000^2.03b|F|
R|1|^^^^Completa.pln|AB^AB^AB^Pos^^^|Dir Gr^Rev Gr^Bloodgroup^Rh^I
^II^IA C||N||F||Servicio* T |20000128160827|20000128160827|REPORT^000^2.03b|
P|2|Hospital ID: sample2|||Jean||19561201|H|
O|1|sample2||^^^^Completa.pln|R|20000128160827
|||||||#28^022063819632^022163819637^0130090500562314
||||||||||REPORT^000^2.03b|F|
R|1|^^^^Completa.pln| ^ ^ ^ ^-^-^Neg|Dir Gr^Rev Gr^Bloodgroup^Rh^I^II
^IA C ||N||F||Servicio T |20000128160827|20000128160827|REPORT^000^2.03b|
L|1|N

5. There are some limitations the lengths of certain fields:

Sample	**30 Characters**
Donor	**30 Characters**
Test	**30 Characters**
Template	**30 Characters**
Results	**200 Characters**
Patient information	**100 Characters**
User name	**10 Characters**