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**The Analyst  
RS422/RS232 Tester**

**With**

**VTR, Monitor, and  
Data Logging Option  
(LOG2)**

**User Manual**

Manual Revision 1.03







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## A. Revision History

1.00	092806	Original VTR Option Manual
1.01	100206	Added reference section.
1.02	100206	Updated block diagrams.
1.03	102506	Corrected Reference Monitor diagrams.

## **B. Introduction**

Congratulations on purchasing The Analyst RS422/RS232 Tester.

### **Because Troubleshooting RS422 & RS232 Interfaces can be so Time Consuming and Frustrating**

Identifying and correcting RS422 and RS232 interface problems just got easier with the data logging option for The Analyst RS422/RS232 Tester. Capture serial communication into a non-volatile log file for review and analysis. Data can be captured in both directions with a timestamp. With the Data Logging Option, Analyst users can upload log files from the tester to a PC for later review and analysis.

The Data Logging Option makes it even easier to isolate and identify communication problems by recording test results so that users can complete an entire round of tests, then study the data whenever it is most convenient, as well as share it with others. The SEARCH function makes it easy to search through a log file for a user entered data pattern. Search both forwards and reverse through the log file.

Anyone working with RS232 and RS422 cabling and equipment understands how difficult and time consuming it can be to track down the problem that is keeping a system from working. The Analyst is an easy-to-use, intuitive troubleshooting tool that enables experts and non-experts alike to rule out potential problems quickly and fix the real problem rather than expending resources on time-consuming trial-and-error methods.

Quickly and easily isolate and identify RS422 and RS232 interface problems — whether testing cable runs between floors or between buildings, verifying RS422/RS232 signal paths, chasing down an RS422 to RS232 adapter problem, or troubleshooting communication problems between equipment.

When to Consult the Analyst:

- Remote production setup: mobile production units, special events
- New studio builds, facility upgrades: new equipment, new cabling
- Maintaining existing facilities and systems

We would like to hear from you. Please let us know how you are using The Analyst and how we can improve it. Our email address is [The-Analyst@dnfcontrols.com](mailto:The-Analyst@dnfcontrols.com).

## C. Getting Started . . .

### C1. Turn On The Analyst

- 1) Plug one end of the power supply into the “Power Input” connect on the right side of the Analyst, next to the power switch.
- 2) Plug the other end of the power supply into a wall outlet.
- 3) Turn the power switch ON.
- 4) The MAIN screen will be displayed.

#### MAIN Screen

```
The Analyst RS422/RS232 Tester
Data Logging Option
Press key to select test mode

MON. VTR Menu
```

Sw #1 Sw #2 Sw #3 Sw #4 Sw #5 Sw #6 Sw #7 Sw #8

Prior to using the Analyst, enter a unique 5-character ID using the “ID Set” function from the Menu Mode. The Analyst’s ID is helpful when testing cables and signal paths to confirm that both ends of the cable or signal path you are testing are indeed connected together.

### C2. Enter Analyst ID

- a) From the MAIN screen, press the [Menu] key. The MENU screen will be displayed.

#### MENU Screen

```
Software Rrev: V2.0 A050405 S050405
Press key to select mode:

In ID Lcd OUT
RS422 Set Firmw Exit Adj 422
```

Sw #1 Sw #2 Sw #3 Sw #4 Sw #5 Sw #6 Sw #7 Sw #8

- b) Press the [ID Set] key. The ID entry screen will be displayed.

#### ID ENTRY Screen

```
Enter 5-character Analyst ID
Analyst ID: 12345

<<< >>> Next Exit
```

Sw #1 Sw #2 Sw #3 Sw #4 Sw #5 Sw #6 Sw #7 Sw #8

- c) The current Analyst ID will be displayed on the 2<sup>nd</sup> line. Select a character position using the [<<<] and [>>>] keys.



Use the knob to change the character at the selected position.

- d) Press the [Next] key to save the new ID and exit to the MENU screen  
OR,

Press the [Exit] key to exit without saving the new ID.

The Analyst is ready for use.

## D. Analyst Test Modes

### MAIN Screen

The Analyst RS422/RS232 Tester							
Data Logging Option							
Press key to select test mode							
MON.			VTR		Menu		

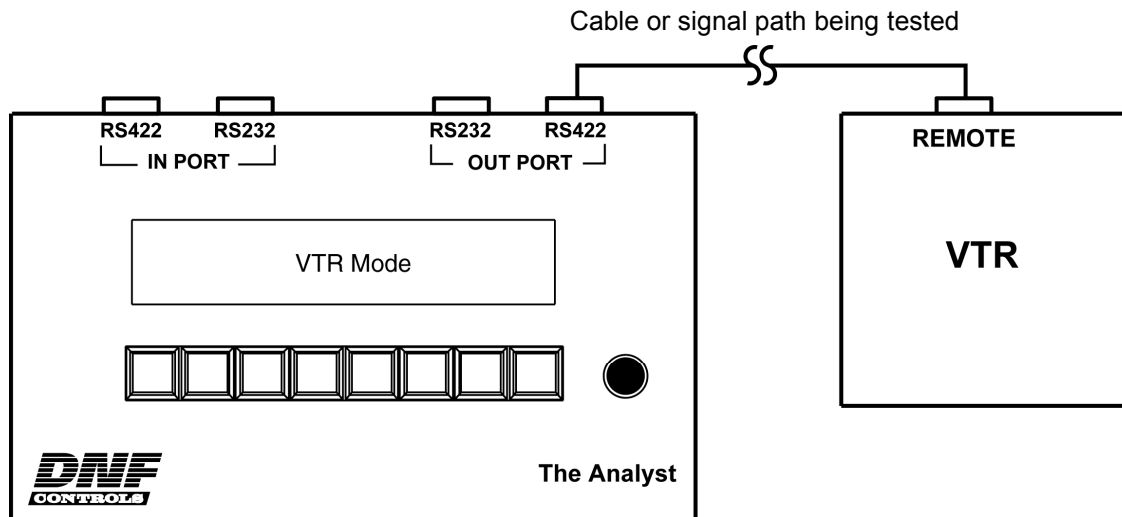
Sw #1 Sw #2 Sw #3 Sw #4 Sw #5 Sw #6 Sw #7 Sw #8

MAIN Screen TEST MODES	Description
MON	Monitor Mode is used for testing serial communication problems between two pieces of equipment. Data Logging is accessed through Monitor Mode.
VTR	VTR Mode is used for testing cables and signal paths with a VTR.
MENU	Menu Mode is used for setting up and configuring the Analyst.

## E. Cable & Signal Path Testing- VTR Mode

Use VTR Mode to test cable and signal paths using a VTR.

- 1) From the MAIN Screen, press the [Menu] key.
- 2) Press the [Out] key to toggle between RS422 and RS232. Select either RS422 or RS232 to match the cable or signal path being tested.
- 3) Press the [Exit] key to exit the MENU Screen.
- 4) Press the [VTR] key to select VTR mode.
- 5) Connect The Analyst RS422/RS232 Tester as follows.



- 6) Connect the cable from the VTR to the OUT PORT on the Analyst
- 7) Press the [Play], [Stop], & [Rew] keys to control the VTR using SONY BVW commands.

The display shows current tape time and current transport status.

## VTR Screen

Use OUT	TIME: No VTR Response						
RS422	STATUS:						
Play	Stop	Rew	Exit VTR	Tx+ Norm	RxTx Norm	Rx+ Norm	
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

- [Play] Send Play command to VTR.
- [Stop] Send Stop command to VTR.
- [Rew] Send Rewind command to VTR.
- [Exit] Exit Monitor Mode
- [Tx+] Swap polarity of transmit lines (RS422 only)
- [RxTx] Swap transmit and receive lines
- [Rx+] Swap polarity of receive lines (RS422 only)

**Refer to Sender/Receiver Mode for IN and OUT port block diagrams**

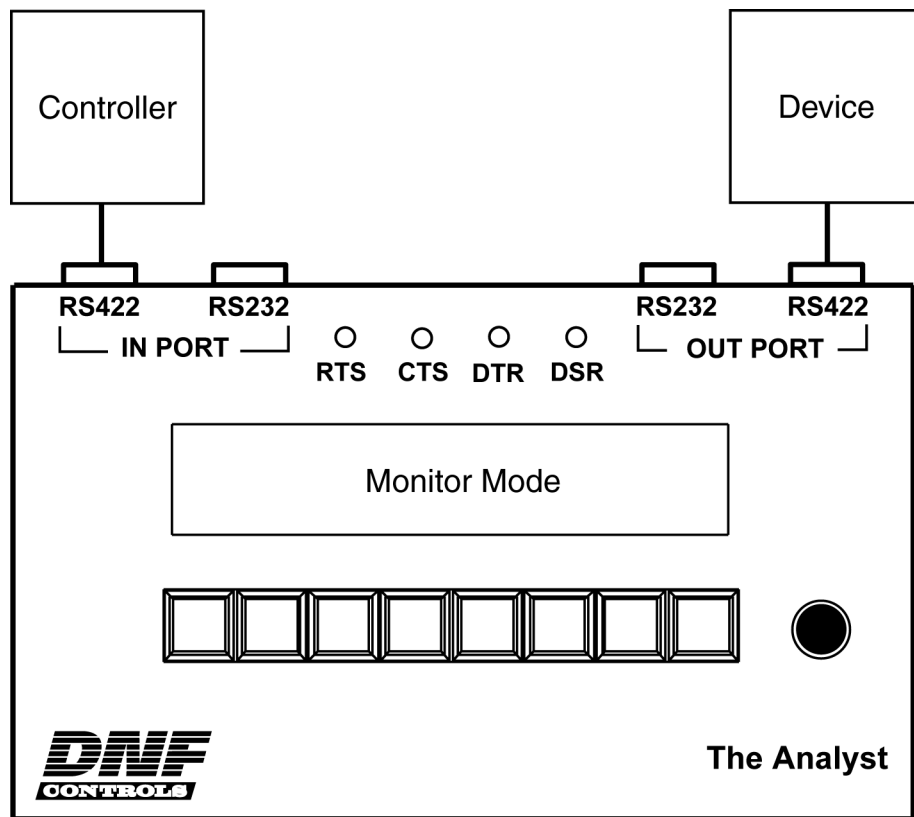
### VTR Mode Troubleshooting Tips

Problem	What it means
Not able to control VTR. The display shows "No VTR Response."	The Transmit circuit is not working. Press the [RxTx] key to swap the transmit and receive lines. If display shows time and status, or you have control of the VTR, the receive and transmit lines are swapped. Press the [Tx+] key to swap the transmit lines (RS422). If you have control of the VTR, the transmit lines are reversed.
Able to control VTR, but the display shows "No VTR Response."	The transmit circuit is working. The receive circuit may be reversed. Press the [Rx+] key to reverse the receive lines (RS422). If the display shows time and status, the receive lines are reversed.

## F. Monitor Serial Communication Between Equipment

Use MONITOR Mode to monitor serial communication between two pieces of equipment.

- 1) From the MAIN Screen, press the [MENU] key.
- 2) Press the [IN] and [OUT] keys to toggle between RS422 and RS232. Select either RS422 or RS232 to match the equipment being monitored.
- 3) Press the [Exit] key to exit the MENU Screen.
- 4) Press the [MON] key to select MONITOR Mode.
- 5) Connect The Analyst RS422/RS232 Tester between the two pieces of equipment.  
(Shown- IN RS422, OUT RS422)



## MONITOR Screen- RS422

**DIR →→** Affect data communication path from IN port to OUT port

IN →	→→	communication from Controller to Device					
RS422	←←	communication from Device to Controller					
Rx+ Norm	RxTx Norm	Dir →→	More	Exit MON.	Disp Run		Tx+ Norm
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

**DIR ←←** Affect data communication path from OUT port to IN port

← OUT	→→	communication from Controller to Device					
RS422	←←	communication from Device to Controller					
Tx+ Norm		Dir ←←	More	Exit MON.	Disp Run	RxTx Norm	Rx+ Norm
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

[RX+] Swap polarity of receive lines (RS422 only)

[RxTx] Swap transmit and receive lines

[Dir] Affect data communication path from IN port to OUT port (→→)

Or, affect data communication path from OUT port to IN port (←←)

[More] Select More screen

[Exit] Exit Monitor Mode. Return to MAIN screen.

[Disp] Display mode-

Run: Update display with received data.

Pause: Do not update display with received data.

[Top] Jump to beginning of received data.

[End] Jump to end of received data.

Current byte number is displayed on the right side of the screen on the third line.

[Tx+] Swap polarity of transmit lines (RS422 only)

## MONITOR Screen- RS232

**DIR →→** Affect data communication path from IN port to OUT port

IN →	→→	communication from Controller to Device					
RS232	←←	communication from Device to Controller					
RTS Open	RxTx Norm	Dir →→	More	Exit MON.	Disp Run		
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

**DIR ←←** Affect data communication path from OUT port to IN port

← OUT	→→	communication from Controller to Device					
RS232	←←	communication from Device to Controller					
RTS Open		Dir ←←	More	Exit MON.	Disp Run	RxTx Norm	
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

[RTS] Connect IN port RTS to IN port CTS. Disconnect OUT CTS from IN CTS.  
Connect IN port DTR to IN port DSR. Disconnect OUT DSR from IN DSR.

[RxTx] Swap transmit and receive lines

[Dir] Affect data communication path from IN port to OUT port (→→)

Or, affect data communication path from OUT port to IN port (←←)

[More] Select More screen

[Exit] Exit Monitor Mode

[Disp] Display mode-

Run: Update display with received data.

Pause: Do not update display with received data.

[Top] Jump to beginning of received data.

[End] Jump to end of received data.

Current byte number is displayed on the right side of the screen on the third line.

## MONITOR More Screen

IN →	→→ communication from Controller to Device						
RS422	←← communication from Device to Controller						
Baud 38.4K	Bits 8	Par. Odd	Back	Disp Hex	Disp Run	LOG	Disp Clr
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

[Baud] Select baud rate- 1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115k

[Bits] Select word length- 5, 6, 7, 8

[Par] Select parity- None, Odd, Even

[Back] Return to Monitor screen

[Disp] Display mode-

Run: Update display with received data.

Pause: Do not update display with received data.

[Top] Jump to beginning of received data.

[End] Jump to end of received data.

Current byte number is displayed on the right side of the screen on the third line.

[LOG] Data Logging Menu

[Disp Clr] Clear displayed data communication

- 6) Press the [More] key. The MORE Screen will be displayed.
- 7) To change Baud rate, Word Length, and Parity, press the [Baud], [Bits], or [Par] keys, respectively. Press the [Baud] key to step through available baud rates. Press the Bits key to change the word length. Press the [Par] key to step through available parities. These settings simultaneously affect the IN and OUT ports.  
Default Data Format-  
Baud rate- 38,400  
Parity- Odd  
Data bits- 8 bit  
Stop bits- always set to 1 bit
- 8) Press the [Disp Hex] key. To toggle the data display between Hexadecimal and ASCII characters.
- 9) Press the [Back] key to return the MONITOR screen.
- 10) Press the [DIR] key to affect the data communication path from the IN port to the OUT port. The display will show "DIR →→".
- 11) Press the [DIR] key again to affect the data communication path from the OUT port to the IN port. The display will show "DIR ←←".
- 12) Communication from the Controller (IN port) to the Device (OUT port) will be displayed on the top line of the display.

Responses from the Device (OUT port) to the Controller (IN port) will be displayed on the 2<sup>nd</sup> line of the display.

- 13) Press the [Disp Run] key to stop updating the display. Use the knob to scroll backwards and forwards through the displayed data.

Press the [Top] key to jump to beginning of received data.

Press the [End] key to jump to end of received data.

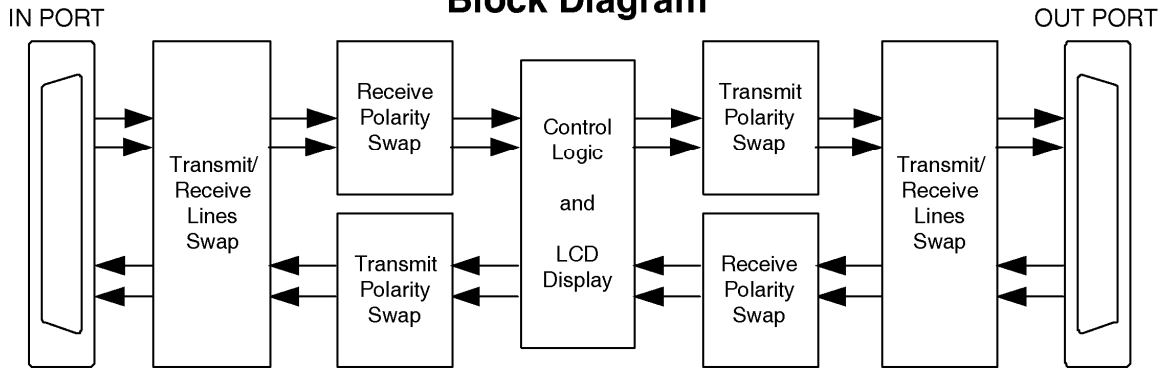
Current byte number is displayed on the right side of the screen on the third line.

Press the [Disp Paus] key to resume updating the display. The knob will have no effect on the display.



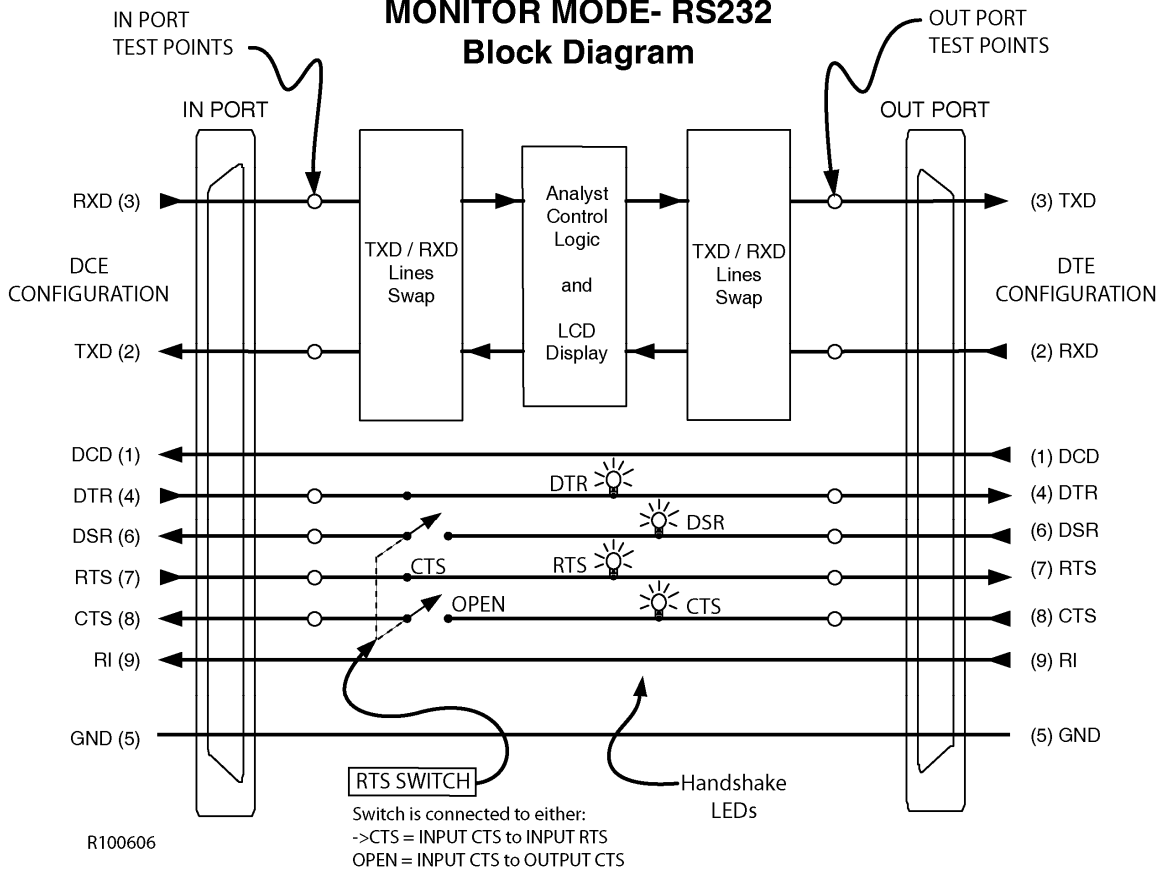
## MONITOR MODE- RS422

### Block Diagram



## MONITOR MODE- RS232

### Block Diagram



## MONITOR Mode Troubleshooting Tips

Step#	On Analyst Display	What it means
1	The top line of the display, after →→, is blank.	<p>There is no communication from the Controller.</p> <p>Press the [DIR] key to select the DIR→→ screen.</p> <p>Press the [RxTx] key to swap the transmit and receive lines from the Controller. If characters are now displayed on the top line of the display, the transmit and receive lines are swapped.</p> <p><b>IN Port RS232 Only-</b></p> <p>The DTR indicator and RTS indicator on the front of the Analyst will turn on when the DTR and RTS signal lines are "ON".</p> <p>Press the [RTS] key to connect IN port RTS to CTS, and IN port DTR to DSR. Some controllers require a CTS and/or DSR handshake line to enable their transmitter.</p>
2	The top line of the display, after →→, shows unreadable characters.	<p>The Controller is transmitting data to the Analyst, but the transmit circuit may be reversed.</p> <p>Press the [DIR] key to select the DIR→→ screen.</p> <p>Press the [Rx+] key to reverse the receive lines (RS422 only) at the Analyst. If readable data is now displayed on the top line of the display, the Controller transmit lines are reversed.</p>

Step#	On Analyst Display	What it means
3	<p>The top line of the display, after →→, shows readable characters.</p> <p>The 2<sup>nd</sup> line of the display, after ←←, is blank.</p>	<p>The transmit circuit from the Controller to the Analyst is working.</p> <p>The transmit circuit from the Analyst to the Device may not be working.</p> <p>Press the [DIR] key to select the DIR←← screen.</p> <p>Press the [RxTx] key to swap the transmit and receive lines to the Device. If characters are now displayed on the 2nd line of the display, the transmit and receive lines are swapped.</p> <p>Press the [Tx+] key to reverse the transmit lines (RS422 only) to the Device. If readable data is now displayed on the 2<sup>nd</sup> line of the display, the transmit lines from the Analyst to the Device are reversed.</p> <p><b>RS232 ONLY-</b></p> <p>Some devices require a DTR or RTS signal from the controller to work. The DTR and RTS indicators on the front of the Analyst will turn on when the DTR and RTS signal lines from the Controller are “ON”.</p> <p>When the DTR line is ON, some devices respond by turning on the DSR line. When the RTS line is ON, some devices respond by turning on the CTS line.</p> <p>The DSR and CTS indicators on the front of the Analyst will turn on when the DSR and CTS signal lines from the Device are “ON”.</p>
4	<p>The top line of the display, after →→, shows readable characters.</p> <p>The 2<sup>nd</sup> line of the display, after ←←, shows unreadable characters.</p>	<p>The transmit circuit from the Controller to the Analyst is working.</p> <p>The transmit circuit to the Device, from the Analyst, is working, but the transmit circuit may be reversed.</p> <p>Press the [DIR] key to select the DIR→→ screen.</p> <p>Press the [Tx+] key to reverse the transmit lines (RS422 only) to the Device (Device receive lines). If readable data is now displayed on the 2<sup>nd</sup> line of the display, the Device receive lines are reversed.</p>
5	<p>The top line of the display, after →→, shows readable characters.</p> <p>The 2<sup>nd</sup> line of the display, after ←←, shows readable characters.</p> <p>The Controller can control the Device.</p> <p>The Controller is not receiving a response from the Device.</p>	<p>The transmit circuit from the Controller to the Analyst is working.</p> <p>The Device transmit and receive circuits are working.</p> <p>The receive circuit from the controller to the Analyst is not working.</p> <p>Press the [DIR] key to select the DIR←← screen.</p> <p>Press the [Tx+] key to reverse the transmit lines (RS422 only) to the Controller (Controller receive lines). If the Controller is now receiving responses from the Device, the Controller receive lines are reversed.</p>

## G. Data Logging

Use DATA LOGGING Mode to capture serial communication between two pieces of equipment into a log file for review and analysis.

DATA LOGGING supports a total of 10 logs files, each of which maybe written to and erased. The default names of these files are FILE0001 through FILE0010. The file names may be renamed as required.

Access DATA LOGGING functions from MONITOR Mode. Prior to using DATA LOGGING functions, use MONITOR mode to confirm that communication data is present and the baud rate and parity are set properly.

- 1) From the MAIN Screen, press the [MON] key to select MONITOR Mode. The MONITOR screen will be displayed.
- 2) Press the [MORE] key. The MORE screen will be displayed.
- 3) Press the [LOG] key. The LOG MENU screen will be displayed.

### LOG MENU Screen

LOG MENU							
Press key to select mode:							
CREATE	VIEW	UPLOAD	ERASE	Exit			
Sw #1	Sw #2	Sw #3	Sw #4	Sw #5	Sw #6	Sw #7	Sw #8

[CREATE] Create new log file. Select a file, then capture communication data into it.

[VIEW] View the contents of a log file. Scroll and search through the log file.

[UPLOAD] Upload log files to a computer through the computer's USB port.

[ERASE] Erase the content of all log files. Initialize log files.

[EXIT] Exit the Log Menu.

### G1. Create Log File

- a. From the LOG MENU, press the [CREATE] key. The list of available log files will be displayed.
- b. Turn the knob to select a log file to use.
- c. Press the [Select] key. If the selected file already contains data, you will be prompted to erase the file.
- d. The current log file name will be displayed on the 2<sup>nd</sup> line.  
Rename the file using the [<<<] and [>>>] keys to select a character position, then turn the knob to select a character.
- e. Press the [Next] key to save the entered file name.  
OR, press the [Exit] key to use the original file name.
- f. Press the [LOG PAUS] key to start writing data to the log file.
- g. Press the [LOG RUN] key to suspend writing to the log file.

- h. Press the [ENDLESS] key to select ENDLESS ON or ENDLESS OFF.  
ENDLESS OFF- Stop logging when the file is full.  
ENDLESS ON- When the file is full, overwrite the oldest data and continue writing data to the file.
- i. Press the [LOG STOP] key to terminate writing to the log file, close the log file, and exit Create Log File.

### **View Log File**

- a. From the LOG MENU, press the [VIEW] key. The list of available log files will be displayed. The EMPTY or NOT EMPTY status of each file will be displayed to the right of the file name. Turn the knob to scroll through the list of files.
- b. Press the [Select] key to select a file.
- c. Turn the knob to scroll forwards and backwards through the file.
- d. Press the [FILE TOP] key to jump to the start of the file.  
OR,  
Press the [FILE END] key to jump to the end of the file.  
OR,  
Press the [SEARCH] key to search to a data pattern in the file.  
The data displayed in the first column of the display is the “current” data. The location in the file of the “current” data is shown on the far right side of the 3<sup>rd</sup> display line. This number will decrease to zero at the beginning of the file. This number will increase to the size of the file at the end of the file.
- e. Press [EXIT] to exit View Log File and return to the MORE screen.

## G2. Search within a File

- a. Follow the instructions in “View Log File” to select a file to view.
- b. Press the [Search] key.
- c. Enter a data pattern to search for. Enter up to 8 characters.  
(The data pattern is composed of hexadecimal characters, 0 through 9, and A through F.)  
Use the [<<<] and [>>>] keys to select a character position.  
Use the knob to change the character at the selected position.  
If the pattern is less than 8 characters, add a space character as the last character. The space character is just before the ‘0’ character.
- d. Press [Next] to continue or [Exit] to abort the search.
- e. Press [IN] to search through data on the IN line.  
OR,  
Press [OUT] to search through data on the OUT line.
- f. Press [Rev] to search backwards from the current location in the file, towards the start of the file.  
OR,  
Press [Fwd] to search forward from the current location in the file, towards the end of the file.  
Search will find the first occurrence of the pattern and park at the first character of the pattern. Use the knob to scroll forwards and backwards from this point.
- g. Press [Search], then [Again] to repeat the search.

## G3. Upload Log File(s) to Computer

- a. From the LOG MENU, press the [UPLOAD] key.  
The display will show:  
“Upload Log to computer”  
“Connect the Analyst to computer USB.”  
“Waiting for computer .....
- b. Use a USB device cable that has a USB “A” plug at one end and a USB “B” plug at the other end.  
Connect one end of the cable to a Microsoft Windows™ computer and the other end to the USB connector on The Analyst.  
The computer will automatically establish a connection to The Analyst.  
The 3<sup>rd</sup> line on The Analyst’s display will show :  
“Waiting for computer .....Connected”

- c. The computer will recognize The Analyst as a removable hard disk drive. Use Windows Explorer to view the files in this removable drive.
- d. Copy files from The Analyst to the computer the same way that you would copy files from one hard drive to another.
- e. Use Windows' "Unplug or Eject Hardware" function to safely disconnect The Analyst from the computer.
- f. Press the [EXIT] key on The Analyst to exit UPLOAD mode.
- g. Run the supplied Analyst File Converter Tool software application on our computer to format the log files as text files that Excel and text programs can read.

#### **G4. Erase Log Files/Initialize Log Files**

- a. From the LOG MENU, press the [ERASE] key.
- b. Press [OKAY] to continue, or press [EXIT] to abort.
- c. When the erase process is completed, the LOG MENU will be displayed.

## G5. Analyst File Converter Tool

- a. Install the supplied “Analyst File Converter Tool” software application on your Windows™ computer.  
The file “filedisplay.gld” must be present in the same folder that the tool is installed in for the software to work correctly.
- b. On the computer, double click on Analyst File Converter Tool.exe to launch the application.
- c. Navigate to the folder containing The Analyst log files by double clicking on directory names in the application’s window.
- d. Highlight the log file to convert, then click “READ”.  
A file of the same name with an extension of ‘txt’ will be created and placed in the same folder.
- e. Close the application when finished.

### Importing Log Files into Excel:

- a. Convert a log file into a text file using the “Analyst File Converter Tool “.
- b. In Excel, choose *File / Open* and in the *Files of type* box choose *All Files*. Navigate to the log text file (.txt extension) and open it.
- c. *Text Import Wizard* will appear. For data type, choose *Delimited* and click next.
- d. For *Delimiters* select only *Comma* and click next.
- e. For the *DataOut* and *DataIn* columns select a data format of *Text*. Click finish.

### File Column Descriptions:

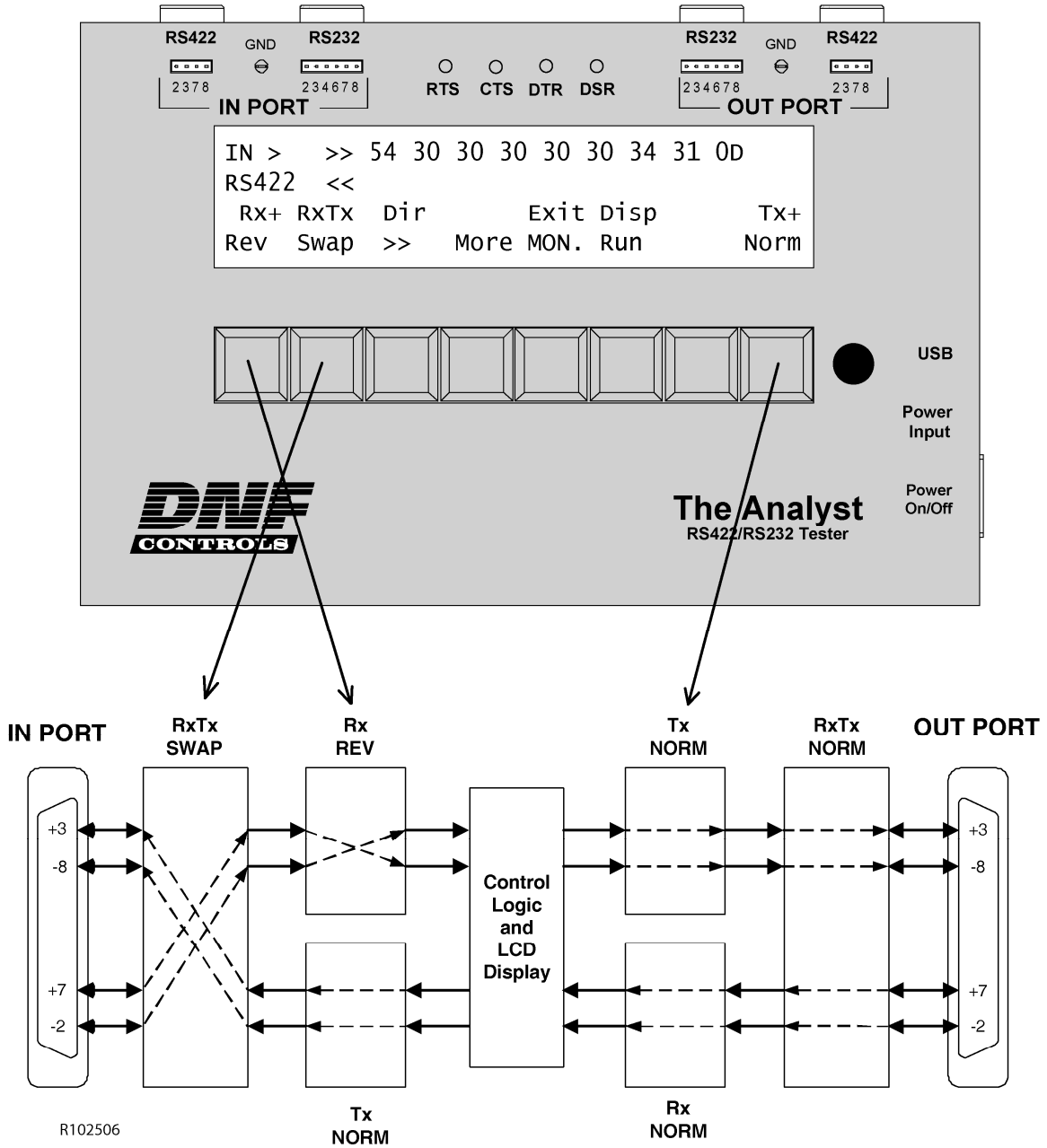
- dt:** The time in milliseconds between receipt of this packet and the previously received packet. The time resolution is 1 millisecond.
- DataOut:** Data communication from OUT port to IN port displayed in Hexadecimal format.
- DataIn:** Data communication from IN port to OUT port displayed in Hexadecimal format.
- ASCII:** ASCII character representation of DataIn or DataOut. Only displayable characters are shown.
- Err:** Error status.
- : No error.
  - B: BREAK error.
  - F: Framing error.
  - P: Parity error.
  - O: Overrun error.



## H. Reference

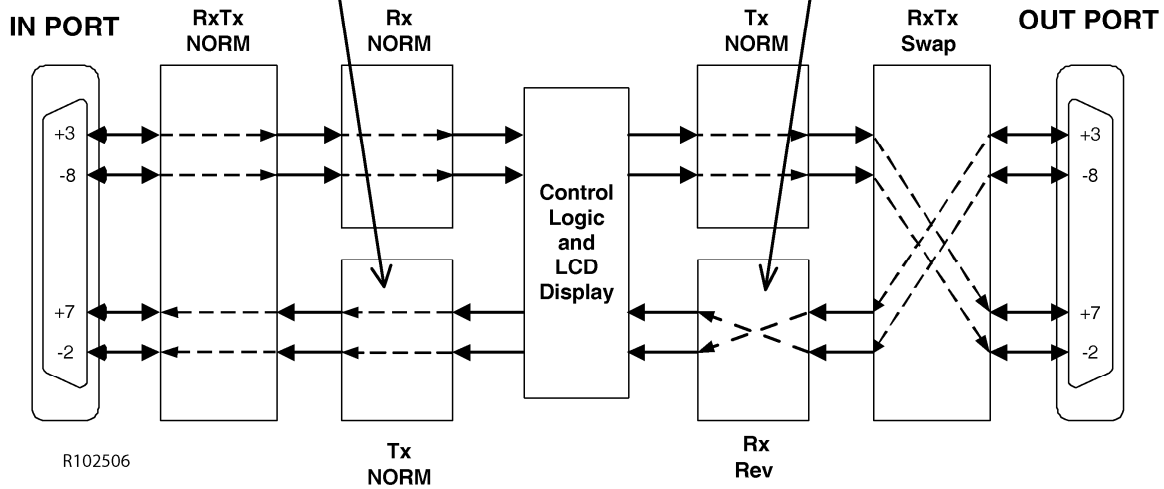
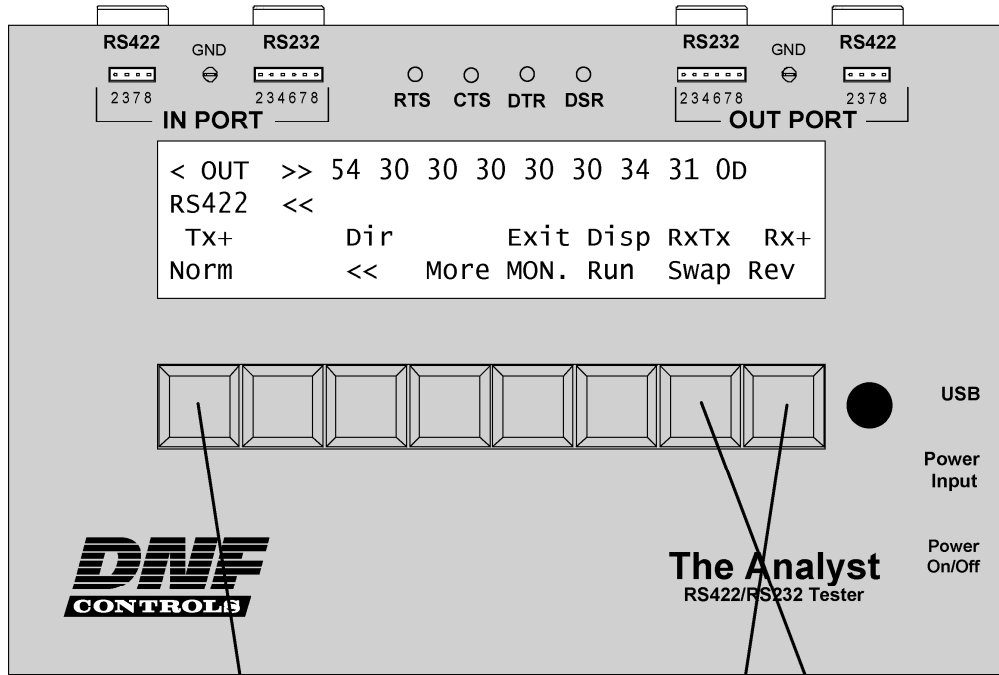
### Button Relationship to Circuit

RS422 Input Port (Direction: Input port to Output port)



## Button Relationship to Circuit

RS422 Output Port (Direction: Output port to Input port)



# I. Specifications

Power: 5v DC @ 1amp

Power Connector: 2.1 mm DC power jack

Size: 9 inches (length) x 5.8 inches (width) x 1.9 inches (height)

Weight: 4 lbs.

Front panel display: Four-line x 40-character liquid crystal display

Front panel indicators: IN Port RS232 RTS

IN Port RS232 DTR

OUT Port RS232 CTS

OUT Port RS232 DSR

Front panel test points: IN Port RS232 pins 2, 3, 4, 6, 7, and 8 Pin 5 connected to GND terminal

OUT Port RS232 pins 2, 3, 4, 6, 7, 8 Pin 5 connected to GND terminal

IN Port RS422 pins 2, 3, 7, 8 Pins 1, 4, 6, 9 connected to GND terminal

OUT Port RS422 pins 2, 3, 7, 8 Pins 1, 4, 6, 9 connected to GND terminal

Keyboard: Eight keys and a rotary knob

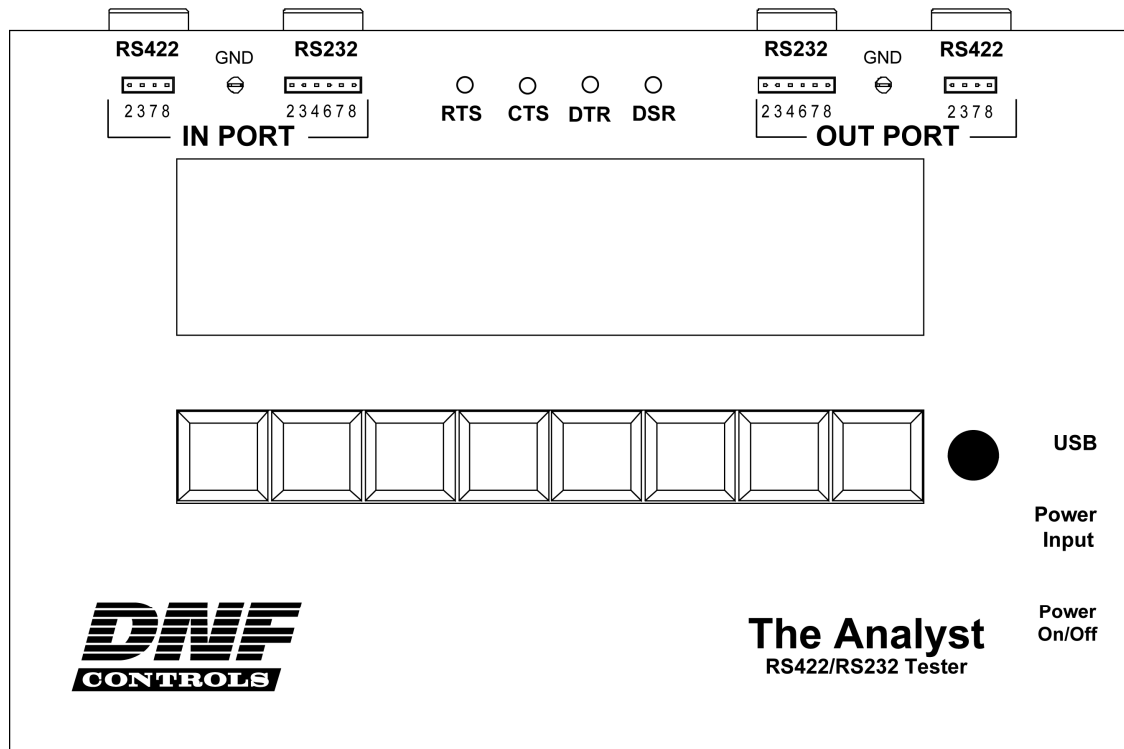
Connectors: IN Port RS422 DB9 female

IN Port RS232 DB9 female

OUT Port RS422 DB9 female

OUT Port RS232 DB9 female

USB Type B male



## J. RS422/RS232 Connector Pin Outs

### IN PORT, RS232 Connector

DCE configuration, 9 pin DB9F female connector

Pin #	Function	Signal Direction	Pin #	Function	Signal Direction
1	DCD	Out	6	DSR	Out
2	Txd	Out	7	RTS	In
3	Rxd	In	8	CTS	Out
4	DTR	In	9	RI	Out
5	Ground				

### OUT PORT, RS232 Connector

DTE configuration, 9 pin DB9F female connector

Pin #	Function	Signal Direction	Pin #	Function	Signal Direction
1	DCD	In	6	DSR	In
2	Rxd	In	7	RTS	Out
3	Txd	Out	8	CTS	In
4	DTR	Out	9	RI	In
5	Ground				

### IN PORT, RS422 Connector

Device configuration, 9 pin DB9 female connector

Pin #	Function	Signal Direction	Pin #	Function	Signal Direction
1	Frame Ground		6	Transmit Common	
2	Transmit A (-)	Out	7	Transmit B (+)	Out
3	Receive B (+)	In	8	Receive A (-)	In
4	Receive Common		9	Frame Ground	
5	Spare				

### OUT PORT, RS422 Connector

Controller configuration, 9 pin DB9 female connector

Pin #	Function	Signal Direction	Pin #	Function	Signal Direction
1	Frame Ground		6	Transmit Common	
2	Receive A (-)	In	7	Receive B (+)	In
3	Transmit B (+)	Out	8	Transmit A (-)	Out
4	Receive Common		9	Frame Ground	
5	Spare				

## **K. DNF CONTROLS LIMITED WARRANTY**

DNF Controls warrants its product to be free from defects in material and workmanship for a period of one (1) year from the date of sale to the original purchaser from DNF Controls.

In order to enforce the rights under this warranty, the customer must first contact DNF's Customer Support Department to afford the opportunity of identifying and fixing the problem without sending the unit in for repair. If DNF's Customer Support Department cannot fix the problem, the customer will be issued a Returned Merchandise Authorization number (RMA). The customer will then ship the defective product prepaid to DNF Controls with the RMA number clearly indicated on the customer's shipping document. The merchandise is to be shipped to:

DNF Controls

12843 Foothill Blvd., Suite C

Sylmar, CA 91342

USA

Failure to obtain a proper RMA number prior to returning the product may result in the return not being accepted, or in a charge for the required repair.

DNF Controls, at its option, will repair or replace the defective unit. DNF Controls will return the unit prepaid to the customer. The method of shipment is at the discretion of DNF Controls, principally UPS Ground for shipments within the United States of America. Shipments to international customers will be sent via air. Should a customer require the product to be returned in a more expeditious manner, the return shipment will be billed to their freight account.

This warranty will be considered null and void if accident, misuse, abuse, improper line voltage, fire, water, lightning or other acts of God damaged the product. All repair parts are to be supplied by DNF Controls, either directly or through its authorized dealer network. Similarly, any repair work not performed by either DNF Controls or its authorized dealer may void the warranty.

After the warranty period has expired, DNF Controls offers repair services at prices listed in the DNF Controls Price List. DNF Controls reserves the right to refuse repair of any unit outside the warranty period that is deemed non-repairable.

DNF Controls shall not be liable for direct, indirect, incidental, consequential or other types of damage resulting from the use of the product.

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