



## **IXARO Paging Systems**

Location of hardware failures

Version 4/2014



# Location of hardware failures in IXARO Paging Systems

20.04.2014

## 1. Description of the IXARO-BUS Paging System

To cover wider areas than possible with a single transmitter the IXARO Paging system was upgraded to operate with several transmitters each covering a certain area. To simplify wiring of extended installations the interfacing between computer and transmitters is accomplished by a RS422 based bus system. This allows cable lengths up to 1500 meters and operation of up to eight transmitters on one cable. This cables provides also power supply.

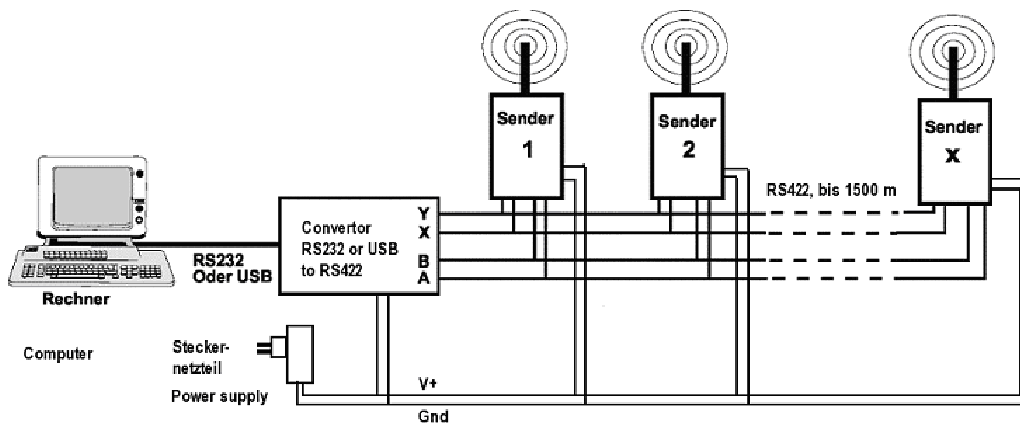


Fig. 1 Typical configuration of an IXARO BUS System. The converter is either an EX9520 or EX9530 from the manufacturer TOPSCCC.

There are two types of convertors in use. The older one, type EX9520, is an RS232 to RS422 convertor. The EX9520 needs to be connected to a 12 Volts power supply. Since serial ports are no longer usual on PC's the EX9520 convertors have been combined with RS232 to USB convertors to use them like USB convertors.

For a more detailed description of the system please study the user manual.

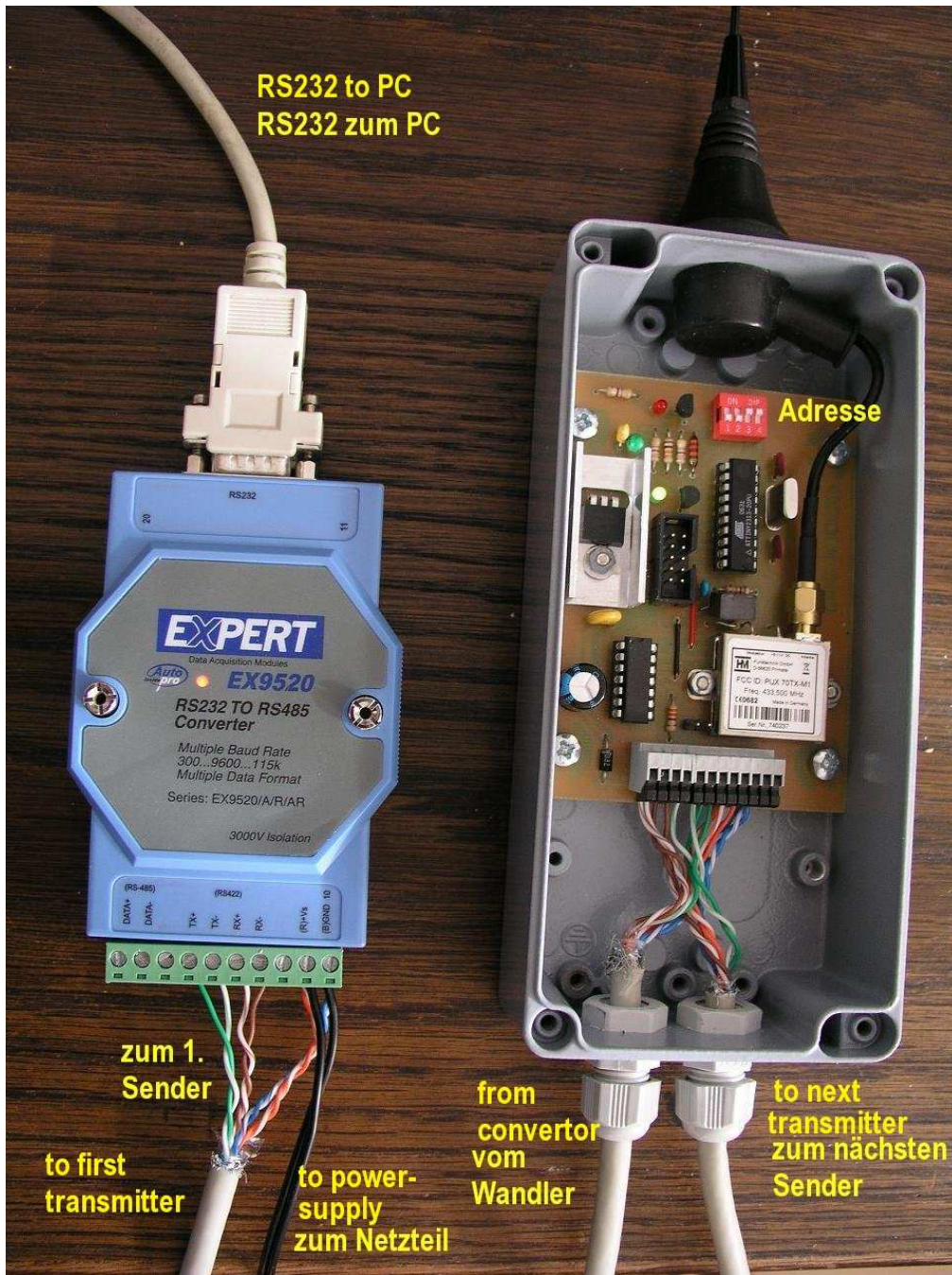


Fig.2 Photo of the wiring between convertor and transmitter. A serial/RS422 convertor EX9520 is used here. The transmitter as well as the convertor need a power supply. If the EX9530 is used the power supply MUST NOT be connected to the convertor otherwise it will be damaged. The EX9530 is USB powered.

Wiring scheme:

EX9520(RS232)	EX9530 (USB)	Transmitter	Colour of leads	Function
TX+	TX+	A	Green	Data line
TX-	TX-	B	Green/White	Data line
RX+	RX+	Y	Brown/White	Data line
RX-	RX-	Z	Brown	Data line
+Vs	No connection	V+	Orange+Orange/White	Power +
Gnd	No connection	Gnd	Blue+Blue/White	Power Gnd



Fig. 3 Combination of EX9520 and serial/USB-converter which has been plugged into the RS232 socket of the EX9520. The RS232/USB converter is contained within the plug.

The EX9530 USB/RS422 convertor or EX9520/USB combination has a virtual serial port driver installed on the computer. Please pay attention that the number of the Serial Port in the Windows control panel and in the IXARO Software are consistent. The virtual COM Port of the convertor will be listed as “Prolific USB-to-Serial Comm Port” in the Ports-Section in the Windows Device Manager. In this example it is Com4 that is connected to the convertor. When there is an additional USB convertor in use together with the EX9520 the Com Port may have another designation.

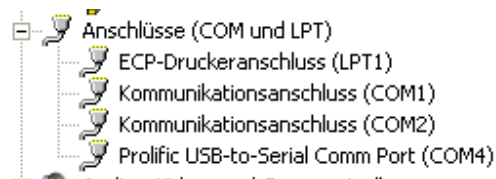


Fig. 4 The Com ports section in the Windows Device Manager showing the Prolific virtual serial port that is attached to the EX9530 convertor

## 2.Types of hardware failures:

### 2.1 Sporadic errors

When a failure appears during operation after successful start the software will show a message box with an “ERROR 13, Transmitter not responding”. This means that a transmitter has not confirmed sending of a message. This could be caused by failure of the IXARO system itself or by stray impulses from power cables in the vicinity of the data cable to the transmitter.

If there are communication errors between computer and transmitter they are stored in the error logfile in your path for logfiles (see “Administration” in the IXARO Software). The name of the file is „ddmmyerror.log“ where dd ist the day , mm the month and yy the year. A new logfile is written every day errors occur.

Communication errors concerning the transmitter are logged in the file with “TX\_ERROR” and an errornumber:

```
15:53:35 13.11.2011 TX_ERROR: 1004
16:29:39 13.11.2011 TX_ERROR: 1004
```

The errorcodes have the following meaning:

Value	Description
1001	A Break signal was received.
1004	Framing Error. The hardware detected a framing error.
1006	Port Overrun. A character was not read from the hardware before the next character arrived and was lost.
1008	Receive Buffer Overflow. There is no room in the receive buffer.
1009	Parity Error. The hardware detected a parity error.
1010	Transmit Buffer Full. The transmit buffer was full while trying to queue a character.
1011	Unexpected error retrieving Device Control Block (DCB) for the port.

Fig. 5 Table of the communication errors

The errors 1001, 1004 and 1009 indicate interference on the data lines from external sources. Another possible reason is corrosion in the data cable (moisture). Errors 1006,1008 should occur only if the computer is too slow (busy). Error 1011 might occur if there is a problem with the virtual com port driver (driver version not suitable for the operating system).

## 2.2 Permanent failure

The IXARO software tries to find and identify all connected transmitters at startup. If there is a permanent hardware failure in an IXARO pager system the system will start in “DEMO Mode” because no transmitter was found.

If there is a permanent failure one of the following components will be faulty:

1. The USB/RS422 convertor EX9530
2. The wiring between convertor and transmitter
3. The transmitter itself or its power supply

Please have a look at the power supply first. Open the case of the transmitter. The green Power LED on the PCB has to be lit. Otherwise the transmitter lacks power. Please check the power supply in this case. If there is power present in the transmitter and the system is not working we will have to carry out the so called loopback test to identify the faulty component. Loopback test means that data that are sent to the convertor will be sent immediately back by some wire bridges at the convertors output.

### 2.2.1 Test of the convertor



Please remove all data lines to the transmitter from the converters output. You will need two short pieces of wire with stripped ends. Use one wire to bridge Terminals TX+ and RX+ at the converters clamps and the other one to bridge TX- with RX- (see picture 1).

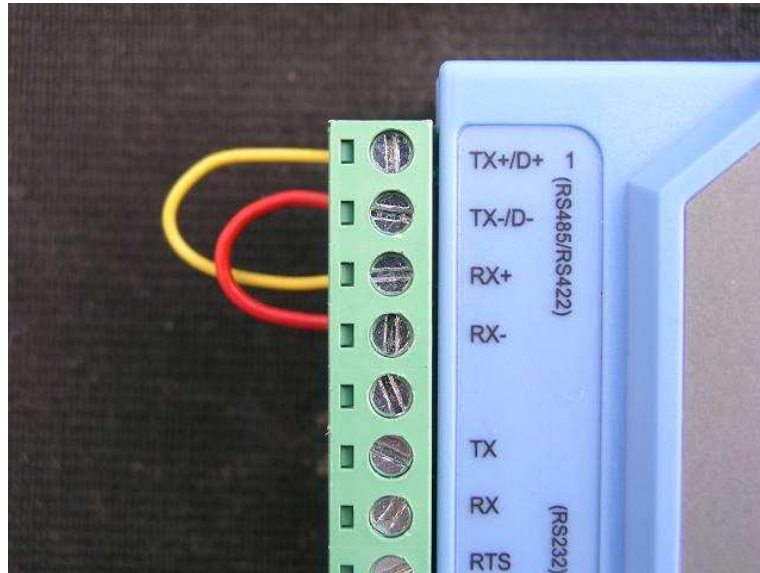


Fig. 6 Bridge wires for the loopback test on the EX9530

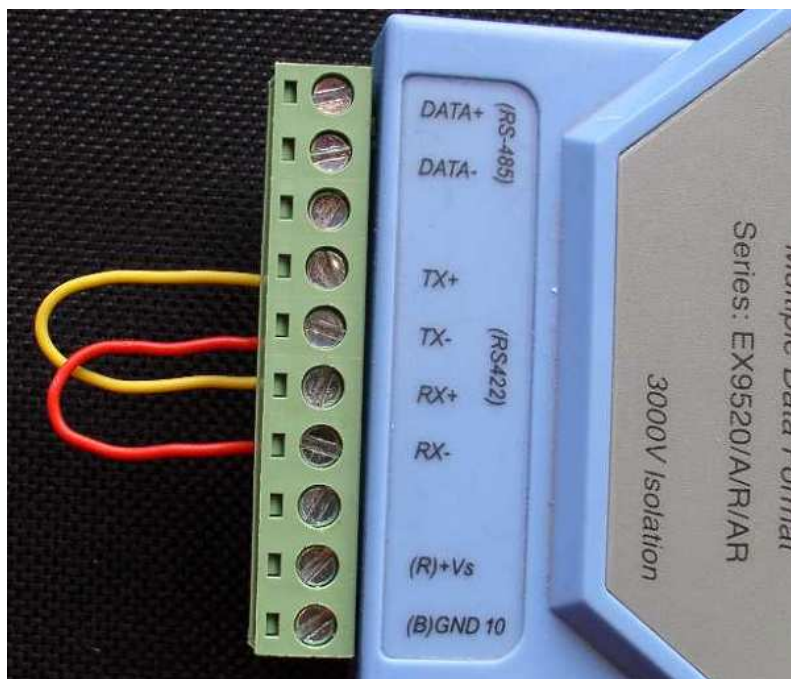


Fig. 7 Bridge wires for the loopback test on the EX9520

Now start some terminal emulation program like "Hyperterminal" that is contained in Windows XP. Since newer versions of windows do not longer contain Hyperterminal we will describe here the usage of the

terminal emulation TeraTerm which can be downloaded from the Internet as freeware:

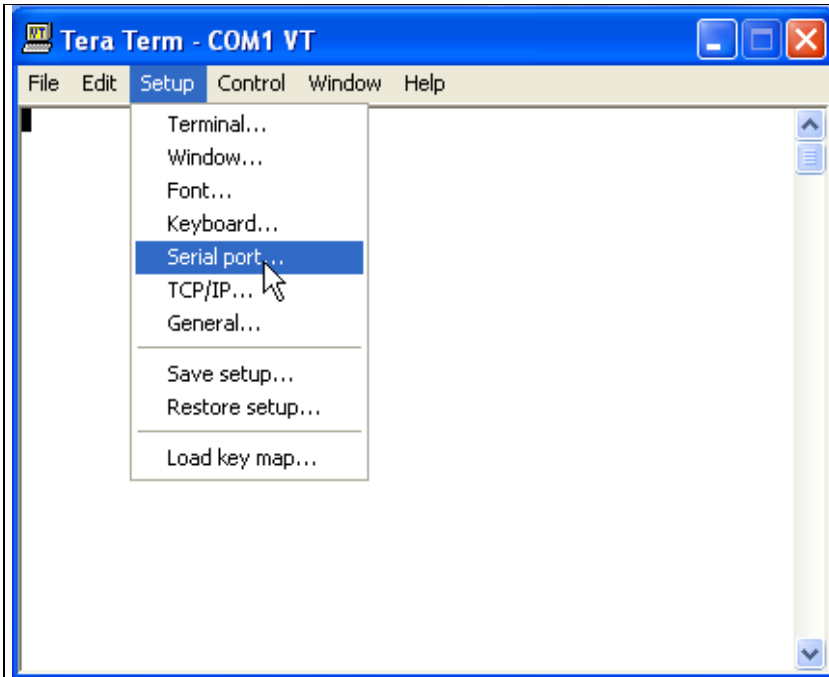


Fig. 8

Start Tera Term and invoke „Setup“ first. The setup window will open. “Local echo” in the “Terminal”-settings must not be activated (this is the default setting).

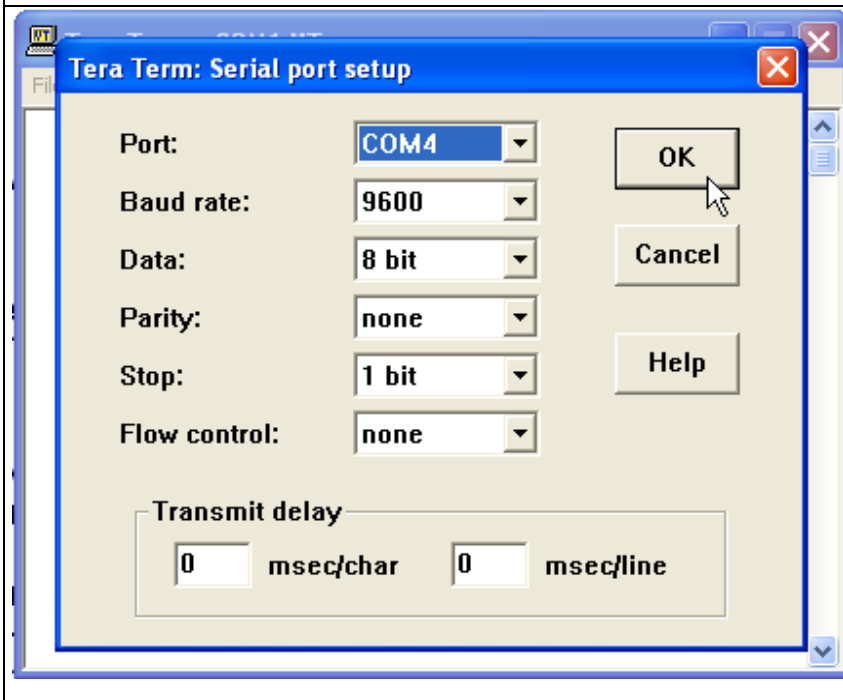


Fig.9

Choose the virtual serial port that is assigned to the convertor. Make the same settings like shown in the picture, then press “OK”.



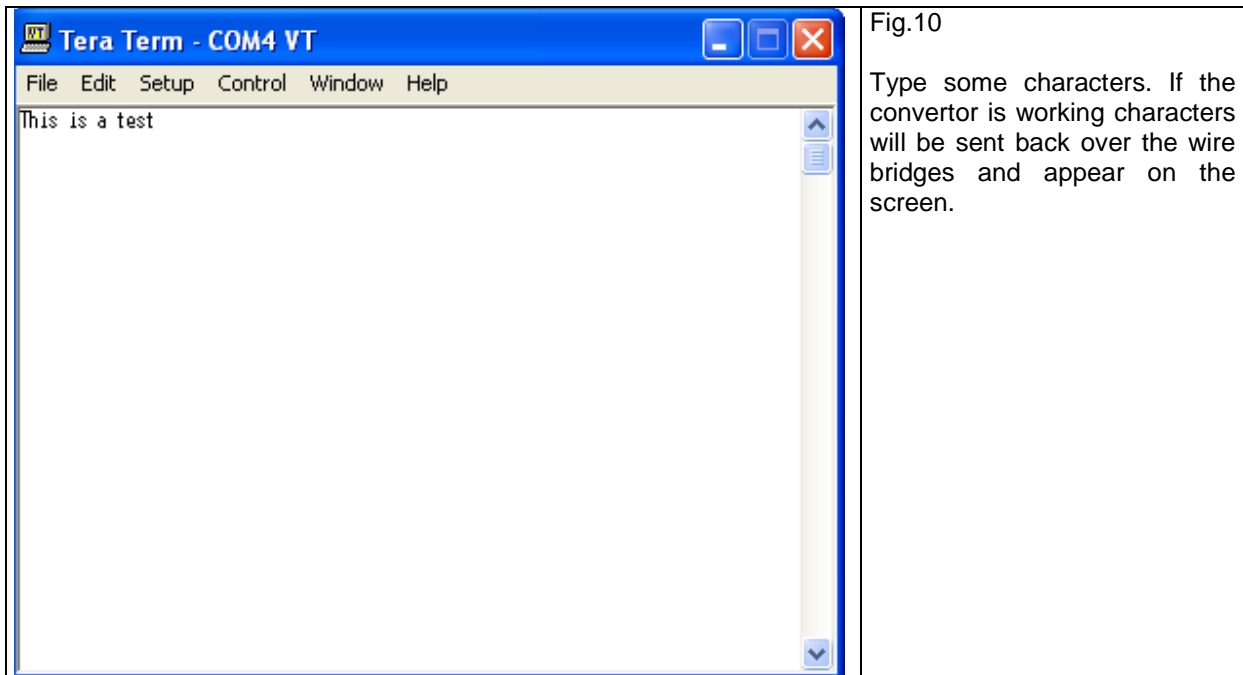


Fig.10

Type some characters. If the convertor is working characters will be sent back over the wire bridges and appear on the screen.

When there is no response the convertor is faulty. We recommend to replace any EX9520/USB-convertor combination by the more reliable EX9530. When characters are sent back the convertor is working and we will have to go on locating the fault.

HINT: You can test also EX9530 convertors that are used to attach an additional data entry terminal to the PC using the loopback test. It is not possible to test EX9520 convertors this way because a jumper has to be set inside to switch them from RS485 to RS422 mode for the test.

## 2.2.2 Test of the wiring

The next component to test is the wiring. Reattach the wires from the convertor to the transmitter. Remove the data wires from the transmitters clamps. Keep the transmitters power supply attached. Make the same connections for the loopback test with the wires in the transmitter. Connect TX+ (Green) with RX+ (Brown/White) and TX- (Green/White) with RX- (Brown) using some additional clamps.

Now type again some characters in the terminal software. When characters appear the cable from convertor to transmitter is in order. When no characters appear some wire in the cable is broken. You have to examine the cable for damage or replace the whole cable.

### 2.2.3 Test of the transmitter

When characters appear as you type them the cable from convertor to transmitter is in order. Therefore it is likely that the transmitter is faulty. To prove that reattach the data wires to the transmitters clamps. To check the transmitter use the Identify-command. Type I1 and the ENTER. You have to type this blind since there is no echoe from the transmitter. The transmitter will respond with "IXAROBUS V.1.5 ready:1". This is the procedure to check transmitter 1. If there is a second transmitter in the system type I2 and the transmitter will respond IXAROBUS V.1.5 ready:2

Please see the user manual for more explanations of the Identify command.

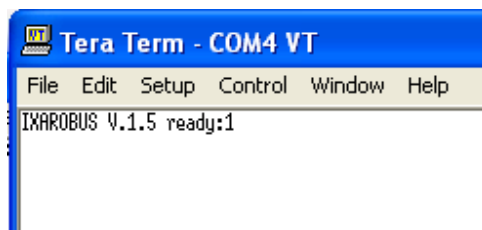


Fig.11 Response of the transmitter to the identify-command "I1"

When the transmitter does not respond it is the faulty component. The most frequent fault in the transmitter is damage of the RS422 line drivers by overvoltage (may occur during thunderstorms by lightning striking in the vicinity). Please send the faulty transmitter to the IXARO repair center.



IXARO Solutions  
Saarburger Ring 32  
D-68229 Mannheim  
Germany

T.....+49 621.14596  
+49 621.48 17 99 71  
F.....+49 621.156 58 22  
email....info@ixaro.com

[www.ixaro.com](http://www.ixaro.com)