NI 9871 Module Testing Progress Report

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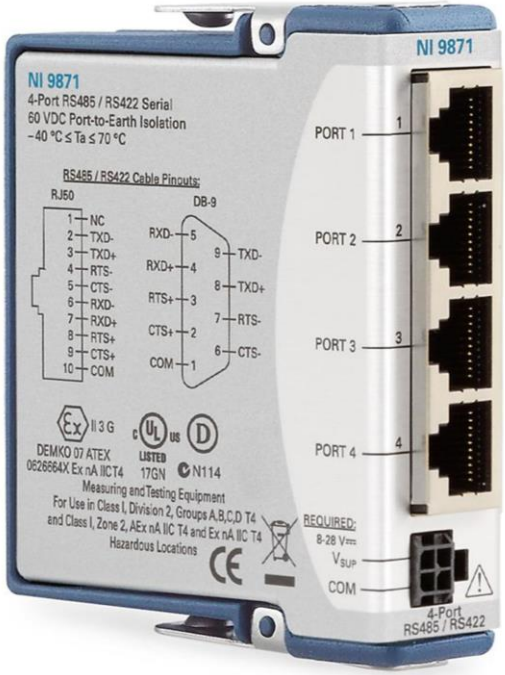
September 11, 2019

Contents

- Overview
  - Module being tested: NI-9871
  - Technical Specifications
- Tests
  - Previous Tests
  - New and Improved Tests
    - Test Structure
    - LabVIEW Front Panel
- Results
- Possible Improvements
- Conclusion

NI-9871

- 4-Port RS485/RS422 Serial Module
  - Used in conjunction with NI USB-to-485 4-Port Serial Interface Device



Technical Specifications

	NI-9871	NI USB-485
Type	4-Port RS485 Serial Module	USB-to-RS485 Serial Interface
S/N	1A71D6E	1A3FAC6
Max Baud Rate	3686.4 kbps	460.8 kbps
Voltage Range	8-28 VDC	9-30 VDC

Both module and USB-485 are connected to their own 24 VDC power supplies.

Tests

- Read/write capability tests
  - Can module read from USB-485 and write back to it? ✓
  - Are there any special characters that this module cannot handle? ✓
  - Does this module read back *exactly* what has been written to it? ✓
  - Does this module write *exactly* what it has been instructed to write? ✓

- Test different baud rates
  - Can module read/write data at rate specified by manufacturer? ✓

Previous Tests

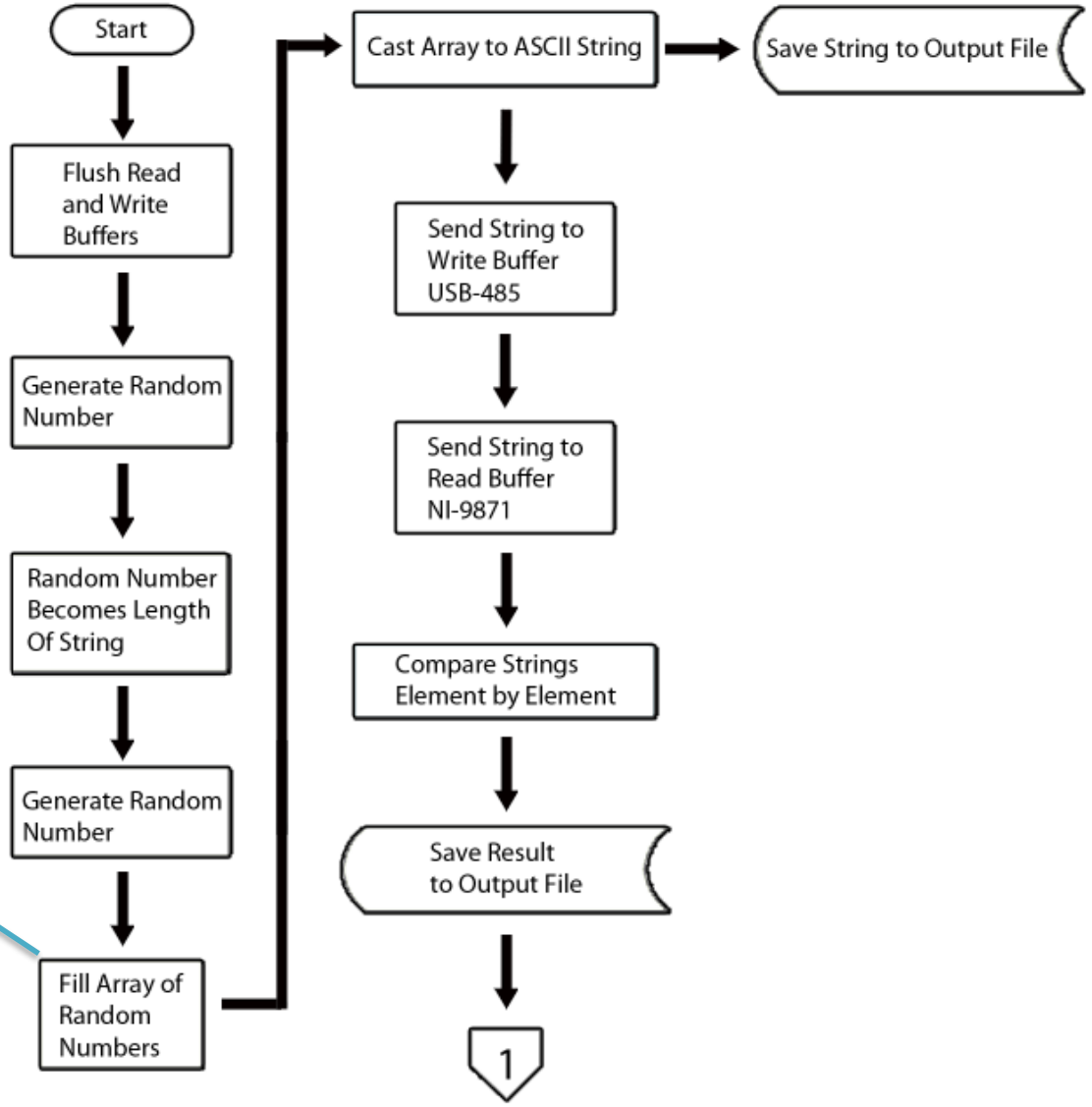
- Margin of error was 22.4%
  - Should be ≤ 5%
  - Only 20 input/output strings per baud rate, per port
- Randomness of strings
  - Strings were not randomly generated
- Automation
  - Each string had to be entered manually before each test

New and Improved Tests

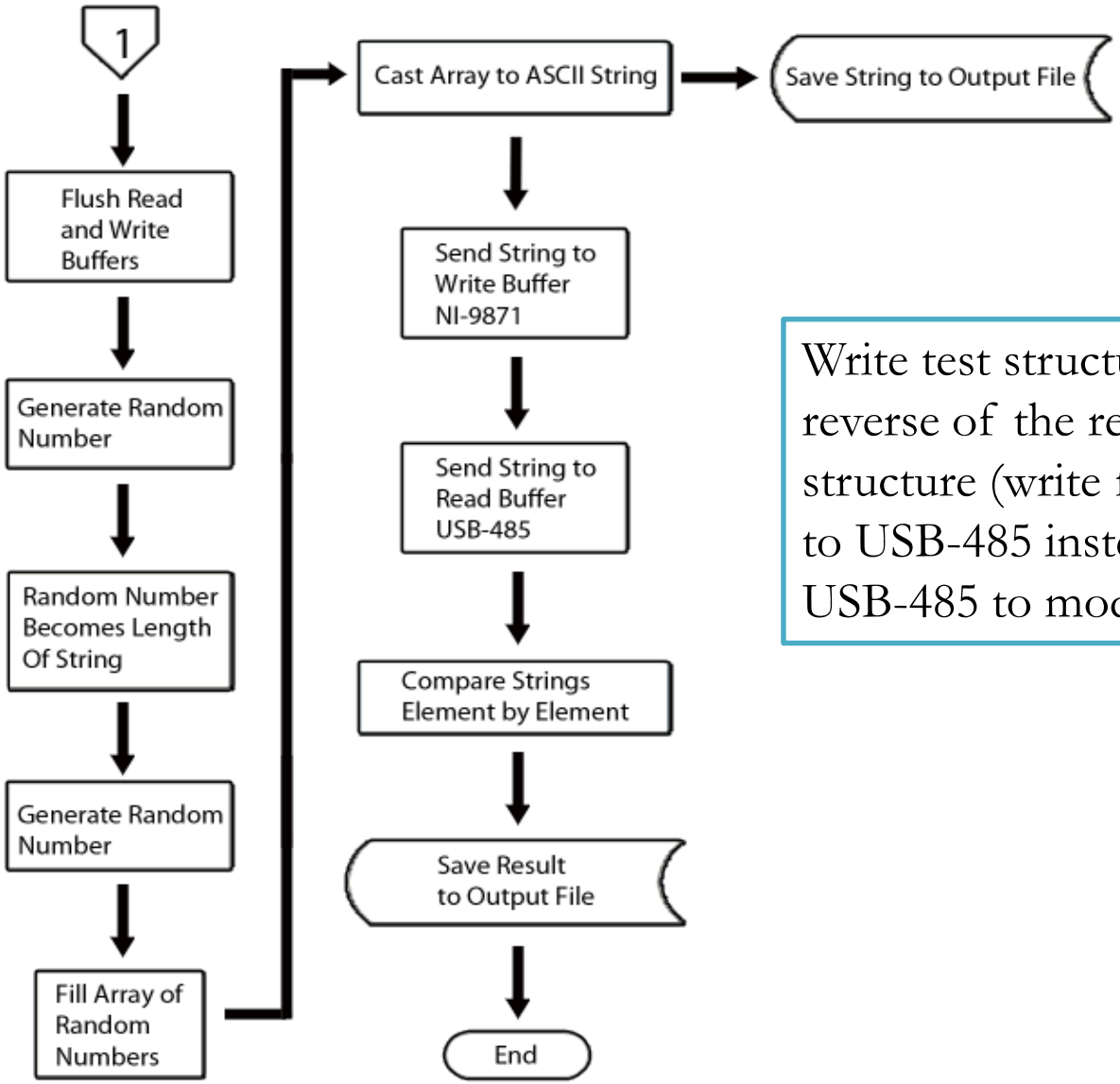
- Increased number of read/write tests to improve (lower) margin of error
- Input and output save files allow for automation
- Random number generators determine the length of the string as well as the content

Read Test Structure

Array is filled with randomly generated whole numbers between 32 and 95 and then cast to a string of ASCII characters

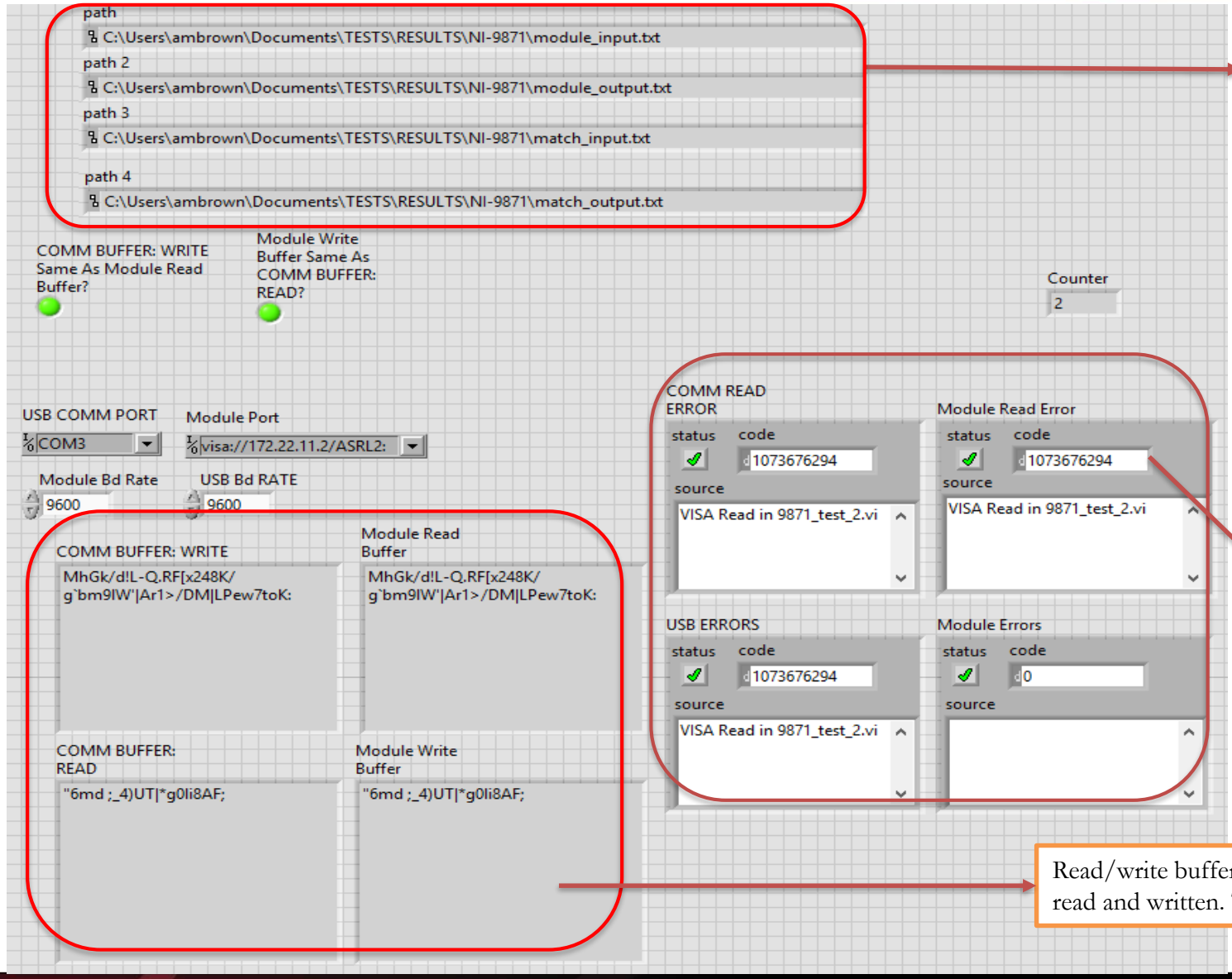


Write Test Structure



Write test structure is the reverse of the read test structure (write from module to USB-485 instead of from USB-485 to module).

Read/Write Test: Front Panel

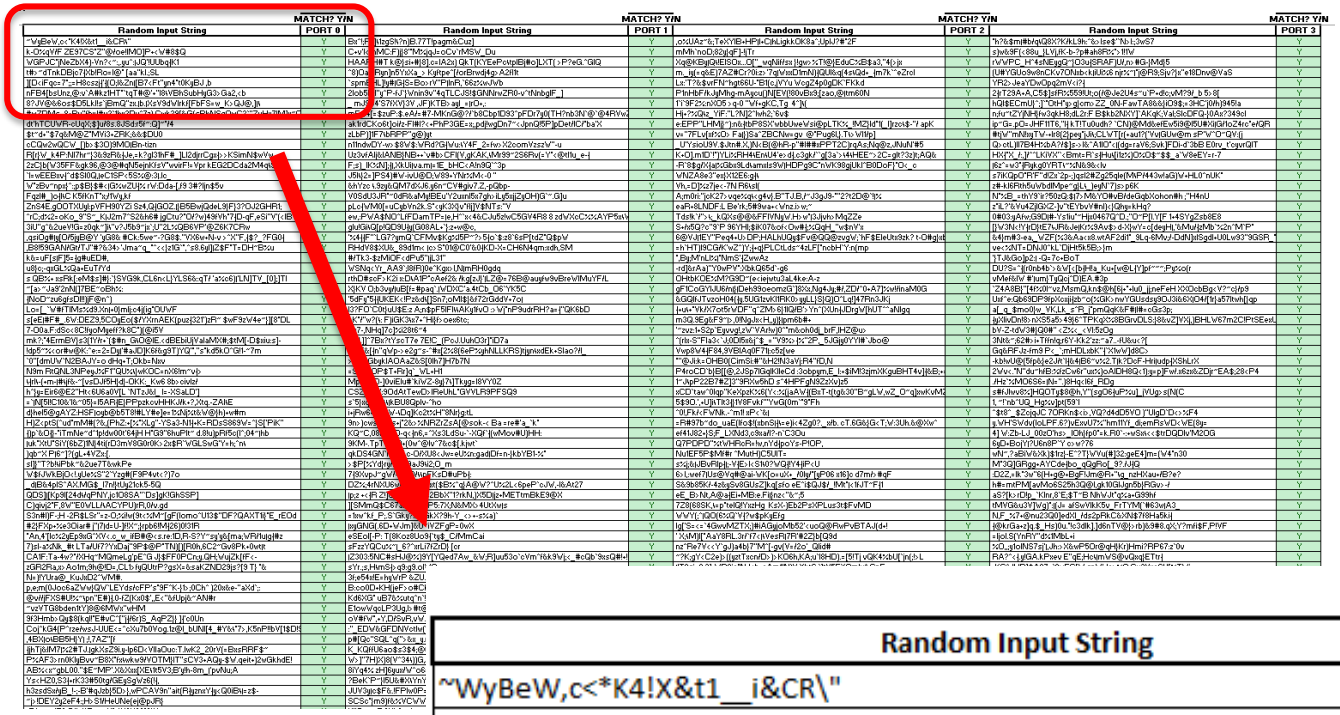


Path indicators for saved input/output files

Error buffers show any read/write error messages in real time

Read/write buffers display strings being read and written. They should match.

Results: Read

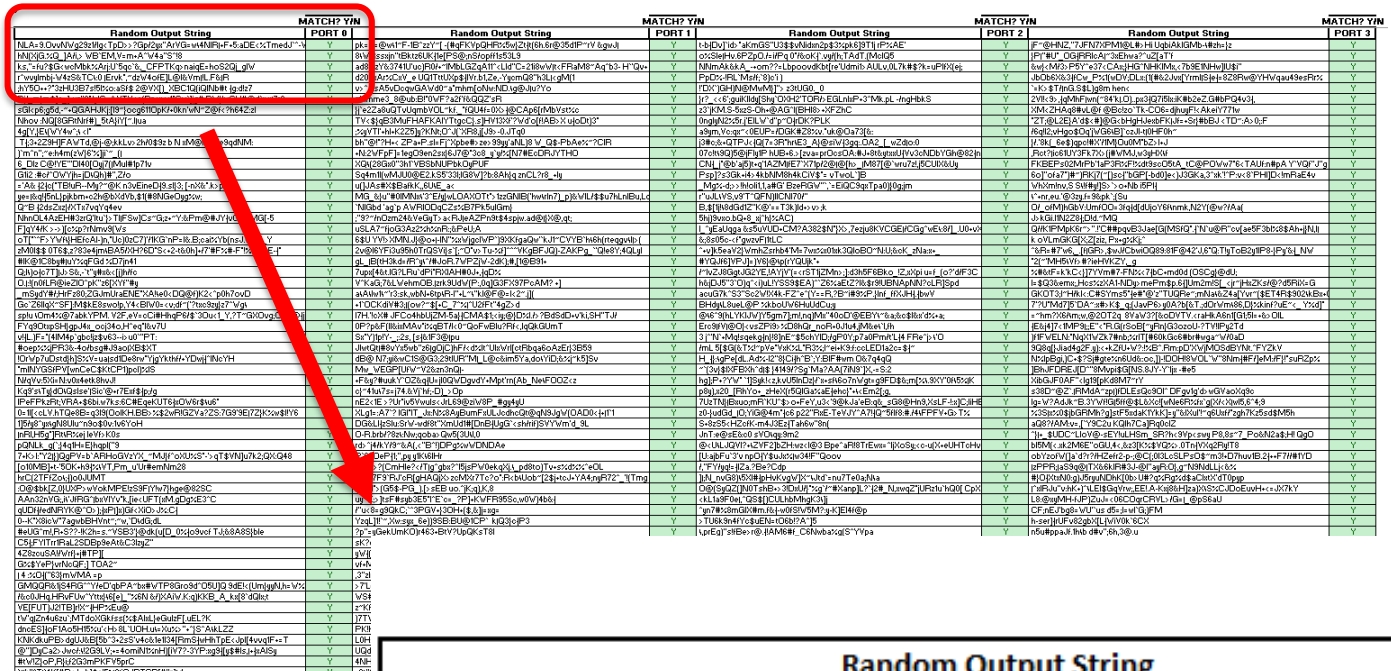


- Written string is compared to read string for accuracy

- Content and length for each input string is randomly generated and saved to an output file

Random Input String	MATCH? Y/N PORT 0
~WyBeW,c<*K4!X&t1__i&CR\"	Y
k-O%qV/F ZE97CS*Z"@/oe!IMO]P+<W#8$Q	Y
WGPJC*jNeZbX4)-Vn?<^:,.yu^:|JQ'!UUbq{K1	Y
t#>~dTnkDBjc7{Xb!Ro=l@* [aa"kl.;SL	Y
][D<iFqc=7*;;=H8cszj{'{(O;l&Zn|[B7<Ft"yn4*t0KyBJ ,b	Y
nFB4[bsUnz,@:v`A#kz1HT*`tqT#@'+"I8\VBhSubHyG3>Ga2,<b	Y
8?JV@&6os$D5Lkl!s`jBmQ"zx.|b.|XsV9dWIrkf[FbFS=w_K>QJ@,]|\	Y
#wZDMs_8+Bu"fbx{#v2`1hx2Du^7z) Cwk29[&G(sPhNSgQwC?`"ZvHx7IM]x~ORhR"	Y

Results: Write



Random Output String	MATCH? Y/N PORT 0
NLA=9.OvvNWg29z1/Ig<TpD>>?Gp/2yx"ArVG=w\4NIR|+F+5:aDE<%TmedJ`^-WW^NH	Y
hN(XjG.%Q_]A/i,> WB`EM,V=m+A^W4a"S^!8	Y
ks,"=fu?$G<wcMbk%Arj:U`5qc`&,_CFPTKq>naiqE=hoS2Qj_glW	Y
r^wvyImbj-W4zS&TC\:0 |Ervk*,"dzW4ofE]L@l&Vm|!L.F&|R	Y
;hY5O++?*3zHU3B7s!5I%o:aSf$ 2@VX[)_XBC1Q(iQlNb#t {g:d!z7	Y
Dj/_m}m$]c_]-vz"8*/ylG.+&XTX<a(Bz<x,w1*Gw`]jg#.RW}lwCH#@d`x;x|7r0	Y

- Read/write tests were conducted for each of the 4 ports for three different baud rates

- Results shown are from the highest baud rate tested: 115,200 bps

Results

- Tested read/write capability for three different baud rates
  - 9,600 bps ✓
  - 19,200 bps ✓
  - 115,200 bps ✓
- Compared read string with written string element by element
  - All ports passed for each baud rate tested ✓
- Each port of NI-9871 module behaved as expected
  - 900 input/output strings per baud rate for each port
  - Margin of error: 4.71%
  - No discrepancies ✓

Possible Improvements

- Was unable to test the module at its maximum baud rate
  - Highest rate attainable in scan mode is 115,200 bps
  - FPGA mode must be used to reach maximum rate of 3686.4 kbps

- Include new-line character in new test

Conclusion

- Using LabVIEW code developed
  - Tested multiple baud rates up to allowable maximum rate
  - Tested all 4 ports of module
- NI-9871 serial module performs according to technical specifications
  - Module was able to read and transmit randomly generated alphanumeric characters accurately at rates within technical specifications

Thank You