FREEDOM
Communication Technologies

Process Automation Toolkit (PAT)


Process Automation Toolkit
Sequential Test Process - KietKOMR
Parameters
Description
Action
Set
Set to
Standard
If
Pass
Then
Continue
Else
Stop
Wait
2000
ms
FREEDOM
Communication Technologies
0 dBm Max
Antenna
Spectrum Analyzer
Power Meter
R8100
Mic In
Demod Out
Mod In/Out
Meter In
RF Gen Out
RF In/Out
Power
Vol

Introduction

Process Automation Tool Kit (PAT) provides an innovative method to automate test procedures for the Freedom range of communications analysers. For many years the Automatic Test Equipment (ATE) environment has required engineers to have two major areas of expertise, intimate knowledge of the device under test (DUT) and software programming skills to automate test procedures.

Over the years many control interfaces were developed, such as HPIB, GPIB, IEEE488, USB, RJ45 for example. These interfaces are coupled with many software control packages such as HP Basic, Basic, Fortran, Atlas, C++ to name but a few.

Instrument drivers were developed to somewhat simplify and speedup software development by reducing the need for the test engineer to learn each and every command for multiple instruments. These may be coupled with software devolvement tools such as Labwindows, Labview, Visa Plug&Play.

PAT enables the test engineer to develop test procedures by a simple and intuitive control interface by simply selecting from a library the function required and insert into the DUT test script. No programming skills are required.

Connection to the analyzer is RJ45 Ethernet, either directly from a PC or over a LAN network. Test scripts are executed from the PAT control interface and test results saved to USB of a network location.

Software Installation

Software location: http://freedomcte.com/library/

Download and install the software.

Analyzer Connection Options

Direct Connection to RJ45 Ethernet socket.

Network connection through RJ45 Ethernet socket.

Initial Operating Instructions

Connect the Analyzer using the RJ45 Ethernet port to the control PC. This may be direct or on the same LAN as the control PC.

On the PC select the PAT Automation desktop shortcut.
The PAT software will now search for the connected analyzer. (see fig. 1)

When the search is successful the IP address of the connected Analyzer will populate the display. (see fig. 2-3)

The Programmable actions area will also populate at this time. (see fig. 3)

Selection from the Programable Actions libraries is achieved by clicking on the desired action

This will open up the selections available in this action section. (see fig. 4-8)

Startup Display (fig. 1)

R8100 Analyser Found & IP Address (fig. 2)

(fig. 3)


Process Automation Toolkit
FREEDOM
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Process Automation Toolkit
v1.0.0
Programmable Actions
Analyzer
Automated Test
External Devices
Operators
Load Test
Save Test
Delete Test
Add
Remove
Settings
Sequential Test Process
#
Description
Parameters
Manual Command Entry
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
IP Address
Model Number
Serial Number
System Version
192.168.0.11
R8100
800LRE0005
3.1.0.0

(fig. 4)


Process Automation Toolkit
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Process Automation Toolkit
v1.0.0
Programmable Actions
Analyzer
Analyser Mode
External Drives
Model Number
Serial Number
Setup
Squelch
Test Mode
Zone
Automated Test
External Devices
Operators
Manual Command Entry
Load Test
Save Test
Delete Test
Add
Remove
Settings
Sequential Test Process
#
Description
Parameters
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Analyzer Found at 192.168.0.11...
Test Results

(fig. 5)


Process Automation Toolkit
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Process Automation Toolkit
v1.0.0
Programmable Actions
Serial Number
Setup
Squelch
Test Mode
Zone
Audio
DMR
Meter
NXDN
NXDN Trunk
P25
P25_TRUNK
RF
TETRA
Manual Command Entry
Sequential Test Process
Parameters
#
Description
Load Test
Save Test
Delete Test
Add
Remove
Settings
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Analyzer Found at 192.168.0.11...
Test Results

(fig. 6)


Process Automation Toolkit
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Process Automation Toolkit
v1.0.0
Programmable Actions
Setup
Analog Averaging Samples
Automatic Attenuation Off/On
Digital Averaging Off/On
Digital Averaging Samples
Input Decoding
Internal Audio Weighting
Language Select
Meter In Filter
Pre/De-Emphasis Off/On
R8000 Legacy Mode
Reference Clock Mode In/Out
RF Gen Port Offset Level
RF I/O Port Offset Level
Manual Command Entry
Sequential Test Process
Parameters
#
Description
Load Test
Save Test
Delete Test
Add
Remove
Settings
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Analyzer Found at 192.168.0.11...
Test Results

(fig. 7)


Process Automation Toolkit
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Process Automation Toolkit
v1.0.0
Programmable Actions
TETRA
Automated Test
Analog & P25 MOTO Test
ChrisMotoAN&P25
ElapsedVoltsTest
FM Radio TX
FM RX Test
FM TX TEST
KiethDMR
POCSAG Test
RX Test AM
TX Test AM
Verification Audio 1
Verification Audio 2
Manual Command Entry
Load Test
Save Test
Delete Test
Add
Remove
Settings
Send CMD
Sequential Test Process
#
Description
Clear
Execute
Pause
Stop
Parameters
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Analyzer Found at 192.168.0.11...
Test Results

(fig. 8)


Process Automation Toolkit
FREEDOM
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Process Automation Toolkit
v1.0.0
Programmable Actions
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Wait (ms)
Manual Command Entry
Load Test
Save Test
Delete Test
Add
Remove
Settings
Send CMD
Sequential Test Process
#
Description
Clear
Execute
Pause
Stop
Parameters
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Analyzer Found at 192.168.0.11...
Test Results

Add

Select a command from the library,
Press Add to add to the test script

Remove

Select a line in the script, Press Remove
to remove that line from the script.

Clear

Clears all line entries from the script.

Send CMD **Selected command**

Select a line in the script to send the command to the
Analyzer for immediate execution.
After adding a command to the script, test by Send CMD.
Analyzer will return Pass/Fail in results area.

Get

Selectable drop menu Get/Set Get reads
the parameter from the Analyzer.

Set

Selectable drop menu Get/Set.
Set writes the parameter to the Analyzer.

Execute

Runs the test script automatically.

(fig. 9)

Add

Remove

Clear

Send CMD

Get

Set

Execute

(fig. 10)

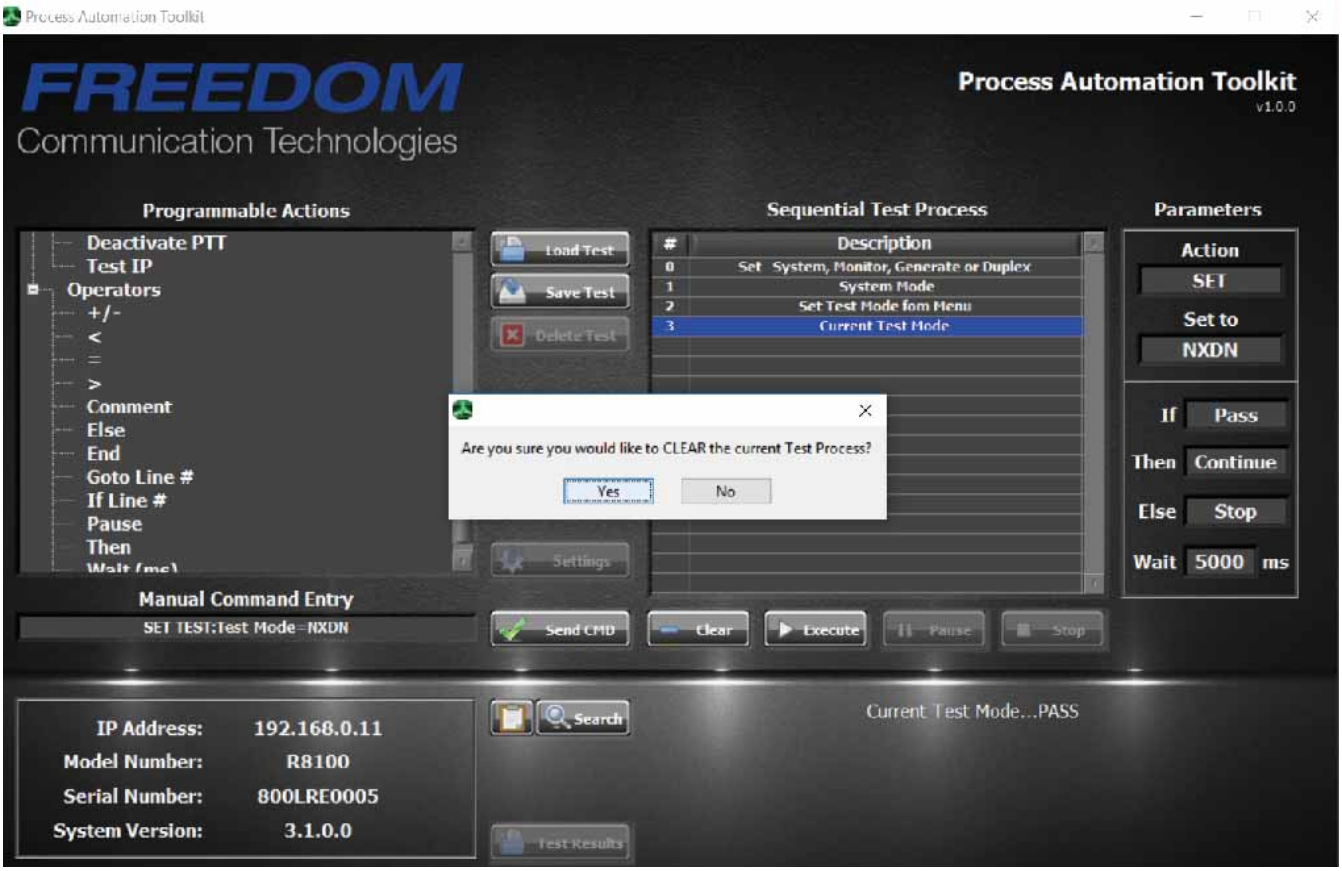
(fig. 11)

Command Control and Timing

Each of the Analyzers commands control and timing is pre-set by PAT software. This panel shows those pre-set parameters

The Wait ms parameter may be operator modified but could result in erratic results.

(fig. 12)


Process Automation Toolkit
FREEDOM
Communication Technologies
Process Automation Toolkit
v1.0.0
Programmable Actions
Deactivate PTT
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Load Test
Save Test
Delete Test
Settings
Sequential Test Process
Description
0 Set System, Monitor, Generate or Duplex
1 System Mode
2 Set Test Mode fom Menu
3 Current Test Mode
Are you sure you would like to CLEAR the current Test Process?
Yes
No
Parameters
Action
SET
Set to
NXDN
If Pass
Then Continue
Else Stop
Wait 5000 ms
Manual Command Entry
SET TEST:Test Mode=NXDN
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
Current Test Mode...PASS

(fig. 13)


Process Automation Toolkit
FREEDOM
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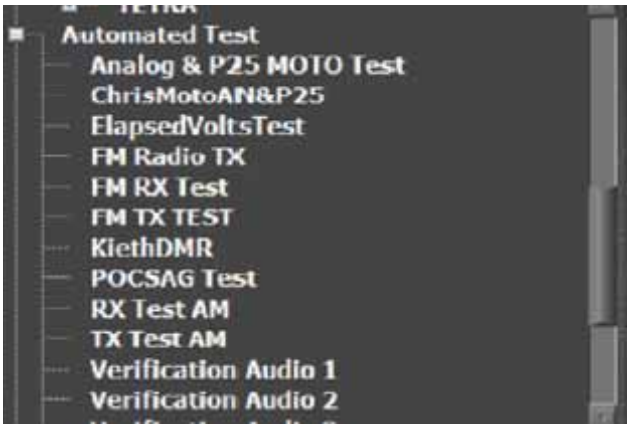
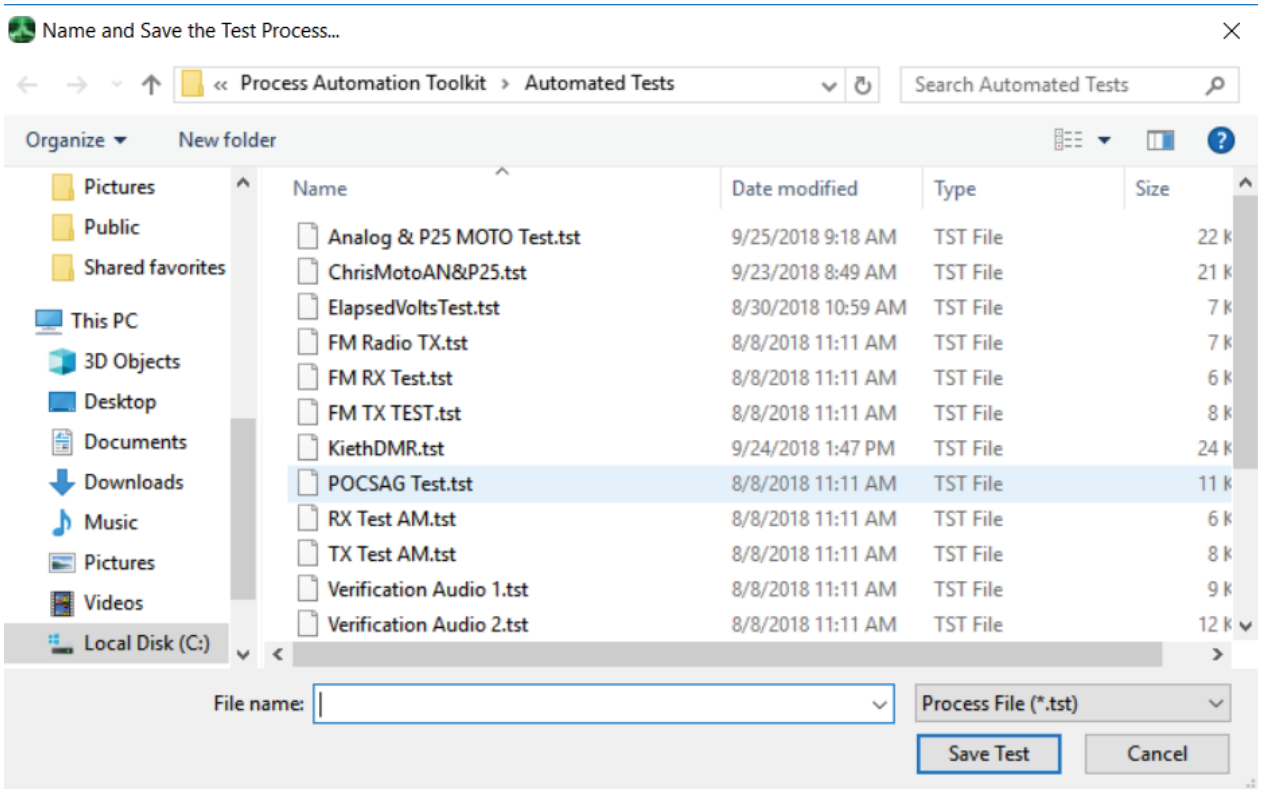
Process Automation Toolkit
v1.0.0
Programmable Actions
TETRA
Automated Test
Analog & P25 MOTO Test
ChrisMotoAN&P25
ElapsedVoltsTest
FM Radio TX
FM RX Test
FM TX TEST
KiethDMR
POCSAG Test
RX Test AM
TX Test AM
Verification Audio 1
Verification Audio 2
Load Test
Save Test
Delete Test
Add
Remove
Settings
Sequential Test Process
Description
Parameters
Manual Command Entry
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
Analyzer Found at 192.168.0.11...

Automated Test Library



Test scripts may saved and loaded from a built in folder achieve.



(fig. 14)


Process Automation Toolkit
FREEDOM
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Process Automation Toolkit
v1.0.0
Programmable Actions
Deactivate PTT
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Load Test
Save Test
Delete Test
Add
Remove
Settings
Sequential Test Process = KiethDMR
Description
0 Basic Set Up
1 SET Current Test Mode to Standard
2 SET System Mode to Monitor
3 SET RF Monitor Port to RF In/Out
4 SET Bandwidth to 25 kHz (Wide)
5 Modulation Type to FM
6 SET Monitor Frequency to 851.0125
7 Copy Frequency to Generator
8 SET RF Attenuation to 40 dB
9 SET System Mode to Monitor
10 Analog Transmitter Tests
11 Select Radio Channel 2
12 Press and hold PTT
13 Wait (ms) 2000
14 GET Input Level
15 GET Meter
16 RF Measured Power
Parameters
Action
SET
Set to
Standard
If Pass
Then Continue
Else Stop
Wait 2000 ms
Manual Command Entry
SET TEST:Test Mode=Standard
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
Current Test Mode...PASS

(fig. 15)


FREEDOM
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Process Automation Toolkit
v1.0.0
Programmable Actions
Deactivate PTT
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Load Test
Save Test
Delete Test
Add
Remove
Settings
Sequential Test Process = KiethDMR
Description
3 SET RF Monitor Port to RF In/Out
4 SET Bandwidth to 25 kHz (Wide)
5 Modulation Type to FM
6 SET Monitor Frequency to 851.0125
7 Copy Frequency to Generator
8 SET RF Attenuation to 40 dB
9 SET System Mode to Monitor
10 Analog Transmitter Tests
11 Select Radio Channel 2
12 Press and hold PTT
13 Wait (ms) 2000
14 GET Input Level
15 GET Meter
16 RF Measured Power
17 GET Frequency Error
18 Speak/Whistle into Microphone
19 Wait (ms) 3000
Parameters
Manual Command Entry
Send CMD
Clear
Execute
Pause
Stop
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
Select Radio Channel 2

(fig. 16)


FREEDOM
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Process Automation Toolkit
v1.0.0
Programmable Actions
Deactivate PTT
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Load Test
Save Test
Delete Test
Add
Remove
Settings
Manual Command Entry
Send CMD
Sequential Test Process = KiethDMR
Description
0 Basic Set Up
1 SET Current Test Mode to Standard
2 SET System Mode to Monitor
3 SET RF Monitor Port to RF In/Out
4 SET Bandwidth to 25 kHz (Wide)
5 Modulation Type to FM
6 SET Monitor Frequency to 851.0125
7 Copy Frequency to Generator
8 SET RF Attenuation to 40 dB
9 SET System Mode to Monitor
10 Analog Transmitter Tests
11 Select Radio Channel 2
12 Press and hold PTT
13 Wait (ms) 2000
14 GET Input Level
15 GET Meter
16 RF Measured Power
Clear
Execute
Pause
Stop
Parameters
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0
Search
Test Results
BER Result=51.23457
Release PTT
SET System Mode to Generate...PASS
Select Test Pattern to 1031 Hz Tone...PASS
Modulation Mode Off/On to Continuous...PASS
Tone Heard

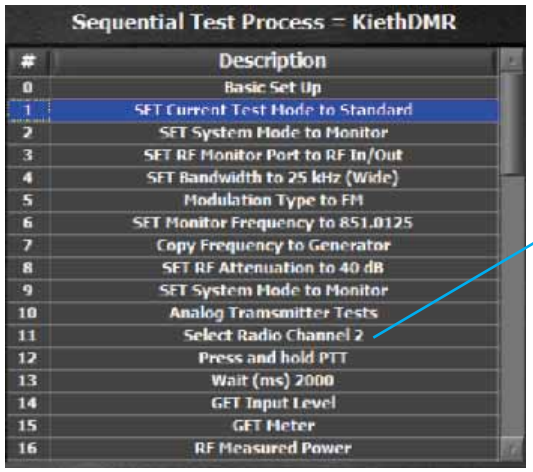
Running a Test Script

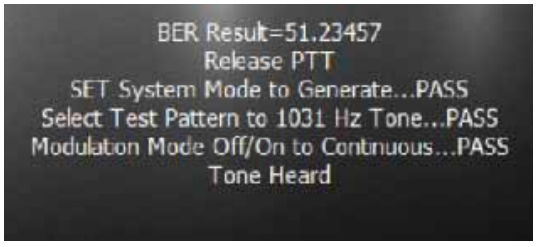
1. Press Execute

2. If a PAUSE is present, respond to the requested action
   Running test results are displayed.

3. At the end of the test the results are displayed in a CSV format.

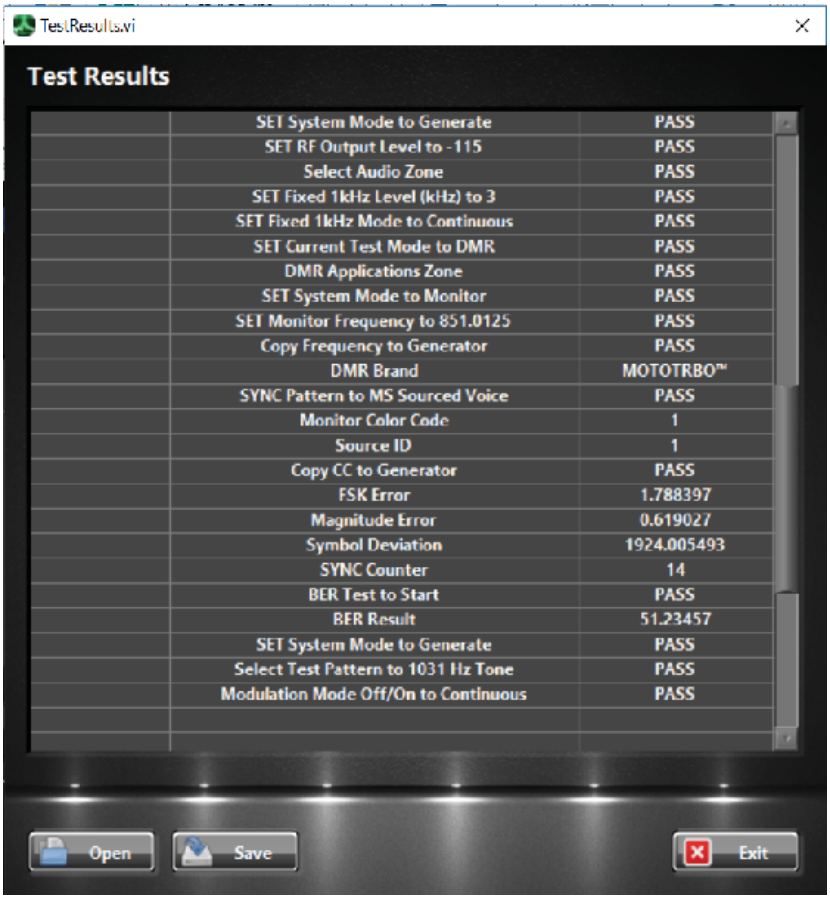
4. These results may be saved to a log file folder, and exported to a USB drive





(fig. 17)


Test Results
Operator: Chris Lazy Sunday
Time: 1:13 PM
Date: 10/7/2018
Analyzer
IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LKE0005
System Version: 3.1.0.0
Test Name: KietNDMR
Description
Data
SET Current Test Mode to Standard PASS
SET System Mode to Monitor PASS
SET RF Monitor Port to RF In/Out PASS
SET Bandwidth to 25 kHz (Wide) PASS
Modulation Type to FM PASS
SET Monitor Frequency to 851.0125 PASS
Copy Frequency to Generator PASS
SET RF Attenuation to 40 dB PASS
SET System Mode to Monitor PASS
GET Input Level FAILED
GET Meter Power Meter
Open
Save
Exit
Programmable Ac
Deactivate PTT
Test IP
Operators
+/-
<
=
>
Comment
Else
End
Goto Line #
If Line #
Pause
Then
Manual Command
Parameters
IP Address:
Model Number:
Serial Number:
System Version:


TestResults.vi
Test Results
SET System Mode to Generate PASS
SET RF Output Level to -115 PASS
Select Audio Zone PASS
SET Fixed 1kHz Level (kHz) to 3 PASS
SET Fixed 1kHz Mode to Continuous PASS
SET Current Test Mode to DMR PASS
DMR Applications Zone PASS
SET System Mode to Monitor PASS
SET Monitor Frequency to 851.0125 PASS
Copy Frequency to Generator PASS
DMR Brand MOTOTRBO™
SYNC Pattern to MS Sourced Voice PASS
Monitor Color Code 1
Source ID 1
Copy CC to Generator PASS
FSK Error 1.788397
Magnitude Error 0.619027
Symbol Deviation 1924.005493
SYNC Counter 14
BER Test to Start PASS
BER Result 51.23457
SET System Mode to Generate PASS
Select Test Pattern to 1031 Hz Tone PASS
Modulation Mode Off/On to Continuous PASS
Open
Save
Exit