



Process Automation Toolkit (PAT)



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 development 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 Programmable 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)

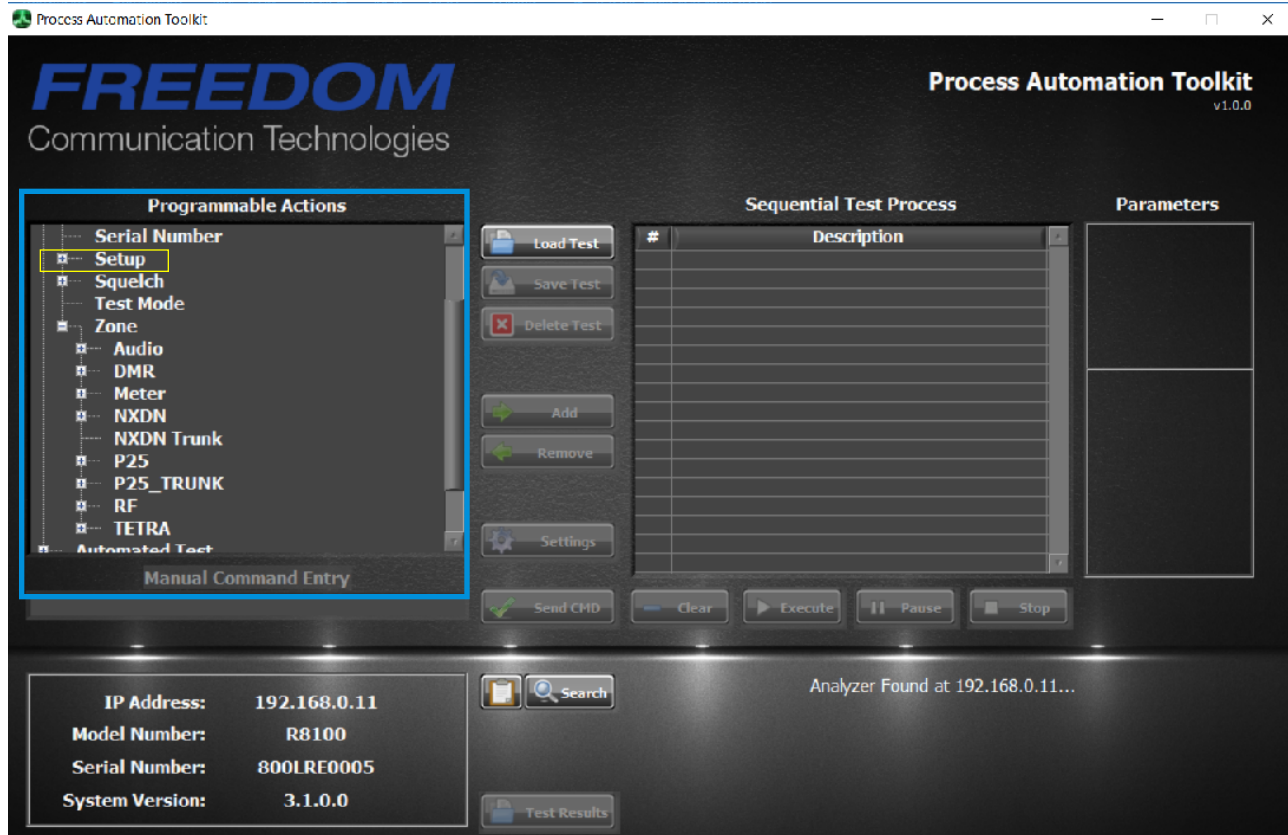
(fig. 3)



(fig. 4)



(fig. 5)



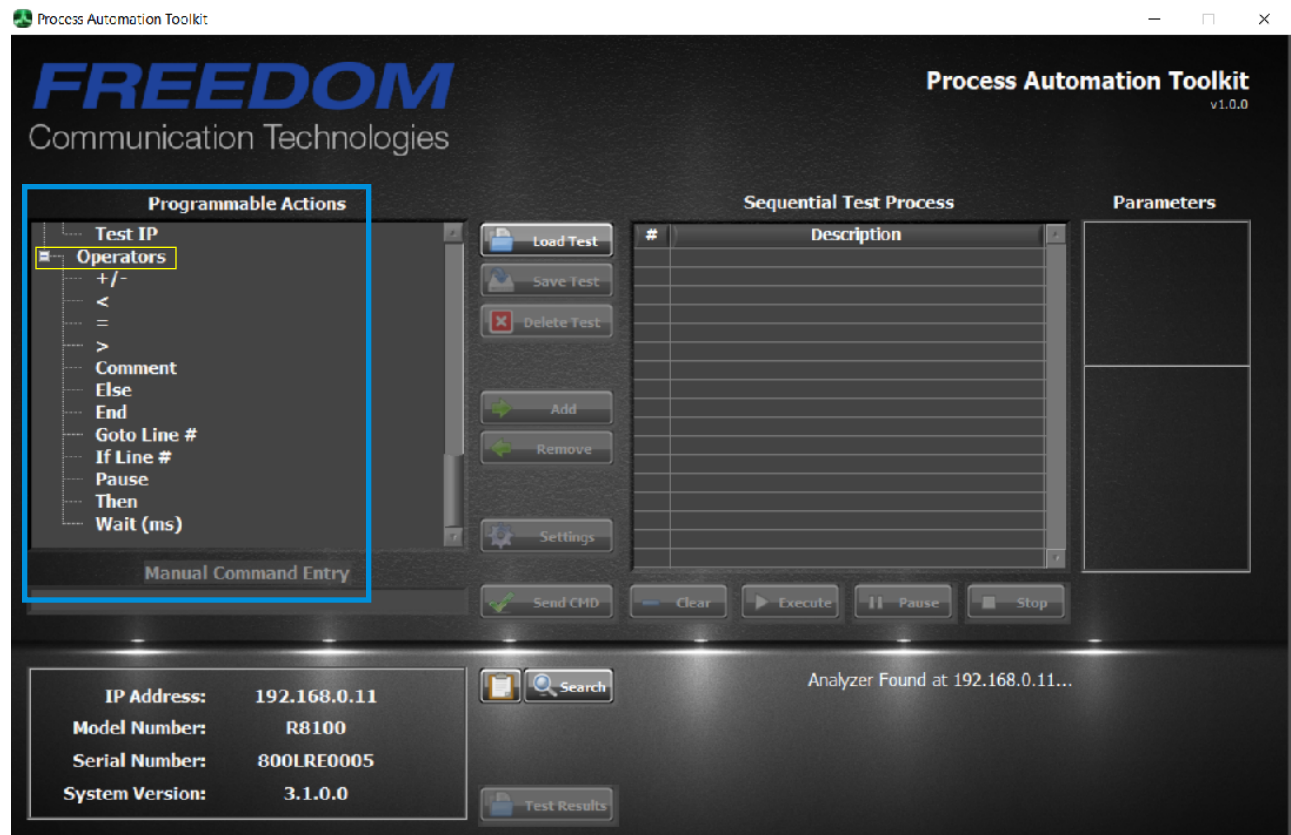
(fig. 6)



(fig. 7)



(fig. 8)



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.

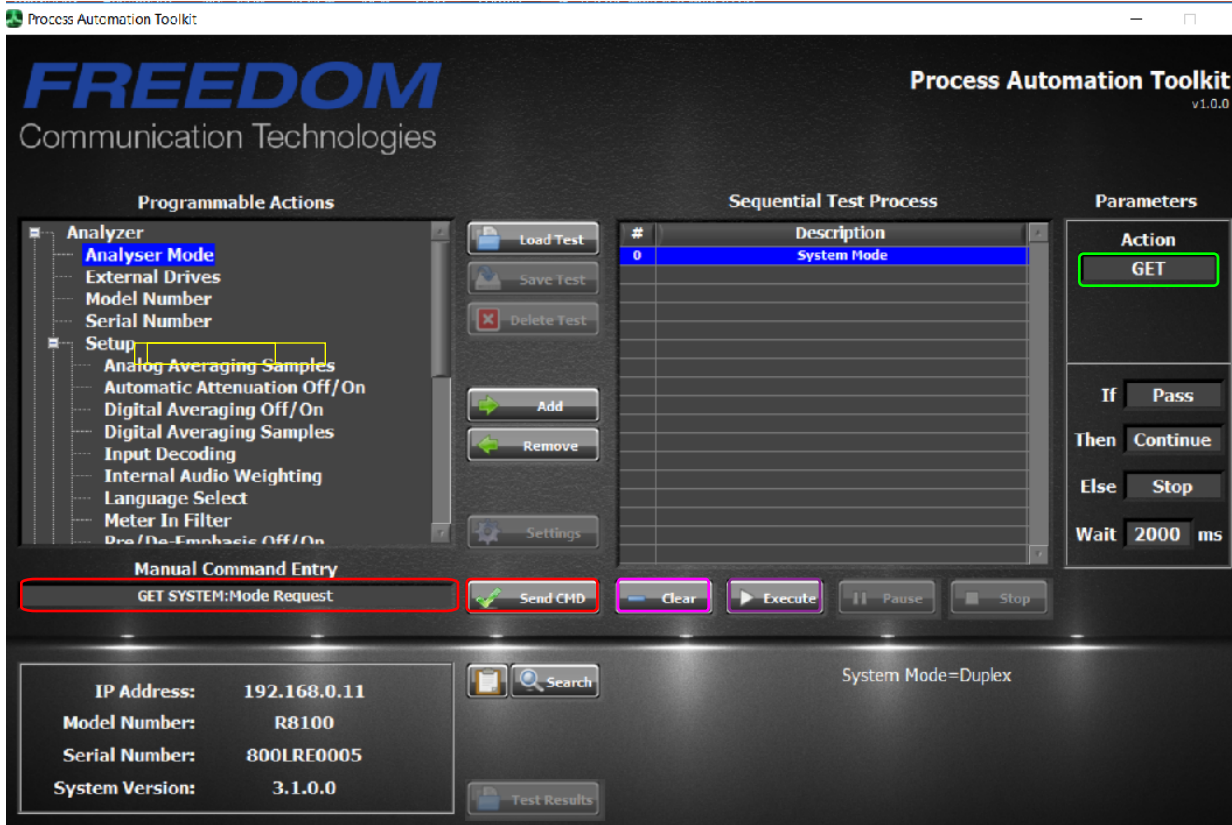
Set

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

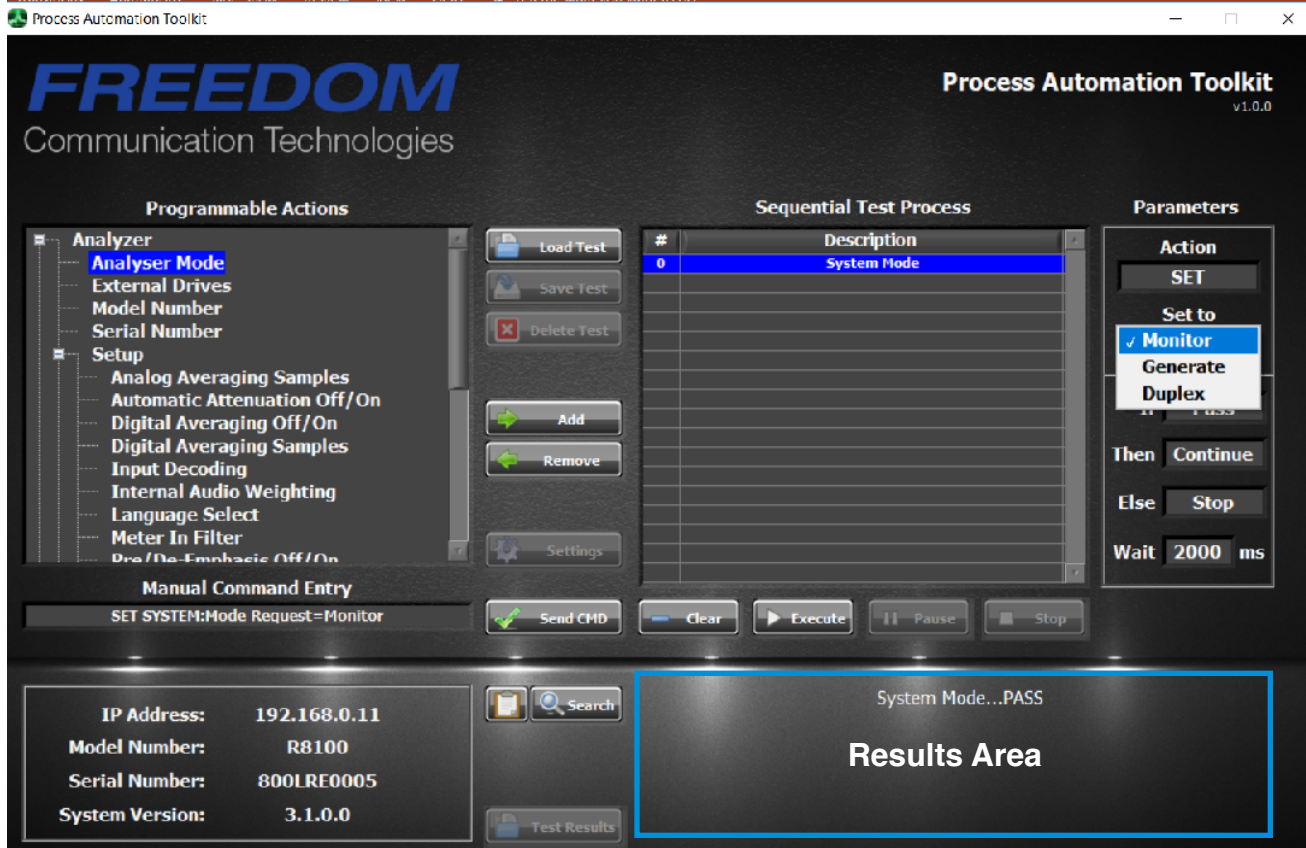
Execute

Runs the test script automatically.

(fig. 9)



(fig. 10)



(fig. 11)



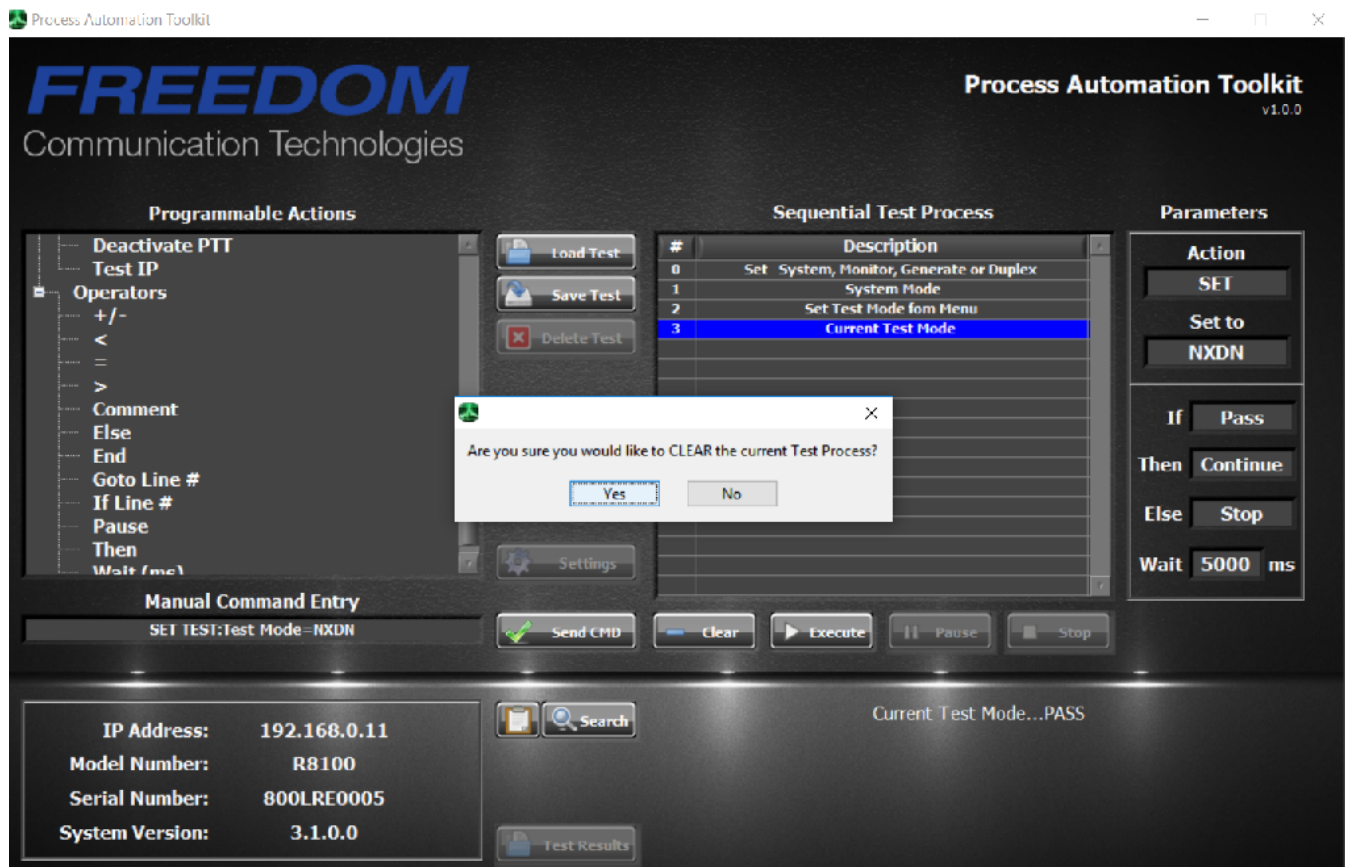
Command Control and Timing



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.

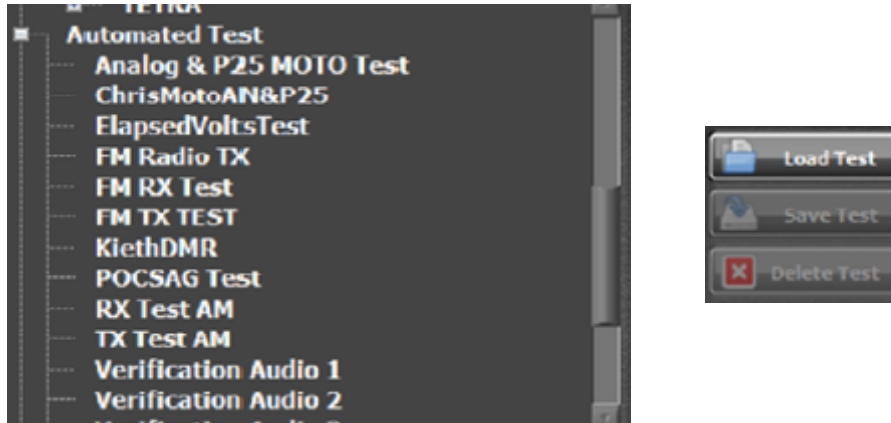
(fig. 12)



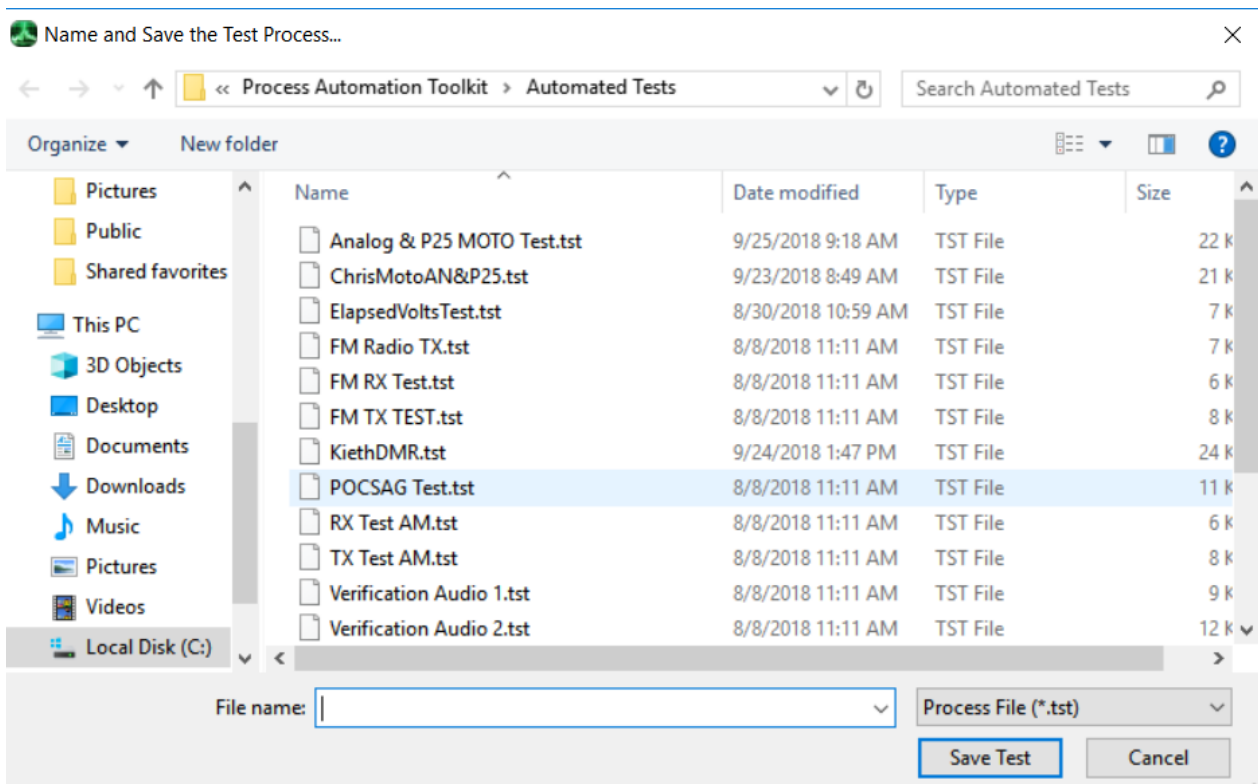
(fig. 13)



Automated Test Library



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



(fig. 14)

Process Automation Toolkit
v1.0.0

FREEDOM

Communication Technologies

Programmable Actions

- Deactivate PTT
- Test IP
- Operators
 - +/-
 - <
 - =
 - >
- Comment
- Else
- End
- Goto Line #
- If Line #
- Pause
- Then
- Wait (ms)

Buttons: Load Test, Save Test, Delete Test, Add, Remove, Settings

Manual Command Entry

SET TEST:Test Mode=Standard

Buttons: Send CMD, Clear, Execute, Pause, Stop

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

Current Test Mode...PASS

IP Address: 192.168.0.11
Model Number: R8100
Serial Number: 800LRE0005
System Version: 3.1.0.0

Buttons: Search, Test Results

(fig. 15)

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FREEDOM

Communication Technologies

Programmable Actions

- Deactivate PTT
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 - +/-
 - <
 - =
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- Comment
- Else
- End
- Goto Line #
- If Line #
- Pause
- Then
- Wait (ms)

Buttons: Load Test, Save Test, Delete Test, Add, Remove, Settings

Manual Command Entry

Buttons: Send CMD, Clear, Execute, Pause, Stop

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

Buttons: Search, Test Results

Select Radio Channel 2

(fig. 16)

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
- Wait (ms)

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	GFT Input Level
15	GFT Meter
16	RF Measured Power

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

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

#	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



```
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
```

(fig. 17)

The screenshot shows the 'Process Automation Toolkit' interface. The main window is titled 'Test Results' and displays the following information:

- Operator: Chris Lazy Sunday
- Time: 1:13 PM
- Date: 10/7/2018
- Analyzer: (empty)
- IP Address: 192.168.0.11
- Model Number: R8100
- Serial Number: 800LRE0005
- System Version: 3.1.0.0
- Test Name: IGethDMR

Below this information is a table with two columns: 'Description' and 'Data'.

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

At the bottom of the window, there are buttons for 'Open', 'Save', and 'Exit'. On the left side, there is a 'Programmable Actions' menu with options like 'Deactivate PTT', 'Test IP', 'Operators', etc. On the right side, there is a 'Parameters' section.

The screenshot shows the 'Process Automation Toolkit' interface. The main window is titled 'Test Results' and displays the following information:

- Operator: Chris Lazy Sunday
- Time: 1:13 PM
- Date: 10/7/2018
- Analyzer: (empty)
- IP Address: 192.168.0.11
- Model Number: R8100
- Serial Number: 800LRE0005
- System Version: 3.1.0.0
- Test Name: IGethDMR

Below this information is a table with two columns: 'Description' and 'Data'.

Description	Data
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

At the bottom of the window, there are buttons for 'Open', 'Save', and 'Exit'.