# Keysight TAP Training Lab 3 — Non-Programmer Training

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### Overview

TAP is designed to make it easy for programmers to develop test steps and procedures using Visual Studio. If you are a non-programmer, TAP offers some built-in steps that can help you control instruments. This exercise will introduce you to the basic built-in steps and the Command Expert plugin that can be a great productivity enhancer for non-programmers.

### Lab Objectives

The objectives of this lab are to:

- Understand how TAP Test Steps can be seamlessly created using using Command Expert and the TAP Command Expert Plugin.
- Learn how the **built-in SCPI steps** can be used for simple instrument control.
- See how to interact with a Keysight analyzer (MXA) and generator (MXG) using TAP. Familiarity with these instruments is NOT a prerequisite.

#### Prerequisites

This lab requires the following software:

- **Test Automation Platform (TAP)**: Download the latest version from Test Automation Platform Developer's System at www.keysight.com. TAP also requires:
  - **TAP license**, obtained through the TAP GUI upon first start.
  - Keysight License Manager (KLM), installed with TAP and used to manage your license.

For instructions on installing TAP, see *Keysight TAP Training Lab 1 — TAP GUI Introduction*.

- **Keysight Command Expert** 1.6 or above: Download the installer from Command Expert at www.keysight.com.
- Keysight IO Libraries 17.2 or later: Download the installer from [IO Libraries Suite} (https://www.keysight.com/en/pd-1985909/io-libraries-suite?nid=- 33330.977662.00&cc=DE&lc=ger) at www.keysight.com.
- **TAP Command Expert Plugin**: Download the plugin from http://plugins.tap.aalborg.keysight.com/. Installing the plugin is explained in this document.
- MXA Setup.iseq: a command expert sequence provided to you in an email or on a USB.

### Lab Setup

We begin this lab by installing the Command Expert plugin, configuring results listeners, and configuring instruments.

To get started, launch the TAP GUI:

- Select Windows Start > Keysight Test Automation Platform, or
- Double-click TAP\_PATH/Keysight.Tap.Gui.exe.

Note: In this document, TAP\_PATH refers to the TAP install directory, which is either:

- For **64-bit systems**: C:/Program Files/Keysight/TAP
- For 32-bit systems: C:/Program Files (x86)/Keysight/TAP

### Install TAP Command Expert Plugin

We will install the **TAP Command Expert plugin** using the TAP Package Manger. This plugin makes it possible for non-programmers to leverage Command Expert for creating custom test steps. From Command Expert, you can construct SCPI sequences and define input variables that will show up as properties (Step Settings) on the Command Expert step in the TAP GUI. Results/outputs from Command Expert are automatically stored as a results in TAP, when a database-based Result Listener is configured.

Follow these steps to install the latest version of TAP Command Expert plugin:

- 1. Copy the downloaded Command Expert. *version*. TapPackage to the TAP installation folder (TAP\_PATH).
- In the TAP GUI, select Tools > Plugin Package Manager to open TAP Package Manager. Notice that the Command Expert plugin appears at the bottom of your list, grayed out, meaning that it is downloaded but not installed:

- T	KEYSIGHT Package Mar	nager					?	_	I		$\times$
Bur	ndles Packages			CSV							
e	Name	Installed Version			8.7.270-rc+9dc06afe (Installed) 11/09					Unin	stall
~	CSV	8.7.270-rc+9dc06afe			More Information						
~	Demonstration	8.0.40+50e701d0		Description	Dependencies						
×	Licensing Components	1.0.31+0bed9d36	I.				stener that allows on data exchange				
✓ 🔒	REST-API	1.2.230-rc+0f1b2eaa	I	supported by consumer, business, and scientific applications. It is basically p text saved in a tabular format and the settings let you configure which separa							
✓ 🔒	Results Viewer	I	use: comma, semicolon or tabular.								
~	SDK	8.7.270-rc+9dc06afe	I	Status							
1	SDK Tools	8.7.270-rc+9dc06afe	I	Released							
1	SQLite and PostgreSQL	8.7.270-rc+9dc06afe	I	Organisation Keysight Technologies							
× .	TAP GUI Controls	8.7.270-rc+9dc06afe	I	, ,	5						
✓ 🔒	Timing Analyzer	8.7.270-rc+9dc06afe	I								
× .	WebRunner	1.0.67+550bfb8f	I								
1	Unpackaged		I								
	Command Expert										
Sea	ırch	c	۹								

3. Click on CommandExpert. Now you see the content of the CommandExpert package in the right

Bur	ndles Packages		Command Ex	pert						
Э	Name	1.0.28+d4c44390 06/19/2018 V Ins							Install	
~	CSV	8.7.270-rc+9dc06afe	Description	Plugins	Files	Dependencies				
<b>~</b>	Demonstration	8.0.40+50e701d0				sers to leverage C				
<b>~</b>	Licensing Components	1.0.31+0bed9d36		custom TestSteps that can communicate with instruments without requiring any programming knowledge.						
✓ 🔒	REST-API	1.2.230-rc+0f1b2eaa	Status							
< ₽	Results Viewer	8.7.270-rc+9dc06afe	Active Development							
~	SDK	8.7.270-rc+9dc06afe	Organisation							
~	SDK Tools	8.7.270-rc+9dc06afe		echnologies, I	nc.					
~	SQLite and PostgreSQL	8.7.270-rc+9dc06afe	Contacts tap.support	t@keysight.co	om					
~	TAP GUI Controls	8.7.270-rc+9dc06afe	Prerequisites							
✓ 🔒	Timing Analyzer	8.7.270-rc+9dc06afe	Command							
~	WebRunner	1.0.67+550bfb8f	Links							
<b>~</b>	Unpackaged		http://keysight.com/find/tap http://keysight.com/find/commandexpert							
	Command Expert									

Click the tabs to see the contents:

- The **Description** tab gives a general overview of the plugin.
- The **Plugins** tab show all the custom test steps, Instruments, DUTs, Result Listeners and other components contained in the plugin.
- The **Files** tab shows all the files included in the Package.
- The **Dependencies** tab shows if the plugin is dependent on any other packages.
- 4. Click Install. When the installation completes, close the TAP Package Manager.

#### **Configure Result Listeners**

For this lab you need an **SQLite Result Listener**, which is based on a lightweight database. It consists of a single file (stored on the local system) that encapsulates the full data set. If you already have a **SQLite Result Listener** configured (perhaps from previous lab) you can skip this section. You can see in the **Resource Bar** if an **SQLite Result Listener** is already configured:

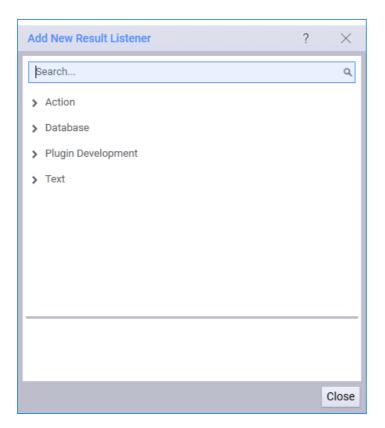
DUTs Add New Instrument	s PSU 🛛	Results	SQLite 🛛	CSV .	Log 🛛
-------------------------	---------	---------	----------	-------	-------

We need to configure where and how TAP stores results. Follow these steps to configure the **TAP Result Listener**.

1. In the TAP GUI, select **Settings > Results**. There are no result listeners configured by default.

Settings					?	$\times$
Engine	GUI	Results				
			1			
+	Click '+' to	o add an				
-	item.					
				ОК	Can	cel

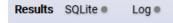
2. Click the + in the lower-left corner of the **Settings** window. A window with supported Result Listeners appears.



3. Click the arrows ( >) to expand the groups then click Add next to SQLite to add the SQLite Result Listener and click Add next to Text Log to add a Text Log Result Listener. Close the window when done.

Add New Result Listener	?	×
Şearch		Q
✓ Action		
Notifier		Add
✓ Database		
PostgreSQL		Add
SQLite		Add
✓ Text		
CSV		Add
Text Log		Add
		Close

Click **OK** in the Settings window. Now you should see two **Result Listeners** in the **Resource Bar** at the bottom of the TAP GUI:



### Using Command Expert

Keysight's Command Expert software provides fast and easy instrument control. It combines instrument commands, documentation, syntax checking, command execution, and code generation in one tool. Command Expert works with instruments that use Standard Commands for Programmable Instrumentation (SCPI), IVI-C, or IVI-COM drivers. In this lab we will focus on controlling instruments via SCPI.

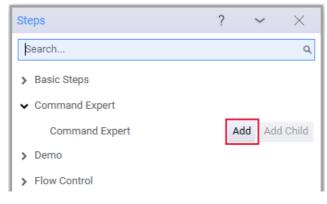
Follow these steps to get familiar with TAP Command Expert plugin.

### Accessing Command Expert

- 1. In the TAP GUI, select **File > New** to create a new test plan.
- 2. Add a Command Expert step:
  - Click the + button to open the Add New Steps dialog:

	Test Automation			
File Settin	gs Tools View	Help		
Test Plan Unt	itled			
Step: +	— Test Plan:	<b></b> > >	Repeat 👻	Completed in 0.0
Step Name	Verdict Duration	Flow	Step Type	
Click '+' to a	dd a step.			

• Expand the Command Expert group, then click Add to insert a Command Expert step.



- Close the dialog.
- 3. You now have a test plan with one **Command Expert** step. Select the step to see the **Step Settings** for this step. Notice that the settings must be edited in **Command Expert**:

KEYSIGHT Test Automation					?	_		$\times$
File Settings Tools View Help						8.7.27	70-rc+9a	lc06afe
Test Plan Untitled*		?	~	$\times$	Step Settings	?	~	$\times$
Step: 🕂 — Test Plan: 🔺 ▷ 🕅 🗌 🗸 Repeat 👻	Completed in 0.00 s				Edit in Command Expert			
Step Name Verdict Duration Flow S	tep Туре			<b>+</b> ↑				
Command Expert	ommand Expert \ Command Expert							

4. Click on Edit in Command Expert to launch Command Expert in add-on mode:

	ntitled - Ke Edit Play		mmand Expert								×
	v <mark>e Instru</mark> one	ments	Command Se	arch		Command					_
	nstrume	nts									
	6700 CPI-99										
	CIT 55										
Nev	v Instrum	ent									
	( <b>6</b>				)						 
	Seque	nce									2
Nariables				I X	Name: Untitled		Description:	<ul> <li>No description</li> </ul>	yet.		
l s		Status	Instrument			Code			Resul	s	
	1 2										
	3										
	4										
IJ	5										_J
					Ex	xport to Add-On	Cancel				
Ready											

**Note**: Command Expert can also be launched in stand-alone mode, which **does not** allow you to export steps/commands to the TAP GUI. When using Command Expert with TAP, always launch it from the TAP GUI.

We are now ready to edit in Command Expert.

### Connecting to an Instrument

In this lab we will build a simple **Command Expert sequence** to control the MXG. First we must connect to the instrument. Follow these steps:

1. In Command Expert, click the **New Instrument...** button:

🤄 Untitled - Keysight Co	ommand Expert		_	×
File Edit Play Help				
Active Instruments	Command Search	Command		
None				
My Instruments				
N6700				
SCPI-99				
New Instrument				
Litew instrument				 
Sequence				-7

- 2. Connect to your MXG
  - Select Connect to a real instrument, then click Next:

堡 New Instrument	×
Choose the instrument connection type	
Connect to a real instrument	
○ Simulate an instrument connection	
< Previous N	lext > Cancel

• Now click Manually enter an instrument address:

C New Instrument	×
No instrument found	
No instruments were located. Choose how you want to proceed:	
○ Search again	
Manually enter an instrument address	
○ Simulate instrument	
< Previous	Next > Cancel

• Enter the MXG instrument's IP address, then click Next:

🖲 New Inst	rument	×
Enter th	he instrument address	
address	TCPIP:: <mxg ip="">:: INSTR</mxg>	
	The address of the instrument can be:	
	<ul> <li>An IP address such as: 192.168.0.1</li> <li>A hostname such as: MyInstrument.MyDomain.com</li> <li>A VISA resource such as: GPIB0::10::INSTR</li> <li>A VISA alias such as: USBInstrument1</li> </ul>	
	For additional help launch Keysight Connection Expert.	
	< Previous Next > Cancel	

Note that you can also simulate a connection, however this is not covered in this lab.

3. Select the **MXG Signal Generators** with the appropriate **FW Version** (most recent in this case) and **Type** set to **SCPI**, then click **Next**:

hoose the instrument command set				
Search: Type a search term and press Enter to search				C
Command Set Name 🔺	FW Version	Туре 🍸	Status 🍸	
M8070A High-Performance BERT	3.0	SCPI	Available	
M8070A System Software	S4.0	SCPI	Available	
M8070A System Software	S4.5	SCPI	Available	
M8190 Arbitrary Waveform Generator	3.1.0.0	SCPI	Available	e
M9485A PXIe Vector Network Analyzer	A.11.60.00	SCPI	Available	
MXG Signal Generators	A.01.44	SCPI	Available	4
MXG Signal Generators	A.01.80	SCPI	Available	
Name: MXG Signal Generators	Type:	SCPI		
FW Version: A.01.80	Author:			
Status: Available	Supported		82A, N5183A, N5161	А,
Description: MXG Signal Generators	Models:	N5162A		

4. Enter the instrument **name** and **description** (optional), then click **Next**:

New Instrume	nent	Х
Enter the	instrument name and description	
		_
name	* MXG	
description	Keysight Generator	
	< Previous Next > Cancel	

5. In the final dialog, click **Add to My Instruments** to add the instrument to Command Expert:

堡 New Instrument	×
Confirm the	connection information
name connection info command set description	MXG Simulate using default values MXG Signal Generators / A.01.80 Keysight Generator (< Previous) Add to My Instruments Cancel

6. Now that the MXG is added to the list of instruments, click the **Connect** button:

🔄 Untitled - Keysight Com	nmand Expert			Х
File Edit Play Help				
Active Instruments None My Instruments MXG N6700 SCPI-99	Name: Address: Command Set: Type: Supported Models: Description:	MXG MXG Signal Generators / A.01.80 SCPI N5181A, N5182A, N5183A, N5161A, N5162A Keysight Generator Identify Instrument		
New Instrument	Connect	Simulate Edit Clone Delete		

- 7. Command Expert now shows:

  - A list of Active Instruments (top left panel)
    A tree of SCPI commands in the Command Search panel (center section)
  - A list of **instrument commands** in the **Sequence** panel at the bottom

Untitled - Keysight Co File Edit Play Help	nmand Expert – 🗆 🗡				
Active Instruments	Command Search	Command			
MXG My Instruments MXG N6700 SCPI-99	Enter search terms here          MXG       Search       Recent         ABORt       ABORt         CALibration       DIAGnostic         DIJSPlay       INITiate         LXI       MEMory         OUTPut       ROUTe         [SOURce]       SYSTem         TRIGger       III	To select a command, click it in the pane to the le	ft, or enter its name here		
Sequence			C R		
Sequence	📄 🕆 📙 🗙 Name: Untitled	Description: 🔍 No description	n yet.		
5 Statu:		Code Signal Generators / A.01.80°)	Results Simulating		
Ready	E	xport to Add-On Cancel			

We are now ready to add SCPI commands to the sequence.

### Building the Test Step Command Sequence

Now we will create a command sequence that will reset the MXG, disable RF output, set the frequency and amplitude, and then send the signal. Follow these steps:

- 1. Add the **\*RST1** command, which resets most signal generator functions to factory-defined conditions:
  - In the **Command Search** panel, search (A) or navigate (B) to locate **\*RST1**. Note that the SCPI programming documentation for the command appears in the Command panel on the right (C).
  - Click **Add Step** to add a step to the sequence (D):

Untitled - Keysight Co	ommand Expert –			
File Edit Play Help				
Active Instruments	Command Search	Command		
MXG	RST A C	*RST		
My Instruments	MXG Search Recent	Command		
MXG	💻 🖪 *RST 🔼	*RST 🏠		
N6700	SYSTem:PRESet:PERSistent			
SCPI-99	B SYSTem:PRESet:ALL			
		Variables >> Add Step & Execute Add Step		
	SOURce:SWEep:FREQuency:     In TRIGger:SEQuence:TIMer	Command Reference		
	SOURce:FREQuency:REFerer			
	SOURce:RADIo:DMODulation	*RST		
	SOURce:CORRection:STATe			
	SOURce:MODulation:PM:BAN	Supported		
	SOURce:SWEep:GENeration	All Models		
	SOURce:MODulation:FM:DEV			
	SOURce:FREQuency:REFeren	* <mark>RST</mark>		
	SOURce:RADIo:MTONe:ARB: ¥	The Reset (RST) command resets most signal generator functions to factory-defined		
New Instrument		conditions		
Sequence				
	Name: Untitled			
Variables Status		Description: (v) No description yet.		
		Code Results		
	MXG (Connect "MXG", "", "MXG	Signal Generators / A.01.80") Simulating		
3				
4				
5				
	Ex	cport to Add-On Cancel		
Ready				

• The step is added to the sequence:

$\overline{\mathbf{O}}$	Sequer	ıce			c?
Variables				Name: Untitled Description: 💽 No description	yet.
les		Status	Instrument	Code	Results
	1	<b>v</b>	MXG	(Connect "MXG", "", "MXG Signal Generators / A.01.80")	Simulating
	2		MXG	*RST	
- 1	3				
	4				
	5				

- 2. Add the [STATe] command, which enables or disables the RF output on the instrument.
  - In the Command Search panel, navigate to output > [POWer] > [STATe].
     In the Command panel, enter **0** in the **state** field.

  - Click Add Step.

_	l - Keysight Co Play Help	mmand Expert – 🗆 X					×	
		<u>( </u>		<u> </u>				
	struments	Command Sea		Command				_
MXG		OUTPut C :OUTPut:STATe 0		Ге 0				
My Instru	uments	MXG Search Recent Command Query						
MXG		▶ 🛄 MM	EMory	OUTPut:STATe			5	
N6700		/ OUTPut						
SCPI-9	99		BLANking	→ state * <mark>0</mark>				
	MODulation PROTection (STATE) Add Step & Execute Add Step							
	ROUTE							
		<ul> <li>▷ [SO</li> <li>▷ STA</li> <li>▷ SYS</li> <li>▷ TRI</li> <li>▷ UNI</li> <li>□ VNI</li> <li>□ *CL</li> <li>□ *ES</li> </ul>	NTUS STem Gger IT .S	[:STATe] Supported • All Models				^
New Inst	trument	▲ ES		: <mark>OUTPut</mark> [:STATe] ON OFF 1 0 : <mark>OUTPut</mark> [:STATe]?			~	
Se Se	quence							<b>P</b>
→ Variables			Name: Untitled	Description: 💽 No description yet.				
les 📃	Status	Instrument		Code	Results			
1	<b>v</b>	MXG		Signal Generators / A.01.80") Sir	nulating			
2		MXG *RST						
4								
5								
	_					_		
			Ex	port to Add-On Cancel				
Ready								

- 3. Add the [cw] command, which sets the signal generator output frequency for the CW frequency mode.
  - In the Command Search panel, navigate to [source] > FREQuency > [CW].
  - In the **Command** panel, click the **Variables** >> button:

🔄 Untitled - Keysight Co	mmand Expert		- 🗆 X	
File Edit Play Help				
Active Instruments	Command Search Command			
MXG	OUTPut Q	:SOURce:FRE	Quency:CW	
My Instruments	MXG Search Recent	Command Query		
MXG	PROTection	SOURce:FREQuency:CW		
N6700 SCPI-99	The former		or a real number	
	I [SOURce]	Value * Enter an integer of a special value of		
BURSt     Image: Consection         Image: Consection				
	FREQuency	Command Reference		
	CENTer		•	
	FREQuency[:CW]			
	▷ □ LSPurs	Supported		
	MODE     MULTiplier	All Models		
	DFFSet	[:SOURce]:FREQuency[:CW] <val< td=""><td></td></val<>		
New Instrument	▷ □ REFerence     ¥	[:SOURCe]:FREQuency[:CW] <va. [:SOURce]:FREQuency[:CW]?</va. 	iue> <unit></unit>	
Sequence				
Variables Status	Name: Untitled	Description: 💉 No description	ı yet.	
Status		Code	Results	
1 🗸		Signal Generators / A.01.80")	Simulating	
2	MXG *RST MXG :OUTPut:STATe 0			
4	MXG :OUTPUL:STATE 0			
5				
	E	xport to Add-On Cancel		
Ready				

- Configure the variable as follows:
  - Use = Parameter
  - Name = Center Frequency [Hz]
  - Value = 2e9

Command
:SOURce:FREQuency:CW <center [hz]="" frequency=""></center>
Command Query
SOURce:FREQuency:CW
Use     Name     Value     Units       → value     Parameter     hcy [Hz]     * 2000000000     Default (HZ)
<< Variables Add Step & Execute Add Step

• Click Add Step. Now you have an input parameter as you can see in the left:

Variables	Seque	nce			Ľ
Input Parameters				Rescription: 💽 No.	description yet.
Center Frequenc 200000000 HZ		Status	Instrumen	Code R	esults
Output Parameters	1	~	MXG	(Connect "MXG", "", "MXG Signal Generators / A.01.80") Simulating	
none	2		MXG	*RST	
Local Variables	3	_	MXG	:OUTPut:STATe 0	
none	4		MXG	:SOURce:FREQuency:CW <center [hz]="" frequency=""></center>	
	5				

4. Add the [AMPlitude] command, which sets the RF output power:

- In the Command Search panel, navigate to [SOURce] > POWer > [LEVel] > [IMMediate] > [AMPlitude].
- In the **Command** panel, click **Variables** >>. Configure the variable as follows:
  - Use = Parameter
  - Name = Amplitude [dBm]
  - Value = -30
- Click Add Step.
- 5. Add a [STATe] command to enable RF output:
  - In the Command Search panel, navigate to outPut > [POWer] > [STATe]. In case this doesn't exists navigate to outPut > [STATe]
  - In the **Command** panel, click **<< Variables**.
  - Set the **state** field to **1**, then click **Add Step**.
- 6. You should now see:
  - Two input parameters in the lower left panel
  - Six steps (including the Connect step) in the Sequence panel

Variables	Seque	nce		
Input Parameters				Untitled Description: 🕑 No description yet.
Center Frequenc 200000000 HZ		Status	Instrumen	Code Results
(♥) Amplitude [dBm] -30	1	<b>v</b>	MXG	(Connect "MXG", "", "MXG Signal Generators / A.01.80") Simulating
	2		MXG	*RST
Output Parameters	3		MXG	:OUTPut:STATe 0
none	4		MXG	:SOURce:FREQuency:CW <center [hz]="" frequency=""></center>
Local Variables	5		MXG	:SOURce:POWer:LEVel:IMMediate:AMPLitude <amplitude< th=""></amplitude<>
none	6		MXG	:OUTPut:STATe 1
	7			

- 7. Click the **Play Sequence** button ( ) to run the sequence. The MXG will switch output off, set center frequency to **2GHz**, and then switch output on again.
- 8. In the Sequence panel Name field, enter MXG Setup:

>			Name: MXG Setup Desc	ription: 🕑 No description yet.
	Status	Instrumen	Code	Results
	~	MXG	(Connect "MXG", "", "MXG Signal Generators / A.01.80")	Simulating
	<b>v</b>	MXG	*RST	
	<b>v</b>	MXG	:OUTPut:STATe 0	
	<b>v</b>	MXG	:SOURce:FREQuency:CW <center [hz]="" frequency=""></center>	
	<b>v</b>	MXG	:SOURce:POWer:LEVel:IMMediate:AMPLitude <amplitude< td=""><td></td></amplitude<>	
	1	MXG	:OUTPut:STATe 1	

9. Click the **Export to Add-On** button at the bottom of the window:



10. This returns you to the TAP GUI, where the **Command Expert** step has been renamed to **MXG Setup** and is populated with SCPI commands and related properties. Select the **MXG Setup** step to inspect its step settings:

Test Plan Untitled*					?	~	×	Step Settings	? ~	$\times$
Step: 🕂 —	Test Plan: 🔺 🖒	🕅 🗌 🗸 Repeat 🖣		Completed in 0.0	0 s				Edit in Comma	nd Expert
Step Name	Verdict Duration	Flow	Step Tupe				+		Export Co	ode
Step Name	verdict Duration	FIOW	Step Type				Ŧ	✓ Instruments		
🖒 🗹 MXG Setup			MXG Setup					MXG	SCPI (TCPIP0::1	0.1 🗸
								✓ Input Parameters		
								Amplitude [dBm]	-30	
								Center Frequency [Hz]	200000000 HZ	Z

Notice the two input parameters from the Command Expert sequence.

11. Change the parameters and click **Run**. The MXG settings change. Notice the settings on the front panel of MXG:

FREQUENCY	AMPLITUDE	
2.000 000 000 00 GHz	-30.00	dBn
R L EXTREF		
	10/28/2016	20:16

12. Set the parameters back to original values (-30dBm/2GHz) and click **Run** once for subsequent steps to work properly.

### Adding More Details to the Test Step

The previously added test step does not show any description of the parameters. To add a description, follow the steps below:

- 1. Select the test step and click the **Edit in Command Expert** button.
- 2. When **Command Expert** opens, focus on the **Variables** dialog:

🔇 Variables	
Input Parameters	
Center Frequenc	200000000 HZ
Amplitude [dBm]	-30
Output Parameters	
none	
Local Variables	
none	
	J

- 3. In this dialog:
  - Expand the **Center Frequency** parameter.
  - Rename the Center Frequency input parameter to Settings/Center Frequency [Hz].
  - Enter a description.

<b>Variables</b>		
Input Parameters		•
Name:	Value (HZ):	
Settings\Center	200000000	
Туре:		
long		
Description:		
Sets the Center Fr Generator output	equency of Signal in Hz.	
	1 🖡 🗙	
• Amplitude [dB	im] -30	
Output Parameter	5	
none		۷

- 4. Similarly, expand Amplitude, and:
  - Rename it to Settings/Amplitude [dBm].
  - Add the description Sets the RF Output power in dBm.
- 5. Next we will enable/disable RF output on the instrument from the **Test Step**:
  - Select the last step of the sequence:

Seque	nce			Ľ
			Name: MXG Setup Desc	cription: 💽 No description yet.
	Status	Instrumen	Code	Results
1		MXG	(Connect "MXG", "", "MXG Signal Generators / A.01.80")	Simulating
2		MXG	*RST	
3		MXG	:OUTPut:STATe 0	
4		MXG	:SOURce:FREQuency:CW <settings\center [h<="" frequency="" th=""><th></th></settings\center>	
5		MXG	:SOURce:POWer:LEVel:IMMediate:AMPLitude <amplitude< td=""><td></td></amplitude<>	
6		MXG	:OUTPut:STATe 1	
7				
0				

- 6. In the **Command** panel, click the **Variables** >> button. Configure the variable as follows:
  - Use = Parameter
  - Name = Enable Output
  - Value = 1

Command		
	:OUTPut:STATe <enable output=""></enable>	
Command	Query	
OUTPut:ST	ATe	☆
	Use Name Value	
→ state	Parameter value Output * 1	V
<< Var	Update Step 6         Add Step & Execute         Add Step	

7. Click **Update Step 6**. The **Enable Output** parameter now appears as an **Input Parameter** in the lower left corner and has a value of 1:

Variables		
Input Parameters		•
Settings\Center	200000000 HZ	
Settings\Amplitu [	-30	
Enable Output	1	=
Output Parameters		
none		
Local Variables		
none		•

8. Click **Export to Add-On**. When the TAP GUI is visible, click on the **MXG Setup** step. You will see that the step now looks more structured. You can hover the mouse over the step properties or settings to reveal additional help text:

Step Settings	?	$\sim$	$\times$
	Edit in	Comman	d Exper
	E	xport Co	de
✓ Instruments			
MXG	MXG (T	CPIP0::1	0.1 🗸
✓ Input Parameters			
Enable Output	<		
✓ Settings			
Amplitude [dBm]	-30		
Center Frequency [Hz]	200000	0000 HZ	

### Command Expert Output Parameters in TAP

Now we will see how Command Expert output parameters can be used in TAP.

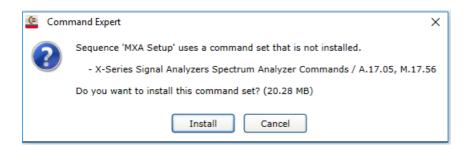
- 1. In the **TAP GUI**:
  - Add a **Delay** step to the test plan after the **MXG Setup** step.
  - Set the **Time Delay** of the Delay step to **1s**; this allows settling time.
  - Add a new Command Expert test step after the Delay step.

The resulting test plan should look like this:

Step Name	Verdict	Duration	Flow	Step Type	+ †
MXG Setup				MXG Setup	
🗘 🗹 Delay				Basic Steps \ Delay	
Command Expert				Command Expert \ Command Expert	

- 2. Select the Command Expert step and click Edit in Command Expert.
- In the Command Expert window, select File > Open Sequence (or press CTRL+O) and open the MXA Setup.iseq file (copied earlier from USB stick to a temp folder on your PC).

This loads a measurement sequence for the MXA. If you see the following dialog, you do not have the command set installed. Click **Install**:



4. Notice that the sequence already contains some input parameters:

🔇 Variables		Seque	nce			Ľ
Input Parameters	<u> </u>				Vame: MXA Setup D	escription: 🕑 No description yet.
Points 101			Status	Instrumer	Code	Results
♥ Center Freq [Hz] 200000000	=	1		N9020A	(Connect "N9020A", "", "X-Series Signal Analyzers Spec	Simulating
		2		N9020A	*RST	=
Span [Hz] 2000000		3		N9020A	:INSTrument:SELect SA	
Output Parameters	- 1	4		N9020A	:SENSe:FREQuency:CENTer <center [hz]="" freq=""></center>	
		5		N9020A	:SENSe:FREQuency:SPAN <span [hz]=""></span>	
none	۷J			NOODOA	CENCarCWEasyDOINte - Daister	v

- 5. In the Sequence panel, select Step 1: (Connect...)
- 6. In the **Command** panel, make sure that the correct **address** and **command** set are used:
  - Click the  $\boxed{\mathbb{Z}}$  icon to set the **IP address** of MXA in your configuration.

(Connect "N9020	A", "", "X-Series Signal Analyzers Spectrum Analyzer Commands / A.17.
→ name	* N9020A
→ address	Enter instrument address or leave blank to simulate
command set	* X-Series Signal Analyzers Spectrum Analyzer Commands / A.17.05, M.1 🔽
→ description	Optionally, enter a description
	Update Step 1

- In the Connect Step Address dialog, select Connect to a real instrument, then click Next.
- If you have access to an MXA, click Manually enter an instrument address, enter the IP address of the MXA in your setup, then click Next.
- Click Confirm.
- For command set, select the **X-Series Signal Analyzers Spectrum Analyzer Commands** with the matching (or most recent) FW version.
- Click Update Step 1.
- 7. Run the sequence by clicking the **Play Sequence** button (  $\blacktriangleright$  ).

You will see that the last SCPI query (READ:SANalyzer?) in the sequence returned a number of values. Click on that step in the sequence and read the documentation in **Command** panel to see that the command returns points as an array of X/Y pairs containing frequency and amplitude.

- 8. Now we will configure this Command Expert step to generate output values, which will be stored as results by the **TAP test step**:
  - In the Command panel, click **Variables >>**:

Command					
:READ:SANalyzer1?					
Query (BlockReal32)	Query (BlockReal64) Query (AsciiReal) Query (BlockInt32)				
READ:SANalyzer?	☆				
This syntax has required formatting commands         Add & Execute Them       Add Them to Sequence					
→ SANalyzer <n></n>	1				
🖛 sAnalyzer	Clicking Add Step & Execute will return a list of comma separated real nu				
Variables >>	Update Step 9 Add Step & Execute Add Step				

- Configure the **sAnalyzer** variable (notice it is an output variable, indicated by the 👘 icon):
  - Use = Parameter
  - Name = Spectrum

Command					
:READ:SANalyzer1?					
Query (BlockReal32) Query (BlockReal64)	Query (AsciiReal)	Query (BlockInt32)			
READ:SANalyzer?		$\Diamond$			
This syntax has required formatting commands         Add & Execute Them         Add Them to Sequence					
→ SANalyzer <n> V</n>	ime <u>Value</u> 1				
🗲 sAnalyzer 🔽	Clicking A	Add Step & Execute will return a li			
< Variables Update Step 9	Add Step & Ex	Add Step			

• Click **Update Step 9**. This adds an output parameter to the variables of this sequence:

Variables	
Input Parameters	
<ul> <li>Points</li> </ul>	101
Center Freq [Hz]	200000000
🕑 Span [Hz]	2000000
Output Parameters	
<ul> <li>Spectrum</li> </ul>	
Local Variables	
none	
	J

- 9. The values returned by this SCPI query are formatted as an array of X/Y pairs. You need to add some extra information so that TAP can make proper use of the data:
  - Expand the **Spectrum** output parameter then expand the **Data Format** group.
  - Set Data Format to Interleaved DataArray 2D as the data we get is returned pairwise.
  - In Field1 type Frequency [Hz].
  - In Field2 type Amplitude [dBm].

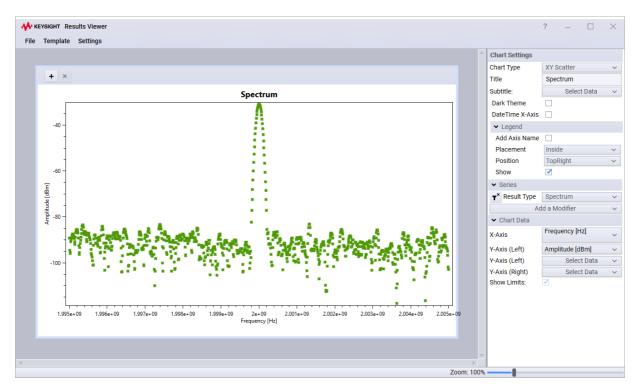
Variables			
Output Parameters	s	•	
$\odot$			
Name:	Value:		
Spectrum	[199000000,-88.3		
Туре:			
double[]			
Description:			
$\odot$			
Data Format:	Interleaved Da ¥	≡	
Field1:	Frequency [Hz]		
Field2:	Amplitude [dBm]		
	1 U X		
Local Variables			
none		•	

10. Click **Export to Add-On**. In the TAP GUI, you will see the renamed step in the **Test Plan** panel:

Step Name	Verdict	Duration	Flow	Step Type	
🔷 🗹 MXG Setup		_		MXG Setup	
🔷 🗹 Delay				Basic Steps \ Delay	
🛆 🗹 MXA Setup				MXA Setup	

- 11. Click on the **MXA Setup step** and notice the Step Settings.
- 12. Let's look at some results:

- Click Run, then select **Tools > Results Viewer** to see the spectrum plot. After inspecting the results, close the viewer.
- Increase the number of points in the spectrum from **101** to **1001**.
- Click **Run** again, then open **Results Viewer** to see the spectrum plot with more points:



- After inspecting the results, close the viewer.
- 13. The **Command Expert Test Steps** in TAP can be used like any other step in TAP. Now we will make the test plan sweep over the frequencies of the MXG:
  - In the TAP GUI, add a Sweep Loop (Range) step below all other steps.
  - Move the three previous steps (Setup MXG, Delay, and Setup MXA) into the Sweep Loop (Range) step, so they become child steps of it. To do this, hold CTRL and click on each of the three steps. When they are selected, drag-and-drop them onto the Sweep Loop (Range) step. The test plan now looks like this:

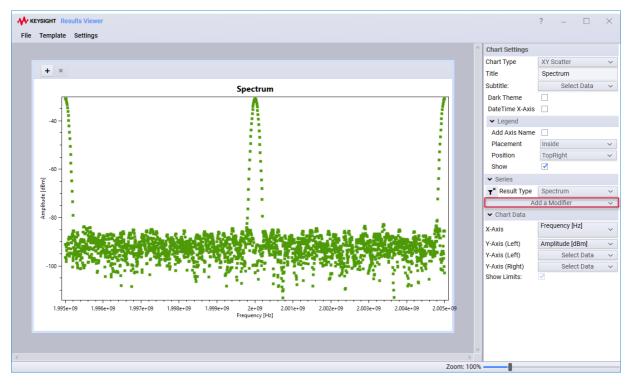
		Step Name	Verdict	Duration	Flow	Step Туре	*
(	2	🗸 Sweep Loop (Range)		-		Flow Control \ Sweep Loop (Range)	
	þ	MXG Setup				MXG Setup	
	φ	🗸 Delay				Basic Steps \ Delay	
	0	🗸 MXA Setup				MXA Setup	

- Click on the **Sweep Loop** step and set the Step Settings as follows:
  - Sweep Parameter Center Frequency [Hz]
  - Behavior Linear
  - Start 1.995e9
  - Stop 2.005e9
  - Step Size 5e6

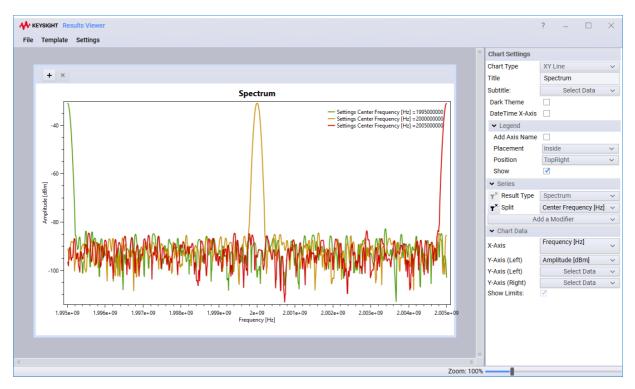
The resulting step settings are:

Step Settings	? ~	$\times$
Sweep Parameters	Center Frequency [Hz]	$\sim$
Behavior	Linear	$\sim$
Start	1995000000	
Stop	2005000000	
Points	3	
Step Size	5000000	
Current Value	2005000000	

• Run the test plan, then open TAP Result Viewer to see the spectrum plot:



- 14. You can split the data by adding a split modifier:
  - In Chart Settings under Series, click Add a Modifier and select Split.
  - Select Settings > Center Frequency [Hz] for the split.
  - Set Chart Settings > Chart Type to XY Line. Now the chart looks like this:



- Close TAP Result Viewer.
- 15. Now that you have set up the MXG and MXA for your tests, you want to start coding to do some more advanced logic for the MXG. Programmers can get a head start by simply exporting the code, which can then be expanded to cover more specific needs:
  - Click the **Setup MXG** step.
  - In Step Settings, click Export Code:

Step Settings	?	$\sim$	$\times$	
	Edit in	in Command Exp		
	Export Code			

This exports the step's logic as C# source code (\*.cs) to file at the location of your choosing. Save this file.

Inspect the file's content in a text editor. Notice the similarities with data/configuration from Command Expert.

#### This completes the TAP Non-Programmer exercises.

We hope you see the power of TAP and see how easy it is to interact with instruments without writing a single line of code, and that you will start using TAP for studies, projects and demonstrations! If you are curious and have time, turn the page for a few more tricks.

## **Bonus Exercise**

### **Configure Instruments**

This bonus exercise requires two bench instruments: an analyzer and a generator. Let's set them up.

- 1. In the TAP GUI, select **Settings > Bench > Instruments** to open the **Bench Settings** window.
- 2. Click the + button in the lower-left corner of the **Bench Settings** window:

Bench Settings		?	$\times$
Profile: Default	* ×	₽	¢
Connections DUTs Instruments			
+ Click '+' to add an			
item.			
	ОК	Ca	ncel

3. In the **Add New Instrument** window, which lists supported **Instruments**, add **two** instances of the **Generic SCPI Instrument** by clicking the **Add** button **twice**:

Add New Instrument	?	$\times$
Şearch		٩
> Demo		
Generic SCPI Instrument		Add
Click twice to add two instances		
		Close

- 4. Close the **Add New Instrument** window.
- 5. In the Bench Settings window:
  - Double-click the SCPI and SCPI1 instruments, and rename them MXA and MXG respectively.
  - $\circ~$  Select each instrument and configure the VISA Address to:
    - MXA TCPIP::<MXA IP>::hislip0::INSTR
    - MXG —TCPIP::<MXG IP>:: INSTR

Bench Se	ttings							?		×
Profile:	Defaul	lt				~	*	×	€	¢
Connecti	ons	DUTs	In	struments						
МХА				Gener	ic SCPI Instrument					
MXG	~	Common								
	VI	SA Address		TCPIP0::1	0.114.182.124::his	lip0::INS	STR			~
	VI	SA I/O Timeo	ut	2 s						
	>	Locking								
	>	Debug								
+										
-										
							ОК		Car	ncel

6. Click **OK** to accept the changes. You should now see the instruments in the **Resource Bar** of TAP GUI: **DUTS** Add New **Instruments** MXA • MXG • **Results** SQLite • Log •

### Using the SCPI Step

We will look into **the SCPI step**, a built-in TAP step for working with SCPI-based instruments. This step:

- Lets you send a single **SCPI command** or **query** to any SCPI instrument, thus enabling you to perform basic SCPI communication without doing any programming.
- Enables you to interpret the response of a SCPI query and set the test plan verdict based on that
- Provides additional features that can be used to generate a verdict and results based on text matching rules

#### Using the Step

- 1. In the TAP GUI, click **File > New** to create a new test plan.
- Click the + button, then click Add next to the SCPI step from the Basic Steps category. Close the dialog.

File Settings Tools View Help					07	270-rc+9	donea
File Settings 1001s view Help					0.7	270-10+9	ucubal
Test Plan Untitled		?	· • ×	Step Settings	?	$\sim$	$\times$
Step: 🕂 — Test Plan: 🔟 🖂	Steps	? ~ X	n average)				
Step Name Verdict Duration Flo		۰ ۲ ۸ ۹	÷				
Click '+' to add a step.							
	✓ Basic Steps						
	Delay	Add Add Child					
	Dialog	Add Add Child					
	Log Output	Add Add Child					
	Run Program	Add Add Child					
	SCPI	Add Add Child					
	Set Verdict	Add Add Child					
	Time Guard	Add Add Child					
Log	✓ Command Expert				?	$\sim$	$\times$
✓ Errors 0 ✓ Warnings 0 ✓ Information	Command Expert	Add Add Child	So	ources - Search	• √ Filter →	🗸 🗸 Auto	Scroll
L1:36:23.302 Summary MXA Setup L1:36:23.302 Summary MXG Setup	> Demo						
11:36:23.302 Summary Delay 11:36:23.302 Summary MXA Setup	> Flow Control						
11:36:23.302 Summary MXG Setup 11:36:23.302 Summary Delay 11:36:23.302 Summary MXA Setup	✓ KeysightDemo	v					
11:36:23.382       Summary         11:36:23.380       Long         11:36:23.357       SCPI         11:36:23.357       SCPI         11:36:23.450       SQLite         11:36:23.460       SQLite         11:36:23.466       SCPI         11:36:23.466       SCPI         11:36:23.466       SCPI         Saved test plan to C	<ul> <li>Sends a SCPI (Standard Comma Instruments) command or query queries, it processes the result w</li> </ul>	to a SCPI instrument. For vith regular expressions.					
<							>

3. Click on the SCPI step in the Test Plan panel to see the Step Settings:

Fest Plan Untitled*	?	$\sim$	$\times$	Step Settings	?	$\sim$	$\times$
Step: 🕂 — Test Plan: 🚢 🕨 🕅 🗌 🗸 Repeat 👻	Completed in 3.43 s (0% faster than a	average)		✓ Common			
Step Name Verdict Duration Flow	Step Tupe		+	Instrument	MXA (TCPIP0::1	0.114.182.	57: 🗸
Step Name Verdict Duration Flow	Step Type		Ť	Action	Query		~
	Basic Steps \ SCPI			Command	*IDN?		
				Add to Log	<ul><li>✓</li></ul>		
				Log Header			
				> Set Verdict			
				> Results			

- 4. Set the settings as follows:
  - Instrument Select MXA
  - Action Select **Query**
  - Command Copy and paste SYSTem:OPTions?
  - Add to Log Enable
  - Log Header Copy and paste **Installed options**:

The resulting step settings are:

Step Settings	?	~	$\times$
✓ Common			
Instrument	MXA (TCPIP0::10.1	14.182.	57: 🗸
Action	Query		~
Command	SYSTem:OPTions?	?	
Add to Log	<		
Log Header	Installed options:		
> Set Verdict			
> Results			

5. Click **Run**. The log should show a list of options installed on the MXA:

KEYSIGHT Test Au													
File Settings Tool	s View	lelp									8.7.27	70-rc+9d	C068
Test Plan Untitled*						?	$\sim$	$\times$	Step Settings		?	$\sim$	$\times$
Step: + - Te	est Plan: 🛛		🗸 Repeat 📼		Completed in	n 624 ms			✓ Common				
Step Name	Verdict D	uration Flow		Step Type				¥	Instrument	MXA (TCF	PIP0::10.1	14.182.5	7: •
	verdict D	Ination Flow		Step Type				Ŧ	Action	Query			
SCPI		47.1 ms		Basic Steps \	SCPI				Command	SYSTem:	OPTions?		
									Add to Log	<ul> <li>Image: A start of the start of</li></ul>			
									Log Header	Installed	ontione:		
											options:		
									Set Verdic	t			
									> Results				
.og											?	~	
Ŭ.	/arnings 0	Information	17 🗆 Debu	ia 12				So	ources - Sea	rch ▼ √ F		~ V Auto S	
Errors 0 V	Varnings 0	✓ Information	n 17 🗌 Debu	ıg 12				So	ources 🕶 Sea	rch ▾     √ F		∼ √ Auto S	Scro
<ul> <li>✓ Errors 0</li> <li>✓ W</li> <li>2:40:08.779</li> <li>TestPlar</li> <li>2:40:08.780</li> <li>TestPlar</li> </ul>	n n Starting	TestPlan 'Untit	Led' on 11/30/20		1 of 1 TestStep	s enabled.		So	uurces ▼ Sea	rch ▾ ─ ✓ F		∼ √ Auto S	
✓ Errors 0 ✓ W 2:40:08.779 TestPlar 2:40:08.780 TestPlar 2:40:08.785 Log	Starting Resource	TestPlan 'Untit "Log" opened. [:	led' on 11/30/20 289 us]	018 12:40:08,		s enabled.		So	ources + Sea	rch ▾     √ F		∽ √ Auto S	
✓ Errors 0 ✓ W 2:40:08.779 TestPlar 2:40:08.780 TestPlar 2:40:08.785 Log 2:40:08.792 SQLite	Starting Resource Resource	TestPlan 'Untit	led' on 11/30/20 289 us] Database.TapResu	018 12:40:08, ults)" opened.	[7.86 ms]	s enabled.		So	ources • Sea	rch ▾ ∨ F		∼ √ Auto S	
2:40:08.779 TestPlar 2:40:08.780 TestPlar 2:40:08.785 Log 2:40:08.792 SQLite 2:40:09.306 MXA 2:40:09.306 MXA	Starting Resource Resource Now conne MXA Simul	TestPlan 'Untit: "Log" opened. [: "SQLite (Sqlited cted to: Keysig ation Connected	led' on 11/30/20 289 us] Database.TapRess ht Technologies	018 12:40:08, ults)" opened. ,N9020A,MY5020	[7.86 ms] 0901,A.19.55			So	ources 🕶 Sea	rch 🔻 🗸 F		∼ √ Auto S	
✓ Errors 0 ✓ W 2:40:08.779 TestPlar 2:40:08.780 TestPlar 2:40:08.785 Log 2:40:08.792 SQLite 2:40:09.306 MXA 2:40:09.306 MXA 2:40:09.306 MXA	Starting Resource Resource Now conne MXA Simul Resource	TestPlan 'Untit: "Log" opened. [: "SQLite (Sqlitel ccted to: Keysig ation Connected "MXA (TCPIP0::10	led' on 11/30/20 289 us] Database.TapRess ht Technologies	018 12:40:08, ults)" opened. ,N9020A,MY5020	[7.86 ms] 0901,A.19.55			So	uurces - Sea	rch 🕶 🗸 F		∼ √ Auto S	
✓ Errors 0 ✓ W 2:40:88.779 TestPlar 2:40:88.780 TestPlar 2:40:88.780 Log 2:40:80.785 Log 2:40:80.792 SQLite 2:40:90.306 MXA 2:40:90.306 MXA 2:40:90.306 MXA 2:40:90.358 TestPlar 2:40:90.357 TestSteplar	Starting Resource Resource Now conne MXA Simul Resource SCPI star SInstalled	TestPlan 'Untit: "Log" opened. [: "SQLite (Sqlitel cted to: Keysig ation Connected "MXA (TCPIP0::1 ted. options:"526,8:	led' on 11/30/20 289 us] Database.TapRess ht Technologies 0.114.182.57::h: 25,BBA,EA3,EMC,I	018 12:40:08, ults)" opened. ,N9020A,MY5020 islip0::INSTR)	[7.86 ms] 0901,A.19.55 " opened. [521			So	urces ▼ Sea	rch 🔻 🗸 F		∼ √ Auto S	
✓ Errors 0 ♥ W 2:40:88.779 TestPlar 2:40:88.780 TestPlar 2:40:88.785 Log 2:40:88.785 Log 2:40:99.386 MXA 2:40:99.386 MXA 2:40:99.380 MXA 2:40:99.358 TestPlar 2:40:90.397 TestSter 2:40:90.387 TestSter	<ul> <li>Starting Resource Resource Now conne MXA Simul Resource</li> <li>SCPI star</li> <li>SCPI comp</li> </ul>	TestPlan 'Untit' "Log" opened. [: "SQLite (Sqlitel cted to: Keysig ation Connected "MXA (TCPIP0::10 ted. options:"526,B: leted. [47.1 ms	led' on 11/30/20 289 us] Database.TapRess ht Technologies 0.114.182.57::h: 25, BBA, EA3, EMC, J	018 12:40:08, ults)" opened. ,N9020A,MY5020 islip0::INSTR) ESC,P26,PFR,SS	[7.86 ms] 0901,A.19.55 " opened. [521 D,PC6,W7X"			So	ources • Sea	rch 🔻 🗸 F		∼ √ Auto S	
♥ Errors 0 ♥ ₩ 2:40:08.779 TestPlan 2:40:08.785 Log 2:40:08.785 Log 2:40:08.792 SQLite 2:40:09.306 MXA 2:40:09.306 MXA 2:40:09.305 TestPlan 2:40:09.397 TestPlan 2:40:09.406 Summary	Starting Resource Resource MXA Simul Resource SCPI star SCPI comp	TestPlan 'Untit: "Log" opened. [: "SQLite (Sqlitel cted to: Keysig ation Connected "MXA (TCPIP0::1 ted. options:"526,8:	led' on 11/30/20 289 us] Database.TapRess ht Technologies 0.114.182.57::h: 25, BBA, EA3, EMC, J	0 018 12:40:08, ults)" opened. ,N9020A,MY5020 islip0::INSTR) ESC,P26,PFR,SS 0/2018 12:40:0	[7.86 ms] 0901,A.19.55 " opened. [521 m D,PC6,W7X" 8			So	urces ▼ Sea	rch 🔻 🗸 F		Ƴ ∀ Auto S	
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#### Setting a Verdict

- 1. In the **Step Settings** panel for the **SCPI** test step, expand the **Set Verdict** group. This reveals options that can be used to test the output of a SCPI query. Configure the step as follows:
  - Instrument Select MXG
  - Action Select Query
  - Command Copy and paste \*IDN?
  - Add to Log Enable
  - Regular Expression Enable it and enter N9020A

The resulting settings are:

Step Settings	? ~ ×
✓ Common	
Instrument	MXG (TCPIP0::1 🗸
Action	Query 🗸
Command	*IDN?
Add to Log	<ul><li>✓</li></ul>
Log Header	Installed options:
✓ Set Verdict	
Regular Expression	✓ N9020A ?
Step Verdict on Match	Pass 🗸
Step Verdict on No Match	Fail 🗸
> Results	

2. Click **Run**. While the test is running, you see a large red **Failed** message in the log showing that the SCPI query resulted in a Fail verdict:

File Settings	Tools View	Help						8.7.270-rc+90	1006
Fest Plan Untitled*					? ~	×	Step Settings	? ~	×
Step: + -	Test Plan:		Repeat 👻	Completed in 118	ms		✓ Common		
							Instrument	MXG (TCPIPO	
Step Name	Verdict	Duration Flow	Step Type			¥			
4							Action	Query	
) 🗹 SCPI	• Fail	1.70 ms	<ul> <li>Basic Steps</li> </ul>	\ SCPI			Command	*IDN?	
							Add to Log	<ul> <li>Image: A set of the set of the</li></ul>	
							, i i i i i i i i i i i i i i i i i i i		
							Log Header	Installed opti	ons
							✓ Set Verdict		
							Regular Expression	N9020A	
							Step Verdict on Match	Pass	
							· ·		
							Step Verdict on No Match	Fail	
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This happens because in the previous step we configured the step to run for MXG. Since the verdict is set to Pass, if the query response matches with the model number of the MXA, the verdict is set to fail.

3. Now, in the SCPI step settings, change the instrument to an MXA and rerun the test plan. You should see a **Passed** verdict as shown below:

						_		8.7.270	10+900	.000
Test Plan Untitled	*			?	$\sim$	×	Step Settings	?	$\sim$	$\times$
Step: + -	Test Plan:	🗕 🕨 🖂 🗸	Repeat - Completed in 41.8 ms (	3% faster than av	verage)		✓ Common			
Step Name	Verdict	Duration Flow	Step Type			*	Instrument	MXA (T	CPIP0::	:1 \
('						Ť	Action	Query		`
) 🗹 SCPI	<ul> <li>Pass</li> </ul>	642 us	Basic Steps \ SCPI				Command	*IDN?		
							Add to Log	✓		
							Log Header			
							✓ Set Verdict			
							Regular Expression	<ul> <li>(.*)</li> </ul>		
							Step Verdict on Match	Pass		,
							Step Verdict on No Match	Fail		
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