

# **CyFlex ® Operator Display User Guide**

Version 4

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**Developed by TRP Laboratories** 



#### Version History

Version	Date	Revision Description
1	1/25/2016	Initial publication
2	7/10/2018	Formatting changes
3	3/26/2020	Retrofit to new template
4	1/30/2024	Rebrand to TRP Laboratories

#### **Document Conventions**

This document uses the following typographic and syntax conventions.

- Commands, command options, file names or any user-entered input appear in Courier type. Variables appear in Courier italic type.
  Example: Select the cmdapp-relVersion-buildVersion.zip file....
- User interface elements, such as field names, button names, menus, menu commands, and items in clickable dropdown lists, appear in Arial bold type.
  Example: Type: Click Select Type to display drop-down menu options.
- Cross-references are designated in Arial italics. Example: Refer to *Figure 1*...
- Click intra-document cross-references and page references to display the stated destination.

Example: Refer to Section 1 Overview on page 1.

The clickable cross-references in the preceding example are 1, Overview, and on page 1.

#### **CyFlex Documentation**

CyFlex manuals are available at <u>https://cyflex.com/</u>. View **Help & Docs** topics or use the **Search** facility to find topics of interest.



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# 1 Overview

The CyFlex<sup>®</sup> **Operator Display** gives users of CyFlex test systems a powerful way to control the test operations and monitor the relevant measurements, states, and performance parameters. It gives operators all of these functions in screens that are fully configurable. The **Operator Display** (OD) enables switching between multiple display screens, each with a graphical and/or tabular layout that can be customized to testing requirements and preferences.

Build up OD screens with output displays and input controls – text or graphic fields arranged in a grid layout. To switch among screens, click in a row of labeled tabs. The fields can be CyFlex Variable values with labels and optional units, arranged in rows and columns. They can be a variety of graphical displays, including dials, bars, sliders, toggle switches, and plots. Collections of these fields can be organized into "groups", rectangular areas of the screen holding display fields that you want to associate together.

The instructions for showing which variables, display types, and OD screens can be saved in configuration files and reloaded as desired. Save and load different configurations for the various test profiles which they follow.

# 1.1 Features

The **Operator Display Main** screen is configurable to enable display of a wide variety of information that continuously updates. *Figure 1* shows a sample screen. *Section 5 Sample Screens* on page 16 describes additional **Operator Display** screens.

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#### Figure 1: Sample Operator Display Main Screen

The screen contains:

- A virtual dashboard of gauges and LED indicators
- Multiple groups of related CyFlex Variables by label and value



- A row of labeled screen tabs at screen top left
- A pair of stripcharts
- A command line for entering CyFlex text commands
- Strings that describe the current GP Test.

*Figure 2* shows the **Operator Display Main** indicating the described screen elements. described



Refer to Section 3 Displays and Controls on page 7 for related information.

# 1.2 Terminology

The following terms are frequently mentioned in this document and described in *Table 1*.

#### Table 1: Terminology

Term	Description
Main Window	The complete window that appears when the application starts
Configuration	The display settings that determine which CyFlex data is displayed, in which screen location, and in which format
Menu Bar	The standard pulldown menus common to graphical interfaces for high-level functions, e.g. open, save, or load a configuration, select variables, exit
Toolbar	The optional row of labeled buttons that users can assign to run CyFlex or Linux commands
Screen Tabs	The row of labeled tabs to switch among display areas. Each tab is the entry point for a rectangular display area with its own configurable layout. Click any tab to display its portion of the screen



Term	Description
Display Area	A rectangular portion of the <b>Operator Display</b> screen configured to hold any of the standard Groups or Fields
Tab Display Area	The <b>Display Area</b> for a single tab.
Field	The <b>Display Area</b> for a single CyFlex Variable, either text or graphics.
Display	A field used only for display output and no user input.
Control	A field which is used for user input, either as text entry or graphical simulation of hardware controls, e.g. knob, button, dial.
Widget	The graphical element in a field that shows the image of a <b>Display</b> or <b>Control</b> , e.g. knob, dial, text input.
Group	A rectangular display area comprised of a set of fields, typically in some logical grouping, arranged in rows and columns with a common background color.
Command Line	A single text field and button that let you enter a CyFlex text command and then press the button to execute it.
String	A single line of text for display only.



# 2 Using the Operator Display

# 2.1 Starting and Stopping

### 2.1.1 Starting the Operator Display

Enter the command below from a Linux shell command prompt or add it to the CyFlex go script:

```
[user@cmx0nn directory]$ runqtui spec.ui
```

Where:

*spec*.ui is the name of a "specs" or configuration file, refer to *Section 2.3 Saving Configurations* below. Specify the *specs* portion of the filename as the ".ui file extension is standard for **Operator Display**.

#### ØNote:

The **Operator Display** window behaves like any other Linux window. It may be maximized, minimized, or closed with the standard buttons in the top right corner of the frame.

### 2.1.2 Stopping the Operator Display

Use any of the following methods to stop the program:

- 1. Close the top right window Close button
- 2. **Menu** select **File** –> **Exit** from the top left Menu Bar.
- 3. Keyboard press Ctrl-q

# 2.2 Locking Variable Selection

The runqtui command also has arguments that determine whether or not the Operator is permitted to change the CyFlex Variable selected for each field. This LockedVariable property is built into the graphical widget of each field. They may be enabled or disabled collectively depending on the command arguments:

#### rungtui Argument Function

-lnone	LockedVariable is ignored [default].
-ladmin	LockedVariable is based on current settings.
-lprop	LockedVariable is enabled.
-lall	LockedVariable is disabled.

# 2.3 Saving Configurations

The current configuration can be saved to the current specs.ui file or a different file and path using the **File > Save** or **File> Save As**... entries in the Tool Bar, respectively:

- File > Save saves the current configuration immediately
- File > Save As... saves the current configuration to the file and path selected in the popup *Save UI File* dialog.



The rungtui command has additional arguments to assign and limit saving the current configuration to a specs.ui file:

runqtui Argument	Function
-ssave	Changes to Variable selections are saved to current <code>specs.ui</code> file. [default]
-ssaveas	Changes to Variable selections may be saved to a selected specs.ui file.
-snone	Changes to Variable selections may <u>not</u> be saved to a file.
-nomenubar	Hide the menu bar and tool bar on the user interface.

### 2.4 Menu Bar

Once the program starts with a given configuration, there is minimal interaction required. However, users can perform several standard functions from the pulldown menus in the Menu Bar. Select the following:

<u>F</u>ile

- **Open** to open and load an Operator Display configuration file.
- Save to save the current Operator Display configuration.
- Save As to save the current Operator Display configuration to a selected file.
- **Exit** to stop the program and close its window.

#### <u>T</u>ools

• Toolbar Setup to display the Toolbar Setup dialog to create and edit the Toolbar.

Figure 3: Toolbar Setup



The Toolbar is an optional row of labeled buttons shown below the Menu Bar. Click the buttons to run CyFlex or Linux commands that have been assigned in the **Setup** dialog. Select a label, an icon, and a tooltip to any valid command, one row in the dialog for each command:

Label for the Toolbar Entry

Icon Image for the Toolbar Entry

**Command** Command to execute



**ToolTip** Text to display on mouse hovering

Wait Not used

Output Not used

• **Select Variables** to change the CyFlex Variable in a field. Open a list of Variables and drag your selection to the field

<u>H</u>elp

- Help Contents F1 to open the CyFlex Help Browser for Operator Display.
- About to display the About panel for the CyFlex Operator Display
- About Qt to display the About panel for Qt



# 3 Displays and Controls

The **Operator Display** screen displays the standard CyFlex layout of data fields as text and/or graphics. The fields are organized in rows and columns with related items grouped together for convenience. Each field is either a **Display** (output) or **Control** (input), or both. They range in complexity from a simple button to a full-featured stripchart with real-time graphics.

An additional **Screen Tabs** display is available for multiple panels. It includes a row of tabs at the top margin for selecting one among many screen tabs to display. **Screen Tabs** are not required but are quite versatile; they can show a large number of fields in a relatively small area by successive tabbing.

Screens can be configured to include Groups and **Display** and **Control** fields in virtually any arrangement. The **Qt Designer** utility (described separately) automates this process in a dragand-drop service. Different configurations can in turn be saved or loaded as specs files for different operating environments.

Individual fields can be tailored per preferences. Right-click on the field to choose either the **Variable Selection** or the **Edit Properties** dialog.

Choose the CyFlex Variable in the **Variable Selection** dialog for the field as in *Figure 4*. Select a Group of Variables and a **Variable** by label in the respective pull-down menus. **SubVariables** may be selected for CyFlex Statistical and Composite Variables.

	Figure 4: Variables Selection	
	Variable Selection	X
Group	ALL VARIABLES	•
Variable	alias_qt_1	-
SubVariable		-
	Ok Cance	:I

Choose the display properties of the field in the **Edit Properties** dialog as in *Figure 5* below. Properties appropriate to the field are listed with corresponding **Values** that you may choose.

Property	Value
CmxString	
name	not_set
nameFont	A [Sans Serif,
backColor	[0, 0, 0] (255)
valueFont	A [Sans Serif,
sampleRate	1000
readOnlyStr	🕱 True
displayAlias	🕱 True



**Operator Display** screens are comprised of fields. The following sub-sections provide a summary of the different types of fields.

### 3.1 Displays

1. **Group** is a rectangular area to group related **Display** and/or **Control** fields in rows and columns. Adjacent groups can be easily differentiated with contrasting background colors. Groups can be arranged on the screen in contiguous tiles to maximize the data display.

	Figure 6: Group	
_	GroupBox	

2. **Value** is a text Display to output a CyFlex Real, Integer, or Logical Variable. The field includes the Variable label and text value updated continuously.

air mtr0 n	
an_muo_p	
	-

It can also be used as a Control to input a value for a CyFlex Variable used as a parameter or a setpoint. Double-click on the value to display the **Enter New Value** dialog. Enter the text and click **OK** to set the new value. The value will be overwritten if the CyFlex Variable changes with each scan.

Figure 8: Enter New Value

dat for t	X 🕢 Enter new value for clnt_in_t _ ? 📀 🛞						
LINT_IN_T 102 DEG_F	Enter a new value for clnt_in_t in the form of DEG_F units.						
	V OK OK Cancel						

**3. Simple Value** is a text Display to output a CyFlex Real, Integer, Logical, or String Variable. Simple Value fields are designed to optimize screen space; they are often organized in rows and columns in a Group.



Simple Values are Display-only fields by default, but may be configured as input Controls as well to enter data where appropriate:

a. Right-click on the field.



b. Choose Edit Properties in the popup menu to display the dialog as in Figure 10.

roperty	Value
nameFont	A [Sans Serif,
hideUnits	🕱 True
group	not_set
flashing	False
readOnlyStr	False
displayAlias	🗶 True
horizontal	🕱 True

- c. As in *Figure 10*, scroll down to the **readOnlyString** in the **Property** column, click its **Value** checkbox to **False**, and close the dialog.
- d. Double-click on the value in the field to display the same **Enter New Value** dialog as with the **Value** field above.
- 4. **Bar** is graphical Display that emulates an analog bar display for CyFlex Real or Integer Variables. It includes the **Variable** label and dynamic sliding bar with scale to indicate the current value. The bar display can be oriented horizontally or vertically in its **Edit Properties** dialog.



5. **String** is a text Display to output a CyFlex String Variable. It includes the **Variable** label and value text string.

Figure 12: String Display

CtrlMada 0		
cuimode_0	OPEN LOOP	

Strings are Display-only fields by default but may be configured as input Controls as well to enter strings where appropriate. Use the same technique to enter a String value as the Simple Values field on page 8 with the **readOnlyString** property.



6. **Gauge** is a graphical Display to output a CyFlex Real or Integer Variables. It is particularly useful as an indicator of dynamic behavior. The field includes the **Variable** label with optional **Units**.



7. **LED** is a graphical Display that emulates various styles of LED lights to display the value of a CyFlex Logical Variable. It includes the Variable label and text describing the current Variable state.



8. **Stripchart** is a graphical Display that emulates an electromechanical stripchart recorder to display the values of multiple CyFlex Real or Integer Variables. It has the same display properties as the standalone Stripchart application. The Help Browser in Stripchart gives detailed information on its capabilities and properties.





### 3.2 Controls

1. **Command Line** is a single text field Control to enter a CyFlex command and then run it by selecting the **Execute** button. Click the down arrow to select from a list of previous entries.

ommand Line	

 Command Button is a labeled button Control. Press the button to execute a prescribed CyFlex command. The command should be easily identified by the label or adjacent text. Figure 17: Command Button Control

F	Rutto	n
	June	· · · ·

3. **Knob** is a graphical Control and Display that emulates an analog knob to input the value of any CyFlex Real or Integer Variable. It includes the **Variable** label and a text readout of the current Variable value.



4. **Pushbutton** is a graphical Control and Display that emulates various styles of on/off pushbuttons to set the value of a CyFlex Logical Variable. It includes the **Variable** label and text describing the current Variable state.



Figure 19: Pushbutton Control and Display



5. **Toggle Buttons** is a graphical Control and Display that emulates various styles of on/off toggle buttons to set the value of a CyFlex Logical Variable. It includes the **Variable** label and text describing the current Variable state.

#### Figure 20: Toggle Buttons Control and Display





# 4 Quick Display

**Quick Display** is both a standalone CyFlex display application and an embedded display in Operator Display. It gives you the ability to quickly create a tabular display of rows and columns of **Simple Value** fields. The resulting display can be embedded in a Group box in **Operator Display**.

# 4.1 Standalone Quick Display

Enter the command below from a Linux shell command prompt to configure a standalone Quick Display:

[user@cmx0nn directory]\$ quick\_display &

Starting with a blank array of numbered rows and columns, drag CyFlex Variables by name from the list provided to the array location of choice. The list supports a name filter in the **Filter** field. Current Variable properties are preserved but may be changed in **Operator Display** in their **Edit Properties** dialog. See *Figure 21*.

Figure 21: Quick Display Configuration

					Title														
itle :	Quick Display																		
ilter :													Rov	vs &	Colum	ns :	8	3	
																			-
	Variable	Owner	Туре	Units			1	2	3	4	5	6	7	8					
1	limit_specs		Logical		1	1													
2	clnt_ot_t		Real	deg_f		2													
3	test_3d	Compvar	Logical			3													
4	BrEmRtCO2		Logical			4													
5	F_exh_prt6_t		Logical			5													
6	wt_selection		Logical			6													
7	channel_170		Real	deg_F		7													
8	imt_vrbl	Compvar	Real	deg_F		8													
9	exh_prt5_t		Real	deg_F															
10	fpmp_in_t_FA		Logical																
11	egrv_in_p		Real	psi															
12	fpmp_in_t_ER		Real	deg_F															
13	dvshft_grsd	Compvar	Real	HR															
14	fr_wrt_delay		Integer	sec															
15	fpmp_in_t_FF		Real	%															
16	er_setpt	Compvar	Real	in_hg															
17	em cart78		Logical		~														
Res	et															<u>C</u> ance	el	<u>о</u> к	_

Use the **Rows & Columns** counter fields to add new rows or columns or remove blank bottom rows or right columns.

When the array is populated as desired, click the **OK** and to save the configuration to a file in the **Select File** dialog. The default directory is /specs/qt/. **Quick Display** will write two files with the selected name:



- 1. A file with a .ui extension for the standalone version
- 2. A file with a .qdl for the embedded version in **Operator Display**.

## 4.2 Operator Display Quick Display

Use the same technique to create a standalone **Quick Display** to embed a **Quick Display** in **Operator Display**. While the process uses Qt Designer and will not be covered fully here, it is reasonably straightforward in practice.

- 1. In Qt Designer, add a Group box to your **Operator Display** specs.
- Run Operator Display and open the specs file in the Open UI File dialog by selecting File -> Open.
- 3. Right-Click on the new Group and choose **Edit Display** in the popup menu to launch the **Quick Display** builder screen shown in *Figure 21* on page 13.
- 4. Drag in the **Variables** to the desired locations. Remove any blank rows and columns with the integer counters as needed.
- 5. Click **OK** to save the specs using the **Select File** dialog.
- 6. In **Operator Display**, right-click on the new **Group** and choose **Edit Properties** in the popup menu to launch the dialog.
- 7. Change the **FileName** value to the specs filename just chosen with the .qdl extension
- 8. Click Close.

The **Quick Display** selections will be embedded in the **Group** box in **Operator Display**. The box may be resized or moved in Qt Designer as desired.

# 4.3 Operator Display Designer

*Figure 22* on page 15 shows a sample of Qt Designer, the user interface tool used to create and change Operator Display screens. The <u>Qt Designer Manual</u> is authored by the Qt Project and is available online.









# 5 Sample Screens

## 5.1 Fuel Screen Tab

*Figure 23* shows a standard layout for a **Fuel screen** tab, including a set of text displays with a Command Line input and two Stripcharts at right. The text displays are **Simple Value** fields in Group boxes. A column of buttons indicates the current **Fuel System Mode**. String Variables of interest are also shown.



Figure 23: Fuel Screen Tab Sample Screen



# 5.2 Startup Display Screen Tab

*Figure 24* shows the **Operator Display** configuration with the **Startup Display** screen tab selected. It includes Group rows of LED indicators for CyFlex Logical Variables associated with Digital Inputs and Digital Outputs. The screen might be used during startup of the test article, after which another screen tab can be selected.



