

WHEN YOU NEED TO BE SURE

SGS

CyFlex® Knowledge Article

Function Codes

Author: Leonard Logterman

June 21, 2022

1 Introduction

The CyFlex system performs various mathematical and logical operations which are pre-defined and depend on certain measured inputs or output channels.

An example of this is the computation of horsepower. The computation is based on engine speed and torque which are both input measurements as below.

```
power = engine_speed * torque
```

A "Function code" is a unique character string which defines the usage of a channel. For the example above the codes are:

```
PERF_ENGINE_RPM and PERF_DYNO_TORQUE
```

The software uses these codes to find the appropriate measurement independent of which physical channel to which it is assigned.

2 Function Codes

This section describes the available function codes.

2.1 Digital Input Function Codes

2.1.1 INPUT_INTEGER

This is a special code indicating that the input channel specification applies to more than one input bit and that they are mapped to an integer variable.

This function code is used only by the [di_specs](#) application.

2.1.2 STARTER_DISABLE

This is the switch that the operator uses to disable the starter in the cell. It is used by the [cell_mon](#) application to detect changes in the input channel and set an MSU state accordingly. The MSU state monitor will display an icon above the test cell to indicate that the starter has been disabled while a person has entered the test cell.

2.2 Digital Output Function Codes

2.2.1 OUTPUT_INTEGER

This is a special code indicating that the specification applies to more than one output bit and that they are mapped to an integer variable. This code is used only by the [do_specs](#) application to assign the group of output channels that a mapped to an integer variable.

2.2.2 WATCH_DOG

This is the output which is toggled by the scheduler application every second whenever the system is running properly. A failure of this output to occur for a few seconds will cause the hardware watchdog to shut the engine down in a manner determined by the hardware watchdog. This output channel must be assigned in the digital output specification file.

2.2.3 IGNITION

This is the relay that enables power to be supplied to the engine system in order to permit it to be started and run.

This function code is used by the following applications:

- [cell_mon](#): This output is set OFF when [cell_mon](#) receives the emergency event and as a backup method for killing the engine/rig when there is no [gp_test](#) to handle the shutdown.
- [do_specs](#): For assignment to a DO channel

2.2.4 TEST_CELL_SYSTEMS

This is the relay that enables basic test cell system power. This output is set OFF when `cell_mon` receives the emergency event and as a backup method for killing the engine/rig when there is no `gp_test` to handle the shutdown.

2.2.5 SHOP_AIR

This is the relay that turns on the shop air. This output is used in the backup method for killing the engine/rig when there is no `gp_test` to handle the shutdown.

2.2.6 TC_FANS

This is the relay that operates the test cell ventilation fans. This output is used in the backup method for killing the engine/rig when there is no `gp_test` to handle the shutdown.

2.2.7 DYNO_OIL_PUMP

This is the relay that operates the dyno bearing lubrication pump. This output is used in the backup method for killing the engine/rig when there is no `gp_test` to handle the shutdown.

2.2.8 FUEL_SYSTEM_POWER

The relay that powers the ECM. This output is used in the backup method for killing the engine/rig when there is no `gp_test` to handle the shutdown.

2.2.9 OIL_CART

This output is used in the backup method for shutting down the test system when there is no `gp_test` to handle the shutdown.

2.3 Analog Input Function Codes

Analog input function codes are read and configured by the [spcl_chans](#) application.

2.3.1 CTRL_ENGINE_RPM or ENGINE_RPM

These are engine speed analog input channels used by [eng_ctrl_task](#) as feedback for PID control of engine speed.

2.3.2 PERF_ENGINE_RPM

This is the engine speed frequency input channel used by [comp_perf](#) for performing an automatic calibration of the CTRL_ENGINE_RPM channel. It is assumed that this is a slower frequency-based input and can be used as a reference for calibration when the engine is at a stable operating condition.

2.3.3 DNDT or DN/DT

If there is an external mechanism for monitoring dn/dt (rate of change of engine rpm), this is used to identify the variable label. This will override the computation of dn/dt by the [eng_ctrl_task](#) application.

2.3.4 CTRL_DYNO_TORQUE

This is the dyno torque analog input channel used by `eng_ctrl_task` as feedback for PID control of engine torque.

2.3.5 PERF_DYNO_TORQUE

This is the dyno torque input channels used to update the `Dyno_torq` variable and to compute the `Dyno_power` variable.

2.3.6 HOUR_METER_VARIABLE

This is the real variable used to control the standard hour meters.

2.3.7 INLET_AIR_TEMP, INLET_AIR_TEMP_L, INLET_AIR_TEMP_R

These are the channels for computing `EPA_fa_okay`.