LEARNING TO OPERATE A FANUC CNC

Using the FANUC Simulator

FANUC CERTIFIED CNC TRAINING

Machine Panel Mode Buttons

FANUC CNC controls are amazingly similar from one control model to another. While we will be focusing on a 0iF control, rest assured that the same functions apply to all FANUC control models. In this lab, you will explore basic machine panel modes.

Objectives

After completing this lesson, you should be able to:

After completing this lab, you should be able to:

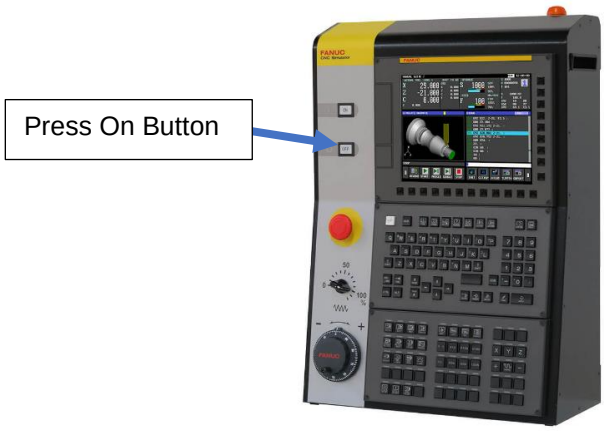
- ✓ Turn on the FANUC simulator
- ✓ Get to know the FANUC simulator
- ✓ Find operator's panel mode buttons
- ✓ Describe when each operator's panel mode is used
- ✓ Describe how to tell which operator's panel mode is currently selected
- ✓ Clear an alarm
- ✓ Turn off the FANUC simulator

Introduction

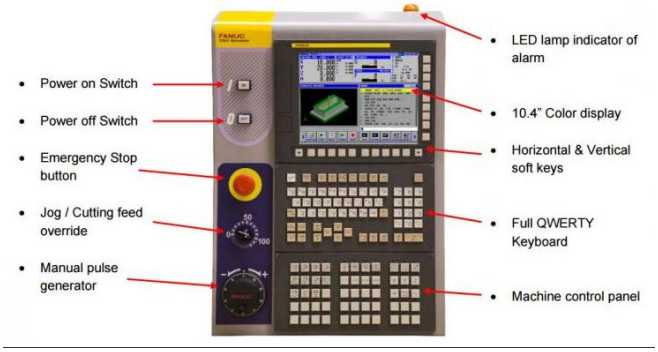
Much of what you will be doing with NCGuide - or with any FANUC control for that matter - will require an understanding of what is presented within the FANUC Certified Education CNC training curriculum. For now, we're simply going to help you get acquainted with the most basic functions of a FANUC control. Some of our explanations will not yet make much sense, but follow along as best you can. Rest assured that upcoming lessons in the curriculum will explain FANUC control functions in detail. And take comfort from the fact that there is nothing wrong you can do in NCGuide that will cause a serious issue - as might be the case with an actual machine/control.

1. Turn On the Computer attached to the CNC Fanuc Controller
    a. Note Password is the same as the Login
2. Select the Machining Icon

3. Press he ON Button on the Fanuc Controller



Controller Setup



Find basic Machine Panel Mode Buttons

The layout of the keyboard, operational buttons, screen, and other input features of the CNC Simulator is similar in configuration to what would be found on most CNC Machines

Emergency Stop

Feedrate Override: Allows the Operator to adjust federate during operation

Multi-Pulse Generator (MPG): Allows Operator to Jog the Machine in various increments

Program and Machine Setup Menu Buttons

QWERTY Keyboard

Machine Operators Buttons

Once a machine is powered up, the first step in *every* operation procedure will be to select the appropriate machine mode. A CNC machine will not respond to your action (nor will the FANUC simulator) if the wrong machine mode is selected.

The top row of buttons on the primary operator's panel provides the mode choices. A light above the button indicates the selected mode (currently, the edit [EDIT] mode is selected in the illustration above)

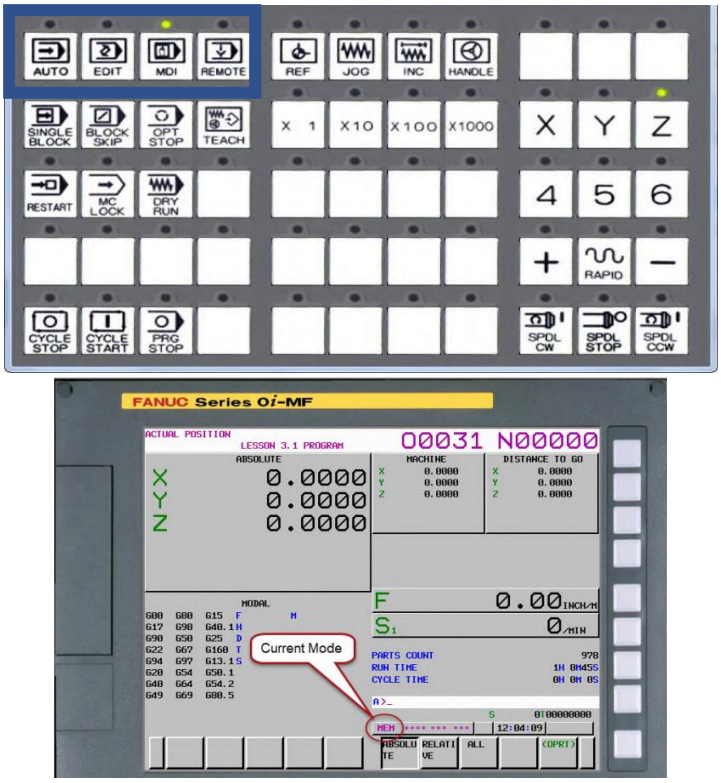
Brief Description and Operation of Mode-Selecting Buttons:

- **AUTO (stands for Automatic)**
  - This button selects the automatic mode, the mode in which programs are run from CNC memory either Internal or from an External Device
- **EDIT**
  - This button selects the edit mode, which is used to load, modify, and search CNC Programs.
- **MDI**
  - This button selects the manual data input mode, used to enter and execute MDI commands.
- **REMOTE**
  - This button also selects an automatic mode, but programs will be run from an external device (like a memory card) instead of from CNC memory.

Activity #1: Operation Mode Selection

Depending upon the settings of other keyboard buttons/keys, nothing appears to happen when you press mode-selector buttons. But look closer.

Main CNC Operational Buttons: These Buttons control what the operator can and cannot do in editing or running programs



1. Select AUTO Mode Button: Notice on the screen three letters will be MEM, standing for memory.
2. Select EDIT Mode Button: these letters change on the screen to EDIT.
3. Select MDI Mode Button: they change on the screen to MDI.
4. Select REMOTE Mode Button: they change to RMT on the screen.

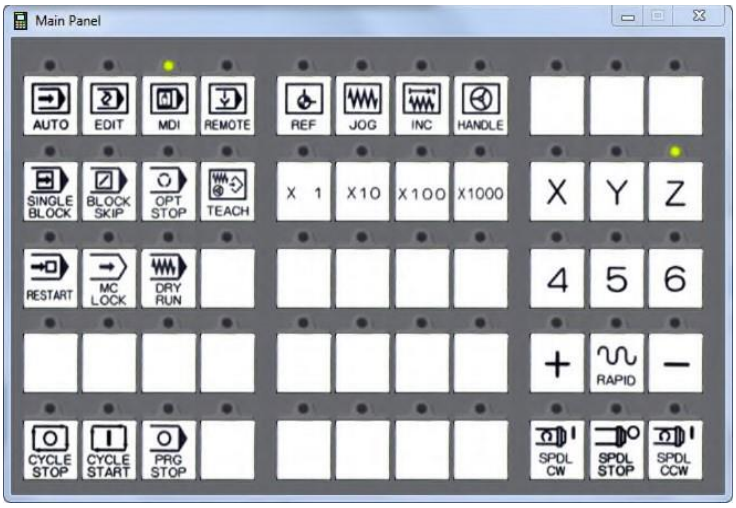
As stated, the machine panel modes are very important. In order to perform any CNC function, you must first select the appropriate machine panel mode. And again, if the machine is in the wrong mode, it will not respond to your action.

Click the machine panel mode choices for AUTO, EDIT, MDI, REMOTE, JOG, INC, and REF a few times and monitor how the display screen follows along.

- **REF**
  - This button selects the Reference mode and is used to manually send machine axes to their reference (home) positions.

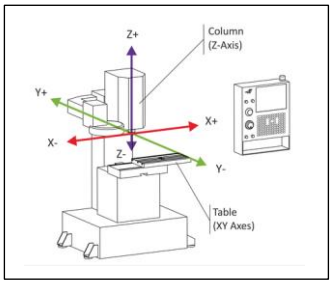
Jog Modes

- **Jog (also called Continuous jog)**
  ○ This button selects the jog mode. This mode is used to manually move machine axes using the X, Y, and Z buttons along with the plus (+) and minus (-) buttons.
- **INC (also called Incremental Jog)**
  - This button selects the incremental jog mode, which is also used to manually move the axes. It works in conjunction with the X1, X10, X100, and X1000 buttons, as well as the X, Y, and Z buttons and plus (+) and minus (-) buttons to make an axis move a specified amount per press of the plus or minus button (0.0001, 0.001, 0.01, or 0.1).
- **HANDLE (also called Hand-wheel)** ○ This button selects the hand-wheel mode. Though a hand-wheel is equipped on almost all CNC machine tools to provide precise control of manual axis motion, NCGuide does not support the hand-wheel function.



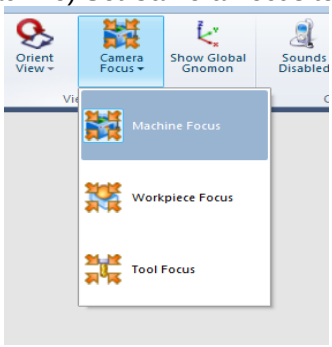
Activity #2: Jogging the CNC Machine

CNC Machine Polarity



Optional: Virtual CNC Machine: Change the View State (Transparent, Hidden, etc.) of the Machine to see the Tooling and Vice

1. On Machining Simulation Software (Virtual Machine) Set Camera Focus to Machine Focus



2. Jog Mode: Jog
    a. Select Jog Icon on the Controller

    b. Select X, Y, Z Button on the Controller

    c. Select + or – to jog the machine
    Notice the build plate on the Computer Screen > Test each of the Coordinates (X, Y, Z) and Jog Speeds

    d. With one of the Axis move the axis to its Limit in + or - > Notice the Controller Screen changes to the Fault Screen and describes the Fault(s) that occurred along with LED Lamp on top of the Controller changes > Complete the following steps to clear the Fault
        i. Jog the Machine in the opposite direction from the where the fault occurred
        ii. Select RESET Button on the Fanuc Controller

3. Jog Mode: Incremental
    a. Select Handle Icon on the Controller > Select X, Y, Z Button on the Controller > Select Value x1, x10, x100, x1000 (0.0001, 0.001, 0.01, or 0.1). > Turn the Hand Wheel on the CNC Controller > Notice the build plate on the Computer Screen > Test each of the Coordinates (X, Y, Z) and Jog Speeds
    b. With one of the Axis move it Limit in + or - > Notice the Controller Screen changes to the Fault Screen and describes the Fault(s) that occurred, along with LED Lamp on top of the Controller changes color > Complete the following steps to clear the Fault
        i. Jog the Machine in the opposite direction from the where the fault occurred
        ii. Select RESET Button on the Fanuc Controller

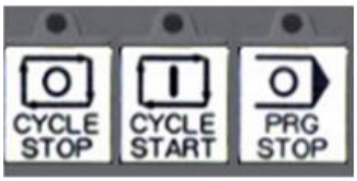
4. Jog Mode: Handwheel
    a. Select Handle Icon on the Controller > Select X, Y , Z Button on the Controller > Select Value x1, x10, x100, x1000(0.0001, 0.001, 0.01, or 0.1). > Turn the Hand Wheel on the CNC Controller > Notice the build plate on the Computer Screen > Test each of the Coordinates (X, Y, Z) and Jog Speeds
    b. With one of the Axis move it Limit in + or - > Notice the Controller Screen changes to the Fault Screen and describes the Fault(s) that occurred, along with LED Lamp on top of the Controller changes color > Complete the following steps to clear the Fault
        i. Jog the Machine in the opposite direction from the where the fault occurred
        ii. Select RESET Button on the Fanuc Controller

Conditional switches

While the focus of this lab is related to Mode selection buttons, here are some brief descriptions of other buttons on the Main Panel. Most of these functions affect the way that CNC programs will execute:

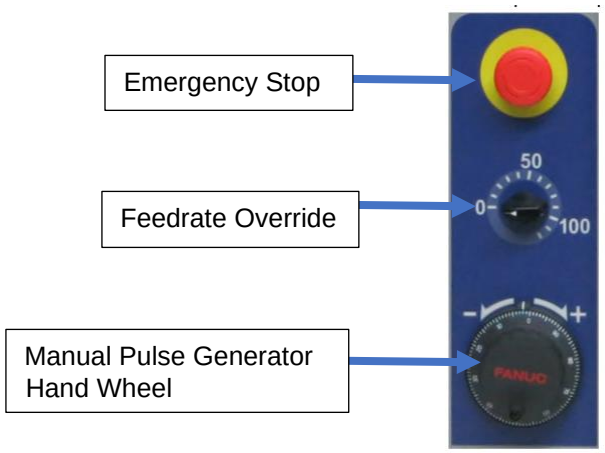
- **SINGLE BLOCK**
  - This button, when activated, will cause a program to be executed one command at a time. The CYCLE START button must be repeatedly pressed to move on from one command to the next.
- **BLOCK SKIP**
  - This button, when activated, will cause the machine to skip commands in the program if they begin with a BLOCK SKIP symbol (a slash code).
- **OPT STOP (Stands for Optional Stop)**
  ○ When this function is on, the machine will stop executing the program when it executes an optional stop word (M01). If this function is off, the machine will not stop when it executes an optional stop word.
- **TEACH**
  - The teach function, which in not often equipped with CNC machining and turning centers, allows the creation of a CNC program during a series of manual positioning movements.
- **RESTART**
  - This button provides one way to restart a cycle from within a CNC program (not from the beginning).
- **MC LOCK (Stands for Machine Lock)**
  - When on, the machine lock function will keep all machine axes from moving. It is a helpful program verification function that will allow you to run programs without allowing axes to move.
- **DRY RUN**
  - Used for program verification and when the workpiece is removed from the workholding device, dry run provides a way to speed up cutting movements and slow down rapid movements using a multi-position switch. It will be very helpful when you are graphing your programs (watching a tool path display) to speed up the program's execution. **Program activation buttons**

These buttons are used to activate programs:



- **CYCLE START**
  - This button is used to activate a CNC program or an MDI command.
- **CYCLE STOP**
  - This button is use to halt axis motion during the execution of a CNC program or an MDI command.
- **PRG STOP (Stands for Program Stop)** ○ The light above this button will come on when the machine executes a program stop word (M00) to indicate that the machine is in the program stop state.

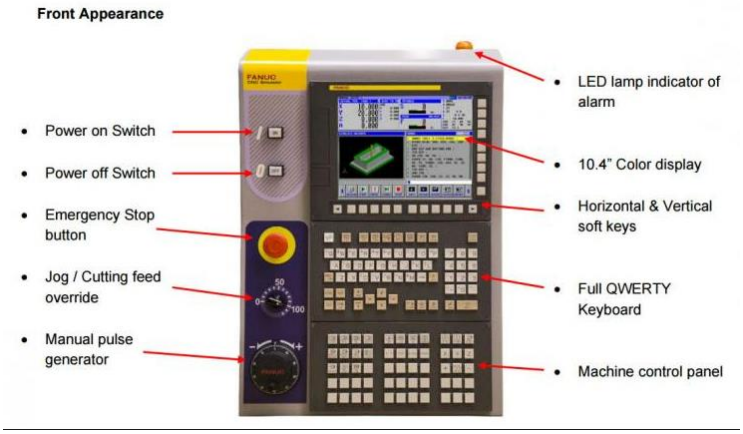
Buttons and Switches on the Second Operators Panel



- **EMERGENCY STOP Button** (big red button)
  - This button will turn off the power to the hydraulic system, and will stop anything that is currently being activated (automatic tool changer, turret index, spindle, coolant, etc.). It is large and red, making it easy to find.

Activity #4: Press the Emergency Stop Button (ESTOP)

- Notice the Controller Screen show ESTOP Fault and the LED Lamp Indicator
- Reset the ESTOP Button > Clear the Fault



- **FEEDRATE OVERRIDE Switch** (Multi-position switch)
  - This switch does three things:
    - Overrides programmed feedrate for axis motion.
    - Controls axis motion rate during a dry run.
    - Controls axis motion rate during continuous jog.
- **SPINDLE OVERRIDE Switch** (Multi-position switch)
  - Though this switch controls the speed of spindle rotation on an actual machine
- **MEMORY PROTECT** (Key-lock on/off switch)
  - Though this switch controls whether or not programs can be modified on an actual machine. If you see an error that specifies something like “Memory is protected” or “Write protect” while trying to modify a program, this switch is probably in the wrong position.
- **POWER OFF button**
- **POWER ON button**

Activity #5: Turn Off the CNC System

When the FANUC simulator is turned off, data will remain intact while the power is off (data memory is backed up by a battery). If the power turned on again, by simply pressing the POWER **ON** button, everything you have been working on will remain intact.

1. Turn OFF the Controller: Press the OFF Button on the Controller
2. Close the Machining Software
3. Press Windows Key + L to Lock Computer (Return the computer to the Login Screen)