

Sample ladder program for Standard Machine Operator's panel

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1 Overview

To operate a machine tool using a Standard Machine Operator's panel, you need to make sequence program for the operation of Standard Machine Operator's panel. For your reference, a sample ladder program for Standard Machine Operator's panel is provided in source file format of function block that can be used in your sequence program using FANUC LADDER-III. This document describes the specification of the sample function block (hereafter "sample FB"), and how to use it in your ladder program.

2 Requirements

The following software option is required to use the sample program.

Name	Description
Function Block function	Required to use the sample program

The following software options may be required according to the machine configuration.

Name	Description
Manual handle feed 1-unit	Required for HND mode.
Playback	Required for TJOG mode and THND mode. [TEACH] key is not effective without this option.
Program restart	Required for "Program restart" function. [RESTART] key is not effective without this option.

3

Sample FBs for Standard Machine Operator's panel

Standard Machine Operator's panel consists of the two panels below:

- Main panel
The main panel is a machine operator's panel connected with the 30i series by the I/O Link *i* or I/O Link with independent key switches all of which key tops are detachable.
- Sub panel A, D
Sub panels A and D are operator's panels with power ON/OFF, emergency stop, program protect, and two override rotary switches.

This sample FBs enable the following operations by main panel and sub panel.

Main panel

- Mode selection (MDI, MEM, RMT, EDIT, REF, JOG, HND/INC (note2), TJOG (note3), THND (note3))
- Cycle start
- Feed hold
- Single block
- Optional block skip
- Program stop
- Program restart (note4)
- Dry run
- Manual handle feed magnification change
- Manual feed axis selection
- Jog feed /incremental feed
- Manual rapid traverse
- Spindle stop when manual operation

Sub panel

- Feedrate override
- Spindle speed override

Note

- 1 This sample program requires "Function Block function" option.
- 2 Some CNC models require "Manual handle feed 1-unit" option to use HND mode. Otherwise INC mode is selected.
- 3 Some CNC models require "Playback" option to use TJOG and THND mode.
- 4 This requires "Program restart" option. Some CNC models do not support this function.



CAUTION

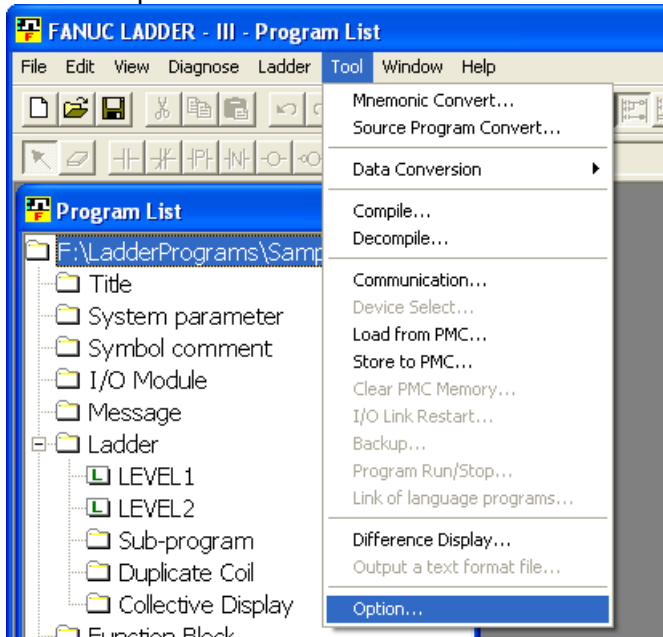
This sample FB does not contain a circuit of emergency stop. The emergency stop button on the sub panel should be connected to I/O device, and the emergency stop circuit of whole of machine tool system should be designed to integrate the signal from the button.

3.1 Integrating Sample FB

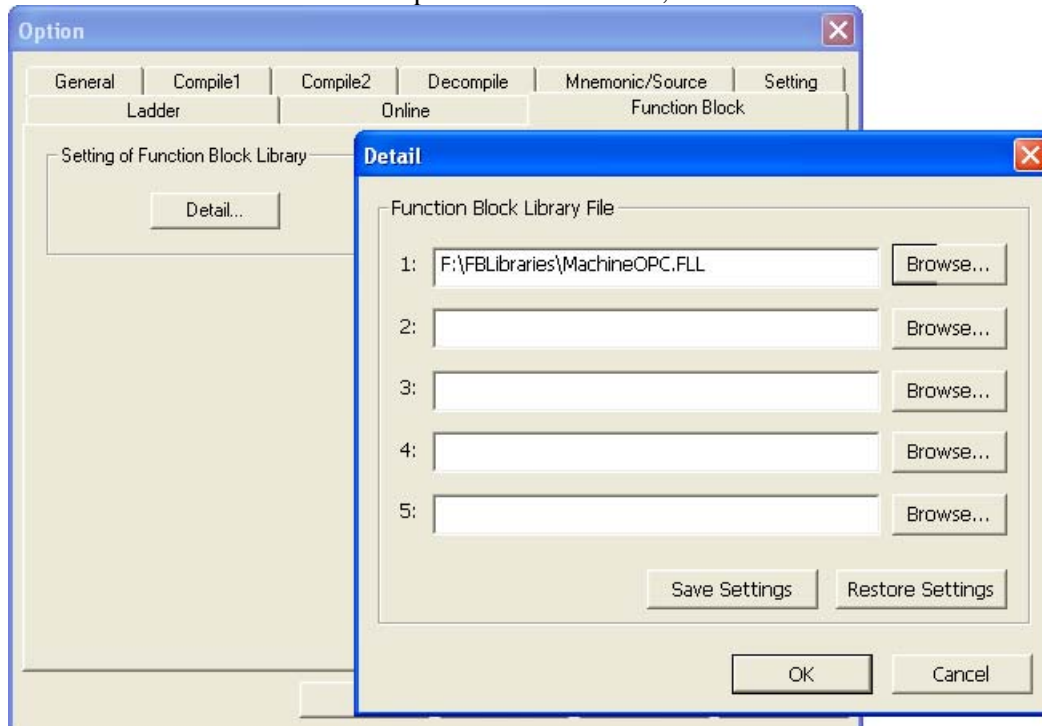
The sample ladder program for Standard Machine Operator's panel is provided in source file format of function block.

This sample FBs whose names are "MachineOperatorsPanelControl" and "OverrideControl" are included in the function block library file "MachineOPC.FLL" attached in the installation CD of FANUC LADDER-III. To use the sample FBs, 1) register "MachineOPC.FLL" as a function block library to refer, 2) drag and drop the sample FB, which appears in "Program List" window, onto the ladder diagram editor window, 3) program proper signals or circuits at the input and output sections of the FB.

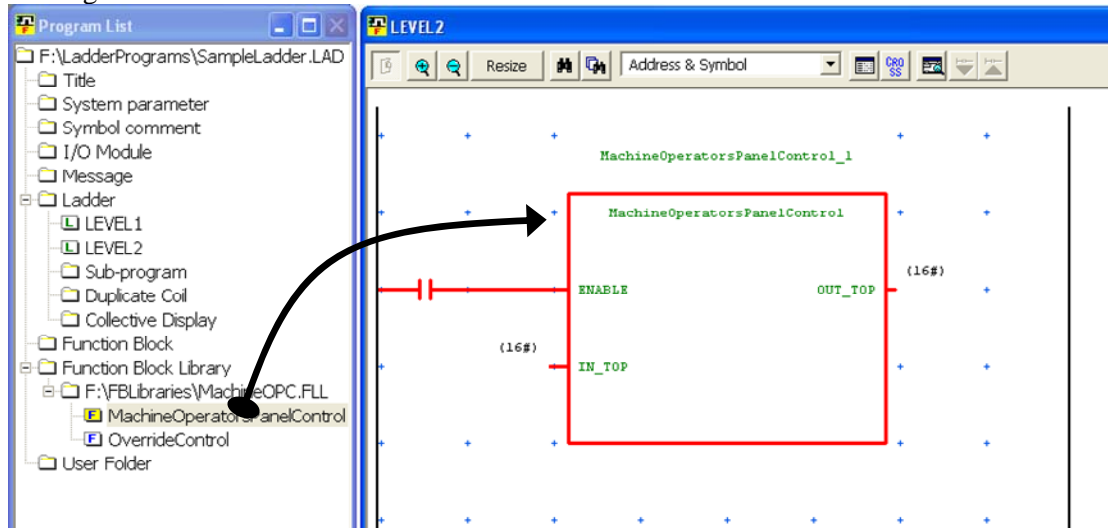
- 1) Register "MachineOPC.FLL" file as a function block library
 - Select "Option" item in the "Tool" menu



- Select "Function Block" tab and press "Detail" button, enter "MachineOPC.FLL" as a function block library



2) Drag & drop the “MachineOperatorsPanelControl” or “OverrideControl” into your ladder program in the ladder diagram window



3) Program proper signals or circuits at the input and output section of the FB

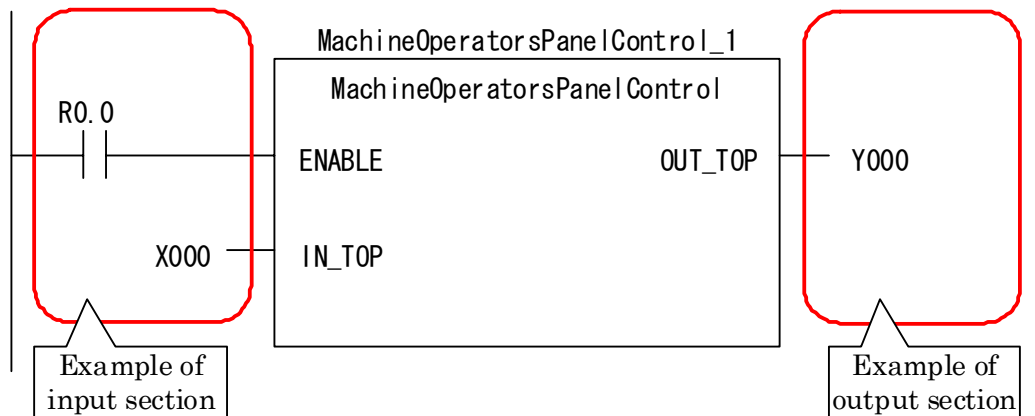


Fig. 3.1 (a) Sample FB

3.2 Specification of Sample FB for Main panel

The sample program for Main panel is provided as the FB below

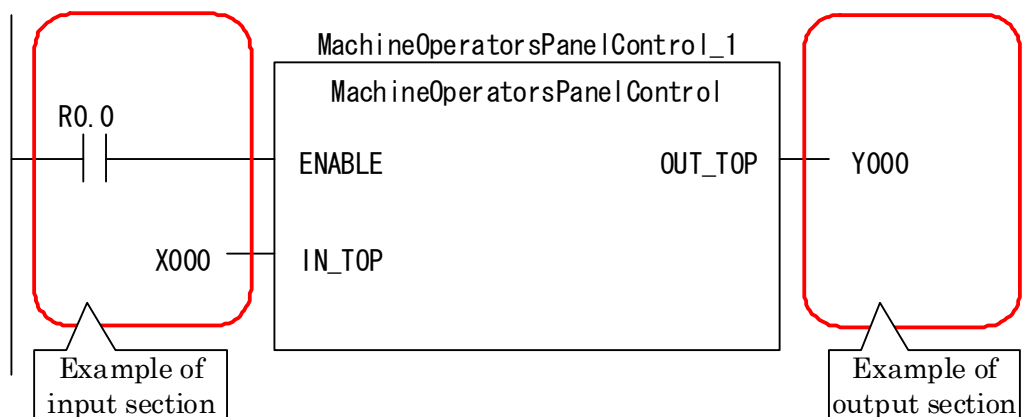


Fig. 3.2 (a) Sample FB for Main panel

The detailed specifications of each parameter of the sample FB are listed below.

Table 3.2 (a) Parameters of the function block for Main panel

Symbol	kind of parameter	Data type	number	Explanation
ENABLE	Input parameter	BOOL	-	Set this parameter ON to activate the Main panel. When this parameter is OFF, any key operation of Main panel is not effective and the all output signals in OUT_TOP area turn OFF.
IN_TOP	Input parameter	BYTE	12	Specify the assigned address of the DI signals of the Standard Machine Operator's panel.
OUT_TOP	Output parameter	BYTE	8	Specify the assigned address of the DO signals of the Standard Machine Operator's panel. This output parameter controls the LEDs on the Main panel. When ENABLE is OFF, all signals in this parameter will be OFF.

In this sample FB, the following signals are written while ENABLE parameter is ON.

Table 3.2 (b) Signals used in the function block for Main panel

Signal	Symbol	Signal name
G0006.0	SRN	Program restart signal
G0007.2	ST	Cycle start signal
G0008.5	*SP	Feed hold signal
G0019.4, G0019.5	MP1, MP2	Manual handle feed amount selection signals
G0019.7	RT	Manual rapid traverse selection signal
G0029.6	*SSTP	Spindle stop signal
G0043.0 ~ G0043.2	MD1, MD2, MD4	Mode selection signals
G0043.5	DNCI	DNC operation selection signal
G0043.7	ZRN	Signal for selecting manual reference position return
G0044.0	BDT1	Optional block skip signal
G0046.1	SBK	Single block signal
G0046.7	DRN	Dry run signal
G0100.0 ~ G100.5	+J1 ~ +J6	Feed Axis and Direction Selection Signals
G0102.0 ~ G102.5	-J1 ~ -J6	

3.3 Specification of Sample FB for Sub panel

The sample program for Sub panel is provided as the FB below

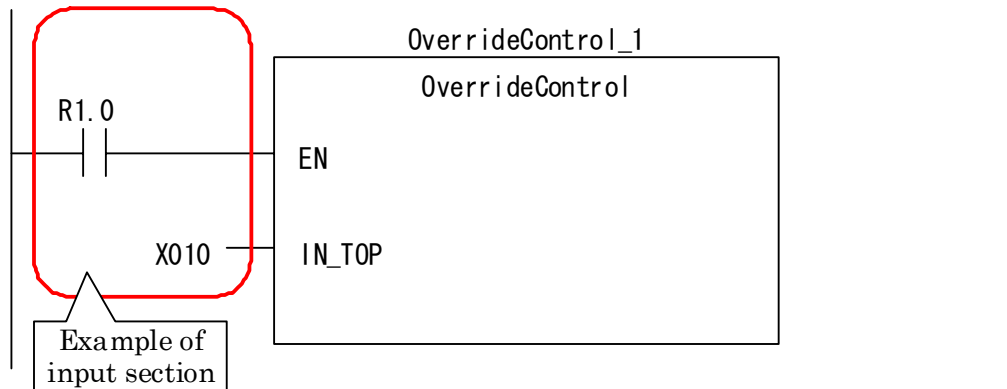


Fig. 3.3 (a) Sample FB for Sub panel

The detailed specifications of each parameter of the sample FB are listed below.

Table 3.3 (a) Parameters of the function block for Main panel

Symbol	kind of parameter	Data type	Number	Explanation
EN	Input parameter	BOOL	-	Set this parameter ON to activate the rotary switches of feedrate override and spindle override on the Sub panel. When this parameter is OFF, this FB does not work.
IN_TOP	Input parameter	BYTE	2	Specify the assigned address of the DI signals of the I/O device, to which the two override rotary switches on Sub panel are connected.

In this sample FB, the following signals are written.

Table 3.3 (b) Signals used in the function block for Sub panel

Signal	Symbol	Signal name
G0012.0 ~ G0012.7	*FV0 ~ *FV7	Feedrate override signals
G0030.0 ~ G0030.7	SOV0 ~ SOV7	Spindle speed override signals



CAUTION

This sample FB does not contain a circuit of emergency stop. The emergency stop button on the sub panel should be connected to I/O device, and the emergency stop circuit of whole of machine tool system should be designed to integrate the signal from the button.

Note
















- 1 This sample FB does not contain any circuit for the power ON/OFF switches and the program protect switch.
- 2 Manual feedrate override and rapid traverse override are not object of this sample program.




4 Keys and Switches on Standard Machine Operator's panel

4.1 Keys on Main panel

The sample program supports the following keys on the Main panel.

Table 4.1 (a) Keys on Main panel

Symbol	Name	Description
	AUTO	AUTO mode selection: Pressing this key switches to the automatic execution (memory execution) mode.
	EDIT	EDIT mode selection: Pressing this key switches to the memory edit mode.
	MDI	MDI mode selection: Pressing this key switches to the automatic execution (MDI execution) mode.
	REMOTE	RMT mode selection: Pressing this key switches to the DNC operation mode.
	REF RETURN	REF mode selection: Pressing this key switches to the manual reference point return mode.
	JOG	JOG mode selection: Pressing this key switches to the jog feed mode.
	HANDLE	HND (or INC) mode selection: Pressing this key switches to the manual handle mode (or incremental feed mode). (note1)
	INC	
	TEACH	TJOG/THND mode selection: Pressing this key switches between teaching jog mode and teaching handle mode. Switching from other mode resumes the last mode. (note2)
	SINGLE BLOCK	Single block: Pressing this key changes ON and OFF of single block execution.
	BLOCK SKIP	Optional block skip: Pressing this key changes ON and OFF of the optional block skip function. Head code of the block that is skipped by this operation is as follows. / or /1
	PRG STOP	Program stop (output only): When the automatic operation stops at M00 in the program, LED above this key turns ON.
	RESTART	Program restart: After the automatic operation is interrupted by some reason, you can restart machining from any block of the program.
	DRY RUN	Dry run: Pressing this key changes ON and OFF of the dry run function.
	CYCLE START	Cycle start: Pressing this key starts automatic operation.

Symbol	Name	Description
	CYCLE STOP	Cycle stop: Pressing this key stops automatic operation.
X1 X100 X10 X1000		Manual handle feed magnification: Pressing one of these keys changes the manual handle feed magnification. (note3)
X Y Z 4 5 6		Manual feed axis selection: Pressing these keys selects and deselects the axes to move in JOG (or INC) mode. (note4)
+ -		Manual feed: Pressing this key moves the selected axes to the direction in the JOG (or INC) mode.
	RAPID	Manual rapid traverse: Pressing this key enables and disables the rapid traverse in the JOG (or INC) mode.
	SPDL STOP	Spindle stop: Pressing this key stops and resumes the spindle revolution in the manual operation.

NOTE

- 1 With “Manual handle feed 1-unit” option, HND mode is selected. Otherwise, INC mode is selected. Both [HANDLE] and [INC] keys have the same functionality.
- 2 Some CNC models require “Playback” option to use TJOG and THND mode.
- 3 CNC parameters (No.7113, 7114) have to be set properly in order to use [X100] and [X1000] keys.
- 4 More than one axis can be selected at the same time. The maximum number of axes that can be moved at the same time depends on the CNC parameters (No.1002#0, 7001#6). If axes more than the maximum are selected, the axes to actually move are selected from the largest axis number.
- 5 For details of these functions, please refer to “CONNECTION MANUAL (FUNCTION)”, “PARAMETER MANUAL”, and “OPERATOR’S MANUAL” of each CNC model.

Arrangement of keys is show below.

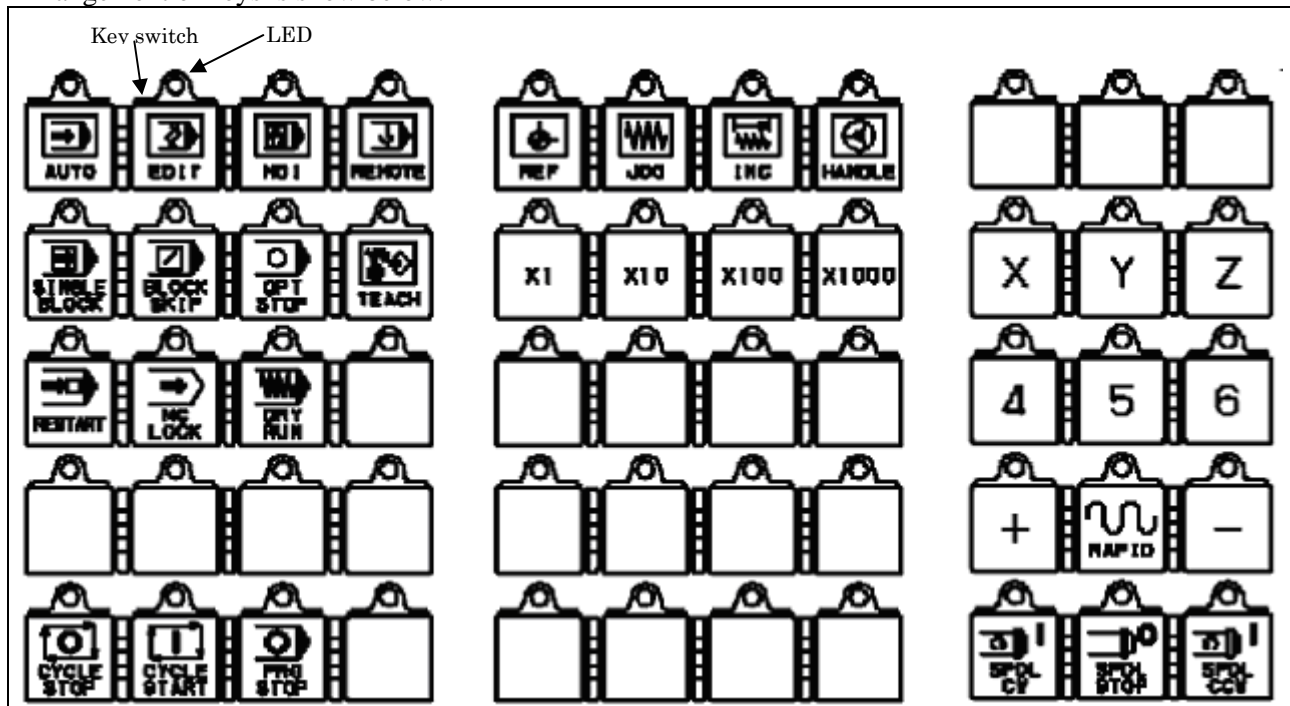

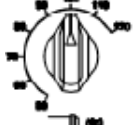


Fig. 4.1 (a) Keys on Main panel

4.2 Switches on Sub panel

The sample program supports the following switches on the Sub panel.

Switch	Description
	Rotary switch for the feedrate override.
	Rotary switch for the spindle speed override.

5

Related CNC parameter

The following CNC parameters have to be set properly to use the sample FBs.

CNC Parameter	Value	Description
7113	100	Set these values to the parameters to use [X100] key and [X1000] key.
7114	1000	

The following CNC parameters should be set properly according to the machine configuration.

CNC Parameter	Value	Description
7100#0	0: Invalid 1: Valid	Set whether to enable manual handle feed in JOG feed mode and incremental feed in the manual handle feed mode.
7103#2	0: x1 1: x10	Set the magnification value for manual handle feed magnification key.

NOTE

For details, refer to “PARAMETER MANUAL” of each CNC model.