

## Dynamic Tool Selection

### Introduction

The importance of using correct tool settings cannot be overemphasized. Proper use of tool settings improves path accuracy, helps to minimize cycle times, and improves the longevity of the robot.

Tool properties are stored in Tool Files. Tool Files should be created for each different tool and payload to be carried. Each taught or calculated point in your programs must be associated with the appropriate Tool File.

What if your application requires the same procedure (program) to be run with one end of arm fixture and many different payloads? Is there a way to dynamically change which tool definition is used within a program? This document will describe options to achieve that.

### Background

First, make sure your controller is configured to allow the use of multiple tool files.

- Boot to normal operations mode
- Login at SAFETY level Security
- Select SETUP
- Select TEACHING COND.
- Cursor down to TOOL NO. SWITCH and press SELECT to toggle from PROHIBIT to PERMIT

Set up each of the tool files you wish to use. For help, refer to the “Instructions” manual for your controller.

### Manipulating the Tool Associated with a MOV

As noted in the introduction, tool settings are associated with each taught or calculated point in your programs. If you want to change the tool settings associated with moving to a point, the trick is to modify the definition of *the point*, rather than using a different MOV setting. Our method for manipulating points is by use of Position Variables. The commands we will be discussing below deal with modification of Position Variables. The lesson here is if you want to modify the tool settings associated with a point, you must define that point using a Position Variable rather than manually teaching a “hard” point.

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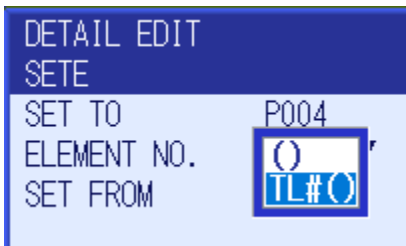
Using the SETE Command

SETE (SET ELEMENT) sets the designated element in a Position Variable equal to a constant or a value stored in a D-variable address. Typically, it is used to manipulate one or more elements of the position (X, Y, Z, Rx, Ry, Rz) data. However, on DX200 and newer controllers there is an optional parameter which allows you to change the Tool File number associated with a Position Variable. The command looks like this:

### SETE P005 TL#(3)

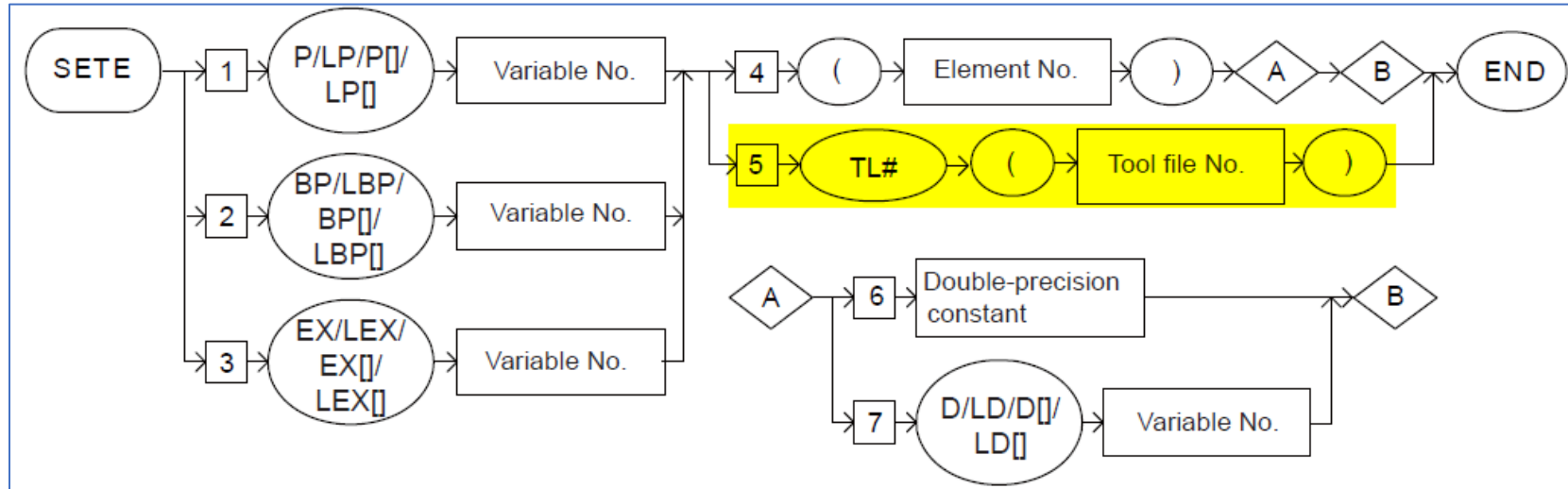
This will change the tool file associated with P005 to Tool File #3

The TL# option occurs when you do a detail edit of the SETE command and select the ELEMENT NO.



Below is a screenshot from the YRC1000 [INFORM Instructions](#) Manual. The “TL” parameter used to change the Tool File associated with a Position Variable is highlighted.

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Below are the explanatory notes associated with label 5 above.

No.	Tag	Explanation	Note
5	TL# (Tool file number)	Specify the tool file number to be set. Unable to set to the base axis position type variable and the station axis type variable. When the tool number tab is locked in the teaching condition window, only tool No. "0" is able to be set.	<Data 2> No.: 0 to 63

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## Sample Job

Below is an example job using SETE. In this scenario, we have three boxes to move, weighing 1kg, 2kg and 3kg. The pick and place locations are all the same. Box 1 is 1kg. Box2 is 2kg and box 3 is 3kg. The Position Variables used are as follows:

P000	Home position
P004	Above the location to pick the box
P005	At the location to pick the box
P006	Above the location to place the box
P007	At the location to place the box

Four tool files were defined.

Tool 0	Unloaded tool
Tool 1	Tool 0 plus 1kg payload
Tool 2	Tool 0 plus 2kg payload
Tool 3	Tool 0 plus 3kg payload

So, in the code below, before a box is moved to a new position, the tool file number must be changed to the appropriate one in the position variable for the target position.

Line	Step	Command
0000		NOP
0001		'BOX 1 TOOL 1
0002	0001	MOVJ P000 VJ=50.00 //HOME TOOL#0
0003		SETE P004 TL#(0)
0004	0002	MOVJ P004 VJ=50.00 //OVER BOX TOOL#0
0005	0003	MOVL P005 V=500.0 //AT BOX TOOL #0
0006		CALL JOB:GRIPBOX

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Line	Step	Command
0007		SETE P004 TL#(1)
0008	0004	MOVL P004 V=500.0 //LIFT BOX TOOL #1
0009		SETE P006 TL#(1)
0010	0005	MOVJ P006 VJ=50.00 //OVER PLACE TOOL#1
0011		SETE P007 TL#(1)
0012	0006	MOVL P007 V=500.0 //AT PLACE TOOL#1
0013		CALL JOB:RELEASEBOX
0014		SETE P006 TL#(0)
0015	0007	MOVL P006 V=500.0 //OVER PLACE TOOL#0
0016		'BOX 2 TOOL 2
0017	0008	MOVJ P000 VJ=50.00 //HOME TOOL#0
0018		SETE P004 TL#(0)
0019	0009	MOVJ P004 VJ=50.00 //OVER BOX TOOL#0
0020	0010	MOVL P005 V=500.0 //AT BOX TOOL #0
0021		CALL JOB:GRIPBOX
0022		SETE P004 TL#(2)
0023	0011	MOVL P004 V=500.0 //LIFT BOX TOOL#2
0024		SETE P006 TL#(2)
0025	0012	MOVJ P006 VJ=50.00 //OVER PLACE TOOL#2
0026		SETE P007 TL#(2)
0027	0013	MOVL P007 V=500.0 //AT PLACE TOOL#2
0028		CALL JOB:RELEASEBOX
0029		SETE P006 TL#(0)
0030	0014	MOVL P006 V=500.0 //OVER PLACE TOOL#0
0031		'BOX 3 TOOL 3

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Line	Step	Command
0032	0015	MOVJ P000 VJ=50.00 //HOME TOOL#0
0033		SETE P004 TL#(0)
0034	0016	MOVJ P004 VJ=50.00 //OVER BOX TOOL#0
0035	0017	MOVL P005 V=500.0 //AT BOX TOOL #0
0036		CALL JOB:GRIPBOX
0037		SETE P004 TL#(3)
0038	0018	MOVL P004 V=500.0 //LIFT BOX TOOL#3
0039		SETE P006 TL#(3)
0040	0019	MOVJ P006 VJ=50.00 //OVER PLACE TOOL#3
0041		SETE P007 TL#(3)
0042	0020	MOVL P007 V=500.0 //AT PLACE TOOL#3
0043		CALL JOB:RELEASEBOX
0044		SETE P006 TL#(0)
0045	0021	MOVL P006 V=500.0 //OVER PLACE TOOL#0
0046	0011	MOVJ P000 VJ=50.00
0047		END