

PLC210 Lab 5: Move and File Instructions #2

Upon completion of this lab, the student should be able to:

1. Explain the function and operation of the FAL instruction
2. Create a Tag array (one dimension)
3. Load values into the Tags, within the Tag array
4. Explain the operation of the FAL while in incremental mode
5. Explain the operation of the FAL while in the numeric mode
6. Explain the operation of the FAL while in the ALL mode

Download the project Compact_Module_3_EX2_FAL.ACD, go Online and put the CompactLogix into the Run mode to do the following lab

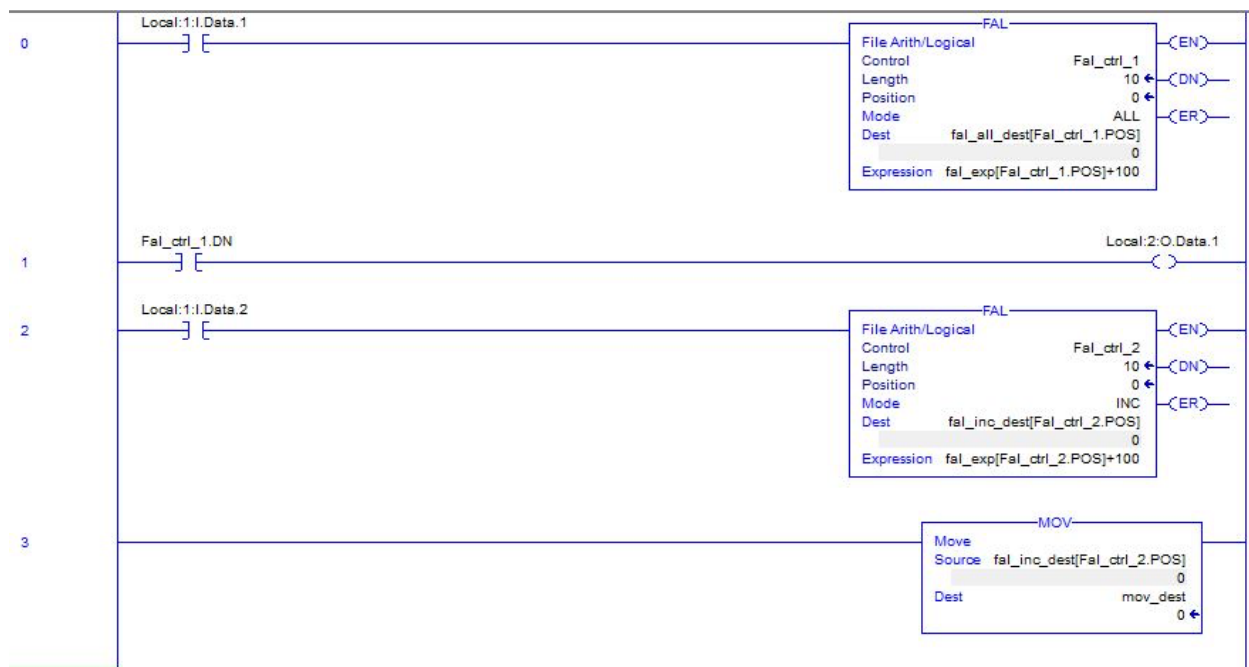


Figure 1. The FAL instruction.

1. FAL – Rung 0 – File Arithmetic/Logic

Monitor the 10 tag array starting at tag fal_exp [0]. Make sure it has data in it.

Name	Value
+ fal_all_dest	{...}
+ Fal_ctrl_1	{...}
+ Fal_ctrl_2	{...}
- fal_exp	{...}
+ fal_exp[0]	1000
+ fal_exp[1]	2000
+ fal_exp[2]	3000
+ fal_exp[3]	4000
+ fal_exp[4]	5000
+ fal_exp[5]	6000
+ fal_exp[6]	7000
+ fal_exp[7]	8000
+ fal_exp[8]	9000
+ fal_exp[9]	10000

Figure 2. Controller Tags – fal_exp array values.

If you have to add the data, start with 1000 in the first tag, then 2000 in the second tag, and populate the array by increments of 1000.

Enter array values for the fal_exp array in the following table.

Tag	Value
fal_exp[0]	
fal_exp[1]	
fal_exp[2]	
fal_exp[3]	
fal_exp[4]	
fal_exp[5]	
fal_exp[6]	
fal_exp[7]	
fal_exp[8]	
fal_exp[9]	

Monitor the 10 tag array that starts at tag fal_all_dest[0].

Name	Value
- fal_all_dest	{...}
+ fal_all_dest[0]	0
+ fal_all_dest[1]	0
+ fal_all_dest[2]	0
+ fal_all_dest[3]	0
+ fal_all_dest[4]	0
+ fal_all_dest[5]	0
+ fal_all_dest[6]	0
+ fal_all_dest[7]	0
+ fal_all_dest[8]	0
+ fal_all_dest[9]	0

Figure 2. Controller Tags – fal_all_dest array.

Verify there are zeros in all fal_all_dest array locations.

Enter zeros if there are other values in the fal_all_dest array

What is the Mode setting of the FAL instruction at Rung 0? _____

What is the name of the Control tag? _____

Note; do not release PB1 pushbutton until next 3 questions are answered.

Press PB1 on demo board – Local:1:I.Data.1 tag

Is the fal_ctrl_1.DN bit at Rung 1 true or false? _____

On the FAL instruction at Rung 0, what is the Position value? _____

How many positions has the FAL instruction completed when the

fal_ctrl_1.DN goes true? _____

Release PB1 on demo board – Local:1:I.Data.1 tag

Is the fal_ctrl_1.DN bit at Rung 1 true or false? _____

On the FAL instruction at Rung 0, what is the Position value? _____

Using Controller Tags, Monitor the values in the destination array
- fal_all_dest.

Enter array values for the fal_all_dest array in the following table.

Tag	Value
fal_all_dest[0]	
fal_all_dest[1]	
fal_all_dest[2]	
fal_all_dest[3]	
fal_all_dest[4]	
fal_all_dest[5]	
fal_all_dest[6]	
fal_all_dest[7]	
fal_all_dest[8]	
fal_all_dest[9]	

Has the data changed from the source array - fal_exp - to the destination array - fal_all_dest?

Explain!!

How many Positions did the FAL instruction complete per

scan? _____

2. FAL – Rung 2 – File Arithmetic/Logic

Monitor the 10 tag array starting at tag fal_exp [0]. Make sure it has data in it.

Note: This is the same array used by the FAL instruction a Rung 0.

If you have to add the data, start with 1000 in the first tag, then 2000 in the second tag, and populate the array by increments of 1000.

Enter array values for the fal_exp array in the following table.

Tag	Value
fal_exp[0]	
fal_exp[1]	
fal_exp[2]	
fal_exp[3]	
fal_exp[4]	
fal_exp[5]	
fal_exp[6]	
fal_exp[7]	
fal_exp[8]	
fal_exp[9]	

Monitor the 10 tag array that starts at tag fal_inc_dest[0].

Name	Value
+ fal_all_dest	{...}
+ Fal_ctrl_1	{...}
+ Fal_ctrl_2	{...}
+ fal_exp	{...}
- fal_inc_dest	{...}
+ fal_inc_dest[0]	0
+ fal_inc_dest[1]	0
+ fal_inc_dest[2]	0
+ fal_inc_dest[3]	0
+ fal_inc_dest[4]	0
+ fal_inc_dest[5]	0
+ fal_inc_dest[6]	0
+ fal_inc_dest[7]	0
+ fal_inc_dest[8]	0
+ fal_inc_dest[9]	0

Figure 4. Controller Tags – fal_inc_dest array.

Verify there are zeros in all fal_inc_dest array locations.

Enter zeros if there are other values in the fal_inc_dest array

What is the Mode setting of the FAL instruction at Rung 2? _____

What is the name of the Control tag? _____

Monitor the data in the Dest tag - fal_inc_dest[Fal_ctrl_2.POS].

fal_inc_dest[Fal_ctrl_2.POS] is known as an indirect tag.

Press and release the PB2 pushbutton on the demo board –
Local:1:I.Data.2 tag input.

What is the Position value for the FAL instruction at Rung 2?

What is the value of the Dest tag - fal_inc_dest[Fal_ctrl_2.POS]?

Using Controller Tags, what is the value of fal_inc_dest[0]?

What is the index value of the tag - fal_inc_dest[Fal_ctrl_2.POS]?

Hint: Using Controller Tags, monitor the Fal_ctrl_2.POS tag.

Name	Value	F
+ fal_all_dest	{...}	
+ Fal_ctrl_1	{...}	
- Fal_ctrl_2	{...}	
+ Fal_ctrl_2.LEN	10	
+ Fal_ctrl_2.POS	0	
- Fal_ctrl_2.EN	0	
- Fal_ctrl_2.EU	0	
- Fal_ctrl_2.DN	0	
- Fal_ctrl_2.EM	0	
- Fal_ctrl_2.ER	0	
- Fal_ctrl_2.UL	0	
- Fal_ctrl_2.IN	0	
- Fal_ctrl_2.FD	0	

Figure 5. Controller Tags – Fal_ctrl_2 tag structure.

Monitor the data in the Dest tag - fal_inc_dest[Fal_ctrl_2.POS].

Press and release the PB2 pushbutton on the demo board a second time, Local:1:I.Data.2 tag input.

What is the Position value for the FAL instruction at Rung 2?

What is the value of the Dest tag - fal_inc_dest[Fal_ctrl_2.POS]?

Using Controller Tags, what is the value of fal_inc_dest[1]?

What is the index value of the tag - fal_inc_dest[Fal_ctrl_2.POS]?

Monitor the data in the Dest tag - fal_inc_dest[Fal_ctrl_2.POS].

Press and release the PB2 pushbutton on the demo board a third time, Local:1:I.Data.2 tag input.

What is the Position value for the FAL instruction at Rung 2?

What is the value of the Dest tag - fal_inc_dest[Fal_ctrl_2.POS]?

Using Controller Tags, what is the value of fal_inc_dest[2]?

What is the index value of the tag - fal_inc_dest[Fal_ctrl_2.POS]?

Continue to press and release the PB2 pushbutton on the demo board, Local:1:I.Data.2 tag input until the Position value equals 9.

How many times does PB2 need to be pressed for the FAL

instruction at Rung 2 to have the Position value equal the value of 9? _____

Monitor the 10 tag array that starts at tag fal_inc_dest[0].

Enter array values for the fal_inc_dest array in the following table.

Tag	Value
fal_inc_dest[0]	
fal_inc_dest[1]	
fal_inc_dest[2]	
fal_inc_dest[3]	
fal_inc_dest[4]	
fal_inc_dest[5]	
fal_inc_dest[6]	
fal_inc_dest[7]	
fal_inc_dest[8]	
fal_inc_dest[9]	

Has the data changed from the source array - fal_exp - to the destination array - fal_inc_dest?

Explain!!

How many Positions did the FAL instruction complete per press of PB2? _____

How many times did PB2 need to be pressed to fill-in all the array elements? _____

When does the Fal_ctrl_2.DN bit come on for the FAL instruction at Rung 2? _____

What does the INC mode parameter mean on the FAL instruction on Rung 2.?

Press PB2 again, what value now appears in the Position location
for the FAL instruction at Rung2? _____

Explain!!

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