

Answers to Self-Test Questions

Tutorial 7: Indirect Addressing

.....To Go Back to [QUESTIONS](#) Click Here

1.	With direct addressing, the data memory address used with an instruction is derived from the Data Page Pointer and the operand. With <i>indirect addressing</i> the data memory address is that contained in a particular Auxiliary Register.
2.	a) LAR #400h, AR4 ; Incorrect. Operands reversed. b) LAR #20, AR5 ; Incorrect. Operands reversed. c) LAR AR1, #200h ; Correct. d) LAR AR7+, * ; Incorrect. + not allowed. e) LAR -AR5, * ; Incorrect. - not allowed. f) LAR AR6, 30h ; Correct. Direct addressing.
3.	The term <i>auxiliary register pointer</i> (ARP) is a field containing a value between 0 and 7. This corresponds to an Auxiliary Register AR0 to AR7 that is used for indirect addressing.
4.	The <i>current auxiliary register</i> is the auxiliary register that is used for indirect addressing. For example, after the instruction MAR *, AR2 the auxiliary register AR2 would be the current auxiliary register.
5.	The instruction MAR means Modify Auxiliary Register.
6.	a) MAR * ; Correct syntax. b) MAR -* ; Incorrect. Should be *- c) MAR +* ; Incorrect. Should be *+ d) MAR *- ; Correct. Decrements auxiliary register. e) MAR *+ ; Correct. Increments auxiliary register.
7.	a) LACC * ; Correct syntax. b) LACC -* ; Incorrect. Should be *- c) LACC +* ; Incorrect. Should be *+ d) LACC *- ; Correct. Decrements pointer. e) LACC *+ ; Correct. Increments pointer. f) LACC *.* ; Incorrect syntax.
8.	The instructions LAR loads an auxiliary register with a value given by the operand. The instruction MAR modifies the current auxiliary register.
9.	To increment the contents of auxiliary register AR4 when using indirect addressing to load the accumulator with data from data memory address 200h we could write: CLRC CNF ; Block B0 for general purpose. LAR AR4, #200h ; AR4 = 200h. MAR *, AR4 ; AR4 is current auxiliary register. LACC *+ ; Increment AR4 after load.

10.	<p>To decrement the contents of auxiliary register AR3 when using indirect addressing to load the accumulator with data from data memory address 180h we could write:</p> <pre>LAR AR3,#180h ; AR3 = 180h. MAR *,AR3 ; AR3 is current auxiliary register. LACC *- ; Decrement AR3 after load.</pre>
11.	To make AR6 the current auxiliary register we could use the instruction MAR *, AR6
12.	<p>Assuming that ARP =3, the instruction</p> <pre>LACC *+</pre> <p>loads the accumulator with data at the address contained in AR3, then increments AR3.</p>
13.	What the main advantage of <i>indirect addressing</i> over <i>direct addressing</i> is the ability to change the pointer to the next address. This allows operations on multiple data addresses to be put into a loop. Also, <i>indirect addressing</i> does not use the Data Page Pointer, so there are no problems when crossing page boundaries.
14.	When loading the accumulator using the instruction LACC, <i>direct addressing</i> and <i>indirect addressing</i> both use the same number of cycles.