

ECT661 Robotic Control Systems
Robot Programing Exercise #4
Palletizing Arrays with I/O & Interrupts

Name: _____

SIGNOFF:

NOTES:

Circuit Operates as expected _____

Successful Demonstration _____

Properly Commented _____

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Objective: To learn how to write robotic programming code that allows the robot to perform palletizing array functions using 'Floating positions.' Integrate Palletizing & Interrupt functions, with I/O operations and other program control as needed.

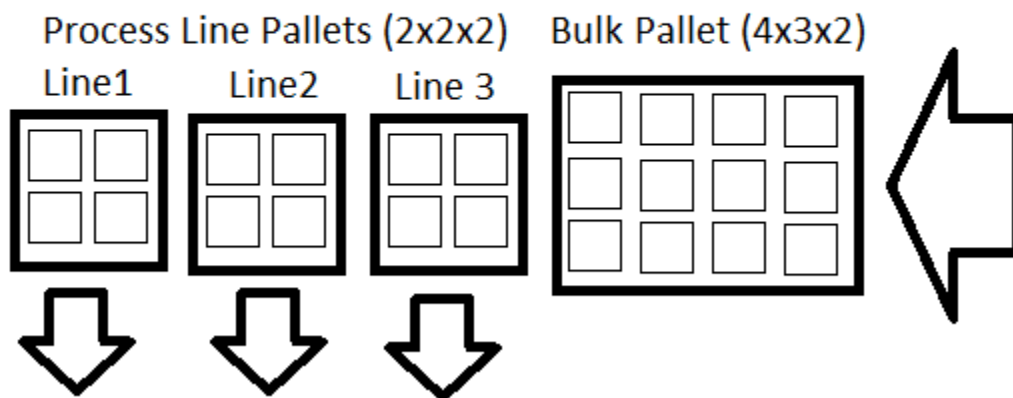
Procedure:

1. The palletizing array commands used in this lab are: DEF PLT, & PLT.
2. Interrupt commands used in the lab are: DEF ACT, & ACT

Assignment: The De-Palletizing Robot.

A manufacturer uses a part supplied by a subcontractor as part of its assembly process. The parts arrive in 24 box bulk pallets arranged 4x3x2. The manufacturer has 3 process lines so a de-palletizing operation is performed by a robot which breaks the 24 unit bulk pallet into 3 8-block process line pallets of 2x2x2. (Each of the pallets is TWO layers deep, one block on top of another.)

The 24 boxes of the Bulk pallet are broken into
three process pallets of 8 blocks each by the Robot.



Design a program for your robot to perform this operation with these specifications. The depalletizing workcell is equipped with three operator pushbuttons. A momentary STOP PB, a momentary START PB, and a maintain E-STOP PB.

The STOP PB causes the robot to return to a safe HOME position at any time during the process (i.e. an interrupt function) however, if the STOP is pressed while the robot is currently in the process of moving and placing a block the robot will complete the move first before going to HOME.

The START PB causes the robot to begin operation. However, the robot must first confirm that the main pallet and the three sub-pallets are in position before moving to get

a block. The pallet positions are confirmed by sensors represented by inputs. If any pallet is not in proper position, the Robot will give a 0.5 second flashing ERROR output and cycle through the checks waiting for the error condition to be corrected by the human operator. If all safety checks are made successfully then pressing the start button will begin operation (we will assume the main pallet is full and all sub-pallets are empty). We will assume this is a momentary PB so turn the input on then after starting the program turn it back off. A CYCLE ACTIVE output is on during processing to let the operator know that the cycle is underway. (Cycle active is not on if there is a pallet error, robot is waiting to start cycle, finished cycle, or an E-Stop condition is active.

The E-STOP pushbutton when pressed at any point in the operation indicates a serious error or dangerous condition has occurred. The robot will immediately cease palletizing and move to the HOME position (even if moving a block) and halt operation. The cycle cannot be started or restarted while the E-STOP is engaged. While in E-STOP an output indicator is made to notify the operator. The Robot should start and end in a safe HOME Position. When the operation is complete the workcell gives a 3 second cycle done indicator as the robot returns to Home position to await a new cycle

NOTES: You must use palletizing commands to unstack and restack the blocks to receive credit. Pallets are two dimensional arrays, but you get to choose which two. You can divide or subdivide the pallet as you wish, so use your imagination. The limitation is that you can only have 8 open pallets defined at any one time. You can redefine a pallet as existing in another point in space if you wish. You can create floating points which only exist in memory, that way the entire operation can be completed using a “Pick” and “Place” which act as pointers. Everytime you move a block you redefine in the program where that point exists (which pallet, which number block), and you can use the same lines of code in a loop to get and put the block in the right place.

Pallets and Interrupts must be defined in the program before they can be called.

Interrupts have to be enabled to be active.

Use the move approach from above technique to pick & place blocks.

The diagram on P.1 is just a reference, place your pallets to fit your workspace.

Input Description	Address		Output Description	Address
Bulk Pallet in Position	8		Pallet Position ERROR	8
Line 1 Pallet in Position	9		Ready to start (Flash 0.5)	9
Line 2 Pallet in Position	10		E-STOP Active	10
Line 2 Pallet in Position	11		CYCLE ACTIVE	11
Cycle Start PB	12		CYCLE DONE (3sec pulse)	12
Stop PB	13			
E-STOP PB	14			