Controls Explorer LLC

ALLEN BRADLEY PLC:
RSLogix 5000

PART - 1

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UNDERSTANDING THE PROGRAM ARCHITECTURE : SHOULD LOOK LIKE:

It's like a "LIBRARY" & you pick a Book: Now Each Book has got a "NAME", and immediately followed by it's "CONTENTS", explaining what each Chapters are about

Theoretically, in each book the Writer might have omitted the Chapter "Contents portion", like straight way could have started writing the book, it might have worked, but would have been a reader's nightmare!

We follow exactly the same pattern when we write PLC Codes:

The Code, i.e. the PLC "File" got a name, similar to a "LIBRARY" of books, Let's give a name: "PLC_Test_1"

The Librarian here, named as "MAIN Task"; Under Main task -- different books reside, each BOOK named as "PROGRAM X, Y, Z,…."

Each "BOOK" Like "PROGRAM -X" got written into different chapters, named "Routine/SubRoutines"

FINALLY, The book "Content" named as "MainRoutine", which calls in all the Chapters of the specific book, i.e. Routine through an Instruction named "JSR" Or Jump To Subroutines.

UNDERSTANDING THE ARCHITECTURE

PROGRAM ARCHITECTURE: SHOULD LOOK LIKE:

Give a Name to the Library, i.e. PLC File: "PLC_Test_1"

PLC Librarian "MainTask"

BOOK1: Each Book, i.e. "Program", Got a specific name: E.g. "Machine_Line_1"

BOOK2: Each Book, i.e. "Program", Got a specific name: E.g. "Utilities"

JUMPS TO THE RESPECTIVE CHAPTER, NAMED SUB-ROUTINES

BOOK CONTENTS of "Machine_Line_1": "MainRoutine"	Instruction "JSR"
	Instruction "JSR"
	Instruction "JSR"
	Instruction "JSR"

Chapter 1, E.g. Motor Control
Chapter 2, E.g. Motor Faults
Chapter 3, E.g. VFD Control
Chapter 3, E.g. VFD Alarms

The actual Story, i.e. the PLC Code is written here into these chapters

NOTE: YOU MAY WRITE YOUR WHOLE CODE IN "MainRoutine" as well, as if in a Book you are removing the Contents & Chapter portion, that will work, but would be a Maintenance Engineer's Nightmare to Troubleshoot!

JUMPS TO THE RESPECTIVE CHAPTER, NAMED SUB-ROUTINES

BOOK Contents of "Utilities" : "MainRoutine"	Instruction "JSR"
	Instruction "JSR"
	Instruction "JSR"
	Instruction "JSR"

Chapter 1, E.g. Compressor Control
Chapter 2, E.g. Compressor Faults
Chapter 3, E.g. MCC Control
Chapter 3, E.g. MCC Alarms

The actual Story, i.e. the PLC Code is written here into these chapters

THE PROJECT TASK:

⇨ A Motor Control: ON Push Button (PB), Off PB, Indicating Lamp Green (Motor Running), Motor / E-Stop Fault "Red Lamp", Motor Restart Timer running "Yellow Lamp".

⇨ The motor got a standard Power design, protected by a Motor Circuit Breaker (Over-Load Relay), whose "NO" is connected to one of the PLC's Digital INPUTS.

⇨ All these Push Buttons are connected to the PLC Digital INPUTS, The E-Stop Status also connected to the PLC Digital INPUTS.

⇨ Motor Power Contactor/Relay Coil connected to one of the PLC's DIGITAL OUTPUTS (24VDC);

⇨ All the Pilot Lamps / Stack Lights are connected to the PLC Digital OUTPUTS,

⇨ One Condition: IF THE MOTOR TRIPS DUE TO OVERLOAD Condition, there should be a minimum of 10 Seconds gap for the next Re-starting of the Motor. During this period of 10 Seconds, the "YELLOW" Lamp will FLASH.

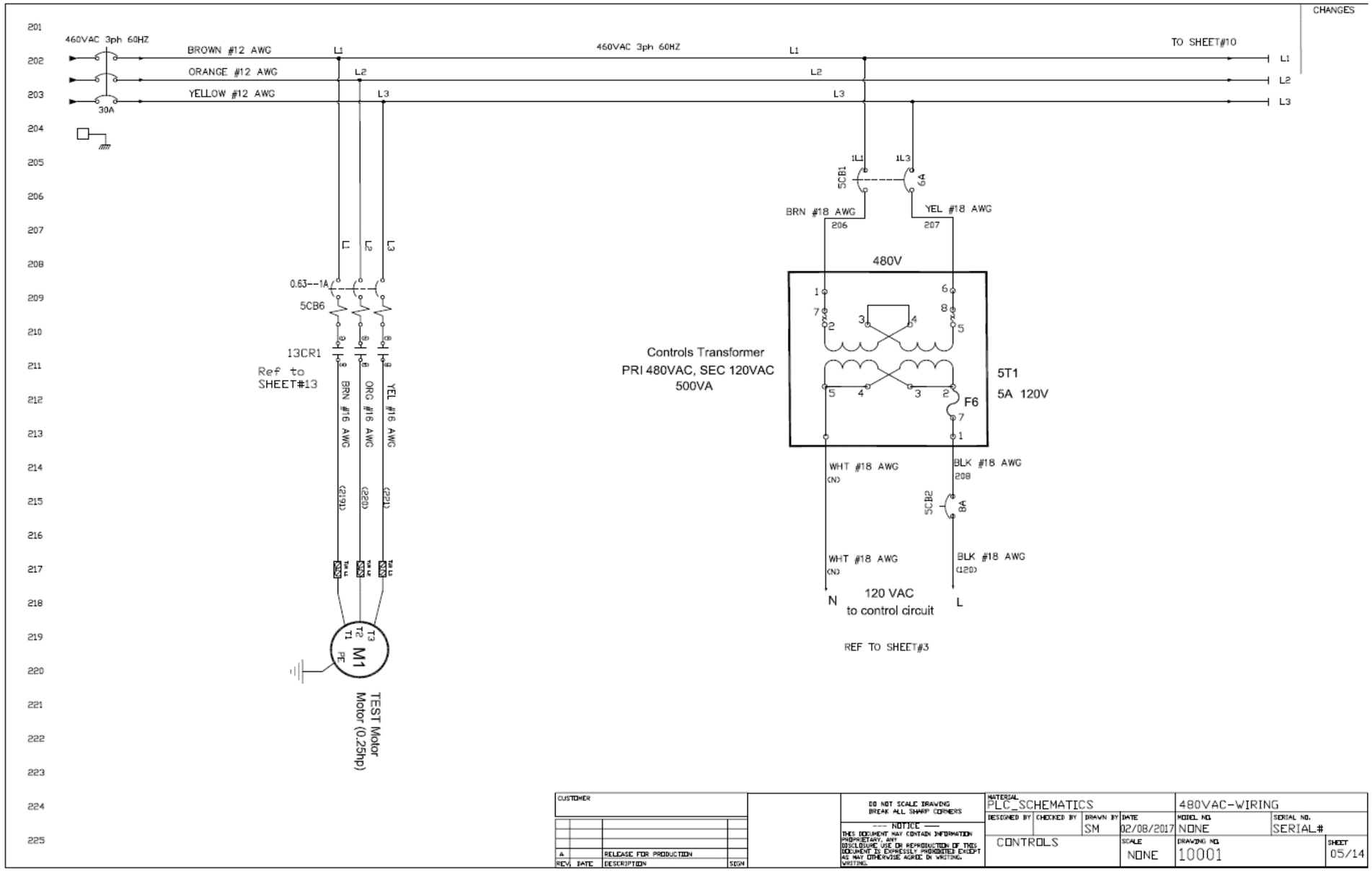
⇨ However: The Above Timer "TIME" Should be adjustable from a Minimum of 5 Seconds to 20 Seconds. (More if you take the HMI Couse);

⇨ The "RED Pilot Lamp" would be Illuminated, if either the Motor Trips Or if the E-Stop Status goes False.

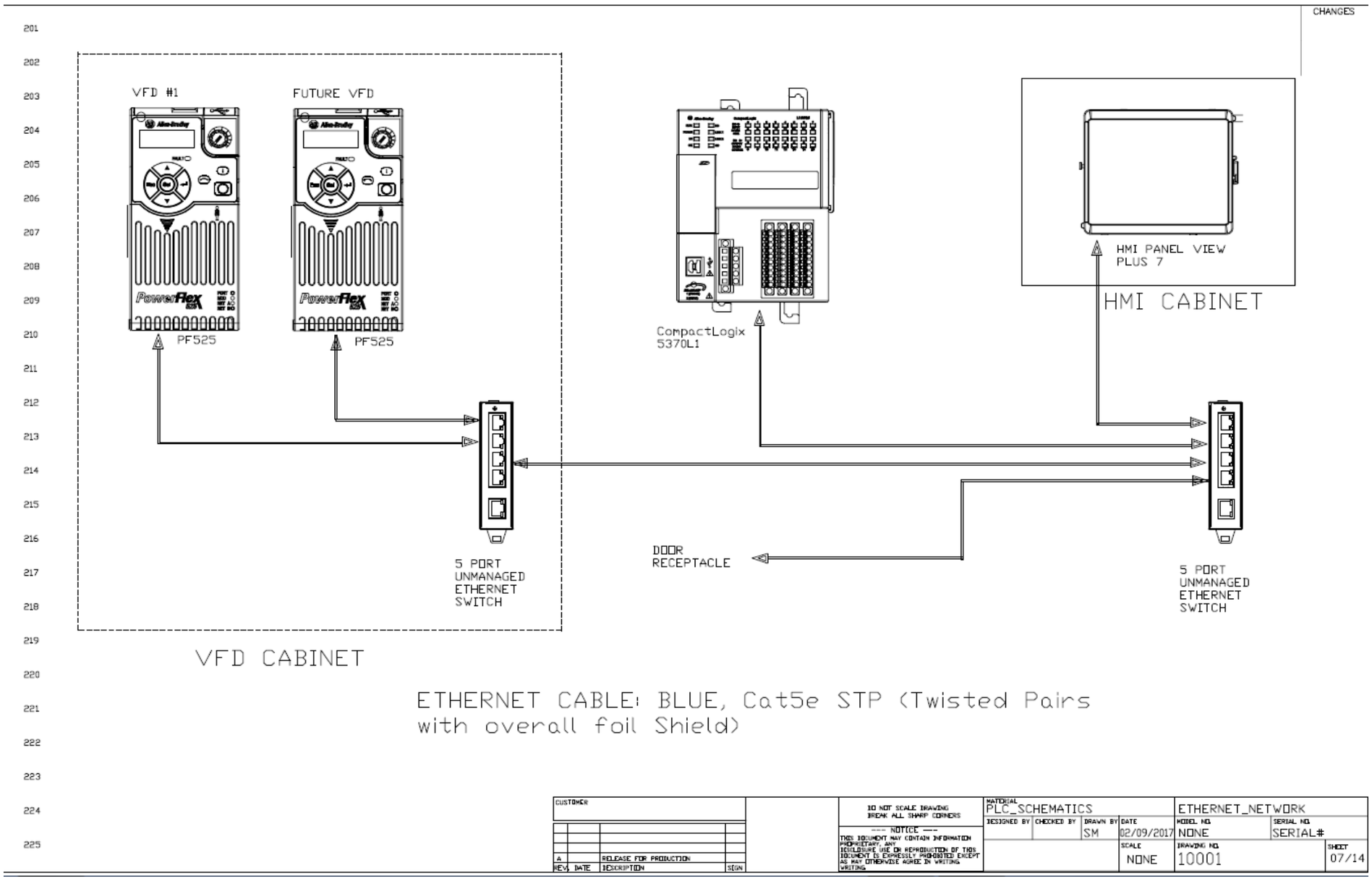
NOTE: IF YOU ARE TAKING THE HMI COURSE, All the above functions like PB, Pilot Lamps, Timer adjustments are covered under HMI Screen Graphics.

PROJECT TASK

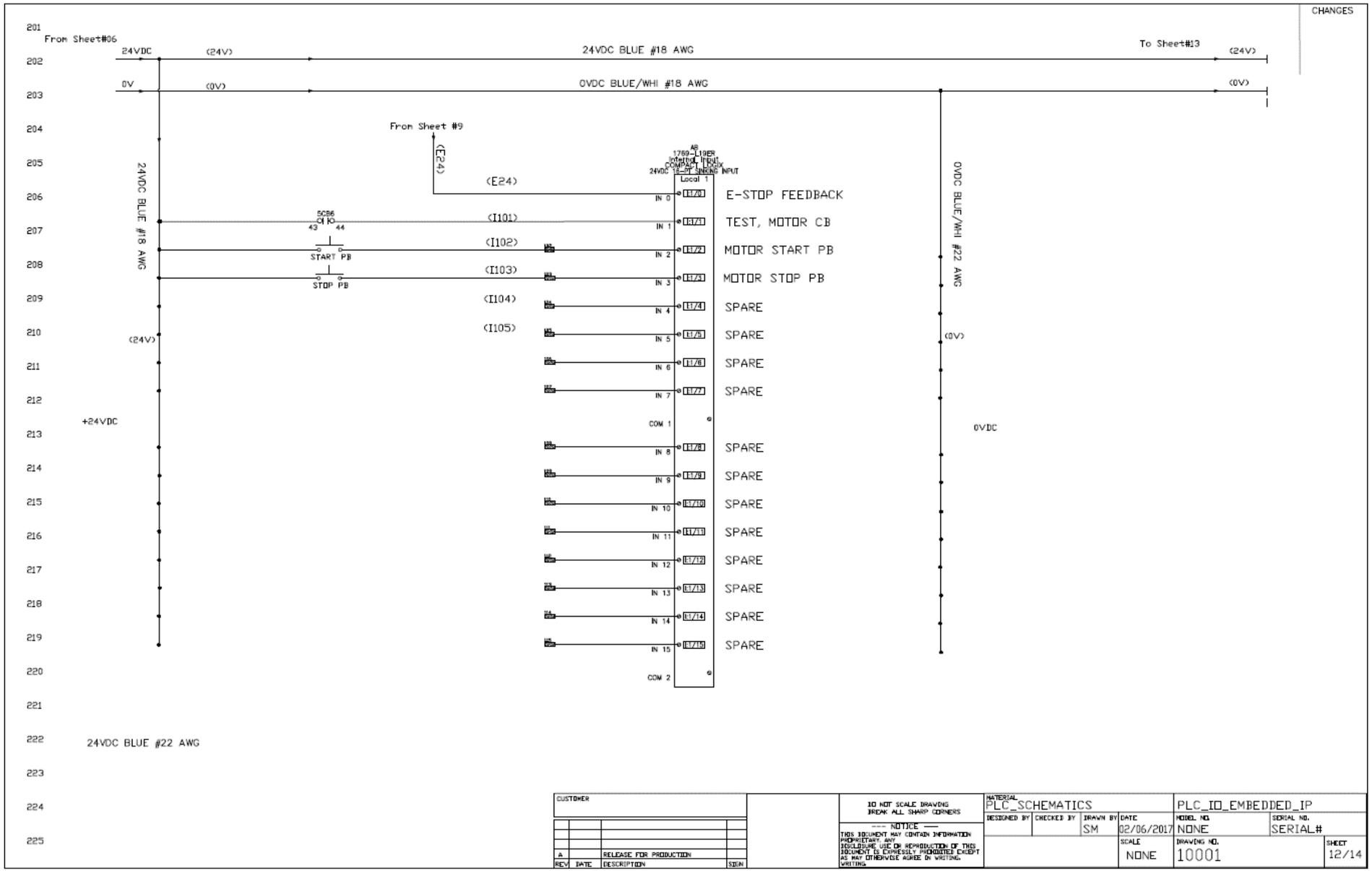
THE SCHEMATICS: VERY BASICS (NOT THE WHOLE SCHEMATICS)



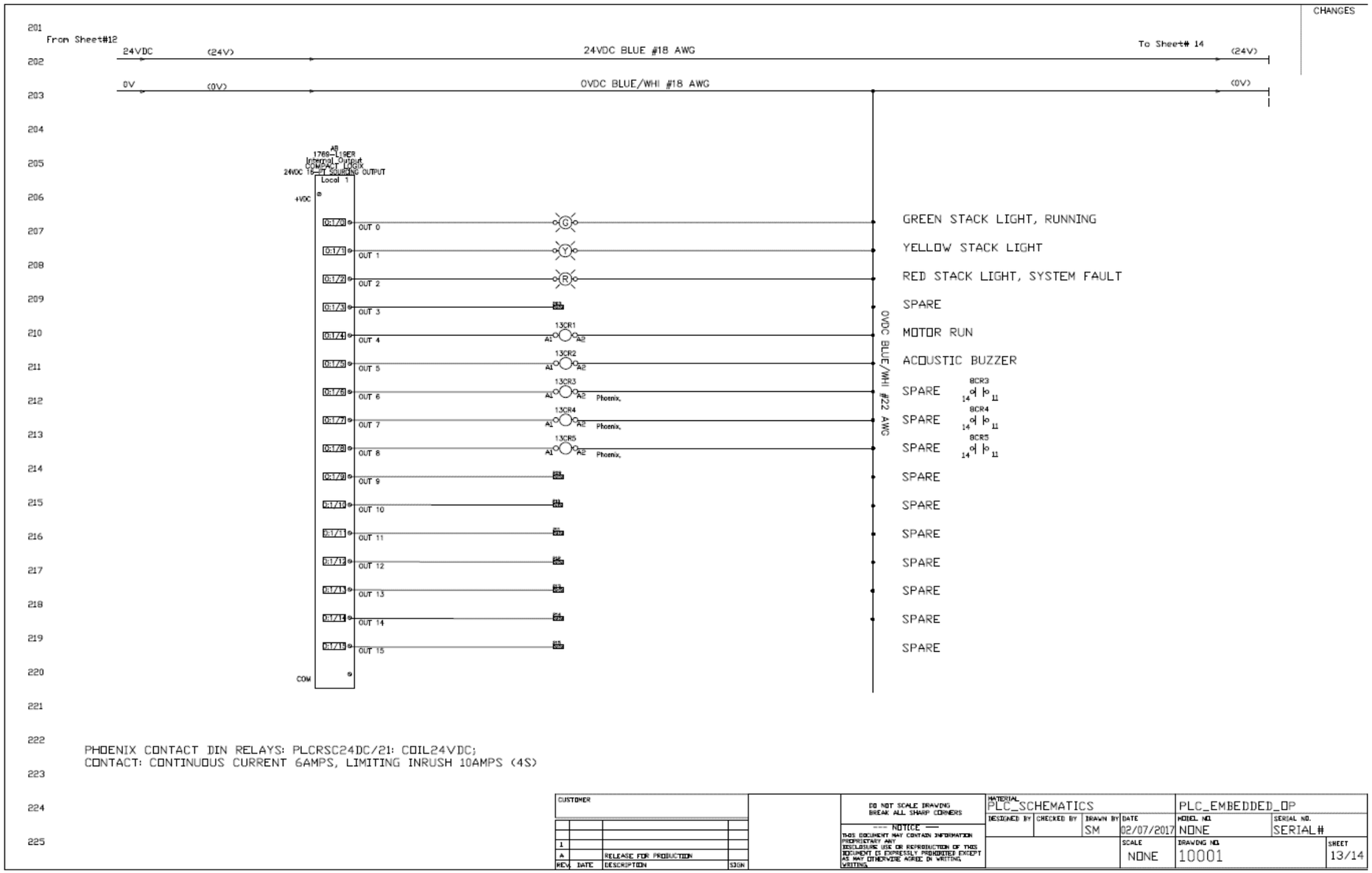
THE SCHEMATICS: NETWORKING ARCHITECTURE



THE SCHEMATICS: PLC DIGITAL INPUT CARD



THE SCHEMATICS: PLC DIGITAL OUTPUT CARD



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UNDERSTANDING THE NEW PROJECT TASK:

➟ TASK: IF THE MOTOR CIRCUIT BREAKER TRIPS: RED PILOT LAMP TO BE ON;

➟ HMI TO HAVE INDICATION THAT THE MOTOR TRIPPED; AND THIS WILL BE LATCHED.

➟ HMI WILL HAVE A "RESET" PUSHBUTTON, TO UNLATCH THE FAULT, PROVIDED REAL FAULT DOES NOT EXIST.

➟ ONCE THE MOTOR TRIPS, CAN NOT RESTART THE MOTOR IN NEXT 5 SECONDS MINIMUM

➟ THIS MOTOR RESTART TIMER ADJUSTABLE, RANGE 5 SEC MINIMUM TO 15 SECONDS, MAX. (By HMI Or PLC)

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Establishing On-Line connection to the CPU:

- Assign the IP Offline in the code 4
- Hardwire the PLC, with Unmanaged Switch 5
- Change the Laptop IP Address 6
- BOOTP/DHCP --->ONLY FOR BRAND NEW PROCESSOR 10
- PING THE CPU: COMMAND PROMPT 13
- LAUNCH RSLINX CLASSIC 14

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Uploading from a CPU
&
Downloading to a CPU

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ON-LINE EDITS
&
ON-LINE TRENDING

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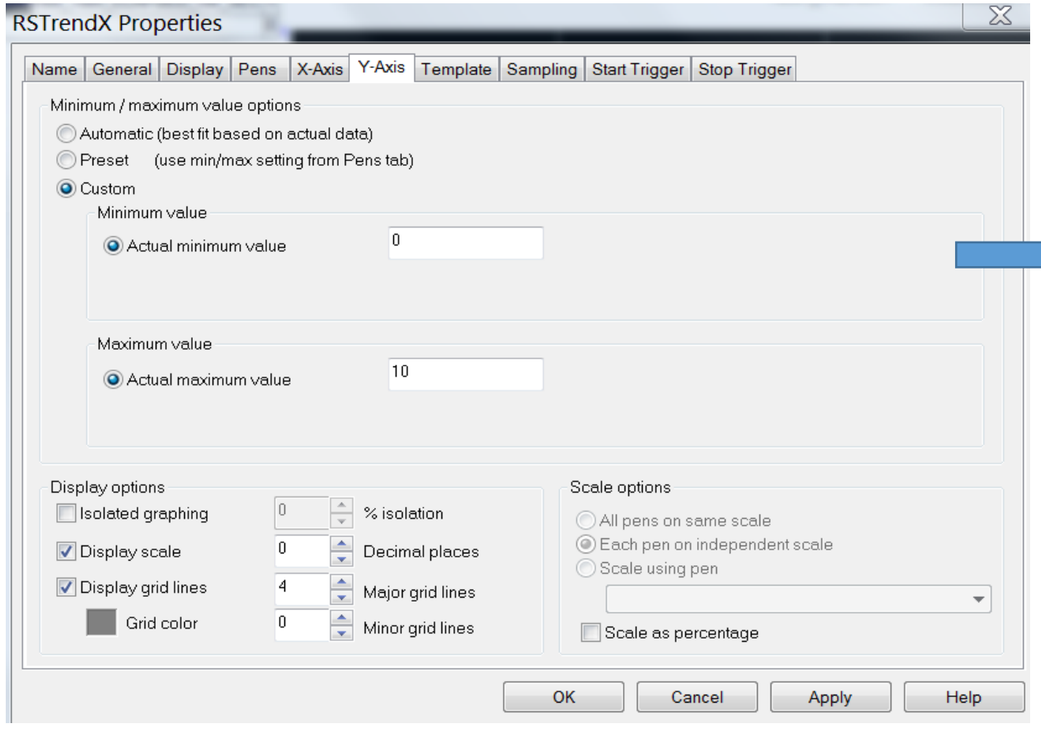
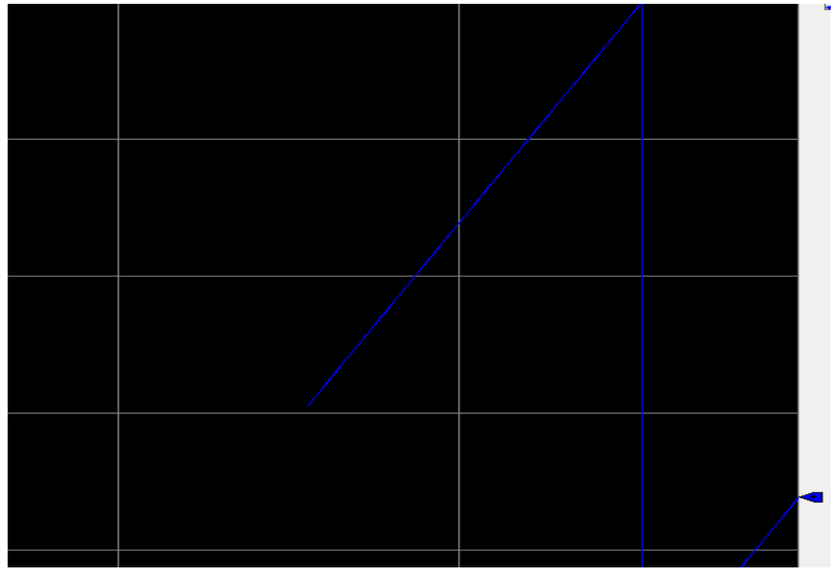
RSLogix 5000 -- PART 5

CONTD.: CREATING ONLINE TRENDS: DIRECTLY WITH PLC, ONLINE

CHANGE THE Y-AXIS RANGE TO : Custom, 0..10 , NEXT "APPLY" -->OK



"Run" THE TREND NOW….



SELECT "Apply", ---> OK

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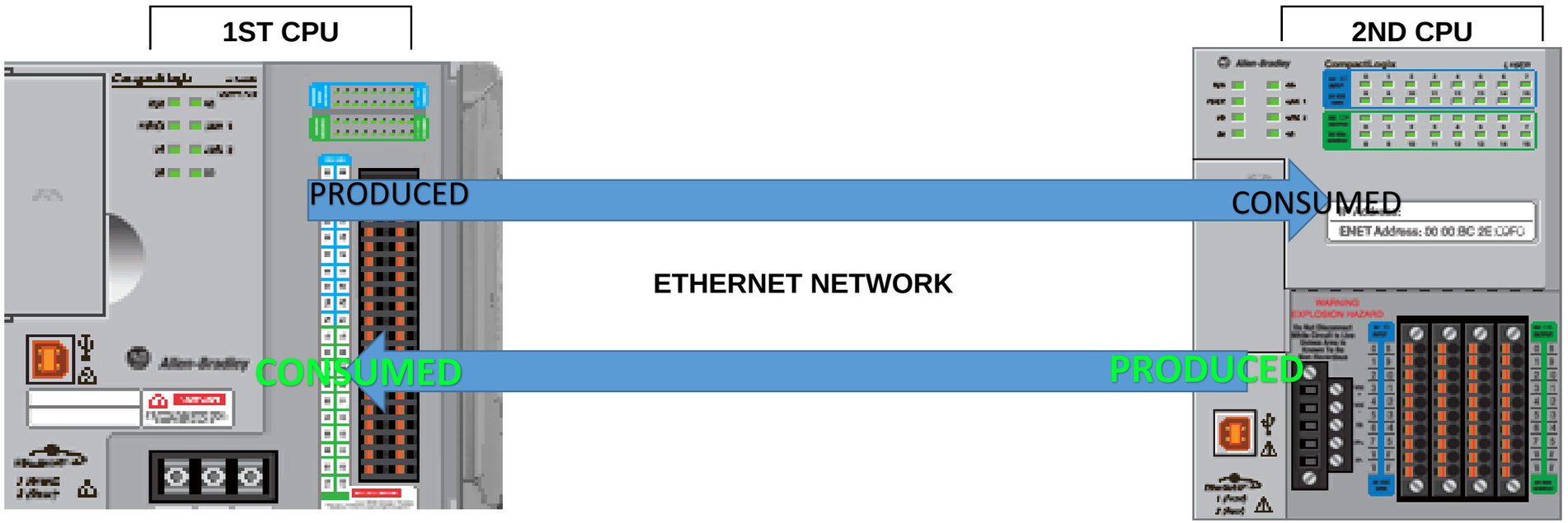
RSLogix 5000 -- PART 6

COMMUNICATION BETWEEN TWO PROCESSORS: BY MEANS OF "PRODUCED / CONSUMED " TAGS, OVER ETHERNET NW:

WHAT IT MEANS: THE TAG "PRODUCED" BY ONE PROCESSOR, GETS "CONSUMED" BY THE OTHER PROCESSOR, & VICE VERSA.



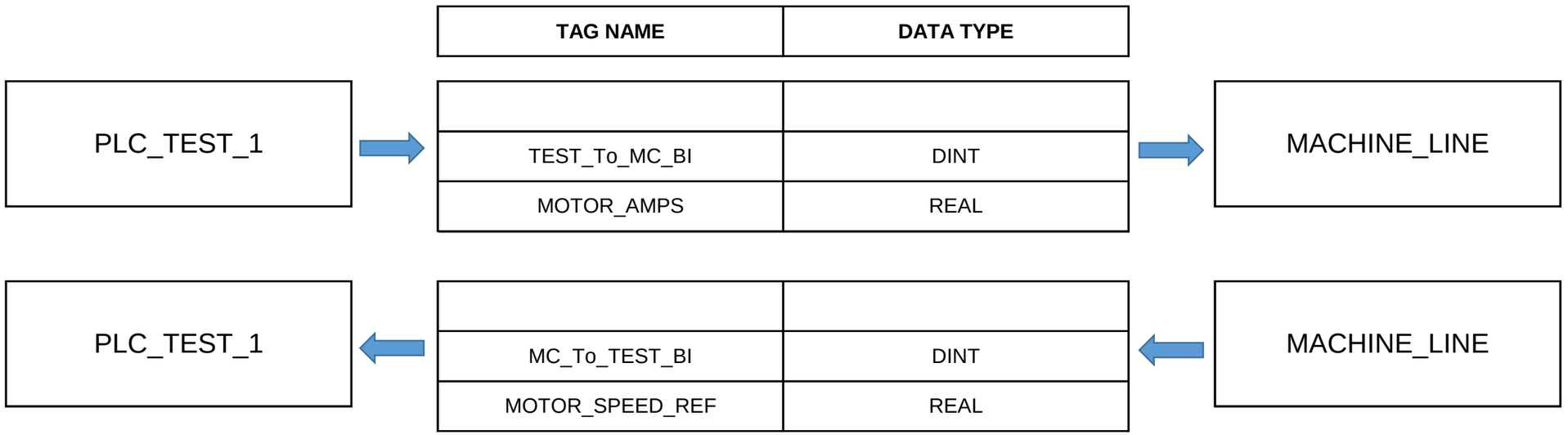
NAME: PLC_TEST_1
ALLEN BRADLEY COMPACTLOGIX:
1769-L23E-QB1
IP: 192.168.0.10
Subnet: 255.255.255.0

NOTE: PRODUCE / CONSUME IS ONE OF THE MOST COMMON AS WELL AS POPULAR METHODS OF "DATA" EXCHANGE BETWEEN THE TWO PROCESSORS. THERE IS ONE MORE WAY, NAMED "CIP" DATA EXCHANGE -- COVERED IN OUR ADVANCED COURSE.

NAME: MACHINE_LINE
ALLEN BRADLEY COMPACTLOGIX:
1769-L16ER-BB1B
IP: 192.168.0.20
Subnet: 255.255.255.0

RSLogix 5000 -- PART 6

PROJECT TASK: WE WOULD BE EXCHANGING THE FOLLOWING TAGS BETWEEN THE TWO PROCESSORS:



NOTE: IF WE HAVE TO EXCHANGE BETWEEN THE TWO PROCESSORS, BY PRODUCE / CONSUME TAGS, WHEN WE EXCHANGE BINARY, I.E. "BITS", ONE OF THE BEST PRACTICES TO USE TAGS FOR EXCHANGE AS "DINT", I.E. A DOUBLE INTEGER. WHAT IT MEANS: ONE SINGE EXCHANGE IT TRANSFERS "32 BITS" OF DATA. WE CAN "ALIAS" THOSE INTENTED BITS TO IT, -- THE BENEFIT EXPLAINED LATER,

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ALLEN BRADLEY HMI: PANEL VIEW PLUS 7

PART - 1

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PANEL VIEW PLUS -- PART 1

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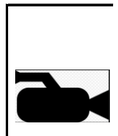

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PANEL VIEW PLUS -- PART 1

UNDERSTANDING THE PROJECT SCOPE:

1. Create a HMI project: first page -- "welcome" screen, with some imporetd images in it
2. Learn how to make a "Hidden PB" within the image, so that "TOUCH ANYWHERE IN THE SCREEN" will take you to the next page
3. Motor Control Page: Illuminated "Start" PB, Stop PB, Fault Reset, Fault Indication
4. Screen Navigation PB, Neumaric DATA Entry, Neumaric Display
5. Create Animation: Visibility, driven by Event, Graphical with Analog values
6. Create Graphics like Gauge, Bar Graph, Trends
7. Display Alarms
8. Set up communication: Offline / Online, Create a .MER i.e. Run version, Download, Create a Backup/ .APA
9. Most Common Errors, Retrieve from a .MER or a .APA file

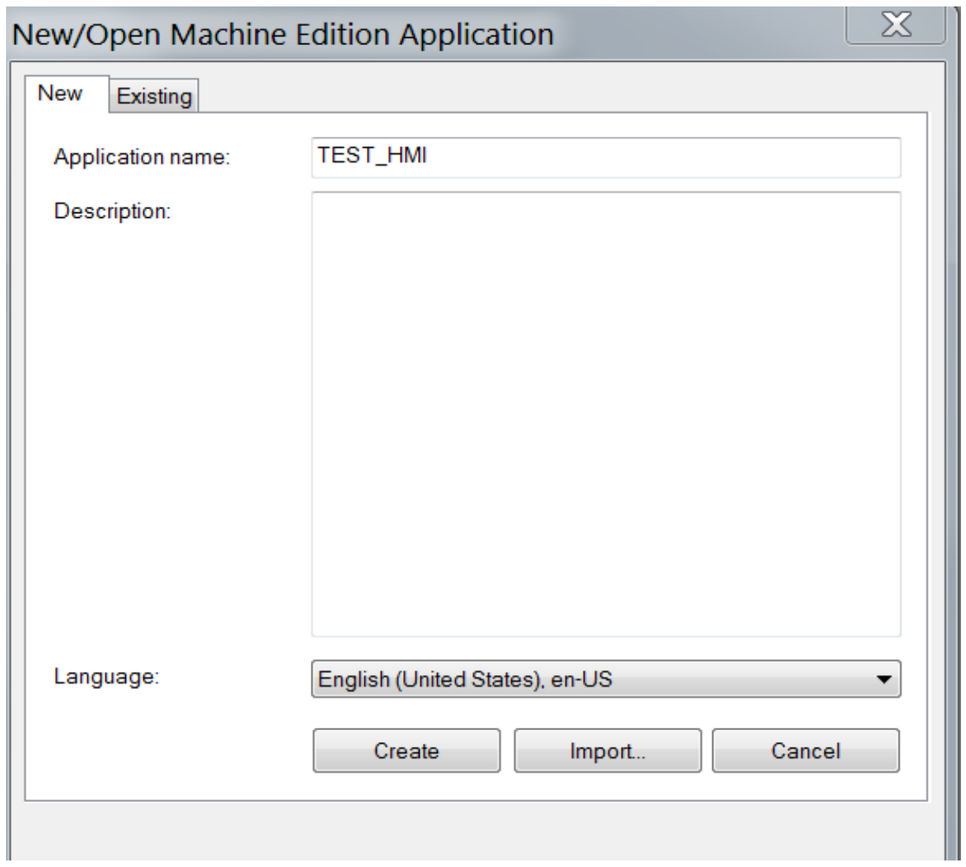
Devices connected for this example with IP Addresses:

PLC	192.168.0.10
HMI	192.168.0.8
SOME ETHERNET GENERIC DEVICE	192.168.0.1
COMPUTER	192.168.0.64

PANEL VIEW PLUS -- PART 1

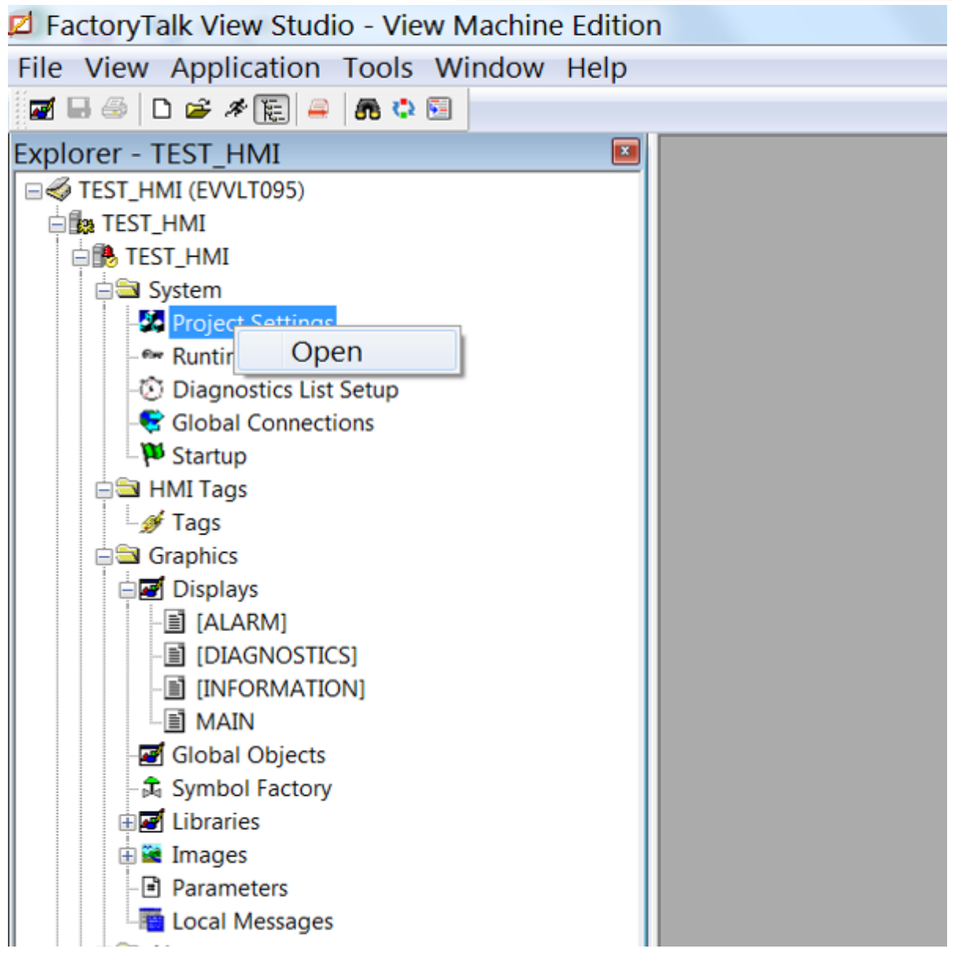
CREATE A NEW PROJECT: START THE PROJECT

Open Factory Talk View Studio, Machine edition: Select NEW:



Give a name: TEST_HMI, & Create

Select Which PV Model we would be using: Project Setting: OPEN



CREATING A NEW PROJECT, SELECT THE PV

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ALLEN BRADLEY HMI: PANEL VIEW PLUS 7

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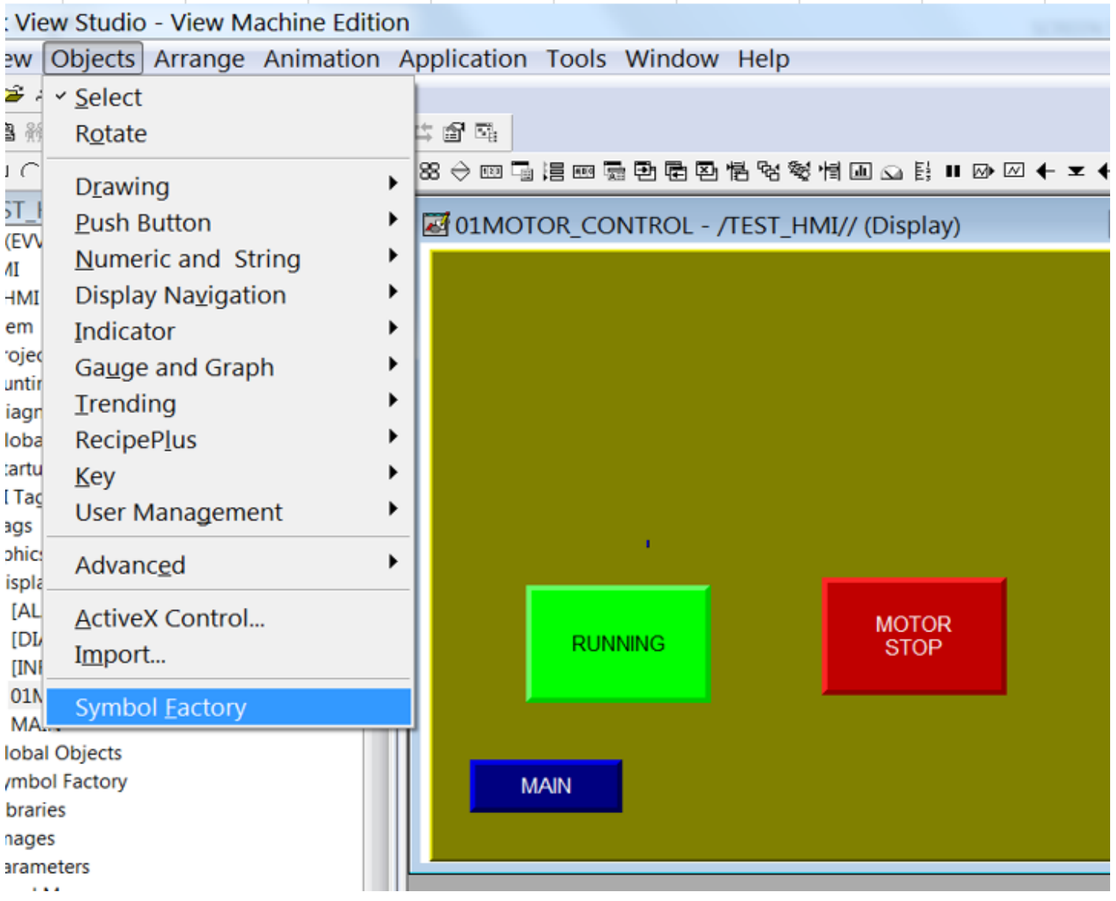
PANEL VIEW PLUS -- PART 2

SCREEN ANIMATION: VISIBLE / INVISIBLE: SYMBOL FACTORY

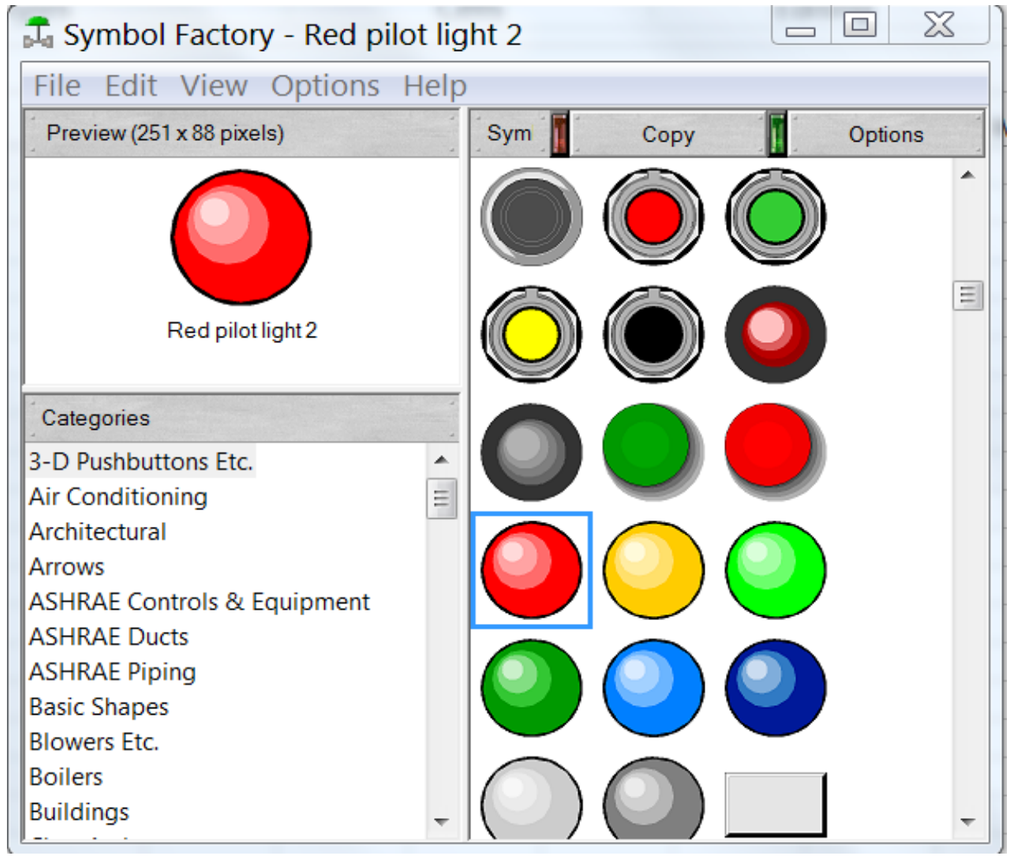
]

LET'S INSERT SOME RED INDICATING LAMP: FOR MOTOR FAULT: LAUNCH THE SYMBOL LIBRARY

LAUNCHING THE SYMBOL LIBRARY: Objects --> Symbol Library



SELECT 3-D PUSH BUTTON: RED pilot light 2



ACCESSING THE SYMBOL LIBRARY

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ALLEN BRADLEY HMI: PANEL VIEW PLUS 7

PART - 3

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HMI: DOWNLOADING PREPARATION: Understanding the Concept

Controls Explorer

- UNLIKE PLC: CAN-NOT DOWNLOAD DIRECTLY, BUT ONLY A "RUN" OR .MER VERSION
- BEFORE WE CREATE A RUN / .MER VER, SET UP IT'S **COMMUNICATION (COMM).**
  WHAT IT MEANS: "**TO WHOM IT WOULD BE TALKING TO AND HOW**"?
- TWO WAYS TO SET UP COMM:
  - SET IT UP OFF-LINE, THE DIFFICULT ONE
  - SET IT UP ON-LINE, THE EASIEST ONE
- ONCE COMM IS SET-UP, CREATE THE RUN Or .MER VERSION
- ONCE DOWNLOADED, MAY GET **SOME ERRORS**, WILL COVER SOME MOST COMMON ERRORS
- ONCE ERRORS TAKEN CARE OF, **CREATE RUN / .MER FILE AGAIN, DOWNLOAD IT AGAIN**
- **POSSIBLE RUNNING** DIRECTLY FROM THE COMPUTER:
  ONCE NO ERROR, & COMM IS SET-UP CORRECT, IF CONNECTED TO THE TARGET PLC ONLINE, CAN RUN THE **INDIVIDUAL PAGE** DIRECTLY FROM YOUR COMPUTER, EVEN BEFORE YOU DOWNLOAD TO HMI.
  EXCEPTION: ALARMS PAGE

NOTE: IT IS REALLY IMPORATNT THAT YOU FOLLOW THE ABOVE STEPS, BEFORE YOU CREATE A RUN OR .MER VERSION. JUST REMEMBER, TO CREATE A .MER FILE IS VERY SIMPLE, BUT MAY NOT WORK…….