



KNOWLEDGE BASE

Article Type: Instructions

TRAC-A-RAC Set-up / Configuration Procedure & Installation

Description:

Instructions on “How to” set-up / configuration procedure and installation on Trac-A-Rac’s using Allen Bradley PLC, Radio Modem (Control Chief), RMC-Delta Module. This document is intended for Service Representatives and Engineers.

WARNING

Never work on, clean or service this unit, control panel or any machine or open or remove any protective cover, guard, grate, door, or maintenance panel until the power or energy sources has been turned off, locked out / tagged out, and all moving parts have come to a complete stop and or blocked to prevent movement. Machinery is dangerous - avoid personal injury and or death by following manufacture, Local, and OHSA safety procedures. Contact Columbia Machine for safety decals, guards, horns and beacons.

TRAC-A-RAC

SET-UP/CONFIGURATION PROCEDURE & INSTALLATION

Ver1.1



9:49:23 AM
9/1/2010

Language

Cancel

Previous

Directory

Customer Information

Customer Name:

Customer Location:

Equipment Model: TRAC-A-RAC

Equipment Serial Number: 1.600xxxxx

Equipment Electrical 328.129.xx

Columbia Service Phone #: 360-694-1501

Columbia Part Phone #: 360-694-1501



Overview Screen	Prox Sw Status	I/O Status	Manual Controls	Loading Table	Car Location	RMC Status	UpCar Control	Service / Help	Alarm	Customer Information
-----------------	----------------	------------	-----------------	---------------	--------------	------------	---------------	----------------	-------	----------------------



CONTENTS:

- A. INTRODUCTION
- B. DOWNLOAD PLC PROGRAM/SETUP RADIO MODEM
- C. DOWNLOAD DELTA MODULE PROGRAM
- D. DOWNLOAD EPRO PROGRAM
- E. HARD WIRING & EQUIPMENT DEVICE CHECK
- F. LOCAR/UPCAR STATUS FROM EPRO
- G. SETUP/CONFIGURE LOCAR
- H. SETUP/CONFIGURE UPCAR
- I. AUTOMATIC OPERATION OF SYSTEM
- J. APPENDIX
 - 1.1 General Information
 - 1.2 PLC Communication Tables
 - 1.3 Troubleshooting TAR
 - 1.4 Service/Help ePro Screen
 - 1.5 Shutting Down ePro
 - 1.6 Delta/RMC Module Programming

A. INTRODUCTION :

OPERATIONAL SETUP & SYSTEM CALIBRATION:

Before the Cars can be operated in automatic mode, the following tables MUST be completed for each car. (Refer to the Locar and Upcar installation guide section in this manual.)

LOCAR:

- DOWNLOAD LOCAR PLC PROGRAM
- DOWNLOAD EPRO OPERATOR INTERFACE PROGRAM
- DOWNLOAD DELTA MODULE PROGRAM
- LOCAR ENCODER – VERIFY OPERATION, COUNT, DIRECTION
- LOCAR VELOCITY (SPEED) SETTING
- LOCAR ACCELERATION & DECELERATION (RAMP) SETTING
- LOCAR COUNT TABLE: LOAD & UNLOAD POSITION TABLE
- LOCAR COUNTS TABLE: FROM ORIGIN TO KILNS
- LOCAR CREEP COUNTS TABLE: FROM ORIGIN TO LOAD KILN
- LOCAR CREEP COUNTS TABLE: FROM LK TO UK (UK > LK) FORWARD
- LOCAR CREEP COUNTS TABLE: FROM LK TO UK (UK < LK) REVERSE
- LOCAR CREEP COUNTS TABLE: FROM UNLOAD KILN TO UNLOAD POS.
- ALARM TABLE FOR UPCAR AT LOAD KILN
- ALARM TABLE FOR UPCAR AT UNLOAD KILN

UPCAR:

- DOWNLOAD LOCAR PLC PROGRAM
- DOWNLOAD DELTA MODULE PROGRAM
- UPCAR ENCODER – VERIFY OPERATION, COUNT, DIRECTION
- UPCAR VELOCITY (SPEED) SETTING
- UPCAR ACCELERATION & DECELERATION (RAMP) SETTING
- UPCAR COUNTS TABLE: LOAD POS.
- UPCAR COUNTS TABLE: UNLOAD
- UPCAR COUNTS TABLE: LOAD KILN COUNTS
- UPCAR COUNTS TABLE: UNLOAD KILN COUNTS
- UPCAR COUNTS TABLE: GOING INTO LOAD KILN CREEP COUNTS
- UPCAR COUNTS TABLE: GOING OUT OF LOAD KILN CREEP COUNTS
- UPCAR COUNTS TABLE: GOING INTO UNLOAD KILN CREEP COUNTS
- UPCAR COUNTS TABLE: GOING OUT OF UNLOAD KILN CREEP COUNTS

B. DOWNLOAD PLC PROGRAM :



The following describes the steps to download the PLC programs to the Track/Rack PLC system. There are two PLC's in the Track/Rack system. One PLC is for the LoCar and the other PLC is for the UpCar. The download procedure must be performed for each PLC separately. The download procedure is as follows:

1. PLC Connection:
 - Establish a connection to the Trac-A-Rac PLC's with RS Linx through either the serial or the Ethernet method. Use the appropriate cable based on the connection method of choice.
 - When connected the desired PLC has been established, the PLC will appear in RS linx. Browse RS Who and PLC should icon will appear as connected.
2. Download program to the PLC:
 - Invoke RS Logix 500.
 - Open the Track/Rack PLC program. (For UpCar or LoCar depending on what PLC you are working on at the moment).
 - Download Program to PLC.
3. Clear all Faults:
 - If a fault exist due to reading from memory, set bit S1/10, in the PLC program and .
 - Check that the physical rack configuration matches the program.

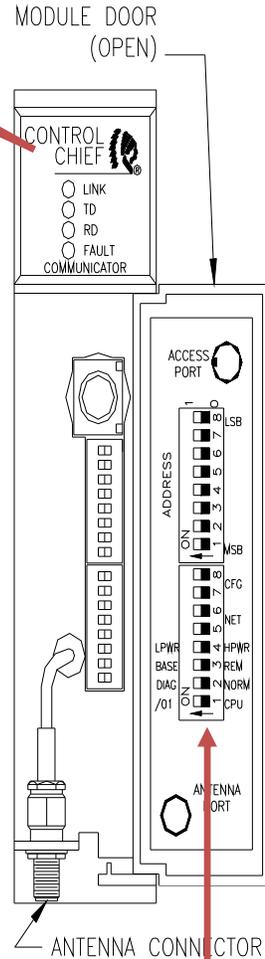
4. Set up Radio Modem:

- Make sure there are no RED LED Fault lights.

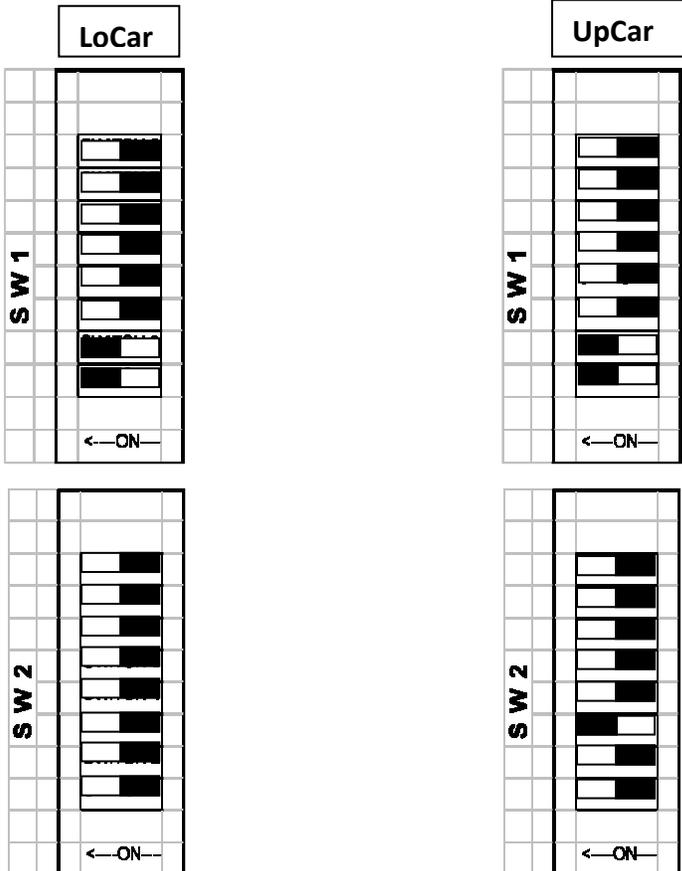
LED INDICATORS

Indicator LED Definition and Function

Indicator	Definition	Function
LINK	Link Status	Indicates an established communication link between modules. The RD indicator should also be flashing to show valid data is being processed
TD	Transmit Data	The Transmit Data LED indicates when the module is sending data.
RD	Received Data	The Receive Data LED flashes ON to indicate when a VALID packet has been processed.
FAULT	Fault	The Fault LED provides an indication of module error conditions.



Configure DIP switch settings on Modem card as per drawing.



5. Write PLC program to EEPROM:
 - From the Main Menu click on save to EEPROM.

6. Verify all I/O in the System:
 - Ring out all inputs.
 - Ring out all outputs.
 - Verify all analog signals.

C. DOWNLOAD RMC-DELTA MODULE PROGRAM:

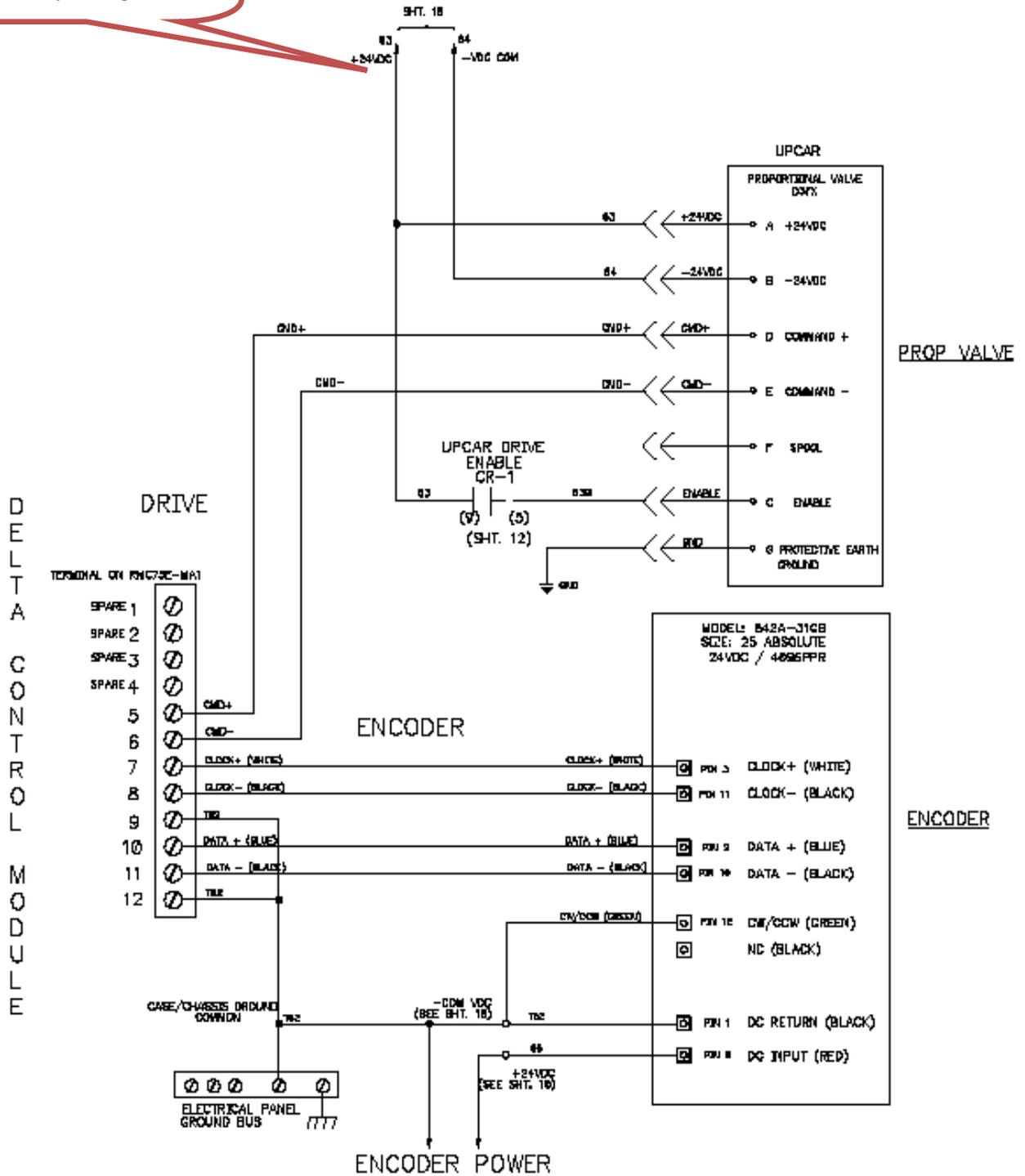


The following steps describe what is required to setup the Delta Module:

- 1. Check and verify all wiring and connections to the Delta Module.**
 - Verify wiring from Delta module to Encoder:
 - Verify wiring from Delta module to Valve controller:

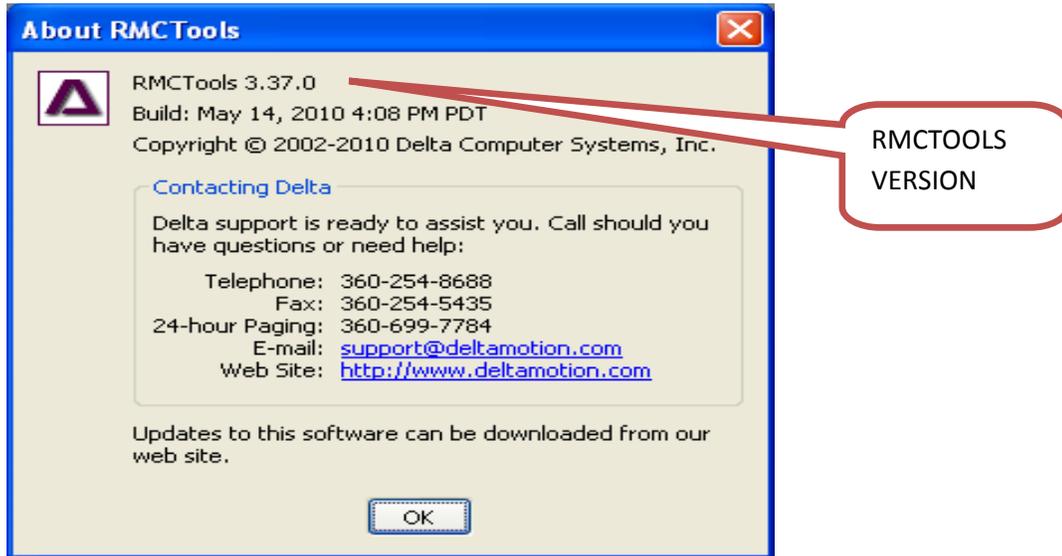
- 2. Verify Power to the Delta Module.**
 - Verify power wires to the Delta Module.
 - Power to the Delta Module should be 24VDC.

See Delta Module/Encoder Wiring Schematic in drawing package to verify wiring.



3. Install RMC Tools Software on to your computer.

- Install RMC Tools Software Version 3.37.0 the latest version.



Installation

You can install RMCTools from the CD that shipped with the RMC, or by downloading it from Delta's download page at www.deltamotion.com/dloads/.

To install from the CD:

- a) Insert the CD and wait for the splash screen to appear. Click **Install RMCTools**. Follow the instructions for installation. If the splash screen does not automatically open, run the autorun.exe file.

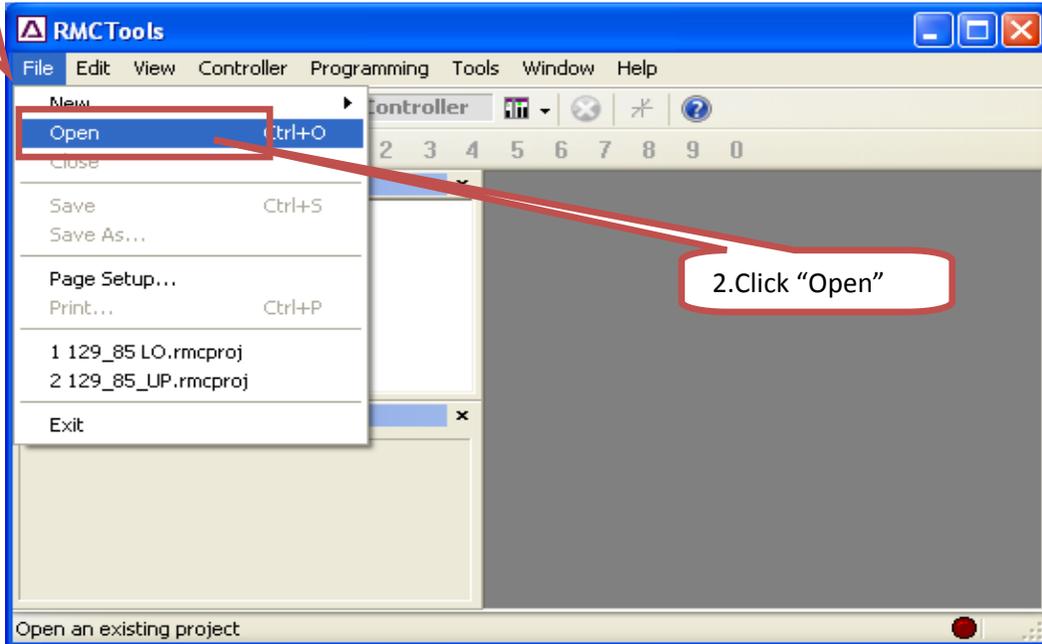
To install by downloading:

- a) Go to Delta's download website at <http://www.deltamotion.com/dloads/>
- b) Locate the RMCTools download under RMC70 Series Software and save it to your computer.
- c) Run rmctoolsinstall.exe and follow the instructions.

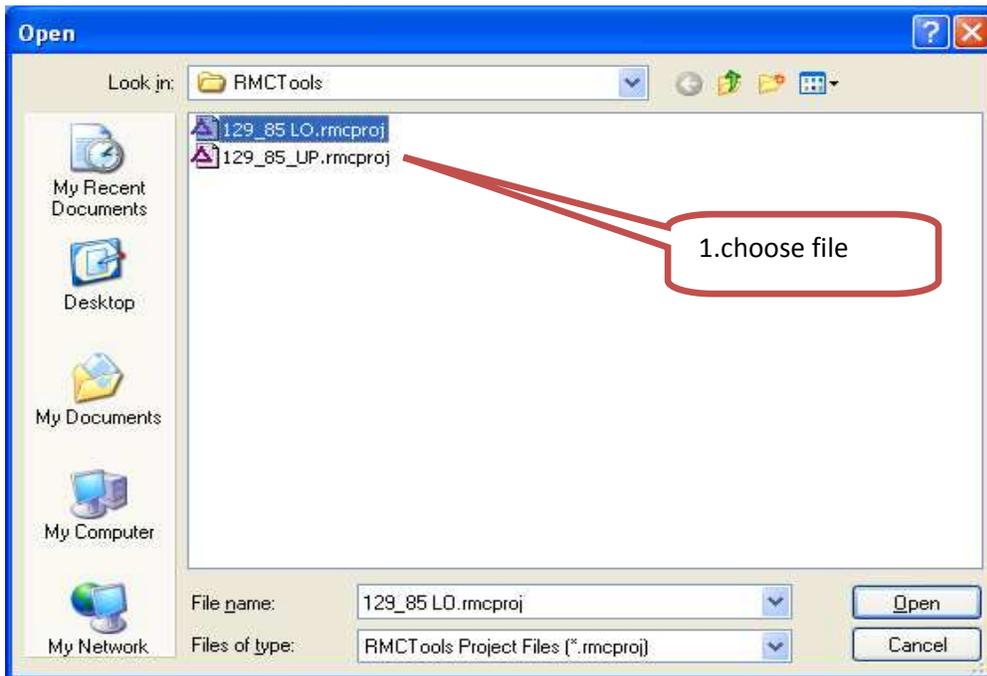
4. Start RMC Tools Software to Open and Download an application Program.

1.Highlight "file"

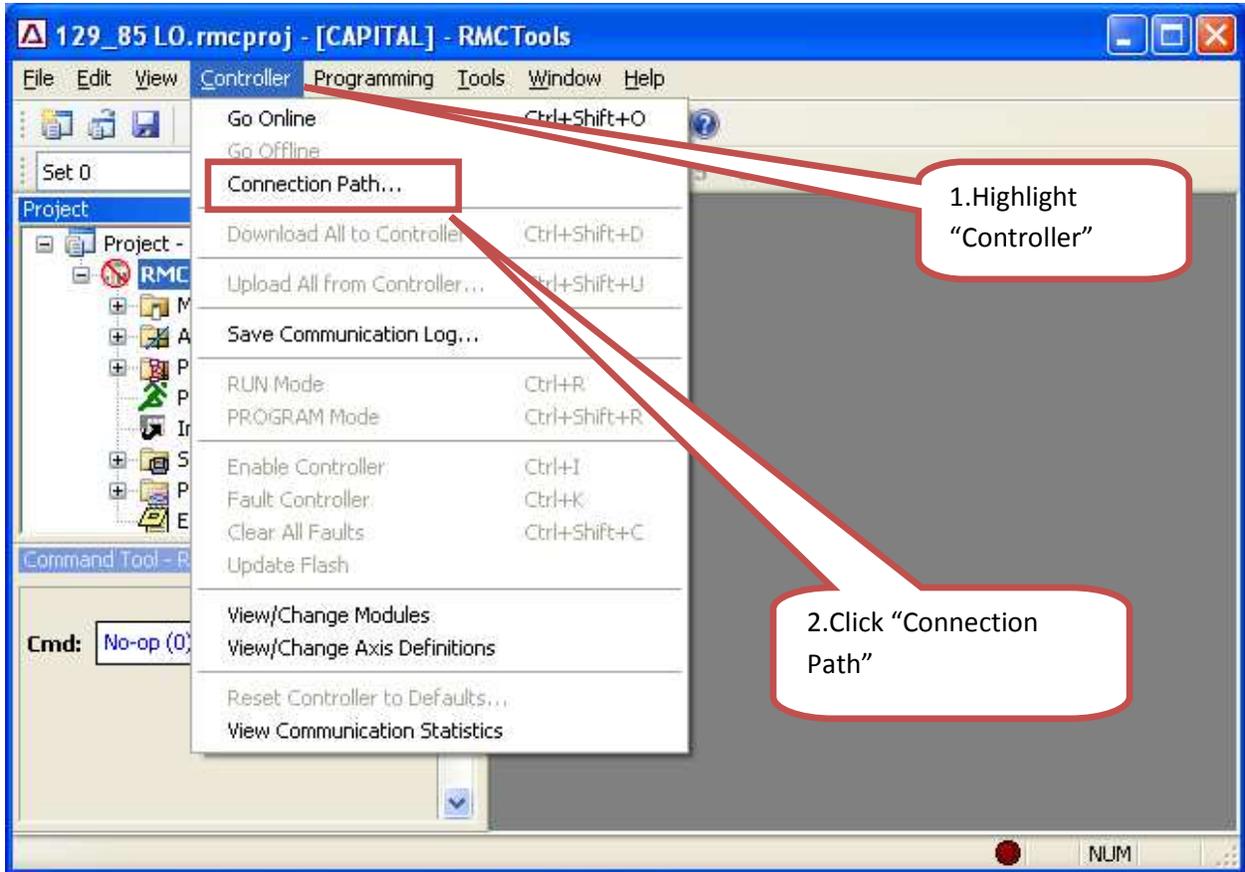
- From **START Menu**→**PROGRAMS** →**RMC TOOLS**.
- This starts the Delta Software. The window below will appear.



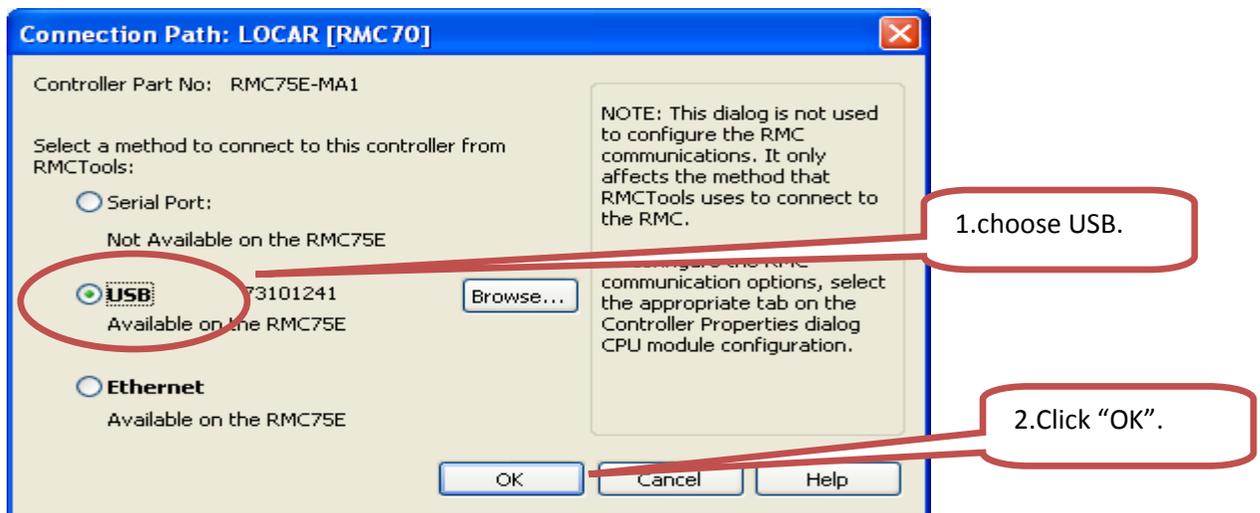
- Open UpCar or LoCar file. File is a .rmcproj file extension. Copy RMC projects to RMC Tools Directory.



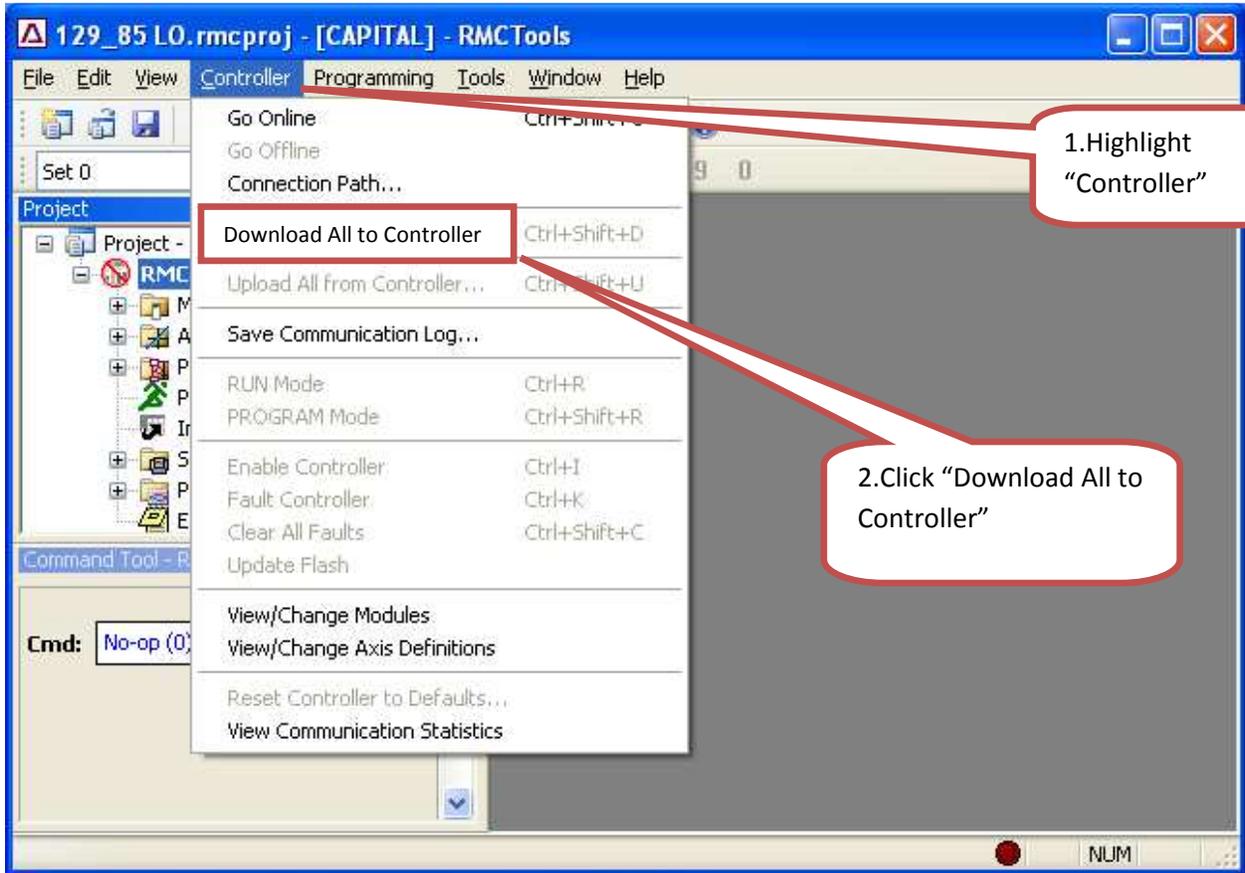
- The following window will appear.
- Connect to the Delta Module. → Connection Path



- Connection Path screen will appear. Choose USB and make sure the USB cable that was provided is connected between the Delta Module and the computer.



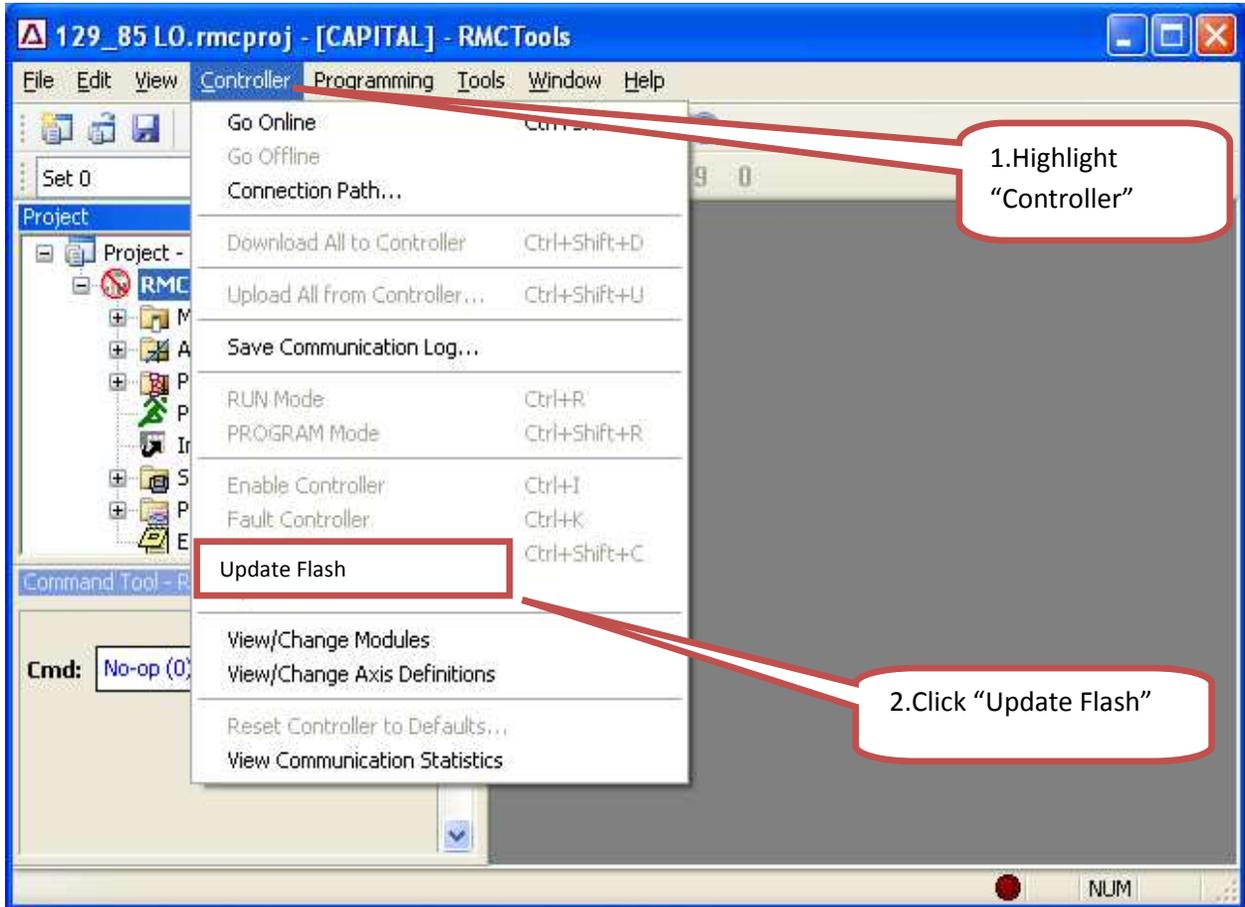
- Once Connection to the Delta module has been established. Download the LoCar or UpCar program to the module.



After the down load ensure that there are NO FAULTS on the Module. RED LED indicates a FAULT.



- After a successful download of the program to the Delta Module, Be sure to save the program to memory on the Delta Module. This is done by the following:



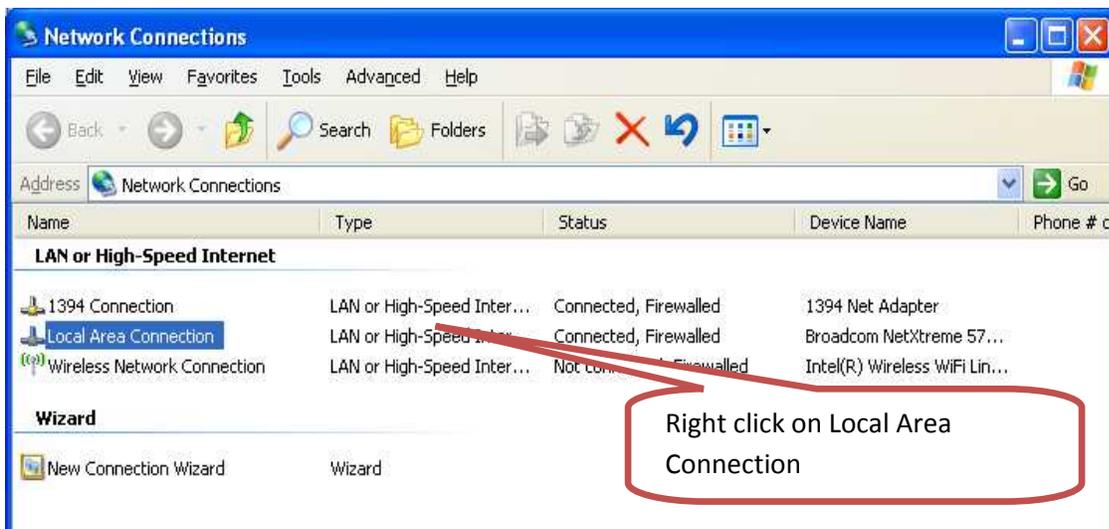
- Disconnect USB communication cables from the Delta Module, the Set-up and configuration of the module is complete.

D. DOWNLOAD EPRO PROGRAM:

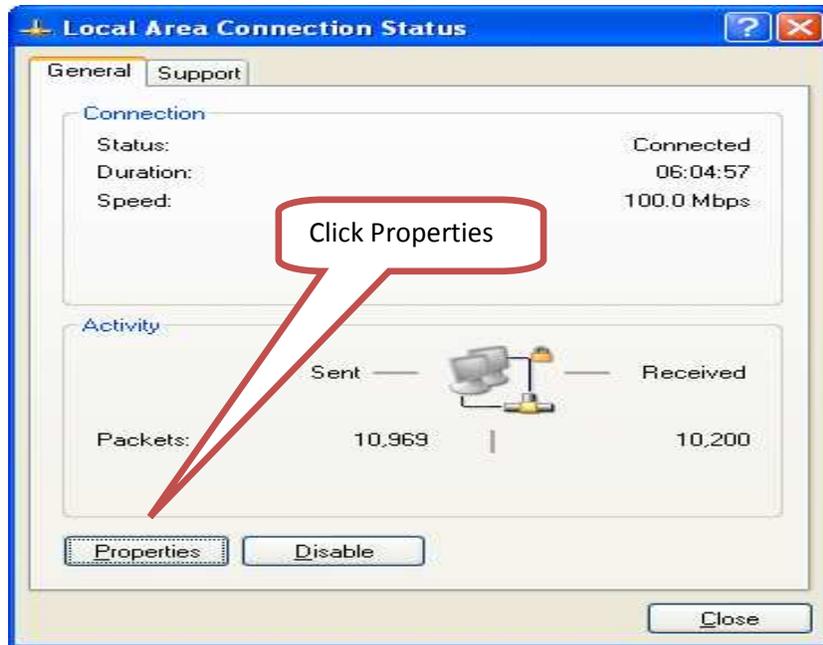
1. Computer configuration:

Reconfigure your laptop computer to communicate with the ePro unit. The IP address of your computer should be set to a specific IP address different from the IP address of the ePro unit, and the computer must be configured to NOT automatically obtain an IP address. The set-up configuration is as follows:

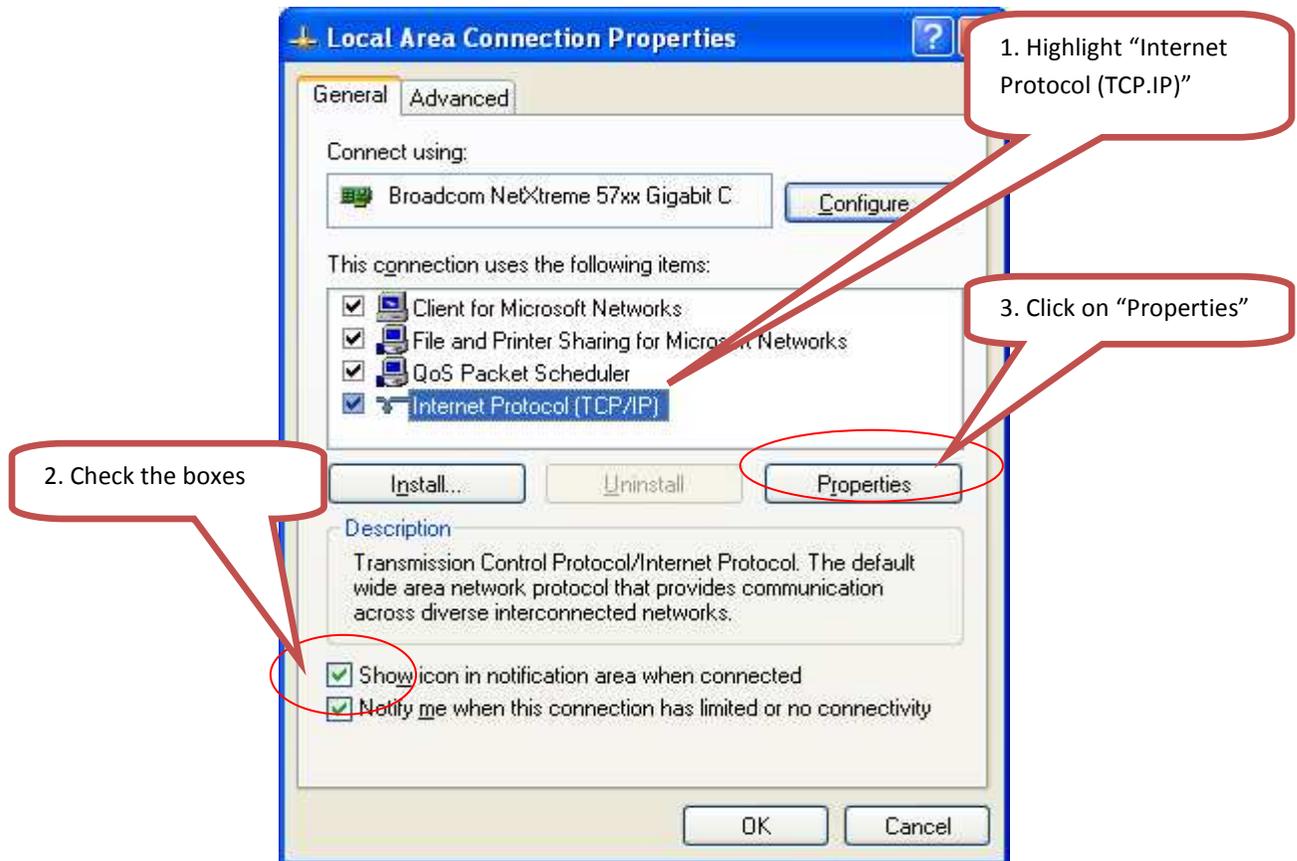
- ❖ From Start Menu of the computer, browse to settings and select “Network Connections”
- **Start → Settings → Control Panel → Network Connections**



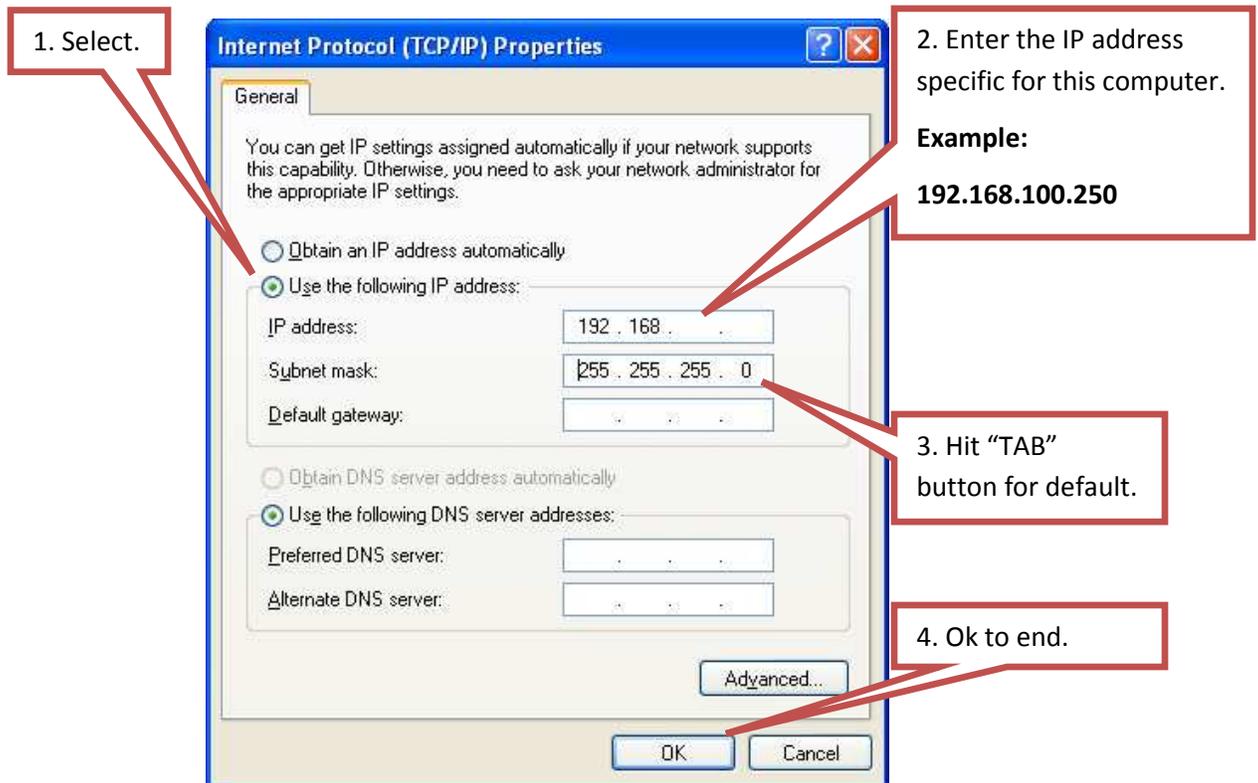
- Right click on Local Area Connection and select “Properties”.



- Select "Properties".



Select "Internet Protocol (TCP/IP)" and Choose Properties.



- Check the "Use the following IP address" and enter the correct IP address, Subnet mask, Default gateway of the unit then choose "Ok".
- Press "OK" to closed window and end configuration.

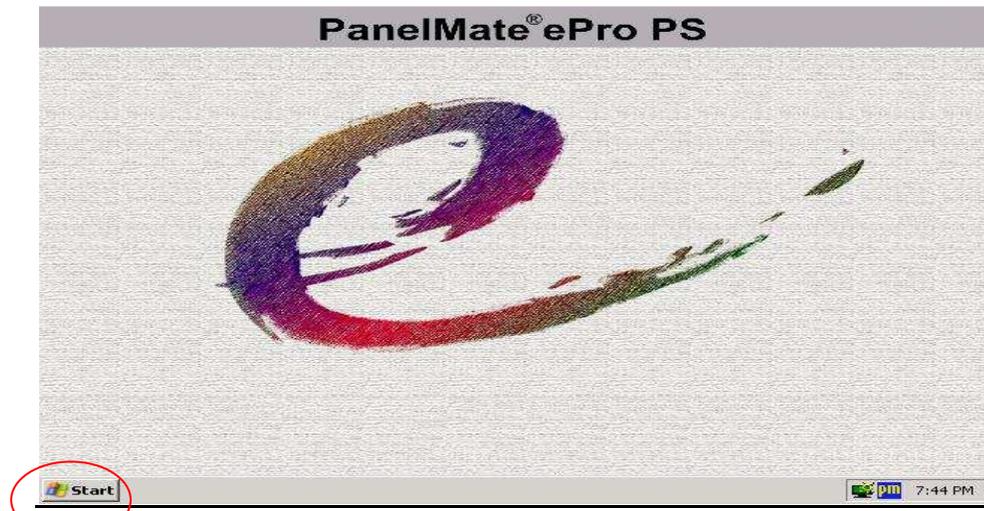
Configuration of computer for communication to ePro is complete.

2. PanelMate ePro configuration:

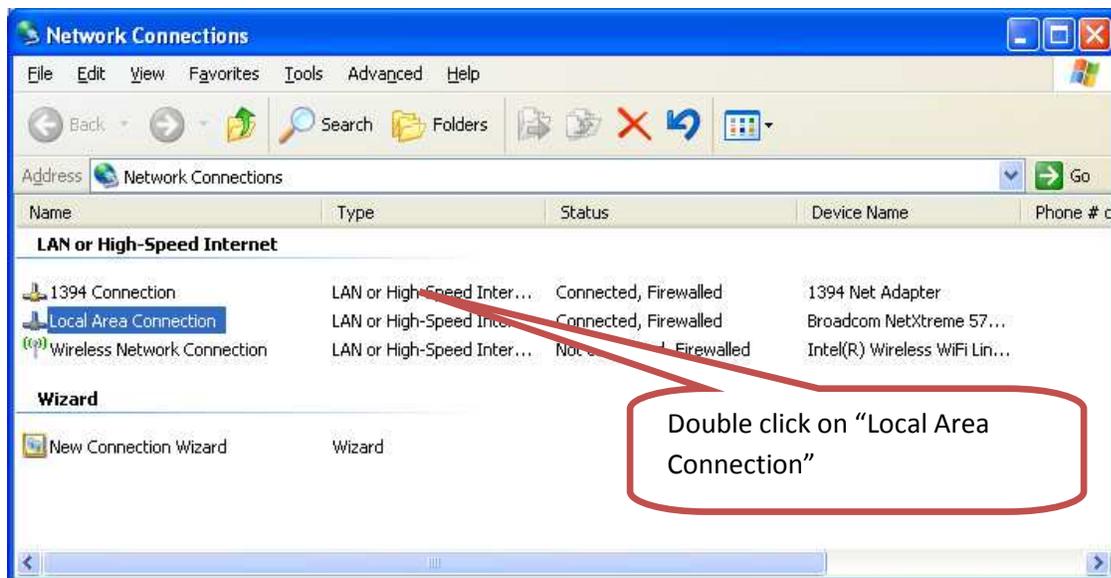
Configure the ePro unit to the specified assigned IP address. The IP address of this particular equipment should be located on the title page of the schematic drawing package. The ePro set-up configuration is as follows:

Setting new ePro Unit to the Correct IP Address

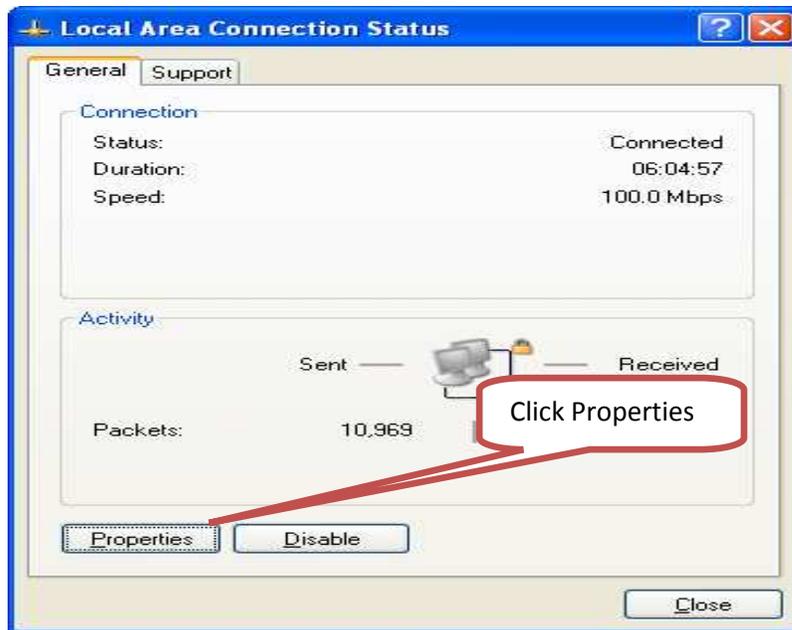
- ◆ Power up the ePro unit. Upon power up the following screen will appear.



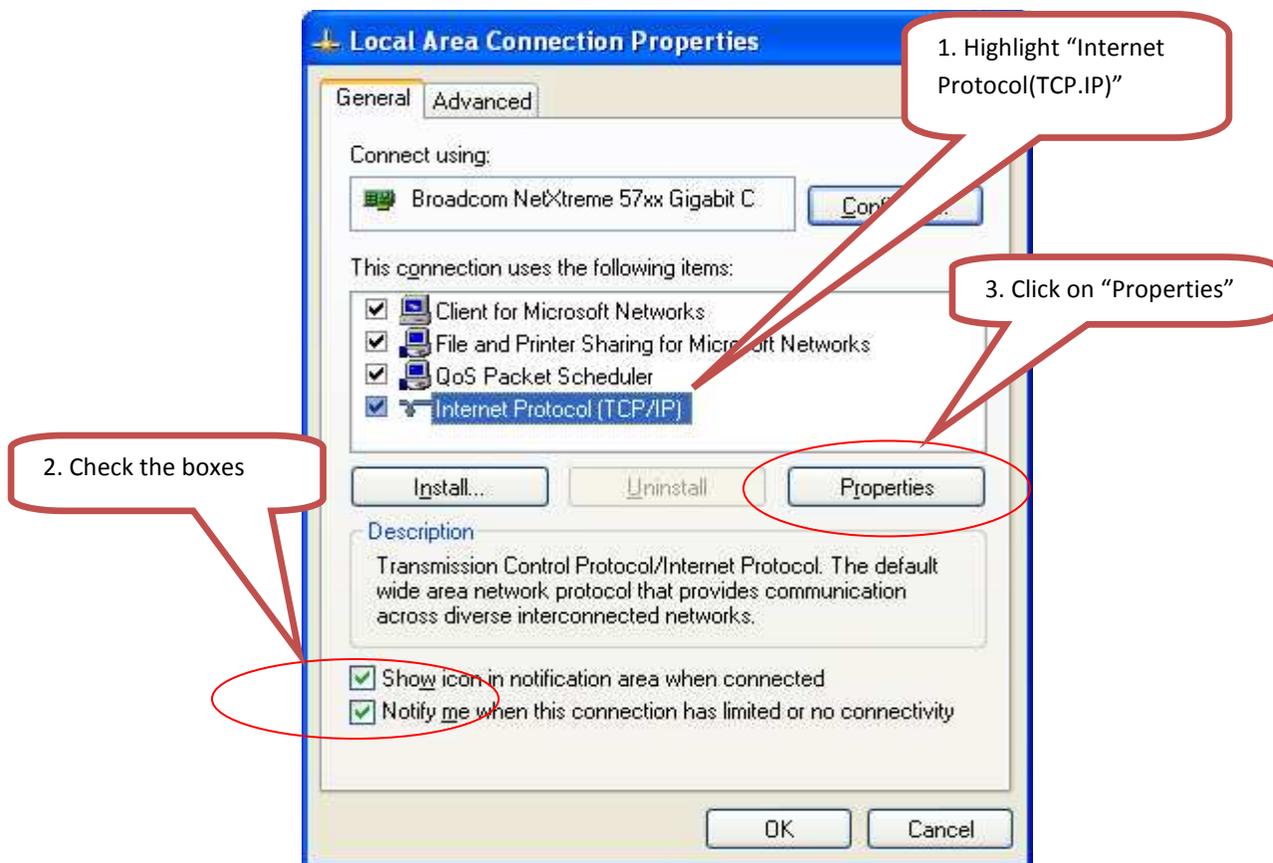
- From Start Menu, browse to settings and select “Network Connections”
- **Start → Control Panel → Network Connections**



- ◆ Double click on Local Area Connection and select “Properties”.

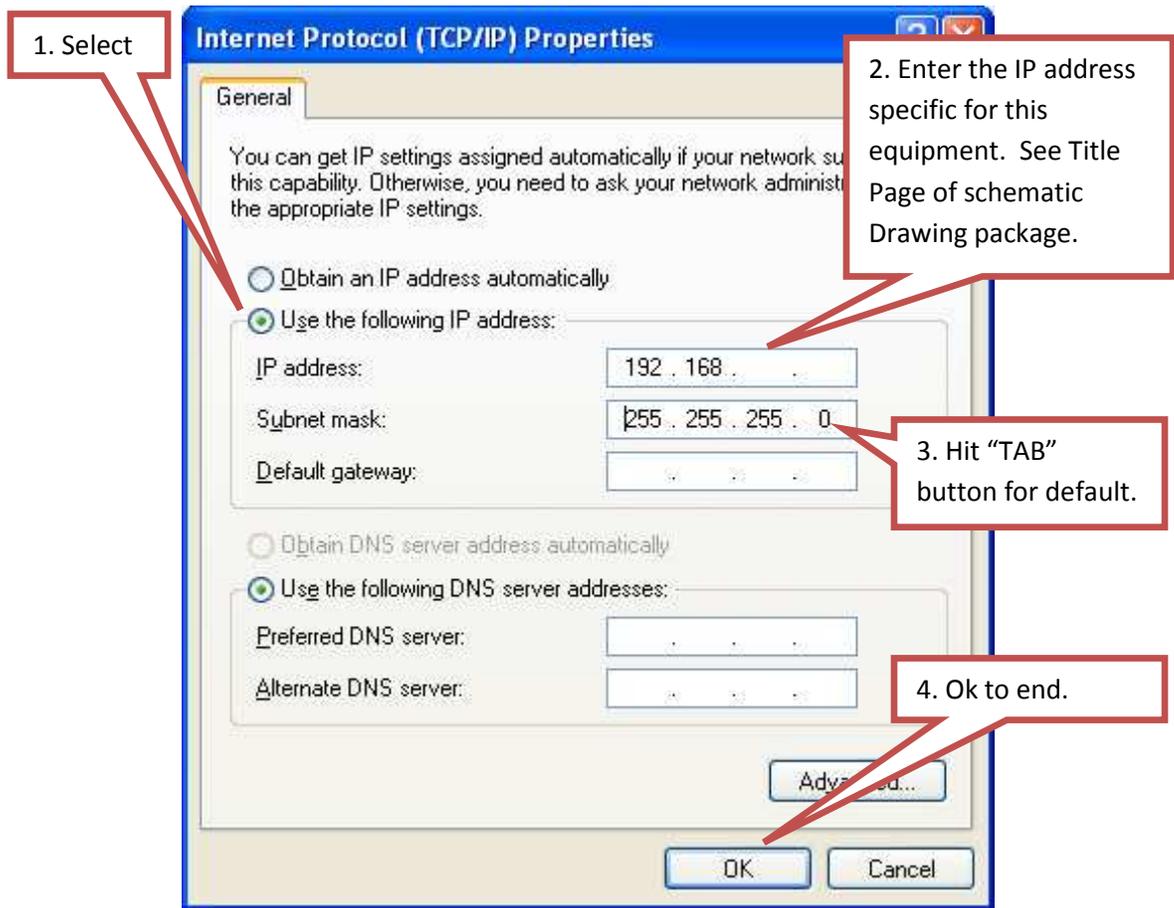


- ◆ Select "Properties".



- Select "Internet Protocol (TCP/IP)" and Choose Properties.

- **NOTE: Connect USB Keyboard or access ON SCREEN Keyboard so you can enter the IP Address.**



- Check the **"Use the following IP address"** and enter the correct IP address, Subnet mask, Default gateway of the unit then choose "Ok".
- Press "Close" to close All windows and end configuration.

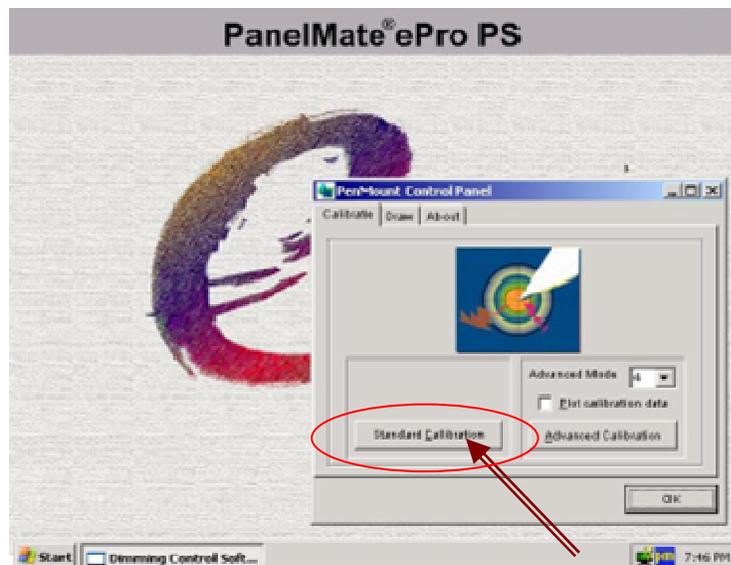
Set up of ePro unit for communication is complete.

➤ Typical Colmac ePro PanelMate Ethernet Standard Sheet

Type of Equipment	Ethernet Communication	
	AB SLC 5/05	ePro w/ Ethernet
BM / CPM	192.168.100.102	192.168.100.112
MBS	192.168.100.103	192.168.100.113
Curing Controls	192.168.100.104	192.168.100.114
Pallet Handling Main (UL / PTS / RTS)	192.168.100.105	192.168.100.115
TAR / PTS / RTS Locar (Hydraulic system)	192.168.100.106	192.168.100.116
TAR / RTS / PTS Upcar (Elec. System)	192.168.100.108	192.168.100.118
QBR	192.168.100.107	192.168.100.117
Splitter (if connected on network)	192.168.100.121	192.168.100.122
Clamp Turnover	192.168.100.125	n/a
Pre-PatternMaker	192.168.100.109	192.168.100.119
CommandView Computer	192.168.100.101	
Laptop Computer # 1	192.168.100.91	
Laptop Computer # 2	192.168.100.92	

➤ Subnet mask: 255.255.255.0

3. Calibrate the ePro Touch Screen



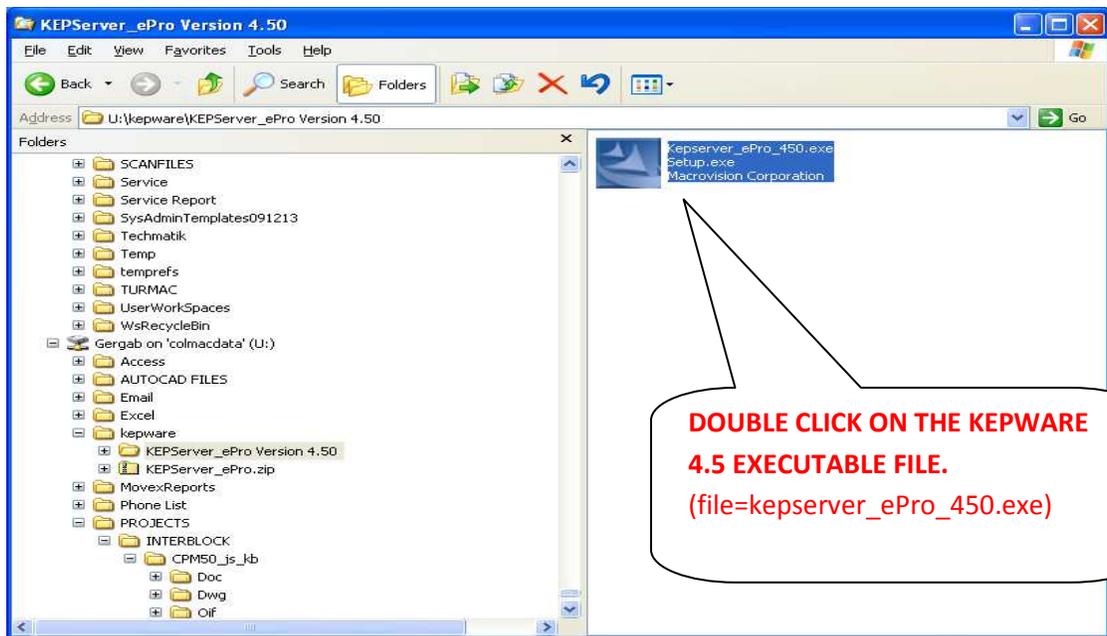
- Select the Standard Calibration button on the Calibrate tab
- Follow On-Screen direction.
- Touch the red squares as directed (top, right, bottom, left and central-area).
- Select OK.

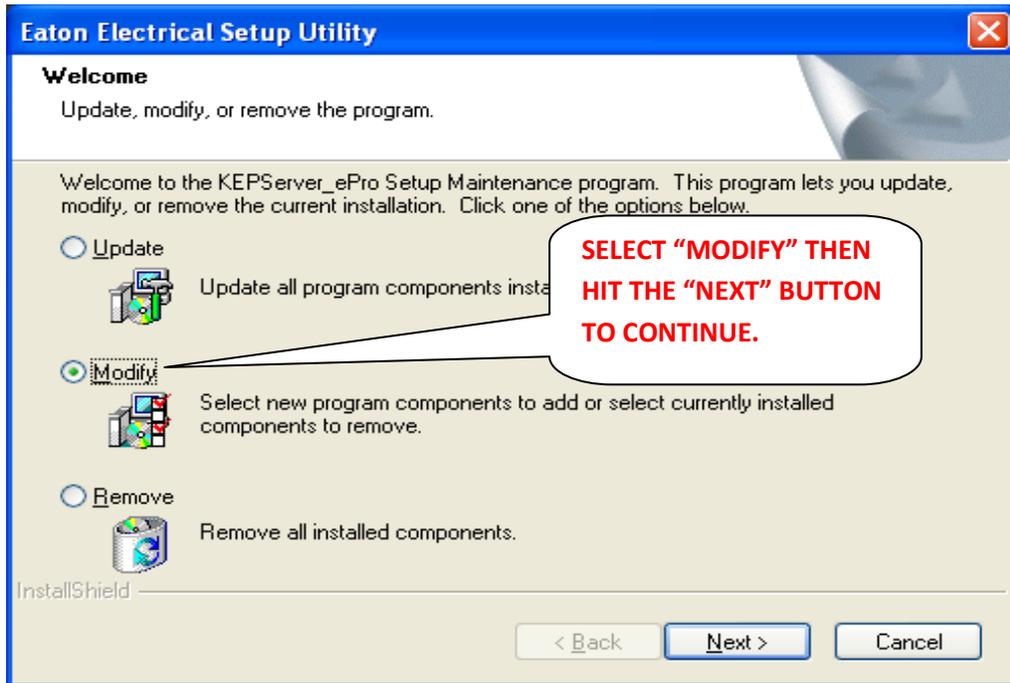
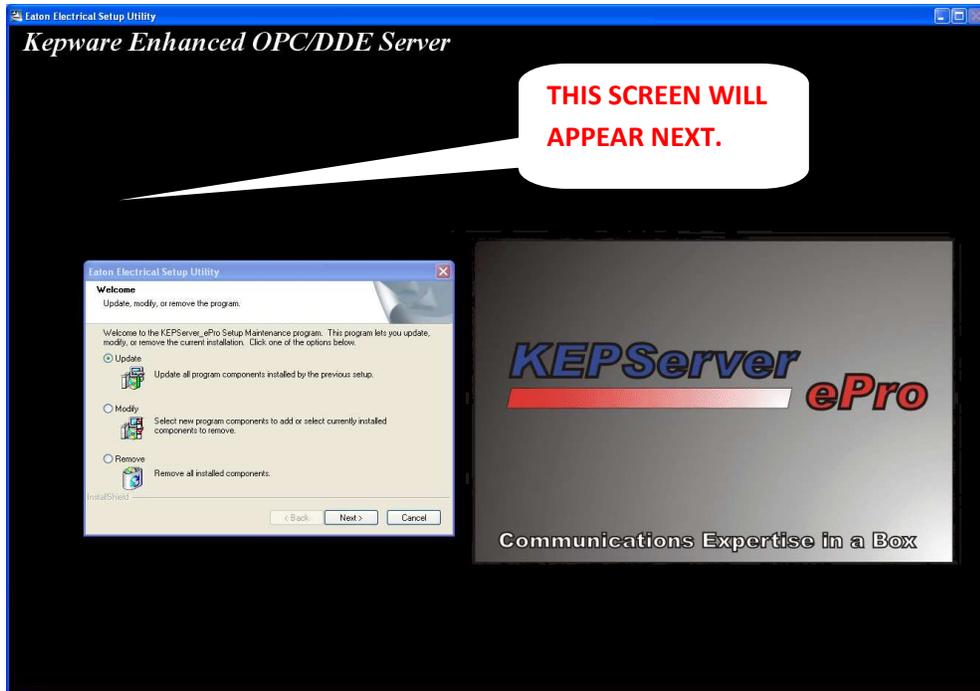
4. Download KepServer Driver Version 4.5.

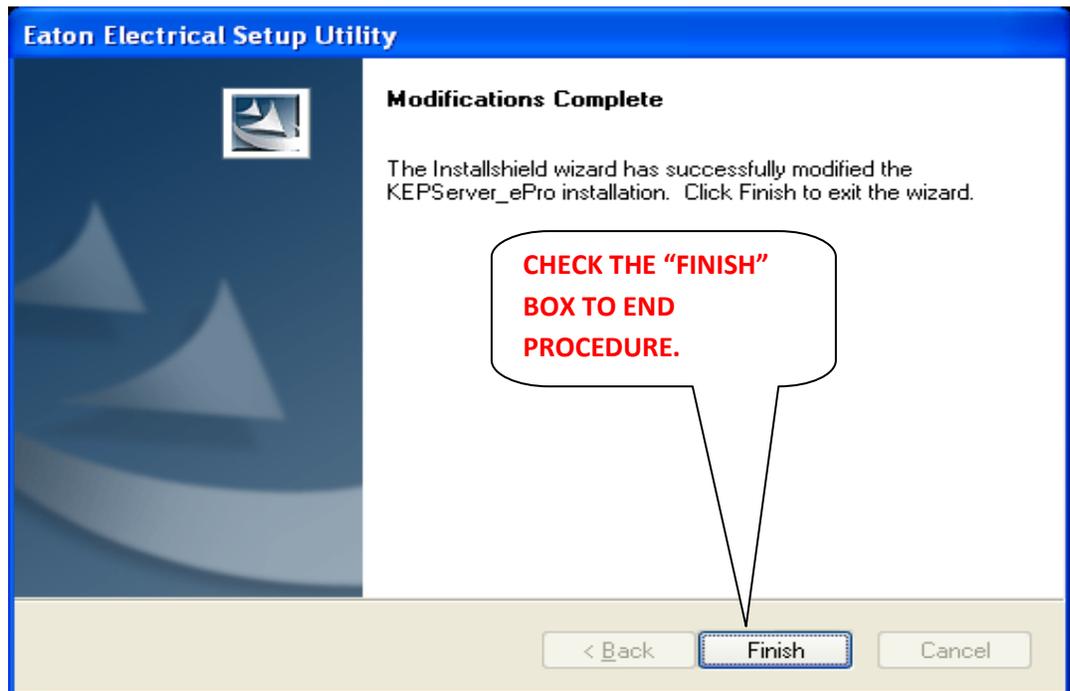
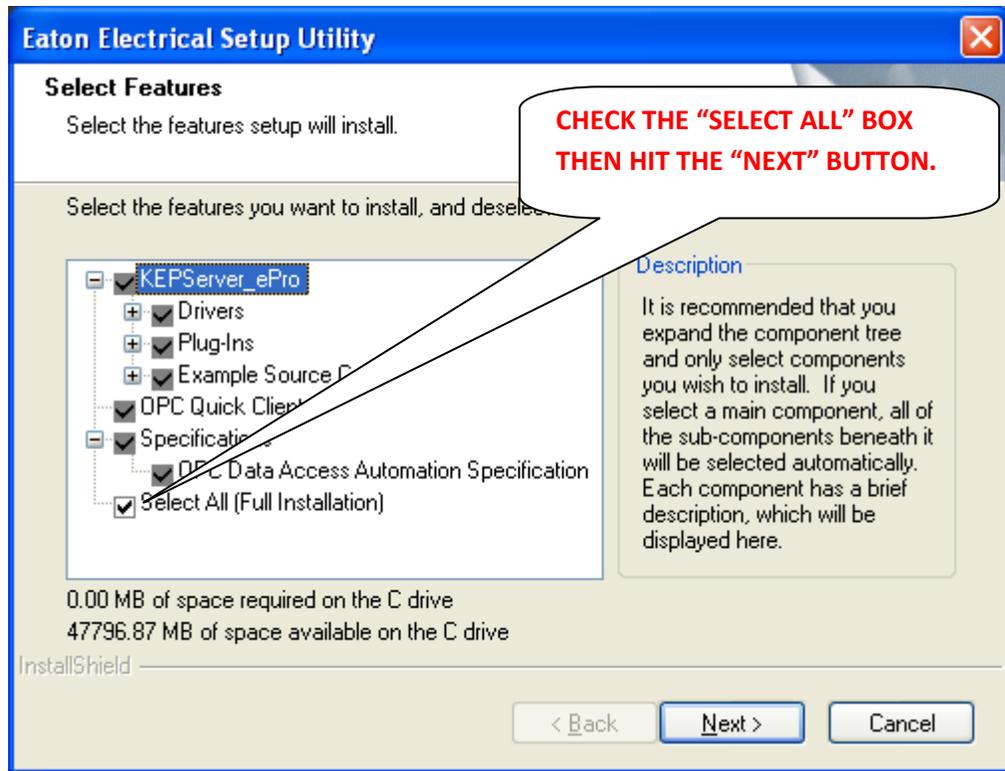
PROCEDURE TO LOAD KEPWARE VERSION 4.5 DRIVER:

If an older Kepware driver already exists in the PanelMate ePro (lower than version 4.5) to upgrade the driver to the most recent 4.5 version perform the following procedure to ensure a successful download of ePro application program:

- Locate the Kepware version 4.5 driver file and copy it onto a USB pen drive.(file= kepservice_ePro_450.exe)
- Insert the pen drive into the PanelMate ePro unit USB port.
- Take the PanelMate ePro out of run mode (if it is in run mode).
- On the PanelMate ePro windows screen invoke **Windows Explorer**.
- From windows explored locate the Kepware 4.5 driver and perform the following procedure: (file= kepservice_ePro_450.exe)



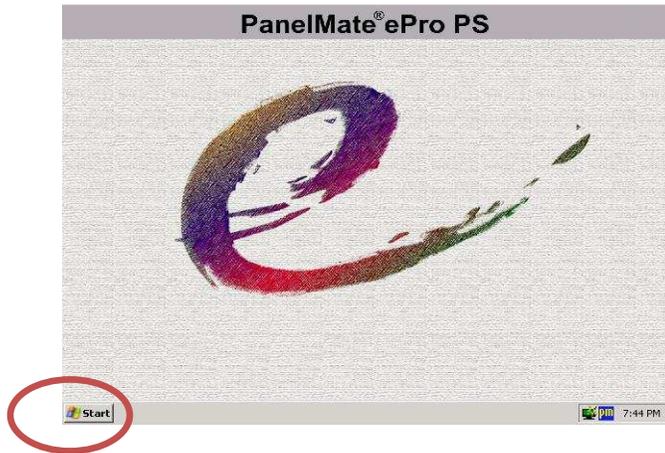




Downloading of the Kepware Server 4.5 is complete; proceed to the next critical task.

“Perform Protect Mode Save.”

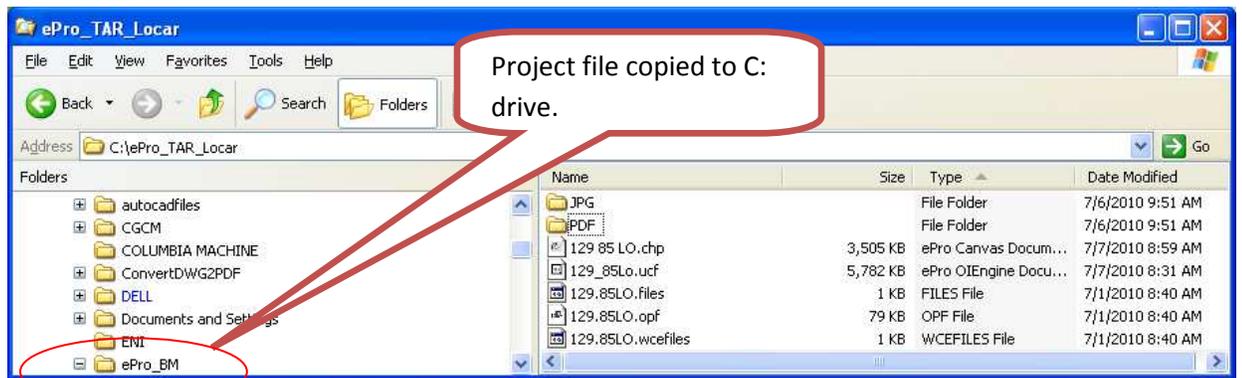
5. Perform a PROTECT MODE SAVE After Setting ePro IP Address & KepServer



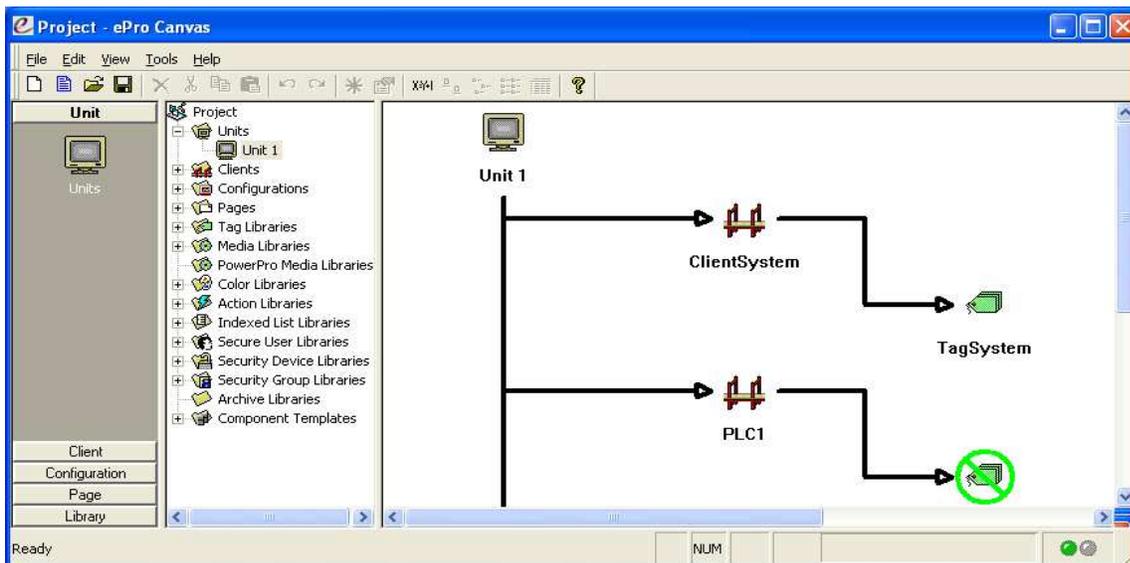
- You must insure that a protect mode save is done after every change done on the ePro Unit.
- From ePro Unit **Start Menu** → **Programs** → **ePro Manager**
- ePro Screen will Appear.
- Click "**Protect Mode Save**"
- Click "**Commit**"
- Go to Next step.

6. Invoke PanelMate ePro Canvas Software to prepare program application for download to the unit. Perform the following steps:

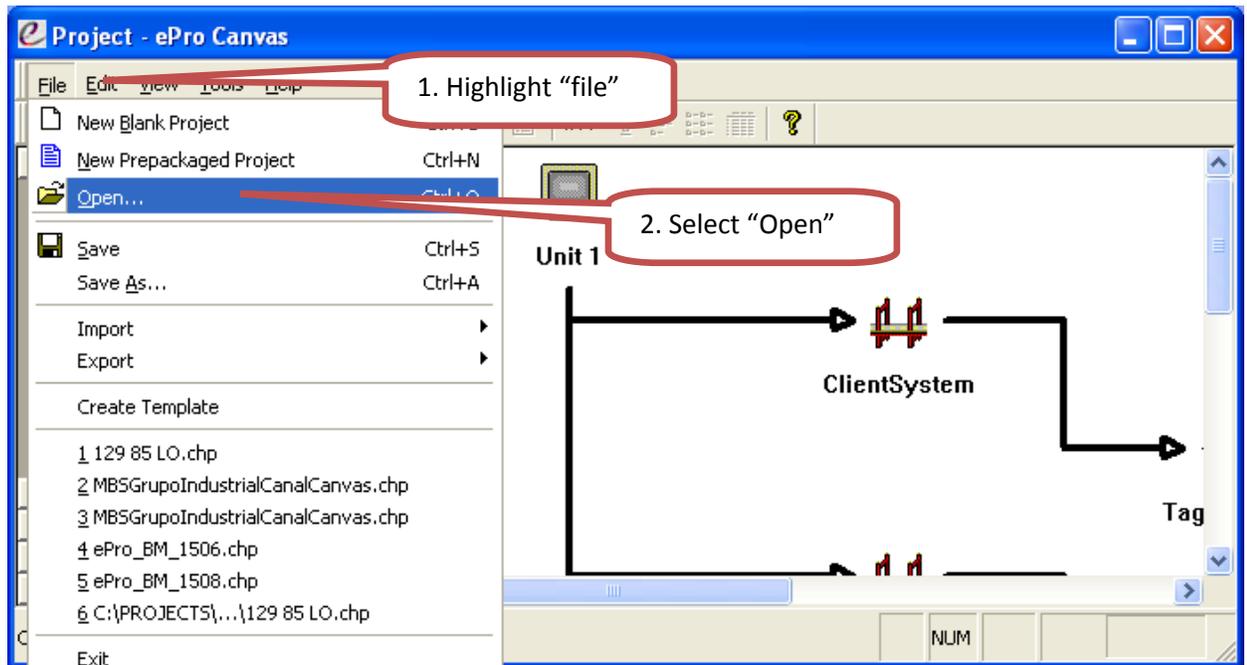
- Columbia Machine Standard is for ePro projects to be loaded from the local drive, C: drive.
- Copy the entire project folder to the root C: drive. It should contain a JPG folder, PDF folder, and the ePro project files. The project files should contain a .chp, .ucf, .opf at a minimum.



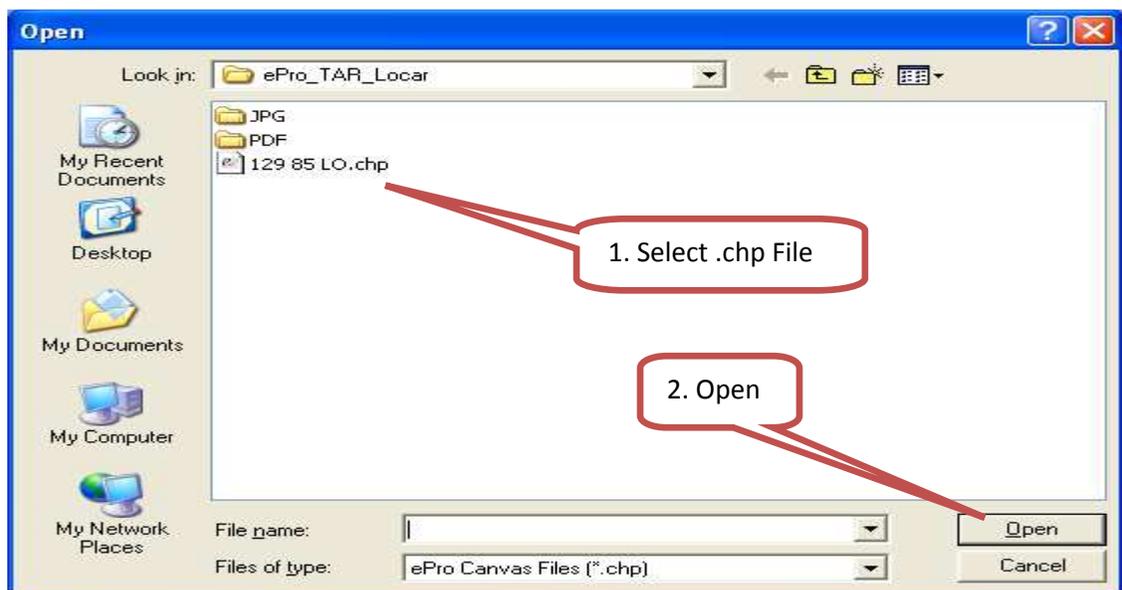
- Start ePro "Canvas Professional" from the **start Menu**. The following will appear.

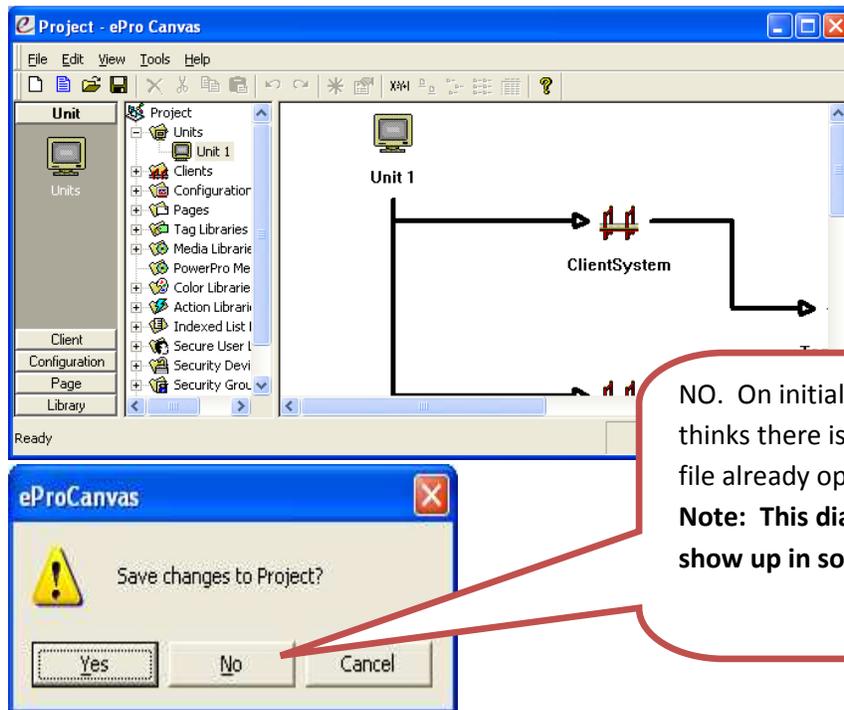


- Open the project file. File is a .chp

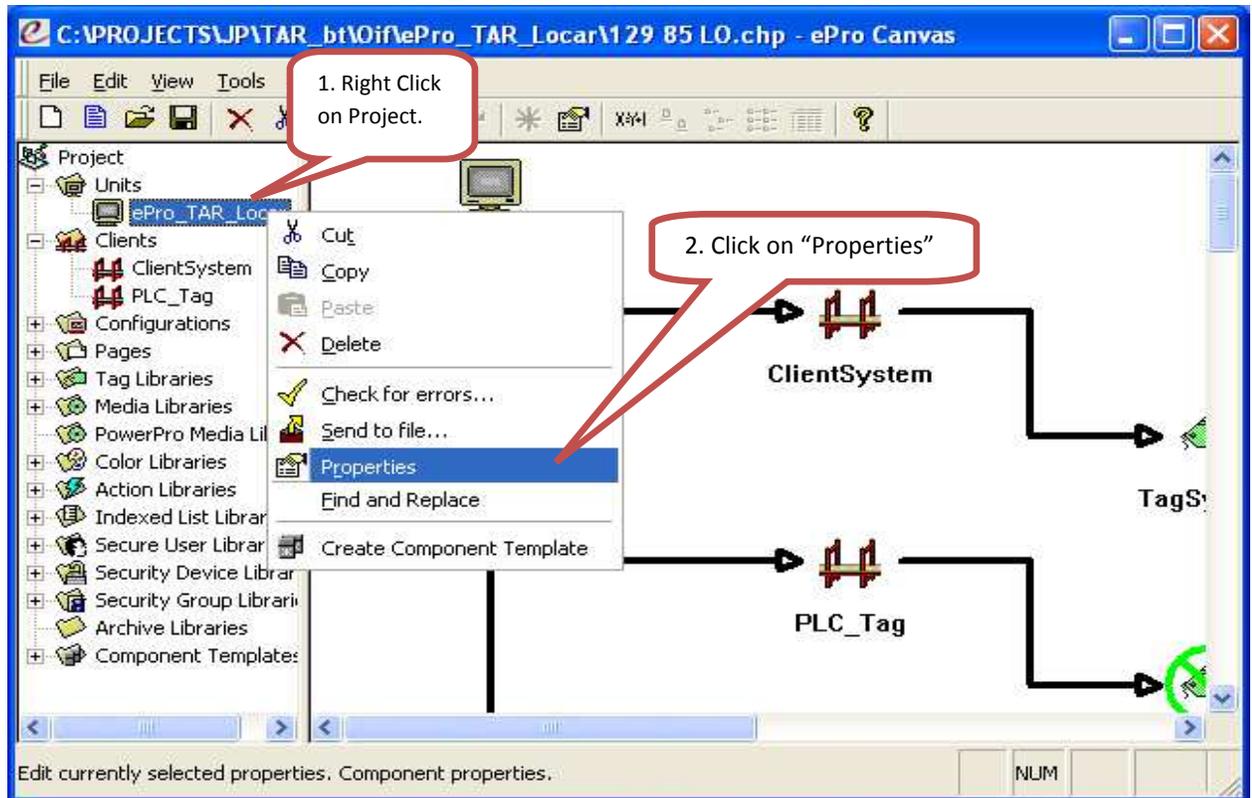


- Select Project file and Open.





- Access project properties.



- From properties, enter all the settings below:

The screenshot shows a dialog box titled "Project - Unit - ePro_TAR_Locar" with the "Destinations" tab selected. The dialog contains a table with the following fields and values:

Destination	1
Transfer .ucf	<input checked="" type="radio"/> Yes
.ucf Name	C:\ePro_TAR_Locar\129_85Lo.ucf
Transfer Runtime	<input checked="" type="radio"/> Yes
Runtime	ePro PS for X86
Transfer Driver(s)	<input checked="" type="radio"/> Yes
Driver	KEPServer_ePro for X86
.opf Name	C:\ePro_TAR_Locar\129.85Lo.opf
Destination Path	192.168.100.117

Annotations and instructions:

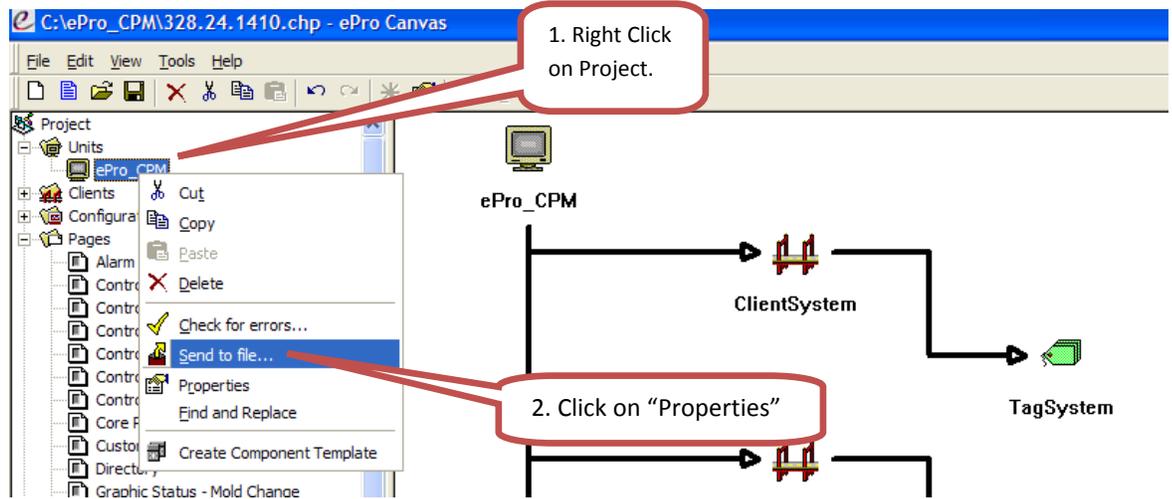
- 1. Select Destination**: Points to the "Destination" field.
- 2. Select Single Row**: Points to the "Single Row" radio button.
- 3. Yes to Transfer .ucf**, **Yes to Transfer Runtime**, **Yes to Transfer Driver(s)**: Points to the "Yes" radio buttons for Transfer .ucf, Transfer Runtime, and Transfer Driver(s).
- 4. Select Configuration**: Points to the ".ucf Name" field.
- 5. Select ePro PS for**: Points to the "Runtime" field.
- 6. Select KepServer ePro for X86**: Points to the "Driver" field.
- 7. Select KEPServer ePro for**: Points to the ".opf Name" field.
- 8. Type in the IP address**: Points to the "Destination Path" field.
- 9. Select Ok to close window**: Points to the "OK" button.

Additional text boxes on the left side of the dialog:

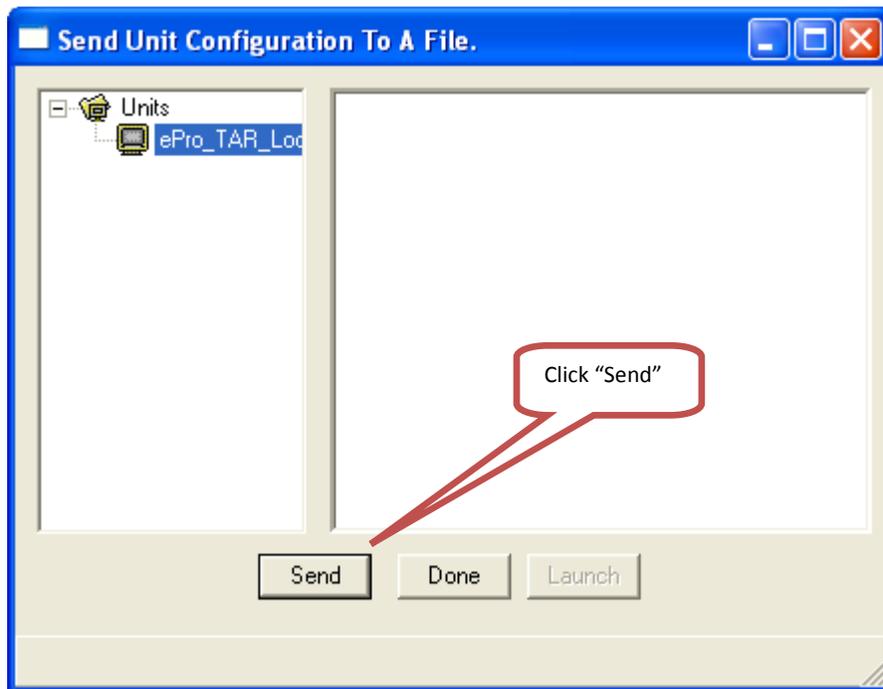
- Transfer .ucf = Configuration (PanelMate PowerPro)
- Transfer Runtime = **Executive Firmware** (PanelMate PowerPro)
- Transfer Driver = **Comm. Drivers** (PanelMate PowerPro)

Note: For Step 8, IP Address, See Colmac ePro PanelMate Ethernet Standard Sheet (reference page 8) for the correct IP address of the machine.

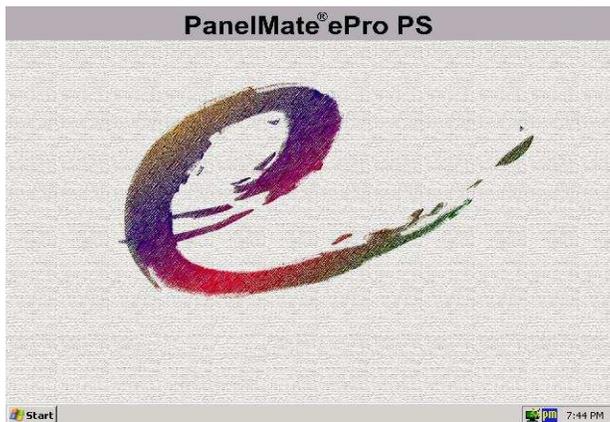
- Next, download the application project to the ePro unit.
 - Connect an Ethernet cable from the computer to the ePro unit. If an Ethernet switch is not use and you are connecting directly to the ePro unit you MUST use an Ethernet Cross-over cable. Perform the following steps to send a file to the ePro Unit:
 - Right click on project name and send to file.



- Select "Send". The system will check for errors and if the project has no error, it will be sending to ePro unit.
- The estimate time for completion is about 2 to 5 minutes.



7. Execute BAT FILE:



- From ePro **Start Menu** → **Programs** → Run “Windows Explorer”
- Go to Directory → C:\Program Files\Cutler-Hammer\ePro Software Suite\System\
- From this Directory **Double Click** on Bat file: **reg_eProPS.bat**
- The bat file will automatically run.

8. Perform a PROTECT MODE SAVE:

- This is the Most CRITICAL step of the download process. You must insure that a protect mode save is done after every change that is done on the ePro Unit.
- From ePro **Start Menu** → **Programs** → **ePro Manager**
- ePro Screen will Appear
- Click “**Protect Mode Save**”
- Click “**Commit**”
- ePro Unit will go Into Run Mode.

9. Check ePro functionality

- ✓ **The ePro Unit should automatically RUN and Download is Complete**
- ✓ **Check all Screens to see that ePro is communicating with PLC.**
- ✓ **Procedure Completed.**

E. HARD WIRING & EQUIPMENT DEVICE CHECK:

1 Major Panels:

- UpCar PLC Panel.
- LoCar Main PLC Panel.
- LoCar Push Button Station.
- Starter Panel.

2 See Proximity switch layout drawing and check that all switches are wired and accounted for. Also check solenoid valves. Place a check mark when each has been verified.

SWITCHES ON LOCAR:

- PC-1, KILN DOOR OPEN
- PX-2, RAILS ALIGNED-ON TRACK
- PX-3, UPCAR ON LOCAR
- PX-4, DOCKING ENGAGED
- PX-5, DOCKING RELEASED
- LS-2, END OF RAIL SAFETY

SOLENOID VALVES ON LOCAR:

- LOCAR MANIFOLD PRESSURE RELIEF VALVE
- DOCKING ENGAGE VALVE
- DOCKING RELEASE VALVE
- DOCKING RELIEF VALVE

SWITCHES ON UPCAR:

- PX-2, SHORT CYLINDER UP
- PX-3, SHORT CYLINDER DOWN
- PX-4, UPCAR ON LOCAR
- PX-5, RACK ON FORKS - UPCAR
- LS-7, FORK SAFETY
- PX-9, LONG CYLINDER UP
- PX-10, LONG CYLINDER DOWN
- PX-11, RAISE/LOWER LONG CYLINDER POS.
- PX-12, IN POSITION AT UNLOADER

SOLENOID VALVES ON UPCAR:

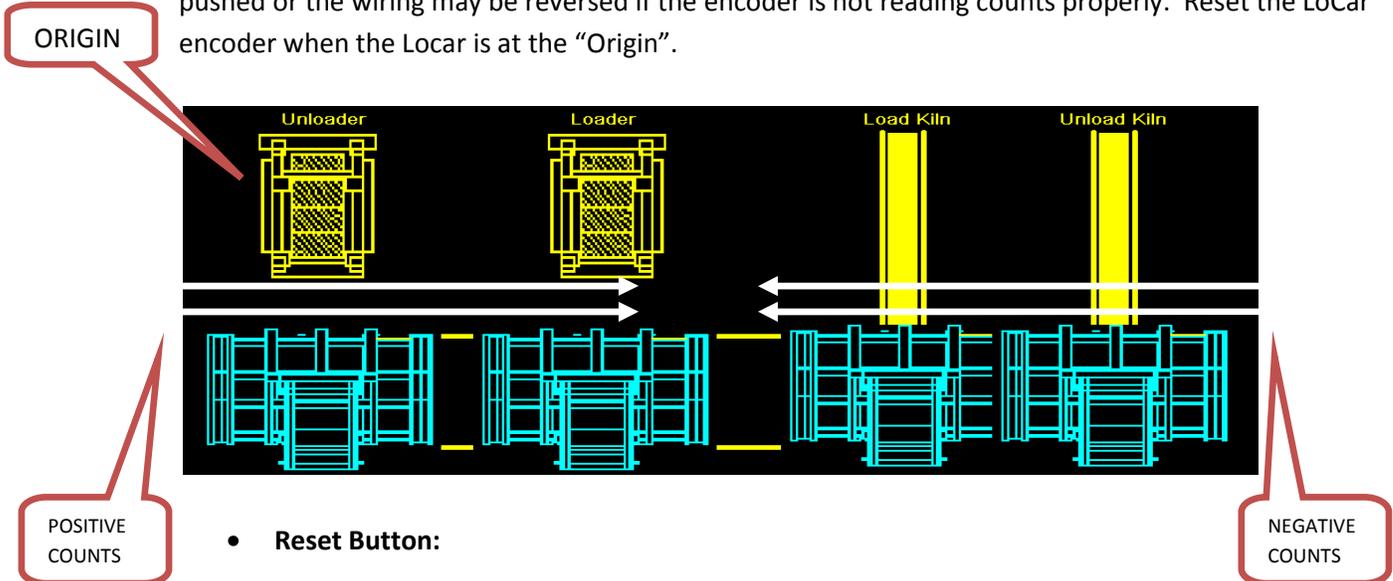
- SHORT CYLINDER UP VALVE
- SHORT CYLINDER DOWN VALVE
- LONG CYLINDER UP VALVE
- LONG CYLINDER DOWN VALVE
- PUMP PRESSURE RELIEF VALVE

3 Verify that ENCODERS Functions Correctly. Check that both encoders physically exist and are wired correctly. Place a check mark when verified.

- Upcar Encoder
- Locar Encoder

Encoder LoCar Function:

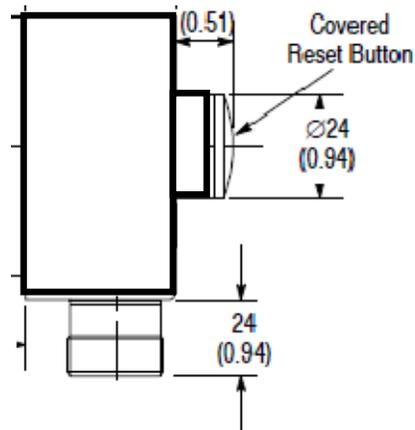
The encoder will **increase** in counts as you travel **away** from the **ORIGIN** and **decrease** in counts as you travel **towards** the **ORIGIN**. The reset button on the encoder itself may be required to be pushed or the wiring may be reversed if the encoder is not reading counts properly. Reset the LoCar encoder when the Locar is at the "Origin".



- **Reset Button:**

Push the reset button on the back side of the encoder. Remove the cover and button is located under cover.

Reset button on backside under protective screw cover.



- **Reverse Wiring:**

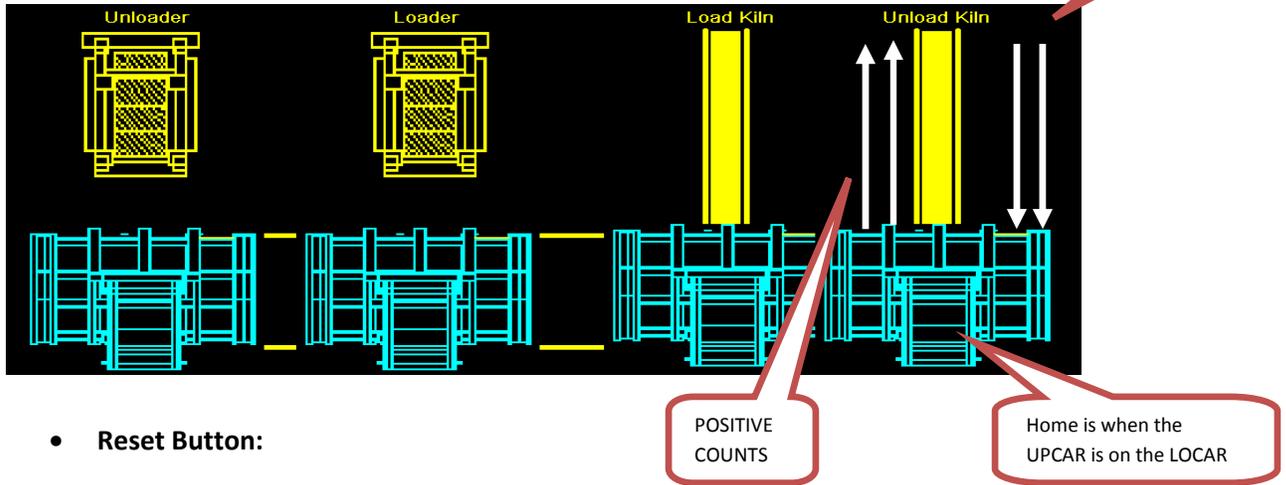
If the reset button does not work, and counts are going in the opposite direction reverse the encoder wiring at the Delta Module as follows:

Rewire **Pin 12 (green wire)** on the encoder from 0 vdc to +24 vdc or from +24vdc to 0 vdc.

If the counts are reading correctly but the car is moving in the wrong direction reverse the wiring on the proportional valve. (CMD+ & CMD-)

Encoder UpCar Function:

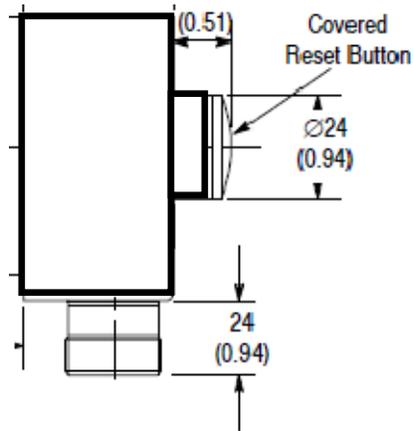
The encoder will **increase** in counts as you travel **away** from the **LoCar** and **decrease** in counts as you travel **towards** the **LoCar**. The reset button on the encoder itself may be required to be pushed or the wiring may be reversed if the encoder is not reading counts properly. Reset the UpCar encoder when the UpCar is on the LoCar.



- **Reset Button:**

Push the reset button on the back side of the encoder. Remove the cover and button is located under cover.

Reset button on backside under protective screw cover.



- **Reverse Wiring:**

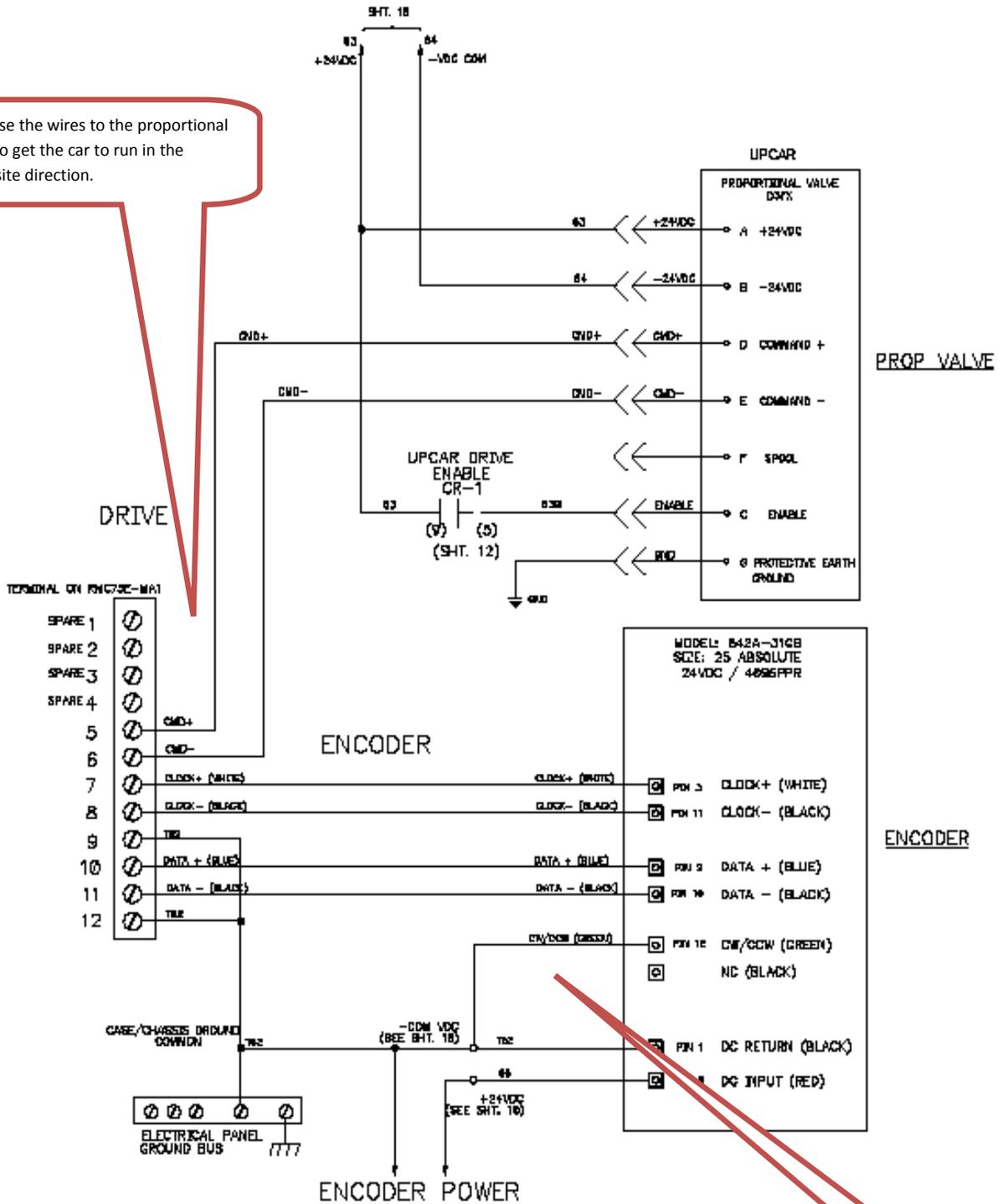
If the reset button does not work, and counts are going in the opposite direction reverse the encoder wiring at the Delta Module as follows:

Rewire **Pin 12 (green wire)** on the encoder from 0 vdc to +24 vdc or from +24vdc to 0 vdc.

If the counts are reading correctly but the car is moving in the wrong direction reverse the wiring on the proportional valve. (CMD+ & CMD-)

Reverse the wires to the proportional card to get the car to run in the opposite direction.

DELTA CONTROL MODULE



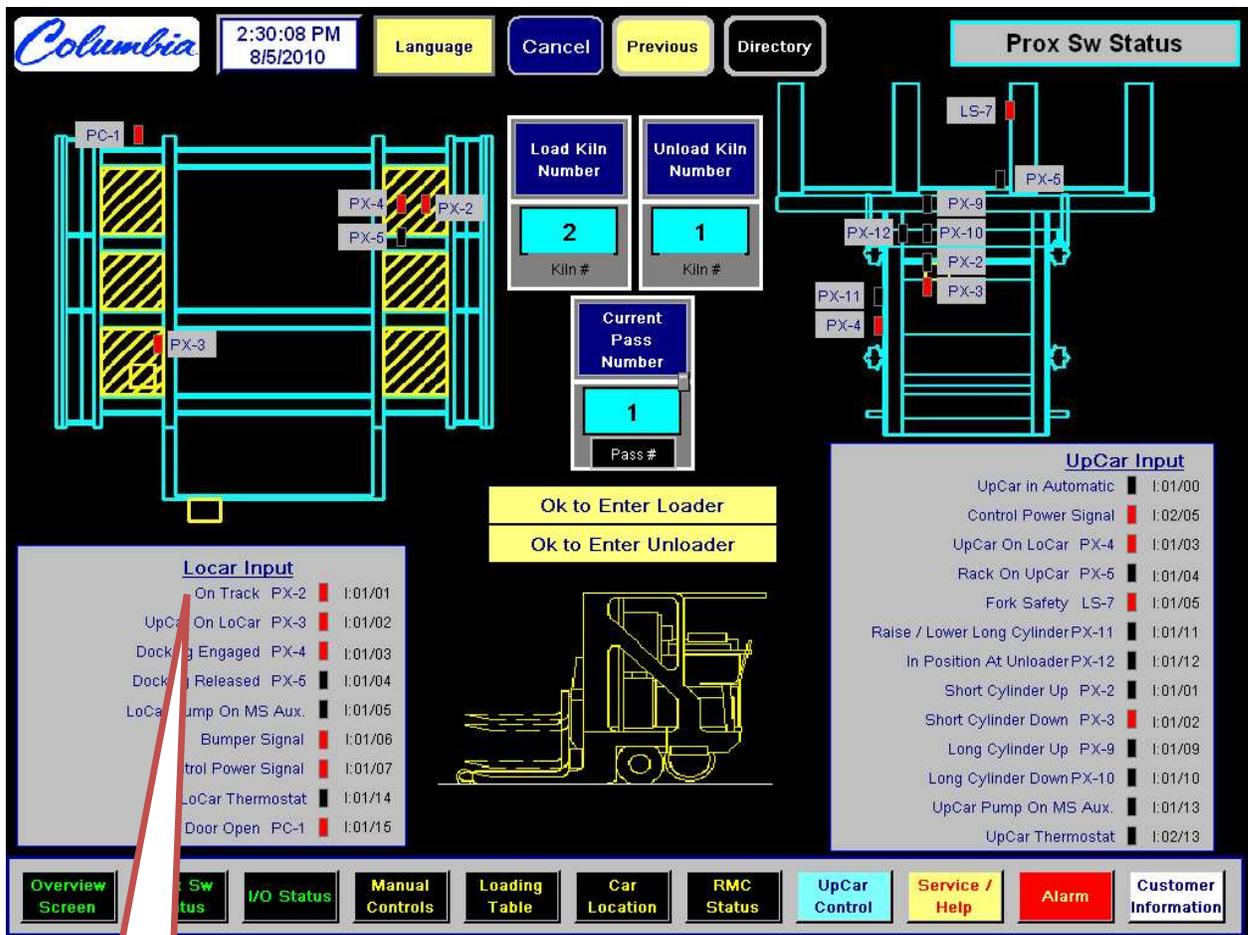
Rewire Green Wire to reverse counts..

Verify that the Over Travel Limit Switch Functions and is wired correctly.

- Physically actuate the **Over Travel Limit Switch** and verify that the input appears on the ePro Operator Screen.

4 Verify that the ON Track Switch Functions and is wired correctly.

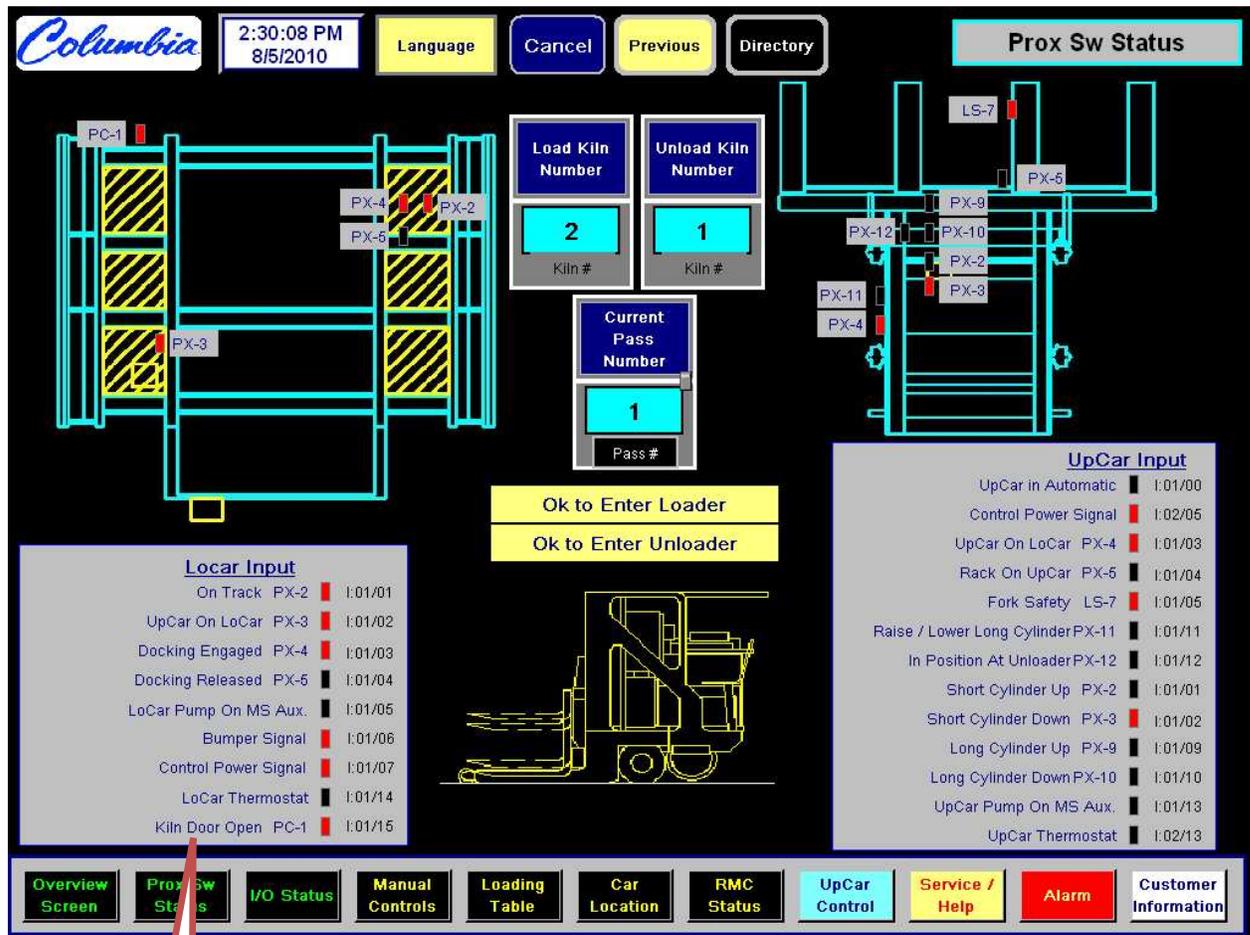
- Physically actuate the **ON Track Switch** and verify that the input appears on the ePro Operator Screen.



ON TRACK
Proximity SW.
Input

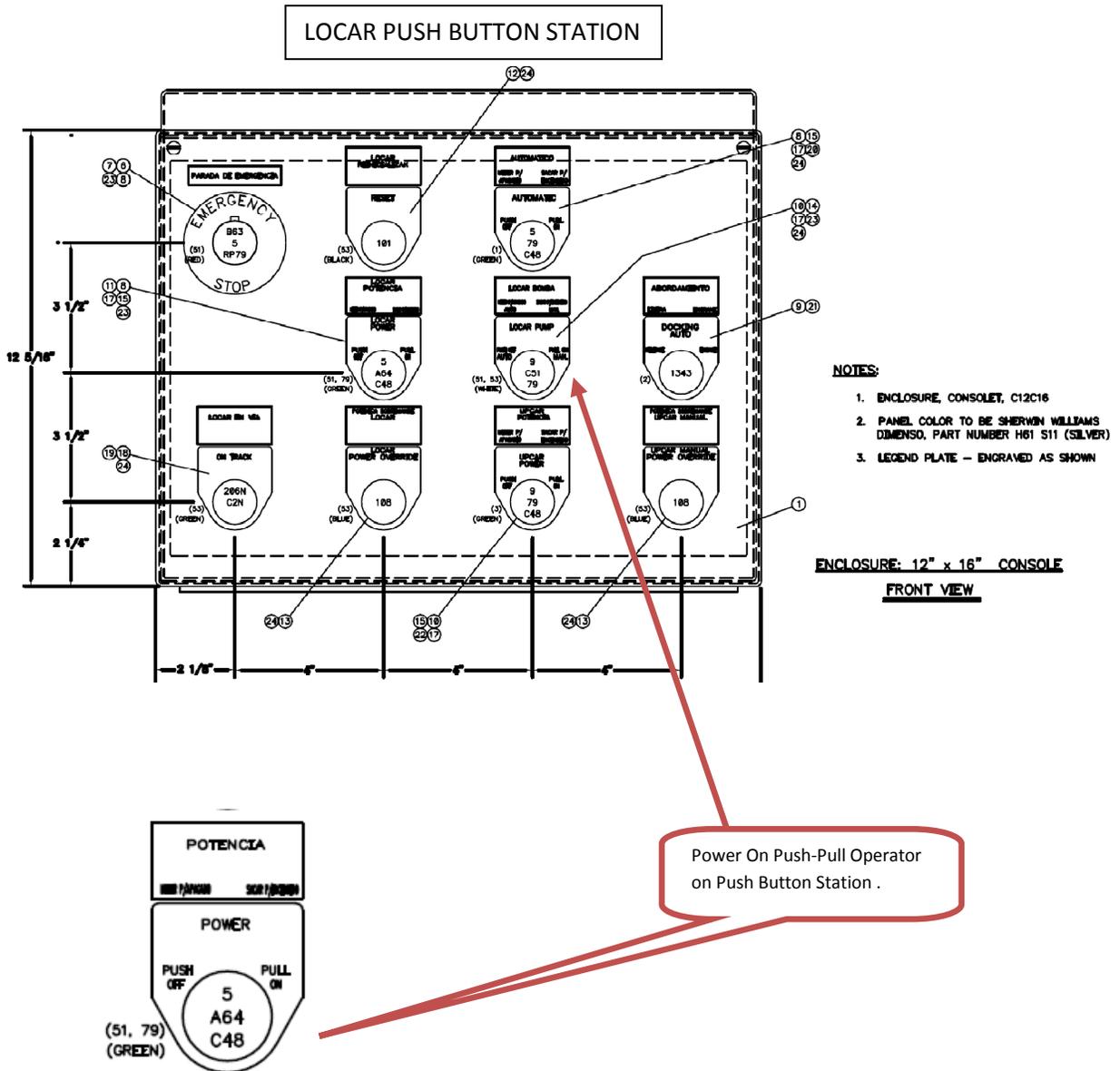
5 Verify that the Kiln Safety Switch Functions and is wired correctly.

- Physically actuate the **Kiln Safety Switch** and verify that the input appears on the ePro Operator Screen.



KILN Safety Proximity SW. Input

6 Verify LoCar Power Wiring.



- Pull ON the LoCar Power switch located on the LoCar Push Button station. Check that pilot Light on the switch is ON and there is power to the system. Troubleshoot wiring from the wiring schematic if corrections to wiring needs to be made.

8 Verify that the Bumper Switch Functions and Shuts down Control Power.

The screenshot displays the Columbia control interface with the following elements:

- Header:** Columbia logo, time 2:30:08 PM 8/5/2010, and navigation buttons (Language, Cancel, Previous, Directory).
- Prox Sw Status:** A diagram of the kiln structure with proximity switches labeled PX-1 through PX-12 and LS-7.
- Load/Unload Kiln Numbers:** Load Kiln Number: 2, Unload Kiln Number: 1.
- Current Pass Number:** 1.
- Buttons:** "Ok to Enter Loader" and "Ok to Enter Unloader".
- Locar Input Table:**

Signal	Address
On Track	PX-2 I:01/01
UpCar On LoCar	PX-3 I:01/02
Docking Engaged	PX-4 I:01/03
Docking Released	PX-5 I:01/04
LoCar Pump On MS Aux.	I:01/05
Bumper Signal	I:01/06
Control Power Signal	I:01/07
LoCar Thermostat	I:01/14
Kiln Door Open	PC-1 I:01/15
- UpCar Input Table:**

Signal	Address
UpCar in Automatic	I:01/00
Control Power Signal	I:02/05
UpCar On LoCar	PX-4 I:01/03
Rack On UpCar	PX-5 I:01/04
Fork Safety	LS-7 I:01/05
Raise / Lower Long Cylinder	PX-11 I:01/11
In Position At Unloader	PX-12 I:01/12
Short Cylinder Up	PX-2 I:01/01
Short Cylinder Down	PX-3 I:01/02
Long Cylinder Up	PX-9 I:01/09
Long Cylinder Down	PX-10 I:01/10
UpCar Pump On MS Aux.	I:01/13
UpCar Thermostat	I:02/13
- Bottom Navigation Bar:** Overview Screen, Prox Status, I/O Status, Manual Controls, Loading Table, Car Location, RMC Status, UpCar Control, Service / Help, Alarm, Customer Information.

KILN Safety Proximity SW. Input

F. LOCAR & UPCAR STATUS FROM EPRO SCREENS:

Before setting up the UpCar and the LoCar all wiring must be complete, all I/O must be rung out, PLC program must be loaded without faults, radio modems set up, Delta module configured, and ePro program downloaded. Only then can you attempt to set up the Track/Rack UpCar and LoCar .

The ePro Operator Interface Display holds information about the Track/Rack system that you have the ability to access. Page through each screen to enter data needed to set up the car system. The following are several examples of screens that may be helpful:

OVERVIEW:

The screenshot displays the 'Overview Screen' of the Columbia ePro Operator Interface. The interface is divided into several functional areas:

- Header:** Includes the 'Columbia' logo, a digital clock showing '2:22:24 PM 8/5/2010', and navigation buttons for 'Language', 'Cancel', 'Previous', and 'Directory'.
- Control Panels:**
 - Upcar / Locar Sequence:** A list of steps for the Upcar and Locar sequence, with checkboxes for 'At Loader', 'Loader to Load Kiln', 'At Load Kiln', 'Load Kiln to Unload Kiln', 'At Unload Kiln', 'Unload Kiln to Unloader', 'At Unloader', and 'Unloader to Loader'. A 'Raw Control Output (Volts)' indicator shows 0.1.
 - LoCar Sequence:** A list of steps for the LoCar sequence, including 'Start Cycle', 'Turn Pump On', 'Release Docking', 'Choose Direction', 'Accel to Fast Speed', 'LoCar at Fast Speed', 'Decel to Creep Speed', 'Decel to Zero', 'LoCar Stop', and 'Engage Docking'.
 - LoCar Input:** A list of status indicators with corresponding lights: 'On Track PX-2' (red), 'UpCar On LoCar PX-3' (red), 'Docking Engaged PX-4' (red), 'Docking Released PX-5' (black), 'Kiln Door Open PC-1' (red), 'LoCar Pump On MS Aux.' (black), and 'LoCar Thermostat' (black).
- Operational Data:**
 - Upcar / Locar Sequence:** Shows 'Raw Control Output (Volts)' at 0.1.
 - LoCar / UpCar Data:** A table showing 'Actual Position' (264.2), 'Destination' (264.2), 'Remaining Counts' (-0.0), 'Total Counts' (0.0), 'Total Creep Counts' (62.0), and 'Raw Control Output (Volts)' (0.0) for both LoCar and UpCar.
- Control Buttons:**
 - Upcar Control:** 'At Load Kiln' (green), 'Upcar RMC Status' (green, 'RMC Ready').
 - LoCar Control:** 'LoCar Movement Reverse' (yellow, 'Stopped'), 'LoCar Movement Forward' (yellow, 'Stopped'), 'LoCar RMC Status' (green, 'RMC Ready').
 - General:** 'Ok to Enter Loader', 'Ok to Enter Unloader', 'On Track' (green, 'Rail Aligned'), 'Car Waiting', 'Press to Select', 'LoCar Control', 'LoCar Location'.
- Footer:** A row of navigation buttons: 'Overview Screen', 'Prox Sw Status', 'I/O Status', 'Manual Controls', 'Loading Table', 'Car Location', 'RMC Status', 'UpCar Control', 'Service / Help', 'Alarm', and 'Customer Information'.

MODEM communications between UpCar and LoCar PLC's:

Columbia 3:33:43 PM 8/5/2010 Language Cancel Previous Directory **Modem Comm**

UpCar	LoCar
63722	Comms Verification
1414	Comms Verification
44	Input Module Slot 1
49	Input Module Slot 2
0	Output Module Slot 4
32	Output Module Slot 5
1000	Actual Position
1000	Destination
30	Total Creep Counts
0	Remaining Counts
7	Location
1	Pass #
0	Cycle Complete Signal

LoCar	UpCar
63722	Comms Verification
1414	Comms Verification
0	Ok to Go From LoCar
1	Ok to Enter Loader
1	Ok to Enter Unloader
0	Location
1	Pass #

Modem Comm Setup - Car Speed Profile Setup - Locar Creep Counts Setup - Locar Counts Table Setup - Axes Homing System Alarm Maintenance

Overview Screen Prox Sw Status I/O Status Manual Controls Loading Table Car Location RMC Status UpCar Control Service / Help Alarm Customer Information

From the ePro screen you can check that the UpCar Delta Module is working properly with the Upcar PLC:

The screenshot displays the Columbia ePro interface for monitoring the Upcar RMC (Remote Module Controller) status. The interface is divided into several sections:

- Header:** Includes the Columbia logo, a digital clock showing 3:27:00 PM on 8/5/2010, and navigation buttons for Language, Cancel, Previous, and Directory. A cyan button labeled "Upcar RMC Status" is highlighted.
- Upcar RMC Status:** A list of 15 status indicators, each with a colored square to its left:
 - In Position (black)
 - At Velocity (black)
 - In Open Loop (black)
 - Axis Fault Input (black)
 - Positive Limit Reached (black)
 - Negative Limit Reached (black)
 - Stopped (green)
 - Input Estimated (black)
 - Enabled Output (black)
 - Primary Target Done (green)
 - Primary Target State A (black)
 - Primary Target State B (black)
 - Direct Output (black)
 - Axis Enabled (green)
 - External Halt (black)
 - Axis Halted (black)
- Upcar RMC Axis Status:** A table of numerical values:

Actual Position	999.9
Destination	1000.0
Remaining Counts	0.2
Count Input Raw	999.9
Total Creep Counts	30.0
Raw Control Output (Volts)	0.1
- Upcar RMC Fault Status:** A large red-bordered box with a black background and the text "RMC No Fault" in white.
- Control Buttons:** Three buttons are visible: "Upcar RMC Status" (blue), "RMC Ready" (green), and "Locar RMC Status" (purple).
- Footer:** A row of navigation buttons: Overview Screen, Prox Sw Status, I/O Status, Manual Controls, Loading Table, Car Location, RMC Status, UpCar Control, Service / Help, Alarm, and Customer Information.

From the ePro screen you can check that the LoCar Delta Module is working properly with the LoCar PLC:

The screenshot displays the Columbia ePro interface for monitoring the LoCar RMC (Remote Motor Control) system. The interface is divided into several sections:

- Header:** Includes the Columbia logo, a digital clock showing 2:53:34 PM on 8/5/2010, and navigation buttons for Language, Cancel, Previous, and Directory. A title bar on the right reads "Locar RMC Status".
- Locar RMC Status:** A list of 17 status indicators, each with a colored square (black or green) to its left:
 - In Position (black)
 - At Velocity (black)
 - In Open Loop (green)
 - Axis Fault Input (black)
 - Positive Limit Reached (black)
 - Negative Limit Reached (black)
 - Stopped (green)
 - Input Estimated (black)
 - Enabled Output (black)
 - Primary Target Done (green)
 - Primary Target State A (black)
 - Primary Target State B (black)
 - Direct Output (black)
 - Axis Enabled (green)
 - External Halt (black)
 - Axis Halted (black)
- LoCar RMC Axis Status:** A table of numerical values:

LoCar Count Status	
Actual Position	264.2
Destination	264.2
Remaining Counts	-0.0
Total Counts	0.0
Total Creep Counts	62.0
Raw Control Output (Volts)	0.0
- LoCar RMC Fault Status:** A large red-bordered box containing the text "RMC No Fault".
- Control Buttons:** A "Locar RMC Status" button (blue) and an "RMC Ready" button (green) are positioned below the axis status table. An "UpCar RMC Status" button (purple) is located below the fault status box.
- Footer:** A row of navigation buttons: Overview Screen, Prox Sw Status, I/O Status, Manual Controls, Loading Table, Car Location, RMC Status, UpCar Control, Service / Help, Alarm, and Customer Information.

LOCAR & UPCAR :

Columbia 3:28:50 PM 8/5/2010 Language Cancel Previous Directory **UpCar Control**

LoCar MUST Be Docked and NOT in Automatic
 If Needed - Restore Power to UpCar
 Select Automatic Disable Button to Disable Automatic On UpCar

T-A-R Upcar In Manual T-A-R Locar In Manual

Automatic Disable

UpCar Out Of Automatic

UpCar Forks Control

Press to Select

UpCar Pump

Off

UpCar	LoCar
63722	Comms Verification
1414	Comms Verification
44	Input Module Slot 1
49	Input Module Slot 2
0	Output Module Slot 4
32	Output Module Slot 5
1000	Actual Position
1000	Destination
30	Total Creep Counts
0	Remaining Counts
7	Location
1	Pass #
0	Cycle Complete Signal

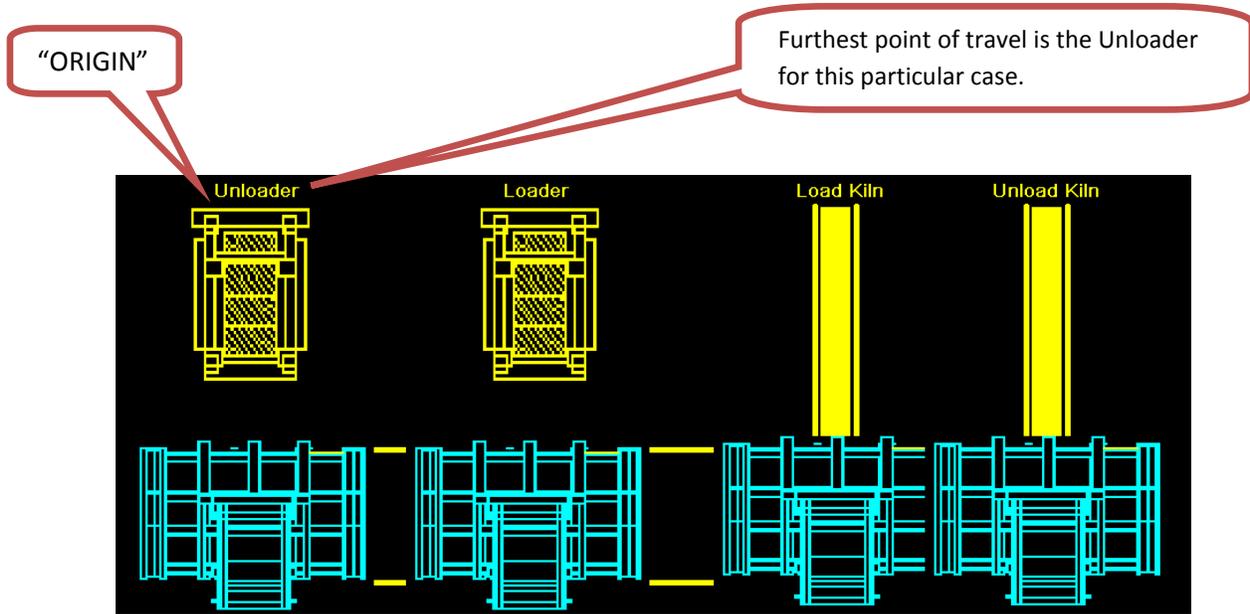
LoCar	UpCar
63722	Comms Verification
1414	Comms Verification
0	Ok to Go From LoCar
1	Ok to Enter Loader
1	Ok to Enter Unloader
0	Location
1	Pass #

Overview Screen Prox Sw Status I/O Status Manual Controls Loading Table Car Location RMC Status UpCar Control Service / Help Alarm Customer Information

G. SETUP/CONFIGURE LOCAR:

Follow the following steps to insure a successful set-up and configuration of Trac-a-Rac LoCar:

1. Based on the Plant layout drawings determine where the farthest point where the Locar is required to travel the longest distance. This will be the far end of travel and will usually be either at the loader or unloaded. This will also establish where the ORIGIN will be located.



TRAC-A-RAC SYSTEM LAYOUT/CONFIGURATION

2. Manually run the LoCar with the hydraulic joystick to check that the encoder is counting properly. The encoder will **increase** in counts as you travel **away** from the **ORIGIN** and **decrease** in counts as you travel **towards** the **ORIGIN**. The reset button on the encoder itself may be required to be pushed or the wiring may be reversed if the encoder is not reading counts properly.

- See Encoder Wiring and Set-up Section if the encoder is not reading properly.

3. Manual Controls form the ePro Operator Interface Unit:

Manually control LoCar from Screen.

Columbia 2:34:26 PM 8/5/2010 Language Cancel Previous Directory **Manual Controls**

T-A-R Upcar In Manual T-A-R Locar In Manual

Load Kiln Number 2 Kiln # Unload Kiln Number 1 Kiln # LoCar Location Press to Select LoCar Control Car Waiting

Car Bypass Option No Bypass Selected Normal Run Kiln Door Option Disable

Number Of Pass Per Kiln 2 Current Pass Number 1 Pass # Manual Docking Docking Engaged Locar Manual Movement Car Motion Off

UpCar Control At Load Kiln UpCar Go Command Press to Select Kiln Door Open

LoCar Control Car Waiting LoCar Location Press to Select

Ok to Enter Loader Ok to Enter Unloader

On Track Rail Aligned

Locar RMC Status RMC Ready Upcar RMC Status RMC Ready

	LoCar	UpCar
Actual Position	264.2	999.9
Destination	264.2	1000.0
Remaining Counts	-0.0	0.2
Total Counts		999.9
Total Creep Counts	62.0	30.0
Raw Control Output (Volts)	0.0	0.1

Locar Input

- On Track PX-2
- UpCar On LoCar PX-3
- Docking Engaged PX-4
- Docking Released PX-5
- Kiln Door Open PC-1
- LoCar Pump On MS Aux.
- LoCar Thermostat

Overview Screen Prox Sw Status I/O Status **Manual Controls** Loading Table Car Location RMC Status UpCar Control Alarm Customer Information

Access Manual Controls through bottom menu buttons

LoCar Manual Control Button

- Manually Control Locar, ensure that encoder is counting properly.

The screenshot shows the 'Manual Controls' interface for a Columbia system. At the top, there is a header with the 'Columbia' logo, a timestamp of 2:40:41 PM on 8/5/2010, and navigation buttons for 'Language', 'Cancel', 'Previous', and 'Directory'. Below this are tabs for 'T-A-R Upcar' and 'T-A-R Locar', each with an 'In Manual' sub-tab.

The main control area is divided into several sections:

- Top Left:** 'Load Kiln Number' (2) and 'Unload Kiln Number' (1) with 'Kiln #' labels.
- Top Center:** 'LoCar Location' (Press to Select) and 'LoCar Control' (Car Waiting).
- Top Right:** 'Car Bypass Option' (No Bypass Selected, Normal Run) and 'Kiln Door Option' (Disable).
- Middle Left:** 'Number Of Pass Per Kiln' (2) and 'Current Pass Number' (1) with 'Pass #' labels.
- Middle Center:** 'Manual Docking' (Docking Engaged) and 'LoCar Manual Movement' (Car Motion Off).
- Middle Right:** 'UpCar Go Command' (Press to Select) and 'Kiln Door' (Open).
- Bottom Left:** 'LoCar Control' (Car Waiting) and 'LoCar Location' (Press to Select).
- Bottom Center:** 'Ok to Enter Loader' and 'Ok to Enter Unloader' buttons.
- Bottom Right:** 'LoCar RMC Status' and 'UpCar RMC Status' (both RMC Ready).

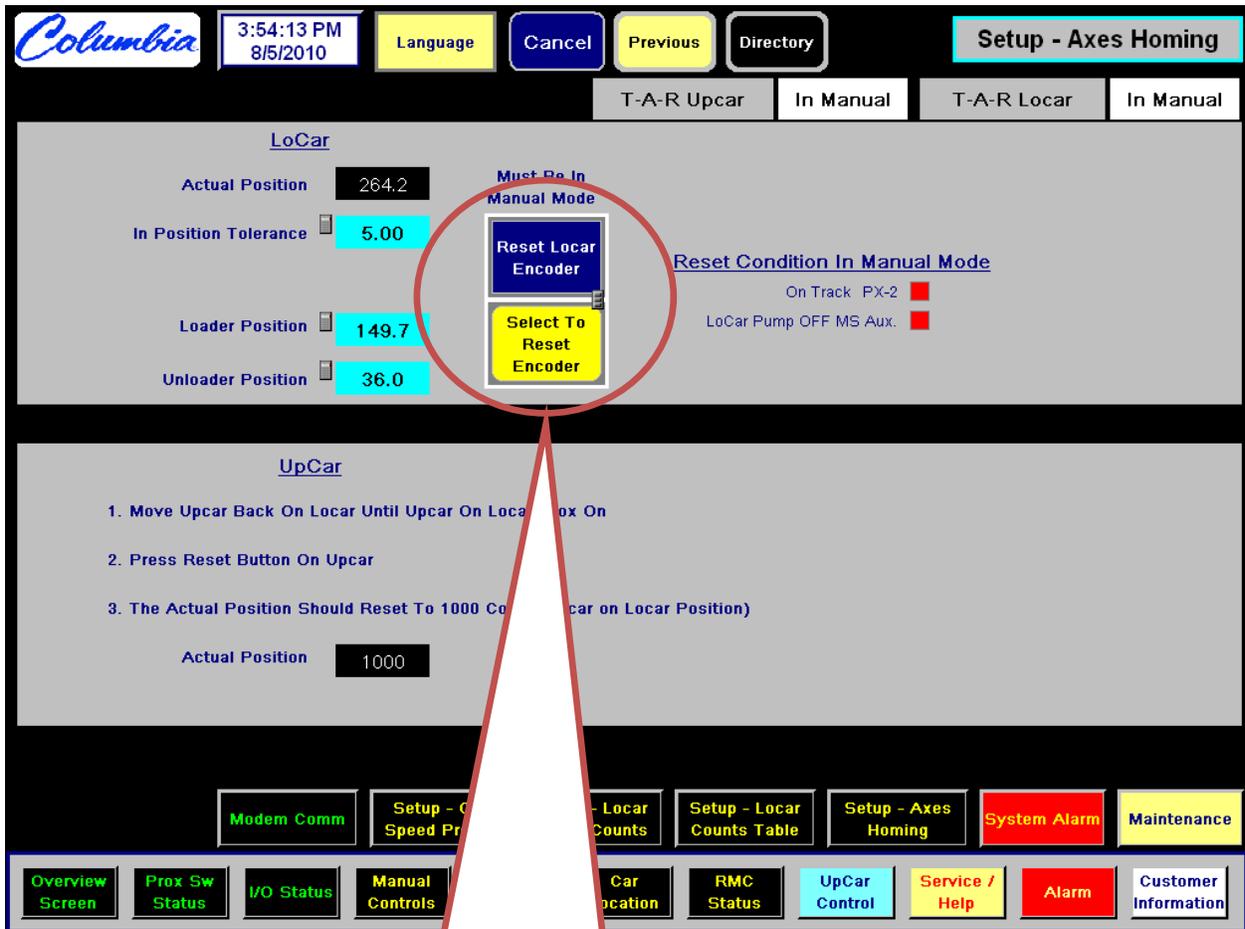
At the bottom of the interface, there is a 'Locar Input' section with a list of status indicators:

- On Track PX-2 (Red)
- UpCar On LoCar PX-3 (Red)
- Docking Engaged PX-4 (Red)
- Docking Released PX-5 (Black)
- Kiln Door Open PC-1 (Red)
- LoCar Pump On MS Aux. (Black)
- LoCar Thermostat (Black)

A red circle highlights the movement buttons: 'Forward Fast', 'Forward Slow', 'Reverse Fast', and 'Reverse Slow'. A callout box points to this circle with the text: 'Manually Control LOCAR through Operator Buttons.'

4. Setup Axis Homing:

Move the Locar to the Loader to set-up PLC axis homing. This procedure sets the starting point of the PLC at the LOADER.



Reset Locar Encoder Count

In the event of slippage or other conditions that will cause the encoder count to be slightly off, Park the Locar at the Unloader and push the "Reset Encoder" and a known value will be set in the count register.

5. LOCAR VELOCITY PROFILE (SPEED) SETTING:

There are THREE Speeds for the locar, refer to the E-Pro on the Locar.

- Green accel/decel
- Cured accel/decel
- Empty accel/decal

- Green full speed
- Cured full speed
- Empty full speed

Super slow or creep speed is hard coded
 Slow speed is hard coded

* Forward/Reverse accel/decel:
 - Generally set Decel/Accel of 1 to 3 (the larger the number the FASTER the Accel/Decel = volts/second)

* Forward/Reverse fast or top speed:
 - Initial setup for 3 to 4 volts for speed, Top speed setting should be no more than 6volts.Accel/Decel set at 3

LOCAR ACCELERATION & DECELERATION (RAMP) SETTING:

With the Accel/Decel the higher the number the faster the Accel/Decel.

The lower the number the more time it will take for the transition for fast to slow and slow to creep.

The screenshot shows the 'Setup - Car Speed' screen. At the top, there is a header with the Columbia logo, a timestamp of 3:36:22 PM on 8/5/2010, and navigation buttons for Language, Cancel, Previous, and Directory. The main area is divided into two columns: 'Locar Speed Profile' and 'Upcar Speed Profile'. Each column contains a table of settings with 'Description' and 'Current' values. To the right of these tables is a 'Car Speed Parameters Profile' section with a 'Select To Start' button and a 'Setup Profile Number' field set to 2. Below this is a numeric keypad with an upper limit of 10.0 and a lower limit of 1.0. At the bottom of the screen, there are two 'Raw Control Output (Volts)' displays showing 0.0 and 0.1. The footer contains a row of menu buttons: Modem Comm, Setup - Car Speed Profile, Setup - Locar Creep Counts, Setup - Locar Counts Table, Setup - Axes Homing, System Alarm, and Maintenance. A second row of buttons includes Overview Screen, Prox Sw Status, I/O Status, Manual Controls, Loading Table, Car Location, RMC Status, UpCar Control, Service / Help, Alarm, and Customer Information.

Locar Speed Profile		Upcar Speed Profile	
Description	Current	Description	Current
Accel Empty	1.4	Accel Empty	1.5
Accel Cured	1.0	Accel Cured	1.5
Accel Green	1.0	Accel Green	1.5
Decel Empty	1.5	Decel Empty	1.5
Decel Cured	1.0	Decel Cured	1.0
Decel Green	1.0	Decel Green	1.0
Fast Empty Speed	5.0	Fast Empty Speed	2.5
Fast Cured Speed	5.0	Fast Cured Speed	2.5
Fast Green Speed	4.0	Fast Green Speed	2.5

6. Set-up the Locar Counts Table. Step 1 determined the plant configuration and location of ORIGIN. :

Always release Clamps before manually moving LOCAR.

- Move the Locar to the Unloader (origin) reset and note counts.
- Move Locar to Loader and note counts
- Move Locar to Kiln #1 and note counts.
- Move Locar to each Kiln and note counts for each Kiln.
- Complete table from screen set-up counts table page below:

Count Setup

To Kiln 1	264
To Kiln 2	378
To Kiln 3	0
To Kiln 4	0
To Kiln 5	0
To Kiln 6	0
To Kiln 7	0
To Kiln 8	0
To Kiln 9	0
To Kiln 10	0
To Kiln 11	0
To Kiln 12	0

Creep Count Setup

Loader to Unloader	80
Unloader to Loader	81

Going In Kiln Door

Car At Kiln Door Outside Position	184.0
Car Going In Kiln Door Creep Counts	35.0
Car Passed Kiln Door Position	200.0

Going Out Kiln Door

Car At Kiln Door Inside Position	208.0
Car Going Out Kiln Door Creep Counts	35.0
Car Passed Kiln Door Position	180.0

Complete the following table before entering the data on the operator screen to provide a setup record and insure all data is properly gathered.

Choose the table below based on your Plant Layout and system Configuration:
 First table is if the Unloader is the Origin, second table is if the Loader is the Origin.

LOCAR COUNTS (LOCATION) SETTING

LOADER BETWEEN UNLOADER AND KILNS

ORIGIN		KILN NUMBER									
UNLOADER	LOADER	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
1000											
F57:192	F57:194	F57:1	F57:2	F57:3	F57:4	F57:5	F57:6	F57:7	F57:8	F57:9	F57:10
		# 11	# 12	# 13	# 14	# 15	# 16	# 17	# 18	# 19	
		F57:11	F57:12	F57:13	F57:14	F57:15	F57:16	F57:17	F57:18	F57:19	

OR

UNLOADER BETWEEN LOADER AND KILNS

ORIGIN		KILN NUMBER									
LOADER	UNLOADER	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10
1000											
F57:194	F57:192	F57:1	F57:2	F57:3	F57:4	F57:5	F57:6	F57:7	F57:8	F57:9	F57:10
		# 11	# 12	# 13	# 14	# 15	# 16	# 17	# 18	# 19	
		F57:11	F57:12	F57:13	F57:14	F57:15	F57:16	F57:17	F57:18	F57:19	

USE ONLY ONE TABLE.

7. Setup LoCar Creep Count:

Enter values on operator screen shown:

Columbia 3:39:35 PM 8/5/2010 Language Cancel Previous Directory **Setup - Locar Creep**

From Loader to Load Kiln		From LK to UK - Forward		From LK to UK - Reverse		From UK to Unloader	
To Kiln 1	76	81	Kiln Apart 1	62	From Kiln 1	102	
To Kiln 2	110	80	Kiln Apart 2	80	From Kiln 2	121	
To Kiln 3	0	0	Kiln Apart 3	0	From Kiln 3	0	
To Kiln 4	0	0	Kiln Apart 4	0	From Kiln 4	0	
To Kiln 5	0	0	Kiln Apart 5	0	From Kiln 5	0	
To Kiln 6	0	0	Kiln Apart 6	0	From Kiln 6	0	
To Kiln 7	0	0	Kiln Apart 7	0	From Kiln 7	0	
To Kiln 8	0	0	Kiln Apart 8	0	From Kiln 8	0	
To Kiln 9	0	0	Kiln Apart 9	0	From Kiln 9	0	
To Kiln 10	0	0	Kiln Apart 10	0	From Kiln 10	0	
To Kiln 11	0	0	Kiln Apart 11	0	From Kiln 11	0	
To Kiln 12	0	0	Kiln Apart 12	0	From Kiln 12	0	

Modem Comm Setup Speed Setup - Locar Creep Counts Setup - Locar Counts Table Setup - Axes Homing System Alarm Maintenance
 Overview Screen Box Sw Status I/O Status Manual Control Loading Table Car Location RMC Status Car Control Service / Help Alarm Customer Information

FROM LOADER TO
LOAD KILN

FROM LOAD TO
UNLOAD KILN FWD
KILN APART

FROM LOAD TO
UNLOAD KILN REV
KILN APART

FROM UNLOAD KILN
TO UNLOADER

Complete the following tables BELOW FOR EACH SECTION before entering the data on the operator screen to provide a setup record and insure all data is properly gathered.

LOCAR CREEP COUNTS TABLE: FROM ORIGIN TO LOAD KILN

This table represents the number of creep counts from the ORIGIN position to the Load Kiln position. The value from this table moves into F57:107 according to the Load Kiln pointer. The program determines when to shut off the FAST valve and slow the car down to the creep speed through the value in F57:107.

Kiln #	F-Location	# of counts
1	F57:21 =	
2	F57:22 =	
3	F57:23 =	
4	F57:24 =	
5	F57:25 =	
6	F57:26 =	
7	F57:27 =	
8	F57:28 =	
9	F57:29 =	
10	F57:30 =	
11	F57:31 =	
12	F57:32 =	
13	F57:33 =	
14	F57:34 =	
15	F57:35 =	
16	F57:36 =	
17	F57:37 =	
18	F57:38 =	
19	F57:39 =	

Load Kiln # N37:48

Load Kiln Pointer F57:[N37:78]

LK Creep counts Temp. location F57:107

LOCAR CREEP COUNTS TABLE: FROM LK TO UK FORWARD

KILNS APART UK# GREATER THAN LK#

This table represents the number of creep counts from the Load Kiln position to the Unload Kiln position. The value from this table moves into F57:108 according to the (UK # - LK #) pointer. The program determines when to shut off the FAST valve and slow the car down to the creep speed through the value in F57:108. (UK# > LK#)

Kilns Apart	F-Location	# of counts
1	F57:41 =	
2	F57:42 =	
3	F57:43 =	
4	F57:44 =	
5	F57:45 =	
6	F57:46 =	
7	F57:47 =	
8	F57:48 =	
9	F57:49 =	
10	F57:50 =	
11	F57:51 =	
12	F57:52 =	
13	F57:53 =	
14	F57:54 =	
15	F57:55 =	
16	F57:56 =	
17	F57:57 =	
18	F57:58 =	
19	F57:59 =	

UK # - LK # Pointer

F57:[N37:50]

Creep counts Temp. location

F57:108

LOCAR CREEP COUNTS TABLE: FROM LK TO UK REVERSE

KILNS APART UK# LESS THAN LK#

This table represents the number of creep counts from the Load Kiln position to the Unload Kiln position. The value from this table moves into F57:112 according to the (UK # - LK #) pointer. The program determines when to shut off the FAST valve and slow the car down to the creep speed through the value in F57:112.

Kilns Apart	F-Location	# of counts
1	F57:221 =	
2	F57:222 =	
3	F57:223 =	
4	F57:224 =	
5	F57:225 =	
6	F57:226 =	
7	F57:227 =	
8	F57:228 =	
9	F57:229 =	
10	F57:230 =	
11	F57:231 =	
12	F57:232 =	
13	F57:233 =	
14	F57:234 =	
15	F57:235 =	
16	F57:236 =	
17	F57:237 =	
18	F57:238 =	
19	F57:239 =	

UK # - LK # Pointer

F57:[N37:51]

Creep counts Temp. location

F57:112

LOCAR CREEP COUNTS TABLE: FROM UK TO UNLOADER

This table represents the number of creep counts from the Unload Kiln position to the UNLOADER position. The value from this table moves into F57:109 according to the Unload Kiln # pointer. The program determines when to shut off the FAST valve and slow the car down to the creep speed through the value in F57:109.

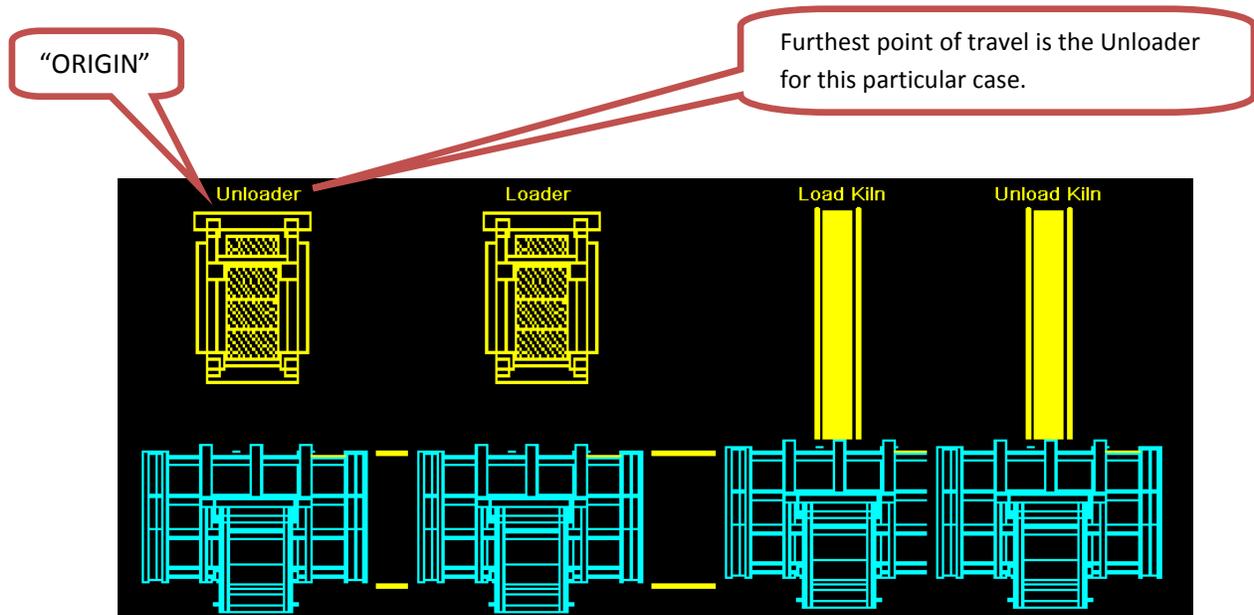
Kiln #	F-Location	# of counts
1	F57:61 =	
2	F57:62 =	
3	F57:63 =	
4	F57:64 =	
5	F57:65 =	
6	F57:66 =	
7	F57:67 =	
8	F57:68 =	
9	F57:69 =	
10	F57:70 =	
11	F57:71 =	
12	F57:72 =	
13	F57:73 =	
14	F57:74 =	
15	F57:75 =	
16	F57:76 =	
17	F57:77 =	
18	F57:78 =	
19	F57:79 =	

Unload Kiln #	N37:49
Unload Kiln # Pointer	F57:[N37:80]
Creep counts Temp. location	F57:109

H. SETUP/CONFIGURE UPCAR:

Follow the following steps to insure a successful set-up and configuration of Trac-A-Rac UpCar :

Based on the Plant layout drawings determine where the farthest point where the Locar is required to travel the longest distance. This will be the far end of travel and will usually be either at the loader or unloaded. This will also establish where the ORIGIN will be located.



TRAC-A-RAC SYSTEM LAYOUT/CONFIGURATION

1. Manually run the UpCar with the hydraulic joystick to check that the encoder is counting properly. The encoder will **increase** in counts as you travel **away** from the **LoCar** and **decrease** in counts as you travel **towards** the **LoCar**. The reset button on the encoder itself may be required to be pushed or the wiring may be reversed if the encoder is not reading counts properly.
 - See Encoder Wiring and Set-up Section if the encoder is not reading properly.

2. UPCAR VELOCITYPROFILE (SPEED) SETTING:

There are THREE Speeds for the locar, refer to the E-Pro on the Locar.

Green accel/decel
Cured accel/decel
Empty accel/decal

Green full speed
Cured full speed
Empty full speed

Super slow or creep speed is hard coded
Slow speed is hard coded

* Forward/Reverse accel/decel:

- Generally set Decel/Accel of 1 to 3 (the larger the number the FASTER the Accel/Decel = volts/second)

* Forward/Reverse fast or top speed:

- Initial setup for 3 to 4 volts for speed, Top speed setting should be no more than 6volts. Accel/Decel set at 3

LOCAR ACCELERATION & DECELERATION (RAMP) SETTING:

With the Accel/Decel the higher the number the faster the Accel/Decel.

The lower the number the more time it will take for the transition for fast to slow and slow to creep.

Setup - Car Speed

Locar Speed Profile		Upcar Speed Profile	
Description	Current	Description	Current
Accel Empty	1.4	Accel Empty	1.5
Accel Cured	1.0	Accel Cured	1.5
Accel Green	1.0	Accel Green	1.5
Decel Empty	1.5	Decel Empty	1.5
Decel Cured	1.0	Decel Cured	1.0
Decel Green	1.0	Decel Green	1.0
Fast Empty Speed	5.0	Fast Empty Speed	2.5
Fast Cured Speed	5.0	Fast Cured Speed	2.5
Fast Green Speed	4.0	Fast Green Speed	2.5

Raw Control Output (Volts): 0.0 (Locar) / 0.1 (Upcar)

Car Speed Parameters Profile: Setup Profile Number = 2

Upper Limit = 10.0, Lower Limit = 1.0

Navigation buttons: Modem Comm, Setup - Car Speed Profile, Setup - Locar Creep Counts, Setup - Locar Counts Table, Setup - Axes Homing, System Alarm, Maintenance, Overview Screen, Prox Sw Status, I/O Status, Manual Controls, Loading Table, Car Location, RMC Status, UpCar Control, Service / Help, Alarm, Customer Information

3. UPCAR SETUP:

All values/counts needed for setup of the UpCar is to be entered through the UpCar PLC.

The Home position or origin of the Upcar is when the Upcar is on the Locar. Therefore, that position is the reference point or **F57:70** = the Actual counts on the E-Pro.

- When the upcar gets to the destination Upcar on Locar and stops, the number in Actual counts represents the number of counts for the Home position (Origin) Upcar/Locar pos..

Locar at the Unload position:

- Manually move the Upcar to the Unload position by operating the E-Pro or Remote. Actual counts should start increasing as soon as the Upcar moves.
- When the upcar gets to the Stops at the Unloader position, the Actual count represents the number of counts between the Upcar/Locar pos.and the Max unload position.
- Unload position (**F57:92**) = **Actual count. Put this count into the Loader position also**
- Load position (F57:94) = **Actual count.**

Manually move the Locar to the Load Kiln.

- Manually move the Upcar to Pass # 1 Kiln #1 position and stop, the number in Actual counts represents the number of counts between the Upcar/Locar and Pass # 1 position.
Pass # 1 position (**F57:101**) = **Actual count.**

Reverse the numbers for Unload (**F57:121**) = **Actual count**
- Repeat the same procedure until getting to the last Pass # Kiln #1.

To double check, manually move the Upcar in the opposite direction, the Actual count should be increasing for forward/decreasing for an reverse as soon as the upcar moves. When the upcar gets back on the Locar, the Actual count should equal the Upcar/Locar position.

The LoCar PLC stores these values in the F registers listed below, fill out count table for verification when setting up.

UPCAR COUNTS (LOCATION) SETTING

UPCAR ON LOCAR	RAISE/ LOWER CYLINDER POS.	RAISE/ LOWER CREEP COUNTS	LOAD POSITION
1000			
N57:70	N57:60	N57:61	N57:94

UPCAR ON LOCAR	RAISE/ LOWER CYLINDER POS.	RAISE/ LOWER CREEP COUNTS	UNLOAD POSITION
1000			
N57:70	N57:60	N57:61	N57:92

***** RAISE/LOWER CYLINDER IS USED BEFORE ENTERING AND AT EXITING LOAD/UNLOAD KILNS FOR RACK CLEARANCE.**

UPCAR COUNTS TABLE: LOAD POSITION

UPCAR COUNTS TABLE: HOME POSITION (UPCAR ON LOCAR)

F-Location	# of counts
F57:70 =	Actual COUNT

UPCAR COUNTS TABLE: GOING INTO LOAD COUNTS

This F-Location represents the total number of counts to the correct position for the upcar to pick up the Rack.

F-Location	# of counts
F57:94 =	

UPCAR COUNTS TABLE: GOING INTO LOAD CREEP COUNTS

This F-Location represents the total number of creep counts to the correct position for the upcar to Drop the Rack.

F-Location	# of counts
F57:74 =	

UPCAR COUNTS TABLE: GOING OUT OF LOAD CREEP COUNTS

This F-Location represents the total number of creep counts to the Home position (Upcar on Locar) after the upcar picked up the Rack in LOADER Position.

F-Location	# of counts
F57:76 =	

UPCAR COUNTS TABLE: UNLOAD POSITION

UPCAR COUNTS TABLE: HOME POSITION (UPCAR ON LOCAR)

F-Location	# of counts
F57:70 =	Actual COUNT

UPCAR COUNTS TABLE: GOING INTO UNLOAD COUNTS

This F-Location represents the total number of counts to the correct position for the upcar to deliver the Rack in the Unload Position.

F-Location	# of counts
F57:92 =	

UPCAR COUNTS TABLE: GOING INTO UNLOAD CREEP COUNTS

This F-Location represents the total number of creep counts to the correct position for the upcar to deliver the Rack in the Unload position.

F-Location	# of counts
F57:72 =	

UPCAR COUNTS TABLE: GOING OUT OF UNLOAD CREEP COUNTS

This F-Location represents the total number of creep counts to the Home position (Upkar on Locar) after the upcar has delivered the Rack in the Unload position.

F-Location	# of counts
F57:71 =	

UPCAR COUNTS TABLE: CREEP TO ZERO COUNTS

This F-Location represents the total number of creep counts needed for the upcar to decel from creep speed to zero or stop

F-Location	# of counts
F57:97 =	

UPCAR COUNTS TABLE: LOAD KILN COUNTS

This table represents the actual total number of counts to the correct position for the upcar to deliver Racks in the load kiln. This table changes if you rearrange the rack location. The Value from this table moves into F57:95 according to the LK pass number pointer, F57:88. The program determines which direction the Upcar travels through the value in F57:95.

LOAD

Pass #	F-Location	# of counts
1	F57:101 =	
2	F57:102 =	
3	F57:103 =	
4	F57:104 =	
5	F57:105 =	
6	F57:106 =	
7	F57:107 =	
8	F57:108 =	
9	F57:109 =	
10	N37:110 =	
11	F57:111 =	
12	F57:112 =	
13	F57:113 =	
14	F57:114 =	
15	F57:115 =	
16	F57:116 =	
17	F57:117 =	
18	F57:118 =	
19	F57:119 =	
20	F57:120 =	

Load Kiln Pass # Pointer F57:88

Load Kiln counts Temp. location F57:95

UPCAR COUNTS TABLE: UNLOAD KILN COUNTS

This table represents the actual total number of counts to the correct position for the upcar to pick-up Racks in the Unload kiln. This table changes if you rearrange the rack location. The Value from this table moves into F57:93 according to the UK pass number pointer, N57:89. The program determines which direction the Upcar travels through the value in F57:93.

UNLOAD

Pass #	N-Location	# of counts
1	F57:121 =	
2	F57:122 =	
3	F57:123 =	
4	F57:124 =	
5	F57:125 =	
6	F57:126 =	
7	F57:127 =	
8	F57:128 =	
9	F57:129 =	
10	F57:130 =	
11	F57:131 =	
12	F57:132 =	
13	F57:133 =	
14	F57:134 =	
15	F57:135 =	
16	F57:136 =	
17	F57:137 =	
18	F57:138 =	
19	F57:139 =	
20	F57:140 =	

Unload Kiln Pass # Pointer F57:89

Unload Kiln counts Temp. location F57:93

UPCAR COUNTS TABLE: GOING OUT OF LOAD KILN CREEP COUNTS

This table represents the total number of creep counts to the Home position (Upcar on Locar) after the upcar delivered a rack in the load kiln. This table changes if you rearrange the rack location. The Value from this table moves into F57:85 according to the LK pass number pointer, F57:29. The program determines when to shut off FAST and slow the car down to the creep speed through the value in F57:85.

Pass #	N-Location	# of counts
1	F57:161 =	
2	F57:162 =	
3	F57:163 =	
4	F57:164 =	
5	F57:165 =	
6	F57:166 =	
7	F57:167 =	
8	F57:168 =	
9	F57:169 =	
10	F57:170 =	
11	F57:171 =	
12	F57:172 =	
13	F57:173 =	
14	F57:174 =	
15	F57:175 =	
16	F57:176 =	
17	F57:177 =	
18	F57:178 =	
19	F57:179 =	
20	F57:180 =	

Load Kiln Pass # Pointer F57:29

LK Creep counts Temp. location F57:85

I. AUTOMATIC OPERATION OF SYSTEM:

1. AUTOMATIC MODE:

Procedure to put the TRAC-A-RAC systems into AUTOMATIC MODE:

Make sure all preset data are entered into the system before going into to AUTO. These parameters should all be entered: “Number of Pass Per Kiln”, “Load Kiln Number”, “Unload Kiln Number”, “Kiln Loading/Unloading Table”.

- Manually move the UpCar onto the LoCar.
- Manually position the LoCar at the Loader.
- Make sure the UpCar Forks are positioned where the Long Cylinder is UP & Short Cylinder is Down.
- Turn on power to the LoCar at LoCar Push Button Station. “LoCar Power”
- Turn on power to the UpCar at LoCar PLC Control Panel. “UpCar Power”
- Press the Reset Button on the UpCar PLC Control Panel.
- Press the Reset Button on LoCar Push Button Station.

Entered Data

The screenshot displays the control interface for the TRAC-A-RAC system. At the top, it shows the time (2:41:41 PM) and date (8/5/2010), along with navigation buttons like 'Language', 'Cancel', 'Previous', and 'Directory'. The main control area is divided into sections for 'T-A-R Upcar' and 'T-A-R Locar', both currently in 'In Manual' mode. Key control buttons include 'Load Kiln Number' (set to 2), 'Unload Kiln Number' (set to 1), 'Number Of Pass Per Kiln' (set to 2), and 'Current Pass Number' (set to 1). These four input fields are circled in red, with a callout box labeled 'Entered Data' pointing to them. Other buttons include 'LoCar Location', 'LoCar Control', 'Car Bypass Option' (set to 'No Bypass Selected Normal Run'), 'Kiln Door Option' (set to 'Disable'), 'Manual Docking' (set to 'Docking Engaged'), 'Locar Manual Movement' (set to 'Car Motion Off'), 'UpCar Control' (set to 'At Load Kiln'), 'UpCar Go Command' (set to 'Press to Select'), and 'Execute Current Command' (set to 'Open'). A status section at the bottom right shows 'LoCar' and 'UpCar' positions and counts, along with 'Locar Input' status indicators. The bottom navigation bar includes buttons for 'Overview Screen', 'Prox Sw Status', 'I/O Status', 'Manual Controls', 'Loading Table', 'Car Location', 'RMC Status', 'UpCar Control', 'Service / Help', 'Alarm', and 'Customer Information'.

- On the ePro “OVERVIEW” Screen hit “LoCar Location” and set current location where the LoCar is presently sitting.

Select Location:

The screenshot shows the 'Manual Controls' section of the ePro interface. A red callout box labeled 'Select Location:' points to the 'LoCar Location' button. The interface includes several control panels and a data table.

LoCar		UpCar
Actual Position	264.2	999.9
Destination	264.2	1000.0
Remaining Counts	-0.0	0.2
Total Counts	0.0	999.9
Total Creep Counts	62.0	30.0
Raw Control Output (Volts)	0.0	0.1

Locar Input

- On Track PX-2 ■
- UpCar On LoCar PX-3 ■
- Docking Engaged PX-4 ■
- Docking Released PX-5 ■
- Kiln Door Open PC-1 ■
- LoCar Pump On MS Aux. ■
- LoCar Thermostat ■

- Pull the Automatic switch on the UpCar PLC Control Panel.
- Pull the Automatic switch on the LoCar Push Button Station.
- Wait 6 seconds and the system will go into AUTOMATIC and the cars will start moving.

2. FINE TUNING LOCAR:

The LoCar can be fine tuned for optimum performance by simply adjusting creep counts to a value where the LoCar does not creep for a long length of time and at the same time does not overshoot its target destination. To Fine tune perform the following:

- Make note of the current creep count at location you are working on:

The screenshot shows the 'Setup - Locar Creep' interface. At the top, there is a header with the 'Columbia' logo, a timestamp '3:40:15 PM 8/5/2010', and navigation buttons: 'Language', 'Cancel', 'Previous', and 'Directory'. The main area is divided into four columns of creep count data:

From Loader to Load Kiln	From LK to UK - Forward	From LK to UK - Reverse	From UK to Unloader
To Kiln 1: 76	81	Kiln Apart 1: 62	From Kiln 1: 102
To Kiln 2: 110	80	Kiln Apart 2: 80	From Kiln 2: 121
To Kiln 3: 0	0	Kiln Apart 3: 0	From Kiln 3: 0
To Kiln 4: 0	0	Kiln Apart 4: 0	From Kiln 4: 0
To Kiln 5: 0	0	Kiln Apart 5: 0	From Kiln 5: 0
To Kiln 6: 0	0	Kiln Apart 6: 0	From Kiln 6: 0
To Kiln 7: 0	0	Kiln Apart 7: 0	From Kiln 7: 0
To Kiln 8: 0	0	Kiln Apart 8: 0	From Kiln 8: 0
To Kiln 9: 0	0	Kiln Apart 9: 0	From Kiln 9: 0
To Kiln 10: 0	0	Kiln Apart 10: 0	From Kiln 10: 0
To Kiln 11: 0	0	Kiln Apart 11: 0	From Kiln 11: 0
To Kiln 12: 0	0	Kiln Apart 12: 0	From Kiln 12: 0

A numeric keypad is overlaid on the screen, showing the number '0' entered. The keypad includes buttons for digits 0-9, a decimal point, a minus sign, and function keys like 'C', 'BkSp', and 'Enter'. At the bottom of the screen, there is a row of navigation buttons: 'Modem Comm', 'Setup - Car Speed Profile', 'Setup - Locar Creep Counts', 'Setup - Locar Counts Table', 'Setup - Axes Homing', 'System Alarm', and 'Maintenance'. Below this is another row of buttons: 'Overview Screen', 'Prox Sw Status', 'I/O Status', 'Manual Controls', 'Loading Table', 'Car Location', 'RMC Status', 'UpCar Control', 'Service / Help', 'Alarm', and 'Customer Information'.

- Place the system into Auto Mode, See Automatic Mode section for procedure.

- Use the operator screen to assign starting point: see screen

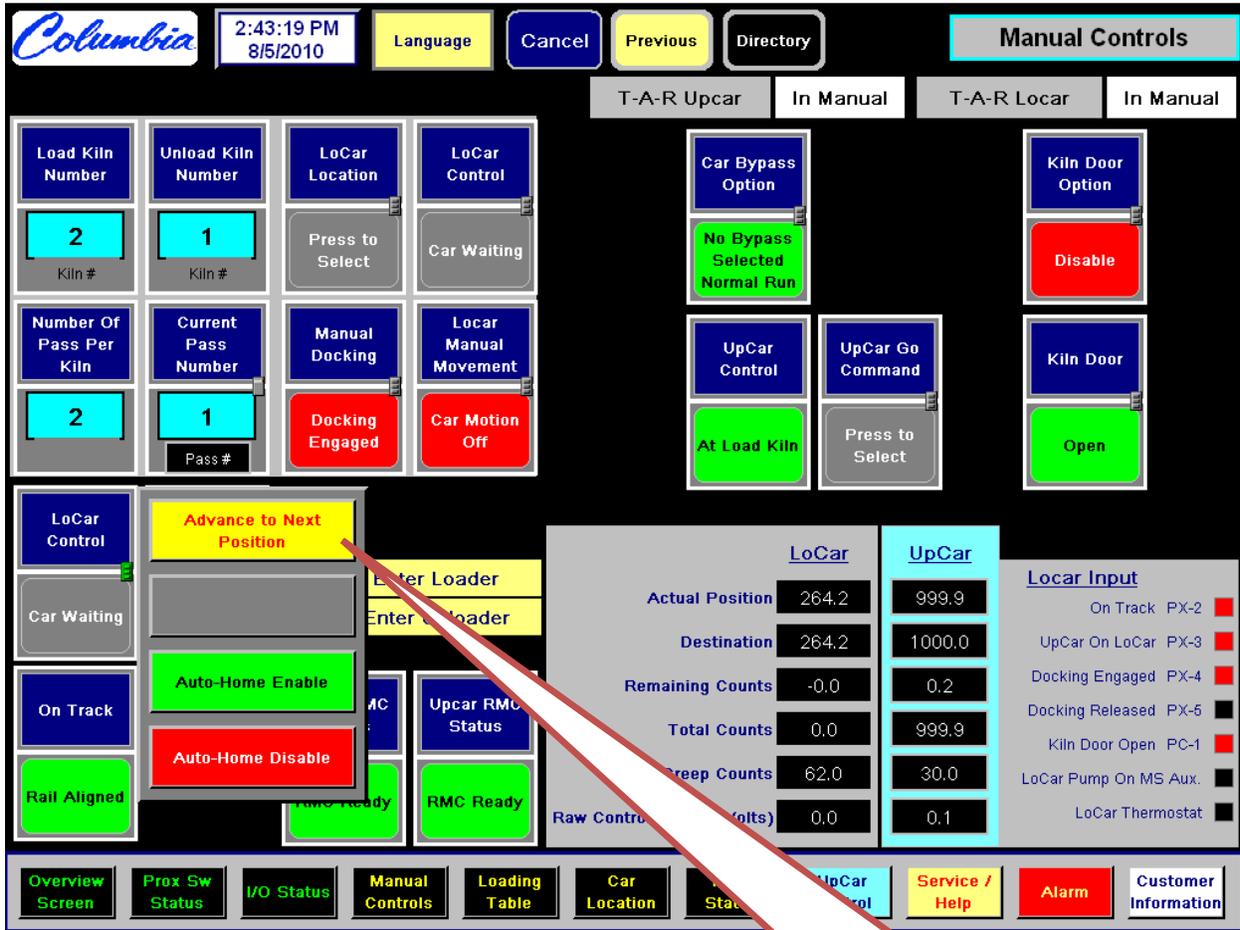
The screenshot displays the Columbia operator interface. At the top, it shows the time 2:44:04 PM on 8/5/2010 and various navigation buttons like Language, Cancel, Previous, and Directory. The main area is divided into several functional sections:

- Manual Controls:** Includes buttons for T-A-R Upcar and T-A-R Locar, both currently in 'In Manual' mode. It features controls for Car Bypass Option (set to 'No Bypass Selected Normal Run'), Kiln Door Option (set to 'Disable'), and Kiln Door (set to 'Open').
- LoCar Control:** Shows 'LoCar Location' as 'At Loader' and 'LoCar Control' as 'Car Waiting'. It also displays 'Manual Docking' (set to 'Docking Engaged') and 'Locar Manual Movement' (set to 'Car Motion Off').
- Pass Information:** Displays 'Load Kiln Number' as 2, 'Unload Kiln Number' as 1, 'Number Of Pass Per Kiln' as 2, and 'Current Pass Number' as 1.
- Positioning and Status:** Includes 'LoCar Control' (set to 'Car Waiting'), 'LoCar Location' (set to 'At Loader'), 'On Track' (set to 'Rail Aligned'), and 'At Unloader' (set to 'At Unloader').
- LoCar/UpCar Data Table:**

	LoCar	UpCar
Actual Position	264.2	999.9
Destination	264.2	1000.0
Remaining Counts	-0.0	0.2
Total Counts	0.0	999.9
Total Creep Counts	62.0	30.0
Raw Control Output (Volts)	0.0	0.1
- Locar Input:** A list of status indicators with corresponding colored lights: On Track PX-2 (red), UpCar On LoCar PX-3 (red), Docking Engaged PX-4 (red), Docking Released PX-5 (black), Kiln Door Open PC-1 (red), LoCar Pump On MS Aux. (black), and LoCar Thermostat (black).

A callout box with a red border and arrow points to the 'At Load Kiln' button in the 'At Loader' section, with the text 'Select Start Location:'.

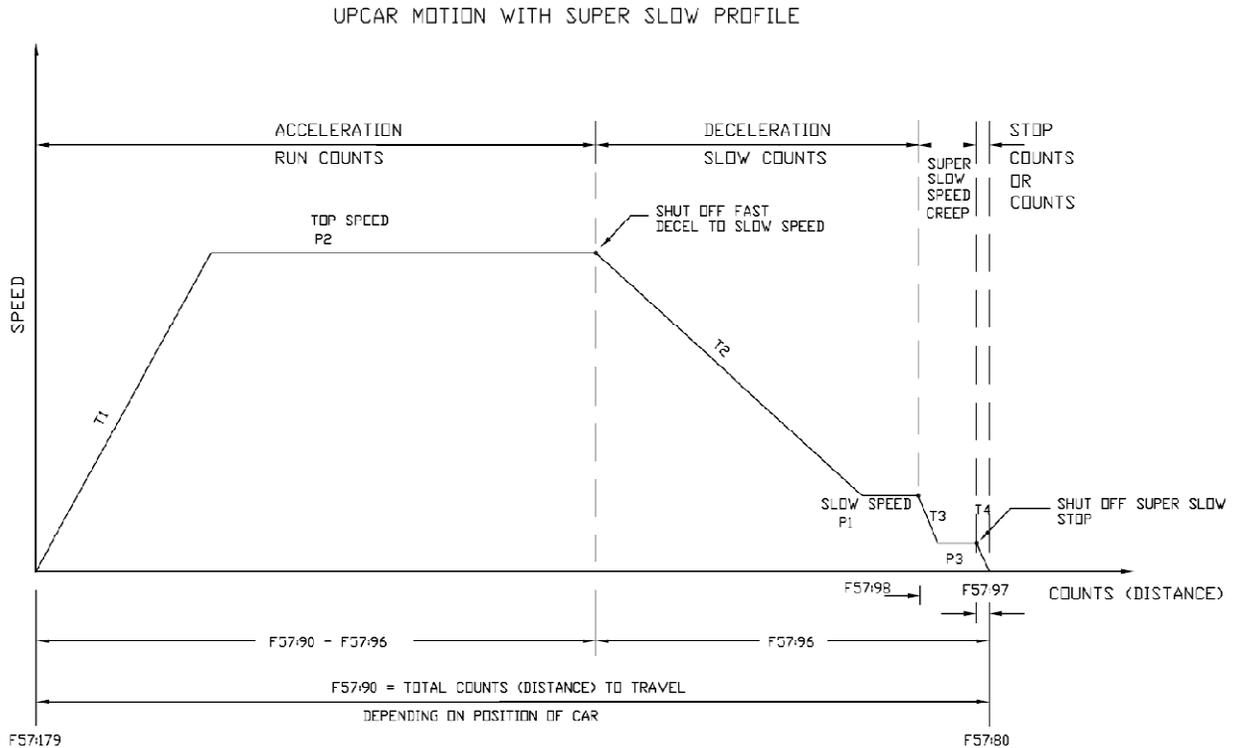
- Initiate start sequence from ePro Screen:



- Pay close attention to performance of the LoCar as it gets to its destination and determine whether to decrease or increase the creep counts. If the creep time is too long, shorten creep counts. The optimum would be a short creep time without overshooting the destination. Repeat as needed.
- Go to "Set-UP Creep" Screen and enter new creep value for that destination.

J. APPENDIX

1.1. General Information:



F57:179 - ACTUAL CAR POSITION (COUNTS)

F57:80 - COUNT # THAT CAR GOING TO (DESTINATION)

F57:81 - REMAINING COUNTS TO TRAVEL FOR CAR

F57:90 - TOTAL COUNTS TO TRAVEL

F57:96 - TOTAL CREEP COUNTS-SHIFT TO SLOW

F57:97 - COUNT WINDOW FOR CAR TO STOP

F57:98 - # OF COUNTS FOR CAR TO SHIFT TO SUPER SLOW-CREEP

P1 - SLOW SPEED SETPOINT

P2 - FAST SPEED SETPOINT

P3 - SUPER SLOW OR CREEP SPEED SETPOINT

T1 - ACCELERATION FROM 0 TO TOP SPEED

T2 - DECELERATION FROM TOP TO SLOW SPEED

T3 - DECELERATION FROM SLOW TO CREEP

T4 - DECELERATION FROM CREEP TO STOP

DIRECTION & COUNTS CALCULATION

* FORWARD:

F57:80 > F57:179

* TOTAL COUNTS TO TRAVEL FORWARD:

F57:90 = F57:80 - F57:179

* REMAINING COUNTS TO TRAVEL FORWARD:

F57:81 = F57:80 - F57:179

* REVERSE:

F57:179 > F57:80

* TOTAL COUNTS TO TRAVEL REVERSE:

F57:90 = F57:179 - F57:80

* REMAINING COUNTS TO TRAVEL REVERSE:

F57:81 = F57:179 - F57:80

* SHUT OFF FAST - DECEL TO SLOW:

F57:81 < F57:96

* SHUT OFF SLOW - DECEL TO SUPER SLOW-CREEP:

F57:81 < F57:98

* SHUT OFF SUPER SLOW - STOP:

F57:81 < F57:97

F57:179 - ACTUAL CAR POSITION (COUNTS)

F57:80 - COUNT # THAT CAR GOING TO (DESTINATION)

F57:81 - REMAINING COUNTS TO TRAVEL FOR CAR

F57:90 - TOTAL COUNTS TO TRAVEL

F57:96 - # OF COUNTS FOR CAR TO SHIFT TO SLOW

F57:97 - # OF COUNTS FOR CAR TO STOP

F57:98 - # OF COUNTS FOR CAR TO SHIFT TO SUPER SLOW-CREEP

COUNT # THAT UPCAR GOING TO (DESTINATION):

* AT LOADER:

F57:94

* AT UNLOADER:

F57:92

* AT LOAD KILN:

F57:95

* AT UNLOAD KILN:

F57:93

* AT RAISE/LOWER FORKS - TO HOME POS.:

F57:60

F57:80

UPCAR TOTAL CREEP COUNTS:

* AT LOADER:

F57:74

* AT UNLOADER:

F57:72

* AT LOAD KILN:

F57:75

* AT UNLOAD KILN:

F57:73

* AT RAISE/LOWER FORKS - TO HOME POS.:

F57:71

F57:96

1.2. PLC Communication Table:

Main PLC w/ MSG Write Instruction to Cars (Lad 3 - rung 4)

Size in Elements **14**
 Main PLC channel **1**
 Locar Local Node Address **16**
 Message Timeout **7**

<u>Description</u>	<u>Main PLC</u> <u>local address</u>	<u>Main PLC</u> <u>Address for</u> <u>MSG instruction</u>	<u>Locar PLC</u> <u>Address for</u> <u>MSG instruction</u>	<u>Locar PLC</u>	<u>Upcar PLC</u>	<u>Ucar PLC</u> <u>local</u> <u>address</u>
				<u>Addr. For</u> <u>Modem</u> <u>xfer</u>	<u>Addr. For</u> <u>Modem</u> <u>xfer</u>	
Pass # to Upcar from Main	N37:30	N137:1	N107:1	O:3.6	I:3.6	N37:40
Load Kiln # to Upcar from Main	N37:48	N137:2	N107:2	O:3.7	I:3.7	N37:48
Unload Kiln # to Upcar from Main	N37:49	N137:3	N107:3	O:3.8	I:3.8	N37:49
OK to GO signal	value of '2' or '0'	N137:4	N107:4	O:3.5	I:3.5	'2' or '0' value
Not Used		N137:5	N107:5	-	-	-
Not Used		N137:6	N107:6	-	-	-
Not Used		N137:7	N107:7	-	-	-
Not Used		N137:8	N107:8	-	-	-
Not Used		N137:9	N107:9	-	-	-
OK to enter Stacker signal	value of '1' or '0'	N137:10	N107:10	O:3.9	I:3.9	'1' or '0' value
OK to enter Unstacker signal	value of '1' or '0'	N137:11	N107:11	O:3.11	I:3.11	'1' or '0' value
OK to raise Forks in the Stacker signal	value of '1' or '0'	N137:12	N107:12	O:3.10	I:3.10	'1' or '0' value
Request Gate Access from Main	value of '1' or '0'	N137:13	N107:13	'1' or '0' value	-	-
Perimeter Gate Closed from Main	value of '1' or '0'	N137:14	N107:14	'1' or '0' value	-	-

Main PLC w/ MSG Write Instruction to Cars (Lad 3 - rung 11)

Size in Elements **1**
 Main PLC channel **1**
 Locar Local Node Address **16**
 Message Timeout **7**

<u>Description</u>	<u>Main PLC</u> <u>local address</u>	<u>Main PLC</u> <u>Address for</u> <u>MSG instruction</u>	<u>Locar PLC</u> <u>Address for</u> <u>MSG instruction</u>	<u>Locar PLC</u>	<u>Upcar PLC</u>	<u>Ucar PLC</u> <u>local</u> <u>address</u>
				<u>Addr. For</u> <u>Modem</u> <u>xfer</u>	<u>Addr. For</u> <u>Modem</u> <u>xfer</u>	
OK to GO signal (B43/36 - ON)	value of '2' or '0'	N137:4	N107:4	O:3.5	I:3.5	'2' or '0' value

Main PLC w/ MSG Read Instruction from Cars (Lad 3 - rung 2)

Size in Elements **32**
 Main PLC channel **1**
 Locar Local Node Address **16**
 Message Timeout **5**

<u>Description</u>	<u>Ucar PLC</u> <u>local address</u>	<u>Ucar PLC</u>	<u>Locar PLC</u>	<u>Locar PLC</u> <u>local address</u>	<u>Locar PLC</u>	<u>Main PLC</u>
		<u>Addr. For</u> <u>Modem xfer</u>	<u>Addr. For</u> <u>Modem xfer</u>		<u>Address for MSG inst.</u>	<u>Address for MSG inst.</u>
Ucar Actual Position	N57:79	O: 3.7	I: 3.7	--->	B103:1	B200:1
Ucar Target Position	N57:80	O: 3.8	I: 3.8	--->	B103:2	B200:2
Ucar Creep Countd	N57:96	O: 3.9	I: 3.9	--->	B103:3	B200:3
Ucar Remaining Counts	N57:81	O: 3.10	I: 3.10	--->	B103:4	B200:4
Ucar Target VFD Spped	N7:41	O: 3.12	I: 3.12	--->	B103:5	B200:5
Ucar Actual VFD Spped	N7:39	O: 3.13	I: 3.13	--->	B103:6	B200:6
Ucar Alarm Word # 0	B11:1	O: 3.17	I: 3.17	--->	B103:7	B200:7
Ucar Alarm Word # 1	B11:2	O: 3.18	I: 3.18	--->	B103:8	B200:8
Locar Actual Position	N57:179	O: 3.22	I: 3.22	--->	B103:9	B200:9
Locar Target Position	N57:180	O: 3.23	I: 3.23	--->	B103:10	B200:10
Locar Creep Count	-	-	-	N19:45	B103:11	B200:11
Locar Remaining Count	-	-	-	N19:43	B103:12	B200:12
Locar Target VFD speed	-	-	-	N7:41 or N7:42	B103:13	B200:13
Locar Actual VFD speed	-	-	-	N7:39	B103:14	B200:14
Locar Alarm Word # 0	-	-	-	B63:0	B103:15	B200:15
Locar Alarm Word # 1	-	-	-	B63:1	B103:16	B200:16
Not Used	-	-	-	-	B103:17	B200:17
Not Used	-	-	-	-	B103:18	B200:18
Pass Completed Signal to Main				value of "1" or "0"	B103:19	B200:19
Ucar Input Module slot # 1	I:1.0/0 - I:1.0/15	O: 3.2	I: 3.2	--->	B103:20	B200:20
Ucar Input Module slot # 2	I:2.0/0 - I:2.0/15	O: 3.3	I: 3.3	--->	B103:21	B200:21
Ucar Input Module slot # 3	I:3.0/0 - I:3.0/15	O: 3.4	I: 3.4	--->	B103:22	B200:22
Ucar Output Module slot # 4	O:4.0/0 - O:4.0/15	O: 3.5	I: 3.5	--->	B103:23	B200:23
Locar Input Module slot # 2	-	-	-	I:2.0/0 - I:2.0/15	B103:24	B200:24
Locar Output Module slot # 3	-	-	-	O:3.0/0 - O:3.0/15	B103:25	B200:25
Ucar Sequencer	B10:1	O: 3.20	I: 3.20	--->	B103:26	B200:26
Locar Sequencer	B10:3	O: 3.21	I: 3.21	--->	B103:27	B200:27
Not Used	-	-	-	-	B103:28	B200:28

Main PLC w/ MSG Read Instruction from Cars (Lad 3 - rung 3)

Size in Elements 1
 Main PLC channel 1
 Locar Local Node
 Address 16
 Message Timeout 5

<u>Description</u>	<u>Ucar PLC</u>	<u>Ucar PLC</u>	<u>Locar PLC</u>	<u>Locar PLC</u>	<u>Locar PLC</u>	<u>Main PLC</u>
-	<u>local address</u>	<u>Addr. For</u>	<u>Addr. For</u>	<u>local</u>	<u>Address for</u>	<u>Address for</u>
-		<u>Modem</u>	<u>Modem</u>	<u>address</u>	<u>MSG inst.</u>	<u>MSG inst.</u>
		<u>xfer</u>	<u>xfer</u>			
Ucar / Locar Comm. Sequencer	B60:6	O: 3.19	I: 3.19	--->>	B10:1	B200:0

Main PLC w/ MSG Read Instruction from Cars (Lad 3 - rung 5)

Size in Elements 3
 Main PLC channel 1
 Locar Local Node
 Address 16
 Message Timeout 7

<u>Description</u>	<u>Ucar PLC</u>	<u>Ucar PLC</u>	<u>Locar PLC</u>	<u>Locar PLC</u>	<u>Locar PLC</u>	<u>Main PLC</u>
-	<u>local address</u>	<u>Addr. For</u>	<u>Addr. For</u>	<u>local</u>	<u>Address for</u>	<u>Address for</u>
-		<u>Modem</u>	<u>Modem</u>	<u>address</u>	<u>MSG</u>	<u>MSG</u>
		<u>xfer</u>	<u>xfer</u>		<u>instruction</u>	<u>instruction</u>
for Confirm - Pass # from Car to Main	N19:46??	I: 3.6	O: 3.6	<<----	N107:1	B25:0
for Confirm - Load Kiln # from Car to Main	N19:18??	I: 3.7	O: 3.7	<<----	N107:2	B25:1
for Confirm - Unload Kiln # from Car to Main	N19:19??	I: 3.8	O: 3.8	<<----	N107:3	B25:2

Communication via Modem - Locar ---->>
Upcar

Locar PLC Address	Locar Buffer PLC Address <u>for Modem xfer</u>	Description	Upcar Buffer PLC Address <u>for Modem xfer</u>	Upcar PLC Address
I:1.0	O:3.0	Processor System Clock	I:3.0	
S:1	O:3.1	PLC'S No Fault/Run Mode	I:3.1	
-	O:3.2	Not Used	I:3.2	
-	O:3.3	Not Used	I:3.3	
-	O:3.4	Not Used	I:3.4	
Send value of '2' or '0'	O:3.5	OK TO GO FROM LOCAR	I:3.5	
N107:1	O:3.6	Pass #	I:3.6	N19:46
N107:2	O:3.7	Load Kiln #	I:3.7	N19:18
N107:3	O:3.8	UnLoad Kiln #	I:3.8	N19:19
N107:10 = 1, send value = '1' or, N107:10 = 0, send value = '0'	O:3.9	OK to enter Stacker Signal	I:3.9	
N107:12 = 1, send value = '1' or, N107:12 = 0, send value = '0'	O:3.10	Ok to Raise Forks Signal	I:3.10	
N107:11 = 1, send value = '1' or, N107:11 = 0, send value = '0'	O:3.11	OK to enter UnStacker	I:3.11	CONTR OL
N107:12 BIT CONTROL FOR UPCAR	O:3.12	UPCAR CONTROL	I:3.12	I:3.12/0
-	O:3.13	Not Used	I:3.13	I:3.12/1
-	O:3.14	Not Used	I:3.14	I:3.12/2
-	O:3.15	Not Used	I:3.15	I:3.12/3
-	O:3.16	Not Used	I:3.16	I:3.12/4
-	O:3.17	Not Used	I:3.17	I:3.12/5
-	O:3.18	Not Used	I:3.18	I:3.12/6
-	O:3.19	Not Used	I:3.19	I:3.12/7
-	O:3.20	Pass # SETUP	I:3.20	I:3.12/8
-	O:3.21	Pass Position Data	I:3.21	I:3.12/9
-	O:3.22	Pass Creep Data	I:3.22	I:3.12/10
-	O:3.23		I:3.23	I:3.12/11
-	O:3.24		I:3.24	I:3.12/12
-	O:3.25		I:3.25	I:3.12/13
-	O:3.26		I:3.26	I:3.12/14
-	O:3.27		I:3.27	I:3.12/15
-	O:3.28	Not Used	I:3.28	
-	O:3.29	Not Used	I:3.29	
-	O:3.30	Not Used	I:3.30	
-	O:3.31	Not Used	I:3.31	

ENABLE SELF CAL
FIRST PASS LOC.
LAST PASS LOC.
PROCESSED
AUTO OVER RIDE
SHORT CYL DOWN
UPCAR REVERSE
UPCAR FORWARD
SHORT CYL UP
PUMP START
PUMP STOP
LONG CYL UP
LONG CYL DOWN
CAL ODD
KILNS
CAL EVEN
KILNS
CAL NORMAL

Communication via Modem - Upcar ----> Locar

Upcar PLC Address	Upcar Buffer PLC Address <u>for Modem xfer</u>	Description	Locar Buffer PLC Address <u>for Modem xfer</u>	Locar PLC Address
S:4	O:3.0	Processor System Clock	I:3.0	O:6.0
S:1	O:3.1	PLC'S No Fault/Run Mode	I:3.1	N7:11
I:1.0/0 - I:1.0/15	O:3.2	Upcar Input Module slot # 1	I:3.2	B103:20
I:2.0/0 - I:2.0/15	O:3.3	Upcar Input Module slot # 2	I:3.3	B103:21
I:3.0/0 - I:3.0/15	O:3.4	Upcar Input Module slot # 3	I:3.4	B103:22
O:4.0/0 - O:4.0/15	O:3.5	Upcar Output Module slot # 4	I:3.5	B103:23
N7:20	O:3.6	Laser Signal (mA)	I:3.6	Not Used
N57:179	O:3.7	Upcar Actual Position (Count)	I:3.7	B103:1
N57:80	O:3.8	Upcar Target Position (Count)	I:3.8	B103:2
N57:96	O:3.9	Upcar Creep Count	I:3.9	B103:3
N57:81	O:3.10	Upcar Remaining Count	I:3.10	B103:4
N7:45	O:3.11	Upcar VFD Output (mA)	I:3.11	Not Used
N7:41	O:3.12	Target VFD Speed (Hz)	I:3.12	B103:5
N7:39	O:3.13	Actual VFD Speed (Hz)	I:3.13	B103:6
B3/65 - Send fork up, value = '4' B3/67 - Send fork down, value = '7'	O:3.14	Upcar Location - Verify for Forks position	I:3.14	Not Used
N37:40	O:3.15	Pass Number Verify	I:3.15	Not Used
B10/8 - Unstkr to Stkr or, B60/109 - Travel to Stacker, send value = '2'	O:3.16	Cycle Complete	I:3.16	To Main - B103:19
B11:1 - see 'upcar alarm' worksheet	O:3.17	Upcar Alarm Word # 0	I:3.17	B103:7
B11:2 - see 'upcar alarm' worksheet	O:3.18	Upcar Alarm Word # 1	I:3.18	B103:8
B60:6 - see 'Upcar Sequencer desc.' worksheet	O:3.19	Upcar / Locar Communication Sequence Drum Word	I:3.19	B10:1
B10:1 - see 'Upcar Sequencer desc.' worksheet	O:3.20	Upcar Sequence Drum Word	I:3.20	
B10:3 - see 'Upcar Sequencer desc.' worksheet	O:3.21	Locar Sequence Drum Word	I:3.21	

Upcar Alarm Word # 0 - B11:1

Main PLC
Address

B200:7/0	B11:1/0	B11/16	Upcar over travel alarm
B200:7/1	B11:1/1	B11/17	Upcar Interlock alarm
B200:7/2	B11:1/2	B11/18	Unused
B200:7/3	B11:1/3	B11/19	Unused
B200:7/4	B11:1/4	B11/20	Unused
B200:7/5	B11:1/5	B11/21	Unused
B200:7/6	B11:1/6	B11/22	Unused
B200:7/7	B11:1/7	B11/23	Unused
B200:7/8	B11:1/8	B11/24	Unused
B200:7/9	B11:1/9	B11/25	Unused
B200:7/10	B11:1/10	B11/26	Unused
B200:7/11	B11:1/11	B11/27	Unused
B200:7/12	B11:1/12	B11/28	Unused
B200:7/13	B11:1/13	B11/29	Unused
B200:7/14	B11:1/14	B11/30	Encoder failure alarm
B200:7/15	B11:1/15	B11/31	Upcar not on Locar alarm

Upcar Alarm Word # 1 - B11:2

B200:8/0	B11:2/0	B11/32	Forks not up alarm
B200:8/1	B11:2/1	B11/33	Forks not down alarm
B200:8/2	B11:2/2	B11/34	Kiln Door not open alarm
B200:8/3	B11:2/3	B11/35	Pallet safety alarm
B200:8/4	B11:2/4	B11/36	Upcar hydraulic pump not on alarm
B200:8/5	B11:2/5	B11/37	Upcar drive contactor not enable alarm
B200:8/6	B11:2/6	B11/38	Locar drive contactor not enable alarm
B200:8/7	B11:2/7	B11/39	Upcar cable reel motion sensor 'ON' timer alarm
B200:8/8	B11:2/8	B11/40	Upcar cable reel motion sensor 'OFF' timer alarm
B200:8/9	B11:2/9	B11/41	Locar count # that car is going to is less than 1
B200:8/10	B11:2/10	B11/42	Laser alarm timer enable
B200:8/11	B11:2/11	B11/43	Upcar not moving alarm
B200:8/12	B11:2/12	B11/44	Laser sensor loss of signal alarm
B200:8/13	B11:2/13	B11/45	Laser sensor over travel alarm
B200:8/14	B11:2/14	B11/46	Unused
B200:8/15	B11:2/15	B11/47	Unused

Main PLC Address	Upcar / Locar Sequencer - UPCAR PLC		
B15/320	B60:6/0	B60/96	Unused
B15/321	B60:6/1	B60/97	Unused
B15/322	B60:6/2	B60/98	Unused
B15/323	B60:6/3	B60/99	Unused
B15/324	B60:6/4	B60/100	Unused
B15/325	B60:6/5	B60/101	Check Interlocks
B15/326	B60:6/6	B60/102	At Stacker
B15/327	B60:6/7	B60/103	Travel to Load Kiln
B15/328	B60:6/8	B60/104	At Load Kiln
B15/329	B60:6/9	B60/105	Travel to Unload Kiln
B15/330	B60:6/10	B60/106	At Unload Kiln
B15/331	B60:6/11	B60/107	Travel to Unstacker
B15/332	B60:6/12	B60/108	At Unstacker
B15/333	B60:6/13	B60/109	Travel to Stacker
B15/334	B60:6/14	B60/110	Bypass # 1 to Unstacker
B15/335	B60:6/15	B60/111	Bypass # 1 At Unstacker
B15/336	B60:7/0	B60/112	Bypass Load Kiln to Stacker
B15/337	B60:7/1	B60/113	Unused
B15/338	B60:7/2	B60/114	Unused
B15/339	B60:7/3	B60/115	Unused
B15/340	B60:7/4	B60/116	Unused
B15/341	B60:7/5	B60/117	Unused
B15/342	B60:7/6	B60/118	Unused
B15/343	B60:7/7	B60/119	Unused
B15/344	B60:7/8	B60/120	Unused
B15/345	B60:7/9	B60/121	Unused
B15/346	B60:7/10	B60/122	Unused
B15/347	B60:7/11	B60/123	Unused
B15/348	B60:7/12	B60/124	Unused
B15/349	B60:7/13	B60/125	Unused
B15/350	B60:7/14	B60/126	Unused
B15/351	B60:7/15	B60/127	Unused

Main PLC Address	<u>Upcar Sequencer - UPCAR PLC</u>		
B200:26/0	B10:1/0	B10/16	Unused
B200:26/1	B10:1/1	B10/17	Upcar on Locar - GO signal
B200:26/2	B10:1/2	B10/18	Check Interlocks
B200:26/3	B10:1/3	B10/19	Upcar Forward
B200:26/4	B10:1/4	B10/20	Upcar Stop Enable
B200:26/5	B10:1/5	B10/21	Raise / Lower Upcar Fork
B200:26/6	B10:1/6	B10/22	Upcar go in reverse direction
B200:26/7	B10:1/7	B10/23	Wait for Upcar on Locar
B200:26/8	B10:1/8	B10/24	Unused
B200:26/9	B10:1/9	B10/25	Unused
B200:26/10	B10:1/10	B10/26	Unused
B200:26/11	B10:1/11	B10/27	Unused
B200:26/12	B10:1/12	B10/28	Unused
B200:26/13	B10:1/13	B10/29	Unused
B200:26/14	B10:1/14	B10/30	Unused
B200:26/15	B10:1/15	B10/31	Unused
Main PLC Address	<u>Locar Sequencer - UPCAR PLC</u>		
B200:27/0	B10:3/0	B10/48	Unused
B200:27/1	B10:3/1	B10/49	Locar Check Interlocks
B200:27/2	B10:3/2	B10/50	Locar Drive Contactor Enable
B200:27/3	B10:3/3	B10/51	Unused
B200:27/4	B10:3/4	B10/52	Locar Choose direction
B200:27/5	B10:3/5	B10/53	Accelerate Locar
B200:27/6	B10:3/6	B10/54	Decel to creep speed
B200:27/7	B10:3/7	B10/55	Shut off Slow - Decel to Super Slow
B200:27/8	B10:3/8	B10/56	Shut off Super Slow - Decel to Stop
B200:27/9	B10:3/9	B10/57	Decel to Stop
B200:27/10	B10:3/10	B10/58	Unused
B200:27/11	B10:3/11	B10/59	Unused
B200:27/12	B10:3/12	B10/60	Unused
B200:27/13	B10:3/13	B10/61	Unused
B200:27/14	B10:3/14	B10/62	Unused
B200:27/15	B10:3/15	B10/63	Unused

1.3. Trouble Shooting TAR:

PROCEDURE FOR RESETTING & PUTTING THE TAR UPCAR IN AUTOMATIC:

Upcar lost power at Loader – going in to pick up the rack:

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar Pushbutton Station.
2. Pull on UPCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on Starter Panel.
3. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT DOWN position.
4. Check Locar Panelmate for Load Kiln #, Unload Kiln #, and Pass # on page 2.
5. Reset the Locar by pressing the RESET button on the Locar control panel.
6. Confirm the information:
 - Load Kiln #.
 - Unload Kiln #.
 - Pass #.
7. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
8. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
9. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.

Upcar lost power at Loader – going back to Locar with the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT DOWN position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.

5. Go to page 2 on the Locar Panelmate.

Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.

- Depress the touch panel membrane keypad that corresponds to the Locar Control Template.
This will bring up control labeled 'Advance to next position'.
- Depress the Advance to Next Position control keypad, this will step the Locar EDRUM and Auto Move to the 'LOAD KILN'.

6. The Locar should automatically undock and travel to the pre-defined Load Kiln.

PROCEDURE FOR RESETTING & PUTTING THE TAR UPCAR IN AUTOMATIC:

A. Upcar lost power at Load Kiln – going in to deliver the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT UP position.
2. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
3. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control panel.
4. Go to page 2 on the Locar Panelmate
 - Using the keypad to select 'UPCAR CONTROL'.
 - Verify correct pass #.
Press the 'ENTER LOAD KILN' Button.
Templates will disappear while sending command to UPCAR, when finished they will re-appear.
Using the keypad to select 'UPCAR GO COMMAND'
Press the 'EXECUTE CURRENT COMMAND' Button when ready to send UPCAR into kiln.
As soon as the Upcar receives the command, it will enter the Load Kiln to deliver the rack.
5. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. station before Upcar returns.

B. Upcar lost power at Load Kiln – going back to Locar without the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT DOWN position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
5. Go to page 2 on the Locar Panelmate.
 - Drum #1 template should display 'AT LOAD KILN'.
 - Depress the touch panel membrane keypad that says 'LOCAR CONTROL'.
This will bring up control labeled 'Advance to next Position'.
Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
 - Depress the Advance to next Position control keypad, this will step the Locar EDRUM until the template display 'LOAD KILN TO UNLOAD KILN'.
6. The Locar should automatically undock and travel to the pre-defined Unload Kiln.

C. Upcar lost power at Unload Kiln – going in to pick up the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT DOWN position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
5. Go to page 2 on the Locar Panelmate, Position template should display 'AT UNLOAD KILN'.
6. On the Locar Panelmate
 - Using the keypad to select 'UPCAR CONTROL'.
 - Verify correct pass #.
Press the 'ENTER UNLOAD KILN' Button.
Templates will disappear while sending command to UPCAR, when finished they will re-appear.
 - Using the keypad to select 'UPCAR GO COMMAND'
Press the 'EXECUTE CURRENT COMMAND' Button when ready to send UPCAR into kiln.
As soon as the Upcar receives the command, it will enter the UnLoad Kiln to pick-up the rack.

7. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station before Upcar returns to Locar.

D. Upcar lost power at Unload Kiln – going back to Locar with the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT UP position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
5. Go to page 2 on the Locar Panelmate.
 - Drum #1 template should display 'AT UNLOAD KILN'.
 - Depress the touch panel membrane keypad that corresponds to 'LOCAR CONTROL' template.
This will bring up control labeled 'ADVANCE TO NEXT POSITION'.
Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
 - Depress the ADVANCE TO NEXT POSITION control keypad, this will step the Locar EDRUM, the template display 'UNLOAD KILN TO UNLOADER'.
6. The Locar should automatically undock and travel to the Unloader.

E. Upcar lost power at Unloader – going in to deliver the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT UP position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
5. Go to page 2 on the Locar Panelmate, Position template should display 'AT UNLOADER'.
6. On the Locar Panelmate

- Using the keypad to select 'UPCAR CONTROL'.
Press the 'ENTER UNLOADER' Button.
Templates will disappear while sending command to UPCAR, when finished they will re-appear.
Using the keypad to select 'UPCAR GO COMMAND'
Press the 'EXECUTE CURRENT COMMAND' Button when ready to send UPCAR into UnLoader.
As soon as the Upcar receives the command, it will enter the UnLoader to deliver the rack.

7. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station before Upcar returns to Locar.

F. Upcar lost power at Unloader – going back to Locar without the rack:

NOTE: DO NOT RESET LOCAR

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar P.B. Station.
Pull on UPCAR POWER button on the Locar P.B. Station and PUSH E-STOP ENABLE on Starter Panel.
2. Manually bring the Upcar back to the Locar.
Make sure the Upcar Forks are in the LONG UP/ SHORT DOWN position.
3. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
4. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
5. Go to page 2 on the Locar Panelmate.
 - Drum #1 template should display 'AT UNLOADER'.
 - Depress the touch panel membrane keypad that corresponds to the 'LOCAR CONTROL' template.
This will bring up control labeled 'ADVANCE TO NEXT POSITION'.
Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
 - Depress the ADVANCE TO NEXT POSITION control keypad, this will step the Locar EDRUM until the template display 'UNLOADER TO LOADER'.
6. The Locar should automatically undock and travel to the Loader.

PROCEDURE FOR RESETTING & PUTTING THE TAR LOCAR IN AUTOMATIC:

A. Locar lost power-Loader to Load Kiln:

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar Pushbutton Station. Pull on LOCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on P.B. Station.
2. Pull on UPCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on Starter Panel.
3. Manually move the Locar to the closest location, Loader or the selected Load Kiln. Engage Docking, turn pump off.
4. Check Locar Panelmate for Load Kiln #, Unload Kiln #, and Pass # on page 2.
5. Reset the Locar by pressing the RESET button on the Locar P.B. station.
6. Confirm the information:
 - Load Kiln #.
 - Unload Kiln #.
 - Pass #.
10. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
11. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
12. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
13. Panel Mate page #2, Press 'ON TRACK/LOCAR LOCATION'.
14. Choose position that you are docked at, Loader or Load Kiln.
15. When the Locar Auto light goes solid, **if the cars are at the Loader**, Press the LOCAR CONTROL keypad and select 'ADVANCE TO NEXT POSITION'.
16. **If the cars are at the LOAD KILN**, Press the 'AT LOAD KILN' then 'UPCAR CONTROL' template then 'ENTER LOAD KILN'. After the pass information has been passed from the Locar to Upcar, press the 'UPCAR GO COMMAND' template, then press 'EXECUTE COMMAND' to send Upcar into the kiln.

B. Locar lost power-Load Kiln to UnLoad Kiln:

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar Pushbutton Station. Pull on LOCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on P.B. Station.
2. Pull on UPCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on Starter Panel.
3. Manually move the Locar to the closest location, Load Kiln or the selected UnLoad Kiln. Engage Docking, turn pump off.
4. Check Locar Panelmate for Load Kiln #, Unload Kiln #, and Pass # on page 2.
5. Reset the Locar by pressing the RESET button on the Locar P.B. station.
6. Confirm the information:

- Load Kiln #.
 - Unload Kiln #.
 - Pass #.
7. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
 8. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
 9. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
 10. Panel Mate page #2, Press 'ON TRACK/LOCAR LOCATION'.
 11. Choose position that you are docked at, Load Kiln or UnLoad Kiln.
 12. When the Locar Auto light goes solid, **if the cars are at the Load Kiln**, Press the LOCAR CONTROL keypad and select 'ADVANCE TO NEXT POSITION'.
 13. **If the cars are at the UnLoad Kiln**, Press the 'AT UNLOAD KILN' then 'UPCAR CONTROL' template then 'ENTER UNLOAD KILN'. After the pass information has been passed from the Locar to Upcar, press the 'UPCAR GO COMMAND' template, then press 'EXECUTE COMMAND' to send Upcar into the kiln.

C. Locar lost power-UnLoad Kiln to Unloader:

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar Pushbutton Station. Pull on LOCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on P.B. Station.
2. Pull on UPCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on Starter Panel.
3. Manually move the Locar to the closest location, UnLoad Kiln or the UnLoader. Engage Docking, turn pump off.
4. Check Locar Panelmate for Load Kiln #, Unload Kiln #, and Pass # on page 2.
5. Reset the Locar by pressing the RESET button on the Locar P.B. station.
6. Confirm the information:
 - Load Kiln #.
 - Unload Kiln #.
 - Pass #.
7. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
8. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
9. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.
10. Panel Mate page #2, Press 'ON TRACK/LOCAR LOCATION'.
11. Choose position that you are docked at, UnLoad Kiln or UnLoader.
12. When the Locar Auto light goes solid, **if the cars are at the UnLoad Kiln**, Press the LOCAR CONTROL keypad and select 'ADVANCE TO NEXT POSITION'.

13. **If the cars are at the UnLoader**, Press the 'AT UNLOADER' then 'UPCAR CONTROL' template then 'ENTER UNLOADER'. Press the 'UPCAR GO COMMAND' template, then press 'EXICUTE COMMAND' to send Upcar into the Unloader when clear.

D. Locar lost power-UnLoader to Loader:

1. Take Locar out of Auto by pushing in the AUTOMATIC button on the Locar Pushbutton Station. Pull on LOCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on P.B. Station.
2. Pull on UPCAR POWER button on the Locar Pushbutton Station and PUSH E-STOP ENABLE on Starter Panel.
3. Manually move the Locar to the Loader.
Engage Docking, turn pump off.
4. Check Locar Panelmate for Load Kiln #, Unload Kiln #, and Pass # on page 2.
5. Reset the Locar by pressing the RESET button on the Locar P.B. station.
6. Confirm the information:
 - Load Kiln #.
 - Unload Kiln #.
 - Pass #.
7. Reset the Upcar by pressing the RESET button on the Upcar Control Panel.
8. Put Upcar in Automatic by pulling on the AUTOMATIC button on the Upcar Control Panel.
9. Put Locar in Automatic by pulling on the AUTOMATIC button on the Locar P.B. Station.

1.4. Service/Help Screen in Epro:

The screenshot displays the Service/Help screen in the Epro software. The interface is organized as follows:

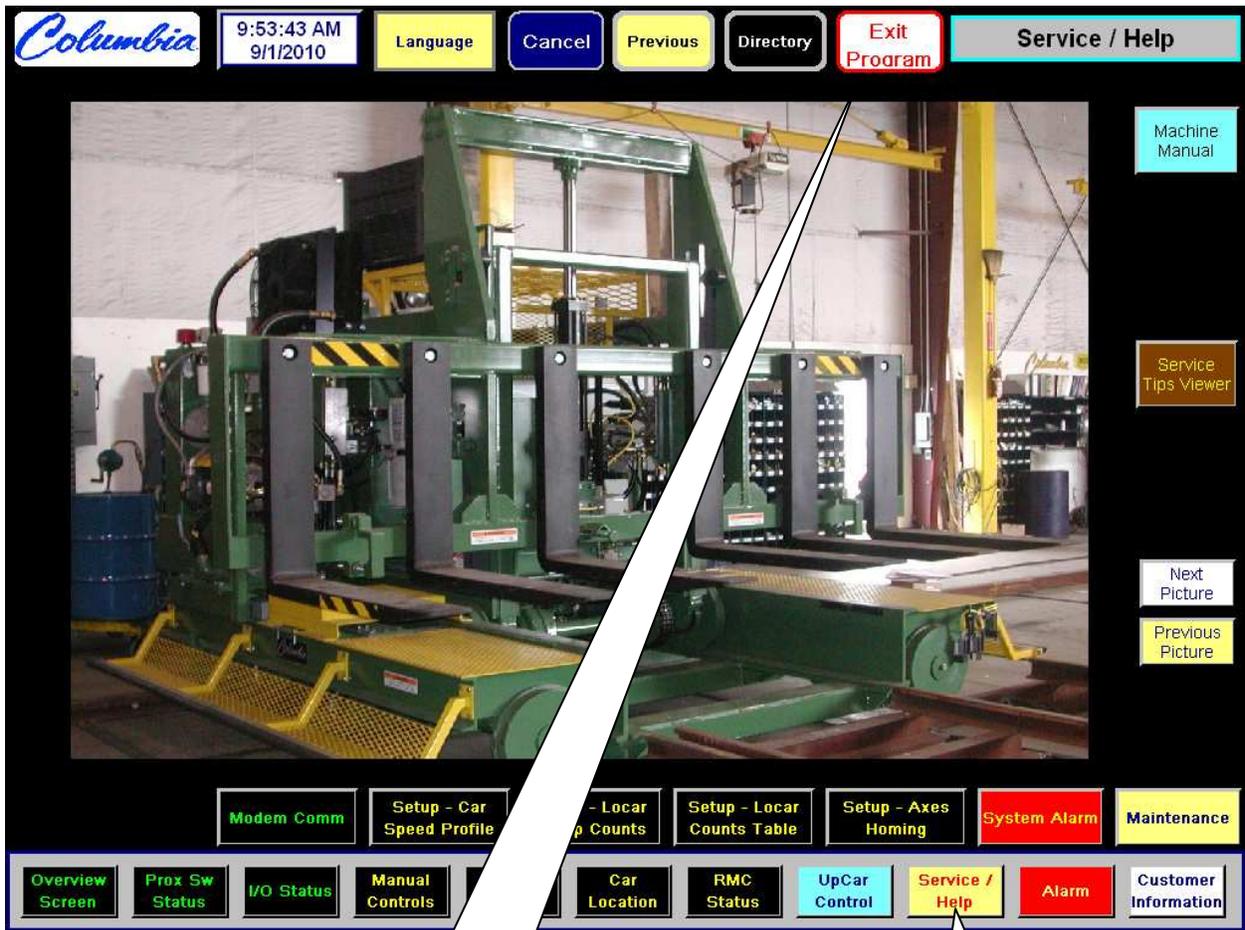
- Top Header:** Includes the 'Columbia' logo, a timestamp of 9:53:43 AM on 9/1/2010, and navigation buttons: Language, Cancel, Previous, Directory, and Exit Program.
- Central Area:** A large photograph of a green industrial machine.
- Right Sidebar:** Contains buttons for Machine Manual, Service Tips Viewer, Next Picture, and Previous Picture.
- Bottom Menu Bar:** A row of buttons including Modem Comm, Setup - Car Speed Profile, Setup - Locar Creep Counts, Setup - Locar Counts Table, Setup - Axes Homing, System Alarm, and Maintenance.
- Bottom Row:** A second row of buttons including Overview Screen, Prox Sw Status, I/O Status, Manual Controls, Loading Table, Car Location, RM Stat, UpCar Control, Service / Help, Alarm, and Customer Information.

Callout boxes provide the following descriptions:

- Setup - Car Speed Profile:** Set up car Speed Profile.
- Setup - Locar Creep Counts:** Set up Locar Creep Counts.
- Setup - Locar Counts Table:** Set up Locar Counts Table.
- Service / Help:** Access Service/Help Screen.

1.5. Shutting Down Epro

Go to the Service/Help Screen ;



2. Select "Exit Program" to Quit Epro.

1..Service/Help Screen

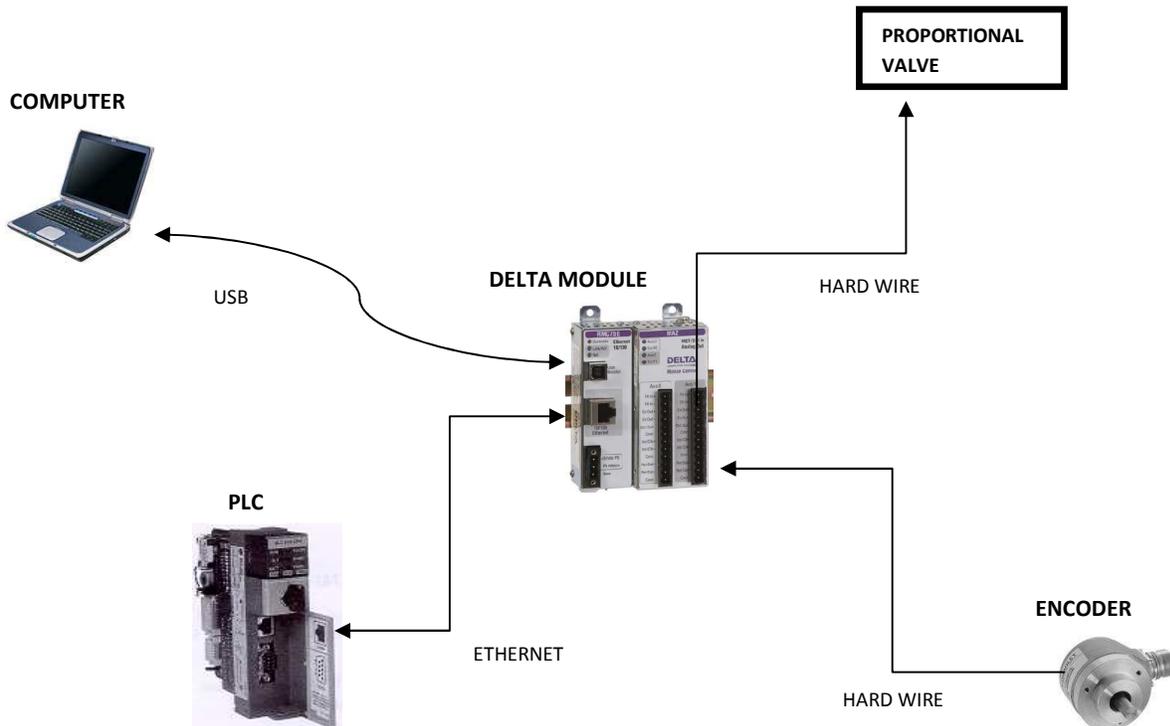
The screenshot displays the Columbia ePro Operator Interface Program. At the top left is the 'Columbia' logo. To its right is a status bar showing the time '9:59:09 AM' and date '9/1/2010'. A row of navigation buttons includes 'Language', 'Cancel', 'Previous', 'Directory', and 'Exit Program' (highlighted in red). On the far right is a 'Service / Help' button. The main area features a background image of industrial machinery with a central dialog box that reads 'Are You Sure?' and 'Select Yes To Exit To Window Desktop'. Below the dialog are 'Yes' and 'No' buttons. A white callout arrow points from the 'Yes' button to a text box at the bottom. On the right side, there are buttons for 'Machine Manual', 'Service Tips Viewer', 'Next Picture', and 'Previous Picture'. At the bottom, a row of function buttons includes 'Modem Comm', 'Car Profile', 'Setup - Locar Creep Counts', 'Setup - Locar Counts Table', 'Setup - Axes Homing', 'System Alarm', and 'Maintenance'. A second row of buttons includes 'Overview Screen', 'Prox Sw Status', 'I/O Status', 'Loading Table', 'Car Location', 'RMC Status', 'UpCar Control', 'Service / Help', 'Alarm', and 'Customer Information'.

Select "Yes" to End ePro Operator Interface Program.

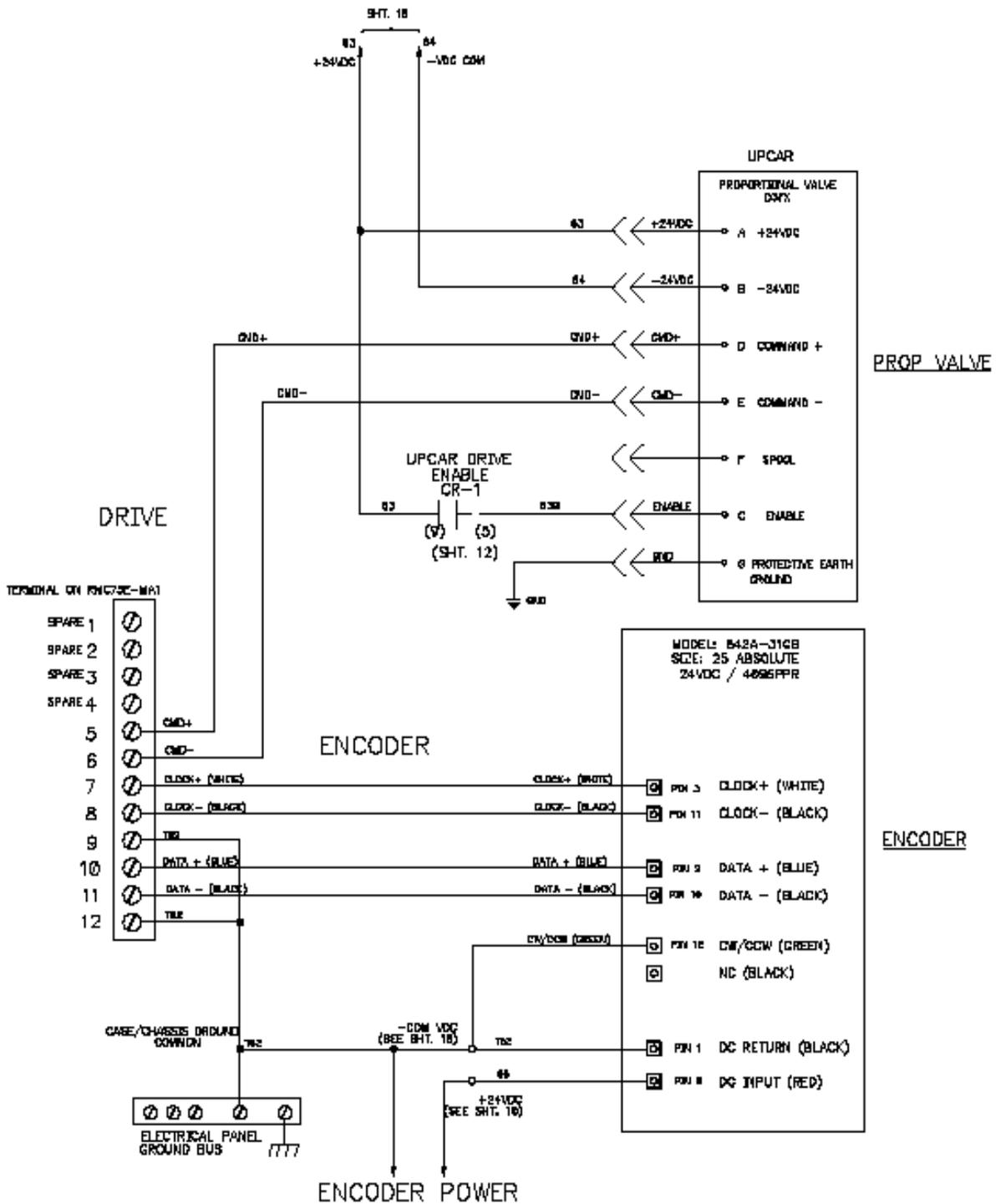
1.6. Delta/RMC Programming



The Allen-Bradley SLC 500 PLC program controls all car movement through the Delta Module. All functions are initiated in the PLC program and transferred to the Delta Module through the F registers. The communication between the PLC and the Delta Module is accomplished through an Ethernet connection. The actual RMC program needed to be downloaded to the Delta Module consist of simple axis 0 configuration and defining the IP address of the Delta Module. All programming of the Delta module is by the RMC Tools Software provided with the Delta Module. 



DELTA CONTROL MODULE



PLC And Delta Module Address Map:

Communication Between PLC And RMC

PLC Address	RMC Indirect Address	Description	Units of Measurement
F8.0	F18:0 (F8:0)	Axis0 Status Bits	
F8.1	F18:1 (F8:1)	Axis0 Error Bits	
F8.2	F18:2 (F8:8)	Axis0 Actual Position	pos-units
F8.3	F18:3 (F8:9)	Axis0 Actual Velocity	pos-units/sec
F8.4	F18:4 (F8:10)	Axis0 Actual Accel	pos-units/sec ²
F8.5	F18:5 (F8:11)	Axis0 Counts	counts
F8.6	F18:6 (F8:12)	Axis0 Raw Counts	raw counts
F8.7	F18:7 (F8:33)	Axis0 Control Output	Volts
F8.8	F18:8 (F12:1)	Axis0 Position Offset	pos-units
F8.9	F18:9		
F41.0	F18:10 (F16:0)	Axis0 Command Area-10 for Open loop	
F41.1	F18:11 (F16:1)	Axis0 Command Par. 1-Volts to Proportional Val	
F41.2	F18:12 (F16:2)	Axis0 Command Par. 2-Accel/Decel Open Loop	
F41.3	F18:13 (F16:3)	Axis0 Command Par. 3	
F41.4	F18:14 (F16:4)	Axis0 Command Par. 4	
F41.5	F18:15 (F16:5)	Axis0 Command Par. 5	
	F18:16		
	F18:17		
	F18:18		
	F18:19		
	F18:20 (F8:53)	Axis0 Target Position	pos-units
	F18:21 (F8:54)	Axis0 Target Velocity	pos-units/sec
	F18:22 (F8:55)	Axis0 Target Accel	pos-units/sec ²
	F18:23 (F8:56)	Axis0 Command Position	pos-units
	F18:24 (F8:57)	Axis0 Command Velocity	pos-units/sec
	F18:25		
	F18:26		

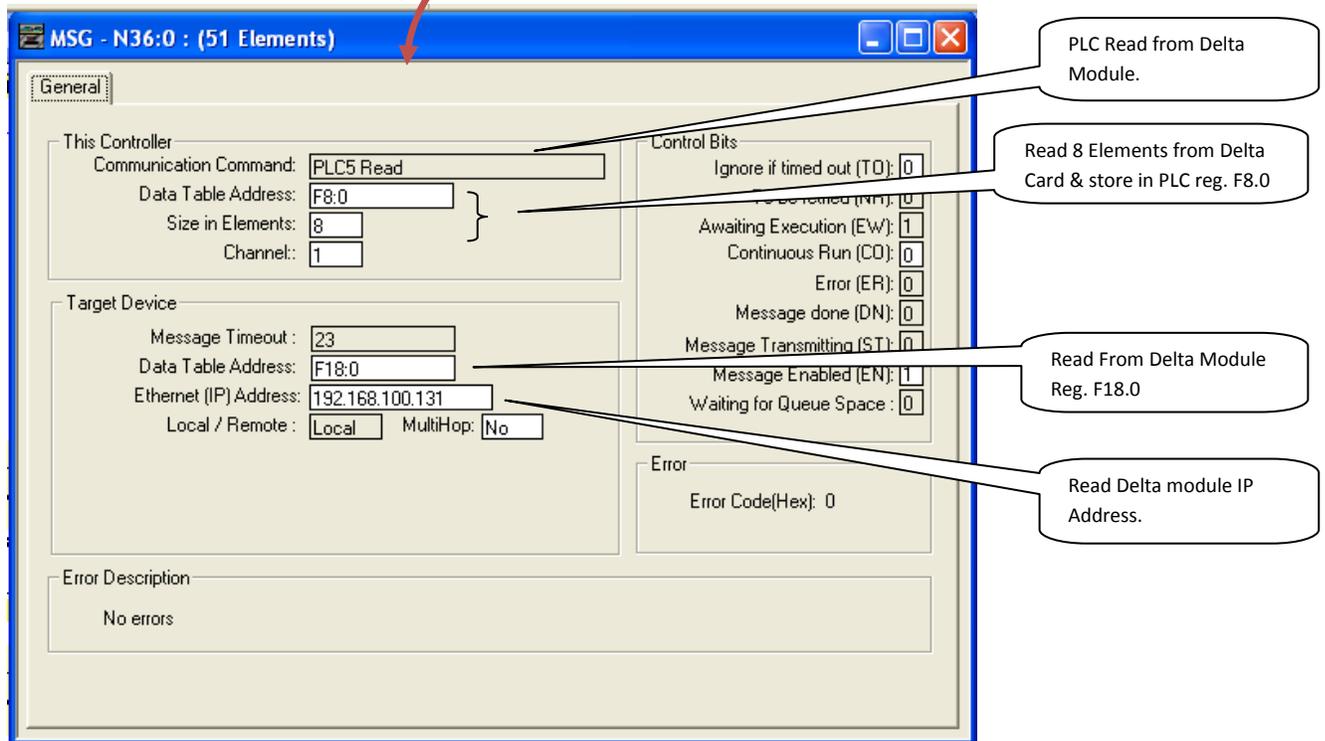
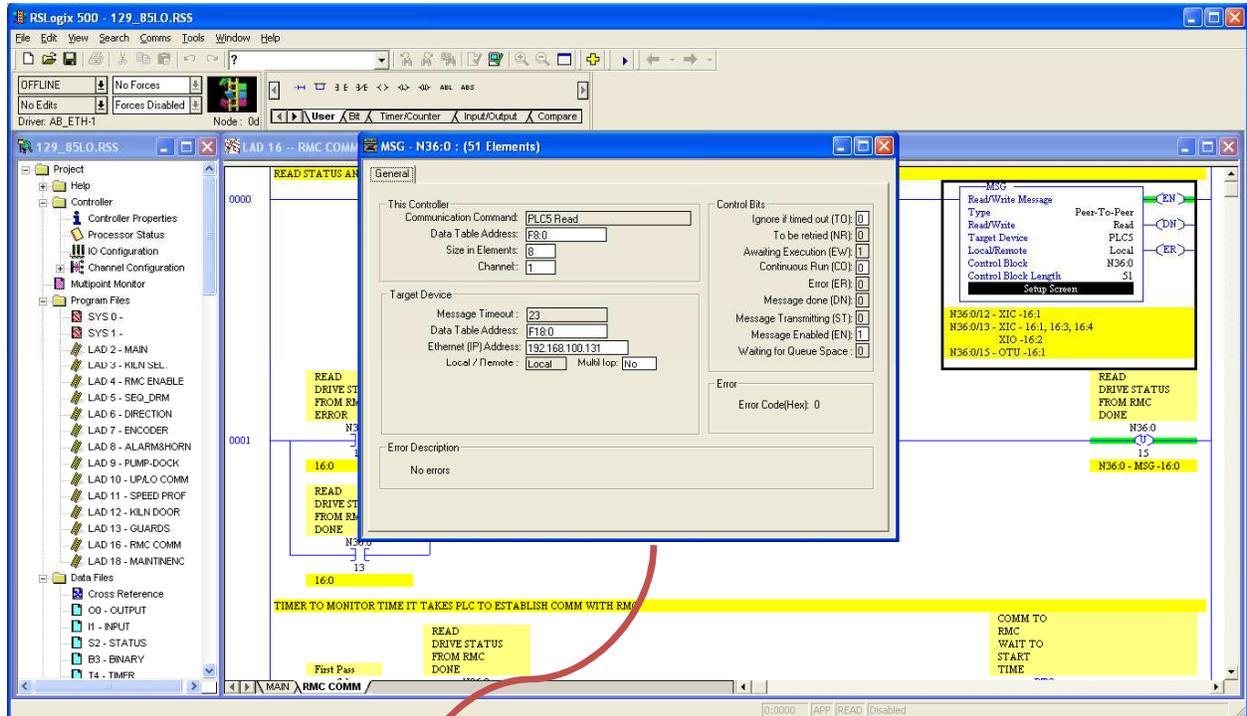
F41:0 Axis Command Area – Trac a Rac command = 10 for open loop. RMC card controls proportional valve by applying voltage.

F41:1 Axis Command Parameter #1 = applying voltage (velocity) to proportional valve

F41:2 Axis Command Parameter #2 = deceleration and Acceleration in open loop command as mention in F41:0

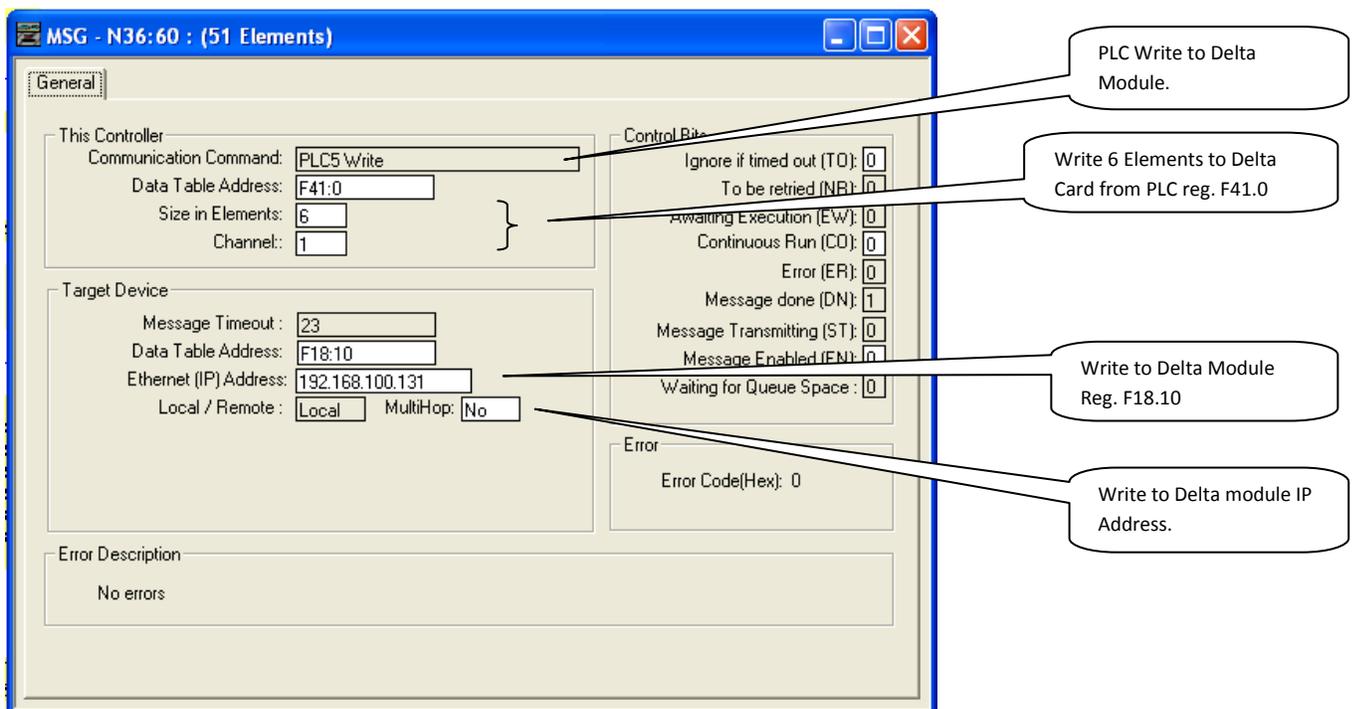
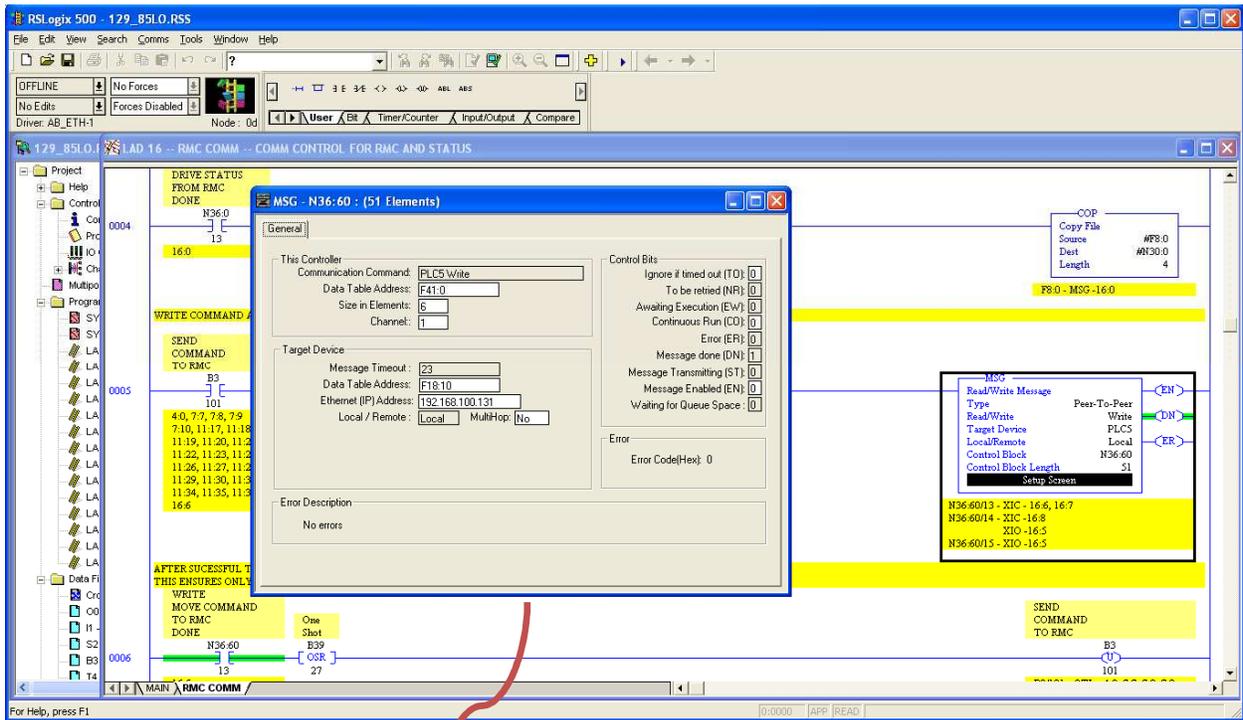
PLC Read from Delta Module:

- Plc program section showing message instruction to read from Delta card read registers and transfer data to PLC registers.



Plc Write to Delta Module:

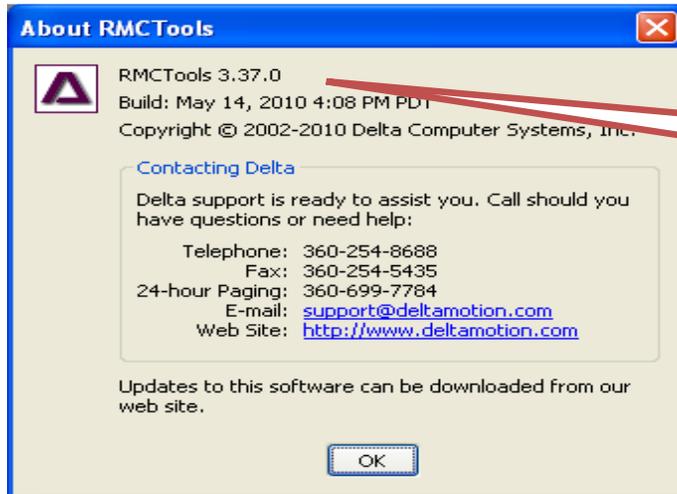
- Plc program section showing message instruction to write from PLC registers and transfer data to Delta module registers.



Program/Configure Delta Module with RMC Tools programming software:

The RMC Tools programming software is provided with the Delta module along with the purchase of the card.

RMC Tools Software Version:



RMCTOOLS
VERSION

5. Run Delta Module RMC Tools Software:

Axis Tools

Configure the Axis Parameter Section

Register	Reg #	Axis0
Command Position (pu)	F8:56	0.000
Target Position (pu)	F8:53	0.000
Actual Position (pu)	F8:8	0.000
Command Velocity (pu/s)	F8:57	0.000
Target Velocity (pu/s)	F8:54	0.000
Actual Velocity (pu/s)	F8:9	0.000
Control Output (V)	F8:33	0.000
Status Bits	F8:0	16#00000000
Error Bits	F8:1	16#00000000

Register	Reg #	Axis0
Feedback Type	F12:10/8	SSI
SSI Format	F12:10/9	Gray code
SSI Data Bits	F12:10/12-17	24
Absolute/Incremental	F12:10/18	Absolute
Linear/Rotary	F12:9/0	Linear
Position Scale (pu/C)	F12:0	0.00998
Position Offset (pu)	F12:1	0.0
Count Offset (C)	F12:11	0
Invert Output Polarity	F12:34/0	<input checked="" type="checkbox"/>
Positive Travel Limit (pu)	F12:92	500000.0
Negative Travel Limit (pu)	F12:93	-1000.0
In Position Tolerance (pu)	F12:56	0.5
Pos Error Tolerance (pu)	F12:57	100.0
At Vel Tolerance (pu/s)	F12:58	10.0
Vel Error Tolerance (pu/s)	F12:59	100.0

Cmd: No-op (0) Send

The following must be configured in the RMC program:

The screenshot shows the 'Axis Parameters' configuration window for 'Axis0'. The window is divided into sections: 'Tools And Wizards', 'Primary Control Setup', and 'Halts'. The 'Primary Control Setup' section contains a table of parameters. Callouts point to the following settings:

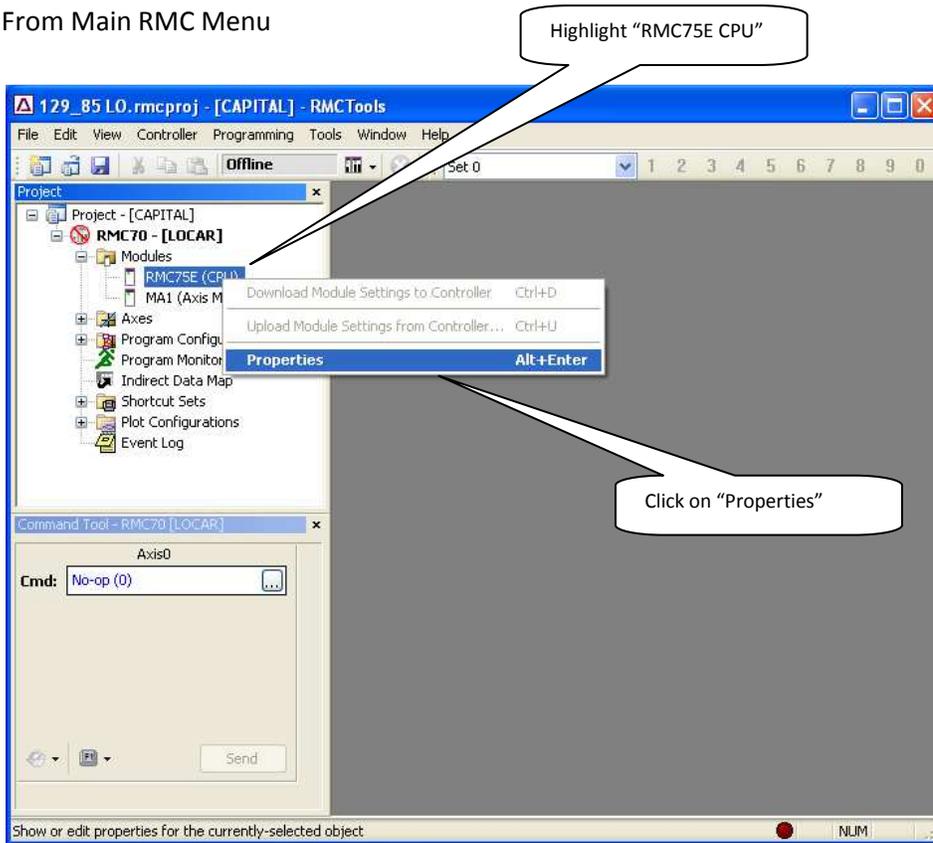
- Feedback Type: SSI
- SSI Format: Gray Code
- Absolute Encoder
- Linear

Register	Reg #	Axis0
Tools And Wizards		
Position Scale/Offset Wizard		Launch...
Primary Control Setup		
Feedback Type	F12:10/8	SSI
SSI Format	F12:10/9	Gray code
SSI Data Bits	F12:10/12-17	24
Absolute/Incremental	F12:10/18	Absolute <input checked="" type="checkbox"/>
Linear/Rotary	F12:9/0	Linear
Position Scale (pu/C)	F12:0	0.00998
Position Offset (pu)	F12:1	0.0
Count Offset (C)	F12:11	0
Invert Output Polarity	F12:34/0	<input checked="" type="checkbox"/>
Positive Travel Limit (pu)	F12:92	500000.0
Negative Travel Limit (pu)	F12:93	-1000.0
In Position Tolerance (pu)	F12:56	0.5
Pos Error Tolerance (pu)	F12:57	100.0
At Vel Tolerance (pu/s)	F12:58	10.0
Vel Error Tolerance (pu/s)	F12:59	100.0
Halts		

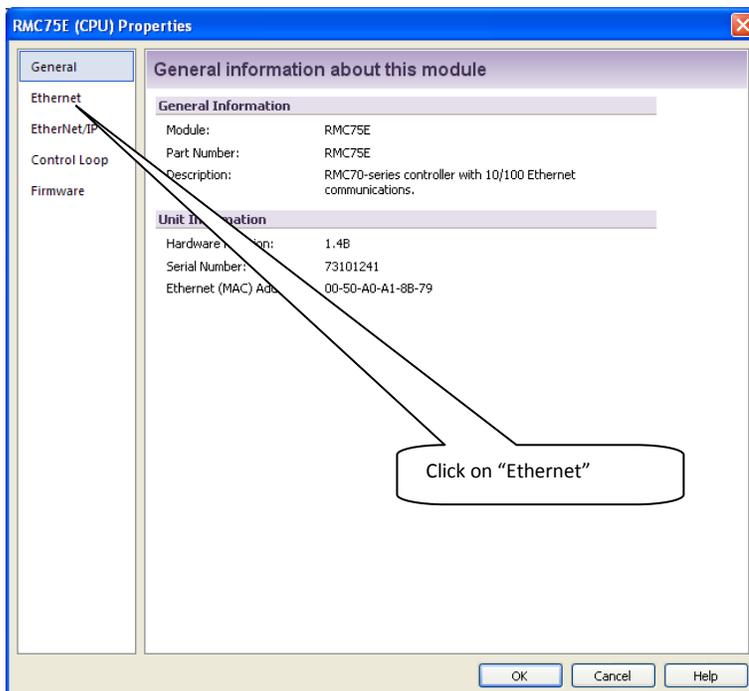
At the bottom of the window, there are tabs for 'Setup', 'Tune', and 'All'. The 'Setup' tab is currently selected.

Set IP Address of Delta Module For Communication to PLC:

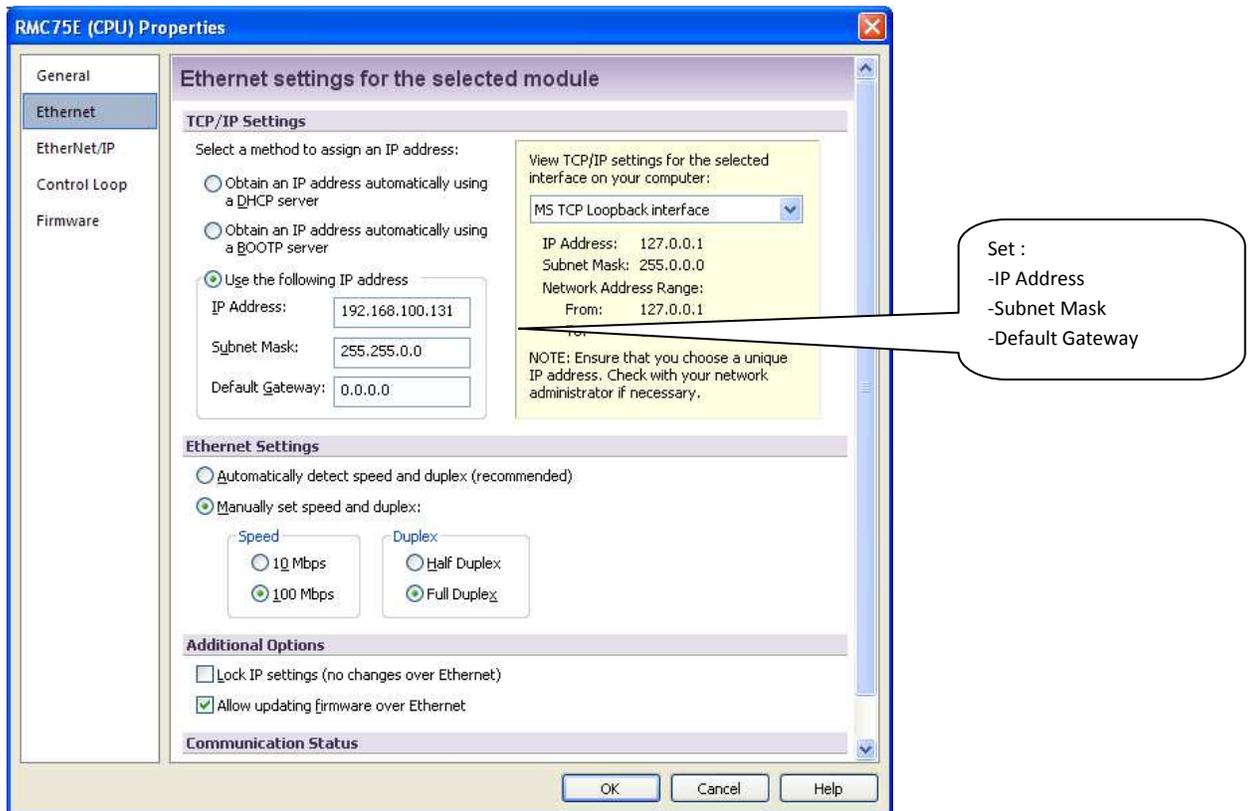
From Main RMC Menu



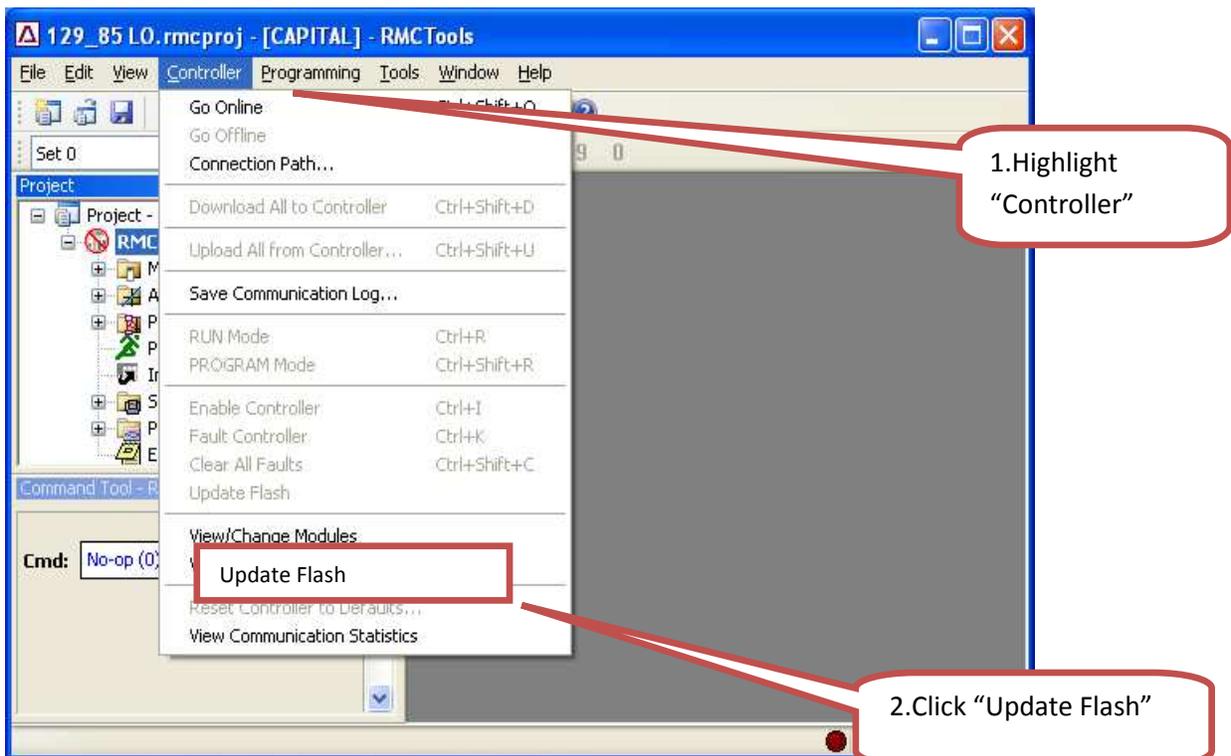
Next Screen:



Change Ethernet IP Address:



After changing IP address of Delta Module, Be sure to save the program to memory on the Delta Module. This is done by the following:

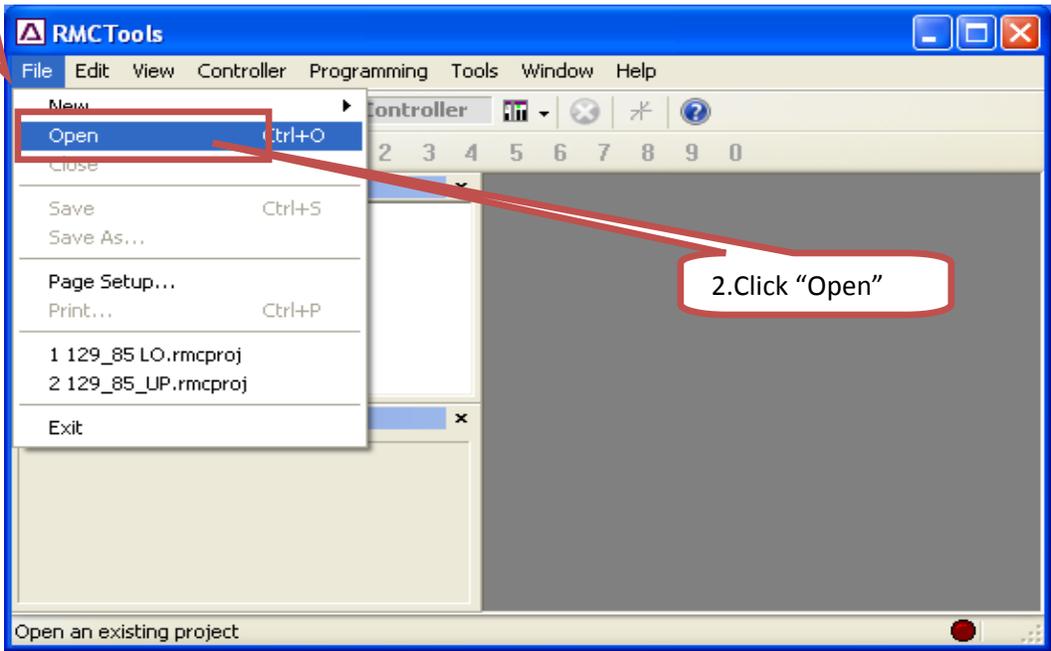


The following is the procedure to download the application program to the DELTA Module:

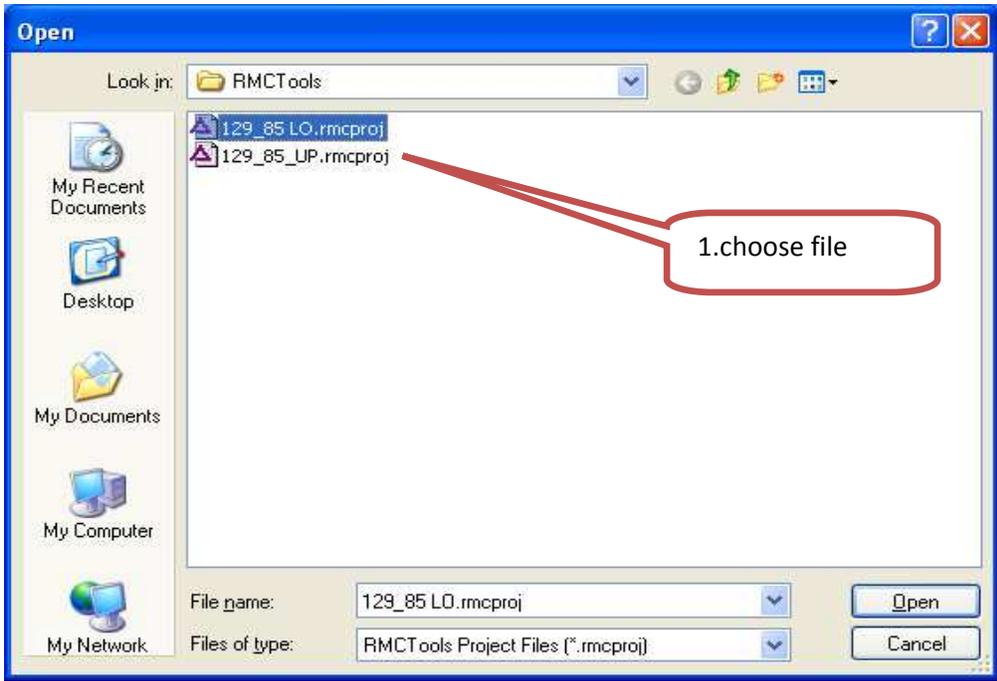
Start RMC Tools Software to Open and Download an application Program.

- From **START Menu**→**PROGRAMS** →**RMC TOOLS**.
- This starts the Delta Software. The window below will appear.

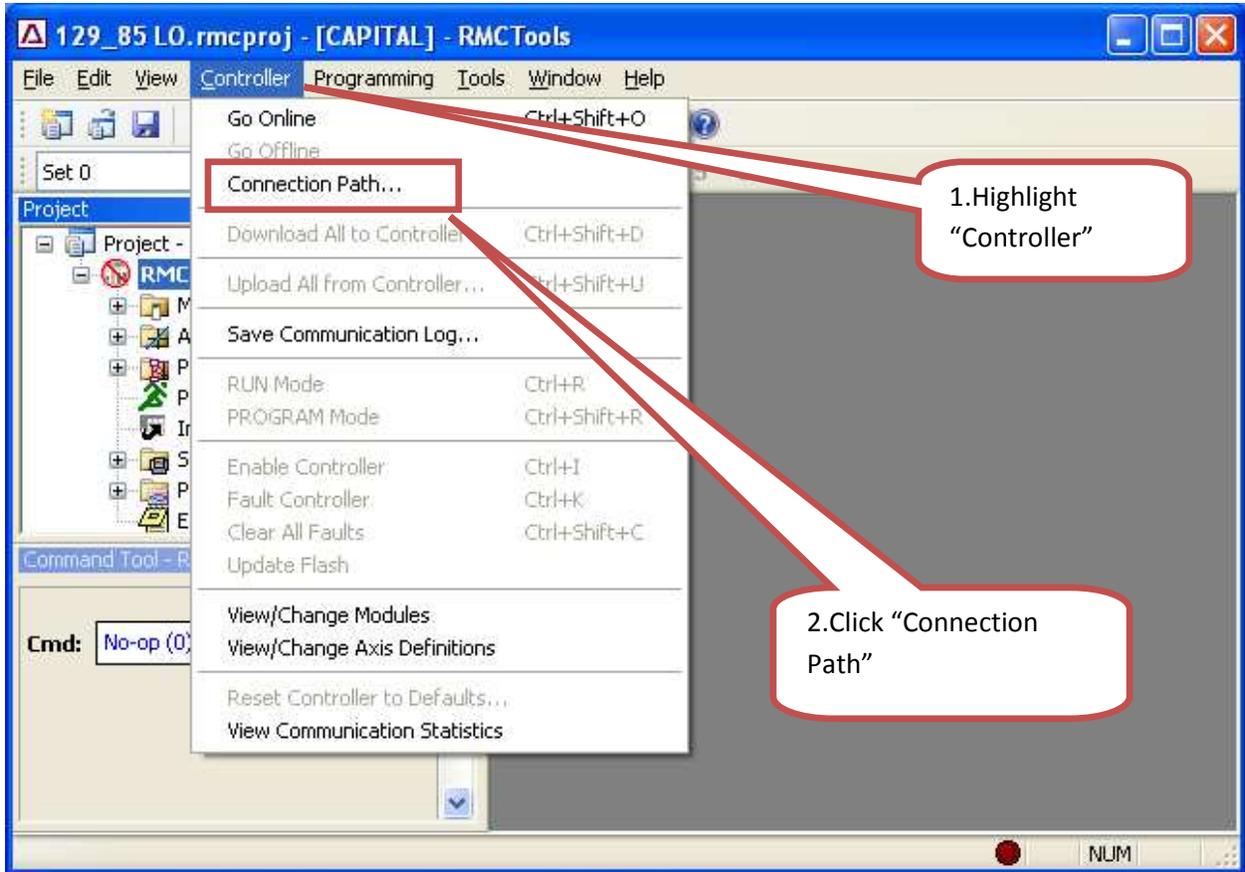
1.Highlight "file"



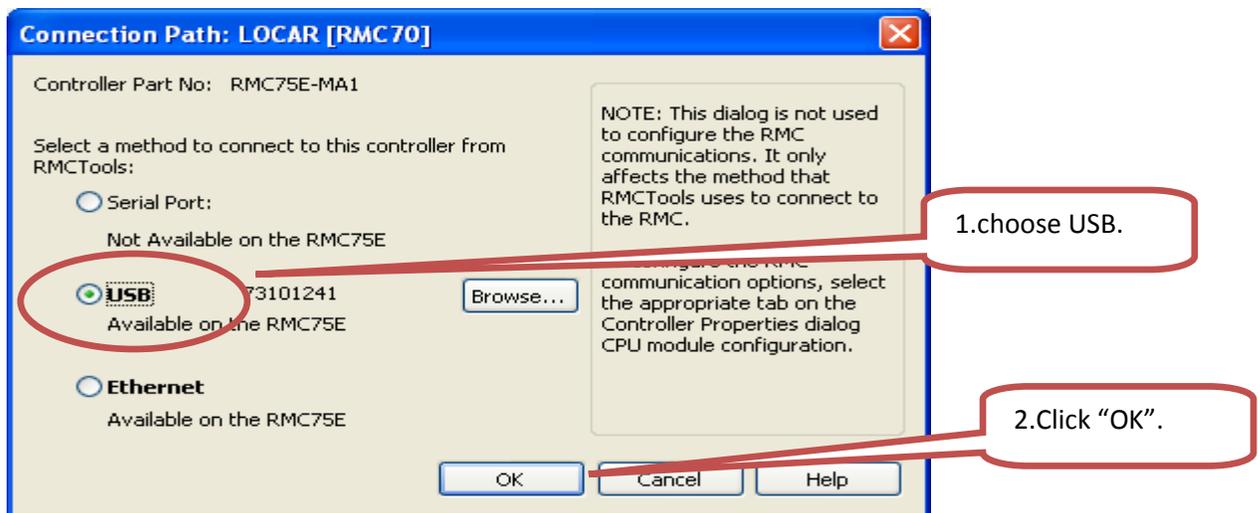
- Open UpCar or LoCar file. File is a .rmcproj file extension. Copy RMC projects to RMC Tools Directory.



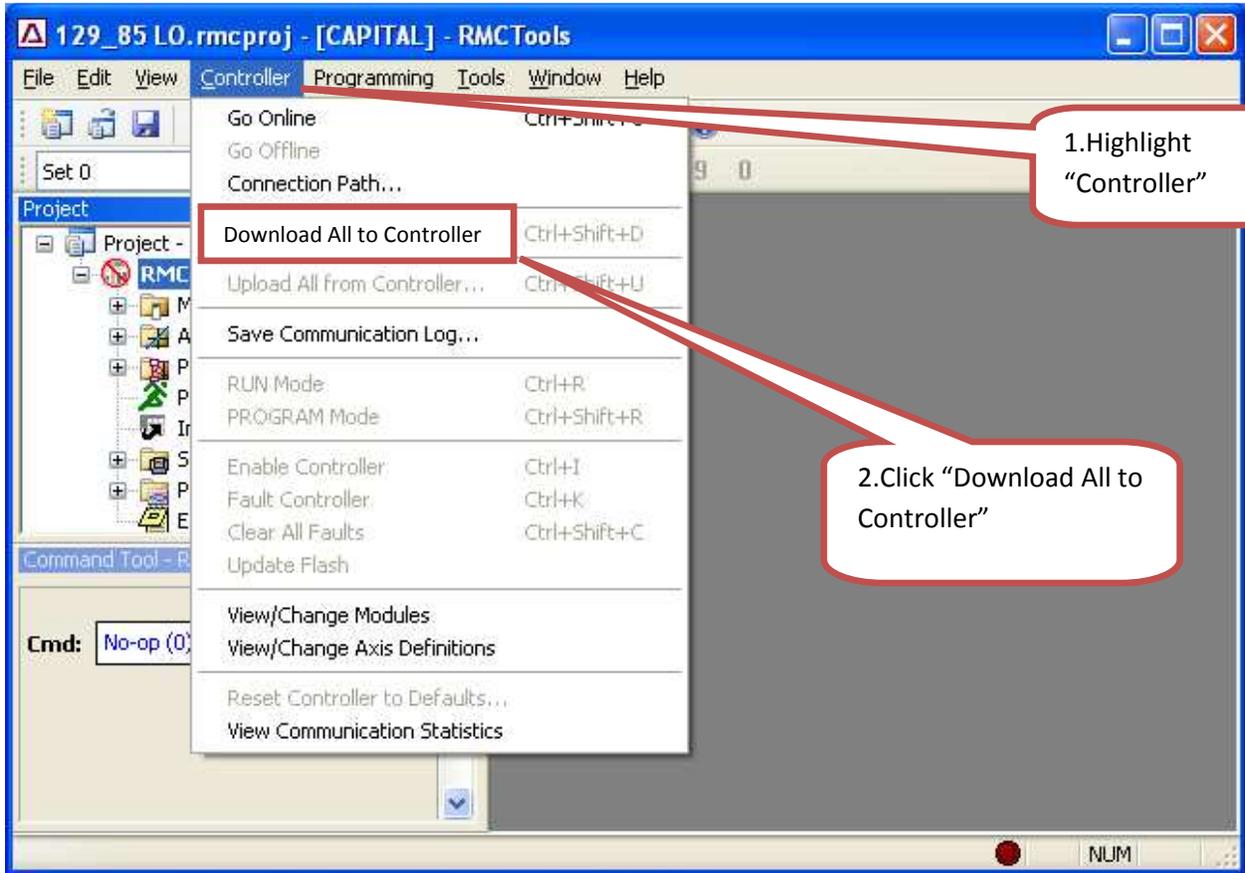
- The following window will appear.
- Connect to the Delta Module. → Connection Path



- Connection Path screen will appear. Choose USB and make sure the USB cable that was provided is connected between the Delta Module and the computer.

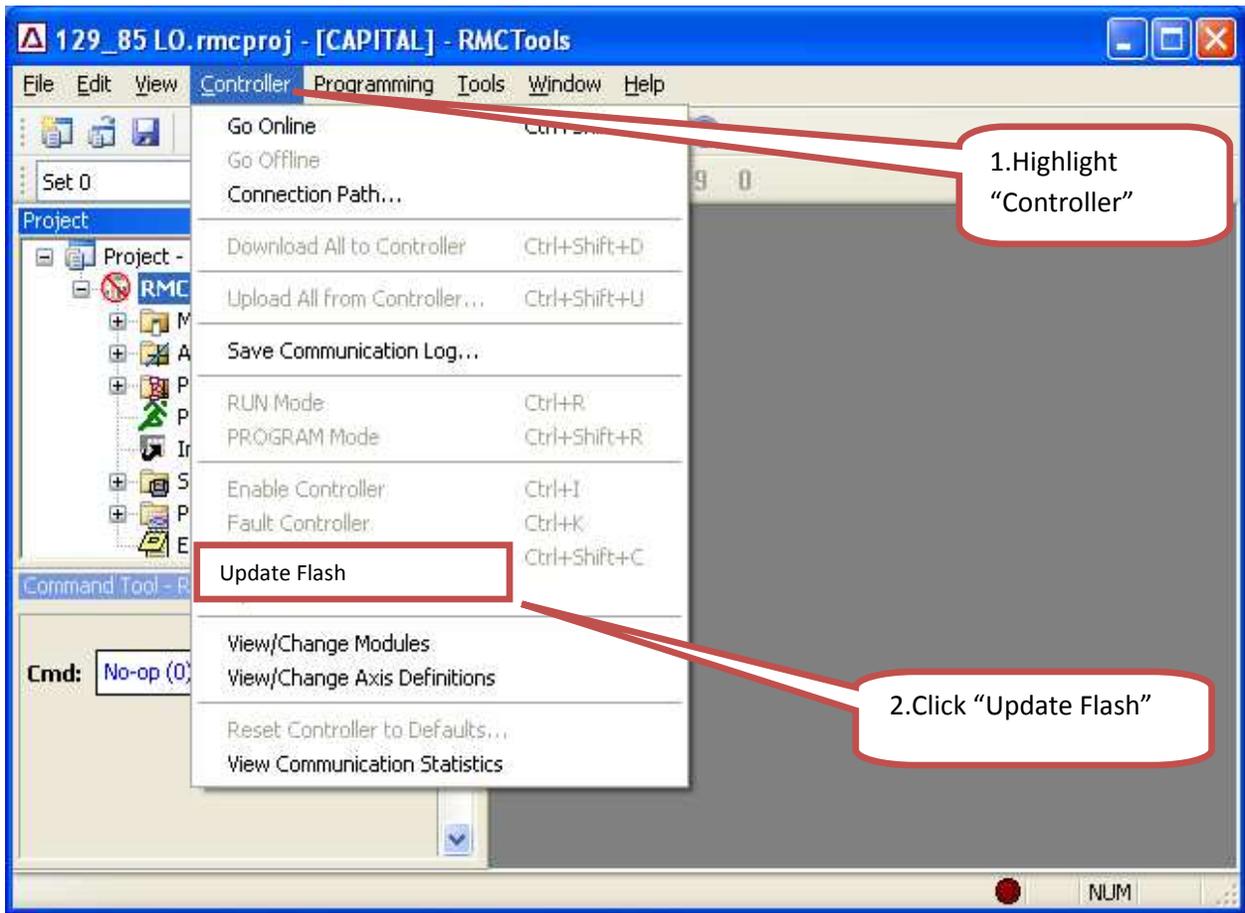


- Once Connection to the Delta module has been established. Download the LoCar or UpCar program to the module.



After the download ensure that there are NO FAULTS on the Module. RED LED indicates a FAULT.

- After a successful download of the program to the Delta Module, Be sure to save the program to memory on the Delta Module. This is done by the following:



- Disconnect USB communication cables from the Delta Module, the Set-up and configuration of the module is complete.

END