



MicroCODE Control (EPP) App

EPP Simulation Tool for GM Strategic Suppliers

June 2023

This document is a user's guide for the new MicroCODE Simulation Tool add-on for the General Motors Error Proofing Platform (EPP) System.

For the latest App information and documentation visit:

<https://www.mcode.com>

This app is part of our Extensible Error Proofing collection...



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Document Status

This table reflects the current status of this document.

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Author:	Tim McGuire, MicroCODE Incorporated
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Document and App Conventions

Throughout the MicroCODE Control (EPP) App and its documentation the following conventions are used....








Live/Online PLC Data

Invalid/Online PLC Data

Old/Offline PLC Data

App or File Data

Read Only Data

	Fault / Fatal
	Errors: Severe/Destructive
	Errors: Controlled/Repaired
	Warning
	Confirmation
	Configuration / Selection
	Information



Revision History

This table records the edit history of this document.

Document Version	Date Updated	Revision Author	Description of Changes
v1.0.0 a (1)	20-Oct-2020	TJM	Initial creation of MicroCODE Control (EPP) User Guide.
v1.0.0 a (2)	21-Oct-2020	TJM	Corrections from Alpha 1 testing at KUKA.
v1.0.1 a (1)	7-Dec-2020	TJM	New features to simplify the support of AGVs and Stop Stations (ALS) for the BET Project.
v1.0.1 a (2)	9-Dec-2020	TJM	New RESTART feature, display of invalid data to make with debugging issues.
v1.0.1 a (3)	13-Dec-2020	TJM	Corrected several issues and added a display of PLC API and APP Version mismatch.
v1.0.2 a (1)	22-Jan-2021	TJM	Enhanced support for Stop Stations (ALS, AGV, VAC).
v1.0.2 a (7)	3-Feb-2021	TJM	Updated API Configuration procedure and various new features.
v1.0.2 a (8)	6-Feb-2021	TJM	New GSIP and TRACE display formats.
v1.0.3 b (1)	9-Feb-2021	TJM	Updates to the EPP PLC API and New Features.
v1.0.3 b (2)	16-Feb-2021	TJM	Updates for the new EPP “Sub-Assembly Interface (SAI)” Conveyor Interface.
v1.0.3 b (6)	24-Feb-2021	TJM	Updates for the reworked FPS Conveyor code in the EPP PLCs.
v2.0.1 b (1)	21-Oct-2021	TJM	Commonized the PLC API program and added autoconfiguration from the EPP SQL Database into the PLC.
v2.0.1 b (2)	21-Oct-2021	TJM	Corrections during HTI buy-offs.
v2.0.1 b (4)	24-Oct-2021	TJM	New Features from support Strategic Suppliers.
v2.0.1 b (8)	27-Oct-2021	TJM	Corrections for new AGV PLC Code and “Single-Sided” Track Zones, denoted by “L” or “R” in Operation Number.
v2.0.1 b (9)	11-Nov-2021	TJM	Added the display of Task State and SLKS to the Footprint Screen. Added support for the new EPP Conveyor Interface structure.
v2.0.1 b (10-12)	19-Nov-2021	TJM	Corrected issues after ESYS, HTI, and KUKA testing.
v2.1.2 a (4)	7-Mar-2023	TJM	Corrected issues for display scaling and resolution and updated the App to use .NET 4.8 for Windows 10.
V3.0.0 a (1)	29-Jun-2023	TJM	Reverted all Apps to .NET 4.5 for GM compatibility. Fix EPP SQL DB issues, see Release Notes.



October 2020 – June 2023

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All readers of this document are requested to return feedback (corrections, improvements, additions and subtractions) to the document owner. Please use the **Reader's Comments** form at the end of this document.



Table of Contents

Document Status	ii
Document and App Conventions	ii
Revision History	iii
Table of Contents.....	v
Figures	vii
Examples	vii
Tables	vii
<hr/>	
1 Introduction to the MicroCODE Control (EPP) App.....	11
<hr/>	
2 Installing MicroCODE Control (EPP) App.....	15
SITE View – All EPP PLCs	20
<hr/>	
3 Configuring the Site for Simulation	21
SITE View – All EPP PLCs	28
<hr/>	
4 Monitoring Production as a Viewer.....	31
TRACK ZONE View – FPS Conveyor	37
TRACK ZONE View – ALS / AGV / AGC / VAC Conveyors	37
FOOTPRINT View	39
CONVEYOR View.....	43
BDX Buffer View	44
FILTERING: BDX Buffer View.....	45
GEPICS Build Data Viewer (BDV).....	46
QDX Defect Queue View	48
FILTERING: QDX Queue View	49
CLEARING: QDX Queue.....	50
VCX Trace Queue View.....	54
GM-1737 Support in TRACE VIEW.....	55
FILTERING: VCX Trace Queue View	56
CLEARING: VCX Queue	57
<hr/>	
5 Configuring the Simulated Vehicle Orders	59
Selecting a GEPICS Seed Job.....	59
Job Control Profiles (JCP)	62
MicroCODE Control (EPP) – Job Control Profiles.....	62
Controlling Job Rotation	64
5.1 PROFILE Job Data Changes.....	65
Auto-Configuration of Vehicle ID positions within the Build Data Packet	69



6	Running System Acceptance Tests (SATs)	71
	Workflow	71
6.1	Handling the Simulated Conveyor.....	80
6.2	Simulator Conveyor Commands	81
6.3	App vs. EPP PLC – Span of Simulation Control	83

7	App Shortcuts and Special Features	85
	Finding an RPO Code or Part Number in a GEPICS Order	85
	Using the GEPICS Viewer to guide PROFILE Creation	87

8	Handling App Support and Issue Reporting	89
----------	---	-----------

9	Common Issues	91
----------	----------------------------	-----------

Appendix A: The MicroCODE API Logix Program	95
READ-ONLY Connection – i.e.: ‘Viewer Mode’	95
READ-WRITE Connection – i.e.: ‘Control Mode’	95
A.1: Installing MicroCODE API Logix Program	96
A.2: Uninstalling MicroCODE API Logix Program.....	104

Appendix B: Required EPP Patches for Control App	106
Appendix C: Memory and I/O Management in the App	108
Appendix D: Allen-Bradley L8x Processor Support	110



Figures

Figure 1	The GM Strategic Supplier Site (SSS) Environment	13
Figure 2	SETTINGS: EPP Cell Controller Tab	23
Figure 3	SETTINGS: Units Tab	25
Figure 4	SETTINGS: Language Tab.....	25
Figure 5	SETTINGS: Options Tab	26
Figure 6	SETTINGS: SQL Tab	27
Figure 7	The SIMULATED JOB Process.....	60
Figure 8	The original Simulated Conveyor Controls (VB App)	83

Examples

Example 1	The MicroCODE Control (EPP) App.....	11
Example 2	Multi-user MicroCODE Control (EPP) App Architecture.....	21
Example 3	EPP TASK details in the App Defect Viewer	52
Example 4	EPP TASK details missing in Defect Viewer	53
Example 5	A GEPICS Format File.....	61
Example 6	Job Profiles MicroCODE Control (EPP) App Architecture.....	63

Tables

Table 1	HEADER Changes	66
Table 2	OPTION Changes.....	67



Purpose of this Document

This document, **MCX-U01 (Control – EPP – User Guide)**, is the user’s guide for the MicroCODE Control Simulation App. It is intended to guide EPP support personnel through the process of configuring a simulation and testing a EPP Error Proofing System in a General Motors Strategic Supplier plant.

Intended Audience

The intended audience of this document is GM Strategic Supplier support personnel who are going to implement, test, and support a GM EPP in a General Motors plant.

Audience Prerequisites

GM EPP support personnel need the following training prior to reading this document:

- Microsoft Windows 10 or higher
- General Motors Error Proofing Platform (EPP) System Training (Advanced)

GM EPP support personnel also need to be familiar with the following GM EPP documents prior to reading this document:

- EPP System Overview
- EPP Test Procedures
- EPP Process Tool Testing

Software Prerequisites

Support personnel need the following laptop environment for this App:

- Microsoft Windows 10
- Microsoft .NET 4.5 or higher
- GEPICS Export Files (EPP Build Data format from GEPICS Coordinator)
- EPP PLC Programs from target GM Facility

Hardware Prerequisites

Support personnel need the following hardware environment for this App:

- Windows 7 or Windows 10 PC
- Spec support for .NET 4+
- Logix 5000 L5x, L6x, L7x



Document Structure

This manual contains the following chapters:

- **Chapter 1** – Introduction to the MicroCODE Control (EPP) App
- **Chapter 2** – Installing MicroCODE Control (EPP) App
- **Chapter 3** – Configuring the Site for Simulation
- **Chapter 4** – Monitoring Production as a Viewer
- **Chapter 5** – Configuring the Simulated Vehicle Orders
- **Chapter 6** – Running System Acceptance Tests (SATs)
- **Chapter 7** – App Shortcuts and Special Features
- **Chapter 8** – Handling App Support and Issue Reporting
- **Appendix A** – The MicroCODE Logix 5000 API Program
- **Appendix B** – Required EPP Patches for the App
- **Appendix C** – Memory and I/O Management in the App

Associated Documents

For additional information on EPP Simulations, see the following documents:

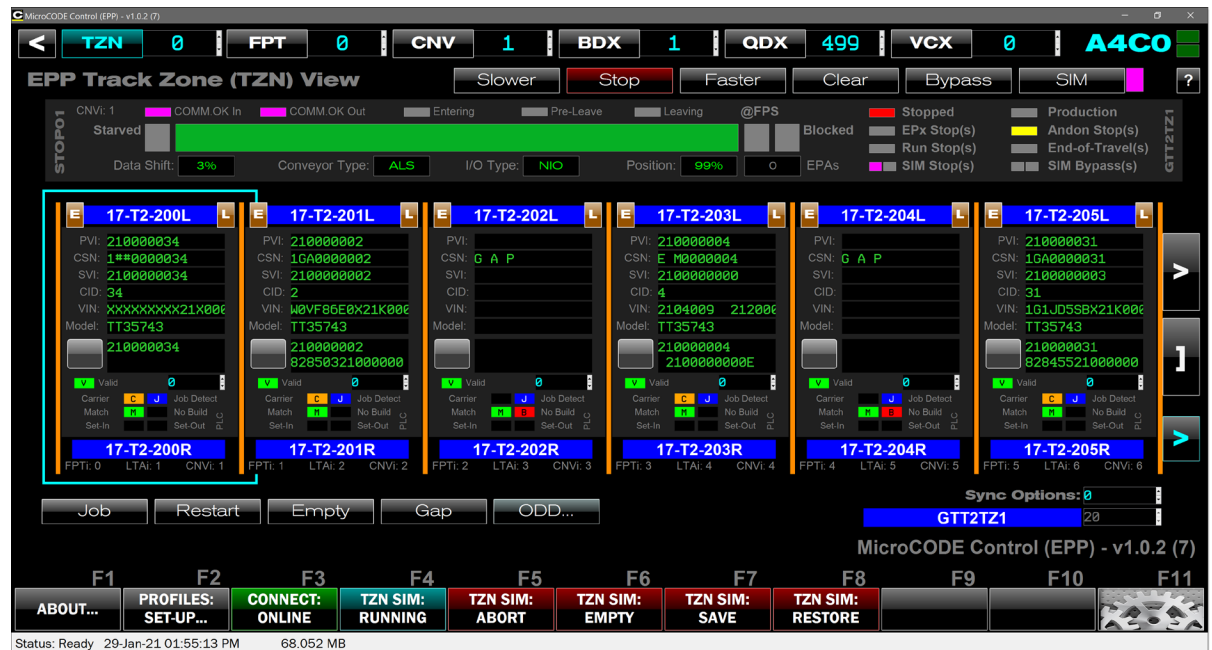
- *EPP System Overview*
- *EPP Test Procedures*
- *EPP Process Tool Testing*
- *EPP Simulation Tool User Manual*



1 Introduction to the MicroCODE Control (EPP) App

This app is used to control the generation of simulated GEPICS Jobs (Customer Orders) during System Acceptance Tests (SATs) outside of a normal GM production facility. This app can also control the EPP Conveyor simulation software held within the EPP Cell Controller, without opening the EPP ControlLogix Program. In addition, it allows a user to view the GSIP Defect Queue and GEPICS Trace Data Queue to check the results of any Error Proofing Action test. This allows Strategic Supplier personnel to simulate conveyor movement, Build Data delivery and Error Proofing Actions (TASKs) without having the actual conveyor at the Strategic Supplier's site, enabling them to test Error Proofing Actions and perform System Acceptance Tests (SATs)... all from one App.

Example 1 The MicroCODE Control (EPP) App



This tool is used in connection with several other components:

- EPP Cell Controller (EPP PLCs) – **mandatory**
- Control Laptop (Windows 7 or Windows 10) – **mandatory**
- EPP I/O Networks – **mandatory**
- EPP Error Proofing Stations – **mandatory**

This tool was written with the assumption that the GM IT Systems would **not** be available:

- EPP Web Server – **optional** (but highly recommended)
- GEPICS Server – **optional**
- GSIP Server – **optional**
- GPM&C Server – **optional**



The high-level work process for performing SATs at the Strategic Supplier Sites (SSS) is as follows:

- Configure the new I/O and Error Proofing Actions in the target Plant's environment
- Save the EPP PLCs from the Plant (after configuration download*)
- Take the Logix ACD Files to the SSS and load into Test Area Controller
- Use the MicroCODE Control (EPP) App to generate simulated Vehicle Orders
- Perform SATs of the staged hardware and tooling
- Use the MicroCODE Control (EPP) App to check the generation of GSIP Defects
- Use the MicroCODE Control (EPP) App to check generation of GEPICS Trace Data

* In order to reserve I/O Nodes addresses in the target GM plant you must go there and configure into their SQL database—thru the EPP Server—all I/O you will be installing. This ensures the plant will not use these same Node address for changes they make while the supplier is staging new equipment at their build shop.

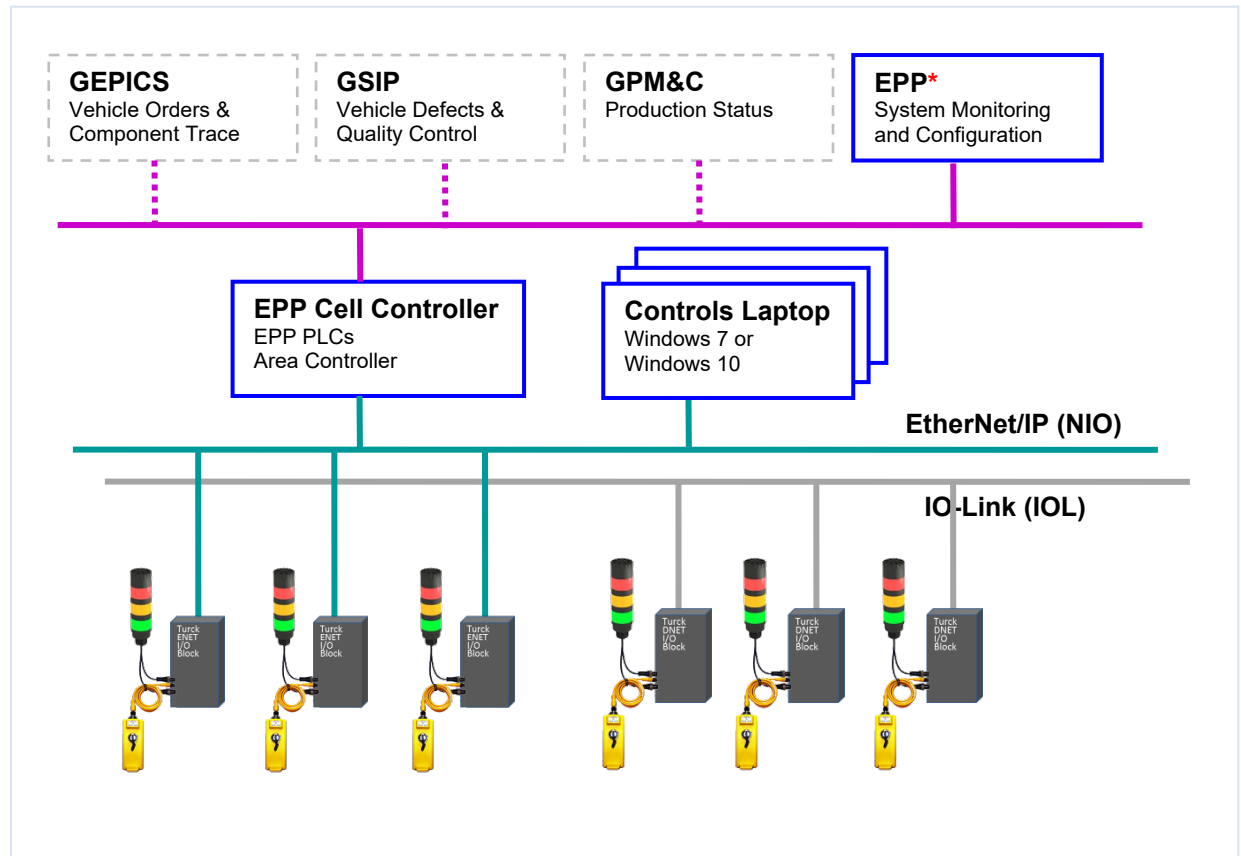
After this I/O is configured, the Supplier must perform a Partial Configuration Download into the EPP PLCs. This must be done to ensure the Plant can continue doing their normal work and will not be caught in a situation where EPP requires a 'Full Configuration Download' which cannot be down while the Plant is running.

Be aware: Any changes to the Production system require start-up support. The Supplier cannot come into the Plant make changes, download them, and walk away.



Figure 1 The GM Strategic Supplier Site (SSS) Environment

The dotted line elements are optional* in the Strategic Supplier Sites, all other components are mandatory. The required Hirschmann (or Cisco) Ethernet switches are not shown.



* The GEPICS, GSIP, and GPM&C Servers are optional because you can use the MicroCODE App to view the queues and buffers used to communicate with these GM IT systems and verify the data *that will be transmitted to the servers in the Plant when installed*.

* An EPP Server (actual or Laptop) is required to view or change any EPP Configuration. So, while the EPP Control App does not need this Server, the User will need this to complete SATs. If the EPP Server is available, the Control App can be auto-configured from the SQL DB on the Server.

If Error Proofing Actions (TASKs) are going to be created or edited at the Strategic Supplier site, they will need an EPP Server with the SQL Database from the target GM Facility. Changes to EPA or I/O Configurations can be performed in the Test site and downloaded to the EPP PLCs. But these changes will have to be documented carefully and reproduced in the GM production facility because there are no import/export tools for EPP SQL configuration at this time.



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DRAFT



2 Installing MicroCODE Control (EPP) App

The Control App uses a standard Windows install procedure.

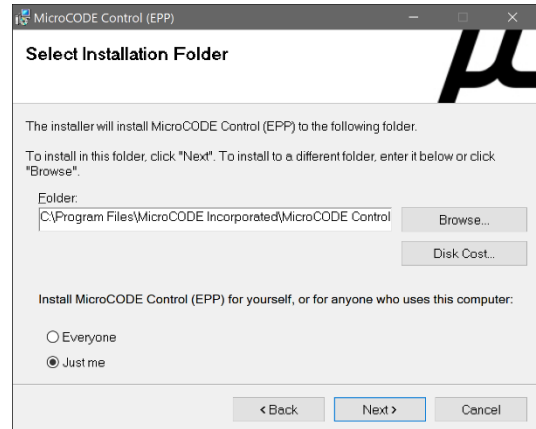
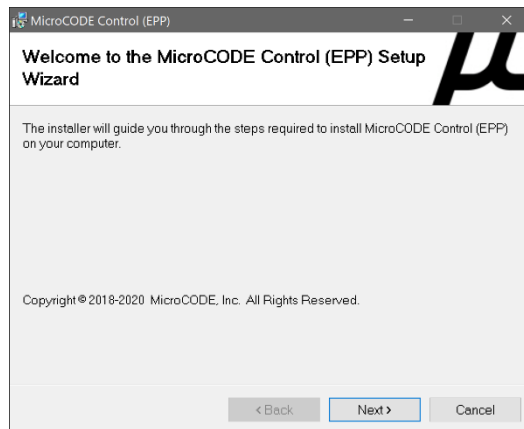
STEP 1: Acquire the Microsoft Installer (.MSI) file for the version you want to install.

The App installs from a single MSI file that is approximately 10MB in size.
The **setup.exe** file is optional and is not required for an installation.

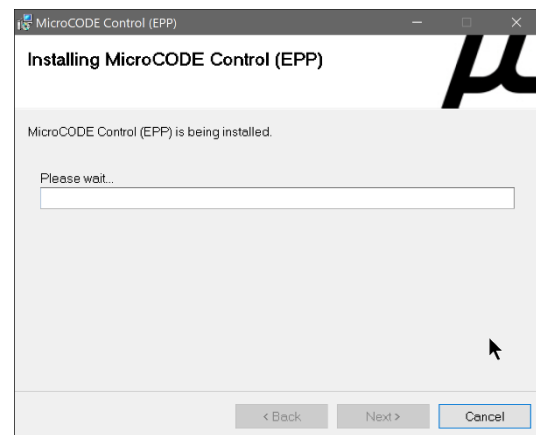
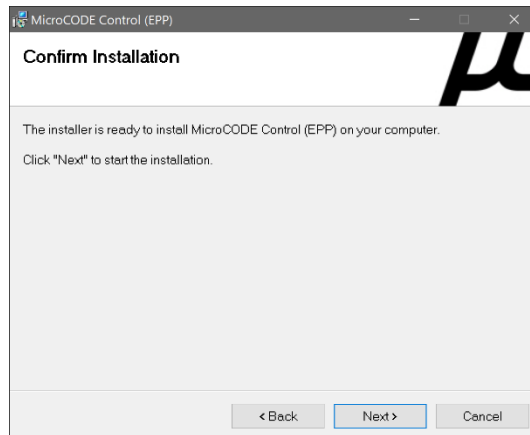
Name	Date modified	Type	Size
Control (EPP) Setup.msi	10/20/2020 8:08 PM	Windows Installer ...	19,739 KB
setup.exe	10/20/2020 8:08 PM	Application	531 KB

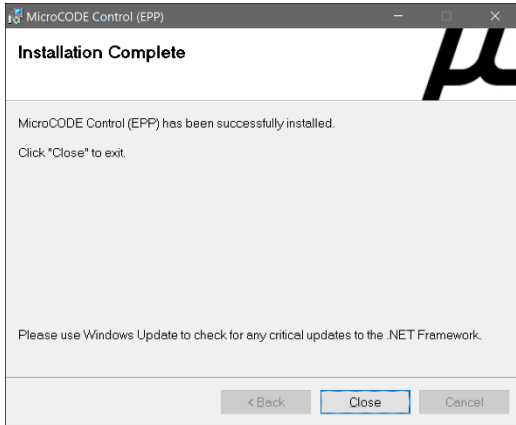
STEP 2: Double-click the .MSI file to start the installation

NOTE: If you have a previous version installed its best to uninstall it first. Uninstalling the App does not delete any user configured data (which is held in your 'Documents' folder).



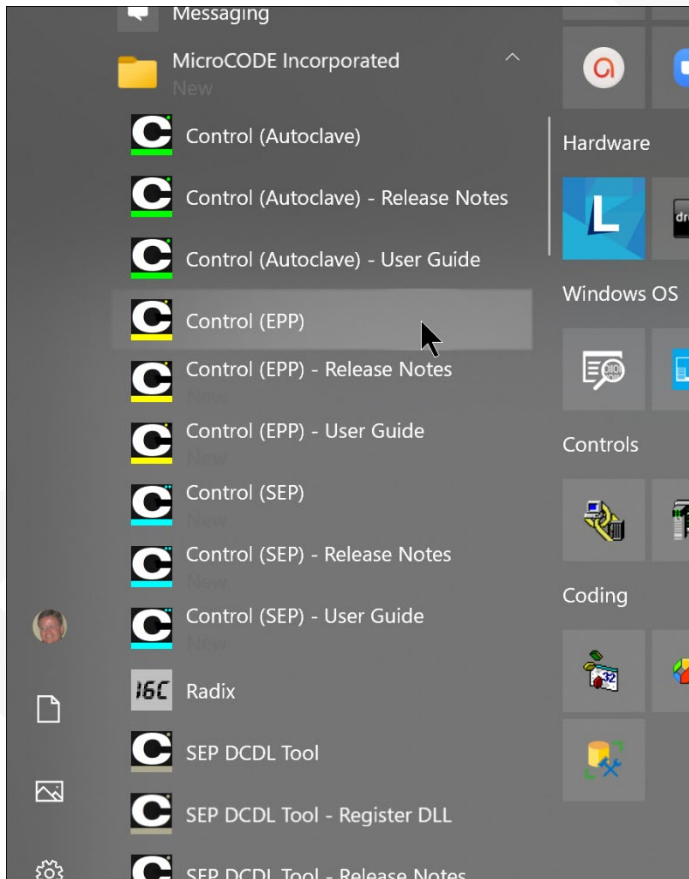
The simplest thing is to just accept all the default install locations...





After installation you will have the following:

- **START MENU** Shortcuts are created for the App, its Release Notes, and the App's User Guide





- **DESKTOP Shortcuts** – there two (2): 1) the Windows App, and 2) the importable .L5X file for the Logix 5000 API program needed in the EPP Cell Controller.



- **Program Files** – App Executable and Data Files

Name	Date modified	Type
Lenovo	8/11/2020 1:38 AM	File folder
Logitech	8/11/2020 1:38 AM	File folder
Malwarebytes	8/11/2020 1:38 AM	File folder
MicroCODE Incorporated	10/20/2020 8:10 PM	File folder
Microsoft	9/12/2020 6:19 PM	File folder
Microsoft Analysis Services	8/11/2020 1:39 AM	File folder
Microsoft ASP.NET Core Runtime Pack...	8/11/2020 1:39 AM	File folder

Name	Date modified	Type
MicroCODE Control (Autoclave)	8/11/2020 1:38 AM	File folder
MicroCODE Control (DCDL)	8/11/2020 1:38 AM	File folder
MicroCODE Control (EPP)	10/20/2020 8:10 PM	File folder

Name	Date modified	Type	Size
GFXs	10/20/2020 8:10 PM	File folder	
Images	10/20/2020 8:10 PM	File folder	
L5Xs	10/20/2020 8:10 PM	File folder	
PDFs	10/20/2020 8:10 PM	File folder	
Sounds	10/20/2020 8:10 PM	File folder	
Control (EPP).exe	10/20/2020 8:07 PM	Application	3,338 KB
Control (EPP).exe.config	10/20/2020 1:22 PM	Configuration Sou...	1 KB
Control.ico	9/13/2020 9:17 PM	Icon File	267 KB
DeployLX.Licensing.v5.dll	11/11/2013 10:39 AM	Application extens...	1,086 KB
INGEAR.NET.Interfaces.dll	7/14/2010 2:10 PM	Application extens...	20 KB
INGEAR.NET.Logix.dll	4/20/2018 2:23 PM	Application extens...	368 KB
nlx7rt5017487.lic	2/7/2020 3:12 PM	LIC File	2 KB
SmartAssembly.Attributes.dll	11/10/2016 2:28 PM	Application extens...	16 KB



- **Documents** – Your data, Profile Configurations, Event Logs, Seed Jobs, etc.

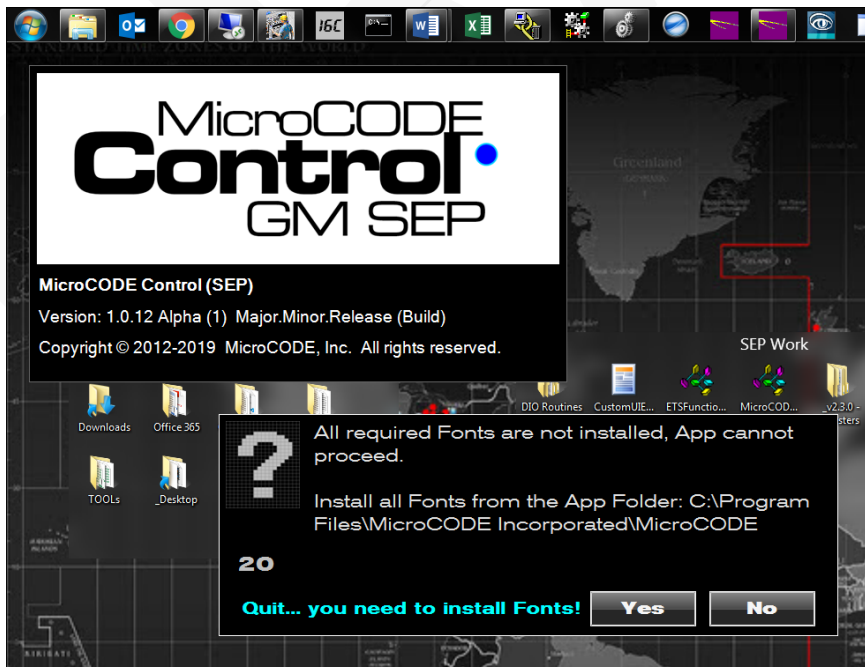
Name	Date modified	Type	Size
Library	9/4/2020 11:58 AM	File folder	
MicroCODE Control (Autoclave)	8/12/2020 6:06 AM	File folder	
MicroCODE Control (EPP)	10/6/2020 3:26 PM	File folder	
MicroCODE Control (SEP)	8/12/2020 6:06 AM	File folder	
MicroCODE Control (Utility)	8/12/2020 6:06 AM	File folder	
My Data Sources	8/12/2020 6:06 AM	File folder	

Name	Date modified	Type	Size
Backups	10/20/2020 10:01 PM	File folder	
Configuration	9/13/2020 6:06 PM	File folder	
Events	10/20/2020 10:01 PM	File folder	
GEPICS Formats	10/6/2020 3:26 PM	File folder	
GEPICS Seeds	10/15/2020 7:49 PM	File folder	
Recordings	10/20/2020 10:01 PM	File folder	

STEP 3: Install the supplied FONTS

The first time you run the App it checks for a set of **Fonts** it requires for proper operation. If any of them are missing, you will see the following...

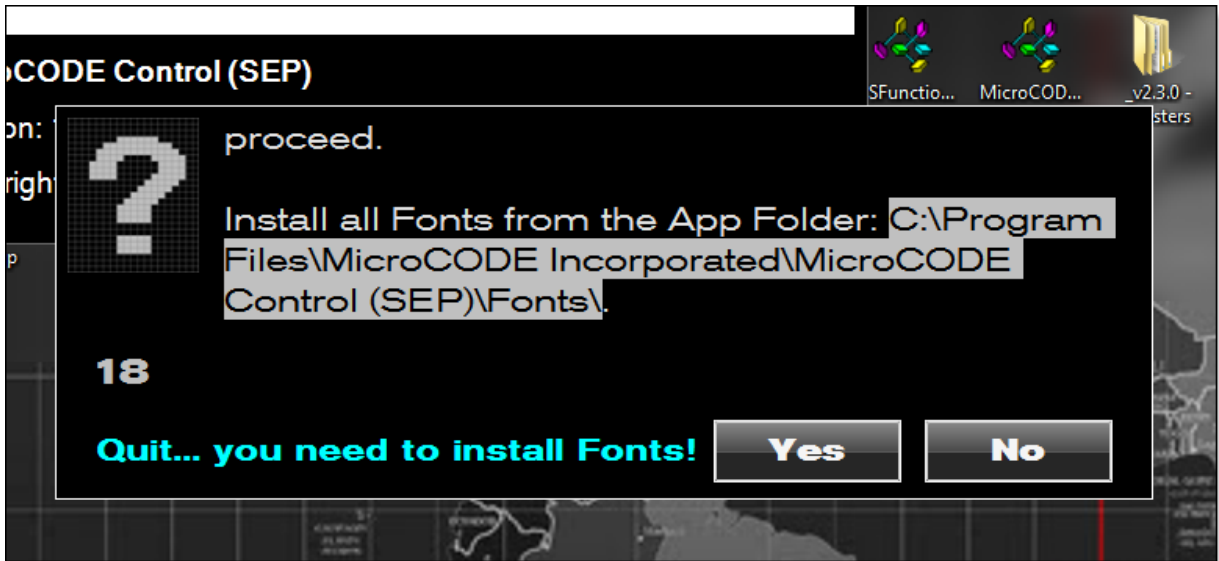
NOTE: The “SEP” App is shown below, the “EPP” App is identical.



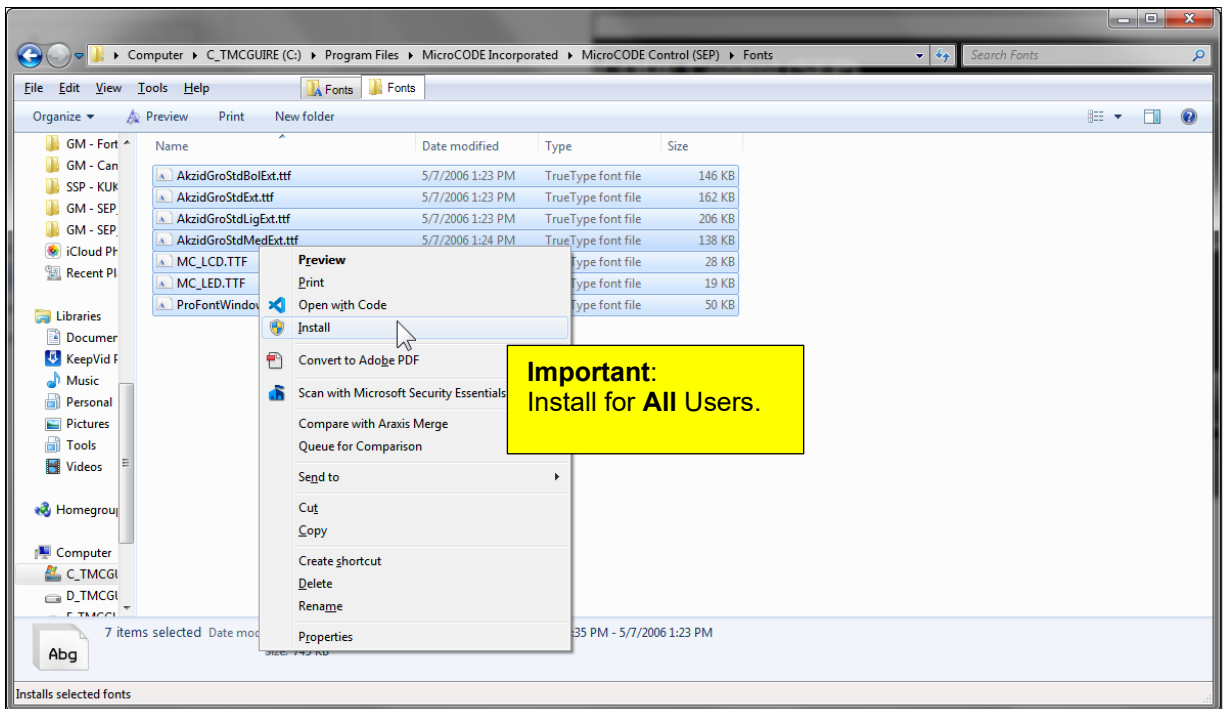


You can select the **path** to the required Fonts right from the dialog box...

NOTE: The “SEP” App is shown below, the “EPP” App is identical.



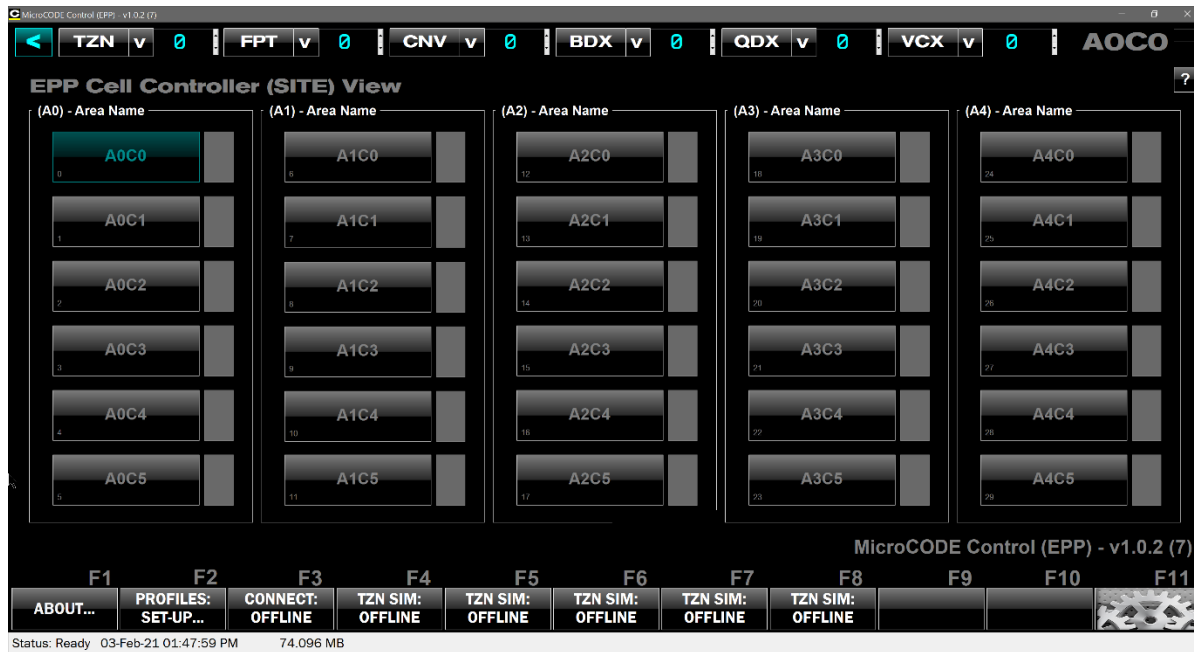
Paste the path into Windows Explorer to get to the supplied Fonts, select them all, right-click, and select **Install...** Note: On Windows 10 machines it is necessary to **install for All Users.**





SITE View – All EPP PLCs

The next run of the App will go right to the main App Screen...



That completes the installation. There is nothing else to install.

You do **not** need:

- GE Fanuc – **CIMPLICITY**
- Rockwell Automation – **RSLinx**
- Microsoft – **Office**

Just the MicroCODE Control (EPP) App.



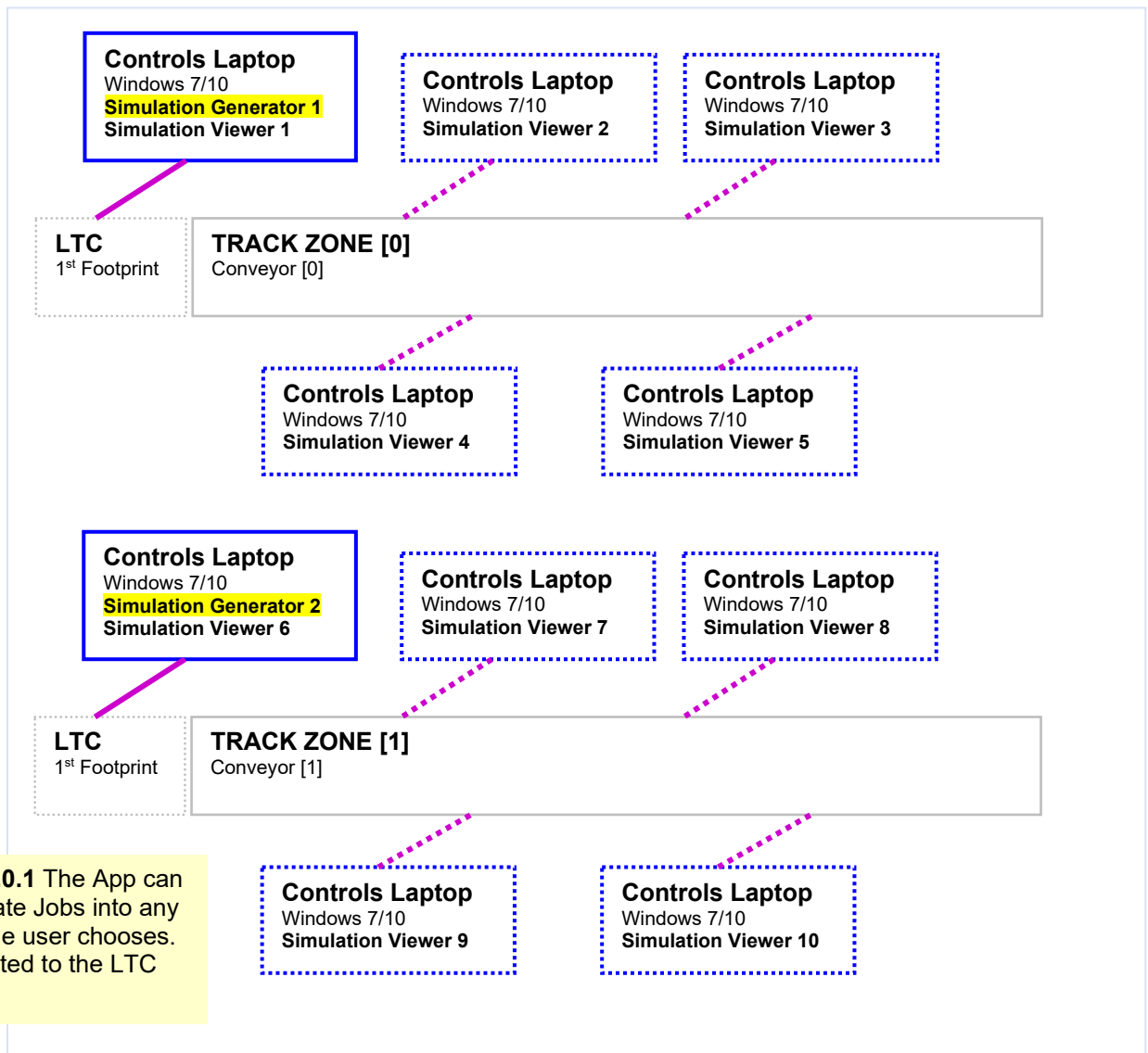
3 Configuring the Site for Simulation

Multiple copies of the MicroCODE Control (EPP) App can be run against the same EPP Cell Controller simultaneously. This allows multiple SAT Teams to work on different Track Zones in the Area.

There is **no limit to the number of ‘Viewers’** connected to a Cell Controller in this App, other than load on the associated Ethernet Card(s) in the PLC.

While only one of the Stations can generate simulated GEPICS Jobs for a particular Track Zone, other Viewers of the Track Zone can have their own simulation running from a different client. **The ‘Generators’ are mandatory and must stay ‘connected’ to the Cell Controller.** The ‘Viewers’ can come and go as they please.

Example 2 Multi-user MicroCODE Control (EPP) App Architecture





The user can tell if they are the ‘Generator’ by the “Simulation Owner” indicator at the bottom of the screen.

NOTE: This indicator is only visible when a Simulation is running in the EPP Cell Controller.

GENERATOR:



NEW in v1.0.1 The App can now generate Jobs into any Footprint the user chooses. It is not limited to the LTC Footprint.

VIEWER:



Because of this new capability the concept of a ‘**Simulation Owner**’ has been deprecated. Any App user can generate GAPs, EMPTY CARRIERS, and JOBS into any Footprint they choose at any time that a Simulation has been started—by anyone—in the EPP Controller.

Any ‘Viewer’ can take over the Simulation but aborting the current Simulation and starting a new one...

- On the Viewer—or current Generator—press [F6] TZN SIM: ABORT
- On the Viewer (the new Generator), press [F5] TZN SIM: START



A Station is configured for a specific EPP Cell Controller in the **SETTINGS** dialog box.

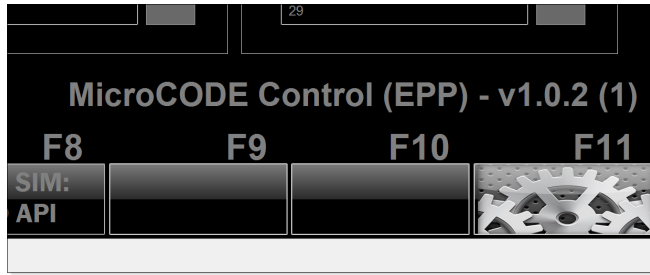


Figure 2 SETTINGS: EPP Cell Controller Tab

Currently selected Cell Controller. ■

Configured Controller but not currently 'selected'. ■

Unconfigured Controller. ■

Settings

Cell Controllers
Units
Language
Options
SQL

EPP Site

Name: ORION

BT10x Launch Project

EPP Cell Controller

Area in Site: 17 - PRE-TRIM A1C0 ■

Cell in Area: CELL Name

PLC Track Zones

Selected Cell Controller (CLX) Configuration

Area: 1 17 - TRIM

Cell: 0 17-T1

PLC Name: EP_GMT100Z1

Cell Controller is configured

Cell Controller is deployed

TCP/IP 120 15 250 30

EPP Main Processor (EPP) Slot: 0

Number of Track Zones in this 1

Check 'deployed' for all Deploy

Uncheck 'deployed' for all Undeploy

Import...
Export...
OK
Cancel

TCP/IP Address of the EPP PLC EN2T Card Selection & Viewer

Logix Chassis Slot #s For both the EPP PLC.



Settings

Cell Controllers Units Language Options SQL

EPP Site Name: **ORION**
 BT1Cx Launch Project

EPP Cell Controller Area in Site: **17 - PRE-TR1** **A1C0**
 Cell in Area: **CELL Name**

PLC Track Zones

TZNi	Name	Footprints	FPTsi	Conveyor	AREA Format
0	17-T1	15	0	CG_GMT100_FPS	EPP_AreaDefault.txt
1		0	15		
2		0	15		
3		0	15		
4		0	15		
5		0	15		
6		0	15		

GEPICS Format: NOTE: Each EPP Track Zone requires two (2) GEPICS Formats to view Job Build Data from the EPP Line Tracking (LTA) and EPP GEPICS Buffer (BDX).

Import... Export... OK Cancel

GEPICS Formats for this Cell Controller Selection & Viewer, AREA and ZONE

Whenever you open a Job’s GEPIC Build Data it will be viewed through these GEPICS Formats, concatenated together. You can change to any other Format you have available ‘on-the-fly’ by using “Import” in the GEPICS Viewer.

GEPICS

Format: **EPP_TRIM, EPP_1007**

PVI: **200001439** CSN: **1GA0001439**

Build Data Viewer

PLC	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11
0	0	9	PVI		2	0	0	0	0	1	4	3	9			
9	9	1	CHARA...	Pad PVI ...												

However, this does not change the default you selected in the Settings Dialog box. If you want to change your default, you must return to this dialog box and import a different Format.



Figure 3 SETTINGS: Units Tab

Imperial / Metric support is a standard feature of the MicroCODE Control Apps, but is not required for SEP.

Settings [X]

Cell Controller **Units** Language Options SQL

This tab defines all the information required to control local measurement units and dynamic switching.

Default Operator Units:

.LOG Recorder Units:

.CSV Recorder Units:

Import... OK Cancel

Figure 4 SETTINGS: Language Tab

Multi-Language support is a standard feature of the MicroCODE Control Apps, but is not implemented in this EPP App, the App is locked in English mode.

Settings [X]

Cell Controller Units **Language** Options SQL

This tab defines all the information required to control local language and dynamic switching.

Default Operator Language:

.LOG Message Language:

Select Languages to enable in dynamic switching:

English German (Deutsch)
 Korean (Hangul/Hanja) Spanish (Mexico) Spanish (Spain)
 Chinese (Hanzi) Portuguese (Brazil) Uzbek
 Thai Russian

Import... OK Cancel



Figure 5 SETTINGS: Options Tab

Data file control is a standard feature of the MicroCODE Control Apps, simply set your own retention rules.

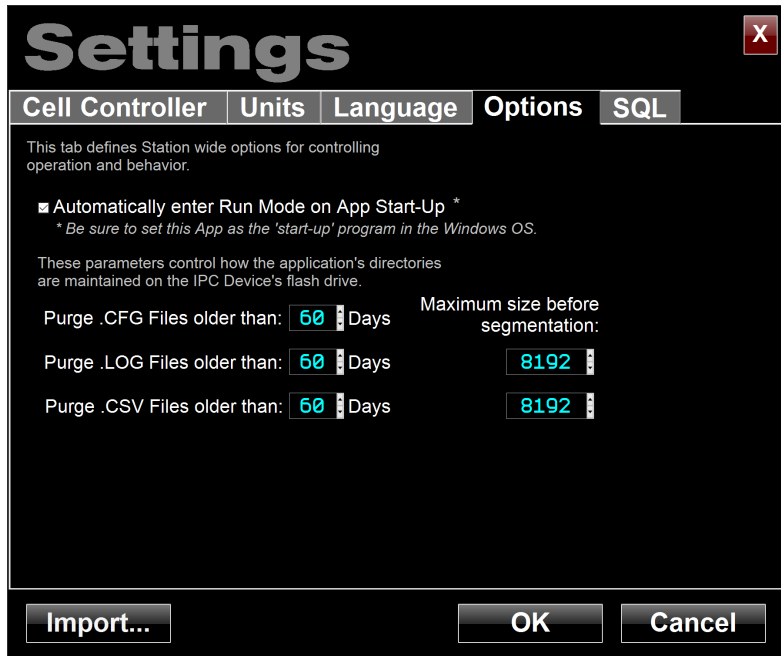
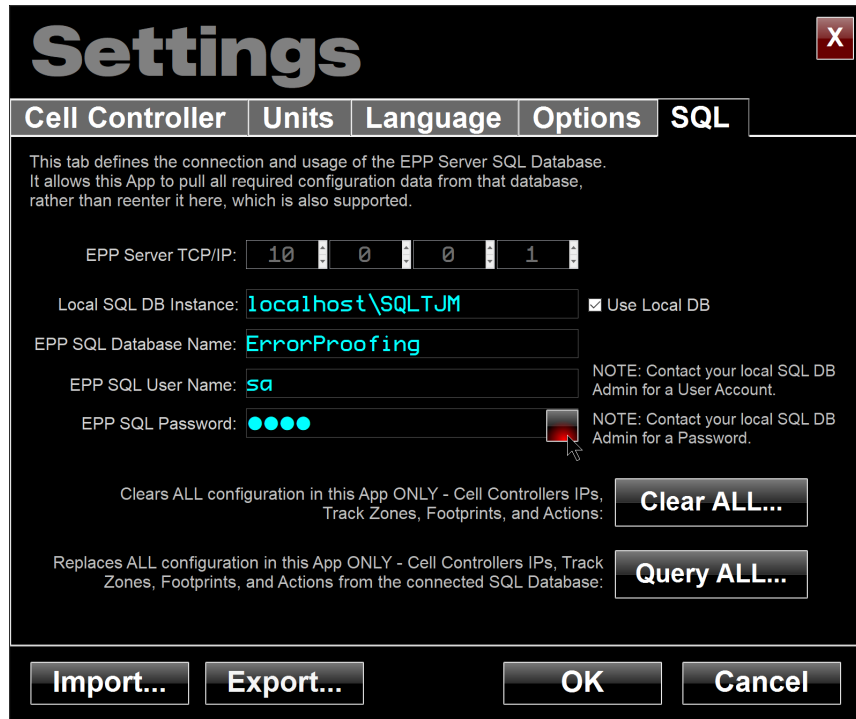


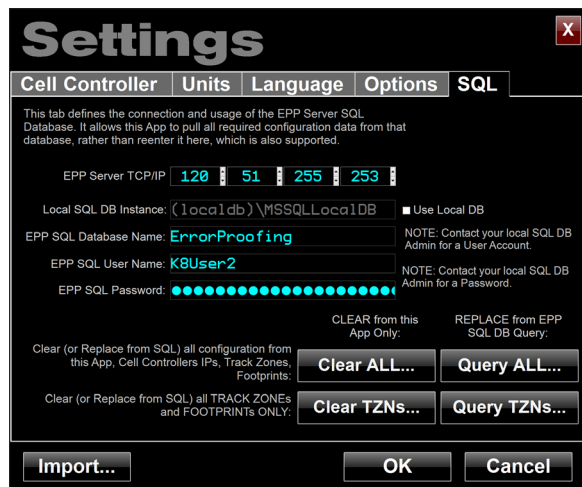


Figure 6 SETTINGS: SQL Tab

The Control App is capable of connecting to an existing EPP SQL Database and auto-configuring itself to match the Site.



NOTE: The command to clear and query only the Track Zones has been removed starting in v2.1. it was an unnecessary complication. It was originally there to increase App speed but importing all the EPP configuration only takes seconds. **Removed in v2.1.**





In addition to being able to pull the configuration of all Cell Controllers—for communication—the App now extracts Track Zone and Footprint (DSOA) names from the EPP SQL DB.

EPP SQL Server

New in v1.0, configures READ-ONLY access to the SQL Configuration Database. The Username and Password of this account are fixed by GM IT.

SQL Configuration

New in v1.0, users can now pull all required configuration from a GM Site’s EPP SQL Database.

Settings

Cell Controller Units Language Options **SQL**

This tab defines the connection and usage of the EPP Server SQL Database. It allows this App to pull all required configuration data from that database, rather than reenter it here, which is also supported.

EPP Server TCP/IP: 10 . 0 . 0 . 0

Local SQL DB Instance: (localdb)\MSSQLLocalDB Use Local DB

EPP SQL Database Name: ErrorProofing

EPP SQL User Name: eppUser

EPP SQL Password: ●●●●●●●●●●

NOTE: Contact your local SQL DB Admin for a User Account.

NOTE: Contact your local SQL DB Admin for a Password.

Clears ALL configuration in this App ONLY - Cell Controllers IPs, Track Zones, Footprints, and Actions **Clear ALL...**

Replaces ALL configuration in this App ONLY - Cell Controllers IPs, Track Zones, Footprints, and Actions from the connected SQL Database: **Query ALL...**

Import... **Export...** **OK** **Cancel**

Erase All Configuration

New in v1.0, clears all EPP configuration within the Control App, it has no effect on the EPP SQL Database.

Get All Configuration

New in v1.0, pulls all required EPP configuration from the EPP SQL Database into the Control App.

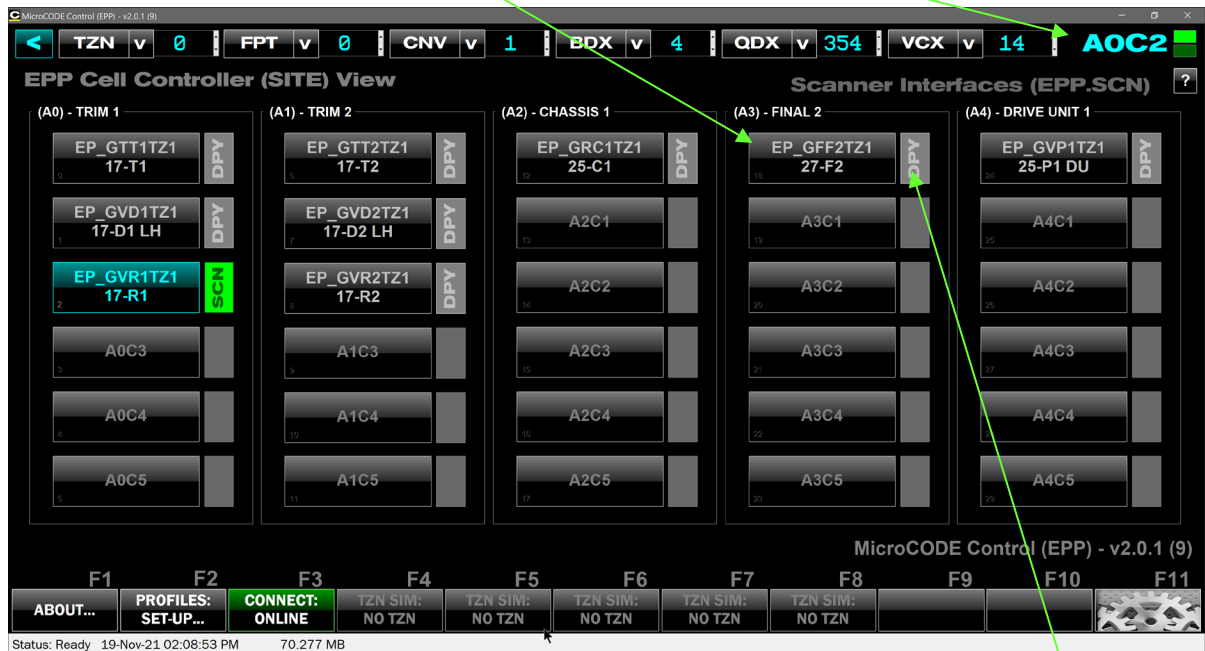


SITE View – All EPP PLCs

After the SQL extraction the App's SITE View is populated with all the EPP PLCs defined in the SEPP "ErrorProofing" database.

Active Cell Controller

New in v1.0, the Active Cell Controller is always displayed in the upper right, this is the only Controller that can be written to by the App. It is changed by simply clicking on a different Controller in the SITE View shown here.

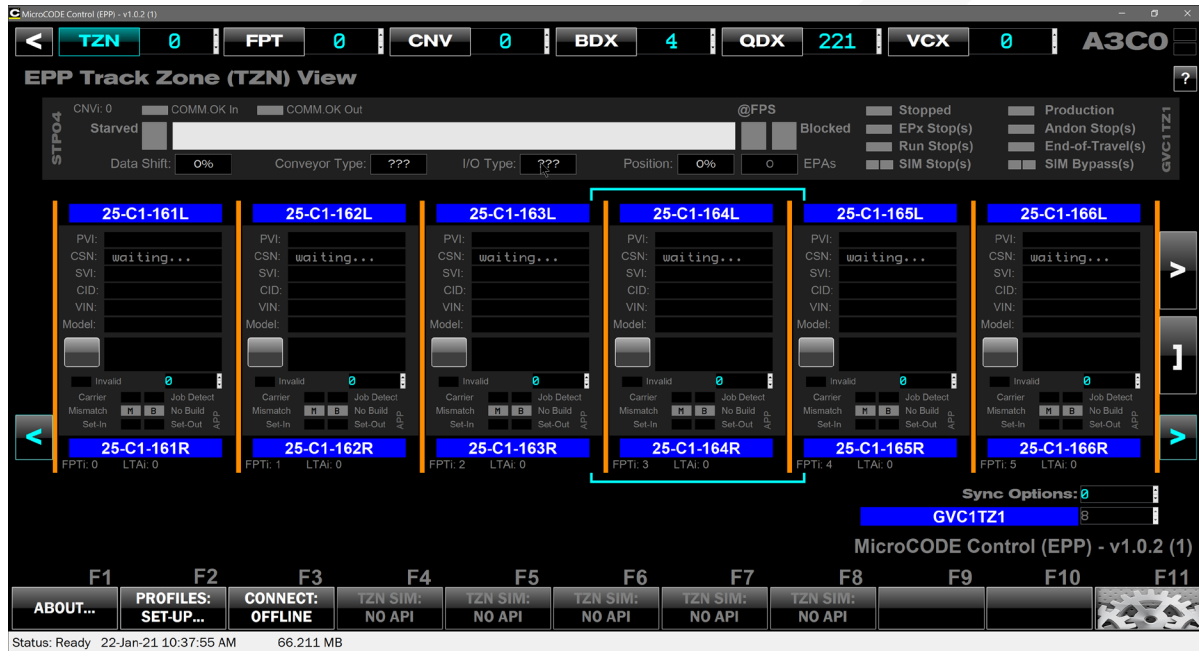


Cell (PLC) Diagnostics Indicator. This shows a rotating indicator summarizing the state of all interfaces in the PLC.



The SQL Extraction allows the App to automatically display the DSOA Placards names with no user input and handles 'custom' DSOAs that do not follow the standard pattern.

- If the Track Zone configuration has been extracted into the App the Footprint Placards from the EPP SQL Database are used.
- If the SQL Database has not been queried, then the starting Placard—configured in this App—is used to generate all Placards for the Track Zone.



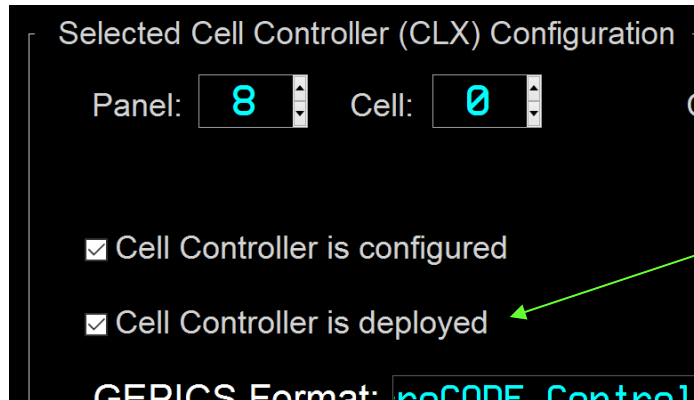


4 Monitoring Production as a Viewer

The MicroCODE Control (EPP) App can be used as a ‘Viewer’ to monitor an EPP Cell Controller – without the risk of entering simulation.

Starting with v2.0.0 the App can now act as an EPP Site Monitor.

When you CONNECT the App to the Site it establishes a READ ONLY connection to every EPP Cell Controller in your configuration that is marked “Configured” and “Deployed”.



NOTE #1: If there are any Cells you do not want the App to connect to simply uncheck ‘Deployed’.

NOTE #2: The initial settings of ‘Configured’ and ‘Deployed’ are taken from the EPP SQL Database.

Once connected all the Cell Controllers have their diagnostics available in the App. This is displayed in a rotating indicator to the right of the Cell Controller button.



Cell (PLC) Diagnostics Indicator. This shows a rotating indicator summarizing the state of all interfaces in the PLC.



Clicking on the ‘Diagnostics Indicator’ open a complete view into the Controller showing all Subsystems summaries...

Cell Status: A3CO GRC1TZ1

EPP Main Processor (EMP)

EMP EPP - Main Processor (EMP)	SIM Simulation Interface <Apps + Web> (EMP.SIM)
PFE Internal EPP Diagnostics (EMP.PFE)	HMI PanelView Interface (EMP.HMI)
CLX ControlLogix Hardware (EMP.CLX)	PMX Plant Monitoring Interface <GPM&C> (EMP.PMX)
EPP Main EPP Program (EMP.EPP)	UIX User Interface <Configuration> (EMP.UIX)
ODD GEPICS Build Data Interface (EMP.ODD)	IOX External I/O Interface(s) (EMP.IOX)
LTS Line Tracking Subsystem (EMP.LTS)	CNV Conveyor Interfaces (EMP.CNV)
SCN Scanner Interfaces (EMP.SCN)	QAX Quality Andon Interface <QAS 1,2,4> (EMP.QAX)
EPX Error Proofing Tasks (EMP.EPX)	VQX VQX Vehicle Quality Interface <GSIP> (EMP.VQX)

11 Controller Scan Time <Milliseconds> (EMP.CLX.OLS)
46 Controller I/O Connections (EMP.CLX.OLC)
20% Communication Time slice Remaining (EMP.CLX.TSR)

...the question / help indicator opens a Key explaining the status coloring:

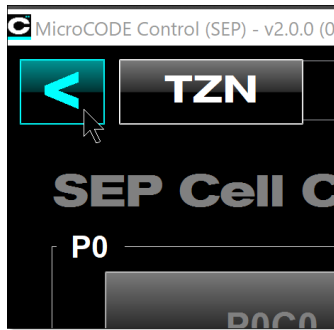
Key

SEP Subsystem States

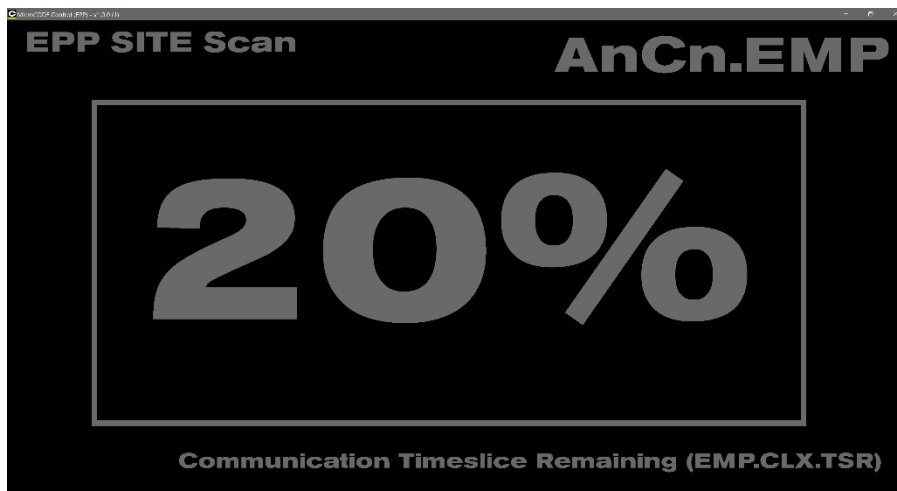
AXP	UNCONFIGURED
AXP	CONFIGURED
AXP	INITIALIZED
AXP	RUNNING - NORMAL
AXP	RUNNING w/WARNINGS
AXP	RUNNING w/ERRORS
AXP	RUNNING w/FAULTS
AXP	STOPPED



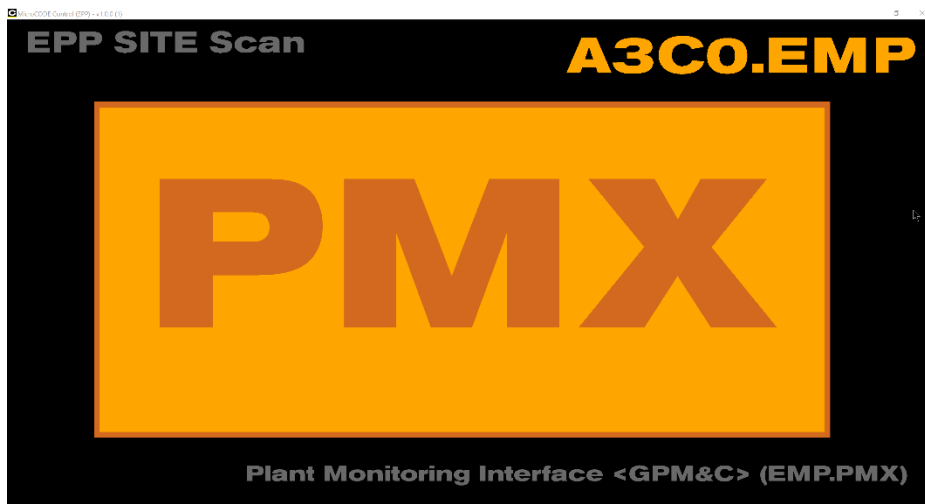
While connected to the Site, backing up from the ‘Site’ screen reveals a rotating monitor of all the Subsystems, in all the Cell Controllers.



If all the EPP Subsystems in all Site Cell Controllers are fine—all Running with no Warnings, Errors, or Faults—the display rotates through them one at a time with a ‘dim gray display’, nice and boring.



If an abnormal condition is found the display shows the Cell Controller with the worst Subsystem state, shows the Cell Controller ID (**PnCn.PLC**) and shows the abnormal condition colorized by severity to draw attention to the issue.





Clicking anywhere on the SITE Scan screen returns you to SITE View screen...

MicroCODE Control (EPP) - v2.0.1 (9)

TZN v 0 FPT v 0 CNV v 1 BDX v 4 QDX v 354 VCX v 14 AOC2

EPP Cell Controller (SITE) View **Scanner Interfaces (EPP.SCN)**

(A0) - TRIM 1 (A1) - TRIM 2 (A2) - CHASSIS 1 (A3) - FINAL 2 (A4) - DRIVE UNIT 1

EP_GTT1TZ1 17-T1 DPY
EP_GVD1TZ1 17-D1 LH DPY
EP_GVR1TZ1 17-R1 SCAN
A0C3
A0C4
A0C5

EP_GTT2TZ1 17-T2 DPY
EP_GVD2TZ1 17-D2 LH DPY
EP_GVR2TZ1 17-R2 DPY
A1C3
A1C4
A1C5

EP_GRC1TZ1 25-C1 DPY
A2C1
A2C2
A2C3
A2C4
A2C5

EP_GFF2TZ1 27-F2 DPY
A3C1
A3C2
A3C3
A3C4
A3C5

EP_GVP1TZ1 25-P1 DU DPY
A4C1
A4C2
A4C3
A4C4
A4C5

MicroCODE Control (EPP) - v2.0.1 (9)

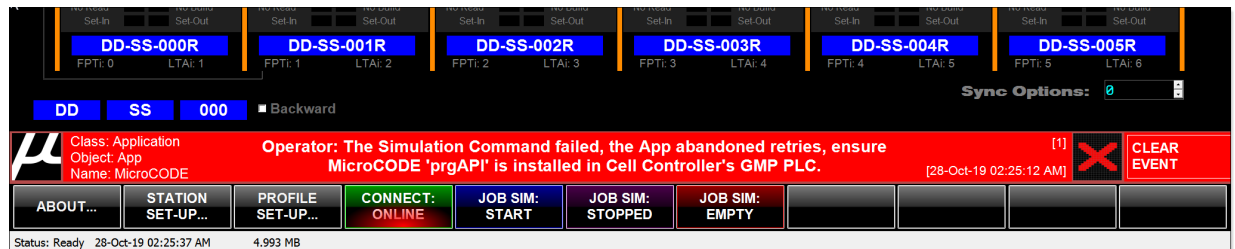
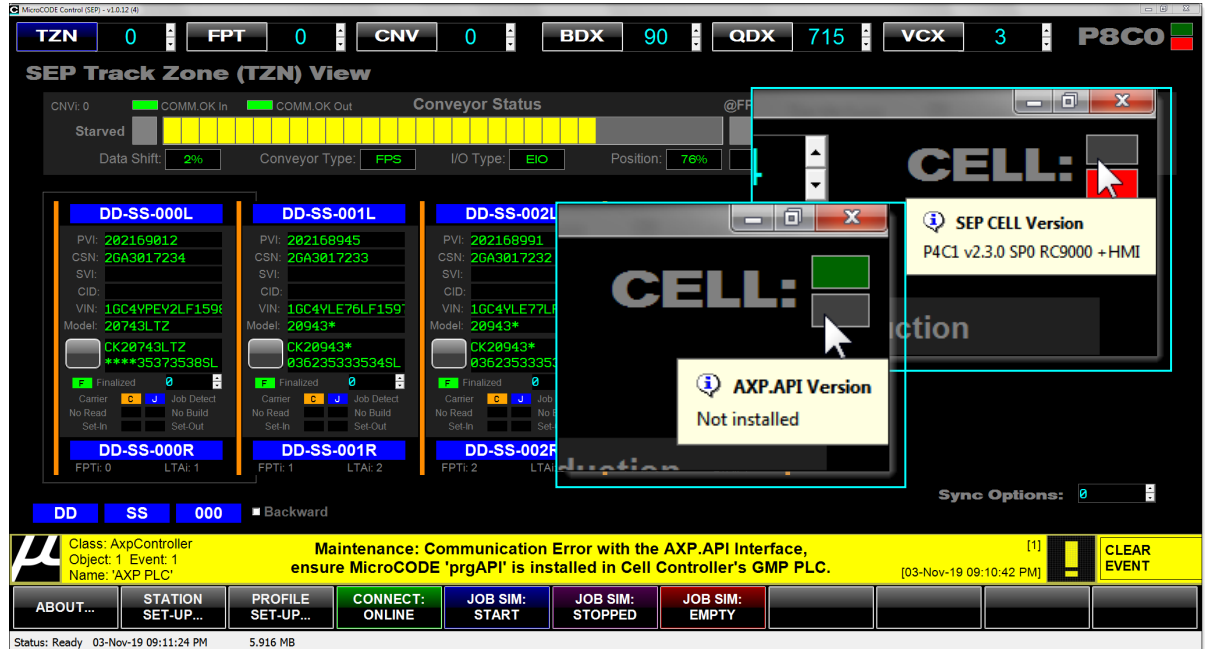
F1 ABOUT... F2 PROFILES: SET-UP... F3 **CONNECT: ONLINE** F4 TZN SIM: NO TZN F5 TZN SIM: NO TZN F6 TZN SIM: NO TZN F7 TZN SIM: NO TZN F8 TZN SIM: NO TZN F9 F10 F11

Status: Ready 19-Nov-21 02:13:55 PM 81.156 MB



The App establishes two (2) distinct connections to the ‘Active’ EPP Cell Controller PLCs...

- The first is a connection to the ‘EPP Cell Controller’ – as a READ ONLY connection.
- The second is a connection to the ‘MicroCODE Application Programming Interface (API)’ which can be added to any EPP Cell Controller – this is a READ/WRITE connection for giving the Cell Controller simulation commands.

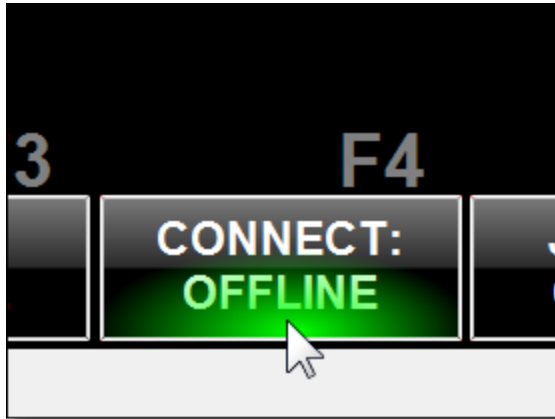


If the MicroCODE API program is not installed this App cannot write anything to the Controller, i.e.: it cannot start/stop/run a simulation; all it can do is act as a ‘Viewer’.

So, it is normal in this case to get the warning and errors shown above, these can be ignored if you only want ‘Viewer Mode’ and closed by clicking CLEAR EVENT (or F12).



To use the App as a ‘Viewer’, simply click F4 **CONNECT: OFFLINE**, this button glows green to show it will start the connection if clicked.



Once ONLINE the display shows the live data from the Cell Controller...



TRACK ZONE View – FPS Conveyor

The main App Screen is used to both configure, monitor, and control all the GM EPP functions.

The screenshot displays the EPP Track Zone (TZN) View interface. At the top, there are conveyor status indicators: TZN (0), FPT (0), CNV (2), BDX (4), QDX (221), and VCX (0). Below this, there are control buttons: Slower, Stop, Faster, Clear, Bypass, and SIM. The main area shows a grid of conveyor stations with their respective job details, including PVI, CSN, SVI, CID, VIN, and Model. The bottom section contains simulation controls: CONNECT: ONLINE, TZN SIM: RUNNING, TZN SIM: ABORT, TZN SIM: EMPTY, TZN SIM: SAVE, and TZN SIM: RESTORE. A status bar at the bottom indicates 'Status: Ready' and '22-Jan-21 10:40:20 AM'.

Track Zone Selection & Viewer

Footprint / Job Selection & Viewer

Conveyor Selection & Viewer

Build Data 'Seed' Selection & Viewer

GSIP Queue Defect Viewer

VCVS Queue Trace Viewer

SITE Set-Up
Communication Set-up, PLC connections.

Job Control Profiles (JCP)
Controls the creation of simulated Jobs.

Connect
Connects the App to the EPP Cell Controller.

TZN SIM: Abort
Aborts the simulation and restores the active Track Zone from the snap-shot.

TZN SIM: Start / Stop Toggle
Starts a new stream of simulated Jobs based on the active Profile. (It starts by taking a snap-shot of the existing tracking).

CNV: Simulator Controls
Starts or Stops simulated Conveyor motion. Clears Andon Holds, Bypasses Andon, changes Speed.

TZN SIM: Empty
Fill the active Track Zone with EMPTY CARRIERS.

TZN SIM: Save
Takes a SNAP-SHOT of the active Track Zone only.

TZN SIM: Restore
Retrieves the SNAP-SHOT of the active Track Zone only.



TRACK ZONE View – ALS / AGV / AGC / VAC Conveyors

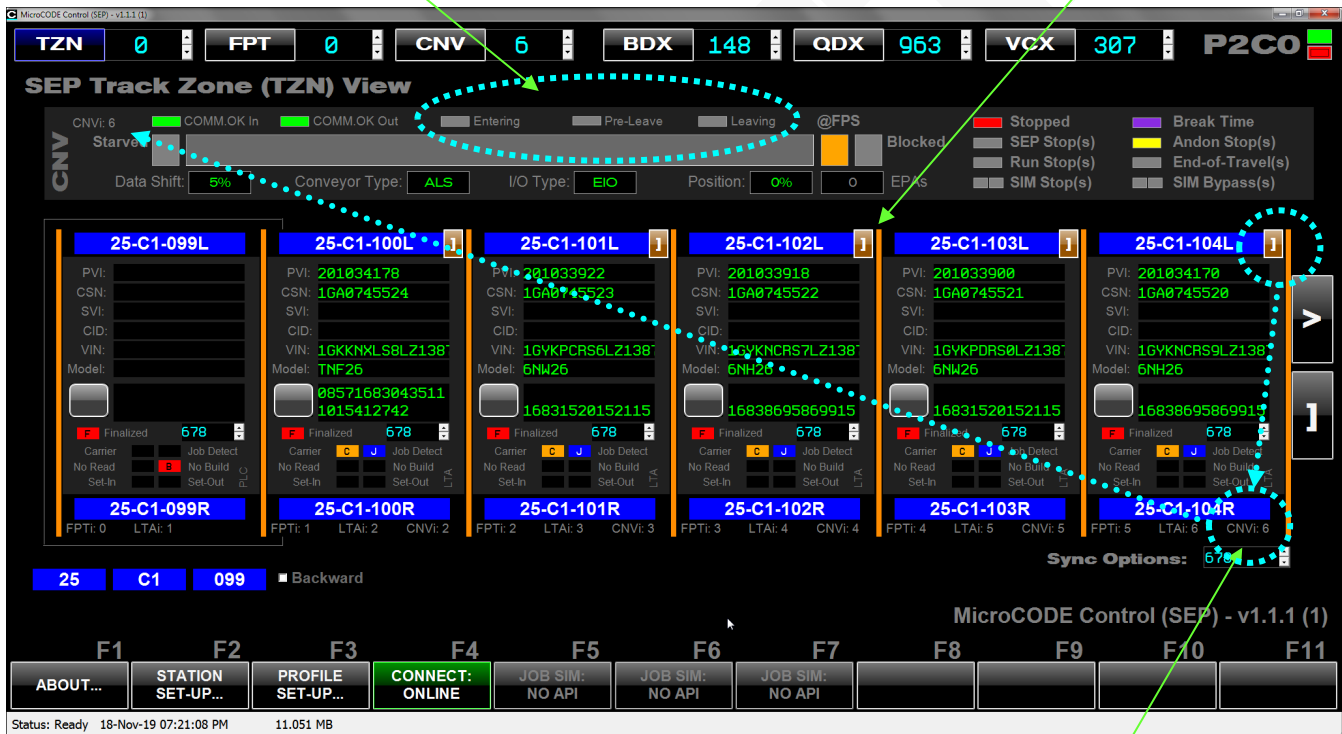
The Track Zone screen has features to better support asynchronous conveyors.

Starting with v1.1.1 the App supports the display of all data associated with Stop Stations, i.e.: Carrier Positions on Accumulating Lane Stop (ALS), Automated Guided Vehicles (AGVs), Vertically Adjusted Carriers (VAC), and Automated Guide Carts (AGCs).

Changes for ALS Tracking Support:

Stop Station Interlocks Entering, Pre-Leave, and Leaving, only visible on Stop Station Conveyors

Stop Indicator Position where a Carrier can be held



Interface Index
Stop Station specific
Conveyor Interface
index in the EPP PLC

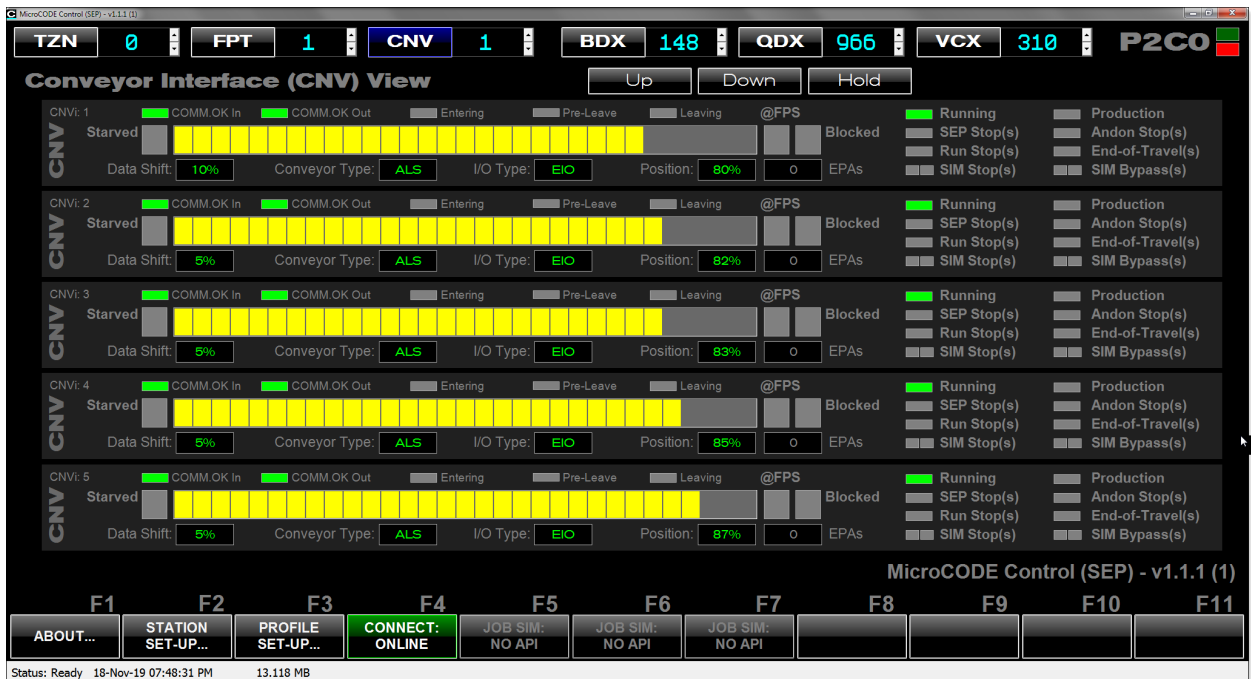
Stop Station Specific Features:

Clicking on the Stop Indicator changes the Conveyor Status displayed on the top of the TZN screen to that specific Conveyor Interface, i.e.: the one for the Stop Station position.



Examples of ALS Conveyor Interface displays:

Note the Entering/Pre-Leave/Leaving interlocks and asynchronous Carrier movement.





FOOTPRINT View

The Footprint (FPT) View is used to monitor all the Actions / Tasks in a Footprint.

25-C1-163L

PVI: 200001440
CSN: 1GA0001440
SVI: 2000000144
CID: 999
VIN: 1G1FZ6S02202014
Model: 1FB48

Valid 0

Carrier C J Job Detect
Mismatch M No Build
Set-In Set-Out PLC

25-C1-163R
FPTi: 2 LTAi: 2

GEPICS Build Data Viewer
Instant access to the GEPICS view of data in any Footprint.
See next page.

Build Data Index
By Footprint, or Sync'ed across all Footprints on screen. Controls the quick view of 32 bytes of the GEPICS Build Data Packet.

Detailed Job Status
A clear view of all the important tracking information.

Sync Options: 103



Use the Footprint View to monitor the state of your Tasks as they are executed. Clicking on a Task opens the detailed TASK Status dialog.

The screenshot shows the MicroCODE Control interface. At the top, the 'FOOTPRINT (FPT) View' is active, displaying various parameters: PVI: 210002458, CSN: 1##0002458, SVI: 210002458, CID: 458, VIN: XXXXXXXXX21202458, Model: TT35743, and Options: 210002458, 2100024581##0002458, TT35743 GA22. A task 'SN' is highlighted in a red dashed circle. A blue arrow points from this task to the 'TASK Status' dialog box below.

The 'TASK Status' dialog box shows the following details:

- SN: GSF1
- TASK: 12540
- SLKS: 1
- PVI: 210002458
- CSN: 1##0002458
- 17-R1-121L

The 'Task Status Viewer' section contains several status categories:

- Job:** Job Present (checked), Job Mismatch, No Build Job, Bad Build Data.
- Work:** Prereq. Complete (checked), Work Started, Pre Warning FP, Pre Stopped FP; Past Start FP, Work in Progress (checked), Past Warning FP, Past Stopped FP; Work Enable (checked), Work Complete, Warning Point (>PWP), Stopped (@FPS), Work Failed.
- O.I.:** Bypassed, Released, Released Required; Bypass (Key), Release (Key).
- I/O:** Faulted, Battery Low; Communication Error, Out-of-Tethering.
- Order:** Work Required (checked), Action Required.
- U.I.:** Enable (Command), Bypass (Command), Release (Command), In Progress (Command), Retrigger Request, Work Disabled.

At the bottom right of the dialog, there is a 'Part Sensor(s)' section with a green 'G' icon and 'OK' and 'Cancel' buttons.



The Control App displays up to sixty-four (64) Tasks in the Footprint. Up to thirty-two (32) on each side. Each Task is display on the appropriate side of the Footprint.

Only the Tasks configured in the Footprint are displayed.

For each Task the App shows a representation of the LED lighted Key Switch (SLKS), along with its state, the SLKS Number (#), and the acronym representing the Task TYPE. (The TYPE and SLKS alternate in the display).

Task Types:

- TT = Torque Tool
- PP = Part Pick
- BC = Part Scan (Barcode Scan)
- SN = Part Sensor(s)
- VC= Verify Component (Trace Scan)
- PT = Process Tool
- VS = Verification Station
- CC = Custom Code
- VV = Vision Verification

Task State at-a-glance:

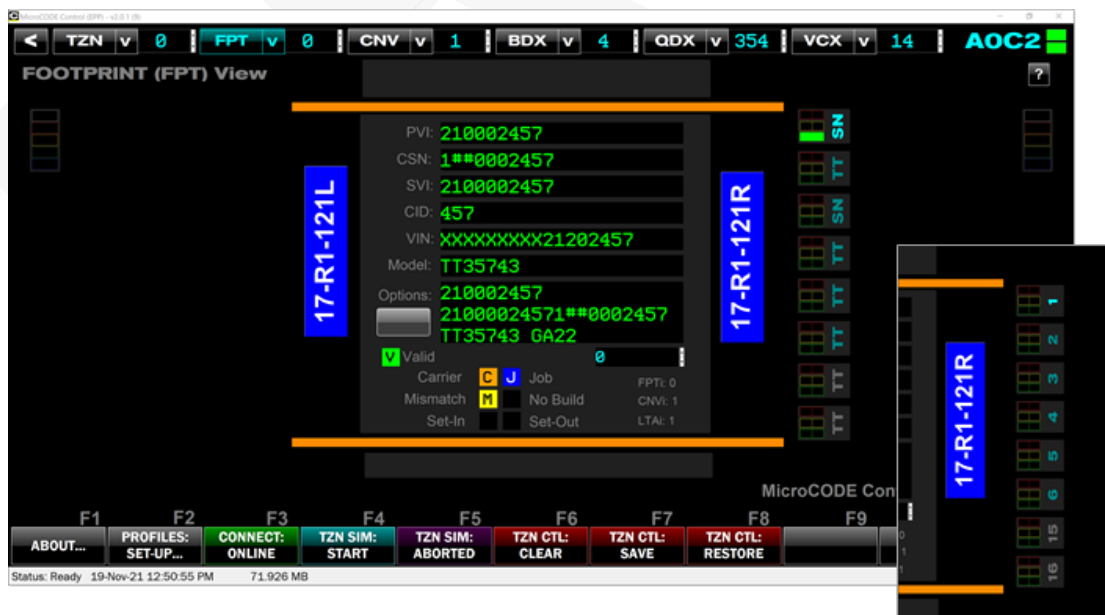
Action / Task that is executing...



Action / Task that is waiting...



Action / Task is the not required...





CONVEYOR View

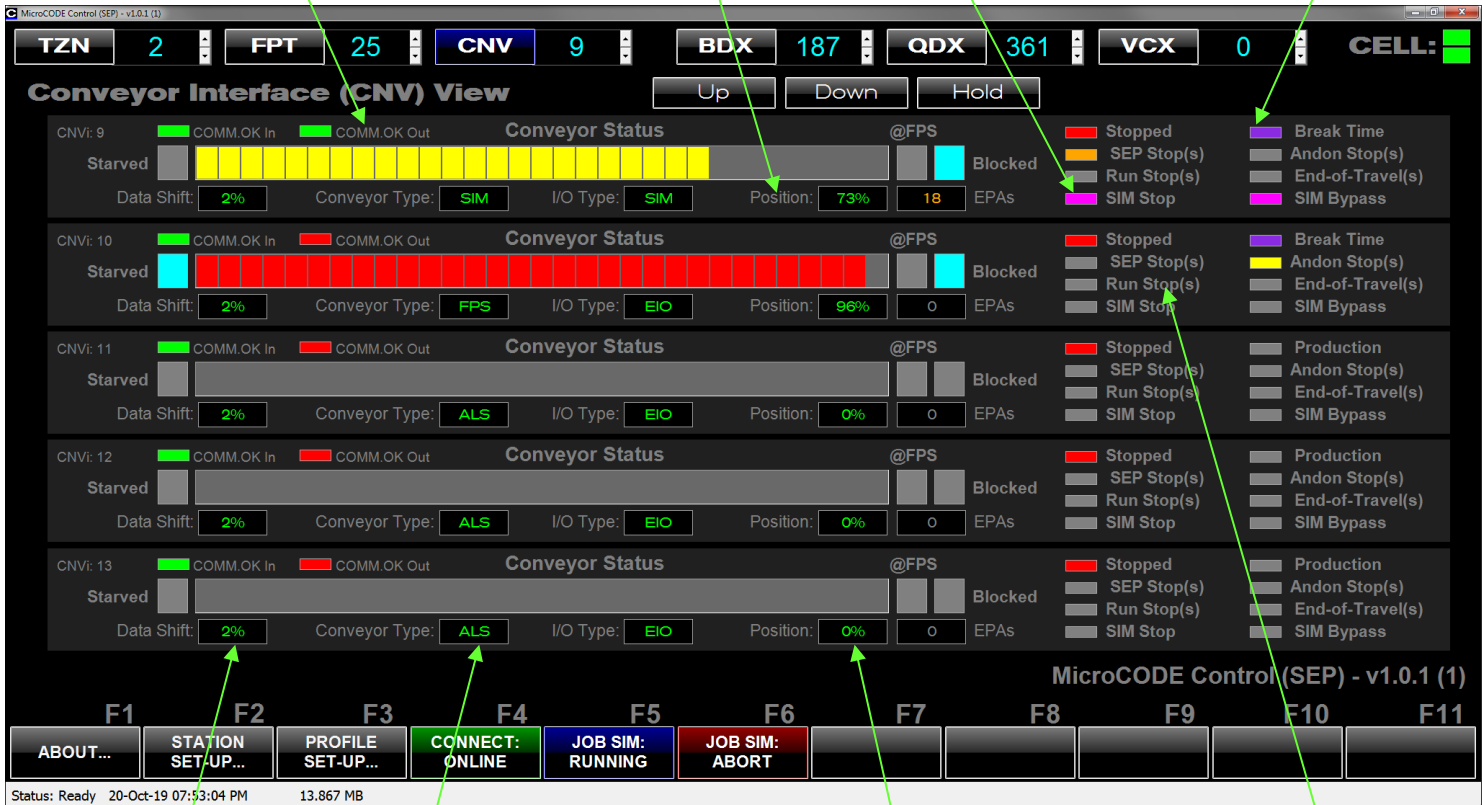
A screen to monitor multiple Conveyors in an Area all at the same time.

Five (5) Conveyors
Live view of a Conveyor group

Interface Status
Complete interface status at-a-glance

Live Count of EPP Holds
What's holding the Line?

Break Time
Production Status



Data Shift
Shift Point displayed and colored

Conveyor and Connection Type
Both report "SIM" during a simulation

% Travel
Graphically and as a direct value.

Blocked and Starved
What's holding the Line?

Scroll and Sync Controls

Common to all buffer/queue viewers, the user can scroll up/down thru the data and hold the view from synchronizing to the live PLC.





BDX Buffer View

A tool to allow users to examine the Build Data Buffer within the EPP PLC, with the goal of finding 'seed jobs' for running SAT simulations.

EPP Index PLC Location in EPP PLC

JOB VID's Vehicle IDs

JOB Model
To help locate the 'seed' Job you need.

Buffer Position
Changed on-the-fly

Build Data Index
By Footprint, or Sync'ed across all Footprints on screen. Controls the quick view of 32 bytes of the GEPICS Build Data Packet.

BDXi	BDBi	PVI	CSN	Model	Options
202	290	202169982	2GA3018350	CK20743	* L5P 3149 179
203	299	202170160	2GA3018349	TK20743	* L5P 2972 179
204	298	202170153	2GA3018348	TK20743	* L5P 2972 179
205	297	202170154	2GA3018347	TK20743	* L8T 2951 179
206	296	202170150	2GA3018346	CK20743	* L5P 9753 179
207	295	202170145	2GA3018345	CK30943	* L5P 9687 179
208	294	202170158	2GA3018344	CK20943	* L8T 3144 179
209	293	202169894	2GA3018343	TK20743	* L5P 2987 179
210	292	202170131	2GA3018342	CK20943	* L8T 3144 179
211	291	202170142	2GA3018341	CK20743	* L5P 9747 179
212	290	202170128	2GA3018340	CC20943	* L8T 3144 179
213	289	202170146	2GA3018339	TK20743	* L5P 2972 179

MicroCODE Control (SEP) - v1.0.12 (5)

F1 ABOUT... F2 STATION SET-UP... F3 PROFILE SET-UP... F4 CONNECT: ONLINE F5 JOB SIM: START F6 JOB SIM: STOPPED F7 JOB SIM: EMPTY F8 F9 F10 F11

Status: Ready 05-Nov-19 10:48:26 AM 4.798 MB

Filtering
This allows the user to filter by PVI, CSN, or MODEL.

End of Sequence
The Track Zone's current position is clearly visible.

Option Content
RPOs, Part Numbers, etc.

Detailed View
Opens the Vehicle Order Viewer on this Job.

Scroll and Sync Controls
Common to all buffer/queue viewers, the user can scroll up/down thru the data and hold the view from synchronizing to the live PLC.





FILTERING: BDX Buffer View

The BDX Buffer View can be filtered by:

- PVI
- CSN
- MODEL

2) Filter Data
Fill it the search data after

1) Filter Type
Click the item to filter by...

3) Apply Filter
Click to start search...

The filtered view is held until you click “Hold” to toggle it off again, and the search is visualized for the user while in progress.



GEPICS Build Data Viewer (BDV)

This Tool—available from the Track Zone (TZN), Footprint (FPT), and Build Data Buffer (BDX) screens—allows the User to examine the Build Data in the EPP PLCs thru the 'lens' of the GEPICS Format they select.

GEPICS and EPP Offsets
For easy communication with GM IT support.

Make Seed...
Makes the current GEPICS Order the 'seed' for the next simulation.

Import Seed...
Creation of a Seed Job form the import of an existing file.

PLC	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	9	PVI		2	0	0	0	0	1	4	4	0								
9	9	1	CHARA...	Pad PVI ...																	
10	10	6	BSSEQU	Last 6 o...	8	6	6	0	4	9											
16	16	10	CHARA...	Pad SVI ...	2	0	0	0	0	0	0	1	4	4							
26	26	11	CSN		1	G	A	0	0	0	1	4	4	0							
37	37	1	CHARA...	Pad CSN ...																	
38	38	7	MODEL7				1	F	B	4	8										
45	45	1	CHARA...	Pad Mode...																	
46	46	2	Hardcode...		G	A															
48	48	2	MODEL...	Last 2 o...	2	0															
50	50	4	CHARA...	Resrv fo...																	
54	54	17	VIN		1	G	1	F	7	6	S	0	2	2	0	2	0				
71	71	1	CHARA...	Pad VIN ...																	
72	72	4	OF_AL...	All RPOs	K	4	C														
76	76	4	OF_AL...	All RPOs	C	9	J														
80	80	4	OF_AL...	All RPOs	B	T	M														
84	84	4	OF_AL...	All RPOs																	
88	88	4	OF_AL...	All RPOs																	

Flexible View
Format columns are resizable, and all columns are sortable.

Choose as 'Seed' Job
Make this Order the starting point for all simulated orders.

PLC	GEPICS	Length	Data Item	Description	0	1	2	3
92	92	4	OF_ALL_OPTION...	All RPOs				
96	96	4	OF_ALL_OPTION...	All RPOs	A	V	F	
100	100	4	OF_ALL_OPTION...	All RPOs	I	2	0	
104	104	4	OF_ALL_OPTION...	All RPOs	4	2	7	4
108	108	4		Format Version Number	3	9	1	6
112	112	4		Earliest Download Supported	0	7	1	
116	116	8	M13	EPP_Part Number Radio	2	5	0	5
124	124	8	J01A	EPP_Part Number Steering Colum	3	6	8	6
132	132	8	V04B	EPP_Part Number IP Harness	8	8	3	5
140	140	8	M10	EPP_Part Number IP Clusters	8	4	0	3
148	148	4	M13	EPP_Part BCC Radio	4	2	4	5
152	152	8	A07F	EPP_Part Number Driver Knee Bo	7	8	2	7
160	160	8	A07G	EPP_Part Number Passenger Knee	8	7	4	9
168	168	8	A10A	EPP_Part Number Tophat	9	6	1	7
176	176	8	A01Y	EPP_Part Number BEV Glove Box	6	2	4	0
184	184	8	X28C	EPP_Part Number LH Heater Duct				
192	192	8	M03N	EPP_Part Number Radio Display				
200	200	0	J01C	EPP_Part Number Steering Coil				



GEPICS Build Data Viewer (BDV) - details

This Tool—available from the Track Zone (TZN), Footprint (FPT), and Build Data Buffer (BDX) screens—allows the User to examine the Build Data in the EPP PLCs thru the 'lens' of the GEPICS Format they select.

GEPICS Formats
 The format being uses to interpret the data (changeable on-the-fly via the **Import** button).

EPP Index
 PLC Location in BD [*]

GEPICS Index
 Format Location

GEPICS Length
 Data Item Bytes output to EPP PLC

EPP Data
 Data from PLC location

GEPICS Items
 Data Items in the GEPICS Format

GEPICS
Format: **EPP_TRIM, EPP_1007**
Items: **329**
X

Build Data Viewer
PVI: **200001439**
CSN: **1GA0001439**
Source: **PLC**

PLC	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	9	PVI		2	0	0	0	0	1	4	3	9								
9	9	1	CHARA...	Pad PVI ...																	
10	10	6	BSSEQNUM	Last 6 o...	8	6	6	0	4	9											
16	16	10	CHARA...	Pad SVI ...	2	0	0	0	0	0	1	4	3								
26	26	11	CSN		1	G	A	0	0	0	1	4	3	9							
37	37	1	CHARA...	Pad CSN ...																	
38	38	7	MODEL7				1	F	B	4	8										
45	45	1	CHARA...	Pad Mode...																	
46	46	2		Hardcode...	G	A															
48	48	2	MODEL...	Last 2 o...	2	0															
50	50	4	CHARA...	Resrv fo...																	
54	54	17	VIN		1	G	1	F	Z	6	S	0	2	2	0	2	0	1	4	3	9
71	71	1	CHARA...	Pad VIN ...																	
72	72	4	OF_AL...	All RPOs	K	4	C														
76	76	4	OF_AL...	All RPOs	C	9	J														
80	80	4	OF_AL...	All RPOs	B	T	M														
84	84	4	OF_AL...	All RPOs																	
88	88	4	OF_AL...	All RPOs																	

Make Seed...
Import Seed...
OK
Cancel

Import GEPICS Seed
 Changes the Job being used as a Seed for simulation by importing a selected .GSJ file.

GEPICS Data Item name
 Locates within GEPICS

GEPICS Data Item description
 Details from GEPICS

GEPICS
Format: **EPP_TRIM, EPP_1007**
Items: **329**
X

Build Data Viewer
PVI: **200001439**
CSN: **1GA0001439**
Source: **APP**

PLC	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	9	PVI		2	0	0	0	0	1	4	3	9								
9	9	1	CHARA...	Pad PVI ...																	
10	10	6	BSSEQNUM	Last 6 o...	8	6	6	0	4	9											
16	16	10	CHARA...	Pad SVI ...	2	0	0	0	0	0	1	4	3								
26	26	11	CSN		1	G	A	0	0	0	1	4	3	9							
37	37	1	CHARA...	Pad CSN ...																	
38	38	7	MODEL7				1	F	B	4	8										
45	45	1	CHARA...	Pad Mode...																	
46	46	2		Hardcode...	G	A															
48	48	2	MODEL...	Last 2 o...	2	0															
50	50	4	CHARA...	Resrv fo...																	
54	54	17	VIN		1	G	1	F	Z	6	S	0	2	2	0	2	0	1	4	3	9
71	71	1	CHARA...	Pad VIN ...																	
72	72	4	OF_AL...	All RPOs	K	4	C														
76	76	4	OF_AL...	All RPOs	C	9	J														
80	80	4	OF_AL...	All RPOs	B	T	M														
84	84	4	OF_AL...	All RPOs																	
88	88	4	OF_AL...	All RPOs																	

Make Seed...
Import Seed...
OK
Cancel

?

This will control the view of the EPP PLC Build Data.

26

Import new Format?
Yes
No



QDX Defect Queue View

A tool to allow users to examine the Vehicle Defects Queue within the EPP PLC, with the goal of verifying Defects are generated during SAT simulations.

EPP Index
PLC Location in EPP PLC

Trigger ID
Used to communicate with QDI

JOB PVI
The Vehicle that will hold the Defect.

Buffer Position
Changed on-the-fly

Defect List (Numeric View)
The Defects that are being opened on the Vehicle.

Filtering
This allows the user to filter by PVI, or MACHINE CODE (EPA).

Machine Code
The tie to GSIP for this Process.

Detailed View
Opens the Vehicle Defects Viewer on this Job.

Scroll and Sync Controls
Common to all buffer/queue viewers, the user can scroll up/down thru the data and hold the view from synchronizing to the live PLC.

Up Down Hold Sync Defects: 0



FILTERING: QDX Queue View

The QDX Defect Queue View can be filtered by:

- PVI
- Machine Code (EPA Identifier)

2) Filter Data
Fill it the search data after

1) Filter Type
Click the item to filter by...

SEP Viewer Filter

202169728 • PVI

15332 • Machine Code

Apply

MicroCODE Control (SEP) - v1.0.12 (5)

Status: Ready 05-Nov-19 12:07:48 PM 7.413 MB

The filtered view is held until you click “Hold” to toggle it off again, and the search is visualized for the user while in progress.

MicroCODE Control (SEP) - v1.0.12 (5)

DEFECTS Queue (QDX) View

QDX: 555 Trigger ID: 590 MC: 15332 PVI: 202162790 Event: Release Defects: 002,003

QDX: 948 Trigger ID: 9982 MC: 15332 PVI: 202170090 Event: Release Defects: 002,003

QDX: 2 Trigger ID: MC: PVI: Event: Defects:

QDX: 3 Trigger ID: MC: PVI: Event: Defects:

QDX: 4 Trigger ID: MC: PVI: Event: Defects:

QDX: 5 Trigger ID: MC: PVI: Event: Defects:

QDX: 6 Trigger ID: MC: PVI: Event: Defects:

QDX: 7 Trigger ID: MC: PVI: Event: Defects:

QDX: 8 Trigger ID: MC: PVI: Event: Defects:

QDX: 9 Trigger ID: MC: PVI: Event: Defects:

QDX: 10 Trigger ID: MC: PVI: Event: Defects:

QDX: 11 Trigger ID: MC: PVI: Event: Defects:

MicroCODE Control (SEP) - v1.0.12 (6)

DEFECTS Queue (QDX) View

QDX: 957 Trigger ID: 6975 MC: 31163 PVI: 202170644 Event: Quality Defects: 000,777

QDX: 958 Trigger ID: 6974 MC: 31161 PVI: 202170644 Event: Quality Defects: 000,777

QDX: 2 Trigger ID: MC: PVI: Event: Defects:

QDX: 3 Trigger ID: MC: PVI: Event: Defects:

QDX: 4 Trigger ID: MC: PVI: Event: Defects:

QDX: 5 Trigger ID: MC: PVI: Event: Defects:

QDX: 6 Trigger ID: MC: PVI: Event: Defects:

QDX: 7 Trigger ID: MC: PVI: Event: Defects:

QDX: 8 Trigger ID: MC: PVI: Event: Defects:

QDX: 9 Trigger ID: MC: PVI: Event: Defects:

QDX: 10 Trigger ID: MC: PVI: Event: Defects:

QDX: 11 Trigger ID: MC: PVI: Event: Defects:

MicroCODE Control (SEP) - v1.0.12 (6)

Status: Ready 05-Nov-19 12:10:00 PM 6.561 MB

417

Status: Ready 05-Nov-19 07:26:18 PM 6.529 MB



CLEARING: QDX Queue

The QDX Defect Queue held within the EPP PLC can be cleared from this App as long as the prgAPI is been installed in the target Cell Controller.

Clear Command
Erases all Defect Data from the connected Cell Controller

DEFECTS Queue (QDX) View

QDX#	Trigger ID	MC	PVI	Event	Defects
427	3735	15164	202169862	Bypass	001
428	3736	15116	202169780	Bypass	001
429	3737	15123	202169772	Bypass	001
430	3738	15051	202169855	Bypass	001
431	3739	15052	202169855	Bypass	001
432	3740	15151	202169845	Bypass	001
433	2741	15101	202168822	Quality	000,777
434	2742	15101	202168841	Quality	000,777
435	2743	15101	202168842	Quality	000,777
436	2744	15101	202168772	Quality	000,777
437	2745	15072	202168791		
438	2746	15101	202168839		

Buttons: Filter, Up, Down, Hold, **Clear...**, Sync: 0

Navigation: F1 ABOUT..., F2 STATION SET-UP..., F3 PROFILE SET-UP..., F4 **CONNECT: ONLINE**, F5 JOB SIM: START, JOI ABC

Status: Ready 14-Nov-19 10:03:56 AM 7.967 MB

? This will clear all Defects from the GMP PLC erasing the current SATs results for all Users.

Clear the Defects Queue?

DEFECTS Queue (QDX) View

QDX#	Trigger ID	MC	PVI	Event	Defects
0					0
1					0
2					0
3					0
4					0
5					0
6					0
7					0
8					0
9					0
10					0
11					0

Buttons: Filter, Up, Down, Hold, Clear...

Navigation: F1 ABOUT..., F2 STATION SET-UP..., F3 PROFILE SET-UP..., F4 **CONNECT: ONLINE**, F5 JOB SIM: START, JOB SIM: ABORTED, JOB SIM: EMPTY

Status: Ready 14-Nov-19 10:06:19 AM 7.990 MB

Operator: The GSIP Defects Queue (QDX) was CLEARED for all Users in the Cell Controller. [14-Nov-19 10:05:47 AM]



GSIP Defect Data Viewer (DDV)

This Tool—available from the Quality Defects View (QDX) screen—allows the User to examine the Defect Data in the EPP PLCs thru the ‘lens’ of the standard EPP Defect definitions.

EPA Machine Code
Unique Part/Process Identifier.

Vehicle Ids
Identification of the Job holding these Defects.

PLC	GSIP RLN	Defect	Description
0	25403002	002	RELEASED
1	25403006	006	SC - DUPLICATE VID or PT.04 - CYCLE ABORTED
2	25403008	008	SC - INVALID S/N or PT.06 - TOOL SPECIFIC #2
3	25403009	009	SC - UNCOLLECTED or PT.07 - TOOL SPECIFIC #3
4	25403010	010	PT.08 - TOOL SPECIFIC #4
5	25403011	011	PT.09 - TOOL SPECIFIC #5
6	25403012	012	PT.10 - TOOL SPECIFIC #6

Defect Position in List
For checking against the EPP PLC.

GSIP RLNs
GSIP Defect Relationship ID for communication to GSIP Coordinator.

Defect Codes
The EPP Defect Codes generated on the Vehicle.

Defect Description
A human readable description of the Vehicle Defect.



Example 3 EPP TASK details in the App Defect Viewer

PLC	GSIP RLN	Defect	Description
0	25403002	007	RELEASED
1	25403006	006	SC - DUPLICATE VID or PT.04 - CYCLE ABORTED
2	25403008	008	SC - INVALID S/N or PT.06 - TOOL SPECIFIC #2
3	25403009	009	SC - UNCOLLECTED or PT.07 - TOOL SPECIFIC #3
4	25403010	010	PT.08 - TOOL SPECIFIC #4
5	25403011	011	PT.09 - TOOL SPECIFIC #5
6	25403012	012	PT.10 - TOOL SPECIFIC #6

TASK Type
PP, TT, BC, PT,
VC, CE, etc.

TASK Name
As entered in the error
proofing system.

TASK ID
As entered in the error
proofing system.

TASK Description
As entered in the error
proofing system.

TASK Location
DD-SS-OOOA
Footprint Placard.

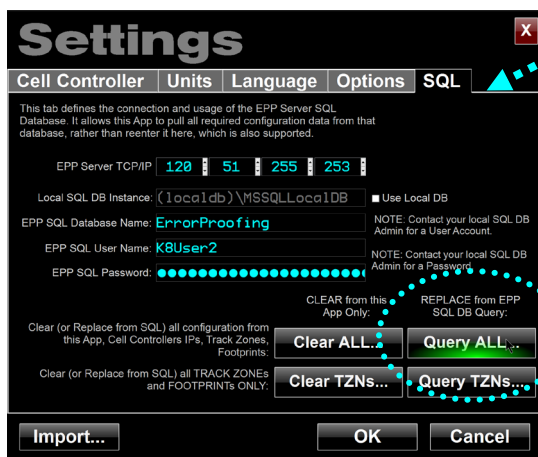
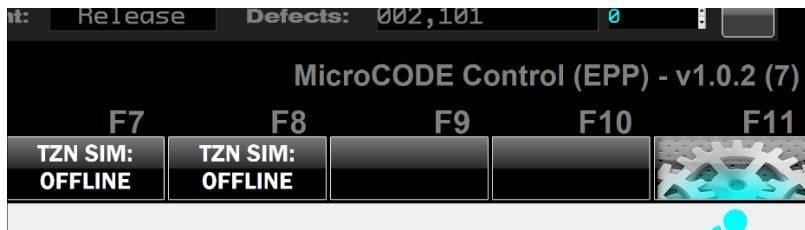
TASK O.I. (LSKS)
Unique ID within
this Cell Controller
for the Light Stack /
Keyswitch Device.



Example 4 EPP TASK details missing in Defect Viewer



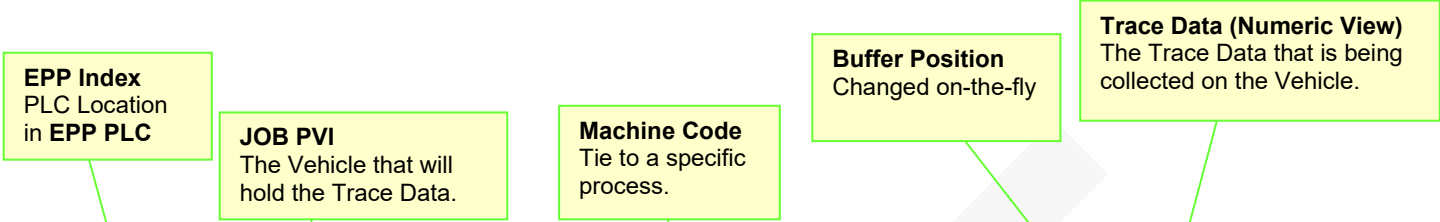
This display— “Can’t locate via Machine Code”—typically means you need to re-query the EPP SQL Database from the SETTINGS dialog box to get the current TASK definitions. The other possibility is that no one has assigned a GSIP Machine Code to the Task.





VCX Trace Queue View

A tool to allow users to examine the Vehicle Trace Queue within the EPP PLC, with the goal of verifying Trace Data are collected during SAT simulations.



TRACE Queue (VCX) View

VCXi	PVI	CSN	MC	Parts	Trace
108	202141943	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
109	202137946	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
110	202151812	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
111	202155924	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
112	202160008	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
113	202167830	<SEPActions>	31462	1	VPPS=<Y4620200000000S >
114					
115					
116					
117					
118					
119					

MicroCODE Control (SEP) v1.0.12 (5)

F1 ABOUT... F2 STATION SET-UP... F3 PROFILE SET-UP... F4 CONNECT: ONLINE F5 JOB SIM: START F6 JOB SIM: STOPPED F7 JOB SIM: EMPTY F8 F9 F10 F11

Status: Ready 05-Nov-19 11:49:00 AM 7.488 MB

Filtering
This allows the user to filter by PVI, CSN, or MACHINE CODE (EPA).

Part Count
Number of parts collected in this transaction.

Detailed View
Opens the Vehicle Trace Viewer on this Job.

Scroll and Sync Controls
Common to all buffer/queue viewers, the user can scroll up/down thru the data and hold the view from synchronizing to the live PLC.

Up Down Hold Sync Parts: 41



GM-1737 Support in TRACE VIEW

The App now supports detecting and displaying GM-1737 Trace Data within the EPP PLC in both the VCX Trace Queue View and Trace Data Examiner...

MicroCODE Control (SEP) - v1.1.2 (2)

TZN: 0 FPT: 0 CNV: 0 BDX: 103 QDX: 185 VCX: 280 P4C0

TRACE Queue (VCX) View Filter Up Down Hold Sync: 0

VCX#	PVI	CSN	MC	Parts	Trace
274	201067528	<SEPActions>	14251	1	VPPS=<V461980000000L >
275	201070531	<SEPActions>	14103	1	VPPS=<V461140000000R >
276	201069686	<SEPActions>	14250	1	VPPS=<V461980000000R >
277	201077437	<SEPActions>	15136	1	VPPS=<V463020000000J >
278	201077437	<SEPActions>	15136	1	VPPS=<V462020000000R >
279	201067528	<SEPActions>	14102	1	COMP.ID=<AB > VENDOR.I
280	201067528	<SEPActions>	14102	1	COMP.ID=<AB > VENDOR.I
281	201064026	<SEPActions>	14251	1	VPPS=<V461980000000L >
282	201065633	<SEPActions>	14102	1	COMP.ID=<AB > VENDOR.I
283	201075831	<SEPActions>	15136	1	VPPS=<V463020000000J >
284	201075831	<SEPActions>	15136	1	VPPS=<V462020000000R >
285	201065290	<SEPActions>	14103	1	VPPS=<V461140000000R >

MicroCODE Control (SEP) - v1.1.2 (2)

F1 ABOUT... F2 STATION SET-UP... F3 PROFILE SET-UP... F4 CONNECT: ONLINE F5 JOB SIM: NO API F6 JOB SIM: NO API F7 JOB SIM: NO API F8 F9 F10 F11

Status: Ready 29-Jan-20 05:04:09 PM 5.986 MB



FILTERING: VCX Trace Queue View

The VCX Trace Queue View can be filtered by:

- PVI
- CSN
- MODEL

2) Filter Data
Fill it the search data after

1) Filter Type
Click the item to filter by...

3) Apply Filter
Click to start search...

The screenshot shows the MicroCODE Control (SEP) v1.0.12 (5) interface. At the top, there are buttons for TZN (1), FPT (14), CNV (1), BDX (198), QDX (105), and VCX (1563). Below these is the 'TRACE Queue (VCX) View' with a 'Filter' button. A 'SEP Viewer Filter' dialog box is open, showing the following fields:

- PVI:** 202167845
- CSN:** 3018431
- Machine Code:** 15332

The dialog also has an 'Apply' button. The background shows a list of VCX items with columns for PVI, CSN, MC, Parts, and Trace. The status bar at the bottom shows 'Status: Ready 05-Nov-19 12:35:17 PM 8.430 MB'.

The filtered view is held until you click “Hold” to toggle it off again, and the search is visualized for the user while in progress.

The top screenshot shows the MicroCODE Control (SEP) v1.0.12 (6) interface with the 'Hold' button highlighted in red. The 'TRACE Queue (VCX) View' shows a filtered list of VCX items. The status bar shows 'Status: Ready 05-Nov-19 12:34:36 PM 5.589 MB'.

The bottom screenshot shows the same interface, but with a large '106.7' overlaid on the VCX list, indicating a search in progress. The 'Hold' button is still highlighted. The status bar shows 'Status: Ready 05-Nov-19 07:20:44 PM 5.842 MB'.



CLEARING: VCX Queue

The VCX Trace Queue held within the EPP PLC can be cleared from this App as long as the **prgAPI** is been installed in the target Cell Controller.

Clear Command
Erases all Trace Data from the connected Cell Controller

The screenshot shows the 'TRACE Queue (VCX) View' with a table of 22 entries. The 'Clear...' button is highlighted in red. A dialog box is open with the text: 'This will clear all Trace Data from the GMP PLC erasing the current SATs results for all Users.' Below the dialog are 'Yes' and 'No' buttons.

VCX:	PVI:	CSN:	MC:	Parts:	Trace:
11	202142308	<SEPActions>	15137	1	VPPS=<V471000000000X 0
12	202146886	<SEPActions>	15137	1	VPPS=<V471000000000X 0
13	202152211	<SEPActions>	15137	1	VPPS=<V471000000000X 0
14	202156300	<SEPActions>	15137	1	VPPS=<V471000000000X 0
15	202160495	<SEPActions>	15137	1	VPPS=<V471000000000X 0
16	202167383	<SEPActions>	15137	1	VPPS=<V471000000000X 0
17					
18					
19					
20					
21					
22					

The screenshot shows the 'TRACE Queue (VCX) View' with an empty table. A status bar at the bottom contains the following information:

- Class: Application
- Object: App
- Name: MicroCODE
- Operator: The GEPICS Trace Queue (VCX) was CLEARED for all Users in the Cell Controller.
- [14-Nov-19 10:32:53 AM]
- CLEAR EVENT



GEPICS Trace Data Viewer (TDV)

This Tool—available from the Quality Defects View (VCX) screen—allows the User to examine the Defect Data in the EPP PLCs thru the ‘lens’ of the standard EPP Defect definitions.

EPA ID + Machine Code
Unique Part/Process Identifier.

Vehicle Ids
Identification of the Job holding these Parts.

GEPICS Trace

Station Name: 25C1089R System Code: VCVSTRAC

Machine Code: 25142 Record Key: C1FUELTANK

EPA Id: 255 Parts: 3

PVI: 201463360 CSN: 0

EPA: 14 SC C1YX VCVS FUEL TANK 25-C1-089R

Trace Data Viewer

SEP	VPPS / Component	Part No.	DUNS / Vendor	Trace Data	Payload Data
0	Y9510000000000X	P84847392	12V840208362	TA121028CFFSA1278	10S00001...
1	Y9529700000000X	P84847394	12V812751138	T6221012000038134	...
2	Y9511200000000X	P13274188	12V588176862	T1M160440R2655620	...

OK Cancel

Part Position in List
For checking against the EPP PLC.

VPPS
The Component ID (Vehicle Part Positioning System).

Part Number
Standard 8 Digit GM Part Number.

Trace Data
The data, like Serial Number, that uniquely identifies a specific part in a single Vehicle.



5 Configuring the Simulated Vehicle Orders

The main purpose of this App is to be a ‘Generator’ of simulated GEPICS Vehicle Orders and provide a ‘Viewer’ to check the results of running SATs.

In order to generate Vehicle Orders the App and User needs three (3) things:

- A GEPICS Order from a EPP PLC* to act as a ‘Seed Job’.
- The corresponding GEPICS ‘Format’ Definition File.
- A Job Control Profile (JCP) configured into this App.

Selecting a GEPICS Seed Job

Any Job Order being viewed in the App’s GEPICS Viewer can be used as the new ‘Seed Job’ by simply clicking “Seed...”. This can even be changed while the simulation is running.

Sources of Jobs:

- EPP – Line Tracking Array (Tracking Image Tag)
- EPP – GEPICS Build Data Buffer (GEPICS ODD Tag)

The screenshot shows the MicroCODE Control (SEP) - v1.0.12 (1) interface. At the top, there are status indicators for TZN (0), FPT (0), CNV (0), BDX (148), QDX (669), VCX (2524), and CELL (red). The main area is titled 'SEP Track Zone (TZN) View' and includes a 'Conveyor Status' section with 'COMM.OK In' and 'COMM.OK Out' indicators. A 'GEPICS' window is open, showing a 'Build Data Viewer' table. The table has columns for SEP, GEPICS, Length, Data Item, Description, and a grid of values. A 'Seed...' button is highlighted with a red circle and a blue dotted line. A tooltip box is overlaid on the 'Seed...' button, containing a question mark icon and the text: 'This memorizes the current Job as the basis for all Jobs created during SAT simulations. This memory will persist regardless of the contents of the Cell Controllers going forward.' Below the tooltip are buttons for '27', 'Select this Job?', 'Yes', and 'No'.

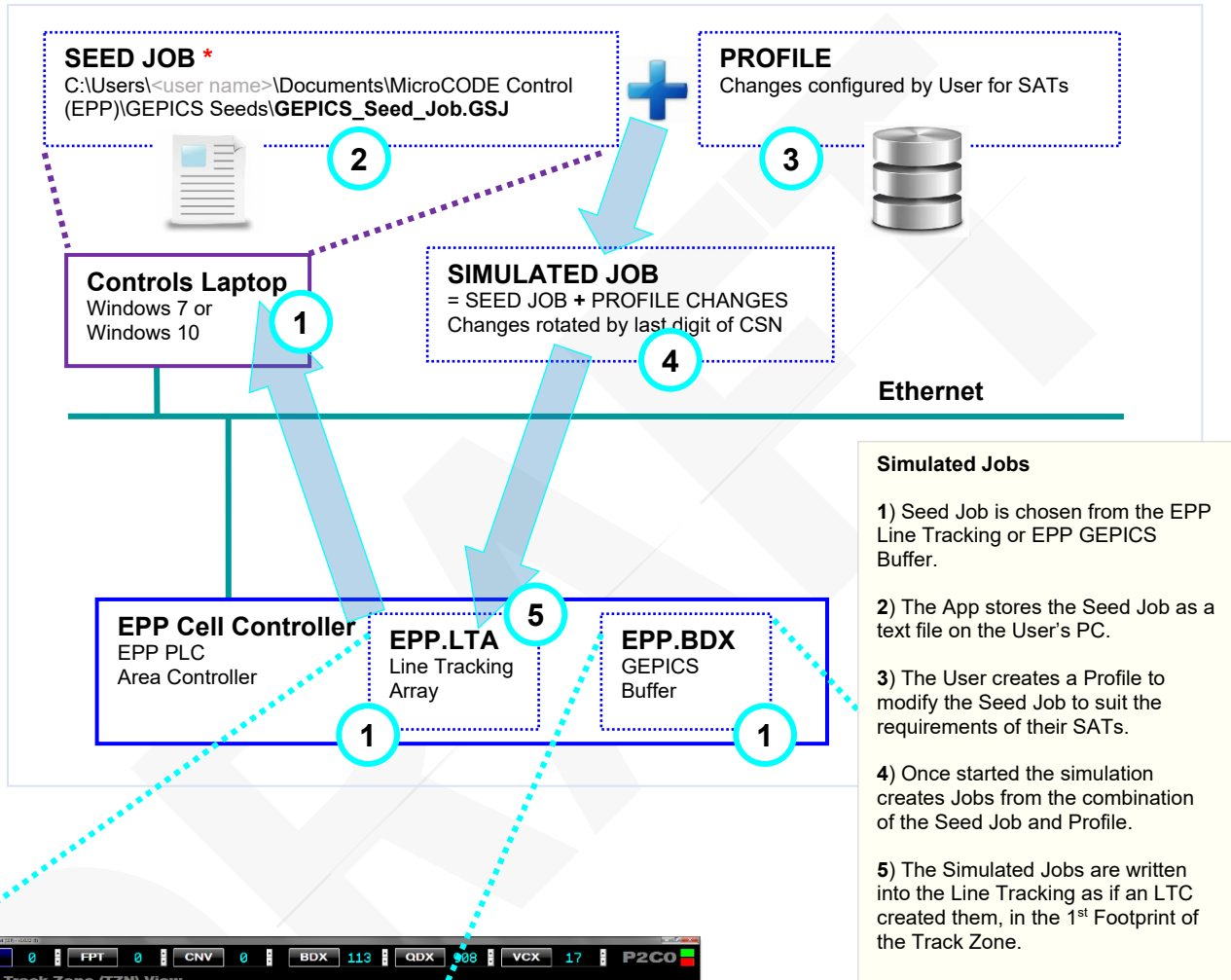
* Once a “Seed Job” has been selected it is stored as a text file, this text file can be emailed to other users who may not have access to a loaded a EPP PLC.



Figure 7 The SIMULATED JOB Process

This is an illustration of how the Seed Job Process works, showing data sources, data storage, and data flow.

* Once a "Seed Job" has been selected it is stored as a text file, this text file can be emailed to other users who may not have access to a loaded a EPP PLC.





Using a GEPICS FORMAT

A GEPICS FORMAT is a data definition file that describes the source and layout of a Vehicle Order for the EPP (or other) manufacturing systems.

The GEPICS Format file can be directly exported via email from GEPICS to a User's email address. This file is used by the Control (EPP) App to interpret all Job Build Data read from the EPP PLCs.

Example 5 A GEPICS Format File

```

C:\Users\Tim McGuire\Documents\MicroCODE Control (SEP)\GEPICS Formats\FSEPPINL.txt
1 |EXP_VERSION', '3'
2 |HOR', 'FSEPPINL', '97', '04/08/19 10:26:53', 'SEP T1XX P2C0 AND P9C0 Final', 'C', 'P', '04/08/19 10:26:53', 'zztzck', '04/08/19 10:26:53', 'Format Promotion',
3 |DET', 'FSEPPINL', '97', '1', '0', 'A', 'PRO', 'PVI', '0', '9', '0', '9', 'N', '0', '0', '0', 'START OF DATA PVI OR PRIMARY V', '0',
4 |DET', 'FSEPPINL', '97', '9001', '9', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '1', 'N', '0', '0', '0', 'SPACE TO MAKE FULL WORD IN PLC', '0',
5 |DET', 'FSEPPINL', '97', '10001', '10', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '15', 'N', '0', '0', '0', 'SVI', '0',
6 |DET', 'FSEPPINL', '97', '25001', '25', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '1', 'N', '0', '0', '0', 'SPACE FOR SVI TO ALLOW FOR FULL', '0',
7 |DET', 'FSEPPINL', '97', '26001', '26', 'A', 'PRO', 'CSN', 'SK', '11', '0', '11', 'N', '0', '0', '0', 'CSN OR CURRENT SEQUENCE NUMBER', '0',
8 |DET', 'FSEPPINL', '97', '37001', '37', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '1', 'N', '0', '0', '0', 'SPACE TO MAKE FULL WORD IN PLC', '0',
9 |DET', 'FSEPPINL', '97', '38001', '38', 'A', 'PRO', 'VIN', 'V', '17', '0', '17', 'N', '0', '0', '0', 'VIN OR VEHICLE ID NUMBER', '0',
10 |DET', 'FSEPPINL', '97', '55001', '55', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '3', 'N', '0', '0', '0', 'SPACE TO MAKE FULL WORD IN PLC', '0',
11 |DET', 'FSEPPINL', '97', '58001', '58', 'A', 'PRO', 'MODEL?', 'B', '7', '0', '7', 'N', '0', '0', '0', 'MODEL', '0',
12 |DET', 'FSEPPINL', '97', '65001', '65', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '1', 'N', '0', '0', '0', 'SPACE TO MAKE FULL WORD IN PLC', '0',
13 |DET', 'FSEPPINL', '97', '66001', '66', 'A', 'TXT', 'GA', '0', '2', 'N', '0', '0', '0', '0',
14 |DET', 'FSEPPINL', '97', '68001', '68', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '6', 'N', '0', '0', '0', 'GA CSN PREFIX FOR GENERAL ASSE', '0',
15 |DET', 'FSEPPINL', '97', '74001', '74', 'A', 'PRO', 'MODEL?', '0', '7', 'N', '0', '0', '0', 'FINAL LINE DATA PACKET MODEL', '0',
16 |DET', 'FSEPPINL', '97', '81001', '81', 'A', 'PRO', 'R06', 'P', '26', '0', '1', 'N', '0', '0', '0', 'FUEL FILL', '0',
17 |DET', 'FSEPPINL', '97', '82001', '82', 'A', 'PRO', 'R02', 'P', '26', '0', '1', 'N', '0', '0', '0', 'TRANS FILL', '0',
18 |DET', 'FSEPPINL', '97', '83001', '83', 'A', 'PRO', 'R03', 'P', '26', '0', '1', 'N', '0', '0', '0', 'POWER STEERING FILL', '0',
19 |DET', 'FSEPPINL', '97', '84001', '84', 'A', 'PRO', 'R05', 'P', '26', '0', '1', 'N', '0', '0', '0', 'RADIATOR FILL', '0',
20 |DET', 'FSEPPINL', '97', '85001', '85', 'A', 'PRO', 'R03', 'P', '26', '0', '1', 'N', '0', '0', '0', 'AIR CONDITIONING FILL', '0',
21 |DET', 'FSEPPINL', '97', '86001', '86', 'A', 'PRO', 'CHARACTER_SPACES', 'SC', '99', '0', '1', 'N', '0', '0', '0', 'TRANS FLUITO TOP OFF', '0'
    
```

SEP Track Zone (TZN) View

Build Data Viewer

SEP	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	0	9	PVI	START OF DATA...	2	0	2	1	6	3	0	0	0	0	0	0	0	0	0
0	9	1	CHARAC...	SPACE TO MAKE...															
0	10	15	CHARAC...	SVI															
0	25	1	CHARAC...	SPACE FOR SVI...															
0	26	11	CHARAC...	CSN OR CURREN...	2	6	A	3	0	1	2	1	9	8					
0	37	1	CHARAC...	SPACE TO MAKE...															
0	38	17	VIN	VIN OR VEHICL...	1	0	C	4	Y	T	E	V	1	L	F	1	5	4	8
0	55	3	CHARAC...	SPACE TO MAKE...															
0	58	7	MODEL?	MODEL	3	0	9	4	3										
0	65	1	CHARAC...	SPACE TO MAKE...															
0	66	2																	
0	68	6	CHARAC...	GA CSN PREFIX...	2	6	A												
0	74	7	MODEL?	FINAL LINE DA...	C	K	3	0	9	4	3								
7	81	1	R06F	FUEL FILL															
8	82	1	R02F	TRANS FILL															
9	83	1	R01F	POWER STEERTN...															

Import new Format? Yes No



Job Control Profiles (JCP)

The App gives complete control over Model Code, RPO Codes, Process Tool Styles, anything in the GEPICS Build Data Packet.

Change Index
Up to 100 changes per CSN Sequence #

HEADER Changes
Vehicle ID and Model changes

OPTION Data
Autogenerated from the seed Job and this pattern

PROFILE Type, Name and Description
Up to 100 Profiles—each with a unique set of 10 Jobs (which of each can have 100 changes).

HEADER (Fixed)
Header data location and size are not changeable

Add and Remove PROFILES
Up to 100 Profiles are available at any time.

CSN Sequence
Up to 10 unique Jobs in constant rotation

Import and Export PROFILES
Take any Profile out to a text file that can be shared with other Users

GEPICS Reference
Open a window into the GEPICS 'Seed Job' data for reference while configuring your simulation.

CSN	#	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data
CSN 0	0	PVI	0	9	NNNNNNNN0	PVI	11	4	NNN0
CSN 1	1	SVI	10	16	NNNNNNNN0	SVI	21	4	NNN0
CSN 2	2	CSN	26	11	NNNNNNNN0	CSN	31	4	NNN0
CSN 3	3	VIN	38	17	NNNNNNNN...	VIN	41	8	NNNNNNNN0
CSN 4	4	MODEL	58	8	MMMMMMMM	MODEL	51	8	MYMODEL !
CSN 5	5	SKIP	---	---	---	RPO	501	3	AAA
CSN 6	6	SKIP	---	---	---	RPO	502	3	BBB
CSN 7	7	SKIP	---	---	---	PART	503	8	11111111
CSN 8	8	SKIP	---	---	---	PART	504	5	22222
Copy	9	NONE	n/a	n/a	n/a	RPO	51	3	C44
Paste	10	NONE	n/a	n/a	n/a	STYLE	1733	1	2

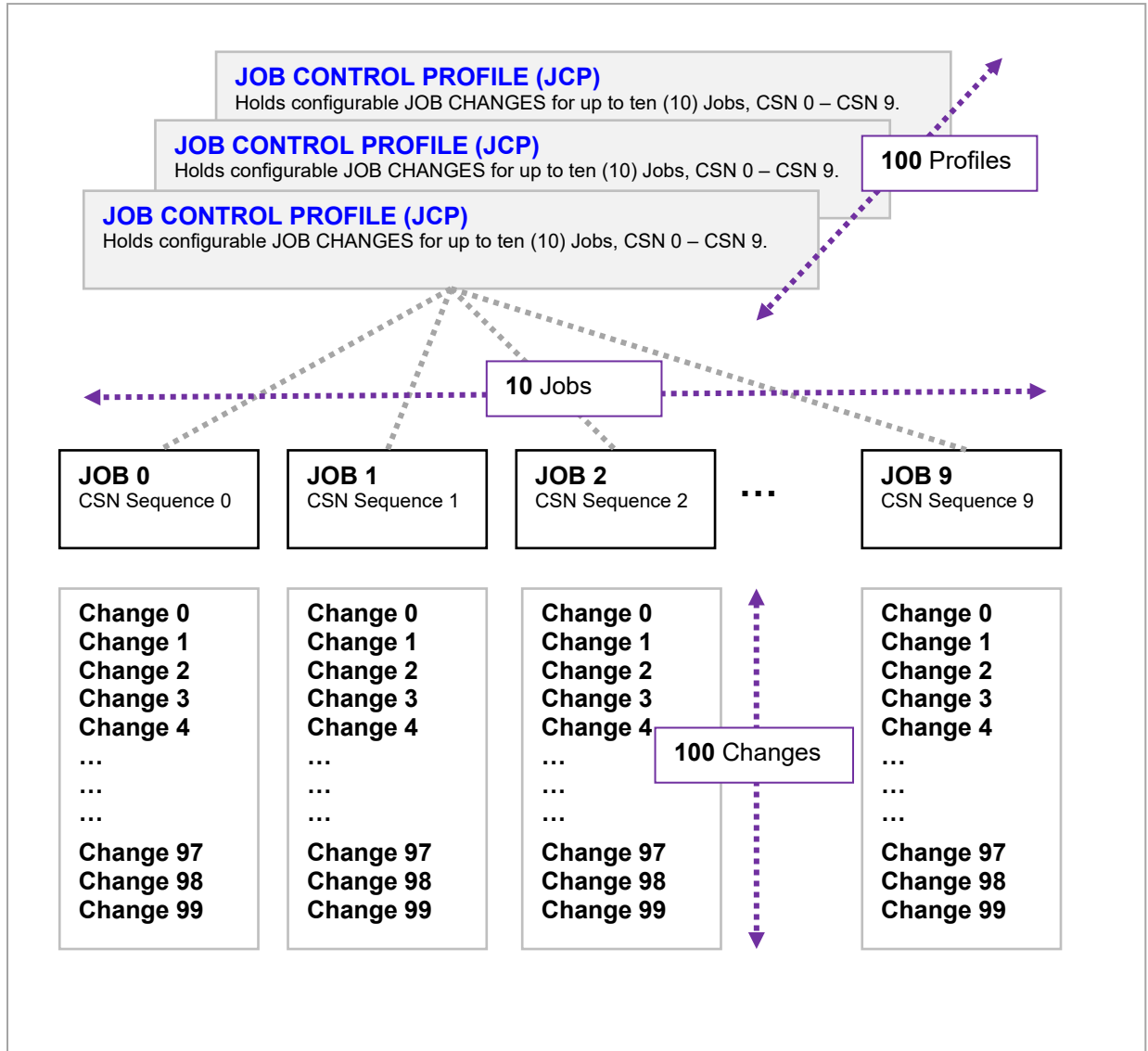


MicroCODE Control (EPP) – Job Control Profiles

Let's look at the configuration design underlying the Job Control Profiles.

The App is capable of holding 100 (Profiles) x 10 (Jobs) x 100 (Changes) = (100,000) Changes for generating simulated orders. Profiles can be imported and exported and are simple ASCII Text files.

Example 6 Job Profiles MicroCODE Control (EPP) App Architecture





Controlling Job Rotation

The App allows you to control the option content of a job generated during simulation based on the last digit of its CSN (0-9). The 'CSN' buttons down the left of the Job Control Profile (JCP) dialog box are used to configure the 'Changes' you want made to the Jobs. These changes will repeat, over and over, based on the ten (10) Jobs you configure in this dialog.

PROFILE Selection
Add, Delete, Edit

Profiles

CAR - Enter name... 1 Add
Enter description... 5 Delete

CSN 0	Changes	Simulation Control							
CSN #	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data	
CSN 1	0 PVI	0	9	NNNNNNNN0	PVI	0	9	NNNNNNNN0	
CSN 2	1 SVI	10	16	NNNNNNNN0	SVI	0	9	NNNNNNNN0	
CSN 3	2 CSN	26	11	NNNNNNNN0	CSN	0	10	NNNNNNNN0	
CSN 4	3 VIN	38	17	NNNNNNNN...	VIN	0	17	NNNNNNNN...	
CSN 5	4 MODEL	58	8	MMMMMMMM	MODEL	0	8	???????	
CSN 6	5 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
CSN 7	6 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
CSN 8	7 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
CSN 9	8 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
Copy	9 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
Paste	10 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
Fill...	11 NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	

Import... Export... Clear... Seed... OK Cancel

JOB Selection
With Copy, Paste, and Fill features

PROFILE Tools
Import, Export

JOB Reset
Clear changes

SEED Job
Open Viewer for reference while creating Profile



5.1 PROFILE Job Data Changes

These are the options that control the generation of simulated Jobs at the beginning of a Track Zone.

The changes are broken into two (2) sections: the HEADER and the OPTIONS.

The **HEADER** is everything in the standard GEPICS Header that identifies the Vehicle Order.

The **OPTIONS** is everything else below the HEADER, as known as the ‘Build Data’... these are the options ordered by the customer or generated automatically based on the customers options.

Profiles TRUCK Enter name... 1 Add X
Enter Description... 6 Delete

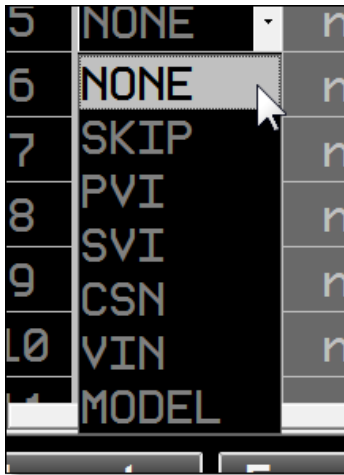
CSN #	Changes	Simulation Control							
CSN #	#	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data
CSN 1	0	PVI	0	9	NNNNNNNN0	PVI	?	9	NNNNNNNN0
CSN 2	1	SVI	10	16	NNNNNNNN0	SVI	?	9	NNNNNNNN0
CSN 3	2	CSN	26	11	NNNNNNNN0	CSN	?	10	NNNNNNNN0
CSN 4	3	VIN	37	17	NNNNNNNN...	VIN	?	17	NNNNNNNN...
CSN 5	4	MODEL	55	7	NNMMMMM	MODEL	?	7	NNNNNNN...
CSN 6	5	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 7	6	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 8	7	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 9	8	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Copy	9	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Paste	10	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Fill...	11	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a

Import... Export... Clear... Seed... OK Cancel

GEPICS Format: FSEPDOOR Items: 311 X
PVI: 202164660 CSN: 2GA3012977

SEP	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	9	PVI	START OF DATA...	2	0	2	1	6	4	6	6	0							
0	9	1	CHARAC...	SPACE TO MAKE...																
0	10	15	CHARAC...	SVI																
0	25	1	CHARAC...	SPACE FOR SVI...																
0	26	11	CSN	CSN OR CURREN...	2	G	A	3	0	1	2	9	7	7						
0	37	1	CHARAC...	SPACE TO MAKE...																
0	38	17	VIN	VIN WITH THE...	0	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4
0	55	3	CHARAC...	SPACE TO MAKE...																
0	58	7	MODEL7	MODEL	3	0	9	4	3	3										
0	65	1	CHARAC...	SPACE TO MAKE...																
0	66	2																		
0	68	6	CHARAC...	GA CSN PREFIX...	2	G	A													
0	74	7	MODEL7	DOOR DATA PAC...	C	K	3	0	9	4	3									
7	81	4	A07Z	DOOR LOCK BY...	3															
11	85	4	A07Y	FRONT DOOR A...																
15	89	3	OF AU3...	AU3-LOCK STDE...																

Import... Seed... OK Cancel

**Table 1** HEADER Changes**NONE**

Makes no changes to the GEPICS HEADER, if coupled with NONE in OPTIONS, ends all changes to the packet. *

SKIP

Makes no changes to the HEADER, indicate OPTIONS changes are being made.

PVI

Automatic. Do not change, this controls the generation of a unique PVI in the HEADER, based on the CSN Sequence #.

SVI

Automatic. Do not change, this controls the generation of a unique SVI in the HEADER, based on the CSN Sequence #.

CSN

Automatic. Do not change, this controls the generation of a unique CSN in the HEADER, based on the CSN Sequence #.

VIN

Automatic. Do not change, this controls the generation of a unique VIN in the HEADER, based on the CSN Sequence #.

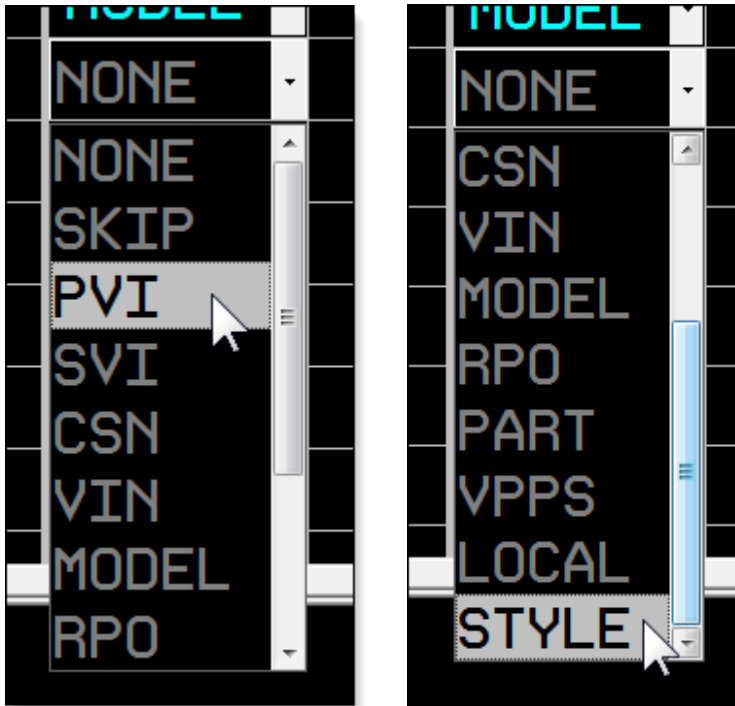
MODEL

Allows you to change the MODEL Number in the Header for testing.

* **Caution:** The App processes the changes from the top and the first row the has NONE for HEADER changes and NONE for OPTIONS changes is deemed the end of the entire change list.



Table 2 OPTION Changes



NONE

Makes no changes to the GEPICS OPTIONS, if coupled with NONE in HEADER, ends all changes to the packet.

SKIP

Makes no changes to the HEADER, indicate OPTIONS changes are being made.

PVI

Optional. If your SAT refers to PVI in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed, this will place a copy of the PVI there (based on the CSN Sequence #) and its length will be based on the length of the NNNN field you enter.

SVI

Optional. If your SAT refers to SVI in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed, this will place a copy of the SVI there (based on the CSN Sequence #) and its length will be based on the length of the NNNN field you enter.

CSN

Optional. If your SAT refers to CSN in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed, this will place a copy of the CSN there (based on the CSN Sequence #) and its length will be based on the length of the NNNN field you enter.

VIN

Optional. If your SAT refers to VIN in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed, this will place a copy of the VIN there (based on the CSN Sequence #) and its length will be based on the length of the NNNN field you enter.



MODEL

Optional. If your SAT refers to MODEL CODE in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the MODEL CODE, that you want to test.

RPO

Optional. If your SAT refers to RPO CODES in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the RPO CODE, you want to test. You can add as many of these as needed to create the Vehicle Order that you want to test. (The only limit is 100 Changes—of any type—to a particular Order).

PART

Optional. If your SAT refers to PART NUMBERS in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the PART NUMBER, you want to test. You can add as many of these as needed to create the Vehicle Order that you want to test. (The only limit is 100 Changes—of any type—to a particular Order).

VPPS

Optional. If your SAT refers to a VEHICLE PART POSITION SYSTEM (VPPS) value in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the VPPS value, that you want to test.

LOCAL

Optional. If your SAT refers to LOCAL BROADCAST CODES in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the LOCAL BROADCAST CODE, that you want to test.

STYLE

Optional. If your SAT refers to a PROCESS TOOL STYLE # in the 'Build Data' area you need to edit this change to enter the EPP offset where it's needed and enter the STYLE NUMBER, that you want to test.



Auto-Configuration of Vehicle ID positions within the Build Data Packet

The App now uses the GEPICS Format you have selected to ‘Auto-Complete’ the positions and Lengths of the Vehicle Identifiers if they are echoed into the OPTIONS area of your Build Data Packet.

Profiles

TRUCK

Rad Fill

4

Add

X

Raiadator Fill

5

Delete

CSN 0	Changes								
CSN 1	#	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data
CSN 2	0	PVI	0	9	NNNNNNNN0	PVI	236	9	NNNNNNNN0
CSN 3	1	SVI	10	16	NNNNNNNN0	SKIP	---	---	---
CSN 4	2	CSN	26	11	NNNNNNNN0	CSN	110	4	NNN0
CSN 5	3	VIN	38	17	NNNNNNNN..	VIN	332	8	NNNNNNNN0
CSN 6	4	MODEL	58	8	MMMMMMMM	MODEL	165	2	MM
CSN 7	5	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 8	6	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 9	7	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
CSN 9	8	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Copy	9	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Paste	10	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
Fill...	11	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a

Import...

Export...

Clear...

View Seed

OK

Cancel



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DRAFT

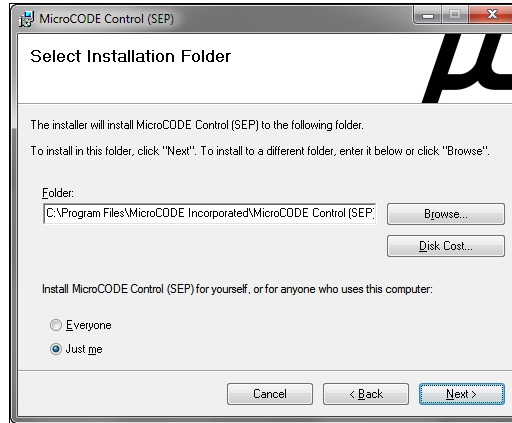


6 Running System Acceptance Tests (SATs)

Once you have the EPP Hardware environment set-up, and laptops available for the MicroCODE Control (EPP) App, you're ready to run a simulation of GEPICS Jobs to test your configured Actions.

Workflow

Step 1: Install the **MicroCODE Control for EPP App (MicroCODE Control (EPP).exe)** on the Windows PC that will control the SAT environment for each Track Zone.



Step 2: Import the **MicroCODE API for EPP Program (prgAPI)** into the EPP Cell Controller that controls the Zone where SATs are to be performed.

NOTE: Import the version that was installed with your Control App.

Name	Date modified	Type	Size
prgAPI_v1_0_0_1.L5X	10/16/2019 9:29 AM	L5X File	3,242 KB
prgAPI_v1_0_0_3.L5X	10/21/2019 8:58 AM	L5X File	3,258 KB
prgAPI_v1_0_0_4.L5X	10/22/2019 10:35 ...	L5X File	3,726 KB



Step 3: Using [F2 SITE SET-UP] Configure a connection from the App to the EPP SQL Database from within the App itself.

Settings

Cell Controller **Units** **Language** **Options** **SQL**

This tab defines the connection and usage of the EPP Server SQL Database. It allows this App to pull all required configuration data from that database, rather than reenter it here, which is also supported.

EPP Server TCP/IP: 10 . 0 . 0 . 1

Local SQL DB Instance: localhost\SQLTJM Use Local DB

EPP SQL Database Name: ErrorProofing

EPP SQL User Name: eppdb_ro NOTE: Contact your local SQL DB Admin for a User Account.

EPP SQL Password: ●●●● NOTE: Contact your local SQL DB Admin for a Password.

Clears ALL configuration in this App ONLY - Cell Controllers IPs, Track Zones, Footprints, and Actions: **Clear ALL...**

Replaces ALL configuration in this App ONLY - Cell Controllers IPs, Track Zones, Footprints, and Actions from the connected SQL Database: **Query ALL...**

Import... **Export...** **OK** **Cancel**

Step 3a: Using [F2 SITE SET-UP] select “Query All...” to pull all the Tracking and Cell Controller communication from the EPP SQL Database.

? This will clear all Cell Controllers: IPs, Names, Track Zones, Counts, Footprint names, Track Zone names, DD-SS-OOOs, and then query the SEP SQL Database to replace them all.

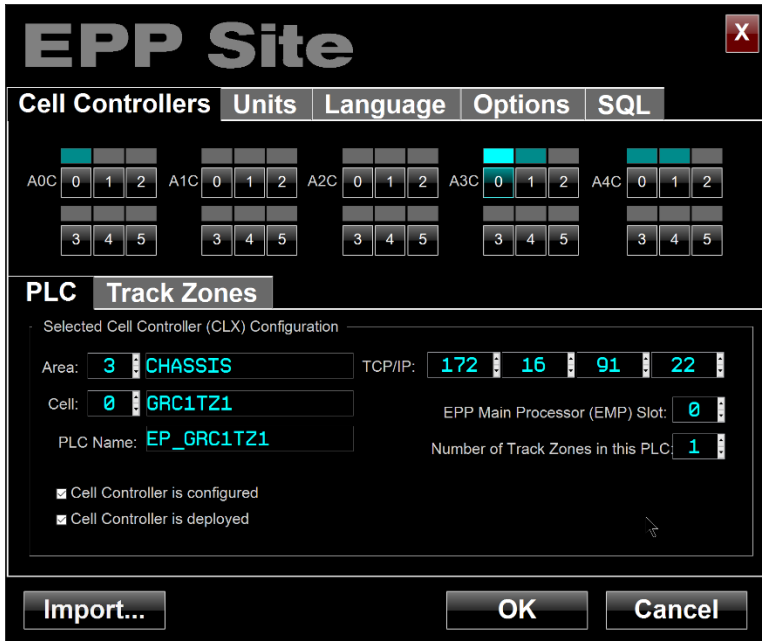
27

REPLACE all Controllers? **Yes** **No**



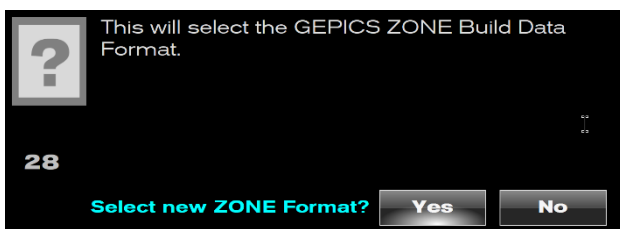
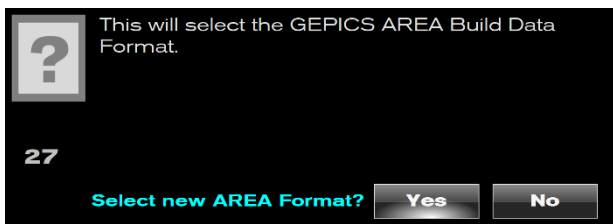
Step 3b: Using [F2 SITE SET-UP] on the “Cell Controllers” tab verify the Ethernet Card address matches your test environment and that the Cell is marked **Configured and Deployed**.

NOTE: The App will not connect to any PLC that is not marked ‘Deployed’.



Step 3c: While still in [F2 SITE SET-UP] on the [Track Zones] tab, select the GEPICS Format associated with this Cell Controller.

TZni	Name	Footprints	FPTsi	Conveyor	AREA Format	ZONE Format	?
0	GRC1T21	20	0	GRC1_ALS	EPP_TRIM.txt	EPP_1007.txt	Y
1		0	20				N
2		0	20				N
3		0	20				N
4		0	20				N





Step 4: Using [F3 PROFILE SET-UP] Configure—or import— Job Control Profile(s) (JCP) that represents the GEPICS Build Data changes you need in the Job rotation to exercise all TASKS and the Behaviors you are SAT'ing.

NOTE: It may be better to do this after you have been connected to the Cell Controller and selected a SEED JOB that you can refer to while creating your Profiles, unless you have very good documentation about what must be changed in the GEPICS Packet for your SATs.

Profiles Enter name... 1 Add
Enter description... 5 Delete

CSN #	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data
0	PVI	0	9	NNNNNNNN0	PVI	0	9	NNNNNNNN0
1	SVI	10	16	NNNNNNNN0	SVI	0	9	NNNNNNNN0
2	CSN	25	11	NNNNNNNN0	CSN	0	10	NNNNNNNN0
3	VIN	38	17	NNNNNNNN...	VIN	0	17	NNNNNNNN...
4	MODEL	58	8	MMMMMMMM	MODEL	0	8	???????
5	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
6	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
7	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
8	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
9	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a
10	NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a

Import... Export... Clear... Seed... OK Cancel

Step 5: Using [F4 CONNECT:] Connect to the EPP Cell Controller.

F4 F5 F6 F7

CONNECT: ONLINE **JOB SIM: START** **JOB SIM: STOPPED** **JOB SIM: EMPTY**

Step 6: Using the [BDX] Screen Button, select a 'Seed' Job from the EPP PLC GEPICS Buffer by right-clicking on the Job in the Buffer and selecting "Make this the Seed Job".

GEPICS Format: **FSEPBOX1** Items: **278**
PVI: **202169962** CSN: **2GA3018151** Source: **LTA**

Build Data Viewer

SEP GE ? This memorizes the current Job as the basis for all Jobs created during SAT simulations. This memory will persist regardless of the contents of the Cell Controllers going forward.

26

Select this Job? Yes No

SEP	GE	Header	Position	Length	Data
0	58	MODEL7	MODEL	2 0 7 4 3 S I	
0	65	CHARA...	SPACE TO...	E	
0	66	2			
0	68	CHARA...	GA CSN P...	2 G A	
0	74	MODEL7	BOX LINE...	T K 2 0 7 4 3	
7	81	V04	END GATE...	S I E R	
11	85	V15	boxside ...	* * * *	
15	89	V12B	V12B-LH ...	3 5 2 9	
19	93	V12A	V12A-RH ...	3 5 3 0	
23	97	V04A	V04A- NA...	D E N A	

Import... Seed... OK Cancel

BDB: 170 PVI: **202163606** CSN: **2GA3012017** Model: **CK20943** Options: **2886CJ2 SN 2GA3 68**

BDB: 118 PVI: **202163606** CSN: **2GA3012017** Model: **CK20943** Options: **2886CJ2 SN 2GA3 68**

BDB: 169 PVI: **202163606** CSN: **2GA3012017** Model: **CK20943** Options: **2886CJ2 SN 2GA3 68**

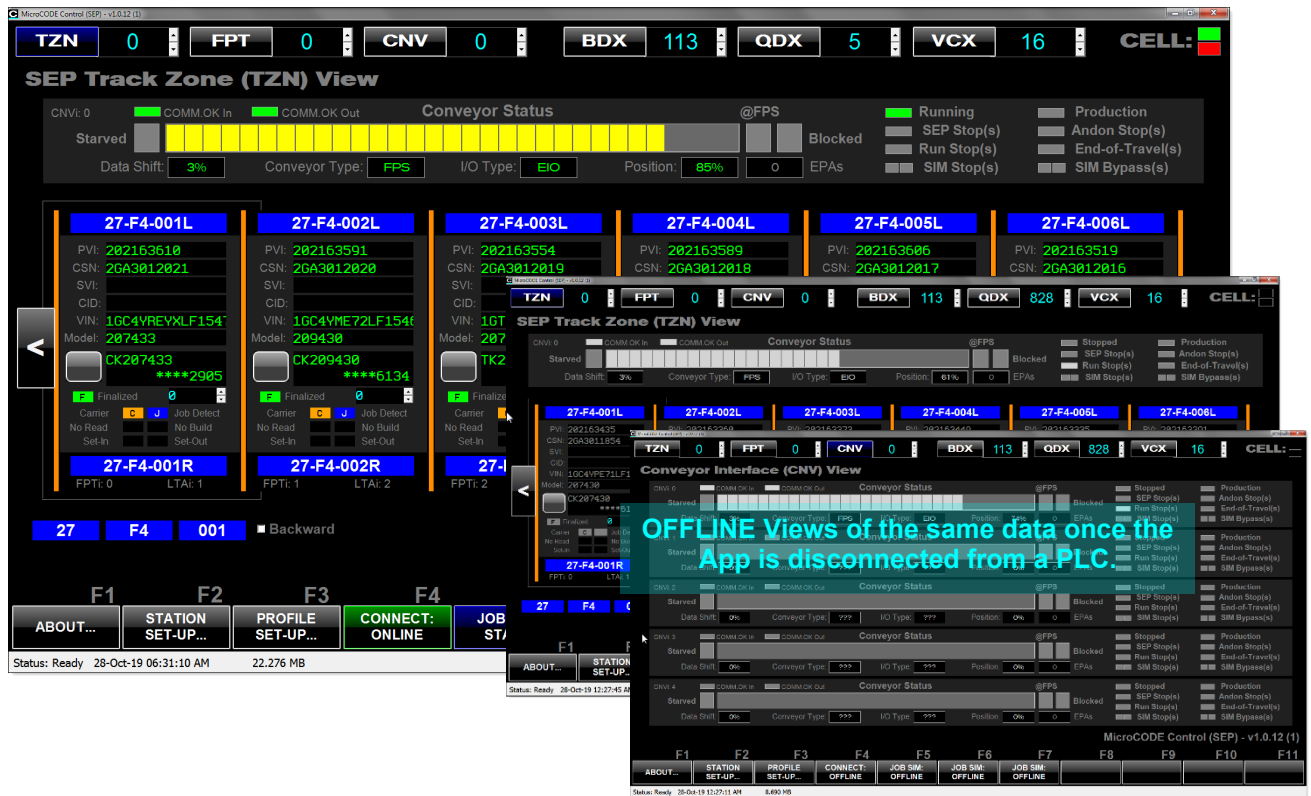
Operator: A new Seed Job was selected and activated, check your PROFILE configurations! [1] CLEAR EVENT [28-Oct-19 06:29:30 AM]

ABOUT... STATION SET-UP... PROFILE SET-UP... **CONNECT: ONLINE** **JOB SIM: START** **JOB SIM: STOPPED** **JOB SIM: EMPTY**

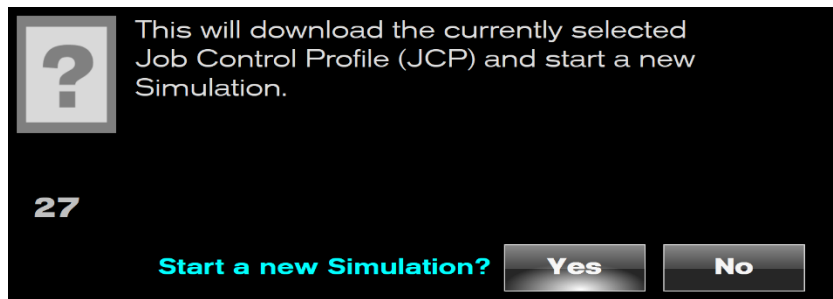
Status: Ready 28-Oct-19 06:30:15 AM 22.470 MB



Step 7: Using the [TZN] Screen Button, select the Track Zone within the EPP PLC that will receive the simulated Job Flow with the Conveyor simulation.



Step 8: Using [F5 SIM:] start the simulated Job Flow. This can be seen as long as the Screen in in the [TZN] View. You can return to the [TZN] view by clicking the [TZN] button at any time.



Step 9: Use [F5 SIM: ABORT] to end the simulation at any time.

Use the **Conveyor Control Buttons** to stop and start the simulated Conveyor.



Step 10: Perform your SAT with the actual hardware.
(See SAT Forms for detailed instructions).

Use the Footprint View to monitor the state of your Tasks as they are executed.
Clicking on a Task opens the detailed TASK Status dialog.

MicroCODE Control (EPP) - v2.0.1.0

Navigation: < TZN v 0 FPT v 0 CNV v 1 BDX v 3 QDX v 354 VCX v 14 AOC2

FOOTPRINT (FPT) View

PVI: 210002458
 CSN: 1##0002458
 SVI: 210002458
 CID: 458
 VIN: XXXXXXXXX21202458
 Model: TT35743
 Options: 210002458
 2100024581##0002458
 TT35743 GA22

Valid Carrier: C J Job FPTI: 0
 Mismatch: M No Build CNVI: 1
 Set-In: Set-Out LTAI: 1

Operator: The Simulated Tracking has CREATED a NEW JOB by generating it from your PROFILE into this Footprint. [19-Nov-21 02:16:20 PM] CLEAR EVENT

Status: Ready 19-Nov-21 02:16:22 PM 80.198 MB

TASK Status

SN: GSF1
 GEO SET FIXTURE 1
 TASK: 12640
 SLKS: 1

PVI: 210002458 CSN: 1##0002458 17-R1-121L

Task Status Viewer

Job
 Job Present
 Job Mismatch
 No Build Job

Work
 Prereq. Complete
 Work Started
 Pre Warning FP
 Pre Stopped FP
 Past Start FP
 Work in Progress
 Past Warning FP
 Past Stopped FP
 Work Enable
 Work Complete
 Warning Point (>PWP)
 Stopped (@FPS)
 Work Failed

O.I.
 Bypassed
 Released
 Released Required
 Bypass (Key)
 Release (Key)

I/O
 Faulted
 Battery Low
 Communication Error
 Out-of-Tethering

Order
 Work Required
 Action Required

U.I.
 Enable (Command)
 Bypass (Command)
 Release (Command)
 In Progress (Command)
 Retrigger Request
 Work Disabled

Part Sensor(s)

OK Cancel



Step 11: Use the QDX Defect Viewer to ensure all required Defects were generated and placed in the EPP PLC's queue.

MicroCODE Control (SEP) - v1.0.12 (1)

TZN 0 FPT 0 CNV 0 BDX 113 QDX 828 VCX 16 CELL: [Red]

DEFECTS Queue (QDX) View

Up Down Hold Sync Defects: 0

QDXi	Trigger ID	MC	PVI	Event	Defects
822	7129	15001	20216333	Release	002,101
823	7130	15101	20216339	Quality	000,777
824	7131	15052	20216341	Release	002,005
825	7132	15101	20216338	Quality	000,777
826	7133	15101	20216335	Quality	000,777
827	7134	15101			
828	6135	15101			
829	6136	15101			
830	6137	15101			
831	6138	15101			
832	6139	15101			
833	6140	15101			

MicroCODE Control (SEP) - v1.0.12 (1)

Status: Ready 28-Oct-19 12:12:22 AM 12.521 MB

MicroCODE Control (SEP) - v1.0.12 (1)

TZN 0 FPT 0 CNV 0 BDX 113 QDX 828 VCX 16 CELL: [Red]

DEFECTS Queue (QDX) View

Up Down Hold Sync Defects: 0

QDXi: 822 Trigger ID: 7129 MC: 15001 PVI: 20216333 Event: Release Defects: 002,101

QDXi: 823 Trigger ID: 7130 MC: 15101 PVI: 20216339 Event: Quality Defects: 000,777

QDXi: 824 Trigger ID: 7131 MC: 15052 PVI: 20216341 Event: Release Defects: 002,005

QDXi: 825 Trigger ID: 7132 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 826 Trigger ID: 7133 MC: 15101 PVI: 20216335 Event: Quality Defects: 000,777

QDXi: 827 Trigger ID: 7134 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 828 Trigger ID: 6135 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 829 Trigger ID: 6136 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 830 Trigger ID: 6137 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 831 Trigger ID: 6138 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 832 Trigger ID: 6139 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

QDXi: 833 Trigger ID: 6140 MC: 15101 PVI: 20216338 Event: Quality Defects: 000,777

GSIP Defect

Machine Code: 15052 Defects: 2

PVI: 20216341 CSN: <Not Queued>

Defect Data Viewer

SEP	GSIP RLN	Defect	Description
0	15052002	002	RELEASED
1	15052005	005	SC - MISSED SCAN or PT.03 - NO CYCLE

MicroCODE Control (SEP) - v1.0.12 (1)

Status: Ready 28-Oct-19 12:10:51 AM 8.918 MB



Step 12: Use the VCX Trace Viewer to ensure all required Trace data was generated and placed in the EPP PLC's queue.

The screenshots show the 'TRACE Queue (VCX) View' in the MicroCODE Control application. The top screenshot shows the interface with the 'CONNECT: ONLINE' button highlighted. The bottom screenshot shows the same interface but with the 'CONNECT: OFFLINE' button highlighted, and a text overlay indicating that the view is offline.

The screenshot shows the 'TRACE Queue (VCX) View' with the 'GEPICS Trace Trace Data Viewer' window open. The window displays the following information:

- Station Name: 27F4016L
- Machine Code: 15137
- EPA Id: 255
- PVI: 202146886
- System Code: GEPTRACE
- Record Key: Y471000000
- Parts: 1
- Trace Data: T5U19213141351074

The Trace Data Viewer window also includes a table with the following columns: SEP, VPPS, Part No., DUNS, Trace Data, and Payload Data. The table contains one row of data:

SEP	VPPS	Part No.	DUNS	Trace Data	Payload Data
0	Y4710000000000X	P84631413	12V602511248	T5U19213141351074	



Step 13: Use the BDx Buffer View to double check the Seed Job configuration...

MicroCODE Control (SEP) - v1.0.12.1

TZN: 0 | FPT: 0 | CNV: 0 | **BDX: 113** | QDX: 828 | VCX: 16 | CELL: [Green]

GEPICS Buffer (BDX) View

Up | Down | Hold | Sync Options: 68

BDXi: 107 BDBi: 13	PVI: 202163421	CSN: 26A3011861	Model: TK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 108 BDBi: 12	PVI: 202163444	CSN: 26A3011860	Model: TK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 109 BDBi: 11	PVI: 202163379	CSN: 26A3011859	Model: TK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 110 BDBi: 10	PVI: 202163408	CSN: 26A3011858	Model: CK30943	Options: 2886CJ2	SN 2GA3	68
BDXi: 111 BDBi: 9	PVI: 202163427	CSN: 26A3011857	Model: CK20943	Options: 2886CJ2	SN 2GA3	68
BDXi: 112 BDBi: 8	PVI: 202163431	CSN: 26A3011856	Model: CK20943	Options: 2886CJ2	SN 2GA3	68
BDXi: 113 BDBi: 7	PVI: 202163442	CSN: 26A3011855	Model: CK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 114 BDBi: 6	PVI: 202163435	CSN: 26A3011854	Model: CK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 115 BDBi: 5	PVI: 202163360	CSN: 26A3011853	Model: CK20743	Options: 2886CJ2	SN 2GA3	68
BDXi: 116 BDBi: 4	PVI: 202163373	CSN: 26A3011852	Model: CK20943	Options: 2886CJ2	SN 2GA3	68
BDXi: 117 BDBi: 3	PVI: 202163449	CSN: 26A3011851	Model: CK20943	Options: 2886CJ2	SN 2GA3	68
BDXi: 118 BDBi: 2	PVI: 202163335	CSN: 26A3011850	Model: TK20743	Options: 2886CJ2	SN 2GA3	68

MicroCODE Control (SEP) - v1.0.12 (1)

Status: Ready 28-Oct-19 12:11:53 AM 12.423 MB

ABOUT... STATION SET-UP... PROFILE SET-UP... **CONNECT: ONLINE**

MicroCODE Control (SEP) - v2.0.0.0

TZN: 4 | FPT: 19 | CNV: 7 | **BDX: 138** | QDX: 771 | VCX: 3 | **P8CO**

GEPICS Build Data Viewer

Format: FSEPBOX1 | Items: 278 | Source: PLC

SEP	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	9	PVI	START OF...	2	0	2	1	1	0	5	2	1								
0	9	1	CHARA...	SPACE TO...																	
0	10	15	CHARA...	BOX SVI																	
0	25	1	CHARA...	SPACE FO...																	
0	26	11	CSN	CSN OR C...	2	G	A	2	9	6	8	2	1	9							
0	37	1	CHARA...	SPACE TO...																	
0	38	17	VIN	VIN OR V...	1	G	C	4	V	N	E	7	4	L	F	1	1	0	9	1	9
0	55	3	CHARA...	SPACE TO...																	
0	58	7	MODEL?	MODEL	C	K	2	0	7	4	3										
0	65	1	CHARA...	SPACE TO...																	
0	66	2																			
0	68	6	CHARA...	GA CSN P...	2	G	A														
0	74	7	MODEL?	BOX LINE...	C	K	2	0	7	4	3										
7	81	4	V04	END GATE...	L	T															
11	85	4	V15	boxside ...	*	*	*	*													
15	89	4	V12B	V12B-LH ...	3	5	3	3													
19	93	4	V12A	V12A-RH ...	3	5	3	4													
23	97	4	V04A	V04A- NA...	S	L	V	E													

MicroCODE Control (SEP) - v2.0.0 (0)

Status: Ready 19-Oct-20 11:33:22 AM 75.736 MB

ABOUT... SEP SITE SET-UP... PROFILE SET-UP... **CONNECT: ONLINE** | TZN SIM: START | TZN SIM: ABORTED | TZN SIM: EMPTY | TZN SIM: SAVE | TZN SIM: RESTORE

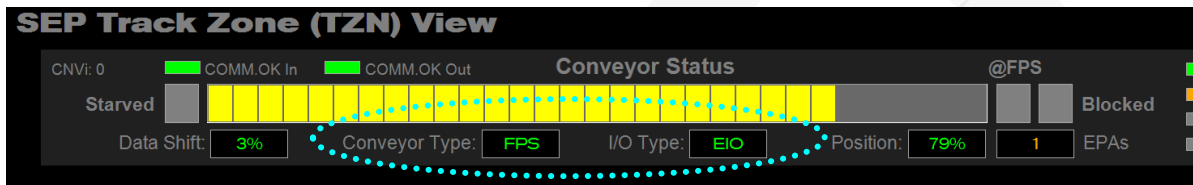


6.1 Handling the Simulated Conveyor

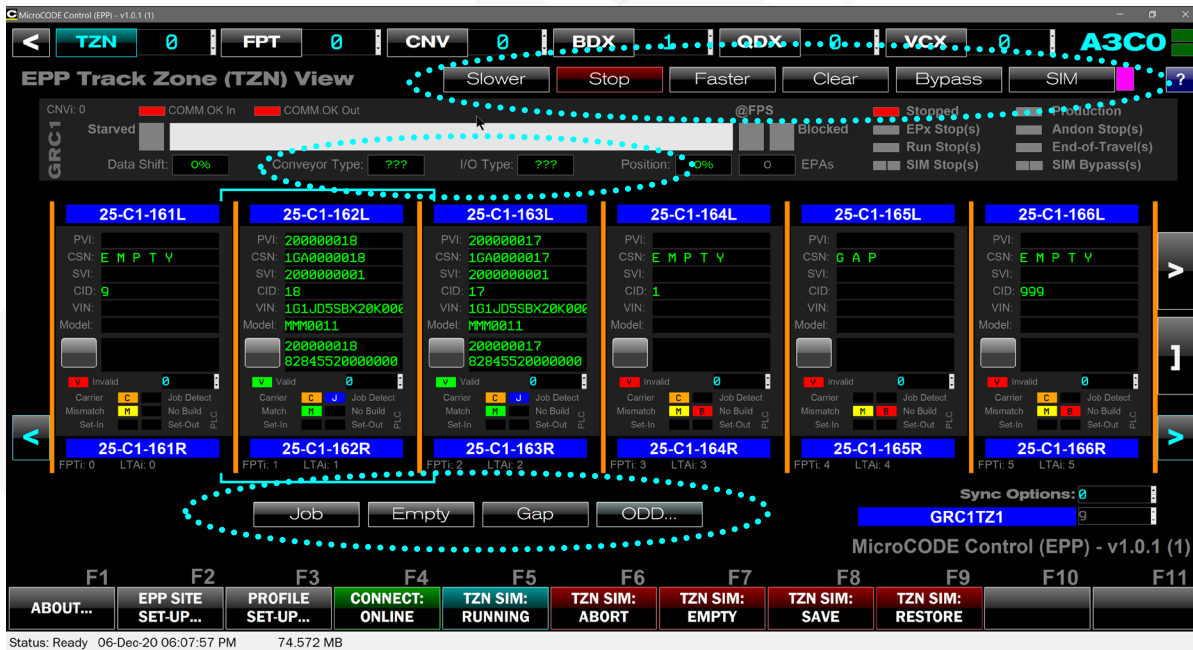
Once a Simulation is started on a Track Zone several things happen:

- 1) The Conveyor’s real-world communication set-up is saved.
- 2) The Conveyor is converted to a ‘Simulated Conveyor’.
- 3) The ‘Simulated Conveyor’ is set to a ‘Stopped’ condition, to allow the User to ‘Save’ the current Track Zone’s tracking image before any movement begins.
- 4) The active PROFILE is used to generate GEPICS JOBS at the start of the Track Zone, like an LTC.

You can see the conversion of the Conveyor by watching the TYPE and I/O indicators:



Once in SIMULATION MODE, the Type and I/O read SIM, and all the controls appear to control the simulated Conveyor. **NOTE: The Conveyor has a ‘SIM Stop’ on by default.**





6.2 Simulator Conveyor Commands

These are the commands that appear on the Track Zone Screen once a simulation is in process. They are hidden when in 'Viewer' mode.

Slower	Decreases Conveyor Speed
Faster	Increased Conveyor Speed
Run	Acts like a Production Run/Stop, this button changes state and acts as a toggle.
Stop	
Clear	Removes all EPP Andon Stop Requests from the Conveyor, allowing it to proceed.
Bypass	Passed the Conveyor in 'Bypass SEP' mode, nothing will stop it.
REAL	Real/Simulated, this button changes Simulation state and acts as a toggle.
SIM	
Job	<p>Clears the current Footprint in the Track Zone display* And allows the next simulated JOB to be generated. NOTE: You may see "READY" displayed in the Footprint right after it is cleared and before the next Job is generated, this is normal.</p>
Restart	Causes the EPP PLC to restart work on the JOB in the currently selected Footprint. This only work when there is a JOB in the Footprint.
Empty	Converts the Job in the current Footprint in the Track Zone display* into an EMPTY CARRIER.
Gap	Converts the Job in the current Footprint of the Track Zone display* into a GAP.
Rebuild..	Fills the Track Zone with simulated jobs starting at the current Footprint* and working backward to the first Footprint, using the simulator's generated Jobs.



* **NOTE:**The JOB, EMPTY, GAP and REBUILD commands are based on the currently selected Footprint and **not** the beginning of the Track Zone. So, if you scroll down the Track Zone and click [**Empty**] you will get an empty where the 'Job Focus' is located, not necessarily where you are looking.

The 'Job Focus' is indicated by the Cyan Cursor around the Footprint.

You can move the 'Job Focus' in three (3) ways:

- 1) Click on the desired Footprint.
- 2) Use the Left/Right Cyan Arrow buttons on the screen.
- 3) Use the Left/Right Arrow Keys on the keyboard.





6.3 App vs. EPP PLC – Span of Simulation Control

The MicroCODE Control (EPP) App is designed to work hand-in-hand with the existing Conveyor Simulation code in the EPP PLC.

- The **Simulated Jobs** are controlled by this App and are created only while it is connected to the EPP Cell Controller as the 'Owner/Generator'.
- The **Simulated Conveyor** is controlled by the EPP PLC code, and that code is fed commands from this App indirectly through the new **prgAPI** that is added to the standard EPP PLC code.

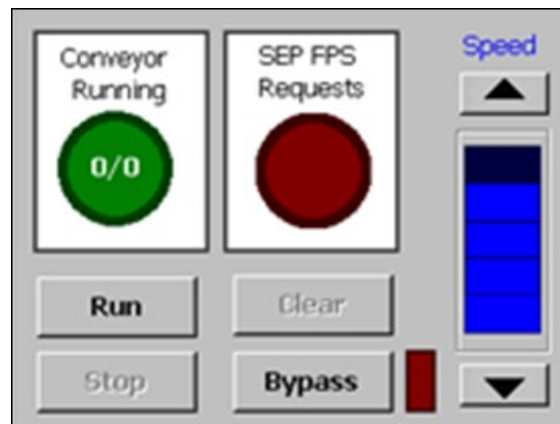
This has several implications that Users must be aware of:

- Once started the **Simulated Conveyor** runs until one of the following happen:
 - TASKs use Andon Requests to stop it
 - It is paused by the MicroCODE Control App controls
 - It is paused by the original EPP Control Simulator controls
 - It is paused by the MicroCODE Process Tool monitoring tool
- The Simulated Conveyor does **not** need this App to run, once started it continues even if the App that started it is disconnected.

The Simulated Conveyor can also be made to ignore all Stop Requests by being put in BYPASS Error Proofing Mode (similar to the real-world Conveyor systems). This is accomplished in several ways:

- The SIM BYPASS Command in this App
- The BYPASS Command in the original EPP Control Simulator controls
- By the SIM CLEAR Command in the App (Bypasses Stop Requests for one Job)
- By the CLEAR Command in the original EPP Control Simulator controls

Figure 8 The original Simulated Conveyor Controls (VB App)





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7 App Shortcuts and Special Features

This section covers some items that the App is capable of that are not obvious to first time users.

Finding an RPO Code or Part Number in a GEPICS Order

A command task when configuring new Error Proofing Actions and supporting Production is to locate a specific Vehicle Option (RPO or Part Number) within a GEPICS Order.

This can be accomplished very quickly using the Control App with a live EPP PLC connection.

STEP 1: Connect to a Cell Controller.

STEP 2: Get to the Vehicle Order you want to check, in EPP Tracking, or EPP GEPICS Buffer.

STEP 3: Open the Job in the GEPICS Viewer.

GEPICS Format: Items: X

PVI: CSN: Source:

PLC	GEPICS	Length	Data Item	Description	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	9	PVI		2	0	0	0	0	1	4	3	9								
9	9	1	CHARA...	Pad PVI ...																	
10	10	6	BSSEQNUM	Last 6 o...	8	6	6	0	4	9											
16	16	10	CHARA...	Pad SVI ...	2	0	0	0	0	0	0	1	4	3							
26	26	11	CSN		1	G	A	0	0	0	1	4	3	9							
37	37	1	CHARA...	Pad CSN ...																	
38	38	7	MODEL?				1	F	B	4	8										
45	45	1	CHARA...	Pad Mode...																	
46	46	2		Hardcode...	G	A															
48	48	2	MODEL...	Last 2 o...	2	0															
50	50	4	CHARA...	Resrv fo...																	
54	54	17	VIN		1	G	1	F	Z	6	S	0	2	2	0	2	0	1	4	3	9
71	71	1	CHARA...	Pad VIN ...																	
72	72	4	OF_AL...	All RPOs		K	4	C													
76	76	4	OF_AL...	All RPOs		C	9	J													
80	80	4	OF_AL...	All RPOs		B	T	M													
84	84	4	OF_AL...	All RPOs																	
88	88	4	OF_AL...	All RPOs																	

Buttons:



STEP 4: Sort the GEPICS Data Elements alphabetically by clicking on the first column.

The screenshot shows a GEPICS interface with a table of data elements. The table has columns for Description and indices 0 through 7. The data is as follows:

Description	0	1	2	3	4	5	6	7
	C	K						
SWINF VPPS ID	D	T			C	N		
LH RR Caliper	D	S	R	W				
Steering Wheel	D	R	Z					
Fast Charge (...)	E	S	L					
	E	6	3					
Shifter	G	R	A	Y				
	G	N						
	H							
Spare - Avail...	J	3	7					
Cluster	K	T	A	D				



Using the GEPICS Viewer to guide PROFILE Creation

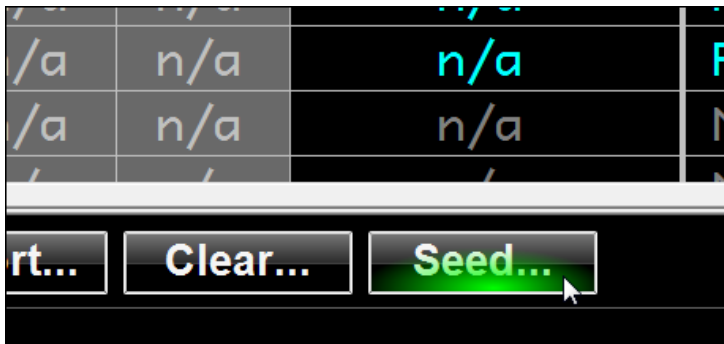
In order to build a good simulation Profile, you will need to refer back to the data layout of your ‘Seed Job’. For that reason, you can open the ‘Seed Job’ while you are editing a Profile and keep it on another monitor for reference.

We highly recommend you use two (2) monitors for this activity. One for editing the Profile and one for referring to the data layout of your ‘Seed Job’.

This can be accomplished very quickly using the Control App with a live EPP PLC connection.

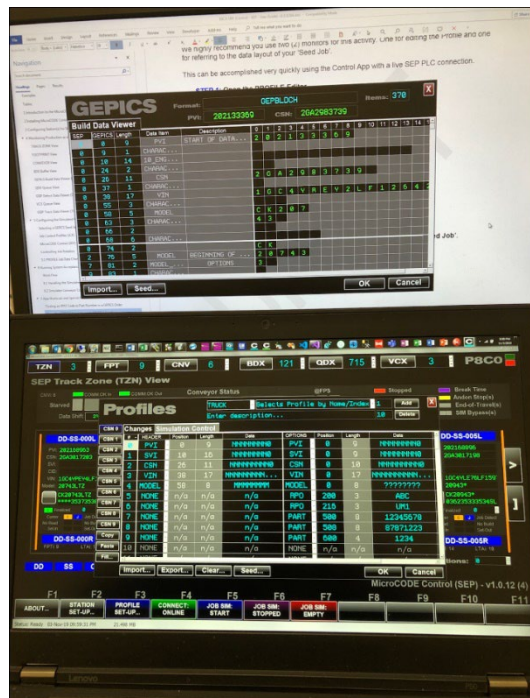
STEP 1: Open the PROFILE Editor.

STEP 2: Click on ‘Seed Job...’ to open a GEPICS Viewer.



STEP 3: Move the ‘Seed Job’ View to a second monitor.

STEP 4: Create your changes for ten (10) CSNs while referring to the ‘Seed Job’.





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8 Handling App Support and Issue Reporting

It is MicroCODE's intention to move the distribution and updates for the Control Series of Apps to our website. This will happen within the next 6 months as licensing issues are resolved. Until then the Microsoft Installation (.msi) file will be distributed via email to registered users.

If you encounter an issue while using a MicroCODE Control App, please follow this procedure:

For immediate assistance call: **855.421.1010**

STEP 1: Gather up the files associated with the issue.

If you are unsure which files to send call us and we'll help determine which will be needed.

- **EPP Programs** – uploaded with data saved.
- **Event Log Files (.LOG)** – located in...

C:\Users\

- **Configuration Files (.CFG)** – located in...

C:\Users\

We may require other files after the initial investigation.

STEP 2: Email MicroCODE with the files attached, as follows:

Attached these files to an email to: tmcguire@mcodes.com

Subject Line: CONTROL APP – DEFECT REPORT

Email Body:

ISSUE: <Brief Description of the problem including steps to reproduce if possible>

SEVERITY: Choose one, please classify honestly to best utilize our shared resources...

SEV.1 - System crash, complete loss of a major system component

Response Time: No longer than 24 hours.

SEV.2 - Function fails, no work-around is possible, or the App missed identifying a product defect

Response Time: No longer than 48 hours.

SEV.3 - Function fails, work-around is possible, or opening erroneous defects on products

Response Time: No longer than 5 days.

SEV.4 - Function fails, no impact to production, no work-around is necessary, or defect is caused by reconfiguring a Station during production

Response Time: No longer than 15 days.

SEV.5 - Display, Report or Tool problem - no impact on system operation

Response Time: No longer than 30 days.

SEV.6 - Annoyances

Response Time: No longer than 90 days.



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9 Common Issues

This section describes issues seen during app deployments, the usual causes, and normal solutions.

ISSUE 1: Track Zones configured in the EPP Server do not show up in the Control App.

Here the User expected two (2) Track Zones to appear in a selected Cell Controller.

TZNi	Name	Footprints	FPTsi	Conveyor	AREA Format	ZONE Format	?
0	GRC1TZ1	9	0	GRC1_ALS	EPP_IPLINE.txt	EPP_1008.txt	Y
1		0	9				N
2		0	9				N
3		0	9				N
4		0	9				N

Common Cause: The Track Zones are not associated an EPP PLC.

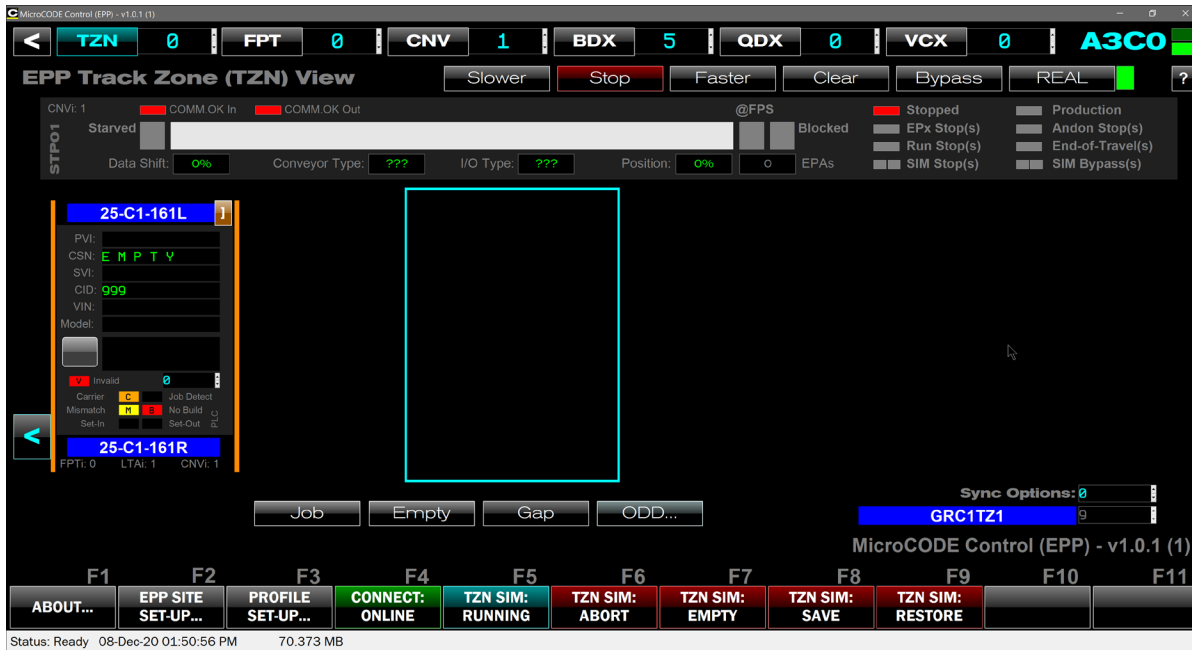
This is seen in the EPP SQL database as shown below... (NULL means not associated with a PLC, in the EPP database “ExecutionTargetId” = EPP PLC).

PlantId	ZONE Name	ZONE Description	ExecutionTargetId	Area	Zone	Zone Description
49	GFF2TZ1	Final Main Mod 2	4	Final	GFF2TZ1	Final Main M...
50	GRC1TZ1	Chassis Main Mod 1	7	Chassis	GRC1TZ1	Chassis Main...
51	GRC2TZ1	Chassis Main Mod 2	5	Chassis	GRC2TZ1	Chassis Main...
52	GVC1TZ1	Chassis Sub Mod 1 (Front Suspension)	NULL	Chassis	GVC1TZ1	Chassis Sub ...
53	GVC2TZ1	Chassis Sub Mod 2 (NULL	Chassis	GVC2TZ1	Chassis Sub ...
54	t2	t	NULL	tz1	t2	t
55	testtz	testtz	NULL	a2	testtz	testtz
56	tz1	t	1	a1	tz1	t

SOLUTION: Associate all Track Zones configured in the EPP Server to an EPP PLC.



ISSUE 2: Track Zone Footprints configured in the EPP Server do not show up in the Control App.



Common Cause: The MicroCODE API code in the EPP PLC has not been configured.

Secondary Cause: The MicroCODE API code has not been initialized after import; this only happens on first scan of the PLC logic.

SOLUTION 1: Tailor / Configure the **prgAPI** program in the EPP PLC after importing it from the App install. This is required because the EPP PLC does not contain externally readable configuration data to completely describe what is in the PLC.

e.g.: The number of Conveyor Interface(s) in the EPP PLC is implied by the hard-coded construction of a Produced-Consumed Tag-Pair, and there is no data point to read externally to discern this. So, the **prgAPI** has two (2) routines named: **rtnAPI_CnvInterface_AnCn** and **ladAPI_Configuration_AnCn**.

The two routines must be edited/created from the supplied templates to make them specific to an EPP AREA (An) and CELL (Cn), i.e.: **_AnCn** suffix.



SOLUTION 2: Program/Run cycle the EPP PLC after completing the **_AnCn** routines.

Before initialization, TZNei is 0. This causes the Control App to show no Footprints after the first position, because they are all after the 'Ending Index' of '0'.

Name	Value	Style	Data Type
APLEPP.TZNei	0	(-)	udtAPI_TznConfig[9]
APLEPP.TZN[0]		(-)	udtAPI_TznConfig
APLEPP.TZN[0].ConveyorType		2 Decimal	DINT
APLEPP.TZN[0].FPTs		9 Decimal	DINT
APLEPP.TZN[0].FPTsi		0 Decimal	DINT
APLEPP.TZN[0].FPTei	8	0 Decimal	DINT
APLEPP.TZN[0].LTAs		9 Decimal	DINT
APLEPP.TZN[0].LTAsi		1 Decimal	DINT
APLEPP.TZN[0].LTBei		9 Decimal	DINT
APLEPP.TZN[0].CNVs		9 Decimal	DINT
APLEPP.TZN[0].CNVsi		1 Decimal	DINT
APLEPP.TZN[0].CNVei		9 Decimal	DINT
APLEPP.TZN[1]		(-)	udtAPI_TznConfig

After initialization, FPTei is set to 8, and all Footprint appear.

Name	Value	Style	Data Type
APLEPP.TZNei	0	(-)	udtAPI_TznConfig[9]
APLEPP.TZN[0]		(-)	udtAPI_TznConfig
APLEPP.TZN[0].ConveyorType		2 Decimal	DINT
APLEPP.TZN[0].FPTs		9 Decimal	DINT
APLEPP.TZN[0].FPTsi		0 Decimal	DINT
APLEPP.TZN[0].FPTei	8	8 Decimal	DINT
APLEPP.TZN[0].LTAs		9 Decimal	DINT
APLEPP.TZN[0].LTAsi		1 Decimal	DINT
APLEPP.TZN[0].LTBei		9 Decimal	DINT
APLEPP.TZN[0].CNVs		9 Decimal	DINT
APLEPP.TZN[0].CNVsi		1 Decimal	DINT
APLEPP.TZN[0].CNVei		9 Decimal	DINT
APLEPP.TZN[1]		(-)	udtAPI_TznConfig
APLEPP.TZN[2]		(-)	udtAPI_TznConfig

The screenshot shows the MicroCODE Control (EPP) interface. At the top, there are navigation buttons for TZNei (0), FPT (0), CNV (3), BDX (5), QDX (0), and VCX (0). The main display area is titled 'EPP Track Zone (TZNei) View' and shows a conveyor layout with stations 25-C1-161L through 25-C1-166R. Each station has a status indicator (Valid/Invalid) and a data field (PVI, CSN, SVI, CID, VIN, Model). The 'TZNei' value is 0, and the 'FPTei' value is 8. The interface also includes various status indicators, data fields, and control buttons.



ISSUE 3: Job generated by the Control App are not activating Error Proofing Actions and show up as 'INVALID' and are dark green in the App display.

In the example below Footprints -162 and -163 are 'invalid' and show up dark green. And the Job in Footprint -165 is marked 'valid' and is in the normal bright green'.

The screenshot shows the EPP Track Zone (TZN) View interface. At the top, there are status indicators for various zones: TZN (0), FPT (0), CNV (5), BDX (5), QDX (0), VCX (0), and A3CO. Below this, there are control buttons: Slower, Stop, Faster, Clear, Bypass, and REAL. The main display area shows a grid of job status for various footprints (FPT) and conveyor units (CNV). Each job entry includes details like PVI, CSN, SVI, CID, VIN, and Model. The status of each job is indicated by a color-coded icon: red for Invalid, yellow for Carrier, and green for Valid. In the example, jobs 25-C1-162L and 25-C1-163L are marked as Invalid (dark green), while job 25-C1-165L is marked as Valid (bright green). The interface also includes a bottom toolbar with function keys (F1-F11) and a status bar at the bottom showing 'Status: Ready 09-Dec-20 05:55:23 PM 68.033 MB'.

Common Cause: The EPP PLC is marking the Job data generated by the Control App as 'invalid' and will not drive error proofing based on the data.

SOLUTION 1: The MODEL CODE is failed the checks in the PLC and needs to be corrected.

In the example Footprints -162 and -163 are 'invalid' because the MODEL CODE is illegal. And the Job in Footprint -165 is marked 'valid' because the MODEL CODE is legal.

Correct this by updating your **PROFILE** that generates the MODEL CODE.

The screenshot shows the Profiles configuration screen. At the top, there are input fields for 'TRUCK' (with a dropdown menu) and 'Enter name...' (with a value of 2), and 'Enter description...' (with a value of 5). Below these are 'Add' and 'Delete' buttons. The main part of the screen is a table with columns: CSN #, Change, #, HEADER, Position, Length, Data, OPTIONS, Position, Length, Data, and N. The table contains 6 rows of profile data. A red dashed circle highlights the 'MODEL' row (CSN 4), specifically the 'Data' field which contains 'CKL0120'. The 'OPTIONS' field for this row is 'MODEL'.

CSN #	Change	#	HEADER	Position	Length	Data	OPTIONS	Position	Length	Data	N
CSN 1	0		PVI	0	9	NNN...	PVI	0	9	NNNNNNNN0	
CSN 2	1		SVI	16	16	NNN...	SKIP	---	---	---	
CSN 3	2		CSN	26	11	NNN...	CSN	26	10	NNNNNNNN0	
CSN 4	3		VIN	54	17	NNN...	VIN	54	17	NNNNNNNN...	
CSN 5	4		MODEL	38	8	MMM...	MODEL	38	7	CKL0120	
CSN 6	5		NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	
	6		NONE	n/a	n/a	n/a	NONE	n/a	n/a	n/a	



Appendix A: The MicroCODE API Logix Program

In order to ensure that this App can do no harm in a General Motors production environment MicroCODE has separated the communication to an EPP Cell Controller into two (2) distinct connections as mentioned in Chapter 4.

NOTE: This App is never supposed to be run within a GM Production Facility, but MicroCODE has still gone to great lengths to code it in such a way as to protect GM Production from a user accidentally or unknowingly running it in a GM Plant.

READ-ONLY Connection – i.e.: 'Viewer Mode'

The first is a connection to the 'EPP Cell Controller', this connection, at the CIP Driver Level, is creation as a 'read only' interface that cannot write to Tags in the Logix 5000.

This connection is used for:

- 1) Displaying Tracking Data from the EPP PLC.
- 2) Displaying Conveyor Status from the EPP PLC.
- 2) Displaying the GEPICS Build Data buffer from the EPP PLC.
- 3) Displaying the GSIP Defect Queue from the EPP PLC.
- 4) Displaying the GEPICS Trace Data Queue from the EPP PLC.

READ-WRITE Connection – i.e.: 'Control Mode'

The second is a connection to the 'MicroCODE Application Programming Interface (API)' **only**. Which must be added to any EPP Cell Controller – before this is a READ/WRITE connection for giving the Cell Controller simulation commands will have control.

So, if a Plant has not imported the **MicroCODE prgAPI** program into their Cell Controllers, then the MicroCODE Control (EPP) App cannot write anything into the PLCs.

And, once **prgAPI** is installed (imported) into the EPP PLC, the App can only write to the Tags of that interface. Those tags are named **API_*** and are Controller Level Tags.

All the interaction between the Control App and the EPP PLC code is handled by the API Program. It receives command from the Windows App, executes them, and produces a status back to the App so it can verify execution.

A Cell Controller can have this interface removed at any time, see **A.2 Uninstalling the MicroCODE API**.

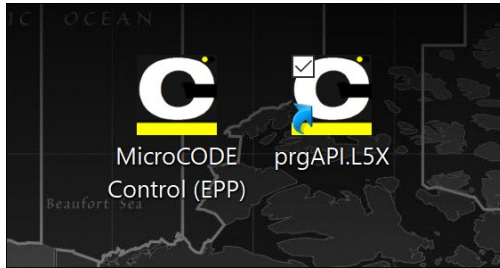


A.1: Installing MicroCODE API Logix Program

The MicroCODE API is installed in the **EPP PLC only**.

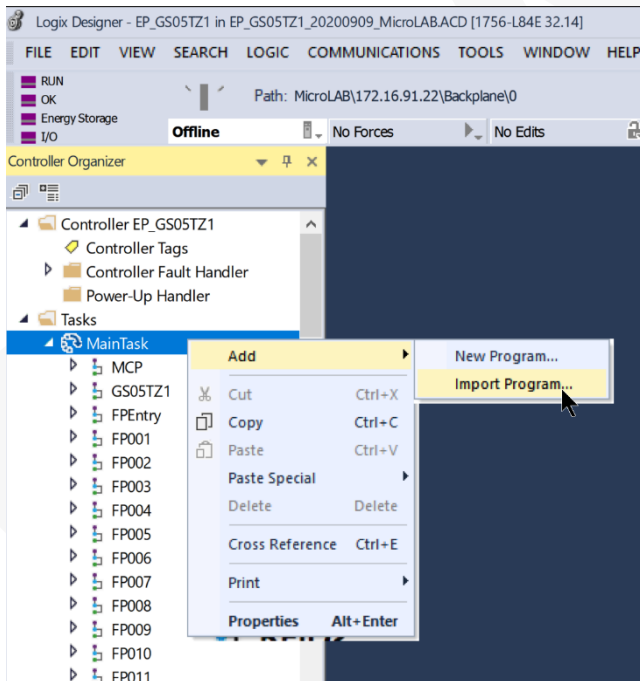
The API is provided as a standard Logix 5000. L5X Import/Export file, and a shortcut is left on the user's desktop after install:

NOTE: Always use the **prgAPI** that was provided with the App you installed. These program's version must match the version of the Windows App you are using.



STEP 1: Import the Program named “prgAPI” into the Continuous Task (tskContinuous).

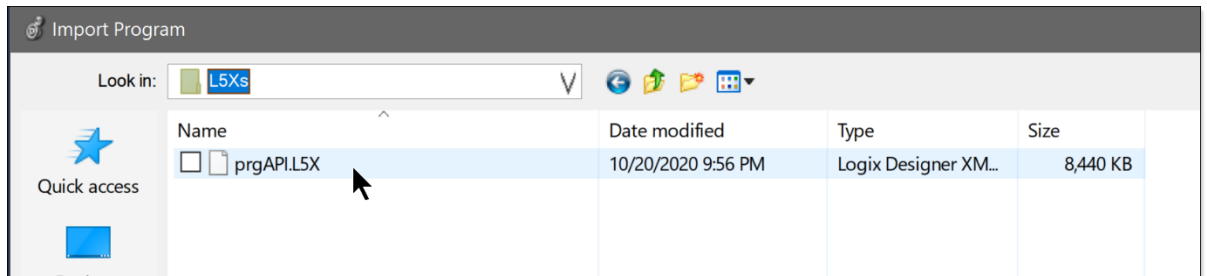
To import, Right-Click on **MainTask**, select **Add**, and the **Import Program....**



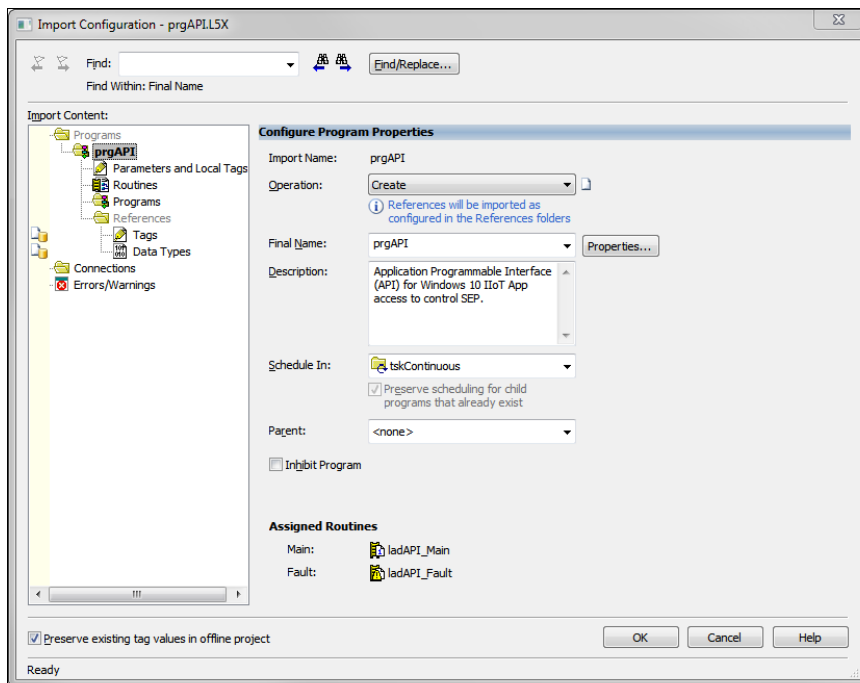


Select the API version that was distributed with you App release (they must match) and click **OK**.

C:\Program Files\MicroCODE Incorporated
 \MicroCODE Control (EPP)\L5Xs



After preparation Logix 500 will present the **Import Configuration** dialog box:



Just click **OK** and **Finalize all edits** in the next step, that's it.

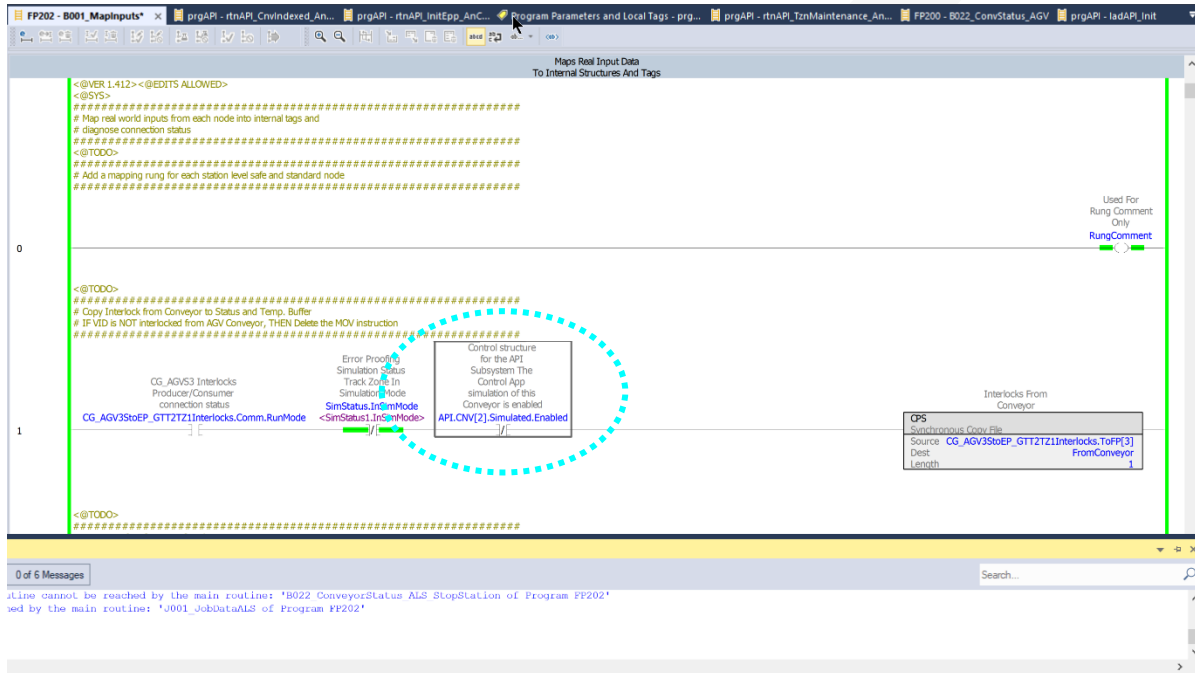
Because there is a completely independent program it does not alter any existing EPP User Defined Datatypes or Code.



STEP 2: Add an API simulation to block consuming real Tags in Footprint Programs.

This step is required because the EPP PLC code directly uses the Conveyor Inputs from a Consumed Tag in the Footprint level code, rather than an intermediate generic object.

In every **FPnnn Program's B001_MapInputs** add NOT of **API.CNV[n*].Simulated.Enabled** to block being the Consumed tag into the temporary Tag **"fromConveyor"**.



*** NOTE:** on the mapping of MicroCODE Control.NET App Conveyor indices (**.CNV[n]**) to EPP Conveyors for Stop Stations / Accumulating Lane Stops (ALS) or Automated Guided Vehicles (AGV):

EPP Conveyor Interface	EPP PLC Code	MicroCODE Control.NET App/API Conveyor Index
1 st Track Zone – Entry	Conveyor interface for 'ID Zone'	CNV[0]
1 st Track Zone – 1 st Footprint	Conveyor interface for '1 st Footprint'	CNV[1]
1 st Track Zone – 2 nd Footprint	Conveyor interface for '2 nd Footprint'	CNV[2]
2 nd Track Zone – Entry	Conveyor interface for 'ID Zone'	CNV[3]
2 nd Track Zone – 1 st Footprint	Conveyor interface for '1 st Footprint'	CNV[4]
2 nd Track Zone – 2 nd Footprint	Conveyor interface for '2 nd Footprint'	CNV[5]
2 nd Track Zone – 3 rd Footprint	Conveyor interface for '2 nd Footprint'	CNV[6]
3 rd Track Zone – Entry	Conveyor interface for 'ID Zone'	CNV[7]
3 rd Track Zone – 1 st Footprint	Conveyor interface for '1 st Footprint'	CNV[8]
3 rd Track Zone – 2 nd Footprint	Conveyor interface for '2 nd Footprint'	CNV[9]

RULE: Every **FPEntry** takes a Conveyor Interface, every SAI or AGV Footprint takes a Conveyor Interface.



STEP 3: Add an API simulation to override the RFID verification in Footprint Programs.

This step is required because the EPP PLC code uses RFID Tag reads to validate every Footprint’s Carrier/Job. This verification is also overridden for the EPP Server simulation as well.

In every **FPnnn Program** add **API.CNV[n].Simulated.Enabled** to override the examination of the RFID Match.

If using Fixed Position Stop (**FPS**) chain Conveyor Interfaces these changes are made in the **FPnnn Program B021_ConveyorInterlock** or **B021_ConveyorStatus** depends on your EPP code version. This will be found in the TRACK ZONE Program for FPS Conveyors.

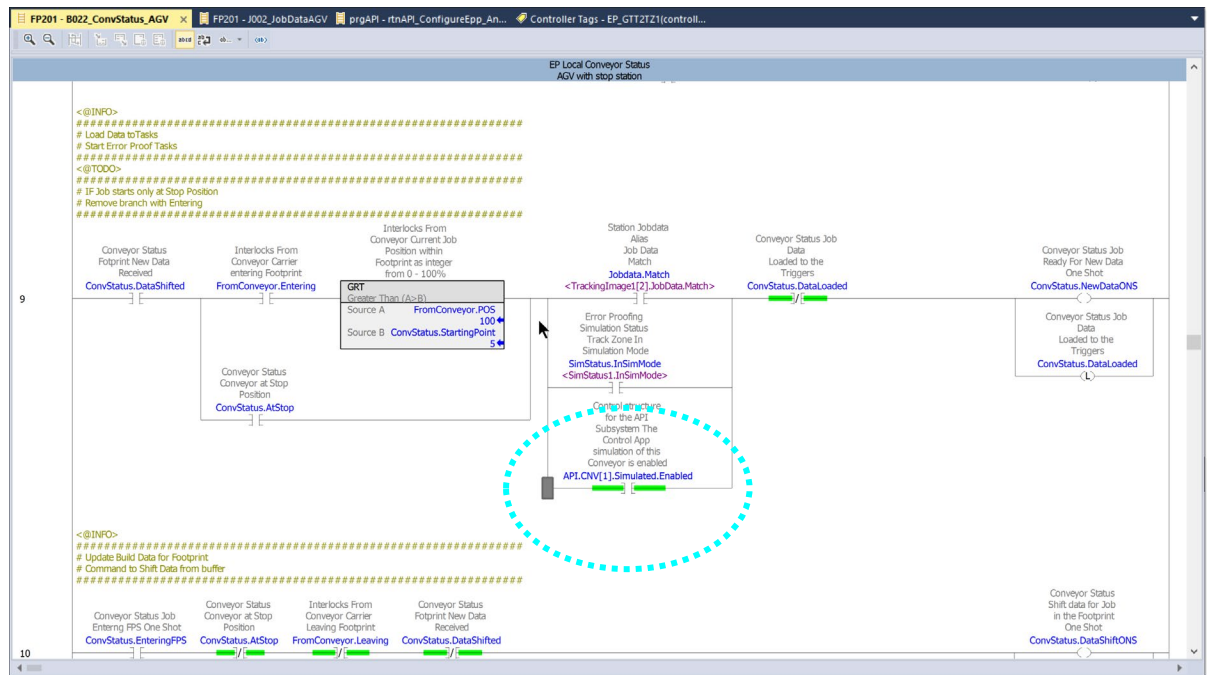
If using Accumulating Lane Stop (**ALS**) Conveyor Interfaces these changes are made in the **FPnnn Program B022_ConvStatus*ALS**. This will be found in the FOOTPRINT Program for ALS Conveyors.

If using Automated Guided Vehicles (**AGV**) Conveyor Interfaces these changes are made in the **FPnnn Program B022_ConvStatus*AGV**. This will be found in the FOOTPRINT Program for AGV Conveyors.

If using Sub-Assembly Integration (**SAI**) Conveyor Interfaces these changes are made in the **FPnnn Program B023_ConvStatus*SAI**. This will be found in the FOOTPRINT Program for SAI Conveyors.

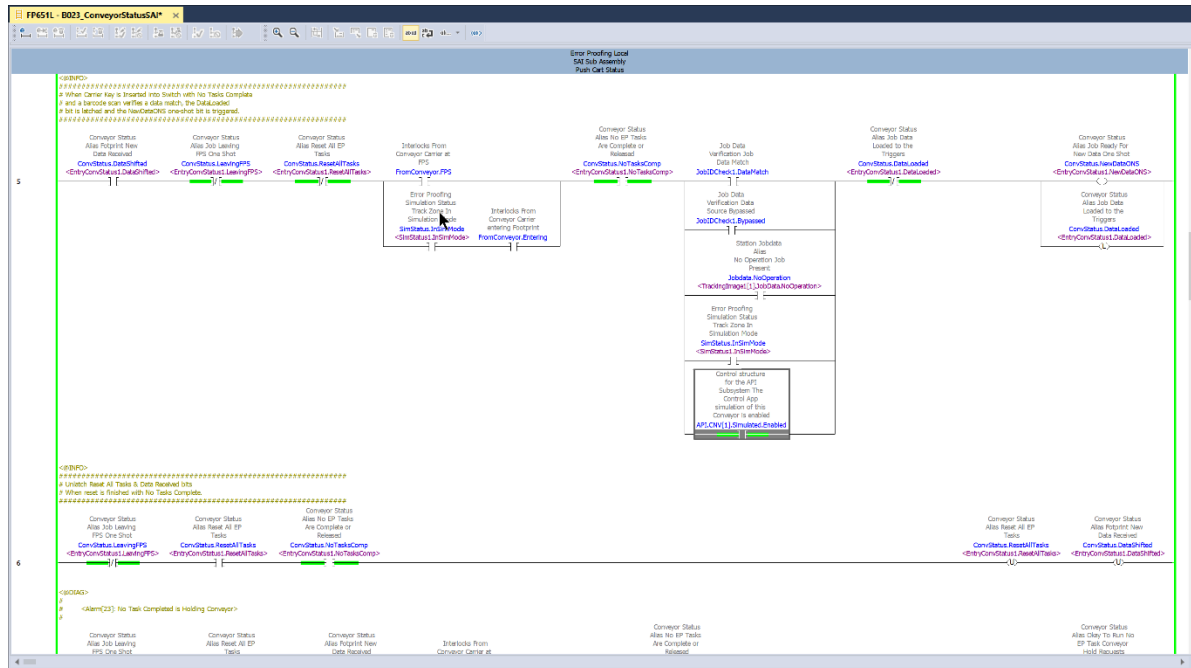
NOTE: If your **ConvStatus.DataLoaded** rung does not have ‘Jobdata.Match’ then you do not need to add the API Simulated status.

AGV Example:

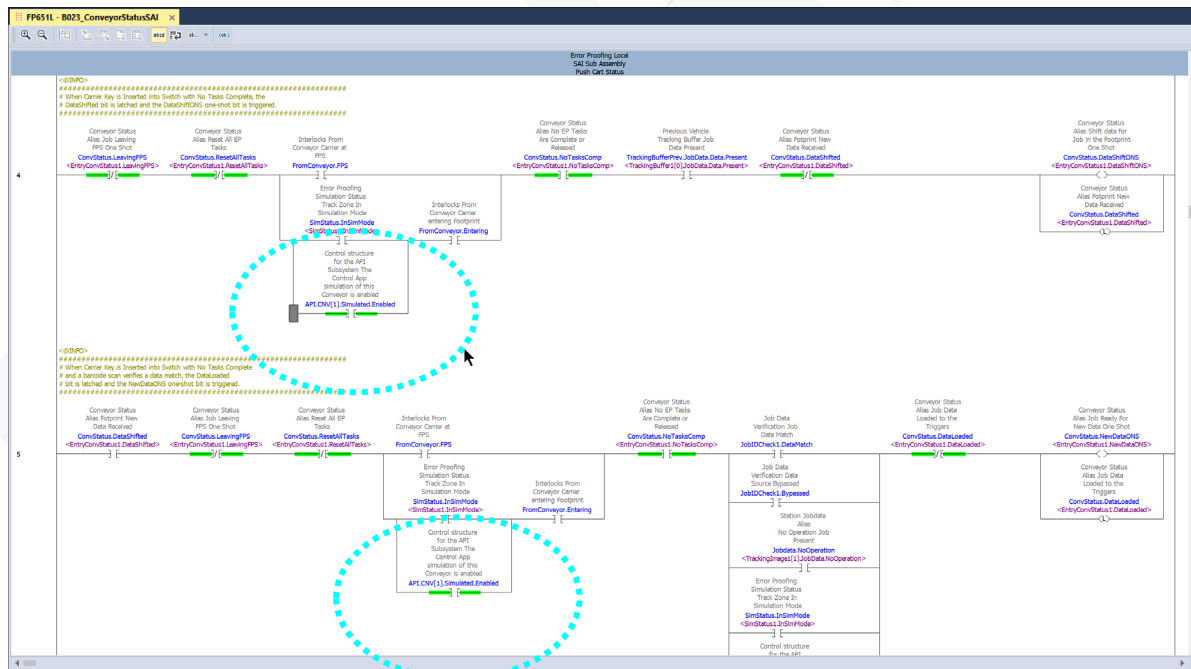




SAI Example:



For every Footprint add **API.CNV[n].Simulated.Enabled** to 'Entering' from the ID ZONE....



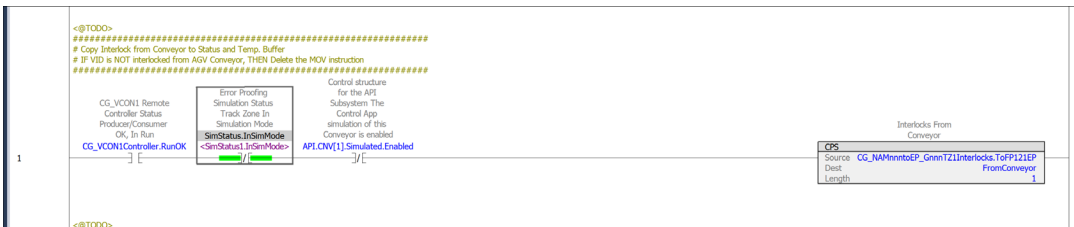


NOTE: To ensure consistent operation of the Control.NET App cross-reference the **SimStatus.InSimMode** alias in Logix 5000 and add the MicroCODE App signal in parallel if normally open, or in series if normally closed everywhere it is referenced in the **Conveyor** code, do not touch the Job Data or Task code. **Do this for every Footprint Program.**

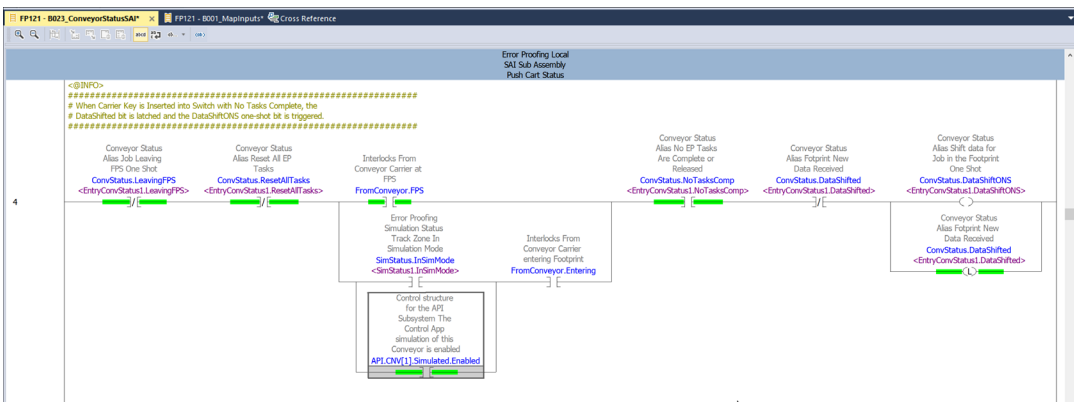
Element	Container	Routine	Location	Reference
XIO	FP121	B001_MapInInputs	Rung 1	SimStatus.InSimMode
za_EPConvSimulation	FP121	B001_MapInInputs	Rung 2	SimStatus
XIC	FP121	B023_ConveyorStatusSAI	Rung 1	SimStatus.InSimMode
XIO	FP121	B023_ConveyorStatusSAI	Rung 1	SimStatus.InSimMode
XIC	FP121	B023_ConveyorStatusSAI	Rung 4	SimStatus.InSimMode
XIC	FP121	B023_ConveyorStatusSAI	Rung 5(2)	SimStatus.InSimMode
XIC	FP121	B023_ConveyorStatusSAI	Rung 7	SimStatus.InSimMode
XIC	FP121	B023_ConveyorStatusSAI	Rung 8	SimStatus.InSimMode
XIO	FP121	B023_ConveyorStatusSAI	Rung 8	SimStatus.InSimMode
XIO	FP121	J002_JobdataCheckSAI	Rung 2	SimStatus.InSimMode
XIO	FP121	J002_JobdataCheckSAI	Rung 5	SimStatus.InSimMode
XIC	FP121	S010_EPTask01	Rung 13	SimStatus.InSimMode
XIO	FP121	S010_EPTask01	Rung 14	SimStatus.InSimMode
XIC	FP121	S020_EPTask02	Rung 13	SimStatus.InSimMode
XIO	FP121	S020_EPTask02	Rung 14	SimStatus.InSimMode

Everywhere the GM IT Server's SIM Mode requires overriding normal PLC code operation the MicroCODE Control.NET App requires the exact same thing.

In **SERIES** (normally closed reference) example:

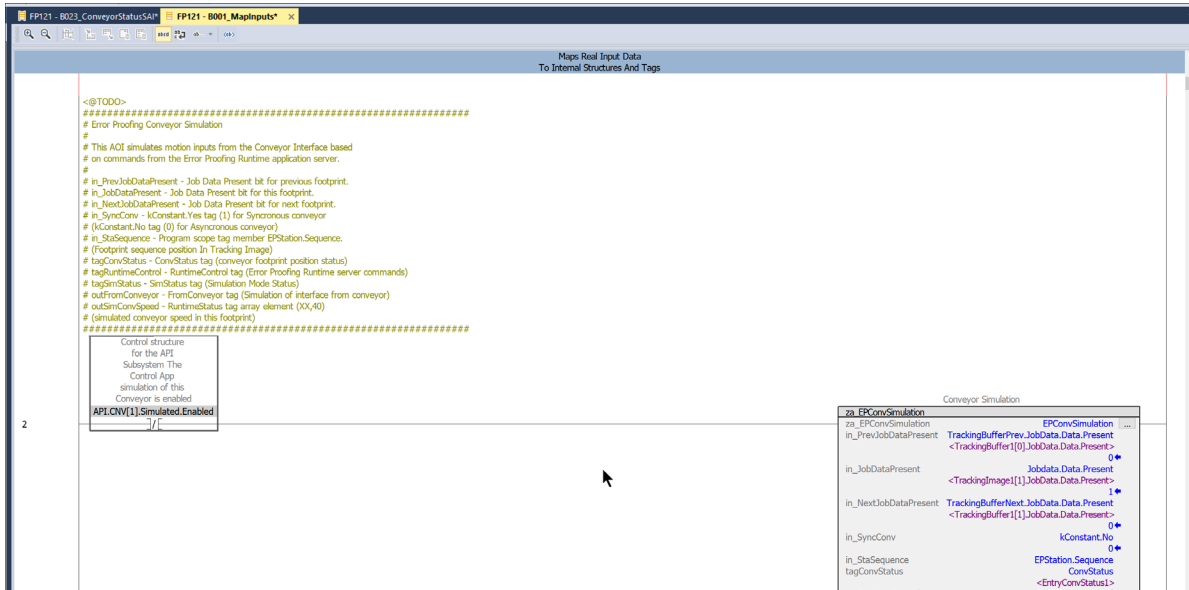


In **PARALLEL** (normally open reference) example:





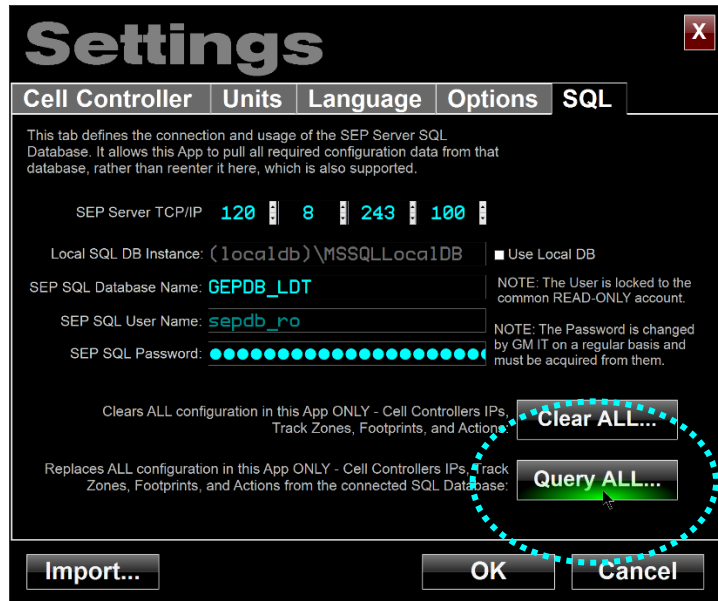
Also, be sure to block the GM IT Conveyor Simulation while the MicroCODE Control.NET App is simulating movement in the same area...



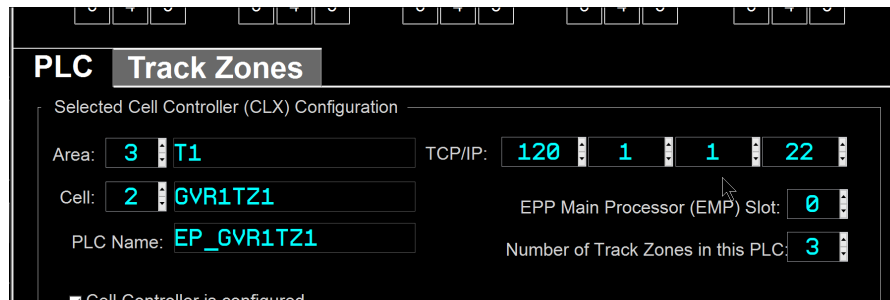


STEP 4: Query your current EPP SQL Database from the SETTINGS Dialog Box

This step is required to being the complete EPP configuration into the Control App. This is then used to auto-configure the API in the EPP PLC the next time you go online.



Be sure after a re-query that you EPP PLC Ips match your environment, the EPP SQL Database value for the IP Addresses will always overwrite what you have. Double-check that you have configured GEPICS Formats as well.



PLC	Track Zones						
TZni	Name	Footprints	FPTsi	Conveyor	AREA Format	ZONE Format	?
0	GVR1TZ1	3	0	GVG1_ALS	EPP_CHASSIS.txt	EPP_1008.txt	?
1	GVI1TZ1	1	3	GVI1_ALS	EPP_CHASSIS.txt	EPP_1007.txt	?
2	GVI1TZ1	4	4	GVR1_ALS	EPP_CHASSIS.txt	EPP_1009.txt	?
3		0	8				?
4		0	8				?

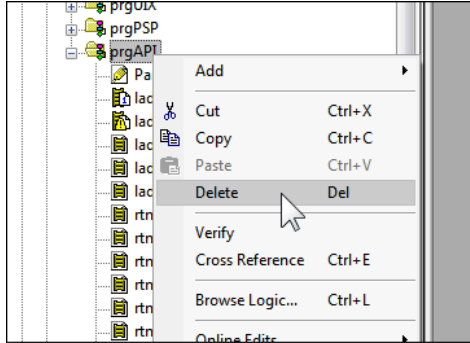
That's, it, go online and start your simulation work.



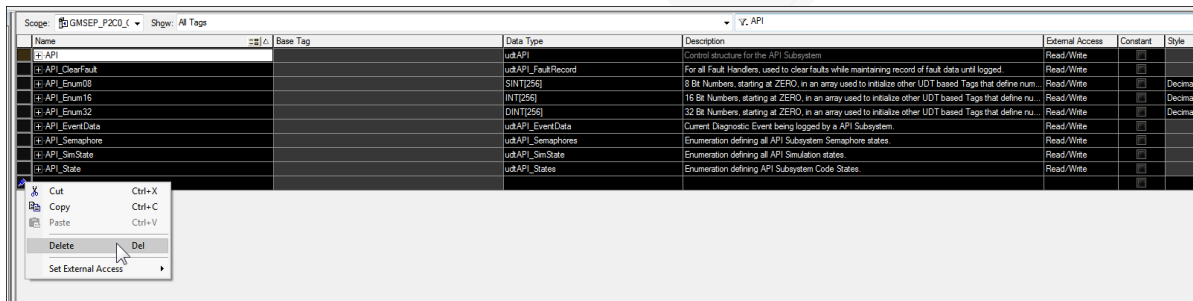
A.2: Uninstalling MicroCODE API Logix Program

Following these steps to uninstall the MicroCODE API from a EPP PLC:

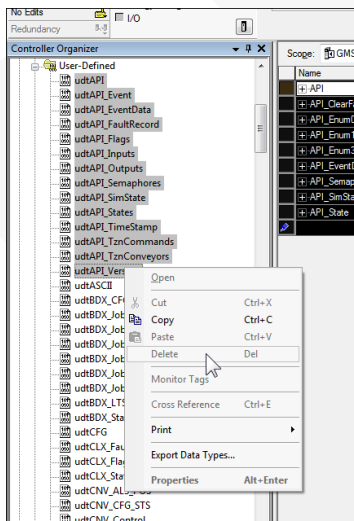
STEP 1: Delete the entire Program named “prgAPI”.



STEP 2: Delete all Controller Level Tags named “API*”.



STEP 3: Delete all User Defined Datatypes named “udtAPI*”.



NOTE: Step 1 and Step 2 can be done ONLINE. But Step 3 must be done OFFLINE and then the Logix 5000 program has to be downloaded back into the PLC.

And you must make several passes at deleting all the UDTs because you cannot delete a UDT if it is referenced by another.

Leaving these UDTs in the Controller has no affect on normal EPP operations.



STEP 4: Delete the modifications made to the Conveyor Interfaces.

This will not compile after you deleted the Controller Level API Tags and the errors will guide you to the code you must remove.



Appendix B: Required EPP Patches for Control App

One of the stated requirements for the new Control EPP App was that it work with the EPP PLC code that is already in the field, without alteration.

The EPP PLC Code version supported are:

- **EPP v1.0.0** – 2018-2020 (Lake Orion)
- **EPP v?.?.?** – 2020-2022 (Plant Zero)

At the time of development, the EPP code for Plant Zero had not been finalized. Changes are expected.

These files are all installed in folders in:

GM Supplier Power



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Appendix C: Memory and I/O Management in the App

One of the implied requirements for the new Control EPP App was that it minimize the communication load placed on the EPP PLCs and Ethernet Cards.

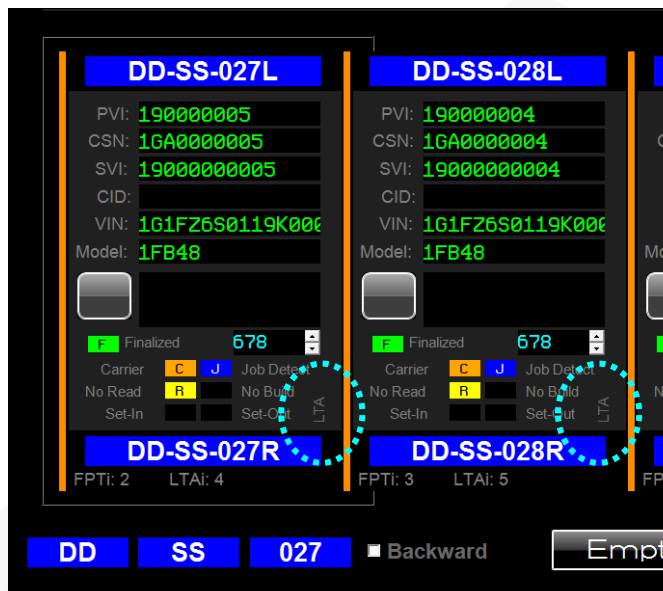
To support this—starting with Release **v1.0.0**—the App added an internal memory of the last (128) GEPICS Jobs it was read from a Controller. This is used to dramatically reduce the amount of data that must be read from the PLCs while the App is running.

This internal memory is cleared under the following conditions:

- On App exit, i.e.: it is not stored to disk.
- When the SITE SET-UP is changed, to prevent using data for a PVI from another Cell, which may have a different GEPICS Format.
- When a new SIMULATION is started to discard all memorized Jobs from a previous PROFILE SET-UP.
- Whenever the User issues the Simulation Command: EMPTY TRACK ZONE.

The App always shows where the Job data has come from with new indicators on all displays.

In the TZN Tracking display:

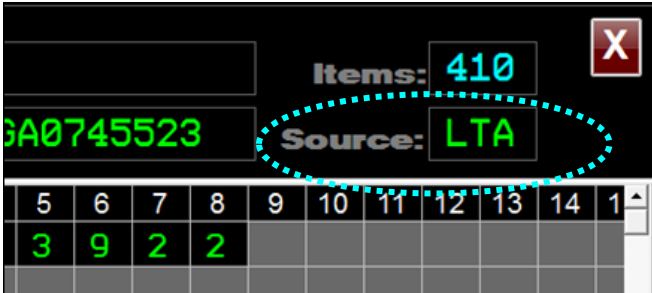


In the BDX Buffer display:





In the GEPICS Data Viewer:



Memory Indicators and meaning:

APP = generated by the App during initialization.

PLC = directing read from PLC memory.

LTA = recalled from App's internal memory, originally read from the EPP Line Tracking Array (LTA).

BDX = recalled from App's internal memory, originally read from the EPP Build Data Interface (BDX).

BDZ = recalled from App's internal memory, originally read from the EPP Build Data Interface (BDX), but with tracking status (Job, Carrier, No Build, etc.) updated from the EPP Track Zone in the PLC.

SIM = generated by the App during simulation, normally this is never seen on the User display.

UNK = unknown.



Appendix D: Allen-Bradley L8x Processor Support

Starting with v2.0.0 this App includes a new ControlNet Interface Protocol (CIP) Driver capable of communicating with the new line of L8x PLCs. The cost of this new driver is built into the App upgrade or purchase price and provides a site-wide license allows as many clients (running this App) as required.

These processors feature 5x – 20x scan time improvements and a built in 1GB Ethernet Port.

ControlLogix 5580 Controllers

Our ControlLogix® 5580 controllers provide increased performance, capacity, productivity, and security to help meet the growing demands of smart machines and equipment for manufacturing. All ControlLogix 5580 controllers use the Studio 5000® design environment as the standard framework that optimizes productivity, reduces time to commission. This framework manages Integrated Motion over EtherNet/IP for high-speed motion applications and SIL2/PLd and SIL3/PLe safety solutions. These controllers are ideal for applications that require high-performance communications, I/O, and motion control for up to 256 axes.



NOTE: This is a ‘Site’ license, not a ‘Company’ license. It is tied to a specific manufacturing site and is not allowed to be used elsewhere. If multiple Sites are to be supported each must have a ‘Site’ license copied of the App. The ‘Site’ location is visible in the **About...** box of the App itself.



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Document: MCX-U01 (Control - EPP - User Guide).doc

I rate this manual's:	Excellent		Good		Fair		Poor	
	10	9	8	7	6	5	4	3
Accuracy (software works as manual says)	10	9	8	7	6	5	4	3
Completeness (enough information)	10	9	8	7	6	5	4	3
Clarity (easy to understand)	10	9	8	7	6	5	4	3
Organization (structure of subject matter)	10	9	8	7	6	5	4	3
Figures (useful)	10	9	8	7	6	5	4	3
Examples (useful)	10	9	8	7	6	5	4	3
Index (ability to find topic)	10	9	8	7	6	5	4	3
Page layout (easy to find information)	10	9	8	7	6	5	4	3

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Troy, MI 48085
Attn: Tim McGuire
tmcguire@mcode.com

The **MicroCODE Control (EPP)** App was created for General Motors Strategic Suppliers by:

MICROCODE INC

software development / controls engineering – since **1987**