A-B Upgrades/Software: PLC Upgrades/Migrations

Table of Contents

Overview . . . 2
Hardware . . . 3
Application/Documentation Conversion . . . 5
PLC-5 Migrations . . . 6
SLC-500 Conversions . . . 8
MicroLogix Conversions . . . 11
PLC-2 Migrations . . . 13
PLC-3 Migrations . . . 15
Other Conversions . . . 16
Resources . . . 17
- Data Sheets . . . 17
- Media . . . 17

Overview

If you have a control system using an Allen-Bradley PLC you can easily migrate to a SoftPLC based system - with minimal re-engineering or disruption to your business, and at much less cost than other alternatives, including those from Rockwell Automation.

Models you can easily upgrade include

- PLC-2 or 1774 PLC
- PLC-5 or SoftLogix5
- SLC-500
- MicroLogix
- PLC-3
- Pyramid Integrator (PLC-5/250)

In most cases, as much of the original I/O racks/modules, field wiring, communication networks, and HMI/SCADA as you want can be left intact.

Over time, you can then retrofit other parts of the system (eg: drives, I/O, HMI) as it makes sense to do so.

With SoftPLC's open architecture PACs, you have a lot of options on future product choices and virtually unlimited capacity!

Total cost of a CPU migration starts at ***only $1850 USD***, which includes a SoftPLC CPU with a built-in A-B RIO interface, application conversion utility or services, and SoftPLC programming software. SoftPLC CPU models are available to handle even the largest applications with multiple RIO and communication networks.

In some cases, based on the age and configuration of the A-B equipment, it may be more cost effective to convert the logic and documentation but replace some or all of the A-B hardware - reduce the ongoing cost of maintaining obsolete equipment, connect to modern networks, add new functionality or hardware, and more. You can even combine multiple A-B PLC's into a single SoftPLC!

Contact us to discuss your upgrade application details.

Hardware

Detailed conversion information for each A-B PLC model can be found in the specific model's section of this document.

Choose to update the CPU only, or upgrade the entire system - SoftPLC has options for both!

The most popular SoftPLC controller models that can replace an Allen-Bradley PLC CPU while continuting to use the A-B I/O are NeoPAC SoftPLC's and Smart SoftPLC's.

CPU

A NeoPAC SoftPLC can be factory equipped with up to (2) A-B interfaces, which can be for RIO (Remote I/O) Master (controller) or Slave (adapter), or DH+ (Data Highway Plus). If you need more than (2) bluehose interfaces or want a built-in Ethernet switch, select a Smart SoftPLC.

A Smart SoftPLC can be factory equipped with up to (3) A-B interfaces. Interfaces can be RIO (Remote I/O) channels, either Master (controller) or Slave (adapter), or DH+ (Data Highway Plus). The Smart also has a built-in 4-port Ethernet switch.

I/O

As described above, you can continue to use the existing A-B I/O. However, if you want to use another type of I/O, you can still re-use the bulk of the application logic and choose from many options with any SoftPLC CPU:

- SoftPLC's Tealware I/O
- Any Ethernet/IP or ModbusTCP I/O
- Any Modbus I/O
- Many others via loadable drivers or industry bus protocol interfaces

HMI/Operator Interfaces

Any HMI/SCADA/DCS system can continue to be used, normally without change, since the SoftPLC will appear as an A-B PLC to the operator interface - either as a PLC-5/SLC-500 or using PLC-2 compatibility mode on serial DF1, DH+ or A-B Ethernet networks.

OR you can upgrade the operator interface as well - either with one of our HMI migration solutions, or with any product of your choice - all are compatible with SoftPLC.

Most specialty I/O, coprocessor and side-car modules are supported as part of the migration process, or many times the modules can be eliminated with functions that are standard in the SoftPLC *(eg: Modbus communication)*.

Other

Drives, scales, robots or other peripherals that are part of the original system connected to the A-B PLC on Remote I/O or DH+ are fully compatible with SoftPLC! SoftPLC fully supports any devices on the remote I/O network that use block transfer to communicate. SoftPLC's block transfer support is complete, and fully replicates the A-B PLC block transfer capabilities.

Application/Documentation Conversion

Detailed file conversion information for each A-B model can be found in the specific model's tab.

SoftPLC Corporation has developed sophisticated utilities that automatically convert A-B ladder logic and documentation to our file format. In most cases, the automatic conversion is 98% or better. These tools provide a report that lists not only what may need manual review, but also details about the conversion process such as a cross-reference from old address to new, rung number equivalences, and more.

We offer automated conversion services as a low flat-rate fee*. Optionally, we offer application engineering services at an hourly fee for detailed review of the results, manual conversion of any flagged logic, or to enter logic/documentation from a program printout *(when files are not available)*.

For SLC-500/MicroLogix applications, there is an automated conversion tool built into TOPDOC NexGen, the SoftPLC programming software. So you can do the conversion yourself, or use our services.

NO RISK

We provide a no-charge engineering pre-review of your migration application prior to issuing a formal hardware quotation. We want to ensure your new SoftPLC based system start-up will be as easy as possible. This review includes an existing system equipment analysis and a review of the program logic, resulting in a list of any potential issues found, along with recommended solutions.

As part of our migration service, we can even ship your new SoftPLC with the converted application pre-loaded.

* *For most A-B models. Some models are quoted by project.*

PLC-5 Migrations

PLC-5 migrations to SoftPLC are unbelievably smooth!

Minimal hardware changes are required in most cases. But, even more significantly, the ladder logic is not converted - it is imported! Rarely does any logic need to be changed, since SoftPLC was initially modeled after the PLC-5.

This means no re-training of personnel, no re-programming of HMI/SCADA systems, and minimal documentation/drawings re-work.

Application Conversion Steps

1. Email us your RSLogix5 .RSP file, if available. Instead, if the files are in 6200 format, export the logic to "pc5" format *(using "Save as pc5" or "Save as text")*. Also, export the documentation to text format and send us those files. If your files are in TOPDOC PLC-5 format, you can email those directly.
2. We will convert the files to a single SoftPLC application file (*.APP) that will load into TOPDOC NexGen, the SoftPLC programming software.
3. Download the application to your new SoftPLC controller using TOPDOC NexGen

Hardware Migration

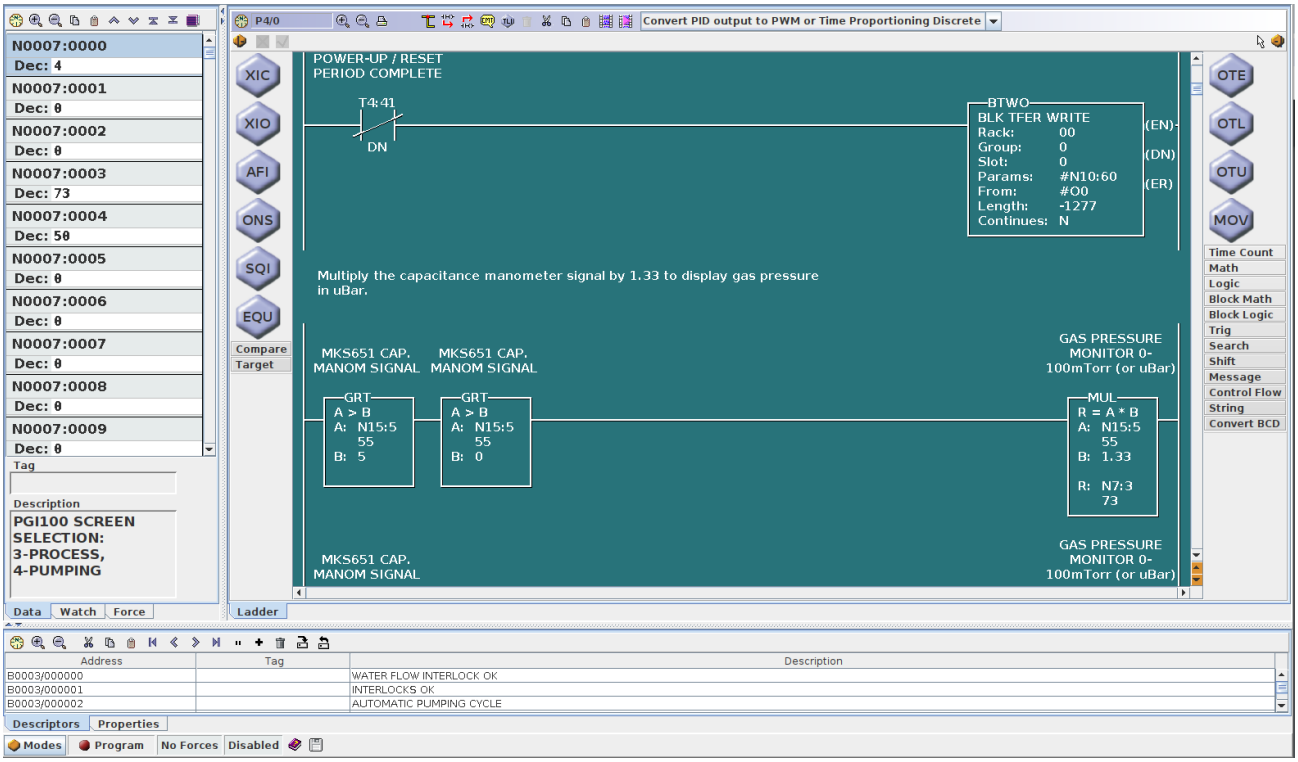
If you want to continue using the existing I/O -

1. Replace the PLC-5 processor with a 1771-ASB remote adapter module or reconfigure it as a remote I/O adapter *(If the PLC-5 had extended local I/O, replace all local adapters with remote adapters.)* SoftPLC Corp provides gently used 1771-ASB modules with wiring arm and 1 year warranty as our Catalog Number ICO-1771ASBKIT.
2. Install the SoftPLC CPU and connect it via "blue hose" to the first I/O adapter.
3. Connect any other hardware to the SoftPLC as needed *(eg: HMI/SCADA, serial devices, other networks)*

If your original system was redundant, had multiple RIO or DH+ networks, or other specialty functions, contact us for an engineering review and quote.

If you want to replace the I/O - 1. As part of the pre-sales engineering review, we would have discussed your new I/O selection, I/O network protocol, connection(s) and configuration. 2. We will identify the steps needed and logic considerations in making the I/O network change such as replacing block transfer instructions, timing, using I/O network diagnostic instructions included in the new protocol driver, and more. *(Application engineering assistance is available at reasonable rates to assist with logic changes.)*

Example of a converted PLC-5 program


N0007:0000
Dec: 4
N0007:0001
Dec: 0
N0007:0002
Dec: 0
N0007:0003
Dec: 73
N0007:0004
Dec: 50
N0007:0005
Dec: 0
N0007:0006
Dec: 0
N0007:0007
Dec: 0
N0007:0008
Dec: 0
N0007:0009
Dec: 0
Tag
Description
PGI100 SCREEN SELECTION:
3-PROCESS,
4-PUMPING
Data
Watch
Force
P4/0
Convert PID output to PWM or Time Proportioning Discrete
XIC
XIO
AFI
ONS
SQI
EQU
Compare
Target
POWER-UP / RESET
PERIOD COMPLETE
T4:41
DN
BTWO
BLK TFER WRITE
Rack: 00
Group: 0
Slot: 0
Params: #N10:60
From: #O0
Length: -1277
Continues: N
(EN)
(DN)
(ER)
Multiply the capacitance manometer signal by 1.33 to display gas pressure in uBar.
MKS651 CAP. MANOM SIGNAL
MKS651 CAP. MANOM SIGNAL
GRT
A > B
A: N15:5 55
B: 5
GRT
A > B
A: N15:5 55
B: 0
GAS PRESSURE MONITOR 0-100mTorr (or uBar)
MUL
R = A * B
A: N15:5 55
B: 1.33
R: N7:3 73
MKS651 CAP. MANOM SIGNAL
GAS PRESSURE MONITOR 0-100mTorr (or uBar)
OTE
OTL
OTU
MOV
Time Count
Math
Logic
Block Math
Block Logic
Trig
Search
Shift
Message
Control Flow
String
Convert BCD
Ladder
Address
Tag
Description
B0003/000000
WATER FLOW INTERLOCK OK
B0003/000001
INTERLOCKS OK
B0003/000002
AUTOMATIC PUMPING CYCLE
Descriptors
Properties
Modes
Program
No Forces
Disabled

SLC-500 Conversions

SLC-500 migrations to SoftPLC are unbelievably easy! Minimal hardware changes are required in most cases, especially if you decide to keep the existing I/O. Rarely does any logic need to be changed, since SoftPLC is a superset of the SLC-500 and PLC-5. The primary differences are in the addressing of digital I/O *(which the automated conversion utility handles)* and the support of some specialty third party I/O modules.

After conversion, there is little re-training of personnel, minimal (if any) re-programming of HMI/SCADA systems and minimal documentation/drawings re-work required.

Hardware Migration

If you are going to continue using the SLC I/O, you have 2 options -

1. Replace the SLC CPU with a model SoftPLC-500 controller.

2. Replace the SLC-500 processor with a 1747-ASB remote I/O adapter. Connect your Smart or NeoPAC SoftPLC to the I/O adapter via "blue hose". SoftPLC Corp provides gently used 1747-ASB modules with 1 year warranty as our Catalog Number ICO-1747ASBKIT.

If you are going to change the SLC I/O, you can use any SoftPLC CPU with your remote I/O of choice, such as a Smart SoftPLC with Tealware local I/O. The conversion utility lists the Tealware modules to use and automatically assigns I/O addresses.

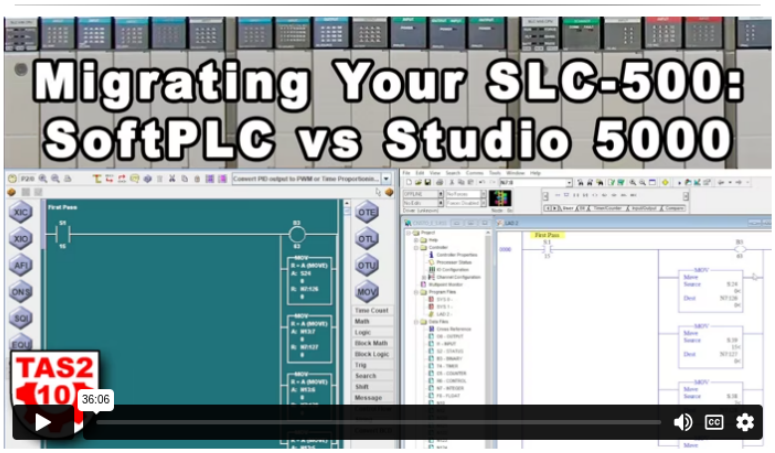
Then, connect any other hardware to the SoftPLC as needed (eg: HMI/SCADA, serial devices, other networks). If your original system had multiple RIO or DH+ networks, or other specialty functions, contact us for an engineering review and quote.

Application Conversion Steps Use the built-in RSLogix500 Utility in TOPDOC NexGen to import the *.SLC and *.SY6 files. The report generated by the tool will identify any areas that may need manual review or modification.

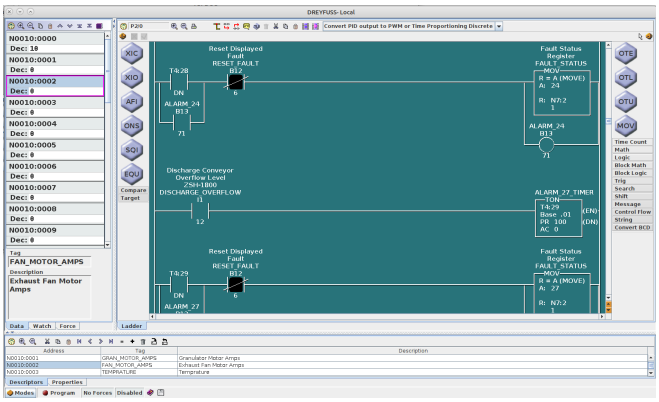
OR, purchase our application conversion services

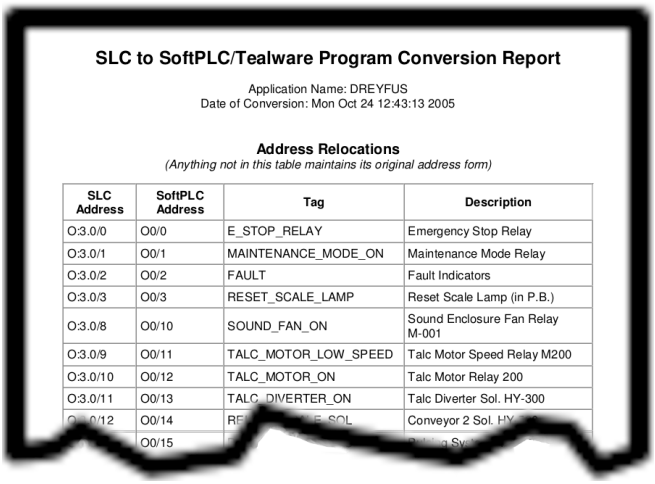
1. Email the *.RSS file from the RSLogix500 software to SoftPLC Corp
2. We will convert the program and documentation to a single SoftPLC application file that will load into TOPDOC NexGen, the SoftPLC programming software.
3. Download the application to your new SoftPLC controller using TOPDOC NexGen

Video: "SLC-500 Migrations Compared-SoftPLC vs Studio 5000"(36min)"



Example SLC-500 Conversion Report and Logic





SLC to SoftPLC/Tealware Program Conversion Report

Application Name: DREYFUS
Date of Conversion: Mon Oct 24 12:43:13 2005

Address Relocations
(Anything not in this table maintains its original address form)

SLC Address	SoftPLC Address	Tag	Description
O:3.0/0	O0/0	E_STOP_RELAY	Emergency Stop Relay
O:3.0/1	O0/1	MAINTENANCE_MODE_ON	Maintenance Mode Relay
O:3.0/2	O0/2	FAULT	Fault Indicators
O:3.0/3	O0/3	RESET_SCALE_LAMP	Reset Scale Lamp (in P.B.)
O:3.0/8	O0/10	SOUND_FAN_ON	Sound Enclosure Fan Relay M-001
O:3.0/9	O0/11	TALC_MOTOR_LOW_SPEED	Talc Motor Speed Relay M200
O:3.0/10	O0/12	TALC_MOTOR_ON	Talc Motor Relay 200
O:3.0/11	O0/13	TALC_DIVERTER_ON	Talc Diverter Sol. HY-300
[illegible]	O0/14	[illegible]	Conveyor 2 Sol. [illegible]
[illegible]	O0/15	[illegible]	[illegible]

MicroLogix Conversions

Since the MicroLogix has built-in I/O, conversions are normally done to preserve logic/documentation only, with the hardware being replaced. Some hardware options include:

MLX Micro SoftPLC

Smart SoftPLC with Tealware I/O

NeoPAC SoftPLC with A-Series or other I/O

After conversion, there is little re-training of personnel, minimal (if any) re-programming of HMI/SCADA systems.

Hardware Migration

1. Choose the new I/O structure and physical connection to the SoftPLC CPU.
2. Install the SoftPLC controller and I/O.
3. Connect any other hardware to the SoftPLC as needed (eg: HMI/SCADA, serial devices, other networks).

Application Conversion Steps

Use the built-in RSLogix500 Utility in TOPDOC NexGen to import the *.SLC and *.SY6 files. The report generated by the tool will identify any areas that may need manual review or modification.

OR, purchase our application conversion services:

1. Email the .RSS file from the RSLogix500 software to SoftPLC Corp
2. We will convert the program and documentation to a single SoftPLC application file that will load into TOPDOC NexGen, the SoftPLC programming software. We will also configure the I/O communication driver to properly map the new I/O.
3. Download the application and driver configuration file(s) to your new SoftPLC controller using

TOPDOC NexGen

If your original system had DH+ networks, specialty functions, etc. contact us for an engineering review and quote.

PLC-2 Migrations

PLC-2 migrations to SoftPLC are incredibly easy! Minimal hardware changes are required in most cases. Logic conversions are normally 98% or better.

The converted logic resembles PLC-5/SLC-500/MicroLogix logic, so if your personnel are familiar with those models, minimal re-training is required. Existing HMI/SCADA products can communicate to SoftPLC using a PLC-2 compatibility mode, so these often do not require re-programming.

Application Conversion Steps

1. Upload the existing PLC-2 program using TOPDOC for PLC-2. As part of our conversion service, we can either provide a rental of TOPDOC PLC-2 and an Attached Mode Cable, or application logic entry services when only a hard copy print of the logic is available.
2. Export the documentation from your PLC-2 programming software to text format. We have imports for most PLC-2 software product documentation formats.

   (Note: If you do not have existing PLC-2 software files or cannot provide the text formatted files, we offer an optional low cost service to enter the documentation into TOPDOC PLC-2 from a hard-copy printout, so that it can be converted with the logic.)

3. Email these files (or reports) to us. With our automated PLC-2 to SoftPLC conversion utility, we convert the logic and documentation to a single SoftPLC application file that will load into TOPDOC NexGen. If there is logic that doesn't convert, or needs to be modified, our application engineers will discuss options with you.
4. Download the application to SoftPLC using TOPDOC NexGen

Mini PLC-2 Hardware Migration

1. Replace the Mini PLC-2 processor with a 1771-ASB remote adapter module. SoftPLC Corp provides gently used 1771-ASB modules with wiring arm and 1 year warranty as our Catalog Number ICO-1771ASBKIT.
2. Install the new SoftPLC and connect it via "blue hose" to the I/O adapter.
3. Connect any other hardware to the SoftPLC as needed *(eg: HMI/SCADA, serial devices, other networks)*

PLC-2/30 or PLC-2/20 Hardware Migration

1. If remote I/O, replace the PLC-2 processor with the SoftPLC controller
2. If local I/O, replace each local adapter (1771-AL) with a remote adapter (1771-ASB). Install the SoftPLC and connect it via "blue hose" to the first I/O adapter. SoftPLC Corp provides gently used 1771-ASB modules with wiring arm and 1 year warranty as our Catalog Number ICO-1771ASBKIT.
3. Connect any other hardware to the SoftPLC as needed *(eg: HMI/SCADA, serial devices, other networks)*

If your system had multiple RIO or DH+ networks, or other specialty functions, contact us for an engineering review and quote.

Example PLC-2 Conversion Report:

Results of PLC-2 to SoftPLC Conversion
PLC-2 rung # 166, SoftPLC program file # 2, rung # 166
FFU encountered. Due to differences between the PLC-2 and SoftPLC, the state of the PLC-2 FIFO is not maintained.
The SoftPLC FIFO will start from empty.

PLC-2 rung # 167, SoftPLC program file # 2, rung # 167
FFL encountered. Due to differences between the PLC-2 and SoftPLC, the state of the PLC-2 FIFO is not maintained.
The SoftPLC FIFO will start from empty.

Address Associations *(PLC-2 address followed by the SoftPLC address)*

017/06	N009:000/15
017/07	N009:005/15
020/00	O:010/00
020/01	O:010/01
200/15	T004:000.DN
200/17	T004:000.EN
203/15	C005:000.DN
203/17	C005:000.CU
243/15	R006:000.DN
244/17	B003/00
260/15	T004:020.DN
260/17	T004:020.EN
263/15	T004:021.DN
400/02	B003/01
400/03	B003/02
602	T004:024.ACC
702	T004:024.PRE
712	N007:001
1000	N007:002
1001	N007:003
#1410 - 1410	#N011:000-000
#1411 - 1411	#N012:000-000

Default datafile assignments in the SoftPLC
SoftPLC datafile # 9 used as default Block Transfer Control block file.
SoftPLC datafile # 7 used as default file for words.
SoftPLC datafile # 3 used as default file for bits.

The following is a listing of rungs added to the SoftPLC program to support various PLC-2 instructions.
SoftPLC 7/0 corresponds to the Multiply subroutine's 0 rung.
SoftPLC 7/1 corresponds to the Multiply subroutine's 1 rung.
SoftPLC 7/2 corresponds to the Multiply subroutine's 2 rung.
SoftPLC 7/3 corresponds to the Multiply subroutine's 3 rung.

SoftPLC 5/0 corresponds to the Binary to BCD subroutine's 0 rung.
SoftPLC 5/1 corresponds to the Binary to BCD subroutine's 1 rung.

The following is a listing of the work locations in the SoftPLC program.
N007:058
N007:059
F008:000
F008:001
N007:060
N007:061

PLC-2 Rung number followed by SoftPLC program file / rung number

0	2/0
1	2/1
2	2/2
306	2/306
307	3/0
308	3/1

PLC-3 Migrations

SoftPLC is an extremely powerful controller. Even though the PLC-3 was used for large, complicated applications, a SoftPLC can handle the challenge! Minimal hardware changes are required in most cases. Logic conversions are normally 95% or better.

The converted logic resembles PLC-5/SLC-500 logic, so if personnel are familiar with those models, minimal re-training is required. Many PLC-3's communicated to HMI/SCADA using PLC-2 compatibility mode which is supported by SoftPLC, so these devices often do not require re-programming.

PLC-3 programs may require manual intervention after the bulk of the program has been automatically converted. We will provide a quote for the conversion after we receive the files and an application engineer has reviewed them.

Application Conversion

1. Using your PLC-3 programming software, export the logic to .ACH format (text). If you are using TOPDOC PLC-3 or 6200 software, the .LOB or .PLC formats are also acceptable. If you do not have PLC-3 software, we can include the cost of "renting" TOPDOC PLC-3 as part of your conversion process.
2. Export any documentation from your PLC-3 programming software to text format. If you are using TOPDOC PLC-3 or 6200 software, the .DBF and .CMT formats can be used directly.
3. Email these files to us. With our automated PLC-3 to SoftPLC conversion utility, we will run a test and report the automatic conversion success rate, as well as the quote for the conversion services, including manual intervention.
4. After your approval, we will convert the logic and documentation to a single SoftPLC application file that will load into TOPDOC NexGen.
5. Download the application to the SoftPLC controller using TOPDOC NexGen.

Hardware Migration

1. Replace the PLC-3 processor with the SoftPLC controller, and connect it via "blue hose" to the first I/O adapter.
2. Connect any other hardware to the SoftPLC as needed (eg: HMI/SCADA, serial devices, other networks).

If your original system had multiple RIO or DH+ networks, or other specialty functions, contact us for an engineering review and quote.

Other Conversions

Other A-B PLC's or control software, as well as some other vendor's PLC systems can also be converted. We are happy to discuss these with you to explore options, feasibility, and costs.

- A-B Pyramid Integrator (PLC-5/250)
- A-B SoftLogix5
- GE Fanuc 90/70, 90/30
- Schneider/Modicon
- Siemens S5, S7

Do you have something else? It doesn't hurt to ask!

Resources

Data Sheets

- A-B PLC Migrations Data Sheet
- Smart SoftPLC Data Sheet
- SoftPLC NeoPAC Data Sheet
- SoftPLC-500 Data Sheet
- MLX-PLC Specifications
- SoftPLC Equivalents to A-B Products

Media

- A-B Control System Migrations *(~16 min video)* Download or Watch on YouTube
- Allen-Bradley PLC Upgrades *(~5 min video)* Download or Watch on YouTube
- A-B Migrations *(~13 min Podcast)* Listen
- A-B PLC Upgrades to SoftPLC
- MLX PLC - MicroLogix Alternative *(~6 min video)* Watch on YouTube
- SLC-500 Migrations Compared-SoftPLC vs Studio 5000 (36min video) Watch on YouTube