

How to...

echochange

Setting up data exchange between a Siemens S7-1200 and an Allen-Bradley ControlLogix, using Siemens PUT and GET functions



Version: E-032014-01

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1 Introduction

This document provides step by step instructions on how to establish data exchange between a Siemens S7-300 PLC and an Allen-Bradley ControlLogix PLC, using a Softing "echochange" protocol converter.

General description of the presented example

- Both PLCs and the echochange are in the same network.
- The S7-1200 controls the flow of communications, using PUT and GET functions.
- The PUT function is used to write data from a S7-1200 data block (Data_to_CLX, 1 byte) onto a ControlLogix tag (Data_from_S7).
- The GET function is used to read data from a ControlLogix tag (Data_to_S7, integer array of 50 elements) and store it onto an S7-1200 data block (Data_from_CLX).

Software used

- Siemens TIA Portal V12 SP1
- Allen-Bradley RSLogix 5000 V20.01.00 (CPR 9 SR 5)
- Allen-Bradley RSLinx Classic Lite V2.59.02 (CPR 9 SR 5)
- Softing NetCon echo V4.33

Conventions

The following conventions are used throughout Softing customer documentation:

Keys, buttons, menu items, commands and other elements involving user interaction are set in bold font and menu sequences are separated by an arrow	Open Start → Control Panel → Programs
Buttons from the user interface are enclosed in brackets and set to bold typeface	Press [Start] to start the application
Coding samples, file extracts and screen output is set in Courier font type	MaxDlsapAddressSupported=23
Filenames and directories are written in italic	Device description files are located in <i>C:</i> \StarterKit\delivery\software\Device Description files



Note

This symbol is used to call attention to notable information that should be followed during installation, use, or servicing of this device.



2 RSLogix 5000- create tags to send and receive data

- 1. Create a tag to receive data from the S7-300 PLC. In this example we will create a SINT tag (short integer, 1 byte).
 - a. In the **Controller Organizer** section, right-click on **Controller Tags** and then click on **New Tag...**.

🐹 RSLogix 5000 - CL1_Demo	_Slot2 [1756-L63 20.13]* - [Cont	troller Tags - CL1_I	Demo_Slot2(cont	roller
Pile Edit View Search	h Logic Communications To	ools Window H	elp	
6 2 9 8 1 1 1 1	5	- # 4 9 [F 🛛 🕿 🔍 G	2
	Path:	THIP-1\192.168.10	.8\Backplane\2*	-
Offline 📴 🖉 🖉	RUN		41-44-63	(u)
No Forces	ок 🛛 🍸			1-1
No Edits	BAT	Favorite Favorite	s 🖌 Add-On 🖌 Sa	fety
Redundancy 3.9	0			
Controller Organizer	- 4 × s	Scope: 🗓 CL1_De	mo_Slot2 👻 S	how:
Tan Controller CL1_De	mo_Slot2	Name 📰	Alias For	Bas
Controller Fau	👌 New Tag Ctrl+W	DI12	Local:0:1.Data.12	Loc
Power-tio Hat	6	DI13	Local:0:I.Data.13	Loc
E Tasks	Monitor Tags	DI14	Local:0:1.Data.14	Loc
A MainTask	Edit Tags	DI15	Local:0:1.Data.15	Loc
H MainProgra	Verify	. Digital_Inputs	Local:0:I.Data	Loc
⊟ 🚳 Task2	Export Tags		Local:1:0.Data	Loc
🗄 🗣 Periodic_1s		DO0	Local:1:0.Data.0	Loc
Unscheduled	Print •	D01	Local:1:0.Data.0	Loc

b. Enter a tag name, select data type **SINT** and click **Create**.

Name:	Data_from_S7		Create 🗸
Description:		*	Cancel
		Ŧ	Help
Туре:	Base Connection.		
Alias For:		¥	
Data Type:	SINT		
Scope:	DCL1_Demo_Slot2	•	
External Access:	Read/Write	•	
Style:	Decimal	•	
Constant			



2. Use the previous method to create a tag for the S7-300 to read. We will create an INT (integer) array with 50 elements.

New Tag	ter fag (int fage	Section.	X	Constant	Style		
inch hug	and there is shown				Decimal		
Name:	Data_to_S7		Create 🗸		Decimal		
					Binary		
Description:		~	Cancel		Binary		
					Decimal		
			Help		Decimal		
		-			Decimal		
			Select Data Type		-	D	X
Туре:	Base	ction	Data Types:				
Alias For:		-/	INT[50]				ОК
Data Type:	SINT		FILTER_NOTCH	SELECTO	в	•	Cancel
Scope:	DCL1_Demo_Slot2	•	FLIP_FLOP_D FLIP_FLOP_JK	_0222010			Help
External Access:	Read/Write	•	FUNCTION_GENE	RATOR		=	
Style:	Decimal	•	IMC				
Constant)-	
	oficiation		Array Dimensions	-			
	inguised		Dim 2	Dim 1	Dim	10	
	AB:1756_AI6_FI	-	0 🗘	0	50	÷	
	AB:1756_Al6_FI		Show Data Tun	ae by Grour			
	AB:1756_AU6		Only Dala Typ	es by Group	10		

3. This is how the new tags should look in the **Controller Tags** table:

cope: 10 CL1_Demo_Slot2 Show: All Tags						•	· 7.		
Name	∆ 8 =	Alias For	Base Tag	Data Type	Description	External Access	Constant	Style	_
AIO		Local:3:1.Ch0Data	Local:3:1.Ch0Data	REAL		Read/Write		Float	
Al1		Local:3:I.Ch1Data	Local:3:I.Ch1Data	REAL		Read/Write		Float	
A00		Local:4:0.Ch0D	Local:4:0.Ch0D	REAL		Read/Write		Float	
A01		Local:4:0.Ch1D	Local:4:0.Ch1D	REAL		Read/Write		Float	
1 BitCounter				COUNTER[10]		Read/Write	1		
Ð Data_from_S7				SINT		Read/Write		Hex	
∃ Data_to_S7				INT[50]		Read/Write		Decim	le
חות		Local:0:1 Data 0	Local:0:LData 0	BOOL		BeadWrite		Decim	al

4. Download the project to the ControlLogix device.



3 NetCon echo – echochange network settings

- 1. Configure the network settings of the echochange port to be used. We will use port 1 (Eth 1).
 - a. Click on Station → Own Station 1.



b. As a minimum, the IP address and subnet mask are required. DNS and Router addresses may be necessary in some cases.

	45	
Station Name	echochange SNA	OK
MAC (Ethernet) Ac	dress 00 A2 DA 23 06 7E	Cancel
CP/IP Station Par	ameter	Help
Use DHCP		
C		
IP Address 19	2.168.10.5	
Subnet Mask 25	5.255.255.0	
Domain Name sn	a.softing.local	
Maximum three D	omain Server Addresses	
DNS Addresses	192.168.10.4	
192.168.10.3		
Maximum three R	outer Addresses	
Router Addresses	192,168,10,1	



4 TIA portal setup

- 1. Open or create your project.
- 2. Enable the clock memory byte, as we will need a cyclic trigger. We use MB0.





3. Create a new connection.



4. Select **S7 connection** from the drop-down menu.

ase select con	nection partner for S7_1200:		Type: 57 connection HMI_connection
onspect			57 connection
	Local interface \$7_1200		
	S7_1200, PROFINET inter		
	1		
	6		
		Local ID (bex): 100	Establish active connection

5. Click [Add], then [Close].



6. Name the connection. Under the **Partner** section, enter the IP address of the echochange and select **Unknown** for the **Interface**.

					_	
General	IO tags	Texts				
General Local ID	J	0	Seneral			
Special conn Address deta	ection prope ails		Connection		1	
		- 11	Name:	ecnochange	J	
		- 11	Connection path			
				Local		Partner
						?
		1	End point:	57_1200	1	Unknown
			Interface:	\$7_1200, PROFINET interface_1[X1 : Ph -	}	Unknown
			Interface type:	Ethernet		Ethernet
			Subnet:	PN/IE_1		
			Address-	192,168,10,7		192,168,10,5

- 7. The echochange accepts TSAPs from 2 to 8 bytes long. The **SIMATIC-ACC** option must be disabled and the TSAPs have to be manually configured.
- 8. We chose the first available **Connection res.** value (10) resulting in local TSAP 10.01. We recommend using the same TSAP for the Partner to avoid confusion.

chochange	[S7 connect	ion]				NELWOIK	0318	
General	IO tags	Texts						
General Local ID			Address details					
Special conr Address det	ection prope ails			Local		Partner		
			End point:	\$7_1200		Unknown		
			Rack/slot:	0]]1	0	1	
			Connection res. (hex):	10	Ŧ	10		
			TSAP:	10.01		10.01		
				SIMATIC-ACC		SIMATIC-A	ACC	
			Subnet ID:	4F6D - 0000 - 0001				

9. Create a data block for the data to be sent to the ControlLogix PLC (1 byte):



10. Double-click on Add new block. In the new Add new block window, select Data block and enter a name (Data_to_CLX in our example).



11. After clicking [OK], select Byte for the data type.

Mi Siemens - DemoProject2							3
Project Edit View Insert Online Optio	ns Tools Window Help						
🕒 💁 🔚 Save project 🚢 🐰 💷 💿 🗙	9: (*: 17 3 10 10 1	🛛 📮 💋 Go online	Go offline		<u>н</u>		
Project tree 🛛 🖬 📢	DemoProject2 > S7_120	0 [CPU 1214C DC/I	DC/DC] • Program	n blocks	Data_to_CL	K [DB1]	
Devices							
1900 B	9 9 8 8 B B B	* 2 2 *					
5	Data_to_CLX						
DemoProject2	Name	Data type	Start value	Retain	Accessible f	Visible in	Setpoint
Add new device	1 💶 👻 Static						
Devices & networks	2 💶 = Static_1	Byte	16#0				
• \$7_1200 [CPU 1214C DC/DC/	3 • <add newo<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td></add>						
Device configuration							
Online & diagnostics							
Add new block							
Add new block							
Data to CLX [DB1]							
Technology objects		N					
External source files		13					
PLC tags							
PLC data types							
Watch and force tables							
2 ¹¹ Program info		3.12		_	1	_	
Text lists	Static_1						
Local modules	General						
Documentation settings	General						
Languages & resources	Attributes	General					
Online access							
Card Reader/USB memory			Name	Static_1			
		-	Data type	Byte			
			Default value	16#0			16
			Start value	16#0			
			Comment	(



12. Right click on the new data block and click on Properties.



13. We will use **ANY** type pointers as input parameters in our GET and PUT function blocks, therefore we need to uncheck **Optimized block access** (see **Basics of block access** section in TIA Portal's help).

seneral		
Seneral nformation rime stamps compilation Protection Attributes	Attributes Only store in load memory Data block write-protected in the device Optimized block access Optimized block access	



14. Create a data block for the data to be read from the ControlLogix PLC following the same method described previously. We name it **Data_from_CLX** and make it an integer array of 50 elements.



- 15. Also uncheck **Optimized block access** as previously described.
- 16. Add a PUT function on your program to write data to the ControlLogix PLC, and name it. We call it **WRITE_TO_CLX** in this example.

Project tree	II 4 DemoProject2 + S7_1200 [CPU 1214C DC/DC/DC] + Program blocks +	Main [OB1]
Devices		
900	: :::::::::::::::::::::::::::::::::::	8 · * 11
DemoProject2 Add new device Devices & networks Social CPU 12144 DC/DC Device configuration Online & diagnostics Program blocks Add new block Device diagnostics Device configuration Online & diagnostics Device configuration Device diagnostics Device diagnostics	Interface Interface Data type Comment I I I I I I I I I I I I I I I I I I I	Cell options Data block Single Single Instance Data block Name Number Manual Automatic The called function block saves its data in its own instance data block.
✓ Details view	PUT_SFB [SFB15]	more
	General Configuration	OK Cancel
Name Address		



17. Select echochange for the Connection name.

JT_SFB [SFB15]					S Propertie
General Conf	figuration				1.7
Connection p 🥑	Connection parame	ter			
States and	General				
		Local	Partner		
	End point:	[\$7 _m 1200	Unknown	×	
	Interface:	57_1200, PROFINET interface_1(X1 : P)	?		
	Interface type:	Ethernet	L Ethernet		
	Subnet name:	PN/IE_1			
	Address:	192.168.10.7	192.168.10.5		
	Connection ID (dec):	100		6	
	Connection name:	echochange			
		Active connection establishment			
		Cone-way			

18. Enter the required parameters for the PUT function.



- REQ: control parameter request, activates the data exchange on a rising edge. We use M0.5, which is a 1 Hz clock bit from the clock memory byte we enabled at the start of this section.
- ADDR_1: pointers to the areas on the partner CPU to which the data will be written. This address will be mapped in the echochange.
 P#DB100.DBX0.0 BYTE 1: pointer to data block 100, byte offset 0, bit offset 0, of data type BYTE, 1 element.
- SD_1: pointers to the areas on the local CPU which contain the data to be sent. P#DB1.DBX0.0 BYTE 1: pointer to data block 1 (Data_to_CLX), byte offset 0, bit offset 0, of data type BYTE, 1 element.



19. Add a GET function on your program to read data from the ControlLogix PLC, and name it. We call it **READ_FROM_CLX** in this example.



20. Select echochange for the Connection name.





21. Enter the required parameters for the GET function.



- REQ: control parameter request, activates the data exchange on a rising edge. We use M0.5, which is a 1 Hz clock bit from the clock memory byte we enabled at the start of this section.
- ADDR_1: pointers to the areas on the partner CPU that are to be read. This address will be mapped in the echochange.
 P#DB200.DBX0.0 INT 50: pointer to data block 200, byte offset 0, bit offset 0, of data type INT, 50 elements.
- RD_1: pointers to the areas on the local CPU in which the read data will be entered.
 P#DB2.DBX0.0 INT 50: pointer to data block 2 (Data_from_CLX), byte offset 0, bit offset 0, of data type INT, 50 elements.
- 22. Compile and download the project to the S7-1200 device.



5 NetCon echo - establish the connections

1. Create a new connection.



2. Enter a connection name and select **Siemens S7** under the **Application Protocol Passive** section and **Rockwell CompactLogix/ControlLogix** under the **Application Protocol Active** section.

Mew Connection		? ×
Connection Name S7_CLX		ОК
Transport Protocol Passive	Transport Protocol Active	Cancel
TCP/IP H1	● TCP/IP ● H1	Help
Application Protocol Passive Siemens S5 AP Siemens S7 Modbus TCP	Application Protocol Active Siemens S5 AP Siemens S7 Modbus TCP	
	Rockwell CompactLogix / ControlLogix Rockwell SIc / Plc5 Mitsubishi Melsec-Q	

- 3. Since we are only using port 1 (Eth 1), we will leave the **Number of Adapter** at **1**.
- 4. Enter the IP of the ControlLogix PLC on the **Destination IP Address**, under the **Active side** section.





5. Click on **RFC1006 TSAPs** and enter the TSAPs chosen in TIA PORTAL.



6. After clicking **[OK]** on the **Echochange Connection Network** window, click **[OK]** on the next window:



7. Enter the ControlLogix CPU slot. In our case we use slot 2.

Control Cogi	(Trotocol	
		ОК
Connection Name	S7_CLX	Cancel
CPU Slot No	2 I	Help

- 8. The **PLC Conversion Table** will come up. Here you will link the S7-1200 data areas with the ControlLogix tags.
- First map the S7 data area to be written to the ControlLogix tag. We used P#DB100.DBX0.0 BYTE 1 for the ADDR_1 parameter in our PUT instruction, so in the echochange we specify DB100 with 0 offset as follows:

		Pic Pro	tocol	Element		Block	Address	Length	Тур	Add ->	OK
	Source	S7	-	DB	-	100	0			Lindate ->	Cancel
	Dest >Symbol	Clx	•						-> Browse	<- Delete	Help
~	Area	Db 9	art Len	Tune -	Pic Are	a Dh. Start	Len Tune Sun	nhol			Clear tal

10. Click on [\rightarrow Browse] to select the respective ControlLogix tag.

	Plc Pro	tocol	Element	t	Block	Address	Length	Тур
Source	S7	•	DB	•	100	0		
Destination	Clx	-		*				i 8 👻
Dest >Symbol			Di con					-> Browse



11. Select the connection you created and click [OK].



12. Select the tag and click **[OK]**.

Element	Access	Parameters *	ОК
Cxn:Float3ad464e2			Cancel
Cxn:Float:3fab961d Cxn:StandardInput:cc69634c			Help
Data_from_S7	Read/Write	Typ INT8, No 0	
Data_to_S7	Read/Write	Typ INT16, No	
DIO	Read/Write	Typ Bool, No C	
DI1	Read/Write	Typ Bool, No C	
DI10	Read/Write	Tvp Bool. No (*	

13. Enter the data length and type (1, byte) and click on **[Add →]** to add the mapping to the conversion table.

		Pic	Protoco	bl	E	lemen	t		Blog	ck		Addres	s Length	Тур	Add ->	OK
	Source	S7		•		DB	•		10	0		0				
	Destination	Cb	ć	•			Ŧ						1	18 -	Update ->	Cancel
	Dest >Symbol	Da	ta_from	n_S7[0	:]									-> Browse	<- Delete	Help
٩c	Area	Db	Start	Len	Туре	-	Plc	Area	Db	Start	Len	Туре	Symbol			Clear tabl
7	DB	100	0	1	i 8	->	Clx		0	0	1	i 8	Data from S7[C]			

14. Now map the S7 data area used to read from the ControlLogix tag. We used P#DB200.DBX0.0 BYTE 1 for the ADDR_1 parameter in our GET instruction, so in the echochange we specify DB200 with 0 offset as follows:

		Pic	Protoco	4	E	lemen	t		Bloc	'k		Addres	s Length	Тур	Add ->	OK
	Source	57		•	1	DB	•		200	0		0			100	
	Destination	Ch	g - 76	•		4	÷		1.3				1	18 👻	Update ->	Cancel
	Dest >Symbol	Dat	a_from	_S7[C	1									-> Browse	<- Delete	Help
Plc	Area	Db	Start	Len	Туре	-	Plc	Area	Db	Start	Len	Type	Symbol			Clear tabl
\$7	DB	100	0	1	18	->	Clx		0	0	1	18	Data from S7IC1			

15. Click on [\rightarrow Browse] to look for the respective ControlLogix tag.

		Plc	Protoco	1	E	leme	nt		Blog	*		Addres:	s Length	Тур
	Source	S7	8	•	0	DB	•		20	0		0		
	Destination	Cb	è	•	E	2	*						1	18
	Dest >Symbol	Da	Data_from_S7[C]								-> Browse			
Plc	Area	Db	Start	Len	Туре	-	Plc	Area	Db	Start	Len	Туре	Symbol	
7	DB	100	0	1	i 8	->	Cix		0	0	1	i 8	Data from S7[C]	



16. Select the connection you created and click [OK].



17. Select the tag and click [OK].

Element	Access	Parameters ^	ОК
Cxn:Float:3fab961d			Cancel
Cxn:StandardInput:cc69634c			Help
Data_from_S7	Read/Write	Typ INT8, No (
Data_to_S7	Read/Write	Typ INT16, No	
DIO	Read/Write	Typ Bool, No (
DI1	Read/Write	Typ Bool, No (
DI10	Read/Write	Typ Bool, No (
DI11	Read/Write	Tvp Bool. No (*	
< III		4	

18. Enter the data length and type (50, Integer) and click on **[Add →]** to add the mapping to the conversion table.

		Plc	Protoco	1	E	lemen	t		Bloc	tk		Addres	Length	Тур	Addes	OK
	Source	\$7	1		6	DB	-		200	0		0	10			- On
	Destination	Cb	¢ .	•		i.	Ψ.						50	i 16 🔹	Update ->	Cancel
	Dest >Symbol	Da	ta_to_S	7[1,0.5	50]									-> Browse	<- Delete	Help
Plc	Area	Db	Start	Len	Туре	-	Plc	Area	Db	Start	Len	Туре	Symbol			Clear table
\$7	DB	100	0	1	18	->	Cix		0	0	1	18	Data from S7(C)			

19. The conversion table should look like this:

	Source Destination Dest >Symbol	Plc Protocol			E	Element			Block		Address		Length	Тур	Add ->	OK
		S7			0	DB	•		200	0	0	0	50	i 16 👻	Update ->	Cancel
		Clx		•												
		Data_to_S7[1,0.50] -> Browse <- Delete												Help		
Plc	Area	Db	Start	Len	Туре	-	Plc	Area	Db	Start	Len	Туре	Symbol			Clear table
57	DB	100	0	1	i 8	->	Clx		0	0	1	i 8	Data_from_S7[C]			
57	DB	200	0	50	i 16	->	Clx		0	0	50	i16	Data to \$7[1,0.50]			

20. Click [OK] to confirm. Setup is now complete.



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