TECH NOTES-306

Integrating RACO® Verbatim®
Gateway with the Allen-Bradley®
MicroLogix™ series PLC
via DF1 over RS232

This technical note explains how to interface the RACO Verbatim Gateway system with the Allen-Bradley MicroLogix family of PLCs. All models of the MicroLogix PLC have at least 1 DF1 port. This allows the Verbatim Gateway to perform its alarm notifications and monitoring functions using the existing wiring to Allen-Bradley MicroLogix PLCs as inputs via data communications. This technical note is applicable for all Verbatim Gateway models

RACO-supplied components:
Verbatim Gateway (any model)
510VAB-1 Cable

Allen-Bradley-supplied components:
MicroLogix family of PLCs
RS232 cable (simple NULL modem – for RSLogix™ 500 to PLC)
RSLogix 500 software version 8.10.00

In order to facilitate data communications via DF1 over RS232, RACO provides a simple NULL Modem serial cable, 510VAB-1 (see above). This cable has the RJ-45 connector required to connect to the Verbatim Gateway. In addition, parameters need to be set within the Allen-Bradley and RACO Verbatim Gateway.

No additional hardware is required.

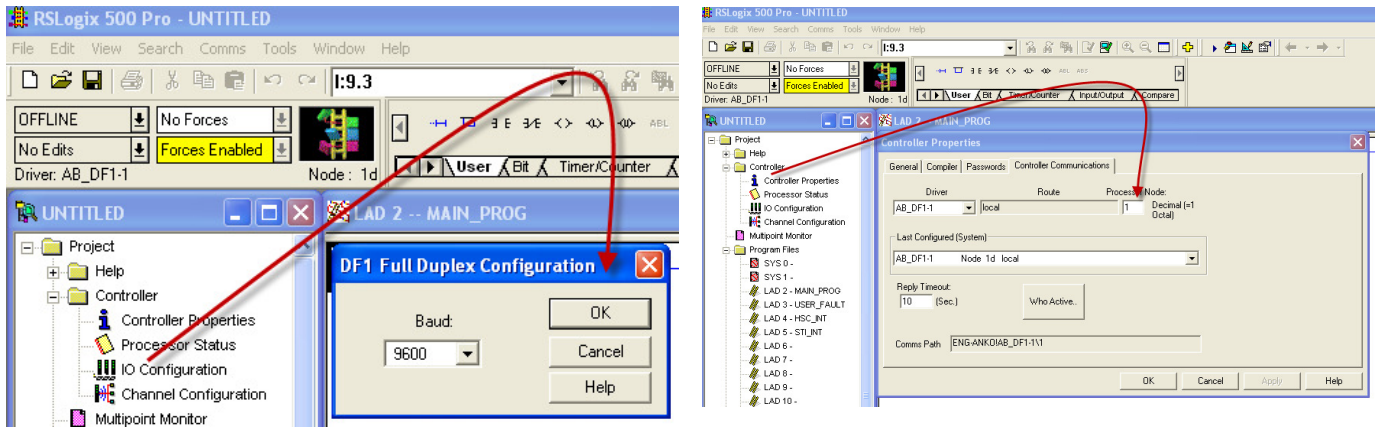# Communication Setup for the Allen-Bradley MicroLogix Platform
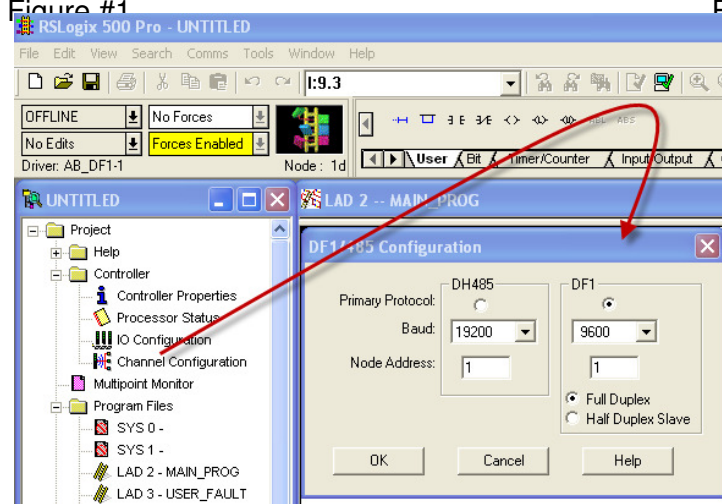

Figure #1

Figure #2

Figure 3

Depending upon the model of MicroLogix PLC, either DH485, Ethernet or an additional DF1 ports may be available.

We recommend you dedicate a DF1 port for the exclusive use of the Verbatim Gateway. Should your MicroLogix contain only one DF1 port, ensure you configure communication parameters to match with both that of the Verbatim Gateway and your PLC programming software.

STEP #1 — Launch RSLogix 500 software

STEP #2 — Open the Channel Configuration form

STEP #3 — Modify Settings
Configuration for the early generation MicroLogix 1000 is very simple. Only BAUD rate (Fig #1) and node address (Fig #2) are custom configurable. Other MicroLogix 1000 having both the DH485 and DF1 ports have the configuration form as illustrated above. (Fig #3)

The remaining parameters are default. They are Parity = NONE, Stop Bits = 1, CRC and No Handshaking.

As shown at right, more recent MicroLogix processors offer a Channel Configuration form to allow full access to the DF1 communication parameters.

Channel configuration form has 3 tabs, General, Chan. 0 and Chan. 1.

The Network link typically connects to Chan. 1. Therefore we will reserve Chan. 1 for RSLogix 500 software.

Open the Channel Configuration form and select Chan. 0. Under the Driver field, you will need to set to *DF1 Full Duplex*.

Next, select the Source ID as 1.

RACO recommends the following:

- Baud rate = 19,200

- Parity = EVEN

- Stop Bits =1

- Error Check = CRC

- Control Line = No Handshaking

- Embedded Responses = Enabled / Auto Detect

- NAK Retries = 3

- ENQ Retries = 3
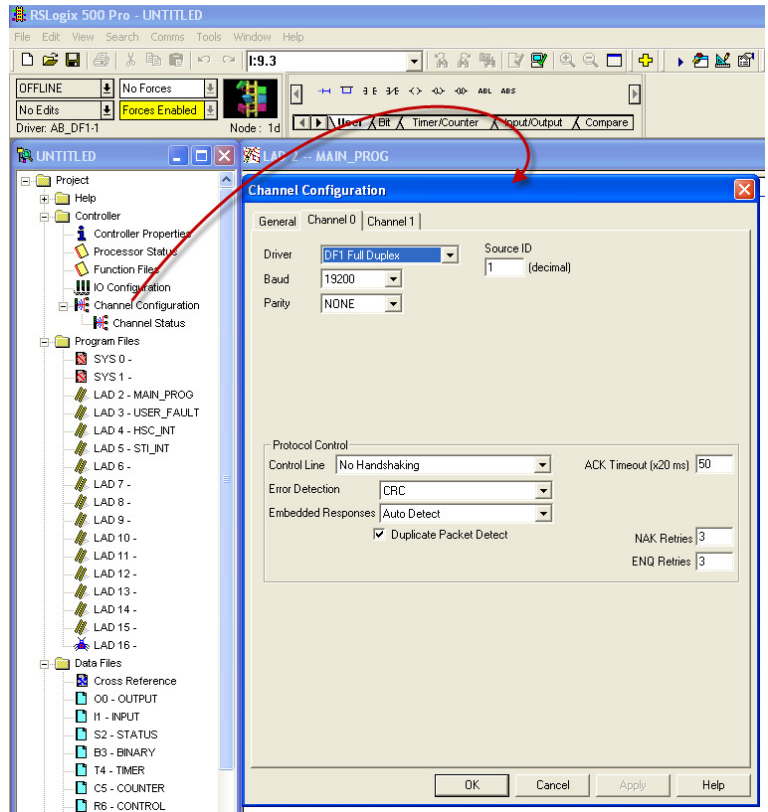
Communication Setup for the Verbatim Gateway

The following seven-step procedure will configure your Verbatim Gateway to link its Remote Channels (RC) to your PLC addresses, via DF1. Once linked, the Verbatim Gateway will monitor RC status and Alarms according to your settings.

Connections to the PLC are via the onboard RJ45 port or NET. With the V232/485, two NET/ports are provided. NET ID = 1 is dedicated to the DH485 protocol and NET ID = 2 is configurable for either Modbus RTU Master or DF1. (Refer to table #1)

Table #1

N	Protocol	Reference	Description	Nets
0	NONE		Device disabled	All nets
2	DH485	7.4.2	Allen-Bradley DH485 protocol	Net1 on V232/485 only
3	DF1	7.4.1	Allen-Bradley serial interface	**Net1 (on VDP only)** **Net2**
4				
5	MODBUSM	7.4.3	Modbus Master	**Net1 (on VDP only)** **Net2**
128	LDL	7.4.5	Local Data Logging May only be used on one device	**Net1 (on VDP only)** **Net2, 4**

STEP #1 — Protocol Driver (4906)
When setting the Protocol, Node Address and Communication parameters, it is good practice to include the NET ID (i.e. 4901, 4903, 4904, 4905 and 4906). Insert the NET ID immediately following the parameter number, as defined below.

As per the Table #1 above, set the Protocol Driver to DF1 on NET 2.
Key in 4906 2 <point> 3 <enter>
To read the Protocol Driver for NET 2, key in 4906 2 <enter>

STEP #2 — Node Address (4905)
Choose a unique DF1 NODE address for the Verbatim Gateway. As illustrated above we've already selected NODE/STATION 1 for the PLC. DF1 allows NODE addresses to range from 1–64.

For example, set the Gateway NODE address to "2" by using code 4905.
To set the NODE address of NET 2, key in 4905 2<point> <2> <enter>
To read the NODE address of NET 2, key in 4905 2 <enter>

STEP #3 — Communication Parameters (4901, 4903, 4904)
Select the communication parameters. These must match with the driver settings on your PLC.

RACO recommends the following communication settings:

BAUD rate = 19200   for "19200" on NET 1, key in 4901 2<point>19200 <enter>
Stop Bits = 1   for "1" on NET 2, key in 4903 2<point> 1 <enter>
Parity = EVEN   for "EVEN" on NET 2, key in 4904 2<point> 2 <enter>
Parity Definition: 0 = No, 1 = ODD, 2 = EVEN, 3 = SPACE, 4 = MARK

STEP #4 – Confirmations (4900, 4901, 4930, and, 4946)
Step #4 will validate all preceding steps.

To verify successful network communications on NET 2, key in 4930 <point> 2 <enter>

To read the BAUD rate for NET 2, key in 4901 2 <enter>
To verify communication settings reflect the above, at NET 2, key in 4900 2<enter>
To verify active node addresses on NET 2, key in 4946 2<enter>

STEP #5 — Set Defaults
this step simplifies Channel Configuration (i.e. Step 6).
By setting to Default both the NET ID and NODE / STATION address, it is no longer necessary to reference them when setting Channel Configuration.

Set the following to DEFAULT.
1   NET ID, used to communicate via DF1 (i.e. "2")
2   NODE/STATION address of the target PLC

To change the NET ID to "2," key in 4910 2 <enter>
To confirm the NET ID, key in 4910 <enter>
To change the PLC NODE / STATION address to "1" of NET 2, key in 4911 1 <enter>
To confirm PLC NODE / STATION address, key in 4911 <enter>

STEP #6 Channel 1 & 2 Configuration (4501) (4502)

Since Verbatim Gateway channels are completely compatible with the logical and I/O addressing scheme for the file structure of the SLC series processors, the table below should look familiar.

Table #2

Identifier	File Type	Example	
O	Output	O:1.0/0	(SLC500)
		O:017/10	(PLC5)
I	Input	I:0.1/0	(SLC500)
		I:013/07	(PLC5)
S	Status	S:2	(word)
		S:2/0	(bit)
B	Bit	B:0	(word)
		B9:0/1	(bit)
T	Timer	T4:0.2	(word)
		T:0.0/1	(bit)
C	Counter	C5:0.2	(word)
		C10:0.0/1	(bit)
R	Control	R6:2.1	(word)
		R:2/15	(bit)
N	Integer	N:1	(word)
		N:1/0	(bit)
F	Floating Point	F:2	(32-bit word)
NOTE: Cannot specify 16 or 1-bit points with F file type.			
D, G, M1, etc…	All other types	Not Supported	

Table #2 shows the Allen-Bradley-supported address types available to link to Verbatim Gateway channels. Indirect, indexed and symbolic addressing schemes are not supported.

The two examples below illustrate the link to the PLC data table (via DF1, Table #2) to the Verbatim Gateway channels.

Example #1
To link B3:0/0 in the PLC to Channel 1 as per the PLC file structure illustrated above, key in 4501 <point> <shift> <B> <3> <shift> <:> <0> <shift> </> <0> <point> <enter>

To verify the current address entered, key in 4501<point><enter>
To read address value, key in 4001<point><enter>; this will read actual PLC value assigned to Channel 1.

Example #2
To link N7:0 in the SLC PLC to Channel 2 as per our PLC file structure illustrated above, key in 4502 <point> <shift> <N> <7> <shift> <:> <0> <point> <enter>

To verify the current address entered, key in 4502<point><enter>
To read address value, key in 4002<point><enter>, this will read actual PLC value assigned to Channel 2.

STEP #7 – Assignment of Alarm Conditions
Having created and tested your Remote Channels, Step #6, you are now able to assign alarm conditions.

Channel #1, configured as Discrete, is either ON or OFF
Should this channel be linked to a "Failsafe" point in the PLC, (i.e. ON = NORMAL, OFF = ALARM) we would alarm when OFF. In this case, we would key in 45 01 2.

To alarm when ON, (i.e. signal is HIGH) key in 45 01 1
To alarm when OFF, (i.e. signal is LOW) key in 45 01 2
To read Alarm status for Channel 1, key in 4001<enter>

Channel #2, configured as Analog, operates within the range from 0 to 65, 535.
Should this channel be linked to a pressure signal in PLC, and the process requires pressure remain within an acceptable level, otherwise ALARM (For example, BELOW 10,000 AND ABOVE 30,000).

We would key in the following:
To alarm when the analog signal falls below a value, for example 10,000; key in 45 02 5 10000
To read the LOW set point alarm; key in 45 02 5
To alarm when the analog signal rises above a value, for example 30,000; key in 45 02 6 30000
To read the HIGH set point alarm; key in 45 02 6

RACO® REMOTE ALARMS AND CONTROLS

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