

105U/905U-G-PR2 Profibus Master & Siemens ET200S Distributed I/O

PURPOSE

The purpose of this document is to provide the reader with an application note for using the 105/905U-G-PR2 Profibus DP Master Gateway with a Siemens ET200 S Distributed I/O system.

This application should be read in conjunction with user manuals for details on powering and programming 105/905U-G. The reader would also have a firm understanding of the Profibus DP protocol.

MATERIALS

The materials used for this application were,
Siemens ET200S Distributed I/O,
105/905U-G-PR2,
GSD File for ET200S,
E-Series Configuration utility (build 1.78 or higher),
RS232 DB9 serial cable (straight through pins 3 & 8),

105/905U-G CONFIGURATION

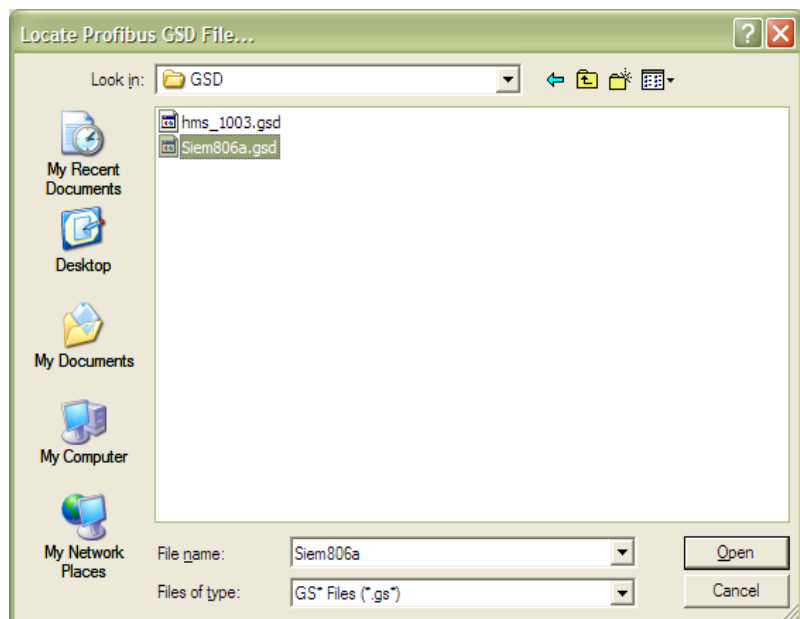
The Profibus Master configuration is done in two parts. Profibus Network Configuration and Fieldbus Mappings.

The Profibus Network configuration sets the links between the Profibus Slave Devices and the Profibus Master Gateway. The Fieldbus Mappings links the Profibus Data to the radio network.

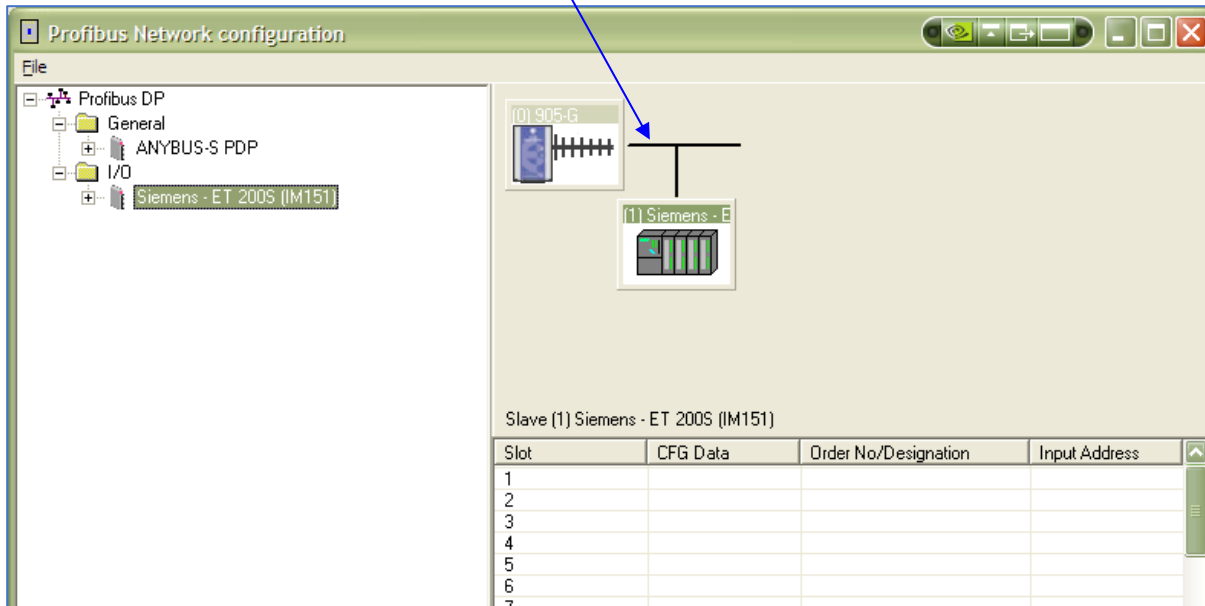
First you need to load the Profibus Slaves GSD file into the E-Series Configuration.

Once configuration software has been opened and a Profibus Master Gateway has been created, select the Profibus Network configuration then Select "Install GSD File" from the drop down File menu and find the GSD file that comes with the Slave device (In this case the ET200S).

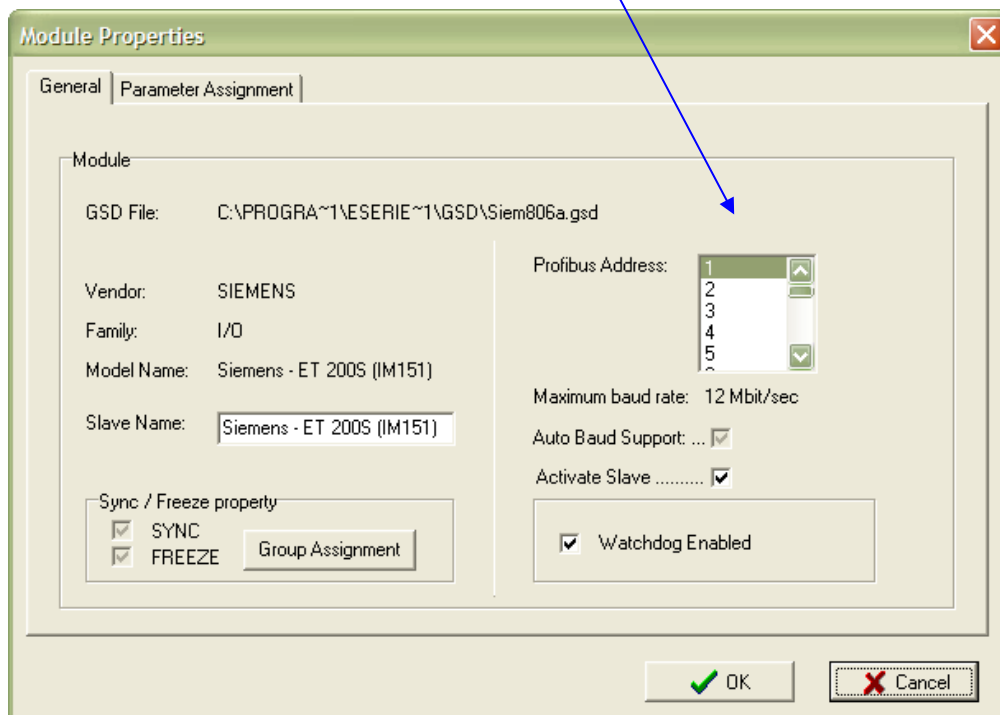
This GSD file has the I/O map for the installed Profibus Slave device and is needed by the software to work out what sort of I/O is available and the addressing.



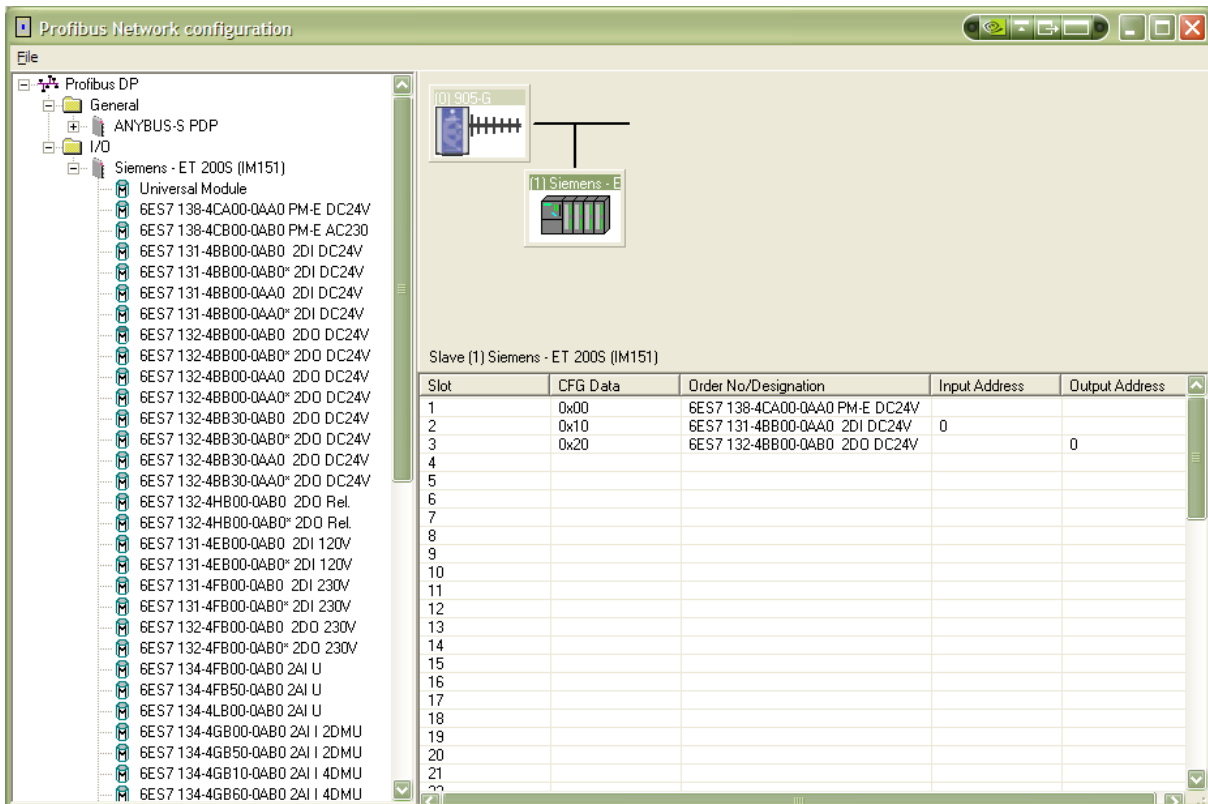
Next find the Slave device in the left hand tree window of the Profibus Network Configuration window. Right click the device being used and select add to network or drag and drop the module onto the network line as shown below. The module can only be added to the network line.



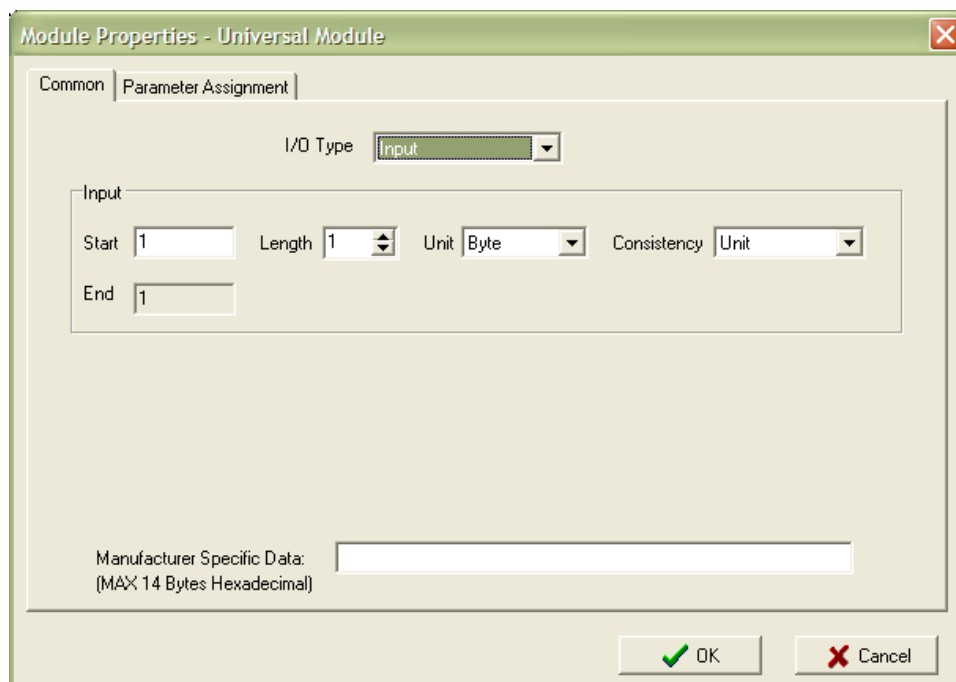
Next Double click on the Siemens ET200S (or other Slave device) to adjust available network settings. See below. This is where you can set the Profibus Slave address (Address will need to match the Profibus Slave Device).



Open the “+” next to the name of the Profibus Slave device on the left hand tree window and drag the I/O modules installed in the device over to the right hand window and drop them into the appropriate slots. (See below) Making sure that all modules are present including any power supply modules etc. Add each slot as you see them on the slave device.



In the above example we have setup 2 digital inputs and 2 digital outputs. If a module is selected from the list provided, all of the addressing is done for you. If the I/O module is not present or is a special type you can add a “universal module” and assign the start address, length type, etc. Ensure you add all the slots configured for the slave device including power supplies and configuration slots if used.

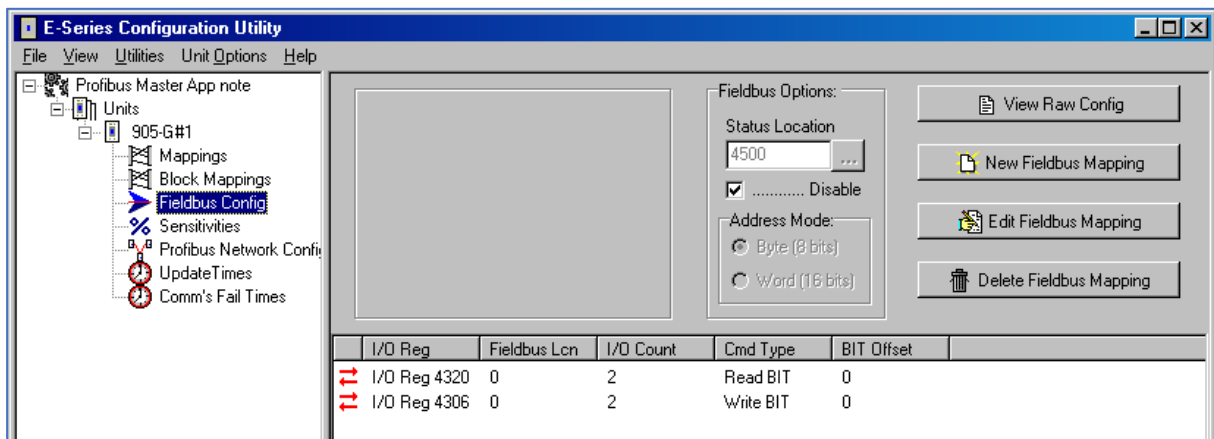
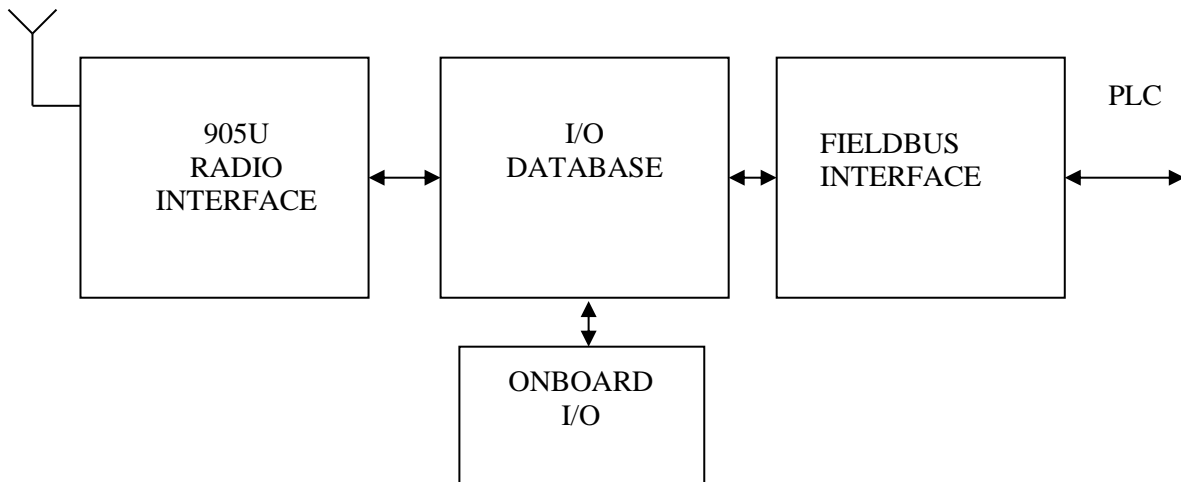


When all I/O has been added, close the Profibus Network Configuration window which will bring you back to the E-Series Configuration window.

Select “Fieldbus Config” see below.

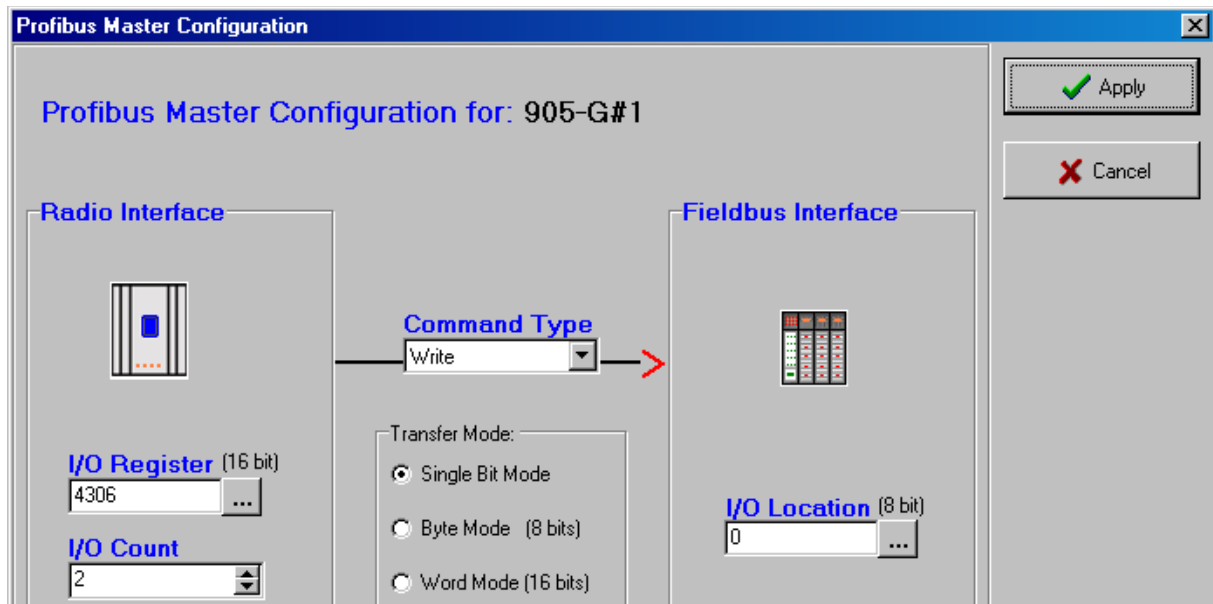
Gateway Infrastructure

- The gateway has an internal database made up of approximately 4300 16 bit registers.
- Values from remote radio sites come in via the “Radio Interface” and are stored in the “I/O Database” which are then written to the ‘Fieldbus Interface’.
- Values that are read from the ‘Fieldbus Interface’ are stored in the “I/O Database” which are then mapped out the “Radio Interface” to remote radio units.
- The Onboard Digital I/O’s are linked to register locations in the “I/O Database” which can be read or written to the “Fieldbus Interface” or mapped to or from the “Radio Interface”.

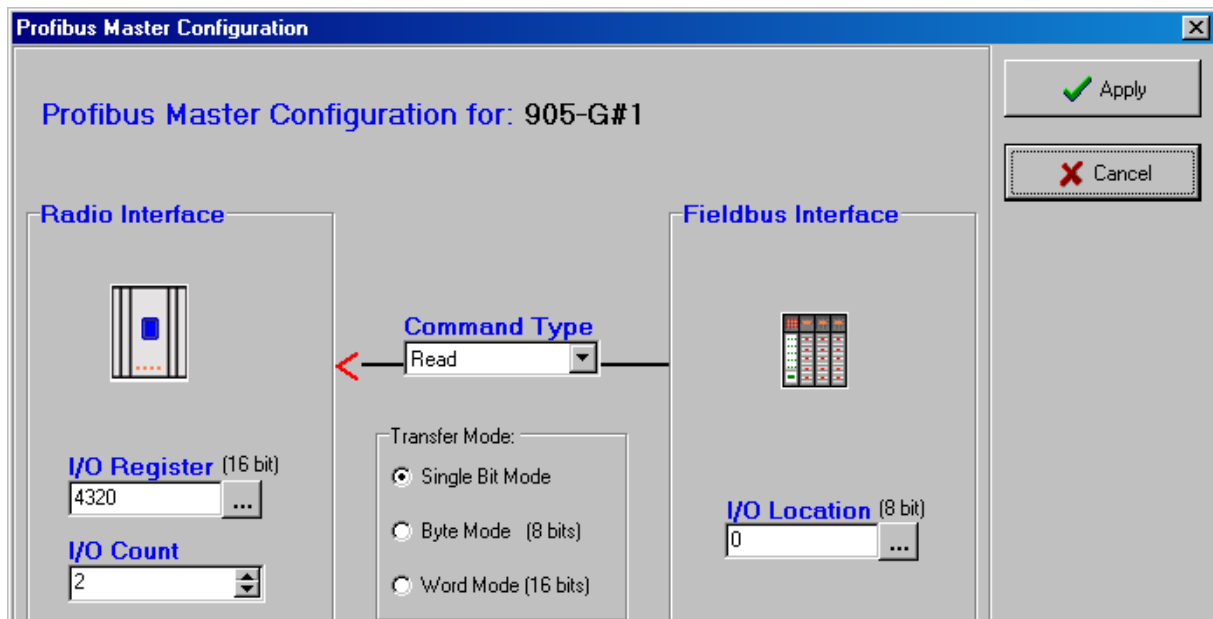


The examples shown in the Fieldbus Config has two mappings, one read mapping of two bits and one write mapping of two bits.

To assign a new mapping select the “New Fieldbus Mapping” button or to edit it just double click on the mapping. The write mapping below shows I/O register 4306 with an I/O count of 2 (4306 & 4307) which will be written to Fieldbus I/O location 0. Registers 4306 & 4307 are the Local Digital Inputs 7 & 8.

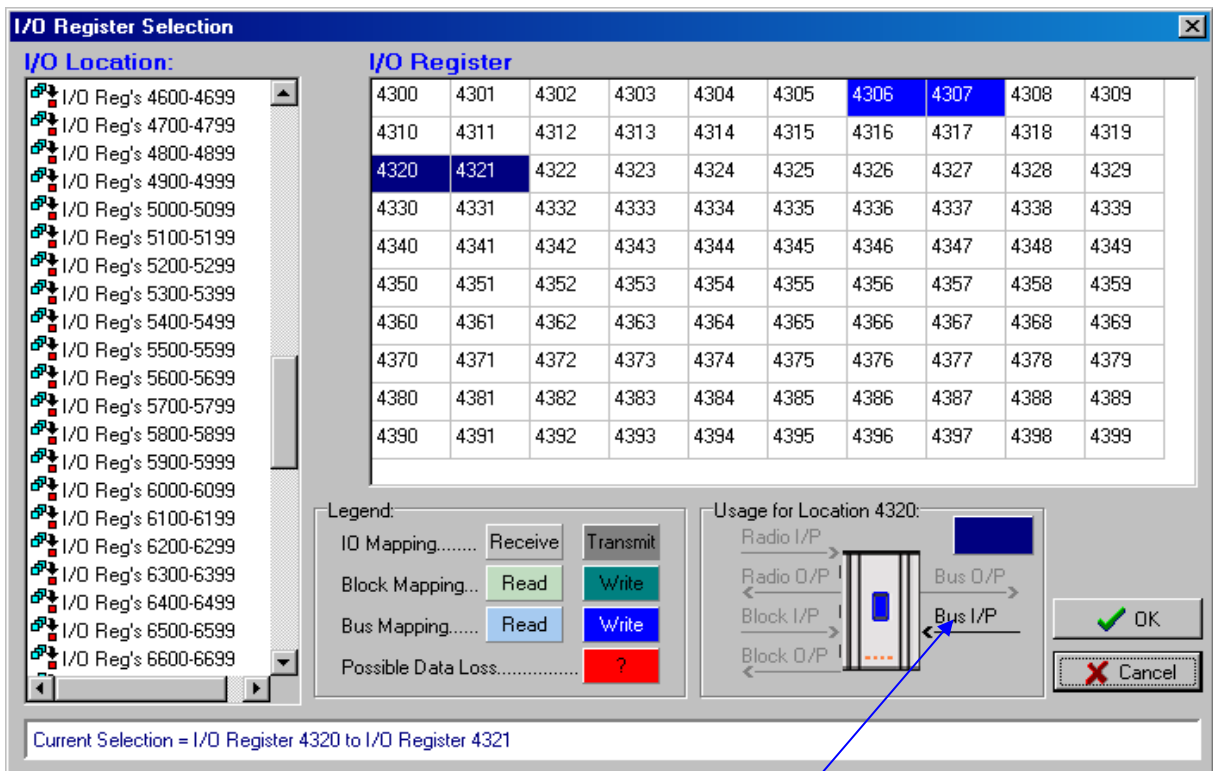


The Read mapping shows Fieldbus I/O location 0 with an I/O count of 2 (0 & 1) will be read into Radio I/O registers location 4320 & 4321. Which are the local Digital Outputs 1 & 2.



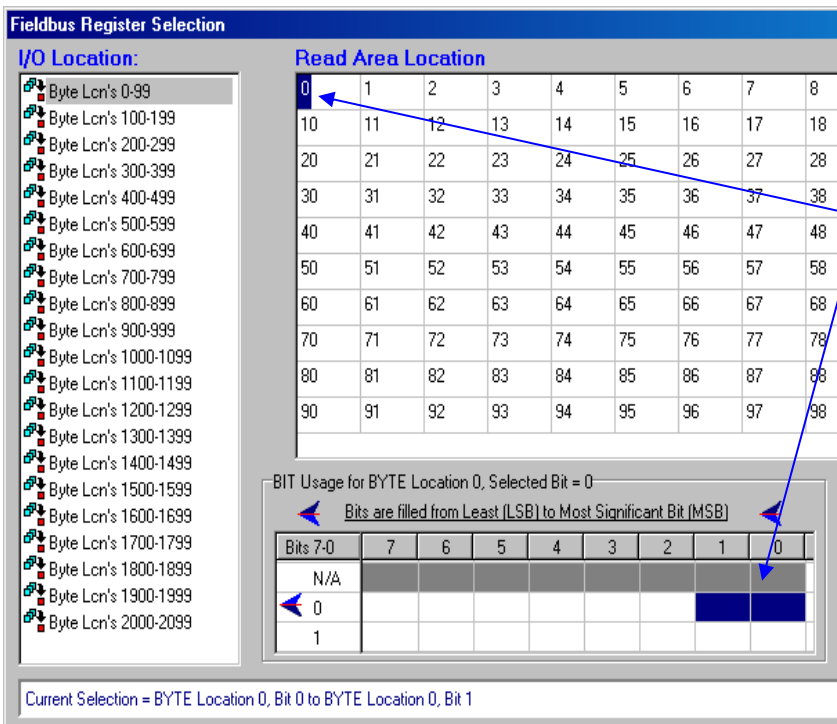
You can select the button next to the I/O Register box in the Radio Interface to show the available registers. See below.

Radio I/O Register



You can see the registers are colour coded and the I/O direction can be checked. This example shows the usage for register 4320 that it has come into the Gateway from the Fieldbus which we have previously selected as a read command.

Fieldbus I/O Location



You can select the button next to the I/O Location box in the Fieldbus Interface to show the available registers.

You will note that this fieldbus mapping is writing two bits into the first byte location.

Fieldbus I/O locations are 8 bit and the available locations are from 0 through to 2047.

There are separate read and write area's which range from 0 to 2047.

The only setup needed on the ET200S is the Profibus Address setting that needs to be the same as what was entered in the Profibus Network Configuration at the beginning of the application note.

Once configurations are complete this will need to be downloaded to module via RS232 cable as per manual.

ET200S Operation

This application note was setup to configure two digital inputs from the ET200S to go to two internal registers in the Gateway. From there they can be radio mapped to any other Module in the system. Also two internal register are written to the two digital outputs on the ET200 S. The internal 4306 & 4307 (DIO #7 & 8) have been setup to write their value in to the Digital output #1 & 2 on the ET200S.

Also the two digital inputs on the ET200S have been setup up so that their values are written into I/O registers 4320 & 4321 (DIO # 1 & 2).

This way you get a visual ON/OFF indication on the Gateway module making it easier to establish if communications is successful or not.

If you turn on one of the digital inputs on the Gateway (DIO7 or DIO8) this will write a value of FFFF hex into one of the registers 4306 and 4307. These Registers are then fieldbus mapped across to the Fieldbus area which in turn is then configured to turn on the digital outputs on the Slave Device.

From the ET200S if you turn on any of the digital inputs a value of FFFF is read from the Slave Device and then mapped across to registers 4320 or 4321. The DIO LEDs 1 & 2 would also be lit on the 105/905U-G.

Online Diagnostics

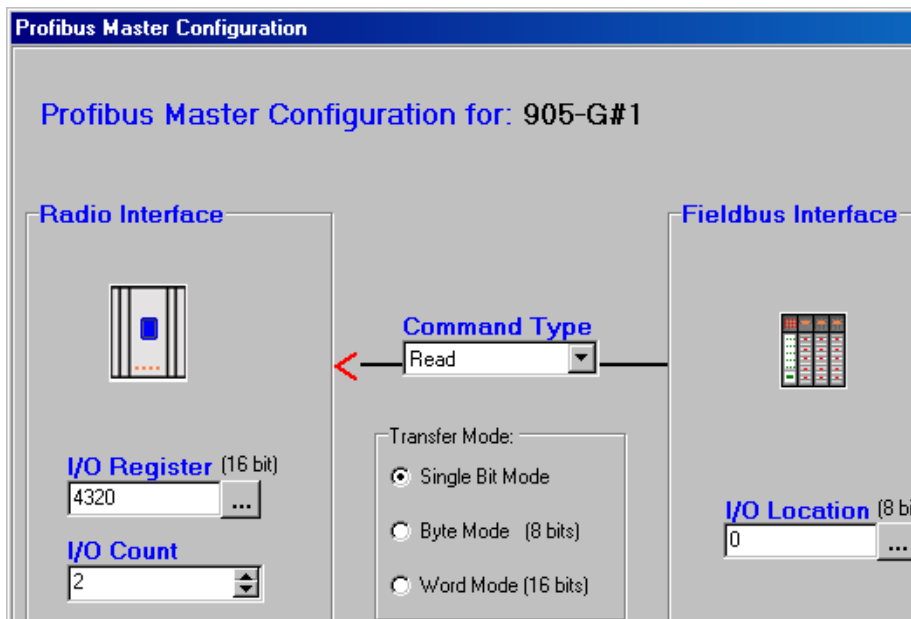
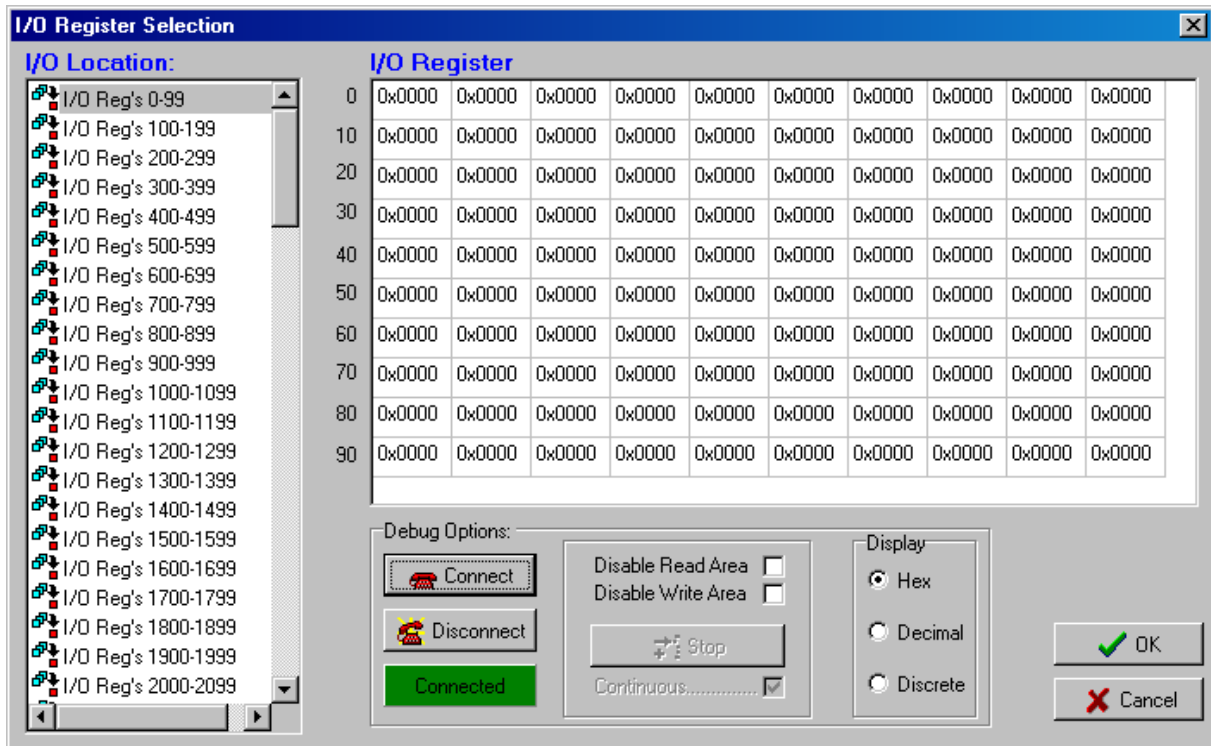
Depending on Firmware version of the Gateway the Online Diagnostics can be done in one of two ways. The Firmware version can be found from the module serial number located on the underside of the module. The firmware version is written in digits 5 through 7 of the serial number, so a module with serial number 0405**170**9468 has firmware version 1.70

To Diagnose the Gateway whilst connected to the Profibus network this is done via the online diagnostics whilst connected to the configuration RS232 port and using the E-series configuration program.

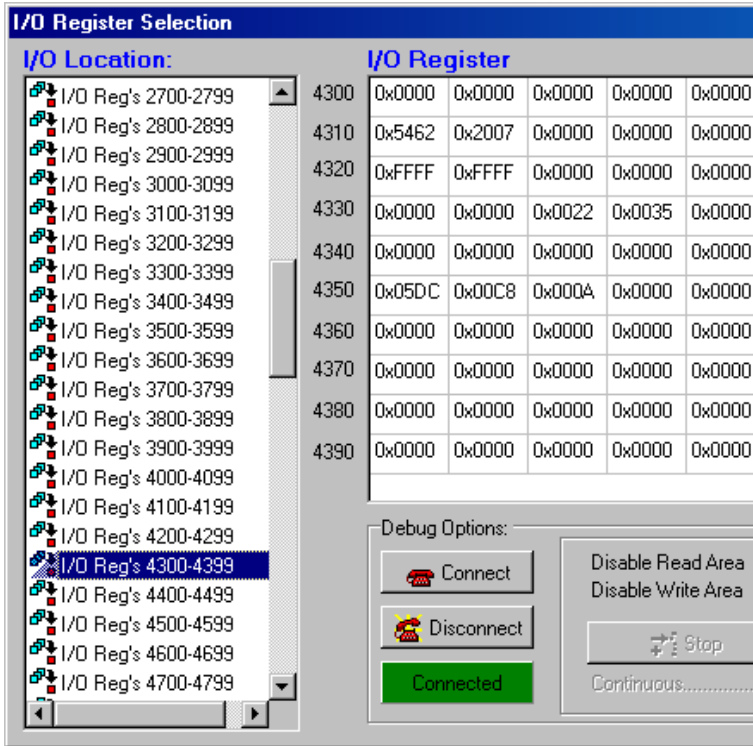
For Firmware versions 1.70 or higher.

Select the Profibus Master Gateway unit in the configuration software. On the right hand side under program unit select Diagnostics. Then in the next screen select Debug I/O. Under Debug Options select Connect and the following screen should appear.

If connected message is not shown as above check serial cable is connected, correct com port is selected, and cable is straight through serial cable.

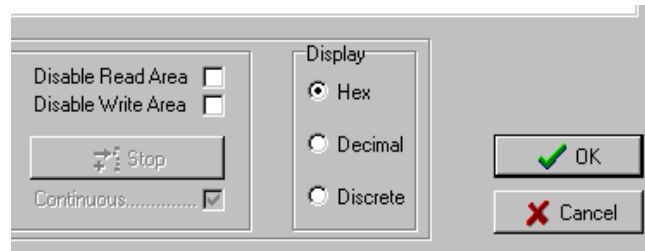


To view values coming in from the Profibus Slave device select the I/O Register location used in the Fieldbus Config Read mapping.

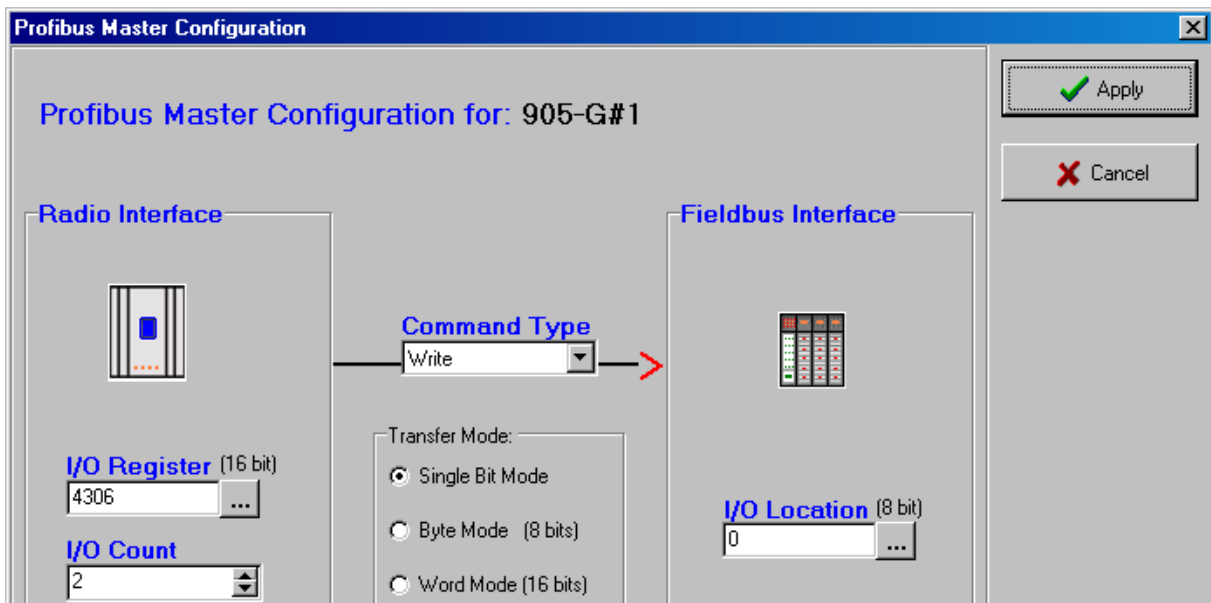


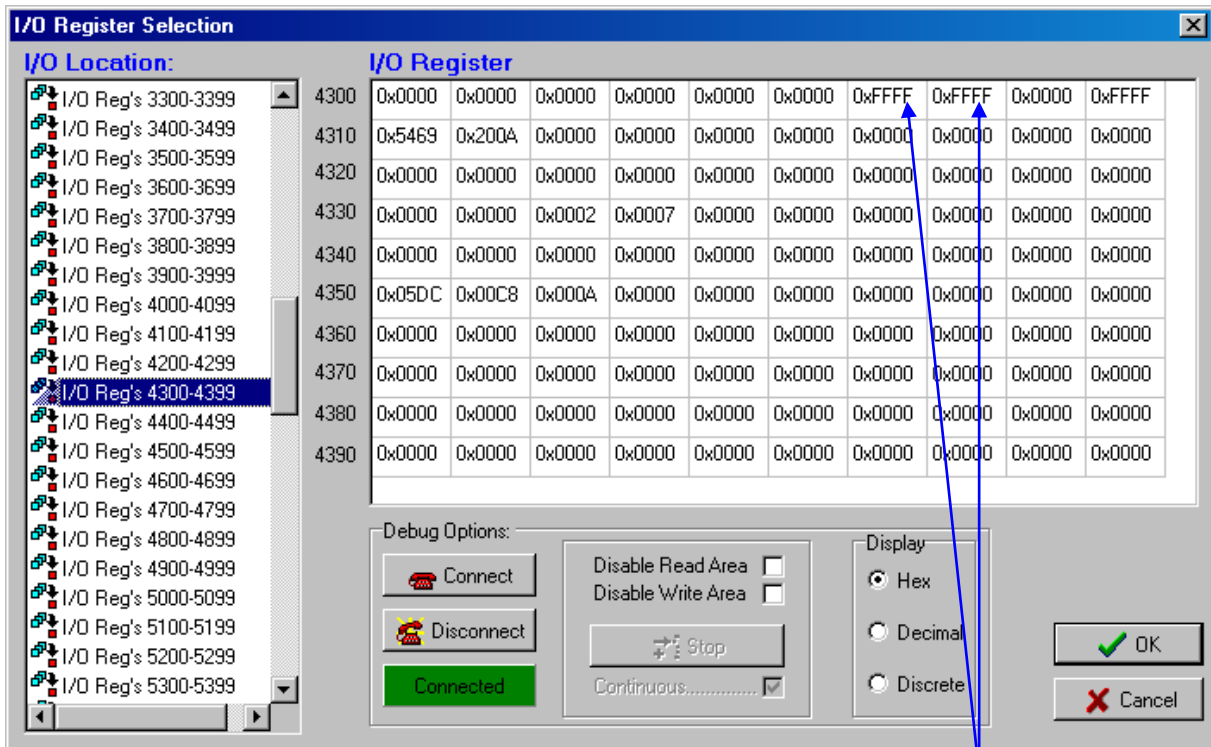
From this application note we are reading 2 bits into register locations 4320 and 4321 as shown from above Fieldbus Config mapping. Once the I/O location is selected from left hand menu the list of 100 registers is shown. Registers 4320 and 4321 both have hexadecimal value of FFFF indicating that the inputs on the slave device are on. Digital Outputs 1 & 2 should also be on at the Gateway.

The values of the registers can be displayed in 3 formats Hex, Decimal or Discrete (1 or 0).



To turn on the Digital outputs on the slave device this application note uses Digital inputs 7 & 8 (Regs 4306 & 4307 in the Gateway) as shown below from Fieldbus Config mapping.

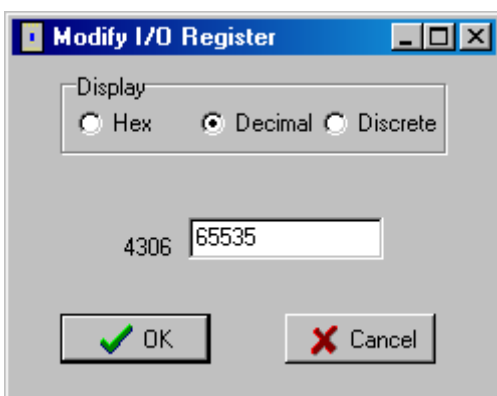




Once the Digital inputs are turned on the register locations 4306 & 4307 are filled with FFFF indicating that the inputs are on and will be written to the Fieldbus I/O location configured, which in turn turns the Digital outputs on the ET200S on.



The Disable Read Area and Disable Write Area are used when diagnostics are needed for configurations over the radio network.



If you can read values from the slave device but are not able to get them sent to the correct destination or you believe values are incorrect you can select Disable Read Area. This will stop the Slave device overwriting values from the Fieldbus Interface into the I/O database so you can then double click on a register location that is being mapped over the radio network enter in a value and check it at the destination module to confirm correct location and value.

Once this has been confirmed ensure that the Disable Read Area has been deselected.

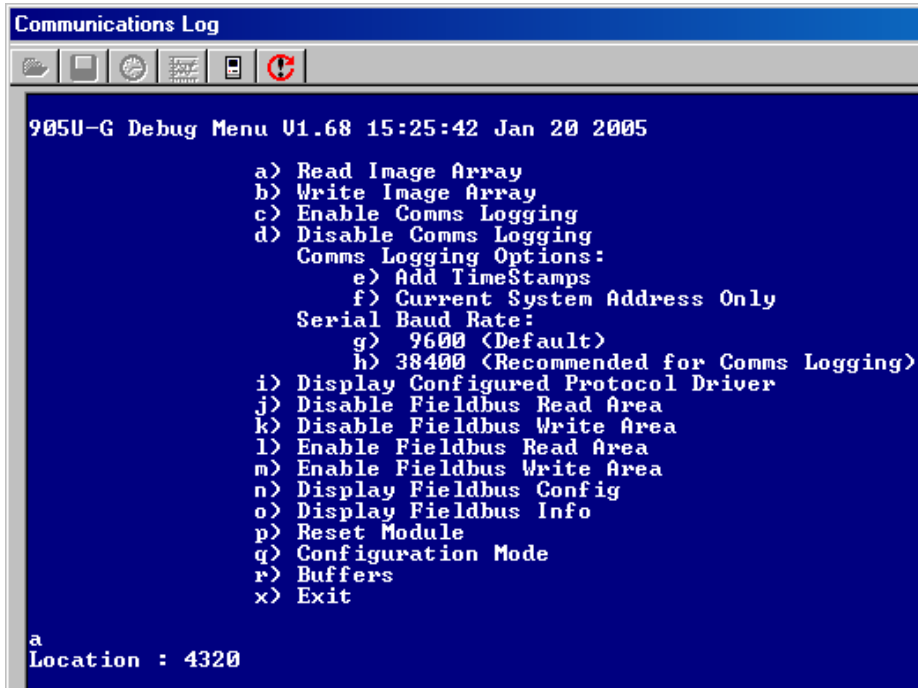
If you want to do local diagnostics to view values coming in from the radio network without sending value to the Profibus Slave device and you cannot disconnect the Profibus cable due to creating a possible Bus Failure for other devices on the network you can select Disable Write Area. This will stop any values being written to the Fieldbus and onto the Profibus Slave device. Once this testing is completed ensure that the Disable Write Area has been deselected.

For Firmware versions below 1.70.

To Diagnose the Gateway whilst connected to the Profibus network is accessed via the online diagnostics as per the manual. Refer to the manual for setting up the online diagnostics.

Select the Profibus Master Gateway unit in the configuration software. On the right hand side under program unit select Diagnostics then Terminal. A flashing Cursor will appear in top left-hand corner of screen select <ENTER> on keyboard and flowing menu will appear.

To view data being sent from the Profibus Slave device we perform a read image array at the Radio Interface location in the Fieldbus mapping.



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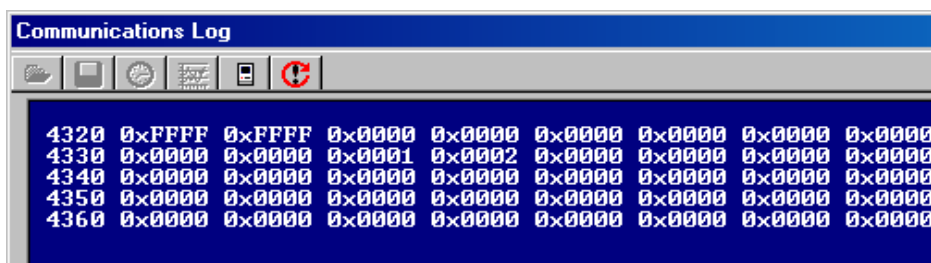
Communications Log
905U-G Debug Menu V1.68 15:25:42 Jan 20 2005
a) Read Image Array
b) Write Image Array
c) Enable Comms Logging
d) Disable Comms Logging
  Comms Logging Options:
    e) Add TimeStamps
    f) Current System Address Only
  Serial Baud Rate:
    g) 9600 (Default)
    h) 38400 (Recommended for Comms Logging)
i) Display Configured Protocol Driver
j) Disable Fieldbus Read Area
k) Disable Fieldbus Write Area
l) Enable Fieldbus Read Area
m) Enable Fieldbus Write Area
n) Display Fieldbus Config
o) Display Fieldbus Info
p) Reset Module
q) Configuration Mode
r) Buffers
x) Exit

a
Location : 4320

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Once in the Online Diagnostics select a) Read Image array and when prompted the Location of the Radio Interface Location

Locations 4320 and 4321 both show hexadecimal value of FFFF indicating that the 2 Digital Inputs from the Profibus Slave device have been turned on. This screen shows 50 registers from the starting location entered above (4320). 10 registers per line are shown in the full screen.



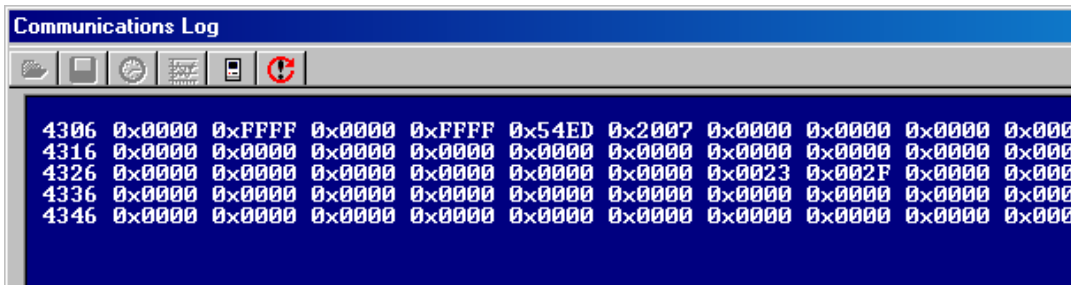
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Communications Log
4320 0xFFFF 0xFFFF 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000
4330 0x0000 0x0000 0x0001 0x0002 0x0000 0x0000 0x0000 0x0000
4340 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000
4350 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000
4360 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000 0x0000

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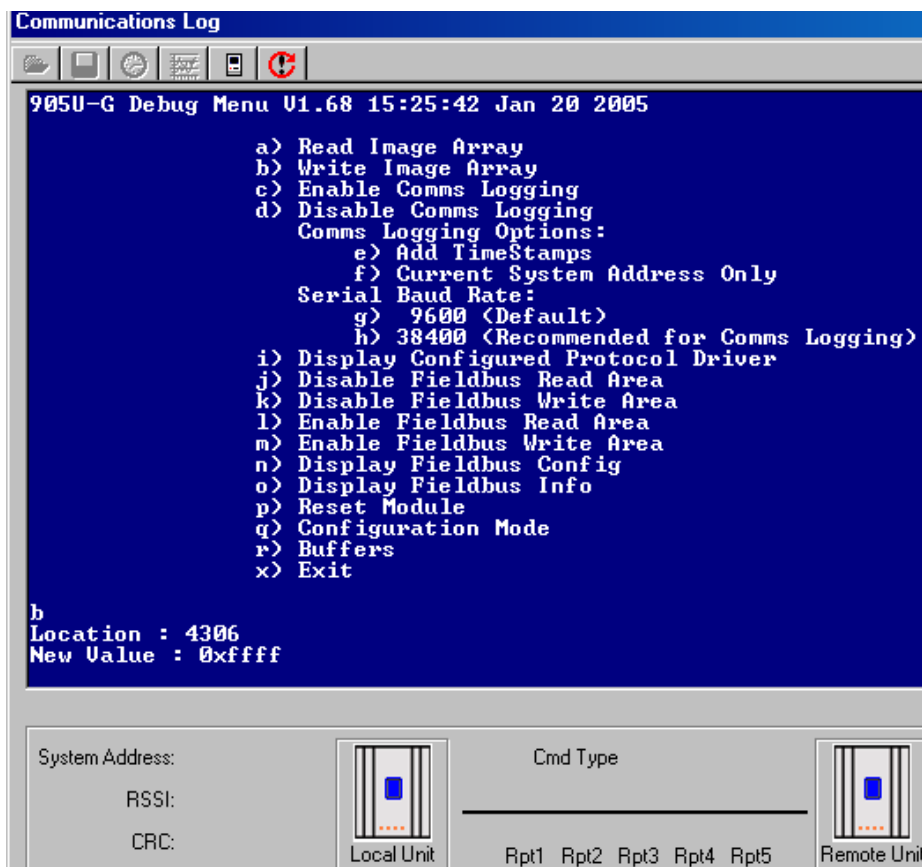
From this example above registers 4320 & 4321 both indicate that the inputs from the slave device are ON which should also have the Digital Outputs 1 & 2 on the gateway ON.

To diagnose turning the Slave outputs on from the local Digital Inputs you can read the register locations for the digital inputs which are at I/O location 4306 & 4307.



Register 4307 has a hex value of FFFF indicating that the Digital Input 8 is on. This will be then written to the Fieldbus location setup in the Fieldbus Config.

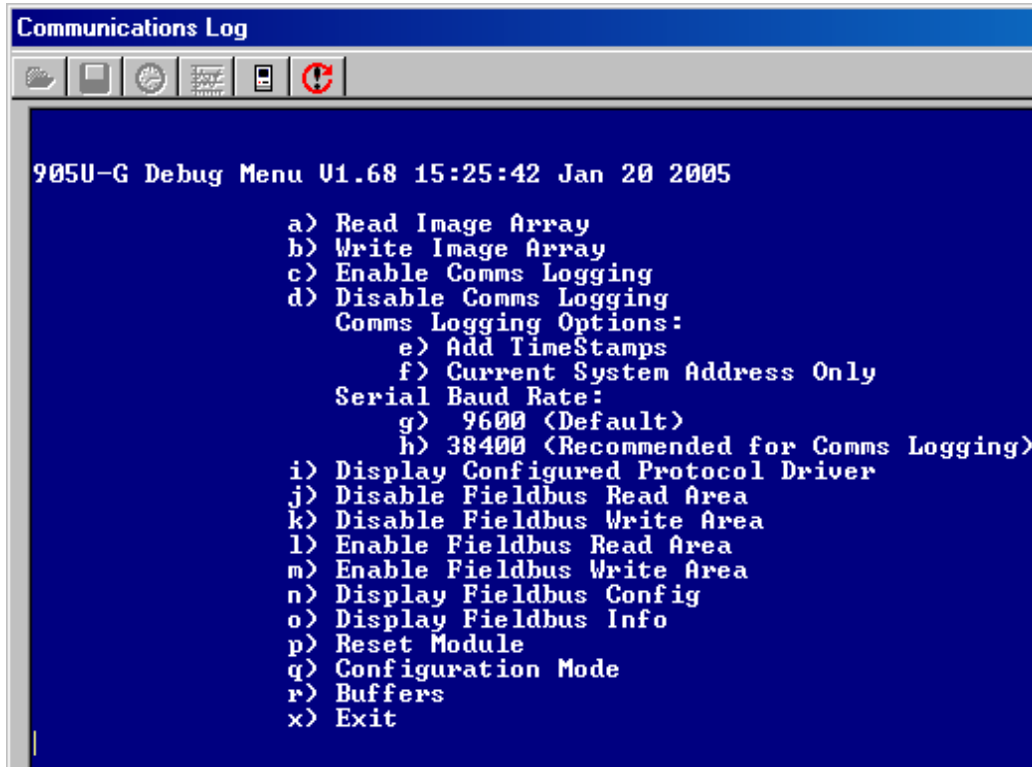
If option b) Write Image array is selected then the register location that you want to write to is entered in along with the value that is to be written.



In this example Digital Input 7 (Reg 4306) is used and value of FFFF will indicate the Digital input is on.

NOTE: For this example, when using the write image array function for the local Digital I/O on the Gateway the output on the slave device will toggle on then off as the internal structure sees the value written as on (FFFF) then immediately after in the next scan of the I/O database it reads it as an off (0000). If using any other, I/O register location the output will stay on at the slave device until the off value is written into the register location again.

The Enable and Disable Fieldbus Read and Write areas are used when diagnostics are needed for configurations over the radio network. If you can read values from the slave device but are not able to get them sent to the correct destination or values are incorrect you can select j) Disable Fieldbus Read Area. This will stop the Slave device overwriting values into the I/O database so you can select option b) Write image array and put a known value into a register to view at the destination that the register is mapped to over the radio network. Once confirmed register location and mappings are correct select l) Enable Fieldbus Read Area.



If you want to do local diagnostics to view values coming in from the radio network without sending values to the Profibus Slave device and can not pull cable out due to creating a possible Bus Failure for other devices on the network you can select k) Disable Fieldbus Write Area. This will stop any values being written to the Fieldbus and onto the Profibus Slave device. Once this is completed select m) Enable Fieldbus Write Area.

Amendment Register:

Issue No.	Date	Details of Amendment
1.0	10-5-05	Draft Issue
1.1	16-5-05	Diagnostics added
1.2	17-5-05	Addition of V1.70 Diagnostics
1.3	10-04-06	Combined 105 & 905 into one document
1.4	12-02-19	Elpro Branding/Formatting