

**E96-222**

**Programmable Controller Coupler (IMPCC01)  
Operation/Configuration Manual**

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## Preface

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The Programmable Controller Coupler module (IMPCC01) provides a convenient means of reading data values from a programmable controller into INFI 90 OPEN function blocks and writing INFI 90 OPEN function block values into a programmable controller.

With an appropriate communication adapter, the PCC01 module supports data communication with:

Allen-Bradley PLC-2, PLC-3, PLC-5 and PLC-5/250 via Data Highway I, Data Highway Plus or Data Highway II.

Modicon 584 and 984 controllers via Modbus (RTU mode).

Programmable controllers that have support for Modbus (RTU mode) communication. G.E. Series-5, Series-6 and Series 90/70. Controller by Siemens, Reliance, and others.

This instruction manual describes the module's communication capability and explains how it can be configured for a specific programmable controller (entirely through function block configuration).

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## Safety Summary

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### **SPECIFIC CAUTIONS**

Always use Elsas Bailey's Field Static Kit (P/N 1948385A2 - consisting of wrist strap, ground cord assembly, alligator clip) when working with modules. The kit connects a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge. (p. 3-1)

Time critical closed loop control and interlocks should not be implemented via this link without first performing tests with the complete INFI 90 OPEN and PC device systems to account for the asynchronous nature of the PC device scan cycle with respect to the PCC01 cycle. (p. 4-4)

Some Modbus protocol PC devices may limit the number of bytes to a number less than 200. See particular manufacturers manuals for details. (p. 4-14)



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# SECTION 1 - INTRODUCTION

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## OVERVIEW

The Programmable Controller Coupler module IMPCC01 is a Elsag Bailey module designed specifically to interface the Elsag Bailey INFI 90 OPEN system to a Programmable Controller (PC) system. The module can be set up to use either Allen-Bradley DF1 or Modbus (RTU mode) protocol via RS232 serial communication. All controllers with support for Modbus functions 1,2,3,4,15, and 16 or Allen Bradley PLC-2, PLC-3, PLC-5, and PLC-5/250 are supported. Support for Allen Bradley includes both Data Highway/Data Highway Plus and Data Highway II. The IMPCC01 module has an optically isolated RS232 port that either connects directly to the controller or connects to a device that provides access to the controller.

The IMPCC01 communicates with a single PC device to pass a preset amount of data to pre-defined contiguous areas of the PC's memory and reads a preset amount of data from pre-configured contiguous areas of the PC's memory. Every point included in the pre-defined areas is read from or written to the PC device once a second.

The IMPCC01 module limits the amount of data transferred between the module and the PC device to 200 bytes in each direction. The 200 bytes read from the device can consist of up to 1024 discrete digital or 100 analog values or any combination thereof not exceeding the 200 byte limit. The 200 bytes written to the device can consist of up to 512 discrete digitals or 100 analog values or any combination thereof not exceeding the 200 byte limit.

**NOTE:** One analog value consists of 2 bytes of data. Eight discrete digital values form 1 byte of data.

The latest status and performance report messages are available via the Monitor port, the second RS232 port, on the IMPCC01 termination unit/module. Module, link and communication status information is also available in I90 block output and the LEDs on the faceplate of the module.

Module redundancy is available with the IMPCC01. Serial link redundancy is not supported.

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## PROGRAMMABLE CONTROLLERS SUPPORTED

The PCC01 module supports the following Allen-Bradley devices when interfaced via the appropriate communication adapter.

Table 1-1. Allen-Bradley PLCs Supported

Programmable Controller Model	Data Highway Model	Communication Adapter Model
PLC-2	None	1771-KG
	I	1771-KE/KF, 1770-KF2
	Plus	1770-KF2 or 1785-KE and 1785-KA
	II	1779-KFL/KFLR and 1779-KP2
PLC-3	None	
	I	1771-KE/KF, 1770-KF2
	Plus	1770-KF2 or 1785-KE and 1785-KA
	II	1779-KFL/KFLR and 1779-KP3
PLC-5	None	
	I	1771-KE/KF or 1770-KF2 and 1785-KA
	Plus	1770-KF2, 1785-KE
	II	1779-KFL/KFLR and 1779-KP5
PLC-5/250	None	
	I	1771-KE/KF or 1770-KF2 and 1785-KA
	Plus	1770-KF2, 1785-KE
	II	1779-KFL/KFLR and 1779-KP5

The PCC01 module supports the following Modbus protocol devices when connected via the appropriate communication adapter.

Table 1-2. PCs With Support For Modbus (RTU) Protocol

Programmable Controller (PC) Model	Modbus (RTU) Communication Adapter Supporting Functions 1, 2, 3, 4, 15 and 16
Modicon 584	Direct connect via Modbus port.
Modicon 984	Direct connect via Modbus port.
GE Series-5	CCM3.
GE Series-6	CCM3.
GE Series 9070	PCM, CMM.
Siemens S5	CP524, CP525.
Reliance	
Other (Standard Modbus RTU)	Access must support Modbus (RTU) functions 1, 2, 3, 4, 15 and 16.

**HARDWARE NEEDED TO SUPPORT THE IMPCC01***Table 1-3. Hardware Requirements*

<b>Hardware</b>	<b>Nomenclature/Part No.</b>
Programmable controller coupler module	IMPCC01.
Termination module or Termination unit	NIMP01/02 or NTMP01.
Cables: PCC to termination unit cable or PCC to termination module cable	NKTU01 or NKTU02.
PCC termination to foreign device serial cable	Device dependent cable.

**MEMORY AND TIME RESPONSE CAPACITY SPECIFICATIONS***Table 1-4. Capacity Specifications*

<b>Specification</b>	<b>Value</b>	<b>Comments</b>
User available Non-Volatile RAM (kBytes)	60	
User available Volatile RAM (kBytes)	160	
Maximum Read data transfer capacity (Bytes)	200	Total number of analog plus digital data bytes input from the programmable controller.
Maximum Write data transfer capacity (Bytes)	200	Total number of analog plus digital data bytes output to the programmable controller.
Maximum number of discrete digital bit values input (Read) from the programmable controller	1024	1024 digital bit values at 8 bits/byte require 128 input bytes leaving 72 bytes for 36 analog inputs.
Maximum number of analog, 16 bit integer, values input (Read) from the programmable controller.	100	100 analog, 16 bit integer, values require 200 input bytes leaving no capacity for digital inputs.
Maximum number of discrete digital bit values output (Written) to the programmable controller.	512	512 digital bit values at 8 bits/byte require 64 output bytes leaving 136 bytes for 68 analog outputs.
Maximum number of analog, 16 bit integer, values output (Written) to the programmable controller.	100	100 analog, 16 bit integer, values require 200 output bytes leaving no capacity for digital outputs.
Bi-directional all point update rate (seconds).	1	All up to 200 input data bytes are transferred from the programmable controller, de-multiplexed and are written to function blocks once a second. All up to 200 output data bytes are updated from function blocks and are written to the programmable controller once a second.

**SOFTWARE SUPPLIED ON THE DISKETTE INCLUDED WITH THE IMPCC01**

1. A base function block configuration.

- The base function block configuration consists of Eltag Bailey CADEWS drawing files. These drawings depict a typical base function block configuration for a PCC01 application which can, if desired, be modified to include the user specific block configuration. The drawings are shown in [Appendix C](#).
2. A terminal program to view the error log output.
    - The terminal program is an MS-DOS program that may be used to view the status and performance messages output from the Monitor port, the second RS232 serial communication port.
  3. A non-volatile error log viewer program.
    - The error log viewer is an MS-DOS program that requires a SPM, CPM or CIU interface to upload the error file.

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## CONTENT OF THIS MANUAL

This manual is intended to be used as a guide and reference for users of the PCC01 module. It includes instructions for configuring and installing the module (hardware dip switches and TU jumpers) and for entering the base block configuration required to set up communication with the user's programmable controller. It is assumed the user has some familiarity with the Eltag Bailey INFI 90 OPEN system and the programmable controller.

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## RELATED DOCUMENTS

*Table 1-5. Related Documents*

Document Number	Document Title
I-E96-200	Function Code Application Manual.
I-E96-401	NIMP01/02 Termination Module.
I-E96-428	NTMP01 Termination Unit.
I-E96-202	IMMFP02 Module.

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**FREQUENTLY USED TERMS***Table 1-6. Frequently Used Terms*

<b>Term</b>	<b>Explanation</b>
PC	Programmable Controller.
PC Device	The user's specific Programmable Controller.
PC I/O Function Blocks	The function blocks associated with the read/write groups to source and receive the programmable controller data.
Communication Port	The port marked <i>PRINTER</i> on the termination unit or module.
Monitor Port	The port marked <i>TERMINAL</i> on the termination unit or module.



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## SECTION 2 - DESCRIPTION

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### OVERVIEW

The PCC01 module can be set up to communicate with an Allen-Bradley PLC-2, PLC-3, PLC-5 or PLC-5/250 using Data Highway, Data Highway Plus or Data Highway II protocol. It can also be set up to communicate with a Modicon 584 or 984 programmable controller using Modbus (RTU mode) protocol or to one of the many other controllers that have support for Modbus (RTU mode) protocol communication. All software setup for communication with a particular controller consists of setting the specifications of the base function blocks, blocks 0 through 99 of the module and can be accomplished with CADEWS (see Section 4 - **CONFIGURATION**).

The PCC01 performs up to four (4) data transactions with the programmable controller. One digital data read transaction. One digital data write transaction. One analog data read and one analog data write transaction. Each transaction is for a contiguous data group for which a contiguous number of function blocks are associated with a contiguous number of data cells in the controller. The performance goal for this module is to read every read point and write every write point included in the digital and analog groups every second. In order to meet this goal the module is designed to address a single controller and to limit the total amount of data that can be read from this controller to 200 data bytes and to limit the total amount of data that can be written to this controller to 200 data bytes.

To help in identifying configuration errors and communication faults, the PCC01 program includes the facility to output a limited number of performance statistics and to report errors detected in the setup block specifications and communications. The performance statistics are output to function blocks 80 through 88. Detected errors are output in three different ways.

- In an encoded form displayed on the module front plate LEDs.
- As unique time stamped text messages output to a file in the non-volatile RAM of the module.
- As unique time stamped text messages output to the *Monitor* port (RS232 terminal port) of the module. The error messages directed to the *Monitor* port are, initially, written to a volatile RAM buffer.

Output to the *Monitor* port must be enabled via a base function block specification, block number 38. A terminal or terminal

emulator must be connected to the PCC01's *Monitor* port to view the error output. Figure 2-1 shows the simple terminal keyboard interactive facility that has been provided for buffer maintenance and output selection.

```
Copyright (c) Elsas Bailey (Canada) Inc., 1992

D - Delete all error messages
P - Pause
C - Continue after pause
S - Start from the beginning
W - Wrap mode
N - No wrap mode
?,H - Help

Press any of the above keys
```

*Figure 2-1. Terminal Keyboard Interactive Facility*

---

## GENERAL INFORMATION

The PCC01 module must be set up appropriately for the Module Bus or ControlWay mounting rack and the plant loop or INFI 90 OPEN loop before any block configuration is entered. See Section 3 - **HARDWARE INSTALLATION AND SETUP** to prepare the module.

The data that is read from and written to the programmable controller is divided into 4 groups;

- A digital read group (DR).
- A digital write group (DW).
- An analog read group (AR).
- An analog write group (AW).

The module setup blocks, referred to as the Base Block Configuration, includes specifications for defining each group including:

- The PC Memory or File Word Offset to the first PC value for the group.
- The application function block configuration starting block number for the group.
- The group size.

(See **BASE BLOCK CONFIGURATION** in Section 4 for details).

The PCC01 performs a transaction for each of the groups for which the size is greater than zero. If for example analog writes are not required, the analog write group size must be set to zero so no analog write transaction will be performed.

The PCC01 module uses block read and block write commands to exchange data with the PC device. As such, the data points for each group must be allocated contiguous locations

in the PC device and must correspondingly be assigned contiguous block numbers in the module's application function block configuration. This allows the PCC01 program to associate groups of data read from the PC device with groups of block numbers in the PCC01 module on a one to one basis in sequential order.

---

#### **TRANSACTION DATA FIELD SIZE DETERMINATION**

The data field of the digital read and write commands are calculated by the PCC01 program to be in word increments (16 bit words). If the defined PC Memory or File Word Offset to the first point of a group does not correspond to the low order bit of a word, and/or the Group Size is not evenly divisible by 16, then the calculated data field size is rounded out to the required number of words to include all points.

**NOTE:** The calculated data field size for the Digital Write Group transaction is the rounded out number of words of data.

---

#### **PROGRAMMABLE CONTROLLER ANALOG DATA FORMAT/CONVERSION**

Base Block Configuration block number 39, PC Register Value Format, is a global definition for all analog read and write points. It defines all programmable controller analog type values to be unsigned binary integers, signed binary integers, unsigned 12 bit BCD integers or 16 bit BCD integers. The only data conversion performed by the PCC01 communication firmware program is to convert between the defined controller analog data format and the floating point real format of analog data blocks. Any required Scale and Offset conversions of analog values may be added to the application function block configuration for the module (see **APPLICATION CONFIGURATION** in Section 4).

---

#### **DIGITAL AND ANALOG WRITE GROUPS INITIAL DATA**

When the module is put into execute the digital and analog write areas in the PC are initially read and stored in an area of the PCC01 module's volatile RAM to become the initial values for the write points. If any of the points in the range of the write groups have no function block defined in the application function block configuration or have a function block of the wrong output type, then the initial values for these points are used for the write transactions to the PC device. Any data values written locally into the PC file locations for the write group are overwritten by the PCC01 (see the notes in **Block 37, Write Permissive (FC 39, Non Tuneable)** in Section 4).

---

**WRITE GROUP BLOCK OUTPUT BAD QUALITY HANDLING**

If any of the application function block outputs associated with the write groups go to bad quality, the last good quality values read from these blocks, which are maintained in the module volatile RAM memory, are re-written to the PC device until the blocks return to good quality. If no good quality value has been read for some or all points of a write group since the module was reset or powered up, then the initial values read from the PC device during the startup phase will be written back to the PC device for these points.

---

**REDUNDANT MODULES STANDBY TAKEOVER**

In redundant PCC01 module configurations, the primary PCC01 module executes the application function block configuration and performs communication with the PC device. The block output values of the standby PCC01 are updated from the primary PCC01 by the Elsig Bailey standard redundancy checkpointing mechanism. When a switchover to the redundant standby module occurs, communication is re-established with the PC device as for a cold start except that all the block output values and qualities are retained from the primary module by the checkpointing mechanism.

---

**ERROR REPORTING METHODS**

The IMPCC01 module is a modified IMMFP02 module. As such its performance can be monitored using the standard Elsig Bailey tools, CADEWS, CLS, the operator stations OIS-10/20/30/40, etc. The PCC01 module provides additional error reporting. It detects a multitude of configuration and communication errors. These errors are reported in the following three different ways:

1. They are displayed in numerically encoded form on the LEDs of the module face plate (see Table A-1 for error interpretation). Under these conditions, the module remains in the *Execute* mode with the status LED solid green. The additional error codes are displayed in flashing red in LEDs 1 through 6 while LEDs 7 and 8 remain solid red.
2. They are written as unique text messages to a circular volatile RAM buffer. The errors in this buffer may be output to the module *Monitor* (terminal) port when a terminal has been connected to this port and output has been enabled via base block number 38, Diagnostic Output Enable (see **BASE BLOCK CONFIGURATION** in Section 4 and Appendix A - **ERROR CODES AND MESSAGES**). The errors recorded in the volatile RAM buffer are lost when the PCC01 module is reset, when power is removed or after a switchover to the redundant standby module.

3. They are written as unique text messages to the Diagnostic Error file, a non-volatile RAM file. The errors written to the Diagnostic Error file must be retrieved via a Serial Port Module (SPM), a Communication Port Module (CPM) or a Computer Interface Unit (CIU) module set and the error viewing program included on the diskette provided with the PCC01 module. The errors written to the non-volatile RAM file are lost only when the PCC01 module is initialized, a manual operation.

The Diagnostic Error file is relatively large (16 Kbytes) but wraps around once full to overwrite the oldest messages. To view error messages that were generated prior to a switchover to the standby module of a redundant module set, the messages must be retrieved from the Diagnostic Error file.

The text messages have been defined with care to ensure that configuration and communication faults are described as clearly as possible.

For a description of all messages, see Appendix A - **ERROR CODES AND MESSAGES**.



---

## SECTION 3 - HARDWARE INSTALLATION AND SETUP

---

### GENERAL INFORMATION

This section explains what you must do before any function block configuration is attempted. The steps performed to initialize the module will clear all current content of the non-volatile and volatile RAM and thus any configuration existing in the module will be cleared.

#### NOTES:

1. This module uses connections to the MMU backplane that served other functions in early Network 90 systems. To avoid module damage, the system must be checked for compatibility prior to module installation.
2. Early Network 90 systems applied -30 VDC to pins 3 and 4 of the module connector P1. This voltage is not required for INFI 90 OPEN modules. In INFI 90 OPEN systems, pins 3 and 4 are used for the redundant Controlway bus.
3. If your system has modules that require -30 VDC, you must set J5 to the 30 VDC position. Doing so allows you to install the PCC01 in a MMU that uses -30 VDC. Refer to manual *I-E96-202*, **Table 3-6** for more information about setting J5.

#### CAUTION

**Always use Elsas Bailey's Field Static Kit (P/N 1948385A2 - consisting of wrist strap, ground cord assembly, alligator clip) when working with modules. The kit connects a technician and the static dissipative work surface to the same ground point to prevent damage to the modules by electrostatic discharge.**

To set up the module and termination unit hardware refer to the following Product Instructions:

**Multi-Function Processor Module (IMMMFP02)** I-E96-202  
and

**Multi-Function Processor Termination Unit (NTMP01)**  
I-E96-428

or

**Multi-Function Processor Termination Modules (NIMP01/02)** I-E96-401.

The IMPCC01 module jumpers J1 through J4 must not be changed from factory settings. The 8 position dipswitches must be set for your application according to manual *I-E96-202*, Section 3 - INSTALLATION. Their particular settings configure the module for Controlway/Module Bus, redundancy, Enable/Disable On-Line Configuration and Enable/Disable memory checksumming self diagnostics. All of these selections must be made before the module is installed for normal operation.

---

**PCC01 MODULE INITIALIZATION**

Next the module must be initialized for either plant loop or INFI 90 OPEN by the following special operations steps. Again see manual **I-E96-202**, Section 3 - INSTALLATION, Special Operations for more detail.

1. Remove the PCC01 module from the Module Bus or Controlway mounting rack and set (open) SW4 switches 1 and 7. All other switches of SW4 must be reset (closed). Re-insert the module in the mounting rack. Wait until the module red lights with LEDs 1 through 6 on. The module RAM has been initialized and the module has been setup for plant loop.
2. If the module is to be installed for INFI 90 OPEN, remove the module again and set switches 1 and 6. All other switches of SW4 must be reset (closed). Re-insert the module in the mounting rack. Wait until the module red lights with LEDs 1 through 6 on.
3. Remove the module from the rack again and restore the required run time setting for SW4.
4. Re-insert the module in the mounting rack. The memory of the module has now been initialized. The base blocks and application configuration should now be loaded to make the module ready for communicating with the PC device.

---

**SERIAL RS232 SIGNAL TERMINATION**

Modems are not required for isolation. Isolation is built into the serial port NTMP01 Termination Unit and NIMP01/02 Termination Module. Modems will be needed for communication over distances exceeding 50 feet.

The termination unit/module jumpers must be set to satisfy the programmable controller's RS232 serial communication DTE/DCE and handshaking characteristics. Refer to Section 2 - INSTALLATION in your **Multi-Function Processor Termination Unit (NTMP01)** manual or Section 2 - Installation of your **Multi-Function Process Termination Module (NIMP10/02)** manual for details on each of the jumpers.

The Communication port (marked *Printer* on the termination unit or module) must be connected to the PC device. The Monitor port (marked *Terminal*) may be connected to a terminal.

---

## SECTION 4 - CONFIGURATION

---

### GENERAL INFORMATION

The module blockware must be configured for the user's specific programmable controller system and application function block logic. Refer to the example drawings in Appendix C - **BASE FUNCTION BLOCK CONFIGURATION**. The CADEWS files for these drawings are on the diskette provided with the IMPCC01 module.

---

### FUNCTION BLOCKS

The PCC01 module function block configuration consists of two parts. The first part makes up the base block configuration and includes function blocks 0 through 99. The second part is the application configuration and includes function blocks 100 through 9998. The CADEWS configuration included on the diskette supplied with the module contains the required base blocks. This file may be used as a starting point for the user's specific configuration for the PCC01 module if desired.

The base block area contains the function blocks that define the communication parameters for the PCC01 module. All function blocks of the base block configuration must be setup for the programmable controller characteristics and the data to be exchanged. Missing blocks or invalid setup values for any of the blocks will cause errors and will inhibit module operation.

The application configuration must contain the function blocks for the data to be written to the programmable controller and the data to be received from the programmable controller plus any additional logic function blocks and slave I/O function blocks. The location and the number of programmable controller I/O data function blocks must correspond to the parameters set up in the base block configuration.

For the PC I/O function blocks into which the data read from the programmable controller is stored, the choice of function codes is limited as follows: (see also Figures 4-3 and 4-5).

<b>Analog (Register) Values</b>	function code 137, Basic Real Output with Quality. function code 30, Analog Exception Report.
<b>Digital (Discrete) Values</b>	function code 138, Basic Boolean Output with Quality. function code 45, Digital Exception Report.

For the PC I/O function blocks, from which the data to be written to the programmable controller is obtained, any function

code with the proper output type may be assigned with the following exception (see also Figures 4-4 and 4-6).

1. Since all block outputs in the PC I/O write group (digital write or analog write group) must be of the same type, function codes with multiple outputs of mixed type **can not** be used.
2. If source values for a group are scattered, it is recommended that buffer blocks be set up to collect the values for a group in one contiguous set of block outputs.

Example 2-Input OR blocks, function code 39, may be used to bring together all point values for the digital write group.

Example 2-Input Summer blocks, function code 15, or Analog Transfer blocks, function code 9, may be used to bring together the point values for the analog write group. Note that the function code 15 specifications allow the block output value to be scaled before it is written to the PC.

---

### SETTING UP THE DATA TRANSFER GROUPS

The coupler allows up to two read groups and up to two write groups. See Figure 4-1. The groups are referred to as follows:

DW	digital write	(output to PC device).
DR	digital read	(input from PC device).
AW	analog write	(output to PC device).
AR	analog read	(input from PC device).

The read and write groups are contiguous areas of memory in the PC device and consecutive function block numbers in the PCC01 module. As mentioned in a preceding section, there should only be analog output blocks within the analog write group PC I/O block range, only digital output blocks within the digital write group PC I/O block range, function codes 30 or 137 blocks within the analog read group PC I/O block range and only function codes 45 or 138 blocks within the digital read group PC I/O block range.

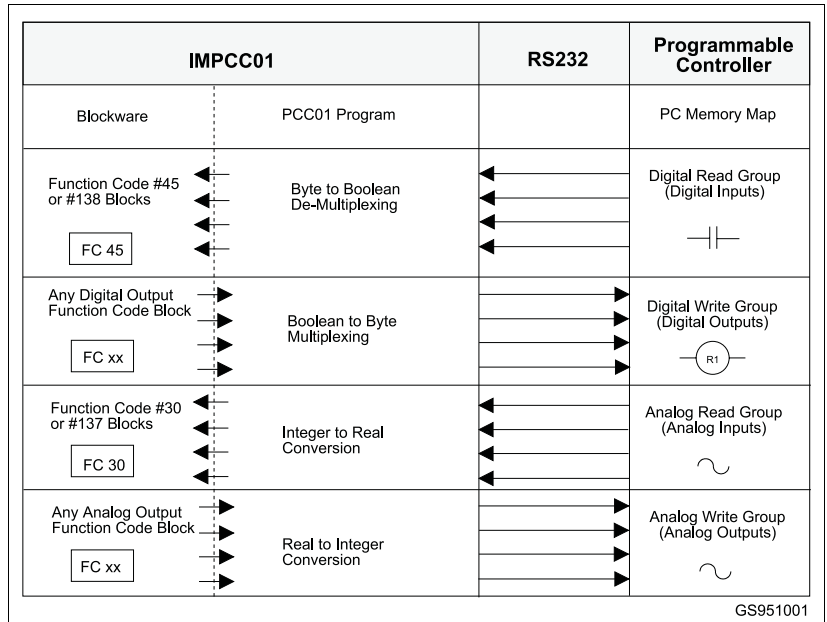


Figure 4-1. Data Groups Transferred by PCC01

**Data Link Boundaries**

The selected baud rate must be 9600 or faster and the PC device response time 50 ms or less, for the coupler to read and write every configured digital and analog point from/to the PC device once every second.

The PCC01 communication with the PC device occurs asynchronous with the function block execution and the PC device program execution. That is, the one second cycle for passing all data between the PC device memory and the PCC01 function blocks occurs asynchronous to any change of state occurring on either side of the data communication link. As such, the time to report a change of state in the PCC01 function blocks to the PC device memory or a change of state in the PC device memory to PCC01 function blocks will vary from less than 1 second to a maximum of 2 seconds.

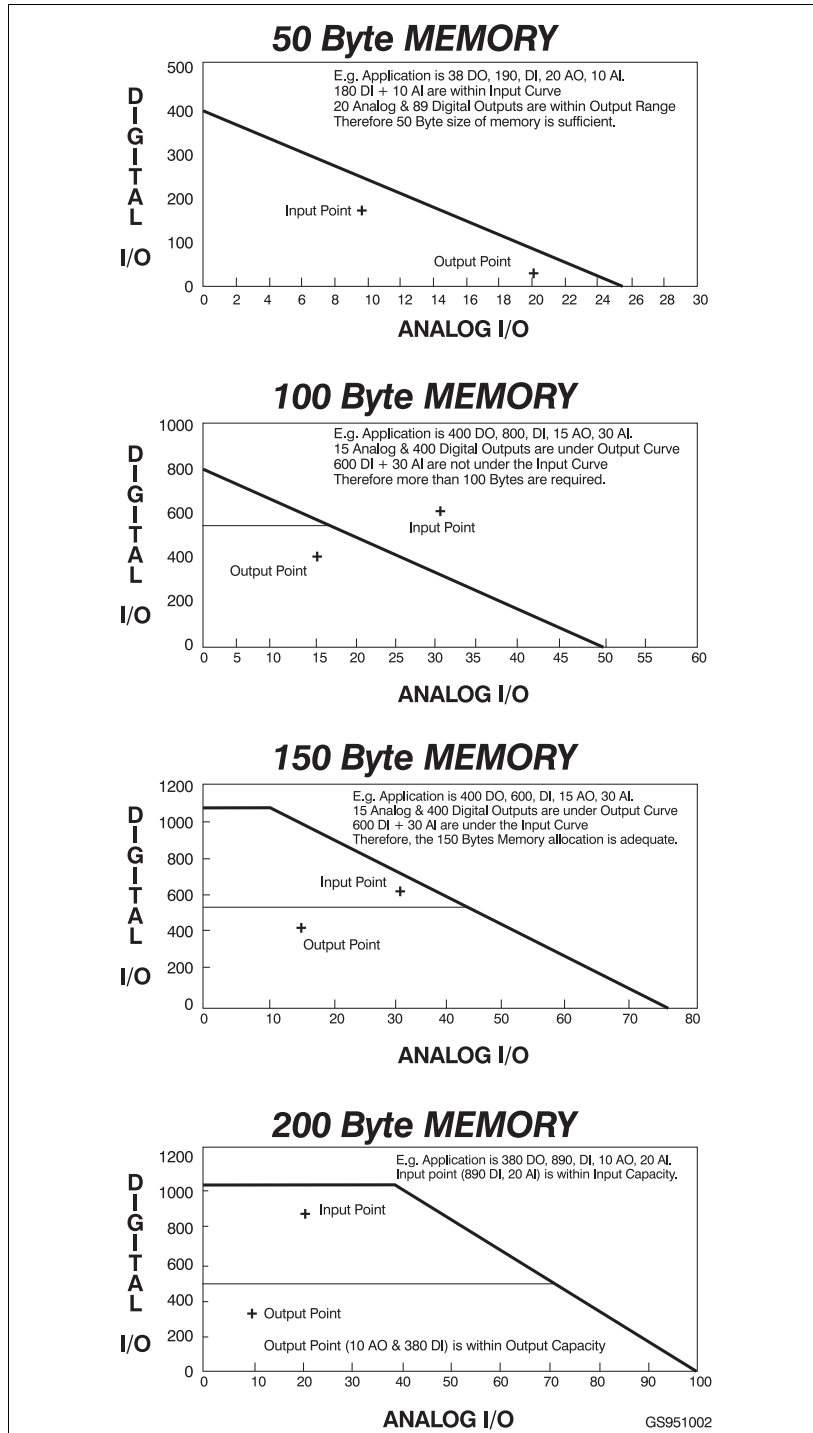


Figure 4-2. PCC01 Capacity Charts

**CAUTION**

Time critical closed loop control and interlocks should not be implemented via this link without first performing tests with the complete INFI 90 OPEN and PC device systems to account for the asynchronous nature of the PC device scan cycle with respect to the PCC01 cycle.

Analog values (register values) in the PC are treated by the PCC01 as signed or unsigned 16 bit integers, unsigned 16 bit BCD integers or unsigned 12 bit BCD integers depending on the global specification entered in block number 39 of the Base Block Configuration. Zero and span conversion of analog values may be performed within the user's function block configuration (see **APPLICATION CONFIGURATION** as well as **SCALING AND OFFSET CONVERSION**).

The PCC01 module capability to interface to I90 slave modules is approximately equivalent to that of the MFP01 module. To limit time utilization for slave module I/O, it is recommended that the amount of slave module I/O be limited to 7 slave modules.

---

***Critical PCC01 Configuration Run Time Considerations***

Block numbers 0 through 99 are exclusively used for the PCC01 module communication setup and are referred to as the Base Block Configuration. Each of the base blocks must be configured to match the programmable controller being interfaced to. These blocks reside in segment #1 whose execution run time parameters reside in the segment control function block (function code 82) at block number 15. Its segment priority must be set to 255 (the highest possible). Block numbers 100 to 9998 must contain the PC I/O data blocks and are further available for user logic and for slave module I/O function blocks. It is recommended that block number 100 be made another segment control block to allow the run time parameters for the blocks above 100 to be set different and independent from the PCC01 program in segment #1. The CADEWS Base Block Configuration files on the diskette supplied with the module have the priority specification for the Segment Control blocks at block numbers 15 and 100 already set up. Refer to **BASE BLOCK CONFIGURATION** for detail.

---

***PC Data Addressing***

The PC data addressing must be set up to accommodate the user's PC device. Not all address fields are required for all PC types. If these fields are not required the PCC01 module requires that the user set such values to 0. Each of the 4 groups (digital read, digital write, analog read, analog write) must have its address locations individually and completely set up in the Base Block Configuration. A general description of the addressing conventions for the different programmable controller types is provided in the following paragraphs:

---

***Allen-Bradley PLC 2***

For PLC 2's, data is referenced only with absolute word addresses. The accepted range is from 0 to 999. The address fields for module number/command number, file type and file

number are unused and must be set to 0. Each of the 4 groups can access any area within the legal range for the PLC.

IMPCC01 applies the Block Check Character (BCC) and not the Cyclic Redundancy Check (CRC) for data verification.

---

***Allen-Bradley PLC 3***

For PLC 3, PCC01 always addresses data tables, logically defined partitions of the physical memory of the controller. The accepted address range within the tables is 0 to 1999. Each of the 4 groups can access any area within the accepted address range of the tables.

The module number/command number field refers to the PLC context. A value of 0 defined for the context means the location specified within the PLC 3 as default for context will be the context area addressed. It is recommended to use the addressed context explicitly (range 1 - 15).

The file types (tables) supported by the PCC01 module are:

1	output image
2	input image
5	integer
7	decimal
8	binary
13	status

The file (table) numbers that are supported are 0 to 999. Each of the four groups can access any supported file type and file number.

IMPCC01 applies the Block Check Character (BCC) and not the Cyclic Redundancy Check (CRC) for data verification.

---

***Allen-Bradley PLC 5***

For PLC 5, PCC01 addresses only files. The accepted address range within each file is 0 to 1999. Each of the 4 groups can access any area within the accepted file address range.

The module number/command number and file type must be set to 0.

The accepted range for file number is 0 - 999. Each of the four groups can access any one of the accepted file numbers.

IMPCC01 applies the Block Check Character (BCC) and not the Cyclic Redundancy Check (CRC) for data verification.

---

***Allen-Bradley PLC 5/250***

For PLC 5/250 addressing, PCC01 supports module numbers 0 through 4 where 0 is the resource manager, and 1 through 4 are logic processor module addresses as set by the thumb-wheel switches. The remote scanner module is not supported.

The PCC01 module accesses the data table system area only. File types (sections) 0 (binary) and 1 (integer) are the only types (sections) supported.

File numbers can range from 0 to 999.

The accepted address range (number of elements) within each file is 0 to 1999. The member and submember fields for addressing elements are unused and are always set to 0 by the PCC01. Each of the four groups can access any area within the accepted file address range.

IMPCC01 applies the Block Check Character (BCC) and not the Cyclic Redundancy Check (CRC) for data verification.

---

***Modbus Protocol***

Valid modbus addresses vary between PC device types. Consult your PC device manual for valid addressing.

For Modbus protocol communication the module number/command number refers to the Modbus function. The supported functions are:

- 1 read coil status
- 2 read input status
- 3 read holding register
- 4 read input register
- 15 force multiple coils
- 16 load multiple registers

Function 1 or 2 may be specified for the digital read group, function 3 or 4 may be specified for the analog read group depending on the PC data area to be read. For the digital write group function 15 must be assigned and for the analog write group function 16 must be assigned.

The file type and file number are not used and must be set to 0.

IMPCC01 supports the Modbus RTU mode only. It does not support Modbus ASCII mode.

---

**BASE BLOCK CONFIGURATION**

Each function block in the base block configuration must be present and have its specifications defined exactly for your programmable controller. Communication will not be established if invalid entries are made. The CAD configuration supplied with the module includes all base blocks. It can be used to start off a user configuration for the PCC01. However, each block specification must be reviewed and the default value replaced with the value needed for your particular programmable controller system. After setting all the Base Block Configuration specifications, the PC data I/O interface blocks plus the user logic blocks, if any, must be configured as required for your application. If errors exist in the base block specifications when the module is loaded and placed in execute, error messages will appear in the error file and at the diagnostic port (if it has been enabled).

**NOTE:** All non-boolean function block specifications must be entered as decimal values. Some Allen-Bradley addressing parameters may be defined in octal in Allen-Bradley publications and these will require conversion to decimal for the Base Block Configuration specifications.

---

**COMMON COMMUNICATION DEFINITIONS**

---

**Block 15, Segment Control Block**

Critical specifications for this block:

S1 = 1 (time in seconds).

S2 = 0.2 (cycle time).

S3 = 255 (priority).

- S2** The target period must be set to 0.2 seconds for the module to read and write each point once a second. The module has two read and two write commands to send to the PC device. One command is sent per target period (0.2 seconds) with one target period left to take care of any late transactions. Increasing this value will slow down communications to the PC device. Decreasing this value may slightly increase the communication rate but may also decrease the module free time (block 12 output). If the freetime is reduced to less than 5%, there may not always be enough time each and every cycle to complete execution of the application configuration in blocks 100 and higher. For installations with redundant modules, the checkpointing procedure whereby the standby module data is kept up to date may not consistently be completed. The standby checkpointing procedure is performed during the module free time remaining after the function block configuration for all segments has been executed.

- S3 The segment priority must be set to 255 (the highest priority) and segment #1 must be the only segment with the highest priority value. The PCC01 firmware has been designed around its highest priority advantage to ensure that the segment is executed every 0.2 seconds. No other segment can interrupt it. If another segment is running when it is time for segment #1 to run, this other segment will be interrupted to allow the data transfer schedule to be maintained.

---

**Block 30, PC Device Type (FC 51, Non Tuneable)**

In this block is specified the type of device that is connected to the module. From this specification the PCC01 firmware determines which protocol to use and how to address the particular device data areas.

Options include:

*Table 4-1. Block 30, PC Device Type Option*

Block 30 Value	PLC Type
1	Allen-Bradley PLC-2U (Unprotected writes).
2	Allen-Bradley PLC-2P (Protected writes).
3	Allen-Bradley PLC-3.
4	Allen-Bradley PLC-5.
5	Allen-Bradley PLC-5/250.
16	Square D SY/MAX (Future).
32	GE Series 5.
33	GE Series 6.
34	GE 9070.
48	Modicon 584.
49	Modicon 984.
64	Standard RTU.
65	Siemens.
66	Reliance.
67	Texas Instrument (Future).

For information on the PLC 2 protected and unprotected writes see applicable **PLC 2** manual.

---

**Block 31, PC AB Data Highway II Link Address (FC 51, Non Tuneable)**

Destination data highway II link address.

AB Data Highway II - Link address 0 to 255.

For AB Data Highway and Data Highway Plus and for all other programmable controllers systems, this specification must be set to 0.

**NOTE:** The value is a decimal value.

**Block 32, PC AB Data Highway II Node Address (FC 51, Non Tuneable)**

Destination node within the destination link.

**NOTE:** The value is a decimal value as defined in the PC device thumbwheel switches.

AB Data Highway II - Node address 1 to 254.

For AB Data Highway and Data Highway Plus and for all other programmable controller systems, this specification must be set to 0.

**Block 33, PC Device Station Address (FC 51, Non Tuneable)**

Destination PC device address. For PLC 2 and PLC 3 in data highway II mode (see **Block 31, PC AB Data Highway II Link Address (FC 51, Non Tuneable)** and **Block 32, PC AB Data Highway II Node Address (FC 51, Non Tuneable)**) and connected directly to the highway as a node, this station address specification must be set to 1.

AB Data Highway II - PLC2, PLC3 set to 1.

AB Data Highway II - PLC5, PLC5/250 0 to 254.

AB Data Highway or - All PLCs 0 to 254.

Data Highway Plus.

Modbus RTU systems - 1 to 247.

**NOTE:** The value is a decimal value.

**Block 34, PC Port Communication Parameters (FC 51, Non Tuneable)**

This specification defines the PCC01 module's programmable controller interface serial port characteristics. They must match the serial port characteristics of the device being connected. The decimal value for this block is determined by summing relevant individual parameter values defined in Table 4-1.

Example      The default setting is equal to 2825.

```

2816 (9600 baud)
+ 1 (8 data bits)
+ 0 (one stop bit)
+ 8 (no parity)
+ 0 (RTS & CTS normal)
-----
2825 (Result)
    
```

**Block 35, Diagnostic Port Communication Parameters (FC 2, Tuneable)**

This specification defines the PCC01 module's diagnostic serial port characteristics. They must match the serial port characteristics of the terminal being connected. The decimal value for this block is determined by summing relevant individual parameter values defined in Table 4-1.

Example The default setting is equal to 2825.

```

2816 (9600 baud)
+ 1 (8 data bits)
+ 0 (one stop bit)
+ 8 (no parity)
+ 0 (RTS & CTS normal)
-----
2825 (Result)
    
```

This setting suits most terminals.

Example values for a modem connection are:

1545 = 1200 baud, 8 data bits,  
one stop bit no parity RTS & CTS normal.

1609 = 1200 baud, 8 data bits,  
one stop bit no parity RTS & CTS on/off.

Table 4-2. Serial Communication Port Parameters

Parameter	Selection	Value
Baud Rate	75	0
	110	256
	134.5	512
	150	768
	300	1024
	600	1280
	1200	1536
	1800	2560
	2000	1792
	2400	2048
	4800	2304
	9600	2816
RTS/CTS	19200	3072
	Normal	0
	RTS ON/OFF	64
Stop Bits	1	0
	2	16

Table 4-2. Serial Communication Port Parameters (continued)

Parameter	Selection	Value
Parity	Even	0
	Odd	2
	Low	4
	High	6
	None	8
Data Bits	7	0
	8	1

---

**Block 36, Error Trigger Block Number (FC 39, Non Tuneable)**

This OR block may be set up to take input from one or two other blocks to determine the OR block's error trigger value output. While the error trigger block output is at logic 1, LED #1 of the module front plate is lit. When the block output changes from logic 0 to 1, an *Error Trigger On* message is logged in the error file and is output to the diagnostic port. When the error trigger block changes from logic 1 to 0, a message *Error Trigger Off* is logged in the error file and is output to the diagnostic port.

The value of this block has no effect on the communication with the PC device or the quality of the PC I/O read group block outputs.

---

**Block 37, Write Permissive (FC 39, Non Tuneable)**

This OR block may be set up to take input from other blocks to determine the OR block's write permissive value output. If the write permissive value is 0, no write group value changes are written to the PC device. If the write permissive changes from 0 to 1, writing to the PC device of write group value changes resumes.

**NOTES:** The Digital and Analog Write Groups communication transactions cannot be inhibited. The data flow takes place in two stages.

1. From the source function blocks to an intermediate buffer.
2. From the intermediate buffer to the PLC.

**NOTES:** The Write Permissive on the IMPCC01 permits or inhibits stage 1 only. It permits or inhibits updating of the data in the intermediate buffer. The second stage, where the communication transactions write the data of the intermediate buffer to the PLC, cannot be inhibited. It has been implemented as follows:

1. IMPCC01 is assumed to be the data source.

2. On the startup or re-start, the IMPCC01 reads the associated data areas from the PLC to align its starting intermediate buffer data values for the Digital and Analog Write Groups with those of the PLC. Note that the IMPCC01 writes a block of data to the PLC. If any source function block values are bad, it cannot update values for these points. Thus the initial alignment.
3. When the Write Permissive is enabled (logic 1), the IMPCC01 scans all available, good quality, source block outputs and replaces the associated current intermediate buffer values. When the Write Permissive is disabled (logic 0), this action is inhibited.
4. The IMPCC01 writes the Digital and Analog Write Group intermediate buffer values to the PLC.

---

**Block 38, Diagnostic Output Enable (FC 50, Tuneable) Disabled = 0, Enabled = 1**

When the diagnostic port output is enabled, LED number 6 of the module front plate is turned on and all diagnostic messages are output to the terminal port buffer as they occur.

Keyboard interaction with the error reporting facility on the terminal port is provided for error buffer maintenance. See **DIAGNOSTIC ERROR MESSAGES** in Appendix A for more details.

---

**Block 39, PC Register Value Format (FC 51, Non Tuneable)**

Any of the 4 formats (signed binary integer, unsigned binary integer, unsigned 12 bit BCD or unsigned 16 bit BCD) can be specified with any type of PC device. Ensure that the specified format matches the analog data format of the device. The format specified applies to all analog values transferred.

- Options**
- Unsigned binary integer = 0
  - Signed binary integer = 1
  - Unsigned 12-Bit BCD = 2
  - Unsigned 16-Bit BCD = 3

---

**Block 40, Maximum Transmit Capacity (Bytes, FC 51, Non Tuneable)**

This block contains the maximum number of bytes that may be written and read from the PC device. Neither the total number of bytes read from the device nor the total number of bytes written to the device may exceed the value assigned to this block. Only the pre-defined byte capacities maximums of 50, 100, 150, and 200 are legal entries for this specification. Any other value reports an error.

One analog point value consists of two bytes. Eight (8) digital points make up one byte. The actual number of data bytes that are sent to or received from the device is dependent on the group size and may be less than the maximum transmit capacity.

Example Block 40 = 50

The maximum number of bytes read from the PC device=50.

The maximum number of bytes written to the PC device=50.

If no analog data is transferred then:

The maximum number of digitals that may be read  
(block 51) =  $50 * 8 = 400$ .

The maximum number of digitals that may be written  
(block 59) =  $50 * 8 = 400$ .

If no analog data is transferred then:

The maximum number of analogs that may be read  
(block 67) =  $50/2=25$ .

The maximum number of analogs that may be written  
(block 75) =  $50/2 = 25$ .

Example Block 40 = 100

If the number of digitals to be read (block 51) is 400, then:

The maximum number of analogs that may be read  
(block 67) =  $(100 - (400 / 8)) / 2 = 25$ .

If the number of digitals to be written (block 59) is 320, then:

The maximum number of analogs that may be written  
(block 75) =  $(100 - (320 / 8)) / 2 = 30$ .

**NOTE:** The maximum number of digitals read is 1024 and the maximum number of digitals written is 512.

**CAUTION** Some Modbus protocol PC devices may limit the number of bytes to a number less than 200. See particular manufacturers manuals for details.

---

**Block 41, PC Communication Time Out (Milliseconds, FC 51, Non Tuneable)**

This value sets the maximum time the PCC01 module will wait for a response from the PC device before timing out and retrying the command. The valid range is 2000 to 10000 (milliseconds). A typical value is 3000.

---

**Block 42, PC Bad Quality Trigger Point Block (FC 39, Non Tuneable)**

This OR block may be set up to take input from one or two other blocks to control the OR block Bad Quality Trigger Point value output. If the OR block output is 1, all values read from the PC device are written to the read group PC I/O function

blocks with bad quality. If the OR block output is 0, all values are written with good quality.

Values read from the PC device are always read and are always written to the read group PC I/O function blocks as received from the PC device. Only the value quality attribute is modified. When the bad quality trigger block is on, LED number 3 on the module front plate is turned on.

**Block 43, Number of Retries (FC 51, Non Tuneable)**

This specification defines the maximum number of times a command is retried before the communication status is set bad and values read from the device are written to the read group PC I/O function blocks with bad quality. The valid range is 0 to 10. A typical value is 3.

When the number of retries have been performed, only the quality attribute of the read group function blocks is set bad. The block outputs last good values are maintained.

**DIGITAL READ GROUP**

**Block 46, First Function Block Number (FC 51, Non Tuneable)**

This block defines the location of the first function block for storing digital values read from the PC device. Block 51 contains the Digital Read Group Size and defines the number of consecutive blocks that must be included in the application configuration for storing the digital values. The blocks within the range of the group must all be either Basic Boolean Output/Quality (function code 138) blocks or Digital Exception Report (function code 45) blocks.

**NOTE:** Specification S1 for function code 45 blocks must be set to 2 to allow the PCC01 program to write a value to the block.

Valid range is 100 to 9999.

**Block 47, Module Number for AB PLC-3 and PLC-5/250 or Function Number for Modbus RTU (FC 51, Non Tuneable)**

Valid entries are:

- |            |                         |
|------------|-------------------------|
| Modbus RTU | - Function 1 or 2 only. |
| PLC2, PLC5 | - Must be set to 0.     |
| PLC3       | - 0 to 15.              |
| PLC5/250   | - 0 to 4.               |

**Block 48, File Type for AB PLC-3 or PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

- RTU, PLC2, PLC5 - Must be set to zero.
- PLC3 - Types 1, 2, 5, 7, 8 or 13 only.

where:

- 1 - Output File
- 2 - Input File
- 5 - Integer File
- 7 - Decimal File
- 8 - Binary File
- 13 - Status File

- PLC5/250 - Types 0 or 1 only.

where:

- 0 - Binary File
- 1 - Integer File

**Block 49, File Number for AB PLC-3, PLC-5 or PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

- RTU, PLC2 - Must be set to 0.
- PLC3, PLC5, PLC5/250 - 0 to 999.

**Block 50, PC Memory or File Word Offset (FC 51, Non Tuneable)**

Word offset from the beginning of the PC device memory or file (offset 0) to the first data value of the group.

Valid entries are:

- RTU - 0 to 32767.  
(Depends on PC manufacture).
- PLC2 - 0 to 999.
- PLC3, PLC5, PLC5/250 - 0 to 1999.

**Block 51, Group Size (FC 51, Non Tuneable)**

Number of contiguous discrete points read from the PC device beginning with the first data value defined in block 50.

Valid range - 0 to 1024.

**NOTE:** The actual number of discrete points that may be read is further limited by the specification for block 40, the Maximum Transmit Capacity and block 67, the Analog Read Group Size (see the description for **Block 40, Maximum Transmit Capacity (Bytes, FC 51, Non Tuneable)**).

---

**DIGITAL WRITE GROUP**

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**Block 54, First Function Block Number (FC 51, Non Tuneable)**

This block defines the location of the first function block whose digital value output is written to the PC device. Block 59 contains the Digital Write Group Size and defines the number of consecutive digital output blocks that must be included in the application configuration to source the digital values for this write group. The blocks within the range of the group must all be Boolean output function blocks.

For any missing block within the range of the group or any block output of incorrect type, the value read from the PC during the initialization phase will be used as the discrete value for the point that will be written back to the PC device. Note that communication is not inhibited because of this and that communication continues normally. An error message will be recorded on startup only.

Valid range 100 to 9999.

---

**Block 55, Module Number for AB PLC-3 and PLC-5/250 or Function Number for Modbus RTU (FC 51, Non Tuneable)**

Valid entries are:

- |            |                        |
|------------|------------------------|
| RTU        | - Function 15 only.    |
| PLC2, PLC5 | - Must be set to zero. |
| PLC3       | - 0 to 15.             |
| PLC5/250   | - 0 to 4.              |

---

**Block 56, File Type for AB PLC-3 or PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

- |                |                                   |
|----------------|-----------------------------------|
| RTU, PLC2, PLC | - Must be set to zero.            |
| PLC3           | - Types 1, 2, 5, 7, 8 or 13 only. |

where:

- 1 - OutPut File
- 2 - Input File
- 5 - Integer File
- 7 - Decimal File

8 - Binary File  
3 - Status File

PLC5/250 - Types 0 or 1 only.

where:

0 - Binary File  
1 - Integer File

**Block 57, File Number for AB PLC-3, PLC-5, PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

RTU, PLC2 - Must be set to 0.  
PLC3, PLC5, PLC5/250 - 0 to 999.

**Block 58, PC Memory or File Word Offset (FC 51, Non Tuneable)**

Valid range:

RTU - 0 to 32767.  
(Depends on PC manufacture).  
PLC2 - 0 to 999.  
PLC3, PLC5, PLC5/250 - 0 to 1999.

**Block 59, Group Size (FC 51, Non Tuneable)**

Number of discrete points to write.

Valid range - 0 to 512.

**NOTES:**

1. The actual number of discrete points that may be written is further limited by the specification for block 40, the Maximum Transmit Capacity and block 75, the Analog Write Group Size (see the description for **Block 40, Maximum Transmit Capacity (Bytes, FC 51, Non Tuneable)**).
2. The area written to in the PC is calculated in word increments so that even if not all bits of the first and/or last word are included by the PC Memory or File Word Offset and the Group Size definitions, all whole words are written.

**ANALOG READ GROUP**

**Block 62, First Function Block Number (FC 51, Non Tuneable)**

This block defines the location of the first function block for storing analog values read from the PC device. Block 67 contains the Analog Read Group Size and defines the number of consecutive blocks that must be included in the application configuration for storing the analog values. The blocks within this range must all be either Basic Real Output/Quality (func-

tion code 137) blocks or Analog Exception Report (function code 30) blocks.

**NOTE:** Specification S1 for function code 30 must be set to 2 to allow the PCC01 program to write a value to the block.

Valid range 100 to 9999.

***Block 63, Module Number for AB PLC-3 and PLC-5/250 or Function Number for Modbus RTU (FC 51, Non Tuneable)***

Valid entries are:

- |            |                         |
|------------|-------------------------|
| RTU        | - Function 3 or 4 only. |
| PLC2, PLC5 | - Must be set to zero   |
| PLC3       | - 0 to 15.              |
| PLC5/250   | - 0 to 4.               |

***Block 64, File Type for AB PLC-3 or PLC-5/250, (FC 51, Non Tuneable)***

Valid entries are:

- |                 |                                   |
|-----------------|-----------------------------------|
| RTU, PLC2, PLC5 | - Must be set to zero.            |
| PLC3            | - Types 1, 2, 5, 7, 8 or 13 only. |

where:

- 1 - OutPut File
- 2 - Input File
- 5 - Integer File
- 7 - Decimal File
- 8 - Binary File
- 13 - Status File

- |          |                |
|----------|----------------|
| PLC5/250 | - 0 or 1 only. |
|----------|----------------|

where:

- 0 - Binary File
- 1 - Integer File

***Block 65, File Number for AB PLC-3, PLC-5, PLC-5/250 (FC 51, Non Tuneable)***

Valid entries are:

- |                      |                     |
|----------------------|---------------------|
| RTU, PLC2            | - Must be set to 0. |
| PLC3, PLC5, PLC5/250 | - 0 to 999.         |

***Block 66, PC Memory or File Word Offset (FC 51, Non Tuneable)***

Valid entries are:

- RTU - 0 to 32767.  
(Depends on PC manufacture).
- PLC2 - 0 to 999.
- PLC3, PLC5, PLC5/250 - 0 to 1999.

**Block 67, Group Size (FC 51, Non Tuneable)**

Number of analog values to read from the PC device.

Valid range - 0 to 100.

**NOTE:** The actual number of analog points that may be read is further limited by the specification for block 40, the Maximum Transmit Capacity and block 59, the Digital Read Group Size (see the description for **Block 40, Maximum Transmit Capacity (Bytes, FC 51, Non Tuneable)**).

**ANALOG WRITE GROUP**

**Block 70, First Function Block Number (FC 51, Non Tuneable)**

This block defines the location of the first function block whose analog value output is written to the PC device. Block 75 contains the Analog Write Group Size and defines the number of consecutive analog output blocks that must be included in the application configuration to source the analog values for this write group. The blocks within the range of the group must all be real output function blocks.

For any missing block within the range of the group or any block output of incorrect type, the value read from the PC during the initialization phase will be used as the analog value for the point that will be written to the PC device. Note that communication is not inhibited because of this and that communication continues normally. An error message will be recorded on startup only.

Valid range 100 to 9999.

**Block 71, Module Number for AB PLC-3 and PLC-5/250 or Function Number for Modbus RTU (FC 51, Non Tuneable)**

Valid entries are:

- RTU - Function 16 only.
- PLC2, PLC5 - Must be set to zero.
- PLC3 - 0 to 15.
- PLC5/250 - 0 to 4.

**Block 72, File Type for AB PLC-3 or PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

RTU, PLC2, PLC5 - Must be set to zero.  
 PLC3 - Types 1, 2, 5, 7, 8 or 13 only.

where:

- 1 - OutPut File
- 2 - Input File
- 5 - Integer File
- 7 - Decimal File
- 8 - Binary File
- 13 - Status File

PLC5/250 - 0 or 1 only.

where:

- 0 - Binary File
- 1 - Integer File

---

**Block 73, File Number for AB PLC-3, PLC-5, PLC-5/250 (FC 51, Non Tuneable)**

Valid entries are:

RTU, PLC2 - Must be set to 0.  
 PLC3, PLC5, PLC5/250 - 0 to 999.

---

**Block 74, PC Memory or File Word Offset (FC 51, Non Tuneable)**

Valid entries are:

RTU - 0 to 32767.  
 (Depends on PC manufacture).  
 PLC2 - 0 to 999.  
 PLC3, PLC5, PLC5/250 - 0 to 1999.

---

**Block 75, Group Size (FC 51, Non Tuneable)**

Number of analog values to write to the PC device.

Valid range - 0 to 100.

**NOTE:** The actual number of analog points that may be written is further limited by the specification for block 40, the Maximum Transmit Capacity and block 59, the Digital Write Group Size (see the description for **Block 40, Maximum Transmit Capacity (Bytes, FC 51, Non Tuneable)**).

---

**STATISTICS**

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**Block 80, Rolling Average PC Turnaround Time (FC 137 No Settable Specifications).**

**Four Outputs. Blocks 80...83)**

This block output represents the average time from the beginning of a command sent by the PCC module to the end of a response received from the PC device. It represents the average calculated by the PCC01 program over 4 consecutive command/reply transactions and is updated every 0.25 seconds.

---

**Block 81, Rolling Average Read/Write Cycle Time**

This block output represents the average time period for repeating the same command. It represents the average calculated by the PCC01 program over 4 consecutive program cycles updated every 1 second.

---

**Block 82, PC Status**

This block output represents the Programmable controller status.

1 = good,  
0 = bad.

Bad status is determined by the PCC01 program and may be due to any one or more of the following:

Base block configuration error.

PC Reply Error (block 85).

PC Link Status bad (block 86).

Link Serial Communication Port Status bad (block 87).

---

**Block 83, PC Communications Time-out Count**

This block output represents a count of the number of time-outs that have occurred since the module was restarted (put into execute, reset or powered up). The block is updated with every time-out occurrence.

**NOTE:** If the module is reset or a redundant module switchover to standby occurs, the time-out count is reset to 0.

---

**Block 84, PC Error Count (FC 137, No Settable Specifications. Four Outputs. Blocks 84... 87)**

This block output represents a count of the number of communication errors that have occurred since the module was

restarted (put into execute, reset or powered up). The block is updated with every error detected.

**NOTE:** If the module is reset or a redundant module switchover to standby occurs, the communication errors count is reset to 0.

---

**Block 85, PC Last Error**

This block output represents the status code received with the last response from the PC device. The status is encoded by the PC device (see [Appendix A](#) for last error code interpretations).

---

**Block 86, Link Status**

This block output represents the status of the serial link.

1 = good,  
0 = bad.

If there is no response from the PC device for the number of consecutive tries defined in block 43, the link status is set to bad and does not go back to good until communication with the device is re-established. Communication is continuously retried by the PCC01 module.

---

**Block 87, PCC01 Link Serial Communication Port Status**

Presently same as link status.

---

**Block 88, Block I/O Error Count (FC 137, No Settable Specifications. Four Outputs. Blocks 88...91)**

This block output represents the number of I90 function blocks allocated within the PC I/O function block groups that are of the wrong type. Normal module communication continues with the PC device.

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***INVOKE C, THE COMMUNICATION PROGRAM***

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**Block 99 Invoke 'C' Block**

This function block is pre-allocated in the firmware of the module. It cannot be deleted or replaced. All specifications must be left at the default settings. The IMPCC01 version number is reported at this block's output.

This function block invokes the PCC01 link communication firmware program. Every time the block is executed the PCC01 program is run to perform the required operations for communication between the PC device and the PCC01 module function blocks.

This function block is active during the time that the PCC01 program is executed. The program limits its execution time to make adequate time available for the application configuration. The segment priority for this segment (See the description for block 15) must be set higher than that of any other segment allocated in the application configuration for the module.

The module's primary function is communication with the PC device. As such, its application function block configuration must be limited to pre-processing, collecting and distributing of PC data. Control logic for special situations needing close coupling with the PC data may be added. Time utilization for the application configuration should be limited to maintain module free time (block 12 output) of at least five (5) percent.

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### **THE RECOMMENDED SECOND SEGMENT**

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#### ***Block 100 Segment Control Block (Recommended)***

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It is recommended that a Segment Control block (function code 82) be placed at block 100. This will allow the execution cycle time for the base blocks and PCC01 program to be set independent of the cycle time for the application function block configuration in the blocks above block 100.

The priority of this segment (block 100) must be made lower than the priority of the base block configuration and the PCC01 program segment (block 15).

The execution cycle time for this segment (block 100) should be carefully set to ensure that the module free time (block 12 output) remains greater than 5 percent.

Critical specifications of this block:

- S1 = (time in seconds).
- S2 = 0.5 or longer (cycle time).
- S3 = less than 255 (priority).

It is further recommended that no additional segmenting be implemented. The PCC01 segment starting at the segment control function code at block 15 and the application configuration segment starting at the segment control function code at block 100 should be the only segments.

APPLICATION CONFIGURATION

PC I/O Function Blocks

Digital Read Group

The PC I/O function blocks for the digital read group have to receive the digital values obtained from the programmable controller. These blocks must all be either Digital Exception Report (FC 45, 1 output) or Basic Boolean Output/Quality (FC 138, 4 outputs) function codes. The blocks must be arranged so that they provide a number of consecutive block outputs equal to the digital read group size, BaseBlock number 51. The first output must be at the block number specified in base block number 46.

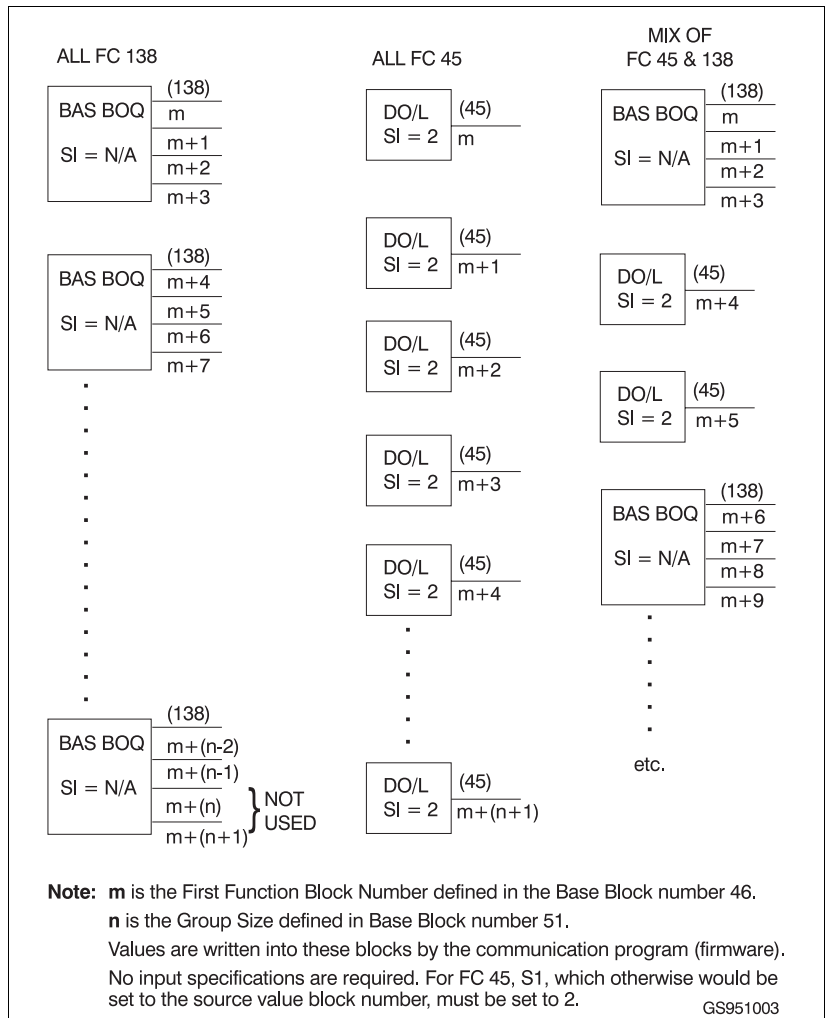


Figure 4-3. Examples of Digital Read Group PC I/O Function Blocks

**Digital Write Group**

The PC I/O function blocks for the digital write group have to provide the digital values that are written to the programmable controller. These blocks may be any function code that provides only boolean output values. They must be arranged so that they provide a number of consecutive block outputs equal to the digital write group size, Base Block number 59. The first output must be at the block number specified in Base Block number 54.

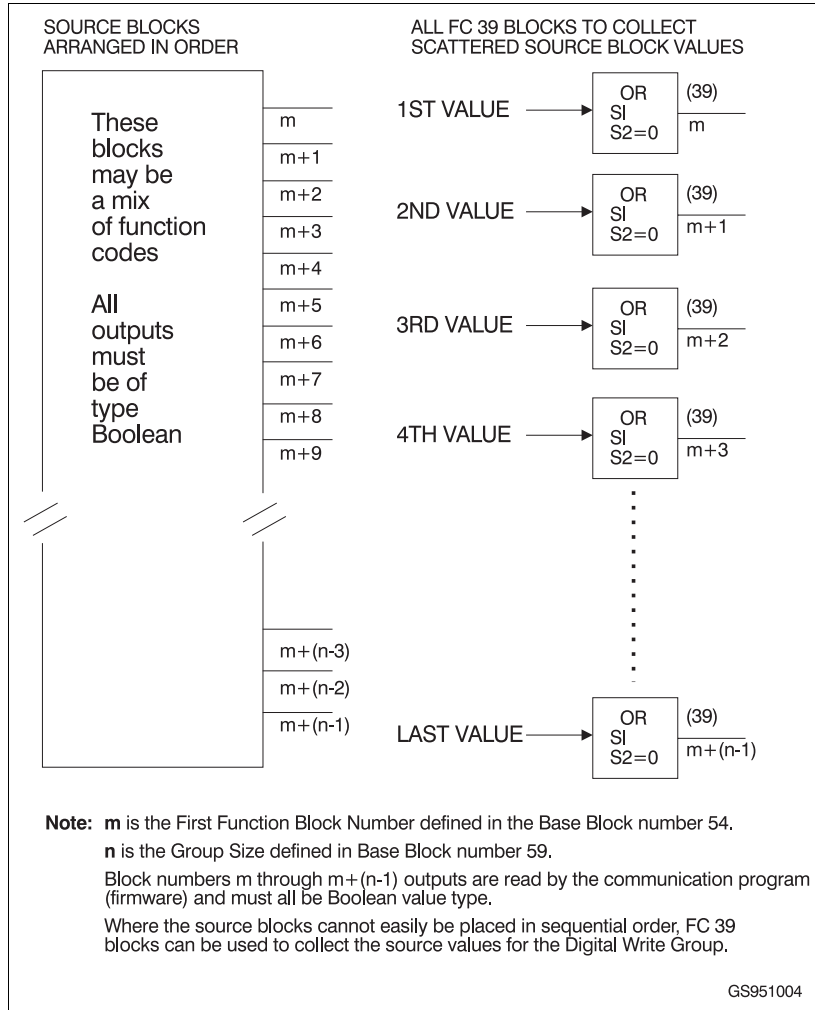


Figure 4-4. Examples of Digital Write Group PC I/O Function Blocks

**Analog Read Group**

The PC I/O function blocks for the analog read group have to receive the analog values obtained from the programmable controller. These blocks must all be either Analog Exception Report (FC 30, 1 output) or Basic Real Output/Quality (FC

137, 4 outputs) function codes. The blocks must be arranged so that they provide a number of consecutive block outputs equal to the analog read group size, Base Block number 67. The first output must be at the block number specified in Base Block number 62.

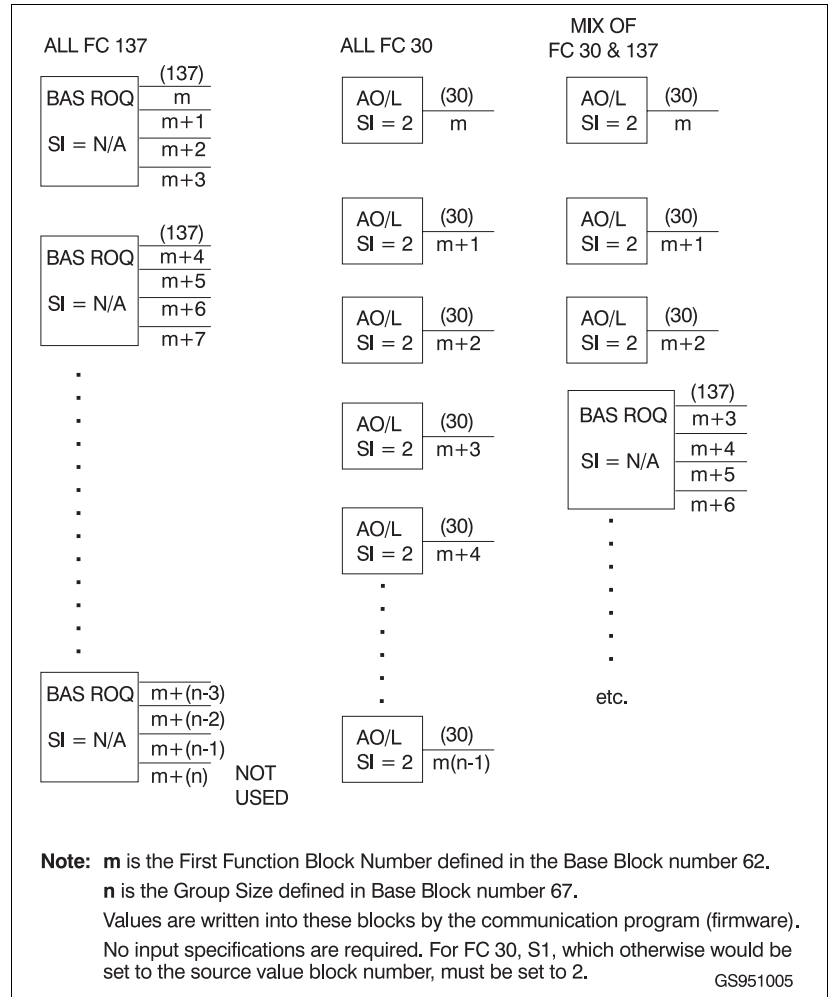


Figure 4-5. Examples of Analog Read Group PC I/O Function Blocks

**Analog Write Group**

The PC I/O function blocks for the analog write group have to provide the analog values that are written to the programmable controller. These blocks may be any function code that provides only real output values. They must be arranged so that they provide a number of consecutive block outputs equal to the analog write group size, Base Block number 75. The first output must be at the block number specified in Base Block number 70.

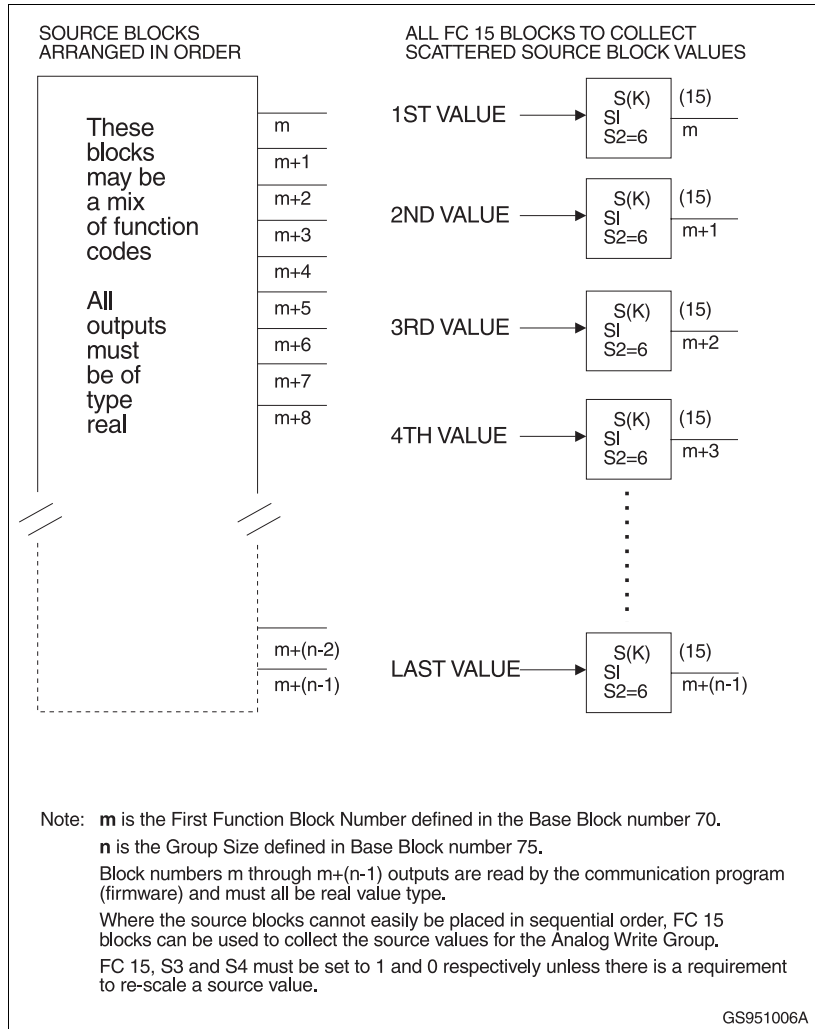


Figure 4-6. Examples of Analog Write Group PC I/O Function Blocks

**SCALING AND OFFSET CONVERSION**

Any analog value received from the controller can be converted with respect to offset and scaling using function code 15, 2-Input Summer. The function code has four(4) specifications.

- S1** Block address of the first input. Set this to the block number of the value to be converted.
- S2** Block address of the second input. Set this to block number 6 which supplies the constant real value 1.0.
- S3** Gain parameter of input 1. Set this equal to the required scale factor.
- S4** Gain factor of input 2. Set this equal to the required offset value.

**Output**  $\langle S1 \rangle * S3 + \langle S2 \rangle * S4$   
 = Controller Value \* Scale factor + Offset  
 where:  $\langle Sn \rangle$  indicates output value of block  $Sn$ .

**PASSING DATA VALUE QUALITY TO THE CONTROLLER**

Where the quality associated with a block output value must be passed to the programmable controller, it must be passed as a digital value of the digital write group.

Where quality is provided as an attribute to the block output value (function codes 25, 26, 41, 45 for example), the quality can be extracted with function code 31, Test Quality. The Test Quality block output must then be passed to or made part of the Digital Write Group PC I/O function blocks.

Where quality is not provided as a block output attribute, it may for some applications be possible to logically derive a quality value using function block logic.

**PASSING DATA VALUE QUALITY FROM THE CONTROLLER**

Where quality associated with a programmable controller value must be passed to the PCC01 application configuration, it must be passed as a digital value of the digital read group. The application configuration thus receives two values from the programmable controller (value and quality) that can be recombined, if required, in the following manner.

**Analog**

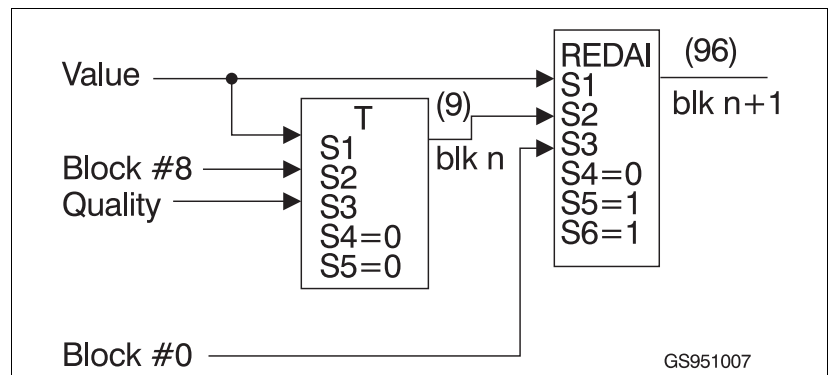


Figure 4-7. Combining Analog Value and Quality in Function Blocks

With quality good, the value is passed to both S1 and S2 of function code 96 at block n+1. With quality bad, the block #8 output value -9.2E18, a constant, is passed to S2 of block n+1. With a difference between S1 and S2 greater than S4 in block n+1, its output value quality attribute will be set bad. With S3

tied to block #0, a constant, the input to S1, value, will always be seen on the output of block n+1.

**Digital**

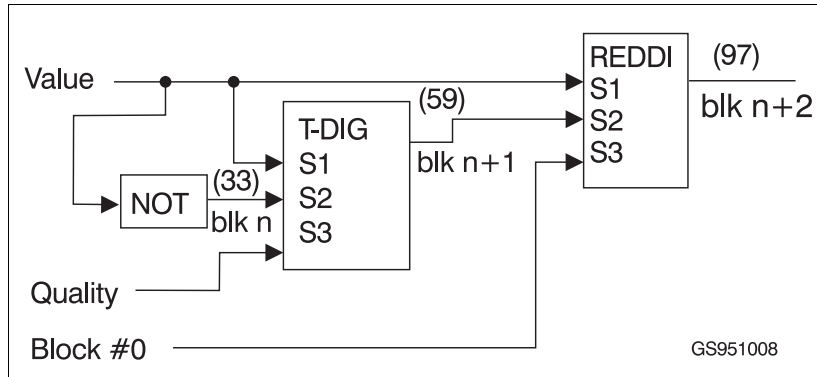


Figure 4-8. Combining Digital Value and Quality in Function Blocks

Block n+2 receives the value on both S1 and S2 when quality is good. When quality is bad, S2 receives the inverse of what is received on S1 (value) and the output value quality attribute of block n+2 is set bad. With S3 tied to block #0, a constant the input to S1, value, will always be seen on the output of block n+2.

**SETTING UP SYSTEM HEARTBEAT MONITORING**

Heartbeat monitoring may be set up with two dedicated digital points. One digital read and one digital write point. The heartbeat write point can be generated with two pulse output timers (function code 35) and two NOTs (function code 33) at block numbers n, n+1, n+2 and n+3 (Figure 4-9).

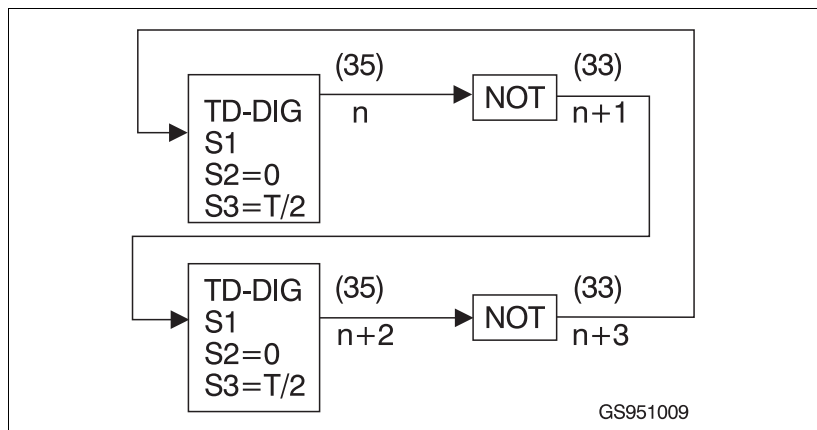


Figure 4-9. Heartbeat Source Signal in Function Blocks

The heartbeat repeat time is T seconds and each timer must be set to T/2. The timers trigger on logic 0 to 1 transition of the output from the NOTs. The NOTs each invert the timer feeding it. Each time a timer's output pulse ends, its NOT triggers the other timer. Any one of the four block outputs can be written to the programmable controller to represent the heartbeat (Figure 4-10).

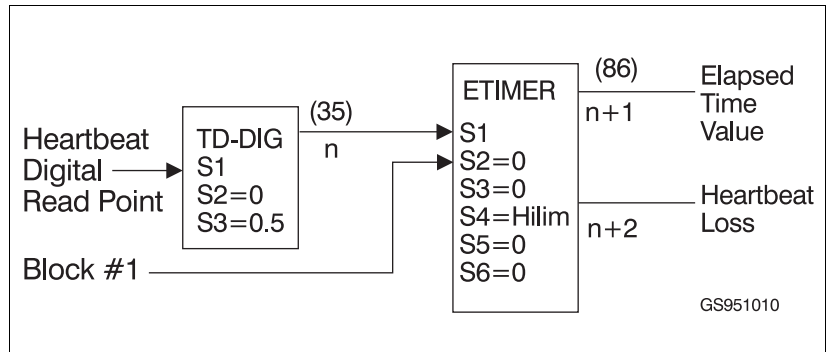


Figure 4-10. Sensing PLC Heartbeat Signal in Function Blocks

A similar logic circuit should be implemented in the programmable controller to represent the heartbeat digital read point. A pulse output Timer (function code 35) and an Elapsed Timer (function code 86) can be added to the application configuration to sense heartbeat continuation.

The heartbeat digital read point should be connected to pulse output Timer, block n, to generate a short (0.5 second) duration pulse on each rising edge of the heartbeat. This pulse will reset the Elapsed Timer, block n+1, with every heartbeat. Loss of this reset will allow the elapsed time value to exceed the limit set in S4 and set the alarm output, block n+2.

**MFP02 FUNCTION CODES NOT AVAILABLE IN THE IMPCC01**

The following function codes, which are available on an MFP01/02 module, are not available on a PCC01 module.

Table 4-3. MFP02 Function Codes Not Available in the IMPCC01

Function Code	Description
Function code #91	Basic Configuration.
Function code #92	Invoke Basic.
Function code #93	Basic Real Output.
Function code #94	Basic Boolean Ouput.
Function code #99	Sequence Of Events Log.
Function code #116	Jump/Master Control Relay.
Function code #148	Batch Sequence.

Table 4-3. MFP02 Function Codes Not Available in the IMPCC01 (continued)

Function Code	Description
Function code #190	User Defined Function Declaration.
Function code #191	User Defined Function One.
Function code #192	User Defined Function Two.
Function code #198	Auxiliary Real User Defined Function.
Function code #199	Auxiliary Digital User Defined Function.
Function code #210	Sequence of Events Slave.
Function code #219	Common Sequence.
Function code #220	Batch Historian.

These function codes represent special functions which, if present, would utilize module resources required for the communication facilities of the PCC01.

---

#### PROGRAMMABLE CONTROLLER DATA PREPARATION

As stated in other sections of this manual, the point data value cells for the read and write groups must be placed in sequential order for the PCC01 to read and especially write the data as contiguous data groups. Especially for the writing, the data groups must not include value cells that are written into locally by the programmable controller. The locally written values would be overwritten each time the PCC01 writes the data group and vice versa. In general, the data cells included in each group should be dedicated to communication with the PCC01.

For new programmable controller installations, these requirements can be taken into account in the original design when the data point assignments are made. For installations where the data point assignments have already been established, or where these PCCO requirements do not conform well with other requirements for organizing the programmable controller data points, controller program logic should be added to move the data to/from their assigned locations into the groups of data cells dedicated to communication with the PCC01.

---

#### GENERAL APPLICATION RECOMMENDATIONS

The purpose of the PCC01 module is to provide data communication between the application configuration function blocks and the connected programmable controller data tables or files. The function codes available in the PCC01 module allow virtually all general function code programming of the module to integrate the programmable controller data I/O for operator station facilities and to provide DCS and programmable controller control logic interlocks.

**The PCC01 module's available memory should not be used as extra logic configuration capacity for function block logic not related to programmable controller data integration.** The application configuration should serve to send and receive controller data and to manipulate this data to make it compatible for integration into the INFI 90 OPEN system.

All programmable controller data included in the digital and analog read groups is written into the associated function blocks once every second. All function block output data included in the digital and analog write groups is written to the programmable controller once every second.

Events in the PCC01 module application configuration occur asynchronously with respect to the cyclic execution of the logic programs in the programmable controller. The same is true for events that occur in the programmable controller and the cyclic execution the application configuration of the PCC01 module.

**This asynchronous nature of the connected systems causes the elapsed time between the occurrence of an event in one system and recognition of this event in the logic of the other system to vary from less than one second up to two seconds. Time critical control loops which cannot tolerate this time variation should therefore NOT enclose this serial communication link.**

**To prevent unfavourable impact on PCC01 performance, no more than seven INFI 90 OPEN I/O slave modules should be addressed by function blocks in the PCC01.**

The item having the most significant impact on the PCC01 communications is module bus poling. Where possible, the discrete programmable controller data should be reported via INFI 90 OPEN composite data types such as RCM, DDB, MSDD, RMSC, etc., by merging the programmable controller data into the composite data structures within the PCC01 application configuration. This may allow the total data points that have to be reported via the Module Bus or Controlway to be reduced significantly.



---

## SECTION 5 - TROUBLESHOOTING

---

### NORMAL OPERATION

When the IMPCC01 module is in the execute mode with no hardware configuration or critical block configuration errors, the front panel status LED is solid green and LED's 7 and 8 of the primary module show solid red.

The IMPCC01 maintains a 100 message circular buffer in volatile RAM and a 16 KBytes Diagnostic Error file in non-volatile RAM both for the purpose of storing error messages (as described in **ERROR REPORTING METHODS** in Section 2).

The messages in the circular volatile RAM buffer (and new messages) may be output by connecting an ASCII text terminal to the *Monitor* port and then setting the Diagnostic Output Enable (base block number 38). When first enabled, the menu shown below is presented. This menu will be re-output in response to the ? and H terminal keyboard keys.

```
Copyright (c) Elsag Bailey (Canada) Inc., 1992

D-Delete all error messages
P - Pause
C - Continue after pause
S - Start from the beginning
W - Wrap mode
N - No wrap mode
?,H - Help

Press any of the above keys
```

Figure 5-1. Diagnostic Output Menu

When the Diagnostic Output Enable (base block number 38) is set, module face plate LED 6 is set to flashing red. This serves to remind the user that error messages are being output to the *Monitor* port.

The error messages in the volatile RAM circular buffer are lost when the IMPCC01 module is reset, when the power is removed from the module or after switchover to the standby module of a redundant IMPCC01 module set.

The circular volatile RAM buffer maintenance features *Wrap* and *Nowrap* should be set depending on whether the first occurrence of errors or the most recent errors are of the most interest to the user. If the *No wrap mode* is invoked, then only the last message is overwritten when the buffer becomes full. In the *Wrap mode*, the oldest messages get overwritten in a continuing circular manner when the buffer becomes full. To trap the first occurrence of an error message, select *Delete all error messages* and then select the *No wrap mode*. To continuously monitor the latest error messages, select the *Wrap mode*.

When a terminal is not connected to this port while the Diagnostic Output Enable is set (enabled), the circular buffer continues to be updated according to the wrap mode selection. During normal operation, when no troubleshooting activity is ongoing and no terminal is connected, it may be advantageous to disable the Diagnostic Output as this function would utilize module resources unnecessarily.

The terminal connection requires an appropriate RS232 serial communication cable and requires that the termination unit jumpers be set to provide compatibility with the terminal. Appendix D includes sections for connecting to an IBM PC or compatible workstation using both the NTMP01 termination unit and the NIMP01/02 termination module.

The ASCII text terminal connected to the Monitor port may be a conventional terminal such as a VT100 or a terminal emulation program running in a personal computer. Microsoft Windows includes terminal emulation (typically in the Accessories group) as do most modem programs. The diskette provided with the IMPCC01 module includes the terminal emulation program, **VT.EXE**.

The error viewing program **ERR\_VIEW.EXE**, on the diskette provided with the IMPCC01 module, is an MS DOS program. It requires a SPM, CPM or CIU interface to address the IMPCC01 module and upload the non-volatile RAM error file.

The COM1 or COM2 serial port of the PC must be connected by serial communication cable to the SPM/CPM/CIU serial port (the cable and connection is identical to that for the standard Elsag Bailey tools EWSCAD and CLS).

The user must enter a MS-DOS file name by which to save the error file text to a disk file. After uploading the error file, the error file text messages are automatically displayed. The standard page and up/down arrow keys allow the user to scroll through the error messages.

```

                                IMPCC01 UTILITY MENU

Select the PORT and the SPM/CPM/CIU communication BAUD RATE

PORT (1,2 for COM1, COM2 or 3 for FILE) : 3      BAUD RATE: 9600

The operation requires a FILE NAME by which to save the error log

                                Enter a FILE NAME: D:\ERRVIEW\TEST\951010.PEL

Also enter the IMPCC01 module location, RING, PCU, MODULE numbers
NOTE: For CPM or SPM interfaces, enter only the MODULE number

                                RING # = 0      PCU # = 0      MODULE # = 3

                                PAGE UP/DOWN. CURSOR UP/DOWN to field, F10 to Accept, F9 to Quit

```

Figure 5-2. ERR\_VIEW User Menu

---

### MODULE (HARD) ERRORS

When a module error occurs (a hardware configuration or critical block configuration error), the module's front panel status LED goes solid red and an error code is displayed on the module front plate LEDs 1 through 8. For information on these errors see the **I-E96-202** manual. One error of specific interest is the Invoke C Error (LEDs 2 and 6 on). To correct this problem, the module must be re-initialized (see Section 3 - **HARDWARE INSTALLATION AND SETUP** of this manual). After re-initializing the module, the configuration must be reloaded.

---

### PCC01 CONFIGURATION/COMMUNICATION ERRORS

When the PCC01 program detects invalid settings in the Base Block Configuration or encounters errors communicating with the PC device, it reports these errors in three different ways as described under **ERROR REPORTING METHODS** in Section 2. One of the three ways is via the front plate LEDs. For the PCC01 program detected errors the module's status LED remains solid green and LEDs 7 and 8 remain solid red. The program detected errors or status are displayed in LEDs 1 through 6 in flashing red. See Table A-1 for a description of the error codes.

---

### THE PROBLEM REPORT FORM

Appendix B contains the Problem Report Form. A copy of this form should be filled out and sent to your local Elsag Bailey service centre. This form provides a convenient way to record all relevant performance information for the module. Please take the time to fill out this form. It will allow Elsag Bailey technicians to diagnose problems more quickly.

---

**REMOTE ERROR MONITORING**

**ERROR REPORTING METHODS** in Section 2, describes how a terminal or terminal emulator may be connected to the PCC01 module's termination unit/module terminal port to view the generated messages. It also describes how the Diagnostic Error file may be retrieved from non-volatile RAM to view the messages saved there. The section further makes reference to the standard Eltag Bailey tools CADEWS and CLS for monitoring the blocks of the module. All of the above methods for monitoring the module behaviour make use of standard RS232 serial communication via the module's Diagnostic (terminal) port, a Serial Port Module (SPM) or a Computer Interface Unit (CIU).

Any of the three serial communication links can be set up to include telephone modems to retrieve module information and remotely monitor module behaviour.

For this purpose, the local telephone modem unit must support auto answer. It can then be pre-connected on a dedicated telephone line to allow a Eltag Bailey technician to dial in with a remote telephone modem unit to diagnose the PCC01 link.

See [Appendix D](#) for an example of remote modem connections.

# APPENDIX A - ERROR CODES AND MESSAGES

## LED ERROR CODES

Table A-1. LED Error Codes

LED Error Code	Diagnostic Reported	Recommended Action
7 & 8	PCC is running with no errors	No action required.
1 flash	Error Trigger On	No action required. See <b>Block 36, Error Trigger Block Number (FC 39, Non Tuneable)</b> in Section 4, for details.
2 flash	Write Permissive Off	No error. See <b>Block 37, Write Permissive (FC 39, Non Tuneable)</b> in Section 4, for details.
3 flash	Bad Quality Trigger On	No error. See <b>Block 42, PC Bad Quality Trigger Point Block (FC 39, Non Tuneable)</b> in Section 4, for details.
4 flash	Total Communication Failure	View the error report output from the <i>Monitor</i> (terminal) port or/and the non-volatile Diagnostic Error file for details. Refer to <b>ERROR REPORTING METHODS</b> in Section 2.
5 flash	PC I/O Function Block Missing	View the error report output from the <i>Monitor</i> (terminal) port or/and the non-volatile Diagnostic Error file for details. Refer to <b>ERROR REPORTING METHODS</b> in Section 2.
6 flash	Monitor Port is Enabled	Monitor (terminal) port output is enabled. Refer to <b>Block 38, Diagnostic Output Enable (FC 50, Tuneable) Disabled = 0, Enabled = 1</b> in Section 4 and <b>ERROR REPORTING METHODS</b> in Section 2 for details.
All 1-6 flash	PCC01 Configuration Error	Module cannot attempt communication with the programmable controller until the error is cleared. View the error report output from the <i>Monitor</i> (terminal) port or/and the non-volatile Diagnostic Error file for details. Refer to <b>ERROR REPORTING METHODS</b> in Section 2.
2 & 7 only	Invoke C Error (hard error)	The PCC01 module must be re-initialized. <b>PCC01 MODULE INITIALIZATION</b> in Section 3 gives a brief outline of the procedure. Refer to the <b>I-E96-202</b> .

## DIAGNOSTIC ERROR MESSAGES

Configuration Error messages. These errors must be corrected before the module can attempt to communicate with the PC device.

**NOTE:** The text under **Explanation and Action** in Table A-2 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

Table A-2. Diagnostic Error Messages

Error Message Text	Explanation and Action
Invalid Device Type	Function block #30 value, PC Device Type, is invalid.
Link Address Not Supported with RTU	Block 31 must be 0 for Modbus protocol devices.

*Table A-2. Diagnostic Error Messages (continued)*

<b>Error Message Text</b>	<b>Explanation and Action</b>
Node Address Not supported with RTU	Block 32 must be 0 for Modbus protocol devices.
RTU Address out of Range	Block 33 value must be in the range 1 .. 247 for the selected Device Type.
Link Address is out of Range	Block 31 value must be in the range 0 .. 255 for data highway II.
Node Address is out of Range	Block 32 value must be in the range 1 .. 254 for data highway II.
Station Address must be set to 1 for Data Highway II	Block 33 value must be 1 for data highway II.
Station Address out of Range	Block 33 value is invalid for the type of Allen-Bradley PC device indicated in block 30.
Invalid Analog format	Block 39 value must be 0, 1, 2 or 3.
Invalid PCC byte Capacity	Block 40 value, PCC Byte Capacity, must be 50, 100, 150 or 200.
Total Writes Greater than Maximum Capacity	Block 59 / 8 + Block 75 * 2 > Block 40. Increase block 40 to its next higher legal value.
Total Reads Greater than Maximum Capacity	Block 51 / 8 + Block 67 * 2 > Block 40. Increase block 40 to its next higher legal value.
Maximum Number of AW's Exceeded	Block 75 must be 100 or less.
Maximum Number of AR's Exceeded	Block 67 must be 100 or less.
Maximum Number of DW's Exceeded	Block 59 must be 512 or less.
Maximum Number of DR's Exceeded	Block 51 must be 1024 or less.
Time Out value out of Range	Block 41 must be in the range 2000 to 10000 (milliseconds).
Retry Number is out of Range	Block 43 must be in the range 0 to 10.
No Points Configured	All read and write group sizes, block numbers 51, 59, 67 and 75, are set to 0.
Unused Module Number must be set to 0	When a group's size (AR, AW, DR or DW) is set to 0, its module number must be set to 0.
Unused File Type must be set to 0	When a group's size (AR, AW, DR or DW) is set to 0, its file type must be set to 0.
Unused File Number must be set to 0	When a group's size (AR, AW, DR or DW) is set to 0, its file number must be set to 0.
<b>For the following entries, %s = AW, AR, DW or DR (for Analog Write, Analog Read, Digital Write, Digital Read)</b>	
%s: Exceed Command Byte capacity	Block 51, 59, 67 or 75 value is too large. Block number corresponds to DR, DW, AR or AW respectively.
%s: PC Memory extends to out of Range	Block number 50, 58, 66 or 74 value plus the corresponding group size extends out of the PC's range
%s: Block number is out of Range	Block number 46, 54, 62 or 70 contains an invalid block number.
%s: Block extends to out of Range	Block number 46, 54, 62 or 70 plus the corresponding group size value extends to an invalid block number.
%s: Number of points cannot be Negative	Block numbers 51, 59, 67 and 75 values can not negative.
%s: Unused PC Offset must be set to 0	Block 50, 58, 66 or 74 must be set to 0 if the corresponding group size is 0.
%s: Unused Block Number must be set to 0	Block 46, 54, 62 or 70 must be set to 0 if the corresponding group size is 0.
<b>The following entries serve for Modbus RTU devices only.</b>	
AW: Only RTU command 16 is supported	Block 71 must be (Modbus function) 16 if used or 0 if unused.
AR: Only RTU commands 3 & 4 are supported	Block 63 must be (Modbus function) 3 or 4 if used or 0 if unused.
DW: Only RTU command 15 is supported	Block 55 must be (Modbus function) 15 if used or 0 if unused.

*Table A-2. Diagnostic Error Messages (continued)*

<b>Error Message Text</b>	<b>Explanation and Action</b>
DR: Only RTU commands 1 & 2 are supported	Block 47 must be (Modbus function) 1 or 2 if used or 0 if unused.
<b>The following entries serve both Modbus RTU and Allen-Bradley programmable controllers.</b>	
%s: Module Number Not Supported, must be 0	Block number 47, 55, 63 or 71 must be 0 for the selected Device Type.
%s: File Type Not Supported, must be 0	Block number 48, 56, 64 or 72 must be 0 for the selected Device Type.
%s: File Number Not Supported, must be 0	Block number 49, 57, 65 or 73 must be 0 for the selected Device Type.
<b>The following entries serve Allen-Bradley devices only.</b>	
%s: Context is out of range	Block number 47, 55, 63 or 71 is out of range. Refer to <b>PC Data Addressing</b> in Section 4, and <b>Allen-Bradley PLC 3</b> in Section 4.
%s: File Type is not supported	Block number 48, 56, 64 or 72 is out of range. Refer to <b>PC Data Addressing</b> in Section 4.
%s: File number is out of range	Block number 49, 57, 65 or 72 is out of range. Refer to <b>PC Data Addressing</b> in Section 4.
%s: Module Number is out of range	Block number 47, 55, 63 or 71 is out of range. Refer to <b>PC Data Addressing</b> in Section 4.

**STATUS MESSAGES**

**NOTE:** The text under **Explanation and Action** in Table A-3 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

*Table A-3. Status Messages*

<b>Message Text</b>	<b>Explanation and Action</b>
Communication Status of Programmable Controller is Good	No error. No action required.
Communication Status of Programmable Controller is Bad	PCC01 module cannot communicate with the PC device. Check device address (block 31, 32, 33) and device type (block 30) and ensure these accurately define your hardware.  <b>Note:</b> First, check to see if the Serial Communication Link Status is bad. If so, correcting it may take care of this error.
Serial Communication Link Status is Good	No error. PC device or interfacing device is communicating with the PCC01 module. No action required.
Serial Communication Link Status is Bad	PCC01 cannot communicate with the programmable controller or interposing device.  Check the PC port parameters (baud, parity, stop bits) defined in block 34.  Check the jumper settings on the termination unit or termination module.  Check if the cable is appropriate for this interface.  Check all relevant programmable controller or interposing device switch settings.  Ensure the cable is attached to printer port. For direct connect check the Communication Status of programmable controller.

**PC I/O BLOCK ERROR MESSAGES**

**NOTE:** The text under **Explanation and Action** in Table A-4 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

Under Message Text in Table A-4, %d refers to the block number in question.

*Table A-4. PC I/O Block Error Messages*

Message Text	Explanation and Action
AW: Block %d Not Present or Wrong Type	Block output within the analog write group range is not a real value type. Communication continues but this block output value is not available to source data for the group. The value read for this variable from the PC device during the initializing phase will be written back to the PC with every analog write transaction.
AR: Block %d Not Present or Wrong Type	Block within the analog read group range is not of an appropriate function code. Communication continues but the data received from the PC for this location is not written to any function block.
DW: Block %d Not Present or Wrong Type	Block output within the digital write group range is not a boolean value type. Communication continues but this block output value is not available to source data for the group. The value read for this variable from the PC device during the initializing phase will be written back to the PC with every digital write transaction.
DR: Block %d Not Present or Wrong Type	Block within the digital read group range is not of an appropriate function code. Communication continues but the data received from the PC for this location is not written to any function block.

**PCC01 GENERAL STATUS MESSAGES**

**NOTE:** The text under **Explanation and Action** in Table A-5 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

*Table A-5. PCC01 General Status Messages*

Message Text	Explanation and Action
PCC01 Rev "PCCVERTEXT" Startup	No error. Module put into execute or redundant module switch over has occurred.
Initializing Failed, Configuration Error	Configuration error. See other messages reported to identify the specific cause.
PCC01 is Initialized	No error. Normal startup message indicating that initialization was successful.
Error Trigger On	Message indicating the Error Trigger (block 36 output) is on. This block output is dependent on the user application block configuration. No specific action is taken in response to this indication.
Error Trigger Off	Message indicating the Error Trigger (block 36 output) is off. This block output is dependent on the user application block configuration. No specific action is taken in response to this indication.
Write Permissive On	Message indicating the Write Permissive (block 37 output) is on. This block output is dependent on the user application block configuration. When this block output is on, the PCC01 writes the write group PC I/O block output values to the PC device.
Write Permissive Off	Message indicating the Write Permissive (block 37 output) is off. This block output is dependent on the user application block configuration. When this block output is off, the PCC01 does not write the write group PC I/O block output values to the PC device.

*Table A-5. PCC01 General Status Messages*

<b>Message Text</b>	<b>Explanation and Action</b>
Bad Quality Trigger ON	Message indicating the PC Bad Quality Trigger Point (block 42 output) is on. This block output is dependent on the user application block configuration but is included to allow a bad quality condition detected in the PC logic to be passed via the block configuration to the PCC01 program. When this block output is on, the PCC01 assigns all read group PC I/O function block outputs bad quality.
Bad Quality Trigger OFF	Message indicating the PC Bad Quality Trigger Point (block 42 output) is off. This block output is dependent on the user application block configuration (see <b>Bad Quality Trigger ON</b> ). When this block output is off, the PCC01 assigns all read group PC I/O function block outputs good quality.

**MODBUS (RTU) SPECIFIC ERROR MESSAGES**

**NOTE:** The text under **Explanation and Action** in Table A-6 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

Under **Message Text** in Table A-6, %s refers to the Modbus reply message error code in question.

*Table A-6. Modbus (RTU) Specific Error Messages*

<b>Block 85 Value</b>	<b>Message Text</b>	<b>Explanation and Action</b>
N/A	CRC Error on Reply Data.	Reply message corrupted. Check the cable and connections. If problem persists, try decreasing baud rate.
0	Status good	No action required.
1	%s: Illegal Function	The Modbus function specified in block 47, 55, 63 or 71 is not supported by the PC device.
2	%s: Illegal Data Address	The memory or file address range, specified by the PC Memory or File Word Offset in block 50, 58, 66 or 74 and Group Size in block 51, 59, 67 or 75, not supported by the PC device.
3	%s: Illegal Data Value	Data in the command message is illegal for the memory or file addresses specified. Check function blocks 46 through 75 and the PC device configuration.
4	%s: Failure in Associated Device	Associated device in the programmable controller system has failed to respond to a message or an abortive message occurred. Check PC device.
5	%s: Acknowledge	PC device busy. Check PC device.
6	%s: Busy, Rejected Message	PC device too busy to accept command message. Check PC device.
7	%s: Nak-Negative Acknowledgement	Check PC device.
others	%s: Unknown RTU Reply Error Code	Undocumented error code. Check PC device.

**ALLEN-BRADLEY SPECIFIC ERROR MESSAGES**

**NOTE:** The text under *Explanation and Action* in Table A-7 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

Under *Message Text* in Table A-7, %s refers to the Allen-Bradley reply error code in question.

*Table A-7. Allen-Bradley Specific Error Messages*

Block 85 Value	Message Text	Explanation and Action
n/a	BCC	Checksum error. If problem persists decrease baud rate.
n/a	Reply long	Reply from PC device too long.
n/a	TNS	Wrong transaction number received with response from PC device.
n/a	Missing ACK	Response from PC device received without an Acknowledge.
n/a	CMD	Invalid reply from PLC. Check to see if PLC is transferring data to the PCC01. Make sure KF communication module is set to execute diagnostic messages.
n/a	Reply Wrong Length	Data returned is wrong size. Contact your local Elsag Bailey Service Center.
n/a	NAK Received	If problem persists decrease baud rate.
n/a	Retry Count Exceeded	Block 43 number of retries have unsuccessfully been tried.
n/a	Command Acknowledge Time Out	KF failed to recognize a command and did not reply. Check KF.
0	Status good	No error
1	%s: Destination Node Out of Buffer Space	KF error response. PC device is out of buffer space.
2	%s: Remote Node Does Not ACK Message	KF error response. PC device not responding.
3	%s: Duplicate Token Holder Detected	KF error response.
4	%s: Local Port is Disconnected	KF error response.
16	%s: Illegal Command or Format	Check PC type, block 30, 31 and 32.
32	%s: Host Has Problem and Will Not Communicate	Check PC device.
48	%s: Remote Node is Missing, Disconnected or Shut Down	Check PC address, block 31, 32 and 33, and highway connection between interposing module and the PC device. Also check PC device switch settings.
64	%s: Host Could Not Complete Function, Hardware Fault	Clear PC hardware fault.
80	%s: Addressing Problem or Memory Protect Rung	Address in command message is not accessible. Check Base Block Configuration and the PC device hardware switch settings.
96	%s: Function Disallowed, Command Protection Selection	Ensure PC device allows word range read and word range write commands.
112	%s: Processor is in Program Mode	Status of PC device.
128	%s: Compatibility Mode File, Communication Zone Problem	Check PC device.
144	%s: Remote Node Cannot buffer Command	Check PC device.

*Table A-7. Allen-Bradley Specific Error Messages (continued)*

<b>Block 85 Value</b>	<b>Message Text</b>	<b>Explanation and Action</b>
176	%s: Remote Node Problem Due to Download	Check PC device.
1001	%s: Error in Converting Block Address	Check PC device.
1002	%s: Less Levels Specified in Address than Required	Check PC device.
1003	%s: More Levels Specified in Address than Supported	Check PC device.
1004	%s: Symbol not Found	Check PC device.
1005	%s: Symbol is of Improper Format	Check PC device.
1006	%s: Address Doesn't Point to Something Usable	Check PC device.
1007	%s: File is Wrong Size	Group size is incorrect or file does not exist in PLC. Check function blocks 46 through 75 and PC device data areas.
1008	%s: Cannot complete command, situation has changed	Check PC device.
1009	%s: File is Too Large	Check PC device.
1010	%s: Transaction Size Plus Word Address is Too Large	Check function blocks 46 through 75. Check PC device.
1011	%s: Access Denied, Improper Privilege	Check PC device.
1012	%s: Condition Cannot be Generated - Resource Problem	Check PC device.
1013	%s: Condition already exists - Resource Problem	Check PC device.
1014	%s: Shut Down Could Not be Executed	Check PC device.
1015	%s: Requester Does Not Have Upload/Download Privilege	Check PC device.
1016	%s: Histogram Overflow	Check PC device.
1017	%s: Illegal Data Type	Check PC device.
1018	%s: Bad Parameter	Check PC device.
1019	%s: Address Reference Exists to Deleted Data Table	Check PC device.
others	%s: Unknown Allen-Bradley Reply Error Code	Check PC device.

**ALLEN-BRADLEY & MODBUS (RTU) COMMON ERROR MESSAGES**

**NOTE:** The text under *Explanation and Action* in Table A-8 refers to block numbers (30 through 99). Refer to **BASE BLOCK CONFIGURATION** in Section 4 for detail.

Under *Message Text* in Table A-8, %d refers to the command retry number.

*Table A-8. Allen-Bradley & Modbus (RTU) Common Error Messages*

<b>Message Text</b>	<b>Explanation and Action</b>
Command Reply From Programmable Controller Time Out.	PC device did not respond to the command within the allotted timeout period (function block 41). Check timeout period. Check all hardware connections with PC device. Check PC device.
Retrying Command, Retry #%d	Command sent to PC device is being retried after an error or a timeout. If retries are common look for timeout, CRC, BCC or CMD errors reports.

***PCC01 MODULE SERIAL PORT ERROR MESSAGES***

*Table A-9. PCC01 Module Serial Port Error Messages*

<b>Message Text</b>	<b>Explanation and Action</b>
Serial Port is Initialized	PCC01 communication ports have been initialized and are ready for communication with the PC device and the diagnostic terminal (if enabled).
Serial Port is Re-Initialized	A communication or port error occurred which caused the PCC01 module to re-initialize the ports in an attempt to clear the error. See other errors that caused this action to occur.
Error Occurred In Serial Port Write	If this error recurs, call your local Elsag Bailey Service Center.
Error Occurred In Serial Port Read	If this error recurs, call your local Elsag Bailey Service Center.
Communication Port Open Failure	If this error recurs, call your local Elsag Bailey Service Center.
Primary to backup switch over	Status message indicating that a switch over to the standby module has occurred.

---

## APPENDIX B - PROBLEM REPORT FORM

---

### *REPORTING A PROBLEM*

If a problem occurs with the IMPCC01 data link, please make a copy of this Problem Report - IMPCC01 form. Fill out the copy and mail it to:

Elsag Bailey (Canada) Inc.  
860 Harrington Court,  
Burlington, Ontario  
Canada  
L7N 3N4  
Att: Quality Assurance Manager

Many of the configuration, status and performance values can be read from the Base Block Configuration.

The programmable controller data is needed to verify the PCC01 module dipswitch and termination settings.

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## Elsag Bailey (Canada) Inc.

### PROBLEM REPORT - IMPCC01

DATE: \_\_\_\_\_

Customer Name:	IMPCC01 Serial No.:								
	Firmware Rev. No.:								
PC Device Type	PLC-2 _____ 584 _____	PLC-3 _____ 984 _____	PLC5/250 _____ Other _____						
Network									
Communication Adapter									
Protocol									
Modem Type									
PCC01 Module Switch Settings Note: 1=Open 0=Closed	SW3:	1	2	3	4	5	6	7	8
		___	___	___	___	___	___	___	___
	SW3:	1	2	3	4	5	6	7	8
		___	___	___	___	___	___	___	___
Termination Jumper Set- tings	Terminal Port:								
	Printer Port:								
Cable Description (pinout)	<b>End:</b>	<b>PCC01</b>	<b>PC</b>						
	Male/Female	M							
	No. of Pins	25							
	Connections	1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		20							
Programmable Controller Setup									
LED Code Note: 0=Off 1=On	LED:	1	2	3	4	5	6	7	8
		___	___	___	___	___	___	___	___

**Base Function Block Specifications**

PCC01 Program Segment Control			
15, S1:	15, S2:	15, S3:	15, S14:
Communication Common Parameters			
30:	34:	38:	42:
31:	35:	39:	43:
32:	36:	40:	
33:	37:	41:	
PC I/O Groups			
46:	54:	62:	70:
47:	55:	63:	71:
48:	56:	64:	72:
49:	57:	65:	73:
50:	58:	66:	74:
51:	59:	67:	75:
Status Blocks			
80:	83:	86:	
81:	84:	87:	
82:	85:	88:	
Recommended Second Segment Control Block			
100, S1:	100, S2:	100, S3:	100, S14:
Other Information			
Attach a printout (or a copy on floppy diskette) of the error log output to this report.			

# APPENDIX C - BASE FUNCTION BLOCK CONFIGURATION

## SPECIFICATION LEGAL RANGES

Table C-1. Base Function Block Specifications Legal Ranges

Description	BLK#	FC	Valid Range					Typical Value
			PLC2	PLC3	PLC5	PLC5250	RTU	
Exec	0	81	*1	*1	*1	*1	*1	*3
Segment Control Block	15 S2 S3	82	0.2 255	0.2 255	0.2 255	0.2 255	0.2 255	0.2 255
Type	30	51	1, 2	3	4	5	32,33,34, 48,49,64, 65,66	*3
Link Addr. (Only Data Highway II)	31	51	0 - 255	0 - 255	0 - 255	0 - 255	n/a	*3
Link Addr. (Non Data Highway II)	31	51	0	0	0	0	0	0
Node Addr. (Only Data Highway II)	32	51	0 - 254	0 - 254	0 - 254	0 - 254	n/a	*3
Node Addr. (Non Data Highway II)	32	51	0	0	0	0	0	0
Sta. Addr. (Only Data Highway II)	33	51	1	1	0 - 254	0 - 254	n/a	*3
Sta. Addr. (Non Data Highway II)	33	51	0 - 254	0 - 254	0 - 254	0 - 254	1 - 247	*3
PC Port Params.	34	51	*3	*3	*3	*3	*3	2825 *4
Diag. Port Params.	35	2	*3	*3	*3	*2	*3	2825 *4
Error Trigger Blk.	36	39	*2	*2	*2	*2	*2	*3
Write Perm.	37	39	*2	*2	*2	*2	*2	*3
Diag. Enable	38	50	0 or 1	0 or 1	0 or 1	0 or 1	0 or 1	0
Reg. Format	39	51	1 - 3	1 - 3	1 - 3	1 - 3	1 - 3	1
Max Cap.	40	51	50, 100, 150 or 200	50, 100, 150 or 200	50, 100, 150 or 200	50, 100, 150 or 200	50, 100, 150 or 200	200
Comm. Time Out	41	51	2000 - 10000	2000 - 10000	2000 - 10000	2000 - 10000	2000 - 10000	3000
Bad Qual. Trigger Blk.	42	39	*2	*2	*2	*2	*2	*3
Number of Retries	43	51	0 - 10	0 - 10	0 - 10	0 - 10	0 - 10	*3
<b>Digital Read Group</b>								
1st Blk.	46	51	100 - 9998	100 - 9998	100 - 9998	100 - 9998	100 - 9998	*3
Mod. # or Function #	47	51	0	0 - 15	0	0 - 4	1, 2	*3

*Table C-1. Base Function Block Specifications Legal Ranges (continued)*

Description	BLK#	FC	Valid Range					Typical Value
			PLC2	PLC3	PLC5	PLC5250	RTU	
File Type	48	51	0	1, 2, 5, 7, 8, 13	0	0, 1	0	*3
File No.	49	51	0	0 - 999	0 - 999	0 - 999	0	*3
Address	50	51	0 - 999	0 - 1999	0 - 1999	0 - 1999	0 - 32767	*3
Size	51	51	0 - 1024	0 - 1024	0 - 1024	0 - 1024	0 - 1024	*3
<b>Digital Write Group</b>								
1st Blk.	54	51	100 - 9998	100 - 9998	100 - 9998	100 - 9998	100 - 9998	*3
Mod. # or Function #	55	51	0	0 - 15	0	0 - 4	15	*3
File Type	56	51	0	1, 2, 5, 7, 8, 13	0	0, 1	0	*3
File No.	57	51	0	0 - 999	0 - 999	0 - 999	0	*3
Address	58	51	0 - 999	0 - 1999	0 - 1999	0 - 1999	0 - 32767	*3
Size	59	51	0 - 512	0 - 512	0 - 512	0 - 512	0 - 512	*3
<b>Analog Read Group</b>								
1st Blk.	62	51	100 - 9998	100 - 9998	100 - 9998	100 - 9998	100 - 9998	*3
Mod. # or Function #	63	51	0	0 - 15	0	0 - 4	3, 4	*3
File Type	64	51	0	1, 2, 5, 7, 8, 13	0	0, 1	0	*3
File No.	65	51	0	0 - 999	0 - 999	0 - 999	0	*3
Address	66	51	0 - 999	0 - 1999	0 - 1999	0 - 1999	0 - 32767	*3
Size	67	51	0 - 100	0 - 100	0 - 100	0 - 100	0 - 100	*3
<b>Analog Write Group</b>								
1st Blk.	70	51	100 - 9998	100 - 9998	100 - 9998	100 - 9998	100 - 9998	*3
Mod. # or Function #	71	51	0	0 - 15	0	0 - 4	16	*3
File Type	72	51	0	1, 2, 5, 7, 8, 13	0	0, 1	0	*3
File No.	73	51	0	0 - 999	0 - 999	0 - 999	0	*3
Address	74	51	0 - 999	0 - 1 999	0 - 1 999	0 - 1 999	0 - 32767	*3
Size	75	51	0 - 100	0 - 100	0 - 100	0 - 100	0 - 100	*3
<b>Status Outputs</b>								
Stats.	80	137	n/a	n/a	n/a	n/a	n/a	n/a
Blocks	84	137	n/a	n/a	n/a	n/a	n/a	n/a
	88	137	n/a	n/a	n/a	n/a	n/a	n/a
Invoke C	99	143	n/a	n/a	n/a	n/a	n/a	n/a
Segment Control Block	100	82						
	S2		>0.25	>0.25	>0.25	>0.25	>0.25	0.5
	S3		<255	<255	<255	<255	<255	0

**NOTES:**

1. See **Function Code Application** manual, I-E96-200.
2. User application function block configuration dependant. See **Critical PCC01 Configuration Run Time Considerations** in Section 4.

3. No typical value provided. Application dependant.
4. 2825 = 9600 baud, RTS/CTS normal, no parity, 8 data bits, 1 stop bit.

---

### **BASE FUNCTION BLOCK CONFIGURATION DRAWINGS**

The following drawings represent an example function block configuration. They include base blocks 0 through 100 but not the actual data I/O blocks. The data I/O blocks are included symbolically only to show **how** they may be implemented.

The configuration drawings represent or are equivalent to the EWSCAD configuration files included on the diskette supplied with the module.

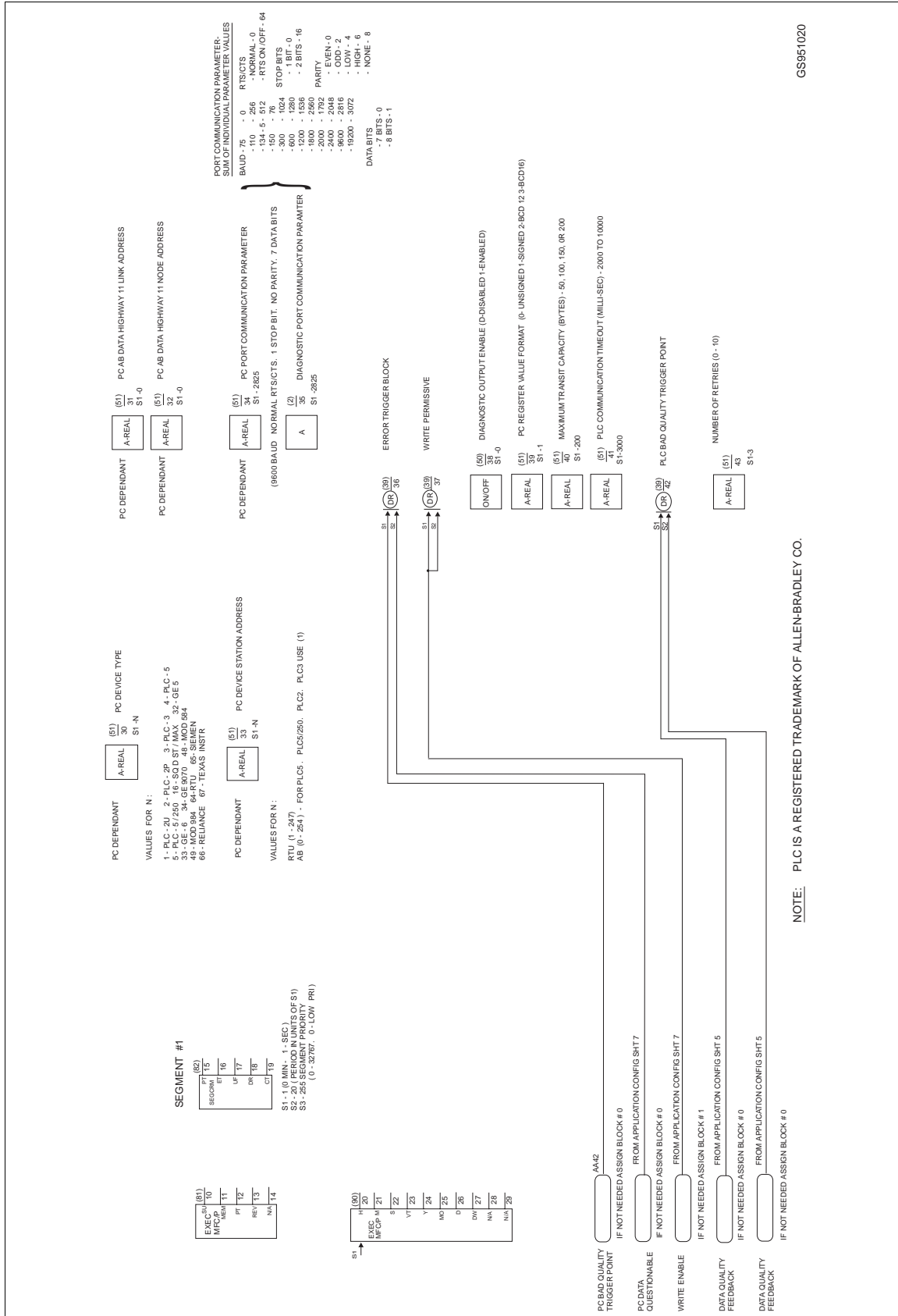


Figure C-1. Base Blocks 0 through 43, Communication Specifications

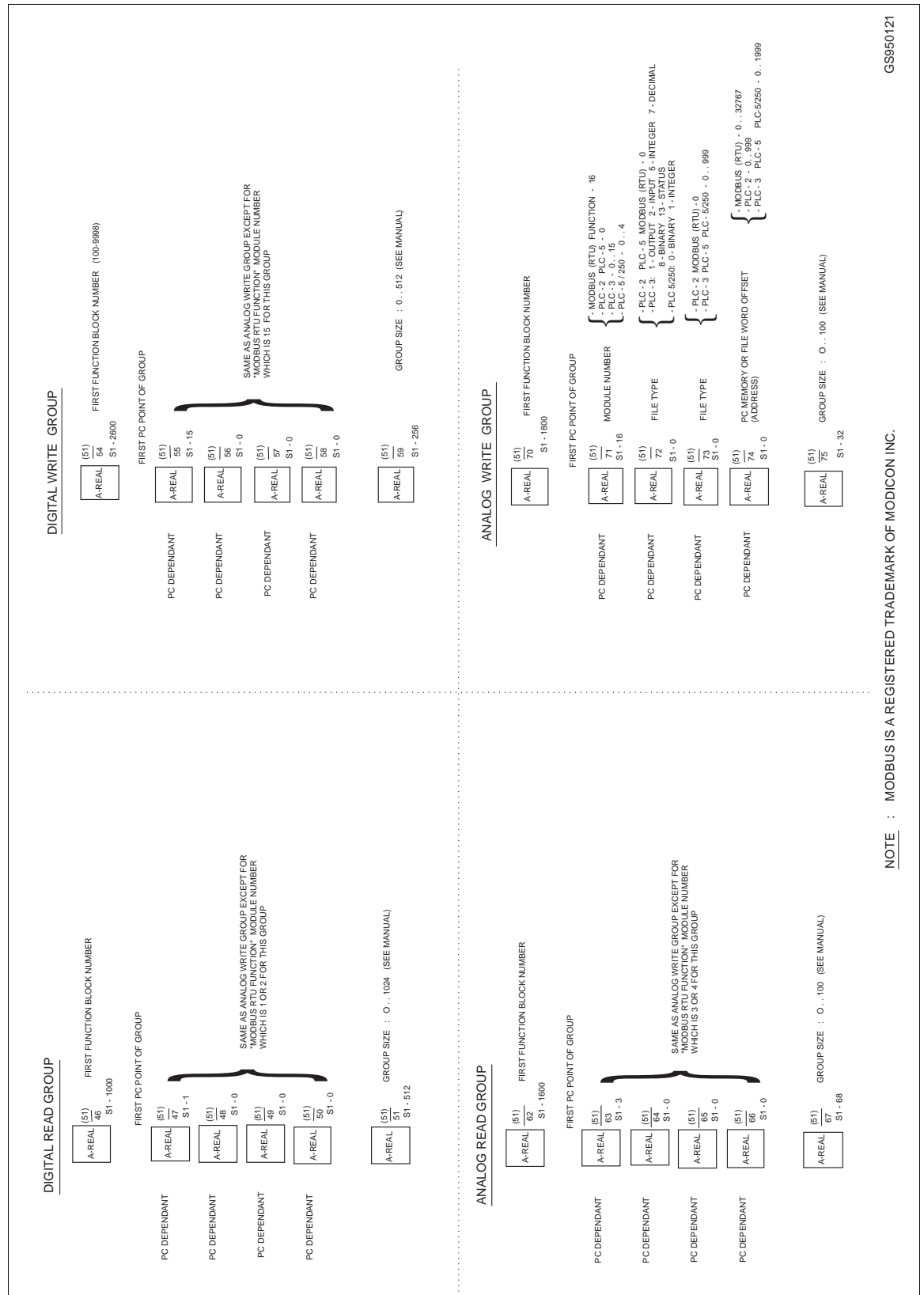


Figure C-2. Base Blocks 46 through 75, Data Groups

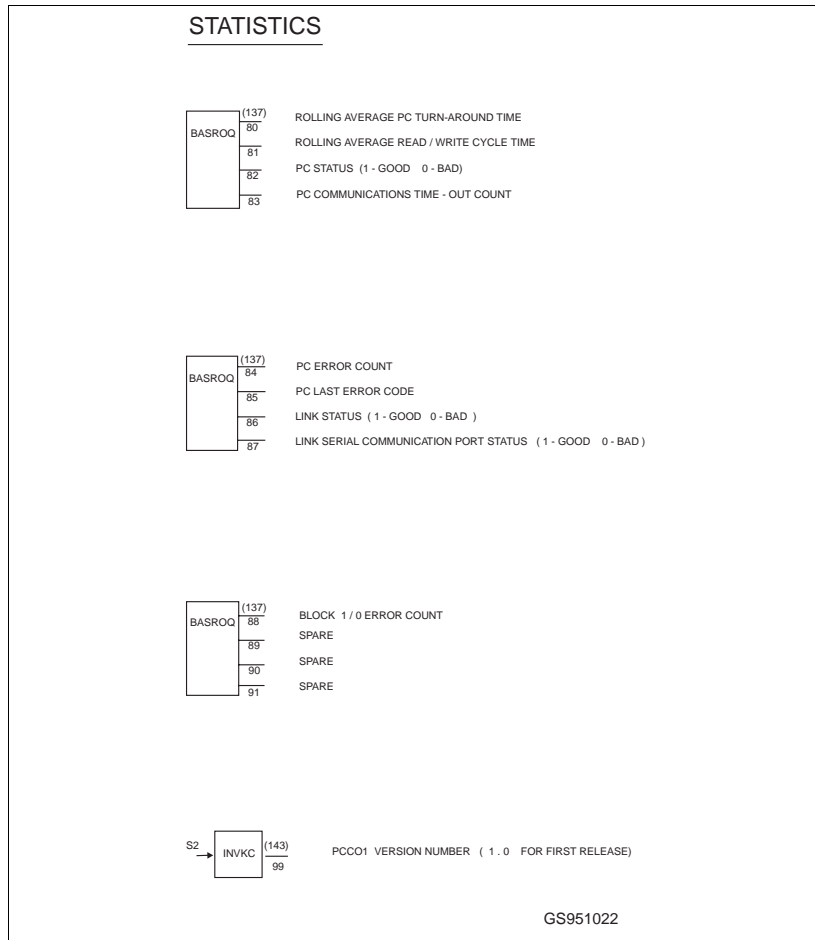


Figure C-3. Base Blocks 80 through 99, Statistics and Invoke C

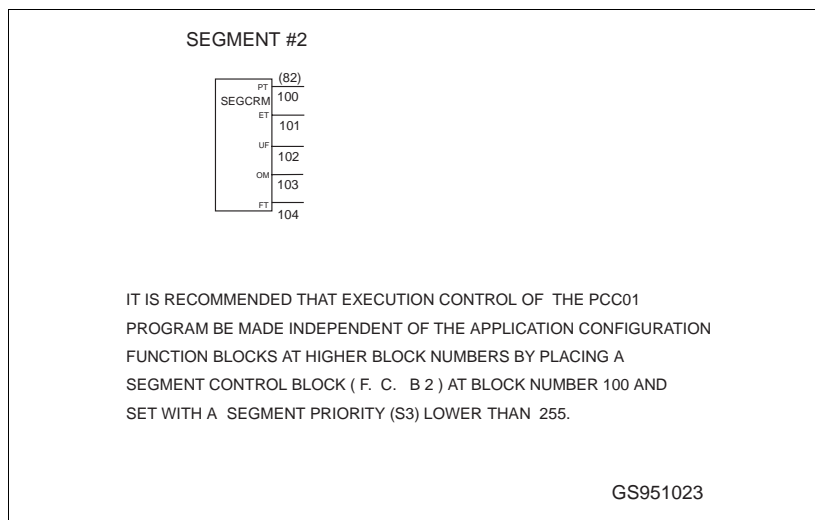
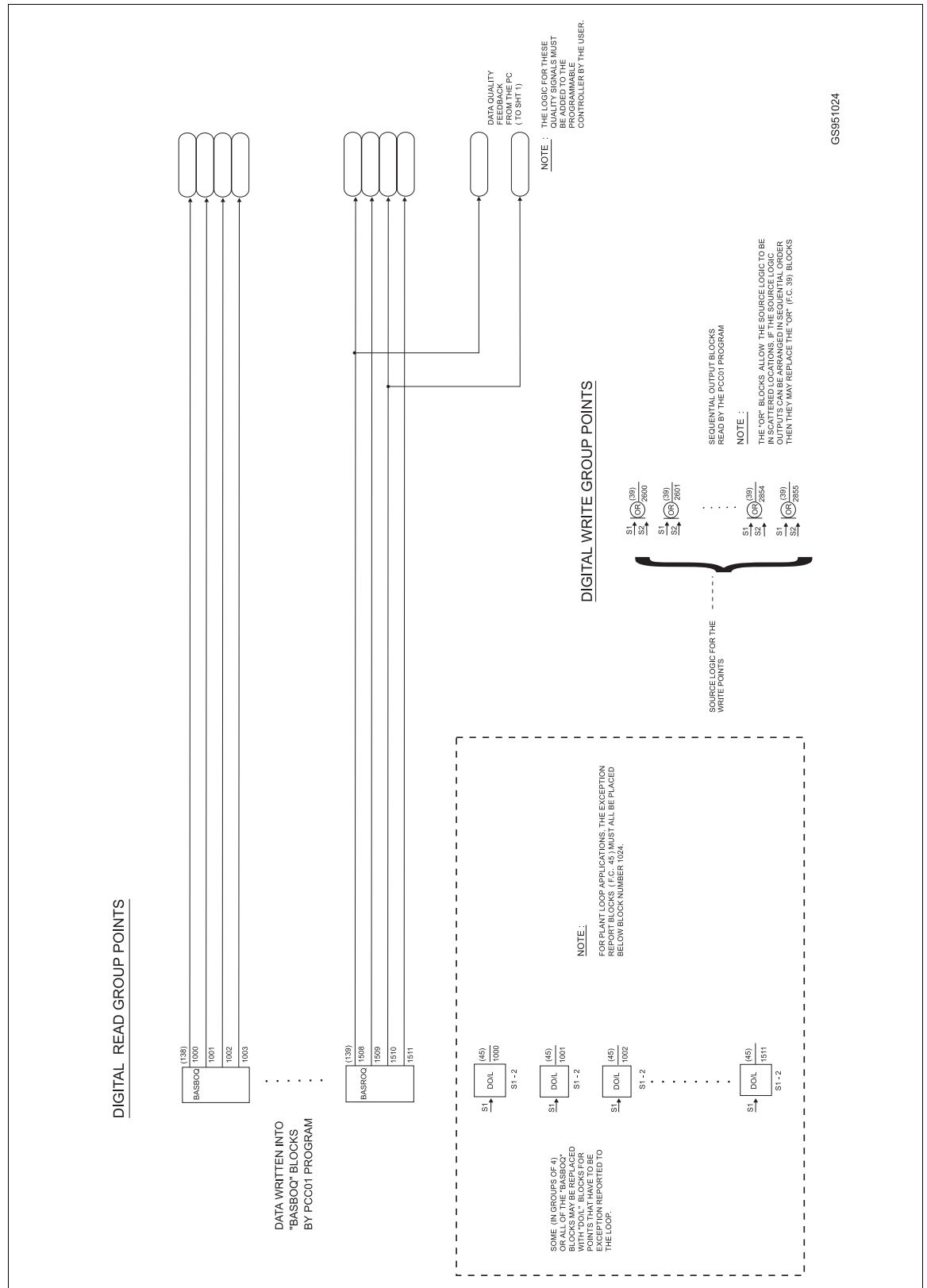
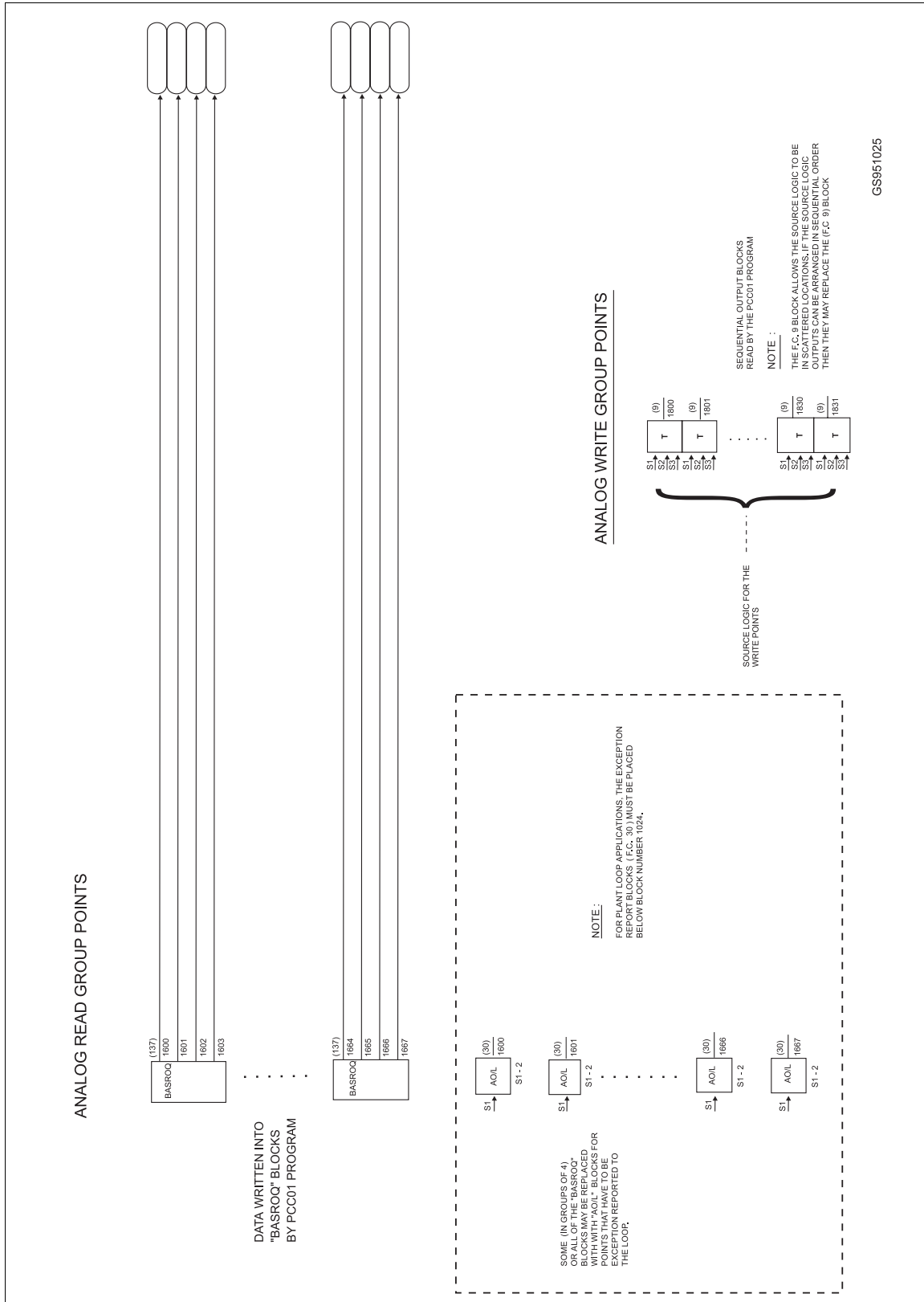


Figure C-4. Base Blocks 100, Recommended 2nd Segment Control Block



GS951024

Figure C-5. Digital Read and Write I/O Blocks Examples



GS951025

Figure C-6. Analog Read and Write I/O Blocks Examples

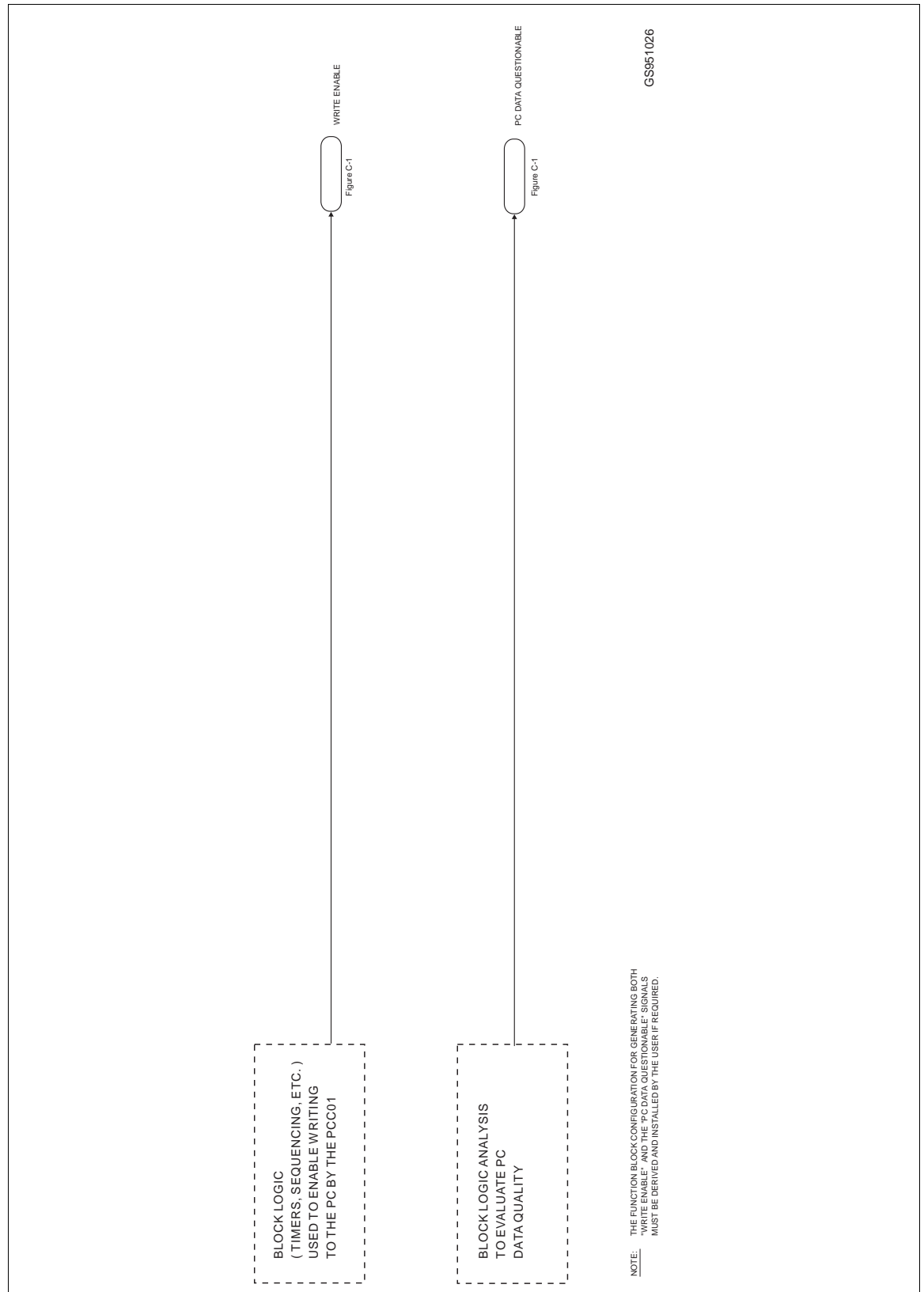


Figure C-7. Function Block Derived Write Enable and Data Quality



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# APPENDIX D - JUMPERS AND CABLE CONFIGURATIONS

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## *GENERAL INFORMATION*

Contained in this Appendix are some examples of jumper settings and cable assemblies. They do not contain jumper settings and cable assembly examples for every Programmable Controller supported by the IMPC01. Refer to manual **I-E96-428** for the NTMP01 and **I-E96-401** for the NIMP01/02 for details of the jumper settings and the RS-232 connector pinout.

ALLEN-BRADLEY SERIES B 1771-KG COMMUNICATION ADAPTER (1770-CG)

Table D-1. Allen-Bradley Series B 1771-KG Communication Adapter (1770-CG)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

Termination Termination Unit, NTMP01 (Printer Port).

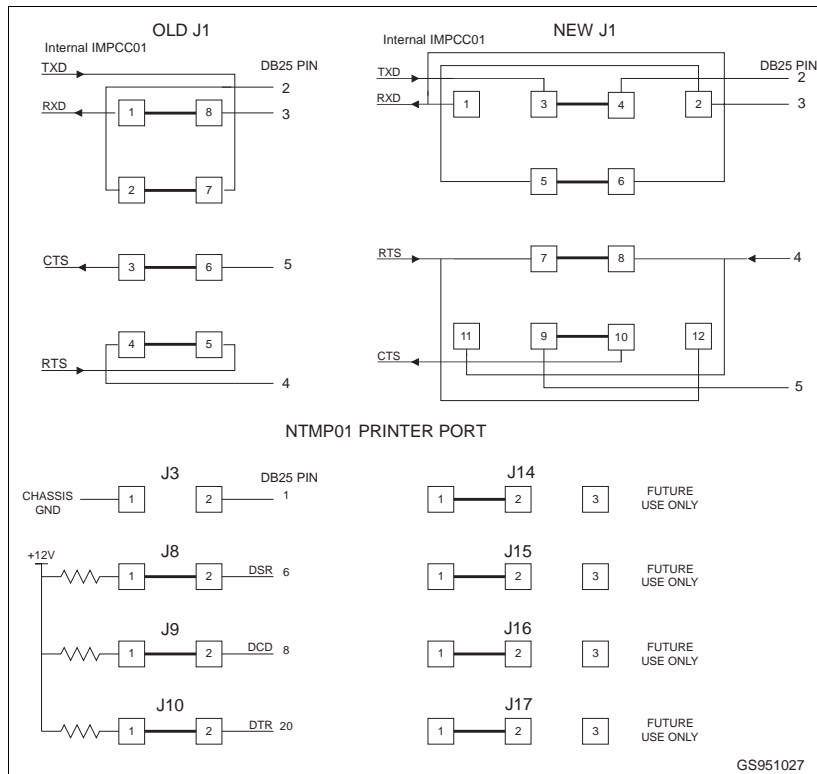


Figure D-1. Allen-Bradley 1771-KG Communication Adapter (1770-CG) Jumper Settings

Table D-2. Allen-Bradley 1771-KG Communication Adapter (1770-CG) Cabling

Cabling	Description	Comments
Connection (Direct or via Modems)	Direct	Crossed Over
Cable (Make and P/N or Custom)	Allen Bradley 1770-CG	

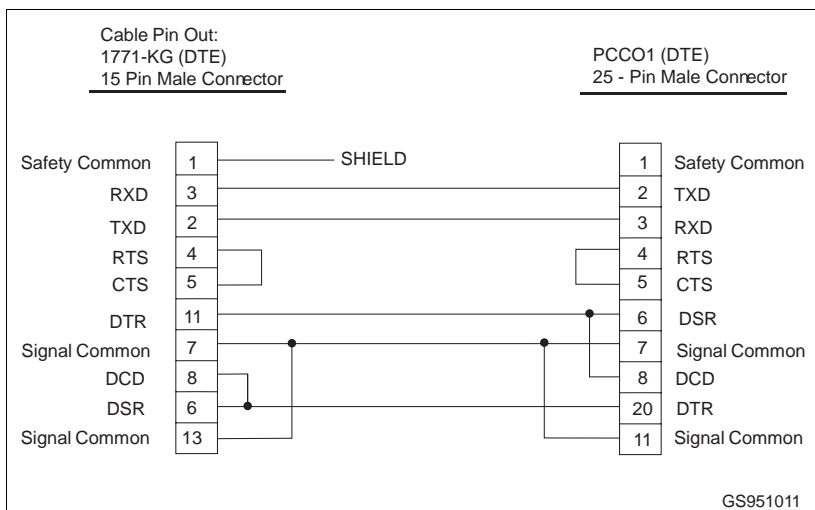


Figure D-2. Allen-Bradley 1771-KG Communication Adapter (1770-CG) Cabling

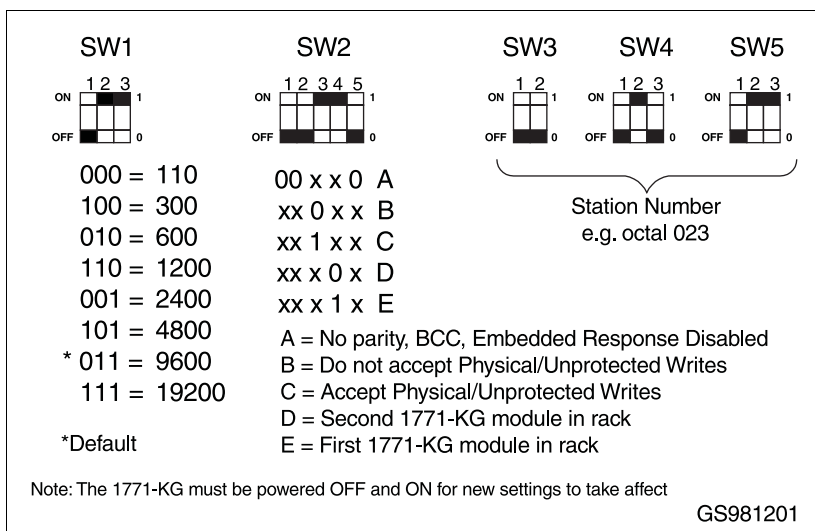


Figure D-3. Allen-Bradley Series B 1771-KG Typical Switch Setting

ALLEN-BRADLEY SERIES B 1771-KG COMMUNICATION ADAPTER (CUSTOM)

Table D-3. Allen-Bradley Series B 1771-KG Communication Adapter (Custom)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

Termination Termination Unit, NTMP01 (Printer Port).

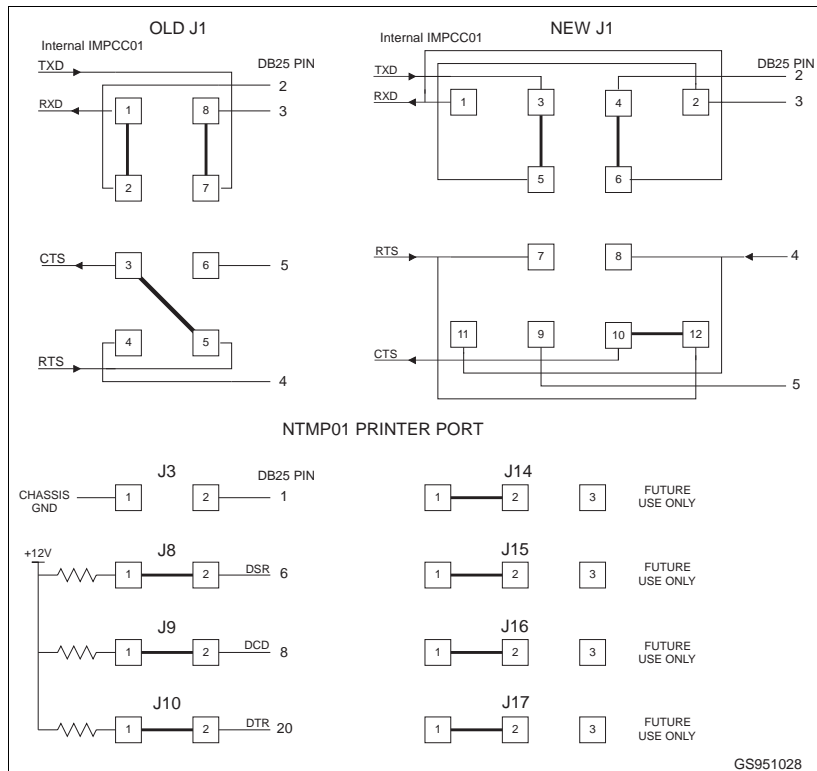


Figure D-4. Allen-Bradley 1771-KG Communication Adapter (Custom) Jumper Settings

Table D-4. Allen-Bradley 1771-KG Communication Adapter (Custom) Cabling

Cabling	Description	Comments
Connection (Direct or via Modems)	Direct	
Cable (Make and P/N or Custom)	Custom	

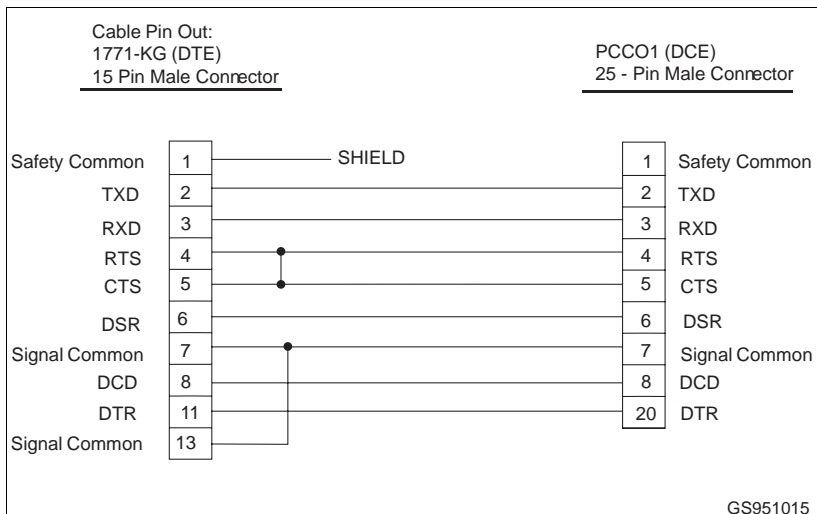


Figure D-5. Allen-Bradley 1771-KG Communication Adapter (Custom) Cabling

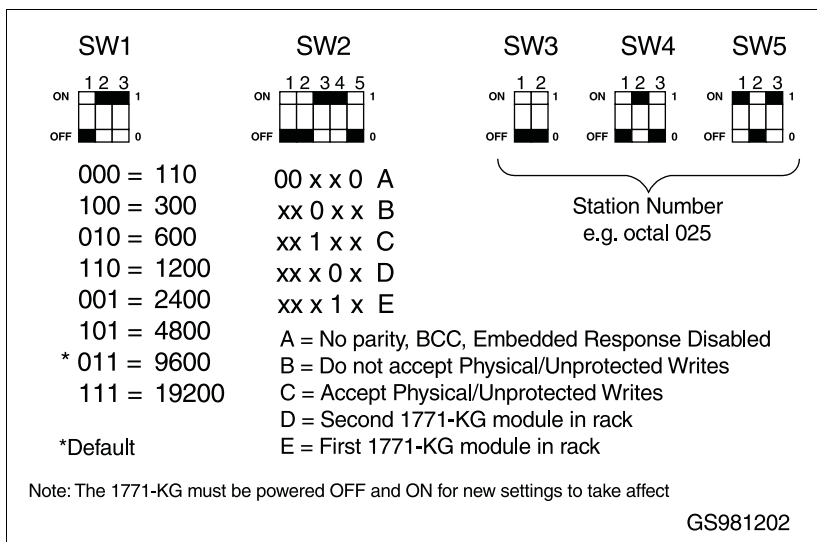


Figure D-6. Allen-Bradley 1771-KG Typical Switch Settings

ALLEN-BRADLEY 1770-KF2 COMMUNICATION ADAPTER

Table D-5. Allen-Bradley 1770-KF2 Communication Adapter

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

Termination Termination Unit, NTMP01 (Printer Port).

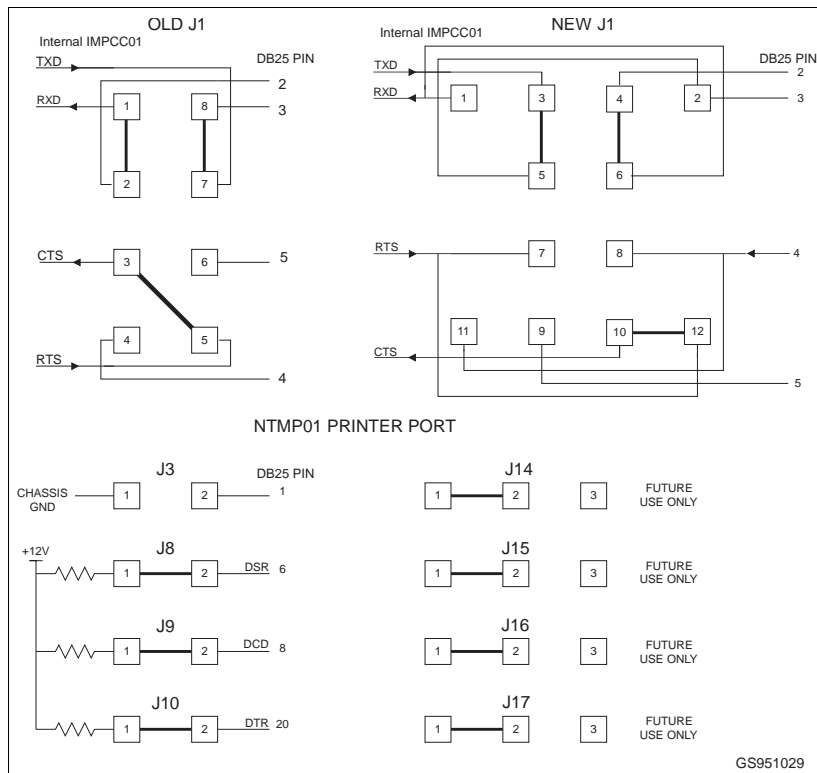


Figure D-7. Allen-Bradley 1770-KF2 Communication Adapter Jumper Settings

Table D-6. Allen-Bradley 1770-KF2 Communication Adapter Cabling

Cabling	Description	Comments
Connection (Direct or via Modems)	Direct	
Cable (Make and P/N or Custom)	Elsag Bailey P/N L700550A2	

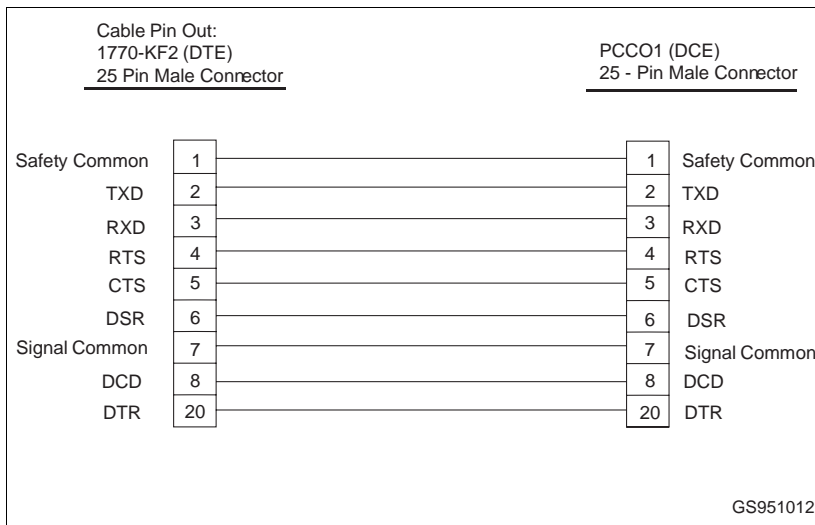


Figure D-8. Allen-Bradley 1770-KF2 Communication Adapter Cabling

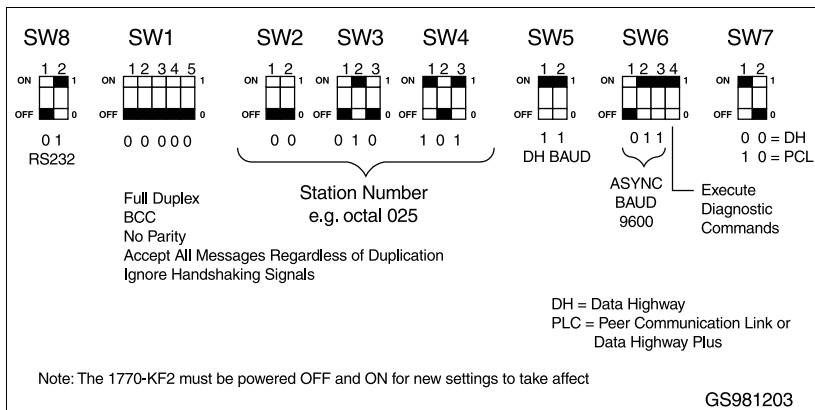


Figure D-9. Allen-Bradley 1770-KF2 Typical Switch Settings

MODICON 984/381 MODBUS PORT CONNECTION

Table D-7. Modicon 984/381 Modbus Port Connection

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	Even	Table 4.1 Value	0
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2817</u>

Termination Termination Unit, NIMP01/02 (Printer Port).

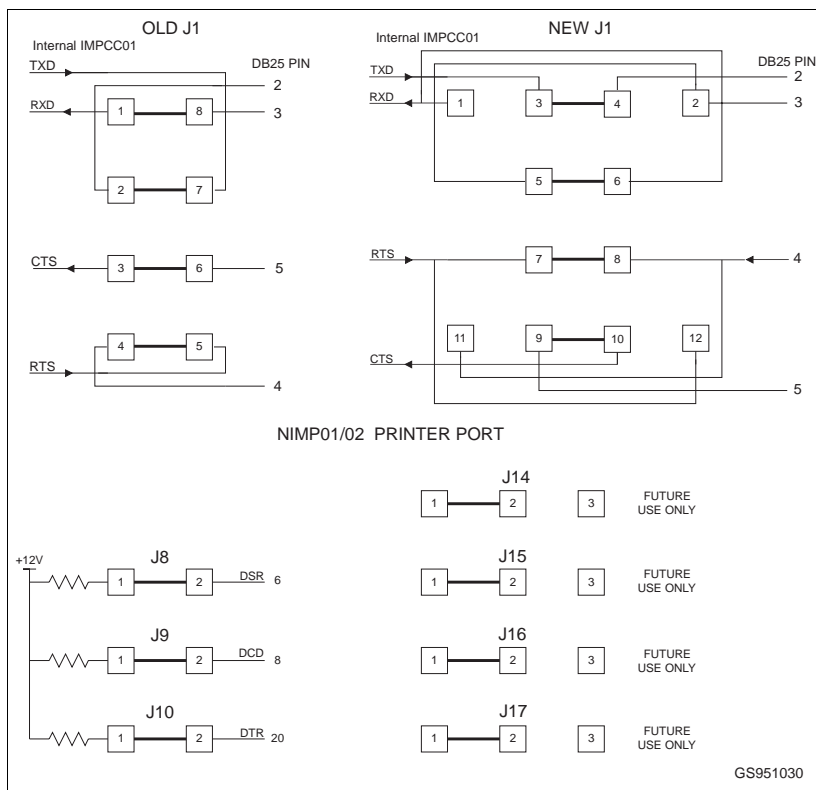
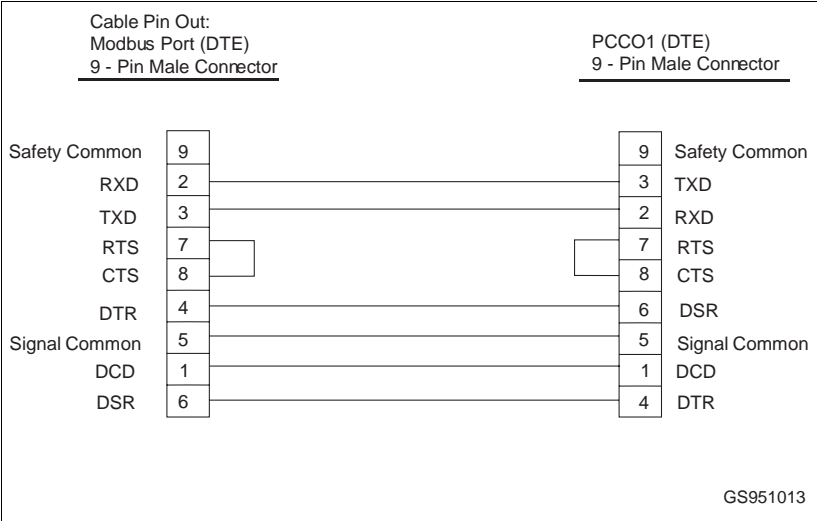


Figure D-10. Modicon 984/381 Modbus Port Connection Jumper Settings

*Table D-8. Modicon 984/381 Modbus Port Connection Cabling*

Cabling	Description	Comments
Connection (Direct or via Modems)	Direct	Crossed Over
Cable (Make and P/N or Custom)	Custom	



*Figure D-11. Modicon 984/381 Modbus Port Connection Cabling*

IBM PC WORKSTATION SERIAL PORT CONNECTION TO MONITOR PORT (NTMP01)

Table D-9. IBM PC Workstation Serial Port Connection to Monitor Port (NTMP01)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			2825

**Termination** Termination Unit, NTMP01 (Terminal Port).

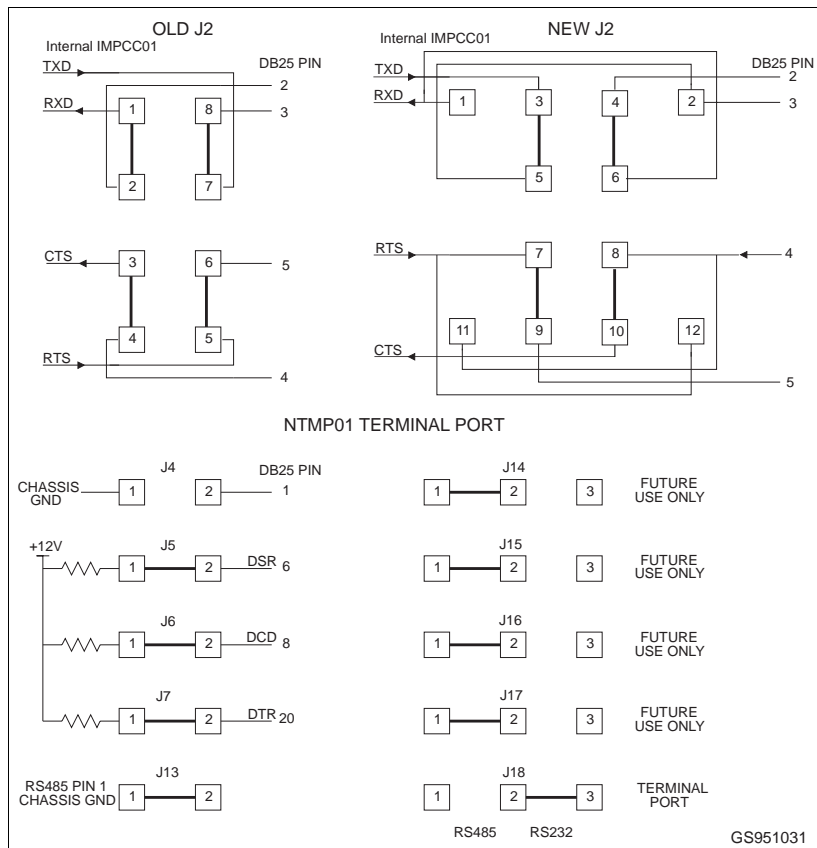
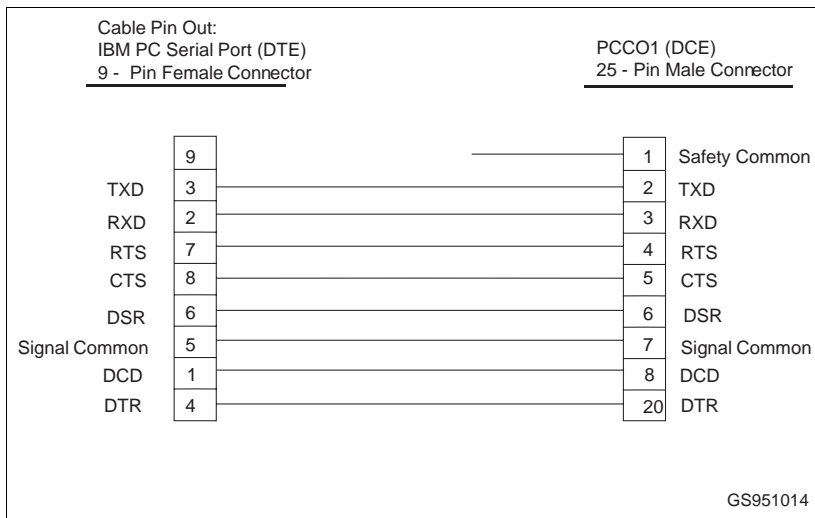


Figure D-12. IBM PC Serial Port Connection to Monitor Port (NTMP01) Jumper Settings

*Table D-10. IBM PC Workstation Serial Port Connection to Monitor Port (NTMP01) Cabling*

<b>Cabling</b>	<b>Description</b>	<b>Comments</b>
Connection (Direct or via Modems)	Direct	
Cable (Make and P/N or Custom)	Elsag Bailey P/N L700579A1	



*Figure D-13. IBM PC Workstation Serial Port Connection to Monitor Port (NTMP01) Cabling*

IBM PC WORKSTATION SERIAL PORT CONNECTION TO MONITOR PORT (NIMP01/02)

Table D-11. IBM PC Workstation Serial Port Connection To Monitor Port (NIMP01/02)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

Termination Termination Unit, NIMP01/02 (Terminal Port).

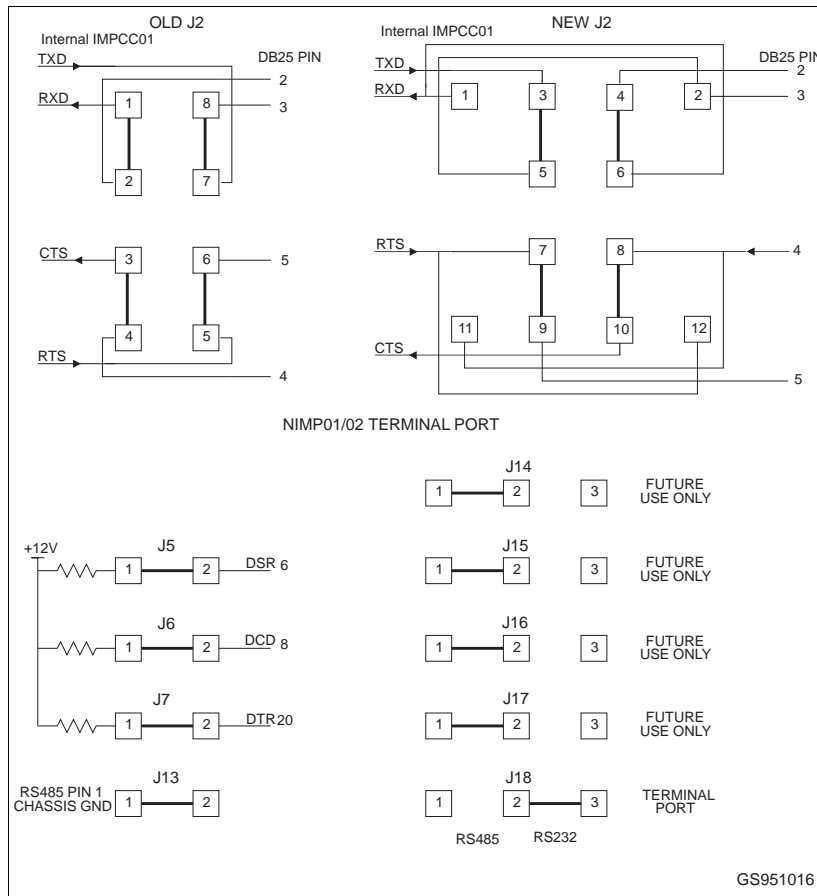
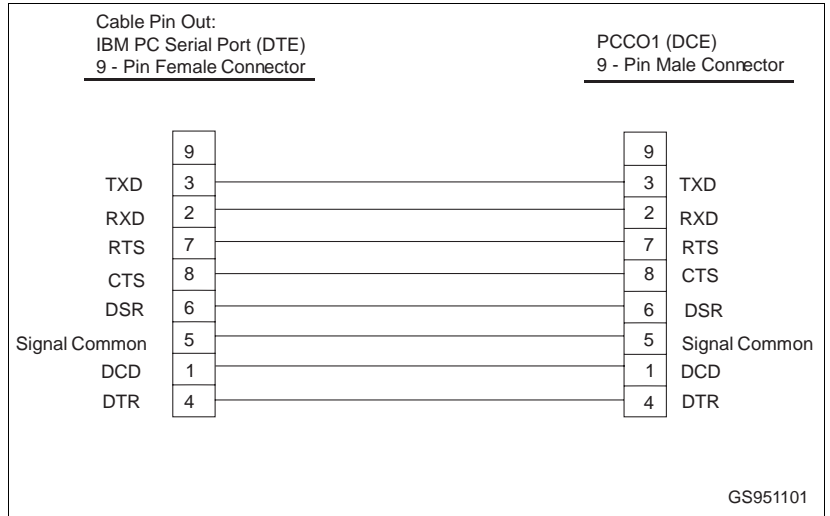


Figure D-14. IBM PC Workstation Serial Port Connection to Monitor Port (NIMP01/02) Jumper Settings

*Table D-12. IBM PC Workstation Serial Port Connection to Monitor Port (NIMP01/02) Cabling*

<b>Cabling</b>	<b>Description</b>	<b>Comments</b>
Connection (Direct or via Modems)	Direct	
Cable (Make and P/N or Custom)	Elsag Bailey P/N L700579E4	



*Figure D-15. IBM PC Workstation Serial Port Connection to Monitor Port (NIMP01/02) Cabling*

TELEPHONE MODEM CONNECTION TO MONITOR PORT (REMOTE MONITORING)

Table D-13. Telephone Modem Connection To Monitor Port (Remote Monitoring)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

Termination Termination Unit, NTMP01 (Terminal Port).

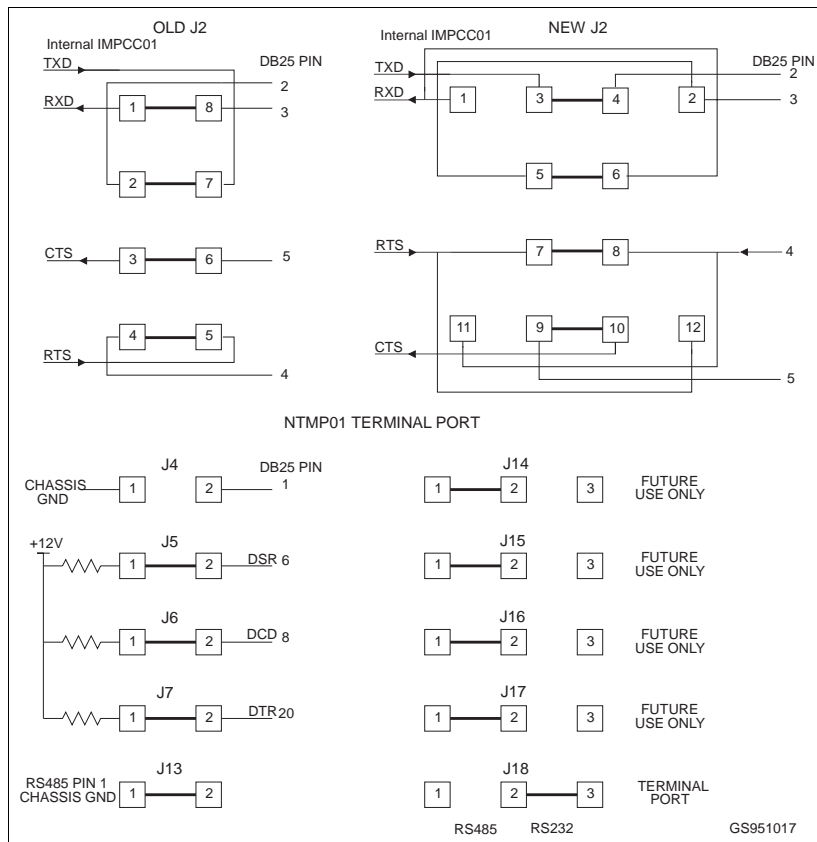
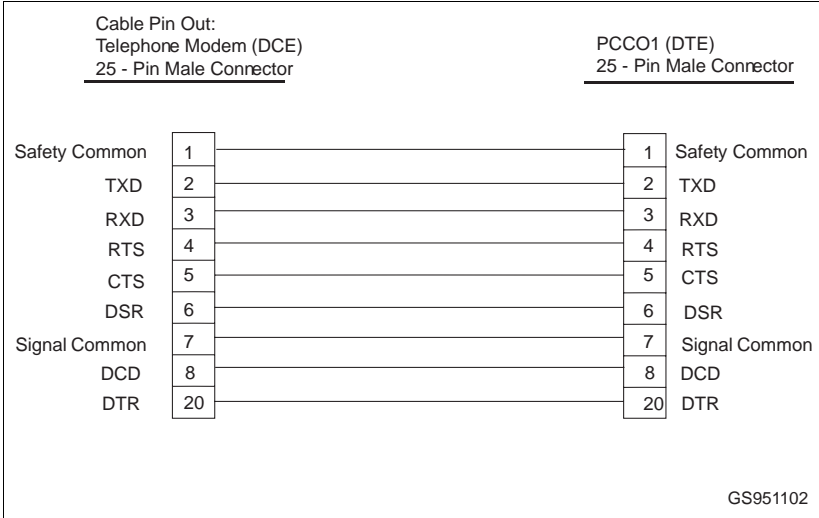


Figure D-16. Telephone Modem Connection to Monitor Port (Remote Monitoring) Jumper Settings

*Table D-14. Telephone Modem Connection to Monitor Port  
(Remote Monitoring) Cabling*

<b>Cabling</b>	<b>Description</b>	<b>Comments</b>
Connection (Direct or via Modems)	Direct	Cable connects PCC01 Monitor Port to a local (site) telephone modem.
Cable (Make and P/N or Custom)	Elsag Bailey L700550A2	



*Figure D-17. Telephone Modem Connection to Monitor Port  
(Remote Monitoring) Cabling*

ALLEN-BRADLEY 1771-KG COMMUNICATION ADAPTER (MODEM)

Table D-15. Allen-Bradley 1771-KG Communication Adapter (Modem)

Baud Rate	9600	Table 4.1 Value	2816
RTS/CTS	Normal	Table 4.1 Value	0
Stop Bits	1	Table 4.1 Value	0
Parity	None	Table 4.1 Value	8
Data Bits	8	Table 4.1 Value	1
Block 34 Specification Total Value			<u>2825</u>

**Termination** Termination Unit, NTMP01 (Printer Port).

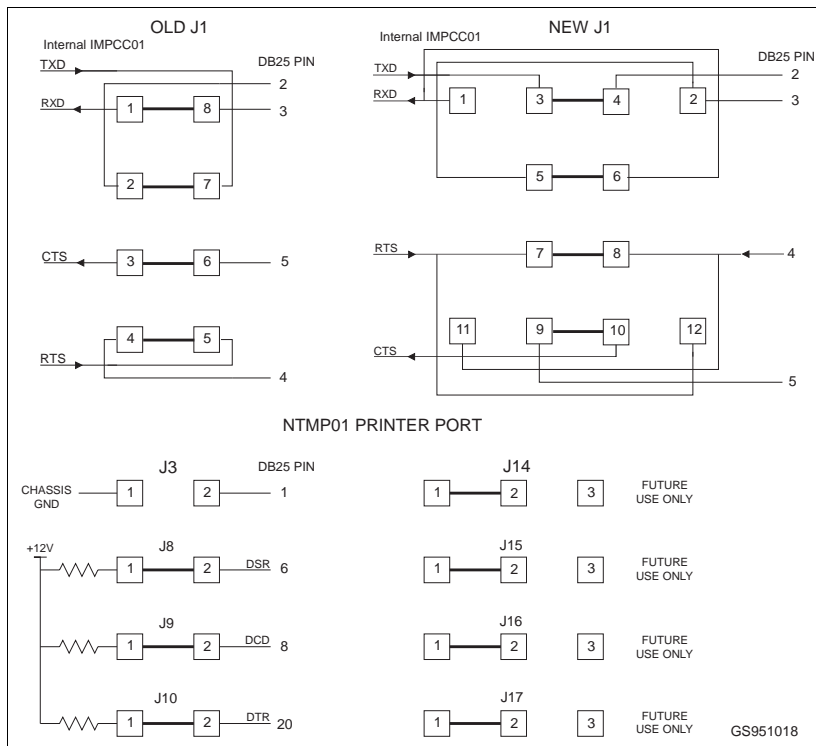


Figure D-18. Allen-Bradley 1771-KG Communication Adapter (Modem) Jumper Settings

Table D-16. Allen-Bradley 1771-KG Communication Adapter (Modem) Cabling

Cabling	Description	Comments
Connection (Direct or via Modems)	via Modems	The modems are powered individually via the RS232 handshake signals.
Cable (Make and P/N or Custom)	IMPCCO1 to Modems: EBI (Elsag Bailey) L700550A1  Modems to 1771-KG Allen-Bradley 1770-CG	1771-KG: DTR, DCD and DSR  IMPCCO1: RTS, CTS, DTR, DCD, and DSR  At least one of the handshake signals to each modem must be high.

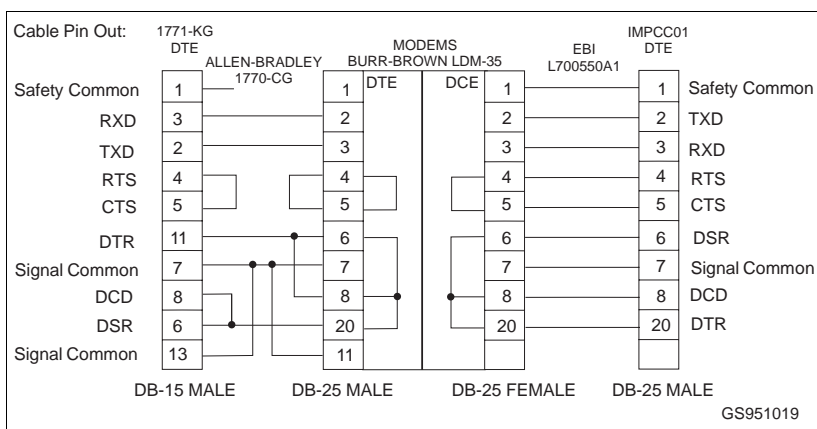


Figure D-19. Allen-Bradley 1771-KG Communication Adapter (Modem) Cabling



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