Technical Bulletin

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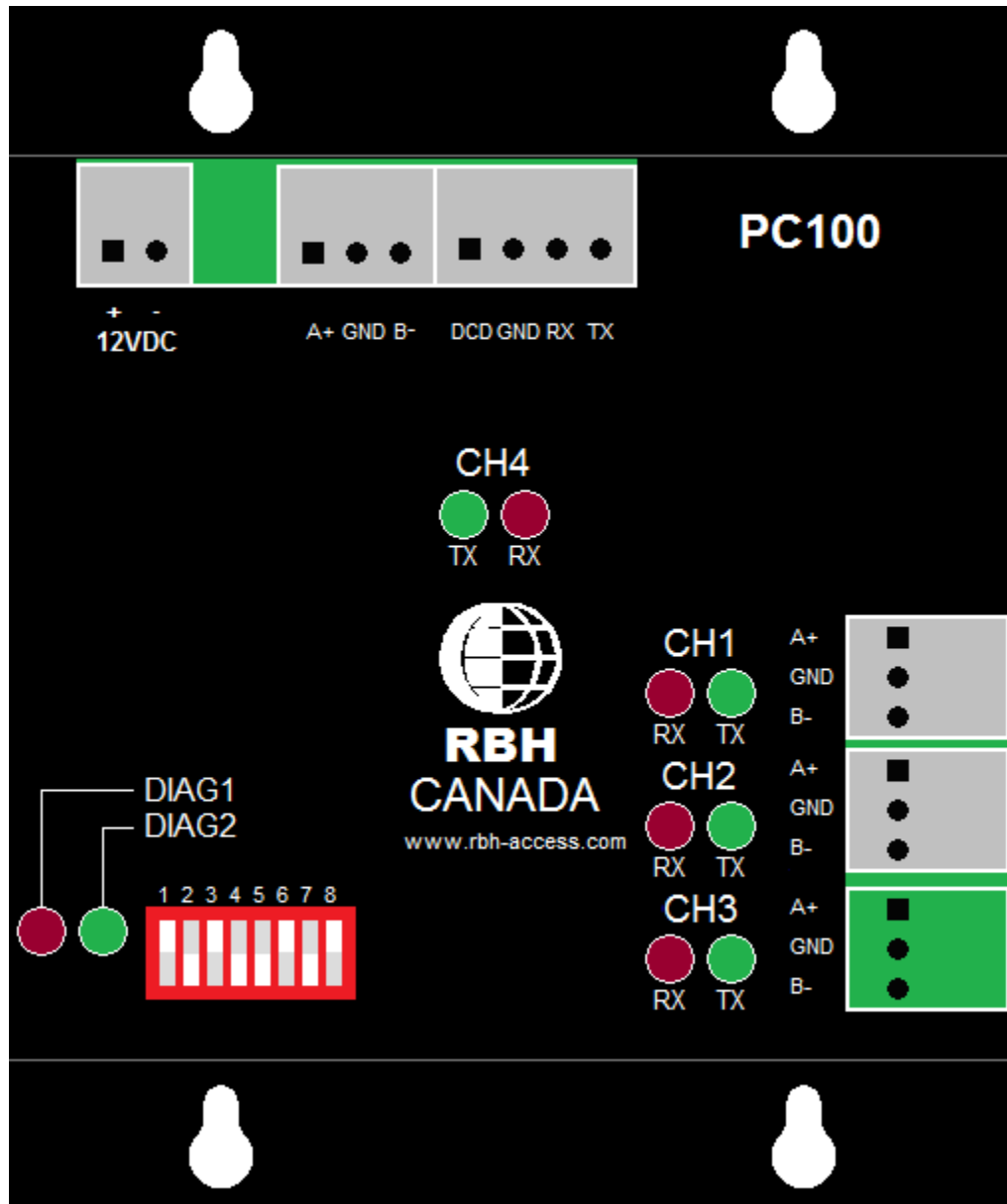
Number: 61   **PC-100 for AxiomV™**

Table of Contents

The PC-100 communications interface can be used for a number of different applications.

PC-100s can be used to interface alarm panels with the AxiomV™ system. Paradox panels and a couple of DSC panels can be interfaced this way. Wavetrend long range readers are also interfaced to the AxiomV™ with the PC-100.

Wiring
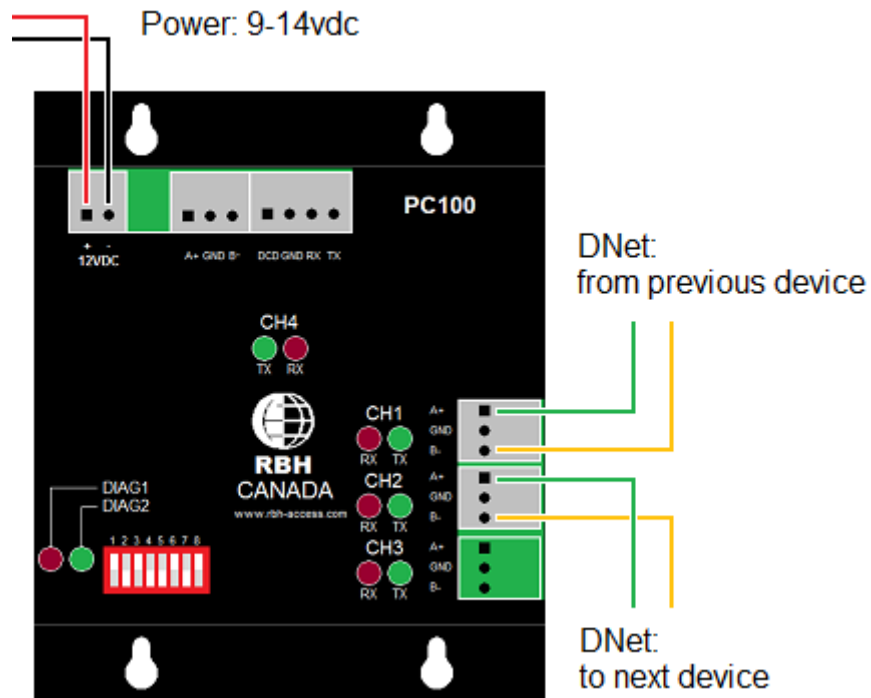
The PC-100 connects to the NC-100 through the DNet, as does all devices. Into channel 1 and out from channel 2.

Power:

9-14vdc @ 150ma

LEDs

DIAG1 – Interface status

DIAG2 – Axiom status:

Communication Channel LEDs – Each communication channel has a green transmit LED and a red receive LED.

Normally flashing at a rate of once a second, DIAG2 will flash twice as fast if the unit is offline with the Axiom Device network.

Virtual IOC Emulator

With firmware version VIOC8 the PC-100 is used to emulate IOC-16 controllers. One PC-100 can emulate from one to sixteen IOC-16 panels. Some alarm panels (the host) can use this version as a general means to interface with the Axiom system.

The emulated IOC16s act as inputs to the network and will present the various states and configurations that a normal IOC16 would do. If configured as an input, commands sent through the host channel will generate messages into the Axiom system. If configured as an output, output control messages will be sent to the host from the Axiom system. A simple protocol has been designed that allows foreign vendors an opportunity to interface to the Axiom Access Control System by messages to the RS232 or RS485 port on the PC100.

DIP-Switch Settings

The Axiom Access Control System starts its IOC addresses at address 5 and can support up to sixteen devices ending at address 20. To make the DIP-switches capable of selecting the range of addresses to which the emulator will respond, an offset address scheme has been developed. The first four switches create the start offset and the last four switches create the end offset. **Desired Address = DIP address + 5**. The device when polled will answer any address that falls between the desired start and end addresses (inclusive). If the end address is smaller than (or equal to) the start address only the start address will be used.

DIP-Switch Selection Table (0 = off, 1 = on)

Start				Desired	End			
S1	S2	S3	S4	Address	S5	S6	S7	S8
0	0	0	0	5	0	0	0	0
1	0	0	0	6	1	0	0	0
0	1	0	0	7	0	1	0	0
1	1	0	0	8	1	1	0	0
0	0	1	0	9	0	0	1	0
1	0	1	0	10	1	0	1	0
0	1	1	0	11	0	1	1	0
1	1	1	0	12	1	1	1	0
0	0	0	1	13	0	0	0	1
1	0	0	1	14	1	0	0	1
0	1	0	1	15	0	1	0	1
1	1	0	1	16	1	1	0	1
0	0	1	1	17	0	0	1	1
1	0	1	1	18	1	0	1	1
0	1	1	1	19	0	1	1	1
1	1	1	1	20	1	1	1	1

Protocol

The protocol is ASCII based C/R delimited with fixed length.

Input Protocol

Whenever the host issues an input command it uses the following protocol. Input messages start with fixed text 'RBH' which is followed by the appropriate point number, followed then by the numeric value for the correct state, and ends with a C/R (carriage return).

Fixed Text	Point Number	State	Fixed Text
	001-256	0 = Restore 1 = Alarm 2 = Trouble 3 = Illegal	C/R
RBH	nnn	s	(0x0d)

A change in state will cause an appropriate log message to be transferred to the Axiom Access Control System. When an input is armed by the Axiom System only alarm and restore messages are available. Virtual Inputs have all the same software features as regular inputs. This includes links, operator commands, and schedules (the only programming that is irrelevant is *circuit type*).

Available Events

State Value	Armed	Disarmed
0	Restore	Normal
1	Alarm	Abnormal
2	Alarm	Trouble
3	Alarm	Illegal

Output Protocol

Whenever the NC100 issues a command to turn on or off an output the host will transmit a message using the following protocol to keep the Axiom system's status up to date.

Fixed Text	Point Number	State	Fixed Text
	001-256	0 = Off 1 = On	C/R
Out	nnn	s	(0x0d)

Virtual Outputs have all the same software features as regular outputs. This includes links, operator commands, and schedules (the only programming that is irrelevant is *on state*).

Point Number

Point numbers are translated into panel IDs and input IDs through a fixed table. Each point can be programmed as either an input or an output. Event messages will only be sent for those panels whose addresses are within the parameters defined by the address DIP-switches.

		P	**a**	**n**	**e**	**l**		**A**	**d**	**d**	**r**	**e**	**s**	**s**			
		5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	1	1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241
	2	2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242
	3	3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243
P	**4**	4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244
O	**5**	5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245
I	**6**	6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246
N	**7**	7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247
T	**8**	8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248
	9	9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249
I	**10**	10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250
D	**11**	11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251
	12	12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252
	13	13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253
	14	14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254
	15	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
	16	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256

Examples

1. RBH1561 C/R   = Input #12 on panel address #14 has gone into alarm.
2. RBH1030 C/R   = Input #7 on panel address #11 has restored.
3. OUT1811 C/R   = Output #5 on panel address #16 has turned on.
4. OUT0440 C/R   = Output #12 on panel address #7 has turned off.

Firmware Upgrade

It is anticipated that the protocol will change according to manufacturer requirements. A method of upgrading firmware for this purpose is available in the latest version of Axiom software (Service Pack 5 [5.2.14] 5-Apr-07). By selecting only one of the emulated IOC16s for a device firmware upgrade the firmware will be overwritten with a selected RBH file.

It takes approximately two minutes for the upgrade to be completed.

Be sure to use the proper firmware file when upgrading a virtual IOC board. A regular IOC firmware file will not work in a virtual IOC (and vice versa). If this does happen the only way to correct the situation will be to replace the firmware chip.

Paradox Alarm Panel Interface

This interface is designed to work with Digiplex EVO48 and EVO192 Alarm panels manufactured by Paradox Security Systems. The protocol used for this interface is the ASCII protocol designed for home automation. In order to use the protocol an APR-PRT3 module must be installed and programmed into the alarm panel.

The PC100 is used as a bridge between the Axiom Access Control System and the APR-PRT3 interface for the Paradox alarm panel. To achieve this functionality the PC100 emulates eight Safesuite™ keypads and up to eight sequentially addressed IOC's.

Axiom Safesuite™ Address	Paradox Partition Address
101	1
102	2
103	3
104	4
105	5
106	6
107	7
108	8

Whenever a partition is armed or disarmed by the Paradox system the corresponding Safesuite™ keypad will display the status. For example if keypad number 102 reports that it is disarmed it really means that Partition 2 has been disarmed.

For a Simple Set-up

The Safesuite™ keypads have 8 zones assigned to each keypad. Whenever an alarm message is sent from the alarm panel it gets translated into two messages:

1. A keypad alarm message.
2. An IOC-16 input change message.

The keypad zone alarm message doesn't accurately reflect the actual input address but instead translates the zone number into a modulo –8 value. See table below.

Keypad Zone	Actual Input	Actual Input	Actual Input
1	1	9	17
2	2	10	18
3	3	11	19
4	4	12	20
5	5	13	21
6	6	14	22
7	7	15	23
8	8	16	24

As long as each area has eight or less nine inputs and every area begins with a modulo –8 value (1, 9, 17, etc) the Keypad Zone Alarm will reflect the input number for the area.

For more complex Installations

For installations where there are more than eight zones per partition the virtual IOC's will reflect the input status. Using Links to arm or disarm a group of inputs allows the virtual IOC's the capability of reporting the Paradox panel's inputs correctly. For inputs used for entering and exiting as well as follower style inputs use an abort delay to prevent an invalid alarm message. Using an input group assigned to a virtual keypad allows the software the capability of assigning any number of inputs to each virtual keypad.

To truly reflect the input status of the Paradox alarm panel four links must be added to the keypad configuration.

Axiom Link	Paradox Type	Link Function
Disarm	Disarm	Disarm all inputs except for Fire and 24 hour types of inputs.
Home	Stay	Arm all inputs except for interior, entry and exit zones.
Evening	Night	Arm all inputs except for interior night zones.
Away	Away	Arm all inputs.

IOC Setup

Determine the number of IOC's needed to reflect the number of inputs in the alarm panel. Add these IOC's starting from address #5 and make them all inputs. Inputs that are used for entry and exit should be given an abort delay to prevent false alarms. A link may be given to the entry zone to disarm the follower zone when abnormal.

Input Groups

Create input groups by assigning the associated IOC inputs with partitions

There should be three groups of inputs for every partition:

1) Interior zones.

2) Exterior zones.

3) Entry zones.

Axiom Links

Create four links for every partition.

1) Disarm Link – Disarm Interior, Disarm Exterior, Disarm Entry.

2) Home Link – Disarm Interior, Arm Exterior, Disarm Entry.

3) Evening Link – Disarm Interior, Arm Exterior, Arm Entry.

4) Away Link – Arm Interior, Arm Exterior, Arm Entry.

In order to synchronize the Paradox Alarm Panel with the Axiom Access Control the Paradox inputs are mapped to virtual IOC-16 using the first eight panels on the point number table above.

For example, Paradox panel input #88 would be mapped to IOC address #10 input #8. This input would be located in one of eight partitions in the Paradox panel programmed through the Paradox keypad.

Dipswitch Setting

To allocate a block of IOC addresses for use by the Paradox alarm panel you must first determine how many inputs you will need. For example if you need to monitor the first 64 inputs you will need 64÷16 (inputs per IOC) = 4 IOC's. The first IOC address will be # 5 representing inputs 1-16 and the last IOC address will be #8 representing inputs 49-64. Use the above DIP Switch Selection table to determine the dipswitch settings.

Connections
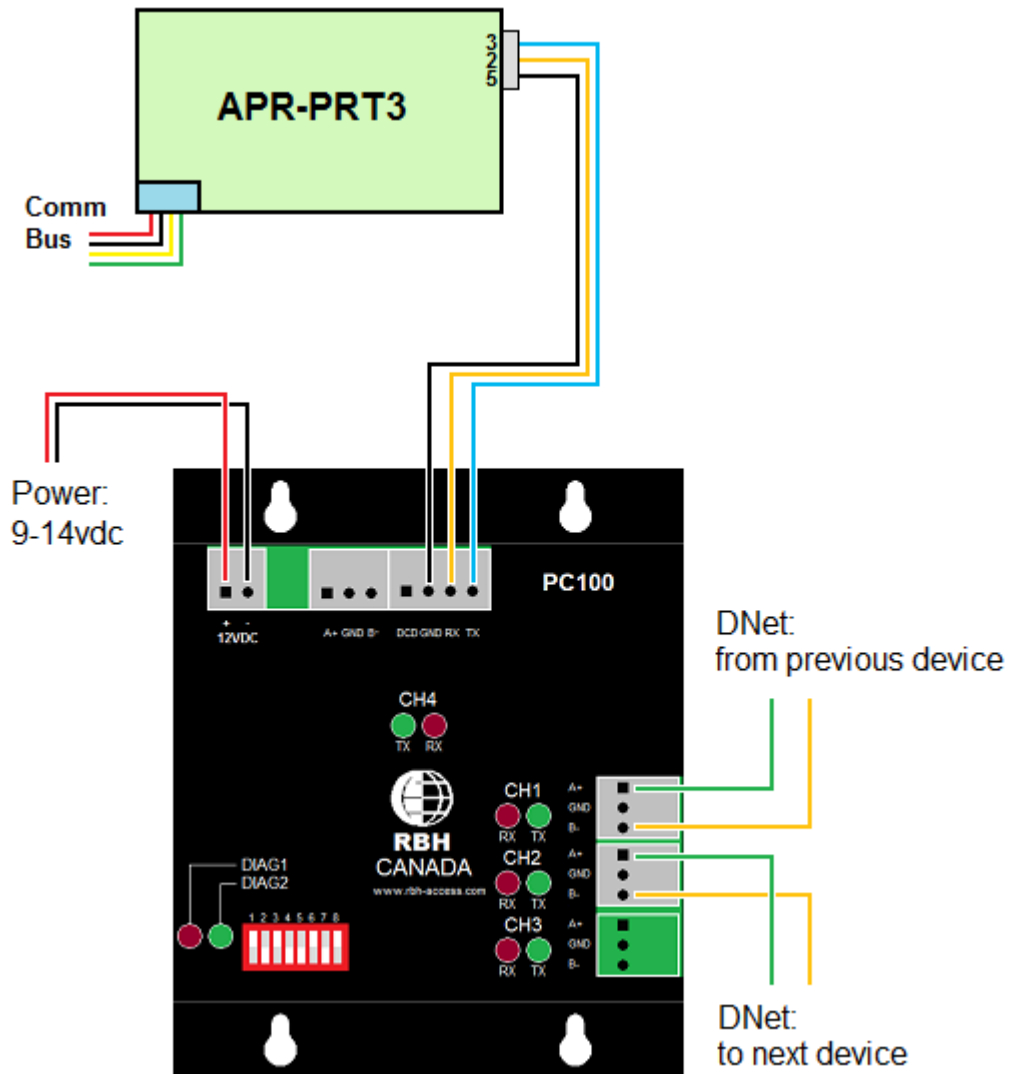
Axiom Installation Procedure

Keypad Setup

A password is needed in order to allow the Axiom system to arm and disarm the panel. Password slot #2 is used for this purpose. The password is not automatically downloaded to the virtual keypad so you must select "Set User" and fill in the # 2 password used by the partition.

Keypad Links

Assign the links to Disarm, Home, Evening, and Away in the keypad configuration.

Paradox EVO Alarm Panel Setup

To access the Printer Module's programming mode:

STEP 1: Press and hold the **[0]** key.

STEP 2: Enter the **[INSTALLER CODE]** default 000000.

STEP 3: Enter section **[4003]**.

STEP 4: Enter the Printer Module's 8-digit **[SERIAL NUMBER]**.

STEP 5: Enter the 3-digit **[SECTION]** you want to program.

STEP 6: Enter the required data.

Serial Port Setup

Section [016] – 1234**

For enabling the home automation protocol and a baud rate of 57600.

Utility Keys

The Paradox Keypad has the ability to send commands to the Axiom System by pressing combinations of keys.

Key Combination	Axiom Message
[1] & [2]	Open door 1
[4] & [5]	Open door 2
[7] & [8]	Call elevator
[clear] & [0]	Toggle audio 1 on/off
[2] & [3]	Toggle audio 2 on/off
[5] & [6]	Toggle Video 1 on/off
[8] & [9]	Toggle Video 2 on/off
[0] & [enter]	Clear message indicator/acknowledge
[1] & [3]	Panic Alarm[1]
[4] & [6]	Emergency Alarm[2]
[7] & [9]	Fire Alarm[3]

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[1] To enable Panic Alarm function program sections 3123 for area 1, 3223 for area 2, 3323 for area 3 etc.

[2] To enable Emergency Alarm function program sections 3123 for area 1, 3223 for area 2, 3323 for area 3 etc.

[3] To enable Fire Alarm function program sections 3123 for area 1, 3223 for area 2, 3323 for area 3 etc.

Virtual Input Usage

In order to use the Paradox Virtual Input option the printer module must be programmed to allow all 16 virtual inputs to be used and the inputs must be programmed into the panel. An IOC16 must be added to Axiom with properties set for all outputs and the address must match the Virtual IOC address set by the PC100 dipswitch. Whenever a virtual output is turned on or off the corresponding virtual input will open or close.

To use this feature apply a link to turn on or off the Virtual output in order to communicate an open or closed zone on the alarm panel.

Virtual Input Programming

Follow the previous procedure for accessing the printer module programming section (4003 followed by the device serial number).

Sections 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850 should be programmed for 1*******, the in-between sections should remain defaulted.

Add the Virtual Inputs to the Alarm Panel

The virtual inputs from the printer module may be assigned to the alarm panel by following the Zone Programming procedure in the programming guide. Not all of the inputs have to be assigned.

DSC Alarm Panel Interface

The PC100 is used as a bridge between the Axiom Access Control System and the IT-100 interface for the DSC alarm panel. To achieve this functionality the PC100 emulates eight Safesuite™ keypads and up to eight sequentially addressed IOC's.

Axiom Safesuite™ Address	DSC Partition Address
101	1
102	2
103	3
104	4
105	5
106	6
107	7
108	8

Whenever a partition is armed or disarmed by the DSC system the corresponding Safesuite™ keypad will display the status. For example if keypad number 102 reports that it is disarmed it really means that Partition 2 has been disarmed. For the virtual keypads there will be no zones assigned, instead the virtual IOC's will reflect the input status. Using Links to arm or disarm a group of inputs allows the virtual IOC's the capability of reporting the DSC panel's inputs. Using an input group assigned to a virtual keypad allows the software the capability of assigning any number of inputs to each virtual keypad.

To truly reflect the input status of the DSC Alarm Panel four links must be added to the keypad configuration.

Axiom Link	DSC Type	Link Function
Disarm	Disarm	Disarm all inputs except for Fire and 24 hour types of inputs.
Home	Stay	Arm all inputs except for interior, entry and exit zones.
Evening	Night	Arm all inputs except for interior night zones.
Away	Away	Arm all inputs.

In order to synchronize the DSC Alarm Panel with the Axiom Access Control the Paradox inputs are mapped to virtual IOC-16 using the first eight panels on the point number table above.

For example, DSC panel input #88 would be mapped to IOC address #10 input #8. This input would be located in one of eight partitions in the Paradox panel programmed through the Paradox keypad.

Dipswitch Setting

To allocate a block of IOC addresses for use by the DSC alarm panel you must first determine how many inputs you will need. For example if you need to monitor the first 64 inputs you will need 64÷16 (inputs per IOC) = 4 IOC's. The first IOC address will be # 5 representing inputs 1-16 and the last IOC address will be #8 representing inputs 49-64. Use the above DIP Switch Selection table to determine the dipswitch settings.

Connections

IT-100
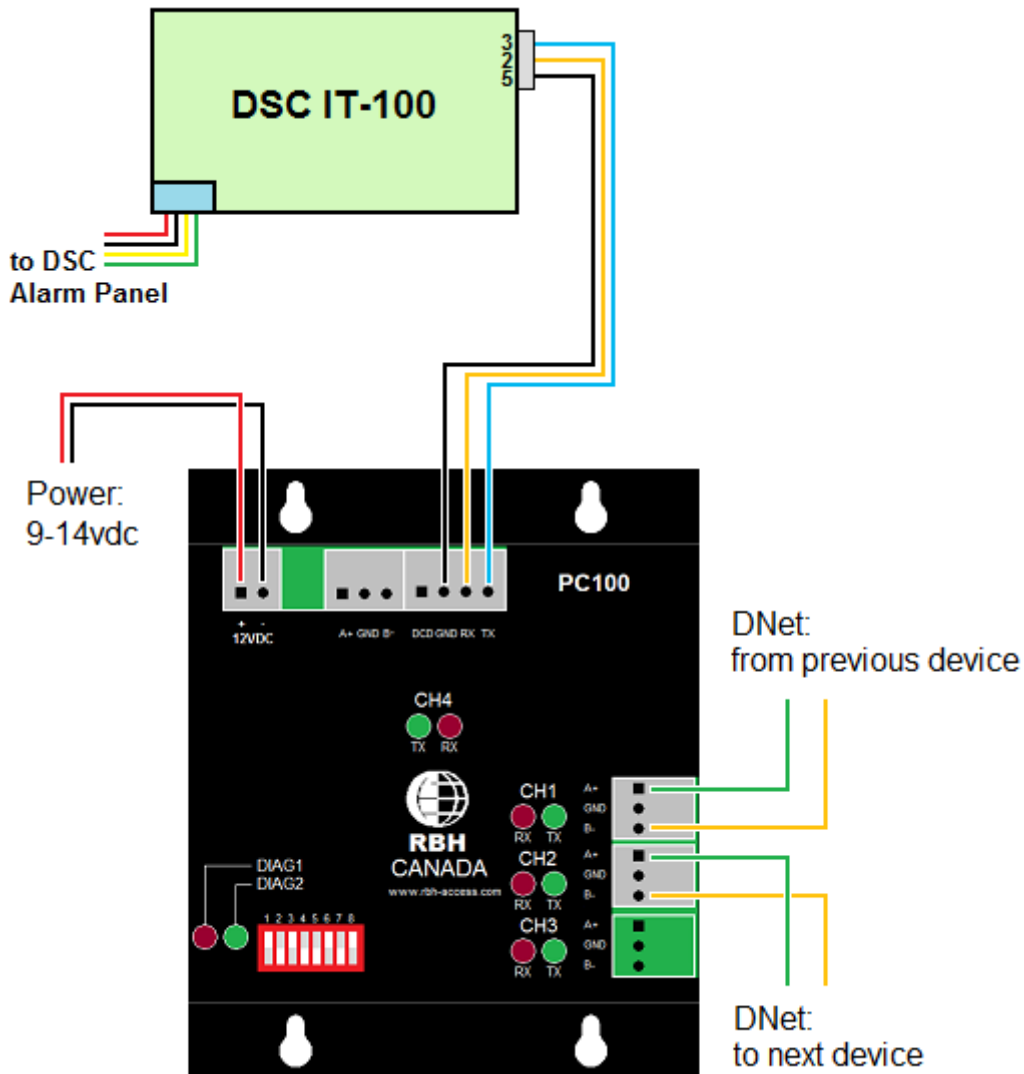
PC4401
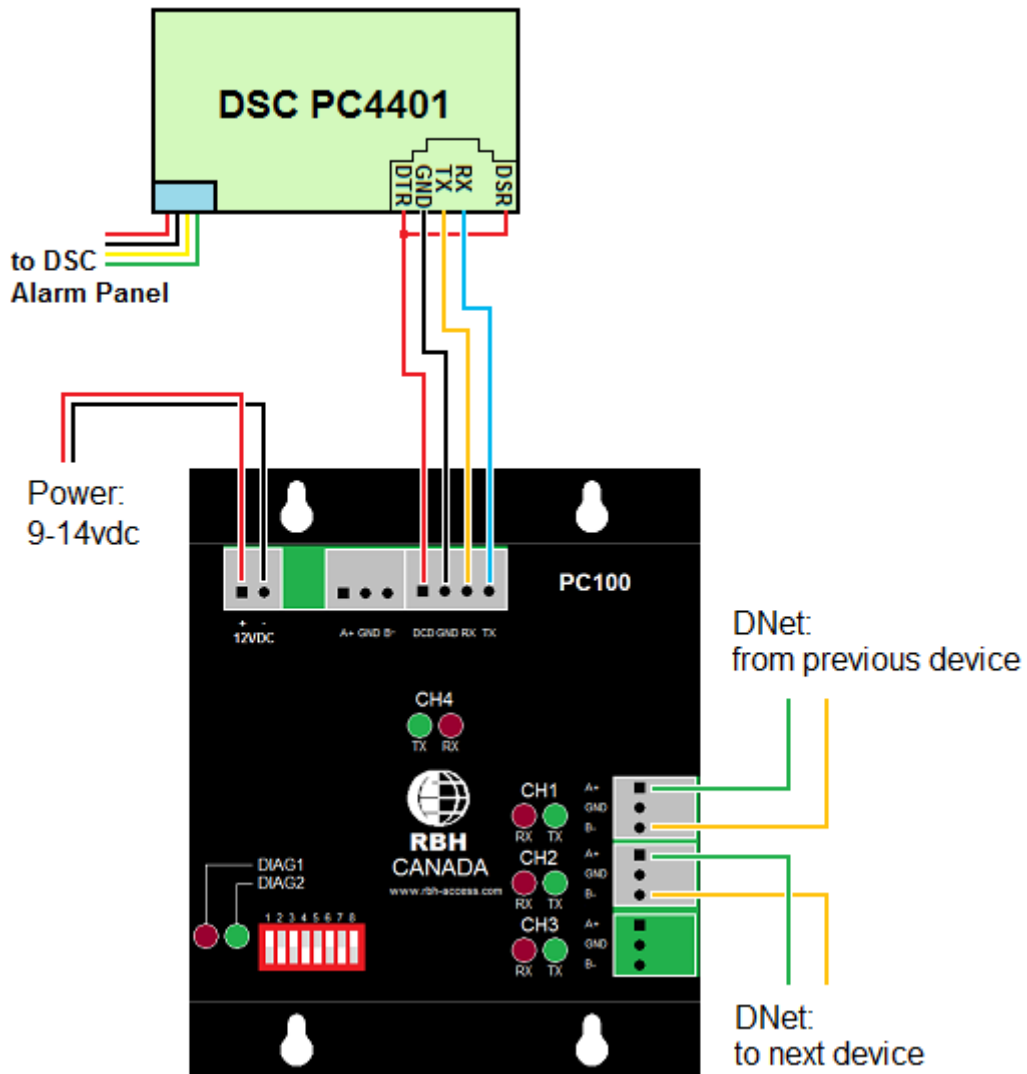
Installation Procedure

IT-100

IOC Setup

Determine the number of IOC's needed to reflect the number of inputs in the alarm panel. Add these IOC's starting from address #5 and make them all inputs. Inputs that are used for entry and exit should be given an abort delay to prevent false alarms. A link may be given to the entry zone to disarm the follower zone when abnormal.

Input Groups

Create input groups by assigning the associated IOC inputs with partitions

There should be three groups of inputs for every partition:

1) Interior zones.

2) Exterior zones.

3) Entry zones.

Axiom Links

Create four links for every partition.

1) Disarm Link – Disarm Interior, Disarm Exterior, Disarm Entry.

2) Home Link – Disarm Interior, Arm Exterior, Disarm Entry.

3) Evening Link – Disarm Interior, Arm Exterior, Arm Entry.

4) Away Link – Arm Interior, Arm Exterior, Arm Entry.

Keypad Setup

A password is needed in order to allow the Axiom system to arm and disarm the panel. Password slot #2 is used for this purpose. The password is not automatically downloaded to the virtual keypad so you must select "Set User" and fill in the # 2 password used by the partition. Some DSC alarm panels will allow arming without a password. The password is used mostly for disarming the partition.

Keypad Links

Assign the links to Disarm, Home, Evening, and Away in the keypad configuration.

PD4401

Connect the PC4401 to the PC100 according to the drawing on page 2. The DSR and DTR signals must be tied together in order for the PC4401 to communicate properly.

After enrolling the module, program the PC4401 for 1200 baud as a DATALINK type.

IOC Setup

Determine the number of IOC's needed to reflect the number of inputs in the alarm panel. Add these IOC's starting from address #5 and make them all inputs. Inputs that are used for entry and exit should be given an abort delay to prevent false alarms. A link may be given to the entry zone to disarm the follower zone when abnormal.

Input Groups

Create input groups by assigning the associated IOC inputs with partitions

Abort Delays on Entry/Exit Zones

Assign abort delays on inputs used for Entry/Exit so that the inputs will not show alarm when first opened prior to disarming the partition.

Axiom Links

Create two links for every partition.

1) Disarm Link – Disarm the input group associated with the partition.

2) Arm Link – Arm the input group associated with the partition.

Keypad Links

Assign the links to Disarm, Home, Evening, and Away in the keypad configuration.

For example:

If there are 16 inputs and 2 partitions with the first partition inputs 1-8 and the second partition 9-16, there will be two input groups assigned.

Groups:

Group Name	Inputs
Office #1	IOC #5 inputs 1-8
Office #2	IOC #5 inputs 9-16

Links:

Link Name	Command
Arm Office #1	Reset Input Group Office #1 Arm Input Semi-permanent
Arm Office #2	Reset Input Group Office #2 Arm Input Semi-permanent
Disarm Office #1	Set Input Group Office #1 Disarm Input Semi-permanent
Disarm Office #2	Set Input Group Office #2 Disarm Input Semi-permanent

Keypad 101 Links   *Keypad 102 Links*

Event	Link	Event	Link
Disarm	Disarm Office #1	Disarm	Disarm Office #2
Away	Arm Office #1	Away	Arm Office #2

Wavetrend Long Range Reader Interface

In this interface the PC100 is programmed to communicate with Wavetrend readers while emulating an RC-2 for an AXIOM system. WAVE57 (or higher) firmware is required. It works with the NC100 firmware version 7.60 or higher and software version 5.2.17 release3 or higher.

The wavetrend RF Tag reader model L-RX201 can be interfaced with the Axiom Access Control System so that credentials can be tracked throughout an access control installation.

Interface Method

The method of interfacing consists of a PC100 emulating eight RC-2s. Each wavetrend reader attached to the reader network will be assigned to its own virtual RC-2.

For example: five readers attached to a network.

Reader #	RC-2
1	RC #1 Side A
2	RC #1 Side B
3	RC #2 Side A
4	RC #2 Side B
5	RC #3 Side A

DIP-SWITCH Settings

The Axiom Access Control System starts its RC addresses at address 1 and can support up to eight devices ending at address 8. To make the DIP-switches capable of selecting the range of addresses to which the emulator will respond, an offset address scheme has been developed. The first four switches create the start offset and the last four switches create the end offset. **Desired Address = DIP address + 1**. The device when polled will answer any address that falls between the desired start and end addresses (inclusive). If the end address is smaller than (or equal to) the start address only the start address will be used.

DIP-Switch Selection Table (0 = off, 1 = on)

Start				Desired	End			
S1	S2	S3	S4	Address	S5	S6	S7	S8
0	0	0	0	1	0	0	0	0
1	0	0	0	2	1	0	0	0
0	1	0	0	3	0	1	0	0
1	1	0	0	4	1	1	0	0
0	0	1	0	5	0	0	1	0
1	0	1	0	6	1	0	1	0
0	1	1	0	7	0	1	1	0
1	1	1	0	8	1	1	1	0

NC100 Firmware Version

Version 760 (or higher) is required for use of wavetrend readers. Selecting the 72-bit WTND format for an access point will enable the use of the long-range readers and credentials.

The NC100 firmware has been designed to ignore the continuous stream of card data from the wavetrend readers unless the card has moved from one zone to another. A special buffer has been reserved to store ID's along with a timer and RSSI value. The timer is refreshed on every transaction for each card in the buffer. If the timer times out the card will be reported as missing. The extended unlock time is used as the value for this timer. A value of 60 seconds works well with 10 credentials.

RSSI Values

The RSSI value is the Received Signal Strength Indicator. This value ranges from 50 to 255 depending upon how close the card is to the reader and how the reader is set up.

If a reader has an antenna attached, the RSSI value of a card 3 meters away will be around 100. Without an antenna the same card will report around 60.

The RSSI value is displayed in the AXIOM cards monitor screen. This can be used to adjust the RSSI threshold so that the zone area can be limited to a particular distance.

RSSI Threshold

The DHO warning time is used as the RSSI threshold value. To use a value greater than 127 select minutes and calculate adding 128 to the value. As an example: to achieve an RSSI value of 140, set the time to minutes and use a value of (140 – 128) 12. The received RSSI value will be displayed in the AXIOM V cards monitor.

RSSI Background Messages

A credential will transmit its ID every 1.5 seconds. This message is translated into an RC-2 style 72-bit wiegand style message by the PC100. Part of the message contains the RSSI value of the card. Whenever the value of the RSSI for a particular card has changed by more than the *Unlock Time* the message will be transmitted. To prevent moving targets from swamping the C-NET with unnecessary background messages the unlock time should be set to above 60. For stationary credentials and during installation this value may be lowered.

Card Missing Timer

The *Extended Unlock Time* (EUT) is used as the "card missing" timer. If the EUT is set to 0 a default value of 60 seconds will be used. Once a card has been received and placed into the buffer, the timer will be decremented every second. When the timer times out an "Access Denied – Missing Card" log message will be recorded.

Access Point Variable Summary

Access Point Variable	Usage
Unlock Time	RSSI background message threshold.
Extended Unlock Time	Card Missing Timer
DHO Warning Time	RSSI threshold for the Wavetrend reader.

Refreshing the Card Buffer

The card buffer will be cleared whenever a download or Initialization command is given. Once the card buffer is cleared all wavetrend credentials will report in.

Low Battery Warning

The wavetrend cards have a second timer that begins when the battery is first applied. There is really no battery measurement but an estimate of the lifetime for a card puts the warning limit to around 3.72 years. At this point a Low battery Warning message will be transmitted when the card is read.

Tamper Messages

Whenever a download occurs or every minute the PC100 issues a "PING" command to check if the readers are online. If a reader is not detected a "Reader Tamper" message will be issued. If a previously offline reader is detected a "Reader Tamper Restore" message will be issued. During the "PING" the diagnostic red LED will turn on.

D-NET Connections

The PC100 connects to the device network like all D-NET devices supporting the redundant communications principle. Connect using channel 1 and channel 2 as per the Wiring diagram.

Wiring Readers

The L-RX201 readers are connected together in a daisy chain type format. That is, Reader 1 is connected to Reader 2 which is connected to Reader 3 etc. A single reader network can address a theoretical maximum of 254 readers. Communications between readers is done via a 2-wire RS485 connection. Connections from reader 1 to the PC100 are done from the "Left" port via a RS232 connection. This is the only case where RS232 communication signals are used. It is important not to have any wires connected to the RS232 pins on any other readers other than reader 1.

Even a short wire connected to the RS232 connection will cause interference.

Power

Data Flow
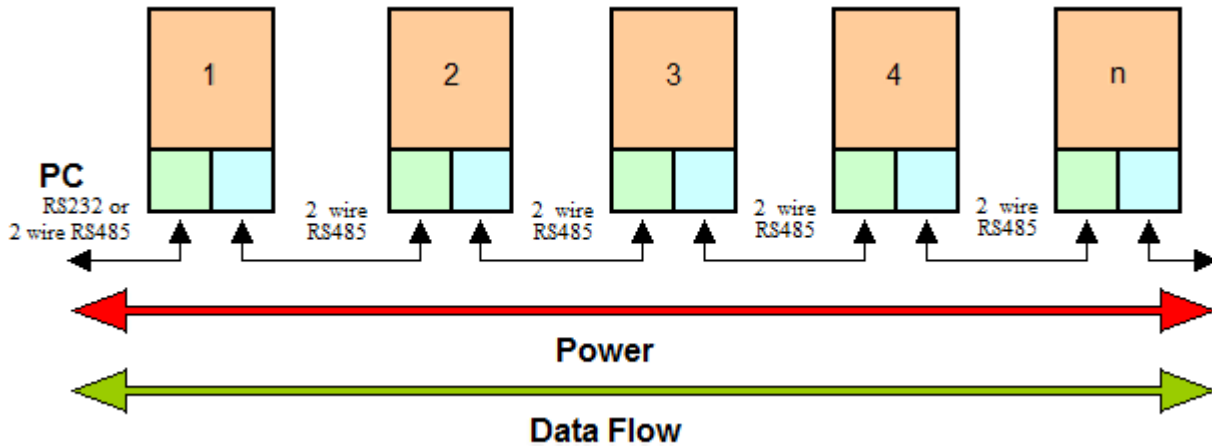
Power is also carried to each reader via the data cable between the readers. Each connection between readers consists of four wires only. (The other wire strands should not be connected.)

OUT RJ45	Name	IN RJ45
3	Power	3
4	GND	4
5	RS485+	5
6	RS485-	6

The connections have been designed in such a way that the cable forms a straight "through" connection and does not require the twisting or changing of any wires between readers. This makes the installation of this network very simple and since each RS485 connection between readers is theoretically a separate network, distances between them can be up to 1.2 km can be achieved. This distance is based on the RS485 standard and is dependent on the quality of the cable used. RS485 termination resistors are included in each reader and therefore do not need to be added as an afterthought. Data packets run bi-directionally up and down this network enabling a reader to perform its functions.

The reader net may be supplied with power from multiple points within the network. When more than one PSU is used, the supplies must be connected via the ground line. In the event that the PSU's are not commonly connected, the maximum differential voltage between the negative supply lines must not exceed 7V. It is important that a stable power supply be used. If more than one power supply is used it is important that the first command sent after the power has stabilized is the Reset Network command.
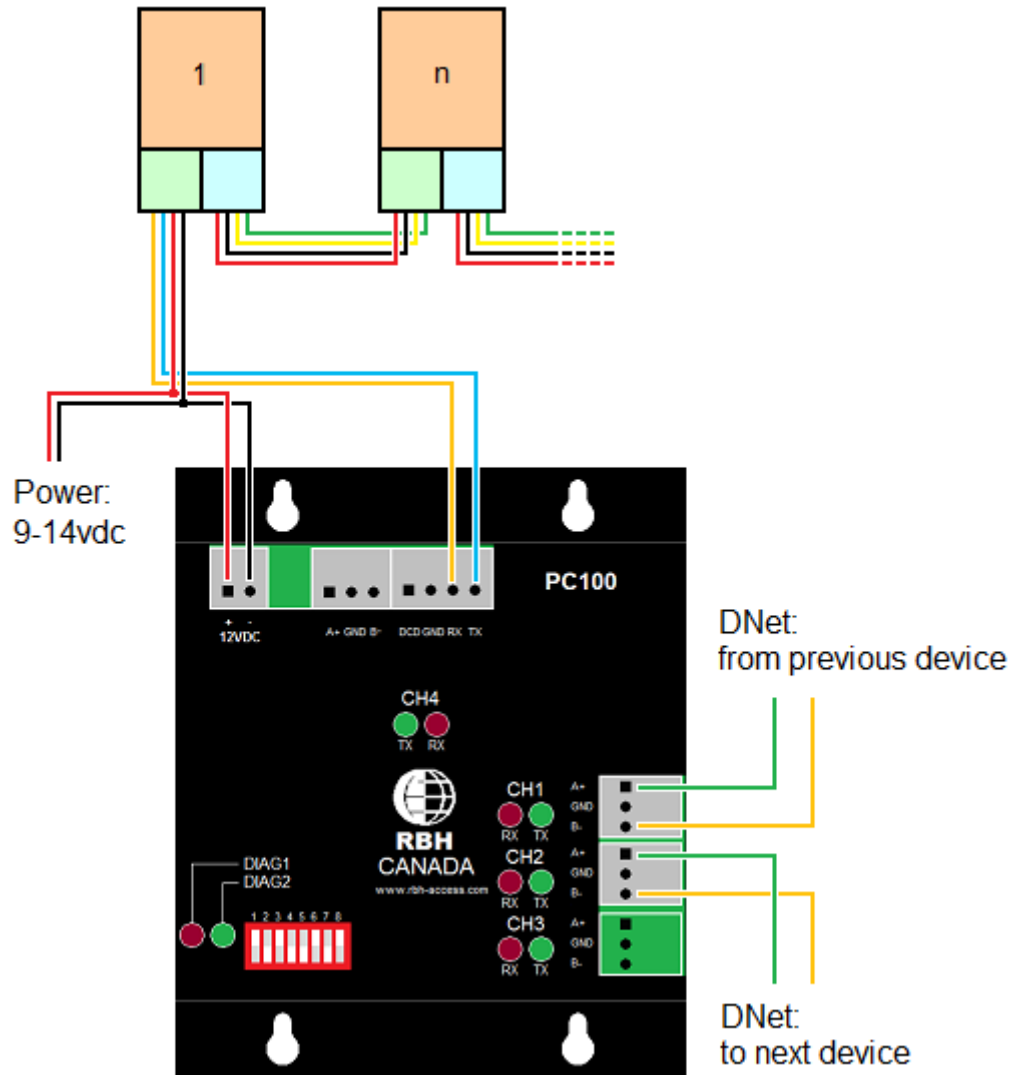
RJ45 Socket Left Side

Pin	Pin Name	Description
1.	RS232 RXD	RS232 Receiver Pin
2.	RS232 TXD	RS232 Transmit Pin
3.	PWR	6V → 18V DC
4.	GND	Ground
5.	RS485+	Non-Inverted RS485
6.	RS485-	Inverted RS485
7.	TTL TXD	TTL RS232 Transmit Pin
8.	TTL RXD	TTL RS232 Receive Pin

✏️ **Note that all the various communications levels (RS232, RS485, and TTL) are at all times carrying the same data, i.e. the exact same for the LEFT ('IN') RJ45 RS485, will be on RS232 as well as TTL.**

Initialization of the Network

At power up, the NODE ID's are automatically established from the readers' physical connection position on the network. This whole process takes about 3.5 seconds at power up and consists of the following sequences.

1. Each reader powers up and sets its data flow in a right hand direction.
2. Each reader then continuously sends ' * ' s out of their right hand RS485 ports, and pre-pares to receive this character in their left hand RS485 ports. This character is sent out in single bursts every 25ms. This avoids any framing errors should a reader not be able to lock onto the data stream in the correct position from start up.
3. If an ' * ' is received in the left RS485 port, the TAG LED (slave indicator) is illuminated to indicate this. Each reader, except for the first reader on the reader network, will therefore receive this character on its left hand RS485 port.
4. The first reader has now been established.
5. This process of sending out the right hand RS485 port lasts for 1 second.

When the PC100 powers up it takes into consideration the initialization sequence and waits for about 4 seconds before beginning to communicate with the first reader.

Wavetrend Health Monitor

Approximately once per minute the PC100 will "ping" all readers to see if they are still communicating. If a reader fails to respond a Tamper message will be sent to the Axiom system for the reader. Once a previously identified non-responsive reader reports correctly a "Tamper Restore" message will be sent.

Specifications for the L-RX201

LED	Colour	Function / Value
Poll	Orange	Successful Poll of current reader
Packet RX	Green	Valid Packet receiced - From either direction
Tag RX	Orange	Valid Tag received from the RF module
System Idle	Green	Indicates that the system communications are Idle and OK
RF Specifications		
RX Frequency		433 MHz
Demodulation		ASK
Sensitivity		-103 dBm
Bandwidth		700 kHz
Stability		2ppm / $^{\circ}$C
Electrical Specifications		
Supply Voltage		6V DC - 18V DC
Max current consumption		± 72 to 90 ma
ESD protection		2kV Human Body Model
Interface		RJ45 connectors
Environmental		
Operational temperature		-10º C to +60º C
Storage temperature		-20º C to +70º C
Humidity		5% to 90% (non condensing)
Physical		
Size		84 mm x 40 mm x 19 mm
Weight		45 grams
Colour		Charcoal
Type of material		ABS (ultrasonically sealed)
Input/Output Connections		2 x RJ45 Sockets

Appendix A

PC-100 Firmware

PC-100 Controller Firmware Version AX4401 (reports version 28)

- DSC PC4401 Alarm Panel Interface firmware. (NC-100 firmware 8.20Beta required)

PC-100 Controller Firmware Version AXPAR3 (reports version 30)

- Paradox Alarm Panel Interface firmware for Digiplex EVO48 and EVO 192. (NC-100 firmware 8.20Beta required)

PC-100 Controller Firmware Version IT100V4 (reports version 31)

- DSC IT100 Alarm Panel Interface firmware. (NC-100 firmware 8.20Beta required)

PC-100 Controller Firmware Version VIOC8 (reports version 8)

- Virtual Input Output Controller with ASCII protocol. (NC-100 firmware 7.16 required)

PC-100 Controller Firmware Version WAVE55 (reports version 55)

- Wavetrend Interface firmware. (NC-100 firmware 7.60 required.)

PC-100 Controller Firmware Version WAVE56 (reports version 56)

- Wavetrend now detecting card tamper. (NC-100 firmware 7.71 required.)

PC-100 Controller Firmware Version WAVE58 (reports version 58)

- Wavetrend tamper alarm bug has been fixed. (NC-100 firmware 7.73 required.)