R A D I O N I C S

READYKEY® K6100 Central Network Controller

Installation Manual

Notice

The material and instructions in this manual have been carefully checked for accuracy and are presumed to be reliable. However, Radionics, Inc. assumes no responsibility for inaccuracies and reserves the right to modify and revise this manual without notice.

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> Radionics, Inc.
> Technical Writing Department
> 1800 Abbott Street
> Salinas, California 93901

FCC Notice

This equipment generates and uses radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been tested and found to comply with the specifications Subpart F of Part 15 of FCC rules for Field Disturbance Sensors. If this equipment causes interference to radio or television reception - which can be determined by turning the equipment on and off - the installer is encouraged to correct the interference by one or more of the following measures: 1) Reorient the antenna of the radio/television, 2) Connect the AC power cord to a different outlet so the control panel and radio/television are on different branch circuits, 3) Relocate the control panel with respect to the radio/television.

If necessary, the installer should consult an experienced radio/television technician for additional suggestions, or send for the "Interference Handbook" prepared by the Federal Communications Commission. This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402, stock no. 004-000-00450-7.

FCC Registration Number: IDHM32Y6K2000

UL Listings

UL 294 -   Access Control System Units

UL 1076 -   Proprietary Burglar Alarm Systems

Table of Contents

About this document

This manual describes the installation of a Readykey Central Network Controller, referred to throughout this manual as the CNC, and the various communication options available. The CNC, available in two versions, Single Site (SS) and Multi Site (MS), allows Readykey door controllers to be administered from a central PC (personal computer). The central PC will be running Readykey administration software such as the K6000/K6000-AM DOS based systems, Readykey for Windows K6100-SS Single Site or Readykey for Windows K6100-MS Multi Site systems.

Single Site and Multi Site

The Single-Site CNC will allow up to 32 door controllers to be connected locally on the Readykey six-wire bus. The Multi-Site allows up to 128 sites, including the local six-wire bus, to be controlled. The extra 127 sites are connected using serial RS-232 communications.

Other Documents

This document should be used in conjunction with the following other documents:

Door Controllers

K2100/1100 Installation Manual 74-06964-000

Administration Software

K6100 Readykey for Windows Overview 74-07045-000

K6100 Readykey for Windows MS Operation Installation Manual 74-07338-000

K6100 Readykey for Windows Software Installation Manual 74-07046-000

K6100 Readykey for Windows Multi-PC Operation Installation Manual 74-07341-000

Margin Notes

Throughout the manual wherever there are specific items referring to particular administration systems or particular models of door controller, a margin note will highlight the fact. For example:

K1100 A note specific to the K1100 2-door controller.

K6000 Whenever something applies to a particular administration system...

Readykey for ... such as Readykey for Windows.
Windows

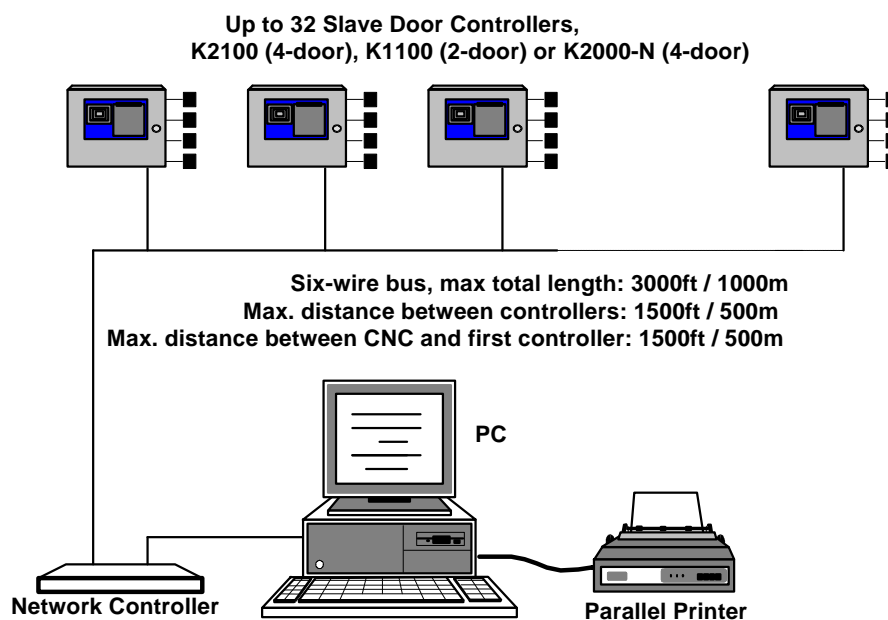*K2000-N* Sometimes reference will be made to older products.

Description

Single Site Network Controller - 128 doors

Maximum Number of Personnel	10000
Maximum Number of Visitors	750
Maximum Number of Doors	128
Editors	32 (plus Master)

Using a Single Site CNC and Readykey for Windows SS or MS software, up to 32 door controllers, all configured as slaves, are connected using the six-wire bus.

K2000-N   The K2000-N door controllers may be used as slaves on the six-wire bus.

**Up to 32 Slave Door Controllers,
K2100 (4-door), K1100 (2-door) or K2000-N (4-door)**

**Six-wire bus, max total length: 3000ft / 1000m
Max. distance between controllers: 1500ft / 500m
Max. distance between CNC and first controller: 1500ft / 500m**

PC

Network Controller   **Parallel Printer**

System Diagram - Single Site Network Controller

Multi Site Network Controller - 128 Sites

Maximum Number of Personnel		9999	
Maximum Number of Visitors		750	
Maximum Number of Doors	Site 1	128	(32 D/C)
	Sites 2-33	32	(8 D/C)
	Sites 34-128	4	(1 D/C)
Editors		32 (plus Master)	

A Readykey Multi-Site CNC allows up to 128 sites to be controlled. One of these sites is the 32 door controller six-wire bus, as described for the single-site CNC above. The other sites are connected using RS-232 serial communication links.

There are 3 serial ports on the multi-site CNC, allowing up to 3 sites to be permanently connected. By using dial-up (PSTN) modems more than one site can be attached to each port. Once or twice a day the CNC will dial-up each site and send updates and receive transactions.

The first 32 serial sites (2-33) may consist of at least one K2100 (or K1100) with up to 7 Slave door controllers attached using the six-wire bus giving a maximum of 32 doors per site. The remaining 95 sites (34-128) may consist of just one door controller each.

When using dial-up links it is possible to set the Master controller to dial-back to the CNC in the event of an alarm - normally all communications are made by the CNC dialing out to each site .

An alternative arrangement, which is available on the first 32 serial sites (sites 2-33) only, may be used when it is not possible to connect the door controllers at the remote site via the six-wire bus. This system involves using a code operated switch (COS), available in 4 and 8 port versions, to switch between door controllers. In this case each door controller would be set as a Slave. Using this configuration does **not** allow dial-back.

K2000-N   The K2000-N door controllers may be used as slaves.
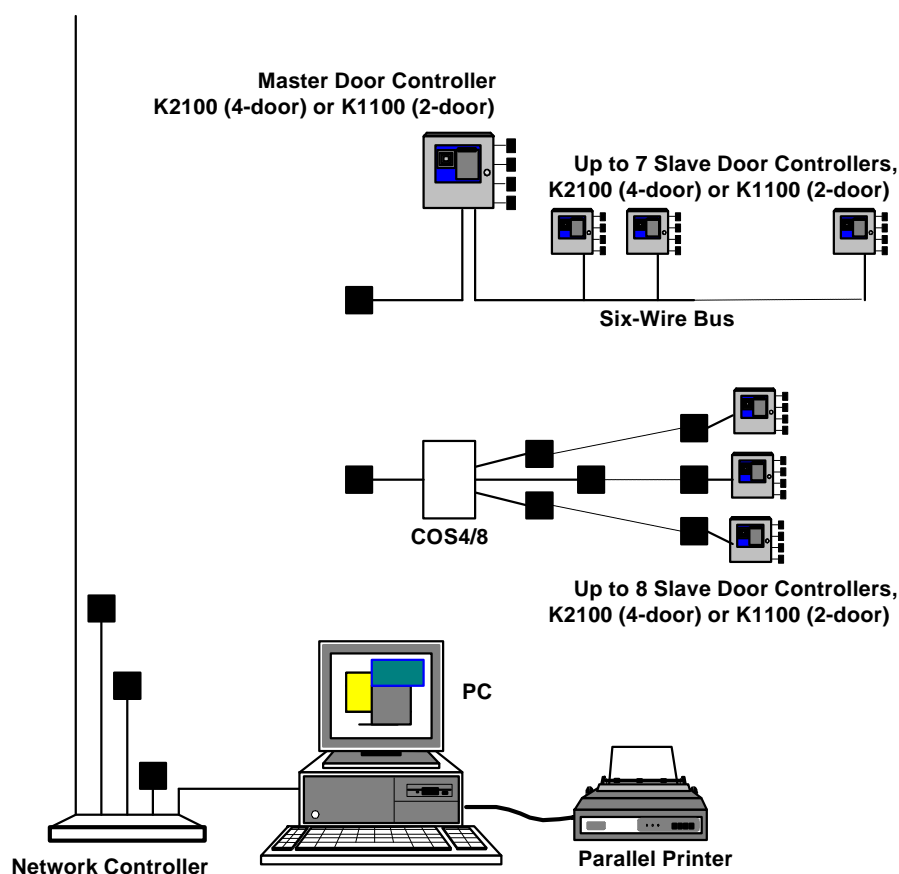
System Diagram - Multi Site Network Controller

The Readykey CNC is flat, steel cased unit ideally suited to being mounted between a PC system unit and the PC monitor. Power is provided to the CNC by a separate power supply unit(PSU) , supplied with every CNC, which also contains four relay outputs.

The front of the CNC has a 16 character display where system messages are displayed, and a built in key/card reader for key/card administration and alarm acceptance. The rear of the controller has six ports; power, six-wire bus, host PC used by both types of CNC and 3 serial ports **used by the Multi-Site version only**
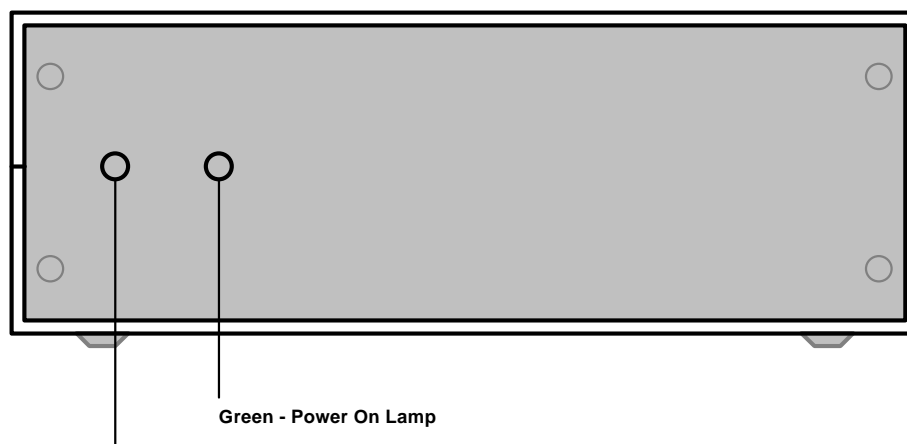
Power Supply Unit - Front Rear

Green - Power On Lamp

Red - No Battery Lamp
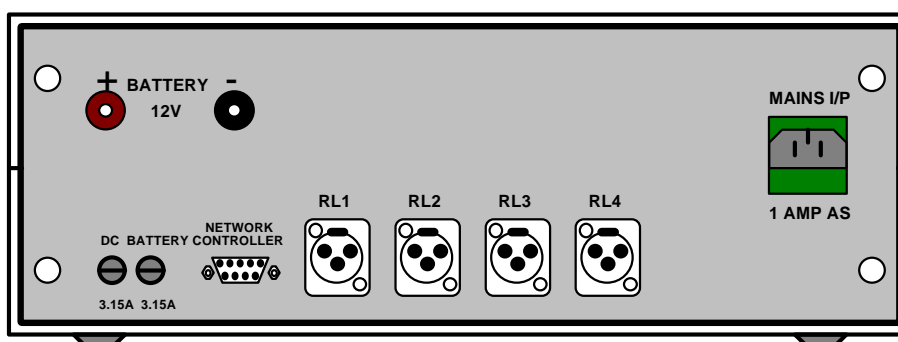
Power Supply Unit - Rear View

F1 = 3A Fast Blow - 12VDC Supply to CNC
F2- 3A Fast Blow - Standby Battery Supply
Main - 2A Slow Blow - 120VAC Main Power

Relay Outputs

Readykey for Windows

Important: these relays are not supported by Readykey for Windows.

4 Relay outputs are provided at the rear of the power supply unit. These are rated:
1 Amp @12v, 4 plugs are provided.

Normally Closed   **Normally Open**

Common
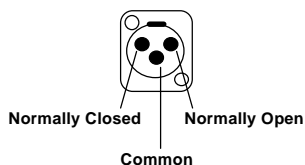
PSU Relay Connections

Each relay will activate when any of the events below occurs. Each relay will stay active until all occurrences of the event are cleared.

Important: The PC **must** be on-line in order for the relays to operate. No relay operation will occur if the PC is not connected to the CNC and running K6000 administration software.

Contact Rating		12v DC @ 1 Amp
Operation:	**Relay 1**	Door Left Open
	Relay 2	Unauthorized Access Alarm
	Relay 3	Zone Alarm (K2015 Alarm Module / K2015A Alarm Event Manager)
	Relay 4	PIN Reader Duress Alarm
Terminals:	**Each relay**	Normally Closed, Common, Normally Open

MONITORING **NETWORK CONTROLLER**

Display Screen **Key Reader**
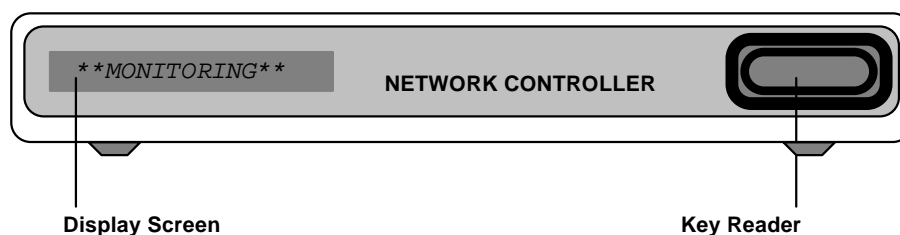
Readykey CNC Front Panel

RS 232 PORT 3	RS 232 PORT 2	RS 232 PORT 1	RS 232 HOST PC	DATA BUS	POWER SUPPLY

Serial Ports only enabled on Multi-Site CNC

Connect to PC
Six-Wire Bus
Connect to Power Supply
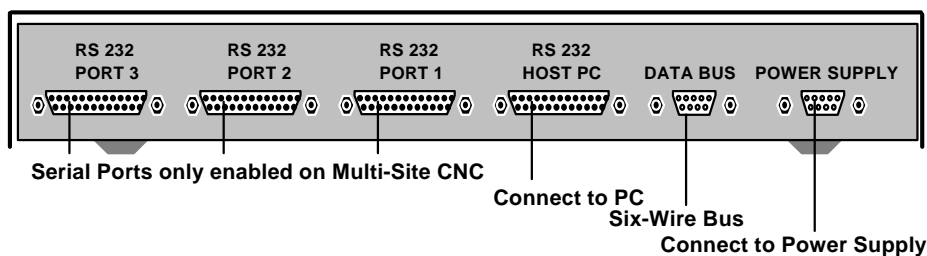
Readykey CNC Rear Panel

Internal Settings

You should not need to remove the lid of the CNC unless upgrading the software, or setting the communications baud rate. The electronics are contained on two circuit boards, one large board contains the power supply, EPROM software and all the external connections. A smaller board is connected, via a short ribbon cable, that contains the display, a sounder and the administration reader.
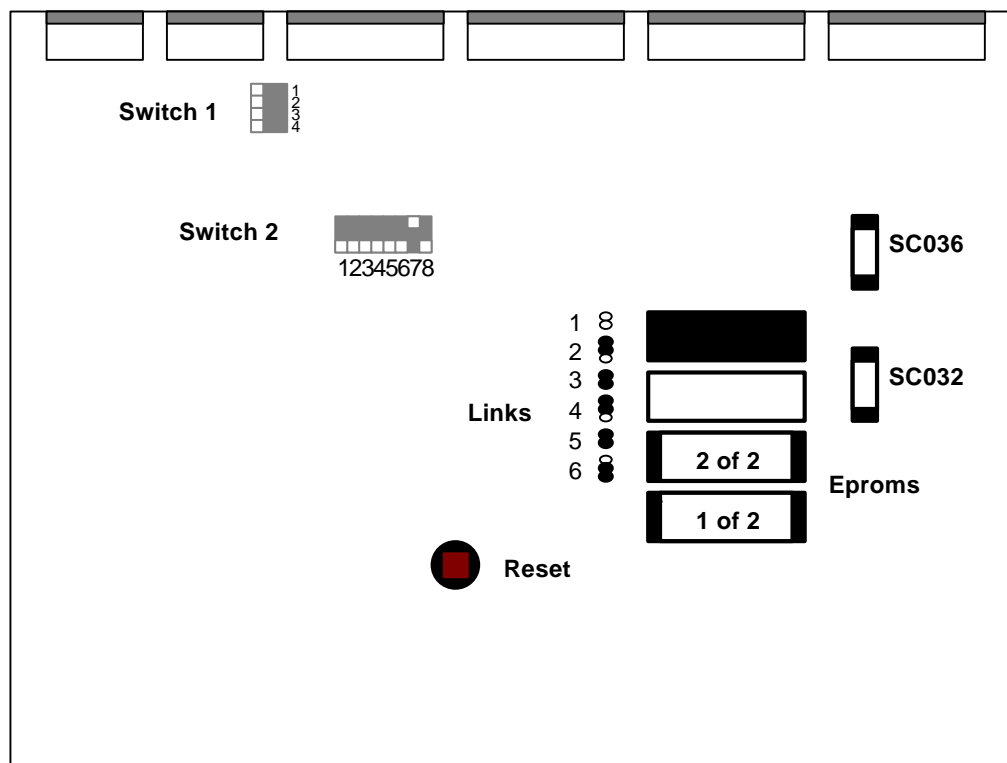
CNC - Internal Components

Switches

There are 2 sets of switches on the main circuit board:

Switch Block 1 - Bus Termination

The 4 switches on this block should **always** be set **ON**, that is to the left when viewed from the front of the CNC.

Switch Block 2 - Feature Selection

All these switches should be **OFF**, towards the front of the CNC, **except** for:

IMPORTANT!   **Switch 7 - Baud Rate.**

K6000 (MS-DOS) systems (19200) : This switch should always be **ON**, towards the back of the CNC.

Readykey for Windows K6100-SS/K6100-MS systems (9600) This switch should always be **OFF**, towards the front of the CNC

Switch 5 - Internal Sounder. When switched **ON** this switch inhibits the internal sounder when alarms are received and the PC is Off-line.

See the description in *PC On-Line* above.

Installation

Two cables are supplied that connect the CNC to the PC. Both have a 25 pin D-type male connector for fitting to the CNC PC Host port. At the other end one of the cables has a 9 pin female connector, the other a 25 pin female connector. Two cables are provided to allow for the different ports provided on PCs, either a 9 pin or 25 pin male.

K6000

The CNC **must** be connected to the PCs COM1 port. If your PC has only one serial port, this will be COM1:. If there is more than one serial port then you should determine which is COM1:.

Readykey for Windows

You can use either serial port of the PC, COM1 **or** COM2. When Readykey for Windows is installed the default serial port for the Master Controller is COM1. Therefore use COM1 unless you wish to change the port from within Readykey for Windows.

CNC, Host PC Port				PC	
25 pin male D-type connector				9 pin female D-type connector	
RX	2	—————	3	TX
TX	3	—————	2	RX
CTS	5	—————	4	DTR
GND	7	—————	5	GND
DTR	20	—————	8	CTS

CNC, Host PC Port				PC	
25 pin male D-type connector				25 pin female D-type connector	
RX	2	—————	2	TX
TX	3	—————	3	RX
CTS	5	—————	20	DTR
GND	7	—————	7	GND
DTR	20	—————	5	CTS

Six-Wire Bus

The six-wire bus is Readykey's proprietary communications link for local connection of door controllers. It uses up to 3000ft / 1000m of standard unscreened signal cable to connect door controllers. No single length of cable should be longer than 1500ft / 500m.

Cable Specification

Use multi-stranded, unscreened, 6-core, 24AWG / 0.22mm² alarm or signal cable. If you do use screened cable then you should reduce the maximum distance by 3 times, that is to 1000ft / 350m maximum.

The cable can be arranged in any pattern, straight line, star etc. as long as the total amount of cable does not exceed 3000ft / 1000m, and no single length is longer than 1500ft / 500m.
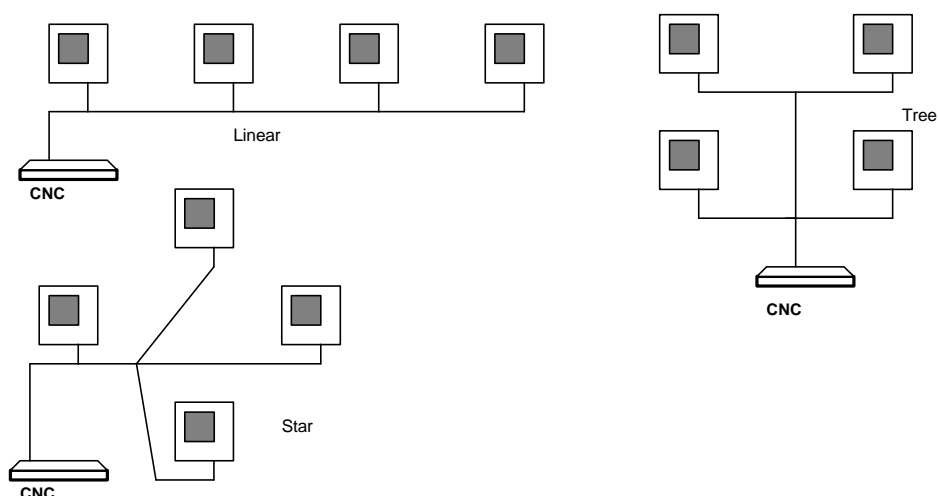
Possible Six-Wire Bus Wiring Configurations
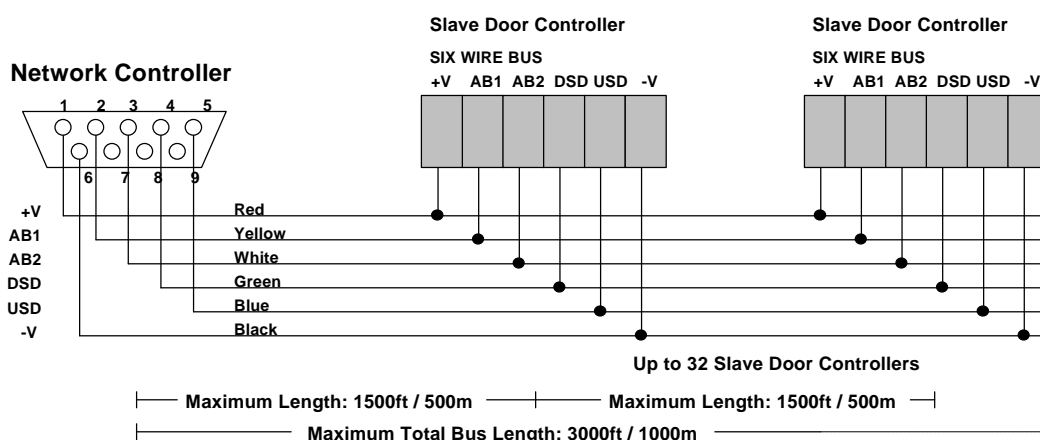
Six Wire Bus Wiring - CNC to Door Controller

Six Wire Bus Wiring - Remote Site Master Controller to Door Controller
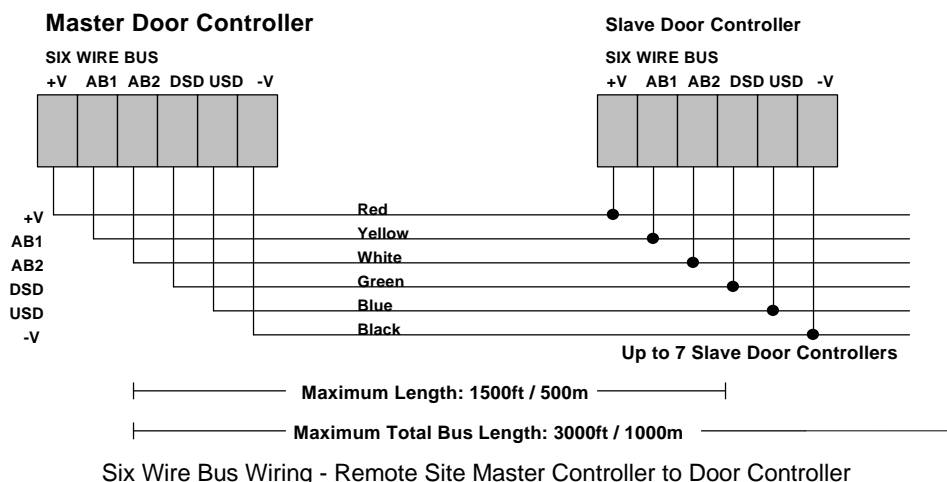
Addresses

The six-wire bus works by each door controller having its own unique address. The order in which door controllers are addressed does not matter, neither do they have to be numbered consecutively. Depending on the type of administration the following are possible:

Single-Site and Multi-Site Network Controller

Up to 32 slave door controllers, addressed 1 to 32.

Serial Link from Multi-Site Network Controller.

One Master door controller (configured as system type 2) and up to 7 slave door controllers, addressed 2,3,4,5,6,7 and 8.

Types of Door Controller

Master Door Controllers (Multi Site serial links only) may be:

- K2100 (4-door) set to System Type 2
- K1100 (2-door) set to System Type 2

Slave door controllers may be:

- K2100 (4-door) set to System Type 3
- K1100 (2-door) set to System Type 3
- K2000-N

Setting the Door Controller Address

See *K2100/1100 Installation Manual* for details on how to set a door controller's address.

Programming the System

K6000 See *K6000 Installation Manual* for details on commissioning and programming the system.

Readykey for Windows SS See *Readykey for Windows K6100-SS Installation Manual* for details on commissioning and programming the system.

Readykey for Windows MS See *Readykey for Windows K6100-MS Installation Manual* for details on commissioning and programming the system.

Serial Communications

Serial Communications are available only with the Multi-Site version of the CNC. This type of communication uses the serial RS-232 outputs on the CNC to communicate with door controllers.

There are two types of serial communication:

1.   Direct connection

A permanent connection to a door controller using line-drivers, leased line modems etc. This type of connection is permanently on-line, events are reported as they happen and updates are immediate. The user will not be aware of any difference between a directly connected serial site and a six-wire bus site. Up to three sites may be directly connected in this way to each multi-site CNC.

2.   Dial-Up connection using PSTN modems

A site is dialed up once or twice a day. On each occasion transactions are received from the door controllers and updates are sent. The K2100 door controller is also able to dial back to the CNC when an alarm occurs. Up to 127 sites may be connected in this way.

Direct Connection

There are 3 RS-232 serial ports fitted to the CNC allowing up to 3 directly connected sites. The maximum length of cable between the CNC and a door controller is 45ft / 15m, to exceed this distance you will need to use some type of line driver or leased line modem.

There are several methods for directly connecting a Readykey CNC to a K2100 over a distance greater than 45ft / 15m. Methods that have been used successfully include:

- Line Drivers or Baseband Modems

- Fiber Optic Lines

- Radio Data

- Microwave

Most serial communication devices will operate provided they can satisfy the following specification:

- Asynchronous, Full Duplex

- Baud Rate of 300, 1200, 2400, 4800, 9600

- No parity, 8 data bits, 2 stop bits

Cable for direct connection to K2100, K2000-N

Use 24AWG 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

Multi-Site CNC	**K2100, K2000-N**
25 pin male D-type connector	5-way Terminal Block

	RX	2	———	TX
	TX	3	———	RX
	GND	7	———	GND
Note 1	CTS	5	⏋	
Note 1	DTR	20	⏌	

Notes

1. The CTS signal should always be kept high at the CNC when a site is connected. The best way of doing this is to connect the CTS signal (pin 5) to DTR (pin 20)

Dial-Up Modems

Description

By using dial-up modems it is possible to communicate either with more than 3 sites or with sites too distant to be directly connected. Dial-up sites require the use of a pair of modems connected to standard public (PSTN) telephone lines.

A modem connected to one of the serial ports of the CNC will dial-up each site in turn once or twice a day. A modem installed at each site, connected to a K2100 (or K2000-N or COS), will answer the call.

Once communications are established, the CNC will receive transactions from the K2100 and send any database updates. A communications session will last as long as required for all transactions to be received and all updates to be sent **or** until a pre-set time limit expires. In addition a dial-up can be manually started at any time.

Dial-back

K2100   Normally events are only sent back to the central point at set times of the day when the CNC dials up the site. This may be satisfactory for records of normal access events, however if an alarm occurs this would not be reported until the next routine dial-up. A feature of the K2100 door controller allows it to 'dial-back' to the CNC in the event of an alarm condition.

The K2100 stores one or two telephone numbers which it will dial in the event of an alarm event. A modem on the CNC will answer the call and connect to the K2100. Once the calling site has been identified, all the high priority transactions will be sent from the site, and only immediate commands will be sent from the CNC to the site, allowing alarm acceptances to be sent back to the door controllers. To ensure that a dial-back modem is not tied up too long, the dial-back will be aborted after 2 minutes.

Although only one modem could be connected to the CNC to act as both the routine dial-up and dial-back device, it is recommended that one modem is used for routine dial-ups, and a second connected to another CNC port, is used as a dial-back only. You could use the routine dial-up modem as the second, backup, phone number programmed into the K2100.

**Master Door Controller
K2100 (4-door) or K1100 (2-door)**

**Up to 7 Slave Door Controllers,
K2100 (4-door) or K1100 (2-door)**

Modem

Six-Wire Bus

REMOTE SITE (Up to 127)

Modem for Normal Dial Out

Optional Modem to Receive Dial-Back Only

CENTRAL ADMINISTRATION POINT

PC

Network Controller

Parallel Printer

Multi-Site CNC Using Dial-Back
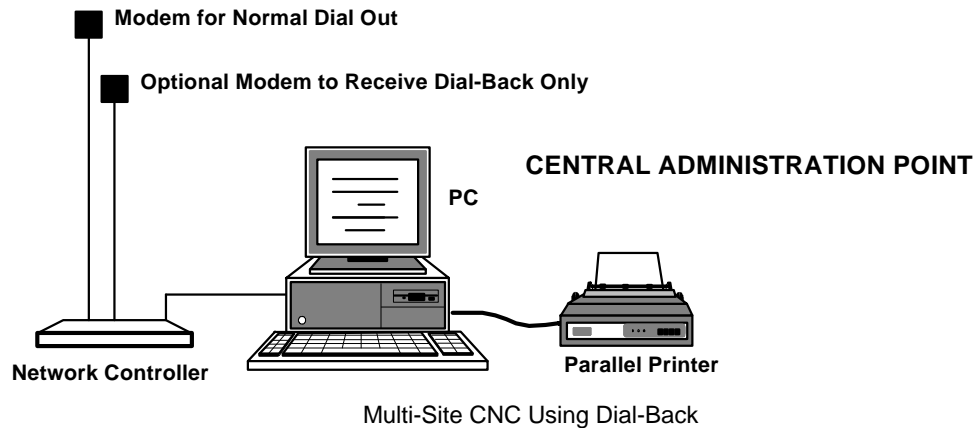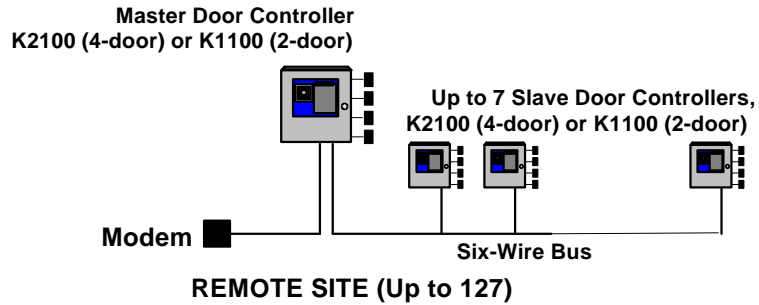
Communication Protection

K2100　　A feature of the K2100 allows dial-up communications between a CNC and the door controller to be protected. This is done by the CNC sending its Master token code to the door controller, if this compares with the door controller's Master token then communications will be established. If the codes do not compare then the communications session will be aborted. See *K2100/K1100 Installation Manual* for full details.

Phone Lines

Each modem you connect to the CNC will require its own phone line. If using the dial-back feature, then the phone number of the dial-back line is the number programmed into the K2100. Phone sockets should be sited so that the modems are within 2m of the CNC.

Each site will also require a phone line, again the phone socket should be sited in close proximity to the modem and the K2100, K2000-N or COS.

Cable for connecting CNC to Modem

Use 24AWG / .22mm² 8-core, unscreened signal cable, maximum length: 45ft / 15m

CNC, RS-232 Port 1, 2 or 3				Modem	
25 pin male D-type connector				25 pin male D-type connector	
Note 1	RX	2	———	3	RX
Note 1	TX	3	———	2	TX
	RTS	4	———	4	RTS
	CTS	5	———	5	CTS
	GND	7	———	7	GND
	DCD	8	———	8	DCD
	DTR	20	———	20	DTR
Note 2	RI	22	———	22	RI

Notes

1. Pins 2 and 3 are crossed between the CNC and Modem.

2. RI (Pin 22) is only required if dial-back is being used.

Cable for connecting Modem to K2100, K2000-N

Use 24AWG / 0.22mm² 6-core unscreened signal cable, maximum length: 45ft / 15m

Modem				K2100
25 pin male D-type connector				5-way Terminal Block
TX	2	———		TX
RX	3	———		RX
GND	7	———		GND
CTS	5	———		CTS
RTS	4	⌐		
DTR	20	└———		DTR

Using More than One Network Controller

Both the K6000 system and Readykey for Windows Multi-Site allow more than one CNC to be used.

K6000   The K6000 system supports two CNCs either both single-site, both multi-site or a one of each. Both CNCs must be connected to different serial ports of the Master PC. The total number of sites, however, may not exceed 128.

Readykey for Windows   A Readykey for Windows MS system may support up to six CNCs which may be connected to different PCs (when using the Multi-PC option). Normally you would not connect more than two CNCs to the same PC. The total number of sites, however, may not exceed 128.

Specification

Dimensions

In both cases below at least 4in / 100mm clearance should be allowed behind each unit for cables and connectors.

CNC

Length x Width x Height   15.0 x 13.8 x 2.3 ins / 380 x 350 x 57mm

Power Supply Unit

Length x Width x Height   10.7 x 13.6 x 5.0 ins / 270 x 345 x 125 mm

Power Requirements and U.L. Standby Calculations

Input Voltage	240v AC or 110vAC (different versions supplied)
	20mm 1.0 Amp time delay fuse in mains socket
Battery Output	13.8v DC at up to 370mA
	20mm 3.15 Amp fast-blow fuse, on rear panel
Current Consumption	CNC 12v DC @ 920 mA
	20mm 3.15 Amp fast-blow fuse, on rear panel

Cables Supplied

Mains supply

One mains lead is supplied with a molded 13 Amp plug and 4.5 ft / 1.5m of cable. A standard molded IEC socket connects to the rear of the power supply unit.

Power Supply to CNC

One lead with 6 ft / 2m of cable is used to connect the power supply to the CNC. A male 9-pin D-type connector fits to the power supply, a female 9-pin D-type connector fits to the CNC.

CNC to PC

Two cables are supplied, both 6 ft / 2m long with a male 25-pin connector at one end to connect to the CNC 'Host PC' port. One cable has a female 9-pin D-type connector, the other a female 25-pin, D-type connector. You only need to use the cable that connects to the appropriate serial port on your PC.

For full details of connecting the PC see:
> *K6000 Installation Guide*

or:

> *Readykey for Windows SS Installation Manual*
> *Readykey for Windows MS Installation Manual*

Six-wire Bus

A short length of cable is supplied with a male 9-pin D-type connector at one end, the other end is unterminated. If using the six-wire bus then use this cable to connect to the CNC.

Features

Dial Back

K2100, Multi Site CNC   The Multi-Site CNC supports dial-back from a K2100 or K1100 door controller. In the event of an alarm the door controller will immediately dial back to the CNC. See *K2100/K1100 Installation Manual* for full details on programming this feature.

Communications Protection

K2100   This feature will prevent another CNC from establishing communications with a remote site. It is done by the K2100 checking the Master token code sent by the CNC and comparing it with its own code. If they do not match then the session is aborted.

Front Panel Display

At various times messages will appear on the CNC display screen. This display screen consists of 16 green, LED segment characters. When a message is too long to fit on the display it will scroll past in a 'ticker tape' fashion. Some messages are accompanied by an audible bleep, especially alarms. All the messages have a priority given to them which determines which will be displayed when more than one condition exists that would generate a message.

Start Up

When the CNC is first powered a sequence of messages is displayed:

```
**SYSTEM RESET**
```

1. The CNC has been reset.

```
CNC V1=2
```

2. The software version number. You may be asked this if you experience any difficulties.

```
HOST BAUD =19200
HOST BAUD =9600
```

3. The baud rate between the CNC and PC. This should be 19200 for the K6000 system, and 9600 for Readykey for Windows.

The highest priority message is the **CLOCK SYNC** message followed by the alarm messages. The lowest priority is the **MONITORING** message which signifies nothing to report. In the descriptions of each message the following code is used to describe parts of the message:-

Snnn	Site Number, **nnn**=1-128
Dnnn	Door Number, **nnn**=1-128
D/Cnn	Door Controller Number, **nn**=1-32
IDnnnn	Personnel ID Number, **nnnn**=1-9999

Clock Synchronization

`** CLOCK SYNC **`

This message is displayed for 6 seconds with the sounder pulsing and can occur on one of two occasions. The first being when 'Synchronize System Clocks' is selected by the user to force the CNC and door controllers to be synchronized to the PC clock. The other occasion is when this occurs automatically at midnight and midday. All door controllers are immediately synchronized if they are connected or at the next time they are dialed up.

Prioritized Messages when PC On-Line

Priority 1 - Buffer Full

`**BUFFER FULL**`

This message appears when the CNC has only room for 1000 transactions left in its internal memory. This will occur if the PC is left disconnected for a long time. The length of time depends entirely on the rate transactions come into the CNC from the Door Controllers. The message will clear when the CNC has room for 1100 transactions.

Priority 2 - Comms Errors

`Snnn D/Cnn ERRnn`

This indicates an error in the communications link between the CNC and a Door Controller. In this case `ERRnn` represents the error number. E.g. `S001 D/C03 ERR03`. Error numbers currently displayed are `02`, `03`, `17` and `18`. If there is more than one error at any one time then the display will show each in turn, allowing 3 seconds for each message.

Priority 2 - Updates

`SITE nnn=nnnnn`

`SITE nnn*nnnnn`

This display indicates that the CNC is storing updates waiting to be sent to a site. This display will usually appear either when a large amount of data is sent to a site, such as during a download, or normal updates sent to a dial-up site not currently on-line.

- A maximum of 8 sites will be reported on this display. If more than 8 sites have updates waiting then only the 8 sites that are either on-line with the largest number will be displayed.

- If a `*` appears instead of `=` then the site is currently on-line.

- During a download the number of updates will increase rapidly. When all the data has been transferred from the PC to the CNC the number will decrease more slowly. The faster the link to the site, the faster the number will decrease.

Priority 3 - Monitoring

`** MONITORING **`

This message means that the PC is connected to the CNC, there are no errors reported in the communications links to the door controllers and there are no alarms waiting to be acknowledged.

Prioritized Messages when PC Off-Line

Note: that the PC will be unable to accept alarms when doing transaction analysis, creating download files and some other tasks including any of the System Configuration features. Therefore while the PC is performing these tasks alarms and communication errors may appear at the CNC

When they do occur all the following messages will be accompanied by a bleep which will remain until acknowledged with a valid Editor key. Even though the alarm is acknowledged at the CNC it will need to be acknowledged again when the PC is running the administration system again.

Priority 1 - Alarms

`Snnn Dnnn UNAUTHORIZED ACCESS`

`Snnn D/Cnn ANTI -TAMPER`

`Snnn Znnnn ZONE ALARM`

`Snnn Dnnn IDnnnn DURESS ALARM`

Priority 2 - Comms Errors

`Snnn D/Cnn ERRnn`

This indicates an error in the communications link between the CNC and a Door Controller. In this case `ERRnn` represents the error number. E.g. `S001 D/C03 ERR03`. Error numbers currently displayed are `02`, `03`, `17` and `18`. If there is more than one error at any one time then the display will show each in turn, allowing 3 seconds for each message.

Priority 3 - Buffer Full

`**BUFFER FULL**`

See the description in *PC On-Line* above.

Priority 3 - PC Off-line

`** PC OFFLINE **`

The PC is switched off, is not running the administration program or there is a fault in the link between the PC and CNC. This may also be displayed if the PC is running a lengthy transaction analysis, starting a download, in the System Configuration section or some other tasks which mean it cannot also communicate with the CNC.

Priority 4 - Updates

`SITE nnn=nnnnn`

`SITE nnn*nnnnn`

Adding a Second CNC

K6000   The K6000 administration system will support two CNCs. These may be both single site, both multi-site or one of each. In this case one CNC is connected as above to the COM1 port of the PC, the second CNC is installed in exactly the same way but may connect to any remaining PC serial port. The K6000 configuration software will allow you to enable the second CNC, see *K6000 Installation Manual.*

Readykey for Windows   The Readykey for Windows MS administration system will support up to six CNCs. These may be single site, multi-site or one of each. In this case one or more CNCs are connected as above to the COM1 port of the PC, the second CNC is installed in exactly the same way but may connect to any remaining PC serial port.

Appendix A

Readykey Equipment

Network Controllers

K6100-SS   Single-Site CNC

K6100-MS   Multi-Site CNC

K6005   CNC Upgrade Single-Site to Multi-Site

COS4/8 Data Switches

An alternative arrangement to using the six-wire bus at a remote site is to use a Code Operated Switch (COS). This device, available in 4 port or 8 port versions, switches control between the CNC and up to 4 or 8 K2100s or K2000-Ns. Each K2100 should be configured as a Slave, system type 3.

The COS may be directly connected to the CNC, or connected via a dial-up modem. Connections from the COS to the door controllers may use line drivers or other directly communicating devices, as described above in *Direct Connections.*

Note: it is **not** possible to use dial-back when using a COS.

Configuring the COS

When looking at the rear of the COS, the Master port is on the left. Slave ports 0,1,2 and 3 (and 4,5,6,7 on COS 8) are numbered from left to right.

The CNC communicates through the Master Port to Door Controllers connected to the Slave Ports. Note that the COS numbers its ports 0-3 (or 0-7 for the COS 8), whereas the Slave Door Controllers are numbered 1-4 (or 1-8). Therefore connect Slave Door Controller 1 to port 0, Slave Door Controller 2 to port 1 etc.

The switch on the front panel should be set to **Text** mode, switch up.

There are several switches inside the COS which should be set as follows:

> O - Switch Open
> C - Switch Closed

Master Port:

SW1A	SW1B
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8
C O O O C O O C	O O O C O C O C

Slave Ports (n=2 to 5 - COS4, n=2 to 9 - COS 8):

SWnA	SWnB
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8
O O O O O C C O	O O O O O O C C

Other Switches:

SW6 (Watchdog)

| O C C O O O O C | Infinite Time-out |

SW7 (Data Format)

| O C C O O O C O | No Parity, 8 Data Bits, 2 Stop Bits |

SW8 (Arming)

| C C O C C C C C | Arming character (ctrl-D) |

SW9 (Graphics)

| C O O O |

SW10 (Baud Rate)   **Close one switch only:**

75	1
300	2
600	3
1200	4
2400	5
4800	6
9600	7
19200	8

Cable for Direct Connection of CNC to COS

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

	Multi-Site CNC		**COS 4 or COS 8 Master Port**	
	25 pin male D-type connector		25 pin male D-type connector	
	RX	2 ———— 2	TX	
	TX	3 ———— 3	RX	
	GND	7 ———— 7	GND	
Note 1	CTS	5 ———— 20	DTR	

Notes

1. The CTS signal should always be kept high at the CNC when a site is connected. This should be done by connecting the CTS signal (pin 5) to DTR (pin 20).

Cable for Connecting Dial-Up Modem to COS

Use 24AWG / 0.22mm² 8-core, unscreened signal cable, maximum length: 45ft / 15m

Modem				COS 4 or COS 8 Master Port
25 pin male D-type connector				25 pin male D-type connector
TX	2	————	2	TX
RX	3	————	3	RX
RTS	4	————	4	RTS
GND	7	————	7	GND
DTR	20	————	20	DTR

Connecting dial-up modems to a COS

When a K2000-N or K2100 is connected directly to a modem then the door controller is able to detect the presence of the modem and program it accordingly. Within 60 seconds of connecting a dial-up modem to a K2000-N or K2100 the auto-answer light of the modem should come on, indicating that the modem has been set to answer a call from a CNC.

However when several K2000-Ns or K2100s are connected to a modem through a COS the door controllers are unable to program the modem directly.

There are two solutions to this problem:

1. **Switch programmable Modem** This is a modem that can be programmed through physical switch settings or by selections made from a front panel. In this case you need to make sure that the modem is set for 'auto-answer'.

2. **Programmed from K2000-N or K2100.** This requires temporarily connecting the modem directly to a K2000-N or K2100 and allow the door controller to program the modem. This requires a modem that will not lose its settings when power is removed - one with 'non-volatile memory'. If the auto-answer setting is ever lost then the modem will not answer the call and will have to be re-programmed by connecting to the door controller.

   To program the modem you need to connect the modem to the door controller using the appropriate cable described above. With both door controller and modem powered up, connect the two with the cable. Within 60 seconds the auto-answer indicator on the modem should illuminate. De-power the modem and reconnect to the COS using the correct cable. When powered up again the auto-answer indicator should be on. If it is not then the modem you have used has a volatile memory and is unsuitable for use with a COS.

Cable for connecting COS to K2100 or K2000-N

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

COS 4 or COS 8 Slave port				K2100 or K2000-N
25 pin male D-type connector				5-way Terminal Block
TX	2	———————		TX
RX	3	———————		RX
GND	7	———————		GND

Operation of the COS

When a site is configured for using a COS then the CNC will 'poll' each door controller by sending a special code sequence to the data switch. The first code, the arming code, sets the COS into 'switch time' and the ST light will come on briefly. The next code will be the port number to switch to, this will cause the number on the front of the COS to change. **Note:** the COS numbers its ports 0-3 (COS 4) or 0-7 (COS 8). Therefore when communicating with door controller 1 the COS will display *0*, when communicating with door controller 2 it will display *1* etc.

When a door controller is connected then its address number will flash on the front panel display.

Appendix B

This appendix describes various non-Readykey serial communication devices, including dial-up modems and line drivers. For the most up-to-date information on recommended devices please call Radionics' Customer Service.

Dial-Up Modems

Dial-up modems are usually described by the speeds at which they will operate. These are usually given in the form of CCITT 'V' numbers:

V21	300 baud
V22	1200 baud
V22bis	2400 baud
V32	9600 baud

Note: V22bis and V32 modems will fall back to a slower speed if they encounter a bad line. As Readykey equipment operates at a fixed baud rate this will result in a communications failure. The system will attempt to dial-up again and perhaps get a better quality line. Under most circumstances a V22, 1200 baud, modem should be suitable.

Usually the faster the modem the more it costs, but is on-line for a shorter period of time. For use with Readykey equipment you should select a modem that gives the best price/performance. A busy site with many transactions and updates will require a faster modem, a quiet site not updated very often will require a lower performance device.

K2100   A feature of the K2100 and K1100 door controllers allows it to 'forget' certain selectable types of transaction such as Request to Exit, Access Authorized etc. This prevents these transactions from being sent and therefore keeps communication times to a minimum.

The modem at the CNC should always match the highest performance modem on the remote sites. For instance you may have a 1200 baud modem on a busy site and 300 baud modems on 3 quieter sites. In this case you should have a 1200 baud modem at the CNC. A modem will usually support all speeds up to its own maximum.

Please consult Radionics' Customer Service for the latest information on recommended modems and other communications equipment.

Non-Powered Short Haul ModemsA pair of these devices will extend the distance that you can send the RS-232 signal from 15m to 20 km, depending on the baud rate used (see table below). These devices should be used with your own twisted-pair cable.

The devices may be used:

- between the CNC and a K2100, K1100 or K2000-N

- between the CNC and a COS

- between a COS and a K2100, K1100 or K2000-N

Description

These short haul modems are small devices that take their power from the RS-232 line itself. They allow communications over distances between 0 and 12 miles / 20 km depending on the speed of communications.

Note these devices should **not** be connected to leased lines.

Each unit has a small switch labeled DCE/DTE on its side, this should be set to DCE.

These units are available with either a male or female 25-pin connector.

Specification

Baud Rate	Maximum Distance
9600	3 miles / 5 km
2400	4 miles / 7 km
1200	6 miles / 10 km
300	12 miles / 20 km

Cables

CNC to Short Haul Modem

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45 ft / 15m

CNC RS-232 Port			Short Haul Modem (DCE)	
25 pin male D-type connector			25 pin male D-type connector	
RX	2	—————	3	TX
TX	3	—————	2	RX
GND	7	—————	7	GND
CTS	5	⌐		
Note 1 DTR	20	⌐─────	20	DTR

Short Haul Modem to K2100 or K2000-N

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

Short Haul Modem (DCE)			K2100, K1100 or K2000-N
25 pin male D-type connector			5-way Terminal Block
RX	2	—————	TX
TX	3	—————	RX
GND	7	—————	GND
Note 1 DTR	20	—————	DTR

Short Haul Modem to COS Master Port

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

Short Haul Modem (DCE)			COS Master Port	
25 pin male D-type connector			25 pin male D-type connector	
RX	2	—————	2	TX
TX	3	—————	3	RX
GND	7	—————	7	GND
Note 1 DTR	20	—————	20	DTR

COS Slave Port to Short Haul Modem

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

COS Slave Port			Short Haul Modem (DCE)	
25 pin male D-type connector			25 pin male D-type connector	
TX	2	———	2	RX
RX	3	———	3	TX
GND	7	———	7	GND
DTR	20	———	20	DTR

Note 1 (at DTR row)

Notes:

1. DTR at the short haul modem is used for providing power.

Between Short Haul Modems

Use twin twisted pair, maximum length: speed dependent, see above.

Short Haul Modem (DCE)		Short Haul Modem (DCE)
Screw Terminals		Screw Terminals
TXA	———	RXA
TXB	———	RXB
RXA	———	TXA
RXB	———	TXB

Line Drivers

A pair of these devices, also known as baseband modems, will extend the distance that you can send the RS-232 signal from 45ft to 4.5 miles (15m to 8 km). These devices may be used for connecting to Leased Line, or they may be used with your own twisted-pair cable. **Do not attempt to connect one of these devices to the public telephone system.**

The devices may be used:

*   between the CNC and a K2100, K1100 or K2000-N

*   between the CNC and a COS

*   between a COS and a K2100, K1100 or K2000-N

Description

These short haul modems are mains powered devices that allow communications over distances between up to 4.5 miles / 8 km at speeds up to 9600 baud.

Specification

Baud Rate	Maximum Distance
up to 9600	4.5 miles / 8km

Cables

CNC to Line Driver

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

CNC RS-232 Port		Line Driver
25 pin male D-type connector		25 pin male D-type connector

RX	2	—————	3	TX
TX	3	—————	2	RX
GND	7	—————	7	GND
	CTS	5		
Note 1	DTR	20		

Notes

1. The CTS signal should always be kept high at the CNC when a site is connected. This should be done by connecting the CTS signal (pin 5) to DTR (pin 20).

Line Driver to K2100 or K2000-N

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

	K2100, K1100 or K2000-N
Line Driver	
25 pin male D-type connector	5-way Terminal Block

RX	2	—————	TX
TX	3	—————	RX
GND	7	—————	GND

Line Driver to COS Master Port

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

Line Driver		COS Master Port
25 pin male D-type connector		25 pin male D-type connector

RX	2	—————	2	TX
TX	3	—————	3	RX
GND	7	—————	7	GND

COS Slave Port to Line Driver

Use 24AWG / 0.22mm² 4-core unscreened signal cable, maximum length: 45ft / 15m

COS Slave Port		Line Driver
25 pin male D-type connector		25 pin male D-type connector

TX	2	—————	2	RX
RX	3	—————	3	TX
GND	7	—————	7	GND

Between Line Drivers

Use twin twisted pair, maximum length: speed dependent, see above.

Screw Terminals		Screw Terminals
1	————	4
2	————	3
3	————	2
4	————	1