

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 assumes no responsibility for inaccuracies and reserves the right to modify and revise this manual without notice.

It is our goal at Radionics to always supply accurate and reliable documentation. If a discrepancy is found in this documentation, please mail a photocopy of the corrected material to:

Radionics  
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

<b>About this Manual</b> .....	<b>1</b>
K6100-CNC and K6100-CNCII Hardware .....	1
Single Site and Multi Site .....	1
Administration Systems .....	2
Other Documents .....	2
Margin Notes .....	2
Definitions .....	2
<b>Description</b> .....	<b>3</b>
Power Supply .....	4
Internal Features .....	5
External Connections .....	7
Using More than One Network Controller .....	8
<b>Features</b> .....	<b>9</b>
Dialup .....	9
Dialback .....	9
Communications Protection .....	9
Site Types/Numbers .....	9
Front Panel Display .....	10
<b>Installation</b> .....	<b>14</b>
Power Supply .....	14
Host PC .....	14
External Reader .....	15
Relay Outputs .....	15
Six-Wire Bus .....	16
<b>Serial Communications</b> .....	<b>18</b>
Direct Connection .....	18
Dial-Up Modems .....	19
<b>Specification</b> .....	<b>21</b>
Dimensions .....	21
Power Requirements .....	21
Fuses .....	21
Cables Supplied .....	21
Door Controller Software .....	22
<b>Appendix A - Full Download</b> .....	<b>23</b>
Description .....	23
Download Procedure .....	23
<b>Appendix B - Non-Readykey Communication Devices</b> .....	<b>25</b>
Dial-Up Modems .....	25
<i>Black Box</i> Non-Powered Short Haul Modem - SHM-NPR .....	25
<i>Black Box</i> Line Driver - LD-120MP .....	26
<b>Appendix C - CNC K6100-CNC to K6100-CNCII Upgrade Kit</b> .....	<b>27</b>
Description .....	27
Installation .....	27
Conversion Cables .....	28

<b>Appendix D - Cable Descriptions .....</b>	<b>29</b>
Power Supply .....	29
Host PC .....	29
Six Wire Bus.....	30
RS-232 Ports.....	31
External Reader .....	33
LD-120MP Line Drivers .....	33
<b>Appendix E - COS-4/8 Data Switches .....</b>	<b>35</b>

---

## About this Manual

---

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 allows Readykey door controllers to be administered from a central PC (personal computer). The central PC will be running Readykey administration software, usually Readykey for Windows but possibly the earlier MS-DOS-based K6000.

### K6100-CNC and K6100-CNCII Hardware

This document is written based on the K6100-CNCII CNC hardware, distinguished from the K6100-CNC by the RS-232 Ports on the rear of the case being **9-way** male D-type connectors, as opposed to **25-way** female D-type on the K6100-CNC.

An upgrade kit (K6199-CNC II) is available that allows installations which use the K6100-CNC to be converted - this includes the new CNC itself, and adapter cables. Use of this Upgrade Kit is described fully in Appendix B of this document.

The major new features in the K6100-CNCII CNC are:

- Overall speed improvement of 3-5 times
- Improved management of 'updates' - i.e. changes made to administration system database
- Support for external Wiegand-compatible administration readers. It will work with current Wiegand 26 bit formats.
- Support for external magstripe compatible administration readers. This is for "true" magstripe readers and does not work with magstripe readers with a Readykey output

**Note:** Only one external reader can be connected to each CNC. There is no external connection for Readykey readers.

- Dialing of dialup sites at a programmable interval of between 10 minutes and 24 hours has this been discussed with the s/w group and is now supported
- Displays which sites are online, even if no updates are waiting to be sent
- 9-way D-type RS-232 connectors used on rear for compatibility with standard PC to modem cables
- Improved reading range on front panel Readykey reader
- Option switches now accessible through hole in underside of unit, eliminating need to remove the cover.

### Single Site and Multi Site

Previously the K6100-CNC was supplied in two versions - Single Site and Multi-Site. The Single-Site CNC allowed up to 32 door controllers to be connected locally on the Readykey six-wire bus ONLY. 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.

The K6100-CNC Single Site was discontinued with the release of Readykey for Windows Version 3.0.

The K6100-CNCII CNC is supplied in a Multi-Site version ONLY. When upgrading from a single site system, change the CNC and the settings in Readykey for Windows to reflect the change.

## Administration Systems

It is assumed that all new installations will be administered through Readykey for Windows. This is Radionics' latest and most advanced administration system. However, the CNC may also be used with the earlier MS-DOS based K6000 system.

## Other Documents

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

### Door Controllers

*K2100/1100 Installation Manual*

These documents describe the installation of the Readykey controllers which can be connected to the CNC. They include, where appropriate, connection to readers, locks and configuration information.

Information on connecting the door controllers to the CNC, via either the Readykey Six Wire Bus or RS-232 is included within the Network Controller Installation Manual.

**Note:** Throughout this manual reference is made to the K2100 controller. Unless explicitly stated otherwise, this includes the other controllers.

### Administration Software

*Readykey for Windows System Overview*

*Readykey for Windows Software Installation Manual*

*Readykey for Windows System Programming Manual*

The above two documents describe the design and installation of a Readykey for Windows system, including where and when a Network Controller is required, and how this is configured within the Readykey for Windows software itself.

*K6000/K6000-MS Installation Manual*

*K6000/K6000-MS User Manual*

These documents describe the installation and programming of a K6000 system. However, you should not refer to any information described in *K6000 Installation Manual* to connect the CNC to the PC and door controllers - this document was based on the K6100-CNC and is not relevant to the K6100-CNCII.

## 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 Windows** ... such as Readykey for Windows.

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

**K6100-CNCII Only** This will be used to indicate a feature available on the K6100-CNCII only.

## Definitions

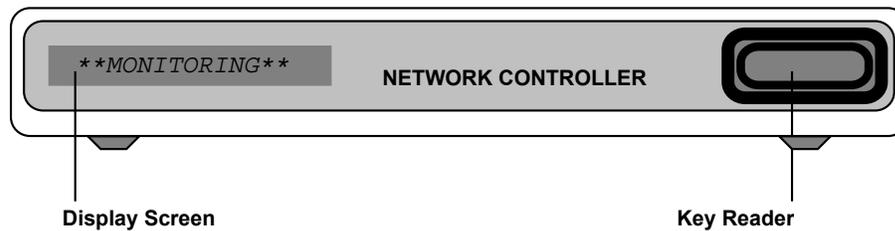
A full glossary of all terms particular to Radionics access control systems is included in *Readykey for Windows System Overview*.

## Description

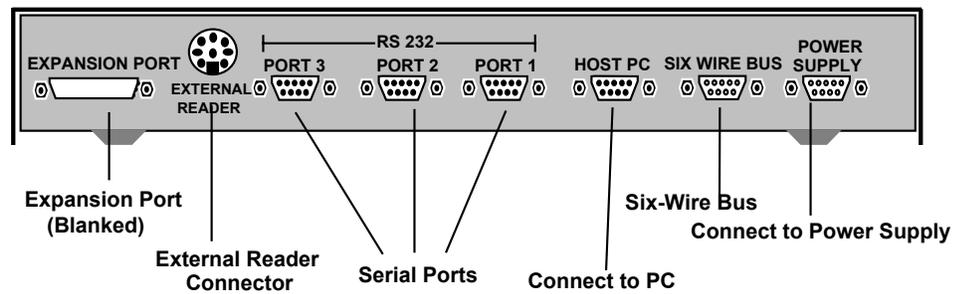
The Readykey CNC is a flat, steel cased unit ideally suited to being mounted between a PC system unit and the PC monitor.

The front of the CNC has a 16 character display where system messages are displayed, and a key reader for key administration and alarm acceptance. The rear of the controller has six 9-way D-type connectors - used for power, six-wire bus, host PC and 3 RS-232 (serial) ports.

The rear of the CNC also includes an 8-way DIN connector (for connection of an external magstripe/Wiegand reader) and a blanked off future expansion port (not used).



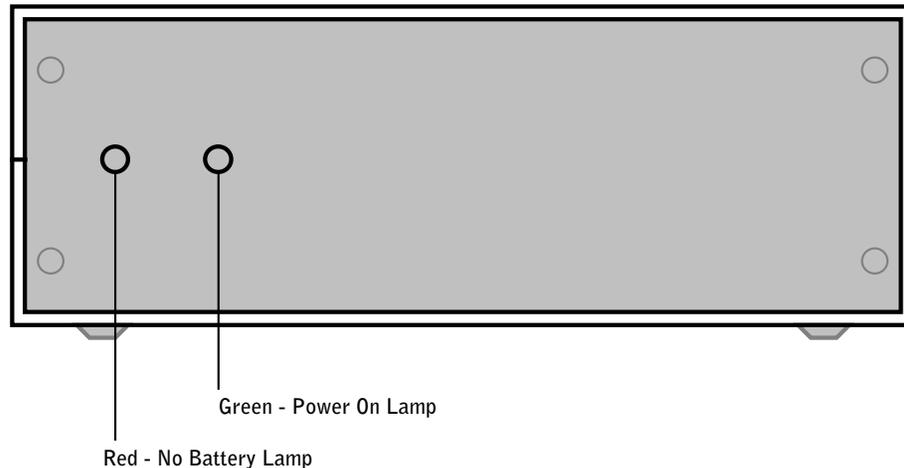
Readykey CNC Front Panel



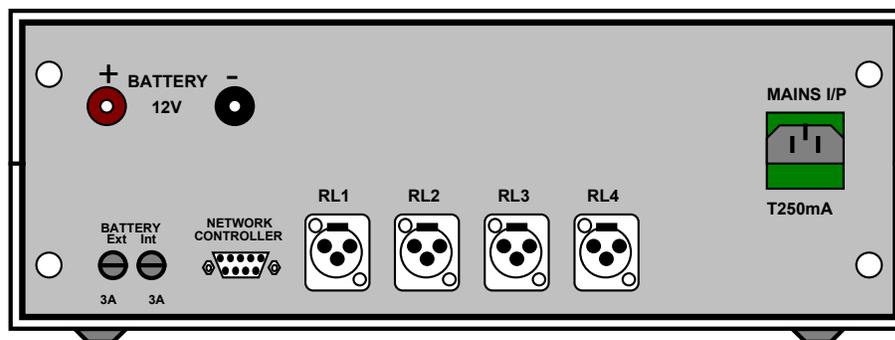
Readykey CNC Rear Panel

## Power Supply

Power is provided to the CNC by a separate power supply unit, supplied with every CNC (not included in the K6100-CNC to K6100-CNCII Upgrade Kit), which also contains four relay outputs (not used by Readykey for Windows systems).



Power Supply Unit - Front Rear



Power Supply Unit - Rear View

## LED Operation

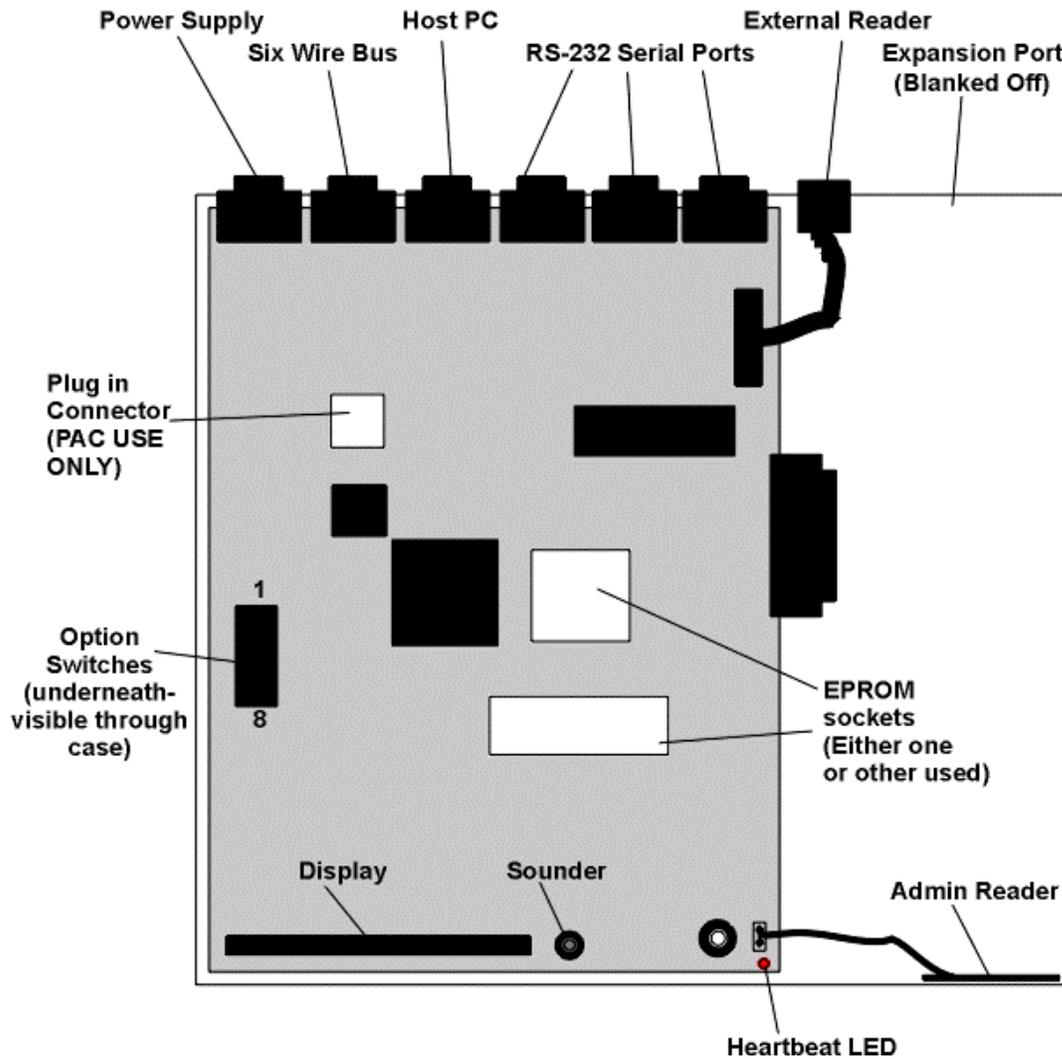
The two LEDs provided on the CNC indicate the current status of the AC (mains) and battery supply. The following table indicates the status of each LED under different conditions.

Power	Red LED ( $\sim$ )	Green LED ( $\oplus$ )
AC (Mains), with Battery	ON	ON
AC (Mains), with no Battery	ON	ON
No Mains, with Battery	OFF	ON
No Mains, Battery low (<10.5V)	OFF	OFF
No Mains, No Battery	OFF	OFF

**Note:** The battery can be low (<10.5V) but it will still operate the CNC as there has been some leeway allowed between the battery low indication and the CNC failing. This allows sufficient time for the battery to be changed.

## Internal Features

You should not need to remove the lid of the CNC unless upgrading the software. The electronics are contained on a single circuit board.



CNC - Internal Components

## Switches

### **K6100-CNCII Only**

There is a set of switches on the main circuit board, located on the underside and accessible through a hole in the case, **without removing the cover**. (On the K6100-CNC it was necessary to remove the cover of the CNC to access these switches.)

These switches are used for feature selection. Switch 1 is located nearest the rear of the CNC, switch 8 nearest the front.

These switches are **ON** when switched towards to the left hand, outer edge of the CNC (closest to switches).

All these switches should be **OFF**, **except** for:

**IMPORTANT!**

**Switches 1-3 - Modem**

- 
- If these switches are **OFF**, then this indicates that a PSTN modem or other RS-232 device is connected to the relevant port (Switch 1=Port 1, etc.) of the CNC.

**Switch 5 - Internal Sounder:**

When switched **ON** this switch silences the internal sounder - including when alarms are received, and the PC is off-line.

**Switch 7 - Host PC to CNC Baud Rate:**

- **Readykey for Windows (9600):** This switch should always be **OFF**, towards the center of the CNC - this is the default setting.
- **K6000 systems (19200) :** This switch should always be **ON**, towards the edge of the CNC.

**Heartbeat LED**

The CNC features a red LED, visible through the front panel bezel, which pulses to indicate the CNC is powered and operating.

**K6100-CNCII  
Only**

Rapid flashing of the LED indicates a 'bad read' when a Wiegand-compatible and/or Magstripe reader is connected to the External Reader port on the rear of the CNC.

**Display**

A 16 character vacuum-fluorescent display is used to display a range of messages - including communications to door controllers and the host PC, alarm events when the PC is off-line, and other system messages.

**Sounder**

When an alarm event is received by the CNC and the host PC is off-line, the CNC will beep to enunciate the alarm. The sounder may be turned off by turning Switch 5 **ON** (not recommended).

**Reader**

A Readykey proximity reader is located behind the front panel bezel, towards the right hand side of the front panel. This is used for a variety of purposes - including operators logging into the PC software, key administration and acceptance of alarms.

**K6100-CNCII  
Only**

If any non-Readykey ID devices are in use, then a Wiegand-compatible or magnetic stripe reader may be connected to the 'External Reader' connector on the rear panel (see below).

## External Connections

The rear panel of the CNC includes six 9-way D-type connectors, one 8-way DIN connector and a blanked off expansion port.

The function of each of these connectors is described briefly below, starting from the right (as viewed from the rear of the CNC).

More detail is provided on the exact connections available in the next sections of this document.

### Power Supply

A 9-way male D-type connector is used to connect the CNC to the Power Supply Unit. This provides all the required voltages to the CNC.,

### Six Wire Bus

This port is a 9-way female D-type connector to which up to 32 K2100 door controllers may be connected. The **total** distance can be up to 3000ft (1000 meters) with a maximum of 1500ft (500m) between door controllers.

### Host PC

The host computer connects to this port, using one of the leads supplied, and via a COM: (serial) port on the PC.

This port is a 9-way D-type male connector (previously 25-way male on K6100-CNC ).

### RS-232 Ports 1-3

A wide variety of devices may be connected to these ports, for communication to door controllers. These devices include PSTN modems,, radio or microwave communication modules, fiber optic or wire line drivers, etc. - generally any communications device that features an RS-232 interface.

Again these three ports are 9-way D-type male connectors (previously 25-way male on K6100-CNC ).

These three ports are identical in function - each may be configured independently through the administration software to indicate the communications method in use.

### External Reader

#### **K6100-CNCII Only**

A Wiegand compatible/mag stripe reader can be connected directly (without interface) to the 8 pin female DIN connector located on the back of the CNC. This external reader can be used for all administration purposes. Multiple reader technologies are supported in any combination (i.e. Readykey and Wiegand, Wiegand and Mag Stripe, Readykey and Mag stripe) by using a combination of Administration Kit, internal Readykey reader and external reader.

**Note:** These different types of readers can be connected directly to this port, and no Wiegand Interface is required. Only one external reader can be used at any one time.

No configuration is required to use the external reader connector.

#### **Wiegand**

- Sensor Engineering 26-bit (2601)
- Casi-Rusco 28 bit
- Checkpoint Mirage reader 33 bit format

#### **Magstripe**

- Paxton/MR Sensors 7 digit
- Paxton/MR Sensors 9 digit
- Paxton/MR Sensors 11 digit

- Default Bank Format

**Note:** If an external Magstripe reader is being used then the output from this reader **must** be in magstripe format, even if the Magstripe readers on the system output the ID in Readykey format.

A 6ft (2 meter) flying lead is supplied with the CNC. One end is terminated in an 8-way male DIN plug, the other end is unterminated. See Appendix C for the color code for this lead and connection information.

**Note:** Radionics recommends unshielded cable

## Using More than One Network Controller

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

### **K6000**

The K6000 system supports two CNCs. 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 system may support up to 20 'masters' which may be connected to different PCs (when using the Multi-PC option). (A 'master' is either a CNC or K2100 controller operating in System Type 2 - refer to K2100/K1100 *Installation Manual*.)

If you are using more than one CNC on your system, then you should consider distributing these across multiple PCs (workstations) to improve system performance.

The total number of sites on a Readykey for Windows system, may not exceed 128 per 'division'.

Refer to Readykey for Windows *System Overview* for a full description of 'masters', 'divisions' and 'sites'.

# Features

---

## Dialup

The CNC can be programmed (through PC administration software) to automatically dial any site that communicates via a modem . The CNC can dial each site either once or twice a day at predefined times.

## Dialback

**K2100** The CNC supports 'dialback' from sites which communicate via PSTN modems , and the 'master' door controller on the site is a K2100. In the event of an alarm (or certain other events) 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 an unauthorized modem from establishing communications with a remote site. It is done by the K2100 checking the Supervisor (Master) key code sent by the CNC and comparing it with its own code. If they do not match then the master code stored in the door controller is compared against the **PREVIOUS** Supervisor code stored in the CNC. If this also fails to match then the session is aborted.

## Site Types/Numbers

Each CNC will support up to 128 sites, of which:

- Site 1 is **always** the Six Wire Bus - up to 32 door controllers
- Sites 2-33 are RS-232 sites - up to 8 door controllers each
- Sites 34-128 are RS-232 sites - 1 door controller ONLY each site.

This also means that only one Six Wire Bus site, and a maximum of 32 RS-232 sites with more than one door controller can be configured to communicate through each CNC.

### **Readykey for Windows**

As sites are added, Readykey for Windows automatically assigns a site number in the appropriate 'range'. Furthermore, Readykey for Windows will not allow you to add more than one 'Six Wire Bus' site, or more than 32 RS-232 sites with more than one door controller.

If your Readykey for Windows system consists of multiple 'divisions', then it is possible for sites from more than one division to communicate with Readykey for Windows via the same CNC. However, the above restrictions and rules still apply - for example, you will not be able to have a Six Wire Bus site in each of two divisions if you only have a single CNC on your system.

The Readykey Engine normally runs as a minimized application (i.e. an icon). However, if the user double-clicks on the icon to restore it to normal window size, then a list of Site names, the division name for each site, the site number and Master (CNC) name will be shown for all sites on the system. This is in the form:

```
MASTER <Master Name>, Site nnn - <Division Name> <Site Name>
```

- where nnn is the site number as used by the CNC.

It is recommended that a written record of Site/Division Names and Site Numbers is kept by each CNC, for reference purposes in the event of the Readykey for Windows software being closed down.

## 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 beep, especially alarms. All the messages have a priority (1 being the highest, 4 the lowest) 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:

1.     **\*\*SYSTEM RESET\*\***

The CNC has been reset.

2.     **Readykey CNC VX=YZ**

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

3.     **HOST BAUD =19200**  
        **HOST BAUD =9600**

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, and the PC is online.

In the descriptions of each message the following code is used to describe parts of the message:-

<b>Snnn</b>	Site Number, <b>nnn</b> =1-128
<b>Dnnn</b>	Door Number, <b>nnn</b> =1-128
<b>D/Cnn</b>	Door Controller Number, <b>nn</b> =1-32
<b>IDnnnnn</b>	Personnel ID Number, <b>nnnnn</b> =1-18,000

**Note:** The site numbers will be automatically assigned by Readykey for Windows, when the site is added to the database in **Installer: Sites**.

**Note:** On multi-division Readykey for Windows systems you may have sites from different divisions communicating through a single CNC as described above. Note that the CNC display does not show the division information.

### 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 'Clock Synchronization' is selected by the user to force the CNC and door controllers to synchronize with 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 (the buffer can hold up to 15000 transactions). 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.

**Note:** If this condition is ignored then events will be lost.

### 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 01, 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.

Readykey equipment may report the following communications errors, that will help diagnosis of any problems that may occur on the system:

**Comms Error 1** means a door controller was polled but no reply was received. This may be due to:

- the door controller being disconnected from the communications cable
- the door controller being switched off
- a faulty door controller
- address conflict - two or more door controllers may have the same address set

**Note: A Comms Error 1 can only occur on a Six Wire Bus link.**

**Comms Error 2** means that an incorrect reply was received to an issued command. This type of error rarely occurs and is usually due to noise on the cable or a software incompatibility.

**Comms Error 3** means the reply from a door controller to a command was not received or understood. This may be due to:

- faulty communications cabling
- one or more door controllers may have the same address set.

**Comms Error 17** means that there is a modem problem at either the CNC or the remote site. This type of error is sent to Readykey for Windows as one of the following transactions:

- Modem Not Connected
- Re-dialing
- Line Unobtainable.

**Comms Error 18** means that although communications was established with the remote modem, the CNC was unable to communicate with the Readykey door controller at the remote site. This type of error is reported to Readykey for Windows as 'D/C Not Responding'.

### Priority 2 - Updates/On-line

SITE nnn=nnnnn

SITE nnn\*nnnnn

This display indicates that the CNC is storing updates waiting to be sent to a site, or that the CNC is online to a particular site. Updates are changes to the administration system database that need to be transmitted to door controllers on the sites. A large number of updates are created when a download is initiated. Updates are also queued up when changes are made at the administration system for a dial-up site that is not currently online.

- A maximum of 8 sites will be reported on this display. The number of updates for a particular site will be displayed for 3 seconds.

If more than 8 sites have updates waiting then the following rules will apply:

The number of updates for any sites that are currently online will **ALWAYS** be displayed, regardless of the number of updates outstanding.

The remaining 'gaps' in the display buffer will be filled by the sites that have the largest number of queued updates.

For example, if 3 sites are currently online, and a total of 12 sites have updates waiting, then the number of updates for the 3 sites that are online, and for the 5 offline sites with the **highest number of updates queued** will be displayed.

- If a \* appears instead of = then the site is currently online.
- If there are **no** updates for a site that is currently online, then the CNC display will show

SITE nnn\*00000

for that site.

- 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 Offline

**Note:** The PC will be unable to take responsibility for alarm annunciation at certain times - for example if the administration software is closed down, the PC is turned off, or is performing a resource-intensive task (this will largely depend on the PC specification). Therefore at this time alarms and communication errors will appear on the CNC display itself.

When these do occur all the following messages will be accompanied by a beep which will remain until acknowledged with a valid operator key. Even though the alarm is acknowledged at the CNC **it will need to be acknowledged again** when the PC is again able to receive alarm events.

**Priority 1 - Alarms**

Snnn Dnnn UNAUTHORIZED ACCESS  
 Snnn Dnnn ANTI-TAMPER  
 Snnn D/Cnn ANTI-TAMPER  
 Snnn Znnnn ALARM RECEIVED  
 Snnn D/Cnn OVERRIDE 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 01, 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.

A description of the meaning of each error message is shown in the section above (Prioritized Messages when PC Online).

**Priority 3 - Buffer Full**

**\*\*BUFFER FULL\*\***

See the description in *PC On-Line* described earlier.

**Priority 3 - PC Offline**

**\*\* 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. On Readykey for Windows systems this may also be displayed if the PC is running a Backup operation or if the PC is particularly busy which means it cannot communicate with the CNC properly.

**Priority 4 - Updates**

SITE nnn=nnnnn  
 SITE nnn\*nnnnn

See the description in *PC On-Line* described earlier.

# Installation

---

## Power Supply

Connect the CNC Power Supply to the AC (mains) via the lead supplied. The red and green lamps on the front of the Power Supply Unit should both illuminate. (If they do not, then check the fuse in the mains supply).

If you intend to install a backup battery, then this should be connected next, observing polarity. If the battery is healthy, then the green LED on the Power Supply should be illuminated. If it is not, then check the battery is charged, connected correctly and the Battery Fuse in the Power Supply Unit is not blown using a suitable meter.

Next, connect the Power Supply Unit to the CNC itself, using the cable supplied (9-way MALE D-type connector at one end, 9-way FEMALE D-type connector at the other).

At this stage the CNC should initialize, and display the startup messages described above. If it does not, then confirm the condition of the 'DC' fuse in the Power Supply Unit itself, and also the correct cable is being used. (A description of the cable is contained in Appendix C.)

## Host PC

Once the CNC is correctly powered, the next stage is to connect it to the Host PC - i.e. the PC running the administration software - either Readykey for Windows or K6000.

### Readykey for Windows

You can use any PC serial port - COM1:, COM2:, COM 3: or COM4:. 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 **Installer: Masters** in Readykey for Windows.

You will also need to make sure that the **Master Type in Installer: Masters** is correctly set to 'Multi-Site CNC'.

Refer to Readykey for Windows *System Programming Manual* for additional information.

### K6000

The first CNC on a K6000 system **MUST** be connected to COM1:, and the second to COM2:. This configuration cannot be changed. If your PC has only one serial port, this will be COM1:. If there is more than one serial port then you will need to determine which is COM1:.

For further information refer to *K6000/K6000-MS User Guide*.

## Connections

Two cables are supplied that connect the CNC to the PC. Both have a 9 pin D-type female connector for connecting to the CNC Host PC 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 types of serial ports provided on PCs, either 9 pin or 25 pin male.)

Use the appropriate cable to connect the CNC Host Port to the desired serial port on the PC.

## Establishing Communications

At this stage you should establish and confirm communications between the CNC and the administration software.

On a Readykey for Windows system use **Status: Masters** to confirm the communications; on a K6000 system the CNC Status on the main transaction screen should become green.

Once you are certain communications are established you should initialize the CNC. Refer to the documentation for the particular administration system being used for details on how to do this.

Briefly, in Readykey for Windows the CNC is initialized through **Installer: Masters**. On a K6000 system, the CNC is initialized using the **Initialize a Network Controller** option, found within the **System Configuration** main menu, **Installation Configuration** sub-menu.

## External Reader

A third party Wiegand-compatible and/or Magnetic Stripe (devices encoded ISO Track 2) reader may be connected to the External Reader socket on the rear of the CNC.

### **K6100-CNCII Only**

If used, these allow non-Readykey ID devices to be used on the CNC, without the need for a PC Interface Kit. No Wiegand or other interface unit is required.

A flying lead, supplied with the CNC is used to connect to the DIN socket on the rear of the CNC. The connection information is detailed in Appendix C. No configuration of the CNC is required. The in-built Readykey Proximity reader, a Magnetic Stripe reader and a Wiegand compatible reading device can all be used on the same CNC.

**Note:** If you are using the Readykey Magnetic Stripe Reader and cards on your system, then you will need to obtain a Magnetic Stripe reader with a standard (ISO Track 2) output to administer these cards and connect it to this socket.

The following formats of Wiegand/Magstripe compatible devices are supported:

### **Wiegand**

- Sensor Engineering 26-bit (2601)
- Casi-Rusco 28 bit
  
- Checkpoint Mirage reader 33 bit format

### **Magstripe**

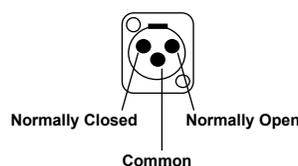
- Paxton/MR Sensors 7 digit
- Paxton/MR Sensors 9 digit
- Paxton/MR Sensors 11 digit
- Default Bank Format

## Relay Outputs

**Important: These relays are not supported by Readykey for Windows.**

### **K6000 Only**

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



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 online 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.

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

## Six-Wire Bus

The six-wire bus is Radionics' proprietary communications link for local connection of door controllers. It uses up to 3000ft/1000m of standard unshielded signal cable to connect door controllers. No single length of cable should be longer than 1500ft (500m). The total cumulative length of the six-wire bus connection can be no greater than 3000ft/1000m.

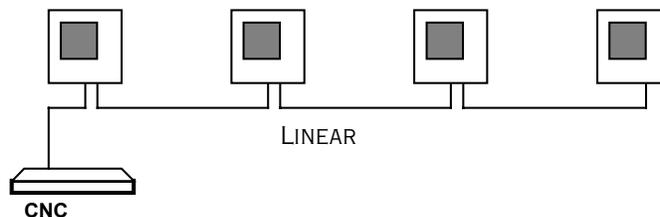
As well as being used on a CNC-based system to connect between 1 and 32 door controllers directly to the CNC, the Six Wire Bus may also be used between the 'master' controller on an RS-232 site (i.e., the controller with address 1) and up to 7 additional 'slave' controllers (addresses 2 to 7) on the site. The same specifications apply to both scenarios.

### Cable Specification

Use multi-stranded, unshielded, 6-core, 24 AWG (0.22mm<sup>2</sup>) alarm or signal cable.

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).

If you do use screened cable then you should reduce the maximum distance allowed to 1150ft (350m) total, 450ft (150m) between devices on the bus.



Six-Wire Bus Wiring Configuration

## Addresses

The six-wire bus works by each door controller having its own unique address. While not required, it is good practice to address door controllers consecutively.

However, on a site that communicates to the CNC via RS-232 - the door controller connected to the remote end of the RS-232 link **MUST have address 1**. The other door controllers will have addresses 2-7.

## System Types/Controller Types

K2100 controllers can be configured in different 'System Types' depending on the exact configuration they are being used in. Only two of these types are used with the CNC:

### System Type 2

The door controller connected directly to the remote end of an RS-232 communications link should be configured as System Type 2.

Up to 7 additional 'slave' (System Type 3) controllers may then be connected to this controller via the Six Wire Bus.

System type 2 controllers are referred to throughout this document as 'Remote Masters'.

There is no equivalent to this type of controller from the earlier K2000 Series. A K2000-N controller can be connected to the remote end of an RS-232 communications link, but **no further door controllers can then be added on this site** via the Six Wire Bus.

To summarize, Master Controllers may be:

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

### System Type 3

Any door controllers that communicate to the CNC via the Six Wire Bus, either directly to the CNC or via a Remote Master should be configured as System Type 3.

These controllers are referred to throughout this document as 'Slaves', and may be considered equivalent to the earlier K2000-N controllers, which some installers may be aware of.

Therefore, Slave controllers may be:

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

## Direct Connect to Network Controller

Up to 32 slave door controllers, addressed 1 to 32, via 'Six Wire Bus' port on CNC.

## RS-232 Direct Link from 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.

**Note:** You can have up to three such sites connected to the CNC.

## Setting the Door Controller Address

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

## Programming the System

**K6000** See *K6000/K6000-MS User Manual* for details on commissioning and programming the system.

**Readykey for Windows** See *Readykey for Windows System Programming Manual* for details on commissioning and programming the system.

# Serial Communications

---

This type of communication uses the serial RS-232 outputs on the rear of the CNC to communicate with door controllers.

There are two types of serial communication:

1. **Direct Connection**
2. **Dial-Up Connection Using PSTN Modems Direct Connection**

## Direct Connection

A permanent connection to a door controller using line-drivers, leased line modems etc. This type of connection is permanently online, 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.

There are 3 RS-232 serial ports installed as standard 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, leased line modem or other device.

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 Links
- Microwave
- Extended distance RS232 cable

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.
- Hardware/software flow control.

At 9600 baud the CNC expects a reply from the door controller in less than 2.5 seconds starting from the first character transmitted by the CNC. Delay between characters during transmission or reception should not exceed 300mS.

A message is considered to be a single packet. Packet sizes vary as follows:

- CNC to the door controller vary between 5 and 120 characters.
- Door controller to the CNC vary between 5 and 210 characters.
- CNC to the PC vary between 5 and 310 characters at 9600 baud.
- CNC to the PC vary between 5 and 410 characters at 19200 baud (DOS products only).
- PC to the CNC vary between 5 and 120 characters.

## Dial-Up Modems

### Description

Up to 127 sites can be serviced by dial-up modems. Dial-up sites require the use of a pair of modems connected to standard public (PSTN) telephone lines.

Up to three modems can be connected to a CNC and the CNC will dial-up each site in turn automatically once or twice a day. A modem installed at each site, connected to a K2100 (or K2000-N or COS), will answer the call.

A second method allows the sites to be 'force dialed' by operator intervention from within the administration software. This may be used, for example, when an operator adds a key for a new person, and requires it to be 'active' on a remote site before the next scheduled dialup.

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.

### Dialback

#### **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 'dialback' to the CNC in the event of an alarm condition.

The current version of the K2100 **also** allows the door controller to be programmed such that in the event of an Access Authorized, Exit Authorized or Entry Authorized transaction being generated the door controller will dial back to the CNC. This facility may be configured on an individual door basis for each door controller on the site. For example, it is possible to configure the master door controller such that it will dial back in the event of access being authorized through door one on each of door controllers 2, 3 and 4 on the site, but not on any other doors. This is in addition to dialing back in the event of any alarm occurring. Detailed information on programming this feature is included in *K2100/K1100 Installation Manual*.

The K2100 stores one or two telephone numbers which it will use for the dialback. 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 high priority commands will be sent from the CNC to the site, allowing alarm acknowledgments to be sent back to the door controllers. To ensure that a dialback modem is not tied up too long, the dialback will be aborted after 2 minutes of inactivity.

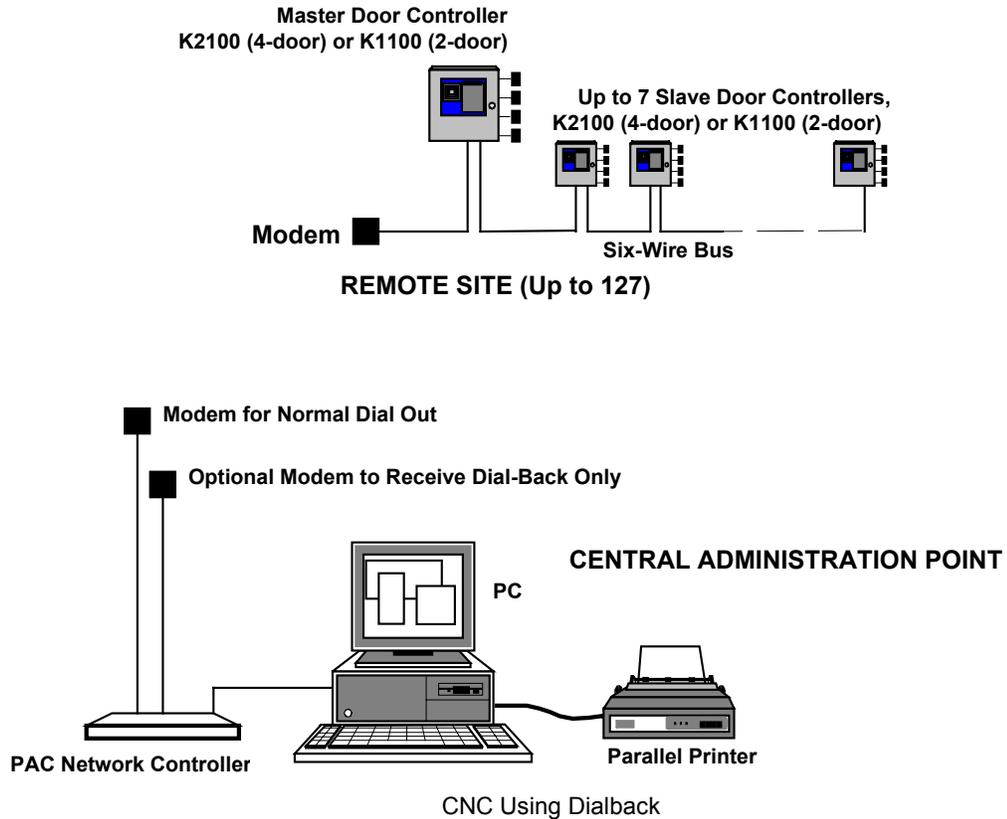
A single modem can be connected to the CNC to act as both the routine dial-up and dialback device. However, we recommended that one modem is dedicated to routine dial-ups, and a second connected to another CNC port, to be used for dialback only. The routine dial-up modem could also serve as the second, backup, phone number programmed into the K2100.

Note: that when a dialback occurs no low-priority transactions will be uploaded to the CNC, and no 'updates' will be downloaded to the door controllers on the site.

### 'Forget' Transactions

#### **K2100**

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



## Communication Protection

### K2100

A feature of the K2100 allows dial-up communications between a CNC and the door controller to be protected. The door controller checks for a match with the current Supervisor Keycode (or the previous one in case it has recently been changed) with the information in the CNC. If no match is found, communications are aborted. See *K2100/K1100 Installation Manual* for full details.

**Note:** If this feature is in use, then you should be careful not to change the Supervisor Keycode in the administration system more than once without first dialing ALL the remote sites, to avoid 'locking yourself' out of communications with a site.

## Phone Lines

Each modem you connect to the CNC will require its own phone line. If using the dialback feature, then the phone number of the dialback line is the number programmed into the K2100. Phone sockets should be located so that the modems are within 6ft (2m) of the CNC.

If you are using the dialback feature, ensure that the number of the modem at the CNC can be reached directly - i.e. not through a switchboard, and that the number does not have 'incoming calls barred'.

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

# Specification

## Dimensions

All dimensions are in millimeters (mm).

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

### CNC

Length x Width x Height      380 x 350 x 57

### Power Supply Unit

Length x Width x Height      270 x 345 x 125

## Power Requirements

**Input Voltage**                      240v AC or 110v AC (different versions supplied)

**Battery Output**                      13.8v DC at up to 370 mA

**Current Consumption**              CNC 12v DC @ 600 mA

## Fuses

The following table details the location, type and rating of each fuse.

Ref	Location	Type	Rating
Mains I/P	Mains fuse under mains input connection	HBC, Anti-surge	250mA
Ext Battery	On back panel	20mm glass, Anti-surge	3A
Int Battery	On back panel	20mm glass, Anti-surge	3A

## Cables Supplied

**Note: Drawings for all of these cables (except for the mains supply) are included in Appendix C.**

All the cables below are supplied by Radionics labeled and identified. However, a brief description is included below for each cable.

### Mains Supply

One mains lead is supplied with a molded IEC 3-pin plug and 4½ft (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 6ft (2m) of cable is used to connect the power supply to the CNC. A male 9-pin D-type connector connects to the power supply, a female 9-pin D-type connector connects to the CNC.

### CNC to PC

Two cables are supplied, both 6ft (2m) long with a female 9-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 at the other end. You only need to use the cable that connects to the appropriate serial (COM:) port on your PC.

**Note:** If the PC has 4 COM ports free (COM1 to COM4) then you can have 4 CNCs on the one PC.

### **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.

### **RS-232 Ports**

Three RS-232 leads are supplied - to allow any RS-232 device to be connected (for example modems, line drivers, etc.) to one of the 3 RS-232 ports on the CNC. Each of these is 6ft (2 meters) in length.

These are connected with a 9-way female D-type for connecting to the CNC itself, and a 25-way male D-type for connecting to the modem or other RS-232 device. You should confirm with the Installation Manual of the RS-232 device that the connections match those expected by this cable. (In the event of the RS-232 device having different connection requirements, then the 25-way connector may be removed and the required connections made, using the color coding detailed in Appendix C.)

### **External Reader**

A 6ft (2 meter) cable is supplied for connection of a third party magnetic stripe or Wiegand-compatible reader. This is connected with an 8-way DIN plug (male) at one end. The other end is unterminated - the color code for the cable is given in Appendix C.

## **Door Controller Software**

Please note that when using a K6100-CNCII CNC the software in the door controllers must be as follows:

### **K2000-N**

- Version SR758 or later

### **K2100/K1100**

- Version 3.0 or later

<p><b>Warning:</b> Failure to ensure this could result in corrupt and incorrect transactions being reported, and changes made to the PC administration system not updating the information stored in the door controllers correctly.</p>
--

Radionics strongly recommend that to obtain maximum benefit from the improved features of the K6100-CNCII , that all door controllers installed on the system are upgraded to K2100 or K1100 controllers using Version 3.0 or later firmware. Firmware upgrade can be obtained by ordering a K2199 for each door controller on the system.

# Appendix A - Full Download

## Description

This appendix describes how to perform a full download to remote dial-up sites. The procedure in this appendix must be used to ensure a successful download.

## Download Procedure

Check that the CNC display shows MONITORING. If this is not the case then it is likely there are updates in the CNC buffer waiting to be sent. If there are pending updates, each site **MUST** be dialed in order to clear the CNC buffer.

**Note:** The CNC will display a maximum of 8 sites that have updates pending.

### Example:

If 3 sites are currently on line, and a total of 12 sites have updates waiting, then the number of updates for the 3 sites on line and the 5 off line sites with the **HIGHEST** number of updates will be displayed. When you hang-up from a site that has completed it's download, if there are more than 8 sites with updates you will now see a new site appear in the CNC display.

A typical display when online to a site will look as follows:

```
SITE 33 *00037
```

This shows that site 33 is online (the asterisk \* indicates online), with 37 updates remaining. These updates will decrement as the controller receives them. An equals sign to the left of the updates, e.g. = 00037 means the site is **not** online and there are 37 updates waiting.

### Notes:

1. If more than 5 off line sites have an equal number of updates then the 5 highest numbered sites will be displayed.
2. If the site is on a six wire bus arrangement or is connected using a direct RS232 connection then updates will occur in real time.

If a communication problem exists where a remote site cannot be dialed **and** the remote site has updates pending, then the CNC will need to be initialized from the utilities menu within the **Installer** application.

**Warning:** this will clear all the updates pending for this site and a full download will be necessary when the communication problem has been corrected. It is recommended that this is done only as a last resort if the communication problem cannot be corrected first.

Initializing the CNC effectively clears out the buffer which means any other sites that have updates will be cleared. Each site that had updates will therefore need to be dialed in order so that a FULL download can be carried out. As a last resort with the above, clear the POLL TABLE for the problem site by disabling the master controller and any slave controllers associated with the master from within **Installer, Controllers**.

When downloading to a site, if it is a new door controller, it is good practice to first **Initialize** the controller.

When communications have been established to a site, whether it is hard wired or dial up, then you must Initialize the door controller. If the site is remote you will need to use the Force Dial facility found in **Installer, Utilities**. The CNC may drop off its link if you are Initializing the controller. The CNC will, however, re-dial the site and re-establish communications. This is more likely to happen if the controllers are old versions.

When communications have been established then a download may be performed from the Initialize and Download utility.

Note that the computer will download its updates to the CNC fairly quickly and you will see a message such as "Download to Network Master complete". This message indicates that the updates have reached the CNC, NOT the relevant controller/s. You will see the updates decreasing on the CNC display as they are downloaded to the controllers.

In order to check the download you may present Id Devices that may have been added to gain entry through doors to the relevant readers on the remote site. If successful you will receive an "Access Authorized" transaction.

Remember that a force dial utility will generally keep the line established for two minutes of inactivity. A normal dial up will only hold the line for a matter of seconds if there is inactivity and subsequently go off-line.

## Appendix B - Non-Readykey Communication Devices

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 - some examples are given below:

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

Under most circumstances a V32, 9600 baud, modem should be suitable. Faster modems can be used as long as they can support the AT command set for 9600.

**Note:** V22bis and faster modems will fall back to a slower speed if they encounter a bad line. As Radionics equipment operates at a fixed baud rate this will usually result in a communications failure. The system will attempt to dial-up again and perhaps get a better quality line. This problem can be overcome for most makes of modem by programming using terminal emulation software.

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

### Black Box Non-Powered Short Haul Modem - SHM-NPR

A pair of these devices will extend the distance that you can send the RS-232 signal from 45ft (15m) to 12½ miles (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 or K2000-N
- between the CNC and a *Black Box* COS
- between a *Black Box* COS and a K2100 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 12½miles (20 km) depending on the speed of communications.

**Note:** These devices are **not** suitable for connection 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.

### Distance

Baud Rate	Maximum Distance miles (km)
9600	3 (5)
2400	4 (7)
1200	6 (10)
300	12½ (20)

## **Black Box Line Driver - LD-120MP**

A pair of these devices, also known as baseband modems, will extend the distance that you can send the RS-232 signal from 45 feet (15m) to 5 miles (8 km). These devices are BABT approved for connecting to Leased Lines, 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 or K2000-N
- between the CNC and a Black Box COS
- between a Black Box COS and a K2100 or K2000-N

### **Description**

These short haul modems are mains powered devices that allow communications over distances between up to 5 miles (8 km) at speeds up to 9600 baud.

### **Distance**

<b>Baud Rate</b>	<b>Maximum Distance miles (km)</b>
up to 9600	5 (8)

---

# Appendix C - CNC K6100-CNC to K6100-CNCII Upgrade Kit

---

## Description

This kit (K6199-CNC II) allows you to upgrade an existing CNC-based Readykey for Windows or K6000 installation to use the improved features and performance of the new CNC, with the minimum of effort and time involved in performing the upgrade.

## Contents of the Kit

The kit consists of a K6100-CNCII (note that the power supply is NOT supplied with this kit - the existing power supply should be used) and four cables. These cables should be used to connect the cables that currently connect to the Host PC and RS-232 ports of the **existing** (K6100-CNC) to the new (K6100-CNCII) .

**Note:** Do not attempt to use these cables to connect the K6100-CNCII directly to the Host PC, modem, or other RS-232 device - they will not work. They are 'conversion' cables.

## Installation

1. Ensure the PC administration software (Readykey for Windows and K6000) is running and the CNC display is showing:

**\*\* MONITORING \*\***

- if any updates are displayed for sites, then you should make sure they are sent to the door controllers on those sites first - for sites that communicate via a dial-up modem, you may need to 'force dial' the site first.

2. Make sure that all the connectors currently plugged into the rear of the CNC are labeled and easily identified.
3. Make sure the Online Transaction Display in either Readykey for Windows or K6000 is visible, and transactions are being displayed.
4. Disconnect the connectors from RS-232 Ports 1 to 3, and also the Six Wire Bus on the rear of the CNC.
5. When no further transactions are being displayed by the PC administration software, log in to the PC administration software using the Supervisor key/card.
6. Disconnect the Host PC and Power Supply connectors from the rear of the CNC.
7. Ensure the DIP switches on the underside of the K6100-CNCII are correctly set - refer to the earlier section in this manual for information. Particular attention should be made to Switch 7 - Host Baud Rate, which is dependent on the administration system being used.
8. Replace the K6100-CNC CNC with the K6100-CNCII unit.
9. Connect the cable from the Power Supply to the Power Supply connector on the K6100-CNCII CNC. A sequence of messages should be displayed - as described earlier in this document.
10. Using one of the conversion cables supplied, connect the 9-way D-type connector to the 'Host PC' port on the new CNC, and the 25-way D-type connector to the **EXISTING** CNC to PC cable.

**Note:** Do not attempt to use this cable to connect the new CNC directly to administration PC - it will not communicate. It must be used in conjunction with the K6100-CNC to PC cable.

11. Verify the PC to CNC communications status by using either **Status: Masters** in Readykey for Windows, or by ensuring **CNC 1** at the top of the main transaction screen is green on a K6000 system.
12. The next stage is to initialize the CNC - this process will clear the contents of the CNC memory, and also send to the CNC information about the sites being controlled. This process is achieved in Readykey for Windows from **Installer: Masters**. On a K6000 system, from the main menu choose option 7 - System Configuration, then option 7 - Installation Configuration, and finally option 7 - Initialize a Network Controller.
13. Once the CNC has been initialized, you should reconnect the Six Wire Bus cable from the door controllers (as previously connected to the K6100-CNC CNC - no conversion cable is required). Confirm communications are established to the door controllers (use the **Status** application in Readykey for Windows; on K6000 systems check the number of door controllers that are being reported as communicating on the main transaction screen).
14. Next, you should reconnect any RS-232 sites using the remaining three conversion cables supplied with this kit to connect the existing RS-232 leads to the RS-232 ports on the new CNC. These are used in the same way as the Host PC Conversion Cable - they cannot be used to directly connect the new CNC directly to an RS-232 device, such as a modem.

It is important to ensure that the correct RS-232 cables are connected to the correct RS-232 port on the CNC - the PC administration software uses the RS-232 port number to help identify sites for communication purposes.

15. Finally, confirm communications with all the RS-232 sites. For sites that communicate via a dial-up modem, you will need to 'force dial' the site first.

## Conversion Cables

Four K6100-CNC to K6100-CNCII Conversion Cables are supplied with this kit. The wiring of these cables is shown below for information.

**Supplied:** Quantity 4, each 6ft (2 meters) length.

Use 8 core 24AWG (7/0.2mm<sup>2</sup>) cable, screened, maximum 6ft (2m) length.

K6100-CNC - Existing Cable	K6100-CNCII Host PC/RS-232
25 pin female D-type connector	9 pin female D-type connector
(Screen) Case	
(Screen) 1	Case (Screen)
(Blue) 2	2 (Blue)
(Red) 3	3 (red)
(Orange) 4	7 (orange)
(Brown) 5	8 (Brown)
(Black) 7	5 (Black)
(Yellow) 8	1 (Yellow)
(Green) 20	4 (Green)
(White) 22	9 (White)

## Appendix D - Cable Descriptions

### Power Supply

**Supplied:** Quantity 1, 6 ft (2 meters) length.

Use 10 core 24 AWG (7/0.2mm<sup>2</sup>) cable, maximum 6 ft (2 meters) length.

CNC, Power Supply Port				Power Supply Unit			
9 pin female D-type connector				9 pin male D-type connector			
(White) Relay 4	1	————	1	Relay 4 (White)			
(Yellow) Relay 3	2	————	2	Relay 3 (Yellow)			
(Green) Relay 2	3	————	3	Relay 2 (Green)			
(Blue) Relay 1	4	————	4	Relay 1 (Blue)			
(Red) +13.8 Volts DC	5	————	5	+13.8 Volts DC (Red)			
(Violet) GND	6	————	6	GND (Violet)			
(Screen) GND	7	————	7	GND (Screen)			
(Brown) Relay Power	8	————	8	Relay Power (Brown)			
(Black) Ground	9	————	9	Ground (Black)			

### Host PC

**Supplied:** Quantity 2, each 6ft (2 meters) length. One with 25-way D-type female, one with 9-way D-type female at one end. Both have 9-way female D-type at other end.

Use 8 core 24 AWG (7/0.2mm<sup>2</sup>) screened cable, maximum 30ft (10m) length.

#### 9-way COM Port

CNC, Host PC Port				PC			
9 pin female D-type connector				9 pin female D-type connector			
(Red) RX	2	——<—	3	TX (Red)			
(Blue) TX	3	——>—	2	RX (Blue)			
(Brown) DTR	4	——>—	8	CTS (Brown)			
(Black) GND	5	————	5	GND (Black)			
(Orange) DSR	6	——<—	7	RTS (Orange)			
(Yellow) RTS	7	——>—	6	DSR (Yellow)			
(Green) CTS	8	——<—	4	DTR (Green)			
(Screen) Case		————		Case (Screen)			

#### 25-way COM Port

CNC, Host PC Port				PC			
9 pin female D-type connector				25 pin female D-type connector			
(Red) RX	2	——<—	2	TX (Red)			
(Blue) TX	3	——>—	3	RX (Blue)			
(Brown) DTR	4	——>—	5	CTS (Brown)			
(Black) GND	5	————	7	GND (Black)			
(Orange) DSR	6	——<—	4	RTS (Orange)			
(Yellow) RTS	7	——>—	6	DSR (Yellow)			
(Green) CTS	8	——<—	20	DTR (Green)			
(Screen) Case		————		Case (Screen)			

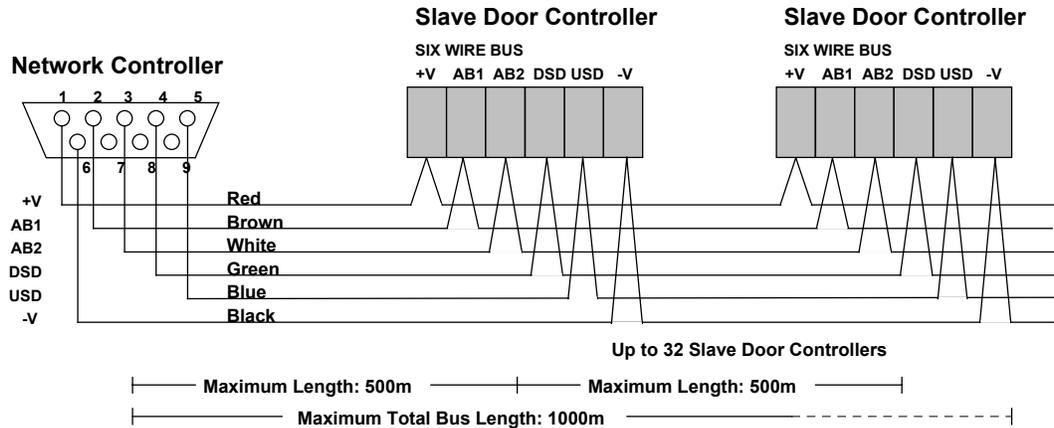
## Six Wire Bus

Use multi-stranded, unshielded, 6-core, 24 AWG (0.22mm<sup>2</sup>) alarm or signal cable. If you do use screened cable then you should reduce the maximum distance allowed by 3 times, i.e. to 1150ft (350m) maximum.

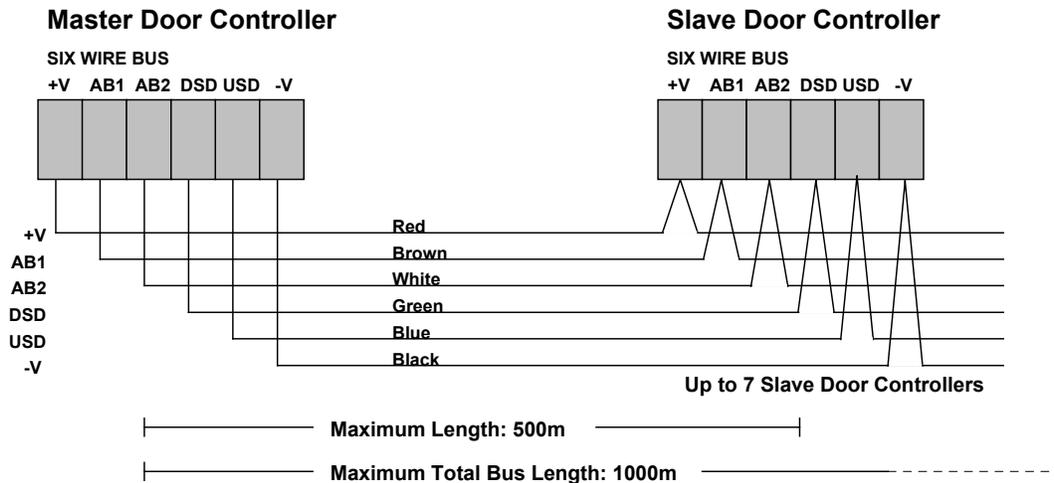
Total amount of cable not to exceed 3000ft (1000m), and no single length more than 1500ft (500m).

### CNC to Door Controller

**Supplied:** Quantity 1, flying lead - 6ft (2m) length. Unterminated at one end.



### Remote Site Master Controller to Slave Door Controller



## RS-232 Ports

### Cable for direct connection to K2100, K2000-N

Use 24 AWG (0.22mm<sup>2</sup>) 4-core screened signal cable, maximum length: 45ft (15m)

CNC RS-232 Port 1, 2 or 3			K2100, K2000-N		
9 pin female D-type connector			5-way Terminal Block		
	TX	3	=====		RX
	RX	2	=====		TX
	GND	5	=====		GND
Note 1	DTR	4	┌		
Note 1	CTS	8	└		

**Note**

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 8) to DTR (pin 4).

### Cable for connecting CNC to Modem

Use 24 AWG (0.22mm<sup>2</sup>) 8-core, screened signal cable, maximum length: 45ft (15m)

**Supplied:** Quantity 3, each 6ft (2 meters) length.

CNC, RS-232 Port 1, 2 or 3				Modem			
9 pin female D-type connector				25 pin male D-type connector			
	Screen (Case)		—<—	(Case) Screen	<b>AND Pin 1</b>		
	(Red) TX	2	—<—	3	RX	Red	
	(Blue) RX	3	—>—	2	TX	Blue	
	(Orange) DTR	4	—<—	20	DTR	Orange	
	(Brown) GND	5	=====	5	GND	Brown	
	(Yellow) DSR	6	—<—	6	DSR	Yellow	
	(Green) RTS	7	—>—	4	RTS	Green	
	(Black) CTS	8	—<—	5	CTS	Black	
Note 1	(White) RI	9	—<—	22	RI	White	

**Notes**

1. RI (Pin 9) is only required if dialback is being used.

**Cable for connecting Modem to K2100, K2000-N**

Use 24 AWG (0.22mm<sup>2</sup>) 6-core screened signal cable, maximum length: 45ft (15m)

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

**Short Haul Modems (SHM-NPR)**

**CNC to Short Haul Modem**

Use 24 AWG (0.22mm<sup>2</sup>) 4-core screened signal cable, maximum length: 45ft (15m)

CNC RS-232 Port		Short Haul Modem (DCE)	
9 pin female D-type connector		25 pin male D-type connector	
RX	3	→	3 TX
TX	2	←	2 RX
GND	5	—	7 GND
CTS	8	┌	
Note 1	DTR	4	└→ 20 DTR

**Short Haul Modem to K2100 or K2000-N**

Use 24 AWG (0.22mm<sup>2</sup>) 4-core screened signal cable, maximum length: 45ft (15m)

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

**Note:**

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

**Between Short Haul Modems**

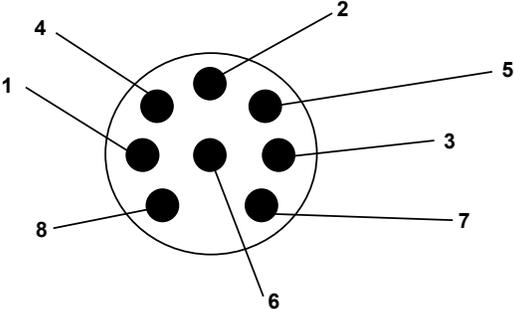
Use twin twisted pair, maximum length: speed dependent, see above.

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

## External Reader

Refer to documentation supplied with reader for cable specifications.

**Supplied:** Quantity 1, flying lead, 8 core **screened**, 6ft (2m) length.



**External Reader Connector PIN Diagram (Viewed from Rear of Plug)**

CNC External Reader Connector/Color	Description
1 Yellow	—<— Mag Stripe DATA
2 Black	— GND
3 Green	—<— Wiegand D0
4 Blue	—<— Mag Stripe CLK
5 White	—<— Wiegand D1
6 Orange	— +5 Volts DC
7 Red	— +13.8 Volts DC
8 Brown	— GND
Connector Case	— Cable Screen

**Note:** Pins 6 and 7 (+5 Volts and +13.8 Volts DC) are rated at 200 mA EACH.

## LD-120MP Line Drivers

### CNC to LD-120MP

Use 24 AWG (0.22mm<sup>2</sup>) 4-core screened signal cable, maximum length: 45ft (15m)

CNC RS-232 Port	LD-120MP
9 pin male D-type connector	25 pin male D-type connector
RX 3	3 TX
TX 2	2 RX
GND 5	7 GND
CTS 8	
DTR 4	

Note 1

**Notes**

- 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 8) to DTR (pin 4).

**LD-120MP to K2100 or K2000-N**

Use 24 AWG (0.22mm<sup>2</sup>) 4-core screened signal cable, maximum length: 45ft (15m)

<b>LD-120MP</b>		<b>K2100 or K2000-N</b>	
25 pin male D-type connector		5-way Terminal Block	
RX	2	←	TX
TX	3	→	RX
GND	7	—	GND

**Between LD-120MPs**

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

<b>LD-120MP</b>		<b>LD-120MP</b>	
Screw Terminals		Screw Terminals	
1	—	4	
2	—	3	
3	—	2	
4	—	1	

---

## Appendix E - COS-4/8 Data Switches

---

An alternative arrangement to using the six-wire bus at a remote site is to use a Black Box 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 connected directly to the CNC, or 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 dialback when using a COS.

This configuration is only used where it is not practical to run a new cable for the Six Wire Bus between door controllers on a site, or where the distances involved exceed those permitted by the Six Wire Bus.

**Note:** If the first door controller on a site is a K2000-N and it is required to add further door controllers to the site, then it is recommended that this is upgraded to a K2100 (via Upgrade Kit) instead of using a COS, wherever practical. A K2100 with a local Six Wire Bus to additional slave controllers will give a greatly enhanced performance over using a COS.

### Connecting and Configuring the COS

The COS is a complex piece of communications equipment - the design and specification of which varies from time to time.

For this reason, you should contact Radionics Customer Service Department for information regarding wiring and configuration of the COS if you intend to use one. The relevant information will be made available to you once the exact COS specification has been established.

