July 7, 2003

TO: ALL HEALTHCARE DISTRIBUTORS – U.S. & CANADA

SUBJECT: R4KWARE V1.07 RELEASE NOTES

Responder® 4000 Software Version Release Notes - Version V1.07 – Date: May 1, 2003

This software is distributed on a CD-ROM and should be installed on each PC that you use to interface with Responder 4000 systems. See the "Upgrade Instructions" section of this document for minimum system requirements necessary to use this software.

What's New in This Release

See also the "History of Changes" section below for more complete perspective on how this release fits in with previous releases.

The most recent "full" (production) release of R4KWare was v1.01. Here is a quick summary of changes since that time:

1. Support PLI – Phone Line Interface (with Caller-ID)

2. Release of LogView – utility for interpreting event-logs that are read from the system. This is used automatically when reading logs from the configurator. Reading logs via Advanced Diagnostics still displays the logs in Notepad and may be used if that way of viewing is preferred. LogView may also be invoked by clicking its icon in the Program Files directory where R4KWare was installed.

3. Release of Modem support – it is now possible to attach a modem to a diagnostic-port for a NIM or PIP and access diagnostic information remotely (e.g., to read event-logs). See the manuals for detailed instructions on how to do this.

4. MsgIO.DLL replaces R4KDevIO.EXE, making for fewer programs running and a simpler, more reliable diagnostic communications system.

5. Release of Compare Config – utility to compare installed hardware against the configuration and then highlight mismatches. Since R4K stations cannot intrinsically tell their own identity, it is impossible for the utility to do a thorough comparison. Rather it gleans as much information to validate as is physically possible.

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6. More Marquee models are supported. A second vendor (ProLite) is now supported.

7. Major revamp of the way to define R4KANN coverage in the configurator. ANN coverage now allows whole areas to be specified (for zone coverage) and the screen is accessible from within the Coverage screen rather than from the Home screen.

8. When the R4K4020 (LCD console) is displaying more than three calls, up- and down-arrow icons appear in the first column to visually indicate that scrolling in that direction is possible.

9. More station (and station add-on) models are supported, including: R4K14SA, R4KFB1, R4K13VA, R4K23VA, R4K16LV, R4K25LV, R4KPB44, R4KOUT4S, R4KOUT4R, R4K12AHZ, R4K13VAHZ, HSS400, HSS401, HSS433.

In more detail, changes from v1.01 to v1.07 are:

1. CL Firmware –

    a. Added support for OUT4 (arbitrary relay control) failsafe operation.

    b. Improve recovery from ESD (static dischange) glitches.

2. PA25 Firmware – no changes.

3. R4K4020 (LCD) Firmware –

    a. Better control of LCD speakerphone feature ("hands-free" mode).

4. R4KANN Firmware –

    a. Blink synchronization.

5. Marquee Firmware –

    a. More models are supported; see in R4KWare configuration-editing for the full list of options.

6. PLI Firmware

7. NIM / PIP Bootstrap –

    a. Fix the overflow that was limiting system size to 14 XBus devices.

    b. Made less vulnerable to accidental flash-erasure.

8. NIM / PIP Operational-Code -

    a. Fix overflow that was limiting system size to 14 XBus devices.

    b. Use LCD column 1 to show Up- and Down-arrows when the display can be scrolled that direction to view hidden calls.

    c. LED is not blinked on Check-in stations when the check-in feature is disabled for that room.

    d. Console swings are now persistent across system reboots and configuration reloads.

    e. The "Cancel" pocket-page is no longer emitted when the page-annunciation being canceled has a delay that was not yet expired.

    f. Audio-paging to misc. coverage (i.e., coverage more complex than "All" or "whole area") is now stable.

g. When calls are orphaned and a covering-swing is turned off, those orphaned calls now properly persist at the console.

h. The pocket-page message for service-requirements can now be configured (it used to be fixed to "SRVC").

i. Audio-paging to Current-Console-Coverage (i.e., taking swings into account) can now be done.

j. Fix audio-paging to coverage more complex than whole areas and where the audio goes across to multiple NIMs.

k. Trouble pagers can now be turned ON and OFF via the LCD console. During installation of a new site, the "trouble" pocket-paging feature can be disabled since it may get in the way.

l. Fix dry-contact cancellation; now re-opening a dry-contact only cancels that one call, not other calls from the bed.

m. Fix problem that offline-CLs can sometimes (rarely) cause NIM rebooting or data-corruption.

n. Added Cord-out-cancel-disable and Bed-out-cancel-disable features.

o. Added support for new hardware models.

9. Configurator –

a. Fix the problem that some tone-names (in the call-priority screen) were incorrectly matched to tone sounds.

b. Cell-Coverage is now specified more naturally (new, easier-to-use configurator screen).

c. Cell-Coverage can now also be for an entire zone (i.e. using an ANN cell as a zone-light).

d. Support Cord-out-cancel-disable feature as a system-wide setting.

e. Support modem dialing.

f. Support Compare-Config.

g. Database Compaction is supported – this should prevent many edits from causing the database to grow beyond where an archival copy will fit into the system. Access though "File | Compact Database".

h. Added support for new hardware models.

10. Configuration Management

a. Compare Configuration – (new feature) compare configuration with report of online devices from the system and report discrepancies.

b. There are more default priorities available for new configurations.

11. Diagnostic Support

a. LogView – this is a new utility to interpret Event-Log data extracted from the system.

b. Modem access – (new feature). Can now do limited diagnostics remotely. Along with this there is now an ability to lock sites from diagnostic tampering via a password.

c. Manuals have been revised (to Rev C).

Special Compatibility Alerts

4KC Format has changed with v1.07 – the first time (after installing this upgrade on your PC) that you edit an existing configuration-file, you will be asked if you want to upgrade. If you do, the program will automatically save a back-up copy of your configuration as it was before the upgrade. Other than restoring to this back-up copy, you cannot make further changes and then go back.

The embedded format was changed from v1.02 to v1.03. If your upgrade is crossing this boundary, then when loading new firmware to the system it will be necessary to also reload configuration. This will happen automatically (unless you are using "Advanced Diagnostics").

R4K4020, R4KANN, and R4KMQC firmware was most recently changed for v1.06 – the first time after loading configuration and firmware to the system that you reboot it back to operational, the system will take up to 30 seconds to forward this firmware to the appropriate peripherals.

Known Issues and Problems of the Release

Note: Technical Bulletins pertaining to issues of this release that were not known at the time of writing of this document are available on the Rauland-Borg extranet.

1. Do not use KBus address 230 (dipswitch value 30) for any R4K4020, R4KANN, or R4KMQC device.

2. Various BETA-test features may be visible in the configurator in places (e.g. there are a few station-models that are supported, but the models are not yet available). These should be ignored. The extra support is intentional; so that it will be working as soon as the features/models are ready.

3. When configurations are upgraded from v1.01 to v1.07, there may sometimes be warning messages. The upgrading process tries to add some dome-patterns and call-priorities (.e.g "Toilet" and "Shower"). For configurations where the Call Priority table was not changed from the defaults, this will cause no problems. However, if Call Priority entries were added for priorities 51, 52, 53, 56, or 65, then the upgrade process will give warnings that there are collisions. In each case, simply click "Continue" so that the upgrade process completes. The only harm is that some new (and possibly useful) call priorities will not have been added to the configuration.

4. The "Periscope" (advanced-diagnostic traffic-stream viewer) doesn't automatically scroll to the bottom on receipt of new messages under Windows-98.

5. When a PLI is answered and there is already audio-in-progress on the same NIM from a remote PLI, then the PLI gets a busy-signal (as expected), but also sometimes the other conversation is interrupted and reorder tone appears at the other PLI-line. Workaround – just hang up when this happens; there are no lasting effects.

6. If a R4KMQC is configured, it is later possible to configure an LCD or ANN console-panel at the same KBus address. The duplication is detected by the configuration completeness checker (that runs by explicit request and also automatically when a download is attempted). Then the duplication must be resolved manually.

7. When editing "Define System-Wide Options | Advanced Functions", to save any changes and exit the screen, you must select "Console Coverage Audio Page" and re-select the setting that you want (even if it is the same as was there).

8. Under some circumstances it is possible to enter a staff-registration review at an LCD console (R4K4020) even when there are no staff registered within the relevant area, i.e. there is no "bullet" highlighting the menu-function key.

9. Numeric pocket-pagers report the numeric priority values as 1 higher than they actually are E.g. for a configuration with "Normal" as priority 20, numeric pagers would report a Normal call with a priority code of 21.

10. Uninstalling the most recent version of R4KWare also causes uninstallation of all previous versions as well. It is recommended to just install this new version without uninstalling previous versions.

Upgrade Instructions

This section gives detailed instructions for installing this software on PCs and for upgrading sites.

To install this release on a PC or Laptop:

Step 1: Verify minimum system requirements:
    CD-ROM drive (24x speed or better).
    Windows-98 SE, Windows-NT 4.0 SR5, Windows-2000 SP2, or Windows-XP.
    256 Megabytes of main-memory (RAM).
    512 Megabytes of free hard-disk space on at least a 10 Gigabyte system drive.
    Screen resolution of at least 1024 x 768 (XGA).
    56k modem (optional).
    400 MHz or faster Pentium II processor.
    Free RS-232 COM (serial) port.
    Microsoft Excel (to run Power-Calculation worksheets; recommended).
    Internet Explorer 4.0 or later.
    Adobe Acrobat 5.0 or later (see download instructions below if you have earlier version).

Also verify for Windows-2000 and Windows-XP systems that you are logged in as the System-Administrator.

Step 2: Put the install CD-ROM into your CD-ROM drive. The install-procedure will automatically run. If it does not (the auto-run feature is disabled in your computer or the disk was in at boot-up-time or for some other reason) then you can try again by removing the disk and putting it in again. If it still does not start the install-procedure, then you can explicitly start it by:

- Double-clicking on the "My Computer" icon on your desktop.

- Double-clicking on the icon representing the CD-ROM drive where the disk is inserted.

- Double-clicking on the "Setup.EXE" icon.

If the install-procedure starts, but then exhibits errors, refer to the "Installation Initialization Error Troubleshooting" section below.

Step 3: Answer the questions posed during the install-procedure. You will be asked (among other things):

- <u>What is the main installation location where program-files (i.e., R4K system files) are to be put?</u> The install-procedure suggests a choice; it is simplest to just accept the suggestion. R4K software is organized to be able to install multiple versions on a PC and use them alternatively, e.g., to support multiple R4K sites running different versions. Each version should have its own unique folder, which is automatically created according to your choice at installation time.

- <u>What is the root location where site-support files (configuration .4KC files and others) are to be kept?</u> The install-procedure suggests a choice; it is simplest to just accept the suggestion. If there is a previous version of R4KWARE on your PC, then the automatic suggestion will be to the same place that was chosen before. If you now choose a different place, it will make it more difficult to find already existing sites in the old place. *The site location is not necessarily related at all to the location of the program-files.* Rather R4K uses a model of a set of sites and (somewhere else) a set of software-files organized by version. The site configurations are automatically processed by the correct version of software.

- <u>What pieces do you want installed?</u> Manuals may be omitted from the installation to save a little hard-disk space. They are available via the installation CD-ROM if you choose not to install them on your PC. Just click "My Computer", then the CD-ROM-drive icon, then "Manuals", then the manual that you are interested in.

- <u>Do you want to reboot?</u> You should reboot before the first time that you want to use the newly installed R4KWARE.

To upgrade an existing site:

Step 4: Verify that this release is installed on the PC that will service the site (see instructions above). It may be installed on multiple PCs without license violation, and multiple PCs may be involved in servicing any site.

Step 5: Open the configuration for the site.

- double-click on the .4KC file that represents the configuration; OR

- start the R4K program (double-click on the "Responder 4000" icon on the desktop) and select the site by clicking on "Existing Site".

Step 6: You are asked whether you want to upgrade the version of the site. Say "Yes".

Note: If you support multiple sites and are installing this version for the sake of one of them, then you will also be asked whether you want to upgrade the others when you open their configurations. You can click on "Don't ask me about this again" before saying "No" to avoid repeated bother if you do not yet want to upgrade them. There is an option within the configurator to explicitly request an upgrade when you are ready.

Note: If you choose to perform the upgrade, then sometimes the upgrade will make irreversible changes to the configuration-file. In this case, a backup copy is automatically saved (in the same folder as the configuration) before the conversion. If you do not like the results of the upgrade, you can delete the 4KC file, locate the pre-conversion copy in Windows Explorer (if there are several copies, identify the correct one by timestamp) and rename it to the original 4KC file name.

Step 7: Physically connect (using an R4KSPA) to the diagnostic-port of any R4KNIM or R4KPIP on the system.

Step 8: Within the configurator, select "Online Interactions"/"Load Configuration to System" and then click on "Update System". The software queries the system to determine which parts need to be reloaded, then proceeds to do the work.

To begin configuring a new site:

Step 9: After installing the release, double-click on the "Responder 4000" icon on the desktop. Now click "New Site" and select the name of the site (that will become the name of the folder where the site-files, including the configuration, are stored). You can also accomplish this step from the "Start" button on your computer. Select "Programs" then "Responder 4000" then "Create New Configuration".

Step 10: This will leave you in the Configurator program to begin working with the new configuration. Follow the instructions found in the appropriate R4K manual(s).

To perform a first-time configuration-load for a new site:

After completing configuration.

Step 11: Select "Perform Completeness Check". Address any problems that are found. Problems printed in red must be fixed in order to proceed. Problems printed in black are warnings. They should be considered carefully, but it is possible to proceed without fixing them.

Step 12: Physically connect (using an R4KSPA) to the diagnostic-port of any R4KNIM or R4KPIP on the system.

Step 13: Within the configurator, select "Online Interactions"/"Load Configuration to System" and then click on "Set Merge Options". Since this is a brand new system you do not want to preserve any garbage calls or other settings that may be left in the NIMs' memories. Select "Overwrite On-Line System". Then click "OK".

Step 13: Select "Update System". The software queries the system to determine which parts need to be reloaded, then proceeds to do the work.

Uninstalling an R4000 Version:

If the version that you wish to remove is the most recently installed version of R4000 software, then use the Windows' Uninstall-facility ("Start | Settings | Control Panel | Add/Remove Programs | Responder 4000 – Application | Add/Remove"). Following completion of the uninstall, if you want to revert back to an earlier version of R4000 software, you must now re-install it from CD-ROM. The re-install is needed to re-establish registry entries that had been changed by installing a later version and then deleted by uninstalling the later version.

The Windows' Uninstall-facility will *only* work to remove the most recently installed version of R4000 software.   To deal with older versions of Responder 4000 software that you do not want, you have several options:

- Ignore the older version. Its presence will not harm your computer in any way other than consuming extra hard-disk space. Most hard-drives are so large that this is usually a viable option.

- Use Windows Explorer to delete the program-files folder where that copy was installed. This will reclaim hard-disk space. It leaves a few residue (harmless) entries in the registry.
- Use the R4KWare (newest-version R4000 software) "Remove Unused Version" option and follow directions given by the program.

Installation Initialization Error Troubleshooting

On occasion, we have seen installation initialization errors. In particular, with some versions of Windows 98 Second Edition we have seen the message "*Error extracting support files*". The InstallShield® Knowledge Base article Q104985 describes several steps to troubleshoot these problems. Step 11 refers to article Q105097, which instructs you to first remove the existing version of "ikernel.exe". It then instructs you to use the link provided to download a setup file to install a new version. For your convenience, we have included this setup file (IkernelSetup.exe,) and the two Knowledge Base articles with our installation disk in the "Trouble" sub-directory of the CD-ROM. These files are not part of the Responder 4000 setup, and will not be installed on your computer.

For other during-installation problems, reference the InstallShield® net site: http://installshield.com or the Knowledge-Base http://support.installshield.com/kb.

History of Changes

From v0.54 (Demo-system release) to v1.00 (first full release):

- User-control over code-blue-supervision feature
- CL "failsafe" mode – reasonable NIM-less operation of corridor-lights
- Faster talk-listen switching for better audio quality and ability of the KBus to handle more traffic (up to the rated 150 CLs and 30 console-panels and marquee-controllers).

From v1.00 (first full release) to v1.01:

This release adds some new features and fixes a few problems that have been noted since the release of v1.01.

1. CL Firmware – this does not affect existing units, only new products shipped

   a. Test-diagnostics have been added to help ensure production quality

   b. Fix – stuck-button repetition-rate. In v1.00 a call is placed initially, but if the button is held down the repeat-call not predictable. It will be placed, but it may take a minute or two. The fix makes repeat calls reliably at 6.4 seconds. The only effect is in finding stuck-button (hardware failures).

2. Paging-Amp (R4KPA) Firmware – this does not affect existing units, only new products

   a. Self-test diagnostics have been added to help ensure production quality

3. LCD (R4K4020) Firmware

   a. Added support to suppress error-toning on code and configuration loads to the system. The OFFLINE toning is delayed when the system is under diagnostic-control for loading and speeded-up when there truly is a system problem.

4. Marquee (R4KMQC) Firmware

a. Added "Updating System" text during the new-firmware loading operation. The goal is to prevent confusion and especially keep it from being unplugged at a sensitive time.

b. Added support to delay error-toning (see corresponding LCD description).

c. Added support for an additional model: 2="Alpha 4120 C".

5. ANN (R4KANN) Firmware

a. Improved power-on display: self-test of all LEDs, then 5 seconds of displaying the version-number (xx.yy, where each digit is read from the line within the corresponding column of the LEDs that is lit).

b. Added flash-write display (a spiral pattern of LEDs) to prevent user-confusion about system inactivity during a system-update

c. Added support to delay error-toning (see corresponding LCD description)

6. Configuration Editor

a. Templates – a new feature to facilitate rapid entry of many similar rooms. Consult the manual for details of use.

b. Check pointing – a new feature to allow rollback-undo and to protect against inadvertent loss of configuration data. Consult the manual for details of use.

c. Remove "Undo" button from all screens (use Check pointing instead).

d. Fix – Marquee scroll rates from 12.9 to 25.6 seconds are now supported

e. Make Unconnected-Stations be red error in Completeness-check rather than blank (warning) error.

f. More comprehensive completeness checking.

g. Prefixes of "Error" (for red) and "Warning" (for black) messages in the Completeness-check screen makes severity clearer.

h. Allow duplicate Call Priority and Area descriptions. The records are distinct, but the descriptions may be identical if the use desires.

i. New tone in the Tone Library – "Active Silence". This may be used in a priority to mask toning of other, lower-priority calls.

j. Prohibit duplicate audio-bed stations for a single bed.

k. Fix – sorting of items in "Current Coverage" pane of Coverage-screen and KBus peripherals on NIM-assignment screen.

l. Help-menu option added to screens – make on-line help more accessible.

m. Change "Page" to "Dial 0-9 Page" on the LCD Console Function Menu – this is to clarify that paging must be defined (on the Coverage screen) and assigned a digit before the Page key will be effective to add as a function onto the LCD.

n. Change "R4KCB10" to "R4KCB10/12". The new model R4KCB12 is configured identically to R4KCB10. The old model R4KCB10 is discontinued.

o. Support additional model of Marquee.

p. Remove the bed-number from the R4KSR1. Staff-Registration applies to the whole room, so no particular bed may be specified.

q. Addition of "White" corridor-light options. "Yellow" is changed to "Amber" to be consistent with other places in the programming.

r. Fix -- The time-intervals in the Corridor Light Patterns screen were mislabeled as eighth-second intervals. They are now correctly labeled as tenth-second intervals.

7. Operational (R4KNIM and R4KPIP) code

a. Fix – The Disable-Checkin feature now also works for non-bedside stations

b. Fix – KBus traffic port had a rare condition that caused loss of a message.

c. Fix – Treat a Pocket-page repetition-rate of 0 as "30 seconds" to prevent the system from sending way to many pocket-pages on this kind of user-error.

d. Fix – Prevent inadvertent rebooting on certain diagnostic actions (requests for large checksum verifications of firmware).

e. Fix – Restore correct annunciation of R4KANN (in a cluster with an R4K4020) when exiting a Review (e.g. Privacy review).

f. Fix – Allow entering of Privacy-, Priority-, and Staff-Registration-Reviews when the R4K4020 is in a console-cluster with one or more R4KANNs.

g. Added display of elapsed-times in the Service-Requirement-Review and sort by that criterion.

h. Added an "Indicator" (triangle-icon) to the Disable-Checkin LCD menu function. The icon appears when there are one or more rooms with Disable-Checkin ON.

i. Fix – The Clock-setting LCD dialog now allow to set "00:xx" in 24-hour time. Previously "24:xx" was used. This is still supported for compatibility.

j. Diagnostic function added to easily and reliably zeros BRAM (should that be desired). Also a few other internal, diagnostic facilities have been added.

k. Fix – Orphaning from ANN now works reliably

l. Fix – Monitor-mode allows duplicate room entry and handles it gracefully

8. Bootstrap (R4KNIM and R4KPIP) code

a. Fix – Allow reliable zeroing of BRAM (from Advanced Diagnostics, under consultation with Technical Support).

b. Fix -- Prevent inadvertent rebooting on certain diagnostic actions (requests for large checksum verifications of firmware).

9. PC Support Components (Communication, Configuration-compile and Diagnostics)

a. Added a query of checksums to help ensure production quality

b. Fix – made the "Disable Hands-Free" configuration option operational

c. Added online Help system for Advanced Diagnostics ("DI"). This can be accessed from the drop-down menu line: "Help | Index".

d. Rearranged menu-functions in Advanced Diagnostics. The menus were re-factored so that various functions are more understandable to find. Also the Alt-key shortcuts are made more consistent.

e. One-pass configuration compilation – preparation of the configuration for loading to the system is quicker, less error-prone, and no longer leaves a temporary file around on the hard disk.

f. Added a lot of flexibility to the configuration-synchronization on-line interaction. There are now "Merge Options" that allows the user to declare desires prior to the start of "Load Firmware and Configuration to System". See the manual for details.

g. Splash-screens (and "Help | About" screens) have been revised to be more consistent.

h. Fix – loading configuration to System works more reliably when there are extra (non-configured) devices on the XBus.

i. Fix – Accessing Log info from the Configurator now works reliably. In v1.00 it was recommended to access logs from Advanced Diagnostics only.

10. Installation and Configuration Version-Upgrading Components

a. Manuals have been revised. Please use the latest revision.

b. A new hyperlink is provided from this document to the list of relevant Technical Bulletins posted on the Rauland web site. See the "Known Issues and Problems" section below. That section describes issues known at the time of release. Technical Bulletins additionally describe problems learned after the time of release.

c. Fix – Windows-98 configuration upgrading issue to now avoid an extra error-popup (that is scary but harmless unless it causes undue user stress). The upgrading process has been internally simplified.

d. Fix – Allow spaces in configuration file pathnames (e.g. "C:\Program Files\…").

e. The MSW PIP (XBus address 11) has been added to the Demo-configuration. While Management-Software is not yet released for R4K, at least now the second PIP in the Demo-system will have proper configuration and will boot to operational-mode.

11. Pocket-Page Simulator (PPSim)

a. A new Windows-compatible version is included. This is the same program now supplied with R4Ware. The previous DOS version is renamed as PPSimDOS.exe.

Built-in System Limitations

This is a quick-reference for some maximums that you may encounter. Consult the full manuals for authoritative and more complete documentation of limits.

- Number of R4KNIMs on an XBus: 25

- Number of ports from R4KPIPs to pocket-page terminals: 1

- Number of ports from R4KPIPs to RSW or MSW (combined): 1

- Dipswitch address range for XBus devices (R4KNIM, R4KPIP): 0 -- 63

- Number of pocket-pagers: 1000

- Number of rooms in the system: 3500

- Number of beds in the system: 3500

- Number of beds on a NIM: 500

- Number of areas in the system: 250

- Range of area-numbers allowed: 1 – 999

- Number of active calls in the system at a time: 2000

- Number of Call Priorities: 250

- Range of call-priority numbers: 1 – 253

- Number of Mobile-Coverage-Sets: 100

- Number of corridor-lights (CL) + domeless-controllers (DC) per NIM: 150

- Number of stations per CL or DC: 6 or 16 depending on model

- Dipswitch address range for CL and DC KBus devices: 1 – 150.

- Number of console-clusters per NIM: 10

- Number of console panels (R4K4020 + R4KANN) per NIM: 20

- Number of console panels per console-cluster: 18

- Max number of R4K4020 (LCD) console panels in a console-cluster: 1

- Number of marquee controllers (R4KMQC) per NIM: 30

- Number of Phone-Line Interfaces (R4KPLIs) per NIM: 1

- Total R4K4020 + R4KANN + R4KMQC + R4KPLI on a NIM: 30

- Dipswitch address range for R4K4020, MQC, ANN, PLI: 1 – 30

- Valid KBus addresses for R4K4020, MQC, ANN, PLI: 201-230

- Number of Marquees per R4KMQC: 4

- Size of call-priority description: 14 characters

- Size of room names: 10 characters

- Size of room dial-number: 8 digits (including allowing leading zeros)

- Size of area-description: 3 characters

- Size of area dial-number: 3 digits (see "area-number" limit above)

- Allowed bed designations: <none>, ':1' -- ':99', ':A' -- ':Z'.

- Hidden (i.e. <none>) bed designations: :0, :100-:199

- Number of distinct individual-bulb-blink-patterns used-in CLs: 16

This is an incomplete list; just giving some of the more important limits. Here are some timing constraints:

- Call-delay annunciation: max 18 hours (but note the difference from R4 in that intentionally not-covered-at-any-console strategy is allowed)

- Service-Request Overtime: max 9 hours

- Pocket-page repetition rate: max 9 hours

- Monitor-mode cycle time: 1 second to 180 seconds (but note that monitoring a single room is also possible, where the cycle-time does not apply)

- Audio session: max 5 minutes (except for single-room monitoring where this limit does not apply)

- Marquee scroll rate: 0.2 seconds to 25.6 seconds

- Resident check-in: the entire sequence must be completed within any 24-hour period, not bounded by midnight