Installation KI-2209P

Responder® 5 Head-End, Console, and Staff Terminal Installation Guide

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1: General Information

The Responder® 5 (R5) system is a highly configurable and flexible Healthcare Communication System. The system is configured using the graphically-based R5Ware Windows application suite.

As those familiar with such systems will note, R5 employs a simplified, intuitive wiring strategy, allowing a single multi-drop Category 5 cable to distribute power, data, and voice to Consoles, Corridor Lights, Domeless Controllers, Staff, Duty, Patient, and other Stations. Cable and conduit costs are, therefore, much less than previous Responder® generations.

Scope of this Document

Read this document if your tasks include system planning/design, installation, or maintenance/troubleshooting.

Alerts, Precautions, and System Limitations

Observe the following alerts, precautions, and system limitations:

- ✓ All head-end components should be mounted in either the 351102 or NC2828 system cabinets. Although these Responder® 5 system components will operate outside of these enclosures, the installation will not meet UL 1069, CE (for the NC2828 only), FCC performance and/or safety standards.
- ✓ The 351102 and NC2828 system cabinets provide protection from physical damage when equipment is located within equipment rooms and allows for continuous uninterrupted nurse call operation. This applies to installations using the NA NEC AC power strip or EU installations using the IEC AC power strip.

- ✓ Mount the components in locations with sufficient air flow and, in rooms with ambient temperature range between 32˚F (0˚C) and 122˚F (50˚C). Preferred ambient temperature range is 20˚C - 30˚C. (The 351102 and NC2828 system cabinets and head-end components include air ventilation holes for proper cooling during operation.)
- ✓ Since ventilation holes must be kept open and do not protect from accidental fluid sprays, we recommend locating the 351102 and NC2828 system cabinets housing head-end equipment away from water and sewer pipes, but not out of range of present fire protection nozzles.
- ✓ Observe "Handle with Care", "Caution" and "Lift Properly" warnings when installing system cabinets and head-end components, as these units can be somewhat heavy and large. Dropping these components could cause damage or injury.
- ✓ All system modules must be connected to earth ground—through a terminal lug provided or case mounting screw and "GREEN" ground wire—for proper ESD and RF noise protection including CE EMC compliance.
- ✓ Use only the AC power connection cables supplied with the 351003 for proper AC line and ground connections to the power supply.
- ✓ The system power supply (351003) is suitable for connection to IT power distribution with 230 VAC line to line and a resistance or voltage limiter between earth lines side and neutral (re EN 60950-1:2006 Annex V).
- ✓ The Responder® 5 system components must only receive power for operation from the 351003 through direct connection or through relay from other designated system components. This includes multiple 351003 unit count installations sized to meet power distribution requirements for a complete system.
- ✓ Be sure the 351003 battery wire connection lugs are properly seated on the battery terminals and the battery switch is in the "ON" position for proper operation of the battery charging circuit.
- ✓ The battery requires 14 hours to charge before the 351003 will have sufficient back-up charge to continue Nurse Call operation through an AC power outage event. A full charge will not occur until two (2) full charge/no-charge cycles (approximately 64 hours).
- ✓ 351003 Power Supply back-up batteries should be replaced every five (5) years.
- ✓ Disposal and Recycling Information: This product must be disposed of properly according to local laws and regulations. When this product reaches its end of life, contact your local authorities to learn about recycling options or your local distributor. See "Disposal and Recycling Information" below for details.
- ✓ Battery Disposal Information: When replacing an internal battery, dispose of the spent battery according to your local environmental laws and guidelines. 351003 batteries are sealed lead acid.
- ✓ Wiring cable and connector materials must meet local fire protection, voltage/current standards, and overload limits in the city, county, district, state, province, prefecture, and/or country of installation.
- ✓ For CE compliant EN 60950-1:2006 installations the system interconnections are classified as Safety Extra Low Voltage (SELV) with all system equipment located within a building. For connections to system components in other buildings, fiber optic isolation is required between buildings. This is the intended application for the 351006 Fiber Optic Adapter Module on Ethernet only. Only Low Voltage Limited Energy (LVLE) SELV circuits shall be used as controlled and power supplied by one or more 351003 Responder 5 power supplies.
- ✓ Wiring directions are included within these installation manuals showing proper

interconnects between head-end components and other Responder® 5 system devices. Please observe all terminal polarity marks and color codes as directed to prevent possible damage to components from reverse voltage and signal connections. Although the system components include a level of self-protection to pass short miss-wiring events, unnecessary stress from careless wiring errors can shorten the operating life of some components.

- ✓ The Responder® 5 system is not suitable for direct connection to public telecommunications (telephone) equipment. Such connections must be indirect through isolated connection to the hospital network and into the telecommunication system.
- ✓ Before inserting or removing the POWER connector on a 351000/351001 BRC, verify that the green DC PWR indicator on the associated 351003 power supply is OFF. The AC LINE and BATT CONNECT switches on the power supply must both be in the OFF position in order to turn off the DC PWR indicator. Hot-swapping the BRC may permanently damage it.
- ✓ Responder 5 head-end devices shall be powered down before switching Ethernet subnets. Cycling power to the device ensures that both the device and its associated network equipment will adapt to the new network address.
- ✓ The 351001 BRC v2 is a drop-in replacement for the 351000 BRC. It uses the same field wiring and performs the same function. Internally, the 351001 and 351000 use different CPUs and require different firmware. These differences are automatically handled by Responder 5 R5WARE Version T14 SP4. The 351001 will not function in a Responder 5 system unless the system has been upgraded to (or beyond) Version T14 SP4.

System Limitations

While there is much to know about designing an R5 system, here are some system limits to keep in mind during the process.

System limits subject to change with the addition of an RNC.

- ✓ Maximum number of 351000/351001 Building Regional Controller (BRC) per system: 96
- ✓ Maximum number of Branch Regional Controllers (BRC)/Network Adapter Modules (NAM) per Responder Network Concentrator (RNC): 12
- ✓ Maximum combined number of devices per system with 351010 Responder Network Concentrator (RNC) : 8 Responder Network Concentrator (RNC) and a combined total of 87 Branch Regional Controllers (BRC)/Network Adapter Modules (NAM) and 1 Responder Gateway Server (RGS)
- ✓ Maximum number of 352000/352010 Corridor Lights and 352020/352021 Domeless Controllers (any combination) per 351000/351001 BRC: 96
- ✓ Maximum number of 352000/352010 Corridor Lights and 352020/352021 Domeless Controllers (any combination) per L-Net port on the 351000/351001 BRC: 24
- ✓ Maximum number of Corridor Lights and Domeless Controllers per system: 96 x 96 = 9216; 87 x 96 = 8352 CLs with RNCs
- ✓ Dipswitch Address Range for Corridor Lights or Domeless Controllers: 1 – 96

- ✓ Maximum number of Stations per Corridor Light or Domeless Controller: 16
- ✓ Maximum number of 353100 Duty Stations per Corridor Light or Domeless Controller: 1
- ✓ Maximum number of Audio Stations per Corridor Light or Domeless Controller: 3
- ✓ Dipswitch Address Range for any Station: 0 – 15 or 0-9 / A-F
- ✓ Maximum number of 351200/351205 Console per 351000/351001 BRC: 16 with use of 351004 Ethernet Switches
- ✓ Maximum number of 351300/351310 Staff Terminals per 351000/351001 BRC: 80 with use of 351004 Ethernet Switches (16 per 351000/351001 for 351300/351310s with coverage).
- ✓ Maximum number of simultaneous calls per 351200/351205 Console/351300/351310 Staff Terminal: 40
- ✓ Simultaneous Full Duplex Audio Channels per 351000/351001: 12
- ✓ Simultaneous Full Duplex Audio Channels per L-Net of 351000/351001: 6
- ✓ Simultaneous Full Duplex Audio Channels between multiple 351000/351001: 36
- ✓ Maximum number of Areas in the system: 999
- ✓ Range of Area Numbers allowed: 1 – 999
- ✓ Maximum number of Call Priorities: 999
- ✓ Range of Call Priority Numbers: 1 – 999
- ✓ Maximum number of Simultaneous Calls in the system: 5000
- ✓ Maximum number of concurrent inbound, plus PCC-initiated alerts and statuses: 2200
- ✓ Size of Call Priority Description: 50 characters
- ✓ Length of Room Names: 30 characters
- ✓ Length of Room Dial Number: 10 digits (including allowing leading zeroes)
- ✓ Length of Area Description: 3 characters
- ✓ Length 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, and 100 - 199
- ✓ Maximum number of distinct individual Bulb-Blink Patterns used-in CLs: unlimited
- ✓ Maximum call delay allowed: 18hrs
- ✓ Maximum number of buttons per 351300/351310 Staff Terminal: 60
- ✓ Maximum number of buttons that could be a call point per 351300/351310 Staff Terminal: 50
- ✓ Maximum Length of the Ethernet: 330 feet in copper or up to 5000 feet of fiber (depending on fiber performance and splice quality) with use of a pair of 351006 Fiber Adapters
- ✓ Maximum Length of the L-Net: 3000 feet (per BRC L-Net Port)
- ✓ Maximum Length of the M-Net: 250 feet (Cumulative in the room per CL)
- ✓ Maximum Length of the D-Net: 50 feet (Cumulative from the station)

Tools and Supplies

You'll need the following tools, materials, and cabling to install R5 components:

- ✓ 4-pair, UTP, CAT-5 cable (plenum or non-plenum, as dictated by code)
- ✓ 350006 L-Net/M-Net Crimping Tool and Fluke JR-LEV-2
- ✓ 350001(obsolete)/350018 R5 M-Net/D-Net Connectors
- ✓ Standard Wire Cutter
- ✓ CAT-5/CAT-6 Jacket Stripping Tool
- ✓ Flathead and Phillips screwdrivers
- ✓ G0394 Patch Cable Tool
- ✓ Siemon STM-8 Cable Tester

Customer Connection

CUSTOMER CONNECTION

You can use Rauland's secure Customer Connection site to find, view, and/or download many support documents—including manuals, drawings, and reports. To request an account, follow the online instructions at: http://customerconnection.rauland.com.

Revision History

This is "P" revision of KI-2209. Since the last edition, we have made the following changes:

- ✓ Added models 352010, 352021, 351205 and 351310.
- ✓ Add content required for regulatory compliance.

Related Documents

Other, related information can be found in the following documents:

- ✓ Responder® 5 *System Design Guide* (KI-2234)

- ✓ Responder® 5 *Corridor Light and Station Installation Guide* (KI-2235)
- ✓ Responder® 5 *Accessory Installation Guide* (KI-2236)
- ✓ Responder® 5 *Configuration Guide* (KI-2237)

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2: Network and Control Components

The following are considered "head-end" Network and Control components:

- ✓ 351000/351001 Branch Regional Controller (BRC)
- ✓ 351002 Network Adapter Module (NAM)
- ✓ 351003 Power supply with Battery Back-Up
- ✓ 351004 Ethernet Switch—8 Port
- ✓ 351006 Fiber Optic Adapter Module (10/100 MB)
- ✓ 351010 Responder Network Concentrator (RNC)
- ✓ 351102 Cabinet
- ✓ NC2828 Cabinet

351000/351001 Branch Regional Controller (BRC)

The Branch Regional Controller (BRC) is R5's central processing unit. It distributes power, control data, and audio to various system devices. Note: the BRC may also bear the 351001 model designation, indicating the second hardware release. When using the associated firmware release version assigned for both, the 351000 and 351001 units are interchangeable.

BRC Mounting

The BRC is 6.60" wide, 11.40" high, and 0.90" deep and can be mounted using a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351000/351001 BRC makes up to four (4) possible types of connection:

1 **Power**: connection to the 351003 Power Supply and only the 351003 is required.

2 **USB Diagnostics (USB DIAG)**: optional connection to a PC running the configuration program (R5WARE)—used for system troubleshooting, and/or performing low-level diagnostics.

3 **Ethernet**: optional connection to other BRCs, to 351200/351205 Consoles, to 351300/351310 Staff Terminals, to 351004 8-port Ethernet switches, to 351006 Fiber

Optic Adapter Modules, or to a hospital's network. Any Ethernet port on a BRC can be used for system configuration and firmware download.

4 **L-Net**: optional connection to Corridor Lights or Domeless Controllers.

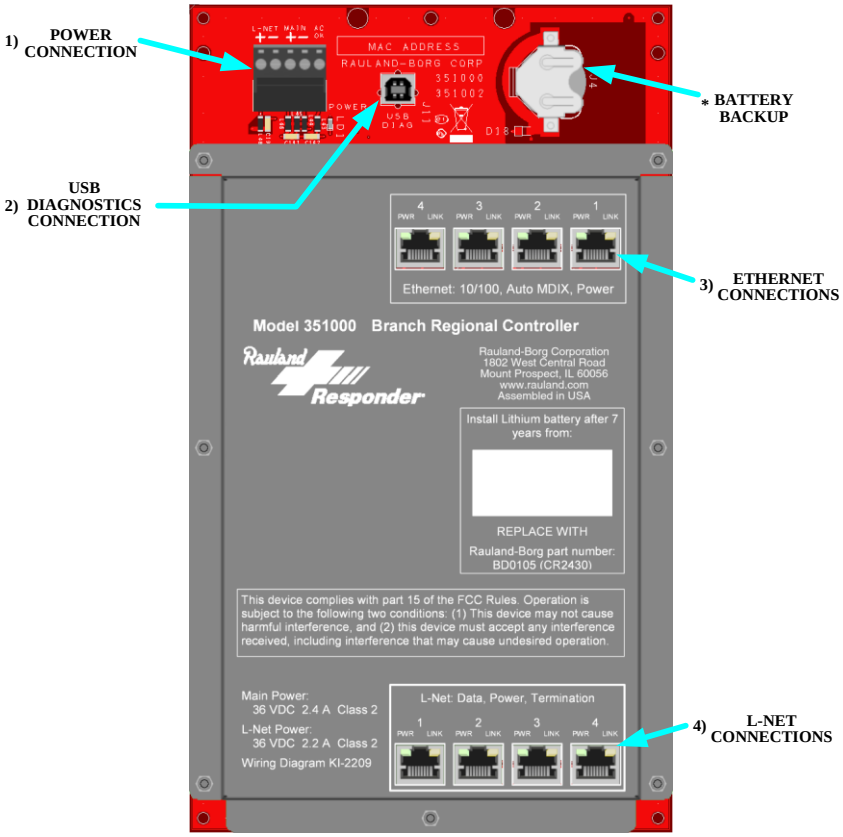


Figure 1: 351000/351001 Branch Regional Controller Connections

Power Connection

With the power turned off at the 351003 Power Supply…

1 Connect the BRC to the power supply via 12-16 AWG wire.

- The MAIN connection supplies power to the BRC as well as to the Power-over-Ethernet (POE) ports. (For POE applications, the four [4] Ethernet ports are supplied with a total of 36V at IEEE 802.3af limits, nominally assumed less than 10 Watts per port.)
- The L-NET connection can be used to supply power to a maximum of eight (8) total rooms per BRC depending on station count. Consult the Corridor Lights document for instructions.
- Consult the Power Calculation Worksheet (*System Design Guide*) to determine the exact wire gauge.

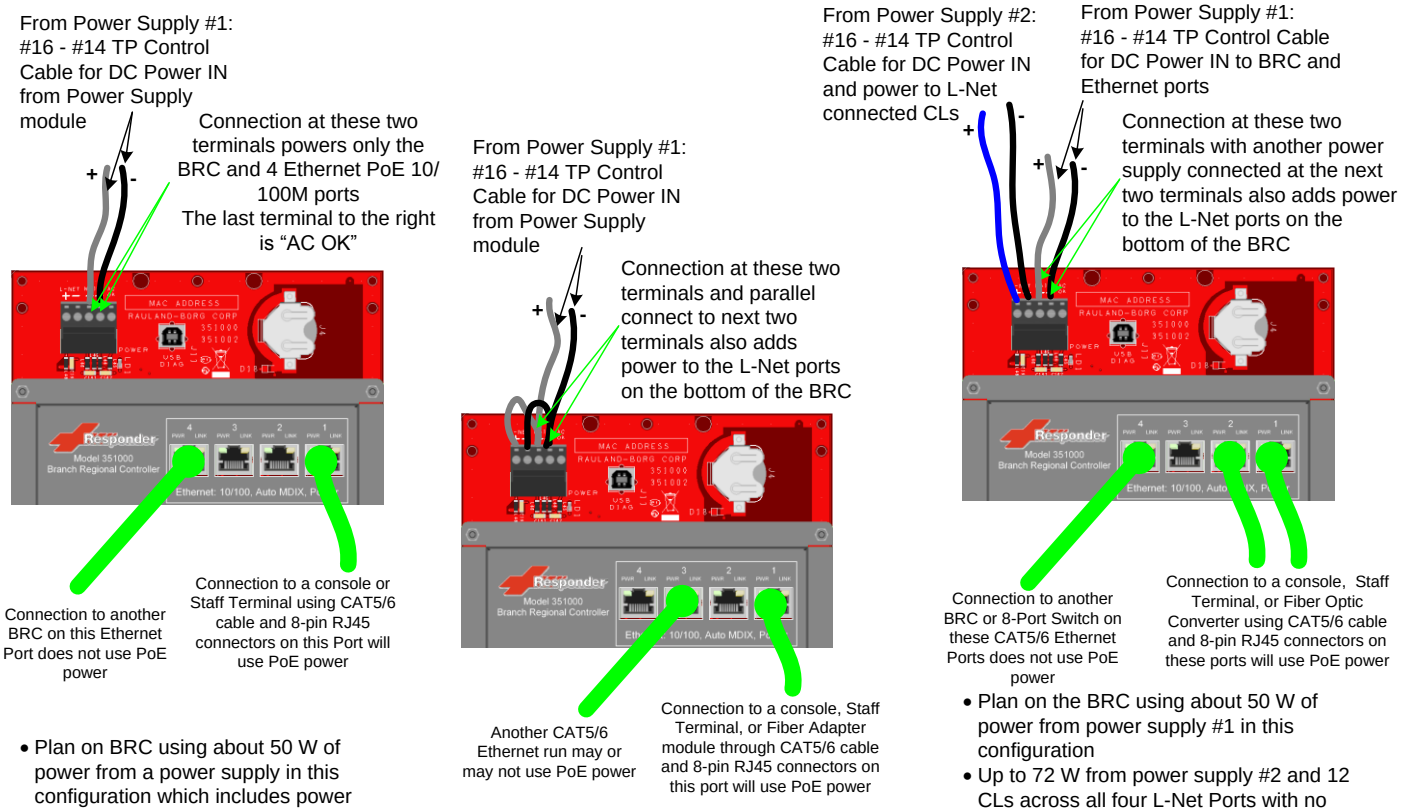
2 Connect the AC OK signal between the BRC and the 351003 Power Supply, using 12-16 AWG wire to properly monitor the AC power source.

- If two (2) or more BRCs or NAMs are connected to Power Supplies on the same AC circuit, only one AC OK is needed to monitor the AC power circuit.

3 Turn the 351003 Power Supply on.

- The BRC's power LED should illuminate.

How to Wire the BRC Power Connector:



- Plan on BRC using about 50 W of power from a power supply in this configuration which includes power to PoE devices on Ethernet
- All CLs controlled by this BRC must have "insert power" starting at the first CL in the line

BRC Wiring Example #1

- Plan on the BRC and attachments using about 85 W of power from a power supply in this configuration – 50 W at the BRC and Ethernet ports and another 35 W at the L-Net ports on this BRC
- Up to 6 CLs across all four L-Net Ports can have power supplied starting at the first CL in the line(s) from the BRC
- No reserve power is available in this set-up (Not the best choice)

BRC Wiring Example #2

- Plan on the BRC using about 50 W of power from power supply #1 in this configuration
- Up to 72 W from power supply #2 and 12 CLs across all four L-Net Ports with no more than 4 CLs connected to one port depending on the run distance to first CL and room station loading on each CL at each room
- Assume no reserve power available from power supply #2 with this connection
- Suggested wiring method is to insert power at CLs on each L-Net run after the first 2 or 3 units

BRC Wiring Example #3

Figure 2: BRC Power Wiring

USB Diagnostics Connection

The USB Diagnostics port is used to connect to any PC running R5WARE. Once connected in this manner, R5WARE will provide diagnostic details regarding the single attached BRC. Should you wish to get diagnostic details (and/or engage in setup management) for multiple BRCs on the closed R5 network, you must connect the R5WARE PC to the R5 network via any Ethernet port on any BRC.

To Get Diagnostic Details for a Single BRC:

- ✓ Run a standard USB cable (USB "B" to "A") from the BRC USB DIAG port (USB "B") to any available USB port (USB "A") on the R5WARE PC. This connection is only used for low-level firmware queries, which are **not** normally necessary during installation or system operation.

To Get Diagnostic Details and Download Configuration for a Single or Multiple Networked BRCs:

- ✓ Run a standard (straight through) Ethernet patch cable from any available BRC Ethernet port to the NIC port on the laptop you are using to run R5WARE.

Ethernet Connections

The BRC provides 4 (four) Ethernet ports. The ports can be used to interconnect BRCs, to connect 351200/351205 Consoles, 351300/351310 Staff Terminals, a 351004 8-port Ethernet switch and/or a 351006 Fiber Optic Adapter Module via the integrated Ethernet switch controller. Connection to Ethernet devices is made using standard RJ45-terminated CAT5 or CAT6 UTP cable. The Ethernet ports also supply power to connected 351200/351205 Consoles, 351300/351310 Staff Terminals, and 351006 Fiber Optic Adapter Modules.

You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given BRC.

Ethernet Cabling

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet depending on fiber selection. (Review Fiber Optic Adapter Module Mounting for details.) Ethernet cables should be wired according to the T568A standard:

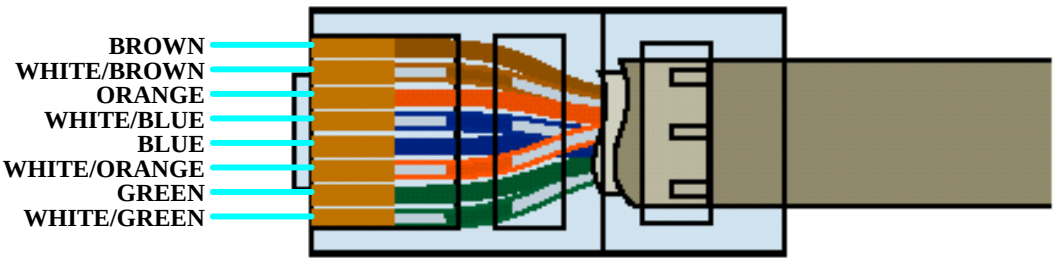


Figure 3: T568A Wiring Colors

L-Net Connections

The L-Net is a multi-drop network. It communicates at 1.5Mbps via dual 768Kbps data pairs. Each L-Net supports six (6) full duplex audio channels. The L-Net supports up to 96 Corridor Lights and Domeless Controllers. Each of its four (4) ports can support any combination of 24 Corridor Lights and Domeless Controllers.

Each of the four (4) L-Net cable runs on a BRC cannot exceed 3000 feet. The L-Net can only be split into a "T" configuration by using a 350004 L-Net Hub. Each 350004 L-Net hub reduces the length of the L-Net by 420 feet.

L-Net Cabling

L-Net cables should be wired according to the T568A standard:

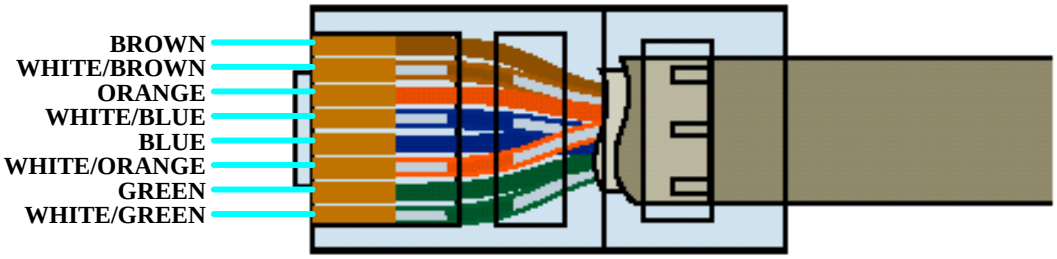


Figure 4: T568A Wiring Colors

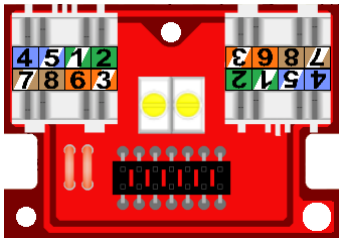


Figure 5: T568A Wiring Colors (L-Net Ports)

L-Net Data, Audio, Power

The BRC always transmits control data and digital audio to those Corridor Lights and Domeless Controllers connected to its L-Net ports. When supplemental power is fed from the 351003 Power Supply to the L-Net power terminals (see Figure 6: L-Net Power Connection), the BRC also supplies these units with power:

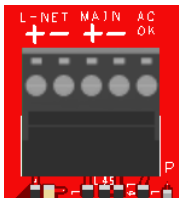


Figure 6: L-Net Power Connection

When L-Net supplemental power is present, each BRC will provide sufficient power for a maximum of eight (8) typically configured rooms; however, the presence of multiple stations in any given room may reduce the maximum total support to six (6) rooms.

Battery Backup

✓ The BRC's RAM—which stores active call, and similar information—is backed up by a replaceable high energy 3V/280mAh coin-type lithium battery (Rauland BD0105 or CR2430), which should be replaced every seven (7) years. The original battery installation date is provided on the cover of the BRC:

Figure 7: Battery Detail

To Replace the Battery:

1 Slide the battery to the right to remove the existing battery.

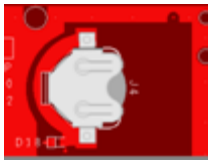


Figure 8: Backup Battery Compartment

2 Replace battery with fresh Rauland BD0105 or commonly available CR2430.

- Polarity matters; make sure the "+" faces up (towards you).

3 Update the label on the device to show a new battery replacement date.

Getting it Ready

Once you've made the appropriate connections, prepare the BRC unit as follows:

1 Connect a laptop bearing the R5WARE Configuration application to the BRC via an Ethernet port.

2 Launch the R5WARE Configurator.

3 Access the Head End Devices screen (Screens | Head End Devices):

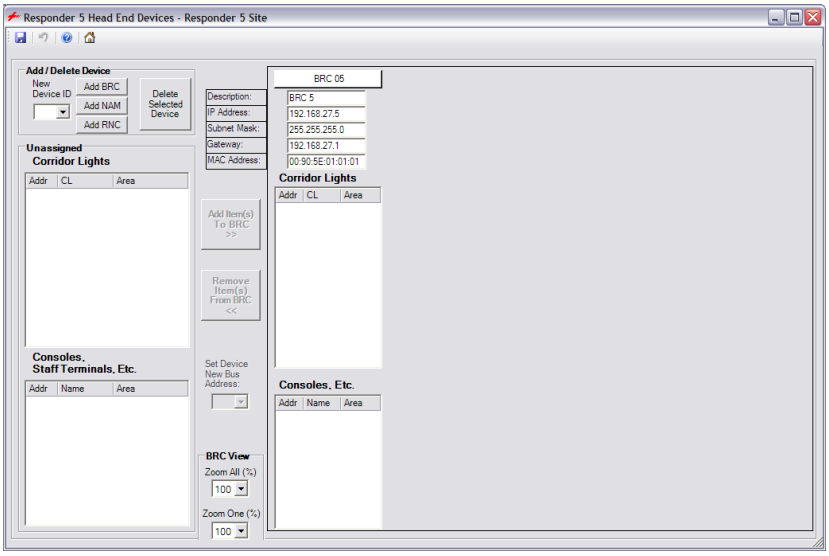
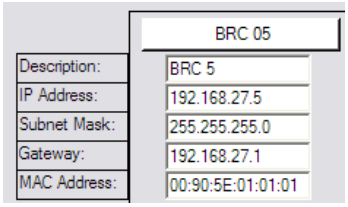


Figure 9: R5Ware Configurator (Head End Devices)

4 Enter IP and MAC addresses.

- Use the right arrow key to move your cursor between entry groups:



- R5Ware v1.05 (and later versions) makes three (3) digits at each position optional. If necessary, add leading and/or trailing zeroes. To use "192.168.6.90," for instance, enter "192.168.006.090" or type "192.168.6.90".
- Alternatively, you may position the cursor in the MAC address entry field and use a bar code reader to read the label affixed to the BRC.
- Putting the IP assignments in the BRC requires running the DHCP server application which will read the MACID – IP address info from a file provided by the GUI configurator and write the info in the BRC flash. Consult the R5 *System Design Guide* (KI-2234) and the R5 *Configuration Guide* (KI-2237) for more details.

Confirming it Works

The 351000/351001 Branch Regional Controller is equipped with a Green power LED below the power connector, which BLINKS SLOWLY when the BRC is fully operational. Power LED OFF or ON SOLID means No Power or Non-functional Re-Booting Mode. A FAST TRIPLE BLINK also means a non-operational mode.

Power LED	
Light Status	**What it Means**
Green Light OFF or ON	No Power or Non-Operational Boot Mode
Green Light SLOW BLINK	Normal fully Operational Mode
Green Light FAST TRIPLE BLINK	Non-Operational Mode

Table 1: Green Power LED

The 4 Ethernet connectors include a "PWR" Orange LED and a "LINK" Green LED to show status of Ethernet connections:

Ethernet Connector LEDs	
Light Status	**What it Means**
PWR Orange Light ON	Power over Ethernet (POE)
LINK Green Light OFF	No Network Activity (Audio)
LINK Green Light ON	Heavy Network Activity (Audio)
LINK Green Light BLINKING	Light Network Activity (Audio)

Table 2: Ethernet Connector LEDs

The BRC L-Net connectors include a "PWR" Orange LED and a Green "LINK" LED to show status of L-Net connections:

L-Net LEDs	
Light Status	**What it Means**
PWR Orange Light ON	Power on L-Net
LINK Green Light ON	L-Net Connection Established
LINK Green Light OFF	No L-Net Connection Established

Table 3: BRC L-Net Connector LEDs

Other Things to Know/Keep in Mind

- ✓ Each system supports a maximum of 96 BRCs. Each 351002 Network Adapter Module is equivalent to a BRC and must be subtracted from the 96 maximum.
- ✓ Each BRC can support a maximum of 96 (4 ports x 24) Corridor Lights or Domeless Controllers.
- ✓ Each Branch Regional Controller supports up to 16 Consoles.
- ✓ Each Branch Regional Controller supports up to 80 Staff Terminals (16 with coverage)
- ✓ The combined length of the four L-Net ports on a single BRC cannot exceed 3000 feet.
- ✓ The L-Net can only be split into a T configuration by using a 350004 L-Net Hub; each 350004 L-Net hub reduces the length of the L-Net by 420 feet.
- ✓ The AC OK signal should be connected to the 351003 Power Supply to properly monitor the AC power source.
- ✓ Connect an earth ground wire (#16 - #14) from a mounting screw to the earth ground stud or screw in the system. The 351102 Wall mounting Equipment Cabinet provides four (4) locations for this along the middle mounting rail.

- ✓ To be compliant with UL, CSA, and EU safety standards, all cable used for wiring the Ethernet, L-Net network(s), M-Net, D-Net, and DC power should be constructed with insulation layers using PVC, TFE, PTFE, FEP, polychlorophrene, or polyimide **and** meet flammability codes established for the hospital by city, county, district, state, province, prefecture, and/or country government entities.
- ✓ For CE compliant installations under EN 60950-1:2006 with EMC under the LVD, the 351000/351001 must be mounted in an NC2828 system cabinet with the R4KHVK power strip panel for 230 VAC EU applications installed.

351002 Network Adapter Module (NAM)

The 351002 Network Adapter Module is the network controller that allows an R5 to interconnect and communicate with Responder® IV nurse call system.

NAM Mounting

The NAM is 6.60" wide, 11.40" high, and 0.90" deep and can be mounted using a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351002 Network Adapter Module makes up to four (4) possible types of connection:

1 **Power (36 Volt DC):** connection to the 351003 Power Supply and only the 351003 is required.

Note: only connect 36 Volts DC wires to the NAM power connector terminals marked "MAIN." (Do **not** connect anything to terminals marked, "L-NET.")

2 **DIAG (USB Diagnostics)**: optional connection to a PC—used for system troubleshooting, and/or performing routine diagnostics.

On the NAM the USB port is used to perform system diagnostics—querying devices, for example; on the Switch, the USB port is used for management functions—changing VLAN settings, turning specific ports on/off, etc.

3 **Ethernet (E-Net1-4)**: connection to BRCs.

Ethernet is the message protocol between other Branch Regional Controllers and the Network Adapter Module. Four (4) RJ-45 Ethernet ports are positioned at the top of the unit. The Ethernet length is limited to the typical 330 feet per segment, but can be extended with a 351004 Ethernet Switch and/or 351006 Fiber Optic Adapter Module. The Ethernet ports are also the primary connection for the R5WARE PC to configure the Nurse Call system or if necessary download new firmware.

4 **X-Bus (Single RJ-45 with 8 Pin Splitter)**: connection to a Responder® IV system.

The X-Bus maintains the message-passing protocol between the Responder® IV nurse call systems via one bottom-mounted RJ-45 connector. The X-Bus is a Rauland proprietary data and digital audio messaging protocol. Responder® IV system X-Bus Cable is usually terminated with a RJ-11 4 Pin Modular Plug that fits into the center 4 pins of the 8 pin Tee-Tap connector provided with the NAM.

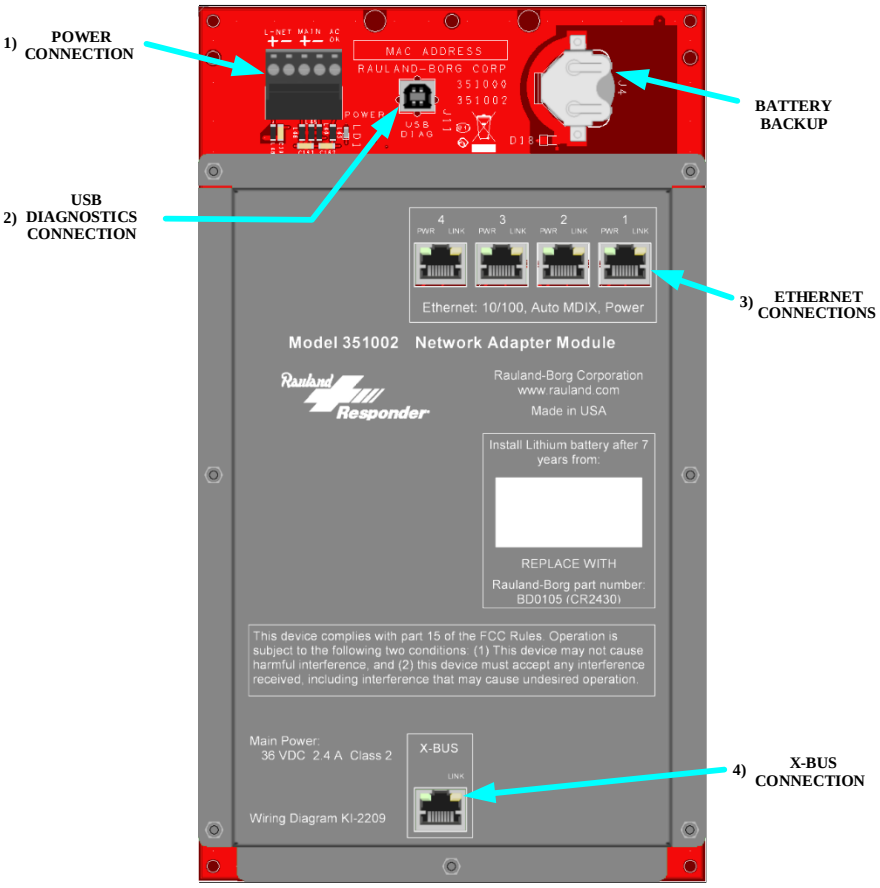


Figure 10: 351002 Network Adapter Module Connections

Power Connection

With the power turned off at the 351003 Power Supply…

1 Connect the NAM to the 351003 power supply via 12-16 AWG wire.

- Consult the Power Calculation Worksheet (*System Design Guide*) for information regarding cable lengths and gauges.
- The MAIN connection supplies power to both the NAM and the Power-over-Ethernet (POE) ports. (The four [4] Ethernet ports are supplied a total of 36V/1.1A for POE applications, per 802.3af limits at 36.5V.)
- To monitor the AC power source, connect the AC OK signal between the NAM and 351003 Power Supply using 12-16 AWG wire.
- If two (2) or more BRCs or NAMs are connected to Power Supplies on the same AC circuit, only one AC OK is needed to monitor the AC power circuit.

How to Wire the Power Connector on the NAM

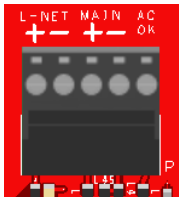


Figure 11: NAM Power Connections

ONLY make the 36 Volt Power Supply connections to the NAM Power Terminals marked "MAIN". Do NOT connect any wires to the "L-NET" terminals – voltage to the "L-NET" terminals will NOT power the NAM or sent any DC voltage to the X-Bus Connector.

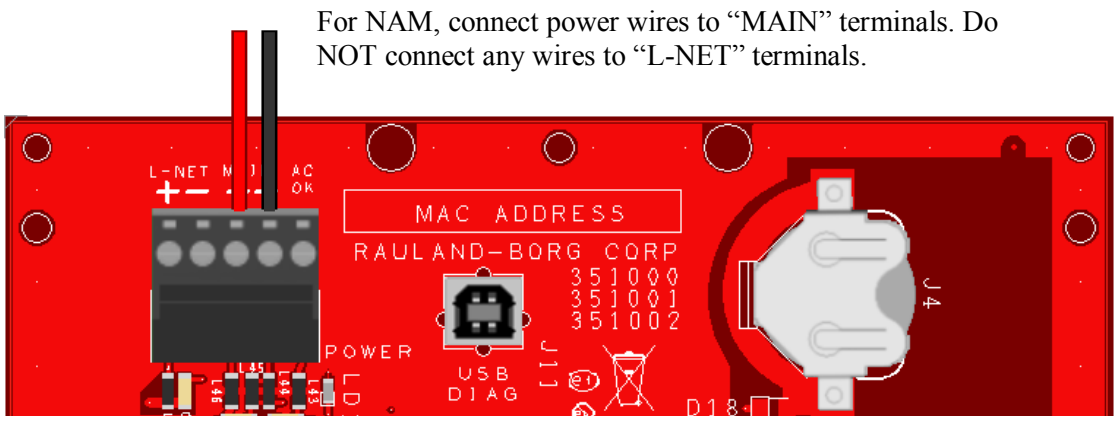


Figure 12: NAM Power and AC OK Connections

USB Diagnostics Connection

The USB Diagnostics port is used to connect to any PC running R5WARE. Once connected in this manner, R5WARE will provide diagnostic details regarding the single attached NAM.

To Get Diagnostic Details for a Single NAM:

Run a standard USB cable (USB "B" to "A") from the NAM USB DIAG port (USB "B") to any available USB port (USB "A") on the R5WARE PC. This is for low-level firmware queries only, which are not normally necessary.

Ethernet (E-Net1-4) Connections

The NAM provides 4 (four) Ethernet ports. The ports can be used to connect to a 351000/351001 BRC, a 351004 8-port Ethernet switch, and/or a 351006 Fiber Optic Adapter Module. Connections to Ethernet devices are made using standard RJ45-terminated CAT5 or CAT6 UTP cable. The Ethernet ports also supply power to connected 351006 Fiber Optic Adapter Modules.

You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given NAM.

Ethernet Cabling

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet depending on fiber selection. (Review Fiber Optic Adapter Module Mounting for details.) Ethernet cables should be wired according to the T568A standard:

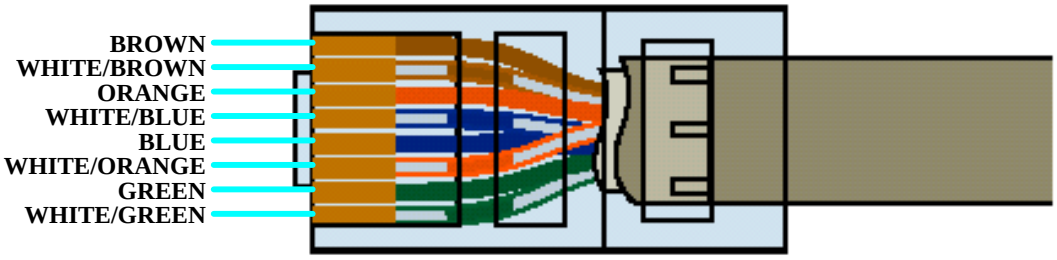


Figure 13: T568A Wiring Colors

X-Bus Connection

The NAM provides a single X-Bus port, which can be used to connect the R5 system with a Responder® IV system. The length of the cable connected to the X-Bus port must be factored into the total X-Bus length limitation of 1400 feet when Long X-Bus option is selected.

Fiber Optic Adapter Modules and cable **cannot** be used to extend the X-Bus cable beyond the 1400 foot total length (Long X-Bus) limitation.

Responder® IV system X-Bus cables should be wired according to the RIV 4 Pin RJ11 Plug standard listed in RIV cable guide and below:

RIV X-Bus **2 Twisted Pair, Category 5e**	
Wire Color	**Pin**
White/Orange	1
Blue/White	2
White/Blue	3
Orange/White	4

Table 4: X-Bus Cable Wiring Pin out

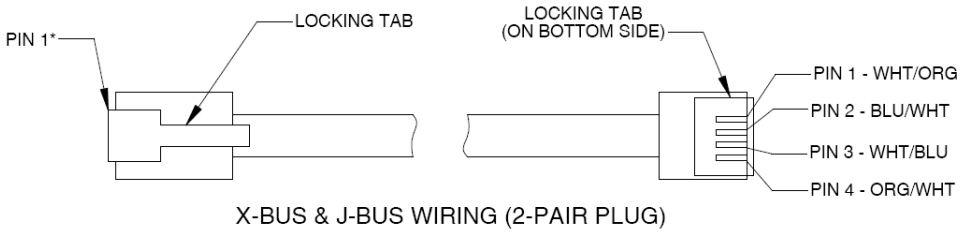


Figure 14: X-Bus Cable Wiring

Connect the NAM module to the other X-Bus devices using CAT5 UTP cable. Use the provided X-Bus Splitter (SF0720) to connect the X-Bus to other Responder® IV (NCGCM, NCDATA).

Figure 15: X-Bus Splitter (8-pin version)

NOTE: The RIV X-Bus 4 Pin RJ11 cable connector will align itself into the center 4 pins of the 8 Pin Splitter and latch in place properly.

Be sure to install the provided end of line terminating resistors (VP1391) at each end of the X-Bus. The NAM may be at the beginning or end of the X-Bus – with one X-Bus cable and a terminating resistor plugged into the splitter. Or the NAM may be between other X-Bus devices – with two X-Bus cables plugged into the splitter and no terminating resistor. Once you've connected X-Bus devices using the splitter, make sure each RIV X-Bus device is operating correctly. (Check the X-Bus Status LED on all X-Bus devices.)

Battery Backup

The NAM's RAM—which stores active call, and similar information—is backed up by a replaceable high energy 3V/280mAh coin-type lithium battery (Rauland BD0105 or CR2430), which should be replaced every seven (7) years. The original battery installation date is provided on the cover of the NAM:

Figure 16: Battery Detail

To Replace the Battery:

When a 351002 Network Adapter Module is in operation, the "MAIN" power can remain connected during a battery replacement.

1 Slide the battery to the right to remove the existing battery.

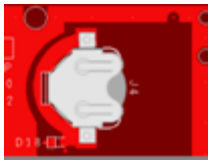


Figure 17: Backup Battery Compartment

2 Replace battery with fresh Rauland BD0105 or commonly available CR2430.

- Polarity matters; make sure the "+" faces up (towards you).

3 Update the label on the device to show a new battery replacement date.

Getting it Ready

Once you've made the appropriate connections, prepare the unit as follows:

1 Connect a laptop bearing the R5WARE Configuration application to the NAM via the Ethernet Port.

2 Launch the R5WARE Configurator.

3 Access the Head End Devices screen (Screens | Head End Devices):

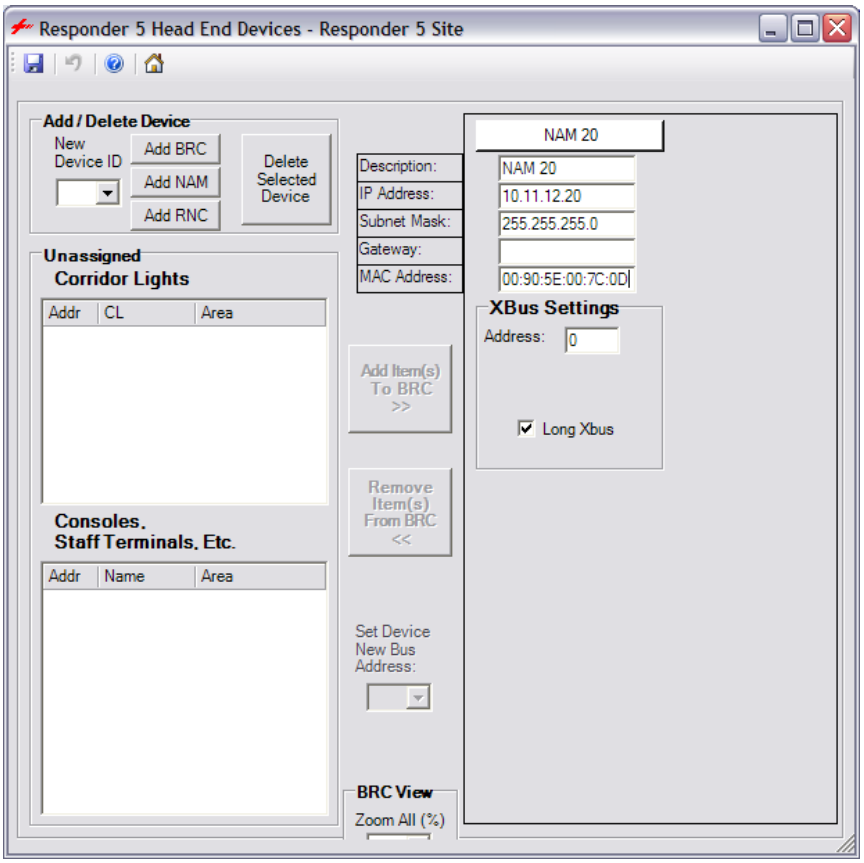


Figure 18: R5Ware Configurator (Head End Devices)

4 Enter IP and MAC addresses.

- Use the right arrow key to move your cursor between entry groups:

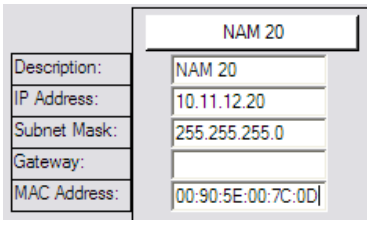


Figure 19: NAM ID, IP and MAC Address

- R5Ware v1.01 requires you use three (3) digits in each position. If necessary, add leading and/or trailing zeros. To use "192.168.6.90," for instance, enter "192.168.006.090".

- Alternatively, you may position the cursor in the MAC address entry field and use a bar code reader to read the label affixed to the NAM.
- Putting the IP assignments in the NAM requires running the DHCP server application which will read the MACID – IP address info from a file provided by the GUI configurator and write the info in the NAM flash. Consult the *R5 System Design Guide* (KI-2234) and the *R5 Configuration Guide* (KI-2237) for more details.

Confirming it Works

The 351002 Network Adaptor Module is equipped with a Green power LED below the power connector, which BLINKS SLOWLY when the NAM is fully operational. Power LED OFF or ON SOLID means No Power or Non-functional Re-Booting Mode. A FAST TRIPLE BLINK also means a non-operational mode.

Power LED	
Light Status	**What it Means**
Green Light OFF or ON	No Power or Non-Operational Boot Mode
Green Light SLOW BLINK	Normal fully Operational Mode
Green Light FAST TRIPLE BLINK	Non-Operational Mode

Table 5: Green Power LED

The 4 Ethernet connectors include a "PWR" Orange LED and a "LINK" Green LED to show status of Ethernet connections:

Ethernet Connector LEDs	
Light Status	**What it Means**
PWR Orange Light ON	Power over Ethernet (POE)
LINK Green Light OFF	Network NOT LINKED
LINK Green Light ON STEADY	Network LINKED No DATA
LINK Green Light BLINKING	Network LINKED with Data Activity

Table 6: Ethernet Connector LEDs

The NAM X-Bus connector includes a Green "LINK" LED to show status of X-Bus connection:

NAM X-Bus Link LED	
Light Status	**What it Means**
LINK Green Light SLOW BLINK	Network Connection Established
LINK Green Light OFF	No Network Connection Established

Table 7: NAM X-Bus Link LED

Other Things to Know/Keep in Mind

- ✓ R5 system can include more than one NAM but each NAM can only supports one X-Bus Network – a RIV System network.
- ✓ The length of the cable connected to the X-bus port must be factored into the total X-

bus length limitation of 1400 feet when Long X-Bus option is selected. Fiber Optic Adapter Modules and cable **cannot** be used to extend the X-Bus cable beyond the 1400 foot total length (Long X-Bus) limitation.

- ✓ The Ethernet ports can be used to connect to a 351000/351001 BRC, a 351010 RNC, a 351004 8-port Ethernet switch, and/or a 351006 Fiber Optic Adapter Module.
- ✓ You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given NAM.
- ✓ The ONLY 36 Volt DC Power Supply connection **must** be to the Terminals marked "MAIN." The "L-NET" power connection does **not** power the NAM, and no 36 Volt DC Power is sent to the X-Bus Connector. The AC OK signal should be connected between the NAM and the 351003 Power Supply to properly monitor the AC power source.
- ✓ To be compliant with UL, CSA, and EU safety standards, all cable used for wiring the Ethernet, L-Net network(s), M-Net, D-Net, and DC power should be constructed with PVC, TFE, PTFE, FEP, polychlorophrene, or polyimide insulation layers that meet flammability codes established for the hospital by city, county, district, state, province, prefecture, and/or country government entities.

351010 Responder Network Concentrator (RNC)

The Responder Network Concentrator (RNC) is R5's network attachment unit. It distributes data and audio to various system devices. One or multiple RNCs are needed if the R5 system is configured with subnets/VLANs for interconnecting the R5 head-end system components, e.g., BRCs, NAMs, consoles, Staff Terminals, and Ethernet switches to facilitae the peripheral connections.

RNC Mounting

The 351010 RNC is 6.60" wide, 11.40" high, and 0.90" deep and can be mounted using a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351010 Responder Network Concentrator (RNC) makes up to three (3) possible types of connection:

1 **Power**: connection to the 351003 Power Supply and only the 351003 power supply is required.

2 **USB Diagnostics (USB DIAG)**: optional connection to a PC running the configuration program (R5WARE)—used for system troubleshooting, and/or performing low-level diagnostics.

3 **Ethernet**: connection to BRCs, to 351004 8-port Ethernet switches, to 351006 Fiber Optic Adapter Modules, or to a hospital's network. Any Ethernet port on a BRC can be used for system configuration and firmware download.

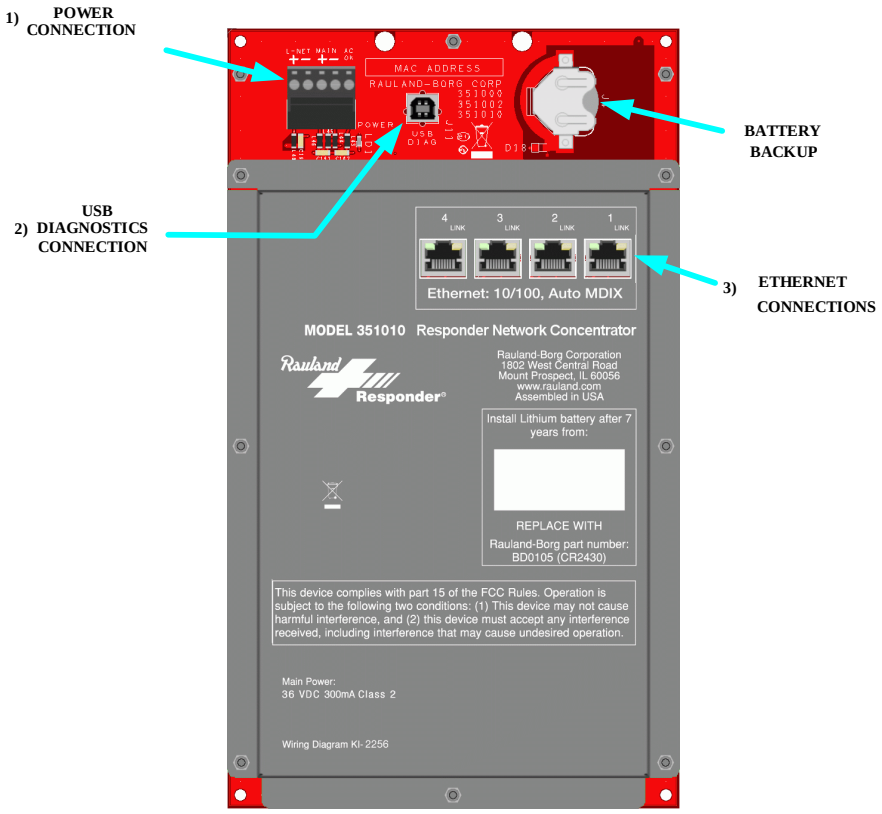


Figure 20: 351010 Responder Network Concentrator Connections

Power Connection

With the power turned off at the 351003 Power Supply…

1 Connect the RNC to the 351003 power supply via 12-16 AWG wire.
- The MAIN connection supplies power to the RNC
- Consult the Power Calculation Worksheet (*System Design Guide*) to determine the exact wire gauge.

2 Turn the 351003 Power Supply on.
- The power LED should illuminate.

How to Wire the RNC Power Connector:

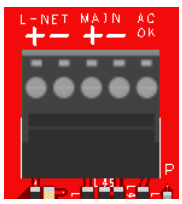


Figure 21 RNC Power Connections

ONLY make the 36 Volt Power Supply connections to the RNC Power Terminals marked "MAIN". Do NOT connect any wires to the "L-NET" terminals – voltage to the "L-NET" terminals will NOT power the RNC. **Note**: the RNC provides no L-Net connections.

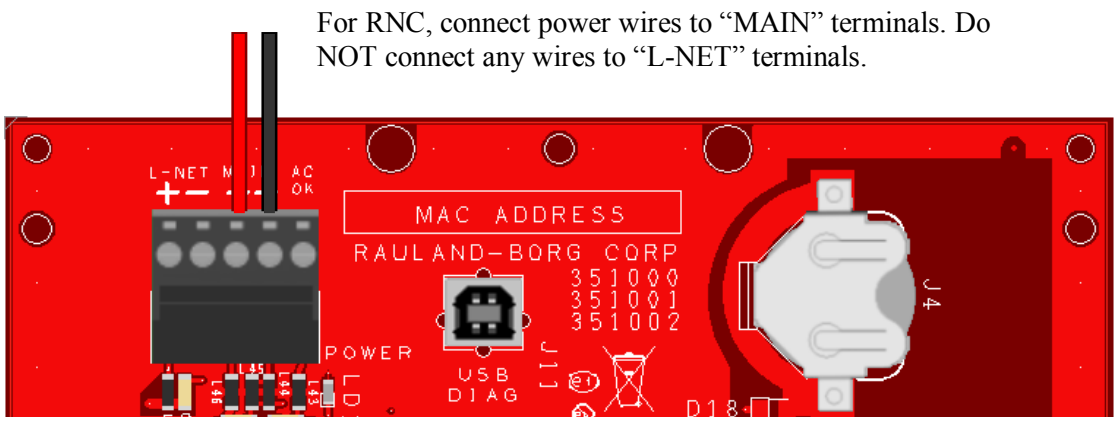


Figure 22 RNC Power Wiring

USB Diagnostics Connection

The USB Diagnostics port is used to connect to any PC running R5WARE. Once connected in this manner, R5WARE will provide diagnostic details regarding the single attached RNC. Should you wish to get diagnostic details (and/or engage in setup management) for multiple RNCs on the closed R5 network, you must connect the R5WARE PC to the R5 network via any Ethernet port on any RNC.

To Get Diagnostic Details for a Single RNC:

✓ Run a standard USB cable (USB "B" to "A") from the RNC USB DIAG port (USB "B") to any available USB port (USB "A") on the R5WARE PC. This is for low-level firmware queries only which are not normally necessary during an install.

To Get Diagnostic Details and Download Configuration for a Single or Multiple Networked RNCs:

✓ Run a standard (straight through) Ethernet patch cable from any available RNC Ethernet port to the NIC port on the laptop you are using to run R5WARE.

Ethernet Connections

The RNC provides 4 (four) Ethernet ports. The Ethernet ports do not support PoE. The ports can be used to interconnect RNCs, a 351004 8-port Ethernet switch and/or a 351006 Fiber Optic Adapter Module (requires external power), via the integrated Ethernet switch controller.

To maintain electrical isolation to all non-R5 systems, Ethernet connections should be made through a 351006 Fiber Optic Adapter. Connections to Ethernet devices are made using standard RJ45-terminated CAT5 or CAT6 UTP cable.

You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given RNC.

Ethernet Cabling

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet depending on fiber selection. (Review Fiber Optic Adapter Module Mounting for details.) Ethernet cables should be wired according to the T568A standard:

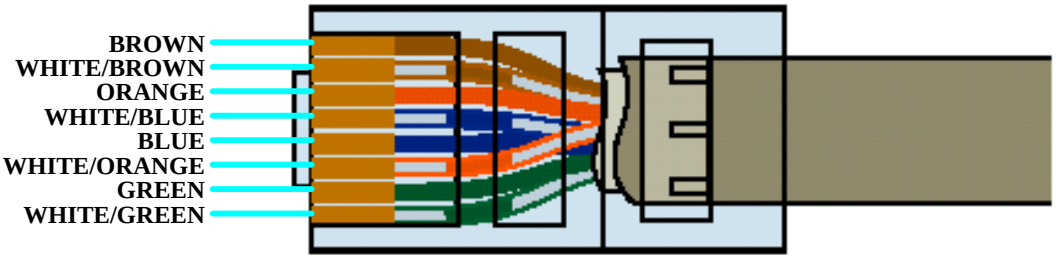


Figure 23: T568A Wiring Colors

Battery Backup

✓ The RNC's RAM—which stores active call, and similar information—is backed up by a replaceable high energy 3V/280mAh coin-type lithium battery (Rauland BD0105 or CR2430), which should be replaced every seven (7) years. The original battery installation date is provided on the cover of the RNC:

Figure 24: Battery Detail

To Replace the Battery:

1 Slide the battery to the right to remove the existing battery.

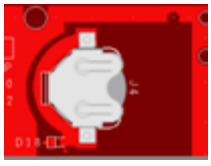


Figure 25: Backup Battery Compartment

2 Replace battery with fresh Rauland BD0105 or commonly available CR2430.

➢ Polarity matters; make sure the "+" faces up (towards you).

3 Update the label on the device to show a new battery replacement date.

Getting it Ready

Once you've made the appropriate connections, prepare the RNC unit as follows:

1 Connect a laptop bearing the R5WARE Configuration application to the RNC via an Ethernet port.

2 Launch the R5WARE Configurator.

3 Access the Head End Devices screen (Screens | Head End Devices):

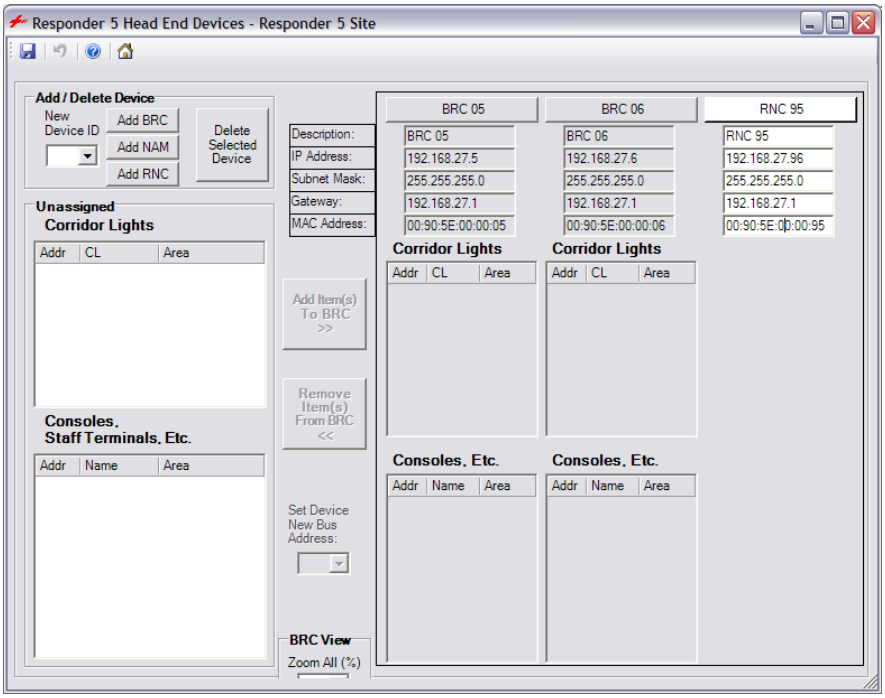
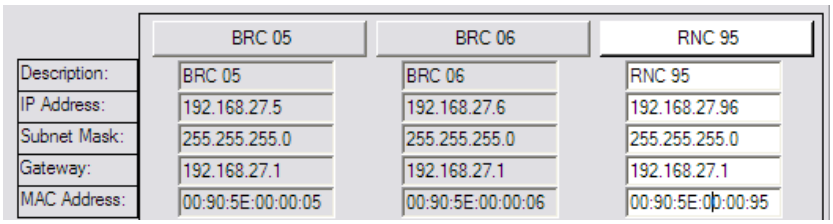


Figure 26: R5Ware Configurator (Head End Devices)

4 Enter IP and MAC addresses.

- Use the right arrow key to move your cursor between entry groups:



- R5Ware v1.05 (and later versions) makes three (3) digits at each position optional. If necessary, add leading and/or trailing zeroes. To use "192.168.6.90," for instance, enter "192.168.006.090" or type "192.168.6.90".
- Alternatively, you may position the cursor in the MAC address entry field and use a bar code reader to read the label affixed to the RNC.
- Putting the IP assignments in the RNC requires running the DHCP server application which will read the MACID – IP address info from a file provided by the GUI configurator and write the info in the RNC flash. Consult the R5 *System Design Guide* (KI-2234) and the R5 *Configuration Guide* (KI-2237) for more details.

Confirming it Works

The 351010 Responder Network Concentrator is equipped with a power LED, which confirms proper operation:

Power LED	
Light Status	**What it Means**
Green Light OFF or ON	No Power or Non-Operational Boot Mode
Green Light SLOW BLINK	Normal fully Operational Mode
Green Light FAST TRIPLE BLINK	Non-Operational Mode

Table 8: Green Power LED

The 4 Ethernet connectors include a "LINK" Green LED to show status of Ethernet connections:

Ethernet Connector LEDs	
Light Status	**What it Means**
LINK Green Light OFF	No Network Activity (Audio)
LINK Green Light ON	Heavy Network Activity (Audio)
LINK Green Light BLINKING	Light Network Activity (Audio)

Table 9: Ethernet Connector LEDs

Other Things to Know/Keep in Mind

- ✓ A 351010 Responder Network Concentrator can support up to 12 Branch Regional Controllers (BRC)/Network Adapter Modules (NAM).
- ✓ A Responder 5 system can support a maximum of 8 RNCs, for a total of 87 BRCs/NAMs and 1 Responder Gateway Server. [96 BRCs/NAMs – 8 RNCs = 88; 88 – 1 RGS = 87 supported system controllers as BRCs or NAMs]
- ✓ Connect an earth ground wire (#16 - #14) from a mounting screw to the earth ground stud or screw in the system. The 351102 Wall mounting Equipment Cabinet provides four (4) locations for this along the middle mounting rail.
- ✓ The 351010 Responder Network Concentrator Ethernet ports **do not** support PoE.
- ✓ To be compliant with UL, CSA, and EU safety standards, all cable used for wiring the Ethernet, L-Net network(s), M-Net, D-Net, and DC power should be constructed with PVC, TFE, PTFE, FEP, polychlorophrene, or polyimide insulation layers that meet flammability codes established for the hospital by city, county, district, state, province, prefecture, and/or country government entities.
- ✓ For CE compliant installations under EN 60950-1:2006 with EMC under the LVD, the 351010 must be mounted in an NC2828 system cabinet with the R4KHVK power strip panel for 230 VAC EU applications installed.

351003 Power Supply with Battery Back-up

The Power Supply (PS) provides system power to 351000/351001 Branch Regional Controllers (BRCs), 351010 Responder Network Concentrator (RNC), 351002 Network Adaptor Modules (NAMs), 351004 Ethernet Switch, 351006 Fiber Optic Adapter Module , 351200/351205 Nurse Console, 351300/351310 Staff Terminal, 352000/352010 Corridor Light or 352020/352021 Domeless Controller and all room stations, buttons, and I/O device

modules via the 352000/352010 or 352020/352021. Use **only** the 351003 Power Supply to power the listed R5 system components.

PS Mounting

The PS is 4.43" wide, 11.50" high, and 2.59" deep and can be mounted using a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351003 Power Supply makes up to two (2) possible connections:

1 **AC Inlet:** required connection to a 90–264 VAC (47-63 Hz) power source—via male IEC connector.

2 **DC Output:** DC output to R5 System devices—via 12-16 AWG wire.

- Consult the Power Calculation Worksheet (*System Design Guide*) for information regarding cable lengths and gauges

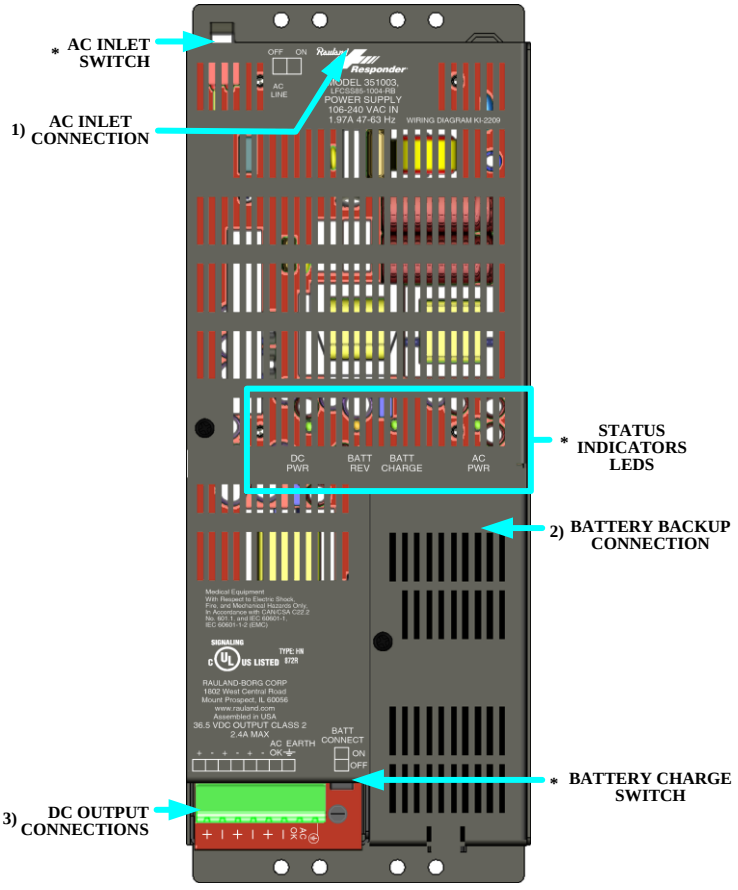


Figure 27: Power Supply Connections

AC Inlet Connection

The PS should be connected to a reliable 90–264 VAC, 47-63 Hz source with a dedicated circuit breaker (minimum of 1.97A per 351003 Power Supply.) using the supplied IEC cable. The AC Inlet Switch can be used to turn the unit on/off.

Battery Backup Connection

Every 351003 Power Supply is equipped with a backup battery. The BATT CONNECT switch removes the charge circuit from the battery and battery output during power faults. Leave the switch in the ON position for normal operation. See "Battery Backup Replacement" below for instructions on battery replacement. The battery will provide power for approximately three (3) minutes during a power failure (typical loading).

DC Output Connections

The unit supplies power via three (3) parallel DC output pairs (+ |). Multiple connection points are provided for wiring convenience. The total output is 36.5V—up to 2.4 amps across all three connections combined. DC connection is made via pluggable screw terminal connectors.

All power supplies connected to devices on the same Branch Regional Controller 351000/351001 must have the 0V tied together. Because the power supplies are floating, 0V must be referenced equally on each device that is communicating on a common L-Net.

AC OK

In addition, to DC Output Connections, an "AC OK" connection is provided. When connected to a BRC or NAM, this "AC OK" connection monitors the AC supply. **Note**: if two (2) or more BRCs or NAMs are connected to Power Supplies on the same AC circuit, only one AC OK connection is required to monitor the AC power circuit.

Earth Ground

The 351003 Power Supply makes a connection to Earth Ground via the grounded AC plug. The PS also provides a connection to Earth Ground for other Head-End devices via the pluggable screw terminal connector. For ESD and RF purposes, all R5 Head-End devices must be Earth Grounded. This connection can be made using a user-provided 12-16AWG wire. To meet safety requirements, the head-end components are mounted in an R5 system case (either the NC2828 or the 351102) bonded to earth ground.

The power supply ground lug should be connected through a short wire to the ground lug in the system case. (Power supply chassis mounting screws **cannot** be relied upon for ground connection.)

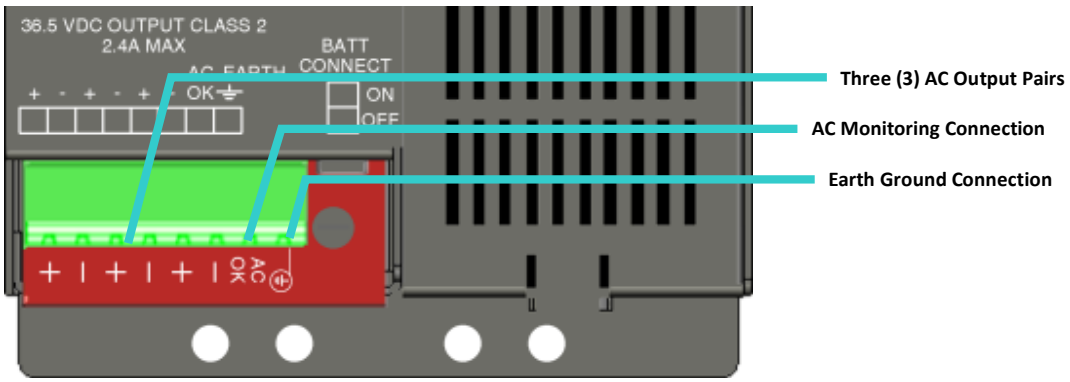


Figure 28: Power Supply DC/AC Monitor/Ground Connections

Short/Overload

In the event of a short or current demand overload, the PS will 1) stop outputting DC, but automatically retry every 2-3 seconds—until a short is cleared; 2) the green DC PWR LED

will flash several times every 2-3 seconds; and 3) the AC PWR will not turn on. In the event of short/overload, unplug the screw terminal block, and check the field wiring.

Status Indicator LEDs

The 351003 Power Supply is equipped with four (4) status indicator LEDs:

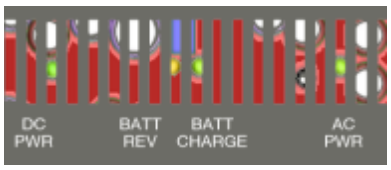


Figure 29: Status Indicator LEDs

1 **DC POWER:** (Green) this LED shows solid green when the DC output is between 35.3 and 37.0 VDC; it will flashes green when the supply is too low (33.8-35.3VDC) or too high (37.0-38.0VDC).

- **Remedy**: if the LED flashes, remove the DC output connector and recheck field wiring.

2 **BATT REV:** (Yellow) this LED shows solid yellow if wires to the backup battery for this Power Supply are reversed. This LED is independent from the charge circuit and switch.

- **Remedy**: if this LED shows yellow, reverse the battery connection wires; see "Replacing the Backup Battery" below for details.

3 **BATT CHARGE:** (Green) this LED shows solid when the backup battery is charging. The battery must be attached for the charge circuit to output and the green LED to illuminate. To increase battery life, the unit will cycle charge the battery—14 +/- 2 hours on and 14 +/- 2 hours off. Cycling will not affect the backup duration.

4 **AC POWER** – (Green) this LED shows solid when the AC output is 90–264 VAC, 47-63 Hz. It flashes when the input AC supply is out of this range.

- **Remedy**: if the AC Power LED flashes, check power source voltage.

Turning the Power Supply On

Once you've made all connections, it is safe to turn the unit on.

To Power Up:

1 Place the AC inlet switch at the top of the Power Supply into the "On" position.

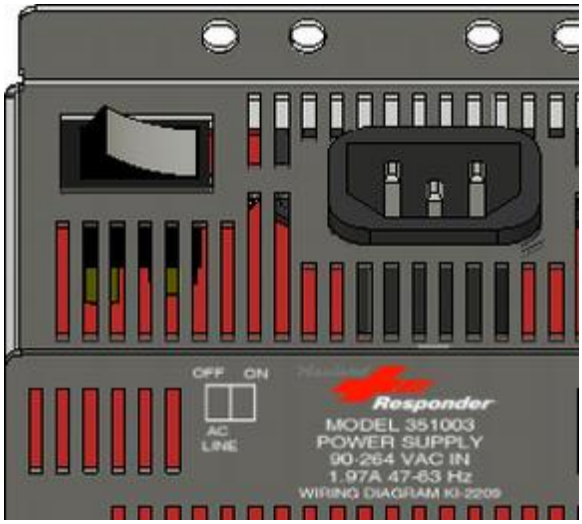


Figure 30: AC Inlet Switch (shown in the "ON" position)

- The DC PWR and AC PWR LEDs should show solid green.
- The BATT CHARGE LED should turn on whenever AC power is first applied. You should be able to measure 35.3 - 37.0 VDC at the DC output screw terminals:

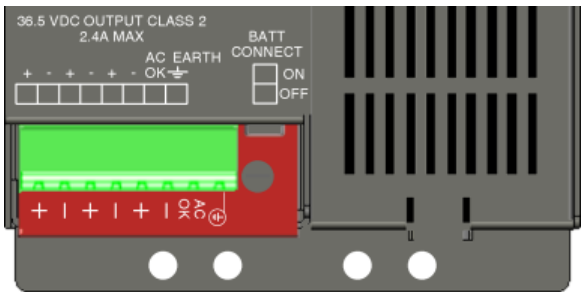


Figure 31: Screw Terminals

Replacing the Backup Battery

The Power Supply cycle charges the battery automatically. Should the battery not charge, or should you know it to be defective in any other way, replace it with a Panasonic LC-R121R3P or use Rauland replacement kit 350009. (The typical battery life of this 12V, 1.3AH sealed lead acid battery is approximately five (5) years.) CAUTION: Only the specified Panasonic LC-R121R3P battery type may be used for replacement without risk of explosion.

To Replace the Battery:

1 Place the Battery Connect switch into the "OFF" position.

2 Use a Philips screwdriver to remove the screw securing the battery cover:

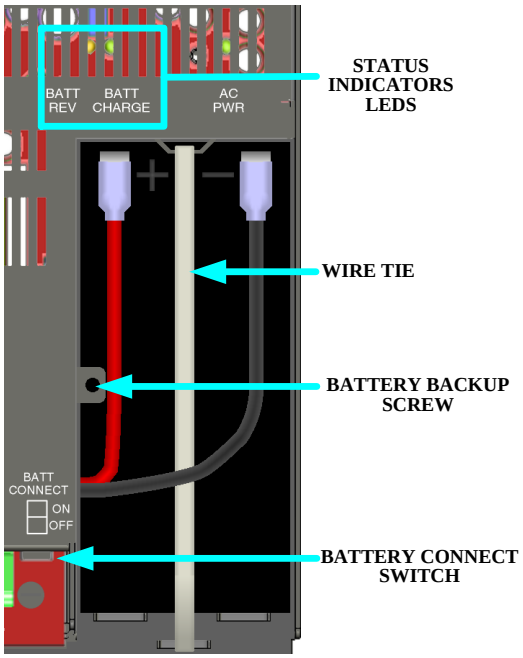


Figure 32: 351003 Battery replacement

3 Disconnect two (2) battery spade lugs—(red = positive [+]; black = negative [-]).

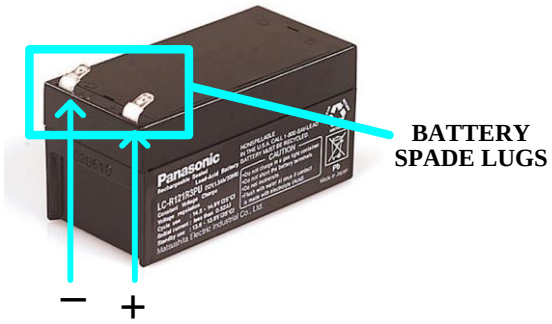


Figure 33: 351003 Battery replacement

4 Cut the wire tie holding the battery in place.

5 Remove the battery.

6 Mount the new BD0112 battery and attach the new QP0819 wire-tie.

7 Reattach the spade lugs—(red = positive [+]; black = negative [-]).

- If the BATT REV LED shows yellow, you've inadvertently reversed the battery terminal polarity. Reconnect the battery spade lugs correctly—(red = positive [+]; black = negative [-]).

8 Reattach the battery cover.

9 Place the Battery Connection switch into the "ON" position.

- The BATT CHARGE LED should show solid green.

Other Things to Know/Keep in Mind

- ✓ If the power supply will not be used for an extended period of time, disconnect the battery at the terminals (not just the switch).
- ✓ The 351003 power supply is shipped with the battery disconnected at the terminal. Be sure to properly attach the battery and secure the front cover.
- ✓ The battery connect switch should **always** be in the ON position. It should **only** be turned off during the replacement procedure.
- ✓ If the battery is connected and the charger will not charge the battery, please see Tech Bulletin H3429TB for recharging details.
- ✓ You must connect the power supply terminal block as directed in the section Making Connections/Interconnect in order to meet safety requirements.
- ✓ CAUTION: Power supply internal wiring includes two (2) pole/neutral fusing.
- ✓ To be compliant with UL, CSA, and EU safety standards, all cable used for wiring the Ethernet, L-Net network(s), M-Net, D-Net, and DC power should be constructed with insulation layers using PVC, TFE, PTFE, FEP, polychlorophrene, or polyimide **and** meet flammability codes established for the hospital by city, county, district, state, province, prefecture, and/or country government entities.
- ✓ You must recycle a battery removed from the power supply as dictated by city, county, district, state, province, prefecture, and/or country codes regarding sealed lead-acid battery packages. Basic handling directions are printed on the side of the case.
- ✓ To be compliant with IEC 60950-1:2006 safety standards, the 351003 must be mounted in a NC2828 system cabinet.

351004 Ethernet Switch – 8+2 Port

The 351004 Ethernet Switch is an eight (8) port plus two (2) net/uplink/trunk ports switch used to interconnect other system switches and to connect to 351000/351001 Branch Regional Controllers (BRCs), 351010 Responder Network Concentrators (RNC), 351200/351205 Nurse Consoles, 351002 Network Adapter Modules (NAMs), 351006 Fiber Optic Adapter Modules (FOA), and/or 351300/351310 Staff Terminals.

Ethernet Switch Mounting

The Ethernet Switch is 1.69” wide, 11.50” high, 2.83” deep and can be mounted in a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351004 Ethernet Switch makes up to four (4) possible connections:

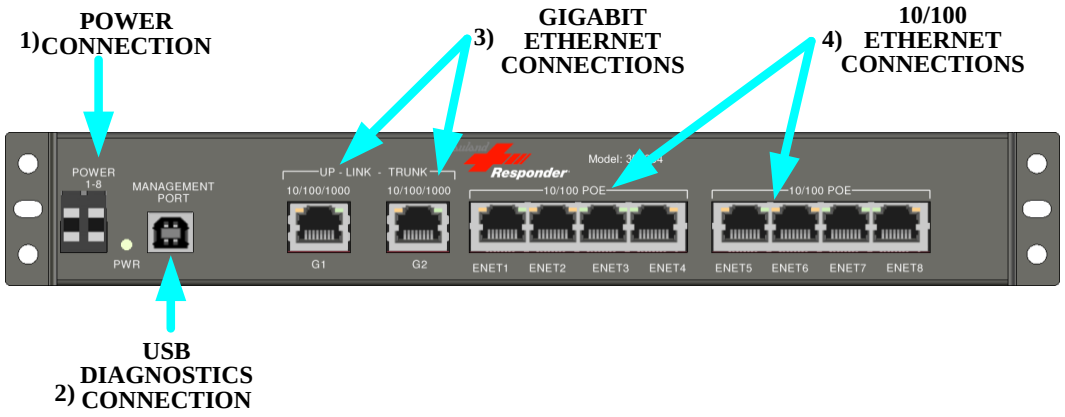


Figure 34: 351004 Ethernet Switch Connections

1 **POWER (1-8)**: required power connection to the 351003 Power Supply.

2 **MANAGEMENT PORT**: optional connection to a PC for viewing the Switch Set-up—and used for troubleshooting and/or performing routine diagnostic queries.

3 **UP-LINK PORTS/TRUNK (G1-G2)**: Gigabit Ethernet connection to the hospital network and to other Ethernet switches.

4 **10/100 POE (ENET1-8):** powered Ethernet connection to BRCs, Consoles, FOA, and/or Staff Terminals.

Power 1-8 Connection

The unit itself and its eight (8) 10/100 Ethernet ports are powered by a connection to the 351003 Power Supply (and **only** the 351003) via 12-16AWG wire. (Consult the Power Calculation Worksheet [*System Design Guide*] to determine the exact wire gauge.) Each powered Ethernet port provides 10W maximum at the port connection.

MANAGEMENT PORT Connection

The MANAGEMENT (USB Diagnostics) PORT is used to connect to any PC running a command window. Once connected in this manner, the switch can be queried for diagnostic details regarding the single attached Ethernet Switch.

To Get Diagnostic Details:

✓ Run a standard USB cable (USB "B" to "A") from the MANAGEMENT PORT (USB "B") to any available USB port (USB "A") on the R5WARE PC.

UP-LINK TRUNK (G1-G2): Gigabit Ethernet Connections

The Ethernet Switch provides two (2) Network and/or **UP-LINK TRUNK ports (G1-G2)** Gigabit Ethernet ports. These can be used to interconnect Ethernet Switches at faster data transfer speeds than the available 10/100 Ethernet ports. These ports automatically negotiate between 10M, 100M, and 1 G and match transmit and receive.

✓ UP-LINK Trunk Ports (G1-G2) are configured by default as normal ports.
✓ You **cannot** use a hub or splitter to split a Gigabit Ethernet port connection.

10/100 POE (ENET1-8): Ethernet Connections

The Ethernet Switch provides eight (8) Ethernet ports. The ports can be used to connect 351000/351001 BRCs, 351010 RNCs, 351002 NAMs, to connect 351200/351205 Consoles, 351300/351310 Staff Terminals, and/or 351006 Fiber Optic Adapter Modules. Connection to Ethernet devices is made using standard RJ45-terminated CAT5 or CAT6 UTP cable. The Ethernet ports also supply power to connected 351200/351205 Consoles, 351300/351310 Staff Terminals, and 351006 Fiber Optic Adapter Modules. Each powered Ethernet port draws ~ 11W maximum to deliver about 10W at the end of a 330' Ethernet cable run.

You **cannot** use a hub or splitter to split a 10/100 POE Ethernet port connection.

Ethernet (Gigabit and 10/100 Cabling)

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet. (This length depends on the fiber cable quality and splices used between connections.) Ethernet cables should be wired according to the T568A standard:

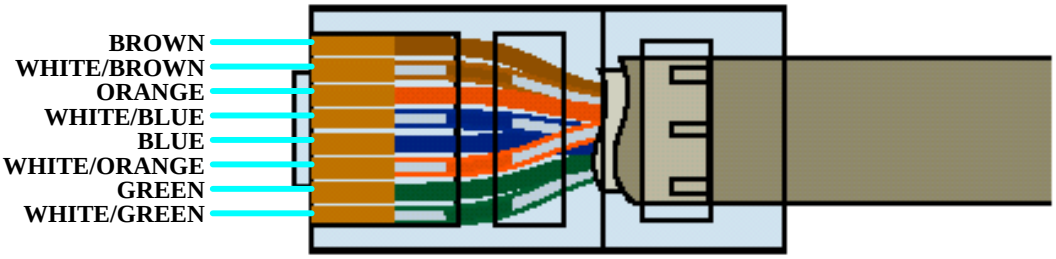


Figure 35: T568A Wiring Colors

Other Things to Know/Keep in Mind

- ✓ Each 10/100 Mbps Ethernet port supports one connection and one PoE powered device.
- ✓ 351004 switches are not IP addressable and do not add to the system controller count when using RNCs to build subnets or VLAN within the R5 Nurse Call network.
- ✓ The maximum power available to a device on a PoE-enabled port is 10 watts at the switch before the cable run.
- ✓ 351006 Fiber Optic Adapter Modules (RJ copper ports) connected to the Gigabit ports will cause the Gigabit ports to auto-negotiate to 100 Mbps connection speed.
- ✓ For proper shielding and to maintain safety requirements, connect a ground wire (#16 - #14) from the ground stud at the ends of the switch case to a ground screw in the system cabinet 351102/NC2828.
- ✓ Position the 351004 on the mounting rails inside of a 351102/NC2828 with other 351004s or power supplies at least ¼" away—preferably ½"—horizontal spacing between devices.
- ✓ For higher than normal ambient temperature applications in 2828 cabinets, add a few flat washers (or single ¼-20 hex nuts) underneath the mounting screws at each end of the 351004 case to free up bottom side ventilation holes.

✓ To maintain CE EN 60950-1:2006 and EMC compliance – and UL 1069 with connections to unlisted devices, 351004 ports connected outside of the Responder 5 Nurse Call system must be isolated through a 351006 Fiber Optic Adapter Module.

351006 Fiber Optic Adapter Module

The 351006 Fiber Optic Adapter Module can be used in bridged pairs to extend the length of Ethernet cable runs. It can also be used as an isolated fiber interface to a hospital's network.

Fiber Optic Adapter Module Mounting

The Fiber Optic Adapter Module is 2.35" wide, 0.80" high and 5.37" deep and can be mounted using a grounded NC2828 or 351102 Cabinet—where room temperature must remain within the recommended temperature range of 32˚F (0˚C) and 122˚F (50˚C).

Making Connections/Interconnect

The 351006 Fiber Optic Adapter Module makes up to three (3) possible connections:

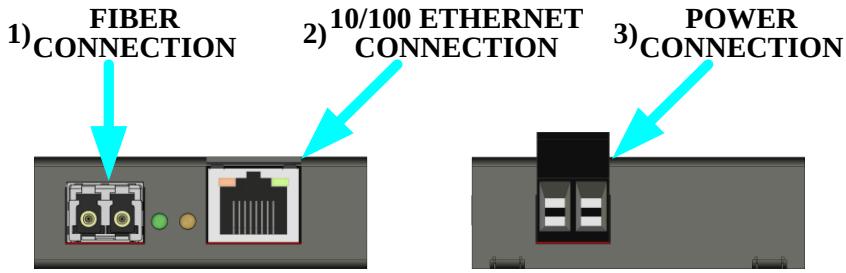


Figure 36: Fiber Optic Adapter Module Connections

1 **FIBER:** connects via multi-mode duplex LC fiber optic cable to another 351006 Fiber Optic Adapter Module or a fiber port in the hospital network.

2 **10/100 ETHERNET:** connects to 351000/351001 Branch Regional Controllers, 351004 Ethernet Switches, 351200/351205 Consoles, and/or 351300/351310 Staff Terminals.

3 **POWER:** connects to the 351003 Power Supply or through PoE RJ45 connectors in a 351000/351001, 351002, and 351004 through a CAT6/6 UTP cable.

Fiber Connection

The multi-mode duplex LC fiber connector can be used when cable runs to 351000/351001 Branch Regional Controllers, 351010 Responder Network Concentrators, 351004 Ethernet Switches, 351200/351205 Consoles, and/or 351300/351310 Staff Terminals extend between 331 and 5000 feet.

351006 Fiber Optic Adapter Modules are normally used in pairs. They can also be used individually, the other end connected to a hospital network switch with a 100 Mbps multi-mode fiber transceiver port.

To maintain Nurse Call system isolation for UL 1069 and IEC EN 60950-1:2006 compliance, two (2) 351006 modules should be used—one connected to the hospital network and the other connecting the fiber run from the hospital to the R5 system.

Calculating an (Ideal) Optical Power Budget

The estimated Optical Power Budget (OPB) for the 351006 transceiver is 14 dB

Typical loss at fiber butt splice* = -1.5 dB

Typical loss at LC connector = -0.5 dB

Typical loss from aging of fiber and transmitter = -1.5 dB

Typical loss in fiber "run"** = -0.4 dB/km

*Accept two splices along fiber loop at the ends, if loss is no more than -1.5 dB per splice. Any additional splices along the fiber run will add to the loss.

**Assume cable is OM1 = 62.5 um, OM2 = 50 um, or OM3 = 50 um tweaked beam at aperture and losses are no more than these numbers. Fiber manufacturer should supply this data.

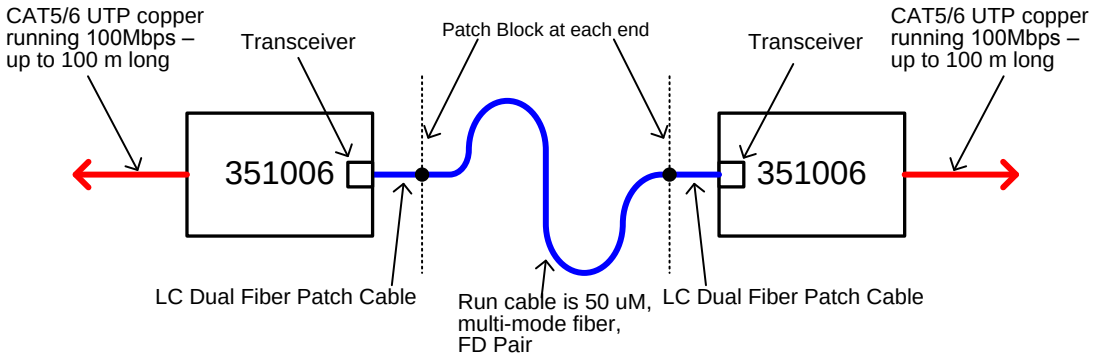


Figure 37: Typical fiber run for calculating the Optical Power Budget

Calculation

Example calculation for a 1km (0.62 mile) fiber run

OPB + (fiber butt splice loss **x** 2) + (LC connector loss **x** 2) + (aging loss **x** 2) + fiber "run" loss = Reserve Sensitivity

14 dB + (-1.5 dB **x** 2) + (-0.5 dB **x** 2) + (-1.5 dB **x** 2) + (-0.4 dB/km **x** 1km) = 6.6 dB

Maintain reserve sensitivity above 6 dB to achieve adequate signal headroom.

No bends in the cable tighter than 2" radius (6" preferred).

Substitute a length multiplier in the calculations for different run distance or extra loss for each splice added.

According to OPB calculations, fiber splice loss estimates depend on installer workmanship. The loss factors used here are typical and conservative for well-spliced connections.

351006 FOA Transceivers for 100 Mbps Multi-mode transmissions only, 1300 nm wavelength.

The copper Ethernet RJ45 port will auto-negotiate a GbE port to 100 Mbps – but the 100 Mbps fiber transceiver may only connect to another 100 Mbps fiber transceiver.

10/100 Ethernet Connections

Connection between the Fiber Optic Adapter Module's 10/100 Ethernet port and a 10/100 Ethernet port on a 351000/351001 Branch Regional Controller, 351010 Responder Network Concentrator, 351004 Ethernet Switch, 351200/351205 Console, and/or 351300/351310 Staff Terminal is made using standard RJ45-terminated CAT5 or CAT6 UTP cable.

You **cannot** use a hub or splitter to split a 10/100 Ethernet port connection.

All Ethernet runs are limited to 100 meters or 330 feet. Ethernet cables should be wired according to the T568A standard:

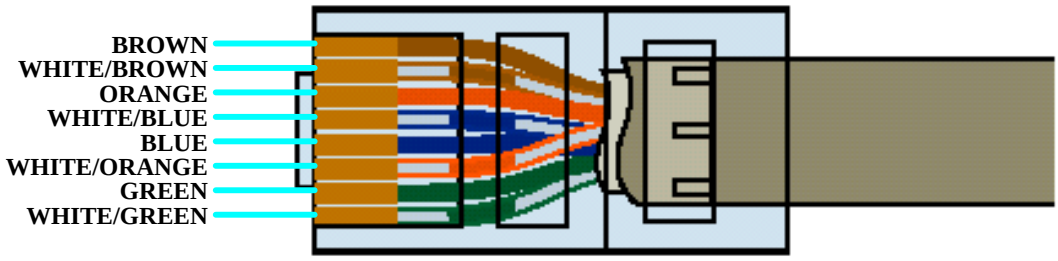


Figure 38: T568A Wiring Colors

Power Connection

The Fiber Optic Adapter Module is powered by a connection to the 351003 Power Supply via 12-16AWG wire (Consult the Power Calculation Worksheet [*System Design Guide*] to determine the exact wire gauge.)

Other Things to Know/Keep in Mind

- ✓ Each 10/100 Mbps Ethernet port from the 351000/351001, 351002, and 351004 supports one connection and one PoE powered device such as the 351006 Fiber Optic Adapter Module.
- ✓ 351006 Fiber Optic Adapter Modules connected to the Gigabit ports on the 351004 will cause the Gigabit ports to auto-negotiate to 100 Mbps connection speed.
- ✓ The fiber port only operates at 100 Mbps and supports multi-mode fiber.
- ✓ Position the fiber port case on the supplied mounting rail with ventilation holes clear and uncovered on both edge-sides of the case.
- ✓ To maintain CE EN 60950-1:2006 and EMC compliance – and UL 1069 with connections to unlisted devices, 351000/351001, 351010 and 351004 network ports connected outside of the Responder 5 Nurse Call system must be isolated through a 351006 Fiber Optic Adapter Module.

351102 Cabinet and NC2828 Cabinet Installations

R5 head-end equipment (351000/351001 Building Regional Controller, 351010 Responder Network Concentrator, 351102 Network Adapter Module, 351003 Power Supply, 351004 Ethernet Switch, and 351006 Fiber Optic Adapter Module) can be mounted in a 351102 Cabinet or an NC2828 Cabinet.

Both the 351102 Cabinet and NC2828 Cabinet provide two (2) rows for equipment mounting. Each row of the 351102 is equipped with 23 mounting holes (0.5” centers); each row of the NC2828 Cabinet is equipped with 25 mounting holes (1.0” centers).

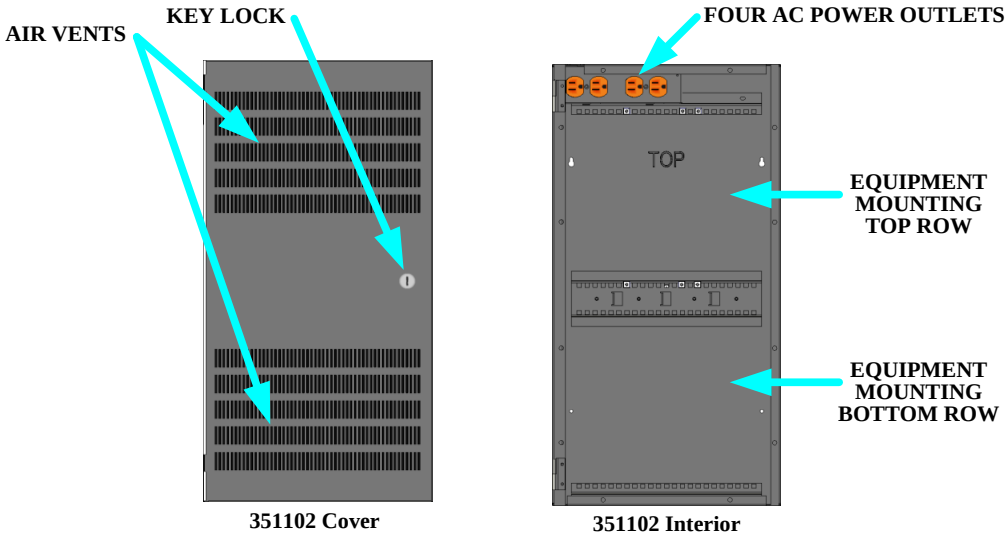


Figure 39: 351102 Cabinet

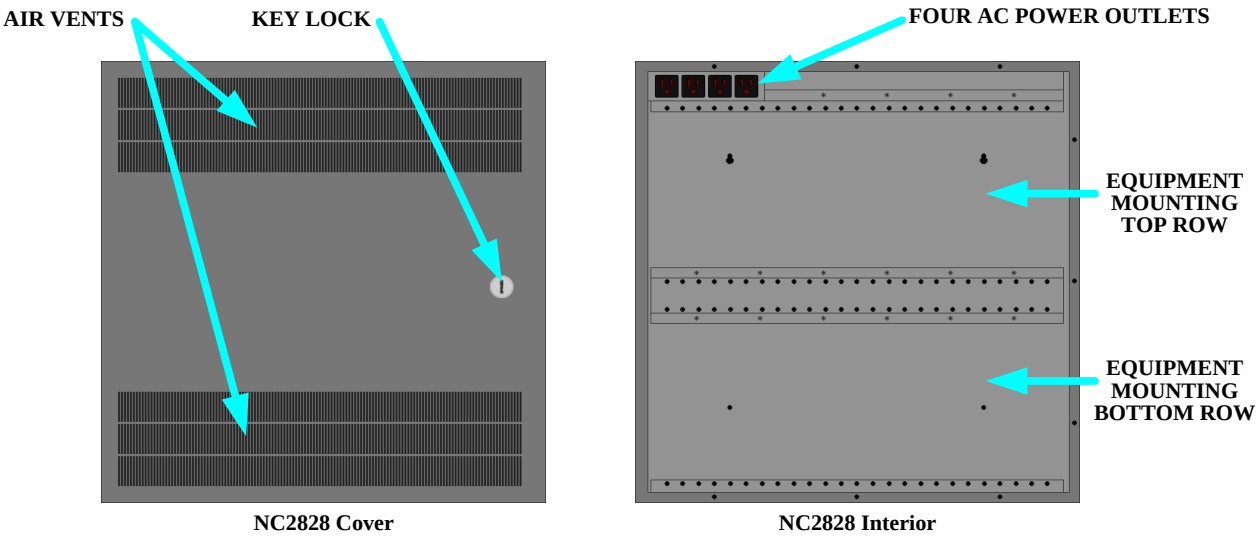


Figure 40: NC2828 Cabinet

Mounting the Cabinets

The cabinets can be mounted on or in the wall (surface/flush), with or without trim plates:

Cabinet	Dimensions
351102 Cabinet	
Without Trim Plate	W: 14.38” (36.53 cm), H: 28.00” (71.12 cm), D: 4.75” (12.07 cm)—including door; 3.75” (9.53 cm)—into the wall
With Trim Plate	W: 16.38” (41.61 cm), H: 30.00” (76.2 cm), D: 4.82” (12.24 cm)—including door; 3.75” (9.53 cm)—into the wall
NC2828 Cabinet	
Without Trim Plate	W: 28.00” (71.12 cm), H: 28.00” (71.12 cm), D: 5.50” (13.97 cm)—including door; 5.00” (12.70 cm)—into the wall
With Trim Plate	W: 30.00” (76.2 cm), H: 30.00” (76.2 cm), D: 5.57” (14.15 cm)—including door; 5.00” (12.70 cm)—into the wall

Table 10: Cabinet Mount Device Detail

To Surface Mount the 351102 Cabinet:

1 Make sure the mounting area is smooth and free of obstacles.

2 Line up one column of the cabinet’s mounting holes with a wall stud.

- While we strongly recommend using wall studs, you may—if absolutely necessary—use wall anchors (rated to 80 lbs.) for either or both columns if you cannot find or choose not to use a wall stud.

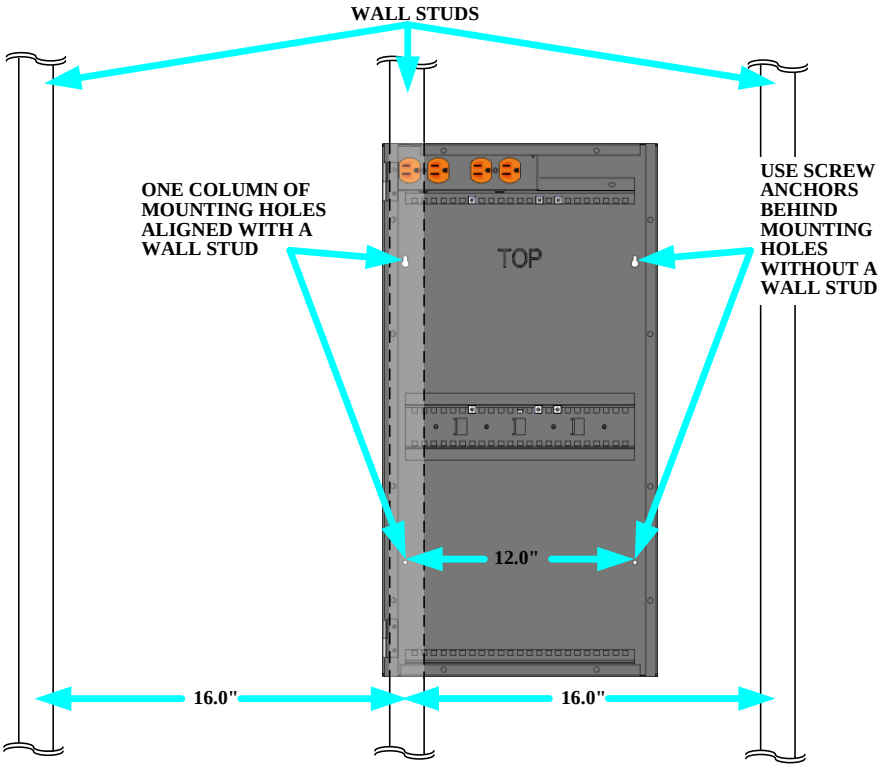


Figure 41: Surface Mounting the 351102 Cabinet

3 Mark the wall for a pilot hole.

4 Drill a pilot hole.

5 Wire AC receptacles as indicated below.

6 Slide the receptacle cover plate over the AC Outlet Enclosure, and secure it with the provided #6 Slotted Hex Head screw.

7 Slide the door onto its hinges and down onto the hinge posts.

To Surface Mount the NC2828 Cabinet:

1 Make sure the mounting area is smooth and free of obstacles.

2 Line up the cabinet's two (2) mounting holes (16" spacing) with wall studs.

3 Mark the wall for a pilot hole.

4 Drill a pilot hole.

5 Wire AC receptacles as indicated below.

To Flush Mount Either the 351102/NC2828 Cabinet:

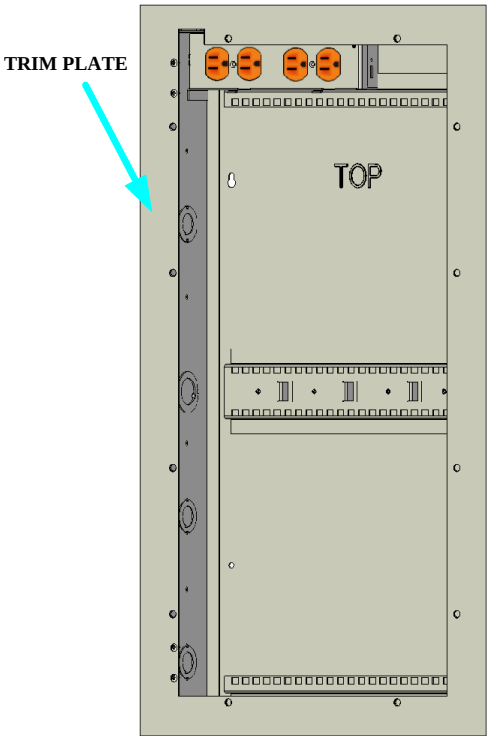


Figure 42: Flush Mounting the 351102 cabinet

1 Make sure the opening can accommodate the unit's depth (3.75" for the 351102; 5" for the NC2828).

2 Remove cabinet door.

3 Use the provided #10 sheet metal screws to attach the trim plate to the cabinet assembly.

4 Slide the cabinet with trim plate into the wall recess.

5 Use appropriate mounting screws or anchors to secure the cabinet to the structure.

6 Wire AC receptacles as indicated below.

7 Slide the receptacle cover plate over the AC Outlet Enclosure, and secure it with the provided #6 Slotted Hex Head screw.

8 Slide the door onto its hinges and down onto the hinge posts.

Equipment Installation

Head-end equipment fit either cabinet as follows:

Device	Device Width	Space Between Mounting Holes
351000/351001 Branch Regional Controller	6.50”	2”
351002 Network Adapter Module	6.50”	2”
351010 Responder Network Concentrator	6.50”	2”
351003 Power Supply	4.40”	2”
351004 Ethernet Switch	1.65”	1”
351006 Fiber Optic Adapter Module	1.65”	1”

Table 11: Cabinet Mount Device Detail

Electrical Installation

Each cabinet supplies power to head-end equipment via one of the four (4) grounded AC Power Outlets. The AC receptacles should be wired to a reliable 100V-250V, 50-60Hz AC source with a dedicated 15A circuit breaker. (Up to two equipment cabinets can be used on a breaker with seven (7) or less 351003 power supplies between both cabinets.) Make sure to observe the correct polarity (hot = black, neutral = white, and earth = green) when wiring. Also, make sure to connect the green ground wire to the green screw terminals on both of the AC receptacles. (For EU applications, Blue is Neutral, Brown is Line (hot), and Green is Earth Ground.)

Use the R4KHVK power receptacle kit in an NC2828 for EU CE-compliant power installations. Follow the included installation directions. In addition to the breaker in the AC power box, a CE mark (IEC 60950) compliant installation should include a separate AC line switch before the system cabinet, where the breaker and switch are rated up to 250 VAC @ 16 A.

To properly observe safety and EMC requirements, the system cabinets (NC2828 and 351102) in all installations must be connected/bonded to a reliable earth ground through a low impedance wire or braid ground strap from the NC2828 or 351102; all head-end components (351000/351001, 351002, 351003, 351004, 351006, and 351010) must be grounded to the threaded studs on the cabinet center rail and mounted in the system cabinet with the door attached and closed.

To be compliant with UL, CSA, and EU safety standards, all cable used for wiring the Ethernet, L-Net network(s), M-Net, D-Net, and DC power should be constructed with PVC, TFE, PTFE, FEP, polychlorophrene, or polyimide insulation layers that meet flammability codes established for the hospital by city, county, district, state, province, prefecture, and/or country government entities.

3

3: Console, Staff Terminal, and Related Accessories

The following Console, Staff Terminal, and related Accessories, and are supported by the R5 system:

- ✓ 351200/351205 Console
- ✓ 351201 Console Receptacle
- ✓ 351300/351310 Staff Terminal

351200/351205 Console/351201 Console Receptacle

The 351200/351205 Console (a.k.a. "R5 Nurse Call Console") is typically located at a local nursing station, work station, centralized communications center, or any place where staff receive calls, communicate with other staff, or initiate any R5 functions. The Console makes connection to a 351201 Console Receptacle, which in turn makes connection to the head-end equipment. Using this 351201 Console Receptacle, the Console may be desk or wall mounted.

Figure 43: 351200/351205 Console

351201 Console Receptacle Mounting

The Console Receptacle should be mounted in a grounded, single-gang electrical box. The opening must be at least 1.70" wide, 2.00" high, and 1.30" deep.

When mounted flush to a wall, the faceplate of the Console Receptacle will be 3.15" wide, 4.25" high, and protrude 0.61" from the wall. In order to allow access, the unit should be mounted with at least 0.75" clearance on all sides. The mounting screws should be tightened to a torque of 1.25 in-lb or 0.141 N-m.

Always fully test a unit's functionality before snapping its faceplate into place—as these plates are not easily removed.

Making Connections/Interconnect

The 351200/351205 Console connects to the 351201 Console Receptacle's front-side Ethernet port; while the Receptacle itself connects to a head-end device (351000/351001 Branch Regional Controller, 351004 Ethernet Switch, or 351006 Fiber Optic Adapter Module) via home-run cable.

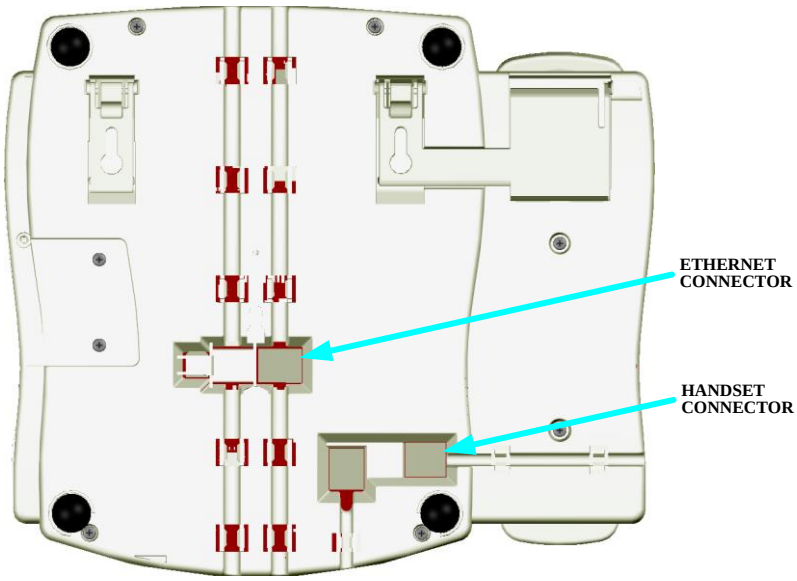


Figure 44: 351200/351205 Console Connections

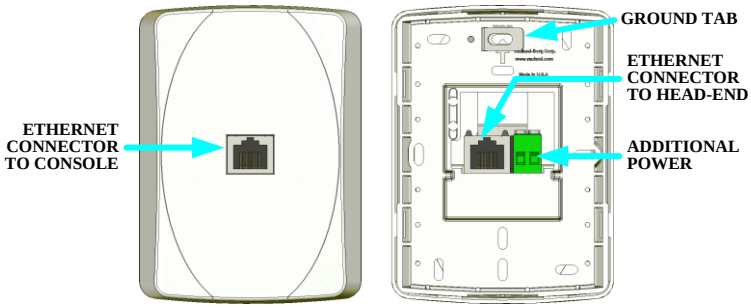


Figure 45: 351201 Console Receptacle Connections

Ethernet Connections

The 351201 Console Receptacle provides two (2) Ethernet ports. The front-side port is used to connect to the 351200/351205 Console; the rear-side Ethernet port is used to connect to a head-end device (351000/351001 Branch Regional Controller, 351004 Ethernet Switch, or 351006 Fiber Optic Adapter Module). Connection to and from the Receptacle and console is made using shielded RJ45-terminated CAT5 or CAT6 UTP cable. (Shielding directs ESD discharges to Earth Ground.)

Ethernet Cabling

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet depending on fiber selection. (Review Fiber Optic Adapter Module Mounting for details.) Ethernet cables should be wired according to the T568A standard:

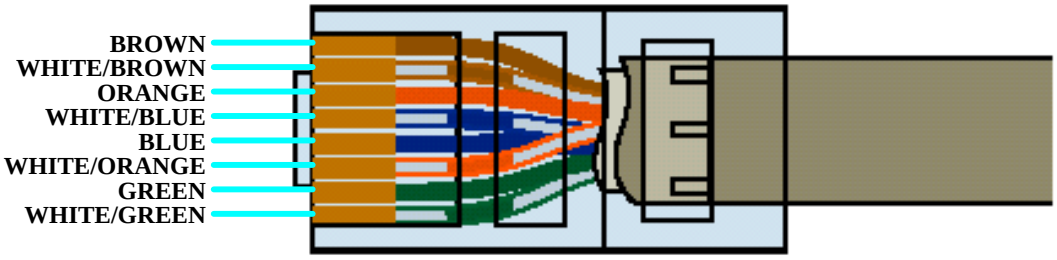


Figure 46: T568A Wiring Colors

You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given BRC.

Power Connections

Where run lengths do **not** exceed the 330 foot Ethernet cabling limitation, power to the Console is provided by the 351000/351001 Branch Regional Controller and the 351004 Ethernet Switch over the Ethernet cable (POE). When the fiber optic solution is used to increase cable run length, "direct" power must be provided to the Receptacle via a 12-18 gauge home run connection to a 351003 Power Supply—located within 300 feet of the Console. Consult the Power Calculation Worksheet (*System Design Guide*) for details.

Handset Connection

The Console makes connection to the included handset via the bottom of the console RJ-11.

Getting it Ready

Once you've made the appropriate connections, prepare the unit as follows:

Setting Console and Staff Terminal Address/Identity

If Consoles and Staff Terminals do not get their address/identity via the DHCP protocol in the GUI (as do other hardware devices); then the address information must be manually input at each unit.

To Access System Information for a Console/Staff Terminal:

1 Press the unit's Cancel button four (4) times and then hold down for 5 seconds.

2 Let the button up and the "System Set-up/Maintenance" buttons should appear.

- The device will enter maintenance mode.

3 Press the touchpoint associated with "System Info" to view the current settings.

- Note the "IpAddr," the "SubnetMask," the "PAddr," "ZAddr," and "ZPort" information.
- These settings can be entered in the Maintenance mode or by the DHCP server from the GUI.

4 Press Cancel, or wait for the screen to automatically return to the diagnostic-menu.

To Change a Console/Staff Terminal's IP address and/or Subnet Mask:

1 Press the right-arrow key until you arrive at the "Set IPAddr Mask" option.

2 Use the keypad to enter an IP Address (###:###:###:###:##, where each pound sign is part of a valid IP string, and the colon [:] is used to represent a period).

- Entering "192:168:27:5:24" would, for instance, make the address "192.168.27.5/24" (see the R5 *System Design Guide* (KI-2234) or an IP reference manual about CIDR notation).
- The "24" appearing at the end of the string is used in a class-C network, i.e. a subnet mask of "255.255.255.0". Another likely scenario is to be a class-B network. The subnet mask is "255.255.0.0" and you should enter the last number as "16", e.g. "172:31:2:3:16".

3 Press the "Set IPAddr Mask" key.

To Change to the <Z, P> Identity

A valid Z,P string consists of a Z address (1-96), a P address (97-112 for Consoles, 113-192 for Staff Terminals), and a facility-specific UDP port number. (Each facility must dedicate a port to R5 use, e.g., 5004.)

1 Use the keypad to enter a <Z, P> entry ("##:##:####", where each pound sign is part of a valid Z,P string and the colon [:] is used to represent a period).

- Entering "5:97:5003," for instance would make the address "5.97.5003".

2 Press the "Set ZPAddr ZPort" key.

3 Press "System Info" to confirm changes.

4 Use left/right-arrows and press "Reboot Panel."

5 The console will reboot and receive configuration data from the BRC.

Adjust the Audio Levels:

Audio levels at the Console speaker are controlled by the speaker button pair on the left side of the Console face. The top button increases the Console speaker level, while the bottom button decreases it. The speaker level is shown on screen. 1 is the lowest level, 10 the loudest.

Audio level at the room is controlled by the BRC managing that Console and room Corridor Light through Action button assignments on the console (or Staff Terminal).

Other Things to Know/Keep in Mind

- ✓ Each Branch Regional Controller supports up to 16 Consoles.
- ✓ Each Branch Regional Controller supports up to 80 Staff Terminals (16 with coverage)
- ✓ Each Branch Regional Controller provides a maximum of 12 simultaneous Full-Duplex Audio slots per controller available to the Ethernet connection.
- ✓ Audio slots per BRC are divided across the BRC L-Net ports with a maximum of six (6) being assignable to a particular L-Net port. Assignment is automatic on an as needed basis driven by call request in the system.
- ✓ Make sure to use shielded RJ45-terminated CAT5 or CAT6 UTP cable between the Console and the Console Receptacle; shielded cable directs ESD discharges to Earth Ground and enhances EMC performance required for city, county, district, state, province, prefecture, and/or country use in hospitals.
- ✓ The 351200/351205 console requires a 100 Mbps Ethernet connection with PoE for operation.

351300/351310 Staff Terminal

The Staff Terminal can be configured to play one of three (3) different roles in the R5Nurse Call system: Mini-Console, Intercom Station, or Dynamic Button Panel.

As Mini-Console, it replicates most of the functionality provided by the Nurse Call Console—allowing users to view and respond to calls, set/review service requirements, review staff registration, upgrade call priority, monitor rooms, manage room privacy, etc.

As Intercom Station, it replicates most of the communication functionality provided by the Nurse Call Console—most importantly, allowing users to view and respond to calls.

As a Dynamic Button Panel, it provides up to twelve configurable call touchpoints, which can be changed as necessary to reflect actual needs. Multiple button panels can be defined in the R5 GUI with a total of over 40 possible button names associated with action button functions.

Figure 47: 351300/351310 Staff Terminal

Mounting the Staff Terminal

The Staff Terminal should be mounted in a grounded, three (3) gang electrical box or headwall with a three (3) gang opening. The opening must be at least 5.20" wide, 2.90" high, and 1.15" deep with added space to clear the cable connection.

When mounted flush to a wall, the faceplate of the Staff Terminal is 9.75" wide, 5.00" high, and protrudes 1.20" from the wall. In order to allow access, the terminal should be mounted with at least 0.75" clearance on all sides. The mounting screws should be tightened to a torque of 0.5 in-lb or 0.056 N-m.

When mounting the Staff Terminal on an uneven wall (or wall with surface variations), use the AB4487 Wall Mounting Plate—thereby eliminating the common issue of continuous button presses caused by the cover edge, which could freeze operation. (For further details, see Tech Bulletin H3601TB.)

Always fully test a unit's functionality before snapping its faceplate into place—as these plates are not easily removed.

To Install the Staff Terminal:

1 Without a face plate snapped in place, remove the screw at the top of the station.
- The board and display assembly will pivot at the bottom of the station.
- A red cord will prevent the assembly from pivoting too far.

2 Flip the screen down.
- The Staff Terminal's mounting holes will come into view:

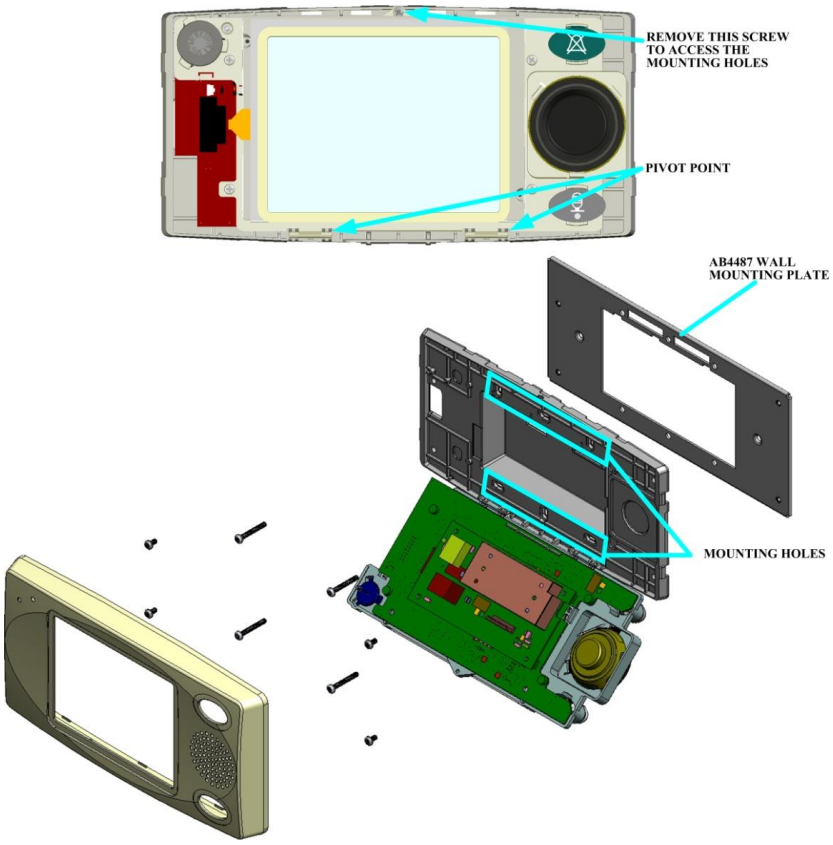


Figure 48: Mounting Hole Locations on the Staff Terminal

Making Connections/Interconnect

The 351300/351310 Staff Terminal provides one (1) required Ethernet connection to either the 351000/351001 Branch Regional Controller or 351004 Ethernet Switch. Route the cable through the base RJ hole in the back panel. Connect the Ethernet cable to the Staff Terminal when the screen is in the flip-down mode.

Grounding the Staff Terminal is essential; therefore, if you don't use a metal electrical box, or if you use one, but the metal box does **not** make contact with the terminal's Earth Ground tabs, you must run a grounded wire to the provided ground terminal.

Grounding is necessary to meet safety and EMC performance required for city, county, district, state, province, prefecture, and/or country use in hospitals

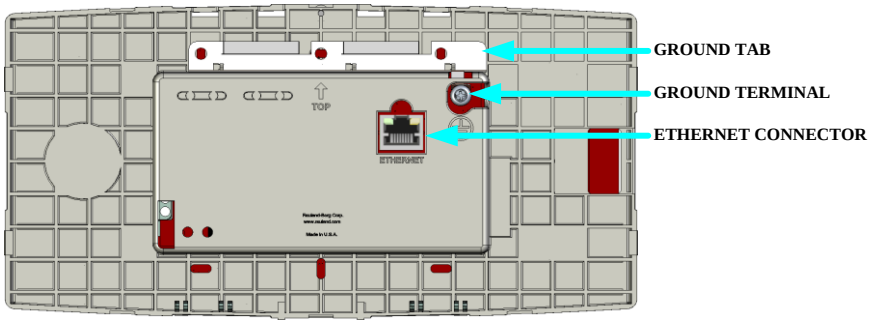


Figure 49: 351300/351310 Staff Terminal Connections

Ethernet Connections

The 351300/351310 Staff Terminal provides a single Ethernet port—used to connect to the head-end (351000/351001 Branch Regional Controller, 351004 Ethernet Switch, or 351006 Fiber Optic Adapter Module). Connection to and from the Receptacle is made using **shielded** RJ45-terminated CAT5 or CAT6 UTP cable. (Shielding directs ESD discharges to Earth Ground and reduces unwanted RF interference.)

Ethernet Cabling

All Ethernet runs are limited to 100 meters or 330 feet. A pair of 351006 Fiber Optic Adapter Modules—connected by multi-mode duplex LC fiber optic cable—can be used to increase run lengths to 5000 feet depending on fiber selection. (Review Fiber Optic Adapter Module Mounting for details.) Ethernet cables should be wired according to the T568A standard:

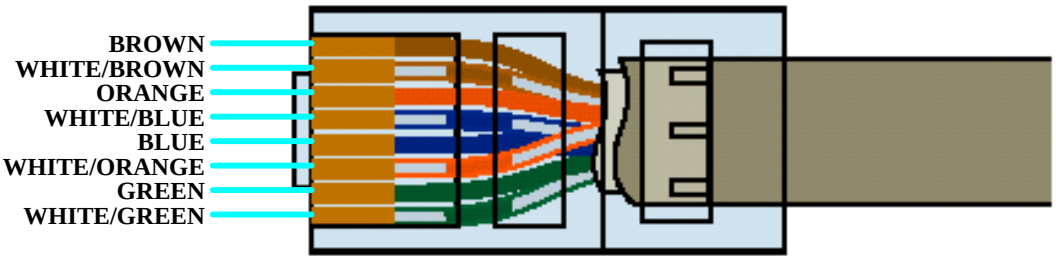


Figure 50: T568A Wiring Colors

You **cannot** use a hub or splitter to split an Ethernet connection. A 351004 8-port Switch is required if you must connect to more than four (4) Ethernet devices from any given BRC.

Power is supplied to the Staff Terminal over the Ethernet cable from either the 35100 Branch Regional Controller or 351004 Ethernet Switch.

Getting it Ready

Once you've made the appropriate connections, prepare the unit as you would the Console (see Setting Console and Staff Terminal Address/Identity).

Adjust the Audio Levels:

Staff Terminal audio levels are adjusted in the same manner as the Console; however, local and room levels are adjusted using Staff Terminal action buttons ("Room Vol DN," "Room Vol UP," by default)—which are defined and assigned by the GUI for download from the management BRC for each given Staff Terminal.

Entering Staff terminal "EOL" menus for set-up was described above. More details are included in the Appendix.

Other Things to Know/Keep in Mind

- ✓ Each Branch Regional Controller (BRC) supports up to 16 Consoles.
- ✓ Each Branch Regional Controller supports up to 80 Staff Terminals (16 with coverage)
- ✓ Each Branch Regional Controller provides a maximum of 12 simultaneous Full-Duplex Audio slots between rooms and other audio devices in the Nurse Call system.
- ✓ Each Branch Regional Controller provides a maximum of 6 simultaneous Full-Duplex Audio slots per L-Net.
- ✓ The 351300/351310 console requires a 100 Mbps Ethernet connection with PoE for operation.
- ✓ See additional notes under the Console 351200/351205 information.
- ✓ Don't forget to remove the clear plastic screen protector before replacing the front cover. Note: Some units will not have this protector, (Display type 0), or it will be clear with a red triangle (Display type 1), or it will be an opaque sheet (Display type 2).

A

Appendix A: Miscellaneous

Console Diagnostics/End of Line Configuration

You can access End of Line (EOL) Configuration directly from the Console and Staff Terminal. EOL Configuration allows you to access/engage in the following:

- ✓ **System Information**: used to view a display's build date; IP Address; MAC Address; Z, P, and Z Port string, associated BRC IP Address (NULL if BRC is offline), TFTP Server IP Address, Subnet Mask, Telogy and TI build information, and Rauland Panel Build number.
- ✓ **Clean Screen Mode**: used to "turn off" buttons for a prescribed duration when a unit is being cleaned.
- ✓ **Screen Saver:** shows the clock during Console/Staff Terminal a user-defined period of inactivity (5-30 minutes).
- ✓ **Exit EOL:** used to exit EOL configuration and return to BRC supplied configuration. (if BRC is off line will exit EOL but return to splash screen announcing that Console needs configuration or is off line).
- ✓ **Calibrate Touch**: used to calibrate touch screens (Staff Terminal only).
- ✓ **Set IPAddr Mask**: used to show current and set up the IP Address and Mask for the Console: 192:168:27:97:24 (where the final two [2] numbers indicate the bits used for the Mask—currently 24). See the *R5 System Design Guide* (KI-2234) for more information.
- ✓ **Set ZPAddr ZPort:** used to show current and set the Z, P, and Z Ports. Typing 05:97:5003 and then hitting this button will, for instance, set the Z, P and Z Ports. The Console reboots after the Z, P, and Z Ports are set.
- ✓ **Clear Pedigree A, Clear Pedigree B**: used to clear the pedigree, which allows the Console to get a new firmware image the next time DI tries to update the existing firmware.
- ✓ **Clear ZP Addr**: used to erase the Z, P, and ZPorts of a device—so that it can rebuild its identity using DHCP.
- ✓ **Light up, Light Down, and Commit Light Level**: used to adjust the back light. "Commit" causes the value to be saved and reused.

To Adjust Screen Contrast:

1 Push CANCEL four (4) times.

2 Then on the fifth (5) time hold the button for 5 seconds and let up.

- The device will enter EOL configuration mode.

3 Press the right arrow menu button until the "Light Down," "Light Up," and "Commit Light Level" display on the row of button faces.

4 In the EOL mode Light level for the screen brightness can be adjusted up and down and then set.

- Push the button and select the light level.
- The Console will change the background light to the selected value.
- We recommend preserving display life by selecting between 60-80% brightness.
- Press the "Commit" button to keep the setting.
  - **Delete Path / Restore Path**: used to allow the use of none path TFTP servers, if necessary. The DI TFTP server depends on the full path being sent by DI from the Console.
  - **Set Spy Level**: used to set groups of debugging levels for diagnostic review.
  - **Reboot Panel**: used to reboot the Console/Staff Terminal. Forces the use of the new firmware recently downloaded.

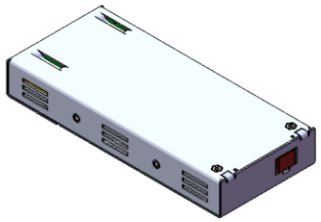
Adjusting Console Tones

Console handset volume can be set locally, at any given unit. Other audio level adjustments such as annunciation tones are global and done through configuration. Audio levels at the Console speaker are controlled by the speaker button pair on the left side of the Console face. The top button increases the Console speaker level, while the bottom button decreases it. The speaker level is shown on screen. 1 is the lowest level, 10 the loudest.

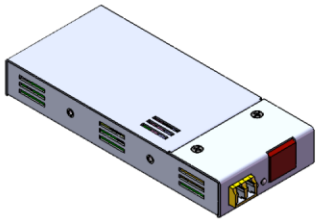
Adjusting Talk and Listen Levels

Talk/Listen levels are controlled by the BRC and stored in NVRAM; however, they can be adjusted on any given Console/Staff Terminal during audio. Handsfree and handset volume are the same and relative to each. Further adjustment of the audio between rooms and the console can be made using "Voice Sense" and "Echo Level" settings on the R5WARE GUI Configuration program Room screen. (The default setting for both parameters is "5".) These adjustments can be useful in highly reverberant rooms or rooms with high ambient noise.

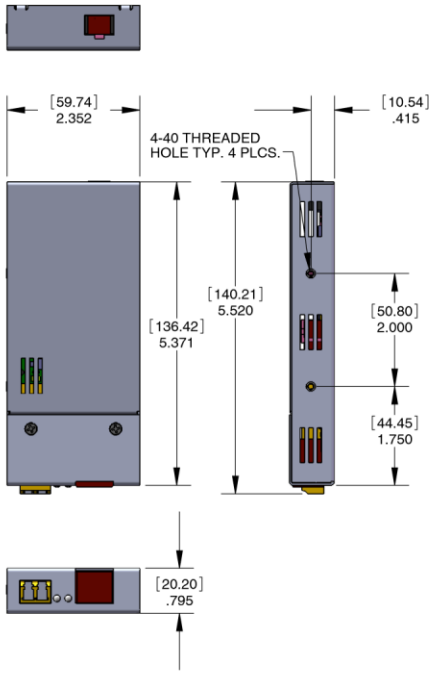
See "R5_Audio_Tuning_Process(23Apr10).PDF" in the software distribution package (T9 SP1 or newer) for instructions regarding Voice Sense and Echo Level adjustment.



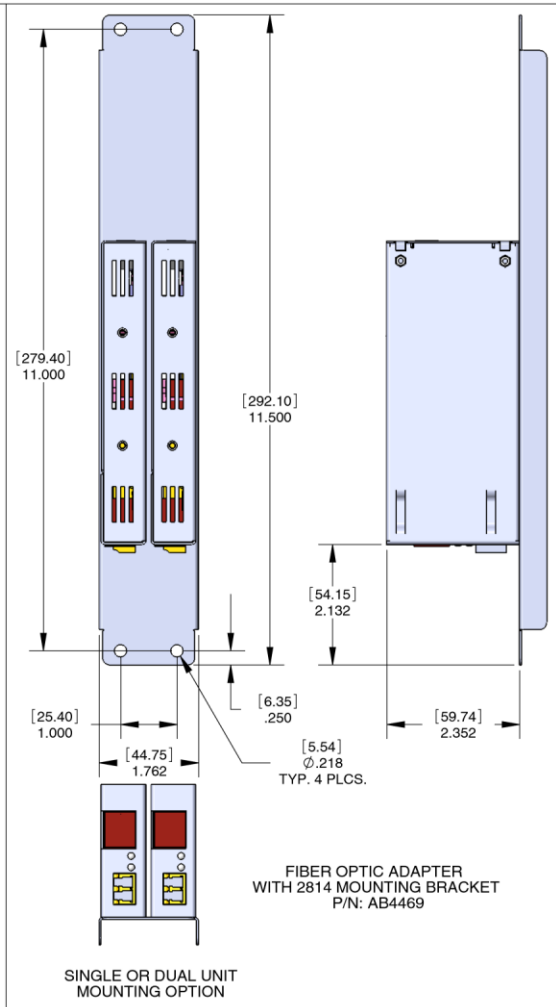
ISOMETRIC BACK VIEW



ISOMETRIC FRONT VIEW

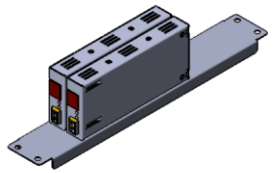


FIBER OPTIC ADAPTER
MODEL: 351006



FIBER OPTIC ADAPTER
WITH 2814 MOUNTING BRACKET
P/N: AB4469

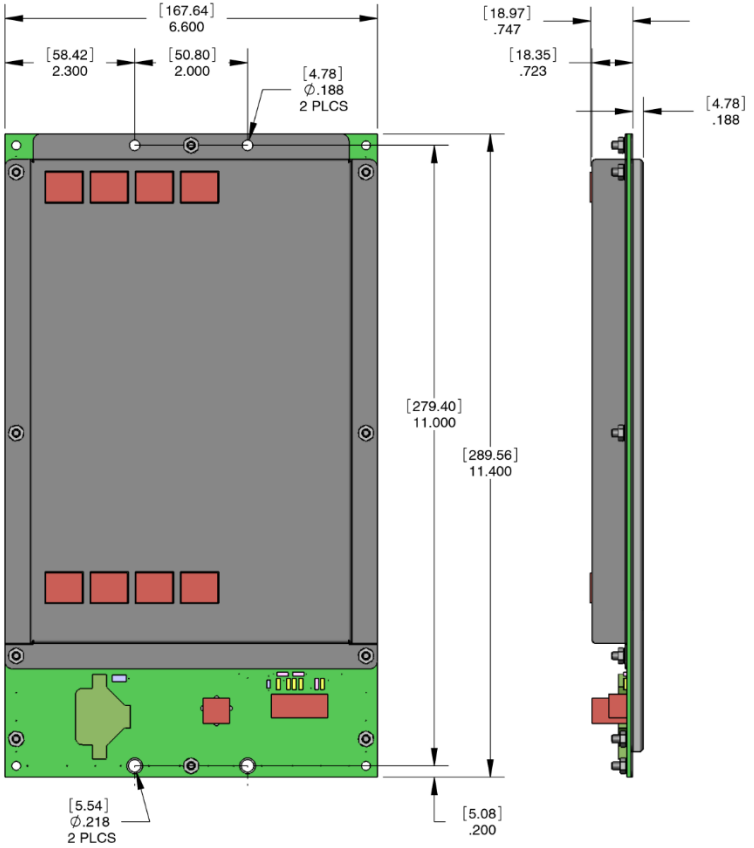
SINGLE OR DUAL UNIT
MOUNTING OPTION



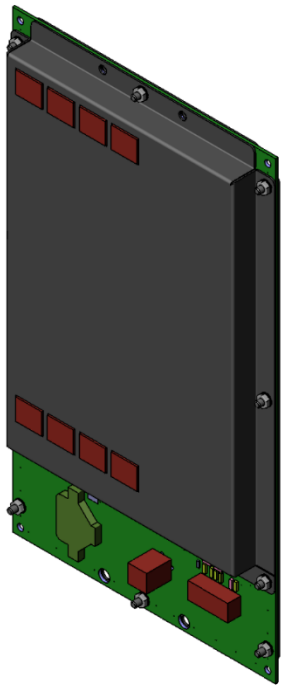
ISOMETRIC VIEW

DRG. NO. KZ0665 O

TITLE R5-INSTALLATION (Fiber Optic Adapter)			FINISH	
RAULAND-BORG CORP. ENGINEERS SKOKIE, ILLINOIS, U.S.A.	USED ON: R5	RoHS: All materials and processes used in the fabrication of the parts described on this drawing are to be RoHS Compliant.	SCALE: 1:2 DRN. LJP DATE 11/25/08 CH'D. APP'D.	MAT'L. DRG. NO. KZ0665 O
	ALL DIMS ARE mm / inches UNLESS SPECIFIED. TOLERANCE: ANGLES x° = ±1° DIMS. mm = ±.40, .xx ±.015; mm = ±.13, .xxx ±.005			



BUILDING REGIONAL CONTROLLER
MODEL: 351000



ISOMETRIC VIEW

DRG. NO. KZ0665 O

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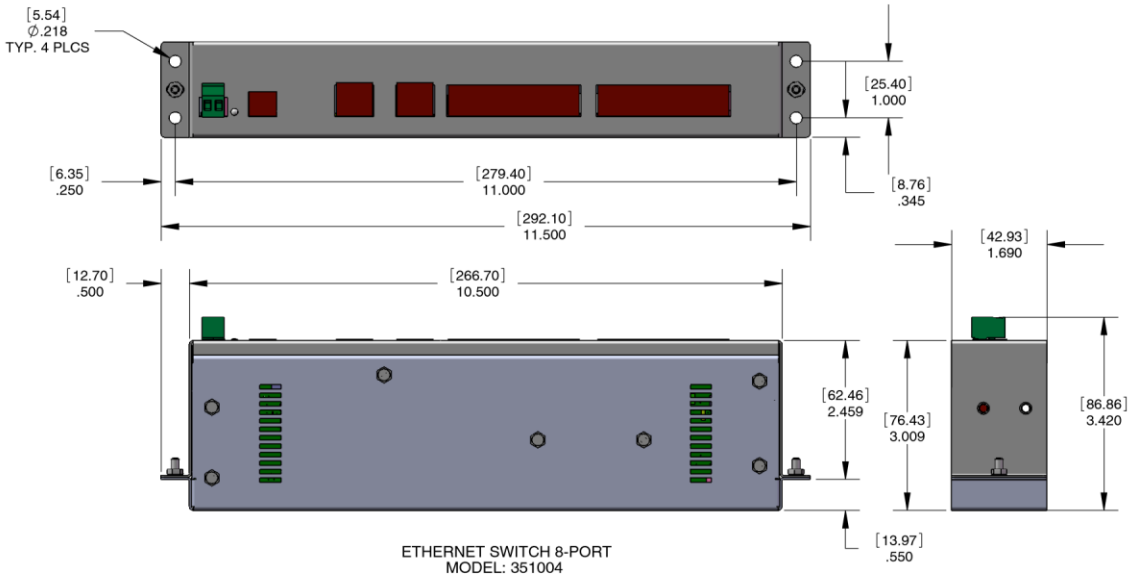
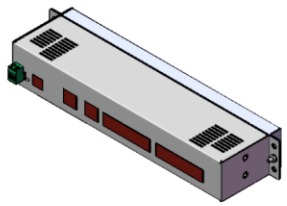
RAULAND-BORG CORP. ENGINEERS SKOKIE, ILLINOIS, U.S.A.	USED ON R5	RoHS All materials and processes used in the fabrication of the parts described on this drawing are to be RoHS Compliant.	SCALE: 1:2		MAT'L.
	ALL DIMS ARE mm / inches UNLESS SPECIFIED. TOLERANCE: ANGLES x° = ±1° DIMS. mm = ±.40, .xx ±.015 mm = ±.13, .xxx ±.005		DR'N. LJP	DATE 11/25/08	
			CH'D.	APP'D.	DRG. NO. KZ0665 O

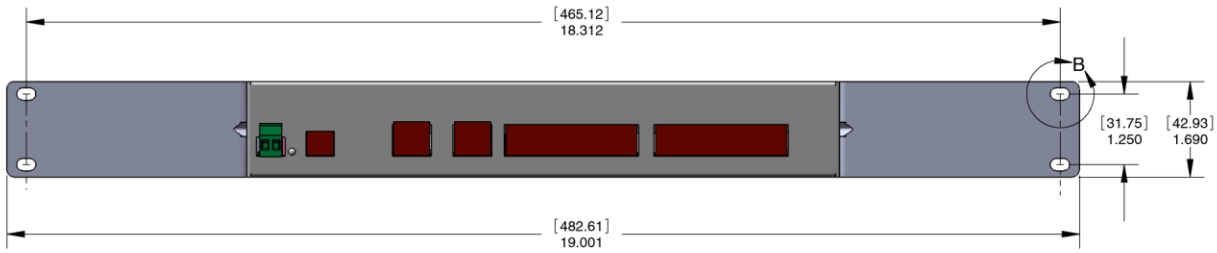


ETHERNET SWITCH 8-PORT
MODEL: 351004

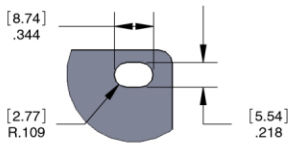


ISOMETRIC VIEW

DRG. NO. KZ0665 O

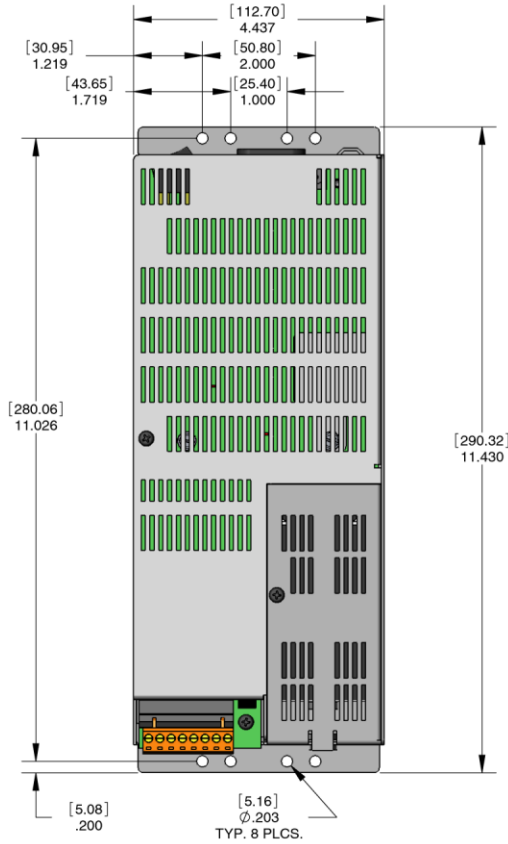


ETHERNET SWITCH 8-PORT (351004)
WITH RACK MOUNTING BRACKETS

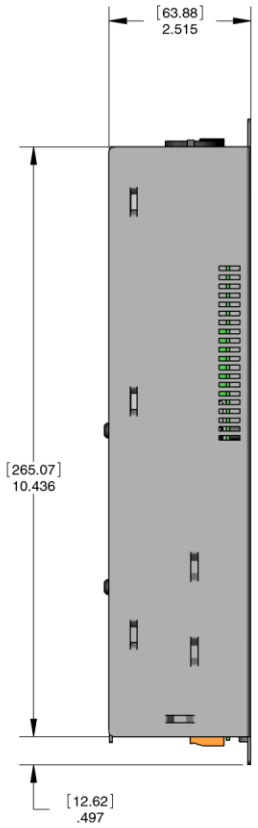


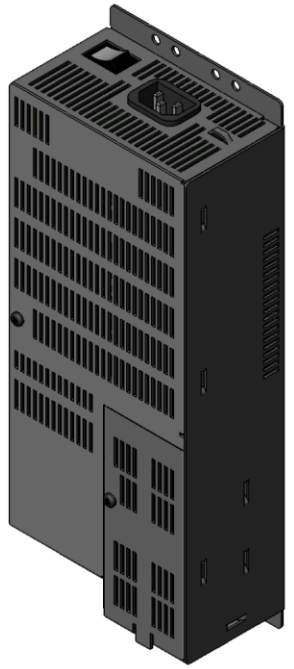
DETAIL B
TYP. 4 PLCS.
SCALE 1 : 1

TITLE R5-INSTALLATION (8+2 port ENET Switch)			FINISH	
RAULAND-BORG CORP. ENGINEERS SKOKIE, ILLINOIS, U.S.A.	USED ON: R5	RoHS: All materials and processes used in the fabrication of the parts described on this drawing are to be RoHS Compliant.	SCALE: 1:1 DRN. LJP DATE 11/25/08 CH'D. APP'D.	MAT'L. DRG. NO. KZ0665 O
	ALL DIMS ARE mm / inches UNLESS SPECIFIED. TOLERANCE: ANGLES x° = ±1° DIMS. mm = ±.40, .xx ±.015; mm = ±.13, .xxx ±.005			



POWER SUPPLY
MODEL: 351003





ISOMETRIC VIEW

DRG. NO.	
KZ0665	O

TITLE R5-INSTALLATION (Power Supply)		FINISH		
RAULAND-BORG CORP. ENGINEERS SKOKIE, ILLINOIS, U.S.A.	USED ON: R5	RoHS: All materials and processes used in the fabrication of the parts described on this drawing are to be RoHS Compliant.	SCALE: 1:1 DRN. LJP DATE 11/25/08 CH'D. APP'D.	MAT'L. DRG. NO. KZ0665 O

ALL DIMS ARE mm / inches UNLESS SPECIFIED.
TOLERANCE: ANGLES x° = ±1° DIMS. mm = ±.40, .xx ±.015 mm = ±.13, .xxx ±.005

B

Appendix B: R5 CE Mark Declaration of Conformity

For your convenience, we have included below the Responder 5 Declaration of Conformity to the EN 60950 Safety Standards and the EMC Standards per the LVD as required for CE mark to be applied to the Responder 5 system and components.

DECLARATION OF CONFORMITY

The technical documentation to demonstrate compliance is maintained by Rauland Borg in Mount Prospect and is available for inspection by the relevant authorities.

Disposal and Recycling Information

Disposal and Recycling Information: This symbol indicates that this product must be disposed of properly according to local laws and regulations. When this product reaches its end of life, contact your local authorities to learn about recycling options or your local distributor.

Battery Disposal Information: When replacing an internal battery, dispose of the spent battery according to your local environmental laws and guidelines. 351003 batteries are sealed lead acid.

Interpreting a Barcode

Serial Number	Serial Number			Serial Number	Serial Number	Serial Number	Serial Number
28 29	CH 1	CH 2	CH 3-4	CH 5	CH 6-20	CH 21-24 CH21-25	CH 25-28 CH 26-29
Notes	A=Jan B=Feb C=Mar D=Apr E=May F=Jun G=Jul H=Aug J=Sep K=Oct L=Nov M=Dec	1=1st week of month 2=2nd week of month 3=3rd week of month 4=4th week of month 5=5th week of month	Last two digits of year	2=Rauland-Borg Corp. Mount Prospect, IL	Alphanumeric, left justified, filled with trailing spaces	Also referred to as ECO number	Unique I.D.