INTRODUCTION

The StarLink™ Dual-Path Commercial / Residential Fire and Burglary alarm capture radio IP communicators are fully supervised, wireless digital two-way subscriber units. All models are compatible with most 12/24VDC alarm control panels (always adhere to the documentation provided by the control panel manufacturer). All can function as a backup to existing telephone lines, or as sole path primary communicators. In backup mode, all units will automatically switch the communication channel from the telephone line to the network when telephone line trouble is detected.

See WI2140 for programming information.

For Commercial Burglary installations, under the armed condition, any loss of communication must be treated as a Burglary Alarm at the central station.

The following features are included with models that include a SLE-ULPS-R power supply:

- Power limited output to the StarLink radio PC board 12V input terminals
- Battery connection red and black flying leads
- Monitored battery charging and Active battery test circuits
- StarLink radio trouble input (from StarLink radio PC board PGM1 terminal to detect StarLink radio trouble)
- Requires a sealed lead acid min 4AH / max 7AH battery for minimum 24-hour standby time (max charge current 200mA).
- Trouble relay output (C, N/O and N/C terminals) to wire to a panel zone dedicated to “GSM Trouble” (dry contacts). Remove jumper “J2” to isolate common from ground
- Green AC ON LED visible from the exterior housing
- Yellow TROUBLE LED "D4" on PC board. Flashes signify:
  - One flash: AC fail / brownout
  - Two flashes: Low battery
  - Three flashes: Charging circuit trouble
  - Four flashes: StarLink radio trouble

The housing-mounted transformer (when provided) is mounted inside its own housing compartment with a replaceable UL Listed .5A fast blow primary fuse. 120VAC connections are to be made by a licensed electrician using suitable connectors, in accordance with N.E.C. and local code requirements.

ADDITIONAL COMPONENTS

In addition to the models listed above, the following sub-assemblies are available:

SLE-ULPS-R - Power Supply. Required for installations where the control panel cannot provide the Auxiliary power required to operate the StarLink radio. Uses a standard 4AH / 12V minimum (7AH maximum, required with optional Wi-Fi Module) rechargeable battery to provide radio standby power. Requires connection to either the model NAPCO TRF12/T123 (16.5V / 20VA) external plug-in transformer or the chassis-mounted 16.5VAC / 20VA transformer affixed inside the housing (see wiring dia-
grams further in this manual). **Note:** For models without the SLE-ULPS-R, connect the radio terminals 1 and 2 to the control panel Aux Power terminals (observing polarity).

**SLE-WIFI-MODULE** - Allows your Napco StarLink™ device to connect to the Internet by means of a wireless (Wi-Fi) link, eliminating a wired Ethernet cable connection. For more information, see WI2191.

**SLE-DLCBL** - Download Cable, 6 feet
**SLE-ANTEXT** - Extended antenna with 15 feet of cable
**SLE-ANTEXT30** - Extended antenna with 30 feet of cable
**SLE-ANTEXT50** - Extended antenna with 50 feet of cable
**SLE-ANTEXT75** - Extended antenna with 75 feet of cable
(Any suitable external cellular antenna is permitted by UL). Always follow the manufacturer's installation instructions. **Note:** Antennas are not Listed by UL. For 3/4G radios where an External Antenna needs to be installed outside of the room in which the radio is installed (maximum 30 meters (98 feet) in Residential applications), please use RF Transmitter Board 9GPS5320EXAPSLD available from our Customer Service Department, if not provided. The 9GPS5320EXAPSLD is identified by "two red dots" located on the lower right corner of the board. See WI2222 included with the 9GPS5320EXAPSLD for the simple installation procedure.

**GEM-Tamperkit** - Tamper switches and screws to protect metal housing (see page 15).

**SPECIFICATIONS**
The following specifications apply to all StarLink radio models unless otherwise stated:

**Electrical Ratings for 120VAC, 60Hz**
- For Models with Power Supply
  - Input Voltage: 120VAC nominal
- For Models without Power Supply*
  - Input Voltage: 10-25VDC regulated (power-limited output from Listed control panel).
  - Input Current: 150mA maximum
  - Maximum Charging Current: 200mA

**Electrical Ratings for +12V / 24V**
- For Models without Power Supply*
  - Input Voltage: 10-25VDC regulated (power-limited output from Listed control panel).
  - Input Current:
    - 10VDC standby: 110mA
    - 12VDC standby: 90mA
    - 15VDC standby: 150mA
    - 24VDC standby: 80mA (Commercial Fire models)
    - 25VDC standby: 65mA (Commercial Fire models)

**Wi-Fi Module** (Optional) Add 40mA to the above. (With peak RF transmission current of 250mA).

**Electrical Ratings for the IN 1 Burg/Fire Input:**
- Input Voltage: 9-25VDC.
- Maximum Input Current: Up to 2mA from FACP NAC circuit

**Electrical Ratings for IN 2 and IN 3:**
- Maximum Loop Voltage: 25VDC.
- Maximum Loop Current: 1.2mA
- End of Line Resistor (EOLR) Value: 10K (2 req'd)

**Electrical Ratings for 3 PGM Outputs:**
- Open Collector Outputs: Maximum Voltage 3V when active; 25V maximum when not active.
- Maximum PGM Sink Current: 50mA (up to 15VDC), 25mA (15.1VDC - 25VDC)

**Physical (W x H x D):**
- Metal Housing: 11½ x 9½ x 3½" (29.2 x 24.1 x 8.9cm)
- Mounting: Metal housing includes two keyhole slots for wall mounting (see measurements on page 7)

**Environmental**
- Operating Temperature: 0°C - 49°C (32°F - 120°F)
- Humidity: Maximum 93% Non-Condensing
- Indoor / dry location use only

**NOTICE TO AUTHORITIES HAVING JURISDICTION, USERS, INSTALLERS, DEALERS, AND OTHER AFFECTED PARTIES**

<table>
<thead>
<tr>
<th>FIRE PROGRAMMING OPTION</th>
<th>PERMITTED IN UL864? (Y/N)</th>
<th>AVAILABLE SETTINGS</th>
<th>REQUIRED UL 864 SETTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unattended Remote Downloading</td>
<td>No</td>
<td>Enable / Disable</td>
<td>Disabled (Jumper 1 installed). Also required for Commercial / Burglary installations. <strong>Note:</strong> See page 8 &quot;Configuration Download / Firmware Updates&quot; for jumper instructions.</td>
</tr>
<tr>
<td>IN2 and IN3 Unsupervised</td>
<td>Yes</td>
<td>Supervised / Unsupervised</td>
<td>Unsupervised using conduit within 20 feet of FACP (default). If not using conduit, install Jumpers 4 and 5 and EOL Resistors (see pages 3 and 4).</td>
</tr>
<tr>
<td>7 Day Supervision, Radio to NOC</td>
<td>No</td>
<td>200 seconds, 5 minutes, 6 minutes, 60 minutes, 6 hours, 7 days</td>
<td>200 seconds, 5 minutes, 60 minutes. <strong>Note:</strong> Minutes permitted for radio path in Commercial Burg UL 1610 with Dual Reporting enabled. 6 Hours permitted in Commercial Fire UL 664 with Dual Path enabled.</td>
</tr>
<tr>
<td>Trouble on Radio or IP Path (Annunciate / Report)</td>
<td>Yes</td>
<td>Either Path or Both Paths</td>
<td>Either Path (annunciation and report of trouble)</td>
</tr>
<tr>
<td>Wi-Fi Module</td>
<td>Yes</td>
<td>Enable / Disable</td>
<td>May be enabled as a primary reporting path for Fire or a Supplemental reporting path for Burglary (Supplemental only when the cell radio is sole burglary path).</td>
</tr>
</tbody>
</table>

*For Commercial Fire installations, a UL Listed Fire Alarm regulated power supply or FACP regulated auxiliary output is required.*
**TERMINAL DESCRIPTIONS**

Configure all inputs and outputs using the Management Center screen (located at [www.napconoc.com](http://www.napconoc.com)). Located at the bottom of the StarLink radio PC board, the 17 terminals are described as follows:

**TB1:** PWR Note: Rated 10-25VDC input.
(Refer to section "STEP 4: APPLY POWER")

**TB2:** PWR GND (–)
(Refer to section "STEP 4: APPLY POWER")

**TB3:** PGM1 (–): Open collector output. PGM1 is normally on (active low). When it is triggered (for example, a trouble is detected) it becomes open collector/high. To have a zone dedicated to a StarLink radio trouble, insert one side of the end of line resistor into this PGM1 terminal, and wire the other side of the resistor to the positive terminal of the zone.

**TB4:** PGM2 (–): Open collector output. This output is defaulted as "Fail to Communicate", and is normally open collector/high. When a report fails to communicate anywhere in the communications path, the output is active low.

**TB5:** PGM3 (–): Open collector output. This output is defaulted as "Telephone Line Cut". When the telephone line voltage is correct, the output is open collector/high; when the telephone line voltage is too low, the output is active low.

**TB6:** IN 1: Active high input for wiring to the panel bell output. When this input detects a pulsing temporal 3 high, it sends a Fire alarm; a pulsing temporal 4 (CO Alarm), a CO alarm is sent. When used, these conductors must be run in conduit (max 20 feet for Commercial Fire, and 3 feet for Residential Fire). Do not use for Burglary applications.

**TB7:** IN 2: See TB9, below.

**TB8:** GND: Common ground terminal.

**TB9:** IN 3: Both inputs IN 2 and IN 3 can be supervised end-of-line resistor inputs that can be triggered with N/O or N/C relay contacts. Wire the common ground terminal GND (terminal TB8) to the relay common. In Burglary applications, when used as arm/disarm status input, a low indicates "armed" and a high indicates "disarmed". For these inputs to report to a central station, the radio must be configured with the central station telephone number and correct reporting formats and codes. See Input Configuration Options table on page 14 for more information.

**TB10:** TIP: See TB11, below.

**TB11:** RING: Terminals TIP and RING: When used for backup reporting, the house Tip and Ring telephone wires must be routed from the outside to these terminals. Under normal back up conditions, these terminals are internally wired to the PANEL TIP and PANEL RING terminals, allowing all transmissions to the central station to be monitored. These wires are monitored for voltage such that if voltage falls below 1.5V, a Telco Line Fault trouble is detected, and the StarLink radio applies telephone line voltage to the control panel Tip and Ring DACT interconnect to the radio allowing it to receive and transmit any alarms sent by the panel.

**TB12:** PANEL RING: See wiring diagrams.

**TB13:** PANEL TIP: See wiring diagrams.

Note: TB14-TB17 no connections permitted by UL.

**TB14:** RTS (R): See TB17 below.

**TB15:** PANEL TX (B): See TB17 below.

**TB16:** PANEL RX (G): See TB17 below.

**TB17:** CTS (Y): No connections permitted.

**TB18:** Earth Ground: Is wired to enclosure earth ground stud.

**Ethernet:** Connect the SLE Dual-Path radio to your broadband modem, router or switch. **Note:** The cable modem/router and switch (if any) at the premises requires standby power, therefore a UL 1481 or 1675A certified device is recommended.

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**Supervised Fire / Burg Input**

```
  8 Radio GND (TB8)  7=9 To StarLink Terminals IN2 (TB7) -or- IN3 (TB9)
  10K (Alarm Panel)
  10K (Alarm Panel)
  C N/O C
  N/O TBL*
  Alarm
```

*The EOLR must be installed and located within the control panel housing.*

---

**Supervised Arm / Disarm Input**

```
  8 Radio GND (TB8)  7=9 To StarLink Terminals IN2 (TB7) -or- IN3 (TB9)
  10K (Alarm Panel)
  10K (Alarm Panel)
  C
  Open = Disarmed
  Closed = Armed
```

*The EOLR must be installed and located within the control panel housing.*

---

*Reverse polarity / energized state.*
UL Listed ITE UPS must be used at the premises to power these devices for a min. 24 hours.

**Wi-Fi:** (JP5, JP6) Install optional Wi-Fi Module in these sockets.

### LED DESCRIPTIONS

The PC board contains several LED's, as follows:

**GREEN RF SIGNAL STRENGTH LED**
Labeled "D3", this LED is located at the lower right corner of the PC board.
Every 30 seconds, the StarLink radio receiver section turns on and listens to the cell tower. Depending on the signal strength detected, it will blink the Signal Strength LED from 1 to 8 times, providing a signal strength indicator that is updated constantly and is always displayed. Refer to Coverage Table above.

**Green LED Operation**
Signal strength (as received by the radio) is displayed by this LED blinking 1 to 8 times at a constant rate (with a short delay between blink cycles). Acceptable power level is greater than or equal to -91dBm (minimum 4 blinks at the mounting location).

**YELLOW OPERATIONAL STATUS LED**
Labeled "D4", this LED is located at the bottom right of the PC board. Operation is as follows:

**Normal Standby Condition:**
- **Blinks on momentarily every 10 seconds:** Unit is in standby waiting for an alarm to report.

**Processing Alarm Conditions:**
- When processing an alarm, this LED will blink variably during each part of the process (dialing, handshaking, data transmission, etc.).

**RED TROUBLE LED**
Labeled "D5", this LED is located at the bottom right of the PC board. Operation is as follows:
- **1 Blink:** Low Aux Power input voltage
- **2 Blinks:** Battery trouble
- **3 Blinks:** Alarm report Failed to Communicate (will restore only when the radio path is restored)
- **4 Blinks:** RF trouble (antenna connection or cellular registration)
- **5 Blinks:** Radio poll or check-in failure (radio and/or Ethernet). Either or both paths will trigger the trouble, but for the trouble to clear, unit requires both IP and radio polling/checkins to be operational
- **6 Blinks:** Unit disabled (reporting or control panel downloading not allowed)
- **7 Blinks:** Unit was shutdown and has no functionality; requires a restart (full power down and full power up sequence) to restore operation
- **8 Blinks:** Telco Line Cut (this is not the DACT interconnect to the radio)

**RED DIAGNOSTIC LED**
Labeled "D7", this LED is located in the middle of the PC board. One blink indicates a weak or non-existent signal from the network (green LED is off). If this red LED is blinking in any other manner, please contact technical support.

**GREEN IP NETWORK CONNECTION LED**
Labeled "D14" (or DS14), this LED is located to the right of the ETHERNET socket on the PC board. Operation is as follows:
- **Off** = No network cable detected
- **Fast Flash** = No IP connection (Occurs just after power on, while trying to obtain a IP address)
- **Slow Flash** = Normal IP network operation
  - **1 Blink:** Static IP
  - **2 Blinks:** DHCP
  - **3 Blinks:** Auto IP (If unable to acquire DHCP address, then after 5 minutes it will convert to Auto IP)

**RED IP NETWORK TROUBLES LED**
Labeled "D16" (or DS16), this LED is located to the right of the ETHERNET socket on the PC board. Operation is as follows:
- **Off** = No troubles
- **Fast Flash** = No IP connection (occurs just after power on while trying to obtain a DHCP address)
- **Slow Flashing:**
  - **1 Blink:** No network cable detected
  - **2 Blinks:** No access to the Internet (mutually exclusive with no network cable)
  - **3 Blinks:** Ethernet failed to communicate
  - **4 Blinks:** Ethernet poll / checkin failure
  - **5 Blinks:** Wi-Fi is enabled, but SLE-WIFI-MODULE is not detected
  - **6 Blinks:** Wi-Fi no access to the Internet
  - **7 Blinks:** Wi-Fi failed to communicate
  - **8 Blinks:** Wi-Fi poll / checkin failure
  - **9 Blinks:** Wi-Fi serial data error or no serial data response
  - **10 Blinks:** Wi-Fi Security/Authentication failed
SUPPLYING POWER

Control panels can provide power through their Auxiliary Power terminals if the available standby current is reduced by the SLE standby power (refer to Electrical Ratings for +12V / 24V For Models without Power Supply on page 2). When there is insufficient standby current due to the application (such as when 24-hour standby time is required for Fire or CO), the SLE-ULPS-R Charger Module accessory must be used to charge an additional battery and to supply the power for the StarLink radio. See WI2131.

Note: The cable modem/router and switch (if any) at the premises requires standby power, therefore a UL 1481 Listed UPS must be used at the premises to power these devices for 24 hours (unless an engine driven generator is provided on the premises, then only 4 hours of UPS backup are required).

JUMPER DESCRIPTIONS

Jumper block labeled "X5"; from top to bottom, as detailed in the following table. Note: Contact ID is always available in response to a Contact ID handshake.

<table>
<thead>
<tr>
<th>Jumper Block &quot;X5&quot; Options</th>
<th>Jumper ON</th>
<th>Jumper Number</th>
<th>Jumper OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tech on site must temporarily remove to download</td>
<td>1</td>
<td>Not permitted by UL 864 and UL 1610</td>
<td></td>
</tr>
<tr>
<td>4/2 with Checksum Pulse Format*</td>
<td>2</td>
<td>4/2 Pulse Format*</td>
<td></td>
</tr>
<tr>
<td>Backup Mode</td>
<td>3</td>
<td>Primary Mode</td>
<td></td>
</tr>
<tr>
<td>Supervised inputs. EOLR(s) required, see page 3</td>
<td>4 and 5</td>
<td>Not permitted by UL 864 and UL 1610 (UL 864 permits use of conduit within 20 feet of FACP in lieu of Supervision)</td>
<td></td>
</tr>
</tbody>
</table>

*See table "NOTICE TO AUTHORITIES HAVING JURISDICTION..." on page 2.

The SLE Series Dual-Path radios are compatible with 4/2 Pulse Dialing formats with 10pps, 20pps, and 40pps with and without checksum, either 1400Hz or 2300Hz handshake / kissoff. See page 6 for table of formats. Refer to WI2140 for selecting the required handshake / kissoff frequency in the NOC. (www.NapcoNOC.com) setup screens (as required by the control panel).

PRIMARY AND BACK-UP REPORTING

The StarLink radio can function as a primary wireless IP communicator, in cases where there are no telephone lines present, when connected directly to the control panel Telco terminals. For primary reporting, do NOT install jumper 3 in terminal block "X5". The StarLink radio can also function as a backup to the existing telephone lines (install jumper 3 in terminal block *X5*). When used as a backup communicator and when it senses telephone line trouble, the StarLink radio automatically switches the communication channel from the telephone line to the cell network.

NETWORK COVERAGE

The StarLink radio constantly supervises the cell network coverage. When the StarLink radio is configured for primary reporting, and the StarLink radio detects a loss in network coverage, the StarLink radio must be configured to prompt the control panel to announce a Telco Line Cut failure trouble using the Management Center screen (located at www.NapcoNOC.com). Note: This Telco Line Cut failure trouble will NOT activate when the StarLink radio is configured for backup reporting.

INSTALLATION STEPS

STEP 1: ACCOUNT REGISTRATION

Create a new account and register specific StarLink radio modules at www.NapcoComNet.com. Accounts and modules registered via the Internet are enabled for activation within 24 hours.

STEP 2: SELECT A MOUNTING LOCATION

The mounting location should be indoors within the protected area and selected based on RF performance. It is HIGHLY recommended that the installer carefully adhere to the following recommendations BEFORE any wires are installed.

- Generally, high locations are best. DO NOT mount radio in basements or below grade as unpredictable performance may result.
- DO NOT mount the radio in non-climate controlled environments (i.e. attics may become extremely hot in summer, garages may become extremely cold in winter).
- Avoid mounting locations within 3 feet of AC power lines, fluorescent light fixtures, or large metal objects (air conditioners, metal garage doors, etc.) as these locations have been shown to have a detrimental effect on signal strength.
- A fair amount of care may be required to mount the StarLink radio so as to achieve an optimal RF path. The installer should spend as much time as needed to obtain the highest signal level possible.
- For Commercial Burglary installations, install in accordance with UL 681, Standard for Installation and Classification of Burglary and Holdup Alarm Systems. Installation shall also be in accordance with UL 827, Standard for the Protection of Buildings and Structures from Burglary and Holdup Alarm Systems.

Note: The cable modem/router and switch (if any) at the premises requires standby power, therefore a UL 1481 Listed UPS must be used at the premises to power these devices for 24 hours (unless an engine driven generator is provided on the premises, then only 4 hours of UPS backup are required).

StarLink™ SLE Commercial Series Dual-Path Alarm Communicators -- Installation Instructions
for Central-Station Alarm Services, and UL 1641, Standard for Installation and Classification of Residential Burglar Alarm Systems

a. **Before applying power, be sure to connect the antenna.** Temporarily connect power to the StarLink radio from a fully charged 12V (4AH minimum) battery. **DO NOT** mount the radio at this time. Press Tamper switch to send a signal.

b. Position the unit in the desired mounting location, with antenna oriented vertically. The signal strength is displayed by the Green “Signal Strength LED” labeled “D3” (located at the lower right corner of the PC board). The GSM radio tower signal strength may fluctuate from day to day, therefore it is best to try to find a mounting location where the LED provides a **minimum of 4 blinks**.

c. Once a location has been selected based on signal coverage, permanently secure the unit using #8 screws (not supplied) in the two mounting holes.

**WARNING:** To ensure user safety and to satisfy FCC RF exposure requirements, this unit must be installed so that a minimum separation distance of 60cm (24”) is always maintained between the antenna of the transmitting device and nearby persons. Use ONLY the existing antenna supplied by the radio to comply with this warning (Exception: The SLE-ANTEXT extended antenna with 15 feet of cable).

**STEP 3: WIRING (PRIMARY AND BACKUP MODES)**

22-gauge wire may be used if mounted up to 50 feet from the control panel, and 18-gauge wire should be used for up to 100 feet. Reference the wiring diagrams further in this manual. See the section **CONTROL PANEL PROGRAMMING** further in this manual.

For **Primary Mode:**

Remove jumper #3 in jumper block labeled "X5". The wiring between the control panel and the StarLink radio is over five (5) wires, as follows:

- TB1: **PWR** Rated 10-25VDC input.
- TB2: **PWR GND** (–)
- TB13: **PANEL TIP**

**STARLINK RADIO RELATED EVENT REPORT CODES** (Contact ID by default)

<table>
<thead>
<tr>
<th>EVENT</th>
<th>AREA</th>
<th>CONTACT ID CODE</th>
<th>ZONE #</th>
<th>PULSE 4/2**</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN 1 Fire</td>
<td>0</td>
<td>E110</td>
<td>990</td>
<td>1A</td>
</tr>
<tr>
<td>IN 2 Panic</td>
<td>0</td>
<td>E120</td>
<td>992</td>
<td>22</td>
</tr>
<tr>
<td>IN 3 Trouble</td>
<td>0</td>
<td>E300</td>
<td>993</td>
<td>F3</td>
</tr>
<tr>
<td>Low Battery/Voltage</td>
<td>0</td>
<td>E302</td>
<td>994</td>
<td>F4</td>
</tr>
<tr>
<td>Tamper Trouble</td>
<td>0</td>
<td>E341</td>
<td>995</td>
<td>F5</td>
</tr>
<tr>
<td>Line Cut</td>
<td>0</td>
<td>E352</td>
<td>996</td>
<td>F6</td>
</tr>
<tr>
<td>Reboot</td>
<td>0</td>
<td>E625</td>
<td>997</td>
<td>F7</td>
</tr>
<tr>
<td>IN1 CO (Carbon Monoxide)</td>
<td>0</td>
<td>E162</td>
<td>998</td>
<td>18</td>
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<tr>
<td>Panic Alarm*</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Holdup Alarm*</td>
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<tr>
<td>Medical Alarm*</td>
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<tr>
<td>24 hour Aux. Alarm*</td>
<td></td>
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<tr>
<td>24 hour Aux. Restore*</td>
<td></td>
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<tr>
<td>Burg Perimeter Alarm*</td>
<td></td>
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<tr>
<td>Burg Interior Alarm*</td>
<td></td>
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<td></td>
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<tr>
<td>Keypad Holdup Alarm (ambush)*</td>
<td></td>
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<tr>
<td>Keypad Panic Alarm*</td>
<td></td>
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<td></td>
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<tr>
<td>Keypad Emergency Alarm*</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Opening*</td>
<td></td>
<td></td>
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<tr>
<td>Closing*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A.C. Trouble*</td>
<td></td>
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<tr>
<td>Tel1 Fail*</td>
<td></td>
<td></td>
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<tr>
<td>Fire Polling Report</td>
<td></td>
<td></td>
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<tr>
<td>Supv Failure Report</td>
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<tr>
<td>Tip/Ring Wiring Fault Report</td>
<td></td>
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</tr>
<tr>
<td>Path Test Report</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*Not generated by the StarLink radio.
**See table "NOTICE TO AUTHORITIES HAVING JURISDICTION..." on page 2.

**SIGNALS ORIGINATED AT THE NOC**

<table>
<thead>
<tr>
<th>NOC Originated Alarms</th>
<th>Contact ID Event Data Sent</th>
<th>Initiated By</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory Fail</td>
<td>E356 A00 Zn000</td>
<td>Automatically by NOC if fail to receive any signal from StarLink radio within Supervisory Timeout duration.</td>
<td>For Auto Enroll, uses captured telephone number, Sub ID and format. For Dealer Programmed, uses entered telephone number, Sub ID and format.</td>
</tr>
</tbody>
</table>

Press to Send Test Signal | E601 A00 Zn000 | Manually by dealer from the Management Center Signal Log screen (located at [www.napconoc.com](http://www.napconoc.com)). Sends test into CS receiver. | Same comment as above. |

Press to Send Radio Test | Not Applicable Nothing sent to CS receiver | Manually by dealer from the Management Center Checksins screen (located at [www.napconoc.com](http://www.napconoc.com)). Sends a command to the StarLink radio to force a check-in to the NOC. | ---- |
the StarLink radio have been properly received by your central station before leaving the premises.

NAPCO CONTROL PANEL PROGRAMMING

To program the central station receiver reporting format, use PCD-Windows Quickloader download software. Open the Digital Communications screen, Central Station Receivers tab, as shown in the following image:

A "Point ID" (also called "Contact ID") receiver format programming example is shown:

The radio can transmit to any central station capable of receiving SIA Contact ID via DACR technology or the DSC Sur-Gard Model System II via TCP/IP.

Note: A receiver reporting format must be entered for each telephone number used, but each telephone number may be assigned a different format.

CAUTION: The installer should always be certain an area code is programmed into the control panel.

Optional: If you wish the StarLink radio to report a code and zone number (Contact ID by default) to the central station in response to a triggered input event, see the table on the previous page.

Note: These event codes and zone numbers can be changed from the Management Center screen (located at www.napconoc.com).

Upon alarm, the NOC can optionally send an SMS message to a third party that includes the appropriate Contact ID alarm code, including the zone or user number, if applicable. The "STARLINK RADIO RELATED EVENT REPORT CODES" table also includes the most common Contact ID alarm codes.

## Wiring Methods

- Strip wire carefully to avoid exposed conductors after installation, etc.
- Use UL Listed wire, ensuring that all conductors are to be insulated for the maximum voltage of any conductor in the enclosure
- All wiring methods must be performed in accordance with NFPA 70, Articles 725, and 800

## STEP 4: APPLY POWER

- **Attach antenna before applying power !**
- Apply 12/24VDC to terminals 1 and 2. (For models without the charger board SLE-ULPS-R). For models with the SLE-ULPS-R, apply power to the unit.

## STEP 5: SIGNAL VERIFICATION

- **Verify Online**: To verify that the signals have been received by the StarLink radio GSM Network online, go to [www.napconoc.com](http://www.napconoc.com), log in with your Username and Password, enter your Company ID number and the StarLink GSM Radio Number, then click Signal Log.

**IMPORTANT**: Verify that the signals transmitted by

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Red and White Metal Housing Dimensions (inches)
Programming StarLink Radio Troubles

It is required that if a StarLink radio or control panel trouble is detected, that it is reported to the central station.

When the StarLink radio detects and sends a trouble to the control panel, the control panel must be programmed to annunciate this trouble. The radio can detect multiple troubles as indicated by the "Red Trouble LED" ("D5"). For these troubles to be annunciated at the panel, there are several methods, some of them are configurable at the Management Center screen (www.napconoc.com):

Wire the radio PGM1 output to a dedicated control panel zone (input) to annunciate the trouble (activate a trouble sounder) when an open is detected. The radio must also report this trouble to the central station. With Napco control panels, program a dedicated zone for Day Zone, Minisounder on Alarm and No bell on Alarm. Wire the zone as indicated in the wiring diagrams further in this manual.

For models with the SLE-ULPS-R Power Supply, wire this Power Supply trouble output relay to the two terminals of the control panel zone dedicated to the trouble. The GEMC Commercial Fire control panels, use the dry contacts of the Power Supply relay by removing the jumper and using the contacts of the Power Supply relay (Common and N/O) in series with a 2.2k EOLR.

For radio models without the SLE-ULPS-R Power Supply (powered by the control panel Aux Power terminals), wire the radio directly to the PGM1 output of the control panel (program the radio to report all troubles on PGM1). Alternatively, you can use the GEMC-F8ZCPIM module to detect a trouble on the zone by use of a PGM output of the radio. See special wiring instructions for use of the GEMC-F8ZCPIM zones.

You can also wire to the positive terminal of the dedicated zone on a GEMC-EZM8. Thus when a radio trouble is detected, the radio PGM activates the control panel zone, and the panel generates a trouble that is sent to the central station.

All installations also require wiring an output from the control panel, as follows: With Gemini C-Series (GEMC) control panels, we recommend using the Fire Aux Relay. Program the Fire Aux Relay to activate as a trouble relay. Wire this zone to the StarLink module IN2 terminal.

Note: We recommend using the text "GSM Trouble" as the Zone Description.

StarLink Radio Supervision

If the two Telco wires (DACT interconnect wiring to the radio) between the StarLink radio and the control panel are cut or otherwise disconnected, the control panel must detect and generate a local trouble indication. The control panel must trigger an output to activate the StarLink radio to report this line cut fault to the central station. Program the control panel for telephone supervision. Program the StarLink radio using the Management Center "Advanced Features" screen (at www.napconoc.com) to enable the Line Cut feature on all troubles (therefore a dedicated zone is not required).

Note: Some control panels may require a different duration than the default time of 3 minutes. See also the alternate supervision method described on page 14, "Alternate Telco Line to Alarm Panel Supervision (For Primary Mode Only)".

Supervision Time Schedule Considerations

If a status change (alarm trouble, etc.) is transmitted, the radio supervision timer is restarted.

For example, if a status change is sent, the next regular supervision transmission will occur at the interval determined by your rate plan.

Configuration Download / Firmware Updates

Technician on site required.

For Commercial Installations a technician is required to be on site during any reprogramming of the radio or control panel and must perform / re-perform acceptance testing. To perform a download or update the radio firmware, jumper 1 must be removed. UL requires that the jumper be replaced after the download is complete. Failure to replace the jumper would allow downloads to the radio without a technician on-site.

For Residential installations jumper 1 may be removed to permit uploading and downloading without a technician on site, however, the dealer is responsible for ensuring the system is operating correctly after any downloads or changes to the system.

Cover Tamper

The SLE series radios in the metal housings may optionally have front and rear tamper switches installed (GEM-Tamperkit) and wired to the control panel (see page 15). Note: The tamper switch on the radio PC board is not used in this housing (but continues to function if pressed).
(Commercial Fire and Commercial Burglary)
SLE3/4GI-CFB-PS, SLECDMAI-CFB-PS, SLE3/4GI-CB-TF and SLECDMAI-CB-TF
Wiring Diagram

SLE3/4GI-CFB-PS or SLECDMAI-CFB-PS
PC Board
All connections are power limited except AC Mains, Telco and battery terminals

Terminals 14-17: No connections permitted.

*Notes:
• Connect the StarLink radio to the control panel output for Telco Trouble (this is the DACT interconnect wiring to the radio). Remember to program the StarLink communicator module to report this IN2 Telco Trouble and for line cut (EOLR) to the central station (options 1 or 4 on page 14). In addition, always add an EOLR at the control panel Telco Trouble Output (Fire Aux Relay for the GEMC control panels).
• Use EOLR value as specified by the control panel installation instructions.
• IN1 not supervised. IN2 and IN3 can be supervised.
• Licensed electrician required to wire the 120VAC connections to the transformer in accordance with N.E.C. and local code requirements.
• Route 120VAC only through the transformer compartment knockouts.
• Keep all non-power limited wiring separate from all power-limited wiring inside the housing by 1/4". In addition, maintain a minimum 1/4" separation of all primary wiring in the transformer compartment from the yellow secondary wires of the transformer.
• Remove shunt J2 to isolate relay common from ground (i.e. jumper on = wet (circuit common); off = dry contact). When wet, configuration is used; the power should be derived from the alarm control panel.
• StarLink module must be configured to trigger PGM1 on any trouble.
• PGM1 of the StarLink module must be wired to the trouble input (terminal 5) of the power supply.
• The Power Supply Trouble Output must be wired to a control panel zone dedicated to a GSM trouble; see control panel programming instructions and program to Report Alarm / Alarm Restore / Trouble / Trouble Restore.
Wiring Diagram for PRIMARY Reporting Configuration
Generic Control Panels
(Use when telephone line is NOT available)

**CONTROL PANEL PC BOARD**

**StarLink Radio Terminals**
SLE3/4GI-CB-TF or SLECDMAI-CB-TF PC Board:
All connections are power limited except AC Mains, Telco and battery terminals. Terminals 14-17: No connections permitted.

**Power Supply (SLE-ULPS-R)** (optional)

*Refer to section "SUPPLYING POWER".

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*StarLink™ SLE Commercial Series Dual-Path Alarm Communicators -- Installation Instructions*
Wiring Diagram for BACKUP Reporting Configuration
Generic Control Panels

CONTROL PANEL PC BOARD

TO TELEPHONE
RJ31X

HOME PHONES

*For StarLink terminals 1 and 2: May be wired directly to Aux Power of the control panel. Refer to Electrical Ratings for +12V / 24V for Models without Power Supply on page 2.

“Refer to section “SUPPLYING POWER”.

StarLink™ SLE Commercial Series Dual-Path Alarm Communicators -- Installation Instructions

11
Wiring Diagram for PRIMARY Reporting Configuration
GEMC-32, GEMC-96, GEMC-128 and GEMC-255 Control Panels
(Use when telephone line is NOT available)
SLE Communicator Non TF or PS versions

GEMC Control Panel PC Board

MONITOR ZONE (+) DEDICATED TO GPRS SUPERVISION

When the SLE-ULPS-R is used, wire the trouble relay to a Zone (+) dedicated to GPRS supervision.

Special Wiring Instructions for the GEMC-F8ZCPIM as a Monitor Zone Only
When PGM1 is wired to a GEMC-F8ZCPIM zone, replace the 2.2k ohm EOL resistor with a 560ohm 1/2 watt min EOL resistor. Connect PGM1 to the negative terminal of the zone.
When PGM2 and/or PGM3 are wired to a GEMC-F8ZCPIM zone, replace the 2.2k ohm EOL resistor with two 1K ohm 1/4 watt min EOL resistors. Connect the PGM wire to the common wire of the two resistors in series.

EOLR for telco line supervision required when the feature "Tip/Ring Wiring Fault Report" is enabled in the NOC.

Note: Connect IN2 to a panel output used for identifying Telco line cut (this is the DACT interconnect wiring to the radio).

SLE3/4GI-CB or SLECDMAI-CB PC Board:
All connections are power limited except AC Mains, Telco and battery terminals. Terminals 14-17: No connections permitted.

*Refer to section "SUPPLYING POWER".
Wiring Diagram for BACKUP Reporting Configuration
GEMC-32, GEMC-96, GEMC-128 and GEMC-255 Control Panels

StarLink Radio Terminals

Either the TRF12/T123 (16.5V / 20VA) transformer or the chassis-mounted 16.5VAC / 20VA transformer

Power Supply (SLE-ULPS-R) (optional)

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StarLink™ SLE Commercial Series Dual-Path Alarm Communicators -- Installation Instructions
### Input Configuration Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Application</th>
<th>Armed</th>
<th>Disarmed</th>
<th>Resend TBL every 24 Hrs</th>
<th>NOC Inputs &quot;Function&quot; Selection</th>
<th>Comments</th>
</tr>
</thead>
</table>
| 1      | FACP with DACT  
Use IN2 or IN3 only for trouble. Panel reports via dialer capture, but Linecut for DACT interconnection wiring to the radio reports via an input on radio. | TBL  | TBL  | TBL  | -  | -  | Yes | Supervised Fire Trouble (Linecut) | Requires two EOLRs. Radio reports in CID (use jumpers 4/5) |
| 2      | FACP without DACT  
Use IN1 (not supervised) either for trouble or alarm. Panel has trouble (or alarm) relay that closes on the condition. | -  | TBL (or ALARM)  | -  | -  | -  | Yes | Un-Supervised Fire Trouble (use 'User Defined' selection for Alarms) | Non-supervised (use conduit activation requires +12V or 12/24V) |
| 3      | FACP without DACT  
Use IN2 or IN3 for both Alarm and Trouble on one input. Panel has alarm and trouble relay outputs. | TBL  | TBL  | ALARM  | -  | -  | Yes | Supervised Fire Alarm/Trouble | Requires two EOLRs. The Trouble relay N.O. contact (de-energized opens) is put in series with one EOLR. Alarm relay put across both EOLR and trouble relay. |
| 4      | BURG with DACT  
Use IN2 or IN3 for only trouble reporting. Panel reports via dialer capture but Linecut for DACT interconnection wiring to the radio reports via an input on radio. | ALARM  | ALARM  | ALARM  | TBL  | TBL  | TBL  | No | Supervised Burg-Linecut | Requires two EOLRs. Program panel to report Open/Close (radio remembers last state of panel for Napco panels when used with local download cable). |
| 5      | BURG without DACT  
Use IN2 or IN3 for both Alarm and Trouble. Panel has alarm and Trouble Relay/PGM outputs. Two EOLRs are needed since for UL Burg it is required to detect both wire breaks and shorts. | ALARM  | TBL  | ALARM  | TBL  | TBL  | TBL  | No | Supervised Burg Alarm/Trouble | Requires two 10K EOLRs. Three off normal conditions can be detected, namely, cut wire, shorted loop and one of the EOLR's having a closed contact in series. The Trouble relay N.O. contact (de-energized opens) is put in series with one EOLR. The Alarm relay N.O. contact is put across both EOLRs and trouble relay. The panel Armed or Disarmed state is determined by a separate input (see Option 6 in this table below for armed status operation). (Note: The Alarm relay should NOT activate on 24hr zones.) |
| 6      | BURG without DACT: Armed Status  
Use IN2 or IN3 for Armed Status input. Two EOLRs are needed since for UL Burg its required to supervise for both wire breaks and shorts. | TAMPER  | N/A  | ALARM  | TBL  | N/A  | TBL  | No | Supervised Arm/Disarm Status | Requires two 10K EOLRs. A relay for PGM for Arm/Disarm status goes in series with one EOLR where open is disarmed and closed is armed. The other EOLR is across the series combination (relay for Arm/Disarm and first EOLR) to provide the loop supervision. |

*Note: On line cut, PGM1 will activate.*

### Alternate Telco Line to Alarm Panel Supervision (For Primary Mode Only)

*Do not use when radio is configured for backup.* A 10K ohm resistor (5% tolerance) can be placed across the "house side" of the telephone line circuit (see wiring diagrams). Use this resistor instead of using a relay on the alarm control panel to trip an input on the radio to supervise the connection between the alarm control panel telco circuit and the radio. **Note:** In installations where two telco lines are used, a 22K ohm resistor (5% tolerance) is required for each telco line (see wiring diagrams).

**REMEMBER:** Enable the feature "Tip / Ring Wiring Fault Report" in the NOC (www.NapcoComNet.com) to supervise the telephone line connection to the control panel.

**REMINDER:** *Never* use this option when the alarm control panel is connected to telephone service!
WIRING THE TAMPER SWITCHES
(REQUIRED FOR UL COMMERCIAL BURGLARY)
Before installation and wiring, the tamper switches (part GEM-Tamperkit) are normally open devices; when placed into the circuit and into operation, they are normally closed devices.

Tamper switches protect against the opening of the radio cabinet door or the removal of the radio enclosure from the wall or other mounting surface.

There are two places in the cabinet to mount tamper switches:
(1) To prevent cabinet removal from the wall, located on the left side of the cabinet there is one knockout for the switch plunger and three mounting holes (in the enclosure sheet metal). (2) To protect the cabinet door, mount a tamper switch in the three mounting holes (in the enclosure sheet metal). When mounted, the switch button contacts the inside surface of the door. **Note:** Be sure to alert the user that opening the enclosure door will cause a tamper alarm.

Wiring a normally closed sensor loop for tamper supervision, wire to a zone on the control panel.

<table>
<thead>
<tr>
<th>Name</th>
<th>Format Type</th>
<th>Handshake Frequency</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ademco Slow</td>
<td>4/2</td>
<td>1400 Hz or 2300Hz</td>
<td>10pps</td>
</tr>
<tr>
<td>Ademco Slow</td>
<td>4/2 checksum</td>
<td>1400 Hz or 2300Hz</td>
<td>10pps</td>
</tr>
<tr>
<td>Radionics Slow</td>
<td>4/2</td>
<td>2300Hz</td>
<td>10pps</td>
</tr>
<tr>
<td>Radionics Slow</td>
<td>4/2 checksum</td>
<td>2300Hz</td>
<td>10pps</td>
</tr>
<tr>
<td>Silent Knight Fast</td>
<td>4/2</td>
<td>1400 Hz or 2300Hz</td>
<td>20pps</td>
</tr>
<tr>
<td>Silent Knight Fast</td>
<td>4/2 checksum</td>
<td>1400 Hz or 2300Hz</td>
<td>20pps</td>
</tr>
<tr>
<td>Radionics Fast</td>
<td>4/2</td>
<td>2300Hz</td>
<td>40pps</td>
</tr>
<tr>
<td>Radionics Fast</td>
<td>4/2 checksum</td>
<td>2300Hz</td>
<td>40pps</td>
</tr>
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<td>Universal High Speed</td>
<td>4/2</td>
<td>1400 Hz or 2300Hz</td>
<td>40pps</td>
</tr>
<tr>
<td>Universal High Speed</td>
<td>4/2 checksum</td>
<td>1400 Hz or 2300Hz</td>
<td>40pps</td>
</tr>
</tbody>
</table>
Optional Alternate Methods for Commercial Fire Branch Circuit Power Connections to the SLE Charger Board

UL LISTED ELECTRICAL PULL BOX WITH LISTED OUTLET BOX AND NON-SWITCHED RECEPTACLE ON DEDICATED FIRE ALARM SYSTEM BRANCH CIRCUIT

CONDUIT TRANSFORMER OUTPUT WIRING
UL LISTED PULL BOX
UL LISTED NAPCO TRF12/T123 TRANSFORMER FOR CONNECTION TO SLE CHARGER BOARD
UL LISTED SURFACE OR FLUSH MOUNT OUTLET BOX AND NON-SWITCHED RECEPTACLE

Maintain a minimum of 1/4 inch separation of circuits (transformer secondary wiring from 120V branch circuit).

TRANSFORMER SECONDARY WIRING CONDUIT LIMITED TO 20 FEET MAXIMUM LENGTH
**NOTES**

**REN** = 0. The *Ringer Equivalence Number (REN)* indicates the maximum number of devices allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the **RENs** of all the devices not exceed five (5).
NAPCO SECURITY SYSTEMS, INC. (NAPCO) warrants its products to be free from manufacturing defects in materials and workmanship for 36 months following the date of manufacture. NAPCO will, within said period, at its option, repair or replace any product failing to operate correctly without charge to the original purchaser or user.

This warranty shall not apply to any equipment, or any part thereof, which has been repaired by others, improperly installed, improperly used, abused, altered, damaged, subjected to acts of God, or on which any serial numbers have been altered, defaced or removed. Seller will not be responsible for any dismantling or reinstallation charges.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THERE IS NO EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR A WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. ADDITIONALLY, THIS WARRANTY IS IN LIEU OF ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF NAPCO.

Any action for breach of warranty, including but not limited to any implied warranty of merchantability, must be brought within the six months following the end of the warranty period. IN NO CASE SHALL NAPCO BE LIABLE TO ANYONE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF THIS OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, EVEN IF THE LOSS OR DAMAGE IS CAUSED BY THE SELLER'S OWN NEGLIGENCE OR FAULT.

In case of defect, contact the security professional who installed and maintains your security system. In order to exercise the warranty, the product must be returned by the security professional, shipping costs prepaid and insured to NAPCO. After repair or replacement, NAPCO assumes the cost of returning products under warranty. NAPCO shall have no obligation under this warranty, or otherwise, if the product has been repaired by others, improperly installed, improperly used, abused, altered, damaged, subjected to accident, nuisance, flood, fire or acts of God, or on which any serial numbers have been altered, defaced or removed. NAPCO will not be responsible for any dismantling, reassembly or reinstallation charges.

This warranty contains the entire warranty. It is the sole warranty and any prior agreements or representations, whether oral or written, are either merged herein or are expressly cancelled. NAPCO neither assumes, nor authorizes any other person purporting to act on its behalf to modify, to change, or to assume for it, any other warranty or liability concerning its products.

In no event shall NAPCO be liable for an amount in excess of NAPCO's original selling price of the product, for any loss or damage, whether direct, indirect, incidental, consequential, or otherwise arising out of any failure of the product. Seller's warranty, as hereinabove set forth, shall not be enlarged, diminished or affected by and no obligation or liability shall arise or grow out of Seller's rendering of technical advice or service in connection with Buyer's order of the goods furnished hereunder.

NAPCO RECOMMENDS THAT THE ENTIRE SYSTEM BE COMPLETELY TESTED WEEKLY.

Warning: Despite frequent testing, and due to, but not limited to, any or all of the following; criminal tampering, electrical or communications disruption, it is possible for the system to fail to perform as expected. NAPCO does not represent that the product/system may not be compromised or circumvented; or that the product or system will prevent any personal injury or property loss by burglary, robbery, fire or otherwise; nor that the product or system will in all cases provide adequate warning or protection. A properly installed and maintained alarm may only reduce risk of burglary, robbery, fire or otherwise but it is not insurance or a guarantee that these events will not occur. CONSEQUENTIALLY, SELLER SHALL HAVE NO LIABILITY FOR ANY PERSONAL INJURY, PROPERTY DAMAGE, OR OTHER LOSS BASED ON A CLAIM THE PRODUCT FAILED TO GIVE WARNING. Therefore, the installer should in turn advise the consumer to take any and all precautions for his or her safety including, but not limited to, fleeing the premises and calling police or fire department, in order to mitigate the possibilities of harm and/or damage.

NAPCO is not an insurer of either the property or safety of the user's family or employees, and limits its liability for any loss or damage including incidental or consequential damages to NAPCO's original selling price of the product regardless of the cause of such loss or damage.

Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, or differentiate in their treatment of limitations of liability for ordinary or gross negligence, so the above limitations or exclusions may not apply to you. This Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

NOTE: This equipment has been tested and found to comply with the limits for a Class B Unintentional Radiator, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction Manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures: 1. Reorient or relocate the receiving antenna; 2. Increase the separation between the equipment and receiver; 3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected; 4. Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT WIRING METHODS

For single-conductor terminal blocks (like the type shown at left), to terminate more than one conductor to a terminal, use the wiring methods shown at right:

For "barrier" type terminal blocks (like the type shown at left), to terminate two conductors to a terminal, use the wiring methods shown at right:

To terminate more than two conductors or conductors of different wire sizes to a terminal, use the "pigtail" type wiring method as shown at right. Use insulated wire for the pigtail, and firmly secure the conductors to the pigtail using an appropriate wire nut or crimp connector for the number and gauge of conductors used.