Installation Manual

PowerCommand® Network
LonWorks™ System Annunciator

PowerCommand

- Normal Power
- Genset Supplying Load
- Genset Running
- Not In Auto
- High Battery Voltage
- Low Battery Voltage
- Charger AC Failure
- Fail To Start
- Low Engine Temp
- Pre–High Engine Temp
- High Engine Temp
- Pre–Low Oil Pressure
- Low Oil Pressure
- Overspeed
- Low Coolant Level
- Low Fuel Level

Silence/
Lamp Test

Network

Genset #1
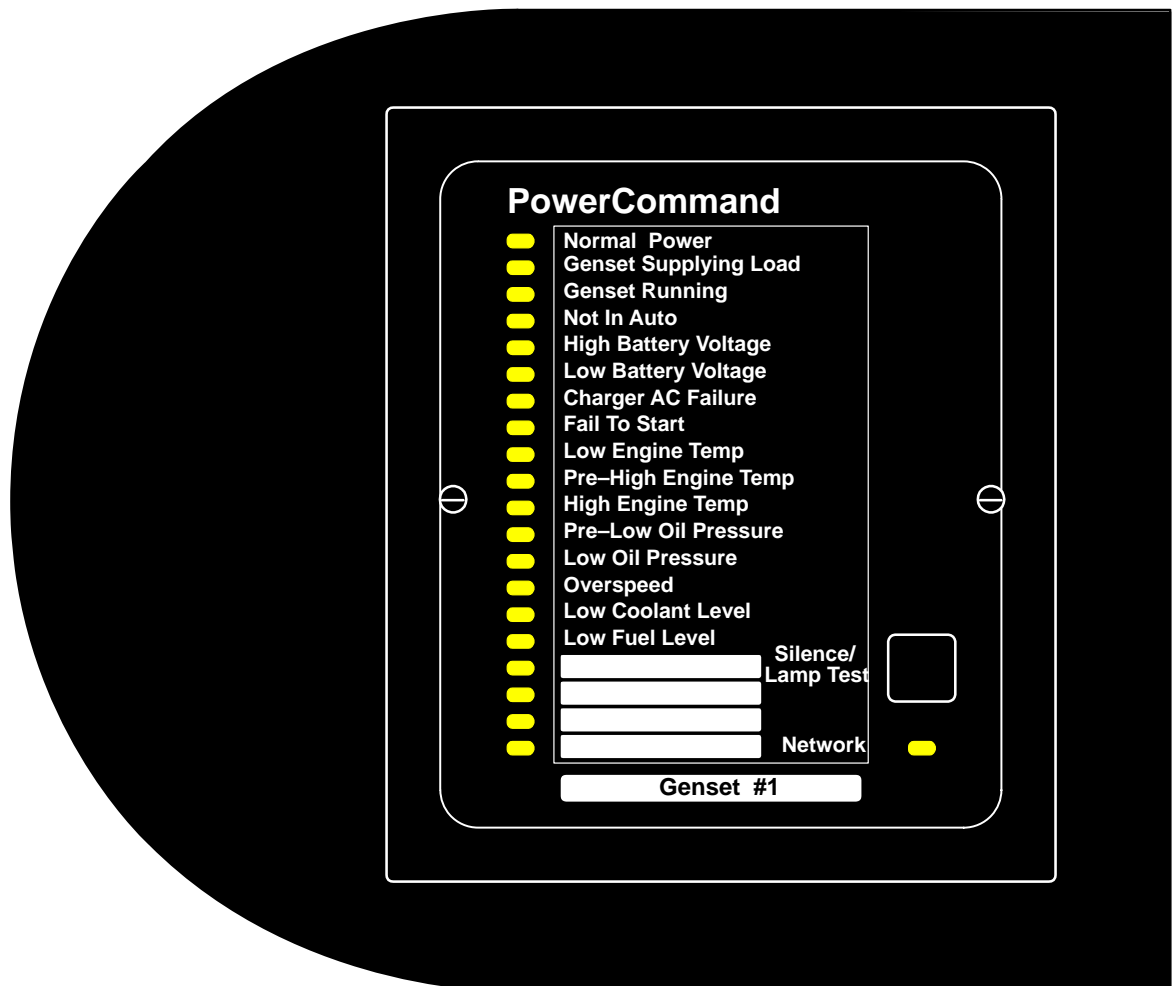
Safety Precautions

⚠ DANGER *High voltage is deadly. Installation and service of the network annunciator involves working with high voltage equipment. Installation and service must be performed by trained and experienced personnel working with such equipment. Disconnect the utility line from the transfer switch and disconnect power from the battery charger, day tank and any other power equipment where connections are to be made.*

⚠ WARNING *Accidental starting of the generator set while working on it can cause severe injury or death. Disconnect the battery cables to prevent accidental starting. Always disconnect the negative (–) cable first, and connect it last, to prevent arcing if a tool accidentally touches the frame or other grounded metal parts of the set while connecting or disconnecting the positive (+) cable. Arcing can ignite explosive hydrogen gas given off by the battery and cause severe injury. Ventilate the battery compartment before removing cables.*

Table of Contents

Refer to the *PowerCommand Network Installation and Operator's Manual* (900-0366) for instructions on wiring, installation and connection of this module to the PowerCommand Network.

Power Generation

Introduction

ABOUT THIS MANUAL

This manual covers the operation and installation of the LONWORKS® System Annunciator in a Power-Command® Network.

The LONWORKS System Annunciator replaces the Network Annunciator Module.

The LONWORKS System Annunciator Module monitors and reports operational status of a generator set and/or transfer switch connected to a network.

The following topics are covered in this manual:

- Installation
  - –Physical
  - –Logical
- Operation
- Troubleshooting
- Parts

Requirements

- PowerCommand LONMARK® Genset or Transfer Switch
- CAT 4 Twisted-Pair Cable
- 14–22 AWG copper stranded wire (depending on distance)
- Network Module Library v1.50 or later (Lon-Maker installed only)
- LonMaker™ Software
- Network Module Library (NML) V 1.8 or later for LONMARK® Standard Network Variable Type (SNVT) Operation

Network installation must be performed by trained and experienced network personnel.

Refer to the *PowerCommand Network Installation and Operator's Manual* (900-0366) for instructions on network wiring and LonMaker software.

All network data wiring must follow a specific network topology and must fall within distance limits. Network power wiring must be sized according to source voltage, distance and load.

A parts list is also included for all available service parts. Study this manual carefully and observe all warnings, cautions and installation procedures.

HOW TO OBTAIN SERVICE

When the equipment requires service, contact the nearest dealer or distributor. Factory-trained Parts and Service representatives are ready to handle all your service needs.

If you are unable to locate a dealer or distributor, consult the Yellow Pages. Typically, our distributors are listed under:

GENERATORS-ELECTRIC or
    ELECTRICAL PRODUCTS

For the name of your local Cummins® Distributor in the United States or Canada, call 1-800-888-6626 (this automated service utilizes touch-tone phones only). By entering your area code and the first three digits of your local telephone number, you will receive the name and telephone number of the distributor nearest you.

For outside North America, call Cummins Power Generation, 1-763-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday. Or, send a fax using the fax number 1-612-574-8087.

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⚠ WARNING

INCORRECT SERVICE OR PARTS REPLACEMENT CAN RESULT IN SEVERE PERSONAL INJURY, DEATH, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE ON HIGH VOLTAGE EQUIPMENT.

Description

The LONWORKS System Annunciator:

- Available with or without an enclosure

- Includes NFPA 110 English and Spanish language inserts with blank backs

- Self-Installs (4 nodes) or LonMaker programmed and Installed

- Verifies Network Communications

- Configurable Lamps (LonMaker programmed only)

- Configurable Horn

- Annunciates Multiple Devices Simultaneously (Genset, Automatic Transfer Switch [ATS], etc.)

- Customizable Lamp Nameplate Insert.

The LONWORKS System Annunciator contains 20 programmable[1] lamps and a horn to annunciate the system status and fault conditions of the emergency power system. The lamp colors can be configured as *green, red*, or *amber* as well as *steady on* or *flashing*.

Each lamp may be configured to sound an audible horn. The horn can be configured for loud or soft operation, or disabled entirely.

The *Network Status* lamp indicates the state of the network in the event that communications to the emergency power system have failed.

The Annunciator can install itself into the network (self-installed) or may be programmed and installed using LonMaker. For simple limited installations. up to 4 Annunciators may be installed in the same network with a single Genset and ATS. However, more complicated network systems require LonMaker for installation.

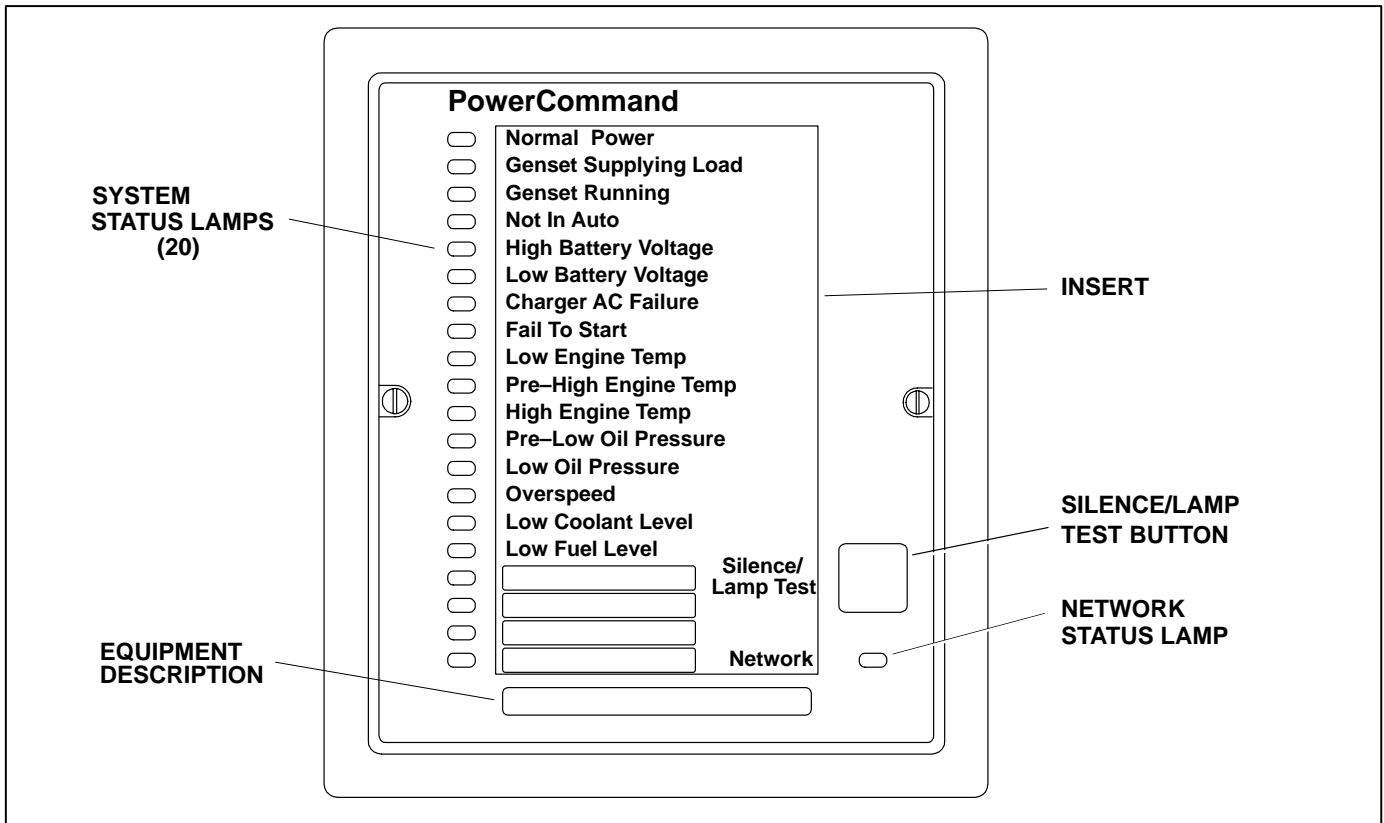[1] Requires LonMaker installation method to customize the lamp operation.

FIGURE 1. ANNUNCIATOR PANEL

Network Overview

After mounting, the LONWORKS System Annunciator is ready to install itself into a network. LonMaker is not required to install the device(s), if the following criteria are met.

- The system consists of a single LONMARK Genset and/or a single LONMARK ATS.

- All devices in the system have the ability to self-install.

- NFPA 110, Genset Extended, Genset Custom, or ATS Extended *Annunciation Set* is selected.

- A maximum of 4 Annunciators are being installed. Each Annunciator must display a different *Annunciation Set*. (See page 8.)

If the above conditions are met, all devices in the system can be automatically installed (self-install) when powered up. After power up, proceed with *Self-Installation* on page 7.

If any of the above conditions are not satisfied, the entire system must be programmed and installed using LonMaker (Page 9).
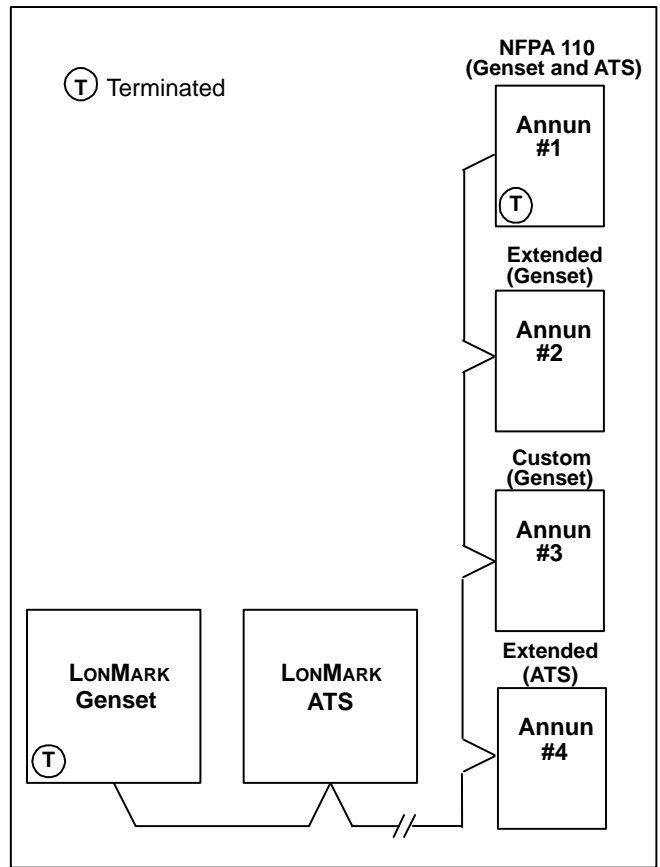

FIGURE 2. SELF-INSTALLED NETWORK REPRESENTATION

Installation

PHYSICAL INSTALLATION

Mounting

The Annunciator is available either with a panel or enclosure mounting.

Enclosure Mounting

1. Remove the front panel assembly from the enclosure.

2. Punch out necessary hole(s) in the enclosure for conduit or wires.

   ⚠WARNING *Drilling into utility lines can cause severe personal injury or death. Make sure no wires, plumbing or gas lines run behind the mounting area before drilling the mounting holes.*

3. Locate the desired location on wall. Using the enclosure as a template, mark the required holes. (Figure 3) Before cutting or drilling, make sure no wiring, plumbing or gas lines run behind the wall. Attach mounting brackets to annunciator using the screws provided.

4. Mount the enclosure securely to the wall at the desired location.

5. Install conduit and wiring as needed. See page 6.

Panel Mounting

1. Remove hex nuts from the front panel assembly.

2. Locate desired location on the modular panel and cutout rectangle and holes as shown in Figure 4.
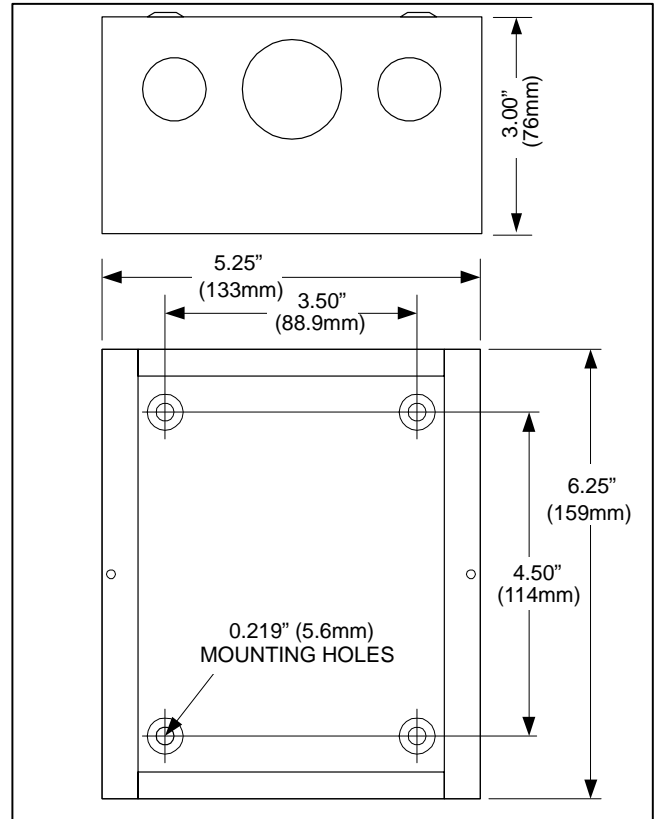
3. Install conduit and wiring as needed. See page 6.
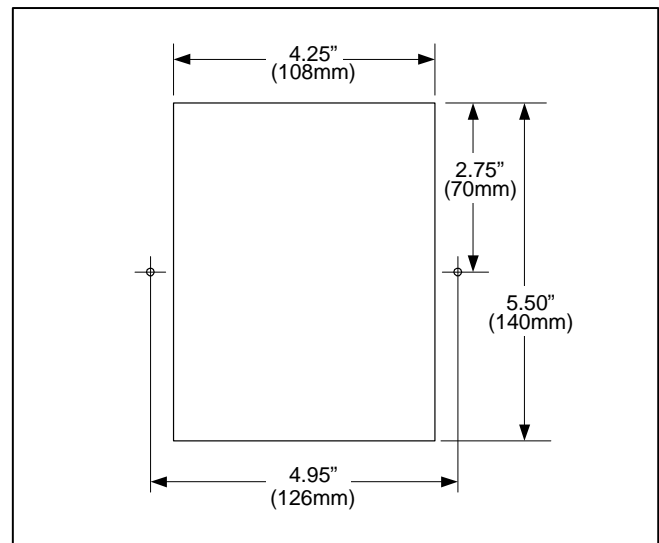

FIGURE 3. ENCLOSURE FOOTPRINT

FIGURE 4. PANEL FOOTPRINT

WIRING

Network Data

The network data bus must be wired using a "Multi-drop Bus" topology. Multidrop Bus requires data lines of each device to be "daisy-chained" together, while allowing an unlimited number of "stubs" (branches). Each end of the data bus must be terminated with an appropriate termination circuit. If the LONWORKS System Annunciator is located at the end of the network data bus, set the on-board switch S1 to the "TERM" position (Figure 5).

Data Inputs: J1-1 and J1-2 (polarity insensitive)

Data Bus Length: 4600 feet (1400m) maximum

Number of Stubs: Unlimited

Stub Length: 10 feet (3m) maximum

Termination: Required at both ends of bus

See *PowerCommand Network Installation and Operator's Manual* (900–0366) for more information.

Termination

If the Annunciator is located at either end of the network data bus, the Termination switch S1 must be set. This is accomplished by moving it to the ON or TERM position. Terminate only those devices at each end of the data bus.

Power

Power Inputs: J1-3 (+) and J1-5 (–)

Power Outputs: J1-4 (+) and J1-6 (–)

Operating Voltage: 8.0 to 30.0 VDC

Power: 3.5 W max, 0.8 W typical

Input Current: 430 mA max, 80 mA typical

Distance: See table below.

TABLE 1. DISTANCE vs WIRE SIZE

Copper Wire Size (AWG)	Maximum Distance in feet	
	12V	24V
22[1]	330 (100m)	1110 (338m)
20	520 (158m)	1760 (537m)
18	820 (250m)	2790 (852m)
16	1300 (398m)	4430 (1352m)
14	2070 (631m)	4600[2] (1400m)

1. Twisted-pair cable (use orange/orange-white).
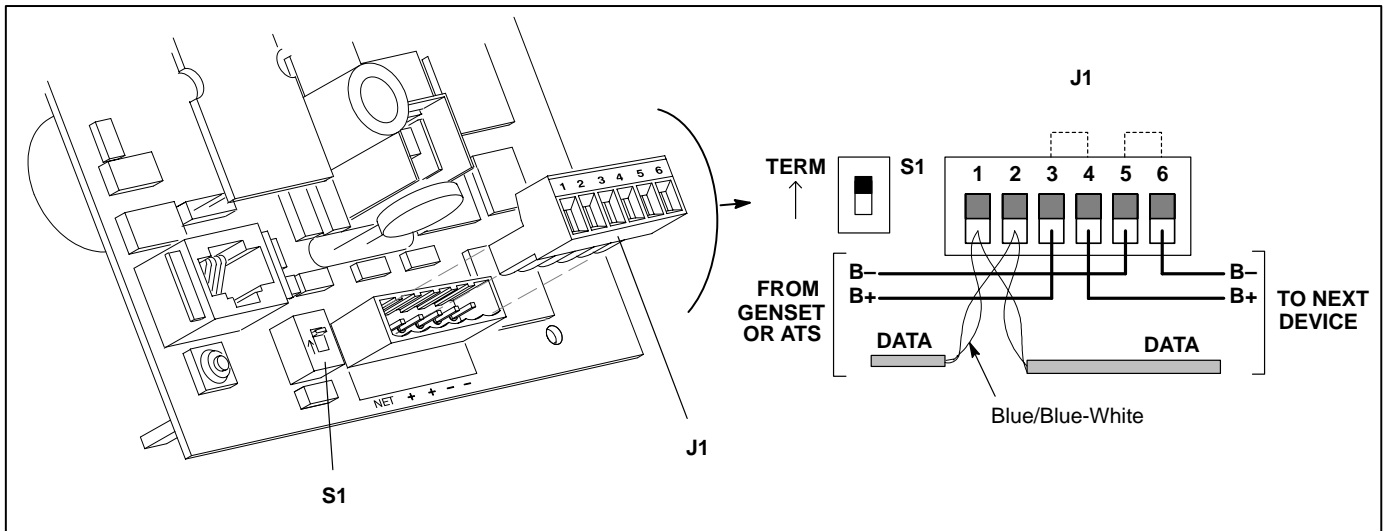2. Limited by maximum data bus length.

FIGURE 5. ANNUNCIATOR WIRING AND TERMINATION

Conduit

When installing conduit, observe the following precautions:

1. Before beginning conduit installation, cover all components to prevent accidental entry of metal shavings.

2. If using rigid conduit, install at least 2 feet (0.6m) of flexible conduit between the rigid conduit and the Genset to absorb vibration.

3. Always follow local code and use correct materials when installing cable. There is no technical limitation associated with single conduit for both network and power supply wiring, but some authorities may require separate conduit for data and DC lines.

   NOTE: The second twisted-pair (orange/orange-white) may be used for DC wiring. See wiring distance limits for 22 AWG (Table 1).

4. Always run DC wiring in separate conduit from AC power lines to avoid interference that could cause control problems.

   ⚠ CAUTION *Installation debris can cause equipment failure. Cover all equipment before drilling to prevent entry of metal shavings.*

Inserts

Pre-printed labels for the lamps are located on a removable insert. The Annunciator is shipped with pre-printed NFPA 110 inserts for English and Spanish. To create your own custom insert, turn the English or Spanish insert over and label each lamp line individually. Place insert completely into slot at top of Annunciator.

Appendix C contains instructions for creating a custom insert using Microsoft Word.

The wide blank label at the bottom of the insert allows for identifying the Genset and/or ATS being monitored.

LOGICAL INSTALLATION

Self-Installation

Configuration

When using the self-installation method, the Annunciator is configured with switch S2 only. Switch S2 sets the *Node Address, Annunciation Set* and *Horn* operation. *Node Address* and *Annunciation Set* configuration apply only to self-installed devices.

NOTE: Lamps cannot be individually configured when self-installed.

Node Address

Each node on a self-installed network must have a unique address. Switches 1 through 4 of S2 are used to set the *Node Address* of the Annunciator.

The switches are oriented so that switch S2-1 is the most significant bit (MSB) of the *Node Address.* Thus, S2-1 has a value of "8" when it is ON. S2-2 has a value of 4, S2-3 has a value of 2, and S2-4 has a value of 1.

Example: To set up a *Node Address* of 3, set switch node configuration switch S2 as follows: S2-1 OFF, S2-2 OFF, S2-3 ON and S2-4 ON (binary setting 0011=0+0+2+1=3 decimal). See Figure 6 and Table 2.

TABLE 2. SETTING THE NODE ADDRESS (S2-1–4)

S2-1 (8)	S2-2 (4)	S2-3 (2)	S2-4 (1)	Address (binary)	Address (decimal)
OFF	OFF	OFF	OFF	0000	0[1]
OFF	OFF	OFF	ON	0001	1
OFF	OFF	ON	OFF	0010	2
OFF	OFF	ON	ON	0011	3
				↓	↓
ON	ON	ON	ON	1111	15

Note 1: "0" (zero) is not a valid Address.

Be sure to assign each node in the network a unique address. The *Node Address* can be verified by counting the number of pulses of the "OK" LED (DS22). See Figure 6.
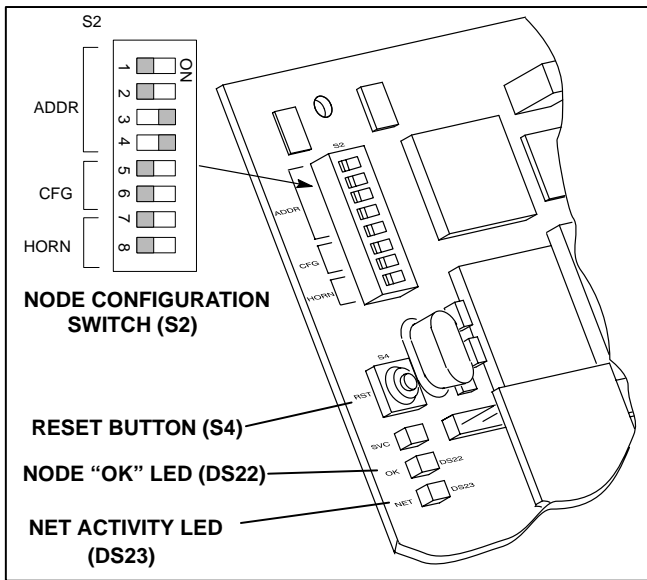
FIGURE 6. ANNUNCIATOR SWITCHES AND LED'S (EXAMPLE OF NODE ADDRESS = 3)

NODE CONFIGURATION SWITCH (S2)

RESET BUTTON (S4)

NODE "OK" LED (DS22)

NET ACTIVITY LED (DS23)

NOTE: If the Annunciator is installed using LonMaker, switches S2-1 thru S2-4 have no bearing on the Node Address.

Annunciation Set

For self-installation, the LONWORKS System Annunciator may be configured for 1 of 4 Annunciations Sets: *NFPA 110, Genset Extended* or *Genset Custom, ATS Extended*. Up to 4 Annunciators may be self-installed without requiring LonMaker. However, each Annunciator must be configured for a different *Annunciation Set* (*NFPA 110, Genset Extended, Genset Custom or ATS Extended*). See the table below to configure switches S2-5 and S2-6.

Appendix B shows the contents of each Annunciator Set.

TABLE 3. SETTING THE ANNUNCIATION SET

S2-5	S2-6	ANNUNCIATION SET	CONFIG. VALUE*
OFF	OFF	NFPA 110	1
OFF	ON	Genset Extended	2
ON	OFF	Genset Custom	3
ON	ON	ATS Extended	4

*Note: Annunciation Set Configuration flashes out the value shown at the end of the Lamp Test. Refer to *Appendix B* to see annunciation set functions.

When changing the desired *Annunciation Set*, re-bind to the Genset and/or ATS to the network. See *Binding*.

Lamps

The lamps are <u>not</u> configurable when the Annunciator is self-installed. They are fixed based on the Annunciator Set chosen. See *Appendix A* for default lamp configurations.

Horn

Switch S2-7 enables the horn. If enabled, switch S2-8 is used to control the horn volume. The horn settings take place immediately and the node does not have to be reset.

TABLE 4. HORN SETTINGS

S2-7	S2-8	HORN
OFF	X	Disabled
ON	OFF	Enabled – *Soft*
ON	ON	Enabled – *Loud*

Binding

After configuring S2 as desired and the Annunciator is *physically* connected to the Genset and/or ATS, the Annunciator is ready to be *logically* connected to a Genset and/or ATS. Logically connecting to another device is referred to as *binding*. Binding may be done at any time after all nodes are installed, connected, and powered.

1. Make sure the Annunciator, Genset and/or ATS LONWORKS modules are all powered and all are connected to the twisted-pair data bus.

2. Make sure S2-5 and S2-6 are configured for the desired Annunciation. Each Annunciator on the network must be configured differently.

3. Install the front panel assembly into enclosure or panel.

4. The front panel *Network Status* lamp should be on (amber) indicating it is powered but not bound.

5. Press and hold the *Silence/Lamp Test* button until the *Network Status* lamp begins flashing (amber).

6. Release the *Silence/Lamp Test* button.

At this time, the Annunciator will self-install and bind to the Genset and/or ATS. If it is able to bind to either a Genset or ATS, the *Network Status* lamp turns green. If no Genset or ATS devices are detected, the lamp remains amber. If lamp remains amber, verify data connections to Genset and/or ATS.

NOTE: The Genset and ATS must be LonMark devices that are able to self-install in the network. Each device on the network must have a unique address.

LonMaker Installation

The LonWorks System Annunciator can be installed with LonMaker. Network Module Library v1.50 or later is required. To install with LonMaker:

1. Install Module Library.

2. Create a new site (or update an existing site).

3. Run **LonMaker**. Refer to the *PowerCommand Network Installation and Operator's Manual* (900-0366).

4. Define, install and bind devices.

   NOTE: When defining devices "Set Config NVs" must be "yes."

5. Verify system operation.

The Annunciator is defined and installed like any other device in LonMaker where:

Device Type: "annunciator"
Set Config NVs: "Yes"

TABLE 5. NETWORK VARIABLES WITH TYPICAL SYSTEM BINDINGS

NETWORK VARIABLE	TYPE	LAMP(S)	TYPICAL BINDINGS	
			GENSET	ATS
nviRemoteAnnun1	unsigned long	1 ... 16	*nvoRemoteAnnun1*	
nvi16PointAnnunA	SNVT_state	1 ... 16	*nvoAnnunNFPA110* *nvoAnnunExtended* *nvoAnnunCustom*	*nvoAnnunExtended*
nvi16PointAnnunB	SNVT_state	1 ... 16		*nvoAnnunNFPA110*
nvi8PointAnnunA *nvi8PointAnnunB*	SNVT_state	1 ... 8 9 ... 16	*nvoAnnun8Point*	*nvoAnnun8Point*
nvi4PointAnnunA *nvi4PointAnnunB* *nvi4PointAnnunC* *nvi4PointAnnunD* *nvi4PointAnnunE*	SNVT_state	1 ... 4 5 ... 7 9 ... 12 13 ... 16 17 ... 20	*nvoAnnun4Point*	*nvoAnnun4Point*
nviLamp [0 ... 20]*	SNVT_switch	1 ... 20	*nvoCustomStatus [0 ... 7]* *nvoFaultStatus* *nvoNotInAuto* *nvoRunStatus*	*nvoFaultStatus* *nvoNotInAuto* *nvoSrc1Available* *nvoSrc1Connected* *nvoSrc2Available* *nvoSrc2Connected* *nvoTestStatus*

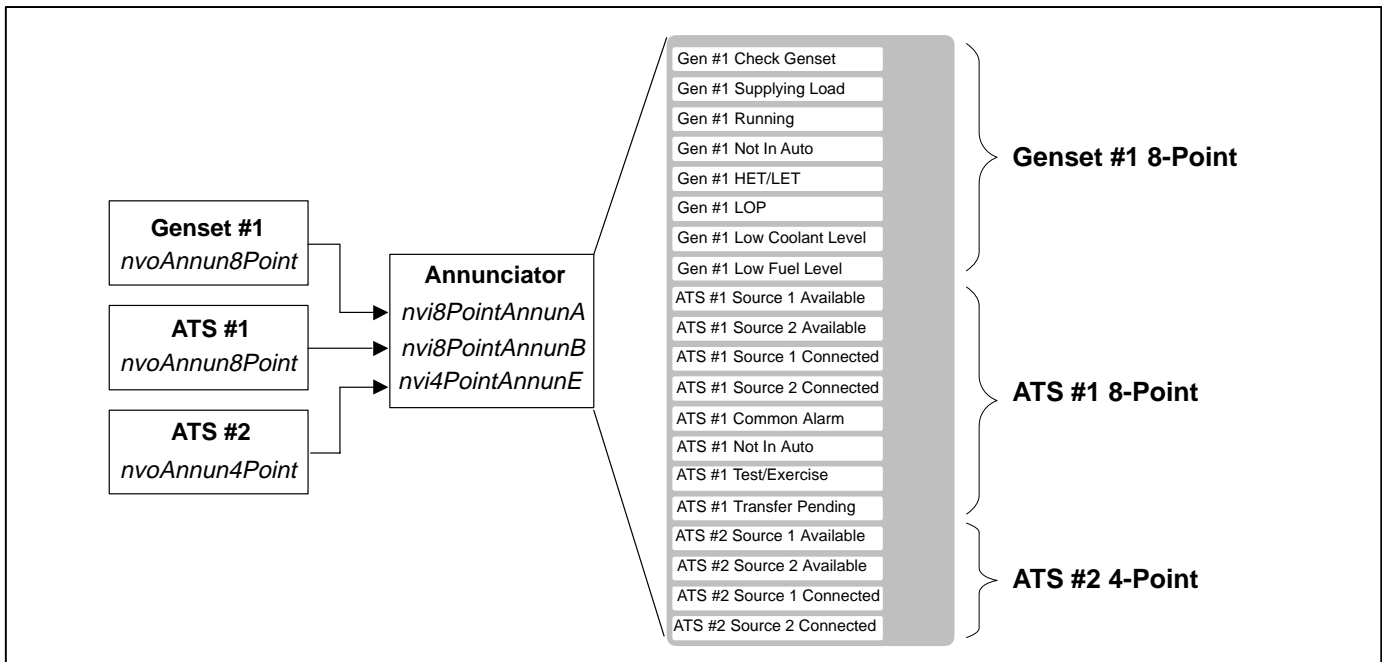*Note1 nviLamp o is not used

Power Generation

FIGURE 7. EXAMPLE SYSTEM BINDINGS

Network Variables

The Annunciator lamps may be controlled in a number of ways. They may be individually controlled with one binding for one lamp or they may be controlled in groups of 16, 8, or 4. The following table shows possible bindings to the various Annunciator inputs. Any combination may be used.

Example

A single annunciator is used to show the status of 2 Gensets and the source status of an ATS. Using LonMaker, the bindings shown in Figure 7 could be made to accomplish this.

Configuration

When the Annunciator is installed with LonMaker, only the lamps and horn may be configured. Lon-Maker assigns the *Node Address*, and the *Annunciation Set* is set by binding Annunciator inputs. The horn is configured using switch S2-7 and S2-8.

Status Lamps

The 20 Status lamps may be individually configured using the network variable input *nciLampConfig*. The lamps may be configured for *color*, *horn,* and *flash* (Table 6). In LonMaker, to change a lamp's configuration:

1. Select "Control" button from left toolbar.

2. Select "Data" (F9) from the bottom toolbar.

3. Set the input *nviMfgTest* = 6 to turn all lamps on in their configured state. This enables viewing the lamps as they are being configured.

4. Under Inputs, scroll to "nciLampConfig" and select "Modify" (F2).

5. Select "lamp" field and select "Modify" (F2). See Figure 8.

6. Enter the lamp number to configure lamps 1 ... 20 and press "Done" (F10).

7. In the same manner, modify the *color*, *horn,* and *flash* fields as desired. (See Table 6.)

8. Select "Done" (F10) to activate changes.

9. After configuration, reset the node to resume normal operation.

Changes will take effect immediately. The *Network Status* lamp can not be configured.

TABLE 6. ANNUNCIATOR LAMP SETTINGS

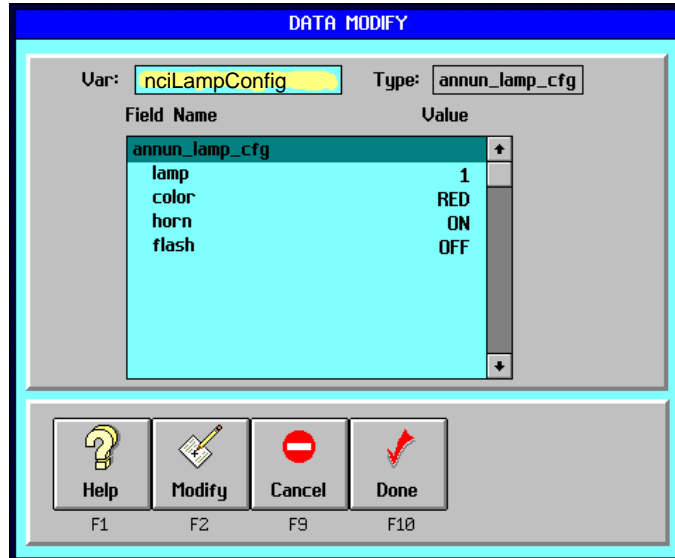| nciLampConfig	RANGE	DESCRIPTION
lamp	1 ... 20	Selects lamp to configure
color	GREEN, RED, AMBER	Selects lamp color
horn	OFF, ON	ON – Activates horn with lamp
flash	OFF, ON	ON – Flashes lamp when activated (1 Hz)

FIGURE 8. CONFIGURING ANNUNCIATOR LAMPS IN LONMAKER

Operation

Status Lamps

A lamp that is steady-on green or steady-on amber with no alarm indicates normal operation. Amber lamps with a sounding alarm are alerting to potential problems with the Genset. Steady-on or flashing red lamps with an alarm indicate a problem with the Genset or ATS that requires immediate attention.

Horn

Switch S2-7 enables the horn. If enabled, switch S2-8 is used to control the horn volume. The horn settings take place immediately and the node does not have to be reset.

TABLE 7. HORN SETTINGS

S2-7	S2-8	HORN
OFF	X	Disabled
ON	OFF	Enabled – *Soft*
ON	ON	Enabled – *Loud*

Silence/Lamp Test

The *Silence/Lamp Test* button on the front panel may be used to:

- Silence an alarm
- Test the lamps

If the horn is on, pressing the *Silence/Lamp Test* button will silence the horn. The horn will not turn on again until another alarm condition is present.

When the horn is off, pressing the *Silence/Lamp Test* button triggers a lamp test in which the annunciator cycles all lamps (green, red, amber) On and Off (500ms each); then returns to normal operation.

NOTE: When self-installed, the *Silence/Lamp Test* button is used to initiate the "Binding" process. Refer to page 8.

Network Status Lamp

The front panel *Network Status* lamp indicates the status of communications with all devices "bound" to the Annunciator. If communications have failed at any input, the *Network Status* lamp flashes red and the horn will activate (if enabled). The lamp remains flashing red until communication with all devices has been restored.

The *Network Activity* LED (DS23) pulses whenever an update has been received by the Annunciator. When the Annunciator is bound, the *Network Activity* LED pulses regularly, indicating that updates are being received from the network. The location of DS23 is shown in Figure 6.

TABLE 8. NETWORK STATUS LAMP INDICATIONS

NETWORK STATUS LAMP	INDICATION
Off	No power or unit failure.
Amber	No inputs are "bound".
Green	Annunciator is "bound" and all inputs are functioning normal.
Red – Flashing	Annunciator is "bound" but at least one device is not communicating.

Power Generation

Troubleshooting

⚠WARNING *Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of high voltage power generating systems should perform service procedures.*

PRE-CHECKS

Annunciator

Verify that the power supply voltage is between 8 and 30 VDC at the network annunciator terminal strip J1. Refer to Figure 5 for wiring connection information.

Reset the node to make sure selections have been activated (S4).

Verify the "OK" LED (DS22) is flashing at 1 Hz. (If self-installed it will flash the *Node Address*.)

If bound, verify the "NET" LED (DS23) flashes periodically.

Verify the horn is configured as desired.

Installation

Verify each device on the network has a unique *Node Address* by counting pulses of the "OK" LED.

Verify the correct *Annunciation Set* has been selected (S2-5 and S2-6).

Verify Annunciator is bound. The *Network Status* lamp is green when bound. Press and hold the *Silence/Lamp Test* button for 2 seconds to bind or rebind.

Network

Verify power at each device (varies by device).

Verify data bus is securely connected at each device and **only** the ends of data bus are terminated.

Verify the data bus topology is "Multi-drop Bus" and "stubs" are less than 10 feet (3m) long. Verify overall network does not exceed 4600 feet (1402m) per channel.

Verify that each end of the network is terminated.

TROUBLESHOOTING

Status Lamps

Some or all lamps fail to light:

– Verify power to node is acceptable.

– Verify *Node Status* lamp is green. (Indicates all bindings are functioning).

– Verify node is reinstalled after changing *Annunciation Set*.

– Verify correct *Annunciation Set* (self-installation only) has been selected. Annunciation Set Configuration flashes out the value shown at the end of the Lamp Test (refer to Table 3).

Lamps are wrong color:

– If self-installed, lamp color cannot be changed.

– If installed using LonMaker, configure lamp as desired using *nciLampConfig*.

Network Status Lamp

Off

– Node has no power or has failed.

Amber

– Node has power but is not bound. Bind Annunciator, either with LonMaker or *Silence/Lamp Test* button.

Flashing Red

– Communications to at least one input has failed.

– Verify "NET ACTIVITY LED" (DS23) is pulsing about once every 5 seconds.

– Verify all external devices are powered and connected.

– If an external device has been replaced or removed from the system, re-bind the Annunciator.

Silence/Lamp Test Button

Lamp Test occurs each time the generator starts:

– Input voltage is dropping below 8 VDC, causing the Lamp Test. This is normal operation and no corrective action is required.

Lamp Test fails to complete:

– Annunciator is too far from power source. Decrease distance or increase gauge of power wiring.

Lamp Test fails to sound horn:

– Verify the horn is enabled (S2-7).

Cannot silence or run Lamp Test:

– Verify ribbon cable to J3 of PCB is connected. Short leads of J3 to test. If fails, replace the Annunciator.

Horn

Horn is off when lamp lights

– Verify the horn is enabled (S2-7).

– If self-installed, individual horn settings are not configurable.

– If installed with LonMaker, configure lamp as desired using *nciLampConfig*.

Horn is too loud/soft:

– Verify the horn volume is set as desired (S2-8).

LonMaker

Cannot communicate after installing:

– Make sure "Set Config NVs" in *Device Setup* is "Yes."

Cannot view lamp configuration:

– Set *nviMfgTest* = 6 to activate all *Status* lamps in their configured state.
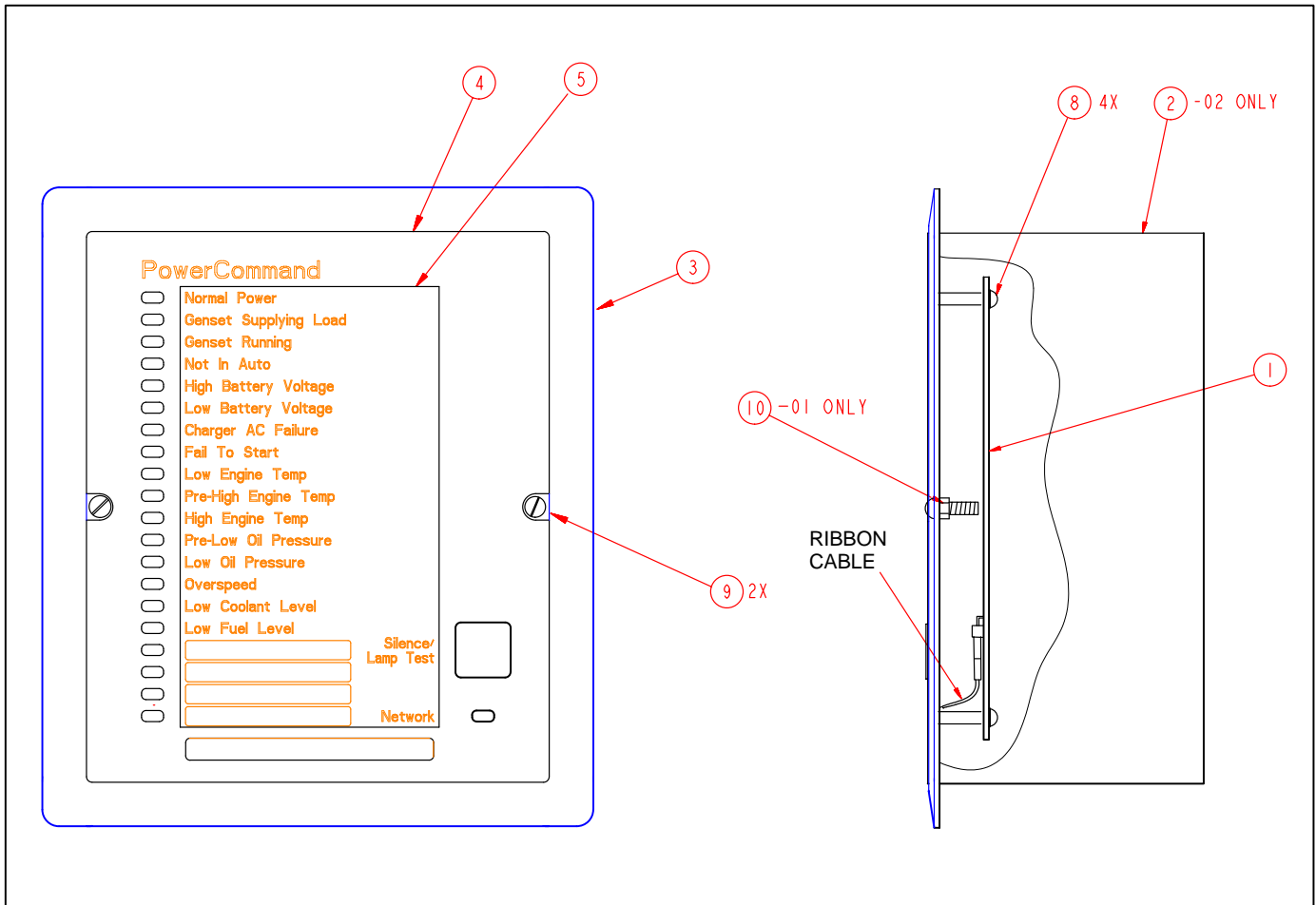
Parts Information

FIGURE 9 ANNUNCIATOR ASSY. 300–5318

REF NO.	PART NO.	QTY USED	PART DESCRIPTION	REF NO.	PART NO.	QTY USED	PART DESCRIPTION
	300–5319–01	1	Kit, Annunciator; Panel Mount	3	319–4182-02	1	Panel, Face Plate
	300–5319–02	1	Kit, Annunciator; Enclosed	4	300–5338	1	Panel, Membrane
	300–5318-01	1	Annunciator Assy., Panel Mount	5	326–5413-01	1	Insert, NFPA 110, English
				5	326–5413-02	1	Insert, NFPA 110, Spanish
	300–5318-02	1	Annunciator Assy., Enclosure Mount	8	815–0947	4	Screw PRHMS; M3 x 1/2 x 10
1	300–5317	1	PCB, Annunciator Assy.	9	822–2160-12	2	Screw, Blk, 6–32 x 1/2
2	301–3090	1	Control Box (-02 only)	10	870–0183	2	Nut, Hex; 6–32 (-01 only)

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Power
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