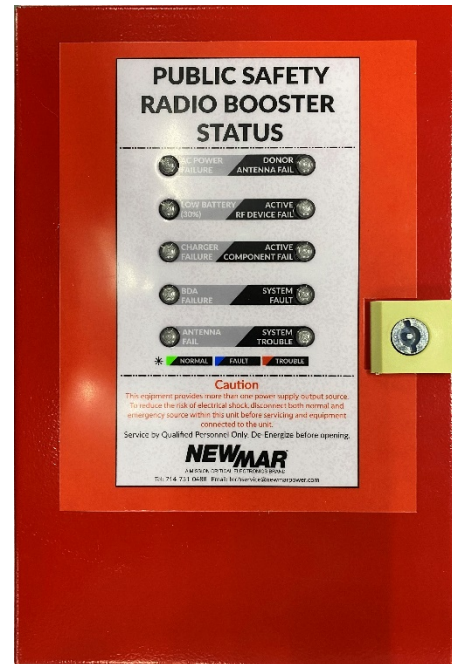


AP8000C

Annunciator for Public Safety Radio Booster

- *Designed to Monitor NFPA 72 IDC Circuits*
- *NEMA 4X Enclosure*
- *DC Power 10 to 58 VDC*
- *Optional Automatic Internal 12VDC Battery Backup*
- *Monitors up to 8 Closed Contacts and wiring for Trouble (Alarm) and Fault (Open or Ground).*
- *2 System Circuits for Any Trouble or Any Fault*
- *10 Form C Relays to Connect to Fire Alarm Panel, Including System Fault and System Trouble*
- *10 Bright LEDs Indicate Status*
- *Audible Alarm with Mute/Unmute*
- *24-hour Automatic Unmute*
- *3 Year DuraComm Warranty*



***NOTE: Specifications are subject to change without notice.**

Description

The DuraComm Annunciator provides visual and audible alarms at the installed location of a Public Safety Radio Booster in an Emergency In-Building Radio system. This annunciator is designed to monitor NFPA 72 IDC (**Initiating Device Circuit**) wiring for **Trouble (Alarm)** and **Fault (Open or Ground)** and report the status to a Fire alarm panel via Form C relay contacts. The power input is 10-58 VDC with an optional internal 12 Volt 12-hour backup battery. An audible alarm will sound when a fault or trouble alarm is triggered. The Alarm can be manually muted until a normal condition is restored, or until a 24-hour unmute occurs. Audible alarm Mute and Unmute are located inside of the enclosure on the PCB for better security.

The DuraComm Annunciator comes with a 3-year warranty.

Simplified Theory of Supervising IDC Wiring

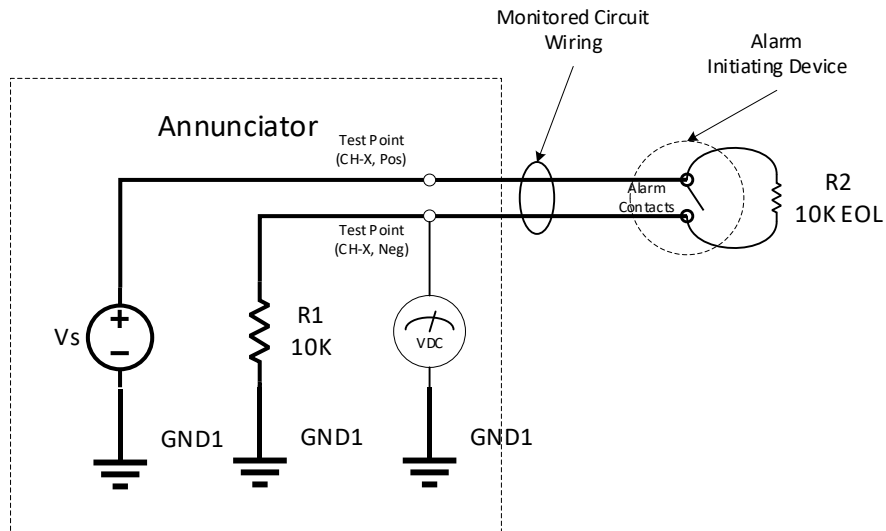


Figure 1: Simplified Circuit for IDC Management

The EOL (End-Of-Line) Resistor must be placed at the Alarm Initiating Device to detect open circuits in the wiring.

A normal circuit divides the test point positive voltage (V_s) in half since the test current passes through two 10K resistors in series. The test point voltage will be $V_s * (R_2 / (R_1 + R_2))$ or $V_s / 2$. This produces a GREEN LED.

A trouble alarm switch closure will short out the EOL resistor, and the full V_s voltage will be applied to the test point (across R_1 only), so the test point voltage will be equal to V_s . This produces a RED LED.

A Single Fault (broken wire or one of the wires is shorted to GND1) will produce a test point voltage of Zero (0) volts.

Both wires shorted to GND1 will produce a Fault since the test point voltage will be Zero. Faults are reported with a BLUE LED.

If both wires are shorted to any other conductive material that is isolated from GND1, it will produce the same result as a Trouble alarm since this will short the alarm circuit wires together, and the test point voltage will be equal to V_s .

DuraComm Annunciator Operation basics

The input power is supplied to connectors J112. 10-58 VDC, or J113 10 to 15 VDC for battery (intended for 12 VDC battery with separate charger). These voltages are combined with two diodes and the highest voltage automatically is used to power the board.

The input voltage is converted to 5V to power the 24-hour timer circuit, and power the isolated 12V circuit for the supervised alarm circuits, CH1-CH8.

The Full Test Point Voltage for the DuraComm Annunciator is reduced by the internal current limiter for each circuit (10ma for each channel CH1 to CH8). The voltage drop is minimal for a normal state, trouble alarm, open circuit fault, or test point short to GND1. If the test point positive wire is shorted to GND1, the current limiter drops all the V_s voltage across itself, and limits the current to 10ma to protect V_s .

For CH1 to CH8 the internal V_s is 12VDC, and the Test Point Positive voltage is approximately 11.5 VDC for normal operation, and the measured test point voltage is approximately 5.7 VDC.

The 12 VDC and 5 VDC supplies are isolated from each other and from earth ground. A single short to earth ground doesn't cause any faults because it will not interfere with any trouble alarms.

The Audible alarm automatically sounds at the same rate as the flashing RED or Blue LEDs (about once per second). The audible alarm is automatically cancelled when no alarms or faults are active. The Audible alarm can be manually muted or unmuted by a button located inside the annunciator door for security. **The audible alarm cannot be muted unless there is an active alarm or fault.**

Section 1 | Important Safety Instructions

These instructions are intended for use by a technician familiar with electronic products.

WARNING: There are no user serviceable parts inside. High voltage may be present. Service must be referred to qualified factory personnel.

NOTE: The individual user should take care to determine prior to use or installation whether this device is suitable, adequate, and safe for the use intended. Since individual applications are subject to numerous variations, DuraComm makes no representation or warranty as to the merchantability, suitability, or fitness of these units for any specific application.

Section 2 | Installation

Conductor Pretreatment

All kinds of copper conductors can be clamped without treatment. DO NOT solder tin stranded conductors. The solder yields and fractures under high pressure. The result is increased contact resistance and excessive temperature rise. Additionally, corrosion has been observed due to the fluxes. Notch fractures at the transition from the rigid tinned part to the flexible conductors are also possible. Ferrules can be used as a protection when wiring stranded conductors. Copper ferrules prevent the current transfer from being influenced by dissimilar metals and remove the risk of corrosion. Always use the correct tool to crimp the ferrule.

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RECOMMENDED COPPER WIRE SIZE FOR CURRENT CAPACITY

(Insulated Wire, Single Conductor in free air)

<u>Current Level in Amperes</u>	<u>Wire Size</u>
<7 AMPERES	20 AWG Up to 5 feet 18 AWG Up to 10 feet
14 AMPERES	18 AWG Up to 5 feet 16 AWG Up to 10 feet
20 AMPERES	16 AWG Up to 5 feet 14 AWG Up to 10 feet
30 AMPERES	14 AWG Up to 5 feet 12 AWG Up to 10 feet
40 AMPERES	12 AWG Up to 5 feet 10 AWG Up to 10 feet
50 AMPERES	10 AWG Up to 5 feet 8 AWG Up to 10 feet
70 AMPERES	8 AWG Up to 5 feet 6 AWG Up to 10 feet
100 AMPERES	6 AWG Up to 5 feet 4 AWG Up to 10 feet

Annunciator quick Install

The following procedure assumes that the annunciator has been mounted in position as well as wiring for power, equipment, and fire alarm panel are all properly installed according to all applicable standards prior to the following installation procedure annunciator.

1. Connect earth ground to annunciator chassis. (Do not connect to PCB 5V or 12V ground)
2. Verify Standard Configuration of annunciator for fire alarms. See Figure 2
3. Verify all IDCs have 10Kohm EOL installed across Normally Open alarm contacts. See Figure 5
4. Verify all IDCs measure 10Kohms (No Alarms) using ohm meter from annunciator end. See Figure 5
5. Connect alarms (alarm on close) to each channel + and TP on connectors J110 and J111. See Figure 4 and Figure 5.
6. Install 10Kohm EOL on channels that are not used for alarms. See Figure 4 and Figure 5
7. Apply Power to J112 (10-58VDC). Verify 5v and 12V power LEDs are on. See Figure 3
8. Verify all Channels GREEN, including System Channels (Front of Annunciator Door).
9. Remove Power from J112. See Figure 3.
10. Install wiring to Fire Alarm Panel from connectors J105 to J109. See Figure 6 and Figure 7.
11. Install Fire Alarm panel EOLs on Connectors J700_CH1 to J700_CH8 (between COM and NO connections). See Figure 6 and Figure 7.
12. Restore Power to J112. See Figure 3.
13. Verify all Alarms are OFF and All LEDs are Green on the front of the Annunciator.

Annunciator quick test

14. Test Each alarm circuit for closed and Open contacts to verify operating properly. RED alarm LED should flash ON and OFF approximately once per second when alarm is active. Audible alarm should sound for any non-green condition. Press MUTE Button when alarm is sounding to silence alarm for 24 hours (see Figure 10). Green LED next to UNMUTE button will turn on when audible alarm is muted (see Figure 3). Press UNMUTE to re-enable audible alarm. Correcting the alarm condition for all channels will also cancel the audible alarm. Each time MUTE is activated, the 24-hour UNMUTE is reset.
15. Test for disconnected IDC (BLUE LEDs) on CH1-CH8 by pulling the plugs off J110 and J111. System Fault LED should be BLUE, and Fire Alarm should report Alarm on System Fault connection.
16. Restore all equipment connections to normal operating condition.

Factory Hardware Configuration Jumpers/Switches for Fire Alarm Operation

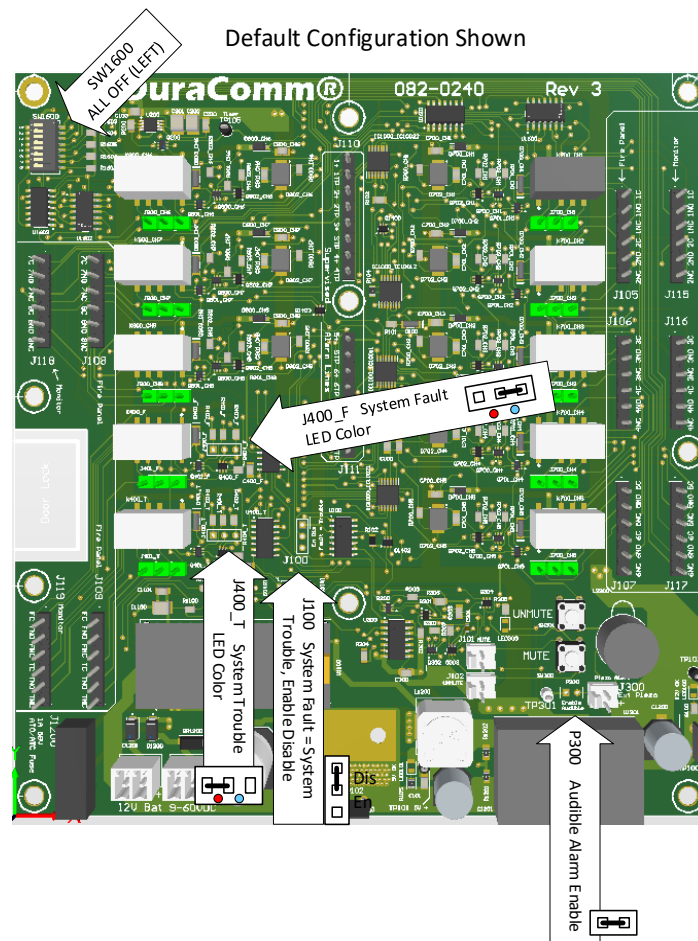


Figure 2: Factory Hardware Configuration

Confirm all jumpers and switches are set as shown here, unless you have made intentional changes for optional functionality.

SW1600 switches should all be off, or toward the edge of the board.

J400_F System Fault LED color should be set for BLUE (jumper on right two pins).

J400_T System Trouble LED color should be set for RED (jumper on left two pins).

J100 System Fault = System Trouble should be set to disable (top two pins jumpered).

P300 Audible alarm enable should be jumpered.

Test Points and LEDs

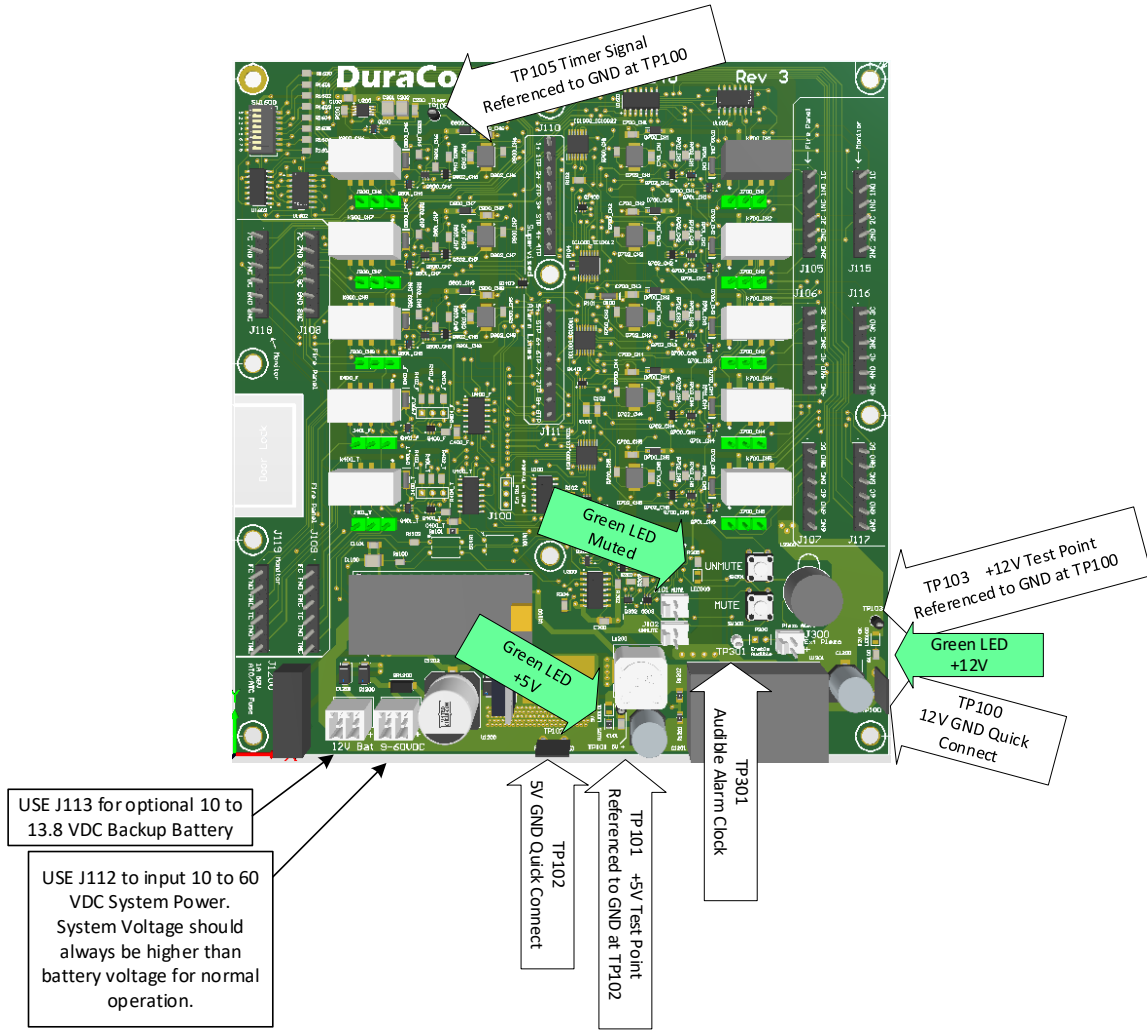


Figure 3: Test Points and LEDs

Supervised Alarm IDC Wiring Connections to Equipment

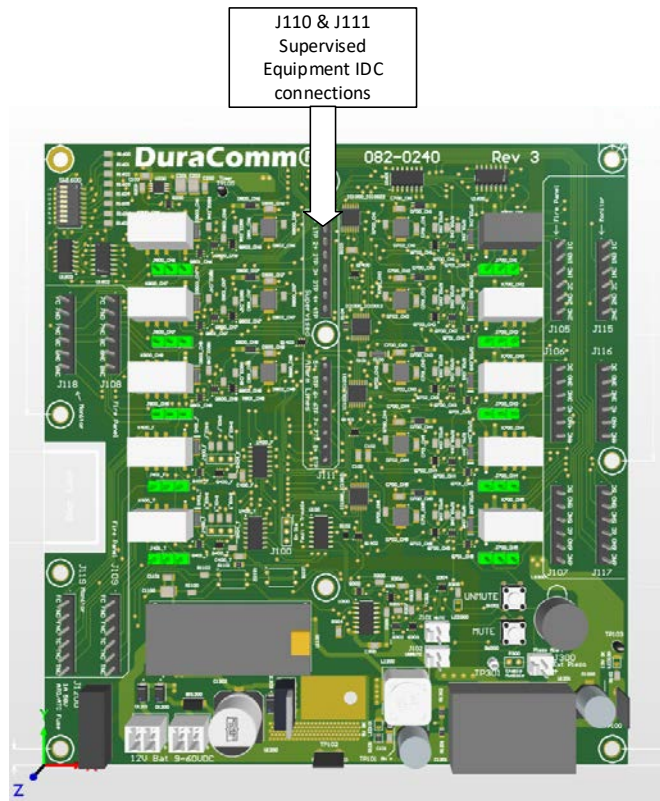


Figure 4: Supervised Equipment Wiring

J110 and J111 have two positions for each of the 8 supervised lines to the equipment alarm contacts. The annunciator channel assumes the contacts are normally open for a non-trouble (non-alarm) situation in a fire alarm circuit. 10 Kohm EOL resistors should be used at the equipment termination end for channels 1-8.

Channels 1 through 8 are floating relative to earth ground due to an isolated 12VDC power supply module, and normal operation is not affected when either the high or low side of any channel has a short to earth ground. If both lines (Supply voltage and test point) are shorted to earth ground, the result is a short across the wires, like an alarm contact, so it will show a Trouble alarm (RED light). Multiple ground faults across multiple channels could cause unpredictable results.

If, for some strange reason the test point supply or test point are shorted to the internal ground (single short) it will show a fault (blue light).

NOTE: A fault condition prevents the alarm contacts from being detected by the annunciator!

Supervised Alarm IDC Wiring Connections to Equipment

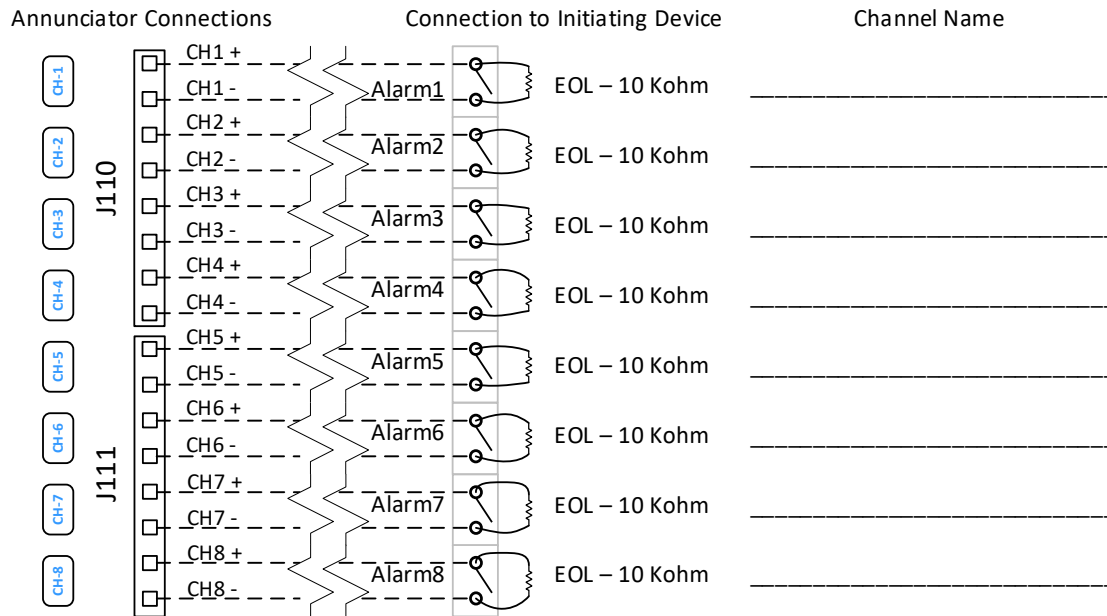


Figure 5: Wiring for Supervised IDC Alarm Connections

Fire Alarm Panel Form C and

Fire Alarm Panel Connections

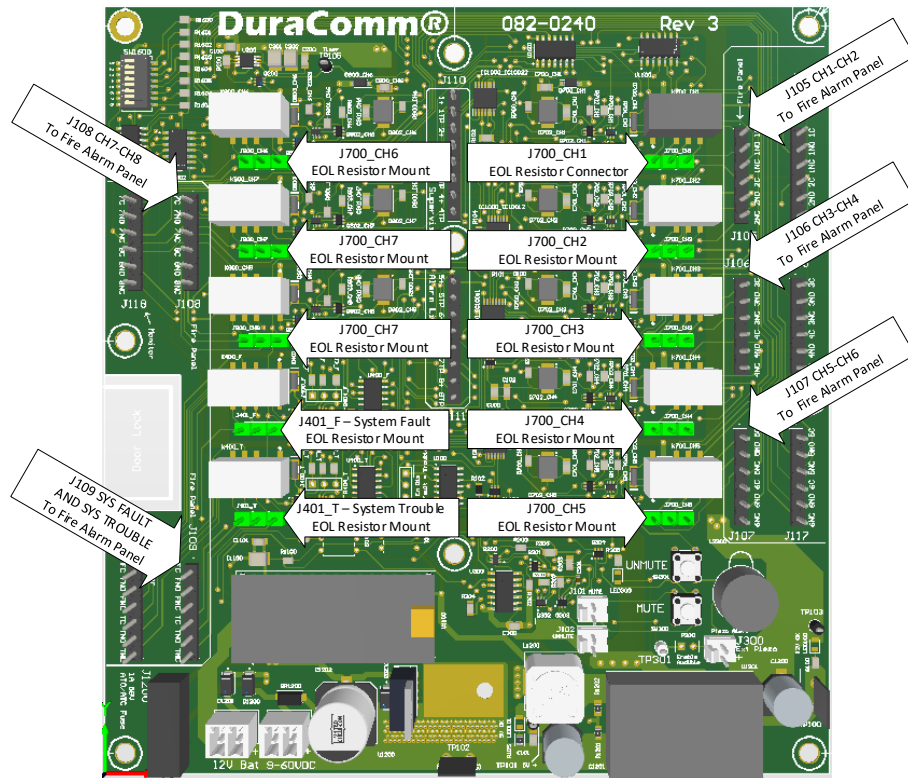


Figure 6: Fire Alarm Panel Connections and On-Board EOLs for Fire Alarm Connections

J105 through J109 connect to the Fire Alarm Panel (FAP) with Form C relay contacts. The separate EOL connector allows the FAP to detect when there is a bad connection to the annunciator board or when the connector is accidentally not replaced on the annunciator connector. Full FORM C connections are available for 8 channels, a system fault channel, and a system trouble (alarm) channel.

Fire Alarm Panel Connections

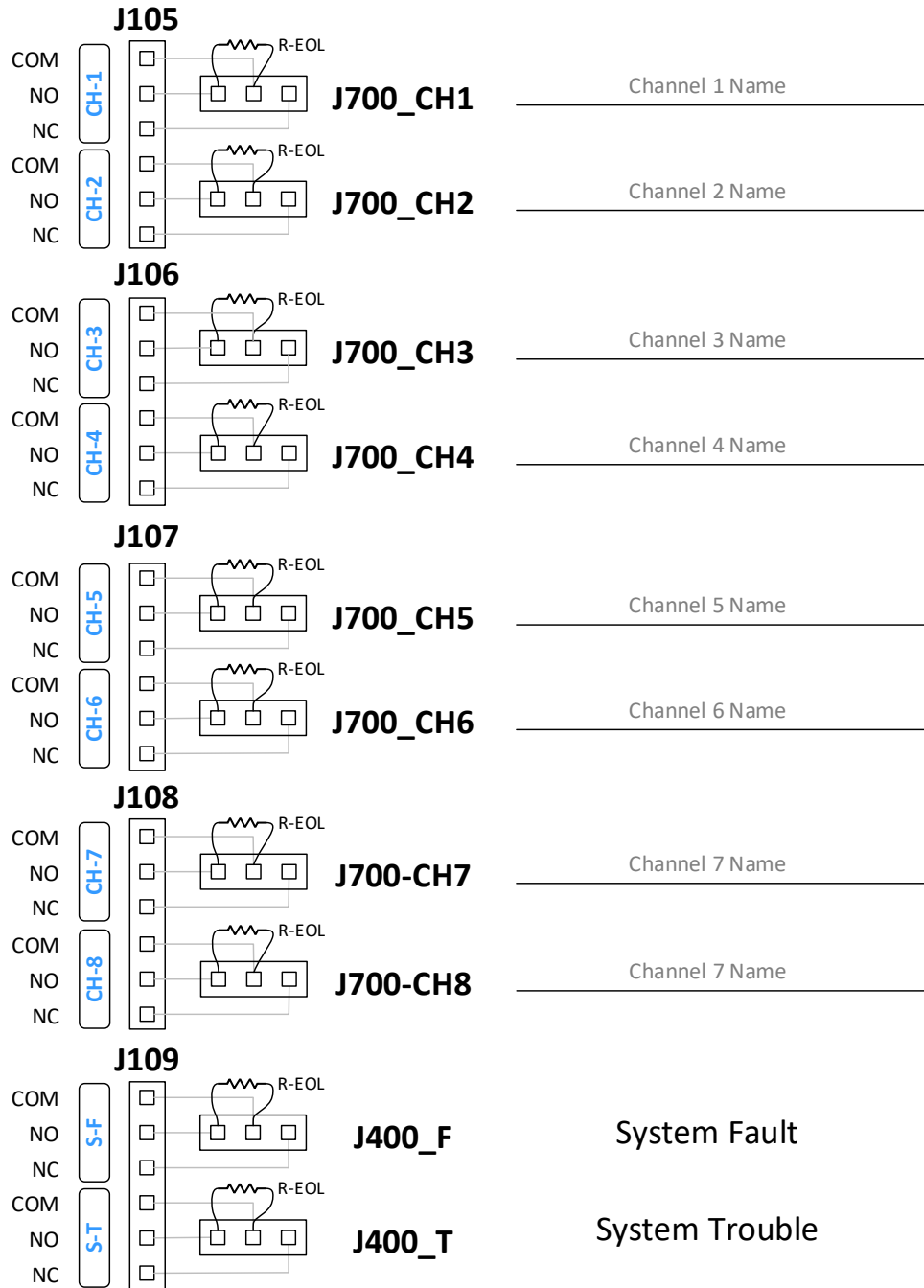


Figure 7: Fire Alarm Panel Connections

Annunciator Status Table

Factory Fire Alarm Configuration: Individual Channel Behavior

Channel Supervised Input	Condition	LED	Audible	Fire Alarm Connector COM-NO	Monitor Connector COM-NO
CH1-8	OPEN (no connection)	BLUE	ON	OPEN (Fire Alarm EOL)	OPEN
	Short to ground (a)	BLUE(a)	ON(a)	OPEN(a)	OPEN(a)
	Alarm switch Closed/SHORT (across input)	RED	ON	CLOSED	CLOSED
	EOL (10K)	GREEN	OFF	OPEN(EOL)	OPEN

- a. If there is a single short to internal 12 V ground on either conductor of a channel, the channel LED will be BLUE, and the audible alarm will sound. If a single channel conductor is shorted to earth ground or any other conductor, it will have no effect on annunciator operation since the internal 12 VDC supply is isolated. If there are multiple shorts to earth ground or any other conductor, the results can be complex and unpredictable. If both wires of a supervised channel are shorted to earth ground, it will act like an alarm short, and it will report a trouble alarm (RED).

Factory Fire Alarm Configuration: System Fault and System Trouble Behavior

Channel Condition	System Fault	System Trouble	Audible	J109 Fire Alarm Connector	J119 Monitor Connector
Any Channel BLUE	BLUE	(Don't Care)	ON	FC-FNO CLOSED	FC-FNO CLOSED (NOTE PINS)
Any Channel RED	Don't Care (b)	RED	ON	TC-TNO CLOSED	TC-TNO CLOSED
All Channels Green	GREEN	GREEN	OFF	OPEN(EOL)	OPEN

- b. NOTE: If a Jumper is placed on J100 to enable FAULT=TROUBLE (pins 2 & 3), ANY BLUE LED WILL ALSO CAUSE A RED SYSTEM TROUBLE LED. See Figure 2.

Remote Monitor Connectors (Optional)

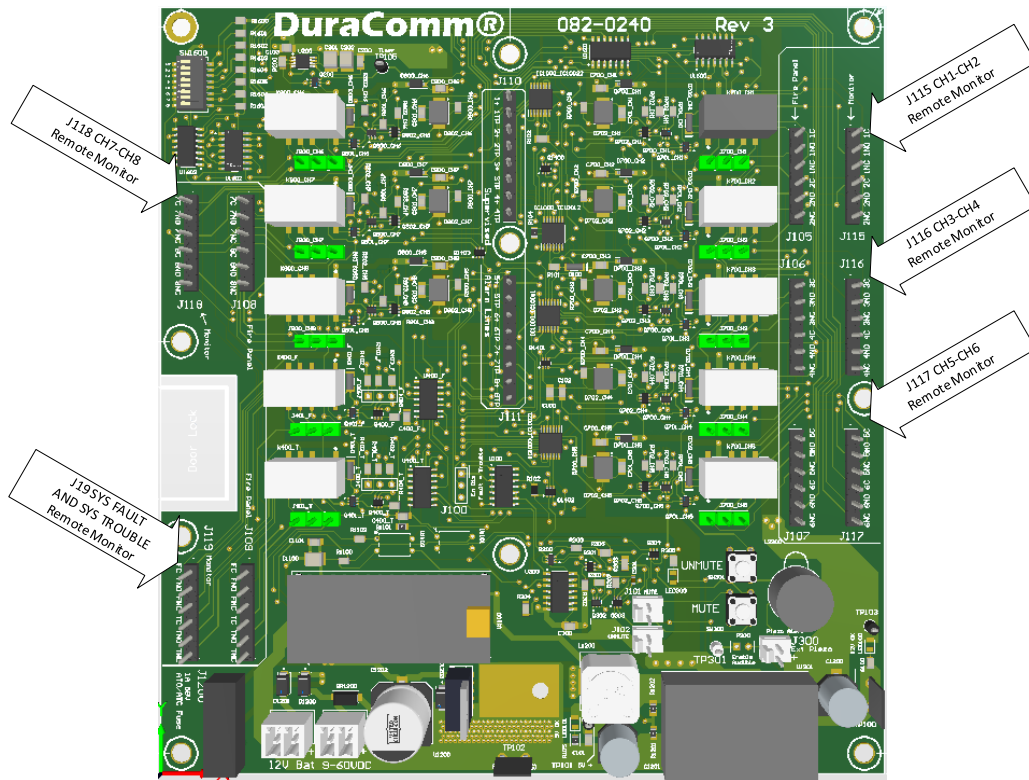


Figure 8: Optional Remote Monitor Connections

Each of the relays has two sets of Form C contacts. One set goes to the Fire Alarm panel connector and a EOL connector, and the other set goes to the remote monitor connectors, with no EOL connector.

Remote Monitor Connections

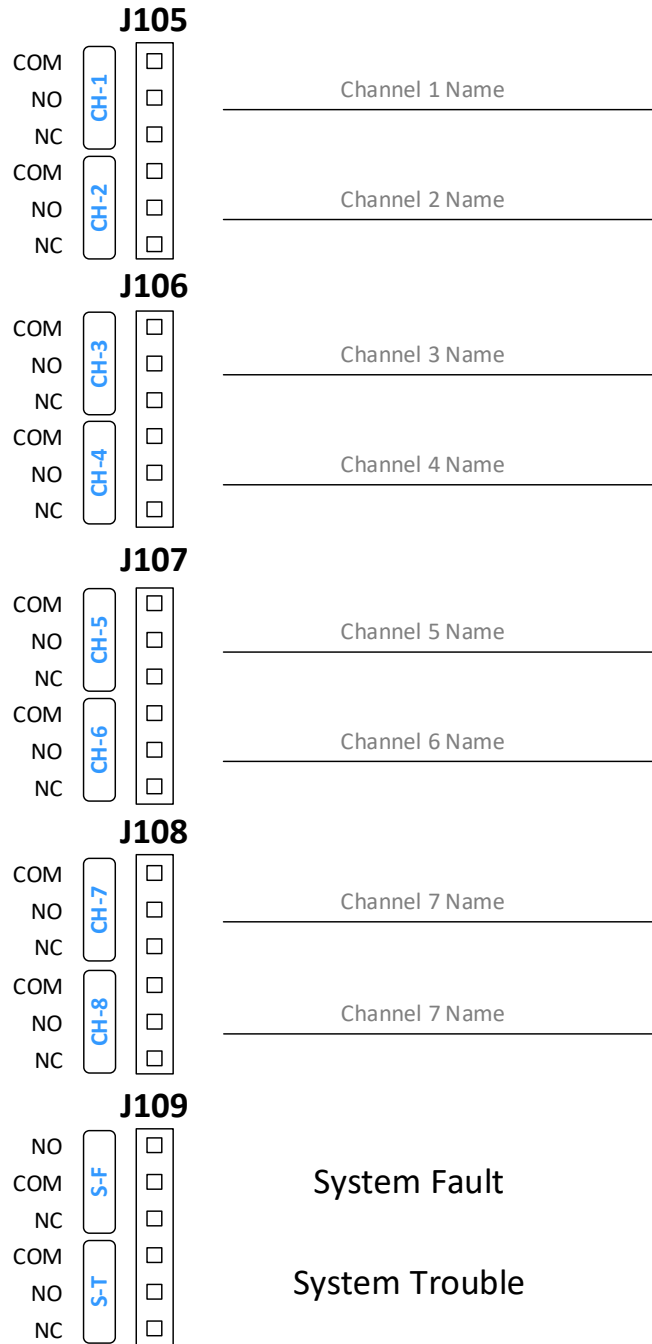


Figure 9: Fire Alarm Panel Connections

Audible Alarm Controls

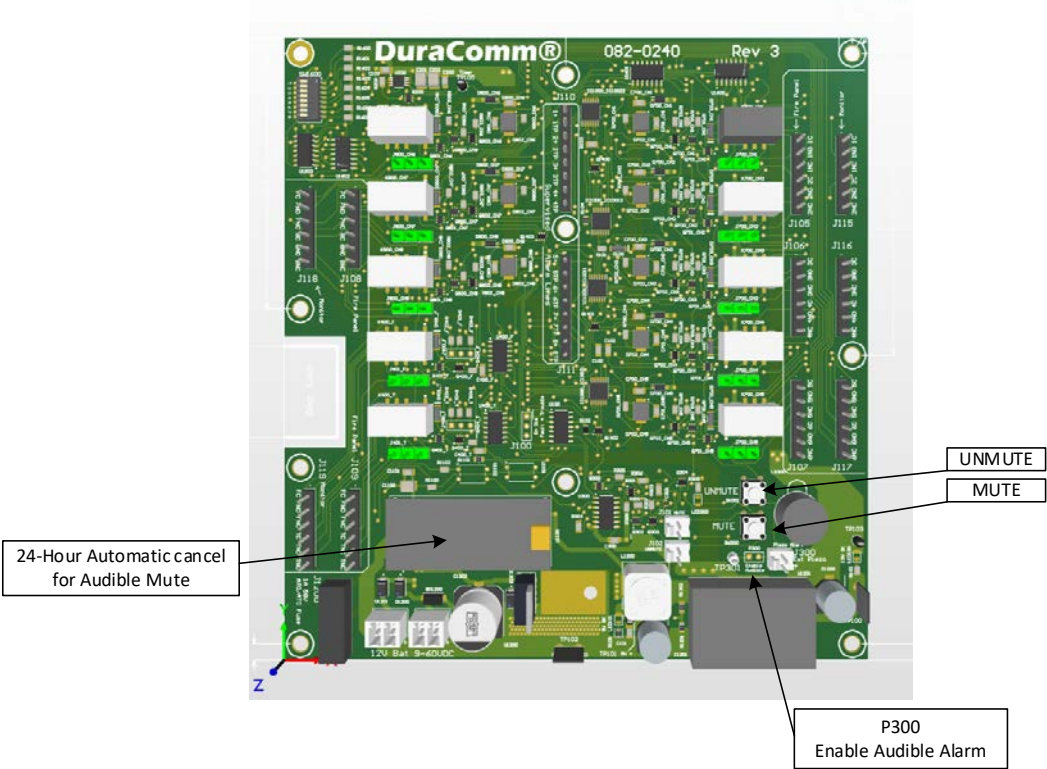


Figure 10: Audible Alarm Control

Note: Audible Alarm mute cannot be set until an alarm is active.

Optional Alarm-On-Open Function (Not for Fire Alarm Use)

Alarm-On-Open capability is typically used for burglar alarm circuits to detect when a circuit is broken. SW1600 in the upper left corner of the annunciator board (see [Figure 2](#)) can be used to configure each channel independently to operate with that capability. The factory setting for all channels is OFF or OPEN (switch towards the outside of the board). When a switch is set to ON (towards the inside of the board) the channel is set to alarm-on-open. Alarms will then operate with the faults and alarms configured for this logic.

NOTE: When set for alarm-on-open, the LED is green when the IDC is closed. Since the EOL resistor is placed across the normally closed switch, there is no assurance that the EOL is connected, or that there is no short before the alarm contacts, without periodic testing.

When SW1600 is set for alarm-on-close (factory setting for fire alarms), if the EOL is across the alarm switch, the entire circuit is confirmed when there is a green light. The alarm contacts must be tested periodically for better assurance that they will close when there is an actual alarm condition.

SPECIFICATIONS

Model : Annunciator	
Power Supply Input Voltage (1)	10 VDC - 58 VDC
Optional Battery Input (1) (Battery Not Included)	12VDC (10VDC Minimum)
Maximum Power Input	3.5 Watts
Inrush Current (typ)	1.5A
Input Fuse	1A ATO/ATC
Maximum Supervised Circuit Voltage	12.1 VDC
Maximum Supervised Circuit Current (ea)	10ma
EOL Resistor	10Kohm
Working Temperature Range (2)	-22 to 158 F (-30 C to 70 C) Edit
Storage Temperature Range (2)	-40 to 176 F (-40 C to 80 C) Edit
Product Dimensions	7.88in W x 11.82in H x 3.43in D (200mm W x 300mm H x 87mm D)
Weight	5.5 lbs.

1. Power Supply and Battery are referenced to 5V Ground on the PCB. The 5V Ground is isolated from earth ground and chassis ground, unless the power supply or battery are connected to earth ground externally. The internal 12V supply is isolated from the 5V supply and earth ground. The 12V supply is used for supervising the equipment alarm connections.
2. Optional battery and charger may decrease temperature range.

LIMITED WARRANTY-----

DuraComm warrants to the initial end user, each power supply manufactured by DuraComm to be free from defects in material and workmanship, when in normal use and service for a period of three years from the date of purchase, from an authorized DuraComm dealer.

Should a product manufactured by DuraComm fail or malfunction due to manufacturing defect, or faulty component, DuraComm, at its option, will repair or replace the faulty product or parts thereof, which, after examination by DuraComm, prove to be defective or not operational according to specifications in effect at the time of sale to the initial end user. The product that is replaced or repaired under the provisions of this warranty, will be warranted for the remainder of the original warranty period, only, and will not extend into a new three year warranty period.

The limited warranty does not extend to any DuraComm product which has been subject to misuse, accidental damage, neglect, incorrect wiring not associated with manufacture, improper charging voltages, or any product which has had the serial number removed, altered, defaced, or changed in any way.

DuraComm reserves the right to change, alter, or improve the specifications of its products at any time, and by so doing, incurs no obligation to install or retrofit any such changes or improvements in or on products manufactured prior to inclusion of such changes.

DuraComm requires any product needing in or out of warranty service to be returned to DuraComm. All requests for warranty service must be accompanied by proof of purchase, such as bill of sale with purchase date identified. DuraComm is not responsible for any expenses or payments incurred for the removal of the product from its place of use, transportation or shipping expenses to the place of repair, or return expenses of a repaired or replacement product to its place of use.

The implied warranties which the law imposes on the sale of this product are expressly LIMITED, in duration, to the three (3) year time period specified herein. DuraComm will not be liable for damages, consequential or otherwise, resulting from the use and operation of this product, or from the breach of this LIMITED WARRANTY.

Some states do not allow limitations on the duration of the implied warranty or exclusions or limitations of incidental or consequential damages, so said limitations or exclusions may not apply to you. This warranty gives you specific legal rights which vary from state to state.

This warranty is given in lieu of all other warranties, whether expressed, implied, or by law. All other warranties, including WITHOUT LIMITATION, warranties of merchantability and fitness or suitability for a particular purpose, are specifically excluded. DuraComm reserves the right to change or modify its warranty and service programs without prior notice.

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