DeltaNet FS90 Fire and Security System

FEATURES

- Conventional and intelligent detection and signaling
- Stand-alone operation and/or integration with higher-order systems
- Function boards for configuration to site requirements
- Easily changeable data file in nonvolatile memory
- Access control and door monitoring
- FS90 Command Center option
- Auto-Tuning Sensitivity

GENERAL

The DeltaNet FS90 Fire and Security (F&S) family of real-time, microprocessor-based controllers offers conventional and intelligent fire detection and annunciation, security, and access control. The family includes:

- DeltaNet FS90 F&S System for conventional zone alarm verification, cross-zoning, annunciation, control, individual zone alarm, supervisory and trouble indication, zone disconnect switches, and a local audible signal. Security functions include local and remote secure/access switching and high-security line supervision.

- DeltaNet FS90 Plus F&S System (“FS90 Plus”) for intelligent F&S functions to monitor and control individually addressable fire and security devices (rather than zones). FS90 Plus can have up to nine Intelligent Loop Interface Boards, each of which can have two 2-wire circuits or one fault-tolerant 4-wire circuit. Each circuit can monitor 99 addressable analog sensors plus 99 addressable control module or monitor module points, up to a controller maximum of 967 points.

- DeltaNet FS90 Fire Management System for emergency audio evacuation, communication, smoke control, and fan system override. An Audio Cabinet houses audio system components. A Fire Command Station allows fire fighters to manage a fire situation through control of evacuation signaling and message output, selective public address, optional two-way telephone communication, and override of automatic fan and damper controls.

- DeltaNet Access Control Supervisor and DeltaNet Access Control Supervisor/SPS for monitoring and control of up to eight card readers and/or keypads per controller. The system supports multiple card technologies, multilevel antipassback, two-card access, supervisor-required access, and elevator control.
DESCRIPTION

The DeltaNet FS90 Fire and Security (F&S) family of real-time, microprocessor-based controllers offers conventional and intelligent fire detection and annunciation, security, and access control. Sites can tailor F&S operation to requirements with a selection of function boards. Detailed descriptions of products within the family are as follows:

DeltaNet FS90 F&S System ("FS90")

Stand-Alone Operation and/or Integration with Higher-Order Systems:
FS90 consists of an enclosure with locking door, power supply, batteries for standby power in the event of ac power failure, Motherboard with eight slots for function boards and terminal blocks for field wiring, a CA Control Board that can control four fully loaded Motherboards, and function boards appropriate for the site application. Single and double enclosures accommodate one and two Motherboards, respectively. To ensure integrity, the CA Control Board checksums its Operating System (OS) every 24 hours, and supervision circuits annunciate a trouble condition on microprocessor failure.

FS90 can be a data gathering panel in systems such as the DeltaNet Micro Central/DeltaNet Plus, DeltaNet Building Supervisor—Integrated, and DELTA 1000 by addition of a Communication Board and the necessary interconnect wiring. If communication with the higher-order system is lost, FS90 independently continues its fire and security functions.

User-Modifiable Data File in Nonvolatile Memory:
The FS90 OS in CA Control Board EPROM uses EEPROM-based parameters to control F&S processing. At system installation and whenever site requirements change, users can modify parameter default values via CA Control Board switches. LED indicators guide and confirm data entry. No special equipment or wiring changes are needed.

Versatile Alarm-Detection and Alarm-Signaling Applications:

Supervised alarm-detection zones can provide:
- Alarm and trouble indication by zone.
- Individual zone disconnect.
- Alarm verification: Time interval (60 seconds maximum) at the end of which FS90 verifies an alarm occurrence.
- Second Detector: On an alarm, a local audible sounds. If a second alarm occurs on the same zone, FS90 sounds an evacuation signal.
- Supervision/Water-Flow Indications: For sprinkler-system supervisory and water-flow (nonsilenceable) indication.
- Two-wire or fault-tolerant initiating circuits.

Supervised alarm-signaling zones can provide:
- Alarm and trouble indication by zone.
- Two-wire or fault-tolerant indicating circuits.
- Cross-Zoning: Indicating circuits can be logically ANDed.
- Indicating (output) circuits can be logically ANDed or ORed.
- Signal Coding: Audible-signal frequency (20 to 120 pulses per minute) can be selected to accommodate march-time coding.
- Time-Delay: Time interval (eight minutes maximum) between initiating circuit activation and relay/output activation.
- Time Cutoff: Time interval (eight minutes maximum) between initiating circuit activation and indicating circuit deactivation.
- Supervised command outputs.
- Individual indicating zone disconnect.

Optional High-Security Line Supervision:
For extra line security that can detect sophisticated attempts to compromise the monitoring, an end-of-line transmitter sends coded signals interpreted by a receiver on an FS90 function board. A mismatch between sent and received signals or no signal from the transmitter results in an alarm. This feature is UL Listed for Grade AA supervision.

Optional Battery Supervision:
A battery supervision module mounted on the power supply detects low-battery and no-battery conditions. Supervision applies to all standard FS90 batteries.

Block Diagram of FS90.
**DeltaNet FS90 Plus F&S System (“FS90 Plus”)**

FS90 Plus includes all the features of FS90. In addition, it offers:

**Analog Information from Smoke and Thermal Sensors:**
The TC806A and TC806B Photoelectric Smoke Sensors, TC807A and TC807B Ionization Smoke Sensors, and TC808A Electronic Thermal Sensor are tamper-resistant solid-state devices that sense smoke density, particles of combustion, and temperature levels, respectively. Each Sensor has a unique point address from 01 to 99 on an intelligent loop interface circuit and provides continuous, analog signals to FS90 Plus. Each Sensor can be tested from FS90 Plus and can also be locally tested using an externally applied magnet to the Sensor base.

FS90 Plus continuously scans Sensors to determine their condition. When alarm threshold is reached, FS90 Plus identifies device type and location (e.g., Smoke Sensor in Room 206) and commands indicating circuits and individual relays (e.g., to turn off fans) to respond to the alarm.

Two integral red LEDs on the Sensor blink each time FS90 Plus scans the Sensor. Optionally, the blink can be suppressed. The LEDs latch ON in alarm.

**Monitoring of the Condition of Fire Alarm and Security Devices:**
The TC809A and TC809B Monitor Modules provide an addressable, two-wire (TC809A, B) or fault-tolerant (TC809A only) initiating circuit for monitoring normally open contact, fire alarm and supervisory devices, and either normally open or normally closed security devices. The TC809A and B have a point address from 101 to 199 on an intelligent loop interface circuit and report circuit status (normal, open, or short) to the FS90 Plus.

An integral red LED on the TC809A blinks each time FS90 Plus scans it. The LED latches ON when the indicating circuit or relay is commanded ON.

**Addressable Control of Indicating Outputs:**
The TC810A Control Module provides an addressable, supervised, two-wire or fault-tolerant indicating circuit (e.g., for audible devices, strobes) that supervises for normal, open, or short conditions on the circuit. The TC810A has a point address from 101 to 199 on an intelligent loop interface circuit. When the TC810A receives a command from FS90 Plus, an internal relay energizes and activates its associated indicating devices. The TC810A can also be wired to provide a nonsupervised dry contact, spdt relay output to control equipment such as fans and dampers.

An integral red LED on the TC810A blinks each time FS90 Plus scans it. The LED latches ON when the indicating circuit or relay is commanded ON.

**Isolation of Short-Circuit Faults from Selected Segments of Loop:**
The TC811A Fault Isolator Module enables part of a circuit to continue operating when a short occurs on loop wiring. If a loop configuration is used, one TC811A isolates a short to the part of the loop between the TC811A and the FS90 Plus, allowing the rest of the loop to operate normally. If two TC811As are used, they isolate a short to the part of the loop between them. In a star configuration, a TC811A can be used in each leg so a short on one leg does not affect communications on any other.

An integral red LED on the TC811A blinks to indicate normal status and is steady ON to indicate a short on the loop.

**Recognition of Trouble, Prealarm, and Alarm Conditions:**
FS90 Plus recognizes normal and alarm conditions, below-normal sensor values that reveal a trouble condition, and above-normal values that indicate either a prealarm condition or the need for maintenance. An operator at the FS90 Plus or higher-order system can read sensor address and condition. The operator can also adjust alarm and prealarm thresholds and other parameters.

**Alarm Verification and Priority Selection of Alarm Levels:**
To minimize false alarms, FS90 Plus performs alarm verification on selected individual sensors. Two alarm levels enable critical alarms to override less critical alarms. For example, a smoke sensor in alarm can override a security contact, or a fire alarm from one floor can override fire alarms from other floors. Alarms that are overridden remain in the FS90 Plus and display after an operator acknowledges all higher-priority alarms.

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Sample FS90 Plus Circuit.
Auto-Tuning Sensitivity Compensates for Environmental Effects:
A smoke sensor’s sensitivity can drift due to sensor aging and environmental changes such as temperature, humidity, and air velocity. This means that a sensor can become more or less sensitive than the desired setting, depending on the type of sensor. The FS90 Plus provides an optional selection feature called Auto-Tuning Sensitivity (ATS) that provides end users with optimum smoke sensor performance and compensates for sensor age and environmental effects.

ATS maintains the set sensitivity of smoke sensors by automatically and periodically readjusting the sensitivity of each sensor. ATS sets the desired TC806 Photoelectric Smoke Sensor or TC807 Ionization Smoke Sensor sensitivity value directly to a value between 1.0 and 2.6 percent per foot obscuration in 0.1 increments. (Due to the nature of the TC806 Sensor, the sensitivity is rounded to a high, medium, or low value.) The ATS algorithm measures the response from a sensor in “clean air” and in a “test” mode. These parameters determine the operating condition of a sensor. Using the user-specified sensitivity value, ATS maintains the set sensitivity by automatically and periodically calculating the prealarm and alarm limits as necessary.

ATS also allows end users to meet requirements of NFPA 72 Chapter 7 (regarding the installation, maintenance, and use of Protective Signaling Systems) with greatly reduced labor efforts. The FS90 Plus is UL listed as a Sensitivity Test Instrument in accordance with the requirements of NFPA 72 Chapter 7. ATS permits an FS90 Plus with a Command Center option or an FS90 Plus in a higher-order system such as an DeltaNet Building Supervisor—Integrated or DeltaNet Graphic Central to measure the sensitivity of sensors. Without ATS, each sensor must be physically connected to a test instrument and its value recorded for the authority having jurisdiction. With ATS, the sensitivity requirements are met via the user interface which greatly reduces the field testing. (Note that at these testing times, however, each sensor must still be visually inspected and placed into alarm.)

Local Numeric and LED Display of Device Address and Condition:
Local numeric and LED annunciation of sensor address and condition occurs in addition to annunciation at a higher-order operator terminal.

Logical Point Groups (LPGs) and Event-Initiated Programs (EIPs):
LPGs activate an initiator when a user-specified number of physical inputs in a group goes into alarm. The initiator can then activate an EIP that controls fans, dampers, and other user-specified devices. An LPG can include up to 15 devices (e.g., water-flow switches on different circuits) in a specific FS90 Plus. A specific device can be in a maximum of four LPGs.

An EIP activates commands to points when the threshold for a specified EIP initiator (either a physical point or an LPG) is reached. Each EIP controls multiple output points and can be chained to another EIP. With an external signal to supply day/night or other status, an EIP can automatically activate the secure/access changes needed for optimum site management. For example, an EIP can change the status of a security point to ACCESS during the day and SECURE at night to ensure fewer nuisance alarms during normally occupied times and greater security during normally unoccupied times.

Sensor Self-Test:
FS90 Plus initiates a self-test each time the Panel Test switch is activated. Every two minutes, FS90 Plus scans to see if a self-test has been requested. When requested, LED operation is verified. Then the first 15 seconds are used to command all Sensors into self-test. For the next 15 seconds, all Sensors are checked for a test value. If a received value is less than the test value, a trouble is annunciated. In the last 15 seconds, Sensors are commanded to terminate self-test.

No alarms are reported during the 45 seconds of the self-test.

DeltaNet FS90 Fire Management System (“FMS”)
FMS includes the features of FS90 and/or FS90 Plus. In addition, it offers:

Fire Command Station (FCS):
FCS includes a maximum of four Motherboards with eight function board slots each, a microphone, and an optional telephone. FMS function boards provide audio and phone control (for fire signal and evacuation message output, all-call paging of multiple speakers), speaker and phone selection (for individual selection of speaker and phone circuits, all-talk two-way communication with multiple phones, optional phone page to address audio speakers from a fire fighter telephone), and Heating, Ventilating, and Air Conditioning (HVAC) override (for two- and three-position control of fans, dampers, and other nonaudio equipment).

Audio Cabinet:
A single-channel Audio Cabinet includes a preamplifier, audio amplifier, trouble detection panel, relay switching panel, card rack with tone generator, input control panel, and power supplies. In addition to this equipment, a dual-channel Audio Cabinet has a second preamplifier, second audio amplifier, and another card rack. Either configuration can optionally include a backup preamplifier, backup audio amplifier, and a message unit.
The Audio Cabinet also provides space to mount one or two Switching/Supervisory Subpanels, each supporting up to three Switching/Supervisory Boards. These Boards switch the audio and phone trunks to and from speaker and phone circuits respectively. They also provide supervision for speaker and phone circuits. In applications where Switching/Supervisory Boards are located remote from the Audio Cabinet, an Audio Trunk Supervision Board provides supervision for the audio trunk. Audio amplifiers also can be distributed at remote locations, with or without local microphones.

**Fire Signal:**
When FCS detects an alarm, speaker circuits automatically activate and sound the fire evacuation signal. Fire fighters can manually activate the fire signal at any time. Individual selection switches permit the fire fighter to selectively activate speaker circuits and direct the fire alarm signal to the desired zones.

**Evacuation Message:**
An optional Message Unit can provide prerecorded messages. When a fire occurs, the prerecorded message automatically outputs to the speakers. Message output overrides the fire evacuation signal. A fire fighter can manually activate or silence the prerecorded message at any time. Individual selection switches permit the fire fighter to selectively activate speaker circuits and direct the message to desired zones.

**Microphone and Telephone:**
Fire fighters can use the FCS microphone to broadcast information to building occupants in specific zones or to instruct fire fighters throughout a building. An all-call function selects all zones and allows the fire fighter to address all building occupants. In single-channel configurations, the microphone overrides message and fire signal output. In dual-channel configurations, the microphone allows broadcast of a message to selected zones without fire signal interruption. The optional telephone provides two-way communication between the FCS and fire fighters.

**HVAC Override:**
FMS can be programmed to automatically open and close HVAC fans and dampers to control smoke. FCS allows manual override of this automatic control.

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**DeltaNet Access Control Supervisor and DeltaNet Access Control Supervisor/SPS (“Access Control”)**

Access Control boards can share an enclosure with other FS90 functions or operate as a dedicated access system. DeltaNet Access Control Supervisor Specification Data Sheet 74-2438 and DeltaNet Access Control Supervisor/SPS Specification Data Sheet 74-2565 describe Access Control in detail. The main features are:

**Integration with Graphic System:**
Access Control is fully integrated into DeltaNet Building Supervisor—Integrated operation. Operators display graphic diagrams of access areas, enter data with familiar click and type methods, and enter or change card holder information with a visual matrix method that helps prevent errors. The same facility allows operators to view the desired subset of card holders based on specified card data (e.g., car color).

**Support for Major Card Technologies:**
Cards can employ magnetic stripe, barium ferrite, proximity, and Wiegand technologies. A Personal Identification Number (PIN) Pad can be operated in addition to or in place of a card reader.

**Support for Common Access Control Applications:**
Access Control supports all common access strategies:

- Area programming to determine where card holders can go and how the system is to report card holder location.
- Card types to indicate whether a card holder is an employee, supervisor, or a visitor needing an escort.
- Elevator control to limit card holder access to just the floors in the assigned floor group(s).
- Extra time to enter and exit for personnel with handicaps or bulky equipment (e.g., mail carts).
- Multilevel antipassback to prevent unauthorized entry.
- Two-card rule to ensure that a card holder is never in a high-security or hazardous area alone.
- Supervisor rule to ensure that a supervisor is present whenever workers enter certain areas.
- 250 schedules with 8 day/time periods per schedule.
- PINs with 3, 4, 5, or 6 digits.
- Duress codes.
- 1000-event buffer for storage of transactions during communication loss.
DeltaNet FS90 Command Center Option
(“Command Center”)

Any DeltaNet F&S System, whether stand-alone or connected
to a higher-order system, can include an optional Command
Center for alarm and trouble message display and optional
printout, and for data display and entry from a keypad.

### Alarm and Trouble Message Display and Printout
Display and strip print capability enhances alarm and trouble
recording. Under normal conditions, the four-line 40-
character-per-line Liquid Crystal Display (LCD) window
shows time and date and a “system normal” message. On a
Change-of-State (COS), backlighting turns on and the display
shows point address, condition (e.g., alarm or trouble), COS
time and date, descriptor (32 characters maximum), and
action message (40 characters maximum). COS data also
prints on the 40-column printer. A status line displays the
number of unacknowledged COSs, fire alarms, other alarms,
and troubles. When the display window is inactive for five
minutes, backlighting automatically turns off.

### Keypad Entry of Data:
Function keys with mnemonic labels along with prompts in
the display window make it easy to do the everyday
operations (e.g., display sensor value, acknowledge alarms,
test panel) normally performed from switches on the CA
Control Board and other function boards. In addition,
Command Center includes several special-purpose keys:

- **MODIFY** to update date and time, add and delete
  operators, add and change action messages and point descriptors, and
  change sensor limits.
- **OPTION** to select and execute up to seven
  preprogrammed sequences of commands (e.g., if a
  special start-up sequence after power failure or a day/
  night transition is needed).
- **COMMAND** to send on/off, on/off/auto, secure/access, day/night, lockout,
  disconnect, isolate, disable, and enable commands to
  points. In addition, an operator can test all sensors.
- **F1-F4** in conjunction with other function keys to perform
  the specific operation desired. For example, after an
  operator presses **COMMAND** and inputs point address,
  the display window shows available commands and the
  F1-F4 key needed to implement each one.

Only authorized operators with a valid PIN have access to the
**COMMAND**, **REPORTS**, **MODIFY**, and **OPTION** keys.
Actions taken with **COMMAND**, **MODIFY**, and **OPTION** keys
are recorded on the strip printer along with operator initials,
date, and time.
**Reports:**
The REPORTS key allows authorized operators to display or print many reports and summaries:

- All Points
- Alarm Summary
- Trouble Summary
- Status Summary (secure/access points and all output points)
- Disabled Points
- Isolated Points (input alarm and trouble indications received but not acted on)
- Disconnected Points (outputs)
- Sensitivity Log (to determine maintenance needs for intelligent sensors and to display point sensitivity values)
- Single Point Log (printout of the point currently on display)
- Historical Log (last 100 COSs in chronological order)
- Logical Point Groups (physical points in LPGs and their status)
- Trend Log

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**Sample FS90 Plus Alarm Summary Log.**

<table>
<thead>
<tr>
<th>ALARM SUMMARY</th>
<th>09:24 15SEP90</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.02.003 ALARM</td>
<td>12:01 13SEP90</td>
</tr>
<tr>
<td>THIRD FLOOR NORTH WING ROOM #304</td>
<td>AV=102</td>
</tr>
<tr>
<td>01.05.136 ALARM SEC</td>
<td>16:34 14SEP90</td>
</tr>
<tr>
<td>SOUTH LOBBY DOOR</td>
<td></td>
</tr>
</tbody>
</table>

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**Sample FS90 Plus Sensitivity Log.**

<table>
<thead>
<tr>
<th>********** ALARM SENSITIVITY REPORT **********</th>
<th>11:35 14/OCT/93</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.02.004 NORMAL</td>
<td>11:09 14/OCT/93</td>
</tr>
<tr>
<td>4-WIRE AE SENSOR 2003, SLOT 10</td>
<td>AV=001</td>
</tr>
<tr>
<td>Day</td>
<td>Night</td>
</tr>
<tr>
<td>Prealarm</td>
<td>22</td>
</tr>
<tr>
<td>Alarm</td>
<td>28</td>
</tr>
</tbody>
</table>

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**SPECIFICATIONS**

**Models:**
- DeltaNet FS90 Fire and Security System
- DeltaNet FS90 Plus Fire and Security System
- DeltaNet FS90 Fire Management System
- DeltaNet Access Control Supervisor
- DeltaNet Access Control Supervisor/SPS

**FS90**

**Motherboard:**
Four 14505102 Motherboards maximum, 8 function boards per Motherboard
One CA Control Board per FS90

**Environmental Operating Limits:**
Temperature: 32 to 120°F (0 to 49°C)
Humidity: 5 to 95% rh, noncondensing

**Communication:**
Depending on Communication Board:
- Current loop, tone, telephone channels, dc-coupled, ac-coupled, fiber optic

**Wiring:**
Two-wire, three-wire, four-wire, or fault-tolerant

**Power Supply:**
14505148-001 Power Supply
14505145 Power Supply Cable
Power Supply/Charger:
- 28V dc output
- 2A maximum in supervision
- 4A maximum in alarm/recharge
- Input 120V ac, +10%, −15%, 50/60 Hz

**Batteries:**
24V dc, float-charged from power supply/charger

**Enclosures:**
14505151-007/005 Enclosure with Knockouts (Single/Double)
14505151-003/004 Enclosure without Knockouts (Single/Double)
14505152-001/002 Enclosure Door (Single/Double)
14505152-005 Stainless Steel Door (Double)

**Enclosure Dimensions:**
Single Enclosure: 24 in. (610 mm) high by 22-1/4 in. (566 mm) wide by 7-3/4 in. (197 mm) deep
Double Enclosure: 38 in. (966 mm) high by 22-1/4 in. (566 mm) wide by 7-3/4 in. (197 mm) deep

**Mounting:**
Surface or semiflush
Shipping Weights:
Motherboard: 2.5 lb (1.13 kg)
Power Supply: 8 lb (3.6 kg)
Enclosures:
Single: 23 lb (10.4 kg)
Double 31 lb (14.1 kg)
Enclosure Door:
Single: 8 lb (3.6 kg)
Double 12 lb (5.4 kg)
Batteries:
14506056-001 (two for 6.5 Ah): 5.7 lb (2.6 kg)
14506056-002 (two for 26 Ah): 18.7 lb (8.5 kg)

Optional Accessories:
14506056-006 Battery: Two for 6.5 Ah, four for 13 Ah
14506056-007 Battery: Two for 26 Ah
14505377 Battery Harness for 6.5 Ah and 13 Ah batteries
14505375 Battery Harness for 26 Ah batteries
14506048 Battery Supervision Module
14505172 Control Relay Assembly
14505149 Legend Cards
14502412 Lightning Protector
14505144-001 Motherboard-to-Motherboard Interconnect
   Cable for inside enclosure
14505144-002 Motherboard-to-Motherboard Interconnect
   Cable between enclosures
14506430 Remote Transmitter End-of-Line Device for high-security monitor
14505159 Tamper Switch
14006090-165501 Bus Extender/Repeater (for FS90 panel mounting)
14006090-165502 Bus Extender/Repeater (for remote mounting)

Software:
S958 DeltaNet FS90 Fire and Security Operating System

Approvals:
UL 864 Listed for use in NFPA 71, 72 applications
UL 1076 Listed for Proprietary Burglar Alarm
FM Approved for Fire Alarm Systems
California State Fire Marshal
Material & Equipment Approval — New York City

FS90 Plus

All FS90 specifications apply.
In addition:

Required Boards:
14505132 AE Intelligent Loop Interface Board (FS90 Plus interface to intelligent Sensors and Modules)
14506344 LJ RS-485 Communication/Display Board (FS90 Plus interface to intelligent loops and higher-order systems, displays specific point information)
—OR—
14506690-001 LL RS-232 Communication/Display Board (FS90 Plus interface to intelligent loops and higher-order systems, displays specific point information)

AE and LJ/LL Board Capacities:
AE Board:
Up to nine boards per FS90 Plus (maximum 9 AE circuits)
Two 2-wire circuits or one 4-wire fault-tolerant loop per board
Per circuit: Up to 99 addressable Smoke and/or Thermal Sensors and up to 99 Monitor Modules or Control Modules. An additional 20 Fault Isolator Modules can be added over and above the Module/Sensor total.

NOTE: All devices on circuit can be in alarm simultaneously.

LJ or LL Board:
One board per FS90 Plus
Annunciation of devices on up to nine AE Board 2-wire circuits and/or 4-wire fault-tolerant circuits
Up to 198 Logical Point Groups, each with up to 15 physical points; each physical point can be assigned to up to four LPGs.
Up to 255 Event-Initiated Programs; each EIP controls up to 32 output points and can be chained to another EIP.

Additional Equipment:
Sensors:
TC806A and TC806B Photoelectric Sensors
TC807A and TC807B Ionization Sensors
TC808A Electronic Thermal Sensor
Modules:
S464 Addressable Manual Station
TC809A and TC809B Monitor Modules
TC810A Control Module
TC811A Fault Isolator Module
Optional:
For DELTA 1000 applications only:
LB, LC, LD, LE, or LF Communication Board as required

Wiring Limitations Worst Case.

<table>
<thead>
<tr>
<th>Board/Configuration</th>
<th>Wire Type *</th>
<th>Wire Gage (sq mm)</th>
<th>Length in Feet (Meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE 2-Wire Loop</td>
<td>AK3741</td>
<td>18 (0.8)</td>
<td>1900 (579)</td>
</tr>
<tr>
<td>without</td>
<td>AK3750</td>
<td>16 (1.3)</td>
<td>3000 (914)</td>
</tr>
<tr>
<td>T-Tapping †</td>
<td>AK3752</td>
<td>14 (2.1)</td>
<td>4800 (1463)</td>
</tr>
<tr>
<td>AE 4-Wire Fault-Tolerant Loop §</td>
<td>AK3741</td>
<td>18 (0.8)</td>
<td>950 (290)</td>
</tr>
<tr>
<td></td>
<td>AK3750</td>
<td>16 (1.3)</td>
<td>1500 (457)</td>
</tr>
<tr>
<td></td>
<td>AK3752</td>
<td>14 (2.1)</td>
<td>2400 (732)</td>
</tr>
</tbody>
</table>

* All wiring is twisted pair, nonshielded.
† Based on 198 devices at end of loop.
§ Based on 198 devices at furthest point in loop and in open condition.
Indicators and Controls for AE, LJ, LL, and LH Interface Boards.

FMS Fire Command Station

All FS90 and/or FS90 Plus specifications apply. In addition:

FCS Enclosure:
- 14505151-005 FCS Enclosure and 14506333 FCS Dead Front Assembly (with dead front panel that conceals internal wiring from function board switches and LEDs and a bracket for mounting microphone and telephone assemblies)
  Dimensions: 38 in. (966 mm) high, 22-1/4 in. (566 mm) wide, 7-3/4 in. (197 mm) deep
  Weight: 31 lb (14.1 kg)
- 14505152-002 FCS Enclosure Door
  Weight: 12 lb (5.4 kg)

Electrical Requirements:
- Power Input: 24V dc from Audio Cabinet power supply
  Input Current:
    Maximum 4A at 28V dc per Motherboard
    Nominal 1A per Motherboard (typical supervisory condition)

Microphone Assembly:
- 14506349 Microphone Assembly, dynamic noise-canceling, bidirectional, handheld
  Frequency Response: 200 to 5000 Hz
  Output Level: –60 db
  Sensitivity: –154 dB low impedance
  Load Impedance: Low impedance (150-ohm)
  Cable: Low-impedance, 6 ft (1.8m), 4-conductor (two shielded) rubber-jacketed coil
  Switch: On/off (two separate circuits)

Telephone Assembly (Optional):
- 14506348 Telephone Assembly
  Transmitter: Carbon, nonpositional, 25-ohm impedance, 57-dB output at 300 Hz
  Receiver: Ring armature diaphragm, 150-ohm impedance at 1 kHz

FMS Audio Cabinet

All FS90 specifications apply. In addition:

Models:
- 14506415-001 Single-channel Audio Cabinet
- 14506415-002 Dual-channel Audio Cabinet

Power Supply/Charger
- Input: 120V ac, +10%, -15%, 50/60 Hz
- Output:
  - 10A output for single-channel systems with 48-hour recharge time. 14506412-001 (input 4 amps).
  - 20A output for dual- and single-channel systems with 24-hour recharge time. 14506412-002 (input 8 amps).
DeltaNet FS90 FIRE AND SECURITY SYSTEM

Cabinet:
- Finish: Frame is off-white, baked enamel; back door is textured charcoal, baked enamel
- Dimensions: 83-3/8 in. (2118 mm) high, 22-1/8 in. (562 mm) wide, 19-3/8 in. (493 mm) deep
- Weight: 103 lb (46.7 kg) including back door

Input Current:

<table>
<thead>
<tr>
<th>Amplifier Size</th>
<th>24V dc Current (A) *</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Supervisory</td>
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<tr>
<td></td>
<td>With 120V ac</td>
</tr>
<tr>
<td></td>
<td>Supervisory</td>
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<tr>
<td></td>
<td>With 120V ac</td>
</tr>
<tr>
<td></td>
<td>125W</td>
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<tr>
<td></td>
<td>250W</td>
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<tr>
<td></td>
<td>Dual-Channel</td>
</tr>
<tr>
<td></td>
<td>125W</td>
</tr>
<tr>
<td></td>
<td>250W</td>
</tr>
</tbody>
</table>

* Battery current values measured with both amplifiers operating at full power.

Audio Amplifiers
- (Standard and Backup Option):
  - 125W: 120V rms at 70.7V rms
  - 250W: 120V rms at 70.7V rms
- Backup Audio Amplifiers require a Backup Preamplifier Option.
- Electrical Requirements:
  - 125W: 120V, 60 Hz, or 24-28Vdc: 3.0A at 120V
  - 250W: 120V, 60 Hz, or 24-28Vdc: 6.0A at 120V
- Dimensions:
  - 125W: 5-1/4 in. (134 mm) high, 19 in. (483 mm) wide, 6-5/8 in. (168 mm) deep
  - 250W: 5-1/4 in. (134 mm) high, 19 in. (483 mm) wide, 15 in. (381 mm) deep
- Shipping Weights:
  - 125W: 22-1/2 lb (10.2 kg)
  - 250W: 50 lb (22.6 kg)
- Frequency Response: +0, –1 dB from 45 Hz to 20 kHz
- Harmonic Distortion: Less than 0.5% 45 Hz (20 Hz for 250W) to 20 kHz at rated output
- Signal to Noise Ratio: Greater than –90 dB below rated output
- Output Regulation: Better than 2 dB (1 dB for 250W) from no load to full load
- Input Impedance: 75K ohms
- Input Sensitivity: 1V rms at 1 kHz for rated output
- Output Impedance:
  - 125W: 40 ohms (70.7V), 5 ohms (25V)
  - 250W: 20 ohms (70.7V), 2.5 ohms (25V)
- Fuses:
  - 125W: 4A SLO-BLO fuse, 15A dc
  - 250W: 6.25A SLO-BLO fuse ac, 25A dc
- Mounting: 19-in. (483-mm) equipment rack

Preamplifier (Standard and Backup Options):
- Standard models provided with Audio Cabinet
- Backup Option Models:
  - 14506416-001 Backup Preamplifier for single-channel model
  - 14506416-002 Backup Preamplifier for dual-channel model
- Electrical Requirements: 24 to 30Vdc at 50 mA nominal
- Dimensions: 1-3/4 in. (45 mm) high, 19 in. (483 mm) wide, 8-1/2 in. (216 mm) deep
- Input Impedance:
  - Microphone (low impedance): 200 ohms or less
  - Program (high impedance): 250K ohms (minimum), single ended
  - Bridging Input: 100K ohms (minimum), single ended
- Input Sensitivity:
  - Microphone: 0.25 mV rms
  - Program: 100 mV rms
- Output Impedance: 600 ohms
- Output Level:
  - Nominal: +2 dBm (1V rms)
  - Maximum: +18 dBm into 600 ohm load
- Noise Level (with control full on):
  - Microphone: better than –63 dBv (at –67 dBv input)
  - Program: better than –75 dBv (100 mV rms input)
- Distortion: less than 0.25%, from 20 Hz to 20 kHz
- Frequency Response: ±1 dB from 20 Hz to 20 kHz (tone controls flat)
- Controls and Indicators:
  - Bass: ±15 dB (boost and cut) at 50 Hz
  - Treble: ±15 dB (boost and cut) at 10 kHz

Card Rack with Tone Generator:
- Card Rack Capacity: 12 card slots maximum
- Tone Generator: Supervised signaling generator with standard backup tone generator.
- Fire signal: Slow whoop tone (2.6 sec on, 0.4 sec off) modulating from 600 to 1100 Hz. Other tones available as options.
- Dimensions: 3-1/2 in. (89 mm) high, 19 in. (483 mm) wide, 9-1/4 in. (235 mm) deep
- Weight: 6 lb 12 oz. (3.1 kg)
DeltaNet FS90 FIRE AND SECURITY SYSTEM

**Message Unit (Optional):**
Models:
- 14506417-002 Message Unit for single-channel model
- 14506417-002 Message Unit for dual-channel model

Message: Digitized audio stored in up to four EPROMs; each EPROM saves 7.5-second message; message time ranges from 7.5 to 30 sec.

Message Repeats: Up to four consecutive times with pause (1 to 30 sec) between message repeats

Electrical Requirements: 24V dc at 250 mA nominal, 300 mA peak

Dimensions: 1-3/4 in. (45 mm) high, 19 in. (483 mm) wide, 7 in. (178 mm) deep

Bandwidth: 50 Hz to 3.4 kHz

Inputs: Stop and start; dry contact closure

Audio Output: 600-ohm transformer coupled line level preset to –5 dBm

Error/Fail Relay: Supervised output; Form A contact rated 1A, 24V noninductive load, closed in nonfailure mode

Playback Relay: Form A contact rated 1A, 24V noninductive load, closed in playback mode

**Input Control Panel:**

Electrical Requirements: 24V dc at 500 mA nominal

Dimensions: 3-1/2 in. (89 mm) high, 19 in. (483 mm) wide, 8 in. (204 mm) deep

Weight: 3 lb (1.35 kg)

Supervisory Tone: 27 Hz

**Trouble Detection Panel:**

Electrical Requirements: 24V dc at 150 mA

Dimensions: 1-3/4 in. (45 mm) high, 19 in. (483 mm) wide, 3-1/2 in. (89 mm) deep

Weight: 4 lb (1.8 kg)

**Relay Switching Panel:**

Capacity: 1 to 10 relays

Relay: Four-pole, double-throw

Contacts: 3A, 28V dc or 3A, 115V ac

Electrical Requirements: 24V dc, 40 mA for each relay

Dimensions: 3-1/2 in. (89 mm) high, 19 in. (483 mm) wide, 7-3/4 in. (197 mm) deep

Weight: 6 lb 7 oz. (2.9 kg)

**Switching/Supervisory Subpanel and Boards:**

Subpanel Model: 14505182

Switching/Supervisory Subpanel Subpanel Mounting: The Audio Cabinet supports up to two subpanels. Each subpanel supports up to three Switching/Supervisory Boards.

- 14506304-010: Used in single-channel applications to supervise and switch up to four speaker circuits to and from the audio trunk.
- 14506304-008: Used in conjunction with single-channel board to perform channel switching functions for dual-channel applications; does not provide supervision.
- 14506304-009: Used to supervise and switch up to four phone circuits to and from the phone trunk.

**Access Control**


**Required Boards:**

- 14506930 AR Reader Interface Board
- 14505106 AC Initiating Board for door contact/strike supervision
- 14505112 DA Accessory Relay Board for door strike and elevator control

**Capacities:**

Maximum 2 AR Boards per Motherboard

Maximum 4 readers (any combination of technologies) and 4 request-to-exit switches per AR Board

Maximum 8 readers per FS90

Maximum 16,000 cards per AR Board

Maximum 16,000 cards per DeltaNet Building Supervisor—Integrated or DeltaNet Graphic Central

Maximum 240 areas

Maximum 240 elevators

Maximum 96 floors

Maximum 250 schedules with 8 day/time periods each

Maximum 250 floor groups, each with a schedule that has 8 day/ time periods

**Software:**

S999 DeltaNet Access Control Supervisor Operating System

S1010 DeltaNet Access Control Supervisor/SPS Software

DeltaNet Building Supervisor—Integrated Personal Computer requires standard system software plus DOS SQLBase

Single-User/Run from Gupta Technologies Inc. (called “DBWindows” on screen)

**Accessories:**

Card readers (magnetic stripe, barium ferrite, proximity, Wiegand)

Door strikes

Request-to-exit switches (n.o. or n.c.)

**Approvals:**

UL 294 Listed as Access Control System Control Unit

FM approval does not apply
DeltaNet FS90 FIRE AND SECURITY SYSTEM

DeltaNet FS90 Command Center

Model:
- 14506817-002 DeltaNet FS90 Command Center Option
- 14506817-003 DeltaNet FS90 Command Center Option without printer

Clock: Real-time clock with battery to back up RAM
Mounting: In top half of double FS90 enclosure, occupying the space of one Motherboard

Communication:
LH Interface Board required
Interface: RS-232 ports

Operator Interface:
LEDs: Yellow for port trouble and setup mode; red for port transmit and receive
Keys: 0-9, F1-F4, Acknowledge, Clear, Command, Enter, Evacuate, Modify, Next, Option, Panel Test, Previous, Reports, Reset, Silence, Status; switchable to alphabetic (A-Z)

Display: Four lines, 40 characters/line, LCD with integral backlighting
Printer: 40-column, paper take-up mechanism, Paper Advance and On-Line switches and indicators
Point Descriptors: 32 characters maximum
Text Programming: Off-line via a portable personal computer

Software:
S994 DeltaNet FS90 LH Command Center Board Operating System
S996 DeltaNet FS90 Portable Programming Terminal (PPT) software

<table>
<thead>
<tr>
<th>Function Board</th>
<th>Description</th>
<th>Controls</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA, AJ Initiating four-zone, two-wire 14505106 AA 14505106-004 AJ</td>
<td>Four supervised circuits (50 ohms, 60 mA max) for n.o. alarm devices and compatible smoke detectors. AJ output test (screw terminals to board) checks short for alarm, open for trouble.</td>
<td>Disconnect per circuit</td>
<td>Alarm and Trouble per circuit, Trouble on AJ output test failure</td>
</tr>
<tr>
<td>AB, AK Initiating two-zone, four-wire 14505108 AB 14505108-002 AK</td>
<td>Two supervised circuits (50 ohms, 60 mA max) for n.o. alarm devices and compatible smoke detectors. AK output test (screw terminals to board) checks short for alarm, open for trouble.</td>
<td>Disconnect per circuit</td>
<td>Alarm and Trouble per circuit, Trouble on AK output test failure</td>
</tr>
<tr>
<td>AC Initiating four-zone, two-wire 14505106 AC</td>
<td>Four supervised circuits (50 ohms, 60 mA max) for n.o. contacts only.</td>
<td>Disconnect per circuit</td>
<td>Security: Alarm per circuit, Fire: Alarm and Trouble per circuit</td>
</tr>
<tr>
<td>AD Digital Input 14505118</td>
<td>Eight inputs for n.o. or n.c. contacts or for logical inputs.</td>
<td>N/A</td>
<td>Circuit energized</td>
</tr>
<tr>
<td>AE Intelligent Loop Interface 14505132</td>
<td>Two 2-wire or one 4-wire fault-tolerant initiating loop for intelligent sensors.</td>
<td>N/A</td>
<td>Alarm 1, Alarm 2, Prealarm, and Trouble</td>
</tr>
<tr>
<td>AF Security Initiating 14505188-001</td>
<td>Four 2-wire supervised security circuits with secure/access switching.</td>
<td>Secure/access switch per circuit</td>
<td>Alarm, Access, and Secure per circuit</td>
</tr>
<tr>
<td>Function Board</td>
<td>Description</td>
<td>Controls</td>
<td>Indicators</td>
</tr>
<tr>
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</tr>
<tr>
<td>AG Security Initiating</td>
<td>Four 2-wire supervised security circuits.</td>
<td>N/A</td>
<td>Alarm, Access, and Secure per circuit</td>
</tr>
<tr>
<td>AH High-Security Line Monitor</td>
<td>Four 2-wire supervised UL Grade AA high-security circuits</td>
<td>Access per circuit</td>
<td>Alarm and Access per circuit</td>
</tr>
<tr>
<td>AR Reader Interface</td>
<td>Interface to four card readers maximum. Maximum of two AR Boards per FS90.</td>
<td>N/A</td>
<td>Tamper per card reader, strike power alarm</td>
</tr>
<tr>
<td>BF Indicating</td>
<td>Two supervised circuits (2.0A max) for polarized bells, horns, and visuals. Two relays with user-selectable n.o. or n.c. contacts (2A, 30V dc max resistive load)</td>
<td>Disconnect per circuit</td>
<td>Alarm and Trouble per circuit. Relays are energized.</td>
</tr>
<tr>
<td>BG Indicating</td>
<td>Two supervised circuits (2.0A max) for polarized bells, horns, and visuals.</td>
<td>Disconnect per circuit</td>
<td>Alarm and Trouble per circuit</td>
</tr>
<tr>
<td>CA Control</td>
<td>Outputs: 24V dc., 100 mA, common trouble, and smoke detector reset.</td>
<td>Silence, Acknowledge, Reset, Panel Test, Manual Evacuation</td>
<td>Alarm, Trouble, Silence, Low Battery, Ground Fault, Disconnect, Power, Setup, Run</td>
</tr>
<tr>
<td>CC Audio Control (with driver)</td>
<td>Outputs: 24V dc, 100 mA, tone generator, message unit, all call</td>
<td>Fire Signal, Message, All Call</td>
<td>Fire Signal ON, Message ON, All Call (CH1 or CH2), Audio Select Status, Trouble</td>
</tr>
<tr>
<td>CE Phone Control (with driver)</td>
<td>Outputs: 24V dc, 100 mA, page enable, all talk.</td>
<td>Page Enable, All Talk</td>
<td>Call In, Trunk Trouble, Page Enable, All Talk, Phone Select Status, Phone Trouble</td>
</tr>
<tr>
<td>DA Accessory Relay</td>
<td>Four unsupervised relays (2A, 30V dc max resistive load), each with n.o. contacts only</td>
<td>N/A</td>
<td>Circuit Energized</td>
</tr>
<tr>
<td>DB Remote Driver</td>
<td>Eight supervised circuits (100 mA).</td>
<td>N/A</td>
<td>Circuit Energized and Trouble per circuit</td>
</tr>
<tr>
<td>DC Accessory Relay</td>
<td>Four unsupervised relays (2A, 30V dc max resistive load), each with user-selectable n.o. or n.c. contacts.</td>
<td>N/A</td>
<td>Circuit Energized</td>
</tr>
<tr>
<td>LA Communication (Sentara)</td>
<td>Dc-coupled/ac-coupled, two- or three-wire for communication between Communication Processor and FS90</td>
<td>N/A</td>
<td>Transmit, Receive, Communication Fail</td>
</tr>
<tr>
<td>LB, LC Communication (DELTA 1000/DCP)</td>
<td>LB: dc, two-wire LC: dc, four-wire</td>
<td>N/A</td>
<td>Transmit, Receive, Communication Fail</td>
</tr>
<tr>
<td>LD, LE Communication (DELTA 1000/DCP)</td>
<td>LD: Tone, two-wire, four-wire LE: Tone, eight-wire</td>
<td>N/A</td>
<td>Transmit, Receive, Communication Fail</td>
</tr>
<tr>
<td>LF Communication (DELTA 1000/DCP)</td>
<td>Fiber optic, redundant half-duplex</td>
<td>N/A</td>
<td>Transmit, Receive, Communication Fail</td>
</tr>
</tbody>
</table>
## Function Board Summary (Continued)

<table>
<thead>
<tr>
<th>Function Board</th>
<th>Description</th>
<th>Controls</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>LH Interface 14506788-002</td>
<td>Printer/Display Interface Board</td>
<td>Acknowledge, All Point Log, Alarm Summary Log, Previous, Next</td>
<td>Transmit, Receive, Port Trouble, Log Active</td>
</tr>
<tr>
<td>LJ RS-485 Communication/Display 14506344 —OR— LL RS-232 Communication/Display 14506690</td>
<td>Communication to DeltaNet Micro Central/Excel Plus System and FS90 Plus</td>
<td>Previous, Next</td>
<td>Transmit, Receive, Communication Fail, four 7-segment LEDs, Alarm 1, Alarm 2, Peralarm, Trouble, Multiple Alarm and Trouble</td>
</tr>
<tr>
<td>LK Interface 14506788-003</td>
<td>Annunciator Interface Board</td>
<td>N/A</td>
<td>Transmit, Receive, Port Trouble</td>
</tr>
<tr>
<td>SB Audio Selection, Single-Channel 14506302-002</td>
<td>Controls up to four speakers</td>
<td>CH1 (Speaker circuit enabled)</td>
<td>CH1</td>
</tr>
<tr>
<td>SD Phone Talk Selection 14506302-002</td>
<td>Selects individual phone circuits in a selected phone system</td>
<td>Talk (Phone circuit enabled)</td>
<td>Talk</td>
</tr>
<tr>
<td>SF HVAC Override Two-Position 14506302-002</td>
<td>Provides override control of fans and dampers from FCS. Not a primary fan or damper control.</td>
<td>On, Off</td>
<td>On, Off</td>
</tr>
<tr>
<td>SH Audio Selection, Dual-Channel 14506302-001</td>
<td>Controls up to four speakers</td>
<td>CH1/CH2 (Speaker circuit enabled)</td>
<td>CH1/CH2</td>
</tr>
<tr>
<td>SK HVAC Override Three-Position 14506302-001</td>
<td>Provides override control of fans and dampers from FCS. Not a primary fan or damper control.</td>
<td>On, Off, Auto</td>
<td>On, Off, Auto</td>
</tr>
<tr>
<td>VA Transmitter 14505114</td>
<td>Supervised local energy and master circuits, Form C contacts (2A, 30V dc max) and supervised 24V dc polarity reversal (2.0A) telephone line.</td>
<td>N/A</td>
<td>Alarm, Trouble, Circuit Energized</td>
</tr>
</tbody>
</table>