ELEVATOR CONTROLS
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Installation & Adjustment Manual
MODEL G900
Group Dispatching Manual
Elevator Controls Corp.

Product Documentation that's Simple to Navigate™

This is the Installation and Adjustment Manual which is the guide for installation, startup and final adjustment of all Model G900 Series Group Dispatching Systems. Other resources include:

- **Field Reprogramming Manual** for Model G900 Group Dispatching System
- **Field Reprogramming Manual** for Model V900/H900 Prodigy & Standard controllers
- **Car Controller Manuals**
- **Maintenance & Troubleshooting Training Manual** provided in conjunction with Factory and Customer Site technical training classes
- **Telephone Technical Support** available for Customers at no charge
  Call: 916/428-1708; **fax**: 916/428-1728; **e-mail**: techsupport@elevatorcontrols.com
- **Onsite Product & Engineering Support** available worldwide by prior arrangement.

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Table of Contents

Introduction

Warnings

Throughout this manual, icons will be used to call attention to certain areas of text. These icons represent safety warnings, cautions, and notes.

WARNING: Denotes operating procedures and practices that may result in personal injury and/or equipment damage if not correctly followed.

CAUTION: Denotes operating procedures and practices that may result in equipment damage if not correctly followed.

NOTE: Denotes useful information or procedures.

Throughout this manual it is assumed that field personnel are well qualified in the installation of elevator equipment. No attempt has been made to define terms or procedures that should be familiar to a qualified elevator mechanic.

CAUTION: Equipment installation must be in compliance with all Local and applicable Elevator and Electrical Codes and regulations

This manual is intended only to acquaint the service technician with the information required to successfully install the G900 microprocessor-based group controller. Field personnel must be familiar with all codes and regulations pertaining to the safe installation and operation of the elevator system.

NOTE: Installation and wiring must be in accordance with the National Electrical Code and consistent with all local codes, and National elevator codes and regulations. The AC power supply to this equipment must be provided through a proper fused disconnect or circuit breaker. Improper protection may create a hazardous condition.

NOTE: Wiring to controller terminals must be done in a neat and careful manner. Stranded wire conductors must be twisted together to avoid strands that would create potential shorts if left out of terminals. All controller and field terminals and cable connectors must be checked for proper seating and tightness. When connecting flat cable connectors, be certain to match pin #1 marks (arrow symbol on connectors, red stripe on cable) to prevent damage.

CAUTION: Restrict access to elevator control equipment and apparatus to qualified personnel only.

Section 1 – Overview

1.1 Product Description

ELEVATOR CONTROLS CORPORATION model G900 Group Dispatching System utilizes *state-of-the-art large scale integrated circuits* built into a high performance modular circuit board design, in such a way as to optimize *reliability* and *minimize installation* and *maintenance costs.*

The G900 Group Dispatching System contains a P8, main microprocessor board, a G900 slaved communications microprocessor board, and two or more I/O-EX Boards depending on number of floors serviced and individual building custom options, a Microprocessor Power Supply, and Control Transformers.

Group Controller G900 is available for the control of up to 16 cars in both versions Compact and XL.

A *simple to use, powerful diagnostic station* is built into the P8 Computer Microprocessor Board which includes capabilities for *complete on-site re-programming* of the G900 Group Dispatching System "Personality" parameters via the LCD display.

Video Display, Modem Remote Communications, and Hardcopy Elevator performance printing are all available by means of an output connector capable of driving a standard PC and, including notebook and palm top computers.

G900 Group Dispatching System Specifications

Number of Stops	64 stops Maximum with selective door operation (typical of EC standardized system architecture)
Number of Cars in a Group	16 cars maximum
Environment Limits	32 to 104 Degrees Fahrenheit or 0 to 40 Degrees Celsius 12,000 ft (3,658 m) altitude 95% relative humidity (non-condensing)
G900 Compact dimensions	Wall Mount enclosure 36" Wide X 30" High X 7" Deep
G900 XL dimensions	Foot Mount enclosure 22" Wide X 70" High X 24" Deep

1.2 Typical Group Controller Physical Layout

Figure 1.2.1 and 1.2.2 show typical layouts of the G900 Group Dispatching System XL and Compact controllers respectively. Following is a brief description of the various components of each controller in Section 1.3.

Figure 1.2.1 - Typical G900-XL Group Dispatching System Controller Layout

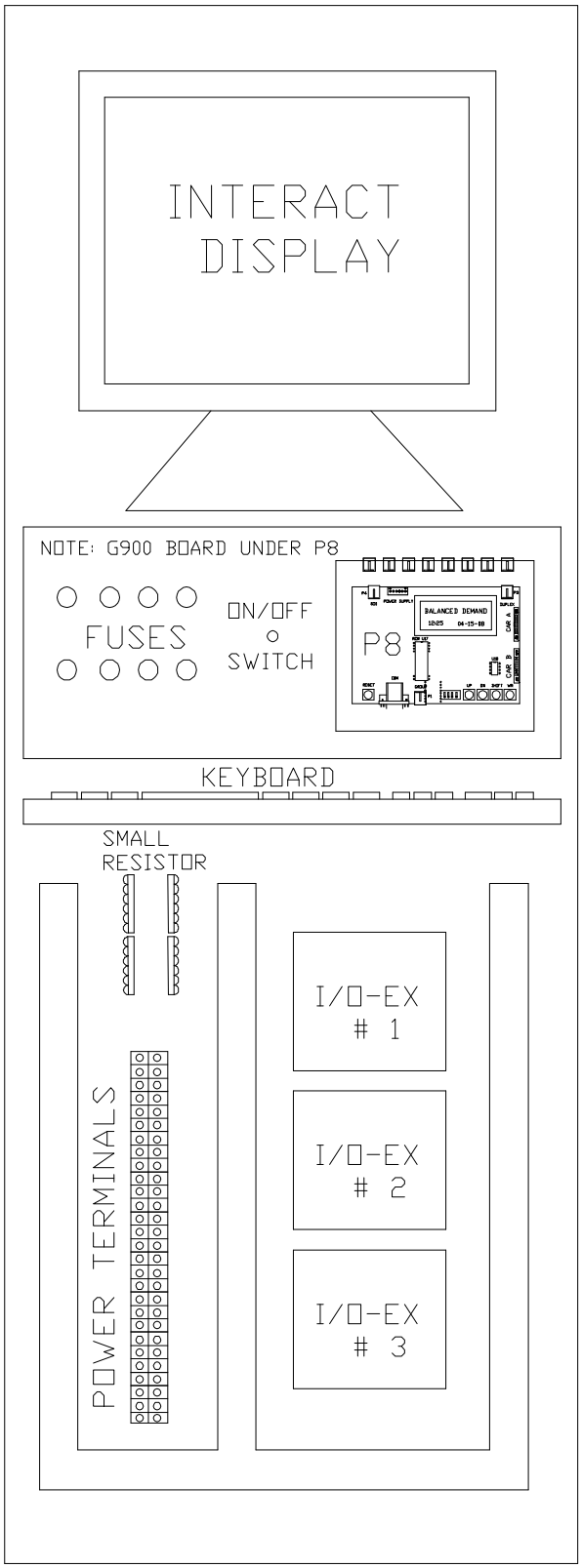
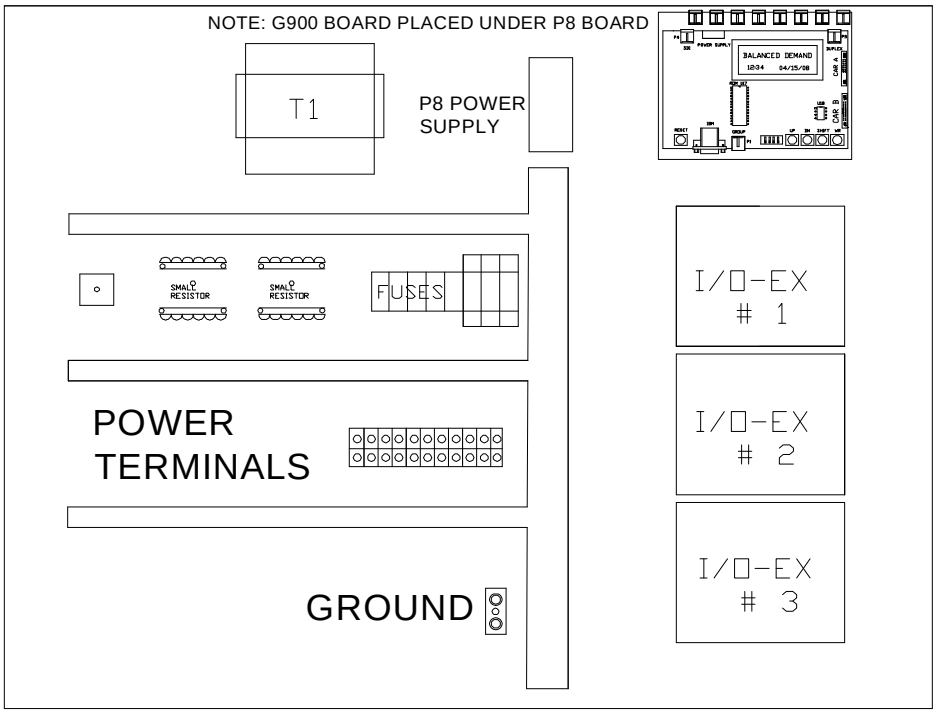


Figure 1.2.2- Typical G900 Group Dispatching System Compact Layout



1.3 Components General Function and Description

1.3.1 P8 Main Microprocessor

The P8 board is universal to all G900 Group Dispatching System line of control systems, and is used as a main Group dispatching microprocessor. The P8 board utilizes high speed, microprocessor technology with a high level of system integration.

NOTE: P8 microprocessor board may also be called MPC-P8 microprocessor board.

The P8 board contains an Onboard Menu Driving Diagnostics Tool coupled with a 2 x 16 alphanumeric display that allows full system reprogramming and diagnostics, four serial ports, a parallel port, an HSO high speed clocked serial port, and a real time clock. System ports are assigned as follows:

- COM1 (IBM) standard RS232 to drive IBM compatible systems
- COM2 (Duplex) Not currently being used
- COM3 (PVF) EZ-Link communications to GNA boards
- COM4 (Group) Not currently being used
- HSO Not currently being used
- LPT1 (Dispatcher) parallel data communication with G900 slave communications microprocessor board.

The P8 board is responsible for all the call to car assignments and group dispatching decision making for the elevator's automatic mode of operation.

1.3.2 G900 Slave Communications Microprocessor

The G900 board handles the serial communications network between the G900 controller and up to sixteen slaved car controllers, freeing the P8 to perform real time system evaluation and call assignment strategy.
The G900 utilizes one full duplex serial communications channel to communicate with each slaved car in the system, all communications channels are active at all times each car can be added or removed from the group at any without affecting the rest of the system performance, and without having to re-arrange remaining slaved cars options.

1.3.3 IO-EX

The I/O-EX board provides interface to all inputs and outputs including car calls, hall calls, etc. Voltage and LED power select jumper positions are critical different types of IO-EX boards are provided, ranging from 110AC Standard to 24DC. When replacing this board, be sure that the type and voltage match the one being replaced, and that the LED power select jumpers are placed in the same positions as the board being replaced.

1.3.4 HALL

The HALL board is used at each landing in a multi-drop configuration. This board gathers hall call information, per opening, and transmits this information to the P8 via RS-485 multi-drop communication path through. It also receives information that illuminates and extinguishes hall calls indicator lights and etc.

CAUTION: The HALL board is configured for a particular floor layout through SW1, a nine-switch pack (dip switch). When replacing the HALL board, make sure the dipswitch positions match those on the board being replaced, or permanent damage to one or more boards in the hall loop may occur.

1.3.13 Power Supply

The power supply has a single linear output that provides +5VDC for all microprocessor logic, and provides power to boards including P8, G900 board, and IO-EX boards. Typical part: Power-One HB5-3/OVP, 3 Amps @ 5VDC.

1.3.14 Power Supply Transformers

Power supply transformers are provided as necessary, according to the power requirements of each individual job, to step down and/or provide power isolation from the main power AC line.

1.3.16 Fuses and Terminals

Fuses, terminals, and any miscellaneous job-specific circuits not part of the standard PC board set are provided as required for each specific job.

Section 2 – Preparation

2.1 General Information

This section contains important instructions and recommendations pertaining to the site selection environmental considerations, and wiring guidelines to ensure a successful installation.

2.2 Site Selection

While selecting the best location for the controller equipment take into account the following factors:

a. Make sure the control system is placed logically, while taking into consideration the rest of the equipment location.

b. Provide adequate working space for installation, wiring, and maintenance of the control system. Please note that the G900 XL controller requires rear access.

c. Do not install equipment in a hazardous location.

d. Do not install equipment in areas or on surfaces where it will be subject to vibration, the control systems contains parts such as relays that are placed in sockets whose functions may be affected by vibration.

e. Provide adequate lighting and working space for comfort and efficiency; a telephone line is desirable to provide access for optional remote diagnostics, as well as more efficient access to E.C.C. factory technical support if required.

2.3 Environmental Considerations

For proper operation and longevity, the elevator control system should be installed according to the following requirements:

a. The temperature inside the control system enclosure should be maintained between 32 to 104 degrees Fahrenheit (0 to 40 degrees Celsius). Higher or lower temperatures will reduce the life of the system and may prevent the system from functioning normally. Provide air-conditioning if required.

b. The air in the machine room should be free of corrosive gases. Air should be sufficiently dry to prevent condensation from moisture. NEMA 4 or NEMA 12 enclosures with integral air-conditioning units are available for these applications.

c. Avoid placing any control system cabinet or component near windows to prevent severe weather conditions from damaging the equipment.

d. Extreme levels of Radio Frequency (RF) radiation should be avoided. Radio Frequency Interference (RFI) may interfere with the operation of the control system. Elevator Controls hydraulic control systems have been tested by CKC Laboratories, Inc. Report Number IM00-029 and found to be in compliance with EN61000-4-2, EN61000-4-3 and EN61000-4-4 in accordance with EN12016 regulations.

✍ **NOTE**: Hand-held communications devices used close to the system computers may generate disruptive RF interference.

2.4 Recommended Tools, Test Equipment and Manuals

The following tools are recommended for installation of G900 Group control system:

a. Digital multi-meter

b. Assorted electronic tools such as pliers, cutters, flash light, Elevator Controls small screwdriver (supplied with each controller), etc

c. Telephone

d. Control system "as built" wiring prints

e. This manual

f. Model G900 Field Reprogramming manual

g. Controller Manuals for slaved car controllers being installed in conjunctions with the G900 Group Dispatching System.

2.5 Controller Installation Guidelines

✍ **NOTE**: It is very important to follow control system wiring guidelines to prevent problems with interference and line pollution.

✍ **NOTE**: Wiring to controller terminals must be done in a neat and careful manner. Stranded wire conductors must be twisted together to avoid strands that would create potential shorts if left out of terminals. All terminals and cable connectors must be checked for proper seating. When connecting flat cable connectors be certain to match pin #1 marks (arrow symbol on connectors, red stripe on cable) to prevent damage.

There are three different entry points that should be maintained separate while wiring the control system:

a. Power wiring: the line power coming from the elevator service disconnect with power ground.

b. Safety and Logic wiring: all wiring to fixtures and switches, as well as cross-connect signals from G900 Group Dispatching System controller to slaved car controllers.

c. Communications cables: communication cables run from G900 Group Dispatching System to slaved car controllers.

✍ **NOTE**: Study your control system layout to achieve the best arrangement, keeping the three entry points separated and positioned logically to suit the particular control system you will be installing. Following are the proposed layout for wiring a standard and Prodigy controller.

✍ **NOTE**: The standard NEMA-1 enclosure provided for G900 Group Dispatching System controller Compact or XL version are provided with factory knockouts, which suggest locations for wiring entry points.

Figure 2.1 – Typical G900 Compact Controller Wiring Layout

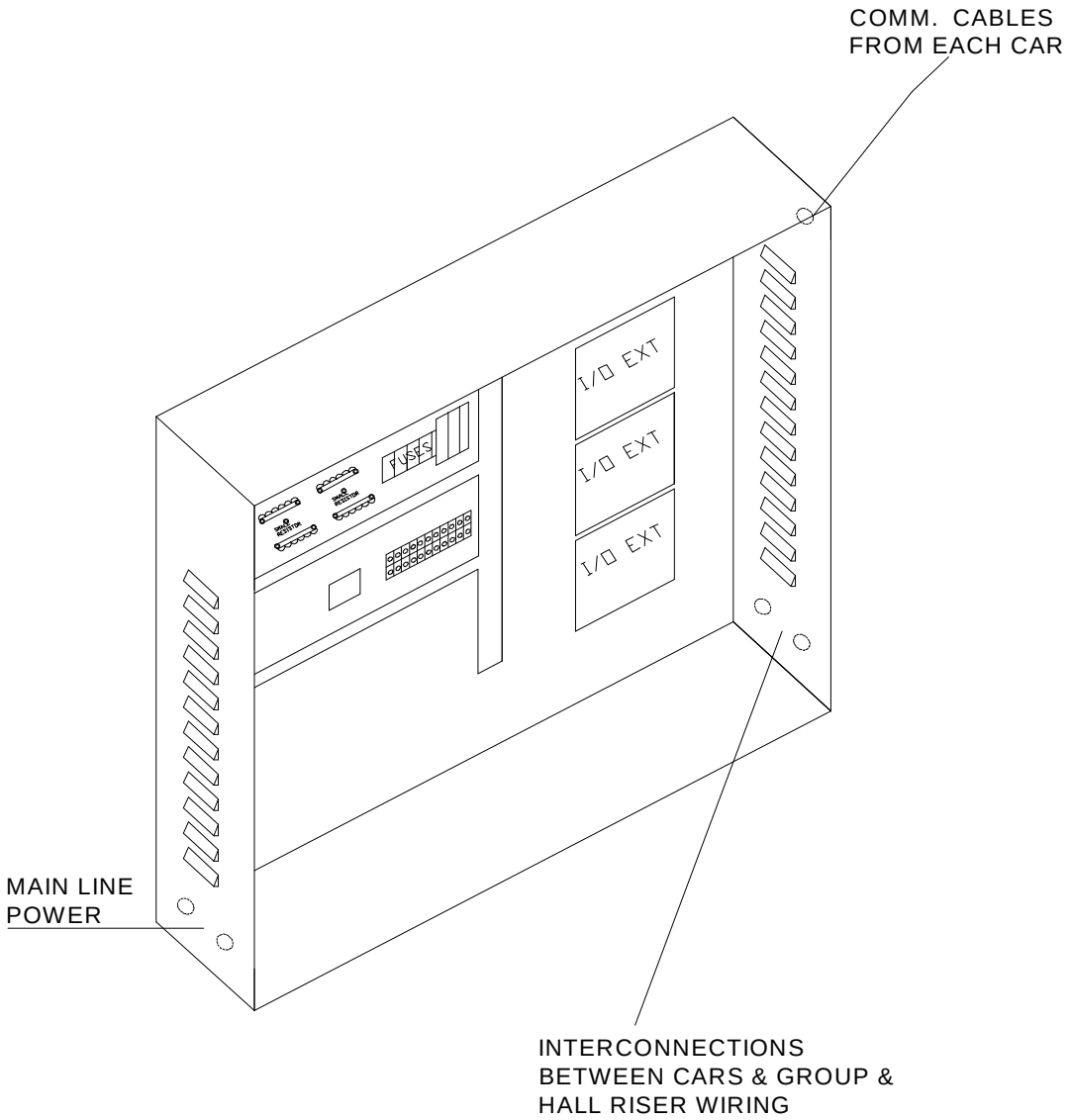
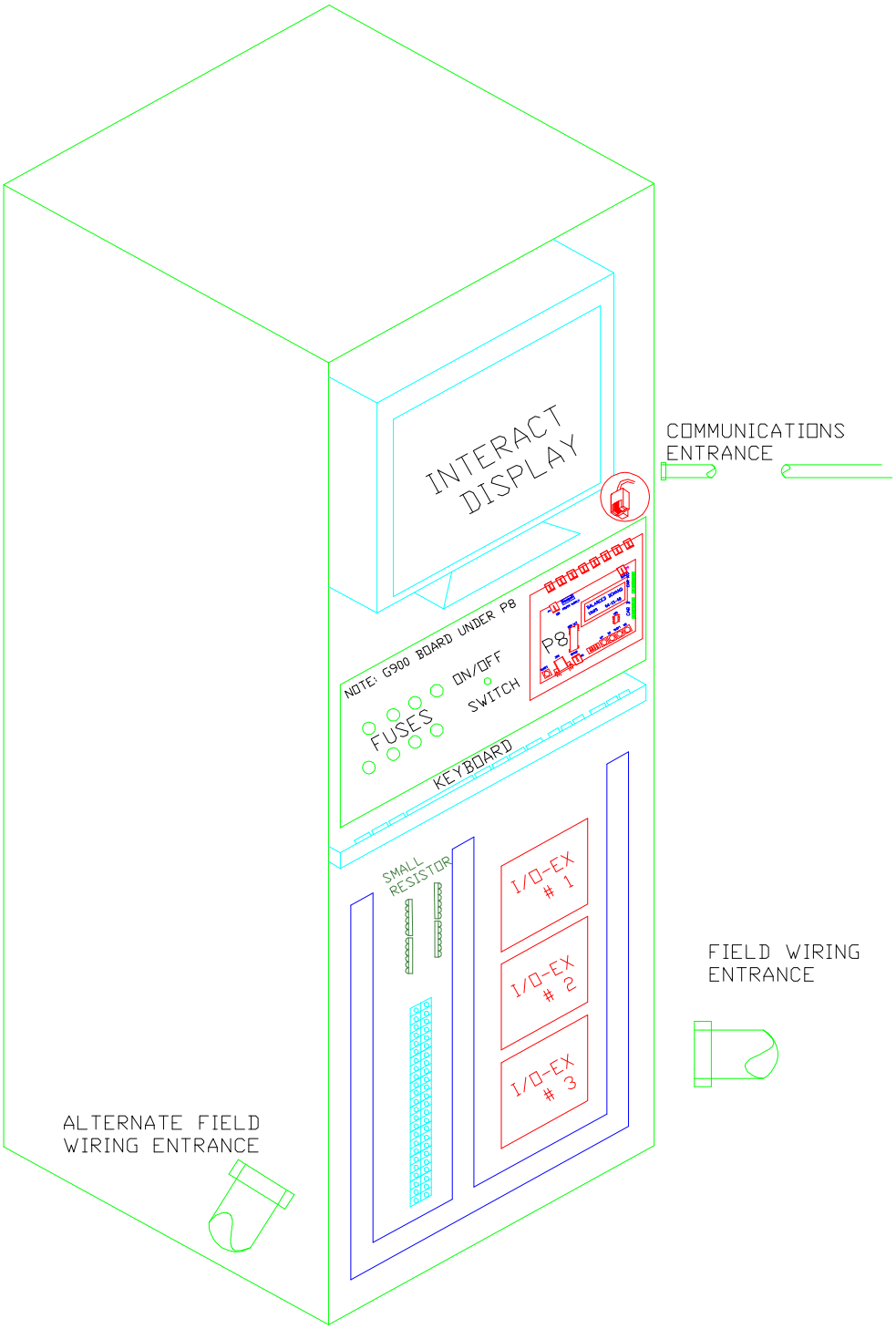


Figure 2.2 – Typical G900 XL Controller Wiring Layout



Section 3 – Startup

3.1 General Information

Protect printed circuit boards from dust and foreign materials. Remove main fuses. Complete elevator controller mounting installation and wiring. Observe controller field terminal locations in relation to wiring ducts in order to determine optimum locations for wiring to enter the control equipment enclosure.

NOTE: The standard G900 controller enclosures have several ¾" knockouts marked for wiring ducts which can be used as guides for location of knockouts required for each particular job.

CAUTION: Use care to protect circuit boards from metal debris when cutting.

3.2 Startup of G900 Group Dispatching System

NOTE: These instructions assume that the installer has a working knowledge of electrical troubleshooting. Follow prescribed procedures carefully.

NOTE: You will find multiple LED indicators on PC boards and onboard computer diagnostics very useful tools that will save installation and troubleshooting time. Read these instructions all the way through before starting work to become familiar with the entire procedure.

The G900 Group Controller prints are made up of two pages Page G1, logic Page, and G2, hoist-way page. The logic page G1 shows how signals enter or are driven by the P8, while page G2 shows a representation us such signals as well as cross connects between each car and the G900 Group controller, observe each car interconnect box to make sure only required signals are cross-connected, each car may have different functions and may require different cross-connections.

NOTE: Communications cables between the G900 Group controller and the cars need to be in a separate metal grounded conduit however all of them can be inside the same conduit with one another.

3.2.1 Test Ground Continuity

Test all terminals for continuity to ground. If continuity is identified, remedy the problem before proceeding.

NOTE: Terminal 3 is connected to ground and is used as system common.

3.2.3 Remove G900 Primary Controller Fuses

Remove fuses F1, and F2 to disable primary controller voltage.

✍ **NOTE**: Always review prints to double check fuse designations and correct amperages, as well as to become familiar with job specific circuit requirements.

3.2.4 Check Disconnect Switch

Check the line side of the disconnect switch and verify for the correct voltage.

WARNING: Make sure power is within 10% of specified control voltage or permanent damage could occur to G900 control logic. Turn off the main line disconnect and correct any voltage problem before proceeding with installation.

3.2.5 Turn on Main Line Disconnect

Turn on the disconnect switch. Verify correct voltages at L1, and L2 terminals, Turn off main line disconnect and install F1 and F2 fuses, turn main line disconnect on.

3.2.6 Verify Fixture Voltages

Verify correct supply voltages for fixtures, fires service and to serial link network if controller equipped with the Ez-Link as follows:

a. Terminal 3 to 50 Hall Call Supply.

b. Terminal 3 to 50H Fire Service Supply.

c. If controller equipper with machine room CRT, verify outlet power to be 120 VAC.

d. Verify that the P8 displays is scrolling and working, disregard any error displayed in the P8 LCD display, if display is off verify P8 microprocessor power supply fuses F3 and F4, and computer power switch to be on the on position.

✍ **NOTE**: Fire Service inputs FRS, FRA, HF1, HF2, Emergency Power input EPI are normally closed contacts, which will need to be closed for normal G900 group operation.

Turn main line disconnect off and finish wiring to G900 controller before proceeding to next section.

Section 4 – Final Set Up

4.1 G900 Group Normal Operation Set UP

The G900 Group controller should be shut down and main power shut off.

a. Unplug all Communications cables from G900 board.

b. Verify all terminal connections and ribbon cables for tidiness and proper seating.

c. Turn power and G900 Group controller on

d. Verify LCD display for error indications and correct as required, refer to Section 6 of this manual for troubleshooting guidance, the objective is to get the LCD to display Intermittent Demand only.

e. Get the Machine Room monitor display installed if G900 Group has been provided with such option. Refer the manual supplied with the monitoring system for installation instructions.

✍ **NOTE**: Interact driven monitoring systems the manual has been loaded in the program Help Menu for reference.

4.2 Ez-LINK Serial Communication System Verification

✍ **NOTE**: For non Ez-LINK systems, skip to Section 4.3.

4.2.1 Verify Communication to Hall Boards

✍ **NOTE**: Make sure the GNA board is hooked on the PVF serial port, refer to job prints for connections.

✍ **NOTE**: The P8 will display and Error "No-Com to Hall XX/YY" where XX= the number of hall boards not responding to the Group Commands and YY= the number of hall boars that need to be present with in the hall node network.

To verify communication to the hall node boards use Direct Access diagnostics menu, refer the G900 Reprogramming manual instructions on how to use the P8 onboard diagnostics tool to view the memory map shown on Figure 4.1 below, Ez-Link hall Node Communications Status , each bit represents one board starting with FH1, front hall board level 1, FH2 front hall board level 2, i.e. FH64 front hall board level 64, and RH1 rear hall board level 1, RH2 rear hall board level 2, i.e. RH64 rear hall board level 64, each bit represents any of following states:

a. Bit solid on represents good communications present.
b. Bit off, no communication present.
c. Bit on/off, intermittent communications exist

Figure 4.1 – Ez-LINK Hall Node Communications Status

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
8450	FH8	FH7	FH6	FH5	FH4	FH3	FH2	FH1	Front Hall Call Boards Communications Status Map
8451	FH16	FH15	FH14	FH13	FH12	FH11	FH10	FH9	
8452	FH24	FH23	FH22	FH21	FH20	FH19	FH18	FH17	
8453	FH32	FH31	FH30	FH29	FH28	FH27	FH26	FH25	
8454	FH40	FH39	FH38	FH37	FH36	FH35	FH34	FH33	
8455	FH48	FH47	FH46	FH45	FH44	FH43	FH42	FH41	
8456	FH56	FH55	FH54	FH53	FH52	FH51	FH50	FH49	
8457	FH64	FH63	FH62	FH61	FH60	FH59	FH58	FH57	
8458	RH8	RH7	RH6	RH5	RH4	RH3	RH2	RH1	Rear Hall Call Boards Communications Status Map
8459	RH16	RH15	RH14	RH13	RH12	RH11	RH10	RH9	
845A	RH24	RH23	RH22	RH21	RH20	RH19	RH18	RH17	
845B	RH32	RH31	RH30	RH29	RH28	RH27	RH26	RH25	
845C	RH40	RH39	RH38	RH37	RH36	RH35	RH34	RH33	
845D	RH48	RH47	RH46	RH45	RH44	RH43	RH42	RH41	
845E	RH56	RH55	RH54	RH53	RH52	RH51	RH50	RH49	
845F	RH64	RH63	RH62	RH61	RH60	RH59	RH58	RH57	
8460								Fire Brd	

If the P8 reports any communication errors dial up table 4.1 to determine which boards are not communicating with the P8 and verify the following at each respective Hall node board:

a. Make sure the configuration switch SW1 on Hall node board is properly set for floor and front or rear selection.
b. Verify hall node board status LED 1 top flash 2 to 4 times per second.
c. Replace hall board if status LED is not on.
d. Revise data and power connections to hall node board
e. Replace hall node board

4.3 Verify Group Functions

At this point the G900 Group P8 is displaying Intermittent Demand, if is not refer to Section 6 of this manual for guidance and instructions to correct any error. Verify Fire service operation for the group by activating corresponding Main Fire or Alternate Fire Inputs, and observing the P8 for correct response to input changes, perform the same operation for Emergency Power and any other function listed in the G900 Group IO boards.

Once all functions have been tested incorporate, plug communications cables, cars to the group and observe following:

a. As each car is incorporated to the group the 8M LED on the car P8 will lit up indicating that it is communicating with the G900 Group.
b. Exercise the G900 Group by placing hall calls and noting that the cars get assigned to answer demand calls.
c. If any car is not responding to G900 Group commands refer Section 6 of this manual for troubleshooting guidance.
d. Verify Fire Service, Emergency Power, and any other Group functions present on the G900 Group system for this job for proper performance.
e. Utilize the machine room display if present to observe system performance, and read the G900 Reprogramming manual for option manipulation and system customization if needed.

Section 5

5.1 Section intentionally left blank

Section 6 – Troubleshooting

6.1 General Troubleshooting Tips.

For your convenience, and in order to save troubleshooting time, the G900 Group controller is equipped with multiple indicators that are designed to help you troubleshoot at a glance.

You are strongly advised to pay particular attention to the indicators in the IO-EX boards and the LCD display unit.

✍ **NOTE**: Signal names written with bar on top of the signal name, indicates the signal is in active mode when the LED is off ($\overline{\text{FRS}}$ and $\overline{\text{FRA}}$ are a good examples – when the LED is off they indicate the car is on main or alternate fire mode respectively).

The computer error code LED display will flash a particular status/error code as detected by the P8; a list of these codes can be found permanently applied to the inside of the G900 Group controller door. Extra or replacement copies can be made from the list found in the G900 Group Field Reprogramming Manual, Appendix 1 of this manual.

Computer error/status codes are also displayed in English format on the LCD display. Finally, an optional PC may be used for powerful troubleshooting, diagnostics, and for monitoring purposes.

6.2 G900 Group General Check List

a. Make sure that the car is not on Fire Emergency Service; The P8 will display the fire operation active if any. During normal operation of fire emergency circuits, 24-110V should be present on each fire recall terminal with respect to terminal 3, and FON should have 0 volts, (refer to prints page G1 for fire interface circuits).

b. If all terminals for Fire Emergency Service are properly set, activate the reset input RES to clear any latched fire status, i.e. per ASME code if the system goes into fire service the only way to reset is by rotating the fire recall key switch to Reset and then back to off.

c. Verify that each power control step-down transformer has the correct secondary voltage (refer to Controller Schematic page G1 for terminal and fuse numbers). Replace fuses as necessary.

✍ **NOTE**: System common is the 3 buss, (normally terminal 3 is connected to chassis ground) unless otherwise noted all DC voltage measurements are with respect to Terminal 3 or chassis ground.

6.3 Microprocessor Error Reporting and Correction

The table 6.1 below shows the different faults that can be generated from the normal monitoring portion of the G900 Group system as follows:

Scrolling Message: Indicates the display shown on the LCD display for each fault.
Description and Possible Solution: Explains how the fault was generated and possible solution to fault.

✍ **NOTE**: A group of special conditions are recognized by the microprocessor. If one of these "errors" occurs, a code will be displayed corresponding to that condition. The microprocessor will scroll up to 4 errors at a time on the LCD display. The eight LED array will display the error that needs too be corrected first, that is, the one with the highest priority.

✍ **NOTE**: The field technician should look first to the LED array to identify the error that needs to be corrected first. Error codes can be found in this Section (below) and on the inside of the control equipment enclosure door.

Figure 6.1 – Fault Conditions that will Prevent system normal operation

Scrolling Message	Description and Possible Solution
Main Fire Service	Fire Recall switch is set to the FON position, Main floor smoke detectors or HF1 smoke detectors activated. **Reset smoke detectors**. **Return cars to the fire floor and turn fire service switch to reset to clear fire service condition then to OFF position.**
Alternate Fire Service	Alternate floor smoke detectors or HF2 smoke detectors activated. **Reset smoke detectors. Return cars to the fire floor and turn fire service switch to reset to clear fire service condition.**
Emergency Power Phase 1	Emergency Power contact opened and removed power from EPI input. **Verify Emergency Power Contact and correct as needed**
Emergency Power Phase 2	Emergency Power contact opened and removed power from EPI input, cars were returned to the main lobby and the G900 is now running on Emergency Power Phase 2 operation. **Verify Emergency Power Contact and correct as needed**
Channel a Cable Disconnected or IO-EX board missing	The P8 is not reading the end of the IO chain on channel A. **Verify jumper on last IO-EX board and ribbon cable, remove one board at a time from end of chain forward by removing ribbon cable and placing the end of chain jumper on next board to identify a bad board or ribbon cable, replace as needed**
Channel b Cable Disconnected or IO-EX board missing	The P8 is not reading the end of the IO chain on channel b, only present when using cross cancellation panel. **Verify jumper on last IO-EX board and ribbon cable, remove one board at a time from end of chain forward by removing ribbon cable and placing the end of chain jumper on next board to identify a bad board or ribbon cable, replace as needed**

Fault Conditions indicating group dispatching mode of operation	
Intermittent Demand	Car is responding to a hospital emergency request.
Balanced Demand	The group is operating on Balanced Demand mode operation
Up Peak demand	The group is operating on Up Peak Demand mode
Down Peak Demand	The group is operating on Down Peak Demand mode
Lobby Up Peak demand	The group is operating on Lobby Up Peak Demand mode
Security Operation	The group Security BSI input has been activated and is now operating on security mode
Hospital Service	The group Security HSI input has been activated and is now operating on Hospital Service mode operation
Password Key Entered	There is a password programmed to the P8 and has been entered to allow programming access to the system
Write Failure to Eeprom	The P8 is not able to write to the Eeprom memory locations and the personality chip needs to be replaced.

6.4 Hall Call Button Problems

Problem	Solution
G900 Group assigns a hall call but call registration lamp will not light.	After verifying that the bulb is not burned out, check to see if the problem is internal to the controller or in the external wiring. This is most easily observed by noting if associated LED is lit. If it won't show call registration, check for voltage on call common supply. Should the common voltage be correct, replace the associated input/output Triac/ Zenner Diode, or IO-EX board.
Problem	Solution
G900 Group will not respond to a specific hall call.	If the system does not register a hall call (or a group of hall calls) but the rest of hall calls functions normally otherwise, the hall call information is not reaching the computer data storage memory. First make sure that the car and hall call common (terminal 50 for car calls or terminal 50 for hall calls) have proper fixture voltage with respect to terminal 3 buss. Next, check the terminals on the controller. One easy method of determining whether the problem is internal to the controller or in the external field wiring is to momentarily jumper 3 to the hall call terminal number in question. If the hall call is latched the problem is external. If not: (1) Check that when call terminal is jumpered to terminal 3, the corresponding LED lights up, then refer to G900 Field Reprogramming section 1.13 to observe memory flag HCCD, Hall Call Disconnect function, inside computer indicating computer not accepting calls. (2) Replace the associated input/output board.

6.5 Microprocessor Troubleshooting

This section is intended to help determine if the Computer Logic Check indicates a faulty board, and if so, which if any of the microprocessor system logic boards is bad so that a good board can be substituted. No attempt has been made to diagnose specific problems that might occur on any particular board, since doing so requires specialized test equipment, which is not generally available to elevator service mechanics in the field.

Assume it has been determined that an output signal is not being sent by the computer system when conditions indicate that a signal should be present. The next step is to determine whether the computer is attempting to turn on the output or not, and if not, what might be preventing it from doing so.

To find out what the computer is trying to do or "thinking", look into the computer memory itself using the onboard diagnostics described in the G900 Field Reprogramming Manual.

6.5.1 Troubleshooting Example

For example, let's say the P8 is displaying Emergency Power Phase 1 and the cars are being returned to Emergency Power Recall floor. The EPI input terminal is located and the associated input LED is off, meaning the emergency power contact is not activated. Set the diagnostics switches as described in the G900 Field Reprogramming Manual. Locate the EPI input on the Memory Flags Listing page, which indicates an address of 8420 bit 6 for EPI. Check the LED indicator corresponding to address location 8420 and observe that the LED is on.

This indicates to the computer program that the EPI input is active even do the associated input LED indicator is off. This must mean that either the EPI signal input is not coming in, or the computer incorrectly reads it as on. Measure voltage at the EPI terminal it must be the same as the 50 buss power, if it is we can conclude that the microprocessor is reading the wrong input state from the corresponding IO-EX board and to resolve the problem the IO-EX will need to be replaced. Based on the method used in this example, any other input/output can be traced to the computer memory to help identify the cause of the fault.

6.6 Hardware Logic

6.6.1 Computer Power Supply

The proper voltage to the computer board is +5VDC +/-5%; this voltage should be checked at the power supply +OUT to -OUT terminals. Adjust with caution, as a trip will result if voltage is adjusted too high. To reset a trip, reduce the voltage adjustment, then cycle power.

CAUTION: Adjusting output too high will cause the unit to trip.

6.6.2 Microprocessor Board

On the microprocessor board there are nine LED's (light emitting diodes), five pushbuttons, and four switches. The On LED for the P8 microprocessor being on indicates that the board is running but not necessarily functioning normally. The eight remaining LED's (in a row) display error/status codes the LCD display will display this information in English format.

Refer to the G900 Field Reprogramming Manual for more details on the use of microprocessor PC board switches.

WARNING: Do **NOT** depress the microprocessor-reset button while any car is running, as it will cause an emergency stop. Use extreme care.

A group of special conditions are recognized by the microprocessor. If one of these "errors" occurs, a code will be displayed corresponding to that condition. The microprocessor will scroll up to four errors at a time, which show on the LCD display. The eight LED array will display the error that needs too be corrected first, that is, the one with the highest priority. The field technician should look first to the LED array to identify the error that needs to be corrected first. Error codes can be found in Section 6.2 of this manual as well as an explanation and correction instructions.

6.6.3 IO section, I/O-EX boards

The I/O-EX board performs the task of buffering or protecting the five volt computer logic environment from the electrically noisy 110 volt outside world. For this reason, most microprocessor system problems occur on the I/O boards.

The input buffer section of the I/O accepts high-level inputs and converts them to five volts computer signals. The I/O-EX boards also provide low-pass filtering to reduce noise susceptibility and Schmitt triggers to increase noise margin.

The output portion of the IO-EX is field replaceable. The replaceable components consist of an output Triac and a Zener diode, which can be identified by the corresponding LED number (i.e. LED 77 corresponds to Triac 77 and Zener diode Z77).

To determine if the Triac is bad, note that normal behavior of the output will be to turn on such signal as soon as power is applied to the controller. If the Zener diode is shorted, the output will not come on until the controller turns it on, and once turned on it will not be able to be turned off.

A Zener diode has the same characteristics as a standard diode. Using a standard multi-meter on diode check mode, the diode shall conduct in one direction only, when the positive meter lead is placed on the anode side (non-belted side of the diode) and the negative lead on the cathode side of the diode, and shall not conduct if meter leads are reversed. If a diode conducts in both directions, it is shorted and needs to be replaced.

If a Zener diode requires replacement, remove it using a pair of pliers. Trim leads on the replacement diode to the proper length, and then carefully insert the new diode into position.

6.7 Group to Cars Communications troubleshooting

To verify communications between G900 Group and slaved cars perform the following steps:

1. Telephone communication cables between cars and G900 controller need to be run inside a grounded metal conduit, and outside any conduit inside the G900 controller or car controllers.
2. If replaced or shortened length of communications cable make sure ends of cable are terminated backwards from each other, Null Cable, i.e. red cable on one end needs to be on the opposite side of telephone connector at other end.
3. On the car while scrolling the 8M Led on the P8 should be solid and the following address indicate whether the car is receiving data from the group, used Direct Access to view:
    a. Slave Memory = address ED39 should count from 1Ch, for car controller Version 5.x software and address EC80 from 64h, for car controller Version 1.xx.xx software, down to a minimum of 10h & should , if count gets below 10h intermittently redo both ends of telephone cable and perform steps 1 and 2 above.
    b. Slave Memory = address ED38, for car controller Version 5.x software only, should always be 80h, if it ever goes to 0 we are intermittently loosing communications, perform steps 1 and 2 above.

4. On the group the G900 P8 stores the good and bad communication rates per car use Direct Access to view addresses per table below:

G900 Group Communications Rate Counters

Car Number	Good Communication Counter	Bad Communication Counter
1	8680	8688
2	8681	8689
3	8682	868A
4	8683	868B
5	8684	868C
6	8685	868D
7	8686	868E
8	8687	868F

NOTE: Good communication counters should increment at a constant rate of 2 to 4 times per second, and no activity if respective communication cable is not connected. Bad communications counter should increment once or twice a day at most. If any car communications rate counter is not performing accordingly perform steps 1 and 2 above.

5. If performing steps 1 and 2 above does not correct the problem, move the communications cable for car with problem to a known G900 working port, if problem moves with the cable replace the P8 board in the car controller, if problem stays with the G900 port replace the G900 communications board.

Section 7

7.1 Section intentionally left blank

Section 8- Dispatching Options

8.1 Specifications G900 Group System

Elevator Controls Model G900 microcomputer based Group System utilizes state-of-the-art, large-scale integrated circuits and a high performance, modular circuit board design to optimize reliability while simplifying installation and maintenance.

The system provides means of supervising and coordinating the individual elevator cars in a group of two to sixteen cars to maximize the level of efficiency in serving the varying elevator traffic needs in the building, while minimizing passenger waiting time.

For group operation, each controller has a dedicated serial phone type jack connection to the group system and all diagnostics are accessible without requiring the need to attach external tools or troubleshooting devices.

8.2 Primary Dispatching Methodology

The Group System electronically calculates and continuously evaluates the traffic demand. It automatically changes the method of supervision or the assignment of hall calls to various cars in the group as appropriate to maximize efficiency in response to the demand of prevalent traffic.

The system continuously inventories the number of cars in service, car location, direction, hall call demand and car call demand distribution throughout the building. Then, based upon estimate of the time required to serve calls, determines which car is in the best location to answer each hall call. If it is determined that the car in the best location will exceed a desired minimum response time estimate, another available car is selected in order to improve response time despite increased distance from the floor at which the call originated.

This scheme optimizes the efficiency of car movement in the building while providing a desired response time as defined by field reprogrammable system parameters.

The efficient movement of elevator in response to hall calls under this scheme not only provides the desired response time but shall also enhances the lifetime of elevator equipment by minimizing wear and tear due to needless movement of the elevators.

A powerful and comprehensive balanced mode is utilized to efficiently dispatch two-way traffic including heavier up or down traffic, and up peak and down peak modes to handle extreme conditions such as those encountered at the beginning and end of a typical workday.

The balanced mode provides a comprehensive, optimized and flexible traffic dispatching scheme, including detection and response to imbalances where traffic is much heavier in one direction than the other. The Group System shall operate effectively in handling the full range of traffic volume from zero to very heavy traffic.

The method of call assignment is selected based on real time, electronic calculations designed to continuously evaluate traffic demand and system status. Automatic and continuous

adjustment of call assignment method and call reassignment is transparently implemented to optimize estimated time of arrival (ETA), consistent with minimum elevator travel. The system's dynamic selection algorithm makes preliminary car-to-call assignments based on best call response time, derived from the car's position and direction. The final assignment evaluates multiple parameters including, but not limited to, the following:

a. Number of hall calls ahead of the car.
b. Number of car calls ahead of the car.
c. Response time to stops ahead of the car.
d. Coincident calls.
e. Maximum hall call response time.

The results of this evaluation shall produces final call-to-car assignment or the placement of the call into a high priority call map, wherein it is assigned to another car which may be further away from the call but whose assignment will result in a better response time, to provide the shortest possible waiting time for passengers.

As cars become available without demand, the system distributes cars to predetermined, field reprogrammable parking floors within unoccupied zones, according to a fixed zone parking scheme. If the lobby zone is unoccupied and unassigned, any available car will be moved to that zone without delay. The next car that becomes available for service will be moved if necessary, after an adjustable delay (and in absence of demand), to the closest unoccupied and unassigned zone.

8.3 Lobby Up Peak Traffic

Lobby up peak operation shall detect and respond to up peak demand by returning all cars to the lobby, where they shall reverse and leave on a first-car-in, first-car-out basis. Cars shall close their doors and leave the lobby when they are either loaded to a predetermined adjustable level, or when the lobby door time expires. Cars shall travel to their highest call whereupon they shall reverse and travel nonstop back to the lobby. Lobby up peak traffic shall have priority over down calls. A down service timer shall provide service to down calls during lobby up peak operation. The selected or next car to arrive shall park with its doors opened and cars subsequently arriving at the lobby shall park with their doors closed.

8.4 Down Peak Traffic

Down peak operation shall detect and respond to down peak demand by reversing cars at their lowest call, whereupon they shall travel nonstop to the highest call in the building. From there they shall collect down calls as encountered, until the cars are loaded (to a predetermined adjustable level). Cars shall then bypass hall calls until a low call reversal has been made.

The next up-traveling car shall stop and reverse at the floor below the floor where the prior car’s load sensing switch operated, placing it in hall call bypass mode. It shall then collect down calls in the same manner as the car before, until loaded, then bypass hall calls to its low reversal floor. All cars shall continue to operate in this manner until the load reversal floor is

one floor above the lobby, or a car makes a low reversal without bypassing hall calls. Cars shall then travel to the highest call registered, restarting the sweeping operation.

Down peak traffic shall have priority over up calls during down peak operation. An up service timer shall ensure service in response to up calls during down peak operation.

8.5 Up Peak Traffic

Up peak operation shall detect and respond to up peak demand by reversing the cars at their highest call whereupon they shall travel nonstop to the lowest call in the building. From there they shall collect up calls as encountered until the cars are loaded (to a predetermined adjustable level). Cars shall then bypass hall calls until a high call reversal has been made.

The next down traveling car shall stop and reverse at the floor above the floor where the prior car's load sensing switch operated, placing it in hall call bypass mode. It shall then collect up calls in the same manner as the car before, until loaded, then bypass hall calls to its high reversal floor. All cars shall continue to operate in this manner until the lead reversal floor is floor one below the top floor, or a car makes a high reversal without bypassing hall calls. Cars shall then travel to the lowest call registered, restarting the sweeping operation.

Up peak traffic has priority over down calls during up peak operation. A down peak service timer shall ensure service in response to down calls during up peak operation.

8.6 Fire Service

The fireman service operation and normal operating features are to be incorporated in accordance with the American National Standard Safety Code (ANSI A17.1) and applicable state and local codes.

8.7 Sequential Starting

Upon application of power, whether normal or emergency, the Group System shall be provided with the means to sequentially start only one car at a time, bypassing those cars not responsive to the start signal, until all cars have been started. This operating sequence shall ease the surge demand on the building's power supply.

8.8 Idle Car Shut Down (for systems with MG-sets)

As the demand on the system decreases and individual car demand ceases, each car shall be allowed to shut down after a predetermined adjustable period of time.

8. 9 Emergency Power Operation

When emergency power generation is detected, elevator cars shall be automatically returned one by one to the main lobby. As each car arrives, doors will be opened and the car shall remain at the lobby with the doors opened. While each car is being returned to the lobby, all other cars shall be shut down to avoid any overload of the emergency power generating system.

Once all cars have been returned to the lobby, one or more cars shall be selected to run under emergency power, based upon the predetermined capacity of the emergency power generator. Emergency Power Operation shall not allow more cars to run than can be safely handled by the emergency power generator. The actual number of cars operated shall be an adjustable predetermined value.

8.10 Medical Emergency Service/Code Blue

Medical Emergency Service/Code Blue shall call any in-service elevator to any floor on an emergency basis, operating independently from Group System and landing call signals. A medical emergency call switch shall be installed at each floor where the ability to enable emergency service operation is desired.

The medical emergency call key switch shall be a two-position, key-operated, momentary-pressure, spring-return-to-off type switch, with a call registration light jewel provided adjacent to each switch.

When a medical emergency call switch is activated at any floor, the call registration light jewel will illuminate at that floor only, and the elevator Group System shall instantly select the nearest available elevator in group service to respond to the medical emergency call.

Immediately upon selection, all car calls assigned to this car shall be canceled. Further, any landing calls which have previously been assigned to that car will be transferred to another car.

If the selected car is traveling away from the floor at which the medical emergency call was entered, the car will slow down, stop at the nearest floor (maintaining doors closed), reverse direction, and proceed nonstop to the medical emergency call floor. If the selected car is traveling toward the floor at which the medical emergency call was entered, it will proceed to that floor nonstop unless, at the time of selection, it happened to be slowing down for a stop, in which event, the car will stop, maintain doors closed, and immediately restart, responding to the medical emergency floor call.

Upon arrival at the medical emergency floor, the car shall remain with doors open for an adjustable time interval (that may be set within the range of 10 to 30 seconds). After this interval has expired, if the car has not otherwise been placed on medical emergency operation from within the car, it will automatically return to normal service.

A medical emergency key switch shall be located in each car operating station for selecting medical emergency service. Upon activation of the key switch, the car shall accept a call to any floor, close doors, and proceed nonstop to the selected floor. Return of the key switch to the normal position shall restore the car to normal service.

Any car selected to respond to a medical emergency call shall be removed from group service and shall accept no additional calls, emergency or otherwise, until the medical emergency key switch has been returned to the normal position.

Any car in group service may be selected. Additional medical emergency calls, as they are registered in the system, shall cause additional cars to respond as described, on the basis of one medical emergency call per car.

All of the key switches for all elevators in the medical emergency service system shall operate from the same key. The medical emergency call service key shall not operate any other key switch in the elevator system, nor shall any other key used within the elevator system operate medical emergency call service switches.

If all cars are out of service or otherwise unable to answer an emergency call, the registration light shall not illuminate.

Section 9 – Maintenance

9.1 Maintenance

The Elevator Controls Microprocessor Elevator Controller has been designed to require as little routine maintenance as possible. In fact, the mechanical interconnections are the least reliable portion of the solid-state system, and the less they are disturbed, the more likely the system is to continue to function properly.

The elevator itself, however, is a complex mechanical apparatus, and therefore requires periodic routine preventive maintenance. In addition to lubrication of the various moving parts, the door lock contacts should be cleaned and inspected regularly since the exposed contacts are susceptible to dirt and corrosion. The doors also receive the most wear, often making two or even three cycles at a floor.

The various rotating machinery belts and couplings should be routinely inspected for wear. Wear could cause loss of control of the elevator car. If the elevator system develops problems or becomes inoperative refer to the Troubleshooting guide Section 6 of this manual.

9.2 Replacement Parts List

9.2.1 Elevator Controls PC Boards

1) P8 Main microprocessor board (Standard controllers only).
2) G900 Communications Microprocessor
3) IOEX-Vxx Input-output expander board.

✍ **NOTE**: xx is the fixture voltage

For EZ-Link systems only

1) Hall Microprocessor for hall stations.

9.2.3 Fuses

AGC 1, 2, 3, 5, 6,10, 15 AMP 250VOLT
MDA TYPE 3, 5, 10 & 15 AMP 250 VOLT
FNQ 5, 10 500 VOLT (440 to 480 VAC power supply)

9.2.4 Power Supply

Power One HB5-3/OVP, 3 Amps @ 5VDC

9.2.5 Semiconductors

Motorola HEP-RO170
Motorola 1N5347B – 10V, 5 Watt, Zener Diode
Motorola 1N5333B – 3.3V, 5 Watt, Zener Diode
Tecor L4004F31 – 4 AMP, 400 VOLT, Sensitive Gate Triac

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