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M3 Group System

General

The M3 Group System includes a group dispatcher and up to twelve IMC, VVMC, VFMC traction or HS hydraulic controllers (HS uses HMC Group System). The M3 Group System is based on a state-of-the-art network of microcomputers linked together through a high speed data communication link.

The Group System analyzes building traffic conditions including, but not limited to hall call demand, number of assigned hall calls, number of cars in operation, number of car calls, number of car stops, car position, car direction, anticipated direction of car travel, car loading, car status, car motion status, car door status, call waiting time, door opening time, door closing time, coincidence calls, and estimated time of car arrival.

The Group System evaluates real time data and selects the best car to serve a given hall call demand. The assignment of cars by the Group System provides efficient handling of varying traffic demands in terms of passenger waiting and transit time.

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M3 Group System Specifications

The group system shall be based on a multi-tasking/multi-processing network of microcomputers. At a minimum, a 32-bit embedded RISC controller that operates at 16 MHz or faster shall be provided. The Group System computer shall have the capacity to address four megabytes or more of EPROM plus RAM, and shall provide up to eight industry standard serial communication ports for use with modems and other peripherals.

Specification Text, M3 Dispatching Algorithm

The dispatching algorithm shall use mathematical modeling and queuing theory to optimize elevator service. The dispatching algorithm shall minimize the mean waiting time, the maximum waiting time and the number of late calls.

This algorithm shall cover all two-way traffic demands including light, medium, and heavy traffic situations. The algorithm shall compile the required physical and statistical data and parameters necessary to perform the above minimization tasks.

Specification Text, Parking Operation

Group system software shall include sophisticated parking programs that provide flexible parking options allowing the user to select the most efficient parking configuration for a specific building. Parking floors shall be divided into two groups: lobby parking floors and non-lobby parking floors. Lobby parking floors are the floors where a lobby function is performed. Non-lobby parking floors are floors where the car performs a regular parking function.

There shall be any number of user definable lobbies with four levels of priority to allow maximum system flexibility. More than one car could park at any lobby, and the number of cars that can park at any lobby shall be field programmable.

There shall be 15 levels of priority for non-lobby parking floors. When all lobby parking floors are occupied, the next car that is ready to park shall park at the highest priority non-lobby floor. If all the non-lobby parking floors are of the same priority, the next car that is ready to park shall park at the closest non-lobby floor. The priorities for non-lobby parking floors shall be field programmable and more than one car could park at any non-lobby floor.

For motor generator systems, once a car is parked for a preset time period, its MG shall shut down. The MG shutdown time shall be field adjustable. A parked car with its MG shutdown shall not respond to any hall calls unless the Group Supervisor detects that the hall call demand has increased to a level that requires the service of a shutdown car.

Specification Text, Lobby Operation

A lobby floor is a floor designated to be a lobby. A user programmable option shall allow the first car that parks at a lobby to park with its doors closed, with its doors open for a programmable time period, or with its doors open indefinitely.

Specification Text, Time Activated Dispatching Configurations

The group system shall allow eight different system configurations to be programmed by the user. The programmable parameters for each configuration shall include the dispatching mode of operation, lobby parking floors, non-lobby parking floors, lobby operation, lobby and non-lobby parking delay timers, and long wait hall call threshold times. The user can invoke any of these configurations, any time of the day. There shall be up to 16 time selections for these configurations.

Specification Text, Traffic Identification Operation

The group system software shall operate as a dynamically balanced system for two-way traffic. Depending upon the traffic pattern in the building, the Group Supervisor shall automatically modify the mode of operation to lobby up peak, demand up peak, or demand down peak.

Specification Text, Lobby Up Peak

The lobby up peak mode shall be capable of being initiated using a switch input, by manual selection from the keyboard, by timed configuration or by automatic monitoring of load weigher inputs and/or the number of up car calls registered at the main lobby floor(s). The lobby up peak condition shall be classified as low or high and shall be programmable from the display terminal. A high level of lobby up activity shall assign more cars to the lobby than a low level.

The lobby up peak program shall handle heavy incoming traffic at one or two lobby landings, at the same time or at different times. This program shall assign one or more cars to the lobby depending on the lobby up peak classification for that particular lobby. The first car at the lobby shall stay with its doors open or closed for a programmable length of time. If more than one car is assigned to the lobby, then all other cars shall stay at the lobby floor with their doors closed. The loading car shall stay at the lobby landing for the duration of the up peak interval, unless dispatched by the loaded car input.

A peak participating car is a car assigned to participate in lobby up peak operation. Depending on the level of traffic, the system shall assign a variable number of cars for lobby up peak operation. All non-lobby up and down hall calls shall be assigned to non-peak participating cars. The selection of cars shall be done dynamically.

Specification Text, Demand Up Peak

Demand up peak mode shall be capable of being initiated using a switch input, by selection from the keyboard, by timed configuration, or as automatically determined by the system.

The demand up peak program shall reverse the car's direction at its highest call and cause it to travel nonstop to the lowest call in the building. The cars shall collect up calls as they are encountered until the cars are loaded to a predetermined adjustable level that shall then cause the cars to bypass hall calls until they make a high call reversal. The next down-traveling car shall stop, reverse direction at the floor above the floor at which the prior car's load switch operated and then collect up calls in the same manner as the previous car.

Specification Text, Demand Down Peak

Demand down peak mode shall be capable of being initiated by using a switch input, by selection from the keyboard, by a timed configuration, or automatically as determined by the system.

The demand down peak mode shall reverse the car's direction at its lowest call and cause it to travel nonstop to the highest call in the building. The cars shall collect down calls as they are encountered until the cars are loaded to a predetermined adjustable level that shall then cause the cars to bypass hall calls until they make a low call reversal. The next up-traveling car shall stop, reverse direction at the floor below the floor at which the prior car's load switch operated and then collect down calls in the same manner as the previous car.

Specification Text, Emergency Dispatch

In case of a malfunction in the Group System communication network, the computers operating the individual car computers shall detect the malfunction and provide emergency dispatching of all in-service cars.

Specification Text, Emergency Power, Optional

When emergency power is detected by an input, the cars shall be returned to the main lobby one at a time, and remain there with doors open. Once all cars have been returned to the lobby, one or more cars may be selected to run under emergency power. Selection of the cars that will run under emergency power shall be done automatically by the Group Supervisor. This automatic selection may be overridden through manual selection. The actual number of cars allowed to run under emergency power shall be a preprogrammed value and the Group Supervisor shall not allow any more than the preprogrammed number of cars to run on emergency power.

Specification Text, Out-of-Service

The system shall automatically remove any car from group operation if the car is delayed in responding to demand for a field adjustable time period. The system shall automatically restore the car to system operation when the reason for the delay has been corrected.

Specification Text, Loaded Car Dispatch, Optional

Waiting time shall be removed from the main lobby dispatching interval when a car becomes loaded to a predetermined adjustable level.

Specification Text, Display Terminal

A CRT terminal or an IBM compatible computer shall be provided for the machine room. These devices shall provide menu driven access to reports and other functions. At a minimum, the following reports shall be provided:

Job Configuration - This report shall provide a brief description of the system, including the job number, programmable job name, number of cars, number of landings, openings per landing for each car, programmable car designation, programmable landing designation, fire service options, serial communication port definitions, and other system options.

System Performance Graph - This report shall provide elevator system performance data based on hall call waiting times. At the end of each hour, the number of up and down hall calls and the up and down waiting time averages shall be calculated and saved in non-volatile RAM. This information shall be stored for a minimum of seven days.

Hall Call Distribution - This report shall provide hourly hall call distribution in a tabular format for each hour, showing the number of hall calls which were answered within 15 second intervals for each landing and direction, and the percentage and number of cars that were in service during a specified time frame. This information shall be stored for at least 24 hours.

Graphic Display of Elevator Status - This report shall provide a graphic display of the elevator hoistway to give the user a comprehensive picture of car location, door status, direction of travel, car calls registered, hall calls registered, hall call assignments, estimated time of arrival of a car for a registered hall call, wait time of a registered hall call, floor labels, system status, and car status. The per-car status window shall display car status including automatic operation, inspection, fire service main and alternate, timed out of service, top floor demand, and bottom floor demand.

Entering Hall and Car Calls - The display terminal shall provide a means for entering hall and car calls using the arrow and enter keys. If the call is valid and registered, a corresponding symbol shall be displayed on the screen.

Dispatching Parameters - The display terminal shall be capable of monitoring and adjusting the group dispatching parameters, including, but not limited to, the eight configurations of parking floors and their priorities, system mode of operation, parking delay times, etc., system parameters of long hall call wait threshold time and lobby up peak parameters.

Real-Time Clock - The display terminal shall provide the capability to program the group system real-time clocks (Group Supervisor and all car controllers).

Car Flags - The display terminal shall provide simultaneous viewing of most individual car flags to detect important sequential events.

Special Events Calendar - The Group Supervisor shall have the ability to document 250 to 500 important fault conditions or events in a Special Events Calendar. The data shall include the type of fault or event, the date and time it occurred, and the date and time it was corrected.

The display terminal shall have the ability to display the Special Events Calendar entries in chronological order to allow the user to examine the documented faults or events. In addition, a description of each event, probable cause(s) of the fault or event and suggested troubleshooting tips shall be provided on-line. The capability to clear all the documented faults and events shall also be provided.

Specification Text, Printer, Optional

A printer shall be provided to allow a permanent copy of reports available from the display terminal to be printed for records or easy reference.

Specification Text, SmartLINK for Hall Call Signals, Optional

The group system shall use the SmartLINK for Hall Call Signals serial communication system. See Section 10 for details about SmartLINK for Hall Call Signals.

Specification Text, Basic Security, Optional

The display terminal shall provide the capability to program the adjustable variables and display information for Basic Security. See Section 15 for details about Basic Security.

Specification Text, ACE Security, Optional

The display terminal shall provide the capability to program the adjustable variables and display information for Access Control for Elevators (ACE). See Section 15 for details about Access Control for Elevators (ACE).

Specification Text, Security Interface System for Windows, Optional

Specification Text, Central Monitoring System (CMS), Optional

The capability to monitor the M3 Group System from a local and/or remote location using a PC and Central Monitoring System (CMS) software shall be provided. See Section 14 for details about CMS.

Specification Text, Keyboard Control for Elevators (KCE), Optional

The display terminal, through CMS, shall provide the user with a submenu allowing programming of certain key functions (Central Monitoring System required). Consult your MCE Sales Representative.

Specification Text, Multiple System Display (MSD), Optional

The capability shall be provided to simultaneously monitor a number of M3 Group Systems through a PC using an easy-to-understand display. MSD is typically used as a lobby display where several elevator systems must be monitored at the same time. Up to eight direct connections or up to sixteen Ethernet connections shall be supported.

Specification Text, Split Bank, Optional

The capability shall be provided to automatically, using a timer table, allow one or more cars to operate independently of the group system. Split Bank is typically used for freight cars, express service, shuttle service or swing operation.