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IMC-MG MANUAL

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MCE

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IMPORTANT PRECAUTIONS & NOTES

We strongly recommend that you read this manual carefully before proceeding with installation. Throughout this manual you will see icons followed by a WARNING, CAUTION or NOTE. These icons denote the following:

WARNING: Operating procedures and practices which, if not done correctly, may result in personal injury or substantial damage to equipment.

CAUTION: Operating procedures and practices which, if not observed, may result in some damage to equipment.

NOTE: Procedures, practices or information which are intended to be immediately helpful and informative.

The following general rules and safety precautions must be observed for safe and reliable operation of your system.

The controller may be shipped without the final running program. However, you may install the unit, hookup and run the elevator on Inspection operation. Call MCE approximately one week before you are ready to turn the elevator over to full automatic operation so the running program can be shipped to you. If you need to change a program chip on a computer board make sure you read the instructions and know exactly how to install the new chip. Plugging these devices in backwards may damage the chip.

Elevator control products must be installed by experienced field personnel. This manual does not address code requirements. The field personnel must know all the rules and regulations pertaining to the safe installation and operation of elevators.

This equipment is an O.E.M. product designed and built to comply with ANSI A17.1, National Electrical Code, CAN/CSA-B44.1-M91/ASME-A17.5-1991 and must be installed by a qualified contractor. It is the responsibility of the contractor to make sure that the final installation complies with all local codes and is installed in a safe manner.

The 3 phase AC power supply to this equipment must originate from a fused disconnect switch or circuit breaker which is sized in conformance with all applicable national, state and local electrical codes, in order to provide the necessary overload protection for the drive unit and motor. Incorrect motor branch circuit protection will void warranty and may create a hazardous condition.

Proper grounding is vitally important to the safe and successful operation of your system. Bring your ground wire to the system subplate. You must choose the proper conductor size and minimize the resistance to ground by using the shortest possible routing. See National Electrical Code Article 250-95, or the applicable local electrical code.

Before applying power to the controller, physically check all the power resistors and other components located in the resistor cabinet and inside the controller. Components loosened during shipment may cause damage.

You must **not** connect the output triacs **directly** to a hot bus (2, 3 or 4 bus). This can damage the triacs. PIs, direction arrows, and terminals 40 & 42 are examples of outputs that can be damaged this way. Note: miswiring terminal 39 into 40 can damage the fire warning indicator triac.

The HC-PI/O and HC-CI/O boards are equipped with quick disconnect terminals. During the initial installation, you may want to remove the terminal connector, hook up the field wires, test for no shorts to ground (1 bus) and to 2, 3 and 4 terminals before plugging these terminals back into the PC boards.

ENVIRONMENTAL CONSIDERATIONS: Keep the machine room clean. Controllers are generally in NEMA 1 enclosures. Do not install the controller in a dusty area. Do not install the controller in a carpeted area. Keep room temperature between $32°$ to $104°$ F ($0°$ to $40°$C). Avoid condensation on the equipment. Do not install the controller in a hazardous location or where excessive amounts of vapors or chemical fumes may be present. Make sure power line fluctuations are within $\pm$ 10%.

CONTROLLER OR GROUP ENCLOSURES WITH AIR CONDITIONING

If your controller or group enclosure is equipped with an air conditioning unit, observe the following precautions (failure to do so can result in water condensation inside the enclosure):

- Ensure the integrity of the NEMA 12 or 4 enclosure is maintained by using sealed knockouts and by sealing any holes created during installation.
- Do not run the air conditioner unit when the doors are open.
- To avoid damaging the compressor, if the air conditioner is turned off while it is running, wait at least five minutes before turning power on again.
- Observe the manufacture's recommended maintenance and optimum thermostat setting of $75°$ F (see Operator's Manual).
- Ensure the air conditioner unit's drain hose remains open.

LIMITED WARRANTY

Motion Control Engineering (manufacturer) warrants its products for a period of 15 months from the date of shipment from its factory, to be free from defects in workmanship and materials. Any defect appearing more than 15 months from the date of shipment from the factory shall be deemed to be due to ordinary wear and tear. Manufacturer, however, assumes no risk or liability for results of the use of the products purchased from it, including, but without limiting the generality of the forgoing: (1) The use in combination with any electrical or electronic components, circuits, systems, assemblies or any other material or equipment (2) Unsuitability of this product for use in any circuit, assembly or environment. Purchaser's rights under this warranty shall consist solely of requiring manufacturer to repair, or in manufacturer's sole discretion, replace free of charge, F.O.B. factory, any defective items received at said factory within the said 15 months and determined by manufacturer to be defective. The giving of or failure to give any advice or recommendation by manufacturer shall not constitute any warranty by or impose any liability upon manufacturer. This warranty constitutes the sole and exclusive remedy of the purchaser and the exclusive liability of the manufacturer, AND IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS, FOR PURPOSE SOLD, DESCRIPTION, QUALITY PRODUCTIVENESS OR ANY OTHER MATTER. In no event shall manufacturer be liable for special or consequential damages or for delay in performance of this warranty.

Products that are not manufactured by MCE (such as drives, CRTs, modems, printers, etc.) are not covered under the above warranty terms. MCE, however, extends the same warranty terms that the original manufacturer of such equipment provides with their product (refer to the warranty terms for such products in their respective manual).

SECTION 1
PRODUCT DESCRIPTION

1.0   GENERAL INFORMATION

The IMC-MG traction controller consists of four major pieces of equipment: a car controller, car top selector (landing system), diagnostic tools and peripherals and a group dispatcher. IMC-MG maintains complete regulation under varying loads for exceptional performance with DC motor generators. All controllers have the features listed below:
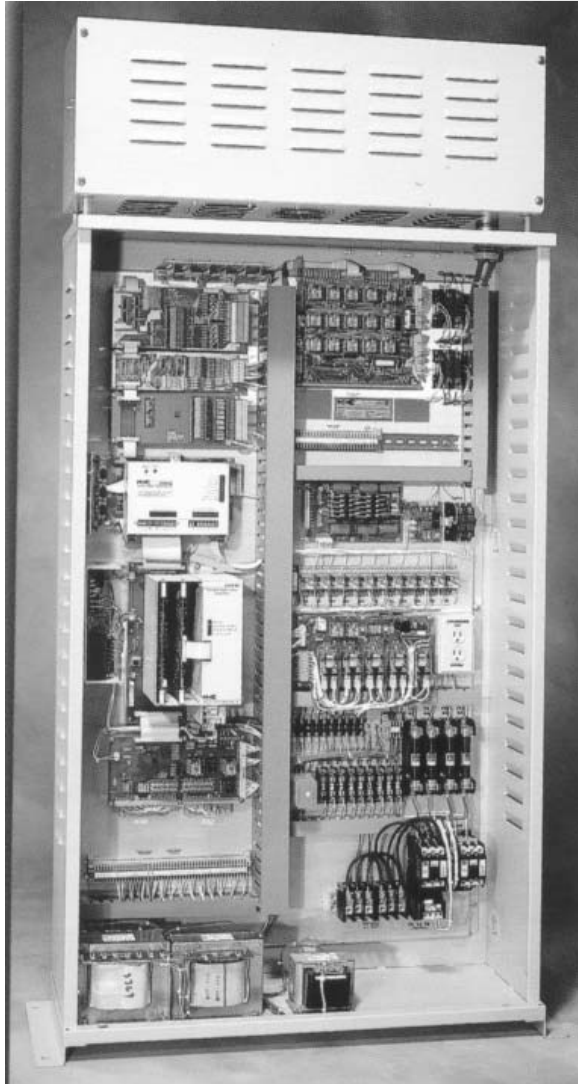
PRODUCT FEATURES

Car Speed	Up to 2500 fpm
Jerk	15 ft/sec^3 (4.572 m/sec^3), maximum 7 ft/sec^3 (2.134 m/sec^3), nominal 1 ft/sec^3 (.305 m/sec^3), minimum
Acceleration	10 ft/sec^2 (3.048 m/sec^2), maximum 4 ft/sec^2 (1.219 m/sec^2), nominal 1 ft/sec^2 (.305 m/sec^2), minimum
Number of Stops	63 (currently available)
Number of Cars in Group	12 (maximum)
Floor Leveling Accuracy	± 1/4 inch (6.35mm), guaranteed ± 1/8 inch (3.175mm), typical
Minimum Floor-to-Floor Time	4.3 seconds for 12-foot (3.66mm) floor heights if rotating equipment is capable of delivering the necessary torque
Environment Limits	32 -104°F (0 - 40°C) ambient 12,000 ft altitude 95% humidity

The IMC-MG traction controller consists of a Car Controller, a Cartop Selector (landing system), diagnostic tools and peripherals (Swing Panel, CRT terminal or PC) and if the controller is part of a group, a Group Supervisor. The computer peripherals and Group Supervisor controller are covered in detail in separate manuals.

IMC-MG controller diagnostics and adjustments are performed through the Computer Swing Panel and the CRT terminal or a PC running terminal emulation software or MCE's Central Monitoring System (CMS for Windows) software. The CRT terminal or PC can be connected to the controller directly or through a modem. The controller can also be monitored from a remote location using MCE's Central Monitoring System (CMS) software.

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FIGURE 1.1   *Controller Diagnostic and Adjustment Tools*
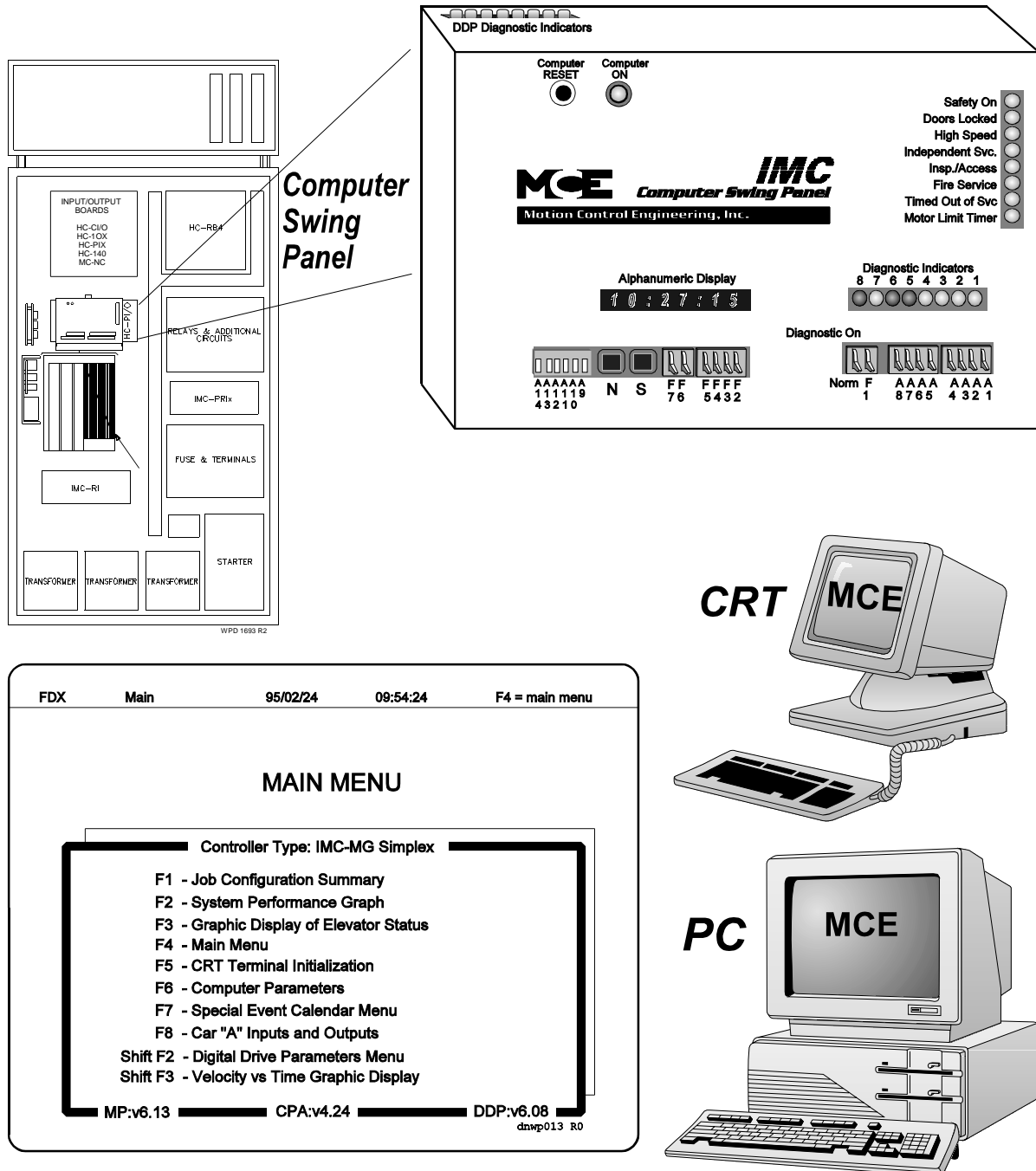
1.1 CAR CONTROLLER PHYSICAL LAYOUT

Figure 1.2 shows a typical layout of the car controller in a standard cabinet. Below is a brief description of the controller equipment. For Controllers with the Option SmartLink for COP (Car Call), please see the SmartLink Appendix for controller layout.

FIGURE 1.2   IMC-MG Controller Cabinet Layout (typical)

WPD 1693 R2
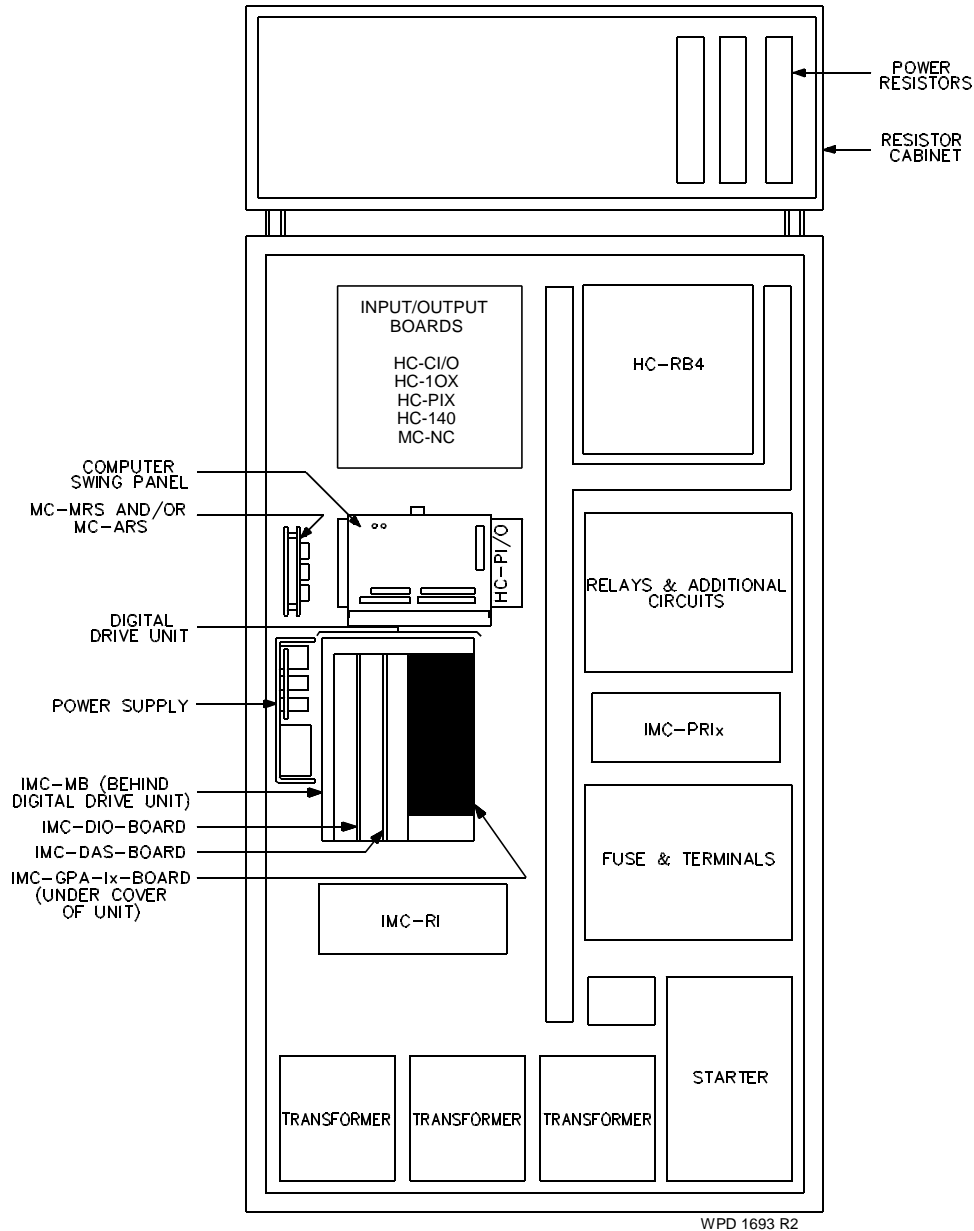
POWER SUPPLY The power supply is a triple output linear power supply that provides +5VDC for the processor boards and the IMC-DIO board, and ±15VDC for the IMC-DAS and IMC-GPA boards.

STARTER The starter is usually located in the lower right-hand corner of the controller cabinet along with AC overloads and the associated terminal blocks for motor connections. Across the line, Wye Delta or resistance starting is usually provided to operate the AC drive motor of the MG set.

42-02-6202   PRODUCT DESCRIPTION • 1-3

RELAYS, FUSES, TERMINAL BLOCKS, ETC. Additional relays, fuses, and terminals are provided as required for other functions such as door operation, reverse phase sensing, safety functions, etc.

TRANSFORMERS Transformers are provided, as necessary, according to the power requirements of each individual load and the available AC line voltage.

POWER RESISTOR CAGE (Optional) If required, power resistors that generate significant heat, such as door resistors or drive system resistors are located in the power resistor cage, on top of the controller cabinet.

DIGITAL DRIVE SUBSYSTEM This subsystem includes the IMC-Gxx Digital Drive Unit and IMC-RI and IMC-PRIx relay interface boards. The subsystem's main function is to control the rotating equipment that moves the car.

FIGURE 1.3   IMC-Gxx Digital Drive Unit

DN2953 R0
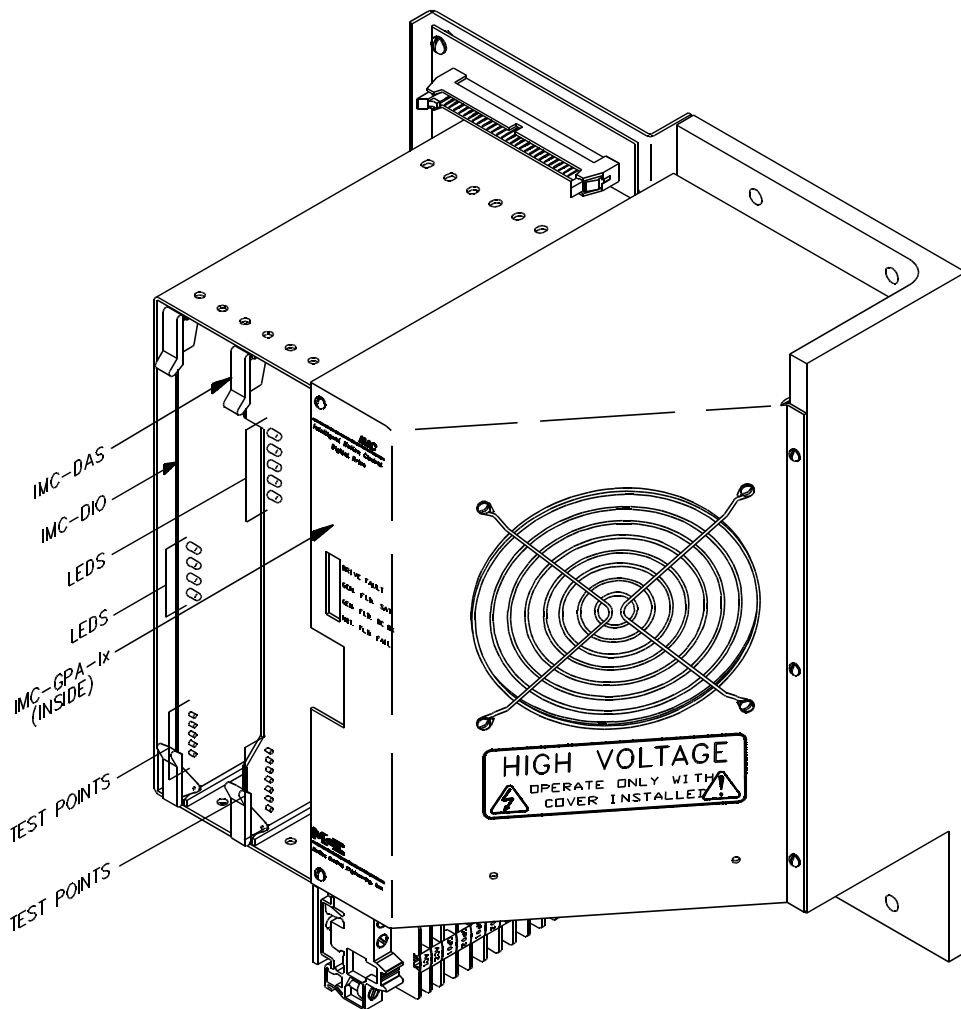
IMC-Gxx This is the label given to the whole assembly of the Digital Drive Unit, including the cover, the IMC-DIO, IMC-DAS, IMC-MB, IMC-GPA-Ix boards, fuses, capacitors, diodes, etc. Each installation has a specific Digital Drive Unit. The possible part names are IMC-GI2, IMC-GI4, IMC-GE2, IMC-GE4 and IMC-GxxH.

The Drive Unit cover reveals four LEDs from the IMC-GPA-Ix board.

COMPUTER SWING PANEL The Computer Swing Panel is composed of three interacting circuit boards. Each circuit board performs a specific task, while it shares resources with the other circuit boards through a common memory block. The Computer Swing Panel is used in conjunction with the CRT terminal or PC for diagnostics and adjustments. Section 5, Onboard Diagnostics, describes the diagnostics and adjustments available through the Computer Swing Panel.

Through the front of the panel, the user can see eight vertical LEDs, eight horizontal LEDs, an alphanumeric display, two pushbuttons, a Computer RESET Button, a Computer ON LED, and 22 function and address switches. These items are actually located on the Main Processor board. The top of the panel has eight horizontal LEDs and the back of the panel has a DDP RESET and DDP Computer ON LED from the IMC-DDP-x circuit board. The MC-CPA-1SL Computer ON LED is seen through the right side of the Computer Swing Panel.

FIGURE 1.4   IMC-MG Computer Swing Panel
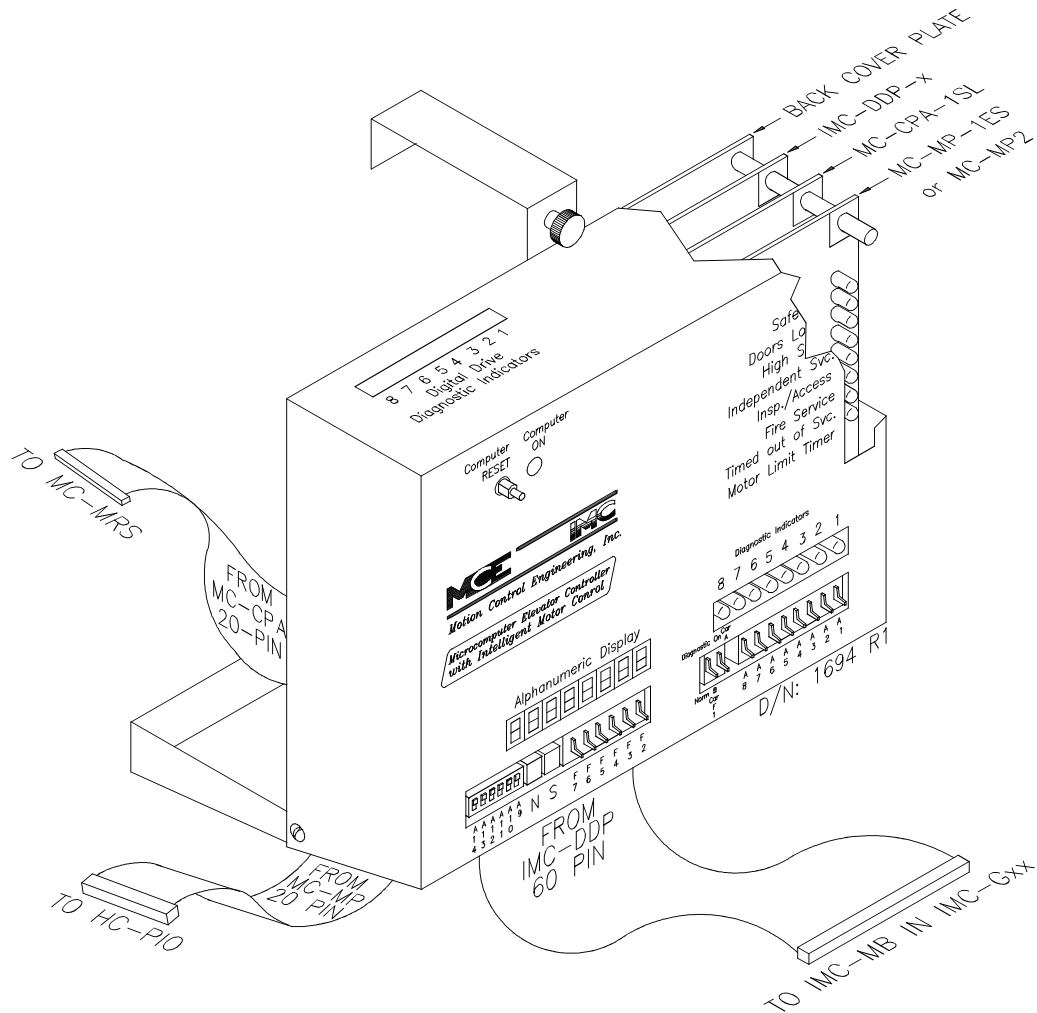
CAR OPERATION CONTROL SUBSYSTEM - This subsystem includes the MC-MP-1ES or MC-MP2 Main Processor (housed inside the Computer Swing Panel) and the input/output boards that connect to the Main Processor board in a "daisy-chained fashion" (using ribbon cables). A typical IMC-MG controller will include one HC-PI/O board, one or more HC-IOX boards, and one or more HC-CI/O boards. The HC-RB4 Main Relay board, which provides a portion of the input conditioning circuit as well as terminals for connecting input and output signal field wires, is connected to the HC-PI/O board.

1.2 OPERATION OVERVIEW

The car controller has four primary functions. Figure 1.5 shows these functional blocks and lists the circuit boards associated with each function.

FIGURE 1.5   *Car Controller Functional Layout*

WPD1692 R5
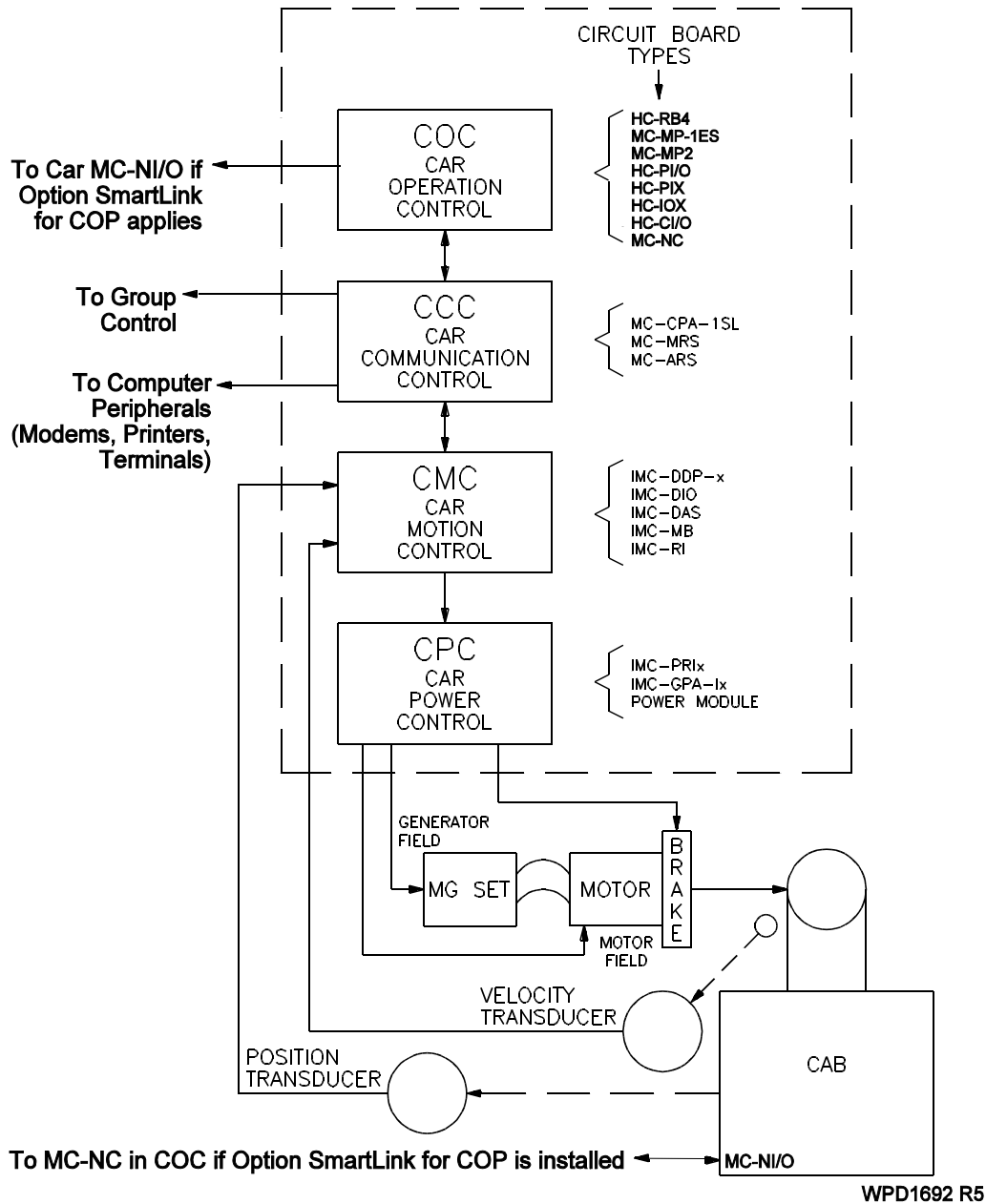
Car Operation Control (COC) This functional block covers normal car operation such as operation of the doors and the response to hall and car call demands. This block also covers special operations such as inspection/access, fire service, etc. Additional special operations are provided as required per specifications.

Car Communication Control (CCC) This functional block coordinates the flow of information between the car controller and other equipment, such as group dispatchers and terminals, modems, and printers.

Car Motion Control (CMC) This functional block is responsible for three different tasks: (1) develop an idealized speed pattern, (2) ensure that the elevator follows the idealized speed pattern command by producing the necessary outputs to the rotating equipment, (3) independently monitor the car velocity during normal operation, inspection operation, and during a car slowdown at terminal landings, and stops the car if a failure or unsafe condition is detected.

Car Power Control (CPC) This functional block generates the necessary voltages for the rotating equipment.

1.2.1 CAR OPERATION CONTROL (COC) COMPONENTS

Car Operation Control involves such things as door operation, response to hall and car calls, plus special operations such as Inspection/Access and Fire Service. The following boards are involved in the COC functions:

- MC-MP-1ES or MC-MP2, Main Processor Board
- HC-RB4, Main Relay Board
- HC-PI/O, Power Input/Output Board
- HC-PIX, Position Indicator Board
- HC-CI/O, Call Input Output Board
- HC-IOX, Input/Output Expander Board
- HC-I40, Input/output Expander Board
- MC-NC, Neuron control Board

FIGURE 1.6 MC-MP2 Main Processor Board
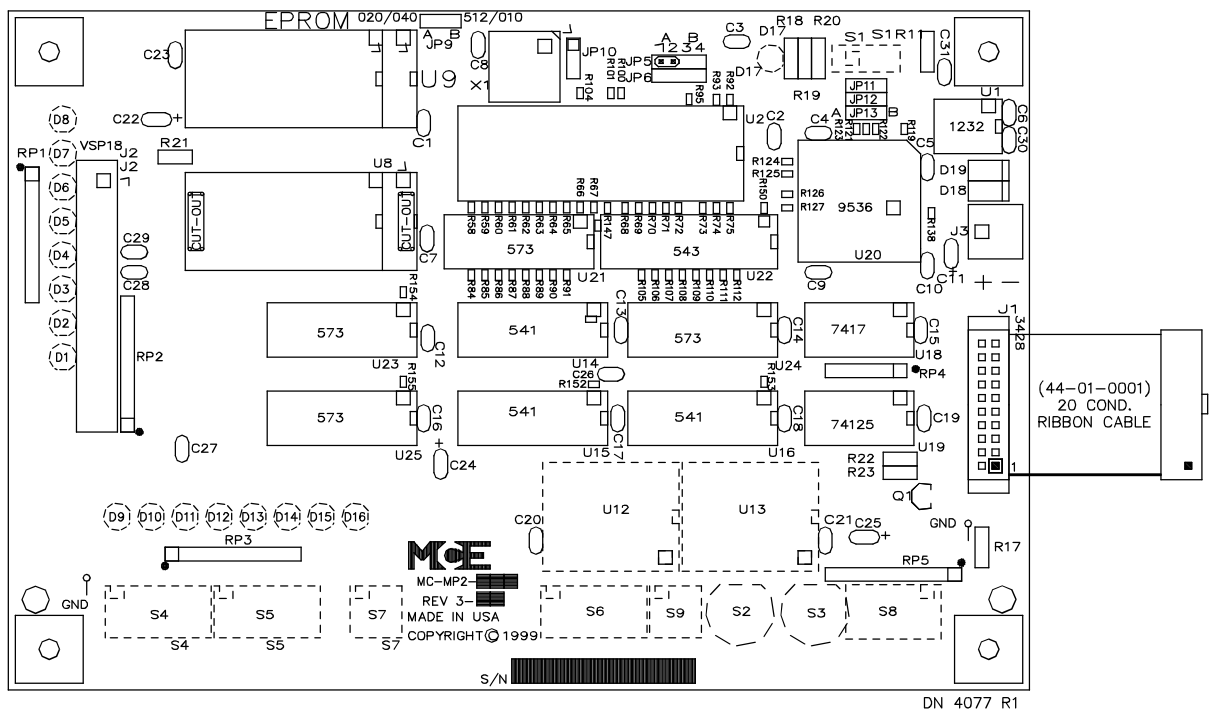
MC-MP-1ES or MC-MP2 Main Processor - The Main Processor board is located within the Computer Swing Panel and is responsible for car operation control. This board is also responsible for the On-Board Diagnostics that provide interactive communication with the elevator mechanic. The board contains the alphanumeric display and all the LEDs, switches, and buttons found on the front of the Computer Swing Panel.

MAIN PROCESSOR SUBSYSTEM This subsystem on the controller consists of many different input/output circuit boards. The layout and arrangement of these boards may vary from controller to controller. This subsystem uses the following boards:

FIGURE 1.7   HC-RB4 Main Relay Board

D/N 1698 R1
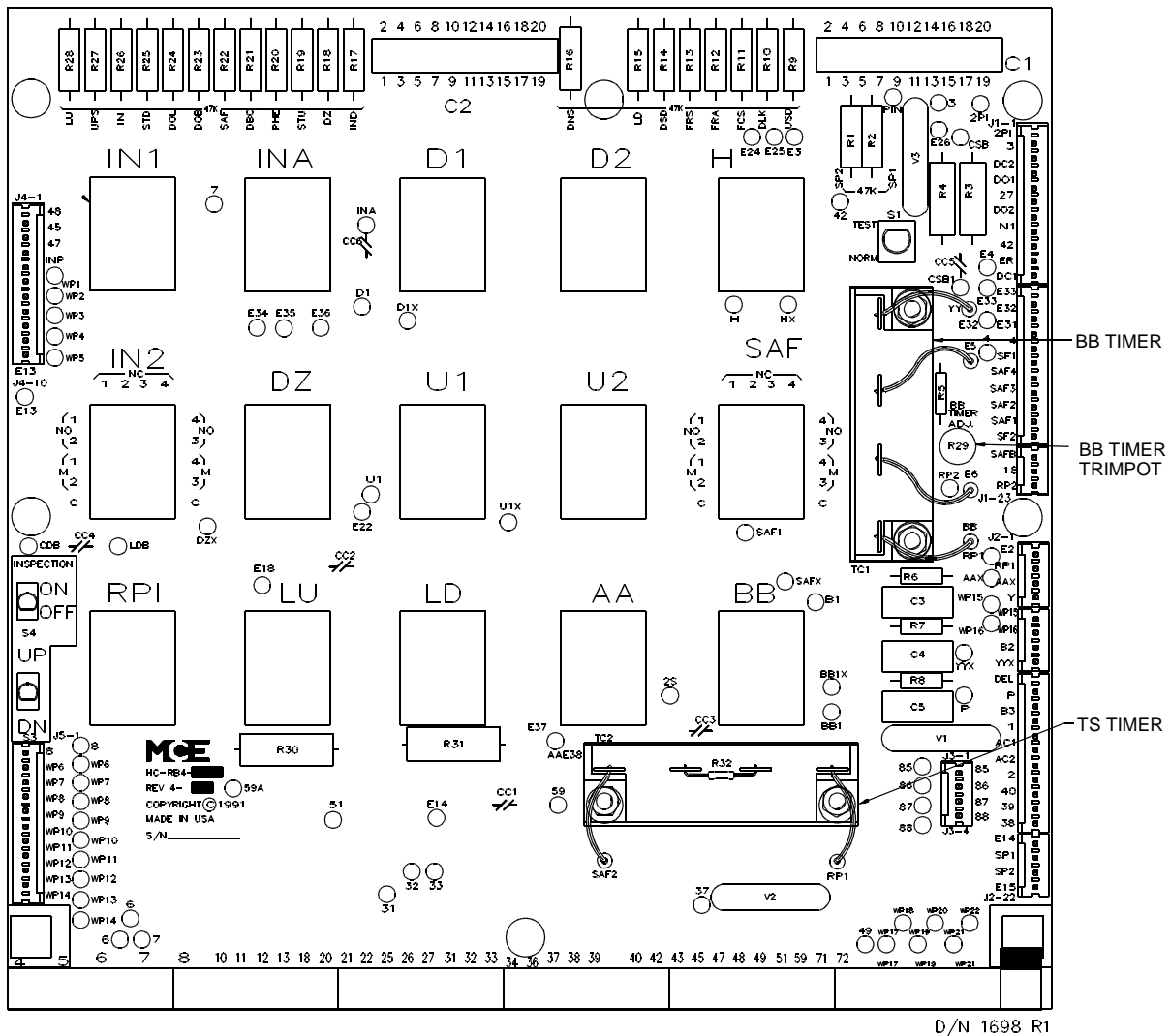
HC-RB4 Main Relay board This board satisfies many code requirements for relay contact redundancy and for normal terminal stopping devices. It also provides the necessary circuitry for running the car on inspection or access operation. This board, in conjunction with the HC-PI/O board, comprises the high voltage interface between the Main Computer and the individual car logic functions such as door operation, direction outputs, direction sensing, MG set control, main safety circuits, leveling circuitry, etc.

There are typically 15 four-pole relays and some terminals at the bottom of the board for field wiring. Test pads surround each relay for ease of troubleshooting. This board is located in the upper right-hand corner of the controller cabinet. This board includes the inspection ON/OFF switch, the inspection car movement UP/DN switch and the TEST/NORM switch.

FIGURE 1.8   HC-PI/O Power Input/Output Board
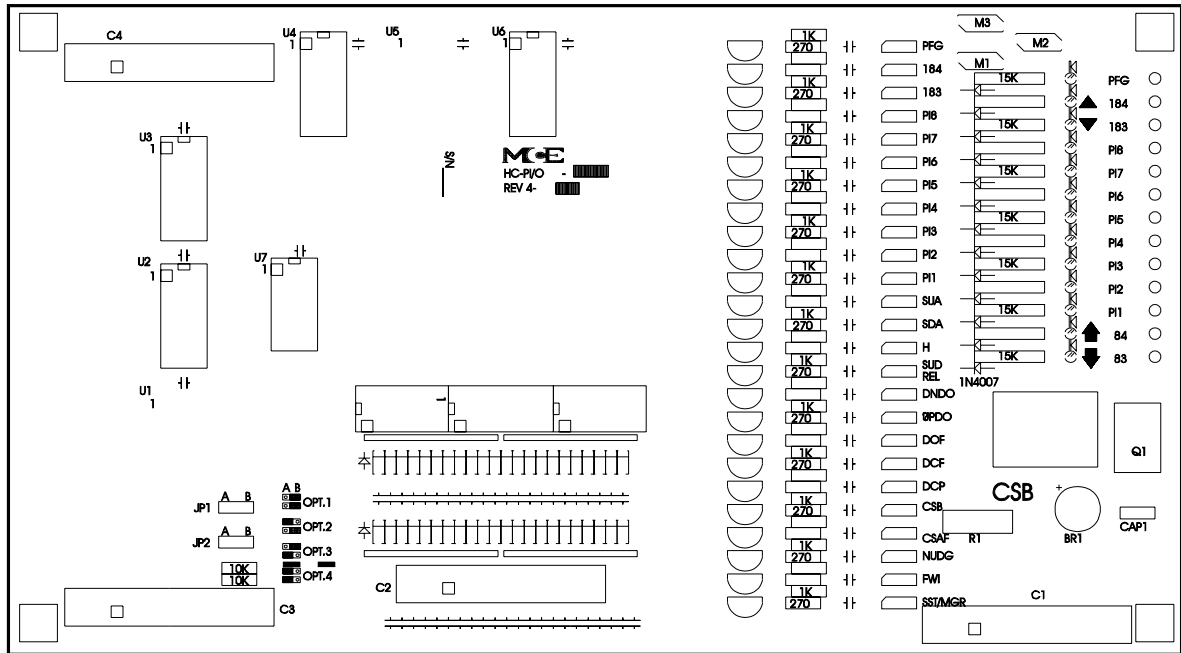
HC-PI/O Power Input/Output board This board is typically located behind the Computer Swing Panel. The main function of this board is to receive inputs and provide outputs for individual car functions such as door operation, limit switches, direction sensing, position indicators, direction arrows, and arrival gongs.

FIGURE 1.9   HC-PIX Position Indicator Expander Board
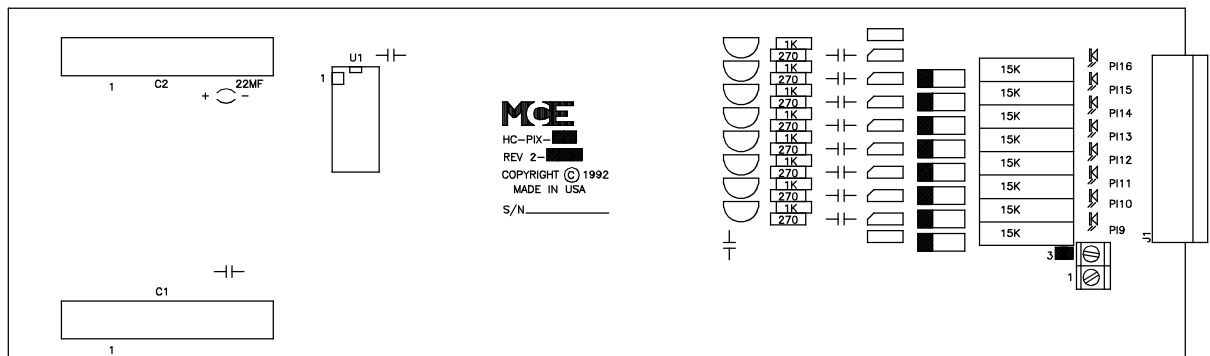
HC-PIX Position Indicator Expander board This board provides for additional PI outputs if there are more than eight floors in the building.

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FIGURE 1.10   HC-CI/O Call Input/Output Board

DN 1071 R1
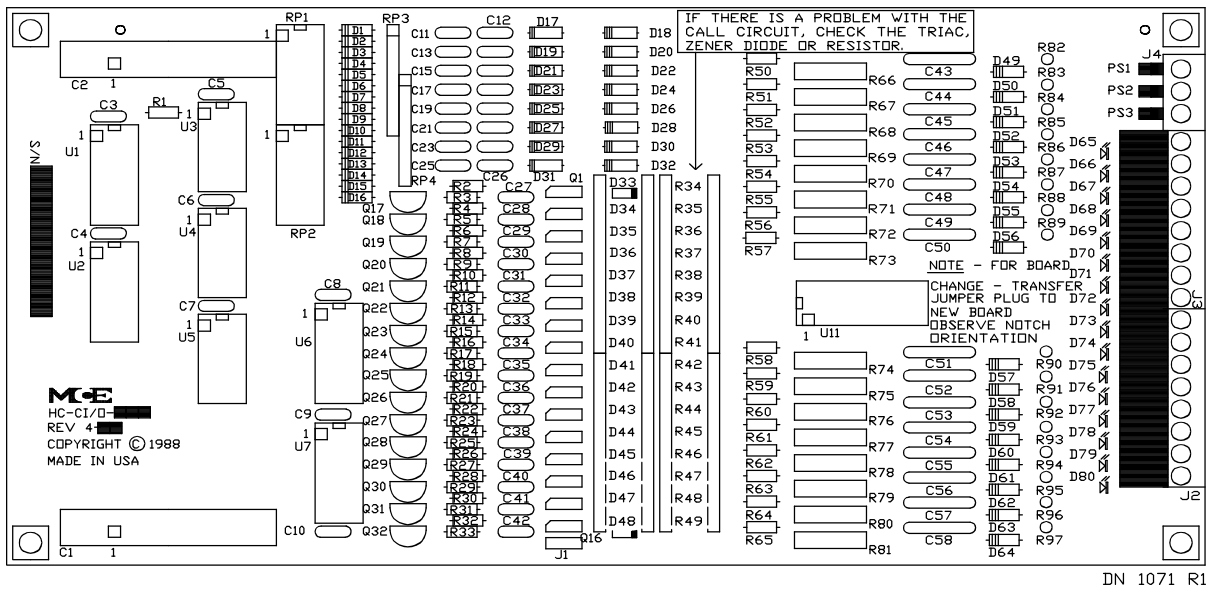
HC-CI/O Call Input/Output board This board processes the hall call and the car call inputs and the call acknowledgment outputs and displays the status of each call.

FIGURE 1.11   HC-IOX Input/Output Expander Board

Components in shaded area are loaded for HC-IOX-A

DN 2088 R2
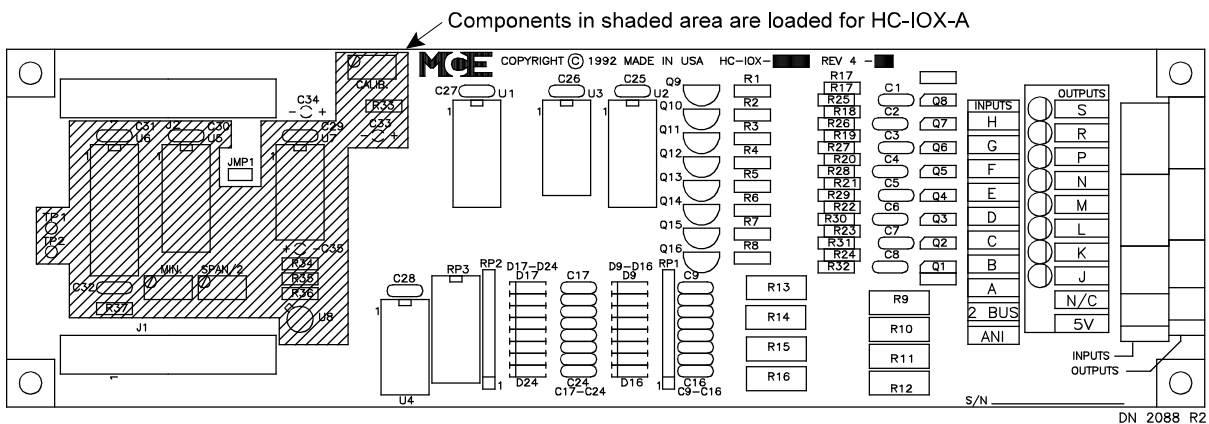
HC-IOX Input/Output Expander board This is a multipurpose input/output board. Some installations have the HC-I4O board instead. Its functions are similar to the HC-IOX.

HC-RD Rear Door board This board provides for the necessary logic required when an additional independent rear door is present. (Not pictured.)

MC-NC Neuron Control board (optional) Control board for SmartLink for COP option (board not pictured). See Appendix *Option* SmartLink for Car Operating Panel if applicable.

MC-NI/O Node Input/Output board (optional) Located in the car, the MC-NI/O transfers COP signal values to and from the car controller node as network packets The COP signals, such as call buttons, door open button, door close button, call lockouts, etc. (board not pictured). See Appendix *Option* SmartLink for Car Operating Panel if applicable.

1.2.2 CAR OPERATION CONTROL (COC) INPUTS AND OUTPUTS

COC INPUTS - This section describes the main signals received by the MC-MP-1ES or MC-MP2 Main Processor board.

The COC module is responsible for the "logical operation" of the elevator control system. For example, the COC may decide that the car should travel from one floor to another in response to a car call, but leaves the "speed control" (acceleration, deceleration, etc.) to the CMC module. The fundamental inputs that are required for the logical control of the elevator come to the Main Processor board through two boards: the HC-PI/O board (power input/output board) and the HC-CI/O board (call input/output board). Each IMC-MG control system has one HC-PI/O board, and as many HC-CI/O boards as are required to accommodate the number of calls in the particular installation. Additional "miscellaneous" inputs come to the Main Processor board through the HC-IOX or HC-I4O board (I/O expansion board, also as many as needed).

Primary Power inputs - HC-PI/O board

- **Door signals** - The HC-PI/O board receives the door-related signals through the main relay board (HC-RB4). The door related signals include the door reopening devices (photo eye, safe edge), car operating panel buttons (door open button, door close button), and the door position contacts (door open limit, door lock).

- **Landing system signals** - The HC-PI/O board receives some of the signals generated by the landing system through the main relay board (HC-RB4). The landing system signals read by the COC module are the door zone, level up and level down signals.

- **Operational mode signals** - The HC-PI/O board receives a few of the operational and safety mode signals through the main relay board (HC-RB4). These signals include the safety string status, the inspection operation status, and the independent service status. Additionally, some of the fire service signals are also received by the HC-PI/O board through the relay board (fire sensors, in-car fire service switch).

- **Direction sensing inputs** - Two direction sensing inputs (up sense and down sense) are read by the COC processor (again through the HC-PI/O and HC-RB4) and are used to process the car position indicator logic and motor protection timing logic.

Call inputs (car call and hall call) - HC-CI/O board

The call buttons and call indicators are wired to the control system and read by the COC Processor through the call board(s) (HC-CI/O and/or MC-NC). The connection to the call board is a single wire connection for both the button and the indicator (the terminal acts as both an input and output terminal). In multi-car group arrangements, "system" hall calls are wired to the Group Supervisor control panel (also to HC-CI/O boards), but "swing car" hall calls are wired to the call board of the individual car controller, along with the car calls.

COC OUTPUTS - This section describes the main signals generated by the Main Processor board.

The fundamental outputs that are required for the logical control of the elevator emerge from the Main Processor board through the same two boards described above: the HC-PI/O board (power input/output board) and the HC-CI/O board (call input/output board). Additional "miscellaneous" outputs emerge from the Main Processor board through the HC-IOX or HC-I4O

I/O Expansion boards (as many as are needed) and some "specialty" output boards which may be used to drive specific devices.

Primary Power Outputs - HC-PI/O board

- **Position indicators, direction arrows, and arrival fixture signals** - Eight position indicator outputs are provided on the HC-PI/O board. Should the particular installation have more than eight landings, additional position indicator outputs are provided through the use of HC-PIX boards (position indicator expansion boards). The up and down direction arrow indicators and the up and down arrival lantern outputs are also provided on the HC-PI/O board. The output terminals for these indicator outputs are located on the HC-PI/O board.

- **Fire service operation signals** - Two outputs associated with fire service operation are generated on the HC-PI/O board, and are routed through the main relay board. The fire warning indicator output generates the visual/audible signal in the elevator during a fire phase I recall, and the in-car stop switch bypass output is used for rendering the in-car stop switch inoperative, also during a fire phase I recall.

- **Door control signals** - Four signals are generated by the COC module to control the operation of the doors. These outputs are generated on the HC-PI/O board, but are routed through the main relay board for connection to external relays. These signals are the door open function, door close function, door close power, and nudging outputs. Should the installation have a floor with both front and rear openings, a rear door logic board (HC-RD) is used to generate the corresponding outputs for the rear door.

- **Car movement signals** - Four signals are generated by the COC module to perform the "logical control" of car movement. In hydraulic applications these signals directly control the valve solenoids to cause the car to move up and down and at high and low speeds. In IMC applications, however, these outputs are read by the CMC module, which creates the proper speed profile for the type of run "requested" through these outputs. The four signals generated by the COC are up direction, down direction, high speed, and relevel speed. As an example, a high speed run in the up direction would be "requested" by the COC by generating the high speed and up direction outputs.

Call outputs (car call and hall call) - HC-CI/O board

The call buttons and indicators are connected to the control system through the HC-CI/O call board(s) (see NOTE). Outputs to the indicators are generated by the COC, through the HC-CI/O board(s). The connection to the call board is a single wire connection for both the indicator and the call button (the terminal acts as both an input and output terminal). In multi-car group arrangements, "system" hall calls are wired to the Group Supervisor, but "swing car" hall calls are wired to the call board of the individual car controller, along with the car calls.

| **NOTE:** | With the optional SmartLink Serial Communication for Car Operating Panel (COP), the call buttons and indicators are wired to the MC-NIO board in the COP and the signals are sent via serial link to and from the MC-NC board in the controller cabinet (see Appendix L for more information). |

1.2.3 CAR COMMUNICATION CONTROL (CCC) COMPONENTS

The flow of information between the car controller and other equipment such as CRT terminals, modems, printers or Group Supervisor is controlled by the following boards:

- MC-CPA-1SL, Communication Processor Board
- MC-MRS, Communication Interface Board
- MC-ARS, Additional Communication Interface Board

FIGURE 1.12   MC-CPA-1SL Communication Processor Board
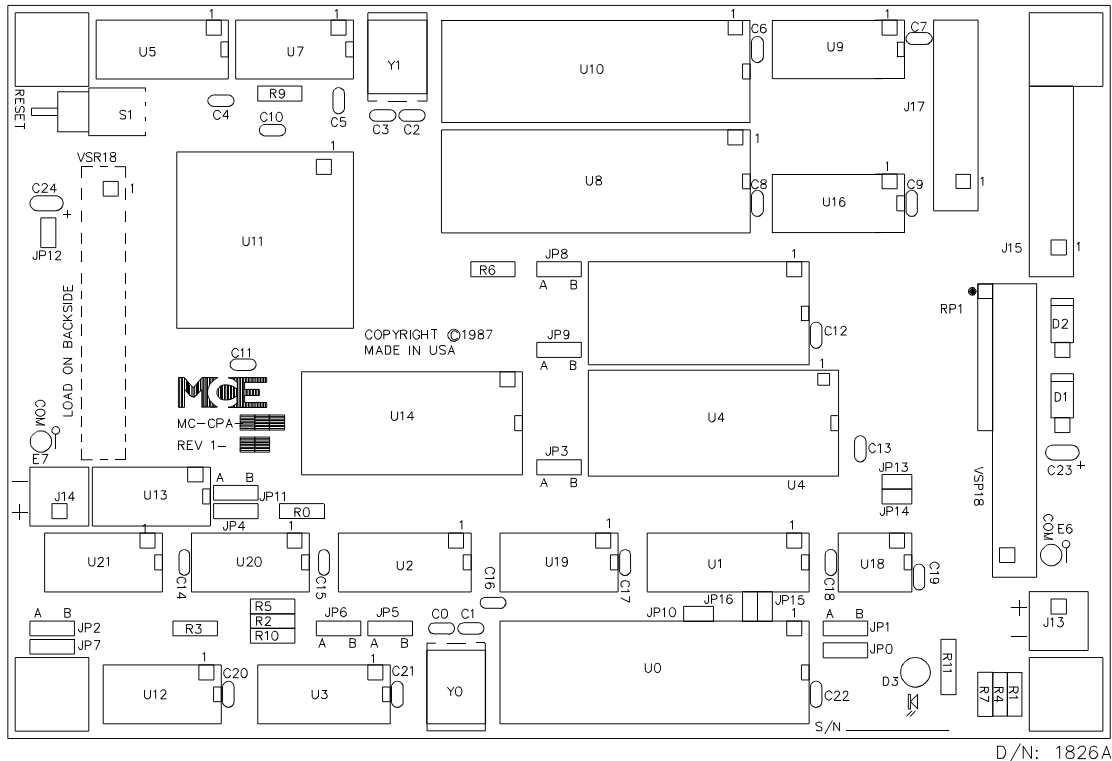
MC-CPA-1SL Communication Processor The Communication Processor board is located within the Computer Swing Panel and communicates with other cars and the group dispatcher through a high speed serial link. Through an RS-232 serial cable connected to the MC-MRS board, the MC-CPA-1SL board also communicates with any industry standard CRT, modem, printer, or another computer.

FIGURE 1.13   MC-MRS Communication Interface Board
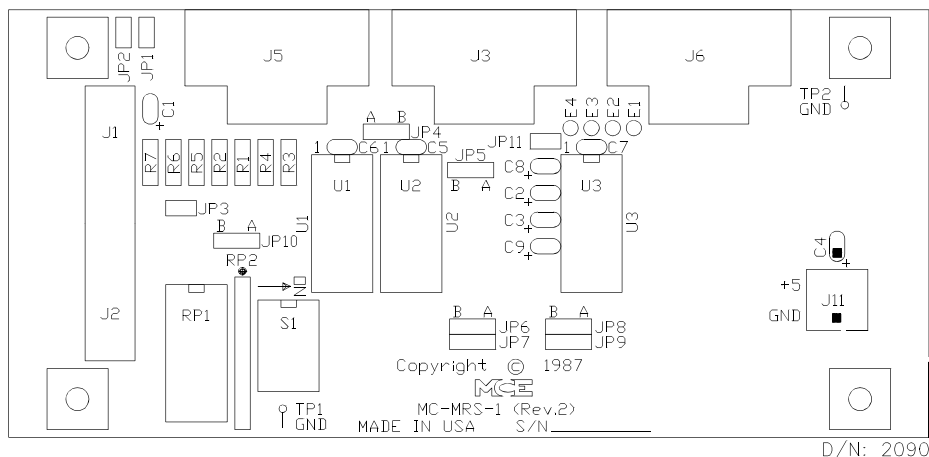
MC-MRS and MC-ARS Communication Interface boards These boards are located to the left of the Computer Swing Panel. The Communication Interface board is used by the MC-CPA-1SL board to communicate with the group dispatcher or computer peripherals. The J6 port (RS-232) on the MC-MRS board is for the computer monitor, modem, printer, etc. The J5 and J3 ports (RS-422) on the MC-MRS board are dedicated to group dispatching. The MC-ARS board is not included in every installation. This board provides extra communication ports for any additional computer peripherals.

1.2.4 CAR MOTION CONTROL (CMC) COMPONENTS

Car Motion Control is comprised of three tasks: (1) developing the idealized speed pattern; (2) ensuring that the elevator follows the idealized speed pattern by producing the necessary outputs to the rotating equipment; (3) monitoring the car velocity during Normal operation, Inspection operation and during slowdown at terminal landings and stopping the car if a failure or unsafe condition is detected. The following boards are involved in the CMC functions:

- IMC-DDP-x, Digital Drive Processor Board
- IMC-DAS, Data Acquisition System Board
- IMC-DIO Digital Input/Output Board
- IMC-MB, Mother Board
- IMC-RI, Relay Interface Board

FIGURE 1.14   IMC-DDP-x Digital Drive Processor Board
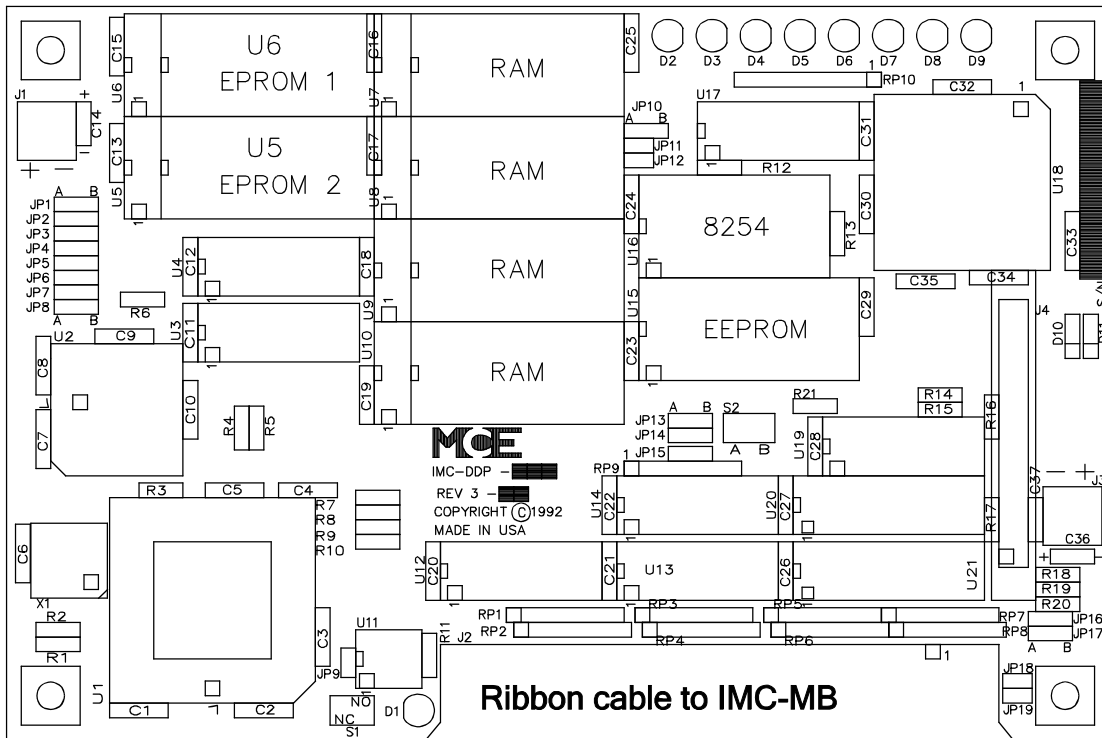
D/N: 1279 R2

IMC-DDP-x Digital Drive Processor board The Digital Drive Processor board is located within the Computer Swing Panel and performs three specific tasks: (1) it uses the signals produced by the hoistway transducers to create a speed pattern, (2) it generates reference signals for the drive using the pattern and feedback signals from the rotating equipment so that the car speed closely matches the ideal speed pattern and, (3) it also performs some safety functions. This board contains the LEDs and RESET button seen on the top and back of the Computer Swing Panel.

FIGURE 1.15   IMC-DAS Data Acquisition System Board
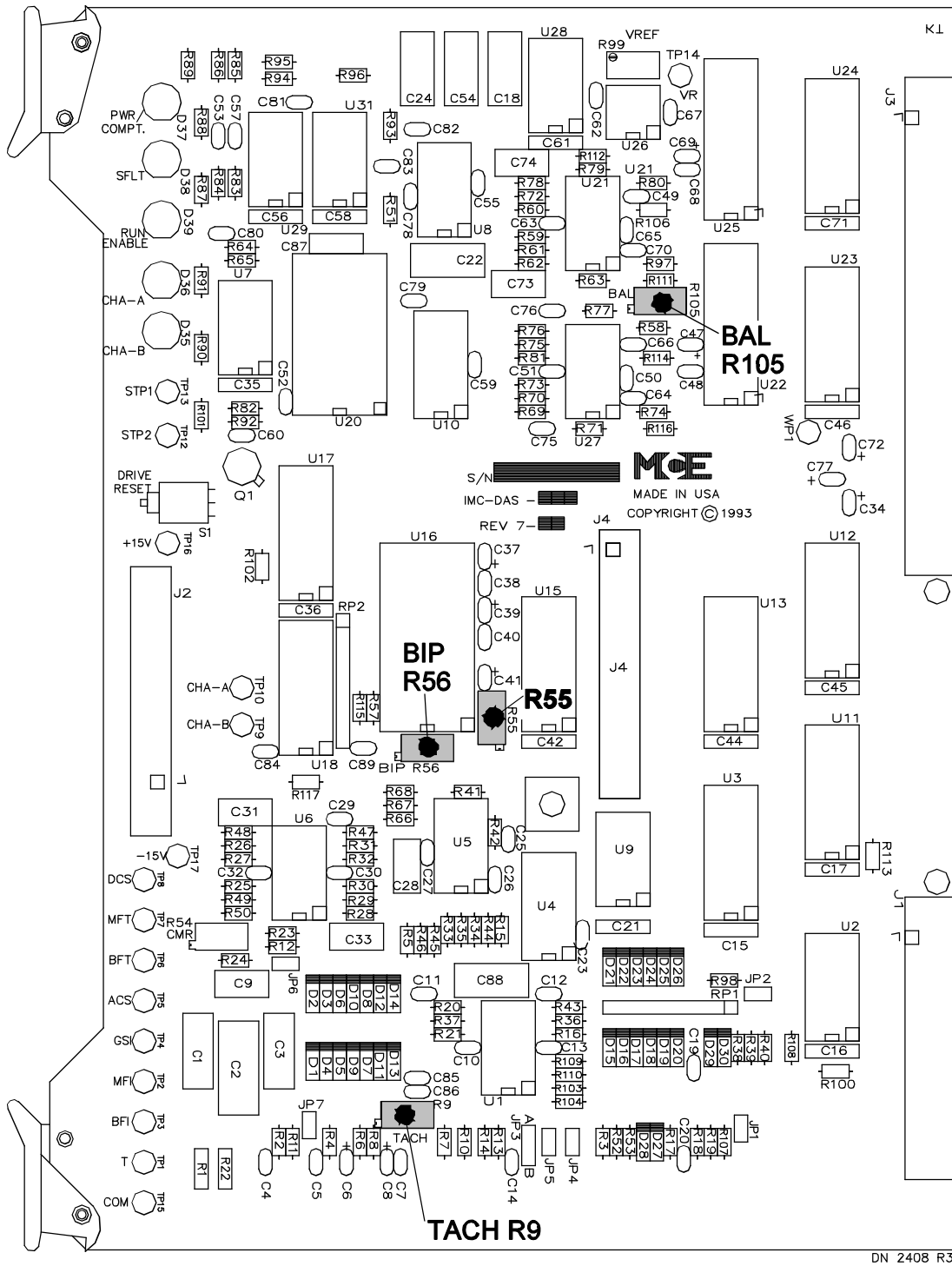
IMC-DAS Data Acquisition System board This board is located inside the Digital Drive Unit and converts the analog signals to digital data and vice versa to provide an interface between the rotating equipment and the IMC-DDP-x processor. Besides data collection, the IMC-DAS board generates reference signals for power devices located in the drive subsystem. This board contains the following test points: T, BFI, MFI, GSI, ACS, BFT, MFT, DCS, STP1, STP2, and COM (if the board contains STP3, please ignore this test point). It also contains the following LED indicators: PWR/COMPT, SFLT, RUN ENABLE, CH-A, CH-B, and the DRIVE RESET button.

FIGURE 1.16   IMC-DIO Digital Input/Output Board
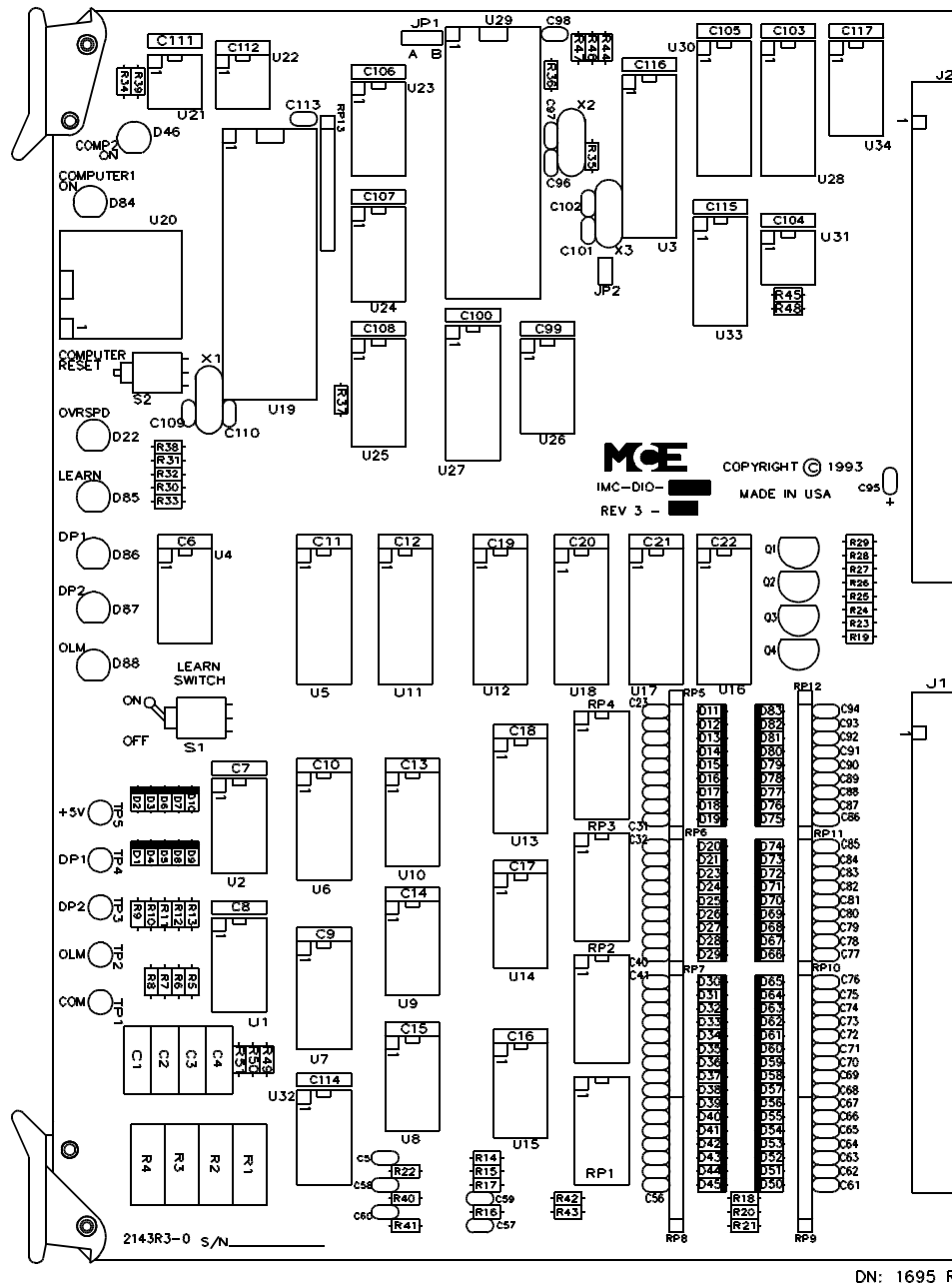
IMC-DIO Digital Input/Output board This board is located inside the Digital Drive Unit and provides the inputs and outputs to the Digital Drive Processor. It also includes a dedicated safety processor to independently perform two major safety functions: (1) it monitors the car speed during normal operation and while on inspection and (2) it compares learned car speed with actual car speed as the terminal slowdown limit switches are opened. Through this board, the IMC-DDP-x board receives car position information.

The IMC-DIO board has an alphanumeric display which shows the car speed and learn messages. It has the following test points: DP1, DP2, OLM, and COM. There are seven LEDs on this board: COMPUTER1 ON, COMP2 ON, OVRSPD, LEARN, DP1, DP2 and OLM. The IMC-DIO board also contains the LEARN SWITCH and COMPUTER RESET button.

FIGURE 1.17   IMC-MB Mother Board

IMC-MB Mother board This board is part of the IMC-Gxx Drive Unit, which is mounted on the controller cabinet backplate. The IMC-DAS and IMC-DIO boards plug into the IMC-MB board. Through the Mother board the IMC-DDP-x passes information to and from the IMC-DAS, IMC-DIO, IMC-GPA-Ix, IMC-PRIx, and IMC-RI.

FIGURE 1.18   IMC-RI Relay Interface Board

IMC-RI Relay Interface board The Relay Interface board is located below the Drive Unit. The function of this board is to convert high voltage signals to low voltage signals. This board receives signals from the HC-RB4 and IMC-PRIx relay boards, the rotating equipment, and the field wiring. It converts these signals from high voltage levels to low voltage levels for the IMC-DDP-x processor. Along with other terminals, this board contains terminals for the binary floor code, quadrature, tachometer, encoder, loadweigher, normal terminal switches, and emergency terminal switches.

1.2.5 CAR MOTION CONTROL (CMC) INPUTS AND OUTPUTS

CMC INPUTS This section describes the main signals received by the IMC-DDP-x Processor board.

- **Quadrature signal** - The IMC-DIO board receives the quadrature signal from the encoder wheel (LS-QUIK-1) or from the hoistway transducer which reads the holes on a perforated steel tape (LS-QUAD-2). The IMC-DIO then sends the position information, which locates the car in the hoistway within 0.1875" (4.7625 mm) accuracy, to the IMC-DDP-x board.

- **OLM signal** - The IMC-DIO board also receives the Outer Leveling Marker (OLM) signal informs the IMC-DDP-x processor that the car is exactly 12" (304.8 mm) from the floor.

- **Terminal switches** - For each terminal landing, up to five terminal switches can be brought to the IMC-DIO board. The safety computer on this board compares the car speed with a reference speed for each terminal switch. In addition, the IMC-DDP-x processor verifies the position of the car at each terminal switch. When it is determined that the car is overspeeding or appears to be at a wrong position when a terminal switch is encountered, the IMC-DDP-x processor discontinues the normal speed pattern and substitutes an alternate pattern that forces the car to rapidly reduce speed and then move at a reduced speed to the next available landing.

- **Car status** - Specific signals, such as direction, high speed, leveling, inspection, etc. are sent to the IMC-DIO board to allow the pattern generator to create the appropriate speed pattern. The pattern information is then sent to the Digital Drive which controls the car's motion.

- **Floor encoding** - When the car stops at a landing, the car top landing system generates and sends, to the IMC-DDP-x processor, a maximum of eight signals that provide the absolute floor number. A parity check is done to verify the floor encoding data.

- **Speed signal** - The raw tachometer (velocity feedback) signal is processed on the IMC-RI board where the tachometer voltage is reduced to a range that accommodates the IMC-DAS board. Then this signal is sent to the IMC-DDP-x processor where the signal is compared with the ideal velocity pattern to ensure the proper motion of the car.

- **Brake contact (Optional)** - This input is used by the IMC-DDP-C processor to determine that the brake has lifted. The car will not be allowed to run if the brake has failed to lift.

CMC OUTPUTS This section describes the main signals generated by the IMC-DDP-x Processor board.

- **Drive Reference Signal** - The Digital Drive Unit reference signal generated by the IMC-DDP-x processor goes to the IMC-DAS board where the digital data is converted to an analog signal. This analog signal is used in the IMC-GPA-Ix board (inside the Drive Unit) to create the trigger signal for power devices that feed the generator shunt field.

- **Run Enable (RE)** - The run enable signal, generated by the IMC-DDP-x processor, allows motion. After receiving a direction signal, with no failure detected in the PT relay contacts, and verifying sufficient motor field, the IMC-DDP-x processor generates the signals to energize the RE and PT relays on the IMC-PRIx board. Enabling these relays provides power to the Drive Unit. Also, this signal indicates that the drive is ready for motion.

- **Fault (FLT)** - The fault output is generated by the IMC-DDP-x processor and the safety processor on the IMC-DIO board. This signal enables the FLT relay on the IMC-RI board. During normal operation, the output is enabled, subsequently picking the FLT relay. When the IMC-DDP-x or the safety processor detects any failure in the drive system or unsafe operation such as overspeed, the output is disabled and it then drops the FLT relay. If FLT is not bypassed, dropping this relay will disconnect the main safety relays (SAF, SAFB, SAFG, etc.) in the controller. After a fault is detected, the IMC-DDP-x automatically resets the FLT relay *if* the fault condition no longer exists. If a fourth fault occurs within seven normal runs, the fault will not automatically reset. The mechanic must push the DRIVE RESET push-button on the IMC-DAS board to clear the drive faults.

- **Intermediate Speed (INT)** - The IMC-DDP-x board generates this speed signal to indicate that the car is traveling more than a specified adjustable speed. This output is used by the Car Operation Control (COC) to decide when it is safe to stop at a landing.

1.2.6 CAR POWER CONTROL (CPC) COMPONENTS

The voltages required by the motor and brake are generated by the Car Power Control components, including:

- IMC-PRI, Power Relay Interface Board
- IMC-GPA-SI, General Power Adapter Board

FIGURE 1.19   IMC-PRIH Power Relay Interface Board
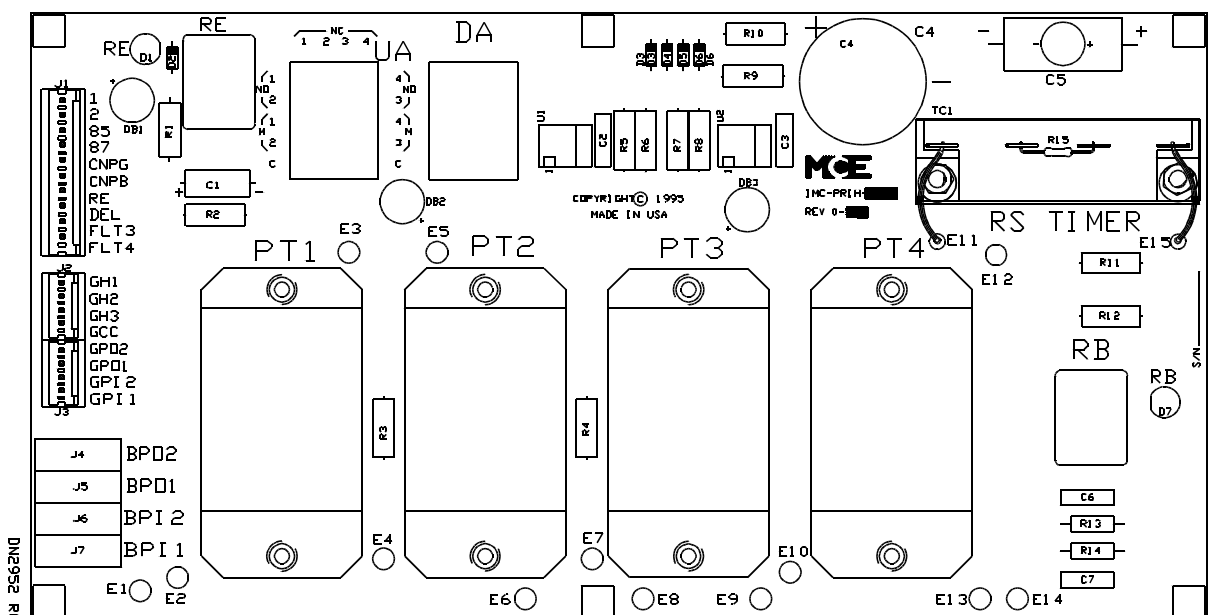
IMC-PRIH (Power Relay Interface board - High Power) This board provides power to the brake and generator shunt field circuits in the high current version of the Drive Unit if direction and the RE signal are present. Any failure in the drive will disable these relays (PT1 - PT4 and RB) on this board. The IMC-DDP-x processor does a redundancy check on each contact of these relays.

FIGURE 1.20   IMC-PRI-x Power Relay Interface Board (IMC-PRI or IMC-PRI-ENH)
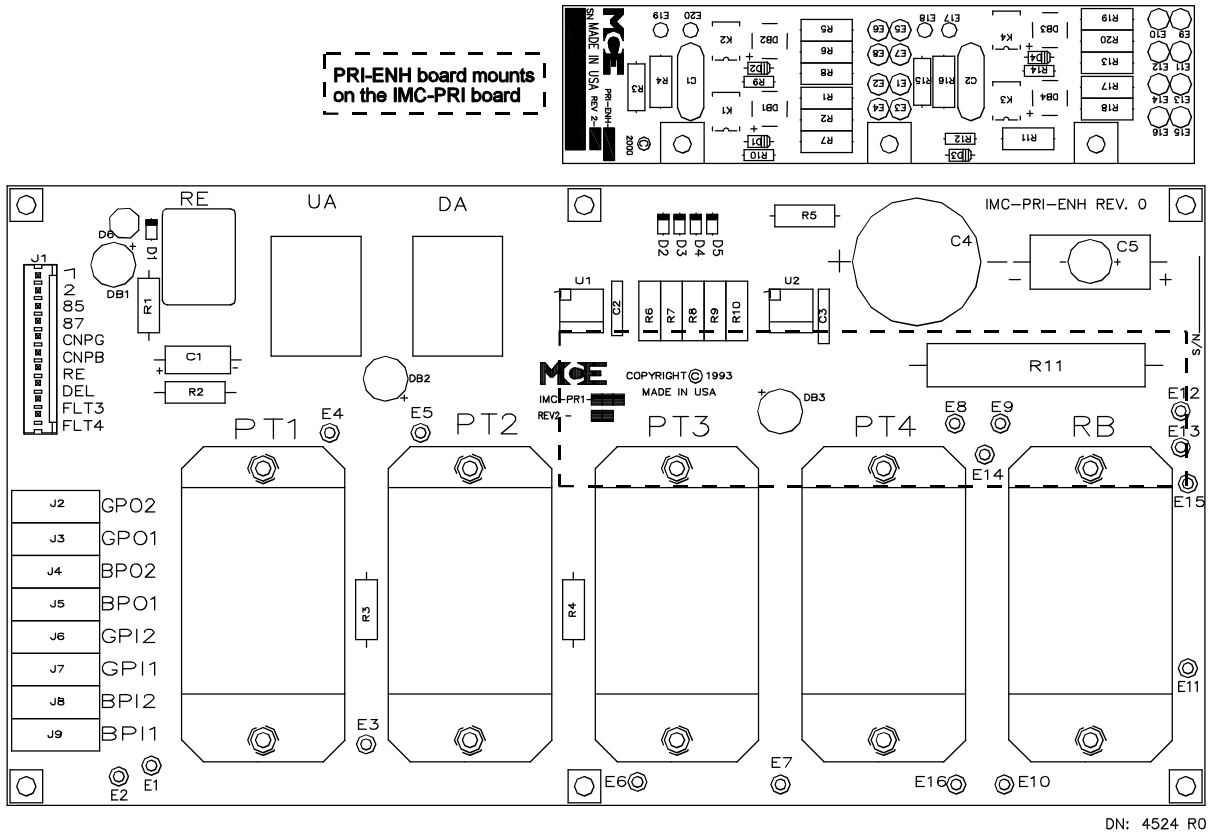
IMC-PRI-x (Power Relay Interface board) This board provides power to the brake and generator shunt field circuits in the Drive Unit if direction and the RE signal are present. Any drive failure will disable relays PT1, PT4 and RB on this board. The IMC-DDP-x processor does a redundancy check on each contact of these relays.

FIGURE 1.21   *IMC-GPA Generator Power Adaptor Board*
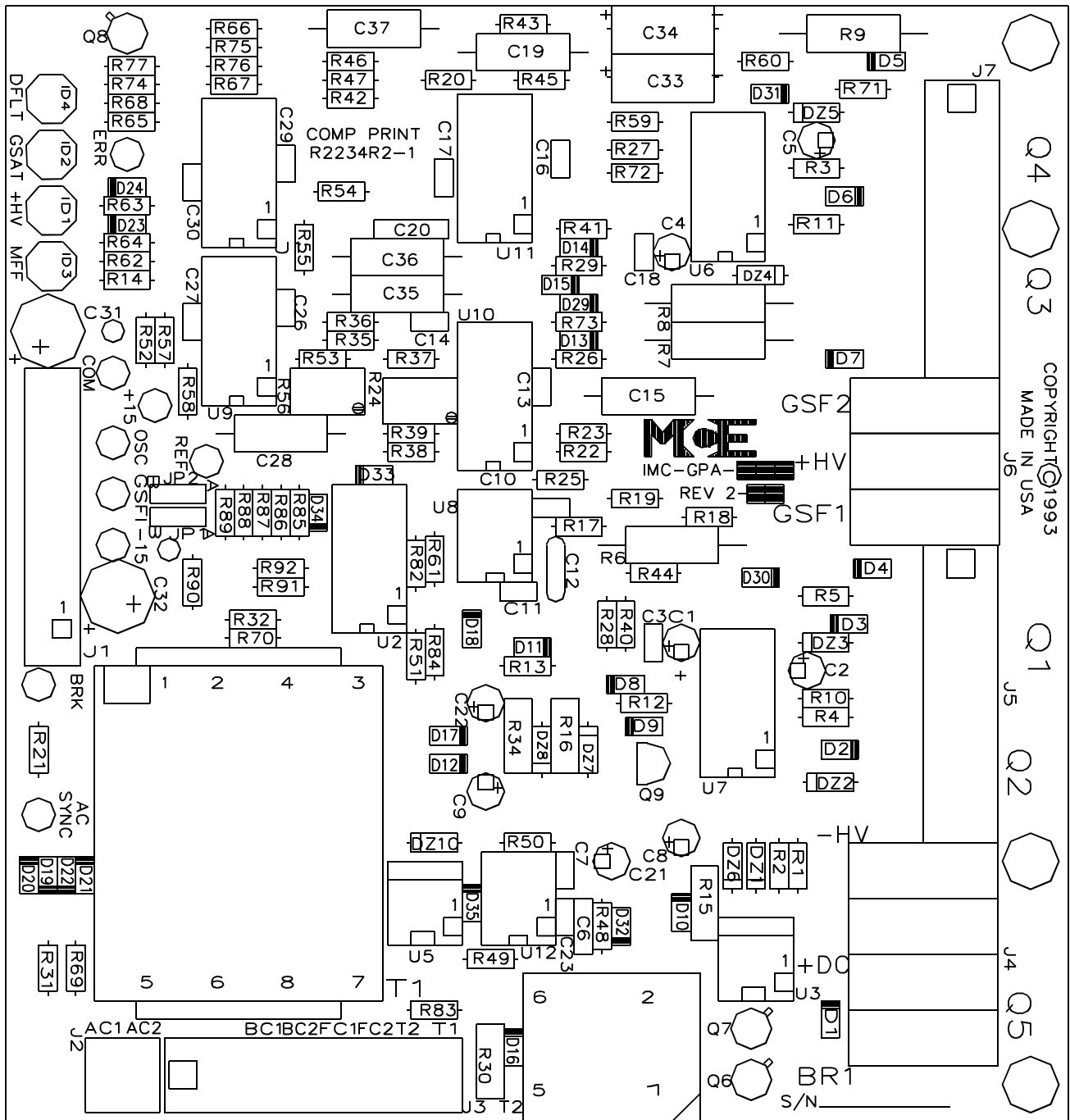
D/N: 2092 R1

IMC-GPA-Ix Generator Power Adaptor This board is mounted under the cover of the Digital Drive Unit. It converts the speed command signals from the IMC-DDP-x to high voltage signals for the rotating equipment. It has four LEDs that show through the Digital Drive Unit cover: DRIVE FAULT, GEN. SHUNT FLD. SATURATED, GEN. SHUNT FLD. SUPPLY OK, and MOTOR FIELD FAILURE.

1.3   LS-QUAD-2 LANDING SYSTEM

The LS-QUAD-2 Landing System includes the following:

- Two sets of tape guides that hold the perforated steel tape precisely with respect to the control box.

- A pair of optical transducers (DP1 and DP2) that provide a quadrature signal for car position.

- Leveling (LU and LD), Door Zone (DZ) and the Outer Leveling Marker (OLM) using magnetic proximity sensors.

- Magnetic proximity sensors for absolute floor encoding (RD, PR, R0, R1, R2, R3, R4 and R5).

- A circuit board (HC-DFLS) to process the sensor signals to be sent to the elevator controller. All sensors have indicators on this circuit board. The quadrature signals and Outer Leveling Markers (OLM) are 50VDC; all other signals are 115VAC.

FIGURE 1.22   LS-QUAD-2 Car Top Control Box (Front and Back View)
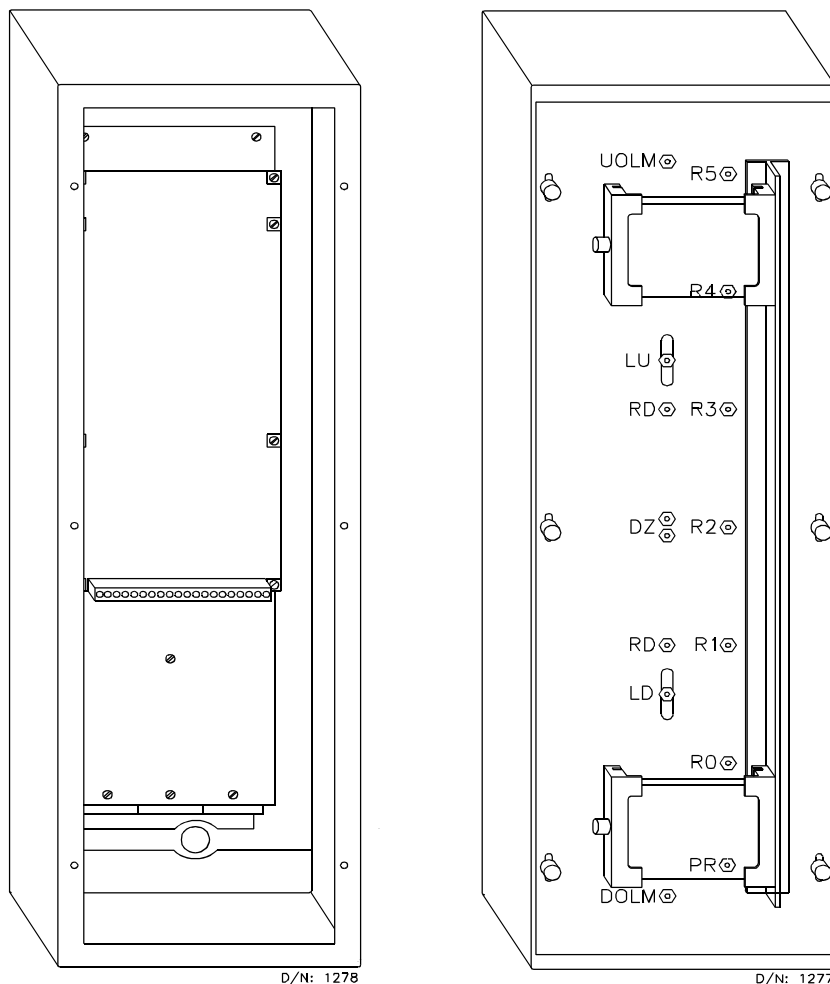
The LS-QUAD-2 Landing System Control Box is designed to be mounted on the car top. Figure 1.23 shows the position of the steel tape and LS-QUAD-2 Landing System Control Box.

1-22 •   PRODUCT DESCRIPTION

FIGURE 1.23   Elevator with LS-QUAD-2 Landing System

MACHINE ROOM
FIRE DETECTOR

GEARED TRACTION
MACHINE

FLYBALL GOVERNOR

MAINLINE DISCONNECT
SWITCH

MACHINE ROOM

CONTROLLER

TOP TAPE
SUPPORT
ASSEMBLY
SEE VIEW B

CAR
GUIDE RAIL

HALLWAY FIRE
DETECTOR
TYPICAL.

LANDING SYSTEM
(LS–QUAD)

CAR

C.O.P.
SEE VIEW A

COUNTERWEIGHT

COUNTERWEIGHT
GUIDE RAIL

HALL DOOR

TRAVELING
CABLE

HALL P.I.

HALL CALL

COUNTERWEIGHT
BUFFER

CAR
BUFFER

PIT

BOTTOM TAPE
SUPPORT
ASSEMBLY
SEE VIEW B

VIEW A

C.O.P.

3   4

1   2

DC   DO

VIEW B

TAPE SUPPORT ASSEMBLIES

TOP

BOTTOM

DN: 3374 | R0

1.4   LS-QUIK LANDING SYSTEM

The LS-QUIK Landing System Control Box (Figure 1.24) is designed to be mounted on the car top and contains the following parts:

- Leveling (LU, LD) and Door Zone (DZ) optical sensors.

- Optical sensors for absolute floor position encoding (PR, R0, R1, R2, R3, R4, R5).

- A circuit board (HC-DFQ) to process the sensor signals to be sent to the elevator controller. All optical sensors have indicators on this circuit board. The quadrature signals and Outer Leveling Markers (OLM) are 50VDC; all other signals are 115 VAC.

- An encoder and follower wheel which provide a quadrature signal for car position.

FIGURE 1.24   LS-QUIK Landing System
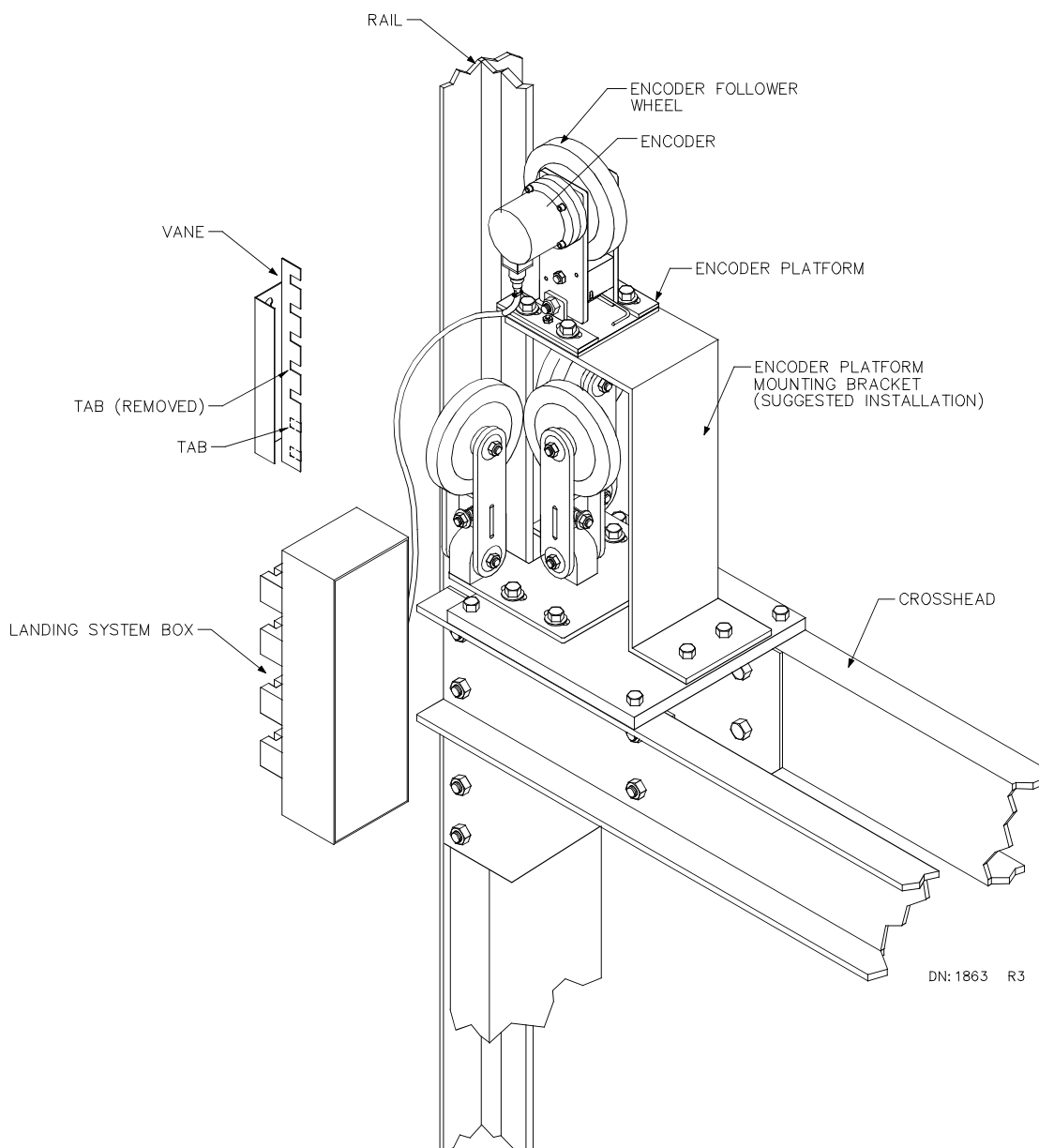
FIGURE 1.25   LS-QUIK-1 Car Top Control Box (front and rear view)

Tab (removed)

Typical Vane

(32) R5

(16) R4

(8) R3

(4) R2

(2) R1

(1) R0

PR

Tab (not removed)

Tabs removed to indicate floor number 1
(R0 + PR not removed)

DN: 1649 R1

DN: 3042 R0

TERMINAL STRIP FOR
CUSTOMER CONNECTIONS
(VIEW SHOWN WITH REAR
ACCESS COVER REMOVED)
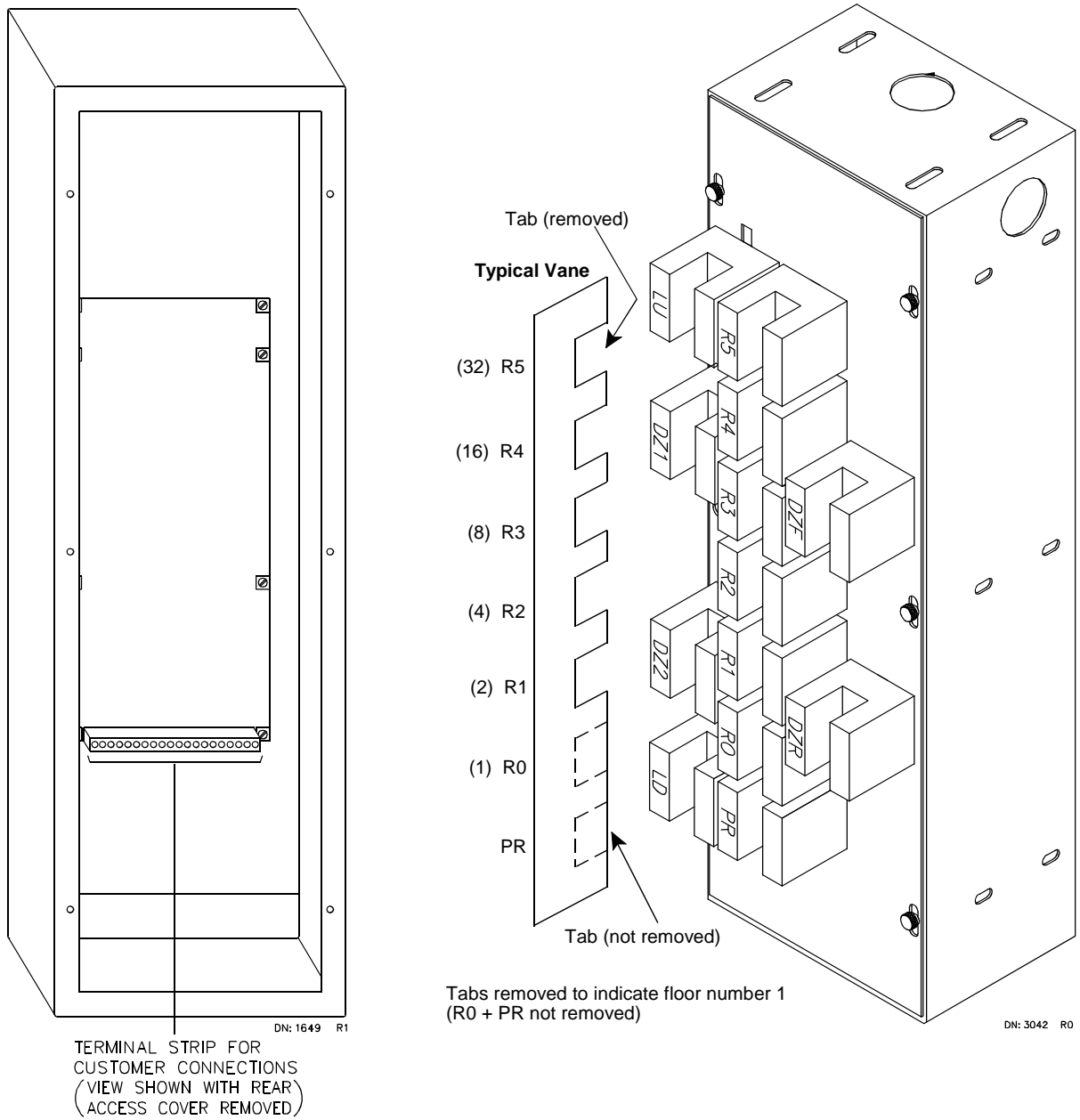
With the LS QUIK landing system, RD is reported when DZ1 and DZ2 are ON but LU and LD are OFF. The LU sensor is used to detect both UOLM and LU. The LD sensor is used to detect both DOLM and LD.

1.5 LOAD WEIGHING SYSTEM (Optional)

Some gearless machines exhibit rollback at the start of car motion. IMC-MG controllers have built-in capability to use load weighing information to pre-torque the machine, thereby starting the elevator with a specific value of torque on the armature to offset the load.

The IMC-MG controller can also use load weighing information to make intelligent dispatching decisions. If the load weight is very light, the controller can be programmed to limit the number of car calls allowed (anti-nuisance). The controller can be programmed so that at a certain load weight the lobby landing door timer is reduced, thereby initiating the process of moving the car out of the lobby. When the load weight exceeds a preprogramed value, the controller can be instructed to bypass hall calls. And, if the load weight exceeds a predefined maximum at which it is considered unsafe to move the elevator, the controller can prevent movement. This application typically includes a visual or audible warning to the passengers that the elevator is overloaded.

Load Weigher - Isolated Platform (LW-MCEIP) is used for elevators with isolated platform cars, (see Appendix H, MCE Load Weigher Installation and Adjustment). Load Weigher - Crosshead Deflection (from K-Tech International) is used for elevators with non-isolated platform cars. The load weigher signal is sent to the IMC-RI board.

SECTION 2
INSTALLATION

2.0   GENERAL INFORMATION

This section contains important recommendations and instructions on site selection, environmental considerations, wiring guidelines and other factors that will ensure a successful installation.

2.0.1   SITE SELECTION

When choosing a proper location for the control equipment, consider the following factors.

*   Adequate work space for comfort and efficiency.

*   Logical arrangement of the equipment, taking into consideration the location of other equipment in the machine room and proper routing of electrical power and control wiring. Note that MCE controls do not require rear access.

*   Do not install equipment in a hazardous location.

*   Provide space for future expansion, if possible.

*   Installing a telephone in the machine room is desirable as it makes diagnostics and adjustment assistance easily available.

*   If any areas in the machine room are subject to vibration, they should be avoided or reinforced to prevent adverse effects on the equipment.

*   Provide adequate lighting for the control cabinets and machines. A good working space such as a workbench or table should also be provided.

*   The location of the Drive Isolation Transformer (if used) is flexible, however, wiring is reduced if it is located near the controller.

2.0.2   ENVIRONMENTAL CONSIDERATIONS

The following are some important environmental considerations that will help to provide for the longevity of the elevator equipment and reduce maintenance requirements.

*   Ambient temperature between 32° and 104° Fahrenheit (0° and 40° Celsius). Higher ambient temperatures are possible, but not recommended because it will shorten the life of the ewuipmejnt. Adequate ventilation and possibly air conditioning may be required.

*   The air in the machine room shoud be free of excessive dust, corrosive atmosphere or excessive moisture to avoid condensation. A NEMA 4 or NEMA 12 enclosure would help meet these requirements. If open windows exist in the machine room, it is preferable to locate cabinets away from windows so that severe weather does not damage the equipment.

- Very high levels of radio frequency (RF) radiation from nearby sources should be avoided. RFI may cause interference with the computers and other parts of the control system. The use of hand-held communications devices used close to the computers may also cause interference. Interference from permanently installed radio transmitting antennas is normally rare.

- Power line fluctuation should not be greater than ±10%.

2.0.3 RECOMMENDED TOOLS AND TEST EQUIPMENT

For proper installation, use the following tools and test equipment:

- A digital multimeter, Fluke series 75, 76, 77 or equivalent
- An oscilloscope, preferably storage-type (a storage scope is mandatory for high speed gearless adjustment)
- A hand-held tachometer
- A clamp-on AC ammeter
- Hand held radios
- A telephone
- Assorted soldering tools, rosin flux solder, electronic side cutters, longnose pliers, flashlight and the MCE screwdriver provided with controller.

DIGITAL MULTIMETER

AMP-PROBE

MEGOHMETER

OSCILLOSCOPE
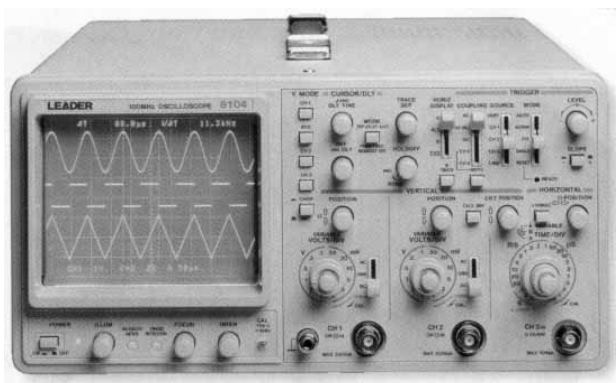
TELEPHONE

2.0.4   WIRING PRINTS

Become familiar with the following information as well as the wiring prints provided with this manual.

DRAWING NUMBER FORMAT - Each print has a drawing number indicated in the title block. The drawing number comprises the job number, car number and page number (see examples below). The drawings are often referred to by the last digit of the drawing number (page number).

Car Number*

Job Number

2004012345-2-1
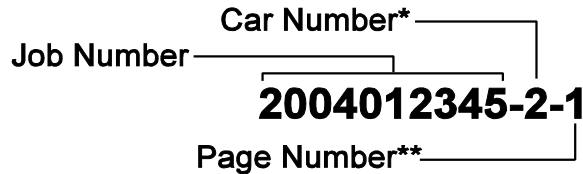
Page Number**

* Car Number "G" = Group Controller
** Page Number "D" = Drive page
** an "X" after the page number = auxiliary page

> **NOTE:**   DRAWING NAME - Some drawings have a drawing name directly above the title block or at the top of the drawing. Drawing names are also used to refer to a particular drawing.

NOMENCLATURE - The following is an example of the schematic symbols use to indicate that a signal either enters or exits a PC board.

PC Board #3   Ribbon Cable   PC Board #1

DZ   C2-8   C2-8   47k 1w   27   Cartop Tape Reader   27

3   1   1   Field wire

PC Board Designators
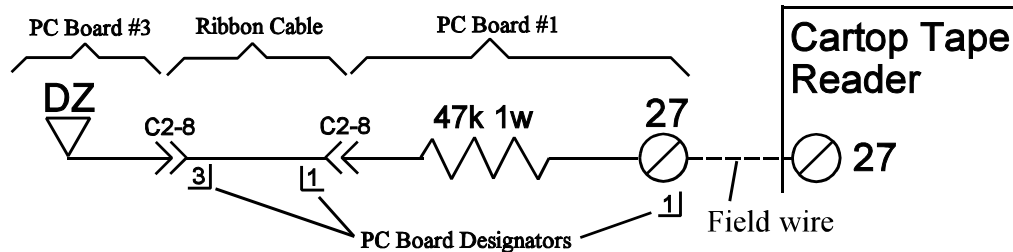
A listing of PC boards and their designator numbers plus other schematic symbols used in the wiring prints can be found at the beginning of the Job Prints and in Appendix C of this manual.

- Become familiar with "Elevator Car Wiring Print" drawing number (-1)."

- Become familiar with "Elevator Hoistway Wiring Print" drawing number (-2).

- Most of the power connections and non-drive related power supplies are shown in drawing number (-3).

- Group interconnects to individual car cabinets (two or more cars) are shown in the drawing titled "Group Interconnects to Individual Car Cabinets."

- Review any additional wiring prints and details provided.

- Page-DX of the job prints includes detailed drawings of the IMC-MG control system.

- Reference to a specific part of a schematic is by the Area Number, which is found on the left-hand margin of a schematic.

2.1 CONTROLLER INSTALLATION

NOTE: It is strongly recommended that you review the wiring guidelines in sections 2.1.1 and 2.2 before bringing wires into the controller.

Mount the controller(s) securely to the machine room floor and cut holes to permit bringing the wires into the cabinet as shown in Figure 2.2. There may be labels in the cabinet to help identify locations for wiring holes. Note that the standard MCE car control cabinet does not require rear access. Also, the doors are reversible and removable for ease of wiring.

CAUTION: Do not allow any metal chips to fall into the electronics.

2.1.1 CONTROLLER WIRING GUIDELINES

CAUTION: All conductors entering or leaving the controller must be run in conduits. High voltage, high current conductors, such as power conductors from the fused disconnect or isolation transformer, must be separated from the control wires. It is essential that the Tachometer/Velocity Encoder control wires be placed in a separate conduit, away from these high current conductors.

Figure 2.2 shows the recommended routing for the field wiring. Observe the following:

a. PC boards can be easily damaged by Electrostatic Discharge (ESD). Use a properly grounded wrist strap, as shown in Figure 2.1, when touching the PC boards.

FIGURE 2.1   ESD - Electrostatic Sensitivity of PCBs

Do not touch PC Boards unless you are properly grounded.

ATTENTION
OBSERVE
PRECAUTIONS FOR
HANDLING
**ELECTROSTATIC
SENSITIVE
DEVICES**
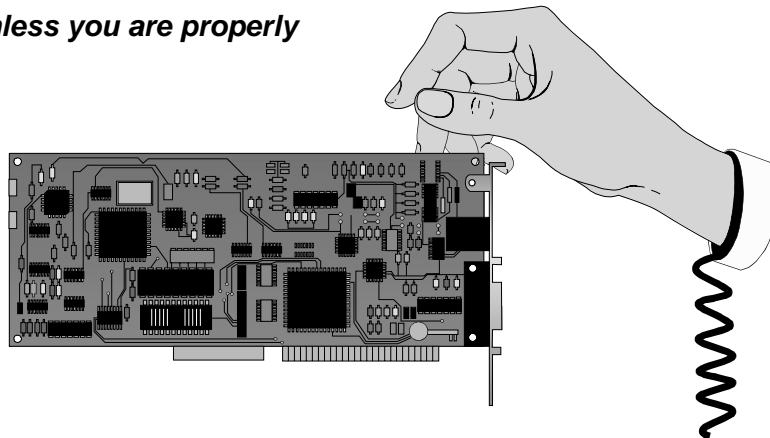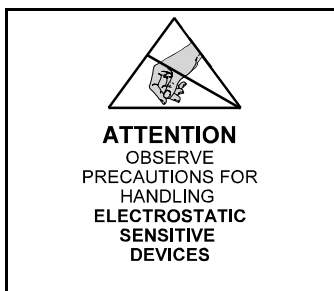
b. Bring the wires in from a location that would allow use of the wiring ducts inside the cabinet. The terminals are located conveniently near wiring ducts.

c. When routing field wiring or power hookups, avoid the left side of the HC-CI/O and HC-PI/O boards.

FIGURE 2.2   Example of a Typical Controller Layout

WPD 1706 R1
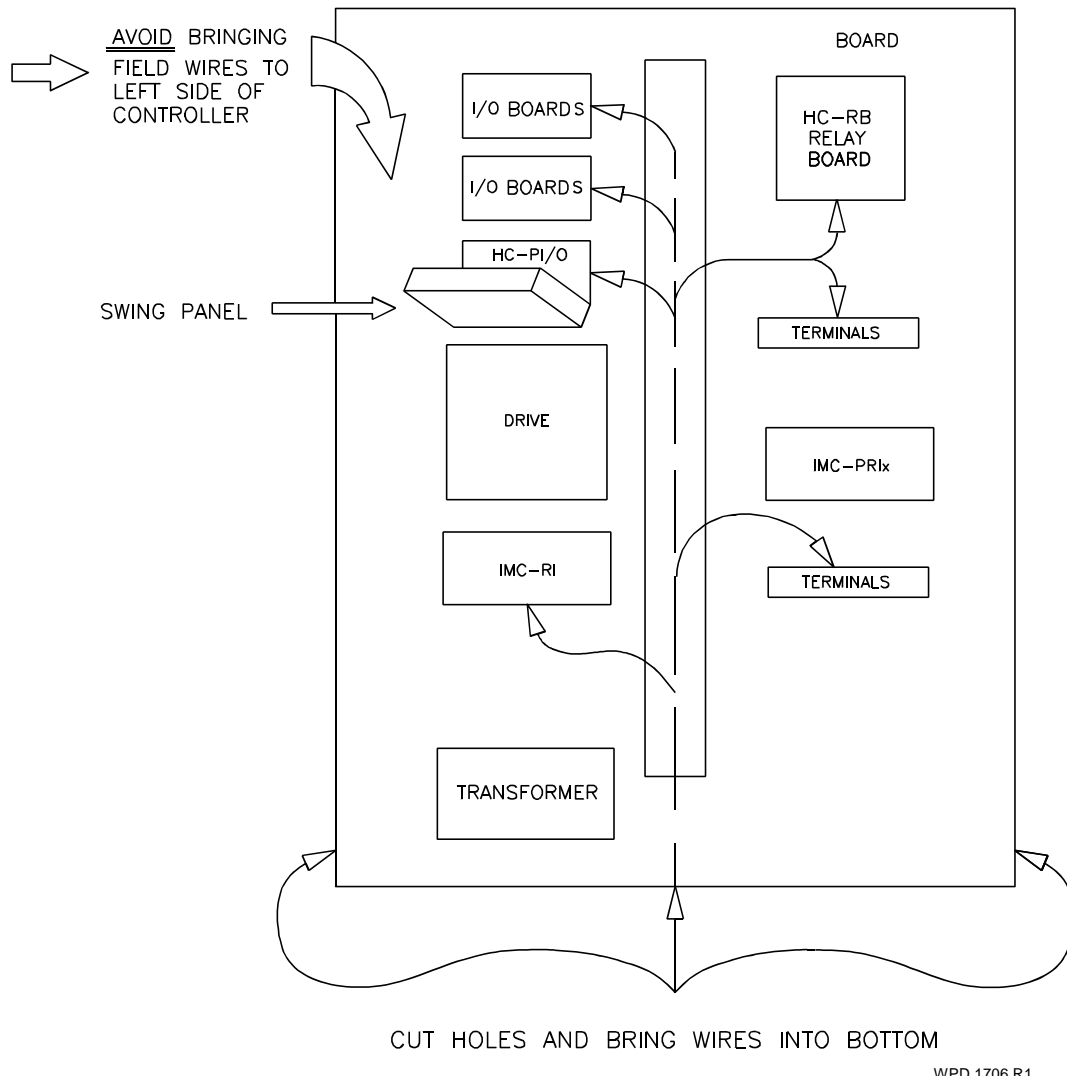
- Call terminals are located on the HC-CI/O board(s). Inputs and outputs are located on the HC-IOX and/or HC-I4O boards.
- All position indicators, arrows and gong enable terminals are located on the HC-PI/O and HC-PIX boards or, if a gong board is provided, position indicators are also provided on the gong board (HC-GB).
- Terminals for the door operator are on respective door boards or on separate terminal blocks.
- Several 1 and 2 bus terminals are provided in different locations.
- Other terminals may be supplied on separate terminal blocks.
- Tach, OLM, position pulser and absolute floor encoder signals are terminated into the IMC-RI board.

d.   When it is time to connect the wires, connect the wires according to the wiring prints.

e.   Proper motor branch circuit protection in the form of a fused disconnect switch or circuit breaker must be provided for each elevator according to applicable electrical code. Each disconnect or breaker must be clearly labeled with the elevator number. The electrical contractor must determine the wire size for the main AC power supply and for the wiring from the disconnect or breaker to the Drive Isolation Transformer.

f.   If the car is part of a group system, there are a number of details relating to the wiring of the interconnects between the individual cars. They are as follows:

  1.   If a group controller cabinet is provided, refer to the drawing titled "Group Supervisor Field Wiring Print" in the job prints. Power for the M3 Group Supervisor cabinet comes from the local Car Controllers as shown in Controller drawing (-2). The main AC power supply wiring size must be determined by the electrical contractor.

> **WARNING:**   Connecting the Group Supervisor directly to the building AC supply may cause damage to PC boards. Also, **connecting out-of-phase power _will_ cause damage**. Check the "phasing" of the individual car 2-bus lines before connecting them to the Group Supervisor. With a voltmeter set to AC Volts, measure between adjacent car 2-bus terminals. The meter must read less than 10 VAC. If the reading is higher, reverse the power leads going to the car's T1 transformer at L1 and L2, and measure again.

  2.   A separate conduit or wiring trough must be provided for the high speed serial link from each car controller to the Group Supervisor cabinet. The wiring details for the high speed communication link are fully detailed in the print titled "Instructions for Connection of High Speed Communication Cables." The wiring details should be followed exactly. Again, note the requirement for routing the high speed interconnect cables through a separate conduit or wiring trough.

  3.   If applicable, also wire according to the print titled "Group Interconnects to Individual Car Cabinets." Be sure to ground all cabinets according to Section 2.2.1.

  4.   The field wiring to the Group Supervisor cabinet is found in the print titled "Group Supervisor Field Wiring Print."

2.2   GENERAL WIRING GUIDELINES

Basic wiring practices and grounding requirements are discussed in this section.

2.2.1   GROUND WIRING

To obtain proper grounding, quality wiring materials and methods should be used.

All grounding in the elevator system must conform to all applicable codes. Proper grounding is essential for system safety and helps to reduce noise-induced problems. The following are some grounding guidelines:

- The grounding wire to the equipment cabinet should be the same gauge (diameter) or larger than the primary AC power feeders for the controller and should be as short as possible.

- The grounding wire between equipment cabinets may be branching or a daisy chain, but the wire must terminate at the last controller and NOT loop back (see Figure 2.3.

- Provide a direct, solid ground to the controller and motor. An indirect ground, such as the building structure or a water pipe, may not provide proper grounding and could act as an antenna radiating RFI noise, thus disturbing sensitive equipment in the building.

- The conduit containing the AC power feeders must not be used for grounding.

FIGURE 2.3   Ground Wiring to Controller Cabinets
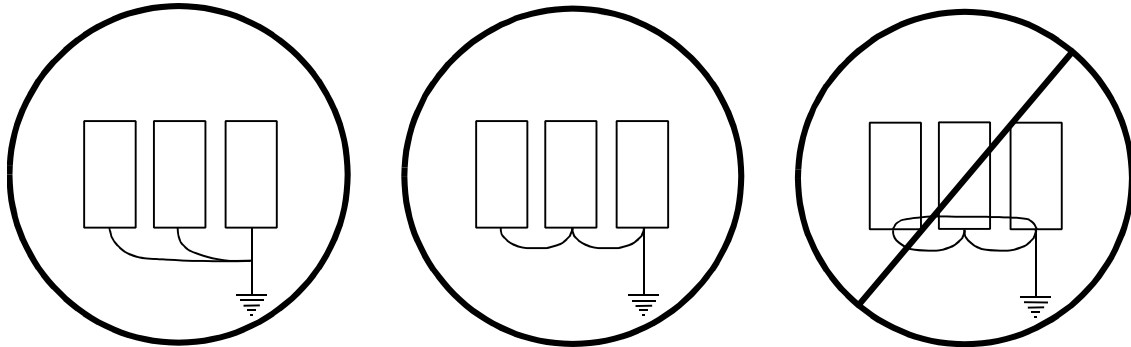
(a) Acceptable   (b) Acceptable   (c) Not Acceptable

2.2.2   MOTOR GENERATOR SET WIRING

a.   If this installation is reusing existing rotating equipment, do the following:

- Disconnect all motor and brake wires from the old controller.
- Perform an insulation test between these wires and the frame of the related equipment using a Megohm meter to subject the insulation to the same high voltages that would be encountered in normal use.
- Correct any insulation problems before proceeding, as this may suggest a serious problem in the equipment.

b.   Verify that the generator shunt fields are not connected to the armature in any way.

c.   Verify that any generator series fields are disconnected and the leads left open and properly insulated.

d.   Refer to drawing -D. This drawing shows the connection between the IMC-Gxx (the Drive Unit) and the rotating equipment. In this control system, it is necessary to bring back a signal from the generator armature and generator interpole as shown on the drawing. On some generators, the junction between the interpole and armature may not exist as a wire that is available in the junction box. Therefore, the installer may have to go inside the generator to make the necessary connection. These connections go to terminals GA, GC and GI and must be correct or the system will respond poorly.

e.   Follow any notes on the schematic regarding the possible rearrangement of the generator shunt field. This may involve splitting the field in half, which may mean the installer will have to find the proper wires inside the generator to make the split. *Use #14 wire size minimum on all field wiring from controller to generator field, motor field and brake.*

2.2.3 DC HOIST MOTOR WIRING

The hoist motor shunt field and brake wiring must use #14 AWG wire or heavier if current levels require it.

2.2.4 TACHOMETER INSTALLATION AND WIRING

In the IMC-MG controller, a tachometer must be used as a velocity feedback transducer.

FIGURE 2.4   Tachometer Installation

Do not connect the shield of the tach cable to the shield of the cable connected to IMC-RI board. To do so may create ground loop noise and affect ride quality.
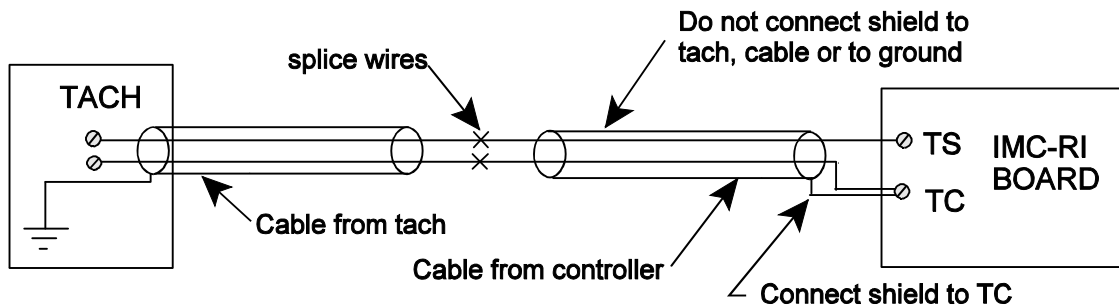
a.   Verify that the tach wheel (for gearless applications) is running on a smooth surface such as the brake drum, etc. *Any* vibration of the tach will produce a vibration in the car and may cause fuses in the generator shunt field circuit to blow.

b.   Do *not* place the tach or tach wiring close to a magnetized area (motor field coils, etc.), because this will cause the car to have different speeds while going up or down, even though the tach puts out the same voltage in both directions. Inside the controller cabinet, if control wires must cross power wires, they must cross at right angles.

> **NOTE:**   It is not necessary to complete the tachometer/encoder installation and wiring until after the start-up portion of this manual. The car can run on inspection without the tachometer.

c.   Alignment of the tach coupling is extremely important for geared machines. In general, most vibration problems come from the tach and/or its mounting. It is important that the tach mounting is rigid and that the coupling is perfectly aligned before attempting to adjust the Drive Unit. **In a geared installation, do not drive the tach from the sheave** because the Drive Unit cannot compensate for the gear lash.

d.   Any vibration caused by the tachometer *cannot* be corrected inside the drive. Rough surfaces, either on the tach wheel or where the tach wheel runs, can also cause vibrations. Remember that the tach must connect to the motor through a coupling or a follower wheel.

e.   Do not run the tachometer directly from a gearless motor. Always use a follower wheel for gearless applications.

f. Use a twisted pair shielded cable to connect the tachometer to the TS and TC terminals on the IMC-RI board. *Do not* connect the shield at the tachometer end, but insulate the shield so it does not touch anything. Connect the shield at the controller end to terminal TC. During the upward motion of the car, the output voltage of the tach must be positive (+) on terminal TS with respect to terminal TC on the IMC-RI board.

FIGURE 2.5   Typical Tachometer Installation

BRAKE DRUM/
DRIVE SHEAVE

TACHOMETER
(USING ITS OWN WEIGHT
TO HOLD TACH WHEEL
ON BRAKE DRUM).

TACH WHEEL

HINGE AND BRACKET
NOTE: HINGE MUST HAVE
VERY LITTLE SLACK AND
MUST BE HIGH QUALITY
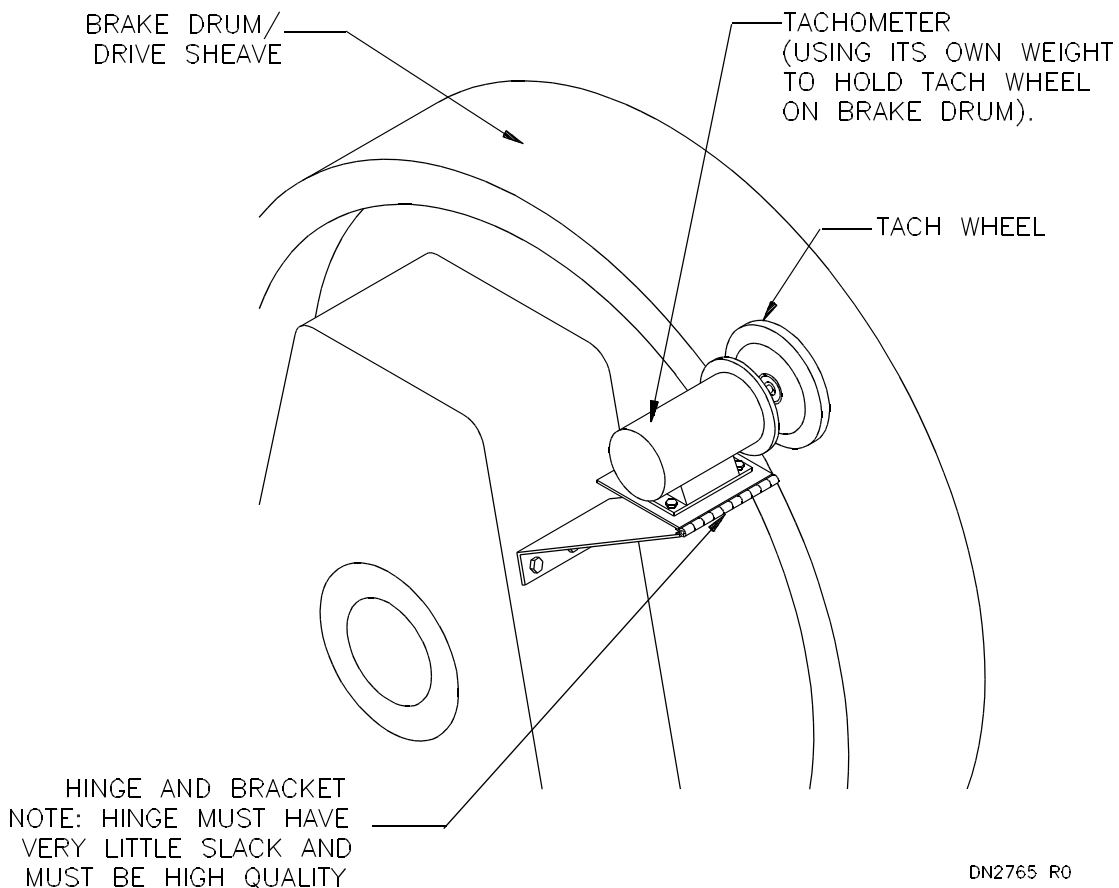
DN2765 R0

2.2.5 BRAKE SWITCH INSTALLATION AND WIRING

IMC-MG controllers may have a Brake Pick Switch (BPS) input that is used to monitor the status of the brake. The controller will prevent the operation of the elevator in the event that the brake fails to release in the intended manner. When this happens, a Brake Pick Failure message will flash on the Diagnostic Indicators on the front of the Swing Panel. This is an additional feature not required by code, which enhances the reliability of the system.

The brake switch is needed for the brake monitor circuit that will shut down the car in case of a brake failure. A switch contact must be attached to the brake assembly if one doesn't already exist. The contact must open when the brake is lifted and it should be rated for at least 1/4 Amp 125 VAC. There are many microswitches suitable for this application. Unfortunately there is no way to anticipate all of the methods for mounting them. Take all necessary precautions not to interfere with the normal brake design or operation.

2.3   HOISTWAY CONTROL EQUIPMENT INSTALLATION

This section covers the recommended procedures for installing the perforated steel tape (LS-QUAD-2) or vanes (LS-QUIK-1) with mounting brackets, hoistway limit switches, hoistway terminal strips and their wiring as shown on the prints.

2.3.1   PERFORATED STEEL TAPE FOR THE LS-QUAD-2

Refer to the prints titled "Top Tape Support Assembly" and "Bottom Tape Support Assembly" and follow these assembly procedures. Note that the tape can be hung in any of three positions (distance from the rail). Determine the best location on the car top to mount the landing system control box in relation to the available tape positions. This should be done with the car at the top landing so that the tape will be able to run smoothly through the tape guides without binding or excessive friction.

2.3.2   LS-QUIK-1 LANDING SYSTEM

Refer to the drawings titled "LS-QUIK-1 Vane Encoding & Installation," "LS-QUIK-1 Landing System Box and Encoder Platform Mounting," and "LS-QUIK-1 Landing System Encoder Platform, Landing System Box, & Vane" and follow the assembly procedures shown. Note that the rotary encoder is normally mounted to the car top so that the encoding wheel runs on the rails. If this is not possible, a special version of the LS-QUIK-1 encoder may be mounted in the machine room so that the encoder runs on the governor, or it may be mounted to run on the deflector sheave. Determine the best physical location for your application. Reference the above drawings for the car top mounted encoder box and rail mounted vane detail.

> **NOTE:**   For a machine room mounted encoder it is critical that the encoder is driven by a surface that is concentric with the hoist or governor ropes.

2.3.3   HOISTWAY LIMIT SWITCHES

- Verify that the cam operating the limit switches keeps any slowdown limit switches depressed until the normal direction limit switch is broken, otherwise a switch failure will be detected.

- Verify that both the normal and final limit switches are held depressed for the entire run-by travel of the elevator.

- For faster elevators, the surface of the cam that operates the limit switches must be sufficiently gradual so the impact of the switch rollers striking the cam is relatively silent.

2.3.4   HOISTWAY TERMINAL STRIPS AND TRAVELING CABLES

The traveling cable must have at least one twisted shielded pair to be used for the position pulser quadrature signal from the landing system box (terminals 95 and 96). The shielded cable should be used all the way to the controller. If there are two or more shielded pairs still available, route the two OLM signals from terminals 93 and 94 in the landing system box through a shielded pair (especially if this building has more than eight floors). It is best to ground the shield only at the controller.

2.4 CAR CONTROL EQUIPMENT INSTALLATION

This section covers the recommended procedures for installing and wiring the landing system box (LS-QUAD-2 or LS-QUIK-1), magnetic strips on the steel tape (for the LS-QUAD-2), leveling/absolute floor encoding vanes and encoder (for the LS-QUIK-1), TM switches on the car top (if used) and diode installation for certain door operators.

2.4.1 INSTALLATION OF LANDING SYSTEM CONTROL BOX

Refer to the following prints: "Option #1 For Mounting Landing System Box to Elevator Crosshead," "Option #2 For Mounting Landing System Box to Elevator Crosshead," "Option #1 For Conduit Knockout," and "Option #2 For Conduit Knockout."

a.   The location for the landing box should have already been selected, with the car at the top landing so that the tape will run smoothly through the guides without binding or excessive friction.

b.   Holes are available on both sides, and on the bottom of the landing system box for mounting to any support brackets or structural channels. The mounting of the box should be very firm and solid so that knocking it out of alignment is difficult. Use ¼" diameter screws with 20 threads per inch.

c.   Be sure to refer to the controller print: "Option #1 for Conduit Knockout" and "Option #2 for Conduit Knockout" for connecting conduit to the LS-QUAD-2 or LS-QUIK-1 landing system box. Be sure to follow the instructions closely. Use pre-punched knockout holes if provided.

d.   If the shielded cable for the quadrature signal is brought to a car top terminal strip, another piece of shielded cable must be used to connect the car top terminal strip to the terminal strip on the circuit board in the landing system box. The shield must be connected to ground *only* at the controller, not at the car top terminal strip or at the landing system box (see Figure 2.6).

FIGURE 2.6   Position Pulser Shielded Cable Wiring
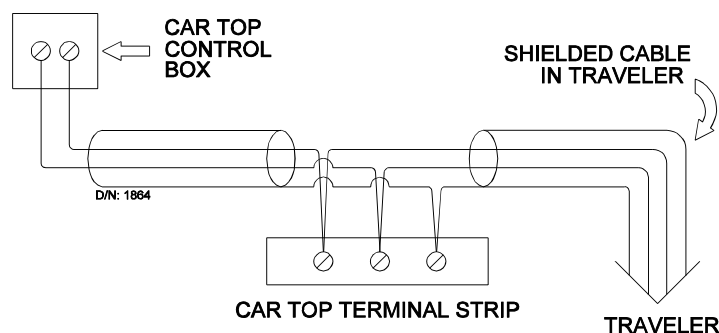
2.4.2 STEEL TAPE ON THE LS-QUAD-2 LANDING SYSTEM BOX

a.   To install the steel tape into the tape guides on the LS-QUAD-2 landing system box, remove the two thumbscrews on the two guide assemblies. Then insert the tape and reinstall the guides with the thumbscrews (tighten firmly).

b.   After inserting the steel tape into the tape guides, check the position of the landing system box. The car should be at the top of the hoistway to make it easy to see if the

box alignment is causing any stress or binding on the tape guides. **Make sure the box is absolutely vertical** from side-to-side and front-to-back to allow easy tape movement. This will also help avoid excessive wear on the tape guides (using a level is helpful). Be careful here, as avoiding premature failure of the tape guides is critical.

> **NOTE:** Notice that the face-plate of the LS-QUAD-2 (which contains the sensors and tape guides) is held in place by 6 thumbscrews, and that this face-plate can be moved up and down. Be sure that the face-plate of the LS-QUAD-2 is in the middle of its side-to-side and up and downrange of movement when the car is near the top of the hoistway. It is also important to ensure that the unit is exactly vertical so there is no binding of the tape in the guides.

c.   Move the elevator from the top to the bottom of the hoistway to check for smooth tape movement and to ensure that excessive pressure on the guides is avoided. Correct problems immediately.

d.   If the OLM signals from terminals 93 and 94 in the landing system box are routed through the shielded cable, as suggested above, and if the shielded cable for the quadrature signal is brought to a car top terminal strip, their wiring method should also be similar to that shown in Figure 2.7.

2.4.3   MAGNETIC STRIPS FOR THE LS-QUAD-2 LANDING SYSTEM

> **NOTE:** The magnetic strips provided with the LS-QUAD-2 landing system may be either north or south pole types (usually south). The poles marked indicate the side away from the adhesive side. The magnets should always be attached to the steel tape from the adhesive side.

a.   Carefully read and follow the Target Installation instructions in the prints, but also read the rest of these instructions before proceeding.

b.   Before installing the magnets, clean the steel tape thoroughly with an appropriate solvent. No oil should be left on the tape as it will interfere with the adhesive backing on the magnets.

c.   There are normally two lanes of magnets installed on the side of the perforated tape facing the car. One lane consists of only the individual floor magnets (leveling magnets) which are all 6″ in length. The other lane consists of magnets (absolute floor position encoding magnets) which are all multiples of 2½″ in length (i.e., 2½″, 5″, 7½″, and 10″). The EDGE and PRESET magnets are all multi-pole magnets and are used only as installation guides.

d.   Do not permanently install the floor magnets operating the LU, DZ, and LD sensors. Do not remove the adhesive cover strip on the back of the magnet. The magnet's position may have to be adjusted later. For now, use clear adhesive tape to attach the magnet temporarily. Adhesive tape covering the magnet will not interfere with its performance.

2.4.4 LEVELING/ABSOLUTE FLOOR ENCODING VANES AND CAR TOP WHEEL DRIVEN ENCODER FOR THE LS-QUIK-1

Install the encoder on the car top, typically above the roller guide assembly. Install one leveling/absolute floor encoding vane at each landing and break out the appropriate tabs to code the particular floor. Refer to "LS-QUIK-1 Vane Encoding & Installation" and "LS-QUIK-1 Landing System Encoder Platform, Landing System Box & Vane" prints.

2.4.5 TM SWITCH (IF USED)

Refer to the "Elevator Car Wiring Print" for details on the wiring and setting of each contact in the TM switch. Carefully examine the functioning of this switch, especially if copper-to-carbon contacts are used. The current levels are quite low and may not be enough to burn the oxide off the contacts.

2.4.6 DOOR OPERATOR DIODE (IF USED)

Certain door operators, such as G.A.L. model MOM or MOH, require the installation of diodes in the door operator on the car top. See the "Elevator Car Wiring Print" for special instructions regarding these diodes.

2.4.7 LOAD WEIGHER

Information regarding the installation of the load weigher used for isolated platform elevator cars (LW-MCEIP) is provided in *Appendix N, MCE Load Weigher Installation and Adjustment*. Information regarding the installation of the load weigher used for non-isolated platform elevator cars is provided with the Load Weigher supplied by K-Tech International.

2.4.8 DOOR POSITION MONITOR SWITCH (IF USED)

If you are in a jurisdiction where ASME A17.1 - 1996 or later is being enforced, Door Position Monitor switch(s) connected to the DPM and/or DPMR inputs, must be added to monitor the position of the closed doors. This must be a separate physical limit switch that makes up approximately 1 to 2 inches before the doors lock.

SECTION 3
START-UP SEQUENCE

3.0   GENERAL INFORMATION

In this section, the car is prepared for use by construction personnel so that they may complete the cab installation process. After completing the steps in this section, basic car movement is available on Inspection operation. This section covers the application of power to the controller and associated components, verifying voltage levels for the MG set, DC hoist motor and brake, and the preliminary adjustment of the system.

3.1   CHECKING FOR SHORTS TO GROUND

NOTE: At this time, the controller wiring must be complete. Make sure the field wiring is correct before proceeding further.

NOTE: A short to ground is defined as having a resistance of less than 20 ohms between the 1-bus (common) and the terminal being checked.

Perform a test for shorts to ground before powering up the system. Power should be OFF at the main disconnect. Refer to Figure 3.1 to help find items as they are referred to in the ground check. If any shorts to ground are found in the following steps, they must be corrected before proceeding.

a.   Remove fuse F4 from the controller cabinet. Consult the job prints and remove the fuses that power terminals 2H and 2F (These may be in the group control cabinet).

b.   Check for shorts to ground on all the terminals on the HC-RB4, HC-PI/O, HC-CI/O and IMC-RI boards.

c.   If a G.A.L. MOD door operator is provided, check for shorts to ground on terminals F1, F2, A1, A2 and D5. Look for their location on page -3 of the job prints. Remove door fuses F7 and F8. For other door operators, consult the prints as to which fuses to remove and then check the appropriate terminals for shorts to ground.

FIGURE 3.1   *IMC-MG Controller Cabinet Layout*

FIGURE 3.1   *IMC-MG Controller Cabinet Layout*

WPD 1693 R2
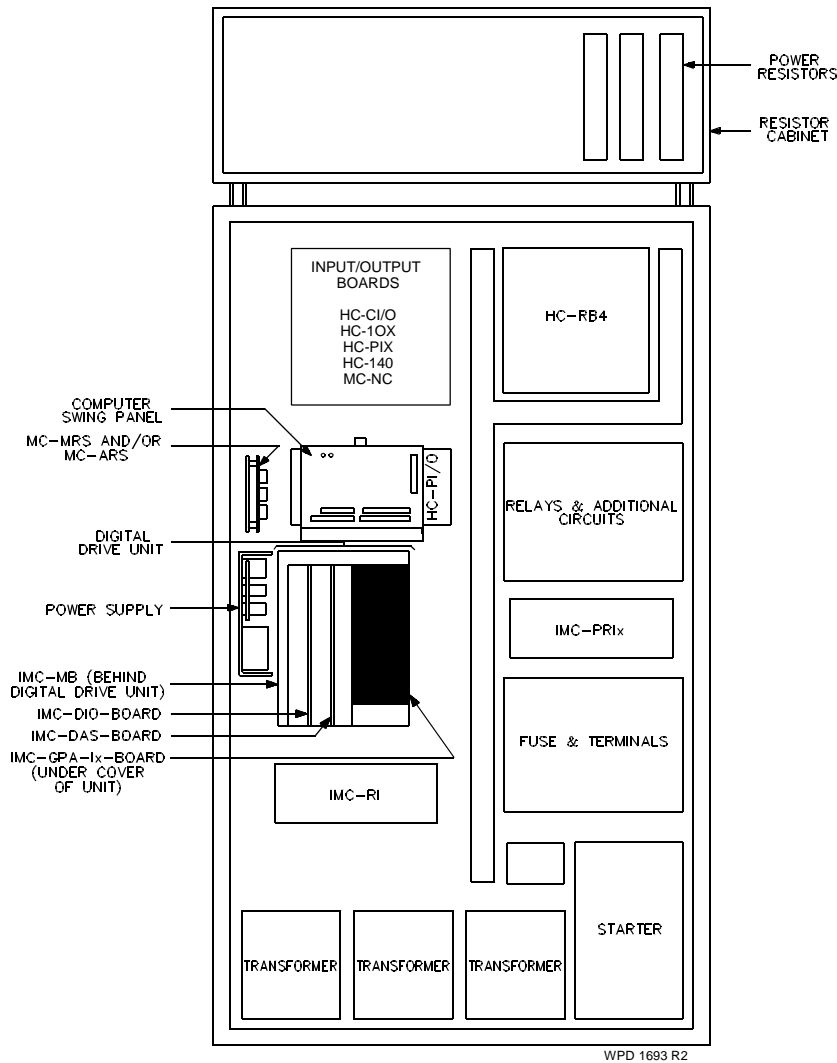
3.2   VERIFYING PROPER VOLTAGES

3.2.1   BEFORE APPLYING POWER

NOTE: These instructions assume the elevator mechanic has adequate electrical troubleshooting experience. Follow the procedures carefully and if the elevator does not respond correctly, check the circuits and use the troubleshooting section in this manual (Section 6). Proceed cautiously. To become familiar with the procedure, read these instructions all the way through before starting the work.

a.   The primary device for operating all of the rotating equipment, brake and certain safety features on this controller is the IMC-DDP-x Processor board, located inside the Swing Panel, and the IMC-Gxx Drive Unit.   The interconnections of the Drive Unit and the IMC-MG controller with the elevator equipment are shown on drive page -D of the job prints.

b. In the following instructions, it is assumed that the sling is suspended from the hoist ropes, all hoistway doors are closed, but not necessarily locked, and the hoistway and machine room wiring is complete. Test the safety by hand to ensure it will hold the car. Correct any malfunction before proceeding further.

c. Unplug the screw terminal blocks from the HC-PI/O and HC-CI/O boards by moving the blocks toward the right (away from the board edge), thereby disconnecting the field wiring. This is to avoid damaging the boards.

d. Be sure the MG set series field, if it has one, is *open* (all leads disconnected) and that all shunts are removed from these windings. Be sure that any special instructions on the print regarding arrangement of the generator shunt field have been followed.

e. Remove fuses F5 and F6 and any other fuses labeled F5 or F6 followed by a letter (such as F5A, F6A, F5B, F6B, etc.). Their location can be found on the drive page -D of the job prints. Also remove fuse FM or any fuses labeled FM followed by a number (FM1, FM2, etc.). Then remove fuses FB1, FB2, FG1 and FG2. These fuses can also be found on Drive Page -D of the job prints. This disconnects all power from the Drive Unit.

f. Remove fuses FL1, FL2, FL3 and F2. Their location can be found on page -3 of the job prints. This disconnects power from the controller logic circuits and power supply. Remove door fuses.

3.2.2 APPLYING POWER

This section describes the procedure for rotating the MG in the appropriate direction.

a. Check the line side of the disconnect to see that all three legs are at the correct voltage.

b. Turn ON power at the main disconnect and check the voltages at L1, L2, and L3 on the starters located at the bottom right-hand side of the cabinet.

c. Turn OFF power at the main disconnect. Reinstall fuses FL1, FL2, and FL3. Restore power at the main disconnect. If the RP (Reverse Phase) sensor is not adjustable, it should energize when the power is turned ON. If not, reverse the position of the L1 and L2 wires at the disconnect to get proper phase sequence. The RP sensor should now energize. If not, make sure that the three phases are coming to pins 3, 4, and 5 or the power input pins on the sensor. The RP sensor may have a delay on picking. Be sure power is ON at the main disconnect.

d. Check MG rotation by momentarily pushing in the WYE starter switch. Do not hold it in more than one second. If the generator turns the wrong way, interchange the motor leads labeled T1 and T2 where they connect at the bottom of the terminal block and interchange T4 and T5 where they connect at the bottom of the starter, if it is WYE-DELTA. Some contactors may not make up when activated by hand. Use a pushbutton relay for AA on the HC-RB4 to check rotation.

e. Check the AC voltage between the top of fuse F2 holder and 1 bus. It should read 120VAC. If this voltage is present, reinstall fuse F2. Proceed with the CRT installation.

3.3   INSTALLING AND USING THE CRT TERMINAL/EMULATOR

Instructions for connecting and setting up the CRT terminal or terminal emulator and for programming the controller's communication ports are provided in Appendix L *CRT Terminal and Terminal Emulator Setup.* Appendix P contains setup instructions for the following:

3.3.1   ACCESSING THE MENU SCREENS

The CRT terminal or terminal emulator should initialize automatically when power to the controller is turned ON. The F5 key on the keyboard can be used to begin the initialization process should automatic initialization fail to occur. The terminal screen will go blank and may flash a couple of times before coming up with a readable display. Once the terminal has been initialized, there are prompts to guide the user to the Main Menu.

If the screen continues to flash for more than one minute after initialization has begun, or the display changes but is not readable, refer to Appendix P *CRT Terminal and Terminal Emulator Setup* for proper terminal parameter settings. Later, should any later problems arise in the terminal functions due to power surges or line noise, reinitializing using the F5 key will usually clear the problem. It is remotely possible that a voltage surge may require reestablishing the correct terminal parameter settings as described in the Computer Peripherals Manual.

After power up and initialization, the MCE logo screen is displayed with the flashing prompt **Press any key to begin.** Press any key to display the Main Menu screen (Figure 3.2). This menu can also be accessed from any other menu by pressing F4.

3.3.2   CRT MENUS

After power up and initialization, prompts lead the user to the Main Menu. This menu can be accessed from any other menu by pressing F4 or ESC. From the Main Menu, press F1 on the keyboard to access the Digital Drive Parameters menu (Shift-F2 for a Simplex controller). Simplex being a single car, Local being a car that is part of a multi-car group.

FIGURE 3.2   CRT Main Menus (Local and Simplex)

MAIN MENU

Controller Type: IMC-MG Local

F1 - Digital Drive Parameters Menu
F2 - Velocity vs Time Graphic Display
F3 - Graphic Display of Elevator Status
F4 - Main Menu
F5 - Computer Terminal Initialization
F7 - Special Event Calendar Menu
F8 - Lockout the Drive Parameters Menu
MP:v6.13   CPA:v4.52   DPP:v6.08
                                                dnwp011

Enter Selection:

Local

MAIN MENU

Controller Type: IMC-MG Simplex

F1 - Job Configuration Summary
F2 - System Performance Graph
F3 - Graphic Display of Elevator Status
F4 - Main Menu
F5 - CRT Terminal Initialization
F6 - Computer Parameters
F7 - Special Event Calendar Menu
F8 - Car "A" Inputs and Outputs
Shift F2 - Digital Drive Parameters Menu
Shift F3 - Velocity vs Time Graphic Display

MP:v6.13   CPA:v4.24   DDP:v6.08
                                                dnwp013 R0

Simplex

FIGURE 3.3   Digital Drive Parameters Menu

DIGITAL DRIVE PARAMETERS MENU

1 - Pattern Parameters

2 - Profile Parameters

3 - Motor Parameters

4 - Gain Parameters

5 - Option/Calibration Parameters

6 - Auxiliary Drive Parameters

7 - Terminal Limit Switches

8 - Floor Heights

9 - Dynamic Adjustment Parameters

dnwp014 R0

Enter Selection:
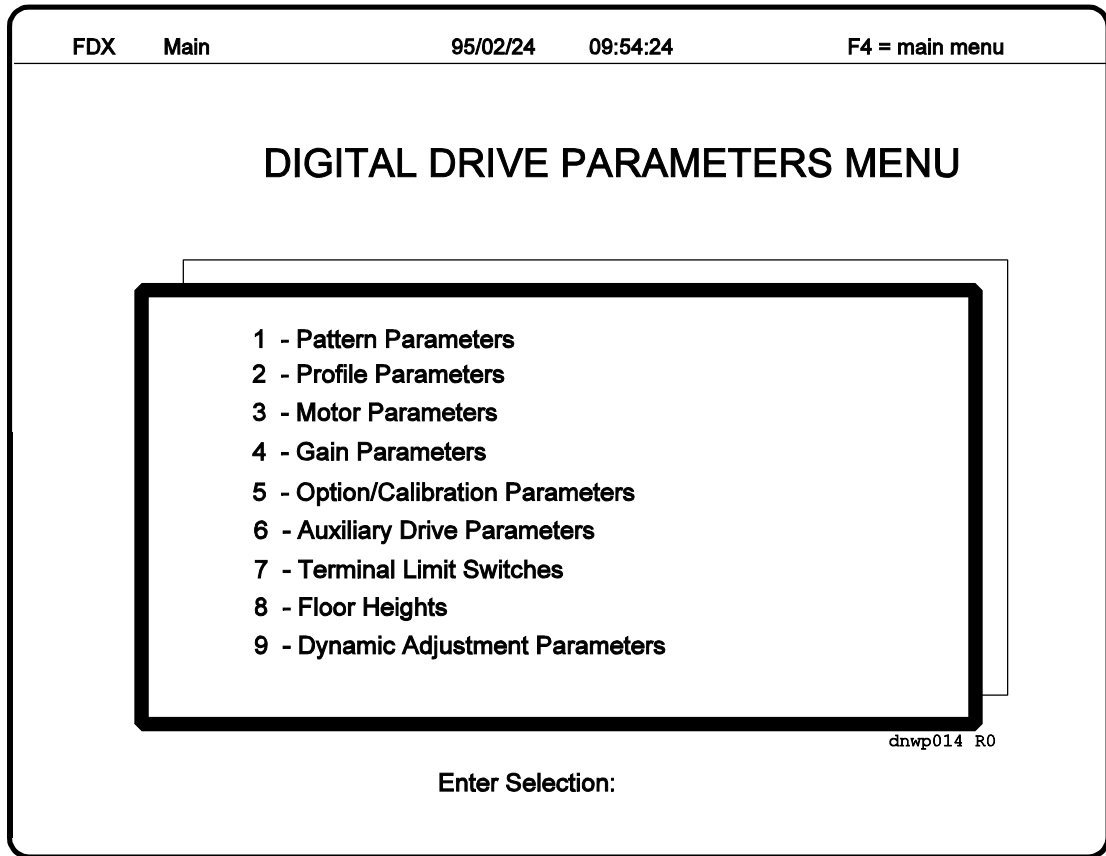
From this menu, any one of nine parameter screens can be accessed. Adjustments to parameters can be made at any time, but will not go into effect until the car has stopped. The Dynamic Parameters are the only exceptions; these changes instantaneously affect the operation of the elevator. The Terminal Limit Switches screen displays the learned velocity and car position information, but the values cannot be changed. The floor height values should *not* be changed in the field except to reenter previous controller-learned values.

On a parameter screen, the cursor initially appears in the DESIRED value's column. The left or right arrow keys move the cursor from column to column and the TAB key (or up/down key) moves to a different row. The F12 key will toggle between the current screen and the previous screen as long as both screens are the last screens available in that series of menus.

FIGURE 3.4   Pattern Parameters Screen

PATTERN PARAMETERS

		Parameters	Actual	Desired	Units
JERK:	J1	Phase One..................	07.00	07.00	ft/(s*s*s)
	J3	Phase Three...............	05.00	05.00	ft/(s*s*s)
	J5	Phase Five..................	05.00	05.00	ft/(s*s*s)
	J7	Phase Seven...............	03.00	03.00	ft/(s*s*s)
ACCELERATION:	A0	Phase Zero.................	00.01	00.01	ft/(s*s)
	A2	Phase Two..................	03.75	03.75	ft/(s*s)
	A6	Phase Six....................	03.50	03.50	ft/(s*s)
VELOCITY:	VH	Contract......................	0350	0350	ft/min
	VEQ	Earthquake..................	150	150	ft/min
	VHL	High Leveling..............	030	030	ft/min
	VIL	Intermediate Leveling..	012	012	ft/min
	VFL	Final Leveling.............	005	005	ft/min
	VRL	Releveling...................	008	008	ft/min
	VIN	Inspection...................	050	050	ft/min
	VCR	Correction...................	050	050	ft/min
	VS	Short...........................	050	050	ft/min
	VLR	Learn..........................	035	035	ft/min
DISTANCE:	DL	Leveling......................	0.50	0.50	ft
	DFL	Final Leveling.............	0.05	0.05	ft
	DEQ	Earthquake Slowdown.	3.00	3.00	ft
	DS	Short Slowdown..........	1.25	1.25	ft
LANDING:	NF	Number of Floors........	24	24	landings

dnwp0001

S - save changes

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

Preset values have been programmed at the factory and displayed in the ACTUAL and DESIRED value's column. These parameter values are listed in the Reference Section Tables R.1 to R.6.

Once the desired parameter is selected, there are two different methods to modify its value. Use the I key to increase the value or the D key to decrease the value. Another method uses the numerical keypad on the keyboard to change a number. Once changes have been made, make the changes permanent by hitting the S key. A confirmation question then comes up. Hitting the Y key (for yes) saves all the values inside the controller's computer chip. If any of the parameters are outside the acceptable range for that parameter, the computer will substitute the closest possible value.

FIGURE 3.5 *Dynamic Parameters Screen*

FDX Main   95/02/24 10:02:24   ESC = main menu

OPERATION

Drive Normal
Idle Task
Standby

DRVR	DRVE	PGU	ORR
RNE	TIN	SPR	PGS
SMF	TEX	PGR	PGE
BRE	BRP		

VELOCITY

Pattern:	0000	fpm
Tach:	0000	fpm
Safety:	0000	fpm
Motor:	0000	rpm
OLM:	0137	fpm

MACHINE

Motor:	074	V
Brake:	000	V
Generator:	000	V
Armature:	-002	V
DC Loop:	-016	V

POSITION

Rel:	094'04.69"
Abs:	017'09.00"
OLM:	-000'09.00"

3

Flr #

22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 M B

[ ]

DYNAMIC PARAMETERS

GAIN	PG	Pattern Gain.	1.00
	PZA	Zero Pattern Adj.	0.00
	GTC	Tach/Encoder.	01.62
	GLV	Loop Voltage	01.25
	GLI	Loop Current	00.00
	GIR	IR Compensation	00.00
	GES	Electric Stop	00.00
	GDPI	Direct Pttrn Inj.	00.00
	GP	Proportional Err.	02.50
	GI	Integrator Error.	02.50
	GD	Differential.	00.00
BRAKE	BDD	Brake Drop Delay.	0.00 S
	BSPD	Speed Pick Delay.	0.35 S
SAFETY	SVSC	Voltage Sfty Cal.	01.25
	SISC	Current Sfty Cal.	00.00
MOTOR	MFRV	Running Field.	120 V

DRIVE

TF	MF	UETS
TE	BF	DETS
TSAT	GSF	
TME	HV	GSAT
FLT	FLTB	LOC
SAF	FBLT	DEL
CNPB		RNF
CNPG		

PATTERN

RD	LEV	FLR	LI	INS
PR	OLM	STP	INT	EQ
R5	LU	RDS	LLT	SPR
R4	DZ	PRS	OLD	SPC
R3	LD	PPS	OLP	SPT
R2	UP	IBJ	TPS	
R1	H		LOP	
R0	DN		LOD	

dnID008b

UP/DN = select   I/D/N = inc/dec/normal   TAB = enter hoistway calls

Before running the car at contract speed, the Pattern Acceleration/ Deceleration Limiter parameter (PADL) value must be set on the Gain Parameters screen. Find your car speed in the table below, and enter the corresponding value into the PADL parameter.

	SPEED (fpm)	PADL	SPEED (fpm)	PADL
up to	300	14.0	700	5.9
	350	9.5	800	5.4
	400	8.0	1000	4.6
	450	7.2	1200	3.9
	500	6.7	1400	3.2
	600	6.2	1600	2.9

The parameters on the Dynamic Parameters screen can be adjusted one at a time, while the car is in motion. Any variation or failure due to the adjustment of any Dynamic Parameters can also be monitored instantly. On the Dynamic Parameters screen, the parameters can only be changed by a small amount at a time. So, if a parameter needs to be changed by a large amount, (i.e., increasing a value by more than two), change the value of the particular parameter on another parameter screen. In addition to changing parameters from this screen, car calls can be entered.

To place a car call, press the TAB key to move the cursor over to the elevator hoistway window. Use the arrow keys to select the desired floor. Once the cursor is on the desired floor, press the ENTER key which will register the car call.

3.4   VERIFYING THE INITIAL PARAMETER VALUES

In order to proceed with start-up, the initial set-up parameters must be entered into the computer before adjusting the car on inspection operation. At this time, turn to the Reference section in the back of this manual and follow along with the instructions below.

The Reference section contains a list of the parameters found on screens 1 - 5 of the Digital Drive Parameters Menu. All the values that have already been entered in the CRT parameter menus are listed in Tables R.1 - R.6. The numbers in the PRESET VALUE columns were set at the factory. There is a setting on the CRT for every parameter. Also listed in the PRESET VALUES column are the letters XX. These indicate that the correct value needs to be entered for this installation as part of the initial set-up. All the values can be changed at any time by the elevator mechanic. If any of the values entered are greater than what is possible, the computer will substitute the closest possible value. In the Reference section, there is a column named USER ADJ. Do not enter any values in this column yet. This column should be filled in when all adjustments are made and the elevator is running smoothly.

a.   Many of the Motor Parameter values are taken directly from the nameplate of the equipment used with this installation. These values must be measured accurately. Failure to enter correct values may damage the drive and rotating equipment or result in car overspeed.

b.   If the tachometer is already installed and wired to the controller, the external feedback signal can be used. Set the software option OSR on the Option/Calibration Parameters screen to EXT.

c.   Look at the tables in the Reference section and compare those values to what is seen on the corresponding CRT parameter screen. Take the time to enter on the CRT screen those values that are marked XX in the Reference section parameter screen tables. Table R.2 lists the recommended speed parameters to use when making adjustments to the Profile Parameters screen.

d.   After making the parameter adjustments on screens 1 - 5, turn OFF power at the main disconnect. Put the car on inspection manually. To do this, check the pit switch, buffer switches, car and car top stop switches, and any other safety switches to confirm that they are all in a closed position. Turn ON the car top inspection switch. Pull the wire out of terminal 59 on the HC-RB4 board and tape the end with electrical tape for protection. Close the car doors. Leave the hall doors closed, and lock the doors that are accessible to the general public.

e.   Connect a jumper wire to terminals 4 and 8 on the HC-RB4 board (see Figure 3.6) to override the gate switch and the door locks. If the car is on the up final limit, connect a jumper to terminals 2 and 16 on the sub-plate, but **remove this jumper as soon as it is possible for safety reasons.**

f.   On the IMC-RI board, there are two single pin terminals, FBP1 and FBP2, used to bypass the drive safety monitors. Use a jumper wire to connect terminal FBP1 to terminal FBP2.

FIGURE 3.6   HC-RB4 Main Relay Board

Terminals 4 and 8

Terminal 59

D/N 1698 R1
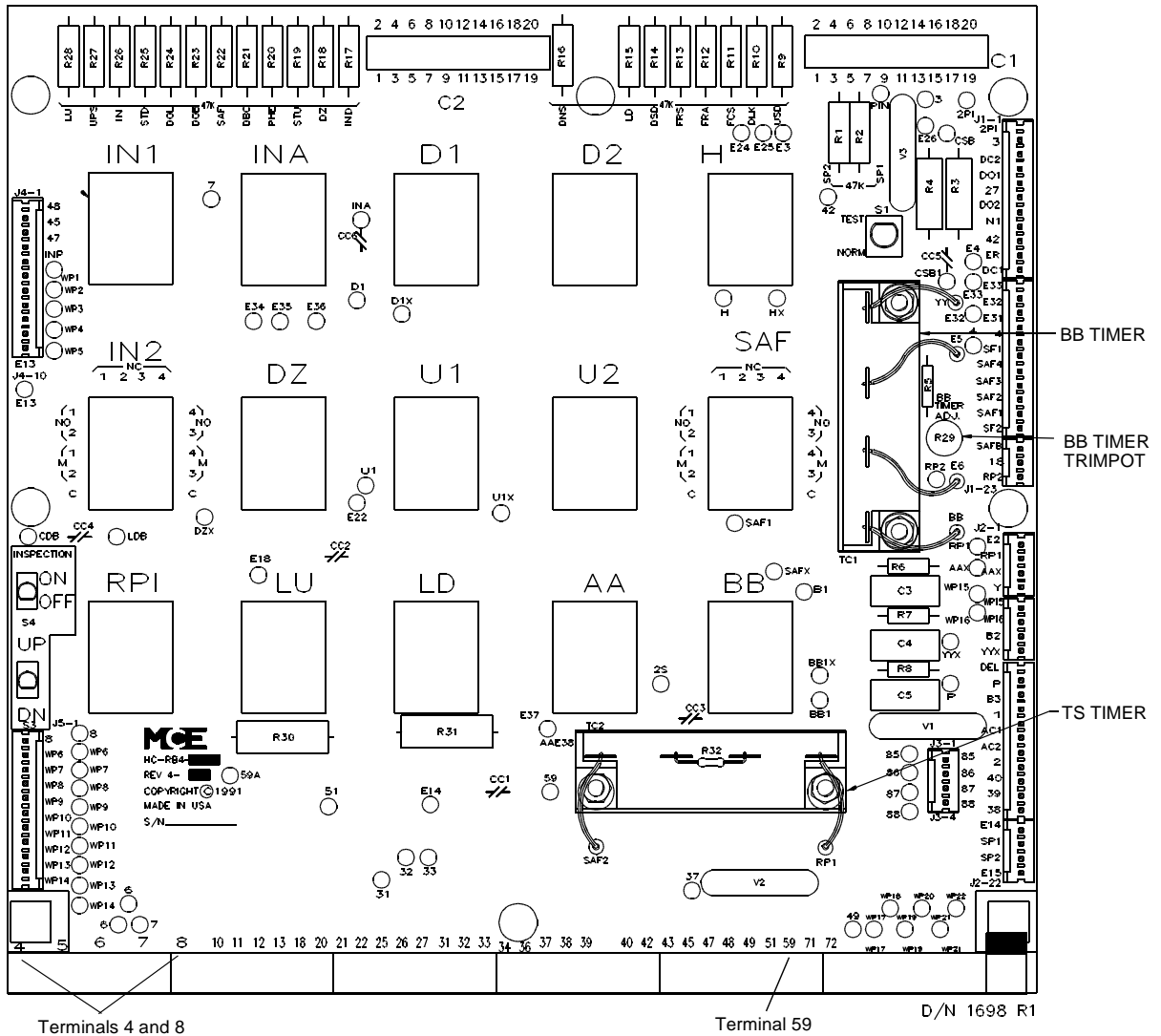
g. On the Main Relay board (HC-RB4), the BB Timer trimpot needs to be adjusted. Turn the trimpot fully clockwise.

h. BIP & BAL Trimpots - Prior to the BIP and BAL adjustments, set the following Gains to zero: GP, GI, GLV and GLI.

1. **BIP Trimpot** Input voltage offset trimming (Figure 3.7). On the IMC-DAS board (Rev. 3 and 4), verify that a TL084 opamp is installed in the U5 socket. This socket is located in the lower middle of the board. A large, 28-pin IC and the BIP trimpot are located above this socket. Access the F4 screen (Main Menu), turn the CAPS LOCK on and push the Ctrl and A keys simultaneously. Then, release the Ctrl and A keys and push the V key quickly. Type in D700. Verify that the value at address D700 and D701 is 00. If the value at these addresses is not zero, use trimpot R55 to set the value to 00. Verify address D702 is either the value FB, 00 or 05 and address D703 is either 00 or FF. If the addresses do not have the above values, adjust the BIP trimpot located on the IMC-DAS board by removing it. Turn the trimpot 3 turns at a time (turn clockwise if the value at D703 is FF. Replace the board and check it again. Repeat the process until the desired values for the address above are obtained.

FIGURE 3.7   **BIP & BAL Trimpots on the IMC-DAS Board**
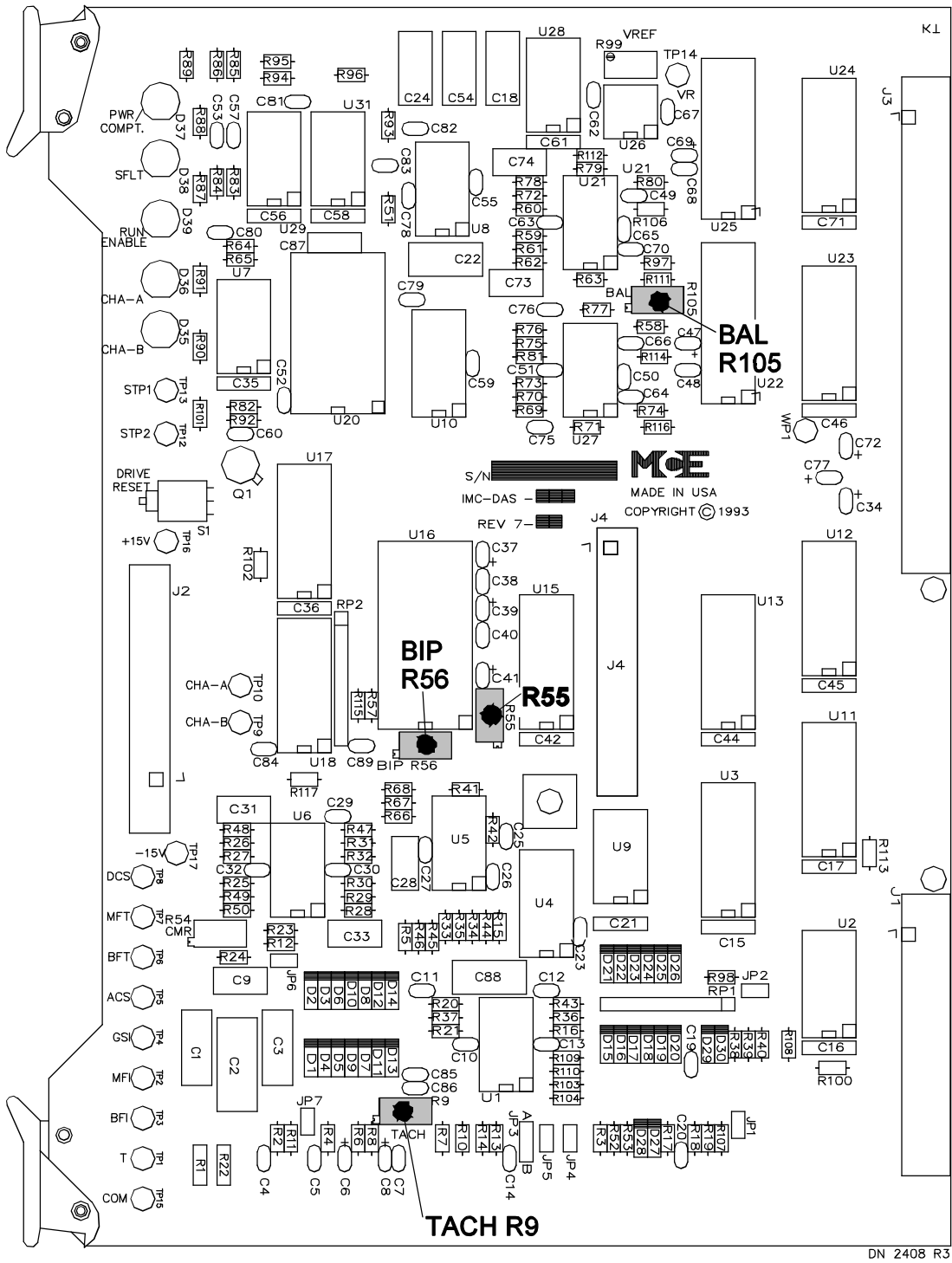
2.   **BAL Trimpot** Output voltage offset trimming (may not be available in the new systems). Park the car at a floor. Connect a DVM set to DC volts (on mV scale) to the DCS test point located on the IMC-DAS board (just below the ribbon cable). This signal must be below ±10mV and preferably below ±5mV. If not, locate the BAL trimpot near the top of the board. Notice that this trimpot is very sensitive, as 1/8 of a turn has a great effect. If the value is positive, turn trimpot BAL clockwise to reduce.

3.5   VERIFYING RELAY OPERATION , VOLTAGE AND POLARITY

a.   Power should be OFF at the main disconnect. Now is the time to disable the hoist motor. Lift all sets of brushes on the hoist motor and put cardboard under them or otherwise tie them back. Remove the brake wire from terminal B1 to disable the brake.

b.   Reinstall fuses F5x, F6x, FM1, FM2 (any FMx fuses), FB1, FB2, FG1 and FG2 (see job prints page -D). Leave out fuses F4, F7, and F8.

c.   Turn ON power at the main disconnect. On the Dynamic Parameters or Gain Parameters screen, reduce the pattern gain (PG) and integrator error gain (GI) to zero (0.00). This prevents the drive from responding to any speed signal. On the Option/Calibration Parameters screen, assign pattern to Software Test Point 1 and assign the synthetic velocity feedback signal to Software Test Point 2 (see Table R.10).

d.   On the Gain Parameters screen, reduce the Pattern Adjust Gain (PG) and Integrator Error Gain (GI) to zero (0.00). This prevents the drive from responding to any speed signal. On the Option/Calibration Parameters screen, assign Processed Pattern option D to Software Test Point 1 (STP1). See Table R.10.

Also, on the Option/Calibration Parameters screen, set the Closed Loop Motor Field option (OCMF) to OFF. Check the standing motor field on terminals MF1 and MF2 and check to see that the voltage is close to the value entered for Standing Motor Field (MFSV) on the Motor Parameters screen.

If there is no motor field output voltage, check the following:

•   The FM1 and FM2 fuses have been installed.

•   There is sufficient AC input voltage between terminals MPO1 and MPO2 on the IMC-Gxx Digital Drive Unit (motor field DC voltage $\approx$ AC x .85).

•   Check the R-C network (25ohms in series with 4µF capacitor) across the motor field to see that the resistor is adjusted to 15ohms. If there are stability problems with the motor field output, it may be necessary to increase or decrease this resistance by adjusting the tap on the resistor.

•   The AC voltage between terminals AC1 and AC2 on the IMC-Gxx Digital Drive Unit must be close to the specified value on page -D of the job prints.

•   For further troubleshooting information, refer to Section 6.

•   If the motor field output voltage is stable at a particular voltage, the motor field calibration should be done at this time. To calibrate the motor field current, place a voltmeter across the motor field output terminals MF1 and MF2 and measure the DC voltage. It should match within 5% of what is displayed for the motor field on the F3 screen. **The relationship between the displayed motor field voltage on the F3 screen and the measured motor field voltage between terminals MF1 and MF2 is *not* adjustable**.

Follow the instruction below to calibrate the motor field and obtain the desired output voltage:

MOTOR FIELD CALIBRATION (Simplified Procedure) - *Do not attempt to move the car during this calibration.*

1. Enter all motor field resistance and voltage parameters into the Standard Motor Field and Brake Parameters (F1 - 2) screen. Set MFSV = MFFV. Note: If the motor field resistance is greater than 30 ohms and there are motor field stability problems, see Section 3.5.2.2.1.e.1.

2. Set MFPG = 1.00 and MFIG = 3.00.

3. On Motor Field and Brake Parameters (F1 - 2) screen set OMFM = CLOSED and CMFV = 1.00.

4. Move to the F3 screen and observe the value of the motor field voltage. You will be moving between the Motor Field and Brake Parameters (F1 - 2) screen and the Graphic Display of Elevator (F3) screen as you calibrate the motor field.

5. Increase (or decrease) parameter CMFV on the F1-2 screen and look at the F3 screen to see that displayed voltage is closer to what was stored in MFSV on F1-2 screen.

6. Continue to increase (or decrease) CMFV until the readout of motor field voltage on the F3 screen is just below the parameter MFSV (by two to three volts).

7. Set MFSV back to your original standing field voltage. Record the final setting of CMFV.

e. Turn OFF power at the main disconnect. Now reinstall fuse F4.

f. Turn ON power at the main disconnect. The MG will start and the following relays will energize: AA, BB, RP, SAF, WYE, then DELTA.

   •   If AA and BB are not energized, on the HC-RB4 board, check to make sure that the IN1 and IN2 relays are dropped out.

   •   If no relays are picked, make sure fuse F4 is installed. Also check to see that 120VAC is running between terminals 1 and 2.

   •   If only the SAF and AA relays are energized on the HC-RB4 board, check the starter overload contacts.

   •   If the SAF relay is not energized on the HC-RB4 board, check the jumper from terminals FBP1 and FBP2 on the IMC-RI board. Also briefly connect a jumper between screw terminals 2 and 20 on the HC-RB4 board. If the SAF relay energizes after connecting the jumper between 2 and 20, then trouble is in the safety contact string. Remember, there are several seconds of delay from power being applied to when SAF energizes.

   •   If the SAF relay still does not energize, check the FLT relay on the IMC-RI board and RP sensor.

- • If the FLT relay is not energized and the FBP1 and FBP2 are jumped together, make sure the COMPUTER1 ON and COMP2 ON LEDs (*COMPUTER ON LED* for IMC-DIO boards up to Rev. 2) on the IMC-DIO board are on (Check the DDP COMPUTER ON LED to verify that it is on, as well).

g. At this time, adjust the BB timer trimpot on the HC-RB4 board to transfer from WYE to DELTA just as the MG reaches maximum rpm from a dead stop.

h. Connect a jumper wire to terminals 34 and 32 on the energized HC-RB4 board to pick the up direction relays. Some relays will energize, but the car should not move and the brake should not lift. Check to make sure that the following relays are energized:

RELAY	LOCATION
AA, BB, RP, SAF, U1, and U2	HC-RB4 board
RE, DA, PT1-PT4, and RB	IMC-PRIx board
SAFG and SAFB	the sub-plate

i. The measured voltage between panel mounted terminals MF1 and MF2 must be close to the forcing motor field value (MFFV) entered on the Motor Parameters screen. Follow the instructions in Step 3.5(d) if there is any problem obtaining a reasonable forcing motor field voltage.

j. Remove the jumper wire from terminals 34 and 32. The motor field should slowly decay to the standing motor field value within five seconds.

k. Make sure the pattern gain (PG) and integrator error gain (GI) on the Gain Parameters screen are still at zero. Place a meter (250VDC scale) on panel mounted terminals GF1 (+ polarity) and GF2 (- polarity). Place a second meter (250VDC scale) on panel mounted terminals GA (+) and GC (-). Connect a jumper wire between terminals 34 and 32 on the HC-RB4 board to pick the up direction and ensure that relays RE, PT1-PT4 and RB pick. This indicates that the generator and brake control circuitry are now enabled. Both meter readings should read 10VDC or less, and the reading between terminals GA and GC on the backplate should not oscillate. If the voltages between GF1 and GF2 and GA and GC saturate to >10VDC, remove the jumper wire from 34 and 32. Then interchange GF1 and GF2 wires. Now place the jumper wire back on 34 and 32. The voltages must be close to zero. Remove the jumper wire from 34 and 32. If there is a problem in this step, continue reading below, otherwise skip to the next step.

- • If there is a problem getting the DC loop voltage feedback into the drive, read this section. The armature voltage from terminals GA and GC on the sub-plate is routed to terminals GA and GC. These inputs and safety adjustments SVSC and SISC make up the synthetic tachometer signal. With this information, notice that if the FA or FC fuse is blown, voltage saturation could happen as described above. Check on the Dynamic Parameters screen to see that the voltage safety calibration (SVSC) value is 1.25. If it is not, make it so. Measure the voltage between Software Test Point 2 (synthetic tachometer signal) and test point COM with a meter on the 10VDC scale. Connect a jumper wire between terminals 34 and 32 on the HC-RB4 board. Now slowly increase the pattern gain (PG) on the Dynamic Parameters screen. If the voltage between GF1 and GF2 rises, then the terminal GA input is good. **Reduce the pattern**

gain (PG) to zero before proceeding to the next section. Remove the jumper between terminals 34 and 32. Now proceed with Step 3.5(m). If there is still a problem, contact MCE Technical Support.

- If there is a problem producing generator shunt field output, read this section. Check to see that fuses FG1 and FG2 are not blown. Check the AC input voltage between terminals GPI1 and GPI2 on the IMC-PRIx board. This voltage is normally 120VAC, but confirm this voltage with the value given on page -D of the job prints. This AC input goes through relays PT3, PT4, and RB and is routed to the drive through terminals GPO1 and GPO2 on the IMC-PRIx board. Confirm that relays PT3, PT4, and RB are energized. Next, check to see if the actual generator shunt field resistance (DGFR) matches the value entered on the Motor Parameters screen. If there is no output, check for continuity, blown fuses, etc. Notice that if the RE relay on the IMC-PRIx board is picked, the chances are very good that the drive is operating normally.

l.   Connect a jumper wire between terminal 34 and 32 again on the HC-RB4 board to pick the up direction. The voltages on both meters (as connected in the previous step) should be 10VDC or less. The meter reading between GA and GC should be stable. Increase the pattern gain *slowly* from the Dynamic Parameters screen until the values on both meters increase. **Make sure the Pattern Gain does not exceed 1.0.** The displayed values on the meters will increase once the up direction is selected. If they do not, check to see that the meters are set to +VDC and the lead polarity is as indicated at the start of step 3.5(k). If there is still a problem, check the GF1 and GF2 wiring on the panel mounted terminals. If the generator shunt field output moves up, but the generator armature moves down, then turn OFF power at the disconnect, interchange the wires at GF1 and GF2, restore power at the disconnect and repeat this step again.

m.   Remove the meter from GF1 and GF2 and connect the black probe (-) to test point COM and the red probe (+) to Software Test Point 1 on the IMC-DAS board.

n.   Ensure that the generator (meter connected to GA and GC) can deliver more than the rated voltage. To verify, set the tachometer option on the Option/Calibration Parameters screen to INT (internal). Decrease the parameter SVSC on the Dynamic Parameters screen by 10% to obtain 110% of loop voltage on terminals GA and GC, which corresponds to 110% of speed loop voltage. If there is *not* enough voltage, contact MCE Technical Support. It is possible to tell if the Drive Unit is putting out maximum voltage by looking at the yellow LED indicator. This is marked GEN. SHUNT FIELD SATURATED on the IMC-MG Drive Unit or GSAT on the F3 CRT screen. If the LED is lit brightly and not flickering, the generator shunt field output is saturated at maximum.

o.   Reduce the pattern gain (PG) on the Gain Parameters screen to zero. The armature voltage between terminals GA to GC should reduce to near zero. Verify that the measured voltage between Software Test Point 1 and the test point COM on the IMC-DAS board is 0.0VDC (meter on 10VDC range).

p.   Remove the jumper wire connecting terminals 34 and 32 and shut OFF power at the main disconnect switch. Reconnect the brushes to the motor armature and the brake lead to terminal B1. Be careful, there may be sparks.

3.6 MOVING THE CAR ON INSPECTION OPERATION

a. Before beginning, make sure that the brake pick and hold voltages on the Motor Parameters screen are the same. Turn ON power at the main disconnect. Connect a jumper wire between terminals 34 and 31 to run the car in the down direction. The brake should lift. If it does, the sheave will rotate in the direction of either the car or the counterweight, whichever is heavier. The car may drift far enough to open an overtravel limit and/or open a buffer switch, if provided. If so, temporarily override the safety circuit by jumping together terminals 2 and 16 on the HC-RB4 board. Measure the voltage between panel mounted terminals B1 and B2 and verify that the measured voltage is close to the value specified for the brake pick voltage on the Motor Parameters screen.

- If there is no voltage, check to see that fuses FB1 and FB2 are good and that relays PT1 and PT2 on the IMC-PRIx board are energized.

- If the voltage is not the same as the entered value for the brake pick voltage, verify that the brake coil resistance (DBR) is correct on the Motor Parameters screen.

- Measure the AC input voltage to the brake circuit between terminals BPI1 and BPI2 on the IMC-PRIx board and verify that the voltage is the same as the one shown on page -D of the job prints. Remove the jumper wire from terminals 34 and 31.

Change the value of the brake hold voltage to the actual brake hold voltage, if there is one. Reinstall the jumper between 34 and 31. The measured brake voltage between panel mounted terminals B1 and B2 will transition to the brake holding voltage a few seconds after the brake lifts (the brake voltage will transition to brake hold voltage only if the voltage first reaches the brake pick voltage). If the car drifts up, keep the jumper wire on 34 and 31. If it drifts down, jumper 34 to 32 instead. Access the Dynamic Parameters screen and increase the pattern gain (PG) very slowly, so that the speed excitation counteracts the drift. Set the gain so that the car moves at about 20 fpm (.10 m/s) in the desired direction. If there is oscillation, increase the loop voltage dampening gain (GLV) until oscillation stops. If the pattern gain adjustment increases the drift, then shut OFF the power. Interchange the motor field wires to panel mounted terminals MF1 and MF2 and restore power.

b. Position the car in the hoistway by connecting a jumper to terminals 34 and 31 or 32 so that the car is allowed to drift several floors in the same direction as it did in Step 3.6(a).

c. Reduce the pattern gain (PG) to zero and increase the value of current safety calibration (SISC) on the Dynamic Parameters screen until the car is held at less than 5 fpm (.025 m/s), or until it stops. If there is oscillation, increase the value of GLV until it stops oscillating. Increase SISC to stop the car if it starts moving again. Too much SISC will cause oscillation.

Notice that as the car moves on inspection, the LEDs labeled DP1 and DP2 on the front of the IMC-DIO board flash on and off. Run the car up on inspection, as slow as 5 fpm (.025 m/s), to see the sequence of the flashing LEDs.

	DP1	DP2
1. DP1 Turns ON	●	○
2. DP2 Turns ON	●	●
3. DP1 Turns OFF	○	●
4. DP2 Turns OFF	○	○

The sequence of flashing is reversed when running on inspection in the down direction. If this sequence is not correct, the DP1 (Terminal 95) and DP2 (Terminal 96) are wired backwards and the wires must be swapped.

The DP1 and DP2 signals may also be verified by looking at the absolute distance value on the F3 screen. The absolute distance value on the F3 screen must increase while the car is moving in the up direction and must decrease while the car is traveling in the down direction.

d.   Now adjust the pattern gain (PG) to give 20 fpm (.10 m/s) car speed as measured with a hand tachometer. Move the car in the opposite direction by moving the jumper wire connecting 34 and 31 or 32. After car speed stabilizes, verify that it moves at 20 fpm (.10 m/s) in the opposite direction. Drop the direction (remove jumper wire) and adjust the gain SISC so that the car speed in either direction is the same. If increasing SISC causes oscillation, then reduce this until there is no oscillation. It is also possible to use the GIR gain to obtain the same car speed in both directions. Do not adjust SISC and GIR simultaneously. Remove the jumper between terminals 34 and 32 or 31. GIR gain is a positive feedback signal, so excessive gain may cause severe oscillation. Therefore, take extra care when adjusting this parameter.

e.   Remove any jumpers in the safety circuit between terminals 2 and 16 on the HC-RB4 board.

f.   Now, *only* if necessary, increase the GI parameter on the Dynamic Parameters screen to stiffen the response of the car. At this point in the adjustment, it is only necessary to prevent the car from sagging severely. Do not attempt any fine tuning at this time. Increasing the GI gain gives stiffer response while decreasing the gain gives a dampening and looser response. Using too little GI (close to 0) will cause the car to drift when the brake is lifted. The car will also show sloppy control during all aspects of operation and will be severely affected by varying loads. Too much GI gain will cause unstable operation, violent oscillation, or speed overshoot.

g.   If a tachometer/encoder has not been installed yet, it may be installed now or prior to the final adjustment.

h.   Adjust the pattern gain (PG) to 1.0 and adjust the inspection speed (VIN) on the Pattern Parameters screen to a moderate value. Stop the car so that the car top is accessible from the top hall door. Remove any jumpers from the safety circuits, including the jumper between terminals 4 and 8. If provided return the car and hoistway door bypass switches to the open position.

i.   Run the car from the car top inspection station, checking the up and down buttons and the stop switch.

j.   While running the car, check clearances and door locks. When all doors are locked, remove the jumper from any door lock terminals.

k.   Verify the operation of the directional limit switches and the final limit switches, and arrange them according to page -2 of the job prints. The distance between the two switches must be greater than the distance required to stop the car after the direction command is removed when on inspection operation.

l.   The initial adjustment process should now be completed, the vanes or tapes and magnets installed, the counterweight balanced, etc. When leaving the job site, shut

down power at the main disconnect. Do not let the MG run overnight or for long periods of time without moving the car as this may damage the commutator. For installing vanes or magnets, it is desirable to open the car door about a foot to check sill heights. Bypass the car gate switch (or use the car door bypass switch if provided) during installation of vanes and magnets. See job print for location.

m. One or more of the status indicators on the front of the Drive Unit may be lit; however, these may be disregarded until the associated safety monitors have been adjusted. Furthermore, the temporary jumper from terminal FBP1 to FBP2 on the IMC-RI board keeps the Drive Unit running in spite of the safety monitors being activated (except for motor field failure).

3.7 PREPARATION FOR FINAL ADJUSTMENT

a. Before final adjustments can be made, the door operator must be working properly on the car. Install door fuses F7 and F8. Remove any jumpers connecting terminals 6 and 7 or 4 and 8. Adjust all door equipment, clutches, rollers, etc., for proper running clearances. Check that the controller prints instructions have been followed regarding the installation of diodes on the door operator (especially for G.A.L. door operators). All parameters referenced in this section are adjustible via the Dynamic Parameters screen.

b. Make sure all hoistway and car doors in the building are closed and locked. Run the car on inspection through the hoistway to ensure it is completely clear. Check that the selector magnets are installed according to the instructions. Place the car in the center of the hoistway.

c. On the HC-RB4 Relay board, turn the TEST/NORM switch to the TEST position.

d. Turn OFF power at the main disconnect.

e. If not already done, install the tachometer. Connect the tachometer wires to terminals TS and TC on the IMC-RI board. If an encoder is used, use terminals CH-A, CH-B, +V$_{CC}$ and COM on the IMC-RI board. Enter EXT on the Option/Calibration Parameters screen. If a tachometer is used as a speed transducer, select TAC for the Tachometer/Encoder (OET) option on the same screen (TS = + for up motion).

f. To prevent nuisance tripping, leave the jumper on terminals FBP1 and FBP2 on the IMC-RI board. This bypasses the IMC-MG drive electronic safety shutdown until final adjustment is complete.

g. Restore power at the main disconnect.

h. With the car on inspection operation (no power on terminal 59), run the car up by connecting a jumper between terminals 34 and 32, or move the car down by connecting a jumper between terminals 34 and 31. To run the car from the HC-RB4 Relay board, the car top inspection switch must be set to NORMAL which will place power on terminal 59 (as long as the mechanic has returned the wire to terminal 59). Turn ON the Relay Panel Inspection switch. Move the car with the UP/DN constant pressure toggle switch on the HC-RB4 Relay board.

i. If the car runs away, reverse the wire connections at the tachometer or (TS and TC) or (CH-A and CH-B) wires at the IMC-RI board for the encoder application.

j.   The car should now run on inspection operation, with the tachometer/encoder attached, without oscillation. There may be substantial rollback when the car first starts.

k.   Verify proper counterweighting (usually 40%) using test weights and a DC ammeter with the car at the middle of the hoistway. With 40% counterweighting the ammeter should read equal and opposite currents for both up and down directions. Adjust counterweighting as necessary to equalize current.

l.   Monitor the pattern voltage with an accurate voltmeter (preferably digital) between STP1 and COM on the IMC-DAS board. Set the inspection speed on the Pattern Parameters screen to 10% of contract speed (maximum is 150 fpm or .76 m/s). Run the car on inspection and check the voltage present between STP1 and COM on the IMC-DAS board. This voltage should be equal to 1.00 volt, which corresponds to 10% of contract speed. A 10.0VDC pattern voltage equals contract speed.

        Use a hand-held tachometer and adjust the gain GTC (Tachometer Calibrate) on the Dynamic Parameters screen to make the actual car speed exactly 10% of contract speed. The acceptable tachometer signal for the drive is 0VDC to 70VDC between terminals TS and TC on the IMC-RI board when using a tachometer with 60/1000 V/rpm. If a tachometer with 100/1000 V/rpm is used, then the voltage range is 0-135V.

        Measure the voltage between the terminals T and COM on the IMC-DAS board. The reading must be between +8.0 and -8.0 volts DC (+10.0 and -10.0 for IMC-DAS boards up to Rev 2). If the tachometer voltage at the test point T is more than 10.0VDC (12.25VDC for IMC-DAS boards up to Rev. 2) at contract speed, then scale it down. **If adjustment of the tachometer signal is necessary, contact MCE Technical Support.** Always consult with MCE before performing the following adjustment. The trimpot Tach (R9) on the IMC-DAS board should be turned clockwise to decrease the voltage. This trimpot is set at the factory for the tachometer shipped with the controller.

m.   The speed offset must now be balanced in order to have the same speed going up and down. Place the car on inspection operation and take the car to the middle of the hoistway. Set the pattern gain (PG) and the zero speed adjustment (PZA) on the Dynamic Parameters screen to zero. Now pick the up direction. If the car moves in the up direction, reduce the PZA parameter slowly until the car becomes stationary. If the car moves in the down direction, increase the value of PZA until the car is stationary. Repeat this adjustment when the car is at the bottom landing and the top landing. This completes the offset adjustment. **Set the pattern gain (PG) back to 1.0.**

⚠ | **WARNING:**   The car may slide into the pit during loading so use extreme caution!

n.   Put *125%* of full load in the car at or near the bottom landing to check the ability of the brake to hold this load.

        Make mechanical adjustments to the brake as necessary to stop and hold the load while releasing the inspection switch while going down on inspection speed.

o.   Now empty the car.

p.   Adjust the response (GP, GI, GLV, GDEC) of the car so that the empty car rollback is negligible. Avoid the oscillations that can occur if too much gain (GP,GI) is adjusted into the system. While running at less than 20 fpm (.10 m/s), adjust the pattern gain so that there is 0.3VDC between Software Test Point 1 and test point COM on the IMC-DAS board. For these adjustments, use a storage oscilloscope capable of a 1 centimeter per second sweep rate, or a strip chart recorder.

q.   The empty car probably drifts up due to counterweighing even when an attempt is made to move it down. Increase proportional error gain (GP) slowly while watching out for severe overshoot or for oscillations such as rapid jiggling or a slow bobbing effect. If jiggling begins, increase the GLV. While increasing the GP, note a narrowing of the difference between up and down speeds. It is unlikely they will become equal. In fact, on inspection, the car may not run in the down direction. Continue to increase GP until it oscillates, then increase GLV to remove the oscillation. Eventually, GLV will not eliminate the oscillation. At this point, back off on the proportional error gain (GP) until any remaining oscillation stops. Remember that an excessive value of GLV may actually cause oscillation instead of dampening it.

r.   Increase the integrator error gain (GI) slowly. Now there will be less rollback at takeoff. Too much GI causes a speed overshoot or a slower bobbing oscillation. If the car snaps away from the floor, increase the BSPD timer value on the Dynamic Parameters screen. Use the oscilloscope or chart recorder, connected to test points COM (negative probe) and T (positive probe) on the IMC-DAS board, to monitor the actual car motion. Positive voltage should indicate down direction and negative voltage, the up direction. With the scope, adjust the values of GLV, GP, GI, and GD gains to get the car's best response. Lastly, disconnect any jumpers on terminals 34 and 31 or 32.

NOTE: At this time a jumper should still be connecting terminals FBP1 and FBP2. Reinstall the fuses that power terminals 2H and 2F. Replace the wire into Terminal 59.

NOTE: At this point, experiment with improvement of response, especially with regard to rollback. Start the GLI gain at zero (0.0) and increase the gain value slowly and watch the rollback. Sometimes this control may help and sometimes it may aggravate an oscillation problem. If the desired response is obtained without using GLI, leave it at zero. A little rollback at this point is not critical because other adjustments later will compensate for it.

SECTION 4
FINAL ADJUSTMENT

4.0   GENERAL INFORMATION

This section describes the sequence of steps to take for the final adjustments of the elevator system. At this point, all the steps in Section 3 should have been completed. Please review Section 5 before proceeding; it explains the adjustment and troubleshooting tools available with the computer.

4.1   LEARNING THE BUILDING FLOOR HEIGHTS

NOTE: If the car is not completely wired (temporary), check the following:
- wire removed from panel mount terminal DCL
- wire removed from terminal 47 on the HC-RB4-x board
- jumper from 2 bus to terminal 36 on the HC-RB4-x board
- jumper from 2 bus to terminal 38 on the HC-RB4-x board
- jumper from 2 bus to panel mount terminal EPI (if present)

Learning the building means recording the location of each floor in the building relative to the bottom floor, to within 0.1875" (4.7625 mm) accuracy, by reading the holes in the perforated tape on the LS-QUAD-2 landing system or by counting the pulses from the position encoder on the LS-QUIK landing system as the elevator travels the entire length of the hoistway from the bottom to the top. The following steps describe the procedure for learning the building floor heights.

NOTE: Learning the floor heights must be successfully performed prior to running the elevator on Normal operation.

Position Encoder Resolution - Verify that the Position Encoder Resolution (MPER) parameter on the *Profile Parameters* (Shift F2-2 - Simplex, F1-2 - Local) screen is set to the correct value, typically 25 ppr for the LS-QUIK-x landing system. If using the LS-QUAD-2 landing system, set the Position Encoder Resolution (MPER) parameter to 0 ppr.

4.1.1   FLOOR HEIGHT LEARN PROCEDURE

The speed at which the car learns the hoistway is adjusted by changing the Learn Velocity (VLR) parameter on the *Pattern Parameter* (Shift F2-1 - Simplex, F1-1 - Local) screen. Setting the learn speed higher than 50 fpm (.254 m/s) is not recommended. A lower learn speed of 35 fpm (0.178 m/s) typically results in higher accuracy in the learned floor height values. The Learn procedure is outlined in the following steps.

a.   Turn OFF the power at the main disconnect switch. Remove the level down wire out of terminal 25 at the bottom of the HC-RB4 Relay board (if Rope Stretch Relevel is implemented, disconnect the "level down" wire at terminal 25X on the sub-plate instead). Place the jumper plug on the LRN side of the INTB jumper on the IMC-RI board. If this installation has a IMC-RI REV0 board, then place the jumper plug on the INTB jumper. Restore power at the main disconnect.

FIGURE 4.1   IMC-RI Board Cut-Out

D/N: 1697A R1
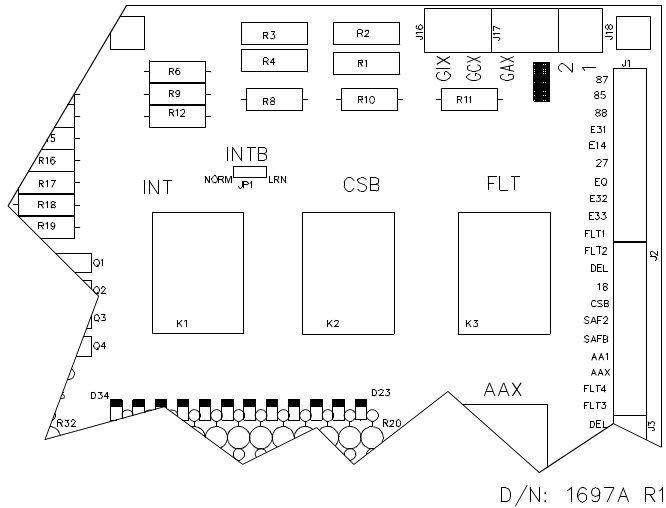
b.   Bring the car 4 - 6 inches (101 to 152 mm) below the bottom landing by connecting a jumper between terminals 8 and 12 on the HC-RB4 board (***bypasses the down normal limit***) and by connecting a jumper between terminals 2 and 16 (***primary safety circuit***). Check the status of the flags listed below at addresses for 28, 29 and 2E (Diagnostic On/Normal switch in the *ON* position). The status of the flags must be as listed below. See Figure 4.2 for example or Section 5.4 for more information on Diagnostic mode of operation.

USD (Up Slowdown)	ON
DSD (Down Slowdown)	OFF
LU (Level Up)	ON
DZORDZ (Front or Rear Door Zone)	OFF

FIGURE 4.2   *Diagnostic Address for 28, 29,2E on Diag. Indicators on Front of Computer Swing Panel*

42-02-6202

c Key to the *Pattern Parameter* screen on the CRT(Shift F2-1 - Simplex, F1-1 - Local). The parameter values for contract speed (VH) and the number of landings (NF) must be correct for the installation before proceeding with the learn function.

> **NOTE:** If this installation has an "express zone", i.e., an area of travel without openings in excess of about 30 feet or 9 meters, "false floors" may be installed in the express zone which are stopping/reversing locations without door openings. These "false floors" must be included in the total Number of Floors parameter (NF). To find the total number of floors, identify the job prints containing information on the LS-QUAD-2 or the LS-QUIK-1 landing system and determine the number of floor vanes or floor magnets for installation. Set the (NF) parameter equal to this number.

d. On the Computer Swing Panel, follow the steps below to enter the Learn Mode:

1. With all other switches in the down position, place the F7 switch to the *ON* (up) position.

2. **PASSWORD** is displayed. If a password is required set with A1-A8 switches, otherwise set A1-A8 in the *Down* (off) position.

3. Press and hold the **S** pushbutton until **SYSTEM** appears in the alphanumeric display.
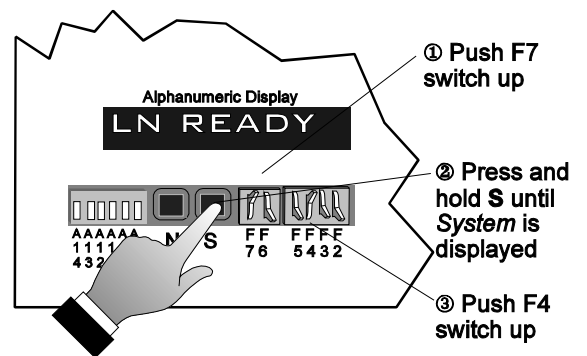
4. Place the F4 switch to the ON (up) position. **LN READY** should now display.

e. Once in the learn operation, the alphanumeric display, the Diagnostic Indicators on the front of the Swing Panel, and the Digital Drive Diagnostic Indicators on the top of the Swing Panel display specific messages as described below. The rest of the indicators and switches are not used in this mode.

- ALPHANUMERIC DISPLAY - While in the learn operation the alphanumeric display indicates the learn operation status by displaying one of the following messages:

  LRN ERR (learn error)
  LN READY (learn ready)
  LEARNING (learning)
  LEARNED (learn complete)

- DIGITAL DRIVE (DDP) DIAGNOSTIC INDICATORS - When the alphanumeric display shows **LEARNING**, the Digital Drive Diagnostic Indicators on the top of the Computer Swing Panel display learn status information. These indicators will flash the code which indicates that the IMC-DDP-x computer is on a learn run or there is a learn error. See Table 6.14 *IMC-DDP Status and Error Messages*.

- If the system is not ready to learn, the alphanumeric display on the front of the Computer Swing Panel will read LRN ERR, and the Diagnostic Indicators on the

lower right hand corner of the Swing Panel will flash the code for the error that is causing the LRN ERR message.

If there is an error indication, refer to the following:

- *F3* screen of the CRT
- Table 6.13 - MC-MP-1ES Status and Error Messages
- Table 6.14 - IMC-DDP Status and Error Messages
- MC-MP2 Scrolling Messages on the Alphanumeric Display

When all of the error conditions have been eliminated, the alphanumeric display should display LN READY.

- In case of difficulty in achieving the LN READY display, turn off switches F4 and F7 on the Computer Swing Panel, wait 10 seconds and then re-enter the learn mode.

f. Key in F3 to show the *Graphic Display of Elevator* screen on the CRT. This screen displays car motion and the distance to each floor while the car is learning the building. It will also display any error messages that may occur while on Learn operation. Ignore any error messages regarding the EEPROM, most of the error messages are due to the car learning the building.

NOTE: If the Up Normal Limit switch is positioned too low in the hoistway, the car will not move high enough to complete the Learn operation. The Up Normal switch should not open until the car is above the top landing by at least 1" to 2" (25.4 to 50.8 mm). If not sure, temporarily jumper terminals 8 to 10 (***bypass the Up Normal Limit***) on the HC-RB4 board.

g. With LN READY on the alphanumeric display, the car must learn the building by running the full length of the hoistway. Do this by holding the INSPECTION UP/DN switch on the HC-RB4 board in the UP direction. *Do not release* this switch until the word LEARNED appears on the alphanumeric display. Premature release of the UP switch will cause a learn error (LRN ERR). The system then must be taken out of Learn operation, the car brought to the bottom of the hoistway and the learn procedure reinitiated. If the hoistway is very long, an alternative to holding the switch is to temporarily pull the wire out of terminal 59 (relays IN1, IN2 not picked) and jumper terminal 32 to terminal 34 to run the car up.

h. Monitor the *Graphic Display of Elevator* (F3) screen as the car learns the hoistway and verify that the floor heights update at each floor and that the new values are displayed correctly when the learn operation is complete.

i. After LEARNED appears on the alphanumeric display on the Swing Panel, wait a few seconds to allow the IMC-DDP-C to store the learned data into computer memory. The *F3* screen may still show some error messages but the only important one at this point is the error message FHL (floor height learn error). If FHL is ON (light blue or bold) this indicates a failed Learn operation.

j. Exit the Learn operation by moving the F4 and F7 switches on the front of the Swing Panel to the OFF position.

k. Turn the power OFF at the main disconnect and re-connect the "level down" wire to terminal 25 on the HC-RB4 board (or terminal 25X on the sub-plate). Move the INTB jumper plug from LRN to NORM position on the IMC-RI board (remove jumper plug INTB for REV 0 board). **Failure to place the plug on the NORM side of the INTB jumper will prevent automatic operation of the car.**

l. Remove any jumpers between panel mount terminals 2 and 16 (also 8 and 12 on the HC-RB4 board, if present). Reinstall the wire on terminal 59, if it was removed. Turn the power ON at the main disconnect switch.

> **WARNING:** Failure to remove the jumpers bypassing the **Down Normal Limit** switch and the **Primary Safety Circuit** may result in personal injury or substantial damage to equipment.

4.2 VERIFYING ABSOLUTE FLOOR NUMBERS

At this point it is important that the adjuster is familiar with Section 5 in this manual and the Enhanced On-Board Diagnostics. Also all the floor encoding magnets should have been installed on the perforated tape as instructed in Section 2.4.3.

a. Turn the Diagnostic On/Normal switch on the Computer Swing Panel to the Diagnostic On (up) position.

b. Bring up the *F3* screen on the CRT to view the R0-R5, PR, and RD flags in the Pattern Generator window. Another way to view these flags is through the Computer Swing Panel. Dial up address 10 on the diagnostic switches A1 to A8 (see figure below). The switches are on the front of the Computer Swing Panel. The DDP or Digital Drive Diagnostic Indicators are on *top* of the Computer Swing Panel.

FIGURE 4.3   Digital Drive Diagnostic Address 10
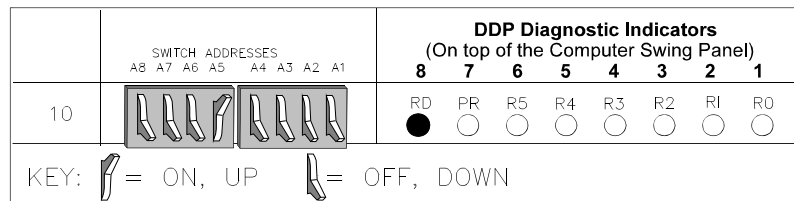
c. Move the car on inspection to the bottom landing. Stop the car so that the RD indicator shown above is illuminated. This indicates that the RDU and RDD sensors on the landing system are centered within ±.5" (12.7 mm) of the floor.

d. The DDP (Digital Drive) Diagnostic Indicators on the *top* of the Computer Swing Panel will light up as shown in Table 4.1 for each floor number listed.

e. With the car at the bottom of the hoistway, run the car to each floor and verify the LEDs read as in Table 4.1. Do not proceed beyond this step until the exact reading is achieved. Failure to do so will result in incorrect floor position and erratic operation. Also, verify that every time the RD indicator is highlighted on the *F3* screen, the DZ relay is energized on the HC-RB4 Relay board (or DZR relay on the HC-RDRB Rear Door Relay board if this job has rear doors).

- If there is difficulty getting the proper diagnostic reading, the most likely causes are missing magnets, wiring mistakes or possibly a defective sensor.

- Test a defective sensor by manually moving a magnet near the sensor and observing the LED indications inside the LS-QUAD-2 landing system box. To more easily verify that the RD indicator is highlighted, reduce car speed with PG.

f. While moving the car through the floor, view the LU, DZ and LD indicators from the *F3* screen on the CRT. If the input is active, the corresponding indicator is highlighted.

TABLE 4.1   Absolute Floor Indicator Listing

● = ON								○ = OFF								
	RD	P	R5	R4	R3	R2	R1	R0		RD	P	R5	R4	R3	R2	R1	R0
Floor #1	●	●	○	○	○	○	○	●	Floor #33	●	○	●	○	○	○	○	●
Floor #2	●	●	○	○	○	○	●	○	Floor #34	●	○	●	○	○	○	●	○
Floor #3	●	○	○	○	○	○	●	●	Floor #35	●	●	●	○	○	○	●	●
Floor #4	●	●	○	○	○	●	○	○	Floor #36	●	○	●	○	○	●	○	○
Floor #5	●	○	○	○	○	●	○	●	Floor #37	●	●	●	○	○	●	○	●
Floor #6	●	○	○	○	○	●	●	○	Floor #38	●	●	●	○	○	●	●	○
Floor #7	●	●	○	○	○	●	●	●	Floor #39	●	○	●	○	○	●	●	●
Floor #8	●	●	○	○	●	○	○	○	Floor #40	●	○	●	○	●	○	○	○
Floor #9	●	○	○	○	●	○	○	●	Floor #41	●	●	●	○	●	○	○	●
Floor #10	●	○	○	○	●	○	●	○	Floor #42	●	●	●	○	●	○	●	○
Floor #11	●	●	○	○	●	○	●	●	Floor #43	●	○	●	○	●	○	●	●
Floor #12	●	○	○	○	●	●	○	○	Floor #44	●	●	●	○	●	●	○	○
Floor #13	●	●	○	○	●	●	○	●	Floor #45	●	○	●	○	●	●	○	●
Floor #14	●	●	○	○	●	●	●	○	Floor #46	●	○	●	○	●	●	●	○
Floor #15	●	○	○	○	●	●	●	●	Floor #47	●	●	●	○	●	●	●	●
Floor #16	●	●	○	●	○	○	○	○	Floor #48	●	○	●	●	○	○	○	○
Floor #17	●	○	○	●	○	○	○	●	Floor #49	●	●	●	●	○	○	○	●
Floor #18	●	○	○	●	○	○	●	○	Floor #50	●	○	●	●	○	○	●	○
Floor #19	●	●	○	●	○	○	●	●	Floor #51	●	○	●	●	○	○	●	●
Floor #20	●	○	○	●	○	●	○	○	Floor #52	●	●	●	●	○	●	○	○
Floor #21	●	●	○	●	○	●	○	●	Floor #53	●	○	●	●	○	●	○	●
Floor #22	●	●	○	●	○	●	●	○	Floor #54	●	○	●	●	○	●	●	○
Floor #23	●	○	○	●	○	●	●	●	Floor #55	●	●	●	●	○	●	●	●
Floor #24	●	○	○	●	●	○	○	○	Floor #56	●	●	●	●	●	○	○	○
Floor #25	●	●	○	●	●	○	○	●	Floor #57	●	○	●	●	●	○	○	●
Floor #26	●	●	○	●	●	○	●	○	Floor #58	●	○	●	●	●	○	●	○
Floor #27	●	○	○	●	●	○	●	●	Floor #59	●	●	●	●	●	○	●	●
Floor #28	●	●	○	●	●	●	○	○	Floor #60	●	○	●	●	●	●	○	○
Floor #29	●	○	○	●	●	●	○	●	Floor #61	●	●	●	●	●	●	○	●
Floor #30	●	○	○	●	●	●	●	○	Floor #62	●	●	●	●	●	●	●	○
Floor #31	●	●	○	●	●	●	●	●	Floor #63	●	○	●	●	●	●	●	●
Floor #32	●	●	●	○	○	○	○	○									

4.3 RUNNING ON AUTOMATIC OPERATION

In the next steps, the final adjustments of the elevator system are discussed. This includes checking contract speed, door operation, and all other functions provided for proper operation.

a. The alphanumeric display on the IMC-DIO board indicates car speed when the LEARN SWITCH located on the IMC-DIO board is off. When the controller is shipped from the factory, the IMC-DIO board has already gone through the learn process.

If the car cannot run on automatic operation, check if the SPR (Safety Processor Ready) flag on the *F3* screen of the CRT is highlighted. If the SPR is not highlighted, check for a safety malfunction or if the IMC-DIO board or it's EEPROM has been changed. If the IMC-DIO board or EEPROM has been changed, put the LEARN SWITCH located on the IMC-DIO board on the learn or up position. This allows the car to run on automatic. NOTE: While the LEARN SWITCH is *ON* the alphanumeric display on the IMC-DIO board will not function as a digital tach. If the car is run at a reduced speed (reduced pattern gain) to both terminal landings some necessary values will be fed into the IMC-DIO that allows placing the LEARN SWITCH to the *OFF* position.

b. Make sure that the speed offset was adjusted as described in Section 3.7 (m). Failure to adjust this parameter may result in poor performance when the car is leaving or stopping at a floor.

c. Ensure the pattern gain (PG) is set to approximately 0.5, (which is equal to 50% of contract speed). Move the car on inspection operation to a location between floors, more than one foot away from a landing, so that no leveling sensors are engaged.

> **NOTE:**   If the car is not completely wired (temporary), check the following:
> - wire removed from panel mount terminal DCL
> - jumper from 2 bus to terminal 36 on the HC-RB4 board
> - jumper from 2 bus to terminal 38 on the HC-RB4 board

d. Next, turn the TEST/NORMAL switch on the HC-RB4 board to *TEST* and turn the Relay Panel Inspection switch to the *OFF* position. If the car moves toward a landing at the correction velocity, levels into the floor, and stops, go to step (e). If not, follow the steps below.

- If the car is leveling up and down repeatedly, spread the LU and LD sensors apart on the LS-QUAD-2 box on the car top. The leveling sensors are designed to slide up or down without opening the landing system box. If for any reason, the car has to be stopped, do so by turning the Relay Panel Inspection switch to the *ON* position.

On the front or faceplate of the LS-QUAD-2, there are six thumbscrews (or thumbnuts), which when loosened, allow the faceplate to slide on its enclosure. These thumbnuts serve the following purposes:

1   To allow for the overall vertical alignment of *all* sensors on the LS-QUAD-2 making it possible to compensate for being too high or too low at *all* floors.

2   To allow for exact vertical orientation of the faceplate of the LS-QUAD-2
     with respect to the steel tape. The horizontal movement built into the
     LS-QUAD-2 allows for a smooth floating action, and minimizes wear on
     the tape guides. Verify that this action is possible. Notice that if all six
     thumbnuts are loosened (on units with floating heads), the movements
     described here and in (1) above can be made at the same time. Ensure
     that when doing one adjustment, the other isn't missaligned.

NOTE: LU and LD sensors must remain equal distance from DZ (as well as RD)
             in order to be sure the PGR flag is on after every run. Move them in
             tandem - that is, if the LU is moved up 1/16 inch then the LD must be
             moved down by the same amount.

FIGURE 4.4   LS-QUAD-2 Detail

Perforated Steel Tape
16 holes/foot - 3/8" dia.

Landing System Sensors

UOLM = Up Outer Level Marker
DOLM = Down Outer Level Marker
DP1 = Digital Pulser 1
DP2 = Digital Pulser 2
LU = Level Up Sensor
LD = Level Down Sensor
DZ = Door Zone Sensors
RDU & RDD = Read Sensors
PR = Parity Bit Sensor
RO-R5 = Floor Code Bit Sensors

UOLM   **R5**

DP1
DP2

R4

LU

RDU   R3

Note: LU and LD sensors
must be adjusted
symetrically around DZ.

LANDING 1   **DZ   R2**

**Door
Zone
Magnet
6"**

RDD   R1

LD

R0   R0

**Floor
Code
Magnets
2.5"**

DOLM   PR   PR

D/N: 1277

FIGURE 4.5   LS-QUIK-1 Car Top Box Detail
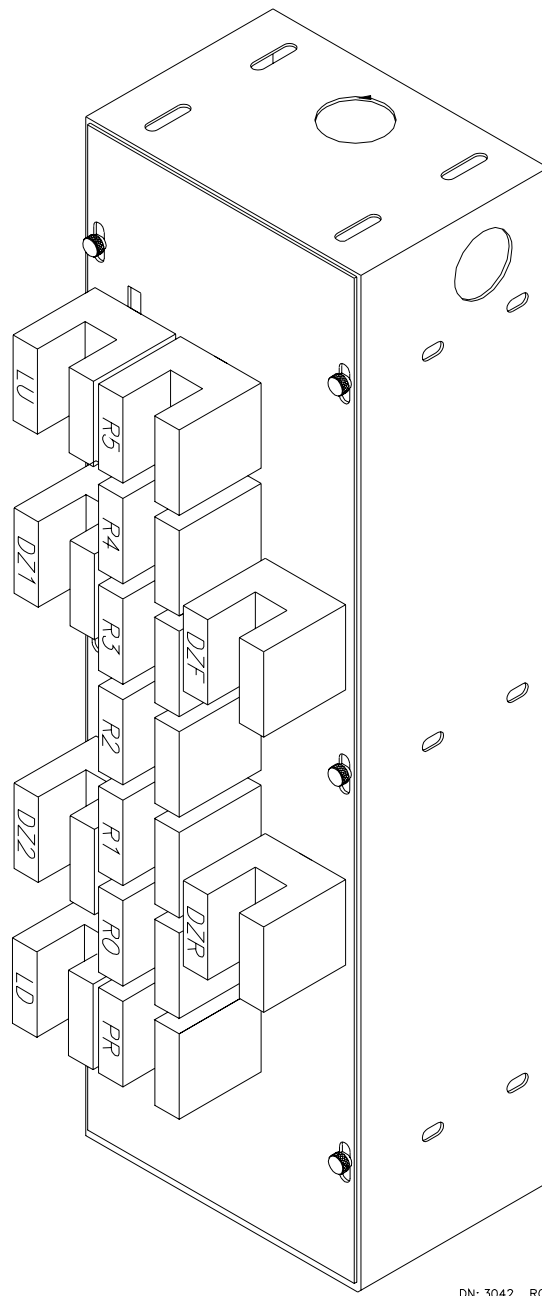
DN: 3042   R0

If there is trouble getting the car to move, check the following:

Check these indicators on the front of the Computer Swing Panel.

*   Safety On LED is lit (Safety is ON)

*   Doors Locked LED is lit (doors are locked)

*   Insp/Access LED is OFF (car is not on inspection).

*   Fire Service LED is OFF (Fire service is OFF).

Safety On
Doors Locked
High Speed
Independent Svc.
Insp./Access
Fire Service
Timed Out of Svc.
Motor Limit Timer
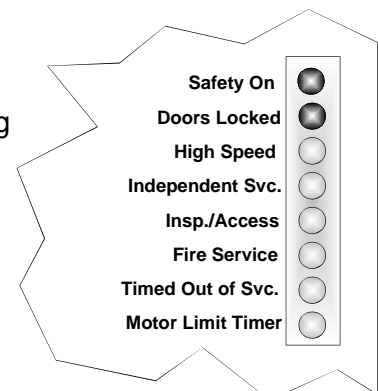
D/N: 1811A

e. Using the *F3* screen, register a car call one floor above or below the current car position. The high speed indicator light in the vertical LEDs on the front of the Computer Swing Panel should be on as the car attempts to start. If the pattern velocity is at leveling speed on the *F3* screen, the car is trying to level and the car will have to complete leveling before selecting high speed. Monitor the car speed with a hand-held tachometer and be sure the car does not overspeed. When the car starts, note that the PI changes to the next floor prior to the middle point of the run. The car will decelerate to a point 6" (152.4 mm) before the floor where the LU or LD sensor will operate the LU or LD relay. The car will continue until it reaches a point 3" (76.2 mm) before the floor, then the DZ relay will energize (DZR relay may pick if this installation has rear doors). The elevator will continue to level into the floor and stop. The final leveling speed should be 2 to 8 fpm (.01 to .04 m/s).

f. Run the car between floors to any landings which are not terminal landings. Observe that the car starts, accelerates and decelerates into the floor and stops. If the car overruns a floor, the relevel function will be activated. The final leveling speed on the first approach to a floor and the relevel speed are two separately programmable values. Look up these values on the CRT's *Pattern Parameter* screen. Make the car overrun the floor at least once and observe the releveling operation. If this installation uses a different relevel brake voltage, make sure that the relevel brake voltage is correct to prevent stalling or excessive loop current during a relevel operation.

g. Place a car call for the bottom landing. After the car stops, observe the LD relay to see if it is still energized. Similarly, place a call for the top landing, and after the car stops, see if the LU relay is still energized. If so, move the Up Normal Limit switch, shown in the job prints, so that the limit switch is not opened until the car is above the top landing by at least one or two inches. Do same for Down Normal Limit switch if necessary.

4.3.1 REACHING CONTRACT SPEED

NOTE: Be sure to read this entire section before performing the following steps.

a. Determine what the armature voltage should be at contract speed from the hoist motor name plate. Set up a meter to monitor the armature voltage on terminals GA and GC. Add enough test weights to the car to provide a balanced load. Monitor the car speed and move the car on multi-floor runs while slowly increasing the pattern gain (PG) value on the *Dynamic Parameter* screen. Do not set the pattern gain higher than 1.0. While increasing the car speed, the armature voltage between terminals GA and GC will also increase. The nameplate's armature voltage will probably be reached before reaching contract speed. When this happens, start decreasing the MFW (motor field weakening) value. This will *not* change the speed, but it will reduce the armature voltage. The goal is to reach contract speed with rated armature voltage by adding the correct amount of motor field weakening while slowly increasing the pattern gain (PG) value. While approaching contract speed, the following may happen.

- If contract speed is reached before a PG value of 1.0, increase the GTC (Tachometer/Encoder Scaling) on the *Dynamic Parameter* screen. This reduces car speed and allows increase of the pattern gain value to 1.0. Finally the GTC adjustment can be set to obtain contract speed.

- It may happen that increasing PG does not increase car speed. If this is so, and the armature voltage is less than the nameplate value, the MG could be running out of generator field excitation.

- There may be considerable speed overshoot while nearing contract speed that threatens to trip the governor. Do not increase the PG value too high or the car can exhibit overspeed. Add test weights to *100% load*.

b. Find the yellow LED indicator labeled Gen. Shunt Fld. Saturated on the Drive Unit and the GSAT flag on the *F3* screen of the CRT. With an oscilloscope, monitor the voltage between test points DCS and COM on the IMC-DAS board. This voltage determines the turn-on time of the IGBT's for the generator shunt field. If this voltage is outside the range of ±7.25VDC, the generator shunt field supply is saturated and cannot put out any more voltage. At this point, the Gen. Shunt Fld. Saturated indicator light will be on, and the GSAT flag on the *F3* screen will be highlighted. With 100% full load in the car, it *is* permissible to be in this saturated state for no more than ½ to ¾ of a second on the tail end of an acceleration to full contract speed. With an empty car, the voltage may reach this ±7.25VDC level, which will cause the Gen. Shunt Fld. Saturated indicator to flicker briefly. If it stays on for longer than about ¾ second, rearrangement of the generator shunt field coils may be necessary. If the car is well under contract speed and is saturating the generator field supply, contact MCE Technical Support.

- Hook up an oscilloscope to the pattern signal as follows. Isolate the ground pin on the power cord of the oscilloscope with a ground isolator device. The ground pin must not be connected. The case of the oscilloscope must be allowed to float at its own potential. On the IMC-DAS board, hook up the ground side of the probe to test point COM and the hot side of the probe to Software Test Point 1 which must be assigned to D (pattern). Full speed equals 10VDC (+) = up, and (-) = down. Set the sweep rate on the scope to 1 centimeter per second, and vertical sensitivity to 2VDC per centimeter (later, 5VDC per centimeter).

- In order to prevent contract speed overshoot and/or saturation of the generator shunt field output, there are three parameters that can be reduced: acceleration rate A2, and low jerk rate J35L (J3 and J5 for older versions of the program). The jerk rates have a slightly greater effect. These parameters are adjusted via the *Pattern Parameter screen*. Also, examine actual car response on test point T (on IMC-DAS) to verify that there is no overshoot. Polarity on test point T is (-) = up and (+) = down.

c. The car should now be running at contract speed, and the voltage on Software Test Point 1 should be at or very close to 10VDC. If not, check to see that the PG value is at 1.0. This should give 10VDC on Software Test Point 1. Adjust the GTC value as necessary to run the car at contract speed. Set the value of FHLV (Filter for Loop Voltage) to 1.50Hz. This provides greater damping during acceleration and deceleration, while reducing the damping effect during steady state speed. It is recommended that the GLV parameter be increased in proportion with FHLV. Making this adjustment may also prevent the car from spotting on approach to the destination floor. If spotting persists, increase VHL and VIL and decrease J7 and/or A6. Although a large number of parameters are available for tuning car response, 90% of the tracking adjustments may be achieved by manipulating just three parameters: GP, GI, and GLV on the *Gain Parameters* screen. The idea is to increase GP and GI until oscillation is observed, and dampen the oscillation with GLV.

Typical values for the Gain Parameters are:

GP   2.00 - 6.00
GI   2.00 - 8.00
GLV   2.00 - 6.00

If there is speed overshoot in the system, increase parameters GLV (Loop Voltage Damping) or GD (Differential Error Gain). If the system starts oscillating, back off the gain.

d.   REDUCED GAINS AT STEADY STATE SPEED - The purpose of the reduced gains is to provide tighter control during acceleration and deceleration, and relaxed control when the car is traveling at steady state speeds. The reduced gains are only effective during Normal, Inspection, Correction, Earthquake and Danger runs. Figure 4.6 illustrates how the reduced gain parameters interact while the car is in Normal operation. On Inspection, the reduced gains will be invoked as soon as the car reaches steady state speed (Inspection speed).

FIGURE 4.6   *Reduced Gains at Contract Speed*
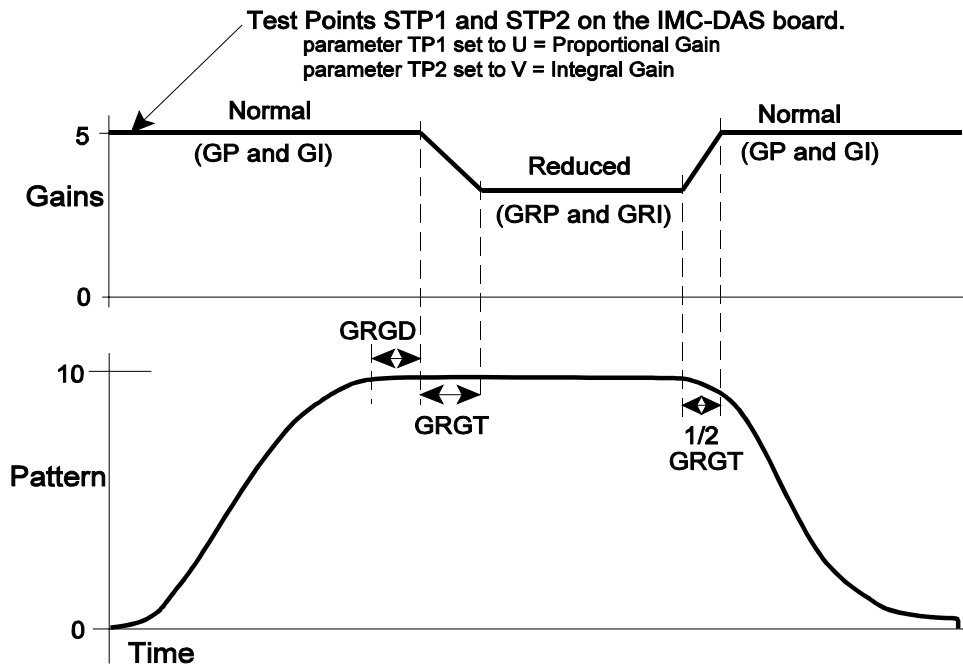
The starting values for these parameters can be:

• GRGD = 1 Second
• GRGT = 0.5 Second
• GRP   = GP times 0.5
• GRI   = GI times 0.5
• GRD   = 0.00

NOTE: NEVER SET GRP OR GRI BELOW 0.5

The reduced gain parameters GRP, GRI, GRGD and GRGT are located on the *Gain Parameters* (Shift F2-4 Simplex, F1 - 4 Local) screen and are defined as follows:

- GRP (Reduced Proportional Error) - After contract speed is reached and an adjustable delay GRGD (typically 1.0 sec.) has expired, the proportional gain is reduced from the Proportional Error (GP) parameter to this reduced proportional gain GRP (usually ½ GP) over an adjustable time GRGT (typically 0.5 sec.). When the elevator begins to slow down, the proportional gain will increase from GRP to GP over half the GRGT interval. This gain can not exceed GP.

- GRI (Reduced Integral Error) - After contract speed is reached and an adjustable delay (GRGD) has expired, the integral gain is reduced from the standard integral gain (GI) to this reduced integral gain GRI (typically ½ GI) over an adjustable time (GRGT). When the elevator begins to slow down, the integral gain will increase from GRI to GI over the GRGT interval. This gain can not exceed GI.

- GRGD (Reduced Gain Delay) - The reduced gains (GRP and GRI) are applied after this time has elapsed at steady state speed.

- GRGT (Reduced Gain Transition Time) - Non-zero value on this parameter activates the reduced gain. The gains are reduced from their standard value to their reduced value over this time interval. When the gains are increased from their reduced value to their standard value, the transition will occur over half of this transition time. It is important that this transition time not be too long. If the reduced gain is not necessary, set this parameter to zero.

The reduced gains will be invoked only if the Reduced Gain Transition (GRGT) parameter is not zero. The GRGT parameter is adjusted so that the gain transition from normal to reduced or reduced to normal is smooth enough to eliminate any "bumpy" feeling in the car. However, the transition time should not be so long that the gains do not reach their standard value before the elevator starts to decelerate.

The Reduced Gain Delay (GRGD) parameter must be adjusted to guarantee that the car has reached contract (or steady state) speed and the speed has stabilized before reducing the gains. Usually 1.0 second is sufficient.

The Reduced Proportional Error (GRP) and Reduced Integral Error (GRI) gain parameters can be reduced until there is no oscillation at steady state speed. However, if the gains are too low it is possible that the control may become too loose and may not track properly. These gains, GRP and GRI, cannot be increased above normal gains GP and GI respectively. If the oscillation is due to a mechanical anomaly (tach wheel), it may not be possible to remove the oscillation completely using reduced gains.

> **WARNING:** The reduced gain parameters must be verified and adjusted before running the elevator. Failure to follow these instructions may result in erratic elevator operation.

4.3.2 SHAPING THE VELOCITY PROFILE

The movement between any two landings has been divided into ten programmable phases (Note: on short runs, all 10 phases may not be seen).   The Velocity vs. Time Graph screen *F2* (*Shift F3* for simplex) on the CRT shows the typical shape of the velocity profile as the car travels through the hoistway (see Figure 4.7). When the car is not running, a flat line is shown at zero velocity. Any large discontinuity in the idealized velocity profile can be observed by looking at this screen while the car is running. Unfortunately, the typical CRT cannot show all the necessary details for adjusting the car. Use of a storage scope is highly recommended for viewing the pattern and the car response (tach). The *F2* screen (*Shift F3* for Simplex) also displays the car PI and the velocity of the car. The Reference section explains the adjustable Pattern Parameters.

FIGURE 4.7   Velocity vs. Time Graph, F2 (Shift-F3 for Simplex)

AO Acceleration — starting
J1 Jerk at start
A2 Acceleration — maximum
J3 Jerk before peak
VH Contract speed
J5 Jerk after peak
A6 Deceleration — maximum
J7 Jerk before leveling
VHL High (initial) leveling speed
DL Leveling distance
VIL Intermediate leveling speed
VFL Final leveling speed
DFL Final leveling distance
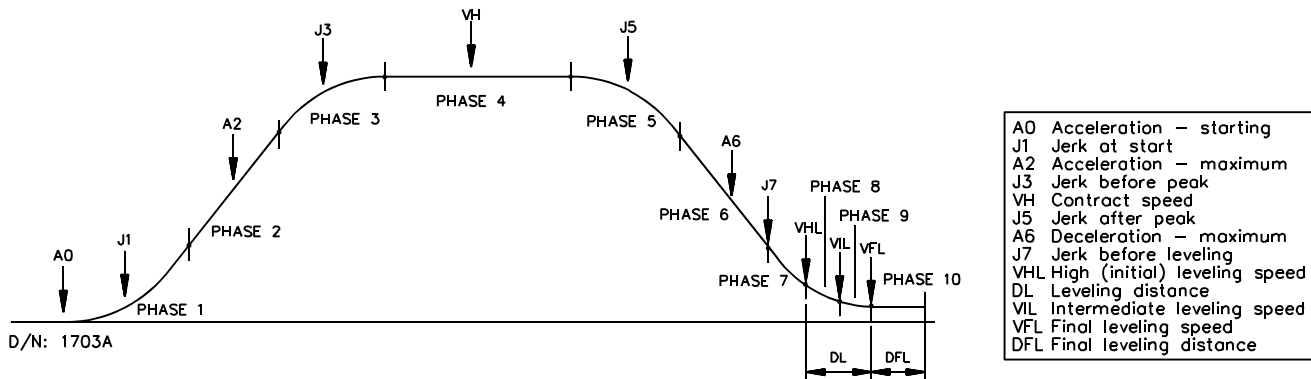
The following recommendations will help in the shaping of the velocity profile.

a.   To get approximately equal acceleration and deceleration speeds, set the A2 parameter greater than A6.

b.   A fairly low value of J7 is recommended if there are difficulties in attaining tight regulation.

c.   To get a proper start without rollback or snapping away from the floor, a variable delay has been provided in the application of the speed signal. The BSPD parameter on the *Motor Parameters* screen affects the amount of delay which occurs from the time the drive processor enables the RE relay on the IMC-PRIx board to the time the pattern generator sends out the pattern value. BSPD must be adjusted so the brake just clears the brake drum before attempting to accelerate the car. Adjust BSPD with an empty car in the down direction. The correct setting can be adjusted by watching the drive sheave for proper takeoff.

d.   If running out of generator shunt field excitation near the end of phase 3 becomes a problem, as is evidenced by the illuminated Gen. Shunt Fld Saturated LED on the Drive Unit during full load up operation, decrease the value of J35L (J3 for older versions of the program) so that there is a smooth transition from maximum acceleration to contract speed.

e.   Ideally, the slope of the acceleration in volts per second should be equal to the slope of the deceleration, as viewed on an oscilloscope or chart recorder with test point T to COM on the IMC-DAS board. To verify that the current in the DC loop does not exceed

250% of the full load rating of the generator, put a DC ammeter in the DC loop or use a clamp-on type ammeter to view loop current while accelerating the car in the up direction with a full load. If there is excessive sparking on the generator or motor brushes or if the acceleration or deceleration feels rough in the car, reduce the acceleration and jerk parameters to provide the desired results. If sparking on brushes continues, check neutral and especially *check the generator interpole connections.*

f. To check if the raw pattern from the pattern generator coincides with the processed pattern, set Software Test Points STP1 to A, STP2 to D, and connect the oscilloscope probes to these test points with respect to COM on the IMC-DAS board. View these signals while the car is accelerating and decelerating, to verify the signals are tracking. If they are not tracking, increase the PADL parameter on the *Gain Parameter* screen until both signals coincide.

4.3.3 ADJUSTING LEVELING AND FINAL STOP

a. To make the final adjustments to the speed pattern, refer to Table R.2 (page R-3). This table is the list of recommended parameter values based on car contract speed. Observe the operation of the elevator by looking at the hoist motor and by observing the car response on test point T to COM on the IMC-DAS board. The parameters VHL, VIL, VFL, DL and DFL can be adjusted to shape the final approach to the floor using the *Pattern Parameter* screen. The goal is for the speed pattern shape to flare out and blend the deceleration into a final leveling speed. The VHL, VIL, VFL, DL and DFL values have all been preset at the factory. Modifying the pattern may obtain a lot of stabilized leveling or decelerate the elevator all the way into the floor for the best brake-to-brake times. Experiment with the final approach to the floor by adjusting the recommended speed parameters for VHL, VIL, VFL, DL, and DFL. It is here that most of the performance and the perceived quality of ride will be determined. Try the full load range to be sure the stops are consistent.

b. To provide a more positive braking action or to reduce the brake-to-brake run time, it may be necessary to adjust the GES (Electric Stop) parameter on the *Gain Parameter* screen. Enough delay in the setting of the brake has to be provided to allow the sheave to stop turning before setting the brake on the brake drum firmly. Before adjusting the GES parameter for more positive braking action, change the BDD (brake drop delay) parameter so that at least a 0.50 second delay occurs before the brake sets. This will allow electric stop adjustment to be observed. Run the car up and down and observe the sheave during stopping at each floor. If needed, vary the GES value so that the sheave stops momentarily before the brake drops (even though the car may drift some after being stopped). Since, the GES control has enough strength to allow a fairly strong final leveling speed, experiment with this to improve brake-to-brake run time. Next, reduce the BDD value so that the brake sets exactly at the point in time that the hoist motor stops turning. Depending on the value of GES, the up and down leveling sensors on the landing system box on the car top might need to be moved to provide the desired dead zone. Slide these sensors with fingers or a screwdriver from the outside of the box (see Figure 4.5).

c. To get the car to stop exactly at a floor when coming in from either direction, the LU and LD sensors may have to be adjusted. Select a floor in the middle of the hoistway as a master floor. Move the floor magnet if necessary so that when the floor of the cab is level with the hall floor, the DZ sensors are in the middle of the floor magnet, then adjust the LU and LD sensors to get the car to stop exactly on the floor. Remember that the car can be stopped by having the LU and LD sensors *both de-energized or both*

energized, but the sensors must be *both de-energized* when the car is stopped at the floor. The distance from the DZ sensors to the LU and LD sensor must be the same.

    d.   Once this is done, go back and permanently attach the floor magnets to the steel tape. Now put the car on normal operation and stop the car at every floor. Verify that the RD flag is on at every floor.

    e.   RELEVELING OPERATION - To verify proper relevel operation, make the car overrun the floor at the end of the run as follows:

> **NOTE:** During tests #1 and #2 a "Leveling Sensor Failure" error message may be indicated on the Swing Panel Diagnostic Indicators. This error occurs when both LU and LD are activated at the same time. Toggle the INSPECTION ON/OFF switch on the HC-RB4 board to clear the fault.

    1.   GEARED INSTALLATIONS - Place a car call above the car. Near the end of the run, when the LU relay on the HC-RB4 board is energized, connect a jumper between terminals 18 and 26 to hold the LU relay energized until the LD relay also is energized. This should stop the car and allow the brake to set fully. Wait 3 seconds, then remove the jumper. This will cause the car to relevel down into the floor. Check to see that the relevel speed is OK (typically 6 to 8 fpm) and causes no oscillations or subsequent releveling operations. Start with the Relevel Velocity (VRL) parameter on the *Pattern Parameters* (F1 - 1) screen, identical to the Final Leveling Velocity (VFL) parameter, and only change the releveling velocity as necessary to cause the car to stop at the same point as it would during a normal approach to the floor. Usually VRL = VFL+2.

    2.   GEARLESS INSTALLATIONS - Set the Relevel Velocity (VRL) parameter to 5 fpm. Place a full load in the car. Check the full load releveling operation by first placing a car call below the car. Near the end of the run when the LD relay on the HC-RB4 board is energized, connect a jumper between terminals 18 and 25 to hold the LD relay energized until the LU relay also is energized. This should stop the car and allow the brake to set fully. Wait 3 seconds, then remove the jumper. This will cause the car to relevel up into the floor against the full load. Refer to the note above.

        Start with a low enough value of brake Relevel Voltage(BRV) parameter on the *Motor Parameters* (Shift F2-2 Simplex, F1-3 Local) screen, to eliminate rollback on the relevel up. Repeat the test while increasing the BRV parameter just until rollback begins at the start of the releveling operation, and then reduce BRV until the rollback just disappears. The goal is to weaken the brake so it does not pick fully on a relevel, but so that the brake pressure is just partially removed, allowing a relevel without rollback under the brake. This procedure provides for the maximum amount of release of brake pressure without encountering rollback, but without fully lifting the brake. If this is done correctly, the least amount of hoist motor current necessary to accomplish proper releveling operation is required, and the Loop Overcurrent detector will not trip.

    3.   ROPE STRETCH RELEVELING - On high-rise applications, when the car is very low in the building with hundreds of feet of cable between the machine and the elevator, substantial movement that can occur when the elevator load changes, thereby causing releveling operation. To make the system more tolerant of this movement, there is a special option which adjusts the amount by

which the elevator must be away from the floor before the releveling operation is engaged. Systems with a RSR (rope stretch relevel) relay have this option. The distance that the car must be away from the floor before engaging releveling is determined by the Rope Stretch Relevel Distance (MRSR) parameter on the *Profile Parameters* (Shift F2-2 Simplex, F1 - 2 Local) screen. The range of adjustment is from 0.00 to 3 inches, with a typical value being 0.72 inches.

f.   RELEVELING GAIN ADJUSTMENTS - In some high speed gearless installations the relevel operation may take an excessive amount of time, because sufficient current must build up in order to move the car under a partially picked brake. Then once the car starts moving, in most cases, it will overshoot requiring another relevel operation in the opposite direction (a "yo-yo" effect). To eliminate the long relevel operation and "yo-yo" effect, an initial relevel gain scheme is implemented in this system. If there is no "yo-yo" effect, skip this adjustment.

As shown in Figure 4.8, the Proportional, Integral and Differential Gains (GP, GI and GD) are increased to their Initial Relevel Gain values (GIRP, GIRI and GIRD) when the relevel operation begins, or after Initial Gains (GIP and GID) if Reduced Differential Gain (GRD) is greater than 0 and Speed Pick Delay (TSPD) is greater than 0. When the velocity feedback (Tach/velocity encoder) reaches the commanded Relevel Velocity (VRL), the gains are returned to the normal gain values GP, GI and GD. The proportional and integral gains applied to the system can be observed through software test points STP1 and STP2 on the IMC-DAS board with the parameter TP1 set to option U (Proportional Gain) and TP2 set to option V (Integral Gain). Note: The maximum value that can be observed through these test points is 10.0V. Applying initial relevel gains allows a lower Relevel Velocity (VRL) on the *Pattern Parameters* (F1 - 1) screen.

FIGURE 4.8   *Releveling Gains*
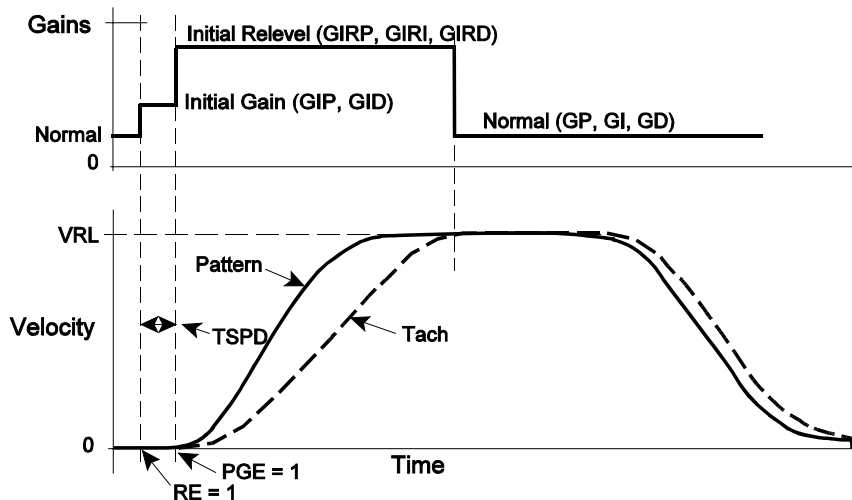
Before adjusting the releveling gains, the car must have been adjusted so that there is no overshoot at the stop. The brake must also have been adjusted for relevel operation.

1.   Bring the empty car to the bottom landing. Set the following parameters on the *Auxiliary Drive Parameters* (Shift F2-6 Simplex, F1 - 6 Local) screen.

•   OIGR = ON, to activate the Initial Relevel Gains

- Initial Relevel Proportional Error (GIRP) = 2 times GP

- Initial Relevel Integral Error (GIRI) = 2 times GI
  GP and GI are on the *Gain Parameters* (Shift F2-4 Simplex, F1 - 4 Local) screen.

- Verify that BRV is 80% of BPV.

- Verify that TSPD > 0.0 (0.5)

2. Now force the car to relevel by momentarily jumpering terminals 18 to 25 or 26. If the relevel operation improves and there is no oscillation, the GIRP and GIRI gains can be increased or decreased until the desired relevel operation is achieved.

3. Test the releveling operation in both UP and DOWN directions. Then verify the relevel operation with a full load in the car in both the UP and DOWN directions.

g. This step is for gearless installations. Check the empty car releveling operation by connecting a jumper between terminals 18 and 26 to give a level up. The car will then stop because the down level LD relay has been selected. Remove the jumper between 18 and 26, toggle inspection switch and the car will level down against the counterweight. If the rollback is acceptable, then do not adjust the relevel brake voltage. If the rollback is not acceptable, decrease the releveling brake voltage (BRV) so the brake barely lifts. The goal is to weaken the brake so it does not pick fully on a relevel, but so the brake pressure is just partially removed, allowing a relevel under the brake. Repeat this step with a relevel in the up direction, with a full load in the car. Adjust the relevel voltage as high as possible without actually lifting the brake (brake should be warm).

h. Check contract speed in both up and down directions with a hand-held tachometer to verify that there is no more than 1% of difference between up and down speeds. If not, assign STP1 to A and STP2 to E to see if the pattern is the same for both directions. If there is more than .1 volt difference in pattern, then there is an internal problem in the drive system or offset in the speed transducer.

If the pattern is within the specified tolerance, but there is more than 1% difference between up and down speeds with the tach signal on STP2, then there may be a tach problem. If the tach is mounted too close to a motor field pole, the magnetic field of the pole may affect the tach and cause problems with speed control.

4.4   CALIBRATION AND VERIFICATION OF SAFETY FUNCTIONS

4.4.1 TACH FAILURE

This procedure creates a signal that is an approximation of car velocity. We call this signal the synthetic tachometer signal. This signal is created from both the armature voltage and the armature current. The synthetic tachometer signal is used to determine certain failures in the tachometer and also certain failures in the motor field. Calibrate this signal by following these steps:

a.   The car should either be empty or have a full load.

b.   The final adjustment of the car, except for safety functions, should already be completed.

c.   Assign option H (the error between the synthetic and external tachometer signals) to test point STP1 on the IMC-DAS board by setting the Test Point One (TP1) parameter on the *Option/Calibration Parameters* (Shift F2-5 Simplex, F1-5 Local) screen to the value 8. Make sure the car is running at contract speed with *an empty car up* or *full load down*. Now adjust the Synthetic Tach Voltage Calibration (SVSC) parameter on the *Gain Parameters* (Shift F2-4 Simplex, F1-4 Local) screen to give a minimum value on STP1 with respect to COM while running at contract speed (STP1 may still be a volt or more - just find the minimum).

d.   Run the car on contract speed runs and measure the voltage on STP1 with reference to COM (only at contract speed). Adjust the Synthetic Tach Current Calibration (SISC) parameter on the *Gain Parameters* screen so that the voltage on STP1 is roughly the same (within 0.5 VDC or less) when the car is going UP or DOWN.

e.   Now repeat the adjustment of the Synthetic Tach Voltage Calibration (SVSC) parameter to give a minimum value on STP1 with respect to COM while running at *contract speed* (STP1 may still be a volt or more - just find the minimum). If needed, repeat the adjustment for the Synthetic Tach Current Calibration (SISC) parameter to minimize the signal on STP1 further. These adjustments are interactive, which is why it is necessary to repeat the adjustments at least once.

f.   Now that the synthetic tachometer signal has been adjusted, compare this signal with the actual tachometer signal. If the actual tachometer signal and synthetic tachometer signals differ by more than four volts (as measured on STP1 on the IMC-DAS board with TP1 set to option 8), the safety monitor trips and highlights the TF (tachometer failure) flag on the *Graphic Display of Elevator* screen. Run the car at contract speed. If TF does not highlight, the synthetic tachometer signal has been adjusted properly.

g.   The settings of SVSC and SISC affect the value of the synthetic tachometer feedback signal, so if TF (tachometer failure) trips, examine the synthetic tachometer signal.

h.   If TF continues, and the difference between T, and STS is greater than 3.5VDC, then do the following:

1.   Swap both your Motor field MF1 and MF2 connections and your Generator GSF1 and GSF2 connections.
2.   If TF continues, then swap GA and GI wires.

4.4.2 INSPECTION/LEVELING OVERSPEED

This test calibrates the inspection and leveling overspeed function.

a. To verify the overspeed monitoring function for access, inspection, and leveling, set the Inspection Velocity (VIN),on the *Pattern Parameters* (Shift F2-1 Simplex, F1-1 Local) screen, to 145 fpm (record your original value of VIN).   The jumper connecting terminals FBP1 and FBP2 on the IMC-RI board should be removed. If this jumper is in place, the overspeed monitoring will be bypassed.

b. Access the *Dynamic Adjustment Parameters* (Shift F2-9 Simplex, F1-9 Local) screen and set the Pattern Gain (PG) parameter to a starting value of 0.75. Run the car on Inspection operation from the controller and, using the I (increment) key, increase the PG value above 1.00 until car speed passes 150 fpm. When this happens, the ILO flag on the *F3* screen should be ON and IOS should be displayed on the IMC-DIO alphanumeric display.

c. After verifying overspeed, use the D (decrement) key to set PG on the *Dynamic Adjustment Parameters* screen back to 1.0. Set the Inspection Velocity-High (VIN) on the *Pattern Parameters* (F1 - 3) screen back to your originally recorded value.

4.4.3 CONTRACT OVERSPEED

This test verifies the high speed overspeed monitor. First turn the Relay Panel Inspection switch OFF, and set the TEST/NORM switch on the HC-RB4 board to TEST. If the jumper between FBP1 and FBP2 on the IMC-RI board is still on, remove it. Then set Pattern Gain (PG), on the *Dynamic Adjustment Parameters* screen, to 1.10 (110% of contract speed).

Register a call that is far enough away to allow the car to reach contract speed. Once the car reaches 107% of contract speed, the FLT relay on the IMC-RI board will drop out, and all of the following will be indicated:

- The OS flag will highlight on the *Graphic Display of Elevator* screen. Also, a COS indication, followed by the actual trip speed in the lower left corner of the *F3* screen.

- COS will be displayed on the alphanumeric display on the IMC-DIO board, showing contract overspeed.

- The red OVRSPD LED on the IMC-DIO board will be illuminated.

- The messages OVERSPEED and SAFETY PROCESSOR FAULT will be logged in the *Special Event Calendar*.

4.4.4 TACH ERROR

This test compares the pattern signal with the external tachometer signal and verifies that the Tach Error (TE) fault flag detects excessive error between the actual and intended car speed.

a. Before beginning this test, reconnect the jumper on terminal FBP1 and FBP2 (**bypass the drive safety functions**). Set the Maximum Error Between Tach and Pattern (STE) value to 001 on the *Gain Parameters* screen. Put a full load in the car and run the car UP and DOWN at full speed. Observe the TE flag on the *F3* screen when the car is accelerating or slowing. The TE flag must be highlighted. Stop the car at a floor and

push the DRIVE RESET button on the IMC-DAS board. The flag faults are cleared by pushing the DRIVE RESET button.

Increase the value of STE (*Gain Parameters* screen). Repeat the above steps until the TE fault flag *does not* highlight when the car is accelerating or slowing. When the flag no longer becomes highlighted on acceleration or deceleration, add 5% to the value of STE to permit a margin before tripping. For sleeve bearing or double-wrapped machines, it may be necessary to add more than 5% to prevent nuisance tripping of TE as the high friction may cause a greater accumulation of error before the machine starts to turn.

Make sure that TE does not trip during an emergency stop or when door locks are opened. Simulate loss of door locks by removing the field wire from terminal #4, *not* terminal #8.

> ⚠ **WARNING:** Read step b all the way through before attempting to perform this test.

b.   This step verifies that the TE flag will highlight and the car will shut down even with a complete tachometer failure (read the ENTIRE step before beginning). Position the car at the bottom landing and then disconnect the tachometer wire from terminal TS on the IMC-RI board. If an encoder is used instead, pull out the wire from terminal CH-A. Tape the end of the wire for protection. **Remove the jumper connecting terminals FBP1 and FBP2 on the IMC-RI board**. Verify that the TEST/NORM switch on the HC-RB4 board is in the TEST position. Register a call at least two floors above the bottom landing. The car will run away very fast; **observe safety precautions**. When the TE flag highlights on the *Graphic Display of Elevator* screen, the car should stop immediately. If the car does not stop immediately, and the TE flag does not highlight, turn the INSPECTION ON/OFF switch on the HC-RB4 board *ON*. Do this before the governor trips. When the car stops, reconnect the tachometer or encoder wire. Press the DRIVE RESET button on the IMC-DAS board.

4.4.5   ARMATURE OVERCURRENT (OVERLOAD PROTECTION)

This test calibrates the armature circuit overcurrent. Before doing so, **reconnect the jumper on terminals FBP1 and FBP2**.

> ⓘ **NOTE:** Run the car *up* during this test so the mechanical safety does not set. Keep the car away from the top because if the mechanical safety does set with the car at the top, it may be difficult to reset the safety.

The product of the current above the learned current and the time the current stayed above the learned value will be analyzed to determine if an LOC fault occurred. If the armature current exceeds the learned value by a large amount, the LOC will trip much faster than when the current in the armature circuit exceeds the learned value by a small amount. The SLOC parameter is used to adjust the time. Set SLOC < 1.0 for less than 3 seconds or > 1.0 for more than 3 seconds.

With a full load in the car, place the car at the bottom landing. Verify that the OLOC parameter on the *Option/Calibration Parameters* screen is set to the ON position. Set the parameter SLOC on the *Gain Parameters* screen to 1.0. Run the car to the top landing. During this run, the average armature current is calculated and saved.

Now set the OLOC parameter to off. Verify the learned LOC value of the MLLC parameter on the *Auxiliary Drive Parameter* screen. If this value is zero the learn process must be repeated.

If the LOC flag is highlighted during these runs, the SLOC on the *Gain Parameters* screen must be calibrated. Before doing so, the LOC flag must be cleared. To do this:

- Bring the car to a full stop.
- Press the DRIVE RESET button to reset the faults on the *F3* screen.

To calibrate the SLOC value, begin by setting the value at 20. Run the car the full length of the hoistway and verify that the LOC fault flag is not highlighted on the *F3* screen. Decrease the SLOC value by half. With a full load, run the car up and observe the LOC flag. If the LOC flag is highlighted, increase the current value of the SLOC by half the difference between its previous and current value. If the value is not highlighted, decrease the current value of SLOC by half the difference between its current and previous value. Run the car up and observe the LOC flag. Repeat this process until the difference between an SLOC value that causes the LOC flag to highlight and a value that does not is 0.25 or less.

If the above condition is satisfied, add 20% to 35% to the SLOC value which does not highlight the LOC flag. This will prevent any nuisance LOC faults. The calibration of SLOC is finished. Armature overcurrent adjustment can be verified as follows:

1. **Be sure the jumper is removed between FBP1 and FBP2** on the IMC-RI board. Disconnect the brake wire from panel-mounted terminal B1.

2. Now enter a call. The brake should not lift. After a short time, the LOC should trip and the safety string should open. Verify that the LOC fault flag on the *F3* screen is highlighted. It is possible that TE (Tach Error) and BF (Brake Failure) may appear before the LOC fault. In this case, increase the Max Error between Tach and Pattern (STE) parameter, on the *Gain Parameters* screen, to 50% and reduce Brake Pick Voltage (BPV) and Brake Hold Voltage (BHV) to minimum value, until the LOC is verified. Make sure that STE, BPV and BHV are returned to their original value..

3. Connect the brake wire back into the panel mounted terminal B1.

At this point, the car should be running well and the jumper connecting FBP1 and FBP2 on the IMC-RI board should be removed. The unit should not be tripping off under any load condition.

4.4.6 CONTROLLING CAR MOTION AT INITIAL START

Depending on the mechanics of the system, some gearless machines may exhibit rollback at the start of car motion. Geared machines rarely exhibit rollback. To eliminate rollback at the start of car motion, the IMC-MG control system allows the customer to choose one or both of 2 alternatives:

- Using a load weigher and implementing pre-torque.
- Adjusting motor control parameters specifically designed for the start of motion.

IMC-MG systems have built-in pre-torque capability. With pre-torque, the elevator is started with a specific value of torque on the armature to exactly offset the load, thereby giving theoretically perfect starts. Implementing the pre-torque capability requires a load weigher, which must be installed on the elevator and adjusted to accomplish the smooth starts for which the controller was designed. If your installation has a K-Tech load weigher, Appendix G, *K-Tech*

LW-KK2 Loadweigher Calibration or Appendix H, *MCE Load Weigher Installation and Adjustment*, provides instructions for proper calibration. Section 4.4.7 provides instructions for setting the pre-torque parameters.

For those installations without load weighing, there are several parameters that can be adjusted to improve control during starts, which are covered in Section 4.4.8.

4.4.7   SETTING THE PRE-TORQUE PARAMETERS

This load compensation circuitry consists of the following:

- •   HC-LWB or HC-LWIP Load Weigher Buffer board
- •   IMC-RI Relay Interface board

The HC-LWB / LWIP is designed to buffer the load signal and to generate a differential output that can be sent to terminals LW+ and LW- on the IMC-RI board through the traveler cable. The two differential output signals on HC-LWB / LWIP (LW+ and LW-) are to be wired to terminals LW+ and LW- on the IMC-RI board. These two wires do *not* have to be shielded.

To perform the load compensation adjustments, all drive parameters (with the exception of safety calibration) must have been fully adjusted prior to performing the following steps.

1.   From the car top, first adjust the load weigher per instructions provided in Appendix G or H of this manual.

2.   When the adjustment is done, measure the following voltages between terminals LW+ and LW- on the IMC-RI board:

Empty car at bottom floor	1.00 VDC *(+/- .2 volts)*
Full car at top floor	9.00 VDC *(+/- .4 volts)*

3.   Put a balanced load in the car and move the car to the top floor. Assign Software Test Point 2 to the value of R (processed load weigher). Place the voltmeter probes on STP2 and COM on the IMC-DAS board. The measured voltage must be 0.0VDC when the car is at the top landing. If the measurement is not 0.0VDC, adjust the parameter GCW on the *Gain Parameter* screen until the voltage is 0.0 at the test point.

4.   Increase the BSPD (Speed Pick Delay) value on the *Motor Parameter* screen so that the brake lifts before the car starts to move; .75 seconds should be sufficient.

5.   Run the car down and up one floor. If the car is truly balanced, there will not be any rollback.

6.   Next, remove the load from the car and run it up to the top landing. Now run the car one floor down and then up. Observe the sheave and increase the GT value on the *Gain Parameter* screen until there is no rollback in either direction. The top zone has now been adjusted.

7.   Move the empty car to the very bottom landing. Now run the car one floor up and then down. Observe the sheave and increase the GTPC value on the *Gain Parameter* screen until there is no rollback in either direction. The bottom zone has now been adjusted.

8. Verify that there is no rollback by running the car from top to bottom, with one floor runs. Then place full load in the car, and make one floor runs to the top while checking the starts on the top floors. Readjust the GT and/or GTPC if rollback is still present.

9. Reduce the BSPD parameter on the *Dynamic Parameter* screen so the brake is fully lifted *before* motion starts, but do not put any *unnecessary* delay in the start of movement. If there are problems controlling rollback, readjust the GP, GI, GD, GLV and GLI gains to allow for tighter control of the car. In general, the GI and GLV parameters allow the drive to have more effective regulation.

4.4.8 ADJUSTMENT OF INITIAL START PARAMETERS

For those installations without a load weigher, brake parameters and adaptive velocity loop parameters need to be adjusted. The brake parameters allow precise coordination of brake pick and subsequent acceleration of the car at initial start. These parameters can be found on the *Motor Parameter* screen. Follow the steps below.

1. Before making these adjustments, measure the amount of time it takes to lift a brake on a normal run. The BWD parameter value (in seconds) should be approximately ¼ - ¾ of the time taken to pick the brake fully.

2. Set the BRD parameter to about ½ - 1 second.

3. Adjust BWV so that a smooth and gradual pick of the brake occurs within the time set for the BRD.

4. Increase the BSPD parameter until there is rollback in the up direction when the empty car is moving down from the top landing. Then reduce BSPD by 0.1 second at a time so that the rollback is removed.

5. Observe the start of the car with the oscilloscope or chart recorder connected to test point T and COM on the IMC-DAS board. The car should not be snapping away from the floor or producing an uneven acceleration. Ride the car and evaluate the quality of the starts. Any readjustments to the parameters BWV and BWD will require readjustment to BSPD as in 4.4.8 (step 4).

Rollback adjustment should be performed when the performance of the car is good during contract speed and at the stop, but there is a rollback problem at the start. If there is no rollback problem at the start, these gains do not need adjustment and this section can be skipped. There are three parameters that can be adjusted to provide a smooth start. The parameters that affect rollback are on the *Gain Parameter* screen.

1. Set the GIP to double the value of GP and set the GID to double the value of GD. Also set the GRD delay to 1.0 second.

2. Make a one floor run and look for rollback or any oscillation at the start of motion.

FIGURE 4.9   *Brake Timing Diagram*
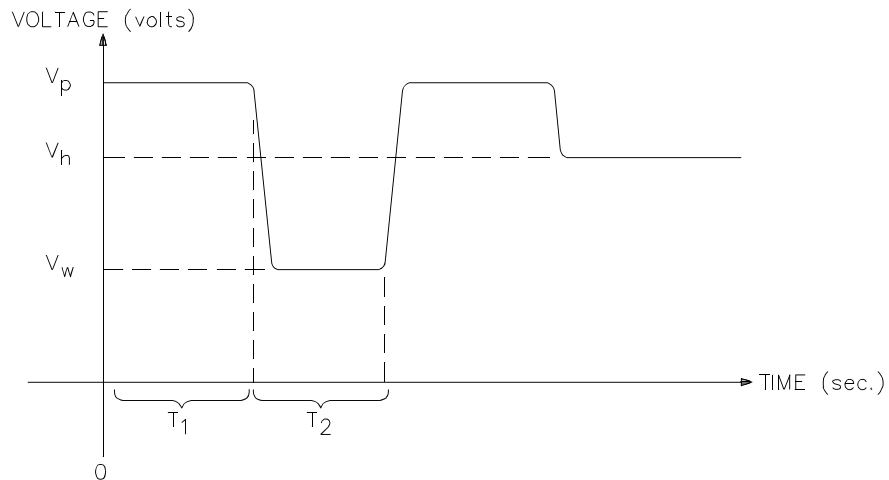
T_1 = WEAKENING DELAY(BWD)
T_2 = REPICK DELAY(BRD)

V_p = BRAKE PICK VOLTAGE(BPV)
V_w = BRAKE WEAKENING VOLTAGE(BWV)
V_h = BRAKE HOLD VOLTAGE(BHV)

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- If there is still rollback at the start and no oscillation, increase both gains GIP and GID by 25%. Repeat step (b). Keep increasing these gains until the rollback is removed, but before oscillations begin.

- If there is oscillation at the start, decrease the gains GIP and GID by 25% and repeat step (b). If the oscillation persists, then reduce the GRD delay to 0.5 seconds and also the gains GIP and GID by 25%.

3. Once the adjustment is completed, make a few multifloor runs. Make sure that the adjustment of GIP and GID gains did not alter the overall car performance.

4.4.9   LOAD WEIGHER ADJUSTMENT FOR DISPATCHING

INTRODUCTION AND THEORY OF OPERATION

The load weigher (isolated platform or crosshead deflection) provides a signal that corresponds to the perceived load. This signal is brought to the control system where it is conditioned, sampled and digitized, and the value is used to calculate the actual load *inside* the elevator. This load value is then used for logical operations such as anti-nuisance and hall call bypass.

With the isolated platform load weigher (MCE), the system simply learns the reference values of the empty and fully loaded car weight, which are then used to calculate the current load (as a percentage of full load). However, with the crosshead deflection load weigher (K-Tech), the magnitude of the signal generated by the load sensor represents the perceived load *at the crosshead*, which includes the weight of the car itself, the load inside the car, the traveling cable, and any compensation cables that might be attached to the car. Therefore it is necessary for the controller to use the measured load value in a calculation to determine the load inside the elevator (the raw load value cannot be used as is).

Due to the dynamics of the elevator system, the load represented by the traveling cable and compensation cables will vary with the position of the car in the hoistway. The load weighing system accounts for these variances by performing a process which learns empty car and full car load values at each floor in the building. The load in the car can then be determined by reading the value at a given floor and, using the learned values for that floor, performing a linear interpolation to approximate the load inside the car (as a percentage of full load). The calculated load percentage is then used to initiate logical operations, i.e., hall call bypass at 80% of capacity.

Logical operations that use the load information include: light load weighing (anti-nuisance), advance car dispatch (reduction of door dwell time), heavy load weighing (hall call bypass), and overloaded car detection. Each threshold is user-programmable, and will determine when each of these logical operations should be performed.

The measurement of the load will only take place when the car is stopped at a landing with the doors open. This is the only time that we would anticipate a change in load upon which a logical operation should be initiated. The measurement is not taken when the car is running because the acceleration and deceleration of the car would be interpreted as a change in load.

Functional Description of Load Thresholds - The four load thresholds are:

- **LLW** (Light load weigher threshold): This threshold value is used to define the load at which a limited number of car calls is to be registered. If the programmed number of car calls is exceeded, all car calls will be canceled.

   Example: LLW=20%. If the measured load in the car is less than 20%, the computer will only allow a certain number of car calls to be registered (defined by a field-programmable value LLCC). If LLCC is programmed at a value of three, the computer will only allow three calls to be registered if the load is less than 20%. If a fourth call is registered, all car calls will be canceled.

- **DLW** (Dispatch load weigher threshold): This threshold value is used to define the load at which the lobby landing door timer is reduced. This threshold should be set to a value (defined in many specifications as 60%) at which it is appropriate to initiate the process of moving the car out of the lobby.

- **HLW** (Heavy load weigher threshold): This threshold value is used to define the load value at which hall calls should be bypassed.

- **OLW** (Overloaded car threshold): This threshold value is used to define the load value at which it is considered unsafe to move the elevator. When this threshold is exceeded, the car will remain at the floor with doors open. Typically an application that requires OLW will use some type of visual and/or audible indicator to alert elevator passengers that the car is overloaded. This operation is overridden by Fire Service operation.

- **OLW2** (Overloaded car threshold 2): When on Fire Service, this threshold value is used instead of the OLW value (see OLW above).

Learn Modes - With the isolated platform load weigher (MCE), the system simply learns the reference values of the empty and fully loaded car weight. However, with the crosshead deflection load weigher (K-Tech), the system must learn the reference values of empty and fully loaded car weight at each floor. This is necessary because the perceived load at the crosshead varies with the position of the car in the hoistway due to the changing proportion of the traveling cable hanging beneath the car and the position of the compensation cables.

The reference values learned for the empty car and full car weight are used to calculate the current load (as a percentage of full load) when the car is positioned at a floor.

Learn Process - The learn process consists of three functions:

- Learning the measured load value for an empty car.
- Learning the measured load value for a fully loaded car.
- Establishing the load thresholds which will initiate the logical operations.

Each of these functions can be performed separately. All three functions must be performed before the load weigher system will perform properly. **To enter the learn function, the car must be placed on Independent Service.** If an independent service switch is available in the car, use it. If not, the car can be placed on Independent Service by connecting a jumper between terminals 2 and 49 on the controller main relay board. A further option is to use the TEST/NORM switch on the HC-RB4-SCRI relay board, but this will electrically disconnect the door open relays, and is therefore **not recommended**.

GETTING INTO LOAD WEIGHER LEARN MODE

a.   Enter the SYSTEM mode of operation on the Computer Swing Panel by following these steps:

   1.   Place all diagnostic switches on the Swing Panel in the OFF (down) position.

   2.   Turn the **F7** switch ON (up).

   3.   The computer should respond with the message PASSWORD on the alphanumeric display. If you do not see this, verify that all other diagnostic switches are turned OFF. If a password has been programmed, enter the password, otherwise go to step four.

   4.   Press and hold the **S** push-button until the computer responds with the message ***SYSTEM*** on the alphanumeric display.

b.	Once in SYSTEM mode, access the load weigher learn function by turning the **Diagnostic On** switch ON (the F7 switch should remain in the ON position). The computer will respond with one of three scrolling messages:

- *NOT USED* - The software has not been configured to provide the "analog load weighing function". Contact MCE if you believe this to be in error.

- *CAR NOT READY TO LEARN* - Verify that the car has been placed on Independent Service.

- *PRESS N FOR K-TECH CROSSHEAD OR S FOR MCE PLATFORM...* - Select the type of load weigher by pressing N for K-Tech crosshead deflection or S for MCE isolated platform load weigher.

The following message is then displayed:

- *ANALOG LOAD WEIGHER LEARN FUNCTION...PRESS N TO CONTINUE* - The system is ready to learn, you have successfully placed the elevator in "load weigher learn mode".

c.	Once the elevator has successfully been placed in "load weigher learn mode" one or all three of the learn functions can be performed as described in sections to follow. The system will display one of three main prompts:

- *READY TO LEARN EMPTY CAR VALUES? PRESS S TO CONFIRM* - Press the S push-button to begin this process. The car must be empty before beginning. Press N to advance to the full load learn procedure.

- *READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM* - Press the S push-button to begin this process. Place the full load weights in the car before beginning. Press N to advance to the threshold adjustment procedure.

- *ADJUST THE LOAD WEIGHER THRESHOLDS? PRESS S TO CONFIRM* - Press the S push-button to adjust the load threshold values. Press N to advance to the empty car learn procedure.

Press the N push-button to cycle through these three different prompts. To exit the load weigher learn mode, turn the Diagnostic On function switch on the Computer Swing Panel to OFF.

LEARNING THE EMPTY AND FULLY LOADED CAR VALUES

Learning the empty and loaded car values is an automated process that requires only that the appropriate load be present in the car before beginning each process. **It is best to have two persons available, one in the machine room at the elevator controller and one positioned at a floor with test weights available.** The test weights must represent the full load value.

If the K-Tech crosshead deflection load weigher was selected, the learn process will automatically run the car from floor to floor, stopping at each landing. The car will first travel to the bottom landing, stop and pause there for a period of time. The car will then move in the up direction, stopping at each floor on the way to the car's highest landing served. Each time the car stops at a landing a value is learned for that landing (either the empty or full load value). Once all floors have been learned, the car will automatically return to its point of origin and

open its doors. The learn process must be performed twice, once for empty car load and once for full car load.

Learning the Empty Car Load Values

a. With the system in "load weigher learn mode", press the N push-button until the following prompt is displayed:

> •*READY TO LEARN EMPTY CAR VALUES? PRESS S TO CONFIRM....*

b. Verify that the car is empty.

c. Press the S push-button to begin the empty car learn process.

 1. When the S push-button is pressed, the car will automatically close its doors and commence the learn operation. During this process, the doors will remain closed and the car will not respond to car or hall call demand. If the K-Tech crosshead deflection load weigher was selected, the car will move to the bottom floor, record the empty car value and then move up, stopping at each floor to record the empty car value. When the top floor has been reached, the car will move back to the floor at which the Load Weigher Learn procedure was begun.

 2. During the learn process the computer will display the scrolling message: *LEARNING EMPTY CAR VALUES...PRESS N TO ABORT....* The learn process may be aborted by pressing the N push-button any time during the process.

 3. Once the learn process is completed for the empty car, the computer will briefly display the message: *EMPTY CAR LEARN PROCESS COMPLETED....* At that time, the car should be positioned at the floor where the learn process was begun, with the doors fully open.

 3. The computer will then display the message: *READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM....* Refer to the next section if you wish to learn the fully loaded car values. **[Do not press the S push-button at this time!]**

Learning the Fully Loaded Car Load Values

a. With the system in "load weigher learn mode", press the N push-button until the following prompt is displayed: *READY TO LEARN FULL CAR VALUES? PRESS S TO CONFIRM....*

b. If the car is not already at the floor where the test weights are located, use a car call to call the car to the floor. Load the test weights that represent the full load value into the car.

c. Once the test weights have been loaded, press the S push-button to begin the full load learn process.

 1. The process is identical to the empty car learn process described above. The computer will display the scrolling message: *LEARNING FULL CAR VALUES...PRESS N TO ABORT....* The learn process may be aborted by pressing the N push-button any time during the procedure.

3. Once the learn process is completed for the fully loaded car, the computer will briefly display the message: *FULL CAR LEARN PROCESS COMPLETED....* At that time, the car should be positioned at the floor where the learn process began, with the doors fully open. The test weights may now be removed from the car.

4. The computer will then display the message: *ADJUST THE LOAD WEIGHER THRESHOLDS? PRESS S TO CONFIRM....* Refer to the next section if you wish to adjust the load weigher threshold values.

ADJUSTING THE LOAD THRESHOLDS

The load thresholds are preset, at the MCE factory, to values based upon the job specification. However, these thresholds are user-adjustable and may be changed at any time. To adjust these thresholds, enter the SYSTEM mode of operation as described above, and select the load weigher learn function. The car must be on Independent Service to enter the load weigher learn function.

a. With the system in the "load weigher learn mode", press the N push-button until the computer responds with the scrolling message: *ADJUST THE LOAD WEIGHER THRESHOLDS? PRESS S TO CONFIRM....*

b. Press the S push-button to adjust the thresholds.

c. Once the S push-button is pushed, the computer will respond by displaying mnemonics that represent the load values. The value shown next to the mnemonic is the current threshold value for that parameter expressed as a percentage of the full load value.

Dispatching Threshold	Typical Value	Range
• LLW = light load (anti-nuisance) threshold	20%	0 - 40%
• DLW = dispatch load threshold	50%	20 - 80%
• HLW = heavy load (hall call bypass) threshold	80%	50 - 100%
• OLW = overloaded car threshold	105%	80 - 125%
• OLW2 = overloaded car threshold 2	125%	100 - 140%

d. Choose the parameter to be adjusted by pressing the N push-button. The mnemonics and values will scroll as long as the N push-button is depressed.

e. The desired value may be adjusted by pressing the S push-button. The value will be incremented until the upper limit value is reached. The value will then roll over to the lower limit value. These limit values are predetermined at MCE, and must be modified with an EPROM change, if necessary.

f. After the last parameter is displayed, pressing the N push-button will cause the computer to display the prompt: DONE ADJUSTING THRESHOLDS? PRESS S TO CONFIRM... At this prompt, pressing the S push-button will exit the threshold adjustment function; pressing the N push-button will return the prompt to the first threshold parameter.

The thresholds can be set to the desired values, as a percentage of a full load. Setting the value to 00% will disable the corresponding function. Example: setting the HLW threshold to 00% will disable the hall call bypass function.

Exiting The Load Weigher Learn Mode

Exit the load weigher learn mode by placing the Diagnostic On/Normal switch in the Normal (down) position. Exit System Mode of diagnostics by turning the F7 switch OFF (down).

DIAGNOSTIC DISPLAY

In the Normal mode of operation, with the Diagnostic On/Norm switch on the computer Swing Panel in the Norm position, one of the default parameter displays will be shown on the alphanumeric display. The display may be changed from one parameter to another by pressing and holding the N push-button.

Time of day - The time of day is displayed in the following format:
[hour] : [minutes] : [seconds]
The time is expressed in military (24-hour) format. For example, 8:15 A.M. would be displayed as "08:15:00", whereas 8:15 P.M. would be displayed as "20:15:00".

Measured load - The measured load in the car is displayed in the following format:
LW=xxx%   (where xxx is the measured value).
The measured load will not be displayed if the load weigher learn process has not yet been successfully performed. The computer has no reference values from which to calculate the load. Instead, the following status message will be displayed: "LOAD WEIGHER NOT YET LEARNED...".

Trip counter - The trip counter indicates the number of runs or trips the elevator has made since the counter was last reset to zero. The format of this display is:

T=yyyyyy   (where "yyyyyy" is the number of runs).

The trip counter may be reset to zero by pushing and holding the S push-button for five seconds.

Software Versions - On local car controllers the version numberS of the software is displayed. The messages are scrolled as follows:

MP VERSION NUMBER IS: x.xx (where x.xx is the version number)
CPA VERSION NUMBER IS: x.xx (where x.xx is the version number)
DDP VERSION NUMBER IS: x.xx (where x.xx is the version number)

4.5   CLOSED LOOP MOTOR FIELD CONTROL

Motor field voltage variation caused by temperature fluctuations can be eliminated by using the closed loop motor field control. In this system, motor field can be operated in either an open or closed loop configuration. MCE recommends this option be used to provide consistency in car performance. Adjusting the gain parameter MFPG (motor field proportional error gain) on the *Motor Parameters* screen and MFIG (motor field integrator error gain) will improve regulation of the motor field output voltages. To select closed loop motor field control, follow the instructions below.

1.   Set the OCMF parameter on the *Option/Calibration Parameter* screen to on.

2.   Attach a voltmeter to panel mounted terminals MF1 and MF2. Run the car on inspection. Look for any fluctuation in the voltage when the car is not moving or when running at a steady speed. This measures the stability of the motor field standing and forcing voltages.

        If there is no fluctuation, increase the MFPG parameter on the *Motor Parameter* screen until slight fluctuation is observed.

3.   Once there is a slight fluctuation in the voltage, decrease the MFPG parameter by 25%. Run the car again on inspection. If fluctuation persists, decrease the parameter another

        25%. Best performance is achieved when the MFPG is set just below the value that causes fluctuation.

4.   With a voltmeter still attached to panel mounted terminals MF1 and MF2, run the car on inspection. Increase the MFIG parameter on the *Motor Parameter* screen until slight fluctuation occurs at standing or forcing motor field voltage.

5.   Once there is fluctuation in the voltage, decrease the MFIG parameter until fluctuation stops. Run the car again on inspection. Best performance is achieved when the MFIG is set right below the value that causes fluctuation.

After these adjustments, measure the DC voltage between panel mounted terminals MF1 and MF2, or observe the motor field voltage display on the *F3* screen of the CRT. If the motor field is unstable during any phase of a normal run, reduce the MFPG and MFIG parameters until the motor field input is stable.

4.6   NORMAL TERMINAL LIMIT SWITCH LEARN OPERATION

> **WARNING:**   This function must be successfully performed before any passenger use.

The normal terminal limit switch Learn operation is defined as recording car velocity at the time each of these terminal switches is encountered on a normal approach to each terminal landing. This Learn operation should be performed after all parameters have been fully adjusted.

Note that whenever Pattern or Profile Parameters are altered, this Learn operation must be repeated. Following are the required steps to learn the normal velocities associated with each terminal landing.

1.   The TEST/NORMAL switch on the HC-RB4 board should be on TEST.

2.   Make sure that all the terminal limit switches are properly installed as per Section 2.3.3. Verify the proper operation of the terminal switches using the *F3* screen. Find the safety window in the lower left-hand corner. Look for UT1-UT5 and DT1-DT5. Look at the job prints to determine which normal terminal limit switches are required for this installation. During a full run, up or down, watch to see if these become highlighted. If the UTx or DTx flag is highlighted, it means the terminal switch is closed, if the flag is not highlighted, it means the switch is open or not connected in this installation.

3.   Turn on the LEARN SWITCH on the IMC-DIO board. If the LEARN SWITCH is already on and the alphanumeric display indicates LRNT/LRNC then turn the LEARN SWITCH off and on. The associated green LED on the IMC-DIO board will illuminate and the alphanumeric display should show LRN.

4.   Make a full hoistway run to the top terminal landing using a car call. Notice as the car starts in the up direction the alphanumeric display on the IMC-DIO will display LRNU. As the car stops at the top terminal it will display LRN.

5.   Now make a full hoistway run to the bottom terminal landing using a car call. The alphanumeric display will read LRND at this time. When the car stops at the bottom terminal landing, the IMC-DIO will display LRNC. The IMC-DIO will display these in sequence:

> LRNW →   the IMC-DIO is writing the learned data into the EEPROM
> LRNR →   the IMC-DIO is reading the stored data back for verification, and
> LRNC →   the IMC-DIO learn process is complete.

6.   At this time, return the LEARN SWITCH on the IMC-DIO board to the off position. The IMC-DIO board has now learned the normal speed of the car as the terminal switches are encountered on approach to each terminal landing. The IMC-DIO alphanumeric display will show the car speed as it moves, or it will display an error flag if any error conditions exist.

7.   Stop the car and verify the limit switch velocity values stored during normal slowdown at the terminal landings. To do so, access the *Terminal Limit Switches* (Shift F2-7 Simplex, F1-7 Local) screen on the CRT. Each value must be less than 95% of the contract velocity. Learned speeds above contract speed may require the Limit Switches to be moved closer to the terminal landings, or alternately, the A6 deceleration

parameter may be reduced. If the switches are moved closer, the emergency slowdown rate must also be adjusted.

8. Now it is time to verify that the IMC-DIO will recognize an overspeeding car at a terminal landing. For each UNTx terminal, run the car up at contract speed and remove each wire from its terminal. In each case, the car must decelerate rapidly and stop at the next floor. Replace the wire. Similarly, for each DNTx terminal, run the car down at contract speed and remove each wire from its terminal. Again, in each case the car must decelerate rapidly to a floor. Reinstall the wire into the terminal.

9. It is necessary to adjust the deceleration into the floor with an overspeed condition as in (h) above. Overspeed the car at a terminal landing once and watch the deceleration. Set the parameter FTR so that the deceleration rate is approximately 15% steeper than the deceleration provided for by parameter A6 on the *Pattern Parameter* screen. This process may have to be repeated again to get the right adjustment. In addition, verify the adjustment of the PADL on the *Gain Parameter* screen. To do this, assign STP1 to A and STP2 to D. Hook up oscilloscope probes in order to monitor STP1 and STP2. Run the car and observe the speed pattern while decelerating into a floor. Adjust the PADL parameter in order to check that the slope of deceleration is the same for both test points. Once this is achieved, increase the PADL value by 25%.

10. Detection and adjustment for terminal overspeed conditions has been completed. Remove all jumpers and finish all other adjustments (doors, etc.) and tests (safety items, door locks).

NOTE:	Every time Pattern, Profile, and or Gain parameters are modified, the safety processor in the IMC-DIO must relearn the velocities associated with each terminal limit switch.

4.7 FINAL ELEVATOR INSPECTION

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> **WARNING:** The following tests should be performed only by qualified elevator personnel, skilled in final adjustments and inspections.

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> **NOTE:** Be sure to record the motor field voltage during contract speed so it can be reset to this value after the tests, if necessary.

4.7.1 CONTRACT SPEED BUFFER TESTS

a. **CAR BUFFER TEST** - To begin this test, put a full load in the car and move the elevator to the top landing. Then, bypass the functions and set the parameters and switches listed below.

1. Connect a jumper between terminals FBP1 and FBP2 on the IMC-RI board to ***bypass the drive safety functions***.

2. Connect a jumper between terminals 8 and 12 on the HC-RB4 board to ***bypass the down normal limit.***

3. Turn on the LEARN SWITCH on the IMC-DIO board. This will ***bypass overspeed detection at the terminal landing***.

4. Set the parameter OBT on the *Option/Calibration Parameter* screen to on. This option must be set before each buffer test.

5. Set parameter PG to 1.0 on the *Gain Parameter* screen. **Note:** If this job has reduced stroke buffers, set PG Pattern Scaling to a value that allows the car to run at the speed rating of the buffer.

6. Set parameter FIN to 0.33 on the *Profile Parameter* screen.

7. Turn on the Relay Panel Inspection switch.

8. Move the car down at contract speed by using the UP/DOWN switch on HC-RB4 board. Run the car down until the car lands on the buffer. Check the hoist ropes to make sure they are in their proper grooves before attempting to move the car.

9. Temporarily connect a jumper to terminals 2 and 16 in order to move the car off of the fully compressed buffer. Use the UP/DOWN direction switch to move the car away from the buffer. ***Remove the jumpers connecting terminals 8 and 12, and 2 and 16***.

10. If PG Pattern Scaling, on the Drive (Shift F5) screen, was changed in step 5 above, return the value to 1.000.

b. **COUNTERWEIGHT BUFFER TEST** - Empty the car and move it to the bottom landing. Then bypass the functions and set the parameters and switches listed below.

1. Turn on the Relay Panel Inspection switch.

2. Ensure that a jumper is still connected between terminals FBP1 and FBP2 on the IMC-RI board to **bypass the drive safety functions**.

3. Connect a jumper between terminals 8 and 10 on the HC-RB4 board to **bypass the up normal limit**.

4. Turn on the LEARN SWITCH on the IMC-DIO board. This will **bypass overspeed detection at the terminal landing**.

5. Set the parameter OBT on the *Option/Calibration Parameter* screen to on. This option must be reset before each buffer test.

6. Set parameter PG to 1.000 on the *Gain Parameter* screen. **Note:** If this job has reduced stroke buffers, set PG Pattern Scaling to a value that allows the car to run at the speed rating of the buffer.

7. Set parameter FIN to 0.33 on the *Profile Parameter* screen.

8. Move the car up at contract speed by using the UP/DOWN switch on HC-RB4 board. Run the car up until the counterweight lands on the buffer. Check the hoist ropes to make sure they are still in their proper grooves before attempting to move the car.

9. Temporarily connect a jumper to terminals 2 and 16 in order to move the counterweight off of the fully compressed buffer. Use the UP/DOWN direction switch to move the counterweight away from the buffer. **Remove the jumpers between terminals 8 and 10, and 2 and 16**.

10. If PG Pattern Scaling, on the Drive (Shift F5) screen, was changed in step 8 above, return the value to 1.000.

4.7.2 GOVERNOR TESTS

1. GOVERNOR ELECTRICAL OVERSPEED SWITCH TEST - Check to see that the Relay Panel Inspection switch is on.

    a. Trip open the electrical overspeed switch contact manually on the governor to verify that the main safety circuit drops out. Manually verify the actual electrical and mechanical tripping speeds.

    b. Turn off the Relay Panel Inspection switch.

2. GOVERNOR AND CAR SAFETY OVERSPEED TEST - Put a full load in the car. Move the car to the top landing in preparation for overspeeding the car in the down direction.

    • Ensure that a jumper is still connected between terminals FBP1 and FBP2 on the IMC-RI board to bypass the drive safety functions.

    • Connect a jumper between terminals 2 and 16 on the HC-RB4 board to bypass the governor overspeed switch.

    • Connect a jumper between terminals 16 and 18 on the HC-RB4 board to bypass the car safety switch.

    a. Operate the car in the down direction on Automatic operation while increasing the PG parameter on the *Dynamic Parameter* screen from 1.0 to the point where the governor jaws drop and the car safety sets. Turn on the Relay Panel Inspection switch after the safety sets which is indicated by the drive sheave slipping under the hoist ropes. Check the hoist ropes to make sure they are in their proper grooves before attempting to move the car. Reset the governor jaws and governor overspeed switch. Remove the jumper connecting terminals 2 and 16. With flexible guide clamp safety, move the car on inspection in the up direction to release the safety. With wedge clamp safety, release the safety from inside the car. Once the safety has been released, remove the jumper connecting terminals 16 and 18. Move the car down on inspection to make sure the safety has completely released and returned to the normal position.

    b. Reset the PG parameter on the *Dynamic Parameter* screen to 1.0 and turn off the Relay Panel Inspection switch.

> **NOTE:** The method for testing a counterweight safety and governor, is similar except that the car is oversped in the up direction.

3. At the end of the buffer, governor and safety tests, disconnect all jumpers. If not proceeding immediately with steps 4.7.3 - 4.7.5, then perform the following tasks:

    a. Remove the jumpers connecting terminals FBP1 - FBP2 on the IMC-RI board.

    b. Since the normal terminal limit overspeed was bypassed for the buffer test, the safety processor in the IMC-DIO board must re-learn the speed at these switches. Perform procedure 4.6.

4.7.3 INSPECTION/LEVELING 150 FPM OVERSPEED TEST

For this test, refer to Section 4.4.2.

4.7.4 TACH ERROR

For this test, refer to Section 4.4.4.

4.7.5 NORMAL TERMINAL LIMIT SWITCH TEST

There are two different ways to accomplish this test. For buildings four stories or less, Procedure (a) must be used; otherwise, Procedure (b) is recommended.

1.   For this test, refer to Section 4.6 (8).

2.   This procedure will test terminal slowdown in both the up and down direction. For the up direction, move the car to the third landing from the bottom and remove any field wiring from terminals R0 through R5 and PR on the IMC-RI board. Next connect a jumper between the 2 Bus and R1 and PR. Enter a call at the top terminal landing and observe the slowdown. Remove any jumpers from R0 through R5 and PR and reconnect the field wiring for the binary floor code on the IMC-RI board. If the car ran through the floor, increase parameter FTR on the *Profile Parameter* screen and possibly parameter PADL on the *Gain Parameter* screen and repeat the test (Refer to section 4.6 (9) for the adjustment of these parameters). The car must stop at the terminal or lower landing. For the down direction, move the car to the third landing from the top and remove any field wiring from terminals R0 through R5 and PR. Next connect a jumper between the 2 Bus and the appropriate binary floor code terminals to generate the code for the second landing from the top (see Table 4.1 for a partial list of absolute floor code values). Enter a call at the bottom terminal landing and observe the slowdown. Parameters FTR and PADL may require readjustment. Repeat the down direction test until the car stops at the terminal or higher landing.

WARNING: Before the elevator can be turned over to normal use, it is important that no safety circuit is bypassed. The items to be checked are included, but are not limited to:

- Wire connected to panel mount terminal DCL.
- Wire connected to terminal 47 on the HC-RB4-x board.
- No jumper between 2 bus and terminal 36 on the HC-RB4-x board.
- No jumper between 2 bus and terminal 38 on the HC-RB4-x board.
- No jumper between 2 bus and panel mount terminal EPI (if present).
- No jumpers between terminals 2 and 16 (HC-RB4)
- No jumpers between terminal 8 and 10 (HC-RB4)
- No jumper between terminal 8 and 12 (HC-RB4)
- Level Down LD installed on terminal 25 (HC-RB4)
- INTB jumper on location NORM (IMC-RI)
- PG (pattern gain) on *Gain Parameter* screen set to 1.0
- All safety switches set to the off position.
- No jumper between FBP1 and FBP2 (IMC-RI)
- No jumpers on R0 - R5 and PR terminals (IMC-RI)
- LEARN SWITCH on the IMC-DIO set to off.

SECTION 5
ONBOARD DIAGNOSTICS

5.0   GENERAL INFORMATION

The IMC-MG traction controller includes user friendly diagnostic tools that help the mechanic install and service the equipment. The diagnostic tools available on the controller include the CRT terminal, the Enhanced Onboard Diagnostics (EOD), and IMC-DIO Onboard Diagnostics. The CRT terminal provides easy-to-use menus for adjusting, servicing and troubleshooting the controller. More information about the CRT is available from the MCE Computer Peripherals Manual and Section 3 of this manual. This section covers the Computer Swing Panel's Enhanced Onboard Diagnostics and the IMC-DIO Onboard Diagnostics.

5.1   ENHANCED ONBOARD DIAGNOSTICS (EOD) OVERVIEW

The Enhanced Onboard Diagnostic Indicators are on the Computer Swing Panel. A quick look at the switches and LEDs provides a complete overview of the elevator and its functions. Once familiar with the equipment, an elevator mechanic can understand the current operating conditions of the elevator car and diagnose a problem just by looking at the EOD. No external devices are require to view the status of elevator car operation and see what the elevator control system is actually trying to do.   The Enhanced Onboard Diagnostics (EOD) operates in three separate modes. These modes are Normal, Diagnostic and System. All three modes are discussed in detail in this section.

5.1.1   DESCRIPTION OF EOD LIGHTS AND SWITCHES

The Diagnostic Indicators and switches are located on the front, top and back of the Swing Panel (see Figure 5.1).

COMPUTER ON LED - The Computer ON LED , when it is ON continuously, indicates that the MC-MP-1ES or MC-MP2 Main Processor board is functioning normally and is completing its program loop successfully. If the Computer ON LED flashes ON and OFF, it means that the program is not looping successfully and the Main Processor board is malfunctioning. Check the EPROM chip to make sure it is installed properly. Refer to Appendix A, *Disassembling the Computer Swing Panel* and Appendix B, *Changing PC Boards, EPROMS or Microcontrollers.*

COMPUTER RESET BUTTON - Pressing the Computer RESET button on the front of the Swing Panel causes the MC-MP-1ES or MC-MP2 (Main Processor board), MC-CPA-1SL (Communication Processor board) and the IMC-DDP-x (Digital Drive Processor board) to reset. If the elevator is running, resetting drops the safety relay and brings the elevator to an immediate stop. The elevator then goes to the closest floor to correct its position before responding to any calls. Existing call and PI information is lost when the computer is reset.

Pressing the Computer RESET button turns the Computer ON light OFF and it will remain OFF while the RESET button is depressed. The Computer ON LED turns back ON when the RESET button is released. The MC-MP-1ES or MC-MP2 Main Processor board is also equipped with an auto reset feature that causes the elevator to go through a resetting process if, for any reason, the program loop cannot be completed. The computer will automatically reset and go back to normal operation, if the interference has not caused hardware damage, thereby preventing unnecessary trouble calls.

FIGURE 5.1   *Computer Swing Panel*
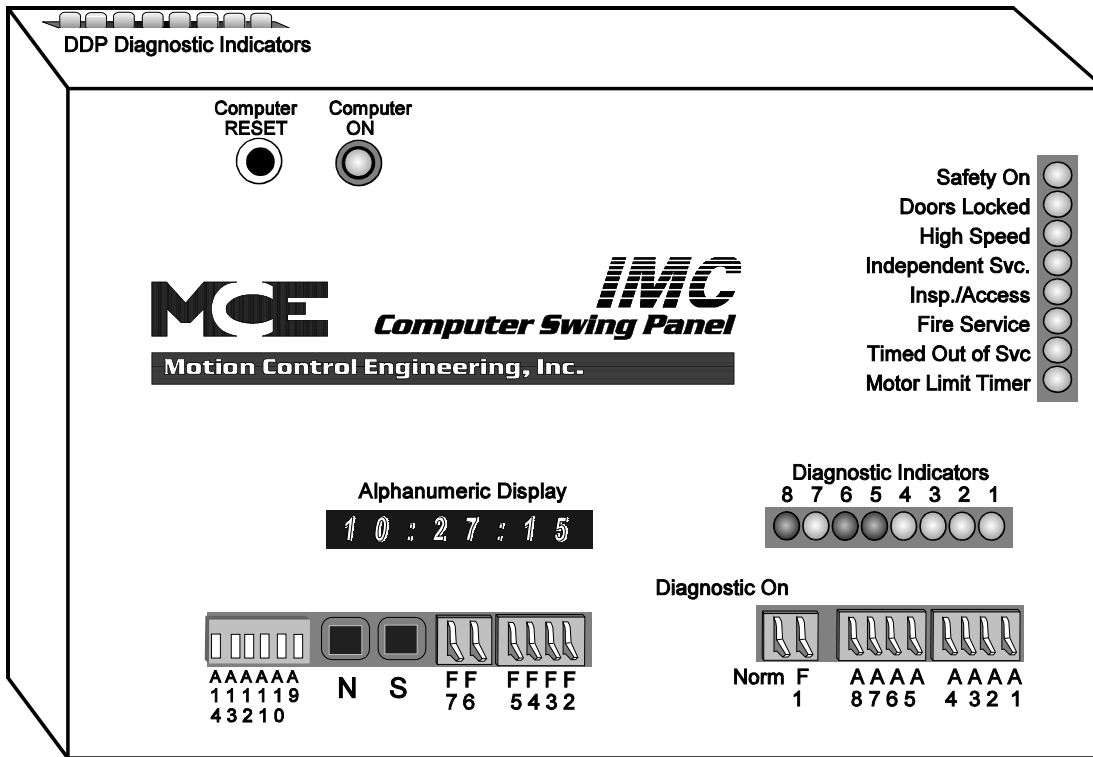
STATUS INDICATORS (vertical LEDs on the front of the Swing Panel) - These lights show the elevator's status. When on, they mean the following:

Safety On	- the safety circuit is closed.
Doors Locked	- the door lock contacts are closed.
High Speed	- speed and direction have been generated.
Independent Svc.	- the elevator is on Independent Service.
Insp./Access	- the elevator is on Hoistway Access, Car Top or Relay Panel Inspection operation.
Fire Service	- the elevator is on Fire Service operation.
Timed Out of Svc	- the TOS timer has elapsed.
Motor Limit Timer	- the Motor Limit Timer has elapsed.

DIAGNOSTIC INDICATORS - The eight horizontal diagnostic indicator lights (MP Diagnostic Indicators) have two functions. When in Normal mode, they indicate the current status or error condition (see Section 5.2.2) and when in Diagnostic mode, they indicate the contents of computer memory (see Section 5.4.1).

ALPHANUMERIC DISPLAY - The eight character alphanumeric display is used to provide user friendly interaction between the control equipment and the elevator mechanic by displaying alphanumeric messages (see Section 5.2.1).

ADDRESS SWITCHES (A1 - A8) - These switches enable the mechanic to look at the memory on the MC-MP-1ES or MC-MP2 Main Processor board (see Section 5.4.1) and IMC-DDP Digital Drive Processor board (see Section 5.4.2). They are also used for entering calls into the system (see Section 5.4.3). These switches are ON in the up position and OFF in the down position.

ADDRESS SWITCHES (A9 - A14) - These address switches are primarily used by MCE personnel for troubleshooting purposes only.

DIAGNOSTIC ON/NORMAL SWITCH - This switch puts the system into Diagnostic mode in the ON (up) position and in Normal mode in the NORM (down) position (see Section 5.4).

FUNCTION SWITCHES (F1 - F7) - These switches are used to access diagnostic information for viewing and changing settings in the Normal and System modes of operation (see Sections 5.2 and 5.3).

PUSHBUTTONS N AND S - These pushbuttons are used to scan through the choices available and to make selections when viewing and changing settings.

DDP DIAGNOSTIC INDICATORS - (row of eight LEDs on the top of the Swing Panel) The DDP Diagnostic Indicators have two functions. When in Diagnostic mode, they indicate the contents of the memory on the IMC-DDP-x board (see Section 5.4.2) and when in Normal mode, they indicate the prevailing status or error message related to the IMC-DDP-x Processor board (see Section 5.2.2).

DDP COMPUTER ON INDICATOR LIGHT - This light is located on the back of the Computer Swing Panel (Figure 5.2). When ON continuously, the DDP Computer ON light indicates that the IMC-DDP-x board is functioning normally and is completing its program loop successfully. If the DDP Computer ON light flashes ON and OFF, it means that the program is not looping successfully and the Processor board is malfunctioning. Check the EPROMs to make sure they are installed properly. Refer to Appendix A, *Disassembling the Computer Swing Panel* and Appendix B, *Changing PC Boards, EPROMS or Microcontrollers*.

DDP RESET BUTTON - Pressing the DDP RESET button, on the back of the Swing Panel, causes the IMC-DDP-x Processor board to reset. It drops the rotating equipment voltages and the brake, and opens the safety string. Do not reset the IMC-DDP-x Processor board while the car is in motion.

Resetting the IMC-DDP-x, turns the DDP Computer ON light OFF and it will remain OFF while the DDP RESET button is depressed. The IMC-DDP-x Processor board is also equipped with an auto reset feature that causes the IMC-DDP-x board to go through the reset process if, for any reason, the program loop cannot be completed. This prevents unnecessary trouble calls if the problem has not caused hardware damage. The auto reset process causes the DDP Computer ON light to turn OFF for a brief period while the auto reset takes place.

FIGURE 5.2   Computer Swing Panel (Back Plate)
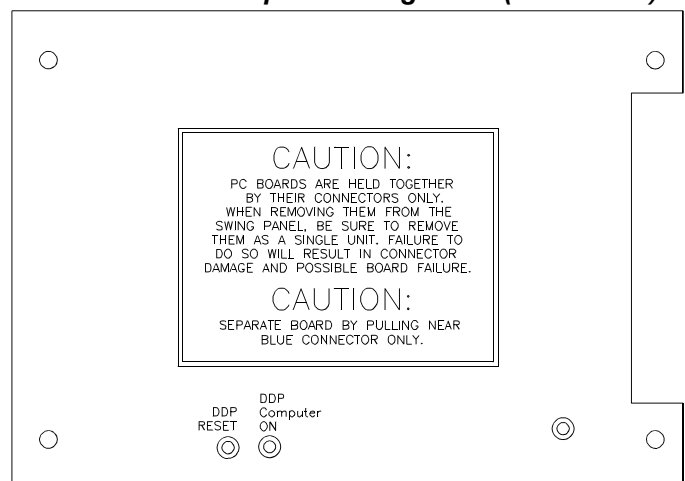
CP COMPUTER ON INDICATOR LIGHT - The Computer ON LED indicates that the MC-CPA-1SL processor is functioning normally and is completing its program loop successfully. The MC-CPA-1SL processor is equipped with an auto reset feature that will cause the elevator to go through a resetting process if, for any reason, the program loop cannot be completed. To find this LED, look through the cut out on the right-hand side of the Swing Panel between the MC-CPA-1SL and IMC-DDP-x boards.

5.2 NORMAL MODE (EOD)

The following is a description of the indicators and switches used in Normal mode, and the settings which can be viewed and changed. Begin with all switches in the OFF (down) position as shown in Figure 5.1. Specifically, the Diagnostic On/Norm and the F7 switches *must* be in the down position. In the Normal Mode, the F2, F4 and F5 switches are used to access and set the following:

- F2 - Adjustment of Elevator Timers (see Section 5.2.3)
- F4 - Setting the Real Time Clock (see Section 5.2.4)
- F5 - Viewing the MP Computer Variable Flags (see Section 5.2.5)
- F2 thru F7 - Resetting the MC-CGP parameters (see Section 5.2.6)

5.2.1 ALPHANUMERIC DISPLAY (DEFAULT DISPLAYS)

NOTE: Upon power up, controllers with the MC-MP2 board scroll the message *MP2 VERSION NUMBER: 8.xx.xx* across the alphanumeric display. If the message *PASSCODE REQUEST...* is then scrolled across the display, refer to Section 5.3.7 *Setting and Resetting the Passcode Option*.

The alphanumeric display is used for a number of special diagnostic functions that are available on the controller. Depending on the configuration of the control system, the available displays include the following:
- scrolling status and error messages
- temperature (Celsius)
- temperature (Fahrenheit)
- measured load
- trip counter
- software versions
- time of day

To scroll through the available displays (change what is currently being displayed on the alphanumeric display), press and hold the N push-button.

STATUS AND ERROR MESSAGES - On controllers with the MC-MP2 Main Processor board, status and error messages are scrolled across the alphanumeric display. The message

```
N O R M A L   O P
```

NORMAL OPERATION is scrolled when no other status or error condition(s) exist. Table 6.15 *Status and Error Messages* provides a list of scrolling messages including descriptions and troubleshooting information.

Note that at any time, more than one status or error condition may exist. But the Alphanumeric Display can show only one message at a time. The message considered to be of highest priority will be displayed first. For example, if the car is on Independent Service *and* the safety circuit is open, the display will scroll SAFETY CIRCUIT IS OPEN. Once the problem with the safety circuit is corrected, the display will scroll the message INDEPENDENT SERVICE OPERATION. When Independent Service is turned OFF, NORMAL OPERATION will again be displayed.

TEMPERATURE (CELSIUS) - This mode displays the temperature in degrees Celsius. This mode is available only if the controller has been configured with the ability to connect a temperature sensor. In the examples, 45C represents 45° Celsius and -15C represents -15° Celsius.

```
T M P =     4 5 C
```

```
T M P = - 1 5 C
```

TEMPERATURE (FAHRENHEIT) - This mode displays the temperature in degrees Fahrenheit. This mode is available only if the controller has been configured with the ability to connect a temperature sensor. In the examples, 104F represent 104° Fahrenheit and -27F represents -27° Fahrenheit.

```
T M P = 1 0 4 F
```

```
T M P = - 2 7 F
```

```
L W =    1 0 0 %
```

MEASURED LOAD - This feature is only available for controllers that use an analog load sensing device (load weigher). In the example on the right, the measured value is 100% of the learned value. If the load weigher learn process has not yet been successfully performed, the measured load will not be displayed; the computer has no reference values from which to calculate the load. Instead, the following status message will be displayed: **LOAD WEIGHER NOT YET LEARNED**.

TRIP COUNTER - This mode provides the ability to view and/or reset a six-figure trip counter. The trip counter records the number of high speed runs made by the elevator since the last time the counter was reset to zero. The example on the right indicates that the car has made two thousand runs since the counter was last reset.

```
T = 0 0 2 0 0 0
```

RESETTING THE TRIP COUNTER - The trip counter may be reset to zero by pressing and holding the S pushbutton while the trip counter is displayed. Once the S pushbutton is pressed, the alphanumeric display will display **CLEAR: 5**, indicating that the counter will be cleared in five seconds. If the button is held for five seconds, the timer will count down from five to zero and the counter will be reset to zero. The five-second delay is provided to prevent an accidental reset of the counter. Once cleared, the counter will display the value zero.

```
T = 0 0 0 0 0 0
```

SOFTWARE VERSIONS - On local car controllers the version number of the MP Main Processor and CGP Communication Processor software are displayed. The following messages are scrolled across the alphanumeric display:

MP VERSION NUMBER:	X.XX.XX	(X.XX.XX is the version number)
CGP VERSION NUMBER:	X.XX.XX	(X.XX.XX is the version number)
DDP VERSION NUMBER:	X.XX.XX	(X.XX.XX is the version number)

TIME OF DAY - This mode displays the time of day in a 24-hour military format (hours, minutes and seconds). Refer to Section 5.2.4 to change or adjust the time. The example shown on the right represents the time 1:30 p.m.

```
1 3 : 3 0 : 0 0
```

5.2.2 DIAGNOSTIC INDICATORS

The Diagnostic Indicators are located on the front of the Computer Swing Panel.
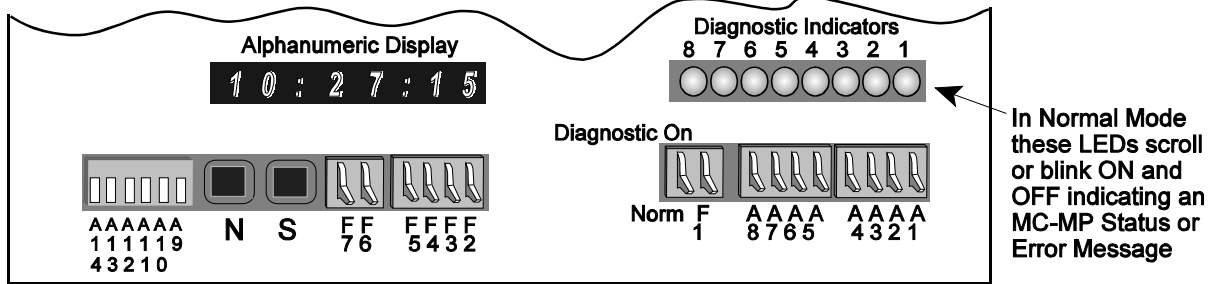
During normal operation these lights scan from right to left (indicating that the MP program is looping properly) or flash ON and OFF to indicate an error or status condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

MC-MP-1ES DIAGNOSTIC INDICATORS - When troubleshooting, pay special attention to these indicators. The diagnostic indicators flash ON and OFF to indicate a status or error message which often points to the source of a problem. Table 6.13 provides a listing of the MC-MP-1ES Status and Error Messages, and Table 6.15 *Status and Error Messages* provides a description and troubleshooting tips.

Note that at any moment, more than one error or status condition may exist, but the Diagnostic Indicators can display only one message at a time. The message considered to be of highest priority will be displayed first. For example, if the car is on Independent Service *and* the safety string is open, all the lights will flash, indicating that the safety string is open. Once the problem with the safety string is corrected, the Diagnostic Indicators will flash the message for Independent Service. When Independent Service is turned OFF, the Diagnostic Indicators will scan normally.

MC-MP2 DIAGNOSTIC INDICATORS - During normal operation these lights scan from right to left (indicating that the MP2 program is looping properly) or flash ON and OFF to indicate a status or error condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

When a status or error condition exists, the Diagnostic Indicators flash one of several messages depending on the software version (MP2 version number scrolls on boot up):

- Software versions 8.02.00 or earlier flash the MC-MP-1ES messages (see Table 6.13).
- Software version 8.03.00 flashes CC Hex.
- Software versions 8.04.00 or later flash 66 Hex.

If the scrolling status or error message is not immediately displayed, press the N pushbutton until the scrolling message appears (see Section 5.2.1 ALPHANUMERIC DISPLAY - STATUS AND ERROR MESSAGES).

DDP DIAGNOSTIC INDICATORS - located on top of the Computer Swing Panel. In Normal Mode these indicators scan from right to left (indicating that the DDP program is looping properly) or flash ON and OFF to indicate an error or status condition. When troubleshooting, pay special attention to these indicators, as they will often point to the source of the problem. Table 6.14 provides a complete listing of the IMC-DDP Status and Error Messages and Table 6.15 Status and Error Messages in the Troubleshooting Section provides a description of the cause and troubleshooting tips.

In Normal Mode these LEDs scroll or blink ON and OFF indicating an IMC-DDP-C Status or Error Mesage

DDP Diagnostic Indicators

Computer RESET   Computer ON
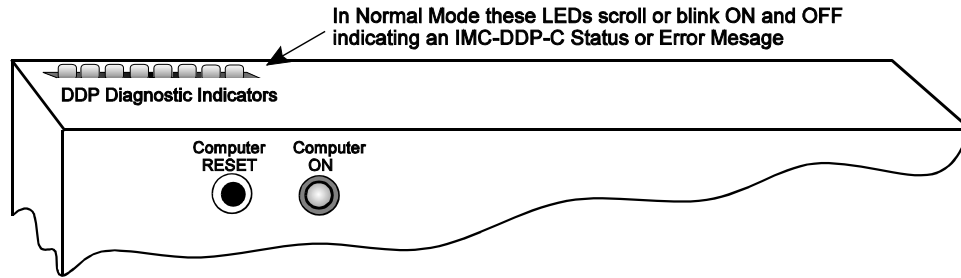
5.2.3 ADJUSTMENT OF THE ELEVATOR TIMERS

To view or adjust the elevator timing functions, set the switches as shown. When the F2 switch is ON the timer settings are displayed and the values can be changed.
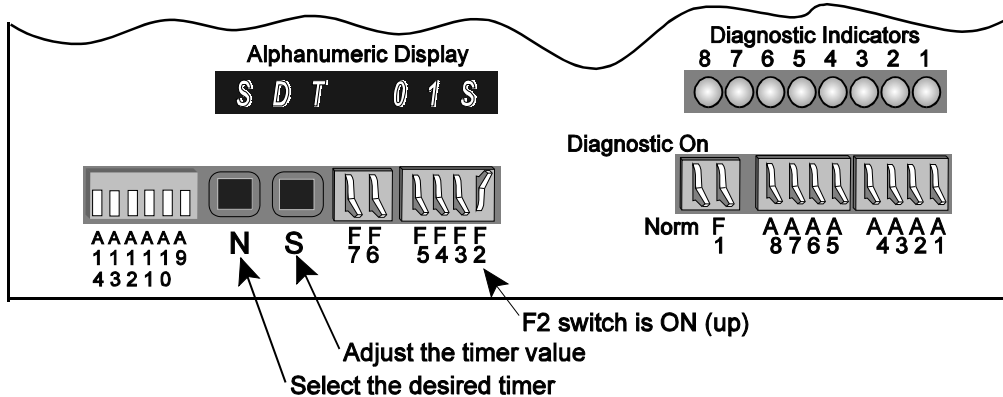
For example, when the F2 switch is turned ON, the display reads **SDT 01S**. SDT is the flag for Short Door Dwell Timer. The number (01S) means that the Short Door Dwell Timer has been set for 01 second. If the value had been in minutes, the last letter displayed would be M instead of S. Pressing the N pushbutton (for next) advances the display to the next available programmable timer. Constant pressure on the N pushbutton causes the display to scroll through all the available programmable timers. Table 5.1 provides a listing of the programmable timers and their ranges.

Once a programmable timer has been selected using the N pushbutton, the timer can be adjusted to a desired value by using the S (for select) pushbutton. The adjustment range for each timer is pre-set (see Table 5.1). Constant pressure on the S pushbutton increases the timer value by one (second or minute) and causes the display to flash until the value reaches the upper limit, at which point it automatically starts over from the lower limit. When the A1 switch is placed in the ON (Up) position, pressing the S pushbutton causes the timer value to decrease. Release the S pushbutton when the desired value is displayed. When the S pushbutton is released, the display flashes for three seconds. After the display stops flashing, the new timer value has replaced the old value.

> **NOTE:** Timers listed in Table 5.1 are not included if the corresponding inputs/outputs/options are not available on your controller.

*TABLE 5.1   Timers and their Ranges**

TIMER	DESCRIPTION	TIMER RANGE
ADAC	**ADA Car Call Door Dwell Timer.** This timer provides the minimum door dwell time when responding to a car call, as required by the ADA. This timer is not shortened by the activation of a button or door reopening device.	01-120 seconds
ADAH	**ADA Hall Call Door Dwell Timer.** This timer provides the minimum door dwell time when responding to a hall call, as required by the ADA. This timer is not shortened by the activation of a button or door reopening device.	01-120 seconds
ASTP	**Automatic Stop Door Dwell Timer.** This timer defines the amount of time the doors will stay open when the car has performed an "automatic stop". This timer will only appear if the controller software has been configured to perform the "auto stop" function.	01-30 seconds
CCT	**Car Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to a car call.	01-120 seconds
DRBZ	**Door Buzzer Timer.** This timer indicates the length of time that the door buzzer output should be active before door closing is initiated.	0-30 seconds
DHLD	**Door Hold Timer.** This timer defines the amount of time the doors will stay open when the door hold button is pressed. This timer will only appear if the controller has been configured with a door hold button (DHLD input).	01-240 seconds
FLO	**Fan and Light Output Timer.** This timer defines the amount of time that the fan and light output (FLO) will keep the car fan and lights operative in the absence of demand on the car. This timer will only appear if the controller has been configured with a fan and light output (FLO output).	01-25 minutes
HCT	**Hall Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to a hall call.	01-120 seconds
HOS2	**In-car Hospital Service Timer.** This timer defines the amount of time that the car will remain at a floor in response to a hospital emergency call. If the timer elapses before the car is placed into "in-car hospital service", the car will revert back to normal operation. This timer will only appear if the controller has been configured with hospital emergency service.	01-120 seconds
IDLE	**Idle Demand Timer.** This timer defines the amount of time that will pass before an idle car is automatically moved to the next floor. This feature is useful in applications in which it is desirable to lubricate the bearings and/or exercise the brake mechanism periodically to prevent friction at initial car movement. This timer may be turned OFF to disable this function.	01-60 minutes
LOT	**Lobby Call Door Dwell Timer.** This timer provides the door dwell time when the car is responding to either a car call or a hall call at the lobby landing (as specified by the adjustable control variable "LBBY").	01-120 seconds
MBWR	**Motor Blower Output.** This timer defines the amount of time that the Motor Blower output (MBWR) stays on after the car has stopped running.	01 - 26 minutes
MGT	**Motor Generator Shut Down Timer.** This timer defines the amount of time that will pass before the motor generator is turned OFF on a car that is idle.	01-10 minutes
PHEB	**Photo Eye Bypass Timer.** This timer defines the amount of time that will pass before an active optical door reopening device is ignored and/or nudging is activated. The computer monitors the PHE input for continuous activation and, should the PHE input remain active for the amount of time defined by the PHEB timer, the PHE input is ignored and/or nudging operation invoked (depending upon the controller configuration).	01-240 seconds
PRIS	**In-car Priority Service Phase II Timer.** This timer defines the amount of time that the car will remain at a floor in response to a Priority Service call. If the timer elapses before the car is placed into "In-car Priority Service", the car will revert back to normal operation. This timer will only appear if the controller has been configured with In-car Priority Service.	01-120 seconds

TABLE 5.1   *Timers and their Ranges**

TIMER	DESCRIPTION	TIMER RANGE
PRKD	**Parking Delay Timer.** This timer represents the amount of time that will pass before an idle car will park at the specified parking floor (if applicable).	01-120 seconds
SDT	**Short Door Dwell Timer.** This timer defines the door dwell time that will be provided when a door reopening device has been activated.	01-120 seconds
SEPT	**Mechanical Safety Edge Protection Timer.** This timer defines the amount of time that will pass before an active mechanical safety edge is ignored and/or nudging is activated. If a mechanical safety edge is used (as specified by the adjustable control variable MSAF), the computer monitors the SE input for continuous activation and, should the SE input remain active for the amount of time defined by the SEPT timer, the SE input is ignored and/or nudging operation invoked (if applicable).	01-240 seconds
TOS	**Time Out of Service Timer.** This timer is used to determine that a car has been prevented from responding to a car or hall call demand. Once this timer elapses, the car's "in service" status is removed to allow hall calls assigned to the car to be reassigned to another car.	15-240 seconds

Some timers are not included if the corresponding inputs/outputs are not programmed.

5.2.4   SETTING THE REAL TIME CLOCK

To adjust the real time clock, set the switches as shown. The F4 function switch is used to access the clock parameters located on the MC-MP-1ES or MC-MP2 board.
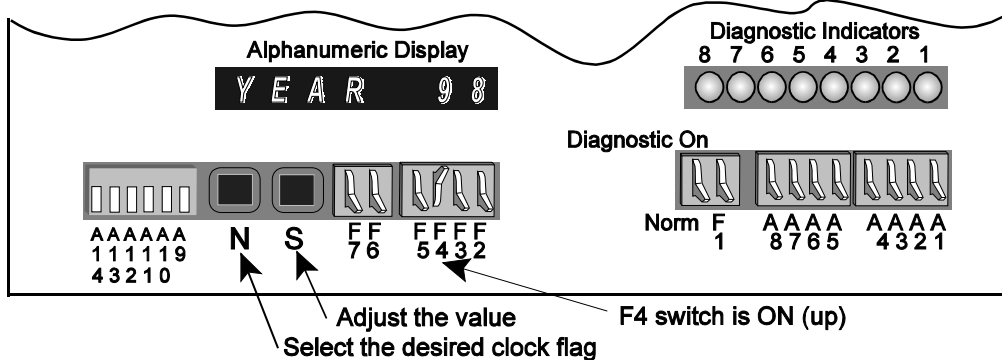
Turning the F4 switch ON causes the alphanumeric display to show the current year. Table 5.2 lists all the adjustable clock parameters and their adjustment ranges.

TABLE 5.2   *Clock Parameters and Ranges*

Parameter	Range	Parameter	Range
YEAR	00 - 99	DATE	01 - 31
MONTH	01 - 12	HOUR	00 - 23
DAY	MON. - SUN.	MIN (MINUTE)	00 - 59

Press the N pushbutton to select the next parameter. Constant pressure on the N pushbutton causes the display to scroll through all of the real time clock parameters. Once a parameter has been selected, the value can be changed by pressing the S pushbutton. Constant pressure on the S pushbutton increases the value by one, until the value reaches the upper limit, at which point it automatically starts over from the lower limit. Release the S pushbutton when the desired value is displayed. The new value is saved immediately. Return the F4 switch to the OFF (down) position to exit the clock parameter adjustment menu.

5.2.5 ALPHANUMERIC DISPLAY - VIEWING THE MP /MP2 INTERNAL FLAGS / INPUTS

This function is used to display the status of many of the input/output and internally generated flags related to the MC-MP-1ES or MC-MP2 computer. To access these flags, set the switches as shown.
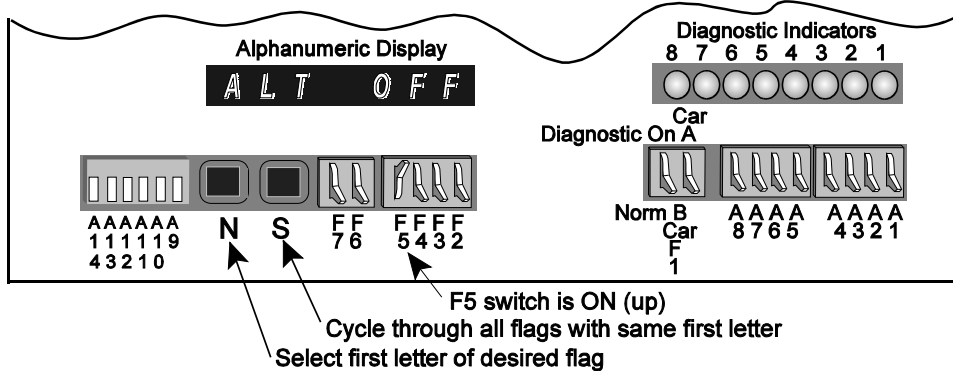
MC-MP-1ES Flags - With the MC-MP-1ES software, after moving the F5 switch to the ON (up) position, the alphanumeric display shows the last selected flag and status, in this case ALT OFF. The first word (ALT) is the abbreviated name for the Alternate Service flag. The second word (OFF) is the status of the flag. For a listing of these flags, see Table 5.8.

To select a flag, press the **N** pushbutton until the first letter of the flag displayed is the same as the first letter of the desired flag. Release the **N** pushbutton and press the **S** pushbutton until the desired flag is displayed. The flag's current status, ON or OFF, is displayed.

MC-MP2 Flags - With the MC-MP2 software, after moving the F5 switch to the ON position, the alphanumeric display scrolls the message **FLAGS STATUS...** and then displays abbreviation and status of the first available flag beginning with the letter A.
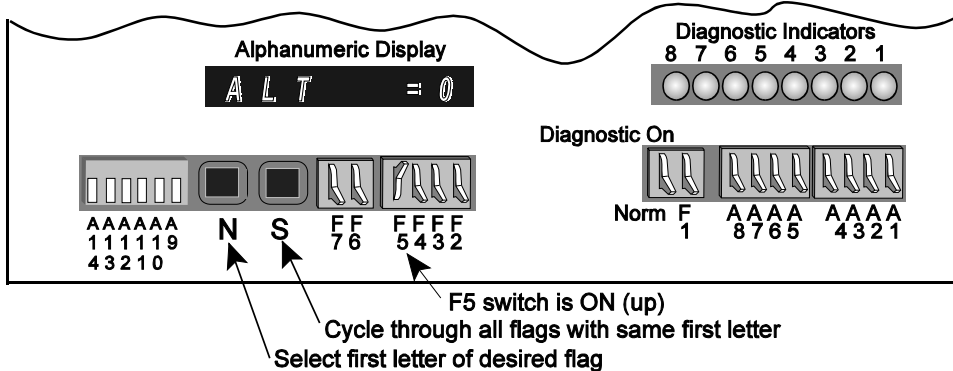
Table 5.8 provides a listing of the available flags. To select a flag, press the **N** pushbutton until the first letter of the flag displayed is the same as the first letter of the desired flag. Release the **N** pushbutton and press the **S** pushbutton until the desired flag is displayed. The flag's abbreviation and current status is displayed (0 = OFF, 1 = ON).

MC-MP2 Inputs - With the MC-MP2 software the status of many system inputs may be viewed on the alphanumeric display. To view the inputs, the F5 switch plus various additional switches must be placed in the ON (up) position as follows:
- F5, A9   HC-PIO board inputs
- F5, A10   HC-RD board inputs
- F5, A9, A10   HC-IOX / HC-I4O board inputs
- F5, A11   HC-CIO board inputs
- F5, A9, A11   MC-NC board inputs

Press the **N** pushbutton to scroll through the inputs available for this job. They are displayed in the order they are arranged on the board. The abbreviation and status of each input is displayed (0 = OFF, 1 = ON).

5.3 SYSTEM MODE (EOD)

The System Mode provides a level of security (if programmed) so that an unauthorized person cannot modify or change the system parameters either intentionally or by mistake. To enter the System Mode, set the switches as shown.

Computer RESET
Computer ON

Safety On
Doors Locked
High Speed
Independent Svc.
Insp./Access
Fire Service
Timed Out of Svc
Motor Limit Timer

Status Indicators scan from bottom to top when in System Mode

IMC
Computer Swing Panel
MCE
Motion Control Engineering, Inc.

Alphanumeric Display

P A S S W O R D

Diagnostic Indicators
8 7 6 5 4 3 2 1

Diagnostic On

A A A A A A
1 1 1 1 1 9
4 3 2 1 0
N   S   F F   F F F F
7 6   5 4 3 2

Norm F   A A A A   A A A A
      1   8 7 6 5   4 3 2 1

F7 switch is ON (up)   Set A1 - A8 to Password value

With the F7 switch in the ON position, the alphanumeric display shows **PASSWORD**. Set the A1 - A8 switches to the password value. If no password has been programmed for this job (which is normally the case), set A1 - A8 to OFF (down).

Alphanumeric Display

✳ S Y S T E M ✳

Diagnostic Indicators
8 7 6 5 4 3 2 1

Diagnostic On

A A A A A A
1 1 1 1 1 9
4 3 2 1 0
N   S   F F   F F F F
7 6   5 4 3 2

Norm F   A A A A   A A A A
      1   8 7 6 5   4 3 2 1

F7 switch is ON (up)
Press S for ½ second
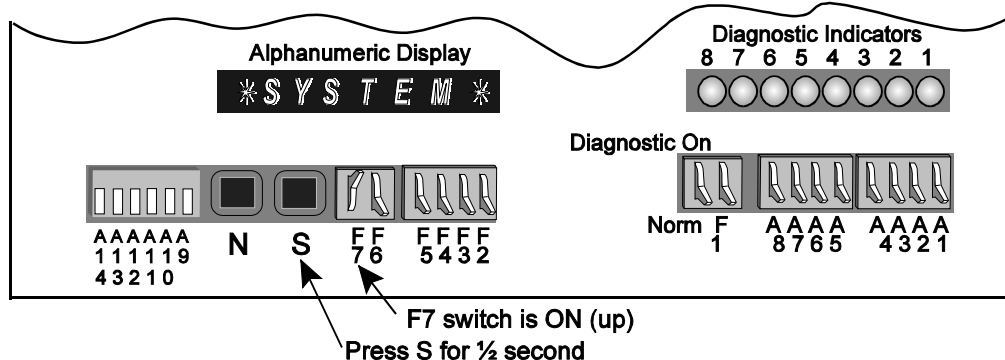
Press the **S** pushbutton for ½ second. The alphanumeric display changes to **SYSTEM**. While in System Mode, the group of eight vertical status LEDs scan from bottom to top indicating that System Mode is active. If no function switch is moved or pushbutton is pressed for a period of two minutes, the computer will automatically exit from System Mode and go into the Normal Mode of operation. Placing the F7 switch in the OFF (down) position also causes the EOD to exit the System Mode.

In System Mode, the Function Keys are used to access and set the following system parameters:

- F1 - Communication Port Settings (see Section 5.3.1)
- F2 - Internal use only
- F3 - Security Codes (see Section 5.3.2)
- F4 - Hoistway Learn Operation (see Section 5.3.3)
- F5 - MSK: Master Software Key (Simplex only) (see Section 5.3.4)
- F6 - Software Options - adjustable control variables (see Section 5.3.5)
- F7 - Turns System Mode ON and OFF
- Diagnostic On/Norm - Load Weigher Learn Operation (see Section 5.3.6)
- A8 Setting and Resetting the Passcode Option (see Section 5.3.7)

5.3.1 PROGRAMMING THE COMMUNICATION PORTS

The communication ports are field programmable through the Computer Swing Panel's Enhanced Onboard Diagnostics (EOD). Instructions for connecting to a COM Port on the MC-MRS board and setting up the CRT terminal or terminal emulator are provided in Appendix P, *CRT Terminal and Terminal Emulator Setup*.

The communication ports were programmed (at the factory) for the original hardware, based on customer-provided information. It may be necessary to reprogram a communication port when changing from a monochrome to a color CRT, adding a lobby CRT or CRT with keyboard or adding a modem. The new hardware will not work correctly until the communication port is reprogrammed.

To reconfigure the communication port, enter the System Mode as described at the beginning of Section 5.3 and set the switches as shown.
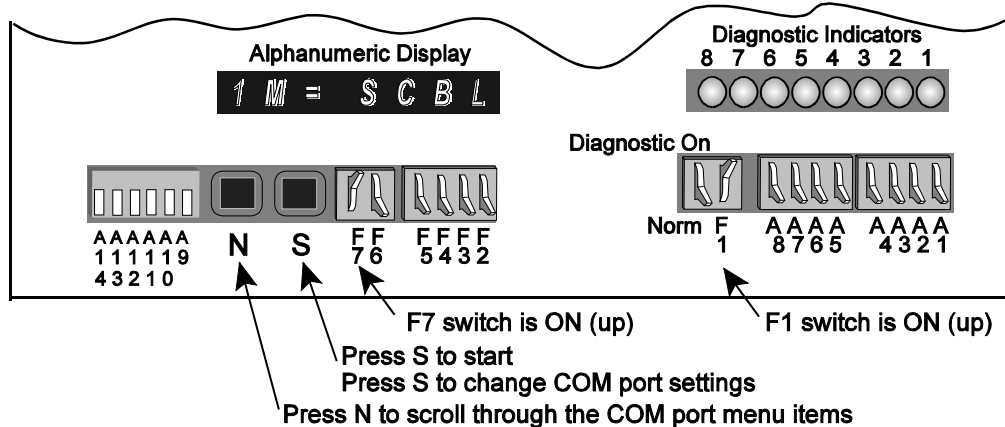
When the F1 switch is placed in the ON (up) position, the alphanumeric display shows the following scrolling message: **COMPORT MENU PRESS S TO START**. Press the **S** pushbutton for ½ second and the display will show the current setting for the first item on the COM port menu, in this case **1M=SCBL**. The *1M* stands for *COM Port 1 Media* and *SCBL* stands for *Serial Cable* (see Tables 5.3 and 5.4) To change a communication port setting, press the **N** pushbutton to scroll through the Communication Port Menu until the desired item is shown on the alphanumeric display. Table 5.3 lists the items on the COM port menu.

CHANGING THE MEDIA SETTING - To change the *media* setting for COM Port #2, press the **N** pushbutton to scroll through the items on the Communication Port Menu (see Table 5.3) and release N when **2M** is displayed. Then press the **S** pushbutton to scroll through the Media Menu

(see Table 5.4). Release S when the desired media is displayed. After selecting the desired media, press N to again scroll through the Communication Port Menu.

CHANGING THE DEVICE SETTING - To change the *device* setting for COM Port #2, press the **N** pushbutton to scroll through the Communication Port Menu and release N when **2D** is displayed. Then press the **S** pushbutton to scroll through the Device Menu (see Table 5.5). Release S when the desired device is displayed. After selecting the desired device, press N to again scroll through the Communication Port Menu.

SAVING THE CHANGES - When you have finished making changes, press the N pushbutton until, **SAVE?N/S** is displayed. Pressing **S** will save the changes and **SAVED...** will be displayed. If **N** is pressed the program will continue to scroll through the Communication Port Menu. To exit the Communication Port Menu, place the F1 switch in the OFF (down) position. If you exit the Communication Port Menu without choosing SAVE?N/S and pressing S, any changes made to settings will be ignored.

TABLE 5.3   *Communication Port Menu*

EOD Display	Description
NO COM	No COM port option has been enabled
1M	COM Port 1 Media
1D	COM Port 1 Device
2M	COM Port 2 Media
2D	COM Port 2 Device
3M	COM Port 3 Media
3D	COM Port 3 Device
4M	COM Port 4 Media
4D	COM Port 4 Device
SAVE?N/S	Save the changes? N for no or continue, S for save

TABLE 5.4   *Media Menu*

EOD Display	Description
NONE	NO MEDIA - Select when removing a computer terminal from a port.
SCBL	SERIAL CABLE - Select when setting up a CRT/terminal with a keyboard.
LDRV	LINE DRIVER - Used when setting up a CRT at a distance over 40 feet.
MODM	MODEM - Select when attaching a modem to a computer.

TABLE 5.5   *Device Menu*

EOD Display	Description
NONE	No Device
CRTMK	Use for these terminals or emulators with keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
CRTM	Use for these terminals or emulators without keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
PC	Personal Computer with CMS / MSD
PCGD	Personal Computer Graphic Display (no longer used)
CRTCK	Use for these terminals with keyboard (Link MC-70, Wyse WY-370)
CRTC	Use for these terminals without keyboard (Link MC-70, Wyse WY-370)

5.3.2 VIEWING AND CHANGING THE SECURITY CODES

For jobs with the MCE SECURITY, either Basic Security or Basic Security with CRT Option, this function allows the security codes to be viewed or changed. If the job does not have MCE SECURITY, the alphanumeric display will show **NOT USED**.

With MCE's Basic Security, the Building Security Input (BSI) is used to turn security ON and OFF. Refer to the job prints to find the BSI input. When *Security* is ON, all car calls are screened by the computer and become registered only if: (1) the call is to a floor that is not a secured floor, or (2) the floor is a secured floor and its Security Code is correctly entered within 10 seconds.

With MCE's Basic Security with CRT Option, additional programming options are available via the CRT terminal. Refer to MCE's Elevator Security User's Guide, part # 42-02-S024, for additional information and programming instructions. For both Basic Security and Basic Security with CRT Option, the security codes for each floor are programmed as described below.

The Security Codes are viewed and changed using the Computer Swing Panel. To view and change the security codes, place the F3 Switch in the *On* or up position while in "System" mode. Not all elevator systems are equipped with the SECURITY option. If the system does not have Basic Security, the Alphanumeric Display will show *NOT USED* when the F3 switch is turned On.
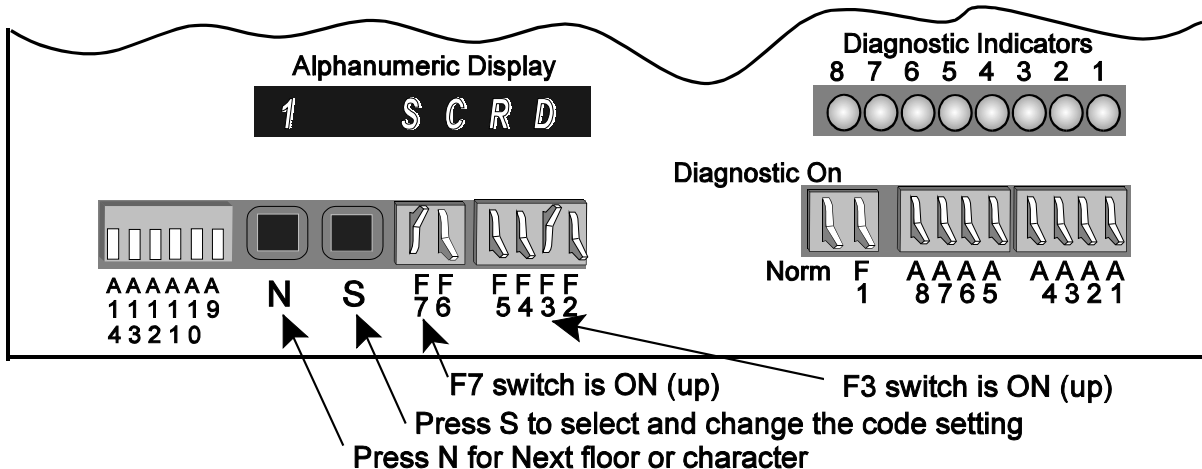
The security code for each floor may consist of from one to eight characters, where each character is one of the floor buttons found in the elevator car. Each floor may have a different length code. Table 5.6, *Changing Floor Security Status and Security Code*, describes the steps required to view and change a floor's security code. **A floor cannot be Secured unless a Security Code has been programed.**

The Appendix, *Security Information and Operation* in the Elevator Security User's Guide, provides instructions for elevator passengers who will be using the elevator while Security is ON. Space has been provided for listing the security codes for each floor.

TABLE 5.6   *Changing the Floor Security Status and Security Code*

Switch	Explanation	Alphanumeric Display
Step 1 **F3** switch **ON** (up)	**To begin, display the 1st floor's status** While in the *System* mode, turn function switch F3 ON (up).	**Example:** `B    N S C R` B = basement NSCR = not secured
Step 2 **Press N**	**To display another floor's security status** Steps to the next floor's security status. Press N again for the next floor, etc.	**Example:** `1    S C R D` 1 = floor #1 SCRD = secured
Step 3 **Press S**	**To select a floor to view or change a code** With the floor's security status displayed, press S. The first character of the floor's security code is then displayed.	**Example:** `2    1 = 3` For floor 2, the first character in the code is 3.
Step 4 **Press S**	**To change a code character** Steps through the available code characters. When the desired character is displayed, go to Step 5.	**Example :** `2    1 = 5` For floor 2, the first security character is now 5.
Step 5 **Press N**	**To display the next code character** Steps to the next character in the code. To change more characters, repeat steps 4 and 5. The last character of a code must be the word END if the code is less than eight characters long.	**Example 1:** `2    2 = 4` For floor 2, the second character in the code is 4. **Example 2:** `2    1 = E N D` For floor 2, the first character in the security code is the word END. Floor 2 is unsecured.
Step 6 **Press N**	**To end and save** If END is chosen as a code character or if this is the eighth character, when N is pressed the computer saves the code and displays the current floor's security status. To view or change the code for another floor, return to step 2.	**Example :** `2    N S C R` If END was chosen for first character, this floor has no security code and is unsecured. Using END for any other character just ends that code, but the floor is still secured.
F3 and F7 switches OFF, down position	**To exit System mode** Every security code must end with the word END or be 8 characters long. If not, the processor remains in System mode.	**Example:** `1 1 : 0 4 : 2 7` The time displayed

5.3.3 HOISTWAY LEARN OPERATION

Since the IMC-SCR traction controller operates under the assumption that its computer knows the exact floor and car positions in the hoistway, the IMC-SCR processors must learn the building before an attempt is made to run the car in any way other than Inspection operation. This section describes how to put the system on Learn operation. For details on performing the learn operation see Section 4.1, Learning the Building Floor Heights.

To place the car on Learn operation, log into System Mode as described at the beginning of Section 5.3 and then place the F4 switch in the ON (Up) position. Once on Learn operation, the alphanumeric display, the Diagnostic Indicators on the front of the Swing Panel, and the DDP Diagnostic Indicators on the top of the Swing Panel display specific messages as described below. The rest of the indicators and switches are not used in this mode.

Alphanumeric Display - While on Learn operation the alphanumeric display indicates the Learn operation status by displaying the following messages:

LRN ERR	-	learn error
LN READY	-	learn ready
LEARNING	-	learning
LEARNED	-	learn complete

Diagnostic Indicators - When **LEARNING** appears on the alphanumeric display, the DDP Diagnostic Indicators on the top of the Computer Swing Panel will flash to indicate that the IMC-DDP-x computer is on a learn run. The Diagnostic Indicators on the front of the Computer Swing Panel will flash to indicate any setup errors or the Alphanumeric Display will scroll a message.

5.3.4 SETTING MSK: MASTER SOFTWARE KEY

On a simplex car, the Master Software Key is used in conjunction with the Basic Security with CRT Option or Access Control for Elevators (ACE) Security. To view or change MSK, log into System Mode as described at the beginning of Section 5.3 and then place the F5 switch in the ON (up) position. If this is not a simplex car or if this job does not have the Basic Security with CRT Option or ACE Security enabled, the alphanumeric display will show NOT USED. Additional information about the Master Software Key (MSK) can be found in the Elevator Security Users Guide (MCE part # 42-02-S024).

5.3.5 SETTING THE SOFTWARE OPTIONS - ADJUSTABLE CONTROL VARIABLES

Table 5.7 provides a listing of the software options - adjustable control variables. Not all of the options are available on all controllers. To view or set the adjustable control variables, log into System Mode as described at the beginning of Section 5.3 and place the F6 switch in the ON (up) position.

The first available variable will be shown on the display. Press the **S** pushbutton to change the setting. Press the **N** pushbutton to scroll to the next available variable. Table 5.7 lists the variables in alphabetic order, not in the order in which they are displayed on the controller.

TABLE 5.7 *Software Options*

VARIABLE	NAME	DEFINITION
AFR	*Alternate Fire Floor Recall*	Determines the designated recall floor for alternate Fire Service Operation.
AFR2	*Second Alternate Fire Floor Recall*	Determines the designated recall floor for the second alternate Fire Service operation (Detroit Fire code).
AGNG	*Alternate Gong Option*	Causes an arrival lantern to be illuminated whenever the car's doors are open at a non-lobby landing. In the absence of actual call demand, the direction selected is a reflection of the car's last direction of travel. If the car is located at a terminal landing, the appropriate lantern will be illuminated.
APP1	*Alternate Primary (lower) Parking Floor*	When ON, the car will no longer park at the original parking floor (PPF). Instead the car will park at the first alternate parking floor specified by the landing stored in this variable.
APP2	*Alternate Primary (lower) Parking Floor #2*	When ON, the car will no longer park at the original parking floor (PPF). Instead the car will park at the second alternate parking floor specified by the landing stored in this variable.
CCBC	*Cancel Car Call Behind Car Option*	If ON, and if the car has a direction arrow (SUA/SDA), no car calls can be registered behind the car's current position. For example, if a car is at the fifth floor, moving down, then no car calls can be registered for any floors above the fifth floor.
CNID	Car Network ID	The Car Network ID identifies each local car controller to the Group Supervisor for communication purposes. With the latest MP Software versions, this parameter may now be set using this software variable, as well as via the CRT terminal.
CPPB	*Constant/Momentary Pressure Photo Eye/Safety Edge Bypass*	This option, when turned "OFF", will disable photo eye/safety edge bypass logic for cars that are on Independent Service, Attendant Service, Hospital Service Phase 2, and any other non-automatic door closing conditions (CPCLOSE, MPCLOSE, etc.).
CSAR	*CSA Redundancy Check Option*	When ON, CSA redundancy checking logic is invoked. When OFF, the LSR, CNP and UDF inputs are ignored, and CSA redundancy checking logic is not performed.
DCFL	*Door Close Front Latch*	Maintains the Door Close Function on the front doors continuously as long as a door open command is absent.
DCRL	*Door Close Rear Latch*	Maintains the Door Close Function on the rear doors continuously as long as a door open command is absent.
DDOP	*Double Ding on Down Option*	When ON, the gong output dings twice for down direction travel and once for up direction travel. If OFF, the gong output will only ding once for both up and down direction of travel.
DDPO	*Door Lock Direction Preference Option*	Causes the car to hold its direction preference until the doors are closed. When OFF, the car will be allowed to change direction preference with the doors open (when the hall call door time elapses).
DGNG	*Door Lock Gong Option*	Determines when the arrival gong outputs are activated. The arrival gong outputs are activated after the doors begin to open. When OFF, the arrival gong outputs are activated when the car steps into the floor. This option should be OFF when hall mounted arrival fixtures are used and turned ON when car-riding arrival fixtures are used.
DOFL	*Door Open Front Latch*	Maintains the Door Open Function on the front doors continuously as long as a door close command is absent.

TABLE 5.7   Software Options

VARIABLE	NAME	DEFINITION
DORL	*Door Open Rear Latch*	Maintains the Door Open Function on the rear doors continuously as long as a door close command is absent.
FTLF	*Failure to Leave the Floor*	The value set in this option determines the maximum number of times H (High speed) may *pick* consecutively at the same landing before the car is shutdown with an MLT fault. Set this option to OFF to disable the shutdown due to this fault.
HNDZ	*Initiate high speed run while releveling (high speed while not in "dead zone")*	This option is only available on those controllers which have been designed with a "rope stretch relevel" relay (RSR), which actively manipulates the "dead zone" perceived by the controller. Enabling this option will allow the controller to initiate a run while the car is still in the "releveling zone" (it will not have to relevel to "dead zone" before initiating a high speed run). The run is initiated only if the doors are locked and a car call has been registered.
HREO	*Reopen doors with hall button*	If enabled, this option will allow the activation of a hall call button to cause a car's doors to reopen (if in the process of closing). If the option is turned OFF, the doors will not reopen if the doors are closing and a car call has been registered for that car.
KCE	*Keyboard Control of Elevators*	MCE's Elevator Central Monitoring System software, CMS for Windows, allows monitoring of elevators and control of certain elevator functions using a PC. The CMS option, KCE can be enabled or disabled at the local car or group level by turning the controller's Adjustable Control Variable (KCE) ON or OFF. Changing the KCE setting in the individual car's controller affects only that car. Changing the KCE setting in the Group controller affects all of the cars in that group. Consult the CMS for Windows manual for additional information.
LBBY	*Lobby Floor*	Determines the location of the lobby floor for a simplex car and for a local car (part of a group system) when the car is operating independently of the Group Supervisor (i.e., Fire Service) or if there is a loss of communication with the Group Supervisor.
LGNG	*Lobby Alternate Gong Option*	Causes an arrival lantern to be illuminated whenever the car's doors are open at the lobby landing. In the absence of actual call demand, the up direction lantern will be illuminated.
LLCC	*Light Load Call Cancel*	When the light load input (LLI) is ON, this variable sets the threshold above which an additional car call will cause all previous calls to be canceled with the exception of the last call entered in the system.
MFR	*Main Fire Floor Recall*	Determines the designated recall floor for main Fire Service operation.
MSAF	*Mechanical Safety Edge*	Determines if the car has a Mechanical Safety Edge. This option must be turned ON if the car has Mechanical Safety Edge, otherwise it should be OFF, as when an infrared detector is used.
NPRE	*No Pre-opening Option*	When ON, prevents pre-opening of the doors on an approach to any landing. When OFF, the doors will start to open as soon as the car is 3" (76 mm) from level at the target floor.
PECC	*Anti-nuisance Call Cancel*	Sets the threshold for the number of car call stops without an interruption of the photo eye. If no photo eye interruption is detected when the car answers the fourth car call, the controller will cancel any additional car calls registered in the system. This function is normally referred to as anti-nuisance.
PHEP	*Photo Eye Protection*	When this variable is set to ON, it will prevent the photo eye from ever being bypassed except on Fire Service. When set to OFF, this option will enable the stuck photo eye protection logic and the photo eye will be bypassed after the car times out of service. This option must be turned ON for all jobs that use the PHE input for the door hold key switch.
PPF	*Primary (lower) Parking Floor*	Determines where the car will park in the absence of call demand. In group systems, this variable only takes affect when the car is operating independently of the group supervisor or if there is a loss of communication with the Group Supervisor.
RCCD	*Reversal CCD Option*	When ON, all registered car calls are canceled when the car reverses direction.

5.3.6 LOAD WEIGHER LEARN OPERATION

Some IMC controllers use a load weigher to determine the load in the car, as a percentage of full load, for the purpose of performing certain dispatching functions such as anti-nuisance call canceling, hall call bypass when fully loaded, and overloaded car detection. The Load Weigher Learn Operation is used to calibrate the load weigher. While in the SYSTEM MODE, the Diagnostic On/Norm switch is used to enter the Load Weigher Learn Mode. Section 4.4.9, *Load Weigher Adjustment for Dispatching*, provides a complete description of the dispatching options and the load weigher learn operation.

5.3.7 SETTING AND RESETTING THE PASSCODE OPTION (NOT ON ALL CONTROLLERS)

The Passcode Requested option can be used to require that a passcode be entered in order to run the car on any mode of operation other then Inspection. If a passcode has not been pre-programmed for the controller, the Passcode Requested option is not available and will not appear.

Upon power up, the message **MP2 VERSION NUMBER: 8.00.0** will scroll across the alphanumeric display. If a passcode has been pre-programmed and the Passcode Requested option has been activated, the message **PASSCODE REQUESTED...** is then scrolled. This means a passcode is required in order to run the elevator on any mode other than Inspection.

In order to set the passcode (to run the car on Normal operation) or clear the passcode (to activate the Passcode Requested option), the controller must first be placed in System Mode as described at the beginning of Section 5.3.

> **NOTE:** PASSWORD is not the same as PASSCODE. The PASSWORD is used to limit access to System Mode. The PASSCODE, when activated, requires that a passcode be set in order to run on any mode other than Inspection.

5.3.7.1 SETTING THE PASSCODE

Once in System Mode, place the A8 switch in the ON (up) position as shown.
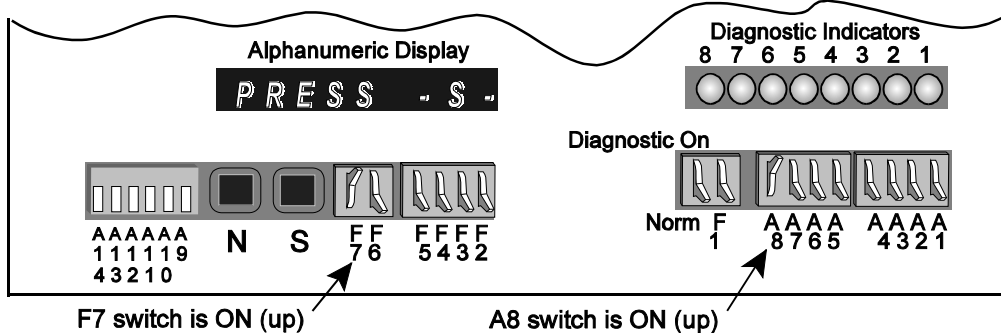
The message **PRESS -S- TO SET PASSCODE OR -N- TO CLEAR PASSCODE...** will scroll across the display. Press the **S** pushbutton. The message **CODE 1 = 0** is displayed.

Press N to select the next character

Press S to change this passcode character

When A1 is ON (up) the display decrements
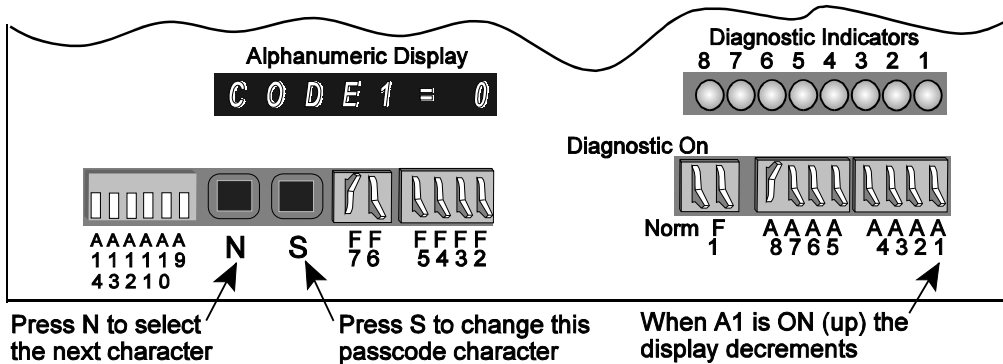
The passcode consists of eight alphanumeric characters. The display indicates the value of code character #1. Press the **S** pushbutton to change the value. Press the **N** pushbutton to select the next passcode character. When the A1 switch is ON (up) the display will decrement when either **N** or **S** are pressed.

When the eighth passcode character is displayed, pressing the **N** pushbutton causes the display to change to *SAVE? N/S*. Press **N** continue setting / changing the passcode. Press **S** to save the passcode. If the passcode is set correctly the display will show *SAVED...*. If the passcode is not set correctly the message *INVALID PASSCODE. PRESS N TO CONTINUE* is scrolled across the display. Pressing **N** causes *CODE1= (x)* to be displayed so that the passcode can be corrected.

Once the passcode is set correctly and saved, exit System Mode by placing the F7 and A8 switches in the OFF (down) position. The car can then be run on Normal operation.

5.3.7.2 ACTIVATING THE PASSCODE REQUESTED OPTION

The Passcode Requested option can be re-activated by clearing the valid passcode setting. To clear the passcode, enter System Mode as described in Section 0.1 and place the A8 switch in the ON (up) position. Press the **N** pushbutton while the message *PRESS -S- TO SET PASSCODE OR -N- TO CLEAR PASSCODE...* is being scrolled. The display changes to *CLEARED*. Exit System mode by placing the F7 and A8 switches in the OFF (down) position. The message *PASSCODE REQUESTED...* is scrolled across the display and the car is only allowed to run on Inspection operation.

5.4　DIAGNOSTIC MODE (EOD)

In the Diagnostic Mode, the A1 thru A8 switches allow access to the MC-MP (MP2) and IMC-DDP computer memory locations. The Diagnostic Indicators and DDP Diagnostic Indicators show the status (ON or OFF) of the flags at those locations (refer to Figure 5.3). To access Diagnostic mode, set the switches as shown.

FIGURE 5.3　Diagnostic Mode (EOD)
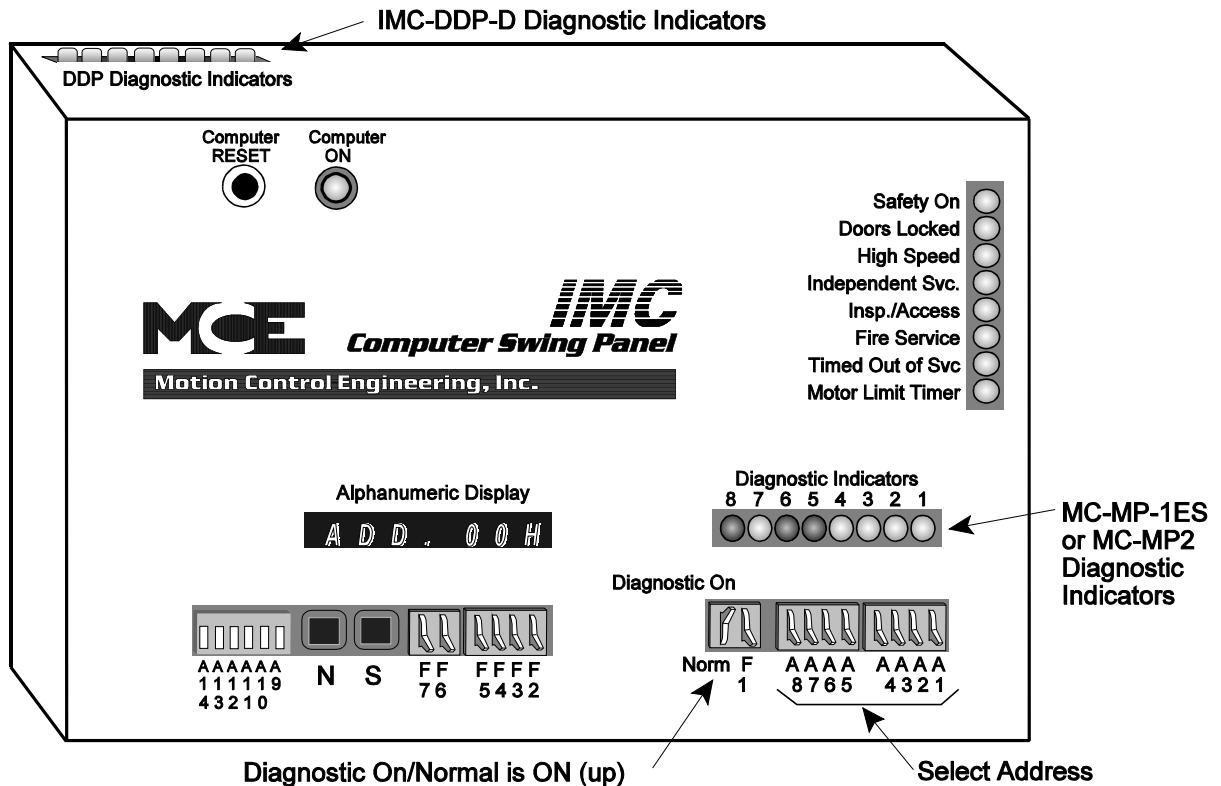
5.4.1　VIEWING THE MC-MP COMPUTER VARIABLE FLAGS

The A1-A8 switches enable an elevator mechanic to view the status of the MC-MP Computer Variable flags when troubleshooting a problem. Figure 5.4 describes the procedure for viewing the computer flags using the Computer Swing Panel Diagnostic Indicators, in this case at address 20H (selected from Table 5.9).

FIGURE 5.4   *Viewing the flags at Address 20H (from Table 5.9)*

MC-MP-1ES BOARD DIAGNOSTIC MODE ADDRESSES AND VARIABLE FLAGS

Computer Memory Address (Hex)	Toggle Switches Diagnostic On ↓ F1 A8.......A5 A4.......A1	Diagnostic Indicators LED *On* = variable flag is On or Active							
		8	7	6	5	4	3	2	1
20		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
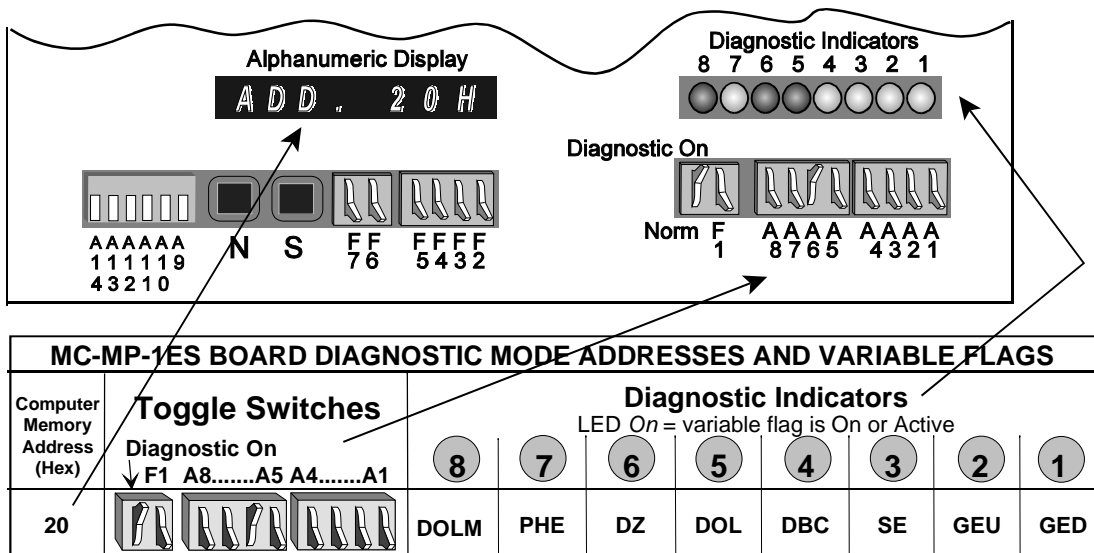
DNmd 010

In this example, address 20 has been selected (see Table 5.9). The Diagnostic On/Norm switch and the A6 switch are ON (up); all other 'A' switches are OFF (down). The display reads ADD.20H. The flags that can be viewed from this address are listed on the right. A complete list of these flags can be found in Table 5.8. Check the Diagnostic Indicators on the front of the Swing Panel. If an LED is ON, it means that flag is ON. For example, if Diagnostic Indicator #6 is ON, this means the Door Zone Input (DZ) is ON.

LED	Flag	Description
8	DOLM	Door open limit memory flag
7	PHE	Photo eye input
6	DZ	Door zone input
5	DOL	Door open limit input
4	DBC	Door close button input
3	SE	Safety edge input
2	GEU	Gong enable up output
1	GED	Gong enable down output

Table 5.8 provides a listing of the MC-MP (MP2) Computer Variable flags and the abbreviation assigned to each flag. Tables 5.9 and 5.10 show the memory address locations for the flags. Access a flag's address by setting the A1 - A8 switches as shown in Table 5.9. Once an address has been selected, the Diagnostic Indicators, on the front of the Swing Panel, show the status of the flags at that computer memory address. Table 5.9 shows the abbreviations for the flags in the columns ❶ thru ❽ (corresponding to indicators 1 thru 8) in each row.

ALTERNATE ADDRESS SELECTION METHOD - There is an alternate way of selecting the computer memory address, without using the A1-A8 switches. To do so, regardless of the position of A1-A8 switches, press the N pushbutton. The alphanumeric display automatically reads **ADD. 20H**, which is the first diagnostic address for the MC-MP flags. The Computer Swing Panel's front Diagnostic Indicators indicate the contents of the address displayed. Constant pressure on the N pushbutton automatically increases the address shown on the alphanumeric display, and the state of the indicator lights changes respectively. Once the address reaches 33H, it automatically goes back to 20H. Releasing the N pushbutton holds the last address displayed on the alphanumeric display for an additional three seconds before changing the display to reflect the address selected by the A1-A8 switches.

TABLE 5.8   MC-MP(2) Computer Variable Flags

ABBREV	FULL NAME	ABBREV	FULL NAME
ADAC	ADA Car Call Timer	FRA	Alternate Fire Phase I Input
ADACR	Rear ADA Car Call Timer	FRC	Fire Phase II
ADAH	ADA Hall Call Timer	FRM	Fire Service Phase I
ADAHR	Rear ADA Hall Call Timer	FRS	Fire Phase I Input
ALT	Alternate Service	FWI	Fire Warning Indicator Output
ATS	Attendant Service Input	GED	Gong Enable Down Output
ATSF	Attendant Service Function	GEU	Gong Enable Up Output
BFD	Bottom Floor Demand	H	High Speed Output
CAC	Car Above Counterweight	HCDX	Hall Call Disconnect
CBC	Car Below Counterweight	HCR	Hall Call Reject
CC	Car Call	HCT	Hall Call Door Time
CCA	Car Call Above	HLD	Hold Input Fire Phase II
CCB	Car Call Below	HLI	Heavy Load Input
CCD	Car Call Disconnect	HLW	Heavy Load Weigher
CCT	Car Call Door Time	HML	Home Landing Select Input
CD	Car Done	HSEL	Hospital Emergency Select
CODE 3	Third Bit in Absolute PI Code	IN	Inspection or Access Input
CSAF	Computer safe	IND	Independent Service Input
CSB	Car Stop Switch Bypass Output	INT	Intermediate Speed Input
CTL	Car to Lobby Input	ISR	In Service and Ready
CTLF	Car to Lobby Function Flag	ISRT	In Service Truly
CWI	Counterweight Input	ISV	In Service
CWIL	Counterweight Input Latch	LD	Level Down Input
DBC	Door Button Close Input	LFP	Lower Floor Parking
DC	Down Call	LLI	Light Load Input
DCA	Down Call Above	LLW	Light Load Weigher
DCB	Down Call Below	LOT	Lobby Door Time
DCC	Door Close Complete	LU	Level Up Input
DCF	Door Close Function Output	MGR	Motor Generator Run Output
DCL	Door Close Limit	MLT	Motor Limit Timer
DCLR	Rear Door Close Limit	NSI	Non-Stop Input
DCLC	Door Closed Contact	NUDG	Nudging Output
DCLCR	Rear Door Closed Contact	PFG	Passing Floor Gong
DCP	Door Closed Power Output	PHE	Photo Eye Input
DDP	Down Direction Preference	PK	Parking
DELSIM	Delta Simulation	PSTX	Preliminary Stepping Function Complete
DHO	Door Hold Open	PTR	Permission To Run *(from Supervisor)*
DLK	Door Lock Input	PTS	Permission To Start *(from Supervisor)*
DMD	Demand Down	PUSD	Earthquake Power Up Shut Down
DMU	Demand Up	REL	Releveling Output
DNDO	Down Direction Output	RUN	Run
DNI	Down Direction Input	SAF	Safety String Input
DNS	Down Direction Sense Input	SD	Supervisory Down
DOF	Door Open Function Output	SDA	Down Direction Arrow Output
DOI	Door Open Intent	SDT	Short Door Time
DOL	Door Open Limit Input	SE	Safety Edge Input
DOLM	Door Open Limit Memory	SLV	Slaved
DPM	Door Position Monitor	STC	Stepping Complete
DPMR	Rear Door Position Monitor	STD	Step Down Input
DSD	Down Slow Down Input	STU	Step Up Input
DSH	Door Shortening (Car Call Button Pushed)	SU	Supervisory Up
DSHT	Door Shortening (Final)	SUA	Up Direction Arrow Output
DZ	Door Zone Input	TFD	Top Floor Demand
DZORDZ	Door Zone or Rear Door Zone	TOS	Timed Out of Service
ECRN	Emergency Power Running Car	UC	Up Call
EDS	Earthquake Direction Switch	UCA	Up Call Above
EPI	Emergency Power Input	UCB	Up Call Below
EPR	Emergency Power Return Function	UDP	Up Direction Preference
EPS	Emergency Power Select Input	UFP	Upper Floor Parking
EQA	Earthquake Function Active	UPDO	Up Direction Output
EQI	Earthquake Input	UPI	Up Direction Input
EQIND	Earthquake Indicator Output	UPS	Up Direction Sense Input
EQN	Earthquake Normal	USD	Up Slow Down Input
ESTE	Earthquake Stop Time Elapsed	YRQ	Wye Request
FCS	Fire Phase II Input	YSIM	Wye Simulation

TABLE 5.9   MC-MP(2) Diagnostic Mode Addresses and Computer Variable Flags

MC-MP(2) DIAGNOSTIC MODE ADDRESSES AND COMPUTER VARIABLE FLAGS

Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8...A5 A4...A1	8	7	6	5	4	3	2	1
20		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
21			DC	UC	CC			DHO	DOI
22		DCF	DCP	DOF	LOT		HCT	CCT	SDT
23				HSEL	CSB	DCC	NUDG		DSHT
24		INT/DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
25				HLW	HLI			FWI	
26		LFP	UFP						
27				EQI	IND	IN		DEL SIM	YSIM
28		LLW	DLK		DZO RDZ			PK	LLI
29		DNDO	LD		DDP	UPDO	LU		UDP
2A		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
2B		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
2C			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
2D						FRM			FRC
2E		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
2F*		HLD		EQA	ATSF		ECRN	CD	EPR
2F		HLD	EPI	EPR	SLV	ISR	YRQ	PTR	PTS
30						EPS	EPI	HML	ALT
32*		CAC	CBC	CWI		EDS	ESTE	EQN	PUSD
32		CAC	CBC	CWI	EQA	EDS	ESTE	EQN	PUSD
33			CWIL						
3B**				DCLR				DCL	
3F**				ADAHR	ADACR			ADAH	ADAC
48**				DPMR	DCLCR			DPM	DCLC

* Simpex Ver. 3.59 or earlier software   ** MC-MP2 Ver. 8.0 or later software.   DNmd 033

TABLE 5.10   MC-MP Diagnostic Mode Rear Door Addresses and Computer Variable Flags

MC-MP-1ES DIAGNOSTIC MODE REAR DOOR ADDRESSES AND VARIABLE FLAGS										
Computer Memory Address (Hex)	Toggle Switches	Diagnostic Indicators LED *On* = variable flag is On or Active								
	Diagnostic On ↓ F1 A8.......A5 A4.......A1	8	7	6	5	4	3	2	1
10		DOLMR	PHER	DZR	DOLR	DBCR	SER	GEUR	GEDR
11			DCR	UCR	CCR			DHOR	DOIR
12		DCFR	DCPR	DOFR	LOTR		HCTR	CCTR	SDTR
13						DCCR	NUDGR		DSHTR

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DOOR CLOSED LIMIT (DCL) AND REAR DOOR CLOSED LIMIT (DCLR) FLAGS

> **NOTE:**   With the MC-MP2 Main Processor board these flags may be viewed using the Alphanumeric Display as described in Section 5.2.5.

DCL INPUT - LOCAL TRACTION (MPOLTM software) - The memory flag for DCL is at external memory address 0268 Hex, Diagnostic Indicator #2. Set the switches as shown.
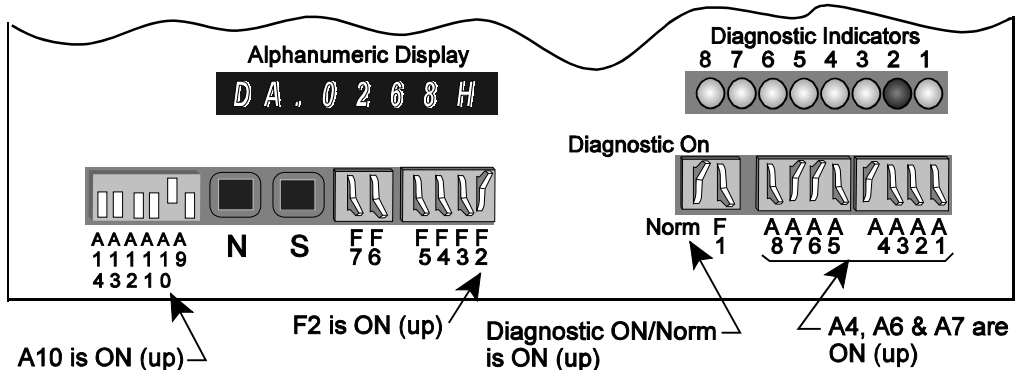
Switch F2 selects external memory. Switches A13 and A14 select the first digit (0), A9 thru A12 select the second digit (2), A5 thru A8 select the third digit (6) and A1 thru A4 select the last digit of the address (8). The Alphanumeric Display indicates that external memory address 0268 Hex is selected (DA.0268H). Diagnostic Indicator #2 shows the status of the DCL input (LED ON = high, LED OFF = low).

DCL INPUT - SIMPLEX TRACTION (MPODT software) - The memory flag for DCL is at external memory address 0049 Hex, Diagnostic Indicator #2. Set the switches as shown.
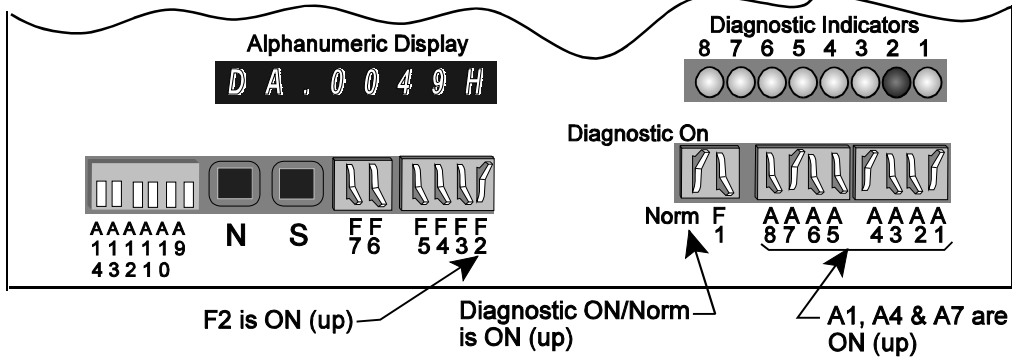
DCLR INPUT - (all software) - The memory flag for DCLR is at external memory address 0003 Hex, Diagnostic Indicator #6. Set the switches as shown.
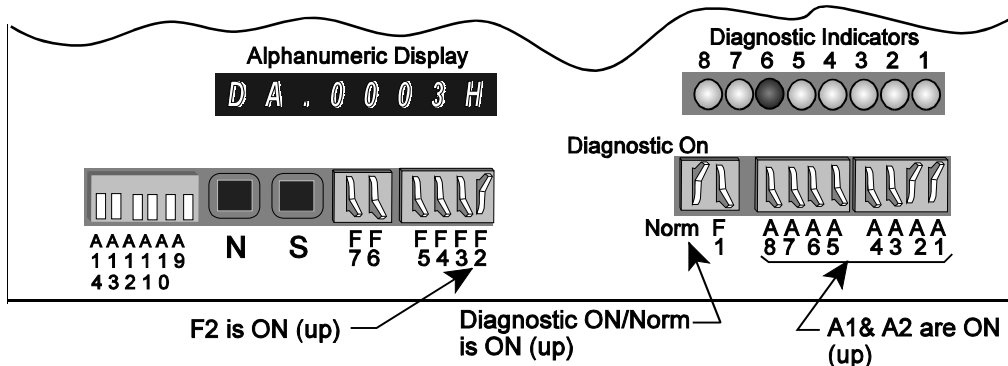
5.4.2   VIEWING THE IMC-DDP COMPUTER VARIABLE FLAGS

The A1-A8 switches also allow an elevator mechanic to view the status of the IMC-DDP Computer Variable flags when troubleshooting a problem. The method used to select the computer address is the same as in 5.4.1, however, the DDP addresses start at 10H and the status of the DDP computer addresses are shown on the DDP Diagnostic Indicators on top of the Computer Swing Panel (see Figure 5.3). Table 5.11 provides a listing of the IMC-DDP-x flags and Table 5.12 shows the memory addresses for the IMC-DDP flags. Note that the alternate method of selecting the address, using the N pushbutton, only allows access to locations 20H thru 33H. All other locations must be selected using the A1 - A8 switches.

TABLE 5.11   IMC-DDP Computer Variable Flags

Pattern Generator			
DN	Down Direction	P2C	Profile Screen Checksum Error
DRVE	Drive Enable	PGE	Pattern Generator Enable
DRVR	Drive Ready	PGR	Pattern Generator Ready
DZ	Door Zone	PGS	Pattern Generator Slave
EQ	Earthquake	PGU	Pattern Generator Updated
FHC	Floor Height Checksum Error	PPS	Pattern Profile Setup
FHL	Floor Height Learned Error	PR	Parity Input
FLR	Car is at the floor	PRS	Parity Signal Error
H	High Speed	R0	Floor Code Input 0
IDC	ID Checksum Error	R1	Floor Code Input 1
IDM	ID Mismatch	R2	Floor Code Input 2
INS	Inspection Operation	R3	Floor Code Input 3
INT	Level Inhibit - Velocity	R4	Floor Code Input 4
LEV	Leveling	R5	Floor Code Input 5
LI	Level Inhibit - Distance	RD	Read Input
LLT	Leveling Limit Timer	RDS	Read Signal Error
LOD	Loss of Direction	SPR	Safety Processor Ready
LOP	Loss of Position	SSO	Step Signal Overlap
LRN	Learning Hoistway	STP	Stepping
OFH	One Floor Height Error	SWC	Terminal Switch Checksum
OLD	Outer Leveling Distance Error	TFH	Two Floor Height Error
OLM	Outer Leveling Marker	TPS	Terminal Position Switch Error
OLP	Outer Leveling Pattern Error	UP	Up Direction
ORR	Main Processor Run Request	VC	Contract Velocity Error
P1C	Pattern Screen Checksum Error	VS	Short Velocity Error

Drive			
BCI	Brake Contact Input	OAT	Auto Tune
BF	Brake Failure	OBT	Buffer Test
BRE	Brake Enable	OCMF	Closed Loop Motor Field
BRP	Brake Pick	OEAC	Encoder Auto Calibration
CNPB	Contactor Proof Brake	OET	Encoder/Tachometer
CNPG	Contactor Proof Generator	OSR	Speed Reference
DEL	Starter in Delta	OTE	Pre-Torque Enable
DETS	Down Emergency Terminal Switch	P3C	Motor Screen Checksum Error
DFO	Drive Fault Output	P4C	Gain Screen Checksum
DRST	Drive Reset Input	P5C	Option/Cal Screen Checksum
DRVE	Drive Enable	PIDSAT	PID Saturated
DRVR	Drive Ready	RNE	Run Enable
FLT	Fault Relay Tripped	RNF	Run Failure
FLTB	Fault Bypass	SAF	Safety String Input
FBLT	Fault Bypass Limit Timer Error	SMF	Sufficient Motor Field
GSF	Generator Field Failure	TF	Tach Failure
GSAT	Generator Field Saturation	TE	Tach Error
HV	DC Supply for GSF	TEX	External Velocity Feedback Signal
LOC	DC Loop Overload current	TIN	Synthetic Tachometer Signal
MF	Motor Field Failure	TME	Tach Mismatch
MFF	Motor Field Forcing Voltage	UETS	Up Emergency Terminal Switch

Safety Processor			
DNT1	Down Normal Terminal Switch 1	SPP	Safety Processor Communication
DNT2	Down Normal Terminal Switch 2	SPR	SP Ready
DNT3	Down Normal Terminal Switch 3	SPT	SP Tripped
DNT4	Down Normal Terminal Switch 4	UNT1	Up Normal Terminal Switch 1
DNT5	Down Normal Terminal Switch 5	UNT2	Up Normal Terminal Switch 2
ILO	Inspection/Leveling Overspeed	UNT3	Up Normal Terminal Switch 3
LRN	SP Learn	UNT4	Up Normal Terminal Switch 4
NTS	Normal Terminal Switch Tripped	UNT5	Up Normal Terminal Switch 5
OS	Contract Overspeed	TSAT	Tach Voltage Saturation
SPC	Safety Processor Communication		

TABLE 5.12 **IMC-DDP Diagnostic Mode Addresses and Computer Variable Flags**

IMC-DDP-C BOARD DIAGNOSTIC MODE ADDRESSES AND VARIABLE FLAGS*

Computer Memory Address (Hex)	Toggle Switches (Diagnostic On ↓F1 A8.......A5 A4.......A1)	8	7	6	5	4	3	2	1
10	(switches)	RD	PR	R5	R4	R3	R2	R1	R0
11	(switches)	STP	LI	INT	OLM	LEV	H	UP	DN
12	(switches)	ORR	PGS	PGU	SPR	PGR	DRVR	PGE	DRVE
13	(switches)					LRN	EQ	INS	DZ
14	(switches)	UETS			UNT5	UNT4	UNT3	UNT2	UNT1
15	(switches)	DETS			DNT5	DNT4	DNT3	DNT2	DNT1
16	(switches)	SPR	SPT	LRN			OS	ILO	NTS
20	(switches)				SWC	IDC	P2C	P1C	FHC
21	(switches)			IBJ	RST	PPS	IDM	PRS	RDS
22	(switches)	OLE	RBK	LOD	LOP	TPS	OLP	OLD	LLT
23	(switches)			FHL	VS	VC	TFH	OFH	SSO
24	(switches)	ILO	OS	SPT	SPC	SPP	CPI	CPP	CPL
25	(switches)								
80	(switches)			SMF	BRE	PGE	DRVE	RNE	DRVR
81	(switches)			DRST	FLT	EBD		ETS	DFO
82	(switches)	FLTB	FBLT	BCI		DEL	CNPG	CNPB	SAF
83	(switches)		DETS	UETS		TSAT	TME	TF	TE
84	(switches)				HV	LOC	GSF	BF	MF
85	(switches)								
86	(switches)						MFF	GSAT	PIDSAT
88	(switches)						P5C	P4C	P3C

Digital Drive Diagnostic Indicators — Top of Swing Pannel — LED *On* = variable flag is On or Active

* for IMC-MG controllers

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5.4.3 VIEWING AND ENTERING CALLS

This function allows the user to view all the calls registered per floor, and to enter calls as desired, without using the CRT terminal's F3 screen. To view or enter calls, set the switches as shown.
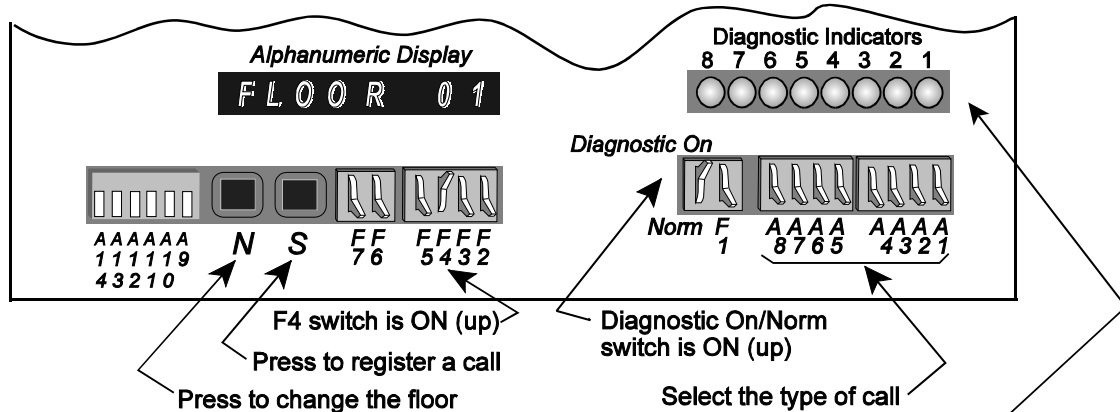
FIGURE 5.5   Viewing and Entering Hall & Car Calls via the EOD

Diagnostic Indicators show current calls	Diagnostic Indicators							
	❽	❼	❻	❺	❹	❸	❷	❶
Call type ⇨	Hall Call UP Rear	Hall Call UP Front	Hall Call DOWN Rear	Hall Call DOWN Front			Car Call Rear	Car Call Front
To register calls, turn the address switch ON and press "S"	A8	A7	A6	A5	A4	A3	A2	A1
	Address Switches							

VIEWING CALLS - With the F4 switch in the ON position, the alphanumeric display shows **FLOOR 01** and the Diagnostic Indicators light up with the calls that have been registered. The format for the call indication is shown in Figure 5.5. To advance the floor number press the **N** pushbutton. The Diagnostic Indicator LEDs will show the calls entered at the floor shown in the alphanumeric display. When the top floor number is displayed, pressing N will cause the display to cycle to the bottom floor.

ENTERING CALLS - To enter calls, select the desired floor as described above. Use the A1-A8 switches to select the type of call to enter (see Figure 5.5). For example, set the A1 switch up to register a front car call. Then press and hold the **S** pushbutton until the call has been registered. Notes: (1) A call type which does not exist in the system cannot be entered, (2) if this car is part of a group, only car calls can be entered.

5.5   IMC-DIO ONBOARD DIAGNOSTICS

The IMC-DIO board includes two independent processors that monitor the car speed and operation as the car approaches a terminal landing. This board is equipped with its own Onboard Diagnostic tools. The IMC-DIO Onboard Diagnostics have three modes of operation:

- Start-Up operation
- Learn operation
- Normal operation

This section provides a brief description of the diagnostic tools available on the IMC-DIO board. It also gives a description for each of the three modes of operation.

5.5.1   DESCRIPTION OF IMC-DIO INDICATORS AND SWITCHES

Four Digit Alphanumeric Display - This display is located near the upper front portion of the IMC-DIO board (Figure 5.6). It displays the car speed, the prevailing board status, and error messages.

Learn Indicator - This is a single green LED below the alphanumeric display on the IMC-DIO board. When this LED is illuminated, it indicates that the IMC-DIO board is on Learn operation.

Computer on Indicators - There are two red LEDs right above the alphanumeric display. The LED labeled COMP2 ON is for the ETS processor. The LED labeled COMPUTER1 ON is for the safety processor. When these LEDs are ON, the processors are properly executing their programs. If either LED is OFF or is flashing ON and OFF, this indicates a processor malfunction.

Tell-tale Indicators - There are four red LEDs near the LEARN LED. These indicate the status of OLM (Outer Level Marker), the position pulser signals, and the overspeed fault.

Learn Toggle Switch - This toggle switch is located below the red OLM LED on the IMC-DIO board.

Computer Reset Button - This pushbutton is located right below the alphanumeric display. This switch is used to reset both processors on the IMC-DIO board. When this switch is depressed, the COMP2 ON and COMPUTER1 ON LEDs will turn OFF.

5.5.2   STARTUP OPERATION

When the system is turned ON or the COMPUTER RESET button is released, the processor on the IMC-DIO board will go through a 30 second self-test. If the self-test is successfully performed, the alphanumeric display shows the car speed as it runs. If the car is not running, it will indicate a zero speed. If the self-test fails, the alphanumeric display will show an error message. Refer to Section 5.5.4 to identify the problem that has caused the IMC-DIO to fail the self-test.

5.5.3 IMC-DIO LEARN OPERATION

Learn operation is intended only for the purpose of learning the normal terminal slowdown limit switches and ETS limit switches as described in Section 4.6, *Normal Termiinal Limit Switch Learn Operation*. Placing the LEARN SWITCH on the IMC-DIO board in the ON position will begin the Learn operation and the green LEARN LED will illuminate. As the IMC-DIO goes through Learn operation, the alphanumeric display will show the following messages:

- LRN   IMC-DIO on Learn operation, car not moving
- LRNU   Learning in the UP direction
- LRND   Learning in the DOWN direction
- LRNW   Writing the learned speed values to the EEPROM
- LRNR   Verifying the speed values in the EEPROM
- LRNC   Learning has been successfully completed
- LRNT   On Learn operation for five minutes without completing Learn operation

The IMC-DIO should be removed from Learn operation as soon as the IMC-DIO has learned the proper velocities associated with each switch. In case the LEARN SWITCH is left in the ON position for longer than five minutes, the IMC-DIO will automatically exit Learn operation, and the alphanumeric display will indicate LRNT. If, at this time, the Learn operation is successfully completed, the car will be able to run normally. If the Learn operation is not completed and the EEPROM does not include valid data, the IMC-DIO board will prevent the car from running.

5.5.4 IMC-DIO NORMAL OPERATION

In this mode of operation, the alphanumeric display will constantly show the car speed as it is traveling in the hoistway. If at any time the IMC-DIO encounters any error conditions, the alphanumeric display will show one of the error conditions listed below.

- ERR1   EEPROM error - reset the IMC-DIO board. ✳
- ERR2   Not used
- ERR3   Not used
- ERR4   Not used
- ERR5   EEPROM checksum error - reset the IMC-DIO board. ✳
- ERR6   EEPROM handshake error - reset the IMC-DIO board. ✳
- ERR7   EEPROM write failure - reset the IMC-DIO board. ✳
- ERR8   Memory update error -reset the IMC-DIO board. ✳

✳   If the error is still present after resetting the IMC-DIO board by pressing the Computer Reset button on the IMC-DIO board, relearn the terminal limit switches as described in Section 4.6. If the fault persists the cause may be a faulty EEPROM.

FIGURE 5.6   IMC-DIO Board Layout
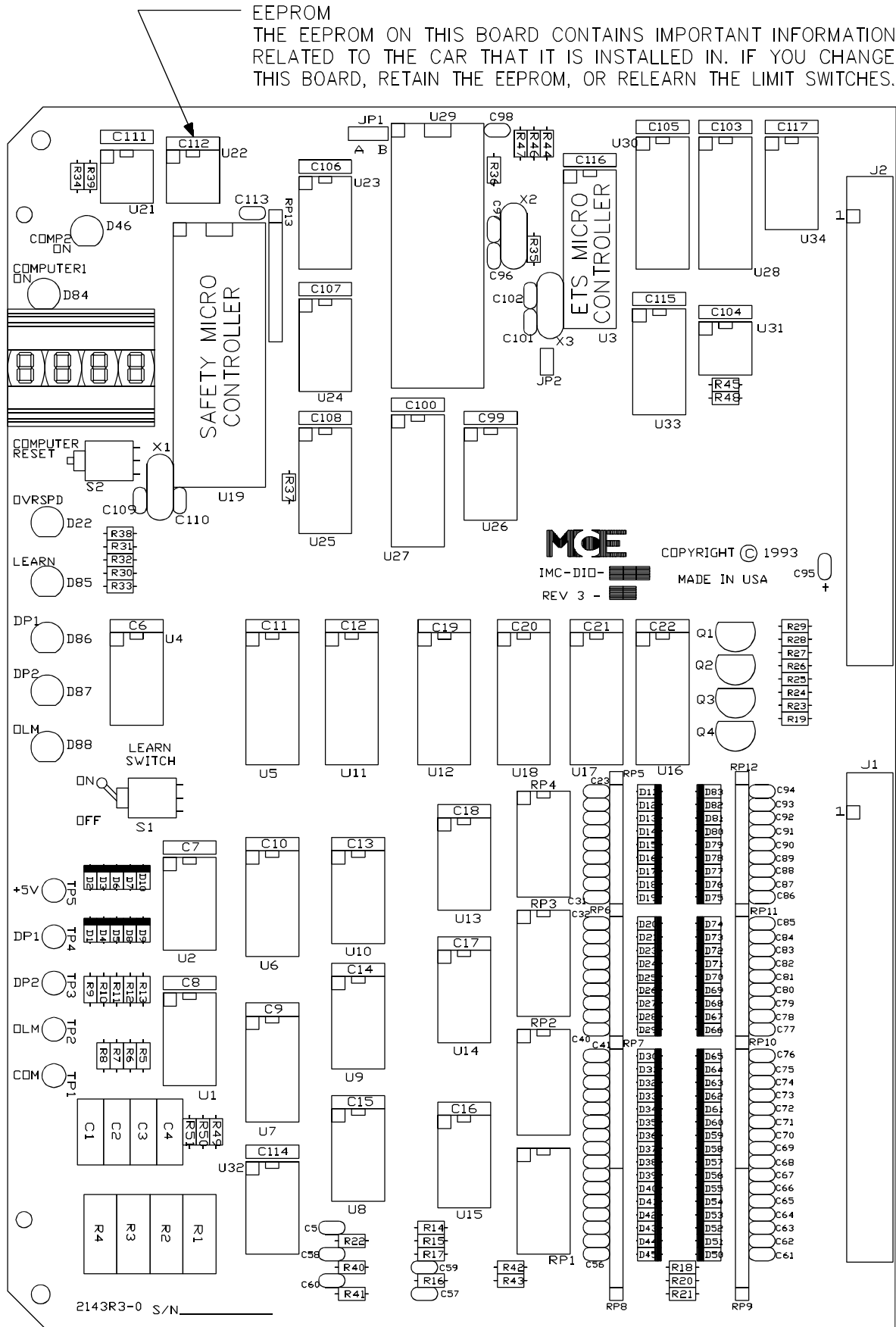
EEPROM
THE EEPROM ON THIS BOARD CONTAINS IMPORTANT INFORMATION RELATED TO THE CAR THAT IT IS INSTALLED IN. IF YOU CHANGE THIS BOARD, RETAIN THE EEPROM, OR RELEARN THE LIMIT SWITCHES.

D/N: 2409

SECTION 6
TROUBLESHOOTING

6.0   GENERAL INFORMATION

IMC-MG controllers have features that speed up the troubleshooting process. The Enhanced-On-Board Diagnostics (EOD) and the diagnostic screens on the CRT guide the user to the source of most problems. The DRIVE and PATTERN GENERATOR control and fault flags on the Graphic Display of Elevator (F3) screen and the messages in the Special Events Calendar Fault Log (F7, 1) provide very useful information. Often the controller will indicate the nature of the problem in the form of a Special Events Calendar message, the status of control and fault flags on the F3 screen, flashing Computer Swing Panel (MP) Diagnostic Indicators, DDP Diagnostic Indicators, or scrolling messages on the Alphanumeric Display.

The Computer Swing Panel Enhanced Onboard Diagnostics (EOD) provide additional troubleshooting information. Troubleshooting often involves determining the status of specific inputs, outputs or computer variable flags. This information is stored in the controller's memory and the status of these memory locations can be viewed using the Computer Swing Panel Diagnostic Indicators and/or Alphanumeric Display as described in Section 5.2.5 *Alphanumeric Display - Viewing the MP / MP2 Internal Flags / Inputs* and Section 5.4 *Diagnostic Mode (EOD)*.

The Troubleshooting section is arranged as follows:

Troubleshooting Topic:	Go to:
Car Operation, Drive and Safety flags on the F3 screen	Section 6.1
Pattern Generator control and fault flags on the F3 screen	Section 6.2
Diagnostic Indicator / Scrolling Messages - descriptions and troubleshooting information.	Section 6.3
Special Event Calendar Entries – F7 screen faults and events - descriptions and troubleshooting information.	Section 6.4
Troubleshooting Car Operation Control (COC), Door Logic, Call Logic, and Quick References for the HC-PI/O and HC-CI/O boards.	Section 6.5
PC Board Quick References	Section 6.6
Using the MLT Data Trap	Section 6.7

6.1 CAR OPERATION, DRIVE AND SAFETY FLAGS

For the IMC-MG controller, car operation is controlled by the MC-MP-1ES or MC-MP2 Main processor, drive operation is controlled by the IMC-DDP-x processor, and safety operation is controlled by the safety processor located on the IMC-DIO board. The Enhanced On-Board Diagnostics and the CRT, provided with the controller, will help in troubleshooting. Section 5, combined with this section of the manual provides a means for troubleshooting problems related to car drive and safety operation. The use of the CRT provides the elevator mechanic with an easy and convenient means of diagnosing problems.

FIGURE 6.1   Graphic Display of Elevator Screen, F3
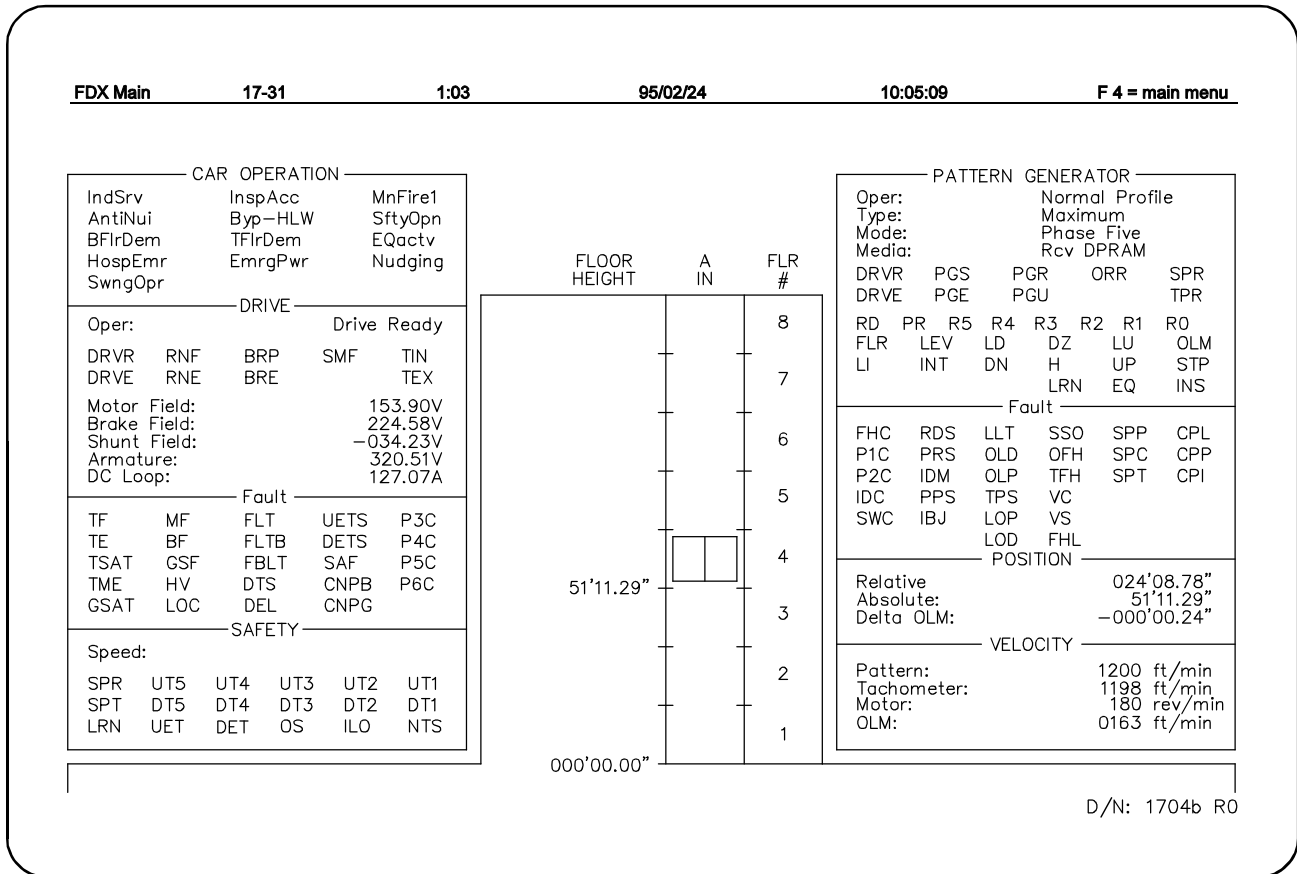
This screen is the primary diagnostic tool for digital drive operation. It displays the operating parameters and status signals of the elevator. The screen is divided into six categories, seen as windows on the screen. A description of the flags in the CAR OPERATION, DRIVE and SAFETY sections are provided in Tables 6.1 thru 6.6.

TABLE 6.1 Car Operation Flags - F3 Screen

CAR OPERATION -The flags appear only when the car condition exists	
AltFir1	The car is on Fire Service phase I; designated floor is the alternate fire floor.
AntiNui	The load weigher indicates that the load in the car is minimal; antinuisance logic is in effect, and may only allow a few car calls to be registered.
AttnSrv	The car is on Attendant Service operation.
AutoOps	The car is running on Automatic operation
BFlrDem	The controller has generated a demand in the down direction in an attempt to establish absolute car position. Car position can be established at any landing at which a floor code can be correctly read.
Byp-HLW	The load weigher indicates that the load in the car is significant; hall calls will by bypassed.
EmrgPwr	The car is operating under emergency power.
Eqactv	Earthquake operation is active.
FirePh2	The car is on Fire Service phase II.
HospEmr	The car is on Hospital Emergency Service operation.
IndSrv	The car is on Independent service (note: the relay panel TEST mode is a form of Independent service).
InServ	The car is in service (normal passenger operation).
InspAcc	The car is on Inspection or Access operation.
MLT	The motor limit timer has elapsed.
MnFire1	The car is on Fire Service phase I; designated floor is the main fire floor.
Nudging	Door nudging operation has commenced.
OutServ	The car is out of service (not available for normal passenger service).
SftyOpn	The safety string is open.
SwngOpr	The car is operating as a swing car, operating independently of the group supervisor. In general, the car should be servicing a riser of hall calls that are dedicated to that car.
TFlrDem	The controller has generated a demand in the up direction, in an attempt to establish absolute car position. Car position can be established at any landing at which a floor code can be correctly read.
TOS	The car has timed out of service; it has been delayed from responding to a car call or hall call demand.

TABLE 6.2 Drive Operation Flags - F3 Screen

OPERATION PARAMETERS - The following parameters inform the user of the current operation of the Drive.	
Drive Ready	The Drive Unit is ready for operation.
Drive Test	The IMC-DDP-x computer is performing the test of safety functions and feedback signals before initiating a run.
Drive Normal	The Drive is controlling the rotating equipment without any fault condition.
Drive Fault	The IMC-DDP-x computer detected a fault condition in the Drive Unit or safety functions.
Drive Buffer	The drive is in buffer test operation (for additional information refer to Section 4.6.1).

TABLE 6.3   Drive Status Flags - F3 Screen

STATUS PARAMETERS - The following signals indicate the state of the Digital Drive. These states determine the sequence of operation.	
DRVR *(Drive Ready)*	When highlighted, indicates that the Drive does not have any fault condition and is ready for motion.
DRVE *(Drive Enable)*	When highlighted, informs the pattern generator processor to initiate the pattern. The drive program checks the safety functions and feedback signals. If the test is successful, then the DRVE flag is generated. On the F3 screen, the DRVE flag comes on after DRVR, SMF, RNE, and BRE flags, and also it depends on the BSPD (speed pick) delay value. If the RNF is highlighted, the DRVE flag will not be created - preventing Automatic operation.
RNF *(Run Fail)*	A highlighted RNF flag indicates that the contactor proof inputs (CNPB and CNPG) have failed and the car will not be allowed to make a normal run. Failure of the CNPB or CNPG inputs may be caused by malfunctioning PT relays (PT1-PT4) or RE relay on the IMC-PRIx board; or bad brake and generator shunt field fuses (FB1, FB2, FG1 and FG2).
RNE *(Run Enable)*	This is highlighted after receiving the direction command and a successful verification of the contactor proof inputs (CNPB and CNPG). This flag indicates that the potential timer (PT) relays are working properly, motor field is above 80% of forcing, and the input voltages for generator shunt field and brake coil are at full strength.
BRP *(Brake Picked)*	A highlighted BRP flag indicates that the brake has been lifted. However, this flag is only valid when a brake contact switch is connected to the BCI input on the IMC-RI board. If no connection is made to the BCI input, the BRP flag will be activated whenever the BRE is enabled.
BRE *(Brake Enable)*	This highlighted flag shows that the IMC-DDP-x processor has provided the command to lift the brake. To generate this flag, the Drive must have already generated DRVR, adequate motor field voltage (SMF), and RE.
SMF *(Sufficient Motor Field)*	This highlighted flag indicates that there is adequate (80% of forcing voltage) motor field voltage to make a normal run. Failure to achieve adequate motor field voltage disables the Brake Enable (BRE), the Run Enable (RNE), and the Drive Enable (DRVE), and consequently prevents a normal run.
TIN *(Internal Speed Feedback Signal)*	This highlighted flag indicates that the Drive is referencing the synthetic tachometer signal, generated from the armature voltage and DC loop current. This implies that the internal speed feedback signal, instead of the tachometer/encoder signal, is compared with the intended speed pattern to generate the drive reference signal.
TEX *(External Speed Feedback Signal)*	This highlighted flag shows that the Drive (velocity loop) is receiving its speed feedback signal from an external transducer (tachometer or encoder).

TABLE 6.4   Drive Current and Voltage - F3 Screen

DRIVE CURRENT AND VOLTAGE DISPLAY - The following displays the voltage and currents of the rotating equipment.	
Motor Field	Displays the motor field voltage. The displayed voltage is calculated from the current in the motor field and the motor field resistance provided on the Motor Parameters screen. Its accuracy is dependent upon proper calibration of CMFV on the Option/Cal Parameters screen.
Brake Field	Displays the brake coil voltage. The voltage is calculated from the current in the brake coil and the brake coil resistance provided on the Motor Parameters screen. Its accuracy is dependent upon proper calibration of CBV on the Option/Cal Parameters screen.
Shunt Field	Displays generator shunt field voltage. The voltage is calculated from the current in the generator shunt field and the resistance provided on the Motor Parameters screen.
Armature	Displays the armature voltage. The displayed voltage is the actual voltage between terminals GA and GC on the backplate. Its accuracy is dependent upon proper calibration of CGFV on the Option/Cal Parameters screen.
DC Loop	Displays the current in the DC loop. The current is derived from the voltage at the interpole (terminals GIX and GCX on the IMC-RI). To obtain an accurate current value from the display, set the parameter CLI on the Option/Cal Parameters screen to 1.0. During a full hoistway run at contract speed, measure the actual current in the DC loop, and at the same time, observe the displayed value on the F3 screen. Use the following equation to calculate the parameter CLI on the Option/Cal Parameters screen: CLI = Measured value/Displayed value. After entering this parameter, make a run and verify the displayed DC loop current.

TABLE 6.5   Drive Fault Flags - F3 Screen

FAULTS - These fault flags indicate problems and/or deficiencies that must be corrected for proper operation.	
TF *(Tachometer Failure)* **(This fault does not automatically reset, the TF fault shuts down the system)**	The difference between the synthetic tachometer signal (generated from the armature feedback voltage) and the external speed feedback signal (tachometer/encoder) has exceeded the tolerance value of 4 volts (40% of contract speed). As mentioned in Section 3, the synthetic tachometer signal is generated from armature voltage and inter-pole current, and the speed signal can be adjusted using SVSC and SISC parameters on the Gain Parameters screen (screen F1-4) so that this speed signal provides 10VDC at contract speed. This signal, or the error between these two signals, can be accessed through the Software Test Points on the IMC-DAS board. The following can activate this flag: • incorrect adjustment of SVSC and SISC parameters; • tachometer/encoder input is not connected to the IMC-RI board; • GA, GC, and GI inputs are missing; • FA, FC, and FI fuses are bad (blown); • faulty tachometer or encoder. If TF continues, and the difference between T, and STS is greater than 3.5VDC, then do the following: a. Swap both Motor field MF1 and MF2 connections and your Generator GSF1 and GSF2 connections. b. If TF continues, then swap GA and GI wires.
TE *(Tachometer Error)*	The difference between the intended speed (pattern) and the speed feedback signal (tachometer/encoder) has exceeded the tolerance value that is labeled STE (Maximum Tachometer Error) on the Gain Parameters screen. The following conditions can cause the flag to be highlighted: • tachometer/encoder input is not connected properly to the IMC-RI board; • faulty tachometer or encoder; • disabled speed command (pattern) due to an unsafe operation; • no generator shunt field voltage; • no brake voltage or brake is not lifting.
TSAT *(Tachometer Saturation)*	The voltage at test point T on the IMC-DAS board has exceeded the maximum voltage of 14.75VDC (10.0VDC for the IMC-GI2 Rev 2 Drive). The cause of this problem may be one of the following: • wrong tachometer is being used. • the trimpot tachometer on the IMC-DAS has been misadjusted. • the resistance of this trimpot must be about 14Kohms for 60VDC/1000RPM tachometer. • misadjustment of PG (Pattern Gain) on the Dynamic or Gain Parameters screen.
TME *(Tachometer Mismatch Error)*	The wrong speed feedback signal has been used. This error will be created whenever the car attempts to run on Normal operation with the internal speed feedback signal. The internal speed feedback signal is only permitted during an inspection run. Set the OSR parameter on the Option/Cal Parameters screen to EXT.
GSAT *(Generator Shunt Field Saturation)*	The generator shunt field output is at maximum value. This is not an error so it will not trip the fault relay (FLT), but it indicates that the generator shunt field output has reached its maximum value.
MF *(Motor Field Failure)*	The motor field voltage is insufficient for any operation of the elevator. This error **cannot be bypassed**, and can be triggered by one of the following: • wrong parameter values for motor field resistance and motor field input voltage on the Motor Parameters screen; • not calibrated correctly using CMFV; • no motor field input voltage. Check for voltage at terminals MPO1 and MPO2 of the Drive, and transformer; • FM1 or FM2 fuses may have cleared (opened); • no triggering signal for motor field. This can be verified on test point MFT on the IMC-DAS board; • no voltage between terminals AC1 and AC2 on the Drive; • faulty motor field current sensing transformer.
BF *(Brake Voltage Failure)*	The brake voltage is insufficient. It can be triggered by one of the following: • If BF is highlighted at the end of a run, the IGBT for the brake has failed. • wrong parameter values for brake coil resistance and brake input voltage on the Motor Parameters screen; • wrong calibration, use CBV parameter on Option/Cal Parameter screen; • no brake input voltage at terminals BPI1 and BPI2 on the IMC-PRIx board; • SAFB is not picked; • direction relays on the HC-RB4 and IMC-PRIx are not picked; • PT1, PT2, and RE on the IMC-PRIx are not picked; • FB1 or FB2 fuses may have cleared; • no triggering signal for brake voltage at test point BFT on the IMC-DAS board; • no voltage between terminals AC1 and AC2 on the Drive; • faulty brake coil current sensing transformer; • bad diode bridge (DBB) inside Drive enclosure.

	FAULTS - These fault flags indicate problems and/or deficiencies that must be corrected for proper operation.
HV *(High Voltage)*	The DC supply voltage for the generator shunt field is not adequate. An inadequate DC supply voltage limits the generator shunt field output voltage, and as the result of this, the Drive may not have control of the car. When there is no direction command, the DC supply voltage is not generated and hence, the HV flag will be highlighted during this time. The failure can be caused by one of the following: • failed direction relays (U1, U2, UA, D1, D2, and DA) on the HC-RB4 and IMC-PRIx boards; • SAFG is not picked; • PT3, PT4, RB, and RE on the IMC-PRIx are not picked; • FG1 or FG2 fuses may have cleared; • fuse FGSF inside the Drive may have cleared; • bad C1 capacitor or bad diode bridge (DBG) inside the Drive.
LOC *(Loop Overload Current)*	The current in the DC loop has exceeded the scaled learned value. This causes the FLT relay to drop. This fault can occur for the following reasons: • the brake is not completely lifted; • the load in the car has exceeded full load. This fault can be remedied by resetting the SLOC parameter on the Gain Parameters screen. If the car is needed during the installation, set option OLOC on the Option/Cal Parameters screen to ON or use a safety bypass jumper between FBP1 and FBP2 on the IMC-RI board.
FLT *(Fault Relay)*	The fault relay has been dropped. This fault can be initiated by any of the above errors. If there are no errors and the FLT relay is not picked, check the triac Q1 on the IMC-RI board. This relay must repick after 10-20 seconds if the fault does not persist.
FLTB *(Fault Bypass)*	Indicates that the safety monitoring is bypassed inside the IMC-DDP-x and IMC-DIO computers. With a highlighted FLTB, the car is only allowed to run for two hours in Normal operation.
FBLT *(Fault Bypass Limit Timer Error)*	Indicates that the safety monitoring (FLTB) has been bypassed for more than two hours. If the car is in Normal operation and the safety monitoring (FLTB) is bypassed for more than two hours, this error will be created and will not allow the car to make a normal run. So if the FLTB is needed for further testing of the controller, reset the Drive using the RESET switch on the IMC-DAS board or toggle ON and OFF the Inspection switch . During Inspection operation, the timer is disabled, so the car can be run on Inspection indefinitely.
DEL *(DELTA Starter Status)*	The DELTA starter has not picked. After enabling direction relays, a highlighted DEL flag will prevent any motion of the car. Check the DELTA starter and MG set motor overload. This fault cannot be bypassed by jumpering FBP1 and FBP2 on the IMC-RI board.
UETS *(Up Emergency Terminal Switch Fault)*	The car was traveling more than 95% of contract speed when the contact of the up emergency terminal switch was opened. If the UETS input on the IMC-RI board is not connected, this error may be activated.
DETS *(Down Emergency Terminal Switch Fault)*	The car was travelling more than 95% of contract speed when the contact of the down emergency terminal switch was opened. If the DETS input on the IMC-RI board is not connected, this error may be activated.
SAF *(Safety String)*	Indicates that the safety string has been opened. This error will be displayed when there is demand for a run and the safety flag from the MP processor fails.
CNPB *(Contactor Proof for Brake)*	Indicates that there is a failure in the potential timer relays (PT1 and PT2) contacts which transfer power to the brake. This error may also be caused by the following: • no brake input voltage at terminals BPI1 and BPI2 on the IMC-PRIx board; • SAFB is not picked; • brake fuses FB1 and FB2 have cleared; • PT1 and PT2 relay contacts never dropped out.
CNPG *(Contactor Proof for Generator Shunt Field)*	Indicates that there is a failure in potential timer relays PT3 and PT4 contacts which transfer power to the generator shunt field. This error may also be caused by the following: • no generator shunt field input voltage at terminals GPI1 and GPI2 on the IMC-PRIx board; • SAFG is not picked; • generator shunt field fuses FG1 and FG2 are bad; • PT3 and PT4 relay contacts have failed to drop out at the end of previous run.
PxC *(P3C, P4C, and P5C)*	There is an error between the parameter value and the value read from the EEPROM.

TABLE 6.6   Safety Processor Flags - F3 Screen

SAFETY: This window displays car speed and any speed faults that are detected.	
Speed	Under Normal operation, displays the current car velocity. This velocity is the same as what is displayed on the alphanumeric display on the IMC-DIO board. When a fault condition is detected, however, a code representing the fault and the velocity at which the fault occurred is displayed.
IOS *(Inspection Overspeed)*	The car velocity exceeded 150fpm when traveling on Inspection.
LOS *(Leveling Overspeed)*	The car velocity exceeded 150fpm when the elevator was leveling (passed over the LU or LD vane) into a destination floor.
COS *(Contract Velocity Overspeed)*	The car velocity exceeded the contract speed of the elevator.
NTSx *(Normal Terminal Switch Overspeed)*	The car velocity exceeded the learned normal terminal switch velocity when the elevator was approaching a terminal landing.
SPR *(Safety Processor Ready)*	When highlighted, indicates that the safety processor is ready for Normal operation. For this to occur, the processor must have learned the normal emergency terminal switches correctly and must be receiving the correct job identification code from the IMC-DDP-x processor.
SPT *(Safety Processor Tripped)*	When highlighted, indicates that the safety processor has detected an overspeed condition. The overspeed condition can be OS, ILO, or NTS. See description below.
LRN *(Learn)*	When highlighted, indicates that the LEARN SWITCH on the IMC-DIO is in the ON position. When the switch is ON, the safety processor is ready to learn the velocities of the normal emergency terminal switches as they open on normal approaches of the elevator to the top and bottom terminal landings.
UTx *(Up Terminal Switch x)*	When highlighted, indicates that the normal emergency terminal switch contact is closed. The switch opens as the car approaches the top terminal landing.
DTx *(Down Terminal Switch x)*	When highlighted, indicates that the normal emergency terminal switch contact is closed. The switch opens as the car approaches the bottom terminal landing.
OS *(Overspeed)*	When highlighted, indicates that the car velocity has exceeded the contract velocity of the elevator.
ILO *(Inspection-Leveling Overspeed)*	When highlighted, indicates that the car has exceeded 150fpm while traveling on Inspection or while leveling (passed over the LU or LD vane) into a destination floor.
NTS *(Normal Terminal Switch)*	When highlighted, indicates that the car velocity exceeded a learned normal terminal switch velocity as the elevator was approaching a terminal landing.

6.2   PATTERN GENERATOR FLAGS

The main purpose of pattern generator hardware and software is to either create a motion pattern or to terminate the pattern due to an unsafe condition. The Enhanced On-Board Diagnostics and the CRT provided with the controller will help troubleshoot the reasons for not creating the desired pattern or for terminating the pattern. Section 5 combined with this section of this manual provides a complete description of the use of EOD for troubleshooting the pattern generator. The use of the CRT provides the elevator mechanic with an easy and convenient means of diagnosing any pattern generator problems.

The resources available for troubleshooting the pattern generator include the Velocity vs. Time Graphic Display screen and the F3 screen.

FIGURE 6.2   Velocity Vs Time Graphic Display, F2 Screen


```
AO  Acceleration — starting
J1  Jerk at start
A2  Acceleration — maximum
J3  Jerk before peak
VH  Contract speed
J5  Jerk after peak
A6  Deceleration — maximum
J7  Jerk before leveling
VHL High (initial) leveling speed
DL  Leveling distance
VIL Intermediate leveling speed
VFL Final leveling speed
DFL Final leveling distance
DTC Tracking compensation distance
```

D/N: 1703A
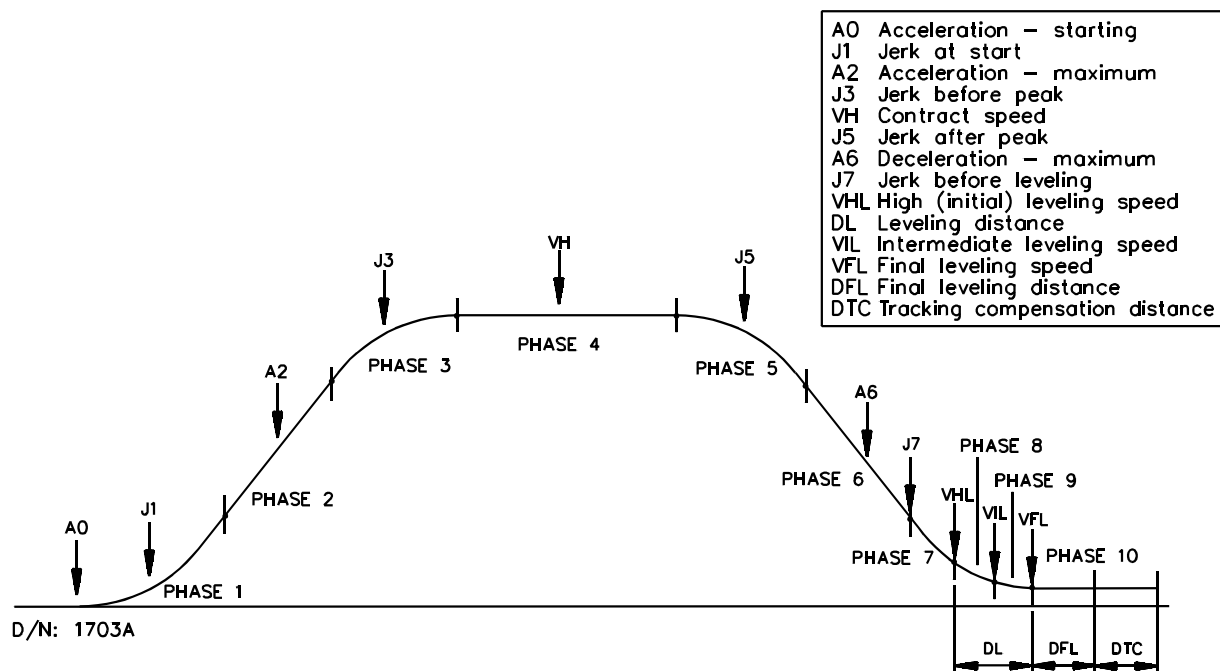
The F2 screen (Shift F3 for Simplex) on the CRT provides a visual representation of the current speed pattern being generated by the computer. If a problem does not reside with a faulty input signal, a comparison of this screen with the actual tachometer velocity can isolate problems between the computer and the rest of the hardware.

FIGURE 6.3   Graphic Display of Elevator F3 Screen

```
FDX Main          17-31          1:03          95/02/24          10:05:09          F 4 = main menu

        ┌──── CAR OPERATION ────┐                              ┌──── PATTERN GENERATOR ────┐
        IndSrv      InspAcc    MnFire1                          Oper:           Normal Profile
        AntiNui     Byp—HLW    SftyOpn                          Type:           Maximum
        BFlrDem     TFlrDem    EQactv                           Mode:           Phase Five
        HospEmr     EmrgPwr    Nudging       FLOOR    A    FLR  Media:          Rcv DPRAM
        SwngOpr                             HEIGHT    IN    #   DRVR   PGS   PGR      ORR    SPR
        ┌──────── DRIVE ────────┐                              DRVE   PGE   PGU             TPR
        Oper:              Drive Ready                    8
                                                               RD  PR  R5  R4  R3  R2  R1  R0
        DRVR   RNF   BRP   SMF   TIN                            FLR    LEV   LD    DZ   LU   OLM
        DRVE   RNE   BRE         TEX                      7     LI     INT   DN    H    UP   STP
        Motor Field:         153.90V                                        LRN   EQ   INS
        Brake Field:         224.58V                      6    ┌──────── Fault ────────┐
        Shunt Field:        −034.23V                           FHC    RDS   LLT   SSO   SPP   CPL
        Armature:            320.51V                           P1C    PRS   OLD   OFH   SPC   CPP
        DC Loop:             127.07A                      5    P2C    IDM   OLP   TFH   SPT   CPI
        ┌──────── Fault ────────┐                              IDC    PPS   TPS   VC
        TF    MF    FLT    UETS   P3C                          SWC    IBJ   LOP   VS
        TE    BF    FLTB   DETS   P4C                     4                 LOD   FHL
        TSAT  GSF   FBLT   SAF    P5C                          ┌──────── POSITION ────────┐
        TME   HV    DTS    CNPB   P6C       51'11.29"          Relative            024'08.78"
        GSAT  LOC   DEL    CNPG                            3   Absolute:            51'11.29"
        ┌──────── SAFETY ────────┐                             Delta OLM:         −000'00.24"
        Speed:                                                 ┌──────── VELOCITY ────────┐
        SPR   UT5   UT4   UT3   UT2   UT1                 2    Pattern:            1200 ft/min
        SPT   DT5   DT4   DT3   DT2   DT1                      Tachometer:         1198 ft/min
        LRN   UET   DET   OS    ILO   NTS                 1    Motor:               180 rev/min
                                                               OLM:                0163 ft/min
                                            000'00.00"

                                                                            D/N: 1704b R0
```

The pattern generator for the IMC-MG controller is controlled by the IMC-DDP-x processor. The F3 screen is the primary diagnostic tool for Digital Drive operation. It displays the operating parameters and status signals of the elevator. The parameter windows that pertain to the pattern generator include: Pattern Generator, Fault, Position and Velocity. This section has detailed descriptions of all pattern generator parameters.

TABLE 6.7   Pattern Generator Operation - F3 Screen

OPERATION PARAMETERS - The following parameters describe specific characteristics of the task being executed and inform the user of what the computer is trying to accomplish at any given time.	
OPER	Indicates the name of the currently executing task
TYPE	Maximum - elevator will reach contract velocity during the run, Intermediate - elevator will not reach contract velocity during the run. Short - elevator will follow a short floor profile, etc.
MODE	Indicates which phase of the speed pattern is being executed.
MEDIA	Indicates other resources that the task requires to complete. (For example, the message RCV DPRAM - saving parameters through the CRT requires a data transfer through the Dual Port RAM between the MC-CPA-1SL and IMC-DDP-x processors).

TABLE 6.8 Pattern Generator Status - F3 Screen

STATUS PARAMETERS The following signals indicate the state of the pattern generator. These states, in addition to the input signals, determine what task will be performed. All these flags must be highlighted prior to making a normal run. The sequence of flags that highlight are: **PGU, DRVR, SPR, PGR, ORR, PGS, DRVE, PGE.**	
DRVR *(Drive Ready)*	Indicates that the Drive does not have a pending fault conditions. This is the second in a chain of status signals that must be active for the pattern generator to create a normal run profile.
PGS *(Pattern Generator Synchronized)*	Indicates that the pattern generator has suspended all other tasks and is waiting for the main processor to generate all signals to initiate a normal run profile. This is the sixth in a chain of status signals that must be active for the pattern generator to create a normal run profile. This status signal will be deactivated if the PGR and/or ORR status signals are not active. No other profile requires this signal to be active.
PGR *(Pattern Generator Ready)*	Indicates that the pattern generator is ready to execute a normal run profile when requested. This is the fourth in a chain of status signals that must be active for the pattern generator to create a normal run profile. No other profile requires this signal to be active. This status signal will be deactivated if the PGU, DRVR, and/or SPR status signals are not active. In addition, the IBJ fault flag will also deactivate the status signal.
ORR *(Operation Run Request)*	Indicates that the Main Processor is requesting the pattern generator to ready itself to generate a normal run profile. This is the fifth in a chain of status signals that must be active for the pattern generator to create a normal run profile. No other profile requires this signal to be active.
SPR *(Safety Processor Ready)*	Indicates that the safety processor is ready. This is the third in a chain of status signals that must be active for the pattern generator to create a normal run profile.
DRVE *(Drive Enabled)*	Indicates that the Drive is ready for motion to be initiated. This is the seventh in a chain of status signals that must be active for the pattern generator to create a normal run profile.
PGE *(Pattern Generator Enabled)*	Indicates that the pattern generator is generating a profile. This is the eighth and last in a chain of status signals that must be active for the pattern generator to generate a profile. This status signal will be deactivated if the DRVE status signal is not active.
PGU *(Pattern Generator Updated)*	Indicates that the pattern generator has calculated all the pattern profiles from the current floor. This is the first in a chain of status signals that must be active for the pattern generator to create a normal run profile. The following faults will deactivate this status signal: FHC, P1C, P2C, RDS, PRS, SSO, OFH, TFH, VC, VS, FHL, and/or CPL.

TABLE 6.9 Pattern Generator I/O Signals- F3 Screen

INPUT/OUTPUT SIGNALS The following lists the principal signals that are used by the pattern generator to initiate motion.	
RD *(Read)*	If active, indicates that a valid floor code can be read. If the signal is inactive, the elevator is not at a floor, the dead zone of the LS-QUAD-2 landing system is too wide, the dead zone of the LS-QUAD-2 landing system is not symmetrical around the DZ sensor, or the DZ magnet has fallen off of the perforated steel tape.
PR *(Parity)*	Used to validate the floor code at each landing. Since even parity is used, an odd number of binary floor code signals (R0 through R5) will be active if PR is active. If this signal is inactive, the elevator is not level with the floor, the floor code requires the PR signal to be inactive (an even number of binary floor code signals are active), or the PR magnet has fallen off of the perforated steel tape.
Rx *(Binary Floor Code)*	Determines the binary floor code for each floor. A comparison of the actual physical location of the elevator and the binary floor code generated for the floor will determine if one of the Rx signals is in error. Please note that the binary floor code is referenced only to the floors that the elevator can service. In addition, the code starts with a value of one (bottom floor code = R0 + PR).
FLR *(Floor Level)*	If active, indicates that the elevator is level with a floor. Without this signal, the PGU status signal never activates.
LEV *(Leveling)*	If active, indicates that the LU or LD sensor is on the DZ magnet and that the elevator is not level with the floor. The LU or LD signal, under normal circumstances, will generate a relevel into the floor. Under Normal operation, a relevel may be the result of a narrow Dead Zone or poor adjustment of the Drive.
LD *(Level Down)*	If active, indicates that the LD sensor is on the DZ magnet and that the elevator is above (within 6" or 152 mm) the floor.
DZ *(Door Zone)*	If active, indicates that the elevator is level with the floor or within 3" (76 mm) of the floor.
LU *(Level Up)*	If active, indicates that the LU sensor is on the DZ magnet and that the elevator is below (within 6" or 152 mm) the floor.
OLM *(Outer Level Marker)*	If active, indicates that the elevator is within 12" (305 mm) of a floor. The signal is used to determine whether there is a problem with the quadrature pulser signals by comparing the traveled distance with a value determined from the learned floor heights. The difference between these two calculations is represented by Delta OLM in the Position window on the F3 screen.

INPUT/OUTPUT SIGNALS The following lists the principal signals that are used by the pattern generator to initiate motion.	
LI *(Level Inhibit)*	If active, indicates that the MC-MP-1ES processor will not drop direction. This signal, along with the INT signal, are the only IMC-DDP-x processor signals that prevent the MC-MP-1ES processor from dropping direction after the H (High speed) signal is deactivated. The signal is user programmable via the MLI parameter on the Profile Parameters screen. This programmed distance is enforced by the program unless an unusual circumstance arises (i.e. the IMC-DDP-x processor looses the quadrature signal, a request to stop is issued, etc.). In addition, if the MLI parameter is set to a distance that is too large, the elevator may stop one floor short of the desired destination floor if the preceding floor is a short floor.
INT *(Intermediate Speed)*	If active, indicates that the MP processor should not drop direction. This signal, along with the LI signal, is the only IMC-DDP-x processor signal that prevents the MC-MP-1ES processor from dropping direction after the H signal is deactivated. The signal is user programmable via the MINT parameter under the Profile Parameters screen. Problems may arise if the MINT parameter is set to a velocity greater than the earthquake velocity (EQ).
DN *(Down Direction)*	If active, indicates that the IMC-DDP-x processor has received a request for motion. The H input signal must be active prior to or simultaneous with the activation of the DN signal in order for the pattern generator to execute a normal run profile.
H *(High Speed)*	If active, indicates that the IMC-DDP-x processor should execute a normal run profile with the activation of the UP or DN signal.
UP *(Up Direction)*	If active, indicates that the IMC-DDP-x processor has received a request for motion. The H input signal must be active prior to or simultaneous with the activation of the UP signal in order for the pattern generator to execute a normal run profile.
STP *(Step)*	If active, indicates that the pattern generator is at a point along the normal run profile where a determination has to be made to begin a deceleration to a floor or to continue to another floor. In order to stop at the correct floor, the H signal must deactivate before the STP signal deactivates. If this does not occur, the pattern generator will travel to at least the next available floor. For example, in order to generate a three floor run, the H signal should not deactivate until the third STP signal is generated.
LRN *(Pattern Generator Learn)*	If active, indicates that the pattern generator is on Learn operation. This signal is required by the pattern generator to execute a learn run profile and to learn the building floor heights.
EQ *(Pattern Generator Earthquake)*	If active, indicates that the pattern generator has received an earthquake input signal. This signal is required by the pattern generator to execute an earthquake run profile.
INS *(Pattern Generator Inspection)*	If active, indicates that the pattern generator has received an inspection input signal. This signal is required by the pattern generator to execute an inspection run profile.

TABLE 6.10   Pattern Generator Faults - F3 Screen

FAULTS These fault flags indicate problems and/or deficiencies that must be corrected for normal operation to begin.	
FHC *(Floor Height Checksum Error)*	If active, indicates that the floor heights saved into memory on the EEPROM chip are invalid and that the pattern generator will not execute a normal run profile. The problem lies with the EEPROM, or a faulty component on the IMC-DDP-x board. Sometimes the problem can be resolved by removing and reinserting the EEPROM and/or EPROM in its socket.
P1C *(Pattern Parameter Checksum Error)*	If active, indicates that the Pattern Parameters read from EEPROM are invalid and that the pattern generator will not execute a normal run profile. Troubleshooting is the same as for FHC.
P2C *(Profile Parameter Checksum Error)*	If active, indicates that the Profile Parameters read from EEPROM are invalid and that the pattern generator will not execute a normal run profile. Troubleshooting is the same as for FHC.
IDC *(Identification Checksum Error)*	If active, indicates that the identification read from EEPROM is invalid and that the pattern generator will not execute a normal run profile. Troubleshooting is the same as for FHC.
SWC *(Normal Terminal Switches Checksum Error)*	If active, indicates that the switch distances read from EEPROM are invalid and that the pattern generator will not execute a normal run profile. Troubleshooting is the same as for FHC.
RDS *(Read Sensor Error)*	If active, indicates that the elevator has stopped and that the pattern generator is not receiving the RD signal.
PRS *(Parity Sensor Error)*	If active, indicates that the state of the PR signal is invalid in reference to the states of the R0, R1, R2, R3, R4, and R5.

FAULTS These fault flags indicate problems and/or deficiencies that must be corrected for normal operation to begin.	
IDM *(Identification Mismatch)*	If active, indicates a mismatch between the identification sent from the MC-CPA-1SL board and read from EEPROM. This problem is caused when the hoistway has not been learned for the first time; the MC-MP-1ES, MC-CPA-1SL, or IMC-DDP-x boards have been exchanged; or the EEPROM on the IMC-DDP-x board has been exchanged. One way to clear this fault is to relearn the hoistway.
PPS *(Pattern Profile Setup Warning)*	If active, indicates that the pattern profile must be regenerated before the pattern generator will execute a normal run profile. If PPS is active, PGU will be deactivated. Please note that this flag is generated when the elevator takes off from a floor via a normal run profile; however, the flag should be deactivated when the elevator stops at a floor.
IBJ *(Intermediate Speed Bypass Jumper Error)*	If active, indicates that the elevator is under Normal operation and the INTB jumper on the IMC-RI board is in the LRN position. This jumper should be in the LRN position only when the elevator is on Inspection and the hoistway is about to be learned. If IBJ is active, PGR is deactivated. To resolve the problem, move the INTB jumper on the IMC-RI board to the NORM position.
LLT *(Leveling Limit Timer Warning)*	If active, indicates that the elevator is traveling at leveling speed too long. In response, the pattern generator creates a correction run profile to the next floor. This warning is usually in response to other abnormal conditions.
OLD *(Excessive Position Error at OLM)*	If active, indicates that the distance traveled to the OLM position at the destination floor is in error with the distance to that point calculated from the learned floor heights. The problem may be related to dirty optical sensors on the LS-QUAD-2 landing system; to a dirty reflective plate opposite the optical sensors; to an oily perforated steel tape; to a large Dead Zone on the LS-QUAD-2 landing system; or to a faulty IMC-RI, IMC-DIO, and/or IMC-DDP-x board.
OLP *(Position Error at OLM)*	If active, indicates that the pattern profile was modified to accommodate the error seen at the OLM distance (12" or 305 mm from the floor). If the error is too great, however, the elevator will be allowed to pass the floor and stop at the next available landing. Refer to OLD above for troubleshooting.
TPS *(Normal Terminal Position Switch Error)*	If active, indicates that the absolute distance reached when a terminal limit switch was activated is different from the learned distance. This problem may be due to an incorrect quadrature pulse signal from the car top, unlearned limit switches, faulty limit switches, or moved limit switches. When the switches have never been learned for the current IMC-DDP-x board or when they have been moved, the IMC-DDP-x board must relearn the absolute position at which the switches open up. For quadrature related problems, refer to OLD for troubleshooting. These positions are learned by the safety processor on the IMC-DDP-x board when the IMC-DIO board learns the normal terminal limit switches.
LOP *(Loss of Position Error)*	If active, indicates an incorrect quadrature signal from the car top. Refer to OLD for troubleshooting.
LOD *(Loss of Direction Error)*	If active, indicates that direction was removed prior to the car reaching the leveling zone of the destination floor. This problem is usually due to a clipped door lock, a faulty ribbon cable between the IMC-RI and IMC-MB boards, a problem detected with the MC-MP-1ES processor, a problem sensed by the Drive, a sagging/low 2 Bus voltage, a normal switch failure, or a faulty IMC-RI, IMC-DIO, or IMC-DDP-x board.
SSO *(Step Signal Overlap Error)*	If active, indicates that the time between successive STP signals was shorter than the duration of signal. To resolve the problem, increase J1, decrease A2, increase J3, increase J5, and/or decrease A6 on the Pattern Parameters screen.
OFH *(One Floor Height Error)*	If active, indicates that a normal run profile would be invalid for the shortest floor in the building. To resolve the problem, decrease DS, decrease VS, increase A2, and/or increase J1 on the Pattern Parameters screen. Parameters listed are given in order of decreasing affect (that is, changing DS would have the most effect and J1 the least effect).
TFH *(Two Floor Height Error)*	If active, indicates that a normal run profile would be invalid for the shortest two floor combination in the building because the minimum profile distance would be greater. To resolve this problem, increase J5, increase A6, increase J7, increase J3, increase A2, increase VHL, increase VIL, increase VFL, decrease DFL, and or decrease DL, and/or increase J1 on the Pattern Parameters screen. Parameters listed are given in order of decreasing affect.
VC *(Contract Velocity Error)*	If active, indicates that a normal run profile is invalid because contract velocity would be exceeded. To resolve this problem, increase J5, increase J3, decrease A6, decrease A2, increase J7. Parameters listed are given in order of decreasing affect.
VS *(Short Velocity Error)*	If active, indicates that a normal run profile is invalid because short velocity would be exceeded on a short floor. To resolve this problem, decrease A2, increase VS, and/or increase J1. Parameters listed are given in order of decreasing affect.
FHL *(Floor Height Learn Error)*	If active, indicates that the number of floors learned by the pattern generator is different from the NL (Number of Landings) parameter. This problem can be due to a NL value that does not reflect the actual number of floors, an up normal limit switch below the top landing, invalid operation of the USD and/or DSD switch; a drop of direction before the entire building is learned, or a faulty EEPROM on the IMC-DDP-x board.
SPP *(Safety Processor Protocol Error)*	If active, indicates invalid data passed between the IMC-DIO and IMC-DDP-x boards. The problem could be the result of an incorrectly socketed EPROM on the IMC-DDP-x board, an incorrectly socketed IMC-DIO board processor, an incorrectly inserted IMC-DIO board, a faulty IMC-DDP-x board or a faulty IMC-DIO board.

FAULTS These fault flags indicate problems and/or deficiencies that must be corrected for normal operation to begin.	
SPC *(Safety Processor Communication Error)*	If active, indicates that the IMC-DDP-x board is not receiving data from the IMC-DIO board. Refer to SPP above for troubleshooting.
SPT *(Safety Processor Tripped)*	If active, indicates that a fault condition was detected by the Safety Processor on the IMC-DIO board.
CPL *(Communication Processor Looping Error)*	If active, indicates that the pattern generator is not detecting a looping MC-CPA-1SL processor. Initially, check whether the power indicator is ON solidly on the MC-CPA-1SL board. The problem may be due to a faulty connection between the IMC-DDP-x and MC-CPA-1SL board, an incorrectly socketed EPROM on the MC-CPA-1SL board, a faulty MC-CPA-1SL board, a faulty IMC-DDP-x board, or a faulty MC-MP-1ES board.
CPP *(Communication Processor Protocol Error)*	If active, indicates that the IMC-DDP-x board is receiving invalid data from the MC-CPA-1SL board. The problem may be due to: a faulty connection between the IMC-DDP-x and MC-CPA-1SL board; an incorrectly socketed EPROM on the MC-CPA-1SL board; a faulty MC-CPA-1SL board; or a faulty IMC-DDP-x board.
CPI *(Communication Processor Identification Error)*	If active, indicates that the IMC-DDP-x board is receiving invalid car identification data from the MC-CPA-1SL board. Refer to CPP above for troubleshooting.

TABLE 6.11   Position - F3 Screen

|	
Relative	Reflects the total distance traveled to reach the destination floor from the starting floor. This value is always positive and should reflect the difference in height between the two floors. The difference based upon the learned floor heights should correlate with this value. This count value is stored with the drop of direction; the elevator will continue to travel a bit further before it comes to a complete stop.
Absolute	Reflects the position of the elevator as referenced from the bottom landing. When the elevator comes to a complete stop, and the floor code of the destination floor is determined, the absolute distance displayed will be obtained from the learned floor heights. This is done to eliminate the accumulation of count errors as the elevator travels within the hoistway. Please note that the initial distance displayed upon power-up may be invalid if the elevator is not at a floor. Once the car moves to a floor, the correct value for the distance will be displayed. This value increases as the elevator travels up and decreases when the car travels down. If this is not the case, the quadrature pulser signals (95 and 96 on the IMC-RI board) may be reversed.
Delta OLM	Reflects the error in distance between actual and learned floor distance obtained from the quadrature pulser signals when the OLM signal is activated at a destination floor. If the value is positive, the pattern generator believed the car was further away from the destination floor than it really was. If the value is negative, it thought the floor was closer. Since the OLM signal occurs one foot away from a floor, the pattern generator is given the opportunity to modify the profile, if possible, in order to stop correctly at the destination floor.

TABLE 6.12   Velocity - F3 Screen

Pattern	Reflects the commanded velocity as based upon user parameters and the floor height distance between the start and destination floor.
Tachometer	Reflects the actual elevator velocity. Its accuracy is dependent upon proper calibration of GTC in the Gain Parameters screen. The correlation between elevator velocity and tachometer voltage, as entered by the adjuster, must be correct for proper display.
Motor	Reflects the actual hoist motor rpm. Its accuracy is dependent upon proper calibration of CTR in Option/Cal Parameters screen. The correlation between tachometer rpm and tachometer voltage, as entered by the adjuster, must be correct for proper display.
OLM	Reflects the actual elevator velocity when it is 1 foot (305 mm) away from the destination floor. Again, its accuracy is dependent upon proper calibration. The correlation between elevator velocity and tachometer voltage, as entered by the adjuster, must be correct for proper display.

6.3 COMPUTER SWING PANEL INDICATORS AND ALPHANUMERIC DISPLAY

The Computer Swing Panel has three sets of eight indicators that can provide status and error information (Figure 6.4). The Status Indicators (vertical row or eight LEDs) provide information on the current status of the controller.

FIGURE 6.4   Computer Swing Panel, Front View
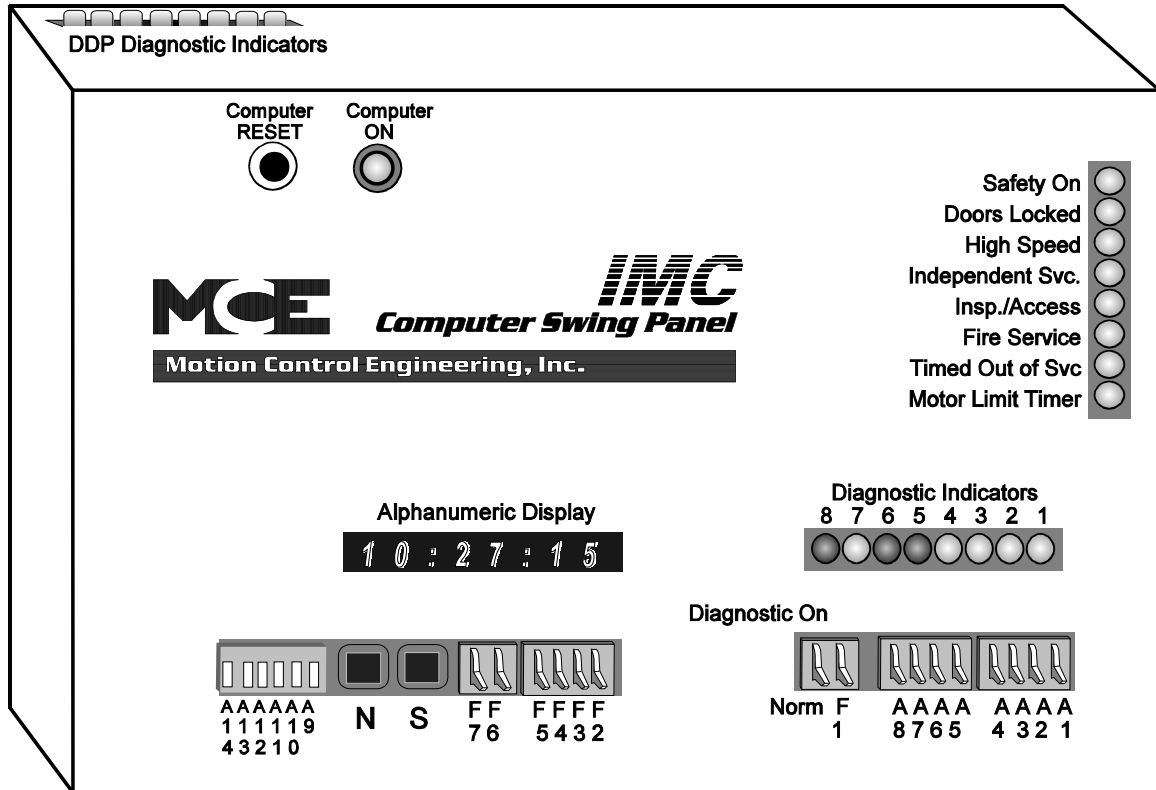
MC-MP-1ES DIAGNOSTIC INDICATORS - (horizontal row of eight LEDs). During normal operation these LEDs scan from right to left (indicating that the MP program is looping properly) or flash ON and OFF to indicate a status or error condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

The MC-MP-1ES Diagnostic Indicators flash when a status or error condition exists. If your controller has the MC-MP-1ES Main Processor, refer to Tables 6.13, MC-MP-1ES Status and Error Messages, to find the message being flashed on the Diagnostic Indicators. Then, for a description and troubleshooting information, look for the message by the scrolling message name in Table 6.15, *Status and Error Messages*.

TABLE 6.13   MC-MP-1ES Status and Error Messages   ○ = LED off   ● = LED blinking

Hex	Diagnostic Indicators	Mode	MC-MP2 SCROLLING MESSAGE
	Single LED scanning	Normal	NORMAL OPERATION
01	○○○○○○○●	Normal	EARTHQUAKE - REDUCED SPEED OPERATION
02	○○○○○○●○	Normal	POWER UP SHUTDOWN DUE TO EARTHQUAKE
03	○○○○○○●●	Normal	ATTENDANT SERVICE OPERATION
07	○○○○○●●●	Normal	HALL CALL BUS IS DISCONNECTED
09	○○○○●○○●	Normal	PASSCODE REQUEST
0F	○○○○●●●●	Normal	CAR CALL BUS IS DISCONNECTED
11	○○○●○○○●	Normal	GOVERNOR SWITCH OPEN
12	○○○●○○●○	Normal	DRIVE TEMPERATURE SENSOR FAULT
13	○○○●○○●●	Learn	CAR NOT AT BOTTOM LANDING (SETUP ERROR) LEARN MODE
14	○○○●○●○○	Learn	CAR NOT ON LEVEL UP (SETUP ERROR) LEARN MODE
15	○○○●○●○●	Learn	CAR NOT ON INSPECTION (SETUP ERROR) LEARN MODE
16	○○○●○●●○	Learn	CAR NOT BELOW DOOR ZONE (SETUP ERROR) LEARN MODE
17	○○○●○●●●	Learn	CAR NOT ON LEVEL DOWN (SETUP ERROR) LEARN MODE
18	○○○●●○○○	Normal	PHOTO EYE FAILURE
1F	○○○●●●●●	Normal	TIME OUT OF SERVICE
20	○○●○○○○○	Learn	LOSS OF INSPECTION DURING LEARN MODE
22	○○●○○○●○	Learn	NO RESPONSE FROM PATTERN GENERATOR (SETUP ERROR) LEARN MODE
22	○○●○○○●○	Normal	HOISTWAY SAFETY DEVICE OPEN
23	○○●○○○●●	Learn	PG ERROR, LOSS OF UP DIRECTION (SETUP ERROR) LEARN MODE
24	○○●○○●○○	Normal	OVERLOAD CONDITION
29	○○●○●○○●	Learn	BOTH LEVELING SWITCHES ARE ON (SETUP ERROR) LEARN MODE
32	○○●●○○●○	Normal	DRIVE FAILED TO RESPOND
33	○○●●○○●●	Normal	BRAKE PICK FAILURE
3C	○○●●●●○○	Normal	LEVELING DOWN
3F	○○●●●●●●	Normal	DOL AND DLK BOTH ACTIVE
42	○●○○○○●○	Normal	PG NOT READY
44	○●○○○●○○	Normal	CAR SAFETY DEVICE OPEN
66	○●●○○●●○	Learn	Check Alphanumeric Display for scrolling message - see Section 6..3.1
71	○●●●○○○●	Normal	CAR IN TEST MODE
72	○●●●○○●○	Normal	DRIVE FAULT 2
73	○●●●○○●●	Normal	PRE-TEST MODE
7E	○●●●●●●○	Normal	ENTER SECURITY CODE
7F	○●●●●●●●	Normal	INDEPENDENT SERVICE OPERATION
80	●○○○○○○○	Normal	INSPECTION OPERATION
82	●○○○○○●○	Normal	DOOR LOCK SWITCH FAILURE

TABLE 6.13   MC-MP-1ES Status and Error Messages   ○ = LED off   ● = LED blinking

Hex	Diagnostic Indicators	Mode	MC-MP2 SCROLLING MESSAGE
83	● ○ ○ ○ ○ ○ ● ●	Normal	DOOR OPEN LIMIT FAILURE
84	● ○ ○ ○ ○ ● ○ ○	Normal	GATE SWITCH FAILURE
85	● ○ ○ ○ ○ ● ○ ●	Normal	REDUNDANCY GATE SWITCH RELAY FAILURE
86	● ○ ○ ○ ○ ● ● ○	Normal	REDUNDANCY DOOR LOCK RELAY FAILURE
88	● ○ ○ ○ ● ○ ○ ○	Normal	IN CAR STOP SWITCH ACTIVATED
C0	● ● ○ ○ ○ ○ ○ ○	Normal	FIRE SERVICE PHASE 2
C1	● ● ○ ○ ○ ○ ○ ●	Normal	DOOR LOCK FAILURE
C2	● ● ○ ○ ○ ○ ● ○	Normal	DOOR CLOSE FAILURE
C3	● ● ○ ○ ○ ○ ● ●	Normal	LEVELING UP
C4	● ● ○ ○ ○ ● ○ ○	Normal	FRONT DOOR IS LOCKED BUT NOT FULLY CLOSED
C5	● ● ○ ○ ○ ● ○ ●	Normal	REAR DOOR IS LOCKED BUT NOT FULLY CLOSED
C9	● ● ○ ○ ● ○ ○ ●	Normal	LEVELING SENSOR FAILURE
CA	● ● ○ ○ ● ○ ● ○	Normal	LANDING SYSTEM REDUNDANCY FAILURE
CB	● ● ○ ○ ● ○ ● ●	Normal	CONTACTOR PROOFING REDUNDANCY FAILURE
CC	● ● ○ ○ ● ● ○ ○	Normal	DIRECTION RELAY REDUNDANCY FAILURE
CD	● ● ○ ○ ● ● ○ ●	Normal	INSPECTION/LEVELING OVERSPEED FAILURE
CF	● ● ○ ○ ● ● ● ●	Normal	ELEVATOR SHUTDOWN SWITCH OR POWER TRANSFER INPUT ACTIVE
DB	● ● ○ ● ● ○ ● ●	Normal	BOTTOM FLOOR DEMAND OR TOP FLOOR DEMAND
E0	● ● ● ○ ○ ○ ○ ○	Normal	FIRE SERVICE PHASE 1 - MAIN
E1	● ● ● ○ ○ ○ ○ ●	Normal	EMERGENCY POWER OPERATION
E2	● ● ● ○ ○ ○ ● ○	Normal	SHUTDOWN OPERATION
E3	● ● ● ○ ○ ○ ● ●	Normal	CAR TO LOBBY OPERATION
E4	● ● ● ○ ○ ● ○ ○	Normal	PRIORITY/VIP SERVICE - PHASE 1
E5	● ● ● ○ ○ ● ○ ●	Normal	PRIORITY/VIP SERVICE - PHASE 2
E7	● ● ● ○ ○ ● ● ●	Normal	HEAVY LOAD WEIGHER CONDITION
E8	● ● ● ○ ● ○ ○ ○	Normal	LIGHT LOAD WEIGHER CONDITION
E9	● ● ● ○ ● ○ ○ ●	Normal	AUX. INSPECTION ACCESS FAULT
EA	● ● ● ○ ● ○ ● ○	Normal	2ND LANDING AUX. ACCESS FAULT
EB	● ● ● ○ ● ○ ● ●	Normal	BOTTOM LANDING AUX. ACCESS FAULT
EC	● ● ● ○ ● ● ○ ○	Normal	DPM REDUNDANCY FAULT
ED	● ● ● ○ ● ● ○ ○	Normal	DPMR REDUNDANCY FAULT
F0	● ● ● ● ○ ○ ○ ○	Normal	FIRE SERVICE PHASE 1 - ALTERNATE
F1	● ● ● ● ○ ○ ○ ●	Normal	HOSPITAL PHASE 1 OPERATION
F2	● ● ● ● ○ ○ ● ○	Normal	HOSPITAL PHASE 2 OPERATION
F3	● ● ● ● ○ ○ ● ●	Normal	DOOR ZONE SENSOR FAILURE
F4	● ● ● ● ○ ● ○ ○	Normal	LEVELING SENSOR FAILED - ON POSITION
F5	● ● ● ● ○ ● ○ ●	Normal	LEVELING SENSOR FAILED - OFF POSITION
F7	● ● ● ● ○ ● ● ●	Normal	EMERGENCY POWER SHUTDOWN
F8	● ● ● ● ● ○ ○ ○	Normal	MOTOR LIMIT TIMER (ANTI–STALL) ELAPSED
F9	● ● ● ● ● ○ ○ ●	Normal	DRIVE FORCED MOTOR LIMIT TIMER
FA	● ● ● ● ● ○ ● ○	Normal	IMC SUB-SYSTEM NOT READY
FC	● ● ● ● ● ● ○ ○	Normal	EARTHQUAKE OPERATION
FD	● ● ● ● ● ● ○ ●	Normal	FAILURE TO LEAVE THE FLOOR
FE	● ● ● ● ● ● ● ○	Normal	BOTH USD AND DSD INPUTS ARE ACTIVE
FF	● ● ● ● ● ● ● ●	Normal	SAFETY CIRCUIT IS OPEN

IMC-DDP DIAGNOSTIC INDICATORS - located on the top of the Computer Swing Panel. In Normal Mode these indicators scan from right to left (indicating that the DDP program is looping properly) or flash ON and OFF to indicate a status or error condition. When troubleshooting, pay special attention to these indicators, as they will often point to the source of the problem. For a description and troubleshooting information, look for the message by name in Table 6.15, Status and Error Messages.

TABLE 6.14   IMC-DDP Status and Error Messages   ○ = LED off   ● = LED blinking

Hex	Diagnostic Indicators	Status / Error Message
	Single LED scanning	Normal Operation - no errors or messages
01	○○○○○○○●	Loss of Position
03	○○○○○○●●	Terminal Position Switch
0E	○○○○●●●○	CP not responding
1F	○○○●●●●●	Learn Run
24	○○●○○●○○	Drive Not Ready
3F	○○●●●●●●	Inspection Run
42	○●○○○○●○	PG Not Ready
7E	○●●●●●●○	Identification Mismatch
80	●○○○○○○○	Read sensor error from the landing system
99	●○○●●○○●	Fault Relay
C0	●●○○○○○○	Invalid Pattern/Profile parameters
C1	●●○○○○○●	Parity Sensor Error from the landing system
C2	●●○○○○●○	Safety Processor not responding
EF	●●●○●●●●	Correction Run
F0	●●●●○○○○	Parameter Checksum Error
F8	●●●●●○○○	Floor Height Checksum
F9	●●●●●○○●	Floors Learned Error

6.3.1 MC-MP2 DIAGNOSTIC INDICATORS AND ALPHANUMERIC DISPLAY

MC-MP2 DIAGNOSTIC INDICATORS - During normal operation these lights scan from right to left (indicating that the MP2 program is looping properly) or flash ON and OFF to indicate a status or error condition. If the car is connected to a Group Supervisor in a multi-car group system, the lights will scan from right to left, then left to right, indicating proper communication between the Car Controller and the Group Supervisor.

When a status or error condition exists, the Diagnostic Indicators flash one of several messages depending on the software version (MP2 version number scrolls on boot up):

- Software versions 8.02.00 or earlier flash the MC-MP-1ES messages (see Table 6.13).
- Software version 8.03.00 flashes CC Hex.
- Software versions 8.04.00 or later flash 66 Hex.

Diagnostic Indicators
8 7 6 5 4 3 2 1

CC Hex ●●○○●●○○

66 Hex ○●●○○●●○

MC-MP2 ALPHANUMERIC DISPLAY - If the scrolling status or error message is not displayed when the Diagnostic Indicators flash, press the N pushbutton until the scrolling message appears (see Section 5.2.1 ALPHANUMERIC DISPLAY - STATUS AND ERROR MESSAGES). Refer to Table 6.15 *Status and Error Messages* and/or Table 6.16 *Special Event Descriptions* for a description and troubleshooting information.

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
2ND LANDING AUX. ACCESS FAULT			MP	●●●○○●○●○ Hex (EA)
The inputs "Second Landing Access Bypass" (2AB) and "Redundant Second Landing Access Bypass" (R2AB) are compared. The car is shut down and this fault is generated if both inputs have the same status.				
ATTENDANT SERVICE OPERATION		AttnSrv	MP	○○○○○○●● Hex (03)
The attendant service input (ATS) is activated. • Attendant service is maintained as long as the ATS input is activated, in the absence of any "emergency services" (e.g., fire service). Check the status of the ATS input, and determine if the status of the input is appropriate.				
AUX. INSPECTION ACCESS FAULT			MP	●●●○○●○○● Hex (E9)
The inputs "Inspection Access" (INA) and "Redundant Inspection Access" (RINA) are compared. The car is shut down and this fault is generated if both inputs have the same status.				
BOTH LEVELING SWITCHES ARE ON (SETUP ERROR), LEARN MODE			MP	○○●○●○○● Hex (29)
Faulty leveling sensor, or faulty computer input (LU or LD) • Position the car below the bottom landing. Check for faulty or mis-wired level down sensor. Check the computer inputs (LU and LD) status.				
BOTH USD AND DSD INPUTS ARE ACTIVE			MP	●●●●●●●○ Hex (FE)
Usually indicates a problem with the up slow down or the down slow down limit switches. • Inspect both switches and associated wiring. The down slow down switch should be closed, unless the car is at the bottom; then it should be open. The up slow down switch should be closed, unless the car is at the top; then it should be open.				
BOTTOM FLOOR OR TOP FLOOR DEMAND	SEC	BflrDem	MP	●●○●●○●● Hex (DB)

The controller is trying to establish the position of the car by sending it to a landing. Four possible causes are:
1. A change from Inspection to Automatic operation.
2. Pressing the COMPUTER RESET button.
3. Initial Power-up.
4. The limit switch contacts, at a terminal landing, did not remain open (USD/DSD inputs).
NOTE: If the controller has the absolute floor encoding feature, then the Bottom and Top Floor Demands should be cleared when the car stops in any door zone. The car does not have to travel to the top or bottom.
• Bottom Floor Demand should be cleared when all of the following conditions are met:
   1. The car is at the bottom and the down slow down (DSD) input to the controller is OFF (because the switch should be open).
   2. The Door Zone (DZ) input to the controller is ON.
   3. The Door Lock (DLK) input to the controller is ON.
   If the car is at the bottom, and the message still flashes, check the Down Slow Down switch & associated wiring. Also, inspect the door zone landing system vane or magnet at the bottom floor and the door lock circuit.
 	
• Top Floor Demand should be cleared when all of the following conditions are met:
   1. The car is at the top and the up slow down (USD) input to the controller is OFF (because the switch should be open).
   2. The Door Zone (DZ) input to the controller is ON.
   3. The Door Lock (DLK) input to the controller is ON.
• If the car is at the top, and the message still flashes, inspect the Up Slow Down Switch & associated wiring. Also, inspect the door zone landing system vane or magnet at the top floor and the door lock circuit.				

BOTTOM LANDING AUX. ACCESS FAULT			MP	●●●○○●○●● Hex (EB)
The inputs "Bottom Landing Access Bypass" (BAB) and "Redundant Bottom Landing Access Bypass" (RBAB) are compared. The car is shut down and this fault is generated if both inputs have the same status.				
BRAKE PICK FAILURE			MP	○○●●○○●● Hex (33)
The car is shut down due to the BPS input being seen as activated during three consecutive runs indicating the brake is not fully picked. (BPS is high). • Check the brake pick switch for proper operation (the contact should open when the brake is fully picked). Check the status of the BPS input, and determine if the status of the input is appropriate (deactivated) when the brake is picked.				
CAR CALL BUS IS DISCONNECTED			MP	○○○○●●●● Hex (OF)
A problem in the wiring or fuses. There is no power to the Car Call circuits on the HC-CIO board. • Check the Car Call Bus fuse. Check the wires that go to the Car Call Power inputs on the HC-CIO board in the controller.				
CAR IN TEST MODE			MP	○●●●○○○● Hex (71)
The TEST/NORM switch on the HC-RB4 board is in the TEST position. • Check the TEST/NORM switch on the HC-RB4 board.				
CAR NOT AT BOTTOM LANDING (SETUP ERROR), LEARN MODE			MP	○○○●○○●● Hex (13)
The car is not positioned at the bottom landing, or down slow limit switch is faulty, or computer input (DSD) is faulty. • Position the car at the bottom landing. Check the down slow limit switch. The switch contacts should be open when the car is at the bottom landing. Check the computer input (DSS) status.				

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
CAR NOT BELOW DOOR ZONE (SETUP ERROR), LEARN MODE			MP	○○○●○●●○ Hex (16)
The car is not positioned below the door zone, or the door zone sensor is faulty, or the computer input (DZ) is faulty. • Position the car below the bottom of the landing door zone. Check for a faulty door zone sensor. Check the computer input (DZ) status.				
CAR NOT ON INSPECTION (SETUP ERROR), LEARN MODE			MP	○○○●○●○● Hex (15)
The car is not on Inspection operation mode, or the computer input (IN) is faulty. • Place the car on relay panel Inspection. Check the computer input (IN) status (IN should be "low")				
CAR ON LEVEL DOWN (SETUP ERROR), LEARN MODE			MP	○○○●○●●● Hex (17)
The car is positioned slightly above the bottom landing, or the leveling sensors are faulty, or the computer inputs (LU and LD) are faulty. • Position the car below the bottom landing door zone. Check for faulty or mis-wired leveling sensors. Check the computer inputs (LU and LD) status.				
CAR NOT ON LEVEL UP (SETUP ERROR), LEARN MODE			MP	○○○●○●○○ Hex (14)
The car is not positioned below the bottom landing, level up sensor is faulty, or computer input (LU) status. • Position the car below the bottom landing. Check for faulty level up sensor. Check the computer input (LU) status.				
CAR SAFETY DEVICE OPEN			MP	○●○○○●○○ Hex (44)
One of the car safety devices has activated, opening the safety circuit (e.g., emergency exit contact, safety clamp switch, car-top emergency stop switch). • Check all car safety devices. Refer to controller wiring prints for applicable devices.				
CAR TO LOBBY OPERATION			MP	●●●○○○●● Hex (E3)
The CTL input has been activated. • Check the status of the CTL input, and determine if the status of the input is appropriate.				
CONTACTOR PROOFING REDUNDANCY FAILURE			MP	●●○○●○●● Hex (CB)
One (or more) of the main power contactors has not "dropped" properly after the car has stopped. • Inspect the main power contactors to ensure that they are working properly. Verify that the CNP input is high when the car is not in motion.				
CP not responding (non-scrollling)			DDP	○○○○●●●○ Hex (0E)
The Pattern Generator is not detecting a looping MC-CGP processor. • Check the power indicator on the MC-CGP board (should be ON solid). Check for a faulty connection between the IMC-DDP-C and MC-CGP boards, an incorrectly socketed EPROM on the MC-CGP, or a faulty MC-CGP, IMC-DDP-C or MC-CGP board.				
Correction Run (non-scrolling)			DDP	●●●○●●●● Hex (EF)
PG is generating a correction profile. • This is a status message indicating that the car is on normal operation and running at correction speed to the nearest landing.				
DIRECTION RELAY REDUNDANCY FAILURE	SEC		MP	●●○○●●○○ Hex (CC)
One of the direction relays appears to have failed in the "picked" state. The computer has detected that the UDF input is high without the computer generating a direction output. • Ensure that, when the car is not in motion, the UDF input is low. The UDF input being high is an indication that one of the direction relays is "picked."				
DOL AND DLK BOTH ACTIVE			MP	○○●●●●●● Hex (3F)
A problem with DOL and/or DLK circuitry or wiring. • Inspect the Door Open Limit and the Door Lock circuitry and wiring.				
DOOR CLOSE FAILURE	SEC		MP	●●○○○○●○ Hex (C2)
Defective door close limit or input. • Verify that the door close limit and inputs function properly when the doors close and open.				
DOOR LOCK FAILURE	SEC		MP	●●○○○○○● Hex (C1)
A failure to lock the doors is detected. The doors have closed DCL = 0 (or DCLC = 1 if retiring cam) but did not lock (DLK = 0) within 80 seconds. • If the Retiring Cam option is set, verify that the Cam relay is activated (DCP=1, DCL=0 or DCLC=1) and the doors lock (DLK=1). If no Retiring Cam is used, verify that the door lock contacts are closed to provide power to the door lock input (DLK=1). When a predetermined number of sequential failures is detected, default set to four, the car will shutdown. The failure will reset once the doors are locked, if the car is placed on Inspection or the Computer Reset Button is pressed.				
DOOR LOCK SWITCH FAILURE			MP	●○○○○○●○ Hex (82)
A door lock contact appears to have failed in the closed state. • Ensure that, with the doors open, there is no power on the DLS input (DLS must be low when DCL is high).				
DOOR OPEN LIMIT FAILURE			MP	●○○○○○●● Hex (83)
A door open limit contact appears to have failed in the open state. • Ensure that, with the doors closed, there is power on the DOL input (DOL must be high when DLS and/or GS is high).				

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
DOOR ZONE SENSOR FAILURE			MP	●●●●○○●● Hex (F3)
Probable causes may be: (1) a faulty door zone sensor or associated circuitry (within the landing system assembly); (2) faulty wiring from the landing system to the controller; (3) faulty computer input circuit (main relay board or HC-PI/O board). • Check the operation of the door zone sensors and associated wiring (place the car on inspection, move the car away from the floor, noting the transitions in the door zone signal(s) coming from the landing system). • Verify that the computer diagnostic display of DZ (or DZ rear) matches the state of the sensor signals at the main relay board (or rear door relay board).				
DOOR ZONE SENSOR FAILURE - OFF POSITION				
Indicates that the car completed a run, but did not see door zone. • Reset this fault by pressing the Fault Reset button or by toggling MACHINE ROOM INSPECTION INSP/NORM switch. Run the car to the same floor and verify that DZ=1 or DZR=1. Check placement of DZ magnets.				
DPM REDUNDANCY FAULT			MP	●●●○○●●○○ Hex (EC)
A failure of a front door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPM (door position monitor) input. • Valid when SAF=1. When DLK is ON (1) then input DPM must also be ON (1). When DOL=0, DPM=0. If this is not the case, then a DPM redundancy fault is recorded and the car is prevented from operating.				
DPMR REDUNDANCY FAULT			MP	●●●○●●●○● Hex (ED)
A failure of a rear door input, relay or associated circuitry has been detected. This logic detects failure of the input structure and hardware associated with the DPMR (door position monitor rear) input. • Valid when SAF=1. When DLK is ON (1), input DPMR must also be ON (1). When DOL=0, DPM=0. If not, a DPMR redundancy fault is recorded and the car is prevented from operating.				
DRIVE FAILED TO RESPOND			MP	○○●●○○●○ Hex (32)
Monitors the Drive ON status of the drive. The DRON input must be ON when the elevator is stopped and OFF when the elevator is in motion. If this condition is not true, the fault is logged. The elevator will attempt to recover from this fault up to four consecutive times after which this fault is latched and requires a manual reset by toggling the Inspection switch. • Check the circuitry associated with the DRON input for proper operation.				
DRIVE FAULT 2			MP	○●●●○○●○ Hex (72)
Not applicable to IMC-MG				
DRIVE FORCED MOTOR LIMIT TIMER			MP	●●●●●○○● Hex (F9)
The system is shut down due to excessive number (4) of drive related faults within 7 normal runs. • Check the special event calendar (F7 Screen) of this car to identify the drive related faults. To clear the MLT fault, put the car on Inspection and press the "Driver Reset" button on the IMC-DAS board.				
Drive Not Ready (not scrolled)			DDP	○○●○○●○○ Hex (24)
Drive has a fault condition and is not ready for motion. • From the Graphic Display of Elevator (F3) screen determine which fault(s) are causing the error condition. Consult the Drive Faults section of Table 6.5 for appropriate corrective action.				
DRIVE TEMPERATURE SENSOR FAULT			MP	○○○●○●○● Hex (12)
The Drive Temperature Sensor (DTS) input is activated. This sensor monitors the temperature inside the IMC-S25 and IMC-G233 drive units. • Verify the temperature inside the drive unit. Check the fan on the drive unit. Check for a faulty temperature sensor inside the drive unit.				
EARTHQUAKE OPERATION	SEC	Eqactv	MP	●●●●●●○○ Hex (FC)
The car is shutdown on Earthquake Operation (EQI is high; used for ANSI and California Earthquake Operation.) • The elevator may be returned to normal service by means of momentary reset button on the earthquake board (HC-EQ2). This should be done by authorized personnel, after it has been determined that it is safe to do so. Should the system remain in this mode of operation after the reset button has been pressed, check the status of the EQI input.				
EARTHQUAKE - REDUCED SPEED OPERATION			MP	○○○○○○○● Hex (01)
The car is allowed to run at reduced speed on Earthquake Normal Operation. (EQI is high, CWI is low; used for ANSI earthquake operation only.) • The elevator may be returned to normal service by means of momentary reset button on the earthquake board (HC-EQ2). This should be done by authorized personnel, after it has been determined that it is safe to do so. Should the system remain in this mode of operation after the reset button has been pressed, check the status of the EQI input.				
ELEVATOR SHUTDOWN SWITCH OR POWER TRANSFER INPUT ACTIVE			MP	●●○○●●●● Hex (CF)
The ESS input has been activated or the PTI input has been activated. • Check the status of the Elevator Shutdown Switch input and the Power Transfer input. Verify that the status of the computer inputs (ESS) and (PTI) is appropriate relative to the status of the switch or contact that feeds the input.				

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
EMERGENCY POWER OPERATION	SEC	EmergPwr	MP	●●○○○○○● Hex (E1)
The car is on Emergency Power operation (EPI is low). • Check the status of the Emergency Power computer input. Verify that the status of the computer input (EPI) is appropriate relative to the status of the switch or contact that feeds the input. • If this is a group system with emergency power, and the Group Supervisor has yet to be installed, place a jumper from the 2 bus to the EPI input on each local car's HC-IOX board. Remove jumper when Group Supervisor is installed.				
EMERGENCY POWER SHUTDOWN			MP	●●●●○●●● Hex (F7)
This status indicates that the car is shutdown during Emergency Power Operation when the controller is unable to communicate with the Group Supervisor. When the Group Supervisor is unable to coordinate running the elevators on Emergency Power, this shutdown occurs in order to prevent the cars from running all at the same time and possibly overloading the generator.				
EMERGENCY STOP INPUT 1 ACTIVATED			MP	
This message is displayed when the Emergency Stop Input 1 (ESTP1) goes high.				
EMERGENCY STOP INPUT 2 ACTIVATED			MP	
This message is displayed when the Emergency Stop Input 2 (ESTP2) goes high.				
ENTER SECURITY CODE			MP	○●●●●●●○ Hex (7E)
MCE Security has been initiated. Enter floor passcode in the C.O.P. within 10 seconds. See Section 5.4.2 or the appropriate security appendix for instructions on how to program or change security passcodes.				
FAILURE TO LEAVE THE FLOOR			MP	●●●●●●○● Hex (FD)
H (High speed) picked at the same floor for a consecutive number of times set in the FTLF option. • To clear the condition the car can be placed momentarily on Inspection and press and release the "Drive reset" button on the IMC-DAS board • Check the Special Event calendar of the controller and of the Group controller (if there is one) for any abnormal events. • To reduce the number of occurrences or to troubleshoot, increase the FTLF counter or turn it OFF.				
FAULT RELAY			DDP	●○○●●○○● Hex (99)
The drive has detected a fault and dropped the Fault Relay, or a faulty triac Q1 on the SCR-RI board. • Consult the Drive Faults section in Table 6.5. Check triac Q1 on the SCR-RI board if no fault exists.				
FIRE SERVICE PHASE 1 - ALTERNATE		AltFir1	MP	●●●●○○○○ Hex (F0)
The FRS input is low, the FRA input is high or FRAON is active. • Inspect the fire sensors (especially the main floor sensor) and the Fire Phase I switch wiring. For some fire codes including ANSI, the Fire Phase I switch must be turned to the BYPASS position and then back to OFF to clear the fire service status once activated.				
FIRE SERVICE PHASE 1 - MAIN		MnFire1	MP	●●●○○○○○ Hex (E0)
The FRS input is low or the FRON or FRON2 inputs are high. • Inspect the fire sensors and the Fire Phase I switch wiring. For some fire codes including ANSI, the Fire Phase I switch must be turned to the BYPASS position and then back to OFF to clear the fire service status once activated. • If this installation myst comply with the requirements of the 1998 Addendum to the ASME A17.1-1996 or later code, and the machine room and hoistway sensors are not yet installed, make sure the FRMR and FRHTW inputs on the IOX boards in each simplex or local are tied to the 2/2F bus, as applicable. Remove jumper when fire service is wired.				
FIRE SERVICE PHASE 2		FirePh2	MP	●●○○○○○○ Hex (C0)
The FCS controller input is ON. • Inspect the phase 2 switch and wiring. In some cases, to exit Fire Service Phase 2, the car must be at the fire floor at which Fire Phase 2 was activated, the doors must be fully open, and the phase 2 switch must be OFF (the FCOFF input must be activated) to get out of phase 2.				
Floor Height Checksum Error (not scrolled)				●●●●●○○○ Hex (F8)
The floor heights are invalid. Can be caused by a faulty EEPROM or IMC-DDP-C board. • Sometimes the problem can be resolved by removing and reinserting the EEPROM and/or the EPROM.				
Floors Learned Error (not scrolled)			DDP	●●●●●○○● Hex (F9)
The floor heights are invalid. Can be caused by a faulty EEPROM or IMC-DDP-C board. • Sometimes the problem can be resolved by removing and reinserting the EEPROM and/or the EPROM.				
FLT RELAY DROPPED			MP	
The FLT relay is dropped as a result of one or more of many possible fault conditions. • Check the Event Calendar to determine what has caused the FLT Relay Dropped message. Then look up that message or messages in this table to determine the appropriate troubleshooting and/or corrective action.				
FRONT DOOR IS LOCKED BUT NOT FULLY CLOSED			MP	●●○○○●○○ Hex (C4)
This fault indicates that the Door Lock input (DLK) was high (doors locked) and the Door Closed Limit input (DCL) was high (doors not fully closed). DCL should be low when doors are locked. • Determine the state of the doors. • If the doors are closed, check the voltage on the DCL input terminal. If the voltage is high, adjust the Door Closed Limit switch so the switch opens prior to DLK. • Check for a faulty door close limit contact or associated wiring.				

TABLE 6.15 Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
GATE SWITCH FAILURE	SEC		MP	●○○○○●○○ Hex (84)
A car gate contact appears to have failed in the closed state. • Ensure that, with the doors open, there is no power on the GS input (GS must be low when DCL is high).				
GOVERNOR SWITCH OPEN		SftyOpn	MP	○○○●○○○● Hex (11)
The overspeed governor has activated, opening the safety circuit. • Check the overspeed governor.				
HALL CALL BUS IS DISCONNECTED				○○○○○●●● Hex (07)
A problem in the wiring or fuses. There is no power to the Hall Call circuits on the HC-CIO board. • Check the Hall Call Bus fuse. Check the wires that go to the Hall Call Power inputs on the HC-CIO board in the controller.				
HEAVY LOAD WEIGHER CONDITION			MP	●●●○○●●● Hex (E7)
The HLI input has been activated. • Discrete HLI input (wired to a load weigher contact): Check the status of the HLI input, and determine if the status of the input is appropriate relative to the load in the car. Analog load weigher: Check the perceived load percentage using the on-board diagnostic station. Determine if the value displayed (percentage) is appropriate relative to the load in the car.				
HOISTWAY SAFETY DEVICE OPEN	SEC	SftyOpn	MP	
One of the hoistway safety devices has activated, opening the safety circuit (e.g., pit stop switch, car and cwt buffers switches, up/down final limit switches). • Check all hoistway safety devices. Refer to controller wiring prints for applicable devices.				
HOSPITAL PHASE 1 OPERATION	SEC		MP	●●●●○○○● Hex (F1)
A hospital emergency momentary call switch is activated at any floor. • The car has been assigned a hospital emergency service call. The car can be removed from Hospital Emergency Service by toggling (ON-OFF) the in-car Hospital Emergency Service keyswitch. The car should automatically return to normal service after a pre-determined period of time (typically 60 seconds) if the in-car switch is not activated.				
HOSPITAL PHASE 2 OPERATION			MP	●●●●○○●○ Hex (F2)
The car has answered a hospital emergency call or the in car hospital emergency key switch has been activated (HOSP is high). • The car has been placed on in-car Hospital Emergency Service. The car will remain in this mode until the in-car Hospital Emergency Service keyswitch is turned off. Verify that the status of the in-car hospital switch computer input (HOSP) is appropriate relative to the status of the keyswitch.				
Identification Mismatch (not scrolled)			DDP	○●●●●●●○ Hex (7E)
A mismatch between the identification sent from the MC-CGP and that read from the EPROM. • Caused when the hoistway has not been learned, one of the Swing Panel boards has been changed, or the EPROM on the IMC-DDP-C has been changed. To clear the fault, relearn the hoistway.				
IMC SUB-SYSTEM NOT READY	SEC		MP	●●●●●○●○ Hex (FA)
The Motor Field voltage is not properly calibrated. • Check the Motor Field calibration (OCMF).				
IN CAR STOP SWITCH ACTIVATED	SEC	SftyOpn	MP	●○○○●○○○ Hex (88)
The in-car stop switch has been pulled, opening the safety circuit. • Check the status of the in-car emergency stop switch.				
INDEPENDENT SERVICE OPERATION			MP	○●●●●●●● Hex (7F)
The Independent switch inside the car has been turned on, or the TEST/NORMAL switch on the Relay board is in the TEST position. • Check the Independent Service switch inside the car. Inspect the TEST/NORMAL switch on the Relay board on the controller.				
INSPECTION / LEVELING OVERSPEED FAILURE	SEC		MP	●●○○●●○● Hex (CD)
The car has exceeded the inspection/leveling overspeed parameter (MILO) when the car is moving on inspection operation, or while in leveling. • Check for proper operation of the velocity transducer (tachometer or velocity encoder). Check for proper adjustment of tachometer scaling (GTC) and pattern gain (PG). Also check for a proper quadrature signal waveform (look for signal noise, or a fluctuating signal during steady state speed).				
INSPECTION OPERATION		InspAcc	MP	●○○○○○○○ Hex (80)
The inspection computer input (IN) is deactivated. Check all of the inspection switches and associated wiring.				
Inspection Run (status) (not scrolled)			DDP	○○●●●●●● Hex (3F)
PG is generating an Inspection profile. • This is a status message indicating that the car is on Inspection with direction activated				
Invalid Pattern Profile Parameters (not scrolled)			DDP	●●○○○○○○ Hex (C0)
PG is unable to generate a pattern profile based on the parameters entered. • From the F3 screen determine which of the following is causing the error (VC, VS, TFH, OFH and SSO for pattern and PRS, SPP and SPT for profile). Consult the Faults section of Table 6.10 for appropriate corrective action.				

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LANDING SYSTEM REDUNDANCY FAILURE	SEC		MP	●●○○●○●○ Hex (CA)

One of the landing system sensors or associated relays has malfunctioned.
• Verify the proper operation of the door zone (DZ), level up (LU) and level down (LD) relays while the car is moving in the hoistway. An Landing System Redundancy Failure will be declared if the LSR input remains high throughout a run (indicating a malfunction of the one of the landing system sensors or associated relay), or if the LSR input is not seen during leveling (indicating a failure of a leveling sensor or relay).

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
Learn Run (status) (not scrolled)			DDP	○○○●●●●● Hex (1F)

PG is generating a Learn profile.
• This is a status message indicating that the car is on Inspection with the Swing Panel set for Hoistway Learn operation and direction is activated.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LEVELING DOWN			MP	○○●●●●○○ Hex (3C)

Comes on normally when the car is just above a floor. If the car is level with the floor and a message appears, it is usually the result of a switch or sensor problem.
• Inspect the LD switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LEVELING SENSOR FAILED - OFF POSITION			MP	●●●●○●○● Hex (F5)

Probable causes may be:
(1) a faulty leveling sensor or associated circuitry (within the landing system assembly);
(2) faulty wiring from the landing system to the controller;
(3) faulty computer input circuit (main relay board or HC-PI/O board).
• Check operation of the leveling sensors and associated wiring (place car on inspection, move above and below a landing, noting the transitions in the leveling signal(s) coming from the landing system).
• Verify that the computer diagnostic display of LU and LD matches the state of the sensor signals at the main relay board.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LEVELING SENSOR FAILED - ON POSITION			MP	●●●●○●○○ Hex (F4)

Probable causes may be:
(1) a faulty leveling sensor or associated circuitry (within the landing system assembly);
(2) faulty wiring from the landing system to the controller;
(3) faulty computer input circuit (main relay board or HC-PI/O board).
• Check operation of the leveling sensors and associated wiring (place car on inspection, move above and below a landing, noting the transitions in the leveling signal(s) coming from the landing system).
• Verify that the computer diagnostic display of LU and LD matches the state of the sensor signals at the main relay board.
• Check also the operation of any contacts that may be placed at the "low side" (the "1-bus" side) of the LU and LD relay coils (e.g., H, INT). Check that such contacts close properly when appropriate.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LEVELING SENSOR FAILURE	SEC		MP	●●○○●○○● Hex (C9)

One of the LU and LD sensors appears to have failed in the active state.
• The computer has observed one or both of the leveling inputs active continuously throughout a floor-to-floor run. Verify the proper operation of the leveling sensor signals when moving the car in the hoistway.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LEVELING UP			MP	●●○○○○●● Hex (C3)

Comes on normally when the car is just below a floor. If the car is level with the floor and a message appears, it is usually the result of a switch or sensor problem.
• Inspect the LU switch or sensor on the landing system and the placement of the landing system vane or magnet for that floor.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LIGHT LOAD WEIGHER CONDITION			MP	●●●○●○○○ Hex (E8)

The Light Load Weighing input is activated.
• The Light Load error message is generated whenever the load inside the car is less than the threshold specified to activate anti-nuisance operation, and car calls are registered. Response is only required if the anti-nuisance function (cancellation of car calls) appears to activate even when the car is loaded to a value above the threshold load value.
• Discrete (LLI) input (wired to a load weigher contact): check the status of the (LLI) input and determine if the status is appropriate relative to the load in the car.
● Analog Load Weigher: check the perceived load percentage using the on-board diagnostic station. Determine if the value displayed (percentage) is appropriate relative to the load in the car.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
LOSS OF INSPECTION DURING LEARN MODE			MP	○○●○○○○○ Hex (20)

The car was taken OFF of Inspection operation during the learn process.
• Place the car on relay panel Inspection and perform the learn process again.

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
Loss of Position (not scrolled)	SEC		DDP	○○○○○○○● Hex (01)

Indicates an incorrect quadrature signal from the car top.
• Check for dirty optical sensors on the LS-QUAD-2 landing system, or failed encoder on the LS-QUIK-1. Check for a dirty reflective plate opposite the optical sensors, an oily perforated steel tape, a large dead zone on the landing system, or a faulty SCR-RI, IMC-DIO and/or IMC-DDP-C board.
• Verify the value of MPER Position Encoder resolution (see Table R.3)

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
MOTOR LIMIT TIMER (ANTI-STALL) ELAPSED	SEC		MP	●●●●●○○○ (F8)
The Starter Overload or the Thermal Overload has tripped, or there is a mechanical problem that prevents or slows the motion of the car. • To clear the condition the car can be placed momentarily on Inspection and press and release the "Drive reset" button on the IMC-DAS board. Immediately check the Starter & Thermal Overloads and all circuitry associated with the motor.				
NO RESPONSE FROM PATTERN GENERATOR (SETUP ERROR), LEARN MODE			MP	○○●○○○●○ Hex (22)
Faulty communication of status information between MP and DDP. • Verify that the boards in the Swing Panel are looping. Reconnect the three boards in the Swing Panel (MC-MP-1ES or MC-MP2, MC-CGP, and IMC-DDP). Verify "Learn Complete" and "Learn Complete Acknowledge" in the MC-CGP & IMC-DDP DPRAM. Learn Complete is sent to the IMC-DDP while Learn Complete Acknowledge is sent to the MC-MP-1ES or MC-MP2.				
OVERLOAD CONDITION			MP	○○●○○●○○ Hex (24)
The Overload input (OLW) is activated, or perceived percentage of load in the car has exceeded the threshold value set for overload condition. • Discrete OLW input (wired to a load weigher contact): Check the status of the OLW input, and determine if the status of the input is appropriate relative to the load in the car. • Analog load weigher: Check the perceived load percentage using the on-board diagnostic station. Determine if the value displayed (percentage) is appropriate relative to the load in the car.				
Parity sensor error from landing system (not scrolled)			DDP	●●○○○○○● Hex (C1)
The state of the PR signal is invalid in reference to the states of R0, R1, R2, R3, R4 and R5. If PR is active, an odd number of floor codes (R0 thru R5) must be active. If PR is inactive it may be due to one of the following: (1) an even number of floor codes (R0 thru R5) are active; (2) the elevator is not level with the floor; (3) The PR magnet has fallen off of the perforated steel tape; (4) or VS-1L failure on LS-QUIK-1.				
PASSCODE REQUEST			MP	○○○○●○○● Hex (09)
The Passcode Requested option can be used to require that a passcode be entered in order to run the car on any mode of operation other then Inspection. See Section 5.3.7 for more information.				
Pattern Parameter Checksum Error (not scrolled)	SEC		DDP	●●●●○○○○ Hex (F0)
The Pattern Parameters are invalid. Can be caused by a faulty EEPROM or IMC-DDP-C board. • Sometimes the problem can be resolved by removing and reinserting the EEPROM and/or the EPROM.				
PG ERROR, LOSS OF UP DIRECTION (SETUP ERROR) LEARN MODE			MP	○○●○○○●● Hex (23)
Up direction was lost during the Learn Operation. • Check for UP direction at terminal 10 on the HC-RB Main Relay Board and at the computer input (UP). If the error occurs at the top, the UP Normal is too close to the top landing. If the UP direction input is correct but the computer input is not, the IMC-DIO board may be faulty. Verify the connections between the Swing Panel, SI2 drive and the IMC-RI board.				
PG NOT READY			MP / DDP	○●○○○○●○ Hex (42)
PGU, DSR, EPR, and/or SPR status signals not active. Also, IBJ fault flag active. • Check for active status signals on PGU, DSR, EPR and SPR. Check for IBJ fault flag.				
PHOTO EYE FAILURE	SEC		MP	○○○●●○○○ Hex (18)
Stuck photo eye input. • Check the photo eye circuitry and wires.				
POWER UP SHUTDOWN DUE TO EARTHQUAKE			MP	○○○○○○●○ Hex (02)
The CWI and/or EQI input was detected high at power up. (Used for ANSI Earthquake Operation only.) • The elevator may be returned to normal service by means of momentary reset button on the earthquake board (HC-EQ2). This should be done by authorized personnel, after it has been determined that it is safe to do so. Should the system remain in this mode of operation after the reset button has been pressed, check the status of the EQI and CWI inputs.				
PRE-TEST MODE			MP	○●●●○○●● Hex (73)
This status indicates that the car is bypassing hall calls and disabling the gongs. However, car calls may still be entered and will be answered. Once the last car call is answered, the car will park with doors closed. This function is normally used to capture a car.				
PRIORITY / VIP SERVICE - PHASE 1			MP	●●●○○●○○ Hex (E4)
A Priority/Special/VIP Service momentary call switch is activated at any floor. • The car has been assigned a Priority/Special/VIP Service call. The car can be removed from Priority/Special/VIP Service by toggling (On-Off) the in-car Priority/Special/VIP Service keyswitch. The car should automatically return to normal service after a pre-determined period of time (typically 60 seconds) if the in-car switch is not activated.				

TABLE 6.15   Status and Error Messages

Scrolling Message	SEC	F3 Flag	MP / DDP	Diagnostic Indicators
PRIORITY / VIP SERVICE - PHASE 2			MP	●●●○○●○● Hex (E5)
The car has answered a Priority/Special/VIP call or the in car Priority/Special/VIP Service key switch has been activated (PRIS is high). • The car has been placed on in-car Priority/Special/VIP Service. The car will remain in this mode until the in-car Priority/Special/VIP Service keyswitch is turned off. Verify that the status of the in-car Priority/Special/VIP Service computer input (PRIS) is appropriate relative to the status of the keyswitch.				
Read Sensor error from landing system (not scrolled)			DDP	●○○○○○○○ Hex (80)
PG not receiving RD signal. Possible causes and corrective actions include: (1) the elevator is not at a floor, check, (2) the dead zone of the landing system is too wide, check, (3) the landing system dead zone is not symmetrical around the DZ sensor, (4) the DZ magnet has fallen off the perforated steel tape (LS-QUAD) or (5) a VS-1L sensor failure (LS-QUIK-1)				
REAR DOOR IS LOCKED BUT NOT FULLY CLOSED			MP	●●○○○●○● Hex (C5)
This fault indicates that the Door Lock input (DLK) was high (doors locked) and the Door Closed Limit Rear input (DCLR) was high (doors not fully closed). DCLR should be low when doors are locked. • Determine the state of the doors. • If the doors are closed, check the voltage on the DCLR input terminal. If the voltage is high, adjust Rear Door Closed Limit switch so the switch opens prior to DLK. • Check for a faulty door close limit contact or associated wiring.				
REDUNDANCY DOOR LOCK RELAY FAILURE	SEC		MP	●○○○○●●○ Hex (86)
A door lock relay appears to have failed in the "picked" state. • Ensure that, with the hoistway doors open, there is no power on the RDLS (or RDLSR, if rear doors) input. If RDLS input is high, a door lock relay appears to be "picked".				
REDUNDANCY GATE SWITCH FAILURE	SEC		MP	●○○○○●○● Hex (85)
A car gate switch relay appears to have failed in the "picked" state. • Ensure that, with the car gate open, there is no power on the RGS input. If the RGS input is high, a gate switch relay appears to be "picked".				
SAFETY CIRCUIT IS OPEN			MP	●●●●●●●● Hex (FF)
The Car Operating Panel emergency stop switch has been pulled, or another contact switch in the safety circuit is in the open position. • Check the C.O.P. stop switch. Check the other switches and contacts in the safety string. Check safety string wiring against the MCE wiring diagrams. This can also result if the FLT relay on the SCR-RI board has been removed.				
Safety Processor not responding (not scrolled)			DDP	●●○○○○●○ Hex (C2)
Invalid data passed between the IMC-DIO and IMC-DDP-C boards or a fault on the IMC-DIO board. • Check for an incorrectly socketed EPROM on the IMC-DDP-C board. Check for an incorrectly socketed IMC-DIO processor board, an incorrectly inserted IMC-DIO board, a faulty IMC-DDP-C or IMC-DIO board.				
SHUTDOWN OPERATION			MP	●●●○○○●○ Hex (E2)
The car is on MG Shutdown Operation (MGS is high). • Check the status of the Motor Generator Shutdown Switch input. Verify that the status of the computer input (MGS) is appropriate relative to the status of the switch or contact that feeds the input.				
Terminal position switch (not scrolled)			DDP	○○○○○○●● Hex (03)
The absolute distance is different from the learned distance. May be due to an incorrect quadrature pulse signal from the car top, unlearned limit switches, faulty limit switches, or moved limit switches. • When the switches have never been learned for the current IMC-DDP-C board or when they have been moved, the IMC-DDP-C board must relearn the absolute position at which the switches open up. For a quadrature related problem refer to "Loss of Position" above. These positions are learned by the safety processor on the IMC-DDP-C board when the IMC-DIO board learns the normal terminal limit switches.				
TIME OUT OF SERVICE			MP	○○○●●●●● Hex (1F)
The T.O.S. timer has expired. Can be caused by a faulty photo eye, call button or other door opening device. • The timer is used to take the car out of service when the car is held at one floor excessively. Typically this occurs when the doors are held open by continuous activation of the photo eye, a call button, or another reopening device. Check for proper operation of the devices mentioned.				

6.4 SPECIAL EVENT CALENDAR ENTRIES - F7 SCREEN

This data is available for troubleshooting and analysis of the events. The EVENT CALENDAR logs the following information:

DATE   - (month/day)
TIME   - (hour/minute)
EVENT - (the cause for logging the data. Any event that affects the pattern generator or Drive functions is recorded inside the MC-CPA-1SL computer memory, such as; doorlock clip, stop switch pulled, ..etc.)
PI   - (the car PI at the time the data was logged)

FIGURE 6.5 Special Event Calendar (F7) screen
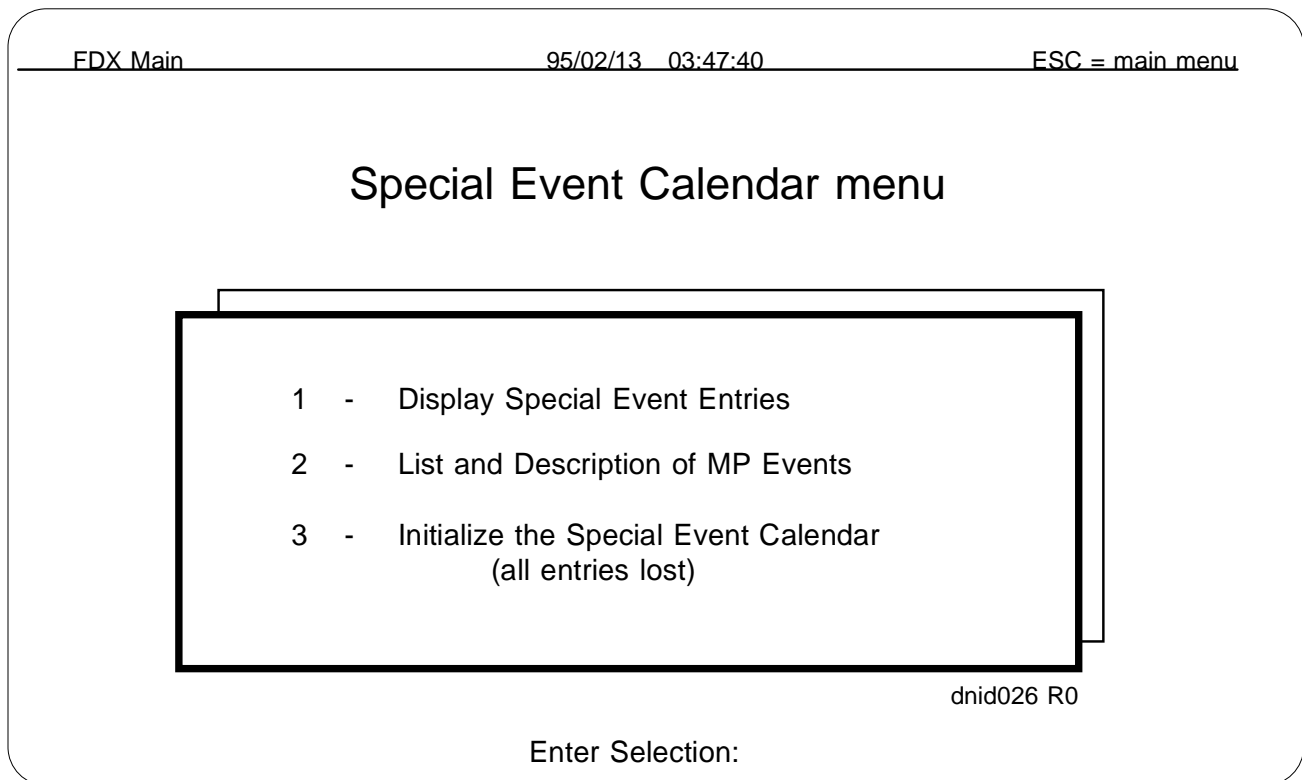
Table 6.16 provides a listing of the events plus a description and troubleshooting information for the Special Event Calendar entries.

TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

BOTH USD AND DSD ARE OPEN	Both USD and DSD are simultaneously active (low). Check wiring on the terminal switches.
BOTTOM FLOOR DEMAND	Generated when the car comes OFF inspection or when the car PI indicates top terminal landing but the car is not there. Check the top terminal landing slowdown switches and USD input.
BRAKE FAILURE	Similar to the motor field, the brake coil current is monitored. After enabling the brake, the Drive program checks the desired brake current with the actual current in the brake coil, and if the actual is much lower than required, a brake failure is reported. If failure occurs at the end of a run, the IGBT on the brake has failed (only in software version (DDP) below 1.2). It can be triggered by one of the following: • wrong parameter values for brake coil resistance and brake input voltage on the Motor Field & Brake Parameters (F1 - 2)screen • wrong calibration, use CBV parameter on the (F1 - 2) screen • no brake input voltage at terminals BPI1 and BPI2 on the IMC-PRI board • SAFB is not picked • direction relays on the HC-RB4 are not picked • PT1, MX, and RE on the IMC-PRI are not picked • FB1 or FB2 fuses may have cleared • no triggering signal for brake voltage at test point BFT on the IMC-DAS board • no voltage between terminals AC1 and AC2 on the drive • faulty brake coil current sensing transformer • bad diode bridge (DBB) inside drive enclosure • IGBT failed inside the IMC-Sxx unit.
BRAKE OUTPUT CIRCUIT FAILURE	Voltage exists on the brake after the brake has been disabled. This fault is reported only on Software (DDP) version 1.2 and above. This means that the IGBT or flywheel diode in the brake output circuit has failed.
CAR CALL BUS FUSE BLOWN	No power exists on the car call common bus. Check fuse F4 on the car.
CAR OUT OF SERVICE WITH DOORS LOCKED	The car was delayed from leaving the landing for a significant period of time. Doors were locked. Suspect a malfunction of running circuits
CAR OUT OF SERVICE WITHOUT DOORS LOCKED	The car was delayed from leaving the landing for a significant period of time. Doors were not locked. Suspect an obstruction that has kept the doors from closing, thus preventing the car from leaving.
CAR SAFETY DEVICE OPEN	One or more of the Car Safety Circuit Devices is open. Check the applicable items: emergency escape hatch, side exit door, cartop emergency stop switch and the safety operated switch.
CONTRACT OVERSPEED	During normal operation, the car speed is monitored by the independent safety processor. Any time the speed of the car exceeds 107% of the contract speed, this fault will be reported. • Make sure that the car is not overspeeding. • If the car overspeeds, adjust parameter GTC on the Drive Parameter screen. • Also verify that the pattern gain (PG) on the Drive or Dynamic Parameter screen is set to 1.0.
DIRECTION RELAY REDUNDANCY FAILURE	One of the direction relays appears to have failed in the "picked" state. The computer has detected that the UDF input is high without the computer generating a direction output. Ensure that, when the car is not in motion, the UDF input is low. The UDF input being high is an indication that one of the direction relays is "picked".
DOOR CLOSE PROTECTION	Doors unable to close and lock in the specified time. Check door lock string contacts and individual doors for physical obstruction.
DOOR LOCK FAILURE	See Retiring Cam failure.
DOOR LOCK CONTACT FAILURE	A door lock contact appears to have failed in the closed state. Ensure that, with the doors open, there is no power on the DLS input (DLS must be low when DCL is high).
DOOR LOCK RELAY REDUNDANCY FAILURE	A door lock relay appears to have failed in the "picked" state. Ensure that, with the hoistway doors open, there is no power on the RDLS (or RDLSR, if rear doors) input. If RDLS input is high, a door lock relay appears to be "picked".
DOOR OPEN LIMIT FAILURE	A door open limit contact appears to have failed in the open state. Ensure that, with the doors closed, there is power on the DOL input (DOL must be high when DLS and/or GS is high).
DOORS OPEN AND LOCKED	Door Open Limit input (DOL) activated (low) and Door Lock input (DLK) activated (high). Check DOL, DLK, LU and LD inputs.
DRIVE FAULT DETECTED	Drive software has instructed the MP to shutdown in an MLT condition following excessive drive faults.
DZP ERROR	The DZP (DZ / #27) input is not active while the elevator is stopped with RD active and LEV inactive. Verify that the status of these inputs is correct. When the elevator is stopped at a floor, DZP and RD should be active while LEV is inactive.
EARTHQUAKE	The Earthquake input (CWI or EQI) are activated (high)

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TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

EMERGENCY POWER	System placed on emergency power. Power removed from EPI input.
EXCESSIVE DC LOOP CURRENT	Loop current has exceeded the reference value either by exceeding for a very high amount for a short period of time, or by a high amount for a relatively long period of time.
EXCESSIVE POSITION ERROR AT OLM	While the car was traveling past a floor on normal operation, the IMC-DDP -C computer detected a difference between the actual distance and intended distance to the floor that exceeded 30" (6" if destination landing). This condition is detected at 12" (305 mm) from the floor as a result of the disturbance of the quadrature signal (95, 96). Check the positioning of the floor magnets to the edge of the steel tape (on LS-QUAD-2). The DP1 and DP2 quadrature signals must be routed through shielded cable over the entire distance from the car top to where the signal enters the IMC-RI board.
FIRE SERVICE ALTERNATE	Main Fire Service input (FRS) activated (low) and Alternate Fire Service input (FRA) activated (high).
FIRE SERVICE MAIN	Main Fire Service input (FRS) activated (low).
FIRE SERVICE PHASE 2	Phase 2 Fire Service input (FCS) activated (high).
GATE SWITCH FAILURE	A car gate contact appears to have failed in the closed state. Ensure that, with the doors open, there is no power on the GS input (GS must be low when DCL is high).
GATE SWITCH RELAY REDUNDANCY FAILURE	A car gate switch relay appears to have failed in the "picked" state. Ensure that, with the car gate open, there is no power on the RGS input. If the RGS input is high, a gate switch relay appears to be "picked".
GOVERNOR SWITCH OPEN	The governor switch is open, check the governor.
HALL CALL BUS FUSE BLOWN	No power exists on the Hall Call Common Bus. Check fuse F4 on group.
HOISTWAY SAFETY DEVICE OPEN	One or more of the Hoistway Safety Circuit Devices is open. Check the applicable items: final limits, buffer switches, pit stop switch, compensating sheave switch, and the pit door switch.
HOSPITAL SERVICE	Car placed in Hospital Emergency Service.
IN CAR STOP SWITCH	In-car stop switch activated.
INDEPENDENT SERVICE	Car placed on independent service.
INSPECTION	Hoistway access or car top inspection.
INSPECTION/LEVELI NG OVERSPEED FAILURE	The car has exceeded the inspection/leveling overspeed parameter (MILO) when the car is moving on inspection operation, or while in leveling. Check for proper operation of the velocity transducer (tachometer or velocity encoder). Check for proper adjustment of tachometer scaling (GTC) and pattern gain (PG). Also check for a proper quadrature signal waveform (look for signal noise, or a fluctuating signal during steady state speed).
INSPECTION OVERSPEED	The car has exceeded the programmed ILO trip speed (MILO on the Safety Parameters screen) while traveling on Inspection (passed over the LU or LD vane) into a destination floor. • Loose connection of E31 (INS)can cause an intermittent ILO fault
INSUFFICIENT FORCING MF	The motor field current did not reach 80% of the forcing value. This fault will prevent RE picking. Check calibration of the motor field.
LANDING SYSTEM REDUNDANCY FAILURE	One of the landing system sensors or associated relays has malfunctioned. Verify the proper operation of the door zone (DZ), level up (LU) and level down (LD) relays while the car is moving in the hoistway. A Landing System Redundancy Failure is declared when the LSR input remains high throughout a run, indicating a malfunction of the one of the landing system sensors or associated relay, or if the LSR input is not seen during leveling, indicating a failure of a leveling sensor or relay.
LEVELING OVERSPEED	The car has exceeded the programmed ILO trip speed (MILO on the Safety Parameters screen) while traveling on Inspection (passed over the LU or LD vane) into a destination floor. • Verify that the leveling relays (LU and LD) are working correctly. • Loose connection of E14 (LEV) can cause an intermittent ILO fault.
LEVELING SENSOR FAILURE	One of the LU and LD sensors appears to have failed in the active state. The computer has observed one or both of the leveling inputs active continuously throughout a floor-to-floor run. Verify the proper operation of the leveling sensor signals when moving the car in the hoistway.
LOSS OF DIRECTION	The direction input (UP or DN) from the HC-RB4, through the IMC-RI, and to the IMC-DDP-C computer has been lost during a normal run. Refer to LOD in Table 6.10.

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TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

LOSS OF POSITION	The IMC-DDP-C computer has lost the quadrature signal from the car top landing system while the car was making a normal run. • Check all connections between terminals 95 and 96 on the landing system and terminals 95 and 96 on the controller (screw terminals, shielded cable, and optical sensors on LS-QUAD-2). Check encoder connections for LS-QUIK-1. • Verify the value of MPER Position Encoder Resolution (see Table R.3).
LOST DOOR LOCK DURING RUN	The door lock input was deactivated while the car was traveling through the hoistway.
MLT SHUTDOWN - Failure to Leave the Floor	The MLT shutdown is due to the car picking H (high speed) at the same floor for a consecutive number of times. The field adjustable option FTLF in the MP's EOD may be used to turn the option OFF or to change the number of times H picks before shutdown.
MLT - Drive Forced	This fault indicates that a Motor Limit Timer fault was generated due to persistent system and drive faults. The system is shut down due to 4 drive related faults within 7 normal runs. • A special event calendar message which details the root cause of this fault should be logged in the event calendar. Refer to the event calendar and the specific troubleshooting suggestions that are associated with the event.
MLT - Excessive PI Correction	This fault indicates that the logical PI value (obtained from the landing system) and the floor encoding are inconsistent. • Call MCE for troubleshooting.
MLT - Excessive Releveling at Floor	This fault indicates that the car has releveled 25 times at the same floor. • Check the brake releveling motor adjustment (BRV on the Brake (Shift F3) screen. • If the job is using a sleeve bearing motor, turn the Idle option ON. (See Table 5.1, Timers and their Ranges, in the manual for details on the Idle option).
MLT - Timer Expired	The motor limit timer has elapsed before the car has completed its movement. This condition can occur because the MC-MP computer receives a direction sensing (UPS or DNS) input for a sufficient amount of time to cause the MLT timer to elapse. This usually happens due to the system's failure to respond to a 120 VAC direction signal appearing on terminals 85(up) or 87 (down) on the HC-RB4-SCRI Relay board. • Check Up and Down Sense inputs. • If the OLM, DZ, or LEV input signal is stuck on during a correction run, the car may not be able to reach the next landing before the Motor Limit Timer elapses. Check these input signals.
MOTOR FIELD FAILURE	Indicates that the motor field voltage is insufficient for any operation of the elevator. If the motor field current drops below 50% of the standing motor field current, this fault will be generated. This error **cannot be bypassed**, and can be triggered by one of the following: • wrong parameter values for motor field resistance and motor field input voltage on the Motor Field & Brake Parameters (F1 - 2) screen • not calibrated correctly using CMFV • no motor field input voltage. Check for voltage at terminals MPO1 and MPO2 of the drive, and Transformer. • FM1 or FM2 fuses may have cleared (opened) • no triggering signal for motor field. This can be verified on test point MFT on the IMC-DAS board. • no voltage between terminals AC1 and AC2 on the drive • faulty motor field current sensing transformer inside the IMC-Sxx unit. • wrong phase relationship between the AC1 - AC2 and the MP01 - MP02 signal.
MOTOR FIELD FEEDBACK SATURATION	The MFI test point voltage (IMC-DAS board) exceeded 9.5VDC. Verify the MFI voltage while the elevator is moving on Inspection. If the voltage exceeds 9.5VDC, repeat the step with motor field mode (OMFM) set to OPEN LOOP. If the voltage no longer exceeds 9.5VDC, the calibration of the motor field (CMFV) is incorrect; otherwise, the motor field jumper (MP2 on the IMC-GPA board) may be set to an incorrect position.
MOTOR LIMIT TIMER	The motor limit timer elapsed, before the car completed its movement. This condition can occur because the MC-MP-1ES computer receives a direction sensing (UPS or DNS) input for a sufficient amount of time to cause the MLT timer to elapse. This usually happens due to the system's failure to respond to a 120VAC direction signal appearing on terminals 85 (up) or 87 (down) on the HC-RB4 Relay board.
MOTOR LIMIT TIMER (INT)	The motor limit timer has elapsed before the car completed its movement, and in addition, the INT (Level Interrupt) relay was energized. If the INT relay is picked it will prevent the car from recognizing the leveling inputs, thus preventing the car from stopping at a floor. This indicates a problem associated with the existence of the INT function rather than a problem with responding to a direction input.
MOTOR LIMIT TIMER (LI)	The motor limit timer has elapsed before the car has completed its movement, and in addition, the LI flag on the F3 screen was set. If the LI (Level Inhibit) flag is set, it will prevent the car from recognizing the leveling and door zone inputs, thus preventing the car from stopping at a floor. This indicates a problem associated with the existence of the LI flag rather than a problem with responding to a direction input.
MOTOR LIMIT TIMER (LI AND INT)	The motor limit timer has elapsed before the car has completed its movement, and in addition, the INT (Level Interrupt) relay was energized and the LI flag was set. This is a combination of the two previous messages and their comments apply here.
+15V POWER SUPPLY FAILURE	A failure of the +15V supply (IMC-DAS board) was detected. Verify that the +15V power supply output and the +15V test point (IMC-DAS board) are correct.

TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

PARAMETER CHECKSUM ERROR	The verification of the IMC-DDP-C EEPROM checksum has failed. The EEPROM checksum is verified after direction is picked. If the verification fails the following will occur: • RE is prevented from picking • A Drive Forced MLT error is generated • The "Parameter Checksum Error" message is logged on the Special Events Calendar • The checksum flag(s) are highlighted on the F3 screen. Verify that the S2 Switch/Jumper on the IMC-DDP-C board in the 'A' position. Access all Advanced Parameter Screens and re-save the parameters by pressing the "S" key. If re-saving the parameters fails to correct the problem, replace the IMC-DDP-C board.
PARAMETER INITIALIZATION ERROR	The software monitors the current command output before picking the RE relay. If the output is greater than 200mV before picking the RE (Run Enable) relay, the software will not allow the car to run. This can be verified at test point DCS on the IMC-DAS board. After enabling RE, the system again checks the current command output and if it is more than 7VDC within 300 ms, the FLT relay is dropped, the error is generated and the car is not allowed to run.
PHOTO EYE FAILURE	The photo eye input has been continuously active for a considerable period of time. Suspect an abnormal blockage of the optical device, a failure of the device itself, or of the photo eye input circuit.
POSITION DETECTED SPEED ERROR	Synthesized velocity from position encoder exceeded 115% of contract speed or error between synthesized velocity and tachometer (velocity encoder) exceeded 50% of contract speed.
POSITION ERROR AT DETS	The position of the car when the contact of the Down Emergency Terminal switch opened was different from the learned value. This fault was detected by the DDP processor. The IMC-DDP-C board must have the learning process completed initially or any time any modifications are made to the location of the DETS switches.
POSITION ERROR AT DNTx	As the car approached a terminal landing, the IMC-DDP-C computer detected a distance that was different from the normal or learned distance at the time the contact opened on one of the DNTx terminal landing limit switches (or contacts on the TM switch). The IMC-DDP-C board must have the learning process completed initially or any time any modifications are made to the location of the DNTx switches.
POSITION ERROR AT OLM	While the car was traveling past a floor on normal operation, the IMC-DDP -C computer detected a difference between the actual distance and intended distance to the floor that exceeded 10" (2" if destination landing). This condition is detected at 12" (305 mm) from the floor as a result of the disturbance of the quadrature signal (95, 96). Check the positioning of the floor magnets to the edge of the steel tape (on LS-QUAD-2). The DP1 and DP2 quadrature signals must be routed through shielded cable over the entire distance from the car top to where the signal enters the IMC-RI board.
POSITION ERROR AT UETS	The position of the car when the contact of the Up Emergency Terminal switch opened was different from the learned value. This fault was detected by the DDP processor. The IMC-DDP-C board must have the learning process completed initially or any time any modifications are made to the location of the UETS or switches.
POSITION ERROR AT UNTx	As the car approached a terminal landing, the IMC-DDP-C computer detected a distance that was different from the normal or learned distance at the time the contact opened on one of the UNTx terminal landing limit switches (or contacts on the TM switch). The IMC-DDP-C board must have the learning process completed initially or any time any modifications are made to the location of the UNTx or switches.
POWER DOWN	This event occurs at controller power up in conjunction with the Power Up / Reset event to indicate how long the controller was without power.
POWER UP / RESET	Reset button pressed, power cycled to IMC-DDP board, or DDP software error.
PR ERROR (BINARY FLOOR CODE)	The system detected a parity error in the binary floor code.
PT2 & PT3 REDUNDANCY FAILURE	The CNPM output from the IMC-PRI board is not high (above 100 VAC) before picking the RE relay. When the RE relay picks, the CNPM should drop to zero volts. The cause can be that PT2 or PT3 did not drop out from the previous run. Check the voltage between terminals MI1 and MI2 on the IMC-PRI board. Check fuse FMC.
RD ERROR (BINARY FLOOR CODE)	The elevator stopped in the dead zone with the RD signal inactive.
RELEVELING	The overshoot situation is characterized by the following sequence of events: the RUN flag drops when the car is in Dead Zone (DZ is ON, LU and LD are both OFF), the REL flag drops within one second. Many things can cause this. The drive must be properly adjusted to track the velocity profile from the IMC-DDP-C computer. Changing one or more of the following parameters can also help: decrease J7 or A6, increase DL or DFL, and decrease VHL or VIL or VFL.
RETIRING CAM FAILURE (DOOR LOCK FAILURE)	This condition indicates that the doors have been closed (DCLC = 1 or DCL = 0) but did not lock (DLK = 0) within 80 seconds. Momentarily place the car on Inspection to reset the retiring cam circuitry.
ROLLBACK DETECTED	Car rollback detected. Check load weigher circuit and adjustments.

TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

S25 UNIT OVER TEMPERATURE	Excessive heat in the drive subsystem. This error applies only to the IMC-S25 drive.
SAFETY OVERSPEED AT DETS	The car was traveling more than the learned speed when the contact of the Down Emergency Terminal Switch opened. If the DETS input on the IMC-RI board is not connected, this error may be activated. This fault was detected by the ETS processor. The IMC-DIO board must have the learning process completed initially or any time any modifications are made to the location of the DETS switches. As the car was approaching the bottom terminal landing, the speed of the car was higher than learned speed at the time the down emergency terminal switch (DETS) contact opened. • Verify the operation of the DETS switch. • Check the COMP2 LED on the IMC-DIO board and make sure that it is **not** blinking. • Verify that the learned values for the DETS switch on the Terminal Limit Switches (F1 -5) screen are reasonable.
SAFETY OVERSPEED AT UETS	The car was traveling more than the learned speed when the contact of the Up Emergency Terminal Switch opened. If the UETS input on the IMC-RI board is not connected, this error may be activated. This fault was detected by the ETS processor. The IMC-DIO board must have the learning process completed initially or any time any modifications are made to the location of the UETS or switches. As the car was approaching the top terminal landing, the speed of the car was higher than learned speed at the time the up emergency terminal switch (UETS) contact opened. • Verify the operation of the UETS switch. • Check the COMP2 LED on the IMC-DIO board and make sure that it is **not** blinking. • Verify that the learned values for the UETS switch on the Terminal Limit Switches (F1 -5) screen are reasonable.
SAFETY PROCESSOR FAULT	The safety processor has detected an overspeed condition. The overspeed condition can be OS, ILO, or NTS.
SAFETY RELAY CIRCUIT OPEN	The safety input (SAF) and the Inspection/Access (IN) input to MC-MP-1ES computer were both simultaneously lost as a result of one of the devices in the main safety string opening up. Check the on-car and off-car safety devices, i.e. Governor overload, over travel limit switches, car stop switches, and SAF input. Restoring the safety circuit to normal will cause the CAR STOP SWITCH ACTIVATED message to appear at that time.
SAFETY OVERSPEED AT DNTx	The car was traveling more than the learned speed when the contact of the Down Normal Terminal switch 1, 2, 3, 4, or 5 opened. This fault was detected by the safety processor. The IMC-DIO board must have the learning process completed initially or any time any modifications are made to the location of the DNTx switches.
SAFETY OVERSPEED AT UNTx	The car was traveling more than the learned speed when the contact of the Up Normal Terminal switch 1, 2, 3, 4, or 5 opened. This fault was detected by the safety processor. The IMC-DIO board must have the learning process completed initially or any time any modifications are made to the location of the UNTx or switches.
SECURITY	Security input is activated (high).
TACHOMETER ERROR	Means that the difference between the intended speed (pattern) and the speed feedback signal (tachometer/encoder) has exceeded the tolerance value that is labeled STE (Maximum Tachometer Error) on the Drive Parameters (F1 - 4) screen. The following conditions can cause this fault: • tachometer/encoder input is not connected properly to the IMC-RI board • faulty tachometer or encoder • disabled speed command (pattern) due to an unsafe operation • no armature voltage • no brake voltage or brake is not lifting
TACHOMETER FAILURE **(This fault does not automatically reset, the TF fault shuts down the system)**	Means that the difference between the synthetic tachometer signal (generated from the armature feedback voltage and current) and the external speed feedback signal (tachometer/encoder) has exceeded the tolerance value of 4 volts (40% of contract speed). The synthetic tachometer signal is generated from armature voltage and inter-pole current, and the speed signal can be adjusted using SVSC and SISC parameters on the Drive Parameters (F1 - 4) screen so that this speed signal provides 10VDC at contract speed. This signal, or the error between these two signals, can be accessed through the software test points on the IMC-DAS board. The following can activate this flag: • incorrect adjustment of SVSC and SISC parameters • tachometer/encoder input is not connected to the IMC-RI board • faulty tachometer or encoder If TF continues, and the difference between T, and STS is greater than 3.5VDC, then do the following: a. Swap both Motor field MF1 and MF2 connections and your Generator GSF1 and GSF2 connections. b. If TF continues, then swap GA and GI wires.
TACHOMETER SATURATION	Indicates that the voltage at test point T on the IMC-DAS board has exceeded the maximum voltage of ±10.0VDC. The cause of this problem may be one of the following: • wrong tachometer is being used or jumper TVR on IMC-RI board is in the wrong position • the trimpot TACH on the IMC-DAS has been misadjusted • the resistance of this trimpot must be about 32Kohms for 60VDC/1000RPM tachometer • misadjustment of PG (pattern gain) on the Dynamic or Drive Parameters (F1 - 4) screen

TABLE 6.16   Special Event Descriptions (F7 - 1 - S) screen

TIMED OUT OF SERVICE	Elevator abnormally delayed in reaching destination in response to a call demand. Doors cannot close and lock, or motor stalled.
TIMED PHOTOEYE FAILURE	The photoeye was on longer than the predetermined time (default 60 seconds).
TOP FLOOR DEMAND	Car PI indicates bottom terminal landing but the car is not there. Check the bottom terminal landing slowdown switches and DSD input.
VELOCITY ERROR AT DETS	As the car approached a terminal landing, the IMC-DIO (ETS processor) detected a higher than normal or learned velocity at the time the contact opened on one of the DETS terminal landing limit switches (or contacts on the TM switch). The IMC-DIO board must have the learning process completed initially or any time any modifications are made to Pattern Parameters (F1 - 3), (F2 - 5) or (F2 - 6) screens. If there are velocity fluctuations as the car approaches a terminal landing, the learn process should be repeated several times and the learned velocities recorded in each case. If the velocity varies by more than 5%, limit switches and roller guides should be checked.
VELOCITY ERROR AT DNTx	As the car approached a terminal landing, the IMC-DDP-C and IMC-DIO (ETS processor) detected a higher than normal or learned velocity at the time the contact opened on one of the DNTx terminal landing limit switches (or contacts on the TM switch). The IMC-DIO board must have the learning process completed initially or any time any modifications are made to Pattern Parameters (F1 - 3), (F2 - 5) or (F2 - 6) screens. If there are velocity fluctuations as the car approaches a terminal landing, the learn process should be repeated several times and the learned velocities recorded in each case. If the velocity varies by more than 5%, limit switches and roller guides should be checked.
VELOCITY ERROR AT UETS	As the car approached a terminal landing, the IMC-DIO (ETS processor) detected a higher than normal or learned velocity at the time the contact opened on one of the UETS terminal landing limit switches (or contacts on the TM switch). The IMC-DIO board must have the learning process completed initially or any time any modifications are made to Pattern Parameters (F1 - 3), (F2 - 5) or (F2 - 6) screens. If there are velocity fluctuations as the car approaches a terminal landing, the learn process should be repeated several times and the learned velocities recorded in each case. If the velocity varies by more than 5%, limit switches and roller guides should be checked.
VELOCITY ERROR AT UNTx	As the car approached a terminal landing, the IMC-DDP-C and IMC-DIO (ETS processor) detected a higher than normal or learned velocity at the time the contact opened on one of the UNTx terminal landing limit switches (or contacts on the TM switch). The IMC-DIO board must have the learning process completed initially or any time any modifications are made to Pattern Parameters (F1 - 3), (F2 - 5) or (F2 - 6) screens. If there are velocity fluctuations as the car approaches a terminal landing, the learn process should be repeated several times and the learned velocities recorded in each case. If the velocity varies by more than 5%, limit switches and roller guides should be checked.

6.5 TROUBLESHOOTING CAR OPERATION CONTROL (COC)

Often a malfunction is due to a faulty input or output signal. Inputs are signals generated outside the controller cabinet that connect to terminals inside the cabinet, and are subsequently read by the computer during its input scan. Outputs are signals generated by the computer that energize relays or turn on indicators during the computer's normal output scan. Since an incorrect input or output can cause a system malfunction, tracing these signals to find the source of the problem is essential.

6.5.1 DOOR LOGIC

As complex as it is, the door logic basically answers one simple question; should the doors be open? The computer looks at certain inputs and then calls upon specific logic to answer this question. All of the inputs and flags generated by the specific logic are available for viewing through the EOD. When troubleshooting a door problem, inspecting the action and sequence of these flags and inputs is important. The status of these logic flags will generally point toward the root of the problem. Once the computer has determined the answer to the door status question, the appropriate outputs are turned ON or OFF, so the doors are in the desired state.

The computer looks at the following inputs:
- DBC   - Door Close Button input
- DCLC - Door Closed Contacts input (Retiring Cam only)
- DLK   - Door Locks input
- SE   - Safety Edge input
- DOL   - Door Open Limit input
- DZ   - Door Zone input
- PHE   - Photo Eye input

The computer generates the following outputs:
- DCF   - Door Close Function output
- DCP   - Door Close Power output
- DOF   - Door Open Function output
- NUDG - Nudging output

TRACING SIGNALS IN THE CONTROLLER

The following example shows how an input signal can be traced from its source (field wire) to its destination inside the computer (EOD). Monitor the Door Zone (DZ) flag. The DZ flag can be monitored using the Computer Swing Panel Diagnostic Indicators as described in Section 5.4.1, *Viewing the MC-MP Computer Variable Flags.* Moving the car in the hoistway should cause this flag to turn ON and OFF whenever the car goes through a floor. If the flag (LED) does not turn ON and OFF, the following could be causing the problem.

1.   Defective Door Zone sensor.
2.   Incorrect hoistway wiring.
3.   Faulty termination of hoistway wiring to the (DZ) terminal inside the controller.
4.   Defect on the HC-RB4 or HC-PI/O board.

> **NOTE:** If this installation has rear doors and at least one floor where both openings exist, look up the rear door zone flag (DZR). To do so, the Diagnostic On/Norm switch and the A5 switch must be up. All other switches are down. Diagnostic Indicator 6 shows the status of the DZR flag.

First, determine whether the problem is inside or outside the controller. With a voltmeter, probe the Door Zone terminal (27). This terminal is in Area 3 of the job prints. Moving the car in the hoistway should cause the voltmeter to read 120VAC when the car is in the door zone. If, when the car passes through the door zone, the voltmeter does not read 120VAC the problem is external to the controller (see items 1, 2, and 3 above). If the voltmeter does read 120VAC when the car passes through the door zone the problem is internal to the controller (see item 4 above). The job prints show the DZ signal goes to the right hand side of the DZ relay to a 47K 1W resistor, to pin 8 of connector C2 on the HC-RB4 Relay board, and then to pin 8 of connector C2 on the HC-PI/O board.

Figures 6.6 and 6.7 show the HC-PI/O and HC-RB4 boards and the location of the DZ signal in the controller. Notice that if terminal 27 is powered, approximately 120VAC will be present at the bottom of the 47K 1W resistor corresponding to DZ. The top of the same resistor should read about 5VAC with respect to COM.

The HC-RB4 board has test pads on the front of the board which surround every relay and connector. Relays IN2 and SAF each have a legend that indicates which pad corresponds to which contact or its coil on this board. To be sure that the input from terminal 27 is making its way to the relay coil, probe the test pad on the lower right hand side of the DZ relay.

It is not necessary to remove the relay or get to the back of the HC-RB4 board to trace signals on the board. Signals can be traced on the HC-PI/O board. If the signal gets to the HC-PI/O board but does not get to the computer, it is safe to assume that the problem is on the HC-PI/O board.

Important computer-generated logic flags:
- CCT - Car Call Time flag
- DOI - Door Open Intent flag
- DSH - Door Shortening (Intermediate) flag
- DSHT - Door Shortening (Final) flag
- HCT - Hall Call Time flag
- LOT - Lobby Time flag
- SDT - Short Door Time flag

Using the logic flags listed above, the computer makes a decision regarding the doors. The Door Open Intent (DOI) flag's status reflects the computer's decision. If the computer recognizes the necessity of either opening the doors or keeping the doors open, this flag will come ON. This flag can be found using the EOD. When viewing this flag, the corresponding Diagnostic Indicator will turn ON when the computer decides that the doors should be open.

The DOI flag is a useful flag to inspect when troubleshooting door problems. Remember if DOI is ON, it will turn the DOF output ON which should pick the DO relay. The door should stay open until the DOL (Door Open Limit) turns OFF. The absence of DOL will turn the DOF output OFF. DOI will remain ON for the door dwell time (CCT, HCT, etc.). When DOI turns OFF, the DCF output turns ON and the DC relay will close the car doors. The signal that turns the DCF output OFF is DLK (Doors Locked) or possibly DCLC if the car has a retiring cam. After the doors are locked there is approximately a two-second delay before the DCF output turns OFF. If there is a demand for the car (as is evidenced by the DMU or DMD flags being on) and if the DOI flag is *not* ON, then the DCP (Door Close Power) output will be turned ON regardless of the position of the door. The DCP output is used to provide door closing power while the car runs through the hoistway for those door operators requiring it, such as those made by the G.A.L. corporation.

FIGURE 6.6   HC-PI/O Power Input/Output Board Quick Reference

| 42-QR-HC-PCI/O Rev. 1 | **HC-PI/O QUICK REFERENCE CARD** | (Board 3) |

For above inputs
ON = 5VDC OFF = 0VDC

Connector C2	
INPUT	**PIN**
SAF	1
DBC	2
SE/DOB	3
PHE	4
DOL	5
STU	6
STD	7
DZ	8
IN	9
IND	10
UPS	11
DNS	12
LU	13
LD	14
USD	15
DSD	16
DLK	17
FRS	18
FCS	19
FRA	20
SPARE 1	21
SPARE 2	22

Connector C1	
OUTPUT	**PIN**
SST/MGR	1
FWI	2,4
SPARE 2 input	3
SPARE 1 input	5
NUDG	6
Lamp Common	7
CSAF	8
SUB/REL	9,11
DCP	10
DCF	12
Stop SW Out	13,15
DOF	14
UPDO	16
DNDO	18
Stop SW Source	17,19
H	20

SAF - Safety String Input
DBC - Door Button Close Input
SE/DOB - Safety Edge/
PHE - Photo Eye Input
DOL - Door Open Limit Input
STU - Step Up Input
STD - Step Down Input

DZ - Door Zone Input
IN - Inspection Or Access Input
IND - Independent Service Input
UPS - Up Direction Sense Input
DNS - Down Direction Sense Input
LU - Level Up Input
LD - Level Down Input
USD - Up Slow Down Input

DSD - Down Slow Down Input
DLK - Door Lock Input
FRS - Fire Phase I Input
FCS - Fire Phase II Input
FRA - Alternate Fire Phase I Input
SPARE 1
SPARE 2

Voltages for car at floor #1
With Power OFF Check for Ground

FIGURE 6.7   *HC-RB4 Main Relay Board Detail*
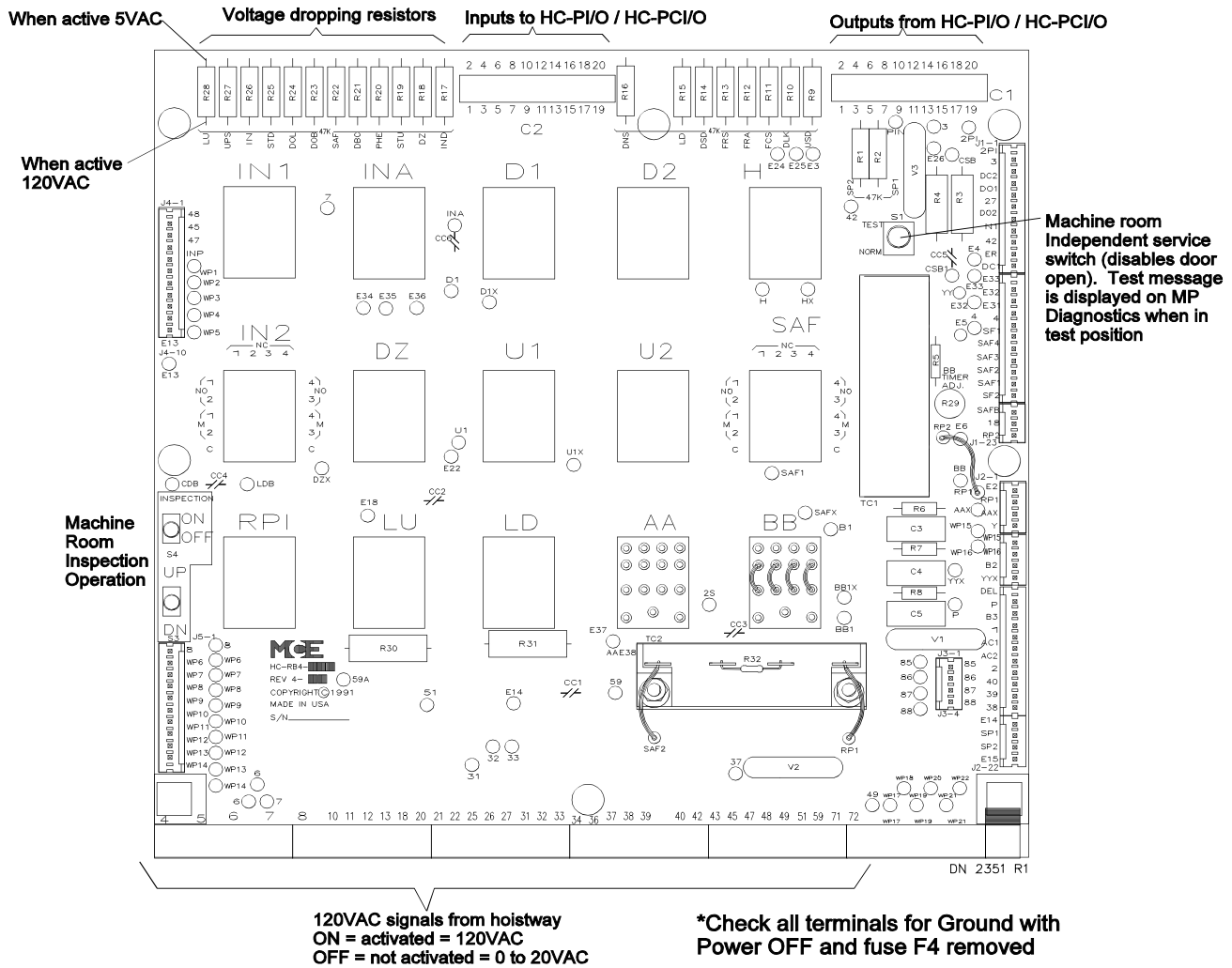
The door logic provides protection timers for the door equipment for both open and closed functions. If the doors get stuck because the door interlock keeper failed to lift high enough to clear the door interlock during the opening cycle, then the doors cannot complete opening, which could damage the door motor. The Door Open Protection Timer will eventually stop trying to open the doors and the car will then go on to the next call. Similarly, if the doors do not close all the way, the computer recycles the doors at a programmed interval in an attempt to clear the problem.

The computer basically looks for a reason to open the doors. If a valid reason to open the doors is *not* found, or if conditions are detected that prohibit the opening of the doors, the logic will close the doors (reset, or turn DOI OFF). To open the doors, the car must be in a door zone and not running at high or intermediate speed. Once the car has settled into a proper position to open the doors, a condition must exist that indicates that the doors should be open. Some of these conditions are listed below:

*   Call demand at the current landing (or a call has just been canceled)
*   Safety Edge/Door Open Button (DOB) input
*   Emergency/Independent Service conditions
*   Photo Eye input

FIGURE 6.8   *Door Sequence of Operation Flowchart*

Door Sequence of Operation

CD = HD = DPM = ON, DCL = OFF

↓

H Picked

↓

Car Call Active

↓

Call cancelled at point of slow down

→

CC--CCT
HC--HCT
LC--LOT
PHE/SE--SDT

* = logical AND

↓

Car Decelerates

→

At floor
CCT * DZ * H̄ --DOI

↓

DOI = DOF = ON → DO = ON → CD = HD = OFF

↓

DPM = OFF,
DCL = ON

↓

DOORS FULLY
OPEN -- DOL = OFF

↓

DOF = DO = OFF--CCT Starts

↓

CCT = OFF = DOI

↓

DOI = OFF -- DCF = ON

↓

DCF = ON = DC

↓

DOL = ON

↓

DPM = ON **

↓

CD = HD = DLK = ON
DCL = OFF

↓

DCF = OFF

DEMAND? —Yes→ DCP = ON

No ↓   ↓

DONE   DONE

** **Note that DPM must make prior to establishing door lock (CD or HD).**

CC = Car Call
CCT = Car Call Time
CD = Car Door Lock
DC = Door Close Relay
DCF = Door Close Function
DCL = Door Close Limit
DCP = Door Close Power
DLK = Door Lock
DO = Door Open Relay
DOF = Door Open Function
DOI = Door Open Intent
DOL = Door Open Limit
DPM = Door Position Monitor
DZ = Door Zone
H = High Speed
H̄ = High Speed Dropped
HC = Hall Call
HCT = Hall Call Time
HD = Hall Door Locks
LC = Lobby Call
LOT = Lobby Time(door dwell time)
PHE = Photo Eye
SE = Safety Edge
SDT = Short Door Time

NOTE: -- (hyphen) = Results
In, For example if a car call is set
(CC) then at the point of slowdown
this results in the setting of the CCT
dwell time.

When a call is canceled, one of the following door time flags should be turned ON: CCT, HCT, or LOT. When one of the reopening devices (SE or DOB) is active, the SDT flag is turned ON. When an Emergency or Independent Service condition exists, the presence of the particular condition will cause the DOI flag to be set. Some of these conditions include: Fire Service, Emergency Power operation, Independent Service, Attendant Service, etc.

Once the state of the computer flags has been determined, inspect the high voltage hardware to see if the appropriate functions are being carried out. For example, if the doors are closed and the DOI flag is set, the doors should be opening (the DO relay picked). If the doors are open and the DOI flag is cleared (turned OFF), the doors should be closing (the DC relay picked).

It is vital to determine whether or not *the control system* is doing what *its* logic determines it should be doing. If the control system is doing what the logic intended it to do, then it is important to determine how the logic came to its conclusions. If the control system is *not* doing what the logic intended it to do, then it is important to determine what is preventing the desired function from being carried out. The diagnostics on the Computer Swing Panel and/or the CRT can help determine which situation is present. The output flags will show which outputs the computer is attempting to turn ON/OFF. Compare the flags with what is actually happening in the high voltage hardware.

6.5.2 CALL LOGIC - NORMAL OPERATION

> **NOTE:** If the controller is equipt with the SmartLink for Car Operating Panel option, see Appendix I, *Option* SmartLink for Car Operating Panel, for troubleshooting information.

Calls are input to the system by grounding the appropriate call input, as labeled on the Call Input/Output board (Figure 6.9, HC-CI/O Call Input/Output Board Quick Reference). The act of physically grounding the call input terminal turns on the corresponding LED on the Call board. Recognition and acceptance of the call by the computer will cause the indicator to remain lit on the board. Cancellation of the call turns the indicator off. The single input/output terminal on the Call board accepts call inputs from the call fixture push-buttons, and also serves as the output terminal illuminating the call fixtures to indicate registration of a call. This means that the field wiring is identical to that used for a standard relay controller.

The computer may intentionally block call registration. When the computer prevents car call registration, it turns ON the Car Call Disconnect flag (CCD) for that car. Inspection of this flag in the diagnostics (ADDR 2C, Diagnostic Indicator #3) will tell if the computer is preventing the acceptance of calls. If the CCD flag is ON, the reason for this condition must be discovered. CCD condition is caused by: Fire Service, motor limit timer elapsed, bottom or top floor demand, etc.

A corresponding flag exists for hall call registration prevention. The computer may detect conditions that prevent hall calls from registering, and set the Hall Call Disconnect Flag (HCDX). This is a system flag (as opposed to a per car flag) but is available for viewing in the diagnostic display along with each car's operating flags. There are many reasons for the computer to reject hall call registration: Fire service, a hall call bus problem, no available cars in service to respond to hall calls, etc.

If a call circuit becomes damaged or simply stuck on as the result of a stuck push-button, the elevator will release itself from the stuck call automatically. If the push-button remains stuck, the car will stop at the floor each time it passes. Again, the computer will release itself automatically, thereby allowing continued service in the building.

FIGURE 6.9   HC-CI/O Call Input/Output Board Quick Reference

HC-CI/O QUICK REFERENCE CARD   *Board 2*

42-QR-HC-CI/O Rev. 2

DN: 1071

Call Power Terminals

Bottom most Call Terminal*

Call Label Strip*
If a call board is replaced, remove the Call Label Strip and transfer it to the new board

Jumper Plug
If a call board is replaced, the jumper plug must be transferred to the new board and the notch orientation must stay the same

Bottom most Resistor Fuse*

Bottom most Triac*
Watch out for polarity when replacing

* The Triacs, Resistor Fuses and Call Terminals are layed out in the same sequence as shown on the Call Label.

NOTE – FOR BOARD, CHANGE – TRANSFER JUMPER PLUG TO NEW BOARD OBSERVE NOTCH ORIENTATION

IF THERE IS A PROBLEM WITH THE CALL CIRCUIT, CHECK THE TRIAC, ZENER DIODE OR RESISTOR.

HC-CI/O– REV 4 COPYRIGHT © 1988 MADE IN USA

6.5.3 TROUBLESHOOTING THE CALL CIRCUITS

If there is a problem with a call, first disconnect the field wire or wires from that call terminal to determine if the problem is on the board or in the hoistway wiring or fixtures. Disconnect the calls by unplugging the terminals, or removing individual wires. If the individual field wire is disconnected, lightly tighten the screw terminal since it may not make contact if an attempt is made to ground the terminal using a jumper when the screw on the terminal is loose.

NOTE: Call terminal voltage must be ≥ 85% of call supply voltage.
Example: If supply is 100VAC, terminal voltage may be 85VAC to 100VAC. 80VAC is insufficient.

TABLE 6.17   Call Board Troubleshooting

Problem	Recommended steps to resolve the problem

Call Terminal Voltage is insufficient	1. Turn OFF the power and remove the resistor fuse associated with that terminal.
	2. Turn ON the power and check terminal voltage again.
	3. If no voltage is present on the terminal:
	   a. Check the jumper plug (header) on the HC-CI/O Call board. The jumper plug socket is located on the right hand side near the call indicators. If a Call board is replaced, this jumper plug must be transferred to the new board and stay in the same board position (more than one Call board on the controller).
	   b. Verify that the correct incoming power is on terminals marked PS1, PS2 and PS3. NOTE: Power will exist on *at least one* and possibly more of these terminals.

Call LED is ON even though the field wire is removed	1. Reset the computer (Computer Reset pushbutton on Swing Panel). 2. Run the car to the nearest landing to reset PI. 3. It may be necessary to reset the computer in the Group Supervisor in order to reset a latched hall call. 4. If the call does not cancel under these conditions--replace the call board
Cannot register a hall call at the call board	To discover whether the problem is with the call board or the field wiring: 1. First remove the resistor fuse and disconnect the field wire(s). 2. Verify that the HCDD, Hall Call Disconnect Computer Variable Flag is OFF (Address 2C, LED 6). 3. Verify that there is proper voltage on the call terminal. 4. Register a call by shorting the call terminal to terminal 1 or GND and verify with EOD as described in Section 5.4.3, *Viewing and Entering Calls* (the call registered light on the call board may not work correctly). 5. If the call does not register under these conditions--replace the call board. 6. If the call circuit works with field wires removed, before connecting wires, jumper the wire(s) to ground or terminal 1 and press the call pushbutton. If a fuse blows, there is a field wiring problem. If connecting the call wires causes a problem, the call board may be damaged.
Call remains latched even though the car arrives at that landing	Remove the associated resistor fuse. If call cancels, replace the bad resistor fuse.

6.5.4 TROUBLESHOOTING THE CALL INDICATORS

When working correctly, a call indicator glows brightly when a call is registered and glows dimly or not at all when a call is not registered.

> **NOTE:** Before troubleshooting the call indicators, ensure that the call circuit is working correctly, the field wires are connected and the resistor fuses are plugged in. If the board is arranged for neon (or LED) indicators (HC-CI/O -N board), the board indicators are not affected by the fixture bulbs.

TABLE 6.18   Call Indicator Troubleshooting

Problem	Recommended steps to resolve the problem
With a call registered, the Call Indicator is dimly lit (HC-CI/O)	Incandescent bulb in the fixture for the call is burned out or missing. Replace the bulb.
Indicator glows bright whether or not there is a call registered	Bad triac or triac driver transistor. Check triac with power OFF and field wire removed. Failed triac usually measures a short circuit from the metal back (collector) to terminal 1. If board is not in system, measure short between metal back and pad area around mounting hole. Be careful, the metal back of the triac is connected to AC when power is ON. NOTE: bottom triac corresponds to bottom terminal.

6.6   PC BOARD QUICK REFERENCES

This section contains a quick reference for the PC boards found in the typical IMC-MG controller. They are as follows:

FIGURE 6.10   Standard Board Layout
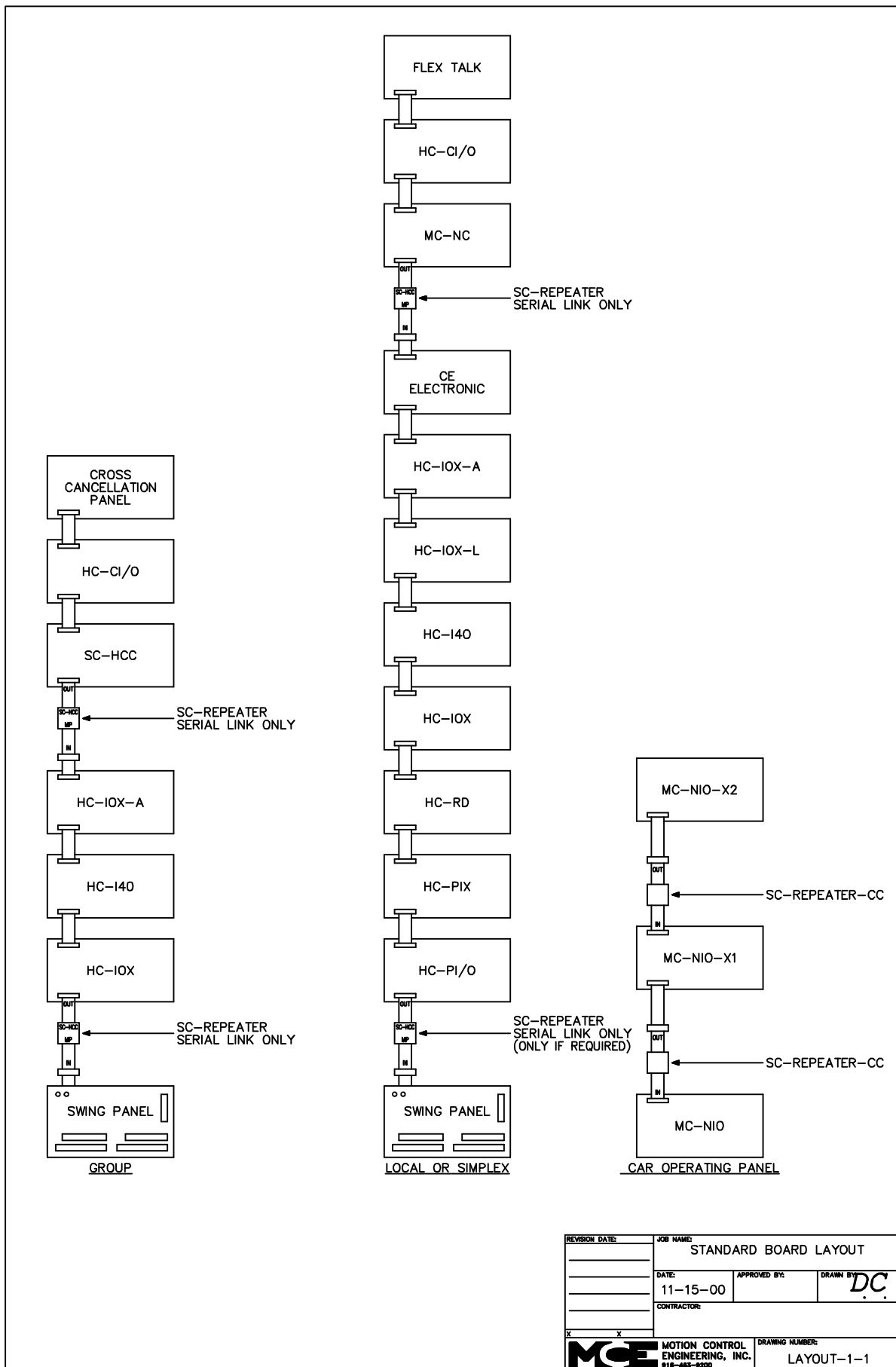
FIGURE 6.11   MC-MP-1ES Main Processor Board Quick Reference

MC-MP-1ES QUICK REFERENCE
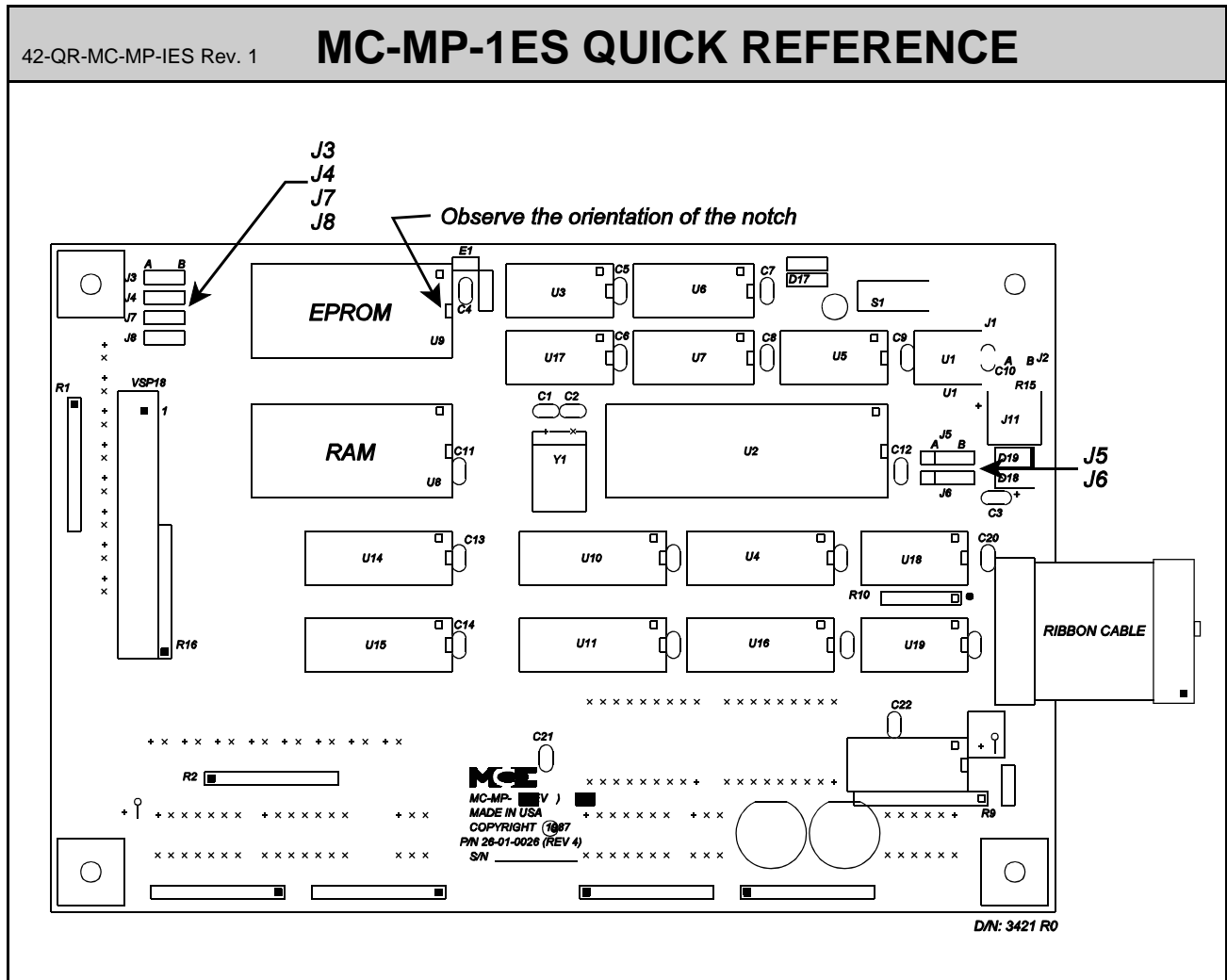
JUMPER	TYPICAL SETTING	DESCRIPTION
J3	A	A = 27C512 or 27C256 EPROM B = 27C128 EPROM
J4	A	A = 27C512 EPROM B = 27C256 or 27C128 EPROM
J5	see Description	N/C = Car Controller ON = M3 Group Supervisor
J6	N/C	Jumper not loaded
J7	A	A = 32K X 8 RAM, M5M525610-LP or HY62256ALP-10 B = 8K X 8 RAM, TC5564 or AM99C88
J8	A	A = 32K X 8 RAM, M5M525610-LP or HY62256ALP-10 B = 8K X 8 RAM, TC5564 or AM99C88

FIGURE 6.12   MC-MP2 Main Processor Board Quick Reference
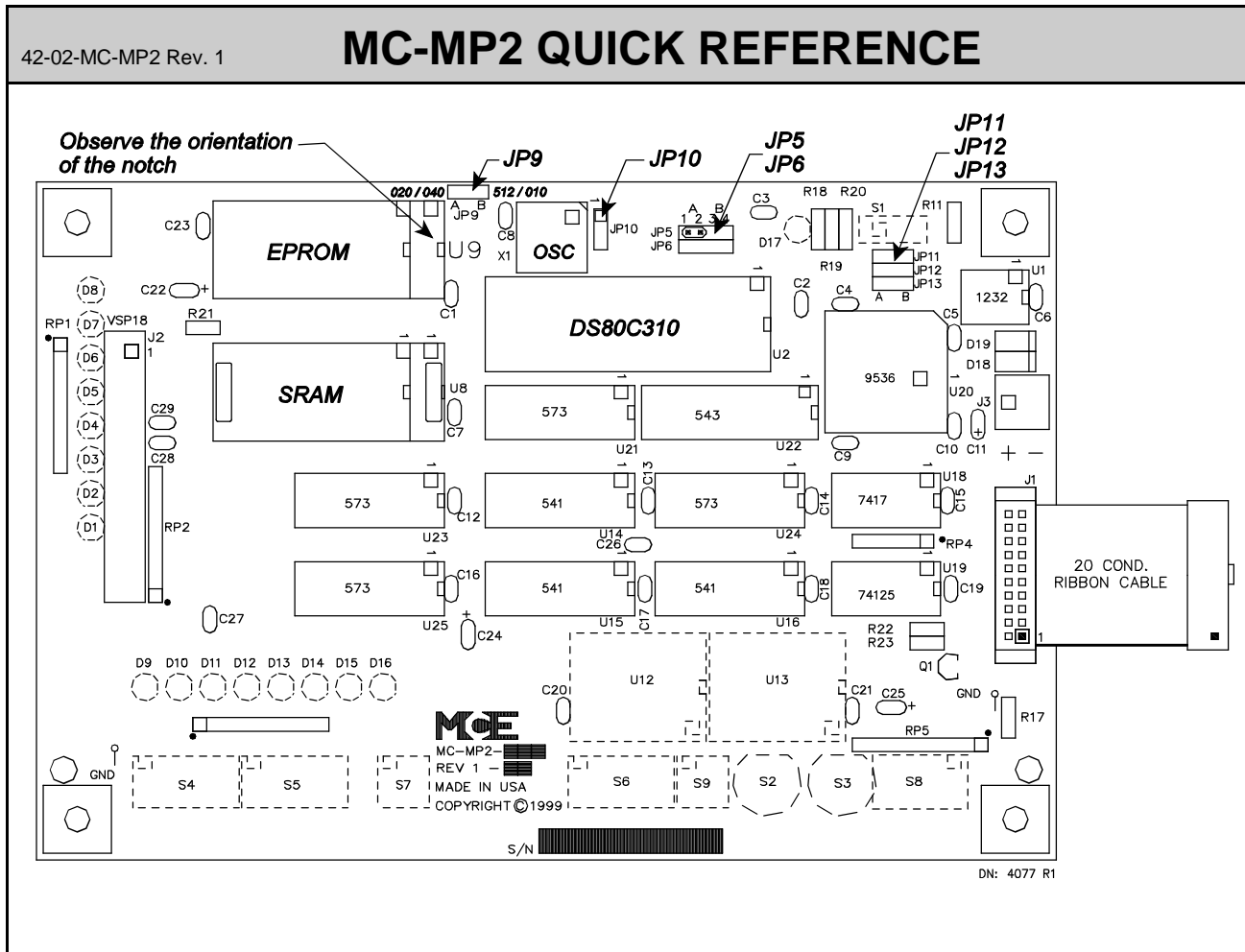
JUMPER	TYPICAL SETTING	DESCRIPTION
JP5	see Description	N/C = Car Controller A pins 1 & 2 = M3 Group Supervisor
JP6	N/C	Jumper not loaded
JP9	A	A = 27C020 or MC27C2001 EPROM B = 27C512, 27C010 or MC27C1001EPROM
JP10	N/C	Jumper not loaded
JP11	A	A = SRAM A16 Bank select enabled, B = Bank select disabled
JP12	A	A = ROM A17 Bank select enabled, B = Bank select disabled
JP13	A	A = ROM A16 Bank select enabled, B = Bank select disabled

FIGURE 6.13   MC-CPA Communication Processor Board Quick Reference

MC-CPA QUICK REFERENCE

42-QR-MC-CPA

Observe the orientation of the notch

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MADE IN USA

MC-CPA-
REV 1-

= NOT LOADED   **Note: EPROM 2 is installed only on simplex controllers**

D/N: 1826A

POWER ON LED	JUMPER	B	DESCRIPTION
Should be ON solid. Flashing indicates a problem with board or software. This LED can be viewed by looking between the boards.	JP2	32K X 8 RAM	32K RAM
	JP3	32K X 8 RAM	32K RAM
	JP8	27512	Set for 27C512 EPROM
CPA Board has no reset switch!	JP9	27512	Set for 27C512 EPROM

CPA INTERRUPT COUNTER	CPA MAIN LOOP COUNTER
C7FBh - The CPA program loop counter. Place Diagnostic "ON" and A11, A10, A9, A8-A1 and F5 "ON" When this address is dialed up, the horizontal Diagnostic LEDs should be changing rapidly	**C7FFh - The CPA timer interrupt counter** - Place Diagnostic "ON" and A11, A10, A8-A4 and F5 "ON" When this address is dialed up, the horizontal Diagnostic LEDs should be changing rapidly at all times. If LEDs pause (even for a second or two) it indicates a software problem.

FIGURE 6.14   MC-MRS / ARS Communication Interface Board Quick Reference

MC-MRS & MC-ARS QUICK REFERENCE CARD

JP1 and JP2 Termination jumpers usually in place on Group and Last car in the daisy chain. Refer to Group Controller Manual, Balancing the High Speed Communication Cable.

OR➡

OR➡

Cable to Peripheral Device (Terminal, PC, Modem, Line Driver)
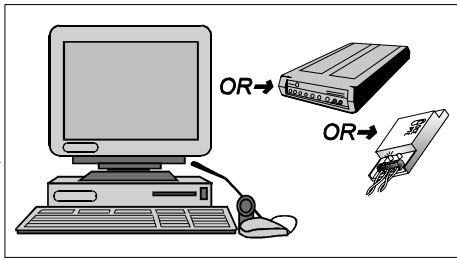
For Group installation all MC-MRS boards are connected together in a daisy chain using the RS422 high speed communication receptacles. See jumper settings for JP1, JP2 and JP4 for group or simplex settings, and JP6 and JP7 for Com Port settings when installing.

RS-422   RS-422   **COM 1**   **COM 2**   **COM 3**   **COM 4**

MC-MRS

A B JP4

B A JP6
JP7

B A JP4   B A JP8   JP12
JP3   JP7   JP11
B A JP2   JP6   JP10
JP1   JP5   JP9
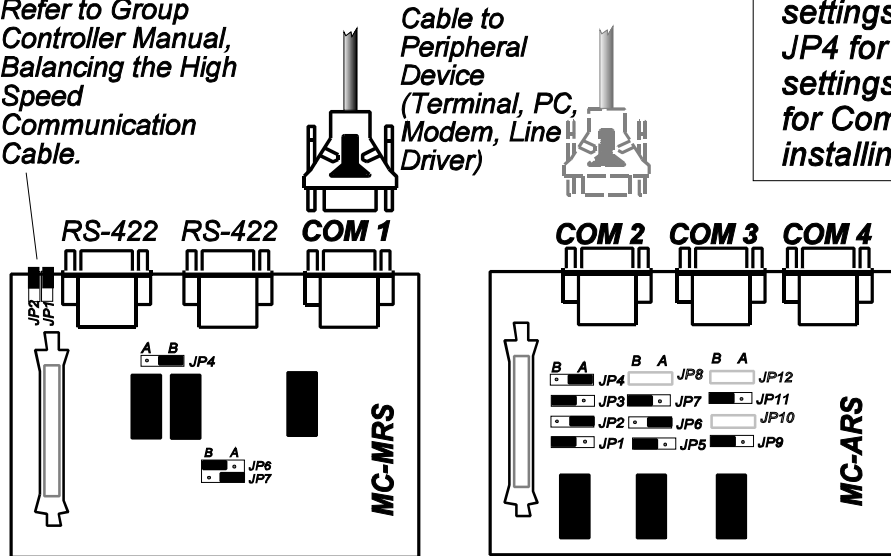
MC-ARS

The figure to the left shows the MC-MRS and the optional MC-ARS boards, their jumper or switch locations, and the connector placement.
NOTE: *See Tables for jumper settings.*
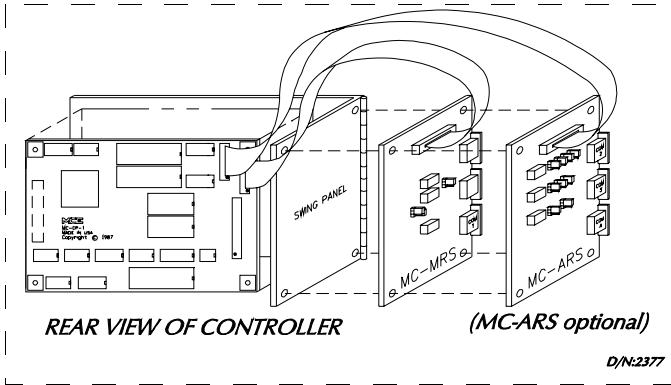
At left: the location of the MC-MRS and MC-ARS boards.

REAR VIEW OF CONTROLLER   *(MC-ARS optional)*

D/N:2377   Dnwp38

JUMPER TABLE FOR COM PORT SETTINGS (– indicates position unimportant)										
PORT	Com 1 (MC-MRS)		Com 2 (MC-ARS)			Com 3 (MC-ARS)			Com 4 (MC-ARS)		
JUMPER	JP6	JP7	JP1	JP2	JP7	JP3	JP4	JP9	JP5	JP6	JP11
CRT Terminal	A	B	A	B	–	A	B	–	A	B	–
Line Driver	B	A	B	A	B	B	A	B	B	A	B
Modem	B	A	B	A	–	B	A	–	B	A	–
PC	A	B	A	B	–	A	B	–	A	B	–

MC-MRS JUMPER TABLE FOR INTERFACE COMMUNICATIONS (GROUP OR SIMPLEX)		
Setting	**Jumper JP4**	**Description**
Car	A	Disables the clock pulse, set all car MC-MRS boards to A (Simplex or Local).
Group	B	Enables the clock pulse used for group controllers, only the MRS board in the Group (Master) should have JP4 set to B, all other MRS boards for cars should have JP4 set to A (Slave).

FIGURE 6.15   IMC-DDP-x Digital Drive Processor Board Quick Reference

IMC-DDP QUICK REFERENCE CARD

42-QR-IMC-DDP Rev. 3 — page 1 of 2

Ribbon cable to IMC-MB / MBX
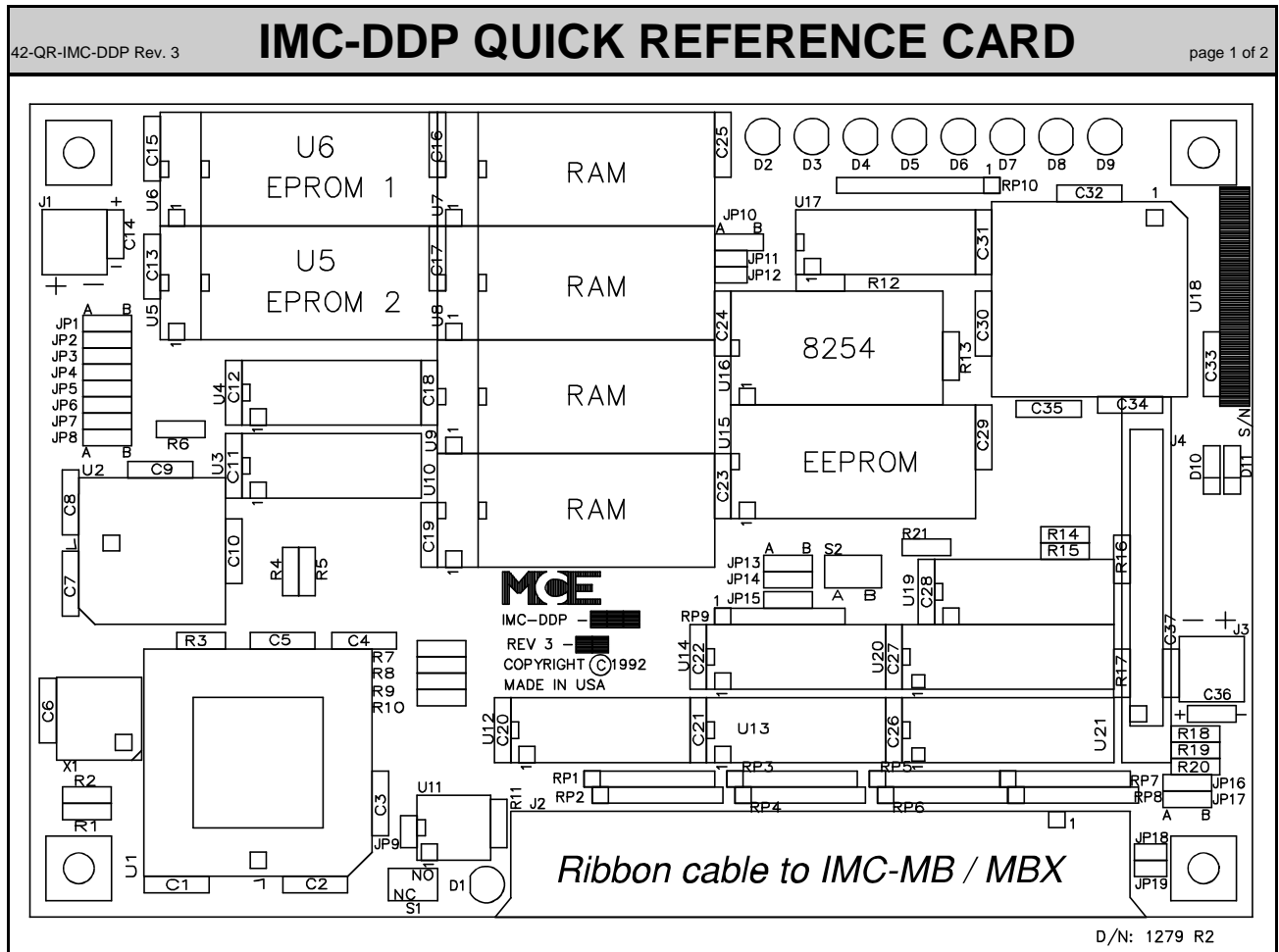
D/N: 1279 R2

	DDP Status / Error Messages		○ = LED off ● = LED blinking
HEX	**DDP Diagnostic Indicators***	**MODE**	**MEANING**
	Single LED scanning	*Normal*	*Normal Operation, no errors or status messages*
01	○ ○ ○ ○ ○ ○ ○ ●	Normal	Loss of Position
03	○ ○ ○ ○ ○ ○ ● ●	Normal	Terminal Position Switch
07	○ ○ ○ ○ ○ ● ● ●	Normal	CP not responding
1F	○ ○ ○ ● ● ● ● ●	Normal	Learn Run
24	○ ○ ● ○ ○ ● ○ ○	Learn	Drive not ready
3F	○ ○ ● ● ● ● ● ●	Normal	Inspection Run
42	○ ● ○ ○ ○ ○ ● ○	Inspection	PG not ready
7E	○ ● ● ● ● ● ● ○	Normal	Identification mismatch
80	● ○ ○ ○ ○ ○ ○ ○	Normal	Read sensor error from the landing system
81	● ○ ○ ○ ○ ○ ○ ●	Normal	Parity sensor error from the landing system
99	● ○ ○ ● ● ○ ○ ●	Normal	Fault Relay
C0	● ● ○ ○ ○ ○ ○ ○	Normal	Invalid Pattern/Profile parameters
C2	● ● ○ ○ ○ ○ ● ○	Normal	Safety not ready
EF	● ● ● ○ ● ● ● ●	Normal	Correction Run
F0	● ● ● ● ○ ○ ○ ○	Normal	Parameter checksum error
F8	● ● ● ● ● ○ ○ ○	Normal	Floor Height checksum error
F9	● ● ● ● ● ○ ○ ●	Normal	Floors learned error

* DDP Diagnostic Indicators on top of the Computer Swing Panel

FIGURE 6.15   IMC-DDP-x Digital Drive Processor Board Quick Reference

JUMPERS				
NOTE: NC = No Pins Connected, ON = Pins Connected, N/A = not applicable				
JUMPER	IMC-DDP	IMC-DDP-B IMC-DDP-C	IMC-DDP-D	REASON
JP1	NC	NC	NC	Future use - Flash EPROM
JP2	A	NC	NC	EPROM: U5 & U6 27C512 (64K) = A 27C010 (128K) = NC 27C020 (256K) or 27C040 (512) = B
JP3	A	A	A	RAM: U7 - U10 less than 2 Megabit = A 2 Megabit of larger = B
JP4	NC	NC	NC	Future use - Large EPROMS
JP5	B	B	B	RAM: U7 - U10 28 PINS= A 32 PINS= B
JP6	B	B	B	EPROM: U5 & U6 27C256 (32K) = A 27C512 (64K) or larger = B
JP7	NC	NC	NC	Future use - Flash EPROM
JP8	B	B	B	Timer/External Clock freq: 4MHz = B 8MHz = A
JP9	NC	NC	NC	RAM: U7 - U10 less than 4 Megabit = NC 4 Megabit or larger = YES
JP10	A	A	A	External Clock source: From Timer=B From OSC = A
JP11	ON	ON	ON	INT2 Interrupt from timer: Enable = ON Disable = NC
JP12	ON	ON	ON	INT1 Interrupt from timer: Enable = ON Disable = NC
JP13	B	B	B	EEPROM: U15 X28C256 (32K) or larger = A X28C64 (8K) or smaller = B
JP14	A	A	B	EEPROM: U15 X28C16 (2K) or smaller (24 pin) = A X28C64 (8K) or larger (28 pin) = B
JP15	A	A	A	EXTERNAL BUS: Yes = A No = B
JP16	A	A	A	RESET: From CPA board = A On board only = B
JP17	NC	NC	NC	External BUS signal: INT3 input = B IO_CS1 output = A
JP18	NC	NC	NC	DDP RESET Output to CPA board: Enable = YES Disable = NC
JP19	NC	NC	NC	INT3: Enable from CPA board = YES Disable from CPA board = NC
S2	N/A	N/A	A	EEPROM write protect: Write Enable = A Write Disable = B

FIGURE 6.16   IMC-DAS Data Acquisition System Board Quick Reference

Test Point MFT (Motor Field Trigger) Signal with respect to ACS Signal (not applicable to IMC-AC controllers)

Test Point BFT (Brake Field Trigger) signal with respect to ACS signal

Test Point ACS - AC zero-crossing signal

BIP R56

R55

BAL R105

TACH R9

IMC-EASI Board optional, plugs into J4, used for velocity encoder

DN 2408 R3

JP6   JP7   JP3, JP4, JP5

JUMPER SCHEDULE FOR IMC-DAS BOARD (N/C = No Connection)							
MG SYSTEM JUMPERS	JP1 Not Used	JP2 Not Used	JP3 B position	JP4 ON	JP5 ON	JP6 N/C	JP7 N/C
SCR & AC SYSTEM JUMPERS	JP1 Not Used	JP2 Not Used	JP3 A position	JP4 N/C	JP5 N/C	JP6 ON	JP7 ON

Indicators

PWR/ COMPT   ON = DDP is looping, OFF = no 5V power supply, blinking = DDP is not looping.

SFLT   Illumination indicates that the Digital Drive's safety monitoring functions have detected one or more safety failures in the Drive Unit and tripped the FLT relay.

RUN ENABLE   Illumination indicates that the Digital Drive is initiating motion.

CHA-A   Illumination reflects the transition of the channel A quadrature signal from the hoist motor encoder. The input is used only if an encoder is used instead of a tachometer.

CHA-B   Illumination reflects the transition of the channel B quadrature signal. See CHA-A.

FIGURE 6.16   IMC-DAS Data Acquisition System Board Quick Reference

Test Points	
COM	This is the reference test point against which all other test points are measured. The oscilloscope or voltmeter common lead wire connects here.
T	Tachometer test point. Maximum is +8VDC (if over 9.9VDC change jumper TVR on SCR-RI board). Use trimpot R9 to set to exactly +8VDC at contract speed.
BFI	Brake Field Current: Maximum is +6VDC. Change JP1 on IMC-GPA board if over +6VDC.
MFI	Motor Field Current: Maximum is +8VDC. Change JP2 on IMC-GPA board if over +8VDC.
GSI	Generator Shunt Field Current:: 0.9VDC is equal to 1 Amp of Generator Shunt Field Current.
DCS	Current Command Signal: 3.0VDC = 100% of SCR Drive rated current. Maximum +/- 5VDC.
CHA-A, CHA-B	Channel A and B quadrature signals from the hoistmotor encoder can be verified at these test points.
STP1, STP2	These test points can be assigned to any software variable listed in, SOFTWARE TEST POINT ASSIGNMENTS by setting param. TP1 and TP2.

SIGNAL PROCESSED BY THE IMC-DAS BOARD	
Digital Inputs	**Digital Outputs**
CHAN-A: Velocity encoder Signal CHAN-B: Velocity encoder Signal GSF SAT: Generator Shunt Field Voltage HIT: High Temperature in SCR Drive DRO: Drive On PLL: Phase Lock Loop Fault IOC: Instantaneous Over Current CFF: Contactor or Fuse Failure HV: Generator Voltage High	FLT: Fault Relay MFF: Motor Field Failure DRE: Drive Enable
Analog Inputs	**Analog Outputs**
Tach: Tach Feedback Loop Voltage (Armature) Loop Current (Armature) Brake Current MF Current: Motor Field Current MF Voltage: Motor Field Voltage GSF Current: Generator Shunt Field Voltage LW: Load Weigher	DCS: Current Command Pre Torque STP1 Software Test Point 1 STP2 Software Test Point 1 Pattern Feed forward (to SCR Drive) Current Feed forward (to SCR Drive)

FIGURE 6.17   IMC-DIO Digital Input/Output Board Quick Reference

42-QR-IMC-DIO	**IMC-DIO QUICK REFERENCE**	(BOARD 35)

Signals Processes by the IMC-DIO board

RD	Read Input
PR	Parity Input
R0	Floor Code Input 0
R1	Floor Code Input 1
R2	Floor Code Input 2
R3	Floor Code Input 3
R4	Floor Code Input 4
R5	Floor Code Input 5
UNT	Up Normal Terminal Switches
DNT	Down Normal Terminal Switches
UETS	Up Emergency Terminal Switch
DETS	Down Emergency Terminal Switch
UOLM	Up Outer Leveling Marker
DOLM	Down Outer Leveling Marker
DP1	Digital Pulse 1
DP2	Digital Pulse 2
UP	Up Direction
DN	Down Direction
H	High Speed
INS	Inspection Operation
LEV	Leveling
FLR	Car is at the floor
EQ	Earthquake
INTB	Intermediate Bypass
FLTB	Fault Bypass
CNPB	Contactor Proof Brake
CNPG	Contactor Proof Generator
CNPM	Contactor Proof M Contactor
BCI	Brake Not Lifted
DEL/MR	Delta/M Contactor Redundancy
RE	Trigger for RE Triac

EEPROM
THE EEPROM ON THIS BOARD CONTAINS INPORTANT INFORMATION
RELATED TO THE CAR IN WHICH IT IS INSTALLED . IF YOU CHANGE
THIS BOARD, RETAIN THE EEPROM, OR RELEARN THE LIMIT SWITCHES.

JP2 = OFF

D/N: 2409

Test Points		**Indicators and Switches**
+ 5V	Digital Supply Voltage	**COMPUTER 1 ON** When illuminated, indicates that the safety processor is looping.
		COMP 2 ON When illuminated, indicates that the ETS processor is looping.
		COMPUTER RESET When pressed, this button resets the safety processor.
DP1	+5V = ON 0V = OFF	**OVRSPD** When illuminated, indicates that the safety processor has detected an overspeed condition. This condition can arise from the following: velocity greater than ILO velocity when on Inspection of Leveling, or velocity greater than contract speed (VH).
DP2	+5V = ON 0V = OFF	**LEARN** When illuminated, indicates that the safety processor is on Learn operation.
		DP1 Illumination reflects the transition of the channel A quadrature signal from the car top landing system.
OLM	+5V = ON 0V = OFF	**DP2** Illumination reflects the transition of the channel B quadrature signal from the car top landing system.
		OLM When illuminated, indicates the transition through the Outer Leveling Marker. Signal occurs 1 ft. (305 mm) before a floor.
COM	0V = GROUND	**LEARN SWITCH** Switch used to place the safety processor on Learn operation.

FIGURE 6.18   IMC-GPA General Power Adapter Board Quick Reference

IMC-GPA QUICK REFERENCE

42-QR-IMC-GPA

Q1-Q4 = Generator Shunt Field IGBTS (IMC-MG, not used on IMC-SCR)

Q5 = Brake IGBT

D/N: 2416

Signal at test point OSC (Oscillator)

Signal at test point REF (Reference)

Signal at BRK with respect to ACS test points (Brake)

Signal at ACS (A.C. Sync) test point

Indicators			Jumpers	
			JP1	**BRAKE CURRENT**
DFLT	DRIVE FAULT	When illuminated, indicates that the Digital Drive's safety monitoring functions have detected one or more safety failures in the Drive Unit and have tripped the FLT relay.	B	Less than/equal to 10A
			A	Greater than 10A
			none	not used
			JP2	**MOTOR FIELD CURRENT**
MFF	MOTOR FIELD FAILURE	When illuminated, indicates insufficient motor field voltage for the safe operation of the hoist motor (less than 50% of Standing Voltage (MFSV).	none	Less than 2A
			B	2A - 15A
			A	Greater than15A

42-02-6202

FIGURE 6.19   IMC-PRI-ENH Power Interface Board Quick Reference

DN: 4524 R0

J1	DESCRIPTION
1	1 bus, ground connection for relays PT1, PT2, PT3, and PT4
2	2 bus, 120VAC
85	Up direction input (120VAC) from the IMC-RI board
87	Down direction input (120VAC) from the IMC-RI board
CNPG	Power supplied by PT3 and PT4 N.O. relay contacts, and then routed to the IMC-RI board for read by the IMC-DDP-x computer
CNPB	Power supplied by PT1 and PT2 N.O. relay contacts, and then routed to the IMC-RI board for read by the IMC-DDP-x computer
RE	Routed to the RE IDC connector on the IMC-RI board. The IMC-RI board provides ground to the RE relay subject to the FLT relay N.O. contacts
DEL	Connected to the DEL IDC connector on the IMC-RI board. The IMC-RI board provides 120VAC to the RE relay subject to the Delta relay N.O. Aux contact
FLT3	This connection provides 120VAC to relays PT1, PT2, PT3 and PT4 conditional to the closure of the FLT relay N.O. contact on the IMC-RI board
FLT4	This connection provides 120VAC to the IMC-RI board subject to an active direction signal on terminal 85 or 87
J2 thru J9	**DESCRIPTION**
GPO2	Output AC voltage to the generator shunt field circuit on the IMC-GI2 unit
GPO1	Output AC voltage to the generator shunt field circuit on the IMC-GI2 unit
BPO2	Output AC voltage to the brake circuit on the IMC-GI2 unit
BPO1	Output AC voltage to the brake circuit on the IMC-GI2 unit
GPI2	Input AC voltage for the generator shunt field circuit
GPI1	Input AC voltage for the generator shunt field circuit
BPI2	Input AC voltage for the brake circuit
BPI1	Input AC voltage for the brake circuit

6.7   USING THE MLT DATA TRAP

The MLT "data trap" records many of the controller's operation "flags" at the moment the MLT occurs. This allows you to see what flags led up to the fault. Note: Direction must be on (inputs UPS or DNS) for two minutes before MLT will occur.

Once an MLT shuts down the car, use these steps to look at the stored flags.

1.   Do not reset the computer, as this will clear the data trap on controllers with older software versions.* To return the car to service and not harm the data, simply toggle the relay panel inspection switch from OFF to ON and back to OFF.

2.   On the Computer Swing Panel, place the Diagnostic On/Norm switch and the F2 switch up (ON) as shown.

F2 selects external memory

Diagnostic On/Norm is ON (up)
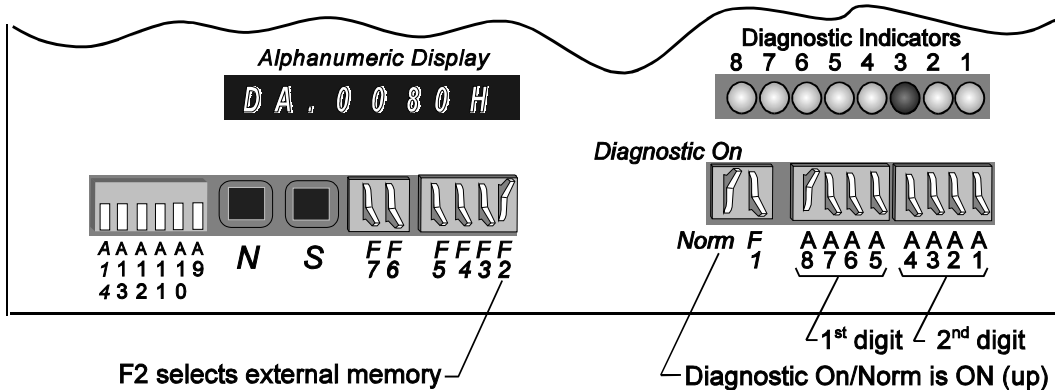
3.   Use the DATA TRAP MEMORY CHART to look at the saved MLT data. Set the address switches A1 thru A8 as shown in the Data Trap Memory Chart which is appropriate for your controller type (Local, Simplex Car A or Simplex Car B). Switches A5 thru A8 select the first digit and switches A1 thru A4 select the second digit of the Hex address. The picture above shows the switches set for the first address in the local controller chart.

4.   Record the data displayed on the Diagnostic Indicators for all rows (addresses) shown on the chart. It helps if you have a few photocopies of the chart. Simply mark the positions in the chart for the Diagnostic Indicators that are ON. The first 20 addresses contain car status flags. The last four addresses contain the car's position indicator value at the instant the MLT condition occurred, MLT counter, PG flags and MLT Code number. Only the labeled positions are important to mark.

5.   Use the recorded values to help determine the root of the problem. Call MCE for assistance if any is needed.

   * Note: If the data trap has been cleared and/or no MLT has occurred, all of the flags in the data trap memory addresses will be set (LEDs will be ON). Each time a new MLT occurs, the new data overwrites the old data.

Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8.......A5 A4.......A1	Diagnostic Indicators LED On = variable flag is On or Active							
		8	7	6	5	4	3	2	1
80		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
81			DC	UC	CC			DHO	DOI
82		DCF	DCP	DOF	LOT		HCT	CCT	SDT
83				HSEL	CSB	DCC	NUDG		DSHT
84		INT/DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
85				HLW	HLI			FWI	
86		LFP	UFP						
87				EQI	IND	IN		DELSIM	YSIM
88		LLW	DLK		DZORDZ			PK	LLI
89		DNDO	LD		DDP	UPDO	LU		UDP
8A		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
8B		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
8C			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
8D						FRM			FRC
8E		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
8F		HLD	EPI	EPR	SLV	ISR	YRQ	PTR	PTS
90								HML	ALT
91		ATSF	NSI	DNI	UPI	ATS	CTLF	CTL	PFG
92		CAC	CAB	CWI	EQA	EDS	ESTE	EQN	PUSD
93			CWIL						
94		PI	PI	PI	PI	PI	PI	PI	PI
95		Counter	Counter	Counter	Counter	Counter	Counter	Counter	Counter
96		LRARN	IN	CORR	SHRTRUN	DANGER	PH2	PH1	PHS0
97		CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #

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TRACTION (SIMPLEX CAR A) MLT DATA TRAP MEMORY CHART

Computer Memory Address (Hex)	Toggle Switches Diagnostic On F1 A8....A5 A4....A1	8	7	6	5	4	3	2	1
C0		DOLM	PHE	DZ	DOL	DBC	SE	GEU	GED
C1			DC	UC	CC			DHO	DOI
C2		DCF	DCP	DOF	LOT		HCT	CCT	SDT
C3				HSEL	CSB	DCC	NUDG		DSHT
C4		INT/DCLC	FRA	FCS	FRS	DNS	UPS	STD	STU
C5				HLW	HLI			FWI	
C6		LFP	UFP						
C7				EQI	IND	IN		DELSIM	YSIM
C8		LLW	DLK		DZORDZ			PK	LLI
C9		DNDO	LD		DDP	UPDO	LU		UDP
CA		DMD	DCB	UCB	CCB	DMU	DCA	UCA	CCA
CB		TOS	MLT	PSTX	MGR	H	REL	DSH	RUN
CC			STC	SAF	HCR	HCDX	CCD	ISV	ISRT
CD						FRM			FRC
CE		SD	SDA	DSD	BFD	SU	SUA	USD	TFD
CF		HLD		EQA	ATSF		ECRN	CD	EPR
D0					ESP2	EPS1	EPI	HML	ALT
D1		SDAM	CTLM	SUAM	DOLL	RDEMD	CTLF	CTL	PFG
D2		CAC	CBC	CWI	EQA	EDS	ESTE	EQN	PUSD
D3			CWIL						
D4		PI	PI	PI	PI	PI	PI	PI	PI
D5		Counter	Counter	Counter	Counter	Counter	Counter	Counter	Counter
D6		LEARN	IN	CORR	SHRTRUN	DANGER	PH2	PH1	PHS0
D7		CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #	CODE #

Diagnostic Indicators — LED *On* = variable flag is On or Active

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APPENDIX

APPENDIX A
DISASSEMBLING THE COMPUTER SWING PANEL

FIGURE A.1   Computer Swing Panel With Boards (Top View)

FRONT OF SWING PANEL

MC−MP−1ES
BOARD

MC−CPA−ISL
BOARD

IMC−DDP−B
BOARD

BRACKET ATTACHED TO BACKPLATE

D/N: 1842D
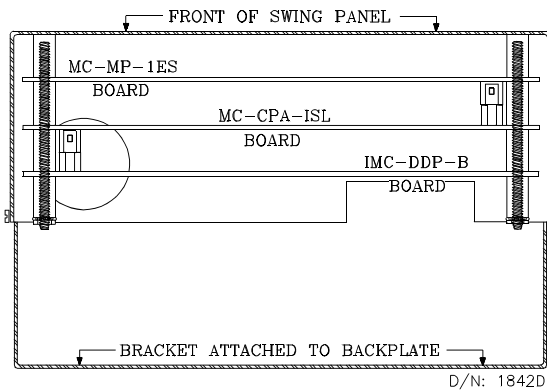
FIGURE A.2 Computer Swing Panel Without Boards (Top View)

D/N: 1842C
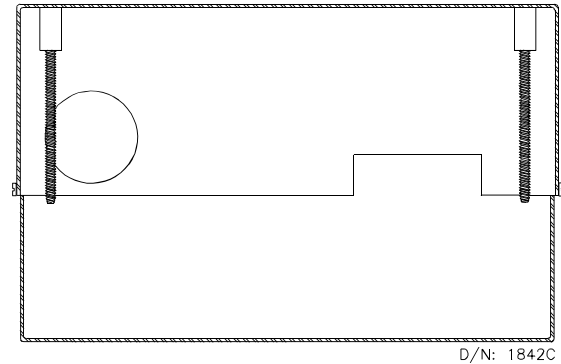
FIGURE A.3 Computer Swing Panel Boards (Snapped Together)

RIBBON CABLE

MC−MP−1ES
BOARD

RIBBON CABLE

MC−CPA−ISL
BOARD

RIBBON CABLE

IMC−DDP−B
BOARD

D/N: 1842B
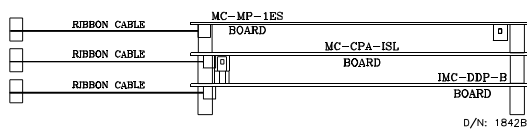
FIGURE A.4 Computer Swing Panel Boards (Unsnapped)

RIBBON CABLE

MC−MP−1ES
BOARD

RIBBON CABLE

MC−CPA−ISL
BOARD

RIBBON CABLE

IMC−DDP−B
BOARD

D/N: 1842A
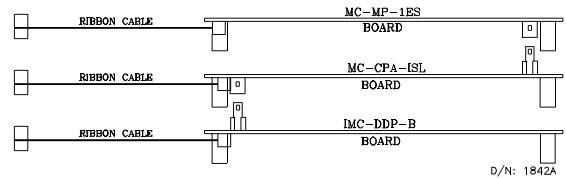
MCE Technical Support may advise an installer to remove a circuit board for troubleshooting reasons. If so, remove the thumbscrews holding the Swing Panel to the bracket on the back plate. Lower the swing panel so that it faces down.

With the back of the Swing Panel facing up, loosen and remove the four nuts securing the back cover plate.   This may require the use of a 11/32 nut driver.

Remove the circuit boards from the Swing Panel. Put the nuts back on the bolts for safekeeping.

Unsnap the boards from each other and replace/repair the boards as necessary.

APPENDIX B
CHANGING PC BOARDS, EPROMS OR MICROCONTROLLERS

With directions from MCE Technical Support, a PC board, EPROMs or Microcontroller may need to be reinstalled in the field. Great care should be taken when changing any of these items. The EPROM stores the computer program, the microcontroller both stores and executes the program and all three are subject to damage by ESD (see CAUTION). These instructions should be followed step-by-step.

⚠	**CAUTION:**	ESD can damaged Components on the PC boards. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

B.1 REPLACING THE MC-MP-1ES / MC-MP2 BOARD OR EPROM

Normally the microprocessor on the MC-MP-1ES / MC-MP2 board is not replaced in the field. Sometimes the EPROM is replaced to upgrade the program and occasionally the complete board is replaced due to a component failure.

Replacing the EPROM - The EPROM for the MC-MP-1ES / MC-MP2 board is labeled S-MP-xx-1. The "xx" represents the controller type. If the new EPROM has the same job number "fingerprint" as the old EPROM, the user settings for timers and adjustable control variables, etc., are retained. Any new timers or variables added to the new EPROM will be set to their default values.

If the job number fingerprint on the new EPROM is different from the job number fingerprint on the old EPROM, all of the timers and variables will be set to their default values. Document the user settings before the old EPROM is removed for re-entered when the new EPROM is installed.

Replacing the MC-MP-1ES board - The user settings for timer and adjustable control variables are stored in battery backed RAM on the MC-MP-1ES / MC-MP2 board. If the new board was previously installed in another car controller, the user settings from that car will be retained. If the new board is a replacement from MCE, all of the user programmable values will be set to their default values. Therefore, document the current user settings before the old board is removed for re-entered when the new board is installed. The following is a list of the user settings:

- Elevator Timers (see Section 5.2.3)
- Processor Clock Flags (see Section 5.2.4)
- Communications Port Settings (see Section 5.3.1)
- Security Codes (see Section 5.3.2)
- Master Software Key (MSK) (see Section 5.3.4)
- Software Options - Adjustable Control Variables (see Section 5.3.5)
- Learned values for the Load Weigher - if a load weigher is used for dispatching, the Load Weigher Learn Operation must be performed (see Section 4.4.9)

Replacement Procedure

1.   Document the current settings for the items listed above.

2.   Turn power OFF at the main disconnect and verify that no lights are operating on the microprocessor panel. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

3.   Remove the MC-MP-1ES / MC-MP2 board from the Swing Panel. Refer to Appendix A for instructions on unloading the boards from the Swing Panel. If you are replacing the PC board, proceed to step 6 below (Refer to the MC-MP-1ES or MC-MP2 Board Quick Reference in Section 6 for proper jumper settings).

4.   Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket, *not* between the socket and the board (see MC-MP-1ES or MC MP2 Board Quick Reference in Section 6). Gently pry the existing EPROM out from the socket. Do this very slowly, taking care not to bend the leads. If they become bent, straighten them carefully with a needlenose pliers.

5.   Place the new EPROM lightly (do not plug it in yet) into the socket and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the orientation of the notch should also correspond to the notches on all of the other chips on the board). Now push the EPROM firmly into the socket and make sure that *none* of the pins are bent during the insertion. Inspect the EPROM to make sure that no pins are bent outward or under the EPROM.

6.   Reassemble the Swing Panel assembly and close the Swing Panel. Refer to the instructions in Appendix A.

7.   Turn power ON at the main disconnect. Verify the proper operation of all boards by inspecting the diagnostic indicators and Computer ON LEDs on the individual processor boards.

    •   If the Computer ON LEDs are not illuminated on all three boards, the EPROMs may not have been installed properly. Repeat the above steps 2 through 7.

8.   Re-enter the user settings documented in step 1 above.

B.2   REPLACING THE IMC-DDP-C BOARD OR EPROMS

The microprocessors on the IMC-DDP-C board is not replaced in the field. Sometimes the EPROMs are replaced to upgrade the program and occasionally the complete board must be replaced due to a component failure.

Replacing the EPROMs - The EPROMs for the IMC-DDP-C board are labeled S-DDP-A-1 and S-DDP-A-2. If the new EPROM has the same job number "fingerprint" as the old EPROM, the user settings are retained. Any new parameters added to the new EPROM will be set to their default values.

If the job number fingerprint on the new EPROM is different from the job number fingerprint on the old EPROM, all of the parameters will be set to their default values. The user settings should be documented before the old EPROM is removed for re-entered when the new EPROM

is installed. The learned values for the NTS and ETS Limit Switches must be relearned as described in Section 4.

Replacing the IMC-DDP-C board - The user settings for the parameters are stored in EEPROM on the IMC-DDP-C board. If the new board was previously installed in another car controller, the user settings from that car will be retained. If the new board is a replacement from MCE, all of the user programmable values will be set to their default values. Therefore, document the current user settings before the old board is removed for re-entered when the new board is installed. The following is a list of user programmable settings:

- Advanced Parameters listed on the Configuration (F2 - 1) screen.
- Advanced Parameters listed on the Brake Parameters (F2 - 2) screen.
- Advanced Parameters listed on the Safety Parameters (F2 - 3) screen.
- Advanced Parameters listed on the Pattern Parameters (F2 - 4) screen.
- Advanced Parameters listed on the Auxiliary Pattern Parameters (F2 - 1) screen.
- Advanced Parameters listed on the Pre-Torque Parameters (F2 - 9) screen.
- Advanced Parameters listed on the Filter Parameters (F2 - 1) screen.
- Advanced Parameters listed on the Floor Heights (F2 - Shift 4) screen.

The Standard Parameters are a sub-set of the Advanced Parameters. The Baldor Drive Parameters are stored in the Baldor Drive and are therefore retained. The learn values for the building floor heights and the NTS and ETS Limit Switches will be incorrect. Document the Floor heights before the old board is removed and then re-enter them when the new board is installed or re-learned the Floor heights as described in Section 4.1. The NTS and ETS Limit Switch values must be re-learned as described in Section 4.6.

Replacement Procedure

1.   Document the current settings for the items listed above.

2.   Turn power OFF at the main disconnect and verify that no lights are operating on the microprocessor panel. Install a grounding strap on your wrist and connect it to ground before handling the PC boards.

3.   Remove the IMC-DDP-C board from the Swing Panel. Refer to Appendix A for instructions on unloading the boards from the Swing Panel. If you are replacing the PC board, proceed to step 6 below (refer to the IMC-DDP-x Board Quick Reference in Section 6 for proper jumper settings).

4.   The two EPROMs on the IMC-DDP-C board are labeled EPROM 1-U6 and EPROM 2-U5 (see IMC-DDP-x Board Quick Reference in Section 6). Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket, *not* between the socket and the board. Gently pry the existing EPROMs out from the socket. Do this very slowly, taking care not to bend the leads. If they become bent, straighten them carefully with a needlenose pliers.

5.   Place the new EPROMs lightly (do not plug it in yet) into the sockets and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the orientation of the notch should also correspond to the notches on all of the other chips on the board). Now push the EPROMs firmly into the socket and make sure that *none* of the pins are bent during the insertion. Inspect the EPROMs to make sure that no pins are bent outward or under the EPROM.

6.   Reassemble the Swing Panel assembly and close the Swing Panel. Refer to the instructions in Appendix A.

7.   Turn power ON at the main disconnect. Verify the proper operation of all boards by inspecting the diagnostic indicators and Computer ON LEDs on the individual processor boards.

•   If the Computer ON LEDs are not illuminated on all three boards, the EPROMs may not have been installed properly. Repeat the above steps 2 through 7.

•   Check the voltage at test point DCS on the IMC-DAS board. It must be less than 200 mV.

8.   Re-enter the user settings documented in step 1 above.

B.3 REPLACING THE IMC-DIO BOARD OR MICROCONTROLLERS

The program instructions for the IMC-DIO board are stored on the microcontrollers. Sometimes the microcontrollers are replaced to upgrade the program and occasionally the complete board is replaced due to a component failure.

Replacing the Safety and/or ETS microcontroller - The learned data for the Normal Terminal Limit Switches (NTS) and Emergency Terminal Limit Switches (ETS) will be retained when the Safety and/or ETS microcontrollers are changed.

Replacing the IMC-DIO board -The NTS and ETS Limit Switch values must be re-learned as described in Section 4.6.

Replacement Procedure

1.   Turn the power OFF at the main disconnect and verify that no lights or LEDs are operating on the board. Install a grounding strap on your wrist and connect it to ground before handling the PC board.

2.   Remove the IMC-DIO board from the Digital Drive enclosure by releasing the extraction handles and pulling forward. If you are replacing the PC board, proceed to step 5 below.

3.   Refer to the IMC-DIO Board Quick Reference in Section 6 for the location of the microcontrollers, safety processor (U19) and ETS processor (U3). Using a small, thin-bladed screwdriver, place the tip of the screwdriver between the microcontroller chip and its socket, *NOT* between the socket and the board. Gently pry the microcontroller chip from its socket. Do this slowly, taking care not to bend the last pins as they come out of the socket.

3.   Place the new microcontroller lightly (do not plug it in yet) into the socket and check that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the microcontroller is correctly aligned with the notch on the socket. The orientation of the notch should correspond with the notches on all the other chips on the board. Now push the microcontroller firmly into the socket and make sure that none of the pins are bent outward or under the microcontroller.

4.   Insert the board firmly into the Digital Drive enclosure and engage the extraction

handles.

5. Reapply power to the system. Verify the proper operation of the IMC-DIO board by observing the TEST and PASS messages on the four character alphanumeric display and the COMPUTER 1 ON and COMP 2 ON LEDs.

- If the TEST and PASS messages do not appear, the microcontroller may not have been installed properly. Repeat steps one through four.

- The COMPUTER 1 ON and COMP 2 ON LEDs should not blink ON and OFF. If either one or both LEDs are blinking, repeat steps one to four.

6. Perform the NTS and ETS Limit Switch learn procedure as described in Section 4.

B.4 REPLACING THE IMC-DAS BOARD

1. Turn the main power OFF and remove the IMC-DAS board from the IMC-Sxx drive unit.

2. If you are replacing an IMC-DAS board perform the following:

- Locate the R9 trimpot at the bottom of the old board (see Figure 3.7 for location). Measure the resistance between the outer pins of this trimpot.

- Adjust the R9 trimpot on the replacement board to get the same resistance reading (as close as possible).

4. Perform the procedure described in Section 3.4 (h) for the adjustment of the BIP and BAL trimpots.

B.5 EPROM INSTALLATION OR REPLACEMENT ON MC-NC and MC-NIO PROCESSOR BOARDS

Identification of the EPROMs - The EPROM for the MC-NIO board is labeled S-NIO-C (Figure C-1). The EPROM for the MC-NC board is labeled S-NC-C (figure C.2).

Replacement Procedure

1. Turn controller power OFF and verify that no lights are operating on the processor boards. Wear an ESD grounding strap on your wrist and connect it to ground before handling the PC boards.

2. Using a small, thin-bladed screwdriver, place the tip between the EPROM chip and its socket (*not* between the socket and the board). Gently pry the existing EPROM out from the socket. Do this very slowly, taking care not to bend the leads.

3. Position the new EPROM into the socket (do not plug it in yet) and check to see that all pins are aligned with their corresponding holes in the socket. Also make sure that the notch on the end of the EPROM is correctly aligned with the notch on the socket (the notch orientation of all the ICs on the board are the same). Once these checks have been made, push the EPROM slowly, evenly and firmly into the socket and make sure that the pins are not bent during the insertion. Inspect the EPROM for pins bent outward or under the EPROM and correct any bent pins found.

4. **Disconnect** Network cable NETA and NETB. Turn power ON. Verify the proper operation of the board by inspecting the diagnostic indicators (COMPUTER ON and SERVICE LEDs) on the respective processor boards.

MC-NIO BOARD

- If properly installed, the SERVICE LED should not illuminate and the COMPUTER ON LED should stay ON continuously. If the SERVICE LED stays illuminated, the EPROM may not be installed properly. Repeat the above steps 1 through 3.

FIGURE C.1   EPROM Location on the MC-NIO Board
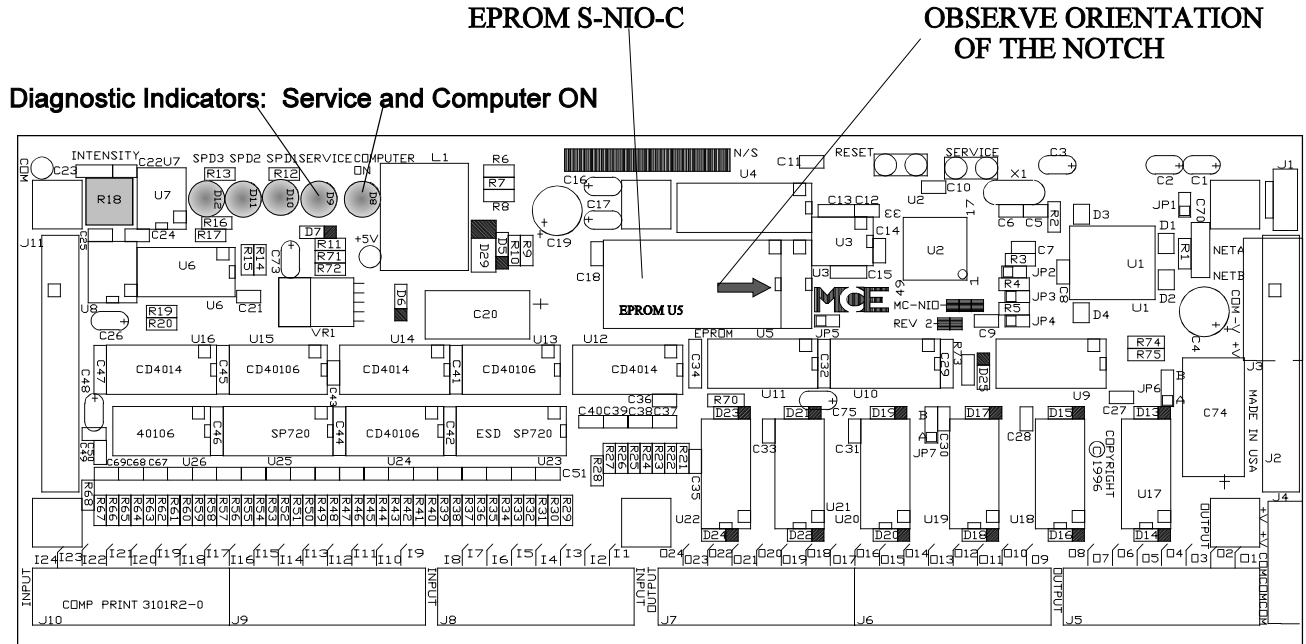
MC-NC BOARD

- If installed properly, the COMPUTER ON LED will be ON continuously and the SERVICE LED will be OFF, plus both will blink together approximately once every 10 seconds. This pattern repeats continuously. If the EPROM has been installed incorrectly, both the Computer ON and the SERVICE LEDs will blink simultaneously once per second. A similar pattern is observed if no EPROM is installed. Repeat the above steps 1 through 3.

FIGURE C.2   EPROM Location on the MC-NC Board

OBSERVE ORIENTATION
OF THE NOTCH

EPROM S-NC-C

Note status of LEDs (Computer ON, Service)

D/N: 3131 R1
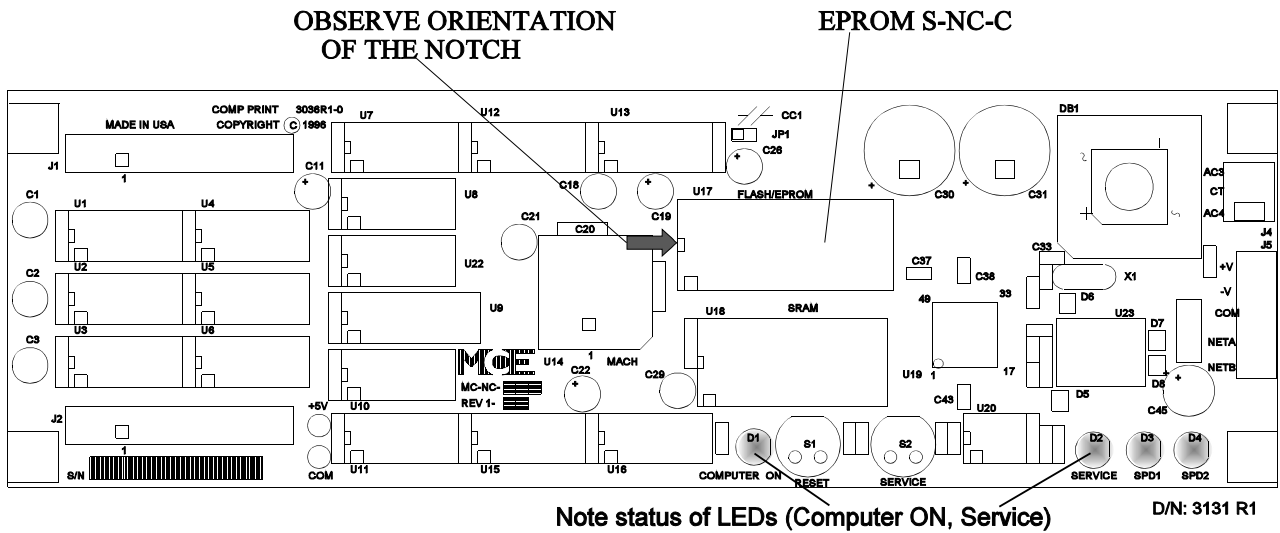
APPENDIX C
ELEVATOR SECURITY INFORMATION AND OPERATION

Building name: _____

Building location: _____

Security activation: Key switch   Mon: from _____ to _____
                       or   Tue: from _____ to _____
             Time clock   Wed: from _____ to _____
                                 Thu: from _____ to _____
                                 Fri: from _____ to _____
                                 Sat: from _____ to _____
                                 Sun: from _____ to _____

Instructions: To gain access to secure floors, follow the steps below while in the elevator car. The steps may be taken while the elevator car is moving or standing still. Requests for an elevator car from a hallway or corridor are answered without restriction.

1. While in the car, press the button for the desired floor. If the destination floor is secured, the button for that floor will flash on/off.

    If the button for that floor stays solidly lit, that floor is unsecured.

2. While the destination floor button is flashing, enter the security code for that floor within 10 seconds. Enter the security code by pressing the corresponding buttons on the panel.

    If the code was entered correctly and within the required time limit, the car will immediately go to that floor. If the code was not entered within the 10 second time period or was entered incorrectly, the destination floor button light will turn off after 10 seconds and the entire sequence must be started over again.

    If a mistake is made while entering the security code, simply wait until the destination floor button light stops flashing and start the entire sequence over again.

SECURITY CODES

Maintain a record of the security codes by noting the floor name as found in the elevator cab and each floor's code. Any floor with a security code is a secured floor.

1. Floor _____   security code =   __ __ __ __ __ __ __ __
2. Floor _____   security code =   __ __ __ __ __ __ __ __
3. Floor _____   security code =   __ __ __ __ __ __ __ __
4. Floor _____   security code =   __ __ __ __ __ __ __ __
5. Floor _____   security code =   __ __ __ __ __ __ __ __
6. Floor _____   security code =   __ __ __ __ __ __ __ __
7. Floor _____   security code =   __ __ __ __ __ __ __ __
8. Floor _____   security code =   __ __ __ __ __ __ __ __
9. Floor _____   security code =   __ __ __ __ __ __ __ __
10. Floor _____   security code =   __ __ __ __ __ __ __ __
11. Floor _____   security code =   __ __ __ __ __ __ __ __
12. Floor _____   security code =   __ __ __ __ __ __ __ __
13. Floor _____   security code =   __ __ __ __ __ __ __ __
14. Floor _____   security code =   __ __ __ __ __ __ __ __
15. Floor _____   security code =   __ __ __ __ __ __ __ __
16. Floor _____   security code =   __ __ __ __ __ __ __ __
17. Floor _____   security code =   __ __ __ __ __ __ __ __
18. Floor _____   security code =   __ __ __ __ __ __ __ __
19. Floor _____   security code =   __ __ __ __ __ __ __ __
20. Floor _____   security code =   __ __ __ __ __ __ __ __
21. Floor _____   security code =   __ __ __ __ __ __ __ __
22. Floor _____   security code =   __ __ __ __ __ __ __ __
23. Floor _____   security code =   __ __ __ __ __ __ __ __
24. Floor _____   security code =   __ __ __ __ __ __ __ __
25. Floor _____   security code =   __ __ __ __ __ __ __ __
26. Floor _____   security code =   __ __ __ __ __ __ __ __
27. Floor _____   security code =   __ __ __ __ __ __ __ __
28. Floor _____   security code =   __ __ __ __ __ __ __ __
29. Floor _____   security code =   __ __ __ __ __ __ __ __
30. Floor _____   security code =   __ __ __ __ __ __ __ __
31. Floor _____   security code =   __ __ __ __ __ __ __ __
32. Floor _____   security code =   __ __ __ __ __ __ __ __
33. Floor _____   security code =   __ __ __ __ __ __ __ __
34. Floor _____   security code =   __ __ __ __ __ __ __ __
35. Floor _____   security code =   __ __ __ __ __ __ __ __
36. Floor _____   security code =   __ __ __ __ __ __ __ __
37. Floor _____   security code =   __ __ __ __ __ __ __ __
38. Floor _____   security code =   __ __ __ __ __ __ __ __
39. Floor _____   security code =   __ __ __ __ __ __ __ __
40. Floor _____   security code =   __ __ __ __ __ __ __ __
41. Floor _____   security code =   __ __ __ __ __ __ __ __
42. Floor _____   security code =   __ __ __ __ __ __ __ __
43. Floor _____   security code =   __ __ __ __ __ __ __ __
44. Floor _____   security code =   __ __ __ __ __ __ __ __
45. Floor _____   security code =   __ __ __ __ __ __ __ __
46. Floor _____   security code =   __ __ __ __ __ __ __ __

APPENDIX D
INSPECTION OF QUADRATURE POSITION PULSER ON THE LS-QUAD-2 AND LS-QUIK-1

D.1   INSTRUCTIONS FOR THE LS-QUAD-2

If the OLD fault flag is displayed on the F3 screen or if there are quad pulser relation messages in the special events calendar then follow the steps below.

Using a multimeter, measure the voltage with reference to the 1 Bus on terminals 95 and 96 on the IMC-RI board.

> On Voltage: 52 ± 5 VDC
> Off Voltage: 0 - 1 VDC (preferably 0.5V or less)

If any of these voltages are out of the above range, locate the error by performing the same voltage measurement inside the LS-QUAD-2 box. Terminals 95 and 96 are located on HC-DFLS board.

Check tape guide assembly distances against the drawing. Make sure that all distances are within the ranges given in the drawing. If the sensors are too close to the running surface of the tape, add a washer between the backplate and the brass spacers for the HC-SB1 assembly. If all the dimensions are correct and yet the proper voltage is not achieved, contact the factory.

Using an oscilloscope, connect the probes from channel 1 and 2 to the DP1 and DP2 test points with reference to COM test point, on the IMC-DIO board. Observe the pulses while running the car in either direction at a constant speed of about 50 fpm. The signals should have approximately a 50% duty cycle at 90 degrees out-of-phase.

FIGURE D.1   LS-QUAD Enclosure (Top View)
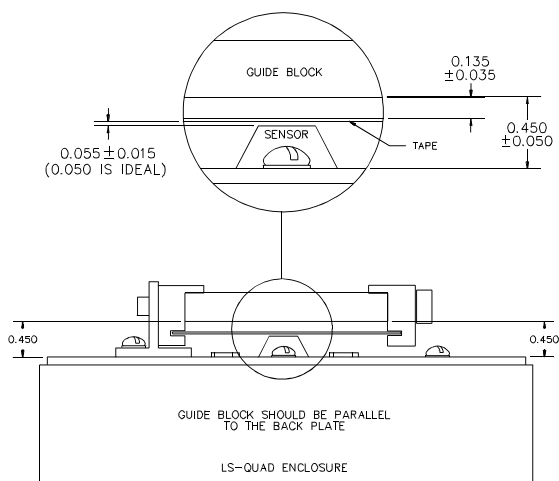
FIGURE D.2   Attaching SB1 to LS-QUAD2 Backplate
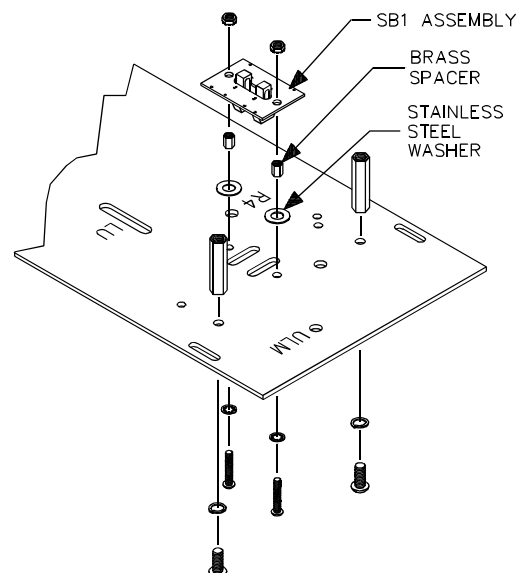
The **MINIMUM** time between any two adjacent transitions of DP1 and DP2 must be at least 18% of one cycle.

> **NOTE:**   90 degrees is equal to 25% of one cycle.

If the OLD flag is still highlighted on the F3 screen and steps 1-4 have been followed, contact MCE Technical Support.

FIGURE D.3   Signal Comparison of DP1 and DP2
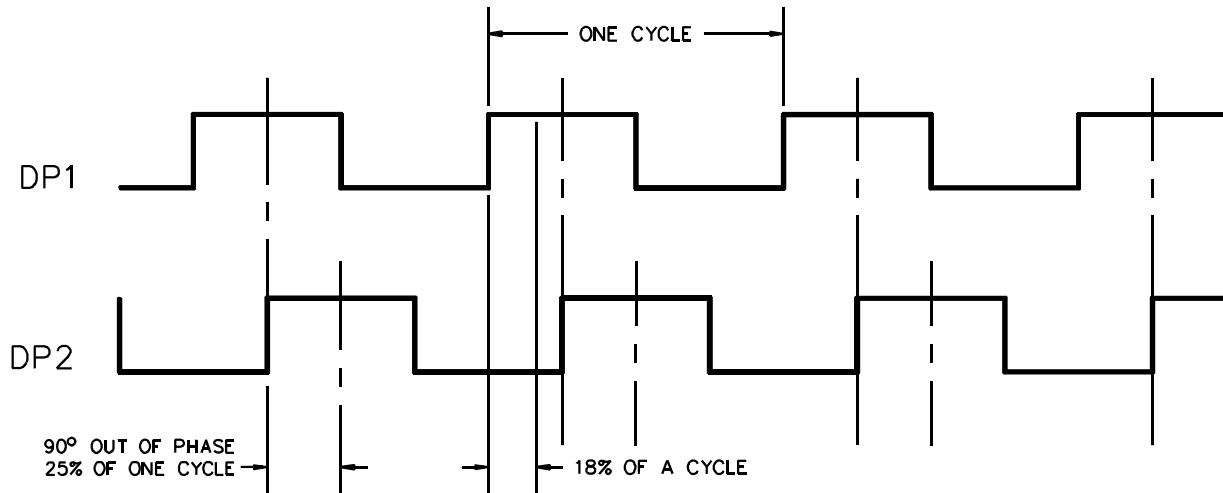
D.2   INSTRUCTIONS FOR THE LS-QUIK-1

STEP 1: QUADRATURE VOLTAGE MEASUREMENT

A.   Using a multi-meter, make the following measurements:

> **NOTE:**   90 degrees is equal to 25% of one cycle.

DP1 & DP2 (Terminals 95 & 96 respectively, inside the controller).

ON VOLTAGE: 52 ± 5VDC respect to ground (1 bus)
OFF VOLTAGE: 0 to 1VDC (preferably 0.5V or less) respect to ground (1 bus)

If any of these voltages are out of tolerance:

1.   Perform the same voltage measurement inside the LS-QUIK-1 box. Terminals 95 & 96 are located on HC-DFLS board.

STEP 2:   QUADRATURE SIGNAL COMPARISON

A.   If an oscilloscope is available, connect channel 1 and 2 to the DP1 and DP2 test points on the IMC-DCP board. Observe the pulses while running the car in either direction at a constant speed of about 50 fpm (.25 m/s). The signals should have approximately a 50% duty cycle and should be 90 degrees out-of-phase (see Figure D.3).

The **MINIMUM** time between any two adjacent transitions of DP1 & DP2 must be 18% of one cycle.

APPENDIX E - NOMENCLATURE

		NOMENCLATURE		
Motion Control Engineering, Inc.				
F:\DOCS\Nmcltr1Shipping.frm		Effective Date: 11/27/00	Approved By: Engineering Manager	Page 1 of 2

#	PC BOARD	DESCRIPTION
1	HC-RB4	Traction Controller Main Relay Board
1	HC-RBH	Hydraulic Controller Main Relay Board
2	HC-CI/O	Non Programmable Controller Call I/O Board
2	HC-CI/O-E	Programmable Controller Call I/O Expander Board
3	HC-PI/O	Non Programmable Controller Power I/O Board (Car A) ①
3	HC-PCI/O	Programmable Controller Power And Call I/O Board
4	HC-PI/O	Non Programmable Controller Power I/O Board (Car B) ①
6	HC-TAB	Traction Adapter Board
7	HC-RDRB	Rear Door Relay Board
8	HC-RD	Rear Door Logic Board (Car A) ①
9	HC-RD	Rear Door Logic Board (Car B)
10	HC-DB-MOD	Front G.A.L. MOD Door Interface Board
11	HC-DB-MOD-R	Rear G.A.L. MOD Door Interface Board
12	HC-DPS	Door Power Supply Board
13	HC-PIX	Position Indicator Expander Board (Car A) ①
14	HC-PIX	Position Indicator Expander Board (Car B)
15	HC-SRT	Suicide Relay Timing Board
16	HC-SCR	SCR Interface Board
17	HC-EQ	Earthquake Board
18	HC-IOX	I/O(8 Input / 8 Output) Expander Board (Car A) ①
19	HC-IOX	I/O(8 Input / 8 Output) Expander Board (Car B)
20	HC-IOX	Additional I/O(8 Input / 8 Output) Expander Board (Car A) ①
21	HC-IOX	Additional I/O(8 Input / 8 Output) Expander Board (Car B)
26	HC-DYNA	Dynalift Interface Board
27	MC-ACFR	AC Feedback Relay Board
28	IMC-GIO	General Turbo DF I/O Board
29	IMC-RB	Turbo DF Relay Board
30	HC-DB-MOM/H	Front G.A.L. MOM/MOH Door Interface Board
31	HC-DB-MOM/H-R	Rear G.A.L. MOM/MOH Door Interface Board
32	HC-OA	Output Adapter Board
33	IMC-RI	M/G Relay Interface Board
34	IMC-PRI	M/G Power Relay Interface Board
35	IMC-DIO	Digital I/O Board
36	IMC-DAS	Data Acquisition Board
37	HC-I4O	I/O(16 Input /4 Output) Expander Board (Car A) ①
38	HC-I4O	I/O(16 Input /4 Output) Expander Board (Car B)
39	HC-I4O	Additional I/O(16 Input / 4 Output) Expander Board (Car A) ①
40	HC-I4O	Additional I/O(16 Input /4 Output) Expander Board (Car B)
41	SCR-RI	SCR/AC Relay Interface Board
42	SCR-PRI	SCR/AC Power Relay Interface Board
43	HC-LB	Lock Bypass Board
44	HC-GB	Gong Board
45	HC-GB	Additional Gong Board
46	HC-SIB	Selectable Input Buffer Board (Car A) ①
47	HC-SIB	Selectable Input Buffer Board (Car B)
48	HC-RT	Relay Tester Board
49	IMC-ACIB	AC Baldor Interface Board
50	HC-DPS-MOM/H	Front G.A.L. MOM/MOH Door Interface and Power Supply Board
51	HC-ACI	AC Drive Interface Board
52	HC-ACIF	AC Flux Vector Interface Board
53	HC-DPS-MOM/H-R	Rear G.A.L. MOM/MOH Interface and Power Supply Board
54	IMC-MBX	IMC Enhanced Motherboard

42-02-6202

#	PC BOARD	DESCRIPTION
55	SCR-RIX	SCR Relay Interface Extension Board
56	HC-HBF	A.S.M.E. Front Door Lock Bypass Board
57	HC-HBFR	A.S.M.E Front and Rear Door Lock Bypass Board
58	IMC-ACIM	AC MagneTek Interface Board
59	HC-TACH-MG	Tach Adjust Board for VVMC-MG Controller
60	HC-TACH-SCR	Tach Asjust Board for VVMC-SCR Controller

① Individual group cars use board numbers for car A only

SCHEMATIC SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	BUS LOCATED ON PC BOARD	OFF BOARD SIDE → |X← BOARD NUMBER	BOARD DESIGNATOR
	BUS LOCATED OFF PC BOARD		SOLDER CONNECTION ON REAR OF PC BOARD
	MICROCOMPUTER OUTPUT OR CALL CIRCUIT		WIRING INSIDE CONTROL CABINET
	MICROCOMPUTER INPUT		TRACE ON PC BOARD
MP	MICROCOMPUTER OUTPUT OR CALL CIRCUIT FOR ASME 17.1–2000 SERIES CONTROLLER	– – – – – – –	CUSTOMER WIRING INTO CONTROL CABINET
MP	MICROCOMPUTER INPUT FOR ASME 17.1–2000 SERIES CONTROLLER		ALL UNMARKED DIODES ARE 2.5 AMP 1000 VOLT
P	PATTERN GENERATOR OUTPUT		VOLTAGE SPIKE SUPPRESSOR
P	PATTERN GENERATOR INPUT		DOT BY RESISTOR INDICATES TOP OR LEFT SIDE AS MOUNTED
S	PATTERN GENERATOR SAFETY INPUT		BOX INDICATES UNUSED ITEM
	POWER TERMINAL		RELAY COIL
	PANEL MOUNT TERMINAL		FORCE GUIDED RELAY COIL
	EYELET ON PC BOARD	POLE NUMBER →X SWING SIDE	NORMALLY OPEN (N.O.) RELAY CONTACT
	SCREW TERMINAL ON PC BOARD	POLE NUMBER →X SWING SIDE	NORMALLY CLOSED (N.C.) RELAY CONTACT
	IDC CONNECTOR ON PC BOARD	N/C	NO CONNECTION
CX–X CX–X	RIBBON CABLE CONNECTOR		
TPX	TEST POINT		

WIRE SYMBOLS

SYMBOL	DESCRIPTION
X	#X AWG THHN WIRE 90° C
X	#X AWG PVC WIRE 105° C
X	#X AWG PTL WIRE 125° C
X	#X AWG TEFLON WIRE 200° C

WIRE GAUGES

SYMBOL	SIZE
03	3/0 AWG
02	2/0 AWG
0	0 AWG
1	1 AWG
2	2 AWG
4	4 AWG
6	6 AWG
8	8 AWG
10	10 AWG
12	12 AWG
14	14 AWG
16	16 AWG
18	18 AWG

UNLESS NOTED, ALL WIRES ARE #18 AWG PVC, WITH EXCEPTION TO THE PC BOARD WIRING, WHICH IS DETERMINED BY ENGINEERING.

MCE Motion Control Engineering, Inc.   NOMENCLATURE

F:\ENG\DOCS\NMCLR2.DWG   Effective Date: 3–14–03

APPENDIX F
REPLACEMENT OF IMC DRIVE COMPONENTS

PURPOSE: The purpose of this document is to provide personnel in the field with detailed information regarding the replacement of IMC drive components.

SCOPE: This document applies to all IMC-GI2/GI4 drives through Rev.3.

1.   IMC-GPA-I REMOVAL

a.   Remove the cover from the IMC-GIx.

b.   Disconnect the ribbon cable from the IMC-DAS board.

c.   Remove the red wires labeled BR1, +DC, -HV, GSF1, +HV, and GSF2 from their IMC-GPA board terminals.

d.   Remove the connectors from J2 and J3 of the IMC-GPA board.

e.   Remove the four screws which hold the IMC-GPA-I in place (Figure F.1).

f.   Remove the IMC-GPA-I.

FIGURE F.1   IMC-GPA-I Removal

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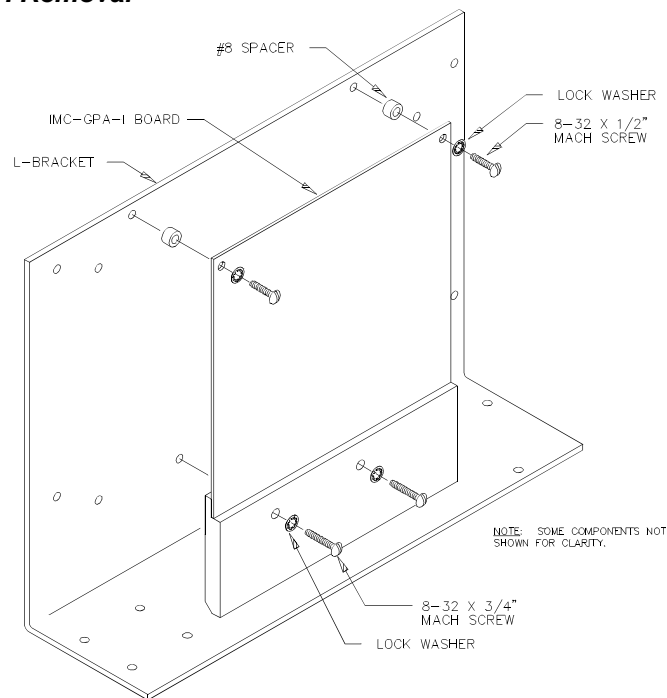
2. IGBT REMOVAL

   a.   With the IMC-GPA-I removed, loosen
        the screw terminals of the IGBT to be replaced.

   b.   Remove the screw which secures the IGBT then the IGBT itself. See Figure F.2.

FIGURE F.2   *IGBT Removal*
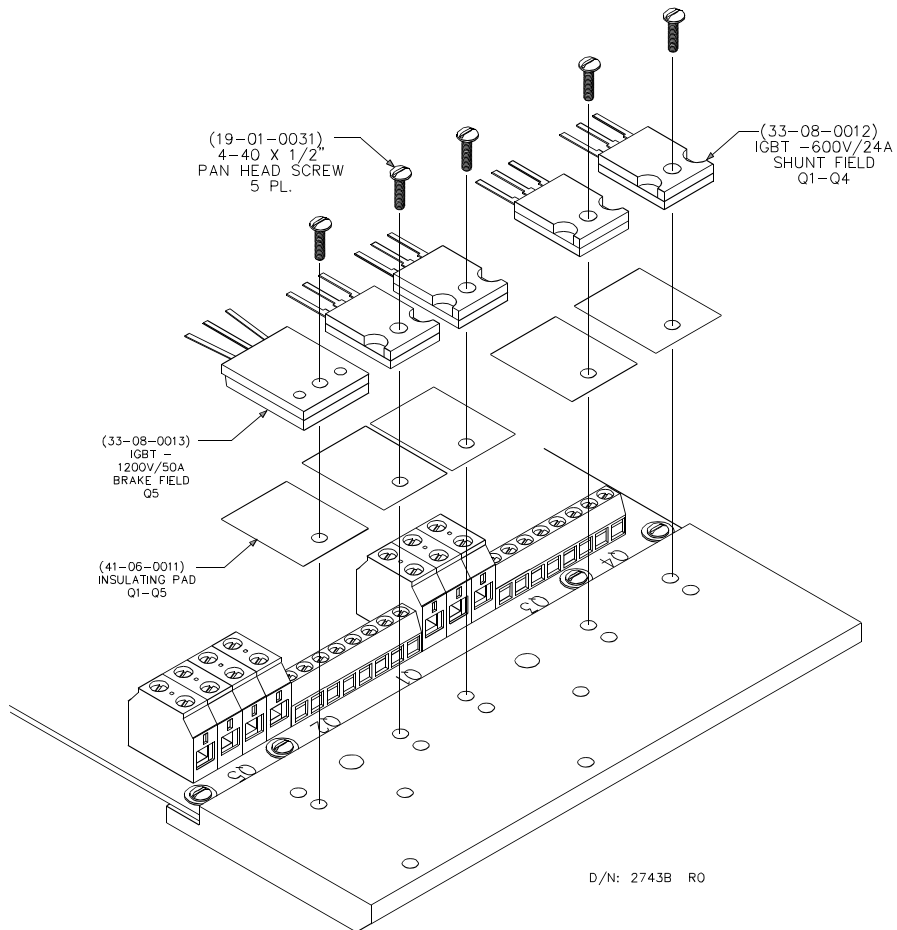
3. IGBT INSTALLATION

   a.   Prepare the new IGBT for installation as shown in Figures F.3 thru F.5.

   b.   Trim the leads to 1/2".

   c.   For IGBT (Q5) bend the leads slightly outward as in Figure F.3.

   d.   Inspect the insulating pad(s) and replace as necessary.

FIGURE F.3   Spreading Leads of IGBT

SPREAD THE LEADS OF IGBT Q5

D/N: 2743D R0
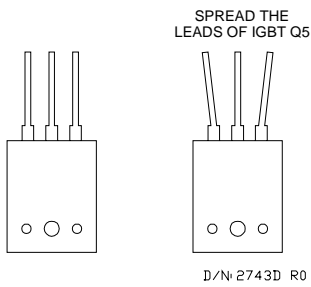
FIGURE F.4   Inserting IGBT Into Screw Terminal

INSERT IGBTs Q1-Q4 INTO SCREW TERMINALS

INSERT IGBT Q5 INTO SCREW TERMINALS

D/N: 2743E R0

D/N: 2743F R0
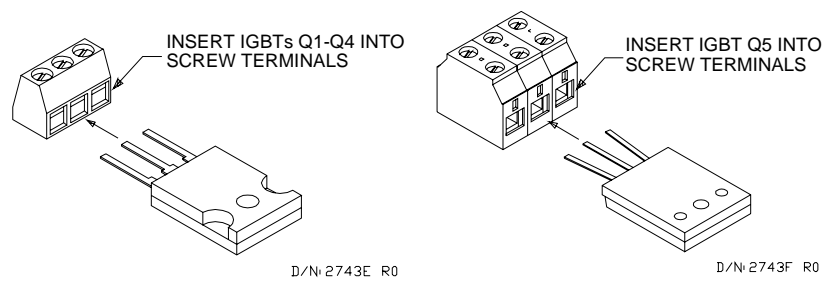
e.   Place the insulating pad in position so that its hole lines up with the hole closest to the screw terminal for Q1-4 and the hole farthest from the terminal for Q5.

f.   Insert the leads of the new IGBT into the appropriate screw terminals but don't tighten.

g.   Install and tighten the screw that holds the IGBT in place.

h.   Tighten the three screw terminals.

4.   SNUBBER CAPACITOR REMOVAL

a.   Loosen the screw terminals of the capacitor to be replaced and remove the capacitor.

FIGURE F.5   Snubber Capacitor Installation

INSTALL WIRES FROM RESISTORS RS1 & RS2 INTO TERMINALS AS SHOWN

TO J7-7
TO J7-3

0.80" REF.

(44-02-0038)
#14 AWG 600V WIRE RED
4 PL.
IMPORTANT
CUT 4 WIRES EQUALLY
INTO 3" LENGTHS
DO NOT CUT WIRES
ANY SHORTER THAN
1/32" OF THE REQUIRED
3" LENGTH

TO J5-7
TO J5-2

1.00" REF.

D/N: 2743G R0
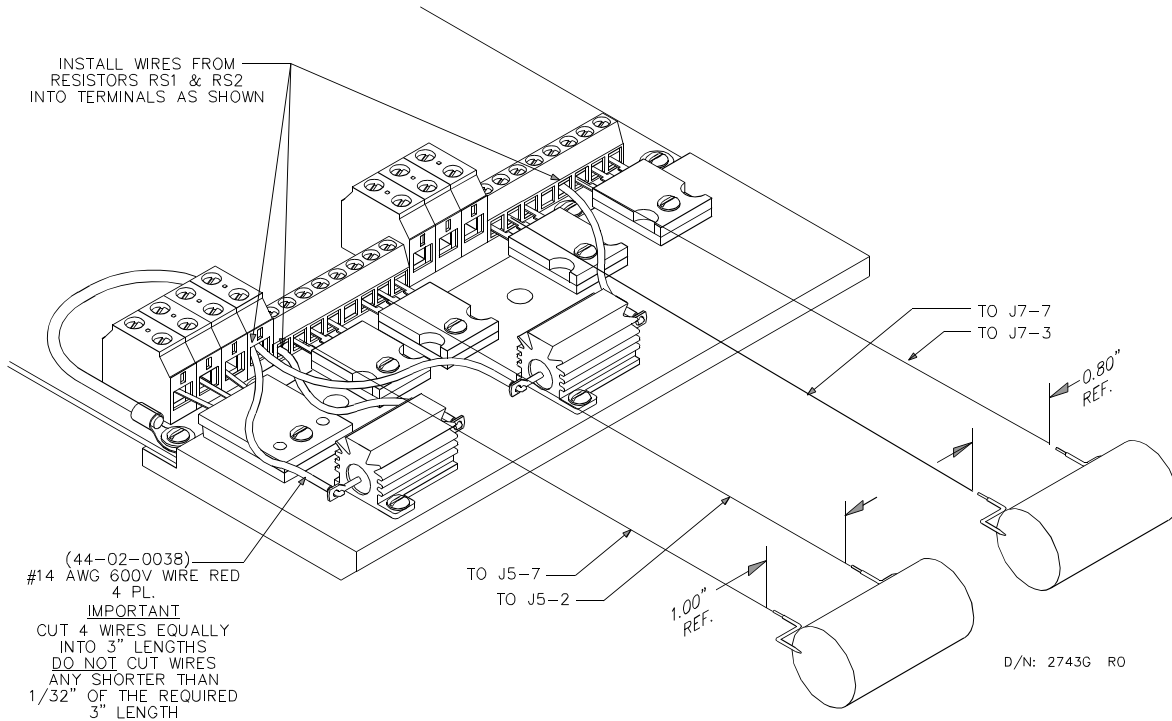
5. **SNUBBER CAPACITOR INSTALLATION**

   a.   Cut the leads of the new capacitor to the proper length and install 1/16" heat shrink over them leaving approximately 3/8" uncovered at the ends.

   b.   Bend the leads into shape as shown in Figure F.5.

   c.   Install the leads into the appropriate screw terminals and tighten.

6. **GENERATOR SHUNT FIELD CURRENT SENSING RESISTOR REMOVAL**

   a.   With the IMC-GPA-I removed and on a flat surface, loosen the screw terminals of the red wires leading from the resistor to be replaced.

   b.   Using a soldering iron, remove the wires from the resistor (Note their positions and use care not to damage the ends, do not clip these wires).

   c.   Remove the faulty resistor.

7. **GENERATOR SHUNT FIELD CURRENT SENSING RESISTOR INSTALLATION**

   a.   Apply heat sink compound to the base of the new resistor and install it.

   b.   Place one end of the wire in the resistor eyelet and the other in the appropriate screw terminal. Snug the terminal down but don't tighten it.

   c.   Solder the wires into the resistor eyelets.

   d.   Tighten the screw terminals.

8. **IMC-GPA-I INSTALLATION**

   a.   Place the IMC-GPA-I in its original position within the drive enclosure as shown in Figure F.1.

   b.   With a starter screwdriver install the two lower screws through the heat sink but don't tighten.

   c.   Install the spacers and screws into the upper holes and tighten.

   d.   Tighten the two lower screws.

         Reconnect J2 and J3.

         Carefully insert each of the red wires into their proper screw terminals and tighten.

         Reconnect the ribbon cable to the IMC-DAS board.

9. **MOTOR FIELD SCR BRIDGE (CBRM) REMOVAL AND INSTALLATION**

   a.   Disconnect the six wires from the original bridge and note their positions.

   b.   Remove the bridge by loosening the screw on the left, removing the screw on the right, and sliding the device to the right and then out.

   c.   Apply heat sink compound to the base of the new SCR bridge.

   d.   Install the new bridge and reconnect the six wires.

FIGURE F.6   Motor Field Circuit
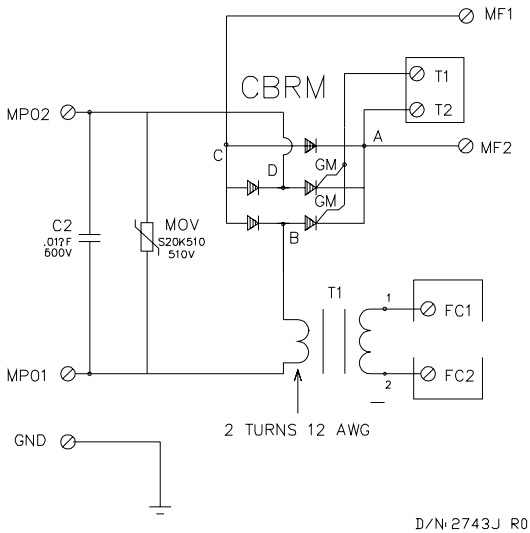
FIGURE F.7   Generator Shunt Field Circuit
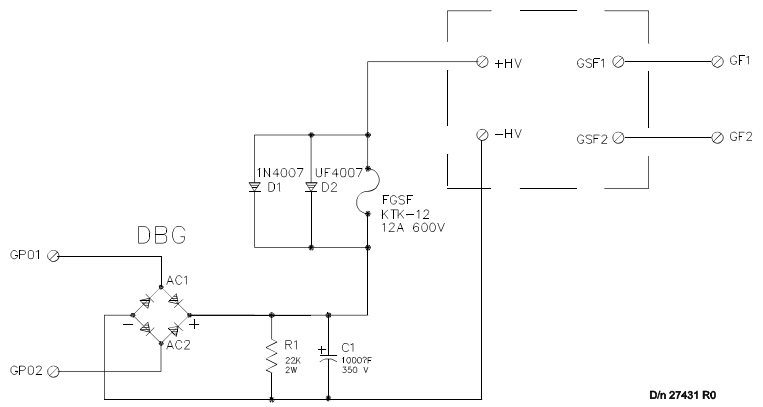
10.   DBB, D8, AND DBG REMOVAL AND INSTALLATION

a.   Disconnect the four wires from the device being removed.

b.   Remove the single screw which holds the device in place followed by the device itself.

c.   Apply heat sink compound to the base of the new device.

d.   Install the new device and reconnect the four wires.

FIGURE F.8   Brake Circuit
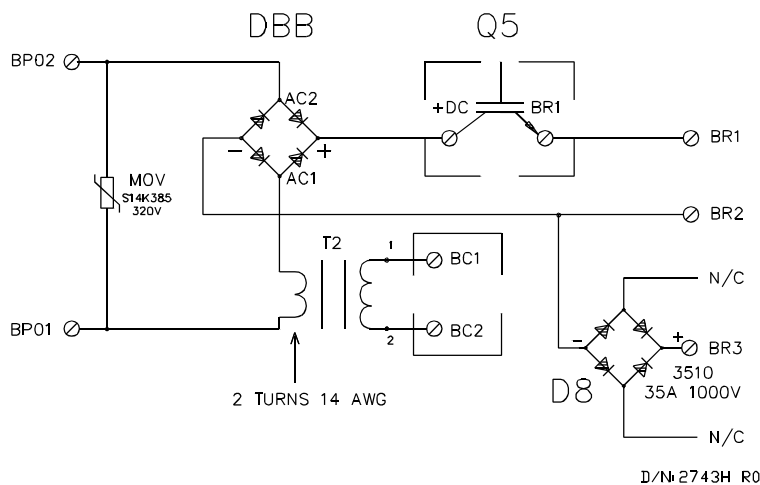
11.   T1 AND T2 REMOVAL AND INSTALLATION

a.   Disconnect transformer leads from J3 on the IMC-GPA board (note where they are connected for reinstallation).

b.   Remove both toroidal current sensing transformers shown in Figure F.9 by removing two 4-40 X 1/2" machine screws and #4 int. star lock washers for each transformer.

c.   Ensure the transformer with **2 shorted turns** is positioned in the **T1** position.

d.   Connect the wires as removed on J3, and tighten the two screws and washers for each transformer.

FIGURE F.9   Part of IMC-G233 Drive Unit

4-40 X 1/2" MACH. SCREW
(19-01-0031)
4 PL.

#4 INT. STAR LOCK WASHER
(19-04-0015)
4 PL.

BASE ASSEMBLY

TRANSFORMER T2
(1 SHORTED TURNS)

TRANSFORMER T1
(2 SHORTED TURNS)
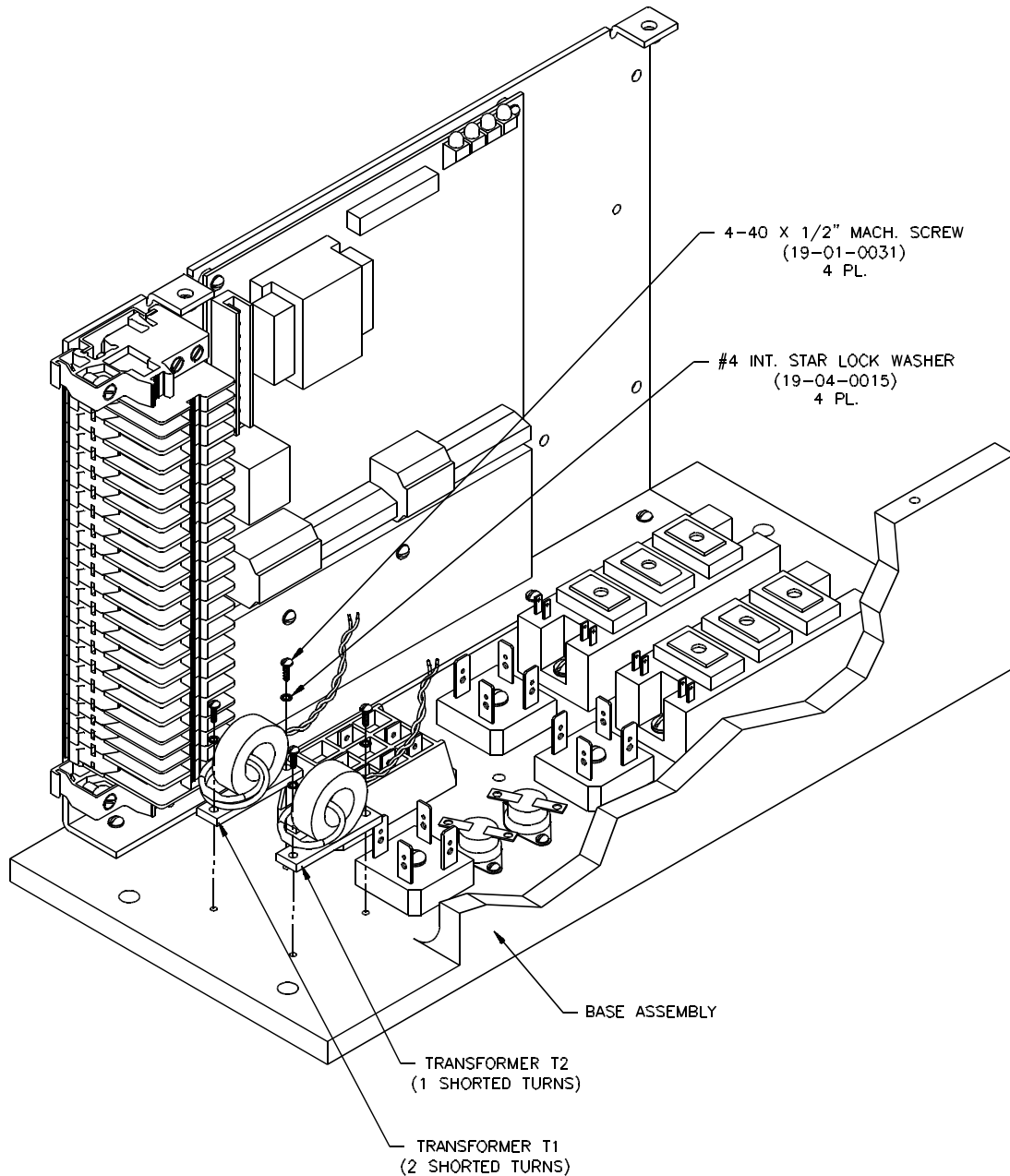
NOTE: SOME COMPONENTS NOT SHOWN FOR CLARITY.

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12.   DBB, DBG, AND D8 REMOVAL AND INSTALLATION

ℹ️ **NOTE: before removal note orientation and wiring placement**.

Disconnect the wires from the diode bridge.

Unscrew the 10-32 X 3/4" machine screw and #10 star lock washer in the center of the bridge to remove.

Apply (if available) a thin coat of heat sink compound to the bottom of the diode bridge.

Install with 10-32 X 3/2" screw and #10 star lock washer (note the orientation of diode bridge).

Reconnect the wires as they were removed.

FIGURE F.10   Part of IMC-G233 Drive Unit

10-32 X 3/4" MACH. SCREW
(19-01-0022)
3 PL.

#10 INT. STAR LOCK WASHER
(19-04-0018)
3 PL.

DIODE BRIDGE 35A, 600V
(33-01-0016)
(D8)
NOTE ORIENTATION

DIODE BRIDGE 50A, 1000V
(33-01-0027)
(DBG)
NOTE ORIENTATION

DIODE BRIDGE 35A, 1000V
(33-01-0019)
(DBB)
NOTE ORIENTATION

HEAT SINK COMPOUND
(13-01-0008)
APPLY A THIN COAT TO THE
BOTTOM OF EACH DIODE BRIDGE.

BASE ASSEMBLY
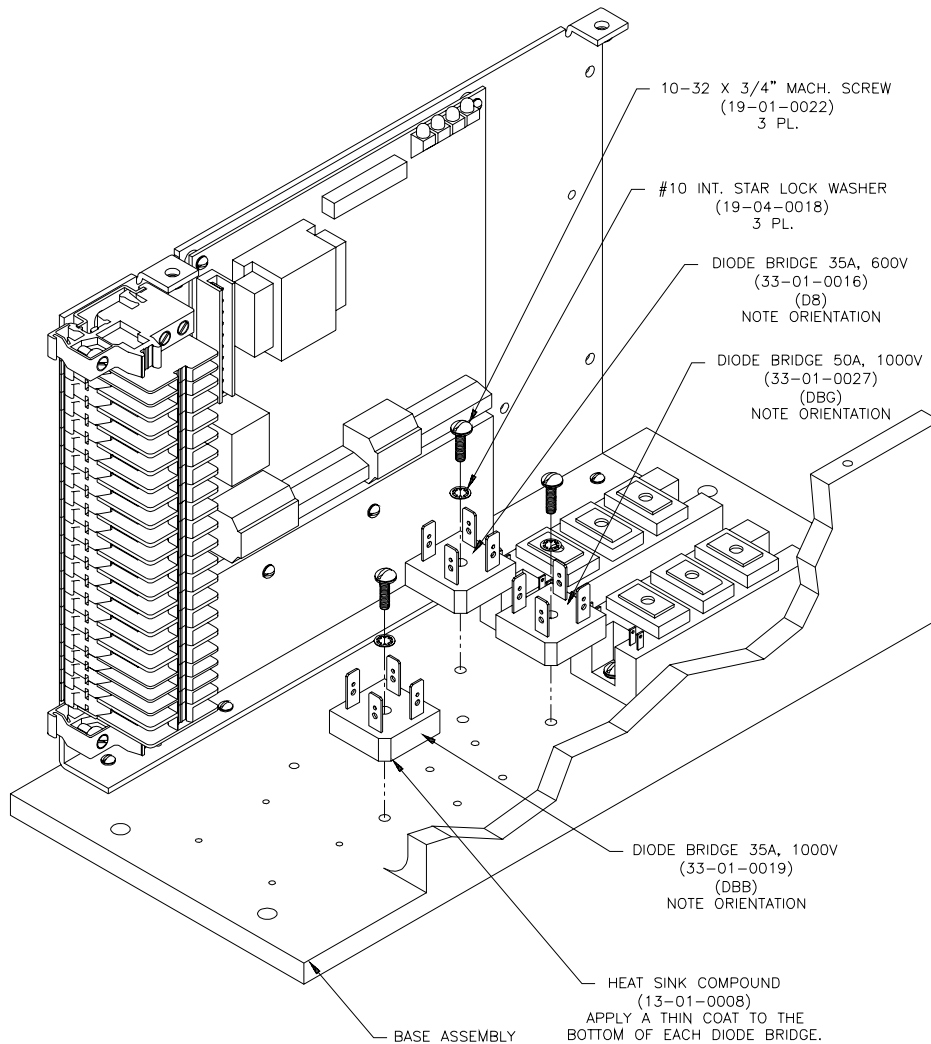
NOTE: SOME COMPONENTS NOT SHOWN FOR CLARITY.

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13 MOTOR FIELD DIODE/SCR (CBRM) BRIDGE REMOVAL AND INSTALLATION

NOTE: before removal note the orientation and wiring placement.

a.   Remove wires, and two 8-32 X 3/8" Kep screws.

b.   Place heat sink gasket on bottom of SCR Bridge.

c.   Screw SCR bridge into place (note orientation) with 8-32 X 3/8" kep screws.

d.   Re-connect wiring as it was removed.

FIGURE F.11   Part of IMC-G233 Drive Unit
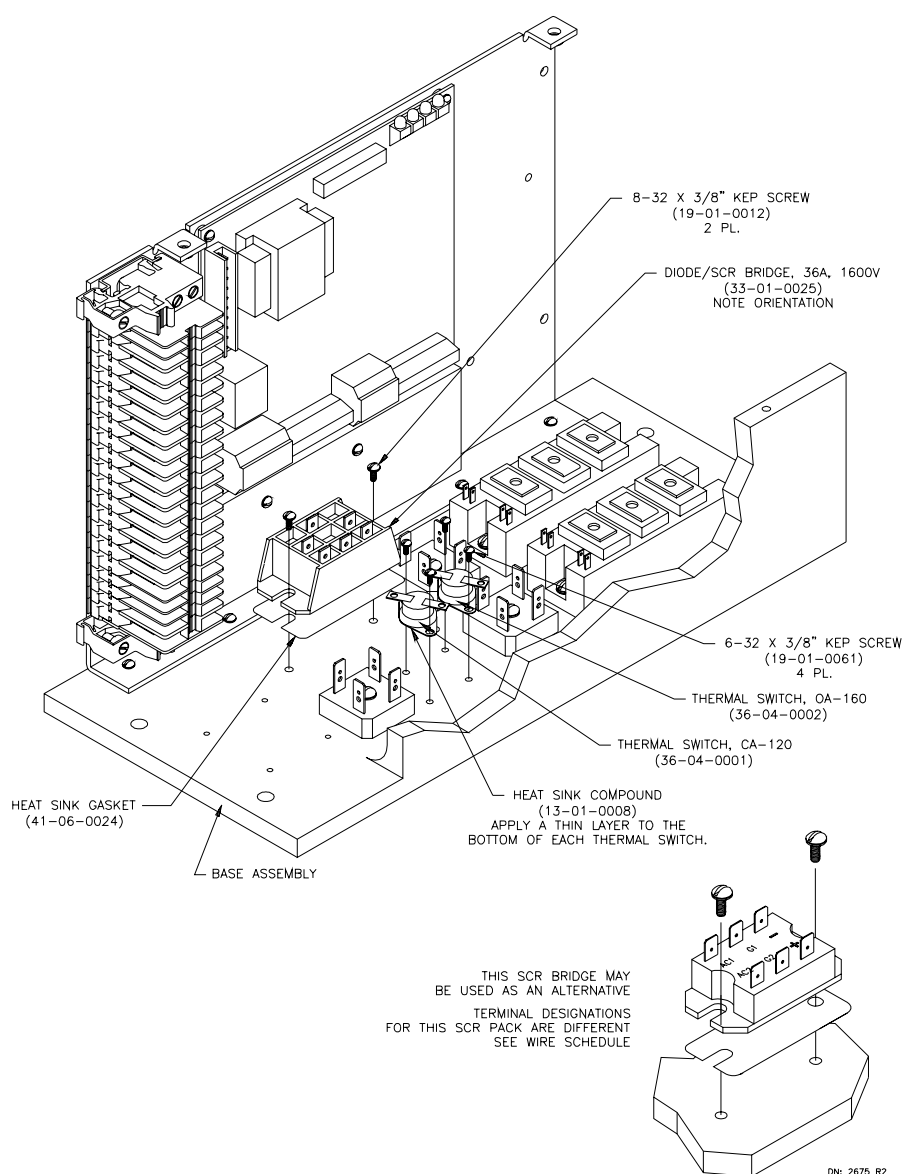
14.   GENERATOR SHUNT FIELD IGBT REMOVAL AND INSTALLATION

a.   The two IGBT units are found under the two 1uf 480V capacitors.

b.   Loosen the screws that attach the capacitor leads, and lift the capacitor off.

c.   Remove the terminal wires connecting the IGBT.

d.   Remove the two 10-32 X 1/2" machine screw and #10 star lock washers that hold it in place.

e.   Place the heat sink gasket under the IGBT before installation.

f.   Lock into place the IGBT with the two 10-32 X 1/2" machine screws and #10 star lock washers.

g.   Re-connect the terminal wires and the capacitor wires and tighten the lugs into place.

h.   If Silicone sealant between the capacitors breaks away, apply a bead of sealant between the capacitors.

FIGURE F.12   Part of IMC-G233 Drive Unit

10-32 X 1/2" MACH. SCREW
(19-01-0021)
4 PL.

#10 INT. STAR LOCK WASHER
(19-04-0018)
4 PL.

IGBT 50A, 1200V
(33-08-0007)
2 PL.

HEAT SINK GASKET
(41-06-0021)

BASE ASSEMBLY
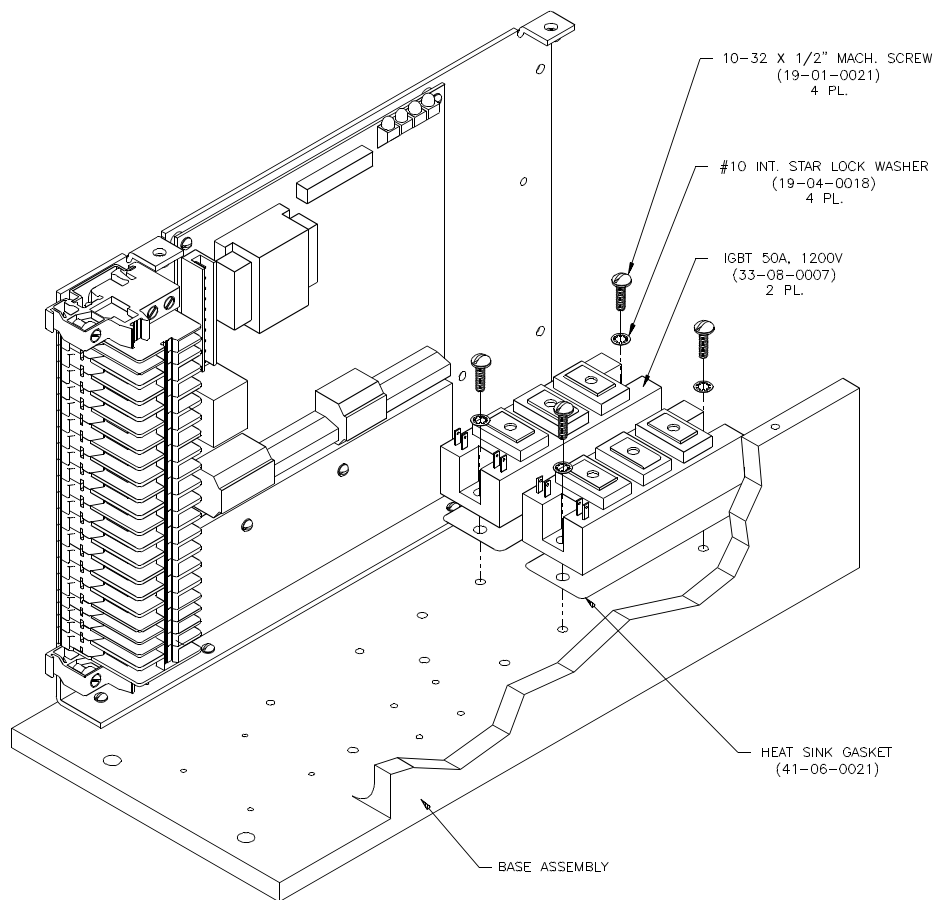
NOTE: SOME COMPONENTS NOT SHOWN FOR CLARITY.

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APPENDIX G
K-TECH LW-KK2 LOAD WEIGHER CALIBRATION

The load weighing system, part # LW-KK2 as manufactured for MCE by K-Tech, consists of a load sensor(s) and control box (most systems use two sensors). The sensor(s) are mounted to the crosshead and measure deflection as the elevator is loaded. The control box contains a power supply, amplifier modules, and an interface or buffer board for processing the load weigher signal to be sent to the elevator controller.

> **ⓘ** **NOTE:** The K-Tech Load Weighing system should be installed according to the installation instructions provided with the Load Weigher. Improper installation is the most frequent cause of poor performance.

G.1 CALIBRATING THE K-TECH LW-KK2 LOAD WEIGHER

The K-Tech LW-KK2 assembly is shown open in Figure G.1, with the two amplifiers and buffer board identified. Signals from the two amplifier boards are averaged at the buffer board (see Figure G.2). If you have a single sensor system, amplifier 2 is not included.

FIGURE G.1   Nyload (Blue) Control Box: LW3200-MC2

NYLOAD (BLUE) CONTROL BOX: LW3200-MC2
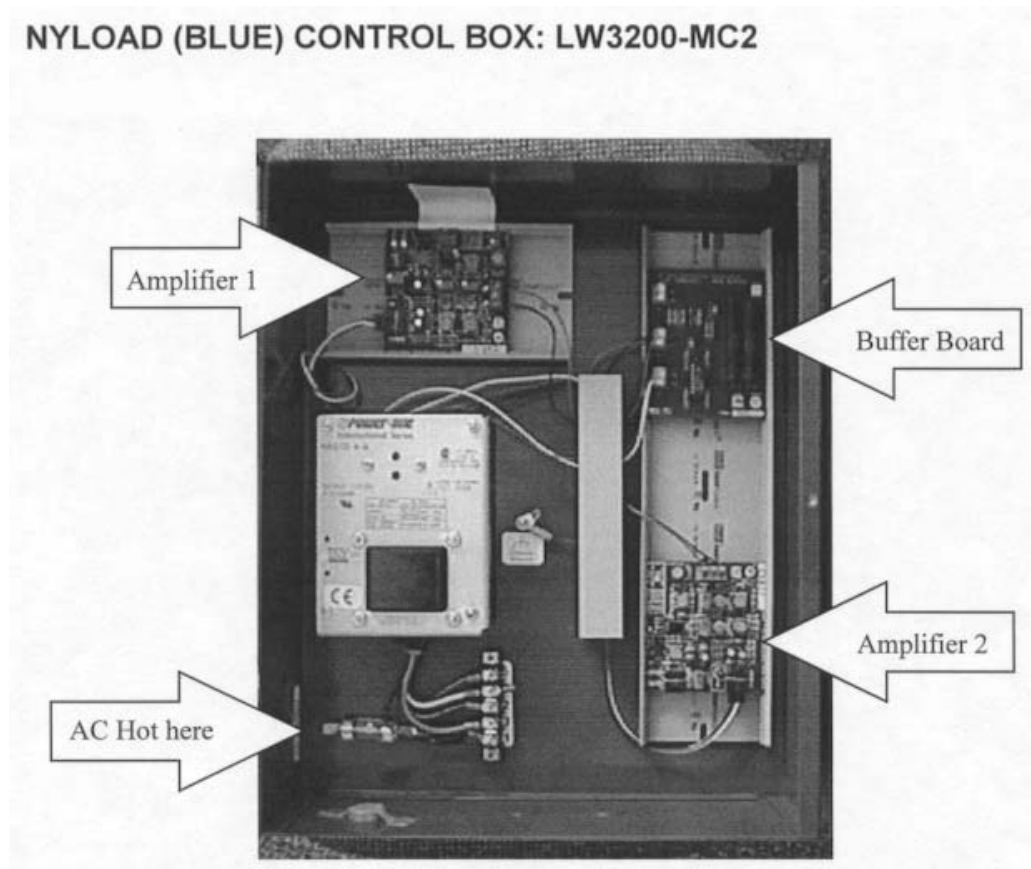
FIGURE G.2   Dual Sensor Single Averaged Analog Output
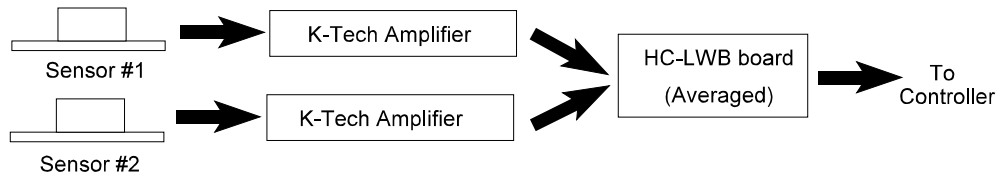
The HC-LWB board is designed by MCE to buffer the load weigher signals by generating a differential output that can be sent to terminals LW+ and LW- on the SCR-RIX board through the traveler cable. The two differential output signals on HC-LWB (LW+ and LW-) are wired to terminals LW+ and LW- on the SCR-RIX board via the traveler cable. These two wires do *not* have to be shielded.

> **NOTE:** Before performing the sensor calibration and load compensation adjustments, all drive parameters (with the exception of safety calibration) must be adjusted so that reasonably satisfactory operation has been achieved.

The following adjustments refer to the Amplifier board(s), Part #PCBELA-04 Rev E (see Figure G.3). The DVM (digital voltmeter) used in this section should be able to read down to +/-1 millivolt, or better, +/-0.5 millivolt. The calibration procedure involves first setting the output voltage to 0 to 8 volts and then later offsetting this to 1 to 9 volts to match the controller's required input. The **green and yellow LEDs are not used in this setup**.

Note that each step must performed for both amplifier boards in a two-sensor setup. To avoid interaction between the two amplifier boards, the test leads must be connected to the isolation resistor as shown in Figure G.3, or the amplifier boards must be disconnected from the buffer board.

G.1.1   CALIBRATING THE SENSOR ADJUST TRIMPOT

a.   Bring the *empty* elevator car to the lowest floor in the hoistway, usually the lobby, and position the car so that the car top can be accessed from the floor above. If the floor above is a blind zone, the Alternate Methods must be used.

b.   Apply power to the K-Tech unit. The **RED** LED should turn ON. Give the system 5 to 10 minutes warm up and stabilize before adjustment.

c.   Connect (clip) the **RED** or positive meter lead to test point **T3** (signal) and the **BLACK** meter lead to test point **T5** (ground), see Figure G.3. Set the meter to the millivolt (mV) range. If you can make the adjustment while *standing off of the car top*, proceed to step 'd', otherwise go to SENSOR ADJUST (Alternate Method).

d.   Adjust the SENSOR ADJUST pot until the meter reads **0 ± 1mV,** otherwise go to the alternate procedure. If you cannot adjust the amplifier to 0 ± 1mV, see Section G.2, Troubleshooting the K-Tech Load Weigher, Check Point #1.

e.   Observe the meter reading at T3. Put some weight (200 lbs.) in the car, or step onto the car top. If the meter reading goes **negative**, verify/set the INVERT/NON-INVERT switch

to the **NON-INVERT** position. If the meter reading goes **positive**, verify/set the INVERT/NON-INVERT switch to the **INVERT** position. This switch will **NOT** change the meter reading at T3, but will invert the output at test point T4. Test point T4 must go positive with added weight.

FIGURE G.3   K-Tech Amplifier Board Test and Adjustment Points
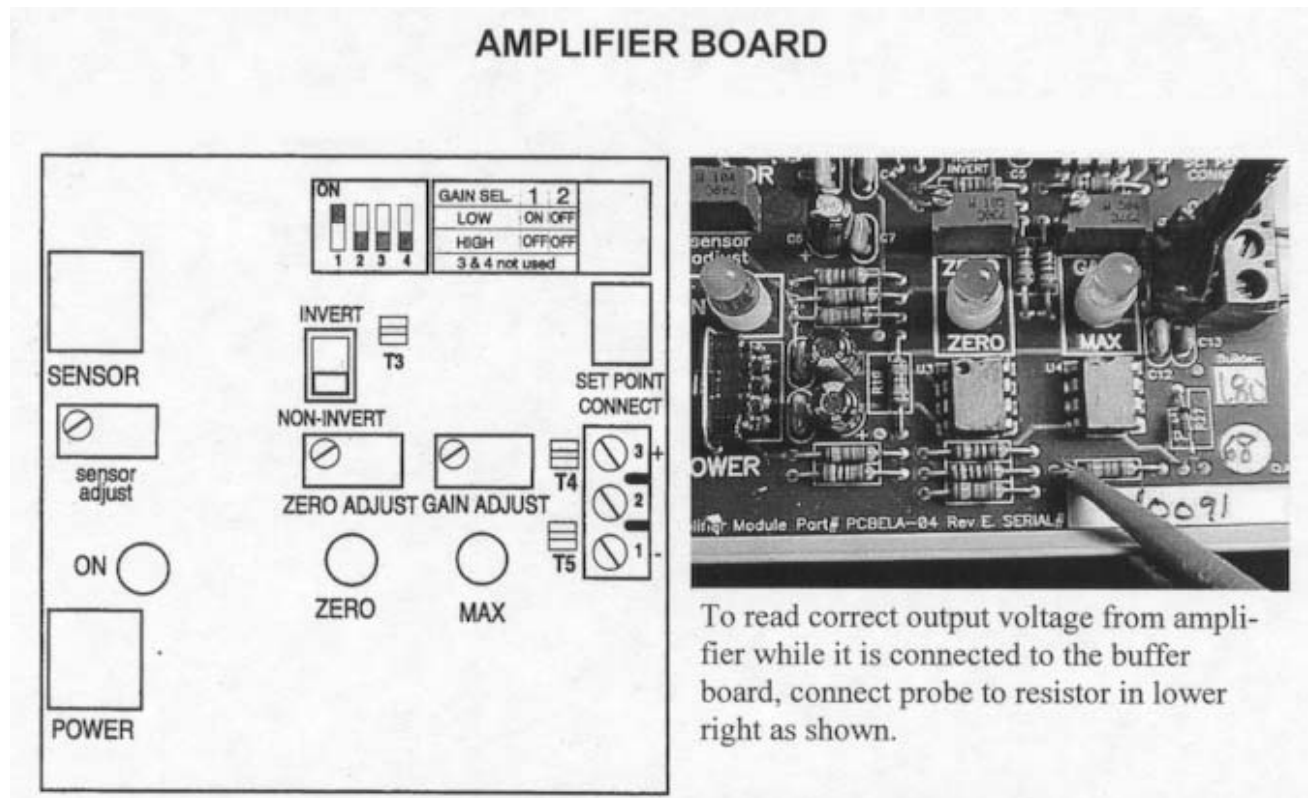
f.   Repeat steps 'c' and 'd' for amplifier 2. Note that it is possible that one amplifier could be set to INVERT and the other to NON-INVERT. You may then proceed to Section G.1.2, *Calibration of the Zero Adjust Trimpot (Empty Car)*.

SENSOR ADJUST (Alternate Method) - This procedure is used if it is not possible to make the adjustment while standing off of the car top.

a.   Connect (clip) the **RED** or positive meter lead to test point **T3** (signal) and the **BLACK** meter lead to test point **T5** (ground), see Figure G.3. Set the meter to the millivolt (mV) range. Adjust the SENSOR ADJUST pot until the meter reads **0 ± 1mV** while standing on the car. We will compensate for your weight in the next step.

b.   Step off of the car. The meter reading should go in the **positive direction*** between 5 and 20 mV (typical) depending on the gain setting and crosshead sensitivity to weight changes. Lets assume that the meter reading changed to **+7mV**. Step back onto the car in the same location and orientation as before and adjust the SENSOR ADJUST pot until the meter reads **-7mV ± 1mV**.

* If the meter reading goes in the negative direction when you step off of the car, perform the sensor calibration as above but with opposite polarities. Lets assume that the meter reading changed to **-7mV**. Step back onto the car in the same location and

orientation as before and adjust the SENSOR ADJUST pot until the meter reads **+7mV ± 1mV**.

c.   Step off of the car again and observe the meter reading. It should now be within **0 ± 1mV**. If you cannot adjust the sensor to within **0 ± 1mV** consult Section G.2, Troubleshooting, Check Point 1.

d.   Observe the meter reading at T3. Put some weight (200 lbs.) in the car, or step on the car. If the meter reading goes **negative**, verify/set the INVERT/NON-INVERT switch to the **NON-INVERT** position. If the meter reading goes **positive**, verify/set the INVERT/NON-INVERT switch to the **INVERT** position. This switch will **NOT** change the meter reading at T3, but will invert the output at test point T4. Test point T4 must go positive with added weight.

G.1.2 CALIBRATING THE ZERO ADJUST TRIMPOT (EMPTY CAR)

a.   The EMPTY car should still be at or near the bottom landing. Connect (clip) the **RED** meter lead to the resistor on amplifier 1 as shown in Figure G.3. and the **BLACK** meter lead to test point **T5** (ground) on the K-Tech amplifier board. Ensure that the GAIN SELECT switches are set to the lowest setting. Set the meter to read **10-20V** at full scale. If you can make the adjustment while *standing off of the car top*, proceed to step 'b', otherwise go to the Alternate Method.

b.   Adjust the ZERO ADJUST pot until the meter reads **0 ±0.025** volts. You may then proceed to Section G.1.3, *Calibration of The Gain Adjust Trimpot (Full Load)*. If you cannot obtain this reading consult Section G.2, Troubleshooting the K-Tech Load Weigher, Check Points 2, 3 and 4.

ZERO ADJUST (Alternate Method) - This procedure is used if it is not possible to make the adjustment while standing off of the car top.

a.   Adjust the ZERO ADJUST pot until the meter reads **1.0 ±0.05V** while standing on the car. We will compensate for your weight in the next step. Ignore the green LED next to the trimpot.

b.   Step off of the car. The meter reading should go down. Observe the **change in voltage**. Lets say that the reading goes down to **0.25V**. Calculate the amount of change, **1.0 - 0.25 = .75V**.

c.   Step back on the car and adjust the ZERO ADJUST pot until the meter reading is equal to the amount of change, **0.75V**.

f.   Step off of the car again and observe the meter. It should now read **0 ±0.025** volts. If you cannot obtain this reading consult Section G.2, Troubleshooting the K-Tech Load weigher, Check Points 2,3, and 4.

G.1.3 CALIBRATION OF THE GAIN ADJUST TRIMPOT (FULL LOAD)

a.   Place a FULL load in the *center* of the car, or equally distributed in the car and run the car to the top landing. Connect (clip) the **RED** meter lead to the resistor as shown in Figure G.3 and the **BLACK** meter lead to test point **T5** (ground) on the K-Tech amplifier board. Set the meter to read **10-20V** at full scale.

b.   Adjust the GAIN ADJUST trimpot on the amplifier board until the meter reading is **8.0 ±0.025** volts, or the maximum output achievable. The MCE controller can work with as little as 5.0 VDC. If you cannot make this adjustment while standing off of the car top, compensate for your weight as in Sections G.1.1 and G.1.2.

c.   Next, go back and adjust the ZERO ADJUST pot until the meter reading is **9.0 ±0.1** volts. If you cannot make this adjustment while standing off of the car as in Sections G.1.1 and G.1.2. The meter reading should now be a maximum voltage of **9.0 ±0.1 VDC** with full weight in the car at the top landing and **1.0 ±0.1 VDC** with no weight in the car at the bottom level (which will be verified in step 'e'). If the maximum output in step 'b' was less than 8.0 VDC, adjust the ZERO ADJUST pot up 1.0 V from the maximum reading achieved. If the output does not reach at least 5.0 volts, consult Section G.2, Troubleshooting the K-Tech Load weigher, Check Point 5.

d.   Repeat steps 'b' and 'c' for amplifier 2.

FIGURE G.4   HC-LWB Buffer Board

e.   With the full load at the top of the hoistway and with no one on the car top, verify that the output of the HC-LWB board (terminals **LW+** and **LW-**) inside the K-Tech control box is **9.0 ±0.2** volts. Also check the wiring from the load weigher to the controller by verifying that the input to the SCR-RIX board (terminals LW+ and LW-) is the same as the output of the HC-LWB board.

f.   Check the installation and calibration settings by verifying that the voltage on the amplifier board resistors is **1.0 ±0.1 VDC** with the car empty at the bottom floor. If the reading is not **1.0 ±0.1 VDC** with the car empty at the bottom floor, see Section G.2, Troubleshooting the K-Tech Load Weigher, Check Points 6 and 7.

This completes the calibration of the K-Tech Load Weigher.

If at any point, you have questions, call K-Tech's Technical Support at:

860-489-9399 or 800-993-9399

NOTE: A properly installed Nyload system is reliable and repeatable over time. However, due to mechanical settling and/or elevator frame variations, periodic re-zeroing of the system may be necessary. It is recommended that the system zero be checked and reset **once/month** to **once/quarter** to maintain original settings. This readjustment **should not require weights** when performed and can be done manually by adjusting the ZERO ADJUST control at the bottom floor with no weight in the car as described in Section G.1.

G.2 TROUBLESHOOTING THE K-TECH LOAD WEIGHER

SENSOR ADJUSTMENT TROUBLESHOOTING		
CHECK POINT	**POSSIBLE CAUSE**	**SOLUTION**
1. Sensor Zero at T3 does not adjust to 0V +/-1.0mv	Elevator car is not at the lowest level	Send car to lowest level
	Crosshead surface may not be flat	If the sensor is unbolted and then can be zeroed, resurface (grind smooth) the crosshead, de-bur the holes and re-bolt the sensor.
2. Empty Load Zero at output isolation resistor does not adjust to 0+/-0.05V	*Sensor Zero* (T3) is out of adjustment	Readjust *Sensor Zero* (T3)
	Gain Adjust is set too high	**NOTE:** Gain Adjust pot on Amplifier bd. is factory set at approximately 2/3 of maximum, or 16 turns CW. Turn Gain pot 1 to 2 turns CCW.
	Gain Select dip switches are improperly set	Make sure that the GAIN select DIP switches are set to the lowest gain (see to Figure G.8A).
3. Empty Load Zero at output isolation resistor Zero Adjust pot has no affect on output (output stuck at 0.00)	*Sensor Zero* (T3) is out of adjustment	Readjust *Sensor Zero* (T3)
	Gain adjust is set too low	Turn Gain adjust pot CW 2 to 4 turns, then try Zero pot again. Repeat one more time if necessary.
4. Output voltage at the output isolation resistor does not respond to any adjustment	Sensor connector is loose	Verify that the sensor connector is fastened securely into the sensor connector housing on the amplifier board(s).
	Power connector is loose	Verify that the power connector is fastened securely into the power connector housing on the amplifier board(s)
5. Full Load Adjustment at output isolation resistor does not adjust to full scale (9.0 VDC) for max weight	Stiff crosshead	The MCE controller can work with as little as 5VDC for full load. If the maximum output achievable at the lowest GAIN switch settings is less than 5VDC, try changing the sensor location or moving it to the other C channel.
6. Buffer Board Output Check at T4 output is drifting **NOTE:** drifting can occur when rails are flexed by adjacent elevators traveling by (in proximity to) the setup elevator. Also the reading "up" will tend to be lower than the "down" reading at a floor do to friction	Sensor may be bowed or not mounted at the lowest level	Remount the sensor (at the lowest level). NOTE: allow unit to settle for "mechanical creep" one to two hours before completing the adjustments.
		Change sensor location on the crosshead or switch to the other crosshead for more linear reaction with respect to weight inside the car.

SENSOR ADJUSTMENT TROUBLESHOOTING		
CHECK POINT	**POSSIBLE CAUSE**	**SOLUTION**
7. Buffer Board Output Check unexpected reading at Lobby or is not repeatable at specific locations in the hatchway under the same conditions	Varying mechanical (bending and twisting) forces as the car moves	**NOTE:** the following are dependent on the elevator and should only be attempted only after all other remedies. 1) Check rails for alignment. Poorly aligned rails can cause the car to drag resulting in pull on the cables and erratic/non-repeatable deflection of the crosshead. 2) Tighten all car frame nuts and bolts. An elevator car that is not plumb can cause errors due to deflection. 3) If the output offset has suddenly changed, the sensor may have been disturbed by changes in the crosshead (not related to weight). See Maintenance Note in the Pre-Installation Checklist for periodic re-zeroing.

APPENDIX H
MCE LOAD WEIGHER INSTALLATION AND ADJUSTMENT

H.0   GENERAL INFORMATION

The MCE Load Weigher is designed for use with isolated platform elevator cars. The accuracy of the load weigher is dependent on the condition of the rubber isolation pads. If they are old, cracked or hard, the performance of the load weigher can be very poor. Similarly, if the wrong pad material is used, the deflection (with load) can be excessive or insufficient. Be sure to verify the performance of the pads with the test in Section H.1.2 step 8.

H.1   SENSOR INSTALLATION METHODS

Method #1   New or replacement installation with target bracket near the middle bottom of the floor, as in Figure H.3 (preferred method).

Method #2   Replacement installations re-using the original load weigher location for target bracket near the center of top of cab or under the floor (see Section H.1.3).

Method #3   Sensor and amplifier on the top of the car (predisposes sensor and amplifier to damage and adjustment problems – see limitations in Section H.1.4).

> ⚠ **CAUTION:**   Increasing the weight in the car must always increase clearance between the proximity sensor and the target for proper operation.

FIGURE H.1   MCE Load Weigher
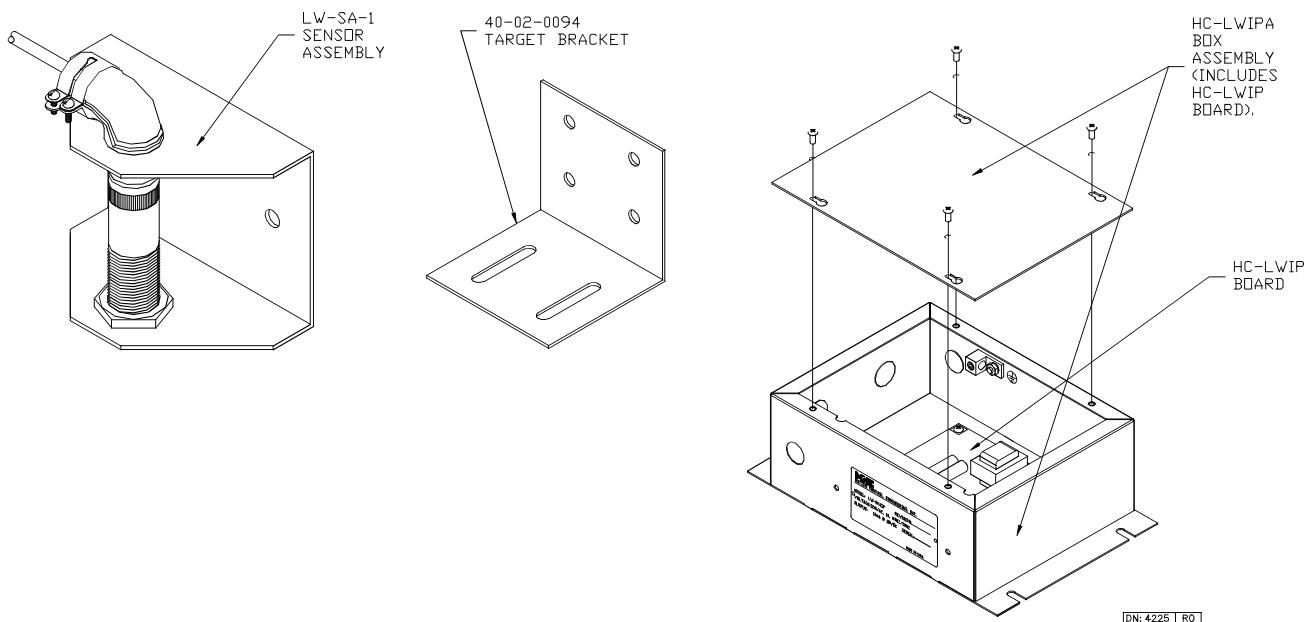
H.1.1 INSTALLATION METHOD #1 OVERVIEW (PREFERRED METHOD)

When installing – remember that the car is supported near the center of gravity. The center of gravity may be offset towards the front of the car to compensate for the door operator weight, unless the car has *both* front and *rear* doors (see Figure H.2). Install the target bracket as close to the center of the floor as possible.

FIGURE H.2   Center of Gravity vs Center of Floor
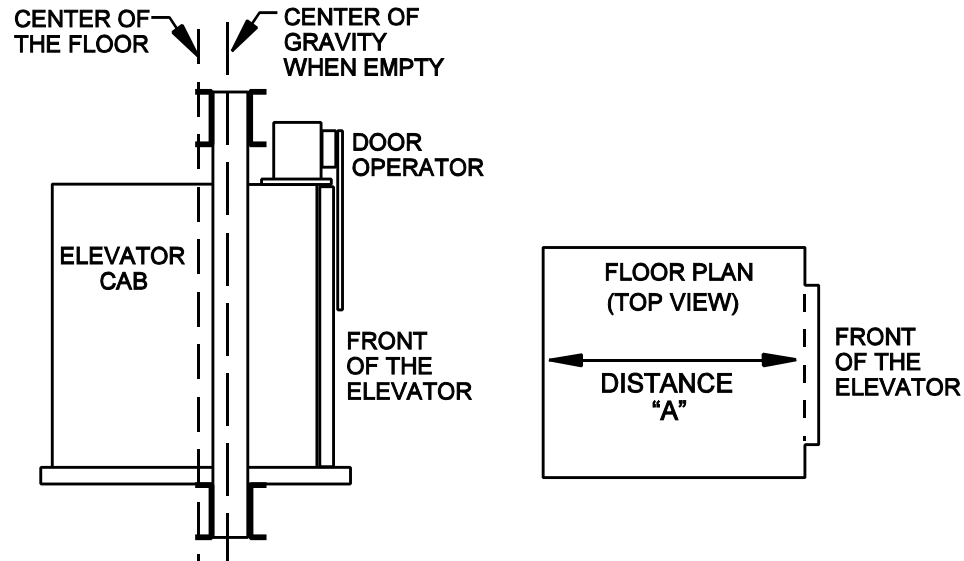
To measure the compression of the rubber pads and not the sagging of the floor – attach a structural piece such as a 1 ½ " by 1 ½" angle to the outside edges of the floor (see Figure H.3).

FIGURE H.3   Sensing the Edges of the Floor (compensation for floor sag)
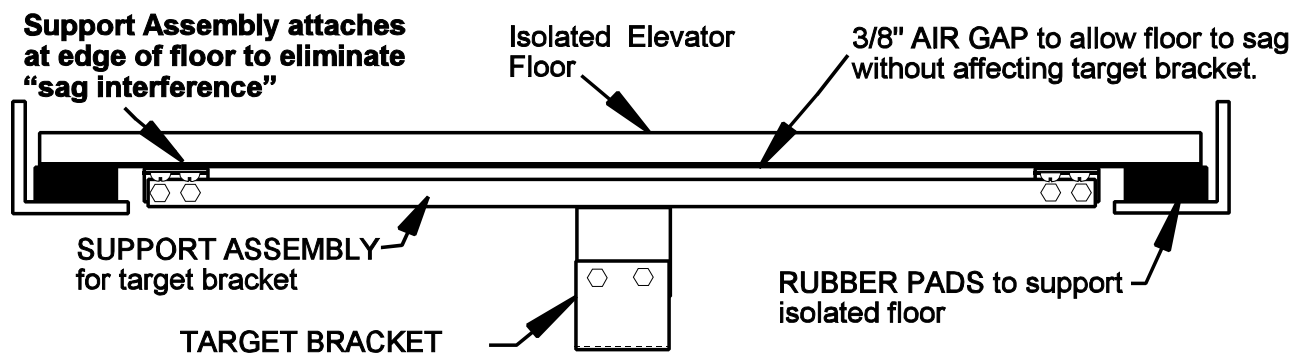
FIGURE H.4   Target Bracket and Sensor mounted on Support Assembly and Car frame

These screws hold the 2 small angles to the bottom of the floor -minimum 2 screws per angle. Screws must be short enough to avoid punching through the floor.

CENTER OF FLOOR
CENTER OF GRAVITY

FRONT OF CAR ➤

FLOOR

SUPPORT ASSY =
2 short pieces of angle
and 1 long piece of angle

FLEXIBLE CONDUIT – To amplifier (mounted on bottom of car). Mount the amplifier toward the front of car so it is easily accessable for re-calibration. Re-calibrate in case of permanent mechanical shift due to safeties being set, etc.

TARGET
BRACKET
(2 PIECES)

Adjustment bolts for setting 1/16" clearance between sensor and target bracket.

PROXIMITY
SENSOR

SENSOR
BRACKET

Make sure 1/4" spacing exists between target bracket and channels

NOTE: The position sensed is where the support assembly for the target bracket is attached to the floor, NOT where the sensor is located. In Figure H.4 the attachment point for the target bracket support assembly is toward the rear of the car, therefore the sense position is toward the rear of the car.

If the distance between where the target bracket attaches to the floor and the center of the floor is greater than 20% of distance "A" (see Figure H.2), an alternate mounting method may produce better results.

Example: If distance "A" is 10'
Then 20% of 10' is 2'
Therefore, if the target bracket attaches to floor more than 2' from the center of the channel, an alternate method of mounting is suggested (see Figure H.5).

FIGURE H.5   Alternate Mounting Location for Sensor and Target

When mounting inside the channel is too great a gap (+20% of distance A), try mounting sensor outside the channel.

CENTER OF FLOOR

CENTER OF GRAVITY

ALTERNATE LOCATION FOR
SENSOR & TARGET ON
OUTSIDE OF CHANNEL

FRONT OF CAR

THE DIMENSION SHOWN MUST BE A MINIMUM OF 3/8" TO PROVIDE CLEARANCE FOR FLOOR TO SAG

3/8"

3/8"
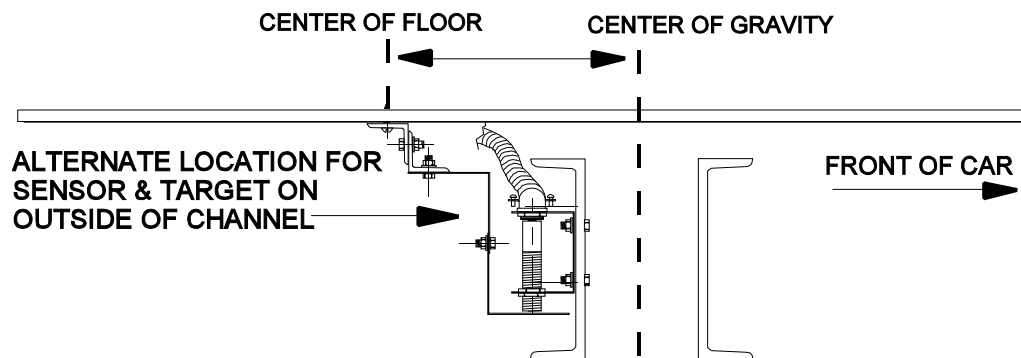
TARGET BRACKET
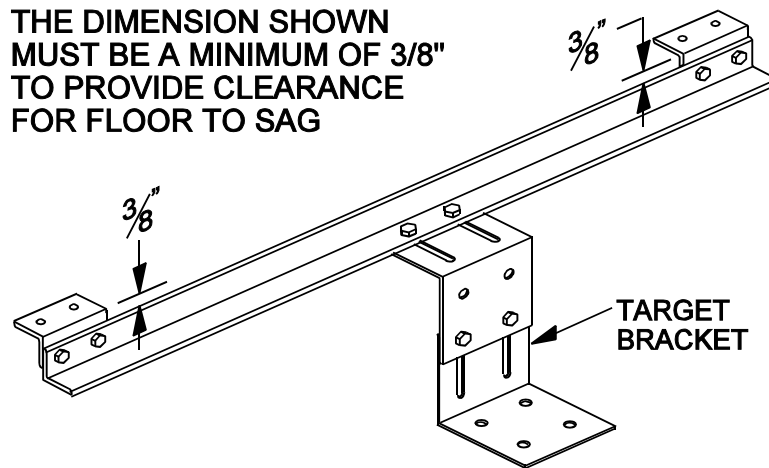
H.1.2 METHOD #1 INSTALLATION INSTRUCTIONS

1.   MAKE THE SUPPORT ASSEMBLY

a.   Cut a piece of 1 ¼" x 1 ¼" or 1 ½" x 1 ½" steel angle to span the width of the floor as shown in Figure H.3 and Figure H.6.

b.   Cut 2 more short 2" lengths of angle to attach the long piece as close as possible to the outer edge of the floor. When attaching the angles together, provide a 3/8" clearance to allow for floor sagging (see Figure H.6).

2.   MOUNT THE TARGET BRACKET ON THE SUPPORT ASSEMBLY

a.   Bolt the two-piece target bracket in the middle of the support assembly so that the slots allow movement of the target for alignment (see Figure H.6).

3.   MOUNT THE SUPPORT ASSEMBLY

a.   The support assembly attaches to the bottom of the floor of the isolated platform as close to the outside edge as possible, preferably attaching between the two channels comprising part of the safety plank (see Figure H.4). Hold the support assembly for the proper 1/4" spacing between the target bracket and the channel shown in Figure H.4 where the sensor will be mounted and mark the holes to drill for the support assembly to attach to the floor. Be sure to leave room for the sensor and mounting bracket.

b.   Drill the holes and mount the support assembly.

c.   Verify the 1/4" space set in step 3a is still 1/4" or within 1/8" to 3/4" after mounting.

4.   MOUNT THE PROXIMITY SENSOR

a.   Mount the proximity sensor and bracket on the channel closest to the front of the car. Center the sensor over the target with about 1/16" (or less) space between the target and sensor (see Figure H.4).

5.   MOUNT THE AMPLIFIER BOX

a.   Mount the amplifier box under the car so that the 6 foot sensor cable can wire directly to the HC-LWIP board inside the amplifier box (preferably no splicing). Try to mount the box so it is accessible from the front of the car, thus eliminating the need to go into the pit to gain access. The box may be mounted upside down or on its side so long as the test points are accessible.

b.   Install ½" flexible conduit from the sensor to the amplifier box (use the knockouts on the box for conduit connection.

c.   Install another flexible conduit from the amplifier box to a junction where Controller terminals 1 and 2 (120VAC), as well as LW+, LW- sensor wires feed through the traveler cable to the machine room. Grounding the amplifier box is recommended, ground according to local electrical codes.

6.   CONNECT THE WIRING

a.   Connect proximity sensor wires to HC-LWIP board terminals (see Figure H.7). For Square D/Telemechanique Sensor Part # XSP-H08362 the color coding is as follows:
   Brown sensor wire to +24V terminal
   Black sensor wire to SIG terminal
   Blue sensor wire to SCOM terminal

b.   Connect terminals 1, 2, LW+ and LW- from the controller to the terminals of the same name on the HC-LWIP board. NOTE: A #18 wire pair is sufficient for LW+ and LW- (shielding is recommended).

FIGURE H.7   Wiring the HC-LWIP board
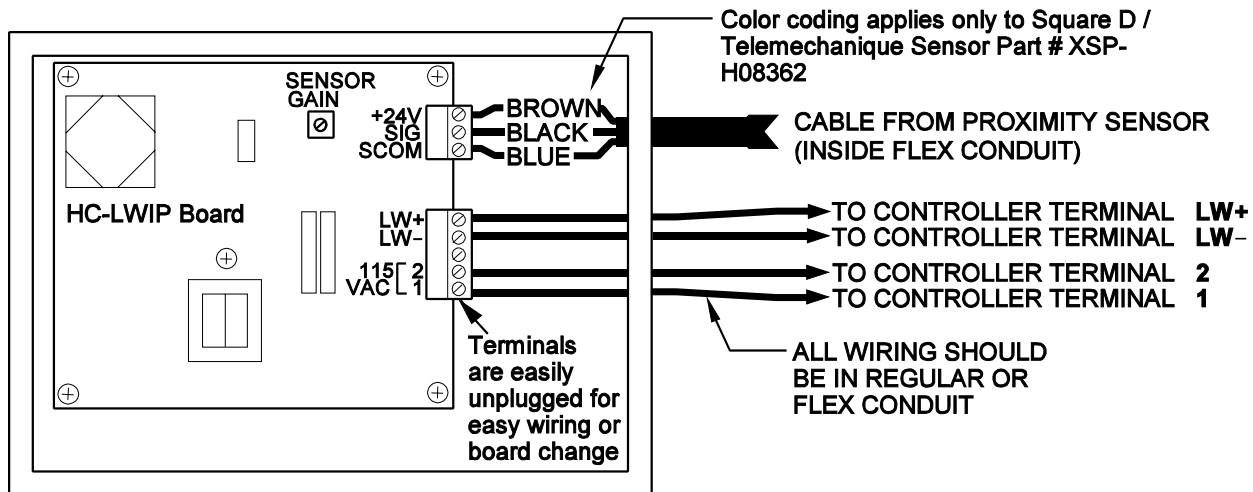
7.   ADJUST THE AMPLIFIER

a.   For adjusting the sensor amplifier the following conditions must first be met:
   • Power to the controller
   • The car is on Inspection operation
   • The brake is already adjusted to hold 125% of full load
   • The elevator is positioned level with the floor and with doors open so test weights may be added and removed.

b. With car empty, adjust the clearance between sensor and target so that 0.3VDC to 1VDC is on test points SIG to SCOM. This is a sensitive apparatus, so hold the target while loosening the adjustment bolts of the target, make the adjustment, and tighten the bolts.

c. Remove all personnel from the pit (in case the car moves when fully loaded) and put 100% of load in the car.

d. Adjust the sensor Gain trimpot on the amplifier board fully clockwise (re-entering the pit if necessary) and check that LESS THAN 14VDC is on test points LW+ and LW-. Then adjust the Gain trimpot for no more than 8VDC on LW+ and LW- and no less than 4VDC (8VDC recommended).

8. VERIFY THE PERFORMANCE

a. Check the voltages measured from SIG to SCOM with the following loads. This information is used to verify the rubber pad compression for the isolation platform. Document the data below.

	Load in pounds	Volts across SIG to SCOM	Voltage increase
No load		(1)	////////////
1/4 of full load		(2)	(2)-(1)
½ of full load		(3)	(3)-(2)
3/4 of full load		(4)	(4)-(3)
Full load		(5)	(5)-(4)

The variation between voltage increase entries should be linear. If voltage increase is more than 25% different from the entry just above it, check the following:
• Condition of rubber pad
• Voltage variance when weight is in center of car vs on edge of car (sagging problem)

b. For future maintenance, measure the voltage between Controller terminals LW+ and LW- with the car empty. Then compute the following:

$$\frac{\text{Empty car voltage between SIG and SCOM on the amplifier board}}{\text{Empty car voltage between terminals LW+ and LW- on controller}} = K$$

For future maintenance, record the K value here **K = _____**.

9. ADJUST THE CONTROLLER PARAMETERS

The loadweigher is now installed and properly adjusted; however, the parameter adjustments for the load weigher must be completed (see Section 4.4.7, *Setting the Pre-Torque Parameters* and Section 4.4.9, *Load Weigher Adjustment for Dispatching*).

10. RECOMMEND MAINTENANCE

Once a month check the voltage set in step 7b. It should be within .3V and 1.0VDC when the car is empty. This voltage may be checked in the machine room at the

controller terminals LW+ and LW-; however, the voltage reading at LW+ and LW- must be multiplied by **K** above. If the measured voltage times K is between 0.3 and 1.0VDC no adjustment is necessary. If the voltage is outside the 0.3 to 1.0VDC range – adjust the target bracket as explained in 7b.

Periodic checks of the voltage increase (table 8a) will help diagnose when rubber pads are losing compression consistency.

H.1.3 INSTALLATION METHOD # 2

Re-using pre-existing holes or brackets to mount sensor and target.

When using supports created for other load weighers, be sure to arrange sensor and target so that increasing the weight in the car increases the clearance between the proximity sensor and the target.

Always use the target bracket for the target as it will flex slightly and not damage the sensor during any rebound while doing a buffer test, etc.

If the voltage between SIG and SCOM varies depending on where the weight is in the car – use the preferred method.

H.1.4 INSTALLATION METHOD # 3

A very simple approach. Mount the sensor and amplifier on the top of the car. This has the advantage of being the most convenient location, both for installation and for any later adjustment. Unfortunately, there are several disadvantages to this approach.

The first disadvantage is that the sensor and target bracket are usually more exposed to accidental physical damage, which is critical, since the system depends on precise clearances between the sensor and target.

Second, since the inclination of most installers would be to mount the target directly to the top of the cab, the extra weight of an elevator adjuster on the cartop often creates problems during adjustment or if they happen to be riding there temporarily during normal operation, especially since the top of the cab is not as structurally rigid as the floor.

NOTE: If locating the load weigher on the cartop is necessary, a better result can be obtained by making up a target bracket assembly similar to Figure H.6 and attaching it to the edges of the elevator cab, which will make it not sensitive to the bending of the top of the elevator cab. Then mount the sensor so it is supported by the crosshead. This can give a very good result, but requires real mechanical expertise on the part of the installer.

CAUTION: In any case of mounting the sensor and amplifier on top of the car, be sure to arrange the sensor and target bracket so that <u>increasing the weight in the car increases the clearance between the proximity sensor and the target.</u>

APPENDIX I
OPTION SMARTLINK FOR CAR OPERATING PANEL

I.0 GENERAL INFORMATION

This Appendix applies to MCE Controllers with the following boards and software versions: MC-NC Software Version 2.00, and MC-NIO Software Version 2.00. SmartLink Serial Communication for Car Call Signals **is an option** for MCE controllers. It links the Car Operating Panel (COP) signals to the car controller in the machine room using serial communication techniques. This option reduces the wiring from the COP to the car controller; thus reducing the installation time and labor cost. The serial link is based on state-of-the-art LonWorks® networking technology. A four-wire link carries the signals and power from the COP to the car controller. If the Smartlink for COP option is on this controller, reference this Appendix Figure I.1 for controller and board layout. Otherwise use the controller manual information only.

TABLE I.1   Principle Characteristics

PRINCIPLE CHARACTERISTICS	
Number of Wires	4 (2 for data and 2 for power)
Power on serial link	24 VDC
Number of I/Os on one COP board	24 inputs, 24 outputs
Communication protocol	LonTalk® (based on OSI 7-layer networking protocol)
Controller characteristics	Available for M3 Group System car controllers

I.1 PRODUCT DESCRIPTION

SmartLink Serial Communication for Car Call Signals provides a serial communication link between the car controller and the Car Operating Panel (COP). Other than the input/output interface between the controller and the COP, there are no changes to the existing controller. The functionality of the controller is not affected.

I.1.1 CAR CONTROLLER NODE

The car controller node (MC-NC board) is the main node of the network. It provides the input/output interface between the car controller computer (MC-MP or MC-MP2 board) and the COP. It contains the Neuron® processor which implements the 7 layers of the LonTalk® communication protocol for receiving and sending signals, as network data packets, to and from the COP. It also implements the application level routines to serially transfer these signal values to the car controller computer.

I.1.2 CAR OPERATING PANEL (COP) NODE

The function of the COP node (MC-NIO board) is to transfer COP signal values to and from the car controller node as network packets. The COP signals, such as call buttons, door close button, call lockouts, etc., are sent serially to the car controller node via the LonWorks® network. Similarly, signals such as call button lights, indicators, etc., are received from the car controller node.

I.2 PHYSICAL LAYOUT AND FUNCTIONAL DESCRIPTION

Figure I.1 shows the typical connection between the controller node and the COP node. The physical layout and hardware are described below.

FIGURE I.1   Typical IMC-SCR System

INSIDE VIEW OF ELEVATOR

TYPICAL IMC SCR SYSTEM

D/N: 3136   R0
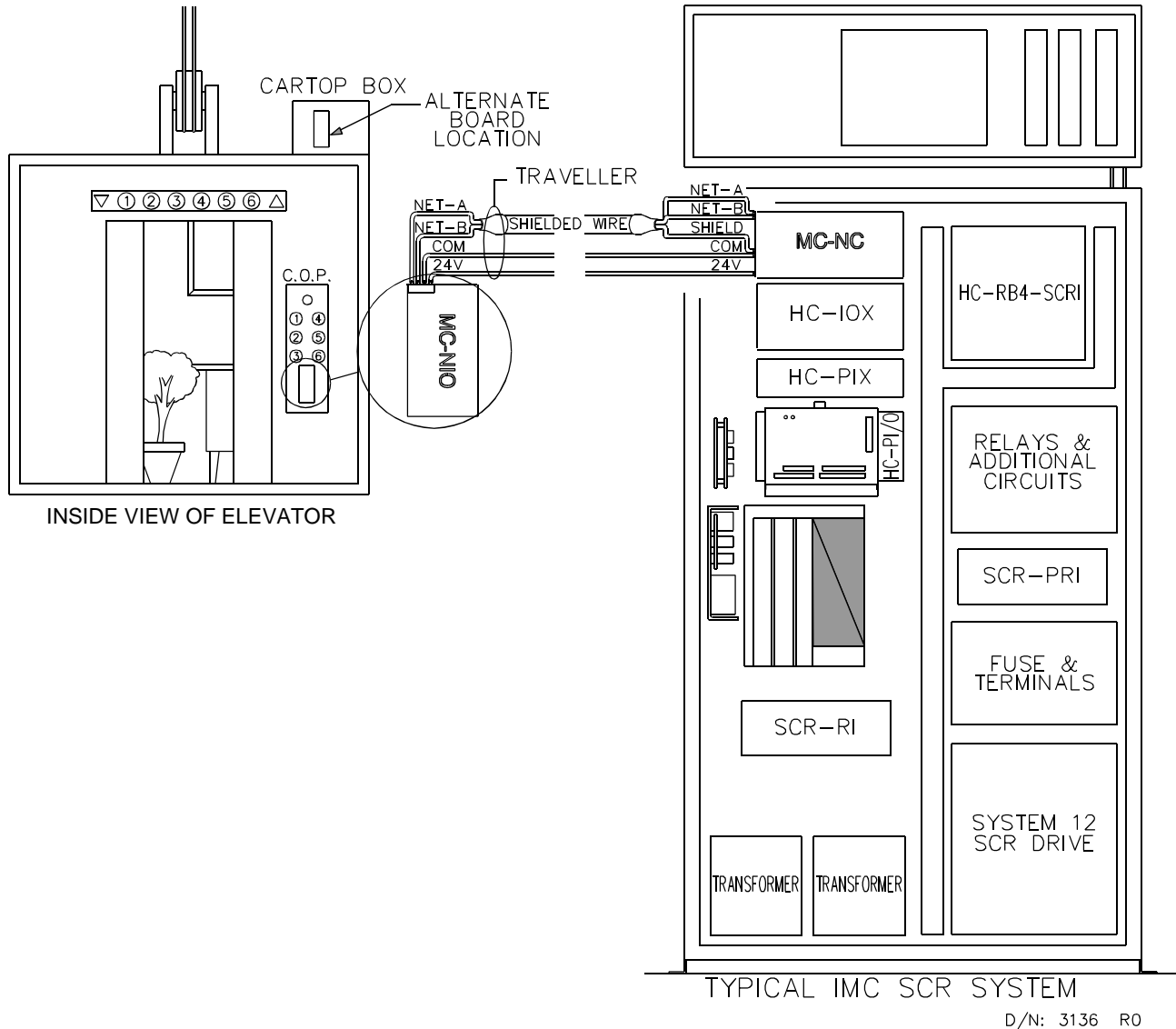
I.2.1   CAR CONTROLLER NODE

The car controller node consists of the MC-NC Neuron Controller board (see Figure I.2) which, for most controllers, replaces the HC-CI/O Call Input/Output board and is physically located where the HC-CI/O board would otherwise be. The MC-NC board provides the interface between the car controller's Main Processor (MC-MP or MC-MP2 board) and the MC-NIO board in the COP. The car call push-button inputs and other input signals from the COP are received serially via the LonWorks® network and are processed by the MC-NC board and then sent serially to the car controller's Main Processor board via a 20 conductor ribbon cable. Information from the car controller's Main Processor board is received serially by the MC-NC board, formatted into data packets, and sent to the COP via the LonWorks® network.

FIGURE I.2   MC-NC Neuron Controller Board

D/N: 3131 R1
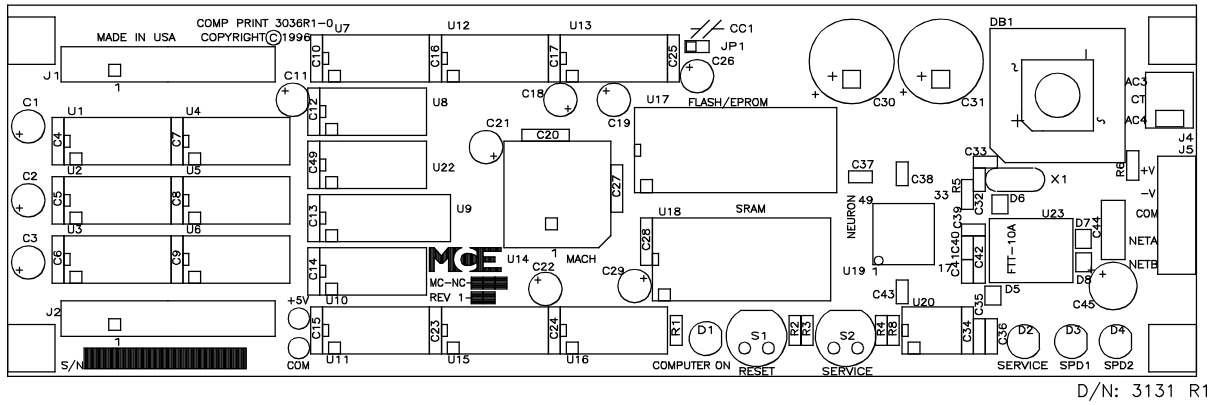
I.2.2 CAR OPERATING PANEL (COP) NODE

The COP node consists of the MC-NIO Neuron Input/Output board (see Figure I.3) and, if required, one or more MC-NIO-X Neuron Input/Output Extender board(s) (see Figure I.4). The COP board(s) are physically located either in the COP itself or on the car top. The MC-NIO board has two major functional blocks, the input/output interface and the LonWorks® network interface.

The MC-NIO board monitors the state of the car call push-buttons (ON/OFF) and activates call acknowledgment outputs. It also acquires other inputs from the COP switches and buttons and activates other COP outputs. The MC-NIO board can handle 24 inputs and 24 outputs. The MC-NIO-X board is used for additional inputs and outputs and is responsible for the input/output interface only. It does not contain the network interface electronics.

FIGURE I.3   MC-NIO Neuron Input/Output Board

D/N: 3132 R1
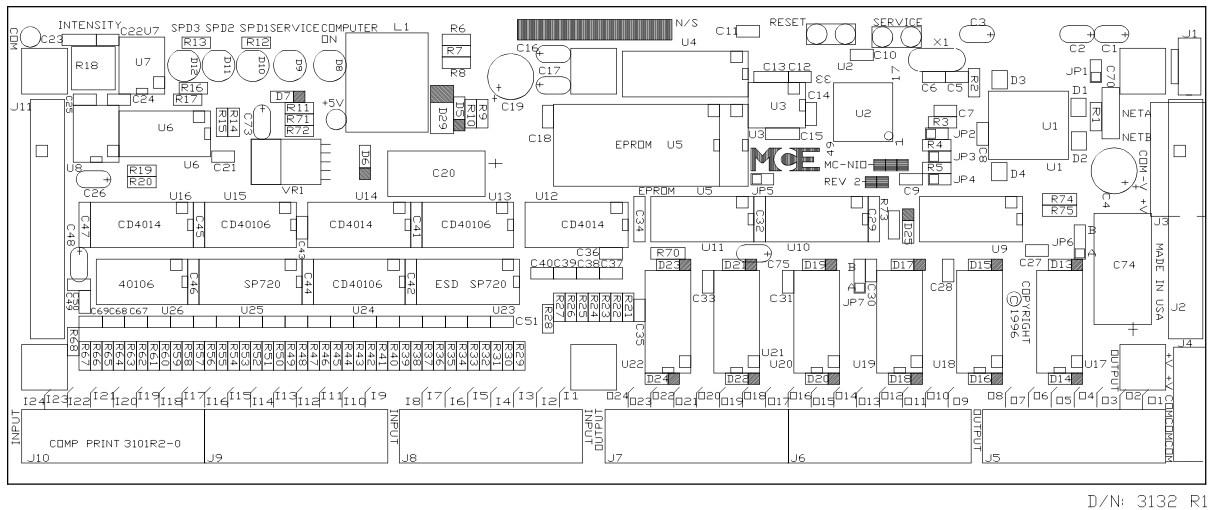
FIGURE I.4   MC-NIO-X Neuron Input/Output Extender Board
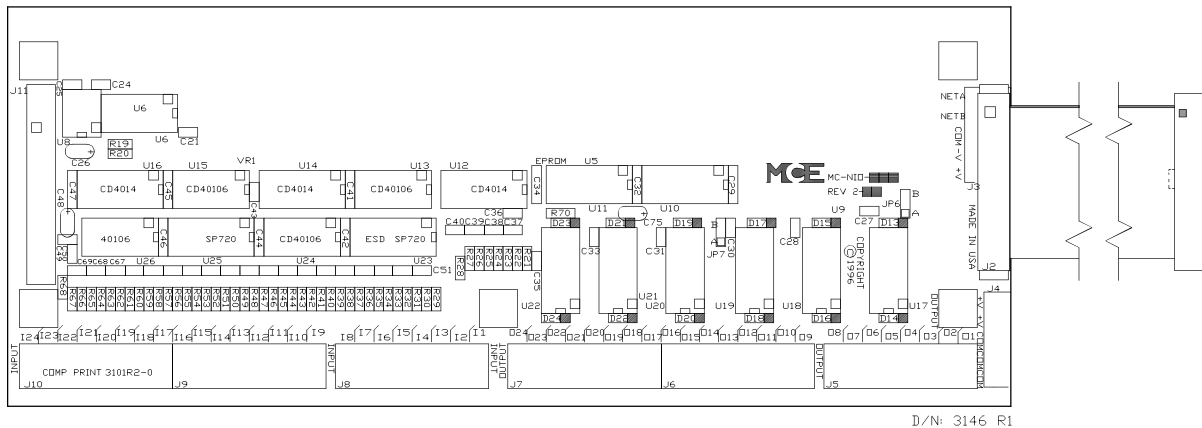
I.3   INSTALLATION OF THE MC-NIO & MC-NIO-X BOARDS

MCE's SmartLink Serial Communication for Car Call Signals option is simple and easy to install. A communication cable is required to connect the MC-NC board (located in the elevator controller) to the MC-NIO board, mounted in the Elevator's Car Operating Panel (COP). As an alternative, the COP board(s) may be located in a metal box on the Car Top and wired to the COP.

The **MC-NIO** board is the 'NEURON INPUT/OUTPUT' board. All car call buttons as well as all car call acknowledge lights are connected to this board. The **MC-NIO-X** board is the 'NEURON COMMUNICATION INPUT/OUTPUT EXPANDER' board. It is also located in the COP and used in conjunction with the MC-NIO board for providing additional I/O. The MC-NIO-X board is used when more inputs or outputs are required than the MC-NIO board can provide. The MC-NIO-X board is the same as the MC-NIO board except that fewer components are loaded. The MC-NIO-X board is connected to the MC-NIO board through a 26 conductor ribbon cable. The MC-NIO board connector J11 connects to the MC-NIO-X board at connector J2. Additional MC-NIO-X boards, if needed, can be connected in a cascaded fashion to connector J11 of the MC-NIO-X board.

I.3.1   MOUNTING THE BOARDS IN THE COP

MOUNTING ONE BOARD - If the job requires only one board, the MC-NIO can be mounted anywhere in the COP such that the connectors are easily accessible and the board does not obstruct any fixture in the COP. The MC-NIO board is supplied with a mounting plate. The dimensions are shown in Figure I.5.

MOUNTING MORE THAN ONE BOARD - If the job requires the expander MC-NIO-X board(s), they can be mounted in the following 3 ways. The MC-NIO-X board is also supplied with a mounting plate.

Option 1 - The boards can be stacked one on top of another (see Figure I.6). Make sure that the total height of the boards stacked together does not exceed the available height for mounting the boards in the COP.

Option 2 - The boards can be placed end to end with connector J11 of one board facing connector J2 of the other board (see Figure I.7). In this case, the height requirement will be that of a single board and the I/O connectors on all the boards will be on the same side. Since the boards are mounted length-wise in this option, make sure that the COP has enough free space length-wise.

Option 3 - The boards can be placed side by side, with the I/O connectors facing the opposite sides and the non-I/O connector side of the two boards facing each other (see Figure I.8). This option can be used if the COP is wide enough to place two boards side by side.

Any combination of the above 3 options can be used to best suit the COP length, width, height and the wiring requirements.

> **NOTE:** The MCE part number for the Mounting Plate is **40-02-0074**

FIGURE I.5   Mounting Plate Dimensions for Mounting the MC-NIO and MC-NIO-X boards
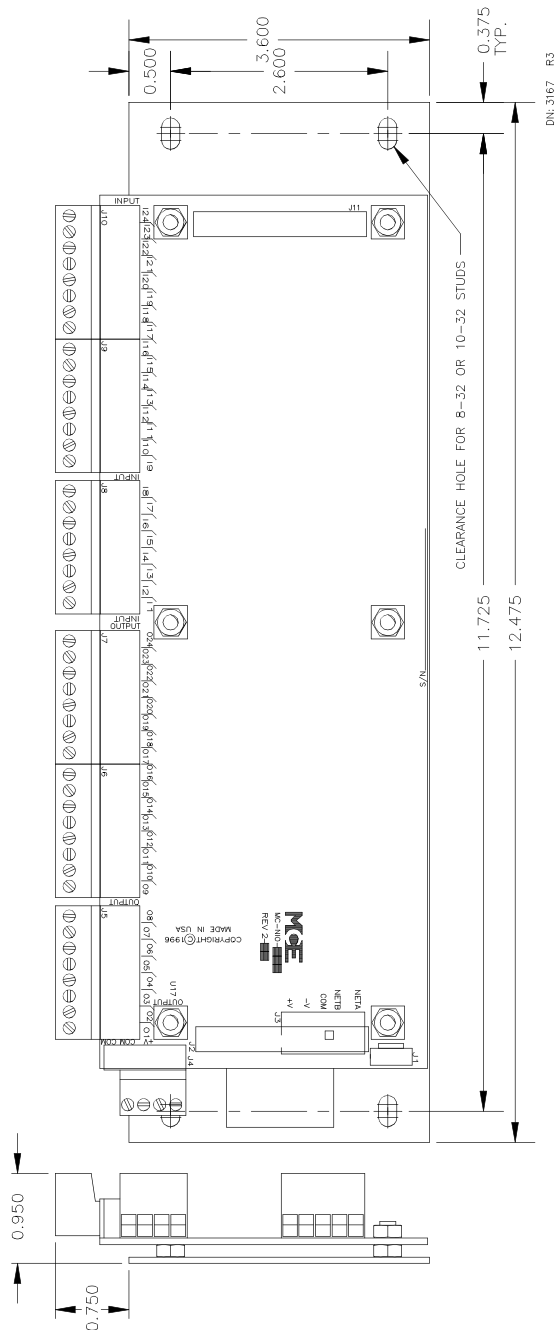
FIGURE I.6   Mounting Option 1: Boards Stacked
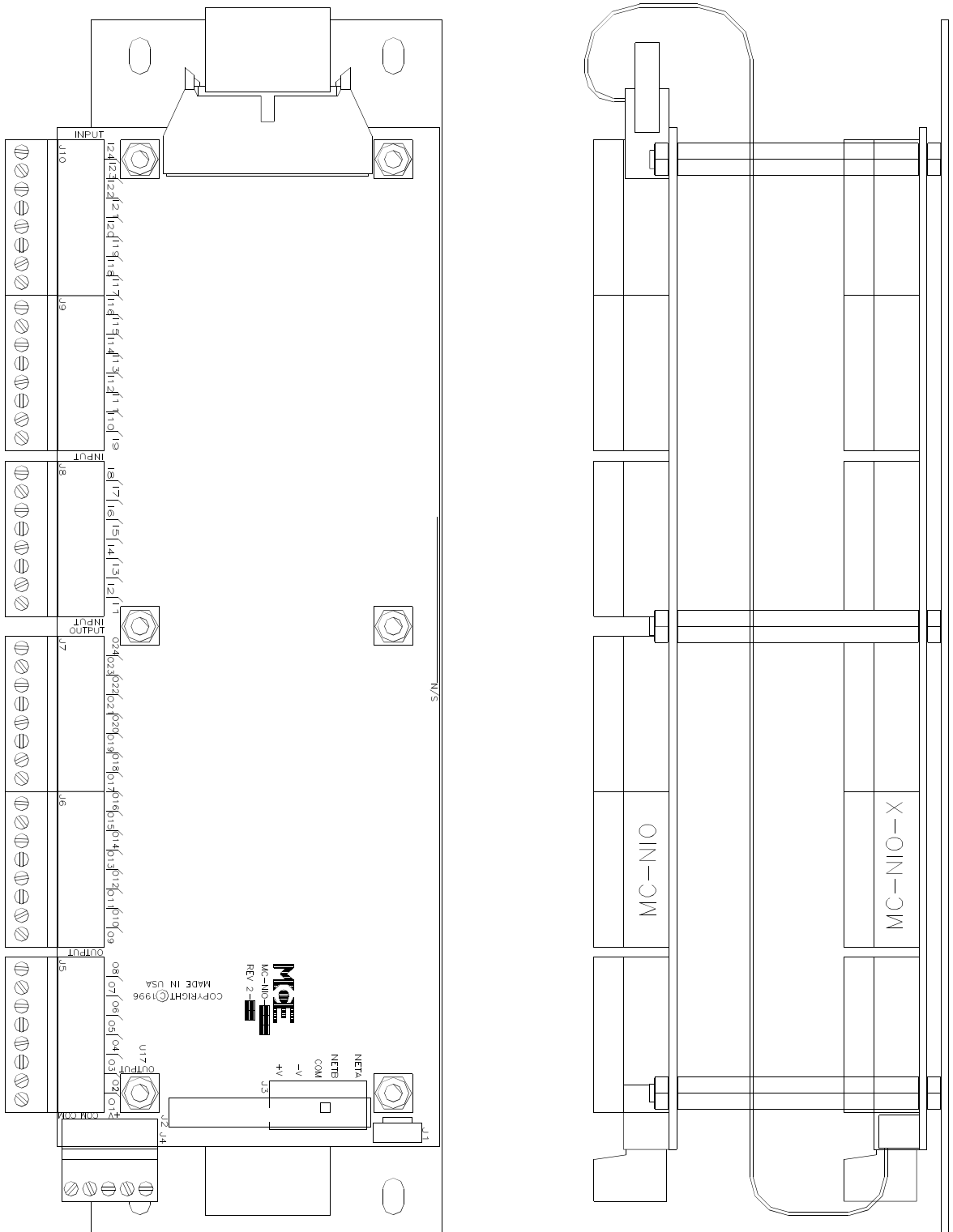
FIGURE I.7   Mounting Option 2: Boards Placed End to End

FIGURE I.8   *Mounting Option 3: Boards Placed Side By Side*
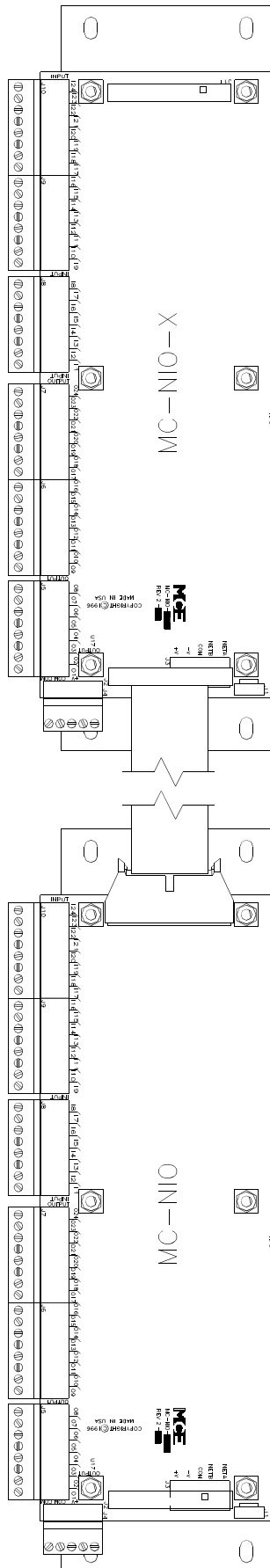
FIGURE I.8   Mounting Option 3: Boards Placed Side By Side
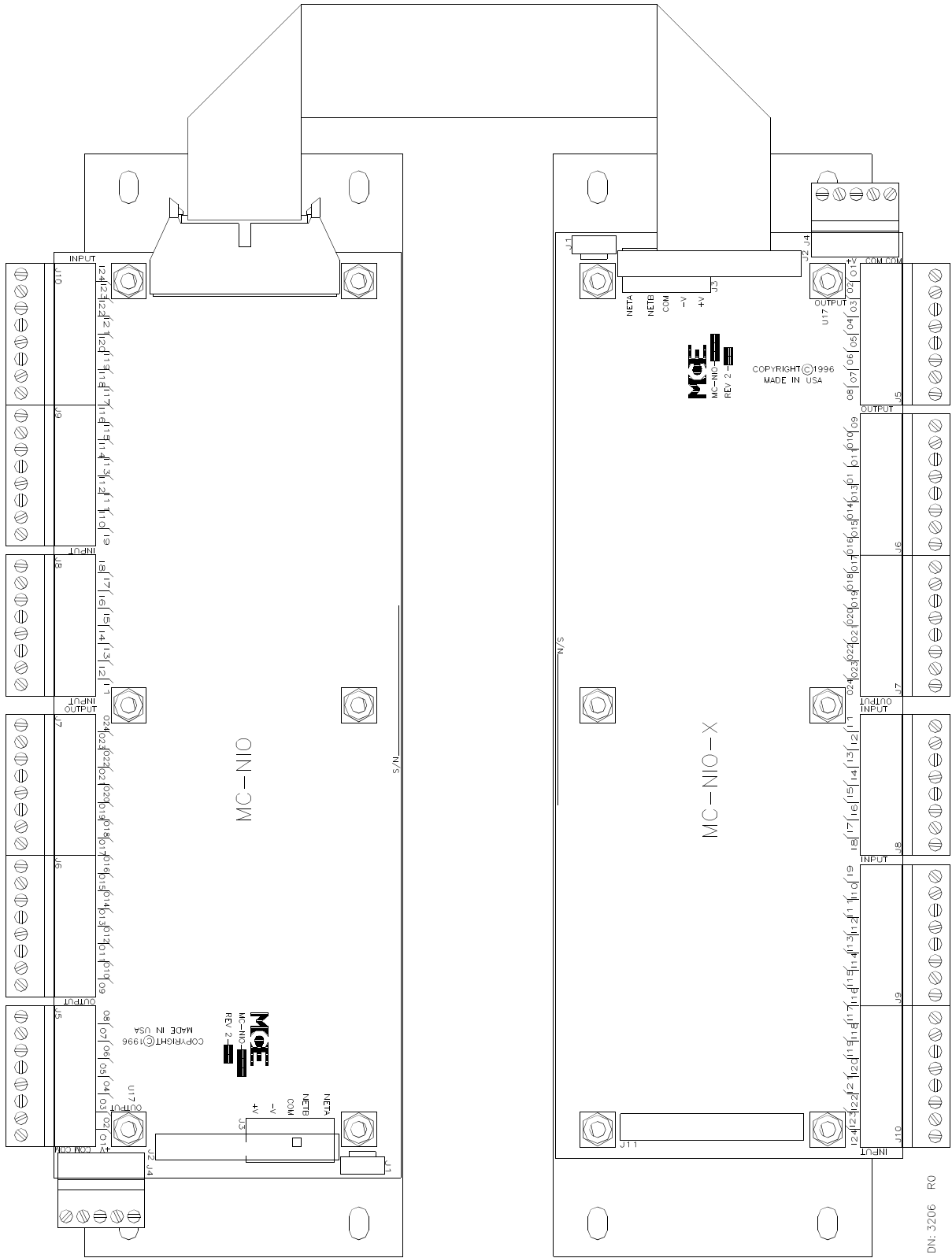
I.3.2 COP INPUT/OUTPUT WIRING

The outputs of the MC-NIO, MC-NIO-X boards are of the "open-collector" type. The bulbs are turned ON when the output terminal is grounded, therefore, the common side of bulbs is connected to the +V terminal (J4) on the MC-NIO and MC-NIO-X boards.

The inputs are internally pulled up to the +V voltage and become activated when grounded, therefore, the common of all the switches is connected to the COM terminal (J4) on the MC-NIO and MC-NIO-X board.

The MC-NIO board is provided with an additional 'COM' terminal (J4) which is to be connected to the car or cartop. This will provide a common to the Car. Refer to the job prints for details of the connections.

I.3.2.1 TESTING THE CONNECTIONS

To locally test the connections to the buttons and indicators, power must be supplied with the Network disconnected. To test inputs and outputs after the connections are made, put the MC-NIO board into test mode. To do this, disconnect NETA or NETB and then momentarily short the reset pins. This will cause the inputs of the MC-NIO and MC-NIO-X (if available) boards to turn on its corresponding outputs (i.e. I1 turns on O1 ..... I24 turns on O24). Inputs are activated by grounding them. Test all the outputs by grounding the corresponding inputs. Confirm the wire connections with this test.

I.3.2.2 ACCEPTABLE BULBS FOR USE WITH MC-NIO AND MC-NIO-X BOARDS

In the following tables, the shaded row indicates the preferred lamp for this application.

TABLE I.2   Indicator Specification

INDICATOR SPECIFICATION			
INDICATOR TYPE	**VOLTAGE**	**MAXIMUM CURRENT EACH OUTPUT**	**WATTAGE EACH OUTPUT**
Incandescent Lamp	28V	0.3 Amps	6 Watts
Solid State LED	28V (lamp must have built-in resistor)	0.3 Amps	6 Watts
Neon Lamp	Not applicable		
Electronic Buzzer/Chime	28V	0.3 Amps	6 Watts
Mechanical Buzzer/Chime	Not Applicable		

TABLE I.3   Miniature Bayonet Bulbs

MINIATURE BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
1495	28V	0.30A (MORE BRIGHT)
1873	28V	0.20A
1864, 313, 456, 356	28V	0.17A
1820	28V	0.10A
757, 265	28V	0.08A
1829	28V	0.07A
1819, 28MB	28V	0.04A
1843	28V	0.022A (LESS BRIGHT)

TABLE I.4   Single Contact Bayonet Bulbs

SINGLE CONTACT BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
303	28V	0.30A (MORE BRIGHT)
1251	28V	0.23A
456	28V	0.17A
757	28V	0.08A (LESS BRIGHT)

TABLE I.5   Double Contact Bayonet Bulbs

DOUBLE CONTACT BAYONET BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
304	28V	0.3A (MORE BRIGHT)
6S6DC/30V	30V	0.23A
1252	28V	0.23A (LESS BRIGHT)

TABLE I.6   Screw Base Bulbs

CANDELABRA, SCREW BASE		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
6S6/30V	30V	6 WATTS (MORE BRIGHT)
28RC	28V	1.1 WATTS (LESS BRIGHT)

TABLE I.7   PSB5 Bulbs

SLIDE BASE - TYPE 5 (PSB5)		
LAMP REFERENCE # *	**VOLTAGE**	**CURRENT**
28PSB	28V	0.04A

* Note: Bulb shapes vary within a given base style and some may not fit within your fixture.

I.3.3   TRAVELER CABLE

For proper operation the specification of this cable must be, at a minimum, the following:

TABLE I.8   Existing Traveler-Communication Cable Specification

EXISTING TRAVELER-COMMUNICATION CABLE SPECIFICATION	
For NETA and NETB connections	**For +V and Com**
Shielded Twisted Pair (16-22 AWG) (Shield grounded in controller)	See Job Prints - page 1

When the opportunity exists for a new traveler cable; the following specifications are recommended.

TABLE I.9   New Traveler-Communication Cable Specification

NEW TRAVELER-COMMUNICATION CABLE SPECIFICATION	
For NETA and NETB connections	**For +V and Com**

Single twisted pair (one of the following)
     Belden # 85102 (or equivalent)
     Belden # 8471 (or equivalent)
     Belden # 9841 (or equivalent)
	See Job Prints - page 1

I.3.3   NODE IDENTIFICATION JUMPERS

A future option will allow multiple MC-NIO boards to be connected to the LonWorks® network where multiple COPs exist. Each MC-NIO board has several jumpers located on it. Three of the jumpers are for identifying the board when more than one is used. These identifying jumper positions are listed in Figure I.10 MC-NIO Board Quick Reference.

I.3.4   BULB INTENSITY

The COP node (MC-NIO board) has an intensity control for incandescent bulbs and solid state LEDs. The intensity adjustment trimpot is located at the edge of the board near the 26-pin ribbon cable connector. It is a single turn trimpot which, when turned fully counterclockwise, reduces the intensity by approximately 50%. When turned fully clockwise the intensity is 100% (full voltage applied at output terminals). In addition, two jumpers control which lamps are affected by the intensity trimpot. Jumper position and affected outputs are listed in Figure I.10 MC-NIO Board Quick Reference. Acceptable bulb types are listed in Tables 0.2 thru 0.7. If two COP's are connected in parallel, bulbs cannot exceed 3 watts each.

I.3.5   PERIPHERAL DEVICES

Output devices connected to the MC-NIO board must be "Positive Common Bus" type devices. The voltage rating must be 24VDC. Devices can include digital PI's, electronic arrival chimes, lanterns, and electronic buzzers.

I.3.6   COMMUNICATION TERMINATION

The shield of the twisted pair SmartLink communication cable must be connected to the "COM" terminal (J5) only on the MC-NC board in the car controller (located in the machine room). Do NOT connect the shield on the MC-NIO board.

The serial link is a 78 Kbit per second data link which should be terminated at both ends of the communication cable, both in the machine room and in the COP or car top box. Termination at the car controller end, on the MC-NC board, is integrated into the design. Termination at the COP end, on the MC-NIO board, is accomplished by placing a shunt on jumper JP1 (factory installed).

I.4   NETWORK SELF-INSTALLATION AND CONFIGURATION

NOTE: Previous software versions required that the installer perform a "network installation process" before the serial communication link would function. MC-NC software version 2.00 includes an enhancement which eliminates the need for such a process.

After all electrical connections have been made, network communication should be established approximately 10 seconds after system power-up.

I.4.1   NETWORK COMMUNICATION

The diagnostic LED SPD2 on the MC-NC board indicates network activity/status.

If the SPD2 LED on the MC-NC board blinks at an approximate rate of twice per second, network communication has been established.

If the LED is solidly ON or OFF, the network communication is not established. Check the network wire connections to NETA and NETB.

Diagnostic address 3017H contains a communication error counter. Normally all diagnostic LEDs displayed at this address should be OFF on the computer swing panel. If the counters are increasing rapidly (once every 10 seconds), the communication is not stable, check for proper wiring and shielding.

I.5   TROUBLESHOOTING GENERAL

The Diagnostic Indicators on the MC-NC and MC-NIO boards and on the Computer Swing Panel assist in troubleshooting the SmartLink Serial Communication for Car Call Signals. The SmartLink for Car Calls option requires two additional boards, the MC-NC Neuron Controller board (in the car controller) and MC-NIO, Neuron Input/Output board (in the COP or on top of the car). Both of these boards have a processor on them and run independent software programs.

I.5.1   TROUBLESHOOTING THE MC-NC BOARD

Begin by examining the indicators and jumpers on the MC-NC board (see Figure I.9, MC-NC Quick Reference).

I.5.1.1 COMPUTER ON LED

Upon power-up the "Computer On" LED on the MC-NC board should be solidly ON. If this LED is OFF or blinking, verify that the EPROM is installed properly and that all the ribbon cable connections are secure. Verify that the voltage at the +5V test point (located near ribbon cable connector J2) is between 4.75V and 5.1V.

I.5.1.2 COMMUNICATION WITH THE MAIN COMPUTER

The diagnostic LED SPD1 on the MC-NC board indicates communication activity with the Main computer (MC-MP/MC-MP2). If this LED is solidly ON, it means that the MC-NC and the Main Computer are not communicating. Verify that the ribbon cable is connected properly to J2. Proper communication is indicated by the SPD1 LED blinking at a rate of approximately 20 times/second.

I.5.1.3 NETWORK COMMUNICATION

The network communication status is indicated by diagnostic LED SPD2 on the MC-NC board. If this LED is solidly ON, it means that the network communication is not established. Verify that the network wires are connected properly to NETA and NETB on the connector.

To confirm that the network communication is established properly, check the SPD2 LED on the MC-NC board. It should be blinking at a rate of twice a second. If the SPD2 LED on the MC-NC board is either ON or OFF, network communication is not established. Check the network communication counters in the diagnostic buffer (address 3017H). If these counters are increasing rapidly (once every 10 seconds), the communication is not stable. Verify proper wiring and shielding of the network cable as shown in the Job prints.

FIGURE I.9   MC-NC Board Quick Reference

MC-NC QUICK REFERENCE Software Ver. 2.00 or higher

Note status of LEDs (Computer ON, Service, SPD1 & SPD2)

D/N: 3131 R1

RESET AND SERVICE TEST PINS

"Reset" test pins reset the board and the board program when shorted together.
"Service" test pins send the node information on the network when shorted together.

MC-NC Diagnostic Indicators

LED	Computer On	Service	SPD1	SPD2
OFF	Board not functioning. Check +5V. If no +5V, check ribbon cable connection at J2.	**Normal.** The normal state of this LED is OFF.	Possible faulty ribbon cable at J2, connector J2, or MC-NC board.	If normal blinking does not occur (as described below), check NETA and NETB connections.
ON	**Normal.** Computer functioning properly.	Verify proper installation of EPROM. If installed properly, replace board.	MC-NC unsuccessful in communicating with MC-MP. Possible software configuration error (MP).	MC-NC unsuccessful in communicating with MC-NIO. Check NETA and NETB connections.
Blinking	If Computer On LED blinks continuously (approx. once per second), verify proper installation of EPROM.	Verify EPROM version. If V2.00 or higher, replace board.	**Normal.** When accompanied by SPD2 blinking, there is communication. SPD1 blinks very rapidly under normal conditions.	**Normal.** Indicates communication between the MC-NC and the MC-NIO (blinks approx. twice per second).

I.5.2 TROUBLESHOOTING THE MC-NIO BOARD

Begin by examining the indicators and jumpers on the MC-NIO board (see Figure I.10, MC-NIO Quick Reference).

I.5.2.1 COMPUTER ON LED

Upon power-up the "Computer ON" LED on the MC-NIO board should be solidly ON. If the LED is OFF or is flashing, verify that the EPROM is installed properly and the voltage on the +V pin of connector J3 is between 12V and 28V and that the voltage at the +5V test point is between 4.75 and 5.15V.

I.5.2.2 NETWORK COMMUNICATION

The network communication status is indicated by diagnostic LED SPD2 on both the MC-NC and the MC-NIO boards. If this LED is solidly ON, it means that the network communication is not established (see the diagnostic indicator table on the MC-NIO QR card).

I.5.2.3 BULB INTENSITY CONTROL

If the bulbs do not come on or if varying the intensity trimpot has no effect on the bulb intensity check jumpers JP6 and JP7 (see Figure I.10, MC-NIO Quick Reference). If the jumpers are installed correctly and the bulb intensity still does not work, replace the MC-NIO board.

I.5.2.4 MC-NIO & MC-NIO-X OUTPUTS

Testing During Installation - To test inputs and outputs during installation, put the MC-NIO board into test mode. To do this, ensure that the board has power at the +V to COM terminals at connector J3, then disconnect the NETA wire and momentarily short the reset pins. This will cause the inputs of the MC-NIO and MC-NIO-X (if available) boards to turn ON its corresponding outputs (i.e. I1 turns on O1 ..... I24 turns on O24). Inputs are activated by grounding them. Test all the outputs.

Output Fails During Operation - If a previously working output fails, check the output device and wiring. If the device is functional, and the wiring correct, swap the corresponding driver chip with another driver chip (U17 to U22) to check for a failed driver. If problem remains, replace the board.

FIGURE I.10   MC-NIO Board Quick Reference

Jumper Settings (* Denotes factory setting)

NODE IDENTIFICATION JUMPERS			
	JP2	JP3	JP4
1st Board*	ON	ON	ON
2nd Board	OFF	ON	ON
3rd Board	ON	OFF	ON
4th Board	OFF	OFF	ON
5th Board	ON	ON	OFF
7th Board	OFF	ON	OFF
6th Board	ON	OFF	OFF
8th Board	OFF	OFF	OFF

OUTPUT INTENSITY CONTROL JUMPERS
R18 adjusts intensity when Enabled

JUMPER	POSITION	DESCRIPTION
JP6	A	Intensity Enabled Outputs 01 to 08
JP6	B*	Intensity Disabled Outputs 01 to 08
JP7	A*	Intensity Enabled Outputs 09 to 024
JP7	B	Intensity Disabled Outputs 09 to 024

TERMINATION JUMPER

JP1	ON*	ON = terminated, OFF = not terminated

EPROM SIZE JUMPER

JP5	ON*	ON = 27C256, 27C512, 27C010. OFF = 27C020

MC-NIO Diagnostic Indicators

LED	Computer On	Service	SPD1	SPD2	SPD3
OFF	Board not functioning. Check +5V and +24V	**Normal.** The normal state of this LED is OFF.	SPD1 lights whenever any input is activated. If SPD1 does not light when a button is pushed, check the button/switch "common."	This LED should flash whenever a button/switch is activated or deactivated.	SPD3 lights whenever the input/output circuits are being read/written. This LED should blink very quickly (this is the normal state of SPD3). Check EPROM and +5V if SPD3 is off continuously.
ON	**Normal.** Computer functioning properly.	Verify proper installation of EPROM. If installed properly, replace board.			
Blinking	Computer not functioning. Verify proper installation of EPROM.	Verify EPROM version. If V2.00 or higher, replace board.			

I.5.3   SYSTEM TROUBLESHOOTING

GENERAL The serial link is a method of transferring input status (buttons and switches) and output status (indicators) between the car operating panel and the elevator controller. A non-operational serial link would generally result in the complete failure in the transfer of this information. When troubleshooting a problem that you believe might be attributed to a failure of the serial link, bear in mind that the serial link is simply an I/O system. For example, the inability to register a car call from the car operating panel may be due to reasons other than the serial link. Whenever possible, separate the issues (divide and conquer) through creative means (e.g. try to register car calls via the group or local CRT to determine if car calls can be registered at all).

A few examples are given below, with commentaries that serve to illustrate the concepts discussed above.

Problem: Car call buttons do not illuminate when pressed, and the calls do not latch.

Pushing a car call button should always result in the illumination of the indicator for that button. If the car call indicators do not light when the respective buttons are pushed, a failure of the serial link should be investigated. Special attention should be paid to the serial bus wiring (the wires that make up the serial link), especially when this behavior applies to all of the car call buttons (not just a select few). Follow the instructions in the "General Troubleshooting Steps" section below.

Problem: Car calls do latch, and a number of car calls can be registered, but after awhile all the calls cancel simultaneously. The car stops at the next landing and does not open its doors.

Because the car calls can, in fact, be registered through the car operating panel, and because the car call indicators do function properly, the problem described may not be related to the serial link. Cancellation of the car calls may be a result of something unrelated to the serial link (e.g., anti-nuisance logic), so it is important to keep an open mind (don't assume that the serial link is the cause for canceling the car calls). Check the job prints for inputs that are being transferred through the serial link. There may be an input transferred through the serial link that may cause car cancellation should an intermittent problem with the input signal exist. For example, "flickering" of the independent service input will generally result in car call cancellation (it is typical to initially cancel all car calls whenever an off-to-on transition of independent service is detected).

Problem: When pressed, the call buttons illuminate, but then extinguish. The call does not latch.

Discussion: This may or may not be a problem with the serial link. During conditions in which car calls are not allowed to latch by the controller main processor, this behavior is expected. Follow the "General Troubleshooting Steps" outlined below.

GENERAL TROUBLESHOOTING STEPS

Step 1   Determine if car calls can, in fact, be registered. On many products this can be accomplished via a system CRT Terminal (connected to either the elevator controller or to a Group Supervisor). If a CRT is not available, car calls can be latched via the elevator controller's swing panel. Section 5 of the controller's installation manual

provides details regarding this process. If car calls cannot be registered, the problem may not be with the serial link at all.

Step 2 Determine if the serial link is communicating reliably. This is done by activating the independent service switch in the COP (if one exists; if one does not exist, go to Step 2A). Make sure that the independent service status is not being established through any other means (i.e. the Test switch, or some other independent service switch not wired through the serial link). Verify the car is on independent service. If a helper is available (with communications) verify that the independent service indicator on the swing panel's vertical LEDs toggles on and off corresponding to the activation and deactivation of the switch in the COP. Check to see that the indicator does not "flicker" when the independent service switch is left in the ON position.

Step 2A If an independent service switch does not exist in the COP, activate the door open and door close buttons. If the doors appear to respond to these buttons, it is very likely that the serial link is performing properly. It may be worthwhile to verify that the communication link is solid by referencing the swing panel diagnostics (address 20H). As an example, an assistant can observe the DBC flag in the diagnostics while the door close button is being pressed continuously in the COP. The DBC flag should illuminate solidly while constant pressure is placed on the door close button. Refer to the Controller Manual for additional swing panel diagnostics information.

Step 3 If Step 2 indicates that the serial communication is not established, all network wiring should be double-checked. "Network wiring" refers to the wires that connect the MC-NC board (in the controller) to the MC-NIO board (in the COP). These wires should be checked for continuity and for connection to the proper respective terminals on each board. [Note: A subsequent step in the troubleshooting process will call for the inspection of diagnostic indicators on the MC-NIO board. Accordingly, it is suggested that access to the MC-NIO board be maintained at this time.]

Step 4 Once all wiring has been verified (both in the controller and in the COP), observe the diagnostic LEDs on both the MC-NC board and the MC-NIO board. Figures 0.9 "MC-NC Quick Reference" and 0.10 "MC-NIO Quick Reference" provide information regarding the interpretation of these LEDs.

I.5.4 COMPUTER SWING PANEL DIAGNOSTICS

The contents of serial link related computer memory flags can be viewed on the Computer Swing Panel's Diagnostic Indicators. MCE Technical Support personnel may request that you access this information while troubleshooting. The memory flags for serial link data begin at address 3000 hex. Set the switches as shown in Figure I.11 to access address 3000 hex.

FIGURE I.11   Diagnostic Switch Settings for Address 3000 HEX
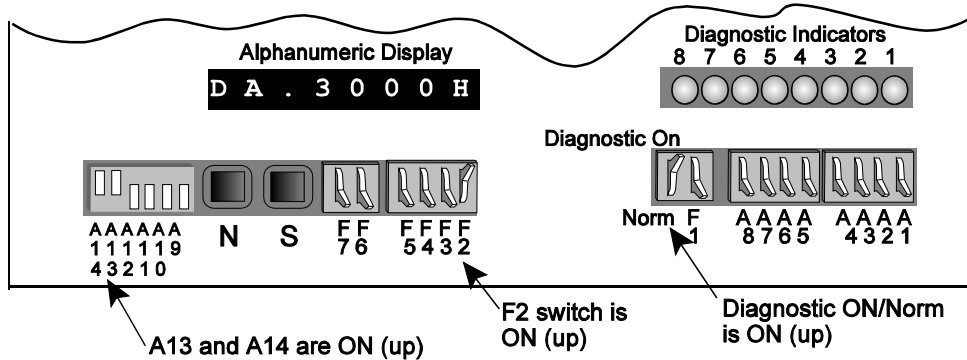
Switches A13 and A14 select the first two digits of the address (30) with A9 thru A12 OFF (down) and A13 and A14 ON (up). Switches A1 thru A8 select the last two digits of the address (00) with A1 thru A8 OFF (down). The Alphanumeric Display indicates that address 3000 hex is selected (DA.3000H). The Diagnostic Indicators show the status of the computer memory flags at this location (LED ON = 1, LED OFF = 0).

Software Version Verification for the MC-NC: Address 03000H displays the major version number on the diagnostics indicators. Address 03001H displays the minor version number. See example below.

Example:
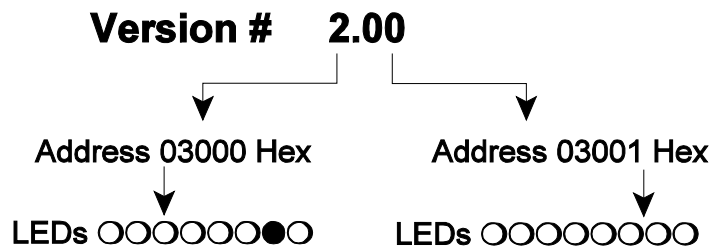
Car call inputs from the MC-NC board to the MC-MP board, and car call latched outputs from the MC-MP board may be viewed in the following addresses and are useful troubleshooting tools.

TABLE I.10   Key Diagnostic Memory Addresses

Alpha-numeric Display	Switch Setting A14 - A9 A8 - A1	Diagnostic Indicators	LED Designation
3017H		Displays the count of failed attempts for MC-NC communication.	LEDs should be *OFF*.
3040H		Displays the car call inputs from the MC-NIO board.	LEDs correspond to the first eight floors. Subsequent floor calls are viewed at address 3041, 3042 etc.
3080H		Displays the car call registration outputs from the Main controller.	LEDs correspond to the first eight floors. Subsequent floor calls are viewed at address 3081, 3082 etc.

APPENDIX J
CLOSED LOOP MOTOR FIELD ADJUST INSTRUCTIONS

In the IMC series of control systems, the motor field can be operated in either an open or closed loop configuration, however, closed loop operation is <u>mandatory</u> for correct operation with an SCR drive, therefore, this option must be turned <u>on</u>. Adjusting the gain parameter MFPG (motor field proportional error gain) and MFIG (motor field integrator error gain) on the Motor Parameters screen will improve regulation of the motor field output voltages. To verify selection of closed loop motor field control and to perform adjustments if necessary, follow the instructions below.

a. Be sure the OCMF parameter on the Option/Calibration Parameters screen is set to "ON." This will insure closed loop motor field operation.

b. Attach a voltmeter to panel mounted terminals MF1 and MF2. Run the car on Inspection. Look for any fluctuation in the voltage when the car is not moving or when running at a steady speed. This measures the stability of the motor field standing and forcing voltages.

    If there is no fluctuation, increase the MFPG parameter on the Motor Parameters screen until slight fluctuation is observed.

c. Once there is a slight fluctuation in the voltage, decrease the MFPG parameter by 25%. Run the car again on Inspection. If fluctuation persists, decrease the parameter another 25%. Best performance is achieved when the MFPG is set just below the value that causes fluctuation (usually set at 1.00).

d. With a voltmeter still attached to panel mounted terminals MF1 and MF2, run the car on Inspection. Increase the MFIG parameter on the Motor Parameters screen until slight fluctuation occurs at standing or forcing motor field voltage.

e. Once there is fluctuation in the voltage, decrease the MFIG parameter until fluctuation stops. Run the car again on Inspection. Best performance is achieved when the MFIG is set just below the value that causes fluctuation (usually set to 3.00).

After these adjustments, measure the DC voltage between panel mounted terminals MF1 and MF2, or observe the motor field voltage display on the F3 screen of the CRT. If the motor field is unstable during any phase of a normal run, reduce the MFPG and MFIG parameters until the motor field input is stable.

APPENDIX K
FLEX-TALK OPTION

> **NOTE:** The following is a listing of diagnostic tools available on a controller if the Flex-Talk option is provided.

Use this appendix in conjunction with the manual. The appendix provides information regarding the diagnostics and volume adjustments for the TPI-FT option on the Flex-Talk unit.

K.1 INTRODUCTION AND THEORY OF OPERATION

The Flex-Talk board is designed for use on any MCE controller to provide flexibility in audio announcement. The TPI-FT board is installed inside the controller and hooked up to the last board of the daisy chain. The TPI-FT receives such needed information as door status, nudging, PI, etc. from the MCE bus. A +5V power supply runs the digital circuitry, and a -/+15V supply operates the analog circuitry of the speaker. There are eight LED's used for diagnostic purposes in conjunction with the dip switches. The input and output connectors (J1 and J2) are used for the MCE bus; however, it is unlikely that the output will be used, as the Flex-Talk board is typically the last in the daisy chain, the exception being a duplex where there are two Flex-Talk boards.

FIGURE K.1   TPI-FT Flex-Talk Board

Diagnostic LED's   Dip Switch set   Volume control trimpots

DN: 3168   R0
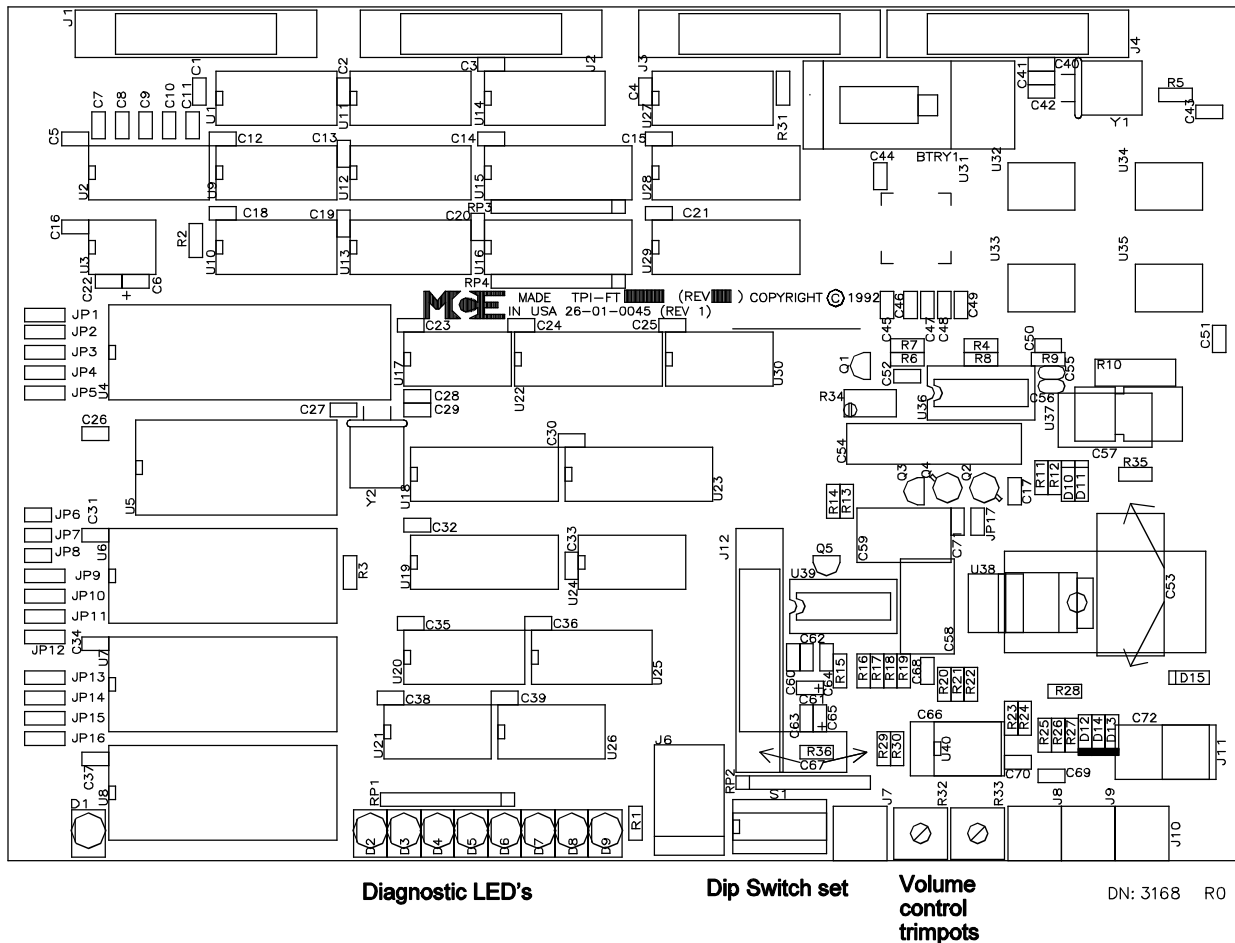
K.2 DIAGNOSTICS

The six switches on the dip switch package are used for diagnostics purposes. There are eight LED's (D2 through D9) also, for displaying diagnostics information. These LED's are used in conjunction with the dip switch package (see below). For self-test, turn on switch S2 of the dip switch set. The unit will announce each of the floor messages, the direction, nudging, and the fire service messages (the special messages are not included in the self test). This test does not require the connection of the MCE bus.

FIGURE K.2   Diagnostic Table

DIP SWITCHES					DIAGNOSTIC LEDS								MNEM.
S2	S3	S4	S5	S6	D2	D3	D4	D5	D6	D7	D8	D9	
1	0	0	0	0	SELF TEST								
0	0	0	0	0	UP	DOWN	NUDG	DOOR	MAIN FIRE	SAF	ALT FIRE	HOSP	MODSW
0	1	0	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								PIN
0	0	1	0	0	X	EM3A	EM2A	EM1A	DORA	GDA	GUA	PIA	MAW
0	1	1	0	0	PIs DISPLAYED IN BINARY (00 = BOTTOM)								IPR_3
0	0	0	1	0	SEC. FLR	HLW	EMP	X	X	X	X	X	SMAW1
0	1	0	1	0	STOP SW	OVS	LOBM	X	X	X	X	X	SMAW2
0	0	1	1	0	X	X	EMP	X	X	X	X	X	EMPWIN
0	1	1	1	0	UP	DOWN	NUDG	DLK	FRS	SAF	FRA	HOSP	ITR-1
0	0	0	0	1	PI0	PI1	PI2	PI3	PI4	CSE	HLW	EPR	ITR-2
0	1	0	0	1	PI5	X	DOPLFR	X	X	H OR (NOT) STC	ATALT	ATMN	ITR-3

Dip switches: - switches S2, S3, S4, S5, and S6 are used to select which flags on the TPI are to be displayed.
- switch S2 is used for the self test.
- switch S1 is current not used.
- 0 = switch is "Off", 1 = switch is "On"

D2 thru D9:   diagnostic LEDs located on the processor board. Lit LEDs indicate that one of the flags listed below D2 thru D9 on the above chart are read as active.

Example: if all switches are off, D4 & D6 are turned on, then nudging and main fire service flags are on.

K.3   VOLUME CONTROL

The trimpots R32 and R33 adjust the main and alternate volume. The main volume adjustment (R32) controls the floor announcements (such as "First Floor"). The alternate volume (R33) controls all other announcements (such as "going up").   Turning either trimpot fully counterclockwise gives maximum volume. The adjustments are easily made with diagnostics switch S2-ON. This will activate the messages and allow the time necessary to adjust volume. These two trimpots do not affect any music volume that may be connected on J8. Music volume is set external of this unit.

K.4   TROUBLESHOOTING

If there are no audio messages, then:
* The speaker may not be connected on J9.
* The +/-15V supply on connector J7 may not be present.
* Relay U39 may be defective.
* U38 (audio power op-amp) may be defective.
* U5 (program EPROM), U7 or U8 (digitized voice EPROM) may be defective.
* A volume control trimpot may be defective or turned fully clockwise.

If the message, "Please allow the doors to close" is heard when nudging:
* The photo eye used to detect objects in the door path may be blocked.
* The photo eye may be dirty, or defective.

K.5   PERIPHERAL EQUIPMENT

Square recessed mount 6 1/4" by 6 1/4" by 4 1/4" deep (manufacturer Model # 198-4).
Square surface mount 7" by 7" by 4 1/4" deep (manufacturer Model # SE 198-4).
Circular recessed mount 6 1/8" by 4 1/4" deep without lip (manufacturer Model # 94-4).
7" round by 4 1/4" deep (including lip).
7 3/8" in diameter with circular grill.

FIGURE K.3   Speaker Dimensions
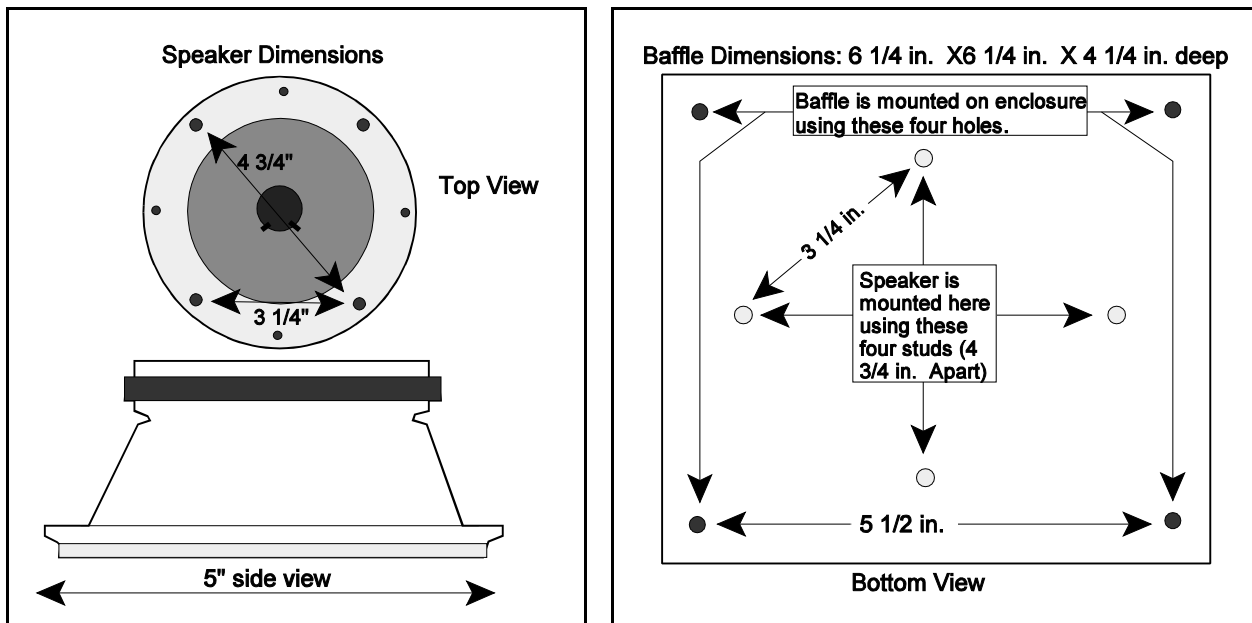
APPENDIX L
CRT TERMINAL AND TERMINAL EMULATOR SETUP

L.1 GENERAL

Refer to Figure 6.14 MC-MRS and MC-ARS Board Quick Reference for information on connecting the CRT terminal or terminal emulator and proper jumper settings. This appendix contains setup information for the controller COM ports and for the following terminals and terminal emulators:

L.1.1 CONTROLLER COM PORT SETTINGS

The communication ports were programmed at the factory for the original hardware, based on customer-provided information. Changing a communication port setting may be necessary if you are:

- Changing from a monochrome to a color CRT terminal or terminal emulator
- Adding a lobby CRT or CRT with keyboard
- Adding a modem, line driver, or serial cable
- Adding a PC (for CMS or MSD software or graphic display)

Refer to Tables L.2 and L.3 to determine the correct Media and Device setting for the communication port being used.

To program a communication port:

1. Set all Swing Panel switches to the down (off) position.

2. Raise the F7 switch on the Swing Panel. "PASSWORD" is displayed.

3. Press and hold *S* until "SYSTEM" is displayed.

4. Raise the F1 switch (F2 if Group controller).

5. Press *S* to enter the COM port menu (Table L.1).
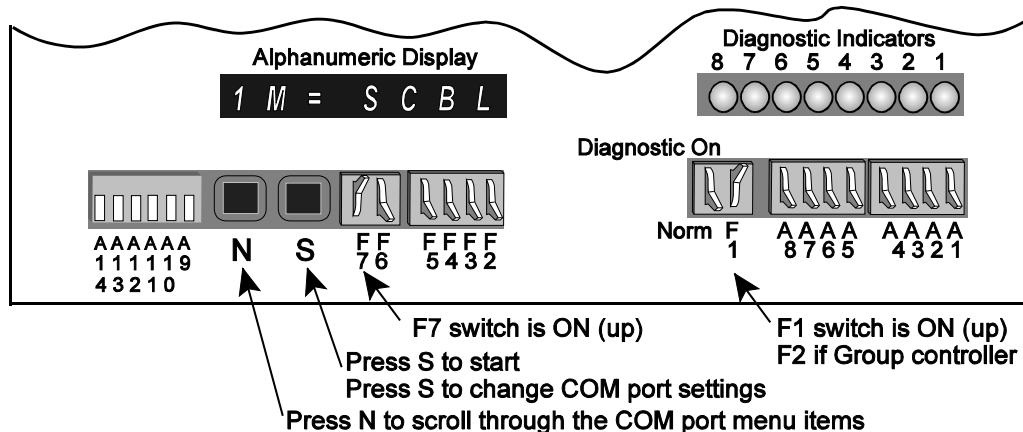
6. Press **N** to scroll and select the desired COM port (1 to 4) and media (M) or device (D).

7. Press **S** to change the media (Table L.2) or device (Table L.3) setting

    or

    press **N** to view the next COM port.

8. When "SAVE" is displayed:

    Press **S** to Save the COM port parameters.

    Press **N** to loop back to COM port 1.

9. To exit, place the Swing Panel switches in the down (off) position.

Media

```
1M : SCBL
```

COM port 1   Serial Cable

COM port 1   Device

```
1D : CRTMK
```

Device setting, see Table P.3
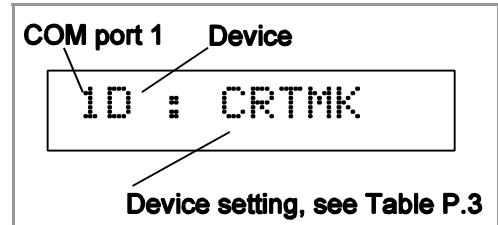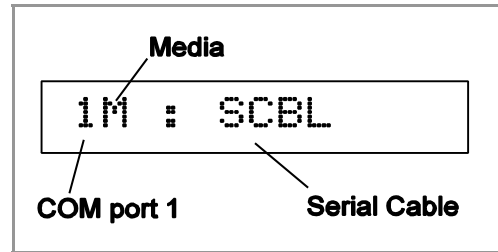
TABLE L.1   Communication Port Menu

EOD Display	Description
NO COM	No COM port option has been enabled
1M	COM Port 1 Media
1D	COM Port 1 Device
2M	COM Port 2 Media
2D	COM Port 2 Device
3M	COM Port 3 Media
3D	COM Port 3 Device
4M	COM Port 4 Media
4D	COM Port 4 Device
SAVE?N/S	Save the changes? N for no or continue, S for save

TABLE L.2   COM Port Media Selections

EOD DISPLAY	DESCRIPTION
NONE	No Media - the port is not being used
SCBL	Serial Cable - direct connection to a CRT terminal or terminal emulator
LDRV	Line Driver - connection to a CRT terminal or terminal emulator at a distance of over 40 feet using a line driver
MODM	Modem - phone line connection to a Personal Computer using modems

TABLE L.3   COM Port Device Selections

EOD DISPLAY	DESCRIPTION
NONE	No Device - the port is not being used
CRTMK	Use for these terminals or emulators with keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
CRTM	Use for these terminals or emulators without keyboard (Link MC5, Wyse WY-325ES, Esprit 250C Emulator or ADDS 260LF Emulator)
PC	Use for Personal Computer with CMS / MSD
PCGD	Personal Computer Graphic Display (no longer used)
CRTCK	Use for these terminals with keyboard (Link MC-70, Wyse WY-370)
CRTC	Use for these terminals without keyboard (Link MC-70, Wyse WY-370)

L.2 ESPRIT 250C TERMINAL EMULATOR SETUP

The ESPRIT 250C terminal emulator, along with a standard monitor and keyboard, is used in place of a traditional terminal.

L.2.1 CONTROLLER COM PORT SETTING (ESPRIT 250C)

Swing Panel Controller - Refer to Section L.1.1 *Controller COM Port* Settings, or to *Programming the Communication Ports* in Section 5 of the Car Controller manual (Section 4 of the Group Supervisor manual) for instructions on viewing and changing the controller Communication Port settings. For the ESPRIT 250C Emulator the COM port *Device* option must be set to *CRTMK*.

PTC / PHC Controller - Refer to *Peripheral Device* in Section 5.4.9 Extra Features Menu Options for instructions on changing the controller Communication Port settings. For the ESPRIT 250C Emulator the *COLOR CRT* option must be set to *NO*.

L.2.2 ESPRIT 250C TERMINAL EMULATOR CONNECTIONS
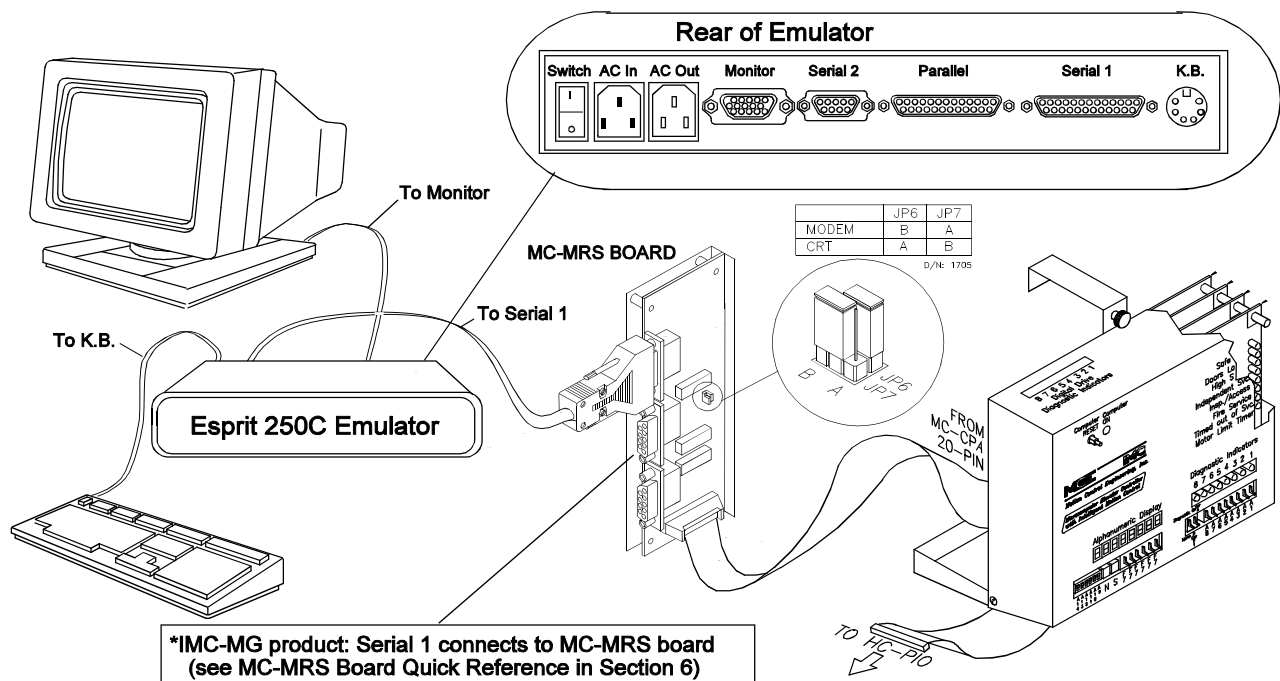
- Connect the monitor's signal cable to the Monitor jack (DB-15) on the rear of the emulator.

- Connect the keyboard cable to the K.B. jack (Din) on the rear of the emulator.

- Connect the controller's communication interface board (MC-MRS) to the Serial 1 jack (DB-25) on the rear of the emulator using a C-CRT/MRS-x cable (x = length in feet).

- If the emulator is connected directly to the communication interface board, set JP6 to A and JP7 to B. If the emulator is connected to the communication interface board through a modem or line driver, set JP6 to B and JP7 to A.

- Connect the printer, if applicable, to the Parallel jack (DB-25) on the rear of the emulator.

- Connect AC In jack on the rear of the emulator to the Group controller's AC outlet using the cord supplied with the emulator.

L.2.3   ESPRIT 250C TERMINAL EMULATOR SETUP

The Esprit 250C Emulator has certain parameters which must be configured properly in order to function with MCE controllers. Disconnect the emulator from the controller while setting these parameters. In order to examine and/or modify these parameters, enter the Emulator setup mode. Press and hold the *Alt* key while pressing the *Esc* key.

TABLE 1   Setup Mode Keyboard Commands

KEY	COMMAND FUNCTION
Arrow Keys	Used to select an item on the menu.
Space Bar	Press the space bar to change the setting

Step 1   With the emulator disconnected from the controller, hold down *Alt* and press *Esc* to put the terminal into Setup mode. The Esc key is in the upper left corner of the keyboard.

Step 2   From the Setup menu press *Shift+Esc* to default all parameters.

ESPRIT 250C Setup: Setup Menu

Setup									Save?		
(F1-F11 selects menu; Shift+ESC sets defaults)									(SPACE toggles)		
									No		
F1 Disp	F2 Genrl	F3 Keybd	F4 Comm	F5 Misc	F6 Tabs	F7 Fkeys	F8 Ansbk		F10 Colr1	F11 Colr2	F12 Exit
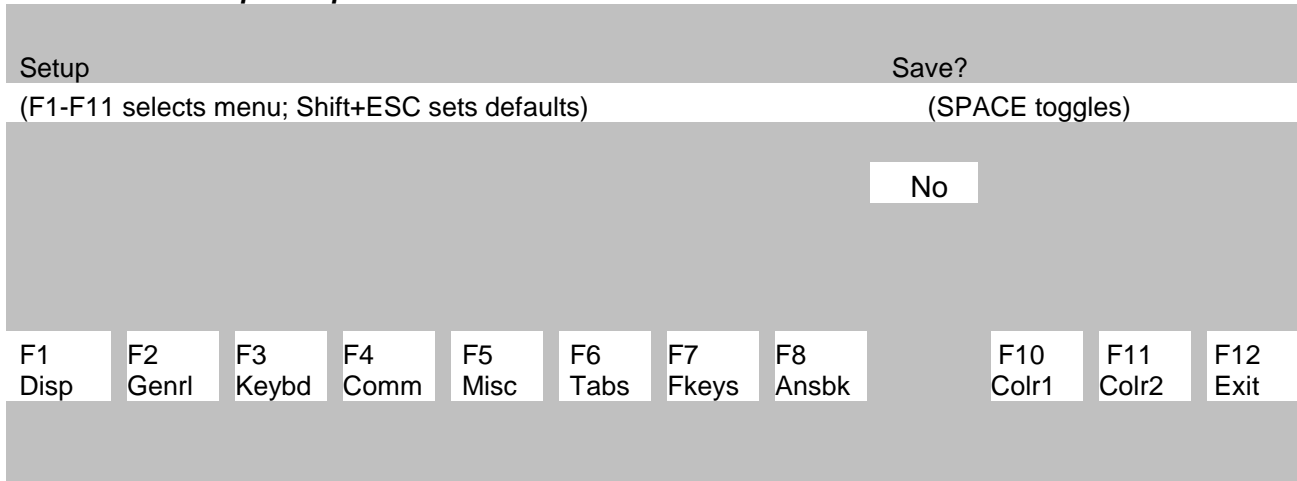
Step 3 From the Setup menu press **F2** to enter the General Menu. Use the **Arrow keys** to highlight **Enhance** and press the *Spacebar* to change the option to **Off**. Use the **Arrow keys** to highlight **Autoscrl** and press the *Spacebar* to change the option to **Off** .

Step 4 Use the **Arrow keys** to highlight **End of Line Wrap** and press the *Spacebar* to change the option to **On**.

ESPRIT 250C Setup: F2 General Menu

Change: Use ARROWS and SPACE

Personality = WY 120/WY 60	Enhance = Off	Status Line = Standard
Scrl = Jump	Autoscrl = Off	End of Line Wrap = On
Rcv CR = CR	Monitor = Off	Attribute = Char

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 5 Press **F1** to enter the Display Menu. Use the **Arrow keys** to highlight **Lines** and press the *Spacebar* to change the option to **42**. Use the **Arrow keys** and **Spacebar** to set **Cursor = Blink**, **Scrn Saver = Off** and **Width Change Clear = On**.

ESPRIT 250C Setup: F1 Display Menu

Change: Use ARROWS and SPACE

Columns = 80	Cursor = Blink Line	Scrn Saver = Off
Lines = 42	Display = Dark	Page Length = 1 * Lines
Auto Page = Off	Width Change Clear = On	ANSI Reverse = Off
Display = CRT		

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 6   Press **F3** to enter the Keybd Menu. Use the **Arrow keys** and *Spacebar* to set **Margin Bell = Off** and **Bell Volume = 1**.

ESPRIT 250C Setup: F3 Keybd Menu

Change: Use ARROWS and SPACE

Keyclick = On	Key Repeate = 5	Xmt Limit = None
Margin Bell = Off	Language = US	Keycode = ASCII
NRC = Off	Bell Volume = 1	NUM Start = Off
DEL Keypad = Dot/Del	Keyboard Installed = EPC	

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 7   Press **F4** to enter the COMM Menu. Use the **Arrow keys** and *Spacebar* to set **Baud Rate = 19200** and **Printer = Off**.

ESPRIT 250C Setup: F4 COMM Menu

Change: Use ARROWS and SPACE

Baud Rate = 19200	Data/Stop Bits = 8/1	Parity = None
Rcv Hndshk = Xon/Xoff	Xmt Hndshake = Xon/Xoff	Comm Mode = FDX
XPC Hndshake = Off	Printer = Off	

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

NOTE: If a line driver is used between the controller and the terminal emulator, set **Baud Rate = 9600**.

Step 8   Press **F10** to enter the Colr1 Menu. Use the **Arrow keys** and *Spacebar* to change colors for best viewing. The recommended colors are:

Normal = Light Blue   Blink = Light Green   Rev. = Yellow   Dim = White

ESPRIT 250C Setup: F10 Colr1 Menu

Change: Use Arrows, Space for Forground, Shift+Space for Background colors

Normal		Dim	
Normal =	Light Blue	Dim =	White
Blank =	White	Blank =	White
Blink =	Light Green	Blink =	White
Blink Blank =	White	Blink Blank =	White
Rev. =	Yellow	Rev. =	White
Rev. Blank =	White	Rev. Blank =	White
Rev. Blink =	White	Rev. Blink =	White
Rev. Blink Blank =	White	Rev. Blink Blank =	White
Undl. =	White	Undl. =	White
Undl. Blank =	White	Undl. Blank =	White
Undl. Blink =	White	Undl. Blink =	White
Undl. Blink Blank =	White	Undl. Blink Blank =	White
Undl. Rev. =	White	Undl. Rev. =	White
Undl. Rev. Blank =	White	Undl. Rev. Blank =	White
Undl. Rev. Blink =	White	Undl. Rev. Blink =	White
Undl. Rev. Blink Blank =	White	Undl. Rev. Blink Blank =	White

F1 Disp	F2 Genrl	F3 Keybd	F4 Comm	F5 Misc	F6 Tabs	F7 Fkeys	F8 Ansbk	F10 Colr1	F11 Colr2	F12 Exit

Step 9   Press **F11** to enter the Colr2 Menu. Use the **Arrow keys** and *Spacebar* to set **Cursor = BLACK** and **Color Association = On**.

ESPRIT 250C Setup: F11 Colr2 Menu

Change: Use ARROWS and SPACE

Sample

Background = BLACK	Cursor = BLACK	Color Mode = Normal
Normal F.G. = GREEN	Intensity F.G. = GRAY	Color Map = Reverse
Normal B.G. = BLACK	Intensity B.G. = BLACK	Color Association = On
Border Color = BLACK	Attribute = Bold	

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 10   Press **F12** to return to the Setup menu and press the *Spacebar* to change **Save** to **Yes**. Press **F12** to save the parameters and exit the Setup Menu.

L.2.4   PARALLEL PRINTER SETUP (ESPRIT 250C)

Printers are typically used to create a hard copy of system parameters, controller screens, or simple reports. MCE currently supports two Epson dot-matrix printers (Epson FX 85 and Epson LQ 570) and their equivalents. For nicer looking reports with the printer of your choice, MCE recommends using a PC connected to the controller. Central Monitoring System software or WYSE emulation software may be used to print screens from the PC. Contact the sales department at Motion Control Engineering for further information.

NOTE: The ESPRIT 250C emulator is set up by default with the printer option turned off. A serial interface card on the printer is not required with this emulator. Display screens wider than 80 columns will not be formatted properly. This model of emulator supports any IBM PC compatible printer.

Step 1 Press **F4** to enter the COMM Menu. Use the **Arrow keys** and *Spacebar* to set **Printer = Parallel**.

ESPRIT 250C Setup: F4 COMM Menu

Change: Use ARROWS and SPACE

Baud Rate = 19200	Data/Stop Bits = 8/1	Parity = None
Rcv Hndshk = Xon/Xoff	Xmt Hndshake = Xon/Xoff	Comm Mode = FDX
XPC Hndshake = Off	Printer = Parallel	

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 2 Press **F7** to enter the Fkeys Menu (Figure 9). Press **Ctrl + Print Scrn** (press and hold the Ctrl key, then press the Print Scrn key). To edit **Print =**, press the keys shown in **bold** in the following order:

Ctrl + [then **Shift + P** then **Ctrl + M** then **Ctrl + J**

The text should look as shown next to **Print =** in Figure 9. Press the **Enter** key on the *numeric* keypad to set **Unshifted Direction = Local**.

Step 3 Press the **down Arrow** key and repeat Step 2 to set **sPrint =** and **Shifted Direction = Local**.

Press **F12** to return to the Setup menu and press the *Spacebar* to change **Save** to **Yes**. Press **F12** to save the parameters and exit the Setup Menu.

ESPRIT 250C Setup: F7 Fkeys Menu

Change: Use ARROWS and SPACE

Unshifted Direction = Local	Shifted Direction = Local	
Print =	▒P⌐R└F	
sPrint =	▒P⌐R└F	

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Misc | F6 Tabs | F7 Fkeys | F8 Ansbk | | F10 Colr1 | F11 Colr2 | F12 Exit |

Step 4   Verify that the emulator is connected to the MCE controller through the rear port labeled SERIAL 1.

Step 5   Verify that the printer's DIP switches are set correctly (refer to Table below).

Parallel Printer DIP Switch Settings

PRINTER	EPSON FX 85		EPSON LQ 570	
SETTING	ON	OFF	ON	OFF
DIP SW1	6, 7, 8	1, 2, 3, 4, 5	1, 2, 3, 4	5, 6, 7, 8
DIP SW2	1	2, 3, 4		1, 2, 3, 4

Step 6   Connect the 25-pin male DB connector end of the parallel printer cable into the PARALLEL port located in the rear of the emulator. Connect other end of the parallel printer cable into the Centronics connector in the rear of the printer. Use the clips on the connector to secure the cable.

Step 7   Feed the paper through the paper guide and line up the perforation with the top of the print head. Refer to the printer manual for operation and proper care of the printer.

Step 8   Plug the printer into a 120VAC outlet and turn on power to both the emulator and printer.

L.2.5   PRINTING SCREENS WITH THE ESPRIT 250C TERMINAL

To print the screen being viewed follow the steps below.

Step 1   Verify printer is connected to the CRT.

Step 2   Turn on the power to the printer and load it with paper.

Step 3   Press the Print Screen key on the keyboard.

L.3 ADDS 260LF TERMINAL EMULATOR SETUP

The ADDS 260LF terminal emulator, along with a standard monitor and keyboard, is used in place of a traditional terminal.

L.3.1 CONTROLLER COM PORT SETTINGS (ADDS 260LF)

Swing Panel Controller - Refer to Section L.1.1 *Controller COM Port Settings*, or to *Programming the Communication Ports* in Section 5 of the Car Controller manual (Section 4 of the Group Supervisor manual) for instructions on viewing and changing the controller Communication Port settings. For the ADDS 260LF Emulator, the COM port *Device* option must be set to *CRTMK*.

PTC / PHC Controller - Refer to *Peripheral Device* in Section 5.4.9 Extra Features Menu Options for instructions on changing the controller Communication Port settings. For the ADDS 260LF Emulator, the *COLOR CRT* option must be set to *NO*.

L.3.2 ADDS 260LF TERMINAL EMULATOR CONNECTIONS

	JP6	JP7
MODEM	B	A
CRT	A	B

D/N: 1705

* IMC-MG product: EIA 25 pin connects to MC-MRS board (see MC-MRS Board Quick Reference in Section 6)
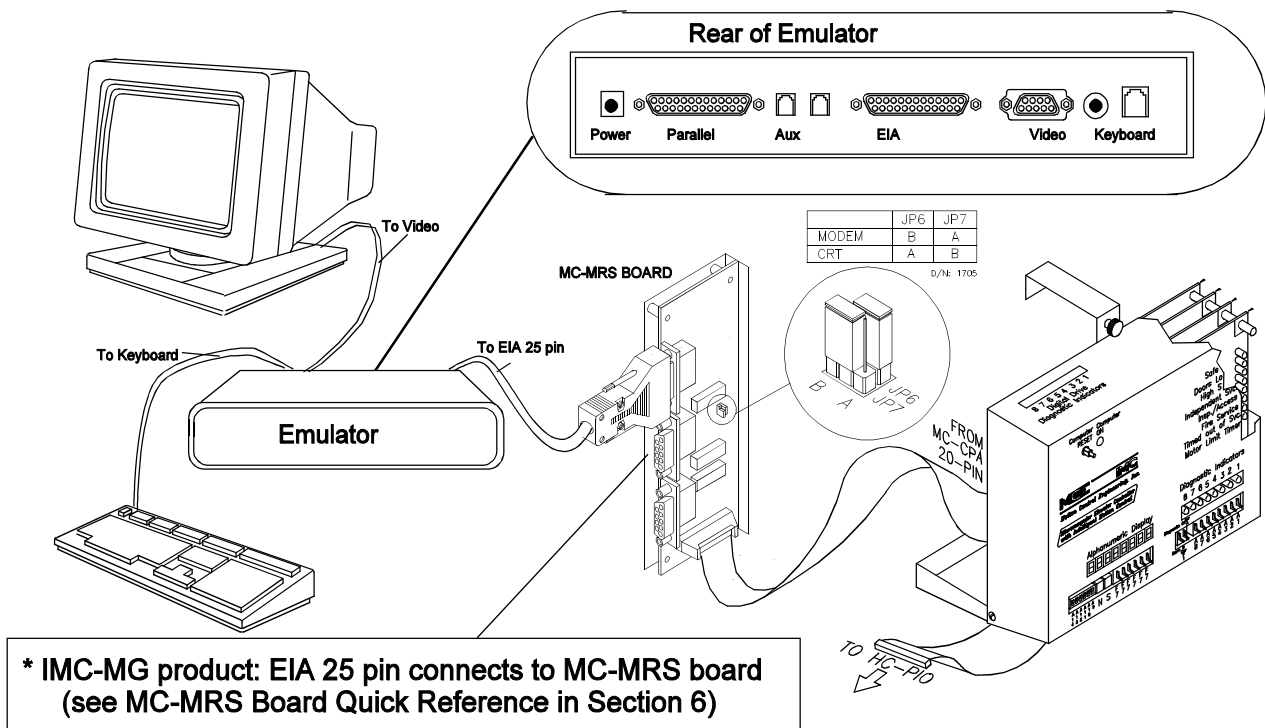
- Connect the monitor's signal cable to the Video jack (DB-15) on the rear of the emulator.

- Connect the keyboard cable to the Keyboard jack on the rear of the emulator.

- Connect the controller's communication interface board (MC-MRS) to the EIA jack (DB-25) on the rear of the emulator using a C-CRT/MRS-x cable (x = length in feet).

- If the emulator is connected directly to the communication interface board, set JP6 to A and JP7 to B. If the emulator is connected to the communication interface board through a modem or line driver, set JP6 to B and JP7 to A.

- Connect the printer, if applicable, to the Parallel jack (DB-25) on the rear of the emulator.

- Connect Power jack on the rear of the emulator to the Group controller's AC outlet using the cord supplied with the emulator.

L.3.3 ADDS 260LF TERMINAL EMULATOR SETUP

Step 1   Disconnect the cable connecting the emulator to the elevator communication board.

Step 2   Hold down the *Ctrl key* and press *Scroll Lock* to enter the setup mode. The F1 Screen comes up automatically.

Step 3   Press the *Print Screen* key to access the Print Exec Screen.

Step 4   Using the right arrow key, move the cursor right to highlight Default Terminal. Press *Enter*.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	**Print Exec**
Parameters												
Save Terminal				Recall Terminal				Default Terminal				
Save Session				Recall Session				Default Session				
Reset Terminal				Rest Session				Reset Ports				
Clear Screen				Default Session UDKs								
Choices												
Use Enter Key To Execute Action												
Select												
← ↑ → ↓ : Parameter				Enter/S-Enter : Next/Prev Choice				Exit : Esc Key				

The terminal will default with all required settings for a serial connection to MCE controllers. After the unit has been defaulted, cursor position is highlighted, default choices are in bold. Verify the following parameters, press the *Pause/Break* key to save the settings.

Step 5   Press the *F1 key*. On the **F1 Quick** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec
Parameters												
Emulation = Wyse-60				EIA Baud Rate = 19200				EIA Data Format = 8/1/N				
Enhanced = Off				Aux Baud Rate = 9600				Aux Data Format = 8/1/N				
Comm Mode = Full Duplex				Language = U.S.				Sessions = One				
Host/Printer = EIA/None(SEE NOTE)												
Choices												
ADDS-VP	**Wyse-60**		Wyse-325		Wyse-50+		Wyse-350		PC-Term		TVI-925	
VT-300-7	VT-300-8		Intecolor		VT-200-7		VT-200-8		VT-100		SCO Console	
AT386												
Select												
← ↑ → ↓ : Parameter				Enter/S-Enter : Next/Prev Choice				Exit : Esc Key				

NOTE: Set Host/Printer to EIA/Para only if you are connecting a parallel printer. If not, set Host Printer to EIA/None. With no printer connected, the EIA/Para setting may cause your emulator to generate an error (TRANSMIT CONDITION PARALLEL PRINTER NO PRINTER) and be unable to communicate with the Controller.

NOTE: If a line driver is used between the controller and the terminal emulator, set the baud rate to 9600.

Step 6 On the **F2 Genrl** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Emulation = Wyse-60	Enhanced = Off	Auto Wrap = On
Auto Font Load = On	Auto Page = Off	Curs Dir = Left to Right
Auto Scroll = On	Monitor Mode = Off	Screen Saver = Off
Bell Volume = 03	Warning Bell = On	Bell Length = 140 ms
Sessions = One		

Choices

ADDS-VP	Wyse-60	Wyse-325	Wyse-50+	Wyse-350	PC-Term	TVI-925
VT-300-7	VT-300-8	Intecolor	VT-200-7	VT-200-8	VT-100	SCO Console
AT386						

Select

← ↑ → ↓ : Parameter   Enter/S-Enter : Next/Prev Choice   Exit : Esc Key

NOTE: The Screen Saver function will only blank the screen after the specified time set if the emulator loses communication with the controller. Therefore, turn off the VGA monitor (and only the VGA monitor) when not in use. Screen Saver settings are Off, 2, 5,15 and 30 min.

Step 7 On the **F3 Displ** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Display Cursor = Off	Cursor = Blink Block	Auto Adjust Cursor = Off
Page Length = 42	Screen Length = 44 Lines	Screen Video = Normal
Columns = 80	Scroll = Jump	Width Change Clear = On
Speed = Fast	Palette Number = Soft 1	

Choices

Off   ON

Select

← ↑ → ↓ : Parameter   Enter/S-Enter : Next/Prev Choice   Exit : Esc Key

Step 8   On the **F4 Kybd** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Language = U.S.	Char Set = Multinational	Code Page = CP 437
Key Mode = ASCII	Keyclick = On	Key Repeat = On
Key Rate = 20 cps	Margin Bell = Off	Key Lock = Caps
Caps Lock = Toggle	Num Lock = Toggle	

Choices

U.S.	U.K.	Danish	Finnish	French	German	Norwegian
Portuguese	Spanish	Swedish	Dutch	Belgian-Flemsh	Fr-Canadian	Italian
Latin-American	Swiss-German	Swiss-French				

Select

← ↑ → ↓ : Parameter   Enter/S-Enter : Next/Prev Choice   Exit : Esc Key

---

Step 9   On the **F5 Keys** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	**F5** **Keys**	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameter

Enter Key = < CR >	Return Key = < CR >	Backspace = < BS > / < DEL >
Alt Key = Funct	Disconnect = Pause	Desk Acc = Ctrl←
Pound Key = U.S.	Return Key Repeat = Off	UDKs = User Dependent

Choices

< CR >   < CR > < LF >   < TAB >

Select

← ↑ → ↓ : Parameter   Enter/S-Enter : Next/Prev Choice   Exit : Esc Key

---

Step 10   On the **F6 Ports** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	**F6** **Ports**	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

EIA Baud Rate = 19200	EIA Data Format = 8/1/N	EIA Parity Check = Off
Aux Baud Rate = 9600	Aux Data Format = 8/1/N	Aux Parity Check = Off
EIA Xmt = No Protocol	EIA Recv = Xany - Xoff (XPC)	EIA Xmt Pace = Baud
Aux Xmt = Xon - Xoff	Aux Recv = No Protocol	Aux Xmt Pace = Baud

Choices

110	150	300	600	1200	1800	2000	2400	4800	9600
19200	38400	57600	76800	115200					

Select

← ↑ → ↓ : Parameter   Enter/S-Enter : Next/Prev Choice   Exit : Esc Key

Step 11 On the **F7 Host** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	**F7 Host**	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Comm Mode = Full Duplex	Local = Off	Null Suppress = On
Break = 250 ms	Modem Control = Off	Disconnect = 2 sec
Recv < CR > = < CR >	Recv < DEL > = Ignore	Send ACK = On
Alt Input Data = Off	Send Line Term = < US >	Send Block Term = < CR >

Choices

Full Duplex　　　Half Duplex　　　Full Block　　　Half Block

Select

← ↑ → ↓ : Parameter　　　Enter/S-Enter : Next/Prev Choice　　　Exit : Esc Key

---

Step 12 On the **F8 Print** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	**F8 Print**	F9 Emul	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Prnt Line Term = < CR > < LF >	Prnt Block Term = < CR >	Secondary Recv = Off

Choices

< US >　　　**< CR > < LF >**

Select

← ↑ → ↓ : Parameter　　　Enter/S-Enter : Next/Prev Choice　　　Exit : Esc Key

---

Step 13 On the **F9 Emul** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	**F9 Emul**	F10 Tabs	F11 AnsBk	F12 Prog	Print Exec

Parameters

Attribute = Character	Page Edit = Off	WPRT Intensity = Normal
WPRT Reverse = Off	WPRT Underline = Off	WPRT Blink = Off
Display NV Labels = Off	Save Labels = On	Char Set = Multinational
Status Lines = Extended	Fkey Speed = Normal	WP-Graphics = On

Choices

Character　　　Line　　　Page

Select

← ↑ → ↓ : Parameter　　　Enter/S-Enter : Next/Prev Choice　　　Exit : Esc Key

Step 14   On the **F10 Tabs** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	**F10 Tabs**	F11 AnsBk	F12 Prog	Print Exec

Parameters

Auto Init Tabs = Off   Default Tabs

```
        10          20          30          40          50          60
         ▼           ▼           ▼           ▼           ▼           ▼
.................................................................................


.................................................................................
   ▲           ▲           ▲           ▲           ▲           ▲           ▲
   70          80          90         100         110         120         130
```

Choices

Off   On

Select

← ↑ → ↓ : Parameter | Enter/S-Enter : Next/Prev Choice | Exit : Esc Key

---

Step 15   On the **F11 AnsBk** Menu verify the following Parameters.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	**F11 AnsBk**	F12 Prog	Print Exec

Parameters

Answerback Mode = Off   Answerback Conceal

Answerback Message:

Bytes Remaining : 0542

Choices

Off   On

Select

← ↑ → ↓ : Parameter | Enter/S-Enter : Next/Prev Choice | Exit : Esc Key

Step 16 On the **F12 Prog** Menu verify the following Parameters.

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	**F12**	Print
Quick	Genrl	Displ	Kybd	Keys	Ports	Host	Print	Emul	Tabs	AnsBk	**Prog**	Exec

<table>
<tr><td colspan="13" align="center">Parameters</td></tr>
<tr><td colspan="4">Key = F1</td><td colspan="5">Program = F Key</td><td colspan="4">Key Dir = Host</td></tr>
<tr><td colspan="13">Text:</td></tr>
<tr><td colspan="13"></td></tr>
<tr><td colspan="13"></td></tr>
<tr><td colspan="13"></td></tr>
<tr><td colspan="8">Label:</td><td colspan="5">Bytes Remaining : 0542</td></tr>
</table>

				Choices								
F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13 F14 F15 F16

Select		
← ↑ → ↓ : Parameter	Enter/S-Enter : Next/Prev Choice	Exit : Esc Key

Step 17 If you are not setting up a modem, but are setting up a parallel printer, go to step 21. If you are setting up a modem, continue to step 18. Otherwise, press *Esc* then *Y* to save.

Step 18 If you are setting up a modem, change the following highlighted settings when connecting with a modem.
         F6 Ports   *EIA Xmt = Xon - Xoff*
                          EIA Recv = No Protocol

F1	F2	F3	F4	F5	**F6**	F7	F8	F9	F10	F11	F12	Print
Quick	Genrl	Displ	Kybd	Keys	**Ports**	Host	Print	Emul	Tabs	AnsBk	Prog	Exec

Parameters		
EIA Baud Rate = 19200	EIA Data Format = 8/1/N	EIA Parity Check = Off
Aux Baud Rate = 9600	Aux Data Format = 8/1/N	Aux Parity Check = Off
EIA Xmt = Xon - Xoff	**EIA Recv = No Protocol**	EIA Xmt Pace = Baud
Aux Xmt = Xon - Xoff	Aux Recv = No Protocol	Aux Xmt Pace = Baud

Step 19 Change the following parameters when using line drivers, set EIA Baud Rate to 9600.

F1	F2	F3	F4	F5	**F6**	F7	F8	F9	F10	F11	F12	Print
Quick	Genrl	Displ	Kybd	Keys	**Ports**	Host	Print	Emul	Tabs	AnsBk	Prog	Exec

Parameters		
EIA Baud Rate = 9600	EIA Data Format = 8/1/N	EIA Parity Check = Off
Aux Baud Rate = 9600	Aux Data Format = 8/1/N	Aux Parity Check = Off
EIA Xmt = No Protocol	EIA Recv = Xon - Xoff (XPC)	EIA Xmt Pace = Baud
Aux Xmt = Xon - Xoff	Aux Recv = No Protocol	Aux Xmt Pace = Baud

Step 20   If you are connecting a parallel printer go to Step 21. If you are not connecting a parallel printer, press the **Esc** Key, then press **Y** to save.

Step 21   Follow these instructions to connect a parallel printer. Go to the **F12 Prog** screen.

F1 Quick	F2 Genrl	F3 Displ	F4 Kybd	F5 Keys	F6 Ports	F7 Host	F8 Print	F9 Emul	F10 Tabs	F11 AnsBk	**F12 Prog**	Print Exec

Parameters

Key = F1   Program = F Key   Key Dir = Host

Text:

Label: Bytes Remaining : 0542

Choices

F1   F2   F3   F4   F5   F6   F7   F8   F9   F10   F11   F12

Select

← ↑ → ↓ : Parameter | Enter/S-Enter : Next/Prev Choice | Exit : Esc Key

On the **F12 Prog** screen, you can assign special programming to different keys. All data that is sent to the printer with a Print Screen function will format in a basic 80-column mode. Print screen features will not print screens wider than 80 columns without offsetting the format, making the page difficult to read. Basic formatting also does not print the last 3 to 4 lines of information that is on the screen. To improve the print function the following steps can be taken.

Step 1   Cursor right one position until the *Program = F Key* is highlighted.

Step 2   Press the **Spacebar** four times to change to *=Edit Key*.

Step 3   Cursor **Left** one position until *Key = TAB* is highlighted.

Step 4   Hold down the **Shift** key and press the **Spacebar** twice change to *=Print*.

Step 5   Cursor down one time to the *Text* edit area. Press the **Shift +Backspace** key to delete any text or characters before entering the following.

Step 6   Type the following keys in the exact order as shown. Keys indicated with a "+" require holding the first key listed and pressing the second one.

Ctrl+[Shift+P   Ctrl+M   Ctrl+J

the text entered will look similar to this: ▌P ⌐R ⌐F

Step 7   Cursor up once. Cursor Right twice to highlight *Key Dir*, if not set to *=All*, hold down the **Shift** key and press the **Spacebar** to change to *=All*.

Step 8   Change the Host/Printer option on the F1 screen to EIA/Para.

Step 9   Press the **Esc** key and then the letter **Y** to save your changes.

Step 10 Make sure that your F1 screen Host/Printer setting is EIA/Para.

When you are finished configuring your emulator, reconnect the cable between the emulator and the elevator controller.

L.3.4 ADJUSTING PALETTE COLORS

It is a good idea to adjust the colors used by the emulator to display MCE screens on the monitor so that it is easier to see if a flag is ON or OFF when viewing diagnostics.

Step 1   While viewing any of the MCE screens, press and hold the *Ctrl* key and then press the *left arrow*. This brings up a menu for the desktop accessaries.

Step 2   Press *F6* to change the palette colors. Use the *right* and *left arrow* keys to adjust the foreground and background colors. Use the *up* and *down arrow* keys to select the option you want to change colors on.

The color table chart below shows the default colors and the colors MCE recommends for easy viewing. The highlighted MCE Recommended settings are different from the default settings.

Step 3   When finished, press *Esc* to exit the desk accessories.

Changes to these colors must be saved or they will be lost when the unit is powered off. To save your color settings:

Step 4   Disconnect the cable between the emulator and the elevator controller.

Step 5   Press *Ctrl* and *Scroll Lock* to enter setup mode.

Step 6   Press the *Pause/Break* key to save the settings.

Step 7   Reconnect the cable between the emulator and the elevator controller.

Color Table

Attributes	Default Setting Fore/Back	MCE Recommended Fore/Back
Normal	Green / Black	Light Gray / Black
Rev	Black / Green	Light Green **/** Blue
Int	Yellow / Black	Green / Black
Rev, Int	Black / Yellow	Black / Yellow
Und	Light Red / Black	Light Red / Black
Und, Rev	Black / Light Red	Black / Light Red
Und, Int	Light Blue / Black	Light Blue / Black
Und, Rev, Int	Black / Light Blue	Black / Light Blue

L.3.5 TROUBLESHOOTING

If you experience problems using your terminal emulator, please refer to the following table.

| Symptom	Cause	Solution
Keyboard not responding to keys pressed.	Possible locked keyboard	If the upper left corner of the display screen shows the word LOCK use the following keystrokes to unlock the keyboard: Shift+Scroll Lock
Screen displays message: "Transmit condition EIA port XOFF To cancel type (Shift + CTRL + Tab)"	Emulator is connected to controller when attempting to save changes to the setup.	Turn off the emulator and wait 5 seconds. Do not attempt to make changes in the emulator setup while the emulator is connected to the controller. Turn the emulator back on.
Screen displays message "Transmit Condition Parallel Port No Printer."	Printing was attempted with no active printer connected to the emulator.	Enter setup and change the F1 screen, Host/Printer setting to EIA/None if a printer is not being used.

L.4 LINK MC5 MONOCHROME TERMINAL SETUP

If you are using a Link MC5 monochrome terminal to configure the elevator controller, set the terminal up as described in this section.

L.4.1 CONTROLLER COM PORT SETTING (LINK MC5)

Swing Panel Controller - Refer to Section L.1.1 *Controller COM Port* Settings, or to *Programming the Communication Ports* in Section 5 of the Car Controller manual (Section 4 of the Group Supervisor manual) for instructions on viewing and changing the controller Communication Port settings. For the LINK MC5 terminal the COM port *Device* option must be set to *CRTMK* (with keyboard) or *CRTM* (without keyboard).

PTC / PHC Controller - Refer to *Peripheral Device* in Section 5.4.9 Extra Features Menu Options for instructions on changing the controller Communication Port settings. For the LINK MC5 terminal the *COLOR CRT* option must be set to *NO*.

L.4.2 LINK MC5 MONOCHROME TERMINAL CONNECTIONS
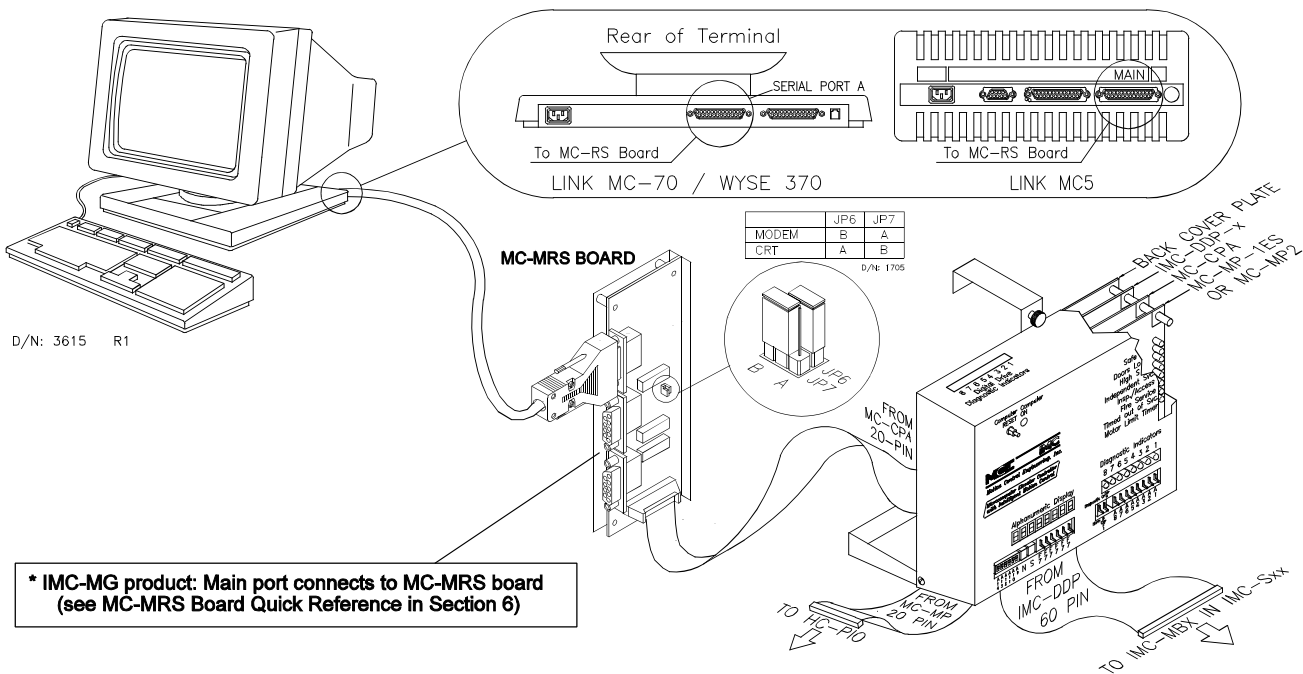
• Connect the DB-25 (25-pin plug) of the signal cable, C-CRT/MRS-x (x = length in feet) into the MAIN jack on the rear of the terminal. Use the screws on the cable hood to secure the cable to the terminal.

• Plug the DB-9 (9-pin plug) of the signal cable into a COM port jack (usually COM 1) on the controller's communication interface board (MC-MRS).

• If the terminal is connected directly to the communication interface board, set JP6 to A and JP7 to B. If the terminal is connected to the communication interface board through a modem or line driver, set JP6 to B and JP7 to A.

• Connect the printer, if applicable, to the Parallel jack (DB-25) on the rear of the terminal.

• Connect the AC jack on the rear of the terminal to the controller's AC outlet using the cord supplied with the terminal.

L.4.3 LINK MC5 TERMINAL SETUP

Setup Mode Keyboard Commands

KEY	COMMAND FUNCTION
⬆ or ⬇	Used to select the operating parameter to be set
⬅ or ➡	Used to change the active setting for the selected operating parameter.
TAB	Moves the highlight cursor to the opposite parameter column.
P	Toggles the communication port between Main and Auxiliary.
D	Restores the default settings.
S	Saves current settings in nonvolatile memory. The settings stored in nonvolatile memory are used at power-up.
R	Restores the most recently saved settings.
E	Exits setup mode.

Step 1   Disconnect the cable connecting the terminal to the elevator controller.

Step 2   Press and hold the *Shift* key while pressing the *Select* key to enter setup mode.

Step 3   With the CRT disconnected from the Controller, press *D* to default the CRT terminal parameters. (You should see the message "Setup Defaulted").

Step 4   Use the *arrow keys* to set the following `highlighted` General Setup parameters:

General Setup Screen

Link MC5	General Setup		Ver. X.XX
Emulation	**Wyse 60**	Auto Page	Off
Enhancements	Off	Warning Bell	Off
Virtual Terminal	Off	Margin Bell	Off
Scroll Style	Jump	Bell Sound	1
Auto Scroll	On	Block Terminator	US/CR
Auto Wrap	On	**Send ACK**	**On**
Received CR	CR	Monitor Mode	Off
	Setup Defaulted		

Step 5 Press the *F2* key to go to the Communications Setup screen.

Step 6 Use the *arrow keys* to set the following ▮highlighted▮ Communications Setup parameters. NOTE: Set Main baud rate to 19200 for everything *except Line Drivers*. For Line Drivers the baud rate should be set to *9600*. If a printer is to be used, set the lighter ▮highlighted▮ parameters.

Communications Setup Screen

Link MC5	Communications Setup	Ver. X.XX	
Main Baud	**19200**	**Aux Baud**	**9600**
Main Data/Parity	8/None	Aux Data/Parity	8/None
Main Stop bits	1	Aux Stop Bits	Off
Main Rcv Hndsk	XON/XOFF	**Aux Rcv Hndsk**	**None**
Main Xmt Hndsk	None	**Aux Xmt Hndsk**	**XON/XOFF**
Main Rcv Level	50%	Aux Rcv Level	50%
Ignore 8th bit	Off	Aux Port	RS232
Comm Mode	Full Duplex	Aux Interface	RS232
Disconnect	2 Sec	**Printer**	**Parallel**

Step 7 Press the *F3* key to go to the Display Setup screen.

Step 8 Use the *arrow keys* to set the following ▮highlighted▮ Display Setup parameters:

Display Setup Screen

Link MC5	Display Setup	Ver. X.XX	
Columns	80	Background	Dark
80/132 Clear	On	Attributes	Char
Lines	**42**	**Wprt Intensity**	**Normal**
Pages	1xLines	Wprt Reverse	Off
Status Line	Ext	Wprt Underline	Off
Cursor Style	**Blink Line**	Refresh Rate	60Hz
Cursor	**Off**	Pound Char	US
Screen Saver	15 Min	Auto Font Load	On

Step 9 Press the *S* key to save the changes.

Step 10 If you are installing a printer. Press *F6* to go to the Function Keys Setup screen to make the print screen key operational.

      10a Press both the *Ctrl* and *Print screen* keys simultaneously to change "sF1=" and "F1=", to "sPRINT=" and "PRINT=."

      10b Use the *numeric keypad Enter* key to toggle "Remote" to "Local."

Function Key Setup Screen

Link MC5	Function Keys Setup		Ver. X.XX
		Direction:	Remote
sF1 =			
F1 =			

Host is on Main	Port	F1 Gen	F6 Fkeys
		F2 Comm	F7 Tabs
CTRL+Key . . Select Key	← . . . . .Erase Char	F3 Disp	F8 Ansbk
arrow keys . . Select Field	HOME/F14 . Erase Field	F4 Kbd	F9 Exit
END/F13 . . . Default Keys	ENTER . . . . .Change Dir	F5 ANSI	

Step 11 Press *F9* to exit the setup mode.

When you are finished configuring your terminal, reconnect the cable between the terminal and the elevator controller.

L.5 WYSE WY-325ES COLOR TERMINAL SETUP

If you are using a Wyse WY-325S color terminal to configure your elevator controller, follow the instructions in this section.

L.5.1 CONTROLLER COM PORT SETTING (WYSE WY-325ES)

Swing Panel Controller - Refer to Section L.1.1 *Controller COM Port* Settings, or to *Programming the Communication Ports* in Section 5 of the Car Controller manual (Section 4 of the Group Supervisor manual) for instructions on viewing and changing the controller Communication Port settings. For the Wyse WY-325ES color terminal the COM port *Device* option <u>must be set to</u> *CRTMK* (with keyboard) or *CRTM* (without keyboard).

PTC / PHC Controller - Refer to **Peripheral Device** in Section 5.4.9 Extra Features Menu Options for instructions on changing the controller Communication Port settings. For the Wyse WY-325ES color terminal the **COLOR CRT** option <u>must be set to</u> **NO**.

L.5.2 WYSE WY-325ES COLOR TERMINAL CONNECTIONS

- Connect the DB-25 (25-pin plug) of the signal cable, C-CRT/MRS-x (x = length in feet) into the SERIAL 1 jack on the rear of the terminal. Use the screws on the cable hood to secure the cable to the terminal.

- Plug the DB-9 (9-pin plug) of the signal cable into a COM port jack (usually COM 1) on the controller's communication interface board (MC-MRS).

- If the terminal is connected directly to the communication interface board, set JP6 to A and JP7 to B. If the terminal is connected to the communication interface board through a modem or line driver, set JP6 to B and JP7 to A.

- Connect the printer, if applicable, to the Parallel jack on the rear of the terminal.

- Connect the AC jack on the rear of the terminal to the controller's AC outlet using the cord supplied with the terminal.

L.5.3 WYSE WY-325ES COLOR TERMINAL SETUP

Step 1 Disconnect the cable between the terminal and the elevator controller before proceeding with setting up the terminal.

Step 2 Press and hold the *Shift* key while pressing the *Select* key to enter setup mode.

> **NOTE:** If the CRT terminal will not enter Setup mode, try powering the terminal ON while holding down the *Select* key until the screen is displayed (about 5 seconds).

Setup Mode Keyboard Commands

KEY	COMMAND FUNCTION
⬆ or ⬇	Used to select an item on the menu.
⬅ or ➡	Used to select items on the Menu Bar (top line).
SPACE BAR	Press the space bar to change the setting.

Step 3   With the CRT disconnected from the Controller, press the *Enter* key to Default all parameters.

Setup Parameters for Wyse WY-325ES CRT Terminal and Printer

Set the following parameters every time.											

Setup   Save?

(F1-F11 selects menu; ENTER sets defaults)   (SPACE toggles)

No

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Disp	Genrl	Keybd	Comm	Attr	Misc	ANSI1	ANSI2	Tabs	Ansbk	Fkeys	Exit

Step 4   Press *F2* to enter the General Menu. Use the *arrow keys* to highlight Personality and press the *Spacebar* to change the option to **"Wyse 60."**

Wyse WY-325ES Setup: F2 General Menu

Change: Use ARROWS and SPACE

Personality = Wyse 60	Enhance = On	Status Line = On
Scrl = Jump	Autoscrl = Off	Wrap EOL = On
Rcv CR = CR	Monitor = Off	Recognize DEL = Off

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Disp	Genrl	Keybd	Comm	Attr	Misc	ANSI1	ANSI2	Tabs	Ansbk	Fkeys	Exit

Step 5   Use the *arrow keys* to highlight Autoscrl and press the *Spacebar* to change the option to "Off."

Step 6 Press *F1* to enter the Display Menu. Use the *arrow keys* to highlight Lines and press the *Spacebar* to change the option to "42." Use the *arrow keys* and the *Spacebar* to change Scrn Saver to "Off" and 80/132 Clr to "On."

Wyse WY-325ES Setup: F1 Display Menu

Change: Use ARROWS and SPACE

Columns = 80	Cursor = Blink Line	Scrn Saver = Off
Lines = 42	Display = Dark	Char Cell = 10 x 16
Page = 1 x Lines	Autopage = Off	80/132 Clr = On

F1 Disp	F2 Genrl	F3 Keybd	F4 Comm	F5 Attr	F6 Misc	F7 ANSI1	F8 ANSI2	F9 Tabs	F10 Ansbk	F11 Fkeys	F12 Exit

Step 7 Press *F4* to enter the COMM Menu. Use the *arrow keys* and *Spacebar* to change Baud Rate to "19200" and Rcv Hndshk to "XON-XOFF/XPC."

Wyse WY-325ES Setup: F4 COMM Menu

Change: Use ARROWS and SPACE

Baud Rate = 19200	Data/Parity = 8/None	Stop Bits = 1
Rcv Hndshk = XON-XOFF/XPC	Rcv Hndshk Level = 192	Xmt Hndshk = None
Comm = FDX	Xmt Lim = None	Host Port = Serial 1

F1 Disp	F2 Genrl	F3 Keybd	F4 Comm	F5 Attr	F6 Misc	F7 ANSI1	F8 ANSI2	F9 Tabs	F10 Ansbk	F11 Fkeys	F12 Exit

Step 8 Press *F5* to enter the Attribute Menu. Use the *arrow keys* and *Spacebar* to change WPRT Intensity to "Normal" and Intensity Attribute to "Off."

Wyse WY-325ES Setup: F5 Attribute Menu

Change: Use ARROWS and SPACE

Color Map = Reverse	Intensity Attribute = Off	Attribute = Char
WPRT Intensity = Normal	WPRT Rev = Off	WPRT Undrln = Off

F1 Disp	F2 Genrl	F3 Keybd	F4 Comm	F5 Attr	F6 Misc	F7 ANSI1	F8 ANSI2	F9 Tabs	F10 Ansbk	F11 Fkeys	F12 Exit

Step 9 Press *F6* to enter the Miscellaneous Menu. Use the *arrow keys* and *Spacebar* to change Multiple Page to "Off."

Wyse WY-325ES Setup: F6 Miscellaneous Menu

Change: Use ARROWS and SPACE

Ptr Baud Rate = 9600	Ptr Data/Parity = 8/None	Ptr Stop Bits = 1
Printer = Parallel	Nulls Suppress = On	Blk End = US/CR
Border Color = {BLACK}	Color Mode = Palette	Multiple Page = Off

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Attr | F6 Misc | F7 ANSI1 | F8 ANSI2 | F9 Tabs | F10 Ansbk | F11 Fkeys | F12 Exit |

Step 10 Press *F7* to enter the ANSI 1 Menu. Use the *arrow keys* and *Spacebar* to change DEL to "BS/DEL."

Wyse WY-325ES Setup: F7 ANSI 1 Menu

Change: Use ARROWS and SPACE

Char Set = Multinational	Char Mode = Multinational	ANSI ID = VT 100
Cursor Keys = Normal	Keypad = Numeric	DEL = BS/DEL
Feature Lock = Off	Fkey Lock = Off	Newline = Off

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Attr | F6 Misc | F7 ANSI1 | F8 ANSI2 | F9 Tabs | F10 Ansbk | F11 Fkeys | F12 Exit |

Step 11 Press *F8* to enter the ANSI 2 Menu. Use the *arrow keys* and *Spacebar* to change Print to "ALL."

Wyse WY-325ES Setup: F8 ANSI 2 Menu

Change: Use ARROWS and SPACE

Print = All	Print Area = Screen	Print Term = None
Send = All	Send Area = Screen	Send Term = None
Xfer Term = EOS	Auto Answerback = Off	Keys = Typewriter

| F1 Disp | F2 Genrl | F3 Keybd | F4 Comm | F5 Attr | F6 Misc | F7 ANSI1 | F8 ANSI2 | F9 Tabs | F10 Ansbk | F11 Fkeys | F12 Exit |

Step 12 Press *F12* to return to the Setup menu and press the *Spacebar* to change the save option to "Yes." Press *F12* to save the parameters and exit the Setup Menu.

The Wyse WY-325ES CRT has 10 color palettes numbered 0 to 9. To change the screen colors, hold down the *CTRL* key and press *(a number)* on the numeric keypad. The recommended color palette is *9*. Other palettes that work well are 1, 2, 3 and 8.

When you are finished configuring your terminal, reconnect the cable between the terminal and the elevator controller.

L.5.4 PRINTER SETUP

Printers are typically used to print a hard copy of system parameters, controller screens, or reports. MCE currently supports two Epson dot-matrix printers (Epson FX 85 and Epson LQ 570) and their equivalents. For nicer looking reports with the printer of your choice, MCE recommends using a PC connected to the controller. Central Monitoring System software or WYSE emulation software may be used to print screens from the PC. Contact the sales department at Motion Control Engineering for further information.

Step 1 Verify that the CRT terminal is connected to the MCE controller through the rear port labeled MAIN.

Step 2 Set the printer DIP switches as shown:

Parallel Printer DIP Switch Settings

PRINTER	EPSON FX 85		EPSON LQ 570	
SETTING	ON	OFF	ON	OFF
DIP SW1	6, 7, 8	1, 2, 3, 4, 5	1, 2, 3, 4	5, 6, 7, 8
DIP SW2	1	2, 3, 4		1, 2, 3, 4

Step 3 Connect the 25-pin male DB connector end of the parallel printer cable to the PARALLEL port on the back of the CRT terminal. Connect the other end of the parallel printer cable to the printer. Lock the clips on the connectors to secure the cable.

- Feed the paper through the paper guide and line up the perforation with the top of the print head. Refer to the printer manual for operation and proper care of the printer.

- Plug the printer into a 120VAC outlet and turn on power to both the CRT terminal and printer.

L.5.5 PRINTING SCREENS

After the printer is connected to the CRT, powered ON, and paper has been loaded, screen data may be printed:

Mono CRT Set the Function Keys as described in Section L.3 Step 9. To print, press the *Print Screen Key*.

Color CRT If the Num Lock light is *ON* (upper right area of the keyboard) press the *Num Lock key* once, to turn it off. To print, hold down the *SHIFT* and *CTRL* keys at the same time and momentarily press "*.*" *(Period key)* on the numeric keypad.
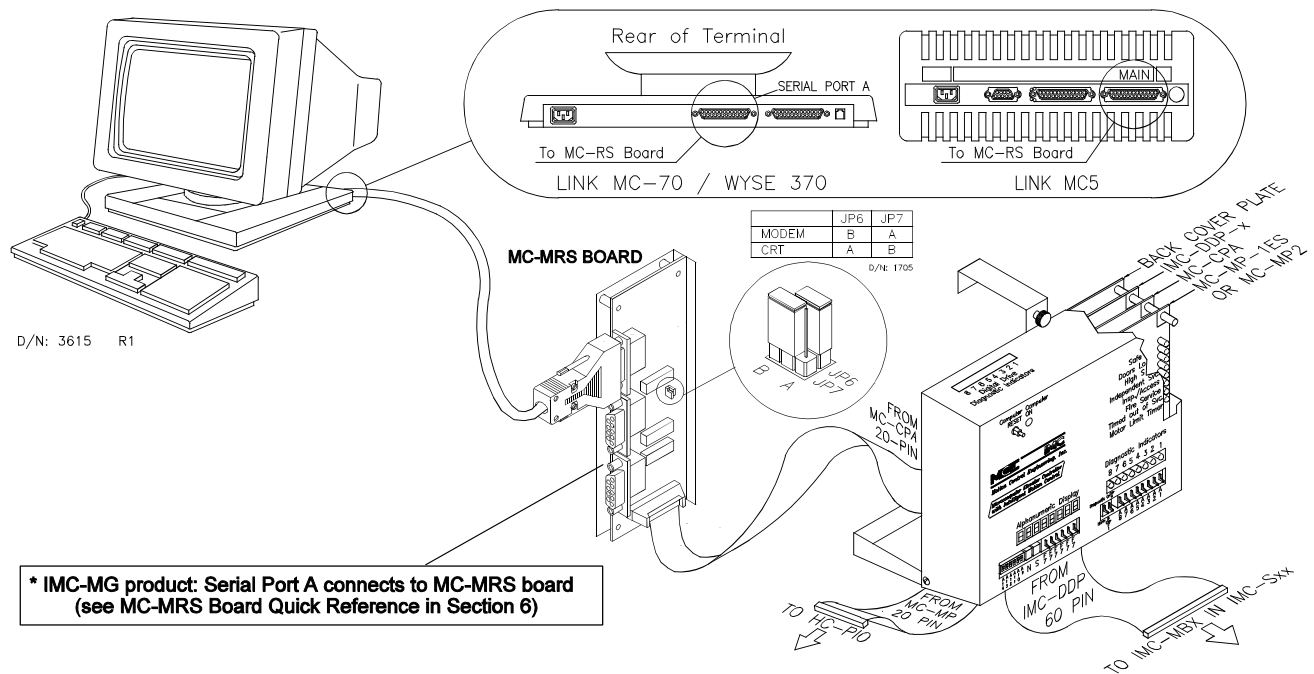
L.6 WYSE WY-370 COLOR TERMINAL SETUP

If you are using a Wyse WY-370 color terminal to configure the elevator controller, set the terminal up as described in this section.

L.6.1 CONTROLLER COM PORT SETTING (WYSE WY-370)

Swing Panel Controller - Refer to Section L.1.1 *Controller COM Port* Settings, or to *Programming the Communication Ports* in Section 5 of the Car Controller manual (Section 4 of the Group Supervisor manual) for instructions on viewing and changing the controller Communication Port settings. For the Wyse WY-370 color terminal the COM port *Device* option must be set to *CRTCK* (with keyboard) or *CRTC* (without keyboard).

PTC / PHC Controller - Refer to *Peripheral Device* in Section 5.4.9 Extra Features Menu Options for instructions on changing the controller Communication Port settings. For the Wyse WY-370 color terminal the **COLOR CRT** option must be set to **YES**.

L.6.2 WYSE WY-370 COLOR TERMINAL CONNECTIONS

* IMC-MG product: Serial Port A connects to MC-MRS board
  (see MC-MRS Board Quick Reference in Section 6)

- Connect the DB-25 (25-pin plug) of the signal cable, C-CRT/MRS-x (x = length in feet) into the SERIAL PORT A jack on the rear of the terminal. Use the screws on the cable hood to secure the cable to the terminal.

- Plug the DB-9 (9-pin plug) of the signal cable into a COM port jack (usually COM 1) on the controller's communication interface board (MC-MRS).

- If the terminal is connected directly to the communication interface board, set JP6 to A and JP7 to B. If the terminal is connected to the communication interface board through a modem or line driver, set JP6 to B and JP7 to A.

- Connect the printer, if applicable, to the Serial Port B jack on the rear of the terminal.

- Connect the AC jack on the rear of the terminal to the controller's AC outlet using the cord supplied with the terminal.

L.6.3 WYSE WY-370 COLOR TERMINAL SETUP

Step 1 Press *Select* to put the terminal into Setup mode. The Select key is in the upper right corner of the keyboard. If you can't get the terminal into Setup mode, try powering the terminal ON with the "Select" key held down until the screen comes up (about 5 seconds).

- Press the left and right arrow keys to select items on the Menu Bar (top line).
- Press the up and down arrow keys to select an item on a menu.
- Press the space bar to change the setting

Step 2 From the Exit menu select "Default all" and press the *Enter* key. Press *Y* to confirm this action.

Set these quick-set parameters every time.

Set these if a Printer is attached.

Exit	Screen	Modes	Display	Attribute	Port	Keyboard

Exit setup
Exit setup and cancel
Exit setup and save
Restore last saved
Default all
Default user defined keys

Step 3 From the Screens menu, set the highlighted parameters as shown.

Exit	Screens	Modes	Display	Attribute	Port	Keyboard

Width change clear	On
Screen Columns	80
Screen data lines	**50**
page columns	132
Page lines	**50/51**
Page line multiplier	1
Number of pages	1
Number of sessions	1
Session display, split	1,Full
Power-on tab stops	Off
Tab stops	

Step 4 From the Modes menu select "Personality". From the Personality sub-menu select "Wyse 350."

Modes	Display	Attribute	Port	Keyboard

Feature lock	Off
Controls mode	Interprt
Received CR	CR
Received LF	LF
Block end	US/CR
Terminal mode	8 bit
Enhance	On
Null OK	Off
Del OK	Off
Send ACK	On
Bell settings	
Personality	

Personality
Wyse 370
VT320/VT220
VT100
VT52
Intecolor 220
Wyse 350
TVI 950
Esprit III
ADDS A2
TEK 4010/4014

Step 5 If you plan to use a printer, set "Enhance" and "Terminal mode" to the values shown (use the space bar to toggle).

Modes	Display	Attribute	Port	Keyboard

Feature lock	Off
Controls mode	Interprt
Received CR	CR
Received LF	LF
Block end	US/CR
Terminal mode	8 bit
Enhance	On
Null OK	Off
Del OK	Off
Send ACK	On
Bell settings	
Personality	

Step 6 From the "Port" menu, select "Port A settings" and press Enter. Set the Transmit baud rate as follows:
* IMC Car controller with MC-CGP board = 19,200
* Group or Car controller with MC-CPA board = 19,200
* Group controller with MC–CGP board = 19,200
* Line Driver = 9600
* Modem = 19,200

Press **Shift-Up arrow** when done.

Modes	Display	Attribute	Port	Keyboard

Communications mode	Full DPX

Port B Settings	
Baud Rate	9600**
Data/stop/parity bits	8/1 None
Receive handshake	Xon/Xoff
Transmit handshake	Xon/Xoff
Transmit limit	None
Break	250ms
Modem control	ASCII
Disconnect delay	Off

Online/local	Online
Trace	Both
Port A settings	
Port B settings	
Communication cartridge	
session resources	

Port A Settings	
Transmit baud rate	19,200*
Receive baud rate	Rcv=Xmit
Data/stop/parity bit	8/1None
Receive Handshake	Xon/Xoff
Transmit handshake	None
Transmit limit	None
Break	250 ms
Interface	RS-232C
Modem control	ASCII
Disconnect Delay	2 sec

Step 7 Do the following only **if you plan to attach a printer** to the terminal. From the "Port" menu select "Port B settings" and press Enter. Set the highlighted Port B Settings as shown. Press Shift-Up arrow when done.
** Printer port (Port B) : baud rate should always be 9600. Note: This port must be connected to a **serial port** on the printer.

Step 8 Return to the Exit menu. Select "Exit setup and save". Press **Enter** and then **Y** for yes.

REFERENCE SECTION

TABLE R.1

	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
PATTERN PARAMETER ADJUSTMENTS						
PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
JERK						
J1 - Phase One	7.00	0.1	25.00		ft/s³	Determines how fast the profile transitions from starting (A0) to maximum acceleration (A2) is. As J1 increases, the profile transition from A0 to A2 is quicker; the velocity at the end of this phase decreases, and the sensation of movement during this phase is greater.
J35L - Low Jerk Rate in Phase Three and Five	4.00	0.1	25.00		ft/s³	Determines how quickly the profile transitions from maximum (A2) to zero acceleration (peak velocity) and from zero acceleration to maximum deceleration (A6). This zone correlates to Phase Three and Phase Five of the pattern. This parameter sets the minimum threshold for these transitions, and in conjunction with J35H, sets the range for these transitions. As the peak speed transitions from minimum to contract speed between any two floors, the jerk rate transitions from J35H to J35L during these phases in the pattern. In other words, J35H will be used for the shortest distance between two floors that does not generate a Short Run, J35L will be used for a distance between two floors that allows the elevator to reach contract speed, and a value between J35L and J35H will be used for speeds between these two extremes. As J35L increases, the profile transitions quicker between these accelerations and increases the sensation of movement.
J35H - High Jerk Rate in Phase Three and Five	4.00	0.1	25.00		ft/s³	Determines how quickly the profile transitions from maximum (A2) to zero acceleration (peak velocity) and from zero acceleration to maximum deceleration (A6). This zone correlates to Phase Three and Phase Five of the pattern. This parameter sets the maximum threshold for these transitions, and in conjunction with J35L, sets the range for these transitions. As the peak speed transitions from minimum to contract speed between any two floors, the jerk rate transitions from J35H to J35L during these phases in the pattern. In other words, J35H will be used for the shortest distance between two floors that does not generate a Short Run, J35L will be used for a distance between two floors that allows the elevator to reach contract speed, and a value between J35L and J35H will be used for speeds between these two extremes. As J35H increases, the profile transitions quicker between these accelerations and increases the sensation of movement.
J7 - Phase Seven	3.00	0.1	25.00		ft/s³	Determines how quickly the profile transitions from maximum deceleration (A6) to the deceleration formed by parameters VHL, VIL, and DL. As J7 increases, the profile transitions quicker between these two deceleration points and the sensation of movement is greater.
ACCELERATION						
A0* - Phase Zero	0.01	0.01	15.00		ft/s²	Determines the starting acceleration for Phase One. Increasing A0 allows the elevator to take off quicker from a floor while maintaining the same J1 value. This compensates for sluggish rotating equipment.
A2 - Phase Two	3.75	0.01	15.00		ft/s²	Determines the maximum acceleration that the system will attain. Maximum acceleration increases as A2 increases. Phase Two does not affect the sensation of movement to any large degree.
A6 - Phase Six	3.50	0.01	15.00		ft/s²	Determines the maximum deceleration that the system will attain. Maximum deceleration increases as A6 increases. Phase Six does not affect the sensation of movement to a large degree.

---

*   *This parameter does not need adjustment in the field.*

XX   *Indicates that the value for this parameter must be taken from either the job print or the rotating equipment used on this job.*

PATTERN PARAMETER ADJUSTMENTS

PARAMETERS		PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
VELOCITY							
VH	- Contract	XX	100	2500		ft/min	Determines the maximum velocity that the elevator can attain when the hoist motor is rotating at rated rpm.
VEQ* -	Earthquake	150	25	150		ft/min	Determines the velocity for the Earthquake Profile. It is generated when the earthquake input is activated.
VHL	- High Leveling	30	1	50		ft/min	Determines the velocity at which the elevator will begin leveling approach to the destination floor. Increasing this parameter increases the velocity.
VIL	- Intermediate Leveling	12	1	25		ft/min	This parameter, bounded by VHL and VFL, determines the leveling approach pattern to a destination floor. Increasing this parameter increases the velocity.
VFL	- Final Leveling	05	1	15		ft/min	Determines the velocity at which the elevator will level into a floor. Increasing this parameter increases the velocity
VRL	- Releveling	08	1	15		ft/min	Determines the velocity at which the elevator will relevel into a floor. Releveling occurs when direction is enabled with a leveling input active (LD or LU). Increasing this parameter increases velocity.
VIN	- Inspection	50	5	150		ft/min	Determines the velocity for the Inspection Profile. With the elevator on Inspection, this profile is generated when direction is enabled. Increasing this parameter increases the velocity.
VCR* -	Correction	50	5	150		ft/min	Determines the velocity for the Correction Profile. This profile brings the elevator to the next landing from a starting position between floors.
VS* -	Short Run	75	25	150		ft/min	Determines the velocity for the Short Profile. This profile is generated when a Normal Profile cannot accommodate the height of a floor. Increasing this parameter increases velocity.
VLR* -	Learn	35	5	150		ft/min	Determines the velocity used when learning the hoistway. Increasing this parameter increases the velocity. Please note that the elevator slows to leveling velocity when traveling across the leveling vane during a learn.
DISTANCE							
DL	- Leveling	0.25	0.01	1.00		ft	Determines the leveling distance the elevator travels when making the transition from VHL, through VIL, to VFL velocity. Increasing this parameter increases the distance.
DFL	- Final Leveling	0.02	0.01	0.50		ft	Determines how much stabilized leveling distance the elevator will travel before arriving at the destination floor. Increasing this parameter increases the distance.
DEQ* -	Earthquake Slowdown	3.00	0.01	5.00		ft	Determines the distance at which the pattern begins to transition to leveling velocity. The FEQ filter parameter determines how gently this transition will occur. If the DEQ distance is too short or the FEQ filter frequency is too low, the elevator may not reach leveling velocity before arriving at the destination floor.
DS* -	Short Run Slowdown	1.25	0.01	5.00		ft	Determines the distance at which the pattern begins to transition from short to leveling velocity. The FS filter parameter determines how gently this transition will occur. If the DS distance is too short or the FS filter frequency is too low, the elevator may not reach leveling velocity before arriving at the destination floor.
LANDING							
NF* -	Number of Floors	XX	2	63		landings	Determines the number of floors that the elevator can service. Please note that this value may not necessarily be the number of floors in the building.

---

* *This parameter does not need adjustment in the field.*

XX *Indicates that the value for this parameter must be taken from either the job print or the rotating equipment used on this job.*

TABLE R.2

RECOMMENDED SPEED PATTERN PARAMETERS						
PARAMETERS	200 fpm	350 fpm	400 fpm	500 fpm	600 fpm	UNIT
J1 - Phase One	6.00	6.00	5.00	5.00	6.00	ft/s³
J35L - Phase Three/Five - Low	4.00	4.00	3.00	3.00	3.00	ft/s³
J35H - Phase Three/Five - High	6.00	6.00	5.00	5.00	5.00	ft/s³
J7 - Phase Seven	2.50	2.50	2.50	2.50	2.50	ft/s³
A0* - Phase Zero	0.10	0.10	0.10	0.10	0.10	ft/s²
A2 - Phase Two	2.40	3.20	3.40	3.60	3.80	ft/s²
A6 - Phase Six	2.20	2.90	3.20	3.30	3.50	ft/s²
VH - Contract	200	350	400	500	600	ft/min
VEQ* - Earthquake	150	150	150	150	150	ft/min
VHL - High Leveling	030	040	045	045	045	ft/min
VIL - Intermediate Leveling	015	015	015	015	015	ft/min
VFL - Final Leveling	004	003	002	002	002	ft/min
VRL - Releveling	008	008	008	008	008	ft/min
VIN - Inspection	050	050	050	050	050	ft/min
VCR* - Correction	050	050	050	050	050	ft/min
VS* - Short Run	075	075	075	075	075	ft/min
VLR* - Learn	035	035	035	035	035	ft/min
DL - Leveling	0.60	0.60	0.45	0.45	0.45	ft
DFL - Final Leveling	0.05	0.04	0.02	0.02	0.02	ft
DEQ* - Earthquake Slowdown	2.50	2.50	2.50	2.50	2.50	ft
DS* - Short Run Slowdown	1.25	1.25	1.25	1.25	1.25	ft

---

*   *This parameter does not need adjustment in the field.*

TABLE R.3

PROFILE PARAMETER ADJUSTMENTS

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
FILTER FNR[*] - Normal Profile	25.0	5.00	25.0		Hz	Determines the cutoff frequency of the Normal Profile filter. Its purpose is to smooth out any large transitions in the pattern for this profile. As the value of this parameter increases, the harsher the transition. If FRP and FPP on Optical/Cal screen are set to much lower than this value, this parameter may not have any effect on improving the smoothness of the pattern.
FIN* - Inspection Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Inspection Profile filter. The value of this parameter determines how gently the pattern transitions to the Inspection velocity. As the value of this parameter increases, the harsher the transition.
FCR* - Correction Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Correction Profile filter. The value of this parameter determines how gently the pattern transitions between the correction and leveling velocity. As the value of this parameter increases, the harsher the transition.
FTD* - Terminal/ Danger Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Terminal and Danger Profile filter. For a Terminal Profile, the value of this parameter determines how gently the pattern transitions between the current and leveling velocity. For a Danger Profile, the value determines how gently the pattern transitions between the current and correction velocity. As the value of this parameter increases, the harsher the transition.
FEQ* - Earthquake Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Earthquake Profile filter. If an earthquake input occurs while the Normal Profile is being generated, the value of this parameter determines how gently the pattern will transition from current to earthquake velocity. Otherwise, the value determines how gently the pattern transitions from earthquake to leveling velocity. As the value of this parameter increases, the harsher the transition.
FS* - Short Run Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Short Profile filter. The value of this parameter determines how gently the pattern transitions between short to leveling velocity. As the value of this parameter increases, the harsher the transition.
FLR* - Learn Profile	0.5	0.05	5.00		Hz	Determines the cutoff frequency of the Learn Profile filter. The value of this parameter determines how gently the pattern transitions between the leveling vane and learn velocity. As the value of this parameter increases, the harsher the transition.

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*   *This parameter does not need adjustment in the field.*

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PROFILE PARAMETER ADJUSTMENTS

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
MISCELLANEOUS						
MPI* - Pattern Interpolation	100	1	125		%	This parameter determines the amount of smoothing that is applied to the pattern (this parameter is not a filter) during slowdown. As this value is increased, more smoothing is applied. During adjustment, this value should be increased from 1% to 125%, in steps of about 10%, to determine the optimum value. For a properly adjusted drive, a value of 75% to 100% usually yields the optimum result. The affect of this parameter can be observed when comparing the signal on Software Test Point "A" (unmodified pattern) with "B" (smoothed pattern).
MLI* - Inhibit Distance	0.5	0.25	1.00		ft	In conjunction with INT, determines when the COC computer is allowed to evaluate the LD, DZ, and LU signals and whether the elevator should stop at an approaching floor. The LI value determines how far away from the destination floor the pattern generator will allow the COC computer to start evaluating the above mentioned signals.
MINT* - Inhibit Velocity	175	25	250		ft/min	In conjunction with LI, determines when the COC computer is allowed to evaluate the LD, DZ, and LU signals and whether the elevator should stop at an approaching floor. The INT value determines below what speed the pattern generator will allow the COC computer to start evaluating the above mentioned signals.
MDTC*- Tracking Compensation	0.00	0.00	1.00		ft	Allows the optimization of both one floor and multi-floor run times without overshooting or excessive leveling time. As DTC increases, more compensation is added to multi-floor runs to eliminate overshooting problems. This parameter compensates for the difference between one floor and multi-floor runs. The parameter has also been modified to bipolar parameter (± value) for DDP software versions 1.19 and above.
MRSR* - Rope Stretch Relevel	0.05	0.0	0.25		ft	This parameter will determine the amount of distance that the car must move from the destination landing before it will be allowed to relevel. The distance that the car moves is usually caused by rope stretch/compression as weight is added/removed from the car (passengers entering/leaving the car).
MPER - Position Encoder Resolution	0	0	512		ppr	This parameter reflects the number of pulses per revolution that the landing system position encoder generates. A value of 0ppr must be entered for this parameter if a LS-QUAD-2(R) landing system is used (using a steel tape); otherwise, the value can be obtained from the encoder itself if a LS-QUIK-1 landing system is used (using vanes). For example, for a BEI encoder with a Model Number of **E25BB-4H-SB-500-AB-7406R-LED-SM16**, this parameter would be set to 500ppr for a LS-QUIK-1 system. A value of 25ppr is common for a LS-QUIK-1 system.
MILO* - Inspection/ Leveling Trip Speed	150	000	150		ft/min	Determines the speed that will cause the elevator to shut down in the event of an overspeed condition during Inspection or Leveling operation.

TABLE R.4

MOTOR PARAMETER ADJUSTMENTS						
PARAMETERS	**PRESET VALUE**	**VALUE RANGE**		**USER ADJ.**	**UNIT**	**DESCRIPTION**
FIELD DATA						
DMFV - Motor Fld. AC Supply Voltage	XX	25	350		Volt	This input voltage is used in determining the maximum possible motor field output voltage. This value is provided in the -D page of the job print; verify by measuring AC voltage between top of MP01 and MP02 fuses. Entering a wrong value for this parameter results in an incorrect motor field output voltage.
DBV - Brake AC Supply Voltage	XX	25	350		Volt	From this input value, the computer determines the maximum possible brake output voltage. This value is provided in the -D page of the job print. Also measure volts between BPI1 - BPI2 on the IMC-PRI Board. Entering an incorrect value for this parameter results in an incorrect brake output voltage.
DGFR - Gen. Shunt Fld. Resistance	XX	5.00	999.00		Ohm	The generator shunt field resistance value and the generator shunt field feedback current is used by the computer to calculate the generator shunt field voltage. Entering an incorrect value may cause GSF fault, which results in an emergency stop.
DMFR - Motor Fld. Resistance	XX	5.00	999.00		Ohm	The motor field resistance value and the motor field feedback current are used by the computer to calculate the motor field voltage.
DBR - Brake Coil Resistance	XX	5.00	999.00		Ohm	The brake resistance value and the brake feedback current are used by the computer to calculate the brake voltage.
DGAV - Gen. Armature Voltage	XX	50	350		Volt	Enter the rated generator armature voltage from the value on product's name plate.
BRAKE						
BPV - Pick Voltage	XX	25	300		Volt	Desired brake pick voltage value.
BHV - Hold Voltage	XX	25	300		Volt	After picking the brake, the brake pick voltage will be changed to this voltage value. If a brake hold voltage is not necessary or the brake pick voltage must be maintained throughout the run, this parameter must be set to the brake pick voltage.
BRV* - Relevel Voltage	XX	25	300		Volt	Desired brake voltage during releveling. This voltage must be sufficient to lift the brake slightly so that the car can relevel.
BWV* - Weakening Voltage	XX	25	300		Volt	This voltage is used in the smooth picking of the brake. This parameter does not need any adjustment unless there is a rollback problem at the start and there is no loadweigher unit. If this parameter is not used, it must be set to the brake relevel voltage (BRV).
BPD - Pick Delay	0.00	0.00	2.00		Sec	This parameter controls the amount of delay in the application of brake voltage from the time the drive is enabled for a run.
BDD - Drop Delay	0.00	0.00	2.00		Sec	The application of the brake at the end of the run is delayed for a short period of time to allow the operation of the electric stop feature.

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*   *This parameter does not need adjustment in the field.*

XX   *Indicates that the value for this parameter must be taken from either the job print or the rotating equipment used on this job.*

MOTOR PARAMETER ADJUSTMENTS

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
BRAKE (Continued)						
BWD* - Weakening Delay	0.00	0.00	2.00		Sec	This delay determines when to apply the brake weakening voltage (BWV) after invoking the brake pick voltage (BPV). If there is no rollback problem at the start, this parameter must be set to 0.0.
BRD* - Repick Delay	0.00	0.00	2.00		Sec	Determines when to reapply the brake pick voltage (BPV) after applying the brake weakening voltage (BWV). If there is no rollback problem at the start, this parameter must be set to 0.0.
BSPD - Speed Pick Delay	0.00	0.00	2.00		Sec	This control delays the application of the speed reference signal (pattern) to the system. The value can be set for 0.0 seconds to 2.0 seconds. This delay allows for proper coordination of acceleration with the picking of the brake. This parameter should be adjusted for minimum rollback without accelerating through the brake.
MOTOR FIELD						
MFSV - Standing Field Voltage	XX	25	300		Volt	Enter the desired standing motor field voltage.
MFFV - Forcing Field Voltage	XX	25	300		Volt	Enter the desired forcing motor field voltage.
MFRV - Running Field Voltage	XX	25	300		Volt	Enter the rated motor field voltage for running. This motor field voltage will be applied as the pattern approaches contract speed. This point is adjusted via the Motor Field Weakening (MFW) parameter.
MFW - Start of Motor Field Weakening	10	000	125		%	Determines at what pattern voltage the motor field begins to weaken. Increasing this value delays the weakening of the motor field. Once the motor field weakening point is reached during acceleration, that voltage is reduced to running voltage (MFRV). This voltage is maintained until the car starts decelerating. Then it is gradually increased to forcing voltage (MFFV). For example, if this value is set to 50%, motor field weakening is initiated when pattern voltage reaches 5.0VDC (50% of contract speed). Once the pattern reaches 10.0VDC (contract speed), the motor field voltage is reduced to its running voltage regardless of this setting.
MFPG - Proportional Error Gain	1.00	00.00	50.00		Factor	Controls the response of the motor field voltage. Increasing this gain provides faster response and tighter regulation, but can also cause oscillation and instability if the gain is too high. The OCMF parameter on the Option/Cal Parameter screen must be on for this setting to work. See Section 4.4.
MFIG - Integrator Error Gain	0.00	00.00	50.00		Factor	Adjusts the accumulated error between the desired and actual motor field voltage. Increasing this gain provides tighter motor field regulation, but can also make the motor field unstable and oscillatory. This must be adjusted after obtaining satisfactory performance with MFPG gain. The OCMF parameter on the Option/Cal parameter screen must be on for this setting to work. See Section 4.4.

*   *This parameter does not need adjustment in the field.*

XX   *Indicates that the value for this parameter must be taken from either the job print or the rotating equipment used on this job.*

TABLE R.5

GAIN PARAMETER ADJUSTMENTS						
PARAMETERS	**PRESET VALUE**	**VALUE RANGE**		**USER ADJ.**	**UNIT**	**DESCRIPTION**
VELOCITY LOOP GTC - Tachometer/ Encoder Scaling	1.00	0.10	10.00		Factor	With a pattern voltage of ±10VDC on software test point 1 and test point COM, the car must be adjusted to run at contract speed via this parameter. When the car is traveling at contract speed, this gain will allow a range of tachometer voltages from 0VDC to 70VDC (assuming 60/1000 V/rpm tachometer is used) on terminals TS to TC on the IMC-RI board and from 0VDC to 12VDC on terminals T and COM on the IMC-DAS board. Decreasing this gain will increase the car speed. Increasing the GTC will reduce the car speed.
GLV - Loop Voltage Dampening	0.00	0.00	50.00		Factor	Controls the armature voltage feedback from the generator. This has the effect of damping any oscillations introduced by the adjustment of gains GP and GI. It is the primary means by which stability is achieved in the response of the car. A higher value gives more damping of the car response.
GLI - Loop Current Dampening	0.00	0.00	50.00		Factor	Controls the DC loop current negative feedback. This control is used to smooth out rapid changes in motor torque, and it dampens the response of the car. A higher gain provides more feedback which gives more damping of torque changes in the motor. Its effects are fairly subtle compared to GP, GI, GD, and GLV, so you may not have to use it.
GIR* - IR Loss Compensation	0.00	0.00	50.00		Factor	This gain compensates for the voltage loss due to the internal resistance in the DC loop. This parameter will help to make the up and down speed the same. Increasing this gain adds more voltage to the control loop.
GES - Electric Stop	0.00	0.00	50.00		Factor	Causes a pulse of reverse polarity to be sent out at the output of the pattern modification function at the instant the car stops (drive direction input is removed). A higher value provides more braking action. A higher value gives a stronger output pulse and a value of zero will remove any pulse. This is used for electric stopping before the brake sets.
GDPI* - Direct Pattern Injection	0.00	0.00	50.00		Factor	Determines how much pattern value (desired speed) can be fed directly to the generator shunt field power circuit. Feeding the pattern value this way increases the response of the system. Excessive gain can cause oscillation.
GP - Proportional Error	1.00	00.00	50.00		Factor	Controls the response of the car. Increasing this gain provides faster response and tighter regulation, but can also cause oscillation and instability if the gain is too high.
GI - Integrator Error	0.00	00.00	50.00		Factor	Adjusts the accumulated error between the desired speed signal (pattern) and the actual speed of the car (tachometer/encoder feedback signal). Increasing this gain provides tighter tracking but can also make the car unstable, causing oscillation, speed overshoot, etc. This must be adjusted after obtaining satisfactory performance with GP gain.
GD - Differential	0.00	00.00	50.00		Factor	Adjusts the influence due to the rate of change of the error between pattern (desired speed) and actual speed (tach/encoder signal). Increasing this gain provides faster response, but it can also make the car unstable, or oscillate, etc. This must be adjusted after obtaining satisfactory performance with the GP, GI, GLV, and GLI gains.

VELOCITY LOOP **(Continued)** GIP* - Initial Proportional Error	1.00	0.00	50.00		Factor	If there is a rollback problem, this gain can be increased to a higher value so that the car will have tighter control to prevent any rollback at the start of motion. If the system does not have any rollback, this parameter must be the same as the GP gain (computer automatically assign this parameter to GP value). Once the car is in motion, the GIP gain gradually decreases to GP gain after the initial gain reduction delay GRD. This must have a higher value than, or equal value to, GP.
GRD* - Initial Gain Reduction Delay	0.00	0.00	10.00		Sec	Determines the length of time taken to reduce GIP and GID to GP and GD. Reduces the initial proportional (GIP) and differential (GID) gains to the normal gain values of GP and GD. This delay is only used when there is a rollback problem. If there is no rollback problem, set this delay to 0.0.
PRE-TORQUE GT* - Pre-Torque	0.00	0.00	50.00		Factor	Controls the amount of output voltage from the pre-torque function. Increasing this gain applies more voltage to the rotating equipment at takeoff and compensates for any rollback at the start.
GTPC* - Pre-Torque Car Position Compensation	0.00	0.00	10.00		Factor	Controls the position influence on the pre-torque output value. Increasing this parameter allows the adjuster to increase the pre-torque output voltage which compensates for the weight of the compensating ropes.
GCW* - Counterweight Percentage	40	000	100		%	During the pre-torque adjustment, this value is adjusted so that no rollback occurs when a balanced car is at the middle of the hoistway. If the pre-torque output is unnecessary, do not adjust.
SAFETY **CALIBRATION** STE - Maximum Tach Error	50	000	100		%	Adjusts the amount of error (100% equals 10VDC or contract speed) that will be permitted between the voltage from the tachometer or encoder and the pattern voltage. Because of the precision of this control, it may be possible to shut down the car by first clipping, then immediately remaking the door locks. If excessive error is detected, the TE fault flag will be highlighted on the Dynamic Parameter screen or F3 screen of the CRT.
SLOC - LOC Trip	1.00	0.00	50.00		Factor	Sets the threshold for tripping the LOC. After learning the DC loop average current, adjust this value until the LOC error flag on the F3 screen is not highlighted. During this adjustment, the car must have a full load.
SVSC - Voltage Safety Calibration	1.25	0.00	50.00		Factor	Creates a car speed signal independent of the tachometer in conjunction with SISC. This signal derives from the armature voltage. The SVSC and SISC gains also allow operation during installation without an external speed feedback signal (tachometer/encoder). Increasing this gain results in more armature voltage to the synthetic speed signal.
SISC - Current Safety Calibration	0.00	0.00	50.00		Factor	Compensates for loop circuit loss in creating the internal speed signal from the DC loop current. Increasing this gain results in more DC loop current to the synthetic speed signal.
PATTERN PG - Pattern Adjust Gain	1.00	0.00	1.50		Factor	Controls the speed of the car. If this gain is zero, the car will not move. If the value is 1.0, the drive will use the idealized speed commands. This gain must be set to 1.0 after all adjustments are completed.
PZA - Zero Pattern Adjustment	0.00	-5.00	5.00		Factor	Eliminate any speed offsets in the system. Adjust this parameter from the Dynamic Parameter screen until the car does not move in either direction when zero speed dictation is applied (PG = 0).
PADL* - Pattern Acc/Dec Limiter	12.00	0.00	50.00		Volt /Sec	Determines the maximum rate of change in the pattern signal. This parameter establishes the emergency deceleration rate and reflects the maximum voltage change allowed in one second. A higher value will slow the car down faster in an emergency situation. (Contract speed is always represented as 10VDC.)

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* *This parameter does not need adjustment in the field.*

REDUCED GAINS						
GRP - Reduced Proportional Gain	1.00	0.00	50.00		Factor	After steady state speed is reached and an adjustable delay (GRGD) has expired, the proportional gain is reduced from the standard proportional gain (GP) to this reduced proportional gain (GRP) over an adjustable time (GRGT). When the elevator begins to slow down, the proportional gain will increase from GRP to GP over half the GRGT interval. This gain cannot exceed GP.
GRI - Reduced Integrator Error	0.00	0.00	50.00		Factor	After steady state speed is reached and an adjustable delay (GRGD) has expired, the integral gain is reduced from the standard integral gain (GI) to this reduced integral gain (GRI) over an adjustable time (GRGT). When the elevator begins to slow down, the integral gain will increase from GRI to GI over the GRGT interval. This gain cannot exceed GP.
GRGD - Reduced Gain Delay	0.00	0.00	15.00		Sec	The reduced gains (GRP and GRI) are applied after this time has elapsed at steady state speed. This time allows the speed to stabilize before reducing gains.
GRGT - Reduced Gain Transition	0.00	0.00	15.00		Sec	Reduced gains are implemented only when this parameter is greater than zero. If this parameter is greater than zero, the gains are reduced from their standard value to their reduced value over this time interval. When the gains are increased from their reduced value to their standard value, the transition will occur over half of this transition time. It is important that this transition time is not too long since the gains may not reach their standard value, the transition will occur over half of this transition time. It is important that this transition time is not too long since the gains may not reach their standard value before the elevator reaches leveling speed. The transition time should not be greater than twice the time required to transition from contract speed to leveling speed.

TABLE R.6

OPTION/CALIBRATION PARAMETER ADJUSTMENTS					
PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
SOFTWARE OPTION						
OSR - Speed Reference (INT/EXT)	INT	INT	EXT		N/A	When set to INT, allows the car to run without a tachometer/encoder during the start-up phase. With this setting, the car can only run on inspection when the FLT relay is not bypassed. When EXT, an external tachometer/encoder signal is used as the speed feedback signal.
OET* - Encoder/ Tachometer (ENC/TAC)	XX	TAC	ENC		N/A	In the ENC position, the speed feedback signal is to be generated by an encoder. When set to TAC, a tachometer is to be used. However, the option will have no effect if the OSR option = INT.
OLOC - Learn Loop Overload Current	ON	OFF	ON		N/A	When on, the overload current can be automatically learned. During this learn process, the car must have a full load and make a full hoistway run from the bottom floor to the top floor. During this full hoistway run, the computer calculates the average DC loop current when the car is traveling at contract speed. Then using the safety calibration parameter SLOC, the loop overload current threshold for tripping can be established.
OAT* - Auto Tune	OFF	OFF	ON		N/A	Not yet fully implemented in this product.
OTE* - Pre-Torque Enable	OFF	OFF	ON		N/A	If on, the pre-torque output is enabled.
OEAC* - Encoder Auto Calibration	OFF	OFF	ON		N/A	Not yet fully implemented in this product.
OBT* - Buffer Test	OFF	OFF	ON		N/A	Allows a contract speed buffer test to be performed when most of the safety circuits are bypassed. The car can reach contract speed on inspection operation. After completing one run, the option automatically turns off.

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*   *This parameter does not need adjustment in the field.*

Parameter					Units	Description
OCMF* - Closed Loop Motor Field	OFF	OFF	ON		N/A	When on, provides closed loop operation of the motor field. This operation uses the MFPG and the MFIG parameters. Useful when temperature variation causes a considerable change in motor field resistance. See Section 4.5.
OACF - AC Line Frequency (50/60)	60	50	60		Hz	This parameter reflects the frequency of the power for the controller. For example, Europe uses 50Hz while the United States uses 60Hz.
SOFTWARE TEST						
TP1 - Test Point 1 TP2 - Test Point 2 TP3 - Test Point 3	D G A	A	X		N/A N/A N/A	Allows the monitoring of selected data, internal to the computer, at test point STP1 or 2 on the IMC-DAS board. In Table R.10, a list of possible assignments to these test points is provided.
FILTER						
FET* - Encoder/ Tachometer	50.0	0.00	99.00		Hz	Determines how much variation will be allowed in the signal received from the encoder/tachometer.
FRP* - Raw Pattern	2.00	0.00	99.00		Hz	Determines how much variation will be allowed in the pattern (desired speed). If there is a wide variation between the tach and pattern, this parameter can be adjusted.
FPP* - Processed Pattern	4.00	0.00	99.00		Hz	Determines how much variation will be allowed in the processed pattern signal.
FLP* - Loop Current	50.0	0.00	99.00		Hz	Determines how much variation will be allowed in the signal received from the interpole.
FLLV* - Loop Voltage-LP	50.0	0.00	99.00		Hz	Determines how much variation will be allowed in the signal received from the armature.
FHLV* - Loop Voltage-HP	0.50	0.00	50.00		Hz	Determines how much of the DC component will be removed from the armature feedback voltage before this signal is used in the velocity loop calculation. Increasing this value reduces the damping effect on the system.
CRT CALIBRATION						
CBV* - Brake Voltage	1.00	0.00	50.00		Factor	Calibrates the brake voltage displayed on the F3 screen. Enter the correct brake input voltage (DBV) and brake coil resistance (DBR) before adjusting this parameter. Adjust this parameter until the measured brake voltage between terminals B1 and B2 is as close as possible to what is displayed on the F3 screen.
CMFV* - Motor Field Voltage	1.00	0.00	50.00		Factor	Calibrates the motor field voltage displayed on the F3 screen. Enter the correct motor field input voltage (DMFV) and motor field resistance (DMFR) before adjusting this parameter. Adjust this parameter until the measured motor field voltage between terminals MF2 and MF1 is almost the same as the displayed voltage on the F3 screen.
CGFV* - Gen. Shunt Field Voltage	1.00	0.00	50.00		Factor	Calibrates the generator shunt field voltage displayed on the F3 screen. Adjust this parameter until the measured generator shunt field voltage between terminals GF1 and GF2 is almost the same as the displayed voltage on the F3 screen.
CLI - DC Loop Current	1.00	0.00	50.00		Factor	Calibrates the DC loop current displayed on the F3 screen. Adjust this parameter until the measured DC loop current is almost the same as the displayed value on the F3 screen. It is highly recommended that the current be compared during a contract run because the loop current is more stable. If the DC loop current display on the F3 screen is not necessary, set this parameter to 0.0.
CTR* - Tachometer RPM Ratio	60	000	999		V/1000	Determines the motor rpm displayed on the F3 screen. Enter the ratio (voltage/revolution) of the tachometer in order to get the correct machine rpm. If an encoder is used as a speed transducer, this parameter does not need any modification.

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*   *This parameter does not need adjustment in the field.*

TABLE R.7

AUXILIARY DRIVE PARAMETER ADJUSTMENTS

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
ONF - Notch Filter	OFF	ON	OFF		N/A	Notch filter is activated when ON.
OIGR - Initial Relevel Gain	OFF	ON	OFF		N/A	In general, only gearless and not geared machines may require this parameter to be activated. This parameter enables initial gains for relevel (GIRP, GIRI, and GIRD) when ON. This parameter should be set to ON only if the system has problems releveling into a floor (machine sluggish during the relevel process or requires a long time to relevel)
OSP - Spare Option	OFF	ON	OFF		N/A	Intended for future use. Must be set to OFF.
GDEC - Direct Error Compensation	0.00	0.00	50.00		N/A	(*was SCRA5*) Direct error compensation gain. Provides a better regulation or tracking when this parameter is increased. A value which is too high may cause oscillation. Reasonable values are 0.25 to 1.0.
GALV - Alternate Loop Voltage Dampening	0.00	0.00	50.0		N/A	(*was SCRA3)* Provides damping. Any oscillation or stability problem can be eliminated by increasing this parameter. However, the side effect of increasing this value is more lag in the system (difference between pattern and tach). Reasonable values are 0 to 1.0.
GIRP - Initial Relevel Proportional	10.00	0.00	50.00		Factor	In general, only gearless and not geared machines may require this parameter. This parameter is enabled by setting parameter OIGR (Initial Gains for Relevel) on the Auxillary Drive Parameters Screen to ON. This gain can be increased to a higher value so that the car will have tighter control to aid in the releveling process. If the system does not have any problems releveling, the OIGR parameter should be set to OFF. Once the car is in motion, the GIRP gain decreases to the GP gain after the car stablizes at the releveling speed. This must have a higher value than, or a value equal to, GP.
GIRI - Initial Relevel Integrator	10.00	0.00	50.00		Factor	In general, only gearless and not geared machines may require this parameter. This parameter is enabled by setting parameter OIGR (Initial Gains for Relevel) on the Auxillary Drive Parameters Screen to ON. If the machine has difficulty releveling into a floor, increase this gain so that the car will have tighter control during this process. If the system does not have any problems releveling, the OIGR parameter should be set to OFF. This parameter adjusts the accumulated error between the desired speed signal (pattern) and the actual speed of the car (tachometer/encoder feedback signal). Increasing this gain provides tighter tracking but can also make the car unstable, causing oscillation, speed overshoot, etc. This must be adjusted after obtaining satisfactory performance with GIRP gain. Once the car is in motion, the GIRI gain decreases to GI gain after the car stablizes at the releveling speed. This parameter must have a higher value than, or a value equal to, GI.
GIRD - Initial Relevel Differential	0.00	0.00	50.00		Factor	In general, only gearless and not geared machines may require this parameter. This parameter is enabled by setting parameter OIGR (Initial Gains for Relevel) on the Auxillary Drive Parameters Screen to ON. If the machine has difficulty releveling into a floor, increase this gain so that the car will have tighter control during this process. If the system does not have any problems releveling, the OIGR parameter should be set to OFF. Once the car is in motion, the GIRD gain decreases to GD gain after the car stablizes at the releveling speed. This parameter must have a higher value than, or a value equal to, GD.
FDLP - Differential - LP	3.00	0.00	199.00		Hz	(*was SCRA1*) 3DB frequency for the differentiator lowpass filter. Decreasing this value will prevent a higher frequency signal from going through the differentiator.
FDHP - Differential - HP	3.00	0.00	199.00		Hz	(*was SCRA2)* 3DB frequency for the differentiator highpass filter. Increasing this value reduces the effectiveness of the differentiator.
FEC - Smoothing for Error Compensation	8.00	0.00	199.00		Hz	(*was SCRA4*) 3DB frequency for the direct error compensation lowpass filter. Increasing this value will allow a higher frequency signal in the direct error compensation signal. If it is possible, this value must be set to the same value as FRP on the Option/Calibration Parameters screen.

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TABLE R.7

AUXILIARY DRIVE PARAMETER ADJUSTMENTS

PARAMETERS	PRESET VALUE	VALUE RANGE		USER ADJ.	UNIT	DESCRIPTION
FPES - Smoothing for Proportional Error	2.50	0.00	199.00		Hz	Smoothing factor for proportional error. For gearless applications, set to 2.5. For geared application set to 10.0 (was SCRA0).
FNP1 - Notch Filter Parameter 1	10.00	0.00	199.00		N/A	(*was SCRA7*) Refer to Table R.12, Notch Filter Parameters.
FNP2 - Notch Filter Parameter 2	50.00	0.00	199.00		N/A	(*was SCRA8*) Refer to Table R.12, Notch Filter Parameters.
FNP3 - Notch Filter Parameter 3	0.33	0.0	199.00		N/A	(*was SCRA9*) Refer to Table R.12, Notch Filter Parameters.
FBD - Smooth Brake Drop	100	0.0	199.00		Hz	Controls the brake dropping. A lower value (<2.0) for this parameter will drop the brake smoothly. If this parameter is not used, set the parameter to 100 or greater.
MSP0 - Spare 0	0.00	0.00	199.00			Intended for future use.
MRLE - Rate Limiter for Error Compensation	10.0	0.0	199.00		N/A	(*was SCRA6*) Slew rate limiter for the direct error compensation signal. A higher value will allow a higher frequency direct error compensation signal (steeper slope).
MLLC - Learned Loop Current	xx.xx	0.00	99.00		N/A	Displays the learned loop current value. It can be modified if necessary during the LOC adjustment.
MSP1 - Spare 1	0.00	0.00	199.00			Intended for future use.
MSP2 - Spare 2	0.00	0.00	199.00			Intended for future use.
MSP3 - Spare 3	0.00	0.00	199.00			Intended for future use.
MSP4 - Spare 4	0.00	0.00	199.00			Intended for future use.

TABLE R.8

	DYNAMIC PARAMETER SCREEN				
LABEL	PARAMETERS	MINIMUM VALUE	MAXIMUM VALUE	DEFAULT VALUE	OTHER SCREEN
PG	Pattern Gain	0.00	1.50	1.00	GAIN
PZA	Zero Pattern Adjustment	-5.00	+5.00	0.00	GAIN
GTC	Tachometer/Encoder Scaling	0.25	10.00	-	GAIN
GLV	Loop Voltage Dampening	0.00	50.00	-	GAIN
GLI	Loop Current Dampening	0.00	50.00	-	GAIN
GIR	IR Loss Compensation Gain	0.00	50.00	-	GAIN
GES	Electric Stop Gain	0.00	50.00	-	GAIN
GDPI	Direct Pattern Injection Gain	0.00	50.00	-	GAIN
GP	Proportional Error Gain	0.00	99.99	-	GAIN
GI	Integrator Error Gain	0.00	99.99	-	GAIN
GD	Differential Gain	0.00	99.99	-	GAIN
BDD	Brake Drop Delay	0.00	10.00	-	MOTOR
BSPD	Speed Pick Delay	0.00	10.00	-	MOTOR
SVSC	Voltage Safety Calibration	0.00	10.00	-	GAIN
SISC	Current Safety Calibration	0.00	10.00	-	GAIN
MFRV	Running Motor Field Voltage	25.0	300.0	-	MOTOR

TABLE R.9

DIGITAL DRIVE INDICATORS AND SWITCHES

IMC-DIO BOARD

COMPUTER ON:	When illuminated, indicates that the Safety Processor is looping.
COMPUTER RESET:	When pressed, this button resets the Safety Processor.
OVRSPD:	When illuminated, indicates that the Safety Processor has detected an overspeed condition. This condition can arise from the following: velocity greater than ILO velocity when on Inspection or leveling, or velocity greater than contract speed (VH).
LEARN:	When illuminated, indicates that the Safety Processor is on Learn operation.
DP1:	Illumination reflects the transition of the channel A quadrature signal from the car top landing system.
DP2:	Illumination reflects the transition of the channel B quadrature signal from the car top landing system.
OLM:	When illuminated, indicates the transition through the Outer Leveling Marker. Signal occurs one foot before a floor.
LEARN SWITCH:	Switch used to place the Safety Processor on Learn operation.

IMC-DAS BOARD

PWR/COMPT:	When illuminated solidly, indicates that the IMC-DDP-B processor is looping and the IMC-DAS board is connected properly.
SFLT:	When illuminated, indicates that the Digital Drive's safety monitoring functions have detected one or more safety failures in the Drive Unit and tripped the FLT relay.
RUN ENABLE:	When illuminated, indicates that the Digital Drive is initiating motion. This indicator stays on until the brake drops or a fault is detected.
CH-A:	Illumination reflects the transition of the channel A quadrature signal from the hoist motor encoder. The input is used only if an encoder is used instead of a tachometer for determining hoist motor rpm.
CH-B:	Illumination reflects the transition of the channel B quadrature signal from the hoist motor encoder. The input is used only if an encoder is used instead of a tachometer for determining hoist motor rpm.
DRIVE RESET:	Button used to reset the Digital Drive after the safety monitoring functions have detected one or more safety failures in the Drive Unit and have tripped the FLT relay. Pushing the button resets all the safety monitors and picks the FLT relay if the failure no longer exists.

IMC-GPA-I *(As seen through the Drive cover)*

DRIVE FAULT:	When illuminated, indicates that the Digital Drive's safety monitoring functions have detected one or more safety failures in the Drive Unit and have tripped the FLT relay.
GEN. SHUNT FLD. SATURATED:	When illuminated, indicates that the generator shunt field voltage has reached its maximum value.
GEN. SHUNT FLD. SUPPLY OK:	When illuminated, indicates that the supply voltage for the generator shunt field has reached its rated value. Illumination will occur only while the PT2, PT3 and RB relays on the IMC-PRI board are energized.
MOTOR FIELD FAILURE:	When illuminated, indicates insufficient motor field voltage for the safe operation of the hoist motor.

TABLE R.10

	SOFTWARE TEST POINTS ON THE IMC-DAS	
COM	Common	This is the reference test point against which all other test points are measured. The oscilloscope or voltmeter common lead wire connects here.
T	Tachometer	The tachometer test point is proportional (<u>but not equal</u>) to the actual tachometer voltage. The voltage on T is proportional to car speed.
BFI	Brake Field Current	The voltage is proportional to the current drawn by the brake coil.
MFI	Motor Field Current	The voltage is proportional to the current drawn by the motor field.
GSI	Generator Shunt Field Current	The voltage is proportional to the current drawn by the generator shunt field. A test point voltage of 1.0VDC is almost equal to 1 amp of current through generator shunt field.
ACS	AC Sensing Signal	The phase information (zero crossing point of AC signal) for the brake and motor field triggering circuits is provided at this test point. It provides narrow pulses (+15VDC) when the AC signal changes polarity. To clearly see the triggering point of BFT or MFT signal, the ACS signal must be displayed simultaneously with one of the triggering signals on an oscilloscope. If no voltage is present here the motor field and brake output voltages will not be generated.
BFT	Brake Field Triggering Signal	Triggering signal for the brake. The signal varies inside the AC half cycle to change the brake voltage. No pulse means that brake voltage is zero.
MFT	Motor Field Triggering Signal	Triggering signal for the motor field. It consists of a burst of three pulses and its voltage level varies from -15VDC to +15VDC. These pulses are varied within the AC half cycle to obtain the desired motor field voltage.
DCS	Drive Control Signal	Determines the output voltage of the generator shunt field. This signal is proportional to desired generator shunt field. When this voltage is outside the range of -7.5 to +7.5VDC (with respect to COM), the generator field is saturated.
STP1 STP2 STP3	Software Test Points 1,2 & 3	These test points can be assigned to any software variables listed in Table R.10. The limitation on this test point is that the allowed voltage range is from -10VDC to +10VDC. Make assignments from Option/Calibration screen. (STP3 may not be available in certain versions of the IMC-DAS boards.)

SOFTWARE TEST POINT ASSIGNMENT		
LABEL	DESCRIPTION	Assign to STP 1 & 2 from Option/Calibration Parameter Screen
A	Raw pattern from Pattern Generator	
B	Raw Drive pattern	
C	Pattern with gain (Pattern)	
D	Pattern after acceleration/deceleration limiter (Processed Pattern)	
E	Tachometer feedback with gain (Raw Tachometer)	
F	Tachometer after filtering (Processed Tachometer)	
G	Synthetic Tachometer Signal (Internal Tachometer)	
H	Error between synthetic and external tachometer	
I	Error between pattern and tachometer	
J	Error between pattern and tachometer after filter	
K	IR compensation with gain	
L	Armature feedback voltage with gain	
M	Armature voltage after filtering	
N	DC loop current with gain	
O	DC loop current after filtering (Processed DC Loop Current)	
P	Brake feedback current (Brake Current)	
Q	Motor field feedback current (MF Current)	
R	Loadweigher feedback after filtering (Processed Loadweigher)	
S	Pre-Torque	
T	PID compensation	
U	PID proportional compensation (Proportional Gain)	
V	PID integrator compensation (Integrator)	
W	PID differentiator compensation (Differentiator)	
X	Drive reference	

FIGURE R.1   CRT Main Menu

```
FDX    Main     26- 64   0:51        95/02/24    09:54:24           F4 = main menu


                            MAIN MENU


                  Controller Type: IMC-MG Local

          F1  - Digital Drive Parameters Menu
          F2  - Velocity vs Time Graphic Display
          F3  - Graphic Display of Elevator Status
          F4  - Main Menu
          F5  - Computer Terminal Initialization
          F7  - Special Event Calendar Menu
          F8  - Lockout the Drive Parameters Menu
         MP:v6.13              CPA:v4.52           DPP:v6.08
                                                       dnwp011

                       Enter Selection:
```
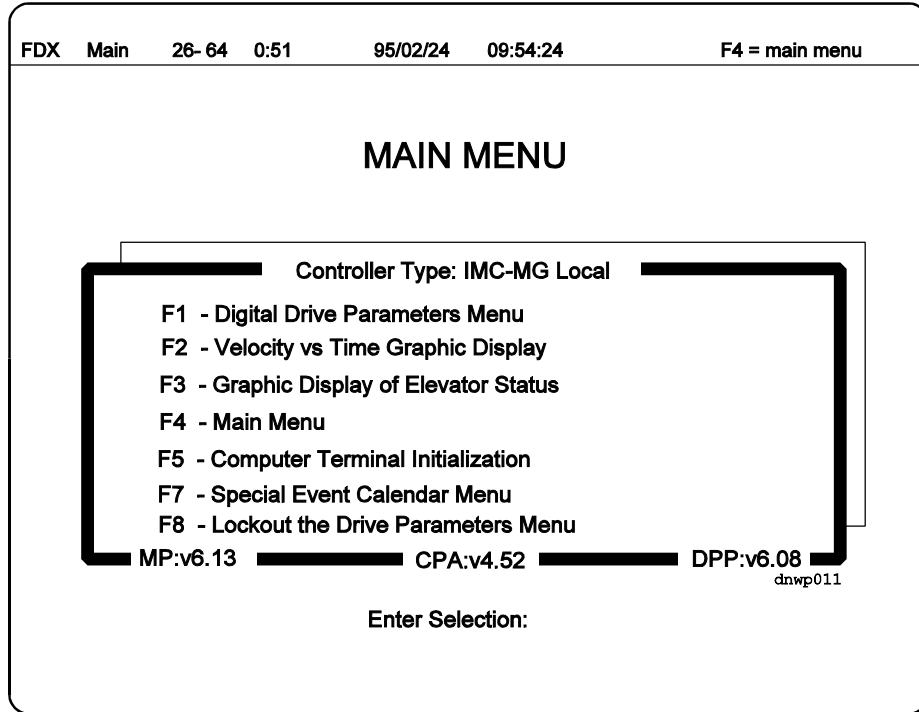
FIGURE R.2   CRT Main Menu (Simplex)

```
FDX          Main              95/02/24    09:54:24        F4 = main menu



                            MAIN MENU


                  Controller Type: IMC-MG Simplex

             F1  - Job Configuration Summary
             F2  - System Performance Graph
             F3  - Graphic Display of Elevator Status
             F4  - Main Menu
             F5  - CRT Terminal Initialization
             F6  - Computer Parameters
             F7  - Special Event Calendar Menu
             F8  - Car "A" Inputs and Outputs
        Shift F2  - Digital Drive Parameters Menu
        Shift F3  - Velocity vs Time Graphic Display
         MP:v6.13              CPA:v4.24           DDP:v6.08
                                                       dnwp013 R0
```

FIGURE R.3 *Digital Drive Parameters Menu (Shift F2 - Simplex, F1 - Local)*

```
 FDX      Main                95/02/24    09:54:24          F4 = main menu

                DIGITAL DRIVE PARAMETERS MENU


                  1 - Pattern Parameters
                  2 - Profile Parameters
                  3 - Motor Parameters
                  4 - Gain Parameters
                  5 - Option/Calibration Parameters
                  6 - Auxiliary Drive Parameters
                  7 - Terminal Limit Switches
                  8 - Floor Heights
                  9 - Dynamic Adjustment Parameters

                                                    dnwp014 R0

                      Enter Selection:
```
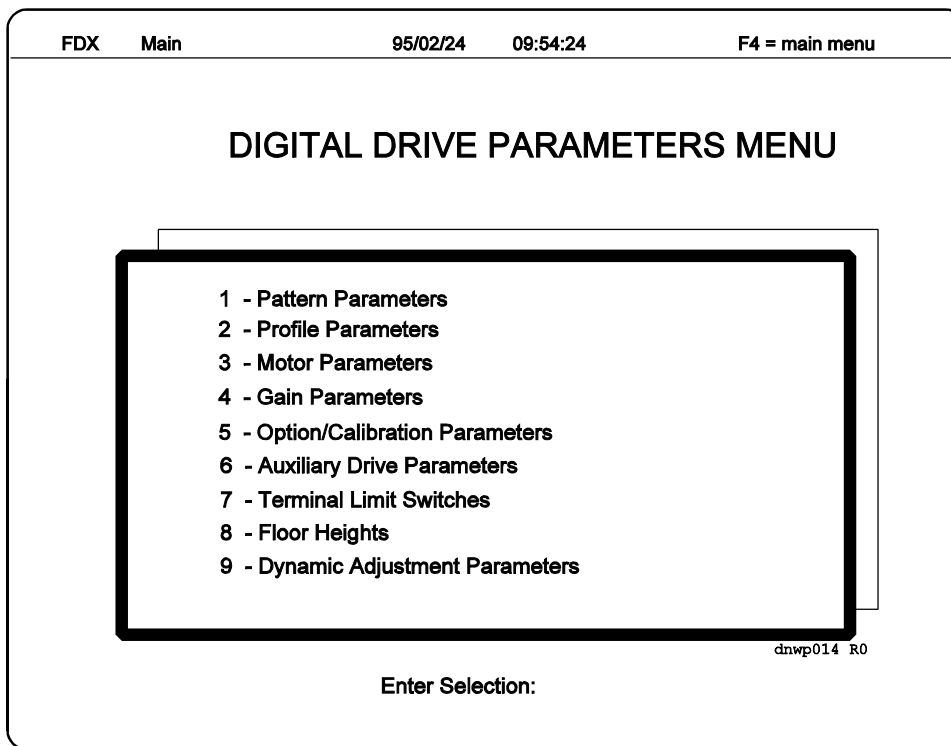
DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.4 *Pattern Parameters Screen (Shift F2-1 - Simplex, F1-1 - Local)*

```
 FDX Main                95/02/13   03:47:40          ESC = previous menu


                      PATTERN PARAMETERS
```

		Parameters	Actual	Desired	Units
JERK:	J1	Phase One..............................	08.00	08.00	ft/(s*s*s)
	J35L	Phase Three/Five - Low..........	04.00	04.00	ft/(s*s*s)
	J35H	Phase Three/Five - High.........	04.00	04.00	ft/(s*s*s)
	J7	Phase Seven..........................	03.00	03.00	ft/(s*s*s)
ACCELERATION:	A0	Phase Zero............................	00.10	00.10	ft/(s*s)
	A2	Phase Two..............................	04.00	04.00	ft/(s*s)
	A6	Phase Six...............................	03.50	03.50	ft/(s*s)
VELOCITY:	VH	Contract..................................	0500	0500	ft/min
	VEQ	Earthquake.............................	150	150	ft/min
	VHL	High Leveling..........................	005	005	ft/min
	VIL	Intermediate Leveling.............	005	005	ft/min
	VFL	Final Leveling.........................	005	005	ft/min
	VRL	Releveling...............................	007	007	ft/min
	VIN	Inspection..............................	050	050	ft/min
	VCR	Correction..............................	050	050	ft/min
	VS	Short......................................	075	075	ft/min
	VLR	Learn.....................................	035	035	ft/min
DISTANCE:	DL	Leveling..................................	0.05	0.05	ft
	DFL	Final Leveling.........................	0.01	0.01	ft
	DEQ	Earthquake Slowdown............	0.01	0.01	ft
	DS	Short Slowdown......................	0.01	0.01	ft
LANDING:	NF	Number of Floors....................	06	06	landings

```
 dnID015 R1
                      S - save changes

  Tab:  Select Field          Rt/Lt Arrows:  Move Cursor       I/D: Inc/Dec Value
```

FIGURE R.5   Profile Parameters Screen (Shift F2-2 - Simplex, F1-2 - Local)

PROFILE PARAMETERS

		Parameters		Actual	Desired	Units
FILTER:	FNR	Normal Profile......................		25.00	25.00	Hz
	FIN	Inspection Profile.................		00.50	00.50	Hz
	FCR	Correction Profile.................		00.50	00.50	Hz
	FTD	Terminal/Danger Profile........		01.00	01.00	Hz
	FEQ	Earthquake Profile................		00.50	00.50	Hz
	FS	Short Run Profile..................		00.50	00.50	Hz
	FLR	Learn Profile........................		00.50	00.50	Hz
MISCELLANEOUS:	MPI	Pattern Interpolation.............		100	100	%
	MLI	Inhibit Distance.....................		0.50	0.50	ft
	MINT	Inhibit Velocity......................		150	150	ft/min
	MDTC	Tracking Compensation.........		0.00	0.00	ft
	MRSR	Rope Stretch Relevel............		0.05	0.05	ft
	MPER	Position Encoder Resolution..		0	0	ppr
	MILO	Inspect/Lev Trip Speed...........		150	150	ft/min

S - save changes

Parameters cannot be modified while the car is in motion

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.6   Motor Parameters Screen (Shift F2-3 - Simplex, F1-3 - Local)

MOTOR PARAMETERS

		Parameters	Actual	Desired	Units
FIELD DATA:	DMFV	Motor Field AC Supply Voltage	236	236	volts
	DBV	Brake AC Supply Voltage.	188	118	volts
	DGFR	Generator Shunt Field Assistance.	057.40	057.40	ohms
	DMFR	Motor Field Resistance.	036.00	036.00	ohms
	DBR	Brake Coil Resistance.	123.00	123.00	ohms
	DGAV	Generator Armature Voltage	240	240	volts
BRAKE:	BPV	Pick Voltage	101	101	volts
	BHV	Hold Voltage	101	101	volts
	BRV	Relevel Voltage	101	101	volts
	BWV	Weakening Delay	0.00	0.00	sec
	BPD	Pick Delay	0.00	0.00	sec
	BDD	Drop Delay	0.00	0.00	sec
	BWD	Weakening Delay	0.00	0.00	sec
	BRD	Repick Delay	0.00	0.00	sec
	BSPD	Speed Pick Delay	0.35	0.35	sec
MOTOR FIELD:	MFSV	Standing Field Voltage	075	075	volts
	MFFV	Forcing Field Voltage	150	150	volts
	MFRV	Running Field Voltage	120	120	volts
	MFW	Start of MF Weakening	010	010	%
	MFPG	Proportional Error Gain	01.00	01.00	factor
	MFIG	Integrator Error Gain	00.00	00.00	factor

dnlD017 R0

S - save changes

Parameters cannot be modified while the car is in motion

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

FIGURE R.7   Gain Parameters Screen (Shift F2-4 - Simplex, F1-4 - Local)

GAIN PARAMETERS

		Parameters	Actual	Desired	Units
VELOCITY LOOP:	GTC	Tachometer/Encoder Scaling . . .	01.00	01.00	factor
	GLV	Loop Voltage Dampening.	01.00	01.00	factor
	GLI	Loop Current Dampening.	00.00	00.00	factor
	GIR	IR Loss Compensation.	00.00	00.00	factor
	GES	Electric Stop.	00.00	00.00	factor
	GDPI	Direct Pattern Injection	00.00	00.00	factor
	GP	Proportional Error.	03.00	03.00	factor
	GI	Integrator Error.	05.00	05.00	factor
	GD	Differential	00.00	00.00	factor
	GIP	Initial Proportion Error	03.00	03.00	factor
	GID	Initial Differential Error.	00.00	00.00	factor
	GRD	Initial Gain Reduction Delay. . . .	00.00	00.00	sec
PRE TORQUE:	GT	Pre-Torque.	00.00	00.00	factor
	GTPC	Pre-Torque Car Position	00.00	00.00	factor
	GCW	Counterweighing Percentage. . .	040	040	%
SAFETY	STE	Maximum Tach Error	050	050	%
CALIBRATION:	SLOC	LOC Trip.	01.25	01.25	factor
	SVSC	Voltage Safety Calibration.	01.25	01.25	factor
	SISC	Current Safety Calibration.	01.00	01.00	factor
PATTERN:	PG	Pattern Adjust Gain	1.00	1.00	factor
	PZA	Zero Pattern Adjustment.	0.00	0.00	factor
	PADL	Pattern Acc/Dec Limiter	10.00	10.00	volt/s
REDUCED	GRP	Reduced Proportional Error. . . .	03.00	03.00	factor
GAINS:	GRI	Reduced Integrator Error.	05.00	05.00	factor
	GRGD	Reduced Gain Delay.	00.00	00.00	sec
	GRGT	Reduced Gain Transition.	00.00	00.00	sec

dnID018b   S - save changes
             Parameters cannot be modified while the car is in motion

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.8   Option/Calibration Parameters Screen (Shift F2-5 - Simplex, F1-5 - Local)

OPTION/CALIBRATION PARAMETERS

		Parameters	Actual	Desired	Units
SOFTWARE	OSR	Speed Reference (INT/EXT).	EXT	EXT	N/A
OPTION:	OET	Encoder/Tachometer.	TAC	TAC	N/A
	OLOC	Learn Loop Overload Current.	ON	ON	N/A
	OAT	Auto-Tune.	OFF	OFF	N/A
	OTE	Pre-Torque Enable.	OFF	OFF	N/A
	OEAC	Encoder Auto Calibration.	OFF	OFF	N/A
	OBT	Buffer Test.	OFF	OFF	N/A
	OCMF	Close Loop Motor Field.	OFF	OFF	N/A
	OACF	AC Line Frequency (50/60).	60	60	N/A
SOFTWARE	TP1	Test Point One.	D	D	N/A
TEST POINT:	TP2	Test Point Two.	G	G	N/A
	TP3	Test Point Three.	A	A	N/A
FILTER:	FET	Encoder/Tachometer.	50.00	50.00	Hz
	FRP	Raw Pattern.	02.00	02.00	Hz
	FPP	Processed Pattern.	04.00	04.00	Hz
	FLP	Loop Current.	50.00	50.00	Hz
	FLLV	Loop Voltage-LP.	50.00	50.00	Hz
	FHLV	Loop Voltage-HP.	00	00	Hz
CRT	CBV	Brake Voltage.	01.00	01.00	factor
CALIBRATION:	CMFV	Motor Field Voltage.	01.00	01.00	factor
	CGFV	Gen. Shunt Field Voltage.	0.00	0.00	factor
	CLI	DC Loop Current.	00.00	00.00	factor
	CTR	Tachometer RPM Ratio.	60.00	60.00	V/1000

dnID005 R1
                         S - save changes

             Parameters cannot be modified while the car is in motion

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.9   Auxiliary Drive Parameters (Shift F2-6 - Simplex, F1-6 - Local)

```
FDX Main              95/02/13  03:47:40           ESC = previous menu


                      Auxiliary Drive Parameters

              Parameters                        Actual   Desired   Units

OPTION:   ONF   Notch Filter. . . . . . . . . . . . . . . . . .    OFF      OFF    N/A
          OIGR  Initial Relevel Gain. . . . . . . . . . . . . .    OFF      OFF    N/A
          OSP   Spare Option. . . . . . . . . . . . . . . . .      OFF      OFF    N/A
GAIN:     GDEC  Direct Error Compensation . . . . . . . . . .    00.75    00.75    N/A
          GALV  Alternate Loop Voltage Dampening. . . . .        00.00    00.00    N/A
          GIRP  Initial Relevel Proportional. . . . . . . . . .   04.00    04.00    N/A
          GIRI  Initial Relevel Integrator . . . . . . . . . . .  03.50    03.50    N/A
          GIRD  Initial Relevel Differential. . . . . . . . . . . 00.00    00.00    N/A
FILTER:   FDLP  Differential - Low Pass . . . . . . . . . . . .  003.00   003.00   Hz
          FDHP  Differential - High Pass .. . . . . . . . . . .  004.00   004.00   Hz
          FEC   Smoothing for Error Compensation . . . .        008.00   008.00   Hz
          FPES  Smoothing for Proportional Error. . . . . .     000.00   000.00   Hz
          FNP1  Notch Filter Parameter 1. . . . . . . . . . .   010.00   010.00   N/A
          FNP2  Notch Filter Parameter 2. . . . . . . . . . .   050.00   050.00   N/A
          FNP3  Notch Filter Parameter 3. . . . . . . . . . .   000.33   000.33   N/A
          FBD   Smooth Brake Drop . . . . . . . . . . . . . .   100.00   100.00   Hz
MISC:     MSP0  Spare 0 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MRLE  Rate Limiter for Error Comp. . . . . . . . .     10.00    10.00    V/Sec
          MLLC  Learned Loop Current. . . . . . . . . . . . .    00.00    00.00    N/A
          MSP1  Spare 1 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MSP2  Spare 2 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MSP3  Spare 3 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MSP4  Spare 4 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MSP5  Spare 5 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A
          MSP6  Spare 6 . . . . . . . . . . . . . . . . . . . .  000.00   000.00   N/A

dnID158a R0
                      S - save changes

              Parameters cannot be modified while the car is in motion

  Tab:  Select Field        Rt/Lt Arrows:  Move Cursor        I/D: Inc/Dec Value
```

DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.10   Terminal Limit Switches Screen (Shift F2-7 - Simplex, F1-7 - Local)

```
CAPS        FDX Main      95/02/13  03:47:40         ESC = previous menu


                    TERMINAL LIMIT SWITCHES


Switch              Learned Velocity              Learned Position

UNT1                0365   ft/min                 193'02.25"
UNT2                0227   ft/min                 196'04.69"
UNT3                0000   ft/min                 000'00.00"
UNT4                0000   ft/min                 000'00.00"
UNT5                0000   ft/min                 000'00.00"
DNT1                0366   ft/min                 004'08.06"
DNT2                0223   ft/min                 001'05.62"
DNT3                0000   ft/min                 000'00.00"
DNT4                0000   ft/min                 000'00.00"
DNT5                0000   ft/min                 000'00.00"
UETS                0332   ft/min
DETS                0332   ft/min

dnID021 R0


                A zero indicates an unused switch.
```

DO NOT PROGRAM THESE VALUES! (FOR EXAMPLE ONLY)

FIGURE R.11 Floor Heights Screen (Shift F2-8 - Simplex, F1-8 - Local)

```
CAPS   FDX Main    95/02/13     03:47:40     ESC = previous menu


                       FLOOR HEIGHTS


              Lnd       Actual        Desired

              22      197'09.56"     197'09.56"
              21      189'02.81"     189'02.81"
              20      180'07.87"     180'07.87"
              19      172'01.31"     172'01.31"
              18      163'06.37"     163'06.37"
              17      154'11.44"     154'11.44"
              16      146'04.87"     146'04.87"
              15      137'09.94"     137'09.94"
              14      129'03.37"     129'03.37"
              13      120'08.44"     120'08.44"
              12      112'01.50"     112'01.50"
              11      103'06.94"     103'06.94"
              10      094'11.44"     094'11.44"
               9      086'04.69"     086'04.69"
               8      077'09.19"     077'09.19"
               7      069'02.25"     069'02.25"
               6      060'07.69"     060'07.69"
               5      052'00.75"     052'00.75"
               4      043'06.19"     043'06.19"
               3      034'10.69"     034'10.69"
               2      026'03.94"     026'03.94"
               1      017'09.00"     017'09.00"
               M      009'00.00"     009'00.00"
               B      000'00.00"     000'00.00"

dnwp007

                    S - save changes


 Tab: Select Field    Rt/Lt Arrows: Move Cursor    I/D: Inc/Dec Value

```

FIGURE R.12   Dynamic Parameters Warning Screen (Shift F2-9 - Simplex, F1-9 - Local)

WARNING !

ANY MODIFICATION TO THE DYNAMIC PARAMETERS MAY IMMEDIATELY AFFECT
SAFE OPERTION AND PERFORMANCE OF THIS ELEVATOR

TO EXIT: Press the ESC key on the keyboard.

TO PROCEED: Type the word "MODIFY" in the space between the
                         arrows and then press the ENTER key.

>>>>>>>>>>   <<<<<<<<<<

dnid023a R0

FIGURE R.13   Dynamic Adjustment Parameters Screen (Shift F2-9 - Simplex, F1-9 - Local)

FDX Main   95/02/24 10:02:24   ESC = main menu

OPERATION

Drive Normal
Idle Task
Standby

DRVR	DRVE	PGU	ORR
RNE	TIN	SPR	PGS
SMF	TEX	PGR	PGE
BRE	BRP		

3
↑

Flr #

VELOCITY

Pattern:	0000	fpm
Tach:	0000	fpm
Safety:	0000	fpm
Motor:	0000	rpm
OLM:	0137	fpm

MACHINE

Motor:	074	V
Brake:	000	V
Generator:	000	V
Armature:	-002	V
DC Loop:	-016	V

POSITION

Rel:	094'04.69"
Abs:	017'09.00"
OLM:	-000'09.00"

Flr #: 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 M B

[   ]

DYNAMIC PARAMETERS

GAIN	PG	Pattern Gain.	1.00
	PZA	Zero Pattern Adj.	0.00
	GTC	Tach/Encoder.	01.62
	GLV	Loop Voltage	01.25
	GLI	Loop Current	00.00
	GIR	IR Compensation	00.00
	GES	Electric Stop	00.00
	GDPI	Direct Pttrn Inj.	00.00
	GP	Proportional Err.	02.50
	GI	Integrator Error.	02.50
	GD	Differential.	00.00
BRAKE	BDD	Brake Drop Delay.	0.00 S
	BSPD	Speed Pick Delay.	0.35 S
SAFETY	SVSC	Voltage Sfty Cal.	01.25
	SISC	Current Sfty Cal.	00.00
MOTOR	MFRV	Running Field.	120 V

DRIVE

TF	MF	UETS
TE	BF	DETS
TSAT	GSF	
TME	HV	GSAT
FLT	FLTB	LOC
SAF	FBLT	DEL
CNPB		RNF
CNPG		

PATTERN

RD	LEV	FLR	LI	INS
PR	OLM	STP	INT	EQ
R5	LU	RDS	LLT	SPR
R4	DZ	PRS	OLD	SPC
R3	LD	PPS	OLP	SPT
R2	UP	IBJ	TPS	
R1	H		LOP	
R0	DN		LOD	

dnID008b

UP/DN = select   I/D/N = inc/dec/normal   TAB = enter hoistway calls

FIGURE R.14   Velocity vs Time Graphic Display (Shift F3 - Simplex, F2 - Local)

A0   Acceleration — starting.
J1   Jerk at start.
A2   Acceleration — maximum.
J35L Jerk before/ after peak for Contract speed.
VH   Contract speed.
J35H Jerk before/ after peak for one— floor run speed.
A6   Deceleration — maximum.
J7   Jerk before leveling.
VHL   High (initial) leveling speed.
DL   Leveling distance.
VIL   Intermediate leveling speed.
VFL   Final stabilized leveling speed.
DFL   Final stabilized leveling distance.
DTC   Tracking compensation distance.

DN: 1703   R2

FIGURE R.15   Graphic Display of Elevator, F3 Screen

FDX Main   17-31   1:03   95/02/24   10:05:09   **F 4 = main menu**

CAR OPERATION
IndSrv	InspAcc	MnFire1
AntiNui	Byp—HLW	SftyOpn
BFlrDem	TFlrDem	EQactv
HospEmr	EmrgPwr	Nudging
SwngOpr		

DRIVE
Oper: Drive Ready

| DRVR | RNF | BRP | SMF | TIN |
| DRVE | RNE | BRE | | TEX |

Motor Field: 153.90V
Brake Field: 224.58V
Shunt Field: −034.23V
Armature: 320.51V
DC Loop: 127.07A

Fault
TF	MF	FLT	UETS	P3C
TE	BF	FLTB	DETS	P4C
TSAT	GSF	FBLT	SAF	P5C
TME	HV	DTS	CNPB	P6C
GSAT	LOC	DEL	CNPG	

SAFETY
Speed:
SPR	UT5	UT4	UT3	UT2	UT1
SPT	DT5	DT4	DT3	DT2	DT1
LRN	UET	DET	OS	ILO	NTS

FLOOR
HEIGHT   A   FLR
           IN   #

8

7

6

5

4

3

2

1

51'11.29"

000'00.00"

PATTERN GENERATOR
Oper:		Normal Profile
Type:		Maximum
Mode:		Phase Five
Media:		Rcv DPRAM

| DRVR | PGS | PGR | ORR | SPR |
| DRVE | PGE | PGU | | TPR |

RD	PR	R5	R4	R3	R2	R1	R0
FLR		LEV	LD	DZ	LU	OLM
LI		INT	DN	H	UP	STP
				LRN	EQ	INS

Fault
FHC	RDS	LLT	SSO	SPP	CPL
P1C	PRS	OLD	OFH	SPC	CPP
P2C	IDM	OLP	TFH	SPT	CPI
IDC	PPS	TPS	VC		
SWC	IBJ	LOP	VS		
		LOD	FHL		

POSITION
Relative	024'08.78"
Absolute:	51'11.29"
Delta OLM:	−000'00.24"

VELOCITY
Pattern:	1200 ft/min
Tachometer:	1198 ft/min
Motor:	180 rev/min
OLM:	0163 ft/min

D/N: 1704b R0

FIGURE R.16   Computer Parameters Screen, F6 (Simplex only)

FDX Main   95/02/13   03:47:40   F4 = main menu

MCE Computer Parameters

Real Time Clock   System Variables

Year. 93   Lobby Floor. . . . . Landing   01
Month. . . . 01   Primary Parking Floor. Landing   01
Date. 02
Day. . . . . MON
Hour. 01
Minutes. . . . 07
Seconds. . . 28   Anti-Nuisance Call Cancel. . . . . OFF

Miscellaneous Timers   Door Timers

MG Time (MGT). . . . . 05 min   Short Door Time (SDT) . . . . 02 sec
Time Out of Service (TOS). . . . . 040 sec   Car Call Time (CCT) . . . . 04 sec
                                                        Hall Call Time (HCT) . . . . 06 sec
                                                        Lobby Call Time . . . . .08 sec

dnID029 R0

Tab: Select Field   Rt/Lt Arrows: Move Cursor   I/D: Inc/Dec Value

R-26 •   REFERENCE   42-02-6202

NOTCH FILTER ADJUSTMENT

The Current Notch Filter parameters are used to remove any oscillation in the system. The parameters, Current Notch Parameter 1 (FNP1), Current Notch Parameter 2 (FNP1), Current Notch Parameter 3 (FNP1) are found on the Auxiliary Drive Parameters (Shift 2-6 - Simplex, F1-6 - Local) screen. To enable the notch filter, the Notch Filter (ONF) parameter must be set to ON.   It is possible to select different combinations of these parameters and get the same notch frequency.

TABLE R.12

Oscillation Frequency (Hz)	CURRENT NOTCH FILTER PARAMETERS		
	FNP1	FNP2	FNP3
5.0	10.0	50.0	0.70
5.8	10.0	50.0	0.50
7.6	10.0	50.0	0.30
8.2	10.0	50.0	0.25
9.3	10.0	50.0	0.20
9.8	10.0	50.0	0.18
10.5	10.0	50.0	0.16
11.0	10.0	50.0	0.14
12.0	10.0	50.0	0.12
13.0	10.0	50.0	0.10
13.7	10.0	50.0	0.09
14.7	10.0	50.0	0.08
15.0	10.0	50.0	0.07
17	10.0	50.0	0.06
18	10.0	50.0	0.05
20	10.0	50.0	0.04
24	10.0	50.0	0.03
30	10.0	50.0	0.02
40	10.0	50.0	0.01

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