USING THE MAGNET 2001 CONTROLLER

2

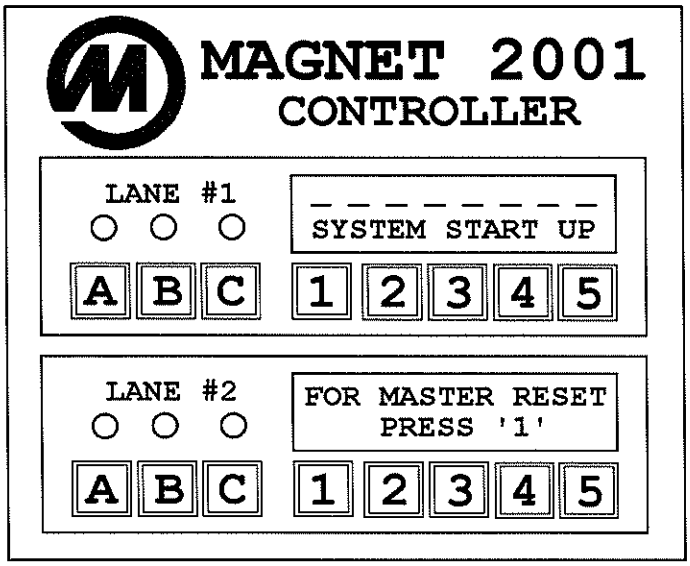
After reading this chapter you should be able to:

Use the Magnet 2001 Controller to start and stop pinsetters.

Perform verifications of the different pinsetter components.

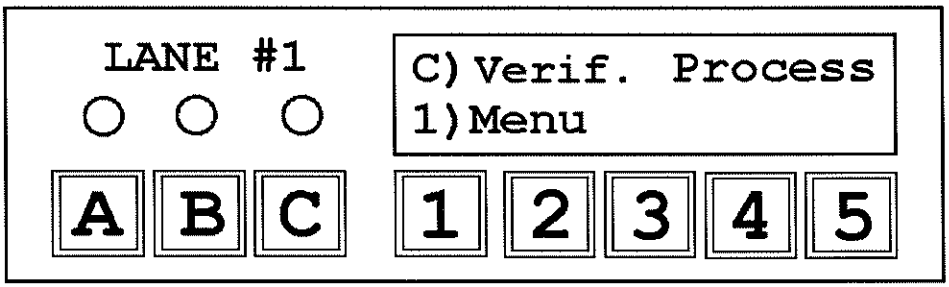
Display relevant information on each pinsetter.

Power On



When the electrical power is turned on to the pair of lanes, the Magnet 2001 Controller will display a message indicating its start up. Allow the pinsetters to start up normally unless you have experienced a problem which would necessitate a RESET.

Once the Magnet 2001 Controller is started, its buttons (or keys) have different functions depending on what is displayed except for the letter buttons. The letter buttons react as indicated below ***whenever*** pressed. Each display unit shows two lanes and the commands are independent of each other except for the **A** button.



Button	*Function*
A	Commonly called the PANIC BUTTON, pressing the **A** button will reset ***both*** pinsetters causing them to go through their synchronization cycles.
B	USER PROBLEM BUTTON, pressing the **B** button will stop the corresponding pinsetter immediately (if the E-MD92-92 version is 1.14 or older, the pinsetter will stop only if it was in movement at the time the button was pressed). Pressing the **B** button for one pinsetter has no effect on the other pinsetter. To return the pinsetter to its normal operation, the **B** button must be pressed again.
C	VERIFICATION PROCEDURES BUTTON, pressing the **C** button will activate or deactivate the Component Verification Procedures (tests) for the MM-2001 pinsetter.
Numbers	The number keys are used to gain access to the menu system and carry out pre-programmed items. Refer to "Chapter 4 - Troubleshooting" for additional information.

Component Verification Procedures

The installation procedures used by Mendes technicians include the verification procedures. These procedures may be carried out at any time by pressing **C** on the Magnet 2001 Controller. In doing so, you gain access to the verification procedures used to test each electronic component in a logical and systematic order.

The verification procedure is composed of three different steps:

1) Verification of all input signals from the major components;

2) Verification of all output signals to the major components;

3) Calibration of both the deck and the drawer.

The operator may exit the verification procedures at all times by pressing **C** on the Magnet 2001 Controller. It is also possible to skip over the different tests, performing only the ones desired.

When performing the verification procedures, make sure that you follow the instructions indicated in the display window.

Testing Input Signals

All input signals may be verified by performing an optical transition test (*pass an object through the optical sensor or in front of the optical transmitter in order to cut its signal*). If the transition is successful, the Magnet 2001 Controller automatically passes to the next test. If the transition is not successful, the Magnet 2001 Controller will continue to display the same message until a transition is successful or until the test is skipped. The following pages list the INPUT SIGNAL TESTS displayed and a brief description for each one. The tests are listed in the order in which they appear during the installation procedure.

The first test is to verify that the drawer's back limit optical sensor (***DWBL***) is functioning correctly.

```
DWBL        5)Skip
Make Transition
```

The drawer's back limit optical sensor (***DWBL***) must be verified a second time in order to test the drawer's DC drive communication bypass with the input circuit board.

```
DWBL again 5)Skp
Make Transition
```

The drawer's front limit optical sensor (***FRNT***).

```
FRNT        5)Skip
Make Transition
```

The drawer obstruction optical transmitter & drawer obstruction optical receiver (***DWOB***). At this time you should also verify that the two components used are well aligned by insuring that the green LED is clearly visible on the transmitter.

```
DWOB        5)Skip
Make Transition
```

The drawer obstruction optical transmitter & drawer obstruction optical receiver (***DWOB***) must be verified a second time in order to test the drawer's DC drive communication bypass with the input circuit board.

```
DWOB again 5)Skp
Make Transition
```

The deck's upper limit optical sensor (***DKUP***). This only appears if the deck IS NOT in its uppermost position. **If the deck IS in its uppermost position then the "Skip Test/Move Deck" will be displayed:**

```
DKUP        5)Skip
Make Transition
```

```
1)Skip Test
2)Move Deck
```

If you don't wish to skip the test, you must use the manual deck crank (Z-ME4100) supplied in your spare parts kit to physically lower the deck so as to have the optical sensor actuator completely removed from the sensor. Once the deck is lowered, press **2** on the Magnet 2001 Controller. If the transition was successful, the Magnet 2001 Controller automatically passes to the next test. If the transition was not successful, the Magnet 2001 Controller will once again display "DKUP 5)Skip" which in effect keeps the same test active but this time with the deck not being in its uppermost position.:

The deck's upper limit optical sensor (***DKUP***) must be verified a second time in order to test the deck's DC drive communication bypass with the input circuit board. This only appears if the deck **IS NOT** in its uppermost position. **If the deck IS in its uppermost position then the "Skip Test/Move Deck" will be displayed:**

```
DKUP again 5)Skp
Make Transition
```

```
1)Skip Test
2)Move Deck
```

If you don't wish to skip the test, you must use the manual deck crank (Z-ME4100) supplied in your spare parts kit to physically lower the deck so as to have the optical sensor actuator completely removed from the sensor. Once the deck is lowered, press **2** on the Magnet 2001 Controller. If the transition is successful, the Magnet 2001 Controller automatically passes to the next test. If the transition is not successful, the Magnet 2001 Controller will once again display "DKUP again 5)Skip" which in effect keeps the same test active but this time with the deck not being in its uppermost position.

```
DOWN        5)Skip
Make Transition
```

The deck's lower limit optical sensor (***DOWN***). This only appears if the deck IS NOT in its lowermost position. **If the deck IS in its lowermost position then the "Skip Test/Move Deck" will be displayed:**

```
1)Skip Test
2)Move Deck
```

If you don't wish to skip the test, you must use the manual deck crank (Z-ME4100) supplied in your spare parts kit to physically raise the deck so as to have the optical sensor actuator completely removed from the sensor. Once the deck is raised, press **2** on the Magnet 2001 Controller. If the transition was successful, the Magnet 2001 Controller automatically passes to the next test. If the transition was not successful, the Magnet 2001 Controller will once again display "DOWN 5)Skip" which in effect keeps the same test active but this time with the deck not being in its lowermost position.

```
OORG        5)Skip
Make Transition
```

The out of range detector (***OORG***) must be verified by pushing up on the metal plate located on the underside of the deck. This plate will make contact with the switch located inside the deck, thus closing the circuit and producing a pulse signal to the electronics.

```
OORG again 5)Skp
Make Transition
```

The out of range detector (***OORG***) must be verified a second time in order to test the deck's DC drive communication bypass with the input circuit board.

```
SWUP        5)Skip
Make Transition
```

The sweep's up position optical sensor (***SWUP***).

```
SWFW        5)Skip
Make Transition
```

The sweep's forward position optical sensor (***SWFW***).

```
BLRD        5)Skip
Make Transition
```

The ball ready optical transmitter (***BLRD***) used to signal a ball's presence at the accelerator's door.

```
BDOP        5)Skip
Make Transition
```

The ball door optical sensor (***BDOP***) used to signal the status of the ball accelerator's door (open or closed).

```
CSENSOR-1 5)Skip
Make Transition
```

The first of seven reed switch detectors (***CS1***) located in the detection bar assembly used to signal the presence of pins in the magazine. Number 1 detector is located to the left. To perform a transition, place a pin in its corresponding magazine station.

```
CSENSOR-2 5)Skip
Make Transition
```

The second of seven reed switch detectors (***CS2***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

```
CSENSOR-3 5)Skip
Make Transition
```

The third of seven reed switch detectors (***CS3***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

```
CSENSOR-4 5)Skip
Make Transition
```

The fourth of seven reed switch detectors (***CS4***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

```
CSENSOR-5 5)Skip
Make Transition
```

The fifth of seven reed switch detectors (***CS5***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

The sixth of seven reed switch detectors (***CS6***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

The last of seven reed switch detectors (***CS7***) located in the detection bar assembly used to signal the presence of pins in the magazine. To perform a transition, place a pin in its corresponding magazine station.

The pin elevator's left side optical sensor (***PL***) used to signal the presence of a pin on the elevator's left side.

The pin loader's left side optical sensor (***LL***) used to signal the presence of a pin on the loader's left side.

The pin elevator's right side optical sensor (***PR***) used to signal the presence of a pin on the elevator's right side.

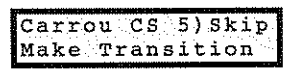
The pin loader's right side optical sensor (***LR***) used to signal the presence of a pin on the loader's right side.

The pin elevator's optical sensor (***ER***) used to signal the elevator's movement.

The carrousel's station synchronization optical sensor (***SS***). One of the 14 bucket assemblies has an optical actuator welded to it which allows for the synchronization.

The carrousel's pin detector optical sensor (***PD***) used to signal the presence of pins in the revolving carrousel.

The carrousel's synchronization optical sensor (***CS***). This sensor is located on top of the carrousel and is activated by the encoder. To perform the transition, gently rotate the carrousel since the encoder is marked at every ¼ inch.



Testing Output Signals

All output signals may be verified by pressing **1** on the Magnet 2001 Controller or skipped by pressing **5** in order to go to the next test.. Pressing **1** will send a power ON signal to the output device being tested followed automatically by a power OFF signal. After each output test is completed, the following will be displayed:

```
1)Again
2)Next Test
```

Each output signal may be tested as often as desired before going on to the next test. It must be noted that the electronics do not verify the fact that the component was actually activated. You must verify the fact of functionality on your own. The only electronic reaction to each command is to turn on the corresponding LED on its corresponding circuit board (refer to the Wiring Diagrams beginning on page 94 of the Magnet 2001 Pinsetter Manual for more details on the location of each LED). The following list contains the OUTPUT SIGNAL TESTS displayed and a brief description for each one. The tests are listed in the order in which they appear during the installation procedure.

If your pinsetters are wired as per pages 188 and 189 of this manual, the pinsetter's main motor must be on in order to perform the fluorescent lights test.

```
Fluorescent
1)Start   5)Skip
```
The pinsetter's fluorescent light.

```
Sweep Clutch
1)Start   5)Skip
```
The sweep's magnetic clutch.

```
Elevator Clutch
1)Start   5)Skip
```
The pin elevator's magnetic clutch.

```
Ball Clutch
1)Start   5)Skip
```
The ball door's magnetic clutch.

```
Ball 1 Light
1)Start   5)Skip
```
The pinsetter's ball 1 light.

```
Ball 2 Light
1)Start   5)Skip
```
The pinsetter's ball 2 light.

```
Trouble Light
1)Start   5)Skip
```
The pinsetter's trouble light.

```
Ball Lift
1)Start   5)Skip
```
The ball lift's motor (actually the 24-volt relay which activates the ball lift's motor).

```
Main Motor
1)Start   5)Skip
```
The pinsetter's main motor.

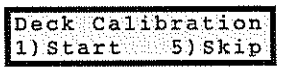
```
Ball Acc. Motor
1)Start   5)Skip
```
The ball accelerator's motor.

```
Carrou Solenoids
1)Start   5)Skip
```
Each of the 14 carrousel solenoids.

Calibration Tests

Calibration tests are vital to the pinsetter's good operation. During these tests, the pinsetter will physically measure the distance it has to travel during its various cycles and store the information for future reference. Since distances traveled by the different components of the pinsetter are measured in sixteenths of an inch, the slightest movement of an optical sensor necessitates a calibration adjustment. Listed below are the CALIBRATION TESTS displayed and a brief description for each one. The tests are listed in the order in which they appear during the installation procedure.

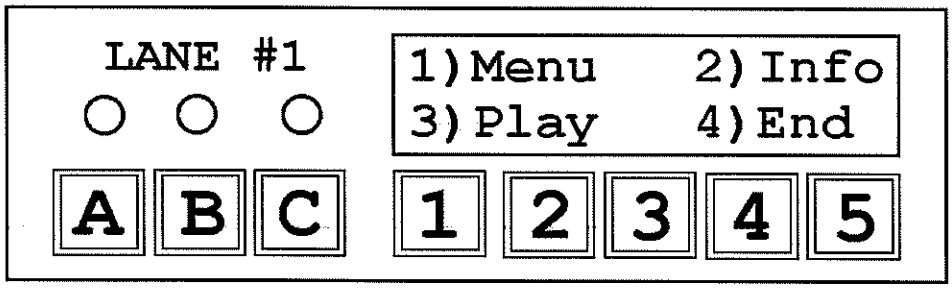
Performs the *deck calibration command.* The deck will physically calibrate itself in conjunction with the deck's lower limit optical sensor.



Performs the *drawer calibration command.* The drawer will physically calibrate itself in conjunction with the drawer's front limit optical sensor.

Menu System

The Magnet 2001 Controller has a user friendly menu system which is built in a pyramidal fashion in order to facilitate its use. Most of the components listed on the preceding pages under verifications are also accessible through the menu system along with many other options which are combined together in categories. Each category is branched out into groups and sub-groups, thus making the controller easy to use and understand.



Press	*to gain access to*
1) Menu	the Main Menu System.
2) Info	the Pinsetter Information display..
3) Play	the Play Information & Commands display.
4) End	the previous menu.

Pinsetter Information

Depending on the version of the EPROM located on the E-MD92-92 circuit board, different information is available to you. Listed below is the information displayed with version 1.16, you may have less information if your version number is lower.

```
1)Seri    2)Cycle
3)Phas    4)More
```

Pressing **1** will display your pinsetter's serial number.

```
Serial Number:
MD92-92-
```

Pressing **2** will display the number of Full Sets completed by the pinsetter.

```
Total Full Set:
              5896
```

Pressing **3** will display the electrical phase used (50 or 60 Hz.).

```
System Phase:
50 Hertz
```

Pressing **4** will present another display with more options as indicated below.

```
1)Ver     2)ReSt
3)Dsw     4)Pins
```

Pressing **1** will display the version number of the EPROM located on the E-MD92-92 circuit board.

```
     VERSION
       1.16
```

Pressing **2** will display the type of RESET last seen by the controller. The display which follows is only an example, various displays are possible.

```
External Reset
```

Pressing **3** will display the setting which is in effect for dip switches SW301 and SW302 (0 = OFF, 1 = ON). The example below displays the Mendes factory settings.

```
SW302-> 00000000
SW301-> 00000000
```

Pressing **4** will display the status of each pin as seen by the pin detection camera (0 = NO PIN, 1 = PIN PRESENT). The example below indicates that the camera is reading pins 3, 6, and 10.

```
Pin  12345678910
pos: 0010010001
```

Play Information & Commands

Depending on the version of the EPROM located on the E-MD92-92 circuit board, different information is available to you. Listed below is the information displayed with version 1.16, you may have less information if your version number is lower.

```
1)Info  2)Enab
3)MoId  4)Sdsw
```

Pressing **1** will display the global ball detector status. The example below indicates the default settings.

```
AO)1 BI)0 EB)1
VB)1 TpuB)0 MI)0
```

- **AO** is the lane status (1 = open, 0 = closed);
- **BI** is the ball input status (1 = ball detected (TPU), 0 = pinsetter reaction to detected ball);
- **EB** is the ball enable status (1 = active, 0 = inactive);
- **VB** is the ball valid status (1 = ready, 0 = waiting for pinsetter to complete its cycle);
- **TpuB** is the ball toggle status (1 = infra-red light beam interrupted, 0 = infra-red light beam present).
- **MI** is the automatic scoring idle mode (1 = idle, 0 = normal). See below for more information.

Pressing **2** will reset the ball detector global settings to their default settings.

Pressing **3** will access the AUTOMATIC SCORING IDLE MODE. This mode was introduced with version 1.16 and is used to de-activate the automatic scoring functions (especially the ball detector) in order that the lanes be dressed with an automatic lane machine without the pinsetter cycling. Press 2 to set the idle mode and press 1 to return to normal once lane dressing is completed. Pressing 5 will return to the previous menu.

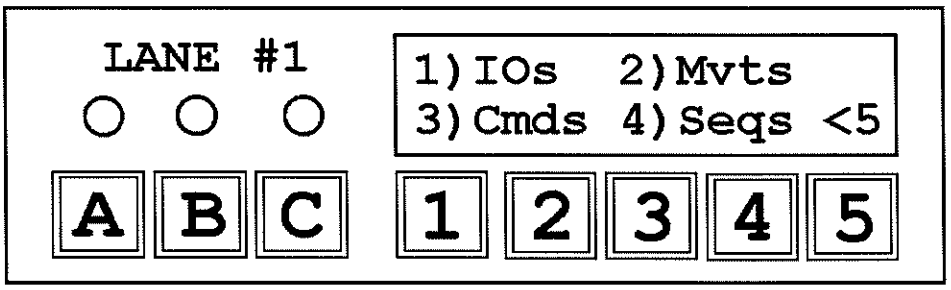
```
1)Set OFF
2)Set ON      <5
```

Pressing **4** allows the user to change dip switch settings on the E-MD92-92 circuit board without having to RESET the board afterwards. This option is practical when a lane is already in play and the user wishes to change a dip switch setting. After having pressed 4, change the desired dip switch settings and then press any key on the Magnet 2001 Controller in order to confirm the changes.

```
Set dip switches
AND hit any key!
```

Main Menu

After having pressed **1** while in the Menu System, the four (4) major categories of the menu system will be presented. Each category is divided into different groups and sub-groups accessible through the major categories.

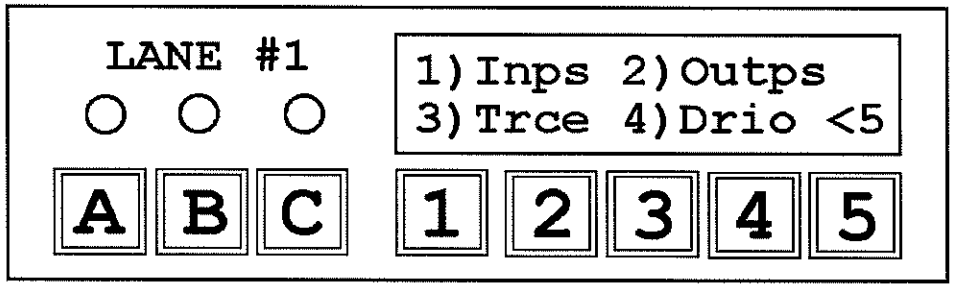


Once in the main menu, you make choices through the number buttons on the controller. Pressing **5** will always return you to the previous menu viewed or skip to the next operation depending on the circumstances and what was displayed on the Magnet 2001 Controller.

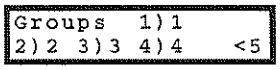
Category	*Gains access to*
1) IOs	the input/output signals used to verify the status of different pinsetter sensors and circuits (inputs) and also to activate and/or de-activate various pinsetter components (outputs) in order to verify their functionality. The input/output signals are divided into 4 major groups under Menu 1.
2) Mvts	the movement commands used to send minor commands to the different moving parts in order to verify their movement and functionality. The movement commands are divided into 4 major groups under Menu 2. During movement commands, the Magnet 2001 Controller will display the action being taken and then return the display to its previous condition allowing the user to select another movement command or return to the previous menu display.
3) Cmds	the basic pinsetter commands used to send major commands to the pinsetter as a whole. These commands will start every moving part necessary in order to perform what is asked of the pinsetter. The basic pinsetter commands are divided into 4 major groups under Menu 3. During pinsetter commands, the Magnet 2001 Controller will display the action being taken and then return the display to its previous condition allowing the user to select another pinsetter command or return to the previous menu display.
4) Seqs	the sequential pinsetter commands used to send major commands to the pinsetter on a repetitive basis. These commands will start every moving part necessary in order to perform what is asked of the pinsetter. The sequential pinsetter commands are divided into 3 major groups under Menu 4. During sequential commands, the Magnet 2001 Controller will display the action being taken and once completed will return the display to its previous condition allowing the user to select another movement command or return to the previous menu display.

A detailed layout of the menu structure may be found at the end of this chapter.

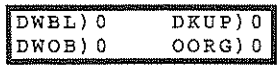
MENU 1 INPUT/OUTPUT SIGNALS



Group	*Gains access to*
1) Inps	the input signals as received by the input circuit board (E-MD92-14) and which originate from different optical reading devices. When using the input signals option, a code number is displayed next to each item in order to inform you of its status. The possible values returned by the different pinsetter components when verifying inputs are 0 and 1. A displayed 0 indicates that the signal is OFF (sensor is not obstructed) while 1 indicates that the signal is ON (sensor is obstructed).
2) Outps	the output signals used to turn on and off the different electrical components through the 24-volt output circuit board (E-MD92-24), the 90-volt output circuit board (E-MD92-90) and the three AC drive circuit boards (E-MD92-01). Contrary to the verification procedures, the menu options under Menu 1.2 will send an ON command to the component if it is off and will send an OFF command to the same component if it is on. The component will remain in the ON or OFF state until another command is sent. For example; if pinsetter 1's fluorescent light is OFF and you press 1 while in Menu 1.2.1, the fluorescent light will be turned ON and remain ON until you press 1 again.
3) Trce	the tracing system which is a programming utility used to de-bug the system. Do not attempt to use the tracing commands unless asked to do so by an accredited Mendes technician. The tracing commands are not explained here, since only an accredited Mendes technician should use the functions in this group which are used for software de-bugging purposes.
4) Drio	the input signals as received by the two drawer DC drives(SB-308-7110) and by the two deck DC drives(SB-308-7100) and which originate from different optical reading devices and bypasses from the input circuit board (E-MD92-14). The possible values returned by the different pinsetter components when verifying inputs are 0 and 1. A displayed 0 indicates that the signal is OFF (sensor is not obstructed) while 1 indicates that the signal is ON (sensor is obstructed).



Menu 1.1 Input Signals The input signals are grouped into 4 distinct sub-groups. Group 1 gains access to the input signals relative to the drawer and deck drive functions. Group 2 gains access to the input signals relative to the sweep and ball accelerator functions. Group 3 gains access to the remote input signals which originate from the player's score table and manager's control when no automatic scoring is installed with the MM-2001. Finally, group 4 gains access to the carrousel related input signals.



Menu 1.1.1 DC Drives The optical reading devices used to determine the functioning of the drawer and deck drives. The drawer back limit optical sensor (***DWBL***), the deck up optical sensor (***DKUP***), the drawer obstruction transmitter - receiver (***DWOB***) and the out of range detector plate (***OORG***) are all included in group 1

of the input signals. Each one of these detectors may be verified at this point by performing a transition. Presently, as displayed in the example, each one of the detectors is de-activated (indicated by **0**). By performing a transition on any given detector, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the detector, its cabling, or one of its components (circuit boards included).

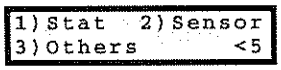
Menu 1.1.2 Sweep & Ball Accelerator

The optical reading devices used to determine the functioning of the sweep and ball accelerator. The sweep up optical sensor (***SWUP***), the sweep forward optical sensor (***SWFW***), the ball ready transmitter - reflector (***BLRD***) and the ball door open optical sensor (***BDOP***) are all included in group 2 of the input signals. Each one of these detectors may be verified at this point by performing a transition. Presently, as displayed in the example, each one of the detectors is de-activated (indicated by **0**). By performing a transition on any given detector, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the detector, its cabling, or one of its components (circuit boards included).

Menu 1.1.3 Remote

There are no reading devices used for remote input signals and they are only valid if the MM-2001 pinsetters are not equipped with automatic scoring. The remote input signals are read through the carrousel controllers and originate from the player's score table and manager's control. When a remote signal is sent to the pinsetter, its corresponding display value will change from **0** to **1**. If the MM-2001 pinsetters are equipped with automatic scoring, the values displayed for these input signals will always be **1**.

Menu 1.1.4 Carrousel

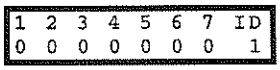


Due to the quantity of input signals related to the carrousel, they are broken down into three sub-groups. The "Stat" sub-group reports on the flag switches which are used to control the carrousel status. The "Sensor" sub-group displays the status of each reed switch located inside the carrousel's detection bar assembly. The "Others" sub-group displays the status of all eight optical sensors used to control the carrousel and pin elevator. By noting all of the circuits necessary for the well functioning of the carrousel, one may quickly determine the importance of the carrousel in conjunction with the performance of the MM-2001 pinsetter.

Menu 1.1.4.1 Flag Switches

The carrousel's optical sensors read information which is then analyzed by the carrousel controller (E-MD92-81). When the carrousel is full, the elevator full flag switch (***ELFL***) is lifted (display will read **1** instead of **0**) in order to advise the main circuit board of this fact so that it may in turn de-activate the magnetic clutch which powers the pin elevator. The carrousel reset flag switch (***CARR***) is used to continually inform the main circuit board of the fact that the carrousel has or hasn't been reset (during a reset, the value displayed will be **1** until the drawer has been calibrated, after which, it will return to **0**).

Menu 1.1.4.2 Magazine



The seven optical reed switches used to determine the presence of pins in their respective magazine stations are all included in this sub-group of the input signals. Each one of these reed switches may be verified at this point by placing or removing the pin from its magazine station. Presently, as displayed in the example, and being the exception to the rule, each one of the detectors is activated (indicated by **0**). By removing a pin from any given station, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the reed switch, its cabling, or one of its components (circuit boards included).

The "ID" information located at the right of the display (introduced in version 1.14) is used to identify the carrousel controller. Although all carrousel controllers are physically the same, they must be correctly identified in order for the electronic power box to distribute its commands correctly. All commands for the carrousel controllers are transmitted to both carrousel controllers (pinsetter 1 & 2). The correct circuit board must capture its own commands and react accordingly. On each even numbered carrousel controller, an MTA connector with a jumper wire joining pins 1 and 2 is connected to CO108 in order to identify it. The odd numbered carrousel controllers have no such jumper. The "ID" displays **0** for an even numbered carrousel controller and displays **1** for an odd numbered carrousel controller. When, if ever, you replace a carrousel controller, make sure it is correctly identified (jumper or no jumper).

```
Pl:0Ll:0Pr:0Lr:0
Er:0Ss:0Pd:0Cs:0
```

Menu 1.1.4.3 Optical Sensors The eight optical sensors used to determine the functioning of the carrousel and pin elevator. The pin elevator left side optical sensor (***Pl***), the pin loader left side optical sensor (***Ll***), the pin elevator right side optical sensor (***Pr***), the pin loader right side optical sensor (***Lr***), the pin elevator movement optical sensor (***Er***), the station synchronization optical sensor (***Ss***), the pin detector optical sensor (***Pd***) and the carrousel synchronization optical sensor (***Cs***) are all included in this sub-group of input signals.

Each one of these sensors may be verified at this point by performing a transition. Presently, as displayed in the example, each one of the detectors is de-activated (indicated by **0**). By performing a transition on any given detector, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the detector, its cabling, or one of its components (circuit boards included).

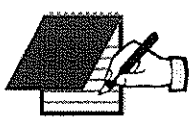
The Pl, Ll, Pr, Lr and Pd optical sensors use negative reactions, which is to say that the actuator is present in the sensor when nothing is happening and is removed from the sensor when activated by a pin. The Er optical sensor uses a similar principle with the pulley having a small hole in it allowing it to activate the sensor with each revolution.

```
1)90Vt  2)24Vt
3)220Vt        <5
```

Menu 1.2 Output Signals The output signals are grouped into 3 distinct sub-groups according to the circuit board(s) which control the electrical components. Group 1 gains access to the output signals sent through the 90-volt output circuit board (E-MD92-90). Group 2 gains access to the output signals sent through the 24-volt output circuit board (E-MD92-24). Group 3 gains access to the output signals sent through the AC drive circuit boards (E-MD92-01).

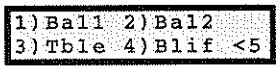
```
1)Fluo 2)Swcl
3)Evcl 4)Bacl <5
```

Menu 1.2.1 90 Volts Through this option you may send a power ON signal to each of the 4 components which function on 90 volts. The components are the fluorescent light (***Fluo***), the sweep's magnetic clutch (***Swcl***), the pin elevator's magnetic clutch (***Evcl***) and the ball door's magnetic clutch (***Bacl***). When a power ON signal is sent through the selection of a number on the keyboard, the component's LED will light up on the 90-volt output circuit board (E-MD92-90) and the component itself will be activated. If the LED does not light up, there is a problem with the cabling between the Magnet 2001 Controller and the electronic power box or the 90-volt output circuit board itself is defective. If the LED lights up but the component is not activated, there is a problem with the cabling between the component and the electronic power box or the component itself is defective. Refer to the 90-Volt Output Circuit Board schematics for the component to LED correspondence.



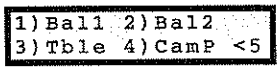
If your pinsetters are wired as per pages 188 and 189 of this manual, the pinsetter's main motor must be on in order to perform the fluorescent lights test.

Menu 1.2.2a 24 Volts (Pinsetter 1)



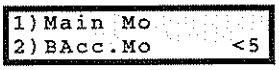
Through this option you may send a power ON signal to each of the 4 components controlled by pinsetter 1 and which function on 24 volts. The components are the ball 1 light (***Ball***), the ball 2 light (***Bal2***), the trouble light (***Tble***) and the ball lift's 24-volt relay (***Blif***) which activates the main power to the ball lift. When a power ON signal is sent through the selection of a number on the keyboard, the component's LED will light up on the 24-volt output circuit board (E-MD92-24) and the component itself will be activated. If the LED does not light up, there is a problem with the cabling between the Magnet 2001 Controller and the electronic power box or the 24-volt output circuit board itself is defective. If the LED lights up but the component is not activated, there is a problem with the cabling between the component and the electronic power box or the component itself is defective. Refer to the 24-Volt Output Circuit Board schematics for the component to LED correspondence

Menu 1.2.2b 24 Volts (Pinsetter 2)



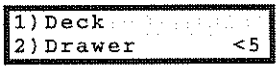
Through this option you may send a power ON signal to each of the 4 components controlled by pinsetter 2 and which function on 24 volts. The components are the ball 1 light (***Ball***), the ball 2 light (***Bal2***), the trouble light (***Tble***) and the camera's power supply (***CamP***). When a power ON signal is sent through the selection of a number on the keyboard, the component's LED will light up on the 24-volt output circuit board (E-MD92-24) and the component itself will be activated. If the LED does not light up, there is a problem with the cabling between the Magnet 2001 Controller and the electronic power box or the 24-volt output circuit board itself is defective. If the LED lights up but the component is not activated, there is a problem with the cabling between the component and the electronic power box or the component itself is defective. Refer to the 24-Volt Output Circuit Board schematics for the component to LED correspondence.

Menu 1.2.3 220 Volts



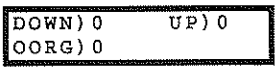
Through this option you may send a power ON signal to each of the 2 components which function on 220 volts. The components are the pinsetter's main motor (***Main Mo***) and the ball accelerator's motor (***Bacc. Mo***). When a power ON signal is sent through the selection of a number on the keyboard, the component's LED will light up on its AC drive circuit board (E-MD92-01) and the component itself will be activated. If the LED does not light up, there is a problem with the cabling between the Magnet 2001 Controller and the electronic power box or the AC drive circuit board itself is defective. If the LED lights up but the component is not activated, there is a problem with the cabling between the component and the electronic power box or the component itself is defective.

Menu 1.4 DC Drive Bypass Signals



The input signals which communicate directly with the DC drives or are bypassed to the DC drives through the input circuit board (E-MD92-14) are grouped under their respective drive (deck & drawer).

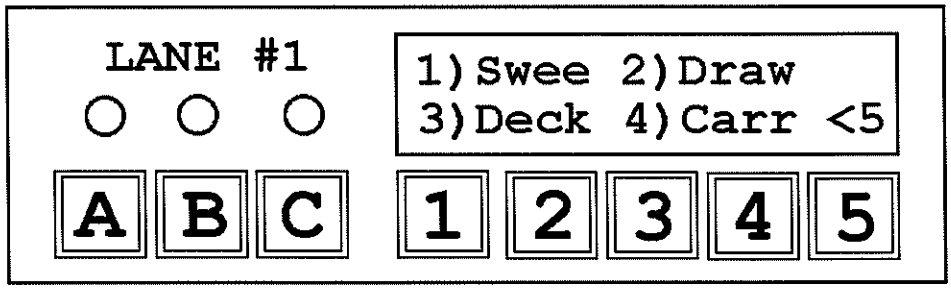
Menu 1.4.1 Deck



The optical reading devices used to determine the functioning of the deck drive. The deck lower limit optical sensor (***DOWN***), the deck up optical sensor (***UP***) and the out of range detector plate (***OORG***) are all included in this group of input signals. Each one of these detectors may be verified at this point by performing a transition. Presently, as displayed in the example, each one of the detectors is de-activated (indicated by **0**). By performing a transition on any given detector, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the detector, its cabling, or one of its components (circuit boards included).

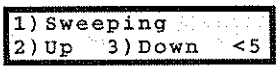
Menu 1.4.2 Drawer The optical reading devices used to determine the functioning of the drawer drive. The drawer front limit optical sensor (***FRNT***), the drawer back limit optical sensor (***BACK***) and the drawer obstruction transmitter & receiver (***OBST***) are all included in this group of input signals. Each one of these detectors may be verified at this point by performing a transition. Presently, as displayed in the example, each one of the detectors is de-activated (indicated by **0**). By performing a transition on any given detector, its corresponding value displayed should change to **1**. If the value remains at **0**, there is definitely a problem with the detector, its cabling, or one of its components (circuit boards included).

MENU 2 MOVEMENT COMMANDS



Group	*Gains access to*
1) Swee	the different movement commands available for the sweep components.
2) Draw	the different movement commands available for the drawer components.
3) Deck	the different movement commands available for the deck components.
4) Carr	the different movement commands available for the carrousel components.

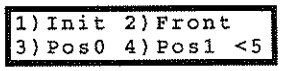
Menu 2.1 Sweep



Three movement commands are available in order to verify the sweep functions.

1) ***Sweeping***: performs a complete back to front sweep movement.
2) ***Up***: lifts the sweep arm to its uppermost position.
3) ***Down***: lowers the sweep arm to the pin deck.

Menu 2.2 Drawer



The drawer may be initialized or calibrated through this menu along with three movement commands used to verify the drawer functions.

1) ***Init***: gains access to Menu 2.2.1.
2) ***Front***: moves the drawer from its middle position to its front position.
3) ***Pos0***: moves the drawer from its front position to its rear position.
4) ***Pos1***: moves the drawer from its rear position to its middle position.

Menu 2.2.1 Initialization

The drawer may be initialized or calibrated through this menu.

1) ***Init***: physically locates the drawer's back limit optical sensor (***DWBL***) and initializes the DC motor's encoder.
2) ***Cali***: physically locates the drawer's front limit optical sensor (***FRNT***) and then positions the drawer accordingly.

Menu 2.3 Deck

The deck may be initialized or calibrated through this menu along with four movement commands used to verify the deck functions.

1) ***Init***: gains access to Menu 2.3.1.
2) ***Others***: gains access to Menu 2.3.2.

Menu 2.3.1 Initialization

The deck may be initialized or calibrated through this menu.

1) ***Init***: physically locates the deck's upper limit optical sensor (***DKUP***) and initializes the DC motor's encoder.

2) ***Cali***: physically locates the deck's lower limit optical sensor (***DOWN***) and then positions the deck accordingly.

```
1)Fset 2)Pset
3)Pkup 4)Load <5
```

Menu 2.3.2 Others Four movement commands used to verify the deck functions.

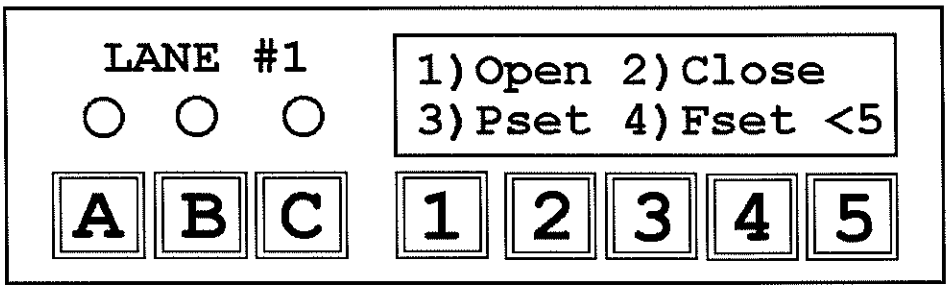
1) ***Fset***: spots pins from the deck's uppermost position.
2) ***Pset***: spots pins from the deck's pick-up position.
3) ***Pkup***: Lifts the pins from the pin deck and remains in the pick-up position.
4) ***Load***: loads the deck with the pins from the drawer and remains in the uppermost position.

```
1)Sole 2)Init
3)Dmp0 4)Dmp1 <5
```

Menu 2.4 Carrousel The carrousel may be initialized along with three movement commands used to verify the carrousel functions.

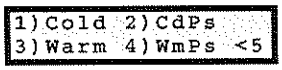
1) ***Sole***: all fourteen (14) solenoids used in conjunction with the carrousel are turned ON and then automatically turned OFF.
2) ***Init***: physically locates the carrousel synchronization optical sensor (***CS***) which, once completed, allows the carrousel to fill the magazine accordingly (the carrousel is automatically initialized any time it is reset).
3) ***Dmp0***: deposits the row of three (3) pins from the magazine into the drawer.
4) ***Dmp1***: deposits the row of seven (7) pins from the magazine into the drawer.

MENU 3 PINSETTER COMMANDS



Group	*Gains access to*
1) Open	the different commands used to open or power on the pinsetter.
2) Close	the different commands used to close or power off the pinsetter.
3) Pset	and performs the part set command.
4) Fset	and performs the full set command.

Menu 3.1 Open

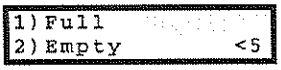


There are four (4) methods available in order to turn a pinsetter on. Depending on the method chosen, the pinsetter will open under different conditions and be ready to bowl in different time delays.

Whenever a pinsetter is powered ON, the optical sensor actuator must be in the drawer back limit optical sensor (DWBL) and there must be NO PINS in the drawer's row of seven (7). If these physical conditions are not present, you must manually remove the pins from the drawer and then push the drawer to the rear so as to have the back limit optical sensor obstructed by its actuator before performing an OPEN command. If the deck is in its lower position, you must use the manual deck crank in order to lift the deck so as to be able to push the drawer back.

1) ***Cold***: before placing the pinsetter in a ball 1 situation (ready to bowl), all of the pinsetter components will be initialized, calibrated and tested.
2) ***CdPs***: the same as a ***Cold*** open with the exception that the pinsetter will spot the same pins on the pin deck as prior to the command.
3) ***Warm***: contrary to a ***Cold*** open, no complicated operations are completed during a ***Warm*** open.
4) ***WmPs***: the same as a ***Warm*** open with the exception that the pinsetter will spot the same pins on the pin deck as prior to the command.

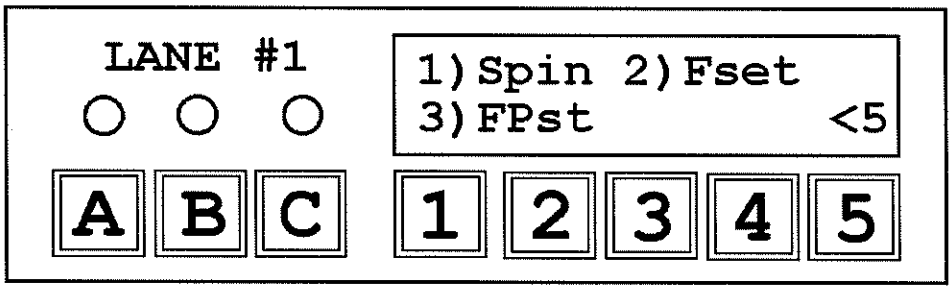
Menu 3.2 Close



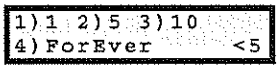
There are two (2) methods available in order to turn a pinsetter off. Depending on the method chosen, the pinsetter will close under different conditions.

1) ***Full***: shuts down the pinsetter leaving ten pins on the pin deck and the sweep in its up position.
2) ***Empty***: shuts down the pinsetter leaving no pins on the pin deck and the sweep in its down position.

MENU 4 SEQUENTIAL COMMANDS PRIOR TO VERSION 1.24 (E-MD92-92)

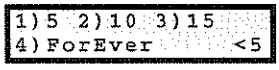


Group	*Gains access to*
1) Spin	the spot pin sequential commands.
2) Fset	the full set sequential commands.
3) FPst	the combination pinsetter (full set followed by a part set) sequential commands.



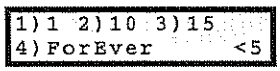
Menu 4.1 Spot Pins This option is used to spot pins using different combinations of pre-programmed pin selections.

1) *1:* performs 1 series of 3 pre-programmed spot pin commands.
2) *5:* performs 5 series of 3 pre-programmed spot pin commands.
3) *10:* performs 10 series of 3 pre-programmed spot pin commands.
4) ***ForEver***: performs 999 series of 3 pre-programmed spot pin commands.



Menu 4.2 Full Sets This option is used to perform a specific quantity of full sets only.

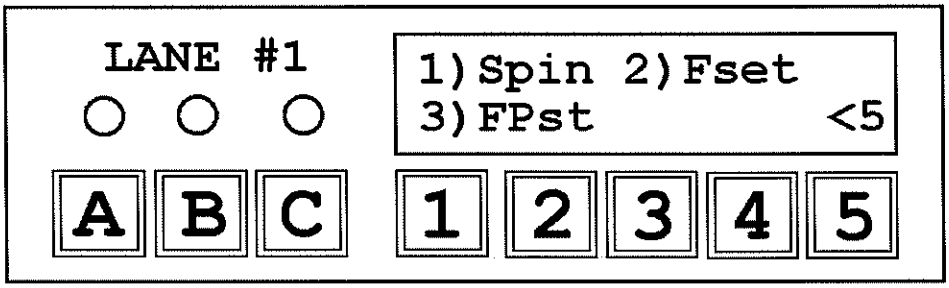
1) *5:* performs 5 pre-programmed full set commands.
2) *10:* performs 10 pre-programmed full set commands.
3) *15:* performs 15 pre-programmed full set commands.
4) ***ForEver***: performs 999 pre-programmed full set commands.



Menu 4.3 Combinations This option is used to perform a specific quantity of full sets, with each being followed by a part set.

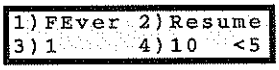
1) *1:* performs 1 pre-programmed full set command followed by 1 pre-programmed part set command.
2) *10:* performs 10 pre-programmed full set commands with each one being followed by a pre-programmed part set command.
3) *15:* performs 15 pre-programmed full set commands with each one being followed by a pre-programmed part set command.
4) ***ForEver***: performs 999 pre-programmed full set commands with each one being followed by a pre-programmed part set command.

MENU 4 SEQUENTIAL COMMANDS
VERSION 1.24 AND LATER (E-MD92-92)



Group	*Gains access to*
1) Spin	the spot pin sequential commands.
2) Fset	the full set sequential commands.
3) FPst	the combination pinsetter (full set followed by a part set) sequential commands.

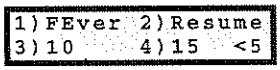
Menu 4.1 Spot Pins



This option is used to spot pins using different combinations of pre-programmed pin selections.

1) ***FEver:*** performs 999 series of 3 pre-programmed spot pin commands.
2) ***Resume:*** resumes the ***FEver*** cycle after experiencing a stoppage of any kind.
3) ***1:*** performs 1 series of 3 pre-programmed spot pin commands.
4) ***10:*** performs 10 series of 3 pre-programmed spot pin commands.

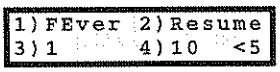
Menu 4.2 Full Sets



This option is used to perform a specific quantity of full sets only.

1) ***FEver:*** performs 999 pre-programmed full set commands.
2) ***Resume:*** resumes the ***FEver*** cycle after experiencing a stoppage of any kind.
3) ***10:*** performs 10 pre-programmed full set commands.
4) ***15:*** performs 15 pre-programmed full set commands.

Menu 4.3 Combinations

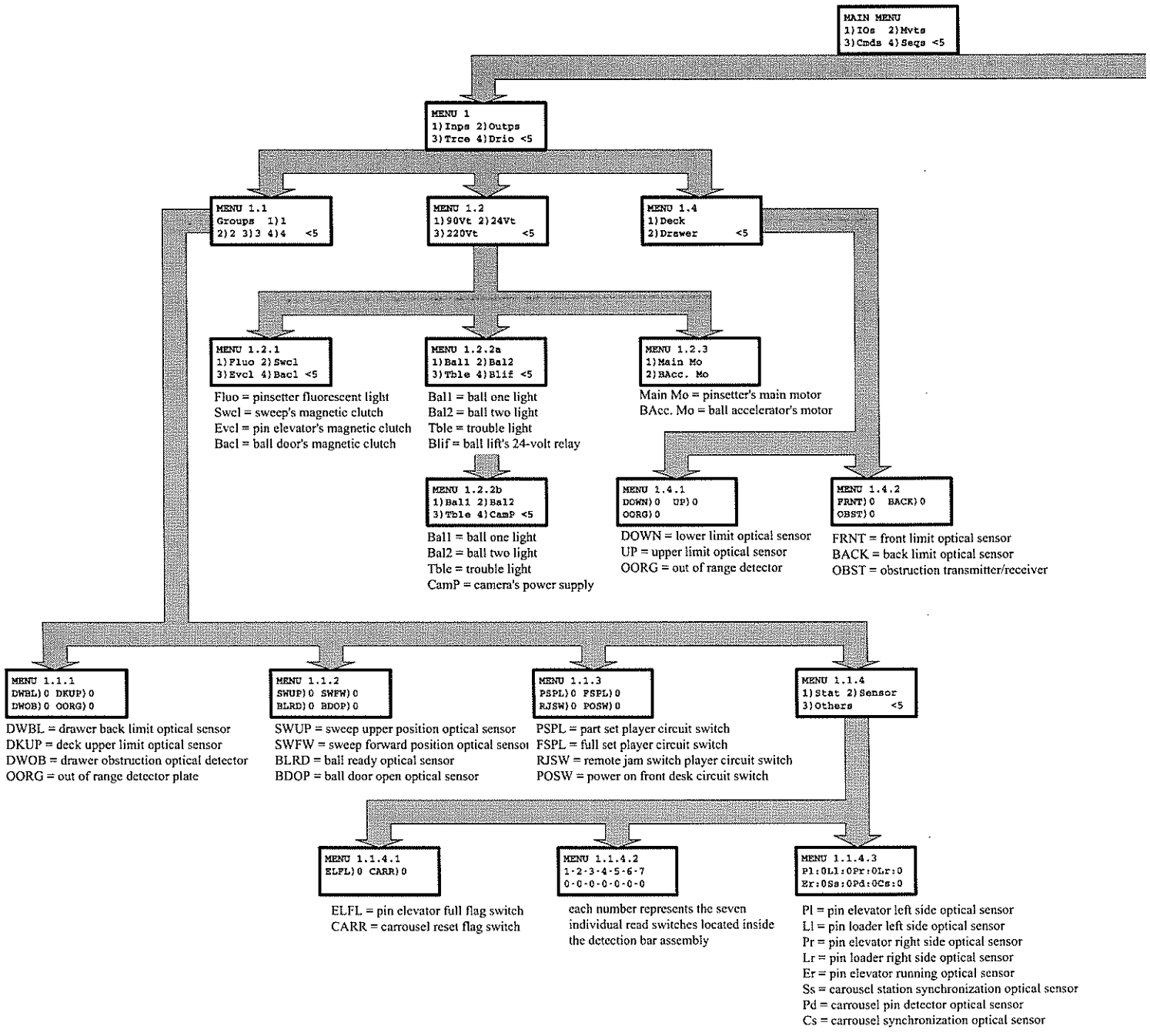


This option is used to perform a specific quantity of full sets, with each being followed by a part set.

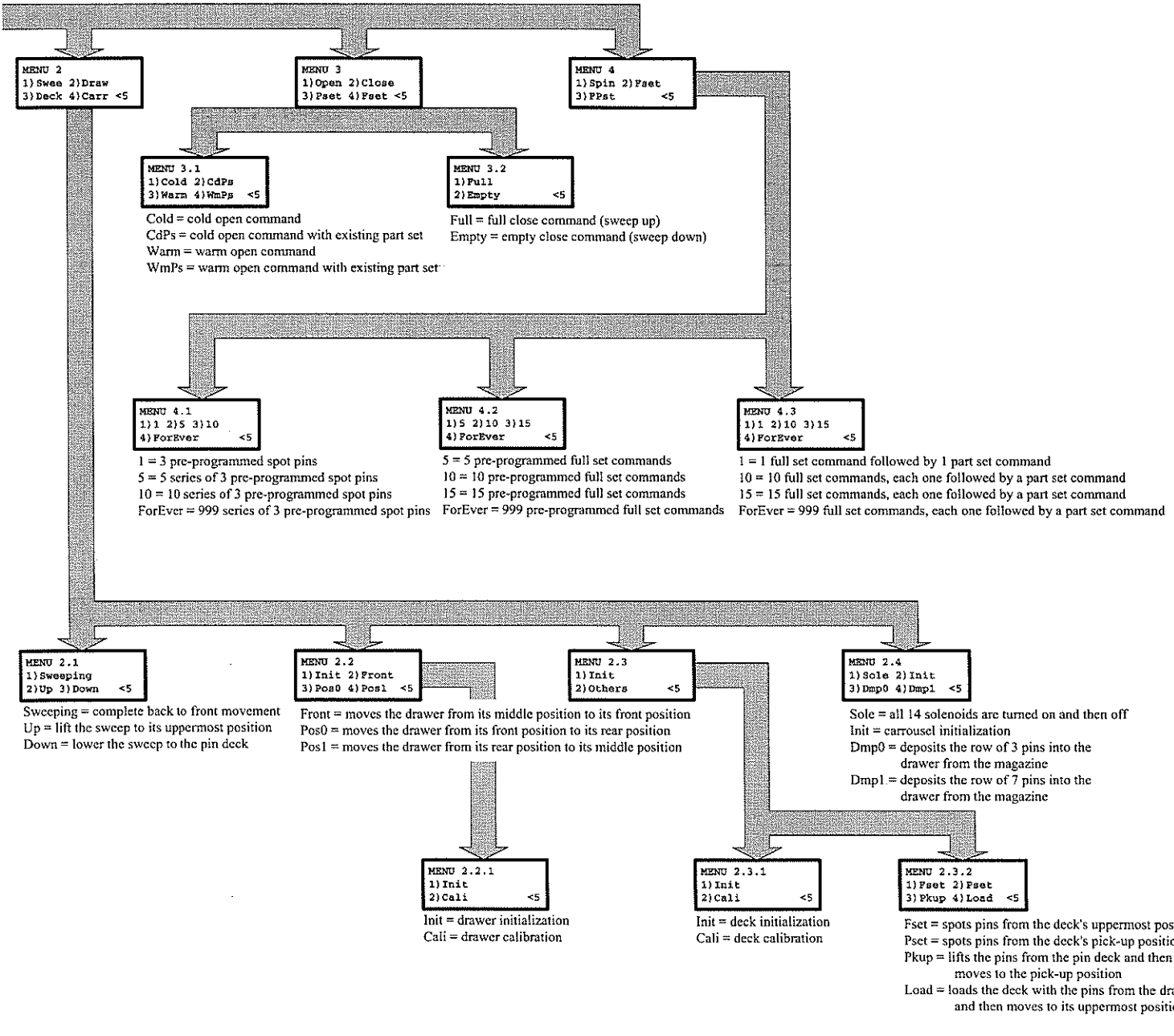
1) ***FEver:*** performs 999 pre-programmed full set commands with each one being followed by a pre-programmed part set command.
2) ***Resume:*** resumes the ***FEver*** cycle after experiencing a stoppage of any kind.
3) ***1:*** performs 1 pre-programmed full set command followed by 1 pre-programmed part set command.
4) ***10:*** performs 10 pre-programmed full set commands with each one being followed by a pre-programmed part set command.

Menu System Notes

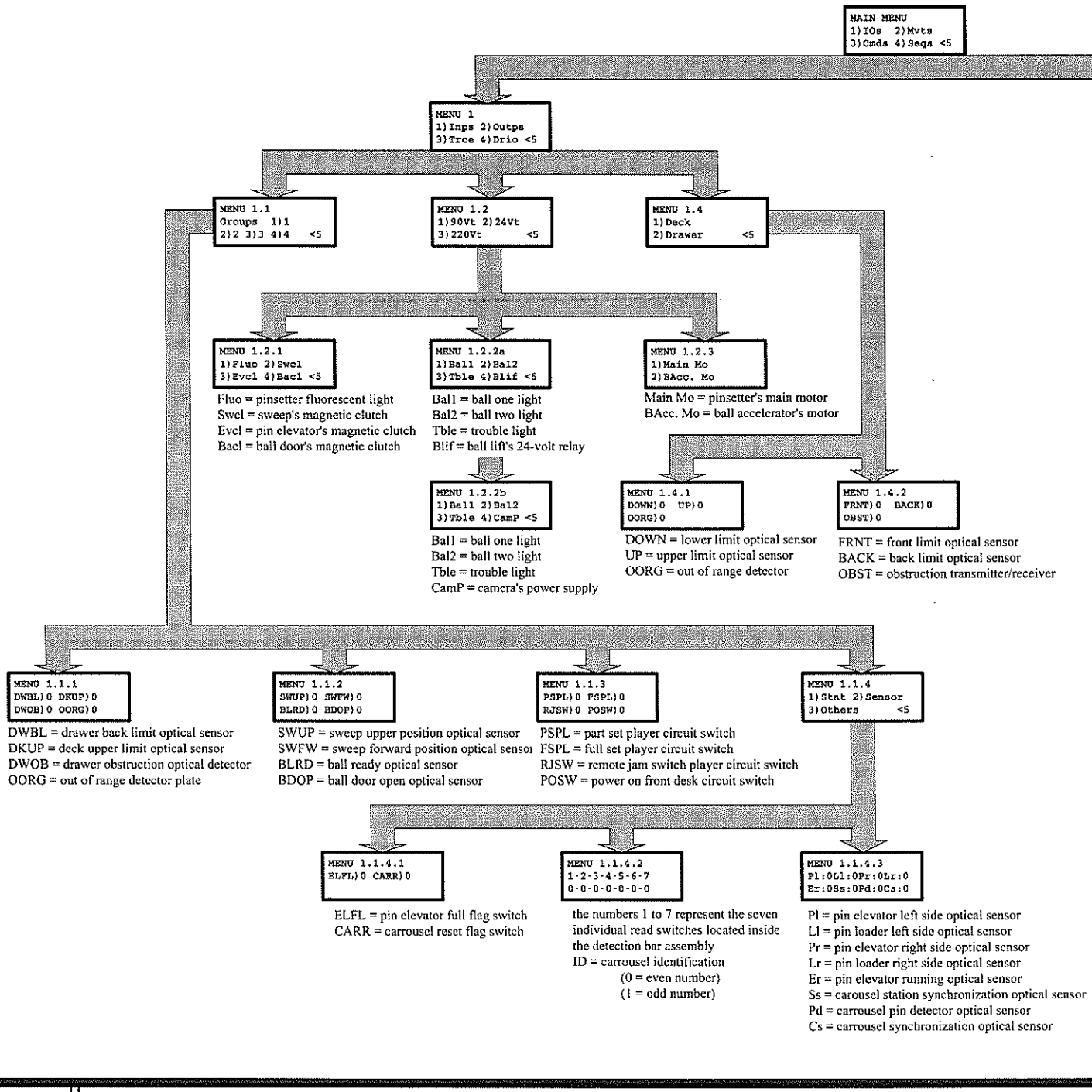
Magnet 2001 Controller



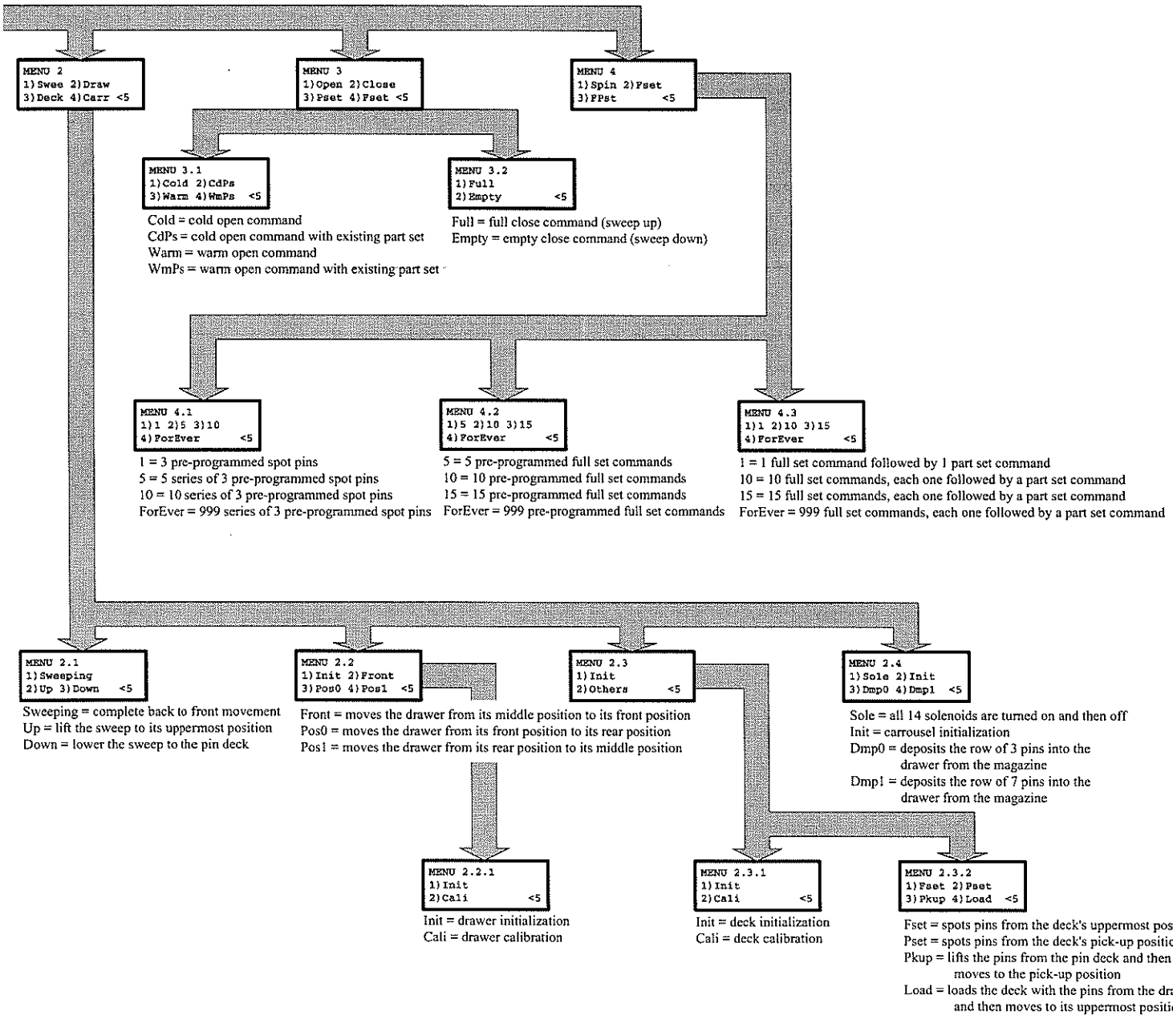
Main Menu System (Version 1.13)



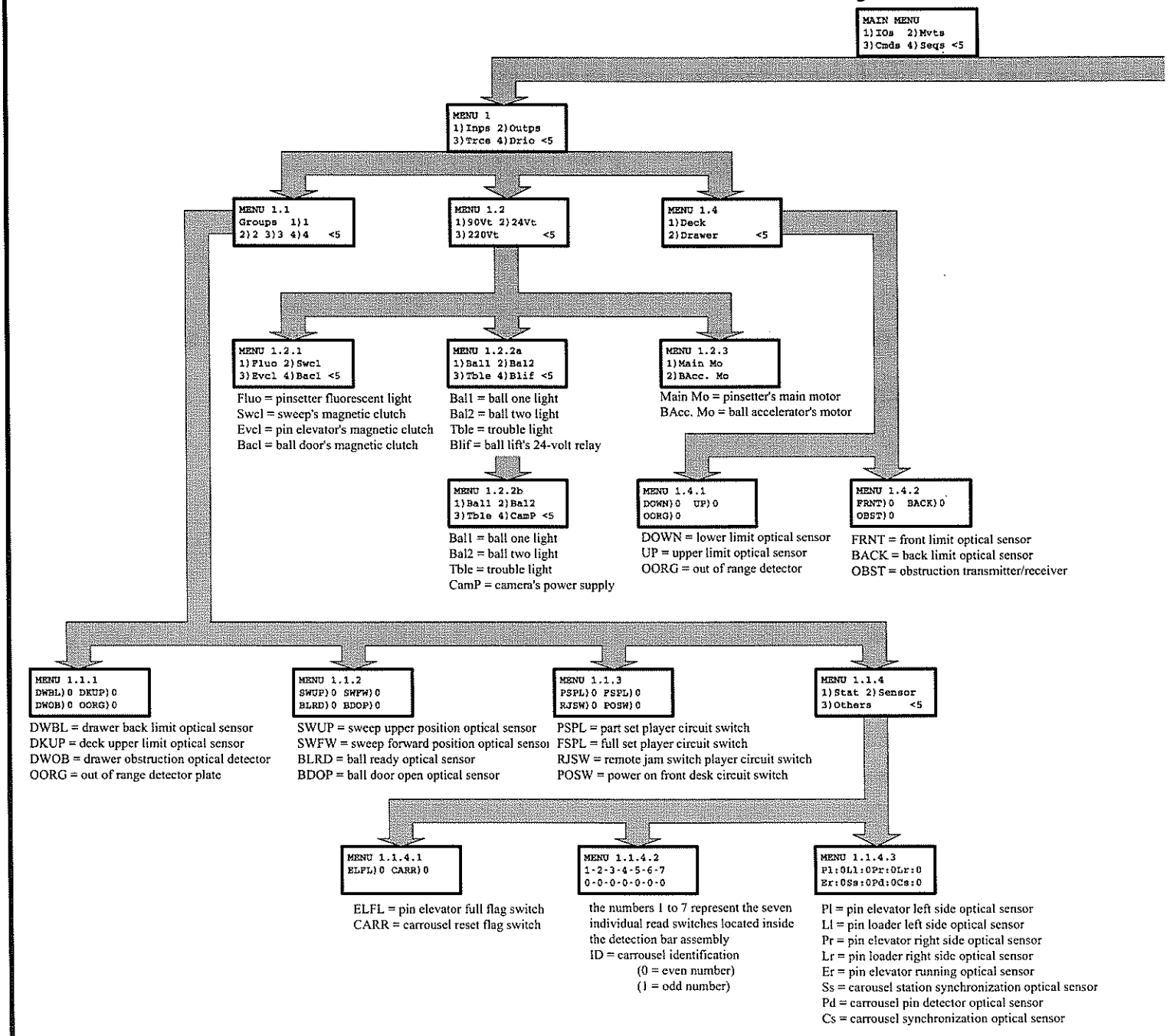
Magnet 2001 Controller



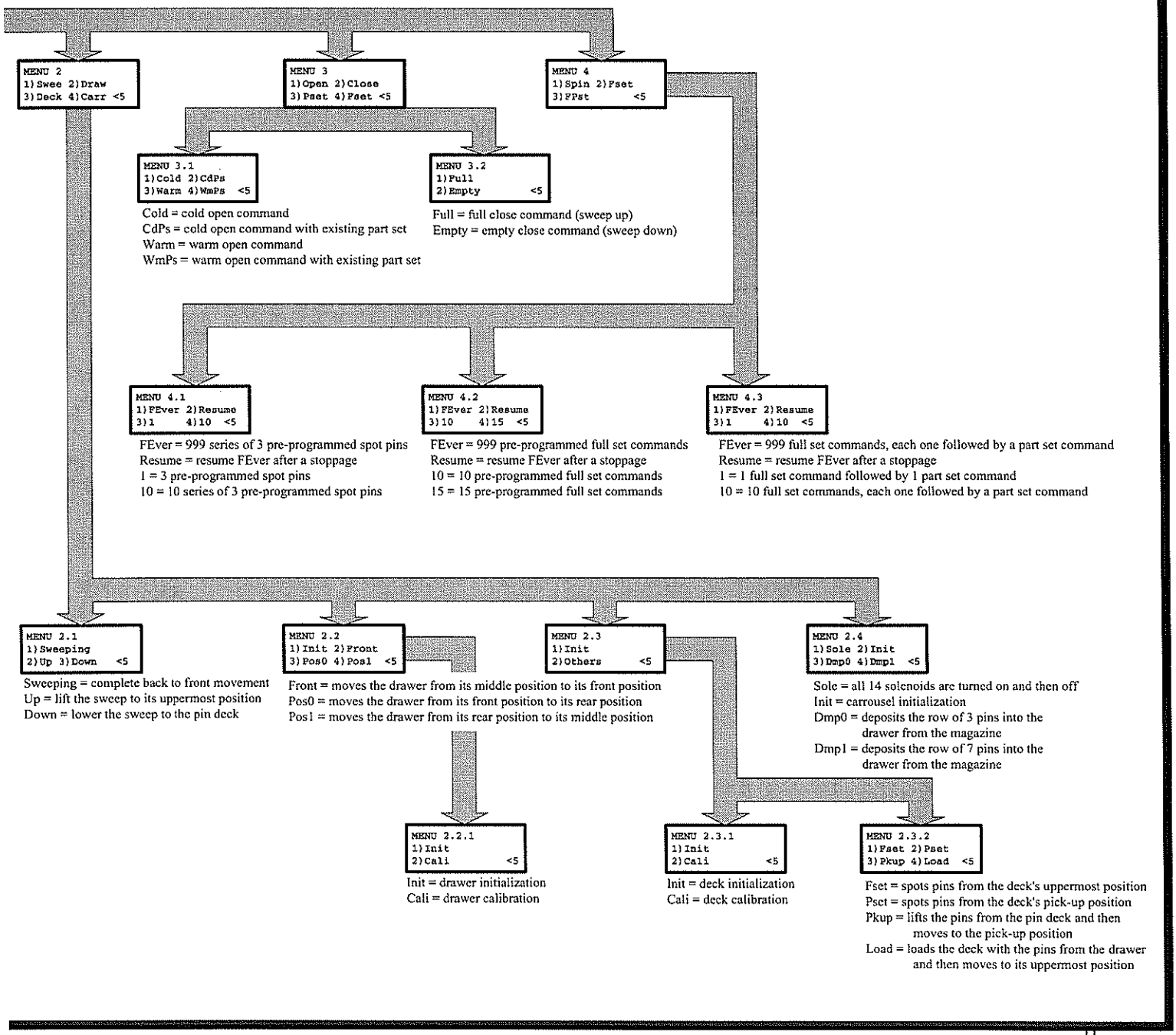
Main Menu System (Version 1.14 to 1.23)



Magnet 2001 Controller



Main Menu System (Version 1.24 to date)



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Future Publications