## TECH TIP

## MC521 Controller Manual Revision C for Swing and Bifold Doors

RDW: $\qquad$ Reference Tech Tip: $\qquad$

Engineering Document Number: $\qquad$

## Summary Information

## Product Information

- Bifold
- Swing
$\square$ Slide
$\square$ Class 2
$\square$ Accessories
- Controls
$\square$ Operators / Drives
$\square$ Panels / Hardware
$\square$ Sensors


## Tech Tip Classification

$\square$ Adjustment
$\square$ Customer Complaints
$\square$ FAQs
$\square$ Retrofit/Upgrade Instructions
$\square$ Installation
$\square$ Clarifications
$\square$ Service

- Design Change Description


## Release Action

$\square$ Level 1 - Does not impact maintenance or operation of door. (Only Safety/Liability and Engineering need to sign.)
■ Level 2 - Full sign off required.

## Release Information (initial and date)

Safety/Liability $\qquad$
Engineering
Technical Support $\qquad$
Field Operations
Quality

## TECH TIP

## MC521 Controller Manual Revision C for Swing and Bifold Doors

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Tech Tip: TT051205

## Action Required

$\square$ Replacement Require $\square$ Inspect During Maintenance

Attached is the revised manual entitled Magic-Swing, Magic-Force, and Bifold, MC521 Control Box, Quick-Reference Guide, 204027, Rev. C, 11/9/05.

This manual covers swing door low energy applications using Magic Force operators, swing door full energy applications using Magic Force and Magic Swing operators, and bifold door applications using Magic Force operators.

The changes can be viewed on the following pages:
Pg. 10, Note.
Pg. 16, Note, Steps (6-8).
Pg. 17, Table 2, Codes (09-10) added.
Pg. 19, Table 6, Code (0b) added.
Pg. 23, Attachment 2, Changed (Relay set to \#2).
Pg. 24, Attachment 3, Changed (Relay set to \#2).
Pg. 26, Attachment 5, Changed TB1-8 to Bodyguard Data.
Note: This manual is different than MC521 manual 204003 which is for slide doors only. Please continue to use that version when working with slide doors.

MAKE SOMETHING GREAT*

# Magic-Swing ${ }^{\text {TM }}$, Magic-Force ${ }^{\text {TM }}$, and Bifold <br> MC521 Control Box <br> Quick-Reference Guide 204027 

Rev. C, 11/9/05

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## Stanley Access Technologies

## TABLE OF CONTENTS

1. PURPOSE ..... 2
1.1 Discussion. ..... 2
1.2 Applicability ..... 2
1.3 Features and Functions ..... 2
2. PRECAUTIONS ..... 3
3. WIRING INSTRUCTIONS ..... 3
3.1 Evaluating Power Requirements. ..... 3
3.2 Connecting Main Power Wiring. ..... 3
3.3 Connecting Breakout Status Signal Wiring (Magic-Swing Operators) ..... 4
3.4 Connecting Breakout Status Signal Wiring (Magic-Force Operators) ..... 6
3.5 Wiring the Operator Switch Module (Magic-Force Operators) ..... 8
3.6 Wiring the Operator for Required Handing (Magic-Force Operators) ..... 9
3.7 Wiring the "ON/OFF/HOLD OPEN" Switch and Power Switch. ..... 9
3.8 Wiring the Door Activation or Safety Device .....  9
3.9 Wiring Sentrex ${ }^{3}$ ..... 10
3.10 Wiring Bodyguard ..... 10
3.11 Wiring Superscan ..... 10
3.12 Wiring Holding Beam ..... 10
3.13 Wiring the Cycle Counter ..... 11
4. TUNE-IN INSTRUCTIONS ..... 12
4.1 Initial Tune-In Settings ..... 12
4.2 Tuning In the MC521 Controller Using the Palm Pilot. ..... 12
4.3 Tuning In the MC521 Controller Using the Controller Pushbuttons ..... 16
4.4 Final Tune-In Adjustments ..... 20
5. SPARE PARTS LIST ..... 21
ATTACHMENTS
Attachment 1, Breakout Status Wiring on Magic-Swing Operators ..... 22
Attachment 2, Magic-Force Wiring Diagram-MC521 ..... 23
Attachment 3, Magic-Force Wiring Diagram—MC521 With Power Close Option. ..... 24
Attachment 4, Magic-Swing Wiring Diagram-MC521. ..... 25
Attachment 5, Terminal Block Connections-TB1 Through TB5. ..... 26
Attachment 6, MC521 Controller Controls and Indicators ..... 27
Attachment 7, ANSI/BHMA and UL Compliance Requirements for Swinging and Folding Doors ..... 29
Attachment 8, Palm Troubleshooting Aid—Swing/Bifold ..... 31

## 1. PURPOSE

### 1.1 Discussion

This manual provides abbreviated descriptive information, wiring instructions, and tune-in instructions for the MC521 controller used with Magic-Swing ${ }^{\mathrm{TM}}$, Magic-Force ${ }^{\mathrm{TM}}$, and Bifold operators. The manual is intended as a quick-reference guide. Attachment 6 illustrates the MC521 controller controls and indicators.

### 1.2 Applicability

This manual is applicable on MC521 control box used with Magic-Swing ${ }^{\mathrm{TM}}$, Magic-Force ${ }^{\mathrm{TM}}$, and Bifold operators.

### 1.3 Features and Functions

1.3.1 Magic-Touch ${ }^{\text {TM }}$ : A feature that allows the door to be actuated by a slight manual movement of the door--without the need for an approach sensor. The MC521 control box controls the Magic-Touch hold-open time delay. Magic-Touch can be used with press plates or a radio control system, providing the system with two separate time delays. Magic-Touch is not recommended for use with a dual door system using Sentrex ${ }^{\mathrm{TM}}$. With dual door systems, Magic-Touch can be selected to open doors independently or simultaneously.
1.3.2 Reverse On Obstruction: A reverse-on-obstruction feature causes the door to reverse motion if an obstruction is met during door opening or closing.
1.3.3 Safety Check: This feature monitors the safety signal activation on every open cycle. If a safety carpet or overhead safety sensor fails "open" or can no longer detect a pedestrian, the door stays open for 12 seconds to indicate that there is a problem.
1.3.4 Emergency Breakout: Disconnects power to the motor when the door is manually pushed in the emergency-out direction. The operator then automatically resets and power is resumed.
1.3.5 2S Logic: Used in trained-traffic applications and is not compatible with sensors. Allows door to open when switch is pushed and door to close when the next sequential switch is pushed. 2 S can be used with a safety sensor.
1.3.6 Automatic Open-Check Calculation: Open-check position-the area where the door slows down before fully open-is calculated for approximately $80^{\circ}$ in the opening direction during first install sequence (FIS). Open-check length can be adjusted using a Palm Pilot or the controller pushbuttons.
1.3.7 Low- and High-Energy Operation: Allows selection of low-speed range (low-energy applications) or high-speed range (full-energy and all dual-operator applications).
1.3.8 Bifold Safety Sensor Logic: Allows selection of bifold logic versus carpet or timer logic. Used in bifold door systems, it eliminates the need for a lockout relay for the overhead safety sensor.
1.3.9 Single- or Dual-Door Selection: Allows selection of single- or dual-door operation.
1.3.10 Opening Speed Adjustment: Permits adjustment of door opening speed.

204027
Rev. C, 11/9/05
2 of 31
1.3.11 Closing Speed Adjustment: On Magic-Force operators, a dual-adjustment closing speed control with two rheostats permits independent adjustment of door closing speed and closing check speed. On Magic-Swing operators, provisions are provided for the installation of an optional single-adjustment closing speed control.
1.3.12 Open Check Speed Adjustment: Permits adjustment of door open check speed.
1.3.13 Torque Adjustment: Allows adjustment of the door opening force. Open torque, check torque, and stall torque are independent adjustments.
1.3.14 Stall Logic: Used with a door-mounted sensor system to stop door motion when a pedestrian or object is present.
1.3.15 One-Piece Switch Module: On Magic-Force operators, the individual breakout, breakout status, close check, and auxiliary switches have been replaced with a single one-piece switch module.

## 2. PRECAUTIONS

2.1.1 The Magic-Touch time delay must be greater than 5 seconds to ensure compliance with ANSI A156.19, "American National Standard for Power Assist and Low Energy Power Operated Doors," specifications.
2.1.2 All ANSI/BHMA and UL Requirements in Attachment 7 must be met before the door is put into operation.

## 3. WIRING INSTRUCTIONS

### 3.1 Evaluating Power Requirements

3.1.1 EVALUATE door system power requirements as follows:

- ENSURE power source is a dedicated 117 VAC, $50 / 60 \mathrm{~Hz}$ source with 20A circuit rating per two controllers.
- ENSURE power source is not shared with other equipment, i.e., cash registers, EAS systems, or other electromagnetic interference generators.


### 3.2 Connecting Main Power Wiring

## WARNING

To prevent injury to personnel, incoming electrical power to header must be deenergized before connecting control box electrical harness to electrical service.
3.2.1 DEENERGIZE incoming electrical power to header.
3.2.2 Refer to Attachments 2, 3, and 4, and, using the wire nut provided, CONNECT ground wire assembly ( $\mathrm{P} / \mathrm{N} 711527$ ) to electrical service ground wire.
3.2.3 In a concealed location inside the header (not visible from the exterior of the header), DRILL a hole for a No. 8 screw.
3.2.4 INSTALL ground wire ring terminal and star washer onto the No. 8 screw provided, and FASTEN screw, star washer, and ground wire to header.
3.2.5 In a concealed location inside the header, DRILL a second hole for a No. 8 screw.
3.2.6 INSTALL power line harness 412544 ring terminal and star washer onto the No. 8 screw provided, and FASTEN screw, star washer, and ground wire to header.
3.2.7 Using the wire nuts provided, CONNECT power line harness 412544 to electrical service as follows:

- CONNECT power pigtail assembly black wire to black (line) service wire.
- CONNECT power pigtail assembly white wire to white (neutral) service wire.


### 3.3 Connecting Breakout Status Signal Wiring (Magic-Swing Operators)

## WARNING

To prevent injury to personnel and damage to equipment, control box power must be deenergized before connecting breakout status signal wiring.

## CAUTION

If the motor is running and the breakout status switch is not connected, arcing across the breakout switch contacts can occur. This will result in damage to the breakout switch. To prevent damage from switch contact arcing, the breakout status switch must always be connected.

## NOTE

1. The breakout status switch should be used in all applications where there is no positive door stop in the breakout direction.
2. The auxiliary switch is the breakout status signal switch. The auxiliary switch was formerly the open check switch on the operator switch plate (top cam).
3.3.1 Refer to Attachment 1, and CONNECT breakout status wiring.
3.3.2 REMOVE quick-connect terminal (brown wire) from the normally open terminal of the auxiliary switch (formerly open check switch), and INSTALL onto normally closed terminal.
3.3.3 CONNECT yellow jumper wires installed on the single/dual motor harness as follows:
a. INSTALL stripped end of first jumper wire (from position 3 of the 8-pin connector on operator harness) into terminal 9 of control box connector TB3.
b. INSTALL stripped end of second jumper wire (from position 5 of the 8-pin connector on operator harness) into terminal 10 of control box connector TB3.
3.3.4 SET the auxiliary cam for approximately $3^{\circ}$ activation (toward breakout direction), and ADJUST cam as necessary to trip the corresponding microswitch prior to activation of the breakout switch.

## NOTE

In a dual-door application, the breakout switches of each operator need to be wired in series to ensure that the control box will not open the doors if either breakout status switch is activated.
3.3.5 IF application is a pair of doors, PERFORM the following:
a. REPEAT steps 3.3.3 and 3.3.4 for the second door operator.
b. CONNECT stripped end of one yellow jumper wire from each operator to terminals 9 and 10 of control box connector TB3.

204027
Rev. C, 11/9/05
4 of 31
3.3.6 Using a wire nut, CONNECT remaining wire from first operator to remaining wire on second operator.
3.3.7 VERIFY breakout status/breakout cam is properly set as follows:
a. Refer to Figure 1, and visually INSPECT cams for proper setting.

Figure 1. Breakout Status/Breakout Cam Settings (Magic-Swing Operators)

R. H. SHOWN

TOP CAM = AUX SWITCH
CENTER CAM = EMERGENCY BREAKOUT SWITCH BOTTOM CAM = CLOSE CHECK SWITCH

L. H. SHOWN
b. UNPLUG TB3 from control box.

## NOTE

When checking breakout status switch continuity, the switch is first checked with the door closed, then again with the door in the breakout (negative $3^{\circ}$ ) position. In a dual-door application, both doors can be tested at the same time in the closed position. However, the doors must be tested individually when checking switch continuity with the doors in the breakout (negative $3^{\circ}$ ) position.
c. ENSURE door is in the closed position.
d. Using a multimeter, CHECK continuity between TB3 terminals 9 and 10, and ENSURE there is continuity.
e. PUSH door in the breakout direction, and HOLD door at approximately the negative $3^{\circ}$ position.
f. Using a multimeter, CHECK continuity between TB3 terminals 9 and 10, and ENSURE there is an open circuit.
g. RELEASE door.
h. PLUG TB3 into control box.
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204027
Rev. C, 11/9/05
5 of 31

### 3.4 Connecting Breakout Status Signal Wiring (Magic-Force Operators)

## WARNING

To prevent injury to personnel and damage to equipment, control box power must be deenergized before connecting breakout status signal wiring.

## CAUTION

If the motor is running and the breakout status switch is not connected, arcing across the breakout switch contacts can occur. This will result in damage to the breakout switch. To prevent damage from switch contact arcing, the breakout status switch must always be connected.
3.4.1 SET "POWER" switch to "OFF."
3.4.2 IF single-operator application, PERFORM the following:

- INSTALL one breakout status switch wire to terminal 9 of control box connector TB3.
- INSTALL second breakout status switch wire to terminal 10 of control box connector TB3.
3.4.3 IF dual-operator application, PERFORM the following to put the breakout switches in series:
- INSTALL one breakout status switch wire from one operator to terminal 9 of control box connector TB3.
- INSTALL one breakout status switch wire from second operator to terminal 10 of control box connector TB3.
- CONNECT remaining two yellow breakout status switch wires together with a wire nut.
3.4.4 VERIFY breakout status/breakout cams are properly set as follows:

204027
Rev. C, 11/9/05
6 of 31

> a. Refer to Figure 2, and visually INSPECT cams for proper setting.

Figure 2. Breakout Status/Breakout Cam Settings (Magic-Force Operators)

b. UNPLUG TB3 from control box.

## NOTE

When checking breakout status switch continuity, the switch is checked twice; first with the door closed, then with the door in the breakout (negative $3^{\circ}$ ) position. In a dual-door application, both doors can be tested at the same time in the closed position. However, the doors must be tested individually when checking switch continuity with the doors in the breakout (negative $3^{\circ}$ ) position.
c. ENSURE door is in the closed position.
d. Using a multimeter, CHECK continuity between TB3 terminals 9 and 10, and ENSURE there is continuity.
e. PUSH door in the breakout direction, and HOLD door at approximately the negative $3^{\circ}$ position.
f. Using a multimeter, CHECK continuity between TB3 terminals 9 and 10, and ENSURE there is an open circuit.
g. RELEASE door.
h. PLUG TB3 into control box.

### 3.5 Wiring the Operator Switch Module (Magic-Force Operators)

3.5.1 Refer to Attachment 2 or 3 as applicable, and CONNECT switch module harness 413791 to dual-adjustment closing speed control connector J4.
3.5.2 IF auxiliary position switch will be used, refer to Figure 3, and PERFORM the following:
a. LIFT switch module release lever up, and SLIDE switch module out of operator

housing.
b. CONNECT wiring to auxiliary position switch terminal block as shown.
c. SLIDE switch module into operator housing until switch module release lever snaps into place.

204027
Rev. C, 11/9/05
8 of 31

### 3.6 Wiring the Operator for Required Handing (Magic-Force Operators)

NOTE
Operator cams are factory-set for right hand operation.
3.6.1 Refer to Figure 4, and DETERMINE door handing.

Figure 4. Door Handing


LEFT HAND


RIGHT HAND
мсB004
3.6.2 CONNECT encoder cable adapter 415001 from encoder to control box encoder 1 and encoder 2 connectors if applicable.
3.6.3 If Sentrex ${ }^{\mathrm{TM}}$ is installed with a left hand Magic-Force operator, refer to Attachment 2 or 3 and INSTALL encoder handing harness (part No. 413767).
3.6.4 CONNECT operator harness from close speed module to control box motor 1 and motor 2 connectors if applicable

### 3.7 Wiring the "ON/OFF/HOLD OPEN" Switch and Power Switch

3.7.1 Refer to Attachment 5, and CONNECT "ON/OFF/HOLD OPEN" switch wiring as follows:

| TB2 Terminal | Connection | Switch Wire Color |
| :---: | :---: | :---: |
| 1 | Hold open | Yellow |
| 2 | Common | Orange |
| 3 | Automatic | Violet |

3.7.2 SET "POWER" switch to "OFF."
3.7.3 CONNECT "POWER" switch harness 516857-1 to power harness 415000.
3.7.4 CONNECT line connect harness 412544 to power harness 415000 .

### 3.8 Wiring the Door Activation or Safety Device

## NOTE

Attachments 2, 3, and 4 illustrate typical wiring for various devices. Though the specific device may not be shown, this attachment can be used as a general guide. Specific wiring instructions from the manufacturer must also be consulted.
3.8.1 Refer to Attachment 2, 3, or 4 and applicable manufacturer's instructions, and CONNECT door activation or safety device.

204027
Rev. C, 11/9/05
9 of 31

### 3.9 Wiring Sentrex ${ }^{3}$

## CAUTION

Do Not connect Sentrex Microboard or Sensors until control box is fully tuned.

## NOTE

Select Sentrex when in step 9 of Table 1 if tuning with pushbuttons, even though Sentrex has not been connected at this time. If tuning with PDA, select Sentrex for Safety Logic in Step 6. For left hand Magic Force Operators, add encoder handing jumper between encoder and encoder cable adapter.
3.9.1 Refer to Attachment 2, 3, or 4, and CONNECT Sentrex ${ }^{3}$ as follows:

| TB1 Terminal | Connection | Sentrex $^{3}$ Wire Color |
| :---: | :---: | :---: |
| 1 | VSX (+) Power for Sensor Head | Red |
| 2 | Serial Communication | Green |
| 3 | Serial Communication | White |
| 4 | GND (-) Ground for Sensor Head | Black |

### 3.10

Wiring Bodyguard

## NOTE

The Bodyguard does not require a lockout relay for use with the MC521 control box. A 300-ohm 5-watt resistor is needed. Part Number 516861 provides the resistor and terminal block. The MC521 control box generates the data signals for door open, closing, and closed positions. Refer to Attachment 2, 3, or 4 as applicable for wiring connections. Program the Bodyguard Relay Output to \#2.

### 3.11 Wiring Superscan

Refer to Attachment 2, 3 , or 4 as applicable for wiring connections. To inhibit the Stall Superscan, a switch is required in series with the Stall output.

### 3.12 Wiring Holding Beam

The Holding Beam input is used in applications when there is a rail-mounted holding beam. When the door is closing and the beam is obstructed, the door will not open until the door is completely closed and the header-mounted sensor becomes active. When the door is open and the beam is obstructed, the door will remain open. Refer to Attachment 2, 3 , or 4 as applicable for wiring connections.

[^0]204027
Rev. C, 11/9/05
10 of 31

### 3.13 Wiring the Cycle Counter

| Cycle counter 413787 is optional. | NOTE |
| :--- | :--- |

3.13.1 Refer to Figure 5, and CONNECT wiring for cycle counter.


## 4. TUNE-IN INSTRUCTIONS

### 4.1 Initial Tune-In Settings

4.1.1 SET "ON/OFF/HOLD OPEN" switch to "OFF."
4.1.2 SET "POWER" switch to "ON."

### 4.2 Tuning In the MC521 Controller Using the Palm Pilot

## WARNING

To prevent injury to personnel and damage to equipment, the following settings must be made before using the door.

## NOTE

The following steps provide instructions for tuning the MC521 controller using the Palm Pilot. MC521 application software is required.

| Step 1: Select MC521 Tool Box from the list of applications. | Step 2: Select Restart FIS on the Main selection menu. (FIS = First Install Sequence) |
| :---: | :---: |
| Step 3: Select door type. | First Install Info <br> Door Type Mogic Force Low Energy... <br> Step 4: Setup the door type, the motor configuration, and the handing. Press Begin FIS when finished. |


| First Install Info <br> Door Type Mogic Force Low Energy... <br> Step 5: If additional configuration is needed press Configure Door. | Step 6: Configure additional settings and press Update after each setting has been changed. Once completed, press Cancel to go back to the Main selection menu. Motor 1 and Motor 2 have independent settings. |
| :---: | :---: |
| First Install Info <br> Door Type Magic Force Low Energy... <br> Step 7: Press Begin Auto Configure. | !!! WARN\|NG !!! <br> The door path must be free of objects and remain free until complete. <br> Press OK to continue when ready. <br> Step 8: Press OK. |
| $\qquad$ ***. <br> Put function switch to Hold Open to begin auto configure sequence. <br> Cancel <br> Step 9: Put Function switch to Hold Open momentarily, and then back to Closed. | Step 10: Door will go through a learn sequence to configure itself. The door will perform the following operations in learn mode: <br> - Open fully at check speed <br> - Close partially to learn stall <br> - Close fully <br> - Open halfway at open speed and stop <br> - Close fully <br> WARNING: <br> During this sequence the sensors are inactive and the door has no SAFETY. To stop the door, turn power off. |

[^1]204027
Rev. C, 11/9/05
13 of 31

|  | Step 12: Configure settings as needed and press Update after each setting has been changed. Once completed, press Cancel to go back to the Main selection menu. <br> Door must be cycled to full open for changes to be stored in permanent memory. |
| :---: | :---: |
| Step 13: If the door is not operating correctly press Trouble Shoot to enter the Trouble Shooting menu. | Turbo TB1 TB2 TB3 TB4 TB5 <br> 1   <br> 2   <br> 3   <br> 4   <br> 5   <br>    <br>    <br>    <br>    <br>    <br>    <br>    <br> 8   <br> 9   <br> 10   <br> Step 14: View the I/O grid to verify the sensors and inputs. |
| Step 15: Press More> to access more functions. | Step 16: Press Clone Settings to pull all of the settings out of one controller and put them into another door. |


| Status: Ready to fetch settings. $\qquad$ <br> Step 17: To pull all of the settings out of one controller and put them into another door, press Fetch Settings. | $\qquad$ <br> Status: Ready to push settings. <br> To put the settings into another controller plug the Palm into the other controller and press Push Settings. Note: Push Settings feature will not work if both doors are not the same or if the software version between the two doors is different. |
| :---: | :---: |
| Step 18: Press Summary Listing to view all current settings for Motor 1 and Motor 2. |  <br> Step 19: Review the information on the summary listing. |

204027
Rev. C, 11/9/05
15 of 31

### 4.3 Tuning In the MC521 Controller Using the Controller Pushbuttons

## NOTE

1. To change the INDEX:

Hold ENTER switch while pressing UP or DOWN to get to desired INDEX
2. To change a VALUE:

Unlock the keypad by setting index 99 to value 01 .
After the desired INDEX is selected, release ENTER and within 2.5 seconds press UP or DOWN to get the desired VALUE. (If the the UP or DOWN buttons are not pressed within 2.5 seconds of releasing the ENTER button, the display will change from the VALUE back to the STATUS.)
3. To display STATUS CODE:

A few seconds after the VALUE is selected, the display indicates the STATUS CODE
4. To show the INDEX and VALUE

To show the INDEX, hold ENTER. Once ENTER is released the display will show the VALUE of that INDEX.
5. Read the descriptions entirely before performing each step. Check the INDEX and VALUE after each step.
6. To store changes in permanent memory:

Cycling door open one time will store changes.
7. To lock keypad:

Lock keypad by setting index 99 to value 01 or by turning power OFF and then ON.
8. To access the door cycle counter function:
a. Ensure that the keypad is locked by setting index 99 to 01 .
b. Ensure that the index is set to any index but 99.
c. Press the up or down key to access the door cycle counter.
d. The display will show "dc" followed by four pairs of digits, followed by "dc". For example, if the door count was 12345678 cycles the door will display "dc" "12" "34" "56" "78" "dc."

Table 1. FIS Procedure Using Pushbuttons

| Step | Description | Display |  |  |
| :---: | :--- | :---: | :---: | :---: |
|  |  | Index | Value | Status Code |
| 1 | Set Function switch to "Closed." |  |  |  |
| 2 | Turn power on. |  |  |  |
| 3 | Unlock keypad. | 99 | 00 | 00 |
| 4 | Restart FIS. | 96 | 01 | A0 |
| 5 | Select door type (Refer to Table 2) | 00 | Refer to Table 2 | A0 |
| 6 | Select Motor 1 handing | 01 | $00=$ Right hand <br> $01=$ Left hand | A0 |

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204027
Rev. C, 11/9/05
16 of 31

| Step | Description | Display |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Index | Value | Status Code |
| 7 | Select Motor 2 handing | 02 | $\begin{gathered} 00=\text { Right hand } \\ 01=\text { Left hand } \end{gathered}$ | A0 |
| 8 | Accept FIS. As soon as the VALUE is changed to 01, display will go to INDEX 00 (Open Speed value) and then to A1. (Note: 09 is the default value for low energy.) | 03 | 01 | A1 |
| 9 | Make changes: Safety Logic <br> (Note: If there are no sensors connected, leave at default value of 00 .) | 11 | $\begin{gathered} 00=\text { Sensor } \\ 01=\text { Sentrex } \\ 02=\text { Carpet } \\ 03=\text { Carpet } 12 \text { sec. } \\ 04=\text { Bifold } \end{gathered}$ | A1 |
| 10 | Function switch: Switch to OPEN, momentarily, then CLOSED/LOCKED. Wait for the learn sequence to end. Display will show $\underline{\text { A2 }}$ when finished. |  |  | A2 |
| 11 | Lock keypad | 99 | 01 | 00 |
| 12 | Final Tune in |  |  |  |

Table 2. MC521 Mode Values

| Code | MC521 Operational Mode |
| :---: | :--- |
| 01 | Dura-Glide door style-Single Motor |
| 02 | Dura-Glide door style-Dual Motor |
| 03 | Magic-Swing Door Style-Single Motor |
| 04 | Magic-Swing Door Style-Dual Motor |
| 05 | Magic-Force Door Style-Single Motor |
| 06 | Magic-Force Door Style-Dual Motor |
| 07 | Magic-Force Door Style-Single Motor Low Energy |
| 08 | Magic-Force Door Style-Dual Motor Low Energy |
| 09 | Bifold door style--Single Motor |
| 10 | Bifold door Style--Dual Motor |

Table 3. Index List

| Index | Description |
| :---: | :--- |
| $00-89$ | API Mode Specific Door Operational Values-These depend upon the mode selected |
| $90-95$ | Reserved |
| 96 | Command - Restart FIS. Entering 01 will cause FIS to restart. |
| 97 | Reserved |
| 98 | Command - RESTART AUTOCONFIGURATION, Entering 01 will cause auto configuration. |

[^2]204027
Rev. C, 11/9/05
17 of 31

| Index | Description |
| :---: | :--- |
|  | Entering "01" will cause auto configuration. |
| 99 | Command - Lock. Entering "01" will lock all VALUE inputs except this INDEX. This prevents <br> inadvertent changes to input values. VALUEs may be unlocked by entering "00" in this INDEX. <br> Keypad is automatically locked upon normal door motion. |

Table 4. Magic Force/Magic Swing Configuration Codes-Motor 1

| Index | Min. <br> Value | Max. <br> Value |  | Description |  |
| :---: | :---: | :---: | :--- | :--- | :--- |
|  |  |  | Low Energy | Full Energy |  |
| 00 | 05 | 35 | Open speed, revolutions per second | 09 | 20 |
| 01 | 03 | 12 | Check speed, revolutions per second | 04 | 04 |
| 02 | 05 | 40 | Stall speed, percent of PWM counts | N/A | N/A |
| 03 | 00 | 99 | Open check length, percent of full opening | N/A | N/A |
| 04 | 00 | 99 | Magic Touch sensitivity (00 = OFF, 01-99 $=$ <br> sensitivity) (01 = max. sensitivity) | 00 | 00 |
| 05 | 00 | 99 | Magic Touch hold open time (25 sec. max. $=99 \%)$ | 21 | 15 |
| 06 | 00 | 99 | Hold-open delay in percent (25 sec. max. $=99 \%)$ | 21 | 05 |
| 07 | 05 | 99 | Open torque, percent of full torque | 33 | 33 |
| 08 | 05 | 99 | Check torque, percent of full torque | 23 | 23 |
| 09 | 05 | 99 | Stall torque, percent of full torque | 23 | 23 |
| 10 |  |  | Reserved | NA | NA |
| 11 | 00 | 04 | Safety Logic (00 = Sensor, 01 $=$ Sentrex, $02=$ <br> Carpet, 03 = Carpet 12 Sec., 04 = Bifold | 00 | 00 |
| 12 | 00 | 01 | 2S Operation, 00 = OFF, 01 = ON | 00 | 00 |
| 13 | 00 | 99 | Obstruction Time (percent) (2.5 sec. max. $=99 \%)$ | 19 | 19 |
| 14 | 00 | 60 | Open Acceleration Slope | 07 | 07 |
| 15 | 00 | 99 | Open Braking Slope | 15 | 40 |
| 16 | 00 | 01 | Magic touch mode (Dual = 00, Single = 01) | 01 | 01 |
| 17 |  |  | Reserved | NA | NA |

Note: Door must be cycled open for changes to be stored in permanent memory.

204027
Rev. C, 11/9/05
18 of 31

Table 5. Magic Force/Magic Swing Configuration Codes-Motor 2

| Index | Min. Value | Max. Value |  | Description |  |
| :--- | :---: | :---: | :--- | :--- | :--- |
|  |  |  |  | Lefaults |  |
| 20 | 05 | 35 | Open speed, revolutions per second | 09 | 20 |
| 21 | 03 | 12 | Check speed, revolutions per second | 04 | 04 |
| 22 | 05 | 40 | Stall speed, percent of PWM counts | N/A | N/A |
| 23 | 00 | 99 | Open check length, percent of full opening | N/A | N/A |
| 24 | 00 | 99 | Magic Touch sensitivity (00 $=$ OFF, $01-99=$ <br> sensitivity) (01 = max. sensitivity) | 00 | 00 |
| 25 | 00 | 99 | Magic Touch hold open time (25 sec. max. $=$ <br> $99 \%)$ | 21 | 15 |
| 26 | 00 | 99 | Hold-open delay in \% (25 sec. max. $=99 \%)$ | 21 | 05 |
| 27 | 05 | 99 | Open torque, percent of full torque | 33 | 33 |
| 28 | 05 | 99 | Check torque, percent of full torque | 23 | 23 |
| 29 | 05 | 99 | Stall torque, percent of full torque | 23 | 23 |
| 30 |  |  | Reserved | NA | NA |
| 31 |  |  | Reserved | NA | NA |
| 32 |  | Reserved | NA | NA |  |
| 33 | 00 | 99 | Obstruction time in \% (2.5 sec. max. $=99 \%)$ | 19 | 19 |
| 34 | 00 | 60 | Open Acceleration Slope | 07 | 07 |
| 35 | 00 | 99 | Open Braking Slope | 15 | 40 |
| 36 |  |  | Reserved | Reserved | NA |
| 37 |  |  |  | NA |  |

Table 6. Status Codes

| Status Code |  |
| :--- | :--- |
| 00 | Normal operation-All OK |
| 20 | Breakout |
| 55 | Stall state |
| A0 | First installation sequence (FIS) |
| A1 | Auto-configuration sequence |
| A2 | Auto-configuration confirmation sequence |
| b0 | Invalid mode |
| b1 | Encoder error |
| dc | Display door cycle counter |
| EE | Obstruction in Learn Mode |
| 0b | Obstruction after Learn Mode |

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204027
Rev. C, 11/9/05
19 of 31

### 4.4 Final Tune-In Adjustments

4.4.1 Refer to ANSI/BHMA A156.10, "American National Standard for Power Operated Doors" or ANSI/BHMA A156.19, "American National Standard for Power Assist and Low Energy Power Operated Doors" and Attachment 7, and DETERMINE ANSI and UL door operating requirements.
4.4.2 CYCLE and RECYCLE door several times to verify proper speeds and forces, and PERFORM adjustments in the following order:
a. ADJUST close check cam.
b. ADJUST open speed.
c. ADJUST open check speed.
d. ADJUST "CLS" (close speed) rheostat.
e. ADJUST "CK" (close check speed) rheostat.

NOTE
Adjustments to the "CK" (close check) rheostat also affect closing speed. Closing speed must always be checked after adjusting close check speed.
f. ADJUST "CLS" (close speed) rheostat.

## CAUTION

To prevent motor overheating and premature motor failure, stall speed must not be set too high.
g. ADJUST stall speed.
h. ADJUST torque.
i. ADJUST time delay.

## WARNING

The Magic-Touch time delay must be set to at least 5 seconds to ensure compliance with ANSI/BHMA A156.19, "American National Standard for Power Assist and Low Energy Power Operated Doors" specifications.
j. ADJUST Magic-Touch ${ }^{\text {TM }}$ time delay.
k. ADJUST breakout and breakout status cams.
l. Refer to Attachment 7, and ENSURE all ANSI/BHMA, and UL compliance requirements are met.
m. POWER DOWN the door, POWER UP the door, and ENSURE that all settings have been stored in the controller.

## 5. SPARE PARTS LIST

Table 7 shows the spare parts for the MC521 control box used with Magic-Swing ${ }^{\text {TM }}$, Magic-Force ${ }^{\text {TM }}$, and Bifold operators.

Table 7. Spare Parts

| Description | Part Number |
| :--- | :--- |
| MC521 Controller and 3 terminal blocks | 313969 |
| MC521 Controller Manual | 204027 |
| Power and Function Switch Assembly 8 feet | $516857-1$ |
| Power and Function Switch Assembly 15 feet | $516857-2$ |
| Harness Encoder Handing | 413767 |
| Harness Line | 412544 |
| Harness Power 18 inch | 415000 |
| Harness Phone Cord 50 feet | 713911 |
| Harness Phone Cord 25 feet | $713911-1$ |
| Adapter Female DB9 to RJ11 | 516826 |
| Terminal Block Plug 10 position | 714055 |
| MC521 New Palm Cable | 415044 |
| Harness Encoder Cable Adapter 12 inch. | 415001 |
| Resistor Assembly, Bodyguard | 516861 |

204027
Rev. C, 11/9/05
21 of 31

## Attachment 1

## Breakout Status Wiring for Magic-Swing Operators

(Sheet 1 of 1)


WIRE HARNESS (CONNECTOR SEEN FROM WIRES SIDE)


BREAKOUT STATUS WIRING--DUAL DOOR

Attachment 2
Magic-Force Wiring Diagram-MC521
(Sheet 1 of 1 )


Attachment 3
Magic-Force Wiring Diagram—MC521 With Power Close Option
(Sheet 1 of 1)


204027
Rev. C, 11/9/05
Page 24 of 31
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Attachment 4
Magic-Swing Wiring Diagram-MC521
(Sheet 1 of 1 )


204027
Rev. C, 11/9/05
Page 25 of 31
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## Attachment 5

Terminal Block Connections -TB1 through TB5
(Sheet 1 of 1)
TB2

(ROCKER SWITCH WIRING)


204027 * REMOVE IF EXTERNAL Rev. C, 11/9/05 POWER SUPPLY IS USED.

ucswo11B

## Attachment 6

MC521 Controller Controls and Indicators
(Sheet 1 of 2)



## Attachment 6

## MC521 Controller Controls and Indicators

(Sheet 2 of 2 )

| ITEM | CONTROL/ <br> INDICATOR | DESCRIPTION |
| :---: | :--- | :--- |
| 1 | Motor 2 Connector J109 | Motor No. 2 connector. |
| 2 | Power Connector J1101 | Connection point for incoming line, neutral, and common power wiring. |
| 3 | Fuse Z1101 | Controller fuse-- 5 Amp, 250V |
| 4 | Motor 1 Connector J601 | Motor No. 1 connector. |
| 5 | Terminal Block Connector <br> TB1 | Connection point for door cycle counter and Sentrex. |
| 6 | Terminal Block Connector <br> TB2 | Connection point for function switch (rocker). |
| 7 | Encoder 2 Connector J403 | Connection point for motor encoder No. 2. |
| 8 | Two Digit Display | Displays Controller Status. Also serves as the display for tune-in by pushbutton switches. |
| 9 | Encoder 1 Connector J402 | Connection point for motor encoder No. 1. |
| 10 | Up Pushbutton Switch <br> S302 | Used manual setup and tuning of door when PDA is not available. |
| 11 | Down Pushbutton Switch <br> S303 | Used for manual setup and tuning of door when PDA is not available. |
| 12 | Enter Pushbutton Switch <br> S301 | Used for manual setup and tuning of door when PDA is not available. |
| 13 | COMM1 Jack | RS232 COMM1 connector. Connection point for PDA harness. |
| 14 | COMM2 Jack | RS232 COMM2 connector. Future provision. |
| 15 | Terminal Block Connector <br> TB5 | Not used. |
| 16 | Terminal Block Connector <br> TB4 | Connection point for operate sensor, safety sensor, and push plate. |
| 17 | Terminal Block Connector <br> TB3 | Connection point for stall sensor, safety sensor, and breakout switch. Using jumper wires across TB3 terminals 1 to <br> 5 and 2 to 6, internal transformer supplies power to multiple external sensors. |
| 18 | J401 | Connection point for Sentrex microboard. |

204027
Rev. C, 11/9/05
Page 28 of 31
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## Attachment 7

## ANSI/BHMA and UL Compliance Requirements for Swinging and Folding Doors (Sheet 1 of 2)

## Final adjustment and proper operation of the door system must be and shall be performed in the field.

Note: These instructions are for informational purposes and do not substitute for review against the current revision of the referenced standards. Where a requirement exists in multiple standards, such as the ANSI/BHMA standard and the UL standard, the more restrictive condition applies. Other local codes and fire codes likely exist, and must also be followed.

### 1.0 ANSI/BHMA A156.10 Full/Standard Power Swinging and Folding Door Systems

Full/standard power swinging and folding door systems must be installed and adjusted for compliance with the current version of ANSI/BHMA A156.10, "American National Standard for Power Operated Pedestrian Doors".

Critical aspects of the installation for compliance with A156.10 include:

- Guide rail size, location, and type.
- Control mat size, layout, molding height, active areas and sensitivity.
- Sensor pattern size, sensitivity, and function.
- Knowing Act guidelines, secondary activating zones and double egress swing door requirements.
- Entrapment protection rules including door speeds, forces, and time delays.
- Signage. (Decals and application instructions are provided with the door operator.)


## ANSI/BHMA A156.19 Low Energy Swinging Door Systems

Low energy swinging door systems must be installed and adjusted for compliance with the current version of ANSI/BHMA A156.19, "American National Standard for Power Assist and Low Energy Power Operated Doors".

Critical aspects of the installation for compliance with A156.19 include:

- Opening times and force.
- Closing times and force.
- Manual opening force.
- Time delay.
- Signage. (Decals and application instructions are provided with the door operator.)


## UL 325 Compliance

All power operated door systems must be installed in compliance with the current edition of UL 325, "Standard for Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems".

## 204027

Rev. C, 11/9/05
Page 29 of 31
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## Attachment 7

## ANSI/BHMA and UL Compliance Requirements for Swinging and Folding Doors

(Sheet 2 of 2 )

Wiring
3.1.1 To reduce the risk of electric shock proper and reliable grounding is mandatory. See Main Power Wiring instructions and Wiring Diagrams in this guide for grounding techniques.
3.1.2 Permanent wiring is to be employed as required by the National Electrical Code and/or local codes.
3.1.3 Connection of external devices is shown in the wiring diagrams and terminal block layouts elsewhere in this guide. Refer to these figures for proper wiring of external devices to ensure compliance with UL 325.

Knowing Act
Doors activated by a manual switch (Knowing Act switch in ANSI/BHMA terms) must have the switch installed in a location from which operation of the door can be observed by the person operating the switch.

Entrapment - Swinging Doors
To ensure that a swinging door operates in accordance with UL 325 entrapment protection criteria the following must be established:

- Manual opening force or breakout force with power on or off must be less than $50 \mathrm{lbf}(222.4 \mathrm{~N})$.
- Closing force must be less than $40 \mathrm{lbf}(177.9 \mathrm{~N})$ at the lock/latch stile.
- Closing time through the final 10 degrees must be greater than 1.5 seconds.
- Maximum recommended door weight:

$$
\begin{aligned}
& \text { Magic-Access Operator }=250 \mathrm{lbs}(115 \mathrm{~kg}) \\
& \text { Magic-Force Operator }=350 \mathrm{lbs}(160 \mathrm{~kg}) \\
& \text { Magic-Swing Operator }=700 \mathrm{lbs}(320 \mathrm{~kg})
\end{aligned}
$$

## Entrapment - Folding Doors

To ensure that a folding door operates in accordance with UL 325 entrapment protection criteria the following must be established:

- Breakout force with power on or off must be less than $50 \mathrm{lbf}(222.4 \mathrm{~N})$.
- Closing force must be less than $30 \mathrm{lbf}(133.4 \mathrm{~N})$ between fully open and latch check.
- Closing time through the final 2 inches of closing (latch check) must be greater than 1.5 seconds measured at the lead edge of each FX (fold slide) panel.
- Maximum recommended door weight:

Bifold Door $=100 \mathrm{lbs}(45 \mathrm{~kg})$ each panel

Attachment 8
Palm Troubleshooting Aid—Swing/Bifold
(Sheet 1 of 1)

| Terminal <br> $\&$ Pin | Description | State |
| :---: | :---: | :---: |
| TB1-5 | External Cycle Counter Output | Dark = low (counter increments) |
| TB1-8 | Bodyguard Data Output |  |
|  | Bodyguard | Dark = door closed |

Function Switch states for TB2

|  | Hold <br> Open | Off |  | Auto On |
| :---: | :---: | :---: | :---: | :---: |
| TB2-1 |  |  |  |  |
| TB2-3 |  |  |  |  |


| TB3-4 | Stall Input (Swing) | Dark = detecting |
| :---: | :---: | :---: |
|  | Stanguard (Fold) | Dark = triggered or detecting |
|  |  |  |
| TB4-8 | Safety Input | Dark = detecting |
| TB3-9 | Breakout Input | Dark = no breakout |
|  <br> TB4-9 | Push Plate Input (connected internally) | Dark = detecting |
| TB4-8 \& | Safety Input | Dark = detecting |
| TB3-8 |  |  |
|  <br> TB4-4 | Operate Sensor Input (connected internally) | Dark = detecting |
| TB5-3 | Sentrex Operate Internal From MicroBoard | Dark = detecting |
| TB5-7 | Holding Beam | Dark = detecting |
| TB5-10 | Spare |  |


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