

Podiatry Procedures Chair

Model Numbers:

646



Service and Parts Manual



FOR USE BY MIDMARK TRAINED TECHNICIANS ONLY

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GENERAL INFORMATION

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Digitally Linked Files

REPAIR PROCEDURES & FORMS

Actuators / Limit Switches:	
Back	003-1738-00
Tilt	003-1915-00
Parts Order Form	004-0755-00
Comments Form	004-0756-00
Color Selector	www.midmark.com

(*) Indicates multiple pages due to model / serial number break(s).

Symbols



DANGER

*Indicates an imminently hazardous situation which **will** result in serious or fatal injury if not avoided.*

This symbol is used only the most extreme conditions.



WARNING

Indicates a potentially hazardous situation which could result in serious injury if not avoided.



Caution

Indicates a potentially hazardous situation which may result in minor or moderate injury if not avoided. It may also be used to alert against unsafe practices



Equipment Alert

Indicates a potentially hazardous situation which could result in equipment damage if not avoided.

The symbols below may be used in this manual to represent the operational status of table functions and components.



Indicates the function / component is working properly. No action required.



Indicates the function / component is working, but a problem exists.



Indicates the function is not working at all, or that the component is faulty.

Ordering Parts

The following information is required when ordering parts:

- Serial number & model number
- Part number for desired part
(Refer to Section E: Exploded Views & Parts Lists)

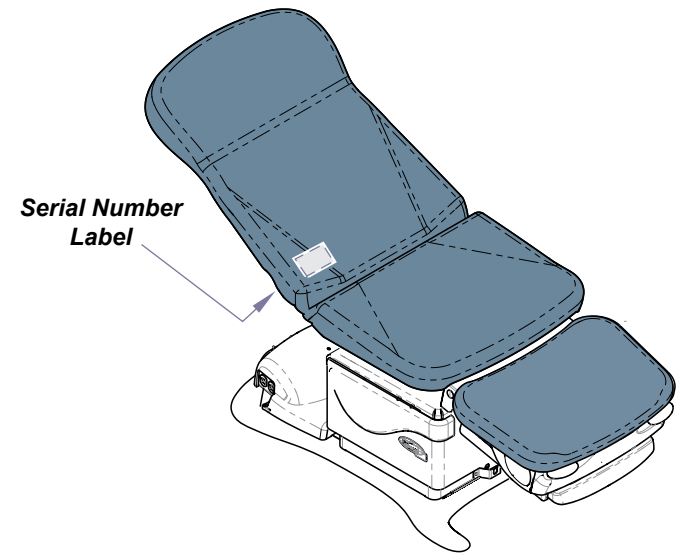
Non-warranty parts orders may be faxed to Midmark using the Fax Order Form in the back of this manual.

For warranty parts orders, call Midmark's Technical Service Department with the required information.

Hours: 8:00 am to 5:00 p.m. EST (Monday thru Friday)

Phone: 1-800-Midmark

Serial Number Location



MA78771

Specifications

Patient Weight (max):	450 lbs (204 kg)
Weight of Chair:	290 lbs (131 kg)
Power Cord Length:	8 ft (244 cm)
Foot Control Voltage:	10 VAC, SELV (Safety Extra Low Voltage)
Chair Receptacle Maximum Load:	115 VAC, 3 amps, 50 / 60 Hz
Duty Cycle (Motor Run Time):	Intermittent Operation (30 seconds ON - 5 minutes OFF)
Protection against ingress of fluids:	Ordinary Equipment <i>Foot control only:</i> IPX1
Classifications:	Class 1, Type B, Applied Part
Electrical Requirements:	See model identification chart below
Regulatory Compliance:	See model identification chart below

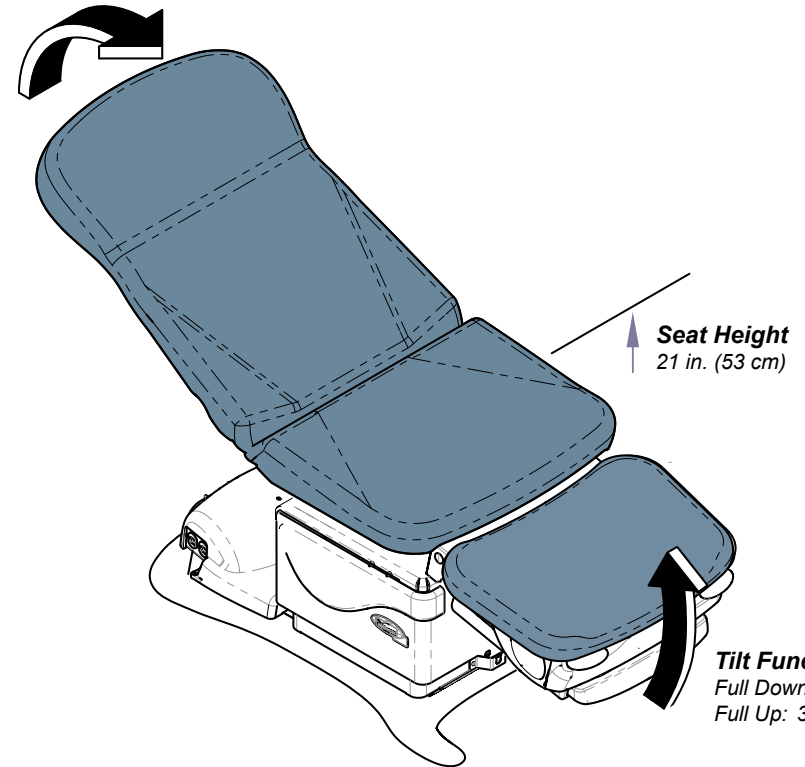
Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen, or nitrous oxide.

Model Identification / Compliance Chart

Model	Description	Complies To:			Electrical Ratings:		
		UL 60601-1	CAN / CSA 22.2, #601.1-M90	EN 60601-1-2 (EMC)	VAC +/- 10%	Amps	Cycles (Hz)
646-001	Two-Function Chair (Back & Tilt) Non-Programmable w/Receptacles	•	•	•	115	6.0	60

Back Function

Full Down: $0^{\circ} \pm 1/2^{\circ}$
Full Up: $80^{\circ} \pm 3^{\circ}$



Tilt Function

Full Down: $0^{\circ} \pm 1/2^{\circ}$
Full Up: $30^{\circ} \pm 2^{\circ}$

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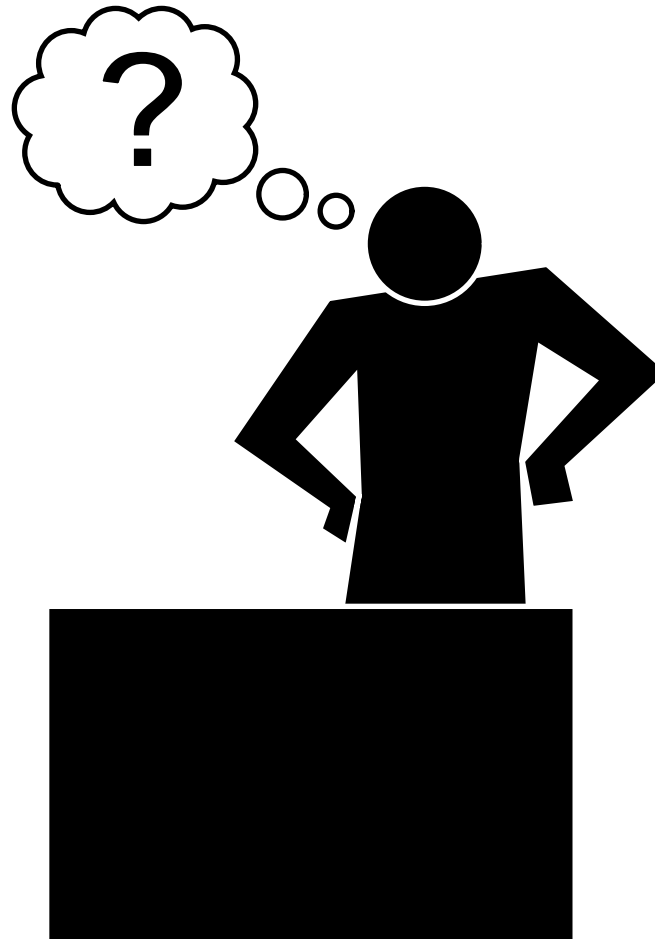
Scheduled Maintenance / Cleaning Chart

Interval	Inspection / Service	Description
Weekly	Cleaning	Clean upholstery with appropriate diluted bleach solution 10:1 (water: bleach)
		Wipe painted metal & plastic surfaces with a clean soft cloth and mild cleaner. (Note: Periodic application of common furniture wax will ease cleaning and maintain the luster of the surfaces).
	Obvious Damage	Visually inspect components for damage that could result in unsafe operation.
Semi-Annually	Mechanical Operation	Check all mechanical functions using the foot control. Repeat using the table mounted touch pads.
	Labels / Decals	Replace any missing or illegible labels.
	Hardware	All fasteners must be present and fastened securely.
	Electrical System	Inspect power cord and all wiring for damage.
Be sure all electrical connections are tight.		
Date of Service:		Model Number:
Location:		Serial Number:
Service Technician:		Notes:

Section A

Troubleshooting

Troubleshooting Chart	A-2
Power to the Chair	A-5
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Tilt Up / Down	A-8
Crash Avoidance System	A-10
QuickChair Function	A-11
Chair Receptacles	A-13
Foot Extension	A-14



Troubleshooting Chart

Problem	Symptom	Probable Cause	Check	Correction
No functions will operate.	Power light is OFF.	Facility supply voltage.	Power cord connections & facility circuit breaker.	Secure power cord connections. Reset circuit breaker if necessary.
		Primary fuse(s) blown.	Inspect fuses.	Replace faulty fuse(s).
		Main PC board	Wire connections between: power cord and main PC board.	Secure loose connections. If connections are OK,
	Power light is ON.	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: Section B - Foot Control / Touch Pads
No power at chair receptacles.	There is power to the chair, but no power at the chair receptacles.	Receptacle fuse(s) blown.	Inspect fuses	Replace faulty fuse(s)
		Loose / damaged wire connections	Wire connections between receptacle power cord & table receptacles	Secure / repair wire connections.
Foot extension malfunctioning.	Foot extension will not lock in place. - or - Foot extension will not release.	Foot extension locking mechanism malfunctioning.	Perform Locking Mechanism Inspection . Refer to: Section B - Foot Extension .	Follow instructions outlined in Section B.

Models:	646
Serial Numbers:	<i>all</i>

Problem	Symptom	Probable Cause	Check	Correction
Back function not operating properly.	No Back Up or Back Down	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: Section B - Foot Control / Touch Pads
		Loose / damaged wire connections	Check wire connections to: back actuator & back limit switches. Check wire connections between main system transformer & main PC board (black & white wires).	Secure any loose connections.
		Back actuator / main PC board	Refer to: Section B - Back Actuator / Limit Switches (Isolating a Malfunction)	Follow test sequence outlined in Section B.
	No Back Up. Back Down-OK. -OR- No Back Down. Back Up-OK.	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: Section B - Foot Control / Touch Pads
		<i>(No Back UP)</i> Back Up limit switch	Wire connections to limit switch.	Replace back limit switch / bracket assembly. Refer to: Section B - Back Actuator / Limit Switches
		<i>(No Back Down)</i> Back Down limit switch	Refer to: Section B - Back Actuator / Limit Switches (Isolating a Malfunction)	Follow test sequence outlined in Section B.
	Back drifts down.	Back actuator / motor coupler		Replace motor coupler. Refer to: Section B - Back Actuator / Limit Switches
Noisy operation (grinding, squeaking, etc.)	Back actuator	Refer to: Section B - Back Actuator / Limit Switches (Isolating a Malfunction)	Follow instructions outlined in Section B.	
Back function moves slowly, and/or will not lift patient.	Patient exceeded 450 lb weight limit		-	Inform staff that max patient weight is 450 lbs.
	Low voltage to table	Check supply voltage. Required: 115 VAC \pm 10%		Connect adequate supply voltage.
	Back actuator motor	Perform Actuator Motor Test . Refer to: Section B - Back Actuator / Limit Switches		Follow test sequence outlined in Section B.

Models:	646
Serial Numbers:	<i>all</i>

Problem	Symptom	Probable Cause	Check	Correction
Tilt function not operating properly.	No Tilt Up or Tilt Down	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: Section B - Foot Control / Touch Pads
		Loose / damaged wire connections	Check wire connections to: tilt actuator, tilt down limit switch.	Secure any loose connections.
		Tilt actuator / main PC board	Refer to: Section B - Tilt Actuator / Limit Switches (Isolating a Malfunction)	Follow test sequence outlined in Section B.
	No Tilt Up. Tilt Down-OK. -OR- No Tilt Down. Tilt Up-OK.	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: Section B - Foot Control / Touch Pads
		(No Tilt Down) Crash Avoidance System	Refer to: Section B - Tilt Actuator / Limit Switch (Isolating a Malfunction)	Follow test sequence outlined in Section B.
		(No Tilt Down) Tilt Down limit switch	Wire connections to limit switch.	If connections are OK, perform Limit Switch Test . Refer to: Section B - Tilt Actuator / Limit Switch
		Tilt actuator / main PC board	Refer to: Section B - Tilt Actuator / Limit Switch (Isolating a Malfunction)	Follow test sequence outlined in Section B.
	Tilt Up / Down - OK, but "beeps" in full UP position	Sensor PC board	Perform Sensor PC Board Check . Refer to: Section B - Tilt Actuator / Limit Switch	Replace Sensor PC Board if necessary.
	Seat drifts down.	Tilt actuator / motor coupler	-	Replace motor coupler. Refer to: Section B - Tilt Actuator / Limit Switch
	Noisy operation (grinding, squeaking, etc.)	Tilt actuator	Refer to: Section B - Tilt Actuator / Limit Switch (Isolating a Malfunction)	Follow instructions outlined in Section B.
	Tilt function moves slowly, and/or will not lift patient.	Patient exceeded 450 lb weight limit	-	Inform staff that max patient weight is 450 lbs.
		Low voltage to table	Check supply voltage. Required: 115 VAC \pm 10%	Connect adequate supply voltage.
		Tilt actuator motor	Perform Actuator Motor Test . Refer to: Section B - Tilt Actuator / Limit Switch	Follow test sequence outlined in Section B.

Models:	646
Serial Numbers:	<i>all</i>

Power to the Chair

No functions will operateA-2

This illustration shows only the components / wiring that affect ALL CHAIR FUNCTIONS.

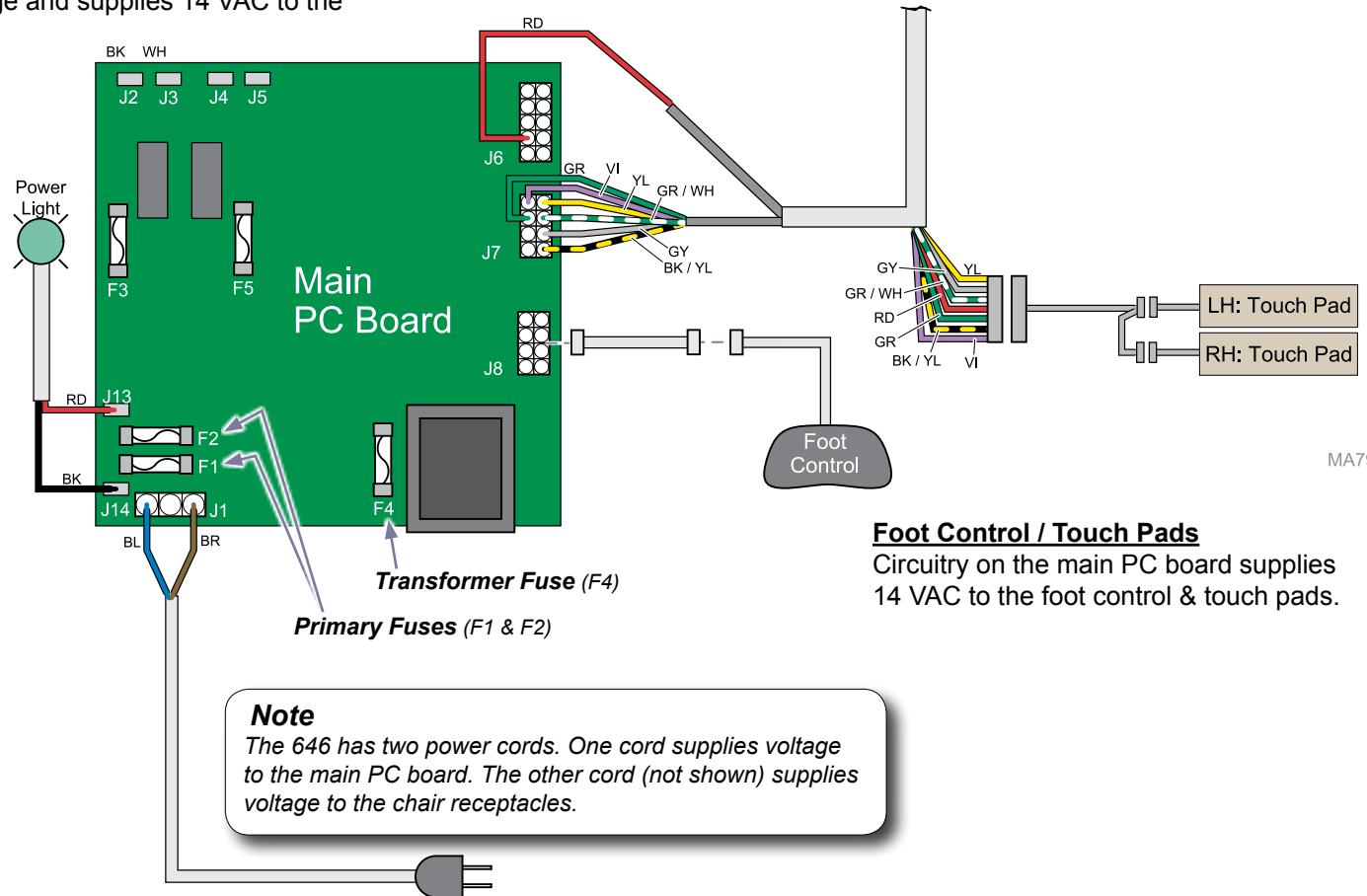
Facility Supply Voltage / Main PC Board

With the chair's power cord properly connected, facility supply voltage (115 VAC) is supplied to the main PC board. Current flows thru the two primary fuses (F1 & F2) to the transformer on the PC board. [F4 fuse protects the transformer].

The transformer reduces the line voltage and supplies 14 VAC to the foot control & the two touch pads.

Power Indicator Light

When voltage is applied to the PC board, the power light is illuminated.



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Foot Control / Touch Pads

Circuitry on the main PC board supplies 14 VAC to the foot control & touch pads.

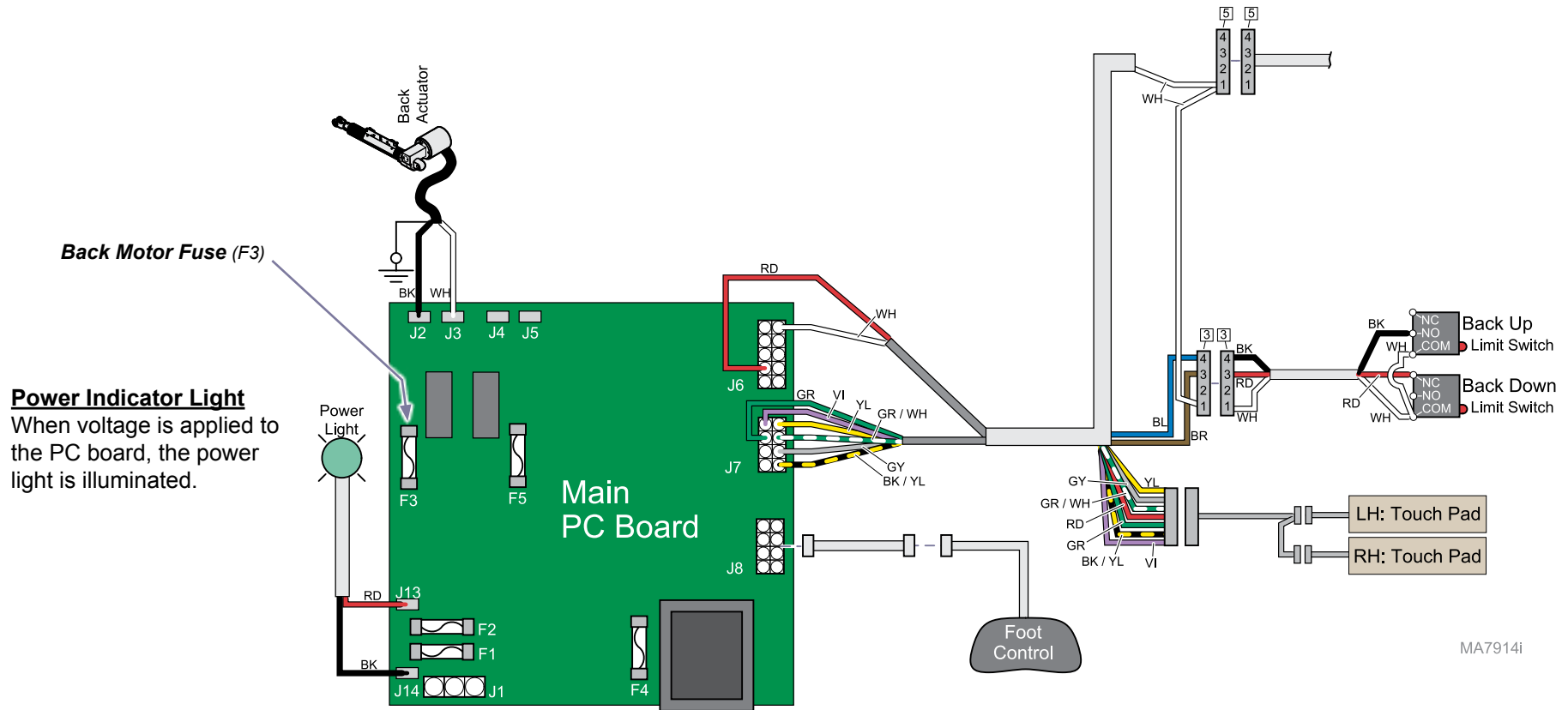
Note
The 646 has two power cords. One cord supplies voltage to the main PC board. The other cord (not shown) supplies voltage to the chair receptacles.

Models:	646
Serial Numbers:	<i>all</i>

Back UP / DOWN Function

This illustration shows only the components / wiring that affect the Back UP / DOWN function. Refer to the following page for a detailed description of Back UP / DOWN operation.

- [No Back Up or Back Down.....A-3](#)
- [No Back Up. Back Down - OK.....A-3](#)
- [No Back Down. Back Up - OK.....A-3](#)
- [Back drifts down.....A-3](#)
- [Noisy operation
\(grinding, squeaking, etc\).....A-3](#)
- [Function moves slowly, and/or
will not lift patient.....A-3](#)



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Models:	646
Serial Numbers:	<i>all</i>

Back UP / DOWN Function

Is there power to the table?

When voltage is present at the PC board, the power light is illuminated.

[Refer to 'Power to the Table' for description of current flow to the PC board].

Power to Foot Control / Touch Pads

Circuitry on the PC board supplies 14 VAC to the foot control & touch pads.

Back Up Operation

When the Back Up function is activated, current flows thru the foot control / touch pad back to the main PC board. Circuitry on the main PC board supplies approximately 48 VDC to the back actuator motor.

The actuator motor runs and raises the back section.

Note

The main PC board continuously monitors the back up limit switch.

If the back up limit switch is tripped (closed), the Back Up function will not operate.

Actuator motor runs until:

1. Foot control / touch pad button is released.
2. Back Up limit switch is tripped.
3. Overcurrent protection tripped
4. Software timeout is reached (30 seconds).

Back Down Operation

When the Back Down function is activated, current flows thru the foot control / touch pad back to the main PC board. Circuitry on the main PC board supplies approximately 44 VDC to the back actuator motor.

The actuator motor runs and lowers the back section.

Note

The main PC board continuously monitors the back down limit switch.

If the back down limit switch is tripped (open), the Back Down function will not operate.

Actuator motor runs until:

1. Foot control / touch pad button is released.
2. Back Down limit switch is tripped.
3. Emergency Stop button is pressed.
4. Overcurrent protection tripped
5. Software timeout is reached (30 seconds).

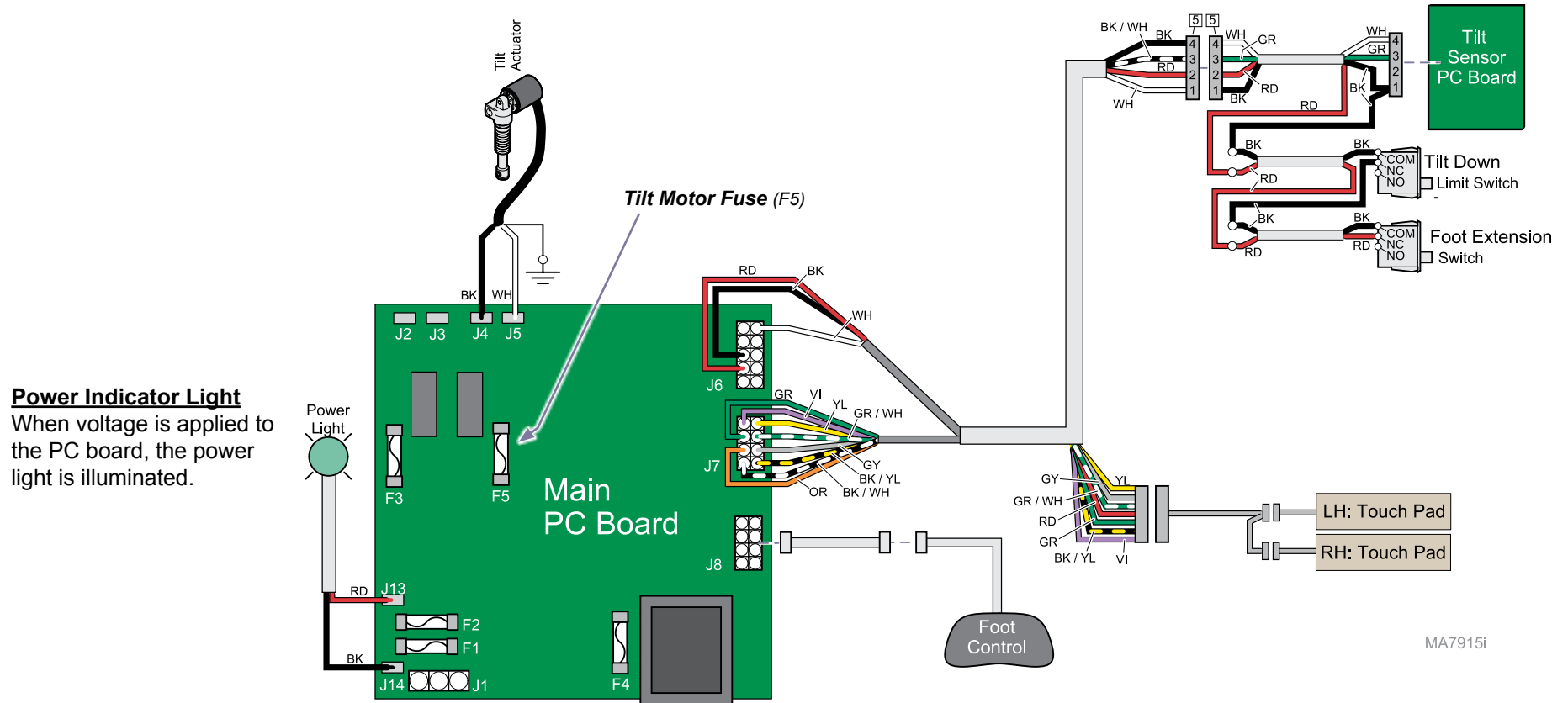
Models:	646
Serial Numbers:	<i>all</i>

** Refer to Section A: Crash Avoidance System for a detailed description of "crash position", and the functions that are disabled.*

Tilt UP / DOWN Function

This illustration shows only the components / wiring that affect the Tilt UP / DOWN function. Refer to the following page for a detailed description of Tilt UP / DOWN operation.

No Tilt Up or Tilt Down	A-4
No Tilt Up. Tilt Down - OK	A-4
No Tilt Down. Tilt Up - OK	A-4
Seat drifts down	A-4
Noisy operation (grinding, squeaking, etc)	A-4
Function moves slowly, and/or will not lift patient	A-4



Power Indicator Light
When voltage is applied to the PC board, the power light is illuminated.

Models:	646
Serial Numbers:	<i>all</i>

Tilt UP / DOWN Function

Is there power to the table?

When voltage is present at the PC board, the power light is illuminated.

[Refer to 'Power to the Table' for description of current flow to the PC board].

Power to Foot Control / Touch Pads

Circuitry on the PC board supplies 14 VAC to the foot control & touch pads.

Tilt Up Operation

When the Tilt Up function is activated, current flows thru the foot control / touch pad back to the main PC board. Circuitry on the main PC board supplies approximately 48 VDC to the tilt actuator motor.

The actuator motor runs and reclines the seat section.

Note

The main PC board continuously monitors the tilt sensor PC board.

When the tilt sensor PC board detects that the seat section has reached its upper limit, the current flow to the tilt actuator is interrupted, and movement stops. (The sensor PC board performs like a normally closed limit switch).

Actuator motor runs until:

1. Foot control / touch pad button is released.
2. Tilt sensor PC board detects upper limit.
3. Emergency Stop button is pressed.
4. Overcurrent protection tripped
5. Software timeout is reached (30 seconds).

Tilt Down Operation

When the Tilt Down function is activated, current flows thru the foot control / touch pad back to the main PC board. Circuitry on the main PC board supplies approximately 48 VDC to the tilt actuator motor.

The actuator motor runs and lowers the seat section to a flat position.

Note

The main PC board continuously monitors the tilt down limit switch and the foot extension switch.

If either the tilt down limit switch, or the foot extension switch is tripped (open), current flow to the tilt actuator is interrupted, and movement stops.

Actuator motor runs until:

1. Foot control / touch pad button is released.
2. Tilt Down limit switch is tripped.
3. Foot extension switch is tripped.
4. Emergency Stop button is pressed.
5. Overcurrent protection tripped
6. Software timeout is reached (30 seconds).

Models:	646
Serial Numbers:	<i>all</i>

** Refer to Section A: Crash Avoidance System for a detailed description of "crash position", and the functions that are disabled.*

Crash Avoidance System

The Crash Avoidance System prevents damage to the table by disabling the Tilt Down function if a potential crash situation is detected.

No Tilt Down function - Tilt Up OK
(chair "beeps")A-4

This illustration shows only the components that are monitored by the Crash Avoidance System.

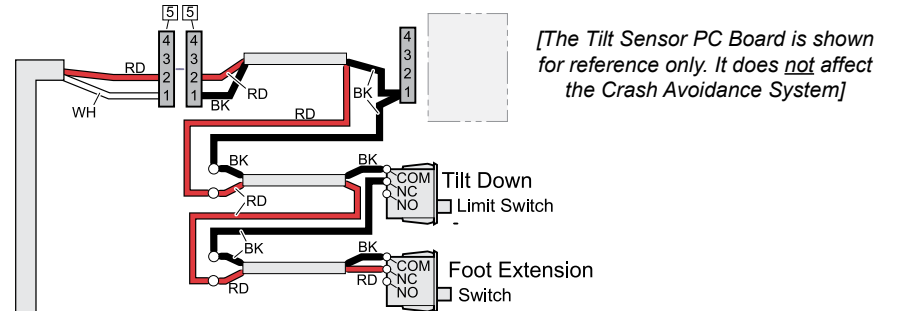
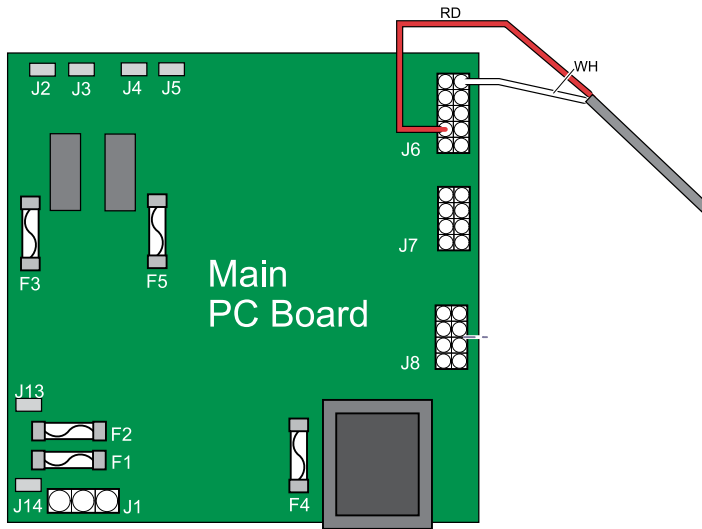
When is Tilt Down function disabled?

The main PC board continuously monitors the Tilt Down and Foot Extension* limit switches.

If either normally closed switch is tripped, the Tilt Down function is disabled.

[The foot extension switch is tripped when upward pressure is applied to the foot section].*

[Only the wires that affect this function are shown]



[The Tilt Sensor PC Board is shown for reference only. It does not affect the Crash Avoidance System]

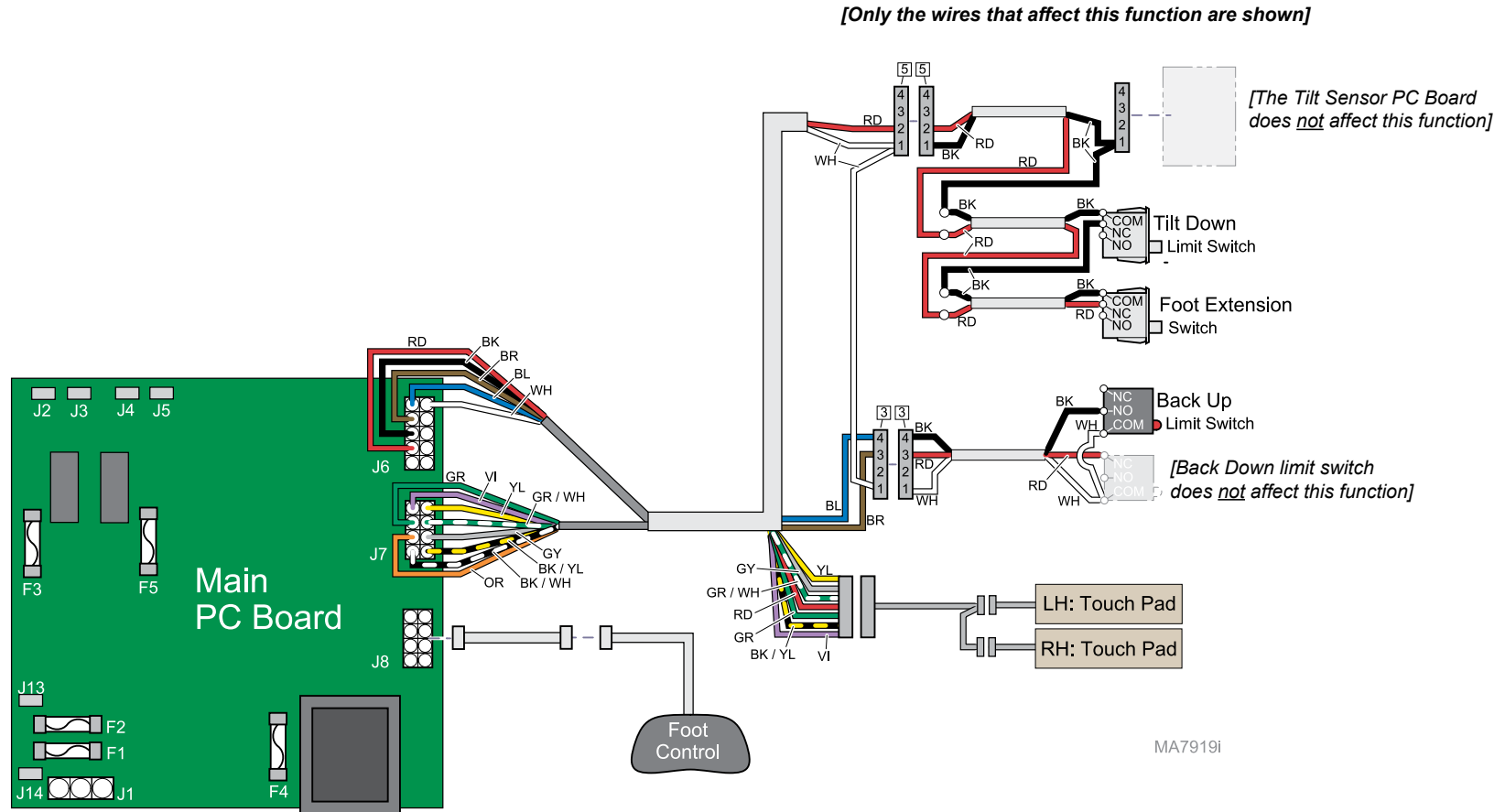
MA7908i

Models:	646	
Serial Numbers:	<i>all</i>	

QuickChair Function

This function activates the Back Up & Tilt Down functions simultaneously to move the table into “chair position”.

This illustration shows only the components that affect the QuickChair function. Refer to the following page for a detailed description of this feature.



Models:	646
Serial Numbers:	<i>all</i>

QuickChair Function

What is "Chair Position"?

Tilt: all the way down

Back: all the way up

How it works...

When the QuickChair button is pressed & held, the PC board activates the following functions:

Function

Tilt Down

Back Up

Runs until...

Tilt Down limit switch is tripped

Back Up limit switch is tripped



To activate the QuickChair function...

Press & release the QuickChair button.

Note: In the event of a malfunction, press the Stop button.

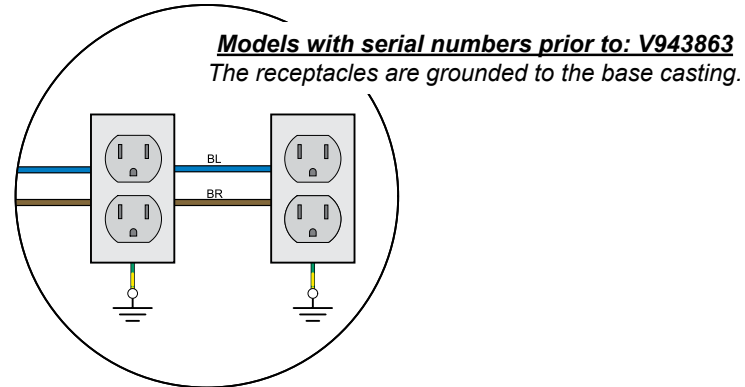


Models:	646	
Serial Numbers:	<i>all</i>	

Chair Receptacles

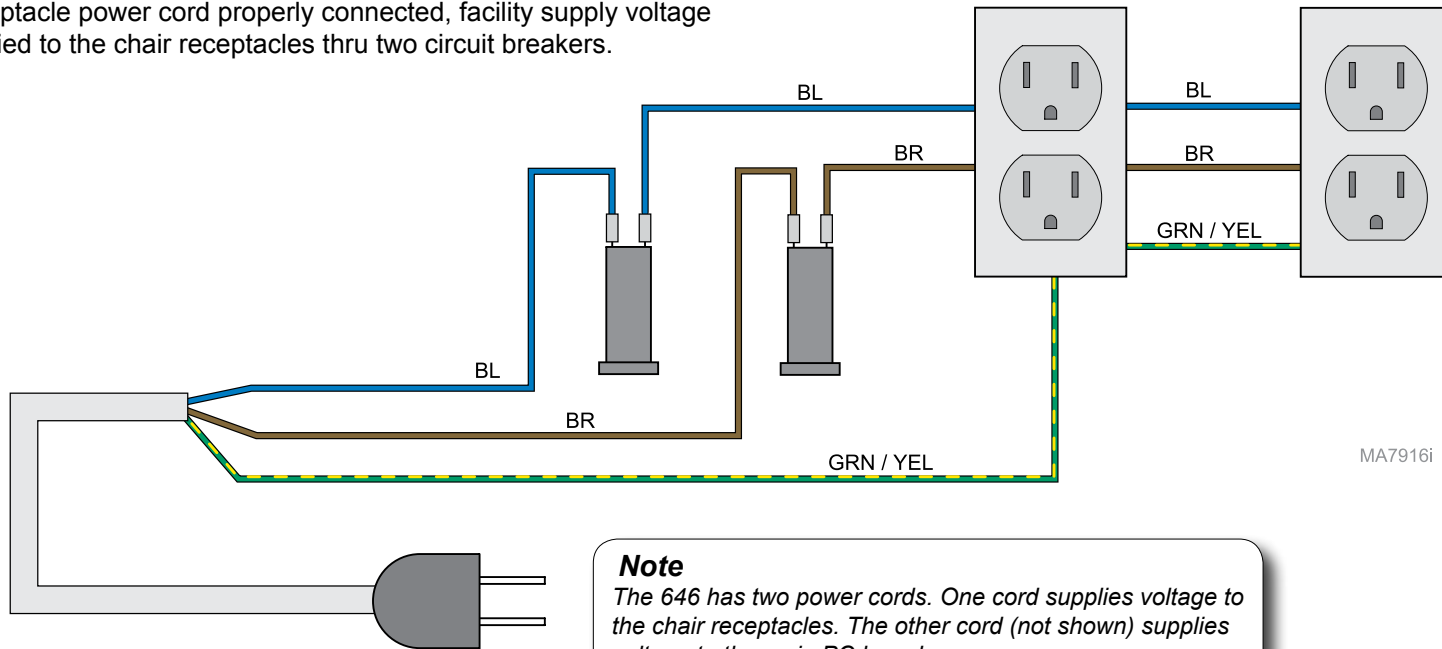
This illustration shows only the components that affect the chair receptacles.

No power at chair receptacles.....A-2



Facility Supply Voltage / Main PC Board

With the chair receptacle power cord properly connected, facility supply voltage (115 VAC) is supplied to the chair receptacles thru two circuit breakers.



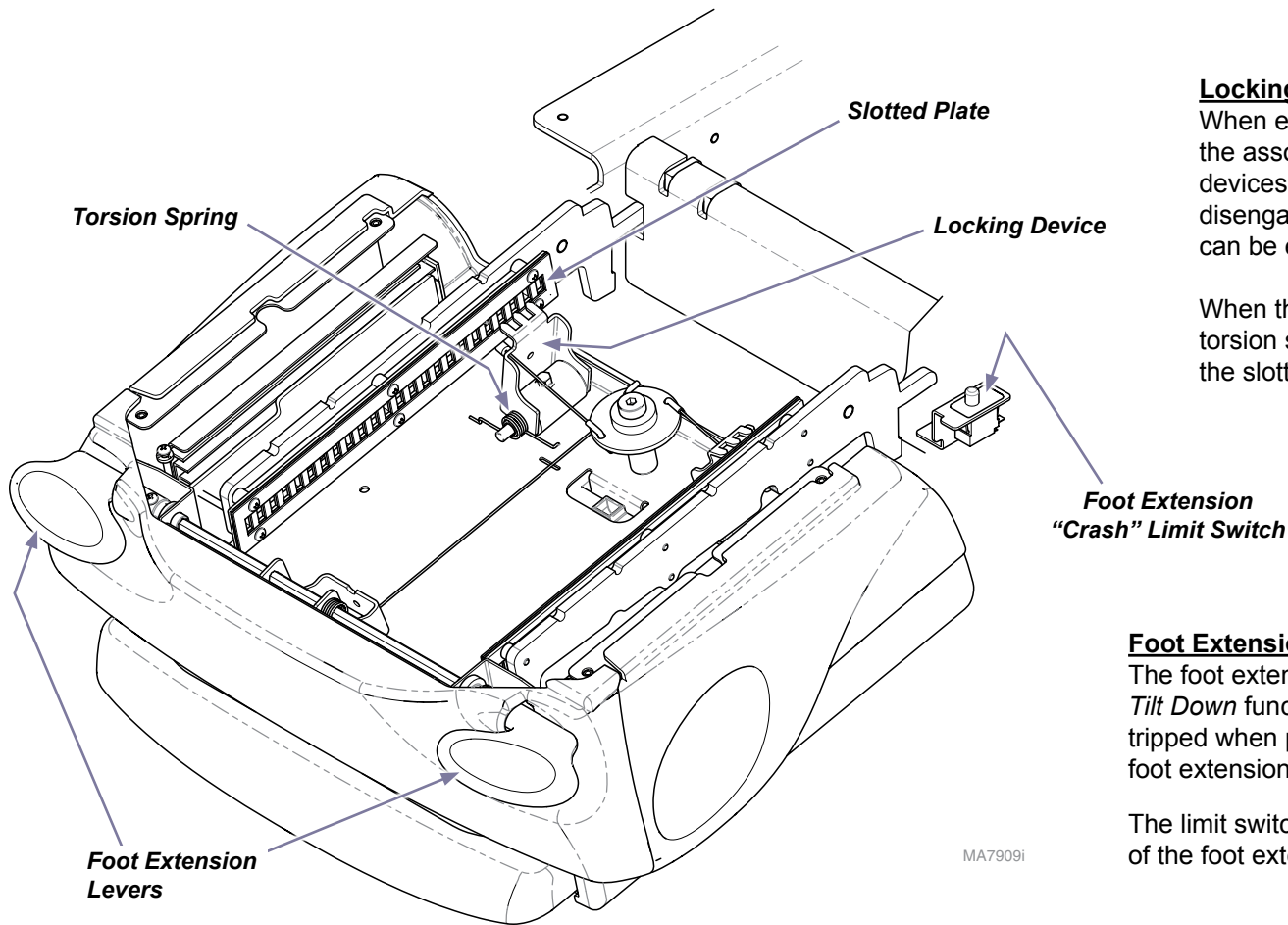
Note
The 646 has two power cords. One cord supplies voltage to the chair receptacles. The other cord (not shown) supplies voltage to the main PC board.

Models:	646
Serial Numbers:	<i>all</i>

Foot Extension

This illustration highlights the main components of the foot extension mechanism.

*Foot extension will not
lock in place / release.....A-2*



Locking Mechanism

When either foot extension lever is pressed, the associated linkage retracts the two locking devices. When the "teeth" on the locking devices disengage the slotted plates, the foot extension can be extended / retracted as desired.

When the foot extension levers are released, the torsion springs cause the locking devices to engage the slotted plates, locking the foot extension in place.

Foot Extension "Crash" Limit Switch

The foot extension "crash" limit switch disables the *Tilt Down* function when it is tripped. The switch is tripped when pressure is applied to the bottom of the foot extension due to contact with an object.

The limit switch does not affect the mechanical function of the foot extension.

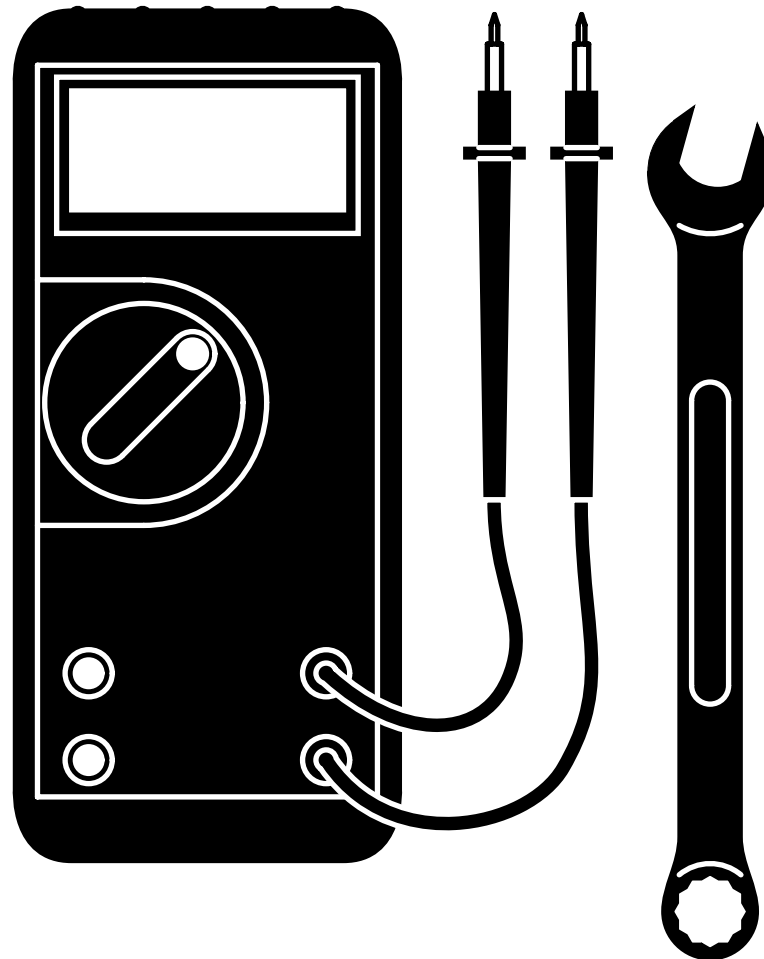
MA7909i

Models:	646
Serial Numbers:	<i>all</i>

Section B

Testing & Adjustments

Foot Control / Touch Pads	B-2
Back Actuator / Limit Switches	B-5
Tilt Actuator / Limit Switch /	
Sensor PC Board	B-8
Foot Extension /	
"Crash" Limit Switch	B-13



Foot Control / Touch Pads

Isolating a Malfunction

To isolate a malfunction, try activating the inoperable function(s) from each touch pad and the foot control.

If function(s) are inoperable from the foot control...

- A) Secure the foot control cord connection at the cord inlet.
- B) Secure inlet harness connection to main PC board (J8).

If function(s) still inoperable:

- C) Perform the [Foot Control Cord Test](#).

If function(s) are inoperable from one touch pad...

- A) Secure connection from inoperable touch pad to touch pad harness.

If function(s) still inoperable:

- B) Perform the [Touch Pad Harness / Extension Harness Test](#).

If function(s) are inoperable from both touch pads...

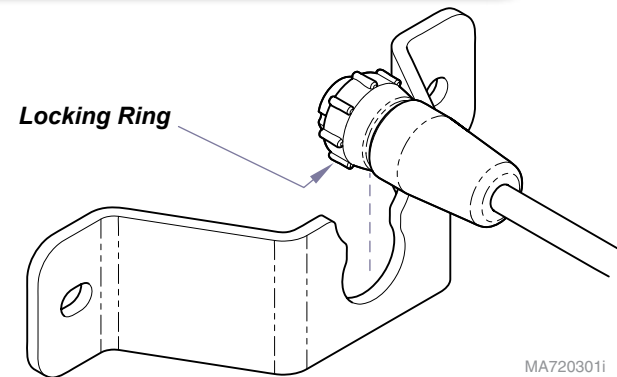
- A) Secure connections from touch pads to touch pad harness.
- B) Secure connection from touch pad harness to extension harness.
- C) Secure extension harness connections to PC board (J6 & J7).

If function(s) still inoperable:

- D) Perform the [Touch Pad Harness / Extension Harness Test](#).

Note

The foot control cord connector is "keyed" and must be oriented properly to connect. Tighten locking ring to secure connection.



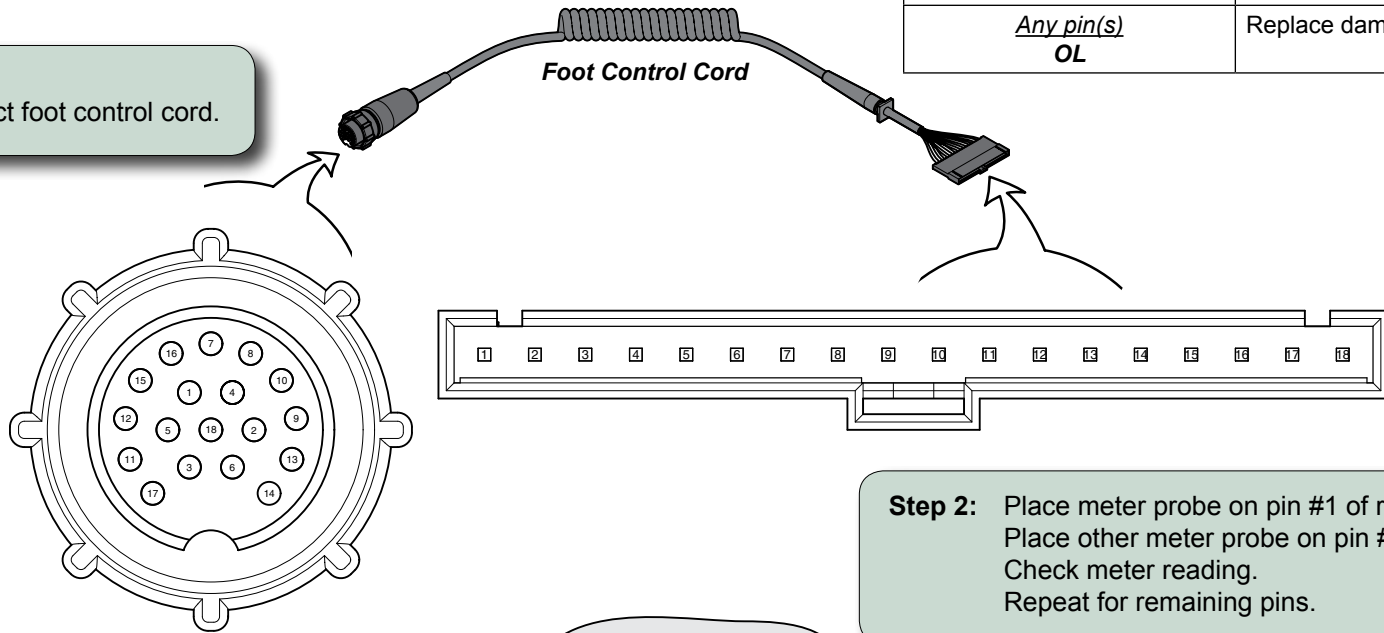
Models:	646	
Serial Numbers:	<i>all</i>	

Foot Control / Touch Pads - continued

Foot Control Cord Test

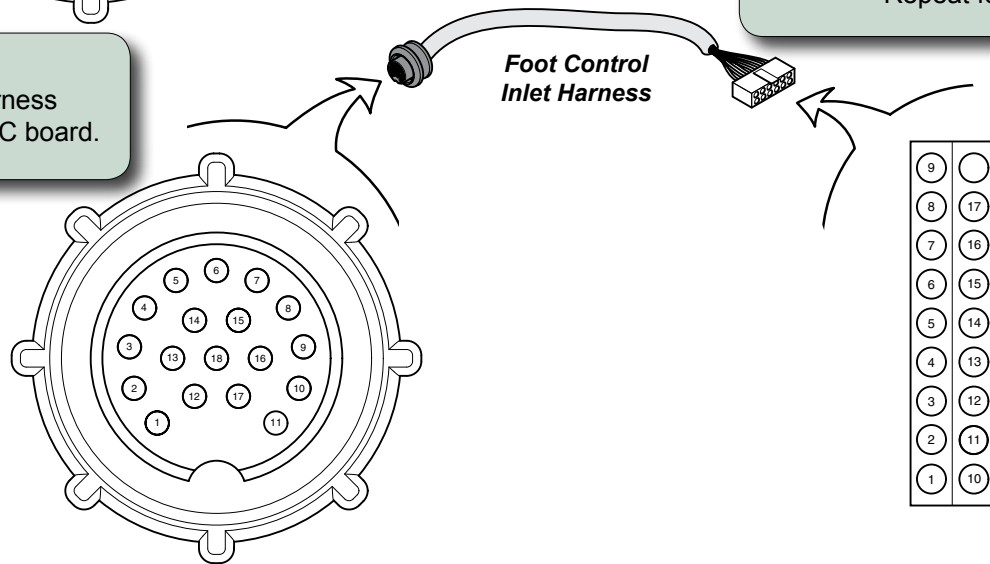
Foot Control Cord

Step 1: Disconnect foot control cord.



Inlet Harness

Step 1: Disconnect inlet harness from J10 on main PC board.



Meter Reading	Required Action
All pin(s) less than 100 ohms	Cord - OK. Replace foot control membrane.
Any pin(s) OL	Replace damaged cord

Meter Reading	Required Action
All pin(s) less than 100 ohms	Cord - OK. Replace foot control membrane.
Any pin(s) OL	Replace damaged cord

Step 2: Place meter probe on pin #1 of round connector. Place other meter probe on pin #1 of flat connector. Check meter reading. Repeat for remaining pins.

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Models:	646
Serial Numbers:	<i>all</i>

Foot Control / Touch Pads - continued

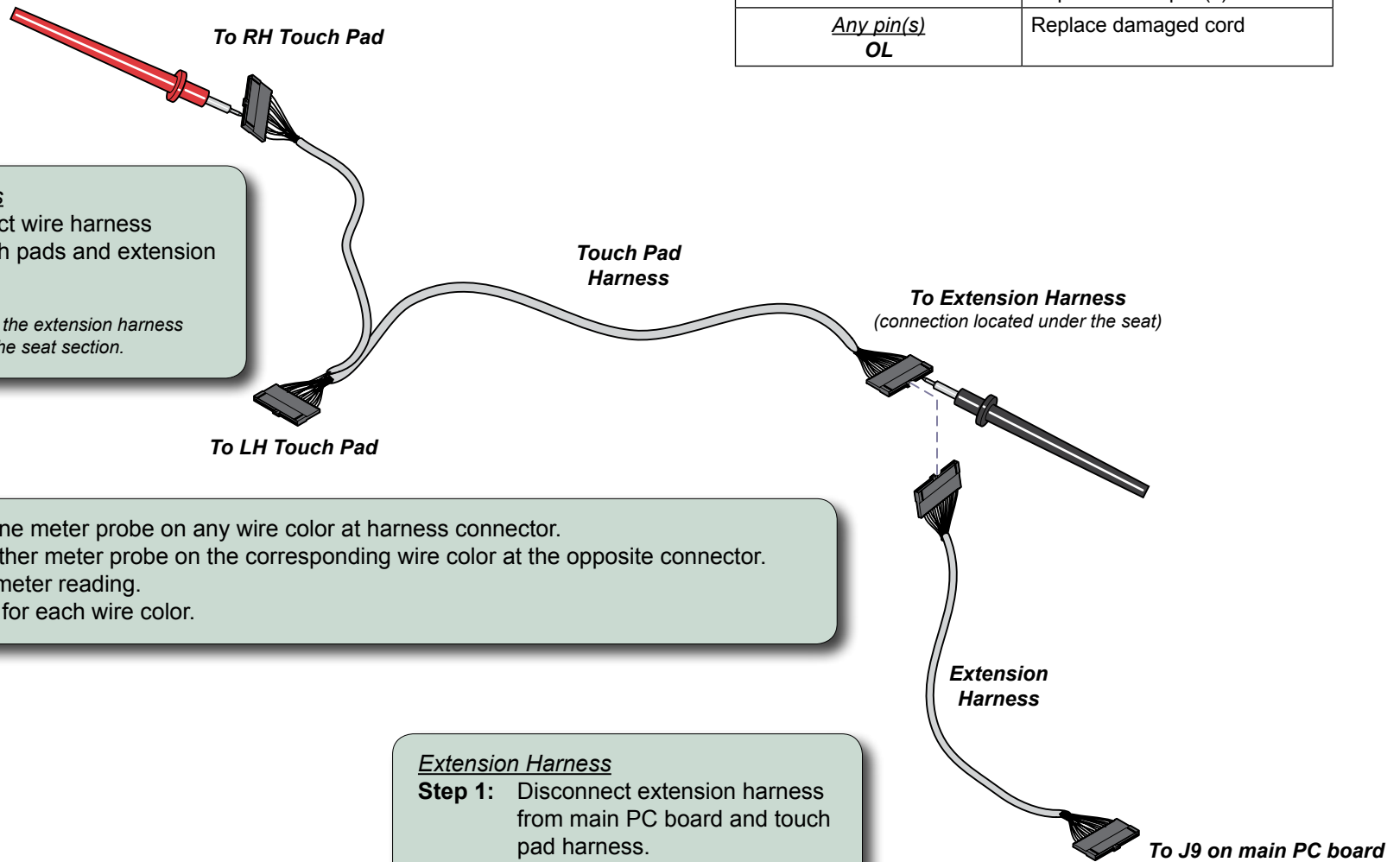
Touch Pad Harness / Extension Harness Test

Meter Reading	Required Action
<u>All pin(s)</u> less than 100 ohms	Cord - OK. Replace touch pad(s).
<u>Any pin(s)</u> OL	Replace damaged cord

Touch Pad Harness
Step 1: Disconnect wire harness from touch pads and extension harness.
Note: The connection to the extension harness is located under the seat section.

Step 2: Place one meter probe on any wire color at harness connector. Place other meter probe on the corresponding wire color at the opposite connector. Check meter reading. Repeat for each wire color.

Extension Harness
Step 1: Disconnect extension harness from main PC board and touch pad harness.
Note: The connection to the touch pad harness is located under the seat section.



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Models:	646	
Serial Numbers:	<i>all</i>	

Back Actuator / Limit Switches

Isolating a Malfunction

This illustration shows the back limit switches and the three serviceable components of the back actuator. Use the table below to isolate the malfunction.

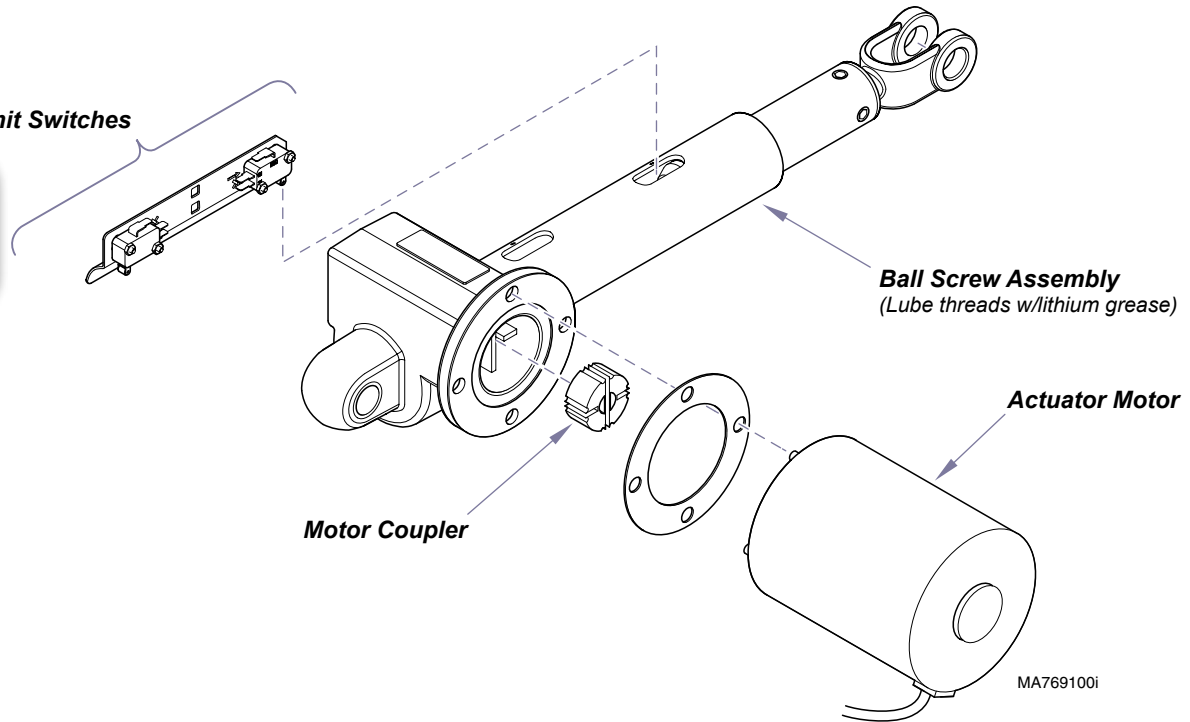
Problem	Required Action
Motor runs, but makes grinding noise.	Clean / lube actuator threads. Replace actuator if necessary*.
Motor runs, but table does not move.	Inspect / replace motor coupler*.
Motor does not run.	Perform Limit Switch / PCB Harness Test

[Actuator Motor Test](#) B-8
[PC Board Test](#) B-9
[Wiring Diagrams](#) D-2
[Exploded View / Part Numbers](#) E-13

 www.Midmark.com:
[Back Actuator / Motor Replacement](#) 003-1738-00

Equipment Alert
 Do not adjust the individual switches!
 The limit switches & bracket must be replaced as a complete assembly.

Back Limit Switches



Models:	646
Serial Numbers:	<i>all</i>

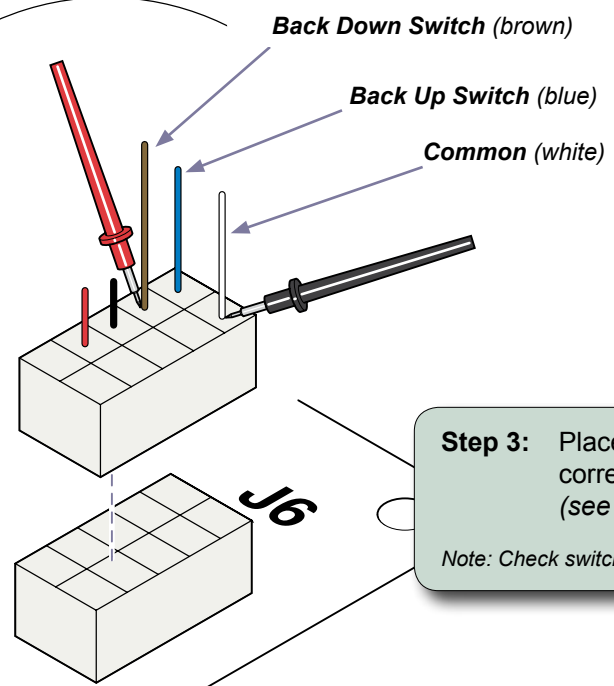
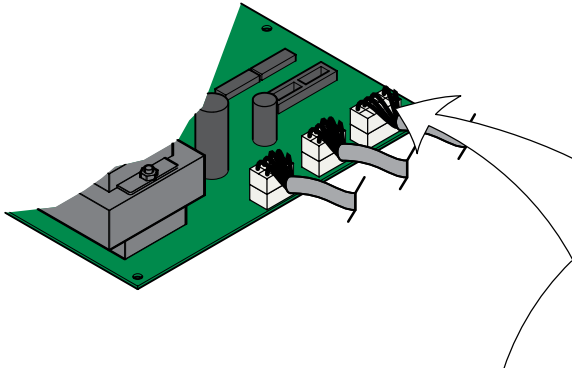
* Replacement instructions are provided with the part. They are also available on [documark.com](#), or by clicking on the blue link.

Back Actuator / Limit Switches - continued

Limit Switch / PC Board Harness Test

Step 1: Disconnect harness from J6 on main PC board.

Step 2: Place one meter probe on the common (white).



Step 3: Place other probe on the wire corresponding the desired switch (see illustration).
 Note: Check switch "tripped" & "untripped".

**Back Down switch "tripped"... - OR-
 Back Up switch "untripped"...**

Meter Reading	Required Action
OL	Limit switch / harness - OK Perform Actuator Motor Test
less than 10 ohms	Perform Limit Switch Harness Test

**Back Down switch "untripped"... - OR-
 Back Up switch "tripped"...**

Meter Reading	Required Action
OL	Perform Limit Switch Harness Test
less than 10 ohms	Limit switch / harness - OK Perform Actuator Motor Test

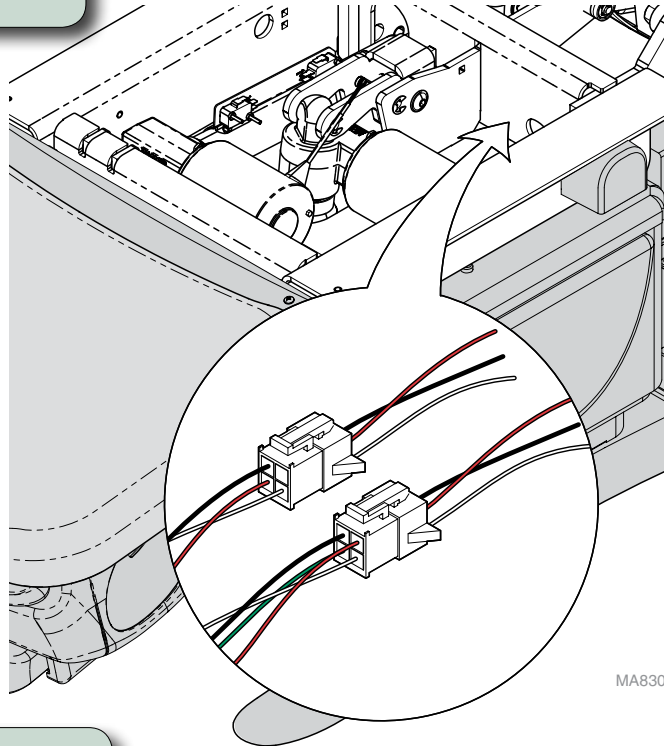
MA8318i

Models:	646
Serial Numbers:	<i>all</i>

Back Actuator / Limit Switches - continued

Limit Switch Harness Test

Step 1: Unplug the appropriate limit switch harness.



MA8303I

Step 2: Measure continuity.

Meter reading should be...

Actuator Full Up	White to Black - Open White to Red - Closed
Actuator Full Down	White to Black - Closed White to Red - Open
Actuator Midway Point	White to Black - Closed White to Red - Closed

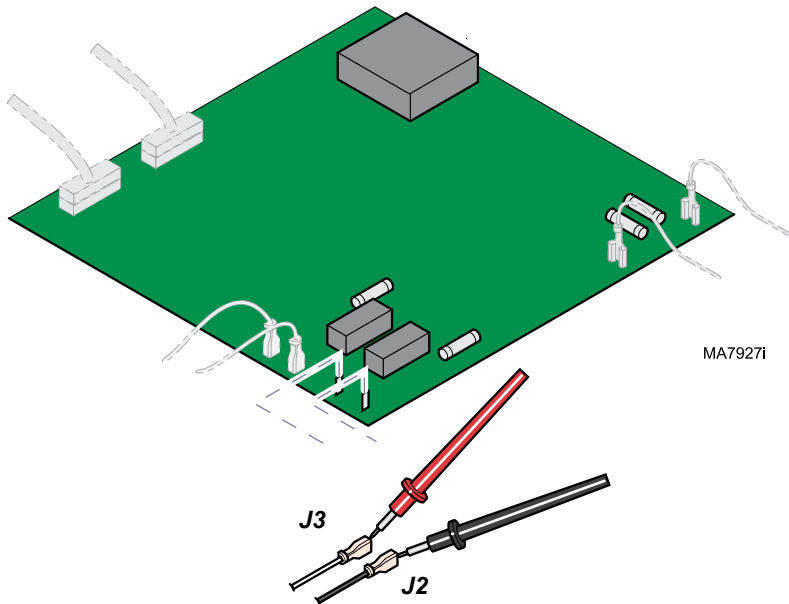
Models:	646
Serial Numbers:	<i>all</i>

Back Actuator / Limit Switches - continued

Actuator Motor Test

www.Midmark.com:
[Back Actuator /](#)
[Motor Replacement](#)..... 003-1738-00

Step 1: Tag and disconnect back actuator wires (J2 & J3).



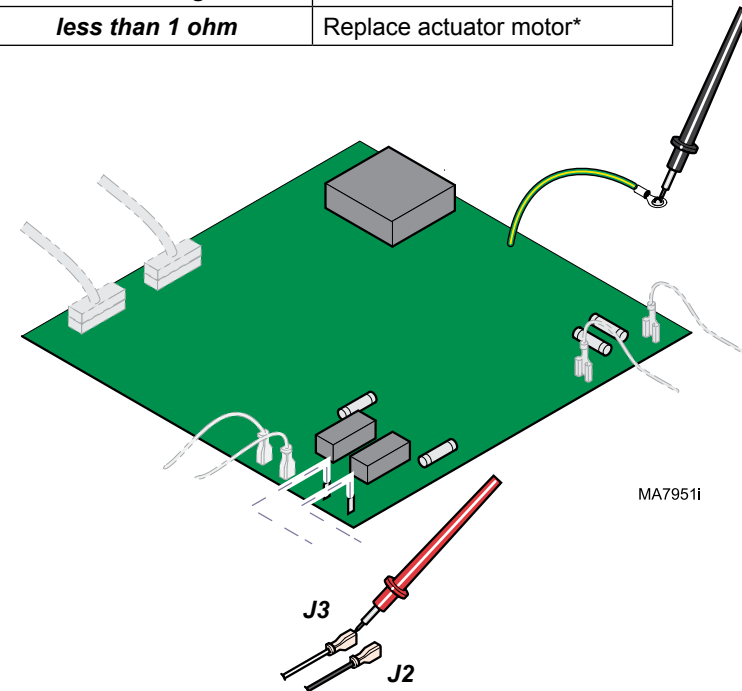
Step 2: Place meter probes on actuator wires. Check meter reading.

Meter Reading	Required Action
1 to 10 ohms	Actuator motor - OK Perform Motor Ground Test
OL -or- less than 1 ohms	Replace actuator motor*

Motor Ground Test

Step 1: Place one meter probe on actuator wire (J3). Place other meter probe on PC board ground wire. Check meter reading. (Repeat for J2)

Meter Reading	Required Action
OL -or- more than 1 mega-ohm	Motor harness - OK Perform PC Board Test
less than 1 ohm	Replace actuator motor*



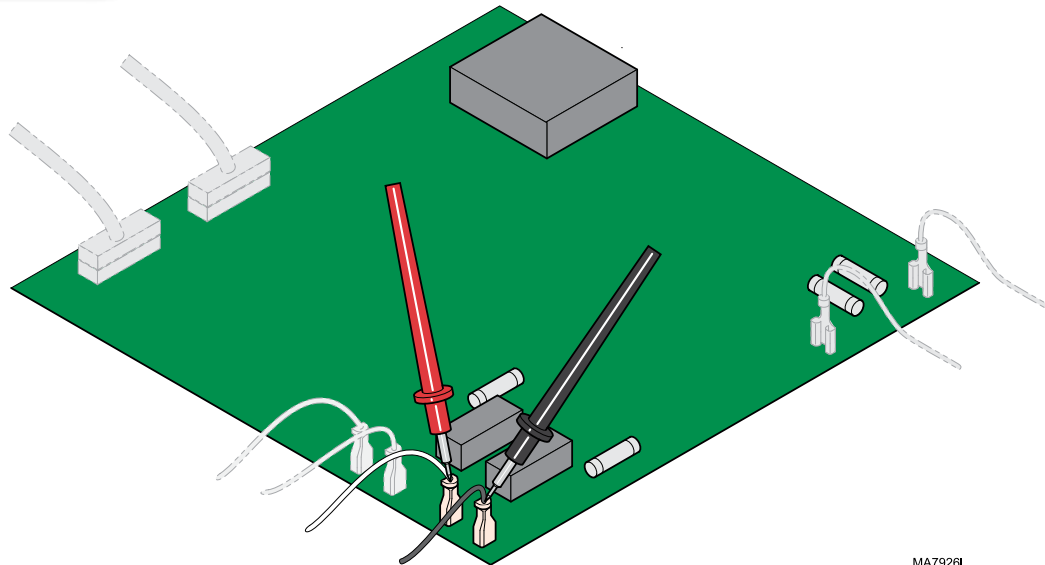
Models:	646
Serial Numbers:	all

* Replacement instructions are provided with the part. They are also available on [documark.com](#), or by clicking on the blue link.

Back Actuator / Limit Switches - continued

PC Board Test

Step 1: Place meter probes on wires at J2 & J3 terminals.



Step 2: Check meter reading while activating *Back Up / Back Down* function with foot control.

<i>Meter Reading</i>	<i>Required Action</i>
<i>approx. 48 VDC</i>	PC board - OK
<i>0 VDC</i>	Replace PC board

Models:	646	
Serial Numbers:	<i>all</i>	

Tilt Actuator / Limit Switch / Sensor PC Board

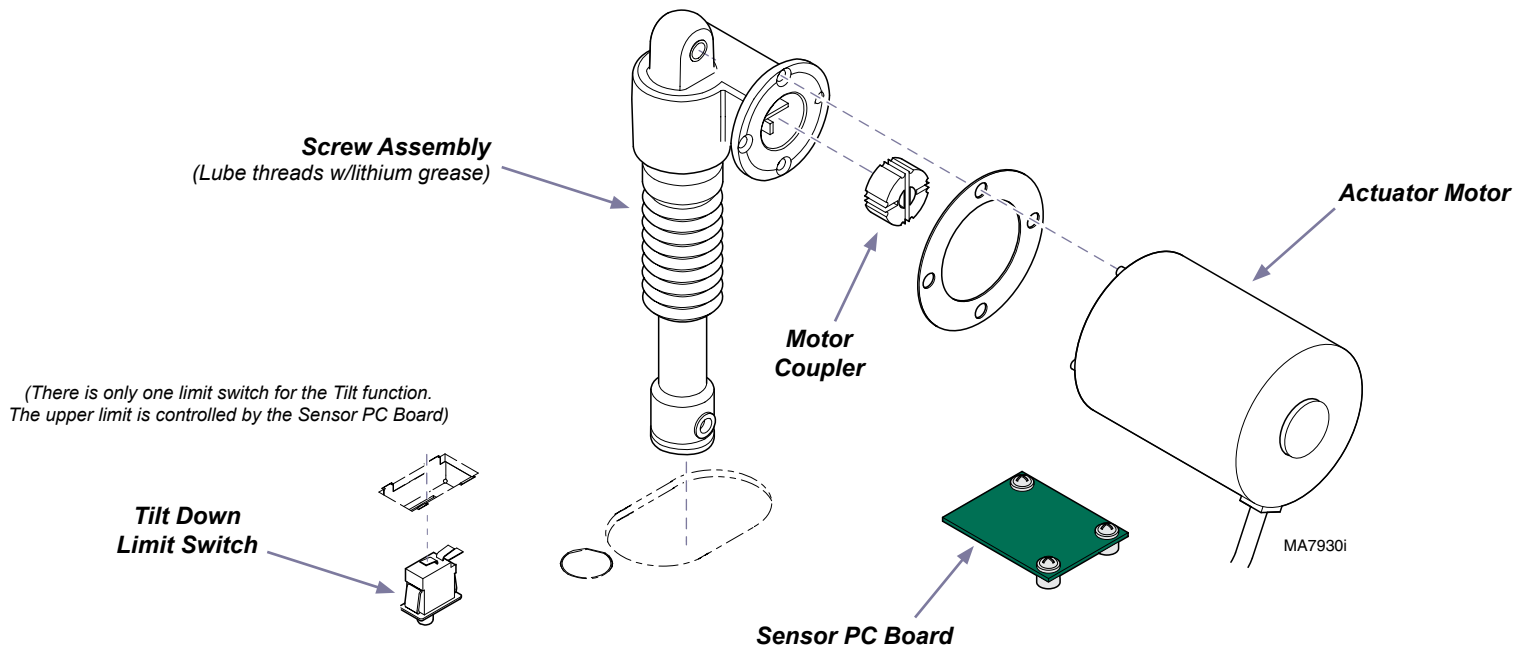
Isolating a Malfunction

This illustration shows the tilt down limit switch, the sensor PC board, and the three serviceable components of the tilt actuator. Use the table below to isolate the malfunction.

Problem	Required Action
Tilt Up / Down - OK, but "beeps" in full UP position	Perform Sensor PC Board Check
Motor runs, but makes grinding noise.	Clean / lube actuator threads. Replace actuator if necessary*.
Motor runs, but table does not move.	Inspect / replace motor coupler*.
Motor does not run.	<i>(Down only)</i> Perform Limit Switch / PCB Harness Test <i>(Up only)</i> Perform Sensor PC Board Check <i>(Up / Down)</i> Perform Actuator Motor Test

[Limit Switch / PCB Harness Test](#)..... B-11
[Actuator Motor Test](#) B-13
[Sensor PC Board Check](#) B-15
[Wiring Diagrams](#) D-2
[Exploded View / Part Numbers](#)..... E-12

www.Midmark.com:
[Tilt Actuator / Motor Replacement](#) 003-1915-00



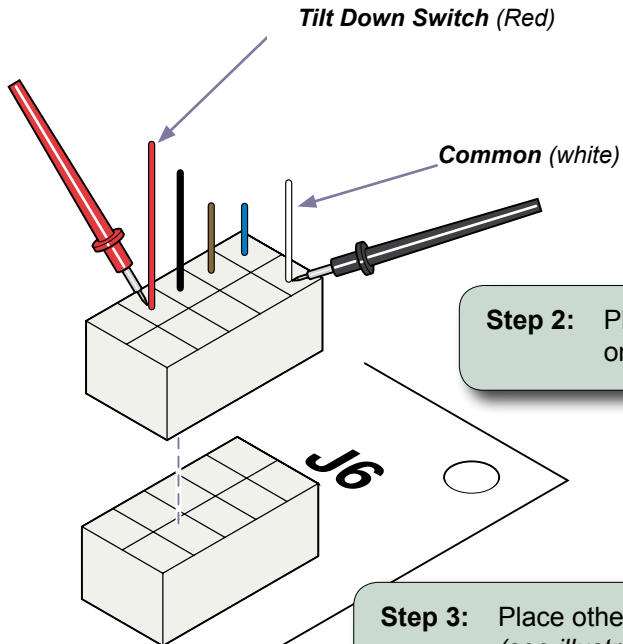
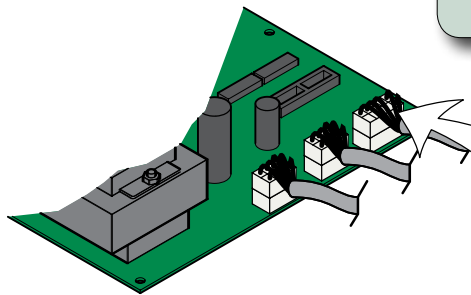
Models:	646
Serial Numbers:	all

* Replacement instructions are provided with the part. They are also available on documark.com, or by clicking on the blue link.

Tilt Actuator / Limit Switches - continued

Limit Switch / PC Board Harness Test

Step 1: Disconnect harness from J6 on main PC board.



Step 2: Place one meter probe on the common (white).

Step 3: Place other probe on the red wire. (see illustration).
 Note: Check switch "tripped" & "untripped".

Tilt Down switch "tripped"...

Meter Reading	Required Action
OL	Limit switch / harness - OK Perform Actuator Motor Test
less than 10 ohms	Perform Limit Switch Harness Test

Tilt Down switch "untripped"...

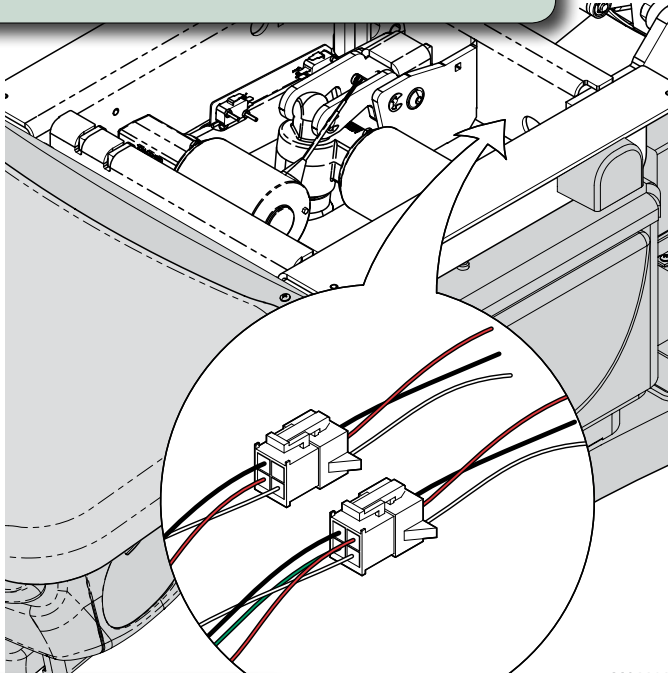
Meter Reading	Required Action
OL	Perform Limit Switch Harness Test
less than 10 ohms	Limit switch / harness - OK Perform Actuator Motor Test

Models:	646
Serial Numbers:	<i>all</i>

Tilt Actuator / Limit Switch / Sensor PC Board - continued

Limit Switch Harness Test

Step 1: Unplug the appropriate limit switch harness.



Step 2: Measure continuity.

Meter reading should be...

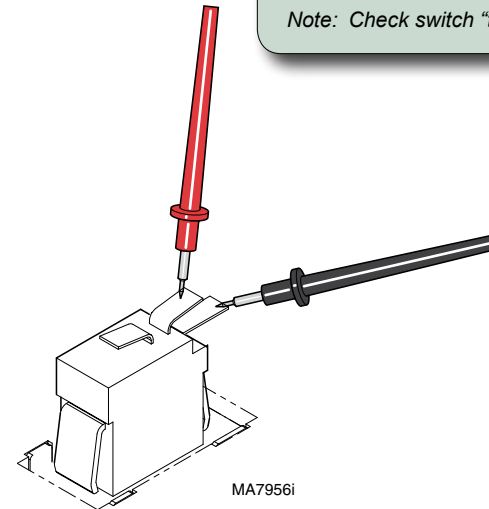
Actuator Full Up	White to Black - Open White to Red - Closed
Actuator Full Down	White to Black - Closed White to Red - Open
Actuator Midway Point	White to Black - Closed White to Red - Closed

Limit Switch Continuity Test

Step 1: Tag and disconnect wires from switch.

Step 2: Place meter probes on COM and NC terminals.

Note: Check switch "tripped" and "untripped".



With switch "tripped"...

<i>Meter Reading</i>	<i>Required Action</i>
OL	Limit switch - OK
less than 5 ohms	Replace limit switch

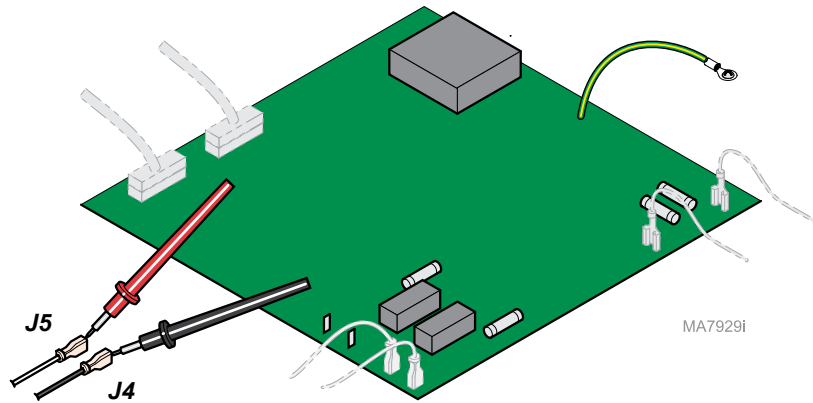
With switch "untripped"...

<i>Meter Reading</i>	<i>Required Action</i>
OL	Replace limit switch
less than 5 ohms	Limit switch - OK Perform Actuator Motor Test

Models:	646
Serial Numbers:	<i>all</i>

Actuator Motor Test

Step 1: Tag and disconnect tilt actuator wires (J4 & J5).



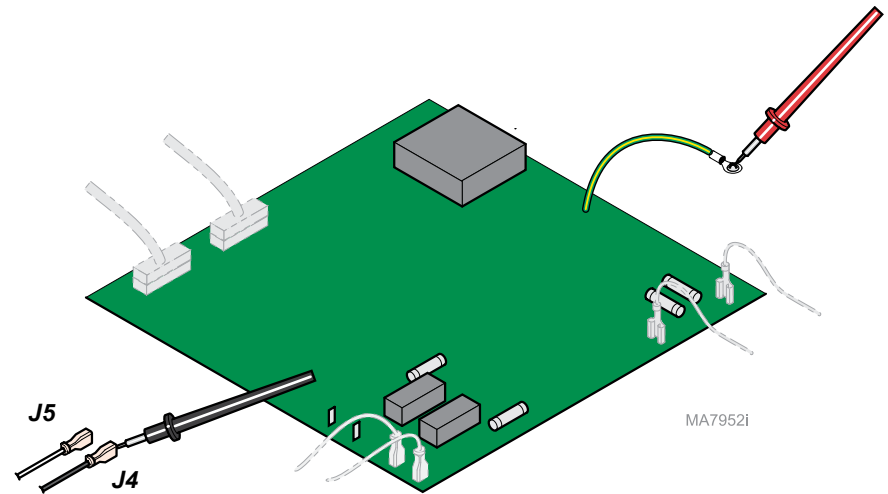
Step 2: Place meter probes on actuator wires. Check meter reading.

Meter Reading	Required Action
1 to 10 ohms	Actuator motor - OK Perform Motor Ground Test
OL -or- less than 1 ohms	Replace actuator motor*

Motor Ground Test

Step 1: Place one meter probe on actuator wire (J4). Place other meter probe on PC board ground wire. Check meter reading. (Repeat for J5)

Meter Reading	Required Action
OL -or- more than 1 mega-ohm	Motor harness - OK Perform PC Board Test
less than 1 ohm	Replace actuator motor*



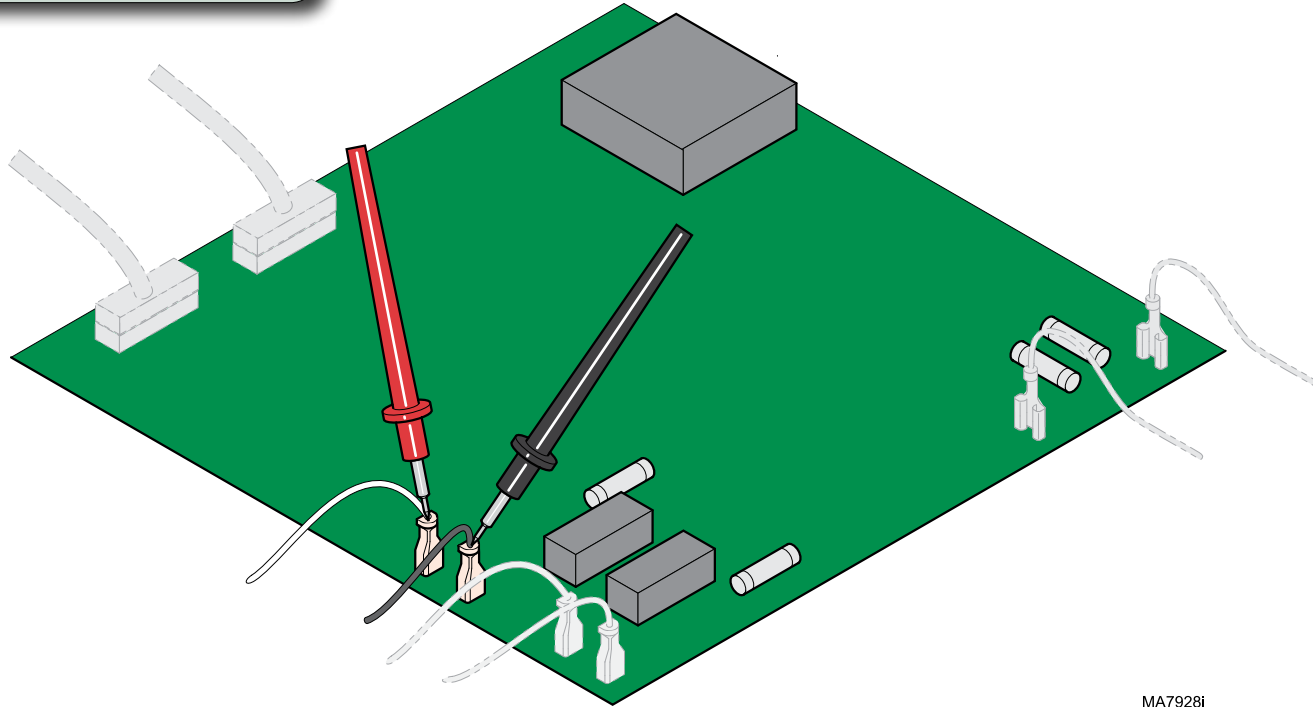
Models:	646
Serial Numbers:	all

* Replacement instructions are provided with the part. They are also available on documark.com, or by clicking on the blue link.

Tilt Actuator / Limit Switch / Sensor PC Board - continued

PC Board Test

Step 1: Place meter probes on wires at J4 & J5 terminals.



MA7928i

Step 2: Check meter reading while activating *Tilt Up / Tilt Down* function with foot control.

<i>Meter Reading</i>	<i>Required Action</i>
approx. 48 VDC	PC board - OK
0 VDC	Replace PC board

Models:	646	
Serial Numbers:	<i>all</i>	

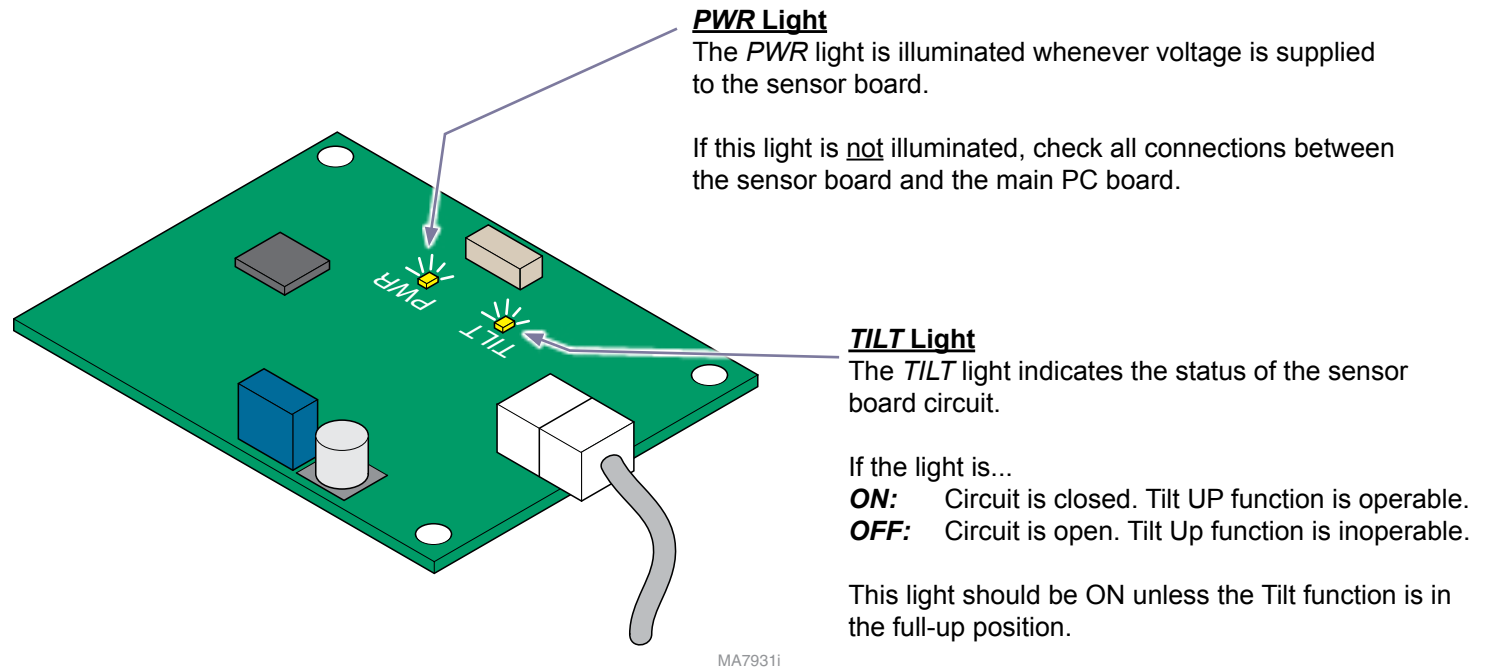
Tilt Actuator / Limit Switch / Sensor PC Board - continued

Sensor PC Board Check

Sensor PC Board Function

The sensor PC board functions like a normally closed, Tilt UP limit switch. When circuitry on the board detects that the tilt actuator has reached its upper limit, it interrupts current to the tilt actuator.

There are two indicator lights that can be used to determine proper operation of the sensor board. Replace board if Tilt light indicates a malfunction.



Models:	646	
Serial Numbers:	<i>all</i>	

Foot Extension / "Crash" Limit Switch

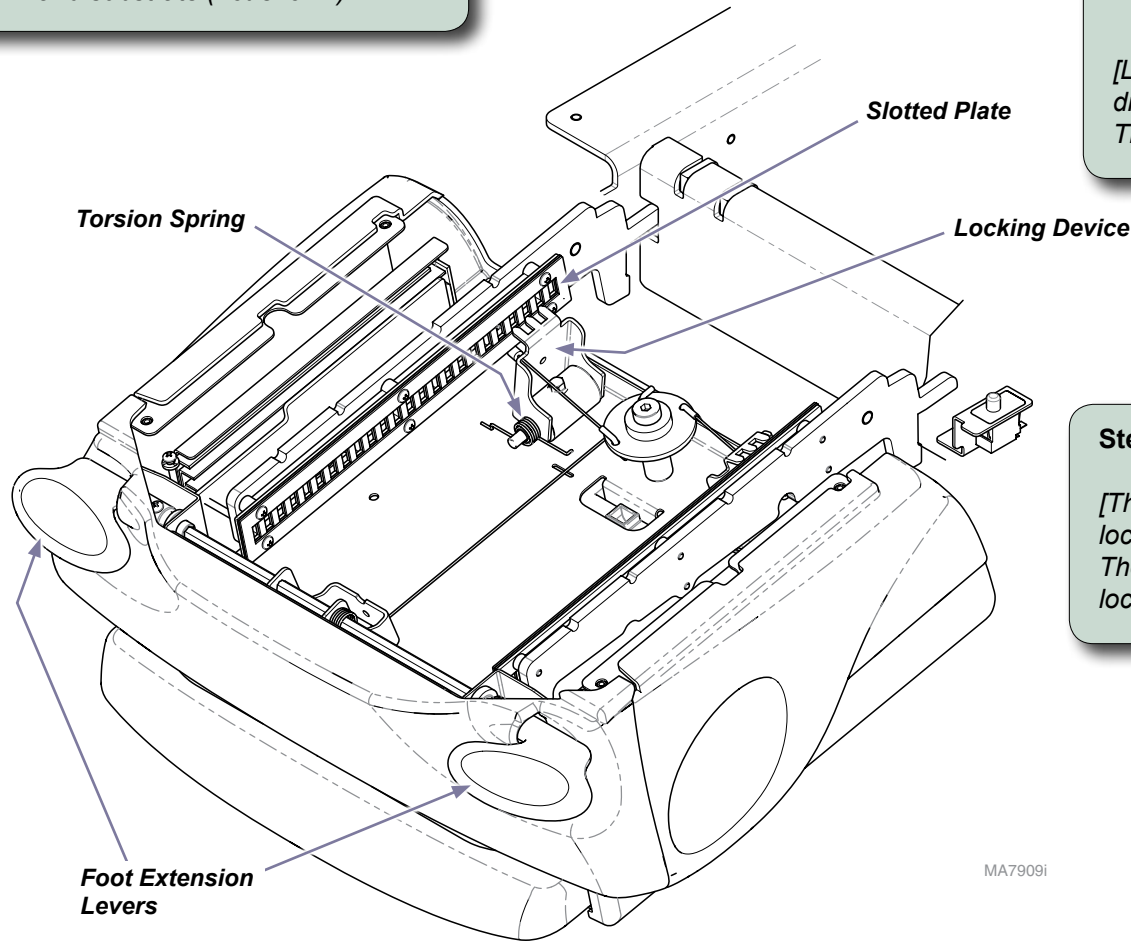
Locking Mechanism Inspection

"Crash" Limit Switch Test	B-17
Exploded View / Part Numbers:	
"Crash" Limit Switch	E-5
Foot Extension	E-6
Foot Extension Housing	E-7

Step 1: Remove foot extension upholstery and substrate (not shown).

Step 2: Press foot extension lever(s).
Extend / retract foot extension.

[Linkage should retract two locking devices, disengaging the "teeth" from the slotted plates. This should allow foot extension to slide in / out.]



Step 3: Release foot extension lever(s).

[The torsion springs should pull the two locking devices into the locked position. The "teeth" should engage the slotted plates, locking the foot extension in position.]

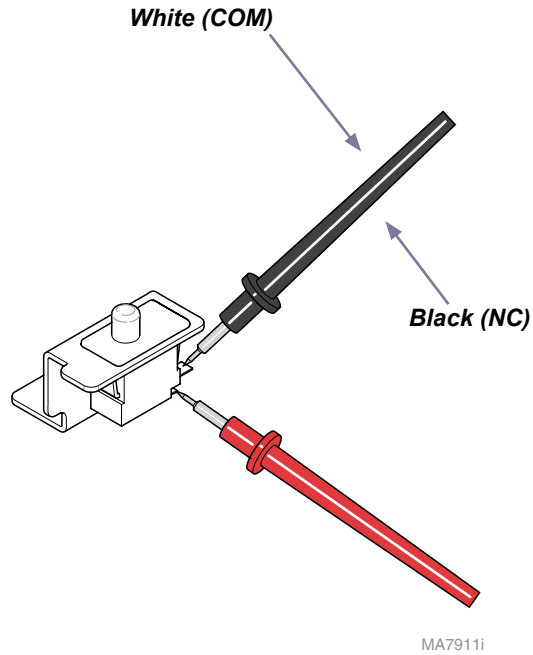
MA7909i

Models:	646
Serial Numbers:	<i>all</i>

Foot Extension / "Crash" Limit Switch - continued

"Crash" Limit Switch Test

Step 1: Tag and disconnect wires.



Step 2: Place meter probes on **COM** and **NC** terminals.

Note: Check switch 'tripped' and 'untripped'.

With switch 'tripped'...

Meter Reading	Required Action
OL	Limit switch - OK
less than 5 Ω	Replace limit switch.

With switch 'untripped'...

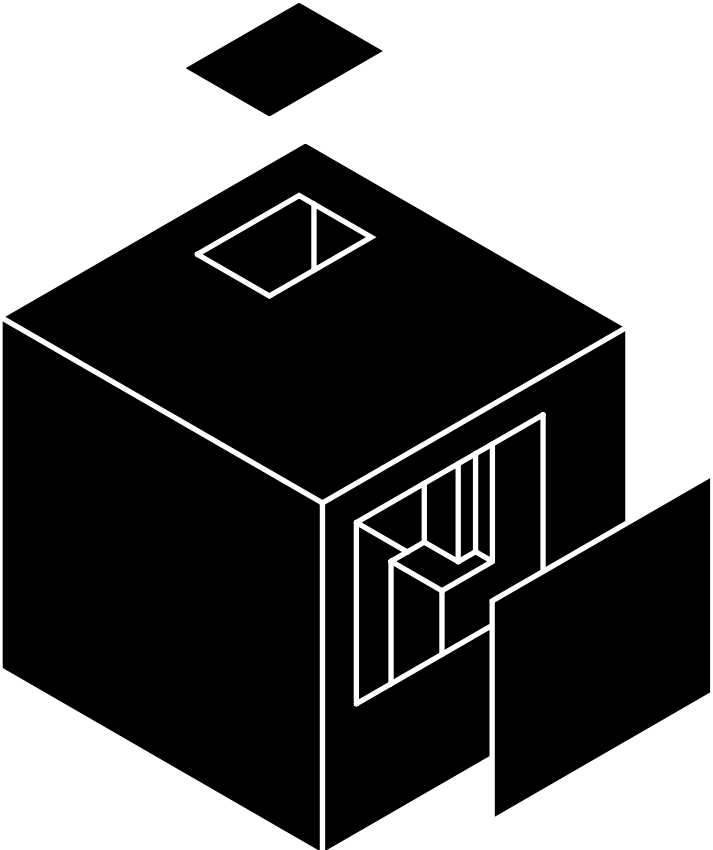
Meter Reading	Required Action
OL	Replace limit switch.
less than 5 Ω	Limit switch - OK

Models:	646	
Serial Numbers:	<i>all</i>	

Section C

Access Procedures

<u>PC Board Cover</u>	C-2
<u>Upholstery</u>	C-3



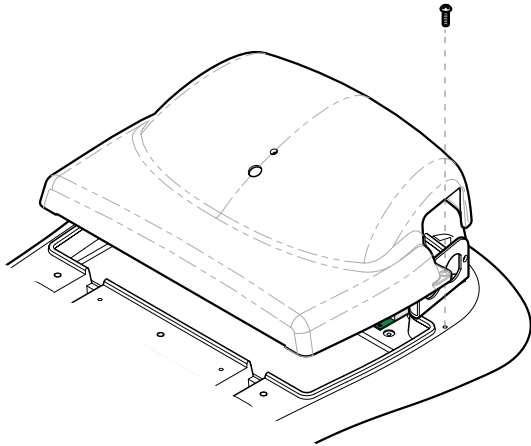
PC Board Cover

Removal / Installation



Caution

Unplug power cord before removing PC board cover.



Installation

Step 3: Secure cover with two screws.



Equipment Alert

You *must* perform Step 2 before cover can be completely removed.

Removal

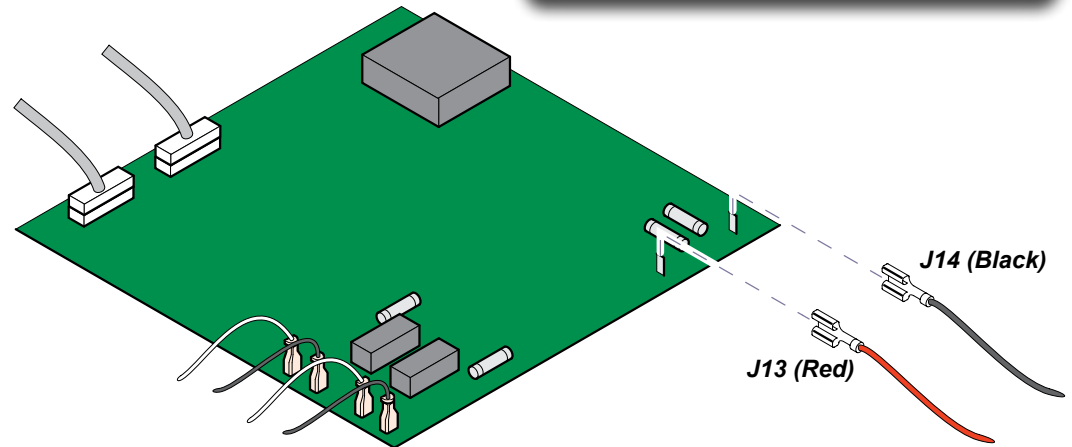
Step 1: Remove two screws, then **partially** separate cover.

Installation

Step 2: Connect wires to J13 & J14 on PC board.

Removal

Step 2: Tag & disconnect wires from J13 & J14 on PC board.



MA7925i

Models:	646	
Serial Numbers:	<i>all</i>	

Upholstery

Removal / Installation

Note

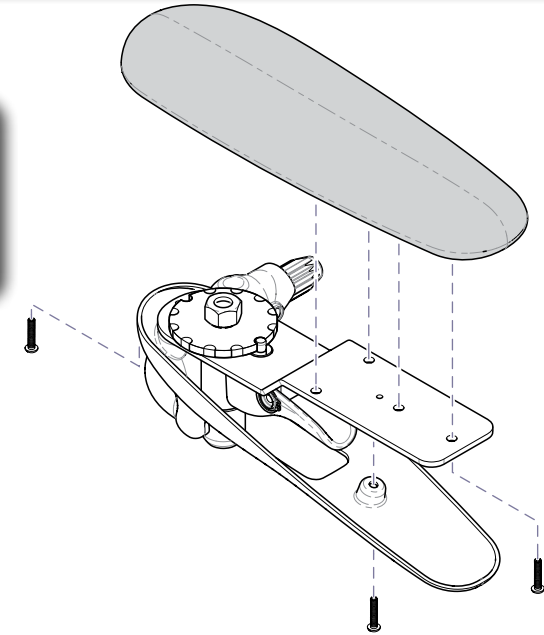
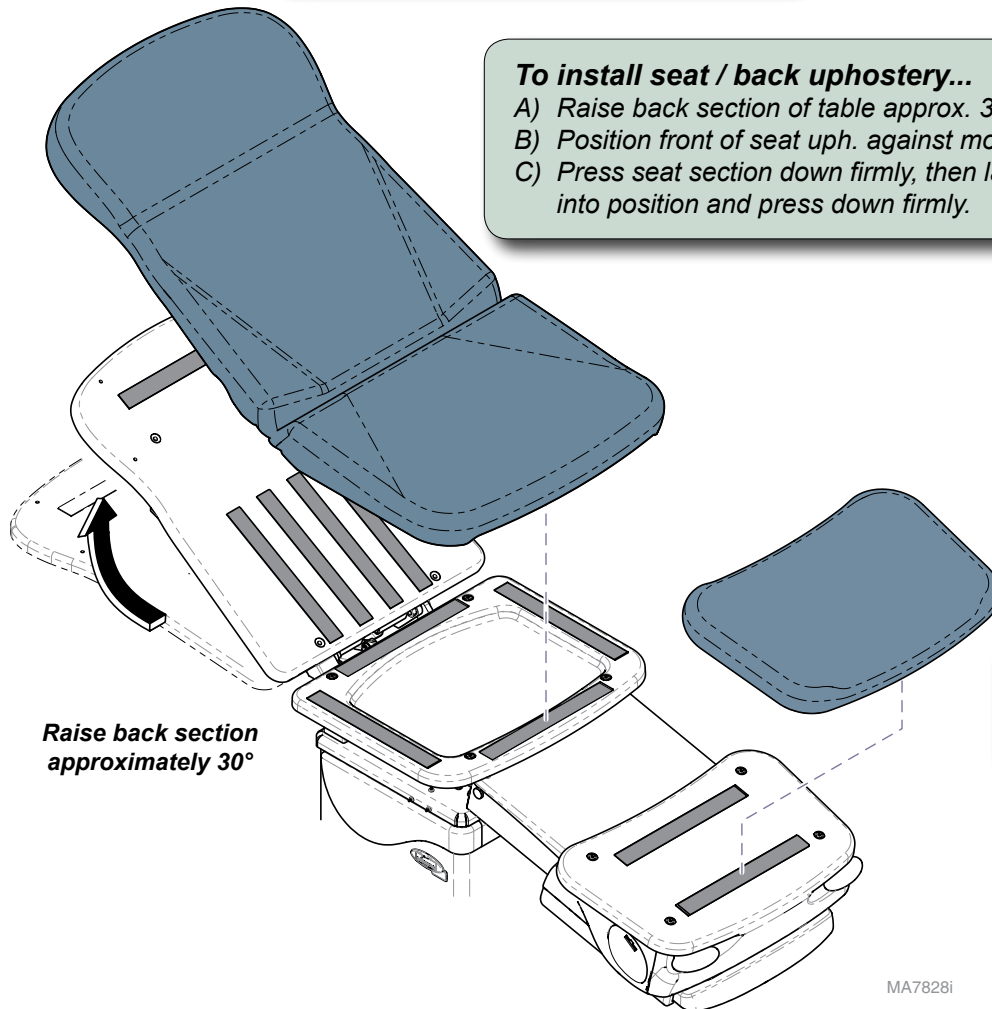
Upholstery is fastened with velcro. To remove, simply pull desired section away from mounting surface.

To replace chair arm upholstery...

- Remove two screws securing bottom cover.
- Remove four screws securing upholstered pad.
- Position new upholstered pad, then secure with four screws.
- Position bottom cover, then secure with two screws

To install seat / back upholstery...

- Raise back section of table approx. 30°.
- Position front of seat uph. against mounting board.
- Press seat section down firmly, then lay back section into position and press down firmly.



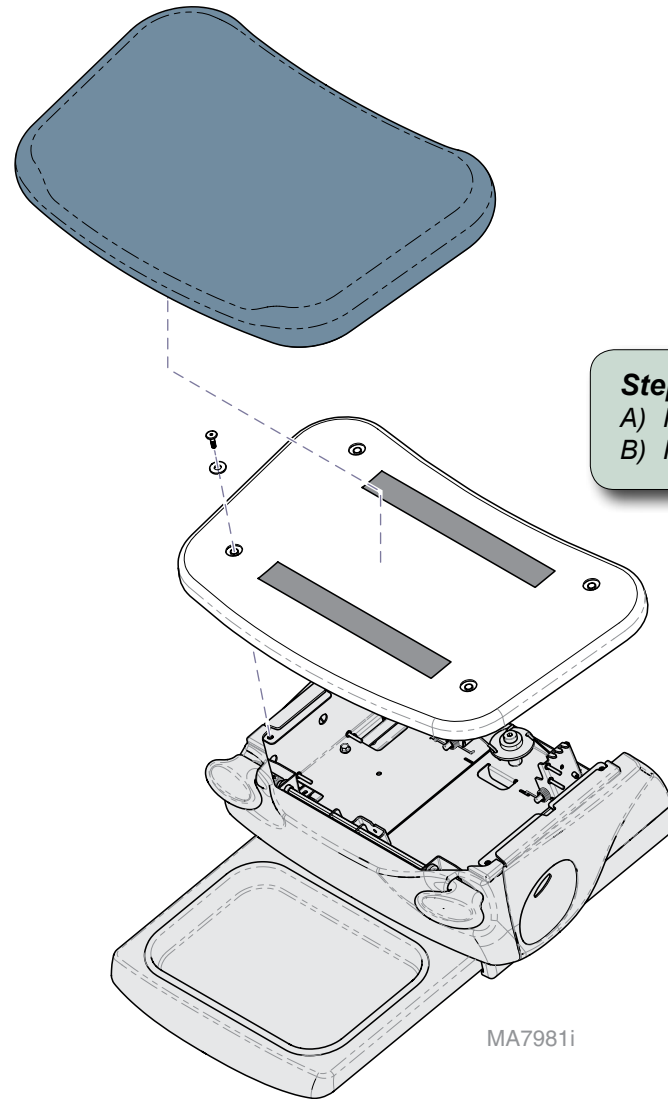
To install foot section upholstery...

- Position foot upholstery on mounting board.
- Press down firmly.

Models:	646	
Serial Numbers:	<i>all</i>	

Foot Extension Covers

Removal / Installation



Step 1: Remove Upholstery and Substrate.
A) Remove foot extension upholstery.
B) Remove four screws and foot extension substrate.

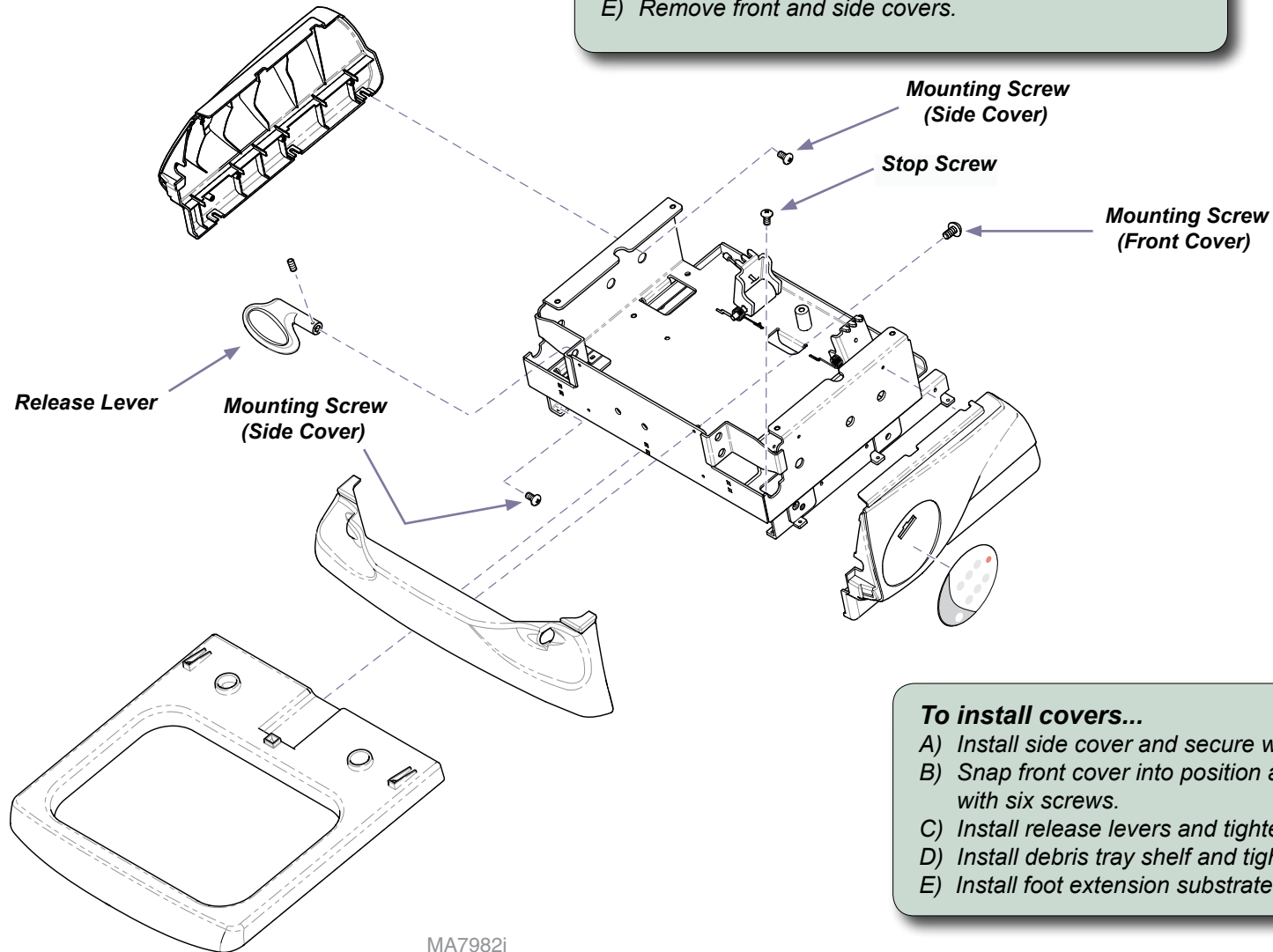
Models:	646	
Serial Numbers:	<i>all</i>	

Foot Extension Covers - continued

Removal / Installation

Step 2: Remove Covers.

- A) Loosen two stop screws and remove debris tray shelf.
- B) Pull out foot extension, loosen set screws and remove release levers.
- C) Remove six mounting screws from front cover.
- D) Remove six mounting screws from side cover.
- E) Remove front and side covers.



To install covers...

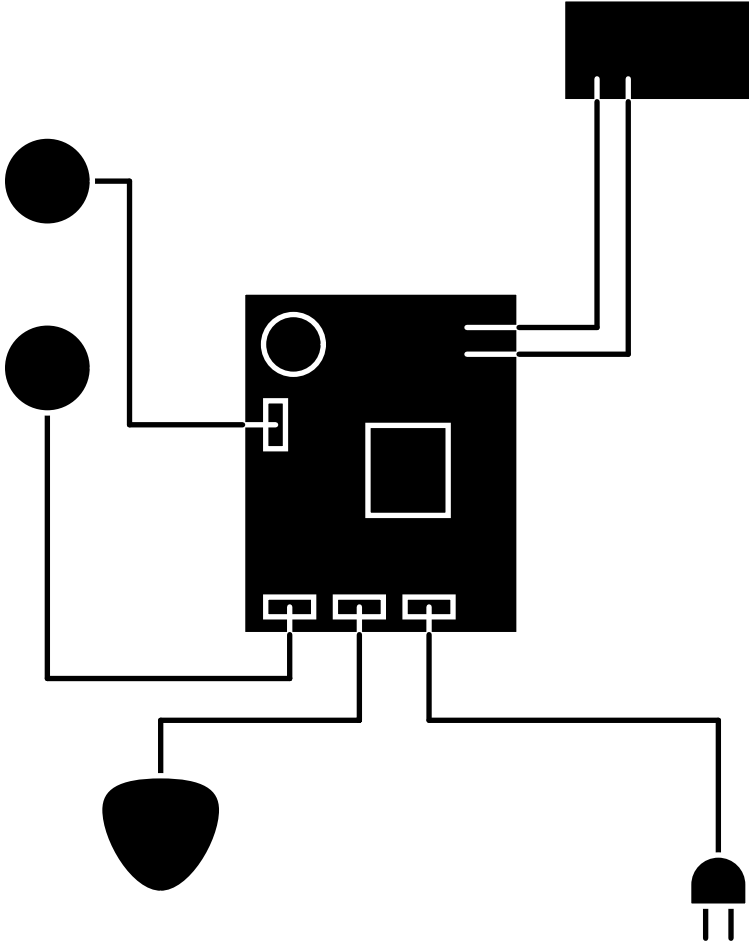
- A) Install side cover and secure with six screws.
- B) Snap front cover into position and secure with six screws.
- C) Install release levers and tighten set screws.
- D) Install debris tray shelf and tighten stop screws.
- E) Install foot extension substrate and upholstery.

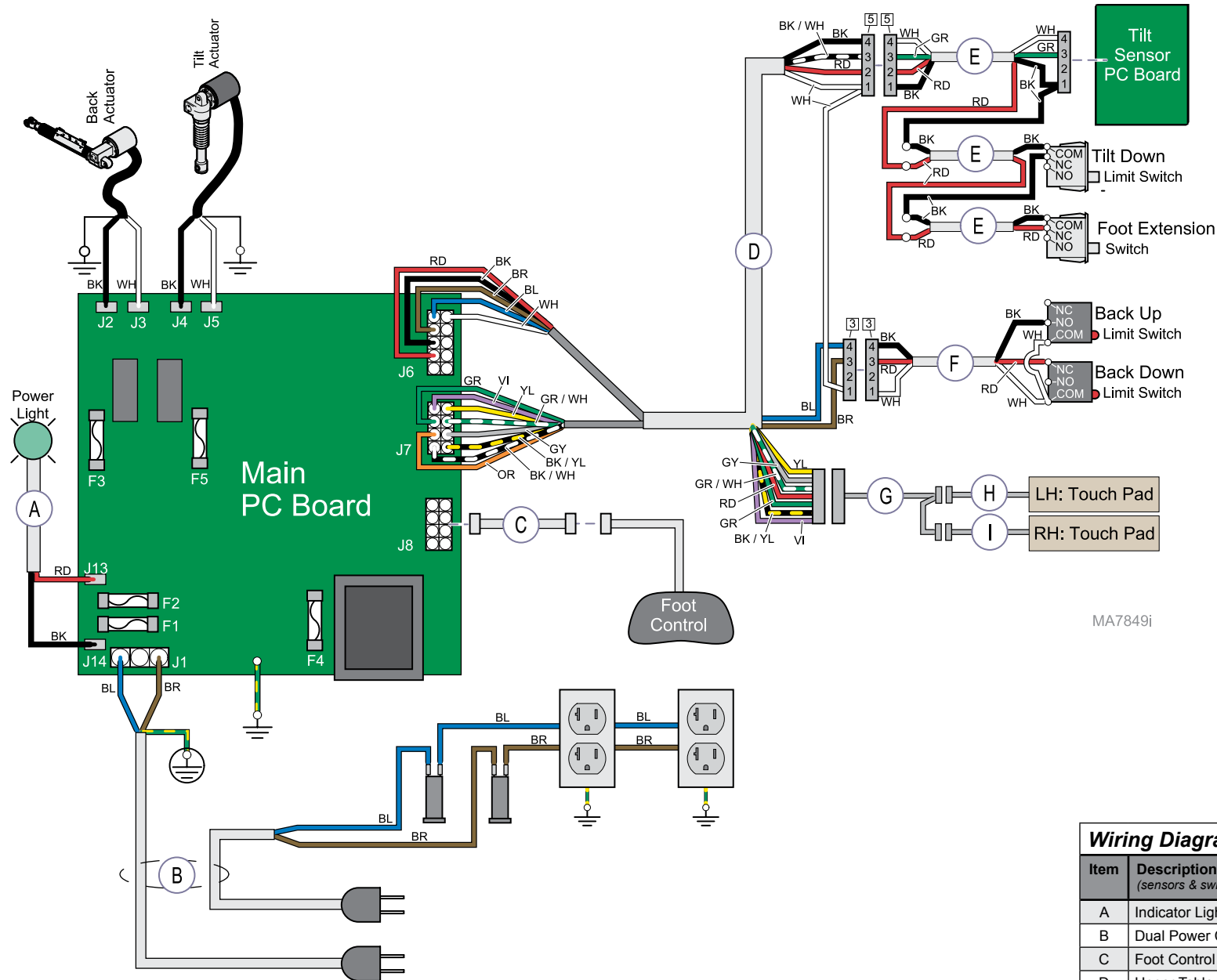
MA7982i

Models:	646
Serial Numbers:	<i>all</i>

Section D

Wiring Diagrams



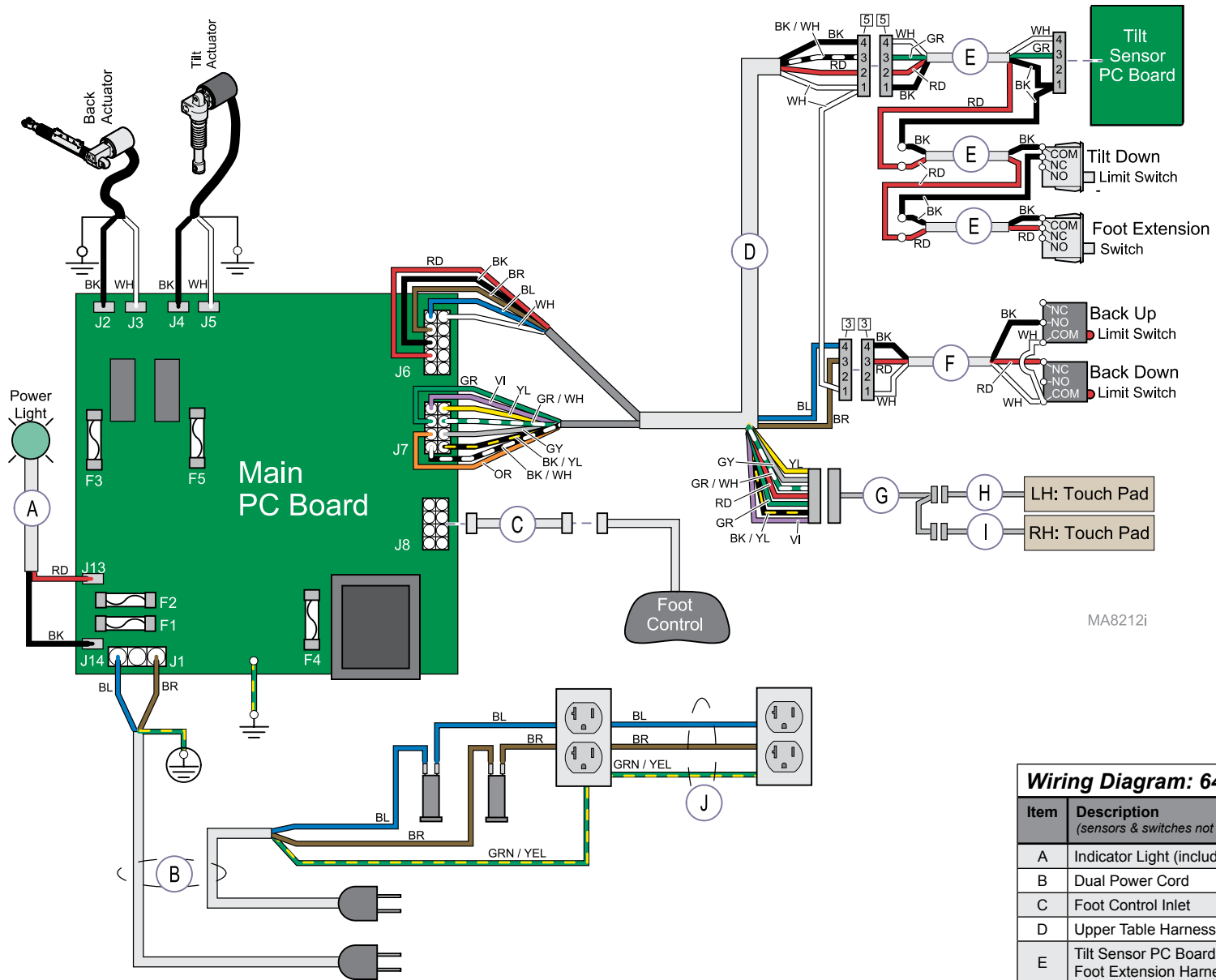


MA7849i

Wiring Diagram: 646 (-001)

Item	Description <i>(sensors & switches not included unless noted)</i>	Part Number
A	Indicator Light (includes bulb)	015-2306-00
B	Dual Power Cord	015-2358-00
C	Foot Control Inlet	015-2307-00
D	Upper Table Harness	015-2309-00
E	Tilt Sensor PC Board / Tilt Limit Switch / Foot Extension Harness	015-2310-00
F	Back Limit Switch Assy. (includes bracket & switches)	015-2097-00
G	Touch Pad Harness	015-2377-00
H	LH Touch Pad	015-2354-00
I	RH Touch Pad	015-2354-01

Models:	646 (-001)
Serial Numbers:	V2200 thru V943862



MA8212i

Wiring Diagram: 646 (-001)

Item	Description <i>(sensors & switches not included unless noted)</i>	Part Number
A	Indicator Light (includes bulb)	015-2306-00
B	Dual Power Cord	015-2799-00
C	Foot Control Inlet	015-2307-00
D	Upper Table Harness	015-2309-00
E	Tilt Sensor PC Board / Tilt Limit Switch / Foot Extension Harness	015-2310-00
F	Back Limit Switch Assy. (includes bracket & switches)	015-2097-00
G	Touch Pad Harness	015-2377-00
H	LH Touch Pad	015-2354-00
I	RH Touch Pad	015-2354-01
J	Receptacle Harness	015-2798-00

Models: 646 (-001)

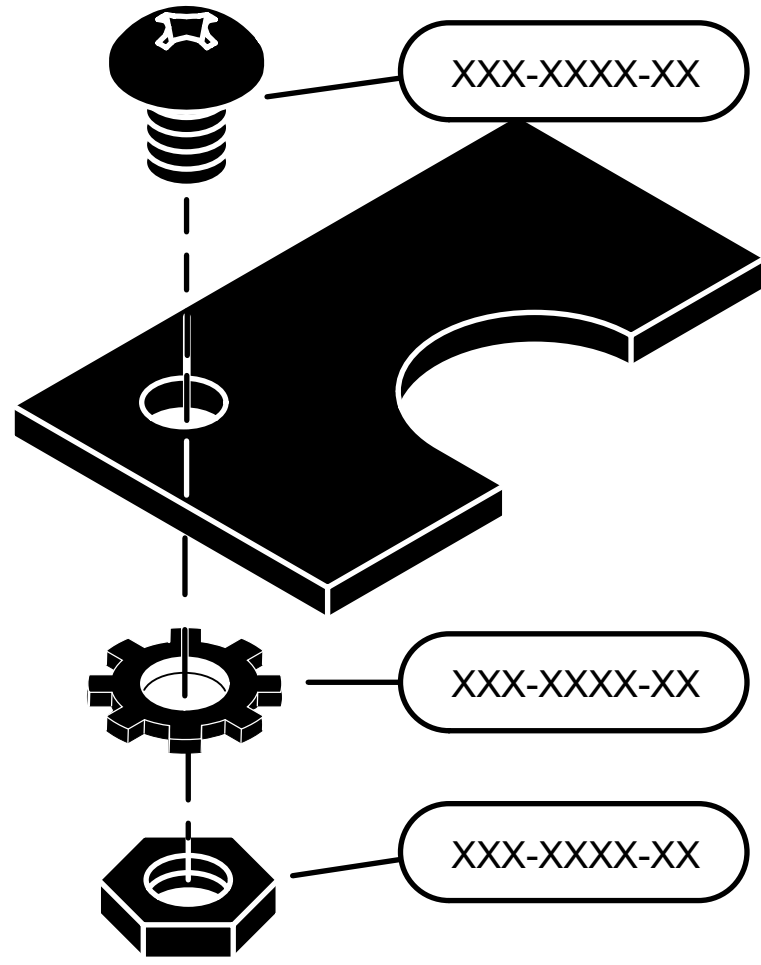
Serial Numbers: V943863 thru present

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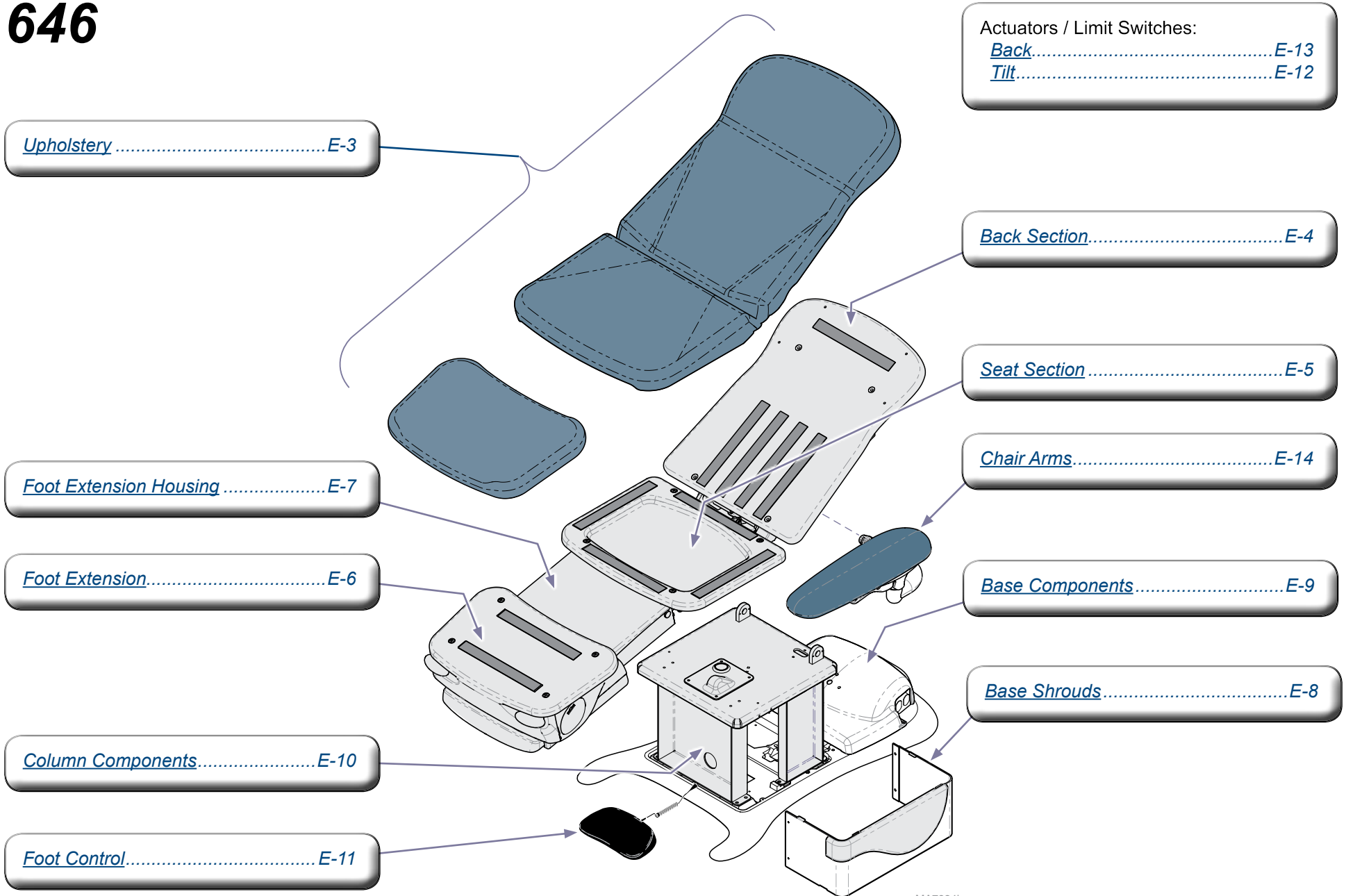
Models:	
Serial Numbers:	

Section E

Exploded Views & Parts Lists



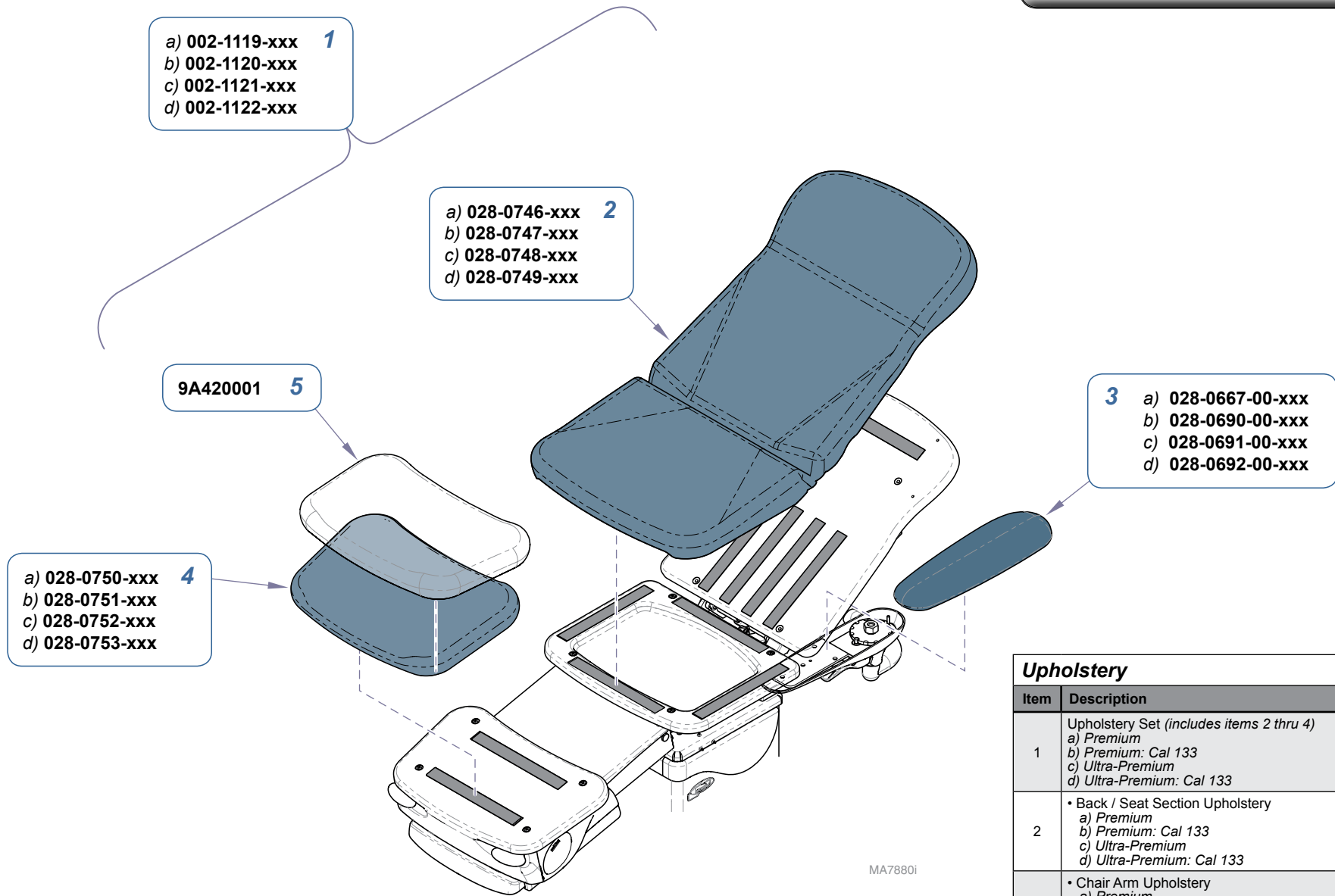
646



MA7924i

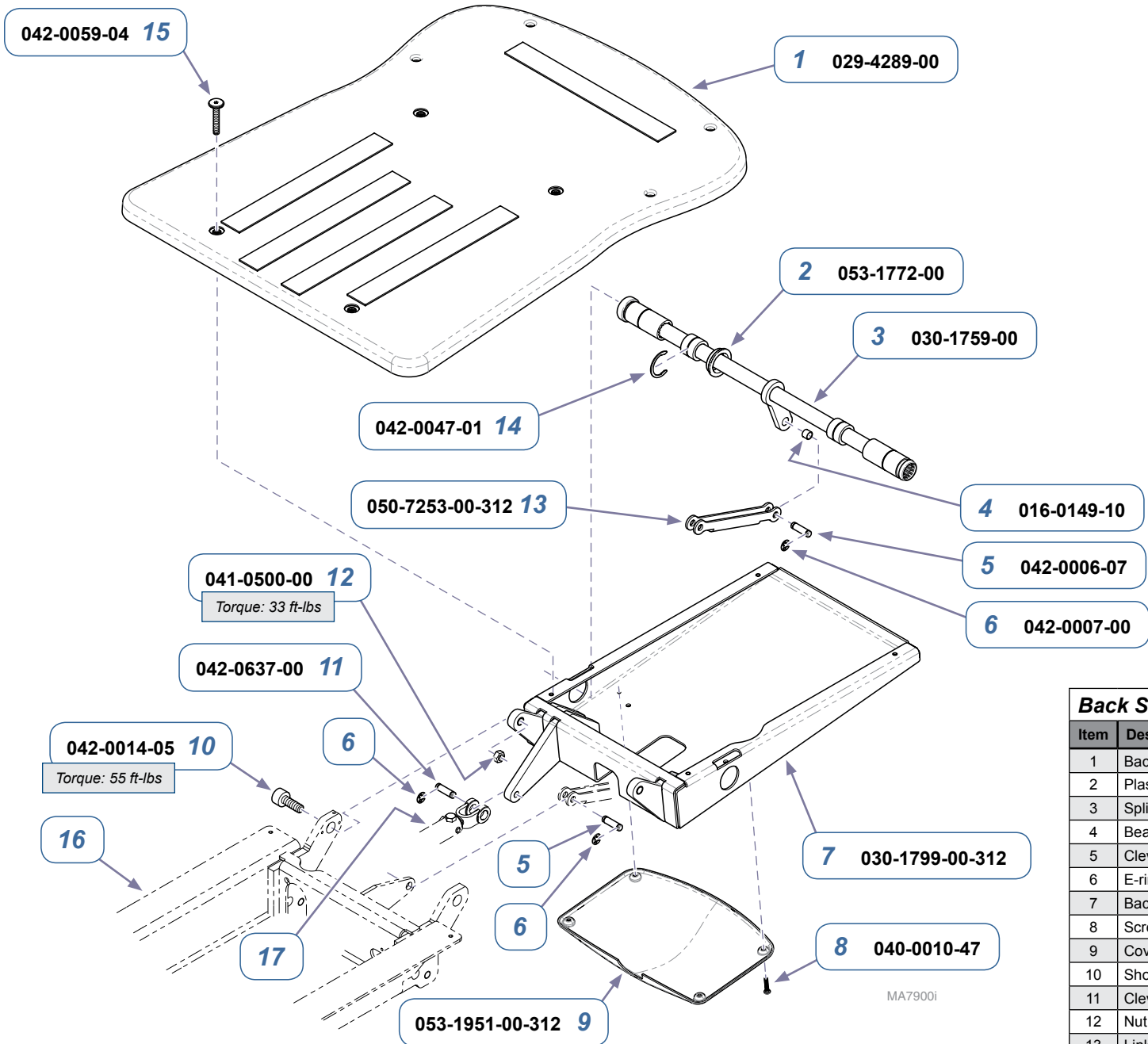
Models:	646
Serial Numbers:	<i>all</i>

** Indicates multiple pages due to a serial number break for the parts illustration.*



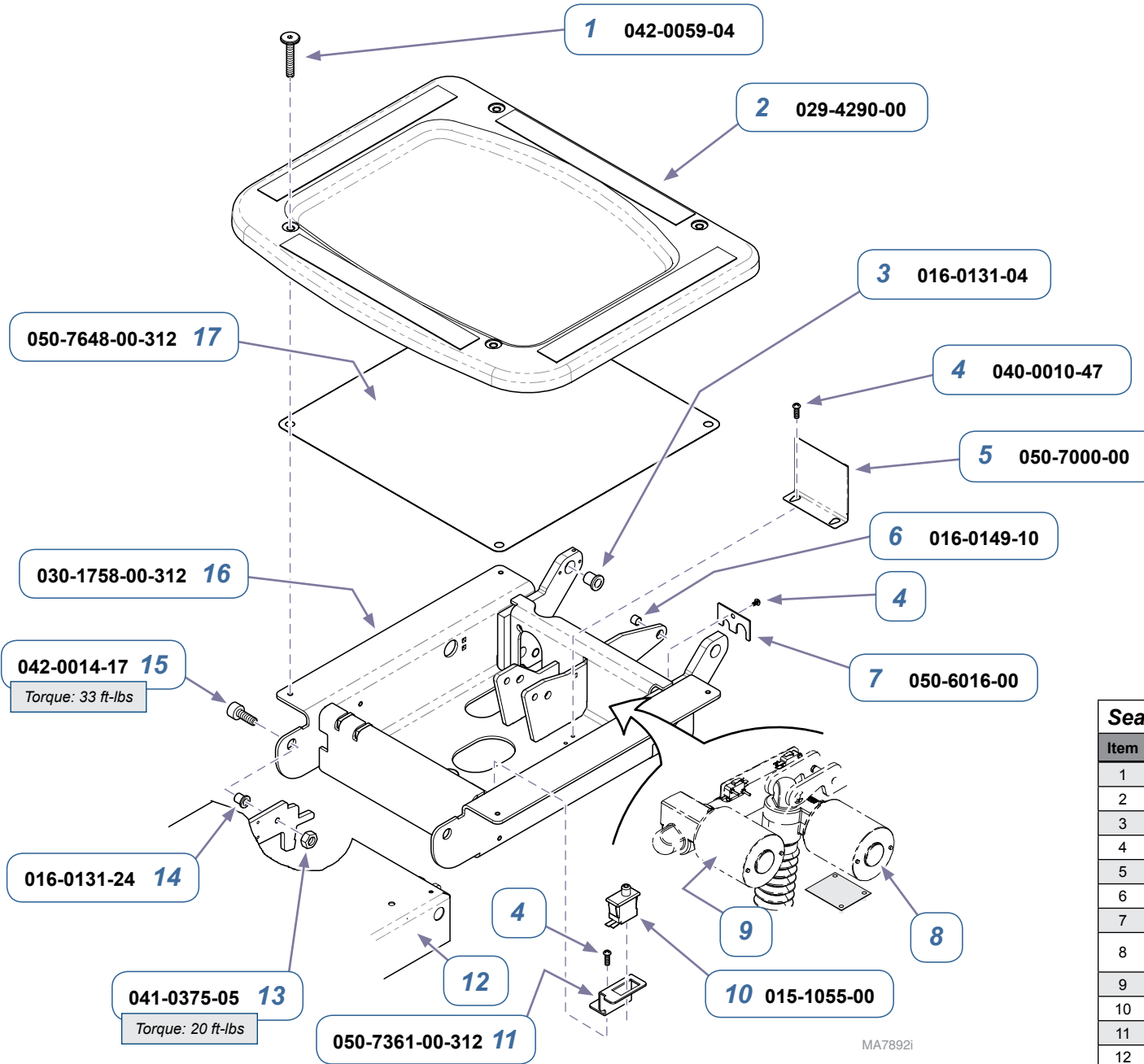
Upholstery		
Item	Description	Qty.
1	Upholstery Set (includes items 2 thru 4) a) Premium b) Premium: Cal 133 c) Ultra-Premium d) Ultra-Premium: Cal 133	1
2	• Back / Seat Section Upholstery a) Premium b) Premium: Cal 133 c) Ultra-Premium d) Ultra-Premium: Cal 133	1
3	• Chair Arm Upholstery a) Premium b) Premium: Cal 133 c) Ultra-Premium d) Ultra-Premium: Cal 133	2
4	• Foot Section Upholstery a) Premium b) Premium: Cal 133 c) Ultra-Premium d) Ultra-Premium: Cal 133	1
5	Plastic Foot Section Cover	1

Models:	646
Serial Numbers:	<i>all</i>



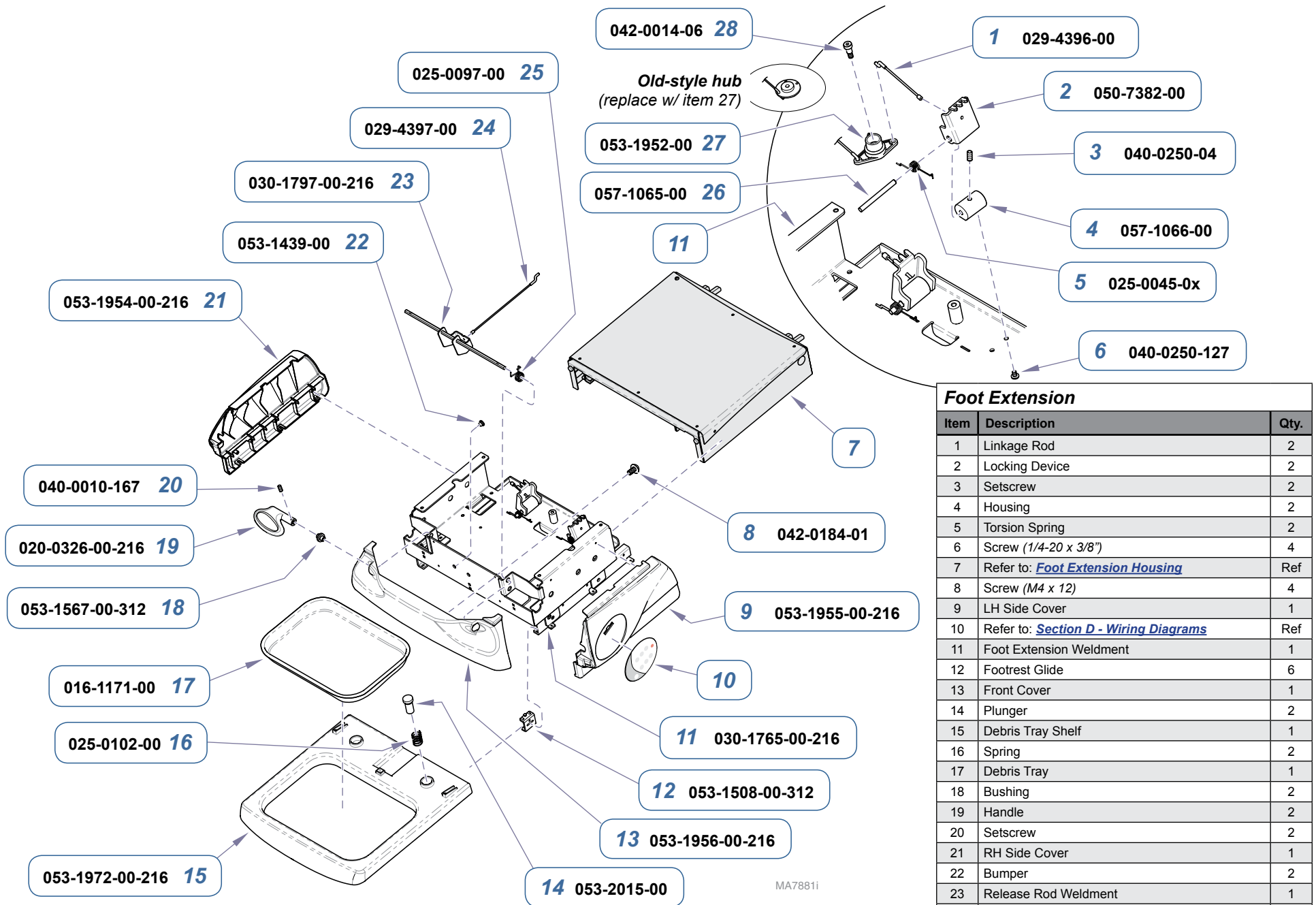
Back Section		
Item	Description	Qty.
1	Back Section Substrate Assy (includes velcro)	1
2	Plastic Bushing	2
3	Spline Bar Weldment	1
4	Bearing	1
5	Clevis Pin	2
6	E-ring	6
7	Back Section Weldment	1
8	Screw (#10-24 x 3/8")	4
9	Cover	1
10	Shoulder Screw	2
11	Clevis Pin	1
12	Nut	2
13	Linkage	1
14	Crescent Ring	2
15	Screw	4
16	Refer to: Seat Section	Ref
17	Refer to: Back Actuator / Limit Switches	Ref

Models:	646
Serial Numbers:	<i>all</i>

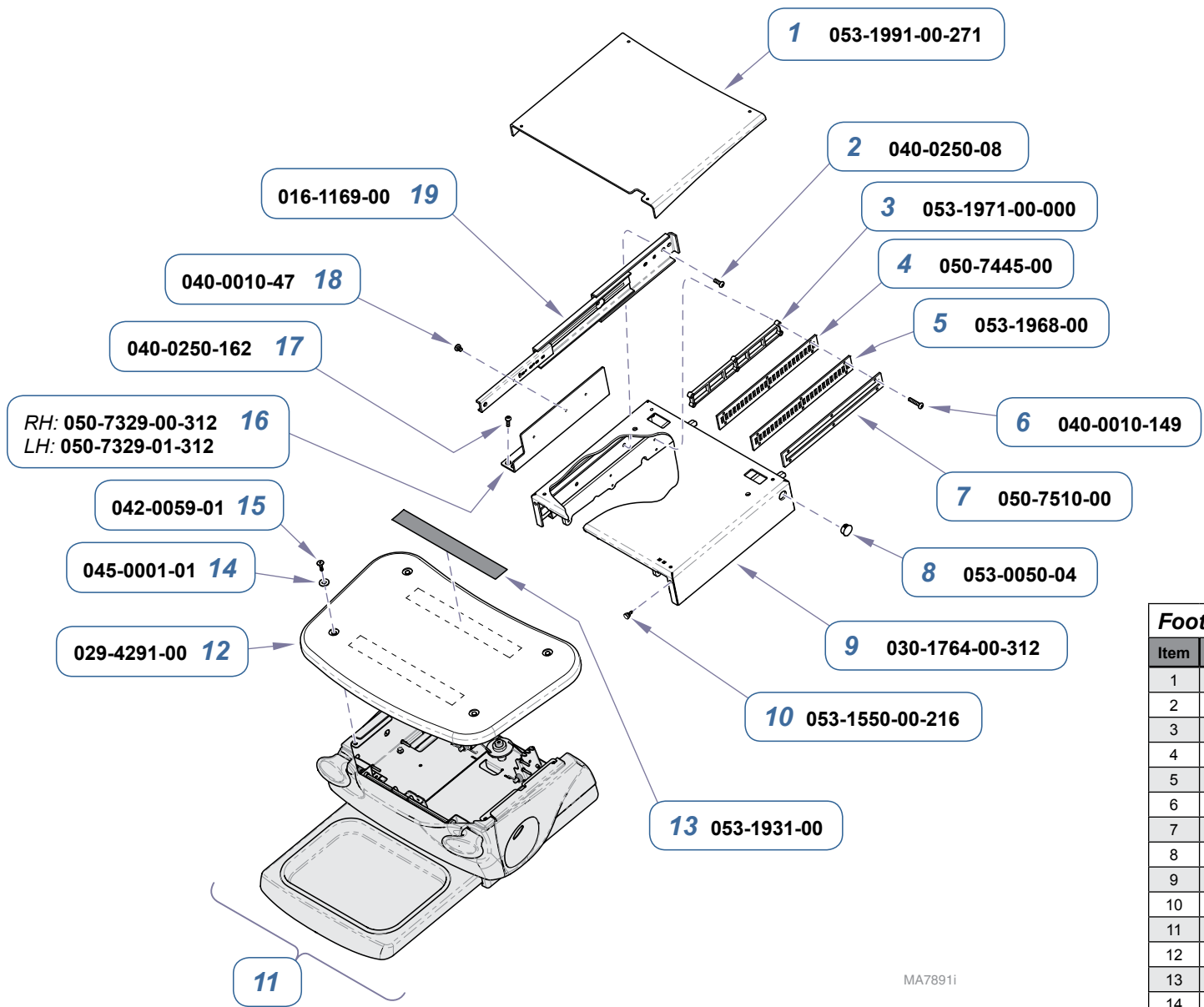


Seat Section		
Item	Description	Qty.
1	Screw	4
2	Seat Section Substrate	1
3	Flange Bearing	2
4	Screw (#10-24 x 3/8")	3
5	Harness Cover	1
6	Bushing	1
7	Tubing Bracket	1
8	Refer to: Tilt Actuator / Limit Switch / Sensor PC Board	Ref
9	Refer to: Back Actuator / Limit Switches	Ref
10	Foot Extension "Crash" Limit Switch	1
11	Limit Switch Bracket	1
12	Refer to: Foot Extension Housing	Ref
13	Nut	2
14	Flange Bearing	2
15	Shoulder Screw	2
16	Seat Weldment	1
17	Seat Cover	1

Models:	646
Serial Numbers:	<i>all</i>



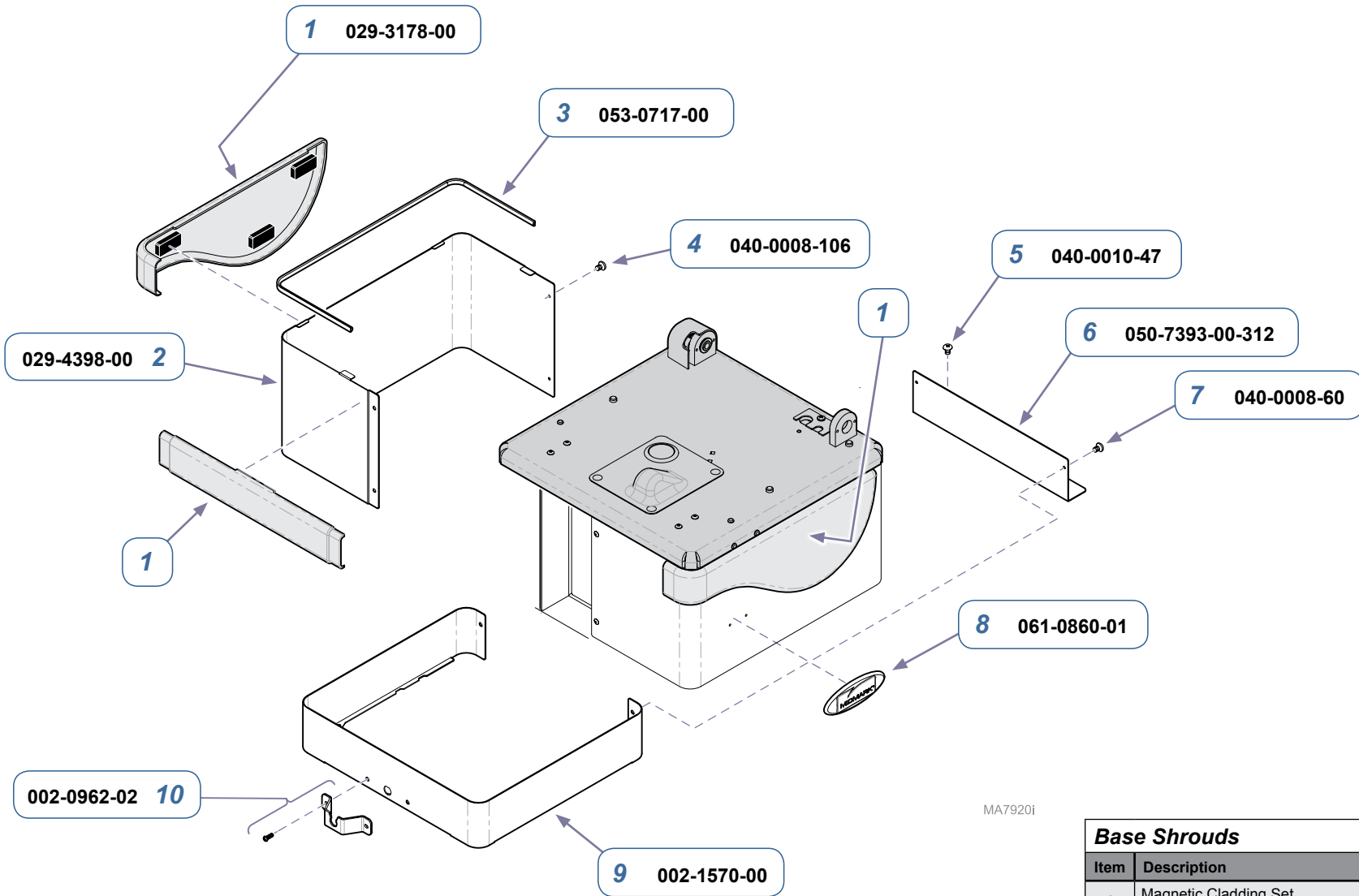
Models:	646
Serial Numbers:	<i>all</i>



Foot Extension Housing

Item	Description	Qty.
1	Mid Section Cover	1
2	Screw (1/4-20 x 3/8")	6
3	Cover Plate	2
4	Foot Lock Wear Plate	2
5	Slotted Plate	2
6	Screw (#10-24 x 1-1/4")	15
7	Spacer	2
8	Hole Plug	2
9	Foot Weldment	1
10	Bumper	2
11	Refer to: Foot Extension	Ref
12	Foot Extension Substrate (incl. items 13 & 14)	1
13	• Velcro	2
14	• Washer	4
15	Screw	4
16	Mounting Bracket (RH shown)	2
17	Screw (1/4-20 x 1/2")	6
18	Screw (#10-24 x 3/8")	10
19	Slide Assembly	2

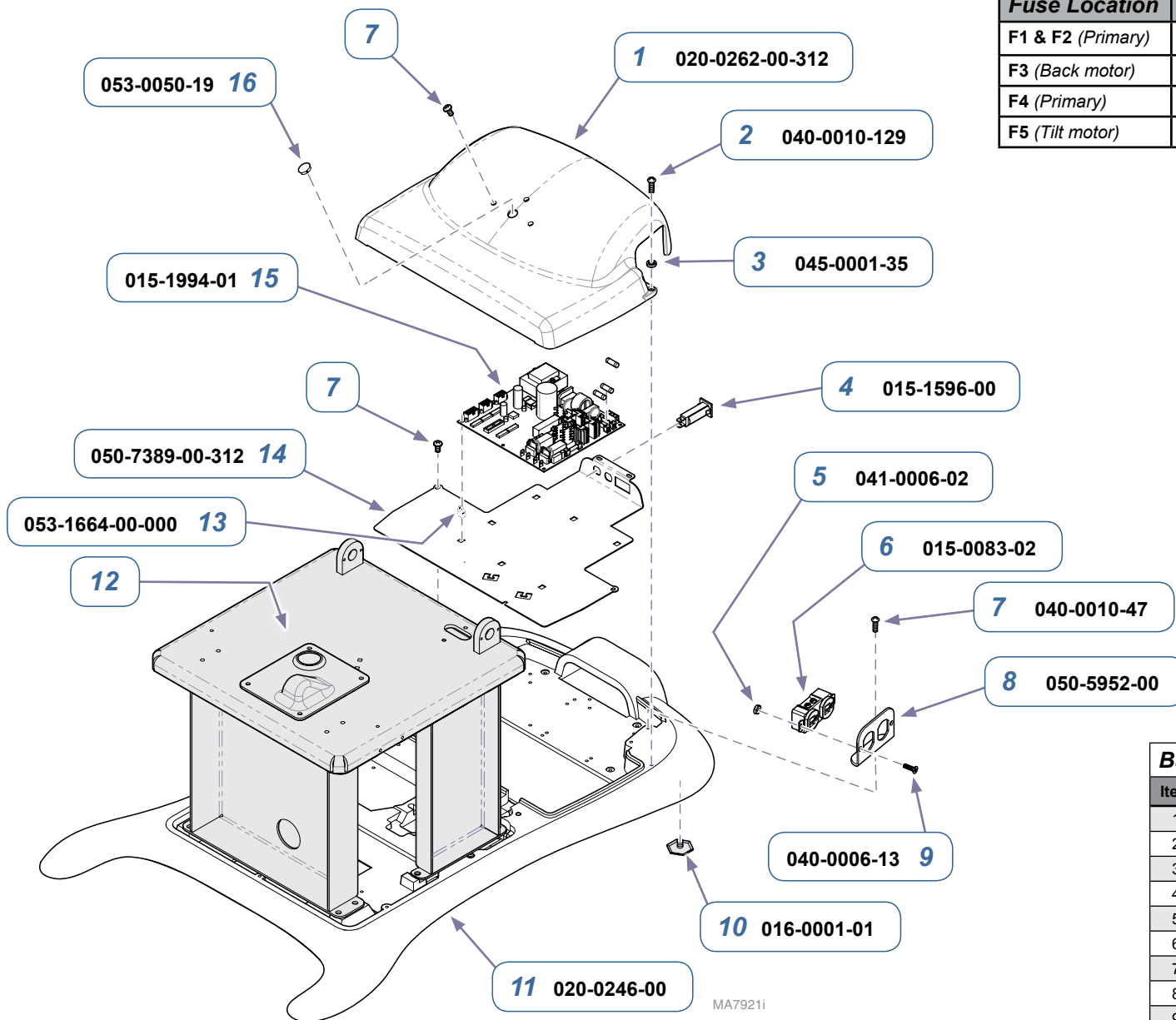
Models:	646
Serial Numbers:	<i>all</i>



MA7920i

Base Shrouds		
Item	Description	Qty.
1	Magnetic Cladding Set (includes RH, LH, and front sections)	1
2	Shroud Assembly (includes item 3)	2
3	• Shroud Seal	1
4	Screw (#8-32 x 1/4")	4
5	Screw (#10-24 x 3/8")	2
6	Spacer Cover	1
7	Screw (#8-32 x 3/8")	4
8	Nameplate	2
9	Shroud Spacer (includes two #8-32 x 3/8" screws)	1
10	Control Cord Bracket Kit (includes bracket, two #8-32 x 3/8" screws, & two nuts)	1

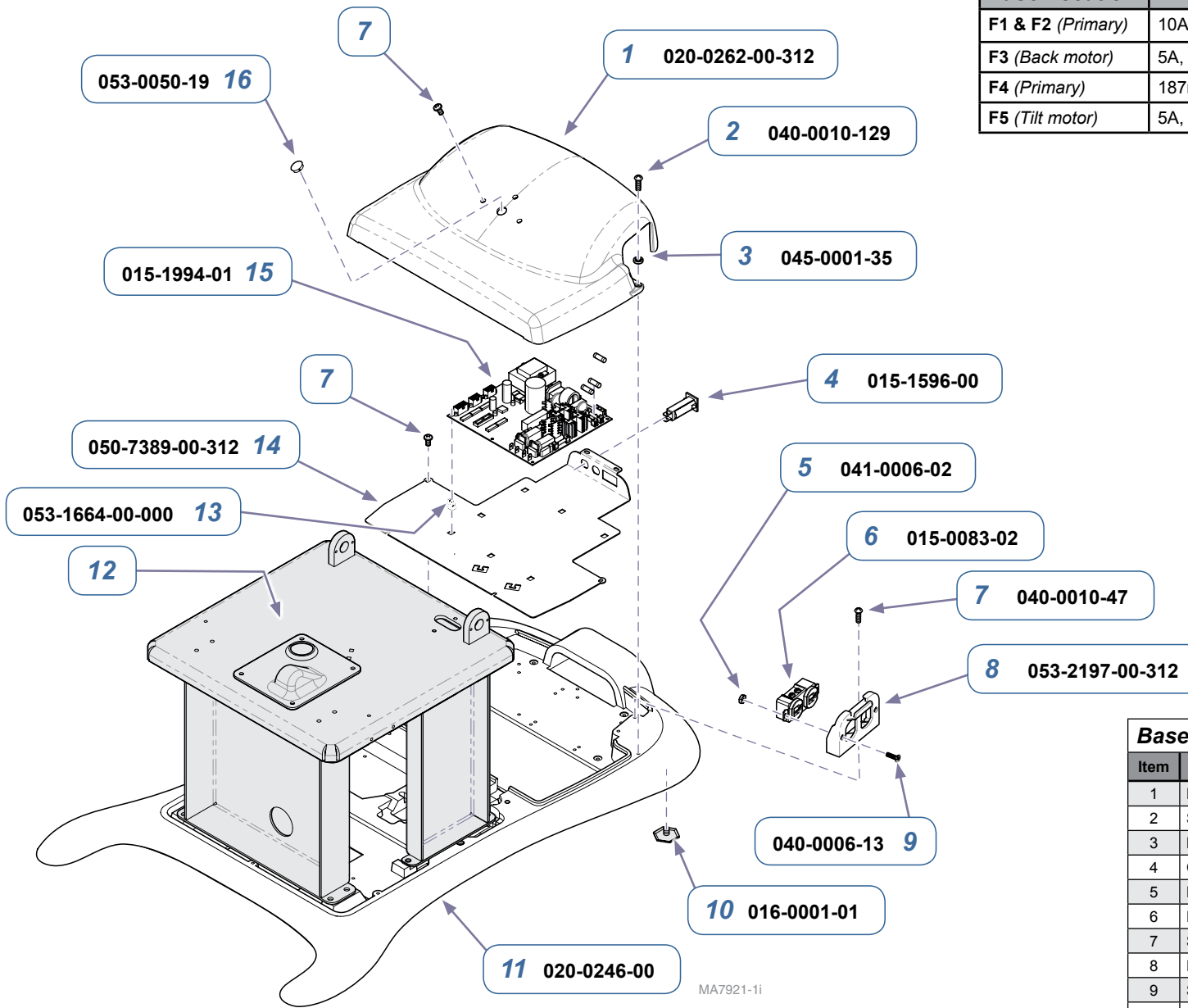
Models:	646
Serial Numbers:	<i>all</i>



Fuse Location		Part No.
F1 & F2 (Primary)	10A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-26
F3 (Back motor)	5A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-31
F4 (Primary)	187mA, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-32
F5 (Tilt motor)	5A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-31

Base Components		
Item	Description	Qty.
1	PC Board Cover	1
2	Screw (#10-24 x 1/2")	2
3	Lockwasher	2
4	Circuit Breaker (5 amp)	2
5	Nut	4
6	Receptacle	2
7	Screw (#10-24 x 3/8")	10
8	Receptacle Plate	2
9	Screw (#6-32 x 3/8")	4
10	Leveling Foot	4
11	Base Casting	1
12	Refer to: Column Components	Ref
13	Standoff	7
14	Mounting Plate	1
15	PC Board	1
16	Hole Plug	1

Models:	646
Serial Numbers:	V2200 thru V943862

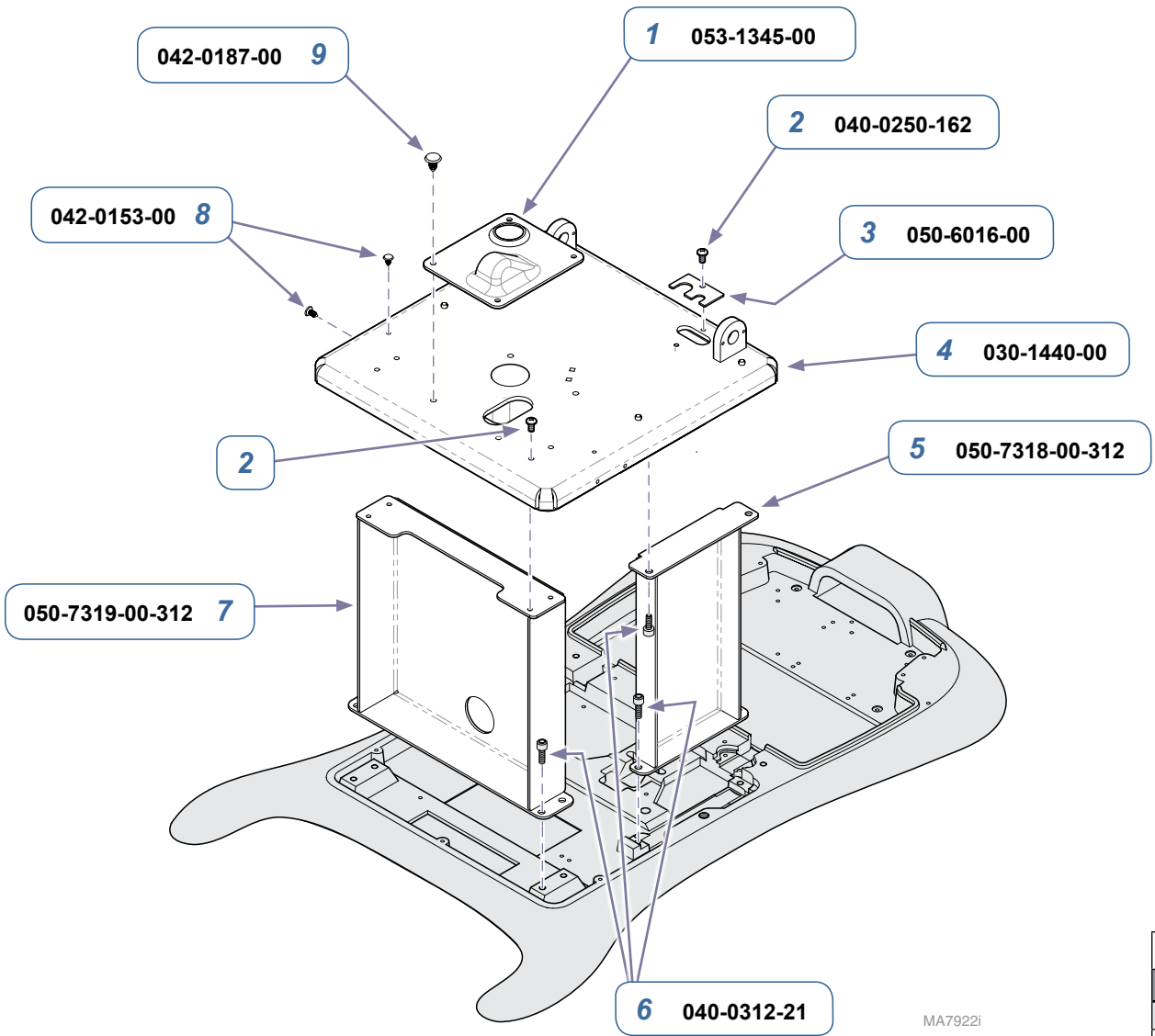


Fuse Location		Part No.
F1 & F2 (Primary)	10A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-26
F3 (Back motor)	5A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-31
F4 (Primary)	187mA, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-32
F5 (Tilt motor)	5A, 250V, Slo-Blo, 1/4" x 1 1/4"	015-0346-31

Base Components

Item	Description	Qty.
1	PC Board Cover	1
2	Screw (#10-24 x 1/2")	2
3	Lockwasher	2
4	Circuit Breaker (5 amp)	2
5	Nut	4
6	Receptacle	2
7	Screw (#10-24 x 3/8")	10
8	Receptacle Plate	2
9	Screw (#6-32 x 3/8")	4
10	Leveling Foot	4
11	Base Casting	1
12	Refer to: Column Components	Ref
13	Standoff	7
14	Mounting Plate	1
15	PC Board	1
16	Hole Plug	1

Models:	646
Serial Numbers:	V943863 thru present

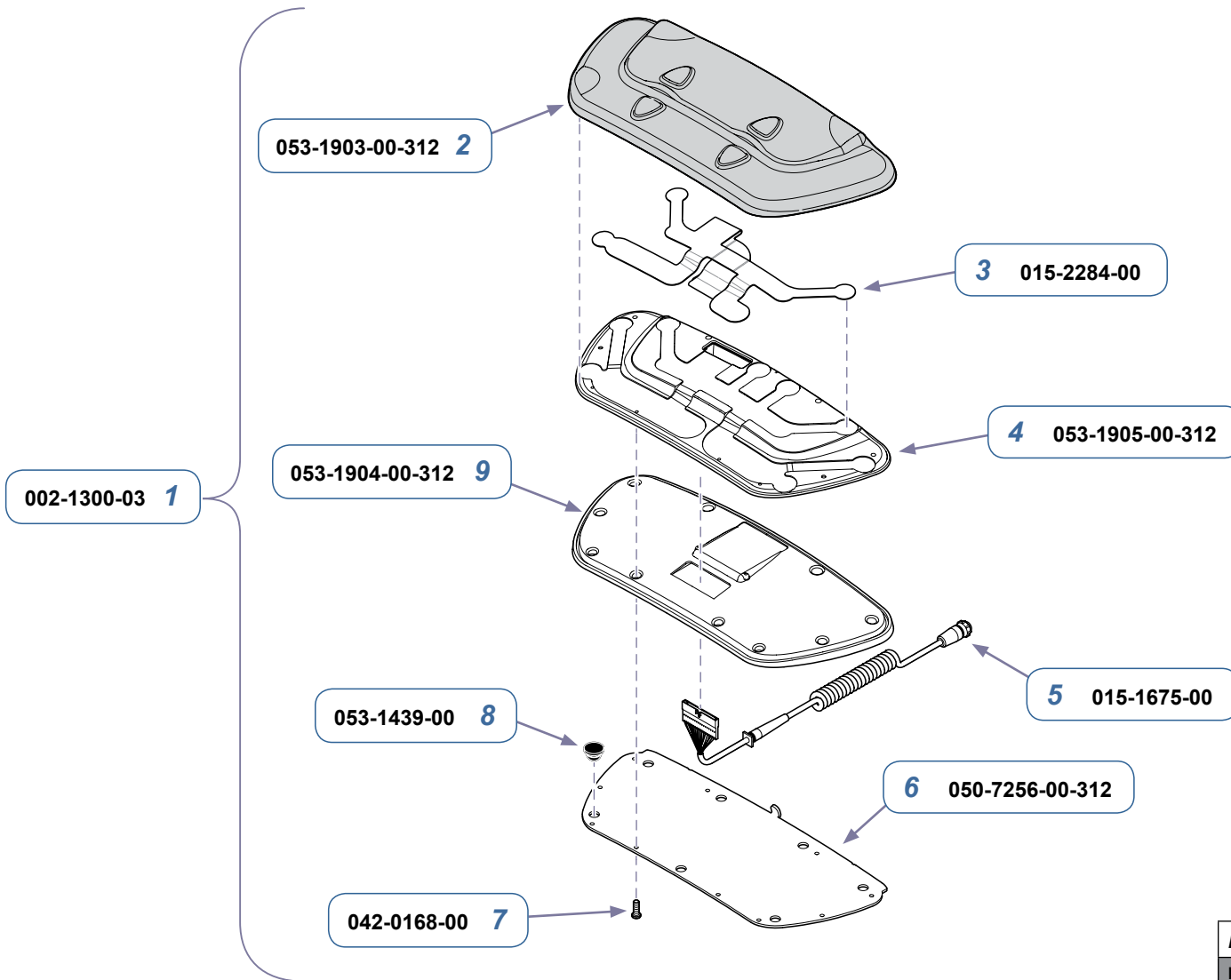


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Column Components

Item	Description	Qty.
1	Cover	1
2	Screw (1/4-20 x 1/2")	5
3	Tubing Bracket	1
4	Column Adapter Weldment	1
5	Side Leg	2
6	Socket Head Screw (5/16-18 x 3/4")	12
7	Front Leg	1
8	Rivet Drive	6
9	Push Fastener	4

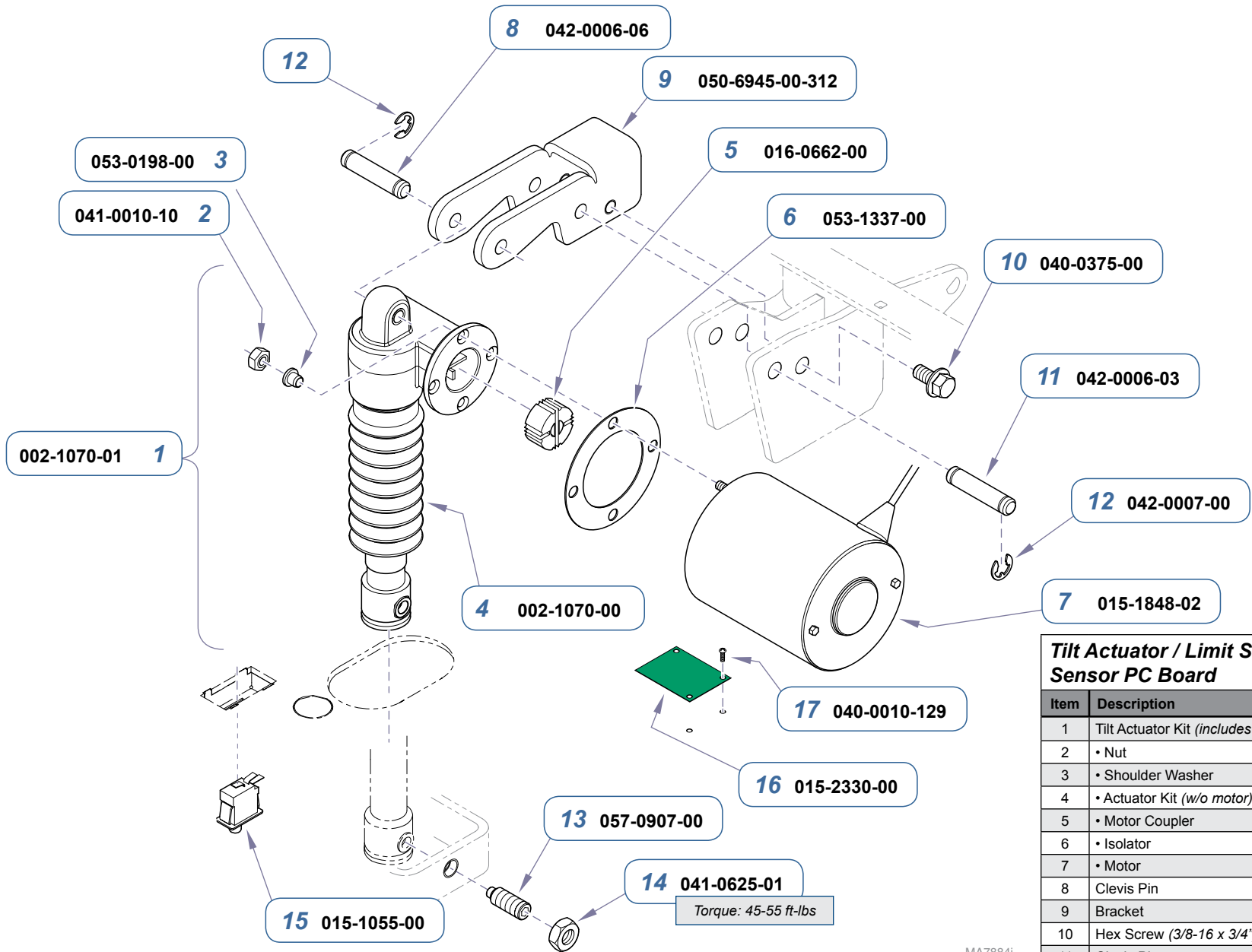
Models:	646
Serial Numbers:	<i>all</i>



MA7923i

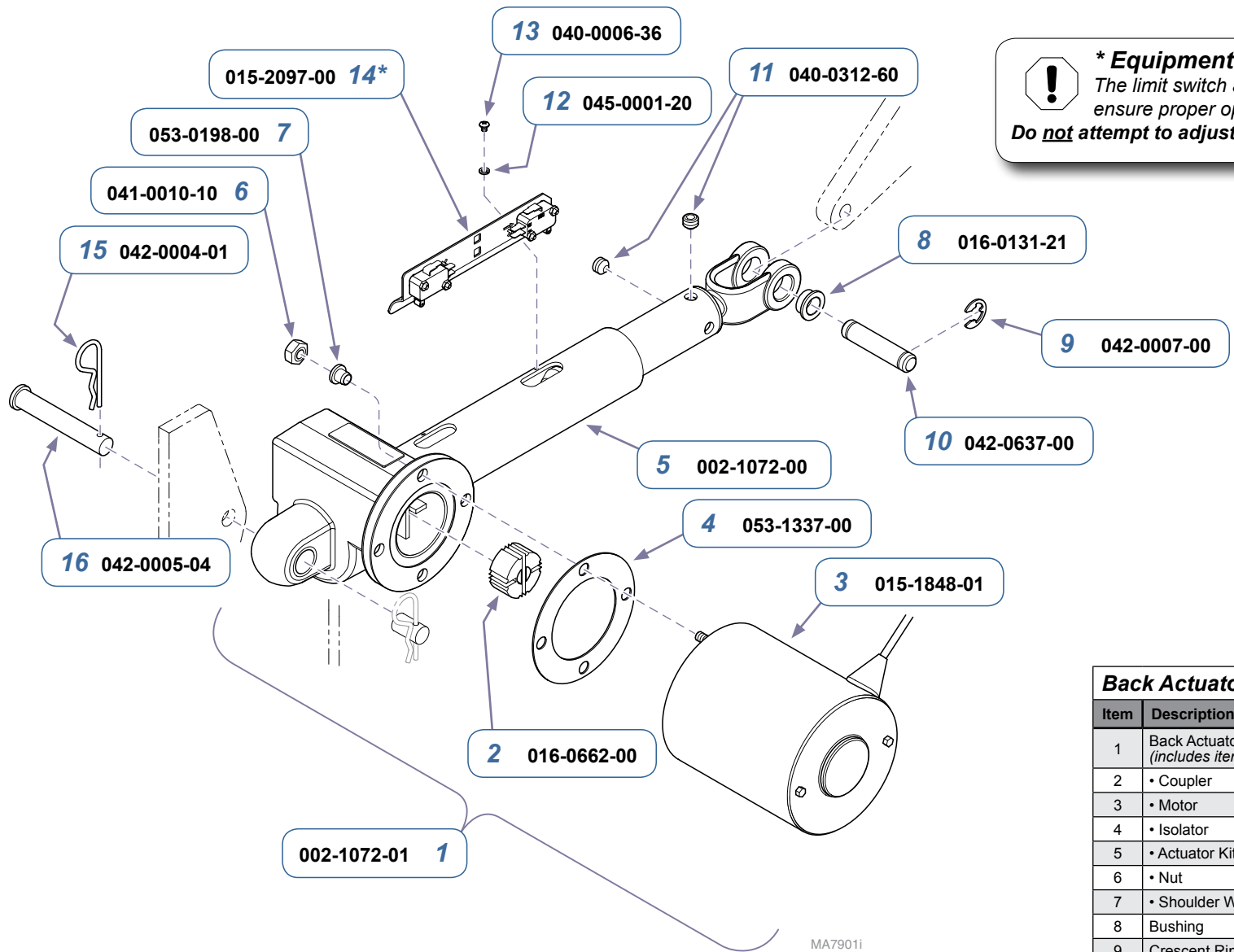
Models:	646
Serial Numbers:	<i>all</i>

Foot Control		
Item	Description	Qty.
1	Foot Control Assembly (incl. items 2 thru 9)	1
2	• Keypad	1
3	• Switch Membrane	1
4	• Retainer	1
5	• Base	1
6	• Cord	1
7	• Base Plate	1
8	• Screw (3.5 mm x 10 mm)	10
9	• Stem Bumper	7



Tilt Actuator / Limit Switch / Sensor PC Board		
Item	Description	Qty.
1	Tilt Actuator Kit (includes items 2 thru 7)	1
2	• Nut	2
3	• Shoulder Washer	2
4	• Actuator Kit (w/o motor)	1
5	• Motor Coupler	1
6	• Isolator	1
7	• Motor	1
8	Clevis Pin	1
9	Bracket	1
10	Hex Screw (3/8-16 x 3/4")	2
11	Clevis Pin	1
12	E-ring	4
13	Pivot Screw	1
14	Nut	1
15	Limit Switch (Tilt Down)	1
16	Tilt Sensor PC Board	1
17	Screw (#10-24 x 1/2")	3

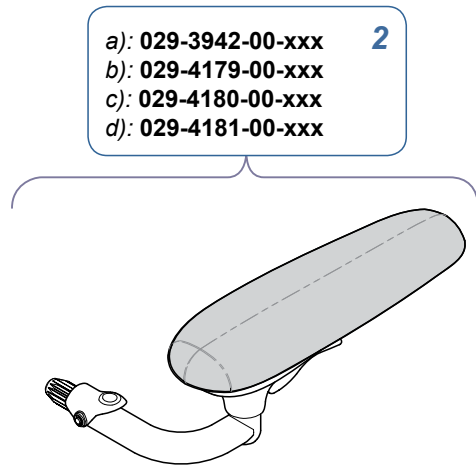
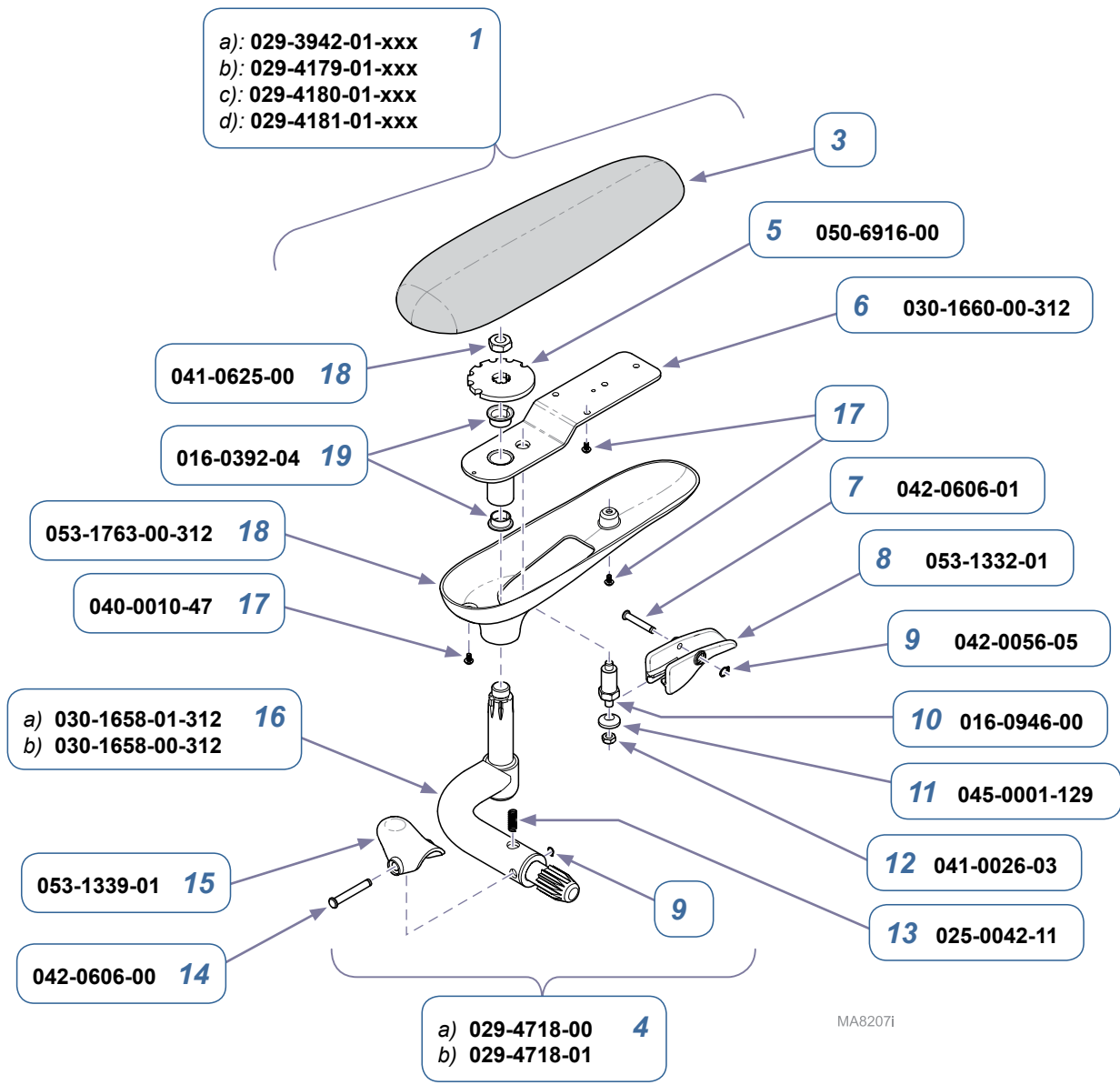
Models:	646
Serial Numbers:	<i>all</i>



! * Equipment Alert
 The limit switch adjustment is critical to ensure proper operation (tolerance: 0.030").
 Do **not** attempt to adjust the individual switches.

Back Actuator / Limit Switches		
Item	Description	Qty.
1	Back Actuator Kit (includes items 2 thru 7)	1
2	• Coupler	1
3	• Motor	1
4	• Isolator	1
5	• Actuator Kit (w/o Motor)	1
6	• Nut	2
7	• Shoulder Washer	2
8	Bushing	2
9	Crescent Ring	2
10	Clevis Pin	1
11	Set Screw (5/16-18 x 1/4")	2
12	Lockwasher	2
13	Screw (#6-32 x 3/16")	2
14	Limit Switch Assembly (includes switches, bracket, & harnesses)	1
15	Cotter Pin	1
16	Clevis Pin	1

Models:	646
Serial Numbers:	<i>all</i>



Chair Arms		
Item	Description	Qty.
1	LH Chair Arm Assy (includes items 3 & 4) a) Premium Upholstery b) Premium Uph - Cal 133 c) Ultra-Premium Upholstery d) Ultra- Premium Uph-Cal 133	1
2	RH Chair Arm Assy (includes items 3 & 4) a) Premium Upholstery b) Premium Uph - Cal 133 c) Ultra-Premium Upholstery d) Ultra- Premium Uph-Cal 133	1
3	• Refer to: Upholstery	Ref
4	• a) RH Chair Arm Assembly (incl. items 5 thru 20) • b) LH Chair Arm Assembly (incl. items 5 thru 20)	1
5	•• Lock Plate	1
6	•• Arm Weldment	1
7	•• Clevis Pin	1
8	•• Pivot Handle	1
9	•• Retaining Ring	2
10	•• Indexing Plunger	1
11	•• Spherical Washer	1
12	•• Nut	1
13	•• Compression Spring	1
14	•• Clevis Pin	1
15	•• Retainer Clip	1
16	•• a) LH Shaft Weldment (shown) •• b) RH Shaft Weldment	1
17	•• Screw (#10-24 x 3/8")	6
18	•• Bottom Cover	1
19	•• Flange Bearing	2
20	•• Nut (apply Loctite 242)	1

Models:	646
Serial Numbers:	<i>all</i>



Because we care.