Barrier-Free® Podiatry Procedures Chair

Model Numbers:

647

MIDMARK®

Service and Parts Manual

FOR USE BY MIDMARK TRAINED TECHNICIANS ONLY

Part No. 004-0579-00 Rev. A (1/4/13)

Style B

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GENERAL INFORMATION

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

Symbols

DANGER
Indicates an imminently hazardous situation which <u>will</u> 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 <u>may</u> 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

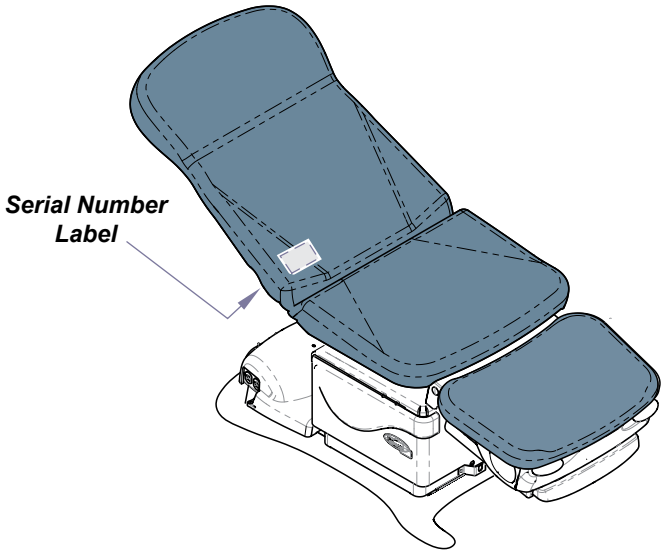
The following information is required when ordering parts:

- 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

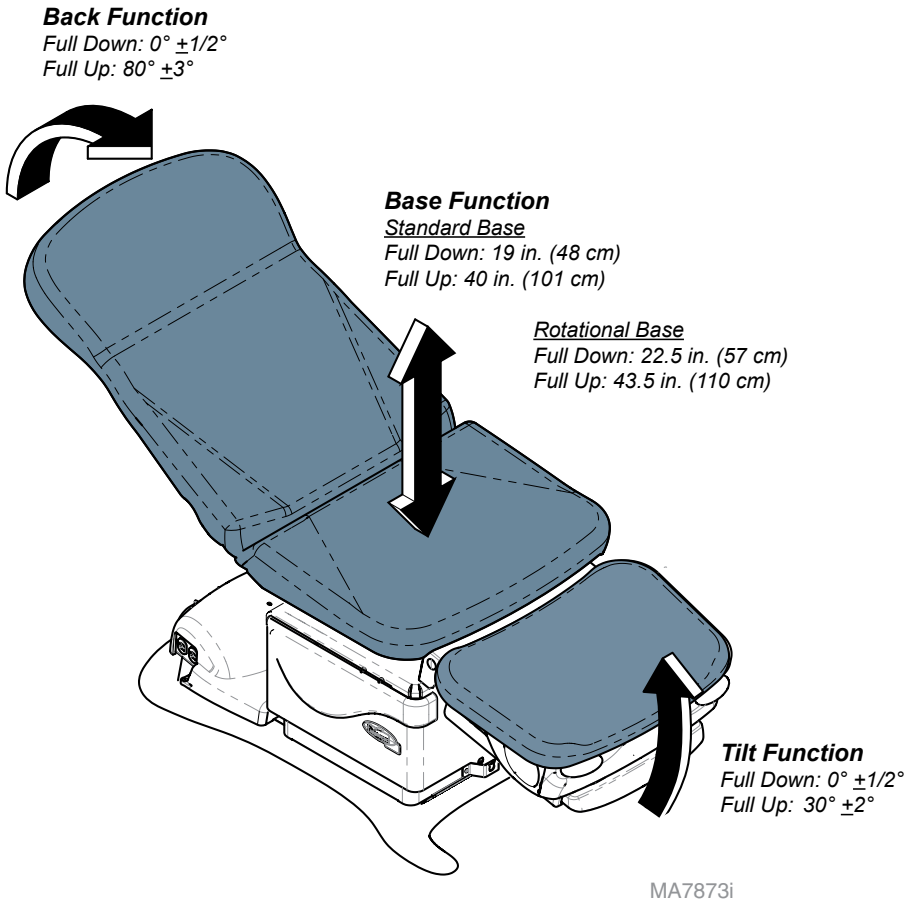
Serial Number Location



Specifications

Patient Weight (max):	450 lbs (204 kg)
Weight of Chair:	**Standard Base:** 421 lbs (191 kg) **Rotational Base:** 506 lbs (230 kg)
Power Cord Length:	8 ft (244 cm)
Fuses *(located at power cord inlet):*	**6.3A, 250V, Type "T", 5 x 20 mm**
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 mintes OFF)
Protection against ingress of fluids:	Ordinary Equipment *Foot control only:* 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

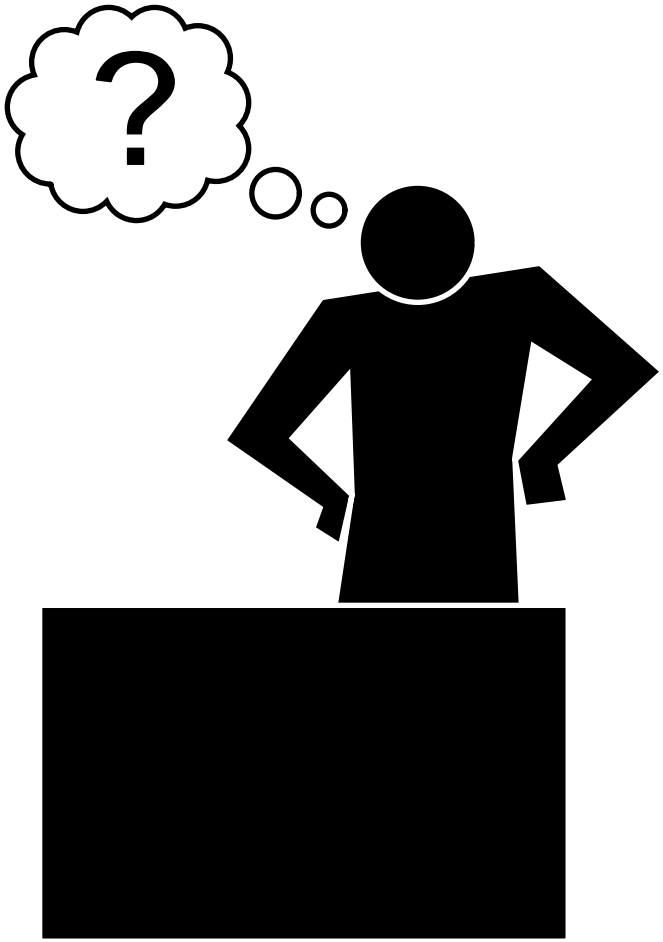
Model	Description	Complies To:			Electrical Ratings:		
		UL 60601-1	CAN / CSA 22.2, #601.1-M90	EN 60601-1-2 (EMC)	VAC +/- 10%	Amps	Cycles (Hz)
647-001	Three-Function Chair *(Base, Back & Tilt)* Non-Programmable w/Receptacles	•	•	•	115	10.5	60
647-002	Three-FunctionChair *(Base, Back & Tilt)* Programmable w/Receptacles	•	•	•	115	10.5	60
647-003	Three-FunctionChair *(Base, Back & Tilt)* Non-Programmable w/Rotational Base	•	•	•	115	8.5	60
647-004	Three-FunctionChair *(Base, Back & Tilt)* Programmable w/Rotational Base	•	•	•	115	8.5	60

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: Location: Service Technician:		Model Number: Serial Number: Notes:

Section A

Troubleshooting



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 system transformer	Wire connections between: power inlet and main PC board.	Secure loose connections. If connections are OK, test the transformer. Refer to: *Section B - Main System Transformer*
			Models w/Rotational Base: Wire connections between: rotational base PC board and transformer.	Secure loose connections. If connections are OK, perform *EMI Filter Board Test*. Refer to: *Section B - Rotational Base Brake System.*
		Main PC board	If main system transformer is OK...	Replace main PC board.
	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*
		System malfunction	Error code LEDs on main PC board.	Refer to: *Section B - Main PC Board*.
Base function not operating properly.	No Base Up or Base Down	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: *Section B - Foot Control / Touch Pads*
		System malfunction	Error code LEDs on main PC board.	Refer to: *Section B - Main PC Board*.
		Loose / damaged wire connections	Check wire connections to: base actuator, base limit switches.Check black & white wire connections between main system transformer & main PC board.	Secure any loose connections.
		Base actuator / main PC board	Refer to: *Section B - Base Actuator / Limit Switches (Isolating a Malfunction)*	Follow test sequence outlined in Section B.

Models:	***647***	
Serial Numbers:	*all*	

Problem	Symptom	Probable Cause	Check	Correction
Base function not operating properly. - continued	No Base Up. Base Down-OK. ***-OR-*** No Base Down. Base Up-OK.	Foot control / touch pad	Try activating functions from each touch pad / foot control.	Refer to: *Section B - Foot Control / Touch Pads*
		System malfunction	Error code LEDs on main PC board.	Refer to: *Section B - Main PC Board*.
		(No Base Down) Crash Avoidance System	Refer to: *Section A - Crash Avoidance System*	Determine appropriate test procedure(s) based on the theory of operation for the Crash Avoidance System.
		(No Base UP): Base Up limit switch *(No Base Down):* Base Down limit switch	Wire connections to limit switch.	If connections are OK, perform *Limit Switch Test.* Refer to: *Section B - Base Actuator / Limit Switch*
		(No Base Down) Foot extension switch	Remove any obstructions under foot section of table.	Perform *"Crash" Limit Switch Test*. Refer to: *Section B - Foot Extension / "Crash" Limit Switch*.
		Base actuator / main PC board	Refer to: *Section B - Base Actuator / Limit Switches (Isolating a Malfunction)*	Follow test sequence outlined in Section B.
	Base drifts down.	Base actuator & gas springs	With no weight on table, does base still drift down?	If YES, replace motor coupler & gas springs. If NO, replace base actuator. Refer to: *Section B - Base Actuator / Limit Switches*
	Noisy operation (grinding, squeaking, etc.)	Gas springs / scissor mechanism	-	Clean / lubricate gas spring pivot joints. Wipe guide bars with a clean, dry cloth. NEVER lubricate guide bars or scissor mechanism! Refer to: *Section B - Gas Springs*
		Base actuator	Refer to: *Section B - Base Actuator / Limit Switches (Isolating a Malfunction)*	Follow instructions outlined in Section B.

Models:	***647***	
Serial Numbers:	*all*	

Problem	Symptom	Probable Cause	Check	Correction
Base function not operating properly. - continued	Base 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 ±10%	Connect adequate supply voltage.
		Base actuator motor	Perform *Actuator Motor Test*. Refer to: *Section B - Base Actuator / Limit Switches*	Follow test sequence outlined in Section B.
		Gas springs	If actuator motor is OK...	Replace gas springs. Refer to: *Section B - Gas Springs*
	Base function moves briefly, then stops (“beeps”).	Main PC board needs to be calibrated	Calibrate main PC board	Refer to: *Section B - Main PC Board*.
		System malfunction	Error code LEDs on main PC board.	Refer to: *Section B - Main PC Board*.
		Base position sensor	Wire connections to sensor. Perform *Output Voltage Test (at Sensor).* Refer to: *Section B - Position Sensors*	Follow test sequence outlined in Section B.
		Base actuator / main PC board	Perform *Actuator Motor Test*. Refer to: *Section B - Base Actuator / Limit Switches*	Follow test sequence outlined in Section B.
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.

Models:	***647***	
Serial Numbers:	*all*	

Problem	Symptom	Probable Cause	Check	Correctio
Back function not operating properly. - continued	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*
		(No Back Down) Crash Avoidance System	Refer to: *Section A - Crash Avoidance System*	Determine appropriate test procedure(s) based on the theory of operation for the Crash Avoidance System.
		(No Back UP) Back Up limit switch *(No Back Down)* Back Down limit switch	Wire connections to limit switch.	Replace back limit switch / bracket assembly. Refer to: *Section B - Back Actuator / Limit Switches*
		Back actuator / main PC board	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 ±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:	***647***	
Serial Numbers:	*all*	

Problem	Symptom	Probable Cause	Check	Correction
Back function not operating properly. - continued	Back function moves briefly, then stops (“beeps”).	Main PC board needs to be calibrated	Calibrate main PC board	Refer to: *Section B - Main PC Board*
		Back position sensor	Wire connections to sensor. Perform *Output Voltage Test (at Sensor).* Refer to: *Section B - Position Sensors*	Follow test sequence outlined in Section B.
		Back actuator / main PC board	Perform *Actuator Motor Test.* Refer to: *Section B - Back Actuator / Limit Switches*	Follow test sequence outlined in Section B.
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 Switch (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 Up) Tilt position sensor	Refer to: *Section A - Tilt Up/Down Function (Tilt Up Operation) for description of proper operation.*	Perform *Output Voltage Test (at Sensor).* Refer to: *Section B - Position Sensors*
		(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.

Models:	***647***
Serial Numbers:	*all*

Problem	Symptom	Probable Cause	Check	Correction
Tilt function not operating properly. - continued	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 ±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.
	Tilt function moves briefly, then stops (“beeps”).	Main PC board needs to be calibrated	Calibrate main PC board	Refer to: *Section B - Main PC Board*
		Tilt position sensor	Wire connections to sensor. Perform *Output Voltage Test (at Sensor).* Refer to: *Section B - Position Sensors*	Follow test sequence outlined in Section B.
		Tilt actuator / main PC board	Perform *Actuator Motor Test.* Refer to: *Section B - Tilt Actuator / Limit Switch*	Follow test sequence outlined in Section B.
Multiple functions are inoperable. Table “beeps”.	Inoperable functions may include any of the following: *Base Down, Back Down, Tilt Up, Tilt Down*	Crash Avoidance System	Refer to: *Section A - Crash Avoidance System*	Determine appropriate test procedure(s) based on the theory of operation for the Crash Avoidance System.
Programming feature does not work properly.	Positions cannot be programmed. ***- or -*** When position button is pressed, table does not move, or moves to wrong position.	Programming failed.	-	Reprogram desired position. Refer to: *Section A - Position Programming*
		Programming process error.	Error code LEDs on main PC board.	Refer to: *Section B - Main PC Board*
		Main PC board needs to be calibrated	Calibrate main PC board	Refer to: *Section B - Main PC Board*

Models:	***647***	
Serial Numbers:	*all*	

Problem	Symptom	Probable Cause	Check	Correction
Rotational base is malfunctioning.	Rotational brake will not lock.	Rotational brake mechanism	Unplug table power cord. If base rotation locks, perform *Rot. Brake Electrical Test*. If base does not lock, inspect the mechanical brake components. Refer to: *Section B - Rotational Base Brake System*.	Follow test sequence outlined in Section B.
	Base wobbles when locked. ***- and/or -*** Grinding noise when base rotates.	Debris between upper & lower castings.	-	Without separating the castings, remove any debris.
		Loose hub screws	Four screws securing the upper & lower castings. For access instructions, refer to: *Section B - Rotational Base Brake System (Separating Upper & Lower Base Castings)*	Tighten screws.
		Rotation bearings / brake disc	Inspect needle bearing & brake disc for damage, debris, etc. For access instructions, refer to: *Section B - Rotational base Brake System (Separating Upper & Lower Base Castings)*	Replace bearing, disc, etc as necessary. Note: Lock nut must be tightened to 75 ft-lbs.
	Rotational brake will not unlock.	Brake pedal switch	Check both brake pedals.	If either pedal works properly, check connections to faulty pedal switch. *Replace switch if necessary*. Refer to: *Section B - Rotational Base Brake System*.
		Electro-magnet	Perform *Electro-magnet Test*. Refer to: *Section B - Rotational Base Brake System*.	Follow test sequence outlined in Section B.

Models:	***647***	
Serial Numbers:	*all*	

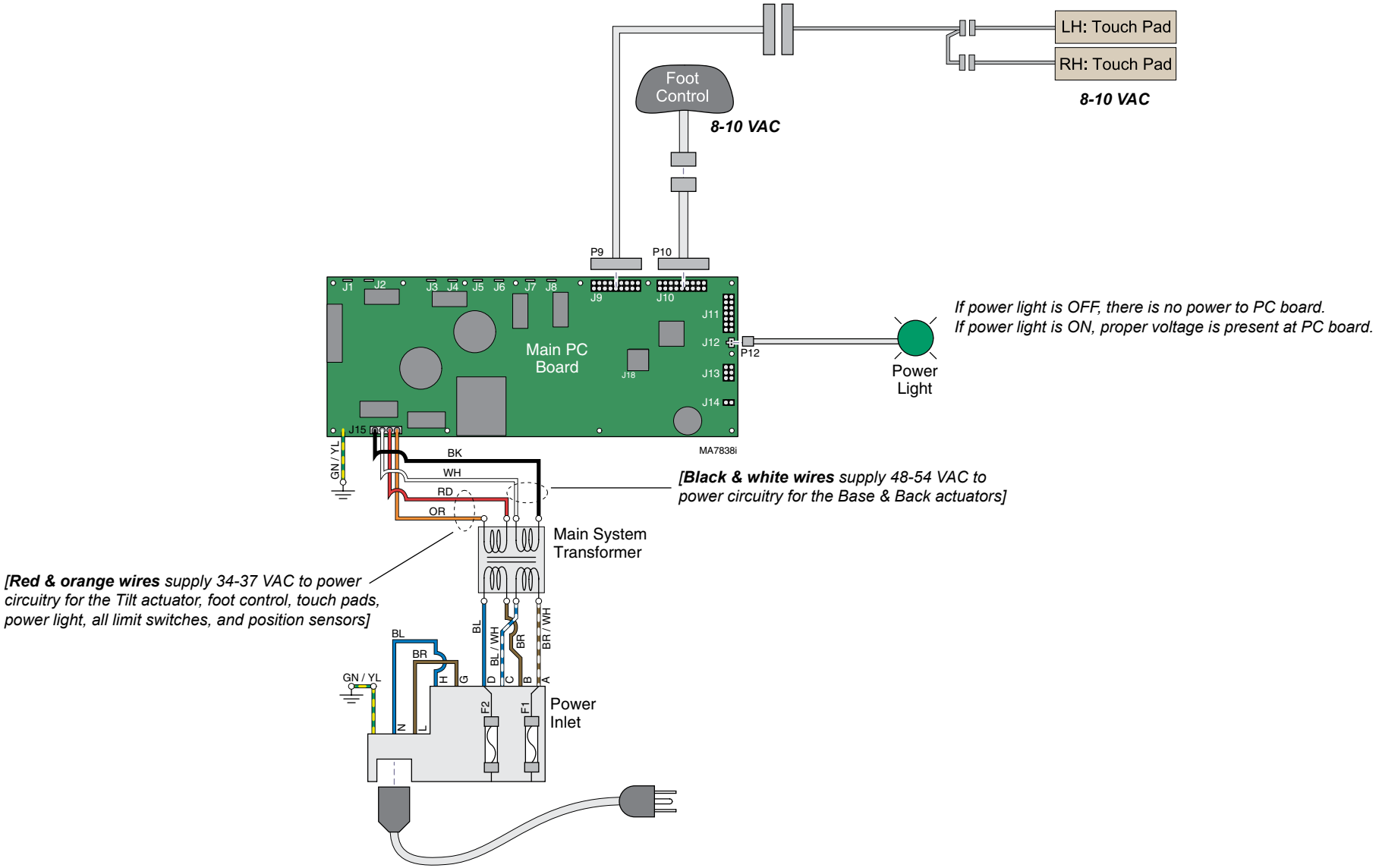
Problem	Symptom	Probable Cause	Check	Correction
No power at chair receptacles.	There is power to the chair, but no power at the chair receptacles.	Loose / damaged wire connections	Wire connections between power inlet & table receptacles	Secure / repair wire connections.
		Isolation transformer / receptacles	Perform *Output Voltage Test*. Refer to: *Section B - Chair Receptacles / Isolation Transformer*	Follow test sequence outlined in Section B.
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:	***647***	
Serial Numbers:	*all*	

Power to the Chair (models w/Standard Base)

No functions will operate A-2

This illustration shows only the components that affect ALL CHAIR FUNCTIONS.
Refer to the following page for a detailed description of the power supply to the chair.



Models:	647	
Serial Numbers:	all	

Power to the Chair (models w/Standard Base)

Facility Supply Voltage

WIth the chair's power cord properly connected, facility supply voltage (115 VAC) is supplied thru the cord to the power inlet.

Power Inlet

> ***Equipment Alert***
> *The voltage setting displayed in the power inlet window must match facility supply voltage (115 VAC).*

Current flows thru two fuses in the power inlet, to the main system transformer.

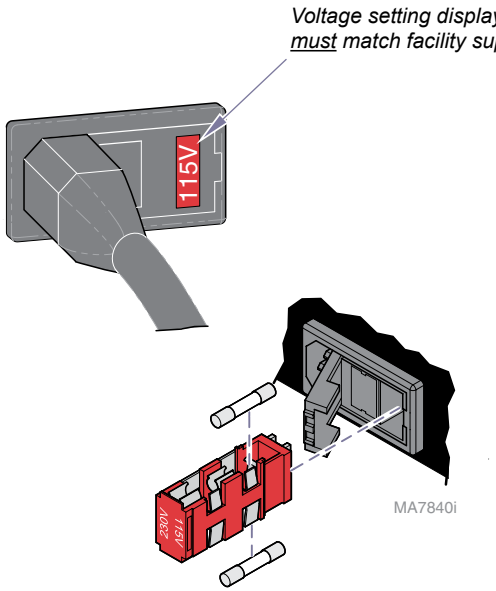
Main System Transformer

> ***Note***
> *This transformer is protected from overload by a thermal cutout feature. This will automatically reset when the transformer cools.*

Line voltage (115 VAC) is supplied to the main system transformer. The transformer reduces the voltage and current flows to the main PC board thru two separate windings (four wires).

[The black & white wires supply 48-54 VAC to power circuitry for the Base & Back actuators only]

[The red & orange wires supply 34-37 VAC to power circuitry for the Tilt actuator, foot control, touch pads, power light, all limit switches, and position sensors].



Power Indicator Light

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

Main PC Board

Circuitry on the PC board provides the required voltage to power all of the table's components: foot control, actuators, limit switches, and position sensors.

Foot Control / Touch Pads

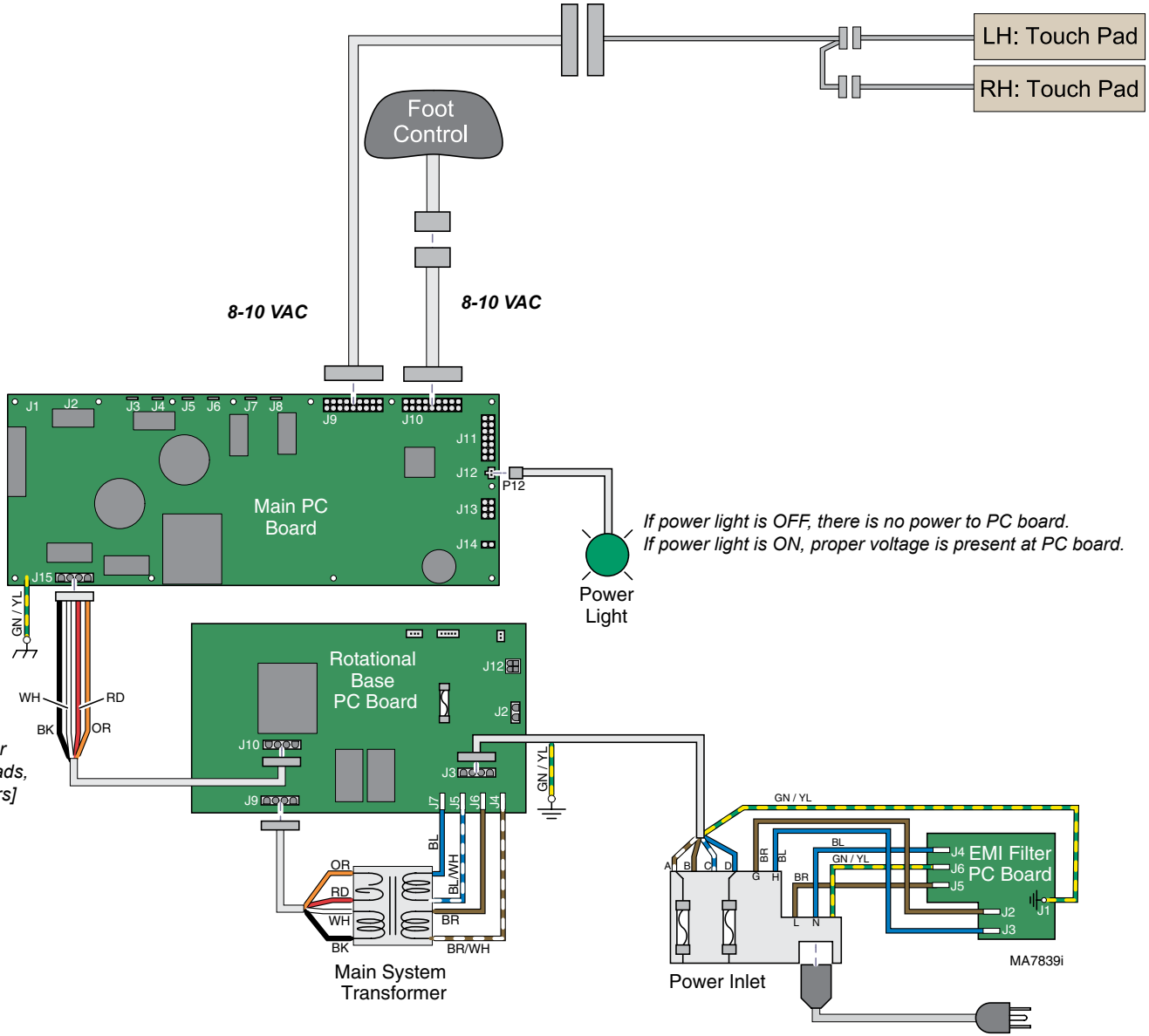
Circuitry on the main PC board supplies 8-10 VAC to the foot control & touch pads.

Models:	***647***	
Serial Numbers:	*all*	

Power to the Chair (models w/Rotational Base)

No functions will operate A-2

This illustration shows only the components that affect ALL CHAIR FUNCTIONS.
Refer to the following page for a detailed description of the power supply to the chair.



*[**Black & white wires** supply 48-54 VAC to power circuitry for the Base & Back actuators]*

*[**Red & orange wires** supply 34-37 VAC to power circuitry for the Tilt actuator, foot control, touch pads, power light, all limit switches, and position sensors]*

Models:	***647***
Serial Numbers:	*all*

Always verify model & serial number

Power to the Chair (models w/Rotational Base)

Facility Supply Voltage
WIth the chair's power cord properly connected, facility supply voltage (115 VAC) is supplied thru the cord to the power inlet.

Power Inlet / EMI Filter Board

> ***Equipment Alert***
> *The voltage setting displayed in the power inlet window must match facility supply voltage (115 VAC).*

Current flows from the power inlet thru the EMI filter board, then back thru the power inlet fuses to the rotational base PC board.

Rotational Base PC Board
Current flows thru the rotational base PC board to the main system transformer. The transformer reduces the voltage and current flows back to the rotational base PC board.

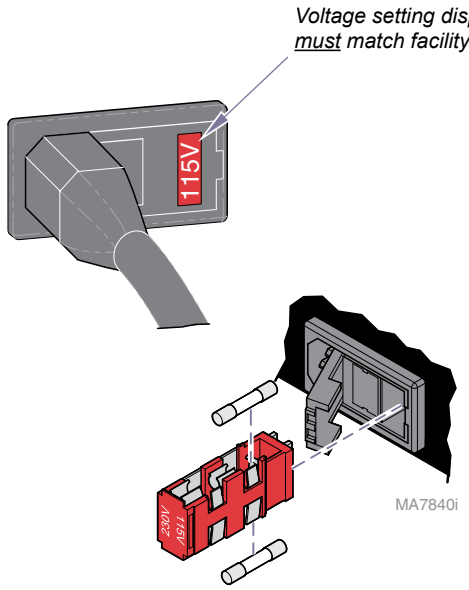
Circuitry on the rotational base PC board provides the required voltage to power the rotational base brake system.

The reduced voltage is supplied to the main PC board thru the rotational bse PC board.

Main System Transformer

> ***Note***
> *This transformer is protected from overload by a thermal cutout feature. This will automatically reset when the transformer cools.*

Line voltage (115 VAC) is supplied to the main system transformer thru the rotational base PC board. The transformer reduces the voltage and current flows back to the rotational base PC board, then to the main PC board thru two separate windings (four wires).



Main System Transformer - continued
[The black & white wires supply 48-54 VAC to power circuitry for the Base & Back actuators only]

[The red & orange wires supply 34-37 VAC to power circuitry for the Tilt actuator, foot control, touch pads, power light, all limit switches, and position sensors].

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

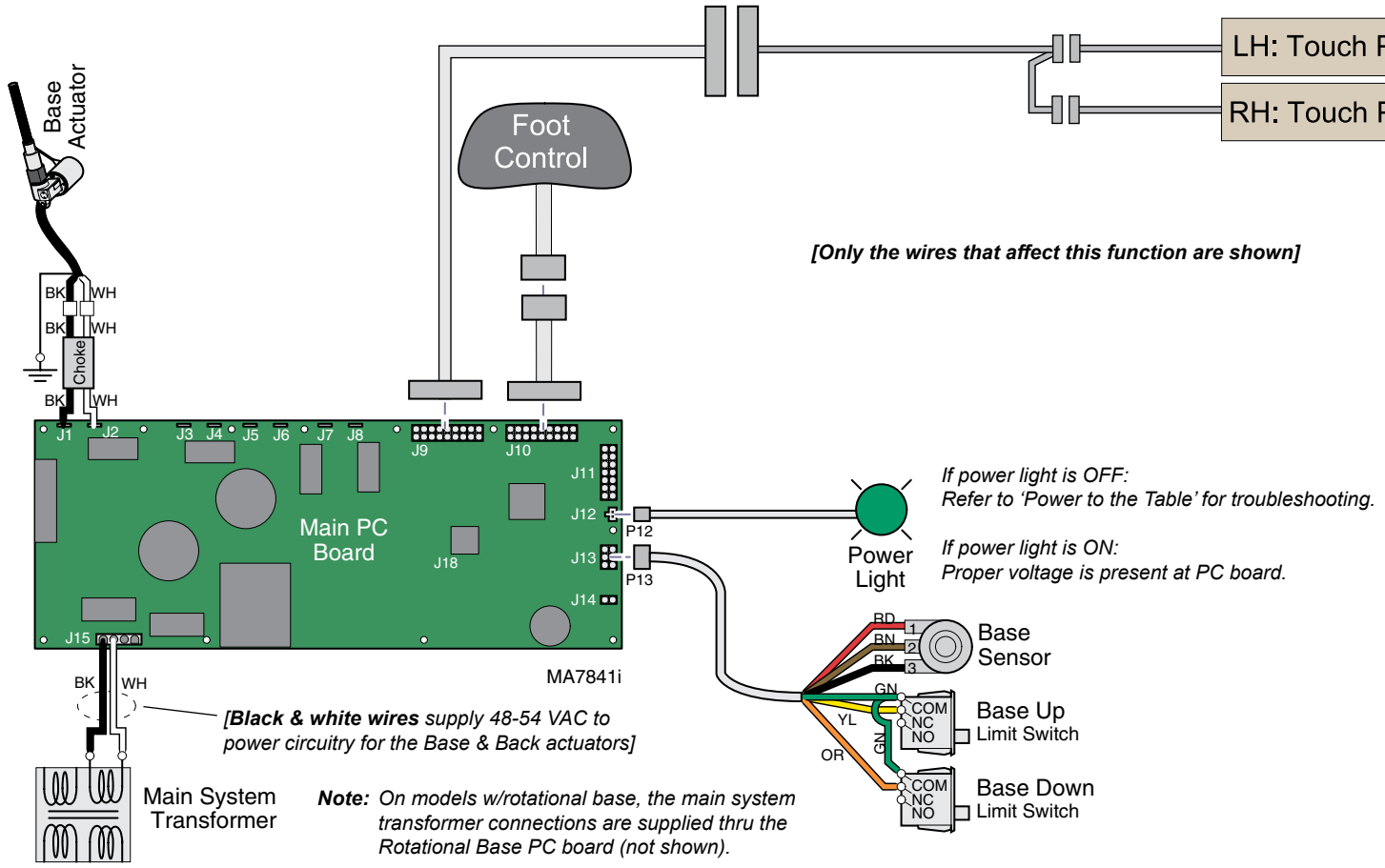
Main PC Board
Circuitry on the PC board provides the required voltage to power all of the table's components: foot control, actuators, limit switches, and position sensors.

Foot Control / Touch Pads
Circuitry on the main PC board supplies 8-10 VAC to the foot control & touch pads.

Models:	***647***	
Serial Numbers:	*all*	

Base UP / DOWN Function

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



Models:	647	
Serial Numbers:	all	

Base 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' (page A-2) for description of current flow to the PC board].

Power to Foot Control / Touch Pads
Circuitry on the PC board supplies 8-10 VAC to the foot control & touch pads.

Base Up Operation
When the Base Up function is activated, current flows thru the foot control / touch pads to the main PC board. Circuitry on the main PC board supplies approximately 48 VDC to the base actuator motor.

The actuator motor runs and raises the table.

Note
The main PC board continuously monitors the base up limit switch and the base position sensor.

If the base up limit switch is tripped (open), the Base Up function will not operate.

If the base position sensor detects that that table has reached its upper limit, the Base Up function will not operate.

Actuator motor runs until:
1. Foot control / touch pad button is released.
2. Base Up limit switch is tripped.
3. Emergency Stop button is pressed.
4. Position sensor detects upper limit.
5. Overcurrent protection tripped
6. Software timeout is reached (25 seconds).

Base Down Operation
When the Base Down function is activated, current flows thru the foot control / touch pads to the main PC board. Circuitry on the main PC board supplies approximately 48 VDC to the base actuator motor.

The actuator motor runs and lowers the table.

Note
The main PC board continuously monitors the base down limit switch and the base position sensor.

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

If the base position sensor detects that the table is in a potential "crash position", or that the base has reached its lower limit, the Base Down function will not operate.*

Actuator motor runs until:
1. Foot control / touch pad button is released.
2. Base Down limit switch is tripped.
3. Crash Avoidance System activated*.
4. Emergency Stop button is pressed.
5. Position sensor detects lower limit.
6. Overcurrent protection tripped
7. Software timeout is reached (25 seconds).

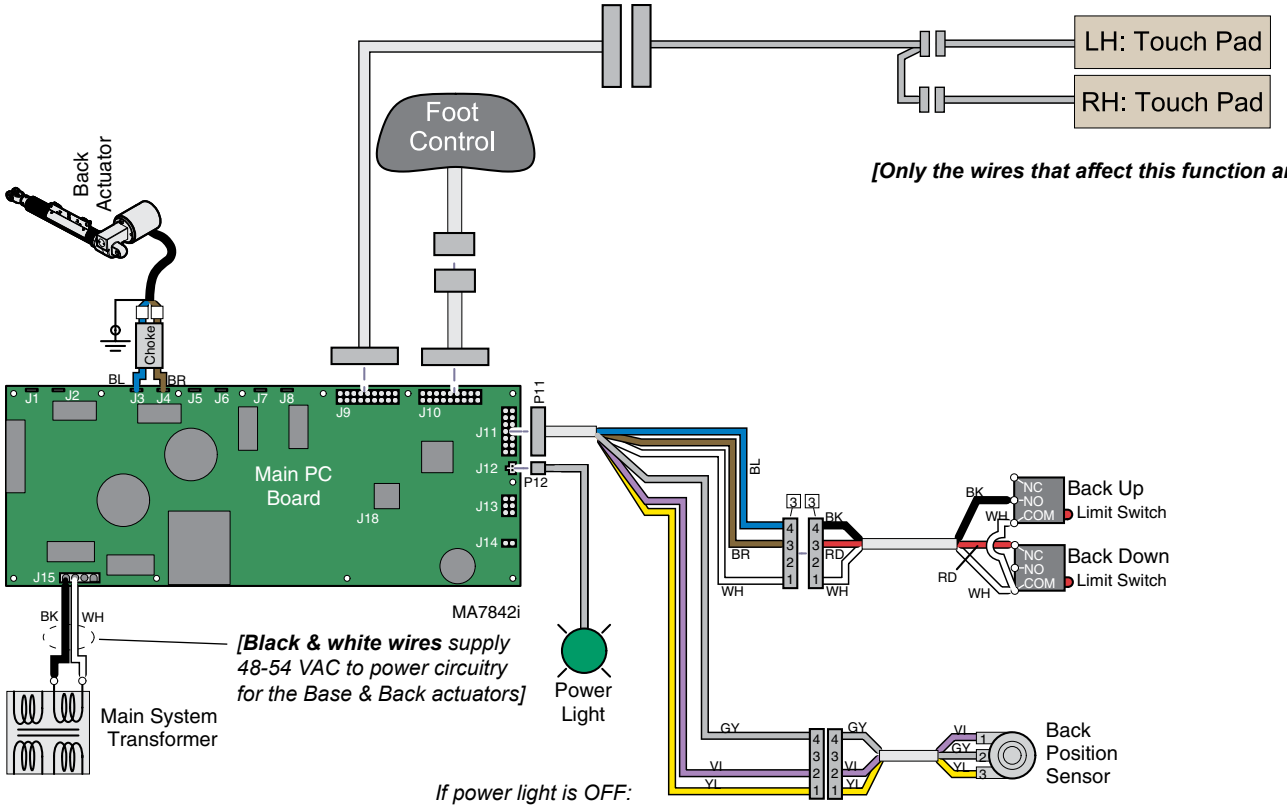
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Back UP / DOWN Function

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



[Only the wires that affect this function are shown]

Note: *On models w/rotational base, the main system transformer connections are supplied thru the Rotational Base PC board (not shown).*

If power light is OFF:
Refer to 'Power to the Table' for troubleshooting.

If power light is ON:
Proper voltage is present at PC board.

Models:	647	
Serial Numbers:	all	

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' (page A-2) for description of current flow to the PC board].

Power to Foot Control / Touch Pads
Circuitry on the PC board supplies 8-10 VAC to the foot control & touch pads.

Back Up Operation
When the Back Up function is activated, current flows thru the foot control / touch pads 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 and the back position sensor.

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

If the back position sensor detects that the back has reached its upper limit, 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. Emergency Stop button is pressed.
4. Position sensor detects upper limit.
5. Overcurrent protection tripped
6. Software timeout is reached (30 seconds).

Back Down Operation
When the Back Down function is activated, current flows thru the foot control / touch pads 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 and the back position sensor.

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

If the back position sensor detects that the table is in a potential "crash position", or that the back section has reached its lower limit, 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. Crash Avoidance System activated*.
4. Emergency Stop button is pressed.
5. Position sensor detects lower limit.
6. Overcurrent protection tripped
7. Software timeout is reached (30 seconds).

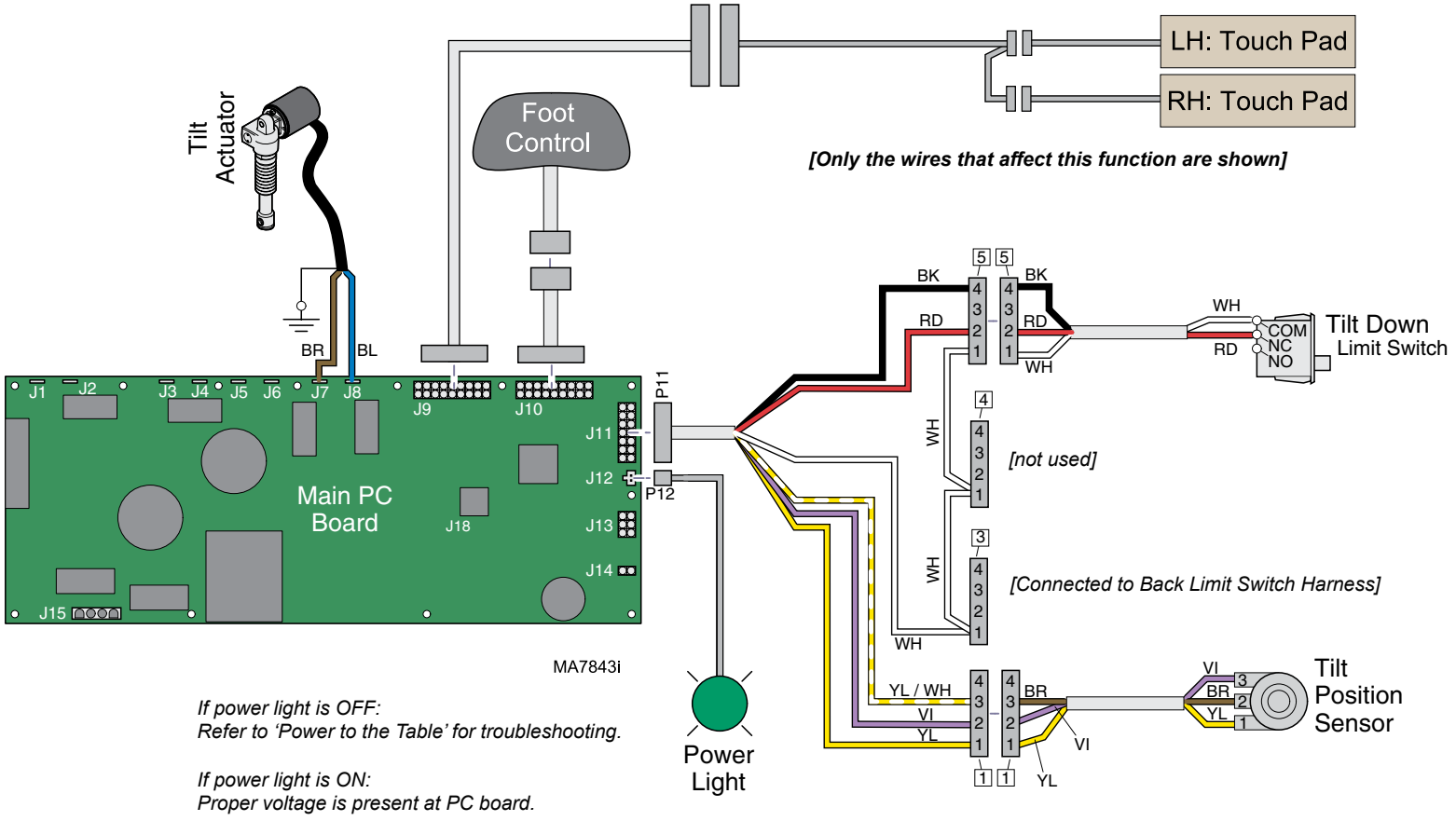
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Tilt UP / DOWN Function

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



Models:	647	
Serial Numbers:	all	

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' (page A-2) for description of current flow to the PC board].

Power to Foot Control / Touch Pads
Circuitry on the PC board supplies 8-10 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 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 raises the seat section.

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

When the tilt position sensor detects that the seat section has reached its upper limit, or that the table is in a potential "crash position", the Tilt Up function will not operate.*

Actuator motor runs until:
1. Foot control / touch pad button is released.
2. Crash Avoidance System activated*.
3. Emergency Stop button is pressed.
4. Position sensor detects upper limit.
5. Overcurrent protection tripped
6. Software timeout is reached (30 seconds).

Tilt Down Operation
When the Tilt Down function is activated, current flows thru the foot control / touch pad 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 back to a flat position.

Note
The main PC board continuously monitors the tilt down limit switch and the tilt position sensor.

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

If the tilt position sensor detects that the table is in a potential "crash position", or that the seat section has reached its lower limit, the Tilt Down function will not operate.*

Actuator motor runs until:
1. Foot control / touch pad button is released.
2. Tilt Down limit switch is tripped.
3. Crash Avoidance System activated*.
4. Emergency Stop button is pressed.
5. Position sensor detects lower limit.
6. Overcurrent protection tripped
7. Software timeout is reached (30 seconds).

Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Crash Avoidance System

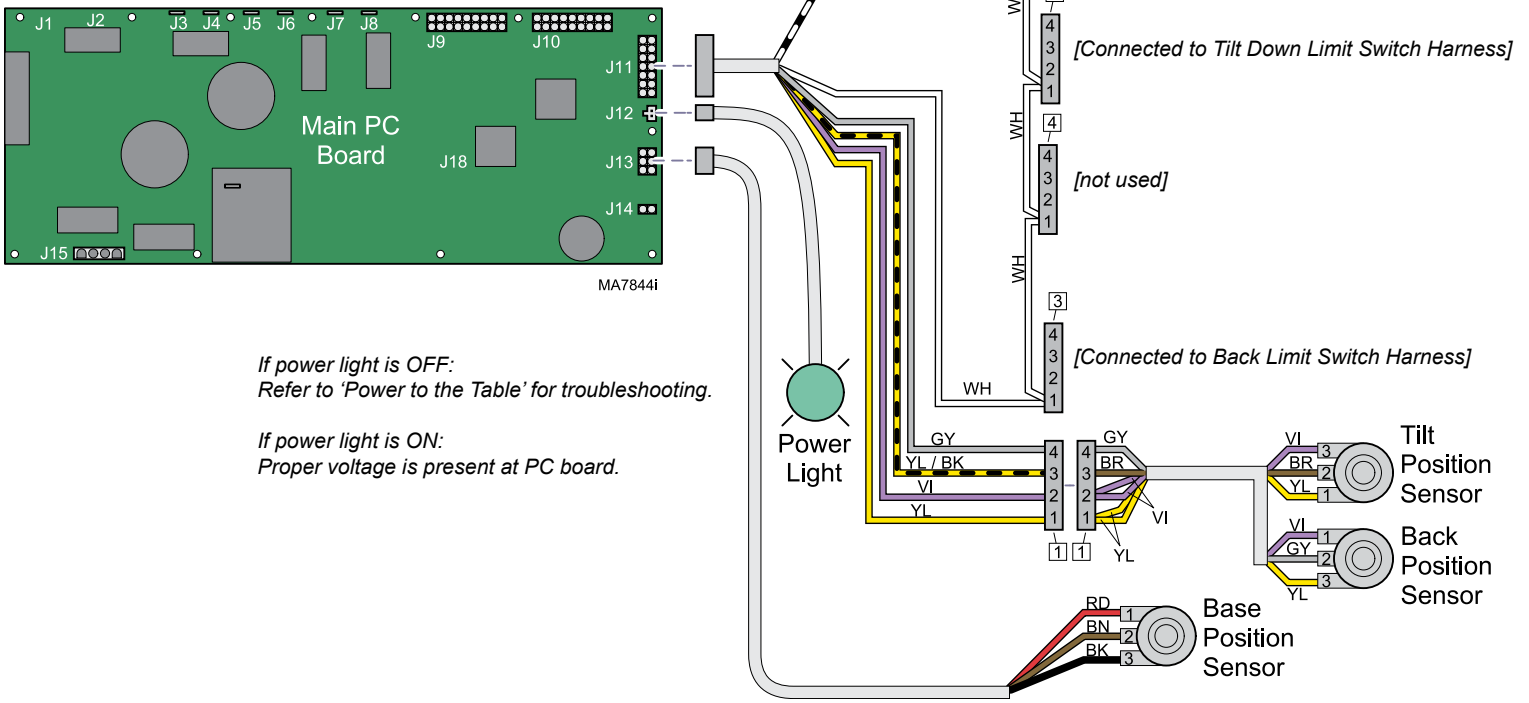
Multiple functions are inoperable (chair "beeps") A-7

The Crash Avoidance System prevents damage to the table by disabling certain functions if a potential crash position is detected.

This illustration shows only the components that are monitored by the Crash Avoidance System.
Refer to the following page for a detailed description of "crash position" and how the system functions.

[Only the wires that affect this function are shown]

If actuator(s) are not working properly, refer to that section for troublshooting (ex. Base Up / Down).



If power light is OFF:
Refer to 'Power to the Table' for troubleshooting.

If power light is ON:
Proper voltage is present at PC board.

Models:	647	
Serial Numbers:	all	

Crash Avoidance System

When are functions disabled?
The main PC board continuously monitors the three position sensors, as well as the foot extension switch.

Based on the position sensor readings, circuitry on the main PC board estimates the position of the back section. If the estimated position indicates a potential collision with the floor, the Base Down, Tilt Up, and/or Back Down functions are disabled.

If the foot extension switch is tripped* *(open)*, the Base Down and Tilt Down functions will be disabled.
[The foot extension switch is tripped when upward pressure is applied to the foot section].*

When are functions restored?
Functionality is restored when one or more of the axis are moved out of the potential crash position, and / or when the foot extension switch is no longer tripped *(closed)*.

What is "Crash Position"?
The table is considered to be in a potential crash position when:

A. The Base, Back, and Tilt position sensors indicate that the back section is approximately x in (xx cm) from the floor.

B. The foot extension switch is tripped *(open)*. *[This is designed to prevent damage due to objects being trapped under the foot section]*.

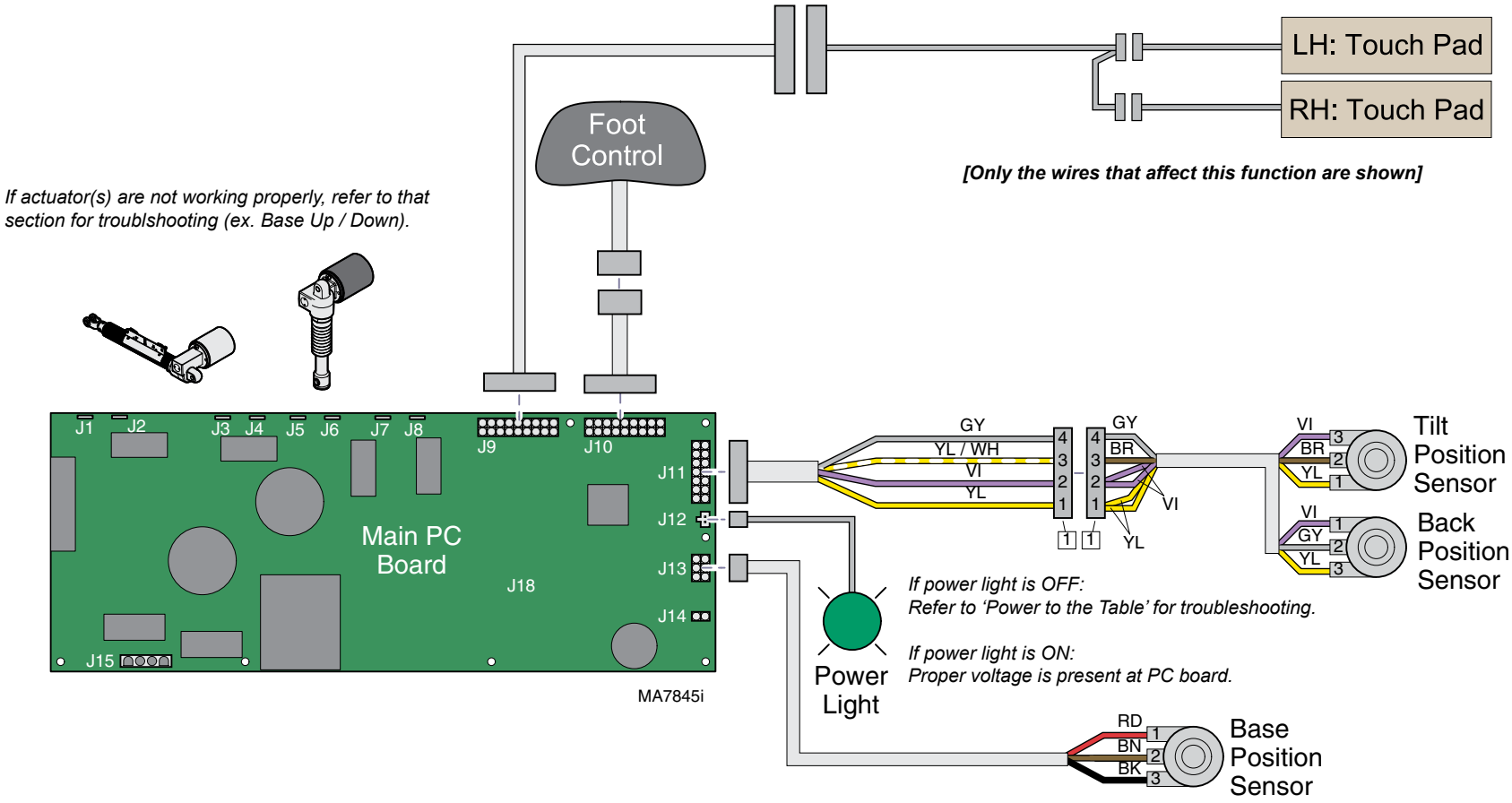
Models:	***647***	
Serial Numbers:	*all*	

Position Programming

The programming feature allows the user to store up to three frequently used table positions.

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

[Positions cannot be programmed.....A-7]
When position button (1, 2, or 3) is pressed:
[Chair does not move .....A-7]
[Chair moves to wrong position .....A-7]



Models:	647	
Serial Numbers:	all	

Position Programming

When are functions disabled?
The three position sensors continuously monitor the position of each axis (Base, Back, & Tilt). This information is transmitted to the PC board.

When a table position is properly programmed into the PC board's memory, the position of each axis is recorded based on the readings from the position sensors.

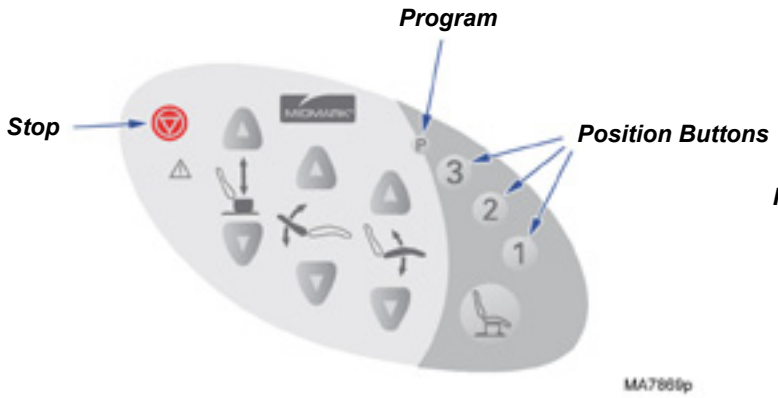
Recalling a programmed position
When a programmed position is recalled, the PC board activates the required functions *(all at the same time)* until the readings from the position sensors match those of the recorded position.

To program a table position...
A) Move the table to desired position.
B) Press the Program button (one "beep").
C) Press the desired Position button (1, 2, or 3). (three "beeps")

Tip: You must press the desired Position button within five seconds of pressing the Program button.

To recall a table position...
Press the desired Position button (1, 2, or 3) momentarily.

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

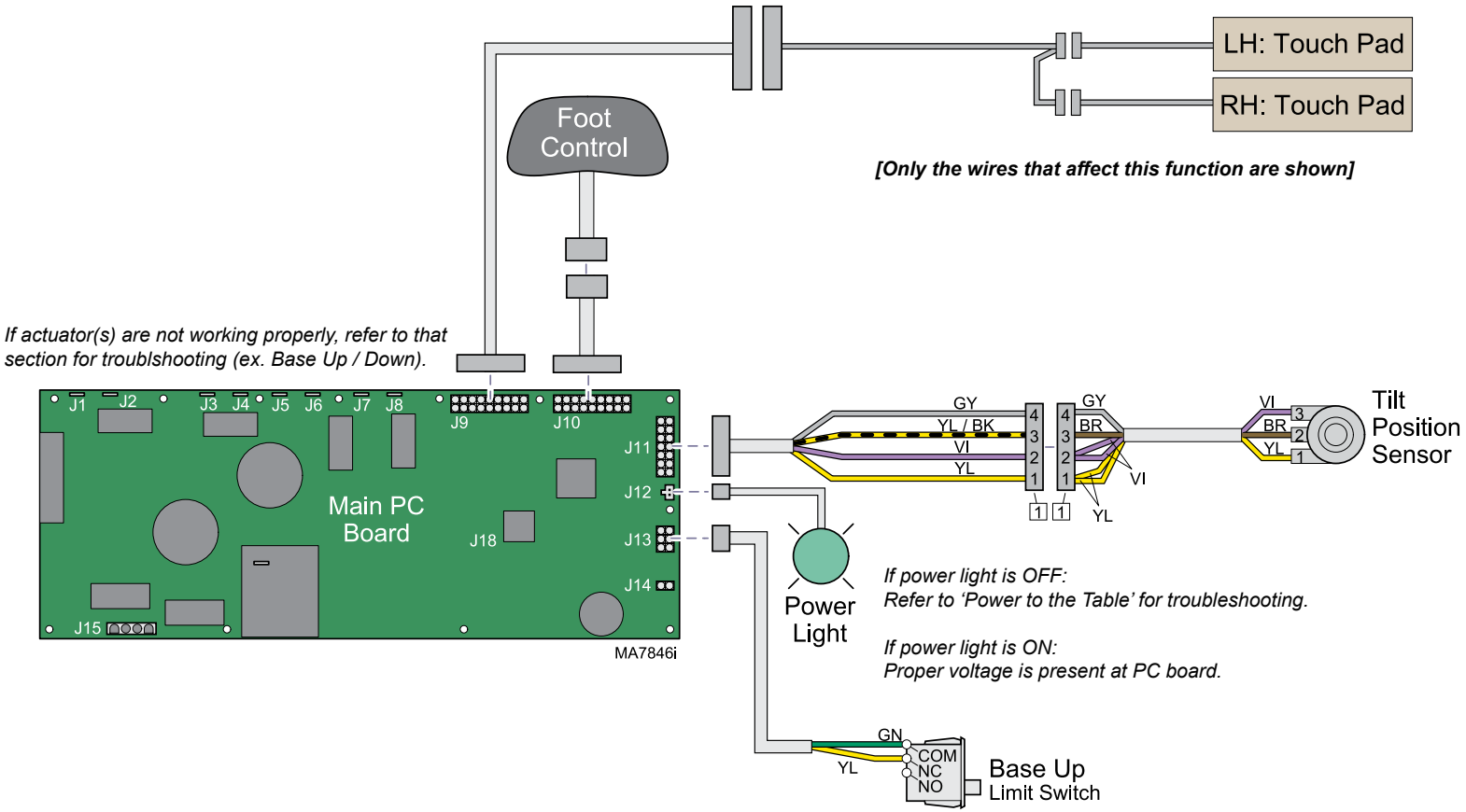


Models:	647	
Serial Numbers:	all	

QuickExam Function

This function activates the Base Up & Tilt Up functions simultaneously to move the table into “exam position”.

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



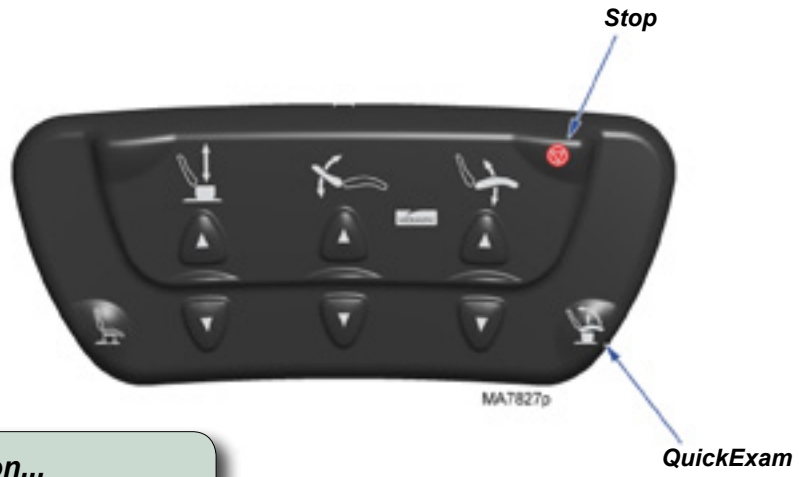
Models:	647	
Serial Numbers:	all	

QuickExam Function

What is "Exam Position"?
Base: *all the way up*
Tilt: *all the way up*
Back: *any position*

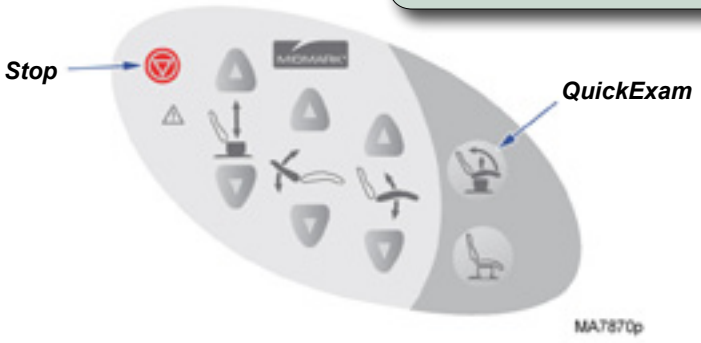
How it works...
When the QuickExam button is presssed & held,
the PC board activates the following functions:

Function	*Runs until...*
Base Up	Base Up limit switch is tripped
Tilt Up	Tilt position sensor indicates seat is all the way up



To activate the QuickExam function...
A) Press & hold the QuickExam button.
B) Release button when table reaches desired position.

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

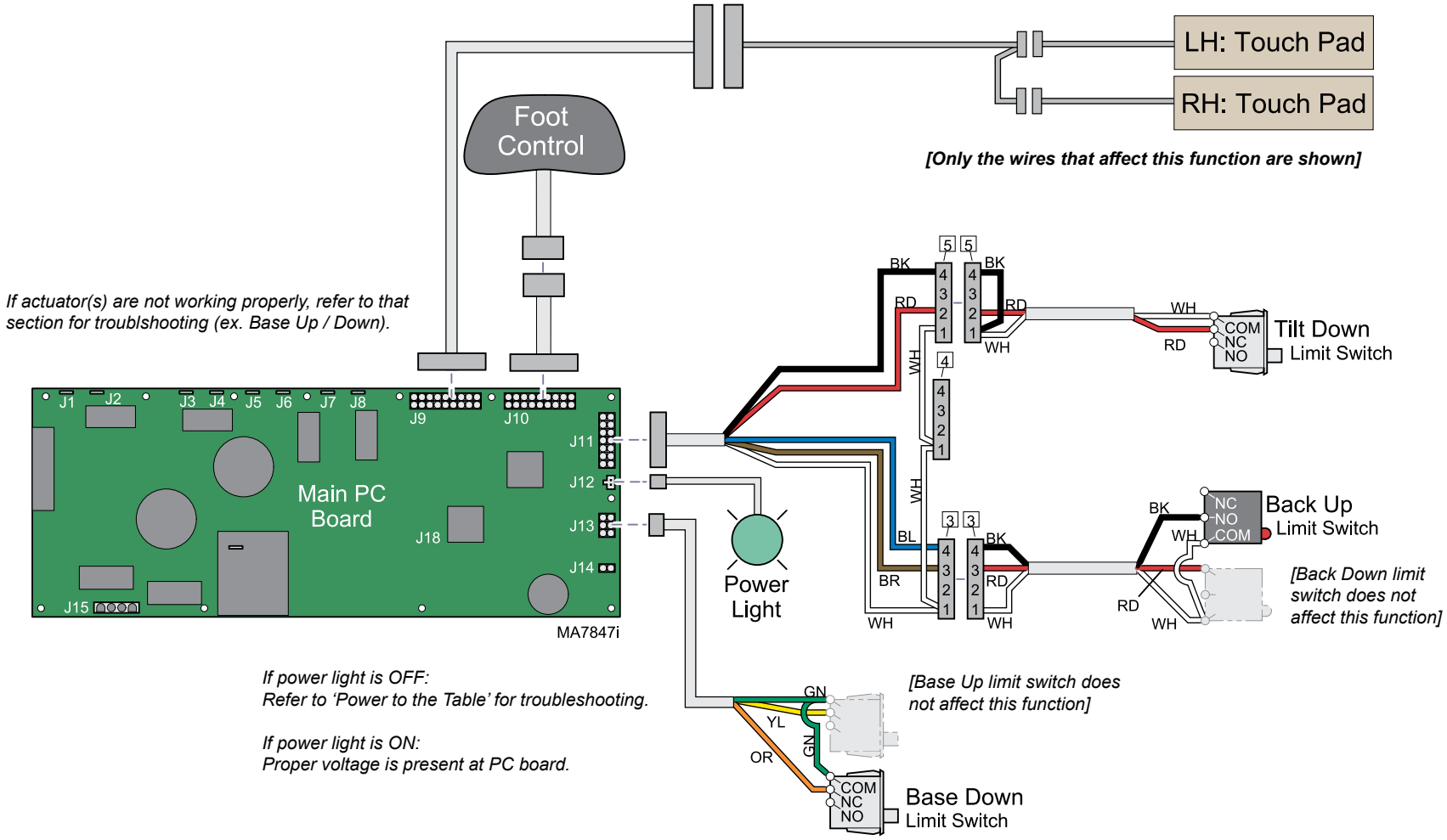


Models:	***647***	
Serial Numbers:	*all*	

QuickChair Function

This function activates the Base Down, 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:	647	
Serial Numbers:	all	

QuickChair Function

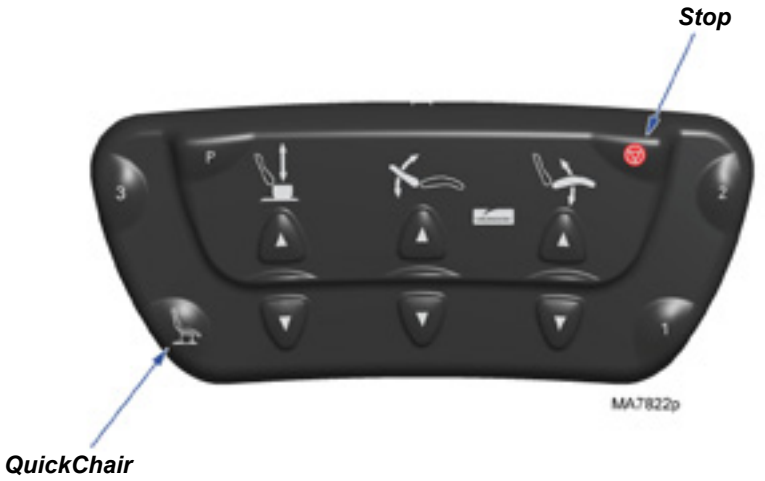
What is "Chair Position"?

Base: *all the way down*
Tilt: *all the way down*
Back: *all the way up*

How it works...

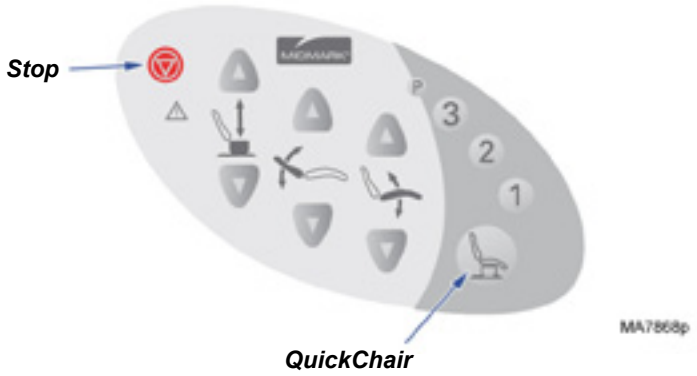
When the QuickChair button is presssed & held, the PC board activates the following functions:

Function	*Runs until...*
Base Down	Base Down limit switch is tripped
Tilt Down	Tilt Down limit switch is tripped
Back Up	Back Up limit swittch is tripped



To activate the QuickChair function...
Press & release the QuickChair button.

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



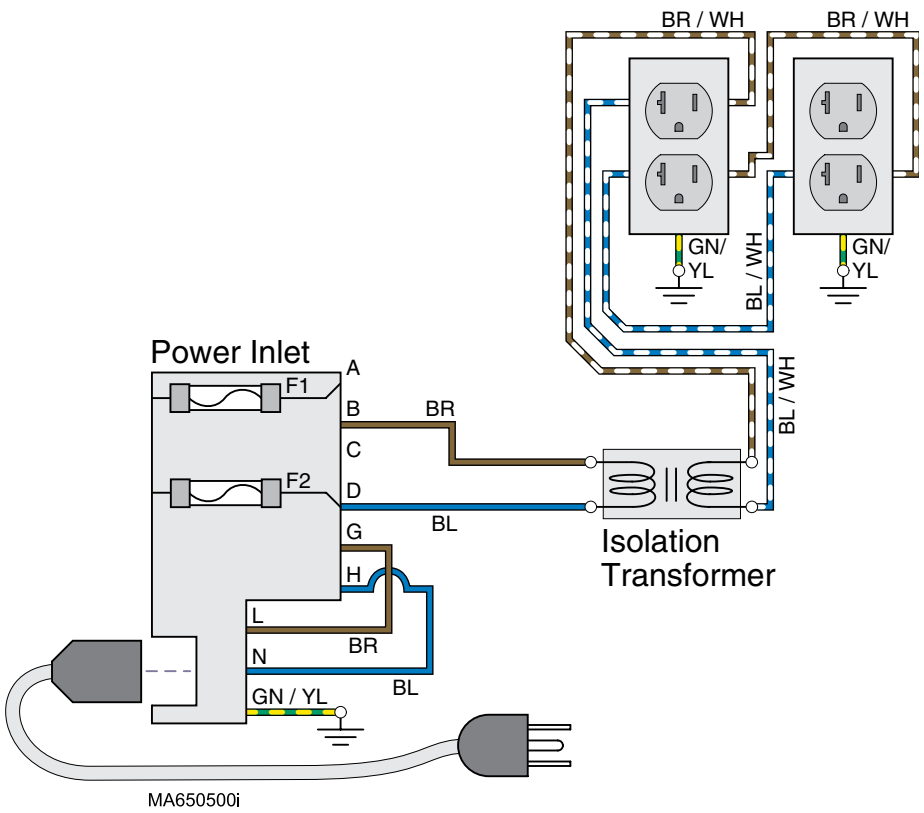
Models:	***647***	
Serial Numbers:	*all*	

Chair Receptacles

No power at chair receptacles.....A-9

This illustration shows only the components that affect the chair receptacles.
A detailed description of current flow also appears below.

[Only the wires that affect this function are shown]



Facility Supply Voltage

With the power cord properly connected, facility supply voltage *(115 VAC)* is supplied to the power inlet.

Power Inlet

Current flows thru two fuses in the power inlet, to the isolation transformer.

Isolation Transformer

Note

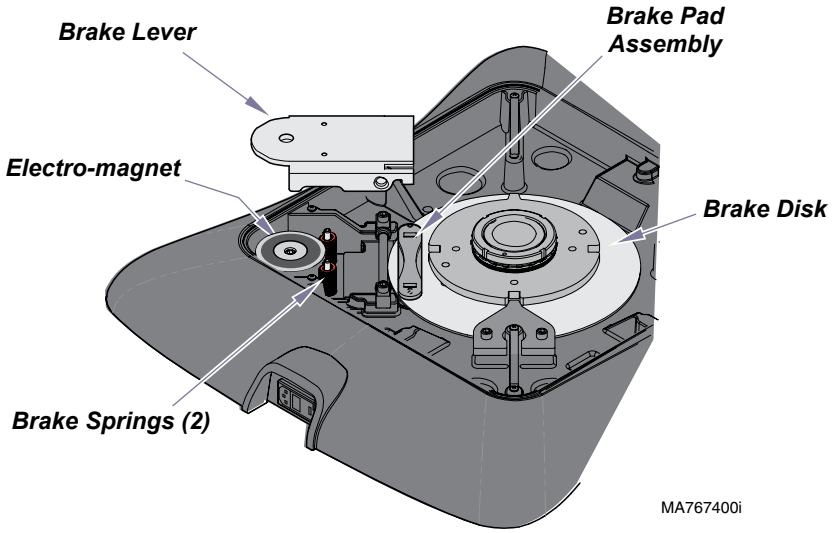
The isolation transformer separates the receptacles from the rest of the table's electrical system. This transformer is protected from overload by a thermal cutout feature. It will automatically reset when the transformer cools.

The isolation transformer provides 115 VAC to each of the table receptacles.

Models:	***647***
Serial Numbers:	*all*

Rotational Base Brake System

This illustration shows only the components that affect the Rotational Base Brake System.
A detailed description of current flow also appears below.



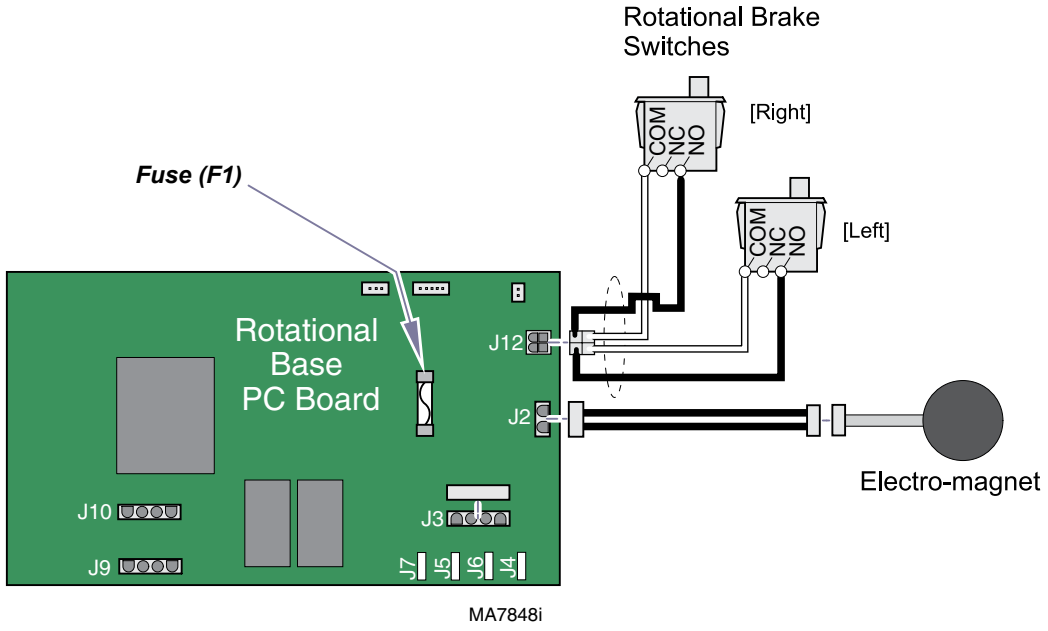
Base Rotation UNLOCKED
The rotational base PC board supplies 31-36 VAC to the two normally closed brake switches. When either brake pedal is pressed & released, the corresponding brake switch opens. When the open switch is detected, the PC board supplies approx. 15-20 VAC to the electro-magnet thru the F1 fuse.

When voltage is applied to the electro-magnet, the magnet's pull overpowers the brake springs. This removes pressure from the brake pad assembly allowing the brake disk to rotate.

To lock base rotation:
Press & release either brake pedal.
[Note: Base automatically locks after two minutes]

Base Rotation LOCKED
The two brake springs press upward on the brake lever. This pivots the brake lever so that pressure is applied to the brake pad assembly. This prevents the brake disk from rotating.

To unlock base rotation:
Press & release either brake pedal.



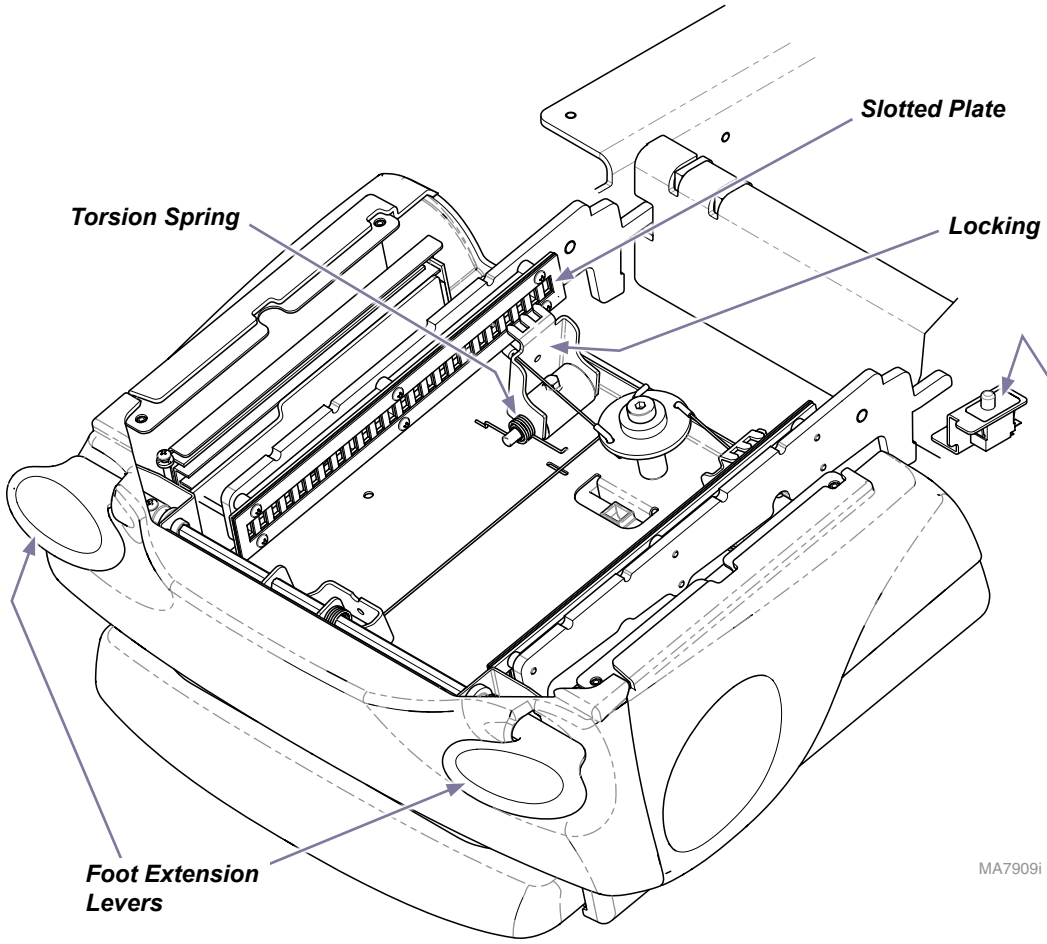
Models:	647	
Serial Numbers:	all	

Always verify model & serial number

Foot Extension

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

Foot extension will not lock in place / release *A-9*



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

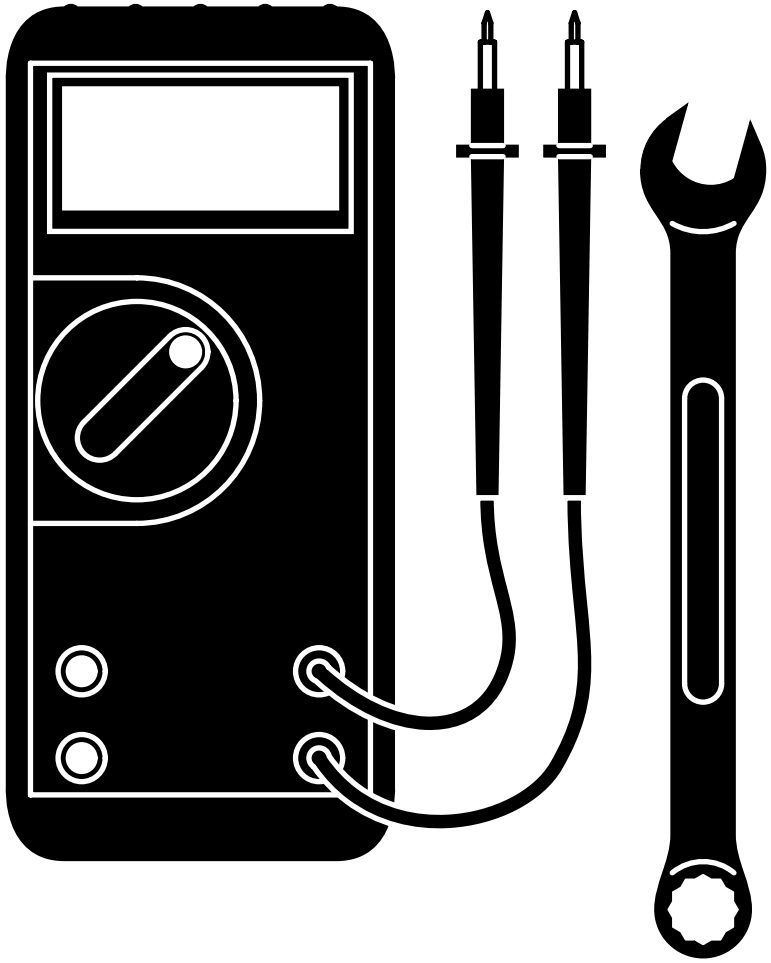
The foot extension "crash" limit switch disables the *Base Down* and *Tilt Down* functions when it is tripped. The switch is tripped when pressure is applied to the bottom of the foot extension due to contact with an object.

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

Models:	647	
Serial Numbers:	all	

Section B

Testing & Adjustments



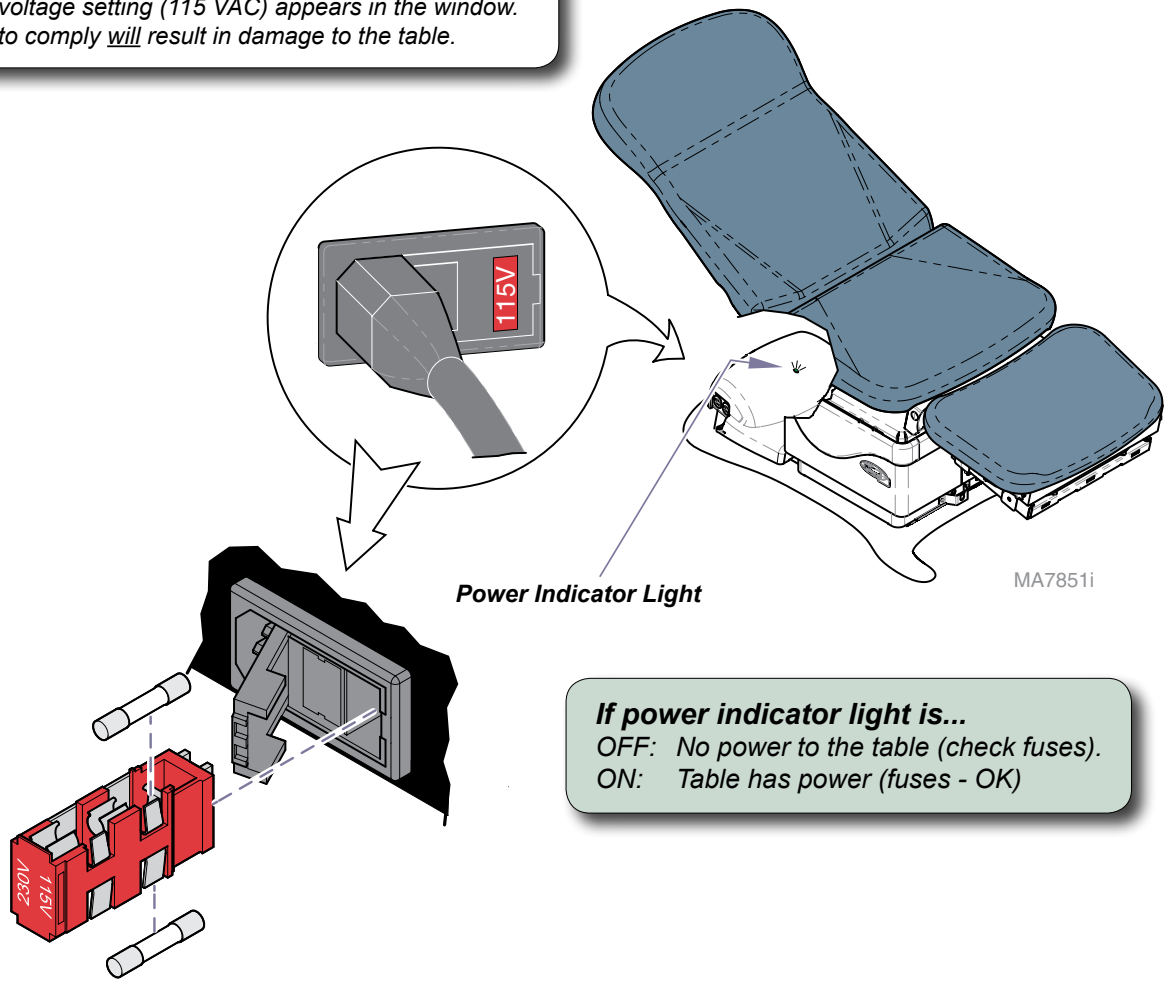
Primary Fuses

Replacement

Wiring Diagrams D-1

Part Number 015-0346-00
Fuse Rating 6.3A, 250V
Type T, 5 x 20 mm

Equipment Alert
When replacing fuses, rotate fuse holder so that the correct voltage setting (115 VAC) appears in the window. Failure to comply will result in damage to the table.



If power indicator light is...
OFF: No power to the table (check fuses).
ON: Table has power (fuses - OK)

Models:	647	
Serial Numbers:	all	

Always verify model & serial number

Foot Control / Touch Pads

Wiring Diagrams.....D-1

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 (J10).

If function(s) still inoperable:
*C) Perform the **Foot Control / Touch Pad Test**.*

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

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

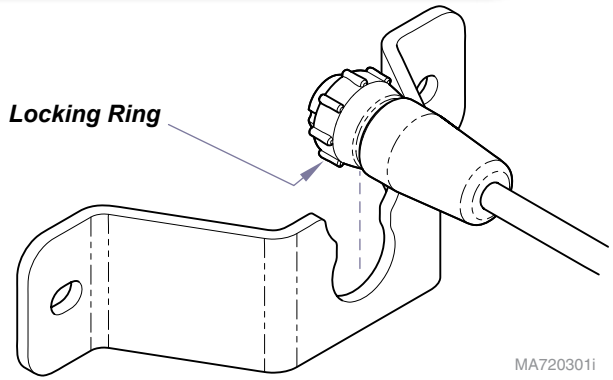
If function(s) still inoperable:
*B) Perform the **Foot Control / Touch Pad Test**.*

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 connection to PC board (J9).

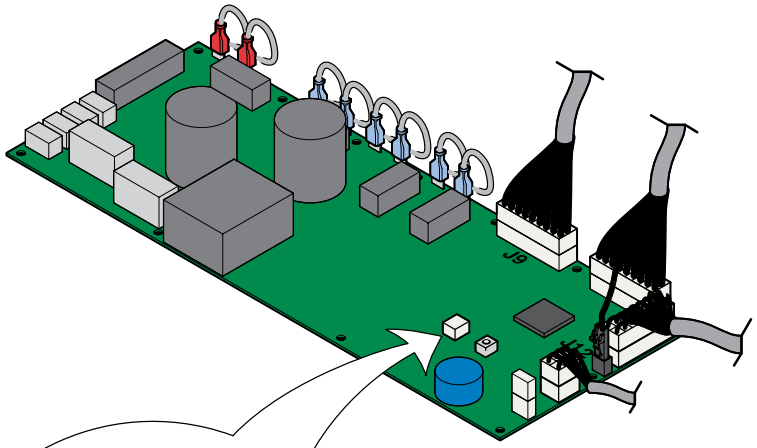
If function(s) still inoperable:
*D) Perform the **Foot Control / Touch Pad Test**.*

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

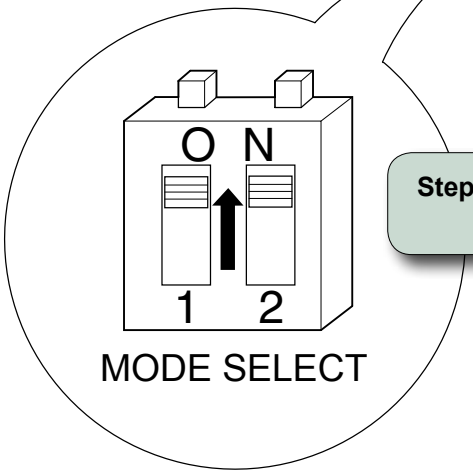


Models:	647	
Serial Numbers:	all	

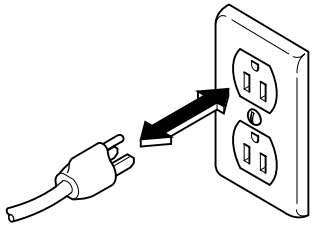
Foot Control / Touch Pad Test



MA653000i



Step 1: Move both switches on the *Mode Select* block to ON.



Step 2: Unplug table *(to reset PC board)*. Plug table back in.

Step 3: One at a time, press & hold each button on the foot control / touch pad.

Do you hear "beeps" each time a button is pressed?
*If **YES**, that button is functioning properly.*
*If **NO**, perform the appropriate Control Cord Test.*

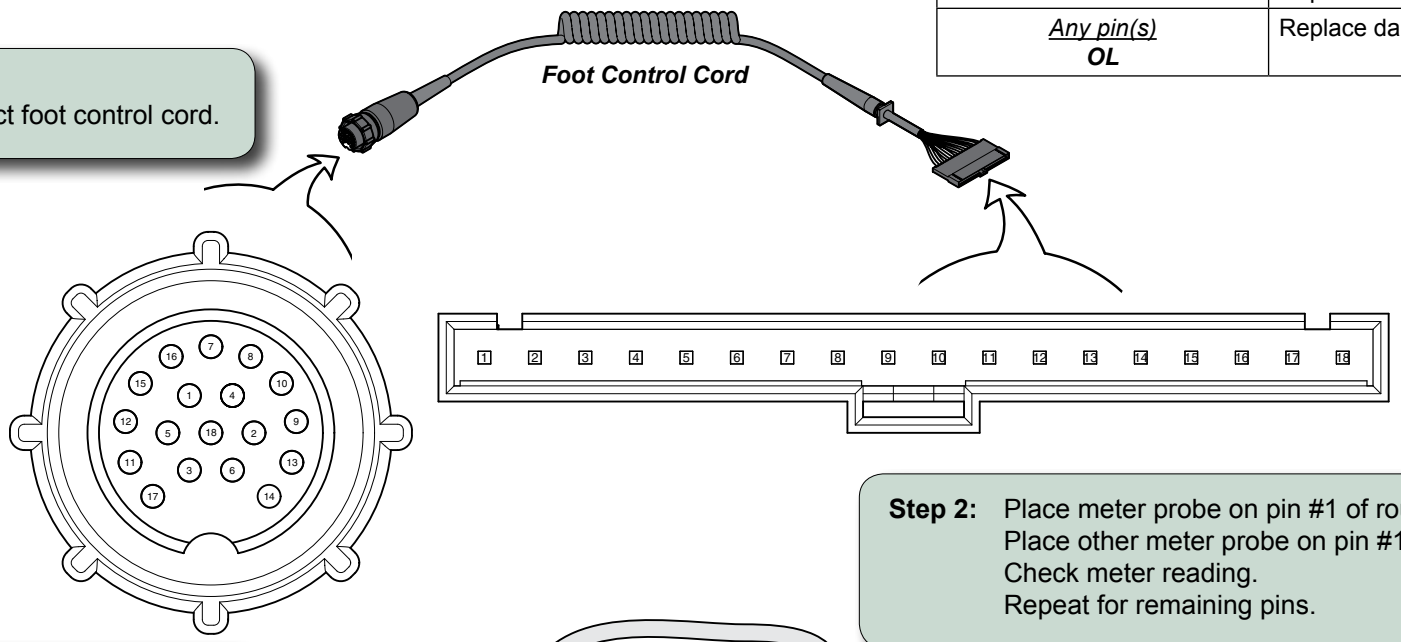
Models:	***647***	
Serial Numbers:	*all*	

Foot Control / Touch Pads *- continued*

Foot Control Cord Test

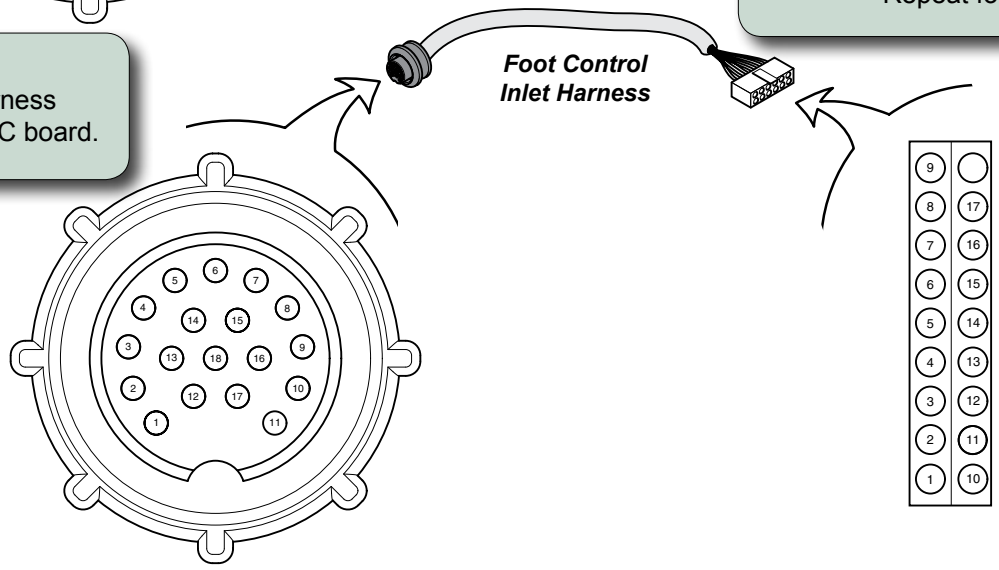
Meter Reading	*Required Action*
All pin(s) **less than 100 ohms**	Cord - OK. Replace foot control touch pad.
Any pin(s) **OL**	Replace damaged cord

Foot Control Cord
Step 1: Disconnect foot control 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.

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

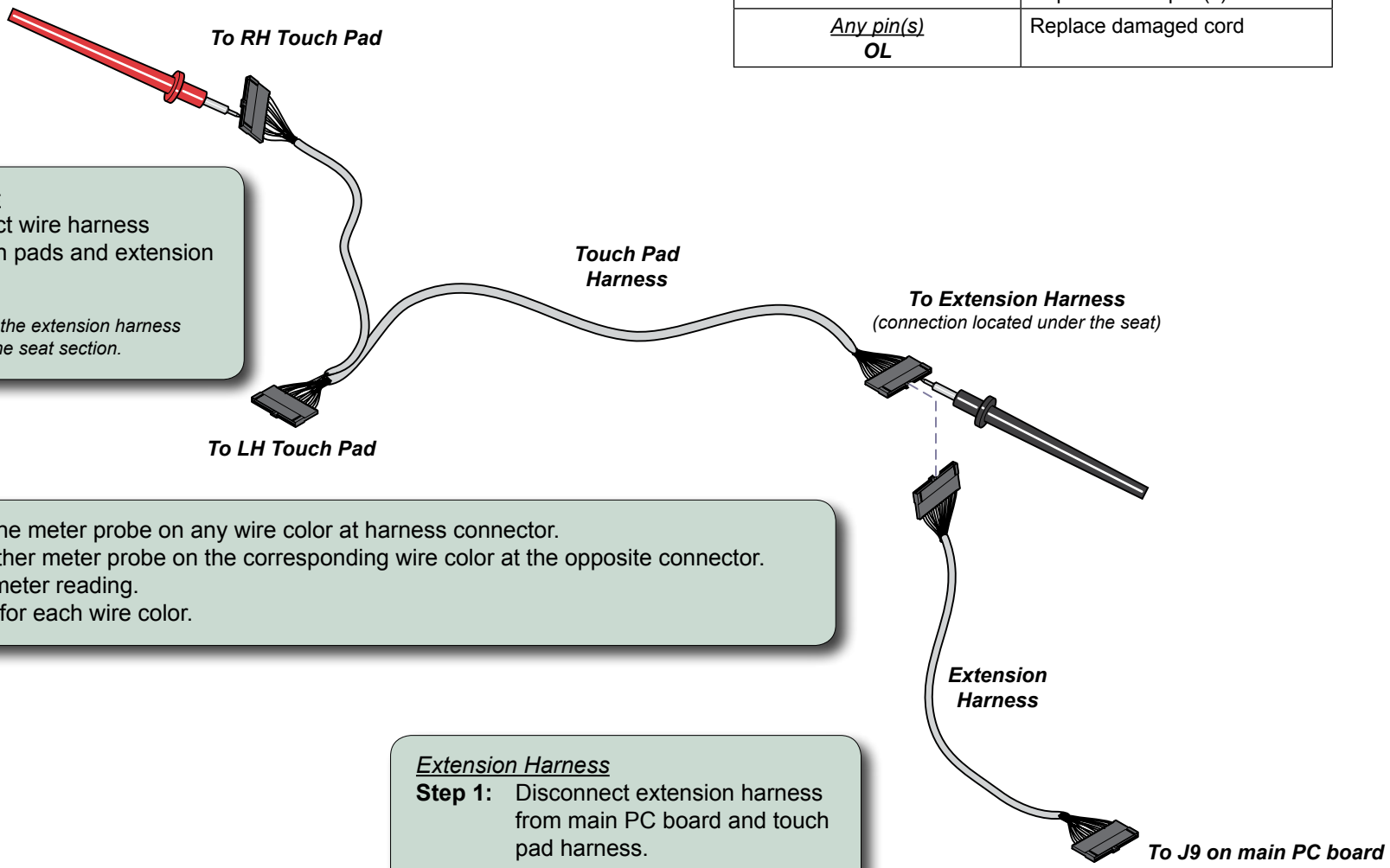


MA7878i

Models:	***647***	
Serial Numbers:	*all*	

Touch Pad Harness / Extension Harness Test

Meter Reading	*Required Action*
All pin(s) **less than 100 ohms**	Cord - OK. Replace touch pad(s).
Any pin(s) **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.

Models:	***647***	
Serial Numbers:	*all*	

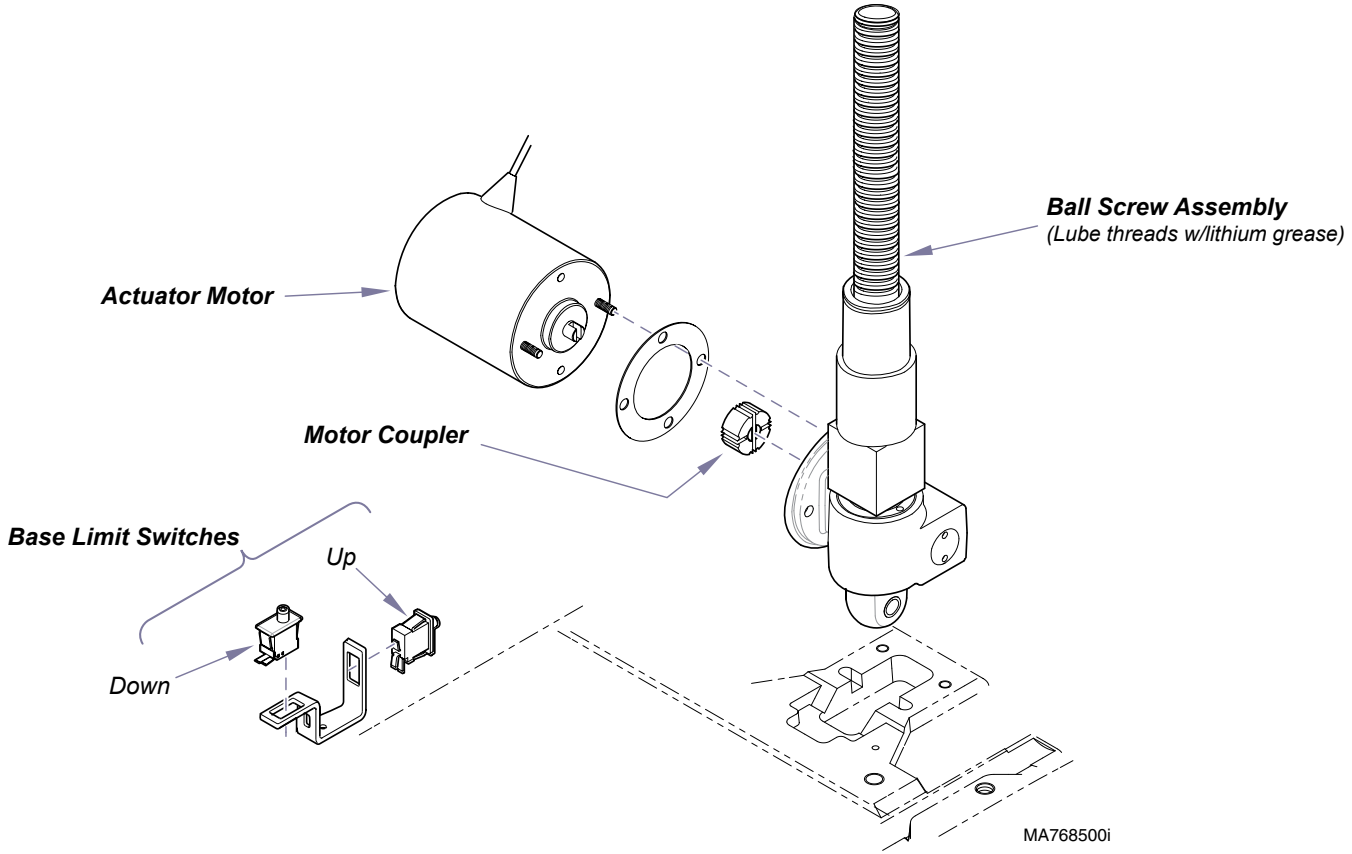
Base Actuator / Limit Switches

Isolating a Malfunction

This illustration shows the base limit switches and the three serviceable components of the base 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 / Harness Test***

www.Midmark.com:
Base Actuator / Motor Replacement *003-1739-00*



Models:	***647***	
Serial Numbers:	*all*	

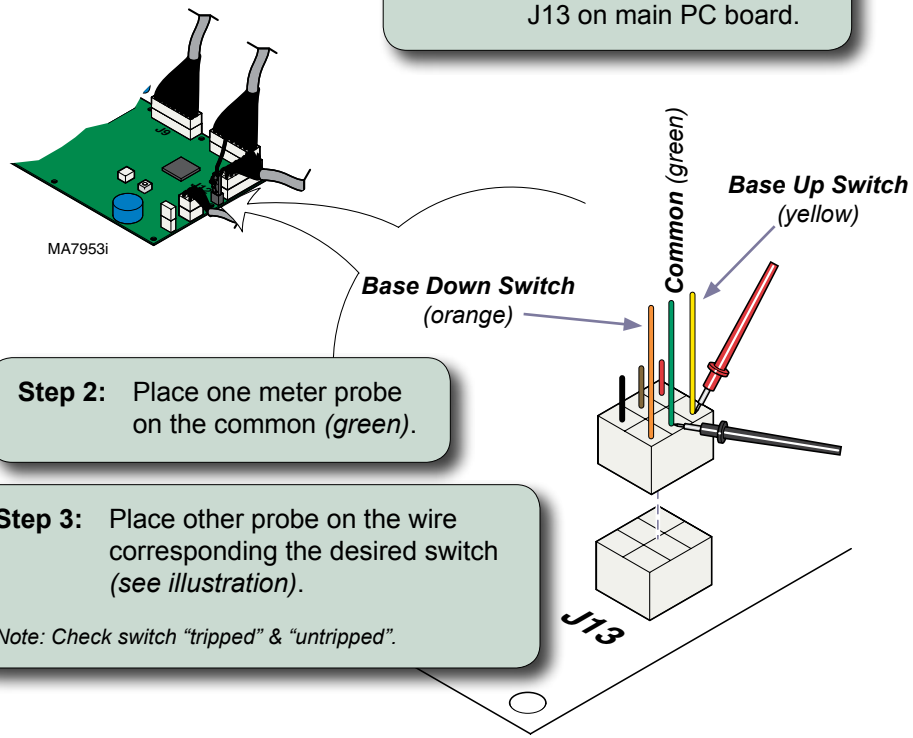
**** Replacement instructions are provided with the part. They are also available on midmark.com, or by clicking on the blue link.***

Always verify model & serial number

Base Actuator / Limit Switches *- continued*

Limit Switch / Harness Test

Step 1: Disconnect harness from J13 on main PC board.



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

Step 3: Place other probe on the wire corresponding the desired switch *(see illustration)*.

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

With switch "untripped"...

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

With switch "tripped"...

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

Limit Switch Continuity Test

Step 1: Disconnect wires from switch.

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

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

With switch "untripped"...

Meter Reading	***Required Action***
OL	Replace limit switch
less than 5 ohms	Limit switch - OK Replace limit switch harness.

With switch "tripped"...

Meter Reading	***Required Action***
OL	Limit switch - OK Replace limit switch harness.
less than 5 ohms	Replace limit switch

Models:	***647***	
Serial Numbers:	*all*	

 [Revised: dd/mo/yr]

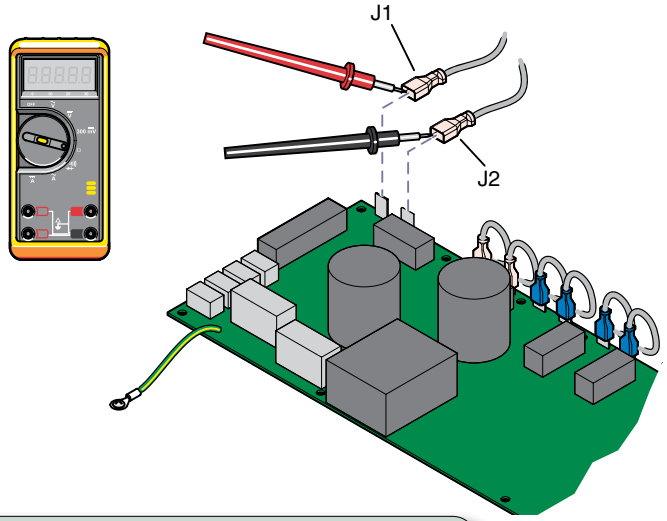
Always verify model & serial number

Base Actuator / Limit Switches *- continued*

www.Midmark.com:
Base Actuator / Motor Replacement 003-1739-00

Actuator Motor Test

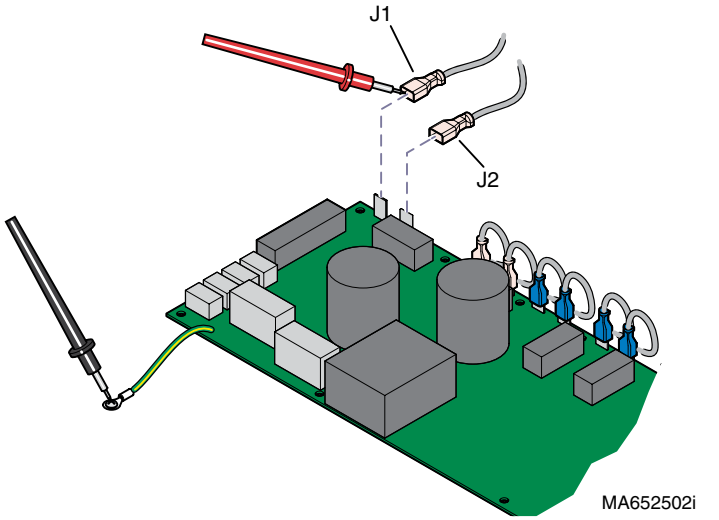
Step 1: Tag and disconnect base actuator wires *(J1 & J2)*.



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 5 ohms	Replace actuator motor*

Motor Ground Test



Step 1: Place one meter probe on actuator wire *(J1)*. Place other 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*

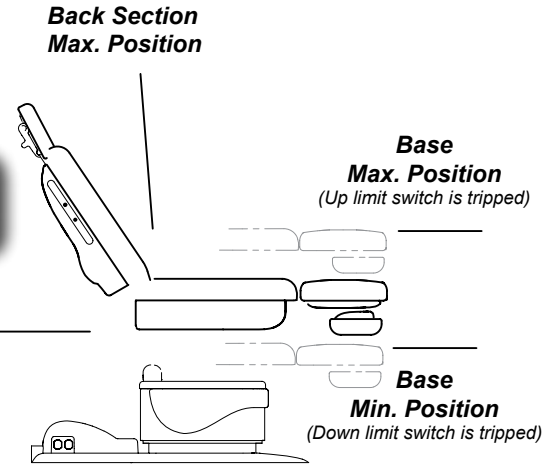
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

www.Midmark.com:
PC Board Replacement..... 003-1490-00

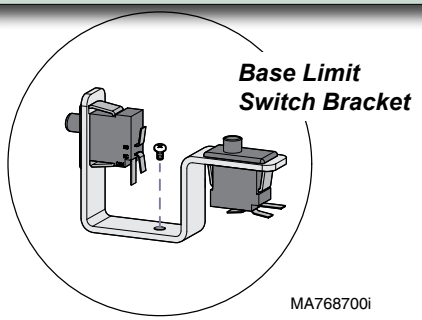
PC Board Test



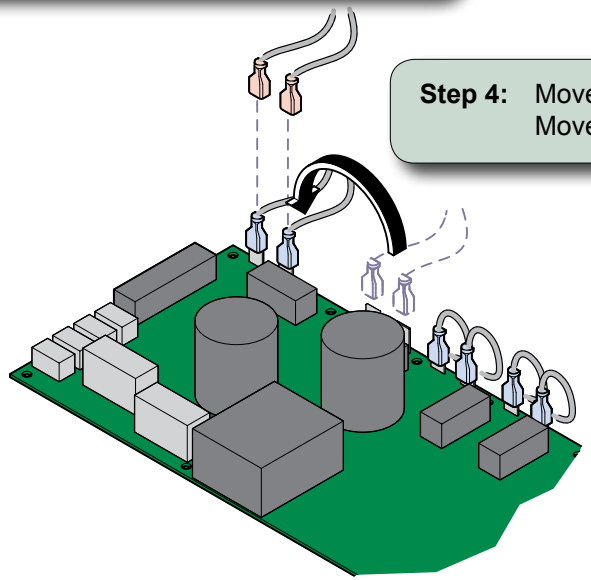
Step 1: Move BACK section so that it is approx. halfway between its maximum & minimum positions.

ATTENTION: *This test cannot be performed if either base limit switch is tripped.*

Step 3: If necessary, remove base limit switch bracket. Switch wires must remain connected.



Step 3: Tag, then disconnect base actuator wires from J1 & J2.



Step 4: Move wire from J3 to J1.
Move wire from J4 to J2.

Equipment Alert

The back limit switches will not stop movement during this test. ***Do not run past max / min positions.***

Step 5: Press & hold Base Up button for 5 seconds.

Does ***back section*** *move up briefly, then stop & 'beep'?*
If YES, go to Step 6.
If NO, replace PC board.*

Step 6: Press & hold Base Down button for 5 seconds.

Does ***back section*** *move down briefly, then stop & 'beep'?*
If YES, PC board is OK.
If NO, replace PC board.*

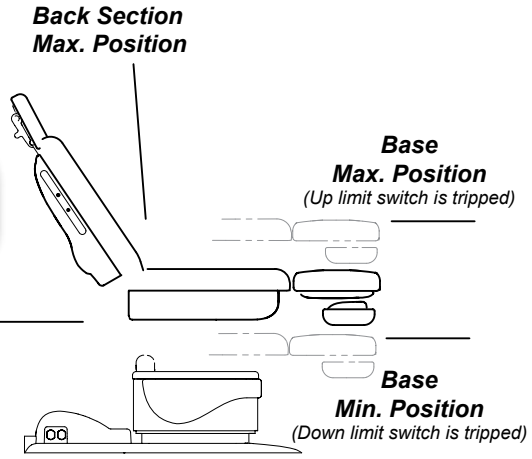
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

www.Midmark.com:
PC Board Replacement..... 003-1490-00

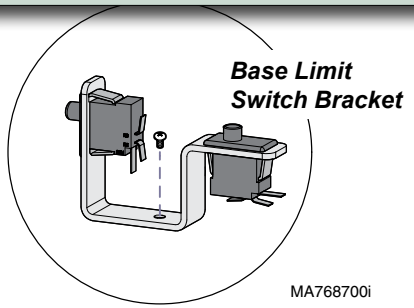
PC Board Test



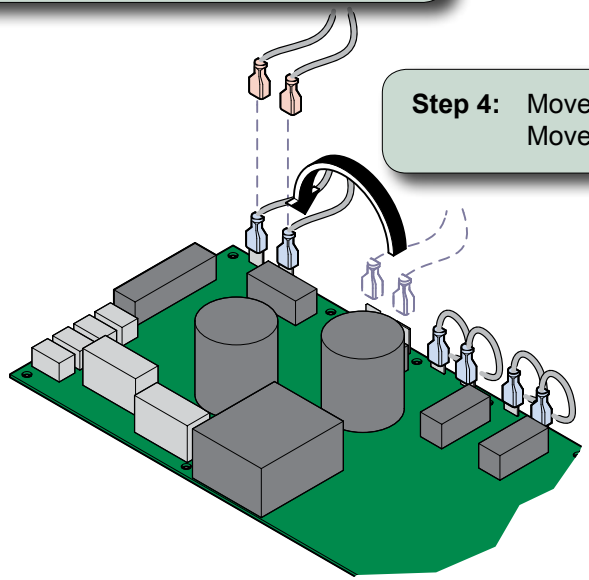
Step 1: Move BACK section so that it is approx. halfway between its maximum & minimum positions.

ATTENTION: *This test cannot be performed if either base limit switch is tripped.*

Step 3: If necessary, remove base limit switch bracket. Switch wires must remain connected.



Step 3: Tag, then disconnect base actuator wires from J1 & J2.



Step 4: Move wire from J3 to J1.
Move wire from J4 to J2.

Equipment Alert
The back limit switches will not stop movement during this test. ***Do not run past max / min positions.***

Step 5: Press & hold Base Up button for 5 seconds.

Does ***back section*** *move up briefly, then stop & 'beep'?*
If YES, go to Step 6.
If NO, replace PC board.*

Step 6: Press & hold Base Down button for 5 seconds.

Does ***back section*** *move down briefly, then stop & 'beep'?*
If YES, PC board is OK.
If NO, replace PC board.*

Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Back Actuator / Limit Switches

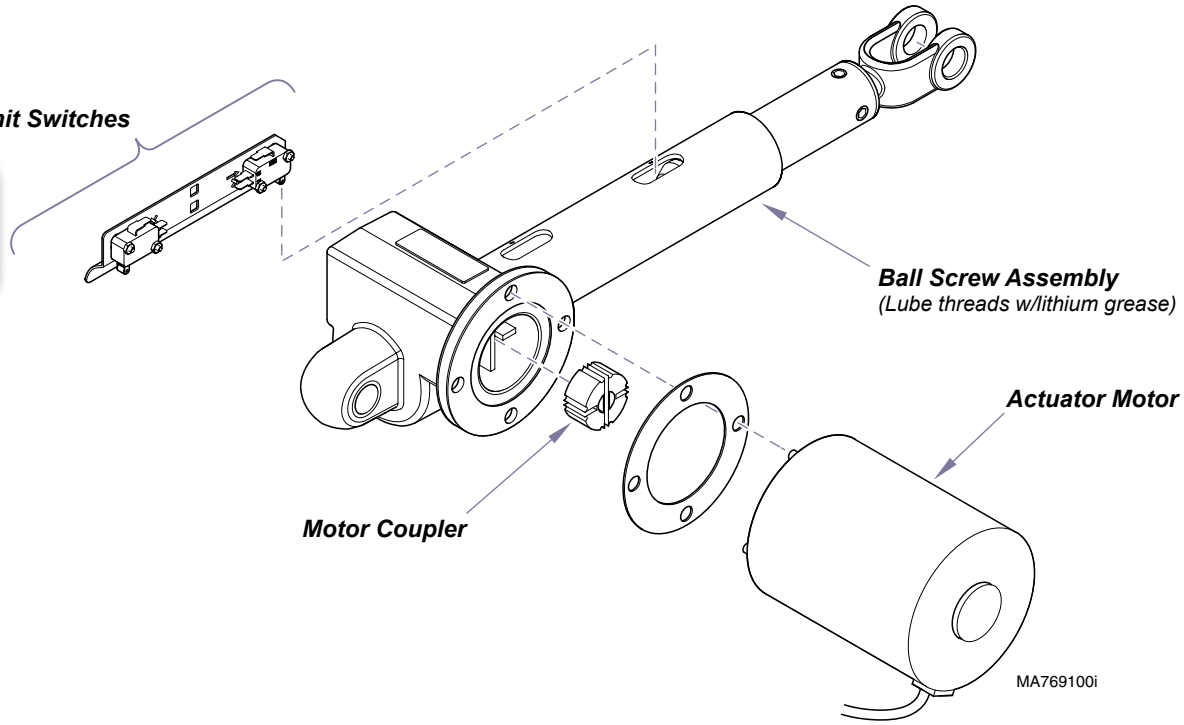
Isolating a Malfunction

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***

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.

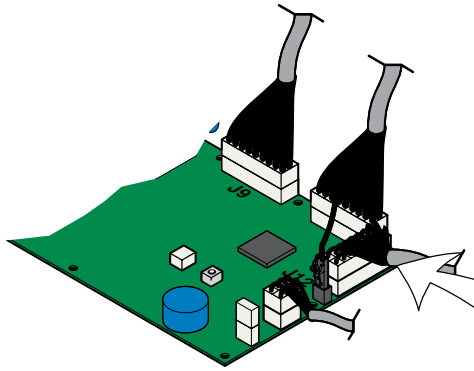


Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

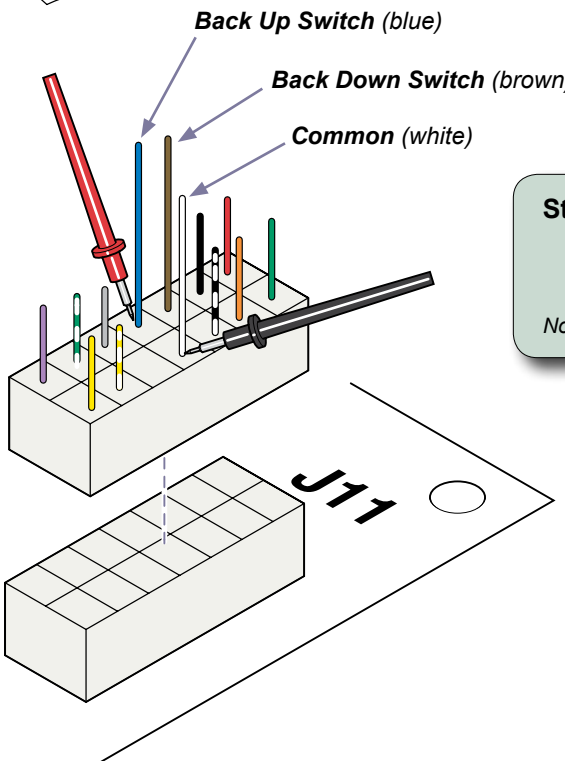
Limit Switch / PC Board Harness Test



MA7954i

Step 1: Disconnect harness from J11 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***

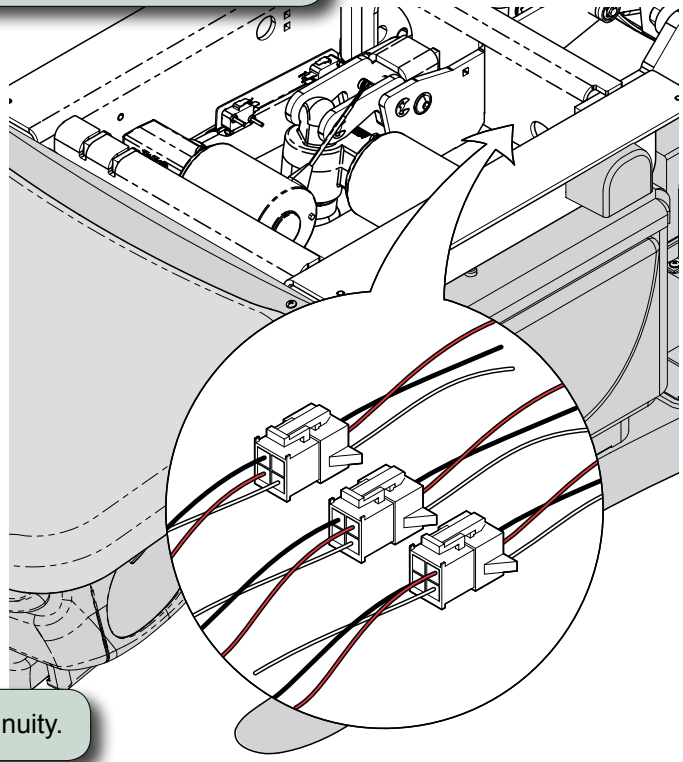
Back Down switch "untripped"... - OR-
Back Up switch "tripped"...

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

Models:	***647***	
Serial Numbers:	*all*	

Limit Switch Harness Test

Step 1: Unplug the appropriate limit switch harness.



Step 2: Measure continuity.

MA8291i

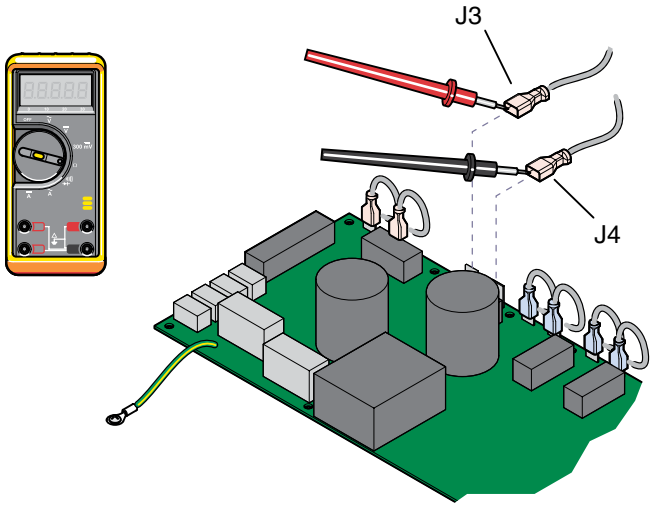
	Meter reading should be...
Actuator Full Up	White to Black - Open White to Red - Closed
Actuator Full Down	White to Black - Closed White to Red - Open
Actuator Midway Point	White to Black - Closed White to Red - Closed

Models:	***647***	
Serial Numbers:	*all*	

www.Midmark.com:
Back Actuator / Motor Replacement 003-1738-00

Actuator Motor Test

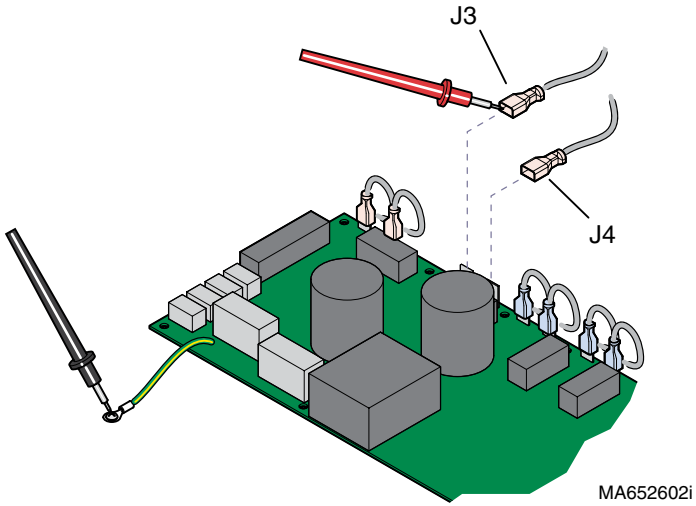
Step 1: Tag and disconnect back actuator wires *(J3 & J4)*.



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 probe on PC board ground wire. Check meter reading. *(Repeat for J4)*

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:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

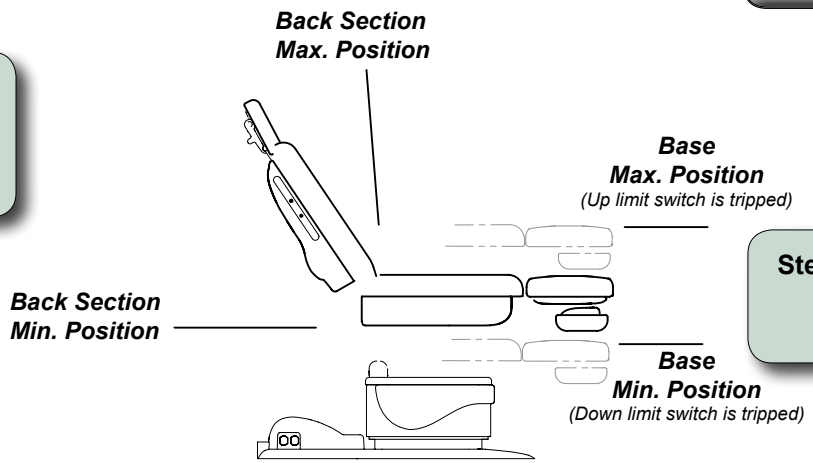
Back Actuator / Limit Switches - continued

www.Midmark.com:
PC Board Replacement..... 003-1490-00

PC Board Test

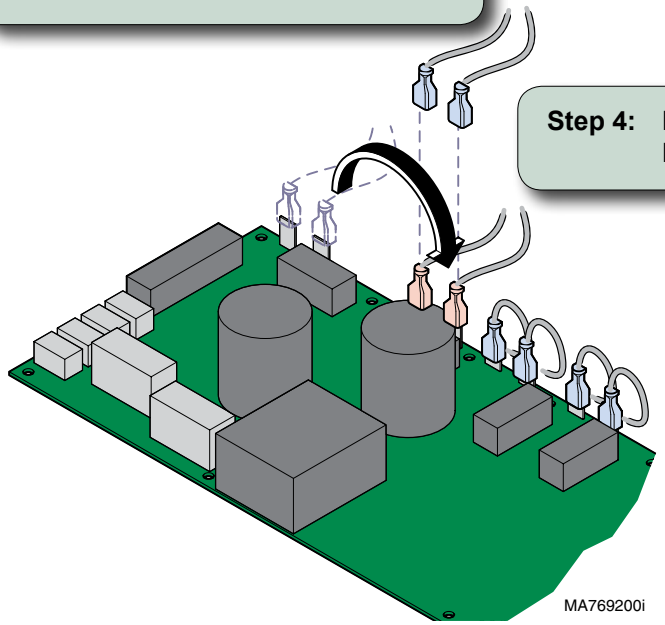
ATTENTION: *This test cannot be performed with the back section in the max. or min position.*

Step 1: If necessary, reposition the back section.



Step 2: Move BASE function so that it is approx. halfway between its maximum & minimum positions.

Step 3: Tag, then disconnect back actuator wires from J3 & J4.



Step 4: Move wire from J1 to J3.
Move wire from J2 to J4.

Equipment Alert
The base limit switches will not stop movement during this test. ***Do not run past max / min positions.***

Step 5: Press & hold Back Up button for 5 seconds.

Does the ***base*** *move up, then stop & 'beep'?*
If YES, go to Step 6.
If NO, replace PC board.*

Step 6: Press & hold Back Down button for 5 seconds.

Does the ***base*** *move down, then stop & 'beep'?*
If YES, PC board is OK.
If NO, replace PC board.*

Models:	***647***	
Serial Numbers:	*all*	

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

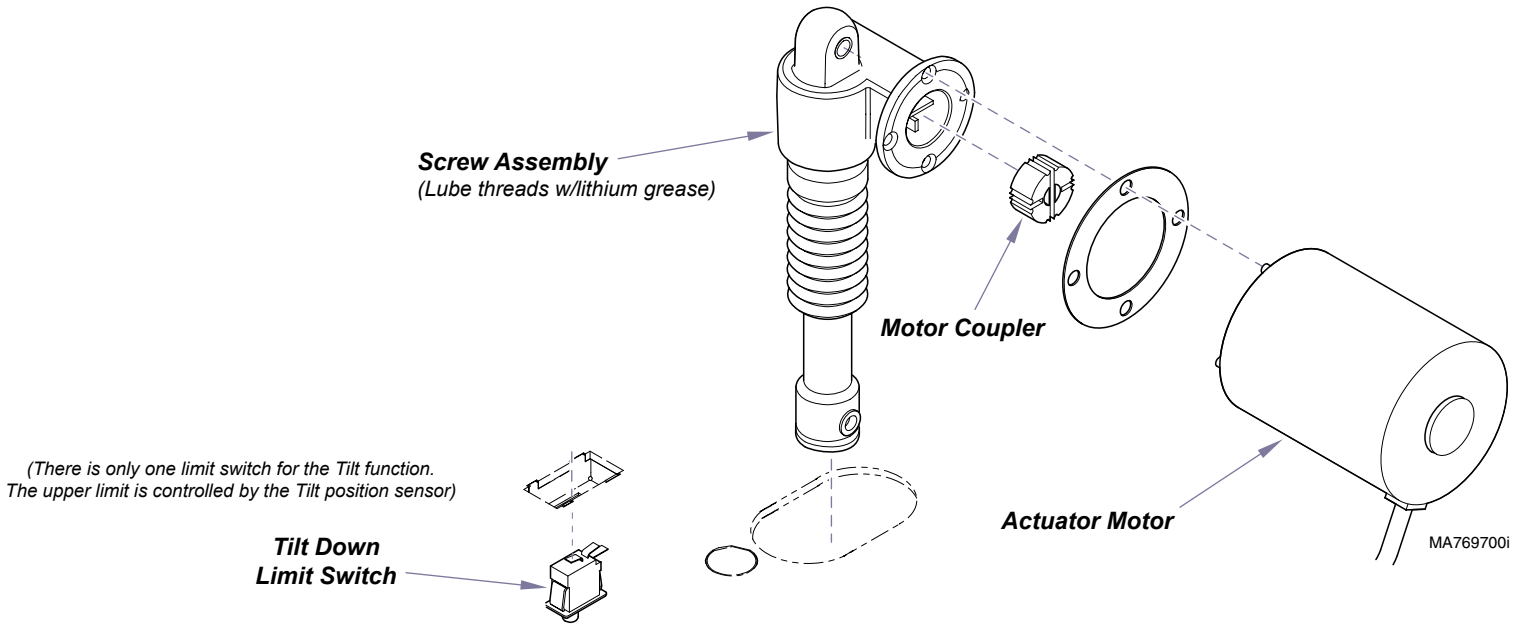
Always verify model & serial number

Tilt Actuator / Limit Switch

Isolating a Malfunction

This illustration shows the tilt down limit switch and the three serviceable components of the tilt 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.	*(UP only)* Perform ***Output Voltage Test (at Tilt Sensor)*** *(Down only)* Perform ***Limit Switch Test*** *(Up & Down)* Perform ***Actuator Motor Test***



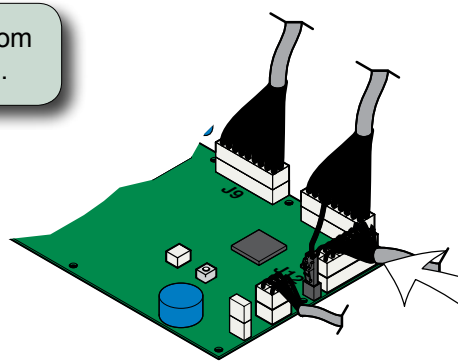
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Limit Switch / PC Board Harness Test

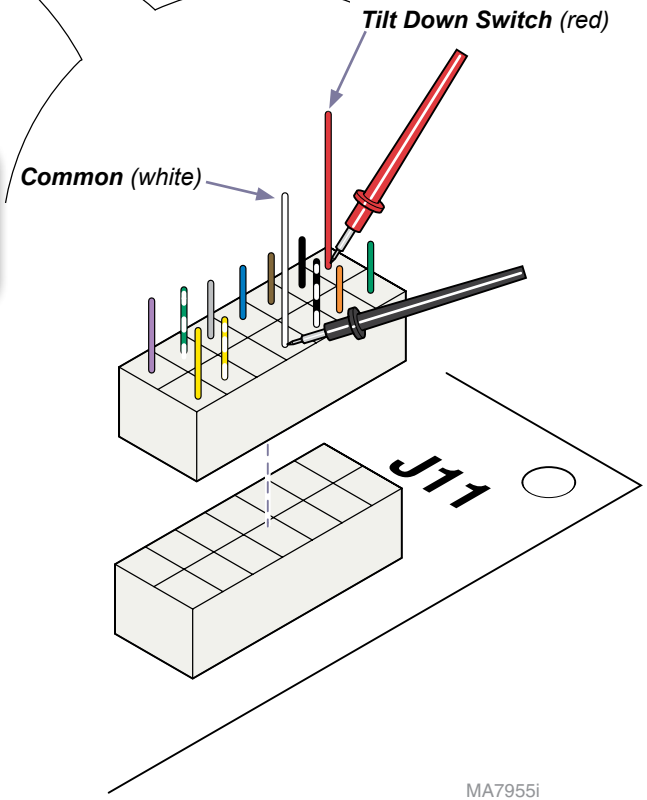
Step 1: Disconnect harness from J11 on main PC board.



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

Step 3: Place other probe on the Tilt Down limit switch *(red)*.

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



MA7955i

With switch "untripped"...

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

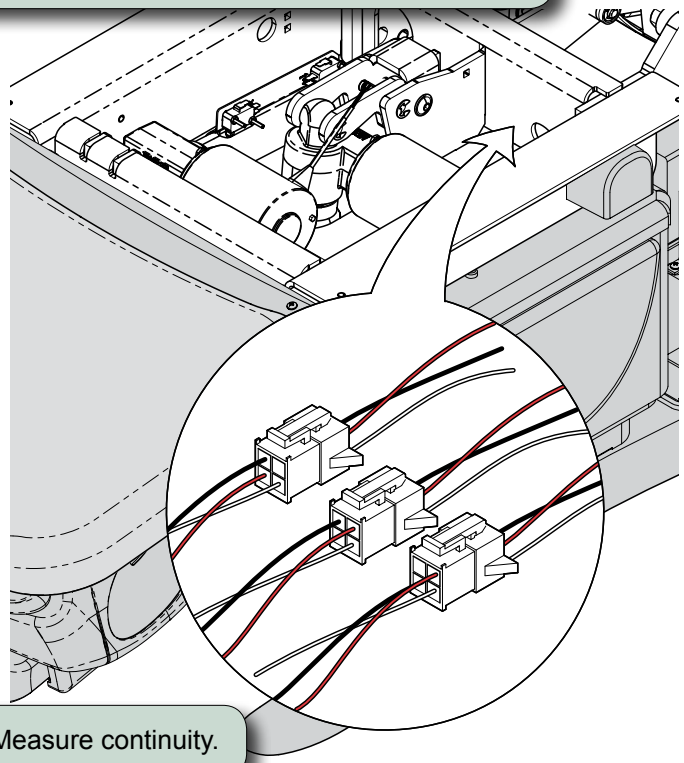
With switch "tripped"...

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

Models:	***647***	
Serial Numbers:	*all*	

Limit Switch Harness Test

Step 1: Unplug the appropriate limit switch harness.



MA8291i

Step 2: Measure continuity.

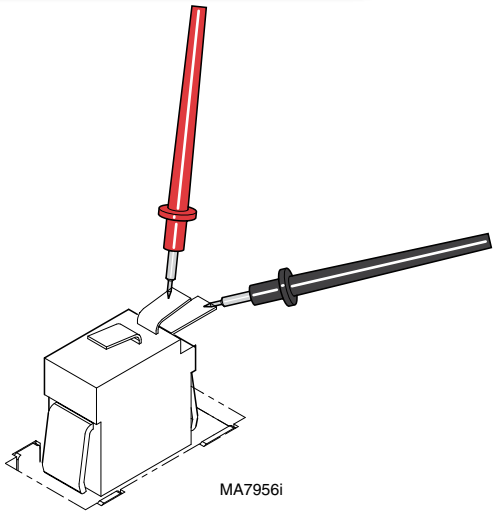
	Meter reading should be...
Actuator Full Up	White to Black - Open White to Red - Closed
Actuator Full Down	White to Black - Closed White to Red - Open
Actuator Midway Point	White to Black - Closed White to Red - Closed

Limit Switch Continuity Test

Step 1: Disconnect wires from switch.

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

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



MA7956i

With switch "untripped"...

Meter Reading	***Required Action***
OL	Replace limit switch
less than 5 ohms	Limit switch - OK Replace limit switch harness.

With switch "tripped"...

Meter Reading	***Required Action***
OL	Limit switch - OK Replace limit switch harness.
less than 5 ohms	Replace limit switch

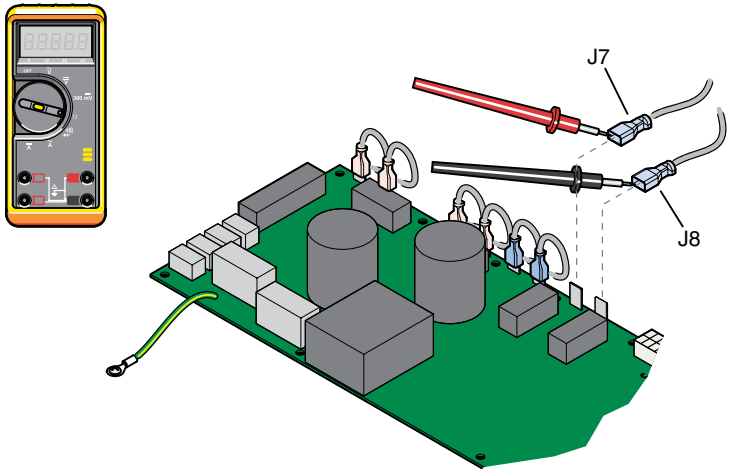
Models:	***647***	
Serial Numbers:	*all*	

Tilt Actuator / Limit Switch - continued

www.Midmark.com:
Tilt Actuator / Motor Replacement 003-1915-00

Actuator Motor Test

Step 1: Tag and disconnect tilt actuator wires *(J7 & J8)*.

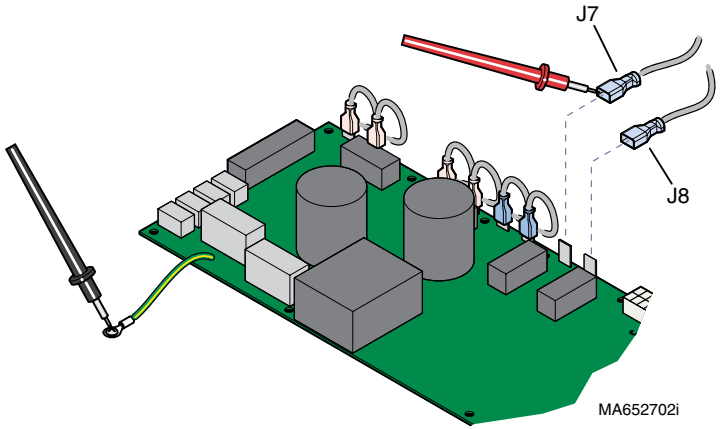


Step 2: Place meter probes on actuator wires. Check meter reading.

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

Motor Ground Test

Step 1: Place one meter probe on actuator wire *(J7)*. Place other probe on PC board ground wire. Check meter reading. *(Repeat for J8)*



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:	***647***	
Serial Numbers:	*all*	

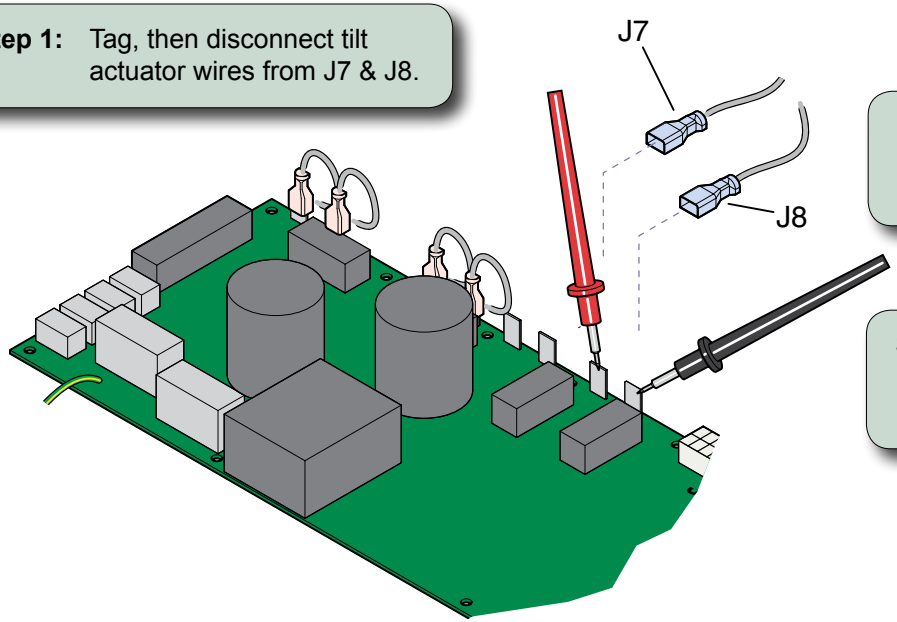
**** Replacement instructions are provided with the part. They are also available on midmark.com, or by clicking on the blue link.***

Always verify model & serial number

www.Midmark.com:
PC Board Replacement..... 003-1490-00

PC Board Test

Step 1: Tag, then disconnect tilt actuator wires from J7 & J8.



Step 2: Place meter probes on J7 & J8 terminals on PC board.
(Meter setting: VDC)

Step 3: Activate the Tilt Up function.
Check meter reading.
Repeat for Tilt Down function.

Meter Reading	***Required Action***
approx 48 VDC	PC board - OK
out of range	Replace PC board*

Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

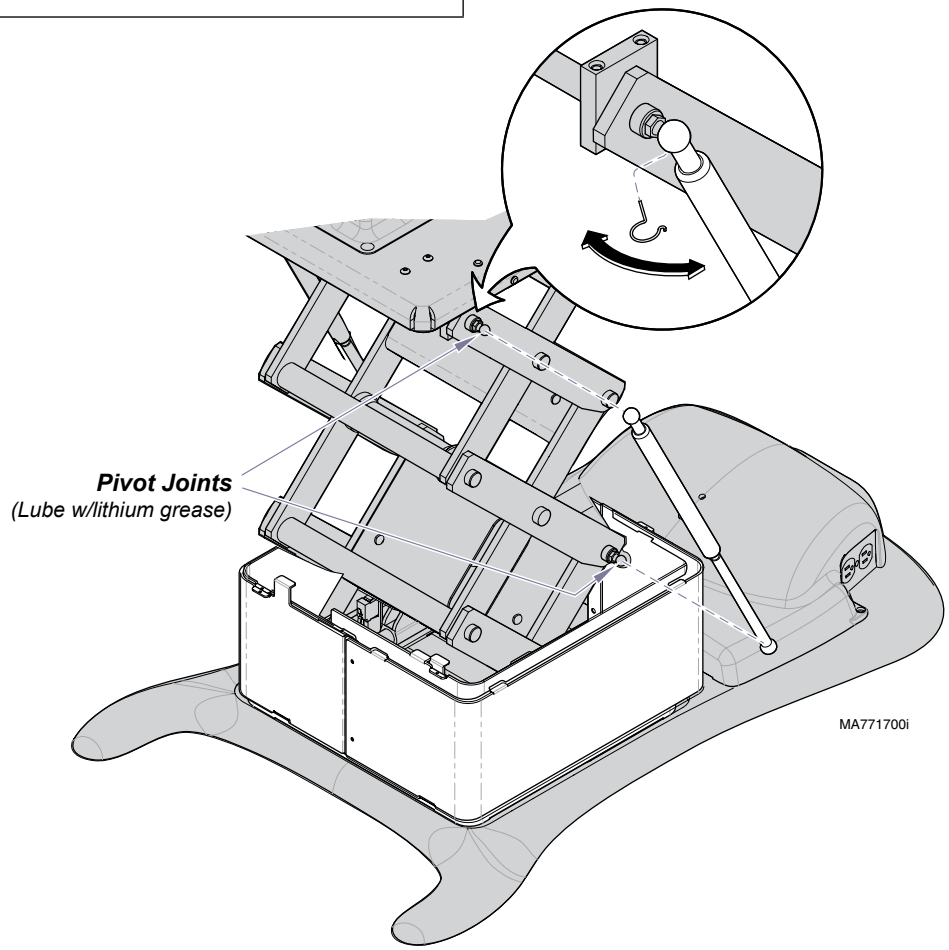
Gas Springs

Access Procedures.....C-1
Exploded View / Part Numbers..... E-11

www.Midmark.com:
Gas Spring Replacement ... 003-1741-00

Isolating a Malfunction

Problem	Required Action
Squeaking, grinding sound coming from pivot joints.	Clean / lube pivot joints. (lubricant: lithium grease)
Diminished lifting capacity. *(Base actuator - OK)*	Replace gas springs*.



Models:	647	
Serial Numbers:	all	

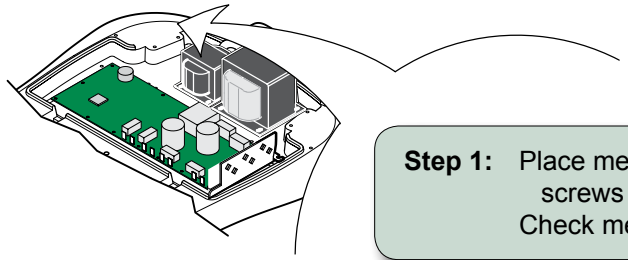
*** Replacement instructions are provided with the part. They are also available on midmark.com, or by clicking on the blue link.***

Always verify model & serial number

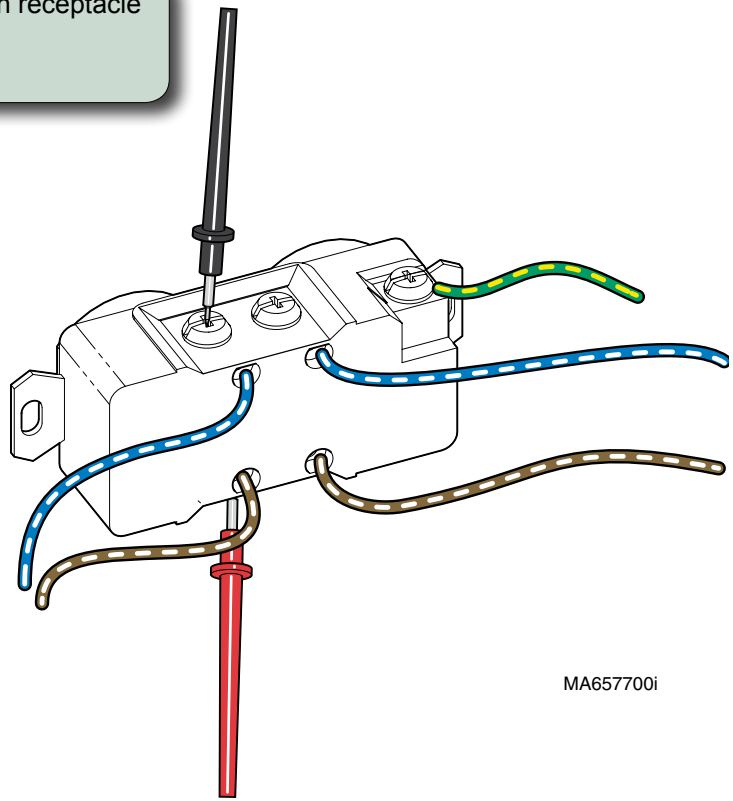
Chair Receptacles (Isolation Transformer)

[Note: The isolation transformer affects the chair receptacles only].

Isolation Transformer Output Voltage Test



Step 1: Place meter probes on receptacle screws as shown.
Check meter reading.



MA657700i

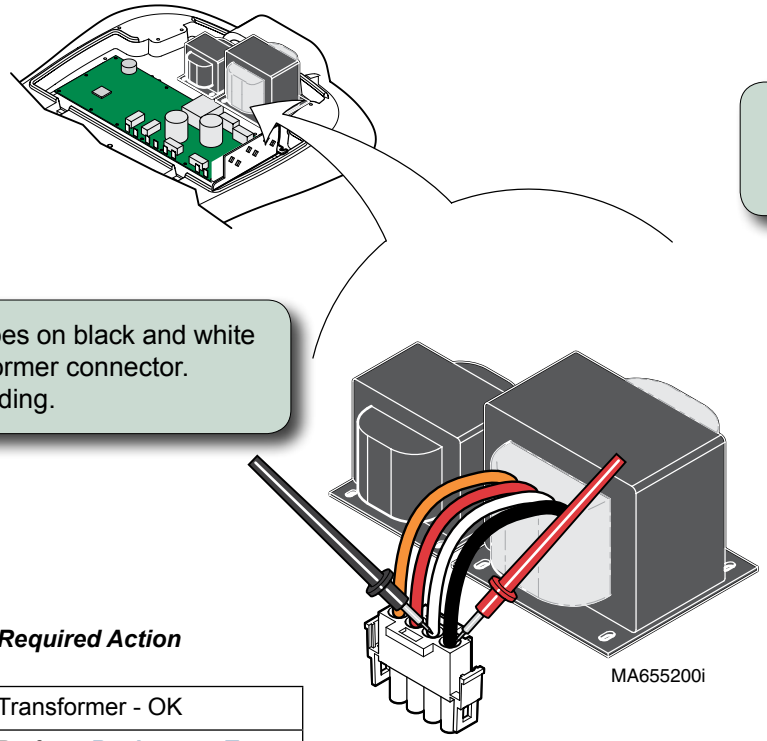
Meter Reading	*Required Action*
120 VAC (± 10%)	Isolation transformer - OK Replace receptacle(s).
less than 108 VAC	If table power light is ON, replace isolation transformer. If power light is OFF, check supply voltage.

Models:	***647*** *(-001 & -002)*	
Serial Numbers:	*all*	

Main System Transformer

[Note: The main system transformer affects all table functions (except chair receptacles)].

Output Voltage Test

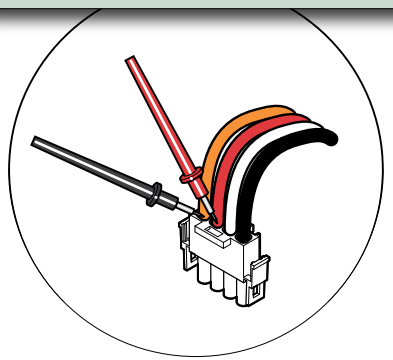


MA655200i

Step 1: Place meter probes on black and white wires of transformer connector. Check meter reading.

Meter Reading (black & white wires)	*Required Action*
42 to 58 VAC	Transformer - OK
out of range	Perform ***Resistance Test***

Step 2: Place meter probes on red and orange wires of transformer connector. Check meter reading.



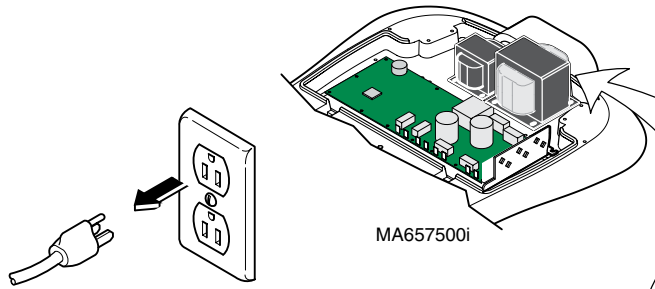
Meter Reading (red & orange wires)	*Required Action*
23 to 43 VAC	Transformer - OK
out of range	Perform ***Resistance Test***

Models:	***647***	
Serial Numbers:	*all*	

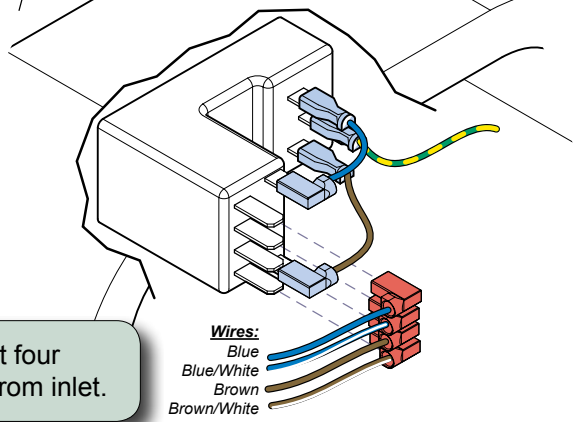
Always verify model & serial number

Main System Transformer - continued

Resistance Test

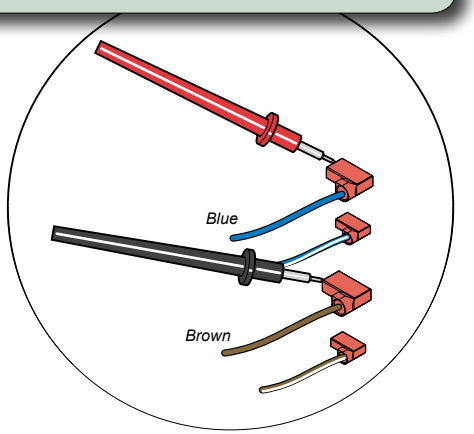


Step 1: Unplug table power cord.



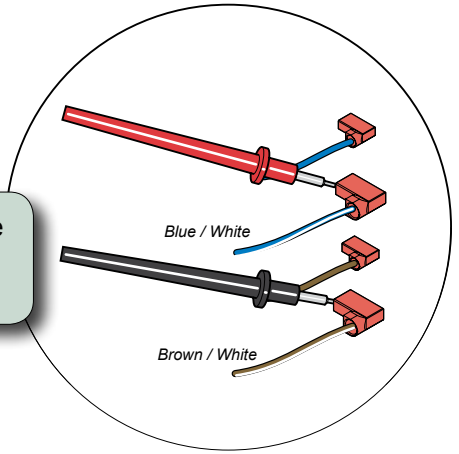
Step 2: Tag and disconnect four transformer wires from inlet.

Step 4: Place meter probes on blue and brown wires. Check meter reading.



Meter Reading	*Required Action*
less than 10 ohms	Transformer - OK
OL -or- more than 10 ohms	Replace transformer.

Step 3: Place meter probes on blue/white and brown/white wires. Check meter reading.



Models:	***647***	
Serial Numbers:	*all*	

Position Sensors

www.Midmark.com:
Position Sensor Replacement 003-1473-00

Testing

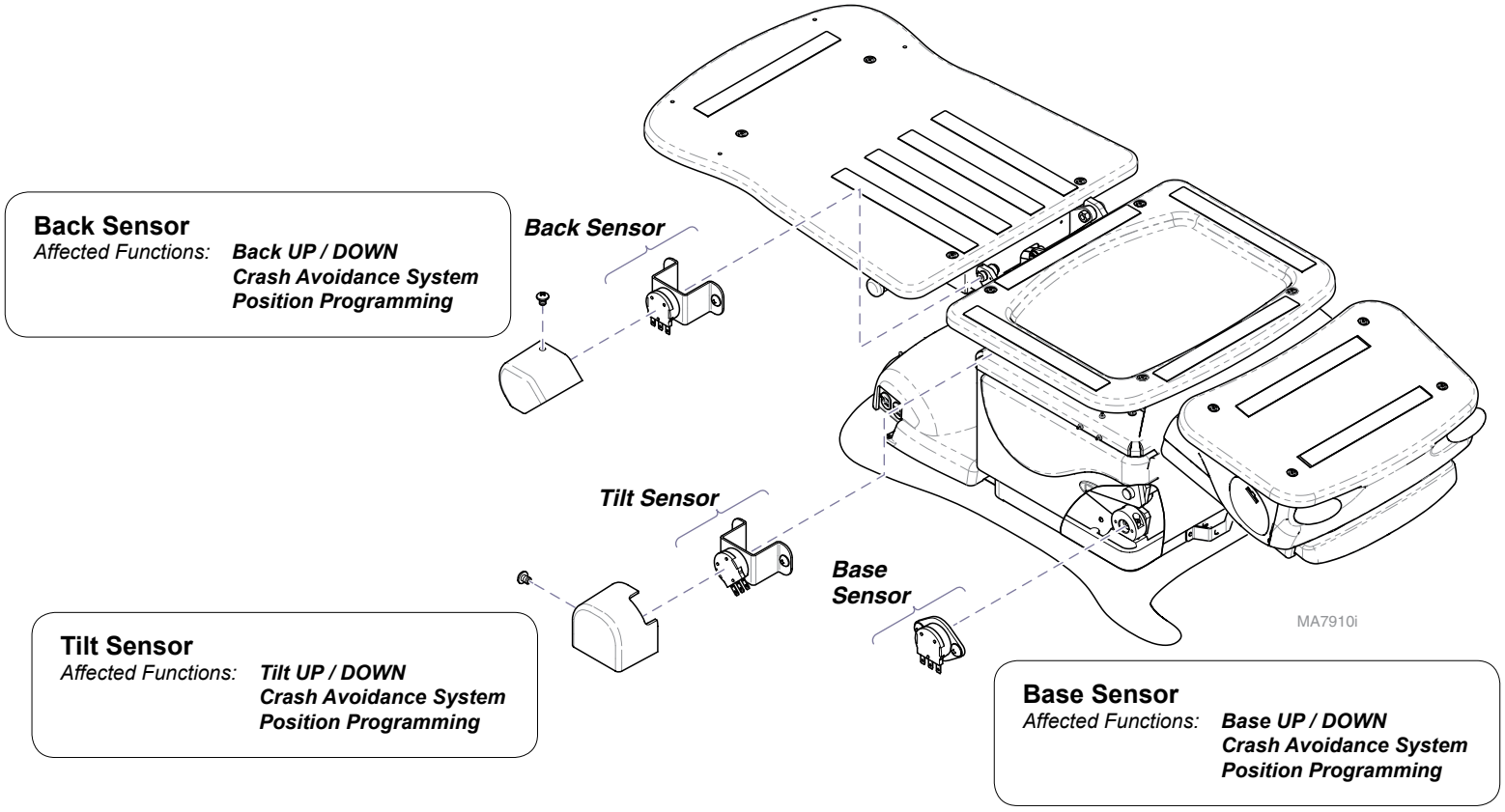
Step 1: Verify position sensor shoulder bolts are tight *(50 ft-lbs)*.

Note: This step does not apply to the Base sensor.

Step 2: Perform Output Voltage Test (at Sensor).

Note: This test must always be performed first.
The results of this test determine the next required action.

Location



Back Sensor
Affected Functions: ***Back UP / DOWN***
Crash Avoidance System
Position Programming

Tilt Sensor
Affected Functions: ***Tilt UP / DOWN***
Crash Avoidance System
Position Programming

Base Sensor
Affected Functions: ***Base UP / DOWN***
Crash Avoidance System
Position Programming

Models:	647	
Serial Numbers:	all	

Position Sensors *- continued*

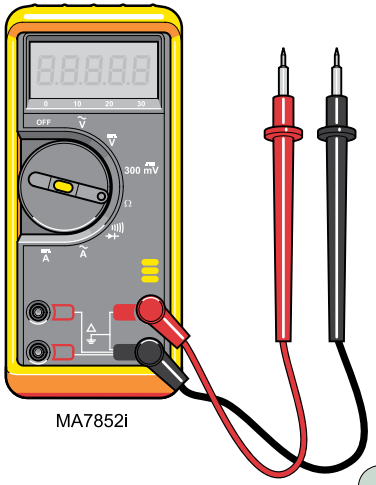
Output Voltage Test (at Sensor)

Note: If Tilt is stuck in Down position...
Disconnect the White and Black wires at J7 & J8 on Main PC Board. Connect Black wire to J7 and White wire to J8. Perform Output Voltage Test on the Tilt Up function by pressing the Tilt DOWN button.

⚠ **Caution: Do not run Tilt Up function beyond the halfway position.**

Reconnect White wire to J7 and Black wire to J8. Perform Output Voltage Test on the Tilt Down function.

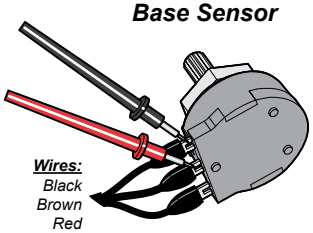
Step 1: Set meter to VDC.


MA7852i

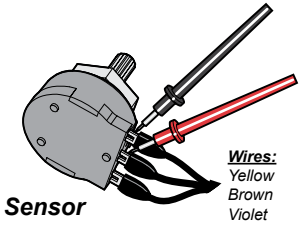
Step 2: Place meter probes on proper terminals.
(See appropriate illustration)

Step 3: Run desired function up & down.
Watch meter reading as function moves.

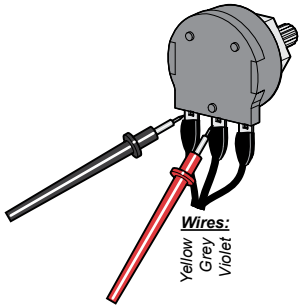
Base Sensor



Tilt Sensor



Back Sensor



Meter Reading	***Required Action***
Voltage steadily increases / decreases *as function moves up / down*	Perform ***Output Voltage Test (at PC Board)***
Voltage doesn't change, or changes erratically *moves up / down*	Perform ***Supply Voltage Test (at Sensor)***

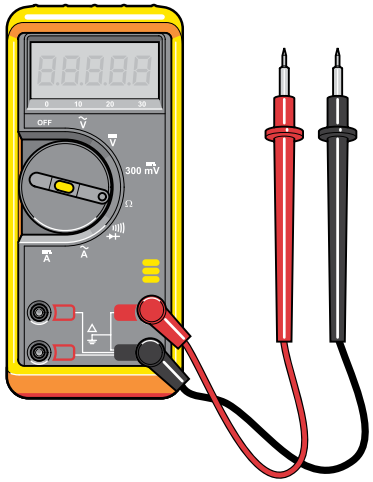
Models:	***647***	
Serial Numbers:	*all*	

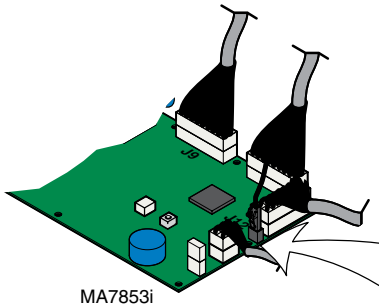
Always verify model & serial number

www.Midmark.com:
PC Board Replacement..... 003-1490-00

Output Voltage Test (at PC Board)

Step 1: Set meter to VDC.



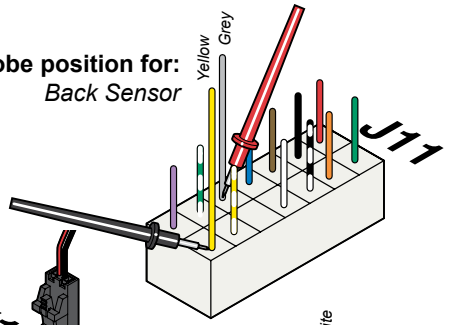


Step 2: Place meter probes on proper wires.
(See appropriate illustration)

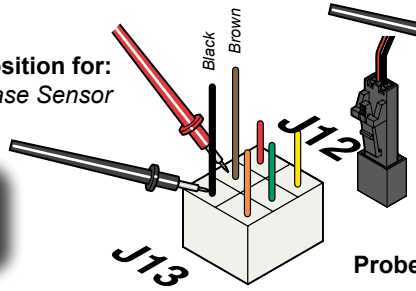
Step 3: Run desired function up & down.
Watch meter reading as function moves.

Note: Each sensor has a different voltage range. The important thing to watch for is whether the voltage changes as the functions moves.

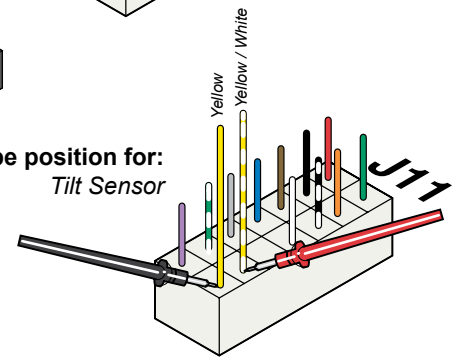
Probe position for:
Back Sensor



Probe position for:
Base Sensor



Probe position for:
Tilt Sensor



Meter Reading	***Required Action***
Voltage steadily increases / decreases *as function moves up / down*	Replace PC board* *(see NOTE)*
Voltage doesn't change, or changes erratically *as function moves up / down*	PC board - OK Inspect wire harness connections.

Note
Before replacing PC board*, be sure shoulder bolt at the sensor pivot point is tight. If bolt is loose, tighten it, then recalibrate PC board & check for proper operation.*

Models:	***647***	
Serial Numbers:	*all*	

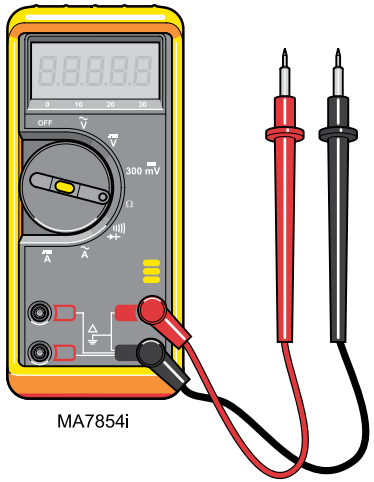
**** Replacement instructions are provided with the part. They are also available on midmark.com, or by clicking on the blue link.***

Always verify model & serial number

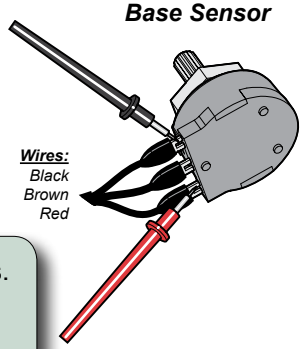
Supply Voltage Test (at Sensor)

www.Midmark.com:
Position Sensor Replacement *003-1473-00*

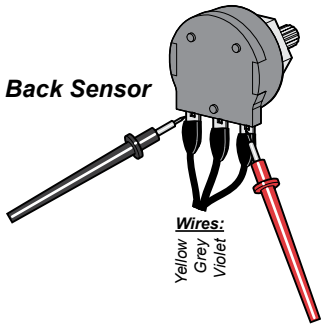
Step 1: Set meter to VDC.



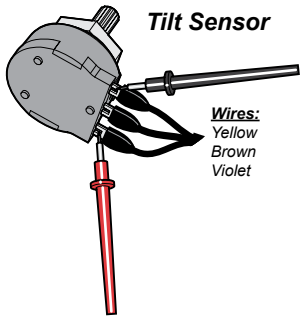
Base Sensor



Back Sensor



Tilt Sensor



Step 2: Place meter probes on proper terminals. *(See appropriate illustration)* Check meter reading.

Step 3: With meter probes in the same position, run Base function to max. / min. position. Check reading as function moves.

Meter Reading	***Required Action***
2 to 4 VDC	Perform ***Position Sensor Adjustment***. Replace position sensor if necessary*.
less than 2 VDC more than 4 VDC	Perform ***Supply Voltage Test (at PC Board)***
Reading changes erratically as Base moves up / down	

Models:	***647***	
Serial Numbers:	*all*	

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

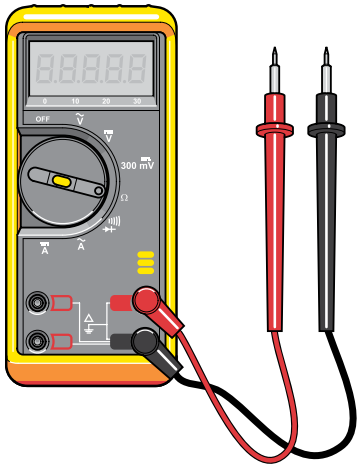
Always verify model & serial number

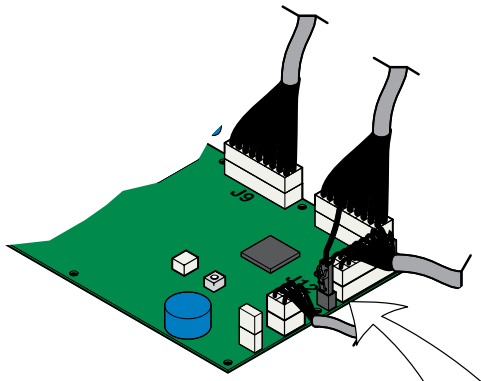
Position Sensors *- continued*

Supply Voltage Test (at PC Board)

www.Midmark.com:
PC Board Replacement..... 003-1490-00

Step 1: Set meter to VDC.





MA654700i

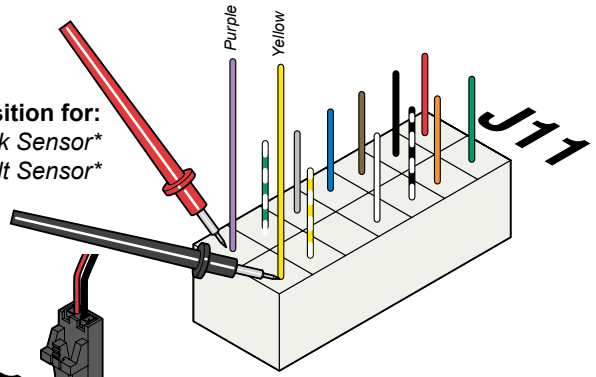
**** Attention (Back / Tilt only)***
If initial reading is less than 2 VDC or more than 4 VDC, unplug J11 connector & check meter reading at pins on PC board (same location).

If reading is:	
2 to 4 VDC	*Replace sensor wire harness*
<2 VDC	*Replace PC board*
>4 VDC	*Replace PC board*

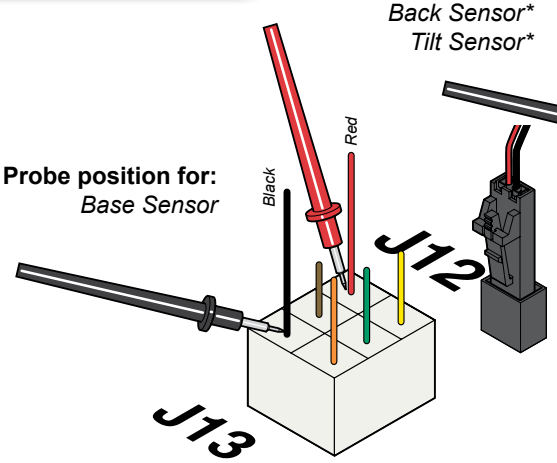
Step 2: Place meter probes on proper wires.
(See appropriate illustration)

Meter Reading	***Required Action***
2 to 4 VDC	Replace wire harness between: *[sensor & junction board] - or - [junction board & PC board]*
less than 2 VDC more than 4 VDC	Replace PC board*.

Probe position for:
*Back Sensor**
*Tilt Sensor**



Probe position for:
Base Sensor



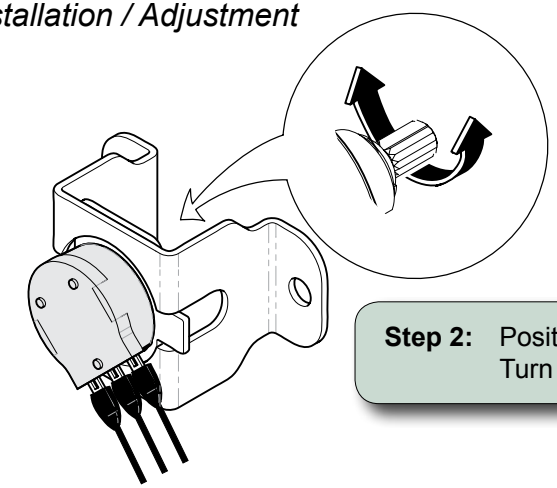
Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

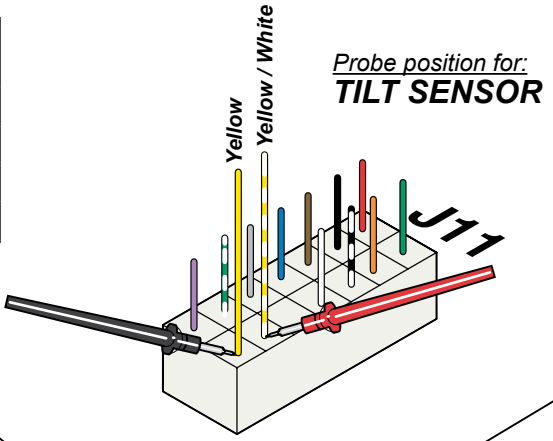
Position Sensors *- continued*

Installation / Adjustment

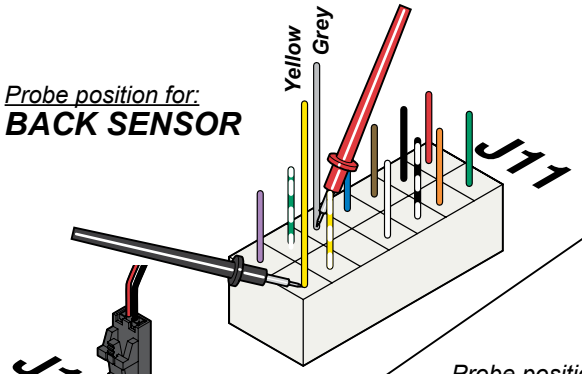


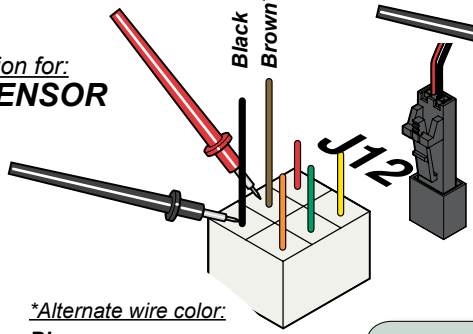
Sensor	*Function Position*	*Voltage Reading s/n V2200 thru V921393*
BASE	*all the way UP*	*1.7 to 2.1 VDC*
BACK	*all the way UP*	*2.4 to 2.6 VDC*
TILT	*all the way DOWN*	*1.8 to 2.1 VDC*
FOOT	*all the way UP*	*2.4 to 2.6 VDC*

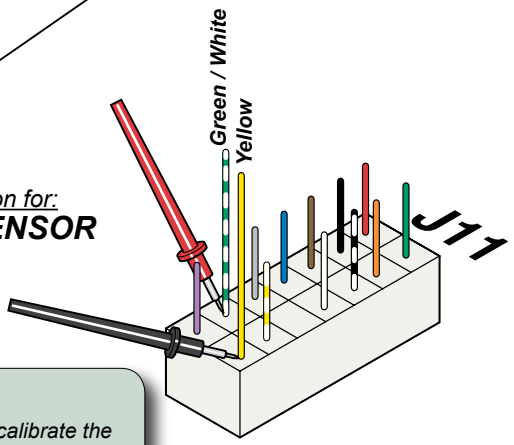
Step 2: Position table function as indicated in the chart.
Turn sensor knob until voltage reading is in the indicated range.

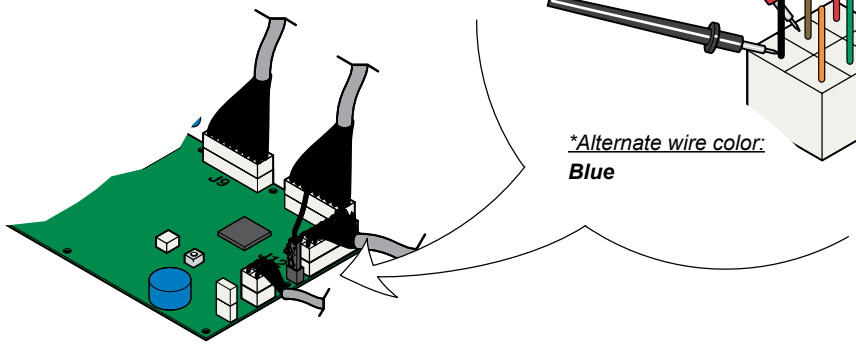


Step 1: Remove main PC board cover.
Place meter probes as shown to test desired sensor.









**Alternate wire color:*
Blue

ATTENTION!
If position sensor wiring is disconnected you must recalibrate the PC board. Failure to do so will cause the table to malfunction.

Step 3: Perform PC Board Calibration Procedure.
[Refer to: Section B - Main PC Board]

MA8060i

Models:	***647***	
Serial Numbers:	*all*	

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

Always verify model & serial number

Main PC Board

Error Codes

If the PC board detects a malfunction in the electrical system, the two error code LEDs on the PC board will flash in a specific sequence to identify the cause of the problem.

How to Display an Error Code

If you suspect a problem with a specific function...

A) Remove PC board cover, then locate error code LEDs.
B) Activate desired function from foot control or touch pad.

If an electrical malfunction is detected:

- *Function will stop moving*
- *You will hear a "beep"*
- *Error code LEDs will flash error code sequence*

How to Recall Last Five Error Codes

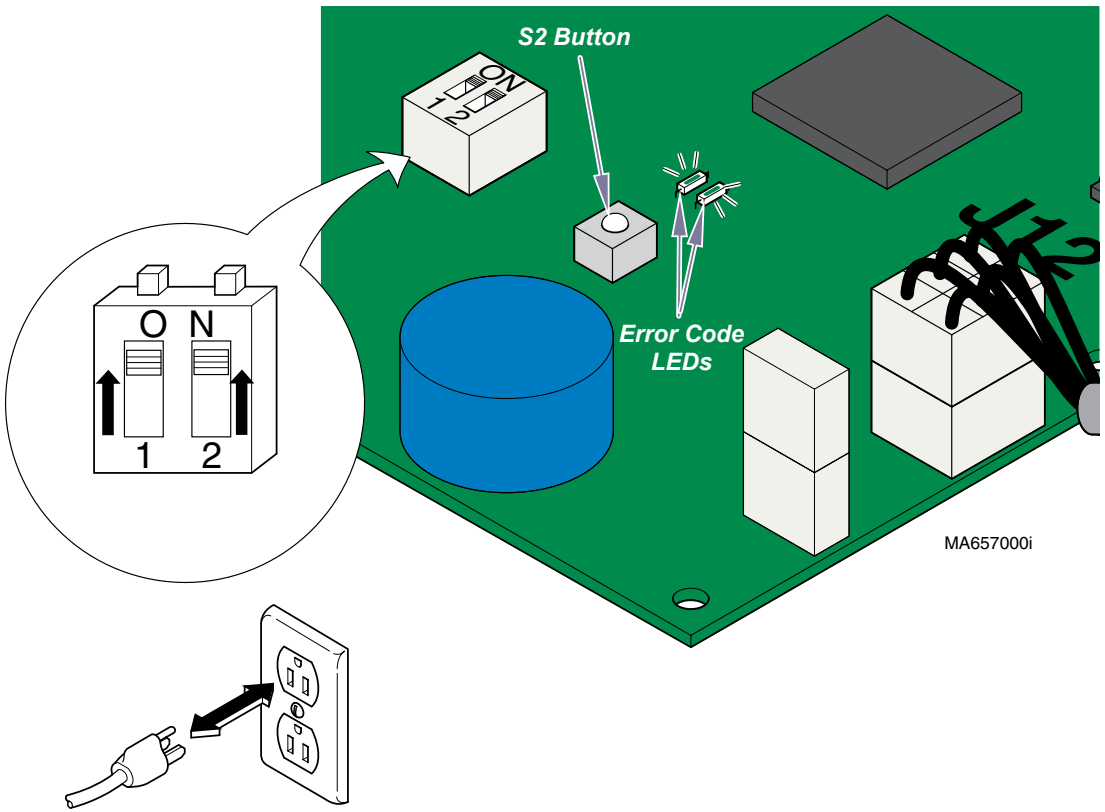
To recall the last five error codes...

A) Move both MODE SELECT switches to ON (up).
B) Unplug table (to reset PC board), then plug back in.
C) Press and release S2 button.
(To repeat error codes, press S2 button again)
(To erase all error codes from memory, press & hold S2 button until you hear three "beeps")

If there are error codes stored in the system memory:

- *Error code LEDs will flash error code sequence of the five most recent error codes.*

(You will hear three "beeps" between each error code)



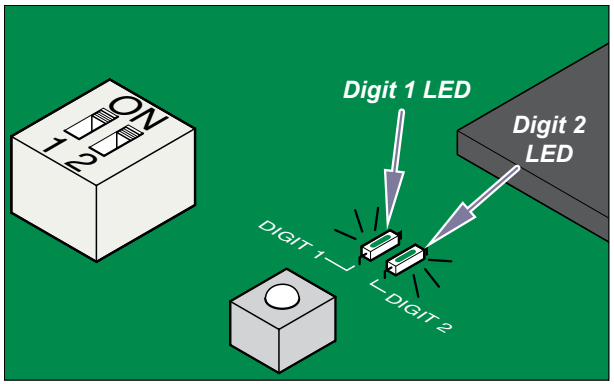
Models:	647	
Serial Numbers:	all	

Error Codes - continued

Identification

Digit 1 LED: This LED identifies the function or mode during which the error was detected.
(ex. Base / Back / Tilt, Programming Mode, Calibration Mode)
Record the number of times this LED flashes before Digit 2 LED begins to flash.

Digit 2 LED: This LED identifies the cause of the error. *(ex. motor overload, incorrect button pressed, etc)*
Record the number of times this LED flashes before Digit 1 LED flashes again.



MA657200i

Locate the two digit error code in the charts below:

(# of flashes) ***Digit 1 LED***	***Table Function***	*(# of flashes)* ***Digit 2 LED***	***Cause of the Error***
1	BASE	**1**	Table in potential "crash position"
2	BACK	**2**	Actuator motor run time exceeded max. limit
3	TILT	**3**	Position sensor did not move when function was activated
		4	Position sensor reading is out of acceptable range
		5	Actuator motor overload
		6	Function failed during calibration

(# of flashes) ***Digit 1 LED***	***Mode***	*(# of flashes)* ***Digit 2 LED***	***Cause of the Error***
7	Programming Mode	**1**	Position button (1, 2, 3) not pressed within 5 seconds
		2	Incorrect button pressed while in Programming Mode
		3	Position cannot be programmed (potential "crash" position)

(# of flashes) ***Digit 1 LED***	***Mode***	*(# of flashes)* ***Digit 2 LED***	***Cause of the Error***
8	Calibration Mode	**1**	Calibration was not successful
		2	Incorrect button pressed while in Calibration Mode
	Error Recall Mode	**3**	Incorrect button pressed while in Error Recall Mode

(# of flashes) ***Digit 1 LED***	***Mode***	*(# of flashes)* ***Digit 2 LED***	***Cause of the Error***
9	Software System	**1**	Software malfunction (need to recalibrate PC board)
		2	
		3	
		4	Foot extension switch is tripped
		9	Disregard this error

Models:	***647***	
Serial Numbers:	*all*	

Calibration Procedure

During the calibration procedure, the PC board records the voltage readings from the position sensors as *the base, back, and foot actuators* move to their maximum, then minimum positions. Note: The tilt actuator will only move momentarily as it clears the tilt down limit switch and then returns to the minimum position. You will hear a steady pattern of “beeps” as the table moves during calibration. When successful calibration is complete, the table will stop moving and you will hear three “beeps”.

<u>You must calibrate the PC board in the following situations:</u>

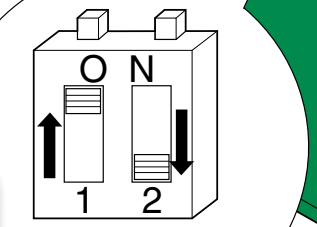
- *After disconnecting / replacing the PC board*
- *After disconnecting / replacing any of the position sensors*

Step 4: Wait five seconds, then press S2 button.

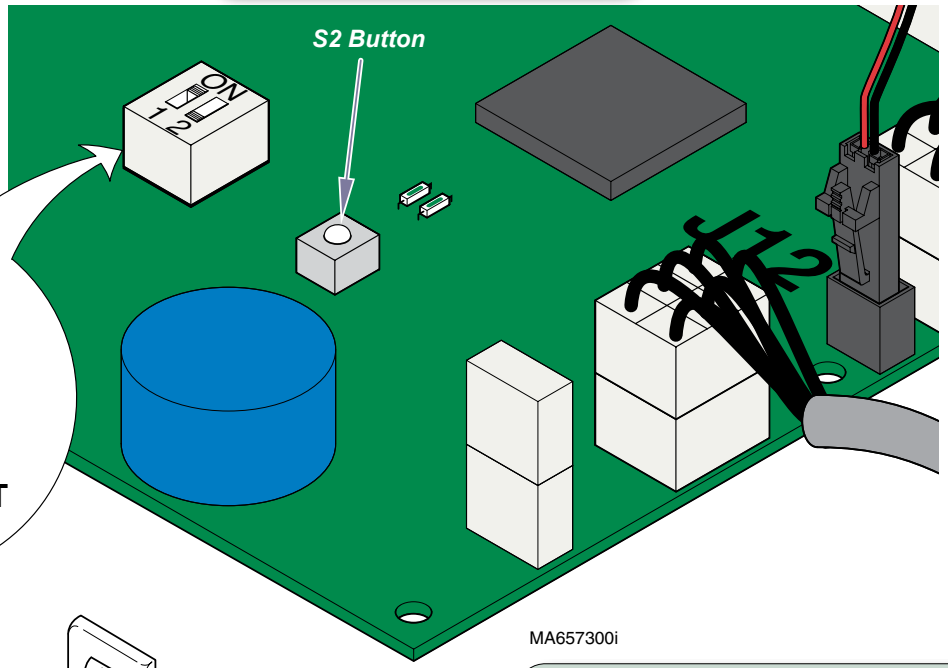
Equipment Alert
*On models with rotational base, **remove** PC board cover before performing the calibration procedure.*

Step 1: Move the foot section to the stowed position.

Step 2: Move MODE SELECT switches:
Switch 1 - ON (up)
Switch 2 - OFF (down)

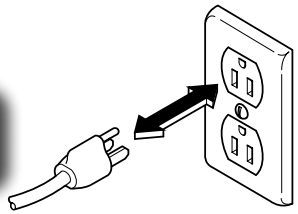


MODE SELECT



MA657300i

Step 3: Unplug table *(to reset PC board)*, then plug table back in.



To return to normal operation...
A) Move MODE SELECT block switches back to original position
B) Unplug table (to reset PC board)
C) Plug table back in.

Models:	***647***	
Serial Numbers:	*all*	

Foot Extension / “Crash” Limit Switch

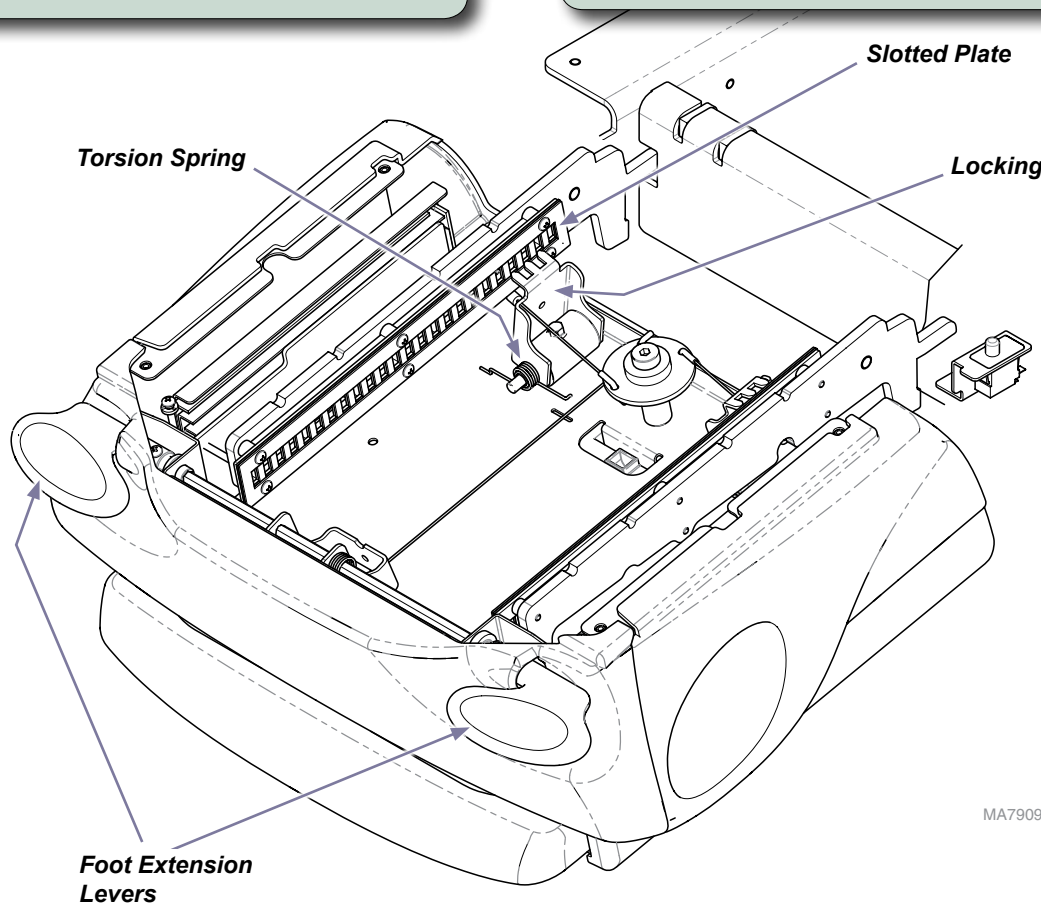
Locking Mechanism Inspection

“Crash” Limit Switch Test.....B-34
Exploded View / Part Numbers:
Foot Extension.....E-7
Foot Extension Housing E-8

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.]

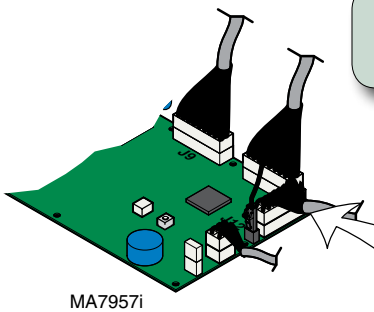
Models:	647	
Serial Numbers:	all	

Foot Extension / "Crash" Limit Switch - continued

"Crash" Limit Switch / Harness Test

Step 1: Disconnect harness from J11 on main PC board.

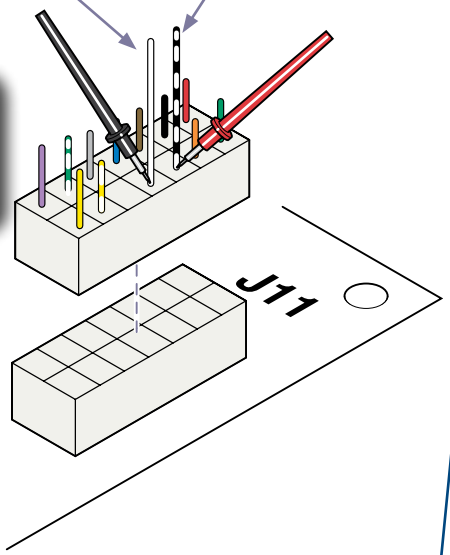
Step 2: Place one meter probe on the common *(white)*.



MA7957i

"Crash" Limit Switch *(black / white)*

Common *(white)*



Step 3: Place other probe on the "Crash" limit switch wire *(black / white)*.

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

With switch "untripped"...

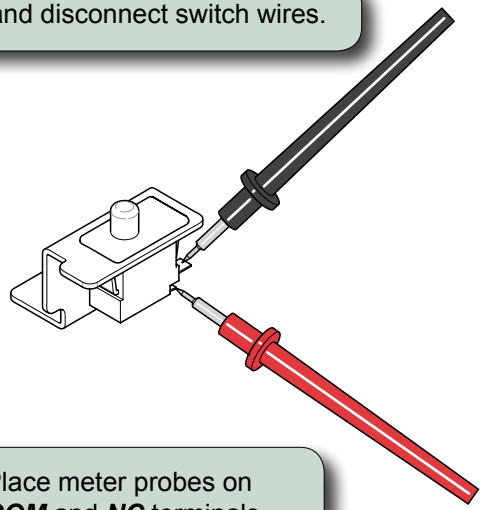
Meter Reading	***Required Action***
OL	Perform ***Limit Switch Continuity Test***
less than 10 ohms	Limit switch / harness - OK Test inoperable function(s).

With switch "tripped"...

Meter Reading	***Required Action***
OL	Limit switch / harness - OK Test inoperable function(s).
less than 10 ohms	Perform ***Limit Switch Continuity Test***

Limit Switch Continuity Test

Step 1: Tag and disconnect switch wires.



MA7911i

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

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

With switch 'untripped'...

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

With switch 'tripped'...

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

Models:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number

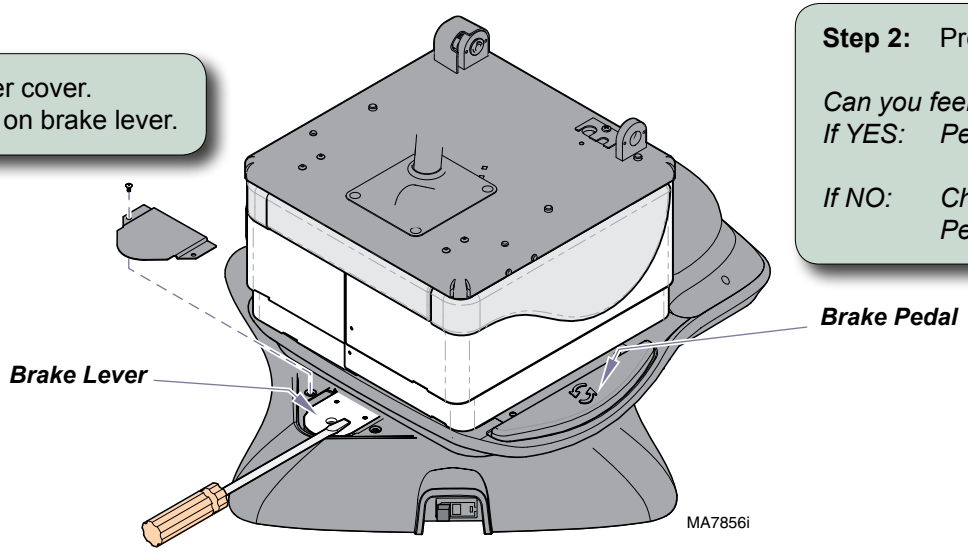
Rotational Base Brake System

Isolating a Malfunction

Problem	Required Action
Brake will not lock.	Unplug table power cord. Does the brake lock? If YES, perform ***Rot. Brake Electrical Test***. If NO, inspect the mechanical brake components. (Refer to: ***Brake Lever / Electro-magnet Access***)
Base wobbles when locked. ***- and / or -*** Grinding noise when base rotates.	Without separating the castings, remove any debris between upper & lower castings. Inspect needle bearing & brake disk for damage. Tighten hub screws. (Refer to: ***Separating Upper & Lower Base Castings***)
Brake will not unlock.	*If one pedal works:* Check faulty brake pedal switch. (Refer to: ***Brake Pedal Switch Access***) *If neither brake pedal works:* Perform ***Screwdriver Test***.

Screwdriver Test

Step 1: Remove brake lever cover.
Hold a screwdriver on brake lever.



Step 2: Press & release the brake pedal.

Can you feel the electro-magnet energize?
If YES: *Perform* ***Magnet Position Adjustment***.

If NO: *Check rotational base PC board fuse.*
Perform ***Rotational Brake Electrical Test***

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Magnet Position Adjustment

If the rotational brake will not unlock, the electro-magnet may be out of adjustment.

Step 1: Rotate the base to access the brake lever cover. Remove brake lever cover.

Note: If the brake will not release, the base can still be rotated manually by applying additional force.

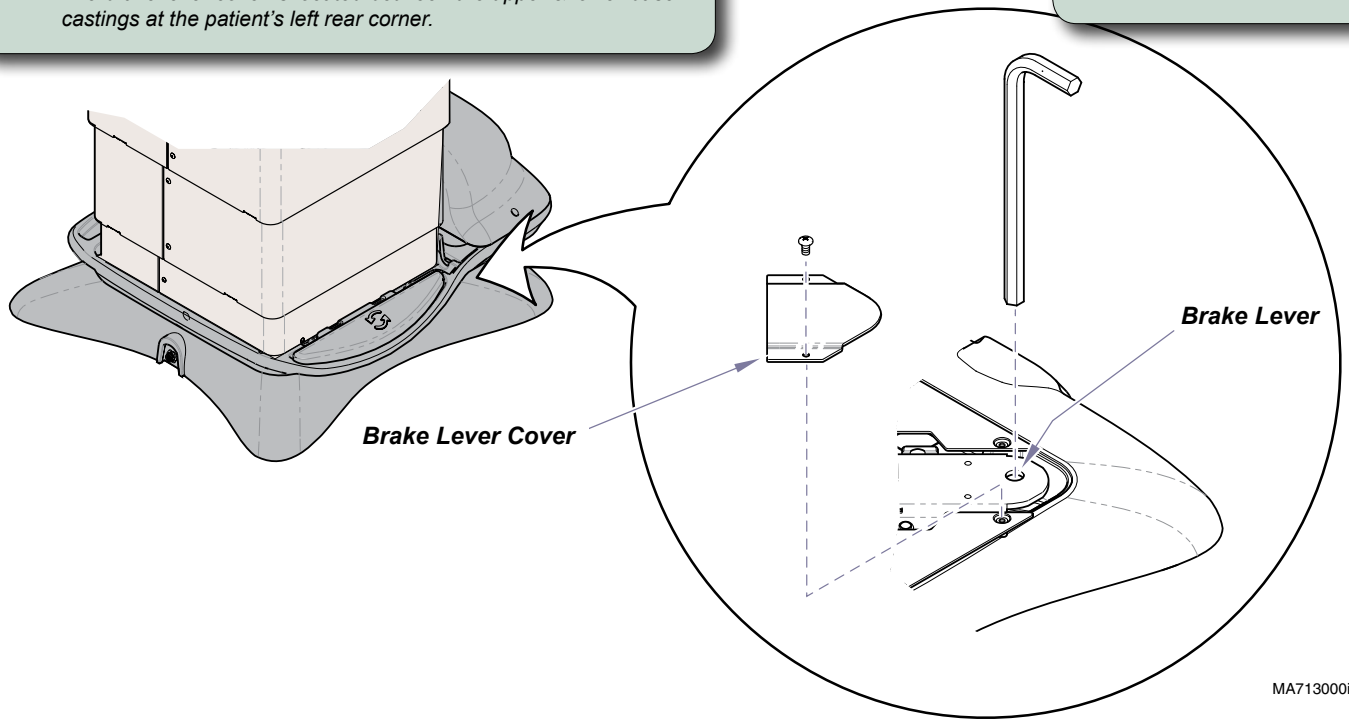
The brake lever cover is located between the upper & lower base castings at the patient's left rear corner.

Step 2: Press the brake pedal while watching the brake lever.

If the magnet "grabs" the brake lever...
Tighten the magnet screw 1/4 turn.

If the magnet does not "grab" the brake lever...
Loosen the magnet screw 1/4 turn.

Check for proper operation. Repeat if necessary.



Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

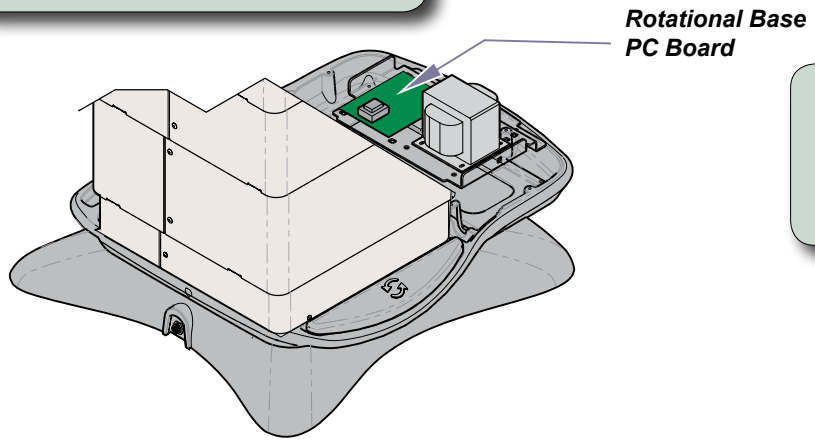
 [Revised: dd/mo/yr]

Always verify model & serial number

Rotational Brake Electrical Test / Fuse Location

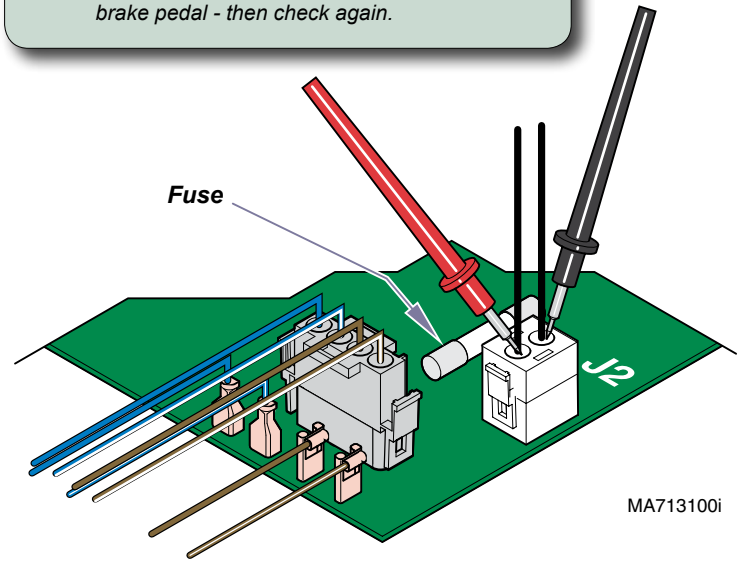
www.Midmark.com:
PC Board Replacement..... 003-1490-00

Step 1: Remove PC board cover.



Step 2: Place meter probes on wires at J2 on Rotational Base PC Board.

Note: If no voltage is detected, press & release the brake pedal - then check again.



Meter Reading	*Required Action*
15-21 VAC	PC board is OK. Perform ***Electro-magnet Test***
0 VAC	Check Rot. Base PC Board fuse. If fuse is OK - Replace PC board*.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

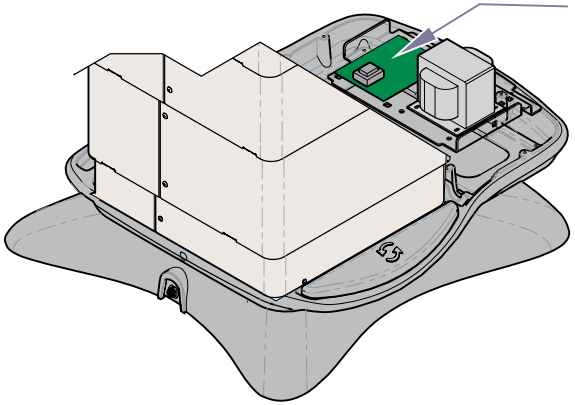
**** Replacement instructions are provided with the part. They are also available on midmark.com, or by clicking on the blue link.***

Always verify model & serial number

Electro-magnet Access.....B-46

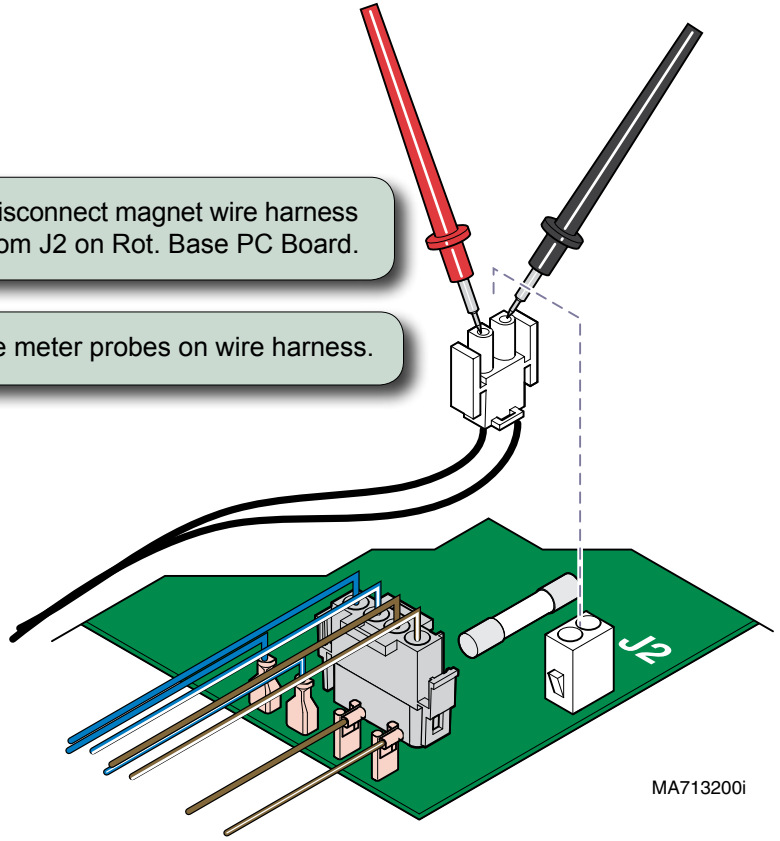
Electro-magnet Test

Step 1: Remove PC board cover.



Step 2: Disconnect magnet wire harness from J2 on Rot. Base PC Board.

Step 3: Place meter probes on wire harness.



Meter Reading	*Required Action*
approx. 10 ohms	Magnet is OK. Check mechanical components.
OL -or- less than 5 ohms	Inspect magnet wire harness. If OK, replace electro-magnet.

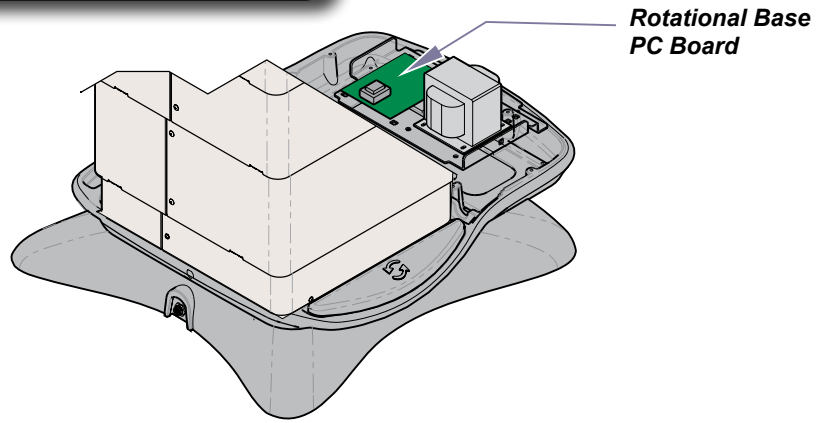
Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Primary Fuses B-2
EMI Filter Board Access B-46
Access Procedures.....C-1

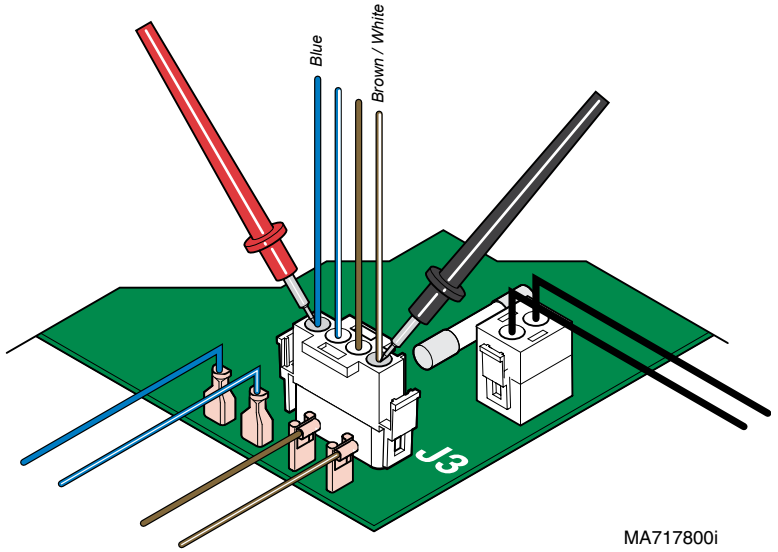
EMI Filter Board Test

This test allows you to check for line voltage coming thru the EMI filter board without separating the upper & lower castings.

Step 1: Remove PC board cover.



Step 2: Place meter probes on blue wire and brown/white wire at J3 on Rotational Base PC Board.

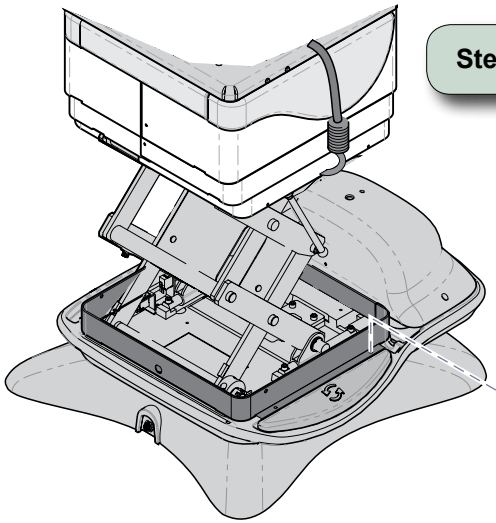


Meter Reading	*Required Action*
approx. 115 VAC	EMI filter board is OK. Check connections to main PC board.
0 VAC	Check primary fuses & wire harness. If fuses are OK, replace EMI filter board.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

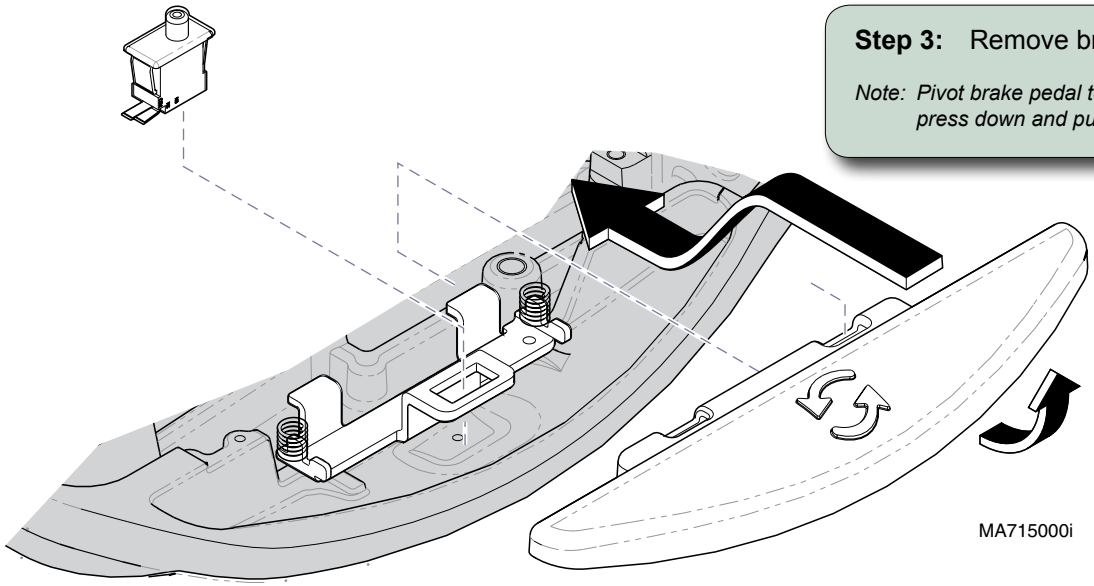
Access Procedures.....C-1

Brake Pedal Switch Access



Step 1: Raise base shrouds.

Step 2: Remove two screws from shroud spacer.



Step 3: Remove brake pedal.

Note: Pivot brake pedal toward column, then press down and push forward to release.

MA715000i

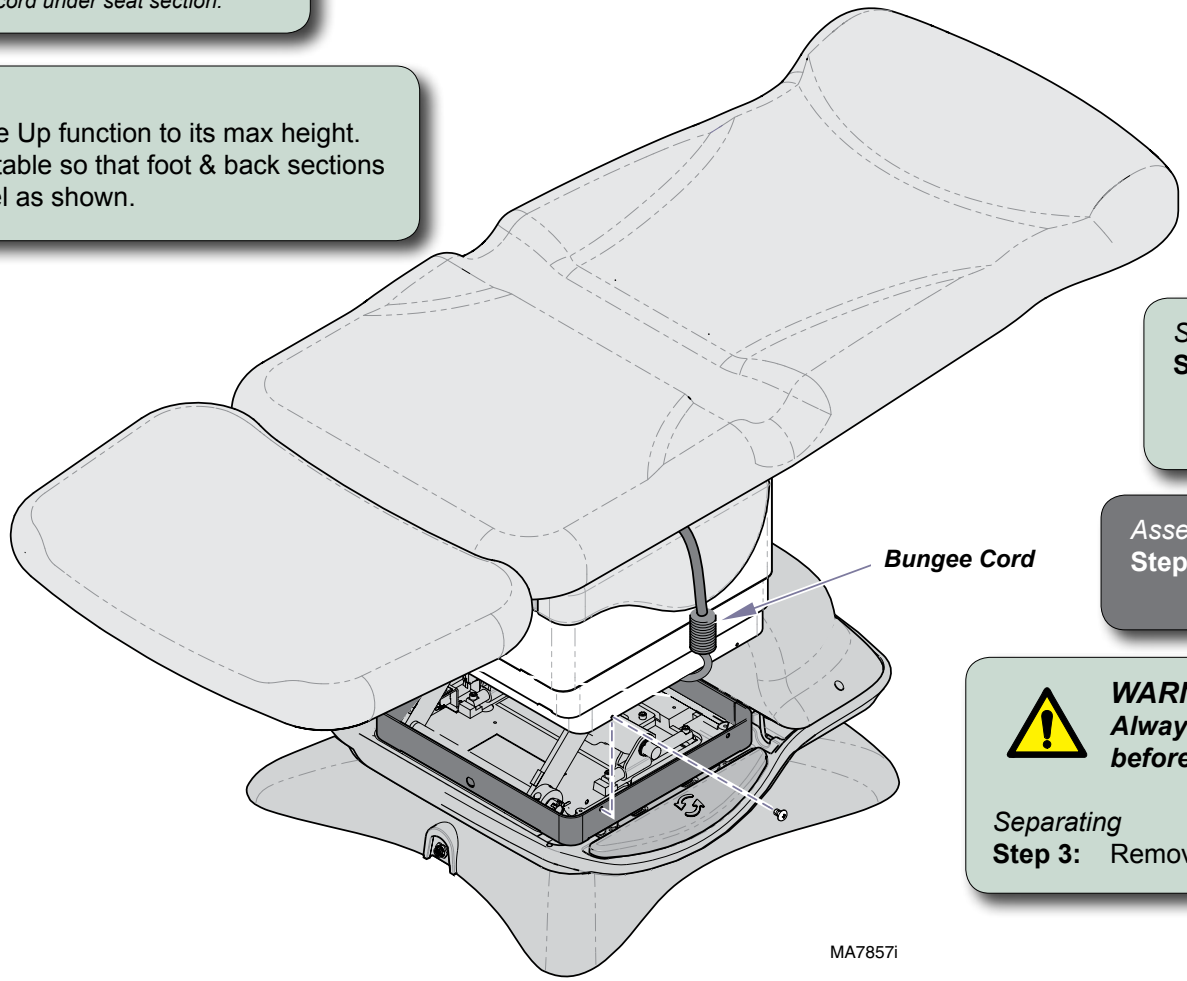
Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Separating Upper & Lower Base Castings

Separating
Step 1: Route bungee cord across top of base column *(under seat)*.

Note: It may be necessary to run the Tilt Up function to route bungee cord under seat section.

Separating
Step 2: Run Base Up function to its max height. Position table so that foot & back sections are level as shown.



Separating
Step 4: Raise shrouds, then attach bungee cord hooks under shrouds on both sides.

Assembly
Step 10: Remove bungee cord. Secure inner shrouds w/screws.

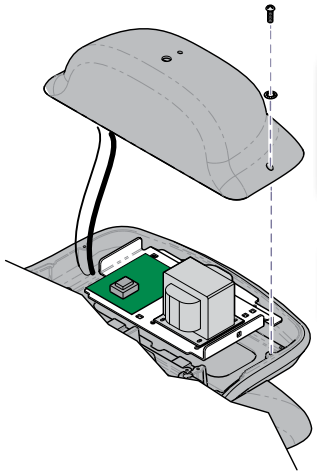
WARNING
Always disconnect table power cord before removing any covers or shrouds.

Separating
Step 3: Remove bottom screws from inner shrouds.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Procedure continued on following page...

Separating Upper & Lower Base Castings - continued



Separating
Step 5: Partially separate PC board cover.

Note: Do not disconnect wire harnesses.

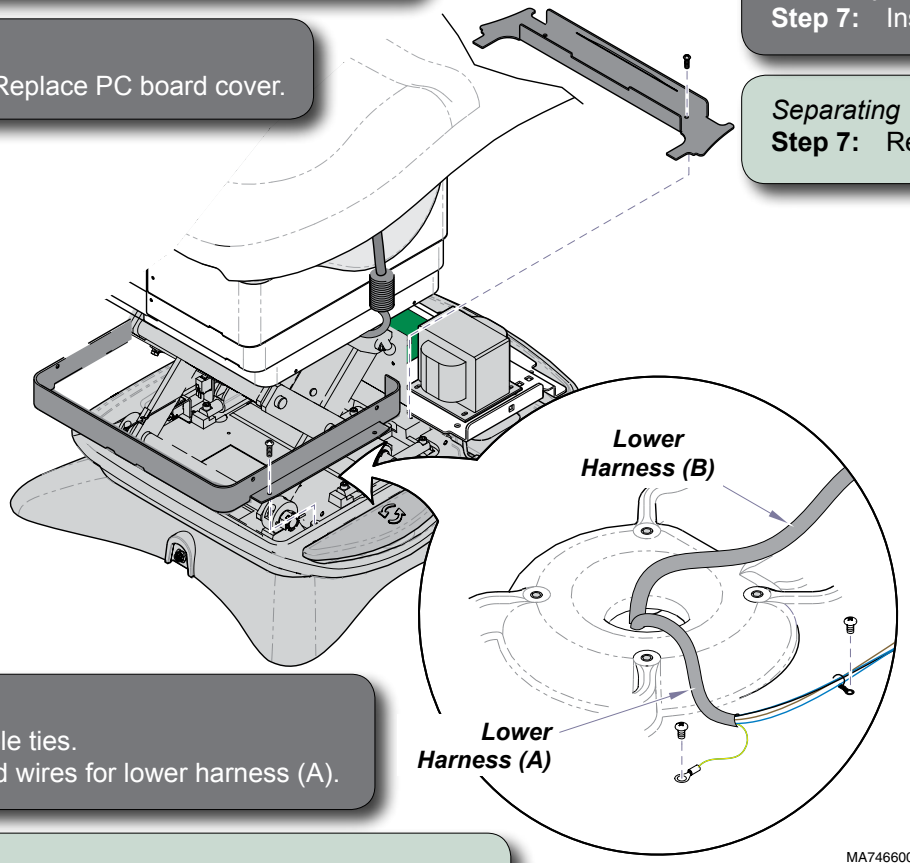
Assembly
Step 9: Replace PC board cover.

Assembly
Step 7: Install wire harness cover.

Separating
Step 7: Remove wire harness cover.

Separating
Step 6: Remove shroud spacer.

Assembly
Step 8: Install shroud spacer.



Assembly
Step 6: Replace all cable ties.
Connect ground wires for lower harness (A).

Separating
Step 8: Disconnect ground wire for lower harness (A).
Remove cable ties securing lower harnesses (A & B) to base.

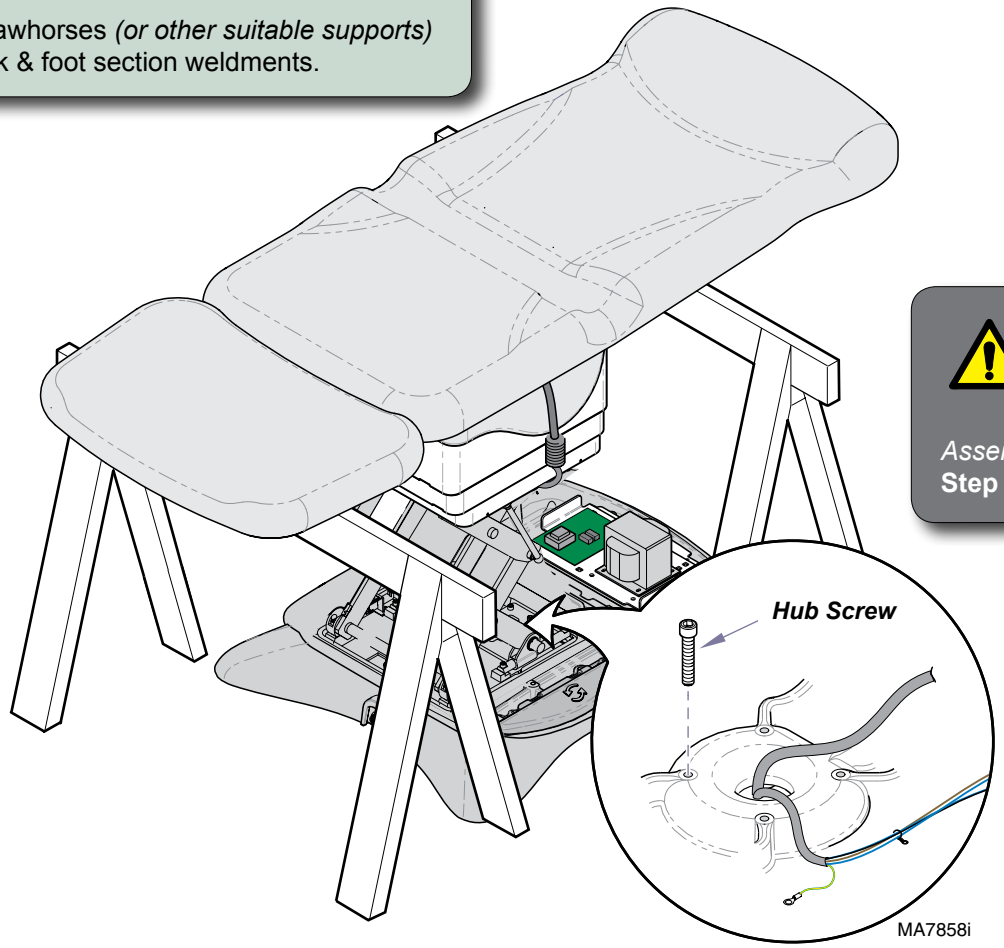
Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Procedure continued on following page...

Separating Upper & Lower Base Castings - continued

Caution
The table weighs approx 500 lbs (226 kg).
Use supports designed for this amount of weight.

Separating
Step 9: Position sawhorses *(or other suitable supports)* under back & foot section weldments.



WARNING
Disconnect the table power cord before performing the remaining installation steps.

Assembly
Step 5: Install four hub screws.

Caution
The table top / upper base is not secured once the hub screws are removed. Hold onto the table when performing the following steps.

Separating
Step 10: Remove four hub screws.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Procedure continued on following page...

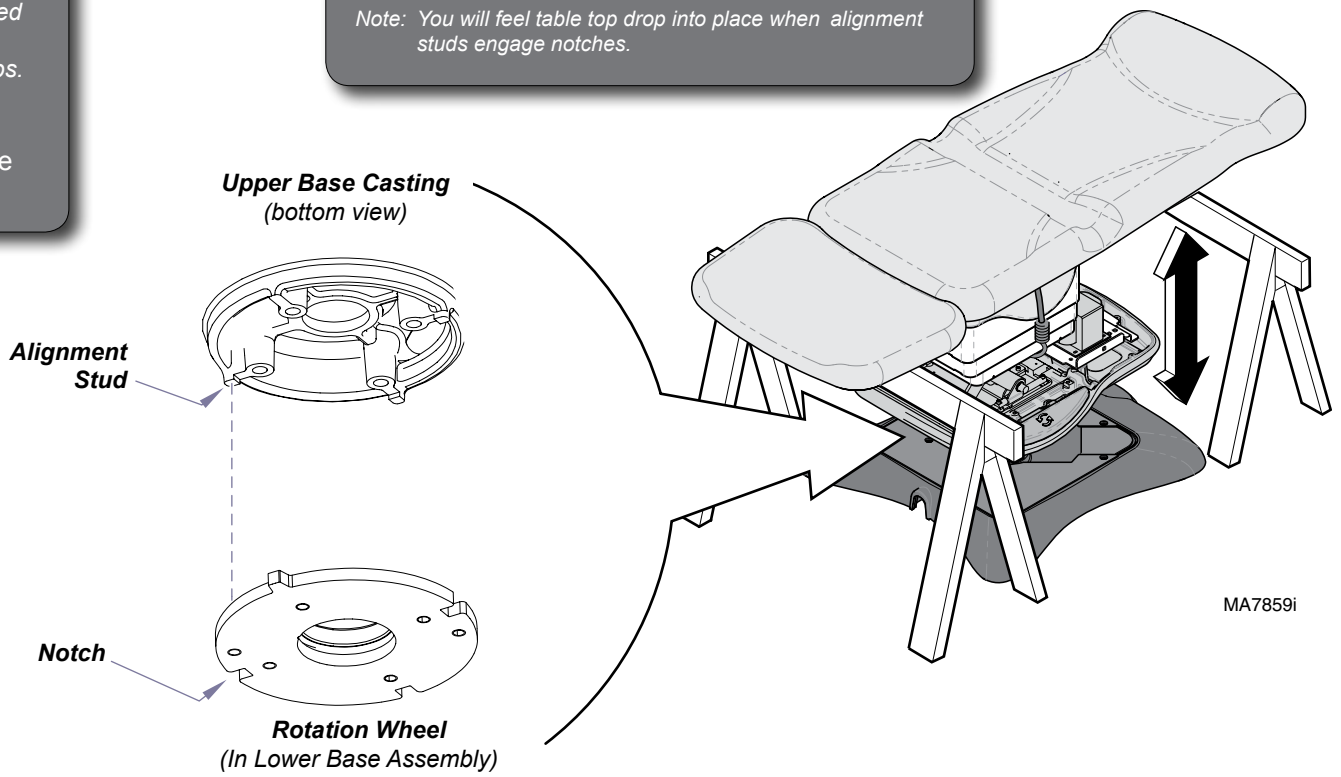
Separating Upper & Lower Base Castings - continued

> ***WARNING***
> ***The steps on this page require power to be connected to the table. Avoid all contact with wiring & electrical components.***

> ***Equipment Alert***
> *The two lower wire harnesses are still connected to upper casting. Running the Base Down function too long may result in damage to the table.*
>
> *Separating*
> **Step 11:** Activate Base Down function until castings separate slightly.

> ***Caution***
> *The table top / upper base is not secured until the hub screws are installed. Hold onto the table when performing the following steps.*
>
> *Assembly*
> **Step 3:** Activate Base Up function until table raises *(slightly)* off of supports.

> *Assembly*
> **Step 4:** Carefully adjust table top until alignment studs on bottom of upper casting lock into the notches on the rotation wheel.
>
> *Note: You will feel table top drop into place when alignment studs engage notches.*



Models:	647 (-003 & -004)	
Serial Numbers:	all	

Procedure continued on following page...

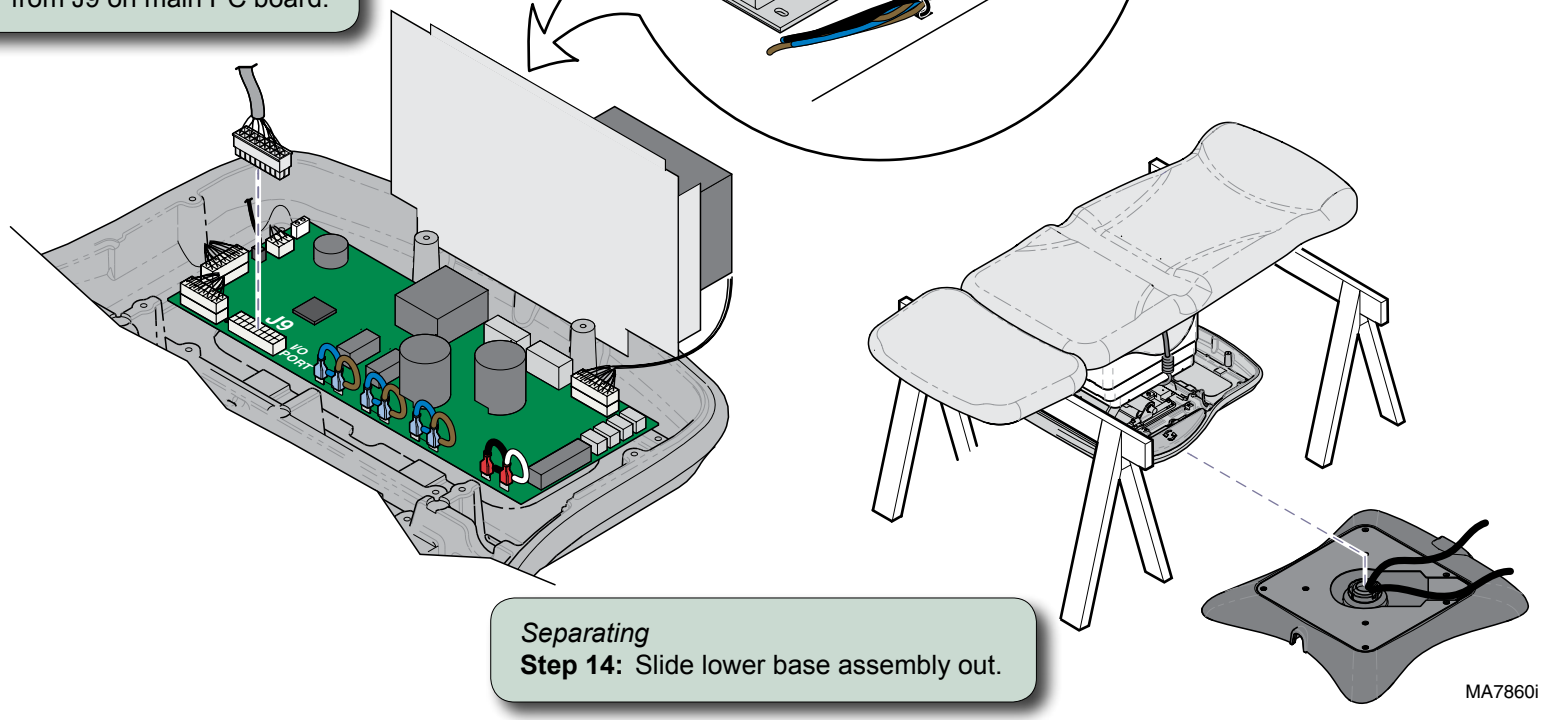
Separating Upper & Lower Base Castings - continued

WARNING
Disconnect table power cord before performing any of the steps on this page.

Assembly
Step 2: Route wire harnesses thru upper casting. Reconnect all wire harnesses as shown.

Separating
Step 12: Disconnect wire harness from J2 & J3 on rotational base PC board.

Separating
Step 13: Disconnect wire harness from J9 on main PC board.



Separating
Step 14: Slide lower base assembly out.

MA7860i

Assembly
Step 1: Slide lower base assembly under table.

Note: To ease installation, align the new lower base assembly in the same position as the old base.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Rotational Base Brake System - *continued*

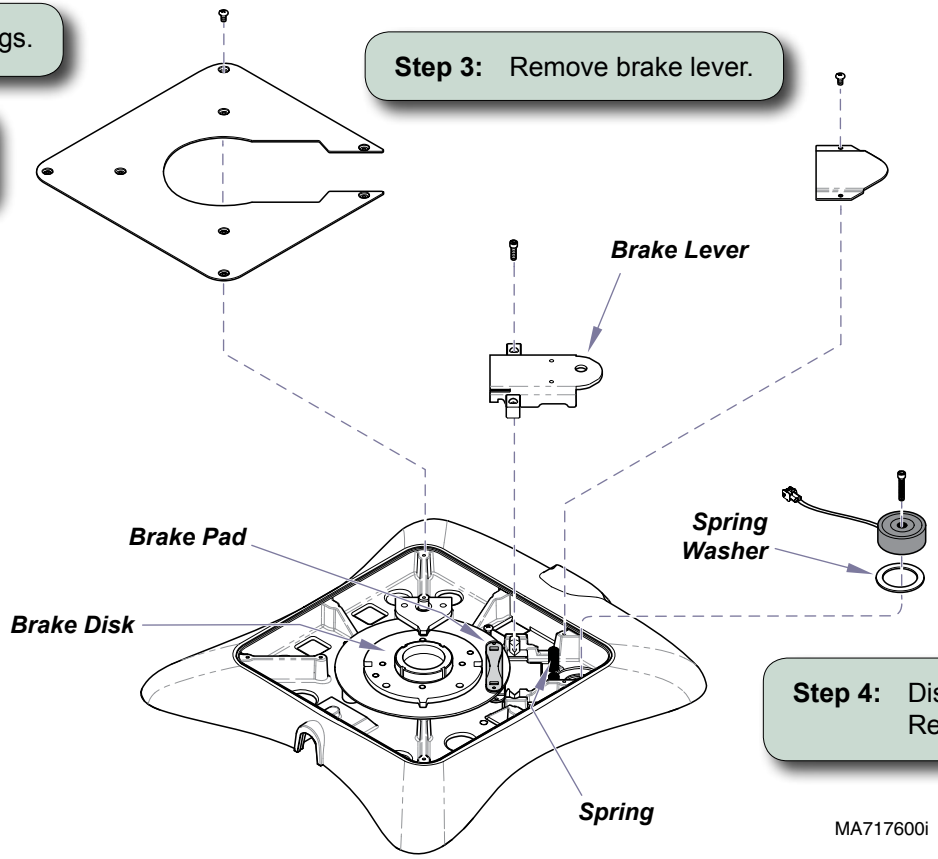
Separating Upper & Lower Base Castings B-40

Brake Lever & Electro-magnet Access

Step 1: Separate upper & lower base castings.

Step 2: Remove corner cover & top cover from lower base assembly.

Step 3: Remove brake lever.



MA717600i

Step 4: Disconnect magnet wire harness. Remove magnet.

To install electro-magnet...
A) Connect magnet wire harness.
B) Install magnet.

Note: Be sure spring washer is in place under magnet.

To install brake lever...
A) Position brake lever so that it aligns w/ slots in brake pad.
B) Secure lever with two screws.

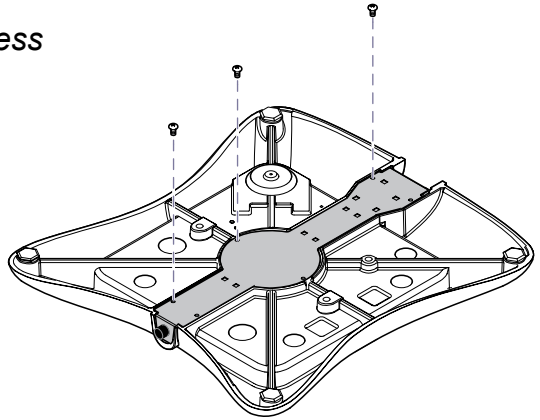
Note: Be sure roll pins (in brake lever) align with springs.

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

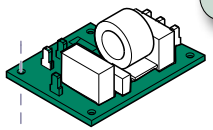
Foot Conrol Inlet / Power Inlet / EMI Filter Board Access

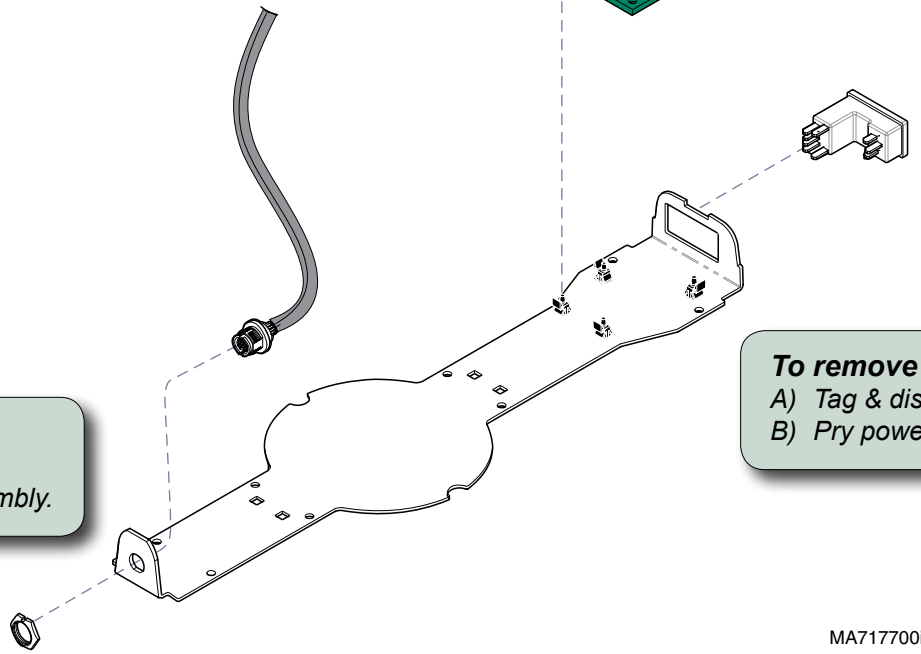
Step 1: Separate upper & lower base castings.

Step 2: Turn lower base assembly upside down. Remove bottom cover.



To remove EMI filter board...
A) Tag & disconnect all wires to board.
B) Remove board from mounting studs.





To remove power inlet...
A) Tag & disconnect all wires to power inlet.
B) Pry power inlet out of bottom cover.

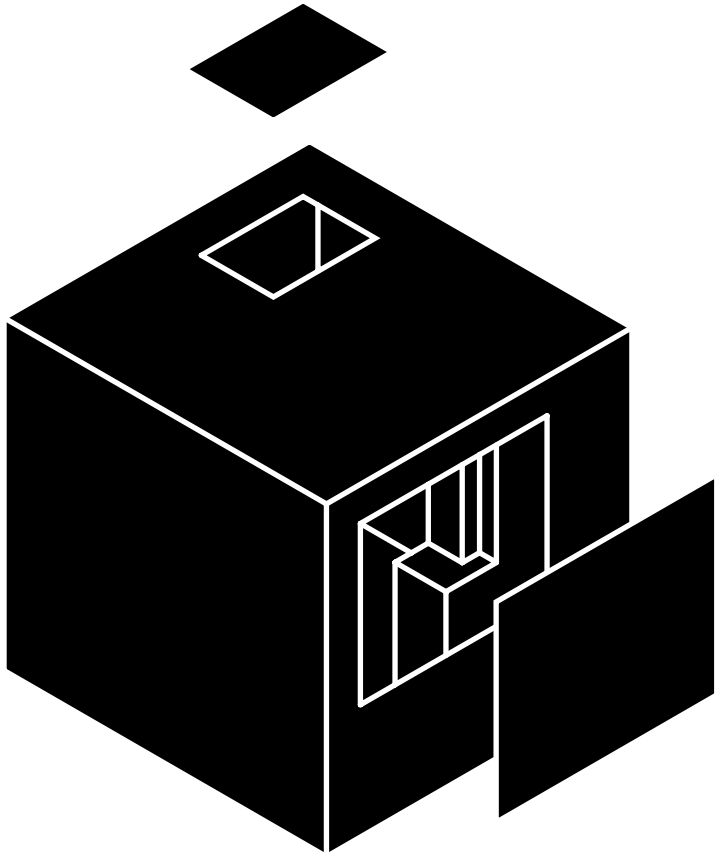
To remove foot control inlet...
A) Unscrew lock nut.
B) Remove foot control inlet / harness assembly.

MA717700i

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

Section C

Access Procedures



PC Board Cover *(models w/ Standard Base)*

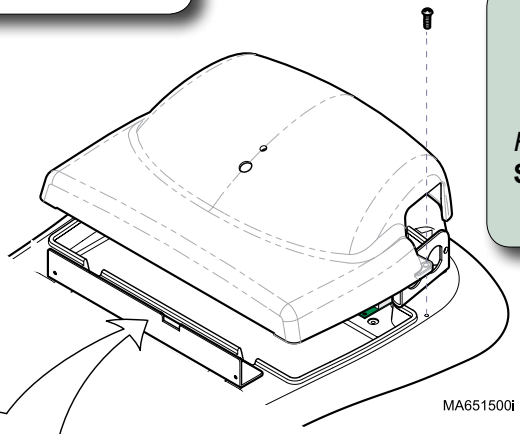
Removal / Installation

Caution
Unplug power cord before removing PC board cover.

Installation
Step 3: Secure cover with two screws.

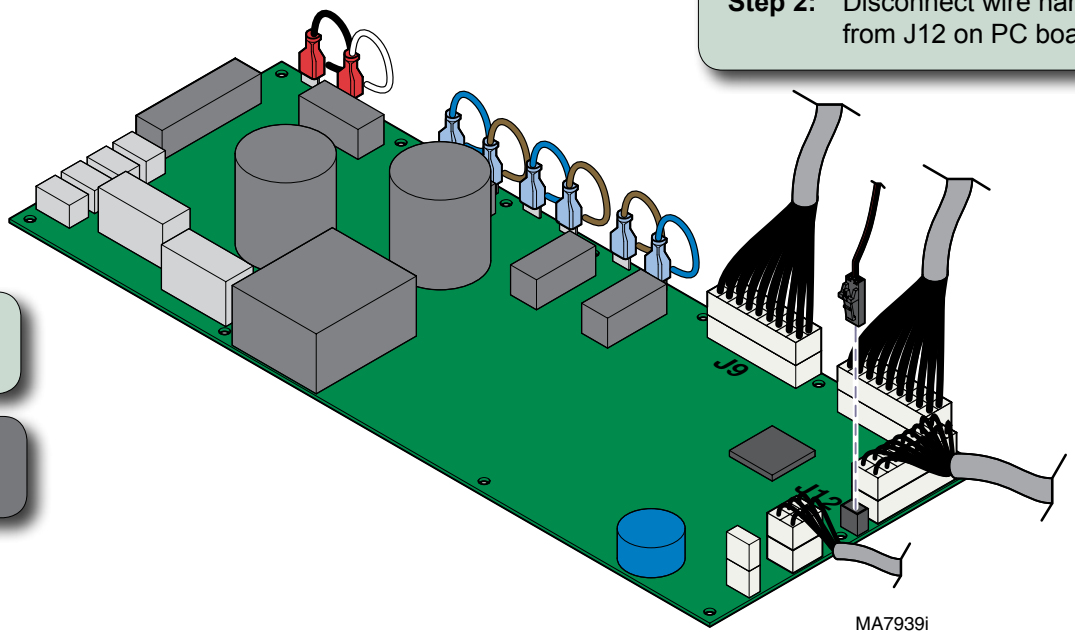
Equipment Alert
You must perform Step 2 before cover can be completely removed.

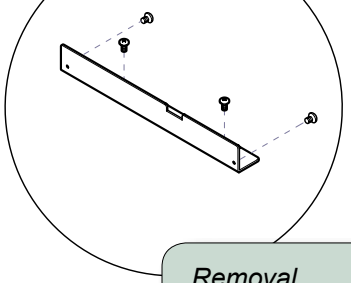
Removal
Step 1: Remove two screws, then **partially** separate cover.



Installation
Step 2: Connect wire harnesses to J12 on PC board.

Removal
Step 2: Disconnect wire harnesses from J12 on PC board.





Removal
Step 3: Remove wire harness cover.

Installation
Step 1: Install wire harnesses cover.

Models:	***647*** *(-001 & 002)*	
Serial Numbers:	*all*	

Always verify model & serial number

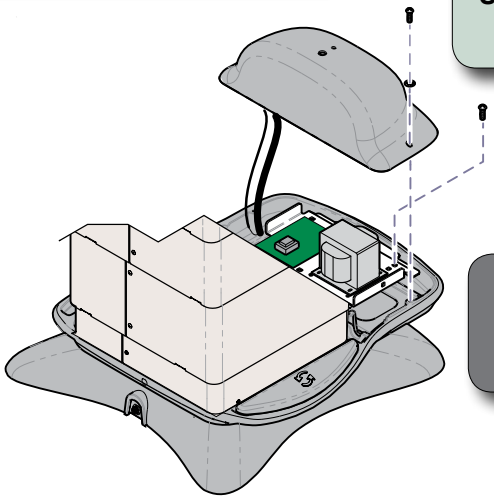
PC Board Cover *(models w/ Rotational Base)*

Removal / Installation

Caution
Unplug power cord before removing PC board cover.

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

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

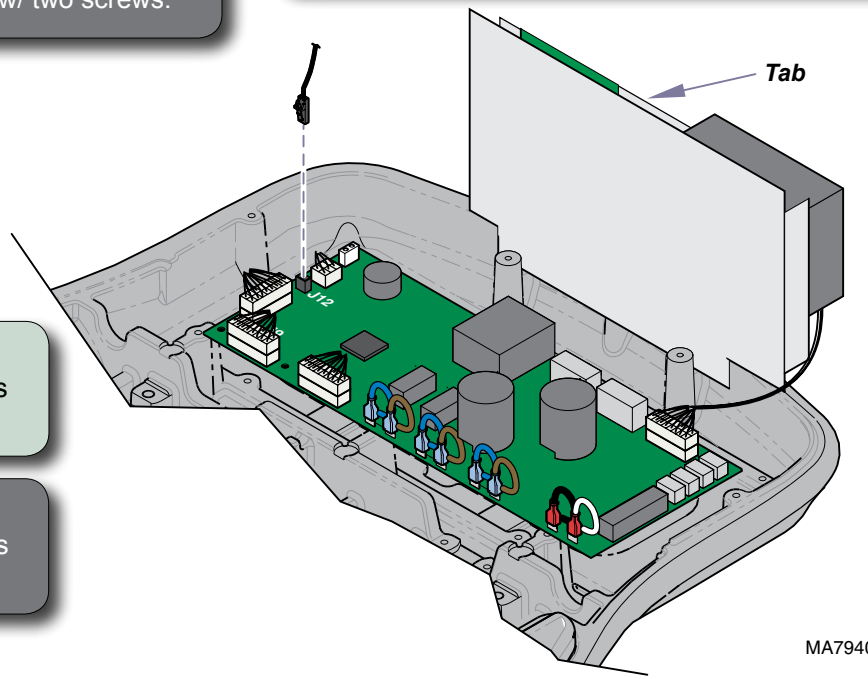


Removal
Step 2: Remove two screws from transformer mtg. plate.

Installation
Step 3: Secure transformer mtg. plate. Secure cover w/ two screws.

Installation
Step 2: Position transformer mtg. plate so that tab is engaged.

Removal
Step 3: Pull transformer mtg. plate out to disengage tab. Prop mtg. plate up behind two standoffs as shown.



Removal
Step 4: Disconnect wire harnesses from J12 on PC board.

Installation
Step 1: Connect wire harnesses to J12 on PC board.

MA7940i

Models:	***647*** *(-003 & -004)*	
Serial Numbers:	*all*	

 [Revised: dd/mo/yr]

Always verify model & serial number

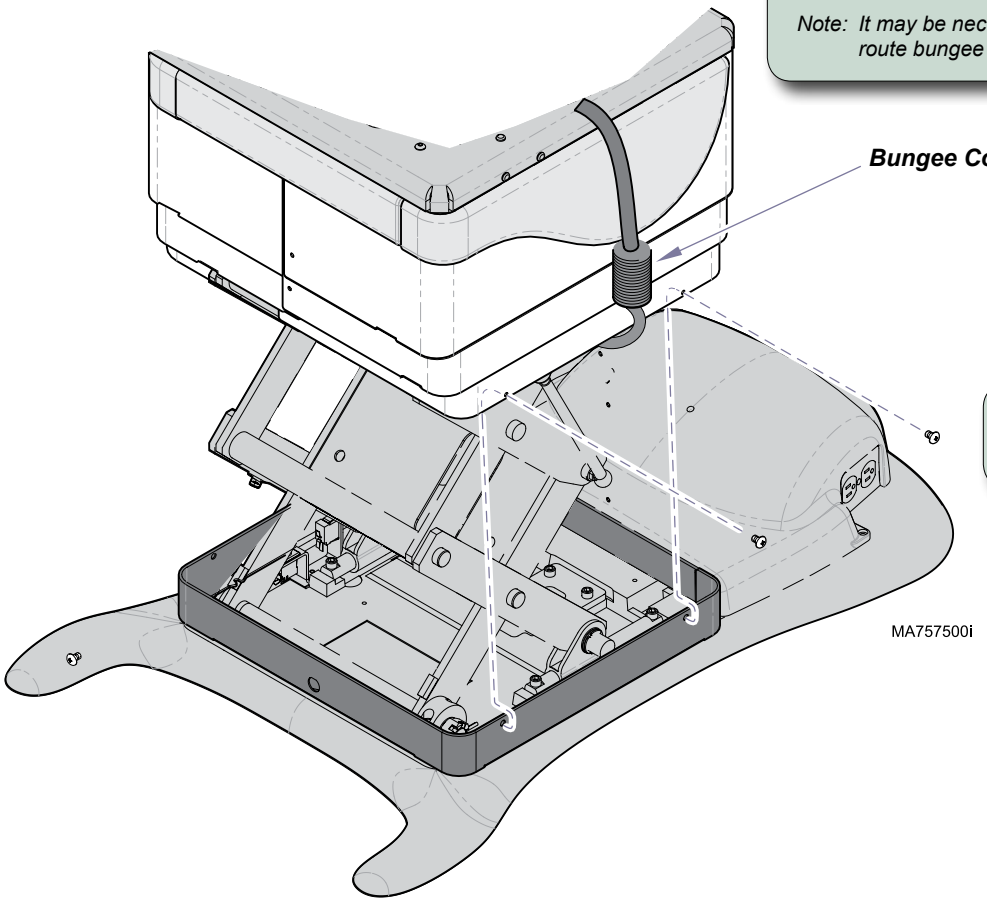
Base Shrouds

Raising (w/bungee cord)

Step 3: Lift shrouds, then attach bungee cord hooks under shrouds on both sides.

Step 2: Stretch bungee cord across top of base column *(under seat)*.

Note: It may be necessary to run Tilt Up function to route bungee cord under seat section.



Step 1: Remove bottom screws from inner shrouds.

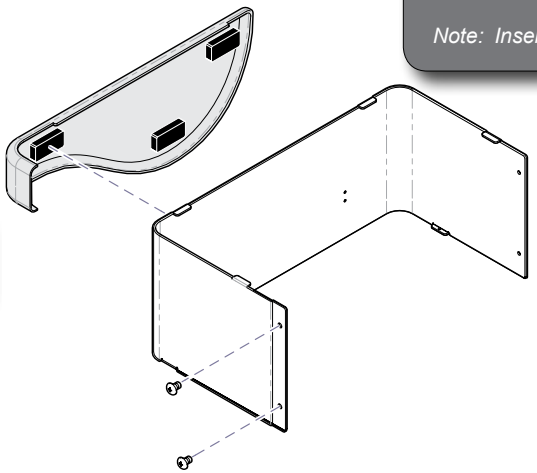
Models:	***647***	
Serial Numbers:	*all*	

Base Shrouds *- continued*

Lowering / Removal / Installation

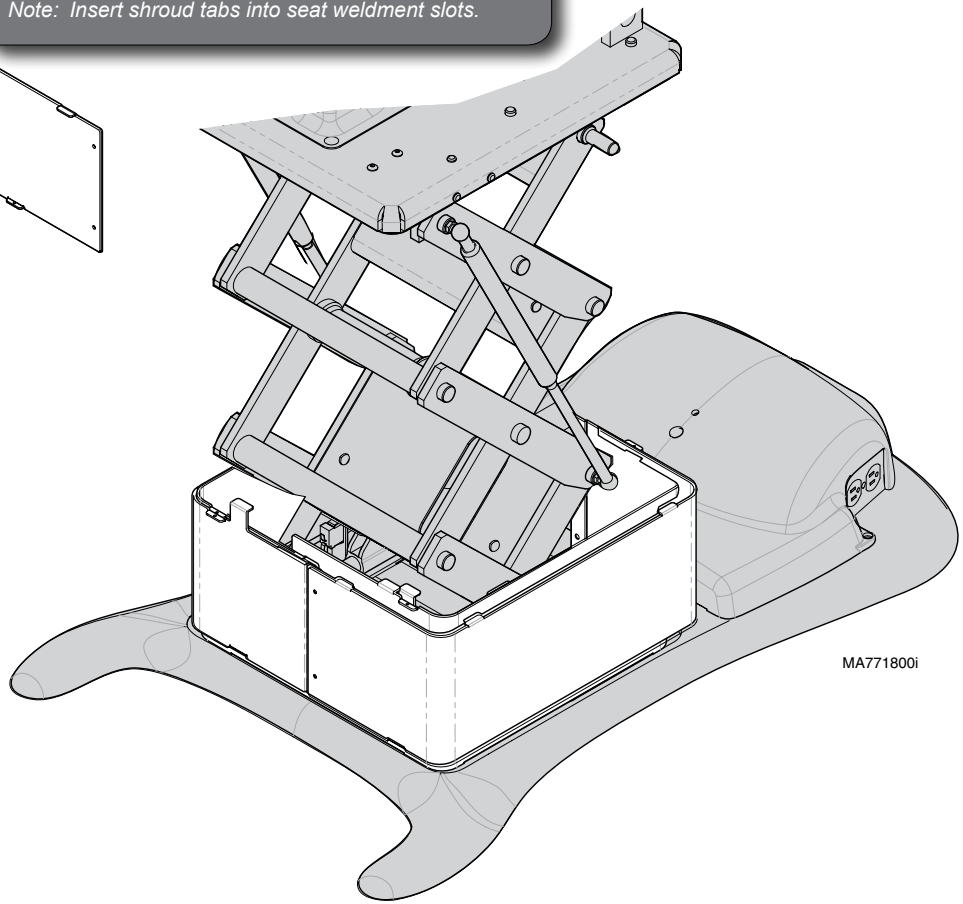
Lowering / Removal
Step 1: Remove magnetic cladding (3 pcs).

Installation
Step 3: Install magnetic cladding.



Installation
Step 2: Position outer shrouds.
Secure with screws at both sides.

Note: Insert shroud tabs into seat weldment slots.



Equipment Alert
Lower the base before performing Step 2. This will prevent the shrouds from falling when the outer shrouds are removed.

Lowering / Removal
Step 2: Remove screws from outer shrouds only.
Pull shrouds outward to disengage tabs.

Installation
Step 1: Position inner shrouds, then secure w/ screws.
Repeat for middle shrouds.

Note: Be sure shroud tabs stack on top of each other.

Equipment Alert
The middle & inner shroud sets are different sizes. Be sure to keep the sets together.

Removal
Step 3: Remove screws from inner & middle shrouds.

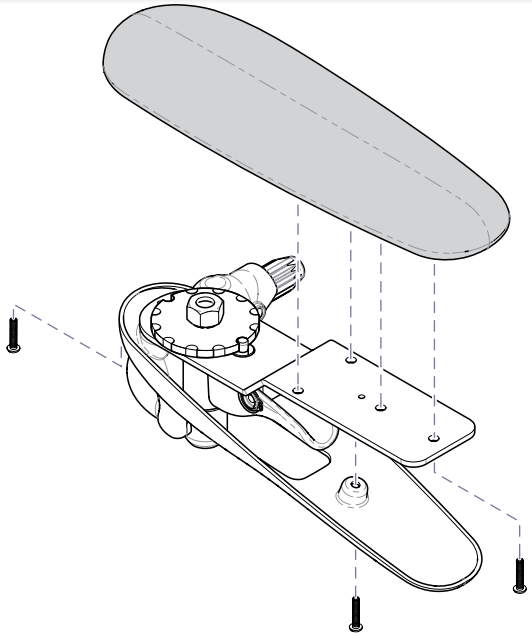
Models:	***647***	
Serial Numbers:	*all*	

Upholstery

Removal / Installation

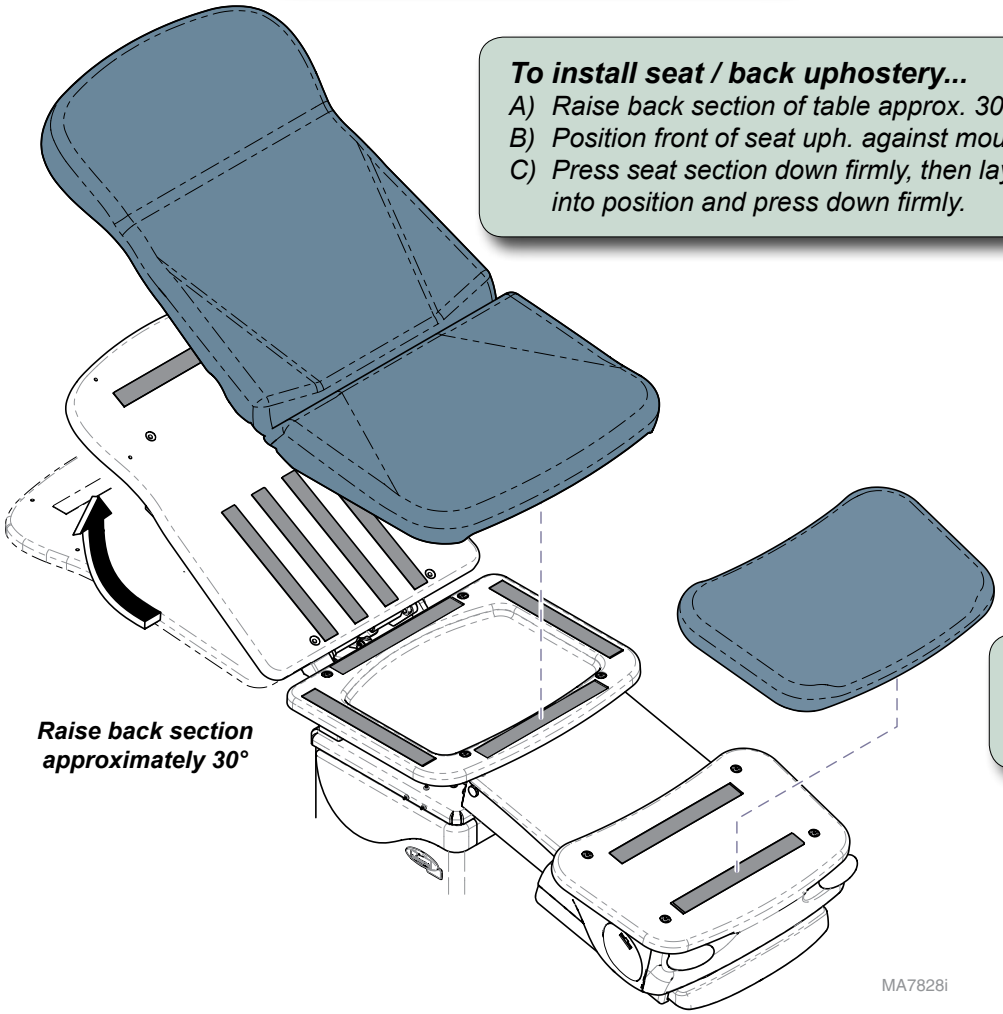
Note
Upholstery is fastened with velcro. To remove, simply pull desired section away from mounting surface.

To replace chair arm uphostery...
A) Remove two screws securing bottom cover.
B) Remove four screws securing upholstered pad.
C) Position new upholstered pad, then secure with four screws.
D) Position bottom cover, then secure with two screws



MA8217i

To install seat / back uphostery...
A) Raise back section of table approx. 30°.
B) Position front of seat uph. against mounting board.
C) Press seat section down firmly, then lay back section into position and press down firmly.



Raise back section approximately 30°

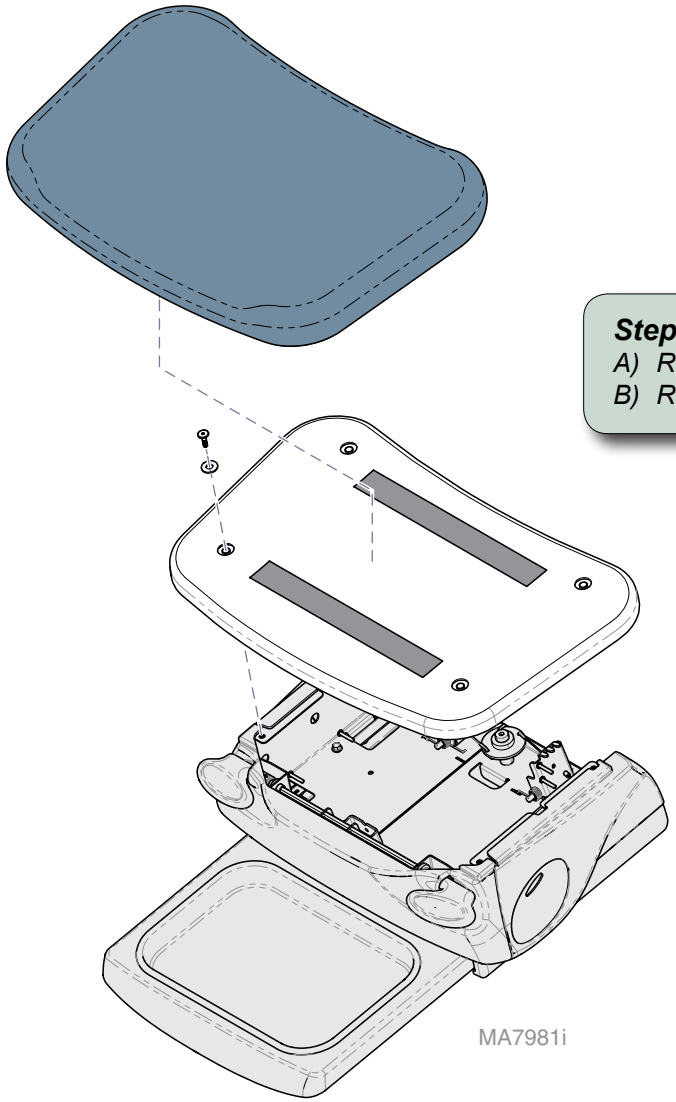
MA7828i

To install foot section uphostery...
A) Position foot upholstery on mounting board.
B) Press down firmly.

Models:	***647***	
Serial Numbers:	*all*	

Foot Extension Covers

Removal / Installation



Step 1: Remove Upholstery and Substrate.

A) Remove foot extension upholstery.

B) Remove four screws and foot extension substrate.

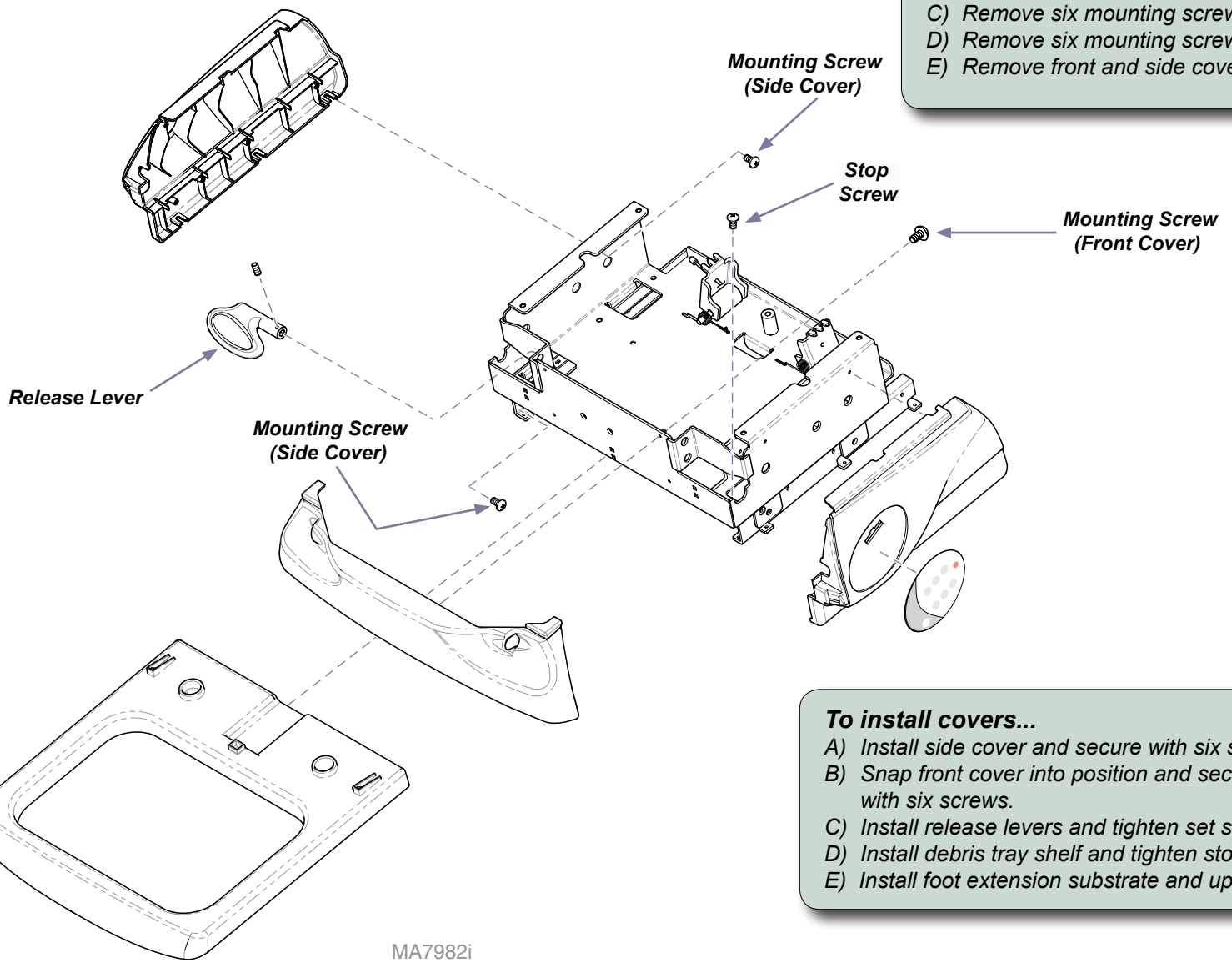
Models:	***647***	
Serial Numbers:	*all*	

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.



MA7982i

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.

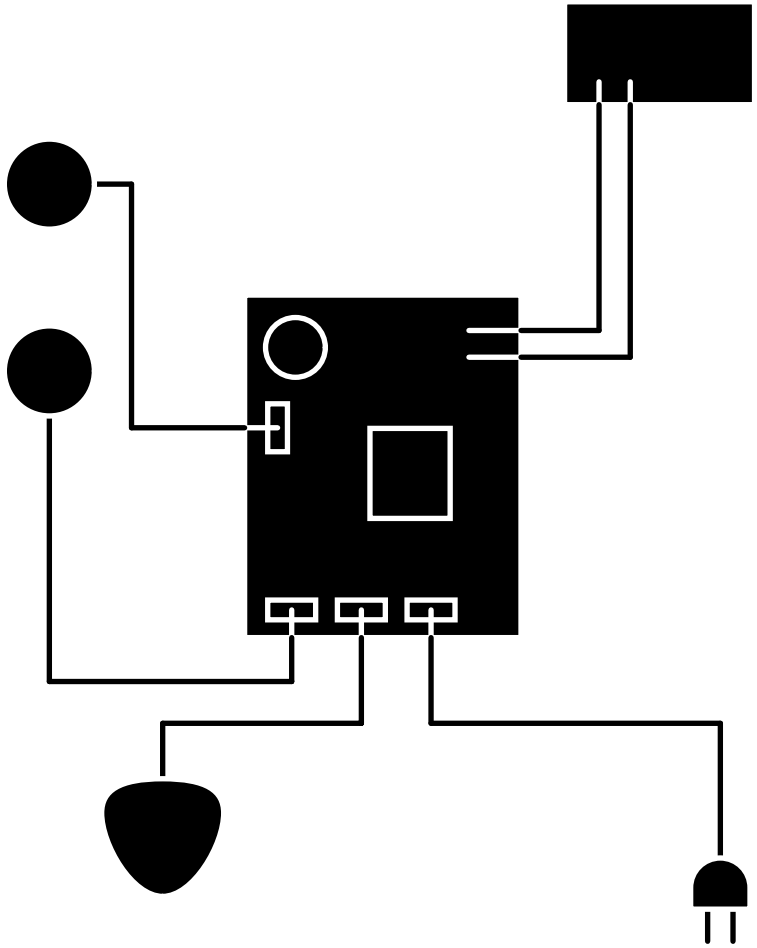
Models:	***647***	
Serial Numbers:	*all*	

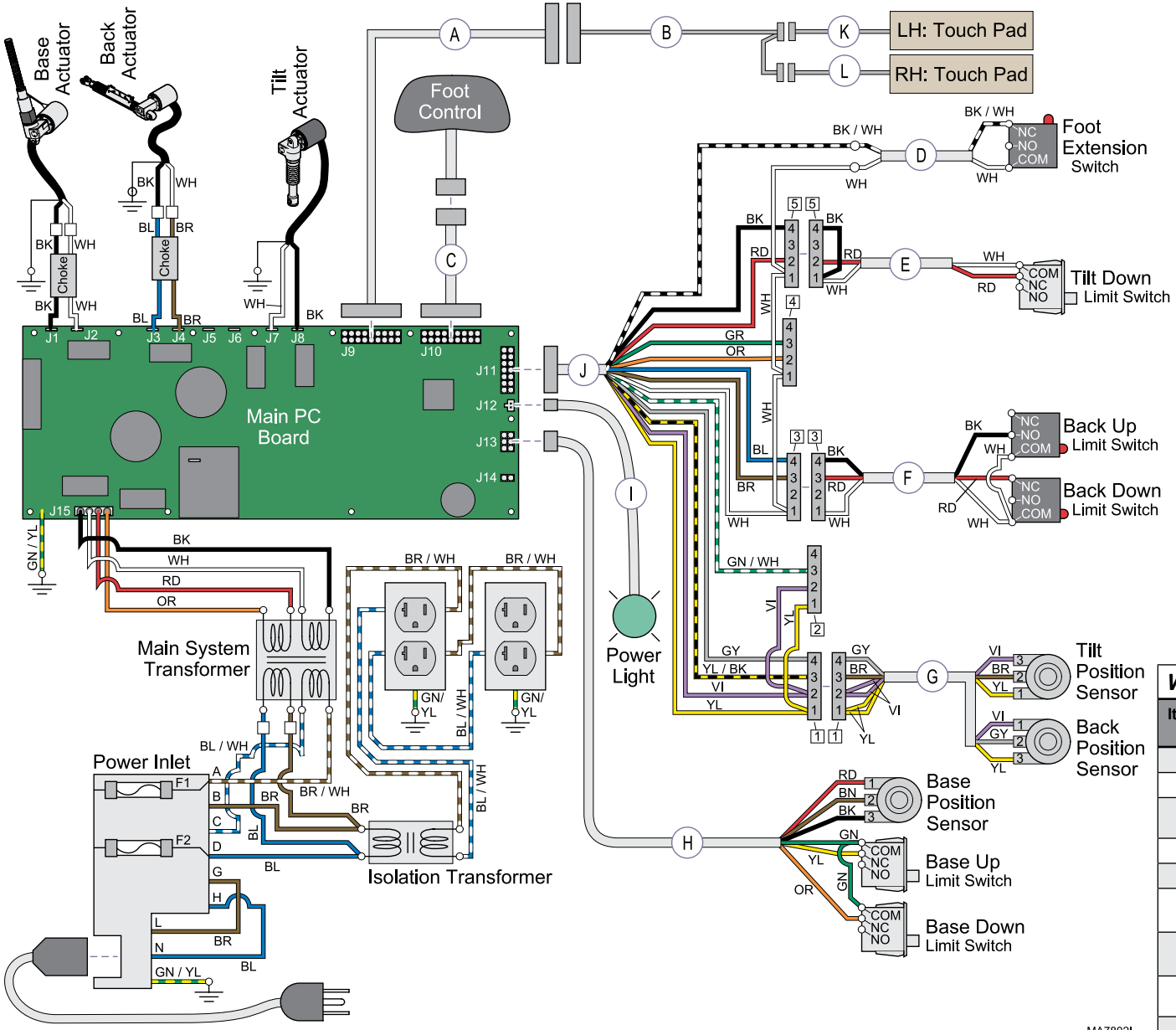
Always verify model & serial number

Section D

Wiring Diagrams

647:



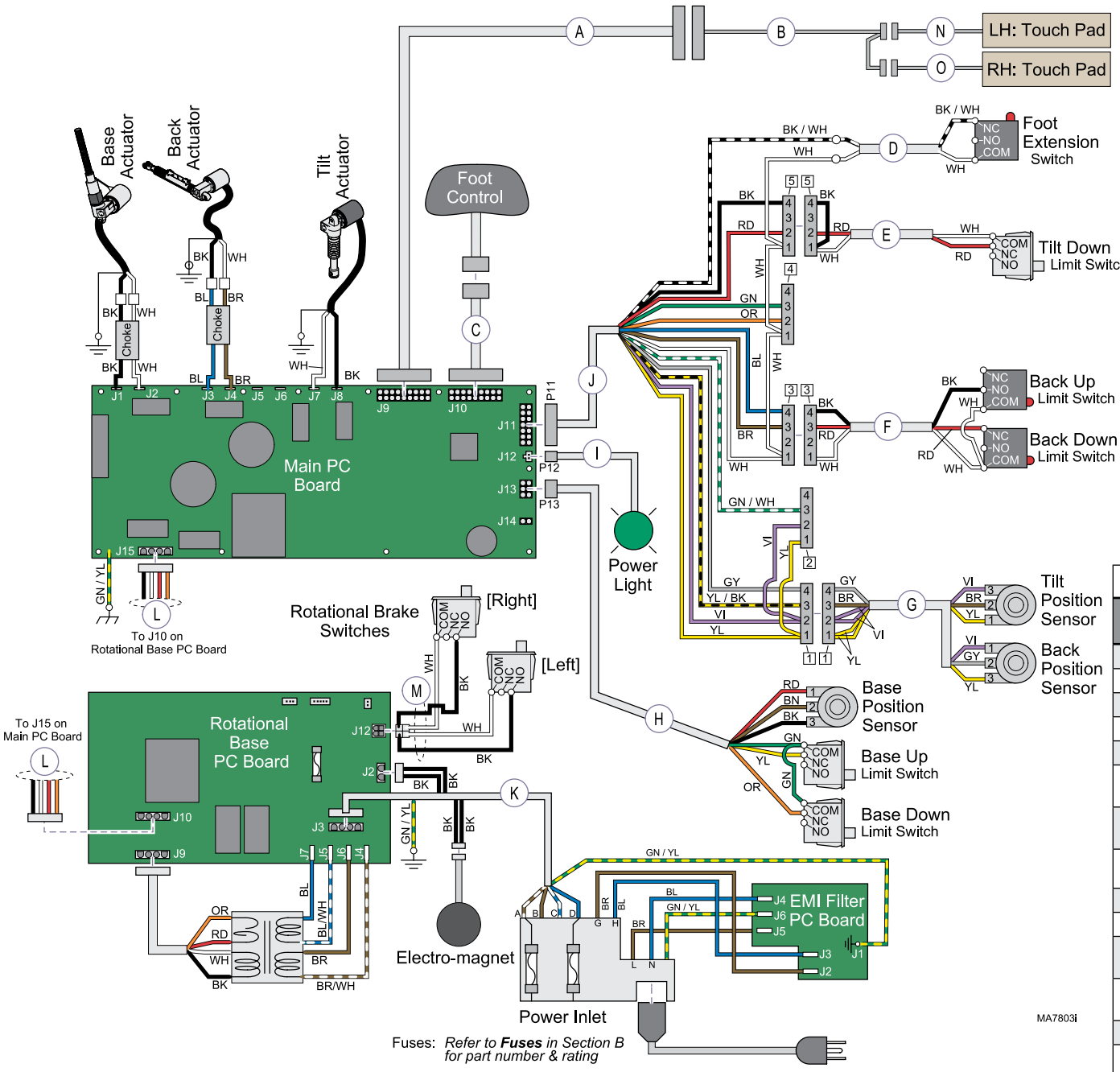


Wiring Diagram: 647 (-001 / -002)

Item	Description *(sensors & switches not included unless noted)*	Part Number
A	Touch Pad Extension Harness	015-2375-00
B	Touch Pad Harness	015-2377-00
C	Connection Port Harness *(long - foot end)*	002-1110-01
D	Foot Extension Switch Harness	015-2311-00
E	Tilt Down Limit Switch Harness	015-2107-00
F	Back Limit Switch Assembly *(incl. harness & two switches)*	015-2097-00
G	Tilt & Back Position Sensor Harness *(incl. both sensors)*	015-1761-00
H	Base Position Sensor / Limit Switch Harness	015-1821-00
I	Power Light Harness *(incl. green light)*	015-1793-00
J	'PC Board to Junction Board' Harness	015-1937-00
K	LH Touch Pad: *Non-Programmable*	015-2355-00
	Programmable	015-2356-00
L	RH Touch Pad: *Non-Programmable*	015-2355-01
	Programmable	015-2356-01

Models:	***647** (-001 & -002)*
Serial Numbers:	*all*

Always verify model & serial number



Wiring Diagram: 647 (-003 / -004)

Item	Description *(sensors & switches not included unless noted)*	Part Number
A	Touch Pad Extension Harness	015-2375-00
B	Touch Pad Harness	015-2377-00
C	Connection Port Harness	002-1110-03
D	Foot Extension Switch Harness	015-2311-00
E	Tilt Down Limit Switch Harness	015-2107-00
F	Back Limit Switch Assembly *(incl. harness & two switches)*	015-2097-00
G	Tilt & Back Position Sensor Harness *(incl. both sensors)*	015-1761-00
H	Base Position Sensor / Limit Switch Harness	015-1821-00
I	Power Light Harness *(incl. green light)*	015-1793-00
J	'PC Board to Junction Board' Harness	015-1937-00
K	Rot. Base PC Board to Power Inlet Harness	015-1966-00
L	Rot. Base PC Board to Main PC Board Harness	015-1968-00
M	Brake Pedal Switch Harness	015-1967-00
N	LH Touch Pad: *Non-Programmable*	015-2355-00
	Programmable	015-2356-00
O	RH Touch Pad: *Non-Programmable*	015-2355-01
	Programmable	015-2356-01

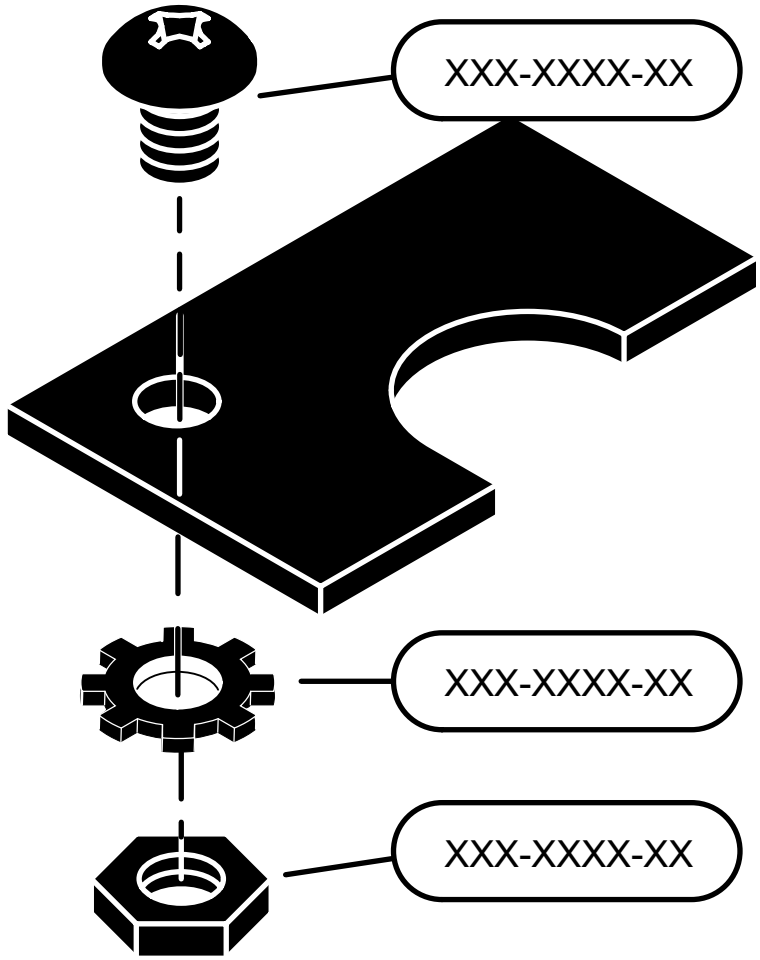
Models:	**647** *(-003 & -004)*
Serial Numbers:	*all*

Always verify model & serial number

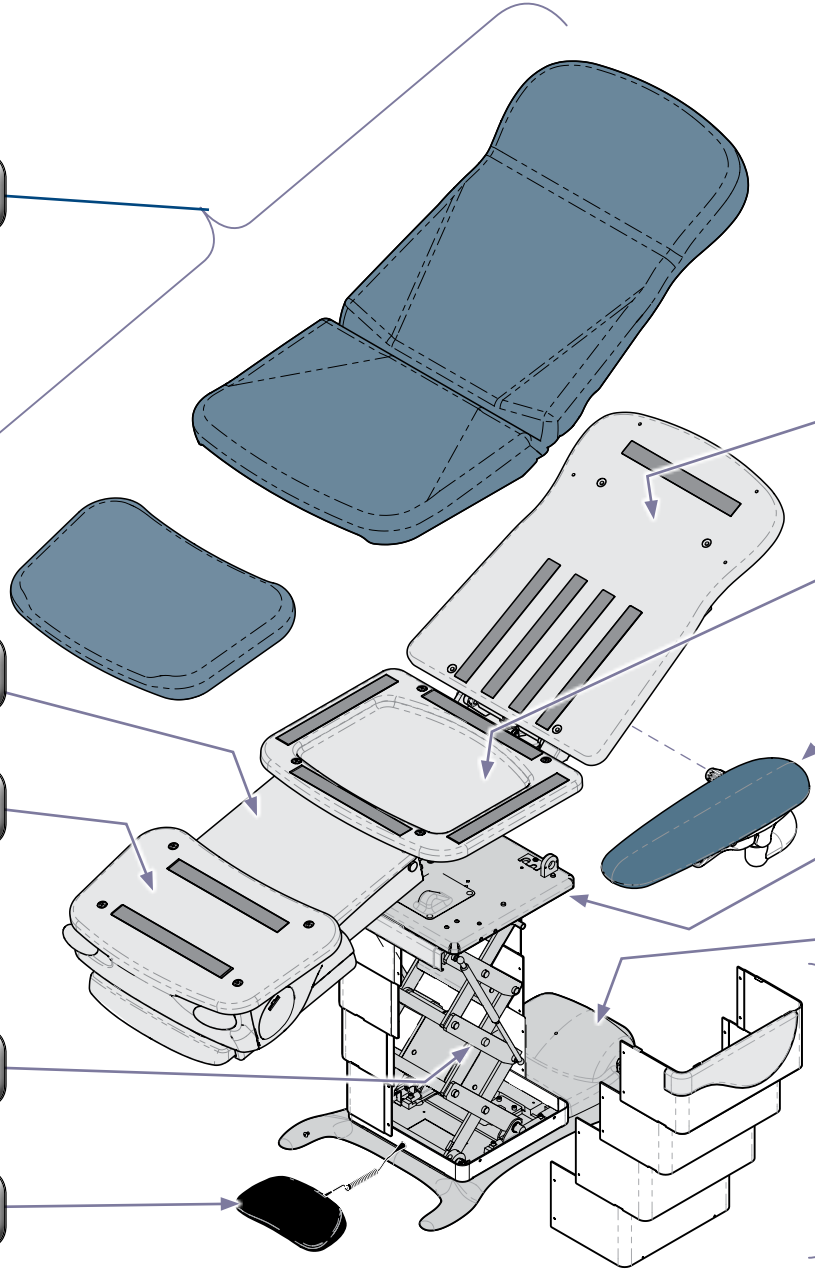
Models:	
Serial Numbers:	

Section E

Exploded Views & Parts Lists



647 (-001 / -002)
Standard Base



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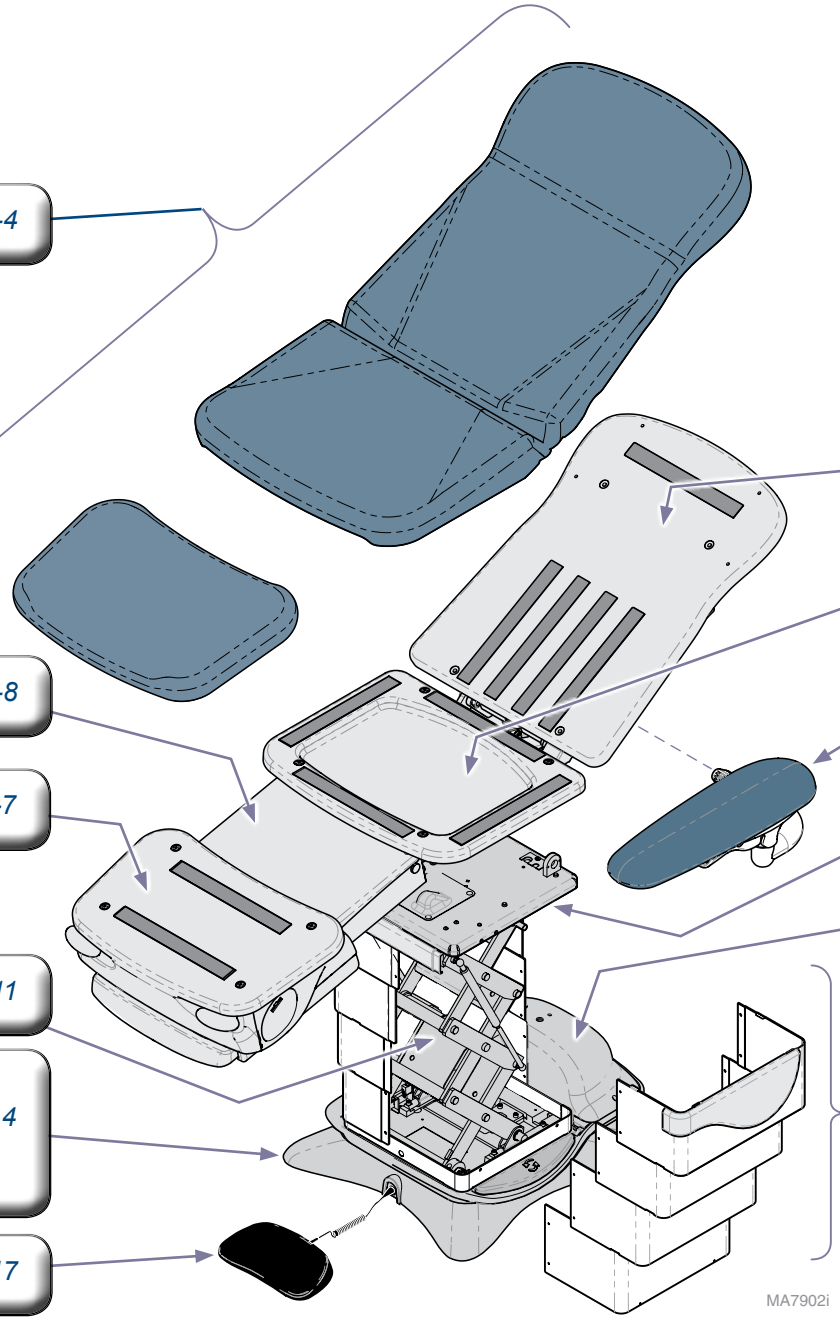
Models:	647 (-001 / -002)	
Serial Numbers:	all	

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

Always verify model & serial number

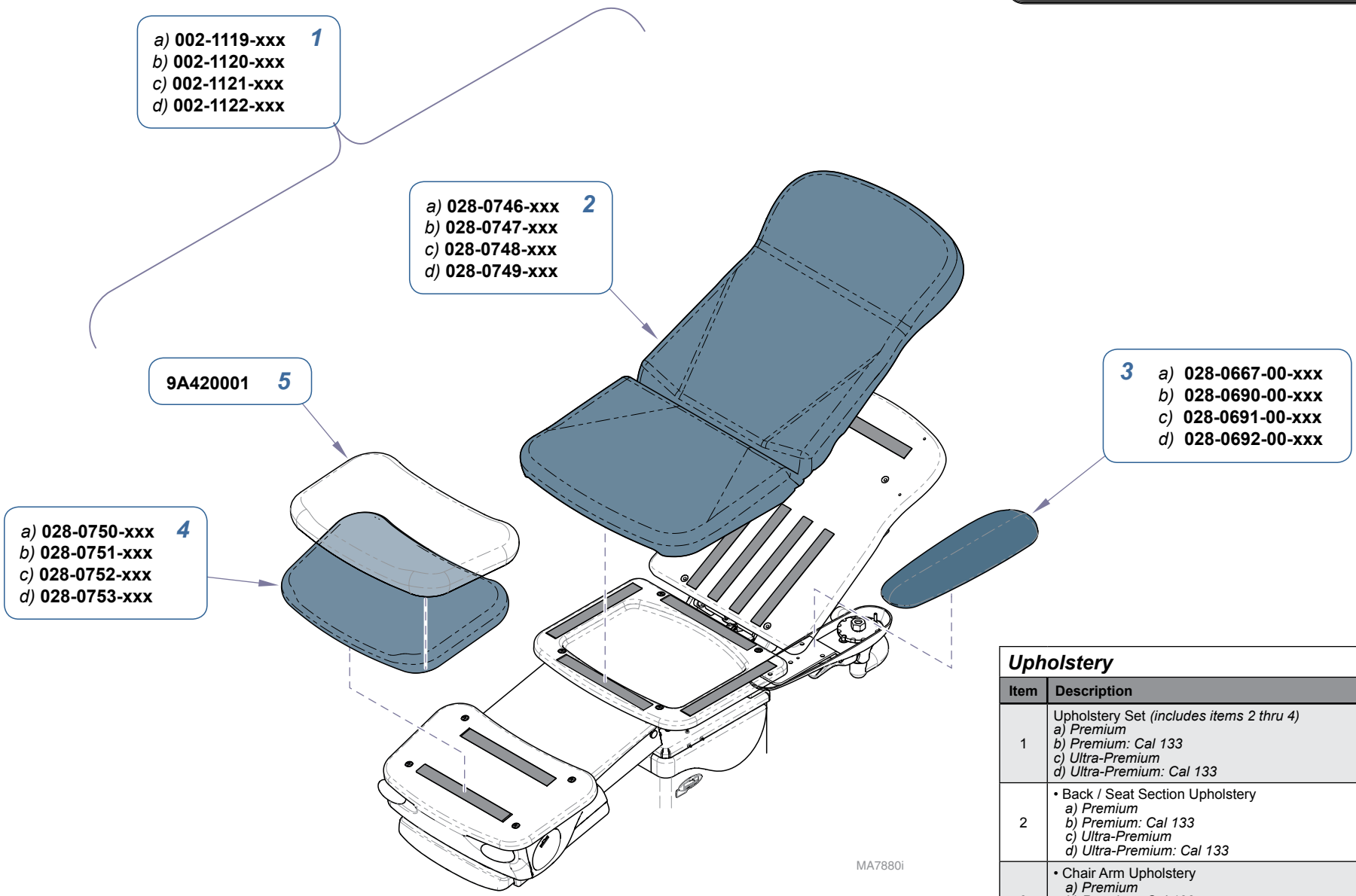
647 (-003 / -004)
Rotational Base



Models:	647 (-003 / -004)
Serial Numbers:	all

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

Always verify model & serial number

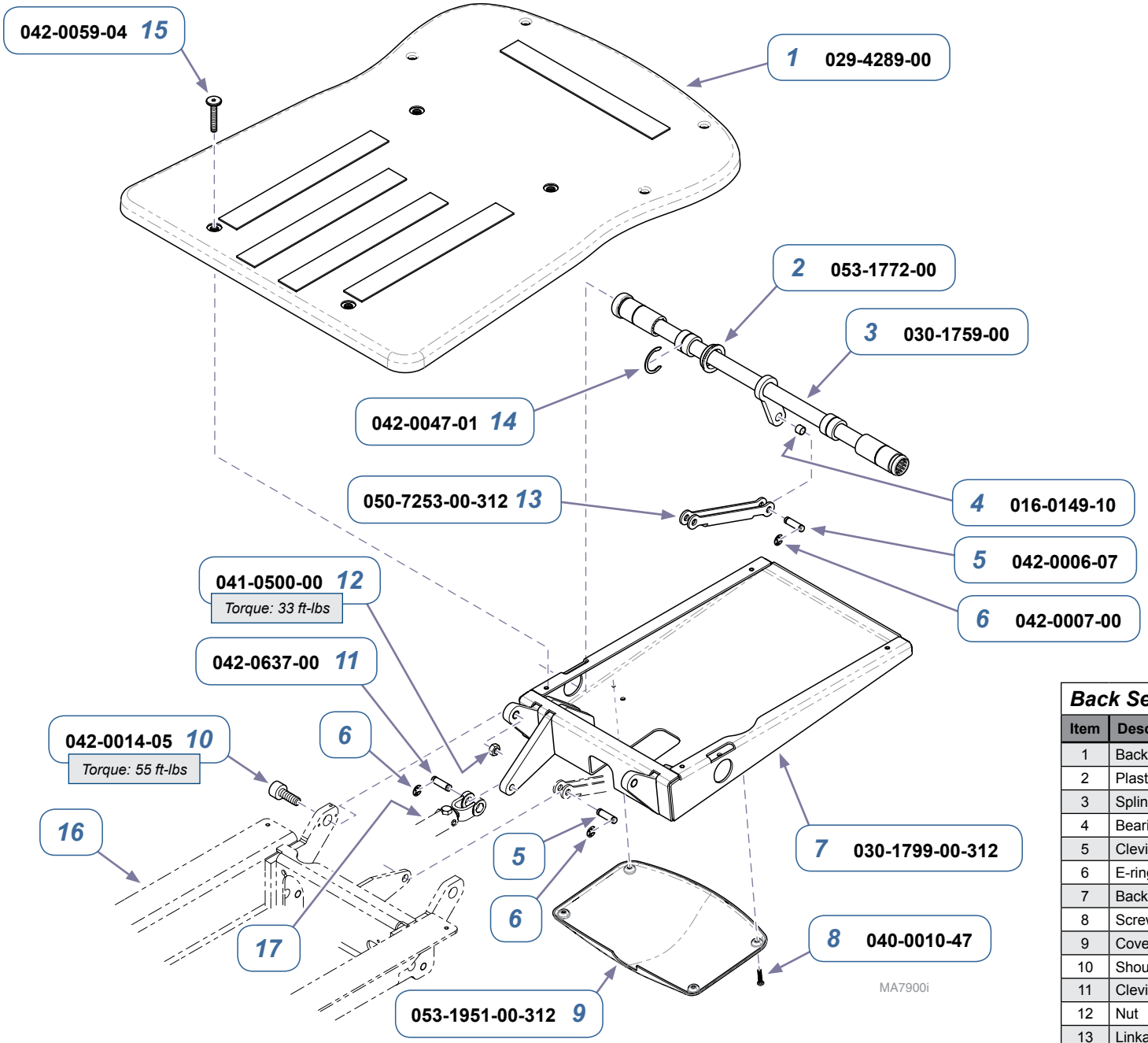


Models:	647	
Serial Numbers:	all	

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

Always verify model & serial number

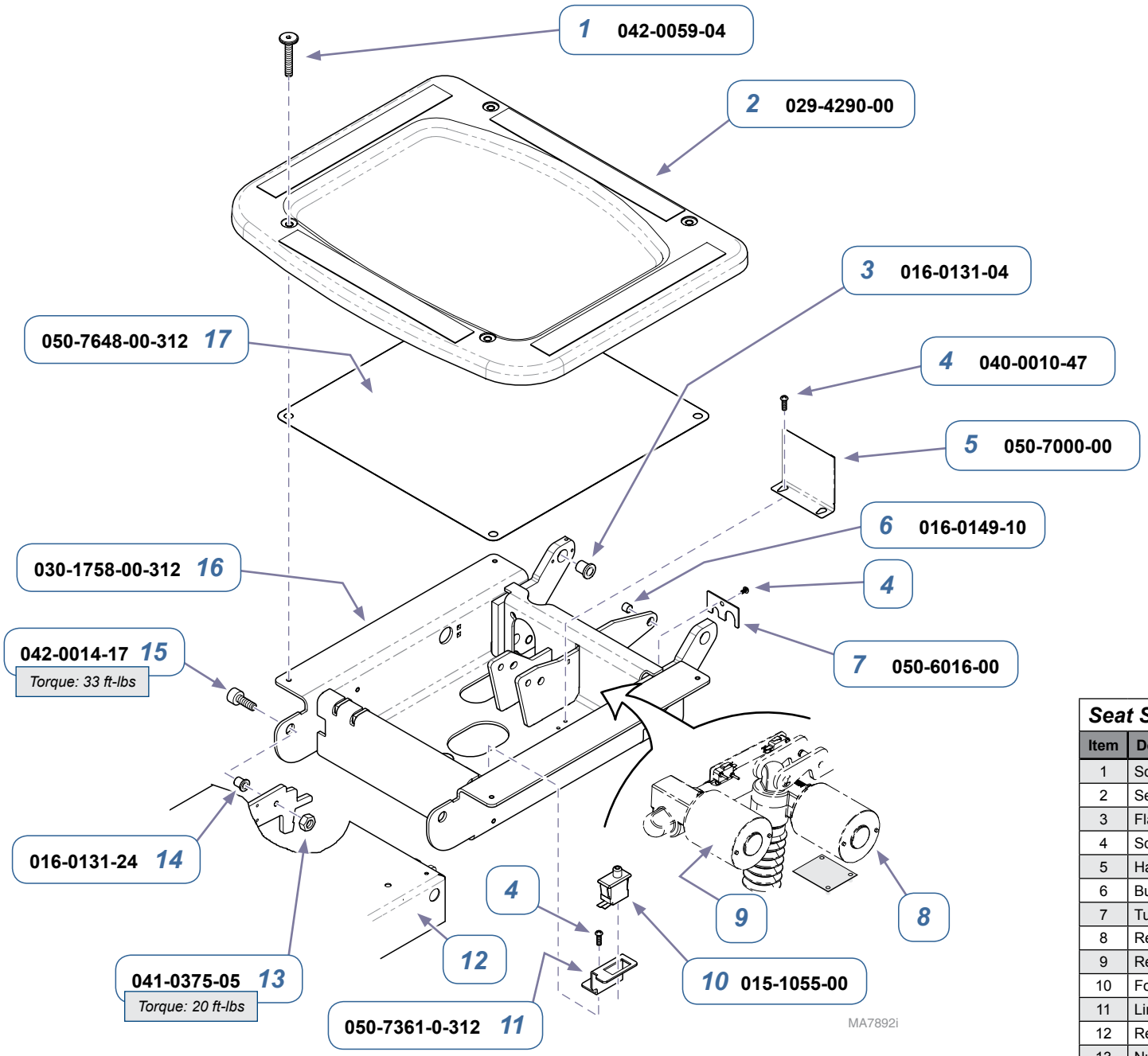


Back Section

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	Shouler 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:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number

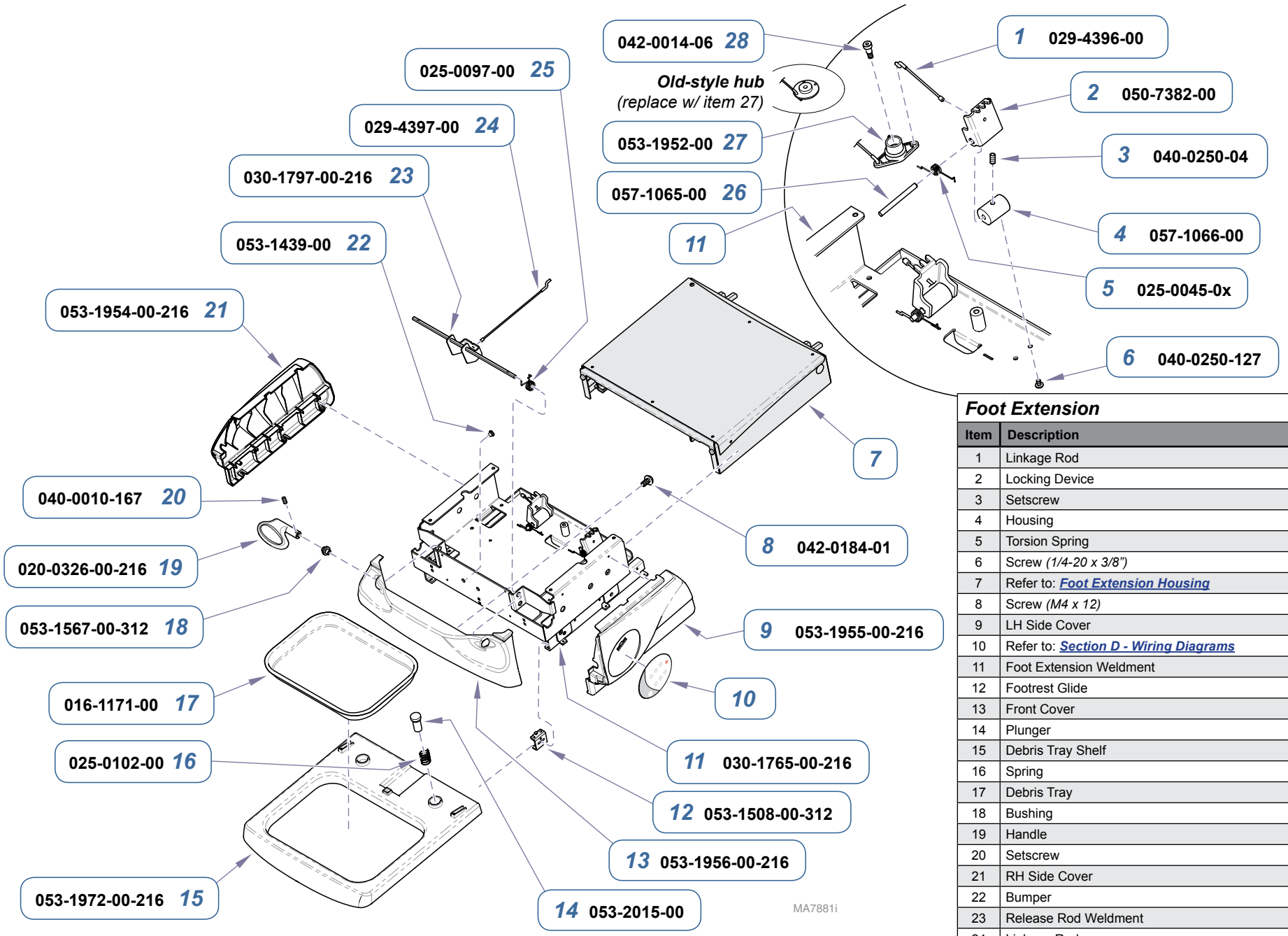


Seat Section

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***	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:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number

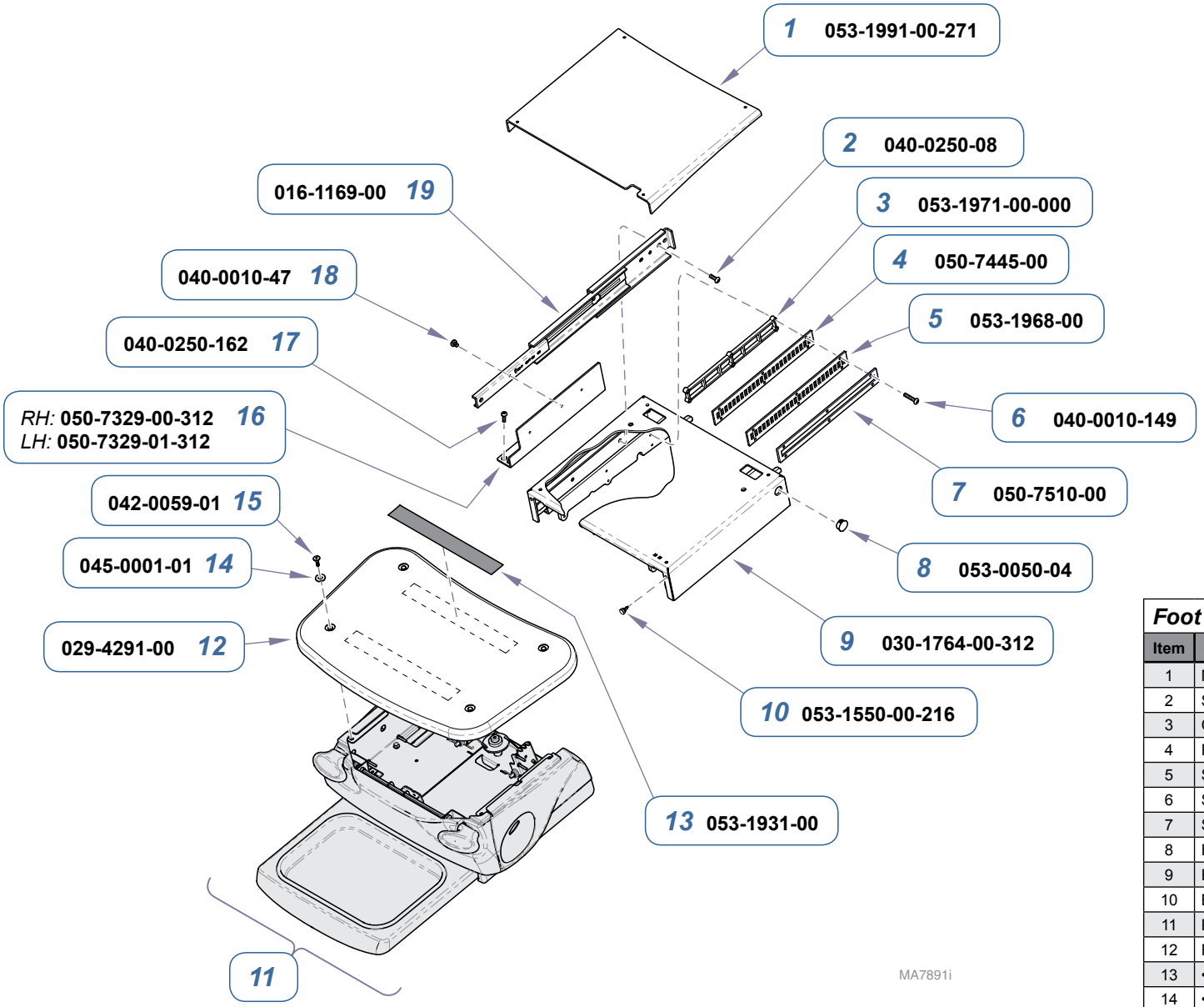


Foot Extension

Item	Description	Qty.
1	Linkage Rod	2
2	Locking Device	2
3	Setscrew	2
4	Housing	2
5	Torsion Spring	2
6	Screw *(1/4-20 x 3/8")*	4
7	Refer to: ***Foot Extension Housing***	Ref
8	Screw *(M4 x 12)*	4
9	LH Side Cover	1
10	Refer to: ***Section D - Wiring Diagrams***	Ref
11	Foot Extension Weldment	1
12	Footrest Glide	6
13	Front Cover	1
14	Plunger	2
15	Debris Tray Shelf	1
16	Spring	2
17	Debris Tray	1
18	Bushing	2
19	Handle	2
20	Setscrew	2
21	RH Side Cover	1
22	Bumper	2
23	Release Rod Weldment	1
24	Linkage Rod	1
25	Spring	1
26	Rod	1
27	Foot Release Hub	1
28	Shoulder Screw	1

Models:	647	
Serial Numbers:	all	

Always verify model & serial number

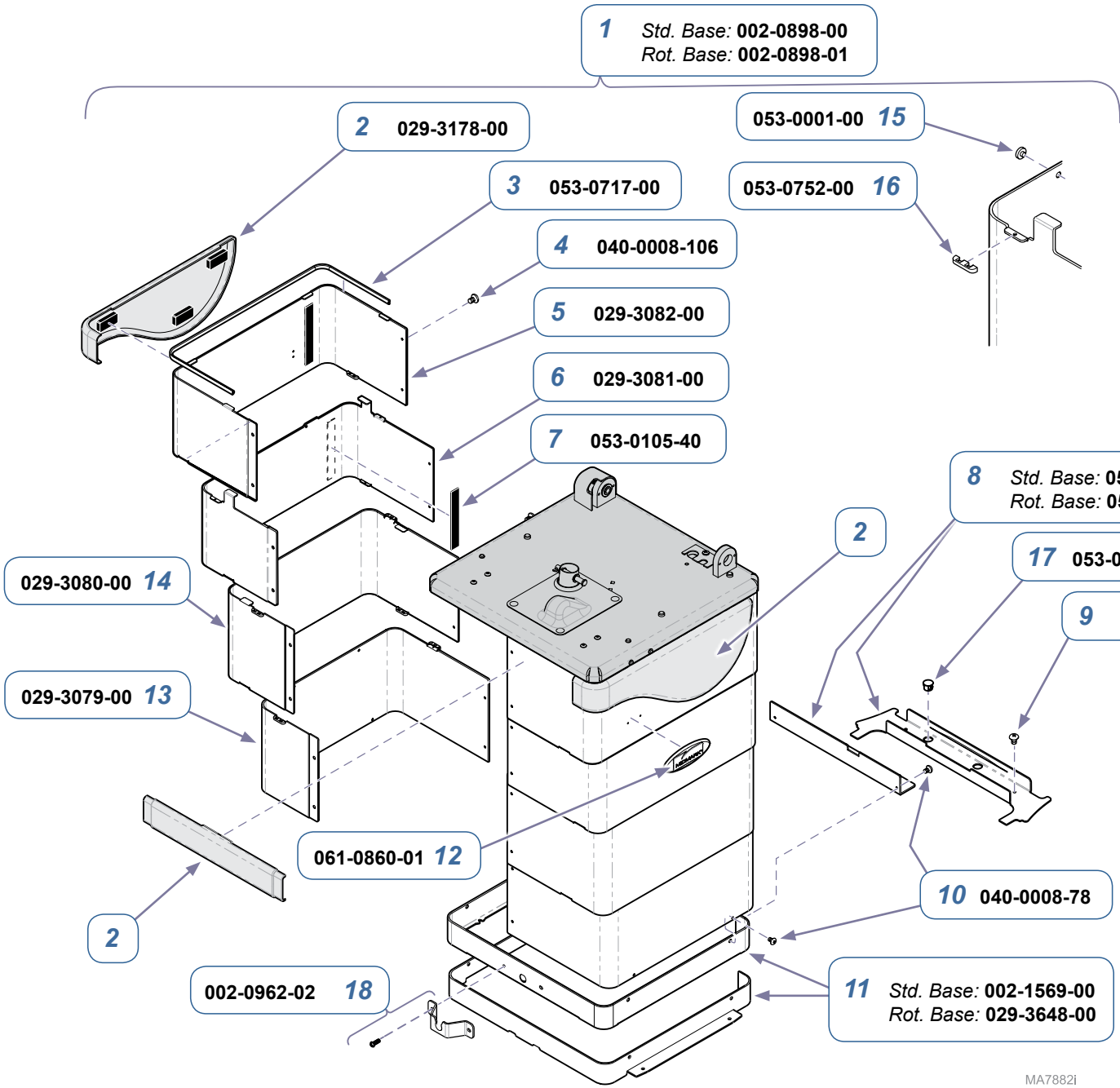


Models:	647	
Serial Numbers:	all	

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

Always verify model & serial number

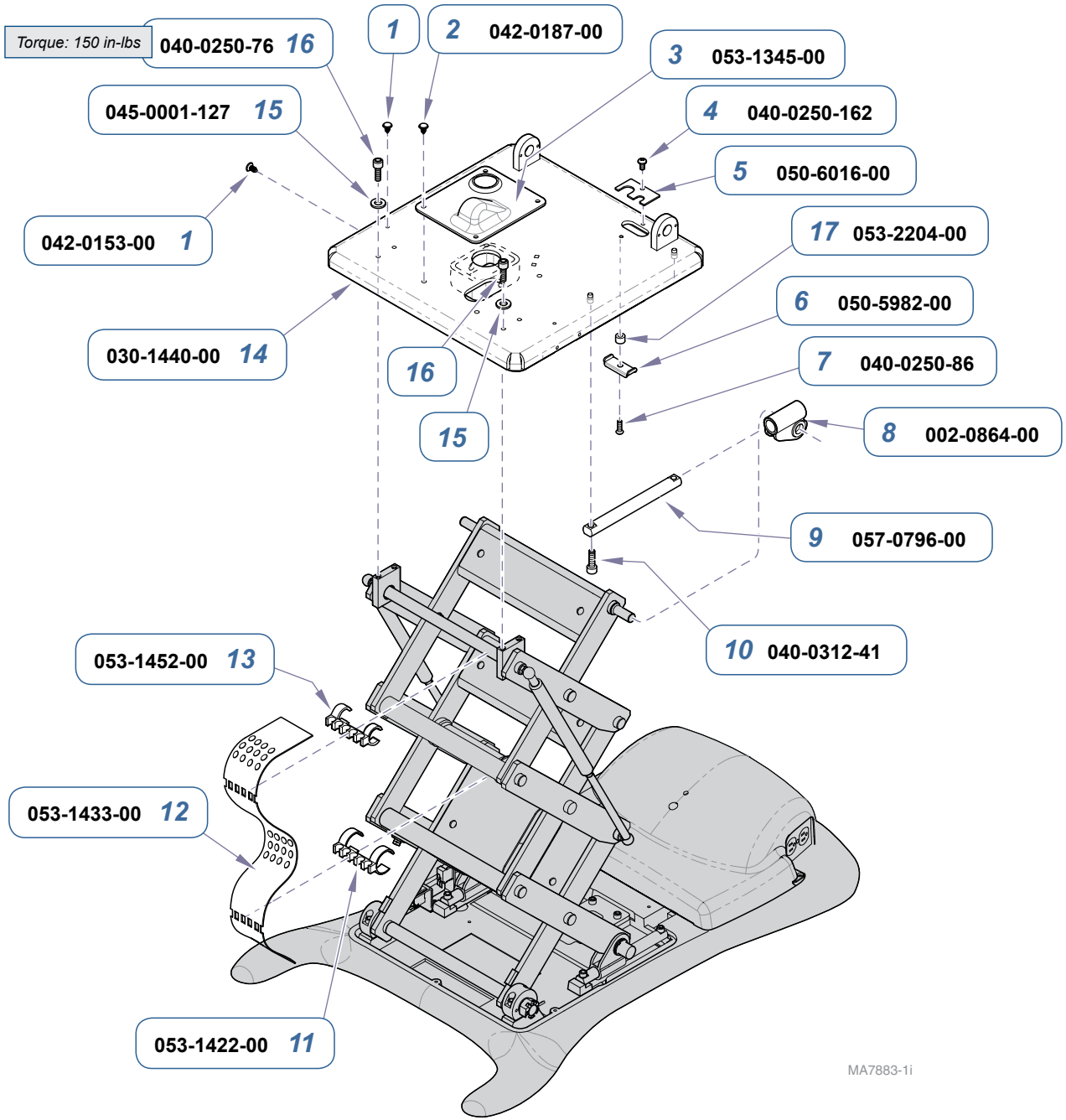


Base Shrouds

Item	Description	Qty.
1	Base Shroud Set *(includes items 2 thru 17)*	1
2	• Cladding Set *(includes RH, LH, & front pieces)*	1
3	• Outer Shroud Seal	1
4	• Screw *(#8-32 x 1/4", truss head)*	10
5	• Outer Shroud Assembly	2
6	• Middle-Outer Shroud Assembly	2
7	• Velcro Loop	4
8	• Wire Harness Cover	1
9	• Screw *(#10-24 x 3/8", pan head)*	2
10	• Screw *(#8-32 x 1/4", pan head)*	10
11	• Shroud Spacer *(Std. Base includes two #8-32 x 3/8" screws)*	1
12	• Midmark Nameplate	2
13	• Inner Shroud Assembly	2
14	• Middle-Inner Shroud Assembly	2
15	• Bumper	2
16	• Snap-on Guide	24
17	• Hole Plug	2
18	Control Cord Bracket Kit *(includes bracket, two #8-32 x 3/8" screws, & two nuts)*	1

Models:	**647**
Serial Numbers:	*all*

Always verify model & serial number

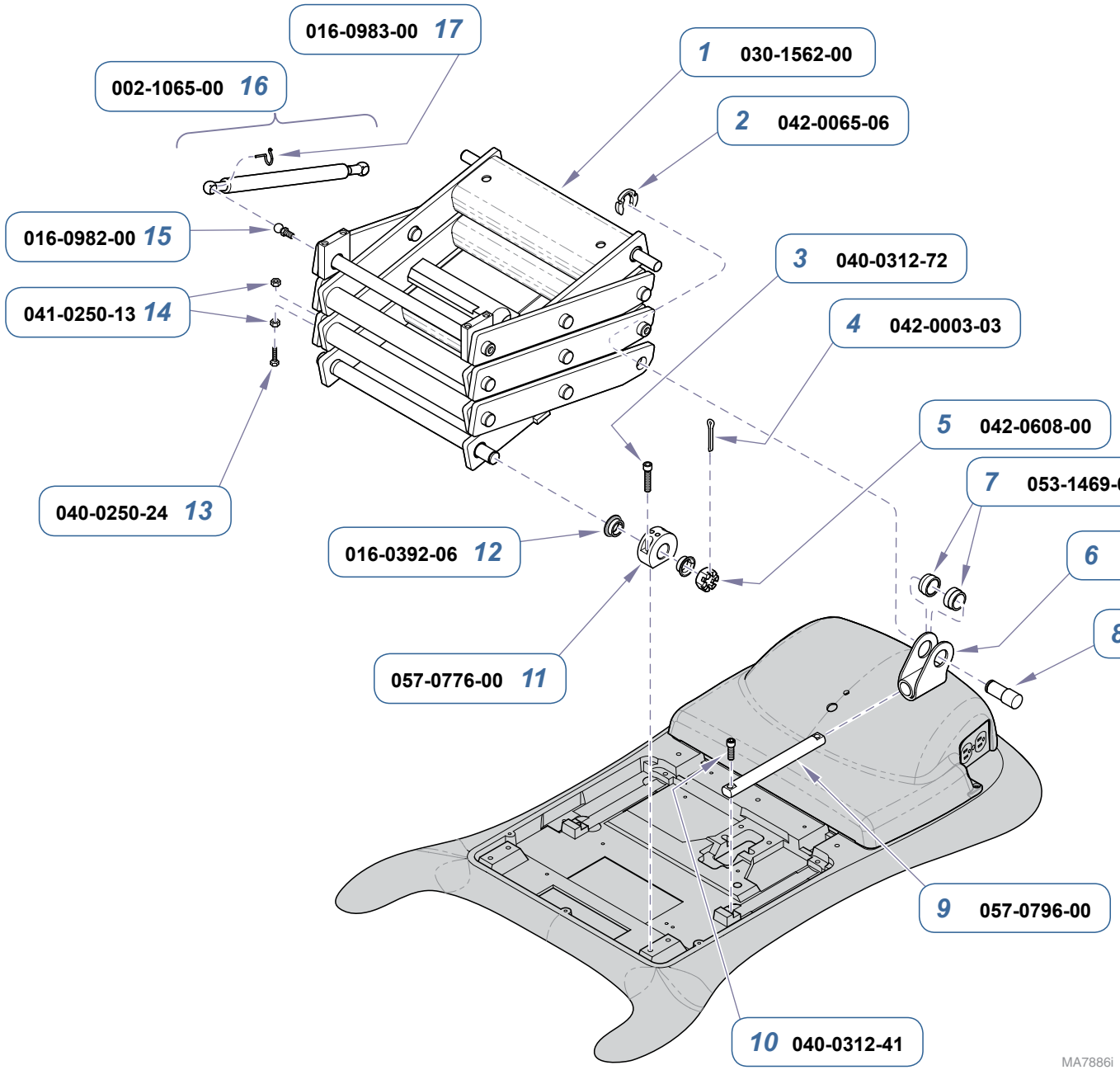


Models:	647	
Serial Numbers:	all	

Column Top Components

Item	Description	Qty.
1	Drive Rivet	6
2	Push Fastener	4
3	Screw Tip Cover	1
4	Screw *(1/4-20 x 1/2")*	1
5	Tubing Bracket	1
6	Cable Restraint Clamp	1
7	Screw *(1/4-20 x 3/4")*	1
8	Upper Glide Kit *(includes two glides)*	1
9	Guide Bar	2
10	Cap Screw *(5/16-18 x 1", socket head)*	4
11	Lower Wire Clamp	2
12	Wire Ribbon Guide	1
13	Upper Wire Clamp	2
14	Column Adapter Weldment	1
15	Washer	4
16	Cap Screw *(1/4-20 x 3/4", socket head)*	4
17	Spacer	1

Always verify model & serial number

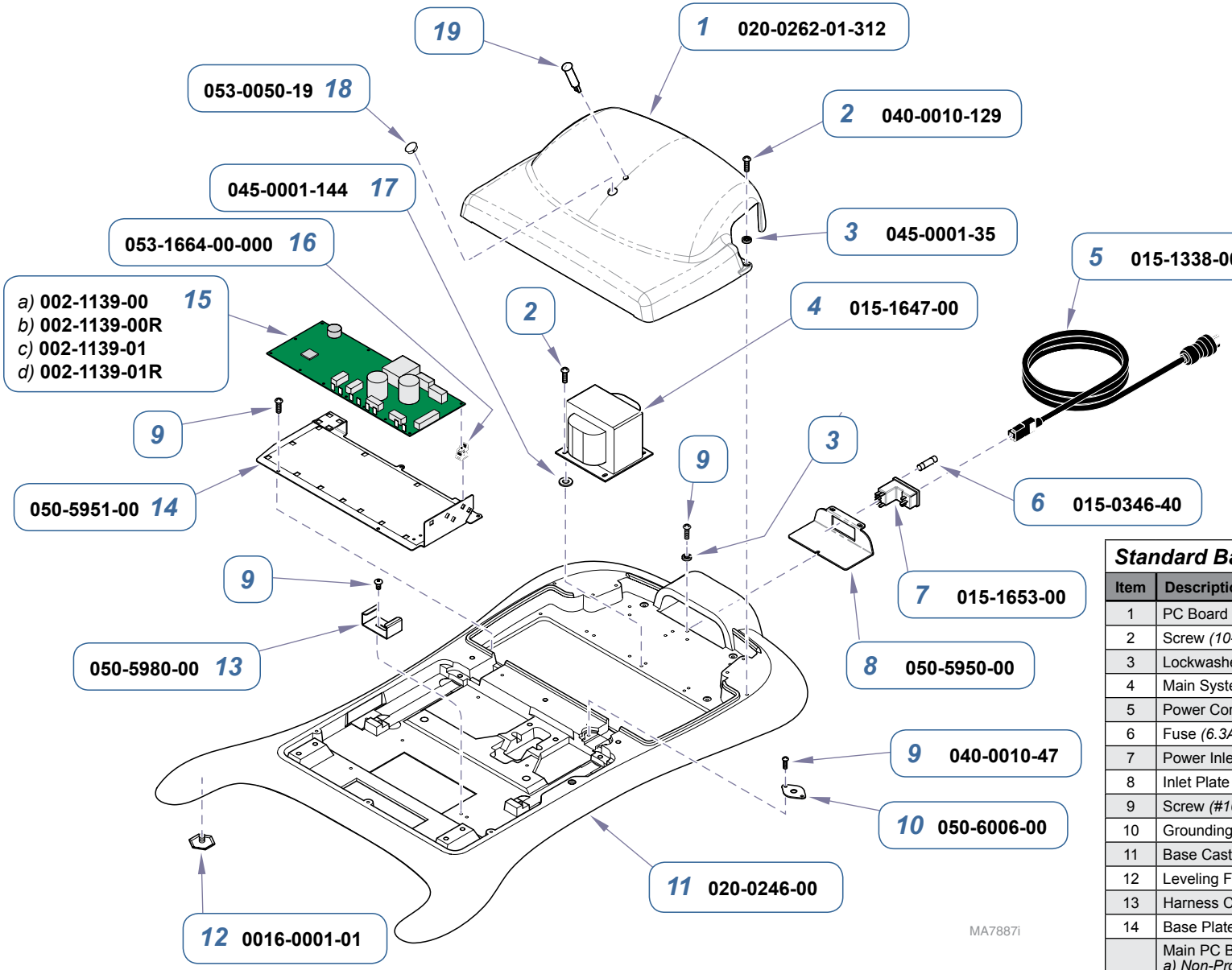


Scissor Components

Item	Description	Qty.
1	Scissor Mechanism	1
2	Clip Ring *(3/4")*	2
3	Bolt *(5/16-18 x 1-1/2")*	4
4	Cotter Pin	1
5	Slotted Nut	1
6	Slide Weldment *(includes item 7)*	2
7	• Bearing Insert	2
8	Guide Shaft	2
9	Guide Bar	2
10	Bolt *(5/16-18 x 1")*	4
11	Main Bearing Housing	2
12	Flange Bearing	3
13	Limit Switch Actuator Bolt *(1/4-20 x 1")*	1
14	Nut *(1/4-20)*	2
15	Gas Spring Ball Stud	4
16	Gas Spring Kit *[includes two gas springs & four clips (item 17)]*	1
17	• Ball Clip	4

Models:	647	
Serial Numbers:	all	

Always verify model & serial number

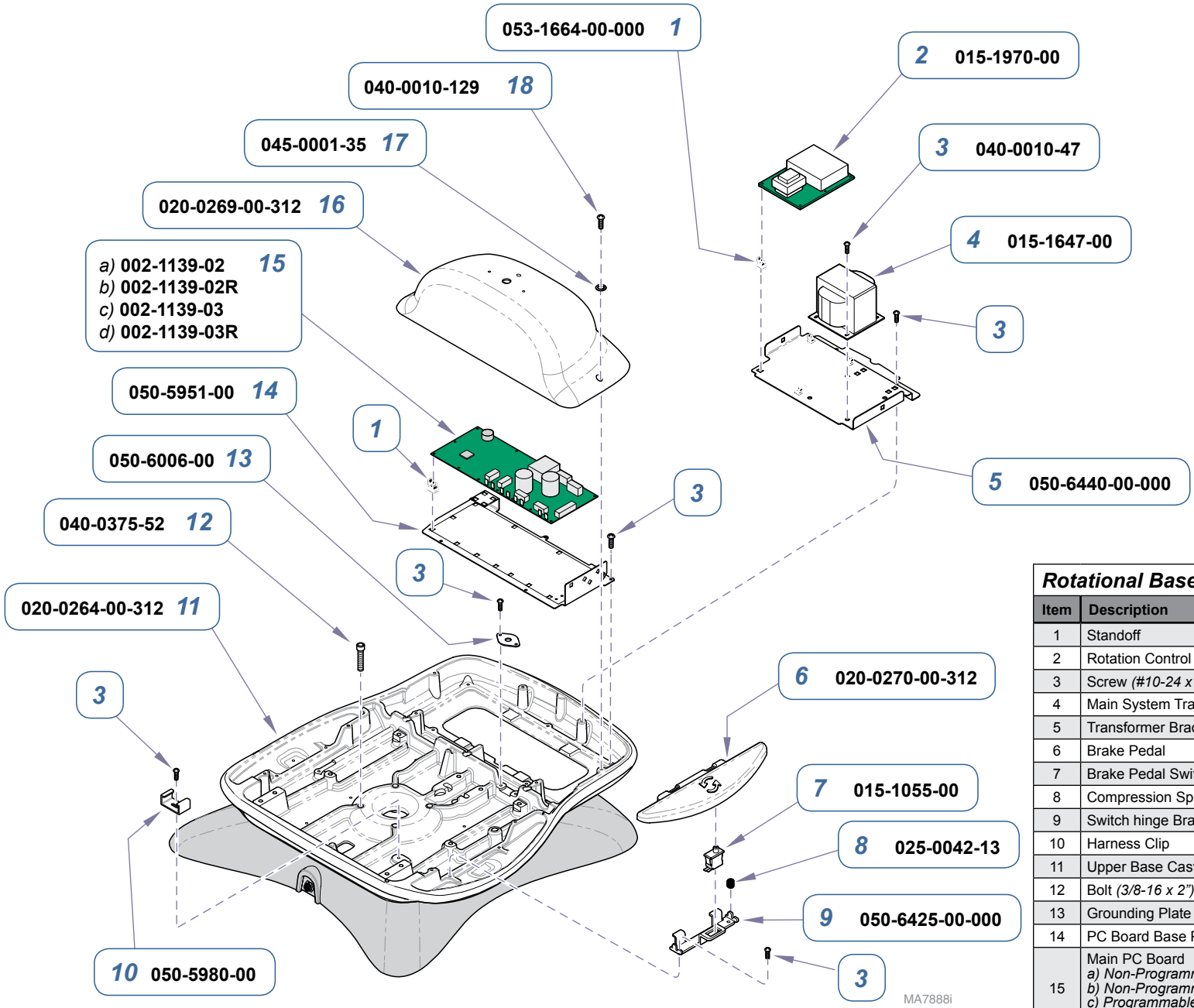


Standard Base Components

Item	Description	Qty.
1	PC Board Cover	1
2	Screw *(10-24 x 1/2")*	6
3	Lockwasher	3
4	Main System Transformer	1
5	Power Cord *(North American, 120V)*	1
6	Fuse *(6.3A, 250V, Type T, 5 x 20 mm)*	2
7	Power Inlet	1
8	Inlet Plate	1
9	Screw *(#10-24 x 3/8")*	12
10	Grounding Plate	1
11	Base Casting	1
12	Leveling Foot	4
13	Harness Clip	1
14	Base Plate	1
15	Main PC Board *a) Non-Programmable* *b) Non-Programmable (Reburbished)* *c) Programmable* *d) Programmable (Reburbished)*	1
16	Standoff	12
17	Rubber Washer	4
18	Hole Plug	1
19	Power Light w/ wire harness Refer to: *Section D - Wiring Diagrams*	Ref

Models:	***647 (-001 / -002)***
Serial Numbers:	*all*

Always verify model & serial number

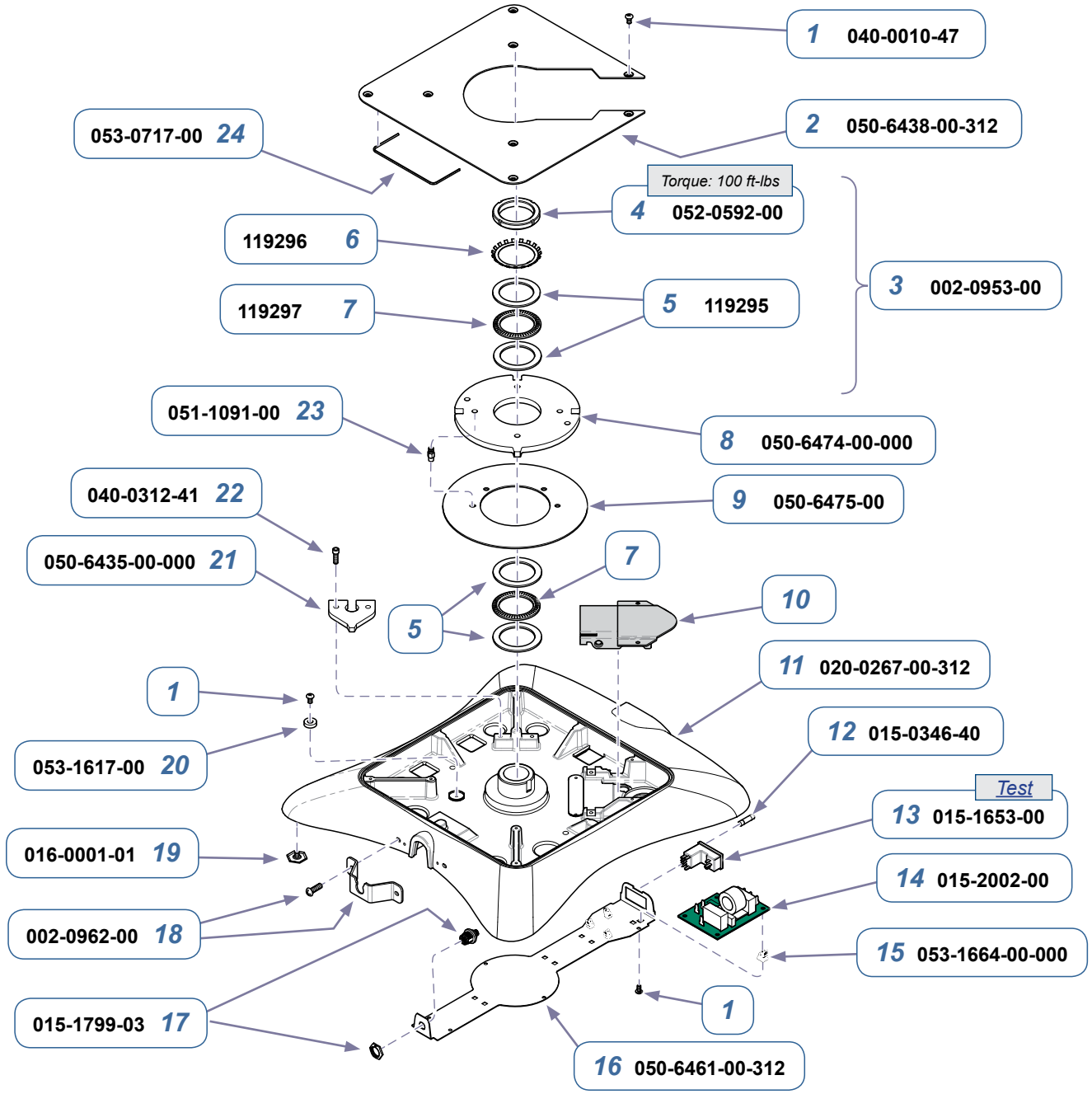


Rotational Base - Upper Section

Item	Description	Qty.
1	Standoff	16
2	Rotation Control PC Board	1
3	Screw *(#10-24 x 3/8")*	1
4	Main System Transformer	1
5	Transformer Bracket	1
6	Brake Pedal	2
7	Brake Pedal Switch	2
8	Compression Spring	4
9	Switch hinge Bracket	2
10	Harness Clip	1
11	Upper Base Casting	1
12	Bolt *(3/8-16 x 2")*	4
13	Grounding Plate	1
14	PC Board Base Plate	1
15	Main PC Board *a) Non-Programmable* *b) Non-Programmable (Reburbished)* *c) Programmable* *d) Programmable (Reburbished)*	1
16	PC Board Cover	1
17	Lockwasher	2
18	Screw *(#10-24 x 1/2")*	2

Models:	647 (-003 / -004)	
Serial Numbers:	all	

Always verify model & serial number

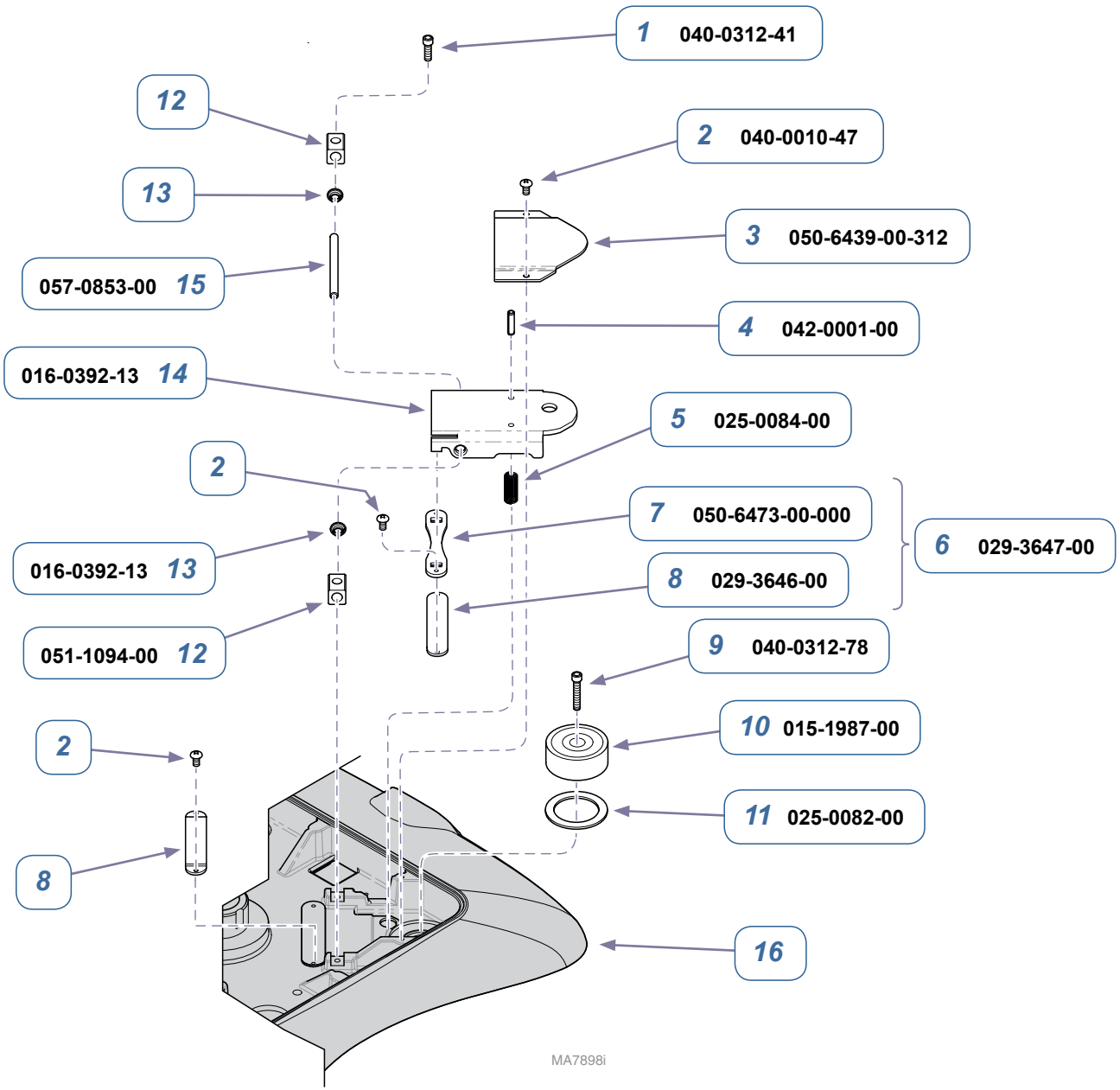


Rotational Base: Lower Section

Item	Description	Qty.
1	Screw *(#10-24 x 3/8")*	19
2	Rotational Base Cover	1
3	Bearing Kit *(includes items 4 thru 7)*	1
4	• Lock Nut	1
5	• Race Washer	4
6	• Lockwasher	1
7	• Thrust Bearing	2
8	Rotation Wheel	1
9	Brake Disc	1
10	Refer to: ***Brake Lever / Electro-Magnet***	Ref
11	Lower Base	1
12	Fuse *(250V, 6.3A, Type-T, Slo-Blo)*	2
13	Power Inlet	1
14	EMI Filter Board	1
15	Standoff	4
16	Wire Trough Cover	1
17	I/O Harness Assembly	1
18	Control Cord Bracket Kit *(incl. bracket & screws)*	1
19	Leveling Screw	4
20	Delrin Spacer	1
21	Stop Bracket	1
22	Screw *(5/16-18 x 1")*	4
23	Shoulder Screw *(apply Loctite 262 to threads)*	2
24	Outer Seal	3

Models:	***647 (-003 / -004)***	
Serial Numbers:	*all*	

Always verify model & serial number

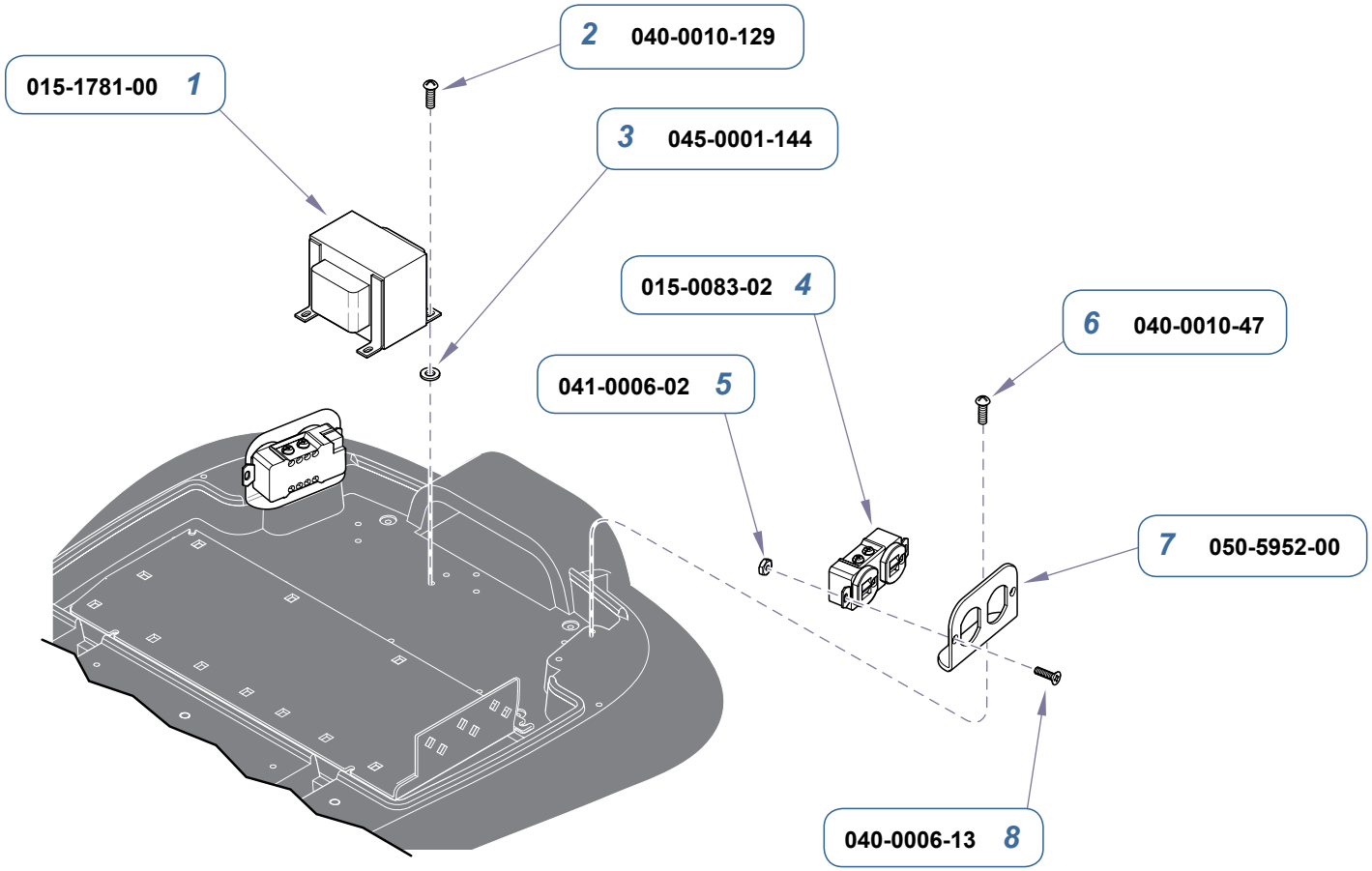


Rotational Base: Brake Lever / Electro-Magnet

Item	Description	Qty.
1	Screw *(5/16-18 x 1")*	2
2	Screw *(#10-24 x 3/8")*	6
3	Brake Lever Cover	1
4	Roll Pin	2
5	Spring	2
6	Swivel Plate Assembly *(includes items 7 & 8)*	1
7	• Swivel Plate	1
8	• Brake Pad	2
9	Cap Screw *(5/16-18 x 1 3/4")*	1
10	Electro-Magnet	1
11	Wave Spring	1
12	Shaft Mount	2
13	DU Bearing	2
14	Brake Lever	1
15	Bearing Shaft	2
16	Refer to: ***Rotational Base: Lower Section***	Ref

Models:	***647 (-003 / -004)***	
Serial Numbers:	*all*	

Always verify model & serial number



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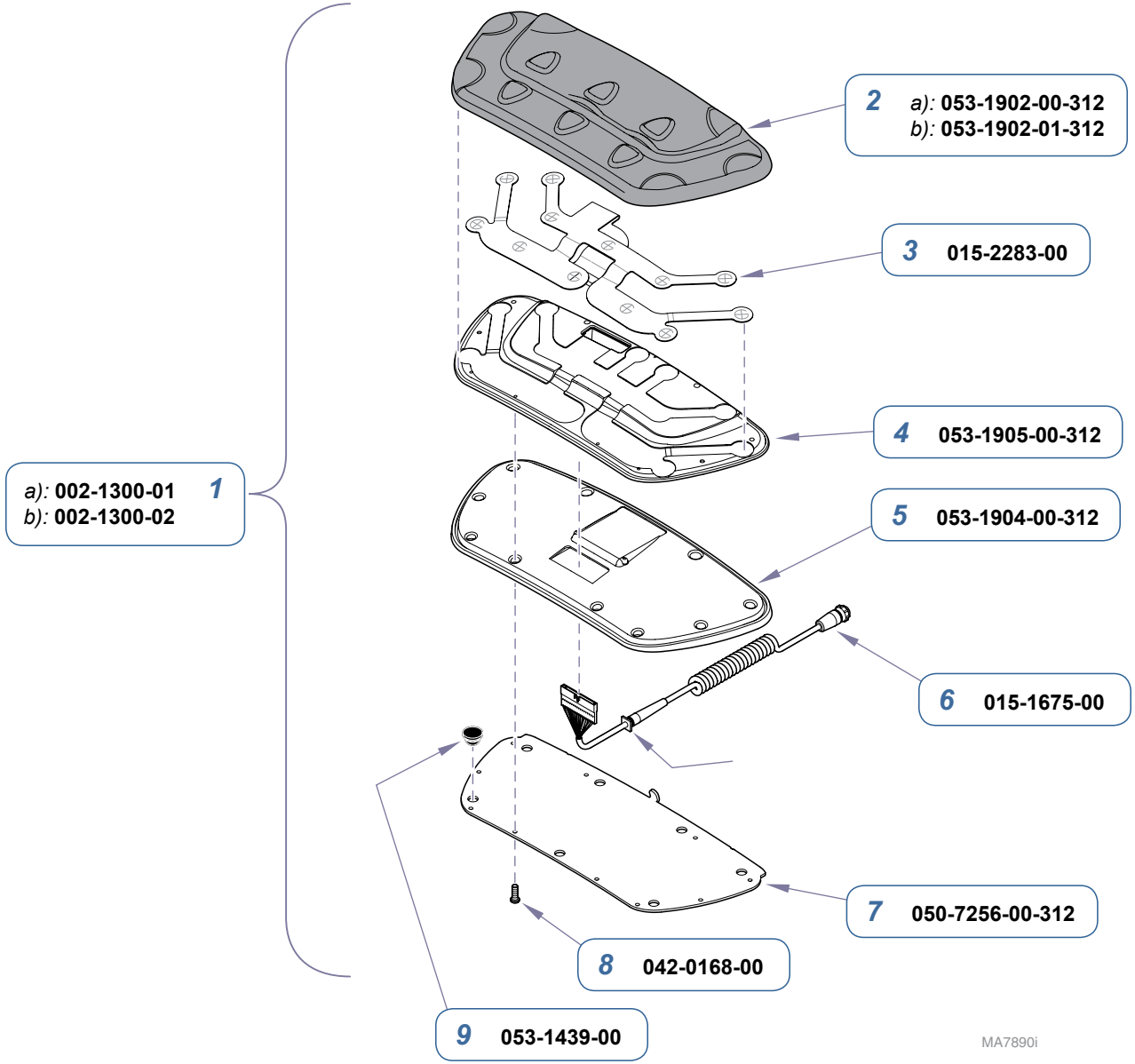
Chair Receptacles

Item	Description	Qty.
1	Isolation Transformer	1
2	Screw *(#10-24 x 1/2")*	1
3	Rubber Washer	4
4	Duplex Receptacle	2
5	Nut *(#6-32)*	4
6	Screw *(#10-24 x 3/8")*	2
7	Receptacle Plate	2
8	Screw *(#6-32 self tapping)*	4

Models:	***647 (-001 / -002)***	
Serial Numbers:	*all*	

Always verify model & serial number

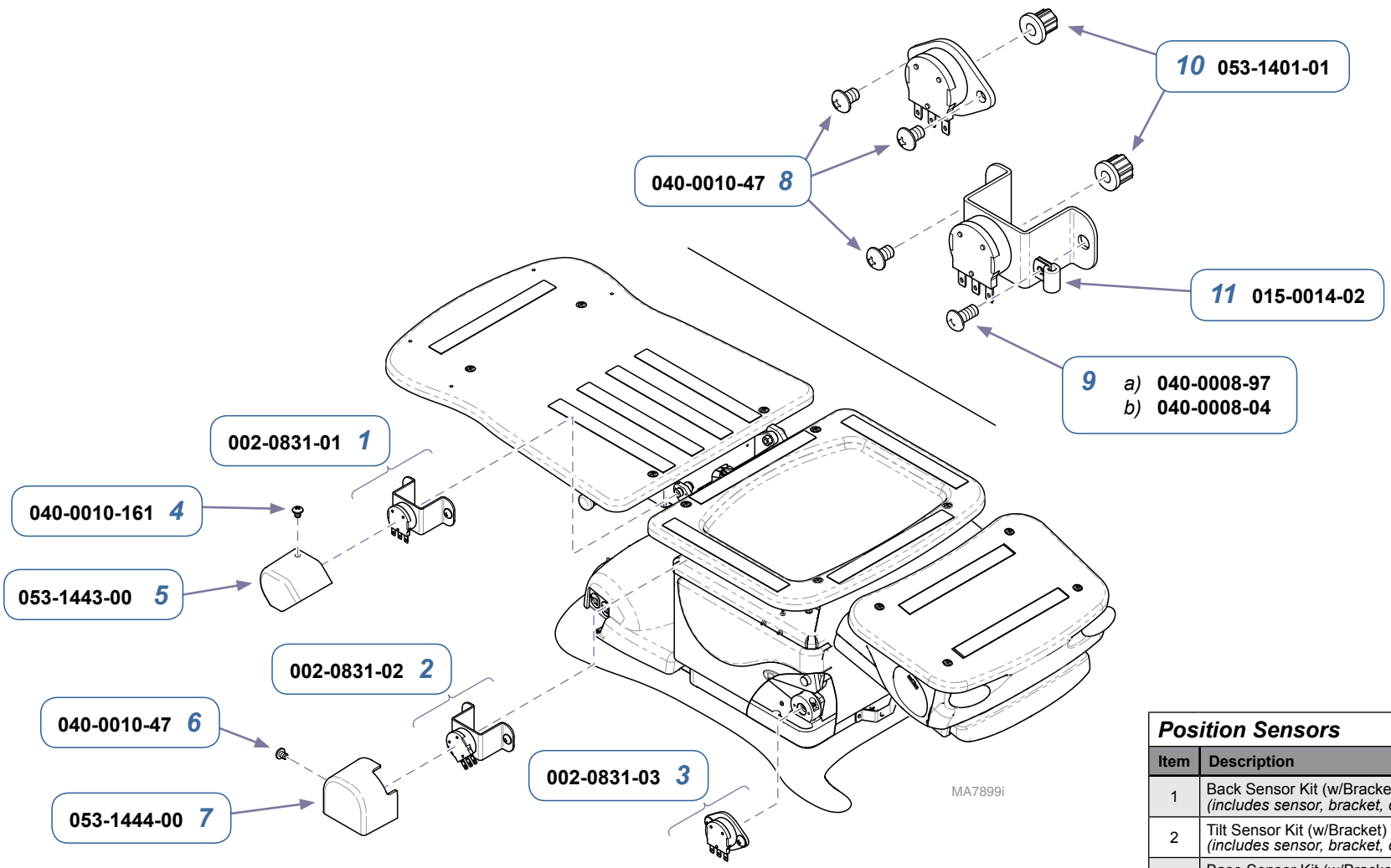


Foot Control

Item	Description	Qty.
1	Foot Control Assembly *(incl. items 2 thru 9)* *a) Programmable* *b) Non-Programmable*	1
2	• Keypad *a) Programmable* *b) Non-Programmable*	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

Models:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number

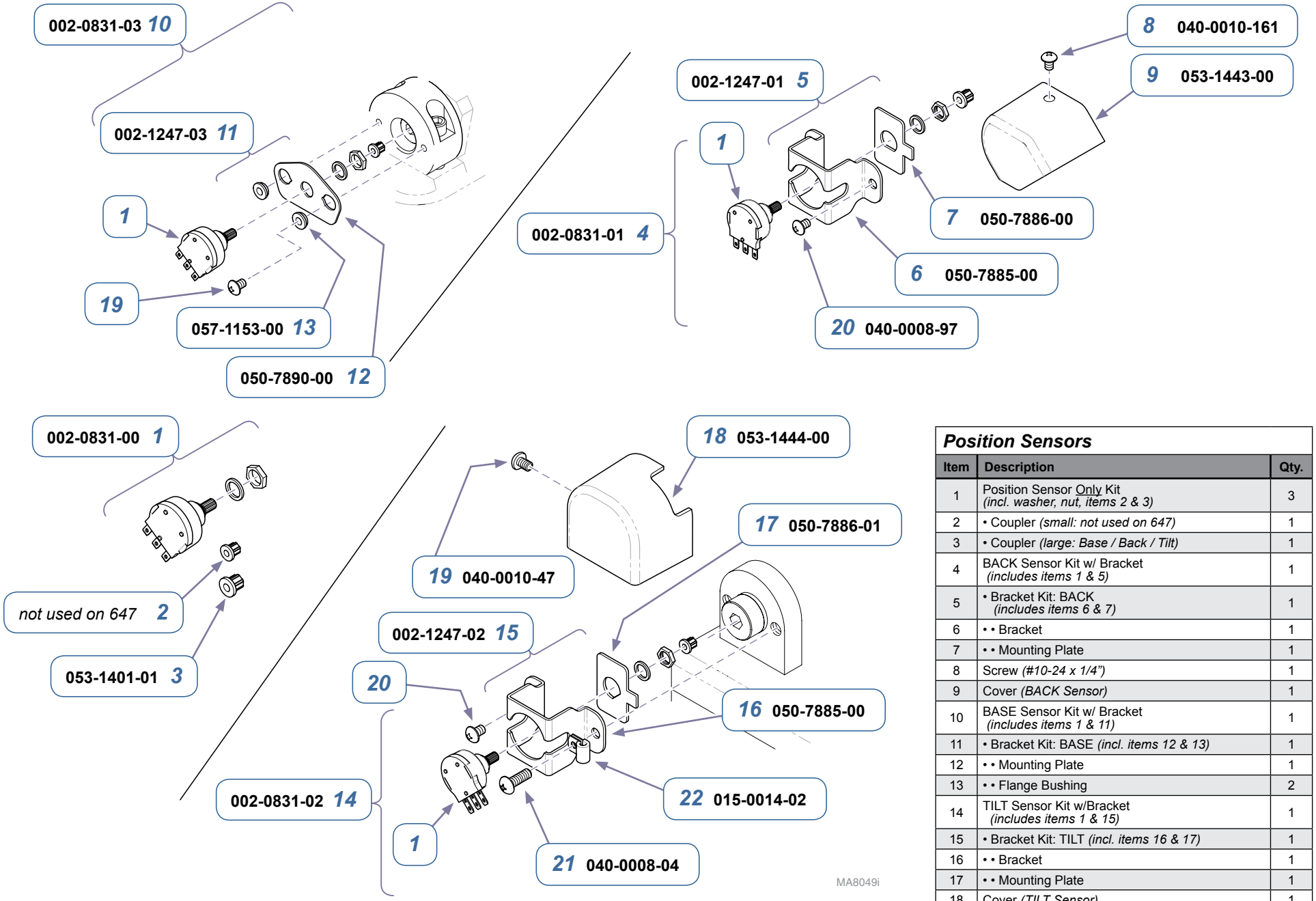


Position Sensors

Item	Description	Qty.
1	Back Sensor Kit (w/Bracket) *(includes sensor, bracket, coupler)*	1
2	Tilt Sensor Kit (w/Bracket) *(includes sensor, bracket, coupler)*	1
3	Base Sensor Kit (w/Bracket) *(includes sensor, bracket, coupler)*	1
4	Screw *(#10-24 x 1/4")*	1
5	Cover *(Back Sensor)*	1
6	Screw *(#10-24 x 3/8")*	1
7	Cover *(Tilt Sensor)*	1
8	Screw *(#10-24 x 3/8")*	4
9	Screw: a) Back (#8-32 x 1/4") b) Tilt (#8-32 x 3/8")	1
10	Coupler	3
11	Wire Clamp *(Tilt sensor only)*	1

Models:	647	
Serial Numbers:	V2200 thru V775313	

Always verify model & serial number

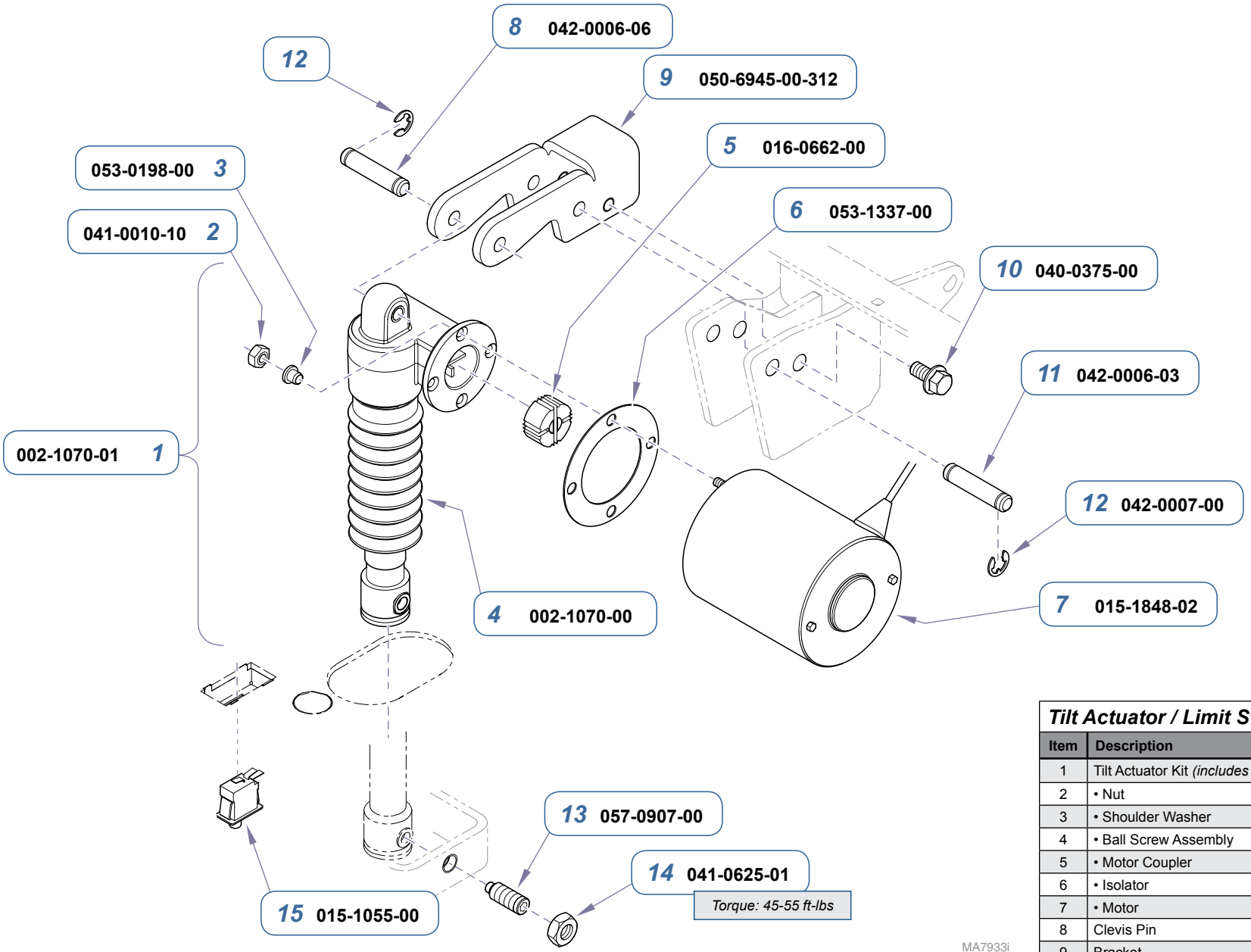


Position Sensors

Item	Description	Qty.
1	Position Sensor Only Kit *(incl. washer, nut, items 2 & 3)*	3
2	• Coupler *(small: not used on 647)*	1
3	• Coupler *(large: Base / Back / Tilt)*	1
4	BACK Sensor Kit w/ Bracket *(includes items 1 & 5)*	1
5	• Bracket Kit: BACK *(includes items 6 & 7)*	1
6	• • Bracket	1
7	• • Mounting Plate	1
8	Screw *(#10-24 x 1/4")*	1
9	Cover *(BACK Sensor)*	1
10	BASE Sensor Kit w/ Bracket *(includes items 1 & 11)*	1
11	• Bracket Kit: BASE *(incl. items 12 & 13)*	1
12	• • Mounting Plate	1
13	• • Flange Bushing	2
14	TILT Sensor Kit w/Bracket *(includes items 1 & 15)*	1
15	• Bracket Kit: TILT *(incl. items 16 & 17)*	1
16	• • Bracket	1
17	• • Mounting Plate	1
18	Cover *(TILT Sensor)*	1
19	Screw *(#10-24 x 3/8")*	3
20	Screw *(#8-32 x 1/4")*	3
21	Screw *(#8-32 x 3/8")*	1
22	Wire Clamp	1

Models:	**647**	
Serial Numbers:	*V775314 thru Present*	

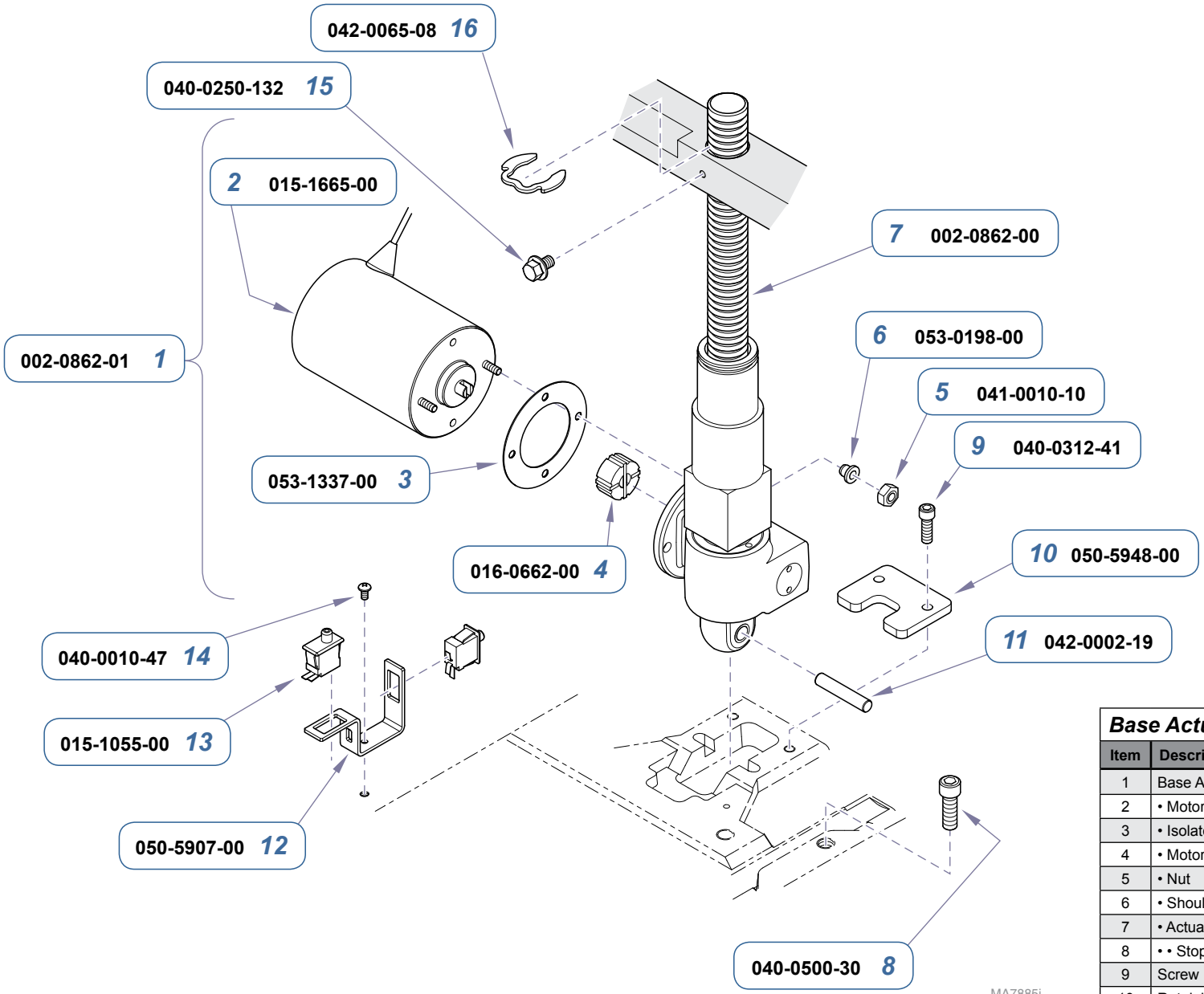
Always verify model & serial number



Tilt Actuator / Limit Switch		
Item	**Description**	**Qty.**
1	Tilt Actuator Kit *(includes items 2 thru 7)*	1
2	• Nut	2
3	• Shoulder Washer	2
4	• Ball Screw Assembly	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

Models:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number

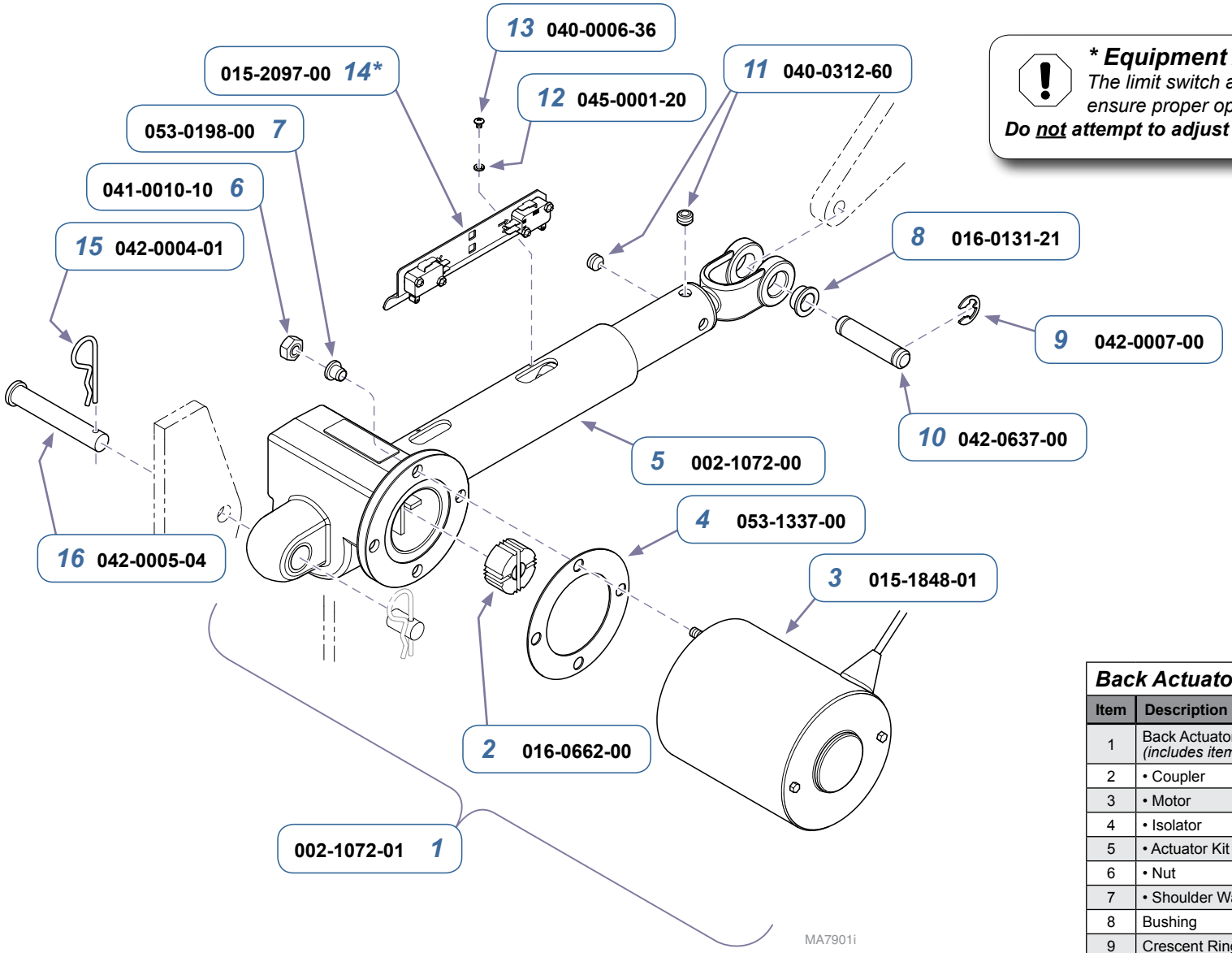


Base Actuator / Limit Switch

Item	Description	Qty.
1	Base Actuator Kit *(includes items 2 thru 7)*	1
2	• Motor	1
3	• Isolator	1
4	• Motor Coupler	1
5	• Nut	2
6	• Shoulder Washer	2
7	• Actuator Kit w/o Motor *(includes item #8)*	1
8	• • Stop Bolt	1
9	Screw *(5/16"-18 x 1")*	2
10	Retaining Plate	1
11	Dowel Pin	1
12	Limit Switch Bracket	4
13	Limit Switch	2
14	Screw *(#10-32 x 3/8")*	1
15	Hex Bolt *(1/4-20 x 3/8")*	1
16	Retaining Ring	1

Models:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number



*** Equipment Alert**

The limit switch adjustment is critical to ensure proper operation (tolerance: 0.030").

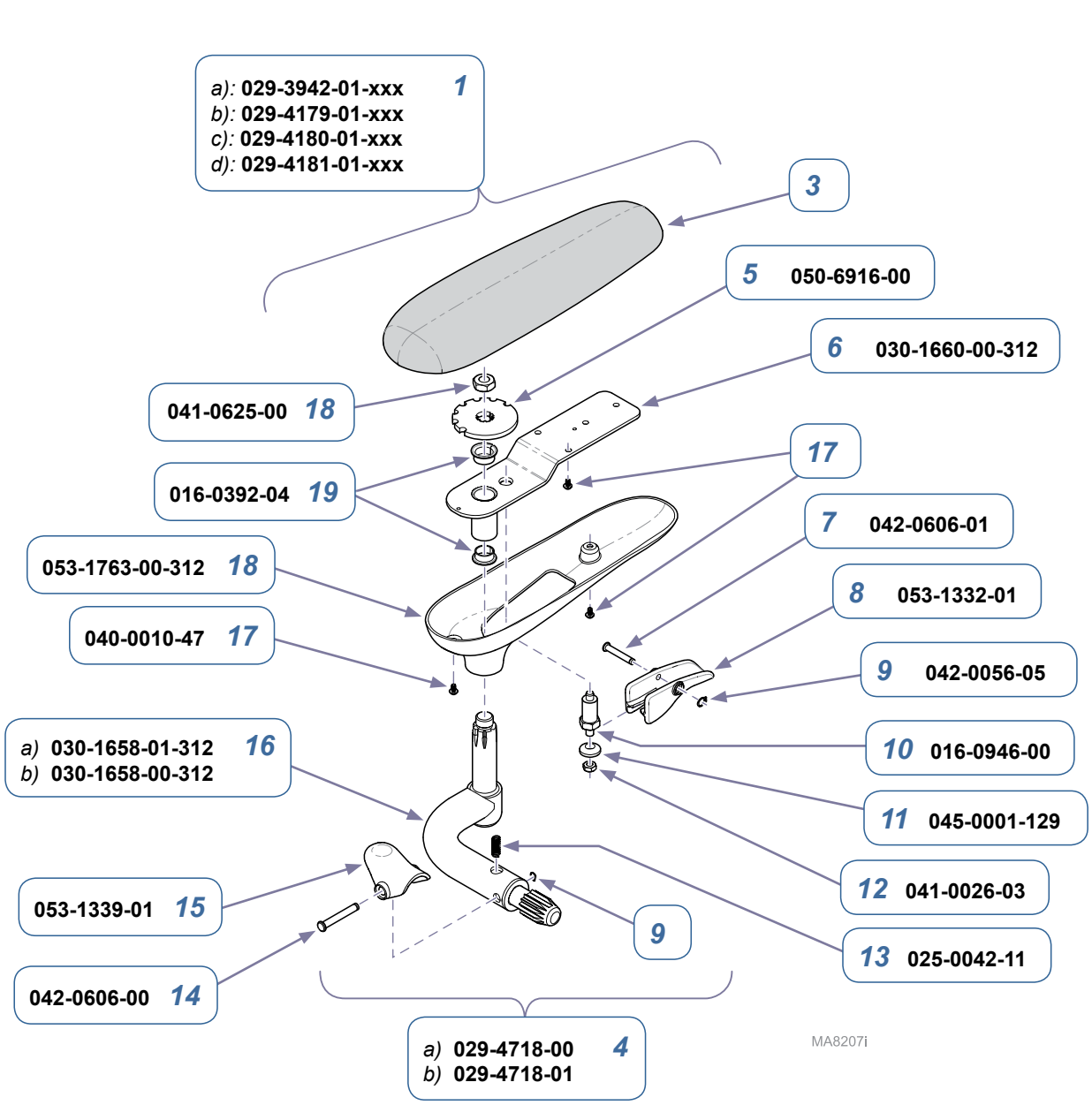
Do not attempt to adjust the individual switches.

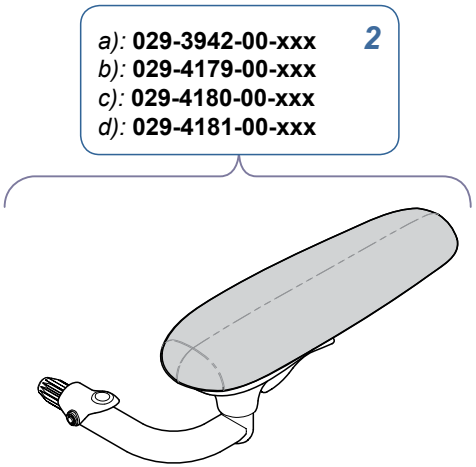
Back Actuator / Limit Switches

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:	***647***	
Serial Numbers:	*all*	

Always verify model & serial number





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	• • Sperical 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:	647	
Serial Numbers:	all	

Always verify model & serial number

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