QUICKIE

Rhythm & Groove

TECHNICAL SERVICE MANUAL

MAY 2009

SUNRISE MEDICAL
www.sunrisemedical.com

Improving People's Lives

Table of Contents

THE LATEST VERSION OF THE TECHNICAL SERVICE MANUAL CAN BE FOUND AT:
www.sunrisemedical.com

Introduction

Please read and follow instructions in this service manual before attempting to troubleshoot or repair this product for the first time. If there is anything in this Service Manual that is not clear, or if you require additional technical assistance, contact Sunrise Medical at 1-800-333-4000. At the prompt, you will be asked to enter your account number, or if you don't have your account number, press "#", then 1 for Customer Services.

Safely troubleshooting and/or repair of this product depends on your diligence in following the instructions within this manual. Sunrise Medical is not responsible for injuries or damage resulting from a person's failure to exercise good judgement and/or common sense.

This Service Manual has been compiled as a troubleshooting guide for the Quickie Rhythm and Groove. Photographs and content may differ from the actual products in some cases due to changes in specifications and other factors.

This Service Manual is intended for use by persons with a basic working knowledge and the skills required in servicing and maintaining Power Wheelchairs. Persons without a General Working knowledge and expertise in the servicing of this product should not carry out troubleshooting procedures. This can result in problems with future servicing, and/or damage to the unit.

Parts and configuration or specifications of Products included in this Service Manual are subject to change without notice.

Tools Required

The following list of tools should enable any task to be dealt with. Some will only occasionally be needed, but it is advisable to own or have access to them.

1. Metric socket set
2. SAE socket set
3. Hexagon wrenches, (SAE & metric)
1. 3.5 - 8mm flat screwdriver
5. No. 0 cross-head screwdriver
6. No. 1 cross-head screwdriver
7. No. 2 cross-head screwdriver
8. Metric combination spanner set 5 - 25mm
9. SAE combination spanner set 1/8 - 1"
10. Mole grips
11. Long nose pliers
12. Adjustable spanner
13. Combination pliers
11. Cir-clip pliers
15. Hammer, (small & large)
16. Soft hammer, (rubber, hide or nylon)
17. Feeler gauges, (metric & SAE)
18. Utility knife
19. Pin punches
20. Electric drill
21. Drill bits, (metric & SAE)
22. Torque wrench
23. Steel engineering rule
21. Tape measure
25. Tire pump
26. Tire pressure gauge
27. Personal safety gear
28. Wire strippers/cutters
29. Tag crimper
30. Multi-meter
31. Battery tester
32. Quickie HHP
33. Parts manuals & Tech Service manuals
31. Tire levers
35. 9 inch diagonal cutters
36. Schrader valve stem puller

Quickie Rhythm Facts

- Mid Wheel Drive (MWD)
- Standard 6.5 mph motor (300 lb. capacity) or optional 5.0 mph motor (400 lb. capacity)
- Up to 3 inch obstacle Climb
- Up to 8.5 mph
- All-Wheel Independent Suspension
- New Leveler Technology helps the driver remain level while navigating everyday terrain
- 6-Form Suspension ensures all six wheels remain in contact with the ground while easily handling ramps, climbing and outdoor terrain even in reverse
- True Free Wheel
- Easy Battery Access


QUICKIE RHYTHM

Groove Facts

- Front Wheel Drive (FWD) & Rear wheel Drive (RWD)
- One Base - Two Solutions
- Standard 6.5 mph motor (300 lb. capacity) or optional 5.0 mph motor (400 lb. capacity)
- 2 Form Suspension provides superior comfort in either RWD or FWD
- Spring system at the drive wheels that are designed for maximum shock absorption and obstacle climbing
- New Leveler Technology helps the driver remain level while navigating everyday terrain
- CG adjustment
- Provides the user the desired drive position FWD or RWD configuration


QUICKIE GROOVE RWD


QUICKIE GROOVE FWD

Diagnostics Chart

Module	Error	Battery Operating State of Charge Indicator	State Indicator	Seating Indicator
	Controller Internal Error		Drive	
	Loss of Communication		Drive	
	Joystick is not Neutral		Drive	
	Left or Right Park Brake		Drive	
MCM	Right Motor Open Circuit or Encoder		Drive	
	Left Motor Open Circuit or Encoder		Drive	
	Batt Under or Over Voltage		Drive	
	Controller High Temp		Drive	
	Invalid System Configuration		Drive	
	External Drive Lockout or Lockout		Drive	
	Not Used		Actuator	
	Loss of Communication		Actuator	
	Not Used		Actuator	
	Not Used		Actuator	
Seating	Actuator Encoder Error		Actuator	
System	Actuator Over Current		Actuator	
	Batt Under or Over Current		Actuator	
	Not Used		Actuator	
	Invalid System		Actuator	
	Drive Lockout		Actuator	
	QRMAC Internal Error		Actuator	
	Loss of Communication		Actuator	
	QRMAC Hex Switch not Neutral		Actuator	
	QRMAC Home Switch not Neutral		Actuator	
QRMAC	Actuator Encoder Error		Actuator	
	Actuator Over Current		Actuator	
	Batt Under or Over Current		Actuator	
	QRMAC High Temp		Actuator	
	Invalid System		Actuator	
	Drive Lockout		Actuator	
	ECM Internal Module		Aux	
	Loss of Communication		Aux	
ECM	Batt Under or Over Current		Aux	
	Invalid System		Aux	
	Drive Lockout		Aux	
	Battery Operating State of Charge			"X" indicates blinking
	>80%		Any	
	70-80%		Any	
	60-70%		Any	
HCM	50-60%		Any	
BSOC	40-50%		Any	
	30-40%		Any	
	20-30%		Any	
	<20%			
	Other			
	Drive Lockout			
	Drive Creep			

Note:The Drive Lockout has a fast flash rate. The Drive Creep has a slow flash rate.

Basic Setup

When setting up the components of the chair, complete the following checklist to ensure proper and safe operation of the equipment.

Check :

□ Are the batteries fully charged?

a. Test battery voltage with D.C. meter across the terminals of batteries. The measurement should be above 12 volts D.C.
b. If not, fully charge the batteries.

□ Are all necessary power components installed and connected ?

a. Input device (normally Joystick)
b. Cable from Joystick to the Bus Line
c. Control Module; for the Groove located in the Center between the 2 batteries
d. Control Module; for the Rhythm located at back of chair behind shroud

□ Are all necessary connections fastened or inserted?

a. Battery connectors to the batteries
b. Cable between Joystick and the Control
c. Both Motor Connectors to the Control Module.

□ Is the Drive Gear engaged?

a. With the power off the chair should not move if pushed from behind.
b. If the chair moves when pushed, refer to Chapter 4 for proper operation of Drive Gear Engagement.

□ Does 7 bar Display light up when Power On/Off switch is depress?

a. If no - recheck the 4 checks listed above then refer to Chapter 8 Diagnostics.
b. If yes – the Power Wheelchair is ready to drive

Multimeter Tutorial

MULTIMETER

The Multimeter

The multimeter is one of the most useful tools in the toolbox. It can be used to check wires, shorts, voltages, resistance, all manner of electrical circuits. This tutorial is designed to help clarify the symbols and socket options found on various multimeters.

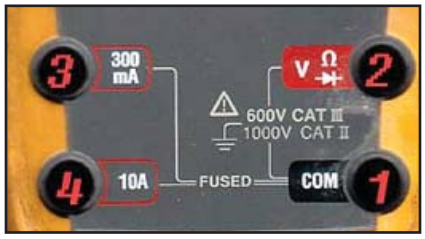
The Probes

PROBES

Probes connect the meter to the circuit. Simply touch them to the connections you want to measure and read the display. Obviously, this depends on how the meter is set up, and what is being measured.

The Ports

PORTS



1. The Common Port.
   Generally, the black probe plugs in here (negative) and as the name suggests, it's the common element to all of the testing circuits. Think of it as the ground rail.
2. Voltage, Resistance and Continuity port.
   This is commonly used option. Connect the red (positive) probe to this port when using any voltage readings, resistance readings or when checking wire continuity (explained in more detail later in the tutorial).
3. Current up to 300mA.
   This port is used for "counting electrons" in a circuit, and thus their rate of flow (current being the flow of electrons). You'll notice that this side is "fused", so that you don't end up melting the meter's circuits.
4. Current up to 10A.
   Same as above, except it can take more current, as the name suggests.

Symbols

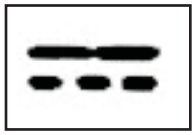
This section describes the basic symbols used in a typical multimeter.

AC

This symbol means alternating current. Use this when you want to test something that has AC current running through it. Typically you'd want to test the voltage of an inverter (for cold cathodes or neons) or a similar device.

DC

This means Direct Current. This is the type of electrical power produced by a battery. With a battery connector, the black wire(s) should be connected to the negative(-) terminal of the battery and should be considered the common ground. The red wire(s) should be connected to the positive(+) terminal of the battery and is considered the "hot" lead.



Voltage

This means Voltage or Potential Difference. This measures the potential difference between the two probes. To measure voltage, connect the positive probe to a port that is marked "V" or Voltage.
Note: "mV" means milli-volts .001 Voltage

Current

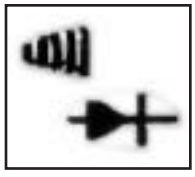
Technically, this term is incorrect. It should be "I" but since current is measured in Amps and the readout value is in amps, the symbol makes sense. This measures the current that is flowing through the part of the circuit between the two probes (the meter itself). Typically, you need to plug the positive terminal into a port marked "A" or Current. You need to put the meter "In Series" in the circuit to use this feature correctly.

Resistance

This symbol means Resistance and is measured in Ohms. You can use this setting to measure the resistance between two points; for example across a piece of wire or a resistor (to check its value). If you don't have a continuity check, then this can be used to check for shorts. Any value below 0.05 Ohms constitutes a short, meaning that whatever the probes are attached to is connected electrically.

Continuity

A commonly used function. Basically, what it does is put a current through the two terminals (the same as the Ohm-meter function) and if the resulting value is within the "contact" range, it will beep. This feature found on some multimeters enables you to check for shorts without taking your eyes off your work. Other meters may have a light that turns on when a short is found.



Health and Safety

Good Working Practices

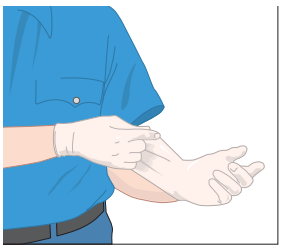
While working on powered mobility products, it is essential to observe good working practices. Below are a series of safety guidelines and recommendations. Please note that these precautions are intended to serve only as a guide, not to supersede or replace any safety statute, NHS or other safety regulations.

General

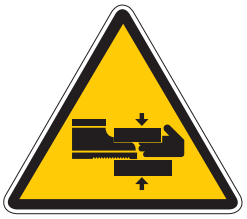
- Always wear suitable protective clothing when handling batteries.
- Always wear suitable eye protection when drilling or inspecting.
- When safe to do so, wear protective gloves when handling the running gear or batteries, as these parts are exposed to paths, parks etc.
- If the drive wheels have to be raised off the floor, always use a pair of axle stands to secure the vehicle.

Battery Safety

- Use extra caution when working with batteries.
- Always make sure that the batteries are disconnected from the vehicle before commencing work.
- Always check that the battery charger is disconnected from the vehicle / batteries before commencing work.
- Do not smoke.
- Keep batteries away from all sources of ignition.
- Do not place objects on the battery tops.
- Always try to keep someone within earshot of your work area so that they may come to your assistance if needed.
- Always wear personal protection when handling batteries, including, eye/face protection and gloves.



- Make sure there is easy access to soap and water in case of acid spills.
- Avoid touching eyes or unprotected parts of the body while working on batteries.
- Remember that non-sealed batteries can contaminate any packaging, housing, or boxes they may have been transported in so handle all packaging with care, especially during disposal.
- If battery acid should come into contact with bare skin or clothing, be sure to wash contacted area immediately, using plenty of soap and water. If battery acid enters the eyes, flush with running cold water for as long as possible while medical help is being sought.
- When the tops of batteries are exposed, take extra care when working on or around the terminals.
- Do not allow metal tools to drop on to or touch the exposed terminals of the batteries or other exposed connections, as this could cause a short circuit, which may result in an explosion.



- Remove personal items of jewelry, such as rings, watches, chains etc. before working on batteries. Such items could cause short circuits resulting in serious burns.
- Batteries are constructed of heavy materials. Therefore moving batteries requires appropriate lifting techniques. Safety footwear should also be worn. In addition, disposal of old batteries requires correct procedures. Contact your local authority for their recommendations.

Battery Chargers

- Remember battery chargers are connected to household current.
- Always observe all guidelines and laws relating to electrical equipment.
- Never operate the battery charger in wet or damp conditions.
- If you think that the charger has been exposed to water or excessive dampness, do not use it. Return the unit to the dealer/supplier for inspection/ replacement.
- If you think the battery charger is defective or is visibly damaged, return the unit to the dealer/supplier for inspection.

EMI Warnings

- EMI means electromagnetic (EM) interference (I). EMI comes from radio wave sources, such as radio transmitters and transceivers. A “transceiver” is a device that both sends and receives radio wave signals.)
- There are a number of sources of intense EMI in our daily environment. Some of these are obvious and easy to avoid. Others are not, and we may not be able to avoid them.
- Powered wheelchairs, although tested in accordance with EMC guidelines, may be susceptible to electromagnetic interference (EMI) emitted from sources such as, radio stations, TV stations, amateur radio (HAM) transmitters, two-way radios, and cellular phones.
- EMI can also be produced by conducted sources or electro-static discharge (ESD).

What effect can EMI have?

1. EMI, without warning, can cause a power chair to:
   - Release its electronic brakes
   - Move by itself
   - Move in unintended directions.
   - If any of these occur, severe injury could result.

2. EMI can damage the control system of a power chair, resulting in a safety hazard and/or costly repairs.

Sources of EMI

1. Hand-Held Transceivers: The antenna is usually mounted directly on the unit. These include:

- Citizens band (CB) radios
- “Walkie-talkies”
- Security, fire and police radios
- Cellular phones
- Lap top computers with phone or fax
- Other personal communication devices

Note - These devices can transmit signals while they are on, even if not in use. The wheelchair should be switched off when not in use.

2. Medium-Range Mobile Transceivers: These include two-way radios used in police cars, fire engines, ambulances and taxi cabs. The antenna is usually mounted on the outside of the vehicle.

3. Long-Range Transceivers: These include commercial radio and TV broadcast antenna towers, amateur (HAM) radios and alarm systems in department stores.

NOTE- The following are Not likely to cause EMI problems: Lap-top computers (without phone or fax), cordless phones, TV sets or AM/FM radios, CD or tape players.
EM energy rapidly becomes more intense as you get closer to the source. For this reason, EMI from handheld devices is of special concern. A person using one of these devices can bring high levels of EM energy very close to a power chair without the user’s knowledge.

Immunity level

The level of EM is measured in volts per metre (V/m). Every power wheelchair can resist EMI up to a certain level. This is called its “immunity level”. The higher the immunity level, the less the risk of EMI. It is believed that a 20 V/m immunity level will protect the power wheelchair user from the more common sources of radio waves.

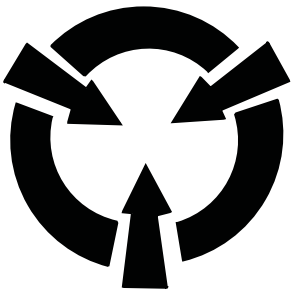
The configuration tested and found to be immune to at least 20 V/m is: QuickieRhythm and Groove power wheelchairs with a right-handed mounted joystick system, 18” seat width, 18” seat depth, dual-post height-adjustable armrests, fixed tapered legrests with one-piece solid footplate and Gp 24 gel cell batteries.

The following dealer installed speciality input devices have an unknown effect on the immunity level because they have not been tested with the Delphi control system:

- Breath Control (“Sip n Puff”)
- Tri-Switch Head Array
- Proximity Head Array
- Proportional Mini-Joystick/Chin Control
- Buddy Button
- Wafer Board

Electro Static Discharge

To help prevent Electro Static Discharge (ESD) the following proper handling techniques should be followed:



ESD:

- Do not place Printed Circuit Boards or their containers near sources of strong electrical fields (such as above a CRT).
- To avoid the occurrence of static charge or discharge due to friction, keep the Printed Circuit Boards separate from one another and do not stack them directly on top of one another if not protected by antistatic bags.
- Store each Printed Circuit Board in an antistatic bag with an external cushioning bubble-wrap layer until assembled to wheelchair. Antistatic bag must have metal content to protect the printed circuit board. Gray bag protects from ESD, pink bag or bubble wrap does not protect as well.
- Always wear an ESD preventive wrist or ankle strap when handling electronic components. Connect one end of the strap to an ESD jack or an unpainted metal component on the system (such as a captive installation screw).
- Handle Printed Circuit Boards by the edges only; avoid touching the Printed Circuit Board and connector pins.
- Place any removed Printed Circuit Board on an antistatic surface or in a static shielding bag.
- Avoid contact between the Printed Circuit Boards and clothing. The wrist strap only protects the card from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Make sure that the Printed Circuit Board power is off by disconnecting the seating harness prior to attaching or removing printed circuit board.

Printed Circuit Board Flexing:

- The printed circuit board has surface-mount components that may break when the board is flexed. To minimize the amount of board flexing, observe the following precautions:
- Hold the printed circuit board only by the edges.
- Do not place the printed circuit board on a hard surface.
- Tighten board mounting screws only hand tight (torque12.4 in lbs/1.4Nm) in a cross pattern to reduce stress on mounting holes and PCB board material.

Rhythm & Groove Power Bases

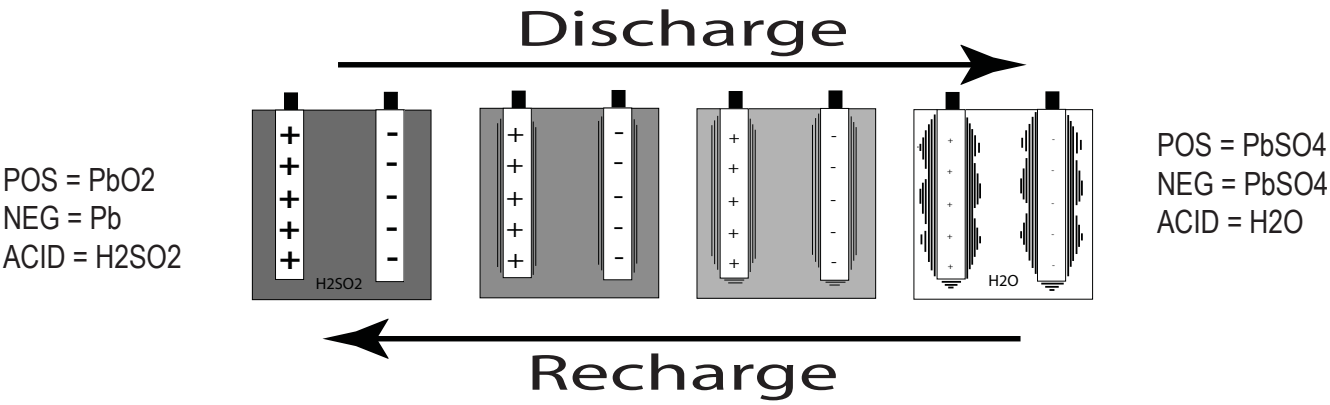
Batteries

Safety

If mishandled batteries can be dangerous and hazardous.

- All mobility batteries, whether wet type or gel/sealed type, contain lead and sulfuric acid. Both of these materials are toxic and in the case of sulfuric acid, highly corrosive. Additionally, when batteries are charged, they produce hydrogen gas which is “highly” flammable and can cause explosion. This is why proper handing is mandatory at all times.
- Battery explosion - This is frequently the result of too low an acid/electrolyte level in the battery, which allows high concentrations of hydrogen to build up. This is possible with all batteries if improper charging or battery failure occurs, but not common in gel/sealed batteries.
- < KEEP SPARKS AND FLAMES AWAY FROM BATTERIES >
- Burns - dropping a wrench or screwdriver across battery terminals results in sparks, and intense heat. Improper assembly of battery boxes or battery box wiring may short the battery through the wiring and produce a possible electrical fire.
- Electronic damage - batteries that are improperly wired can short out electronic chair components resulting in expensive repairs.
- Pollution - improper disposal of batteries could damage the environment. All batteries should be disposed of through a reliable battery recycler.

Battery Charge Cycle Illustration
Typical Flooded Battery



As battery discharges, the sulfate from the electrolyte forms on the plates.
As battery recharges, the sulfate is driven back into the electrolyte

Battery Diagnostics

How Long Should Batteries Last?

An average of 1 to 1.5 years.
Factors that affect battery performance:

- Maintenance - Poor maintenance.
- Charging - Improper charging shortens battery life.
- Chair Components - Malfunctioning electronics, bad motors, electric brakes, and corroded wiring are just some of the factors that may affect battery life and performance.

Battery Servicing and Replacement

Automobile batteries, which are used for starting, are tested with a load tester to assure a high rate of energy production in a short burst.

The voltmeters on load testers are not accurate enough to establish a state of charge.

Deep-cycle batteries produce energy more slowly and are designed to hold up to constant discharging and recharging. Testing a deep-cycle wheelchair or scooter battery requires different procedures than an automobile battery.

A routine for testing deep-cycle batteries should follow these guidelines:

Never replace just one battery at a time. This will create an imbalance when charging and ultimately damage both batteries.

Check batteries for a voltage difference. A voltage difference of more than .4 volts D.C. is a true indicator of a bad battery.

Voltage test - A dead battery cannot be effectively tested, yet many people mistakenly try to do just that. Any battery that reads 11.0 volts or less is technically dead.

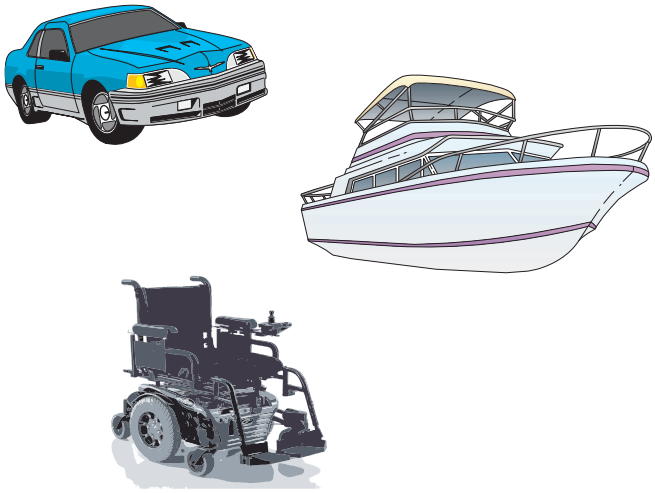
To perform any testing, especially a load test:
A. Batteries must be charged
B. The top charge must be taken from fully charged batteries if charge rate has just finished.

- *Load Test* - This test can only be done on fully charged batteries and can diagnose one type of problem, an internal short.
- *Capacity/ Discharge Test* - This is the only accurate way to test a deep-cycle battery for adequate running time. The problem with this test is that it is time consuming.
- *Current / Voltage check with a regular interval check* - Another way of truly knowing how much time your battery will last is also time consuming.

Battery Types

REMEMBER: IT IS THE RESPONSIBILITY OF THE INSTALLER TO KNOW WHAT KIND OF BATTERIES TO INSTALL IN THE CUSTOMER'S WHEELCHAIR!

- Deep-cycle batteries are designed to be discharged and recharged on a regular basis.
- Starting or automotive type batteries use a rapid burst of power to start an engine and are quickly recharged by an alternator or generator. They are rated by cold cranking amps, a measure that has no relevance to wheelchair application.
- Marine and RV batteries frequently are not deep-cycle as they are often used for starting engines.
- Only use Deep-Cycle sealed type batteries in a wheelchair.



Batteries Used On both Groove and Rhythm

Battery Size

- Batteries function as a power wheelchair's fuel tank. The larger the group size, the farther the wheelchair will go.
- Use the size specified by the wheelchair manufacturer. Never use undersized batteries.

Note: GP24 should be used with Tilt / Recline / Lift Systems

22 NF

GP24

Accessing the Batteries

Rhythm

1. Unscrew each of the 2 Seat Studs (A) until they release.
2. Carefully tilt Seat Assembly back until it stops.
3. Lift the front of Battery Cover Panel and pull it forward to expose the batteries.

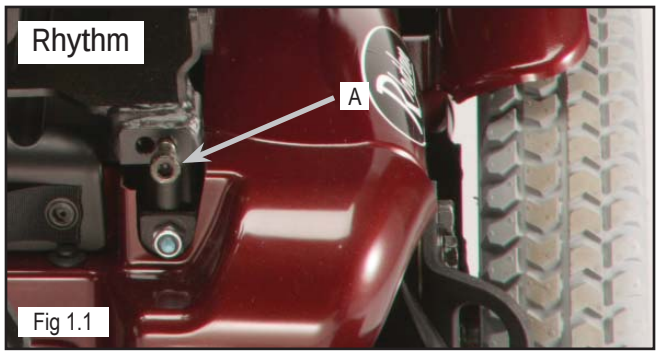


Fig 1.1

Fig 1.2

General Battery Maintenance

Keep terminals free of corrosion and insure wiring connections are secure. Check for frayed or loose contacts.

Groove

1. Unscrew each of the 2 Seat Studs (B) until they release.
2. Carefully tilt the seat assembly back and support using the seat stay (C)
3. The Groove battery cover uses four Velcro strips to secure it to the battery compartment. Simply pull up on the cover to remove it.

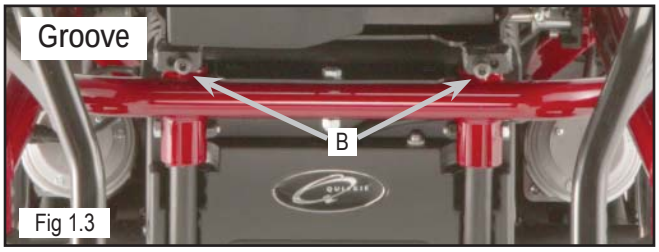


Fig 1.3

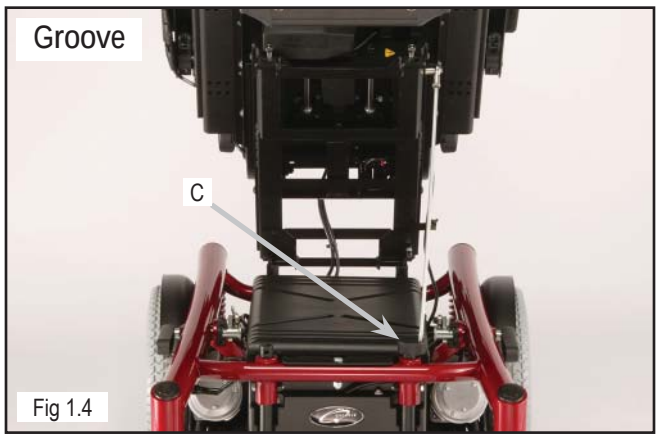


Fig 1.4

Fig 1.5

General Battery Maintenance

Keep terminals free of corrosion and insure wiring connections are secure. Check for frayed or loose contacts.

Changing the Battery

Rhythm

1. Firmly grasp the red battery connectors and pull apart.
2. Firmly grasp the black battery connectors and pull apart.
3. Firmly grasp the smaller white battery connectors and pull apart.
4. Using provided strap, carefully lift battery from chair.

To install batteries reverse above procedures.

Fig 1.6

Fig 1.7

Groove

1. Firmly grasp the red battery connectors and pull apart.
2. Firmly grasp the black battery connectors and pull apart.
3. Firmly grasp the smaller white battery connectors and pull apart.
4. Using provided strap, carefully lift battery from chair. Rear battery is removed at an angle due to seat assembly.

To install batteries, reverse above procedures. Insure all wiring is clear of battery compartment before replacing batteries in compartment.

Fig 1.8

Fig 1.9

Battery Connectors

The battery connection uses a 2 way connector with a White Jumper to give the series connection of 24 volt It has a clearly designated RED and BLACK connector which connect to the Positive for RED and the Negative for the BLACK with JUMPER (White) joining the system. The system has a 100 amp non-removable fuse built into the Cable and a removable 15 amp fuse for Auxiliary Power.

Fig 1.10

Inspecting the Fuses

Remove caps on each of the two 15 amp fuses and visually inspect. Insure there are no breaks in the fuse material. If continuity is still in doubt, unplug fuse from holder and check resistance across fuse blades. Zero resistance indicates a usable fuse. Infinite resistance indicates a non-usable fuse.

The 100 amp fuse must be checked by measuring their continuity. Zero resistance indicates a usable fuse. Infinite resistance indicates a non-usable fuse. The 100 amp fuse is not replaceable, the harness must be replaced.


Fig 1.11

Fuse Wiring Diagram

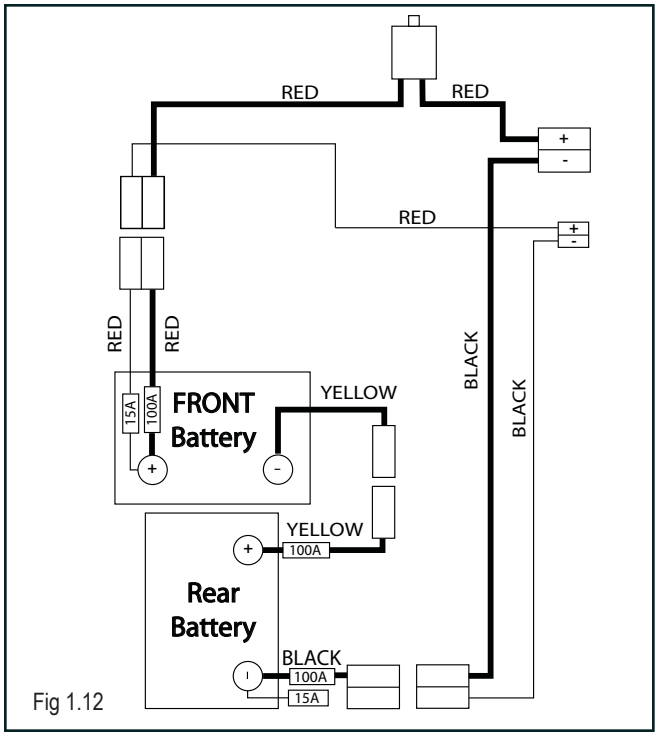


Fig 1.12

Battery Chargers

Chargers and Charging

- Use the wheelchair manufacturer's automatic charger for all routine charging.
- The best recharge point for deep cycle batteries is roughly at 50% discharge.
- Never run batteries completely flat [total discharge].
- Do not purchase automotive chargers. They are not designed to charge deep cycle batteries and will quickly ruin gel/sealed batteries.
- Do not use chargers designed for wet battery charging with gel/sealed batteries; their charging voltages are different.

Desktop 8 Amp Fully Automatic Charger

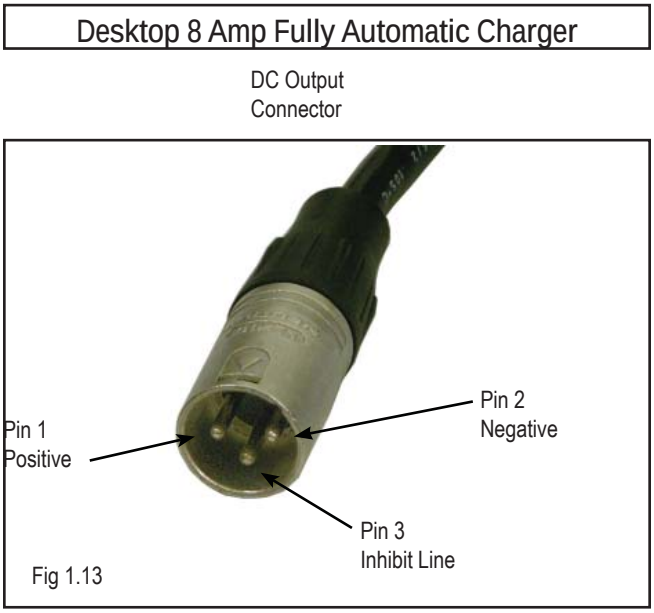


Fig 1.13

Fig 1.14

Red Light	Green Light	Function
Off	Off	No AC power or no battery connected
Steady	Steady	Light test when AC connected
Off	Slow Blink	Charging (< 80% charged)
Off	Fast Blink	Charging (> 80% charged)
Off	Steady	Normal charge completed
Steady	Off	Undervoltage shut off, < 18.0 volts
Slow Blink	Off	Overvoltage shutoff, > 33.96 volts
Fast Blink	Off	Max timer shutoff, > 16 hours

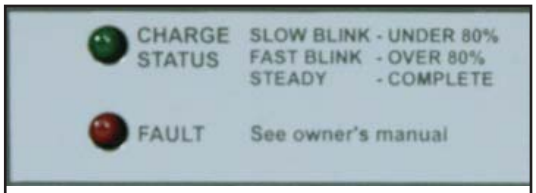


Fig 1.15

Troubleshooting Tips

1. Check for battery voltage at chair's charger input .
2. Check for continuity between cable (DC output and connection inside).
3. Check for AC voltage.
1. Check for possible blown fuse.

Lightweight Charger

The Lightweight Charger is a switched mode 8 amp output charger. Because of its compact size it uses a forced air cooling system. After the voltage drops to 25.7 volts, the charger will come back on at a lower Amp range of 2 amps to recycle the batteries.

Fig 1.16

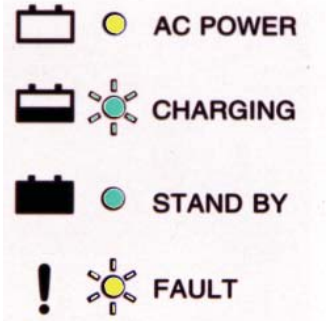


Fig 1.17

Trouble Shooting

The following checklist should help you to troubleshoot any of the problems with the charger. Make sure to observe all Safety instructions.

Symptom	Possible cause	Solution
LED's do not turn on	No Power. Unit not plugged in. Bad Outlet. Blown Fuse internal to charger. D.C. internal board faulty.	 Try a known good outlet. Try another charger. Try another AC cord.
Yellow LED blinks 1 time	Battery's rated capacity exceeds charger rating. Battery may be damaged or old.	Try another set of batteries. Try another charger.
Yellow LED blinks 2 times	Battery's rated capacity exceeds charger rating Battery may be damaged or old.	Try another set of batteries. Try another charger.
Yellow LED blinks 3 times	Unit may be damaged if A.C. is removed and re-applied and does not work. Battery's rated capacity exceeds charger rating.	 Try another set of batteries. Try another charger.
Yellow LED blinks 4 times	Battery voltage exceeds charger specified operating range.	Try a specified set of batteries Try another charger.
Yellow LED blinks 5 times	Battery charger overheated.	Remove power, wait ten minutes and then reapply power. Physically check all connections Look for shorts or burning smell If power is re-applied and fault re-occurs change charger.
Yellow & Green LED's blink simultaneously	Battery not connected to charger Too low of voltage less than 6 volts Reverse Polarity.	Check for good continuity of cable. Check for good battery Voltage at charger port Make sure voltage on meter is reading positive [no reverse polarity]

Motors

Checking Motor Resistance and Continuity

Motor	Motor Resistance	Brake Solenoid Resistance
Standard	0-2 ohms	21.0-22.0 ohms
Encoder	0-2 ohms	15.0-17.0 ohms

Motor Connector

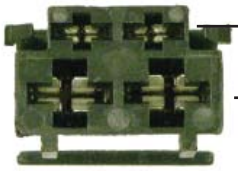


Fig 1.18

Fig 1.19

Fig 1.20

Checking the Motor Brushes

Note: When removing brushes from the motor for inspection, please note orientation and location of the brushes as they are removed from the motor (fig 1.21). The brushes are “burned in” to the commutator and reinstallation in a location or orientation not matching the pre-inspection location may negatively affect motor operation.

Checks:

- How smooth is the brush surface – did it create “C” shaped groove?
- If there is less than 1/4” brush material left the Brushes should be replaced.
- How the wire between the coil looks – did it discolor (fig 1.22)
- Did the Top soldered joint melt (fig 1.23).
- How does the commutator look after the brush has been contacting the surface (fig 1.24).

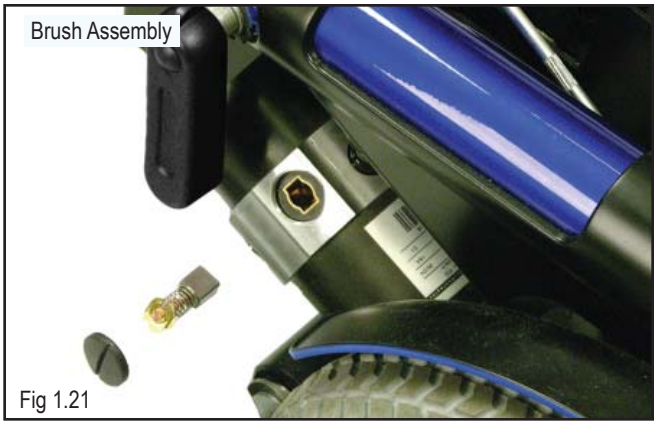


Fig 1.21

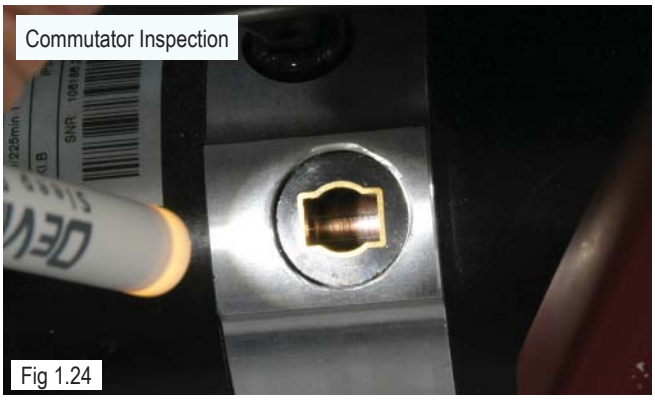


Fig 1.24

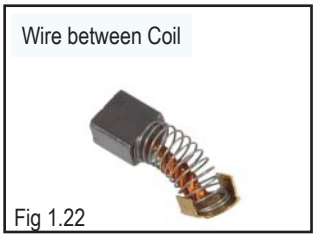


Fig 1.22

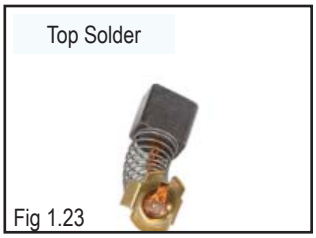
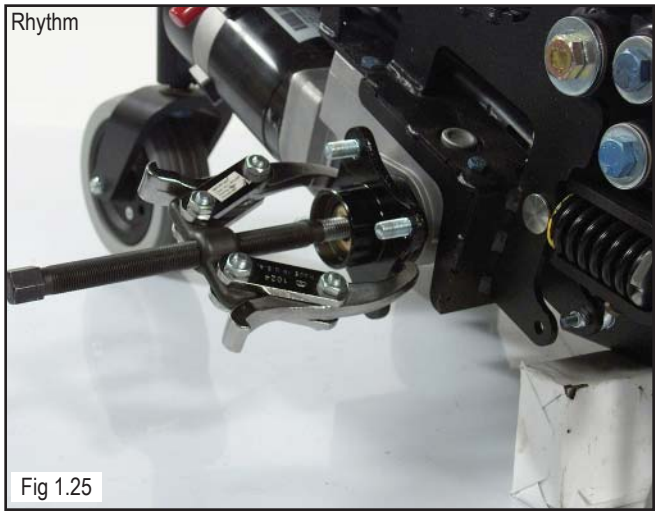
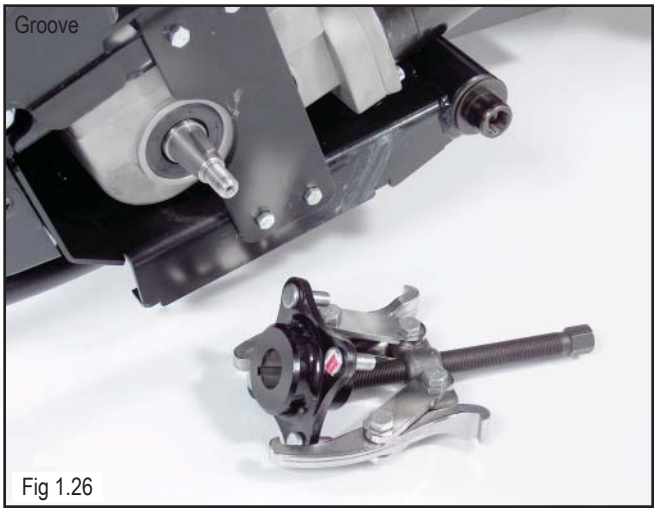


Fig 1.23

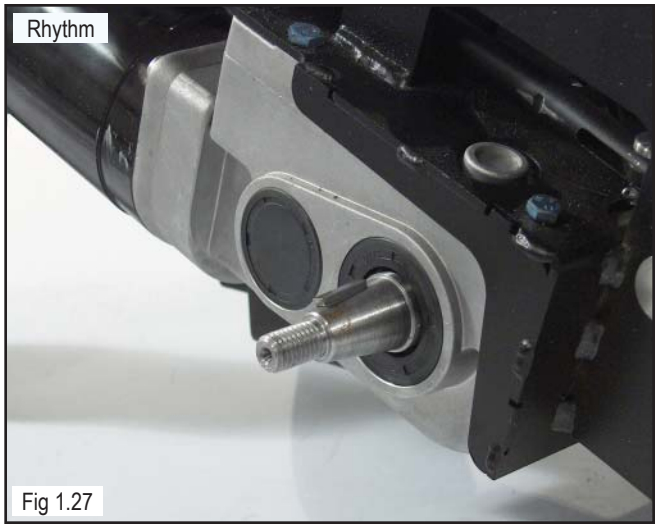
Hubs and Bolts

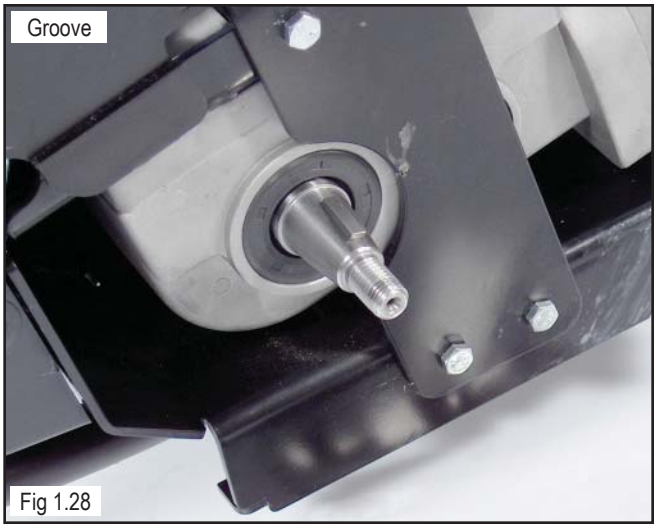




Use a 19mm wrench to remove the nut off of end of shaft. Take the washer away. Use a pulley puller to remove the Hub Assembly from the output shaft. (Fig 1.25&1.26)
Note: Do not lose the hub assembly locating woodruff key.

Output Shaft





Inspect: Tapered Shaft – Check keyway for wear – check for physical deterioration

Motor Removal and Replacement Rhythm

Raise the chassis of the chair on a stable platform so that all wheels are off of the working surface.

Lift the center pad of the fasteners that secure the side shroud to the chair. Remove the fasteners (fig 1.29) and after disengaging the side shroud from the front shroud, remove the side shroud and set aside.


Fig 1.29

With the motor release engaged, loosen and remove the drive wheel securing lug nuts and the drive wheel (fig 1.30).


Fig 1.30

Use a 4mm allen key to remove the two fasteners that secure the drive wheel fender (fig 1.31). Remove and set aside the fender.

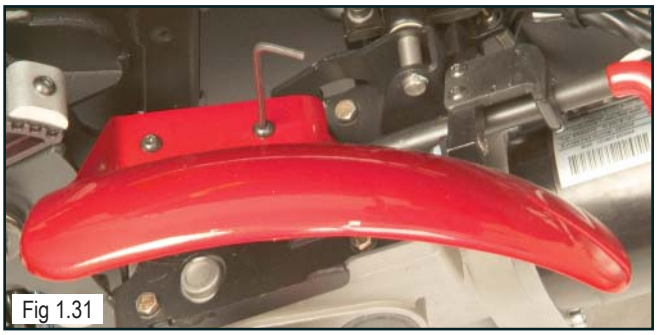


Fig 1.31

1. Remove Cotter Pin that holds the Large Freewheel release lever to the freewheel release on the gearbox.You will now have access to the 5 bolts that hold the motor to the mount.
   Tip: Use 9 inch diagonal cutters to clip the heads from the cotter pins for easy removal.
2. Loosen the bolts using a 10mm wrench or ratchet
3. You will now be able to remove the motor assembly from the chair.
1. Operation complete – reverse steps to re-assemble.

Note: Always use a new cotter pin.

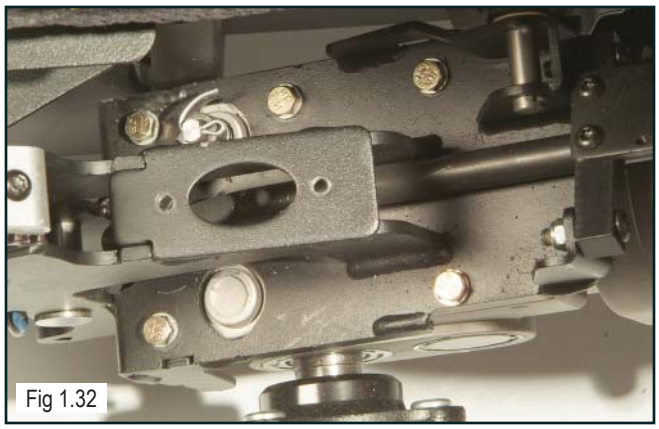


Fig 1.32

Motor Removal and Replacement Groove

Support the Groove power base securely using jackstand or suitable blocking.
Remove the drive wheel lug nuts using a 16mm Socket wrench. Set Drive wheel aside (fig 1.33).


Fig 1.33

Remove the Cotter Pin from the Freewheel Mechanism and discard the cotter pin (fig 1.34).

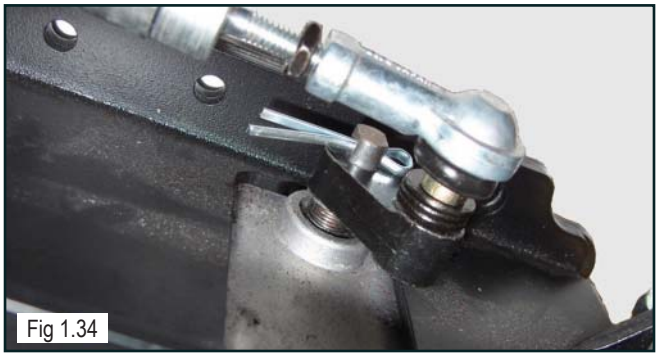


Fig 1.34

Remove the Motor Splash Guard by using a Phillips head screw driver to remove the single Phillips head screw (fig 1.35).

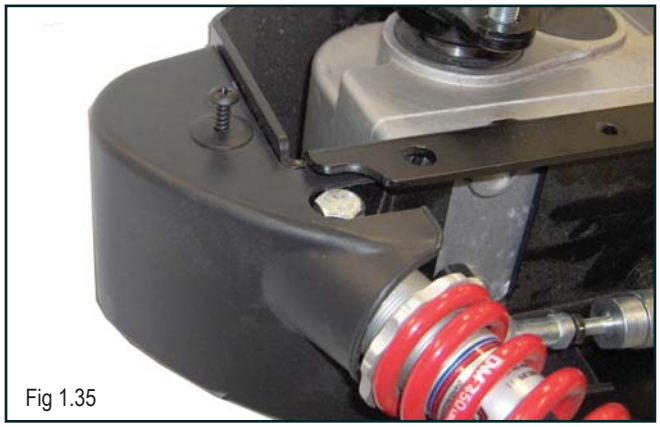


Fig 1.35

Use a 10mm socket wrench to remove the five motor mounting bolts (fig 1.36).


Fig 1.36

Motor Removal and Replacement Groove cont.

Remove the Bridging Plate by removing the four nuts, bolts and washers that attach it to the motor mount assembly (fig 1.37)

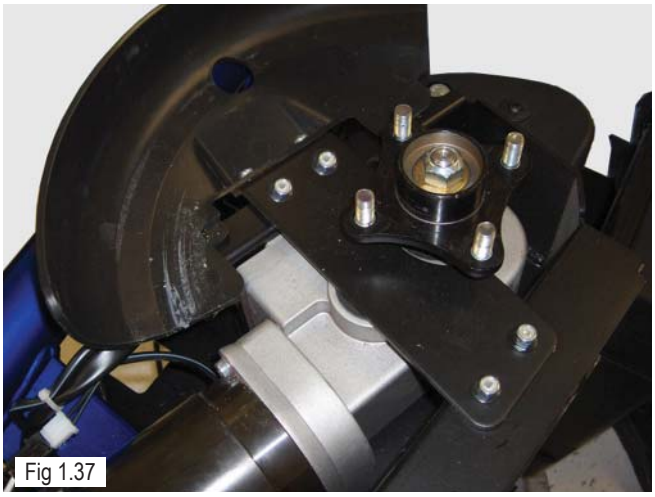


Fig 1.37

The Motor Gear Box assembly can now be removed from the chair (fig 1.38).

Reinstallation: Reverse above steps.
Torque motor mounting bolts and Bridging Plate bolts to 16-20 Newton Meters (12-15 ft-lbs).
Torque drive wheel lug nuts to 47.5-54 Newton Meters (35-40ft-lbs).

Note: Always use new cotter pins.

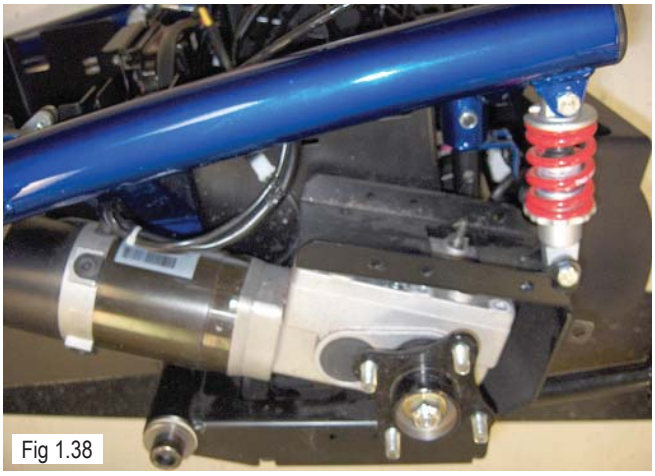


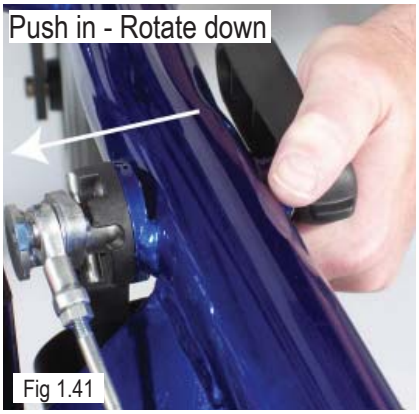
Fig 1.38

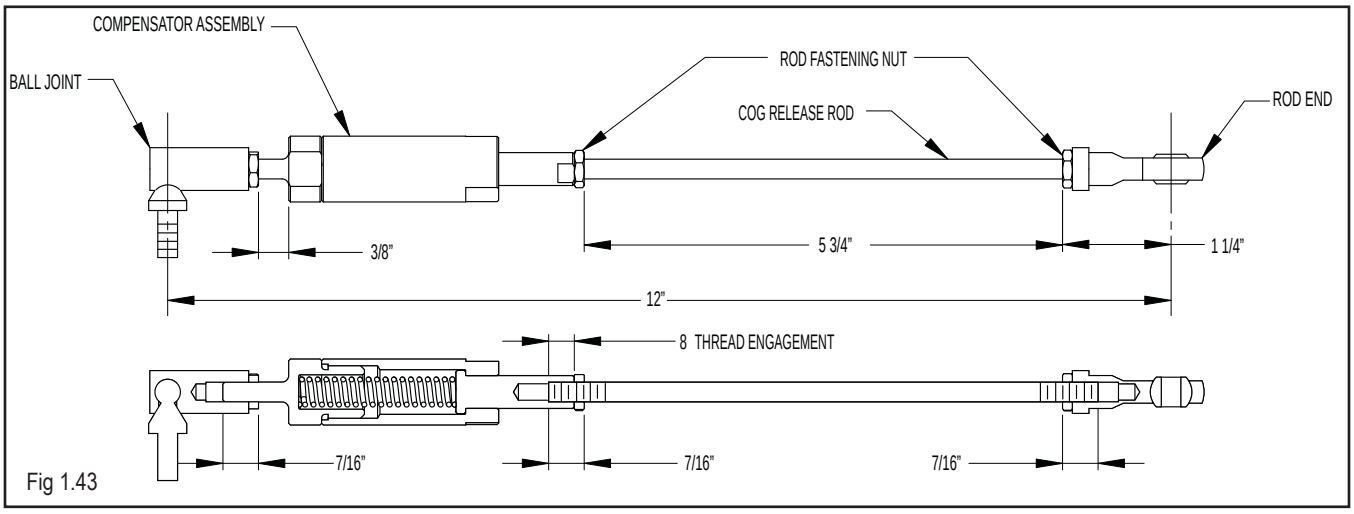
The Freewheel Mechanism

Rhythm Free Wheel Assembly

Fig 1.39

Groove Free Wheel Assembly





Pre-Assembly:

1. Thread Rod Fastening Nut and Rod End to the Cog Release Rod – turn about 7 Full turns.
2. Tighten Rod Fastening Nut snugly.
3. Do the same for other end of rod, thread nut and Compensator Assembly. Do not over-tighten at this time.
4. Set the distance between the fastening nuts to be approximately 5 ¾ inch (5.7 inch).
5. Add Ball Joint assembly to Compensator and thread another fastening nut but keep it loose at this time
6. Set the distance to be approximately 3/8 inch (.35 in) between fastening nut and Compensator.

Final Assembly:

1. The Motor Should be Set in “DRIVE Mode” position before installing the COG.
2. Make sure that the Cog Release Rod Handle is Parallel with the Chassis Tube Pointing towards casters.
3. Fasten the Cog Release Rod assembly to the Motor Lever and Cog Release handle assembly.
4. Add Batteries and any additional parts to system (Ex. Seating System) to add weight for proper adjustment Note: Further adjustment is available via the Compensator thread if required.
5. Now adjust the Compensator thread until slop on Cog release Rod side is gone.
6. Dis-engage and try to push wheel for any gear noise, adjust more if necessary.
7. Try a couple more times to ensure “Drive” and “Free Wheel” operation are working properly – finish with tightening all fasteners securely.

Drive Wheels

Changing Drive Wheel Assembly

Disassemble:

1. Carefully support the frame of the wheelchair using jack stands.
2. Remove the four lug nuts using a 16 mm socket wrench.
3. Slide Wheel assembly off Hub.

Reassemble:

Align wheel and slide back onto hub.

Replace the four lug nuts and tighten to 35-40 ft. lbs.

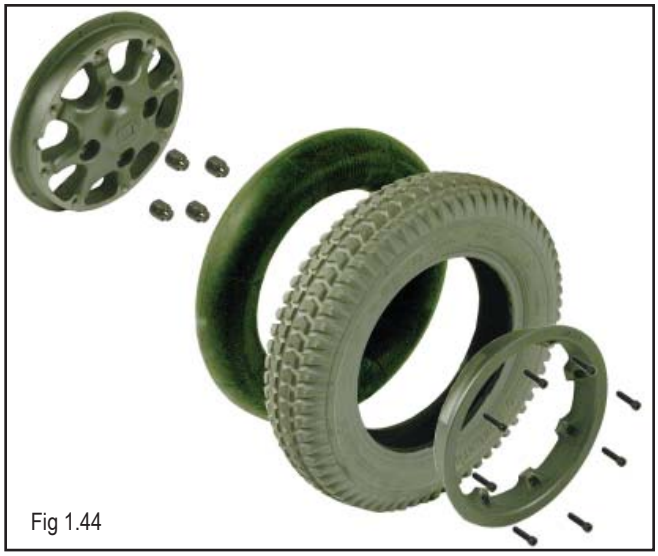


Fig 1.44

Changing Drive Wheel Tires

Note: it is not necessary to remove the entire wheel assembly in order to change tires or tubes.

Disassemble:

1. Carefully support the frame of the wheelchair using jack stands.
2. Release all pressure from tire by removing valve core.
3. Remove the eight socket head cap screws using a 3/16 Allen wrench.
4. Remove inner tube and replace if necessary.
5. Replace Tire if necessary, always replace inner tube when replacing tire.

Reassemble:

1. Install the eight socket head cap screws and tighten to 12-15 ft.-lbs or Newton Meters.
2. Reinflate tire to manufactures recommended pressure.

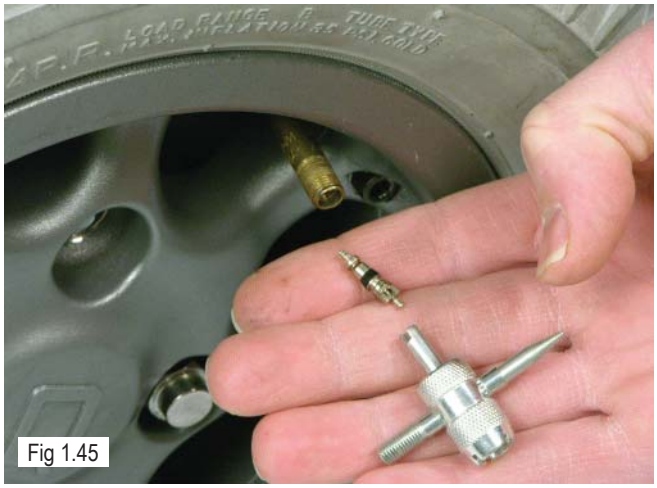


Fig 1.45

Fig 1.46

Motor Encoders

Introduction

Encoders allow chairs maintain a straight line while driving on uneven terrain and allows the usage of Switch Controls without the normal veering of other products. It does this by 5 individual Hall Effect Sensors that will detect 1 degree per 360 degree rotation of the wheel by means of the Encoder. Encoders are simple to add on and operate with our Delphi Electronics. The following details will show you
what parts are necessary and how it plugs into the module as well as programming.

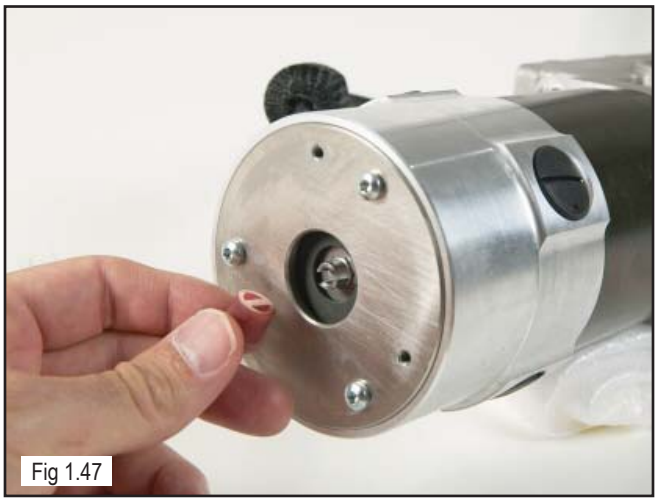


Fig 1.47

Fig. 1.47 shows the Encoder mechanism and the Plastic coupler which connects to both Motor Shaft and Encoder Assembly. This procedure is done by removing the Brake cap and using the Same 3 Screws that were used initially.


Fig 1.48

Your next step is to plug the Encoder Plug into the control Module (Fig 1.48) with Symbol seen in Fig 1.49.

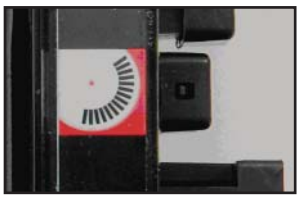


Fig 1.49

Final Step is to Plug in Programmer
Go to Program (Fig 1.50)
Go to Motor control (Fig 1.51)
Go into General Parameters (Fig 1.52)
Go into General – which is Encoder Selection – Using On for operation
Set Encoder to: On (enable) (Fig 1.53)– resolution is preset and does not need to be changed
You are now set to Drive with Encoders – INTELLI-DRIVE

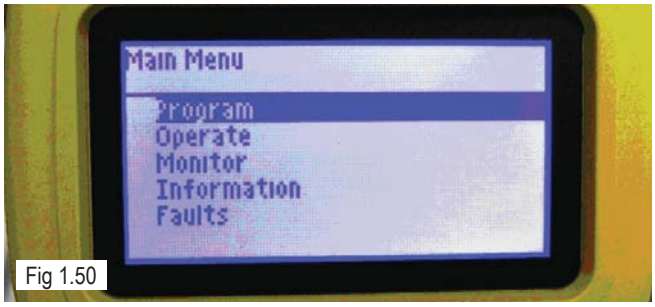


Fig 1.50

Fig 1.51

Fig 1.52

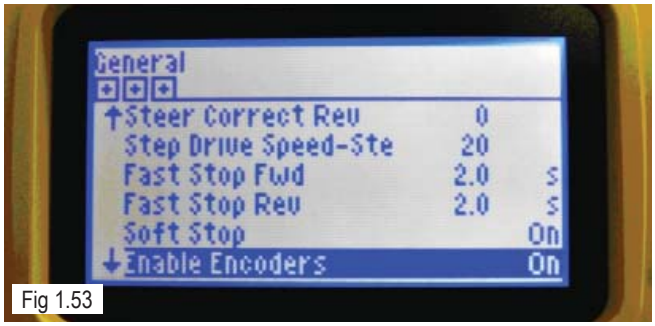


Fig 1.53

Suspension

The Quickie Rhythm base has a special 4-bar suspension system that pulls the front caster wheels up over curbs, while simultaneously maintaining independent suspension on the remaining four wheels.

- The front caster housing pivots horizontally, which absorbs front impact. Then the tension between the caster and the drive wheel literally pull the caster up over the curb.
- When only going over rough terrain, the connecting belt allows independent suspension of the front casters as well as the drive wheel
- The rear casters also feature independent suspension.
- All 6 wheels suspend independently and remain in contact with the ground.

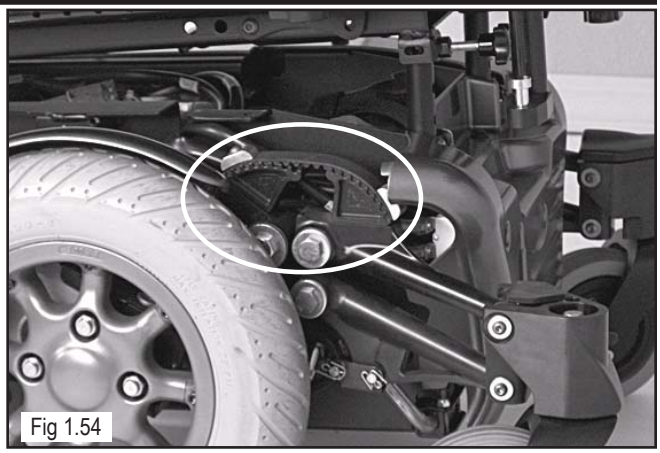


Fig 1.54

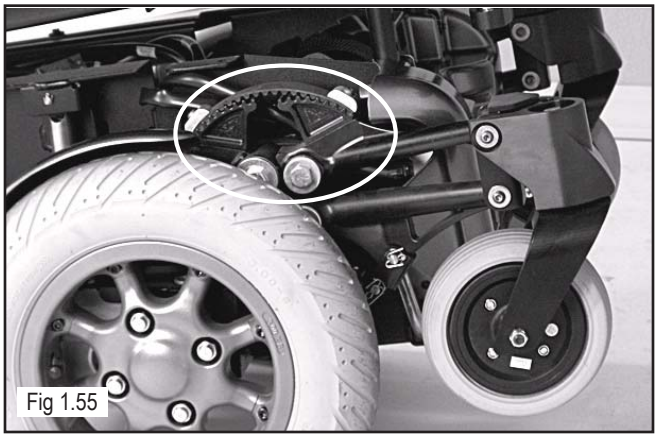


Fig 1.55

Changing and Adjusting Suspension

The chair is shipped with factory preload settings.

Preload Settings (Fig 1.56 - DIM A)

- 63mm/2.5” No Power options.
- 70mm/2.25” If Power options are included.

If you add or remove a power option please adjust the spring preload setting accordingly.

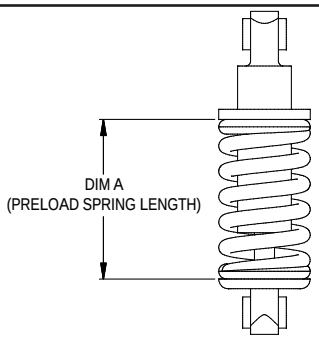


Fig 1.56

63mm No Power
70mm Power options

Spring Preload Adjustment:
(Refer to Fig 1.57.)
Without weight (chair off the ground.)

1. Remove cotter pin.
2. Remove pivot pin inboard.
3. Rotate spring cage down.
4. Use hex drive tool to tighten / loosen the screw.

Fig 1.57

It is important that you check the settings of the rear shock dampening assembly before you proceed to make any changes to the springs.

Note: Contact Technical Service for any changes to the seating system such as addition of Tilt, Lift, or Ventilator.

Fig 1.58

Fig 1.59

Anti-pitch Timing Adjustment

For Rhythm, each rear suspension element controls the pitch damper mechanism on that side of the chair. Timing of the initiation of the anti-pitch function on the Rhythm can be accomplished by the following method.

- Place the chair on a pedestal so that the drive wheels are suspended off of the riding or work surface.
- To allow a clearer indication of anti-pitch function, move to the front of the chair and remove the 6mm hardware that secures the anti-sway bar end links to the motor mounts (Fig. 1.60).
- Lift the rear caster so that the black rubber pad on the front of the rear shock mount is against the chassis tube (Fig 1.61).
- The motor on that side of the chair should move freely on its pivot and the anti-pitch tube.
- Slowly lower the rear suspension so that the black rubber pad on the front of the rear shock mount separates from the chassis tube (Fig 1.62).
- After the rubber pad separates from the chassis tube the effort required to move the motor about its pivot should increase substantially. This is the pitch damper increasing the suspension damping level.
- The increase in motor movement effort should take affect before the rubber pad has separated from chassis tube by more than 1/8". This constitutes pitch damper "timing"

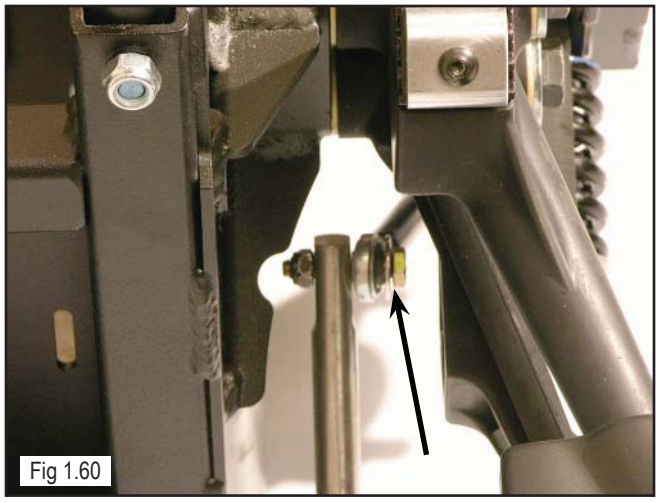


Fig 1.60

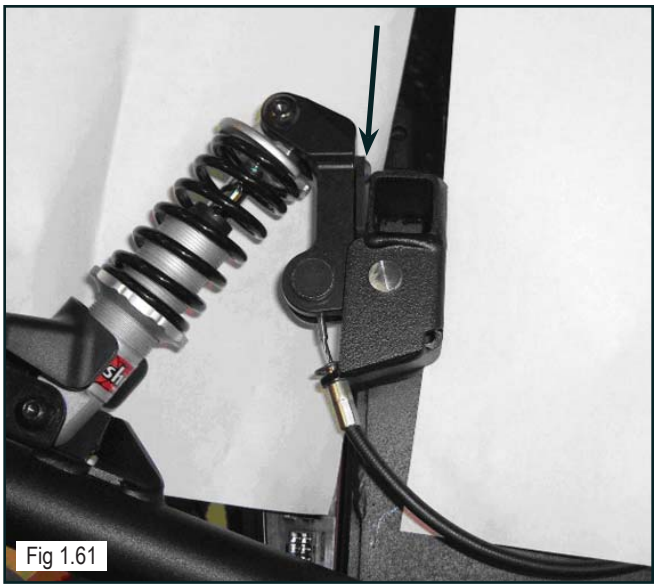


Fig 1.61


Fig 1.62

- Adjusting the timing of the anti-pitch effect is accomplished by rotating the nut at the end of the anti-pitch actuation cable at the anti-pitch housing. The anti-pitch housing is located on the stainless steel anti-pitch shaft inboard of the drive motor. (Fig 1.63) (NOTE: The free threads seen between the nut and the cable rotary barrel indicate that this anti-pitch is fully engaged.)
- As seen, the barrel end of the cable has a hexagonal shape and while an adjustable wrench could be set to fit this portion of the cable, a vise-grip type of pliers would be better suited to this application.
- Adjusting the nut clockwise will increase the amount of suspension travel prior to anti-pitch damping engagement. Adjusting the nut counter clockwise will reduce the amount of suspension travel prior to anti-pitch engagement.
- After evenly adjusting the timing of the anti-pitch on each side, reinstall the 6mm anti-sway bar and attaching hardware, then set torque to 6 ft-lbs or 8.13 Newton-meter.
- Remove the chair from the pedestal. The procedure is complete.

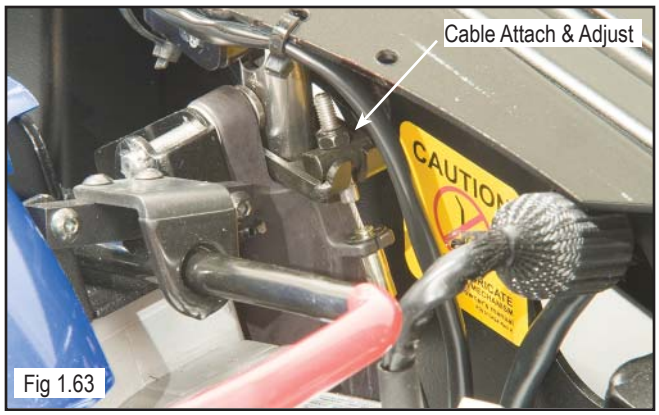


Fig 1.63

Anti-pitch Damper Mechanism Cleaning

If the Anti-Pitch Mechanism becomes contaminated with grease or oil it will be necessary to remove and disassemble it for cleaning.

- Raise the chassis of the chair on a stable platform, such as jack stands, so that all wheels are off of the working surface.
- Disconnect the motor power lead from the controller and remove the motor wiring through the chassis so that the motor assembly can be removed from the chair chassis.
- Remove the side shroud and set aside. (Refer to Shrouds section for removal instructions)
- With the motor cog release engaged, loosen and remove the drive wheel securing lug nuts and the drive wheel. (Refer to Drive Wheels section for instructions)
- Remove the front most cotter pin (A) on the suspension linkage.
- Remove the small cotter (B) pin on the Anti-Pitch Damper post.
- Remove the main motor assembly bolt (C).
- Remove the button head cap screw (D) that holds the belt clamp and belt to the motor mount pulley.
- Use a 10 mm wrench to remove the M6 bolt (E) attaching the Anti Sway bar to the Motor assembly.
- Pull the motor assembly away from the chassis using a rocking motion.
- Remove the 1/6 x 1/2 cotter pin (F) and the Anti-Pitch Damper Rod Pivot Pin that secure the Anti-Pitch assembly to the chassis.
- Remove the E-clip (G) that holds the cable to the Anti-Pitch assembly
- Remove the two socket head cap screws (H)on the bottom of the Anti-Pitch assembly
- During reasembly the two socket head cap screws (H) should be torqued to 7-9 foot-pounds or 10-12 newton-meters. The M6 bolts (E) that attach the Anti sway bar to the Motor assembly should be torqued to 6 ft-lbs or 8.13 Newton Meters. The Main Motor Bolt (C) should be torqued to 55-60 Newton Meters (40-.60 ft-lbs)

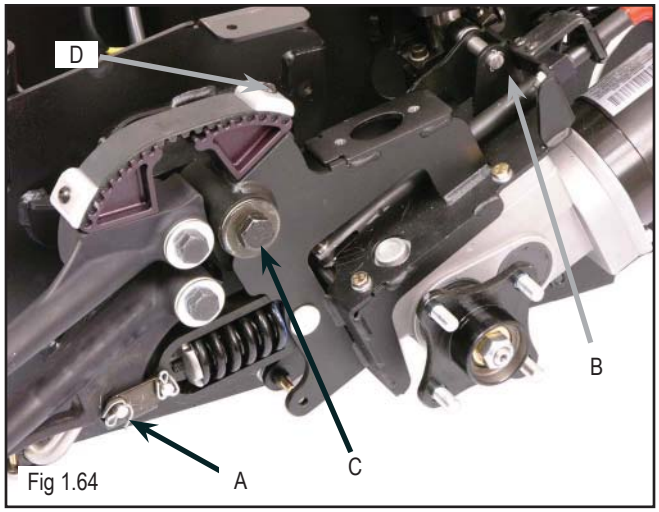


Fig 1.64

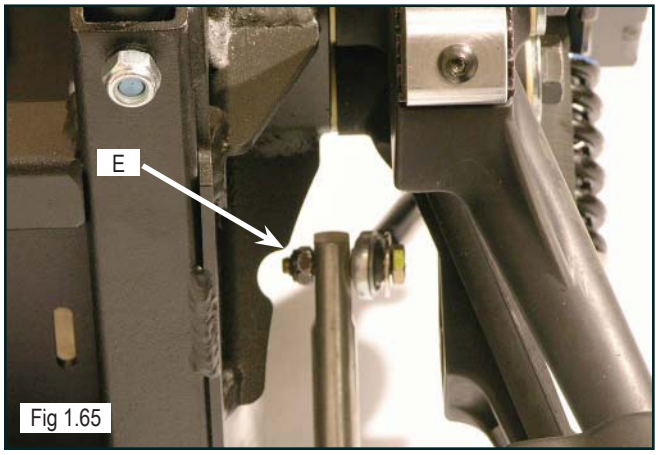


Fig 1.65

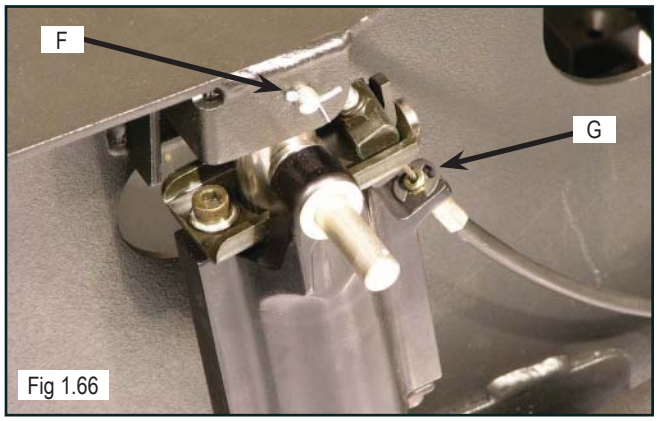


Fig 1.66

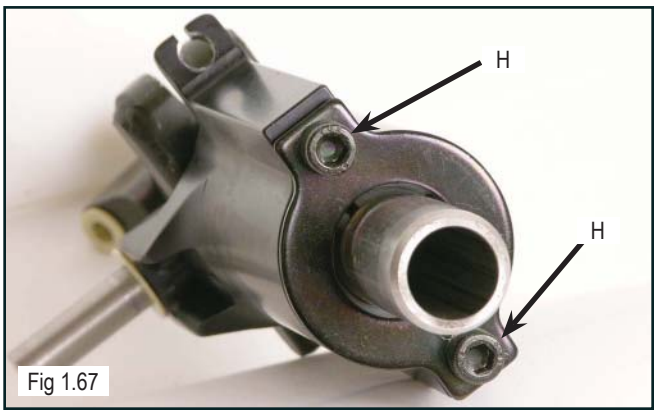


Fig 1.67

Using a soft hammer tap down on the top of the cylinder to release the internal parts.

Fig 1.68

Use soap and water, alcohol or acetone to clean the Damper Rod and the plastic Anti-Pitch Taper.
Do not lubricate any parts of the anti-Pitch Assembly.
Always use new cotter pins when reassembling.

Fig 1.69

Replacing Shrouds

Rhythm

- The Front (B) and Side shrouds (A) are held in place by reusable shroud fasteners (C & Fig 1.71).
- To remove the fasteners, insert a flat blade screw driver under the slot of the fastener center piece and pry up. (Fig 1.72)
- The Battery compartment Lid (D) is removed by lifting up on the web handle and then pulling forward.
- The Rear Shroud (E) is removed by pulling the top of the shroud back then lifting off.

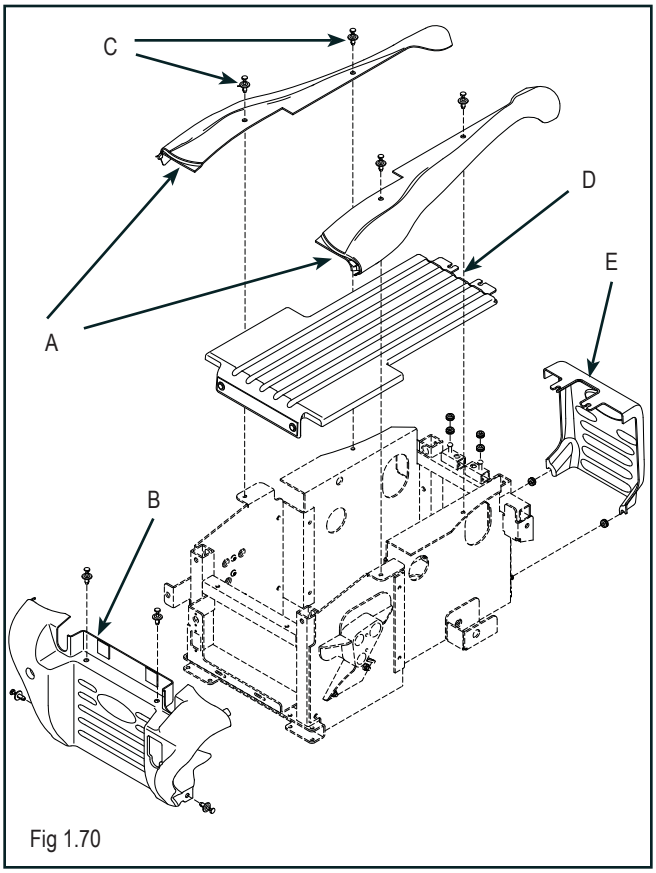


Fig 1.70

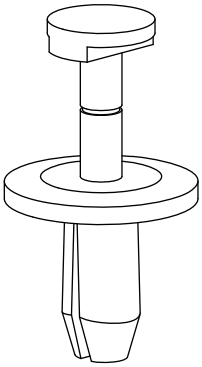


Fig 1.71

Insure tabs on front shroud are inserted into slots on side shrouds during reassembly. (Fig 1.73)

Fig 1.73

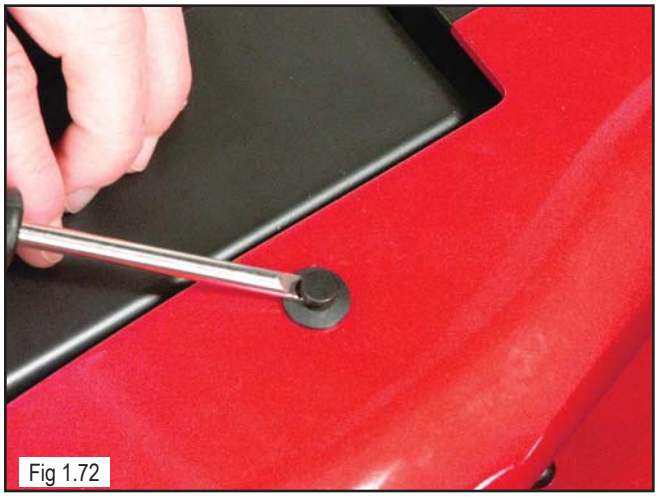


Fig 1.72

Quickie Electronics by Delphi

Hand Control Types and Functionality

Joystick Descriptions:

- All joysticks use a Centered Power On/Off button which have a delay for Power-up
- No delay for Power-down.
- All Joysticks have a Horn which is programmable for volume levels.
- The QC4 and QC5 Joysticks have a Minimum speed designated as a Turtle and a Maximum speed designated as a Rabbit
- To increment the 4 separate LED's press the Rabbit and to decrement or decrease the speed press the Turtle button.
- The QC5 is the only Joystick that uses an Actuator button.
- The actuator button is used to select actuator control.
- The LED under the last actuator used will illuminate.
- The LED will illuminate under the chosen actuator if the joystick is pushed to the right or left.
- For dual legrest operation, push joystick once again and both LEDs will illuminate and actuator pair will operate .
- The operation of up or back (Drive Through Condition) is achieved by deflecting the Joystick in the reverse direction
- The forward direction will allow the customer to come back to starting position.

QC 4 Button Joystick
Sunrise P/N 101568 or 104972

Power – On/Off
Horn
Speed Up / Down Buttons

Fig 2.1

QC 5 Button Joystick
Sunrise P/N 101569 or 104973

Power – On/Off
Horn
Powered Seating Button
Speed Up / Down Buttons

Fig 2.2

Actuator Modes

Fig 2.3

QR3 – 3 Button Rehab Control

- SUNRISE PART # 020012
- Works with all Quickie Rehab Motor Controls.
- Mode Select, On/Off and Horn Buttons only.
- Program system through programming port in front of hand control, or through any other available Bus port.
- Programming via HHP or Quickie iQ (PCSS).
- LED Indicators for Mode Status, Mode selection,
- Seating function and Battery SOC.
- Keyless Lock Mode
- Sleep and Power Off Modes
- "Switch" Joystick option with Latched control.

Fig 2.4.1

Sunrise P/Ns
020012
Basic QR3 replacement
104959
Basic QR3 service kit
020021
QR3 w/ 1/8" phone jackse-placement
104960
QR3 w/ 1/8" phone jacks service kit
020022
QR3 w/ toggle and speed pot replacement
104964
R3 w/ toggle and speed pot service kit

QR7 – 7 Button Rehab Control

- Works with all Quickie Rehab Motor Controls.
- Program system through programming port in front of hand control, or through any other available Bus port
- Programming via HHP or Quickie iQ (PCSS)
- LED Indicators for Mode status, Mode selection
- Seating function and Battery SOC
- Keyless Lock mode
- Sleep and Power Off modes
- "Switch" Joystick option with Latched control
- 5 assignable buttons and one assignable jack port on hand controls with ports – each assignable button can be programmed for two distinct functions using either HHP or Quickie iQ (Fig.2.4.3 shows using Quickie iQ to program functions)

Fig 2.4.2

Sunrise P/Ns
020010
Basic 7 button hand control replacement
104965
Basic 7 button hand control service kit
020017
7 button hand control w/ 1/8 inch phone jacks replacement
104966
7 button hand control w/ 1/8 inch phone jacks service kit
020018
7 button hand control w/ toggle switch for mode and speed pot replacement
104968
7 button hand control w/ toggle switch for mode and speed pot service kit

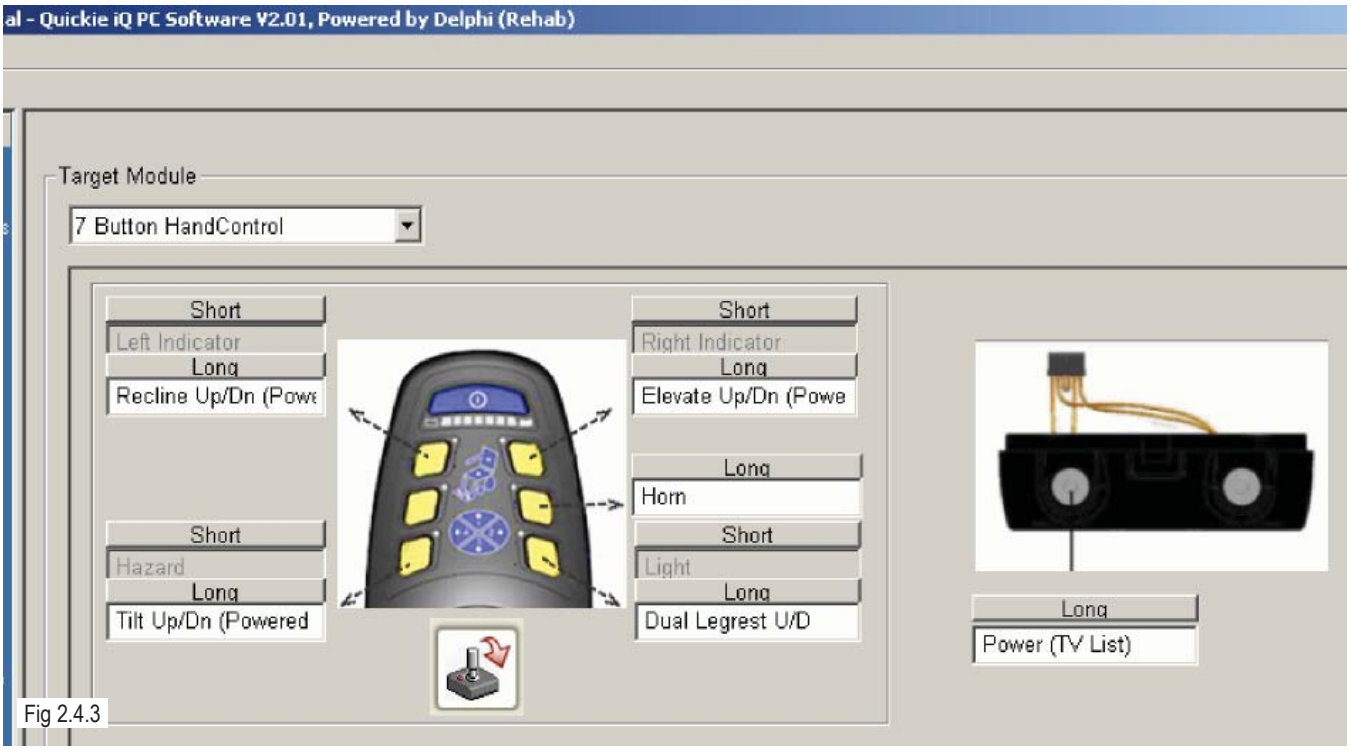


Fig 2.4.3

Drive Profile Mode

Red Mode light Shows flashing and Choice of Drive can be made

There are 4 separate Drive Profiles to choose. After depression of Mode Button push in any of the 4 directions to choose what Drive Profile to be in.

Fig 2.5

When you select a drive profile, the small light for that drive profile will glow red to indicate that it has been selected. After you select a drive profile, the wheelchair automatically goes back into drive mode and any further movement of the joystick will begin to move the wheelchair.

Actuator Mode

There are 6 different Actuator Modes to go through.
Lights will illuminate to indicate what Mode you are in.
The Mode Indicator Light will flash Green
The different Modes are as follows :

- Dual Legrest
- Rt Legrest
- Lt Legrest
- Tilt where both Seat and Back are lit
- Recline where back is lit and Lift where Seat only is lit.


Fig 2.6

To operate through the Modes of Actuator simply deflect Joystick in a Right or Left command position.

Hand Control Parts Replacement

Flying Lead Replacement

1. Remove the Joystick from the Joystick Mount
2. Remove the four T 10 torx screws from the bottom case of the Joystick (fig 2.7.1)
3. Remove the bottom case
4. Remove the strain relief from the bottom case
5. Release the retaining clip on four pin connector and pull from the circuit board
6. Plug the four pin connector of the New Flying lead into the circuit board
7. Insert the strain relief into the bottom case
8. Install the four T 10 torx screws

Fig 2.7.1 Note: QR3/QR7 shown

Fig 2.7.2

Joystick Mechanism and/or Joystick Boot Replacement

1. Remove the Joystick from the Joystick Mount
2. Remove the four T 10 torx screws from the bottom case of the Joystick (fig 2.7.1)
3. Remove the bottom case
4. Remove the eight pin connector by pulling from the circuit board (fig 2.8.1)
5. Remove the four T 10 torx screws securing the joystick mechanism retaining ring (fig 8.2.2)
6. Remove the joystick mechanism
7. Remove the boot by pulling the knob off the joystick mechanism and sliding the boot off
8. Install the boot, knob and retaining ring on the new joystick mechanism
9. Install the four T 10 torx screws that secure the retaining ring to the joystick housing.
10. Plug the eight pin connector of the joystick mechanism into the circuit board
11. Insert the strain relief into the bottom cover
12. Install the four T 10 torx screws that secure the bottom case

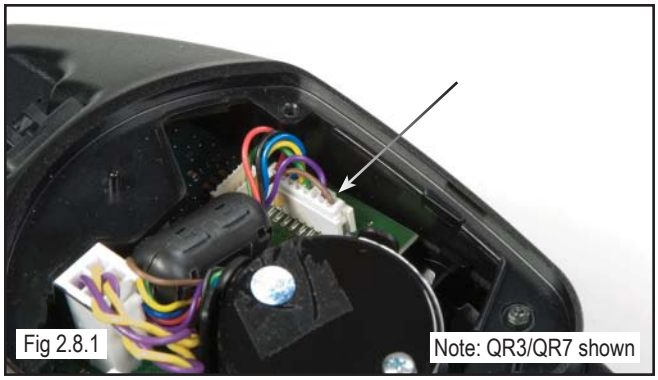


Fig 2.8.1 Note: QR3/QR7 shown

Fig 2.8.2

Joystick Housing Replacement

1. Turn off Joystick and unplug
2. Remove the Joystick from the Joystick Mount
3. Remove the four T 10 torx screws from the bottom case of the Joystick (fig 2.7.1)
4. Remove the bottom case If bottom case is equiped with jacks or switch and potentiometer then remove the six pin connector if applicable
5. Remove the eight pin connector by pulling from the circuit board (fig 2.8.1)
6. Remove the four T 10 torx screws securing the joystick mechanism retaining ring (fig 2.8.2)
7. Remove the joystick mechanism, retaining ring, hood and knob
8. Remove the four T 10 torx screws securing the upper and middle housing (fig 2.9.1)
9. Remove the circuit board
10. Remove the com-port connector and boot by pushing the boot out from the inside of the middle housing (fig 2.9.2)
11. It may be necessary to disassemble middle and top housing of the new joystick housing
12. Insert the com-port and boot from the outside into the new middle housing and pull the boot flange tight against the middle housing
13. Insert the joystick mechanism in the upper housing and align the retaining ring with the four holes reinstall the four T10 torx screws
14. Insert the circuit board on the three location pins of the new upper housing
15. Align the upper and lower housings and make sure the rubber gasket is properly seated then reinstall the 4 T 10 torx screws
16. Re-connect the com-port connector, the eight pin joystick mechanism connector and the six pin heel controls connector if equiped (fig 2.9.4)
17. Insert the strain relief of the flying lead into the bottom cover (fig 2.9.3) and re-connect the four pin connector (fig 2.9.4)
18. Make sure the rubber gasket is properly seated between the middle housing and bottom case
19. Install the four T 10 torx screws that secure the bottom case (fig 2.7.1)


Fig 2.9.1


Fig 2.9.2


Fig 2.9.3

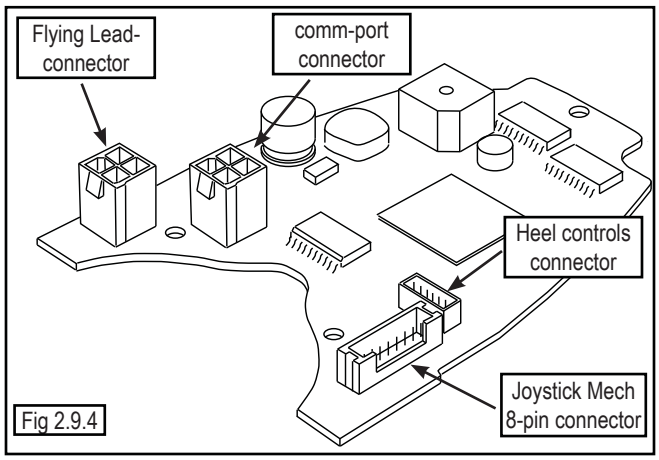


Fig 2.9.4

Additional Hand Control Heels and add-ons

Heels are exchangeable by removing the 4 Torx screws and separating the heel from the main body of the hand control. Disconnect the cable from the heel to the main body of the control (where applicable), and ensure that the Main Bus cable is detached from the heel. Take the new heel and perform the reverse operation to fit it to the main body of the Hand Control.
Wrist Rests are removed by loosening the two Torx screws in the base of the Rest, splitting the Rest into 2 halves and removing a further 2 Torx screws that hold the Rest to the main body of the Hand control. To add a Wrist Rest, perform the reverse operation.


Fig 2.10.1

Speed Potentiometer and On / Off Switch Heel
SUNRISE PART # 020041


Fig 2.10.2

Jack Socket Heel (2 eighth inch Jacks)
SUNRISE PART # 020042

Mounting

- QR Hand Controls can be mounted on either side of the Wheelchair to accommodate Left Handed and Right Handed Users.
- QR Hand Controls must be mounted using 3 M5 x 14 button head screws.

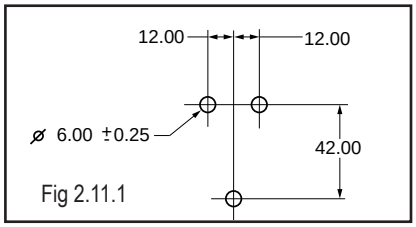


Fig 2.11.1


Fig 2.11.2

Wiring

- Before making any connections to the Hand Control, disable the Wheelchair by disconnecting the Batteries and/or elevating the drive wheels.
- Use only Sunrise Medical approved wiring Harnesses to connect the Hand Control.
- Wiring should be suitably restrained and fastened to the wheelchair to prevent snagging and to ensure that there is no strain on connectors.
- Take particular care when routing and securing cables on moveablestructures, such as Tilt, Lift and Recline etc. Such moving structures have the potential to crush and shear wiring, causing potential electrical issues.
- To maintain EMC compliance, ensure that wires are routed as per Sunrise Medical recommendations.

Note: bottom 2 pins 3&4 can be used to measure battery voltage.

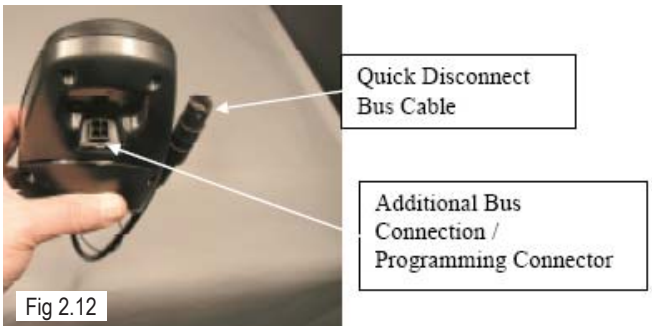


Fig 2.12

Can Bus Pin Outs

Pin	Definition
1	CAN Hi
2	CAN Lo
3	+24V
4	Ground

Programmable Ranges

Menu Item	Description	Range
Drive Profiles	Determines number of profiles (QC=1 QR=4)	1-4
Device	Selects Drive input when profile is Active	
Forward Speed	Determines Fwd Speed settings	5 - 100
Reverse Speed	Determines Rev Speed settings	0 – 100
Turning Speed	Determines Turning Spd settings	0 - 100
Forward Acceleration	Determines Fwd Accel Rate	0 - 100
Reverse Acceleration	Determines Rev Accel Rate	0 - 100
Forward Deceleration	Determines Fwd Decel Rate	0 - 100
Reverse Deceleration	Determines Rev Decel Rate	0 - 100
Turn Acceleration	Determines Turn Accel Rate	0 - 100
Turn Deceleration	Determines Turn Decel Rate	0 - 100
Power	Determines allowable current for Motor torque limiting	20 - 100
High Speed Torque	Determines the maximum amount of torque available at the highest speed	20 - 100
Low Speed Torque	Determines the maximum amount of torque available at the lowest speed	20 - 100

Device
Type of input control utilized : hand control,3 Button, SCIM1, SCIM1 or compact joystick.

Forward Speed,
The maximum speed setting for the control module and the minimum setting – to drive the chair in the forward direction.

Reverse Speed
The maximum speed setting for the control module and the minimum setting – to drive the chair in the reverse direction.

Turning Speed
The maximum speed setting for the control module and the minimum setting – to drive the chair in the left or right direction.

Accel Fwd & Rev
How quickly the chair reaches the selected speed up to the maximum. Settings are in 1% increments.

Decel – Fwd & Rev
How quickly the chair comes to a stop from forward or reverse directions. Settings are in 1% increments.

Turn Acceleration
How quickly the chair reaches maximum turning speed, or how quickly the chair responds to a turn command. This parameter is extremely important as to how sensitive the chair is to input device movements and how easy it is for the user to control the chair.

Turn Deceleration
How quickly the chair comes to a stop from a turn. Also very important in the control of the chair. Settings are 1% increments.

Torque Limit
Determines amount of demand or current applied to output of control to motors in response to Drive Input commands.

Power On / Off Options

This button turns the wheelchair control on and off. You can see if the wheelchair control is on by looking at the lights just under the on/off button. If any of the lights are visible, the control is on.

Keyless Lock Feature

This is a programmable feature that can be Enabled or Disabled – Default Disabled. The lock is engaged by depressing and holding the On/Off switch for a period of greater than 10 seconds and then simultaneously pushing the joystick forwards.
The lock is disengaged by depressing and holding the On/Off switch for a period of greater than 5 seconds and then simultaneously pulling the joystick backwards.
Audio acknowledgment of the lock engaged operation is by sounding the horn for 50ms. Audio acknowledgment of the lock disengaged operation is by sounding the horn for 50ms 3 times, with 50ms “spacing” between the tones.

Battery Diagnostic Threshold

- Battery under-voltage Error Threshold (Range – 13-23 volts - normally set to 16 volts) This is the voltage at which the control will monitor for a specified period of time and will execute an error of 1 bar flash.
- Battery Voltage Error Period (Range setting of 0 – 100 seconds - normally set to 30 seconds) This is the period of time in which the control will look at a lower voltage parameter and count a time out – prior to execution of error
- Battery Voltage Low Warning Threshold (Range setting of 13 – 23 volts - normally set to 18 volts) This is the voltage at which the control will give a Low Voltage warning normally set prior to the Under-voltage Error Threshold.

Programming Devices

Hand Held Programmer

Features :

- (+) and (-) keys (A) to increase or decrease data
- Up, Down, Left, and Right key (B) Moves around in the menu
- The top three buttons are reserved for future use
- Menus broken down into levels (fig 2.14)
- Levels identified with (+) symbols (fig 2.15)
- Main Menu followed by:
  - (+) First Level
  - (++) Second Level, etc.

Note: When programming with the HHP, you need to back out of the current menu screen for the new programming to take effect."

Hand Held Programmer

Fig 2.13

Fig 2.14

Fig 2.15

FULL QR MOTOR CONTROLLER (QR-ACT)
SUNRISE PART # 020001

- Accepts Motor Encoders for Intellidrive option.
- Works with Attendant Control
- Accepts two external switch inputs, which can be used for external seat reversal switch, Drive inhibits or 1/2 Direct Actuator Control Switches.
- 2 Bus Ports to allow connection to other Delphi QR Components
- Functional Connectors Denoted by Markings on Labels
- Charge Through Motor Control Off Board
- Two actuator outputs – both 10A with Encoder and Limit switch options
- Independent outputs for lights and indicators
- Analogue Sensor Port for future use.

QR-ACT – Rehab Motor Controller w/ Actuator Outputs

Fig 2.16

Connector Functions	Symbol
Battery	
Battery Charger	
Motor/Parking Brake A,B	
Encoder A,B	

Connector Functions	Symbol
System Bus 1,2	
Actuator 1,2	
Direct Actuator Switches	
Analog Inputs	

Control Operation Description

The Motor Controller is a 70 amp control module for QC and 100 amp for QR. When used on flat terrain it will draw approximately 10 amps (+/- 2). On a steep incline or curb, it will draw up to 70 amps of current to give the motors a power boost for 10 seconds. If required, it will deliver 35 amp output for an additional 100 seconds. Most controls would either shutdown or go into full current rollback after going for that length of time. The QC Motor Control will continue to deliver output at 25 amps.

Current Rollback is a condition of over-temperature for the module. After the module cools to a temperature of less that 122° (< 50 degree's Celsius), it will go back to full operation mode.

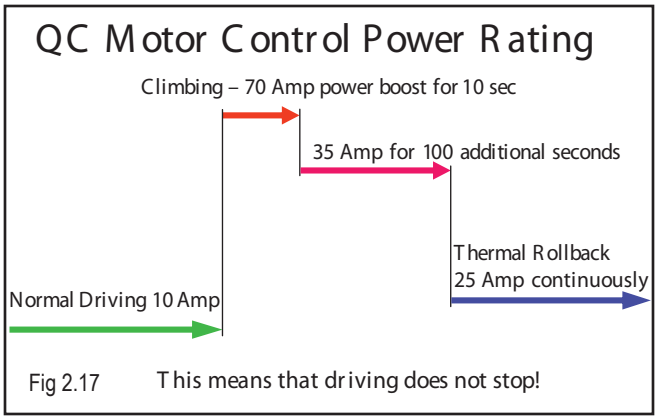


Fig 2.17

QR-MAC - Quickie Rehab Multiple Actuator Control
SUNRISE PART # 020007
Works only with QR system.

- Used when more than 2 actuators are required in the seating system.
- Actuator outputs for left and right leg rests (4A), tilt, lift, recline (10A).
- 2 bus ports to allow connection to other Delphi QR components.
- Battery power input for remote actuator control option.
- Hex switch input for remote actuator control option.
- Input for anti-tip actuator, attitude sensor and auto-home switch.
- Incorporates lockout angle settings, creep, inhibit, encoder and limit switch inputs.
- Works with many types of actuators for future design flexibility.
- Recline / leg rest combined operation feature.
- Enhanced recline (combination recline / tilt) option.

Fig 2.18

Wiring:

- Before making any connections to the Controller, disable the Wheelchair by disconnecting the Batteries and/or elevating the drive wheels.
- All wiring should be as short as possible to minimize voltage loss at High Current.
- Use only Sunrise Medical approved wiring Harnesses to connect the Motor Controller.
- Wiring should be suitably restrained and fastened to the wheelchair to prevent snagging and to ensure that there is no strain on connectors.

Electronic Pin Out Characteristics – QC Motor Controls

Can Bus Pin Outs

Pin	Definition
1	CAN Hi
2	CAN Lo
3	+24V
4	Ground

Actuator Pin Outs

Pin	Definition
1	Actuator +
2	Switch A (Encoder A or Reed or Limit)
3	Ground
4	Switch B (Encoder B or Limit)
5	Actuator -
6	+24V

Direct Switch Pin Outs

Pin	Definition
1	No connection
2	Ground
3	Switch 1
4	Switch 2

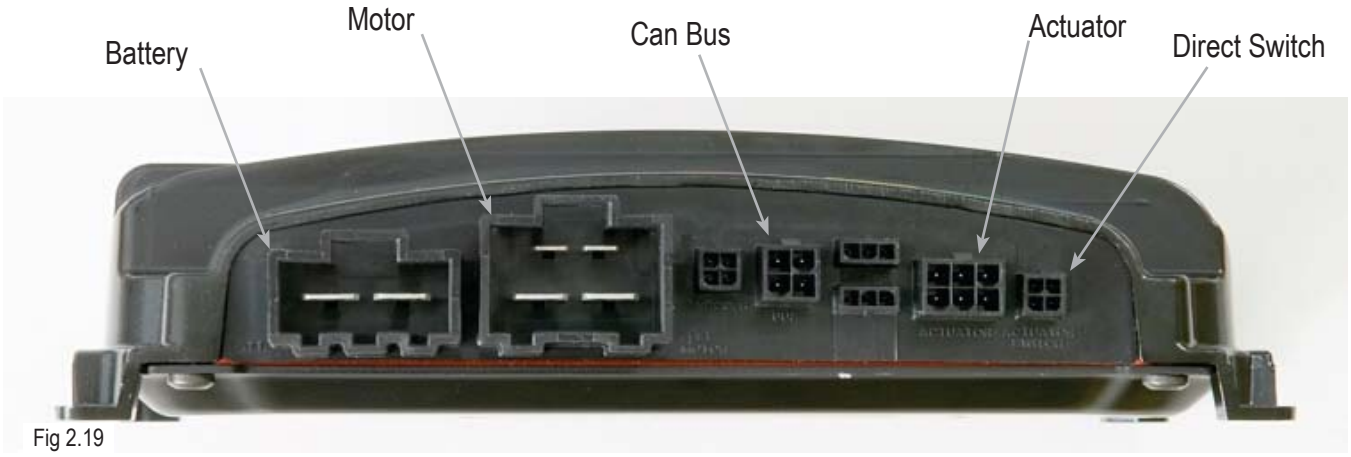
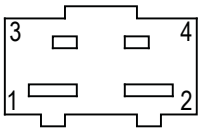


Fig 2.19

Motor Pin Outs

Pin	Definition
1	Motor + (for forward chair motion)
2	Motor - (for forward chair motion)
3	Brake +
4	Brake -



View looking into cavity of header connector:

Fig 2.20

Electronic Pin Out Characteristics – QR Motor Controls

Actuator Pin Outs

Pin	Definition
1	Actuator +
2	Switch A (Encoder A or Reed or Limit)
3	Ground
4	Switch B (Encoder B or Limit)
5	Actuator -
6	+24V

Analog Sensor Pin Outs

Pin	Definition
1	+24V
2	Ground
3	Analog 1
4	Analog 2
5	Analog 3
6	Analog 4

Encoder Pin Outs

Pin	Definition
1	Encoder Supply
2	Encoder Ground
3	Encoder A
4	Encoder B

Battery Charger Pin Outs

Pin	Definition
1	Charge +
2	Charge -
3	Charge Inhibit

Direct Switch Pin Outs

Pin	Definition
1	No connection
2	Ground
3	Switch 1
4	Switch 2

Can Bus Pin Outs

Pin	Definition
1	CAN Hi
2	CAN Lo
3	+24V
4	Ground

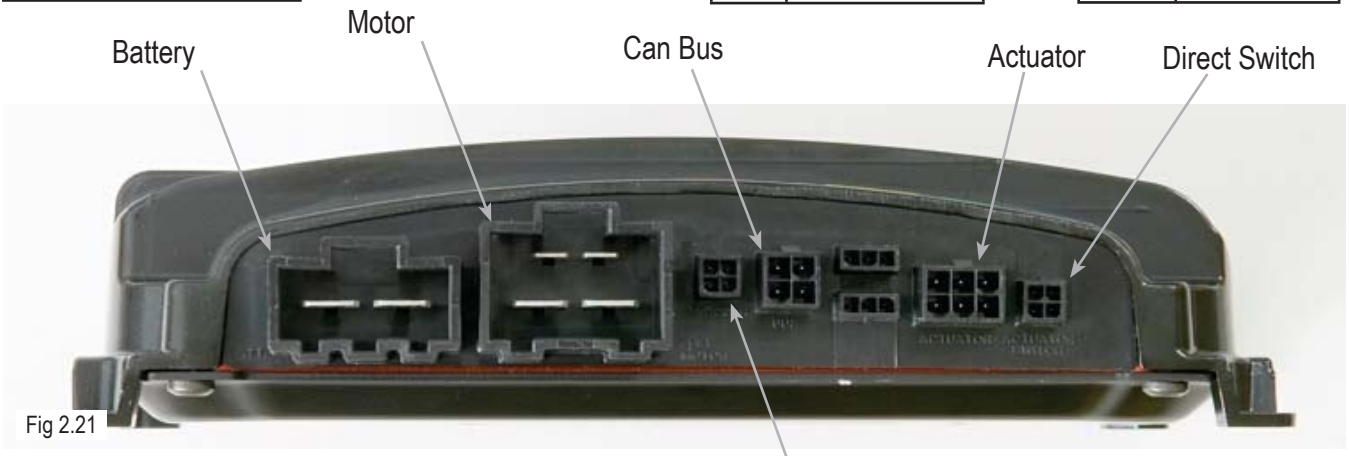
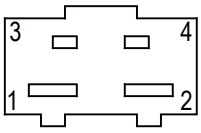


Fig 2.21

Motor Pin Outs

Pin	Definition
1	Motor + (for forward chair motion)
2	Motor - (for forward chair motion)
3	Brake +
4	Brake -



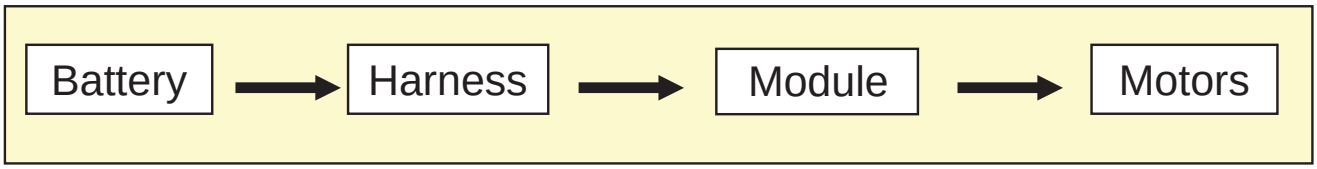
View looking into cavity of header connector:

Encoders

Fig 2.22

Diagnostics Overview

The first step in Troubleshooting any Power Wheelchair is to look at the chair and break it down into four simpler groups.



Quickie by Delphi Diagnostic Codes

Refer to the following tables for a quick diagnostic guide provided by the Battery Gauge on the Quickie system.For additional information, refer to the Users guide for each system.

Priority Values show which error takes priority in the event of multiple errors.
(1=Highest Priority, 10=Lowest Priority)

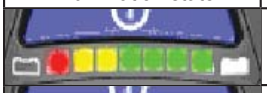
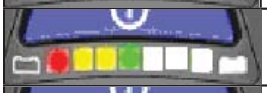
Drive Mode errors are indicated by the red LED next to the Mode Button Flashing RED.

Drive Mode Errors

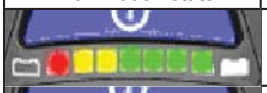
LED illumination state	Error Description	Priority *
	Motor Controller Internal Module Error	2
	Module Communication Error	3
	Input Device Out of Neutral at Power On	8
	Park Brake Open Circuit Error	6
	Right Motor Open Circuit Error or Right Motor Encoder Error	4
	Left Motor Open Circuit Error or Left Motor Encoder Error	5
	Battery Under Voltage Error or Battery Over Voltage Error	9
	Motor Controller High Temperature Warning	10
	Invalid System Configuration Error	1
	Drive Lockout External Source	7

Errors are indicated by the LED associated with the Mode Button Flashing GREEN.

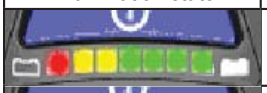
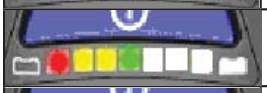
Seating Mode Errors

LED illumination state	Error Description	Priority *
	Actuator Internal Error	2
	Module Communication Error	3
	Actuator Hex Switch not Neutral at Power On	8
	Actuator Home Switch not Neutral at Power On	6
	Actuator Encoder Error	4
	Actuator Over Current Error	5
	Battery Under Voltage Error or Battery Over Voltage Error	9
	Actuator High Temperature Warning	10
	Invalid System Configuration Error	1
	Drive Lockout External Source	7

ECM Errors

LED illumination state	Error Description	Priority *
	ECM Internal Error	2
	Module Communication Error	3
	Battery Under Voltage Error or Battery Over Voltage Error	9
	Invalid System Configuration Error	1
	Drive Lockout External Source	7

QR-MAC Errors

LED illumination state	Error Description	Priority *
	QR-MAC Internal Error	2
	Module Communication Error	3
	QR-MAC Hex Switch not Neutral at Power On	8
	QR-MAC Home Switch not Neutral at Power On	6
	Actuator Encoder Error	4
	Actuator Over Current Error	5
	Battery Under Voltage Error or Battery Over Voltage Error	9
	QR-MAC High Temperature Warning	10
	Invalid System Configuration Error	1
	Drive Lockout External Source	7

Delphi Diagnostics Trouble Shooting Chart

Symptom	Code Flash	Diagnosis	Solution
Battery Voltage has Dropped Lower or Raised Higher Than Operating Voltage	1 Bar – every 2 seconds	Batteries Depleted Loose or Disconnected battery Bad Cells Overcharged Batteries	Recharge batteries Test with Volt Meter Load Test Batteries Check Connections Replace batteries with New Set. Check Battery Condition for Overcharged You will notice sides of Batteries Concaved (overcharged)
Disconnect Left. Motor Connection	2 bars – every 2 seconds	Motor 2 Open Circuit	Check motor connector Check Armature Resistance Switch Motor Leads Replace Brushes Replace Motor
Disconnect Right. Motor Connection	3 bars – every 2 seconds	Motor 1 Open Circuit	Check motor connector Check Armature Resistance Switch Motor Leads Replace Brushes Replace Motor
Disconnect of Left or Right Brake Connection or complete Motor Connection	4 bars – every 2 seconds	Park Brake 1 or Park Brake 2 open circuit	Reconnect brake Check brake resistance Switch motor leads replace motor
Active Input Not Neutral At Power-On Error	5 Bars – every 2 seconds	Active Input Not Neutral At Power-On Error	Check to see if client has their hand on remote Reset Power check integrity of Joystick Gimbal If bent Replace out Replace Joystick Module.
Loss of Communication	6 Bars – every 2 seconds	Loss of Communication with Bus Line Devices on Bus	Check wiring connections Check all bus connections Check diagnostic readings Replace components causing failure if constant problem.
Motor Controller Internal Module Error	7 Bars – every 2 seconds	Motor Controller Internal Module Error	Replace Control module Check all connections
Motor Controller High Temperature Warning	1 Green (far right green)	Motor Controller High Temperature Warning is TRUE	Stop Chair Check Motor Connections Check Motor resistance (Refer to Section 4) Check all connections Replace Control Module
Invalid System Configuration	2 Green (right to left)	Invalid System Configuration Error is TRUE	Check to see if Module is compatible with system If using QC control and hooking up non protocol device error will occur If compatible with system try another control module unplug Device
Drive Lockout External Source	3 Green (right to left)	Drive Lockout Source is True	Connection to source of inhibit such as tilt system Recline
Charger is Plugged in	Ripples up from 1st LED to Top LED #7	Charger Plugged In – Inhibit Circuit	Disconnect Charger Check wiring for Common Pin 2 and Pin 3 short

Fault Isolation Procedures Using Quickie iQ or Hand Held Programmer

Introduction

1. Observe all safety precautions in the Quickie iQ, the HHP Owner's Manual and the Rhythm and Groove Technical Service Manual.
2. Connect the Quickie iQ or the HHP to the wheelchair per instructions in the Quickie iQ or the HHP Owner's Manual.
3. If using the HHP, select Faults on the Main Menu. (fig 2.23.1)
4. If using Quickie iQ select Diagnostic Faults. Read and record the faults (fig 2.23.3).
5. Refer to the Rhythm and Groove Technical Service Manual to replace any defective components on the wheelchair.
6. Clear the faults using either the HHP or Quickie iQ once the wheelchair has been repaired.
7. Complete the following tests to further isolate problems to individual components.

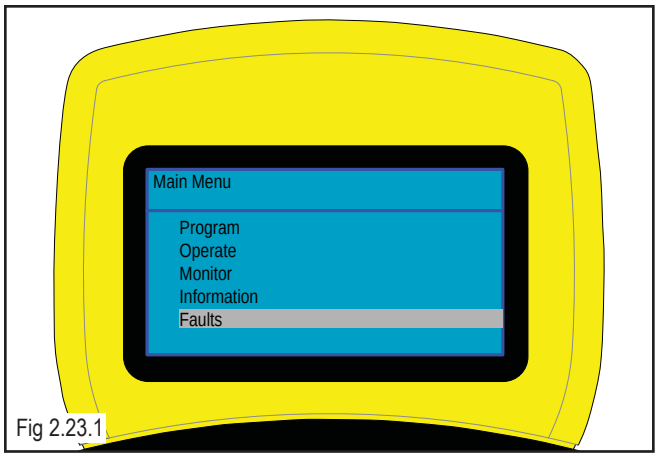


Fig 2.23.1

Fig 2.23.2

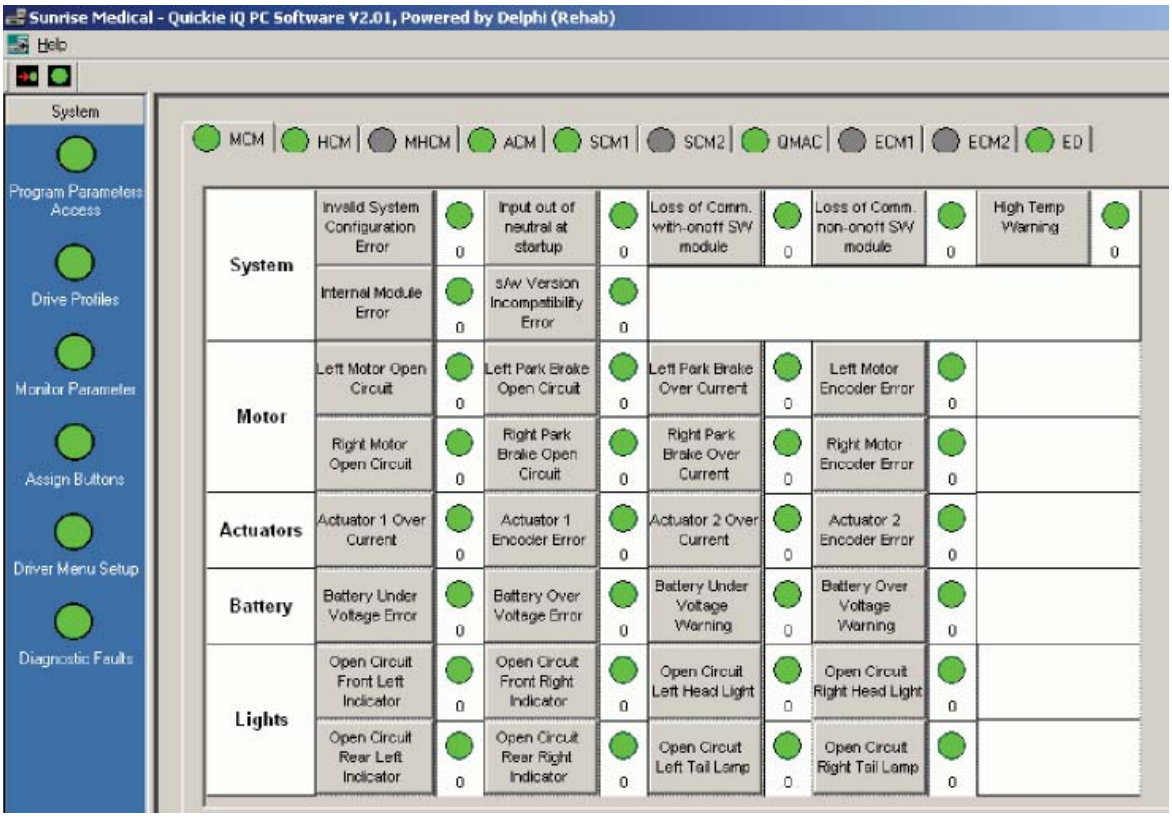


Fig 2.23.3

Battery and Battery Charger Tests

Notes:

- Fully charge the batteries prior to testing. Fully charged batteries are 12.8 VDC, or 25.6 VDC for the pair.
- After removing the batteries from the charger, operate the wheelchair for a few minutes to remove any surface charge.

Battery Tests

Perform the following steps to check the initial state-of-charge and to load test the Batteries.

1. Connect the Quickie iQ or HHP to the wheelchair.
   Warning
   If the following step is not completed the wheelchair may move unexpectedly possibly causing injury.
2. Disengage the gearbox from the motors. Verify that the chair is in free-wheel by pushing on the wheelchair.
3. Turn on the wheelchair.
4. If using Quickie iQ, enable Drive by selecting Drive (fig 2.23.4) under Drive Inhibit Status. (fig 2.23.5) Ignore this step if using the HHP.
5. If using the HHP, select Monitor, then System. Under System, select Battery (fig 2.23.6).
6. If using the Quickie iQ, select Monitor Parameter followed by Motor Controller, then Battery. (fig 2.23.7)
7. Record the voltage displayed.

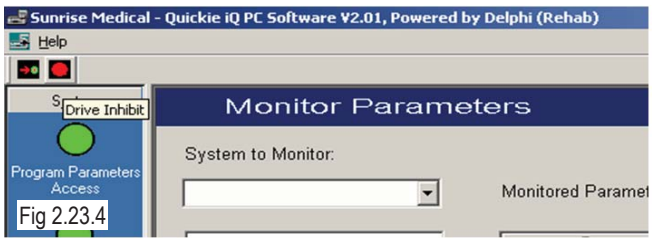


Fig 2.23.4

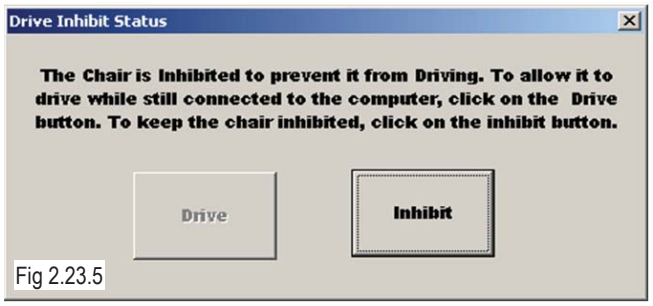


Fig 2.23.5

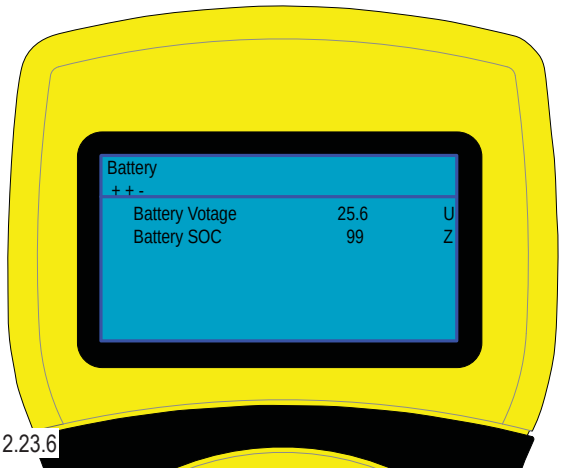


Fig 2.23.6

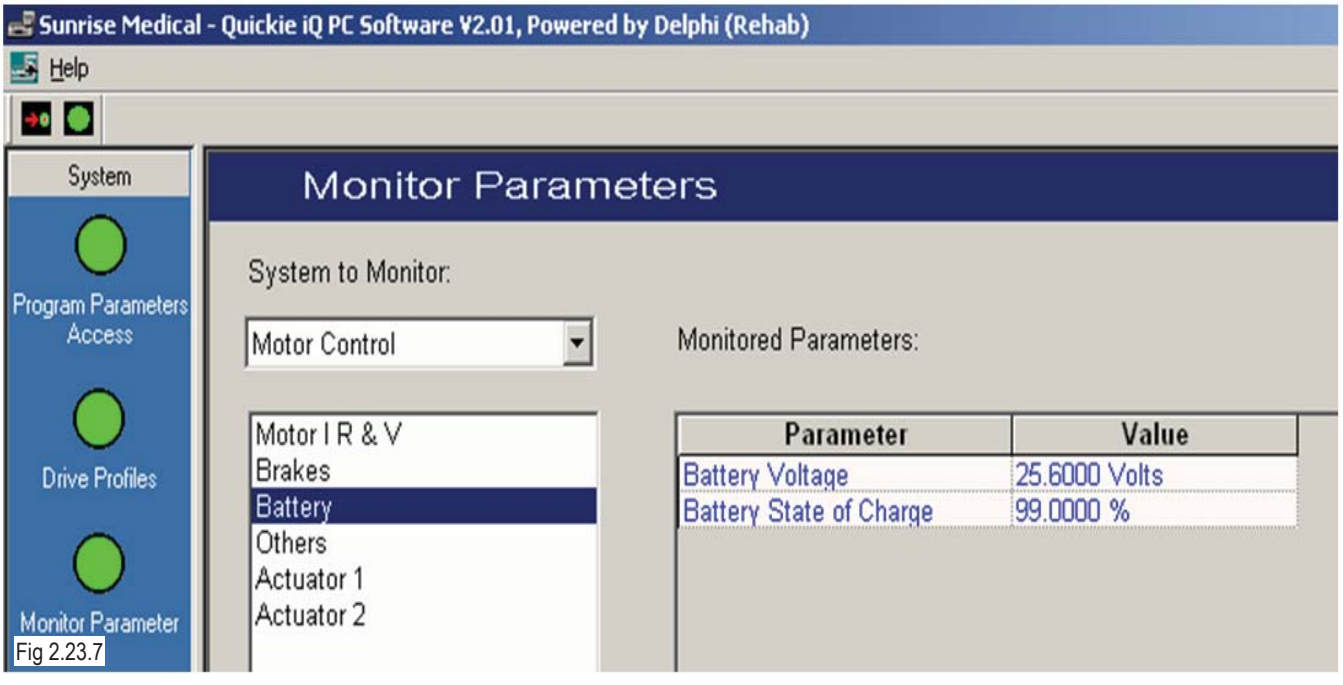


Fig 2.23.7

8. Operate the chair for one minute at high speed. (Gear boxes disengaged). Observe and record the voltage drop.
9. At the end of one minute, release the joystick. Observe the voltage for the next 5 minutes. Refer to the following notes:
    - a. If the voltage drops rapidly (typically 2 volts or more) during the first 5 seconds, this is an indication that one or both of the batteries contains a bad cell.
    - b. If the voltage drops more than 0.6 VDC during the first 5 seconds (typically 1 volt) and continues to drop slowly over the next 55 seconds, this is an indication that the batteries are becoming weak and no longer performing as group 24 batteries (70 amp hour).
    - c. An indication that the batteries are getting weak and should be replaced soon is when the voltage does not return to the starting value at the end of the 5 minute rest.
    - d. If the voltage drops no more than 0.6 volts during the first 5 seconds, followed by level state during the next 55 seconds, and recovers to within .1 VDC of the starting voltage after 5 minutes rest, the batteries are good.
10. Replace any defective batteries.

Battery Charger Test

Perform the following steps to test the battery charger.

1. Complete the Battery Test prior to testing the battery charger to verify that the batteries are good. Defective batteries must be replaced prior to performing this test.
2. Run the chair for a few minutes to partially discharge the batteries.
3. Connect either the HHP or the Quickie iQ to the wheelchair.
4. Turn on the wheelchair.
5. If using the HHP, select Monitor then System. Under System, select Battery. (fig 2.23.8)
6. If using the Quickie iQ, select Monitor Parameter followed by Motor Controller, then Battery (fig 2.23.8).
7. Observe the battery voltage on either the HHP or Quickie iQ

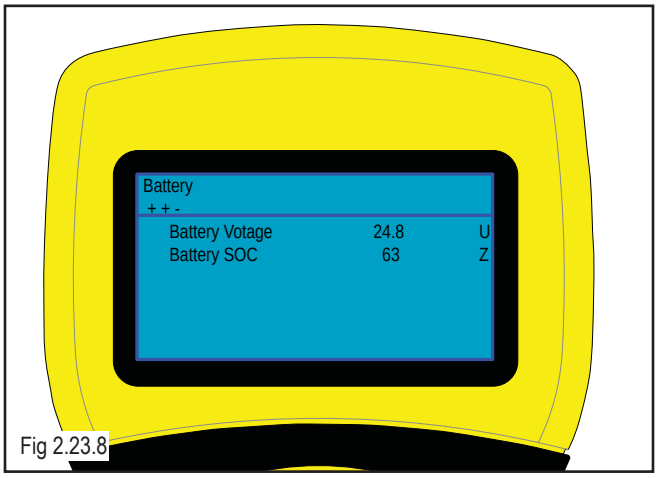


Fig 2.23.8

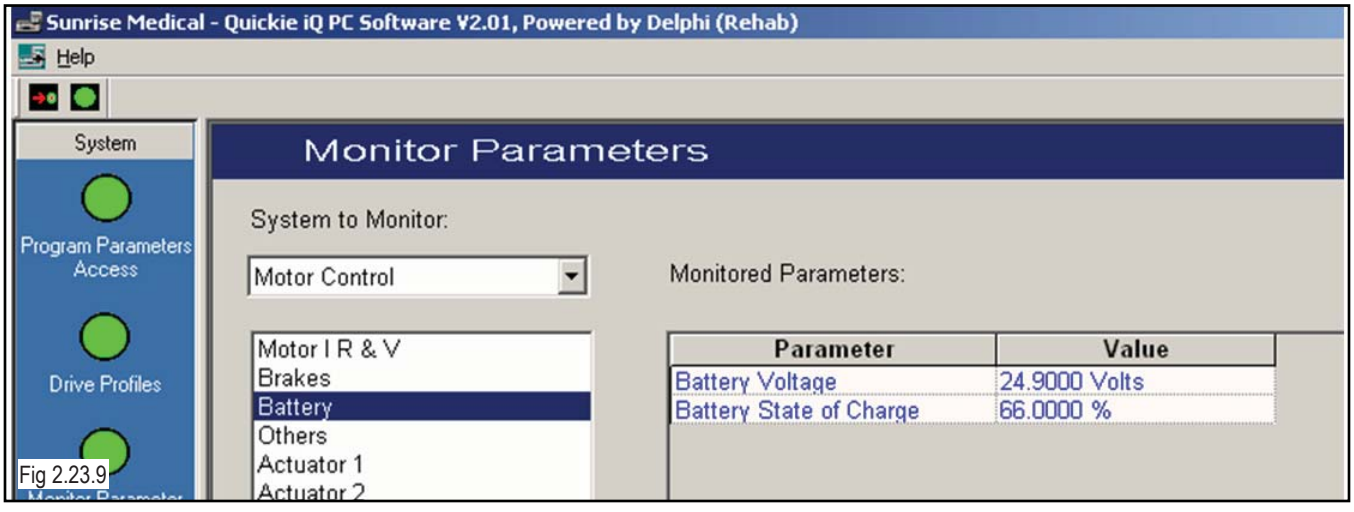


Fig 2.23.9

8. Connect the battery charger to the wheelchair.
9. Connect the battery charger to an outlet.
10. Observe the battery voltage on either the HHP or Quickie iQ. Refer to the following notes:
    - The battery voltage should slowly increase from its starting value once the charger is connected.
    - When the batteries are nearly full charged, the top-off battery voltage should indicate approximately 32 to 33 VDC.
    - When the LEDs on the battery charger indicate full charge, the battery voltage recorded on the HHP or Quickie iQ should drop slightly.
11. If the battery voltage increases to more than 34 VDC, replace the battery charger.
12. If the battery voltage does not reach 27.5 VDC and the battery charger LEDs indicates full charge, replace the battery charger.

Motor and Gear Box Tests

Motor Test

Perform the following steps to electrically test the motors.

1. Connect the Quickie iQ or HHP to the wheelchair.

   Warning
   If the following step is not completed the wheelchair may move unexpectedly possibly causing injury.

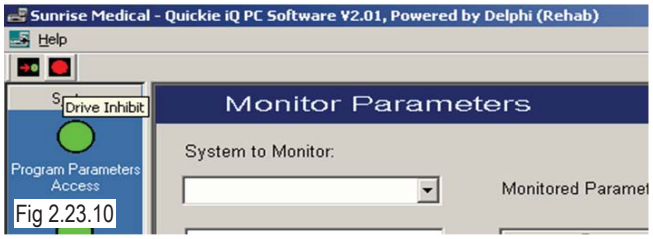


Fig 2.23.10

2. Turn on the wheelchair.
3. Disengage the gearbox. Verify that the chair is in free-wheel by pushing on the wheelchair.
4. If using Quickie iQ, enable Drive by selecting Drive under Drive Inhibit Status. (fig 2.23.10 & 11)

Fig 2.23.11

   Ignore this step if using the HHP.

5. If using the HHP, select Monitor, then Motor Controller. Under Motor Controller, select Motor I R

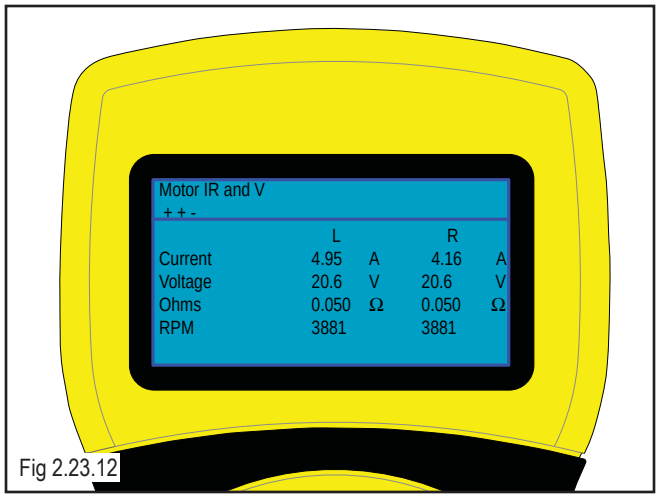


Fig 2.23.12

and V. (fig2.23.12)

6. If using the Quickie iQ, select Monitor Parameter, followed by selecting Motor Controller, then Motor I R and

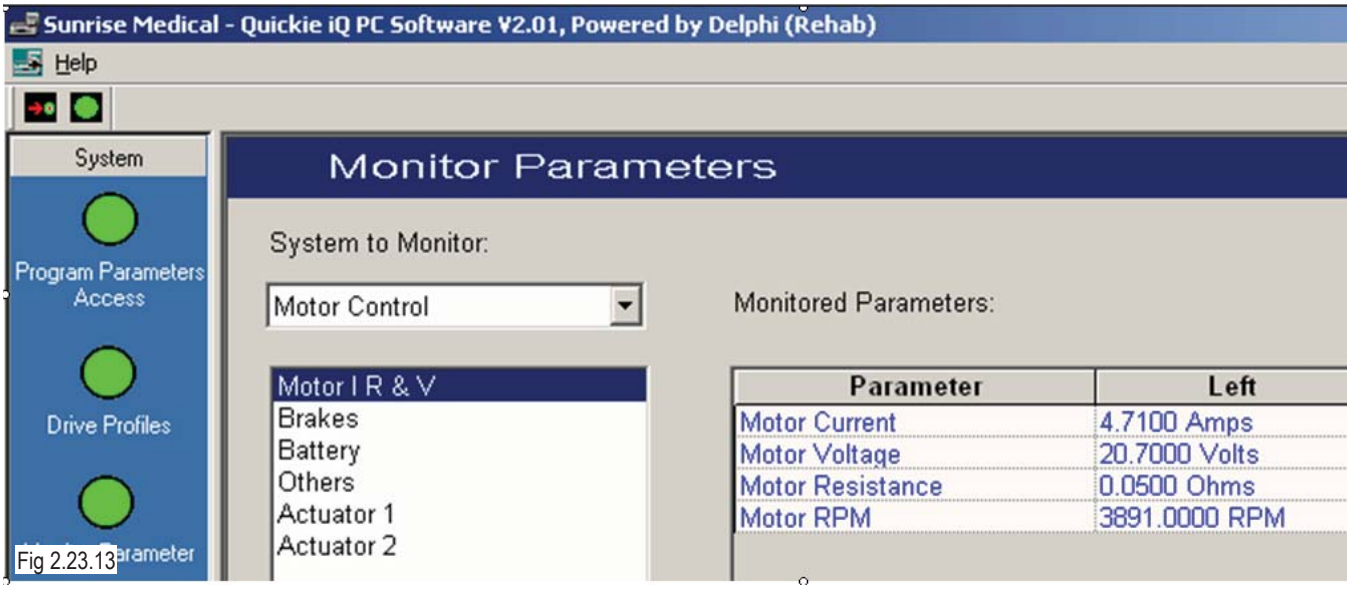


Fig 2.23.13

V. (fig 2.23.13)

7. Operate the wheelchair by moving the joystick (or other control device) to full speed forward. Verify that the command is forward and even both left and right.
8. Monitor the Motor Current, Motor Voltage and Motor RPM for both the left and right motors. Refer to the following notes:
   - The Motor Resistance is the factory default motor compensation. Typical programmed value is .05 Ohms.
   - The Motor Voltage for each motor should increase evenly.
   - If the voltage is not even, verify that a Veer Compensation has not been programmed into the chair.
   - If the Motor Voltages are still not even, the Motor Controller may be defective. Verify that there are no faults recorded in the Fault section of the Quickie iQ or HHP.
   - The Motor Current should be even for both motors when the Motor Voltages are equal. A typical value for the Rhythm or Groove motors with the gear box disengaged is 4 to 6 amps. Cold motors may indicate higher current.
   - Excessive current may be caused by bad bearings, defective or shorted motor windings, or a dragging park brake.
   - The Motor RPM should be even for both motors when the Motor Voltages are equal.
   - If the Motor RPMs are not equal and the wheelchair contains IntelliDrive, suspect a bad motor encoder or motor controller.
9. If using the HHP, select Monitor then Motor Controller. Under Motor Controller select Brakes.

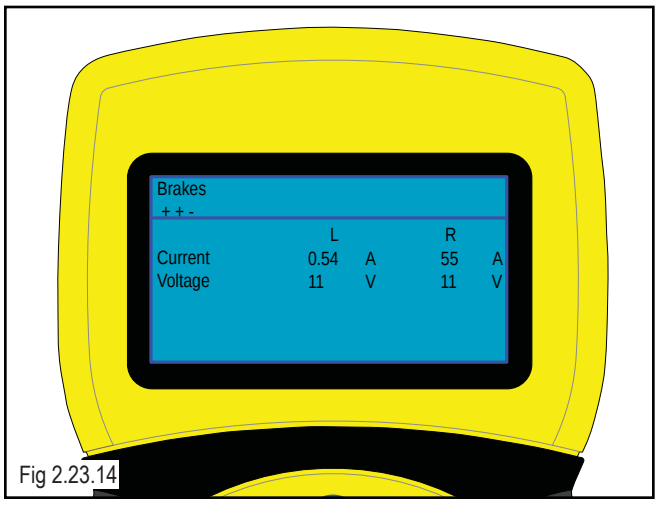


Fig 2.23.14

(fig 2.23.14)

10. If using the Quickie iQ, select Monitor Parameter

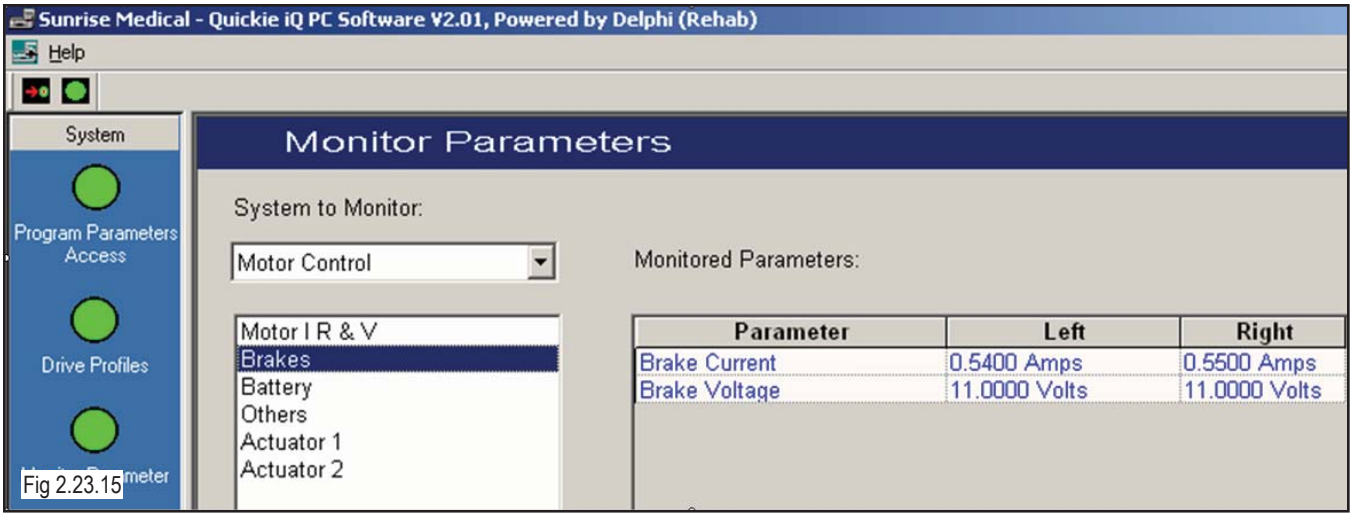


Fig 2.23.15

followed by selecting Brakes. (fig 2.23.15)

11. Operate the wheelchair by moving the joystick slight forward. Observe the Brake Current and Brake Voltage.
    - The Rhythm and Groove use 12 VDC park brakes. Typical Brake Voltage is 11 VDC.
    - The Brake Current should be approximately 0.5 amps. Typical values are between 0.4 amps and 0.6 amps.

    Refer to the following notes:

12. Move the joystick further forward, followed by moving it to the left, then right, then reverse. Refer to the fol-
    - The Brake Voltage and Brake Current should remain constant.
    - An increase in Brake Current or Brake Voltage indicates that the park brake is shorted to the motor windings.

    lowing notes:

Gear Box Test

Perform the following steps to electrically test the gear box.

1. Prior to completing this test, complete the Motor Test. A defective motor may also appear as defective Gear Box.
   Warning
   If the following step is not completed the wheelchair may move unexpectedly possibly causing injury.
2. Elevate the wheelchair by placing blocks under the battery box. Verify that the drive wheels are completely off the ground and free to rotate.
3. Engage the motor gearboxes.
4. Repeat the Motor Test. Refer to the following notes:
   - Extra drag is put on the motors when the gearboxes are engaged. This extra drag shows up as an increase in Motor Current.
   - An increase in motor current by 1 amp is typical if the gearboxes are warm.
   - If the gearboxes are cold, the increase in current may be more.
   - Fully warm them prior to making a decision to replace the motor/gearbox assembly by running them for 30 minutes.
5. If the drag placed by the gearbox is excessive, as indicated by a large increase in motor current, replace the motor/gearbox assembly that is experiencing extra drag.
6. If one gearbox places significantly more drag on the motor, as indicated by a large increase in one of the motors' current, replace the motor/gearbox assembly.

Drive Control Tests

Hand Control Test

Complete the following steps to test the Hand Control

1. Connect the Quickie iQ or HHP to the wheelchair.
   Warning
   If the following step is not completed the wheelchair may move unexpectedly possibly causing injury.
2. Disengage the gearbox from the motors. Verify that the chair is in free-wheel by pushing on the wheelchair.
3. Turn on the wheelchair
4. If using the HHP, select Monitor, then Joystick. Under Joystick select JS Position. (fig 2.23.16)

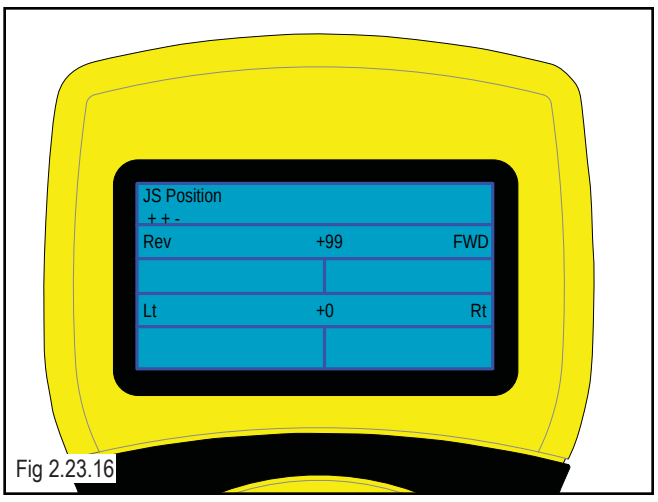


Fig 2.23.16

5. If using the Quickie iQ, select Monitor Parameter followed by selecting Hand Control, then JS Position. (fig 2.23.18)

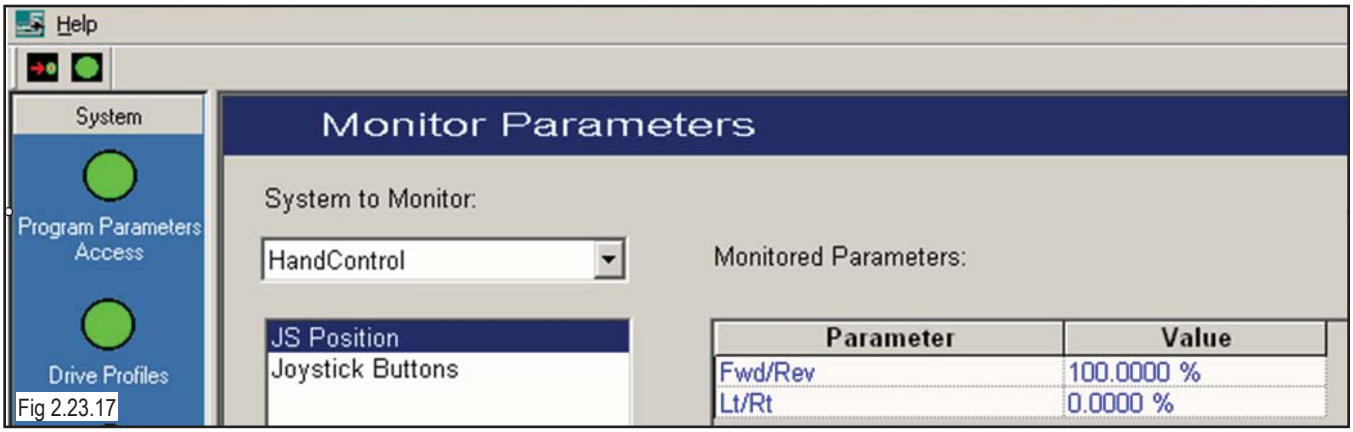


Fig 2.23.17

6. Slowly move the joystick forward and verify that the Joystick Position increases smoothly to 100%. Repeat the test in the reverse direction.
7. Verify that the joystick returns to neutral in both directions.
8. Slowly move the joystick to the right and verify that the Joystick Position increases smoothly to 100%. Repeat the test for the left position.
9. Verify that the joystick returns to neutral in both directions.
10. If the previous tests fail, calibrate the joystick using either the HHP or Quickie iQ. Refer to the HHP or Quickie iQ Operation manuals.
11. If using the HHP, select Buttons/SW. (fig 2.23.18)
12. If using the Quickie iQ, select Joystick Buttons. Monitor the screen on either the HHP or Quickie iQ. (fig 2.23.19)

Fig 2.23.18

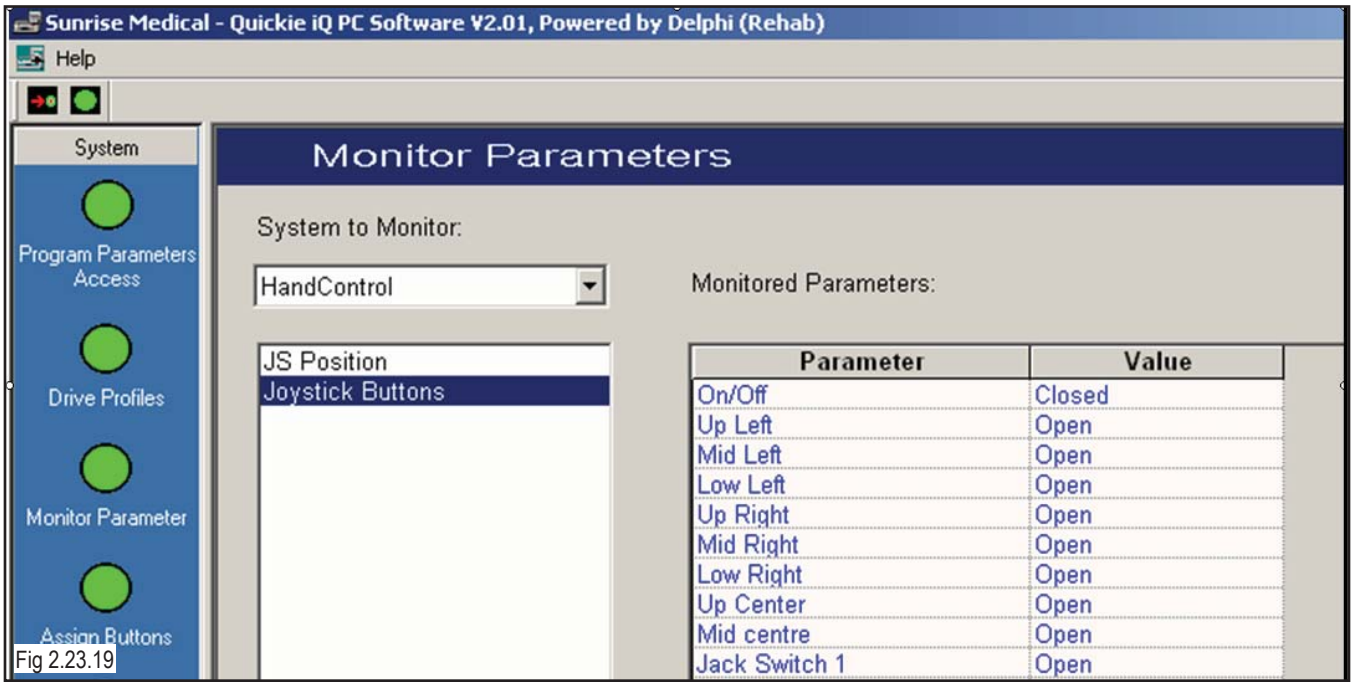


Fig 2.23.19

13. Operate each button (or toggle switch) one at a time to verify that they function correctly. This is indicated on the HHP by the box highlighting. On the Quickie iQ, the status will change from Open to Closed.
14. Note, allow a few seconds for the system to respond.
15. If the hand control is equipped with a Speed Pot, operate it slowly to verify that it is functioning. This is indicated by the display changing from 100% to 0%.
16. If the hand control contains jacks for external switches, connect pushbuttons to the jacks and verify that they also function.
17. Replace the hand control if any of the above tests fail.

Mini Hand Control or Attendant Control Module Test

Complete the following tests If the wheelchair contains either/or a Mini Hand Control (MHCM) or an Attendant Control Module (ACM):

1. Refer to Hand Control Test.
2. Complete the Hand Control Test, except select Compact Joystick if using the HHP, or MHCM or ACM if using the Quickie iQ.
3. Replace the Mini Hand Control or Attendant Control Module if any of the above tests fails.

SCM Test

Complete the following tests if the wheelchair contains a Specialty Control Input Module (SCM).

Connect the Quickie iQ or HHP to the wheelchair.

1. Disengage the gearbox from the motors. Verify that the chair is in free-wheel by pushing on the wheelchair.

   Warning

   If the following step is not completed the wheelchair may move unexpectedly possibly causing injury.

2. Turn on the wheelchair
3. If using the HHP, select Monitor then SCM1 or SCM2. Under SCM, select Switches. (fig 2.23.20)

Fig 2.23.20

4. If using the Quickie iQ, select Monitor Parameter followed by selecting SCM1 or SCM2, then Switch Status. (fig 2.23.21)

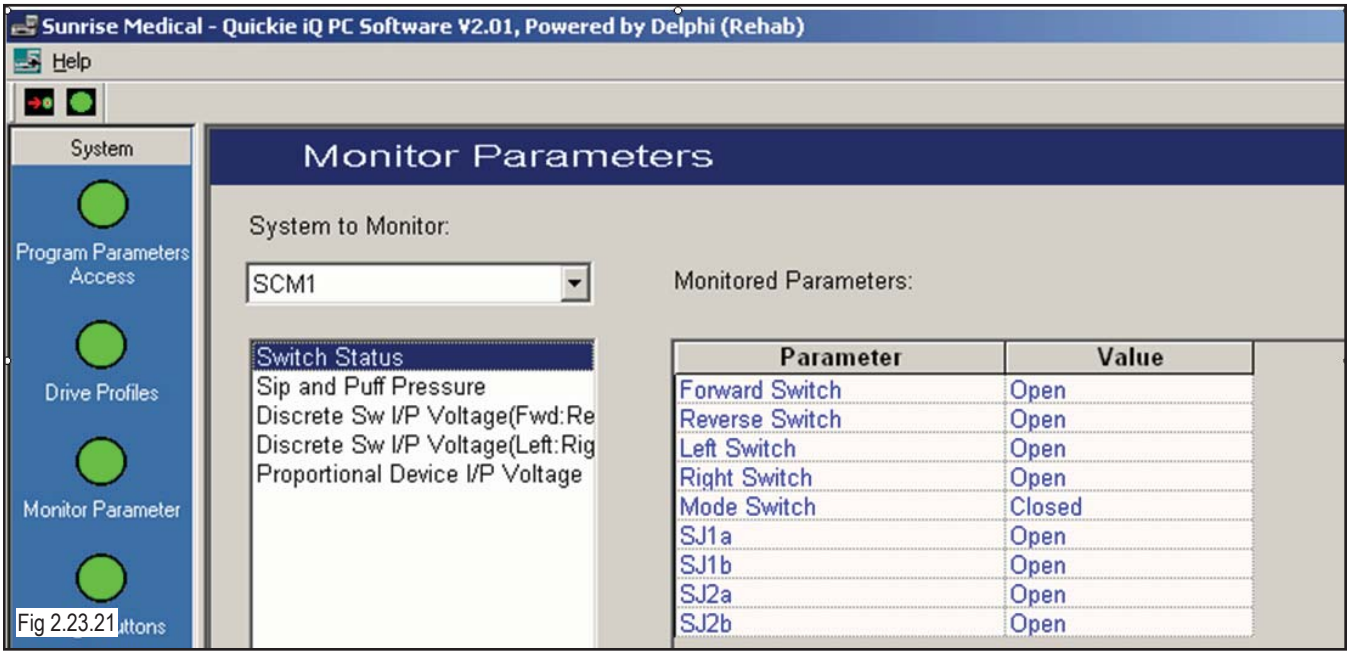


Fig 2.23.21

5. Operate each switch connected to the SCM one at a time. Verify that each switch closes by noting on the HHP that the box highlights, or on the Quickie iQ by the status changing from Open to Closed.
6. If using the HHP, select S&P Pressure for Sip and Puff test. If using the Quickie iQ, select Sip and Puff Pressure.
7. Apply vacuum and pressure to the sip and puff port to verify that the display on either the HHP or Quickie iQ changes.
8. Verify that when the command is removed, the reading returns to near zero on the HHP or Quickie iQ.
9. Replace the SCM if any of the above tests fail.

Actuator Tests

Notes:

- The seating actuators contain encoders that provide position information to the Motor Controller or QMAC.
- Counter Reset Switches (CRS) automatically provide re-home information to the Motor Controller or QMAC. The re-home function occurs when the actuator moves across the CRS.
- Failure to operate the seating system far enough to operate the CRS over time may cause the controller to lose counts and to not return to programmed position. Encoder errors may also occur if the CRS is not exercised periodically.
- Encoder errors are often cause by “homing” errors. Re-Home the wheelchair anytime encoder errors are present.
- Creep speed (profile) will be active anytime the back angle is 15 degrees from vertical. This angle may be from recline, tilt, or a combination of the two.
- Creep speed (profile) is active anytime the seat elevator is active. Raising the seat approximately 1/8” will invoke creep speed.
- Creep profile is a percent of maximum wheelchair speed. It is adjustable using the HHP or PCSS. However, the speed can never exceed the maximum safe speed predetermined by Sunrise Medical.

Actuator Test (Motor Controller controlled actuators)

Complete the following steps to test the seating system actuators.

1. Connect the Quickie iQ or HHP to the wheelchair.
2. Turn on the wheelchair. Prior to completing any test, re-home the wheelchair.
3. If using the HHP, select Monitor, then Motor Controller. Under Motor Controller, select the actuator to test (i.e., Tilt). (fig 2.23.22)
4. If using the Quickie iQ, select Monitor Parameter followed by Motor Controller, then actuator to test (i.e., Actuator 1). (fig 2.23.23)

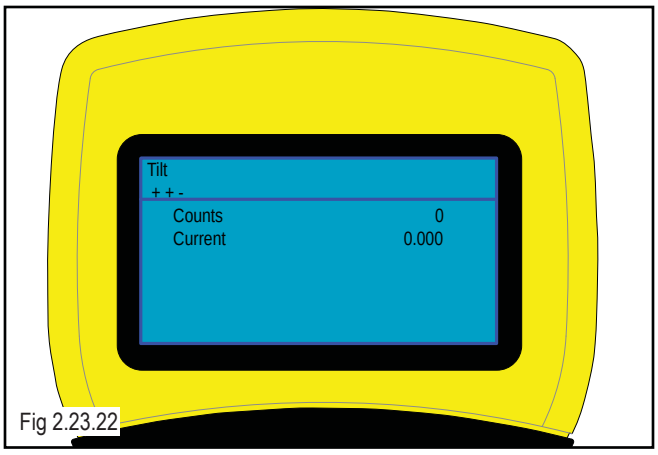


Fig 2.23.22

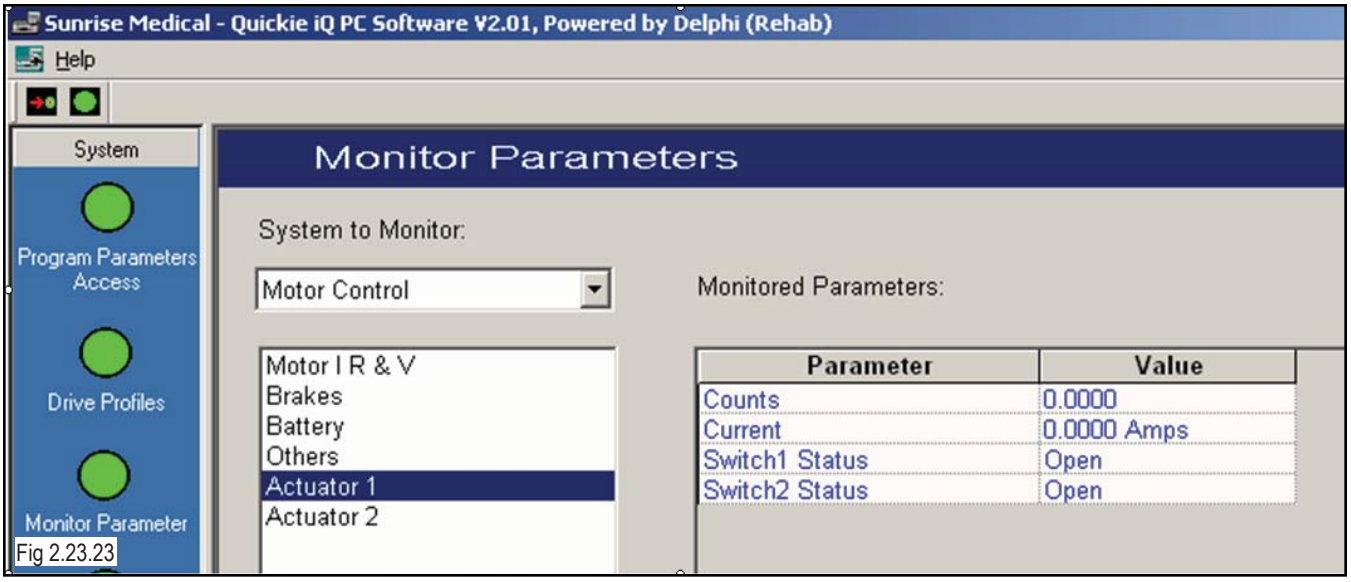


Fig 2.23.23

5. Note the position of the actuator (counts). Operate the actuator and observe the counts and current. Refer to Table 1 for a listing of currents typical for each actuator.

6. Verify that the actuator travels to the count programmed in the chair. Refer to the following notes:
    - If using Quickie iQ, this value may be found under Programmed Parameters Access, Motor Control, then Actuator 1 or 2. (fig 2.23.24)

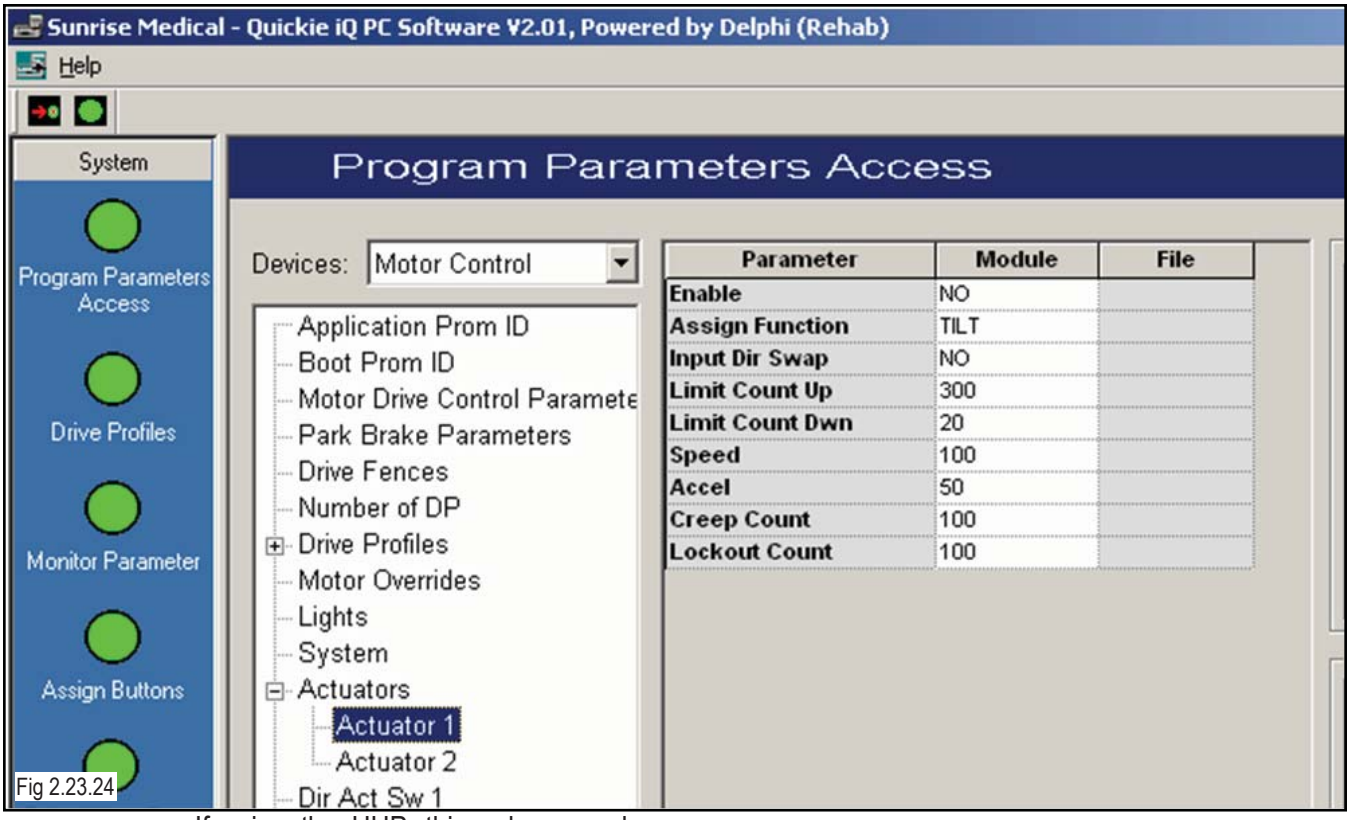


Fig 2.23.24

    - If using the HHP, this value may be found under Program, Motor Controller, then Actuators, then Actuator 1 or 2. (fig 2.23.25)

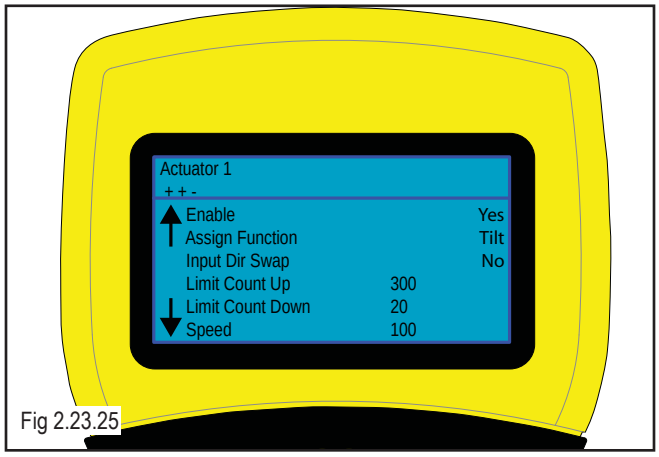


Fig 2.23.25

7. Operate the actuator to the “home” position and verify that the counts return to the programmed value.
8. If using Quickie iQ, monitor the status of Switch 1 and Switch 2 to ensure that they are changing state as the actuator moves from one extreme to the other. Switch 1 is the encoder switch and will flicker Open and Close. Switch 2 is the Count Re-set Switch. Failure of the CRS switch will cause the chair to fail automatic or manual Re-Home.
9. Observe the operation of each actuator that is drawing excessive current and retest. Correct any binding observed. Replace the actuator if binding did not cause the excessive current.
10. Investigate the wiring to each actuator to ensure that the cables or connectors are not damaged. Replace any defective cable.
11. For actuators not operating, move the control cable at the motor controller to another port (i.e. move the tilt cable from one seating port to the other seating port to test the tilt function of the motor controller). If the actuator operates correctly in the new port, replace the motor controller.
12. Replace any actuator that is not automatically re-homing as it is being operated, or the status of Switch 1 or 2 does not change as the actuator is operated.
13. Replace any actuator that repeatedly generates encoder errors and no cables or connectors are damaged.

Actuator Test (QMAC controlled actuators)

Complete the following steps to test the seating system actuators.

1. Connect the Quickie iQ or HHP to the wheelchair.
2. Turn on the wheelchair. Prior to completing any test, re-home the wheelchair using either the HHP or the PCSS.
3. If using the HHP, select Monitor, then QMAC Actuators. Under QMAC Actuators, select the actuator to be tested (i.e., Tilt). (fig2.23.26)
4. If using the Quickie iQ, select Monitor Parameter, followed by selecting QMAC, then actuator to test (i.e., Tilt). (fig 2.23.27)
5. Note the position of the actuator (counts and degrees). Operate the actuator and observe the counts, degrees and current. Refer to Table 1 for a listing of typical currents for each actuator.

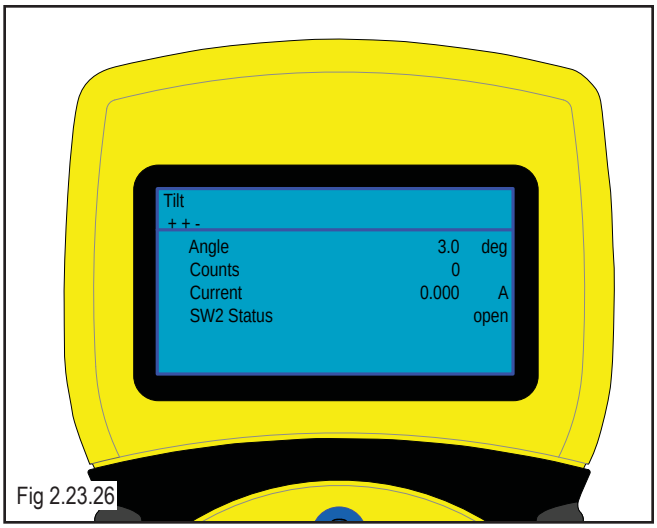


Fig 2.23.26

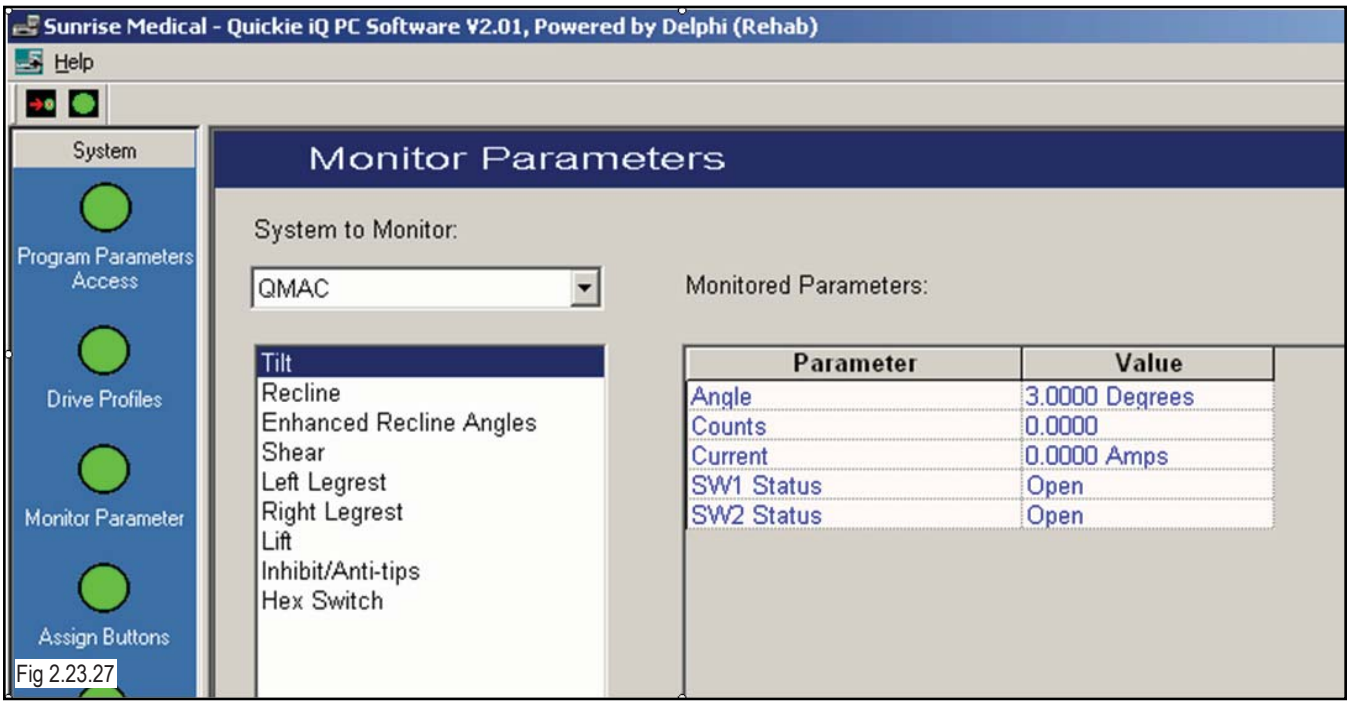


Fig 2.23.27

Actuator	Average Current – No Load	Maximum Current –Under Load
Recline	1 to 2 amps	8 amps
Tilt	1 to 2 amps	8 amps
Lift	1 to 2 amps	8 amps
Left Leg	1 to 2 amps	4 amps
Right Leg	1 to 2 amps	4 amps
Power Shear	1 to 2 amps	4 amps

Table 1

6. Verify that the actuator travels to the count programmed into the chair. Refer to the following notes:
   - If using the HHP, this value may be found under Program, then QMAC, and then select the actuator under test (i.e. Recline). (fig 2.23.28)
   - If using Quickie iQ, this value may be found under Programmed Parameters Access, QMAC, and then select the actuator under test (i.e. Recline). (fig 2.23.29)

Fig 2.23.28

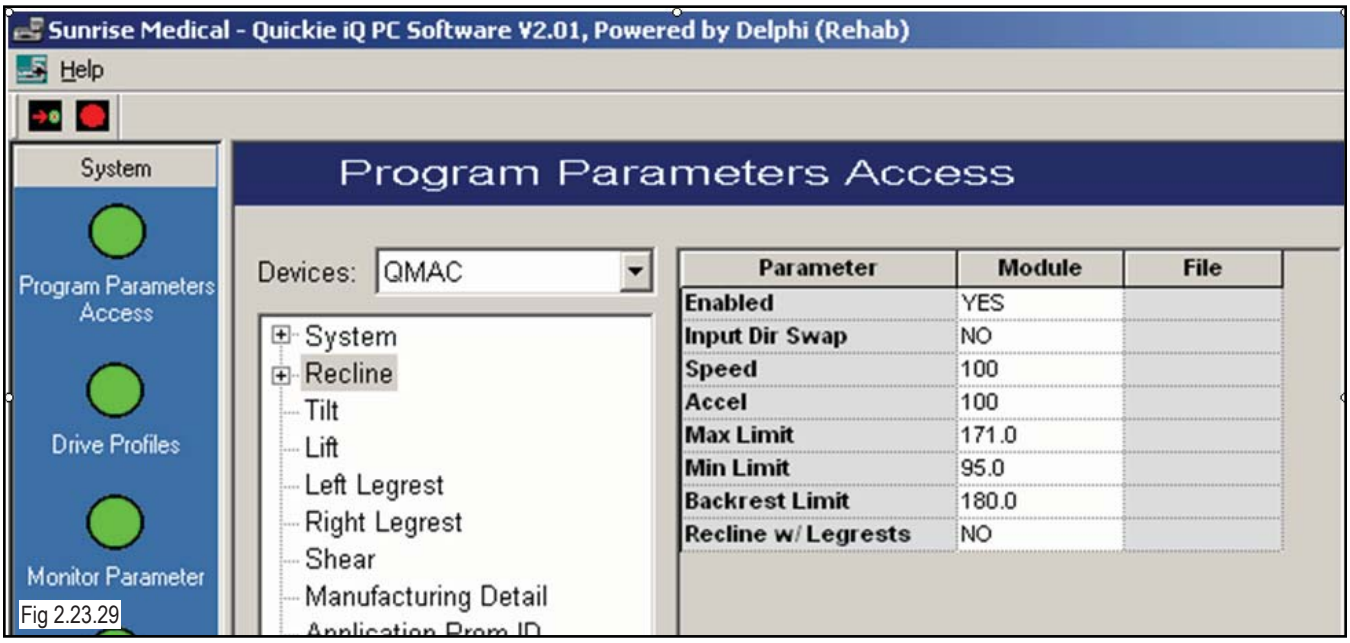


Fig 2.23.29

7. Operate the actuator to the “home” position and verify that the counts return to the programmed value.
8. Monitor the status of Switch 1 and/or Switch 2 to ensure that they are changing state as the actuator moves from one extreme to the other. Switch 1 is the encoder switch and will flicker Open and Close. Switch 2 is the Count Reset Switch. Failure of the CRS switch will cause the chair to fail automatic or manual Re-Home.
9. Observe the operation of each actuator that is drawing excessive current. Correct any binding observed. Replace the actuator if binding did not cause the excessive current.
10. Investigate the wiring to each actuator to ensure that the cables or connectors are not damaged. Replace any defective cable.
11. For actuators not operating, move the control cable at the QMAC to another port (i.e. move the tilt cable to the recline port to test the tilt function of the QMAC). If the actuator operates correctly in the new port, replace the QMAC.
12. Replace any actuator that is not automatically re-homing as it is being operated, or the status of Switch 1 or 2 does not change as the actuator is operated.
13. Replace any actuator that repeatedly generates encoder errors and no cables or connectors are damaged.

General Wheelchair Test

Complete the following test to verify Time On, Time Driven, and Internal Control Box Temperature (Motor Controller).

1. Connect the Quickie iQ or HHP to the wheelchair.
2. Turn on the wheelchair
3. If using the HHP, select Monitor, then System, then Others. (fig 2.23.30)
4. If using the Quickie iQ, select Monitor Parameter, then Motor Controller, then Others. (fig 2.23.31)

Fig 2.23.30

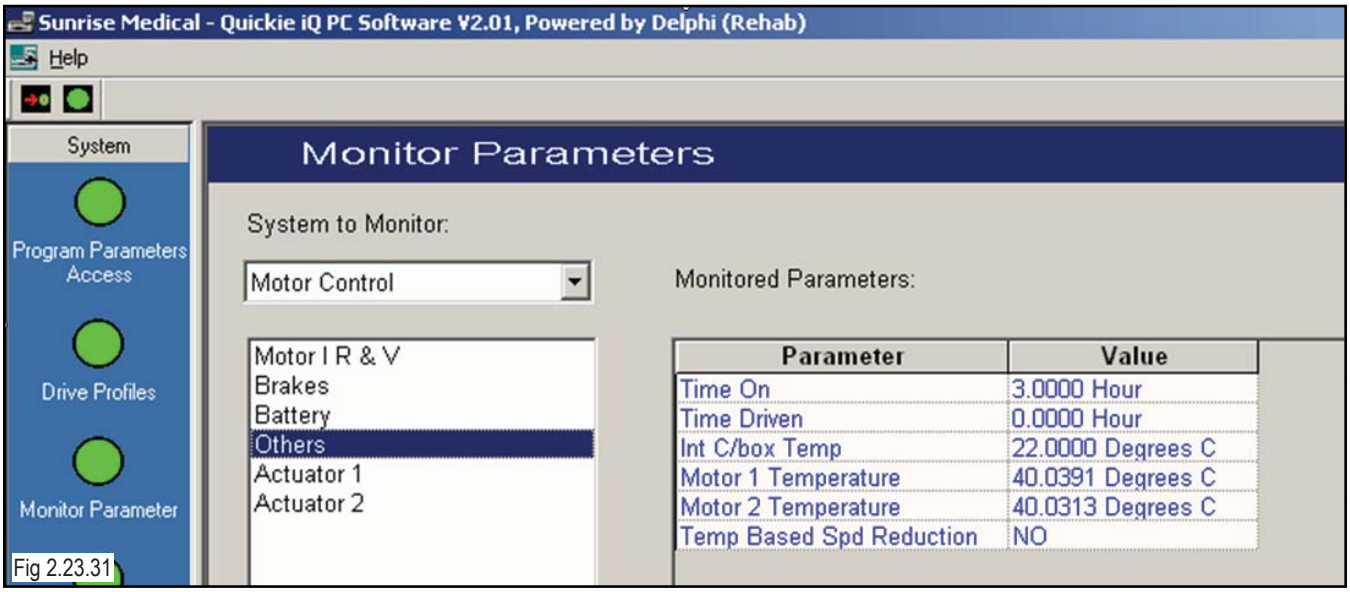


Fig 2.23.31

5. If using the HHP, record Time On, Time Driven, and Internal Control Box Temperature. If using Quickie iQ record Time On, Time Driven, Internal Control Box Temperature, and Motor 1 and Motor 2 Temperature
6. Refer to the following notes:
   - Internal Control Box Temperature and Motor Temperate are valuable information for trouble-shooting Thermal Rollback Issues.
   - Motor maximum temperatures are approximately 100 degrees C.
   - Time On and Time Driven are important values to record in case issues are reported after repairs are completed on the wheelchair.

Perfect Fit Seating System

Introduction

The integrated Perfect Fit Seating System is available in both non-recline, and recline with shear reduction. The Perfect Fit Seating System is designed to adapt to various platforms, including front, rear, and mid-wheel bases using either a filler module, or a tilt and/or power seat module. The filler module also provides adjustments to the seat angle.

Height Adjustment

Each module fits on top of a module/base adaptor. This adaptor features 3 inches of height adjustability.

3 Inches of Height Adjustment

Fig 3.1

Fig 3.2

Several backs are available, each providing select features and adjustments for the client. A brief description for each back follows:

- The Contour Posterior Adjustable Back contains:
- Slightly curved wings to provide mild positioning
- Lateral attachment points
- Headrest adjustment points
- Up to 7” width adjustment
- Up to 3” height adjustment

Fig 3.3

The Posterior Lateral Positioning Back contains:

- Deeply curved lateral wings to provide a lateral hug
- Headrest adjustment points
- Up to 7” width adjustment
- Up to 3” height adjustment
- Posterior lateral support (135 mm)

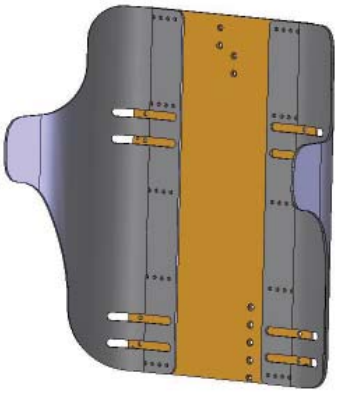


Fig 3.4

The curved General Purpose Back contains:

- Slight curvature
- Multiple T-nut mounting positions
- Multiple hardware mounting positions in the back
- No size adjustment
- Up to 3” height adjustment

Fig 3.5

Recline Options

Recline options include Manual Recline and Power Recline with Shear Reduction using dual actuators and keipers.

The Manual Recline Back Rest provides:

- Maximum posterior back angle 40° from vertical, limited by Gear Reduction Mechanism (GRS).
- Minimum anterior back angle 10 degrees.
- The backrest can be folded all the way down if the armrests are up and the back plates are an inch off the seat.

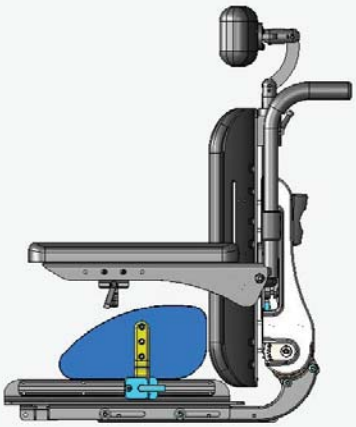


Fig 3.6

The Power Recline with Shear Reduction provides:

- Shear induced during full angle range: 2” to 2.5”
- Back reclines from vertical (95°)to full recline (171°)

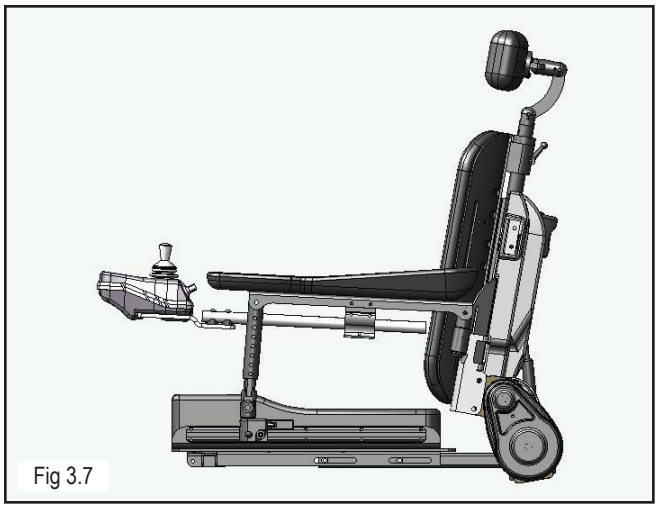


Fig 3.7

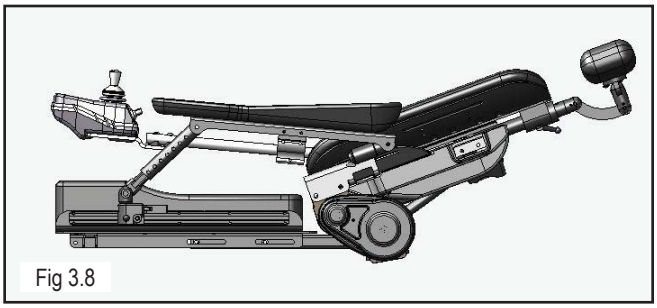


Fig 3.8

Changing the Seating Size

Changing the seating size of the Perfect Fit Seating System is accomplished by either adjusting the width, depth, and/or the back height by relocating the growth pans; or by replacing the growth pans with growth pans of different sizes.


Fig 3.9


Fig 3.10


Fig 3.11

Adjustments

Refer to the following tables for the range of adjustments for the Perfect Fit Seating System.

Seat Pan Width Table

Narrow Center Pan	Medium Center Pan	Wide Center Pan
12” – 17”	15” – 20”	19” – 24”

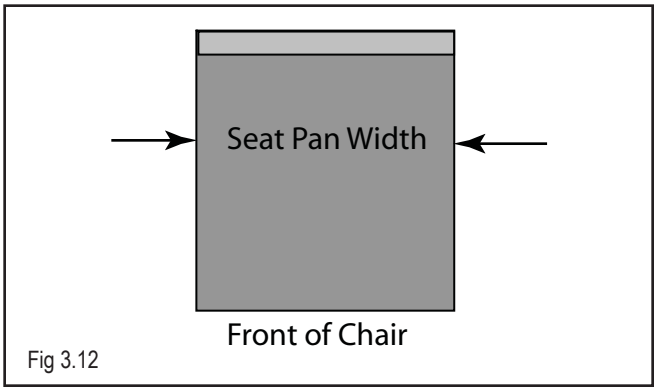


Fig 3.12

Seat Frame Depth Table

Pan	Wing	Range
12-14 Deep	12”	12” - 16”
12-14 Deep	13”	13”- 16”
12-14 Deep	14”	14” - 17”
15-17 Deep	15”	15” - 19”
15-17 Deep	16”	16” - 19”
15-17 Deep	17”	17” - 20”
18-20 Deep	18”	18” - 22”
18-20 Deep	19”	19” - 22”
18-20 Deep	20”	20” - 23”
21-22 Deep	21”	21” - 25”
21-22 Deep	22”	22” - 25”

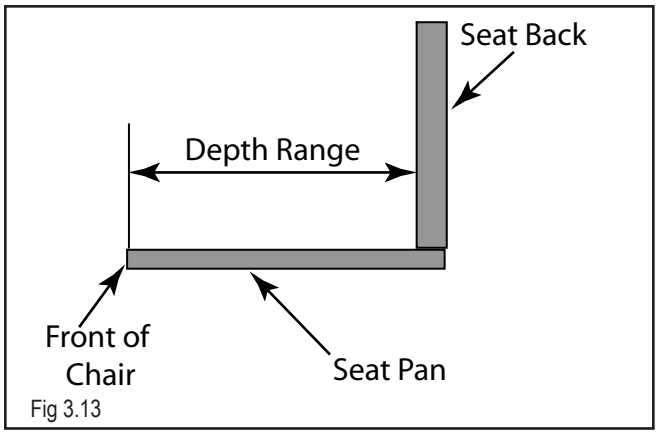


Fig 3.13

Seat Back Width Table

	Narrow Wing	Wide Wing
Narrow Center Pan	12” - 13”	14” - 19”
Wide Center Pan	N/A	17” - 24”

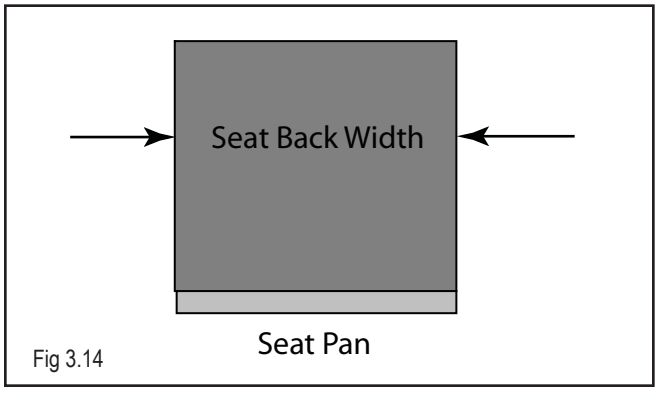


Fig 3.14

Manual Recline Back Height Table

Wing	Back Height	Bottom of Back from Seat Pan
15”	15.5” – 18.5”	.8” – 3.8”
17”	17” – 20”	.5” – 3.5”
19”	19” – 22”	.5” – 3.5”
21”	21” – 24”	.5” – 3.5”
23”	23” – 26”	.5” – 3.5”
25	25” - 28”	.5” - 3.5”

Power Recline Back Height Table

Wing	Back Height	Bottom of Back from Seat Pan
15”	17.5” – 20.5”	3.0” – 6.0”
17”	19” – 22”	2.6” – 5.6”
19”	21” – 24”	2.6” – 5.6”
21”	23” – 26”	2.6 – 5.6”
23”	25” – 28”	2.6 – 5.6”

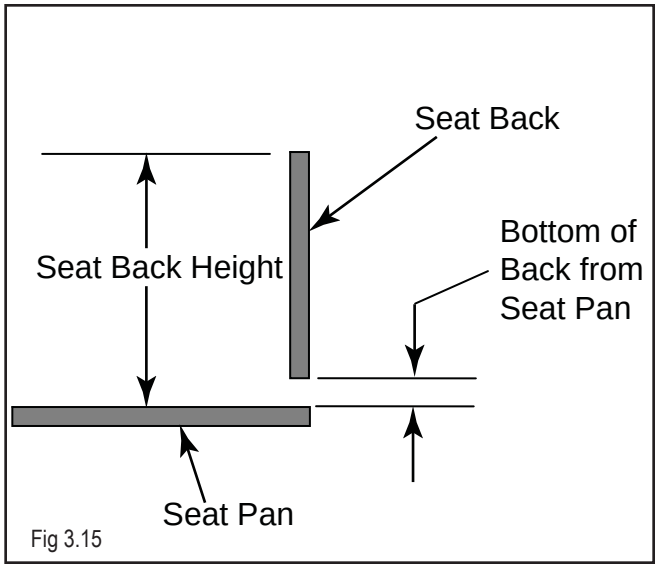


Fig 3.15

Seat Back and Seat Pan Width Adjustments

Both the seat back and the seat pan width adjust independently. To adjust either the seat back or seat pan:

- Locate the hardware securing the wings to the center pan of the Perfect Fit Seating System. Note: Each hole on the back or seat pan allow ½ inch increments.
- Determine the correct adjustment needed. Example, if the seat back is 16” wide and the desired width is 17”, than each wing should be moved ½” (one hole) outward.
- Remove the hardware using the correct size Allen wrench.
- Reposition the wing and reinstall the mounting hardware.

Note: A new back cushion may be needed after width adjustment.


Fig 3.16


Fig 3.17

Seat Back Height Adjustments

Note: Each starting back height adjusts upward 3". The adjustment is based on a slot & block alignment. Refer to the following illustrations for adjustment procedures and ranges.

- Remove back cushion.
- Locate the mounting hardware securing the back assembly to the Perfect Fit Seating System.
- Remove the back assemblies from the frame.
- Locate the four adjustment blocks. Refer to the following diagrams.
- Reposition the back assembly by moving the hardware on the block.
- Reinstall the back assembly.

Note: Many third-party backs will mount to the Perfect Fit Seating System. Refer to their installation instructions before mounting their equipment to the Perfect Fit Seating System.

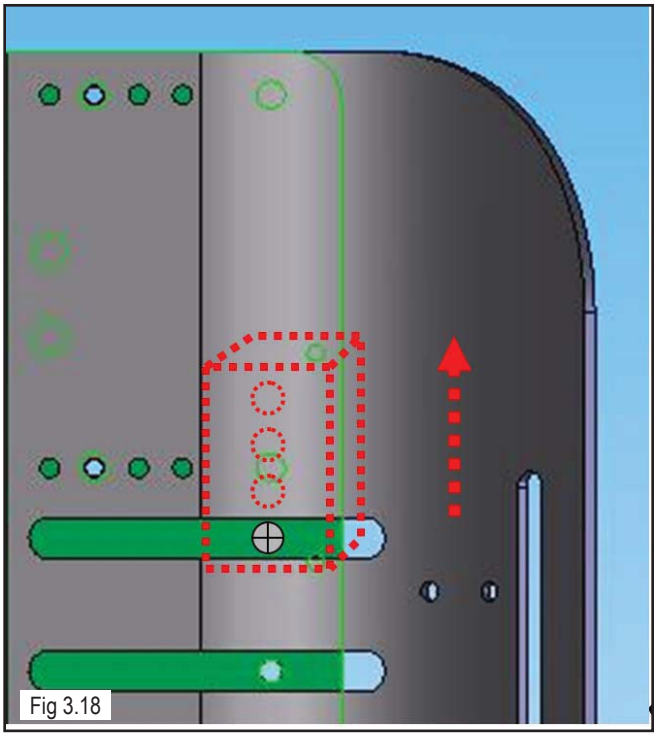


Fig 3.18

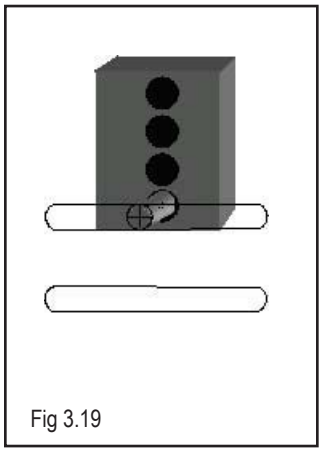


Fig 3.19

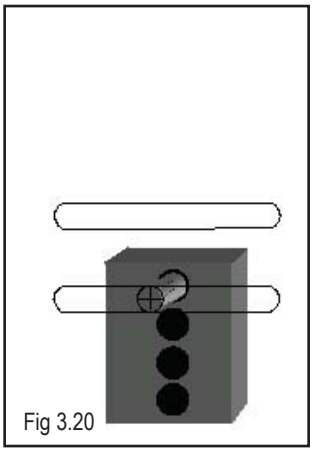


Fig 3.20

Seat Depth Adjustments

The seat has 3” to 4” of built in depth adjustment depending on the starting depth.
Note: Seat Depth Adjustment is only used as a means of accommodating an offset backrest.
To adjust the seat depth, follow these adjustments:

- The Seat Depth is adjusted by first moving the front seat weldment forward. Do this by removing the mounting hardware (A) and sliding the seat pan.
- Reinstall and tighten the mounting hardware after the correct adjustment is reached.
- Remove the mounting hardware (B) that secures the seat wings.
- Remove the mounting hardware that secures the seat center pan.
- Slide the center pan (C) forward and reinstall the mounting hardware.
- Slide the wings (D) to the correct position and reinstall the mounting hardware.

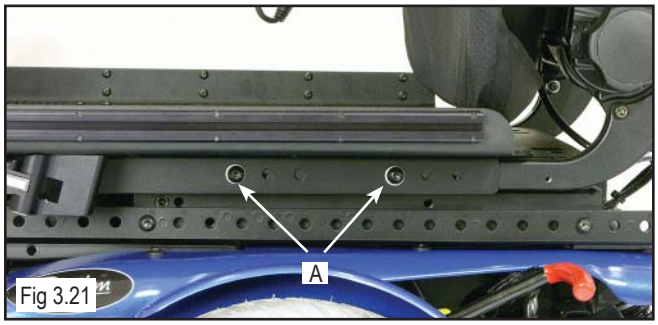


Fig 3.21

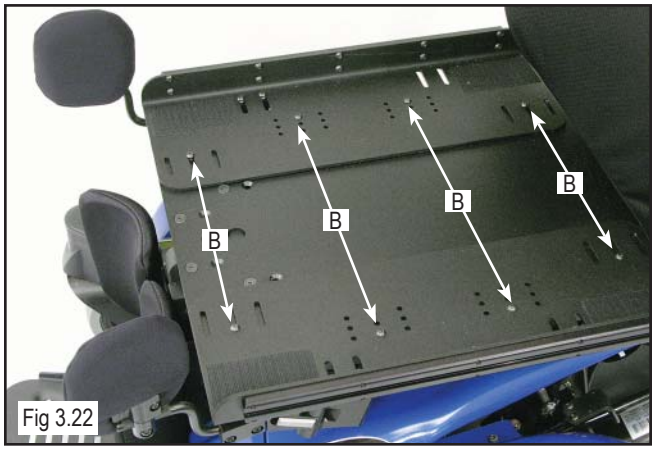


Fig 3.22

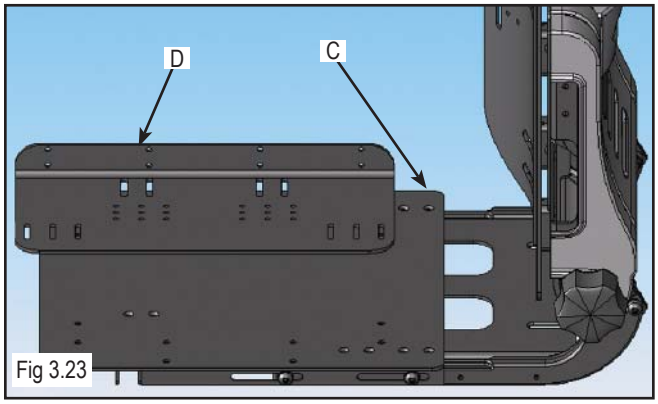


Fig 3.23

Manual Back Rest Adjustment

Two versions of the manual back adjustment are available, the Adjustable Integrated Back and the Manual Recline to 40 Degree Back.

To adjust the Adjustable Integrated Back, complete the following procedures:

- Locate the 16 mm adjusting nut on the rear bottom of the back.
- Using a 16 mm wrench, adjust the back to the desired angle.


Fig 3.24

Manual Recline to 40 Degree Back

To adjust the Manual Recline Back, complete the following procedures:

- Locate the adjustment knob on the rear bottom of the back.
- Rotate the knob to achieve the desired back angle.

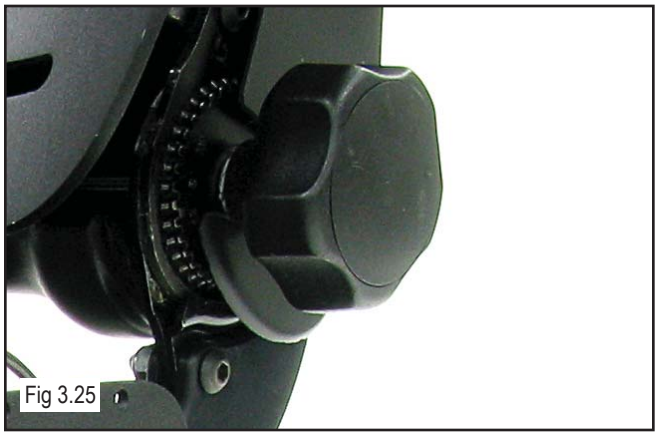


Fig 3.25

Arm Rest Adjustments

1.The Perfect Fit Flip Back Height Adjustable Armrest is only available with the manually reclining backrest.
2.Armrest height ranges from 7”–14”. Up to 2” of width adjustment is available.
Complete the following procedures to adjust the armrest height:

1. To adjust the armrest height, loosen the two mounting-clamp bolts(A), slide the armrest up or down and retighten.
2. To increase the slots adjustment range, remove the armrest, flip the mounting bracket, and reinsert the armrest(Fig 3.28). This adds an additional 1.5” of vertical adjustment to the existing 1.5”, providing a total 3” of vertical adjustment.
3. If still more upward or lower adjustment is necessary, remove the armrest from the mounting bracket(Fig 3.29) and reinsert at a 45º angle(Fig 3.30).
4. Retighten the mounting bracket.

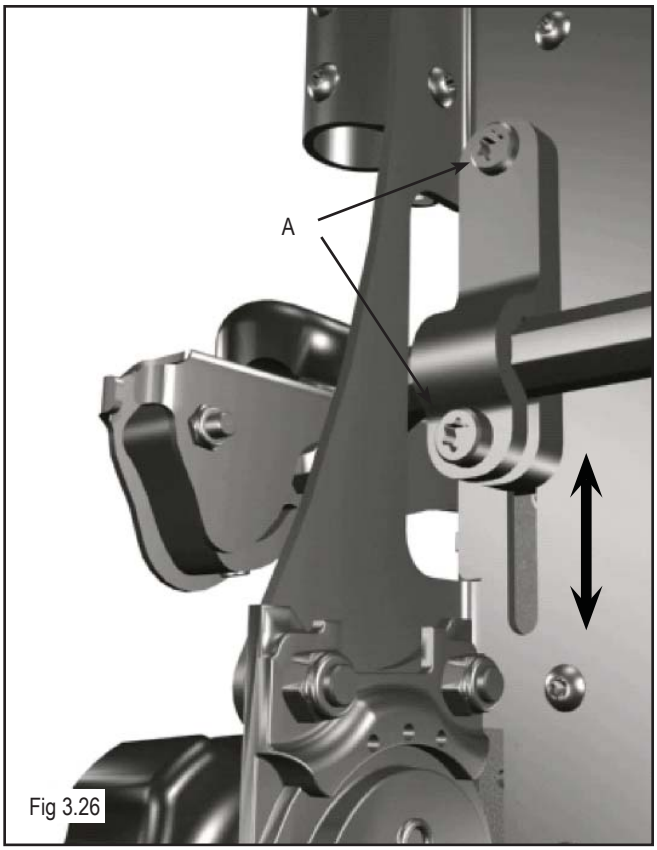


Fig 3.26

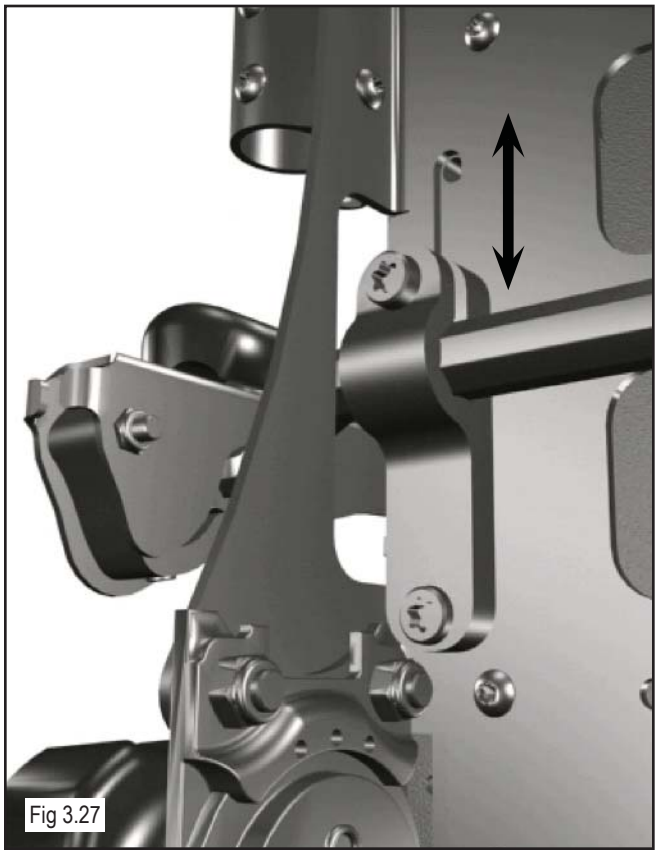


Fig 3.27

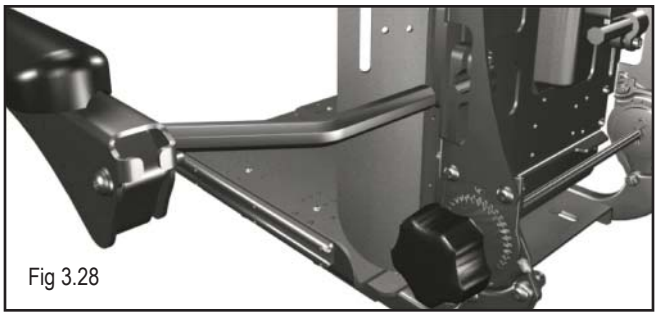


Fig 3.28

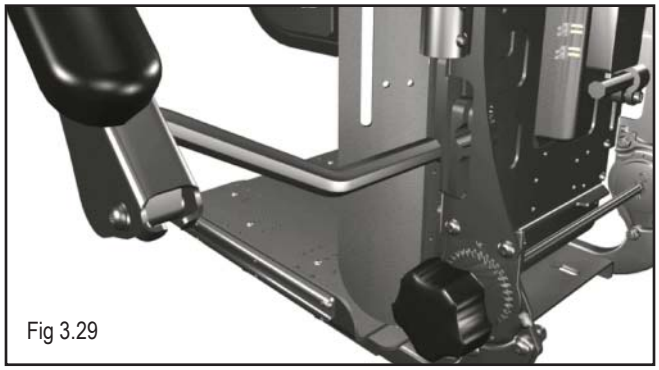


Fig 3.29

Level the Arm Pad

Complete the following steps to level the arm pad:

- Loosen the upper clamps.
- Pull the armrest out.
- Reinsert the armrest so the arm pad is parallel to the ground and tighten the upper clamps.

Notes:

1. This method of adjusting the armrest height adds an additional 2” to each of the upper and lower adjustment range.
2. The total available adjustment range from the seat to the top of the arm pad is 7” (7”-14” total range).


Fig 3.30


Fig 3.31


Fig 3.32

Armrest Angle Adjustment

Complete the following procedures to adjust the angle of the armrest.

1. Loosen the outer clamp. (A)
2. Turn the rear, fine-tune adjustment screw (B) in the upper armrest adjustment clamp clockwise or counter clockwise, depending on the change needed.
3. Re-tighten the outer clamp.
4. If this does not provide enough angle adjustment, it may be necessary to remove the armrest and reinsert it closer to the desired angle, and then make any fine-tune adjustments.

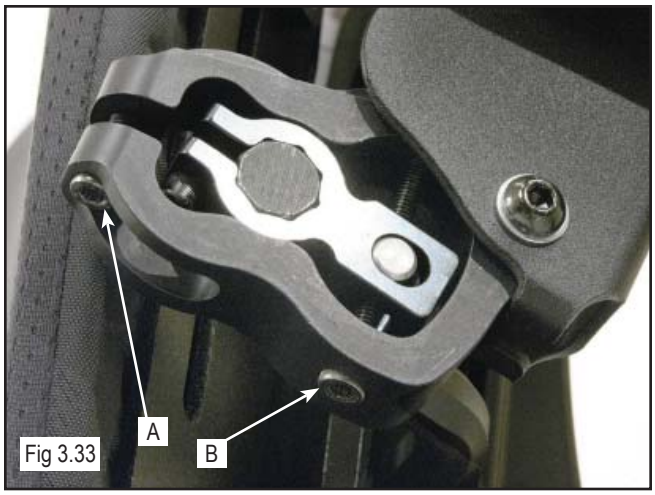


Fig 3.33

Arm Pad-Position Adjustment

The arm pad features 2” of horizontal arm pad adjustment.

Complete the following procedures to adjust the length of the arm pad:

- Loosen the two slot-screws on the underside of the arm pad(Fig 3.35).
- Slide the arm pad to the desired position(Fig 3.36) and retighten.

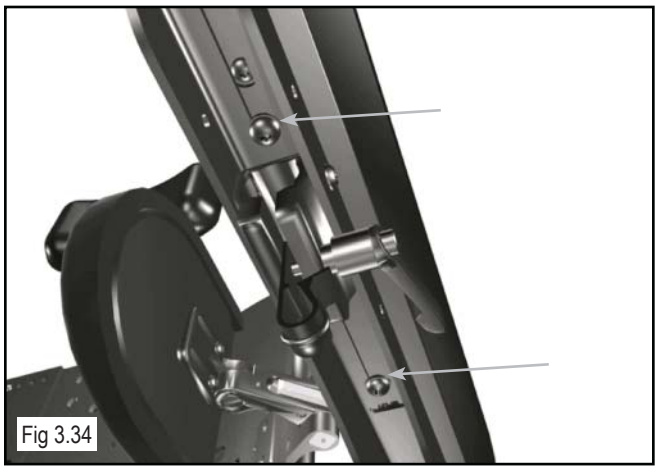


Fig 3.34


Fig 3.35

Installation - Adjustment of Lateral Knee Supports

- Mount and Adjust Lateral Knee Supports using the two mounting screws (Fig 3.37 & Fig 3.38).
- To open Lateral Knee Supports, push release lever and rotate out (Fig 3.39).
- To close Lateral Knee Supports, rotate to the front.
- To adjust Lateral Knee Supports, loosen and rotate pad. Note: Arms come in either 2" or 4" offset (Fig 3.40).

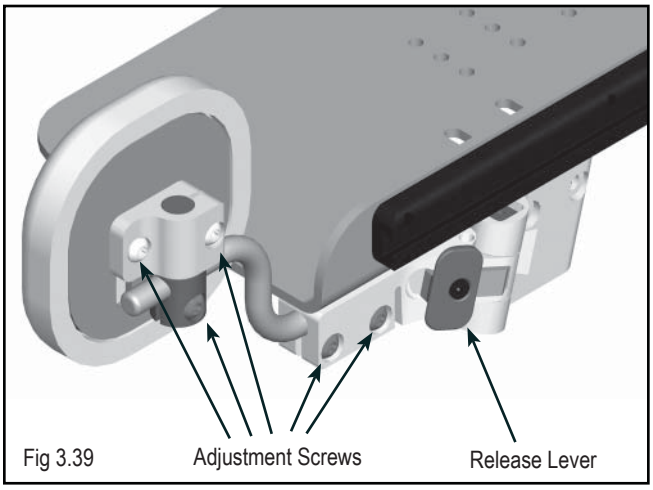


Fig 3.39

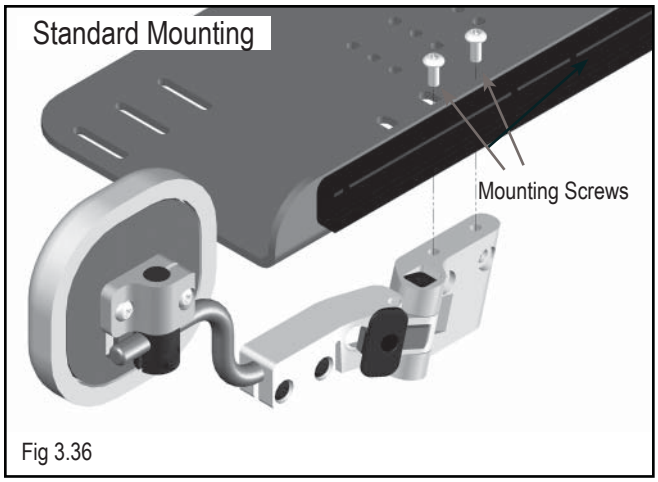


Fig 3.36

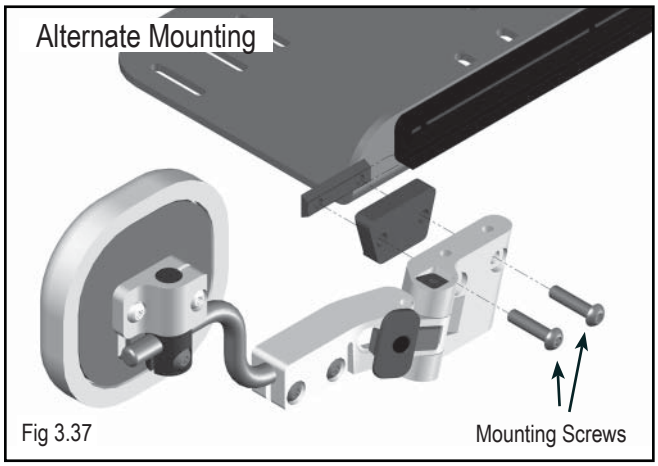


Fig 3.37

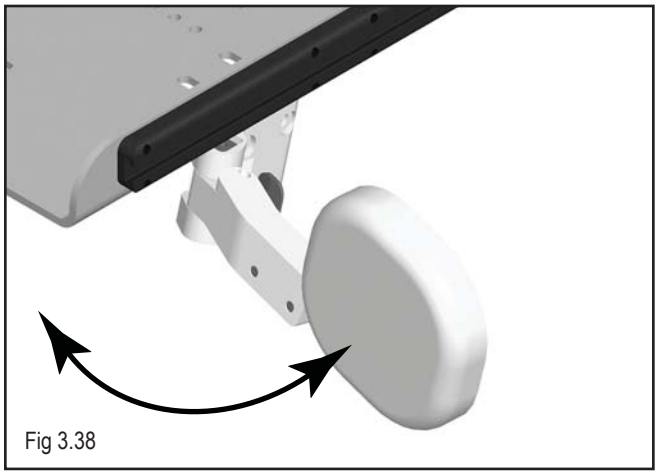


Fig 3.38

Leg Rest Hangers

New leg rest hangers are used on the Perfect Fit Seating System. These hangers provide more positive lock. The following drawing illustrates the repair/ adjustment procedures:

- Locate the adjustment bolt covered with a rubber bumper (A).
- Lossen stop nut (B). Turn rubber bump stop (A) inwards or outwards until hanger touches bumper when latching to remove sideways movement.
- To replace the mounting pins (C), remove the pin by removing the stop nut (E), then unscrew the pin. Replace with a new mounting pin.
- To replace the latch spring (D), remove the screw securing the latch and remove the latch. Unscrew the pivot bushing (F) by twisting by hand then remove spring. Replace the spring and reinsert the bolt.

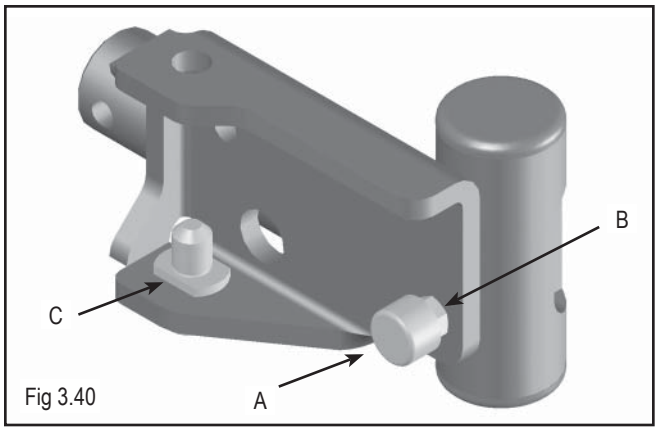


Fig 3.40

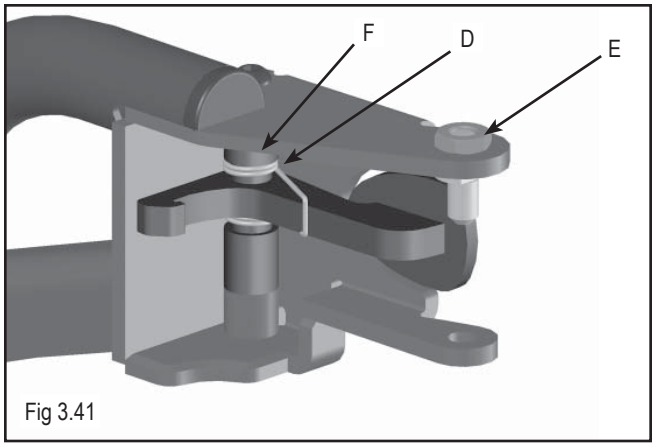


Fig 3.41

Leg Rest

The leg rest length may be adjusted as follows: (Fig 3.43)

- Locate the mounting bolts. Remove the bolts.
- Move the leg rest up or down in the hanger until the desired length is reached.
- Reinstall mounting bolts.


Fig 3.42

Installing and Adjusting Side Guards

- Mount the side guard on the seat pan rail as illustrated.
- Slide the side guard forward or rearward as required.
- Adjust the height of the guard by moving up or down the guard plate.

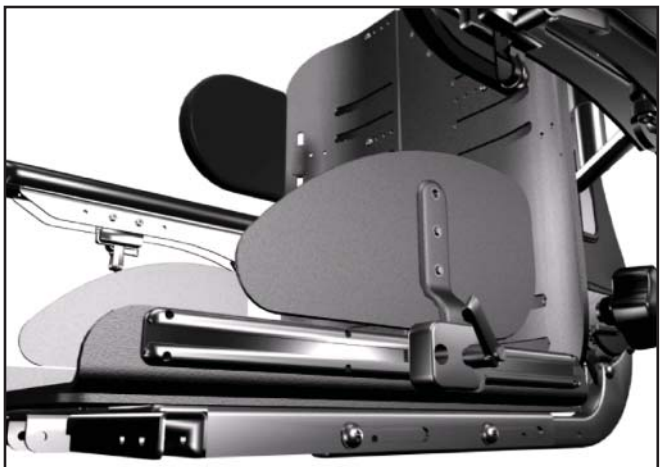


Fig 3.43

Positioning Belts

Mount to dovetail channel on seat wings

Fig 3.44

Mounting and Adjusting Lateral Supports

- Lateral supports come in several different styles, mounts and offsets. Mount them on the seat back wings as shown.
- Position them by moving them up and down in the slot on the back wing.

Fig 3.45

Mounting and Adjust Head Rests

- Head rests come in different styles. Several third party head rests such as Whitmyer, Otto Bock and Jay may be used.
- Mount them to the seat back mount as illustrated.
- Adjust the head rest by sliding it up and down, as well as rotating it in its mount.


Fig 3.46

Center Mount Foot Rest

Adjusting the Center Mount Foot Rest.

- Calf Pad adjustment: Remove mounting bolt and nut. Move Calf Pad to desired location and remount.
- Calf Pad angle adjustment: Loosen mounting bolt and nut, adjust angle and tighten hardware.
- Foot Plate angle adjustment: Loosen bottom bolt and locknut, move bolt in or out to set desired angle. Retighten bolt and locknut.
- Footplate height adjustment: Tilt seating system back, remove two lower bolts and locknuts and adjust to desired height. retighten hardware.


Fig 3.47

The Perfect Fit System

Theory of Operation

The Recline Portion of the Perfect Fit Seating System uses dual keipers to operate the back. Each keiper is powered by independent 24 VDC motors. A cogged belt connects the motors to the keipers.

The keipers are similar to those used in the automobile industry to recline seat backs. A hinged rod connects the left keiper to the right keiper to ensure synchronization.

An optical encoder is mounted on the left keiper assembly to record the rotation of the keipers. The control module decodes this signal and calculates the back angle.

A conventional joystick, or other input device, sends actuator commands over the CANBUS line to the control module. If a QR-MAC is also incorporated, the commands are routed to it as well. The control module or QR-MAC sends operating voltage to a PC board mounted on the seat back.

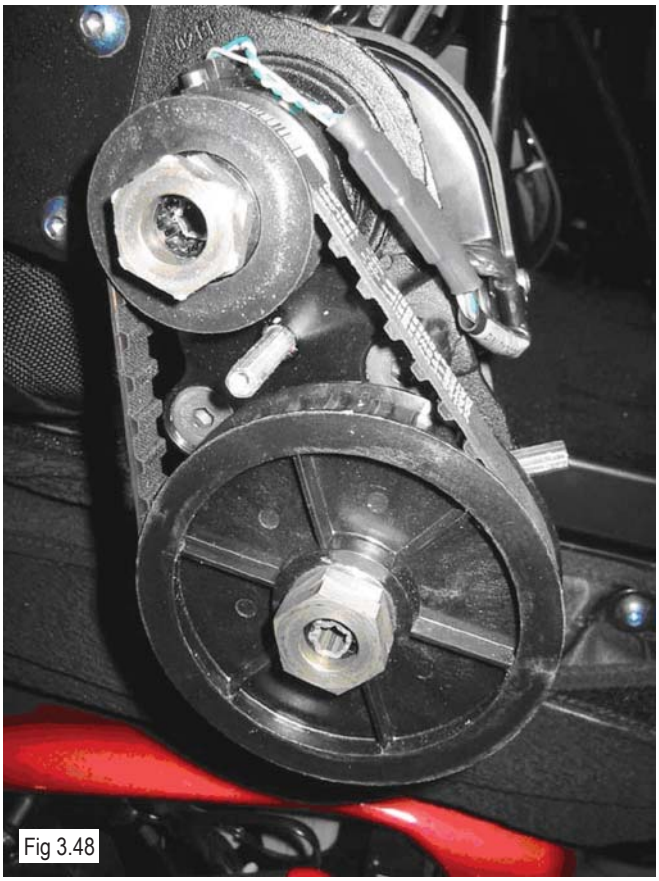


Fig 3.48

The PC board has several functions, including routing the voltage from the controller module to the recline actuators. The optical encoder sends its signal to the PC board. The PC board routes this signal to the control module where it is analyzed for correct operation and position.

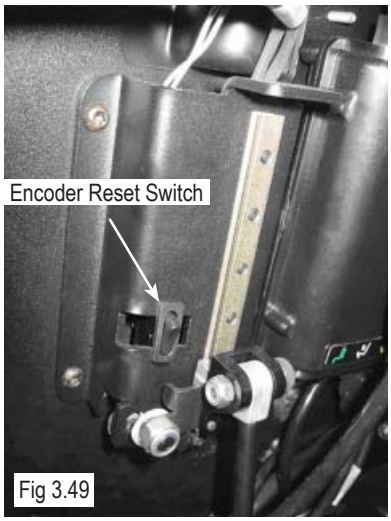


Fig 3.49

For recline, the PC board receives a signal from a rocker switch that is mounted in the center of the back. This switch (the Encoder Reset Switch) is operated by a sliding link connected to a strut. Its purpose is to synchronize the optical encoders with the back angle. This signal is sent to the control module.

The tilt system contains an 18-degree micro switch that informs the computer when the tilt is at 18-degrees. The purpose is to reset the encoder circuit each time the chair is tilted past 18-degrees. With the exception of the legrest system, the other seating functions reset during the operation by recording the actions of micro-switches located within the actuators.

Two reed switches are mounted on the same bracket that houses the Encoder Reset Switch. One reed switch is the End of Travel (EOT) “Home” for the up direction of the actuator, and the other reed switch is the EOT for the “Back”, or down direction, of the actuator. These signals are sent to the PC board which interupts the actuator current when the seatback reaches either end-of-travel.

The actuators are connected to the PC board. The actuator drive voltage is provided by the control module and routed through the PC board to the actuators.

Creep (speed reduction) and drive lockout are controlled by the Delphi system. Twelve degrees of tilt, 40 degrees of recline, or any lift will cause the chair to drive in creep speed.

Drive lockout will occur anytime two or more of the functions (tilt, recline) are causing the chair to drive in creep speed. Example, if the chair is tilted past 12 degrees and also reclined more than 40 degrees, the chair will not drive.

Troubleshooting the Recline Seating System - without QR-MAC

Prior to troubleshooting the Perfect Fit seating system, verify that the QR-MAC is correctly programmed and that the actuators are enabled. Refer to the HHP Owners Manual.
See below to troubleshoot each indicated fault.

The Recline Actuator will not function or will not correctly function.

Verify that the Recline functions illuminate on the input device (joystick or Enhanced Display). If not, refer to the Delphi troubleshooting section of the service manual.

1. Open the cover on the back of the wheelchair.
2. If a PCB Power Failure is noted, locate the Actuator Cable running from the control module to the PC Board. Refer to the Perfect Fit Wiring Diagram for the cable location.
3. Disconnect the cable. Turn on the wheelchair at the joystick (or other wheelchair control) and within 3 minutes measure for full battery voltage between pins 3 (ground) and 6 (positive battery voltage).
4. If full battery voltage is not observed, ensure that the Actuator Cable is connected to the control module. If not, reconnect and retest.
5. If voltage is still not present at the Actuator Cable, replace the Actuator Cable and retest.
6. If voltage is not present after replacing the Actuator Cable, replace the control module and retest.
7. Disconnect the 4-pin “Recline” cable (A) leading from the actuators to the Printed Circuit Board.
8. Using this connector, check the resistance of the actuators by measuring across the two left pins on the connector (black and blue wires), followed by the two right pins on the connector (black and blue wires). Correct resistance is between 3 and 9 ohms. (Fig 3.52)

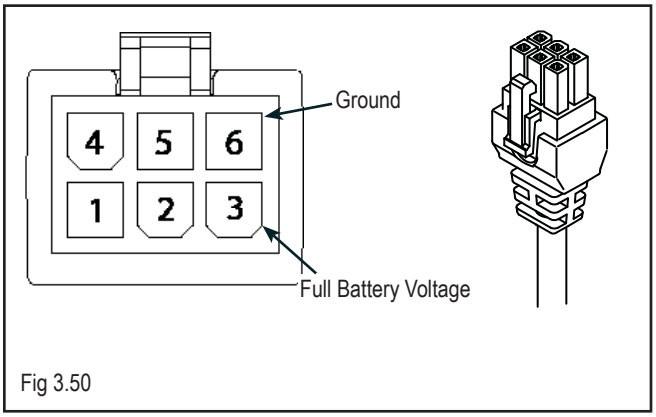


Fig 3.50

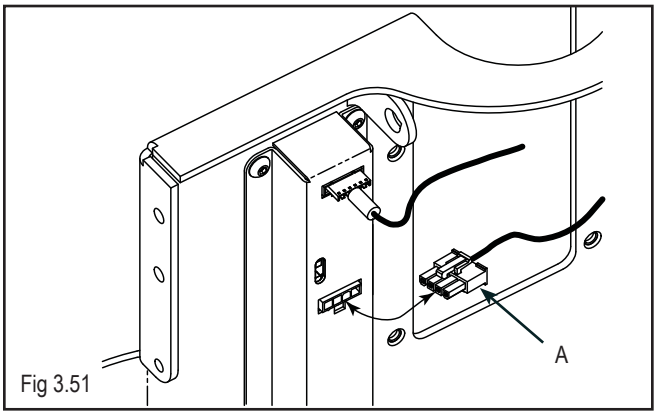


Fig 3.51

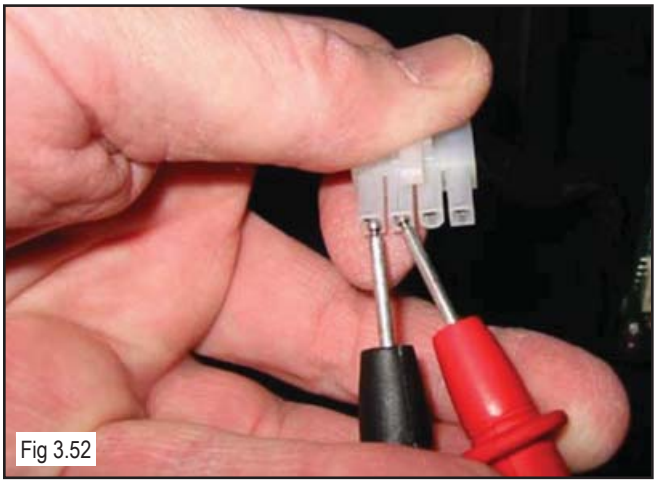


Fig 3.52

9. If the readings are not in the acceptable range (3 to 9 ohms), replace the keiper assembly and retest.
10. Locate the Encoder Reset and Back EOT and Home EOT switch assembly on the back of the chair.
11. Locate the two EOT switches at the bottom of the mounting plate.
12. Magnet close to back EOT sensor motor should stop. While moving to front, place magnet close to home EOT sensor motors should stop.
13. Connect a multimeter across the two black wires on the 6-pin connector. Check for continuity with the "Home" switch open and closed by moving a magnet close to the switch and then removing it. If the switch does not open and close, replace the Encoder Reset and EOT switch assembly and retest.
14. If the multimeter indicates correct switch operation, readjust the Home switch by following the reed switch adjustment procedures outlined in this manual.
15. Connect a multimeter across the two green wires on the 6-pin connector and check for continuity with the "Back" switch open and closed by moving a magnet close to the switch and then removing it. If the switch does not open and close, replace the Encoder Reset and EOT switch assembly and retest.
16. If the multimeter indicates open and close, readjust the Back switch by following the reed switch adjustment procedures outlined in this manual.
17. If all of the above tests are correct, replace the PC Board assembly and retest.
18. If replacing the PC Board does not fix the problem, replace the control module and retest.
19. Re-home seating system after testing.

Caution, when testing the Encoder Reset Switch, ensure that it is in the proper position (Fig 3.55) prior to operating the seat back. Failure to do so could cause damage to the switch


Fig 3.53

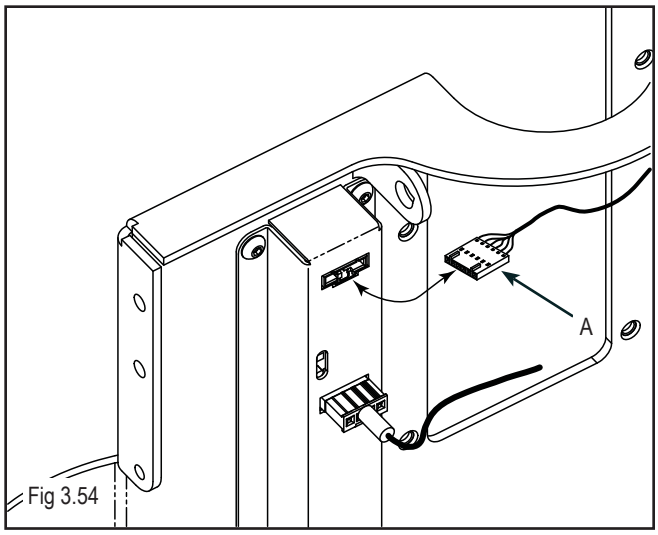


Fig 3.54

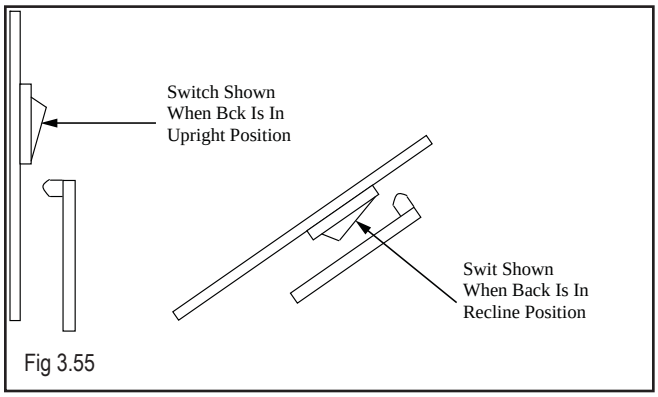


Fig 3.55

The chair will not drive or will only drive in creep mode

1. Verify that the battery charger is not plugged into the chair.
2. Verify that there are no faults displayed on the joystick or Enhanced Display. If faults are displayed, refer to the Delphi troubleshooting section of the service manual.
3. Verify that the seat is not reclined, tilted or elevated if equipped with a power seat and/or tilt. If tilted, reclined, or elevated, return all actuators to neutral position and retest.
4. MCM will flash actuator that indicated to the chair a creep condition. See table for actuator signaling creep.
5. Reset Encoders. Bring actuator to home position. Move actuator away from home past the encoder reset switch. Move actuator back to home position. Retest chair. Repeat for all actuators connected to the chair.
6. Recline, check Encoder Reset:
   a. Locate the Encoder Reset and EOT switch assembly (Fig 3.56)on the back of the chair. Follow the cable to the 6 pin connector on the PC board.
   b. Disconnect the 6-pin connector (A) leading from the Encoder Reset and EOT switch assembly.
   c. Connect a multimeter across the two white wires of the 6-pin connector. Check for continuity when the Encoder Reset switch is open and closed by manually operating the rocker switch.
   d. Replace the Encoder Reset and EOT switch assembly if the continuity tests fail. Retest the chair.
   e. Disconnect the 6-pin actuator connector from the control module.
   f. Connect a multimeter across pins 3 and 4 of the 6-pin actuator connector. Check for continuity when the Encoder Reset switch is one and closed by manually operating the rocker switch.
   g. Replace the PC Board if no continuity is observed. Retest the chair.

Caution, when testing the Encoder Reset Switch, ensure that it is in the proper position (Fig 3.58) prior to operating the seat back Failure to do so could cause damage to the switch

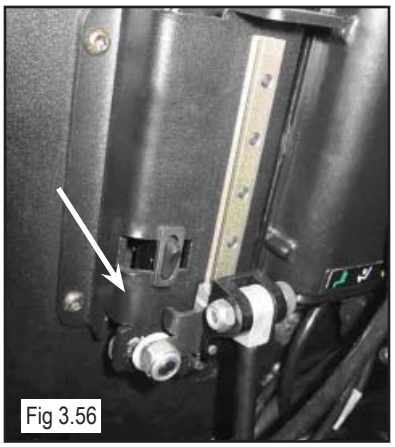


Fig 3.56

Table for actuator signaling creep

Actuator	Port
Tilt Only	Actuator #1
Lift Only	Actuator #2
Recline Only	Actuator #2
Tilt and Lift	
Tilt	Actuator #1
Lift	Actuator #2
Tilt and Recline	
Tilt	Actuator #1
Recline	Actuator #2
Lift and Recline	
Lift	Actuator #1
Recline	Actuator #2
ELR/ALR	
Right Legrest	Actuator #1
Left Legrest	Actuator #2

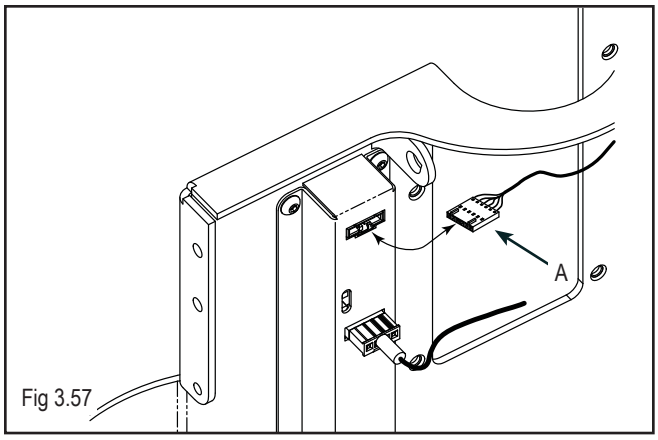


Fig 3.57

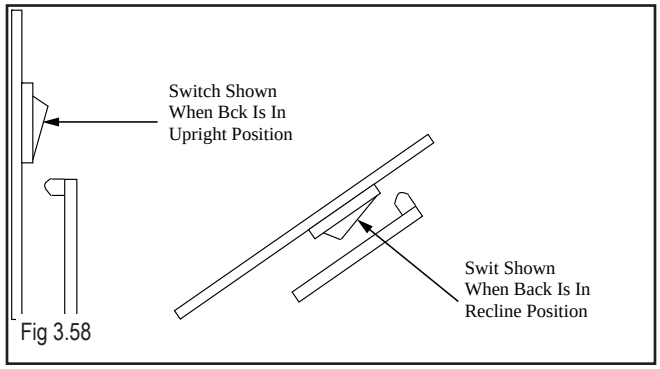


Fig 3.58

7. Tilt or Lift, check Encoder Reset:
   a. Disconnect the 6-pin actuator connector (A) from the control module.
   b. Connect a multimeter across pins 3 and 4 of the 6-pin actuator connector. Check for continuity when the Encoder Reset switch is one and closed by manually operating the rocker switch.
   c. Replace the Tilt or Lift module if the problem is not solved. Retest the chair.
8. Replace the control module if the problem is not solved. Retest the chair.

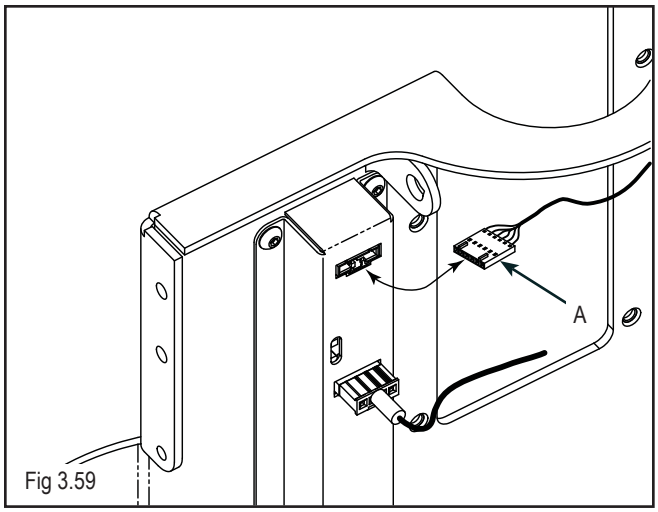


Fig 3.59

Trouble Shooting Seating Function other than Recline

Verify that the seating functions illuminate on the input device (joystick or Enhanced Display). If not, or if any fault codes are displayed, refer to the Delphi trouble-shooting section of the service manual.

1. Locate the control module on the wheelchair. Note: The control module is located at the rear of the base on a Rhythm and between the batteries on a Groove.
2. Verify the connector leading to the suspect actuator is mated to the control module. If not, reconnect and retest. Note: Power seat (lift) illustrated.
3. If the connectors are mated, disconnect them and measure resistance to the actuators. Refer to the following figure for the pin locations. Compare the readings to the table below.

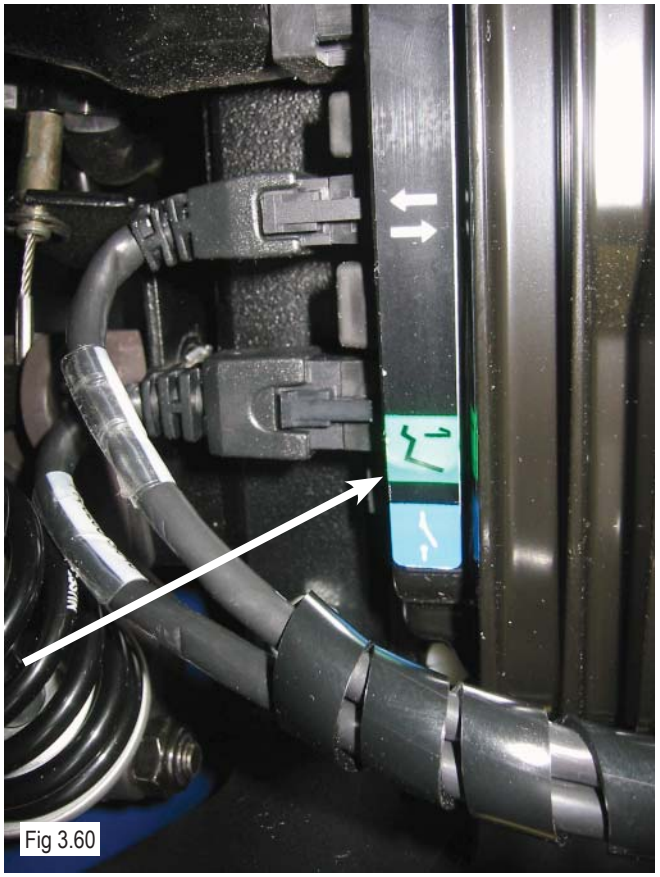


Fig 3.60

Actuator	Approximate Reading In Mid-Stroke	Approximate Reading at Home Position
Left Leg (for Power Center Mount ELR)	4 ohms	2 meg ohms or greater
Left Leg or Right Leg (for Power ELR)	8 ohms	2 meg ohms or greater
Tilt	2 ohms	2 ohms
Elevating Seat	2 ohms	2 meg ohms or greater

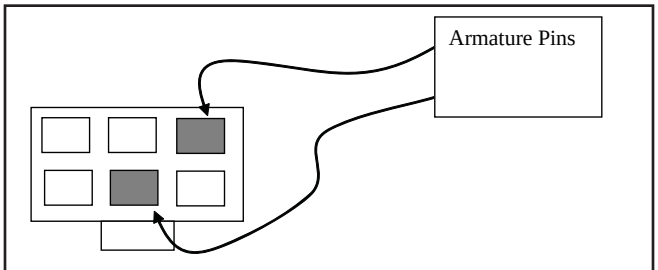


Fig 3.61

4. If any reading is not correct, disconnect each cable at the actuator and check for continuity through it to the control module. Replace any defective cable and retest.
5. If the readings are correct, replace the control module and retest.
6. If replacing the control module does not correct the problem, replace the appropriate actuator or seating component and retest.

Note: Contact Sunrise Medical Tech Support for assistance.

Troubleshooting the Perfect Fit System with QR-MAC

Prior to troubleshooting the Perfect Fit seating system, verify that the QR-MAC is correctly programmed and that the actuators are enabled. Refer to the HHP Owners Manual.

Total Seating System Failure

1. Locate the QR-MAC mounted on the back of the wheelchair (Fig 3.62).

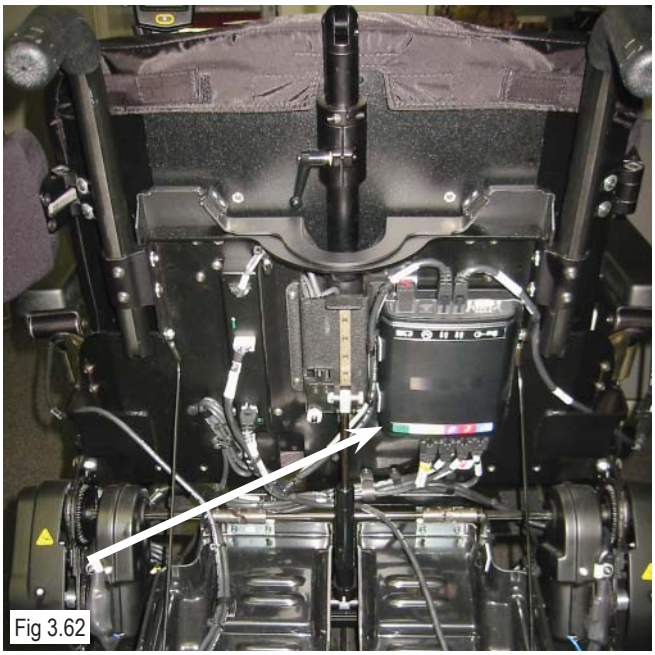


Fig 3.62

2. Verify that the BUS cables are connected to the QR-MAC (Fig 3.63). If disconnected, reconnect and retest.

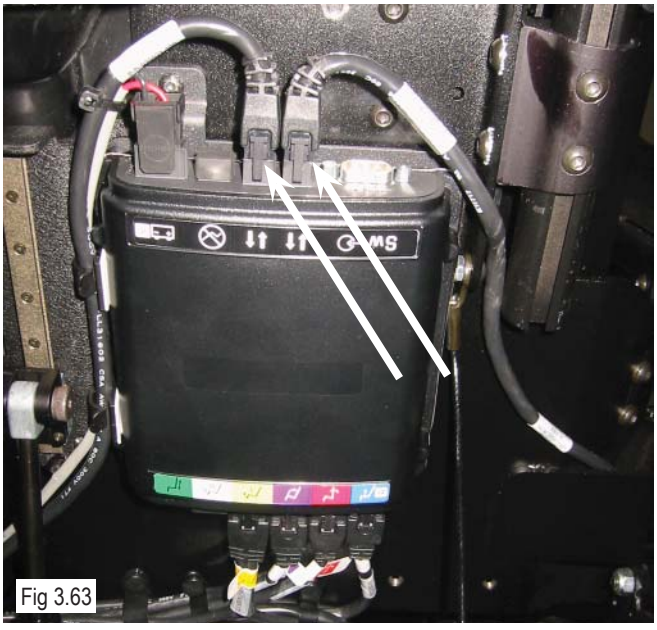


Fig 3.63

3. Verify that the BUS cables leading to the seating system are mated at the back of the wheelchair. If disconnected, reconnect and retest.

Fig 3.64

4. Check for battery voltage at the 2-pin connector leading to the QR-MAC
5. If battery voltage is present at the 2-pin connector and no seating functions are illuminated, replace the QR-MAC and retest.


Fig 3.65

6. If battery voltage is not present, locate the 2-pin connector leading from the base to the seating system

Fig 3.66

7. Disconnect the 2-pin connector and measure for battery voltage on the cable leading to the base.
8. If battery voltage is not present at the 2-pin connector, verify that the 15-amp fuse in the base of the wheelchair is not defective and that the 2-pin connector near the batteries is mated correctly. Reconnect the connectors or replace the fuse if defective and retest.
9. 9. If battery voltage is present at the base, check for continuity from the 2-pin connector on the seating system leading to the 2-pin connector at the QR-MAC.

Fig 3.67

10. If the 2-pin cable leading through the seating system to the QR-MAC does not indicate continuity, trace the cable through the seating system to locate a second 2-pin connector. Verify that this connector is mated correctly. If not, reconnect and retest.

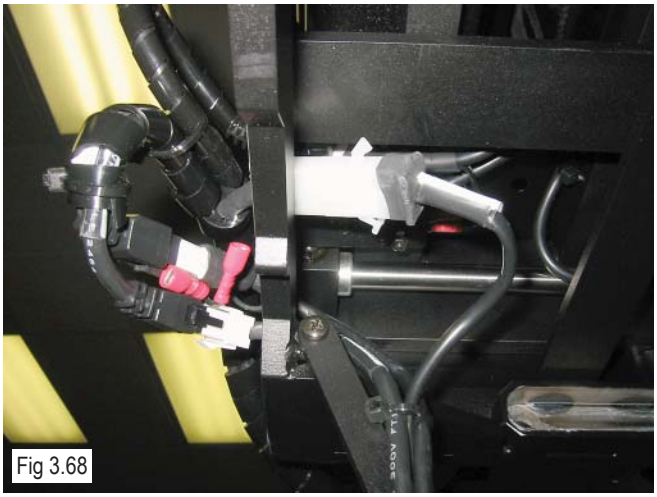


Fig 3.68

11. If the 2-pin connector is mated correctly, disconnect it and verify continuity from the appropriate half of the connector to the QR-MAC, and to the base 2-pin connector. Replace the cable assembly that does not test correctly and retest.

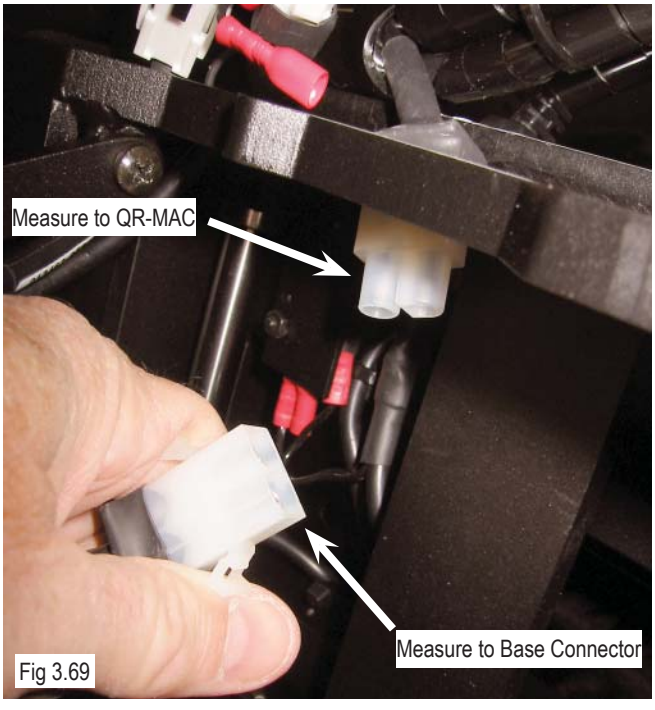


Fig 3.69

Individual Actuators Do Not Function or Function Correctly

Verify that the seating functions illuminate on the input device (joystick or Enhanced Display). If not, or if any fault codes are displayed, refer to the Delphi troubleshooting section of the service manual.

1. Locate the QR-MAC on the rear of the wheelchair

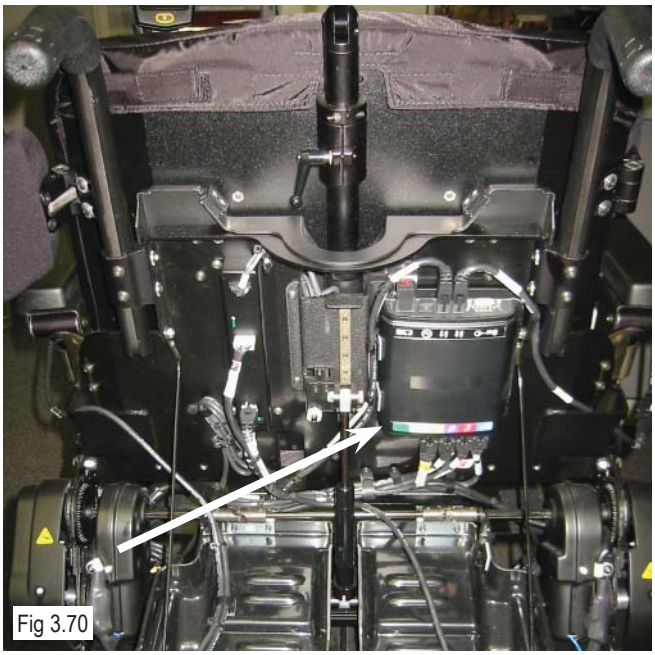


Fig 3.70

2. Inspect the seating connectors located on the bottom of the CR-MAC. Reconnect any connector not mated correctly and retest.

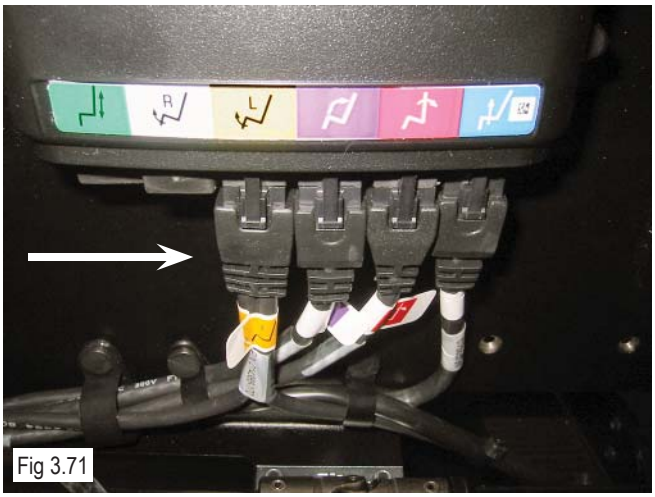


Fig 3.71

3. If the connectors are mated, disconnect then and measure resistance to the actuators. Refer to the following figure for the pin locations. Compare the readings to the following table.


Fig 3.72

Actuator	Approximate Reading In Mid-Stroke	Approximate Reading at Home Position
Left Leg (for powered foot platforms)	4 ohms	2 meg ohms or greater
Left Leg or Right Leg (for independent legs	8 ohms	2 meg ohms or greater
Tilt	2 ohms	2 ohms
Recline	11K ohms (reading through PCB)	11K ohms (reading through PCB)
Elevating Seat	2 ohms	2 meg ohms or greater

4. If any reading is not correct, disconnect the appropriate 6-conductor cable at the actuator and check for continuity to the QR-MAC, or to the PC board for recline. Replace any defective cable and retest.
5. If the readings are correct, replace the QR-MAC and retest.

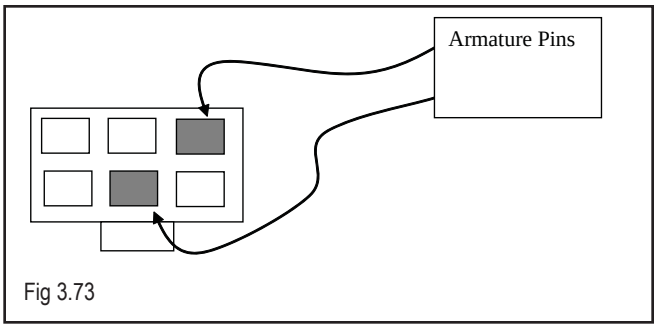


Fig 3.73

Note: If the Recline Actuator is not functioning correctly, refer to “The Recline Actuator will not function or function correctly” section of the service manual and complete steps 7 through 19.

6. If replacing the QR-MAC does not correct the problem, replace the appropriate actuator or seating component and retest.

Note: Contact Sunrise Medical Tech Support for assistance

Tilt Module does not Home (reset) Correctly

If any fault codes are displayed, refer to the Delphi troubleshooting section of the service manual.

1. Operate the seating system to approximately 30 degrees tilt and locate the 18-degree reset switch located on the tilt module under the seat.
2. Disconnect the 6-pin connector leading to the tilt module.


Fig 3.74

3. Verify correct operation of the 18-degree reset switch by checking its operation at the 6-pin connector. Refer to the following drawing for the correct readings.
4. Replace the 18-degree reset switch assembly if defective and retest. Re-home the seating system by fully operating the tilt or using the HHP and retest.

Note: Contact Sunrise Medical Tech Support for assistance.

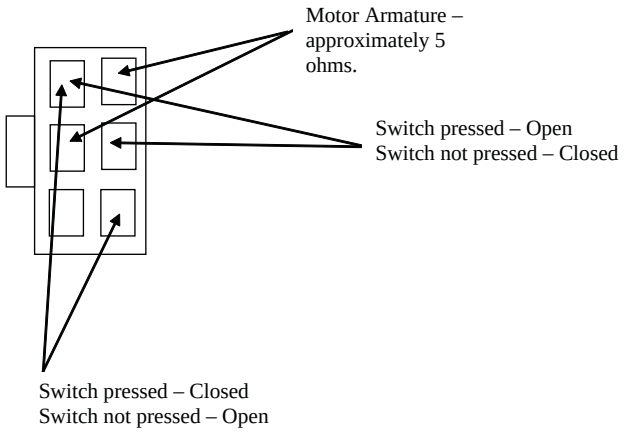


Fig 3.75

Reed Switch Adjustment

1. With the back pan set at 95° ±1° with respect to the seat pan, the Actuator Magnet (B) should activate Reed Switch “A”.
2. Actuator Magnet (B) may be moved vertically as shown by arrow (C) to accomplish this set up.
3. Rocker Switch MUST be in the down position as shown, during initial set-up, and be activated with the back pan set at 107°±2.5° with respect to seat pan.
4. Hole pattern in Actuator Bracket provides 2.5° incremental adjustments.

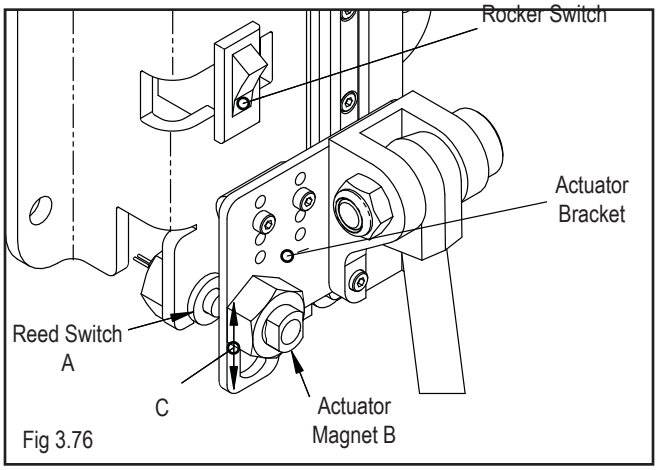


Fig 3.76

5. Gap between the Reed Switch (A) and Actuator Magnet “B” to be 1-3 mm (3mm maximum).
6. Actuator Magnet (B) is depth adjustable by loosening hex nut, pushing mount in, then rotating it 90°, and re-tightening hex nut.

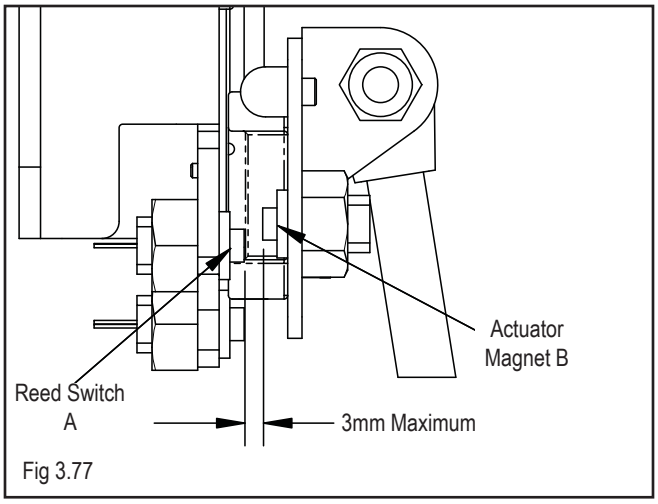


Fig 3.77

7. With the back pan set at 171° ±1° with respect to the seat pan, (Gas Spring fully compressed), the Actuator Magnet (E) should activate Reed Switch (D).
8. Actuator Magnet (E) may be moved vertically as shown by arrow (F) and horizontally as shown by arrow (G) to accomplish this set up.

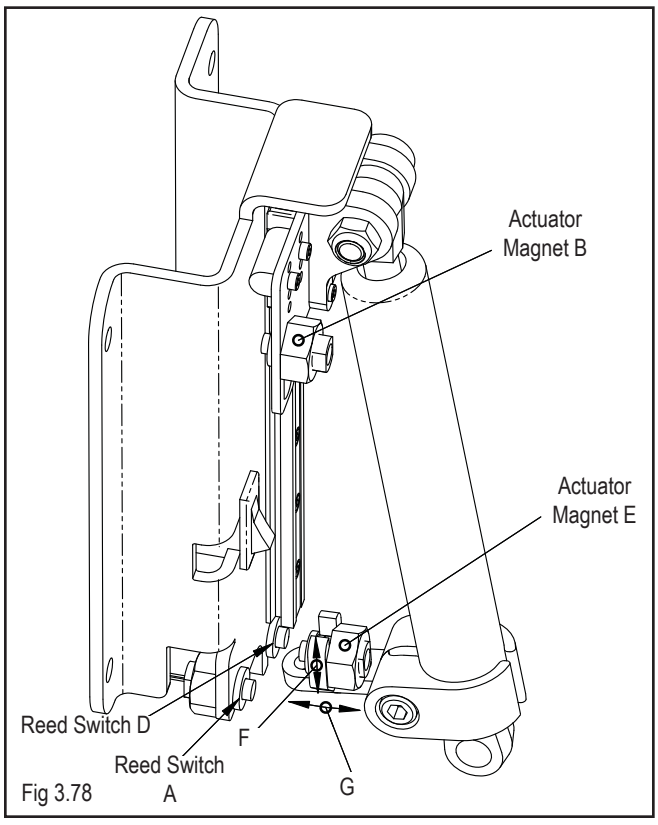


Fig 3.78

Power Modules

Tilt System

- 50 degrees of tilt.
- Linak Actuator.

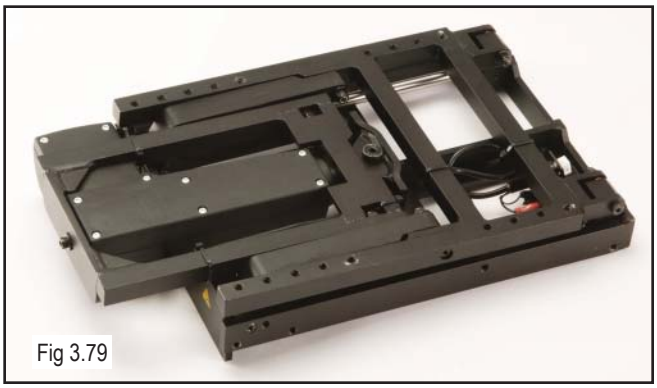


Fig 3.79

Pin 1	Motor +	Brown
Pin 2	Encoder	Red
Pin 3	Ground	Black
Pin 4	COT Switch	N/A
Pin 5	Motor -	Blue
Pin 6	24 Volt Switched Power	N/A

- When + 24 is connected to Blue/Motor+/Pin 5 and Ground is connected to Brown/Motor-/Pin 1 the actuator will extend and the tilt will go up.
- When + 24 is connected to Brown/Motor+/Pin 1 and Ground is connected to Blue/Motor-/Pin 5 the actuator will retract and the tilt will go down.

The Linak actuator is replacable in both lift and tilt modules (Fig 3.83).


Fig 3.80


Fig 3.81

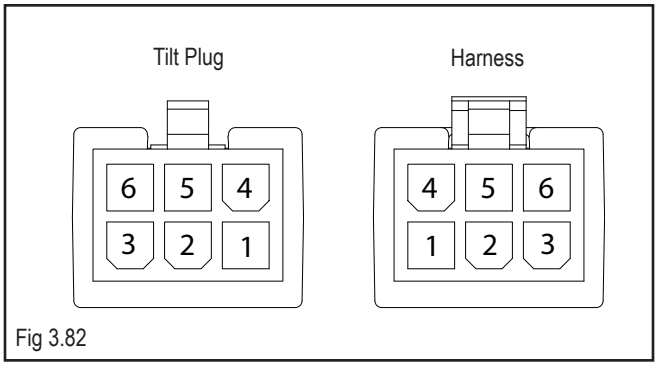


Fig 3.82


Fig 3.83

Power Modules

Lift System

- Eleven inches of lift.
- Linak Actuator.
- Cross arm x-style actuation design.
- Connects directly to the motor controller.
- Operated by either a toggle activation switch or directly through the joystick.

Fig 3.84

Pin 1	Motor +	Brown
Pin 2	Encoder	Red
Pin 3	Ground	Black
Pin 4	COT Switch	N/A
Pin 5	Motor -	Blue
Pin 6	24 Volt Switched Power	N/A

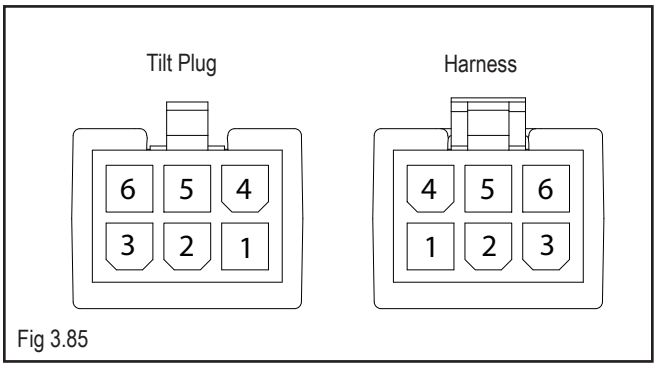


Fig 3.85

- When + 24 is connected to Blue/Motor+/Pin 5 and Ground is connected to Brown/Motor-/Pin 1 the actuator will extend and the lift will go up.
- When + 24 is connected to Brown/Motor+/Pin 1 and Ground is connected to Blue/Motor-/Pin 5 the actuator will retract and the lift will go down.

The Linak actuator is replacable in both lift and tilt modules (Fig 3.83).

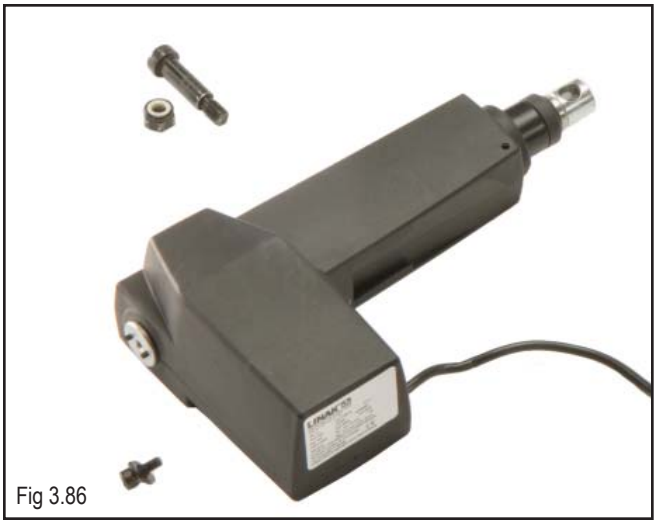


Fig 3.86

Seat Interface

Permanent Tilt Adjustments

The Perfect Fit Seating System may be mounted with 0, 3, 6 or 9 degrees of permanent tilt. The system uses a filler plate to mount the seat to the base. The tilt angle may be adjusted as follows:

1. Remove the adjustment bracket (B) by removing the mounting hardware.
2. Reposition the bracket to desired angle and reinstall the mounting hardware into the mount.
3. Tighten the mounting hardware.

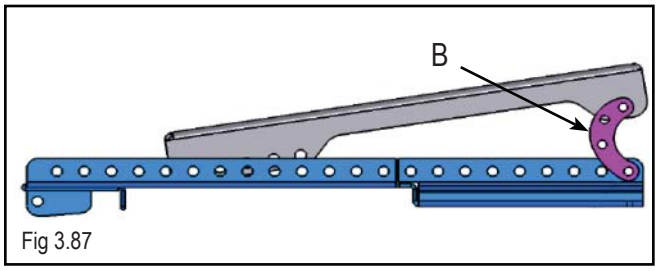


Fig 3.87

Height Adjustments

The Perfect Fit Seating System contains 3 inches of height adjustment. The seating system may be adjusted up or down using the mounting post that connects to the base. The seat height may be adjusted as shown:

1. Remove the shroud from the wheelchair.
2. Locate the mounting posts that mount the seating system to the base.
3. Locate the bolts that secure that posts to the base.
4. Remove the bolts and move the posts up or down to adjust the height.
5. Replace the mounting bolts.


Fig 3.88


Fig 3.89

Power Recline with Power Shear Reduction

The New Power Recline with Power Shear Reduction is modeled after the Quickie Smart Seat with the additional enhancement of operation by the Quickie iQ Electronics powered by Delphi. Electrical adjustments for the New Power Recline are either by using the HHP or Quickie iQ. The three new adjustments available using the HHP or Quickie iQ are:

1. Shear Program – This program allows the use of the HHP or Quickie iQ program to map the shear amounts in relation to the back angle.
2. Enable – Enable selects the Power Shear Program.
3. Tuning Factor – Tuning Factor smoothes the Shear Program (shear mapping) to prevent jerky shear reduction. The factory setting is 10 and the range is 1 to 100. One (1) is the smoothest setting, 100 follows the shear map exactly.

The recline system uses encoders in the actuators to provide seat position to the Delphi system. This system has been improved over the Smart Seat by providing automatic “re-home” capabilities. Automatic re-home is performed anytime the seat is operated past a certain point and micro-switches are closed. These micro-switches, known as Counter Reset Switches (CSR), tell the Delphi system the exact position of the actuator.

Automatic speed-reduction, known as Creep, is controlled by the position of the back. Anytime the back angle is 15 degrees past vertical in any combination of Tilt or Recline, the wheelchair reverts to a programmable Creep Profile. This profile may be modified by either the HHP or Quickie iQ to run slower than the factory settings. Creep speed is a percent of maximum Creep speed programmed by Sunrise Medical.

Prior to performing any troubleshooting, “re-home” the recline and shear system using the HHP.

It is also a good idea to use the HHP or Quickie iQ to troubleshoot the system prior to performing any component testing. Refer to Fault Isolation Procedures Using Quickie iQ or HHP in this tech manual.

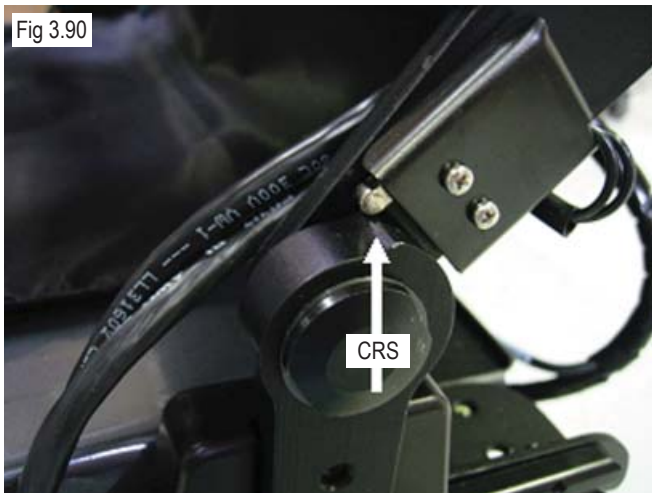
Once the wheelchair has been re-homed and then tested using the HHP or Quickie iQ, complete the following sections to test the individual components.

To remove the rear shroud for service work, refer to the section covering Recline Actuator Removal in this tech manual.

The wheelchair will only drive in Creep Speed, or the back will not drive to the preprogrammed value

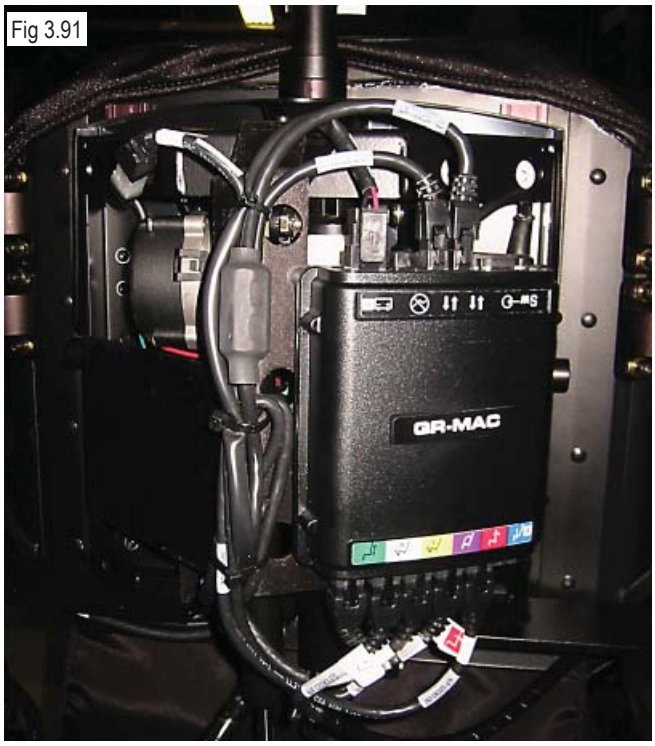
1. Locate the Recline Counter Reset Switch (CRS) mounted on the left seat hinge (Fig 9.90). Note: this switch is Normally Open (NO) when the seat is fully elevated, and closes as the seat-back reclines.
2. Verify that the switch is not damaged and free to operate.

Fig 3.90



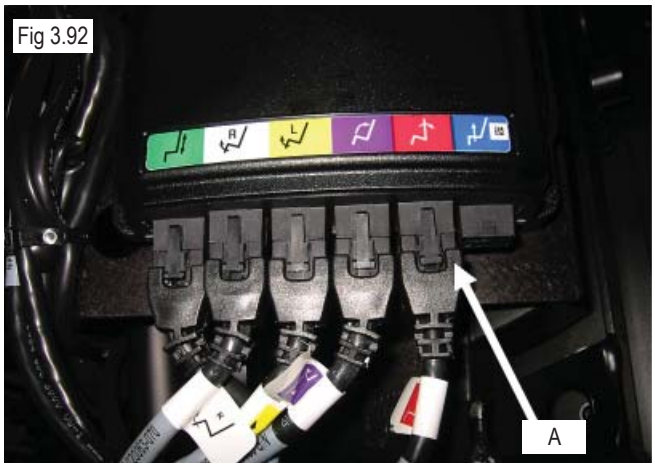
3. Locate the QMAC mounted on the back of the wheelchair(Fig 3.91).

Fig 3.91



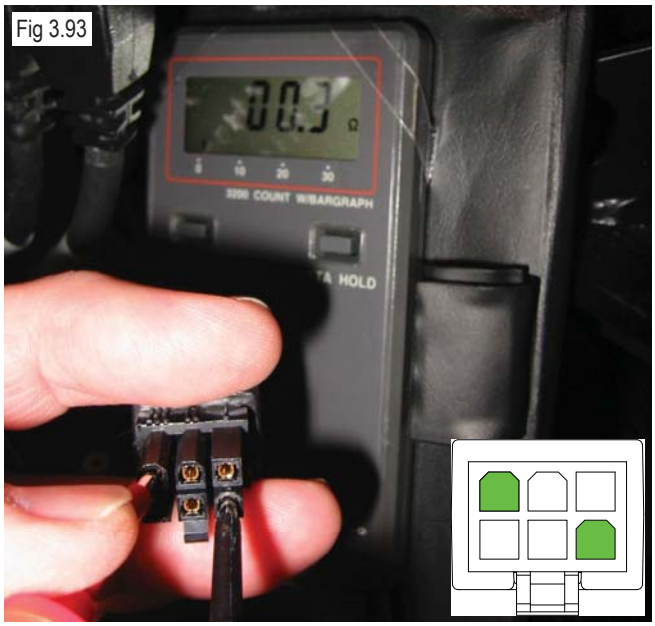
4. Disconnect the 6-pin female connector (A) leading to the Recline port of the QMAC (Fig 3.92).

Fig 3.92



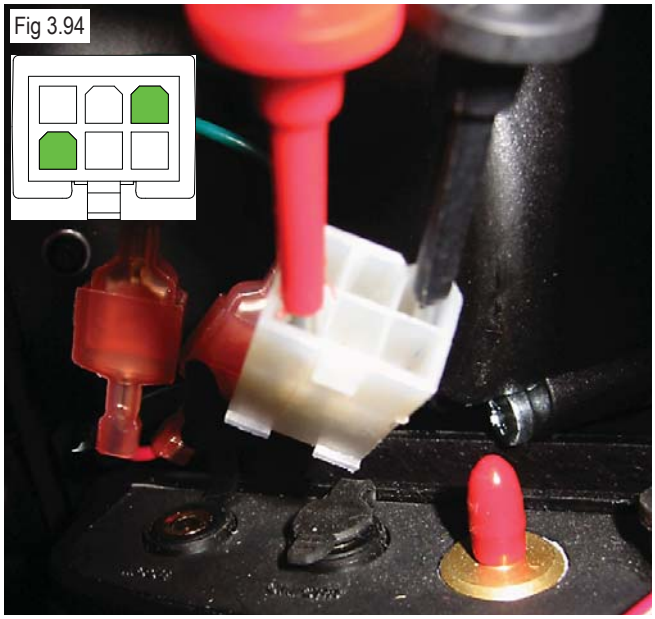
5. Connect a meter to the 2 pins indicated in the photo (Fig 3.93).
6. Check continuity through the switch by pressing in on the Recline CRS plunger. Note, when the seat-back is in the full upright position the switch should open. When the seat reclines the switch should close.

Fig 3.93



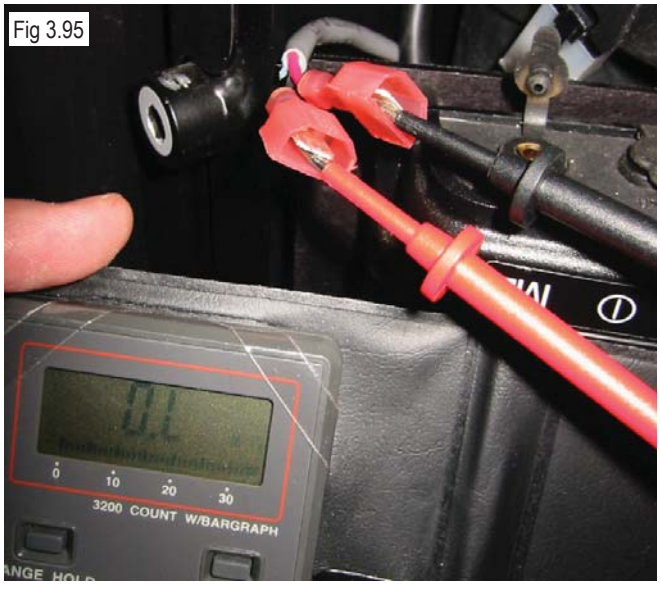
7. If the switch does not change state, trace the cable from the QMAC to the other end and another 6-pin cable leading to the actuator.
8. Disconnect the 6-pin connector.
9. Check continuity through the 6-pin male connector leading to the Recline CRS by pressing in on the Recline CRS plunger. Refer to the photo to determine the correct pins to measure continuity (Fig 3.94).
10. If the switch changes state, replace the cable with the two, 6-pin female connectors leading to the QMAC.

Fig 3.94



11. If the switch does not change state, locate a 2-wire cable leading from the Recline CRS to the recline actuator.
12. Disconnect the 2 lug connectors.
13. Check operation of the Recline CRS by measuring continuity through the actuator (Fig 3.95) and by pressing on the CRS plunger.
14. Replace the recline actuator if the switch changes state. Refer to Recline Actuator Removal section in this manual.
15. Replace the Recline CRS assembly if the switch does not change state. Refer to Recline CRS Replacement section in this manual.
16. Replace the QMAC if the switch does change state and no switch or wiring errors were found. Refer to Recline Actuator section in the manual to replace the QMAC.

Fig 3.95

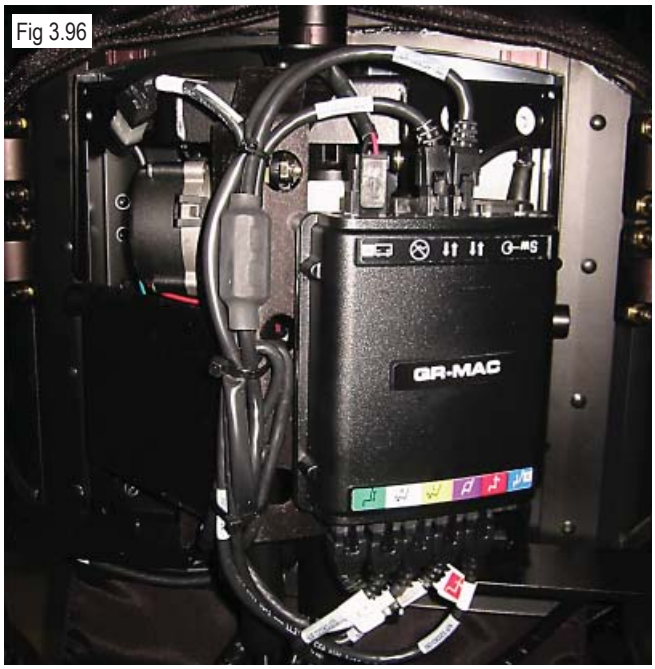


The back will not drive to the preprogrammed shear value

Additionally there may be encoder errors. Use the HHP to re-home the chair prior to completing any tests. Complete the following procedures to test the Shear Count Reset Switch (CRS).

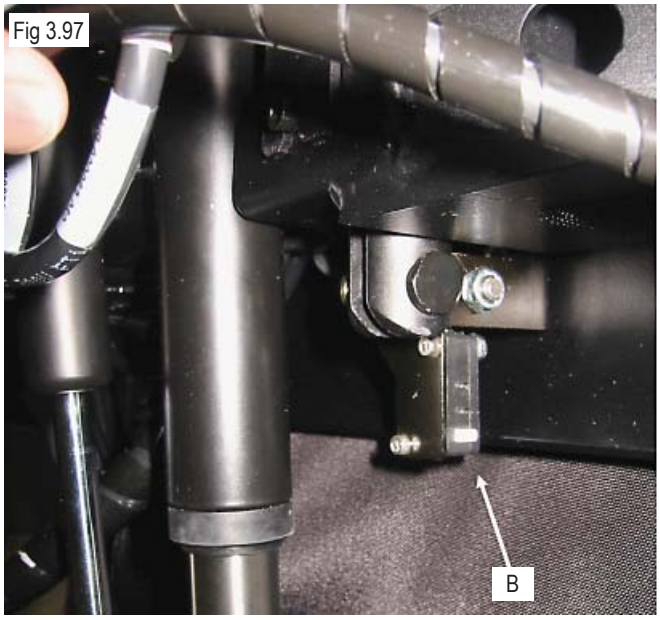
1. Locate the QMAC mounted on the back of the wheelchair (Fig 3.96).

Fig 3.96



2. Locate the Shear CRS (B) mounted under the QMAC (Fig 3.97). Note: this switch is Normally Open (NO) when the seat-back is fully elevated, and closes as the seat-back lowers.
3. 3. Verify that the switch is not damaged and free to operate.

Fig 3.97

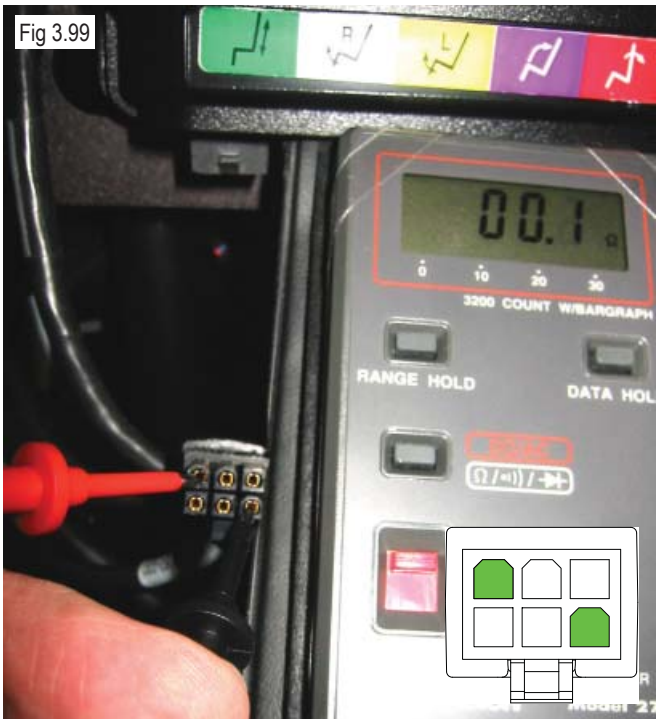


4. Disconnect the 6-pin female connector (C) leading to the Shear port of the QMAC(Fig 3.98).

Fig 3.98

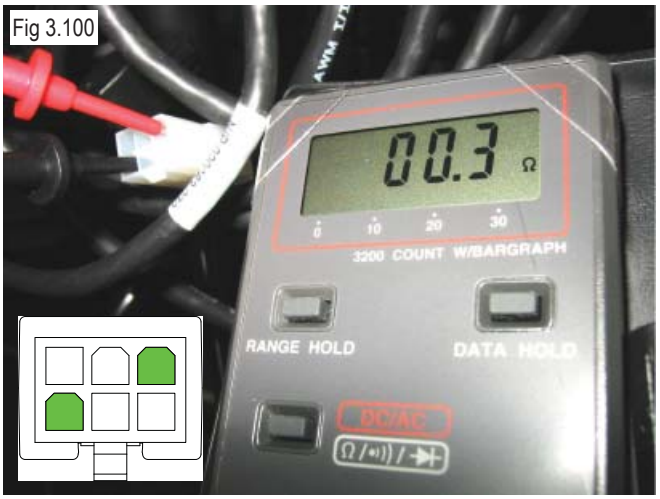
5. Connect a meter to the 2 pins indicated in the photo (Fig 3.99).
6. Check continuity through the switch by pressing in on the CRS plunger. Note, when the seat-back is in the full up position the switch should be open. When the seat lowers the switch should close.
7. If the switch does not change state, trace the cable from the QMAC to the other end.

Fig 3.99



8. Disconnect the 6-pin connector.
9. Check continuity through the 6-pin male connector to the Shear CRS by pressing in on the plunger on the Shear CRS. Refer to the photo to determine the correct pins to measure continuity through (Fig 3.100).
10. If the switch changes state, replace the cable with the two, 6-pin female connectors leading to the QMAC.
11. Replace the Shear CRS and cable assembly if the switch does not change state. Refer to New Recline and Shear CRS replacement and adjustment section in this manual.
12. Ensure that the switch operates when the back (shear actuator) is lowered. If the switch does not change state as the back is lowered, adjust the CRS. Refer to Shear CRS Replacement and Adjustment section in this manual.
13. Replace the QMAC if all other components are found ok and the fault is still present.

Fig 3.100



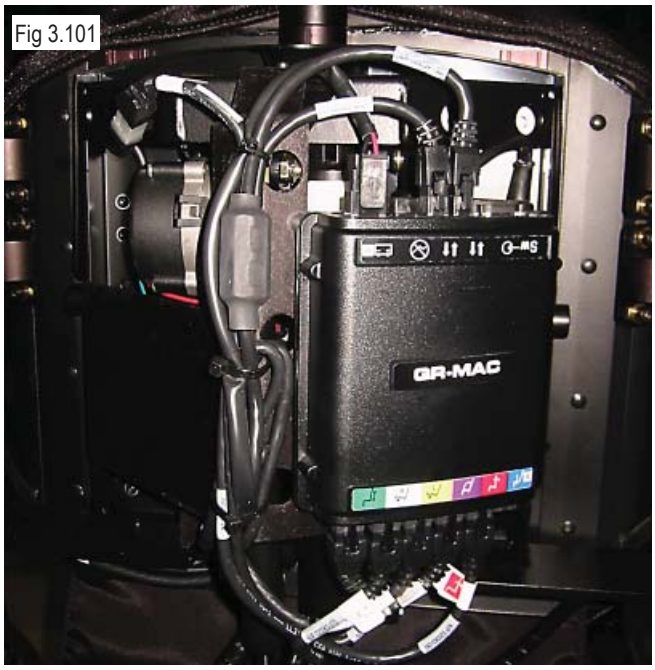
The Recline Actuator will not run, or runs erratically

The Recline Actuator will not run, or runs erratically

Complete the following procedures to test the Recline Actuator. Use the HHP to re-home the chair prior to completing any tests.

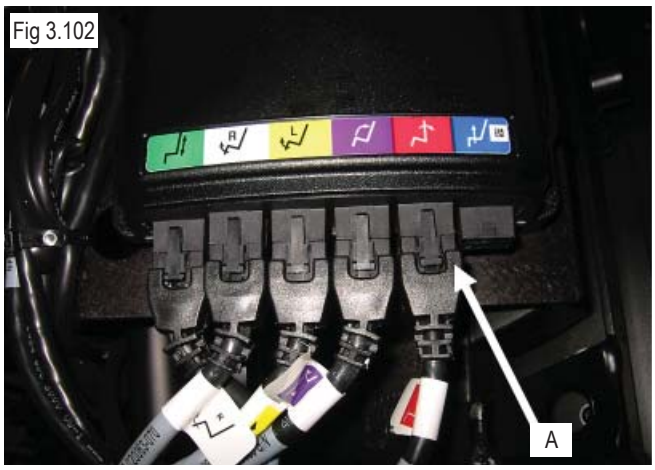
1. To test the current drain and operation of the encoder switches of the Recline actuator, complete the Fault Isolation Procedures Using Quickie iQ or HHP located in this manual. Replace the Recline actuator if the procedure fails. To continue testing, complete the following procedures.
2. Locate the QMAC mounted on the back of the wheelchair (Fig 3.101).

Fig 3.101



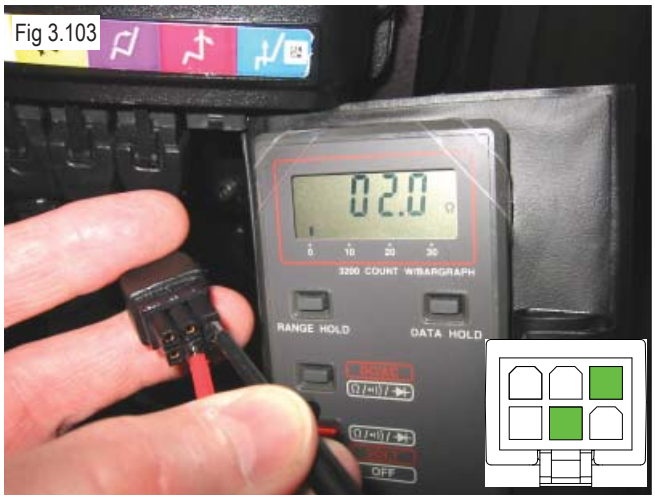
3. Disconnect the 6-pin female connector (A) leading to the Recline port of the QMAC (fig 3.102).

Fig 3.102



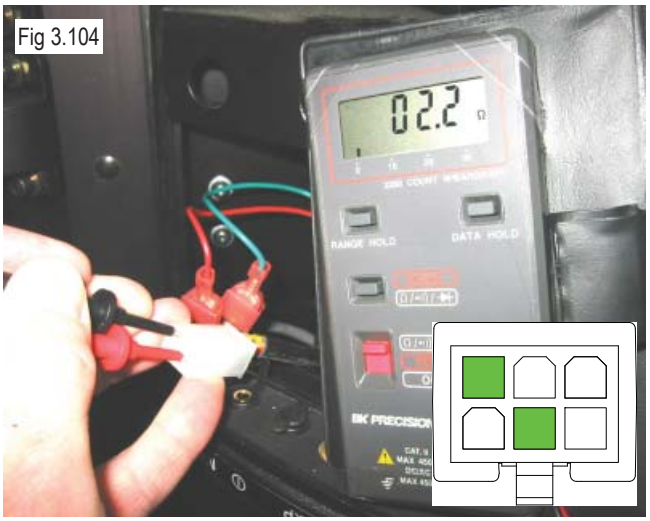
4. Check the armature resistance through the pins indicated in the photo (Fig 3.103). Nominal resistance is 2 to 4 ohms.

Fig 3.103



5. Follow the cable to another connector leading to the actuator if the resistance is excessive.
6. Disconnect this connector and check armature resistance through the pins indicated in the photo (Fig 3.104). Nominal resistance is 2 to 4 ohms.
7. Replace the 6-pin cable leading from the QMAC to the cable leading to the actuator if the resistance is correct
8. Replace the actuator if the resistance is out of tolerance and the actuator does not run. Refer to Recline Actuator Removal section in this manual.
9. On the QMAC, move the Recline actuator cable from its port to another port (i.e. Tilt). Operate the recline system. If the system operates correctly, replace the QMAC. Refer to the Recline Actuator Removal section in this manual.

Fig 3.104



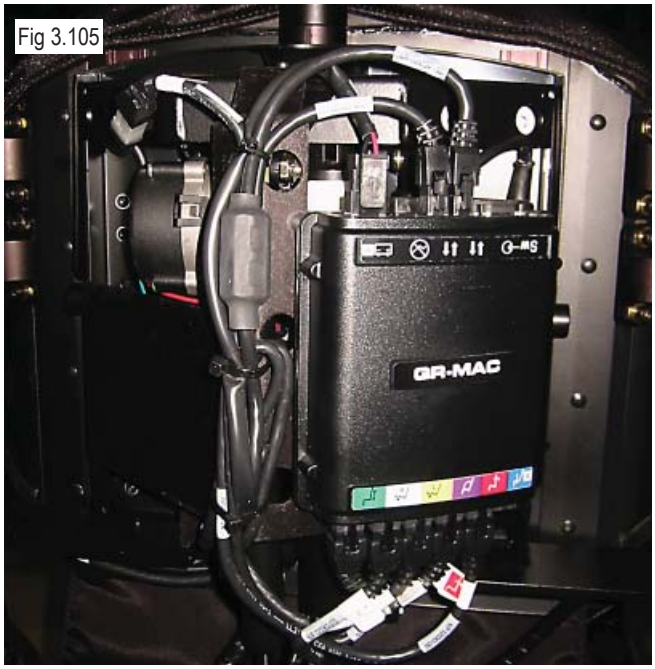
The Shear Actuator will not run, or runs erratically

The Shear Actuator will not run, or runs erratically

Complete the following Test Procedure to test the Shear Actuator. Use the HHP to re-home the chair prior to completing any tests.

1. To test the current drain and operation of the encoder switches of the Shear actuator, complete the Fault Isolation Procedures Using Quickie iQ or HHP. Replace the shear actuator if the procedure fails. To continue testing, complete the following procedures.
2. Locate the QMAC mounted on the back of the wheelchair (Fig 3.105).

Fig 3.105



3. Disconnect the 6-pin female connector(C) leading to the Shear port of the QMAC (Fig 3.106).

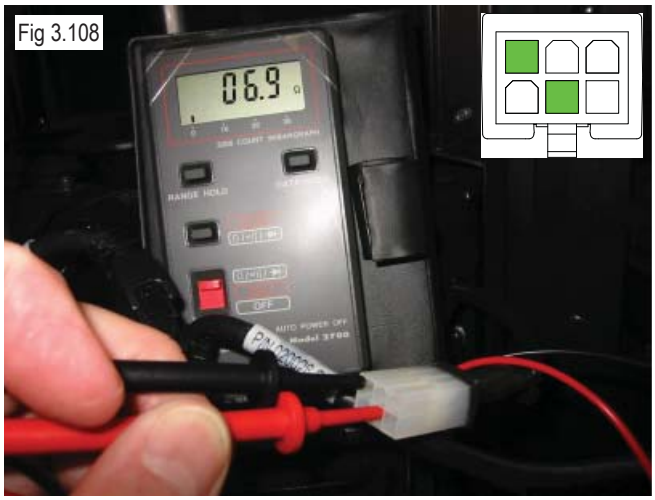
Fig 3.106

4. Check armature resistance through the pins indicated in the photo (Fig 3.107). Nominal resistance is 6 to 8 ohms when the actuator is in mid-stroke and greater than 1 MΩ when at either extremity.

Fig 3.107

5. If the resistance is open, follow the cable to another cable leading to the actuator.
6. Disconnect this connector and check armature resistance through the pins indicated in the photo (Fig 3.108). Nominal resistance is 6-8 ohms when the actuator is in mid-stroke and greater than 1 meg ohm when at either extremity.
7. Replace the 6-pin cable leading from the QMAC to the cable leading to the actuator if the resistance is correct
8. Replace the actuator if the resistance is out of tolerance and the actuator does not run. Refer to Recline Actuator Removal section in this manual.
9. On the QMAC, move the Shear actuator cable from its port to another port (i.e. Tilt). Operate the Shear system. If the system operates correctly, replace the QMAC. Refer to the Recline Actuator Removal section in this manual.

Fig 3.108



Adjustments

Adjustments of the New Recline for the seat-pan are similar to the old Perfect Fit Recline. Refer to that portion of the Rhythm and Groove Tech Service Manual for those procedures.

Adjustments for the seat-back are simpler than the old Perfect Fit Seating System. Complete the following procedures to complete these adjustments.

1. The seat-back angle is adjusted using either the HHP or Quickie iQ. No mechanical procedures are required. Refer to the HHP or Quickie iQ Operation Manual.
2. The pivot point (seat-back height) may be moved up in the seat-back bracket. The factory setting is 4" measured from the top of the seat-pan to the pivot point. This may be adjusted up in ¾" intervals (Fig 3.109).
3. Use a 7/16" socket and ratchet to remove the pivot point (A). Raise it to the desired location (Fig 3.110).
4. Reinsert and tighten the bolts securing the pivot point.
5. As the pivot point is raised, the Recline Actuator and Gas Strut must be raised an equal amount. Do this by removing the mounting bolts (B) to raise the units (Fig 3.111).
6. Note: if the pivot point is raised, it is suggested to replace the back pan with a larger pan to decrease the gap from the bottom of the back to the seat-pan.

Fig 3.109

Fig 3.110

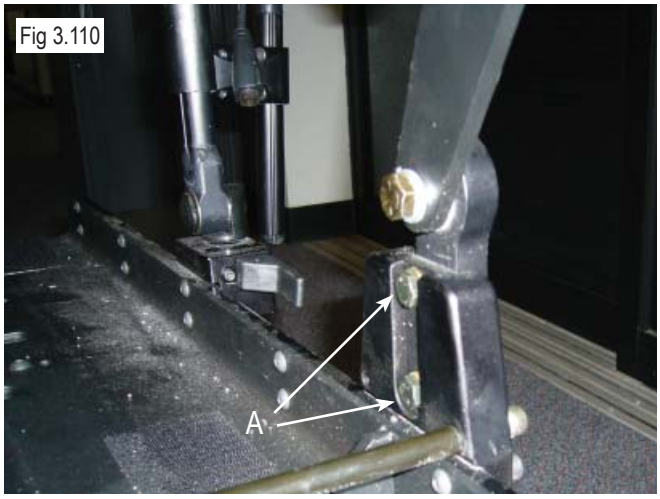
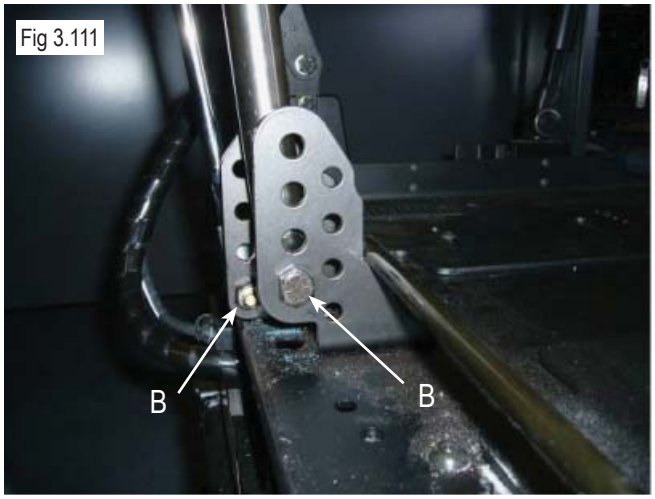
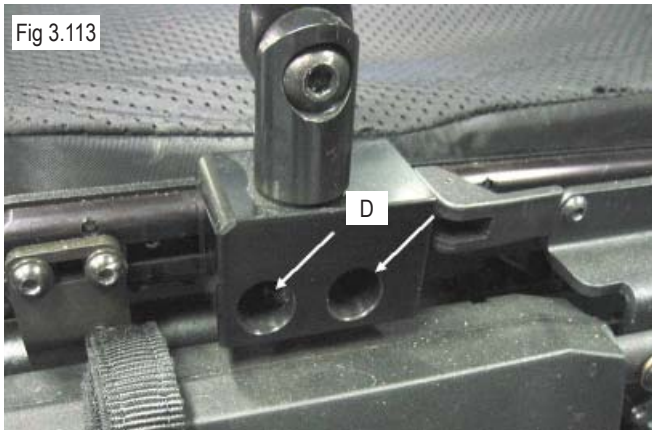


Fig 3.111

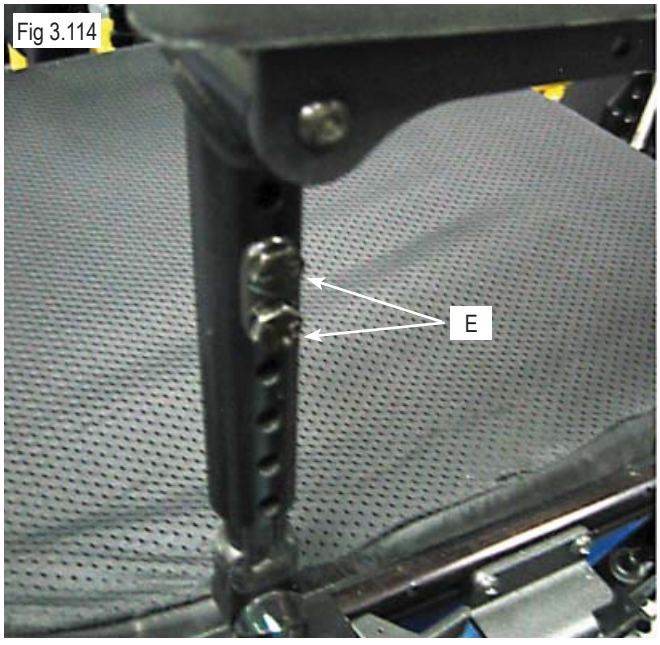


7. Seat-back depth is adjusted by moving the mounting brackets to the front or rear in the seat-pan track.
8. Loosen the two mounting bolts (C) and slide the bracket to the desired location (Fig 3.112).

9. To adjust the arm rest hanger, loosen the two mounting bolts (D) and slide the mount to the desired location (Fig 3.113).



10. To adjust the arm rest height, remove the two bolts(E), raise or lower the arm rest, and reinstall the bolts (Fig 3.114).

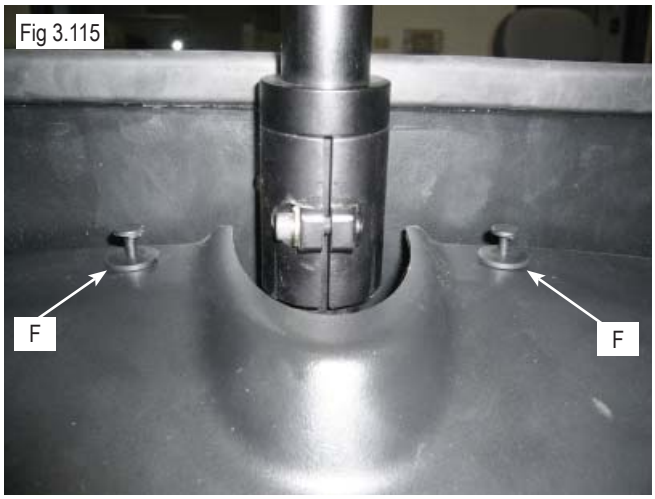


Recline Actuator Removal

In order to remove either the recline or the shear actuator, the gas strut must be removed. In addition, the QR-MAC mount must be removed. Complete the following procedures to remove and replace the recline actuator.

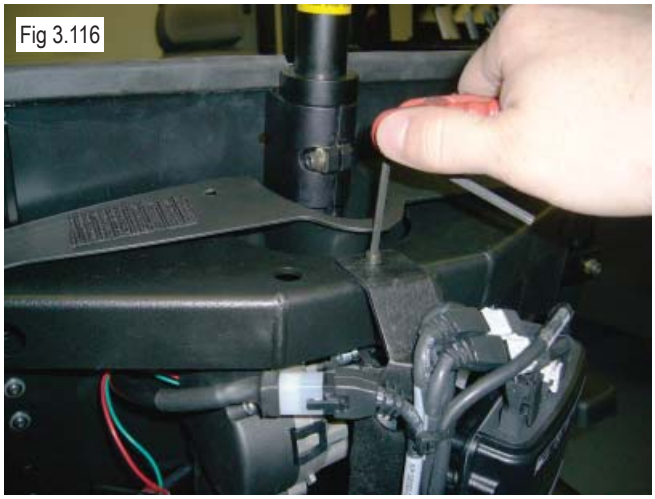
1. Remove the rear shroud by using a flat head screw driver to lift the small head of the fasteners (Fig 3.15).
2. Remove the four fasteners (F) that attach the shroud to the wheelchair, two on the top and one on each side of the shroud.

Fig 3.115



3. Use a 9/64" Hex wrench to remove the socket head cap screw that attaches the QR-MAC mount to the recline structure (Fig 3.16).

Fig 3.116



4. Use the same wrench to loosen (Do Not Remove the screws) the bottom two-socket head cap screws (Fig 3.17).

Fig 3.117

5. Once both screws are loosened, lift the QR-MAC mount up and place it to the side (Fig 3.18).

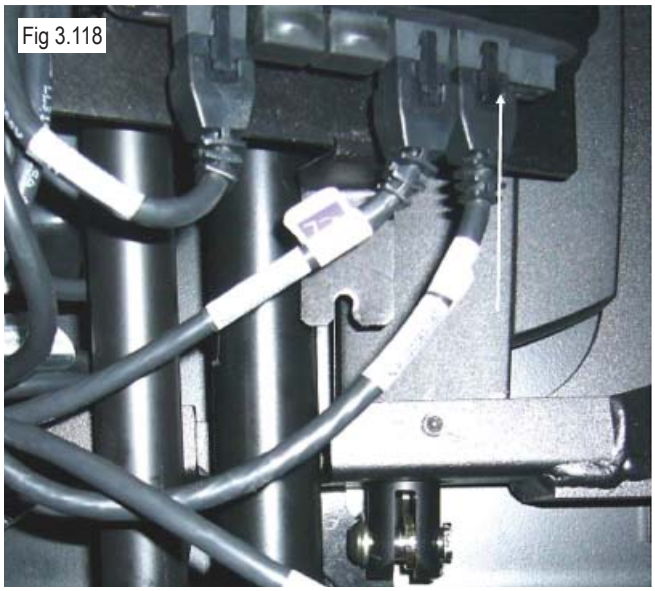


Fig 3.118

WARNING
During the next steps, you will be removing the Gas Strut. It is under pressure. Be sure to use caution when removing the Recline Actuator from the chair. Once the Recline Actuator is detached from its mount, the Gas Strut will be allowed to fully extend.

6. Use a 9/16" socket and ratchet to remove the bolts that attach the bottom of the recline actuator.
7. Note: in order to stop the center spacer from rotating, a small hex wrench must be inserted into the small hole located in the middle of the spacer. (Fig 3.20)
8. Once one bolt is removed, the same technique may be used to remove the other side of the lower recline actuator mount.
9. Note: prior to removal of Recline Actuator, observe the position of bottom bracket to ensure that it is mounted in the same position during re-assembly.

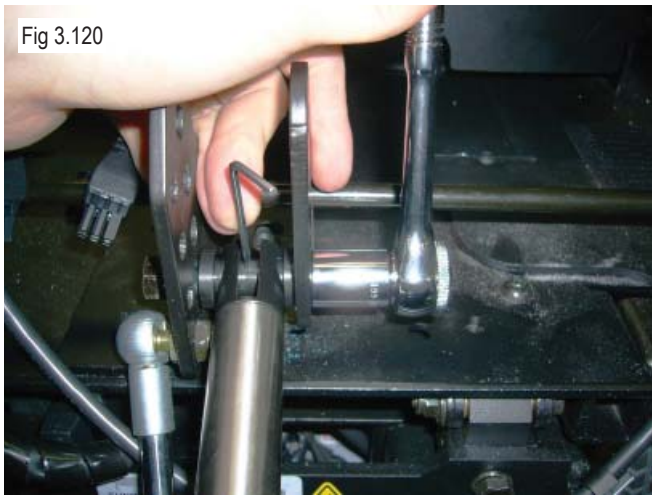


Fig 3.120

WARNING
It is suggested to have a second person pull back on the wheelchair back to help compress the gas strut while removing the bottom bolts.

10. Use a pair of needle nose pliers and a ½" box-end wrench to remove the gas strut from its upper mount after the bottom recline actuator mount is disconnected (Fig 3.21).
11. Note: you do not have to fully disconnect the gas strut. Once the top mount is disconnected; rotate the gas strut down and out of the way to work on the other components of the wheelchair.

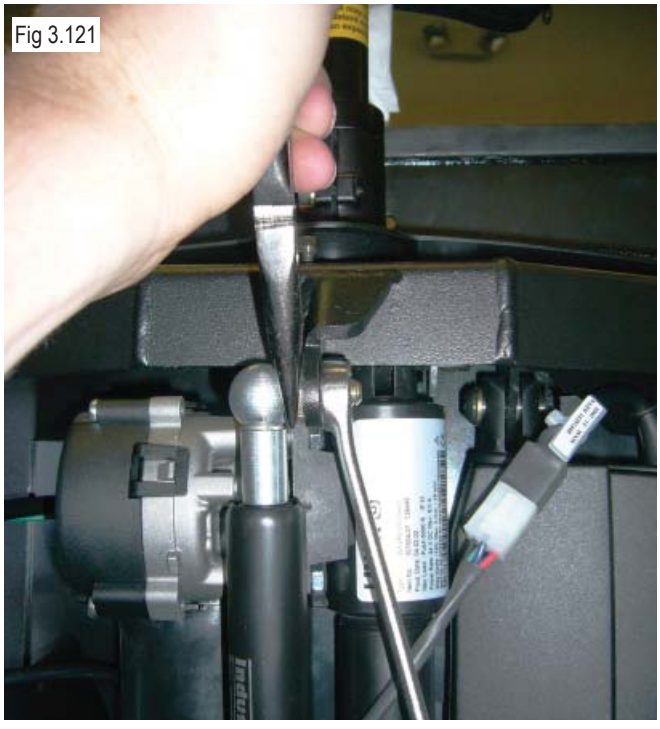
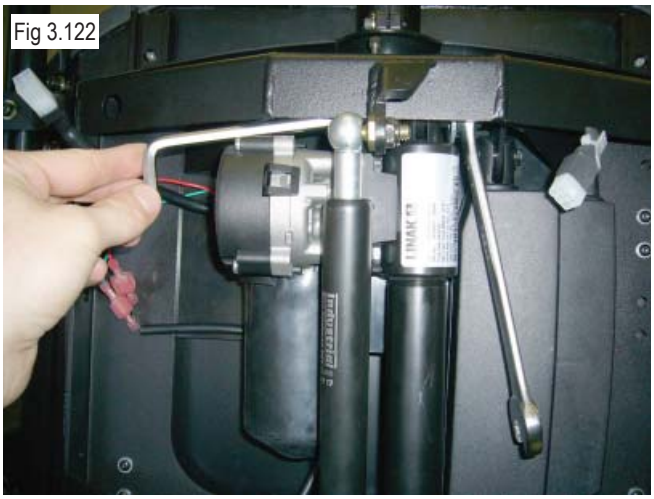


Fig 3.121

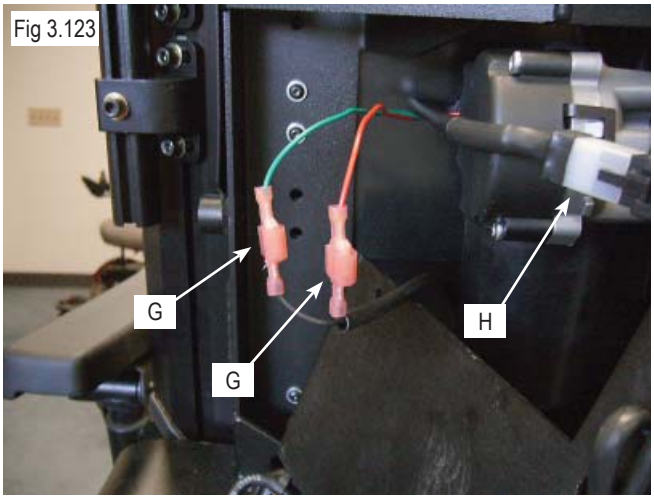
12. Use a ¼" Hex wrench and a 9/16" open-end wrench and remove the top bolt that holds the Recline actuator to the back structure (Fig 3.122).

Fig 3.122



13. Unplug the three connectors to the recline actuator (two spade connectors (G) with red and green wires, and one 6-pin connector (H)) (Fig 3.123).

Fig 3.123



14. Note: the Recline Actuator can now be replaced with a new actuator. (Fig 3.124) The part number is 120988.

Fig 3.124

WARNING

Attaching the Recline Actuator may require 2 people – one to pull on the back to compress the gas strut and one to insert the bolts into the bottom Recline Actuator mount.

15. Note: in order to reinstall the Gas Strut it must be reattached before the bottom Recline Actuator bolts. Once the gas strut is connected, pull on the back to compress the gas strut before inserting the bolts to reattach the Recline Actuator.
16. To install the Recline Actuator, reverse the previous steps.

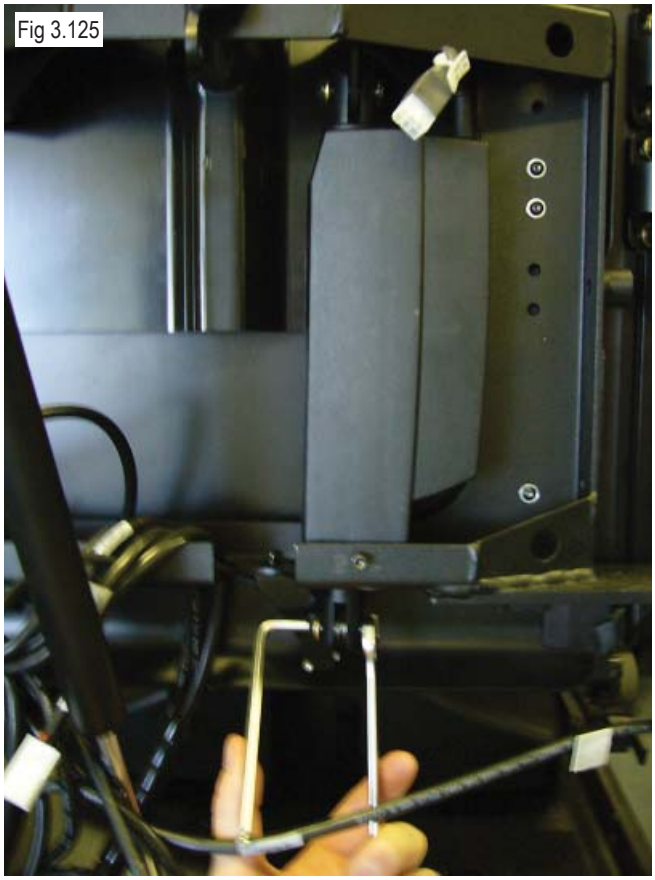
Shear Actuator Removal

Shear Actuator Removal

In order to remove the Shear Actuator, the Gas Strut and Recline Actuator must be removed. Refer to the Recline Actuator Removal section in this tech manual.

1. Once the Recline Actuator is removed, complete the following steps to remove the shear actuator.
2. Unplug the shear actuator by disconnecting the 6-pin connector (Fig 3.125).
3. Using a 7/16” open-end wrench and a 3/16” hex wrench, remove the top and bottom mounts.
4. Lift the actuator out of the back shroud by pulling the top mount out towards the back of the chair, and then remove the Shear Actuator from of the bottom mount.

Fig 3.125



5. Reverse the process to reinstall a new Shear Actuator. The part number is 012038 (Fig 3.126).

Fig 3.126

Recline CRS Replacement

In order to eliminate the re-home switch (previously found on the Smart Seat), a separate Counter Reset Switch (CRS) is installed that allows the system to "re-home" during normal operation. This switch is located on the left side of the wheelchair next to the Recline pivot point (Fig 3.127).

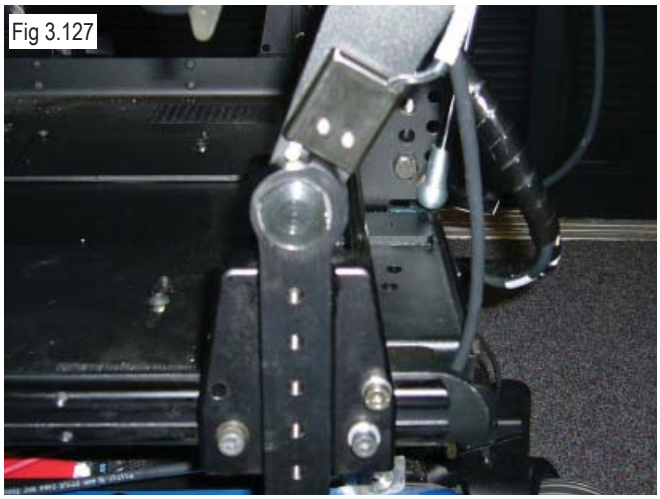


Fig 3.127

In order to remove the Recline CRS switch, the shroud must first be removed. Refer to the Recline Actuator Removal section in this tech manual.

Complete the following steps to remove and replace the Recline CRS.

1. The Recline CRS located near the pivot point is non-adjustable.
2. To remove the CRS, use a small Phillips head screw driver and remove the two screws securing the switch to the pivot point (Fig 3.128).


Fig 3.128

3. Follow the wires up the back until two spade lugs are located. Disconnect the spade lugs and remove the switch (Fig 3.129).
4. Reverse the process to install a new Recline CRS. The part number for the CRS is 103953.

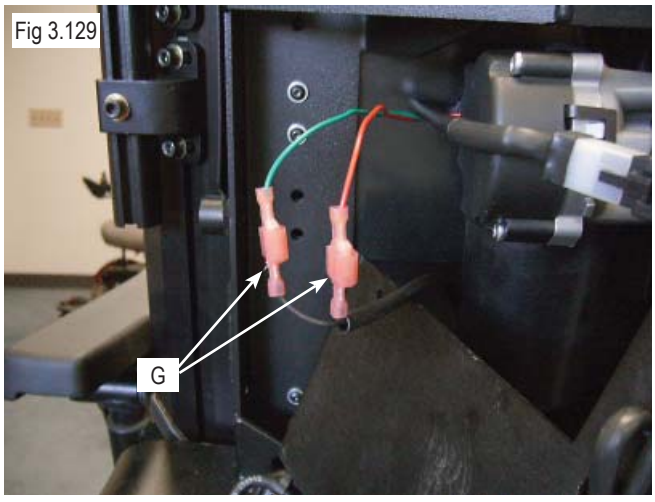


Fig 3.129

Shear CRS Replacement and Adjustment

In order to eliminate the re-home switch (previously found on the Smart Seat), a separate Counter Reset Switch (CRS) is installed that allows the system to “re-home” during normal operation. This switch is located near the bottom of the shear actuator (Fig 3.130).

Fig 3.130

Complete the following steps to remove/replace or adjust the Shear CRS.

1. The Shear CRS may be adjusted by sliding the switch bracket side to side.
2. In order for the CRS to work correctly, the roller switch must contact the button head screw on the shear actuator mount.
3. The CRS can be adjusted by loosening the two screws behind the switch bracket with a 9/64” hex wrench.
4. To remove the bracket, remove the two screws that were used for adjustment.
5. Follow the wires up to their mating connectors and disconnect them.
6. Reverse the procedure to install the new Shear CRS. The part number is 103952 (Fig 3.131).

Fig 3.131

Acronyms for Delphi

Acronym or Term	Definition
ACM	Attendant Control Module
BSOC	Battery State Of Charge
CAN	Controller Area Network
CRD	Customer Requirements Document
DC	Direct Current
ECM	Environmental Control Module
ED	Enhanced Display
GUI	Graphical User Interface
HCM	Hand Control Module
HHP	Hand Held Programmer
IR	Infra Red
LED	Light Emitting Diode
LCD	Liquid Crystal Display
MCM	Motor Control Module
MHCM	Mini Hand Control Module
PWM	Pulse Width Modulated
SAE	Society of Automotive Engineers
SCIM	Specialty Control Input Module

2009 Quickie Rhythm Service Manual Supplement

SUNRISE MEDICAL
MOBILITY PRODUCTS DIVISION

Rhythm

PG DRIVES TECHNOLOGY®

xxxxxx Rev A

Quickie Rhythm Service Manual Contents

VR2 Controller Buttons

Battery Gauge
A series of ten LED's, which indicate charge level.

On/Off Key- Press to power on or off the power chair or Controller.

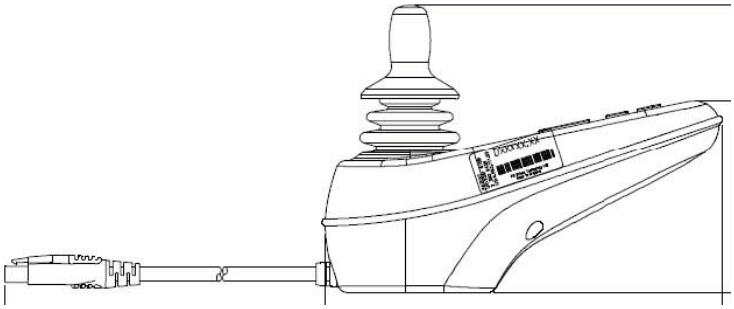
Horn Key- Activates a warning horn.

Speed/Profile indicator- A series of five LED's, which display speed and profile settings

Speed/ Profile Decrease. Used to decrease the Speed/ Profile setting.

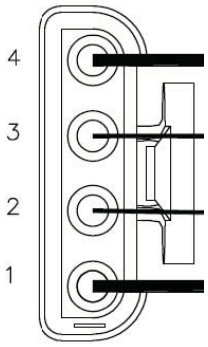
Speed/ Profile Increase. Used to Increase the Speed/ Profile setting.

VR2 Plugs/Connectors



4pin

charger port

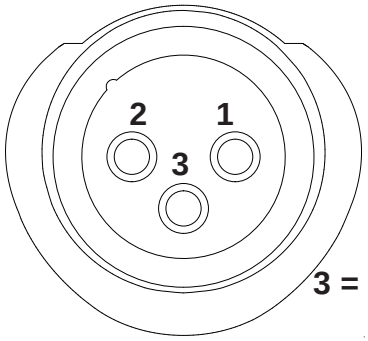


4 = Red (+)

3 = Yellow

2 = White

1 = Black (-)



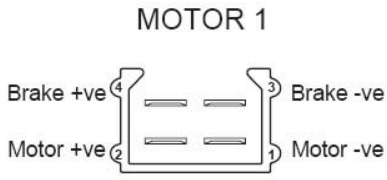
1 = 24 Vdc

2 = 0 Vdc

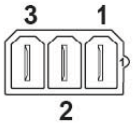
3 = Inhibit 1/ Programmer

Charger port
Outside View

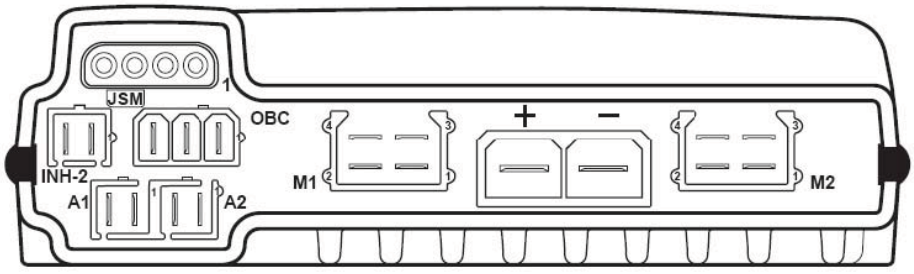
Motor Plug Port



On-Board Charger (not used)

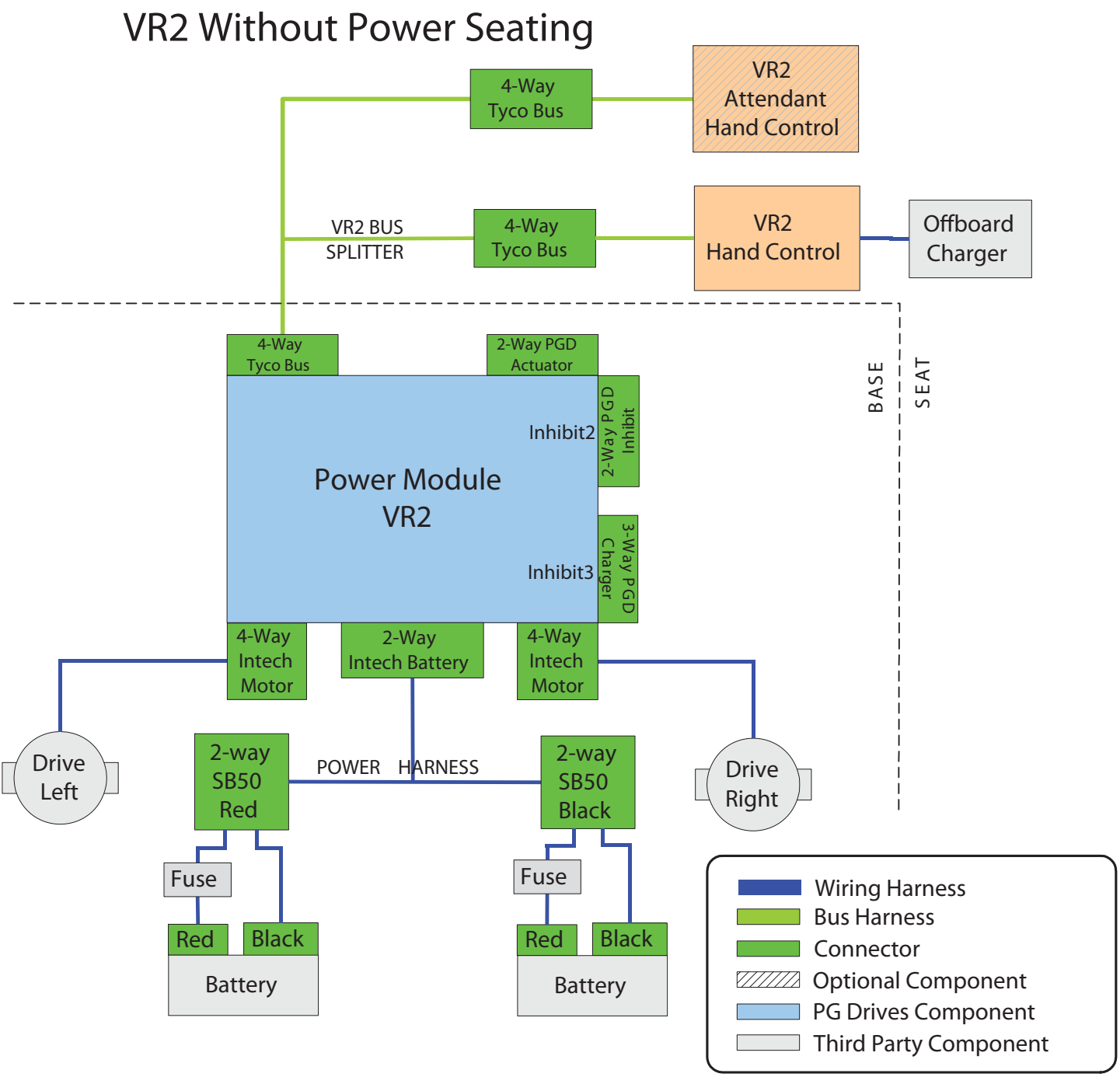


VR2 Controller

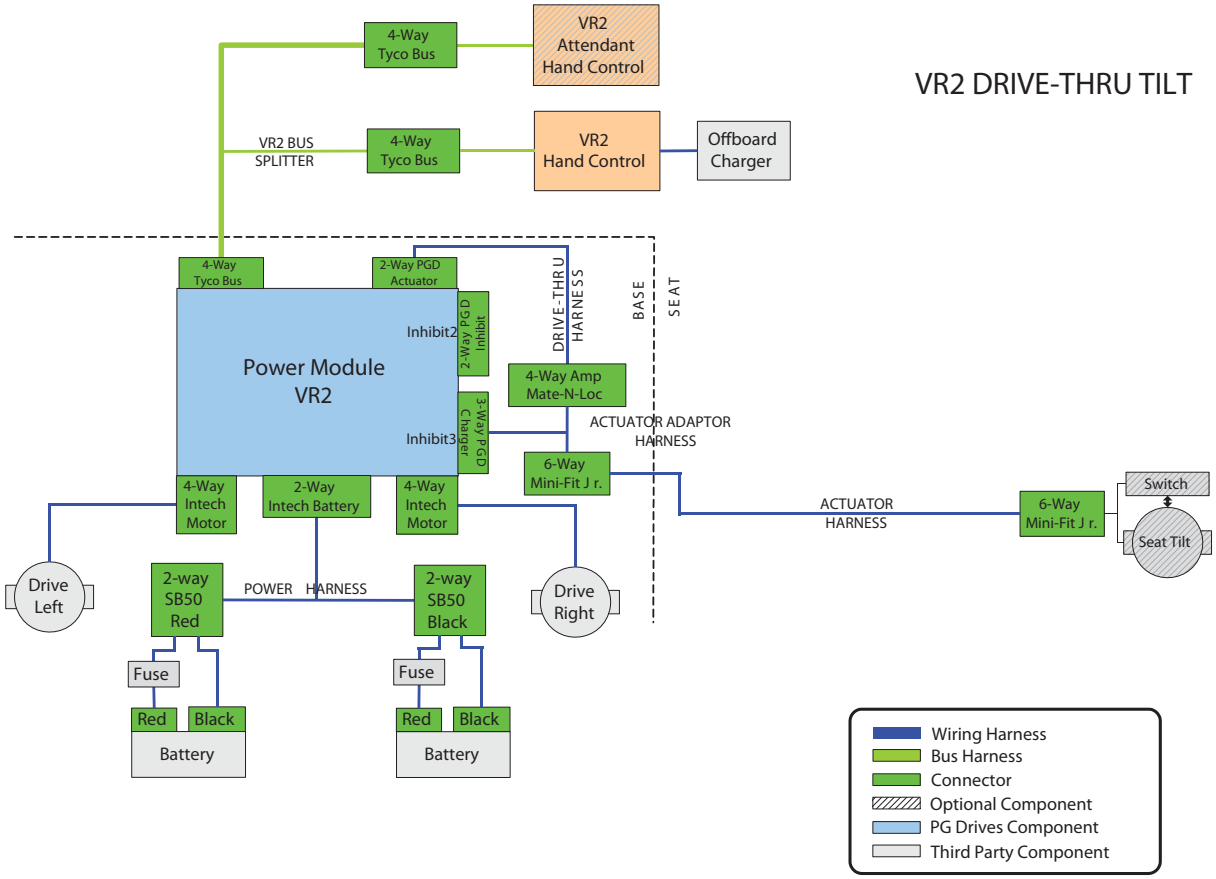


M1 = RIGHT SIDE MOTOR
M2 = LEFT SIDE MOTOR
JSM = JOYSTICK MODULE
INH-2 = INHIBIT 2
A1 = ACTUATOR 1
A2 =ACTUATOR 2
OBC = ON BOARD CHARGER (not used)
+ - =BATTERY

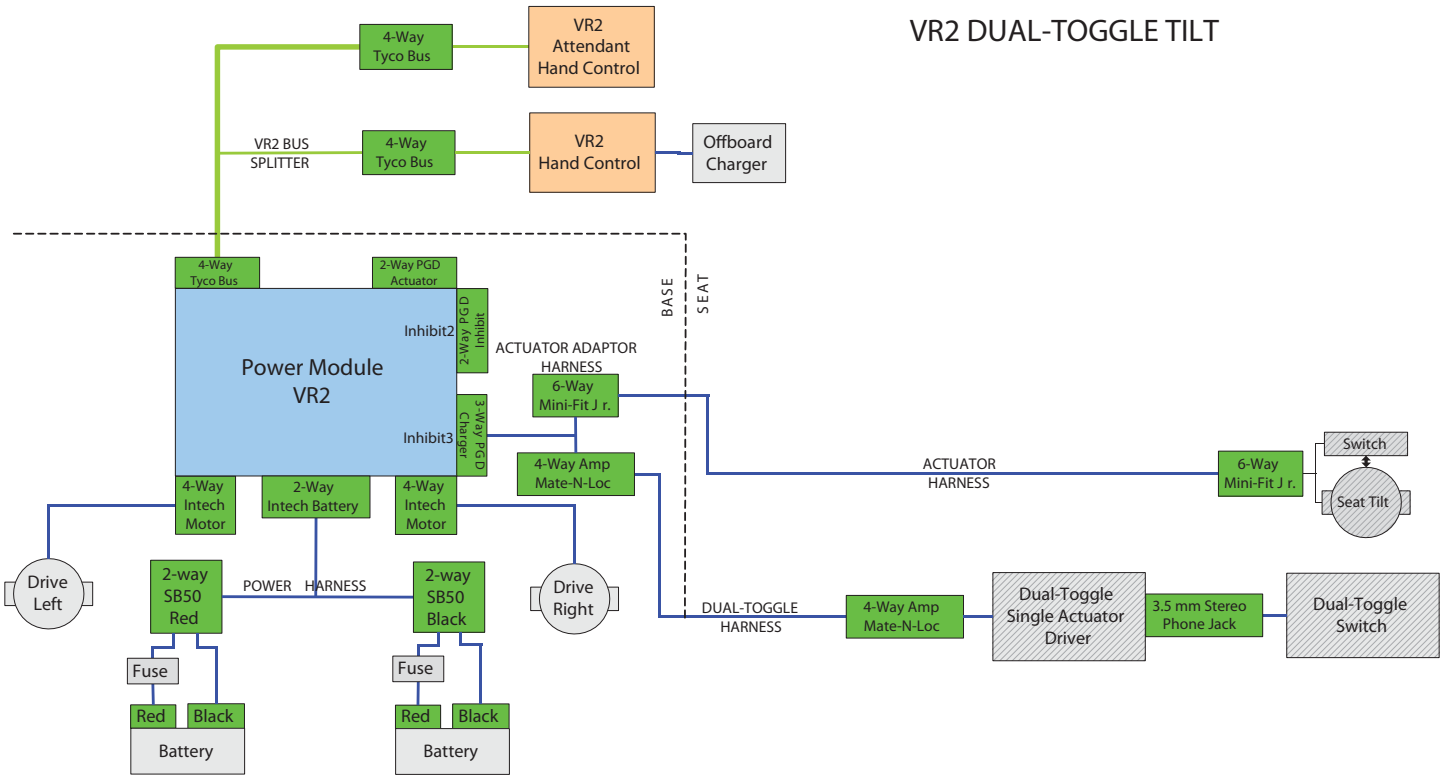
VR2 -Main Wiring Diagrams



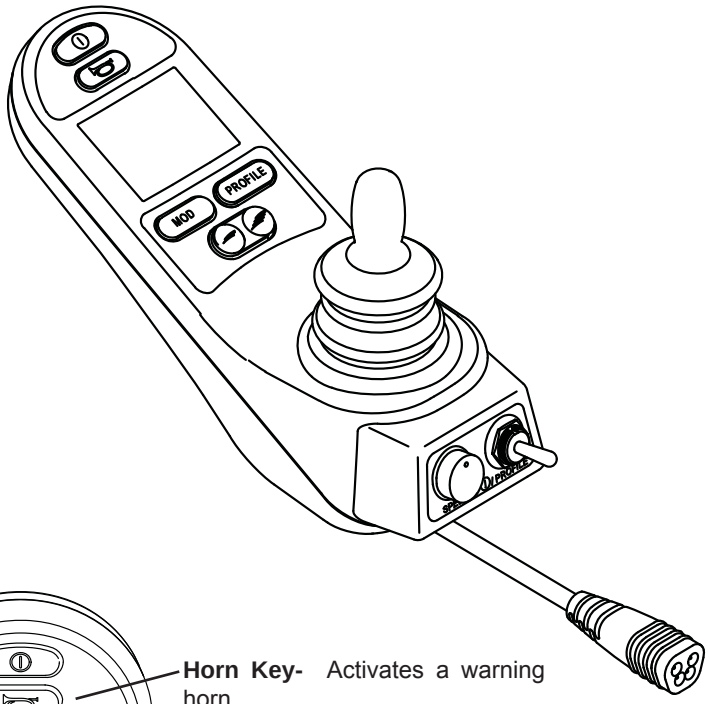
VR2 DRIVE-THRU TILT



VR2 DUAL-TOGGLE TILT



R-NET Remote Controller



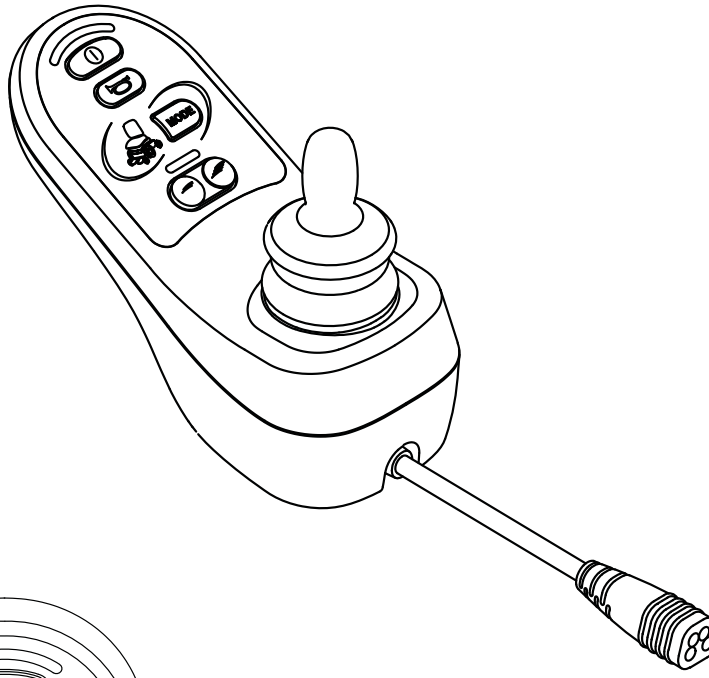
On/Off Key- Press to power on or off the power chair or Controller.

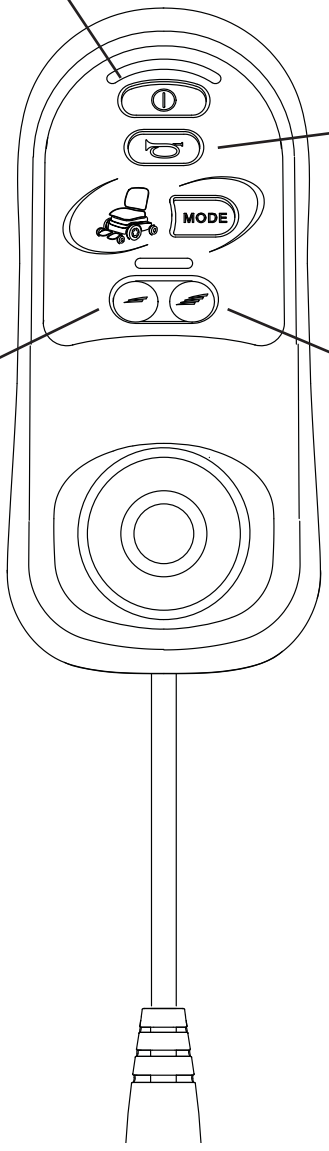
Horn Key- Activates a warning horn.

Speed/ Profile Decrease. Used to decrease the Speed/ Profile setting.

Speed/ Profile Increase. Used to Increase the Speed/ Profile setting.

R-NET Remote Controller





On/Off Key- Press to power on or off the power chair or Controller.

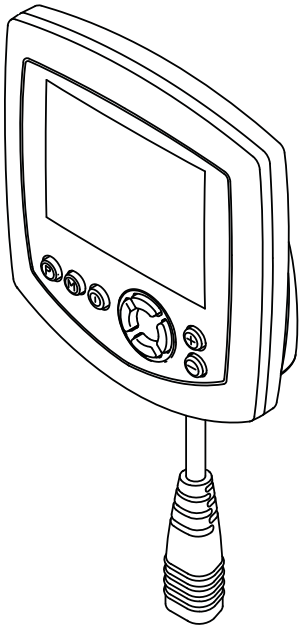
Horn Key- Activates a warning horn.

Speed/ Profile Decrease. Used to decrease the Speed/ Profile setting.

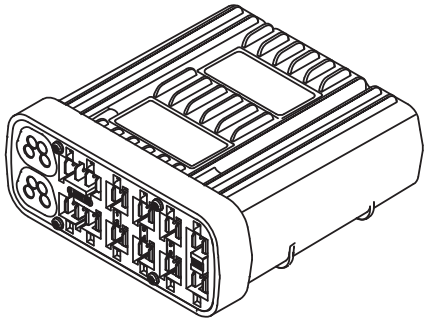
Speed/ Profile Increase. Used to Increase the Speed/ Profile setting.

R-NET Optional Electronics

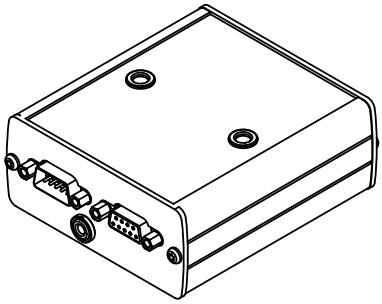
R-net Omni



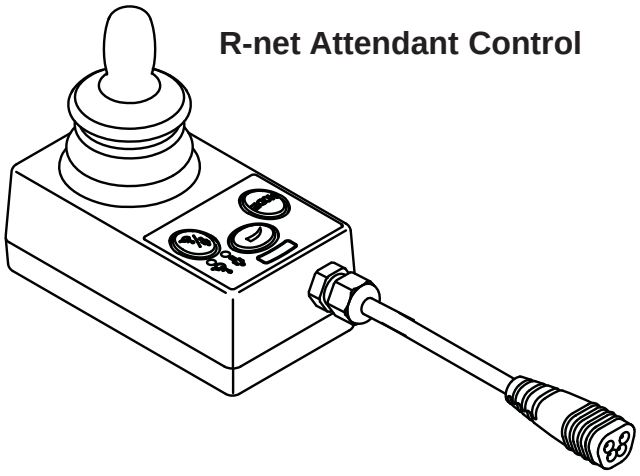
R-net ISM (Intelligent Seating Module)



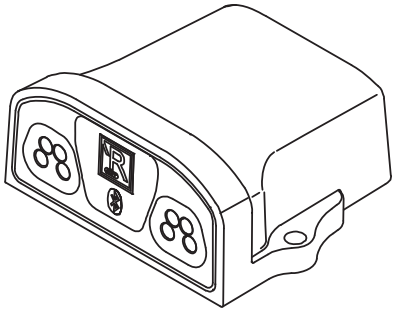
R-net Output Module



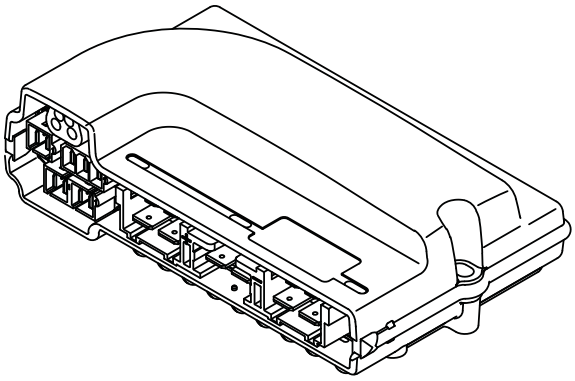
R-net Attendant Control



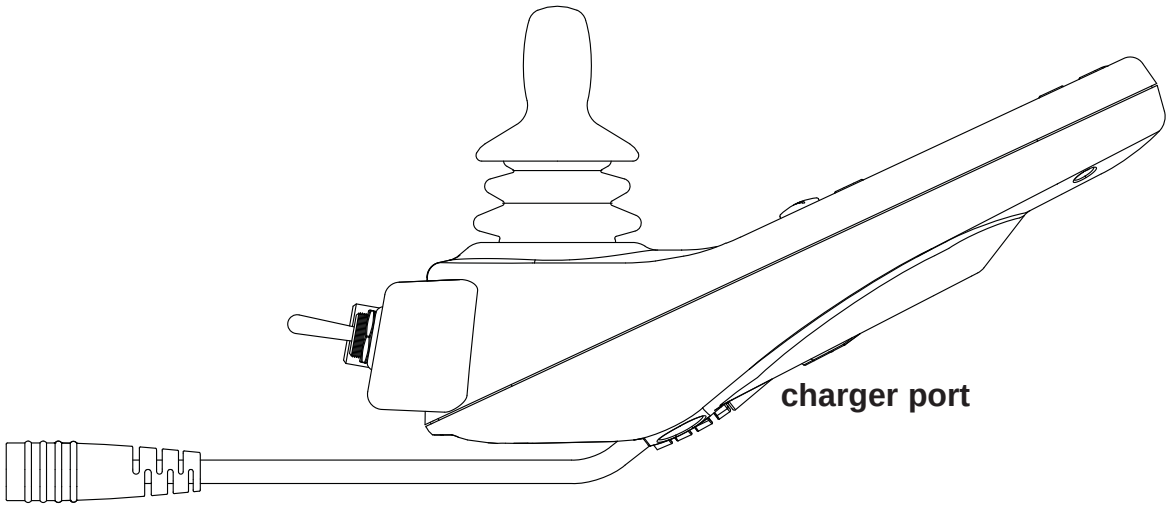
R-net Blue Tooth Module

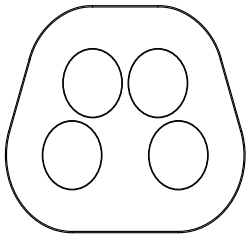


R-net Power Module



R-NET Plugs/Connectors



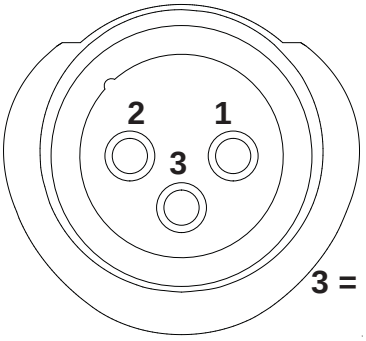


4 = Red (+)

3 = Yellow

2 = White

1 = Black (-)



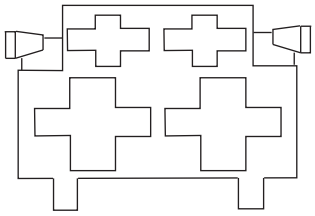
1 = 24 Vdc

2 = 0 Vdc

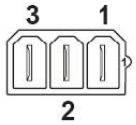
3 = Inhibit 1/ Programmer

Charger port
Outside View

Motor Plug Port

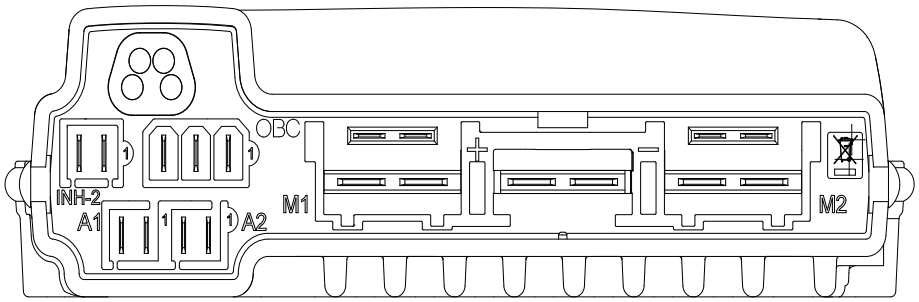


On-Board Charger (not used)



1 = 24 Vdc
2 = 0 Vdc
3 = INHIBIT 1/ PROGRAMMER

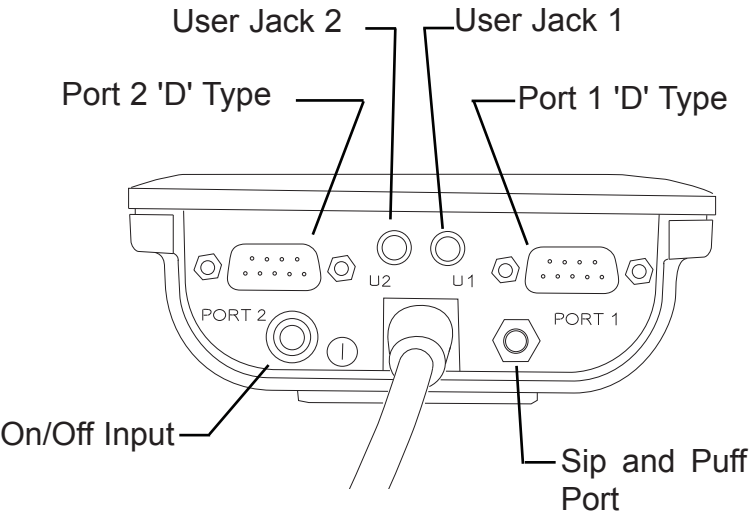
R-net Controller



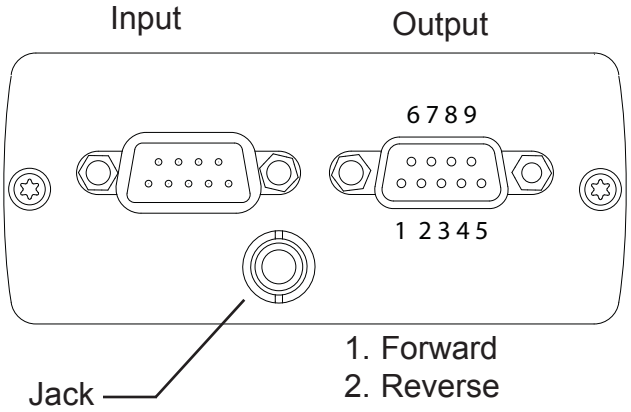
M1 = RIGHT SIDE MOTOR
M2 = LEFT SIDE MOTOR
JSM = JOYSTICK MODULE
INH-2 = INHIBIT 2
A1 = ACTUATOR 1
A2 =ACTUATOR 2
OBC = ON BOARD CHARGER
+ - =BATTERY

R-NET Plugs/Connectors

Omni (bottom)

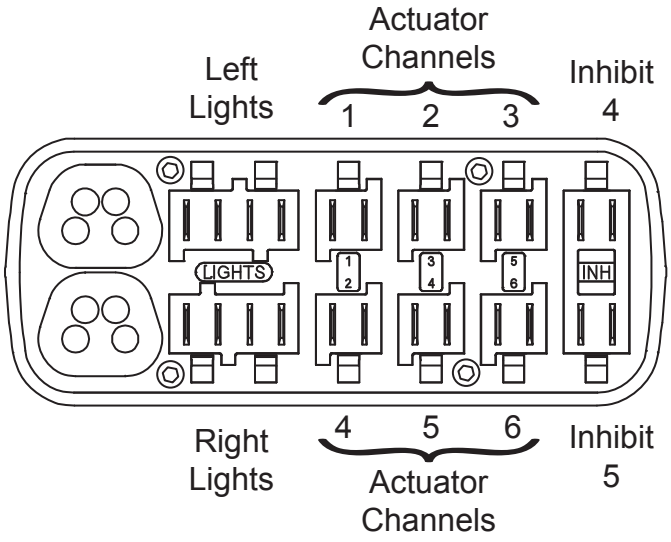


Output Module



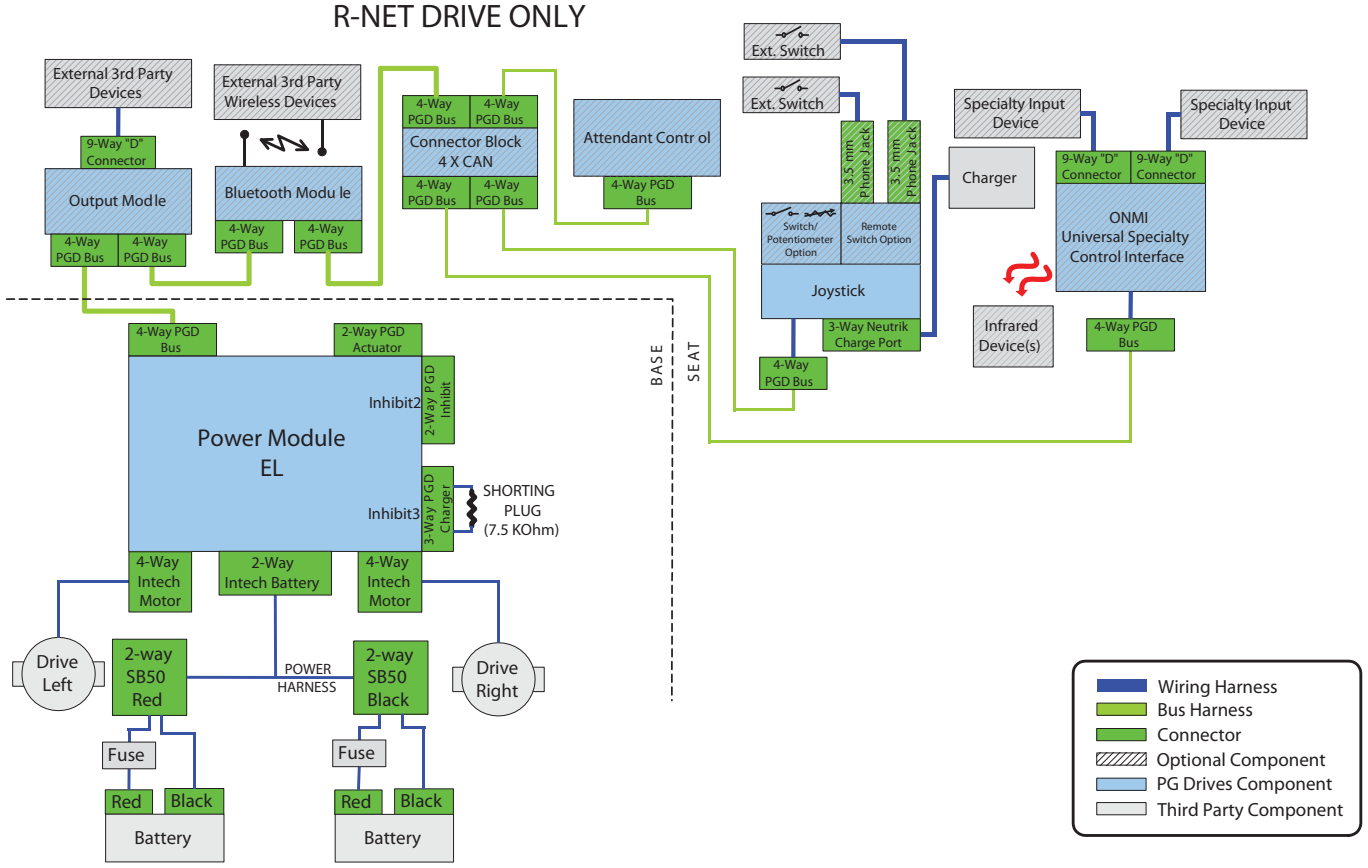
1. Forward
2. Reverse
3. Left
4. Right
5. Speed Down
6. Speed UP
7. Horn
8. Common
9. NC

ISM (Intelligent Seating Module)

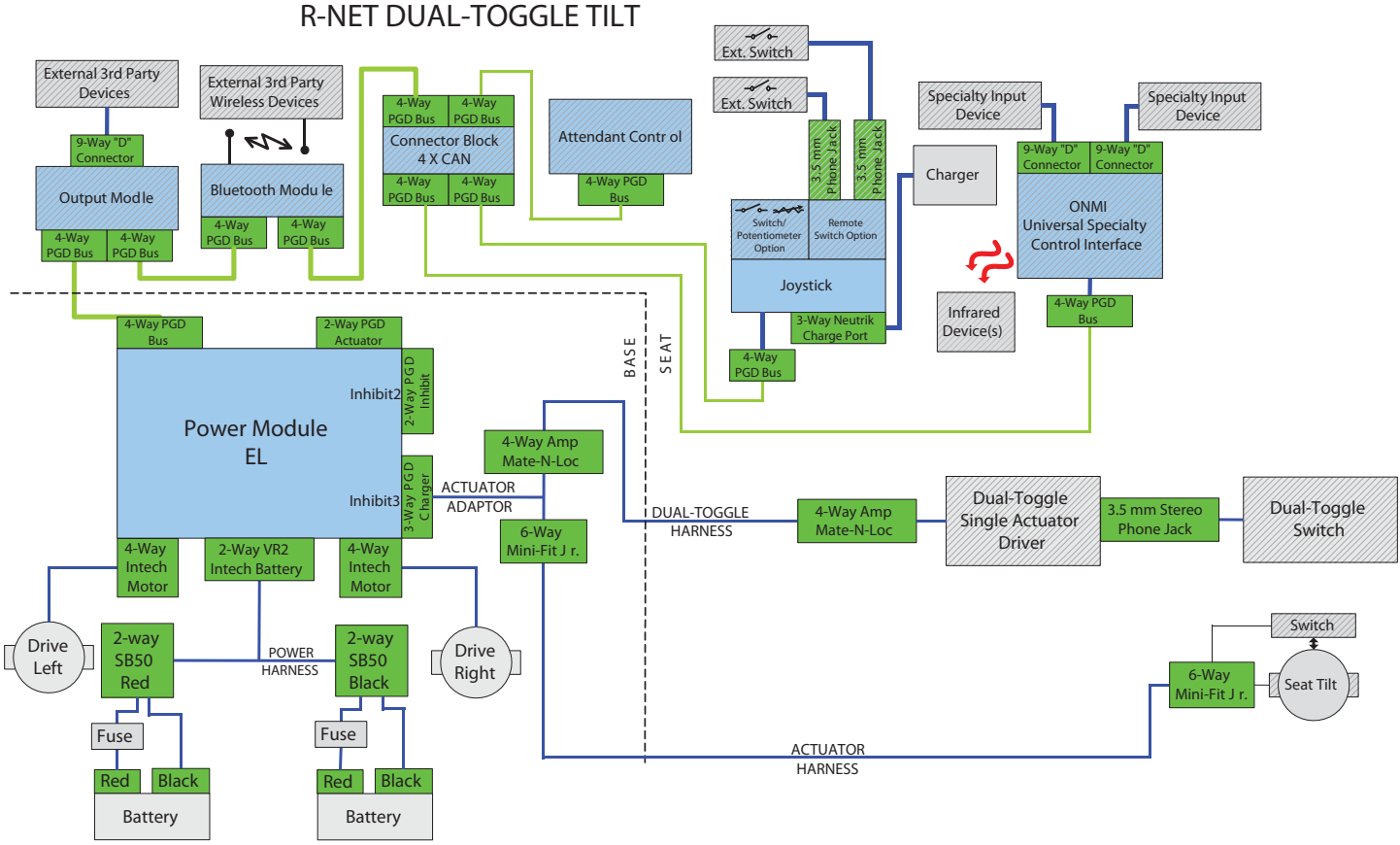


Main Wiring Diagram R-NET

R-NET DRIVE ONLY

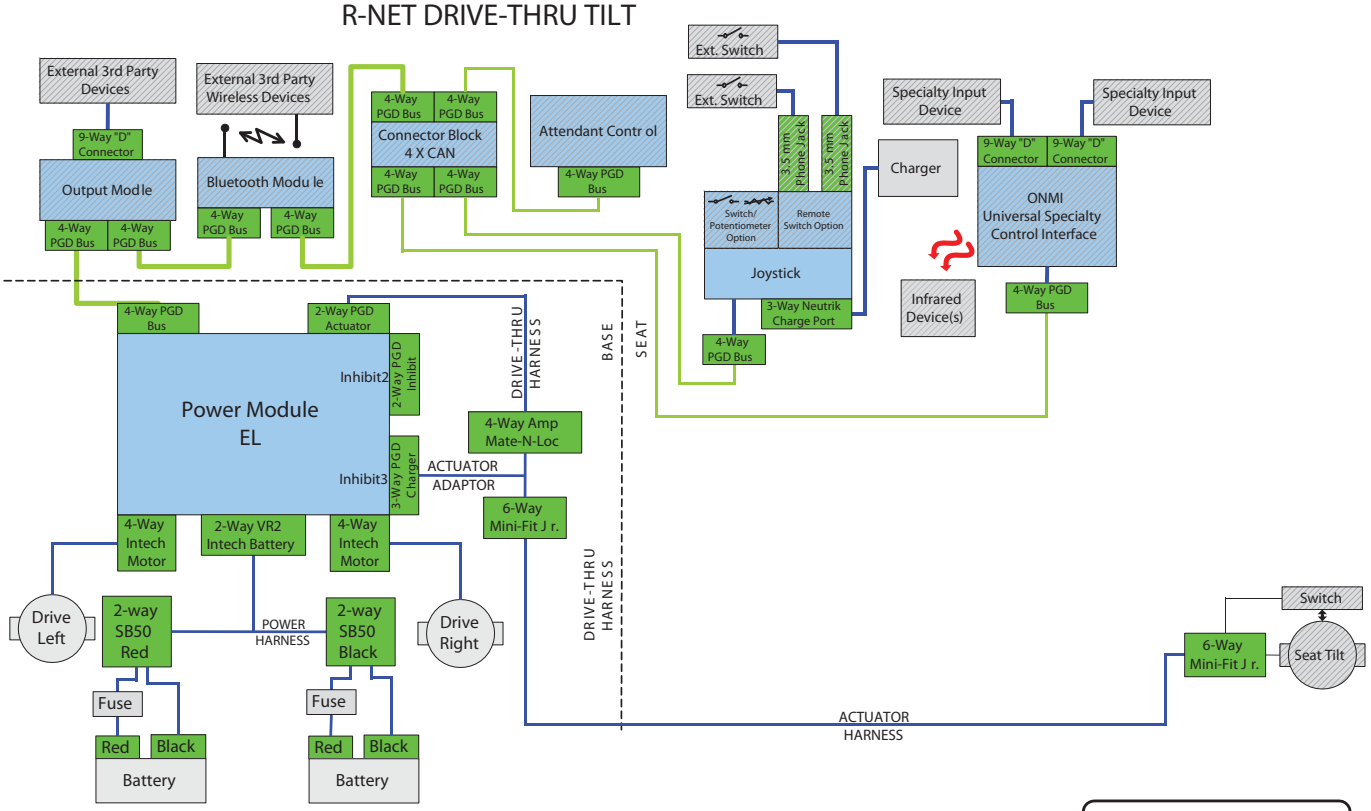


R-NET DUAL-TOGGLE TILT

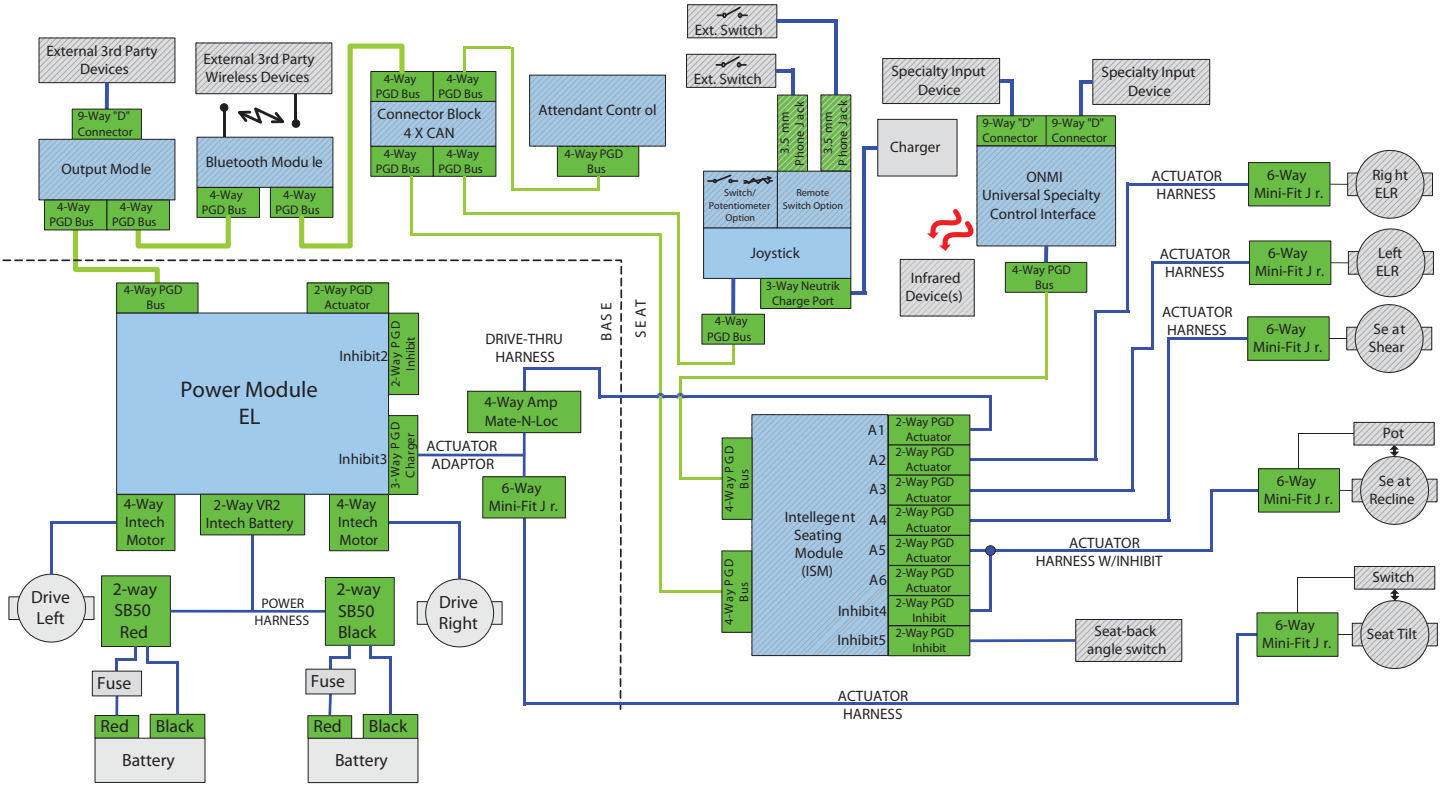


Main Wiring Diagram R-net

R-NET DRIVE-THRU TILT



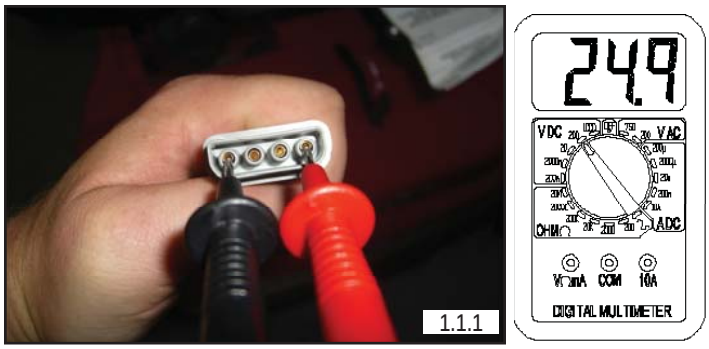
R-NET MULTI-ACTUATOR



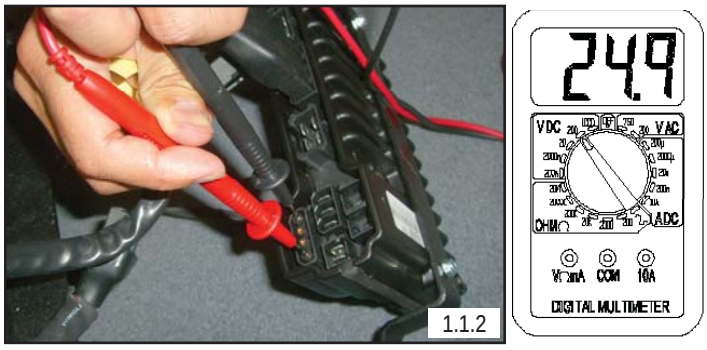
Troubleshooting: No Power (cont.)

Battery Connection Test

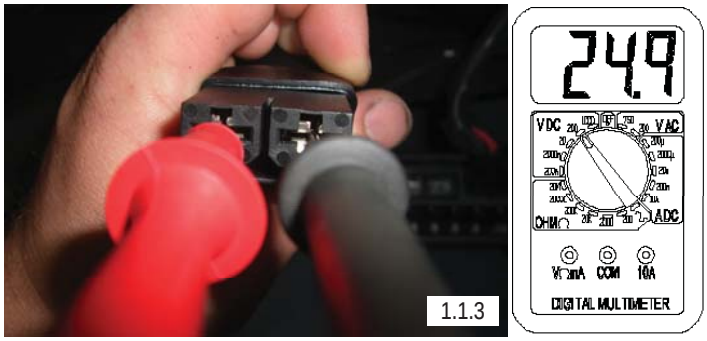
1. Check that the female VR2 Bus plug on the chair has voltage. Set the meter to DC volts and measure pins 4 (using the red lead of the meter) and 1 (using the black lead of the meter) as shown in (fig A1.1.1)
If the voltage meter reads full voltage, then replace the joystick module



2. If the voltage meter reads zero voltage measure the corresponding pins on the VR2 controller as shown in (figure 1.1.2).
If the voltage reads full voltage at the motor controller, then replace the remote cable.



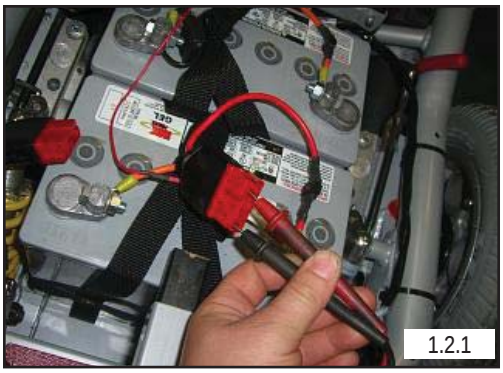
3. If the voltage meter reads zero at the motor controller, then measure the battery harness connector as shown in (figure 1.1.3). If the voltage meter reads full voltage at the battery harness, then replace the Motor Controller.



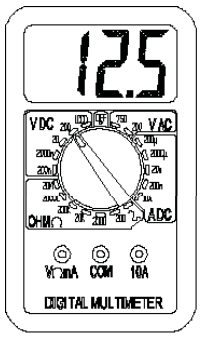
Troubleshooting: No Power (cont.)

Check Battery Wire Harness

Check that the battery wire harness has the polarity correct. Set the meter to dc volts and measure the connector with the red lead on the + terminal and the black lead on the negative terminal as shown in (figure 1.2.1). If the polarity is reversed correct battery wiring.



1.2.1



Section 2

VR2 Remote Controller Display

The Maximum Speed Indicator Ripples

Indicates that the wheelchair is locked. To unlock the wheelchair, deflect the joystick forwards until the control system chirps. Then deflect the joystick in reverse until the control system chirps. Release the joystick, there will be a long beep. The wheelchair is now unlocked.

To lock the wheelchair, while the control system is switched on, depress and hold the on/off button. After 1 second, the control system will chirp. Now release the on/off button, deflect the joystick forwards until the control system chirps, and deflect the joystick in reverse until the control system chirps. Release the joystick, there will be a long beep. The wheelchair is now locked.

The Maximum Speed Indicator Flashes

This indicates that the chair is charging . The chair will be ready to drive as soon as the charger is unplugged from the chair and power is recycled.

Battery Gauge is Steady

This indicates that all is well.

Battery Gauge Flashes Slowly

The control system is functioning correctly, but you should charge the battery as soon as possible. At 22 V, the red light starts to blink. Each bar represents a .5V value. The controller requires 18V to start and a minimum of 16V to work once started.

Battery Gauge Steps Up.

Indicates the wheelchair batteries are being charged with the offboard charger. You will not be able to drive the wheelchair until the charger is disconnected and you have reset the control system by switching off the power and then powering up again.

Battery Gauge Blinks Once Every 2.5 Seconds

The control system has "gone to sleep" because the wheelchair has not been driven for a period of time. The time period depends on the programming of the system. To re-start, reset the system by switching off the power and then powering up again.

Battery Gauge Flashes Rapidly

Make sure the Joystick is completely released (Joystick should be centered and/or nothing is pushing the gimbal out of center). The control system safety circuits have been activated and the control system has been prevented from moving the wheelchair. This indicates a system trip, i.e. the VR2 has detected a problem somewhere in the wheelchair's electrical system. Please refer to Section 3 (VR2 Controller Diagnostics).

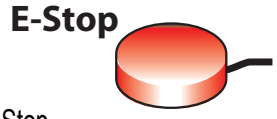
VR 2 Remote & R-Net LED Controller Display

Note: On hand controls that contain LED battery gauges, they will display the fault code by illuminating various LED's. Refer to the Corrective Action column for a list of items to check for each fault.

Table 1, Error Codes cont.

Bar Indication	Corrective Action
1 Bar 	The battery needs charging or there is a bad connection to the battery. Check the connections to the battery. If the connections are good, recharge the battery.
2 Bar 	Verify that the left motor is connected to the control module. Complete the Motor and Gearbox Inspection section of this manual.
3 Bar 	The left motor has a short circuit to a battery connection. Contact Sunrise Medical Technical Service for assistance.
4 Bar 	The right motor has a bad connection. Complete the Motor and Gearbox Inspection section of this manual.
5 Bar 	The right motor has a short circuit to a battery connection. Contact Sunrise Medical Technical Service for assistance.
6 Bar 	The wheelchair is being prevented from driving by an external signal. Verify that the battery charger is not connected. Contact Sunrise Medical Technical Service for assistance.
7 Bar 	Ensure that the joystick is centered upon power up. If it is centered, replace the hand control, and or cable.
8 Bar 	A control system fault is indicated. Make sure that all connections are secure. Contact Sunrise Medical Technical Service for assistance.
9 Bar 	The parking brakes have a bad connection. Complete the Motor and Gearbox Inspection section of this manual.
10 Bar 	Verify that the battery charger is not defective. Leave the chair on for a few minutes to drain off the excess charge. Check the condition of the battery charger.
7 Bar + S 	A communication fault is indicated. Make sure that joystick cable is securely connected and not damaged.
Actuator Flash 	An Actuator trip is indicated. If more than one actuator is fitted, check which actuator is working correctly. Check the actuator wiring.

R-Net Color Joystick & OMNI Controller Display Symbols

 Restart	When the control system requires a reboot this system will be flashing.Recycle power
 Motor Temperature	This symbol is displayed when the control system has intentionally reduced power to the motors in order to protect them against heat damage. (thermal rollback)
 Control System Temperature	This symbol is displayed when the control system has intentionally reduced its own power in order to protect itself against heat damage.
 Timer	This symbol is displayed when the control system is changing between different states. An example of this would be entering into programming mode. This symbol is animated to show the sands falling.
 E-Stop	If the control system is programmed for latch drive or actuator operation, then it is normal for an emergency stop switch to be connected into the external profile switch jack (user switch). If the emergency stop switch is operated or disconnected, this symbol will flash.
 Environmental	This icon will appear when the environmental mode is entered.
 BlueTooth	This icon will appear when Bluetooth mode is entered.
 In Focus	When the control system contains more than one method of direct control, such as a secondary joystick module or a dual attendant module, then the module that has control of the wheelchair will display the Focus symbol.
 Speed Limit	If the speed is being limited, for example by a raised seat, then this symbol will be displayed.
 Latched	When the control system is operated in a latched condition this symbol will be displayed.
 Sleep	This symbol is displayed when the R-net has gone into sleep mode.
 Control System Locked	The control system can be locked in one of two ways. 1. using a physical key 2. using a key sequence How the control system is locked depends on how the chair is programmed.

Section 3

VR2 Controller Diagnostic Codes

One Bar - Low Battery Voltage)

This code could indicate discharged batteries, failed batteries, or poor battery connections. Begin by recharging the batteries and then refer to Section 1 to check batteries and connections.

Two Bars - Left Motor Disconnected

Check that the batteries are fully charged and in good condition; and check all cables and connections. Check the connections to the left motor, look for a loose or damaged connector.

Use the meter to check the resistance across the two bottom contacts (thicker wires) on the 4-pin motor connector as shown in (figure 3.1.1). If the meter reads between 0 to 1.5 ohms, then replace the controller. If none of the above corrects the problem, replace the left motor.

A3.1.1

Otherwise, check the brushes on the left motor (Figure A3.1.2). Ensure that they are not excessively worn. Replace as required.


A3.1.2

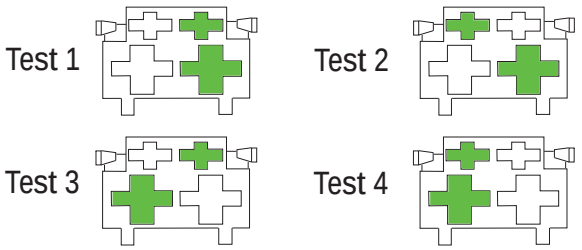
VR2 Controller Diagnostics Codes (cont.)

Three Bars - Left Motor Wiring Trip)

Check that the batteries are fully charged and in good condition; and check all cables and connections. Check the connections to the left motor, look for a loose or damaged
connector.

Measure the resistance from the bottom contact of the red thick wire on the 4-pin left motor connector to each of the top contacts of the connector (figure 3.2.1). Measure the resistance from the bottom contact of the black thick wire on the 4-pin left motor connector to each of the top contacts of the connector see (below right). If all of the readings are open, then replace the controller. If any of the readings are short, then replace the left motor.

A3.2.1

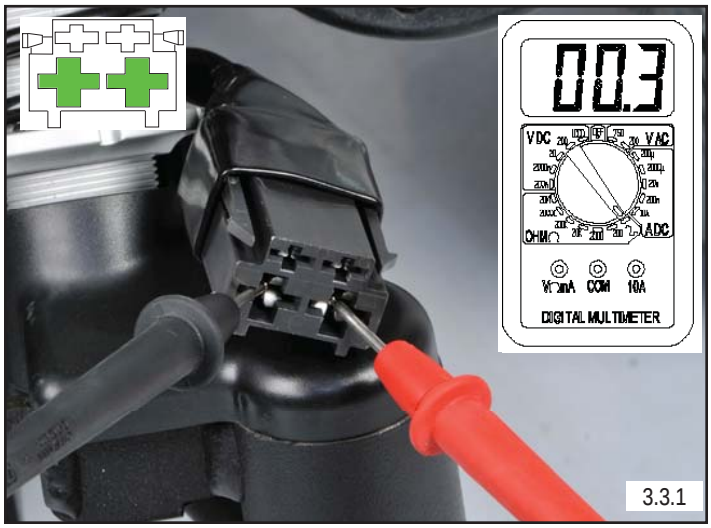


VR2 Controller Diagnostics Codes (cont.)

Four Bars- Right Motor Disconnected

Check that the batteries are fully charged and in good condition; and check all cables and connections. Check the connections to the right motor, look for a loose or damaged connector.

Use the meter to check the resistance across the two bottom contacts of the thicker wires on the 4-pin motor connector as shown in (figure 3.3.1). If the meter reads between 0 to 1.5 ohms, then replace the controller. If none of the above corrects the problem, replace the right motor.



3.3.1

Otherwise, check the brushes on the right motor (Figure 3.3.2). Ensure that they are not excessively worn. Replace as required.

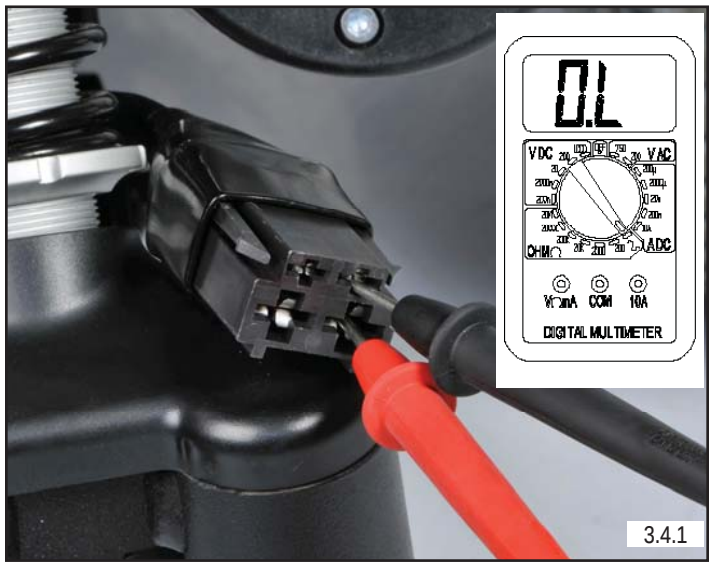

3.3.2

VR2 Controller Diagnostics Codes (cont.)

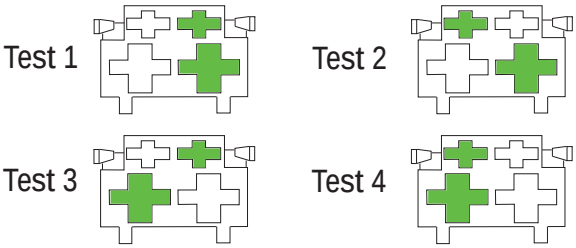
Five Bars - Right Motor Wiring Trip

Check that the batteries are fully charged and in good condition; and check all cables and connections. Check the connections to the right motor, look for a loose or damaged connector.

If the reading is short (resistance is less than 10 K ohms) on any of the readings, proceed to check the 4-pin motor connector. Measure the resistance from the bottom contact of the red thick wire on the 4-pin right motor connector to each of the top contacts of the connectors see (figure 3.4.1). Measure the resistance from the bottom contact of the black thick wire on the 4-pin right motor connector to each the top contacts of the connector (below right). If all of the readings are open, then replace the controller. If any of the readings are short, then replace the right motor.



3.4.1



Six Bars - Charger Connected

The Onboard Batteries are being charged with the off-board charger. You will not be able to drive the wheelchair until the charger is disconnected. You will have to reset the control system by switching off the power and the Powering up again. The On-Board charger has no indication that the chair is charging, and the chair will not move until complete.

If the condition still exists after the charger has been disconnected and the chair has been switched off and powered up again, the Joystick module may be defective.

Seven Bars - Possible Joystick Trip

A joystick trip is indicated. Make sure that the joystick is in the center position before switching on the control system.

Check that the batteries are fully charged and in good condition, examine the joystick for damage. This fault can be caused by a joystick that fails to center itself due to being dirty, bent or broken. If this is the case, replace the joystick module.

Note: If replacing the joystick does not resolve the issue, replace the cable connecting the joystick to the controller.

Seven Bars + Speed Profile Indicator Communication Error

Inspect wiring between joystick module and controller. Replace the jumper or joystick module with damaged wiring. If the problem persists replace the controller.

VR2 Controller Diagnostics Codes (cont.)

Eight Bars - Possible Control System Trip

Controller Fault - A control system trip is indicated. Make sure that all connections are secure. Check that the batteries are fully charged and in good condition, and check all joystick connections and cables. If this does not correct the problem, disconnect the power to the controller for 2 minutes, replug in to reboot the module. If the condition still exits, then replace the controller.

Nine Bars - Solenoid Brake Trip

The parking brakes have a bad connection. Check the parking break and motor connections. Make sure the control system connections are secure. Measure the two small contacts on the four-pin motor connector (fig 3.5.1). If both motor connectors read approximately 60 ohms, then replace the controller. Otherwise replace the motor that does not read approximately 60 ohms.

3.5.1

Ten Bars - High Battery Voltage

An excessive voltage has been applied to the control system. This is usually caused by a poor battery connection. Check the battery connections.

Battery Fault

Check that the batteries are fully charged, the correct voltage and in good condition. Take a voltage reading from pin 1 and pin 2 of the charger port of the VR2 controller, see (figure 3.5.2) If the meter reads more than 30 volts, then check the charger. Otherwise, replace your controller.

3.5.2

Section 4

R-net Troubleshooting Procedures

Chair Will Not Power Up

1. Check for battery voltage at the hand control using a Multimeter. Connect the Multimeter between the two outside pins (fig 4.1.1), pin 1 is positive (+), pin 2 is negative (-). Note: Positive is on the right.

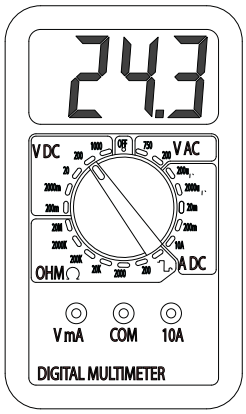


fig. 4.1.1

2. If battery voltage is present, replace the following components in this order:

a. Cables

b. Hand control

c. Control module. Refer to Control Module Replacement section of this manual.

d. Retest as necessary.

3. Verify that the bus cables are correctly mated between the hand control and the control module (fig 4.2).

Note: This connector is mated <u>incorrectly</u>. The connectors are designed to visually indicate when they are not mated correctly. If yellow is showing between the halves (A), push them closer together until only black is visible. Retest as necessary.

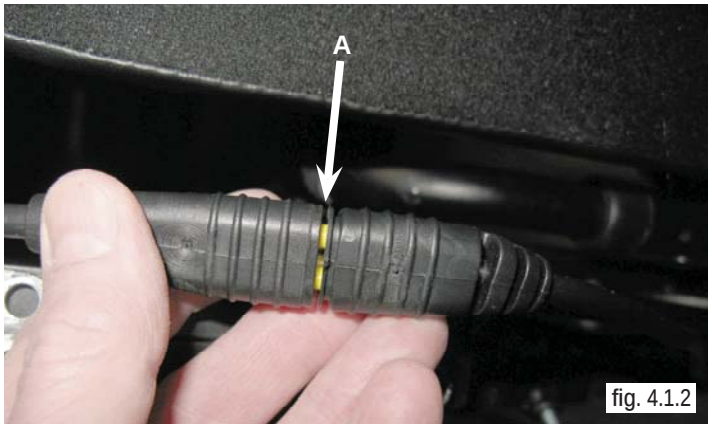


fig. 4.1.2

4. Disconnect the joystick harness (bus cable) from the controller. Use a Multimeter to test voltage at the positive (+ red) and negative (- black) ports in the controller module (fig. 4.2.1). If voltage is present, replace the following components in this order:

a. Harness

b. Joystick

If voltage is NOT present please proceed to step 5.

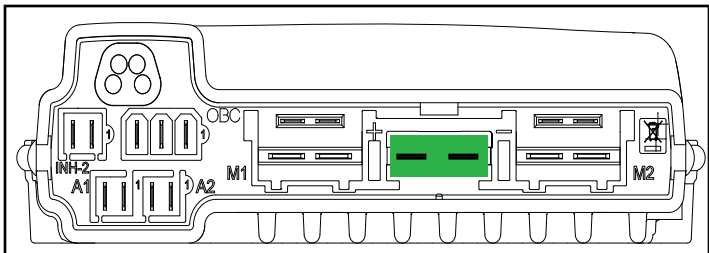


fig. 4.2.1

5. Disconnect the power connector from the control module, and use a Multimeter to check for battery voltage at the connector (fig4.2.2). If voltage is present, replace the control module. Retest as necessary.

Note: The power connector is the larger 2-pin connector between the left and right motor cable.

fig. 4.2.2

6. Manually tilt the seat back and remove the shroud from the base. Refer to Battery Removal section of this manual.

7. Disconnect the batteries (fig 4.2.3).


fig. 4.2.3

9. Verify that battery voltage is present at each connector leading to the batteries (fig. 4.3.1). (Each battery should be approximately 12 volts.)

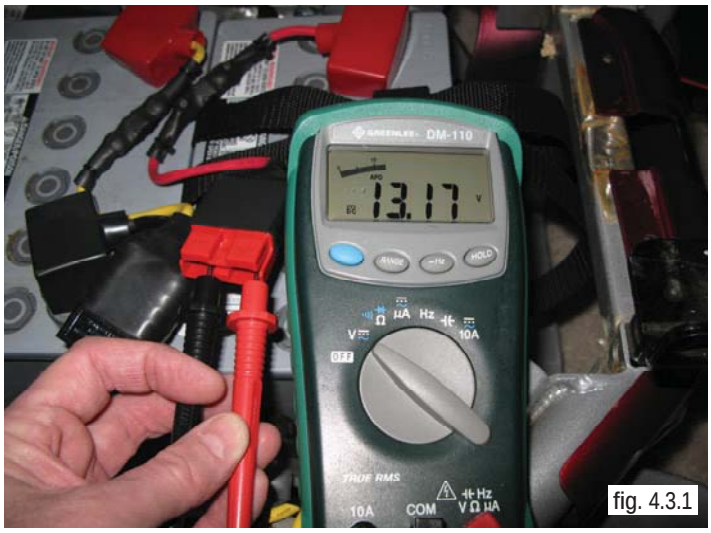


fig. 4.3.1

10. If battery voltage is not present, use a Multimeter and measure for continuity across the fusible links connected to positive (+) terminal of each battery (fig. 4.3.2). Normal resistance is less than 1 ohm. If open, replace the defective battery harness. Retest as necessary.

.

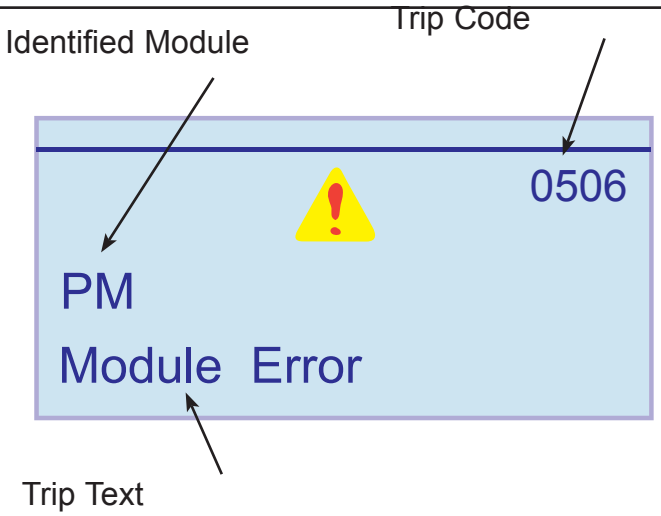
fig. 4.3.2

Section 5

R-net Fault Codes

Power Chair Displays a Fault on the Hand Control or Omni

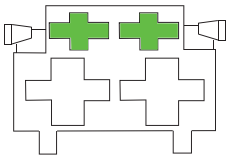
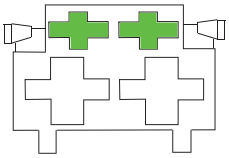
The R-Net control used on this power chair is constantly monitoring for conditions that can cause unsafe or erratic operation. When a fault is displayed, refer to the fault code table in this manual for a list of corrective actions.



The following identifies which module of the control system has registered the problem.

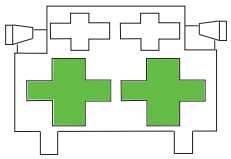
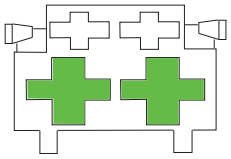
- PM-Power Module (Control Module)
- JSM-Joystick Module/Omni Module
- ISM-Intelligent Seating/lighting Module

Table 1, Error Codes

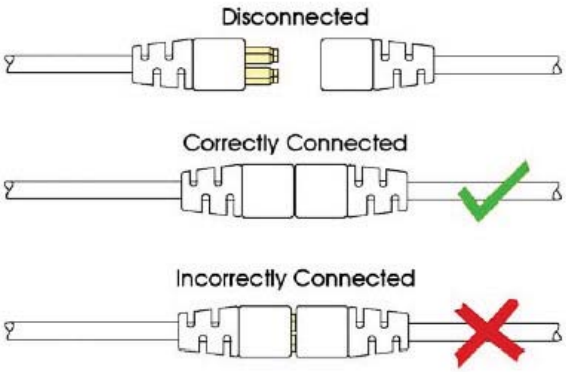
Trip Text	Corrective Action
Joystick Error	Ensure that the joystick is centered upon power up. If it is centered, replace the hand control.
Low Battery	Recharge the batteries. After charging, perform the Battery Testing section of this manual.
High Battery	Verify that the battery charger is not defective. Leave the chair on for a few minutes to drain off the excess charge. Check the condition of the battery charger.
M1 Brake Error	Verify that the left motor is connected to the module. Check brake resistance at the motor connector. Brake resistance should be approximately 16 ohms.  
M2 Brake Error	Verify that the right motor is connected to the control module. Brake resistance should be approximately 16 ohms. Brake resistance should be approximately 16 ohms.  

R-net Fault Codes cont.

Table 1, Error Codes cont.

M1 Motor Error	Verify that the left motor is connected to the control module. Check Motor resistance at the motor connector. Normal resistance will be between 0-1.5 ohms.  
M2 Motor Error	Verify that the right motor is connected to the control module. Check Motor resistance at the motor connector. Normal resistance will be between 0-1.5 ohms.  
Inhibit Active	Cycle power. Check all cable connections. If this does not correct the fault, contact Sunrise Technical Service for assistance.
Joystick Cal Error	Calibrate the joystick. If the error is still present, the hand control may be defective.
Latched Timeout	A latch function has exceeded it preset time.
Over-current	This fault occurs when the limits of an actuator circuit is exceeded. Perform Tilt Will Not Operate troubleshooting section of this manual to test the end of travel limit switches.
Overtemp. (Acts)	This error indicates that the Intelligent Seating Module (ISM) has become excessive warm. Note: An ISM is only required when there are more than 2 actuators and may not be mounted on this power chair. Allow the unit to cool. If the error repeats, the actuator may be defective or over loaded.
Overtemp. (Lamps)	Note: This fault can only occur if an Intelligent Seating Module is used on this power chair and connected to external lights.
DIME Error	This error indicated that one or more of the modules are not compatible. Remove the last module installed and retest. Recycle the power. Contact Sunrise Technical Service for assistance.
Memory Error	Recycle the power. Verify that the cables are correctly mated. If a module has been replaced recently, suspect that module may be defective. Contact Sunrise Technical Service for assistance.
PM Memory Error	Recycle the power. Verify that the cables are correctly mated. If a module has been replaced recently, suspect that module may be defective. Contact Sunrise Technical Service for assistance.

R-net Fault Codes cont.

Bad Cable	Inspect and replace the defective cable(s).
Bad Settings	Verify that the programming agrees with the installed equipment. If all settings are correct, the control module may be defective. Contact Sunrise Technical Service for assistance.
Module Error	Recycle the power. Verify that the cables are correctly mated. If a module has been replaced recently, suspect that module may be defective. Contact Sunrise Technical Service for assistance.
System Error	Recycle the power. Verify that the cables are correctly mated. If a module has been replaced recently, suspect that module may be defective. Contact Sunrise Technical Service for assistance. 
SID Detached	The Omni has detected that a specialty control has become disconnected. Recheck all cables. If the error is still present, replace the specialty control.
User Switch Detached	Indicates that a user switch has become disconnected. Reconnect the switch.
Gone to Sleep	The predetermined sleep time has been exceeded due to inactivity by the user.
Charging	This indication is present when the battery charger is connected. There may also be an error in the control module. Contact Sunrise Technical Service for assistance.

Example of R-10 Fault Isolation

1. In this example, one of the right motor being disconnected (fig.5.3.1). The hand control displays the fault and the power chair will not operate.
2. To troubleshoot this problem, refer to Table 1, Error Codes.
3. From this error we see that the problem is being recorded in the PM (Control Module).
4. The hand control tells us that motor 2 (M2) has the error and it is with the brake circuit. Motor 2 is the right motor.
5. Table 1 informs us to, "Verify that the right motor is connected to the control module. Complete the Motor and Gearbox Inspection section of this manual."
6. The next step is to complete the Motor and Gearbox Inspection section of this manual and

fig. 5.3.1

Troubleshooting Tilt

Does the chair have powered seating? If so, the slow driving may be a result of an active inhibit from the seating system. Start by identifing what seating compnents are on the chair. An inhibit can come from either the power recline or power tilt system. Bring your tilt and recline to the upright position. If the wheelchair is still in creep try to identify which component may be causing the inhibit

1. Locate the 6-pin connector (A) at the rear of the tilt (fig. 5.4.1). Make sure it has not been unplugged

2 Locate the creep microswitch (B) mounted at the rear of the actuator (fig. 5.4.1). The creep switch may be seen from the top of the seating system on the right rear of the actuator. It may be necessary to remove the seat pan to access the switch.

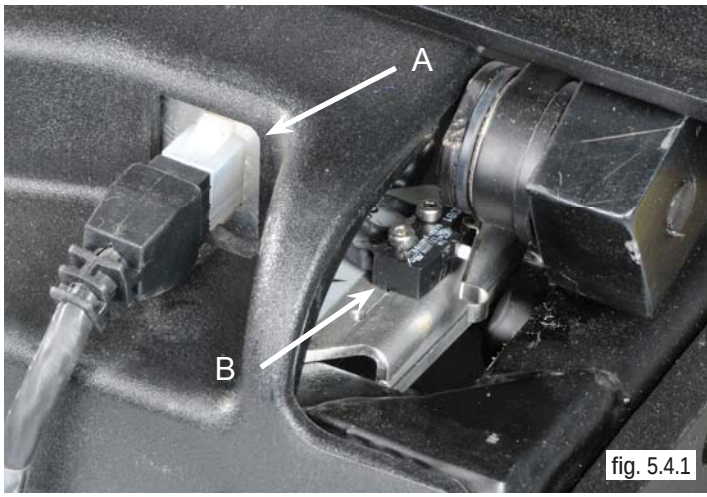


fig. 5.4.1

3 Manually operate the creep micro-switch while observing the hand control or Omni for the turtle symbol to go on and go off with the micro-switch operation.
If the symbol changes, the problem is in the programming. Contact Sunrise Medical Technical

Service for assistance.

4. Lower the tilt system.

5. Locate the 6-pin connector (A) at the rear of the tilt (fig. 5.4.1).

6. Disconnect the harness from the control module.

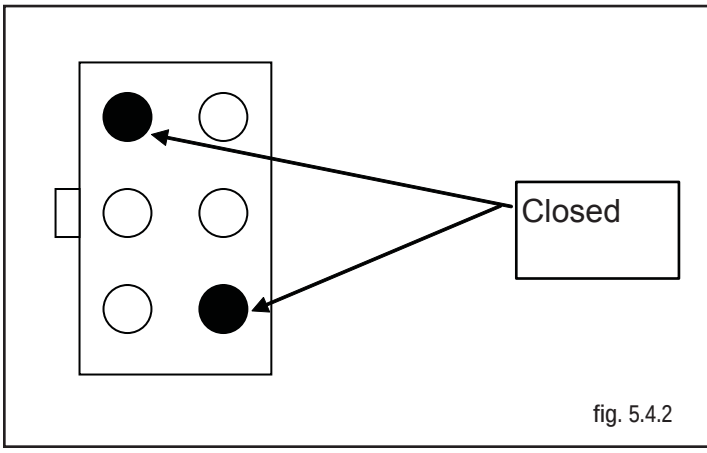


fig. 5.4.2

8. Test the micro-switch wiring by performing the following test.
a. Ensure that the seat is in the full down position.
b. Use Multimeter and measure continuity between the indicated pins below on the 6-pin connector mounted on the tilt. When down the indication should be closed (fig. 5.4.2). If it is open, replace the micro-switch assembly. Refer to Tilt Actuator and Micro-Switch Removal section of this manual.

If the test passes, replace in this order:
a. Cable leading from tilt to control module.
b. Control module

Tilt with Recline: Refer to the recline section of this manual

Troubleshooting Tilt cont.

Power Chair Will Not Drive in Creep Speed when Tilted

An external micro-switch is mounted next to the actuator in the rear of the tilt system. This micro-switch is closed when the tilt is lowered. The closing of this micro-switch allows a signal to be being sent to the control module through the 6-pin connector located on the back of the tilt. The signal informs the control module that the tilt is less than 16 degrees and that maximum speed should be used. If the tilt is more than 16 degrees, the switches opens and invokes “Creep” Speed. Creep speed is a predetermined speed programmed at time of manufacture. Creep is indicated by a “turtle” on either the color Joystick or Omni.

1. Tilt the seat all the way back and observe the hand control or Omni to see if the turtle symbol is displayed.
If the turtle (A) is displayed (fig 5.5.1), contact Sunrise Medical Technical Service for assistance.

If no turtle is displayed, continue to step 2.

2. Tilt the seating system beyond 16 degrees.

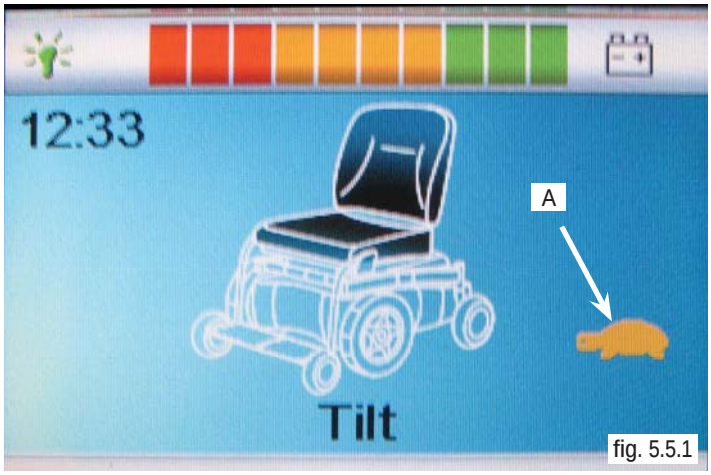


fig. 5.5.1

3. Locate the 6-pin connector on the rear of the tilt. (fig 5.5.2). Disconnect the harness from the tilt module.

4. Test the micro-switch by performing the following test:

a. Ensure that the tilt is beyond 16 degrees.

b. Use the multimeter and measure continuity between the indicated pins on the pin connector mounted on the tilt. When the seat is tilted the indication should be open (fig 5.5.3).

If it is closed, replace the micro-switch.

Refer to tilt actuator and micro-switch removal section of this manual.

Re-test as necessary.


fig. 5.5.2

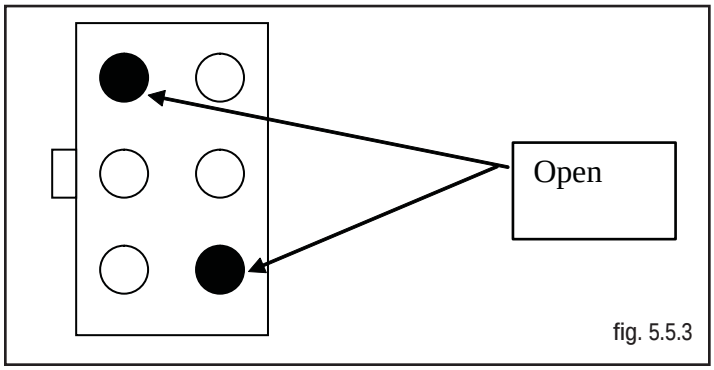


fig. 5.5.3

R-net Fault Codes cont.

Tilt Will Not Operate

The tilt actuator used in the tilt system receives power through a 6-pin connector located at the rear of the tilt. The actuator also contains micro-switches that open at the end of their stroke to prevent stressing of the tilt system. Around these micro switches are diodes that allow reverse power to flow to the actuator when reversing direction.

1. Selected the tilt mode on the Joystick or Omni. (fig. 5.6.1). Operate the joystick and listen closely to the control module for a click. This click indicates that the control module is closing the power relay inside and supplying power to the tilt actuator.
If no click is heard, replace the control module or ISM

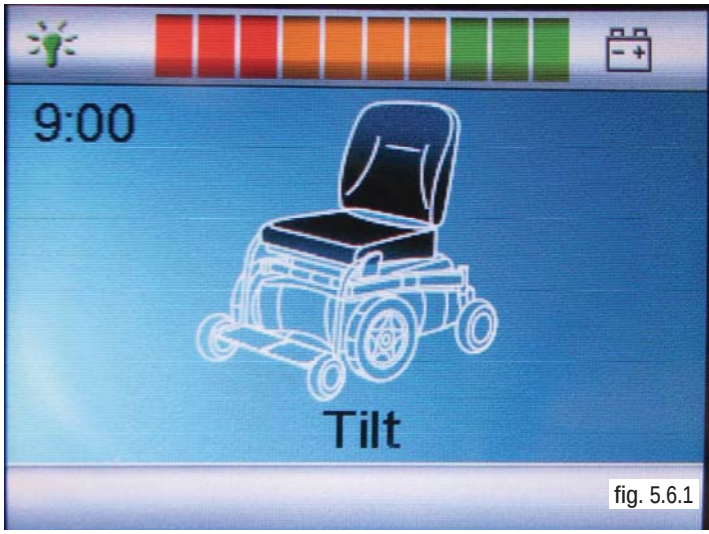


fig. 5.6.1

If click is heard proceed to step 2.

2. Verify that tilt is selected on the hand control. Operate the joystick and listen closely to the tilt actuator. If the actuator appears to be running but the tilt is not moving, replace the tilt actuator.

3. If the actuator does not appear to be running, locate the 6-pin connector on the rear of the tilt actuator (fig. 5.6.2) and disconnect it.

fig. 5.6.2

4. Select tilt on the hand control and place a rubber band around the joystick to hold it displaced (fig. 5.6.3).

fig. 5.6.3

R-net Fault Codes cont.

Tilt Will Not Operate - cont.

Warning: Use caution in the next step. Do not short the leads of the Multimeter together or damage may occur to the control module.

5. At the 6-pin connector on the cable leading to the control module, verify that battery voltage is present between the indicated pins (fig. 5.7.1). Note: The polarity of the voltage is not important since it is reverses when the opposite direction is selected.

fig. 5.7.1

6. If voltage is not present, replace the cable leading to the control module. Retest with new cable. If the new cable does not correct the problem, replace the control module.

7. At the 6 pin connector (fig. 5.7.2) on the rear of the tilt, check to see if the actuator is capable of tilting if power is applied directly to the actuator (fig 5.7.3). Or, proceed to step 8.


fig. 5.7.2

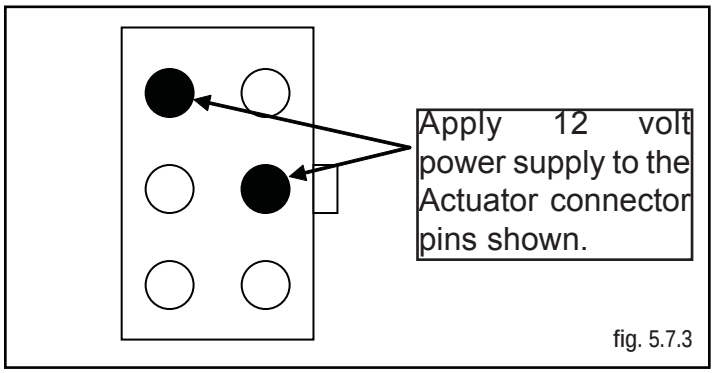


fig. 5.7.3

Tilt Will Not Operate - cont.

Note: Since the tilt actuator will not operate, it is only possible to check for one condition. Pick the condition below that best describes the position of the tilt system.

8. Tilt is in mid-stroke. (Fig 5.8.1)
The value recorded is the resistance through the actuator motor windings. If this reading is not correct, replace the tilt actuator and retest.

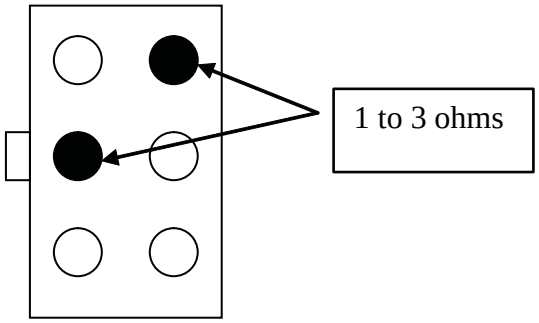


fig. 5.8.1

10. Tilt is in the full down position. (Fig 5.8.2)
If the readings are not correct, replace the tilt actuator.
Note: The value recorded in one direction is the forward resistance through a diode and will vary with the type of Multimeter used. This value is not important, as long as there is continuity in one direction only. This value may even be high. The value recorded in the other direction is across the open contact of the end of stroke micro-switch and should be open.

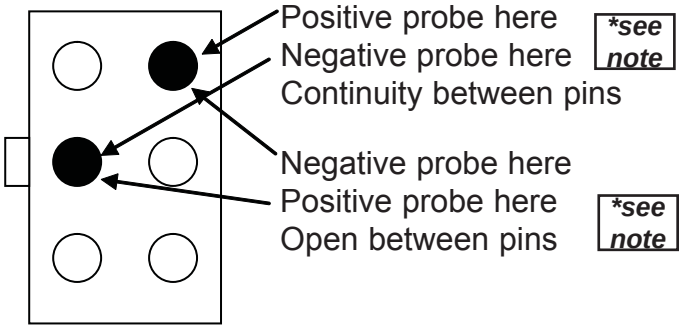


fig. 5.8.2

11 Tilt is in the full up position. (Fig 5.8.3)
If the readings are not correct, replace the tilt actuator.
Note: The value recorded in one direction is the forward resistance through a diode and will vary with the type of Multimeter used. This value is not important, as long as there is continuity in one direction only. This value may even be high. The value recorded in the other direction is across the open contact of the end of stroke micro-switch and should be open.

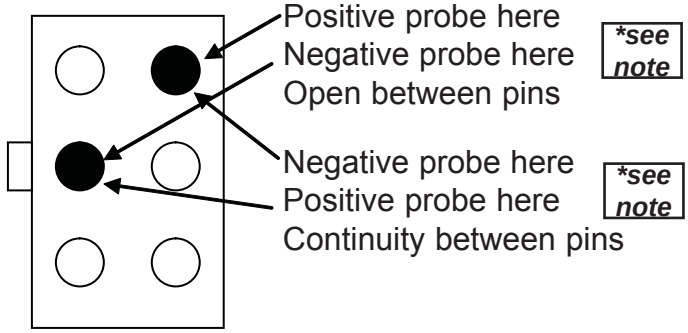
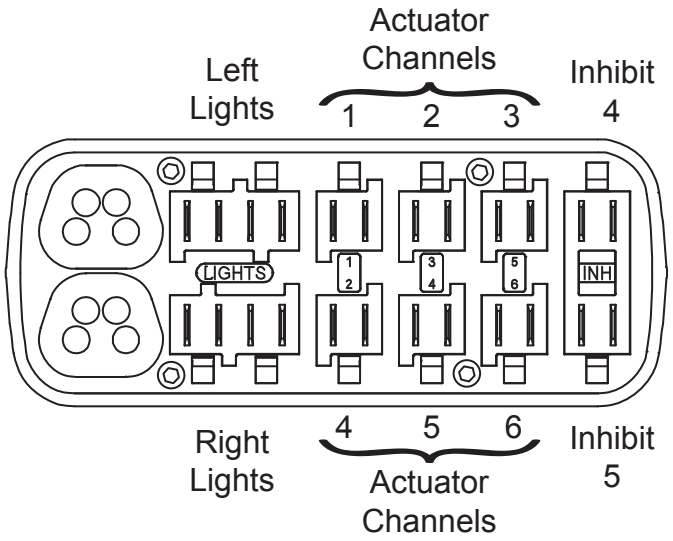


fig. 5.8.3

Section 6

Troubleshooting Recline

Power Recline is offered on the Rhythm. This Powered seating option Offers both Power Recline and Power Shear and its operation is controlled by the ISM (Intelligent Seating Module).



Power Chair Will Not Drive at Full Speed

The Power Recline System has 3 Possible Minimum angles 90, 95, 100 degrees. This angle is set by programming. The minimum angle for each chair is based on how the chair was ordered. The ISM (Intelligent Seating Module) calculates the degree based on the resistance of the recline actuator's internal potentiometer. To determine what angle your back should be calibrated to you can contact Sunrise Customer Service to see confirm what angle was requested when the chair was built. (Making changes to this preset "Home Angle" will require a program change.) You can confirm the recline calibration using the following chart.

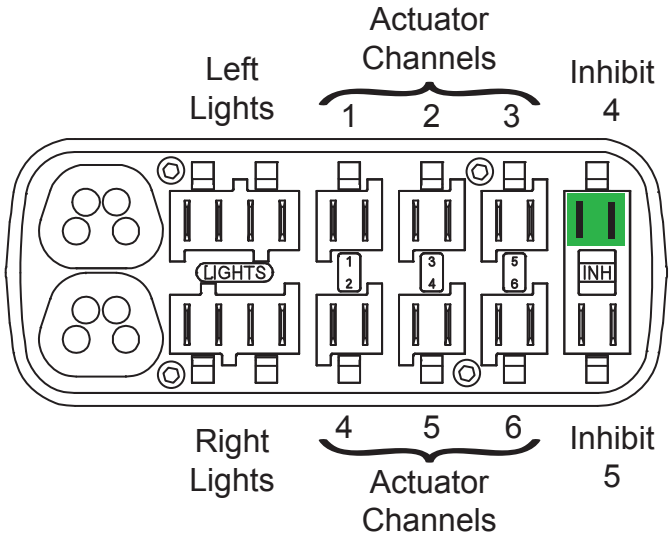
Recline Angle (Degrees)	Potentiometer Resistance (K Ohms)	Length of Act Rod (From lower eyelet to eyelet) (In)
Calibration Point (81)	1	19.37
90	1.5	
95	1.8	
100	2.1	
165	6.1	14

Troubleshooting Power Recline Calibration.

1. Start by bringing the backrest into the upright position.
Remove the shroud covering the backrest and locate the ISM. (fig. 6.2.1)


fig. 6.2.1

2. The recline Inhibit connector is the 2 pin connector located at Inhibit 4 port in the ISM. (fig. 6.2)



3. Check the recline potentiometer resistance at the Inhibit 4 harness as shown. (fig 6.2.2)


fig. 6.2.2

4. If you have a correct reading at this location, skip to step 6.
If your reading is open, take a reading directly from the 6-pin recline actuator harness (fig 6.3.1) at pins 3 & 4.

5. If your reading is still open, replace the recline actuator and re-rest.

If your reading matches the Recline Calibration Chart above, then replace the harness from the recline actuator to the ISM.

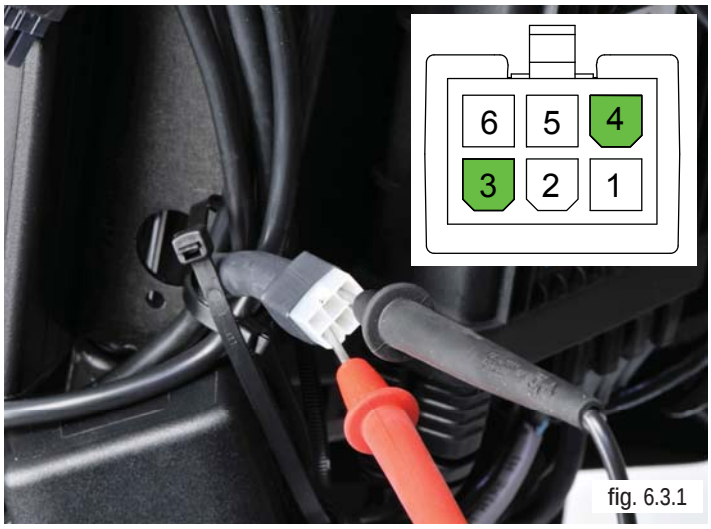


fig. 6.3.1

6. If do you have a reading, but find that is does not match the calibration chart based on your preset angle, remove the recline actuator (follow installation instructions from this manual). Once removed, run direct power to the actuator until you are able to match the desired resistance 1.0 k ohms when monitoring pins 3 & 4 with your multi meter. Once this reading is achieved, you will be able to rotate the actuator rod to match the length listed on the calibration chart. (fig 6.3.2


fig. 6.3.2

Power Chair will not Drive in Creep Speed when Reclined

If the wheelchair is not driving in creep speed when the backrest is reclined more than 110 degrees, refer to the above the recline actuator calibration process. And re-test.
If the calibration process does not correct the issue, please contact Sunrise Medical Tech Support.

Power Recline does not Operate

1. Verify that the recline has not been disabled in programming. If it has been disabled, enable the option and re-test.

2. If actuator resistance is lost, the actuator will no longer be displayed as an option on the joystick. To test the recline actuator resistance, locate the ISM mounted on the back of the wheelchair. (fig 6.4.1)

3. Disconnect the 2-pin connector at actuator port 5 (Fig 6.3.)

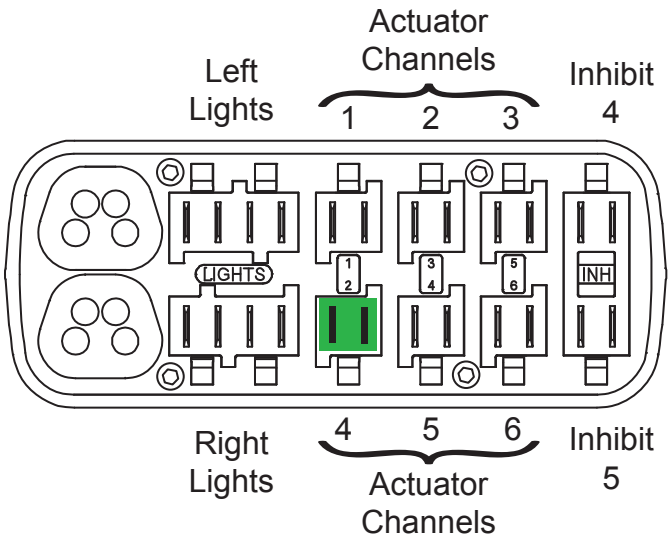



fig. 6.4.1

4. Check for resistance at this harness, normal resistance would be 2 to 4 ohms.
If you have verified resistance at this connection, Replace the ISM.

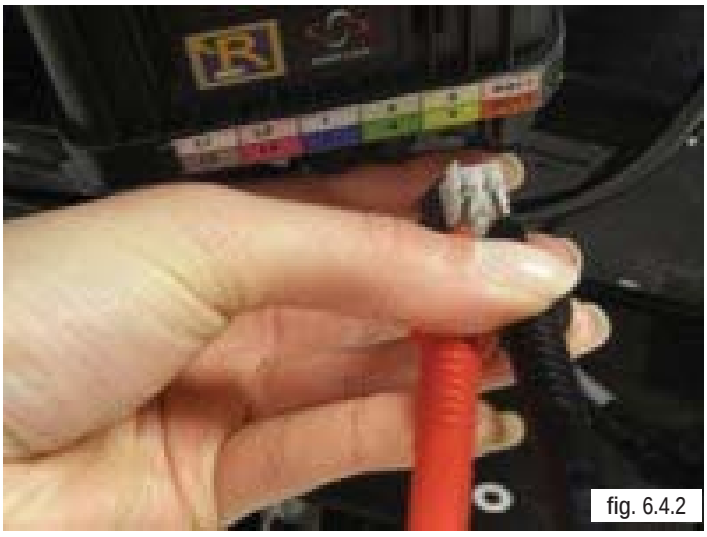


fig. 6.4.2

5. If your reading is open, re-test the resistance at the 6 pin connection leading directly from the recline actuator (fig 6.4.2) at pins 1 and 5. (Fig 6.4.3)

If your reading is open, replace the recline actuator.

If resistance is verified, replace the harness leading from the 6 pin actuator harness to the ISM.

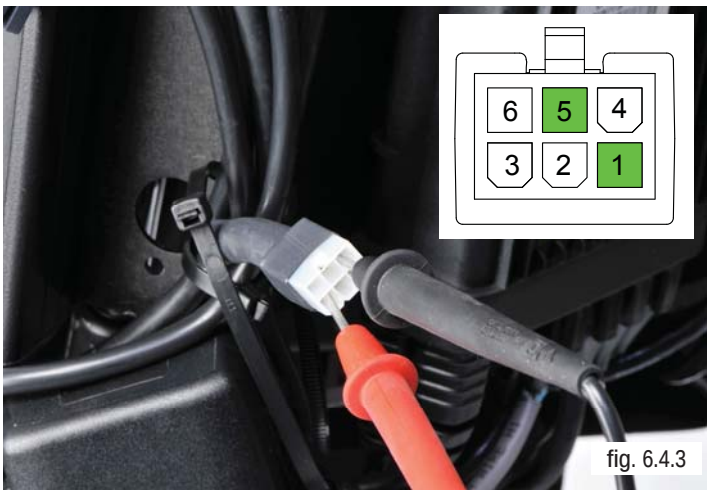
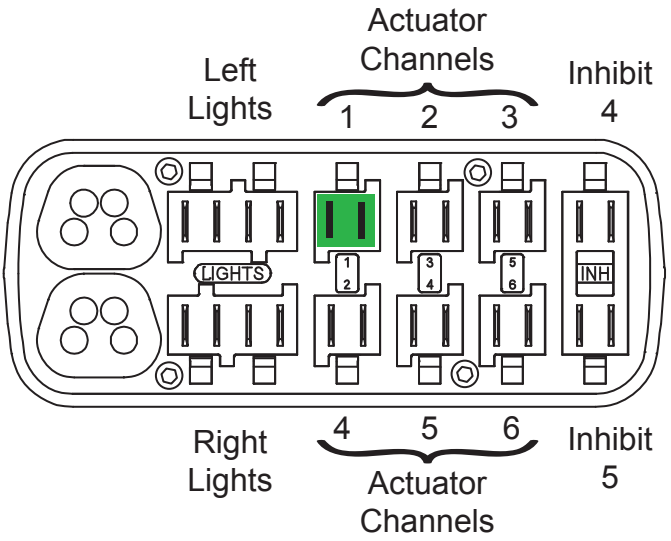


fig. 6.4.3

Power Shear Does not Operate

1. To test the Shear actuator resistance, locate the ISM mounted on the back of the wheelchair.
2. Disconnect the 2 pin connector at actuator port 1 (fig. 6.5.1)
3. Check for resistance at this harness, normal resistance would be 6 to 8 ohms when the actuator
is in mid-stroke and greater than 1 m ohms when at
either extremity.
If you have verified resistance at this connection, Replace the ISM.


fig. 6.5.1



4. If your reading is open, re-test the resistance at the 6 pin connection leading directly from the shear actuator (fig 6.5.2) at pins 1 and 5.
If your reading is open, replace the shear actuator.
If resistance is verified, replace the harness leading from the 6 pin actuator harness to the ISM.

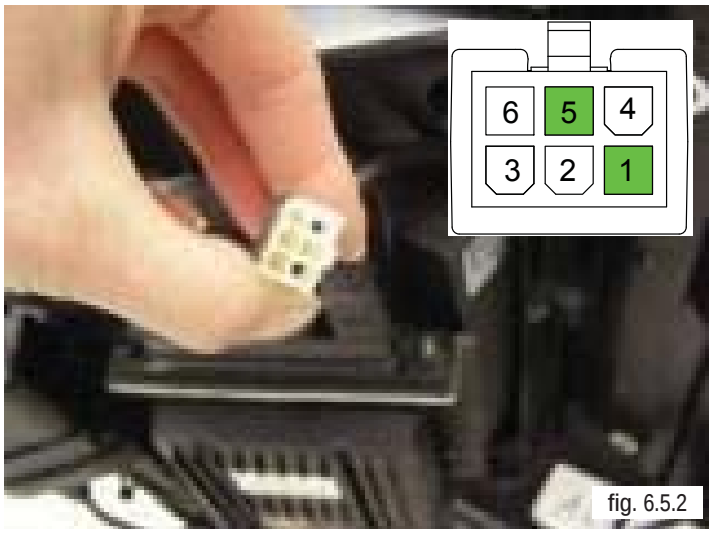


fig. 6.5.2

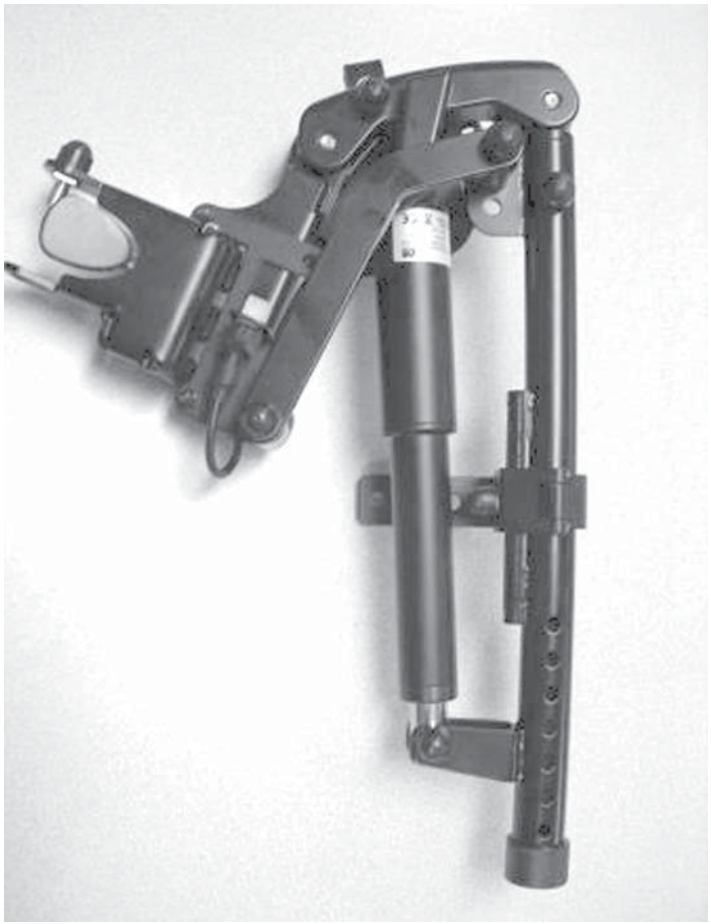
Section 7

Troubleshooting Power Legrest

We are offering two versions of power legrest, Center Mount legrest actuator and Swing away Dual Elevating / Articulating (ELR/ALR). With these new assemblies, the actuator is attached directly to the legrest.

Power Center Mount Legrest

Power ELR/ALR Swing-Away Legrest

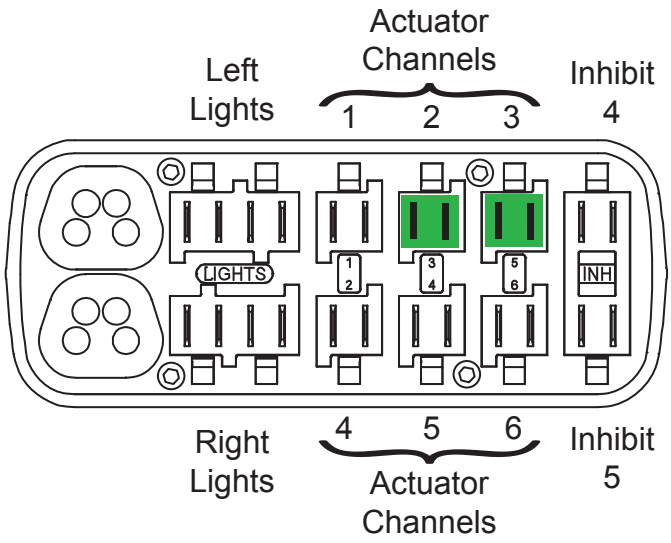


Troubleshooting Power Legrest - cont.

1 Are you able to access the legrest option on the joystick menu? If yes, contact Sunrise Medical Tech support for assistance.

2. If No, Verify that the legrest option is enabled in programming and check all connections from the legrest actuators to the ISM.

3. If all connections are good, disconnect the legrest harness from the ISM.



	Power Center mount	Dual Legrests
Act Port 2	Extend	Right Leg
Act Port 3	Elevate	Left Leg

4. Check resistance at this 2 pin connection. (fig 7.2.1)

5. If no resistance If found, check resistance at the 6-pin connection directly from the actuator at pins 1 and 5. (fig 7.2.2)

If no resistance is found, replace the legrest actuator that is not functioning.

If resistance is verified at this actuator connector, replace the harness from the actuator to the ISM.

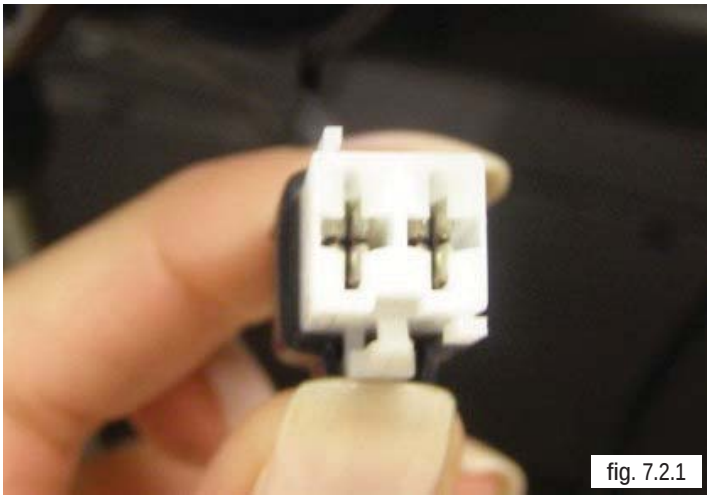


fig. 7.2.1

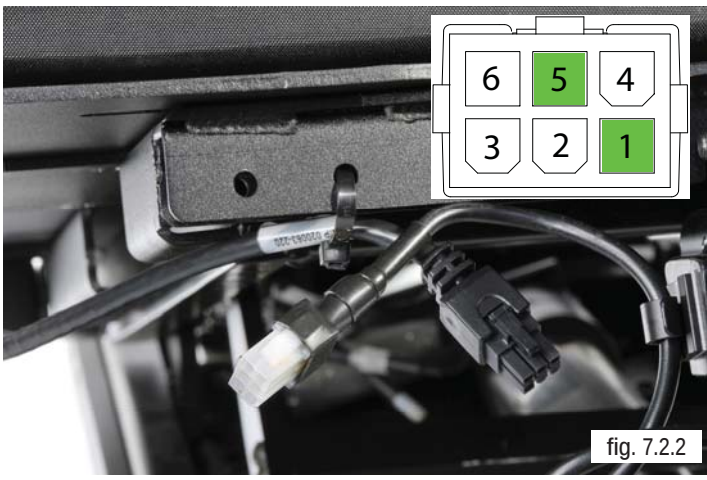
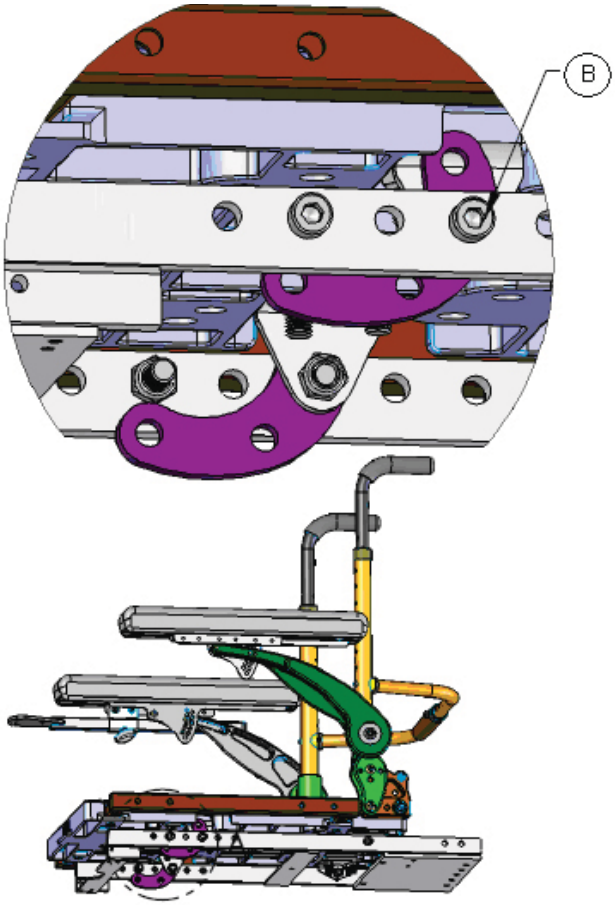


fig. 7.2.2

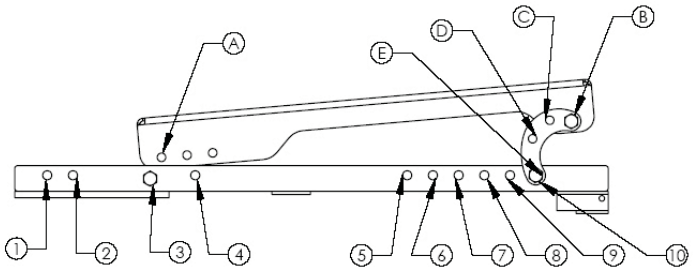
Seating System Mounting Instructions

Non Tilt Module/Packer Interface



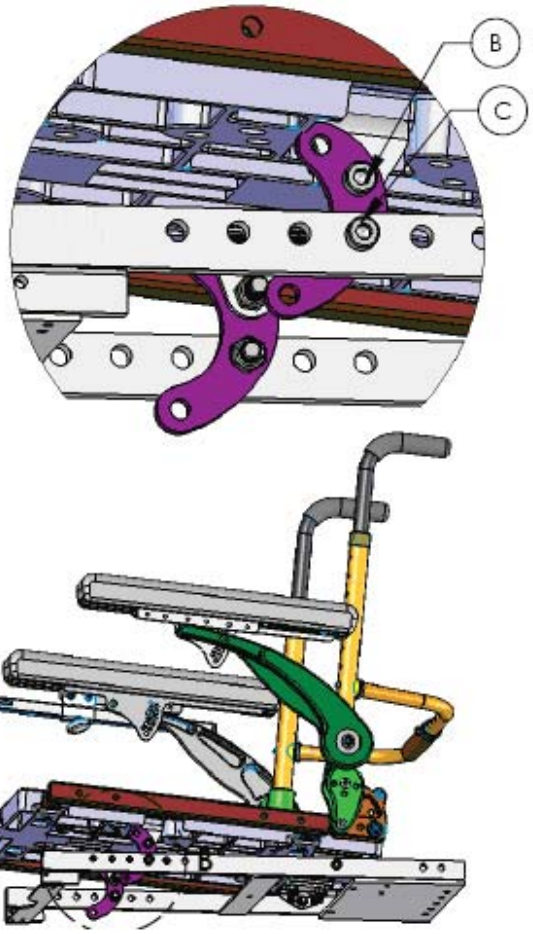
For 0° pretilt use Hole 3&6 on interface with hole B on curved Bracket

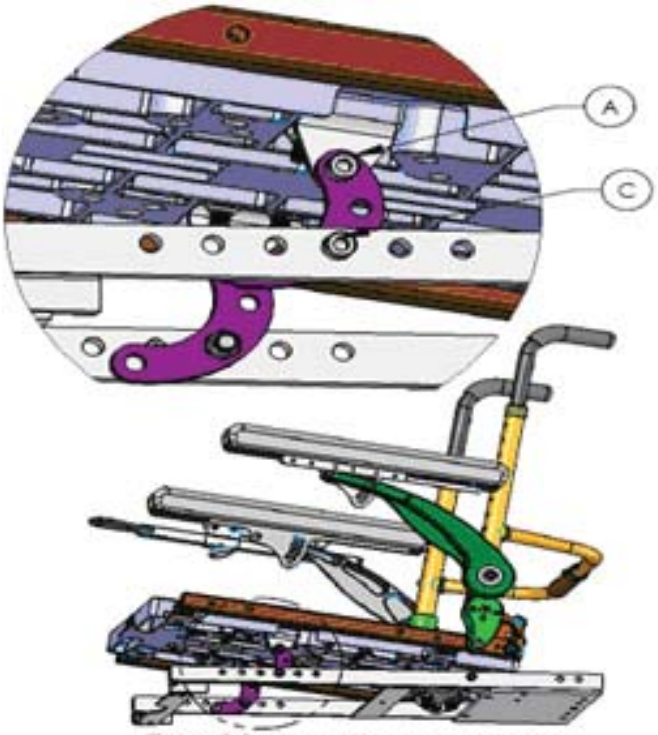
Extra bolt and nut use hole 8



	Rehab Seat 15-24W Rehab Seat 12-14W	Rehab Seat 15-24W 22" Depth Power Recline	ASAP
Packer	A to 2: B,C,D or E to 8	A to 1: B,C,D or E to 7	N/A

For 0° pretilt use Hole B
For 3° pretilt use Hole C
For 6° pretilt use Hole D
For 9° pretilt use Hole E

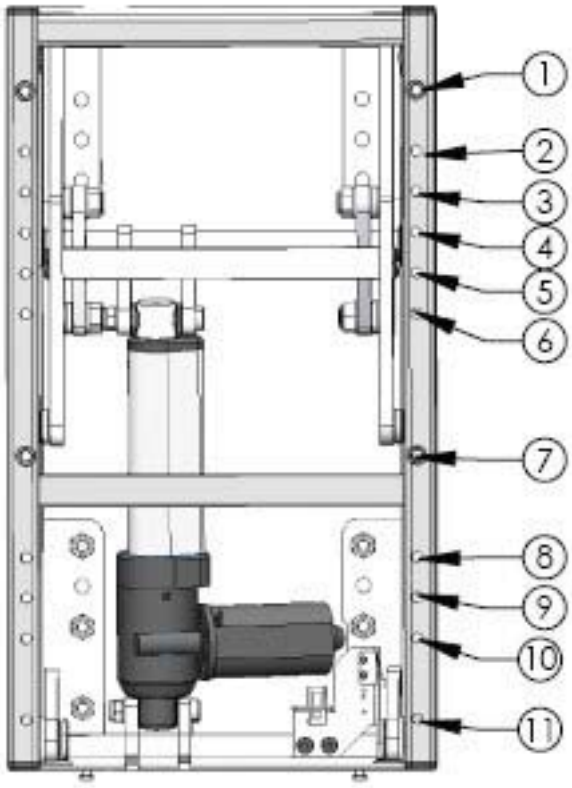


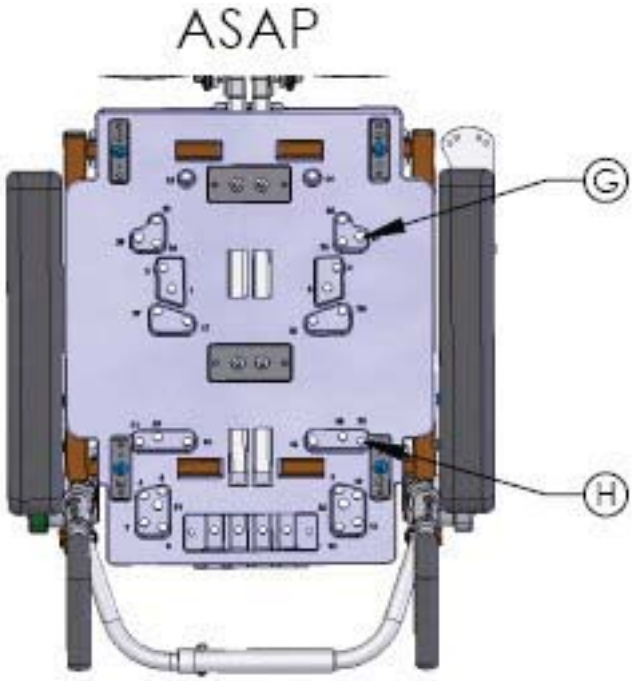


For 9° pretilt use Hole 3&6 on interface with hole A&C on curved bracket

ASAP (Tilt Only) Seating System Mounting Instructions

Seat to Tilt Mounting





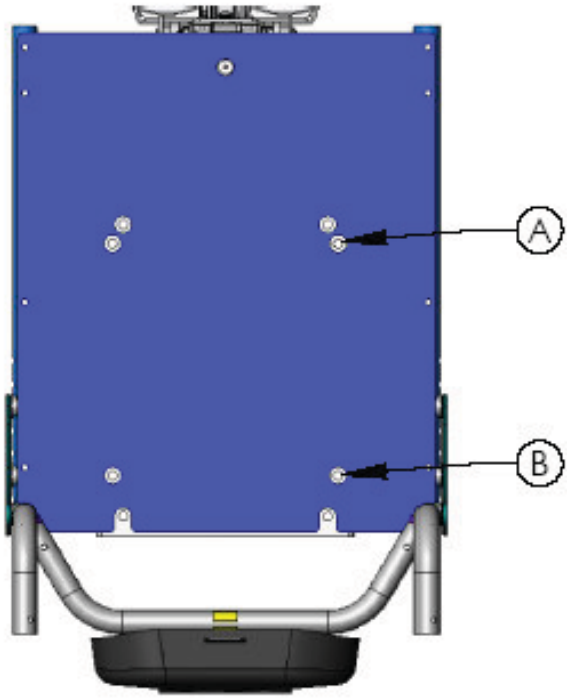
ASAP
G&H to 1&7

Traditional Rehab Seating System Mounting Instructions

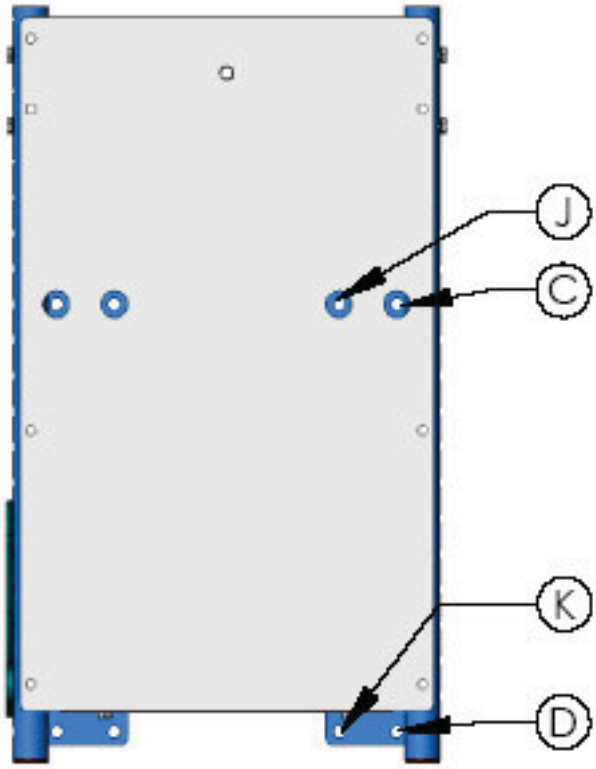
Seat to Tilt Mounting

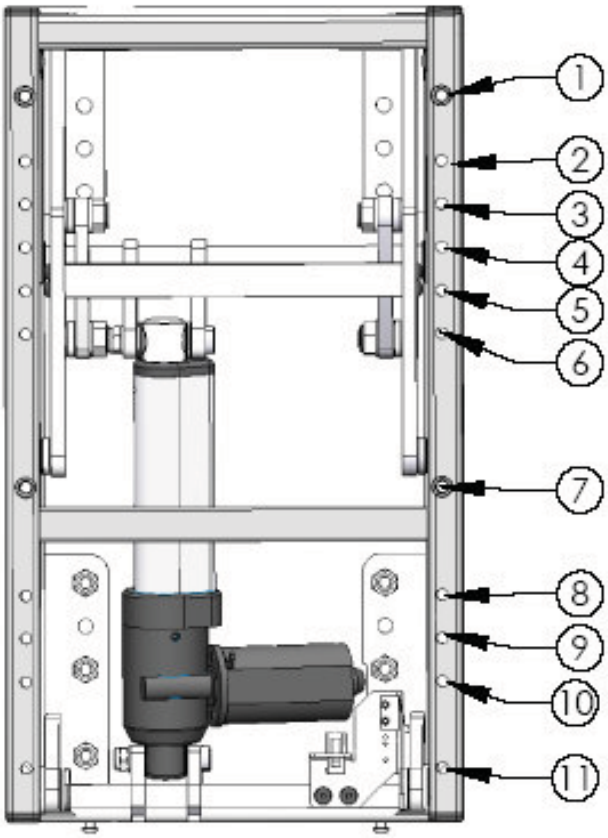
Rehab Seat 15-24W All Depths	Rehab Seat 12-14W
A&B to 3&9	C&D to 4&11

15-24" Wide Rehab

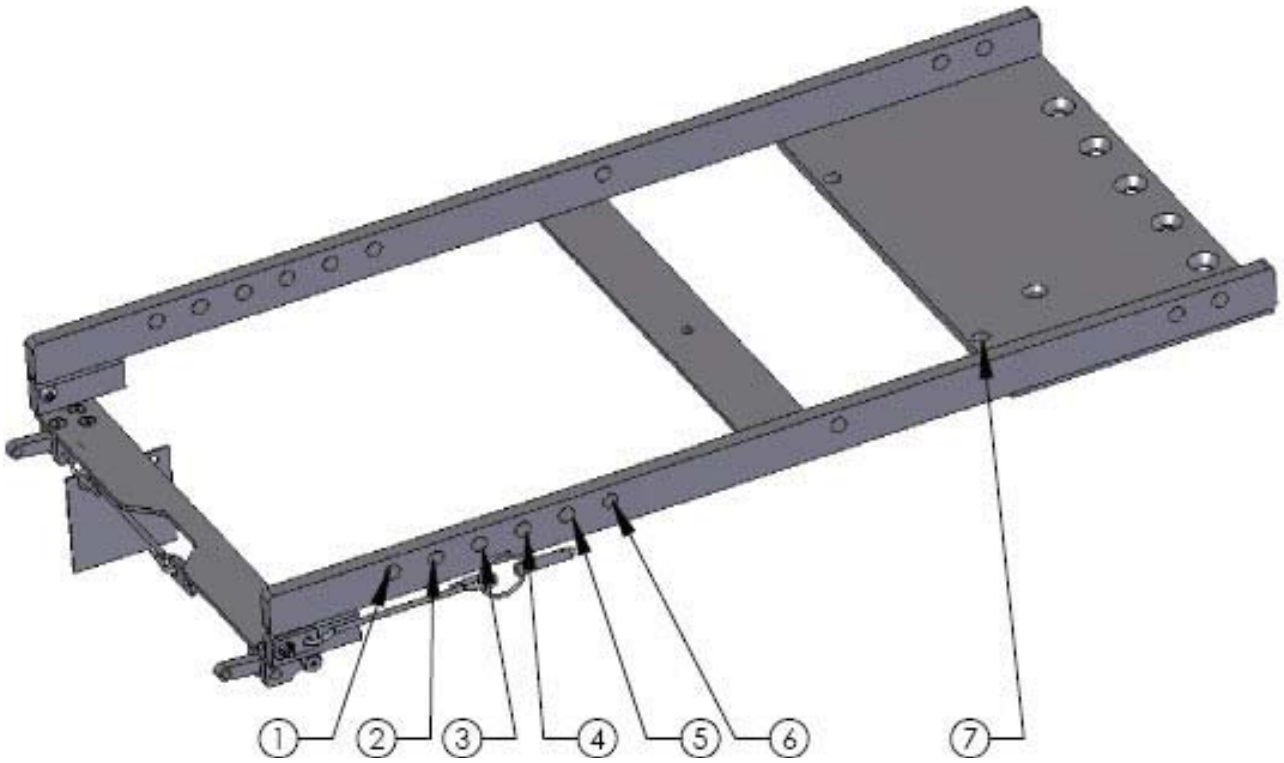


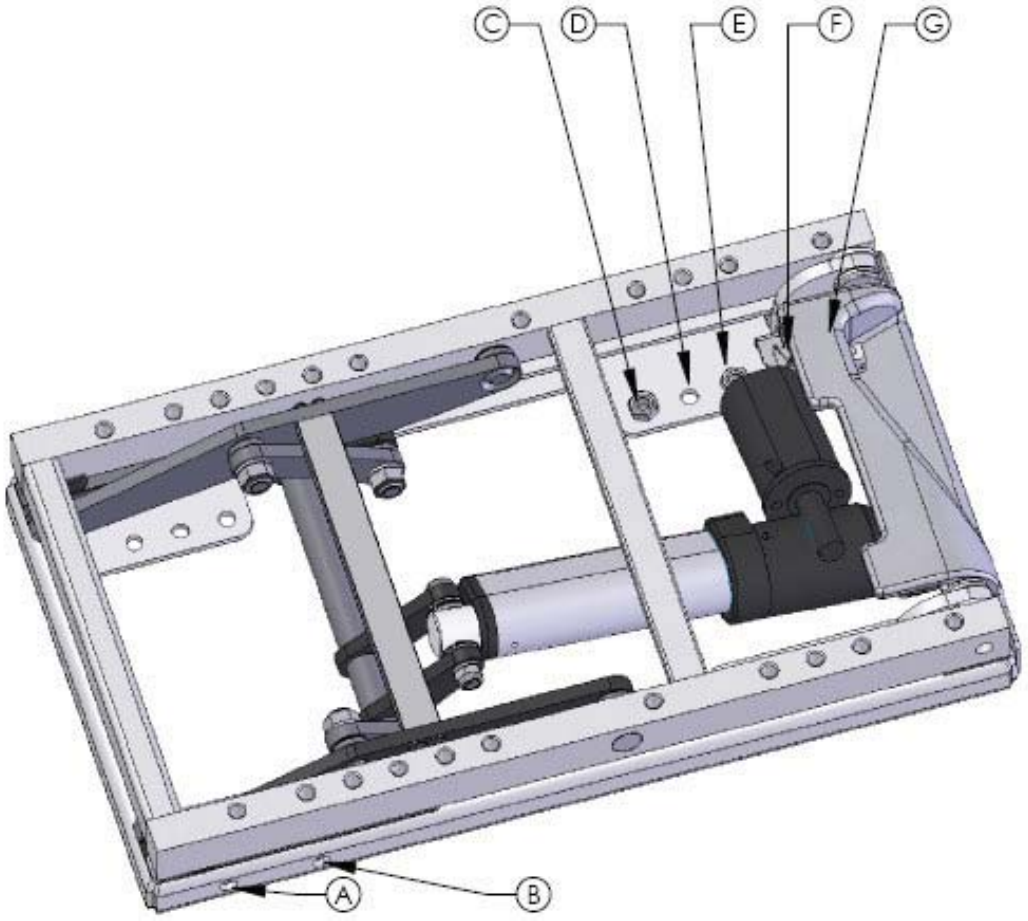
12-14" Wide Rehab





Tilt to Interface Mounting

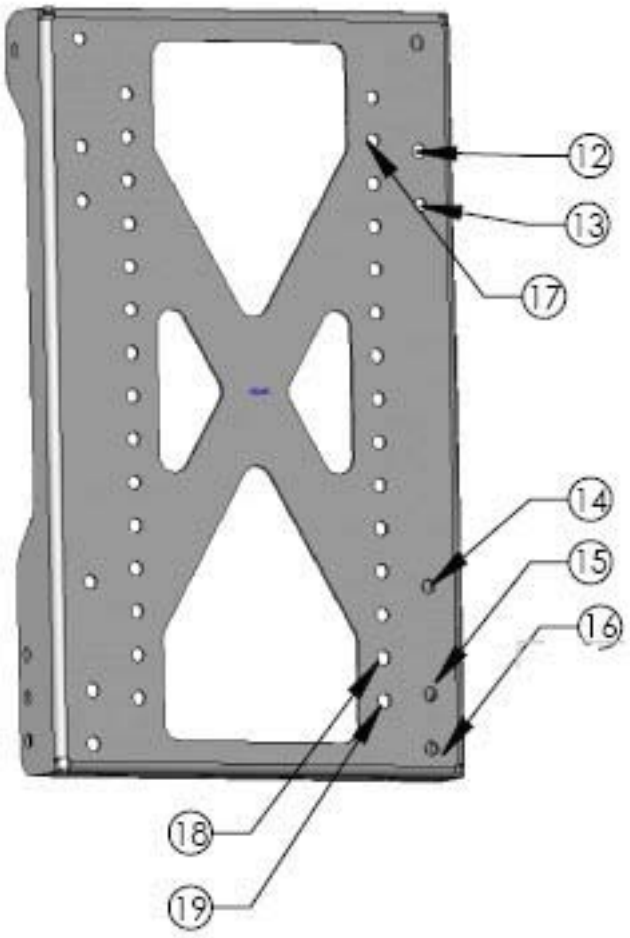




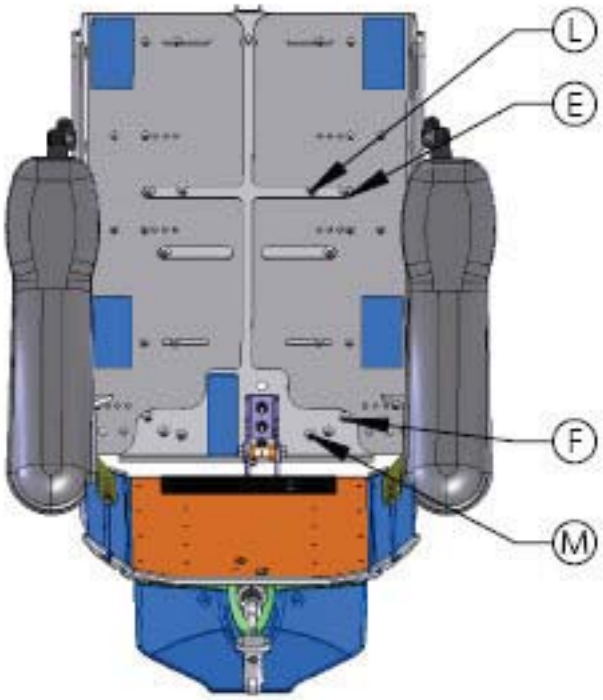
New Power Recline Seating System Mounting Instructions

Seat to Recline Mounting

	Power Recline
Packer	L&M to 17&19

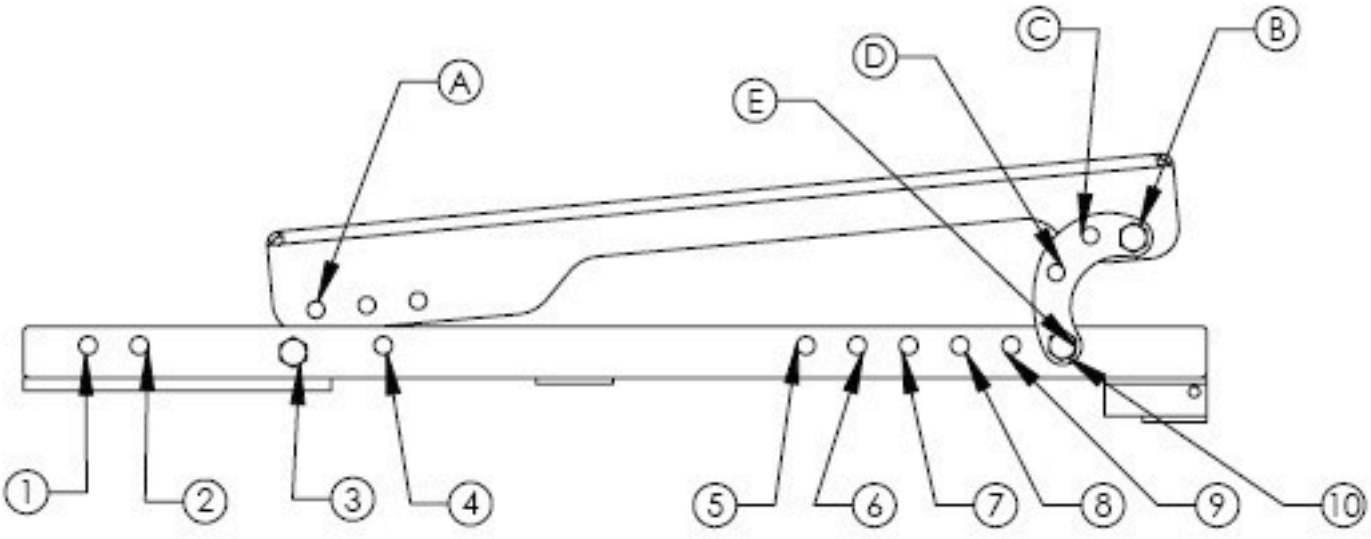


Power Recline



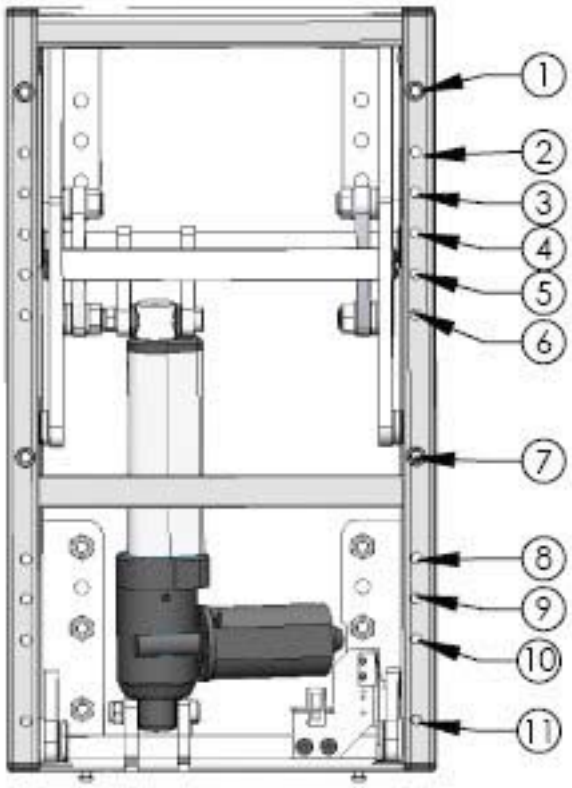
Power Recline
A to 1: B,C,D or E to 7

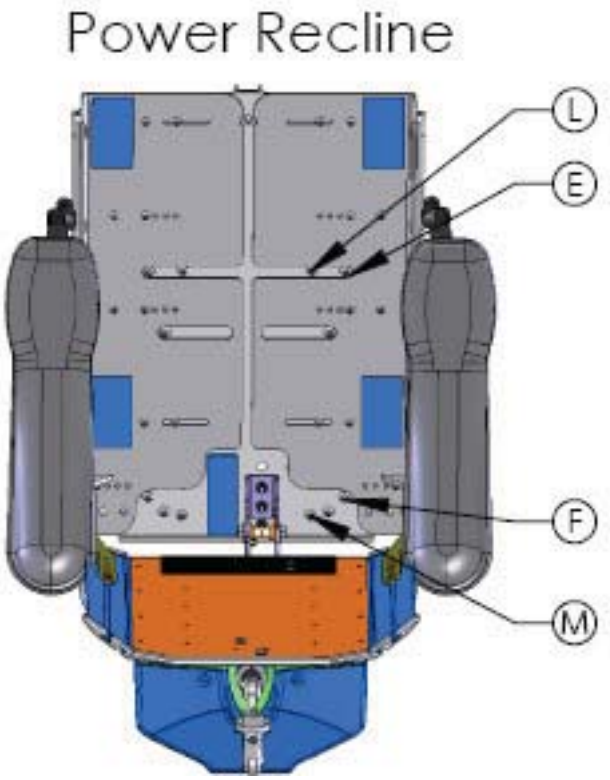
For 0° pretilt use Hole B
For 3° pretilt use Hole C
For 6° pretilt use Hole D
For 9° pretilt use Hole E



New Power Tilt & Recline Seating System Mounting Instructions

Seat to Tilt/Recline Mounting:

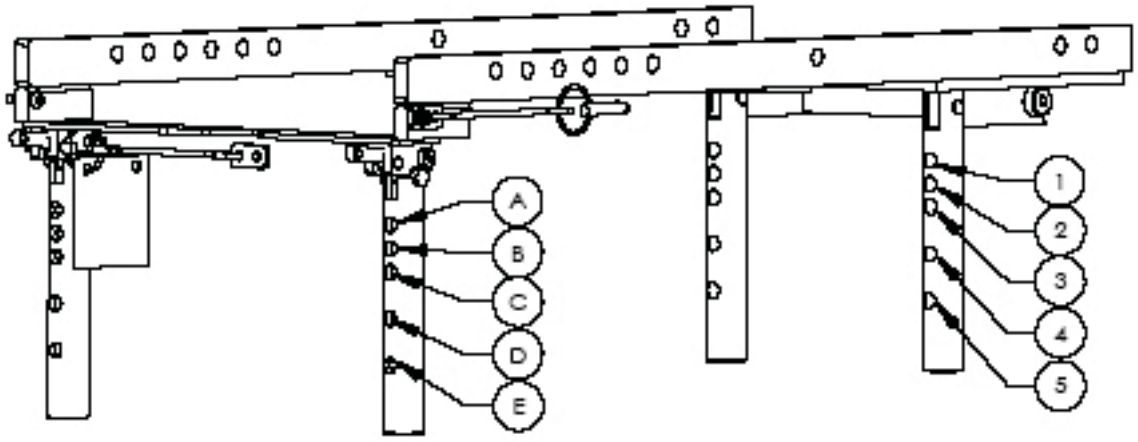




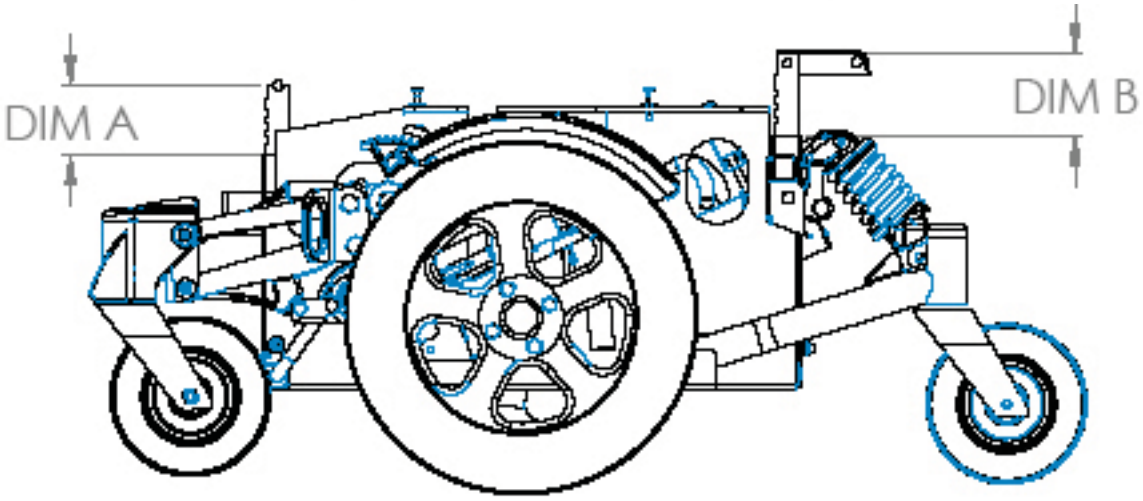
	Power Recline
Tilt	E&F to 2&10

fig. 7.7

Seat to Floor Height Matrix



REAR SEAT POST POSITION	FRONT SEAT POST POSITION	DIM A	DIM B
1	A	0.6	1.1
1	C	1.6	
2	B	1.1	1.6
3	C	1.6	2.1
3	D	2.6	
4	D	2.6	3.1
4	E	3.6	
5	E	3.6	4.1



Actual STFH dimensions are listed for short configuration:
Add 1” for Med / Add 2” for Tall / add 3” for Extra Tall

fig. 7.11

Seat to Floor Height Matrix (cont)

	Actual STFH (in)	Post Position Short	Post Position Med	Post Position Tall	Post Position Extra Tall	Pre-Tilt Angle (degrees)
Power Recline						
No Module	17.1	1 / A	3 / C	4 / D	5 /E	0
No Module with Transit	17.6	2 / B	3 / C	4 / D	5 /E	
Tilt	17.9	1 / A	3 / C	4 / D	5 /E	
Tilt with Transit	18.4	2 / B	3 / C	4 / D	No Go	
No Module	18.2	1 / A	3 / C	4 / D	5 /E	3
No Module with Transit	18.7	2 / B	3 / C	4 / D	No Go	
Tilt	19.0	1 / C	3 / D	4 / E	No Go	
Tilt with Transit	19.6	2 / C	4 / E	5 / E	No Go	
No Module	19.3	1 / A	3 / C	No Go	No Go	6
No Module with Transit	19.8	2 / B	3 / C	No Go	No Go	
No Module	20.4	1 / A	No Go	No Go	No Go	9
No Module with Transit	20.9	2 / B	No Go	No Go	No Go	
Asap Seating						
No Module	17.1	1 / A	3 / C	4 / D	5 /E	0
No Module with Transit	17.6	2 / B	3 / C	4 / D	5 /E	
Tilt	18.6	1 / A	3 / C	4 / D	5 /E	
Tilt with Transit	19.1	2 / B	3 / C	4 / D	5 /E	
No Module	18.2	1 / A	3 / C	4 / D	5 /E	3
No Module with Transit	18.7	2 / B	3 / C	4 / D	No Go	
Tilt	19.7	1 / C	3 / D	4 / E	No Go	
Tilt with Transit	19.5	2 / C	3 / D	4 / E	No Go	
No Module	19.3	1 / A	3 / C	No Go	No Go	6
No Module with Transit	19.8	2 / B	3 / C	No Go	No Go	
No Module	20.4	1 / A	No Go	No Go	No Go	9
No Module with Transit	20.9	2 / B	No Go	No Go	No Go	

Seat to Floor Height Matrix (cont)

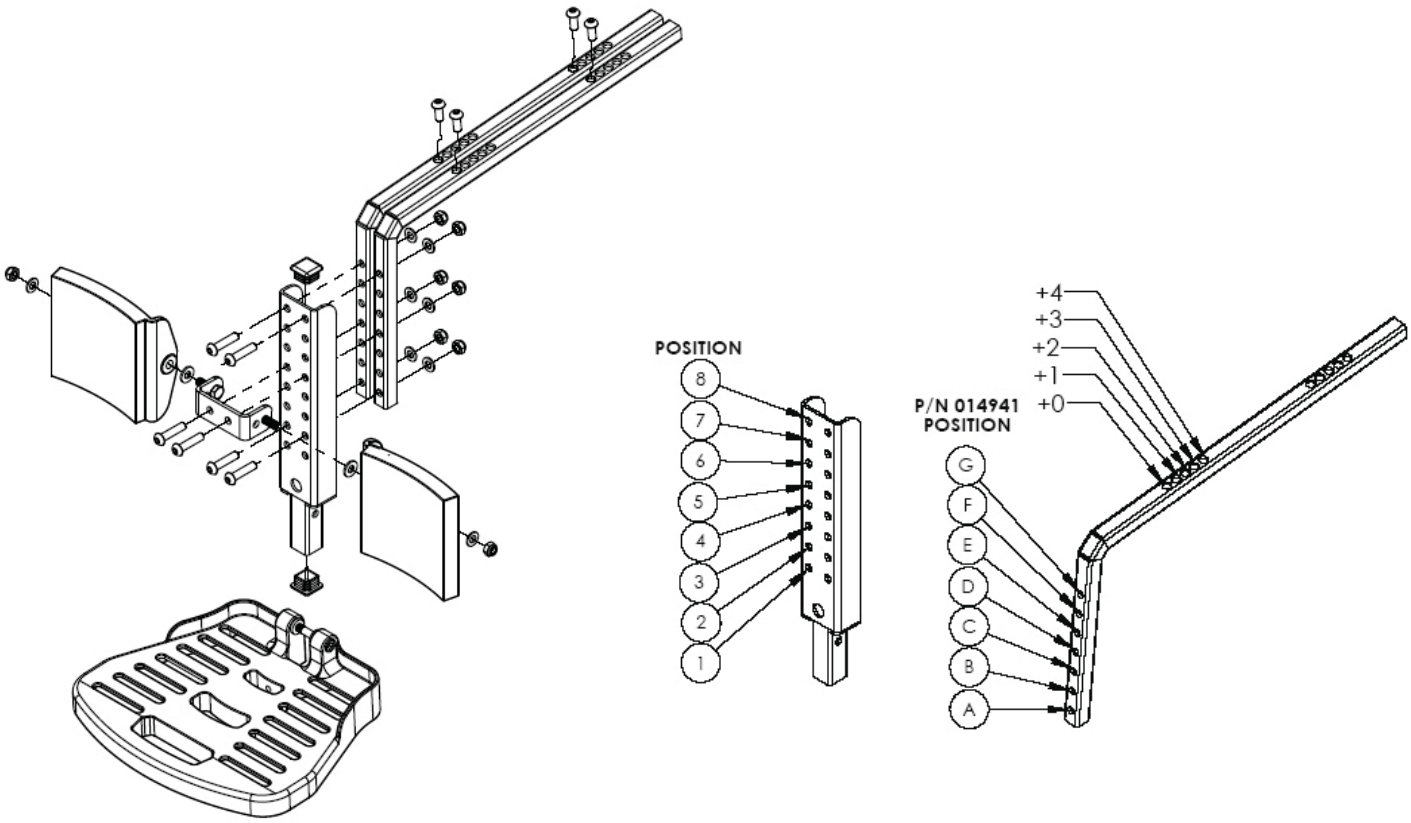
Traditional Rehab Seating 15-24" Width						
No Module	16.8	1 / A	3 / C	4 / D	5 /E	0
No Module with Transit	17.3	2 / B	3 / C	4 / D	5 /E	
Tilt	17.5	1 / A	3 / C	4 / D	5 /E	
Tilt with Transit	18.0	2 / B	3 / C	4 / D	No Go	
No Module	17.9	1 / A	3 / C	4 / D	5 /E	3
No Module with Transit	18.4	2 / B	3 / C	4 / D	No Go	
Tilt	18.6	1 / C	3 / D	4 / E	No Go	
Tilt with Transit	19.2	2 / C	3 / D	4 / E	No Go	
No Module	19.0	1 / A	3 / C	No Go	No Go	6
No Module with Transit	19.5	2 / B	3 / C	No Go	No Go	
No Module	20.1	1 / A	No Go	No Go	No Go	9
No Module with Transit	20.6	2 / B	No Go	No Go	No Go	

Traditional Rehab Seating 12-14" Width						
No Module	16.8	1 / A	3 / C	4 / D	5 /E	0
No Module with Transit	17.3	2 / B	3 / C	4 / D	5 /E	
Tilt	17.5	1 / A	3 / C	4 / D	5 /E	
Tilt with Transit	18.0	2 / B	3 / C	4 / D	No Go	
No Module	17.9	1 / A	3 / C	4 / D	5 /E	3
No Module with Transit	18.4	2 / B	3 / C	4 / D	No Go	
Tilt	18.6	1 / C	3 / D	4 / E	No Go	
Tilt with Transit	19.2	2 / C	3 / D	4 / E	No Go	
No Module	19.0	1 / A	2 / B	No Go	No Go	6
No Module with Transit	19.5	2 / B	3 / C	No Go	No Go	
No Module	20.1	1 / A	No Go	No Go	No Go	9
No Module with Transit	20.6	2 / B	No Go	No Go	No Go	

Asap Fixed Center mount Footrest Mounting Matrix

Part # 014945 Position	Part # 014941 Position	Leg Length	Ground Clearance Tilt				Ground Clearance Non-Tilt			
STF			18 ½"	19 ½"	20 ½"	21 ½"	17 ¼"	18 ¼"	19 ¼"	20 ¼"
1	A	13 ½"	4 5/8"	5 5/8"	6 5/8"	7 5/8"	3 3/8"	4 3/8"	5 3/8"	6 3/8"
2	A	14 ½"	3 5/8"	4 5/8"	5 5/8"	6 5/8"	2 3/8"	3 3/8"	4 3/8"	5 3/8"
3	A	15 ½"	2 5/8"	3 5/8"	4 5/8"	5 5/8"	1 3/8"	2 3/8"	3 3/8"	4 3/8"
4	A	16 ½"	1 5/8"	2 5/8"	3 5/8"	4 5/8"	3/8"	1 3/8"	2 3/8"	3 3/8"
5	A	17 ½"	5/8"	1 5/8"	2 5/8"	3 5/8"	NOGO	3/8"	1 3/8"	2 3/8"

RED SHADED AREAS ARE NO-GO's
DEFAULT CONFIGURATEION FROM FACTORY



Adjusting Power ELR / ALR Legrest Length

To adjust & or remove the footrest length on a Power ALR/ELR loosen the two 4.0 mm allens to undo the footrest extension tube. Fig 8.6

The actuator is secured to the legrest by a bolt at each end. To better access the top bolt you will need to remove the knee pad first. A 13mm open wrench on the nut and a 13mm socket to remove the knee pad bracket. Fig 8.7

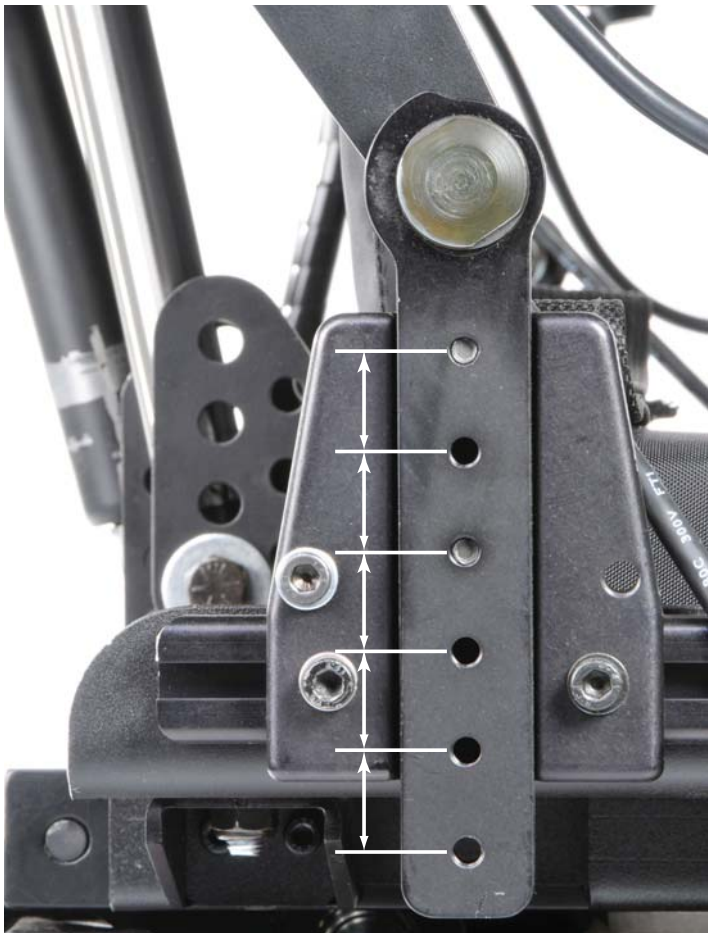
Removing the legrest actuator from the ELR / ALR cont.

Use a 13 mm open wrench and a 13mm socket to release the top nut. Fig 8.8

Repeat this process for the bottom nut. Fig 8.9

Adjusting Power Recline Backrest

Adjustments of the New Recline for seat pan are similar to the old perfect fit recline.
Refer to that portion of the Rhythm and Groove service manual for those procedures.

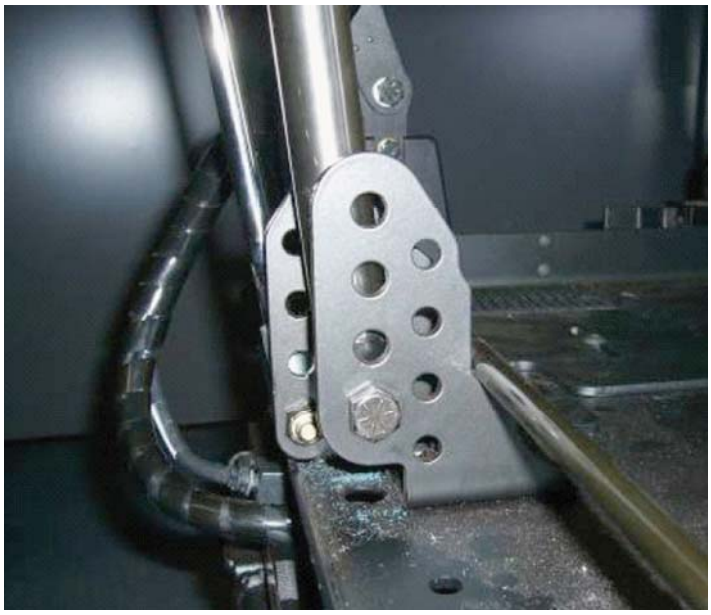


1. The seat-back angle is adjusted thru a change in programming. No mechanical procedures are required.

2. The Pivot point may be moved up in the seat-back bracket. The factory setting is 4" measured from the top of the seat pan to the pivot point. This may be adjusted in ¾" intervals. (fig 8.1).

3. Use a 7/16" socket and ratchet to remove the pivot point A. Raise it to the desired location (fig 8.2).

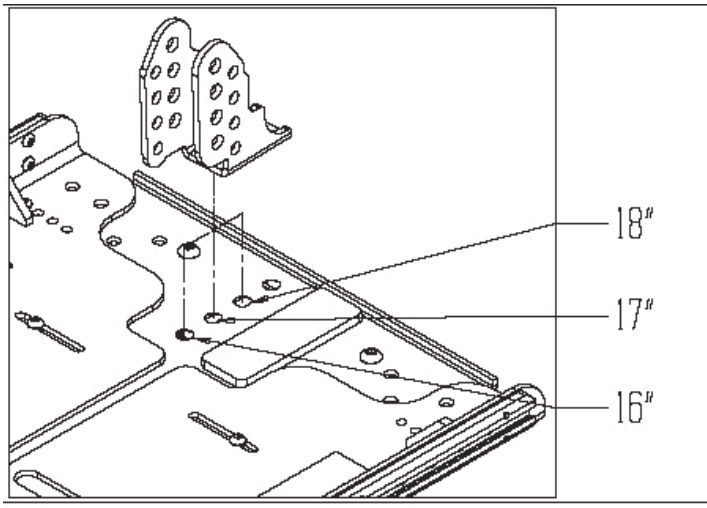
4. Reinsert and tighten the bolts securing the pivot point.

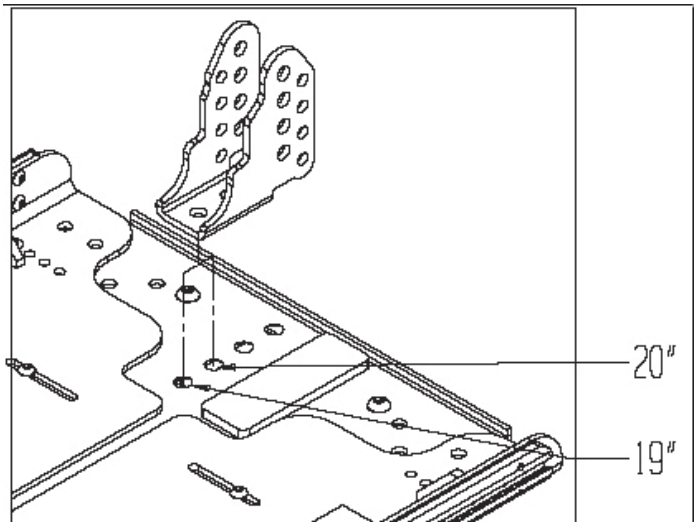


5. As the pivot point is raised, the Recline actuator and gas strut MUST also be raised an equal amount. This is done by removing the bolts B. (fig 8.3).
Note: If the pivot is raised, it is suggested to replace the back pan with a larger pan to decrease the gap from the bottom of the backrest to the seat pan.

6. Seat depth is adjusted by moving the mounting brackets to the front or rear in the seat pan track.
7. Loosen the two mounting bolts C and slide the bracket to the desired location.
(fig 8.4)

8. It is important to also adjust the placement of the recline actuator pivot bracket when seat depth has been changed. See fig 8.5





Section 9

OBP Programming Quick Guide

RNET JOYSTICK ON BOARD PROGRAMMING (OBP)

These parameters are available in OMNI and DTT as well.

- SPEEDS
  - FORWARD → (PROGRAMMING EACH PROFILE) → ACCELERATION / DECELERATION / SPEEDS MIN & MAX
  - REVERSE → (PROGRAMMING EACH PROFILE) → ACCELERATION / DECELERATION / SPEEDS MIN & MAX
  - TURN → (PROGRAMMING EACH PROFILE) → ACCELERATION / DECELERATION / SPEEDS MIN & MAX
- DRIVE → (PROGRAMMING EACH PROFILE)
  - POWER — 10 to 100 (increments of 1.0)
  - TORQ (torque) — 0 to 100 (increments of 1.0)
  - TRMR (tremor damping) — 0 to 100 (increments of 1.0)
- CONTROLS
  - GLOBAL CONTROLS
    - STEER CORRECT — -9 to +9
    - SOUNDER VOLUME — 0 to 10
    - ENDSTOP BEEP — YES/NO
    - ACT ENTRY AXIS — LAST, 0 to 12
    - CHGE PRF IN DRV — YES/NO
    - SPEED ADJ — YES/NO
    - SPD ADJ IN DRV — YES/NO
    - MOMENTARY SCREENS — YES/NO
    - REV DRIVING ALARM — YES/NO
    - EMERGENCY STOP — YES/NO
    - LOCK FN ENABLE — None / Seq / Key / Both
    - POWER UP MODE — LAST, 0 to 8
    - DISPLAY SPEED — off / kph / mph
  - PROFILE CONTROLS
    - SLEEP — 0 to 30 (increments of 1.0)
    - CMID — YES/NO (change mode in drive)
    - BACKGROUND — BLUE / WHITE
  - JOYSTICK
    - ACTIVE THROW → PROFILES 1-7 & ATTENDANT
    - THROW DETAIL → THROW PROFILE PROGRAMMING 25-100 (increments of 1.0)
    - ACTIVE ORINTATION → PROFILES 1-7 & ATTENDANT
    - ORINTATION DETAIL → INV FR / LR/ SWAP — YES/NO
    - DEADBAND → 10o 50 (increments of 1.0)
  - STANDBY
    - SWSBY — YES/NO (switch to standby)
    - SBYTM — 0 to 200 (increments of 1.0) (standby timer)
    - MDESL — YES/NO (mode select)
    - REMSL — YES/NO (remote select)
- LATCHED → (LATCHED PROFILE PROGRAMMING)
  - DRIVE — ON/OFF
  - ACTS — YES/NO
  - TIME — 5 to 250 (increments of 5.0)
  - BLEEP — YES/NO
- ISM ACTUATOR → (ISM PROFILE PROGRAMMING) → UP / DN SPD — 25 to 100 (increments of 1.0)
- PROFILES → (PROFILES ENABLED) — YES/NO
- MODES → (MODES PROFILE PROGRAMMING) — YES/NO
- INPUT DEVICES → (INPUT DEVICES PROFILE PROGRAMMING) — TYPE - UNI / JS / ATT / OMN / SWIT / IOM 1 / IOM 2 / IOM 3
- SYSTEM
  - DIAGNOSTICS → DEVICE FAULT CODES/LOG
  - TIMERS → HOURS/MINUTES OF OPERATION
  - JOYSTICK CALIBRATION → FOLLOW ON SCREEN INSTRUCTIONS (X = 0)
  - COPY PROFILE → FOLLOW ON SCREEN INSTRUCTIONS
  - LOAD PRESETS → RESTORES FACTORY SETTING
  - ADJ CONTRAST → USE SPEED WHEEL

DIANOSTIC TEST TOOL (DTT)

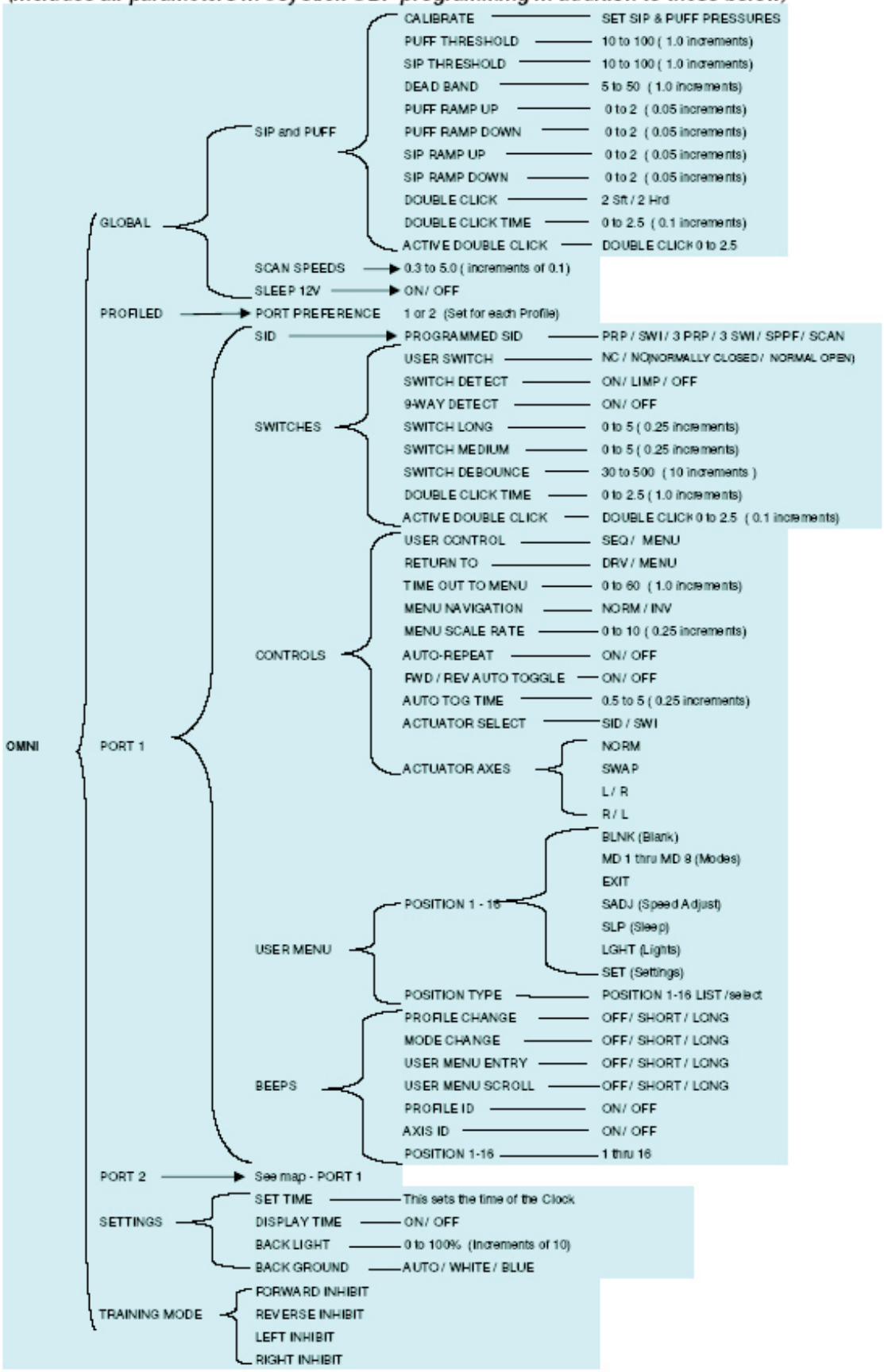
(Includes all parameters in Joystick OBP and OMNI programming inaddition to these below)

- MY FILES
  - READ → (Reads current file from controller)
  - DELETE → (Deletes the current file that is Highlighted)
  - WRITE → (Loads the currenty highlighted program file onto the controller)
- DIAGNOSTICS
  - SYSTEM TEST
    - IOM (INPUT OUTPUT MOD)
    - OMNI — COMMUNICATION
    - JSM (JOYSTICK MOD) — COMM / HORN / SPEED
    - DUAL — COMM / SP SETTING
    - PM (POWER MODULE)
      - COMMUNICATION
      - BATTERY GUAGE / VOLTAGE / CURRENT
      - VOLTAGE M1 — (LEFT / RIGHT MOTOR)
      - CURRENT M1 — (LEFT / RIGHT MOTOR)
      - HEAT SINK TEMP
      - INHIBIT 2 / 3 BAND
    - JOYSTICK STATUS — (INDICATES JSM POSITION)
  - SYSTEM LOGS
    - IOM / OMNI / JSM / DUAL / PM → (LISTS FAULTS AND CODES OF CONNECTED MODULES)
    - MY LOGS — (SAVE THE SYSTEM LOG FILE INTO MY LOGS)
  - SYSTEM TIMERS → (HOW MANY HOURS THE APPLICATION HAS BEEN DRIVEN)
- DTT INFO → (CONTAINS INFORMATION PERTAINING TO THE DTT INCLUDING THE SOFTWARE VERSION)

OBP Programming Quick Guide

OMNI PROGRAMMING *(Available when accessing OBP through OMNI or DTT)*

(Includes all parameters in Joystick OBP programming in addition to these below)



QUICKIE®

SUNRISE MEDICAL®
www.sunrisemedical.com

303.218.4600
800.333.4000
800.263.3390 in Canada

014061 Rev A