QUANTUM®
#1 FOR REHAB POWER

Pride Learning Institute

Quantum Rehab Technology and Repair

Q-Logic Electronics

Quantum Rehab Technology and Repair

- Power Positioning Technical Overview
- Control Options
- Q-Logic electronics overview and testing
- Basic Programming of Q-Logic electronics
- Handheld as a Troubleshooting Tool
- Hands on applications/troubleshooting

Quantum Rehab Technology and Repair Learning Objectives

- Upon Completion of this course the participant will be able to:
- Identify a Rehab seat and it's components.
- List different control options available for rehab products.
- Demonstrate proper readings at common test points.
- Summarize basic programming parameters of Q-logic electronics.
- Execute proper troubleshooting practices utilizing the hand held programmer.
- Execute proper troubleshooting practices following the Technical Troubleshooting Guides.

Introduction To Power Positioning

What is Power Positioning?

- Power Positioning is the process of adjusting a patient's seating position through electro-mechanical means.
- This includes the seat's back angle, tilt angle, leg elevation, or entire seat elevation.

Anatomy of a seat

- Base- seated surface
- Back- what your back rests against
- Foot Rigging- calf pads, foot rests, Etc.
- Seat to floor height- distance from the ground to top of seat base.

Tilt

- A tilt system will angle the back and the base of the seat. This will transfer some pressure from the patients bottom to their back.
- Allows 55° of Tilt on Tru-Balance seating systems
- Located under the seat base

Power Recline

- A power recline will change the angle of the back while the base remains stationary. Allowing the patient to lie back.
- Allows back of seat to recline to 168°
- Located on back of seat in an inverted position on Tru-Balance seating systems

Power ALR's

- Power actuating leg rests will raise the legs.
- The foot rests will move out as the legs raise to coincide with the legs natural movement. This feature typically works with power recline to allow the patient to lie flat.

Power Elevating Seat

A power elevating seat will raise the seat to floor height, allowing the patient to be higher off the ground while still seated.

Power Elevating Seat

Standard Tower Actuator

- Single Actuator mounted in base of unit
- Allows 6” or 7” of elevation

Lift and Tilt

- Two actuators mounted on bottom of seating system
- Allows 10” of elevation

Armrest Options

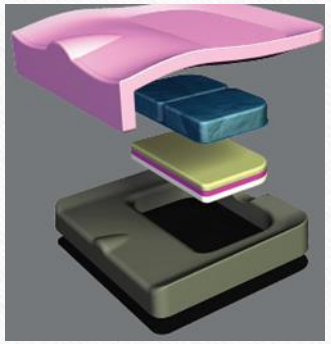
- Flip back, cane mounted
- Cantilever Armrests
- 2-Post, flip back, height adjustable, removable
- Single Post Height adjustable, removable
- Removable, single-post, height adjustable, heavy duty
- Pediatric, removable, adjustable, quick height
- Reclining, flip-back (Recline systems only)
- Desk and Full length armpads available in straight and waterfall designs

Foot Riggings

- Swing Away (Adult and Pediatric)
- Manual Elevating Legrests (ELR)
- Power Elevating Legrests (Power ELR)
- Power Articulating Legrests (ALR)
- Power Articulating Foot Platform (AFP)
- Heavy Duty Drop-ins
- High mount Clamp-on
- High mount foot platform

Positioning Components

- Cushions
- Synergy Simplicity, Solution, Solution 1, Spectrum, Spectrum Air, Tru-Comfort and Tru-Comfort Plus
- Thoracic or Hip/Thigh Laterals
- Abductor Pads
- Adductor Buttons/Pads
- Headrests
- Residual limb supports
- Arm Channels / Palm Extensions
- Belts / Straps
- Lap and pelvic belts
- Chest, Shoulder, Toe, Ankle and Legrest straps



Control Options

- Joystick
- Head array
- Sip n Puff
- Single/Toggle Switches
- Attendant control
- Other controls available including Magitek, Lap Trays, Foot control, Penta, Waffer, Star, Mini joysticks with chin or midline mounts

Q-Logic HandControl
Multiple Purpose Joystick

- 2.2” Color LCD Graphical Display

Input Device Summary
Handcontrol

On/Off and Mode Select Lever

- - Pressing forward powers the system On
- - Pressing forward again changes to the next Profile
- - Pulling downward turns the system Off
- -2 - 1/8" jacks on underside of joystick replace this function

Speed Pot Knob

- - Adjust the speed potentiometer
- - Increases in the direction of the longer bars
- - Programmable for different functional levels through (Handcontrol->Speed Pot->Type)

Horn Button

- Activates warning buzzer

I & II Buttons

- Provides the user shortcuts to desired profiles
- Factory programmed

Input Device Summary Handcontrol

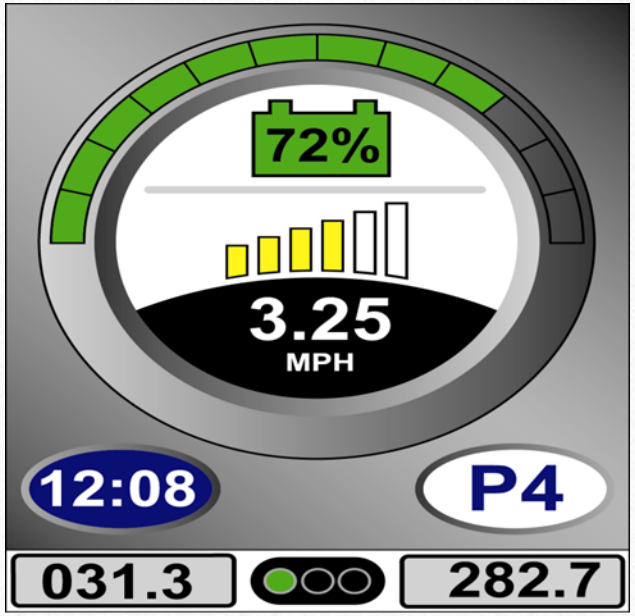
Main Menu Button

Provides user access to adjustments such as:

- -Display Brightness
- -Language
- -12/24 Hour Clock
- -Auditory Feedback
- -Measurement system, Std. & Metric

Input Device Summary
Handcontrol and Enhanced Display Screens

- Speedometer = 3.25mph-Can be removed from display
- Battery Charge Indicators; 2 ways
- 180° Arc & Actual % Value
- Profile Indicator = P4
- Real Time Clock = 12:08-Can be removed from display
- Speed Adjustment Bars = 2/3 of Max-Can be removed from display
- Odometer = 282.7 miles-Can be removed from display
- Trip Odometer = 31.3 miles-Can be removed from display
- Drive Status Indicator = Green or Full Speed
- Green – Full Drive
- Yellow – ¼ Speed or Rescue Drive
- Red - Full Drive Lockout



Drive Screen

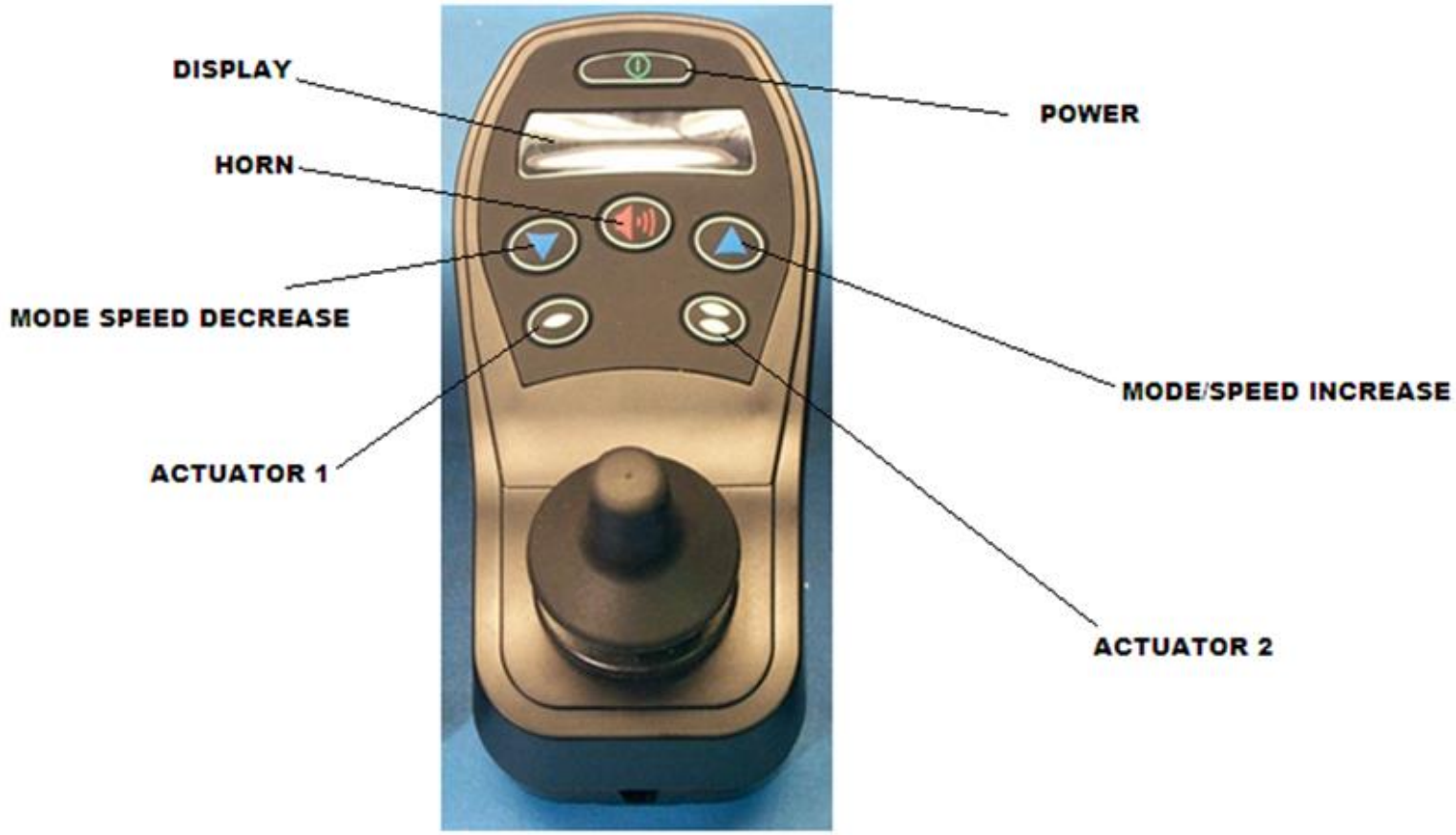
Input Device Summary Handcontrol and Enhanced Display Screens

- Illuminated Panels indicate active seating functions
- Tilt is Active
- Drive Status Indicator = Red
- Battery Indicator = 92%
- Profile Indicator = P4
- Real Time Clock = 10:37

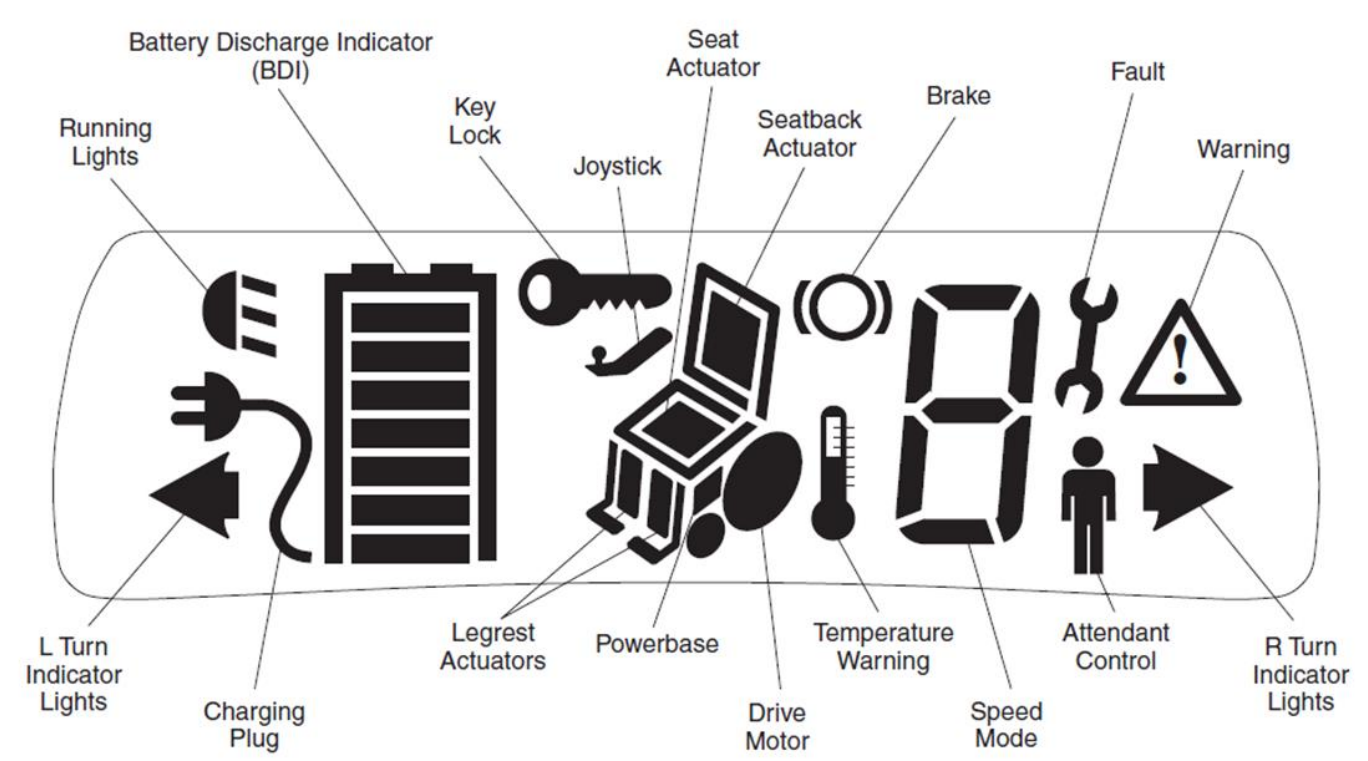
Seating Screen

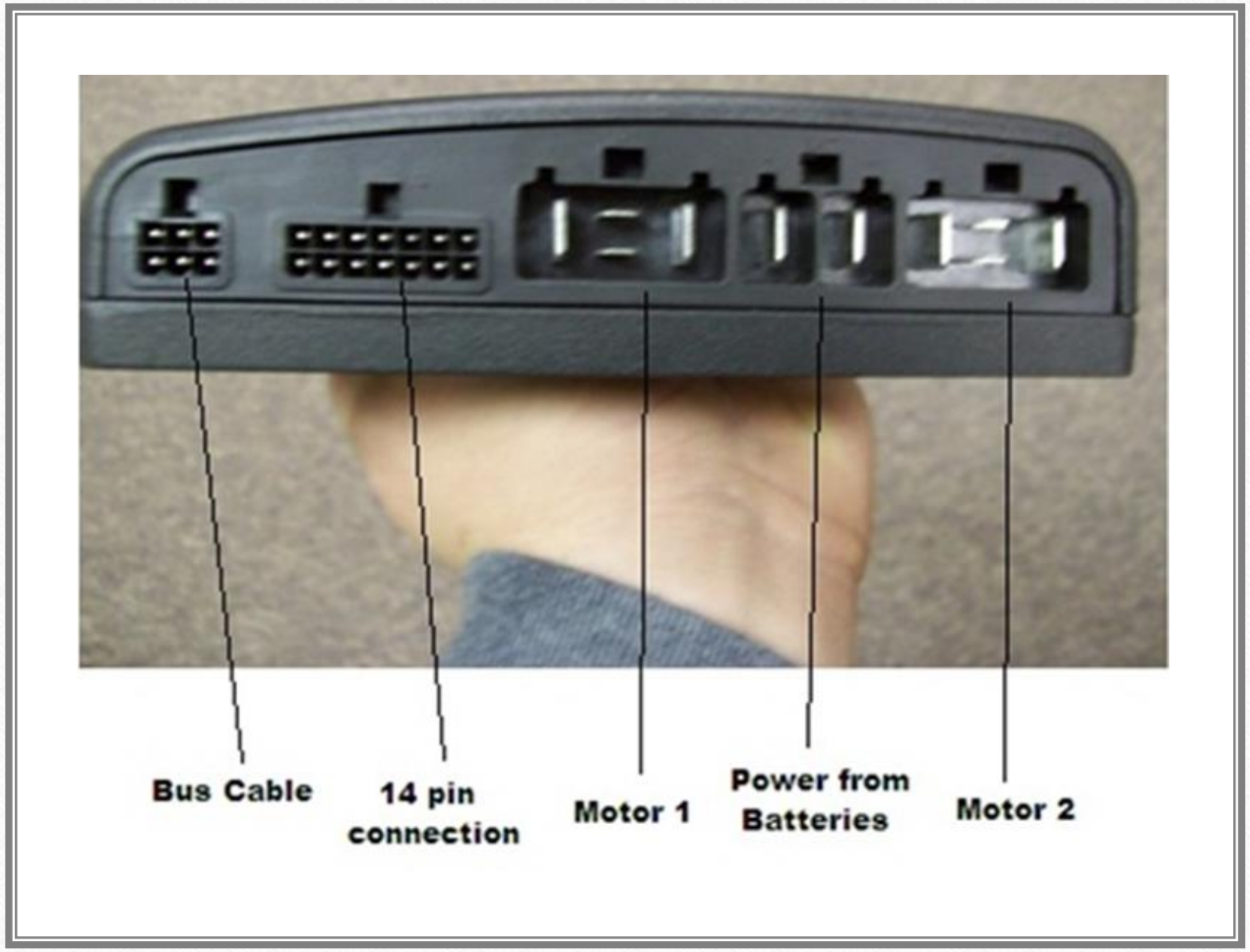
NE+ Hand Control

- Non-expandable control
- 3 hand control options- Jacks, Jacks and Actuators, Jacks, Lights, and Actuators
- Modules for single actuator, two actuator, lights or 2 Actuators and Lights
- Same battery, motor, actuator, and inhibit connectors between modules
- Allows for easy upgrade of control systems in the field
- Jack to activate single actuator through switch



Reading The LCD Screen



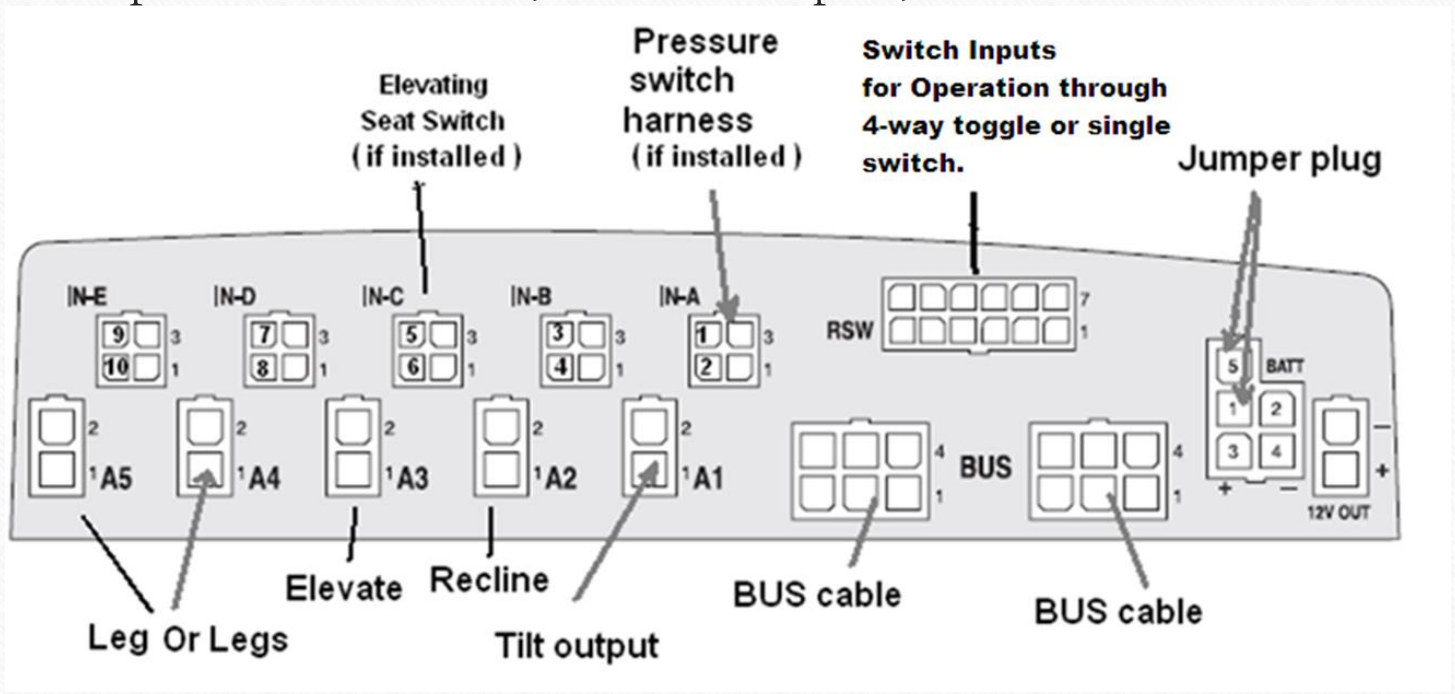


Q-Logic Power Base

- 100 Amps
- Designed to accept motor Feedback
- Built in switch Inputs
- Controls the brake and drive motors and is the master of the system
- Where most information is stored and where input and output signals are managed

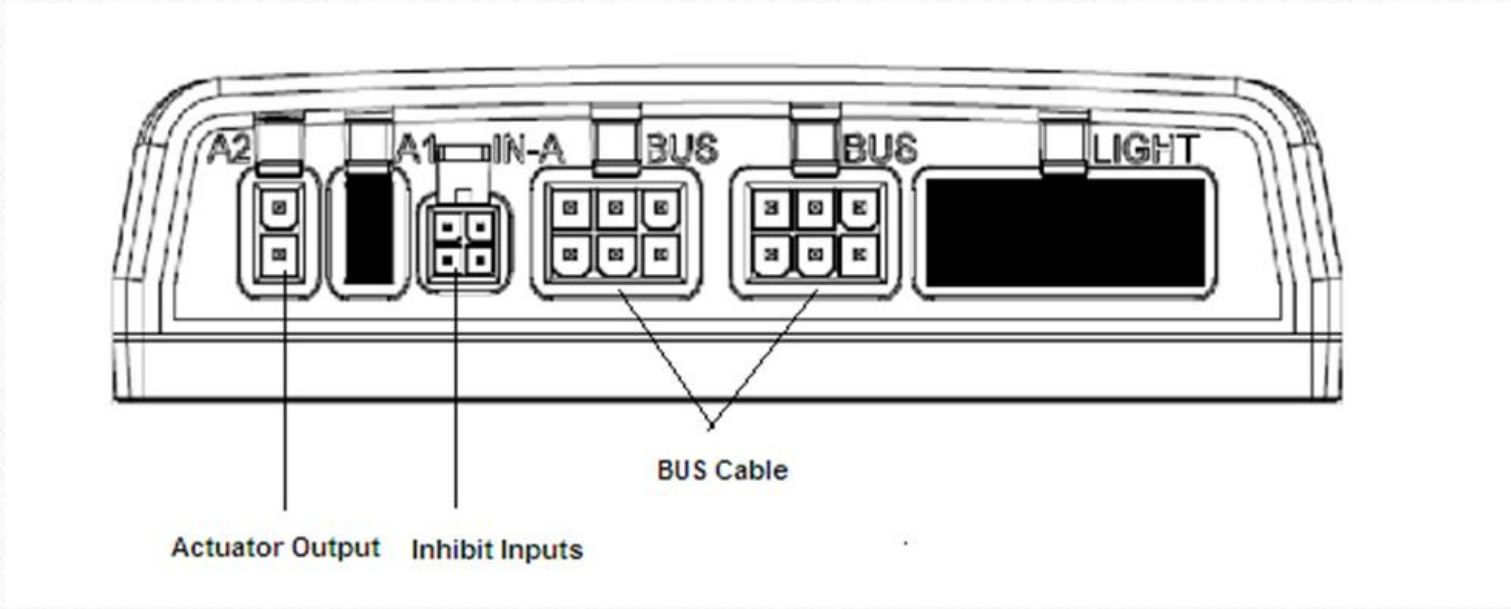
AAM

The AAM has outputs for 5 actuators, 10 Inhibit inputs, 2 bus connections and a 12 Volt output.



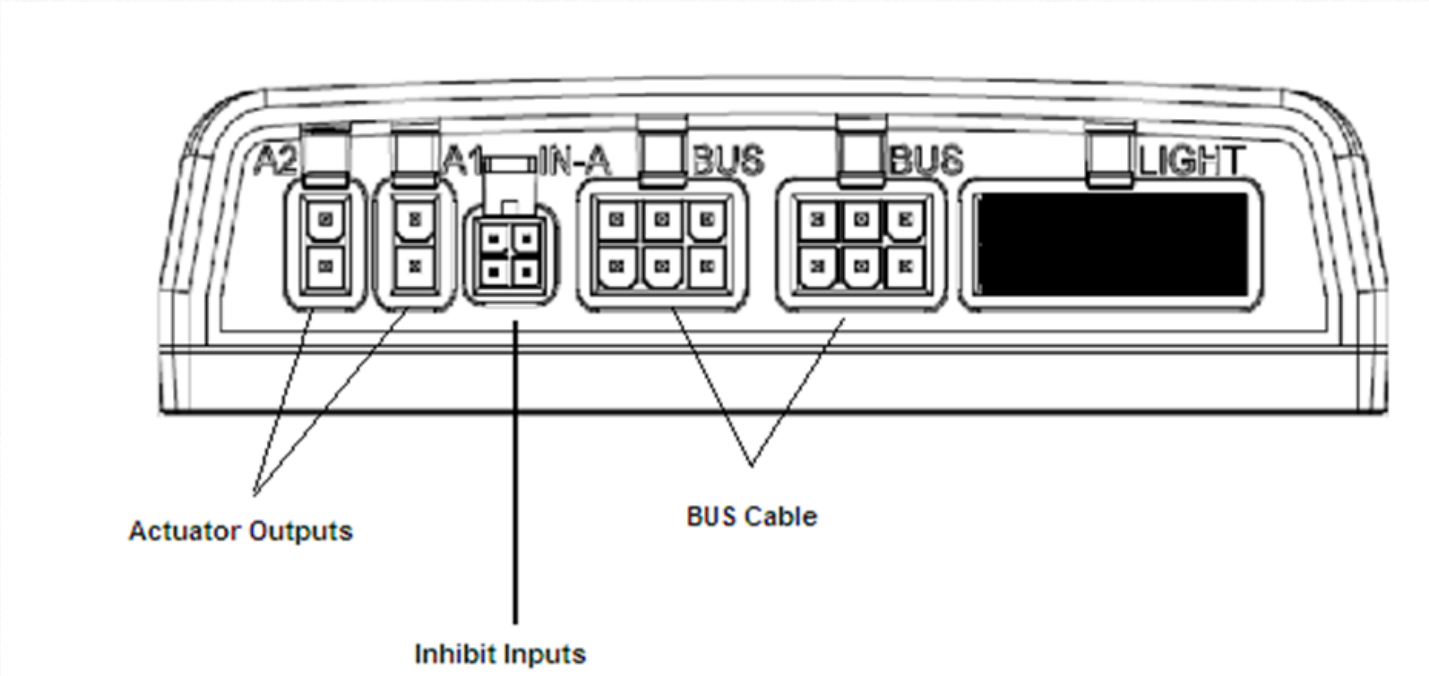
AM1

The AM1 has outputs for 1 actuator, 2 Inhibit inputs and 2 bus connections



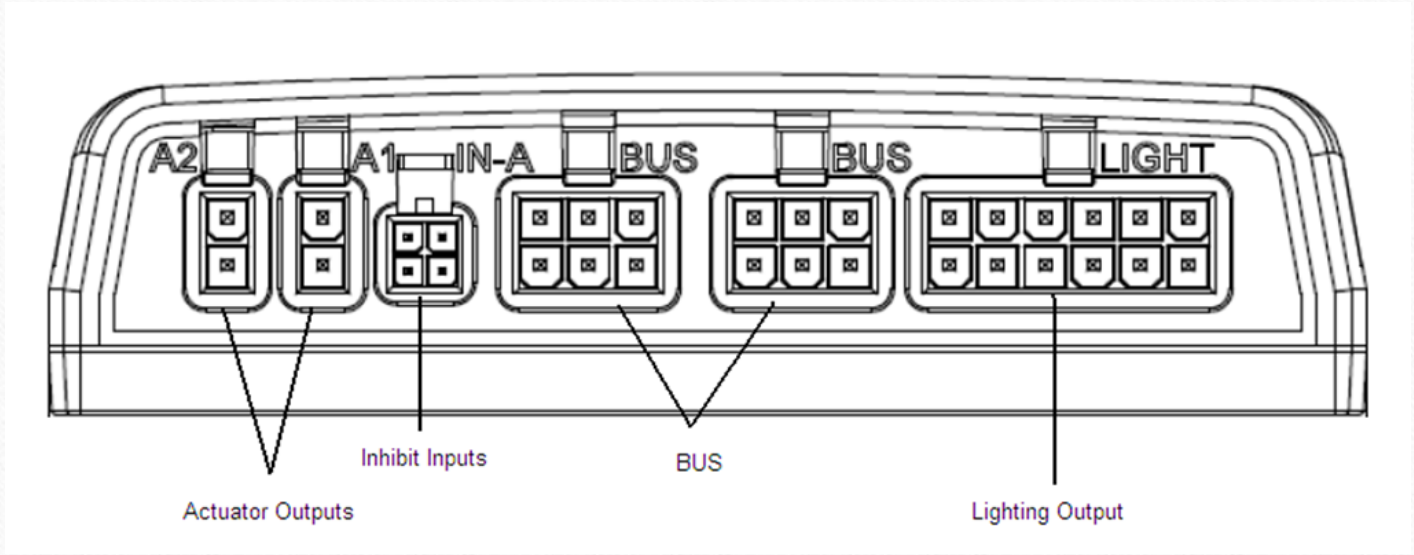
AM2

The AM2 has outputs for 2 actuators, 2 Inhibit inputs And 2 bus connections



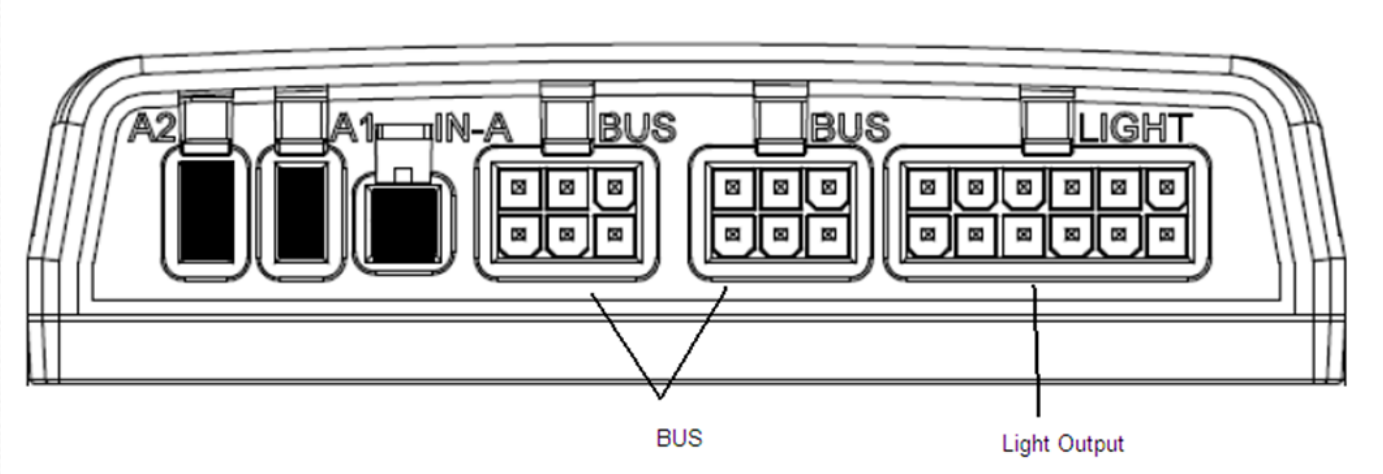
LAM2

The LAM2 has outputs for 2 actuators, 2 Inhibit inputs, 2 bus connections and Light Output



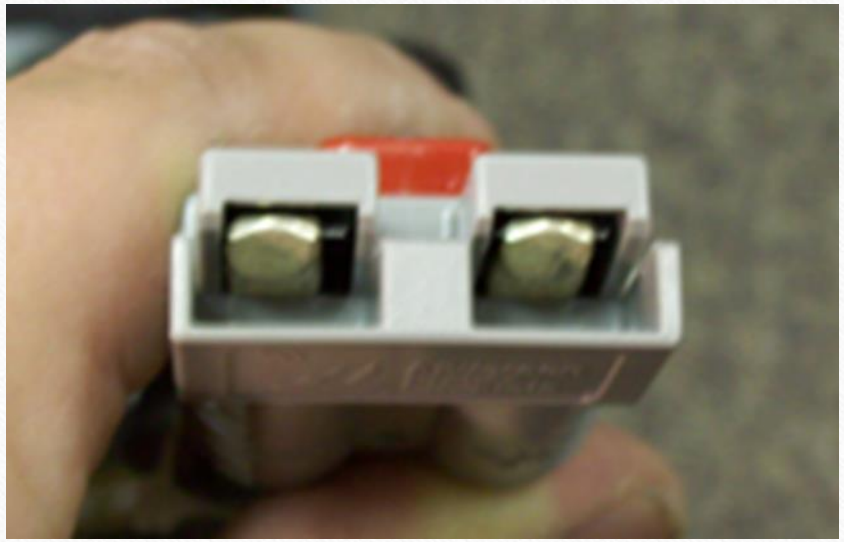
LM

The LM has 2 bus connections and Light Output



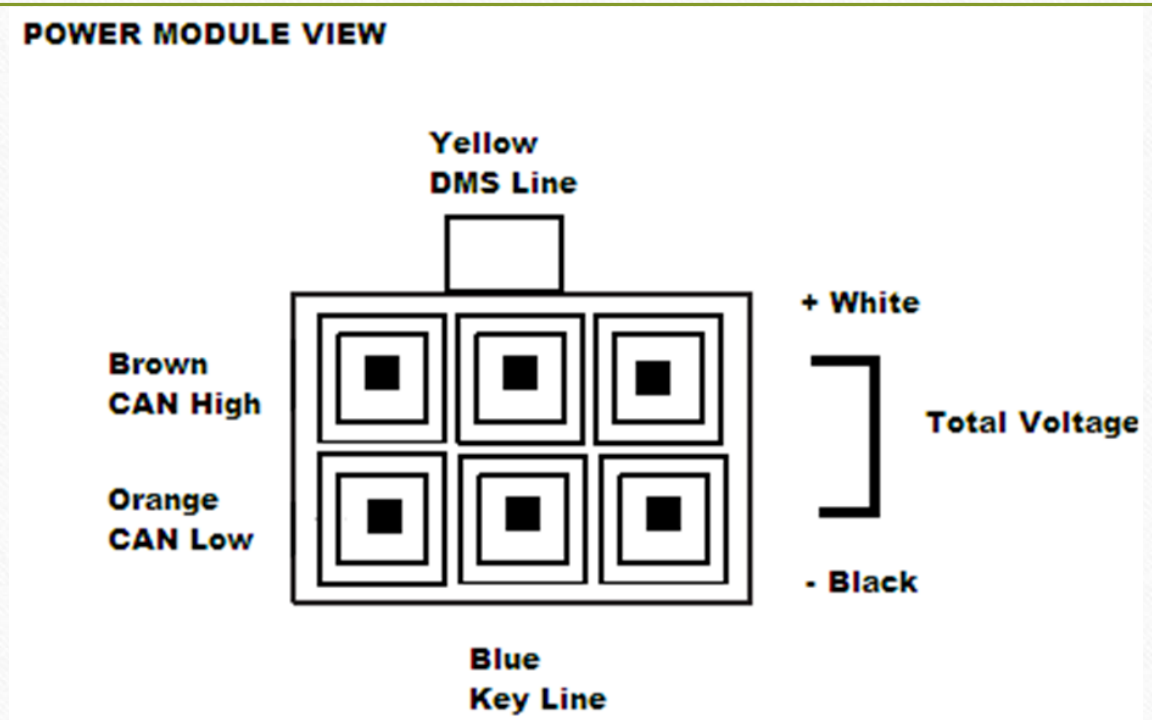
Common Test Points

Q-Logic Power input from battery



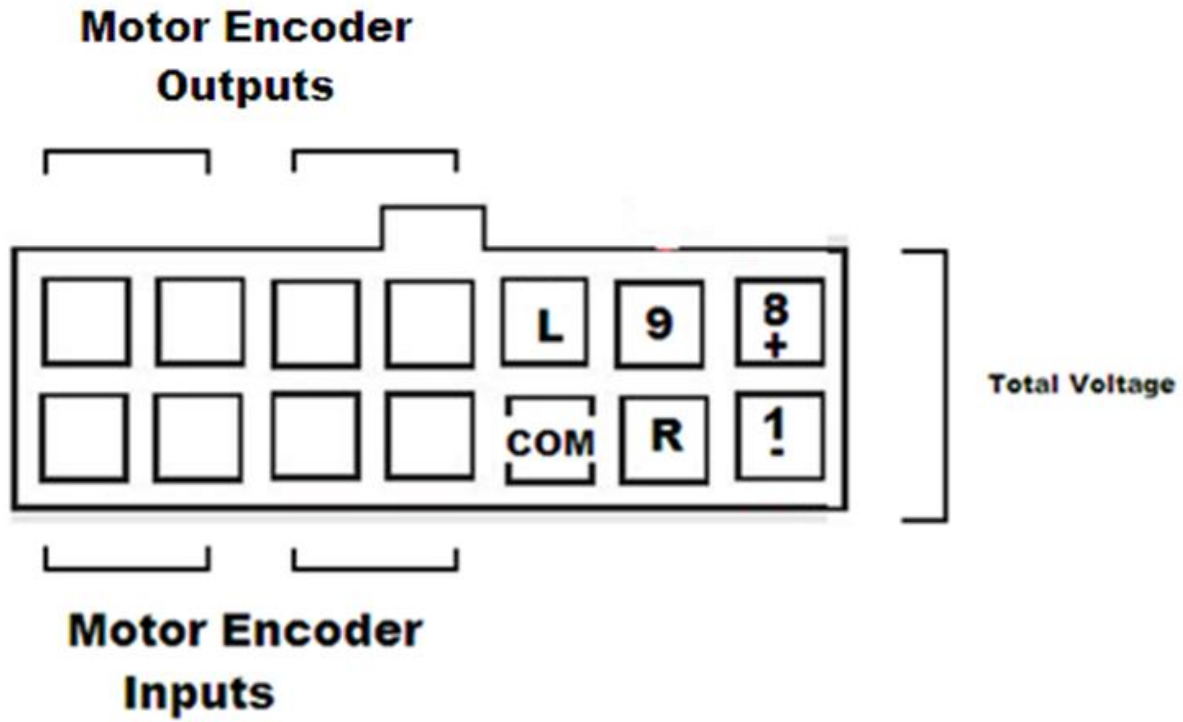
Q-Logic Power Connection Input to Power Module

Common Test Points



Common Test Points

Power Module View



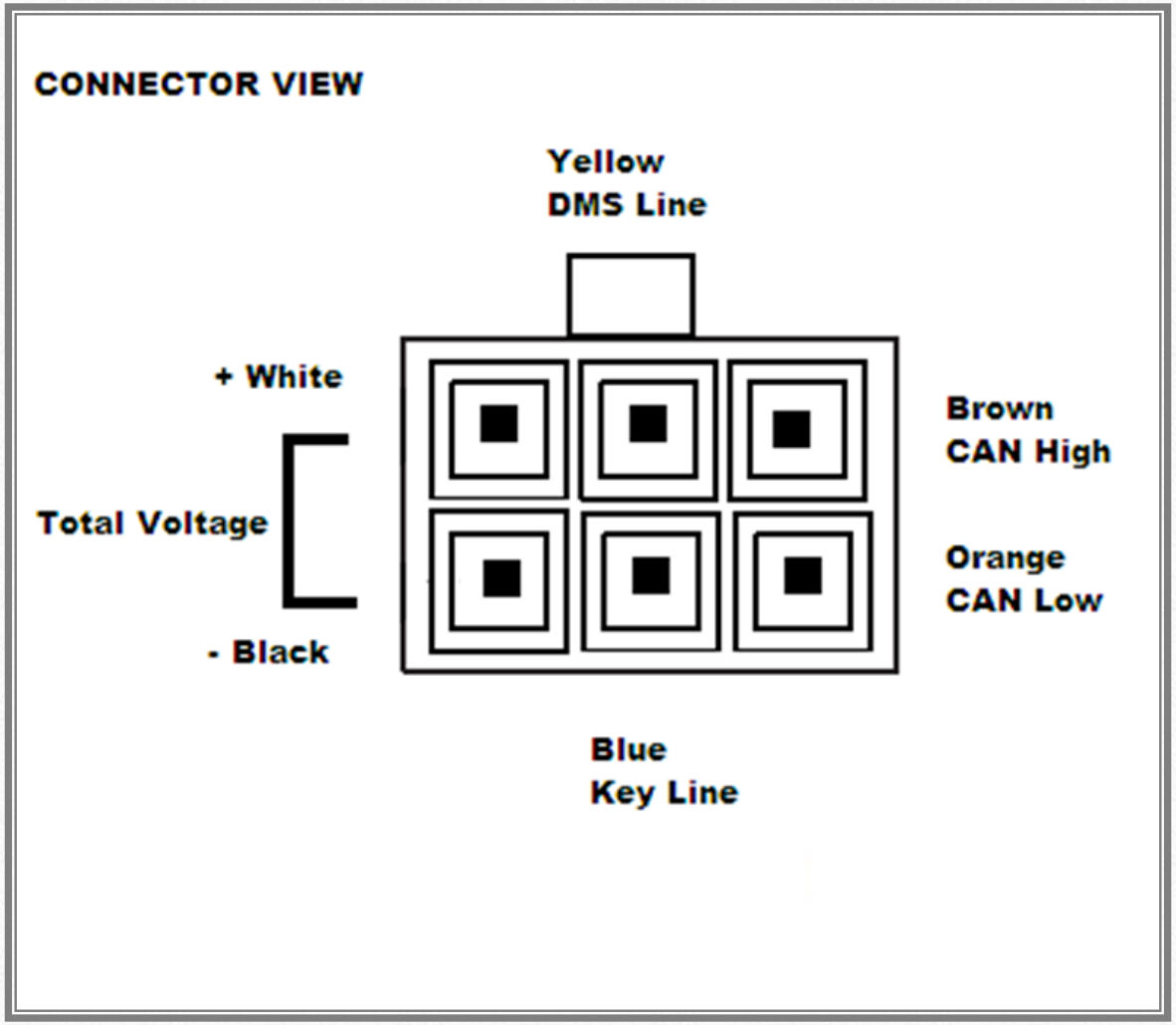
Pin 2 to Common(3)=Right Mouse Click
Pin 10 to Common (3)=Left Mouse Click
Pin 1 to Pin 9=Closes Inhibit
Pin 1 to Pin 8=Total Voltage
Pin 4 to 5=Encoder Input
Pin 6 to 7=Encoder Input
Pins 11 to 12=Encoder Output
Pins 13 to 14=Encoder Output

Common Test Points

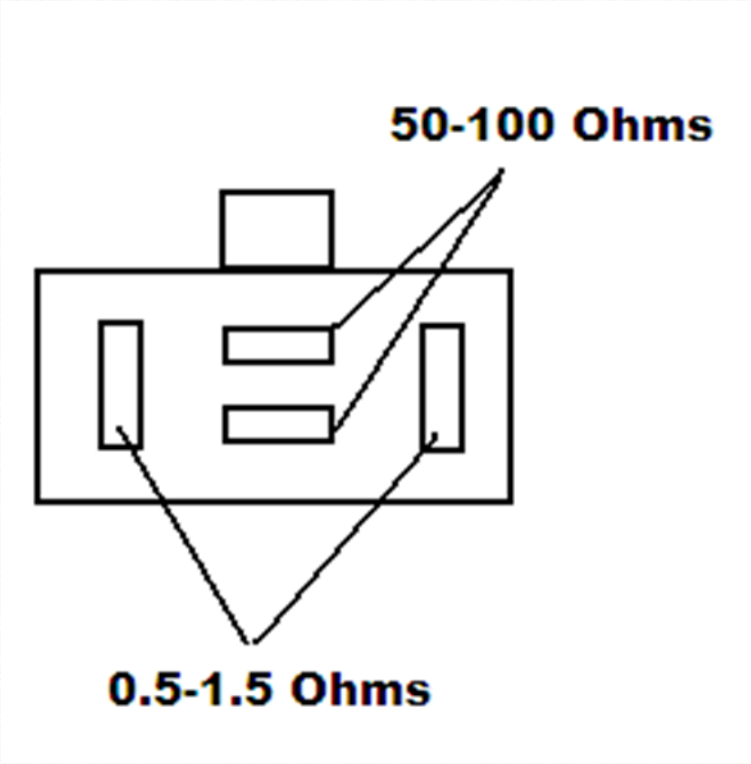
- 6 Pin Bus cable
- Common connection for all input devices
- Carries power and communication throughout the system

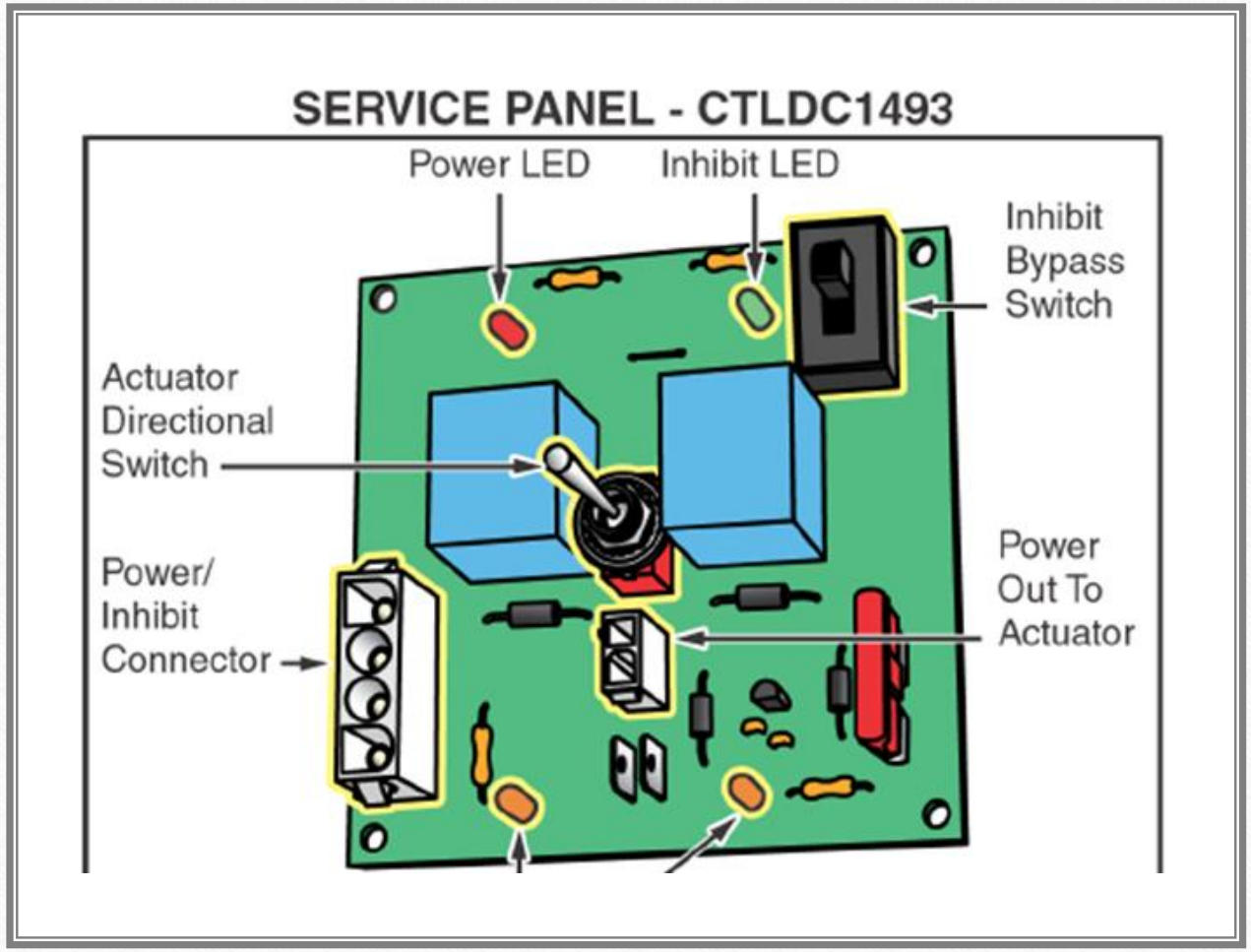
Common Test Points

BUS Cable Pin out



Motor and Brake Connection

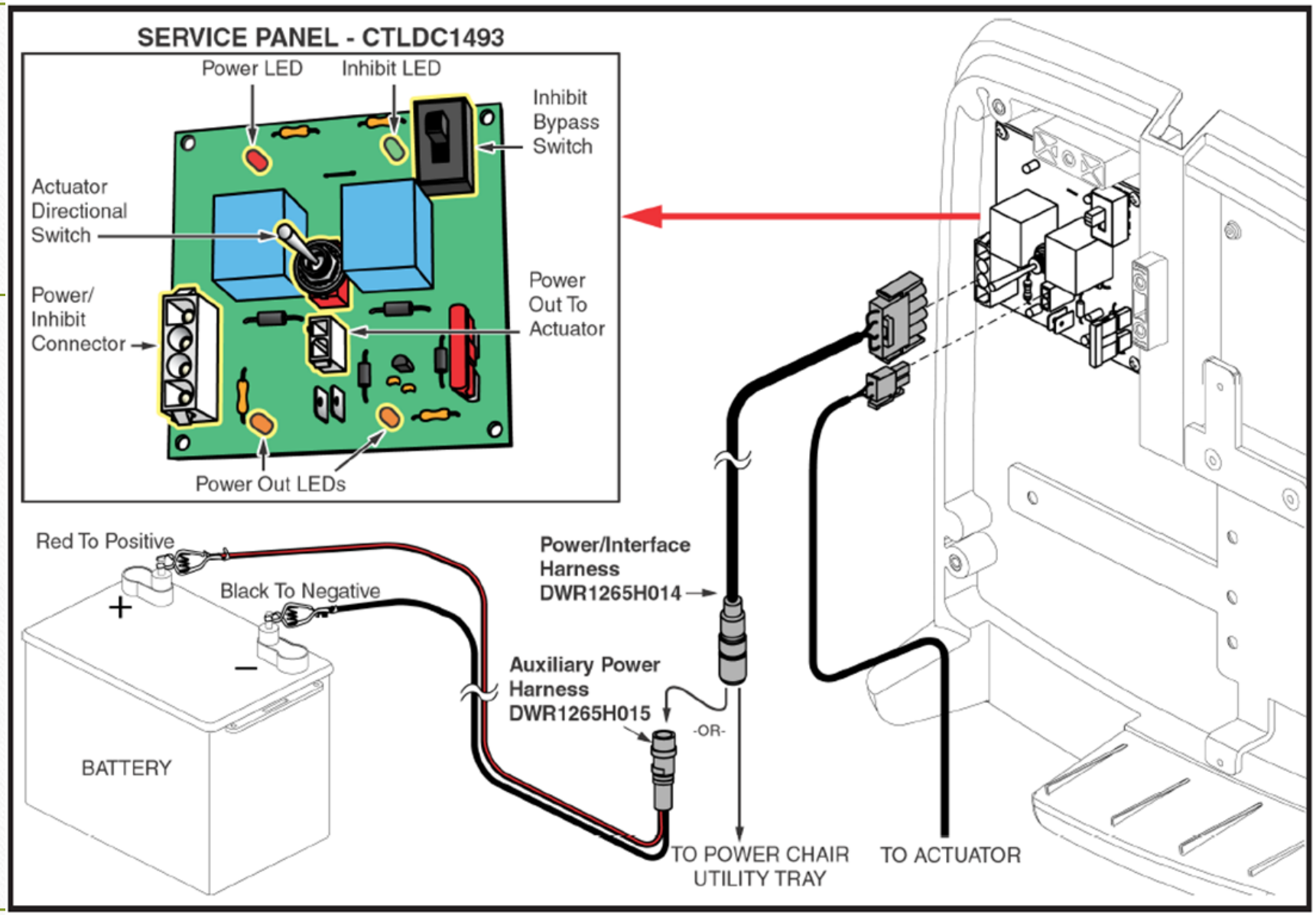




TB2 Service Panel

- Included on all TB2 Seating systems
- Allows Direct power to be applied to actuators
- Allows Emergency Bypass of Controllers to get seating back down.
- Included Harnesses

~~DWR1265H014 (Interface)~~
~~DWR1265H015 (Power)~~

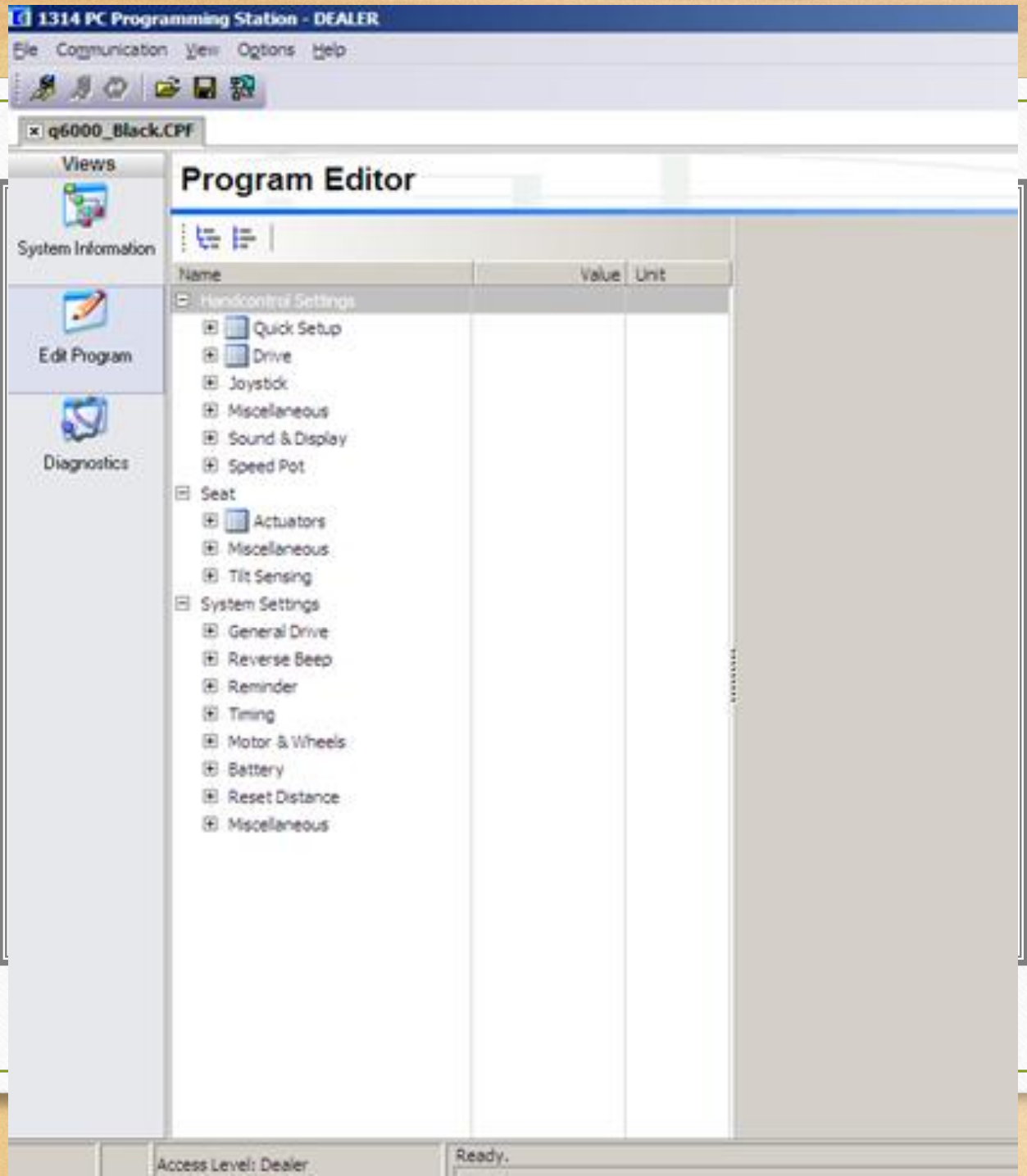

SERVICE PANEL - CTLDC1493
Power LED
Inhibit LED
Inhibit Bypass Switch
Actuator Directional Switch
Power/ Inhibit Connector
Power Out To Actuator
Power Out LEDs
Red To Positive
Black To Negative
+
–
BATTERY
Power/Interface Harness DWR1265H014
Auxiliary Power Harness DWR1265H015
-OR-
TO POWER CHAIR UTILITY TRAY
TO ACTUATOR

Q-Logic Programming

- Programmers
- Basic programming parameters
- Using the programmer as a troubleshooting tool
- Firmware updates

Hand Held Programmer

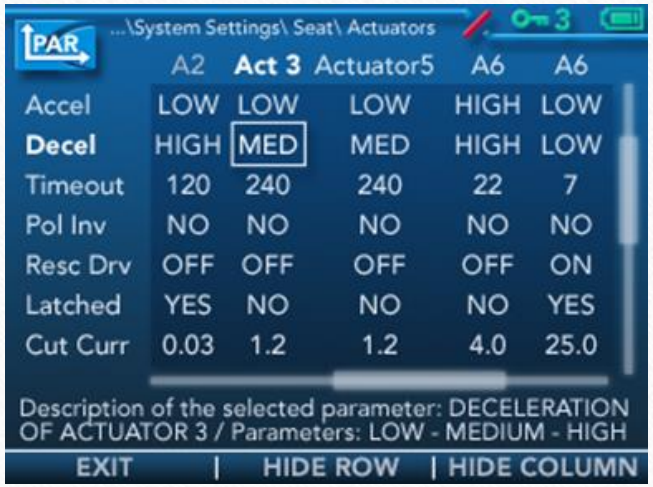
- Uses simple menu tree to easily navigate menus
- ELEASMB5215 Part Number
- Displays all drive profiles at once for quick programming
- Convenient “Bookmark” feature allows for easy program menu navigation
- Allows changes to be made while driving to more customize the system to a specific client



PC Programming Station

- Requires the purchase of an additional Cable to connect Power chair to Computer.
- Uses the same menu tree navigation as the Hand Held Programmer.
- Has added features to save and upload files.
- Will only work with Q-logic and NE+ (not available for NE)

New Q-Logic Handheld Programmer



- Next generation programming device
- Allows for easy one handed operation
- Provides
- Programming
- Firmware / Software Updates
- Diagnostics
- Monitoring
- Color LCD with Programmable Backlight (not a touch screen)

New Q-Logic Handheld Programmer

- 3 Navigation Keys
- Quad Arrow Keys for menu navigation
- +/- Keys for parameter adjustments
- Favorites Menu for Shortcuts to often used parameters or monitor values
- Icon Based Menu for Windows-Like Navigation Structure
- Help Text Pop-Ups to describe function of each parameter

New Q-Logic Handheld Programmer

- SD Card Slot
- Memory size dependent on SD Card fitted
- Cards can be purchased at Wal-Mart or any electronics store
- Allows for saving firmware, software, and individual client files
- Hinged rubber cover

New Q-Logic Handheld Programmer

- Battery Powered for off-chair adjustment of programs
- Mini USB port allows easy transfer of files between hand held programmer and PC programmer via connection to a PC USB
- Update the programmer easily though USB connector
- Appears as a mass storage device when connected
- No special software needed to transfer files

New Programmer Operation

Power Button

- Ability to turn on the Programmer without the need to connect to a system. (Requires 2 AA Batteries)

Softkeys

- Provides three versatile softkeys that provide multiple functions depending on the context. The function of these keys change as the screens change.

Arrow keys

- Allow you to move up, down , in and out of the menu trees.

+/- Keys

- Allows you to adjust Programmable parameters.

Help Function

- The Help screen gives descriptions of adjustable Parameters, Monitored Values and Faults.

Favorites

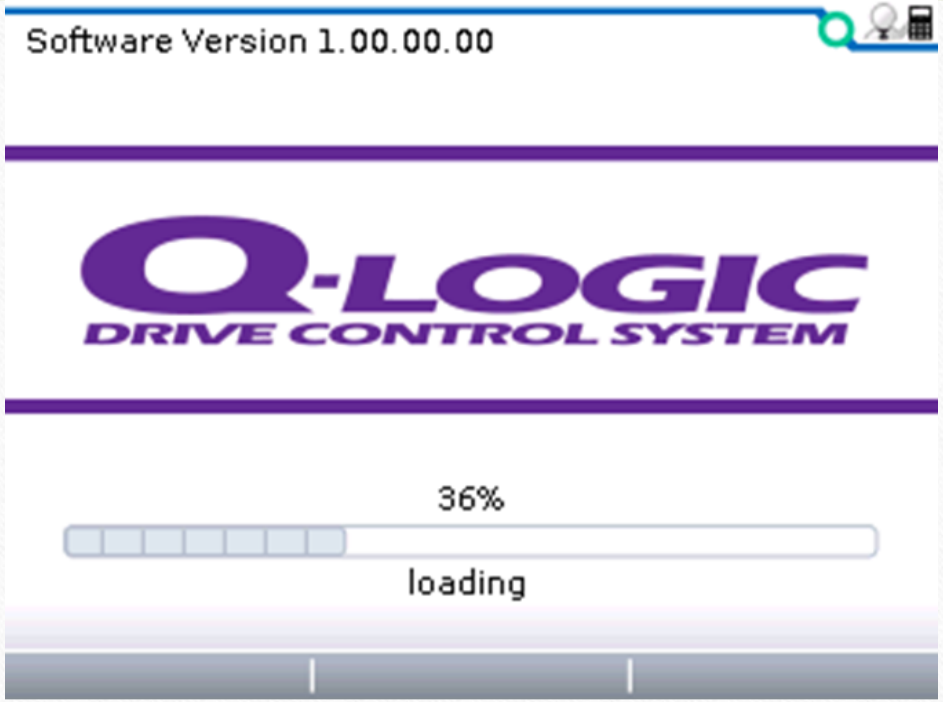
- The favorites function allows you to create shortcuts to your frequently-used adjustable parameters and monitor values.

Main Menu Button

- The main menu button returns you to the main menu of the programmer.

Hand Held Programmer

- Navigation

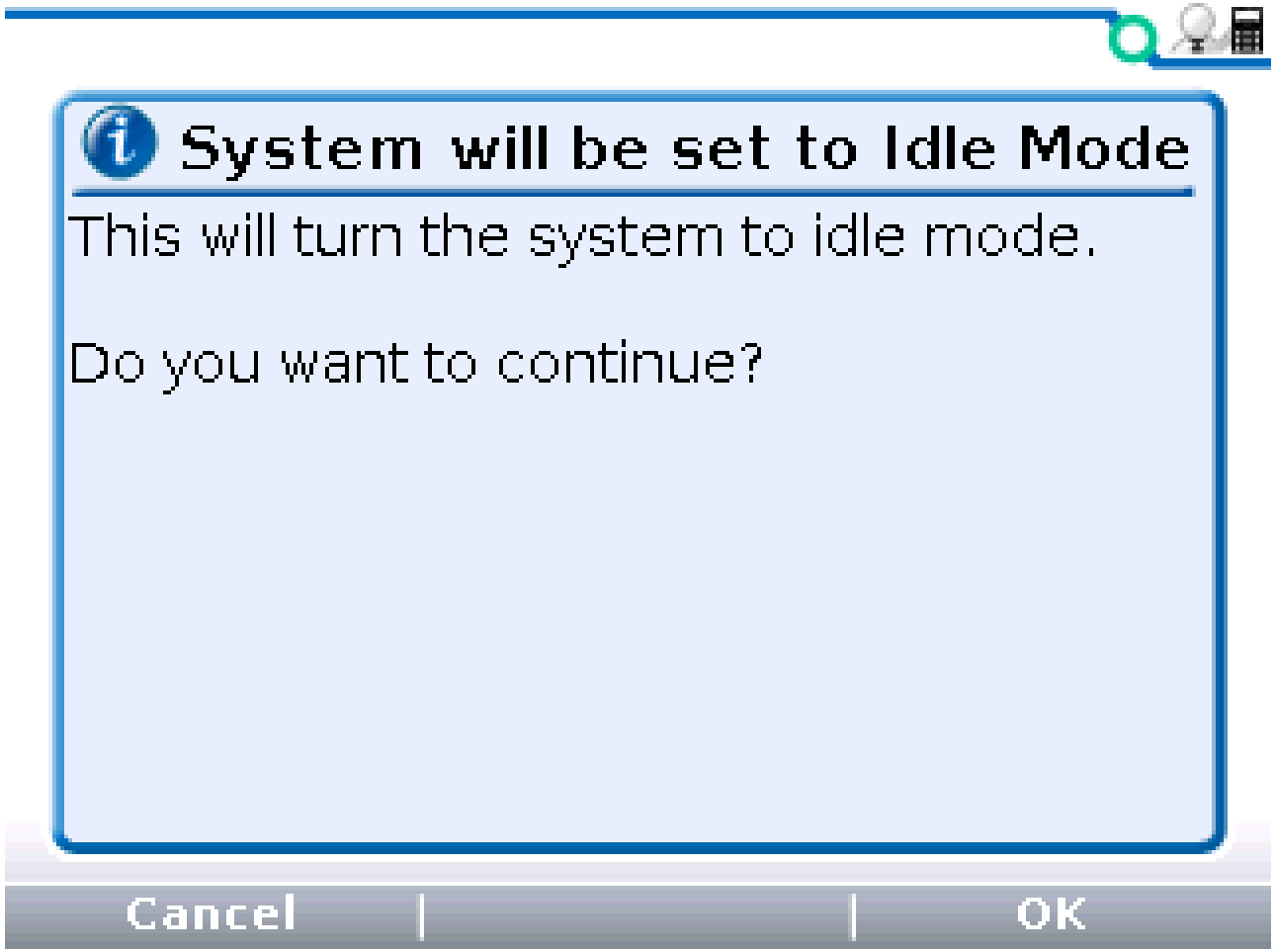


Start Up Screen

To Enter a Menu use the directional arrows to select the menu and then press the button below “Select”

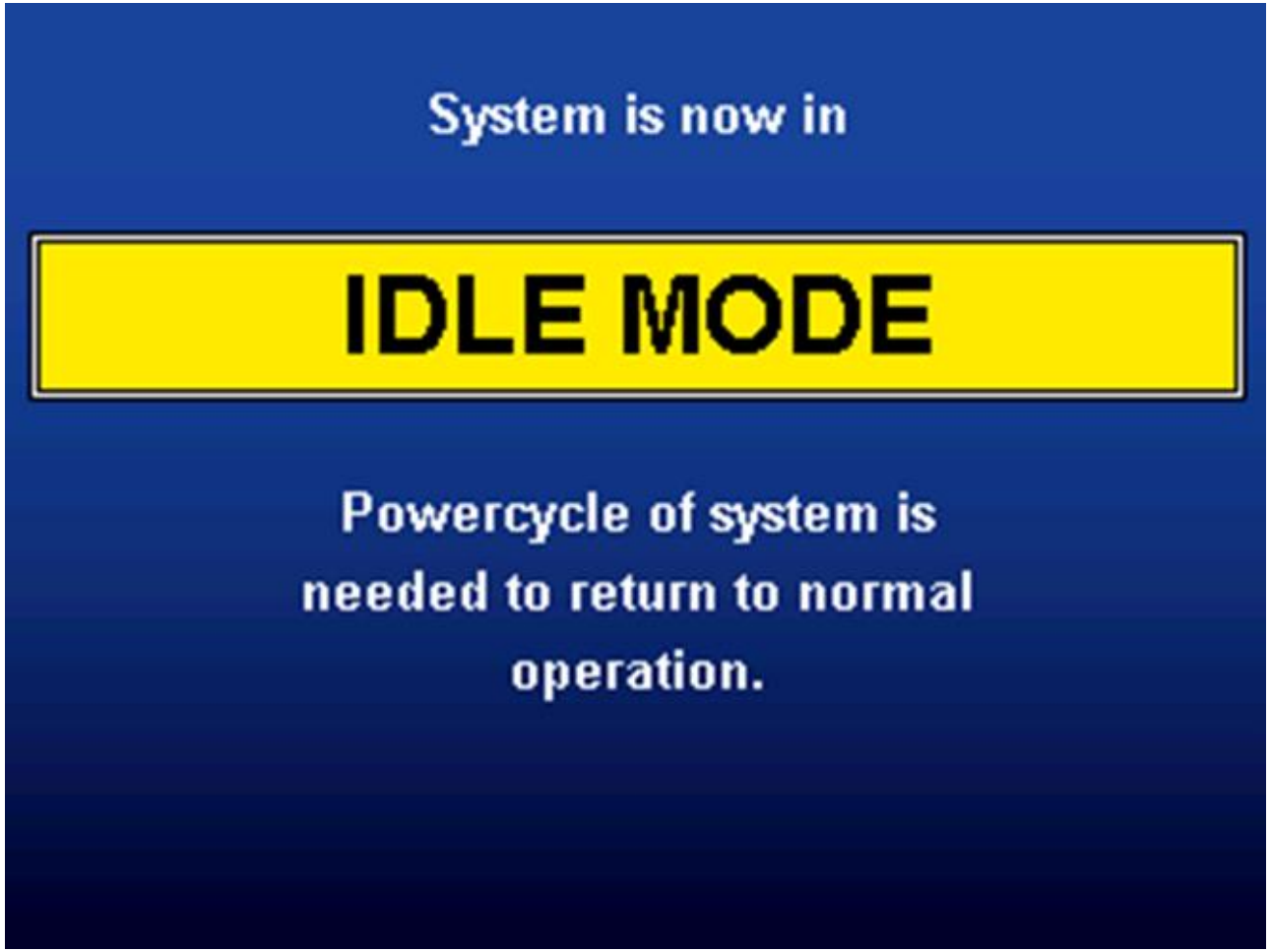
IDLE MODE – Programmer Screen

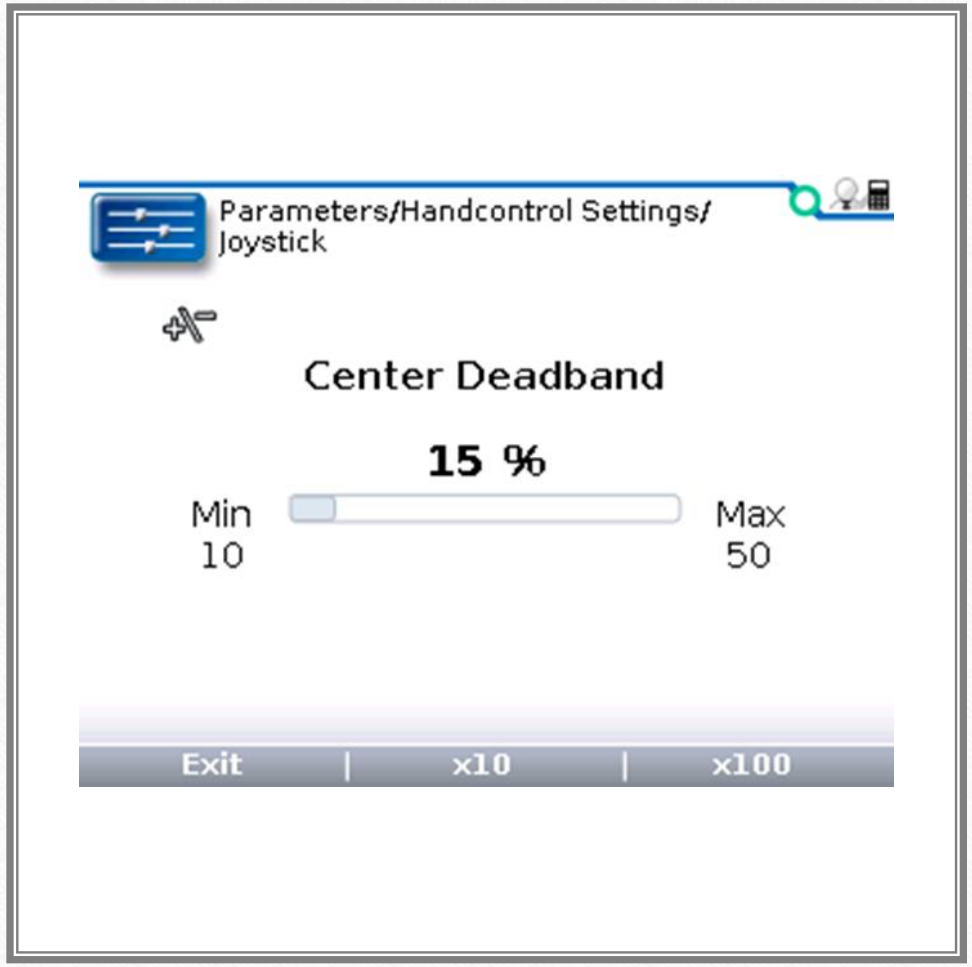
- When Entering Idle mode the programmer will Advise that Idle Mode must be entered
- Press OK to Accept



IDLE MODE - Display Screen

- System Safety Setting
- Automatically enters IDLE Mode to warn the programmer of a major change taking place
- Requires a simple Power Cycle to Reset
- Occurs during adjustments such as:
  - Latch Mode
  - Assigning Directions
  - Changing Input Device



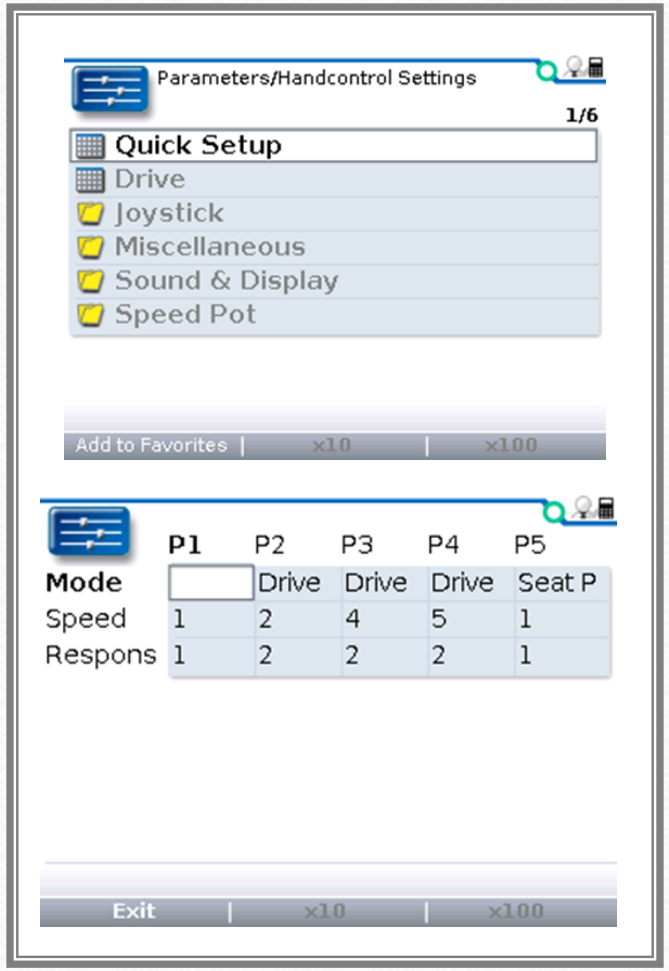


Handheld Programmer operation summary

- When in a Program Change screen using the Plus (+) and Minus (-) Key will change the values up and down

Handcontrol
Multiple Purpose Joystick

Programming Review



Handcontrol
Quick Setup Parameter Programming

Quick Setup

Profile allocation

- Drive
- Seat
- Aux.
- Enable
- Disabled

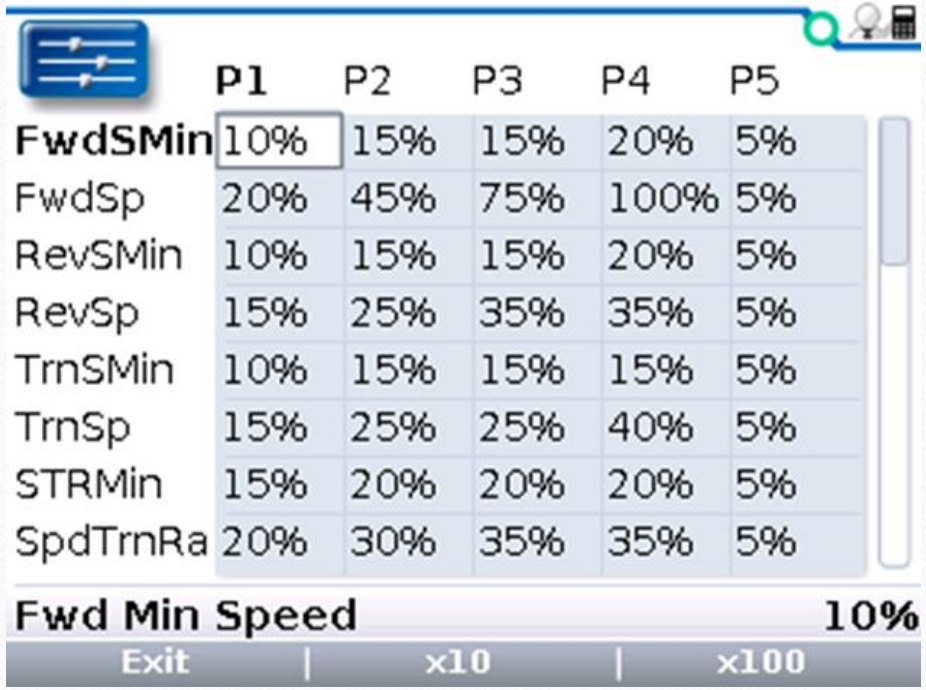
Speed & Response

- 1-5 Value for each
- Gives quick adj's to desired driving aspects for both overall speed and responsiveness of the powerchair.
- Profile 1 is always a Drive profile!!

Handcontrol
Drive Parameter Programming

Drive

- Fwd Speed
- Turn Speed
- Fwd Accel
- Fwd Decel
- Rev Accel
- Rev Decel
- Turn Accel
- Turn Decel
- Turn Sensitivity



Speed Turn Rate

- Defines the maximum turn speed when the speed pot is at its minimum position.

Latch Forward

- Stepped & Cruise

Power

- Only reduces the power going to the motors

Latch Reverse

- Stepped & Cruse Used Rarely & with Caution!!

Handcontrol
Joystick Parameter Programming

Joystick Parameter

Center Deadband:

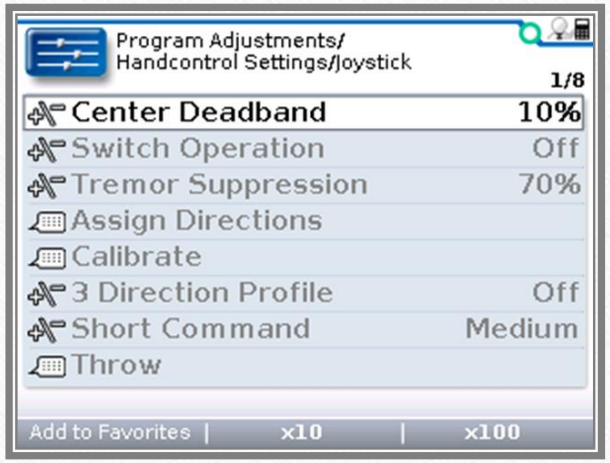
- Defines how far the joystick must be moved from the center to recognize it as a command.

Switched Operation:

- Changes joystick from proportional operation to switched

Tremor Suppression:

- This settings allows the operator to manipulate the responsiveness of the joystick. This setting is useful for users who have hand tremors.



Handcontrol Joystick Parameter programming Cont.

Joystick Parameter

Assign Directions:

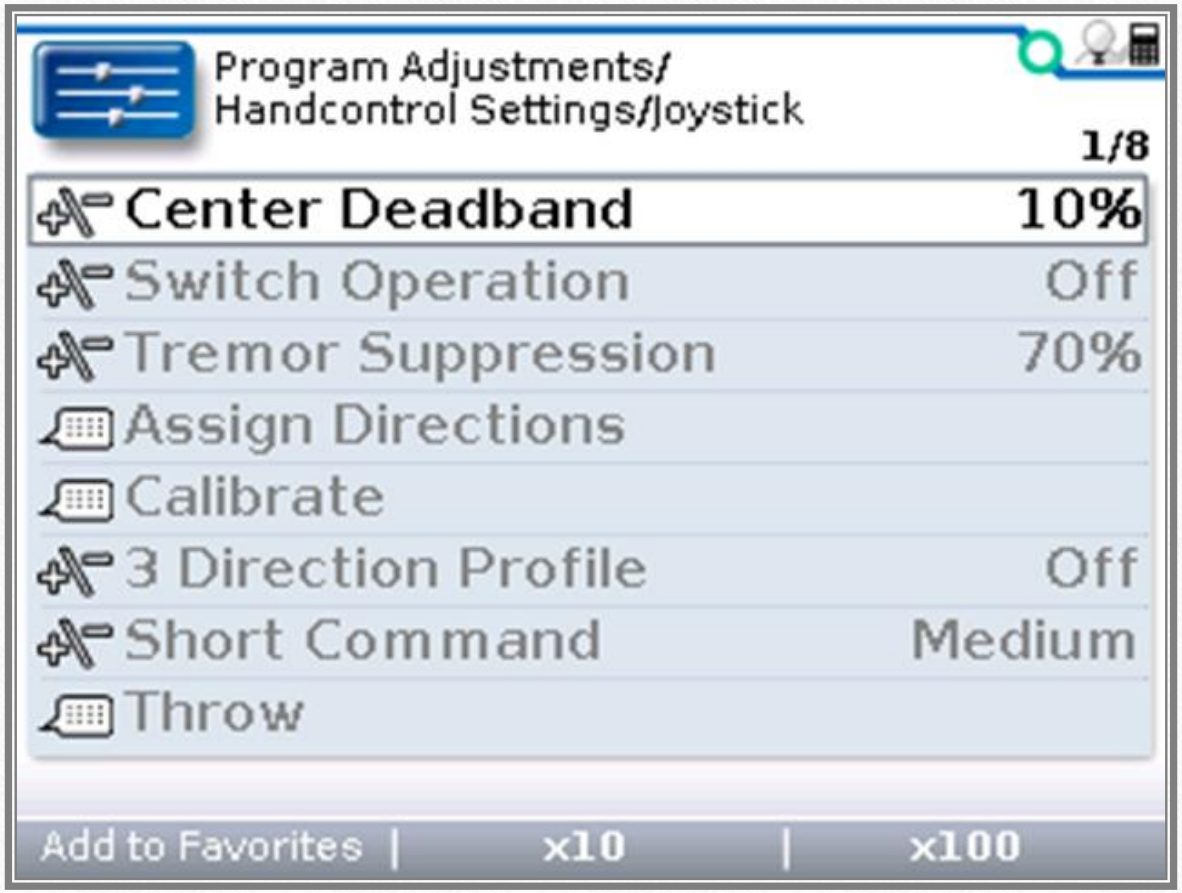
- This setting allows you to change the orientation of the joystick. By using this parameter a HandControl could be set up so the user pushes the joystick forward to achieve a reverse drive

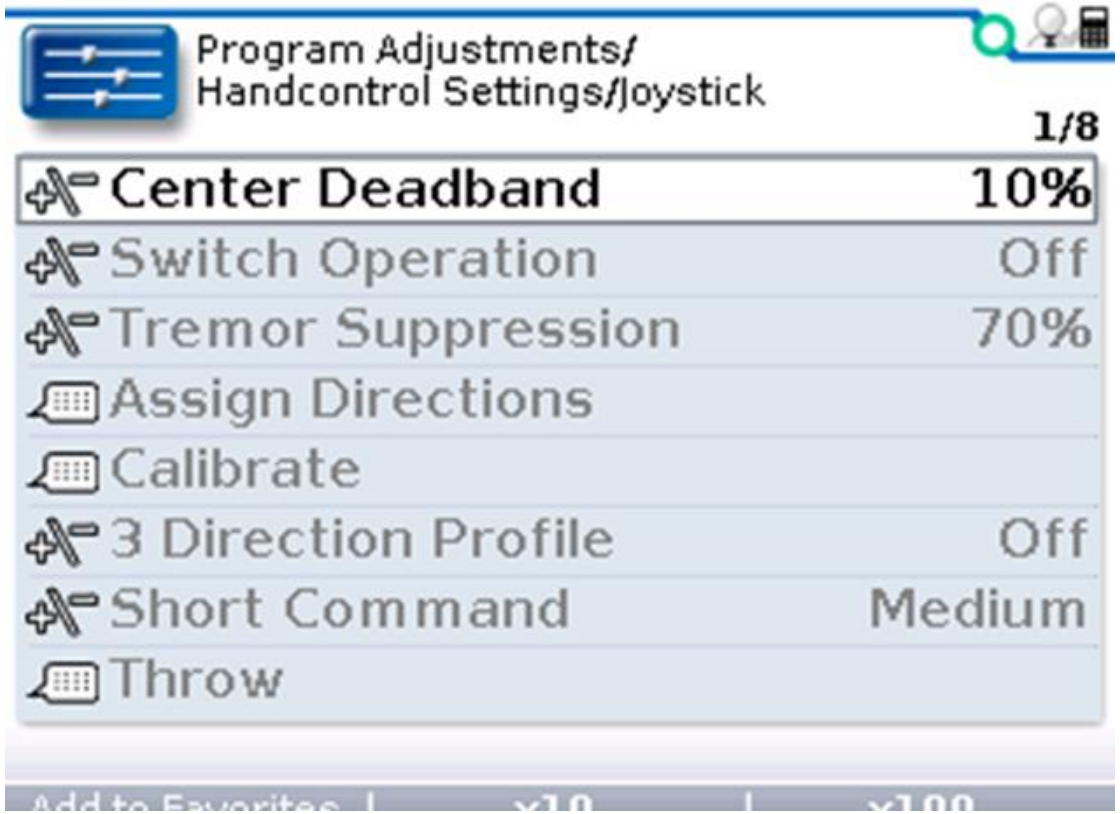
Calibrate:

- Performs the calibration function to calibrate the joystick.

3 Direction Profile:

- This setting is enabled for operators who cannot use all four direction of the HandControl. When enabled only the left, right, and reverse directions are active. Forward and reverse drive are both on the reverse direction of the joystick. A short reverse command will toggle between forward and reverse.





Handcontrol Joystick Parameter programming Cont.

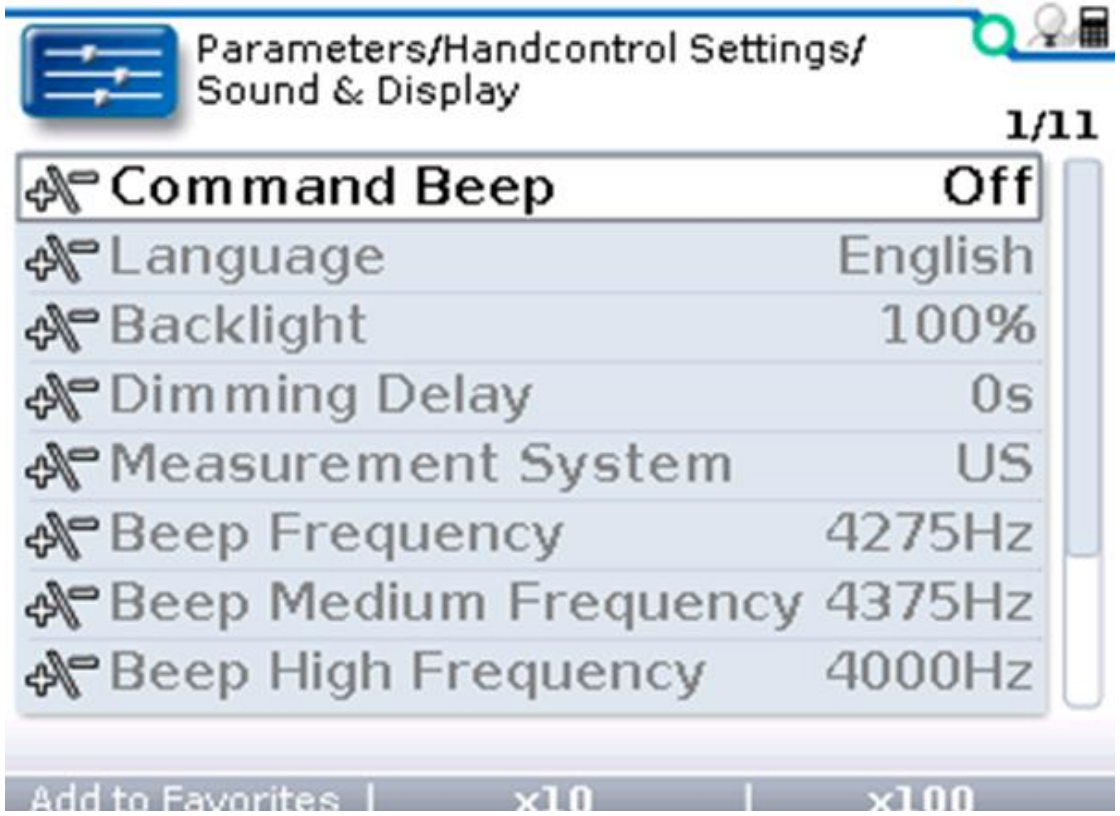
Joystick Parameter

Short Command:

- Adjusts the amount of time needed to make a fwd/rev command in 3 direction profile

Throw:

- The joystick throw parameter defines how far the joystick must be moved in each direction to generate a full speed command.



Handcontrol Sound and Display Parameter programming

Sound and Display

Command Beep:

- This parameter enables a short beep to give audible feed back when a menu command is recognized.

Language:

- Sets your preferred language dialog English, German, Italian, French and Spanish

Backlight:

- Sets the desired amount of illumination from the display.

Dimming Delay:

- This parameter allows you to set a time-out if no command is given. The display will dim until a command is given.

Handcontrol
Sound and Display Parameter programming

Sound and Display (cont'd)

Beep Frequency:

- The frequency of the beep and warning frequencies.

Beep Medium Frequency:

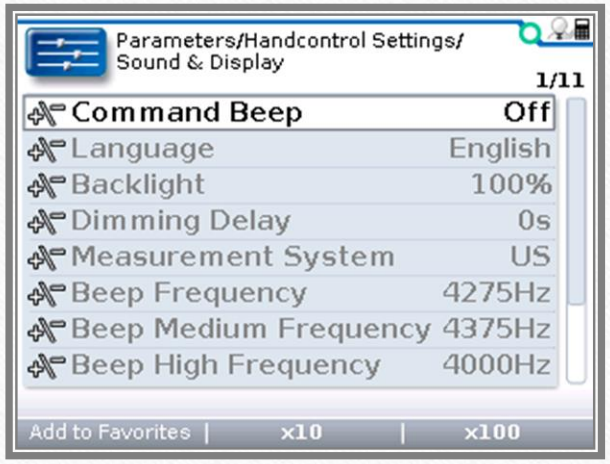
- The frequency of the medium beep that signals the change into seat

Beep High Frequency:

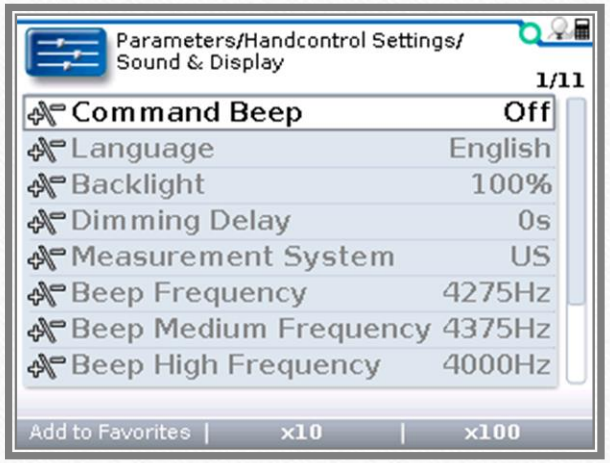
- The frequency of the high beep. That signals the change into the aux menu

Horn Frequency:

- The Frequency of the warning beep or horn.



Handcontrol
Sound and Display Parameter programming



Sound and Display (cont'd)

Measurement System:

- This allows you to change between two measurement systems

Photo Album::

- Enable / Disable menu entry 'photo album' on LCD. If this parameter is set to 'disabled', the photo album will not be accessible on the LCD.

Time:

- Sets the time format on the display

Handcontrol
Speed Pot Parameter Programming

Speed Pot

Type

Based on functional level the speed pot's rotation can be modified to best suit a variety of consumer abilities.

- Limited Stroke - Std. factory set-up, will have a stop in place for low and high limits.
- Continuous - Removal of stop "tooth" on dial and setting this programming application allows speed adjustments w/out limits.
- Continuous Forward – Forward movements ONLY!
- Continuous Reverse – Reverse movements ONLY!

Handcontrol
Speed Pot Parameter Programming

Speed Pot

- Continuous, Continuous Fwd or Continuous Rev and Limited Stroke Scaling
- Gives programmable control over the amount of distance the speed pot must travel to achieve full range.

Inactive Range

- Defines where the speed pot becomes inactive at its min & max values.

These are helpful for adjusting the speed pot's reaction to varying gross and fine motor movements from the driver.

Calibrate

- Specific Calibration to Speed
- Pot Adjustment Dial.

Seat Programming

Advanced Actuator Module (AAM) Actuator parameter programming

Actuators

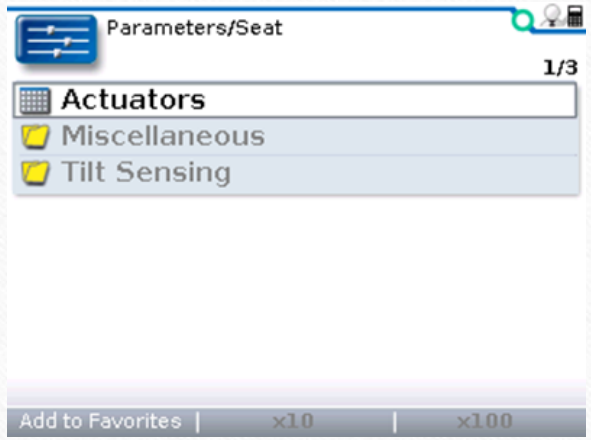
- A 1-5:
- A1=tilt, A2=recline, A3=elevate, A4=left leg, and A5=right leg
- Allows you to adjust and customize the individual actuator

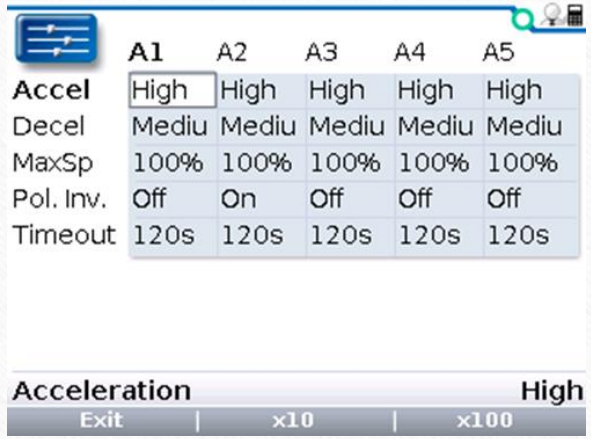
Max Speed:

- The Max Speed parameter defines the maximum speed for the corresponding actuator in %. The parameter can be reduced to limit movement speed.

Acceleration:

- The Acceleration parameter defines how the actuator speeds up from zero to maximum speed. It can be set to low, medium or high depending on the application.





Advanced Actuator Module (AAM) Tilt Sensing parameter programming

Tilt Sensing

- Internal tilt sensing capability.

Tilt Threshold 1 (only used on multiple actuator power positioning systems that have an advanced actuator module):

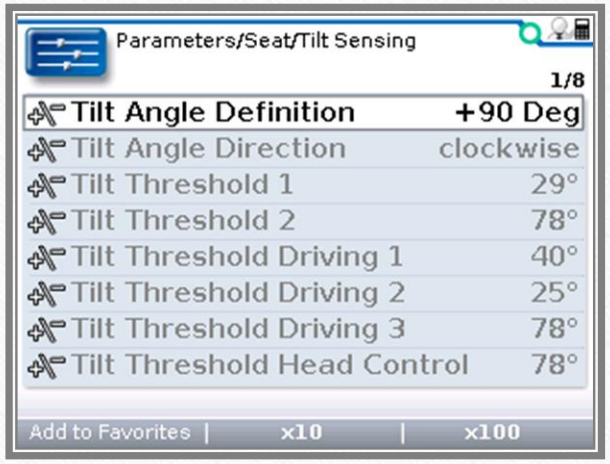
- This parameter sets the angle at which the tilt or recline will no longer go back when the power seat is elevated.

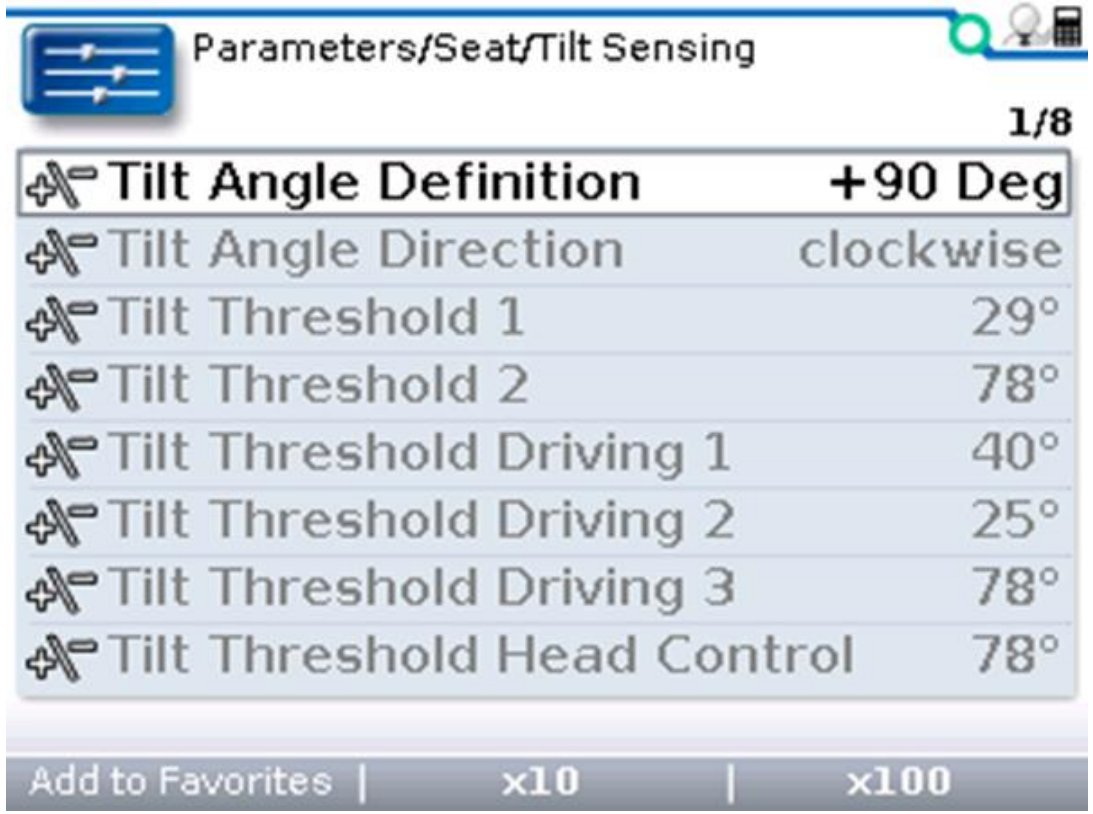
Tilt Threshold 2:

- To limit tilt range you can set Tilt Threshold 2 to the desired degree, adjust accordingly.

Functional Application!

- For example, if you want to limit our 55 degree tilt to 40 degrees, Adjust Tilt Threshold 2 to 40





Advanced Actuator Module (AAM) Tilt Sensing parameter programming

Tilt Threshold Driving 1, 2 & 3

Tilt Threshold Driving 1:

- This parameter allows you to adjust the degree of tilt achieved before the system enters a full drive lockout.

Tilt Threshold Driving 2(only used on multiple actuator power positioning systems that have a advanced actuator module):

- This parameter sets the angle that will restrict the power seat from elevating when already tilted or reclined.

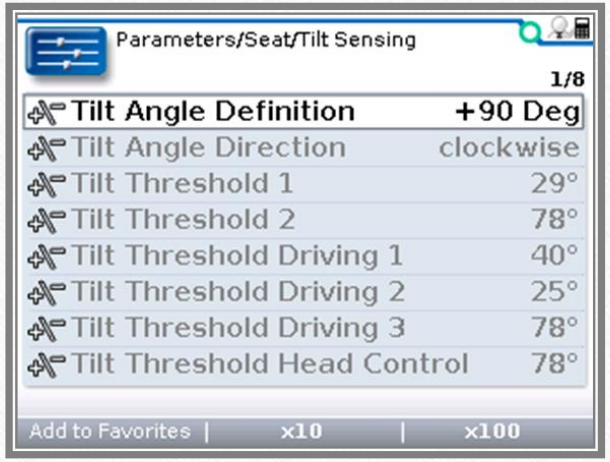
Tilt Threshold Driving 3:

- This threshold is not used

Advanced Actuator Module (AAM) Tilt Sensing parameter programming

Tilt Threshold Head Control:

- This threshold only is active if a head array is used as the input device. Such as 3-switch head, 4-switch head, and 5-switch head. If this threshold is on and the tilt is beyond the set degree on this parameter, but below the degree set for tilt threshold driving, the driving will change from 3, 4, or 5 switch mode to 2 switch mode. This means forward and reverse driving will be controlled with the right head pad and left and right driving directions with the left head pad.



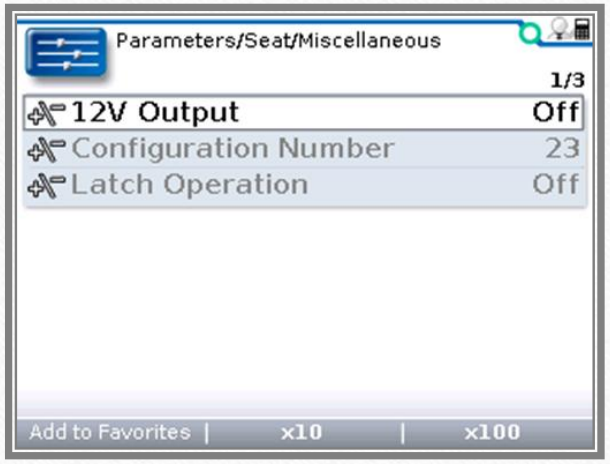
Tilt Angle Definition:

- Defines the angle that will set it at 0 degrees

Tilt Angle Direction:

- Determines the direction that the AMM will count up to reach the thresholds settings (clockwise or counterclockwise)

Advanced Actuator Module (AAM)
Seat Miscellaneous parameter programming



Miscellaneous:

Configuration #

- Allows you to preset the system to accommodate the specific actuator configuration on the chair.

Consult Quantum Technical Service for configuration consultation.

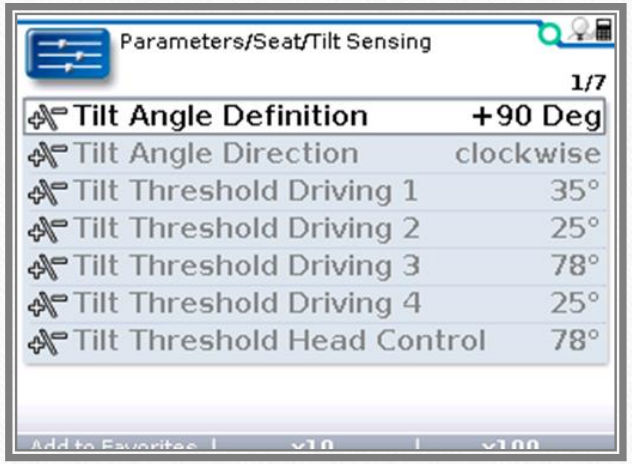
Latch Operation

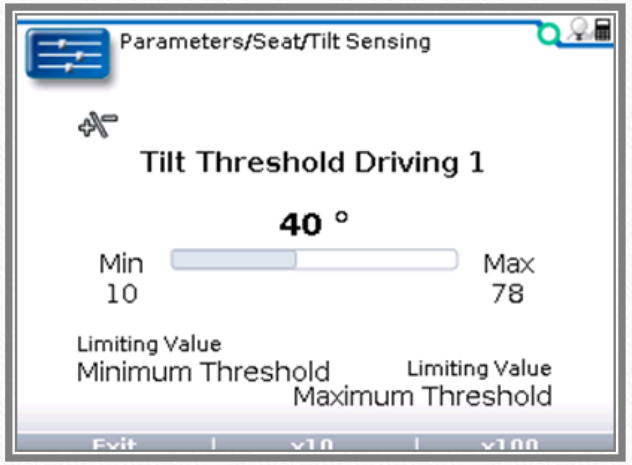
- Latches actuator movement. Operates in a simplistic manner with no need for preset timeouts.

12v Output

- Enables 12 volt output

Actuator Module (AM1 and AM2) Tilt Sensing parameter programming





Tilt Threshold Driving 1:

- The angle that puts the unit into drive lockout when tilting or Reclining back (usually set to 25°)

Tilt Threshold Driving 2:

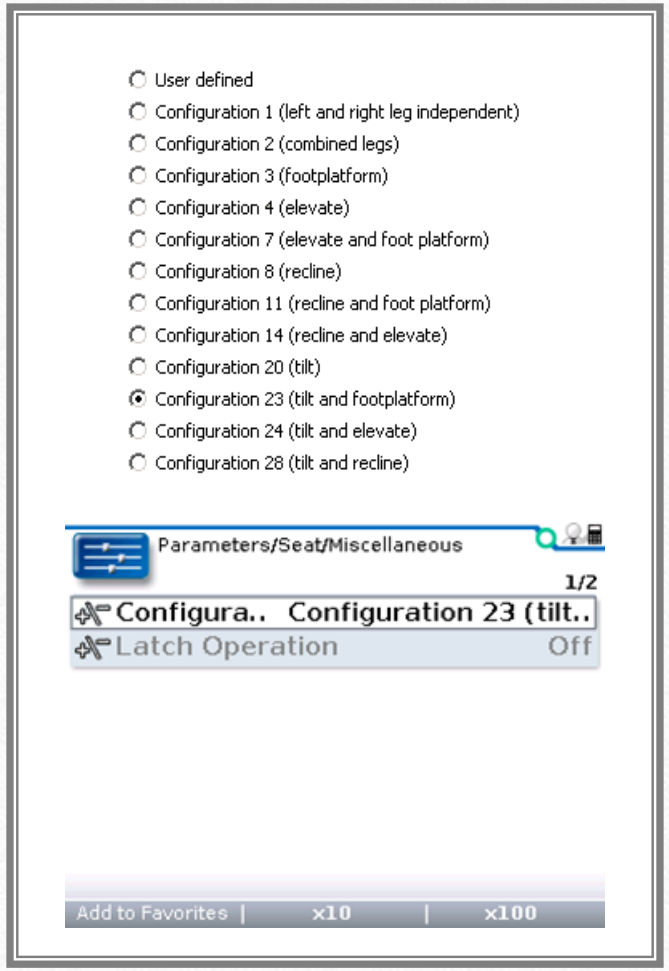
- The angle that will restrict the Power seat from going up when already Tilted or reclined (usually set to 25°)

Tilt Threshold Driving 3:

- The Angle at which the seat will no longer Tilt or Recline or the Maximum Back angle (usually set to 78°)

Tilt Threshold Driving 4:

- The angle that Tilt or Recline will no longer move back when the Power elevating seat is elevated (usually set to 25°)



Actuator Module (AM1 and AM2) Seat Miscellaneous parameter programming

Configuration

Allows you to preset the system to accommodate the specific actuator configuration on the chair.

Note: If an AM1 is used, only configurations with 1 actuator will be present in the list

Handheld Programmer as a Troubleshooting Tool

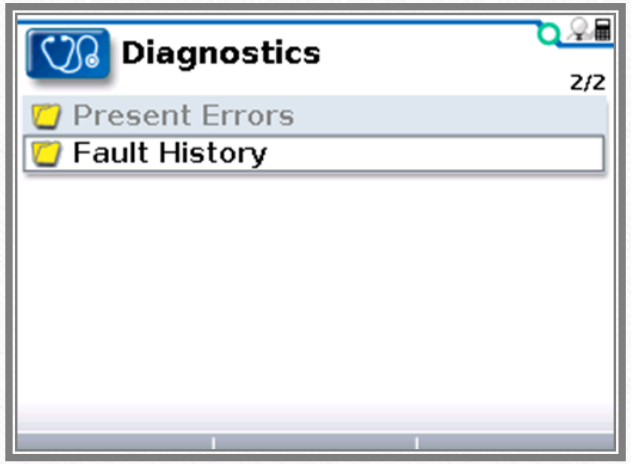
Diagnostics

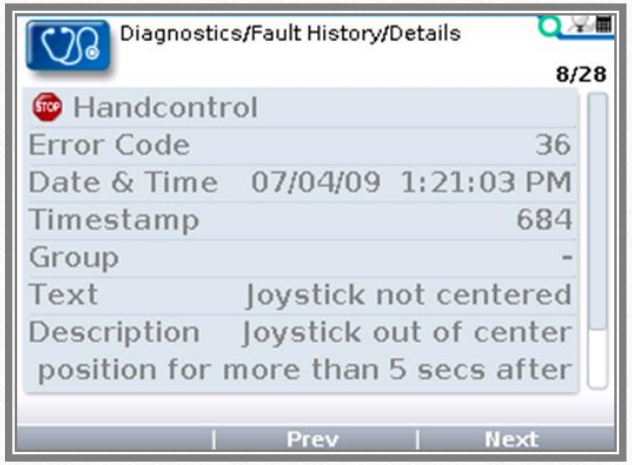
Present Errors:

- This setting allows you to view faults that are currently occurring

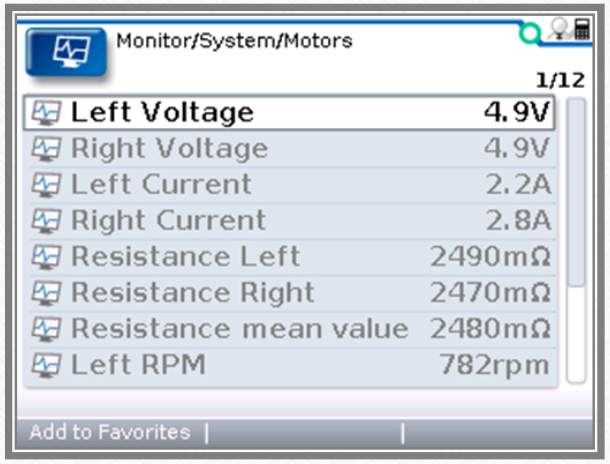
Fault History:

- The fault history contains all faults that have happened to the system. They are logged individually by module. When accessing the fault history you are given a detailed description of every fault that has occurred on that particular module. This log contains the error type and error code.





Diagnostics



Monitor:

- The Q-Logic system has advanced features that enable technicians to monitor and collect information that will help greatly in troubleshooting and correctly diagnosing problems when or if they should occur.

Advanced Monitoring Features:

- Real time measurement of battery voltage under load.
- Real time measurement of system bus voltage.
- Real time measurement of the current draw of each motor.
- Real time temperature measurement of motors and power base (power module).
- Detailed, time stamped log of system fault history.
- Ability to select specific parameters and sample them at regular intervals, storing them in an Excel log file to be reviewed later (Computer programmer only).

Diagnostics

Information:

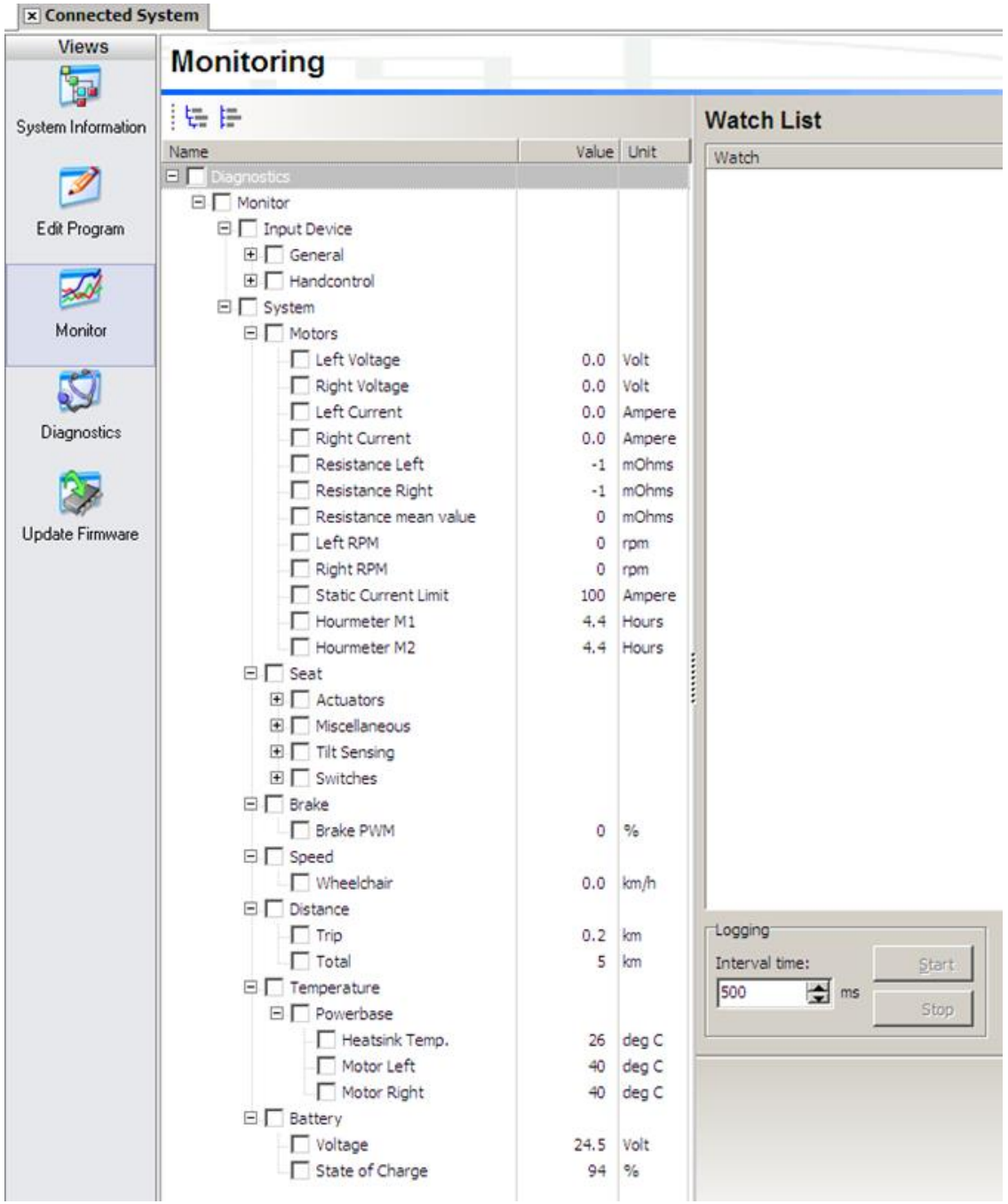
The information parameter holds all of the information of the connected modules in the system. The information contained is:

- Module Part Number (Pride)
- Curtis Part Number
- Model Number
- Serial number of Module
- Curtis manufacturing date
- Hardware version
- Software version

Advanced Diagnostic Capability

Real Time Log

- Computer Programmer
- Select the parameter and how frequently the parameter is monitored
- Automatically put into an Excel spreadsheet for later review



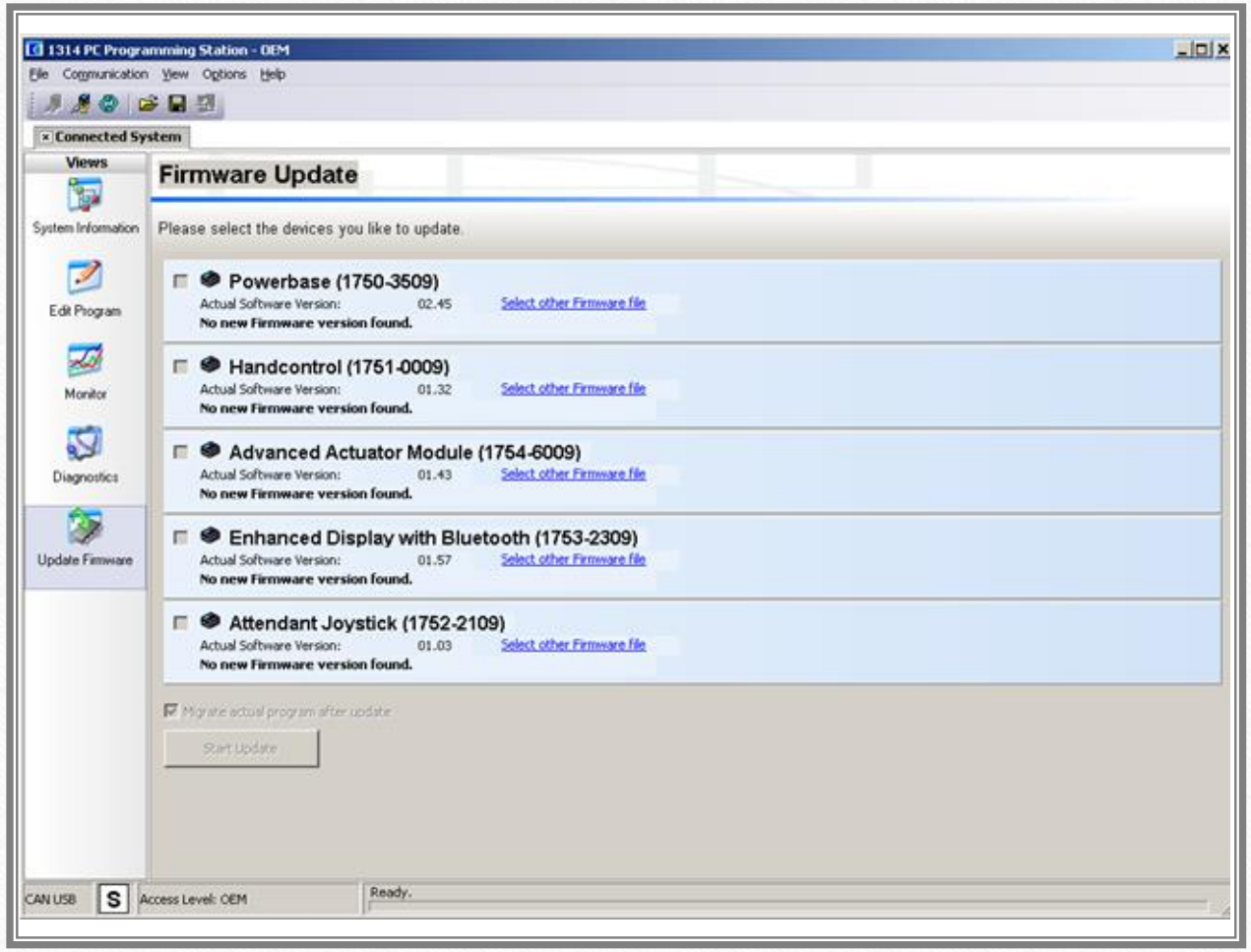
Firmware Updates

Why do we Update firmware?

- When new features are released a firmware update will give the new features without the need to purchase a new Power Module.

What are .CAG and .CPF Files?

- .CAG is a firmware file.
- .CPF is a Program file.

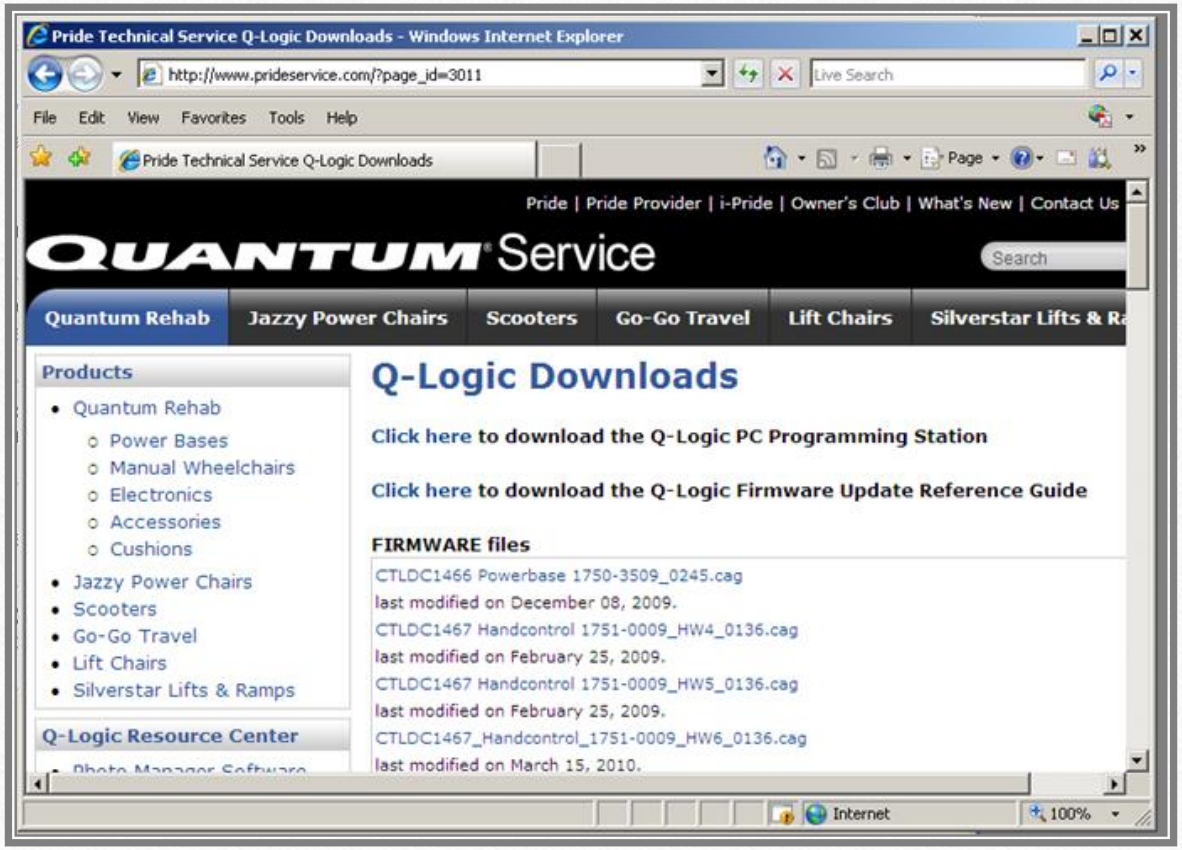


Firmware Updates

- The firmware is able to be updated when new features are released.
- Firmware can be updated using the 1314 PCPS (computer program) or the New Q-Logic handheld programmer.
- When using the Computer Programmer, you will need the CAN-USB cable.

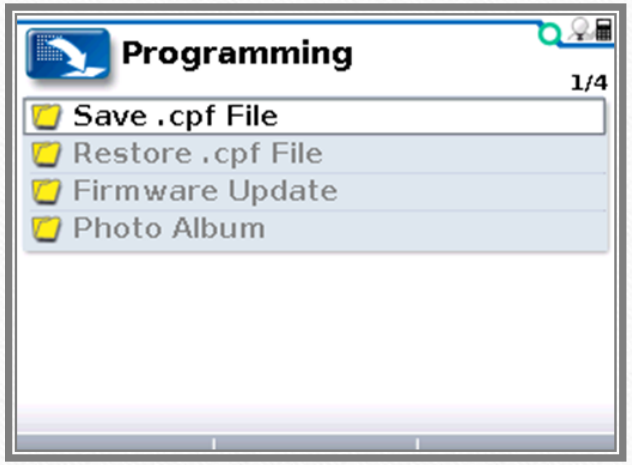
Firmware Updates

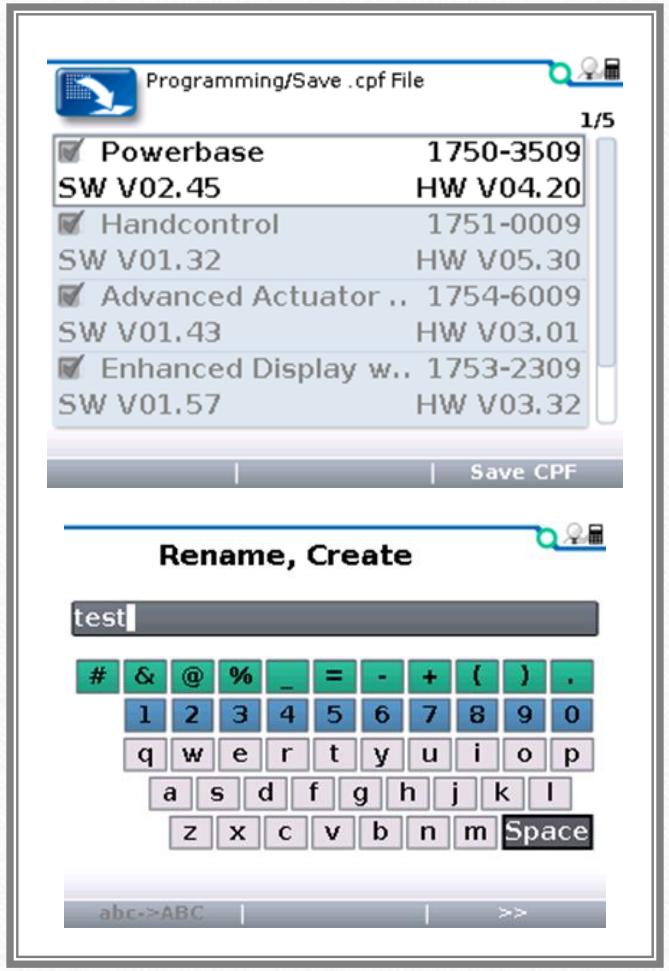
- Download all the needed CAG and .CPF files needed from the service website www.prideservice.com
- Save these files either to an SD Card or directly to the internal memory of the programmer using the supplied USB cable.



Firmware Updates

- Connect the programmer to the Powerchair.
- Choose File Manager from the main menu.
- Choose Save CPF to save the chairs current CPF file.





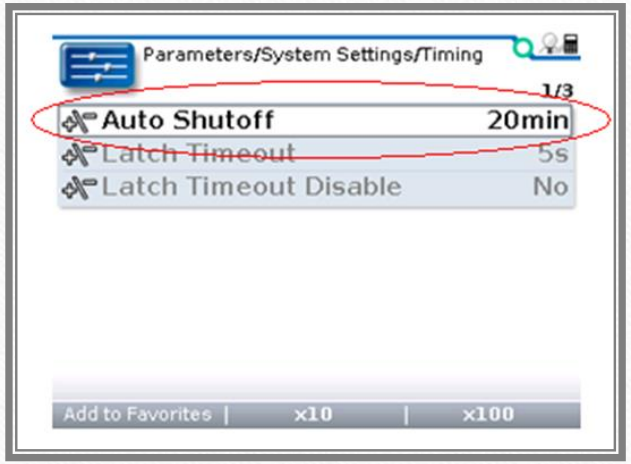
Firmware Updating

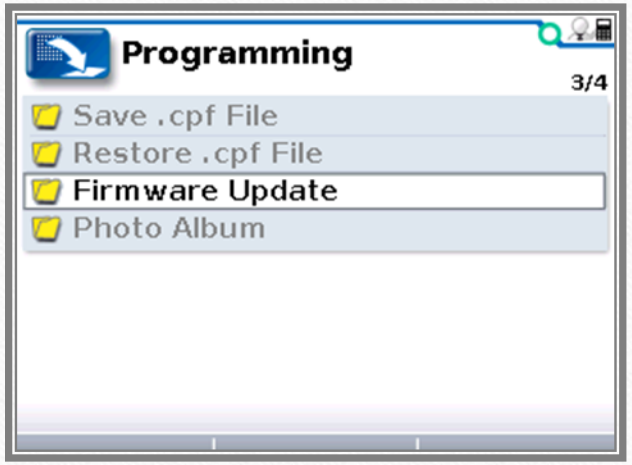
- Choose the Modules to be saved
- Select the location to save the file.
- Name the file using the onscreen keyboard.
  - Use the 4 way directional arrows to select the letters, and the + button to choose the letters.

Firmware Updating

- Before you start the upgrade process, it is recommended to turn off Auto shutoff. Setting this to 0 will turn this feature off.

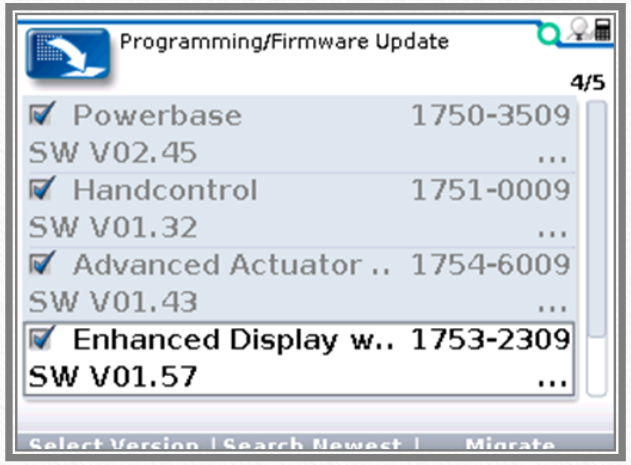
- Choose the File Manager from the main menu and then choose Firmware Update.

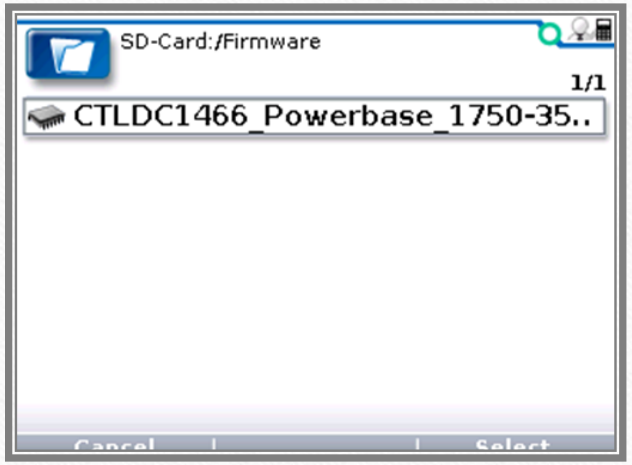




Firmware Updating

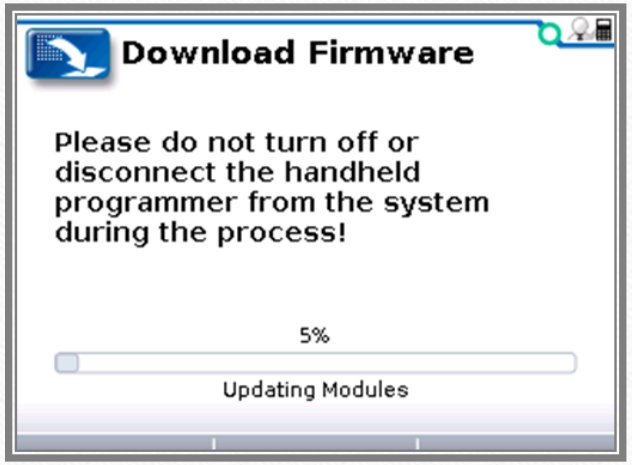
- Select what Modules you want to update by using the + key to check the module.
- Highlight the firmware file to be used to update and choose select.
- Choose Migrate

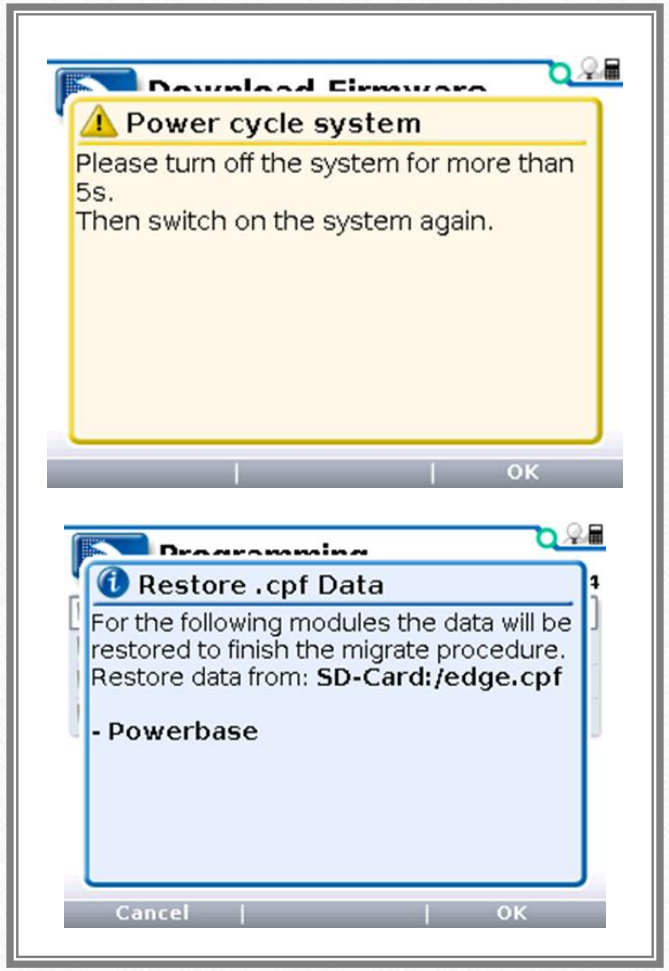




Firmware Updating

- After choosing Migrate, the programmer will prompt you to save the current CPF that is in the unit.
- Select the location to save the current CPF
- Use the Onscreen keyboard and choose Save.
- After saving this, the Firmware update will start.
- Note: Do not turn off the power chair or unplug the programmer during this process.



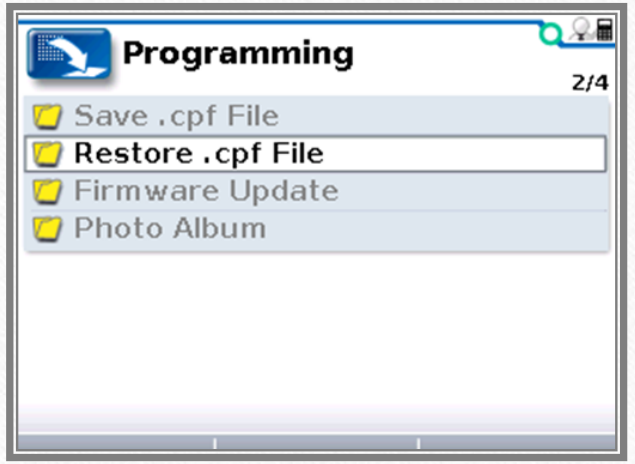


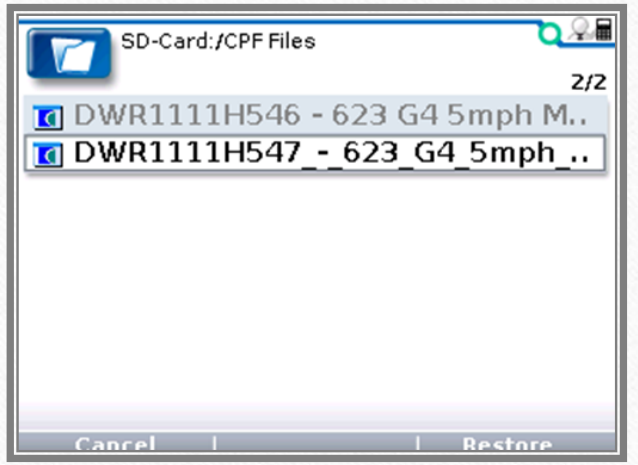
Firmware Updating

- After the firmware upgrade, you will be prompted to restart the power chair.
- When it restarts, it will prompt you to save the CPF to the unit.
- Choose CANCEL at this time.

Firmware Updating

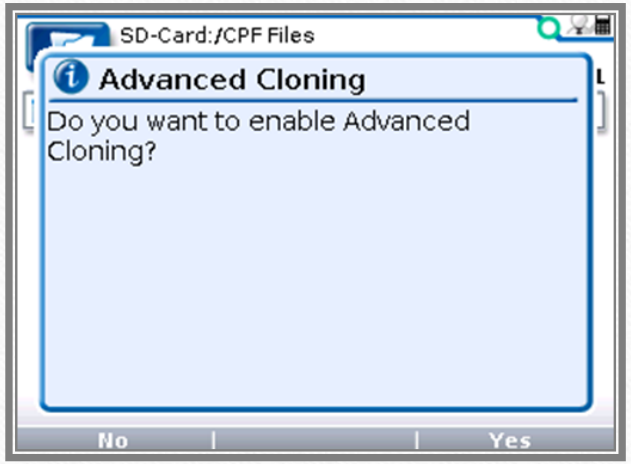
- Choose Restore .CPF from the programming menu
- Navigate to the location where you saved the new CPF files from the website.
- Choose Restore

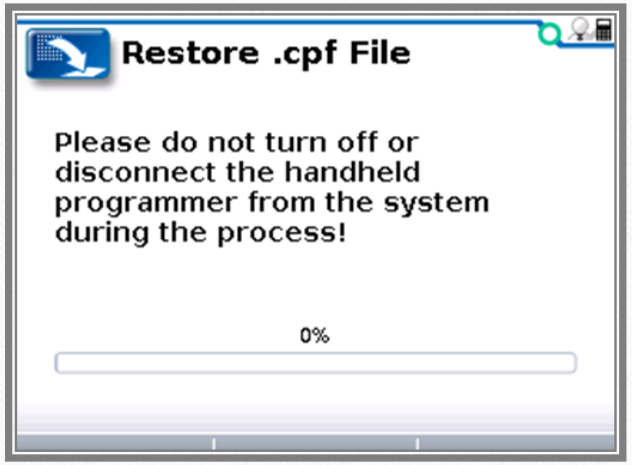




Firmware Updating

- Select YES when asked if you want to advance clone.
- If upgrading both the Power Module and AAM/AM1/AM2 this step will have to be done for both modules.
- After this step is complete, your chair is at factory specifications.
- You are now free to clone the original file from the chair. When asked to advance clone that file, choose NO





Pride Learning Institute

QUANTUM®
#1 FOR REHAB POWER

Thank you for your time

Quantum Rehab
Clinical Education Department
education@pridemobility.com