



## Linking Clinical Presentation to Power Chair Driver Control Selection and Set-up

.15 Ceu's

2011 Invacare CARES

Certified for Ceu's by U. of Pittsburgh



## Learning Objectives

- Identify the difference between **Proportional and Non-Proportional Driver Controls** and list at least three characteristics of each.
- Name three clinical indicators for **evaluating driver control sites** to use when selecting appropriate driver controls
- List at least two current technology options for **mechanical & electrical switches** used for Driver Controls or mode switch and well as list appropriate applications and candidates for each
- Identify the **key programming parameters** and corresponding adjustments for optimal power wheelchair control with at least three different driver control input.
- Discuss the application of **Tracking technologies** and it's impact on power wheelchair performance.

## Clinical Goals



## Diagnoses Considerations



**CP-** positioning, planned surgery, tone management, independent movement in system

**MD/MS/SMA/ALS-**Energy conservation, how will system need to change with them?

**SCI-** date injury, what level, complete/incomplete, environment, vocation plans, transportation, positioning, AT needs

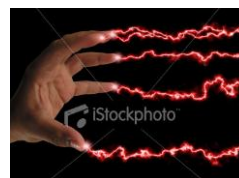
**HI-**cognition, frustration, behavior, coordination/tone issues, positioning

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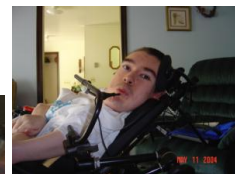
## Physical/Clinical Assessment



- Volitional Movement
- Muscle tone
- Reflexes'
- Range of Motion
- Muscle strength
- Muscle endurance
- Fatigue



## Matching Client with Technology



## Electronic Systems



- Non-expandable= standard joystick and programming
- Expandable= alternative access methods can be added later

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## Access Methods



- Proportional
  - 360 degree directional control
  - Speed control
- Non-proportional or Digital
  - Switches
  - 4-8 directional control
  - Single speed control



## Access Methods: Proportional

## Joystick - hand



- Proportional joystick control requires grading of force and distance of movement
- Grading requires co-contraction of the flexors and extensors
- Difficult for clients with abnormal muscle tone



## Alternative Joystick Placement



## Joystick Handles



- Larger handles may reduce muscle tone
- Goal post style designed for poor grasp



## Examples of Alternative Proportional Driver Controls:



Compact Joystick

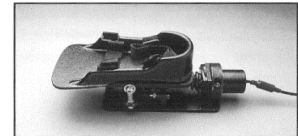
RIM Head Control



## Compact



- A proportional 4 quadrant (directional) driver control
- Hand control, chin control, foot control, elbow control, & attendant control
- Requires Display with Switches if used as a "Stand Alone" Control.



## Examples of Alternative Proportional Driver Controls:



Peachtree (PHC-3)

ASL Mini

ASL Stealth Mushroom Joystick

## Joystick – chin/lip



- Can be mounted on a swing away arm or bib
- Can lead to repetitive stress injuries of the jaw or cervical area
- Can be difficult to use if surface isn't smooth

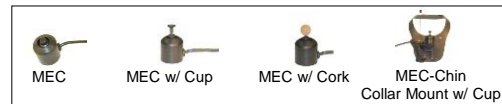


## Mini Proportional Joystick



PMJ

## "Micro Extremity Controls"



PASL-MEC-C (Chin)



PASL-MEC-H (Hand)

## Mushroom joystick



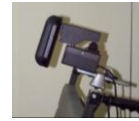
- Designed for clients who cannot grasp a joystick handle
- Stiff



## Joystick - proportional head control



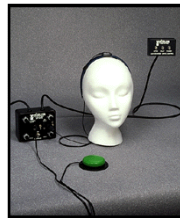
- Pushing back moves wheelchair forward
- Sustained pressure required to continue movement
  - Can lead to increased muscle tone and difficulty stopping



## Joystick - Magitek Drive Control



- Sensor mounted at top of head
- Translates head movement into wheelchair movement
- Requires very good head control
- Stop: enter Neutral Zone



## Heavy Duty Joystick



## Joystick specific parameters



- Short throw
  - Use with caution with mini joysticks
- Sensitivity
- Changing axes
- 3 direction

## Alternative Digital Controls:



ASL Head Array



Fiber Optic



ASL Sip n' Puff Head Array



## Alternative Digital Controls:



Tash Wafer Board

Sip n' Puff Controls



Tash Mini

## Switches



Mechanical Switches



Electrical Switches

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## Switch Evaluation



- **User preference**
- Number of switch signals
- Type of activation
- Travel
- Force
- Feedback
- Target size
- Operating environment
- Mounting/placement

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## Digital Access Methods

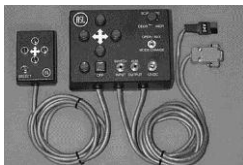


- single switch scanning
- 2, 3, 4 or 5 switch combination
- sip 'n puff
- Head Array (proximity)
- 4 switch array (proximity)
- 2 or 4 switch fiberoptic array
- Analog Digital Drive system
- Sip 'n puff head array
- Eye Gaze

## Single Switch Scanning



- Clinical Indicators:
  - only 1-2 switch sites can be found
  - Client can see and monitor display



## Any 2, 3, 4 or 5 switch combination



- Clinical Indicators:
  - **Ideally, 3 switch sites provides Forward, Left and Right directional control**
  - If a 4<sup>th</sup> switch can be identified, Reset provides the most function
- Requires a switch interface box and switches



## ASL Head Array (proximity)



- 3 -5 proximity switches in a tri-pad headrest
- Clinical Indicators:
  - Fair to good head control
  - Little extremity control



## Stealth Head Array



- Suboccipital pad can increase stability of the head



## Sip 'n Puff



Clinical Indicators:

- Little control of head or extremity movement
- Good oral motor control, lip closure, intact palate
- Full directional control and speed control



## Sip 'n Puff STOP switch



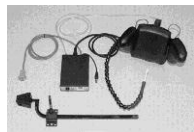
- Stops the wheelchair if the straw moves out of reach
- Can also be used as a reset switch



## ASL sip 'n puff head array



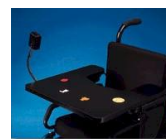
- Left and Right pads active on the head array
- Any puff is Forward
- Any sip is Reverse



## Proximity Array

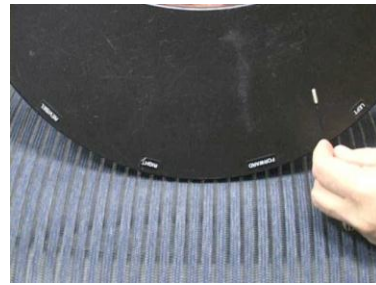


- Clinical Indicators:
  - Fair upper extremity control
  - Accommodates larger movement
  - Eliminates a plane of movement





## ASL 3 switch fiberoptic array



## 4 switch fiberoptic array in tray



## ASL Eye Gaze Control System



- Uses eye gaze and a computer screen
- Operates seat functions
- EADL functions



## Stand-By Programming



Stand-By Select is a Great Feature...  
But...

Many just want to "Hit a Switch" to have direct access



## Programming Adjustments Related to Drive Input



- **Mono Port 1 – Mono Port 2:**
  - allows flexibility when using external mode switches
  - have a "Y" cable on hand to demonstrate
- **View/Scan:**
  - 2 View Modes: Standard and Enhanced
  - 3 Scan Modes: Row/Column, Enhanced & Sequential
- **4 Way Std Prgm/4 Way Switch:**
  - activates powered seating through driver control
- **Start in Drive:**
- **Audible Indicator:**
- **PRS Time:**
  - requires a mode switch



## Mounting



- No standard position
- Place where you need it
- Joystick/attendant “docking” stations
- Swing-away mounting arms
- Modified trays
- “Flip-down”/removable for ease transfers
- Velcro/duct tape

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## Attendant Controls



### Proportional Attendant Control

- *\*Independently programmable*
- On/Off, Speed Potentiometer



### Digital Attendant Control:

- On/Off Switch
- *\*Independently programmable*



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## Programming Strategies



## Expandable Electronic Systems



- Input type
- Standard Programs
- Forward Speed
- Turning Speed
- Sensitivity
- Acceleration
- Joystick throw
- Tremor dampening
- **Power Level**
- **Torque**
- **Traction**
- **Axes Selection**
- MOM/LATCH
  - Latched Type
- MOM Reverse
- Standby Select
  - Standby Time
- **RIM Control**
- Drive Select
- No Driving
- Auto Scan (Display Only)
- Attendant
- Tracking
- Saving

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## Standard Programs



STANDARD PROGRAM	FORWARD SPEED
1. Indoor Joystick Average	45%
2. Moderate Outdoor	75%
3. Speed Level Terrain	95%
4. Ramps & Curbs	50%
Very Slow Driving	15%
MEC	20%
Indoor Learner	30%
ASL Indoor	15%
ASL Outdoor	32%
SNP Learner	25%
Learner 3 Speed Momentary	30%
Very Slow 1 Speed Sip n Puff	15%
Learner 1500 RIM	30%

## Momentary v/s Latched



**Momentary:** Operation of the chair occurs ONLY during the “Moment” the driver control is being depressed / activated. (Can be either Proportional OR Non-Proportional Systems).

**Latched:** Operation of the chair continues after releasing (letting go) the driver control. Application includes Sip-n-Puff, Switch Drivers, and Hand control drivers with significant weakness driving long distances.

## Saving Programs



- Some systems with remote SD card, others laptop dependent.
- Replace equipment without losing complex programming
- Transfer programming to updated power chair
- Use program settings with another client w/ similar diagnoses or symptoms



## Take Home Message



- All shapes and sizes!
- Mounting
- Programming
- Training

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Effect Positioning on Drive  
input/switch activation!

**Effect switch placement and  
activation on Positioning!**

Thank you for attending!

See you at the next Invacare  
CARES Education Event

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