

SWITCH ASSESSMENT: DETERMINING TYPE AND LOCATION

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Access to Independence

As assistive technology continues to advance, more and more means of accessing that technology become available. If switches have been chosen as an access method, the next step of an assessment is determining the switch types(s) to be used and placement.

Assessment

Switches can be used to access a variety of assistive technology (AT) devices such as battery operated toys, power wheelchairs, computers, communication devices and electronic aids to daily living (EADLs). Many other access methods are available, as well, and should be explored during the assessment. If switches are the most appropriate access method, switch site(s) and switch type(s) need to be determined. Scanning usually requires 1 switch, while a power wheelchair usually requires 3-4 switches.

Switches can be placed at nearly any body site using virtually any movement. In general, an optimal switch site:

- Uses as small a movement as possible
For example, instead of a large “windup” of the entire arm before activation with the hand, a switch may be placed by the side of the head, using a small lateral flexion movement.
- Uses an isolated movement, that does not pull in overflow or patterns of movement
- Uses a volitional movement, rather than reflexive movement or pattern of movement
- Uses controlled activation
Scanning requires an accurate and quick activation, whereas activation is not time dependent for a power wheelchair. Scanning may be used for access to communication devices, computers and EADLs.
- Uses sustained pressure if required
Most scanning requires a momentary switch activation. Using switches with a power wheelchair requires sustained activation to keep the chair moving, unless the latch feature is used.
- Uses controlled release
Release needs to be timed for power mobility, for stopping the chair accurately and quickly. Release is not usually as critical in scanning.
- Does not increase muscle tone
This includes immediately and over time. Sustained switch activation often increases muscle tone over time. This can then effect the ability of the client to release quickly to stop the wheelchair safely.
- Does not fatigue
If the client has to use a switch repeatedly over a period of time, they may fatigue. If the client cannot access an AT device as long as desired, another switch site may be more appropriate.
- Does not elicit or utilize abnormal reflexes

Also, in general, there is a hierarchy to switch sites. The most common sites, in order, are:

- Hands – switches can be placed horizontally or vertically
- Head – usually either side of head
- Mouth – sip ‘n puff or tongue activated
- Feet – dorsi flexion, plantar flexion or lateral movements
- Other upper extremity locations – above shoulders, behind elbows
- Other lower extremity locations – medial, lateral or superior knee
- Mind

Switch Types

There are two main categories of switches: mechanical and electrical. Mechanical switches require a physical depression over a short distance for activation and release. Varying amounts of force are required for activation, as well. Electrical switches require a power source. No physical depression or release of distance or force is required. These switches detect activation by a variety of means. Following is a hierarchy of mechanical and electrical switches with examples of manufacturers for each. This is not an exhaustive list.

Mechanical Switches:

Plate

A flat surface which is depressed to activate switch.

- Ablenet Big Red, Jellybean, Specs
- Enabling Devices – you name it! Various textures and feedback
- Tash Big Buddy, Buddy, Pillow, Soft, Square Pad, Round Pad, Platform, Cap, Heavy Duty Cap, Cup, Mini Cup, Treadle

Light Touch Plate

A flat surface which is depressed to activate switch, requires less pressure than the Plate switches.

- Adaptation Pal Pads, Flexible
- Enabling Devices Saucer
- Tash Membrane Plate, Micro Light

Lever

These switches are bent in any direction to activate.

- Enabling Devices Ultimate, Wobble
- Tash Leaf, Flex

Pneumatic

A change in air pressure activates the switch. This may be a sip or puff. Some of these switches are dual switches, as well.

- Enabling Devices Sip and Puff
- Enabling Devices Grip, Plump and Puff
- Tash Grasp

Mercury

Tipping the switch allows a drop of mercury to make contact, make the connection and activate the switch.

- Enabling Devices Tilt
- Tash Tip

Other switch types

There are many, many types of switches available. Here are a few unique ones that do not fit in the other categories.

- Enabling Devices String – pulling a string makes the connection
- Enabling Devices Roller – rolling the cylinder activates the switch
- Enabling Devices Pinch – this is designed to be placed between the fingers and is activated by a pinch

Dual Switches

Dual switches house two switches in one package, providing two switch outputs

- Tash Rocker

Switch Joysticks

Shaped like a joystick, these provide from 1 to 5 switch outputs

- Tash Joystick with Pad, Mini Joystick with Push

Multiswitches

These provide from 1 to 5 switch outputs and are often used for power mobility access

- Tash Penta, Star and Wafer

Wireless/Remote Switches:

Mechanical switches that are wireless.

- Ablenet Jellybeamer
- Ablenet Airlink (uses infrared signal)
- Ablenet Cordless Big Red (uses radio signal)
- Enabling Devices Wireless Saucer Switch (uses radio signal)

Electronic Switches:

Proximity (capacity switch, range up to 3/8")

These are activated by a body part coming within an adjustable range. Non-animate objects will not activate capacity switches.

- Adaptive Switch Laboratories Adjustable Proximity (target area adjustable)
- Tash Untouchable Buddy

Fiberoptic (visible light)

Breaking the beam of light activates the switch. This is designed for very small movements.

- Adaptive Switch Laboratories Fiber Optic (range up to 2.5", target area 1/4") and Mini Fiber Optic (range up to 1/2", target area pencil lead diameter)

Infrared (invisible light, range up to 15")

Breaking the beam of light activates the switch. This is designed for larger movements.

- Adaptive Switch Laboratories Adjustable Beam (target area Quarter size)
- SCATIR (Self-Calibrating Auditory Tone Infrared)
- Enabling Devices Movement Sensor
- Words+ IST

Touch

The skin is conductive and completes the circuit to activate the switch

- Adaptation Taction Pads
- Equal Access Computer Technology - Minimal Motion
- Words+ IST Switch

Sensor

These switches pick up electrical impulses from the muscle (small movements) which activates the switch. These require careful placement and frequent calibration.

- Don Johnston Sensor

Photocell/Photoelectric (visible light, range up to 21")

Breaking the beam of light activates the switch. These are designed for larger movements.

- Adaptive Switch Laboratories Adjustable Photoelectric (target: beam is cone shaped)
- Enabling Devices Photocell

Sound activated

Volume of sound activates the switch.

- Enabling Devices Voice Activated
- Words+ IST
- Piezo Electric Film (detects vibration)

These are activated by vibration, such as small movements and even the force of your breath.

- Adaptation Vibration
- Enabling Devices Twitch, Movement Sensor

Ultrasonic (invisible light, range 6"-30")

Breaking the beam of light activates the switch. These are designed for larger movements.

- Adaptive Switch Laboratories Ultrasonic

Mind Switch (bioelectrical)

This switch is activated by a combination of muscle movement and EEG readings. It is worn on the forehead.

- Technos America MCTOS

As you can see, the options are varied and many! As exciting as all this new technology is, however, I have found that finding the best switch site is much more challenging than finding the right switch. And, once the best switch site is found, I have found that I rarely need to use switches found further down in the hierarchy. Check out these switches as you accept the challenge of switch assessment: it is not always easy, but it is never boring!

References:

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Speaker Bio

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