

## Comparison test

### Chairs tested

The foregoing comparison report compares chairs tested at different times. Every effort was made to ensure repeatability of tests so that chairs from different groups can be compared against each other.

### Chairs tested in 1998

Make	Model	Category	List price (Cdn)
Action	Arrow Storm Series MWD	HR FWD	\$9374
	Arrow Storm Series RWD	HR RWD	\$8998
Permobil	Chairman Corpus	LR FWD	\$29,247
	Chairman MPS	LR FWD	\$20,708
Pride	Jazzy	HR FWD	\$7380
Electric Mobility	Viva	LR RWD	\$6005
Quickie	P200	HR RWD	\$7496
Shoprider	Spitfire 8	HR RWD	\$3795
	Spitfire 10	LR RWD	\$4495

Vector	Velocity	LR CWD	\$7941
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**Chairs tested in 1999**

Teftec	Ω megaTrac®	LR FWD	\$30000
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**Chairs tested in 2000**

Action	Arrow Storm Series FWD	HR FWD	\$7691
	Arrow Ranger X GB RWD	HR RWD	\$8600
E and J	Solaire	LR CWD / FWD	\$6295
21 <sup>st</sup> Century Scientific	Bounder	LR RWD	\$
Quickie	G424	HR CWD / RWD	\$6795
	S525	LR RWD	\$6595
	S 626	HR CWD / RWD	\$9295

## Contact information

Company	Phone	Web site
21 <sup>st</sup> Century Scientific	(604) 853 4644	<a href="http://www.wheelchairs.com">http://www.wheelchairs.com</a>

Action - Invacare	(800) 668 5324	<a href="http://www.invacare.com">http://www.invacare.com</a>
E and J	(800) 387 9113	<a href="http://www">http://www</a>
Electric Mobility	(604) 853 4644	<a href="http://www .electricmobility.com">http://www .electricmobility.com</a>
Jazzy - Pride	(888) 570 1113	<a href="http://www.pridehealth.com">http://www.pridehealth.com</a>
Permobil	(888) 737 6624	<a href="http://www.permobil.se">http://www.permobil.se</a>
Quickie Sunrise	(800) 263 3390	<a href="http://www.sunrisemedicalonline.com">http://www.sunrisemedicalonline.com</a>
Shoprider	(604) 273 5173	<a href="http://shoprider.com">http://shoprider.com</a>
Teftec	(888) 234 1433	<a href="http://teftec.com">http://teftec.com</a>

## Comparison Test Methodology

### Setup

We asked that all chairs be configured to fit the primary tester:-

6 feet tall 160 lb

16" hip width

20" heel to back of knee

20" back to knee

We made minor adjustments to refine the fit.

Chairs with an adjustable centre of gravity location (both Arrows, the Pride and the Quickie) were set up so that between 80 and 87% of the weight passed through the driving wheels. The Vector was initially set up with the centre of gravity directly over the driving wheels and then retested with the seat moved 3" forward. The  $\Omega$  megaTrac® was tested with 72% of the weight on the drive wheels which is the most we could get.

The performance of each chair was optimized for each test using the appropriate programmer.

In addition to chairs, chargers and programmers, we also asked for the literature provided to the client and copies of ANSI / RESNA test results. The ANSI / RESNA tests are designed to allow any approved test facility to conduct standard tests on different chairs and be able to directly compare the results with those achieved by other facilities on different chairs.

## Testers

All people involved in the testing of the chairs are employees or former clients of GF Strong. None have any affiliation with manufacturers or retailers of power wheelchairs. Our sole purpose in testing these chairs is to help power wheelchair users select the most appropriate chair for their needs. GF Strong, a government funded rehabilitation facility, provided funding for the testing.

Ian Denison performed all tests generating performance figures.

Ian Denison and Doug Gayton performed tests yielding dimensional data.

Doug Gayton performed ECU related tests.

Joanne Yip and Cheryl Sheffield (OT's in the GF Strong Seating Service) performed seating system interface tests.

Opinions, analysis and subjective comments were collected from a group of consumers representative of people likely to use these wheelchairs.

The group included:

Linda McGowan

David Metcalfe

Marshall Nickel

Alan Richards

## Comparison Test Methodology

## Testing

Manufacturers were asked for copies of any ANSI / RESNA tests that their chairs had been subjected to. We hoped to use this data in our report to prevent unnecessary duplication of tests. This turned out to be unrealistic. Only Vector supplied us with the necessary data. Some did not run their chairs through the tests and some simply didn't bother getting it to us.

In designing the tests we used ANSI / RESNA standards as much as possible. However we frequently deviated from standard testing protocol whenever we felt that more functional testing would create more valuable information regarding the chair's suitability to task.

In all tests we took measures to ensure that results were repeatable and that conditions were as close to identical as possible for all chairs being tested.

The measures considered included:

- Battery state of charge
- Familiarity with the chair

- Environmental conditions
- Testers weight
- Tire pressure
- Programme settings

## Confirmation

On completion of testing, Suppliers were sent a draft copy of this report for review prior to publication. They were invited to review the document and asked to challenge any of our findings or opinions. Teftec were the only company to respond.

Details of the actual test parameters are available from the author.

## Comparison Test Summary

<b>Indoor</b> J = better K = average L = worse NT = Not tested	Bounder	Arrow FWD	Arrow MWD	Arrow RWD	Ranger X GB RWD	Corpus	MPS	Jazzy 1170	Viva	G 424	P 200	S 525	S 626	Spitfire S 8	Spitfire S 10	Ω megaTrac®	Velocity	Solaire
Overall	K	K	J	J	K	K	K	J	L	J	J	K	J	J	K	L	K	K
Handling	K	K	K	J	K	K	K	J	L	J	J	K	J	J	K	K	J	K
Size	K	K	K	K	K	K	K	K	K	K	J	J	K	J	J	L	L	J
Manoeuvring	K	K	J	K	K	K	K	K	K	J	J	K	NT	J	K	L	K	K
Turning radius	L	K	J	K	L	K	K	J	L	J	K	K	K	J	K	L	K	J

Turn around	K	K	J	J	K	J	K	K	K	J	J	J	K	J	J	L	K	J
Confined space								J		J	J	K	NT	K	K	L	K	L

**Outdoor**

Overall	J	L	K	J	J	K	K	J	K	J	J	K	J	K	K	J	L	L
Speed	J		J	J	J					J	J		J					
Handling	J	L	K	J	K	L	L	K	L	J	J	J	J	K	K	K	K	L
Curbs	J	K	L	J	J	K	K	J	K	L	J	L	K	L	L	J	L	L
Curb cuts	J	J	K	J	J	J	J	K	L	L	J	K	J	K	K	J	L	L
Inclines	L	J	K	K	K	J	J	J	K	J	J	K	K	K	J	K	K	J
Braking	L	J	L	K	K	K	K	J	K	J	J	K	J	K	K	J	K	L
Tracking	J	L	K	J	J	L	L	K	J	J	J	J	J	J	J	J	K	L
Range	K	L	J	J	J	K	K	K	J	K	J	K	J	L	L	L	K	L
Comfort	J	K	K	J	J	J	J	J	K	J	K	J	J	K	K	J	K	J

**Off Road**

Overall	L	L	K	J	J	K	K	J	L	K	J	K	J	L	L	K	L	L
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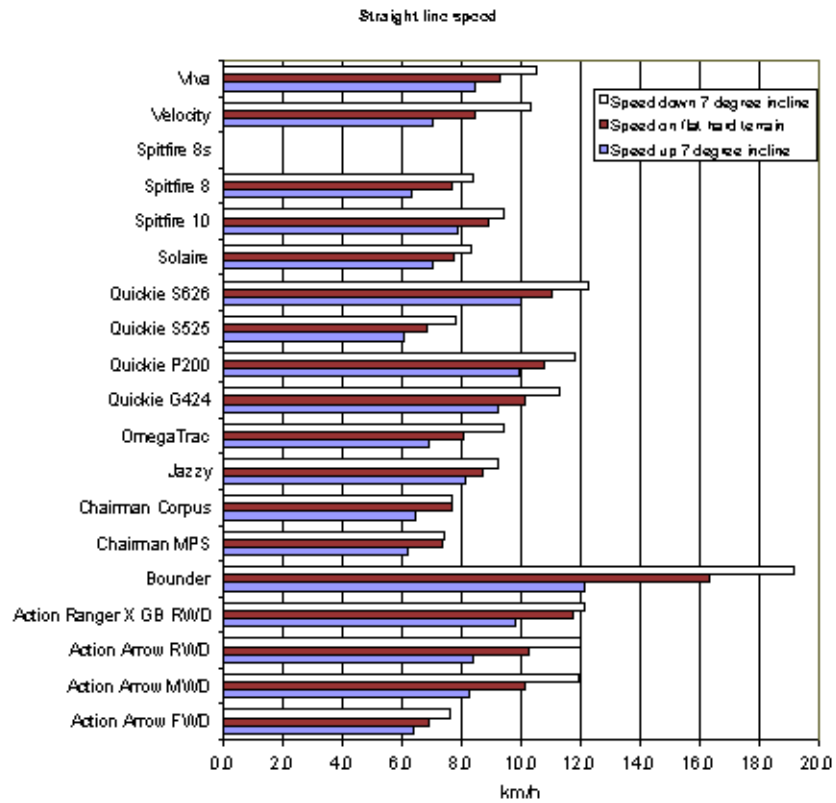
Slow speed	K	K	K	K	K	J	J	K	L	K	K	K	K	L	L	J	L	L
Rough terrain	L	L	K	J	J	L	L	K	K	J	J	K	K	K	K	K	K	L
Up hill	J	L	J	J	J	L	L	J	L	J	J	J	J	J	J	K	L	L
Down hill	L	J	K	J	J	J	J	J	L	L	J	L	J	L	L	J	L	L
Side hill	L	K	J	J	J	J	J	J	L	J	J	L	J	L	L	L	K	K
Safety on hill	K	L	J	J	J	K	L	J	K	K	J	L	J	K	K	K	L	K

**Other**

Portability	J	K	J	K	J	K	K	K	J	L	J	K	K	L	L	L	K	L
Adjustability	L	K	K	K		J	J	J	L	K	K	K	K	J	K	J	K	K
Programmer	J	K	K	K	K	K	K	J	NT	J	J	J	J	J	J		J	J
Noise	K	K	J	J	J	K	K	J	K	K	L	K	K	K	K	L	K	J
Damage	K	K	K	K	J	J	K	K	J	J	J	J	J	J	J	K	L	J
Transfers	L	K	L	J	J	J	J	K	J	J	J	J	J	J	J	J	J	J
Battery charger	K	J	J	J	J	NT	NT	NT	NT	K	K	K	K	K	K		NT	J

**Test Results**

## Straight line speed on smooth hard surface



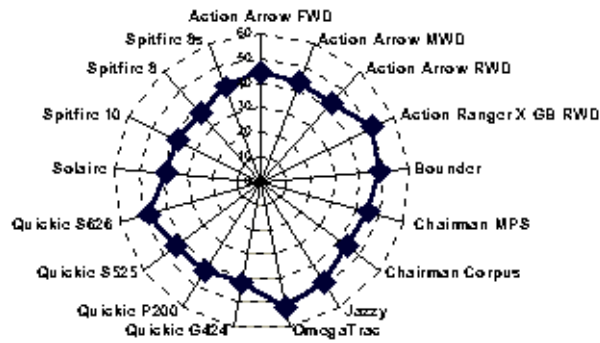
A chair which maintains its speed whether travelling up and down hill or cruising along on the level is more satisfying to drive than one which toils up hills and builds up a head of steam on the way down.

So a graph like the Viva (closer together) is preferable to a graph like the Bounder

### Test Results

#### Narrowest Corridor that chair can be turned around in

**Narrowest corridor for tum around in inches**

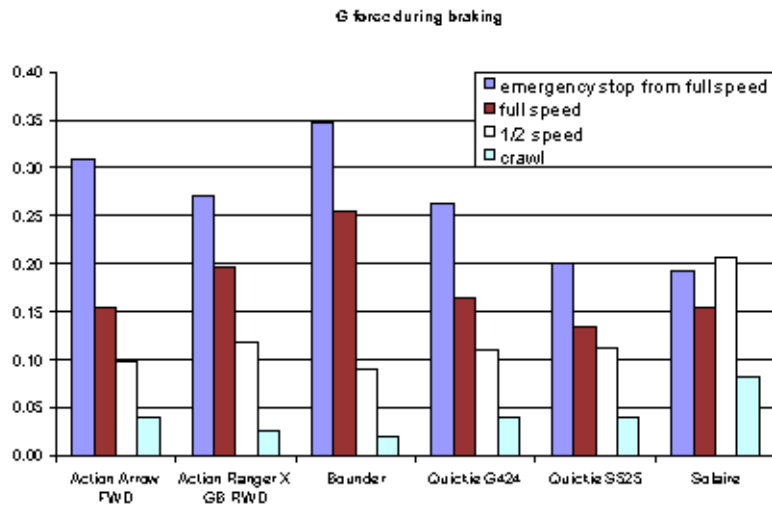


The further a chair is from the centre, the more room in inches it needs to turn around.

A three point turn is not required; all chairs with passive casters and counter rotating drive wheels can turn around in a corridor the same width as the chair’s diagonal dimension. (see page 12.)

**Test Results**

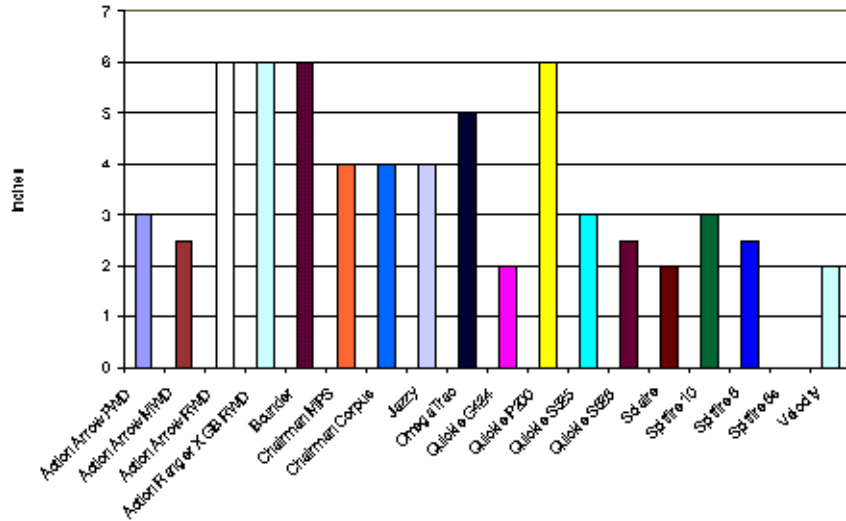
**Deceleration rate**



Our experience has been that deceleration between 0.15 and 0.20 g’s is a suitable rate for most people. Emergency deceleration, where the joystick is momentarily put in reverse should be between 0.3 and 0.4g’s. This provides people with good balance or appropriate restraints an option to stop more quickly if necessary.

## Test Results

### Maximum curb with minimal body movement

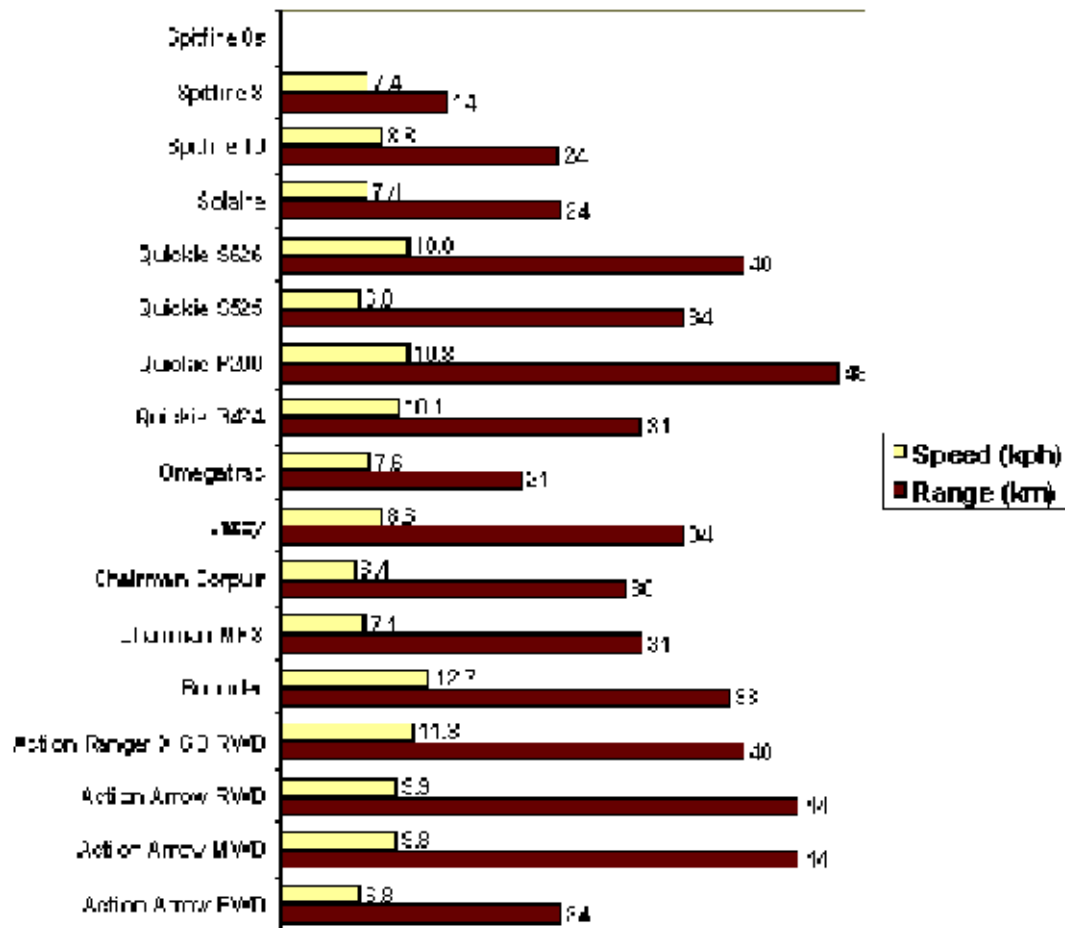


Generally, the higher the bar the more capable a chair is of negotiating curbs. If a 2" rise has to be negotiated, it will be easier for someone to do in a chair tested at 5" rather than one we tested at 3". However, the chair's behaviour while negotiating the curb should also be considered. E.g., to negotiate a 3" curb the P200 and Action RWD chairs have to be wheelied and the impact is quite hard when the rear wheels hit. In contrast, the FWD Permobil and Omegatrac can negotiate the same curb relatively smoothly. See individual test reports.

## Test Results

### Outdoor Speed and Range

**Outdoor speed and range  
(calculated on a 1 km course with inclines up to +/- 7 degrees)**

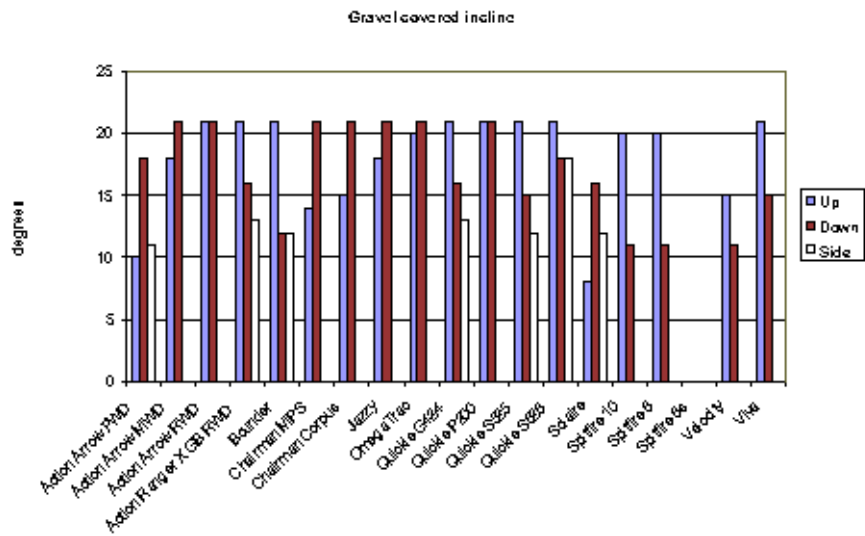


A long pale bar indicates a fast chair.

A long dark bar indicates a long range.

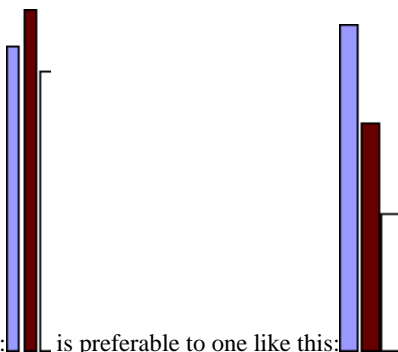
### Test Results

#### Performance on Gravel inclines



A taller column indicates the chair is able to cope with a steeper incline.

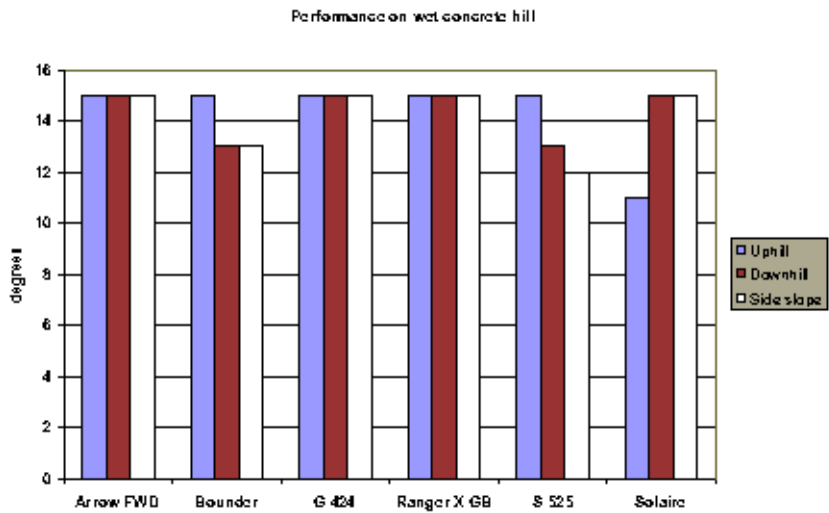
A chair is much safer and more predictable if the columns representing up, down, and side slopes are similar in height.



So a graph that looks like this: [Left Chart] is preferable to one like this: [Right Chart]

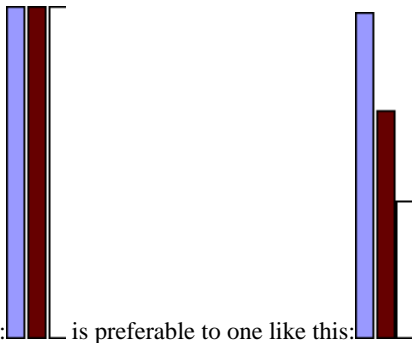
### Test Results

#### Performance on Concrete inclines



A taller column indicates that the chair is able to cope with a steeper incline.

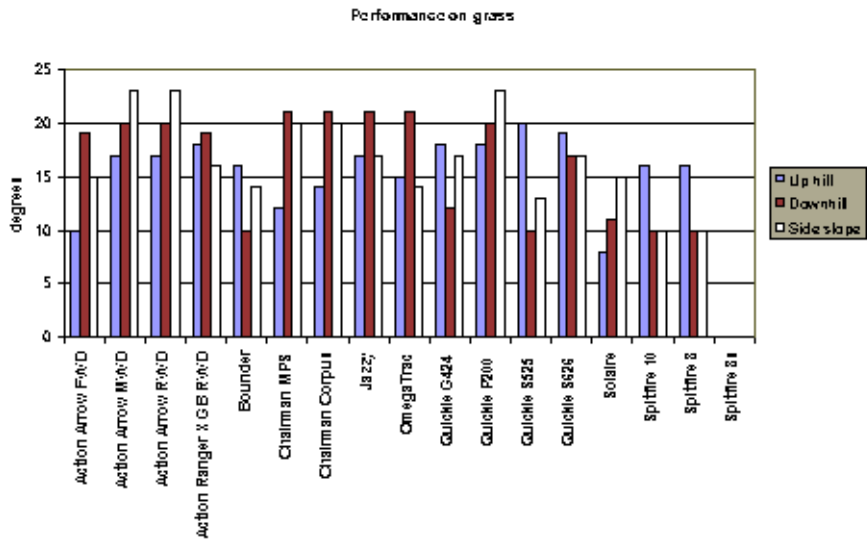
A chair is much safer and more predictable if the columns representing up, down, and side slopes are similar in height.



So a graph that looks like this: [balanced bars] is preferable to one like this: [unbalanced bars]

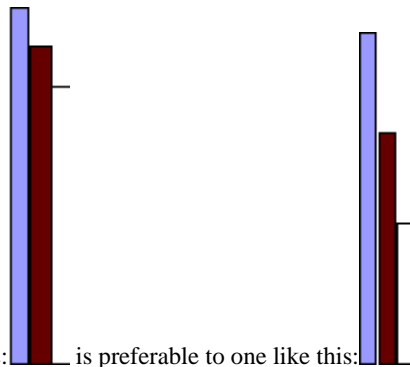
**Test Results**

**Performance on Grass covered inclines**



A taller column indicates that the chair is able to cope with a steeper incline.

A chair is much safer and more predictable if the columns representing up, down, and side slopes are similar in height



So a graph that looks like this: [tall blue bar, shorter red bar] is preferable to one like this: [tall blue bar, very short red bar]

**Detailed test results for all chairs....**

Are available from our website:- <http://assistive-technology.bc.ca>. These pages will be updated as new chairs are tested.

To order more copies of this manual contact:

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