

Image Cover Sheet

CLASSIFICATION

SYSTEM NUMBER

511883

UNCLASSIFIED



TITLE

Advanced Lithium Ion Super Polymer Rechargeable Batteries

System Number:

Patron Number:

Requester:

Notes: Paper # 9 contained in Parent sysnum #511874

DSIS Use only:

Deliver to: CL



Advanced Lithium Ion Super Polymer Rechargeable Batteries

by **S. Das Gupta, J.K. Jacobs and D. Murdoch**

Electrofuel Inc., 21 Hanna Avenue, Toronto, Ontario M6K 1W8

ABSTRACT

Electrofuel has recently developed a Lithium Ion Super polymer rechargeable battery. The Electrofuel battery has energy density of 470Wh/litre and 175 Wh/kg, which is the highest energy density of all lithium ion batteries in the world. Presently 98% of the world's Lithium Ion batteries are supplied by Japanese companies such as Sony, Panasonic and Toshiba with battery performance around 300Wh/litre and 120 Wh/kg. The Electrofuel battery is produced in a flat format, and can be produced in most shapes and sizes. Typical cells available from Electrofuel range from 1Ah to 12Ah. A new battery pack of 150Wh at 14.8V and 10.2Ah will be announced at this conference. This battery pack is compatible with portable computers and other uses. Electrofuel has a production plant in Toronto.

Introduction

Electrofuel, Inc. has developed a new type of Lithium Ion SuperPolymer battery which has the world's highest energy density of greater than 450 W/l and 190 W/ Kg.

The battery consists of a graphite negative electrode and a Lithium-Cobalt Oxide positive electrode, with the Lithium Ion shuttling between the electrodes. Typical average cell voltage is 3.75V.

The cells are charged to 4.2 volts through a constant current, constant voltage regime and typically discharged to 3.0 volts.

Applications

Electrofuel's SuperPolymer battery exceeds the following targets for different applications:

Name	Target Market	ENERGY DENSITY Wh/liter
1. Japan's Sunshine Program targets 2001	Alternate energy	360
2. USABC: long term target 2003	Transportation	250
3. NEMI : future energy requirements 2008	Electronic devices	400
4. Electrofuel: 1999		450
5. Electrofuel: target for 2001		600

The Electrofuel battery exceeds the performance of the above and therefore can be amply used in areas such as:

- Notebook Computer
- Personal Digital Assistance
- Cellular Telephones
- Portable Telecommunication Devices
- Electric Cars

- Power Assisted Bicycles
- Hybrid Vehicles
- Medical Devices
- Defense Power sources
- Aerospace Power sources

Product Performance

Electrofuel has developed a battery pack named the PowerPad 160. This pack has a capacity of 11 Ah and gives an average output of 15 volts and. Four 11 Ah cells are connected in series with the following configuration:

Dimensions: 3/8" thin by 8.75" x 11.75"

Weight: 2 lbs

Fuel Gauge: 5 LED Fuel Gauge with low battery alarm alert

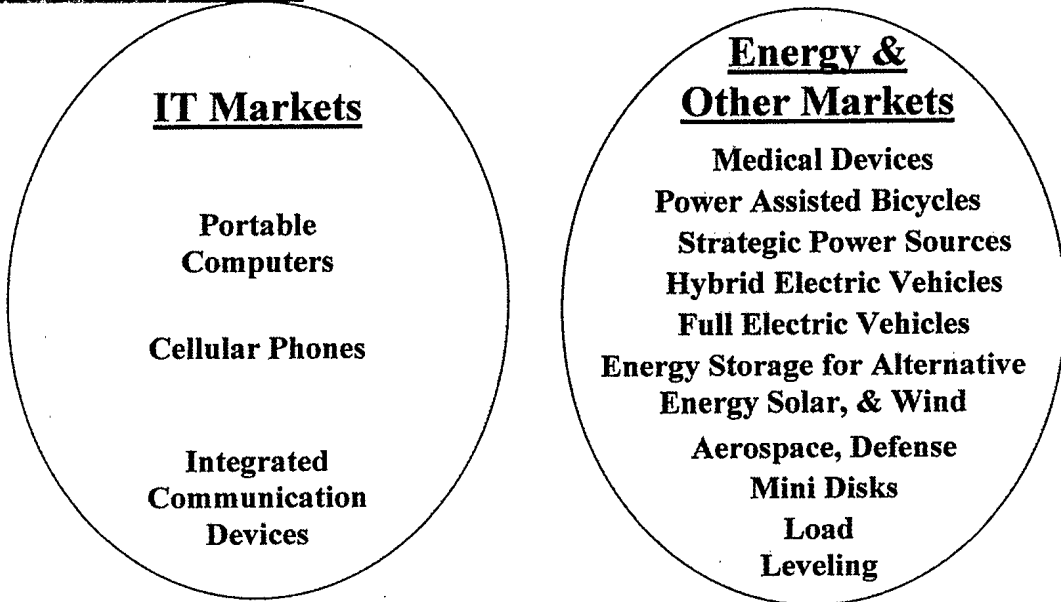
The PowerPad 160 is designed specifically to provide external, long-lasting power for portable notebook computers.

Conclusion

The SuperPolymer battery appears to have many applications and the battery can be tailored to each application with respect to shape, size, capacity, voltage, configuration and discharge rates.

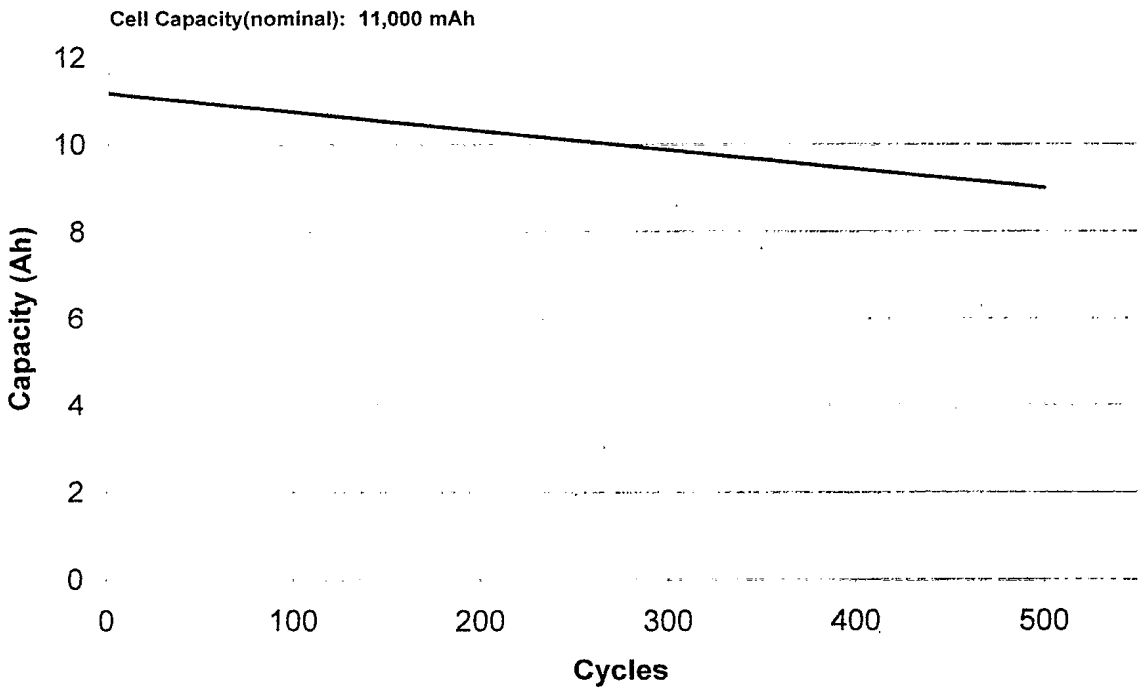


Electrofuel Vision



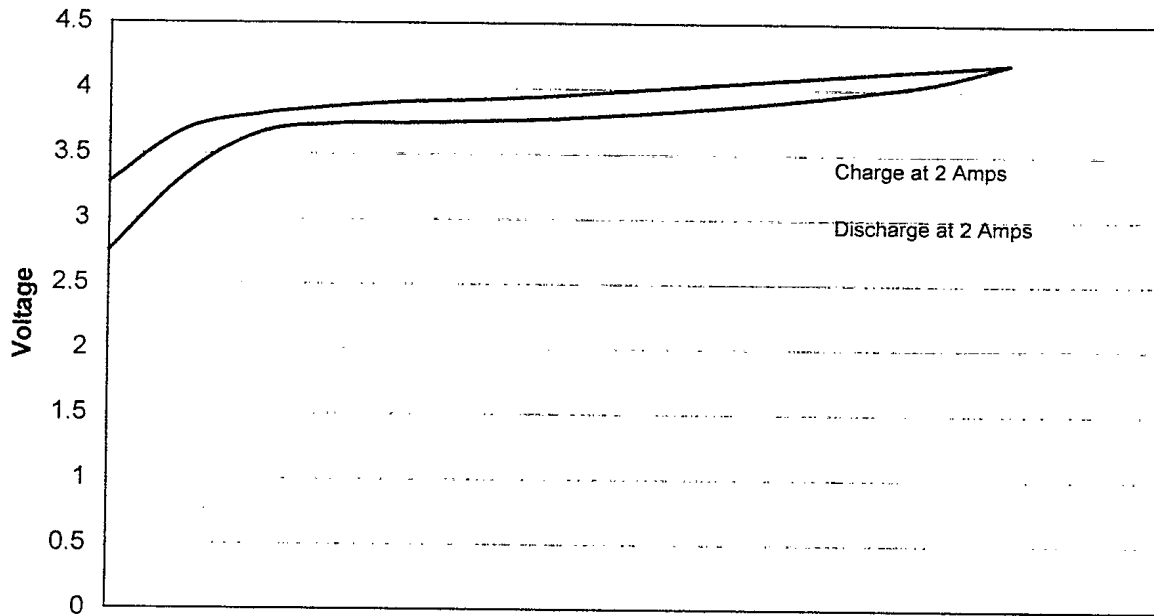
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ELECTROFUEL: Life Cycle Profile



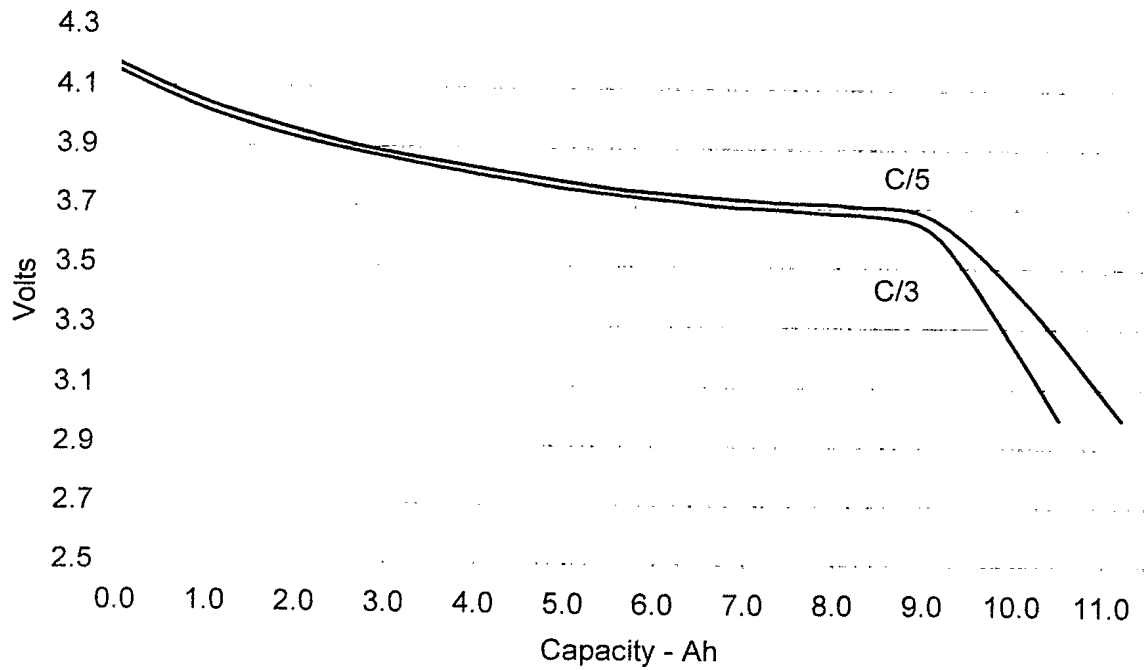
ELECTROFUEL: Charge - Discharge Profile

Cell Capacity (nominal): 11,000 mAh



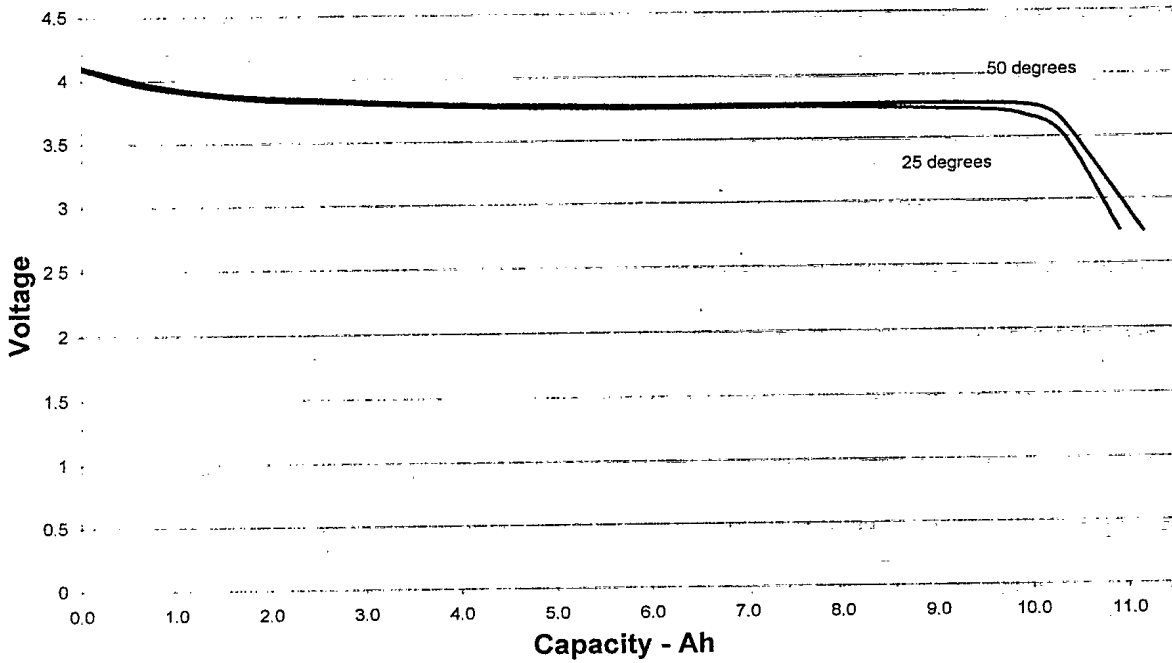
ELECTROFUEL: Discharge Characteristics

Cell Capacity (nominal): 11000 mAh

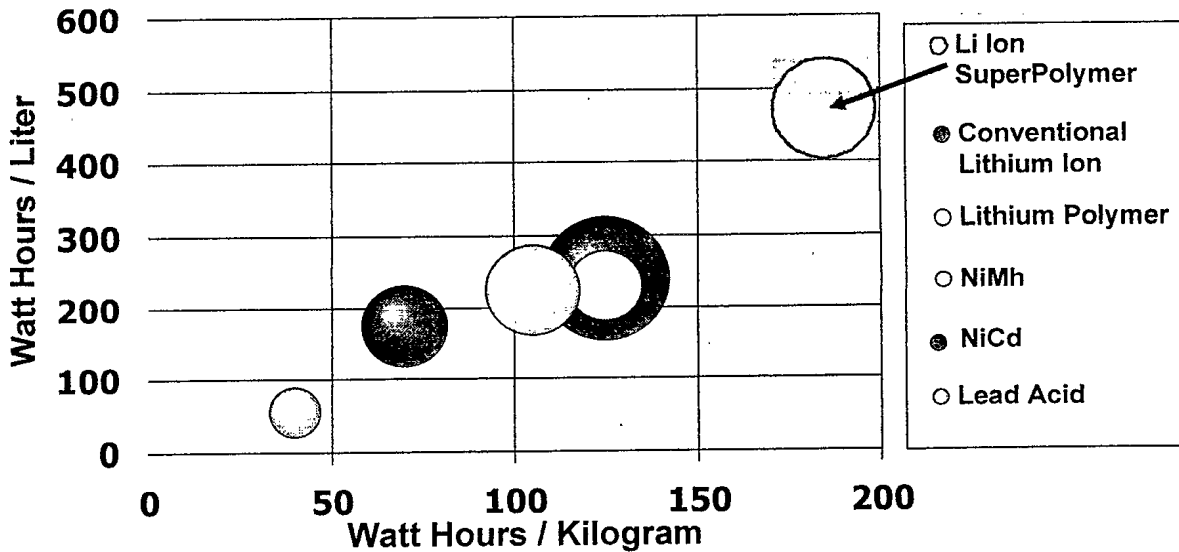


ELECTROFUEL: Discharge Profile

Cell Capacity (nominal): 11,000 mAh



Performance Comparison



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PowerPad™

electrofuel's extended life battery

Capacity:

14.8 V, 11Ah, 160 Wh

Run-time:

Up to 16 hrs from
full charge

Ultra-Thin and

Compact:

3/8" thin (9.5mm)
by 8.75 x 11.75"
(220 x 295mm)

Lightweight:

approximately 2 pounds

Rugged Design:

Titanium case

Fuel Gauge:

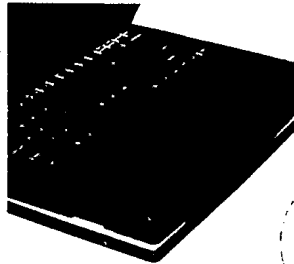
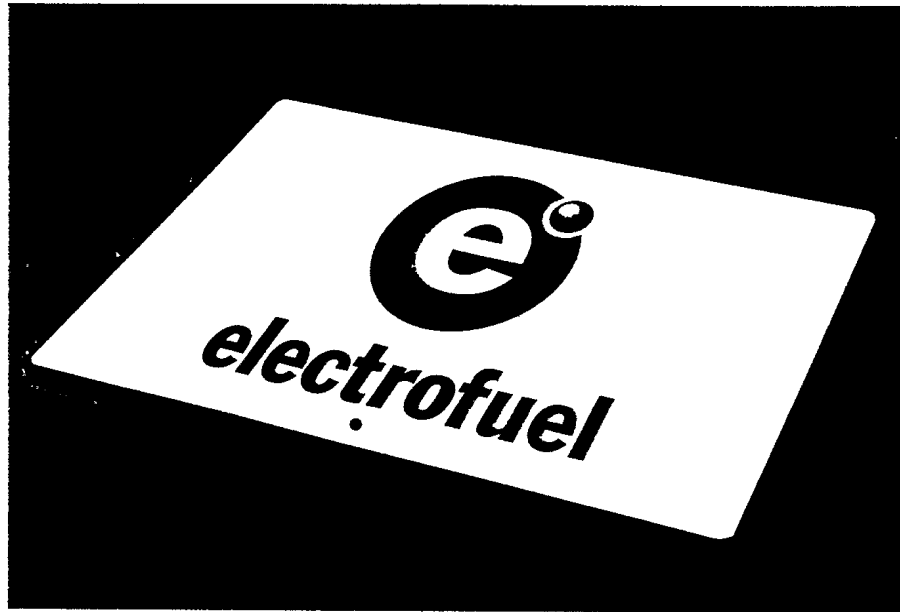
5 LED Fuel Gauge with low
battery alarm alert

Fast Charge:

80% charge in less than
4 hours

Convenient to Use:

Can use portable computer's
AC adapter



21 Hanna Avenue
Toronto, Ontario
Canada, M6K 1W9
T: 416.535.1114
F: 416.535.2361
E: www.electrofuel.com

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PowerPad™

electrofuel's extended life battery

**PowerPad 160™ with Electrofuel's Lithium Ion SuperPolymer.
WORLD'S HIGHEST ENERGY DENSITY BATTERY**

The ultimate
Portable Computer
Battery...16 hours
of power!...
160 Watt Hours.

Powering the
21st Century

Never be short
of energy when
you need it most.
Order your
PowerPad today.

Up to 10 times the run-time for some
notebook computers.

In a lightweight and ultra-thin titanium clad pack!

Never worry about running out of battery life
for those

- Long-haul flights overseas
- Extended presentations with no accessible outlet
- Weekends at the cottage or out in the boat with no power outlets
- Road warriors with no opportunities for recharge during the day

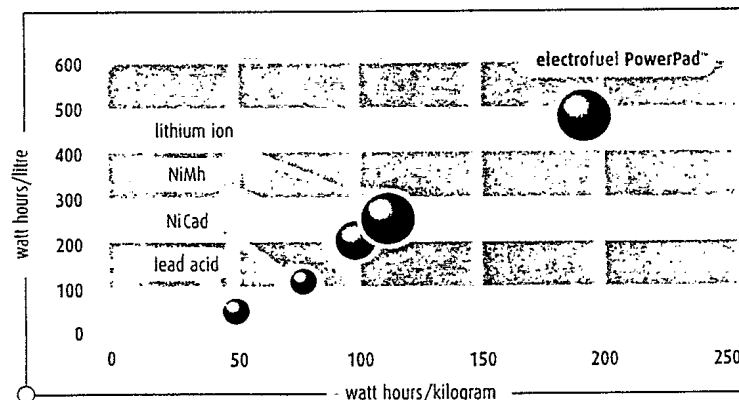
Imagine using your notebook computer for a
full day and not having to worry about recharging.
This in a light-weight and compact package no
larger than a paper notepad. Easily stored away.

The pack is convenient to use with a universal
cord with detachable connectors to fit most
portable computers.

How can this be possible? Using Electrofuel's
patented revolutionary new Lithium Ion
SuperPolymer batteries, Electrofuel can deliver
double the capacity in a thinner package than
conventional lithium ion batteries or up to
5 times that of lead acid batteries.

This is the battery technology of the 21st century
available now in a titanium, ultra-thin pack.

Be the first to own this new battery technology,
which will change the world of portable
computing. Why use an internal battery pack,
which forces you to choose between inserting
your floppy drive or your CD-ROM? Why use
an internal battery pack, which only delivers
two-hours of run-time or less?



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Lithium ion super polymer battery

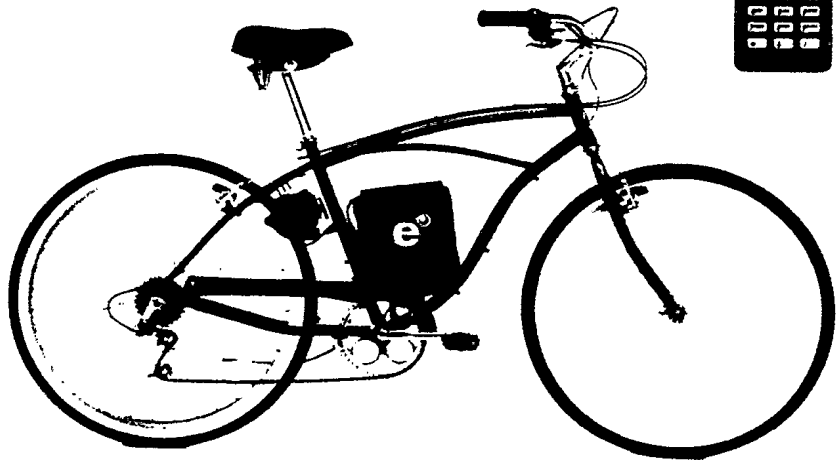
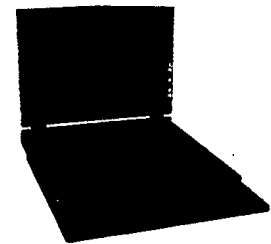
world's highest energy density

Applications:

- Portable
- Personal Digital Assistants
- Electric Vehicles
- Storage Systems
- Medical Devices Aerospace

500Wh/L, 180Wh/kg

- Cellular Phones
- PCS/PHS
- Camcorders
- Load leveling
- Defence
- Power Assisted Bicycles



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E: dmurdoche@electrofuel.com

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