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Bi-Polar AgZn Battery

The silver-zinc (AgZn) battery system has been unique in its ability to safely satisfy high power demand applications with low mass and volume. However, a new generation of defense, aerospace and commercial applications will impose even higher power demands. These new power demands can be satisfied by the development of a bi-polar battery design. In this configuration the power consuming, inter-electrode, current conductors are eliminated while the current is then conducted via the large cross-section, electrode substrate. Negative and positive active materials are applied to opposite sides of a solid silver foil substrate.

In addition to reducing the weight and volume required for a specified power level the output voltage performance is also improved as follows.

1.	Reduced Weight:	A.	Elimination of the plastic cell container
		B.	Elimination of plate leads and intercell connector
		C.	Elimination of internal plate current collector
2.	Increase Voltage:	A.	Eliminate resistance of current collector
		B.	Eliminate resistance of plate lead
		C.	Eliminate resistance of intercell connector

EPI worked previously (1974-75) on development of a secondary bipolar silver zinc battery. This development demonstrated the electrical capability of the system and manufacturing techniques. One difficulty with this development was mechanical problems with the seals. However, recent improvements in plastics and adhesives should eliminate the major problem of maintaining a seal around the periphery of the bipolar module. The seal problem is not as significant for a primary battery application or for a requirement for only a few discharge cycles. A second difficulty encountered was with activation (introducing electrolyte into the cell) and with venting gas from the cell without loss of electrolyte.

During previous work, the following projections for energy density were made from test data for a high power system which demonstrated in excess of 50 discharge/charge cycles.

Projected system power = 100 kilowatts
Discharge time = 30 seconds
Discharge current density = 1.75 amps/in^2
System Weight = 86 lbs (9.7 WH/lb)
System Volume = 1071 in^3 (.78 WH/in^3)

EPI is currently working on a development program to produce a bi-polar silver-zinc battery design for NASA. The potential application would be to power electromechanical actuators for space launch vehicles.

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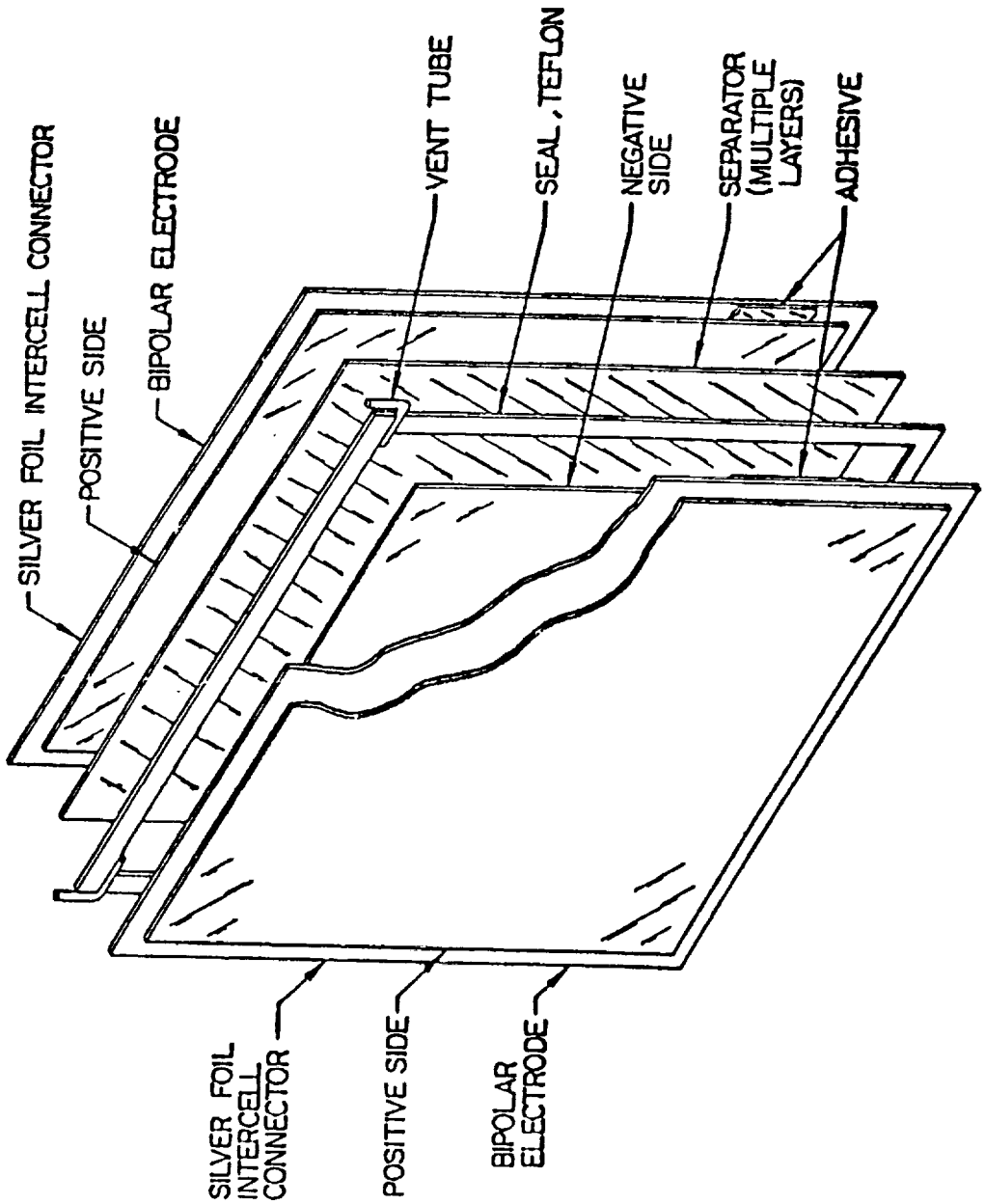

Bi-Polar Silver-Zinc Battery
Relationship of Components