

ELA NASA BATTERY WORKSHOP PRESENTATION

November 18, 1993

Johnson Controls Battery Group, Incorporated

Douglas C. Pierce

Dr. William O. Gentry

Marshall Space and Flight Center

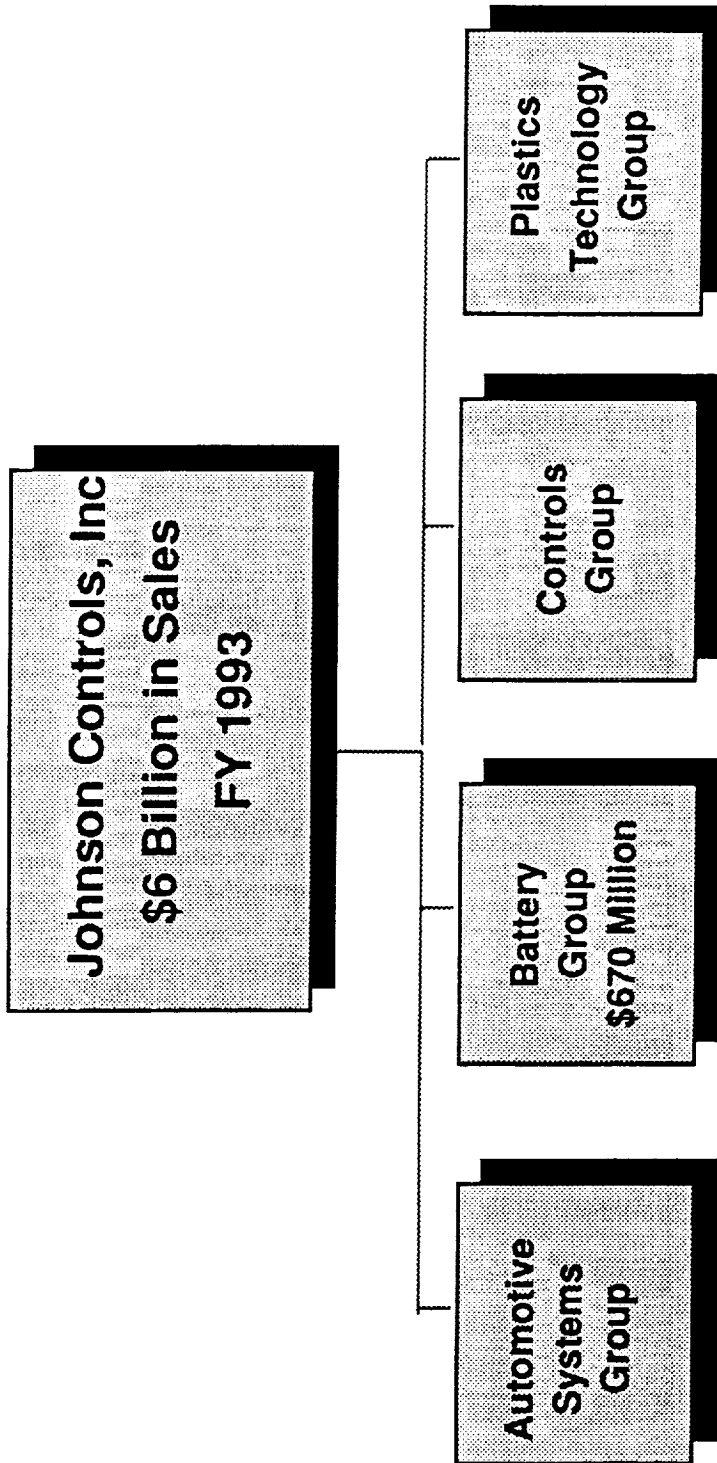
David Hall

pgs

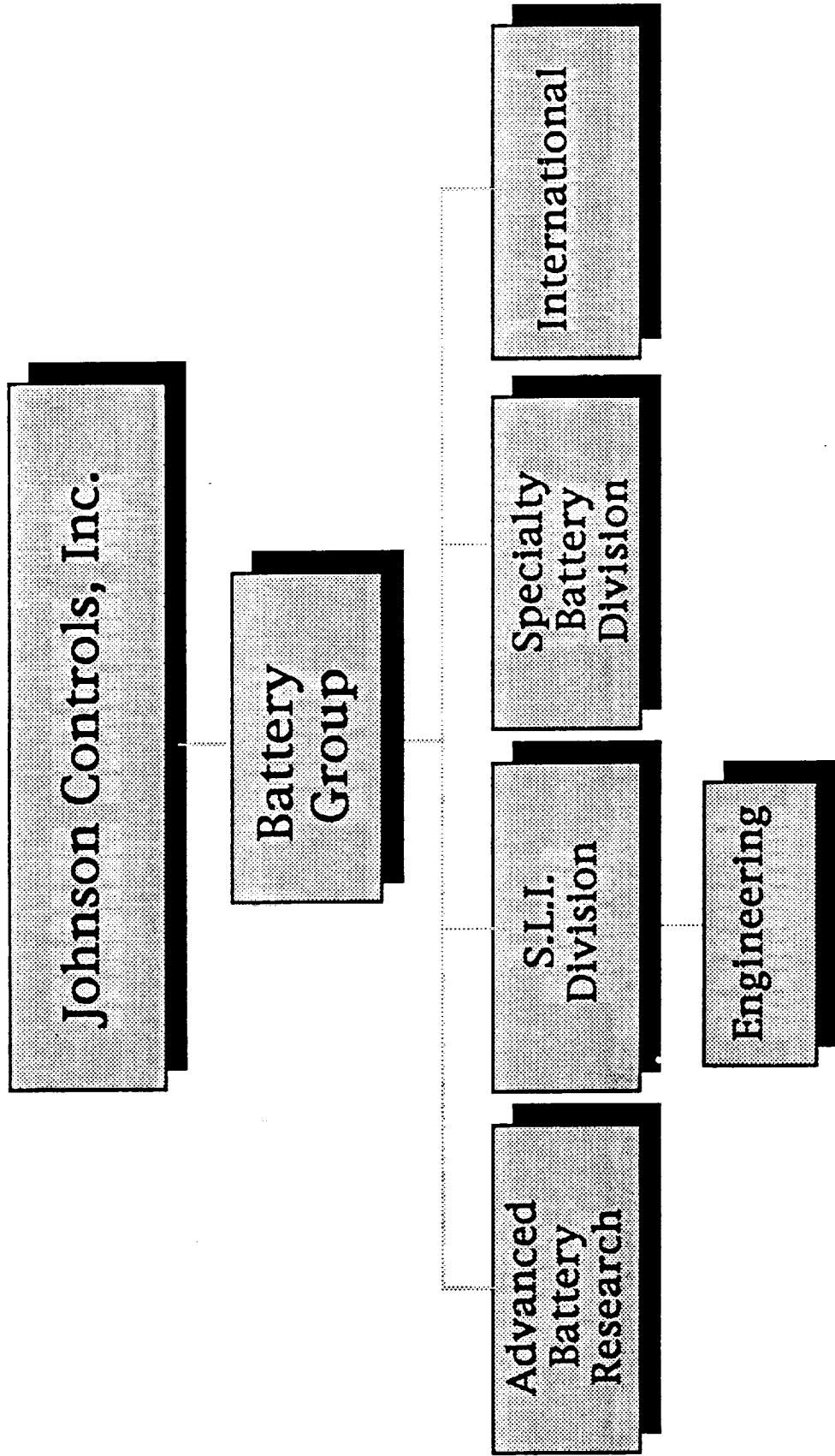
20

N94-28134

JOHNSON CONTROLS, INCORPORATED



ORGANIZATION STRUCTURE



TRUE BIPOLAR BATTERY DEVELOPMENT WPAFB CONTRACT

- GOALS:

Develop a Composite Bipolar Substrate
Material with the Following Characteristics:

Resistivity: $< 2\Omega$ -cm

Thickness: < 0.064 cm

Weight: < 150 mg/cm

Area: > 400 cm²

The 270 Volt Battery will be Designed to be
used in the More Electric Aircraft Program

TRUE BIPOLAR BATTERY DEVELOPMENT
WPAFB CONTRACT

• VALUE:

Contract Total	1,013.4M
Spending To Date	636.4M
Funding For FY'94	377.0M

10% Cost Share to JCBGI

TRUE BIPOLAR BATTERY DEVELOPMENT WPAFB CONTRACT

- APPROACHES:

Compound Stable Conductive Filler(s) into Plastic or Thermosets to Produce Non-Porous Highly Conductive, Lightweight Substrate Material

Use Compounding Additives Which Enhance Conductivity, and Manufacturability While Eliminating Porosity

TRUE BIPOLAR BATTERY DEVELOPMENT WPAFB CONTRACT

- PROGRESS:

Conductive Filler Stability Proven

Conductive Filler Supplier Qualified

Composition of Substrate Identified

Project Substrate Thickness of 0.010-0.015"

Numerous Batteries Tested To Date

TRUE BIPOLAR BATTERY DEVELOPMENT WPAFB CONTRACT

- NEXT STEPS:

Improved Containment Design Trial

Improve Present Manufacturing
Techniques - Mass Production

Produce Lighter, Thinner, More
Conductive Substrate

Test for SLI, EV Applications

JCBGI LABBM
300 Volt Bipolar Battery System
ELA Program

Battery Parameter

Design Specs

WPAFB Goals

Substrate Thickness

0.015"

0.025"

Substrate Resistivity

2Ω -cm

2Ω -cm

Substrate Weight/Area

150 mg/cm²

150 mg/cm²

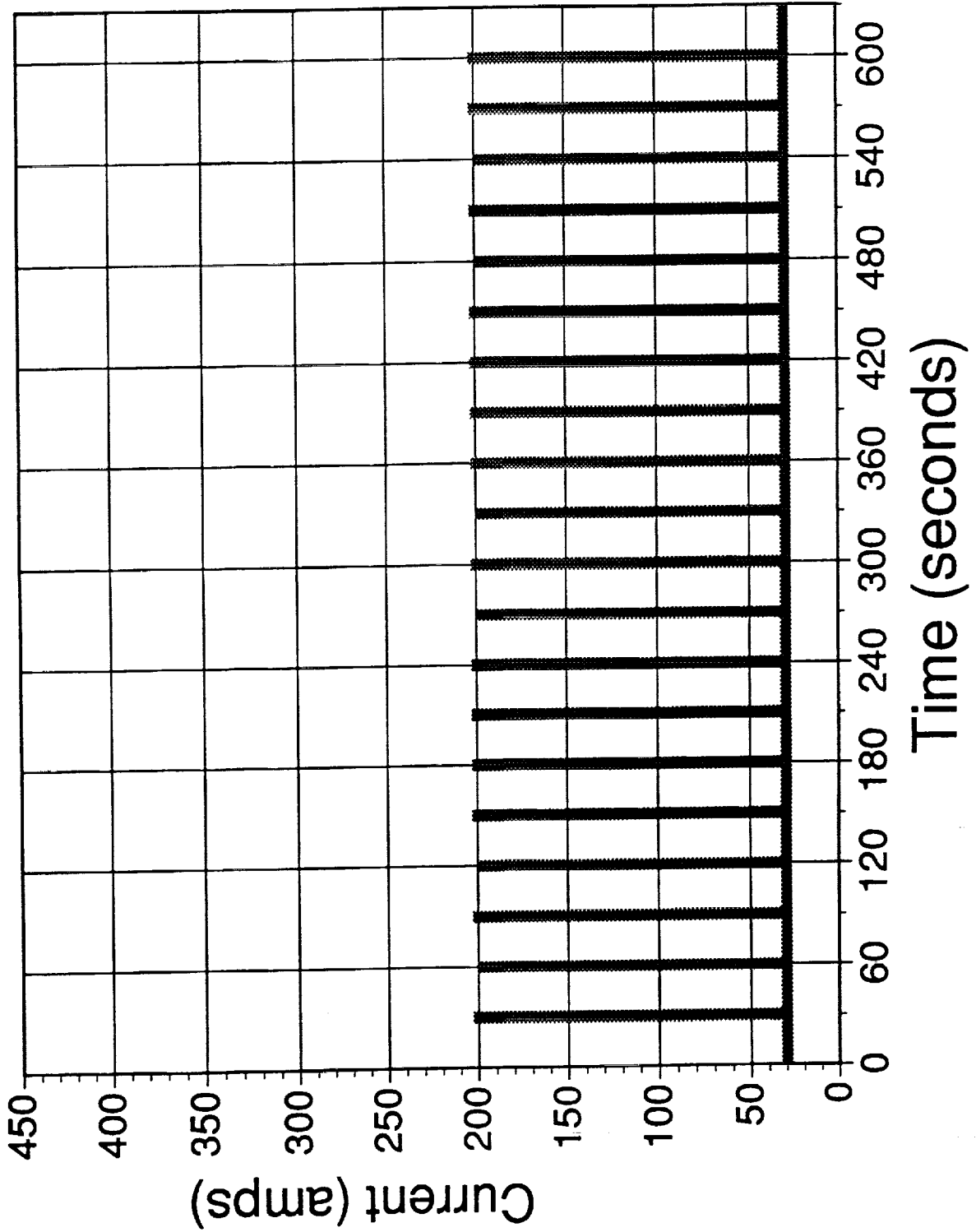
Substrate Area

1200 cm²

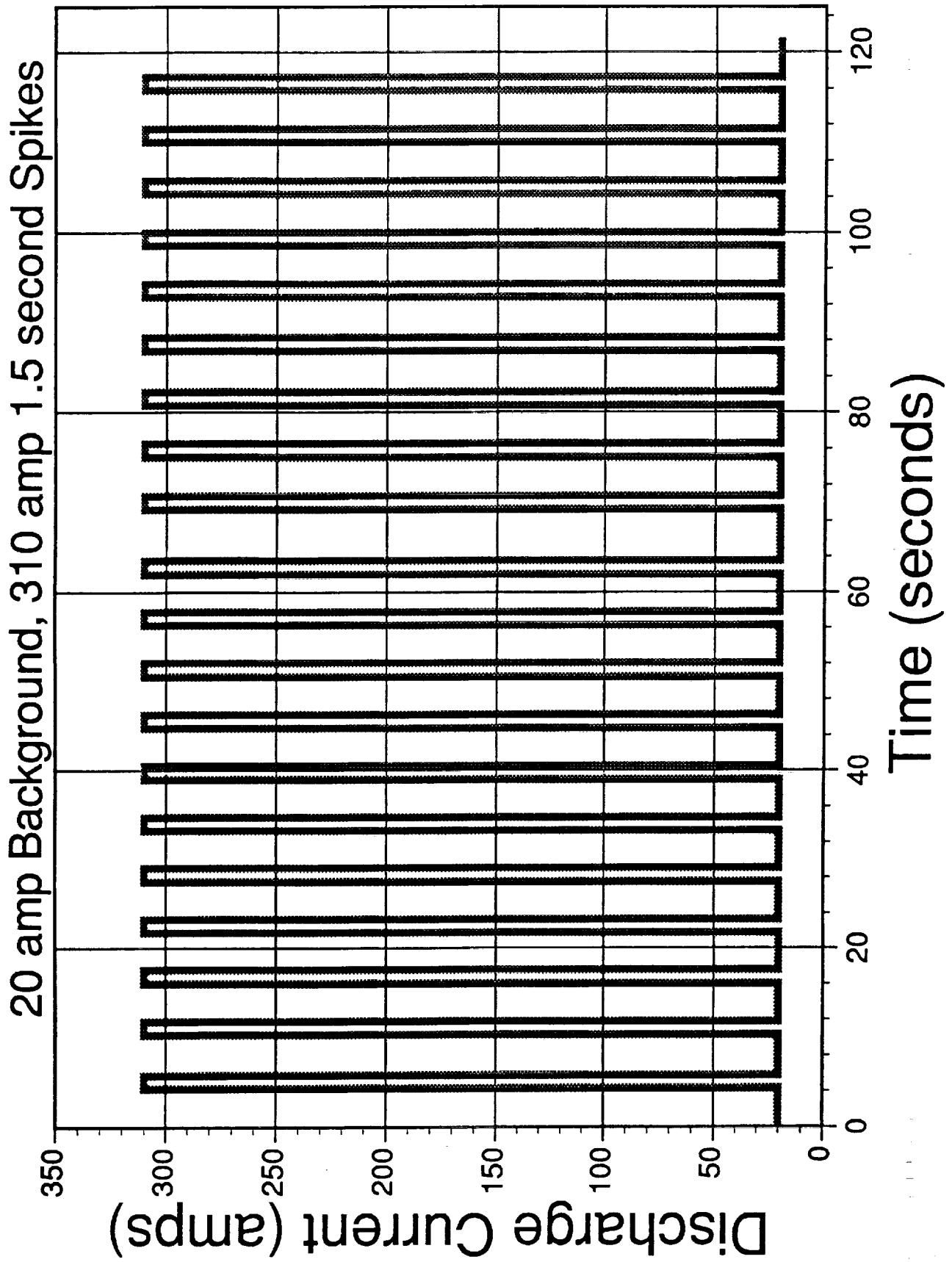
400 cm²

ELA Current Profile

30 amp Base Load, 200 amp Pulse for 0.2 Seconds



ELA Current Profile

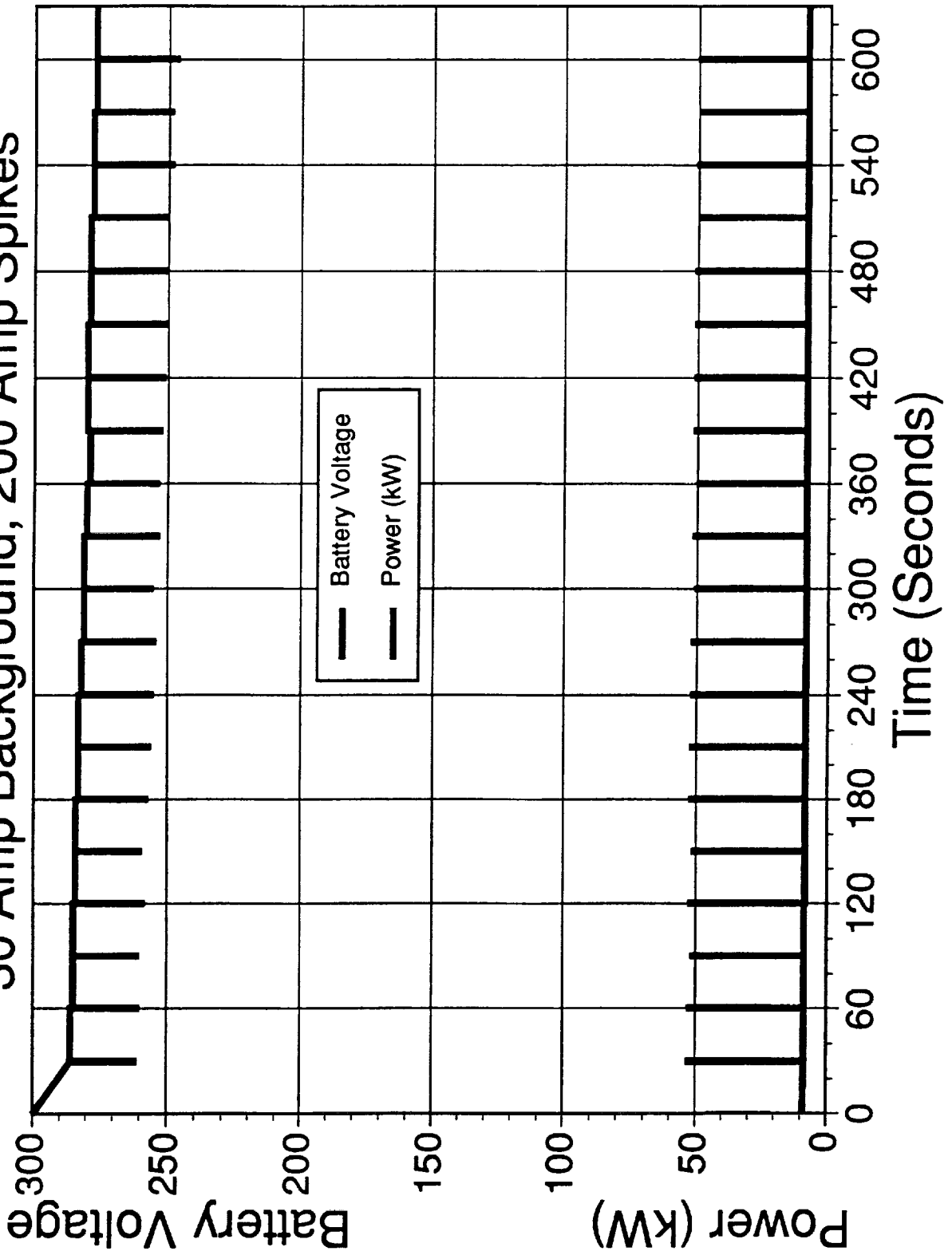


JCBGI LABBM
300 Volt Bipolar Battery System
ELA Program

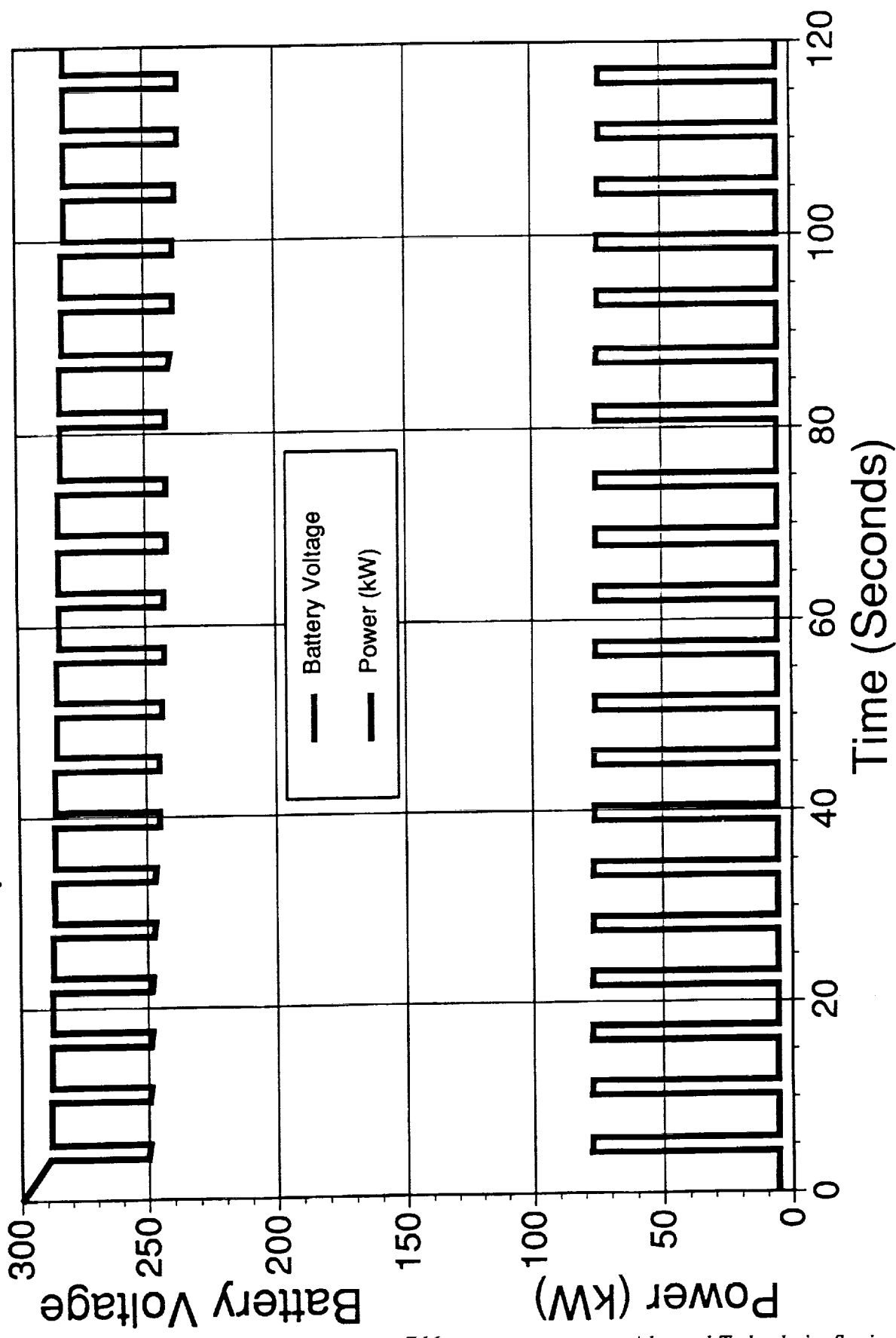
Battery System 1 Parameters

Battery Size	15" x 15" x 9"
Weight	228 pounds
Number of Cells	140
OCV	300 Volts
Cell Thickness	0.063"

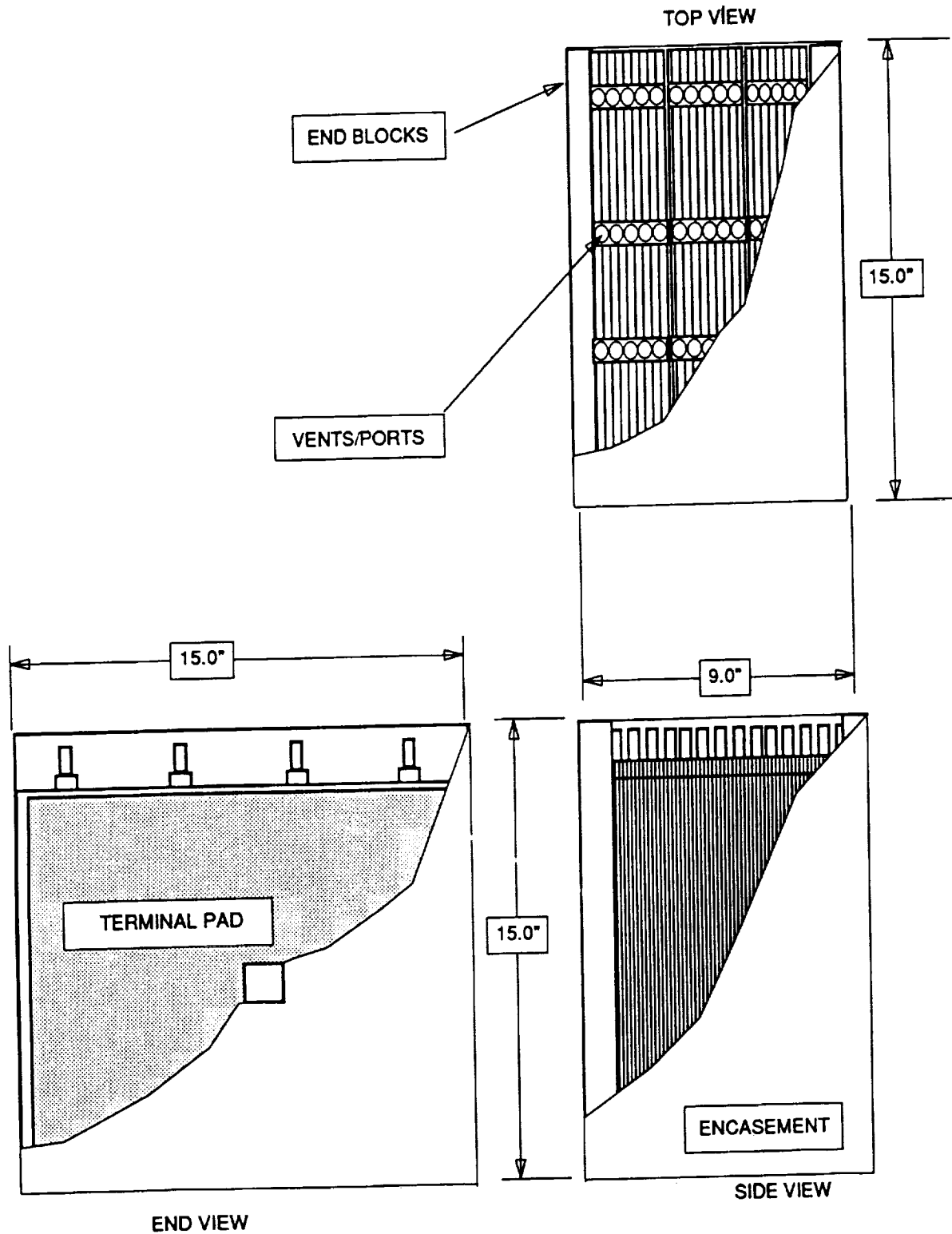
JCBGI Bipolar Battery Voltage/Power Profile 30 Amp Background, 200 Amp Spikes



JCBGI Bipolar Battery Voltage/Power Profile 20 Amp Background, 310 Amp Spikes

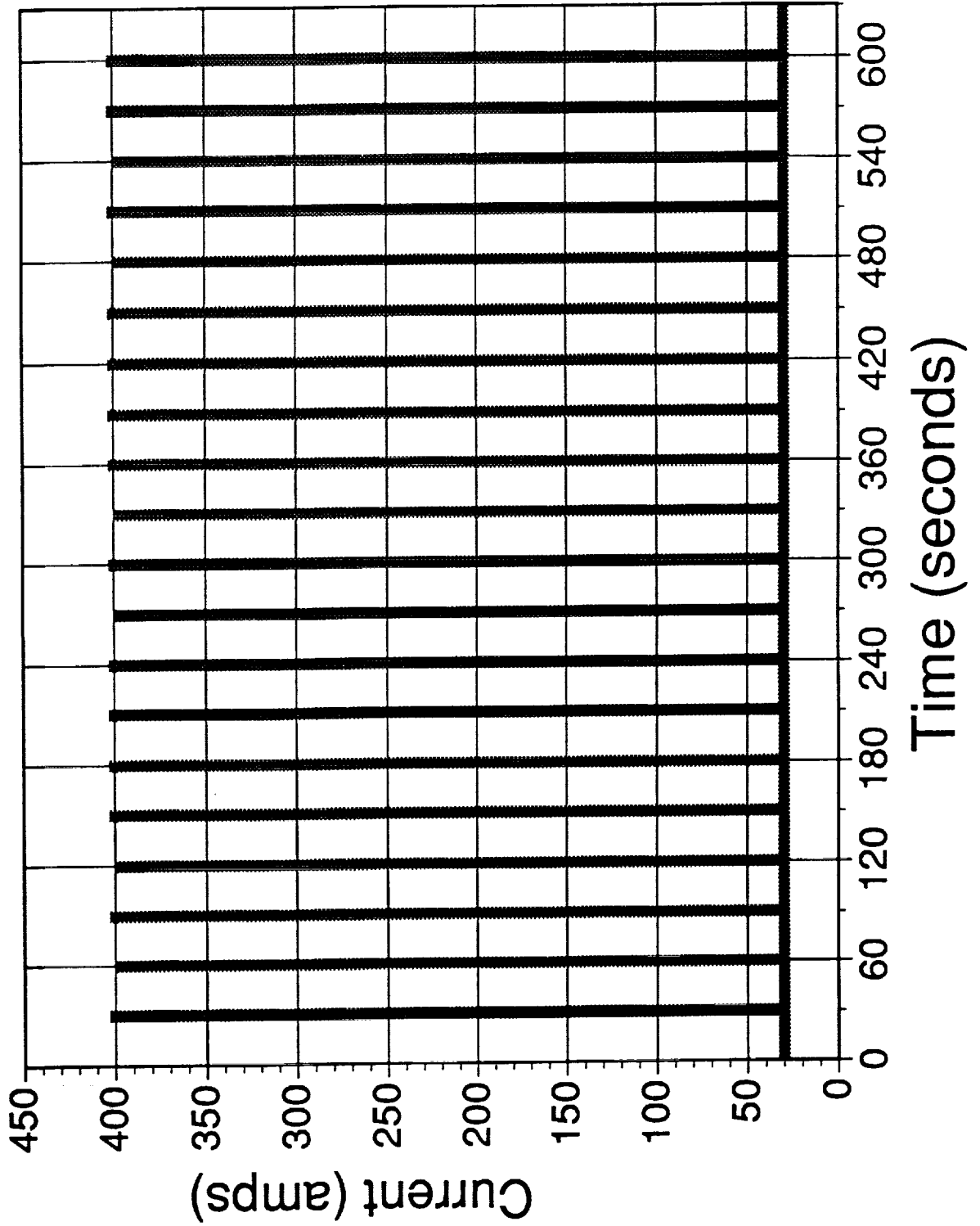


JCBGI Bipolar Lead/Acid 300 Volt Battery System 1 ELA Program



ELA Current Profile

30 amp Base Load, 400 amp Pulse for 0.2 Seconds

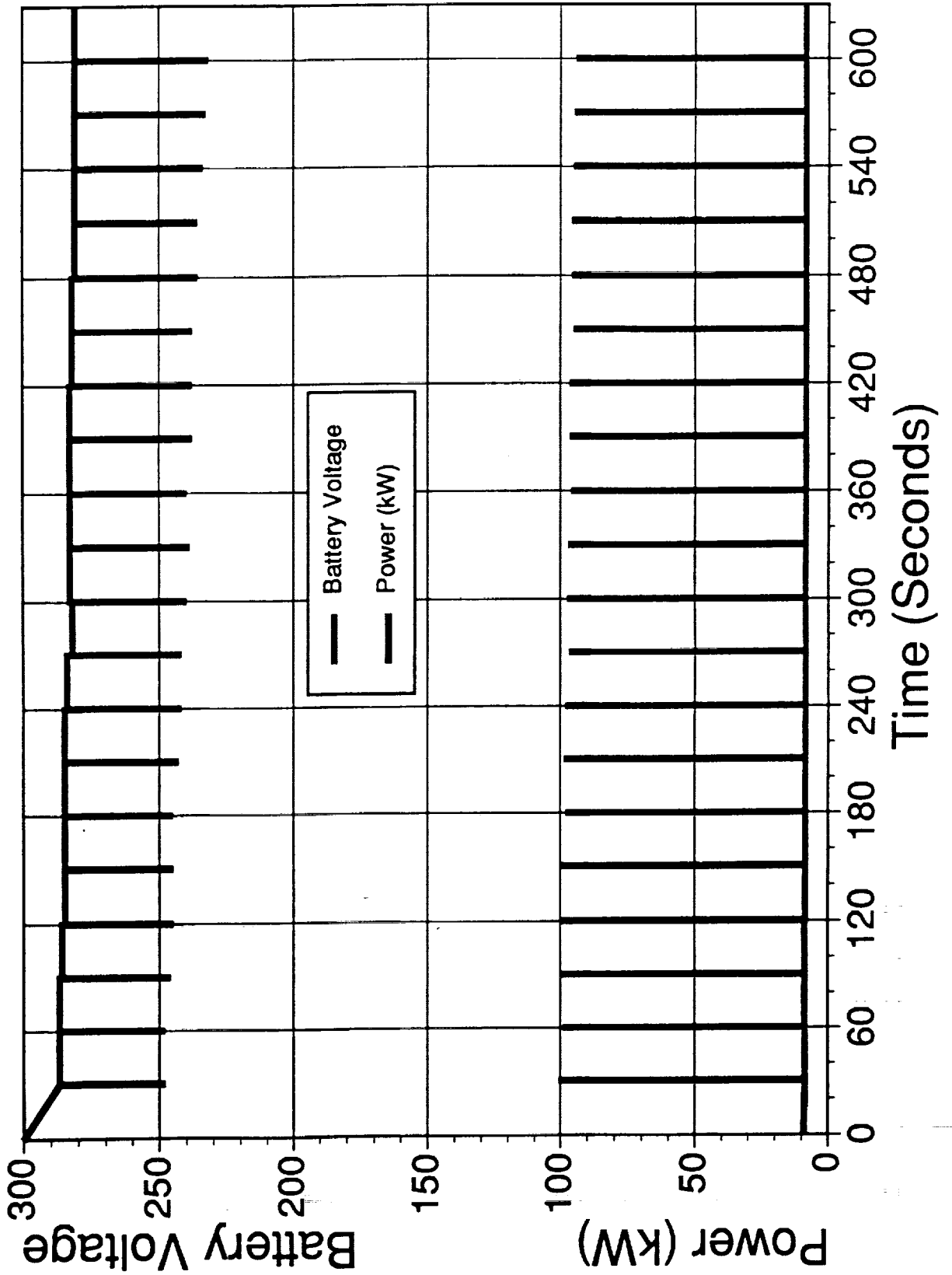


JCBGI LABBM
300 Volt Bipolar Battery System
ELA Program

Battery System 2 Parameters

Battery Size	16.8" x 16.8" x 8.7"
Weight	273 pounds
Number of Cells	140
OCV	300 Volts
Cell Thickness	0.061"

JCBGI Bipolar Battery Voltage/Power Profile 30 Amp Background, 400 Amp Spikes



JCBGI Bipolar Lead/Acid 300 Volt Battery System 2 ELA Program

