

CHAPTER ONE: INTRODUCTION.....	1
STUDY GOAL AND OBJECTIVES	1
REASONS FOR DOING THE STUDY	2
SCOPE AND FORMAT	2
METHODOLOGY	3
INTENDED AUDIENCE.....	3
ANALYST CREDENTIALS.....	4
RELATED REPORTS.....	4
BCC ONLINE SERVICES.....	4
DISCLAIMER	5
 CHAPTER TWO: SUMMARY.....	 6
SUMMARY.....	6
SUMMARY (CONTINUED)	7
<i>SUMMARY TABLE BATTERY CONTROL TECHNOLOGY SALES AND SHIPMENTS SUMMARY: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	8
<i>SUMMARY FIGURE A BATTERY CONTROL TECHNOLOGY SALES AND SHIPMENTS SUMMARY: CONSENSUS SCENARIO, 2006-2016 (\$ MILLIONS/MILLION UNITS)</i>	8
<i>SUMMARY FIGURE B SHARE OF BATTERY CONTROL TECHNOLOGY SALES AND SHIPMENTS, 2011 (%)</i>	9
 CHAPTER THREE: OVERVIEW: BATTERY CONTROL TECHNOLOGY.....	 10
BATTERY CHARGERS.....	10
BATTERY CHARGER BACKGROUND	10
Battery Charger Background (Continued)	11
BATTERY CHARGER COMPONENTS.....	12
Rectifiers	12
Transformers	13
Battery Charger Regulators, Testers, and Meters.....	13
Microcontrollers	14
Packaging.....	14
BATTERY CHARGER COMPANIES.....	15
<i>TABLE 1 BATTERY CHARGER COMPANIES</i>	16
<i>TABLE 1 (CONTINUED)</i>	17
BATTERY CHARGER MARKETS AND PREDICTION.....	18
<i>TABLE 2 TOTAL BATTERY CHARGER SALES AND SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	18
<i>TABLE 2 (CONTINUED)</i>	19
BATTERY CONDITIONERS	19
BATTERY CONDITIONER BACKGROUND.....	19
BATTERY POWER CONDITIONER COMPANIES	20
<i>TABLE 3 BATTERY CONDITIONER COMPANIES</i>	20

BATTERY POWER CONDITIONER MARKETS AND PREDICTION	21
<i>TABLE 4 TOTAL BATTERY CONDITIONER SALES AND SHIPMENTS: CONSENSUS SCENARIO (\$ MILLIONS)</i>	21
SMART BATTERY SYSTEM MARKETS.....	21
SMART BATTERY BACKGROUND.....	21
Smart Battery Background (Continued)	22
Smart Battery Background (Continued)	23
SMART BATTERY COMPANIES	24
<i>TABLE 5 SMART BATTERY SYSTEM (SBS) STAKEHOLDERS</i>	25
<i>TABLE 6 SMART BATTERY AND SMART BATTERY CHARGER COMPANIES</i>	25
<i>TABLE 6 (CONTINUED)</i>	26
<i>TABLE 7 SMART BATTERY OEM COMPANIES</i>	27
SMART BATTERY SYSTEM MARKETS & PREDICTION	27
<i>TABLE 8 TOTAL SMART BATTERY SALES AND SHIPMENTS: CONSENSUS SCENARIO (\$ MILLIONS)</i>	27
<i>TABLE 8 (CONTINUED)</i>	28
 CHAPTER FOUR: INDUSTRY STRUCTURE AND COMPETITIVE ASPECTS.....	 29
THE DRIVING FORCES OF THE BATTERY CONTROL TECHNOLOGY INDUSTRY.....	29
DRIVING FORCE ONE: IMPROVING BATTERY CHARGER TECHNICAL MATURITY.....	29
DRIVING FORCE TWO: IMPROVING BATTERY TECHNICAL MATURITY	30
DRIVING FORCE THREE: EMERGING BATTERY/BATTERY CONTROL APPLICATIONS.....	30
DRIVING FORCE FOUR: NEW BATTERY/BATTERY CONTROL DISTRIBUTION OPPORTUNITIES.....	31
DRIVING FORCE FIVE: AUTOMOTIVE SMART BATTERIES.....	31
DRIVING FORCE SIX: THE PROMISE OF THE ELECTRIC VEHICLE BATTERY CHARGER MARKET.....	31
DRIVING FORCE 7: PATENT ACTIVITY	32
<i>TABLE 9 BATTERY CONTROL PATENT AWARDS</i>	33
<i>TABLE 9 (CONTINUED)</i>	34
<i>TABLE 9 (CONTINUED)</i>	35
<i>TABLE 9 (CONTINUED)</i>	36
<i>TABLE 9 (CONTINUED)</i>	37
<i>TABLE 9 (CONTINUED)</i>	38
<i>TABLE 9 (CONTINUED)</i>	39
<i>TABLE 9 (CONTINUED)</i>	40
<i>TABLE 9 (CONTINUED)</i>	41
<i>TABLE 10 BATTERY CONTROL PATENT ACTIVITY</i>	41

<i>TABLE 10 (CONTINUED)</i>	42
<i>TABLE 10 (CONTINUED)</i>	43
DRIVING FORCE EIGHT: SMART BATTERY SAFETY.....	43
Background.....	43
Background (Continued).....	44
Alternative Designs.....	45
Recent Patents that Lithium-ion Address Battery Safety.....	46
Title: Battery pack.....	46
Title: Secondary battery with protective circuit.....	47
Title: Battery capacity calculating method.....	47
Title: System and method for efficiently implementing a battery controller for an electronic device.....	47
Title: System ...(Continued).....	48
Title: System ...(Continued).....	49
Title: System ...(Continued).....	50
DRIVING FORCE NINE: GOVERNMENT REGULATION AND SUBSIDIES.....	51
Driving Force Nine:...(Continued).....	52
Driving Force Nine:...(Continued).....	53
BATTERY CONTROL TECHNOLOGY MARKET SEGMENTATION.....	54
BATTERY CONTROL INDUSTRY CONCENTRATION FACTORS.....	55
<i>TABLE 11 BATTERY CONTROL TECHNOLOGY COMPANY COUNTS</i>	55
<i>TABLE 11 (CONTINUED)</i>	56
<i>TABLE 12 BATTERY CONTROL COMPANIES BY MARKETS SERVED AND PRODUCT TYPE</i>	56
<i>TABLE 12 (CONTINUED)</i>	57
<i>TABLE 12 (CONTINUED)</i>	58
<i>TABLE 12 (CONTINUED)</i>	59
<i>TABLE 12 (CONTINUED)</i>	60
<i>TABLE 12 (CONTINUED)</i>	61
<i>TABLE 12 (CONTINUED)</i>	62
<i>TABLE 12 (CONTINUED)</i>	63
<i>TABLE 12 (CONTINUED)</i>	64
<i>TABLE 12 (CONTINUED)</i>	65
<i>TABLE 12 (CONTINUED)</i>	66
BATTERY CONTROL INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	66
INDUSTRIAL TRACTION, STATIONARY MARINE AND AVIATION BATTERY CONTROL TECHNOLOGY INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	66
EV CHARGING STATION BATTERY CONTROL TECHNOLOGY INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	67

CONSUMER/COMMERCIAL AUTOMOTIVE BATTERY CONTROL TECHNOLOGY INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	67
CONSUMER/COMMERCIAL EXTERNAL BATTERY CHARGER INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	68
SPECIALTY BATTERY CONTROL TECHNOLOGY INDUSTRY ENVIRONMENT AND TRADE PRACTICES.....	68
BATTERY CONTROL CHANNELS OF DISTRIBUTION	69
<i>TABLE 13 U.S. BATTERY CONTROL CHANNELS OF DISTRIBUTION (% SALES)</i>	69
MASS MERCHANDISER CHANNEL DISCUSSION	69
SPECIALTY MERCHANDISER RETAIL OUTLET CHANNEL DISCUSSION.....	70
MAIL ORDER AND OR WEB SALES TO PUBLIC CHANNEL DISCUSSION.....	70
COMMERCIAL PURCHASE CHANNEL DISCUSSION	70
GOVERNMENT PURCHASE CHANNEL DISCUSSION.....	70
BATTERY CONTROL INDUSTRY PURCHASING INFLUENCES	71
<i>TABLE 14 REPRESENTATIVE BATTERY CONTROL PRODUCT PRICES (\$)</i>	71
 CHAPTER FIVE: BATTERY CONTROL TECHNOLOGY MARKET	
SUMMARY	72
<i>TABLE 15 TOTAL BATTERY CONTROL SALES AND SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	72
<i>TABLE 15 (CONTINUED)</i>	73
<i>TABLE 15 (CONTINUED)</i>	74
<i>FIGURE 1 TOTAL BATTERY CONTROL SALES AND SHIPMENTS: CONSENSUS SCENARIO, 2006-2016 (\$ MILLIONS)</i>	75
<i>FIGURE 2 BATTERY CONTROL SHIPMENTS, BY TYPE OF TECHNOLOGY, 2011 (%)</i>	75
<i>FIGURE 2 (CONTINUED)</i>	76
<i>FIGURE 3 BATTERY CONTROL VALUE, BY TYPE OF TECHNOLOGY, 2011 (%)</i>	76
<i>FIGURE 3 (CONTINUED)</i>	77
<i>TABLE 16 TOTAL BATTERY CONTROL SALES AND SHIPMENTS SUMMARY, THROUGH 2016 (\$ MILLIONS)</i>	77
<i>TABLE 17 TOTAL BATTERY CONTROL SALES AND SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	78
<i>TABLE 17 (CONTINUED)</i>	79
 CHAPTER SIX: BATTERY CONTROL TECHNOLOGY APPLICATIONS	
AUTOMOTIVE BATTERY CONTROL MARKET	80

AUTOMOTIVE BATTERY CONTROL MARKET	
BACKGROUND	80
AUTOMOTIVE BATTERY CONTROL COMPANIES	81
<i>TABLE 18 AUTOMOTIVE BATTERY CONTROL COMPANIES.....</i>	<i>82</i>
AUTOMOTIVE BATTERY CONTROL MARKETS AND	
PREDICTION	82
<i>TABLE 19 AUTOMOTIVE BATTERY CHARGER INCENTIVES AND</i>	
<i>DISINCENTIVES</i>	<i>83</i>
<i>TABLE 20 GLOBAL AUTOMOTIVE BATTERY CONTROL SALES AND</i>	
<i>SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$</i>	
<i>MILLIONS).....</i>	<i>84</i>
<i>TABLE 21 GLOBAL AUTOMOTIVE BATTERY CONTROL SALES AND</i>	
<i>SHIPMENTS BY REGION: CONSENSUS SCENARIO, THROUGH</i>	
<i>2016 (\$ MILLIONS).....</i>	<i>85</i>
TRACTION MARINE AND AVIATION BATTERY CONTROL	
MARKET.....	85
TRACTION, MARINE AND AVIATION BATTERY CONTROL	
BACKGROUND	85
TYPES OF TRACTION, MARINE AND AVIATION	
BATTERIES	86
TRACTION, MARINE AND AVIATION BATTERY CONTROL	
COMPANIES	87
<i>TABLE 22 LOW SPEED COMMERCIAL/INDUSTRIAL ELECTRIC</i>	
<i>VEHICLE MAKERS.....</i>	<i>88</i>
<i>TABLE 23 TRACTION, MARINE, AND AVIATION BATTERY</i>	
<i>CONTROL COMPANIES.....</i>	<i>88</i>
<i>TABLE 23 (CONTINUED).....</i>	<i>89</i>
TRACTION, MARINE AND AVIATION BATTERY CONTROL	
MARKETS AND PREDICTION.....	89
<i>TABLE 24 INDUSTRIAL/COMMERCIAL VEHICLE MARKET</i>	
<i>DRIVERS.....</i>	<i>90</i>
Traction, Marine And Aviation... (Continued).....	91
<i>TABLE 25 CONSENSUS, OPTIMISTIC, AND PESSIMISTIC</i>	
<i>COMMERCIAL/INDUSTRIAL SCENARIOS.....</i>	<i>92</i>
<i>TABLE 26 TOTAL GLOBAL COMMERCIAL/INDUSTRIAL VEHICLE</i>	
<i>MARKET SCENARIOS, THROUGH 2016 (THOUSANDS OF UNITS).....</i>	<i>93</i>
<i>TABLE 27 GLOBAL TRACTION, MARINE, AND AVIATION BATTERY</i>	
<i>CONTROL SALES AND SHIPMENTS: CONSENSUS SCENARIO,</i>	
<i>THROUGH 2016 (\$ MILLIONS).....</i>	<i>94</i>
<i>TABLE 28 GLOBAL TRACTION, MARINE, AND AVIATION SALES</i>	
<i>AND SHIPMENTS BY REGION: CONSENSUS SCENARIO,</i>	
<i>THROUGH 2016 (\$ MILLIONS).....</i>	<i>94</i>
PORTABLE PRODUCT BATTERY CONTROL MARKET.....	95

<i>TABLE 29 PORTABLE BATTERY-POWERED PRODUCT</i>	
<i>DEFINITIONS AND SCOPE</i>	96
<i>TABLE 29 (CONTINUED)</i>	97
PORTABLE PRODUCT BATTERY CONTROL BACKGROUND.....	97
Internal Portable Product Battery Charger Background	98
External Portable Product Battery Charger Background	99
PORTABLE PRODUCT BATTERY CONTROL COMPANIES	100
<i>TABLE 30 PORTABLE PRODUCT BATTERY CONTROL COMPANIES</i>	100
<i>TABLE 30 (CONTINUED)</i>	101
<i>TABLE 31 PORTABLE PRODUCT SMART BATTERY COMPANIES</i>	102
PORTABLE PRODUCT BATTERY CONTROL MARKETS & PREDICTION	103
<i>TABLE 32 PORTABLE PRODUCT BATTERY CHARGER AND BATTERY CONDITIONER GROWTH DRIVERS AND INHIBITORS</i>	103
<i>TABLE 33 IMPORTANT PORTABLE PRODUCT SMART BATTERY GROWTH DRIVERS AND INHIBITORS</i>	104
<i>TABLE 33 (CONTINUED)</i>	105
<i>TABLE 33 (CONTINUED)</i>	106
<i>TABLE 34 SMART BATTERY GROWTH DRIVERS AND INHIBITORS</i>	107
Portable Product Battery ...(Continued)	108
<i>TABLE 35 AVERAGE BATTERY CHARGER PRICES, THROUGH 2016 (\$ PER UNIT)</i>	109
<i>TABLE 36 GLOBAL PORTABLE PRODUCT BATTERY CONTROL SALES AND SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	110
<i>TABLE 37 GLOBAL PORTABLE PRODUCT BATTERY CONTROL SALES AND SHIPMENTS BY REGION: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	110
<i>TABLE 37 (CONTINUED)</i>	111
<i>TABLE 38 GLOBAL MARKET FOR PORTABLE PRODUCT LITHIUM INTERNAL/OEM CHARGERS BY APPLICATION, THROUGH 2016 (\$ MILLIONS)</i>	111
<i>TABLE 38 (CONTINUED)</i>	112
<i>TABLE 39 GLOBAL MARKET FOR PORTABLE PRODUCT SMART BATTERIES BY APPLICATION, THROUGH 2016 (\$ MILLIONS)</i>	112
<i>TABLE 39 (CONTINUED)</i>	113
STATIONARY BATTERY CONTROL MARKET.....	113
STATIONARY BATTERY CONTROL BACKGROUND.....	113
STATIONARY BATTERY BACKGROUND	114
Uninterruptible Power Supply Battery Control Technology	114
Uninterruptible Power ... (Continued)	115
EMERGENCY LIGHTING BATTERY CONTROL TECHNOLOGY.....	116

REMOTE AND PHOTOVOLTAIC POWER STORAGE	
BATTERY CONTROL TECHNOLOGY.....	116
STATIONARY BATTERY CONTROL COMPANIES	117
<i>TABLE 40 STATIONARY BATTERY CONTROL TECHNOLOGY</i>	
<i>COMPANIES</i>	118
STATIONARY BATTERY CONTROL MARKETS AND	
PREDICTION	118
Stationary Battery ... (Continued).....	119
<i>TABLE 41 GLOBAL STATIONARY BATTERY CONTROL SALES AND</i>	
<i>SHIPMENTS: CONSENSUS SCENARIO, THROUGH 2016 (\$</i>	
<i>MILLIONS)</i>	120
<i>TABLE 42 GLOBAL STATIONARY BATTERY CONTROL SALES AND</i>	
<i>SHIPMENTS BY REGION: CONSENSUS SCENARIO, THROUGH</i>	
<i>2016 (\$ MILLIONS)</i>	121
ON-ROAD ELECTRIC VEHICLE BATTERY CONTROL MARKETS	121
ON-ROAD ELECTRIC VEHICLE BATTERY CONTROL	
BACKGROUND	121
On-road Electric Vehicle ... (Continued)	122
On-road Electric Vehicle ... (Continued)	123
HISTORIC TRENDS.....	124
<i>TABLE 43 ELECTRIC VEHICLE TIMELINE, 1828-2011</i>	124
Historic Trends (Continued)	125
Historic Trends (Continued)	126
Historic Trends (Continued)	127
Historic Trends (Continued)	128
<i>TABLE 44 PROJECTED ANNUAL GREENHOUSE GAS EMISSIONS</i>	
<i>REDUCTIONS FROM PHEVS IN THE YEAR 2050 (MILLION MT)</i>	129
<i>TABLE 45 PEAK NEW VEHICLE MARKET SHARE IN 2050 FOR THE</i>	
<i>THREE PHEV ADOPTION SCENARIOS (%)</i>	130
Historic Trends (Continued)	131
Historic Trends (Continued)	132
Historic Trends (Continued)	133
ON-ROAD ELECTRIC VEHICLE BATTERY CONTROL	
TECHNOLOGY COMPANIES.....	134
<i>TABLE 46 EV AND HEV BATTERY CONTROL TECHNOLOGY</i>	
<i>COMPANIES</i>	134
<i>TABLE 46 (CONTINUED)</i>	135
ON-ROAD EV BATTERY CONTROL MARKETS AND	
PREDICTION	135
<i>TABLE 47 EV AND EV BATTERY CONTROL MARKET DRIVERS</i>	136
<i>TABLE 48 CONSENSUS, OPTIMISTIC, AND PESSIMISTIC BATTERY-</i>	
<i>POWERED VEHICLE SCENARIOS</i>	137
<i>TABLE 48 (CONTINUED)</i>	138

<i>TABLE 49 GLOBAL EV MARKET: CONSENSUS SCENARIO, THROUGH 2016 (THOUSANDS OF UNITS)</i>	138
<i>TABLE 50 GLOBAL EV MARKET: CONSENSUS, PESSIMISTIC, AND OPTIMISTIC SCENARIOS, THROUGH 2016 (\$ MILLIONS)</i>	139
<i>TABLE 51 GLOBAL ELECTRIC VEHICLE BATTERY CONTROL SALES AND SHIPMENTS BY TYPE: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	140
<i>TABLE 51 (CONTINUED)</i>	141
<i>TABLE 52 GLOBAL ON-ROAD ELECTRIC VEHICLE BATTERY CONTROL SALES AND SHIPMENTS BY REGION: CONSENSUS SCENARIO, THROUGH 2016 (\$ MILLIONS)</i>	141
<i>TABLE 53 GLOBAL EV MARKET: CONSENSUS, PESSIMISTIC, AND OPTIMISTIC SCENARIOS, THROUGH 2016 (\$ MILLIONS)</i>	142
CHAPTER SEVEN: BATTERY CHARGER COMPANY PROFILES.....	143
350GREEN.....	143
PRODUCT FOCUS: BATTERY CHARGERS.....	143
A123SYSTEMS.....	144
PRODUCT FOCUS: SMART BATTERIES.....	144
Product Focus: Smart Batteries (Continued).....	145
Product Focus: Smart Batteries (Continued).....	146
AAA.....	147
PRODUCT FOCUS: BATTERY CHARGERS.....	147
ABACUS CONTROLS INC.	148
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	148
ABSL POWER (AEA BATTERY SYSTEMS, AGM BATTERIES LTD.).....	148
PRODUCT FOCUS: SMART BATTERIES.....	148
ABSOPULSE ELECTRONICS.....	149
PRODUCT FOCUS: BATTERY CHARGERS.....	149
PRODUCT FOCUS: SMART BATTERIES.....	149
ACER.....	150
PRODUCT FOCUS: BATTERY CHARGERS.....	150
ACTION BUSINESS SUPPLIERS INC.	150
PRODUCT FOCUS: BATTERY CHARGERS.....	150
ADCON ELECTRONICS, INC.....	151
PRODUCT FOCUS: BATTERY CHARGERS.....	151
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS.....	151
ADVANCED BATTERY SYSTEMS, LLC.....	152
PRODUCT FOCUS; BATTERY CHARGERS, SMART BATTERIES.....	152
ADVANCED BATTERY TECHNOLOGIES, INC. (ABAT).....	152
PRODUCT FOCUS: SMART BATTERIES.....	153
ADVANCED MICRO DEVICES, INC. (POWER COMPONENTS).....	154

PRODUCT FOCUS: BATTERY CHARGERS.....	155
ADS POWER RESOURCE.....	155
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	155
ADVANCED POWER AND CONTROLS.....	155
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	155
AEROVIRONMENT INC.	155
PRODUCT FOCUS: BATTERY CHARGERS.....	156
AKER WADE POWER TECHNOLOGIES.....	157
PRODUCT FOCUS: BATTERY CHARGERS.....	157
ALURATEK.....	157
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	157
ALLEGRO MICROSYSTEMS, INC.	157
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	158
AMERICAN BATTERY CHARGING INC.....	158
PRODUCT FOCUS: BATTERY CHARGERS.....	158
AMETEK.....	158
PRODUCT FOCUS: BATTERY CHARGERS.....	158
AMERICAN POWER CONVERSION (APC).....	158
PRODUCT FOCUS: BATTERY CHARGERS.....	159
ANALOG DEVICES.....	159
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES.....	159
APPLE COMPUTER, INC.....	159
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES.....	159
APPLIED POWER, INC.	160
PRODUCT FOCUS: SMART BATTERIES.....	160
APX TECHNOLOGIES, INC.....	160
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	160
AROTECH CORP.....	161
PRODUCT FOCUS: SMART BATTERIES.....	161
ASSOCIATED EQUIPMENT CORP.....	161
PRODUCT FOCUS: BATTERY CHARGERS.....	161
ASTRODYNE CORP. (AUDAX GROUP).....	162
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	162
ASTROFLIGHT INC.....	162
PRODUCT FOCUS: BATTERY CHARGERS.....	162
ATMEL CORPORATION.....	163

PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES, BATTERY CONDITIONERS	163
AXEON	164
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	164
BATTERIES BATTERIES, INC.....	164
PRODUCT FOCUS: BATTERY CHARGERS	165
BATTERIES PLUS	165
PRODUCT FOCUS: BATTERY CHARGERS	165
BATTERY-BIZ	165
PRODUCT FOCUS: BATTERY CHARGERS	165
BATTERY SYSTEMS, INC.	166
PRODUCT FOCUS: BATTERY CHARGERS	166
BATTERY TECHNOLOGY, INC. (BTI)	166
PRODUCT FOCUS: SMART BATTERIES	166
BENQ.....	166
PRODUCT FOCUS: BATTERY CHARGERS	166
BESCOR VIDEO	167
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	167
BETTER PLACE.....	167
PRODUCT FOCUS: BATTERY CHARGERS	167
BOLLORÉ AND PININFARINA	168
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	168
BOSTON POWER.....	169
PRODUCT FOCUS: SMART BATTERIES	169
BREN-TRONICS.....	170
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	170
BST SYSTEMS, INC.....	171
PRODUCT FOCUS: BATTERY CHARGERS	171
BYD BATTERIES	171
PRODUCT FOCUS: SMART BATTERIES	171
CADEX	171
PRODUCT FOCUS: BATTERY CHARGERS	172
CAR CHARGING GROUP.....	173
C&D TECHNOLOGIES, INC.....	174
PRODUCT FOCUS: BATTERY CONDITIONERS	174
CELL-CON	174
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	174
CHINA BAK BATTERY, INC.	175
PRODUCT FOCUS; SMART BATTERIES	176

CHRYSLER	177
CLIPLIGHT, INC.....	178
PRODUCT FOCUS: BATTERY CHARGERS	178
CLIPPERCREEK.....	179
PRODUCT FOCUS: BATTERY CHARGERS	179
CLUB CAR (INGERSOLL RAND).....	179
PRODUCT FOCUS: BATTERY CHARGER	179
COLUMBIA PAR CAR	180
PRODUCT FOCUS: BATTERY CHARGERS	180
COULOMB TECHNOLOGIES INC.....	180
PRODUCT FOCUS: BATTERY CHARGERS	180
Product Focus:... (Continued)	181
COMPAL ELECTRONICS	182
PRODUCT FOCUS: BATTERY CHARGERS	182
CURTIS INSTRUMENTS	182
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	183
CUSTOM POWER SYSTEMS.....	183
PRODUCT FOCUS: BATTERY CONDITIONERS	183
CYPRESS SEMICONDUCTOR CORP.....	183
PRODUCT FOCUS: BATTERY CHARGERS	183
CT&T	183
PRODUCT FOCUS: BATTERY CHARGERS	183
DAIMLER.....	184
PRODUCT FOCUS: BATTERY CHARGERS	184
Product Focus: Battery ... (Continued).....	185
Product Focus: Battery ... (Continued).....	186
Product Focus: Battery ... (Continued).....	187
D&B POWER, INC.	188
PRODUCT FOCUS: BATTERY CONDITIONERS, BATTERY CHARGERS	188
DELL.....	188
PRODUCT FOCUS: BATTERY CHARGERS	188
DELPHI AUTOMOTIVE LLP	188
PRODUCT FOCUS: BATTERY CHARGERS	189
DELTRAN CORPORATION	190
PRODUCT FOCUS: BATTERY CHARGERS	190
DEPENDABLE POWER SYSTEMS.....	190
PRODUCT FOCUS: BATTERY CONDITIONERS	190
DIVERSIFIED POWER INTERNATIONAL, LLC	190
PRODUCT FOCUS: BATTERY CHARGERS	191
DURACELL INTERNATIONAL.....	191
PRODUCT FOCUS: BATTERY CHARGERS	191
Product Focus: Battery Chargers (Continued)	192

DYNAGE POWER & MAGNETICS.....	193
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	193
DYNASTY ELECTRIC VEHICLES LTD.	194
PRODUCT FOCUS: BATTERY CHARGERS.....	194
EATON CORP.....	194
PRODUCT FOCUS: BATTERY CHARGERS.....	195
ECOTALITY NORTH AMERICA	196
PRODUCT FOCUS: BATTERY CHARGERS.....	196
Product Focus: Battery Chargers (Continued).....	197
EIC LABORATORIES	198
PRODUCT FOCUS: SMART BATTERIES.....	198
ELECTRIC CAR CORP.	198
PRODUCT FOCUS: BATTERY CHARGERS.....	198
ELETRA AUTOMOTIVE (DIV. GOTTLIEB INVENTIONS, INC.).....	199
PRODUCT FOCUS: BATTERY CHARGERS.....	199
ELECTROVAYA (ELECTROFUEL).....	199
PRODUCT FOCUS: SMART BATTERIES.....	199
Product Focus: Smart Batteries (Continued).....	200
ELEKTROMOTIVE LTD.....	201
PRODUCT FOCUS: BATTERY CHARGERS.....	202
ELTEK VALERE	203
PRODUCT FOCUS: BATTERY CHARGERS.....	203
ENER1, INC. (ENERDEL)	203
PRODUCT FOCUS: SMART BATTERIES.....	203
Product Focus: Smart Batteries (Continued).....	204
ENERSYS, INC.....	205
PRODUCT FOCUS: SMART BATTERIES.....	205
EFACEC	206
PRODUCT FOCUS: BATTERY CHARGERS.....	206
ENERGIZER	207
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	207
ENERIZE CORP. (FIFE BATTERIES).....	208
PRODUCT FOCUS: SMART BATTERIES.....	208
ENGINEERING DESIGN & SALES.....	209
PRODUCT FOCUS: BATTERY CHARGERS.....	209
E-ONE MOLI ENERGY	209
PRODUCT FOCUS: SMART BATTERIES.....	209
ERICSSON.....	210
PRODUCT FOCUS: BATTERY CHARGER.....	210
EUAUTO TECHNOLOGY LTD.....	210
PRODUCT FOCUS: BATTERY CHARGERS.....	211
EVATRAN (PLUGLESS POWER)	211

PRODUCT FOCUS: BATTERY CHARGERS	211
EV CONNECT.....	212
PRODUCT FOCUS: BATTERY CHARGERS	213
FORD MOTOR CO.....	213
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	213
Product focus: Battery Chargers, ... (Continued).....	214
FREEPLAY ENERGY PLC	215
PRODUCT FOCUS: BATTERY CHARGERS	215
FRIWO, INC.....	216
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	216
FUJITSU LTD (FUJITSU MICROELECTRONICS)	216
PRODUCT FOCUS: BATTERY CHARGERS	216
GENERAL ELECTRIC	217
PRODUCT FOCUS: BATTERY CHARGERS	217
GENERAL MOTORS COMPANY.....	217
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	217
Product Focus: Smart Batteries, ... (Continued).....	218
Product Focus: Smart Batteries, ... (Continued).....	219
Product Focus: Smart Batteries, ... (Continued).....	220
GIGABYTE TECHNOLOGY	221
PRODUCT FOCUS: BATTERY CHARGERS	221
GLOBTEK, INC.	222
PRODUCT FOCUS: BATTERY CHARGERS	222
GOODALL MANUFACTURING.....	222
PRODUCT FOCUS: BATTERY CHARGERS	222
GOOGLE	222
PRODUCT FOCUS: BATTERY CHARGERS	223
GP BATTERIES (GOLD PEAK INTERNATIONAL).....	224
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	224
GREATBATCH, INC.	225
PRODUCT FOCUS: SMART BATTERIES, BATTERY CONDITIONERS.....	225
GRIDTEST SYSTEMS.....	226
PRODUCT FOCUS: BATTERY CHARGERS	226
HALOIPT (QUALCOMM)	226
PRODUCT FOCUS: BATTERY CHARGERS	226
HARDING ENERGY, INC.	227
PRODUCT FOCUS: BATTERY CHARGERS	227
HITACHI MAXELL CORP.....	228

PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	228
HLK & ASSOCIATES, INC.....	228
PRODUCT FOCUS: BATTERY CHARGERS	229
HM ELECTRONICS, INC.....	229
PRODUCT FOCUS: BATTERY CHARGERS	229
HONDA	229
PRODUCT FOCUS: BATTERY CHARGERS	229
Product Focus: Battery Chargers (Continued)	230
HONEYWELL BATTERIES	231
PRODUCT FOCUS: BATTERY CHARGERS	231
HP CO.....	231
PRODUCT FOCUS: BATTERY CHARGERS	231
HTC	232
PRODUCT FOCUS: BATTERY CHARGERS	232
HYB BATTERY CO., LTD. (HUA-YUE-BAO BATTERY)	233
PRODUCT FOCUS: SMART BATTERIES	233
HUANYU BATTERY	233
PRODUCT FOCUS: SMART BATTERIES	233
IGO	233
PRODUCT FOCUS: BATTERY CHARGERS	233
INSIGNIA.....	234
PRODUCT FOCUS: BATTERY CHARGERS	234
INDUSTRIAL BATTERY ENGINEERING.....	234
PRODUCT FOCUS: SMART BATTERIES	234
INDUSTRIES INTERNATIONAL, INC. (INDI)	234
PRODUCT FOCUS: BATTERY CHARGERS	235
INTEL CORP.	235
PRODUCT FOCUS: BATTERY CHARGERS	235
INTERMEC TECHNOLOGIES CORP.	236
PRODUCT FOCUS: BATTERY CHARGERS	236
INTERNATIONAL BATTERY	236
PRODUCT FOCUS: SMART BATTERIES	236
INTERSIL CORP.	237
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	237
IOMEGA CORP.....	238
PRODUCT FOCUS: BATTERY CHARGERS	238
IOTA ENGINEERING.....	238
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	238
IQ POWER	238
PRODUCT FOCUS: SMART BATTERIES	238
ISL PRODUCTS INTERNATIONAL, LTD.	239

PRODUCT FOCUS: BATTERY CHARGERS	239
ITAUTEC.....	239
PRODUCT FOCUS: BATTERY CHARGERS	240
JEROME INDUSTRIES CORP.....	240
PRODUCT FOCUS: BATTERY CHARGERS	240
JOHNSON CONTROLS	240
PRODUCT FOCUS: SMART BATTERIES	240
Product Focus: Smart Batteries (Continued)	241
Product Focus: Smart Batteries (Continued)	242
KEYSTONE BATTERY CORP.....	243
PRODUCT FOCUS: BATTERY CHARGERS	243
KOEHLER LIGHTING.....	243
PRODUCT FOCUS: BATTERY CHARGERS	243
KONINKLIJKE PHILIPS ELECTRONICS N.V.....	243
PRODUCT FOCUS: BATTERY CHARGERS	244
KUSSMAUL ELECTRONICS CO., INC.....	244
PRODUCT FOCUS: BATTERY CHARGERS	244
LA MARCHE MANUFACTURING	244
PRODUCT FOCUS: BATTERY CHARGERS	244
LANIX.....	245
PRODUCT FOCUS: BATTERY CHARGERS	245
LENMAR ENTERPRISES INC.....	245
PRODUCT FOCUS: BATTERY CHARGERS	245
LENOVO GROUP	245
PRODUCT FOCUS: BATTERY CHARGERS	245
LESTER ELECTRICAL INC.....	246
PRODUCT FOCUS: BATTERY CHARGERS	246
LEVITON MANUFACTURING CO. LTD.	246
PRODUCT FOCUS: BATTERY CHARGERS	246
Product Focus: Battery Chargers (Continued)	247
LG	248
PRODUCT FOCUS: BATTERY CHARGERS	248
LIND ELECTRONIC DESIGN	248
PRODUCT FOCUS: BATTERY CHARGERS	248
LITHIUM TECHNOLOGY CORP. (GAIA).....	249
PRODUCT FOCUS: SMART BATTERIES	249
Product Focus: Smart Batteries (Continued)	250
Product Focus: Smart Batteries (Continued)	251
LUMENEO.....	252
PRODUCT FOCUS : BATTERY CHARGER	252
MAC MOTOR & CURRENT.....	253
PRODUCT FOCUS: BATTERY CHARGERS	253
MAGNA INTERNATIONAL	253
PRODUCT FOCUS: BATTERY CHARGERS	253

MAGNETEK	253
PRODUCT FOCUS: BATTERY CONDITIONERS	253
MATHEWS BATTERY ASSOCIATES	254
PRODUCT FOCUS: BATTERY CHARGERS	254
MAXELL CORPORATION.....	254
PRODUCT FOCUS: SMART BATTERIES	254
MAXIM INTEGRATED PRODUCTS, INC.....	254
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	254
MICROCHIP TECHNOLOGY, INC.....	255
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	255
MICRO POWER.....	255
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	255
MICROSOFT.....	256
PRODUCT FOCUS: BATTERY CHARGERS	256
MIDTRONICS.....	256
PRODUCT FOCUS: BATTERY CHARGERS	256
MILES ELECTRIC VEHICLES (CODA).....	257
PRODUCT FOCUS: BATTERY CHARGERS	257
MITSUBISHI INTERNATIONAL	257
PRODUCT FOCUS: SMART BATTERIES	257
MITSUBISHI MOTORS	258
PRODUCT FOCUS: BATTERY CHARGERS	258
MOTIVE ENERGY, INC.	259
PRODUCT FOCUS: BATTERY CHARGERS	259
MOTOROLA, INC.....	259
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS	260
MYERS MOTORS	260
PRODUCT FOCUS: BATTERY CHARGERS	260
NATIONAL SEMICONDUCTOR CORP.	261
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	261
NEC CORP. (E-ONE MOLI ENERGY).....	261
PRODUCT FOCUS: SMART BATTERIES	261
NEW ENERGY SYSTEMS GROUP	262
PRODUCT FOCUS: SMART BATTERIES	262
NEXERGY	263
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	263
NISSAN.....	263
PRODUCT FOCUS: SMART BATTERIES	263

Product Focus: Smart Batteries (Continued)	264
Product Focus: Smart Batteries (Continued)	265
Product Focus: Smart Batteries (Continued)	266
Product Focus: Smart Batteries (Continued)	267
NEWMAR	268
PRODUCT FOCUS: BATTERY CHARGERS	268
NOKIA CELLULAR SYSTEMS	268
PRODUCT FOCUS: BATTERY CHARGERS	268
NOVA ELECTRIC (TECHNOLOGY DYNAMICS, INC.)	268
PRODUCT FOCUS: BATTERY CONDITIONERS, BATTERY CHARGERS	269
O2MICRO INTERNATIONAL LTD.	269
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	269
ONEAC CORP	269
PRODUCT FOCUS: BATTERY CONDITIONERS	269
PANASONIC	269
PRODUCT FOCUS; SMART BATTERIES, BATTERY CHARGERS	270
PHILIPS GLOBAL	270
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	271
POSITIVO INFORMATICA (GRUPO POSITIVO)	271
PRODUCT FOCUS: BATTERY CHARGERS	271
POWER PRODUCTS INC.	271
PRODUCT FOCUS: BATTERY CHARGERS	271
POWER-SONIC CORP.	271
PRODUCT FOCUS: BATTERY CHARGERS	272
PROMARK ELECTRONICS	272
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS	272
PURE ENERGY VISIONS INC. (ENERGY VISIONS, INC.)	273
PRODUCT FOCUS: BATTERY CHARGERS	273
QUALLION LLC	273
PRODUCT FOCUS: SMART BATTERIES	274
QUICK CHARGE CORP.	274
PRODUCT FOCUS: BATTERY CHARGERS	274
RECHARGE SOLUTIONS INTERNATIONAL	274
RIM	275
PRODUCT FOCUS: BATTERY CHARGERS	275
SAFT	276
PRODUCT FOCUS: SMART BATTERIES	276
Product Focus: Smart Batteries (Continued)	277
SAMSUNG	278

PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	278
Product Focus: Smart Batteries, ... (Continued).....	279
SANYO ELECTRIC CO., LTD. (PANASONIC).....	280
PRODUCT FOCUS: SMART BATTERIES	280
Product Focus: Smart Batteries (Continued)	281
Product Focus: Smart Batteries (Continued)	282
SB LIMOTIVE CO. LTD. (COBASYS).....	283
PRODUCT FOCUS: SMART BATTERIES	283
SCHAUER MANUFACTURING CORP.	284
PRODUCT FOCUS: BATTERY CHARGERS	284
SCHNEIDER ELECTRIC.....	285
PRODUCT FOCUS: BATTERY CHARGERS	285
SEGWAY	285
PRODUCT FOCUS: BATTERY CHARGERS	285
SENS	286
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS.....	286
SETO HOLDINGS, INC.	286
PRODUCT FOCUS: SMART BATTERIES	287
SHARP ELECTRONICS CORP.	287
PRODUCT FOCUS: BATTERY CHARGERS	287
SIEMENS AG (POWER GENERATION DIVISION)	287
PRODUCT FOCUS: BATTERY CHARGERS	287
SMITH ELECTRIC VEHICLES (TANFIELD GROUP)	288
PRODUCT FOCUS: BATTERY CHARGERS	288
SOCIETE DE VEHICULES ELECTRIQUES (SVE) (DASSAULT AND HEULIEZ).....	288
PRODUCT FOCUS: BATTERY CHARGERS	289
SONY CORP.....	289
PRODUCT FOCUS: BATTERY CHARGERS, SMART BATTERIES	289
Product Focus: Battery Chargers, ... (Continued)	290
SOUTHWEST ELECTRONIC ENERGY CORP.	291
PRODUCT FOCUS: BATTERY CHARGERS	291
SPECTRUM BRANDS (RAYOVAC, BLACK & DECKER, VARTA CONSUMER BATTERIES).....	291
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	292
SPLASHPOWER.....	293
PRODUCT FOCUS: BATTERY CHARGERS	293
TAMURA CORP. OF AMERICA.....	293
PRODUCT FOCUS: BATTERY CHARGERS	293
TANDY CORP. (RADIO SHACK)	293

PRODUCT FOCUS: BATTERY CHARGERS	294
TE CONNECTIVITY	294
PRODUCT FOCUS: BATTERY CHARGERS	294
TEXAS INSTRUMENTS (TI)	294
PRODUCT FOCUS: BATTERY CHARGERS	294
TOSHIBA LTD.	295
PRODUCT FOCUS: SMART BATTERIES, BATTERY CHARGERS	295
TOYOTA	296
TOYOTA (CONTINUED).....	297
TOYOTA (CONTINUED).....	298
TOYOTA (CONTINUED).....	299
TRIPP-LITE	300
PRODUCT FOCUS: BATTERY CHARGERS	300
TRITRONICS, INC.	300
PRODUCT FOCUS: BATTERY CHARGERS	300
ULTRALIFE BATTERIES, INC. (MCDOWELL RESEARCH)	301
PRODUCT FOCUS: SMART BATTERIES	301
UNIROSS BATTERIES CORP.	301
PRODUCT FOCUS: BATTERY CHARGERS	301
VALENCE TECHNOLOGY, INC.	302
PRODUCT FOCUS: SMART BATTERIES	302
VANNER POWER GROUP	303
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS	303
VENTURE TECHNOLOGIES, INC.	304
SMART BATTERIES	304
WHEEGO ELECTRIC CARS	304
PRODUCT FOCUS: BATTERY CHARGERS	304
WITRICITY CORPORATION	305
PRODUCT FOCUS: BATTERY CHARGERS	305
XANTREX TECHNOLOGY	306
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS	306
XENOTRONIX, INC.	307
PRODUCT FOCUS: BATTERY CHARGERS	307
ZAP	307
PRODUCT FOCUS: BATTERY CHARGERS	307
ZENN MOTOR COMPANY	308
PRODUCT FOCUS: BATTERY CHARGERS	308
ZILOG INC.	309
PRODUCT FOCUS: BATTERY CHARGERS, BATTERY CONDITIONERS	309
ZTE	309

PRODUCT FOCUS: BATTERY CHARGERS.....	309
APPENDIX A: BATTERIES AND BATTERY CONTROL TECHNOLOGY.....	310
BATTERY BACKGROUND.....	310
BATTERY CHARACTERISTICS.....	311
VOLTAGE.....	311
CAPACITY.....	311
SHELF LIFE.....	311
DRAIN.....	312
SAFETY.....	312
Safety (Continued).....	313
ENERGY DENSITY.....	314
POWER.....	314
RECHARGE TIME.....	314
CYCLE LIFE.....	315
DISPOSAL FACTORS.....	315
COMMERCIAL ENERGY STORAGE CHARACTERISTICS.....	316
Battery Characteristics by Type.....	316
<i>TABLE 54 COMMERCIAL SECONDARY BATTERY TYPES.....</i>	<i>317</i>
APPENDIX B: COMPETING POWER SYSTEMS.....	318
CAPACITIVE ENERGY STORAGE.....	318
<i>TABLE 55 COMPARISON BETWEEN CAPACITIVE AND</i>	
<i>ELECTROCHEMICAL ENERGY STORAGE.....</i>	<i>319</i>
NUCLEAR BATTERIES.....	320
NUCLEAR BATTERIES (CONTINUED).....	321
FUEL CELLS.....	322
PROTON EXCHANGE MEMBRANE FUEL CELLS.....	323
ALKALINE FUEL CELLS.....	324
PHOSPHORIC ACID FUEL CELLS.....	324
SOLID OXIDE FUEL CELLS.....	324
MOLTEN CARBONATE FUEL CELLS.....	325
AIR CELLS.....	325
Zinc-air Cells.....	325
Aluminum-Air Cells.....	326
FLYWHEEL ENERGY STORAGE.....	327