

INTRODUCTION	LI
STUDY GOALS AND OBJECTIVES.....	LI
REASONS FOR DOING THE STUDY	LII
INTENDED AUDIENCE.....	LIII
SCOPE OF REPORT	LIII
INFORMATION SOURCES.....	LIV
ANALYST CREDENTIALS.....	LIV
RELATED BCC REPORTS	LV
BCC ONLINE SERVICES.....	LV
DISCLAIMER	LVI
 SUMMARY.....	 LVII
<i>SUMMARY TABLE GLOBAL MARKET FOR POWER ELECTRONICS</i>	
<i>DEVICES, BY REGION, THROUGH 2013 (\$ BILLIONS)</i>	<i>LIX</i>
<i>SUMMARY FIGURE WORLDWIDE AND U.S. DEMAND FOR POWER</i>	
<i>ELECTRONICS, 2007-2013 (\$ BILLIONS)</i>	<i>LIX</i>
 OVERVIEW	 1
OVERVIEW.....	1
<i>TABLE 1 INDUSTRIES FORCASTED IN THIS REPORT</i>	<i>2</i>
<i>TABLE 1 (CONTINUED)</i>	<i>3</i>
<i>TABLE 1 (CONTINUED)</i>	<i>4</i>
<i>TABLE 1 (CONTINUED)</i>	<i>5</i>
<i>TABLE 1 (CONTINUED)</i>	<i>6</i>
<i>TABLE 1 (CONTINUED)</i>	<i>7</i>
<i>TABLE 1 (CONTINUED)</i>	<i>8</i>
<i>TABLE 1 (CONTINUED)</i>	<i>9</i>
 POWER ELECTRONICS TECHNOLOGY.....	 10
POWER ELECTRONICS TECHNOLOGY.....	10
POWER ELECTRONICS TECHNOLOGY (CONTINUED).....	11
BASIC POWER ELECTRONICS CIRCUITS	12
AC TO DC RECTIFIERS	13
DC TO AC INVERSION.....	13
AC TO AC CONVERTERS	13
DC TO DC CONVERTERS	13
BASIC POWER ELECTRONICS COMPONENTS	14
POWER DIODES	14
Power Diodes (Continued).....	15
THYRISTORS.....	16
POWER MOSFETS.....	17
INSULATED-GATE BIPOLAR TRANSISTORS—IGBT	18
FORECASTS FOR POWER ELECTRONICS COMPONENTS.....	19

<i>TABLE 2 GLOBAL VALUE OF POWER ELECTRONICS</i>	
<i>COMPONENTS, THROUGH 2013 (\$ BILLIONS)</i>	19
INDUCTORS AND CAPACITORS	20
WIDE BAND GAP MATERIALS	20
<i>TABLE 3 CHARACTERISTICS OF WIDE BAND GAP MATERIALS</i>	
<i>(BAND GAP IN EV AT 300 AT 300 DEGREES K)</i>	21
POWER ELECTRONICS IN ELECTRICITY PRODUCTION	22
ELECTRICITY PRODUCTION IN THE UNITED STATES	22
ELECTRICITY PRODUCTION IN THE UNITED STATES	
(CONTINUED)	23
<i>TABLE 4 100 LARGEST U.S. ELECTRICITY PRODUCERS</i>	
<i>(MEGAWATT-HOURS IN 2006)</i>	24
<i>TABLE 4 (CONTINUED)</i>	25
<i>TABLE 4 (CONTINUED)</i>	26
<i>TABLE 4 (CONTINUED)</i>	27
GROWTH OF GENERATING CAPACITY	27
<i>TABLE 5 ENERGY TO GENERATE ELECTRICITY IN THE U.S., 1950-</i>	
<i>2006 (BILLIONS OF BTUS)</i>	27
<i>TABLE 5 (CONTINUED)</i>	28
RETURNING TO THE ROAD TO INDEPENDENCE	28
Returning to the Road to Independence (Continued)	29
Returning to the Road to Independence (Continued)	30
THE U.S. ENERGY POLICY ACT OF 2005	31
ENERGY INDEPENDENCE AND SECURITY ACT OF 2007	31
Energy Independence and Security Act of 2007	
(Continued)	32
GLOBAL ELECTRIC POWER PRODUCTION	33
<i>TABLE 6 OECD MEMBERS</i>	33
<i>TABLE 7 OECD VERSUS NON- ELECTRICITY PRODUCTION, 1980-</i>	
<i>2030 (BILLIONS KWHR)</i>	34
<i>TABLE 8 GLOBAL ELECTRIC POWER PRODUCTION (BILLIONS OF</i>	
<i>KWHR)</i>	35
ELECTRICITY FROM RENEWABLE SOURCES	35
<i>TABLE 9 GLOBAL RENEWABLE PRODUCTION, BY COUNTRY, 2004</i>	
<i>(BILLIONS OF KWHR OF ELECTRICITY)</i>	36
<i>TABLE 9 (CONTINUED)</i>	37
PHOTOVOLTAIC CONCENTRATORS	37
Photovoltaic Concentrators (Continued)	38
THE HYDROKINETIC TECHNOLOGIES INITIATIVE	39
<i>TABLE 10 GLOBAL HYDROELECTRIC POWER, BY COUNTRY</i>	
<i>(BILLIONS OF KWHR)</i>	40
<i>TABLE 10 (CONTINUED)</i>	41
<i>TABLE 10 (CONTINUED)</i>	42
<i>TABLE 10 (CONTINUED)</i>	43

THE HAWAII CLEAN ENERGY INITIATIVE.....	44
TABLE 11 <i>INSTALLED WIND PRODUCTION, THROUGH 2013</i> <i>(MEGAWATTS)</i>	45
FORECAST FOR POWER ELECTRONICS THE ELECTRICITY PRODUCING SECTOR.....	45
TABLE 12 <i>GLOBAL VALUE OF POWER ELECTRONICS FOR THE</i> <i>ELECTRICITY PRODUCING SECTOR, THROUGH 2013 (\$</i> <i>MILLIONS)</i>	46
POWER ELECTRONICS IN TRANSMISSION AND DISTRIBUTION.....	47
THE GRID.....	47
TABLE 13 <i>ELECTRICITY PRODUCTION AND DELIVERY COSTS</i> <i>(2006 CENTS PER KWHR, %)</i>	48
TABLE 14 <i>AC TRANSMISSION MILESTONES, 1911-1985</i>	49
TABLE 15 <i>MINOR ELECTRICITY EXPORTERS (< 1 BILLION KWHR</i> <i>PER YEAR, TOTAL = 17.25 BILLION KWHR, PER YEAR)</i>	50
TABLE 16 <i>MAJOR ELECTRICITY EXPORTERS (BILLIONS KWHR</i> <i>PER YEAR)</i>	50
TABLE 16 (CONTINUED).....	51
TABLE 17 <i>COUNTRIES THAT IMPORT ELECTRICITY</i>	51
TABLE 17 (CONTINUED).....	52
THE GRID (CONTINUED).....	53
IMPROVING GRID PERFORMANCE WITH SUPERCONDUCTING CABLES.....	54
TABLE 18 <i>LINE LOSS BY GEOGRAPHIC REGION, 1980-2005</i> <i>(BILLIONS KWHR)</i>	55
TABLE 19 <i>LINE LOSS BY COUNTRY, 1980-2005 (BILLIONS OF</i> <i>KWHR)</i>	55
TABLE 19 (CONTINUED).....	56
TABLE 19 (CONTINUED).....	57
TABLE 19 (CONTINUED).....	58
TABLE 19 (CONTINUED).....	59
TABLE 19 (CONTINUED).....	60
IMPROVING PERFORMANCE WITH FLEXIBLE AC TRANSMISSION SYSTEMS.....	61
SERIES COMPENSATION.....	62
PARALLEL OR SHUNT COMPENSATION.....	63
SVCs.....	64
REVIVING DIRECT CURRENT.....	65
THE IMPACT OF HYBRID-VEHICLE BATTERY CHARGING.....	66
FORECAST FOR POWER ELECTRONICS THE ELECTRIC POWER TRANSMISSION AND DISTRIBUTION SECTOR.....	67
TABLE 20 <i>GLOBAL VALUE OF POWER ELECTRONICS FOR THE</i> <i>ELECTRIC POWER TRANSMISSION AND DISTRIBUTION</i> <i>SECTOR, THROUGH 2013 (\$ MILLIONS)</i>	68

SPECIAL CONSIDERATIONS FOR FORECASTING END-USER DEMAND	
FOR POWER ELECTRONICS	69
GLOBAL ELECTRICITY CONSUMPTION	69
TABLE 21 WORLD NET ELECTRICITY CONSUMPTION BY REGION, THROUGH 2013 (BILLIONS KWHR).....	70
THE HUMAN DEVELOPMENT INDEX AS A LEADING INDICATOR OF POWER ELECTRONICS REQUIREMENTS	70
TABLE 22 COUNTRIES WITH HIGH HUMAN DEVELOPMENT INDEX RANKINGS (INDEX, HIGHER IS BETTER)	71
TABLE 22 (CONTINUED).....	72
TABLE 22 (CONTINUED).....	73
TABLE 23 COUNTRIES WITH MEDIUM HUMAN DEVELOPMENT INDEX RANKINGS (INDEX, HIGHER IS BETTER).....	73
TABLE 23 (CONTINUED).....	74
TABLE 23 (CONTINUED).....	75
TABLE 24 COUNTRIES WITH LOW HUMAN DEVELOPMENT INDEX RANKINGS (INDEX, HIGHER IS BETTER)	75
TABLE 24 (CONTINUED).....	76
TABLE 25 ELECTRICITY CONSUMPTION PER CAPITA (KWHR PER YEAR).....	76
TABLE 25 (CONTINUED).....	77
TABLE 25 (CONTINUED).....	78
TABLE 25 (CONTINUED).....	79
TABLE 25 (CONTINUED).....	80
END-USER SECTORS	80
TABLE 26 U.S. ELECTRICITY USE BY SECTOR, 1995-2006 (MEGAWATTHOURS)	81
ELECTRICITY IN THE POST PEAK-OIL ERA.....	81
ELECTRICITY IN THE POST PEAK-OIL ERA (CONTINUED).....	82
TABLE 27 IMPORTANCE OF OIL IN NATIONAL ENERGY SUPPLIES (OIL AS % OF TOTAL PRIMARY ENERGY SUPPLY).....	83
TABLE 27 (CONTINUED).....	84
TABLE 27 (CONTINUED).....	85
POWER ELECTRONICS IN THE RESIDENTIAL SECTOR.....	86
TABLE 28 SNAPSHOT OF U.S. RESIDENTIAL ENERGY USE	86
TABLE 28 (CONTINUED).....	87
TABLE 28 (CONTINUED).....	88
THE LIGHT EMITTING DIODE (LED) ILLUMINATION INITIATIVE	88
TABLE 29 DOWNLIGHT COMPARISON.....	89
TABLE 30 SIGNIFICANT LED ILLUMINATION RESEARCH AND DEVELOPMENT EFFORTS.....	90
TABLE 30 (CONTINUED).....	91
TABLE 30 (CONTINUED).....	92

<i>TABLE 30 (CONTINUED)</i>	93
LOAD-SHEDDING REFRIGERATORS	93
LOAD-SHEDDING REFRIGERATORS (CONTINUED).....	94
FORECASTS FOR POWER ELECTRONICS IN THE RESIDENTIAL SECTOR.....	95
<i>TABLE 31 RESIDENTIAL—SINGLE- AND MULTI-FAMILY STRUCTURES, THROUGH 2012 (\$ MILLIONS)</i>	95
<i>TABLE 31 (CONTINUED)</i>	96
<i>TABLE 32 RESIDENTIAL—OTHER RESIDENTIAL STRUCTURES, THROUGH 2013 (\$ MILLIONS)</i>	96
<i>TABLE 33 RESIDENTIAL—OWNER-OCCUPIED DWELLINGS (\$ MILLIONS)</i>	96
<i>TABLE 34 RESIDENTIAL PERMANENT SITE SINGLE- AND MULTI- FAMILY STRUCTURES, THROUGH 2013 (\$ MILLIONS)</i>	97
<i>TABLE 35 RESIDENTIAL—MAINTENANCE AND REPAIR, THROUGH 2013 (\$ MILLIONS)</i>	97
<i>TABLE 36 RESIDENTIAL—PERSONAL AND HOUSEHOLD GOODS REPAIR AND MAINTENANCE, THROUGH 2013 (\$ MILLIONS)</i>	98
POWER ELECTRONICS IN THE COMMERCIAL SECTOR.....	99
<i>TABLE 37 SNAPSHOT OF U.S. COMMERCIAL ENERGY USE</i>	99
<i>TABLE 37 (CONTINUED)</i>	100
FORECAST FOR POWER ELECTRONICS THE COMMERCIAL SECTOR.....	101
BUILDING-RELATED APPLICATIONS	101
<i>TABLE 38 NONRESIDENTIAL COMMERCIAL AND HEALTH CARE STRUCTURE, THROUGH 2013 (\$ MILLIONS)</i>	101
<i>TABLE 39 OTHER NONRESIDENTIAL STRUCTURES (\$ MILLIONS)</i>	102
<i>TABLE 40 COMMERCIAL—NONRESIDENTIAL MAINTENANCE AND REPAIR (\$ MILLIONS)</i>	102
SERVICE-RELATED APPLICATIONS.....	103
<i>TABLE 41 RETAIL STORES, THROUGH 2013 (\$ MILLIONS)</i>	103
<i>TABLE 42 AUTOMOTIVE REPAIR AND MAINTENANCE*, THROUGH 2013 (\$ MILLIONS)</i>	103
<i>TABLE 43 BUILDINGS AND DWELLINGS MAINTENANCE AND REPAIR, THROUGH 2013 (\$ MILLIONS)</i>	104
<i>TABLE 44 NONDEPOSITORY CREDIT INTERMEDIATION AND RELATED ACTIVITIES, THROUGH 2013 (\$ MILLIONS)</i>	104
<i>TABLE 45 WAREHOUSING AND STORAGE, THROUGH 2013 (\$ MILLIONS)</i>	105
<i>TABLE 46 CIVIC, SOCIAL, PROFESSIONAL AND SIMILAR ORGANIZATIONS, THROUGH 2013 (\$ MILLIONS)</i>	105
<i>TABLE 47 COURIERS AND MESSENGERS, THROUGH 2013 (\$ MILLIONS)</i>	105
<i>TABLE 47 (CONTINUED)</i>	106

TABLE 48 DATA PROCESSING, HOSTING AND RELATED SERVICES, THROUGH 2013 (\$ MILLIONS)	106
TABLE 49 DRY CLEANING AND LAUNDRY SERVICES, THROUGH 2013 (\$ MILLIONS).....	106
TABLE 50 ELECTRONIC AND PRECISION EQUIPMENT REPAIR AND MAINTENANCE, THROUGH 2013 (\$ MILLIONS).....	107
TABLE 51 FOOD SERVICES AND DRINKING PLACES, THROUGH 2013 (\$ MILLIONS).....	107
TABLE 52 INTERNET SERVICE PROVIDERS AND WEB SEARCH PORTALS, THROUGH 2013 (\$ MILLIONS).....	108
TABLE 53 HOSPITALS, THROUGH 2013 (\$ MILLIONS).....	108
TABLE 54 COMMERCIAL AND INDUSTRIAL MACHINERY AND EQUIPMENT REPAIR AND MAINTENANCE, THROUGH 2013 (\$ MILLIONS).....	108
TABLE 54 (CONTINUED).....	109
TABLE 55 RADIO AND TELEVISION BROADCASTING, THROUGH 2013 (\$ MILLIONS).....	109
TABLE 56 SOUND RECORDING INDUSTRIES, THROUGH 2013 (\$ MILLIONS).....	109
TABLE 57 SUPPORT ACTIVITIES FOR PRINTING, THROUGH 2013 (\$ MILLIONS).....	110
TABLE 58 TELECOMMUNICATIONS, THROUGH 2013 (\$ MILLIONS).....	110
TABLE 59 WASTE MANAGEMENT AND REMEDIATION SERVICES, THROUGH 2013 (\$ MILLIONS).....	110
EMERGING COMMERCIAL APPLICATIONS	111
TABLE 60 SHIP BUILDING AND REPAIRING, THROUGH 2013 (\$ MILLIONS).....	112
TABLE 61 ALL AMUSEMENT AND RECREATION VENUES, THROUGH 2013 (\$ MILLIONS).....	112
TABLE 62 RELIEF AND REHABILITATION SERVICES, THROUGH 2013 (\$ MILLIONS).....	112
TABLE 63 OTHER STATE AND LOCAL GOVERNMENT SERVICES, THROUGH 2013 (\$ MILLIONS).....	113
TABLE 64 CHILD DAY CARE SERVICES, THROUGH 2013 (\$ MILLIONS).....	113
TABLE 65 HOTELS AND MOTELS, INCLUDING CASINO HOTELS, THROUGH 2013 (\$ MILLIONS).....	113
TABLE 66 PROMISING COMMERCIAL APPLICATIONS (GLOBAL MARKET <\$1 MILLION IN 2013).....	114
POWER ELECTRONICS IN THE TRANSPORTATION SECTOR.....	115
REVIVAL OF THE ELECTRIC VEHICLE	115
TABLE 67 U.S. TRANSPORT-RELATED ELECTRICITY CONSUMPTION AND COSTS.....	116

TABLE 68 ALTERNATIVE FUELED VEHICLES IN USE IN THE UNITED STATES, BY FUEL TYPE, 2003–2006.....	117
FORECAST FOR POWER ELECTRONICS IN THE TRANSPORTATION SECTOR.....	117
TABLE 69 AVIATION, THROUGH 2013 (\$ MILLIONS, EXCLUDES AVIONICS AND FLIGHT CONTROLS).....	117
TABLE 70 PIPELINE APPLICATIONS, THROUGH 2013 (\$ MILLIONS).....	118
TABLE 71 RAIL, THROUGH 2013 (\$ MILLIONS).....	118
TABLE 72 STATE AND LOCAL GOVERNMENT PASSENGER TRANSIT, THROUGH 2013 (\$ MILLIONS).....	119
TABLE 73 TRANSIT AND GROUND PASSENGER, THROUGH 2013 (\$ MILLIONS).....	119
TABLE 74 TRUCK TRANSPORTATION, THROUGH 2013 (\$ MILLIONS).....	119
TABLE 74 (CONTINUED).....	120
TABLE 75 SCENIC AND SIGHTSEEING AND SUPPORT ACTIVITIES, THROUGH 2013 (\$ MILLIONS).....	120
POWER ELECTRONICS IN THE OFF-GRID SECTOR.....	121
POWER ELECTRONICS IN THE OFF-GRID SECTOR.....	121
TABLE 76 POPULATIONS WITHOUT ELECTRICITY, 2007 (MILLIONS).....	122
TABLE 76 (CONTINUED).....	123
FORECAST FOR POWER ELECTRONICS THE OFF-GRID SECTOR.....	123
TABLE 77 OFFICES, THROUGH 2013 (\$ MILLIONS).....	123
TABLE 78 STORES AND RESTAURANTS, THROUGH 2013 (\$ MILLIONS).....	124
TABLE 79 PUBLIC SAFETY, THROUGH 2013 (\$ MILLIONS).....	124
TABLE 80 PRIVATE HOMES, THROUGH 2013 (\$ MILLIONS).....	124
POWER ELECTRONICS IN THE INDUSTRIAL SECTOR.....	125
POWER ELECTRONICS IN THE INDUSTRIAL SECTOR.....	125
TABLE 81 U.S. INDUSTRIAL-RELATED ELECTRICITY CONSUMPTION AND COSTS, 2005-2013.....	126
TABLE 82 SNAPSHOT OF U.S. INDUSTRIAL ENERGY USE.....	126
TABLE 82 (CONTINUED).....	127
TABLE 83 PARTICIPATING INDUSTRIAL ASSESSMENT CENTER UNIVERSITIES.....	128
FORECASTS FOR AGRICULTURAL RELATED APPLICATIONS.....	129
TABLE 84 FORECASTS FOR ANIMAL PRODUCTION, EXCEPT CATTLE AND POULTRY AND EGGS, THROUGH 2013 (\$ MILLIONS).....	129
TABLE 85 COTTON, THROUGH 2013 (\$ MILLIONS).....	129
TABLE 86 DAIRY CATTLE AND MILK PRODUCTION, THROUGH 2013 (\$ MILLIONS).....	129

<i>TABLE 87 FRUIT, THROUGH 2013 (\$ MILLIONS)</i>	130
<i>TABLE 88 FARM MACHINERY AND EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	130
<i>TABLE 89 GRAIN, THROUGH 2013 (\$ MILLIONS)</i>	130
<i>TABLE 90 GREENHOUSE, NURSERY AND FLORICULTURE PRODUCTION, THROUGH 2013 (\$ MILLIONS)</i>	131
<i>TABLE 91 HUNTING AND TRAPPING, THROUGH 2013 (\$ MILLIONS) ...</i>	131
<i>TABLE 92 AGRICULTURAL PRODUCTS NOT SPECIFIED ELSEWHERE, THROUGH 2013 (\$ MILLIONS)</i>	132
<i>TABLE 93 OILSEED, THROUGH 2013 (\$ MILLIONS)</i>	132
<i>TABLE 94 POULTRY AND EGG PRODUCTION, THROUGH 2013 (\$ MILLIONS)</i>	132
<i>TABLE 94 (CONTINUED)</i>	133
<i>TABLE 95 SUGAR CANE AND SUGAR BEET, THROUGH 2013 (\$ MILLIONS)</i>	133
<i>TABLE 96 TOBACCO, THROUGH 2013 (\$ MILLIONS)</i>	133
<i>TABLE 96 (CONTINUED)</i>	134
<i>TABLE 97 TREE NUTS, THROUGH 2013 (\$ MILLIONS)</i>	134
<i>TABLE 98 VEGETABLES AND MELONS, THROUGH 2013 (\$ MILLIONS)</i>	134
<i>TABLE 98 (CONTINUED)</i>	135
<i>TABLE 99 AGRICULTURE—FERTILIZER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	135
<i>TABLE 100 AGRICULTURE—NOT OTHERWISE ELSEWHERE, THROUGH 2013 (\$ MILLIONS)</i>	135
<i>TABLE 100 (CONTINUED)</i>	136
<i>TABLE 101 AGRICULTURE—PESTICIDE AND OTHER AGRICULTURAL CHEMICAL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	136
<i>FORECASTS FOR ARMAMENTS MANUFACTURING</i>	136
<i>TABLE 102 AMMUNITION MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	136
<i>TABLE 102 (CONTINUED)</i>	137
<i>TABLE 103 ARMS, ORDNANCE AND ACCESSORIES MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	137
<i>TABLE 104 GUIDED MISSILE AND SPACE VEHICLE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	137
<i>TABLE 105 MILITARY ARMORED VEHICLE, TANK AND TANK COMPONENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	138
<i>FORECASTS FOR AUTOMOTIVE MANUFACTURING</i>	138
<i>TABLE 106 AUTOMATIC ENVIRONMENTAL CONTROL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	138
<i>TABLE 107 AUTOMOBILE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	139

TABLE 108 HEAVY DUTY TRUCK MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	139
TABLE 109 LIGHT TRUCK AND UTILITY VEHICLE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	139
TABLE 110 MOTOR HOME MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	140
TABLE 111 MOTOR VEHICLE BODY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	140
TABLE 112 MOTOR VEHICLE PARTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	140
TABLE 113 TRAVEL TRAILER AND CAMPER MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	141
TABLE 114 TRUCK TRAILER MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	141
FORECASTS FOR CHEMICAL MANUFACTURING	142
TABLE 115 ALKALIS AND CHLORINE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	142
TABLE 116 BASIC INORGANIC CHEMICAL MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	142
TABLE 117 BASIC ORGANIC CHEMICAL MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	142
TABLE 117 (CONTINUED).....	143
TABLE 118 CHEMICAL PRODUCT AND PREPARATION MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	143
TABLE 119 CARBON AND GRAPHITE PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	143
FORECASTS FOR FOOD MANUFACTURING	144
TABLE 120 ANIMAL (EXCEPT POULTRY) SLAUGHTERING, RENDERING AND PROCESSING, THROUGH 2013 (\$ MILLIONS).....	144
TABLE 121 BEET SUGAR MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	144
TABLE 122 BREAD AND BAKERY PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	144
TABLE 122 (CONTINUED).....	145
TABLE 123 BREAKFAST CEREAL MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	145
TABLE 124 BREWERIES, THROUGH 2013 (\$ MILLIONS).....	145
TABLE 125 CHEESE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	146
TABLE 126 CHOCOLATE AND CONFECTIONERY MANUFACTURING FROM CACAO BEANS, THROUGH 2013 (\$ MILLIONS).....	146
TABLE 127 CONFECTIONERY MANUFACTURING FROM PURCHASED CHOCOLATE, THROUGH 2013 (\$ MILLIONS).....	146

<i>TABLE 128 COOKIE, CRACKER AND PASTA MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	147
<i>TABLE 129 DRY, CONDENSED AND EVAPORATED DAIRY PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	147
<i>TABLE 130 FATS AND OILS REFINING AND BLENDING, THROUGH 2013 (\$ MILLIONS)</i>	147
<i>TABLE 131 FLAVORING SYRUP AND CONCENTRATE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	148
<i>TABLE 132 FLOUR MILLING AND MALT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	148
<i>TABLE 133 FLUID MILK AND BUTTER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	148
<i>TABLE 134 FROZEN FOOD MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	149
<i>TABLE 135 FRUIT AND VEGETABLE CANNING, PICKLING AND DRYING, THROUGH 2013 (\$ MILLIONS)</i>	149
<i>TABLE 136 NONCHOCOLATE CONFECTIONERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	149
<i>TABLE 137 POULTRY PROCESSING, THROUGH 2013 (\$ MILLIONS)</i>	150
<i>TABLE 138 SEAFOOD PRODUCT PREPARATION AND PACKAGING, THROUGH 2013 (\$ MILLIONS)</i>	150
<i>TABLE 139 SEASONING AND DRESSING MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	150
<i>TABLE 140 SNACK FOOD MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	151
<i>TABLE 141 SOFT DRINK AND ICE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	151
<i>TABLE 142 SOYBEAN AND OTHER OILSEED PROCESSING (\$ MILLIONS)</i>	151
<i>TABLE 143 SUGAR CANE MILLS AND REFINING, THROUGH 2013 (\$ MILLIONS)</i>	152
<i>TABLE 144 TORTILLA MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	152
<i>TABLE 145 WINERIES, THROUGH 2013 (\$ MILLIONS)</i>	152
<i>FORECASTS FOR FUEL-RELATED INDUSTRIES</i>	153
<i>TABLE 146 ALL OTHER PETROLEUM AND COAL PRODUCTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	153
<i>TABLE 147 DRILLING OIL AND GAS WELLS, THROUGH 2013 (\$ MILLIONS)</i>	153
<i>TABLE 148 NATURAL GAS DISTRIBUTION, THROUGH 2013 (\$ MILLIONS)</i>	153
<i>TABLE 148 (CONTINUED)</i>	154
<i>TABLE 149 OIL AND GAS EXTRACTION, THROUGH 2013 (\$ MILLIONS)</i>	154

<i>TABLE 150 PETROLEUM REFINERIES, THROUGH 2013</i> <i>(\$ MILLIONS)</i>	154
<i>TABLE 151 SUPPORT ACTIVITIES FOR OTHER MINING, THROUGH</i> <i>2013 (\$ MILLIONS)</i>	155
FORECASTS FOR PULP AND PAPER MANUFACTURING	155
<i>TABLE 152 ALL OTHER CONVERTED PAPER PRODUCT</i> <i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	155
<i>TABLE 153 COATED AND LAMINATED PAPER, PACKAGING PAPER</i> <i>AND PLASTICS FILM MANUFACTURING, THROUGH 2013</i> <i>(\$ MILLIONS)</i>	156
<i>TABLE 154 COATING, ENGRAVING, HEAT TREATING AND ALLIED</i> <i>ACTIVITIES, THROUGH 2013 (\$ MILLIONS)</i>	156
<i>TABLE 155 PAPER BAG AND COATED AND TREATED PAPER</i> <i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	156
<i>TABLE 156 PAPER MILLS, THROUGH 2013 (\$ MILLIONS)</i>	157
<i>TABLE 157 PAPERBOARD CONTAINER MANUFACTURING,</i> <i>THROUGH 2013 (\$ MILLIONS)</i>	157
<i>TABLE 158 PAPERBOARD MILLS, THROUGH 2013 (\$ MILLIONS)</i>	157
<i>TABLE 159 STATIONERY PRODUCT MANUFACTURING, THROUGH</i> <i>2013 (\$ MILLIONS)</i>	158
<i>TABLE 160 PULP MILLS, THROUGH 2013 (\$ MILLIONS)</i>	158
FORECASTS FOR PETROCHEMICAL MANUFACTURING.....	158
<i>TABLE 161 PETROCHEMICAL MANUFACTURING, THROUGH 2013</i> <i>(\$ MILLIONS)</i>	158
<i>TABLE 162 PETROLEUM LUBRICATING OIL AND GREASE</i> <i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	159
FORECASTS FOR PLASTICS MANUFACTURING.....	159
<i>TABLE 163 MATERIAL AND RESIN MANUFACTURING, THROUGH</i> <i>2013 (\$ MILLIONS)</i>	159
<i>TABLE 164 LAMINATED PLASTICS PLATE, SHEET (EXCEPT</i> <i>PACKAGING) AND SHAPE MANUFACTURING, THROUGH 2013</i> <i>(\$ MILLIONS)</i>	160
<i>TABLE 165 PLASTICS BOTTLE MANUFACTURING, THROUGH 2013</i> <i>(\$ MILLIONS)</i>	160
<i>TABLE 166 PLASTICS PACKAGING MATERIALS AND</i> <i>UNLAMINATED FILM AND SHEET MANUFACTURING,</i> <i>THROUGH 2013 (\$ MILLIONS)</i>	160
<i>TABLE 167 PLASTICS PIPE AND PIPE FITTING MANUFACTURING,</i> <i>THROUGH 2013 (\$ MILLIONS)</i>	161
<i>TABLE 168 POLYSTYRENE FOAM PRODUCT MANUFACTURING,</i> <i>THROUGH 2013 (\$ MILLIONS)</i>	161
<i>TABLE 169 UNLAMINATED PLASTICS PROFILE SHAPE</i> <i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	161

<i>TABLE 170 URETHANE AND OTHER FOAM PRODUCT (EXCEPT POLYSTYRENE) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	162
<i>TABLE 171 PLASTICS AND RUBBER INDUSTRY MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	162
<i>TABLE 172 OTHER PLASTICS PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	162
<i>FORECASTS FOR TEXTILE AND APPAREL MANUFACTURING</i>	163
<i>TABLE 173 APPAREL KNITTING MILLS, THROUGH 2013 (\$ MILLIONS)</i>	163
<i>TABLE 174 BROADWOVEN FABRIC MILLS, THROUGH 2013 (\$ MILLIONS)</i>	163
<i>TABLE 175 CARPET AND RUG MILLS, THROUGH 2013 (\$ MILLIONS)</i>	163
<i>TABLE 176 CURTAIN AND LINEN MILLS, THROUGH 2013 (\$ MILLIONS)</i>	164
<i>TABLE 177 CUT AND SEW APPAREL CONTRACTORS, THROUGH 2013 (\$ MILLIONS)</i>	164
<i>TABLE 178 FABRIC COATING MILLS, THROUGH 2013 (\$ MILLIONS)</i>	164
<i>TABLE 179 FIBER, YARN, AND THREAD MILLS, THROUGH 2013 (\$ MILLIONS)</i>	165
<i>TABLE 180 KNIT FABRIC MILLS, THROUGH 2013 (\$ MILLIONS)</i>	165
<i>TABLE 181 NARROW FABRIC MILLS AND SCHIFFLI MACHINE EMBROIDERY, THROUGH 2013 (\$ MILLIONS)</i>	165
<i>TABLE 182 NONWOVEN FABRIC MILLS, THROUGH 2013 (\$ MILLIONS)</i>	166
<i>TABLE 183 OTHER TEXTILE PRODUCT MILLS, THROUGH 2013 (\$ MILLIONS)</i>	166
<i>TABLE 184 TEXTILE AND FABRIC FINISHING MILLS, THROUGH 2013 (\$ MILLIONS)</i>	166
<i>TABLE 185 TEXTILE BAG AND CANVAS MILLS, THROUGH 2013 (\$ MILLIONS)</i>	167
<i>TABLE 186 WOMEN'S AND GIRLS' CUT AND SEW APPAREL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	167
<i>FORECASTS FOR OTHER TYPES OF MANUFACTURING</i>	167
<i>TABLE 187 ABRASIVE PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	167
<i>TABLE 188 ADHESIVE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	168
<i>TABLE 189 AIR AND GAS COMPRESSOR MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	168
<i>TABLE 190 AIR CONDITIONING, REFRIGERATION AND WARM AIR HEATING EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	168

<i>TABLE 191 AIR PURIFICATION AND VENTILATION EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	169
<i>TABLE 192 AIRCRAFT—AIRCRAFT ENGINE AND ENGINE PARTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	169
<i>TABLE 193 AIRCRAFT—AIRCRAFT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	169
<i>TABLE 194 AIRCRAFT—OTHER PARTS AND AUXILIARY EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	170
<i>TABLE 195 AIRCRAFT—PROPULSION UNITS AND PARTS FOR SPACE VEHICLE AND GUIDED MISSILES, THROUGH 2013 (\$ MILLIONS)</i>	170
<i>TABLE 196 ANALYTICAL LABORATORY INSTRUMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	170
<i>TABLE 197 ARTIFICIAL AND SYNTHETIC FIBERS AND FILAMENTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	171
<i>TABLE 198 ASPHALT PAVING MIXTURE AND BLOCK MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	171
<i>TABLE 199 ASPHALT SHINGLE AND COATING MATERIALS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	171
<i>TABLE 200 AUDIO AND VIDEO EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	172
<i>TABLE 201 BALL AND ROLLER BEARING MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	172
<i>TABLE 202 BARE PRINTED CIRCUIT BOARD MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	172
<i>TABLE 202 (CONTINUED)</i>	173
<i>TABLE 203 BIOLOGICAL PRODUCT (EXCEPT DIAGNOSTIC) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	173
<i>TABLE 204 BLIND AND SHADE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	173
<i>TABLE 205 BOAT BUILDING, THROUGH 2013 (\$ MILLIONS)</i>	174
<i>TABLE 206 BRICK, TILE AND OTHER STRUCTURAL CLAY PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	174
<i>TABLE 207 BROADCAST AND WIRELESS COMMUNICATIONS EQUIPMENT, THROUGH 2013 (\$ MILLIONS)</i>	174
<i>TABLE 208 CLAY AND NONCLAY REFRACTORY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	175
<i>TABLE 209 COMMUNICATION AND ENERGY WIRE AND CABLE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	175
<i>TABLE 210 COMPUTER STORAGE DEVICE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	175
<i>TABLE 211 COMPUTER TERMINALS AND OTHER COMPUTER PERIPHERAL EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	176

TABLE 212 CONCRETE—CEMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	176
TABLE 213 CONCRETE—OTHER CONCRETE PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	176
TABLE 214 CONCRETE—PIPE, BRICK AND BLOCK MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	177
TABLE 215 CONCRETE—READY-MIX MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	177
TABLE 216 CONSTRUCTION MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	177
TABLE 217 COPPER ROLLING, DRAWING, EXTRUDING AND ALLOYING, THROUGH 2013 (\$ MILLIONS).....	178
TABLE 218 CROWN AND CLOSURE MANUFACTURING AND METAL STAMPING, THROUGH 2013 (\$ MILLIONS).....	178
TABLE 219 CROWN AND CLOSURE MANUFACTURING AND METAL STAMPING, THROUGH 2013 (\$ MILLIONS).....	178
TABLE 220 CUSTOM ROLL FORMING, THROUGH 2013 (\$ MILLIONS).....	179
TABLE 221 CUTLERY, UTENSIL, POT AND PAN MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	179
TABLE 222 CUTTING TOOL AND MACHINE TOOL ACCESSORY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	179
TABLE 222 (CONTINUED).....	180
TABLE 223 DENTAL EQUIPMENT AND SUPPLIES MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	180
TABLE 224 DENTAL LABORATORIES, THROUGH 2013 (\$ MILLIONS)....	180
TABLE 225 DOG AND CAT FOOD MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	181
TABLE 226 DOLL, TOY, AND GAME MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	181
TABLE 227 ELECTRIC LAMP BULB AND PART MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	181
TABLE 228 ELECTRICAL EQUIPMENT AND COMPONENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	182
TABLE 229 ELECTRICITY AND SIGNAL TESTING INSTRUMENTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	182
TABLE 230 ELECTROMEDICAL AND ELECTROTHERAPEUTIC APPARATUS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	183
TABLE 231 ELECTROMEDICAL AND ELECTROTHERAPEUTIC APPARATUS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	183
TABLE 232 ELECTROMEDICAL AND ELECTROTHERAPEUTIC APPARATUS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	183
TABLE 233 ELECTRONIC COMPUTER MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	184

<i>TABLE 234 ELECTRONIC CONNECTOR MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	184
<i>TABLE 235 ENGINEERED WOOD MEMBER AND TRUSS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	184
<i>TABLE 236 FABRICATED PIPE AND PIPE FITTING MANUFACTURING (\$ MILLIONS)</i>	185
<i>TABLE 237 FLUID POWER PROCESS MACHINERY, THROUGH 2013 (\$ MILLIONS)</i>	185
<i>TABLE 238 FOOTWEAR MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	185
<i>TABLE 239 FURNITURE—INSTITUTIONAL FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	186
<i>TABLE 240 FURNITURE—MATTRESS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	186
<i>TABLE 241 FURNITURE—METAL AND OTHER HOUSEHOLD FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	186
<i>TABLE 242 FURNITURE—NONUPHOLSTERED WOOD HOUSEHOLD FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	187
<i>TABLE 243 FURNITURE—OFFICE FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	187
<i>TABLE 244 FURNITURE—UPHOLDSTERED HOUSEHOLD FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	187
<i>TABLE 245 GASKET, PACKING AND SEALING DEVICE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	188
<i>TABLE 246 GLASS—FLAT GLASS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	188
<i>TABLE 247 GLASS—GLASS CONTAINER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	188
<i>TABLE 248 GLASS—GLASS PRODUCT MANUFACTURING MADE OF PURCHASED GLASS, THROUGH 2013 (\$ MILLIONS)</i>	189
<i>TABLE 249 GLASS—PRESSED AND BLOWN GLASS AND GLASSWARE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	189
<i>TABLE 250 GROUND OR TREATED MINERAL AND EARTH MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	189
<i>TABLE 251 HANDTOOL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	190
<i>TABLE 252 HARDWARE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	190
<i>TABLE 253 HEATING EQUIPMENT (EXCEPT WARM AIR FURNACES) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	190
<i>TABLE 254 HOUSEHOLD APPLIANCE MANUFACTURING, NOT SPECIFIED ELSEWHERE, THROUGH 2013 (\$ MILLIONS)</i>	191
<i>TABLE 255 HOUSEHOLD COOKING APPLIANCE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	191

<i>TABLE 256 HOUSEHOLD LAUNDRY EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>192</i>
<i>TABLE 257 HOUSEHOLD REFRIGERATOR AND HOME FREEZER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>192</i>
<i>TABLE 258 ICE CREAM AND FROZEN DESSERT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>193</i>
<i>TABLE 259 INDUSTRIAL GAS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>193</i>
<i>TABLE 260 INDUSTRIAL MACHINERY MANUFACTURING NOT SPECIFIED ELSEWHERE, THROUGH 2013 (\$ MILLIONS)</i>	<i>193</i>
<i>TABLE 260 (CONTINUED)</i>	<i>194</i>
<i>TABLE 261 INDUSTRIAL MOLD MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>194</i>
<i>TABLE 262 INDUSTRIAL PROCESS FURNACE AND OVEN MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>194</i>
<i>TABLE 263 INDUSTRIAL PROCESS VARIABLE INSTRUMENTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>195</i>
<i>TABLE 264 IN-VITRO DIAGNOSTIC SUBSTANCE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>195</i>
<i>TABLE 265 IRON AND STEEL MILLS AND FERROALLOY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>195</i>
<i>TABLE 266 IRRADIATION APPARATUS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>196</i>
<i>TABLE 267 JEWELRY AND SILVERWARE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>196</i>
<i>TABLE 268 LABORATORY APPARATUS AND FURNITURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>196</i>
<i>TABLE 269 LAWN AND GARDEN EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>197</i>
<i>TABLE 270 LEATHER AND HIDE TANNING AND FINISHING, THROUGH 2013 (\$ MILLIONS)</i>	<i>197</i>
<i>TABLE 271 LIGHTING FIXTURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>197</i>
<i>TABLE 272 LIGHTING FIXTURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>198</i>
<i>TABLE 273 LIGHTING FIXTURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>198</i>
<i>TABLE 274 MANUFACTURED HOME MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>198</i>
<i>TABLE 275 MANUFACTURING NOT OTHERWISE SPECIFIED, THROUGH 2013 (\$ MILLIONS)</i>	<i>199</i>
<i>TABLE 276 MATERIAL HANDLING EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	<i>199</i>

<i>TABLE 277 MECHANICAL POWER TRANSMISSION EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	199
<i>TABLE 277 (CONTINUED)</i>	200
<i>TABLE 278 MEDICINAL AND BOTANICAL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	200
<i>TABLE 279 METAL CAN, BOX AND OTHER METAL CONTAINER (LIGHT GAUGE) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	200
<i>TABLE 280 METAL CUTTING AND FORMING MACHINE TOOL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	201
<i>TABLE 281 METAL TANK (HEAVY GAUGE) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	201
<i>TABLE 282 METALS—ALUMINA REFINING AND PRIMARY ALUMINUM PRODUCTION, THROUGH 2013 (\$ MILLIONS)</i>	202
<i>TABLE 283 METALS—ALUMINUM PRODUCT MANUFACTURING FROM PURCHASED ALUMINUM, THROUGH 2013 (\$ MILLIONS)</i>	202
<i>TABLE 284 METALS—FERROUS METAL FOUNDRIES, THROUGH 2013 (\$ MILLIONS)</i>	202
<i>TABLE 285 METALS—NONFERROUS METAL (EXCEPT COPPER AND ALUMINUM) ROLLING, DRAWING, EXTRUDING AND ALLOYING, THROUGH 2013 (\$ MILLIONS)</i>	203
<i>TABLE 286 METALS—FORGING, STAMPING AND SINTERING, NOT ELSEWHERE SPECIFIED, THROUGH 2013 (\$ MILLIONS)</i>	203
<i>TABLE 287 MINERAL WOOL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	203
<i>TABLE 288 MINING AND OIL AND GAS FIELD MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	204
<i>TABLE 289 MISCELLANEOUS NONMETALLIC MINERAL PRODUCTS, THROUGH 2013, THROUGH 2013 (\$ MILLIONS)</i>	204
<i>TABLE 290 MOTOR AND GENERATOR MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	204
<i>TABLE 291 MOTORCYCLE, BICYCLE AND PARTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	205
<i>TABLE 292 MUSICAL INSTRUMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	205
<i>TABLE 293 OFFICE SUPPLIES (EXCEPT PAPER) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	205
<i>TABLE 294 OPHTHALMIC GOODS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	206
<i>TABLE 295 OPTICAL INSTRUMENT AND LENS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	206
<i>TABLE 296 ORNAMENTAL AND ARCHITECTURAL METAL PRODUCTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	206
<i>TABLE 296 (CONTINUED)</i>	207

<i>TABLE 297 ORNAMENTAL AND ARCHITECTURAL METAL PRODUCTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	207
<i>TABLE 298 PAINT AND COATING MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	207
<i>TABLE 299 PHARMACEUTICAL PREPARATION MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	208
<i>TABLE 300 PHOTOGRAPHIC AND PHOTOCOPYING EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	208
<i>TABLE 301 WORK AND FABRICATED STRUCTURAL PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	209
<i>TABLE 302 PLUMBING FIXTURE FITTING AND TRIM MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	209
<i>TABLE 303 POTTERY, CERAMICS AND PLUMBING FIXTURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	209
<i>TABLE 304 POWER BOILER AND HEAT EXCHANGER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	210
<i>TABLE 305 POWER, DISTRIBUTION AND SPECIALTY TRANSFORMER MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	210
<i>TABLE 306 POWER-DRIVEN HANDTOOL MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	211
<i>TABLE 307 PREFABRICATED WOOD BUILDING MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	211
<i>TABLE 308 PRIMARY BATTERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	211
<i>TABLE 309 PRIMARY SMELTING AND REFINING OF COPPER, THROUGH 2013 (\$ MILLIONS)</i>	212
<i>TABLE 310 PRIMARY SMELTING AND REFINING OF NONFERROUS METAL (EXCEPT COPPER AND ALUMINUM), THROUGH 2013 (\$ MILLIONS)</i>	212
<i>TABLE 311 PRINTED CIRCUIT ASSEMBLY (ELECTRONIC ASSEMBLY) MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	212
<i>TABLE 311 (CONTINUED)</i>	213
<i>TABLE 312 PRINTING, THROUGH 2013 (\$ MILLIONS)</i>	213
<i>TABLE 313 PRINTING INK MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	213
<i>TABLE 314 PUMP AND PUMPING EQUIPMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	214
<i>TABLE 315 RAILROAD ROLLING STOCK MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	214
<i>TABLE 316 RECONSTITUTED WOOD PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	214
<i>TABLE 316 (CONTINUED)</i>	215

TABLE 317 RELAY AND INDUSTRIAL CONTROL MANUFACTURING (\$ MILLIONS).....	215
TABLE 318 ROLLING MILL AND OTHER METALWORKING MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	215
TABLE 319 RUBBER—OTHER RUBBER PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	216
TABLE 320 RUBBER—TIRE MANUFACTURING (\$ MILLIONS).....	216
TABLE 321 RUBBER AND PLASTICS HOSES AND BELTING MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	216
TABLE 322 SAWMILLS AND WOOD PRESERVATION, THROUGH 2013 (\$ MILLIONS).....	217
TABLE 323 SEARCH, DETECTION, AND NAVIGATION INSTRUMENTS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	217
TABLE 324 SECONDARY SMELTING AND ALLOYING OF ALUMINUM, THROUGH 2013 (\$ MILLIONS).....	217
TABLE 325 SEMICONDUCTOR AND RELATED DEVICE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	218
TABLE 326 SEMICONDUCTOR MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	218
TABLE 327 SHOWCASE, PARTITION, SHELVING, AND LOCKER MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	218
TABLE 328 SIGN MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	219
TABLE 329 SMALL ELECTRICAL APPLIANCE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	219
TABLE 330 SOFTWARE, AUDIO AND VIDEO MEDIA REPRODUCING, THROUGH 2013 (\$ MILLIONS).....	219
TABLE 331 SOAP AND CLEANING COMPOUND MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	220
TABLE 332 SPECIAL TOOL, DIE, JIG, AND FIXTURE MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	220
TABLE 333 SPEED CHANGER, INDUSTRIAL HIGH-SPEED DRIVE AND GEAR MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	221
TABLE 334 SPORTING AND ATHLETIC GOODS MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	221
TABLE 335 SPRING AND WIRE PRODUCT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	222
TABLE 336 STEEL PRODUCT MANUFACTURING FROM PURCHASED STEEL, THROUGH 2013 (\$ MILLIONS).....	222
TABLE 337 STORAGE BATTERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	222
TABLE 338 SURGICAL AND MEDICAL INSTRUMENT MANUFACTURING, THROUGH 2013 (\$ MILLIONS).....	223

<i>TABLE 339 SURGICAL APPLIANCE AND SUPPLIES</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	223
<i>TABLE 340 SWITCHGEAR AND SWITCHBOARD APPARATUS</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	224
<i>TABLE 341 SYNTHETIC DYE AND PIGMENT MANUFACTURING,</i>	
<i>THROUGH 2013 (\$ MILLIONS)</i>	224
<i>TABLE 342 SYNTHETIC RUBBER MANUFACTURING, THROUGH</i>	
<i>2013 (\$ MILLIONS)</i>	225
<i>TABLE 343 TELEPHONE APPARATUS MANUFACTURING,</i>	
<i>THROUGH 2013 (\$ MILLIONS)</i>	225
<i>TABLE 344 TOILET PREPARATION MANUFACTURING, THROUGH</i>	
<i>2013 (\$ MILLIONS)</i>	225
<i>TABLE 345 TOTALIZING FLUID METERS AND COUNTING DEVICES</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	226
<i>TABLE 346 TRANSPORTATION EQUIPMENT MANUFACTURING</i>	
<i>NOT SPECIFIED ELSEWHERE, THROUGH 2013 (\$ MILLIONS)</i>	226
<i>TABLE 347 TURBINE AND TURBINE GENERATOR SET UNITS</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	227
<i>TABLE 348 TURNED PRODUCT AND SCREW, NUT, AND BOLT</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	227
<i>TABLE 349 VALVE AND FITTINGS OTHER THAN PLUMBING,</i>	
<i>THROUGH 2013 (\$ MILLIONS)</i>	227
<i>TABLE 350 VENDING, COMMERCIAL, INDUSTRIAL, AND OFFICE</i>	
<i>MACHINERY MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	228
<i>TABLE 351 VENEER AND PLYWOOD MANUFACTURING, THROUGH</i>	
<i>2013 (\$ MILLIONS)</i>	228
<i>TABLE 352 WATCH, CLOCK, AND OTHER MEASURING AND</i>	
<i>CONTROLLING DEVICE MANUFACTURING, THROUGH 2013</i>	
<i>(\$ MILLIONS)</i>	229
<i>TABLE 353 WET CORN MILLING, THROUGH 2013 (\$ MILLIONS)</i>	229
<i>TABLE 354 WIRING DEVICE MANUFACTURING, THROUGH 2013</i>	
<i>(\$ MILLIONS)</i>	229
<i>TABLE 355 WOOD KITCHEN CABINET AND COUNTERTOP</i>	
<i>MANUFACTURING, THROUGH 2013 (\$ MILLIONS)</i>	230
<i>TABLE 356 WOOD PRODUCT MANUFACTURING, MISCELLANEOUS,</i>	
<i>THROUGH 2013 (\$ MILLIONS)</i>	230
<i>TABLE 357 WOOD WINDOWS AND DOORS AND MILLWORK,</i>	
<i>THROUGH 2013 (\$ MILLIONS)</i>	230
THE POWER ELECTRONICS COMMUNITY	231
THE POWER ELECTRONICS COMMUNITY	231
TECHNOLOGY LEADERS	232
<i>TABLE 358 TECHNOLOGY LEADERS</i>	233
<i>TABLE 358 (CONTINUED)</i>	234
EARLY ADOPTERS	234

<i>TABLE 359 EARLY ADOPTERS</i>	235
<i>TABLE 359 (CONTINUED)</i>	236
<i>TABLE 359 (CONTINUED)</i>	237
INSTITUTIONAL ADVOCATES	238
<i>TABLE 360 INSTITUTIONAL ADVOCATES</i>	238
<i>TABLE 360 (CONTINUED)</i>	239
APPENDIX A—POWER ELECTRONICS PATENT ANALYSIS	240
<i>TABLE 361 THE 50 EARLIEST PATENTS THAT REFERENCE POWER</i> <i>DIODES, POWER MOSFETS, THYRISTORS, OR IGBTs IN THEIR</i> <i>ABSTRACTS</i>	240
<i>TABLE 361 (CONTINUED)</i>	241
<i>TABLE 361 (CONTINUED)</i>	242
<i>TABLE 362 THE 50 MOST RECENT PATENTS THAT REFERENCE</i> <i>POWER DIODES, POWER MOSFETS, THYRISTORS, OR IGBTs IN</i> <i>THEIR ABSTRACTS (TABLE BEGINNING JUNE 1, 2008)</i>	242
<i>TABLE 362 (CONTINUED)</i>	243
ABSTRACTS OF EARLY PATENTS	243
AC MOTOR CONTROL SYSTEM	244
APPARATUS FOR PROTECTING THE THYRISTORS OF A HIGH-VOLTAGE CONTROLLED CONVERTER FROM OVERVOLTAGE.....	244
CAPACITIVE DISCHARGE IGNITION SYSTEM.....	245
CHOPPER CONTROL SYSTEM.....	245
CIRCUIT ARRANGEMENT FOR PRODUCING A DEFINED LOGIC CONDITION, PARTICULARLY FOR THE MONITORING SIGNAL OUTPUT IN DATA PROCESSING EQUIPMENT	245
CIRCUIT FOR THE SIMULTANEOUS IGNITION OF A PLURALITY OF THYRISTORS	246
CIRCUITRY FOR REDUCING THYRISTOR TURN-OFF TIMES	246
COMMUTATION CIRCUIT AND APPLICATIONS.....	247
CONTACTLESS OSCILLATOR-TYPE PROXIMITY SENSOR WITH CONSTANT- VOLTAGE IMPEDANCE.....	247
CONTROL CIRCUITS FOR ELECTRICALLY DRIVEN VEHICLES.....	247
CONTROL CIRCUITS FOR ELECTRICALLY DRIVEN VEHICLES.....	248
CONTROL PROCESS FOR OPERATING A PARALLEL- RESONANT CIRCUIT INVERTER THAT SUPPLIES AN INDUCTIVE CHARGE.....	248
DEVICE FOR ADJUSTING IGNITION TIME FOR INTERNAL COMBUSTION ENGINE	249
DIODE-INTEGRATED THYRISTOR	249

DIRECT CURRENT POWER CONTROL CIRCUIT.....	249
DISCHARGE DEVICE CONTROL CIRCUIT INCLUDING A THYRISTOR	250
ELECTRIC DISCHARGE LAMP LIGHTING DEVICE.....	250
ELECTRICAL THYRISTOR CIRCUIT.....	250
ELECTRONIC MONITORING SYSTEM INCLUDING CONTACTLESS MOTION DETECTOR	251
ELECTRONIC MONITORING SYSTEM WITH SHORT- CIRCUIT PROTECTION.....	251
ELECTRONIC SWITCHING CIRCUIT WITH ZERO VOLTAGE SWITCHING	252
FIRING APPARATUS FOR A PLURALITY OF ELECTRIC VALVES	252
FORCE COMMUTATION STATIC FREQUENCY CHANGER APPARATUS USING DIRECT CURRENT CHOPPER TECHNIQUE	253
GATE CONTROL OF THYRISTOR CONVERTERS FOR REVERSIBLY DRIVING A DC ELECTRIC MOTOR.....	253
GEOPHYSICAL ENERGY SOURCE UTILIZATION CIRCUIT	253
GTO TURN-OFF CIRCUIT PROVIDING TURN-OFF GATE CURRENT PULSE PROPORTIONAL TO ANODE CURRENT	254
HIGH SPEED, HIGH POWER PLASMA THYRISTOR CIRCUIT....	254
HIGH-FREQUENCY HEATING DEVICE FOR VARIABLY CONTROLLING A HIGH FREQUENCY OUTPUT IN A CONTINUOUS OR STEPWISE MANNER.....	255
INDUCTION COOKING UNIT HAVING ALL PAN SAFE OPERATION, WIDE RANGE POWER CONTROL AND LOW START-UP AND SHUT-DOWN TRANSIENTS.....	255
METHOD OF ELIMINATING SELF OSCILLATIONS OF AN INDUCTION MOTOR POWERED FROM A FREQUENCY CHANGER	256
MICROWAVE OVEN POWER SUPPLY CIRCUIT	256
MULTI-LEVEL TELEVISION RECEIVER CHANNEL INDICIA DISPLAY	257
OPTICALLY COUPLED SEMICONDUCTIVE SWITCHING DEVICES.....	257
POWER SUPPLY SOURCE FOR ARC WELDING.....	257
PROTECTIVE DEVICE FOR AT LEAST ONE THYRISTOR.....	258
PULSED FLASH TUBE REGULATOR USING THYRISTOR GATE CONTROL.....	258
REGENERATIVE BRAKING CONTROLLER FOR A DC MOTOR	259
REVERSE VOLTAGE SURGE INVERTER MEANS	259

SYSTEM FOR EFFECTING TAP CHANGES OF TAPPED TRANSFORMER WINDINGS BY MEANS OF THYRISTORS	259
SYSTEMS COMPRISING A RELAXATION OSCILLATOR PARTICULARLY FOR ELECTRICAL IGNITERS.....	260
TEMPERATURE CONTROL CIRCUIT	260
THYRISTOR.....	261
THYRISTOR COLUMN.....	261
THYRISTOR CONTROL CIRCUIT	261
THYRISTOR CONTROL SYSTEM	262
THYRISTOR-FIRING APPARATUS USING AN ACOUSTIC SURFACE WAVE DEVICE.....	262
TRIAC WITH GOLD DIFFUSED BOUNDARY	263
VARIABLE BRIGHTNESS LIGHT DISPLAY APPARATUS.....	263
VOLTAGE REGULATOR FOR A SEPARATELY EXCITED GENERATOR.....	263
ABSTRACTS OF RECENT PATENTS	264
AC POWER LINE PROTECTION USING THYRISTORS	264
ADAPTIVE GATE DRIVE FOR SWITCHING DEVICES OF INVERTER.....	264
CHARGE CONTROL METHOD OF CAPACITOR IN THYRISTOR CONVERTER.....	265
COMPREHENSIVE POWER QUALITY CONTROLLER FOR SUBSTATION IN POWER SYSTEM	265
DEEP TRENCH ISOLATION FOR THYRISTOR-BASED SEMICONDUCTOR DEVICE.....	266
DIMMER CIRCUIT ARRANGEMENT.....	266
DIMMER CIRCUIT WITH IMPROVED RIPPLE CONTROL.....	267
EFFICIENT FAST PULSED LASER OR LIGHT-EMITTING DIODE DRIVER	267
EFFICIENT THYRISTOR-TYPE POWER SWITCHES	267
ELECTRIC CAR CONTROL APPARATUS.....	268
HIGH-FREQUENCY DIELECTRIC HEATING DEVICE AND PRINTED BOARD WITH THERMISTOR	268
HYBRID TYPE WORKING MACHINE.....	269
IGBT OR LIKE SEMICONDUCTOR DEVICE OF HIGH VOLTAGE WITHSTANDING CAPABILITY	269
IMAGE HEATING APPARATUS.....	270
INVERTER POWER SOURCE CONTROL FOR HIGH FREQUENCY HEATER.....	270
JUNCTION-GATE TYPE STATIC INDUCTION THYRISTOR AND HIGH-VOLTAGE PULSE GENERATOR USING SUCH JUNCTION-GATE TYPE STATIC INDUCTION THYRISTOR	271

LAMP HAVING FIXED FORWARD PHASE SWITCHING POWER SUPPLY WITH TIME-BASED TRIGGERING	271
LASER DIODE TRIGGERED SOFT START CONTROLLER FOR A POLYPHASE ELECTRIC MOTOR	272
MATERIAL COMPOSITE AND PRODUCTION AND USE OF THE MATERIAL COMPOSITE	272
METHOD AND APPARATUS FOR ELECTRONIC POWER CONTROL	272
METHOD AND CIRCUIT ARRANGEMENT FOR LIMITING AN OVERVOLTAGE	273
METHOD OF MANUFACTURING A THYRISTOR SEMICONDUCTOR DEVICE	273
MULTIFUNCTIONAL OPTOELECTRONIC THYRISTOR AND INTEGRATED CIRCUIT AND OPTICAL TRANSCEIVER EMPLOYING SAME	274
OPERATING METHOD FOR A WIND TURBINE WITH A SUPERSYNCHRONOUS CASCADE	274
OPTOELECTRONIC CIRCUIT EMPLOYING A HETEROJUNCTION THYRISTOR DEVICE TO CONVERT A DIGITAL OPTICAL SIGNAL TO A DIGITAL ELECTRICAL SIGNAL	275
OPTOELECTRONIC CLOCK GENERATOR PRODUCING HIGH FREQUENCY OPTOELECTRONIC PULSE TRAINS WITH VARIABLE FREQUENCY AND VARIABLE DUTY CYCLE AND LOW JITTER	276
POWER CONTROL APPARATUS AND METHOD FOR ELECTRIC COOKERS	276
POWER SUPPLY APPARATUS	277
POWER SUPPLY DEVICE	277
POWER TRANSISTOR CONTROL DEVICE	278
REVERSE BLOCKING SEMICONDUCTOR DEVICE AND A METHOD FOR MANUFACTURING	278
SELF-SCANNING LIGHT-EMITTING ELEMENT ARRAY AND DRIVING METHOD	279
SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD	279
SEMICONDUCTOR DEVICE AND METHOD OF MANUFACTURE	280
SEMICONDUCTOR DEVICE INCORPORATING THYRISTOR- BASED MEMORY AND STRAINED SILICON	280
SEMICONDUCTOR DEVICE WITH A MOSFET FORMED IN CLOSE PROXIMITY TO A BIPOLAR DEVICE AND METHOD OF MANUFACTURE	281

SEMICONDUCTOR SYSTEM FUNCTIONING AS THYRISTOR IN ON-STATE, AND AS BIPOLAR TRANSISTOR IN TRANSIENT STATE OR WITH OVERCURRENT	281
SILICON WAFER FOR IGBT AND METHOD FOR PRODUCING SAME	282
SOLID STATE TURBINE ENGINE IGNITION EXCITER HAVING ELEVATED TEMPERATURE OPERATIONAL CAPABILITY	282
STUD WELDING METHOD	283
SWITCHABLE VOLTAGE CONVERTER.....	283
SWITCHING DEVICE AND DRIVING APPARATUS FOR PLASMA DISPLAY PANEL.....	283
THREE-IN-ONE AC SERVO DRIVE.....	284
THYRISTOR AND METHOD OF MANUFACTURE.....	284
THYRISTOR CIRCUIT AND APPROACH FOR TEMPERATURE STABILITY	285
THYRISTOR-BASED DEVICE HAVING DUAL CONTROL PORTS.....	285
THYRISTOR-BASED DEVICE WITH TRENCH DIELECTRIC MATERIAL	286
THYRISTOR-BASED MEMORY AND ITS METHOD OF OPERATION.....	286
THYRISTOR-BASED SRAM.....	287
THYRISTOR-TYPE MEMORY DEVICE.....	287
 APPENDIX B: ORGANIZATIONAL PROFILES.....	 288
ABB, INC., CORPORATE RESEARCH.....	288
ACBEL POLYTECH	288
ACTEL.....	288
ADD-VISION.....	288
ADVANCED ANALOGIC TECHNOLOGIES.....	289
ADVANCED ENERGY INDUSTRIES.....	289
ADVANCED MICRO DEVICES	289
ALCATEL-LUCENT	289
AMERICAN POWER CONVERSION (SEE SCHNEIDER)	289
ANALOG DEVICES.....	289
ANSOFT SEE ANSYS	290
ANSYS	290
AO SMITH.....	290
APPLE.....	290
ARGONNE NATIONAL LABORATORY.....	290
ARGUS TECHNOLOGIES.....	291
BAE SYSTEMS.....	291
BEL FUSE.....	291

BENNING	291
BOEING	292
BOSE	292
C&D TECHNOLOGIES.....	292
CARNEGIE MELON UNIVERSITY.....	292
CATERPILLAR.....	293
CENTER FOR POWER ELECTRONICS SYSTEMS.....	293
CERMET	294
CHALMERS UNIVERSITY	294
CHEROKEE INTERNATIONAL.....	294
CHIL SEMICONDUCTOR.....	294
CHINA COMPULSORY CERTIFICATE PROGRAM.....	294
COLDWATT	295
COLORADO POWER ELECTRONICS CENTER.....	295
COMMERGY	295
COMPACT MODEL COUNCIL	295
CPI INTERNATIONAL	296
CRANE AEROSPACE & ELECTRONICS	296
CREE.....	296
CURTIS INSTRUMENTS	297
CYPRESS SEMICONDUCTOR	297
DANFOSS ELECTRONIC DRIVES	297
DELTA ELECTRONICS.....	297
DENSEI-LAMBDA KK.....	297
DIGITAL POWER.....	298
DOW CORNING	298
DRS POWER AND CONTROL TECHNOLOGIES.....	298
DYNEX POWER	298
EATON CORP.....	299
ELECTRIC POWER RESEARCH INSTITUTE.....	299
ELECTRONIC CONCEPTS	300
ELTEK VALERE	300
EMERSON MOTOR	300
ENI SPA	301
ENPIRION	301
ERICSSON POWER MODULES	301
FAIRCHILD SEMICONDUCTOR	301
FLOMERICS	302
FORD MOTOR.....	302
FREESCALE SEMICONDUCTOR.....	302
FSP GROUP.....	302
FUJI ELECTRIC ADVANCED TECHNOLOGY.....	303
GE ENERGY	303
GENERAL MOTORS.....	303

GEORGIA INSTITUTE OF TECHNOLOGY	304
GRUNDFOS A/S	304
HAMILTON SUNDSTRAND	304
HEWLETT-PACKARD	305
HIPRO ELECTRONICS	305
HITACHI COMPUTER PERIPHERALS.....	305
HONDA MOTOR	305
HONEYWELL INTERNATIONAL.....	306
HR TEXTRON.....	306
IBM.....	306
INFINEON TECHNOLOGIES.....	307
INGERSOLL-RAND	307
INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERING.....	307
INTEL.....	307
INTERNATIONAL RECTIFIER.....	308
INTERSIL	308
IOWA STATE UNIVERSITY	308
IWATT	308
IXYS.....	309
JAPAN RESEARCH INSTITUTE.....	309
JOHNSON CONTROLS	309
KEMET.....	310
KOHLER	310
L-3 COMMUNICATIONS, POWER SYSTEMS GROUP.....	310
LAWRENCE BERKLEY NATIONAL LABORATORY	310
LEHIGH UNIVERSITY.....	311
LEM USA	311
LINEAR TECHNOLOGY	311
LITE-ON TECHNOLOGY	311
LOS ALAMOS NATIONAL LABORATORY	312
MAGNETEK	312
MASSACHUSETTS INSTITUTE OF TECHNOLOGY.....	312
MAXIM INTEGRATED PRODUCTS	313
MICREL	313
MICROSOFT.....	313
MILLER ELECTRIC.....	313
MITSUBISHI ELECTRIC	314
MKS INSTRUMENTS, INC.	314
MONOLITHIC POWER SYSTEMS	314
MOTOROLA (SEE FREESCALE SEMICONDUCTOR).....	314
MURATA POWER SOLUTIONS	315
NATIONAL SEMICONDUCTOR	315
NETPOWER TECHNOLOGIES	315

NIPPON CHEMI-CON	315
NISSAN MOTOR	315
NORTH CAROLINA A&T STATE UNIVERSITY	316
NORTH CAROLINA STATE UNIVERSITY	316
NORTHROP GRUMMAN.....	316
NXP SEMICONDUCTORS	316
ON SEMICONDUCTOR.....	317
OSHKOSH.....	317
OSRAM SYLVANIA.....	317
OTIS ELEVATOR	317
PACIFIC NORTHWEST NATIONAL LABORATORY	318
PACIFIC SCIENTIFIC ELECTRO KINETICS DIVISION	318
PANASONIC ELECTRIC WORKS	318
PHILIPS SEMICONDUCTOR (SEE NXP SEMICONDUCTOR).....	318
PHOENIX INTEGRATION	318
PHOSPHORTECH.....	319
PHYSICAL OPTICS	319
POTENTIA SEMICONDUCTOR (SEE TUNDRA SEMICONDUCTOR)	319
POWER INTEGRATIONS.....	319
POWER ONE	319
PRIMARION	320
PURDUE UNIVERSITY.....	320
REGAL BELOIT	320
RENESAS TECHNOLOGY	320
RENSELAER POLYTECHNIC INSTITUTE.....	321
RICHTEK TECHNOLOGY	321
ROCKWELL AUTOMATION.....	321
ROLLS-ROYCE.....	322
S&C ELECTRIC.....	322
SAN DIEGO STATE UNIVERSITY.....	322
SANDIA NATIONAL LABORATORIES	322
SATCON TECHNOLOGY	323
SCHNEIDER ELECTRIC—SQUARE D.....	323
SEMIKRON INTERNATIONAL.....	323
SEMISOUTH LABORATORIES	323
SEW-EURODRIVE	324
SHINDENGEN ELECTRIC	324
SIEMENS VDO AUTOMOTIVE.....	324
ST MICROELECTRONICS	324
SUMMIT MICROELECTRONICS	325
SUN FROST	325
SYCHIP (SEE MURATA POWER SOLUTIONS)	325
SYNQR.....	325
SYSTEL DEVELOPMENT & INDUSTRIES	325

TDK-LAMBDA	326
TECHNITROL	326
TECHNOLOGIES AND DEVICES INTERNATIONAL	326
TEXAS INSTRUMENTS	327
TEXTRON SYSTEMS.....	327
TOSHIBA INTERNATIONAL	327
TOYOTA MOTOR.....	327
TRANE (SEE INGERSOLL RAND).....	328
TRINAMIC MOTION CONTROL	328
TSINGHUA UNIVERSITY.....	328
UNITED TECHNOLOGY RESEARCH CENTER	328
UNIVERSAL DISPLAY.....	329
UNIVERSITY OF CALIFORNIA, SAN DIEGO.....	329
UNIVERSITY OF CALIFORNIA, SANTA BARBARA	329
UNIVERSITY OF FLORIDA.....	329
UNIVERSITY OF GEORGIA RESEARCH FOUNDATION.....	329
UNIVERSITY OF NORTH TEXAS.....	330
UNIVERSITY OF PUERTO RICO AT MAYAGUEZ	330
UNIVERSITY OF SOUTHERN CALIFORNIA.....	330
UNIVERSITY OF WISCONSIN AT MADISON	330
VACON.....	330
VALERE POWER (SEE ELTEK VALERE).....	331
VICOR	331
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY	331
VOLTERRA SEMICONDUCTOR.....	331
VPT.....	331
WEST VIRGINIA UNIVERSITY	332
WHIRLPOOL CORP.....	332
WORLD SEMICONDUCTOR TRADE STATISTICS ORGANIZATION	332
XI'AN JIAO TONG UNIVERSITY	332
YALE UNIVERSITY.....	332
YASKAWA ELECTRIC AMERICA.....	333
YELLAND CONTROL.....	333
ZILKER LABS.....	333
ZN TECHNOLOGY.....	333