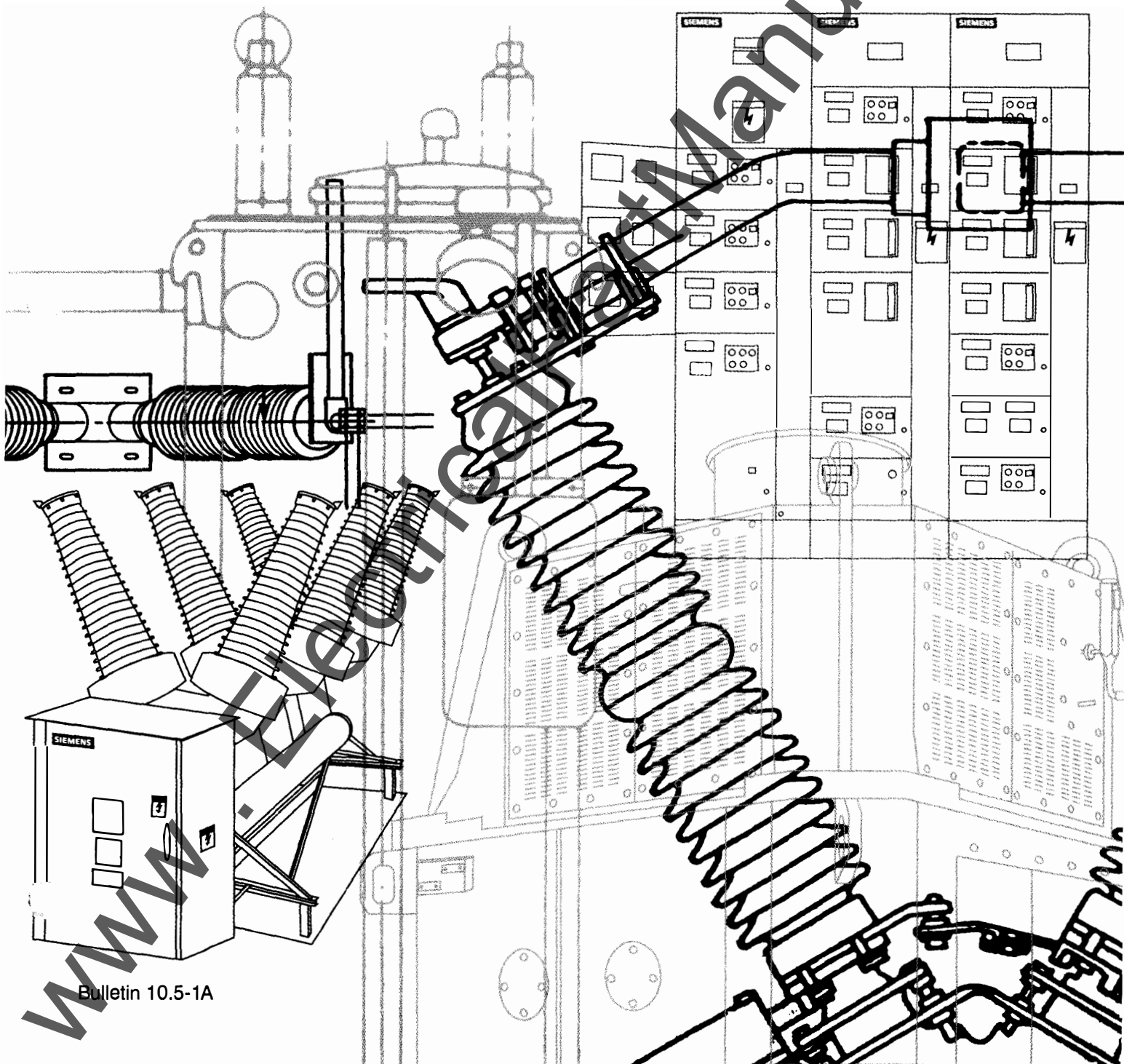


SIEMENS

Products and Services For The Utility Market



Bulletin 10.5-1A

Research and Development: One Important Reason for Siemens Success in Utility Market Products

Research and Development

Siemens Energy and Automation, Inc. is backed by a global research organization that is totally committed to designing innovative, quality products that are second to none. As one of the world's largest companies, Siemens invests more than \$10 million a day worldwide in research and product development. In fact, the Siemens investment is more than double the amount annually spent on research and development industry-wide.

Manufacturing Strength

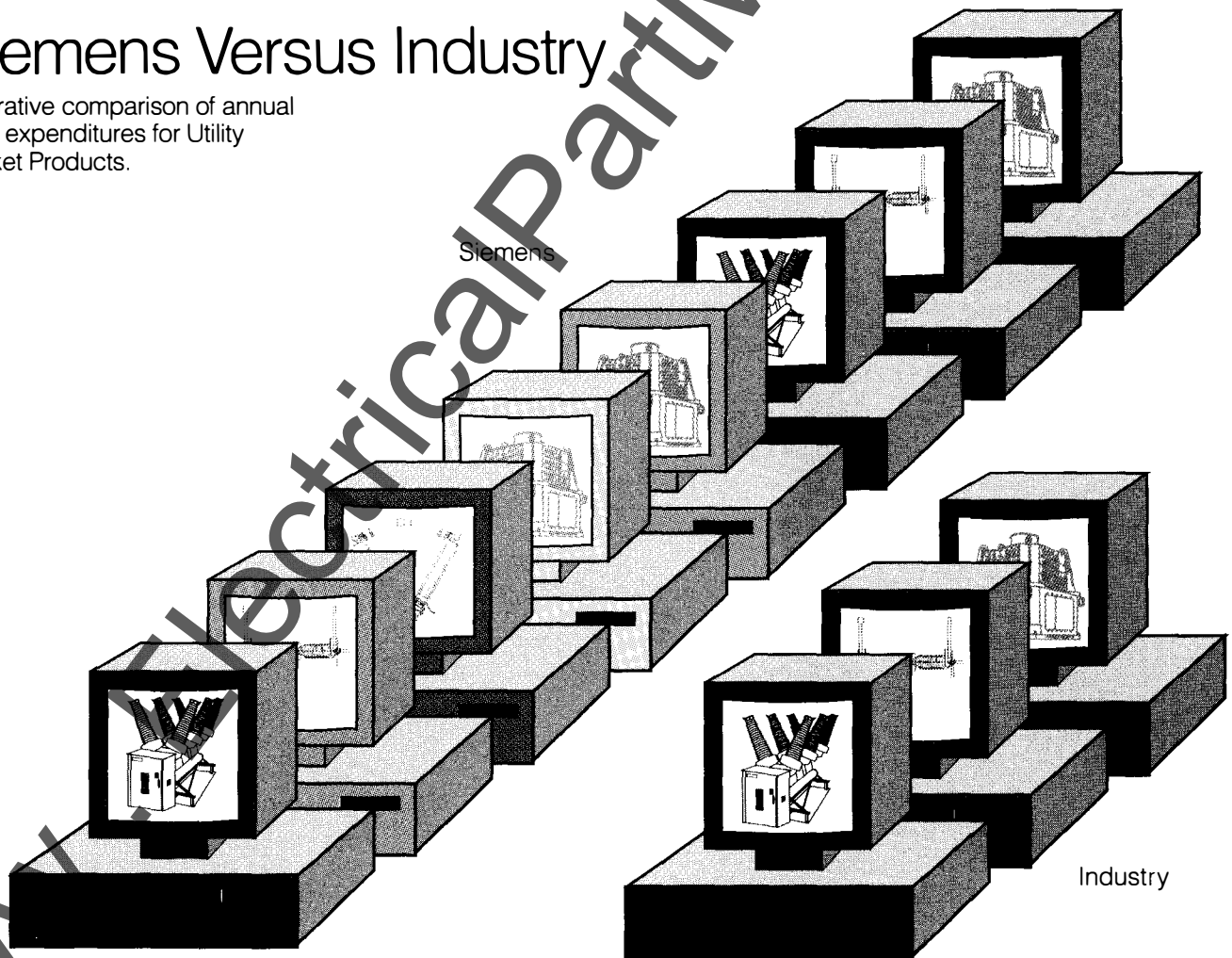
The Siemens commitment to innovation in utility market products is visibly reflected in our American manufacturing base. At our sophisticated facilities in Jackson, Mississippi, we manufacture most of our power breakers, switches and regulators from start to finish. Engineering and technical support for these products, as well as marketing and administrative functions, is based in Jackson, Mississippi.

Above NEMA motors are manufactured in Norwood, Ohio. Electrical apparatus and distribution equipment, including switchgear and motor control centers are manufactured in Raleigh, North Carolina.

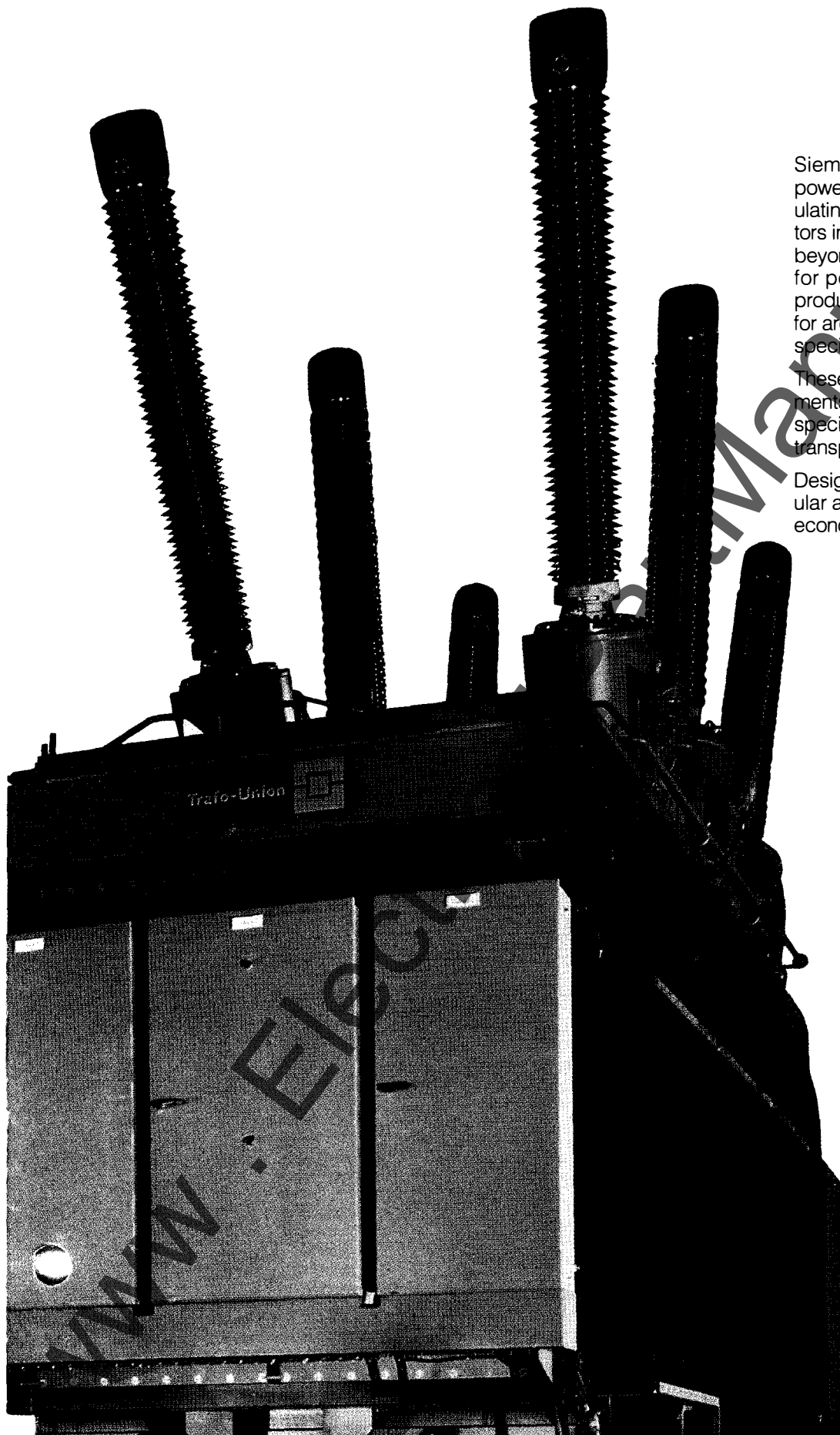
Add these plants to the rest of our worldwide network coupled with our experience in electrical products, research and commitment to service, you have an unbeatable, single-source supplier of utility market products.

Siemens Versus Industry

Illustrative comparison of annual R&D expenditures for Utility Market Products.



Power Transformers



Siemens offers a complete line of power transformers, phase-angle regulating transformers and shunt reactors in the range of 50 MVA up to and beyond 1000 MVA and up to 1500 kV for power system application. The product spectrum also includes units for arc furnace, rectifier and HVDC special purpose applications.

These transformers meet all requirements concerning power, voltage, special connections, type of cooling, transport and installation.

Designs are optimized for the particular application resulting in the most economical cost of operation.

Power Circuit Breakers

Jackson,
Mississippi



Siemens offers a complete line of advanced power circuit breakers that are among the best engineered and most reliable in the world.

With a range of 15 to 800 kV, we can satisfy all your needs for distribution, subtransmission, transmission and EHV class substations.

These products offer a full range of technologies, from the newest SF₆ gas circuit breakers to time-proven vacuum and oil. All are tested to meet ANSI, IEEE and NEMA standards. Thousands are in service, building an excellent track record. And together, they form one of the most complete power breaker product lines available in the United States.

Distribution and Subtransmission Breakers

SF₆ Puffer Circuit Breakers (Type SP) are the most advanced solution for applications requiring voltages of 15 to 72 kV. Three-cycle interrupting assures system stability and reduces equipment damage during faults.

Vacuum Insulated Breakers (Type SDV) are available for 15 to 38 kV applications. Their contacts stay free of pollutants for long contact life and low maintenance costs.

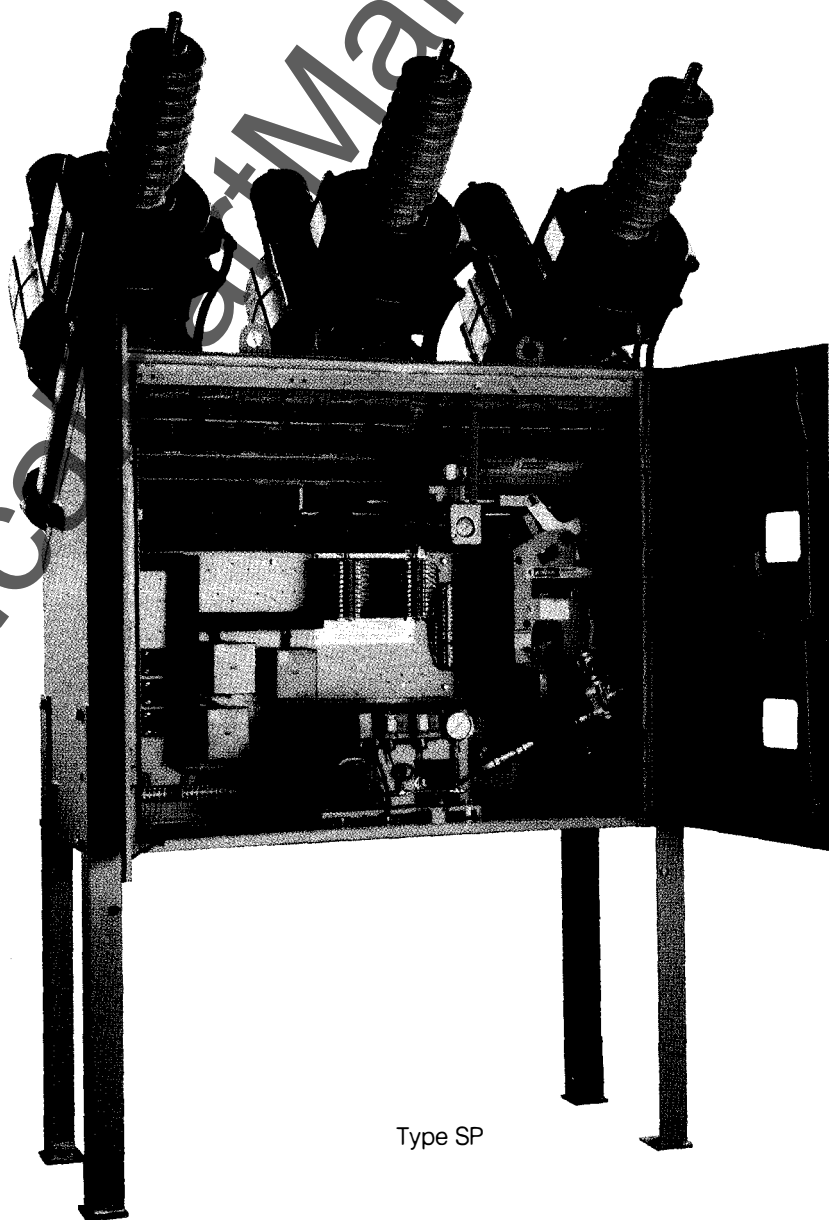
Oil Circuit Breakers (Type SDO) offer both economy and a proven long term service record. Their single tank design and low oil content make them easy and economical to install.

Transmission and EHV Breakers

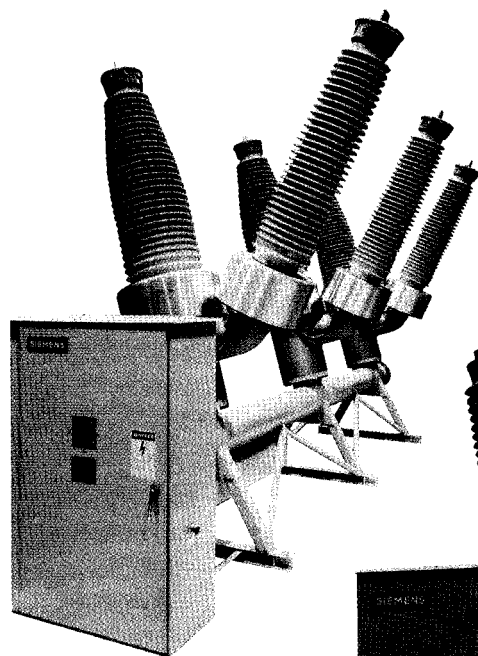
Transmission Class SF₆ Puffer Circuit Breakers (Type TCP) are an excellent example of advanced, yet proven technology. With a well-documented reliability record spanning more than a decade, these breakers are general and definite purpose units used for maximum rated voltages of 121 to 242 kV.

3-Cycle Oil Breakers (Type BZO) are an economic alternative for all your transmission needs, offering proven reliability at high interrupting levels.

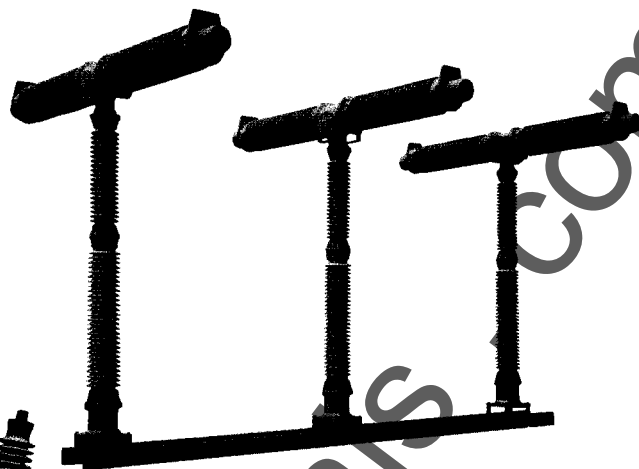
Live Tank SF₆ Puffer Breaker (Type 3AT) designs are based on technology field-proven by more than 30,000 interrupter units and operating mechanisms. They are rated 242 to 800 kV.



Type SP



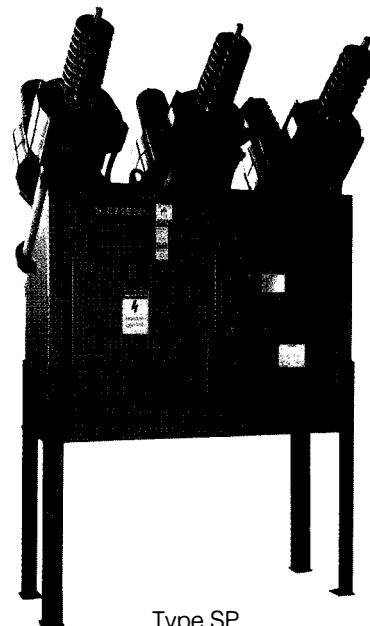
Type TCP



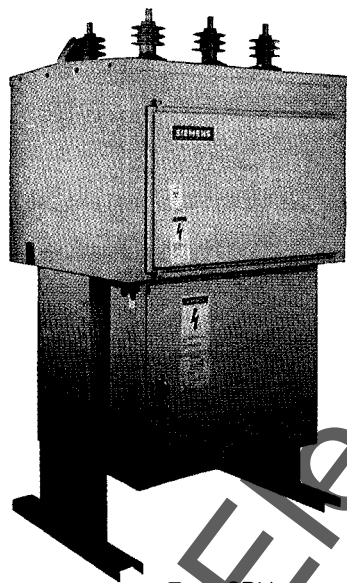
Type 3AT



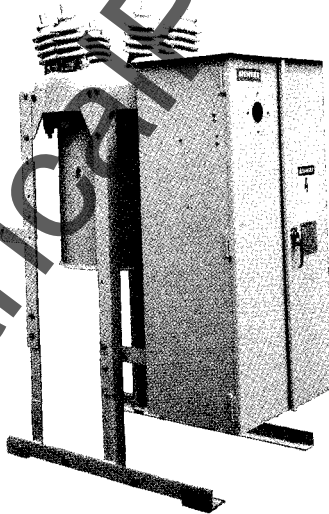
Type BZO



Type SP



Type SDV



Type SDO

Type	Voltage (kV)	Interrupting Capacity (kA)	Continuous Current Ratings (kVA)
SP SF ₆ (Gas)	15-72	23-40	1200-3000
SDV (Vacuum)	15-38	12-25	1200-2000
SDO (Oil)	15-30	8.9-20	600-1200
TCP SF ₆ (Gas)	121-242	20-50	1200-3000
BZO (Oil)	121-242	20-63	1200-3000
3AT SF ₆ (Gas)	242-800	40-80	2000-4000

Power Switches

Jackson,
Mississippi

Air Disconnect Switches

Siemens is at the forefront of developing and producing a wide range of dependable power switches. All component production is consolidated in our Jackson facility, furthering Siemens' commitment to the production of reliable, quality switches.

Three-pole, group operated switches come in a wide ratings range. All are supplied with manual operators, or motor operators with a motor/mechanical drive that can be operated locally or from a remote location.

Group Operated Switches

Vertical Break (Type AVB), aluminum heavy-duty, maintenance-free switch for outdoor service.

Center Break (Type CCB), copper low-profile "V" switch configuration, two low-cost insulators per phase.

Center Break (Type CBL-2)*, copper low-profile "V" switch configuration, two low-cost insulators per phase.

Single Side Break (SSB-T)*, copper two insulator, truss blade construction with one stationary and one rotating insulator.

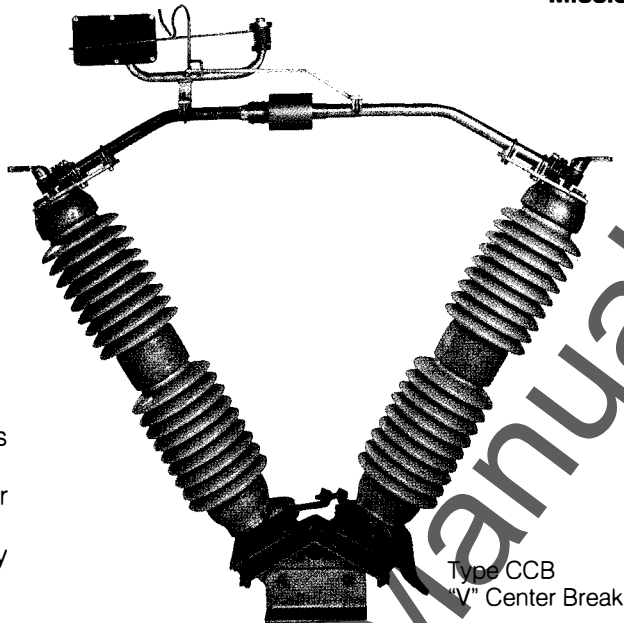
Hookstick Operated Switches

Single Pole (Type HS) Substation Class disconnect switch for long, maintenance-free operation.

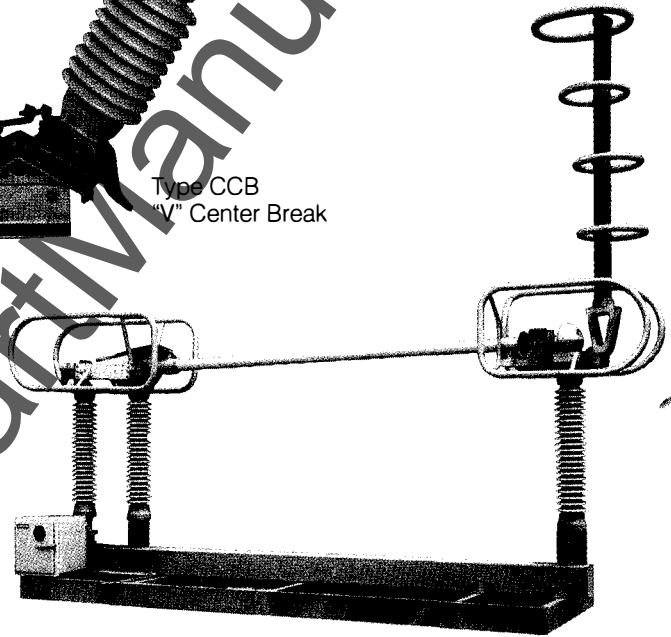
Single Phase (Type HR)* Regulator/Current Transformer Bypass Switch.

Motor Operating Mechanism

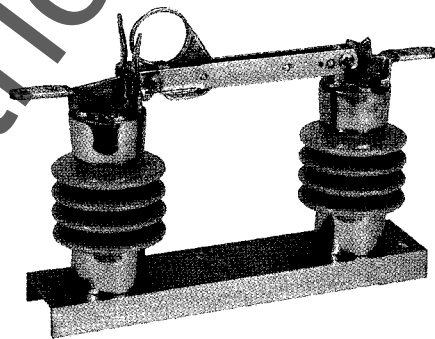
Type CM-4A for outdoor disconnect switches, with 1/8" aluminum, weather proof, maintenance-free, three-door cabinet.



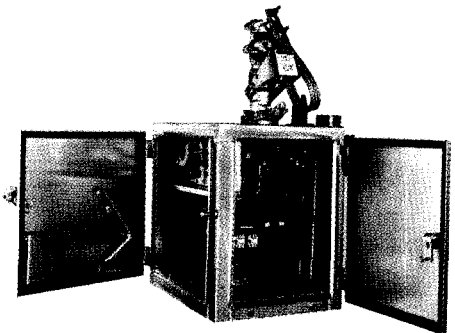
Type CCB
"V" Center Break



Type AVB Group
Operated Vertical Break



Type HS Hookstick



Type CM-4A
Motor Operating Mechanism

Type	Voltage (kV)	Continuous Current Ratings (Amps)
AVB	15.5 - 500	600 - 4000
CCB	121 - 242	600 - 1600
CBL-2*	121 - 242	600 - 2000
SSB-T	15.5 - 72.5	600 - 1200
HS/HA	15.5 - 25.8	600 - 4000
HR*	15.5 - 25.8	600 - 1200
CM-4A	-	-

* Product available, but not pictured.

Solar Electric Power

Camarillo,
California



Siemens is the world's largest and most experienced provider of solar electric power systems. Utilities have discovered a wide range of reliable and economical applications of solar electricity in use today for internal transmission and distribution loads.

Solar electric systems have an immediate payback when compared to many conventional service options such as line extension or step-down transformers for relatively small power requirements.

Utility applications for photovoltaic solar electricity include power for sectionalizing switches, tower obstruction lighting systems, SCADA, and battery charging.

Siemens provides solar electric power supplies for stand-alone loads ranging from as low as 25 watts to megawatt size installations for grid voltage support.

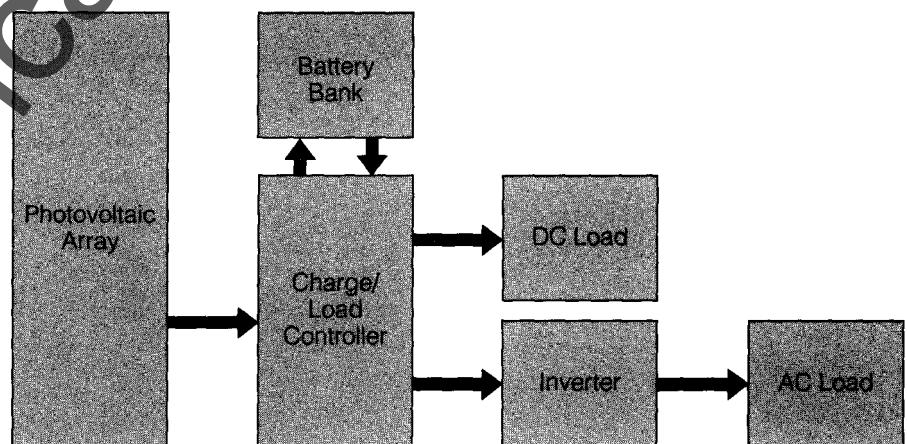


High Efficiency Photovoltaic Solar Electric Array

Typical Generator System

The heart of a solar electric system is the photovoltaic module, which create electricity directly from the light of the sun.

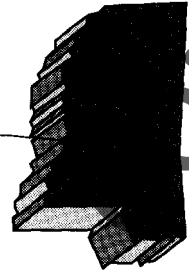
The basic generator system is formed by connecting solar modules, arrayed in parallel and in series, to provide the appropriate voltage and current. Electricity generated by the modules is stored in batteries and monitored by charge controllers to run the system 24 hours a day, 7 days a week.



WWW.Electrical.com

Circuit Switchers

Jackson,
Mississippi



Line Backer® Circuit Switches

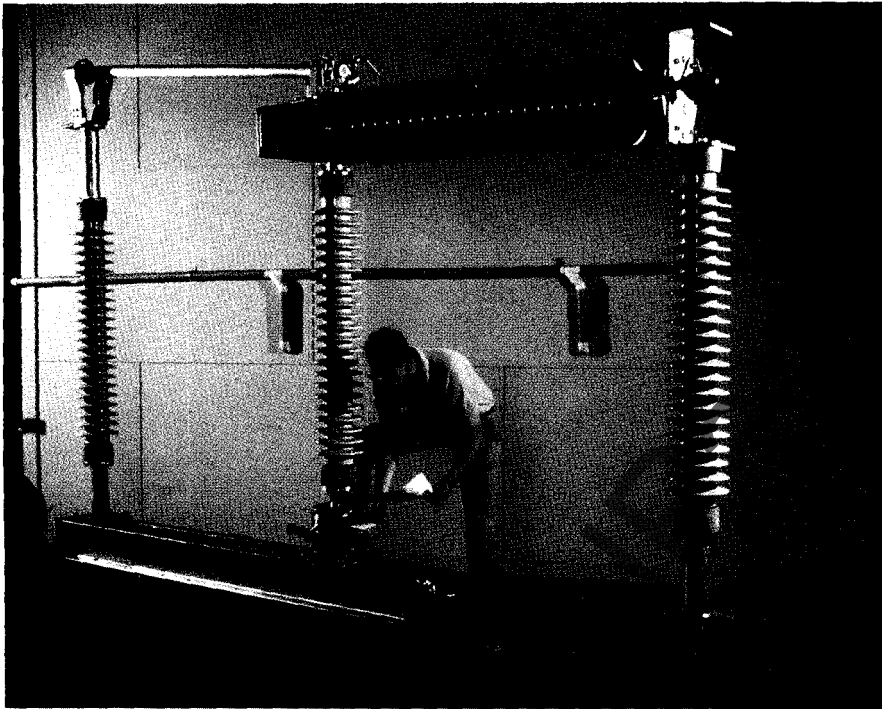
If you have applications that don't require reclosing, and where interrupting requirements are relatively low, the Line Backer circuit switcher is the perfect solution. By combining

SF₆ puffer interruption and air break isolation functions in a single compact unit, it provides flexible and space-saving protection at an economical cost.

Power Insulators

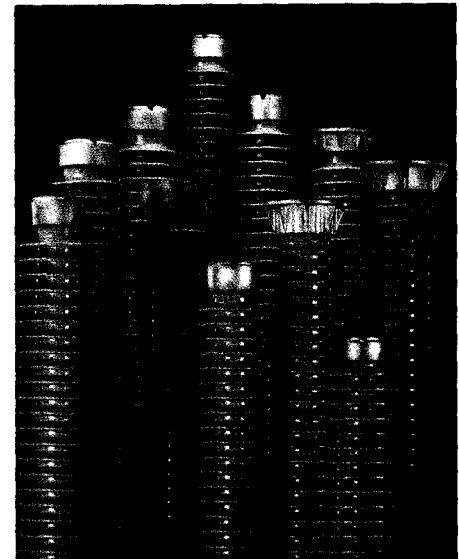
For more than 50 years, Siemens solid-core station post insulators have been used in substations as components for disconnect switches and bus supports. Our solid-core station post insulators meet all transmission and distribution system component requirements for both mechanical and electrical loading.

Plus, our state-of-the-art manufacturing facilities and inspection techniques guarantee the quality of all materials used for the insulator body, hardware and cement joint. Siemens insulators are engineered and tested in compliance with the relevant ANSI and CAN/CSA standards.



Circuit Switcher

Type	Voltage (kV)	Interrupting (kA)	Continuous (Amps)
CP	38-169	10	1,200-2,000
CPS	38-169	20	1,200-2,000
MFB	38-169	10	1,200-2,000
CPS-VB	38-169	20	1,200
CPS-CB	38-169	20	2,000



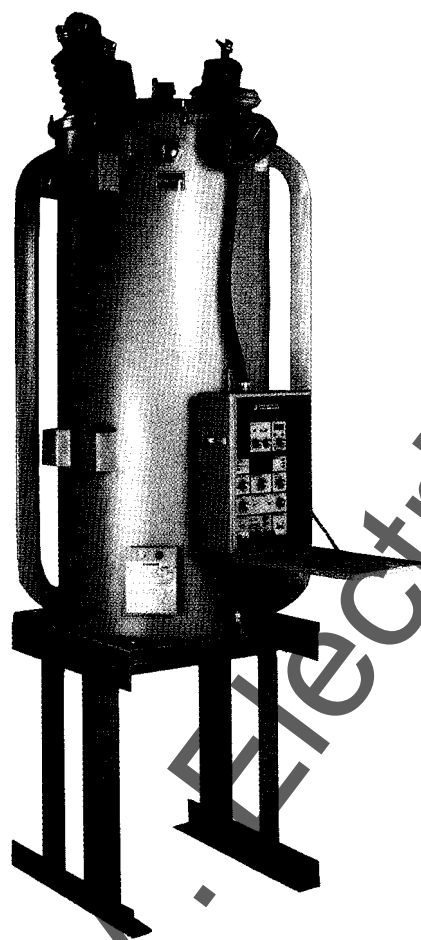
Power Insulators

www.electronic.com

Voltage Regulators

Siemens regulators give you consistent voltage control of your power distribution under a variety of load conditions. That means increased efficiency for you—and improved service for your customers.

Our experience includes development of the first successful 5/8% step-type voltage regulator, now an industry standard. A Siemens voltage regulator maintains a consistent output by providing plus or minus 10% regulation in 32 steps of 5/8% each.



JFR Single Phase

A more recent innovation is the micro-processor control, and Siemens is the first manufacturer to offer this as a standard control. Our Type MJ-3A microprocessor control increases reliability, and with various accessories, will control the circuit and collect system information. A communications capability transmits this information through your SCADA system.

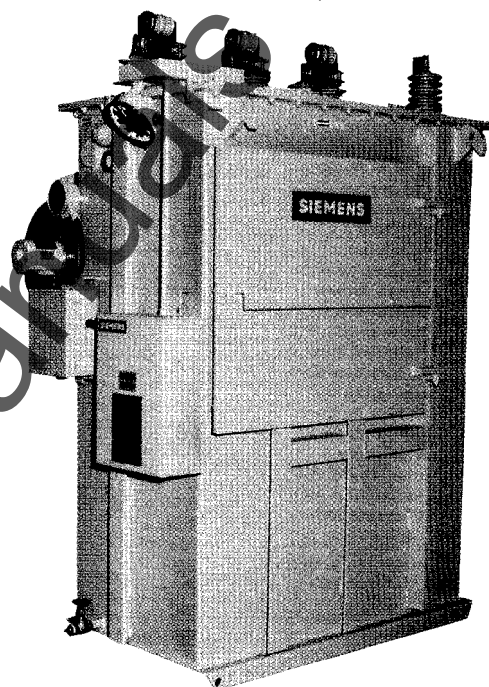
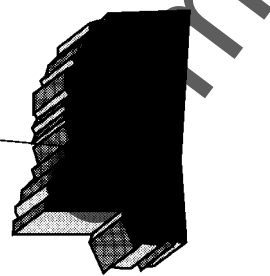
Type SFR Three-Phase Voltage Regulator

Voltage regulation $\pm 10\%$ regulation in thirty-two 5/8% steps. Oil-filled, 55° rise by resistance, rated 13,200 volts and 34,000 volts, in the following kVA ratings: Self-cooled: 500, 750, 1,000, 1,500, 2,000, 2,500 and 2,970 kVA. Forced air: 625, 937, 1,250, 2,000, 2,667, 3,333 and 4,000 kVA.

Type JFR Single-Phase Voltage Regulator

Voltage regulation $\pm 10\%$ regulation in thirty-two 5/8% steps. Oil-filled, 55° rise by resistance, rated from 2,500 to 19,920 volts, in kVA ratings of from 38.1 thru 887.

Jackson, Mississippi

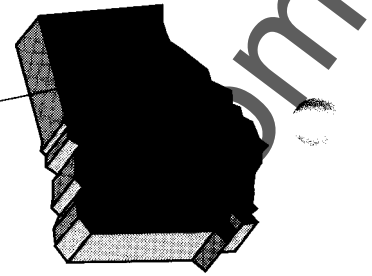


SFR Three Phase

Type	Voltage	Continuous Current	kVA
JFR	2,500	400 - 1,665	100 - 4,163
	5,000	334 - 835	167 - 4,163
	7,620	50 - 1,164	38.1 - 887
	13,800	50 - 200	69 - 276
	14,400	50 - 578	72 - 833
	19,920	50 - 418	100 - 833
SFR	13,200	219 - 1,750	500 - 4,000
	34,500	84 - 446	500 - 2,667

Power Systems and Studies

Atlanta,
Georgia



Power System Studies

Using a state-of-the-art digital simulation system and specially designed power system models, our highly skilled system study team can determine the effect or cause of almost any kind of network transient, control interaction, or equipment operation. Through years of experience in advanced computer modeling, we can provide detailed analysis of component stresses, network harmonics, control operation and complex system-to-system interactions. Siemens can also help you understand your system requirements and put together specifications for reactive compensation and HVDC systems.

Power System Development

In addition to systems analysis, Siemens has the ability to design, manufacture and install Static VAR, Series Compensation, Gas Insulated Substation, and High Voltage DC systems as turnkey projects.

Static VAR transmission and load compensation installations are designed and built for specific regulation needs of both utilities and large industrial customers.

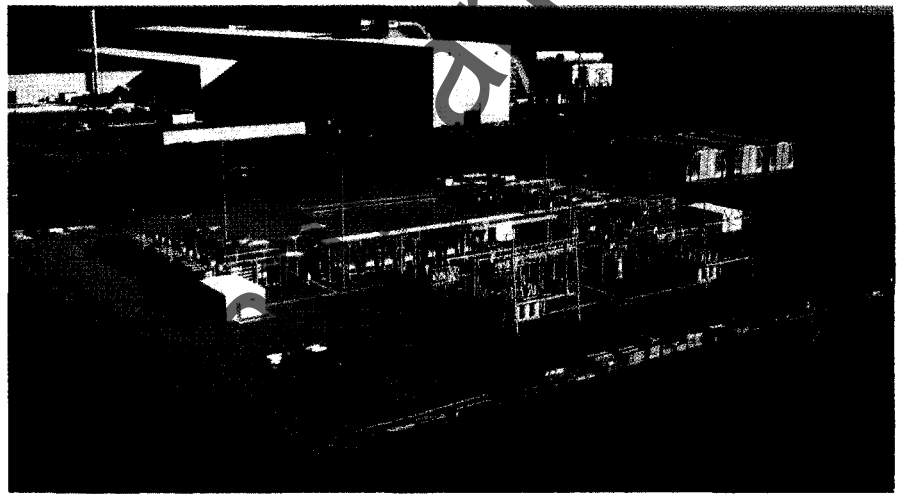
Series Compensation increases power transfer capability of existing AC transmission lines and enhances transmission stability. Thyristor control of series compensation represents the most recent development toward "flexible AC transmission."

Gas Insulated Substations (GIS)

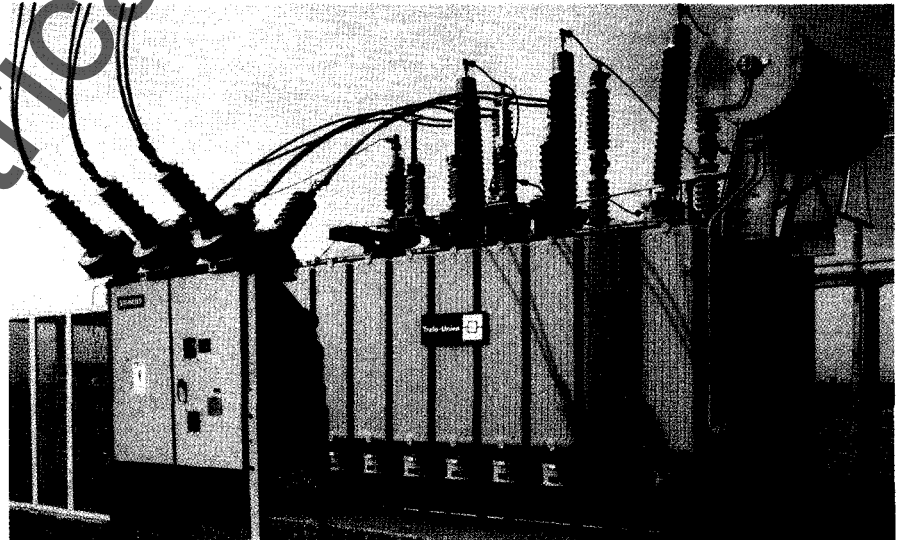
utilize SF₆ technology for special purpose installations. This technology provides an excellent alternative where substations must be built in areas where real estate is at a premium or the environment is particularly hostile.

HVDC Substations

use advanced thyristor technology to provide an economical method of moving power between two asynchronous AC systems or across long transmission distances.

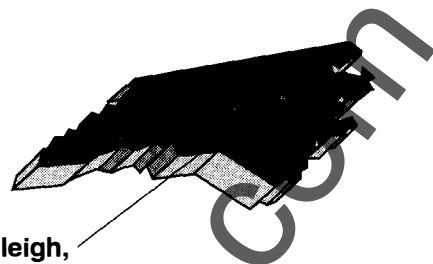


Power System Development



Static Var

ACCESS™ Electrical Distribution Communications Network



Raleigh,
North Carolina

The Siemens ACCESS system provides the communications architecture to link microprocessor-based protective devices with a host computer to monitor and control electrical distribution for an entire facility—at one location.

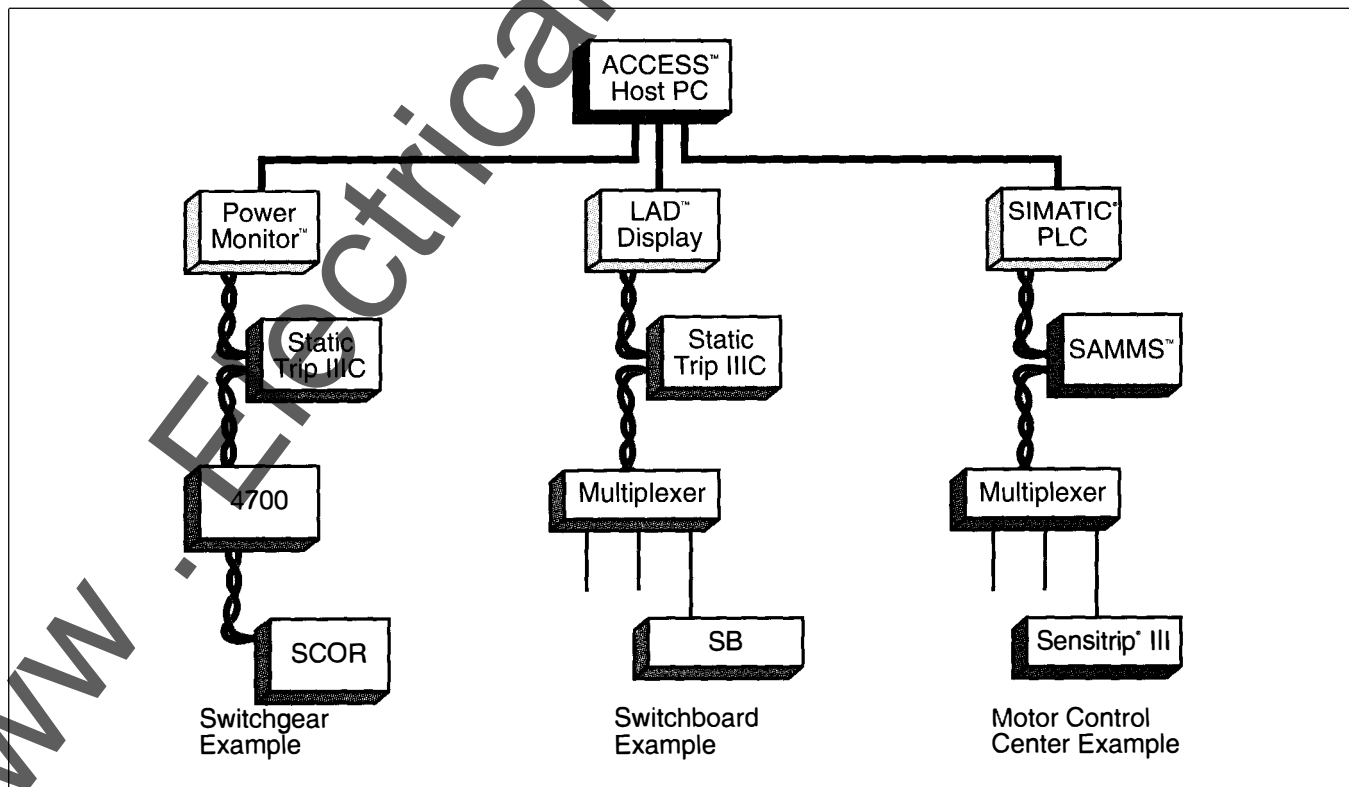
Access systems start with intelligent field devices, each with unique protective or metering functions of their own. These intelligent trip units, power meters and protective relays have built-in communications capabilities and can send and receive information using proven industry-standard RS-485 local communications networks. Complicated traditional “hard-wiring” is replaced with shielded twisted pair cable, so installation is simple.

Supervisory, or “cell” level devices act as collection points for information coming from these intelligent field devices. They also add display, programming, alarm monitoring and event logging functions. Siemens offers the Power Monitor display and monitoring unit with nine-inch graphic display or a local display unit with basic alphanumeric display features. Both use simple operation with self-prompting on-screen messages. Siemens SIMATIC® line of programmable logic controllers are also “ACCESS compatible” for easy integration of process control functions.

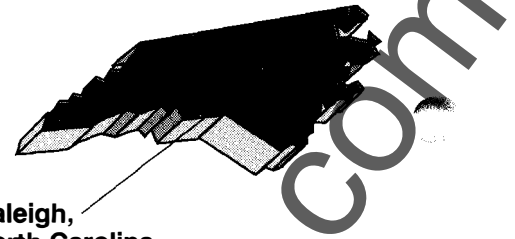
At the top of the system is the ACCESS host personal computer which can monitor an entire electrical system with more than 1000 field devices. The ACCESS host PC software is designed for simple operation with minimal training—even for personnel not already familiar with personal computers.

Because the ACCESS communication system uses industry-standard electrical interfaces with “open” protocols, it’s possible to tie in outside vendor’s devices. And the system can interface with other distributed control or SCADA systems.

Since ACCESS systems are built from the bottom up, you can start with intelligent devices like the SCOR overcurrent protective relay or 4700 power meter and add communications capability later. Or include a Power Monitor display and monitoring unit talking to Static Trip III trip units in your next switchgear lineup and add a host PC later. Even field retrofits or upgrades are easy due to the simple wiring required.



Switchgear and Motor Control Centers



Raleigh,
North Carolina

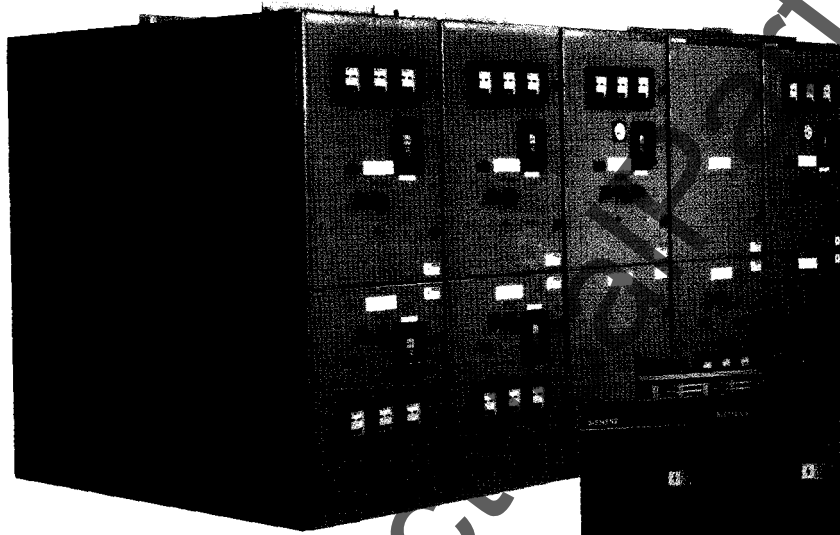
Low Voltage Metal Enclosed Switchgear (Type R), with drawout air circuit breakers, Type RL, 208 to 600 volts, 800 to 4000 amps, 30 to 200 kA interrupting capacity.

Medium Voltage (Type GM), two high, Metal-clad Switchgear, with Vacuum Circuit Breakers, Type GMI, 4.16 to 38 kV, 1200 to 3000 Amps, to 1000 MVA.

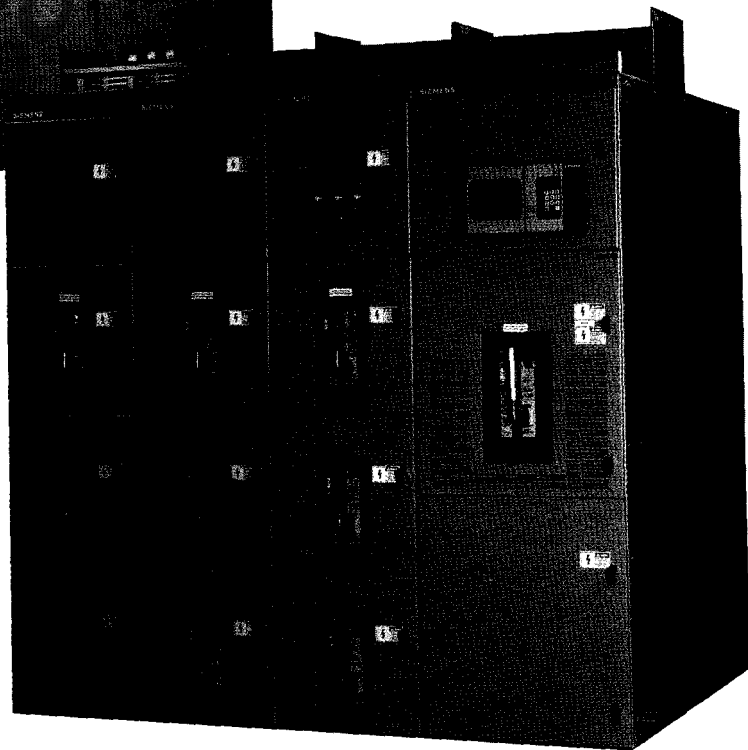
Load Center Substations, consisting of primary load interrupter switches (5 or 15 kV, fused or unfused), liquid or dry type transformers (500-2500 kVA); Metal Enclosed Switchgear or Distribution Board secondary.

Low Voltage Motor Control Centers, 600V to 2500 Amps, Short Circuit Ratings to 100 kA. NEMA Class I and II, Type A, B or C wiring.

Medium Voltage Motor Control Centers, 2.4, 4.16 and 7.2 kV, with 360 and 720 Amp contractors.



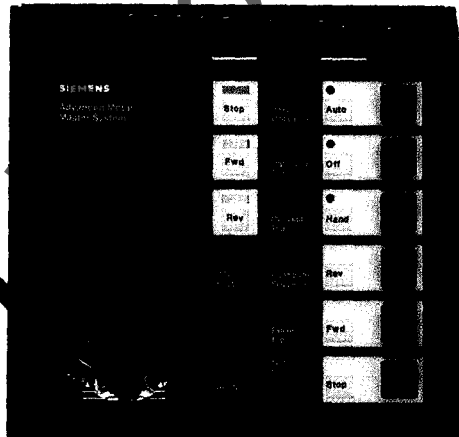
MV Switchgear



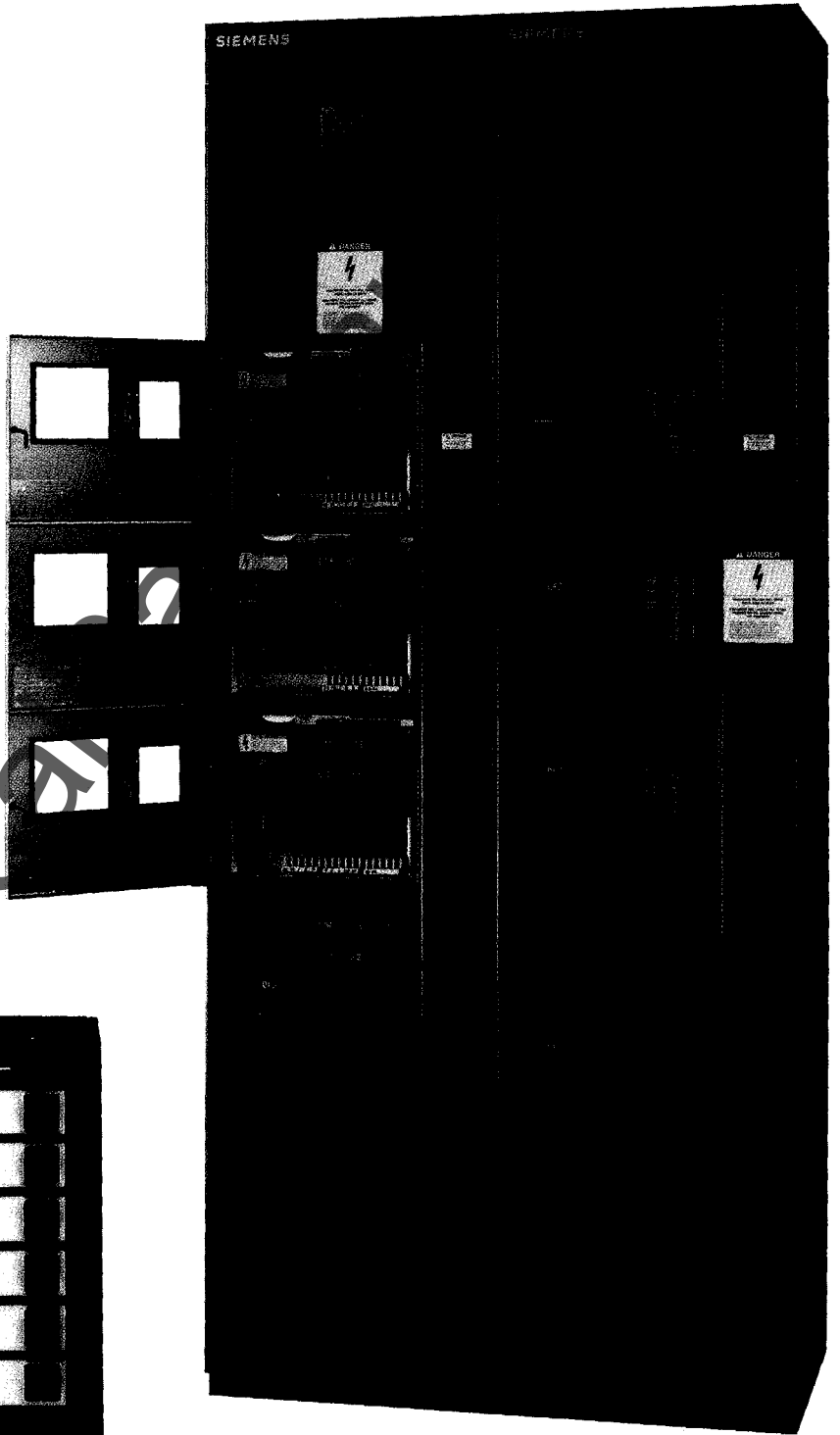
LV Switchgear

SAMMS

The SAMMS unit is a software-configurable motor control and protection relay that can be programmed using industry-standard ladder logic. Acting like a "micro" programmable logic controller, the SAMMS relay can be set to automatically start, stop or reduce speed to a motor based on input conditions you select. Or issue the same motor control commands to the SAMMS relay from a separate SIMATIC programmable logic controller using the communications bus instead of traditional hard wiring and transducers for load shedding, process control or power factor correction.



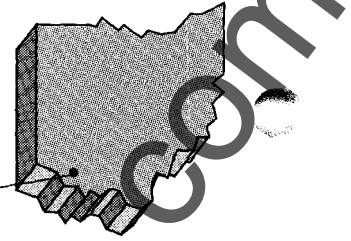
Siemens Advanced Motor Master System



Low Voltage Motor Control Center

Large Motors and Drives

Norwood, Ohio



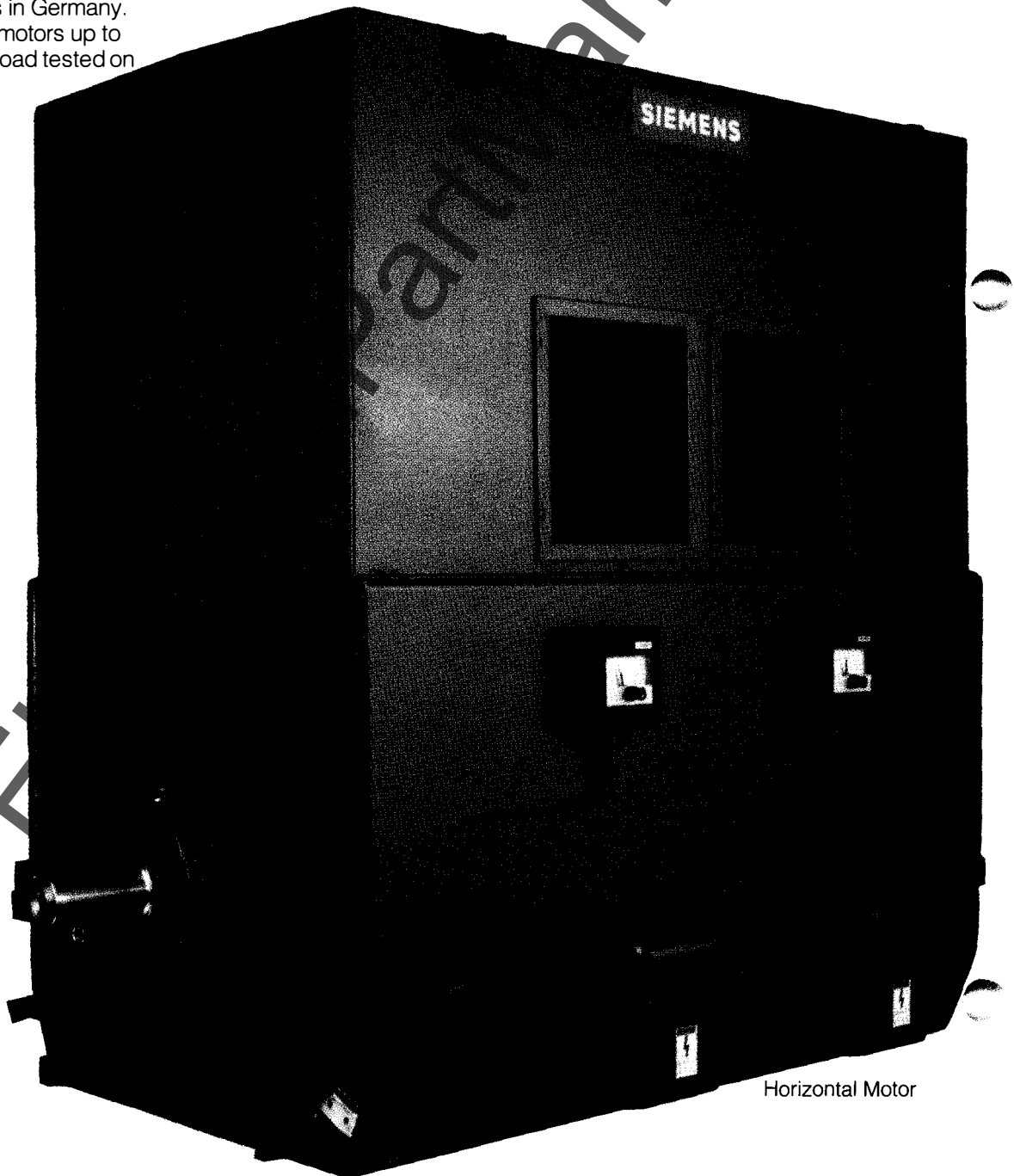
Siemens provides a wide selection of large electric motors and drives for the utility industry.

Siemens designs and manufactures highly efficient induction motors from 1 to 10,000 HP in its U.S. facilities in Little Rock, Ark., and the Cincinnati suburb of Norwood, Ohio. Larger motors up to 30,000 HP are imported from Siemens factories in Germany. At the Norwood plant, motors up to 10,000 HP can be full load tested on

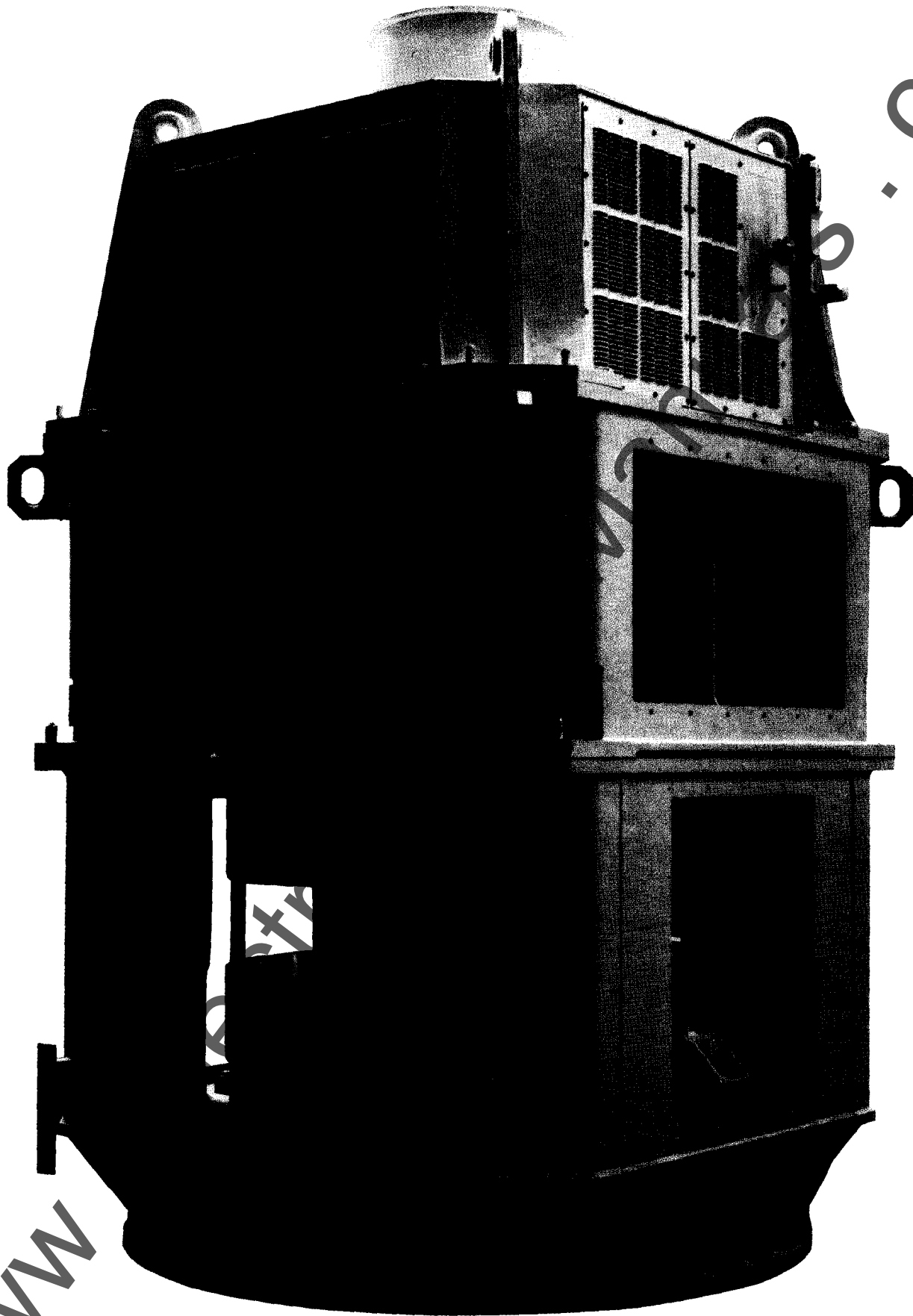
the largest dynamometer testing facility for motors in the United States.

Motors are available in a wide variety of enclosures, both horizontally and vertically mounted, and are custom designed to meet the specific application requirements of each individual utility customer.

In addition, Siemens markets a complete line of digital DC drives for the most demanding speed control applications in the industry. Siemens also offers a line of AC drives to provide an engineered speed control solution for any type of electrical service.



Horizontal Motor



Vertical Motor

Siemens Energy & Automation Sales Offices

Alabama

Birmingham
(205) 879-7030
Mobile
(205) 621-0822
Montgomery
(205) 271-4486

Alaska

Anchorage
(907) 346-2489

Arizona

Phoenix
(602) 944-7900

Arkansas

Little Rock
(501) 661-9008

California

Fresno
(209) 264-5018
Los Angeles
(714) 979-6600
Sacramento
(916) 631-9433
San Diego
(619) 569-8015
San Francisco
(415) 429-1200
Stockton
(209) 478-9596

Colorado

Colorado Springs
(719) 473-7880
Denver
(303) 694-3770
Ft. Collins
(303) 223-2712

Connecticut

Wallingford
(203) 265-5003

Florida

Ft. Lauderdale
(305) 484-3888
Fort Myers
(813) 656-3605
Jacksonville
(904) 363-0087
Miami
(305) 592-4106
Orlando
(407) 894-7771
Tallahassee
(904) 422-2885
Tampa
(813) 287-2356
West Palm Beach
(407) 683-5185

Georgia

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Macon
(912) 743-8994
Savannah
(912) 354-5092

Hawaii

Honolulu
(808) 533-7135

Idaho

Boise
(208) 342-6852

Illinois

Chicago
(708) 330-4320
Peoria
(309) 688-8729
Rockford
(815) 229-0092

Indiana

Evansville
(812) 422-9176
Fort Wayne
(219) 483-6999
Indianapolis
(317) 788-5500
Roseland
(219) 277-7040

Iowa

Davenport
(319) 359-1357
Des Moines
(515) 280-1614

Kansas

Kansas City
(913) 491-3114
Wichita
(316) 942-1409

Kentucky

Louisville
(502) 426-4647

Louisiana

Baton Rouge
(504) 293-6874
New Orleans
(504) 885-3622
Shreveport
(318) 424-0720

Maine

Portland
(207) 854-0021

Maryland

Landover
(301) 459-2044

Massachusetts

Boston
(508) 658-0142
Springfield
(413) 562-7994
Worcester
(508) 792-4566

Michigan

Grand Rapids
(616) 247-7611
Detroit
(313) 597-7400

Minnesota

Edina
(612) 942-8888

Mississippi

Jackson
(601) 936-9360

Missouri

Kansas City
(913) 491-3114
St. Louis
(314) 567-3900
Sunrise Beach
(314) 374-2737

Nebraska

Omaha
(402) 397-1940

Nevada

Las Vegas
(702) 739-7900

New Hampshire

Manchester
(603) 623-0701

New Jersey

Union
(201) 687-7672

New Mexico

Albuquerque
(505) 881-1611

New York

Albany
(518) 482-0790
Buffalo
(716) 834-3815
Long Island
(516) 759-2325
New York (metro)
(212) 736-2640
Syracuse
(315) 453-3780

North Carolina

Charlotte
(704) 536-1201
Greensboro
(919) 852-1758
Raleigh
(919) 782-3365

North Dakota

Bismarck
(701) 258-9555
 Fargo
(701) 293-7709

Ohio

Cincinnati
(513) 891-8777
Cleveland
(216) 642-0701
Columbus
(614) 766-2204
Toledo
(419) 893-7197
Wooster
(216) 262-3268

Oklahoma

Oklahoma City
(405) 235-7515
Tulsa
(918) 665-1806

Oregon

Eugene
(503) 683-2111
Portland
(503) 635-6700

Pennsylvania

Erie
(814) 456-5998
Philadelphia
(215) 646-3800
Pittsburgh
(412) 788-8060
York
(717) 854-9776

Rhode Island

Providence
(401) 943-6990

South Carolina

Columbia
(803) 254-7095
Greenville
(803) 288-3490

Tennessee

Chattanooga
(615) 267-7412
Johnson City
(615) 282-2718
Knoxville
(615) 690-5172
Memphis
(901) 761-2123
Nashville
(615) 367-9403

Texas

Austin
(512) 443-7822
Dallas
(214) 247-4481
Fort Worth
(817) 735-1947
Houston
(713) 681-5001
McAllen
(512) 687-2072
San Antonio
(512) 377-3292

Utah

Salt Lake City
(801) 272-2090

Virginia

Richmond
(804) 288-8311
Roanoke
(703) 982-2776
Virginia Beach
(804) 486-0174

Washington

Seattle
(206) 828-6600
Spokane
(509) 325-2582

Washington, D.C.

(301) 459-2044

Wisconsin

Milwaukee
(414) 774-9500
Green Bay
(414) 336-1144

Canada

Mississauga,
Ontario
(416) 564-1995
Pointe Claire,
Quebec
(514) 695-7300
Vancouver,
British Columbia
(604) 321-8687

International

TLX: 822024SEA
IBU UF

Fax: (404) 740-3996
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Other Siemens Energy and Power Companies:

- * Siemens Solar Industries, 4650 Adohr Lane, Camarillo, CA 93011; (805) 482-6800
- * Siemens Power Company, P.O. Box 180, Brandenton, FL 34206-0180; (813) 723-4100
- * OSRAM Corporation, 110 Bracken Road, Montgomery, NY 12549; (914) 457-4040