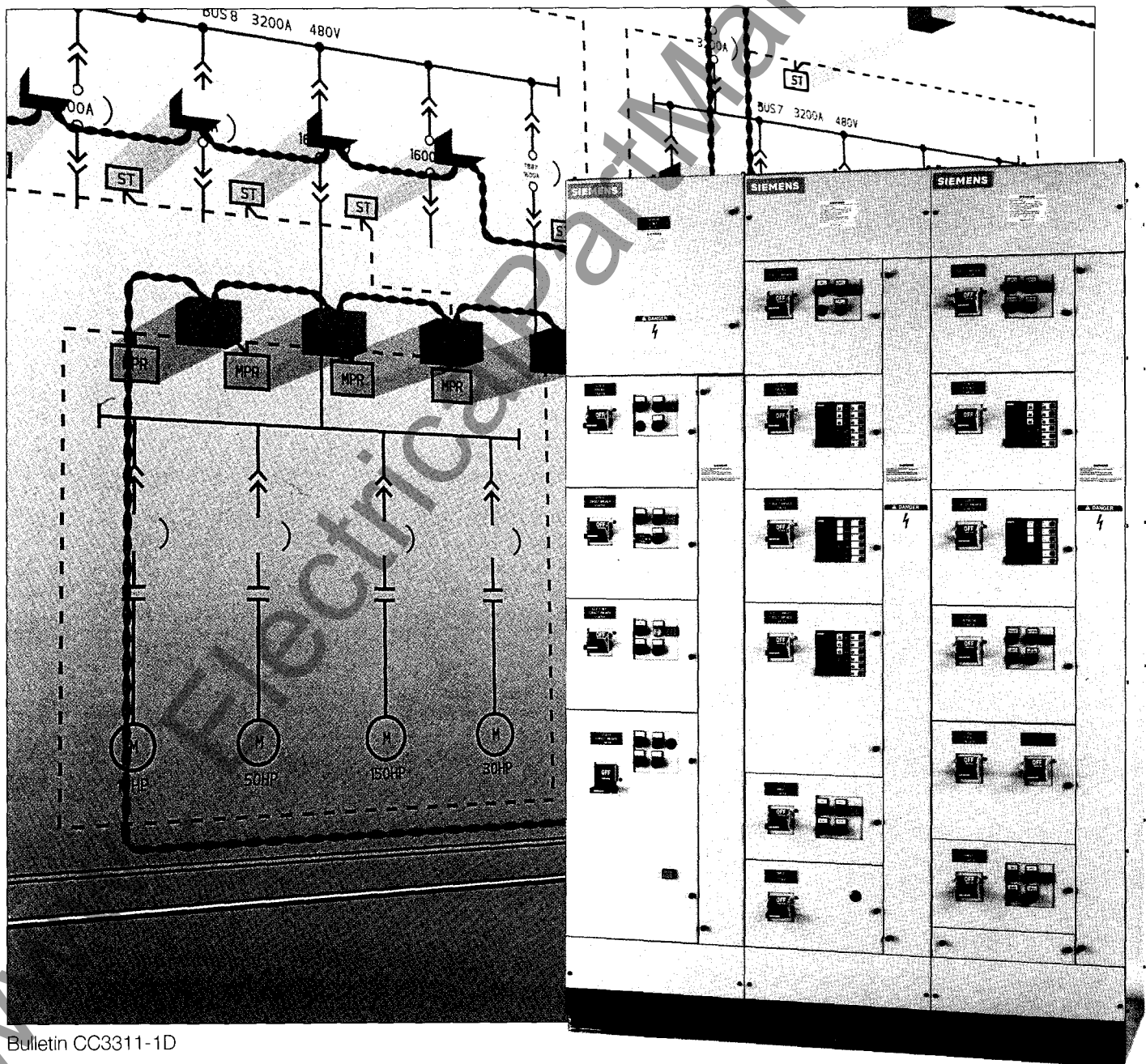


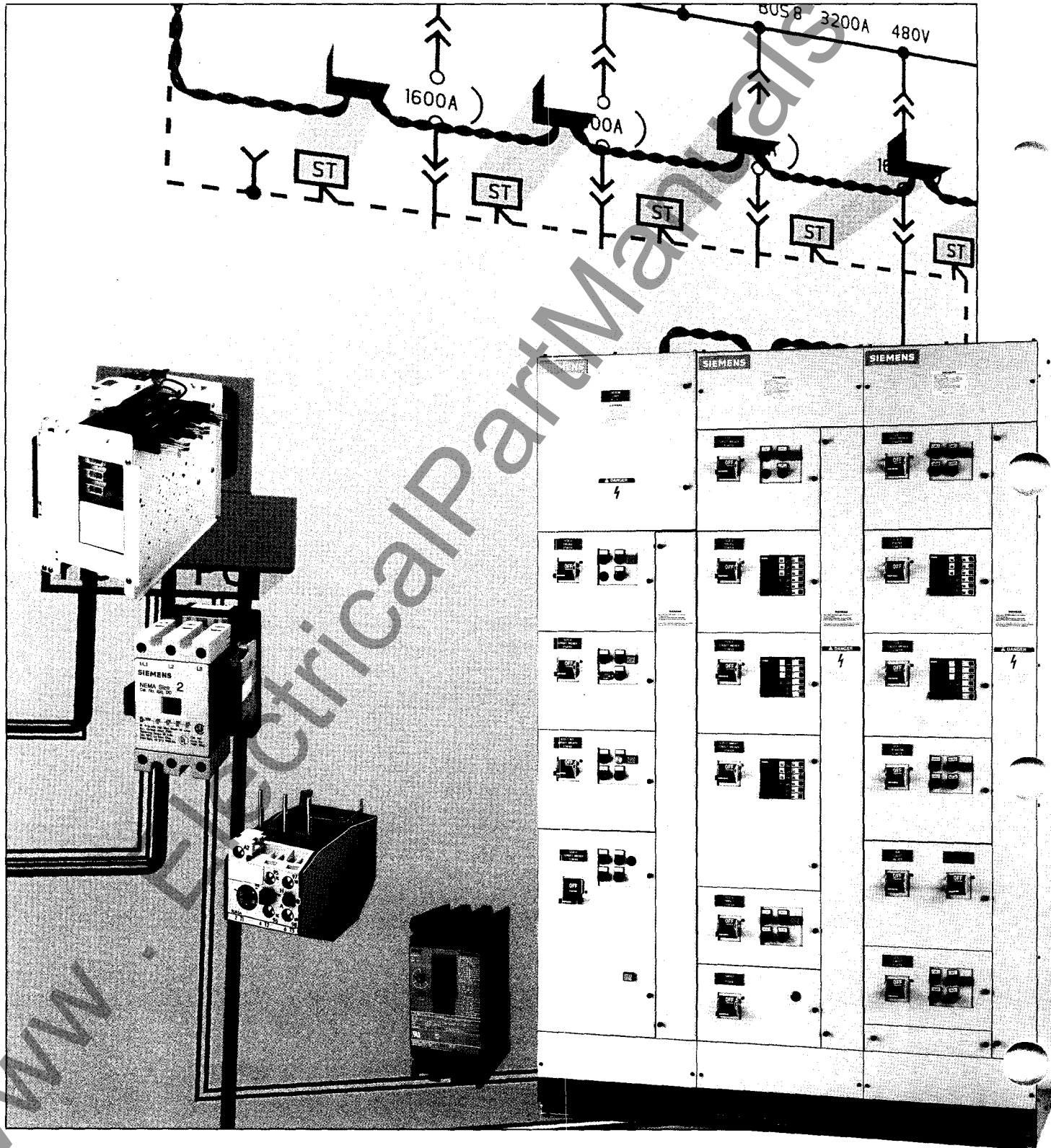
# SIEMENS

## Model 90 Motor Control Centers

Selection  
and Application  
Guide



# Model 90 Modular Design Technology that Serves the Customer.



Ease of maintenance and modular design make Model 90 Motor Control Centers the appropriate choice where 600 volt class MCCs are specified.

The Model 90 is a rigid, self-supporting, freestanding assembly designed to permit future additions or rearrangement of control units. Each enclosure provides maximum protection against operating environments such as those seen in major industrial installations.

## Contents

Model 90 Modular Design	1
Structure Design	2
Bus System	3
MCC Pan	4
New Breaker Technology	6
Contactors & Overload Relays	7
SAMMS Technology	8
Ratings & Dimensions	10
Siemens Commitment to Customer Service	11
ACCESS™. The Electrical Distribution Communications System	12

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

# Structure Design

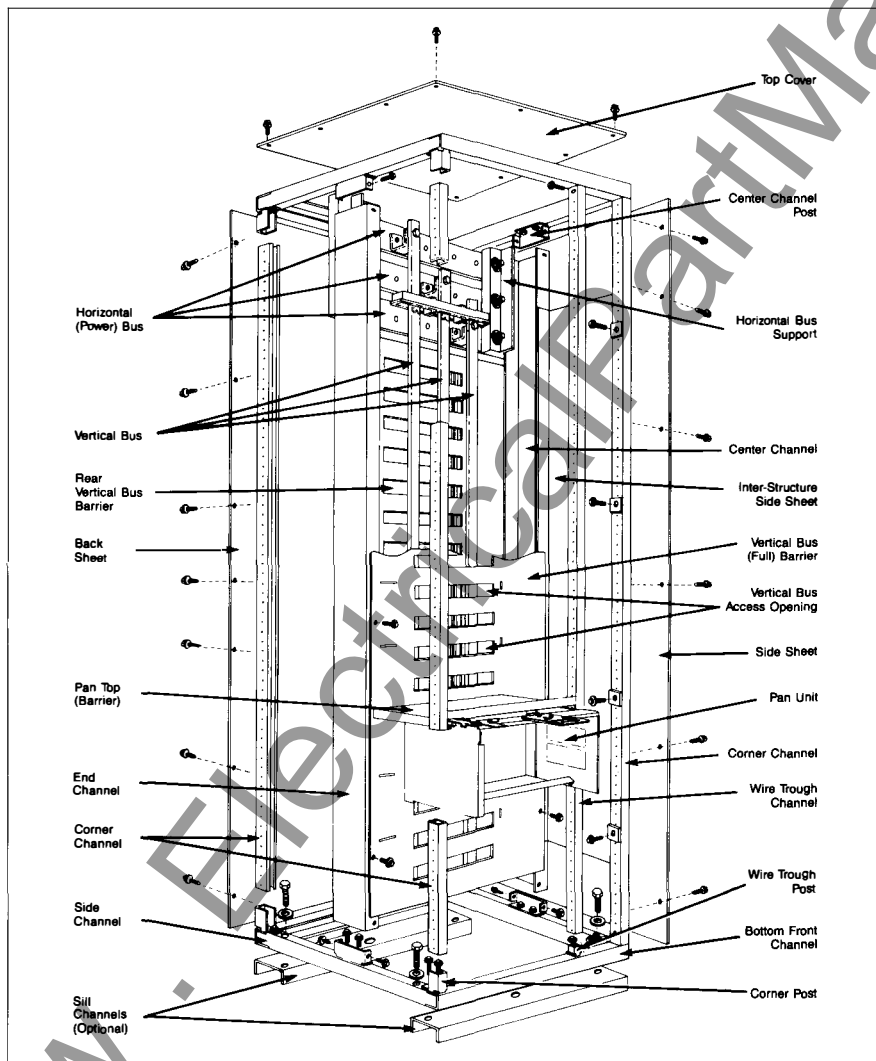
Siemens Model 90 Motor Control Centers are designed in full compliance with NEMA and UL 845 standards. The basic structure (figure 1) is formed with continuous top and bottom frame assemblies which extend to the full width of the shipping section. Shipping sections are

available in combinations of 1,2,3, or 4 sections with a maximum width of 80".

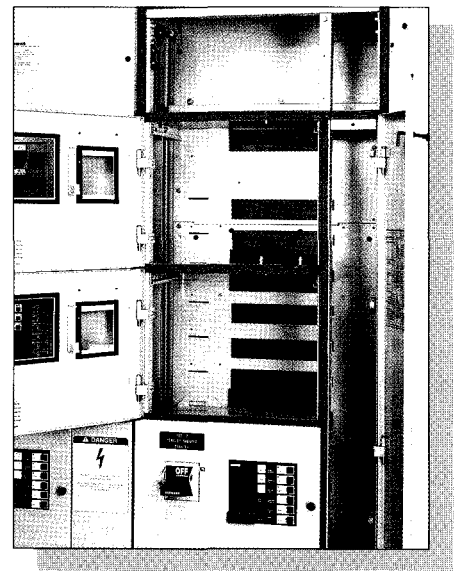
The top and bottom frame assemblies are supported by 12 gauge C-channels and cold rolled steel corner channels. The Model 90

MCC can meet the requirements of Seismic applications with minor modifications.

Model 90 MCCs offer enhanced personnel safety through the use of a unique grounded steel barrier system (figure 2). All bus bars are isolated by grounded steel barriers. These barriers are galvanized as standard with painted steel available as an option. The horizontal barrier is easily removable for maintenance. The vertical bus barrier extends the full width of the structure and has small cutouts every 3 inches for pan stab insertion. Unused openings are filled with red snap-in inserts.



Model 90 MCC isometric drawing (figure 1).



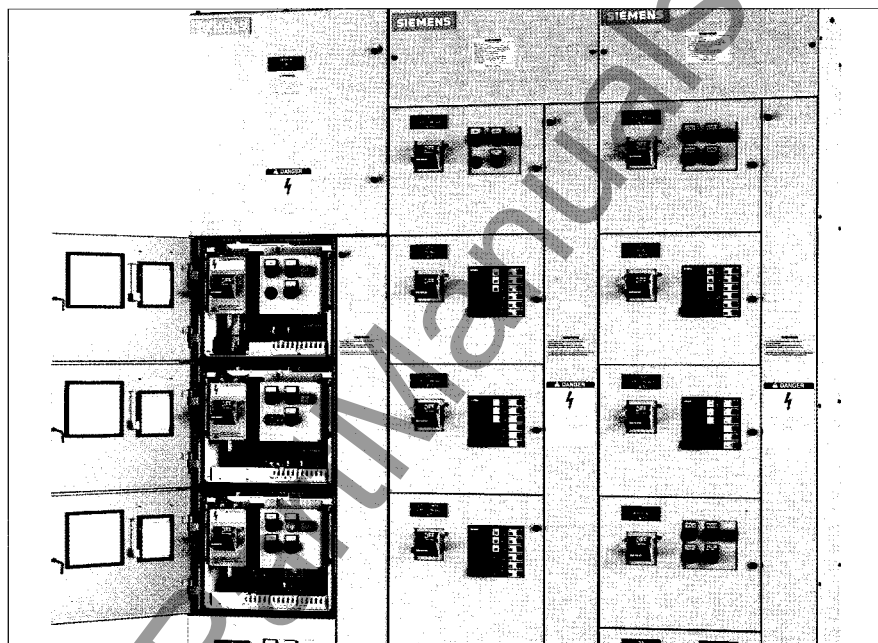
Steel barrier system covering vertical and horizontal bus (figure 2).

# Bus System

Our standard MCC offers "front only" construction with six standard or eight compact Size 1 starter spaces available in each section (figure 3). Optional back-to-back configurations are available offering 72" of mounting space in the front and 60" in the rear. This floor saving option requires only a 20" deep structure.

Double deep arrangements are also available. In this configuration, two cubicles are mounted back-to-back allowing a full 72" of mounting space on both the front and rear of the MCC. This design is available in 32" or 40" deep arrangements. The entire assembly is shipped in one piece up to 80" long with the horizontal bus integrally connected.

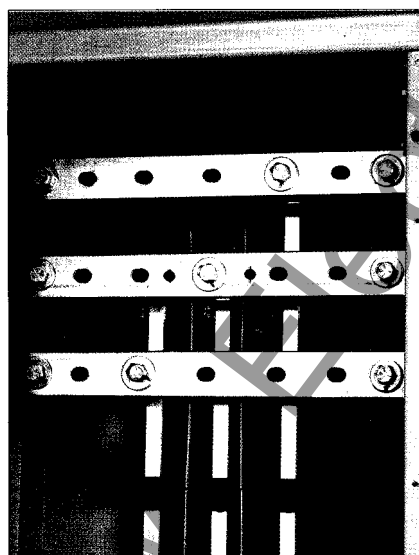
Siemens bus systems (figure 4) offer horizontal ratings of up to 2500 amperes and vertical bus in 300 or 600 ampere configurations. Tin plated



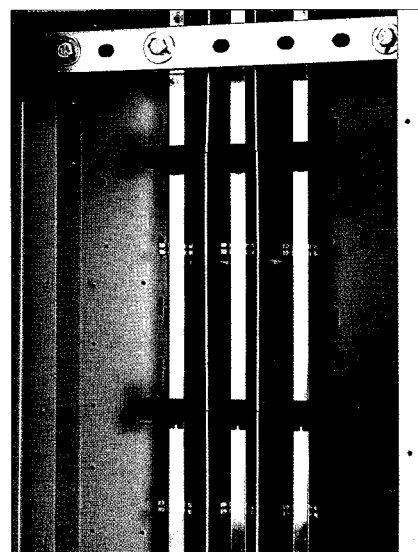
Standard MCC enclosure (figure 3).

aluminum is standard, with tin or silver plated copper available as an option. Bus ratings are based on UL standards with a maximum 50°C temperature rise over a 40°C ambient.

A tubular vertical bus system (figure 5) is utilized for its inherent mechanical strength and for increased heat dissipation, yielding lower operating temperatures and enhanced dependability. Non-tracking glass filled polyester insulators are used for bracing. Standard bracing provides 25,000 AIC, RMS symmetrical fault, withstandability with optional levels of 42kA, 65kA and 100kA available. Optional phase isolation barriers are also available.



Rear view of MCC showing horizontal and vertical bus (figure 4).



Rear of vertical bus with bracing and phase barriers shown (figure 5).

# MCC Pan

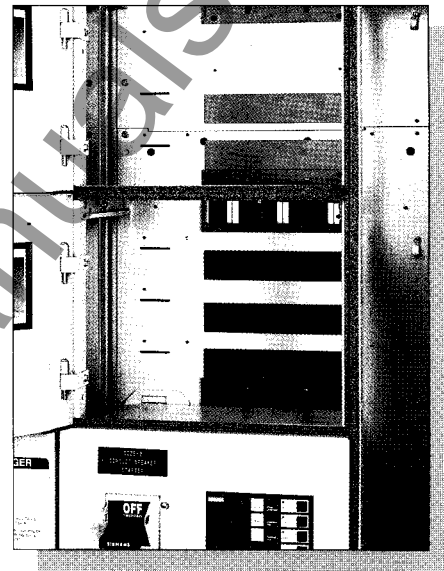
The MCC Pans stab onto the vertical bus through openings located in the vertical bus barrier (figure 6). There are no wires behind the pan unit. Stab fingers are bifurcated to allow four contact points per phase.

The stab openings which are located every 3" in the vertical bus barrier have snap-in inserts as standard for unused openings. An additional level of protection can be obtained with optional shutter mechanisms that automatically close the stab openings when the pan units are removed.

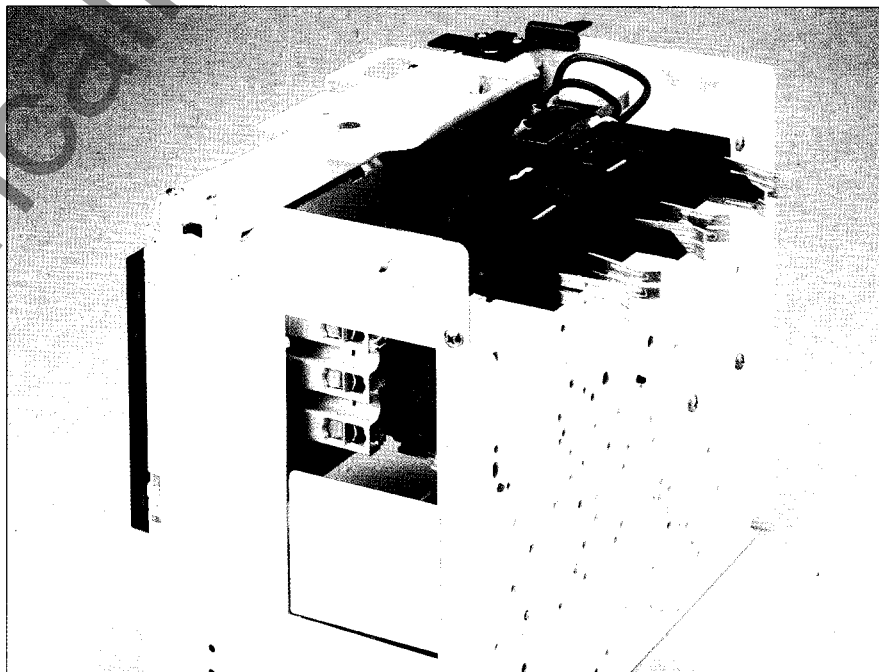
The pan assemblies are available in increments from 9" minimum to 48" maximum. Standard pan offerings are available for starters NEMA Size 1 through 4, and feeders through 225 amperes. An optional arrange-

ment is available that allows draw-out ease for Size 5 circuit breaker combination starters and 400A circuit breaker feeder units. Pans positively guide into the structure on a full depth rail via two guide tabs on each side of the pan. This method insures a positive path to the vertical bus.

The pan itself is painted white for visibility and has steel sides with a cutout on the right hand side available for easy routing of the motor leads directly to the overload relay. This opening can be easily expanded as necessary for larger size cable runs (figure 7).

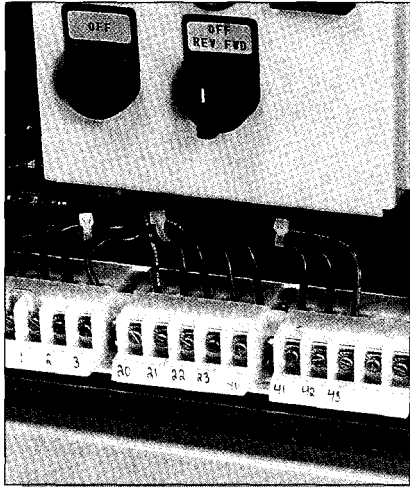


Front view of vertical bus barrier showing stab openings, snap-in inserts and shutter mechanism (figure 6).



Pan showing stabs and access opening for motor connections (figure 7).

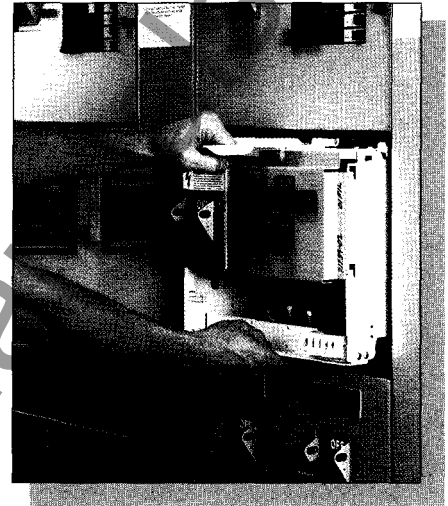




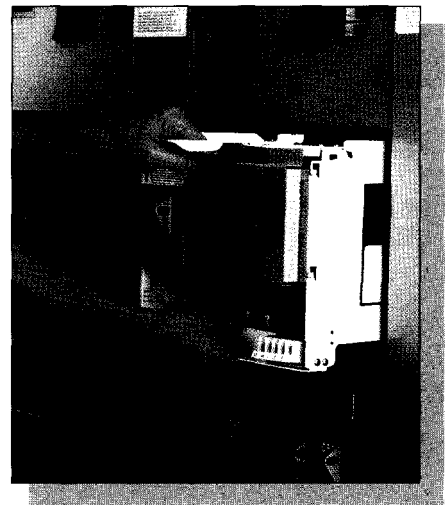
Front-mounted, pull-apart terminal blocks (figure 8).

Control terminal blocks are pull-apart as standard and mounted in the front, bottom of the pan for easy wiring, and access for maintenance (figure 8). Terminal blocks have captive screws to ensure positive contact of terminals at all times. Up to 20 control terminal points are available when motor leads are connected directly to the overload relay. Optional pull-apart T1, T2, T3 terminal blocks are available for starters through Size 2. Control terminal blocks are 600V, 25A, and power terminal blocks are 600V, 60A. These blocks will accept pressure, tongue or ring terminations.

A new mechanically advantaged racking mechanism (figures 9 and 10) has been developed to ease insertion and withdrawal of the pan from the structure. This positive guidance system ensures a positive grip of the stabs to the vertical bus and allows padlocking of the pan in a disengaged position with the stabs safely isolated from the vertical bus. Interlocking prevents withdrawing or insertion of the pan when the disconnect device is in the "ON" position. Door interlocks also prevent opening the door when the disconnect device is in the "ON" position. The operator clearly shows "ON", "OFF" and "Tripped" position.

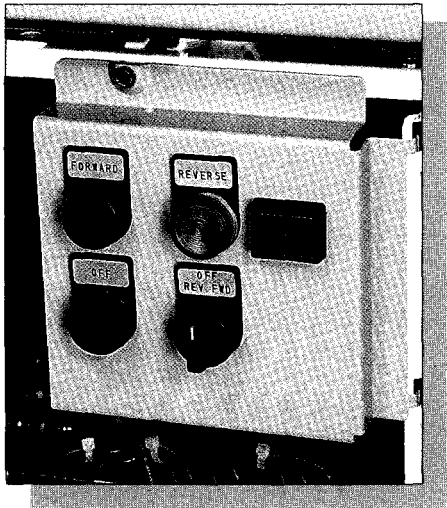


Positive guidance system (figure 9).



Positive guidance system with pan out of MCC (figure 10).

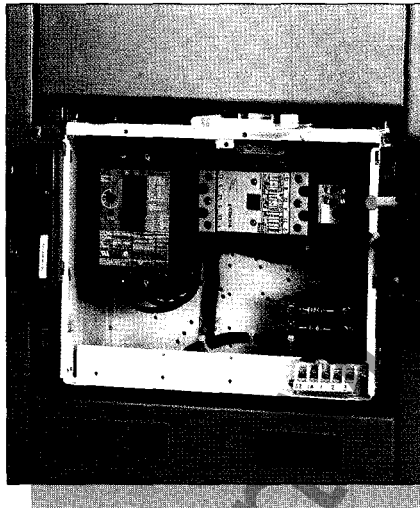
# New Breaker Technology



Device Panel (figure 11).

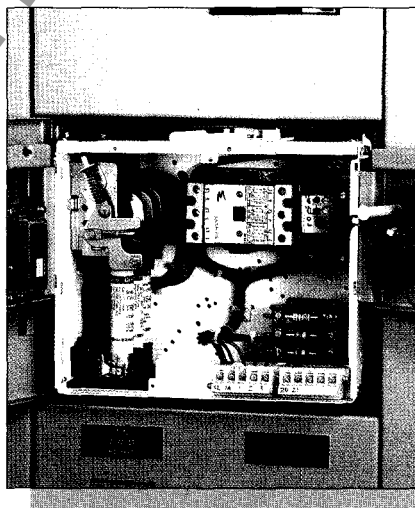
When local control is required, Model 90 MCCs are provided with a four-hole device panel (figure 11) for mounting of pilot lights, push-buttons and selector switches. Small elapsed time meters may also be conveniently mounted on this panel without increasing standard unit dimension.

The new Model 90 Motor Control Center pans were arranged with ease of maintenance in mind. The operator and device panels swing in opposite directions leaving all components readily accessible (figure 12). The control transformer is mounted in the open position with primary and secondary fuse blocks mounted on top for easy accessibility.



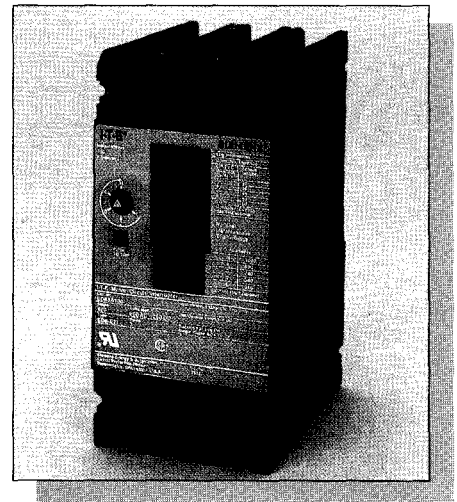
View of pan with operator mechanism and device panel open showing access to all components (figure 12).

When fusible combination units are required, the new Siemens disconnect is side mounted to offer easy viewing of the visible blades (figure 13). The area in front of the fuses is left clear so test probes can be safely used to verify fuse conditions and fuses can be easily replaced.



Fusible pan showing visible blade switch and fuse accessibility (figure 13).

Using ETI magnetic only circuit breakers (figure 14), Model 90 MCCs offer standard starter combination interrupting ratings which are substantially higher than those available from other manufacturers. For example: Size 1, 2, 3 and 4 combination starters can be UL labeled for 100,000A, RMS interrupting capacity without the addition of current limiters. Significant savings result from two advantages with this rating: (1) high cost current-limiters are not required for elevated fault level applications, and (2) MCC space requirements are not increased in order to accommodate special breakers.



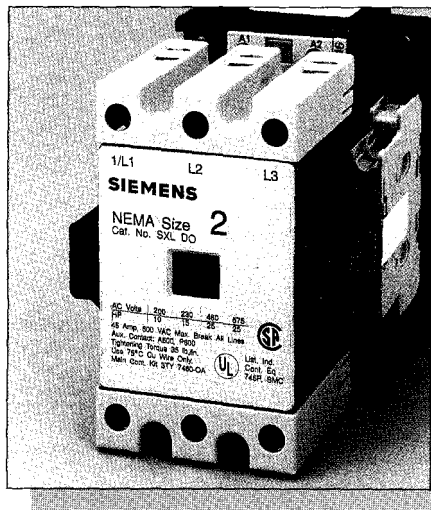
ETI Magnetic Only Breaker (figure 14).



# Contactors and Overload Relays

## 3TF/3TB Contactors and 3UA Overload Relays

- Long Life Expectancy
- Low Power Consumption
- Compact Design
- Low Contact Bounce



3TF Contactor (figure 15).

### Contactors

Each starter features Siemens long-life contactors (figure 15). Testing has shown extended mechanical life of over 10 million operations for sizes 1 through 5. Extremely long electrical life is also characteristic. Each contactor meets or exceeds the requirements of NEMA and UL.

Contacts are silver alloy faced and designed for minimal contact bounce, thus insuring extended electrical life expectancy. The contacts close with a positive wiping action that helps to ensure clean, low resistance mating of contact surfaces. This too, assures better conductivity and aids in lengthening

electrical life. The contactors have very low power consumption and utilize dual frequency coils for 50 cycle or 60 cycle operation.

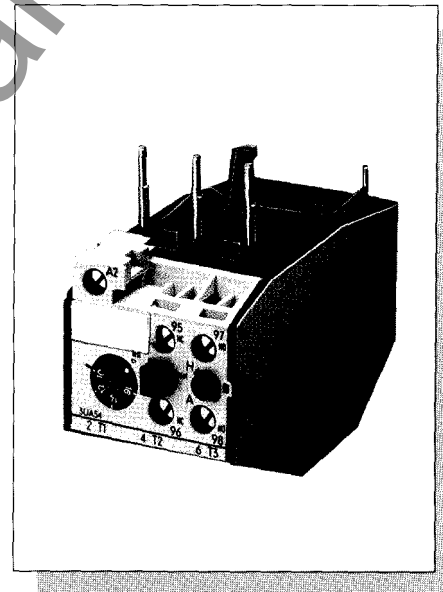
Auxiliary interlocks are available in combinations up to 4 N.O. and 2 N.C. for sizes 1, and 4 N.O. and 4 N.C. for sizes 2, 3, 4, 5 and 6.

The three phase thermal overload relay (figure 16) is a NEMA Class 10, directly heated, front adjustable, ambient temperature compensating, bimetallic device. The relay is supplied with one isolated, normally closed contact for opening the control circuit in case of thermal trip and one isolated, normally open contact for wiring to an alarm or other device.

The overload relay provides three phase Class 10 protection for both "T" and "U" frame motors; and, in addition to motor overload protection, the internal trip mechanism provides motor single phase protection and phase unbalance protection.

All overload relays are equipped with a choice of either hand or automatic resetting. The hand reset button extends through an opening in the compartment door. Other overload relay features offered as standard include: ambient temperature compensation, manual test button, and trip indicator.

Bimetallic relays with this feature provide effective protection for motors whose windings are particularly endangered by single-phasing conditions. This is possible because the duration of the single-phasing condition is shortened as a result of the shorter tripping time.



3UA Overload Relay (figure 16).

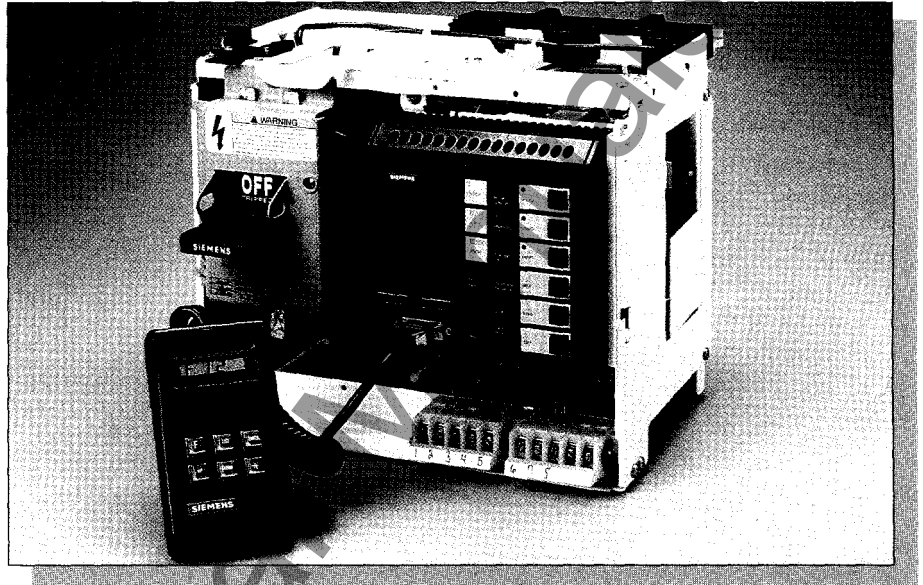
# SAMMS™ Technology

Siemens Advanced Motor Master System, "SAMMS", is a UL recognized microprocessor-based motor control and protection device designed specially for use in motor control centers. SAMMS is a reliable, flexible and practical protection system for all NEMA size low voltage motors.

The system is made up of a current transformer, controller and hand-held communicator (figure 17).

## **SAMMS offers motor protection features such as:**

- (+/-5% accuracy) overload protection.
- Choice of up to 22 overload protection curves.
- Phase loss/phase unbalance protection.
- Impending overload trip alarm.
- Lockout on thermal overload trip.
- Undercurrent/loss of load protection.
- Mechanical jam protection.
- Process current (load current) alarm.
- Flexibility to change the motor protection settings via the hand-held communicator.



*Model 90 MCC unit with SAMMS controller (figure 17).*

SAMMS offers programmable control logic. Its design is based on a standard hardware configuration that can be modified by programming the controller's microprocessor. Control devices such as timers, control relays, pushbuttons and selector switches which are located in the motor control center are replaced by software, and/or standard pushbuttons and lights on the control panel.

The SAMMS unit offers visual diagnostics. The front panel of the controller has eight diagnostic LEDs providing indication of:

- Current Phase Unbalance
- Impending Overload Trip
- Overload Trip
- External Trip
- Incomplete Sequence
- Ground Fault (optional)
- CPU Fault
- Ready (control power)

Statistical motor data including elapsed motor running time, number of starts, and number of overload trips, is stored in the microprocessor's memory and displayed using the hand-held communicator.

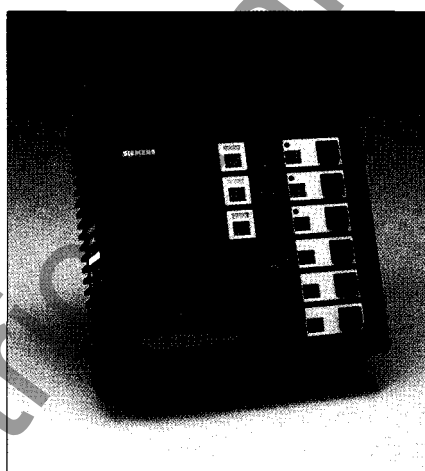
The hand-held communicator can also be used as an ammeter to display motor current.

#### Options Available Are:

- Ground Fault Protection
- Loss of Voltage Interrupt  
Ridethrough (Up to 1 second)
- Overload Alarm Contact
- IBM compatible software package to allow development of customized control circuit logic diagrams.
- Open protocol communications to a host computer or the power monitor panel using the ACCESS™ local area network. This allows for control and monitoring of motors from a centralized point. All the information available from SAMMS, such as diagnostics, statistical data, real time metering and controller status can be communicated.

SAMMS is available in three models to meet the various demands of industrial and commercial applications.

- **SAMMS 3** is designed for critical process control where downtime translates into tremendous losses in production time and process material. Plant engineering and operating personnel will have access to important data enabling them to optimize motor and driven equipment capabilities and maximize the process system output.



SAMMS Control Module (figure 18).

- **SAMMS 2** offers motor diagnostics for preventative maintenance programs to avoid costly downtime while also lengthening motor and driven equipment life. With SAMMS, maintenance engineers will now have data such as total number of starts and trips, trip current and elapsed motor running time to establish effective motor control, performance and service records.

- **SAMMS 1** is the answer to situations where quick turnaround time and installation is extremely important. Last minute adjustment of motor parameters is no problem and will not impact MCC delivery or installation.



SAMMS hand-held communicator (figure 19).

# Siemens Model 90 Ratings and Dimensions

## Dimensions

Overall Height .....	90"
With optional sill channels .....	91-1/2"
Width .....	20", 30"
Depth: Front Mounted Only	
Standard .....	16-1/4"
Optional .....	20"
Back-to-Back Mounted .....	20"
Vertical Wireway Height .....	72"
Width .....	5"
Depth .....	8"
Cross Section .....	40 square"
Top Horizontal Wireway	
Front Mounted Only and Front of	
Back-to-Back Mounted	
Height .....	9"
Depth .....	8"
Bottom Horizontal Wireway	
Front Mounted Only and Front of	
Back-to-Back Mounted	
Height: Standard .....	9"
Depth .....	16-1/4", 20"
Rear of Back-to-Back Mounted	
Height .....	9"
Depth .....	20"

## Material

Frame .....	12 ga.
Formed Galvanized Steel	
Side, Back & Roof Sheets .....	16 ga.
Unit Wrapper & Doors .....	14 or 16 ga.
Steel Sheet	
Finish(Ext.) .....	ASA 61 Light Gray
Electrostatically applied dry powder	
paint is standard.	

## Horizontal Bus

Ampere Ratings	
Standard: 600 amperes,	
tin-plated aluminum	
Optional: 600 amperes, copper	
800 amperes, aluminum	
or copper	
1000 amperes, aluminum	
or copper	
1200 amperes, aluminum	
or copper	
1600 amperes, aluminum	
or copper	
2000 amperes, copper	
2500 amperes, copper	

## Vertical Bus

Ampere Ratings	
Standard: 300 amperes,	
tin-plated aluminum	
Optional: 300 amperes, copper	
600 amperes, copper	

## Neutral Bus (Top Mounted)

Optional: Full neutral aluminum or	
copper	
Optional: Neutral landing pad	
Ratings: 600 to 1600 amperes	

## Plating

All power bus, both copper and aluminum, is tin-plated as standard. Silver plating is also available, by request, for copper bus only.

## Bus Bracing

Standard: 25,000 amperes	
symmetrical	
Optional: 42,000, 65,000 and	
100,000 amperes*	
symmetrical	

\*Requires 600 ampere vertical bus.

## Incoming Line Terminations:

Incoming line arrangements are available in many configurations from 600A to 2500A.

## Barriers

Standard:	
Isolation Barrier: Grounded sheet	
steel with stab openings.	
Optional: Inserts to cover unused	
openings in V-bus	
barrier.	
Optional: Phase isolation barriers.	
Automatic shutter	
mechanism.	

## Ground Bus (Bottom Mounted)\*\*

Standard: 1/4" X 1" tin-plated	
aluminum	
Optional ground bus available up	
to 1200 amperes.	
Vertical ground bus available as	
option, rating 300	
amperes.	

\*\*Ground bus required for UL labeling.

## Drawout Units

Dimensions:	
Widths.....	14"
Depth.....	8-1/2"
Height.....	9" to 48" in 3"
increments	
Stab Ratings:	
30 amperes	
45 amperes	
100 amperes	
150 amperes	
225 amperes	

The following table gives average weights per vertical section for indoor MCC structures fully equipped with combination starters:

Structure Size/Type	Shipping Weight Per Section
90"H x 20"W x 16"D (front only)	550 lbs.
90"H x 20"W x 20"D (front only)	600 lbs.
90"H x 20"W x 20"D (back-to-back)	850 lbs.
90"H x 30"W x 20"D (front only)	800 lbs.

# Siemens Commitment To Customer Service

## Quality and Reliability

All motor control equipment feature our quality components — Siemens contactors, the 3UA overload relay, I-T-E<sup>®</sup> molded case circuit breakers, plus a full complement of Siemens relays, timers, terminal blocks, and other control products.

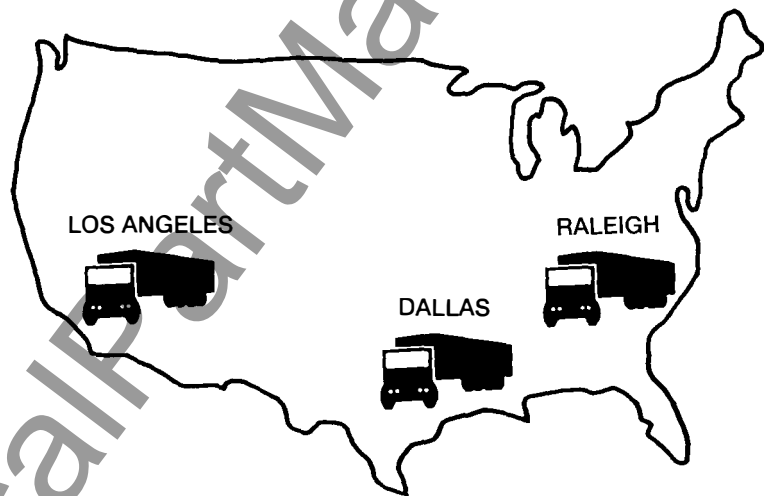
## Service and Response-Ability

When you need engineered products fast — when you need emergency protection against scheduling delays, idle labor costs, and high interest rates — you can count on the Siemens Model 90 Motor Control Center. Through sophisticated order entry and computerized bills of materials, your order is handled quickly and efficiently.

## Features and Flexibility

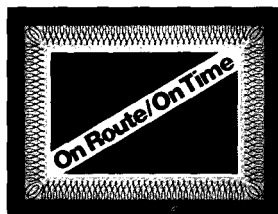
All Model 90 Motor Control Centers offer high reliability and long service life, compact design and lighter weights. We also provide a wide variety of grouped assemblies, and designs for easy conversions and rearrangements.

## Regional Fast Shipment . . . From Dallas, Los Angeles and Raleigh



## On Route/On Time<sup>™</sup>

The fast shipment program is a total service package and is the most comprehensive in engineered products history.



# ACCESS™. The electrical distribution communication system that tells you what, when, where, how much and why.

Now there's an effective way to centrally monitor and control your entire electrical distribution system. Engineers, accountants, executives and technicians can gain a wealth of information – for troubleshooting, preventive maintenance, cost allocation and facilities planning. And most of all, for saving substantial sums of money.

ACCESS is the intelligence of your electrical distribution system. It delivers the information you've never had. And the control you've always wanted.

ACCESS adds a new dimension to managing energy-intensive facilities. It begins with the technology to collect and communicate vital data from "smart" trip

units, meters, and protective relays throughout the facility to a central host computer. Here device data is transformed into a new kind of power: the intelligence you need to assure reliable, safe and cost-effective performance of your power system.

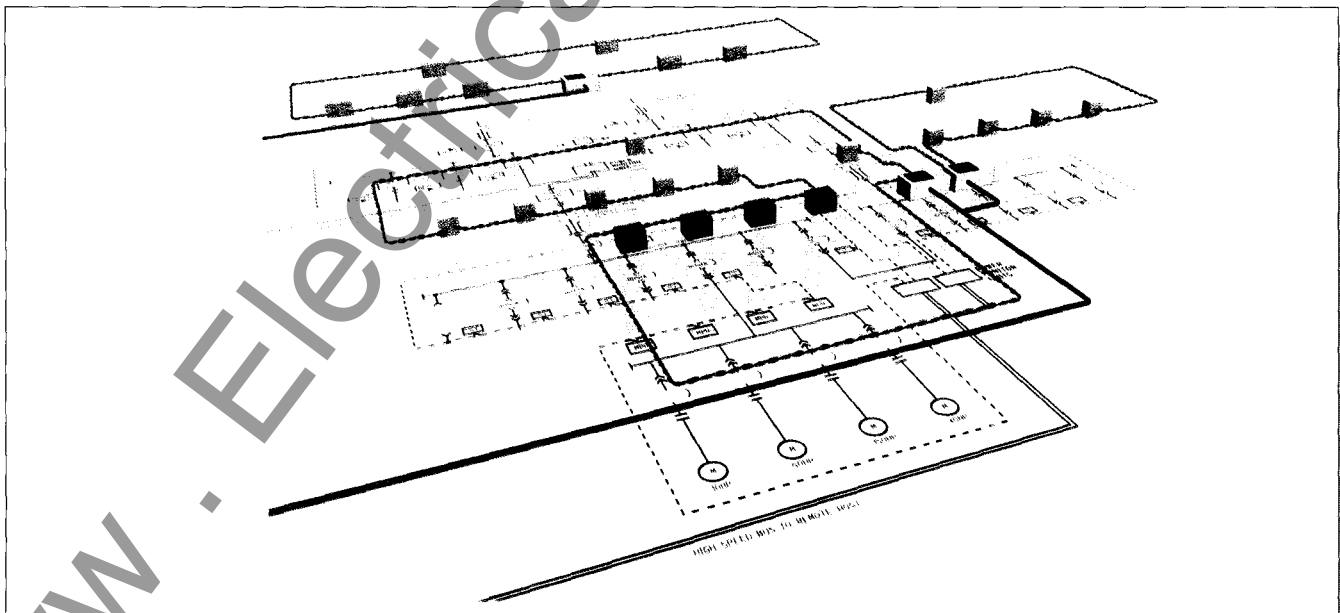
With ACCESS, managers and engineers will be able to identify and correct potential problems before they cause damage, waste, injuries or downtime. You will have the ability to feel the pulse of your electrical power system: what's happening to load levels. Where your power is consumed. What's causing peaks. Where, when and why a circuit breaker tripped. Where load conditions are on the verge of exceeding normal operating limits. How to

prevent problems from recurring.

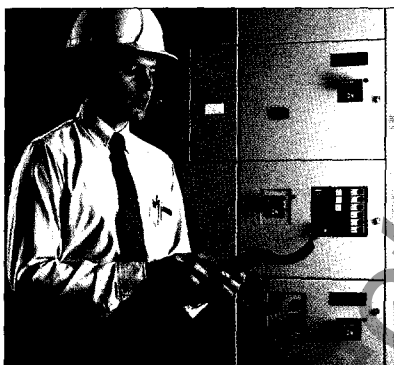
Moreover, ACCESS can make sense of energy data by putting it into readily understandable forms, including graphic presentation. So you have the ability to plan ahead, to isolate the true energy costs of a product or process, and to identify many cost-saving opportunities.

ACCESS plugs decision-makers into the electrical distribution system. For the first time, energy has a boss. You.

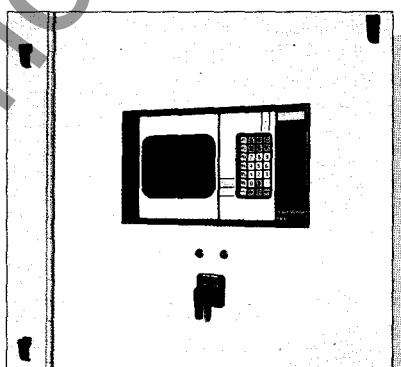
For more information on the ACCESS Communications System, contact your local Siemens sales office.



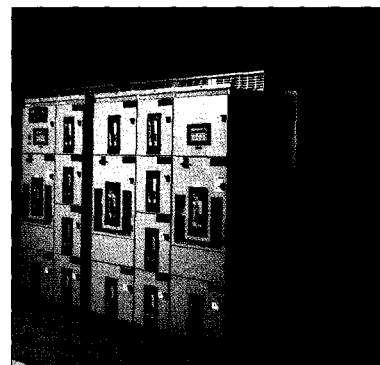




Siemens motor control centers can be supplied with SAMMS™ software-configurable motor control and protection relays.



The Siemens medium voltage 2-high switchgear shown here includes a Power Monitor™ display and monitoring unit which signals "early warning" alarms to changing load conditions.



This Siemens Type R low voltage switchgear uses 4700 power meters to communicate highly accurate real-time and historical data.



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(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) 891-8717  
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) 257-1040  
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) 824-7421

### 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

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