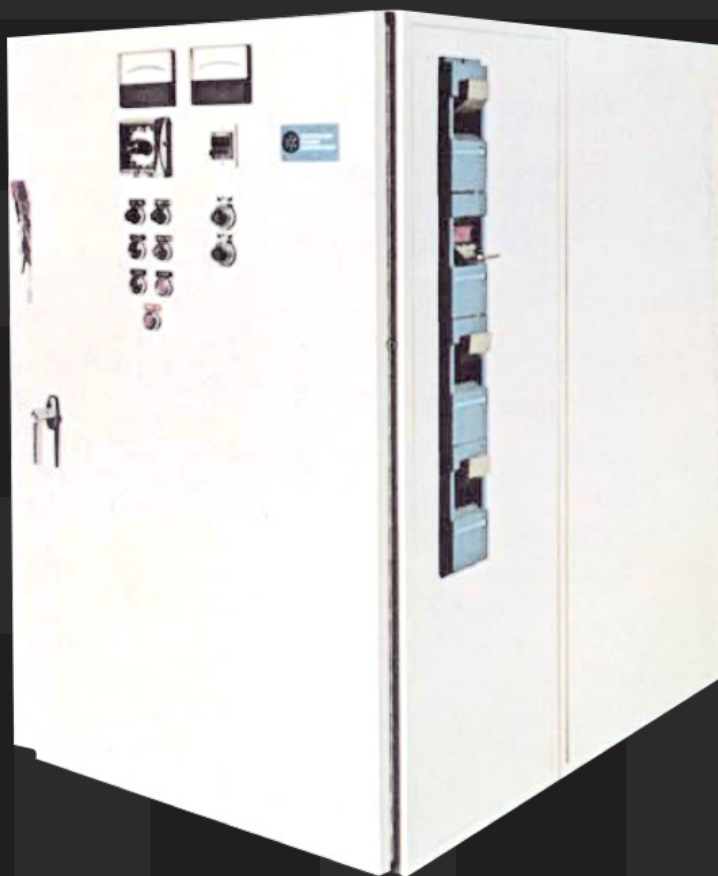




Sealed and Water Cooled  
Reliable, Expandable, Solid State



DC Power Supply  
6 to 600 Volts 25 to 250,000 Amperes

## APPLICATIONS:

### RECTIFICATION FOR:

- Plating
- Electrocoating
- Anodizing
- Electro Machining
- And Many Other Industrial Applications

## BENEFITS

- Modular “Unlimited” Expandability
- Minimum Investment
- Water Cooled and Sealed Against Corrosion
- Completely Automatic
- All Solid State
- Modular Reliability
- Modular Flexibility
- Modular Versatility
- Modular Serviceability

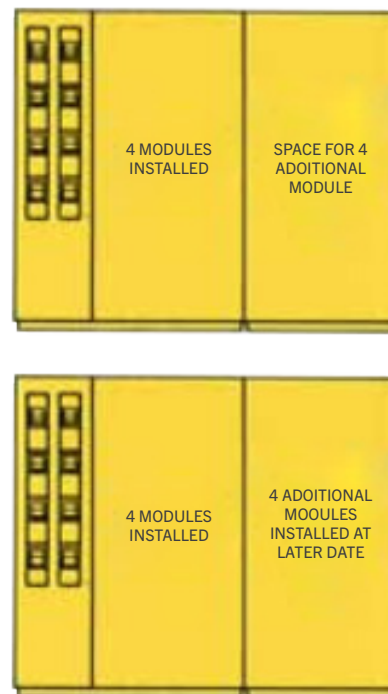
## MODULAR EXPANDABILITY “Unlimited”

### EXPANDABILITY WITHIN A SINGLE CUBICLE with Additional Power Modules

SealedTrystar systems can be purchased for present output requirements and with the capability of expanding to a predictable level in the same cubicle. See back page for various cubicle sizes.

Example:

Single cubicle can be purchased with one to eight power sections installed. If it is purchased, for example, with four power sections, up to four additional power sections can be added at a later date. If the system illustrated above is a 12 Volt system, it would have a rating of 6,000 Amperes at 12 Volts expandable in the same cubicle to 12,000 Amperes.



## EXPANDABILITY UNLIMITED with Additional Rectifier Modules

Additional cubicles with a wide range of power levels can be added at a later date to attain virtually any power level.

If the “Basic Unit” illustrated above is a 12 Volt system, it would have a capability of 6,000 Amperes at 12 Volts. When additional power is required, Expandable Unit #1 can be added to deliver a total of 12,000 Amperes. If even more power is required, Expandable Unit #2 can be added to deliver 12,000 additional amperes for a total of 24,000 Amperes. Power can be added in virtually any increment at any time. Each cubicle has its own regulator and control system for trouble free operation and complete redundancy.



Basic Unit



Expandable Unit1



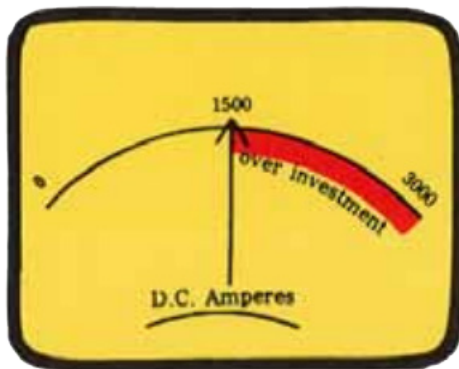
Expandable Unit 2

## BENEFITS OF MODULAR EXPANDABILITY

NOTE: Power modules are non-draw out type; i.e. modules are mounted and bolted into a rack assembly versus a draw-out drawer.

### 1. Minimal Investment Through Expandability:

Changing processes, varying current densities and other factors affect power output requirements. Trystar systems permit deferring investment in output power until production requirements demand it. The additional power can be added either in small increments within a cubicle or by adding additional cubicles. Initial investment can be reduced by 50% or more.



### 2. Standby Power and Spare Module Stocking:

A “spare” module can be installed in one of the expansion spaces as “insurance” against loss of any power module in the system. The “spare” becomes operative merely by closing its individual circuit breaker.

### 3. Service Simplified:

A red “Module Off” flag indicates a defect in a given power section. The module can be removed and replaced within 30 minutes.

**4. Transformer Replacement:**

In conventional rectifiers the power transformer requires two to three weeks to repair. Controlled Power Company's modular transformer can be replaced within minutes and are most likely a stock item.

**5. Improved Efficiency:**

The modular system allows you to improve efficiency when operating at reduced loads. By opening the breakers of some modules you force the remaining operating modules to operate at a full load. This will improve your efficiency.

## MODULAR SEALED WATER COOLING

**WATER COOLED AND SEALED**

Controlled Power's exclusive modular water cooling incorporates many of the advantages of power modularity with the capability of operating as a completely sealed unit. Controlled Power's Sealed Water Cooled Power Supplies have the following advantages:

- Sealed "RxPO" Modular Power seals out industrial lint, dust and corrosive atmosphere.
- Water is never in physical contact with high voltage.
- All liquid components are made of copper.

**ADVANTAGES OF WATER COOLING:**

- Eliminates equipment maintenance problems caused by dust, lint and corrosive atmosphere.
- Extends life of components and reduces down time.
- Eliminates need for air make up for D.C. power units. (No air is exhausted into the plant.)
- Minimizes installation costs by locating unit close to the area of the load.

**INSTALLATION ADVANTAGES:****LOCATE NEAR PROCESS TANK:**

Because the sealed "RxPO" units are sealed against corrosion, they may be located close to the process tank without the fear of corrosion hindering operations. Bus bar normally costs \$18 to \$24 per foot per 1,000 Amperes for a one way run of bus bar (installed) i.e. A 10,000 Ampere unit with a 20 foot distance between the rectifier and the load will cost approximately 20 feet x 10 (Amperes) x 18 (cost) = \$3600 one way or \$7200 for a two way run(+ and -). Locating the power supply close to the load therefore offers a significant savings in installation.

**WATER REQUIREMENTS**

Water temperatures up to 85° F can be utilized. Sources of water can be pre-rinse water, cooling tower water, well water or city water.

A built in water modulating means is utilized to control the water flow and maintain an ideal interior temperature while conserving water.

## MAIN CIRCUIT BREAKER DISCONNECT

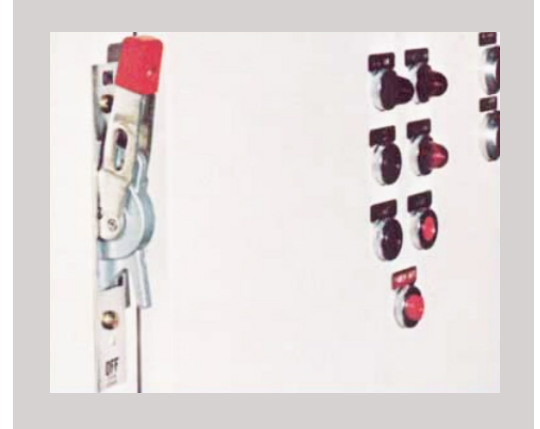
A circuit breaker disconnect is standard at no extra cost. A side operated or front operated (on smaller units) circuit breaker disconnect allows a complete disconnect of incoming power to meet safety requirements. A solid state switch is used for normal on-off operation. No physical movement or contact wear will take place, "soft-starting" eliminates large inrush currents. In addition to the solid state switch an electro magnetic three pole contactor can be provided as an option to control the main power.

## CONTROL FUNCTIONS

**These Controls are Standard.**

### Automatic Voltage Control with Current Limit

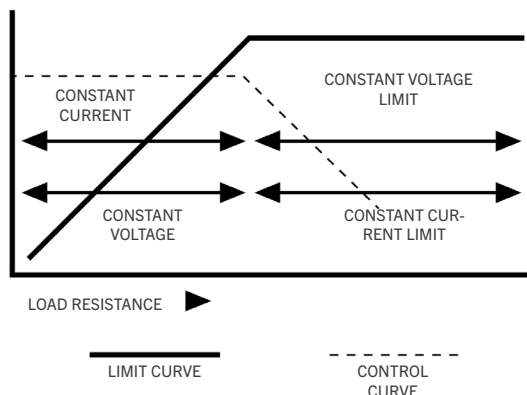
The function of this control is to maintain the preset voltage constant as the load varies. The preset current limit will limit the output to a safe level if an excessive load is placed on the power supply. To guarantee high quality, each control is tested under power in heated and cooled cyclic atmosphere for two 7 day, 24 hour weeks.



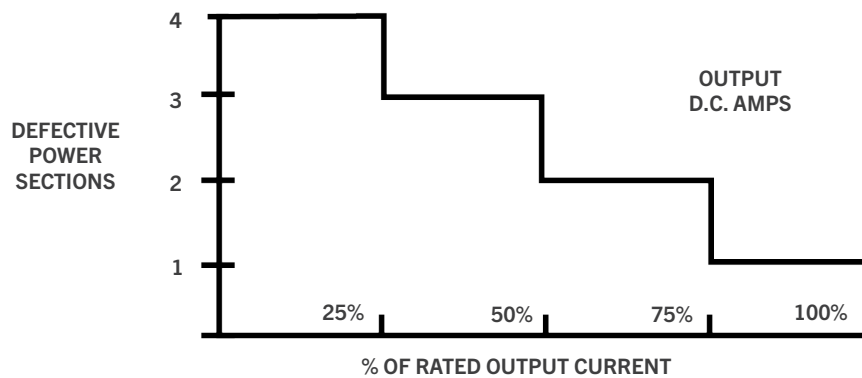
## Modular FLEXIBILITY

**These Controls are Optional (partial listing)**

- Remote Operators Control
- Timed Automatic Cycle
- Automatic Average Current Density (TVC)
- Automatic Current Interruption
- Automatic Digital Ampere Hour Meter Shut Off and Alarm
- Clear Anodizing Program
- Color Anodizing Program
- Data Trak Programmer
- Command Multiple Level Control
- Automatic Ramp
- Conveyor Stop Low Voltage



### AUTOMATIC DE-RATING



#### Automatic De-Rating

When a power section is defective, the output current is automatically de-rated so that the remaining power sections never assume a greater load than their design capability. This feature prevents overloading of the remaining power sections so that production can continue. A red “Module Off” flag indicates which section is defective. The illustration is for a four module system. The greater the number of installed modules the smaller the increment of de-rating if a failure occurs.



## Modular RELIABILITY and SERVICEABILITY

### OUTSTANDING SYSTEM RELIABILITY

Production interruptions can now be minimized, since each power module in the system is protected by its own circuit breaker to isolate any problem from the rest of the system. This allows continuous operation with minimum power loss. In multiple rectifier module systems, redundancy and duplication also exist in the regulator and control system.

### CIRCUIT BREAKER PROTECTION

Each power section is protected by a magnetic trip circuit breaker. In the event of a diode or transformer failure, the circuit breaker will automatically disconnect the defective power section. A highly visible “Module Off” flag will indicate to maintenance personnel which section is defective. The

remaining power sections continue to operate without being overloaded.

### AUTOMATIC DE-RATING

When a module circuit breaker trips, the output of the power supply will automatically de-rate itself so that the remaining power sections do not exceed their design load limits. This will prevent “cascade failure” from interrupting production.

### MULTIPLE RECTIFIER MODULE SYSTEMS:

In systems that have multiple rectifier modules to achieve the desired output power, complete redundancy is present in the control system, regulator, and power section; i.e. a failure of any component in the rectifier module will only disable that module. The remaining rectifier modules will continue to operate.

### SUPERIOR COMPONENT RELIABILITY

Component reliability is assured by rigorous mechanical, electrical and environmental quality control. Human error is minimized by the “production line” approach made possible with modular design. Power sections are identical for a given rating, assuring thoroughly field-tested systems.

### QUALITY MATERIALS

The highest quality materials are used throughout. From the plug in circuit cards to the Class H transformer in each power section. There is no compromise with quality in any component of the Trystar system.

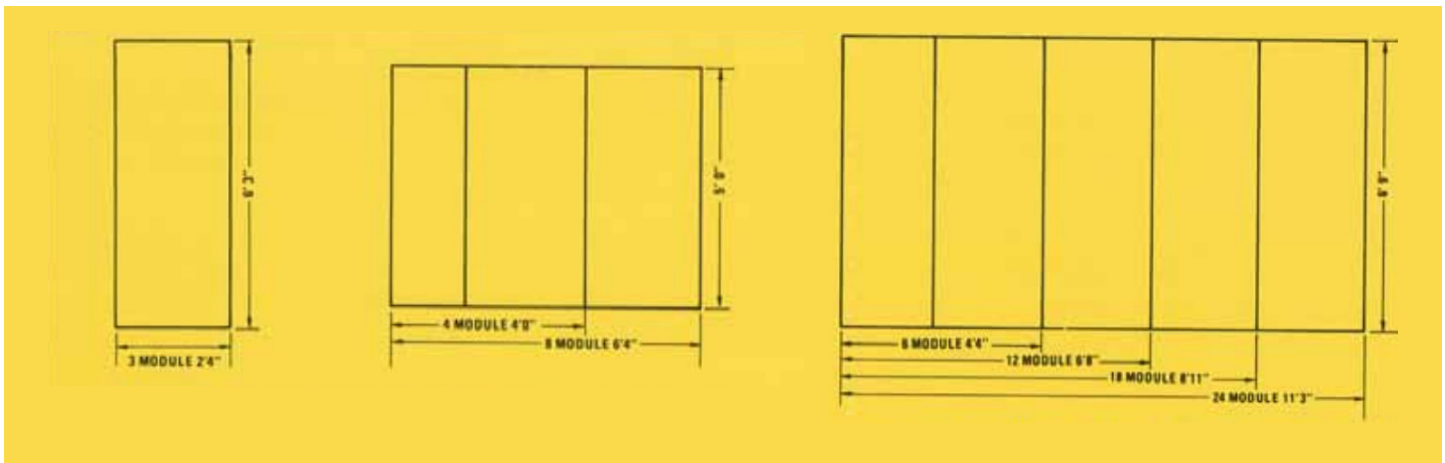
### MODULAR SUB-SYSTEMS

All major sub-systems are in modular form i.e. transformers, regulators, automatic controls.

## Modular VERSATILITY

**NOTE:** All units are 3' 3" wide.

**NOTE:** Outline dimensions do not include output bus.



## “INFINITE” POWER COMBINATIONS

“Building block” design provides a wide range of power combinations. Voltage levels from 6 to 600 volts are available. Power levels from 12 to 600 kilowatts in a single system are standard. Additional “rectifier modules” can be added for virtually any power level.

## Modular AIR COOLING

Air cooled power (with “non-draw out” type power modules) deliver most of the expandability, reliability and serviceability features that the “Sealed” units deliver.

Critical components such as relays, circuit breakers, and controls are in a NEMA 12 enclosure. Hermetically sealed semi-conductors are utilized whenever they are exposed to ambient conditions. The transformer is coated and protected. Cabinet sizes and configuration are the same as the “Sealed-Trystar Modular” units except that the side panels have grills. The air flow is horizontal.



## Reliable, Expandable, Solid State DC Power Supply

1.5 to 600 Volts 25 to 250,000 Amperes

### POWER SUPPLIES WITH VERSATILITY AND QUALITY

### WITH THE EXCLUSIVE MODULAR POWERBANK

#### Rectification for:

- Plating
- Anodizing
- Electro-Machining
- Electro-Refining
- Electro-Coating
- Battery Charging
- and many other Industrial Applications





## BENEFITS

- Modular Expandability
- "Fail-Safe" Reliability
- Minimum Investment
- All Solid State
- Air Cooled
- Completely Automatic
- Highest Quality
- Simplified Installation
- Simplified Maintenance
- All Copper Conductors

## Modular EXPANDABILITY

### MINIMAL INVESTMENT THROUGH EXPANDABILITY

RxPO systems can be purchased for present output requirements, with built-in expansion capability to meet future needs, merely by adding more standard power modules.

### EXAMPLE OF EXPANDABILITY

System Capability 5000 Amps.-12V. Power Module Capability 1250 Amps.-12V. Illustration shows system originally purchased for 2500 Amp. operation (2 power modules to which 2 additional standard modules can be added later to bring output to 5000 Amps.

### BENEFITS OF MODULAR EXPANDABILITY.

#### 1. Additional Power Later

Additional power can be quickly added at a later date.

#### 2. Standby Power and Spare Module Stocking

A "spare" module can be installed in one of the expansion spaces as "insurance" against loss of any module in the system. The "spare" becomes operative merely by closing its individual circuit breaker.

#### 3. Service Simplified

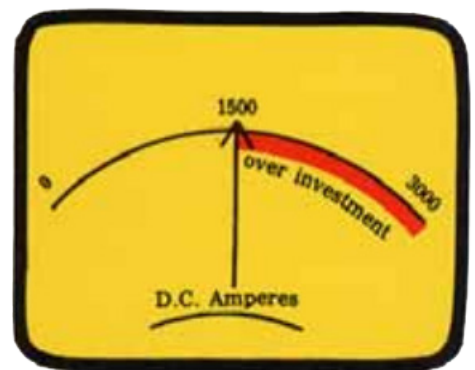
Installation or removal of power modules is easily accomplished by non-technical personnel with simple hand tools.

#### 4. Transformer Replacement:

In conventional rectifiers the power transformer requires two to three weeks to repair. Controlled Power Company's modular transformer can be replaced within minutes and are most likely a stock item.

#### 5. Improved Efficiency:

The modular system allows you to improve efficiency when operating at reduced loads. By opening the breakers of some modules you force the remaining operating modules to operate at a full load. This will improve your efficiency.



## QUALITY MATERIALS & WORKMANSHIP

The highest quality materials and workmanship are used throughout. From the custom-extruded heat sink (pictured) to the Class H transformer in each module with computer industry oriented workmanship.

## Modular FLEXIBILITY

### COOLING FLEXIBILITY

**Efficient Forced Air Cooling** - With the modular “flowthrough” cooling system, 60 percent less air volume is required than with existing “brute force” systems. This gives quiet operation and eliminates the characteristic “vacuum cleaner” effect on the plant floor.

### MAIN CIRCUIT BREAKER DISCONNECT

A circuit breaker disconnect is standard at no extra cost. A side operated or front operated (on smaller units) circuit breaker disconnect allows a complete disconnect of incoming power to meet safety requirements.

A solid state switch is used for normal on-off operation. No physical movement or contact wear will take place, “softstarting” eliminates large inrush currents.

In addition to the solid state switch an electro magnetic three pole contactor can be provided as an option to control the main power.

Compact Size-RxPO modular systems require as little as half the floor space of conventional power supplies of comparable ratings.

Simplified service access further reduces plant floorspace requirement.

### CONTROL FUNCTIONS

**These Controls are Standard.**

#### Automatic Voltage Control with Current Limit

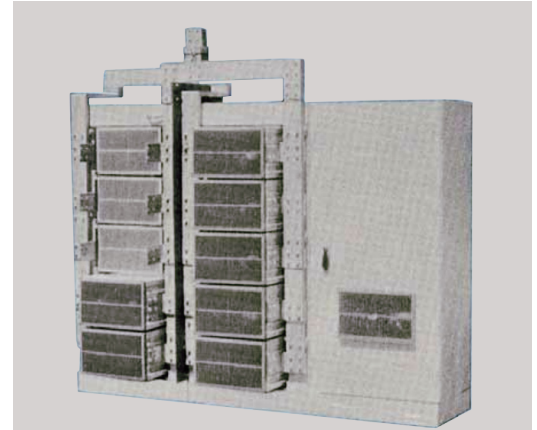
The function of this control is to maintain the preset voltage constant as the load varies. The preset current limit will limit the output to a safe level if an excessive load is placed on the power supply. To guarantee high quality, each control is tested under power in heated and cooled cyclic atmosphere for two 7 day, 24 hour weeks.

#### Automatic Constant Current Control with Voltage Limit

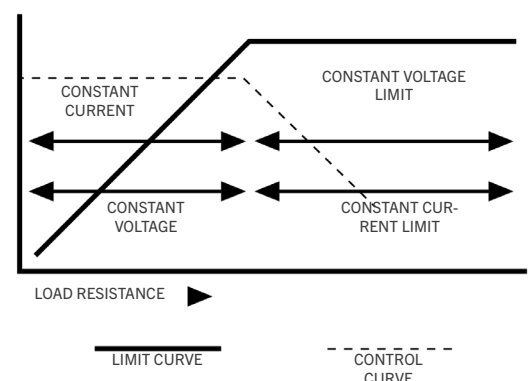
The function of this control is to maintain the output preset current constant under varying load conditions. If the load is reduced, the voltage will rise to preset safe limit value and remain constant with the current being reduced until this condition is corrected. This should prevent burning of the load.

**These Controls are Optional (partial listing)**

- Remote Operators Control
- Timed Automatic Cycle
- Automatic Average Current Density (TVC)
- Automatic Current Interruption



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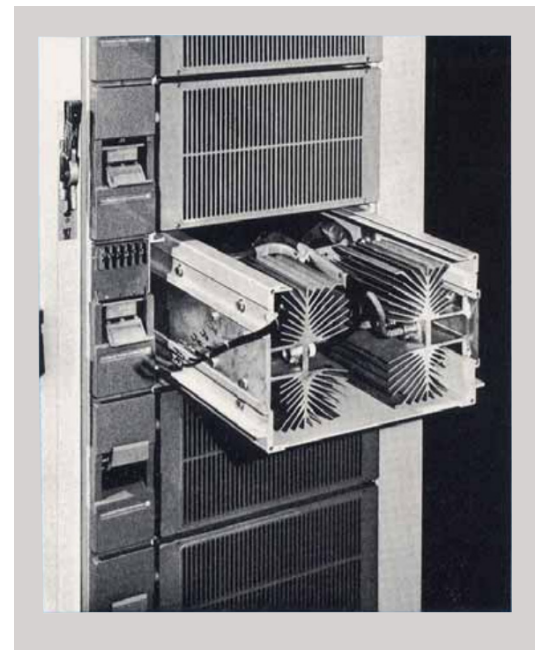
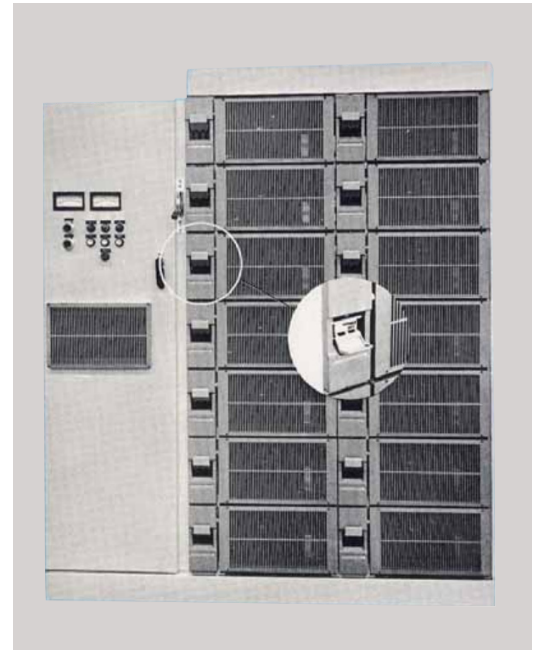
## Modular RELIABILITY

- Automatic Digital Ampere Hour Meter Shut Off
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- Clear Anodizing Program
- Color Anodizing Program
- Data Trak Programmer
- Command Multiple Level Control
- Automatic Ramp
- Conveyor Stop Low Voltage

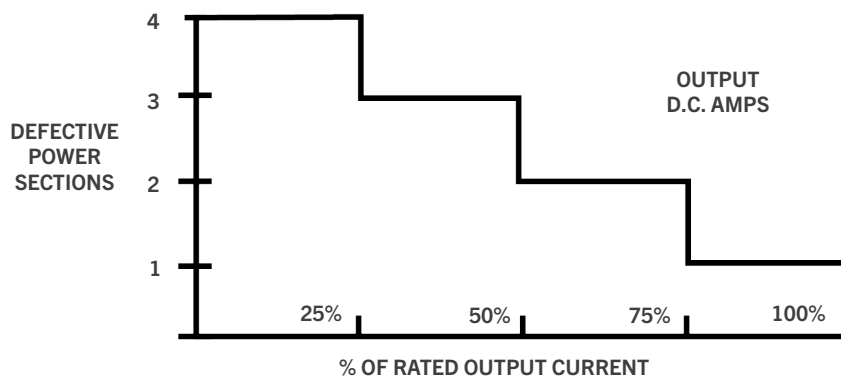
### OUTSTANDING SYSTEM RELIABILITY

Production interruptions can now be minimized, since each module in the system is protected by a circuit breaker to isolate any problem from the rest of the system, which continues to operate as usual!

The circuit breaker handle forms an automatic safety shield, which prevents access to a “hot” module. An optional auxiliary contact can alert the operator at the control center if a breaker trips, and the safety lock provides a highly visible “flag” at the power module.



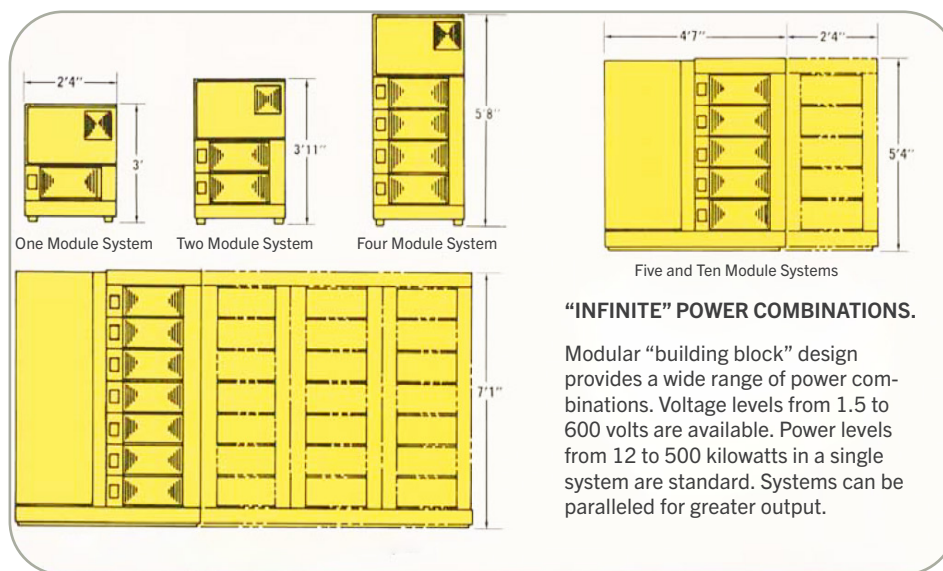
### AUTOMATIC DE-RATING



#### Automatic De-Rating

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## Modular VERSATILITY



## Modular AIR COOLING

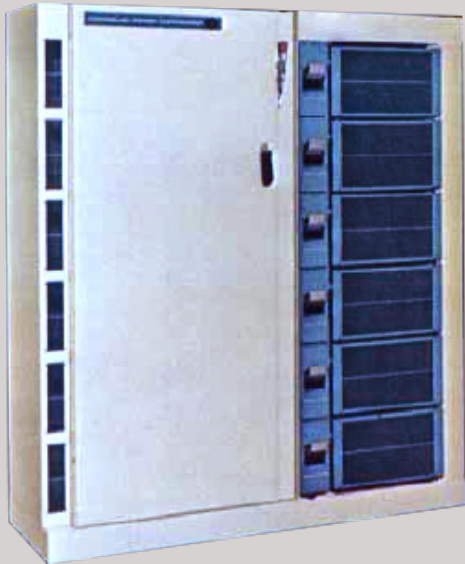
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Critical components such as relays, circuit breakers, and controls are in a NEMA 12 enclosure. Hermetically sealed semi-conductors are utilized whenever they are exposed to ambient conditions. The transformer is coated and protected. Cabinet sizes and configuration are the same as the “Sealed-Trystar Modular” units except that the side panels have grills. The air flow is horizontal.



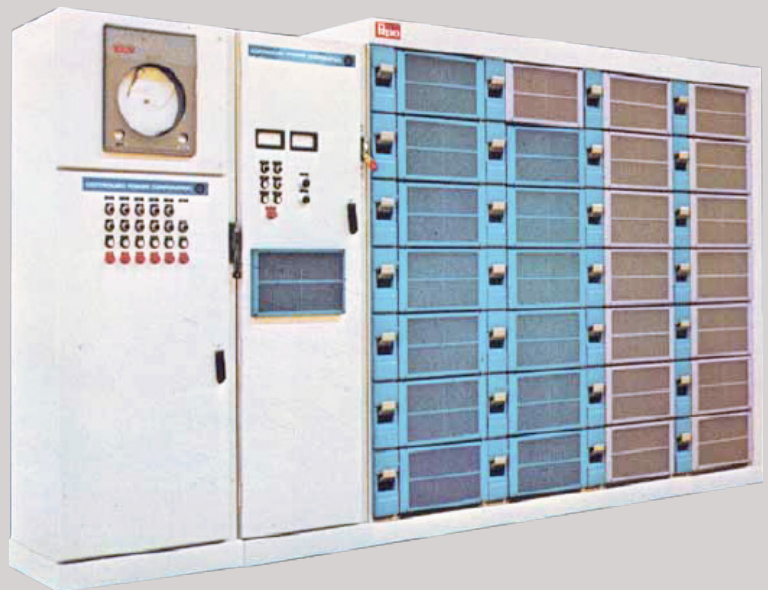


## Modular **VERSATILITY** INDIVIDUALLY REGULATED MULTIPLE POWER SUPPLIES



Left and Above-individual power modules in this system are separately controlled to power a multiple-cell chromeplating process. A remote operator's console assures precise individual control monitoring and adjustment.

Expandable from 900 Amps. to over 2,000 Amps. this, 500 KVA system for electrocoating also incorporates complete process control instrumentation in an integral cabinet.







TRYSTAR<sup>®</sup>