SYLVANIA

LIGHTING PRODUCTS DIVISION

. . . PLANTS . . . PRODUCTS . . . CAPABILITIES

By its Accomplishments

SYLVANIA

Has earned the reputation of being the

DYNAMIC INNOVATOR

of the Lighting Products field

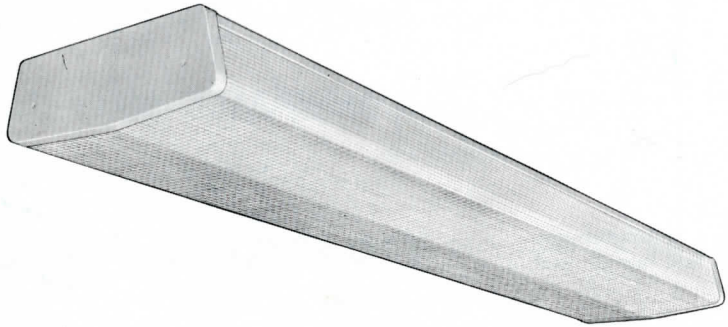
The name "SYLVANIA" is identified with breakthrough after breakthrough in technological advances in the art of lighting.

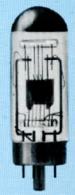
In the Lighting Products Division there is a lively spirit of competition which is encouraged by management. There is a deep-seated desire to be best. There is a climate that stimulates the creative urge.

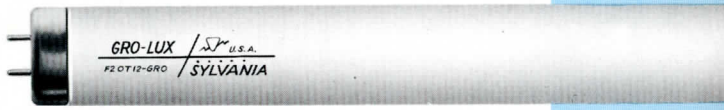
Sylvania has proved again and again that it is not afraid to be first with the new . . . nor to travel alone in new directions.

On this page are indicated examples of just a few of the technical and marketing innovations introduced by Sylvania that have added new dimensions to lighting in various broad areas of applications.

This record speaks for itself.







SYLVANIA FIRSTS

FLUORESCENT
- Triple-life Cathode
- Very High Output Lamps in Tubular Jackets
- Reflector Lamps with Aperture in Coating for High Brightness
- 75 Lumen Per Watt Lamps
- Natural Color Lamps
- Internally Welded Base Pins

INCANDESCENT
- Inside-Coated Reflector Lamps
- Protected Fuse in Base for Safety
- Four-prong Base Projection Lamps (Tru-focus)
- Four-prong Base Reflector Projection Lamps (Tru-flector)
- Soft Lights

PHOTOGRAPHIC
- Bantam-size Flashlamps
- Zirconium Flashlamps
- Sun-Gun® Movie Lite
- Long-Duration Flashlamp

MERCURY
- Ruggedized Lamps
- Stamped Frame for Internal Support
- Base Space for Marking Dates

ELECTROLUMINESCENT
- Electroluminescent Lamps
- Steel-Backed Ceramic Lamps
- El Clock and Radio Dials
- Auto Instrument Lighting
- Outdoor Signs
- Flash Airport Runway Markers

TRANSFORMERS
- Commercial Wafer-wound Coils
- Commercial Bent-strip Steel Cores

CIRCUIT BREAKERS
- Glass-enclosed Breakers

HORTICULTURAL
- Plant-aiding Fluorescent Lamps

AVIATION
- Electronic Flash Approach System
- Controlled Fluorescent Runway Lighting
- Flash Electroluminescent Runway Lighting
- Electroluminescent Airport Signs

PRODUCT DIVERSIFICATION SPELLS DIVISIONAL STABILITY

■ The Lighting Products Division of Sylvania Electric Products Inc., is far more than a light source producer. It has pioneered in new areas of radiant energy to develop new high quality light sources, their application, and auxiliary equipment.

Sylvania has been an important producer of Incandescent lamps since the Company was founded in 1901. When radio swept the country in the '20's, the firm entered the rapidly expanding radio tube industry. In the meantime, the Company's far-sighted lighting and research engineers invented and patented scores of innovations in lighting and related fields.

In 1939 Sylvania established its Lighting Equipment Operation, which designed, manufactured and actively merchandised its high efficiency fixture. This product set a standard for the Flourescent Fixture industry. Sylvania's program to develop this market is recognized as a major contribution to the successful commercial development of fluorescent lighting.

During World War II Sylvania's technical abilities were called upon for defense production. Its outstanding contribution to the war effort was the production of the famed proximity fuse, which is credited by the United States Navy with being "the second most important weapon of the war." It was produced by the Lighting Products Division, which also led in production of microwave devices through close association with the Massachusetts Institute of Technology Radiation Laboratory.

Today the Division's products range from microminiature lamp small enough to fit through the eye of a darning needle to the Metalarc lamp, one of the most efficient light sources ever made. The Metalarc's development was made possible by a plasma physics breakthrough by Sylvania scientists who discovered methods of

introducing metal iodides into an arc stream to obtain a light source with standards of color rendition previously impossible to attain.

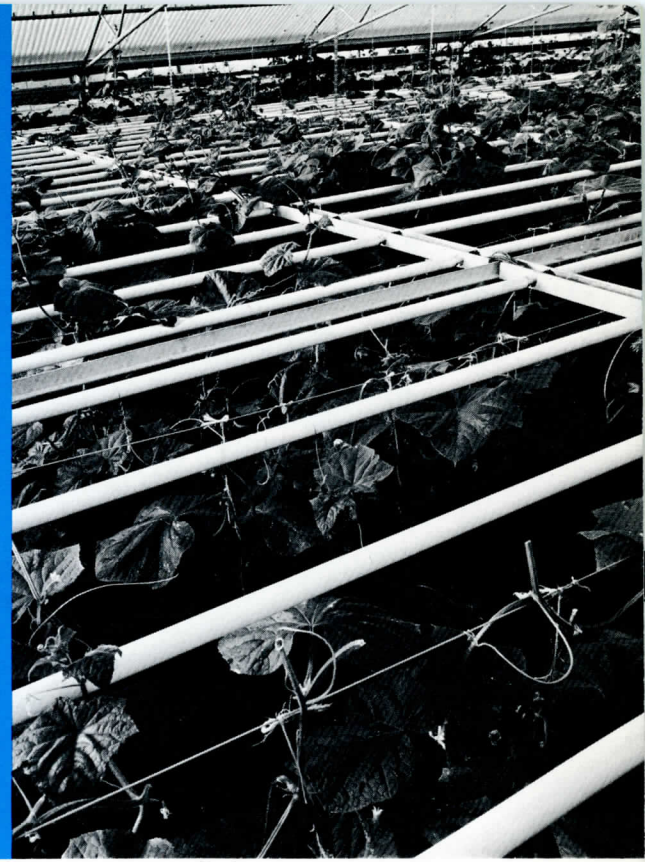
Sylvania develops its own specialized equipment for precision and high production needs. Each new product presents an urgent new challenge to all Sylvania engineers to make it better, make it faster, make it more efficient.

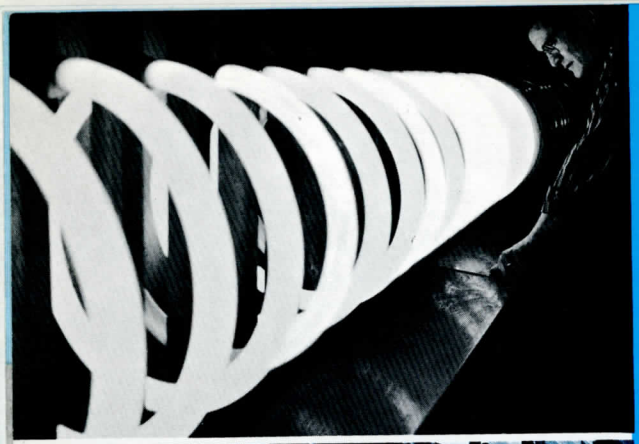
An important contributing reason to the depth and efficiency of the Division's product line is its ceaseless questing for greater perfection in both product quality and production methods. Existing products are studied to broaden their use. Engineers are engaged in a never-ending mission to satisfy ever-growing needs for new and more efficient light sources to meet particular and varying demands.

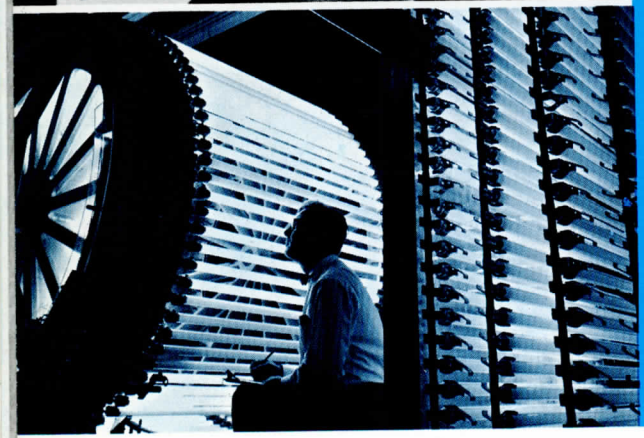
This intensive search for the perfect product has pervaded the Lighting Products Division's management philosophy since its founding.

Product conception is not entirely an engineering effort in this Division. Ideas are solicited from all. An unusual product idea might originate in the Sales Department. A new product suggestion might come from an application engineer. Customers might request a product which has not yet been conceived which will result in development work leading to a profitable new item.

When Sylvania developed its widely-used Sun Gun® movie-light for amateur motion picture photographers, it was also adapted for professional use. Following additional developmental work, a unit was evolved whose efficiency resulted in Sylvania receiving an Award for Outstanding Achievement from the Motion Picture Academy of Arts and Sciences.







Another photographic product cited for its standards of excellence is Sylvania's Flashcube, which permits four photographs to be taken with Instamatic type cameras without changing flashbulbs.

This revolutionary new product has been cited several times for its design and standard of excellence. It received the Materials in Design Engineering Award; the Industrial Design Award; and was cited by Industrial Research Magazine as being one of the 100 most significant products of the year upon its introduction.

An outstanding example of the creativeness of Sylvania's Lighting Division engineers was the development of an entirely new concept in Projection lamps. The Tru-Focus and Tru-Flector projection lamps are more compact, more exact, and more efficient than any projection lamp previously made. The use of base pins, glass wafers, and new sockets was a radical improvement in the field.

Sylvania has also made an important contribution to biological sciences in the development of its Gro-Lux plant-growth fluorescent lamp. This efficient radiant energy source has proven its capability to raise economic crops on a commercial scale. Some 4000 Wide Spectrum Gro-Lux lamps are now providing the energy required to raise tomatoes, cucumbers and other salad crops in a one-acre greenhouse near Anchorage, Alaska.

The Division's diversification program has resulted in a high, constant level of activity. Existing product lines are continually scanned for improved engineering, production or application requirements, and advanced research projects are constantly in progress.

Sylvania's Lighting Products Division has always built the finest quality in its product through utilization of the finest raw materials available and a constant search for the finest engineers, technicians, and production specialists to work toward better light sources for the nation's consumers.

DANVERS

Massachusetts
Endicott Street
Division Headquarters
Sylvania Lighting Center

An ultramodern building in Danvers, Mass., houses the Lighting Products Division's headquarters operation and a honeycomb of highly specialized laboratories which is the Division's Lighting Center, the newest and most modern lighting research and development facilities in the world.

Located just off Route 128 on a 61-acre site, the Division's new headquarters includes facilities for testing all types of lighting sources, including photographic lighting products, electroluminescent devices, industrial and commercial lighting fixtures, electrical control devices and heat-of-light testing and developmental facilities.

A large portion of the center is devoted to the research and development of infrared and ultra-violet products which are used in non-lighting industrial and commercial applications such as painting, baking, plant growth and germ control. Its research capabilities range from highly specialized work in the plasma physics area, to chemical engineering, crystallagraphy, optics, metallurgy, glass technology and instrumentation.

Here, too, is the executive center of the far-flung Lighting Products Division. Sales, public relations, sales promotion, commercial engineering, marketing, advertising, industrial relations, industrial engineering and purchasing offices are located here.

In addition to executive offices and laboratory facilities, the building contains extensive display and demonstration areas for the operation of existing and new light sources and related equipment. It contains a large residential setting with a highly flexible lighting capability for the demonstration of new lighting units and techniques. It also contains displays designed to illustrate the modern lighting techniques for supermarkets, clothing stores, women's stores, along with materials requiring special display techniques, such as glassware.

DANVERS

Massachusetts
World's Largest
Fluorescent Lamp Plant
Sylvan Road

EQUIPMENT DEVELOPMENT PLANT

Automation Wonderland

■ The world's largest fluorescent lamp plant is Sylvania's Danvers, Massachusetts, facility. More than 336,000 square feet of factory floor space is devoted to producing and warehousing the Division's fluorescent products. About 800 employees turn out fluorescent lamps, germicidal, diazo, appliance and other special purpose lamps and a complete line of Circline fluorescent lamps.

The plant's capabilities are in keeping with Sylvania's position as the popularizer of the fluorescent lamp about a quarter-century ago.

A fluorescent lamp starts its manufacture as glass tubing. The first step in becoming a lamp comes when its interior is coated with phosphor. An exhaust tube, lead wires and a tungsten coil with an electron-emitting coating, assembled on a bell-shaped piece of glass, are fused to each end of the tube. Argon gas and a small amount of mercury then replace the air in the tube. The lamp is completed with the addition of a base at each end.

In operation, a fluorescent lamp emits light when a mercury arc is created between coils as current passes between them. The phosphor converts the arc to visible light which is then emitted from the tube.

Sylvania was a pioneer in the fluorescent light field. In the 1930s, it was the only light source producer in the nation to urge the consumer use of fluorescents. And to make the application of this light less complex for industrial and commercial users, Sylvania developed a lighting fixture operation which remains an industry leader.

Typical of Sylvania's creative innovation is the Gro-Lux® fluorescent lamp, a light source specifically engineered to enhance plant growth and to free commercial flower growers from their dependence upon daylight.

■ Imagination plays a key role in the life of the automation experts at the Equipment Development Plant in Salem. Complex production problems are normal daily tasks for the 250 highly skilled engineers and technicians whose mission is the conception, design and production of machines for the mass manufacture of a high quality, low-cost product.

In offices and from behind draftsmen's tables in 55,000 square feet of space, engineers, designers and production specialists pool their talents in an effort to produce more efficient machinery for the production of high-efficiency light sources.

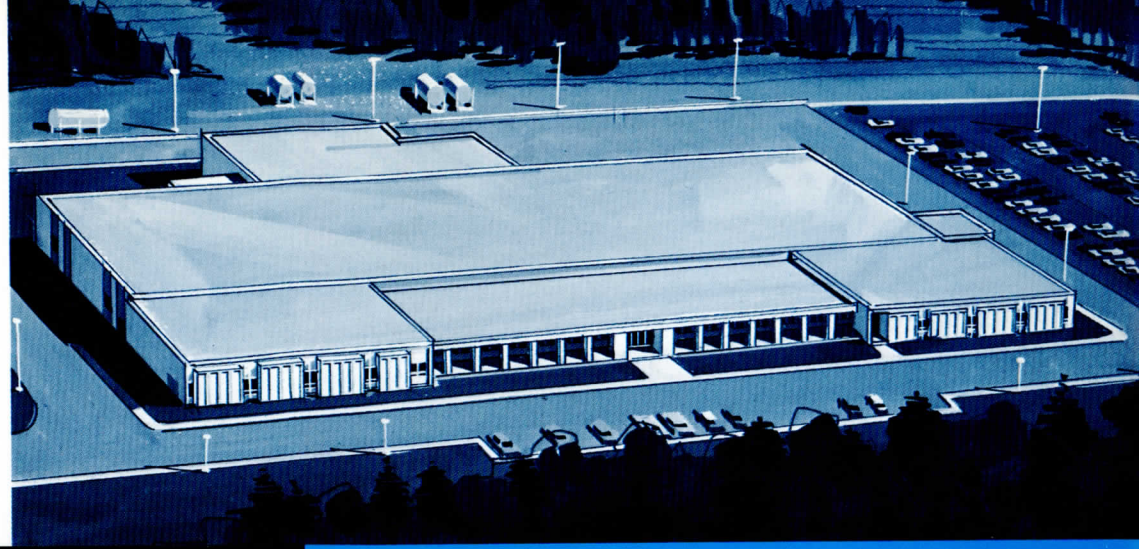
These design teams have developed equipment for the manufacture of numberless Lighting Products Division products, including incandescent and fluorescent lamps, flash bulbs, filaments, fluorescent starters, mercury lamps, projection lamps, telephone switchboard lamps, Flexi-core® transformers, Panelescent® lamps, iodine and quartz-iodine lamps, semiconductor equipment, reflector lamps and many others.

Equipment Development engineers also design basic machinery for Sylvania's foreign affiliates located in seven countries. They have produced chassis which serve as the basic unit in developing automated processes in many other industries.

Over 30,000 parts of varying types and sizes, ranging from three ton castings to those weighing only grams are produced each year by Equipment Development.

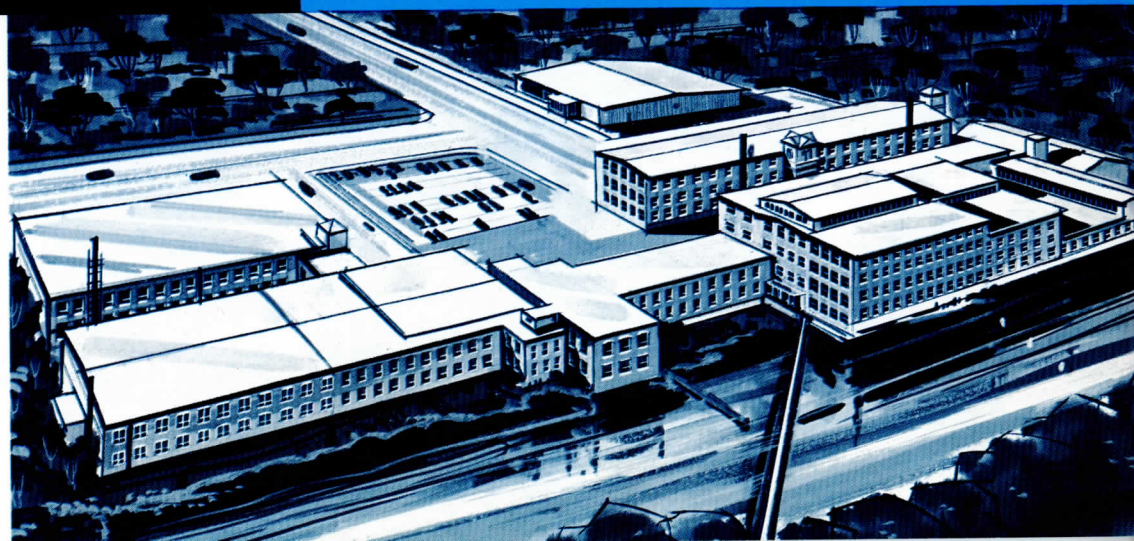
EXETER

New Hampshire
Producer of
Tungsten "Coiled Coils"



IPSWICH

Massachusetts
Transformers and Miniature Lamps



One of the basic plants in Sylvania's production of high quality lighting products is in Exeter, New Hampshire, where hundreds of machines produce high quality tungsten "coiled coils" for the Lighting Products Division, and other industrial customers.

Operating with micrometer standards, these machines twist as much as 31 linear inches of tungsten wire into a highly efficient coil only an inch long to insure a high efficiency, long-life light source.

About 350 employees staff this 80,000 square foot plant located on a 60-acre site, with their products ranging from filaments only the fraction the size of a human hair to assemblies weighing almost 100 pounds.

Among the raw materials used in the Exeter operation are tungsten, tantalum, molybdenum and other refractory metals. The Division's pioneering efforts in the use of these exotic metals, while serving the lighting industry, has found important acceptance in non-related items such as electronic tubes, semiconductors, furnace parts and in rockets and missiles.

An important product developed by the Lighting Products Division has been the tungsten mesh heating element, which for the first time has allowed temperatures as high as 3000°C. to be used routinely in production and laboratory work. Consisting of a metal fabric assembled by interweaving tungsten wire with the flexibility and conformability of heavy cloth, the mesh has also been used as reinforcing agent in space vehicles because of its dependable strength under high heat conditions.

Production of miniature lamp types and outdoor lighting equipment is a specialty of the Division's plant at Ipswich, Mass. Here some 600 employees turn out high quality miniature lamps and hardware for telephone switchboards, computers and other electronic devices; microminiature lamps for use in surgical instruments and other specialized applications, and outdoor lighting equipment for the illumination of airports, bridges, roadways, parking lots, building facades and grounds, and residences.

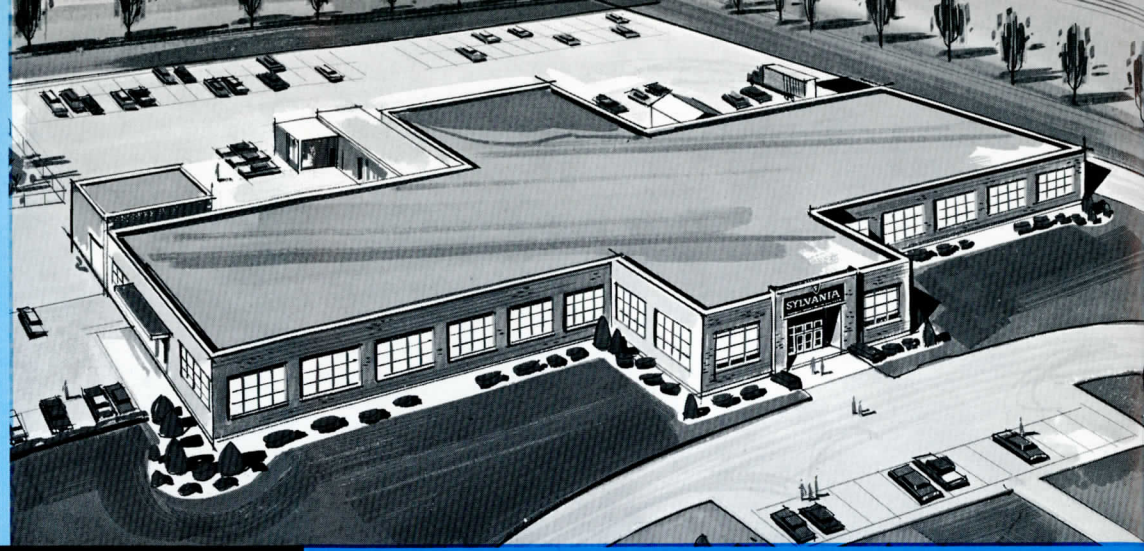
Circuit breakers, such as Positive Make and Break, Snap Make and Break, Mite-T-Breakers, Thermo-Break Motors and Circuit Protectors and Mercury Wetted Relays are swiftly produced in highly automated processes.

Transformer production includes TV power, mercury vapor and Metalarc lamp ballasts, and lighting accessory types, in addition to plate, power, filament, audio, interstage transformers, and certain saturable reactors. Sylvania transformers are used in missile guidance systems where high reliability levels are mandatory. Flexi-core® type transformers manufactured in this plant minimize magnetizing current and allow wide design latitude because of their lighter, smaller core construction.

Operations at this plant occupy nearly 215,000 square feet of floor space.

MANCHESTER

New Hampshire
Home of the Mercury Lamp



MONTOURSVILLE

Pennsylvania
Blue Dot for Sure Shot

■ Manchester, New Hampshire, is the home of Sylvania's famed Mercury Vapor lamp, widely used for high efficiency — low-cost high and low bay industrial lighting and for street and highway lighting throughout the country.

The heart of a mercury vapor lamp is the quartz arc tube. Tungsten electrodes are sealed into each end of a quartz cylinder about one-half inch in diameter and five inches long. Argon and mercury are added to the tube and it is then mounted in a metal frame which results in a ruggedized shock-resistant structure. The assembly is placed into a weather-resistant glass bulb, nitrogen is introduced to replace the air and the bulb is then sealed to form an air-tight unit. A metal base is then affixed for socket insertion.

Mercury vapor lamps vary in wattage and size for many applications. Phosphor coatings are applied to the inner bulb wall of some types where improved color rendition is desirable.

Manchester also produces the Metalarc lamp, developed by Sylvania scientists engaged in the field of plasma physics. Several exotic metals, in the iodide form, are added to the arc tube to produce highly efficient and intense light with excellent color rendition. The Metalarc lamp produces about four times as much light as incandescent lamps of comparable wattage.

Other products made at Manchester include the popular Sun Lamp, a source of ultraviolet energy, and tubular mercury and tubular Metalarc lamps which are finding wide use in the expanding photocopying field.

The Manchester plant is located on a nine-acre suburban tract upon which further expansion is planned.

■ Sylvania's Lighting Products Division has made Montoursville, Pennsylvania, the flashlamp capital of the world. In this plant Sylvania manufactures more flashlamps than any other producer in the world.

Sylvania's famed "Blue Dot for Sure Shot" quality is responsible for creating the unprecedented consumer demand which has made the Division's flashlamp the most popular in the nation. The "Blue Dot" was the first flashlamp to use zirconium as a combustible for greater efficiency. This revolutionary development set new industry standards as it enabled Sylvania to reduce its flashlamp size while maintaining high lighting levels. It was here that Sylvania developed and produced the famed Flashcube for Instamatic Cameras.

Five classes of flashlamps are produced at Montoursville, covering 23 types. Sizes run from the world's smallest, 15/32 of an inch in diameter, to the largest which is almost three inches in diameter. Montoursville's engineers developed a flashlamp with a two-second peak which is utilized in missile photography to verify the jettisoning of burned out propulsion units.

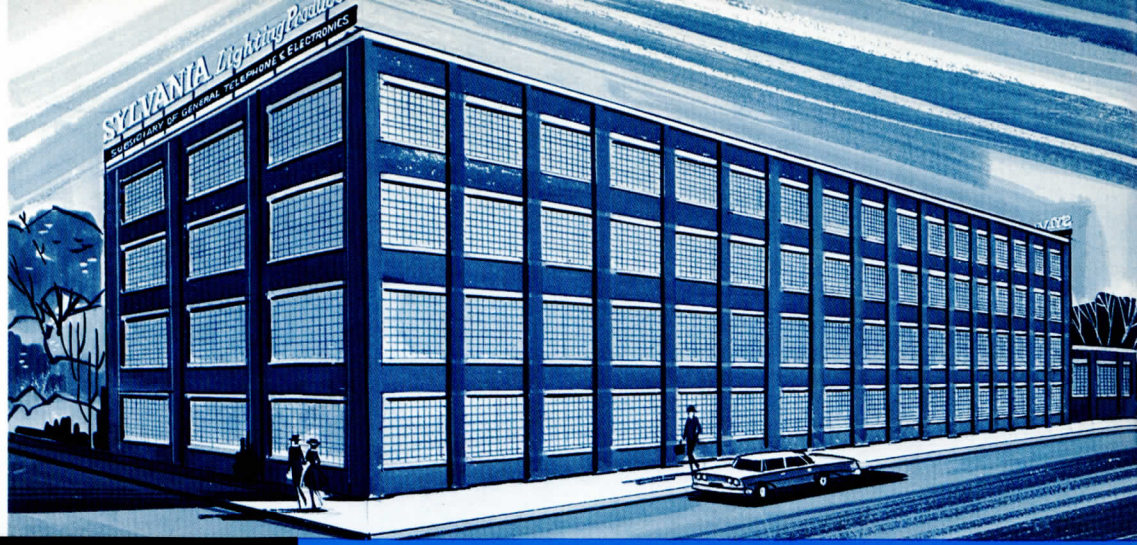
Several hundred million flashlamps are produced annually at Montoursville, including the famed AG-1, which has replaced larger lamps in the occasional photographer's kit. More than 250,000 square feet of floor space are utilized in the flashlamp manufacturing operation.

As is true in all Divisional plants, long-term employment is the norm at Montoursville. More than 55 percent of its 850 employees have worked at the plant a decade or longer.

Boston Street

SALEM

Home of
Special Products



Loring Avenue

SALEM

Incandescent Lamp Center

The manufacturing complex located on three acres of land on Boston Street in Salem, Mass., is the Lighting Products Division's senior site.

Here some 950 persons staff the world's largest electroluminescent factory and a large segment of the Division's Special Lighting Products operation, including arc tubes and lamps, iodine-quartz lamps, dichroic reflector projection lamps, hologen lamps, sealed beam reflector lamps and scores of other highly specialized light sources, in seven buildings with a total of 95,000 square feet of floor space.

The Boston Street plant was opened in 1915, when Sylvania was the Hygrade Lamp Company, carrying on all of its operations from a single building which today is but one element of the international organization which is Sylvania Electric Products, Inc.

Development of new light sources is the mission of the Special Lighting Products operation. Its interests range from diminutive pin-points of light to the largest incandescent, fluorescent and electroluminescent units. The award-winning Sun Gun® movie light is an example of this unit's caliber of work.

In the Panelescent plant, where Sylvania's electroluminescent light is produced, Division engineers are packing more lumens into flatter, more compact units for use in scores of applications. Automobile instrument panels, radio and TV dials, clocks, toys, police and highway safety devices, night lights, electric switch plates and table tops have been made of this existing new light source. Sylvania, the pioneer in the development of electroluminescence, remains its largest producer.

Salem's Loring Avenue incandescent plant was built in 1936. Yet it remains in the forefront of modern incandescent production centers because of Sylvania's inflexible policy of using the most modern machinery and manufacturing methods to produce the finest lamps possible.

Loring Avenue includes some 301,000 square feet of production and warehouse space to produce and store the unceasing flow of high quality lamps which pour from this efficienct incandescent lamp production center.

The 800 employees at Loring Avenue produce a wide variety of light sources ranging from tiny pilot lamps to massive spotlights. Machinery in this plant can produce 5000 types of incandescent light sources.

Three-way lamps, photofloods, reflector types, Lumiline lamps, rough service lamps for industrial and military use and giant 1500 watt lights flow from machines on two levels to supply the world's lighting market.

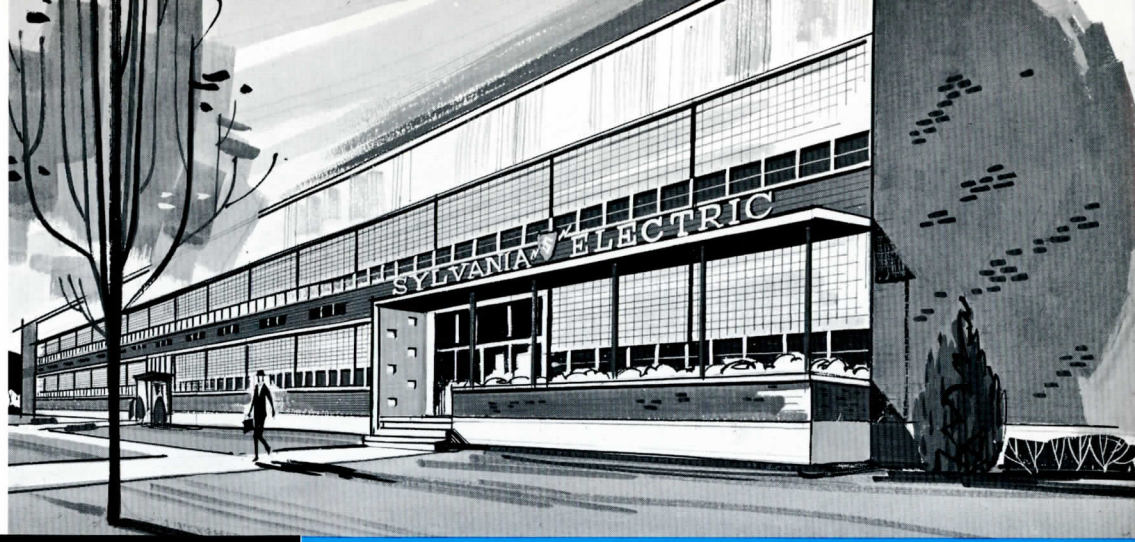
Although most components for lamps produced here, such as the filament, base, lead and support wires, are made in other Sylvania plants, the manufacture of an incandescent lamp is far more than an "assembly" operation.

The bulb must be treated for color and the type of illumination it is to supply. Filaments are meticulously positioned on two lead wires sealed in a glass mount. The mount is then sealed within the bulb. Air is extracted from the bulb and replaced with various gases to protect the filament and increase its life. The base is then cemented to the bulb. At this point, the bulb becomes a lamp. It is then tested to detect flaws and to "age" the filament for maximum lighting efficiency.

The lamps are again tested during packaging, then started to the consumer.

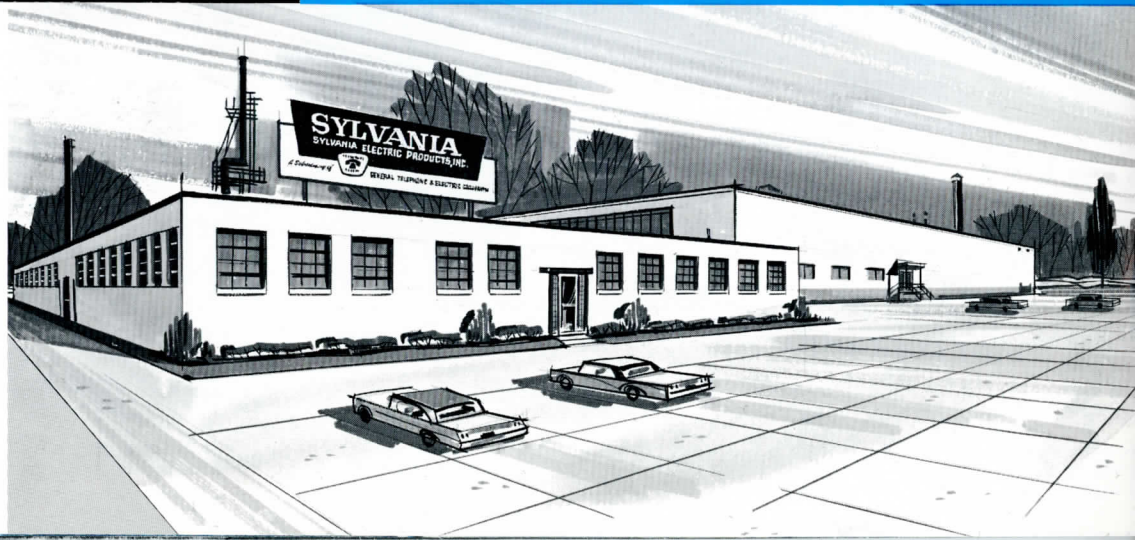
ST. MARYS

Pennsylvania
Lamps with
"Locked-in Quality"



WALDOBORO

Maine
Maine's First Electronics Plant



■ St. Marys, Pennsylvania, built in 1955, was recognized by Factory Management and Maintenance Magazine as one of the "Ten Best Plants" of the year. Today this award winning production unit remains an outstanding example of industry automation. Here at the "World's Most Modern Lamp Plant", Sylvania produces light bulbs in volume, being one of the largest single unit producers of incandescent lamps in the world. This ultra-modern plant features "Locked-in Quality" constantly insured by new and unique control and alarm system, which are part of each process. This feature provides Sylvania customers with the highest possible quality.

Within this giant split level structure lies the results of years of planning and design with efficiency paramount. This spacious 240,000 sq. ft. plant area on a 15 acre site provides for a clear span of 100 ft. x 362 ft. manufacturing area. Loading and unloading facilities includes an indoor siding for seven railroad freight cars and indoor docks for nine motor carriers. This also houses highly efficient machines developed by Equipment Development operating at fantastic speeds and efficiencies with capacities to produce well in excess of 1,000,000 lamps daily.

This modern plant is a most impressive monument to the St. Marys founders of Sylvania. Historically, Sylvania had its origination in two places, St. Marys, Pa. and Middleton, Massachusetts.

The St. Marys operation is a direct descendant of the Novelty Incandescent Lamp Company, which began operations in 1906 to refill burned out lamp bulbs, a common practice of this area. In 1931, this firm merged with the Hygrade Incandescent Lamp Company of Massachusetts to form the Hygrade Sylvania Corporation, the Sylvania Electric Products Inc. of today.

■ In 1951, the Division's plant at Waldoboro was Maine's first electronic plant. Today it leads the nation in fluorescent starter production and turns out nearly half of the tungsten coils used by Sylvania in its massive production of incandescent and fluorescent light sources.

The Waldoboro facility covers about 48,000 square feet of production space, employing 650 persons. Its products include simple, manual and automatic types of fluorescent starters for all wattages, all types of fluorescent, incandescent, heater and aluminized coils and automatic and remote reset types of circuit breakers handling one to five amperes and with voltages as high as 120 volts.

Intensive automation is a hallmark at Waldoboro. But despite its high production rate, each of its products is carefully checked for quality at various points in the manufacturing process. All products are individually inspected before entering consumer pipelines to insure their high quality.

VERSAILLES

Kentucky
Fluorescent Lamps
for the mid-west

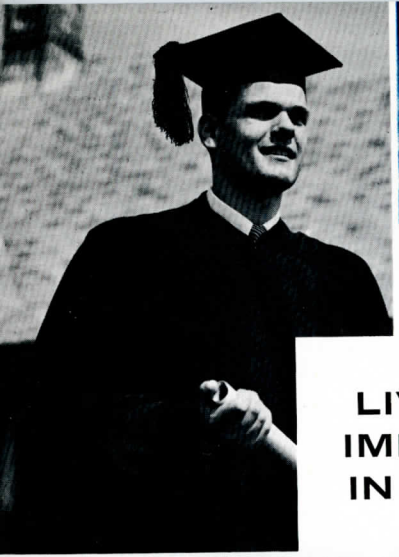
Nestled in the rolling countryside of Kentucky's famed Blue Grass Region is one of the more recent additions to the Lighting Products Division's family of plants at Versailles, where fluorescent lamps are manufactured for mid-western markets.

In addition to producing four and eight-foot fluorescent lamps in their four most popular colors, the 160,000 square foot plant performs a centralized warehouse function, stocking hundreds of thousands of fluorescent and incandescent lamps, made at other sites, for the convenience of the Division's customers.

The Versailles plant, located on a 43-acre site, augments fluorescent lamp production carried on at the Division's Danvers, Mass., plant, the largest fluorescent lamp facility in the world. The two plants make up the world's most modern fluorescent lamp production complex.

Opened in 1964, the Versailles operation pours thousands of high quality, pre-tested lamps into consumer pipelines daily with the assistance of 200 highly skilled employees.

While in a rural area, the Versailles plant is less than 20 miles from Lexington, where excellent advanced educational facilities are available. In addition, it is located about midway between Louisville and Cincinnati, Ohio, where additional education facilities are available for those wishing to qualify themselves for positions of greater responsibility through education program.



LIVING CONDITIONS IMPORTANT FACTOR IN PLANT LOCATION

To maintain its lead in the swiftly competitive radiant energy field, the Division seeks outstanding personnel who demonstrate the promise to grow with and contribute to the company.

At present, some 300 colleges and universities are represented among the Division's engineering, sales and administrative corps where opportunities in fields such as electrical, chemical, metallurgical, mechanical and industrial engineering; physics, commercial and sales engineering, business administration, production and financial management and marketing are offered.

On-the-job training is offered to all newcomers. Starting salaries are competitive and increments are awarded on the basis of merit and increased responsibility.

Another element of Sylvania employment is its comprehensive employee benefit program. This includes a non-contributory pension plan, insurance and medical program for employees and their families, stock plan, regular vacations, special education courses, credit unions, society memberships, excellent cafeterias, and suggestion systems.

Sylvania's Lighting Products Division plants are located primarily in smaller communities, with maximum employment at about 700. This arrangement prevents complete community dependence upon the Sylvania payroll, and helps plant managers know all employees intimately.

Where possible, plants are located close to educational centers to provide advance schooling opportunities and enable engineers and technicians to remain abreast of the latest advances in their field of specialty.

SYLVANIA DIVISION
HEADQUARTER CITIES ARE:

LIGHTING PRODUCTS DIVISION
Danvers, Massachusetts

SEMICONDUCTOR DIVISION
Woburn, Massachusetts

CHEMICAL AND METALLURGICAL DIVISION
Towanda, Pennsylvania

PARTS DIVISION
Warren, Pennsylvania

SYLVANIA ELECTRONIC SYSTEMS
Waltham, Massachusetts

SYLCOR DIVISION
Hicksville, New York

COMMERCIAL ELECTRONICS DIVISION
Bedford, Massachusetts

ENTERTAINMENT PRODUCTS DIVISION
Batavia, New York

ELECTRONIC TUBE DIVISION
Seneca Falls, New York

SYLVANIA

SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS

SYLVANIA

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GENERAL TELEPHONE & ELECTRONICS

An equal opportunity employer

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