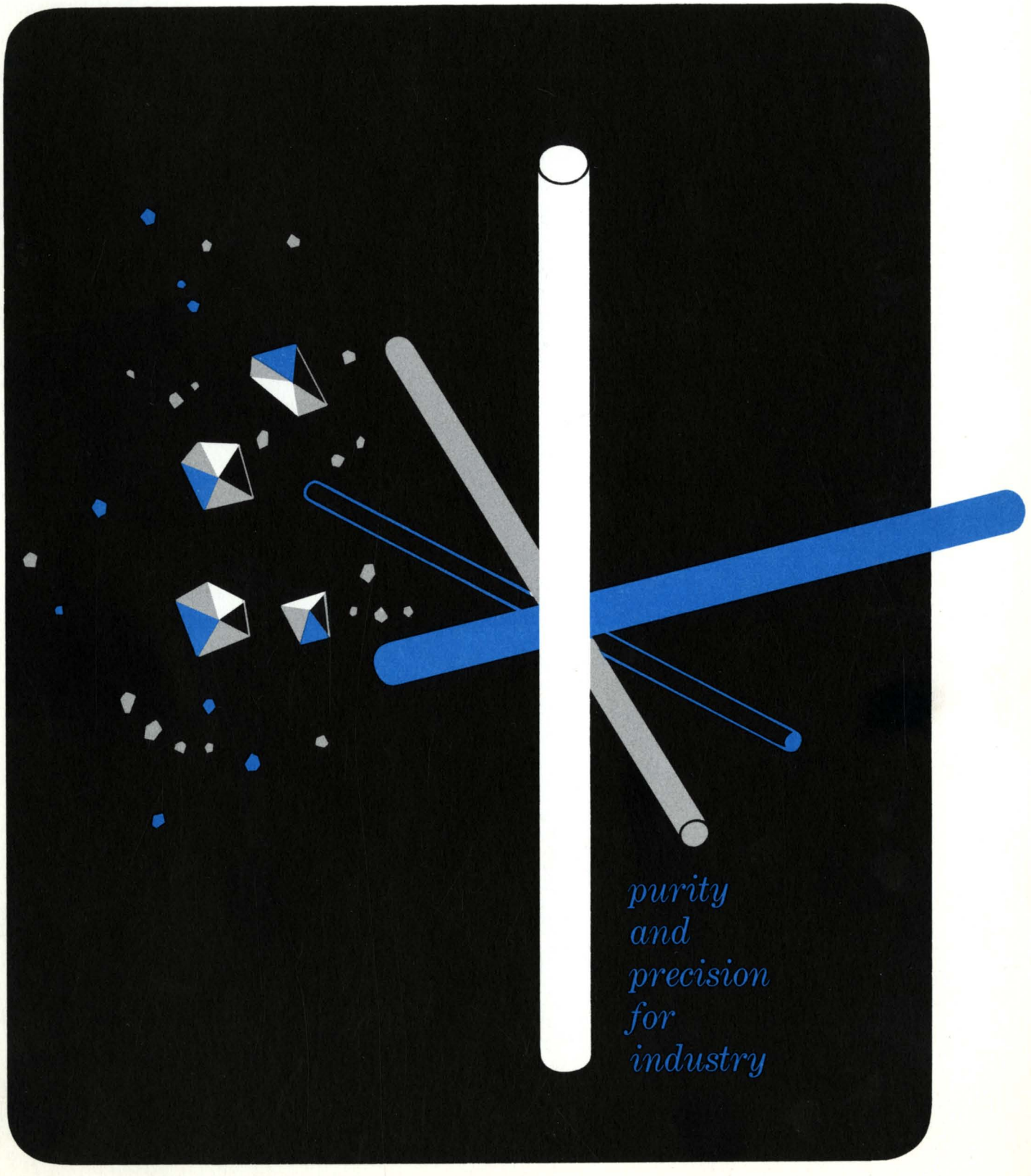
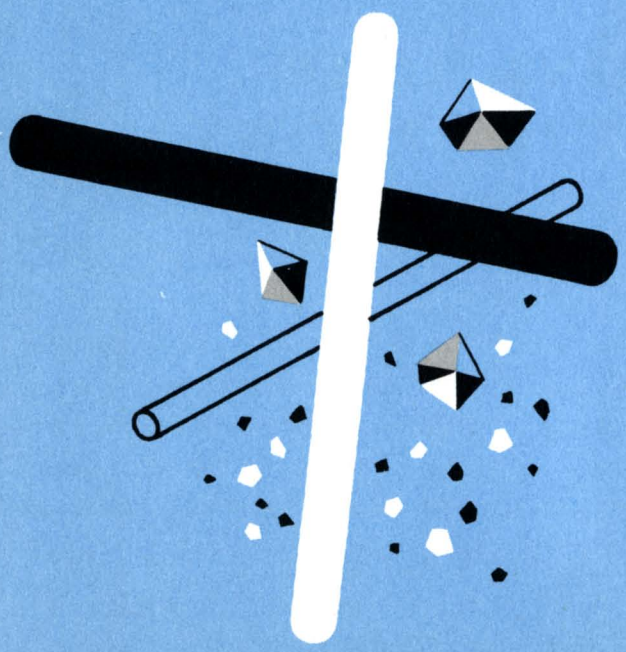
SYLVANIA

CHEMICAL AND METALLURGICAL DIVISION



TOWANDA

. . . headquarters for chemical and metallurgical research, development, and production.



■ About 900 Sylvania scientists, engineers, technicians and production people are at work today in the northeastern Pennsylvania town of Towanda.

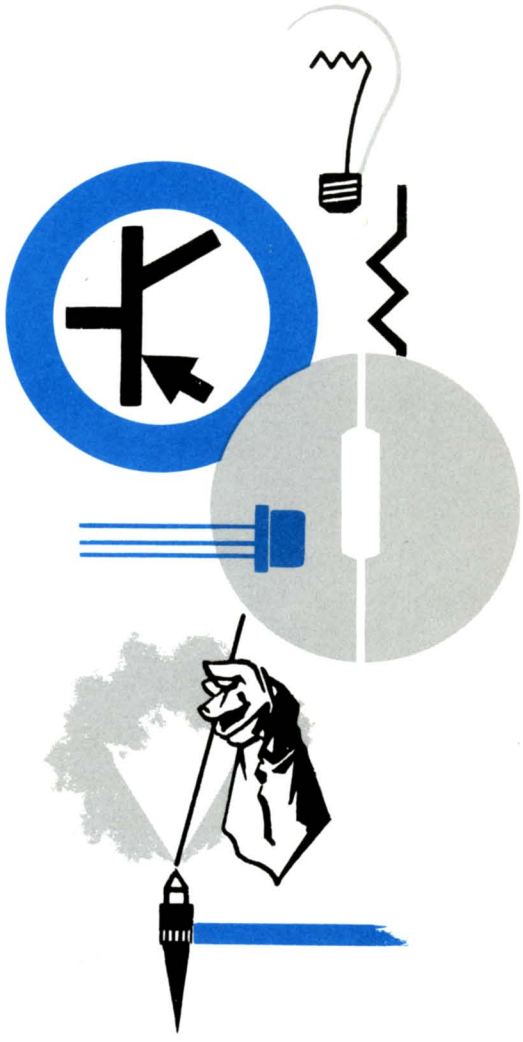
Many of them are involved in the development and production of materials vital to manufacturers of lighting products, missiles, semiconductors, electron tubes and other modern wonders. Together, these men and women comprise the Chemical and Metallurgical Division of Sylvania Electric Products Inc.

At its start in 1941, the Chemical and Metallurgical Division, with a work force of 24 people, was engaged solely in the making of phosphors for Sylvania fluorescent lamps. The processing of the vital metal, tungsten, and then the drawing of fine tungsten wire were to follow soon after.

With the advent of television, more new products were offered, such as screen-settling materials, TV picture-tube phosphors and precision parts for vacuum tubes. While continuing to provide Sylvania manufacturing plants and other companies in the electronics and lamp fields with basic materials and components, the division also began to supply many other industries. Sales to corporations other than Sylvania now represent well over half of the division's business.

The widening scope of the division has necessitated constant expansion. Today, more than 350,000 square feet of working space are maintained at Towanda. In the Engineering Building, a 50,000 square foot research and development center, some 100 scientists and engineers employ the most modern techniques, including diffraction-grating emission spectrography, ultraviolet spectroradiometry, x-ray diffraction, radiochemistry, and electron paramagnetic resonance. In addition, pilot plants for all product lines are maintained to improve materials and manufacturing methods.

Since merging with the General Telephone Corporation, Sylvania has continued to operate as a separate company. However, this merger has given the Chemical and Metallurgical Division an opportunity to increase the scope of its products and customer service . . . backed by a giant in the field of communications.



OFFERING ADVANCED TECHNOLOGY

in metallurgical products,
phosphors and chemicals,
semiconductor materials.

Long association with the lighting and electronics industries has resulted in the development of unique equipment and techniques for maintaining the Chemical and Metallurgical Division's high standards of precision and purity . . . only the finest products bear the Sylvania name.

SYLVANIA CHEMICAL and METALLURGICAL DIVISION

METALLURGICAL PRODUCTS

TUNGSTEN and MOLYBDENUM, two of the most useful and widely sought refractory metals, are available from Sylvania in a wide range of basic forms.

POWDER

Tungsten and molybdenum powders of the highest purity and uniformity are produced by the hydrogen reduction of chemicals extracted from the ores. These powders are the basic starting materials for all of the formed products that follow. Tungsten and molybdenum powders are available in a full range of particle sizes and distributions.

INGOTS AND BILLETS

With the development of its efficient method of isostatically pressing and sintering, Sylvania offers the metals fabricator a broad range of sizes and shapes — among them are cylindrical electrodes for vacuum melting, round billets for forging, and rectangular slabs, rings, and conical preforms.

Tungsten and molybdenum powders and their alloys can now be pressed and sintered in sizes up to 10 inches in diameter by 48 inches in length. One advantage of pressed and sintered tungsten and molybdenum is the availability of a billet of fine-grained structure with a clean, smooth, carbide-free surface suitable for rolling, forging, or extruding without the need for surface machining.

Pressed and sintered shapes can be also furnished infiltrated with copper, silver, and other precious metals.

PELLETS AND DISCS

Both refractory metals are offered in high-purity, high-density pellet forms for use as alloy additions. Their size and shape, approximately 5/8 by 1 inch, afford easy weighing and handling, and their uniformity helps alloy producers to standardize batch formulations from heat to heat.

Pressed and sintered discs are available for cathodes, and semiconductor devices.

ROD

Ingots of tungsten or molybdenum are reduced to rod through a rolling, swaging, or drawing operation. Rod is supplied in a fine, medium, or coarse grain. It can be furnished in the following finishes: black, cleaned, ground and polished, or ground and etched. Parts also can be fabricated; precision work can be done on pointing, beveling, chamfering, and grinding.

WELDING ELECTRODES

Sylvania offers, through leading welding distributors, four types of top-quality tungsten electrodes — Puretung,® Zirtung,® and 1% or 2% Thoriated — for inert-gas arc welding. Each type is available in the preferred finish, cleaned or ground, and is color-coded to save time and to prevent costly errors.

ELECTRODES FOR BOOSTER MELTING

Sylvania produces molybdenum electrodes with a clean, matte finish expressly for the glass industry. They are available in standard lengths with threaded or straight-cut ends. Exacting purity standards assure minimum melt contamination.

WIRE

Tungsten and molybdenum wire is available in black and cleaned finishes. These wires are also available in thoriated and alloy form.

Drawing extremely fine tungsten and molybdenum wire in large quantities and to close tolerance is a carefully controlled operation at Sylvania. Precise machines and methods carry out the many operations from heavy swaging to finished spooling. Tests for straightness, tensile strength, and elongation are part of Sylvania's normal production line.

Wire to meet exacting specifications for rigid winding and forming applications is available in a variety of sizes, down to 0.0003-inch tungsten and 0.0005-inch molybdenum wire. Sylvania also produces stranded tungsten wire to customer specifications.

Tungsten-Rhenium alloy wire is offered in compositions up to 25% rhenium as required for lighting and electronic applications.

PLATED WIRE

Sylvania has facilities for electroplating any base metal wire "at size" with a wide variety of different platings.

COIL PRODUCTS

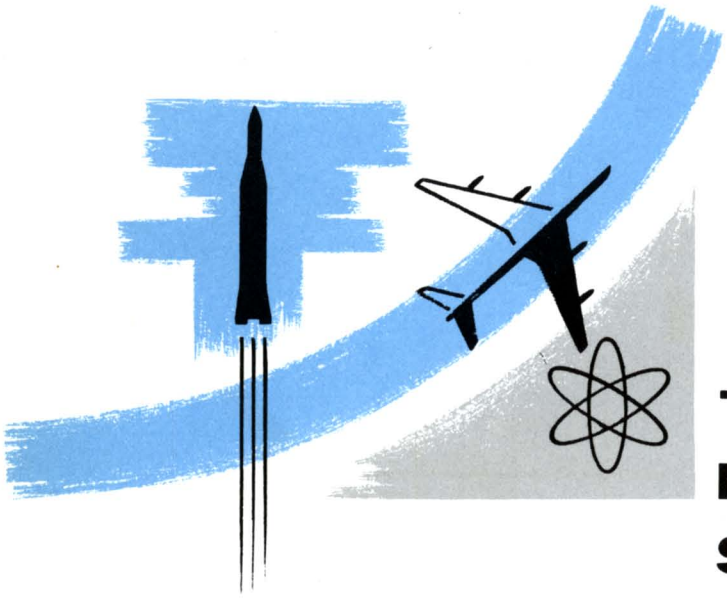
Sylvania also supplies tungsten and molybdenum coils for all applications in the vacuum-metallizing, semiconductor, electronic, and lighting industries. They can be made to standard or customer specifications. Coated coils also are available.

SHEET

Facilities are available for rolling refractory-metal sheet to a minimum 20-mil thickness and widths to 11 inches. Sylvania also supplies parts fabricated from sheet, such as molybdenum boats.

HIGH DENSITY MATERIALS

Tungsten is combined with copper and nickel to form high-density alloys that are readily machinable for counterweights and other similar applications.



TUNGSTEN, MOLYBDENUM AND SPECIAL CHEMICALS

Sylvania supplies a broad line of high-purity tungsten, molybdenum, and special chemicals. Their applications range from use as analytical reagents to high-temperature lubricants to highly active petrochemical catalysts.

TUNGSTEN CHEMICALS

Ammonium Paratungstate
Ammonium Metatungstate
Phosphotungstic Acid
Tungstic Acid
Tungstic Oxide
Blue Tungsten Oxide
Tungsten Disulfide
Sodium Tungstate
Magnesium Tungstate
Calcium Tungstate
Strontium Tungstate
Barium Tungstate
Zirconium Tungstate
Copper Tungstate
Zinc Tungstate
Cadmium Tungstate
Aluminum Tungstate
Lead Tungstate

MOLYBDENUM CHEMICALS

Ammonium Paramolybdate
Ammonium Polymolybdate
Phosphomolybdic Acid
Magnesium Molybdate
Calcium Molybdate
Strontium Molybdate
Barium Molybdate
Zirconium Molybdate
Copper Molybdate
Zinc Molybdate
Cadmium Molybdate
Lead Molybdate

SPECIAL CHEMICALS

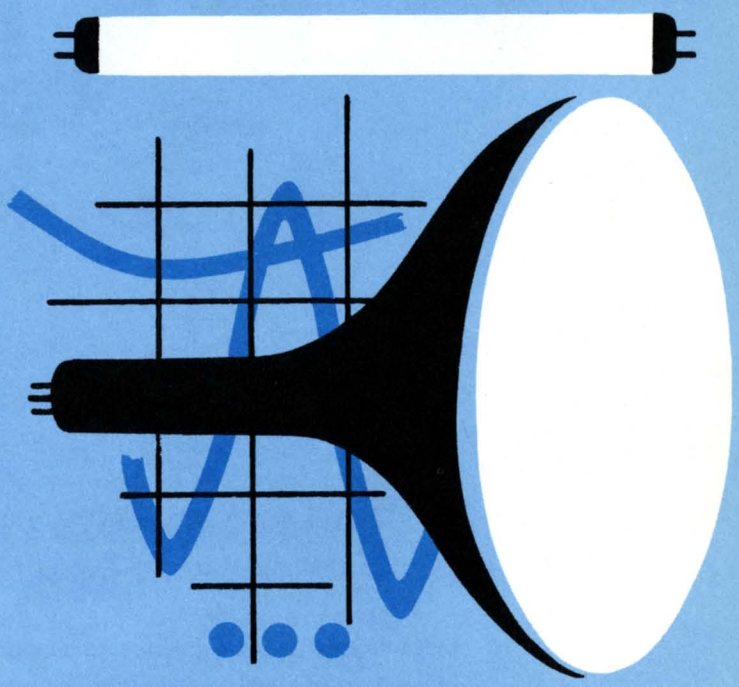
Lithium Fluoride
Magnesium Fluoride
Calcium Fluoride
Barium Fluoride
Cadmium Fluoride
Lead Fluoride
Strontium Fluoride

PHOSPHORS AND ELECTRONIC CHEMICALS

Sylvania offers a complete line of inorganic phosphors and allied inorganic chemicals for fluorescent lamps and sign tubing, cathode-ray tubes and other electronic applications.

FLUORESCENT-LAMP AND SIGN-TUBING PHOSPHORS

For many years, Sylvania lamp phosphors have been known for their high quality and high brightness. Sylvania maintains its leadership in this highly specialized field of inorganic phosphors by a continuing, concentrated research and development program. This includes basic research on phosphor raw materials, components, and blends.



TV PHOSPHORS

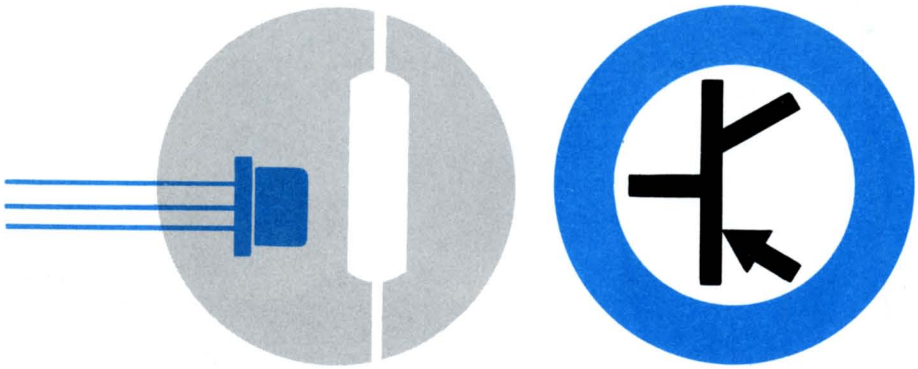
All Sylvania cathode-ray-tube phosphors are rigidly inspected for particle size, purity, settling characteristics, brightness, and uniformity of color. Through the integrated Sylvania screening systems, phosphors and settling-solution chemicals complement each other to produce maximum screen adherence, strength, and superior brightness.

POTASSIUM SILICATES

Sylvania's specifications for high-purity silicates exceed industry acceptance figures by a considerable margin. Quality control here is just as strict as in the manufacture of Sylvania phosphors. For this reason, Sylvania's potassium silicates provide an unexcelled screen-settling solution.

EMISSION CARBONATES AND SPECIAL COATINGS

Sylvania furnishes a line of emission carbonates for the preparation of oxide-coated cathodes for electronic devices. Also available are mica insulator coatings and heater coatings.



SEMICONDUCTOR MATERIALS

Sylvania produces the major semiconductor materials. From the processing of pure chemicals through the recovery of germanium scrap, Sylvania offers the device manufacturer a wide range of products and services.

Experience gained in many years of controlling purity from raw material to finished product is your assurance of quality semiconductor materials from the Chemical and Metallurgical Division.

GERMANIUM

Zone-purified Ingots, polycrystalline
Single Crystals, doped and undoped
Slices
Lapped Wafers
Cast Pieces
Scrap-refining Services

SILICON

Doped Single Crystals • Slices • Lapped Wafers

EPITAXIAL CHEMICALS

To help the semiconductor manufacturer in producing epitaxial devices, Sylvania provides — in production quantities — the following specially purified chemicals:

Germanium Tetrachloride *
Germanium Tetraiodide
Germanium Tetrabromide

Silicon Tetrachloride *
Silicon Tetraiodide
Silicon Tetrabromide

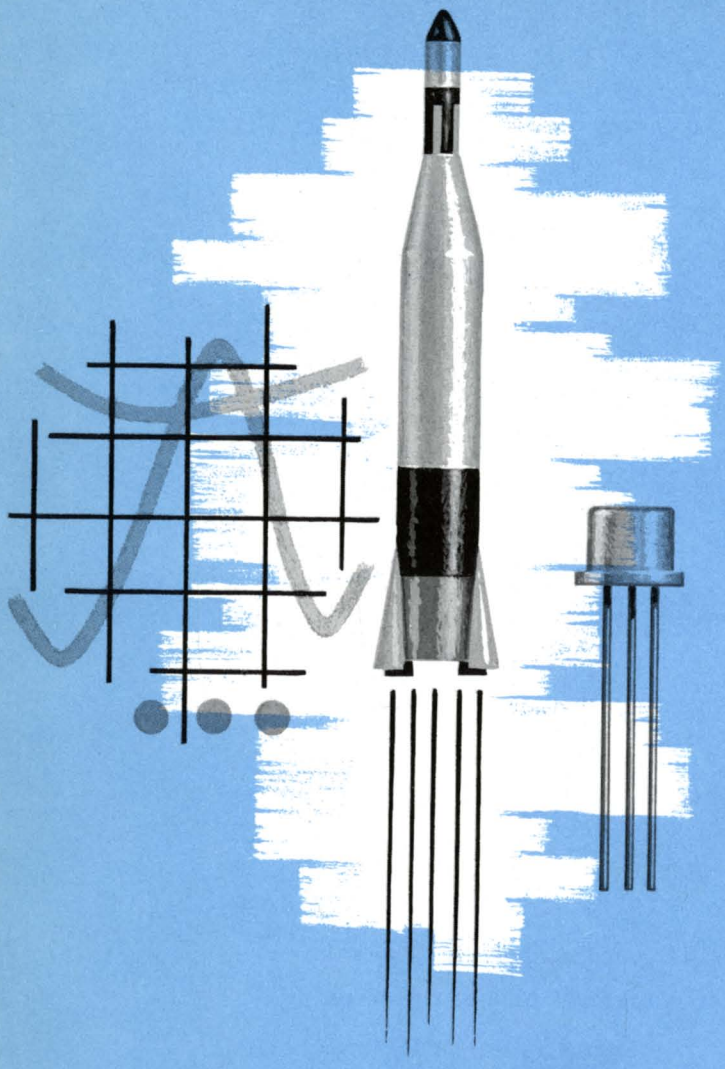
* Also available doped to specifications.

INTERMETALLIC COMPOUNDS

Sylvania scientists are continually developing methods and equipment to produce the latest semiconductor materials. Gallium arsenide is now available. Research and development to broaden the use of this and other "III-V" compounds is a priority project at Sylvania.

INFRARED APPLICATIONS

Germanium in high-purity polycrystalline and monocrystalline form is produced for use in infrared applications. Sylvania's development of casting techniques permits the manufacture of large germanium pieces for the optical industry.



PERFECTING

NEW PRODUCTS FOR TOMORROW

Because Sylvania is constantly in search of new products and processing techniques, Towanda has become a center of modern research, of scientific talent and of engineering know-how. These resources, plus a wealth of experience in the chemical and metals fields, are focused on meeting the future needs of industry.

Massive molybdenum and tungsten, essential in the race for super-powerful space vehicles and missiles . . . gallium arsenide for sub-miniature electronic miracles . . . and special phosphors for a totally new, glare-free source of light are among the varied, vital interests of Sylvania's Chemical and Metallurgical Division.

These and other Sylvania projects are removing obstacles to progress. For countless allied industries, they mean new and better materials that will make possible the products of tomorrow.

SYLVANIA CHEMICAL and METALLURGICAL DIVISION

For additional information, contact the Sylvania Sales Office closest to you . . .

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2001 N. Cornell Avenue
Melrose Park, Ill.
Phone: FIllmore 5-0100

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CHEMICAL AND METALLURGICAL DIVISION

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Printed in U.S.A.

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