



C7C11-63B

15 MAY 57

STROMBERG-CARLSON — SAN DIEGO

# CHARACTRON® SHAPED BEAM TUBE



## APPLICATION

The Type C7C11-63B CHARACTRON shaped beam tube is a high resolution 7-inch round cathode-ray tube designed primarily for very high speed data recording. It is termed a high density tube since it is capable of displaying approximately 10,000 characters, numerals, or symbols within a 4 1/4" square on its screen. This is equivalent to the information density of the large 19-inch visual display CHARACTRON shaped beam tube. Although characters on the tube screen are so small they are not easily discerned by the naked eye they produce excellent definition when recorded by micro-film camera or high speed dry printer. The tube is flexible and versatile in that either analog or digital data may be combined in one display or displayed separately.

Excellent display quality results from generating characters with a beam having cross sections formed into shapes of pre-determined characters. In contrast to other methods of character generation, registry of the letter components is inherent.

The CHARACTRON shaped beam tube can be operated at speeds in excess of 20,000 characters per second, that is, over ten times faster than functionally similar mechanical devices presently available.

## TYPICAL OPERATING CONDITIONS<sup>3</sup>

|   |                     |
|---|---------------------|
| Heater Voltage.....                       | 6.3 volts           |
| Heater Current.....                       | 0.6 ± 006 amps      |
| Third Anode Voltage.....                  | +11,500 volts       |
| Third Anode Current (Max.).....           | 500 microamps       |
| Second Anode & Matrix Voltage.....        | +3300 volts         |
| First Anode Voltage <sup>4</sup> .....    | +600 to +1200 volts |
| Grid Cutoff.....                          | -60 to -140 volts   |
| Convergence-Winding Current.....          | 38 ± 2 ma           |
| Trim-Winding Currents <sup>5</sup> .....  | 0 ± 30 ma           |
| Focus Coil Current.....                   | 20 ± 5 ma           |
| Character-Selection Factors <sup>2</sup>  |                     |
| S1, S2 (Vertical) Selection Factor.....   | 11 ± 2 volts/char.  |
| S3, S4 (Horizontal) Selection Factor..... | 10 ± 2 volts/char.  |
| Character-Reference Factors <sup>2</sup>  |                     |
| R1, R2 (Vertical) Reference Factor.....   | 8 ± 1.5 volts/char. |
| R3, R4 (Horizontal) Reference Factor..... | 8 ± 1.5 volts/char. |

## GENERAL CHARACTERISTICS

|  |  |
|--|--|
| Dimensions.....                                  | Refer to outline drawing   |
| Base.....  | Small shell diheptal 14-pin  |
| Bulb contact.....                                | Cavity Type J1-21  |
| Screen.....                                      | P 11 aluminized  |
| Screen quality circle.....                       | .6 inches diameter   |
| Display orientation <sup>1</sup> .....           | By index mark  |
| Matrix.....                                      | 64 character position Type M63B  |
| Selection.....                                   | Electrostatic  |
| Reference.....                                   | Electrostatic  |
| Deflection.....                                  | Magnetic   |
| Convergence.....                                 | Magnetic   |
| Focus.....                                       | Magnetic   |
| Height of displayed character <sup>2</sup> ..... | .035 inch (variable)   |
| Display pattern <sup>6</sup> .....               | Square to $\sqrt{2} \pm .03$   |
| Auxiliary equipment.....                         | Deflection Yoke, Convergence Coil, Focus Coil, Mount Assembly, Logic & Driving Circuits such as Deflection Amplifiers, Synchronizers, Power Supplies, etc. |

## MAXIMUM RATINGS<sup>3</sup>

|  |               |
|--|---------------|
| Third Anode Voltage.....   | +18,000 volts |
| Second Anode & Matrix Voltage.....   | +3600 volts   |
| First Anode Voltage.....   | +1300 volts   |
| Grid Voltage   |               |
| Negative Bias Value.....   | -200 volts    |
| Positive Bias Value.....   | 0 volts       |
| Positive Peak Value.....   | +2 volts      |
| Peak Voltage Between Second Anode and Matrix and any Selection or Reference Plate..... | 500 volts     |

## NOTES

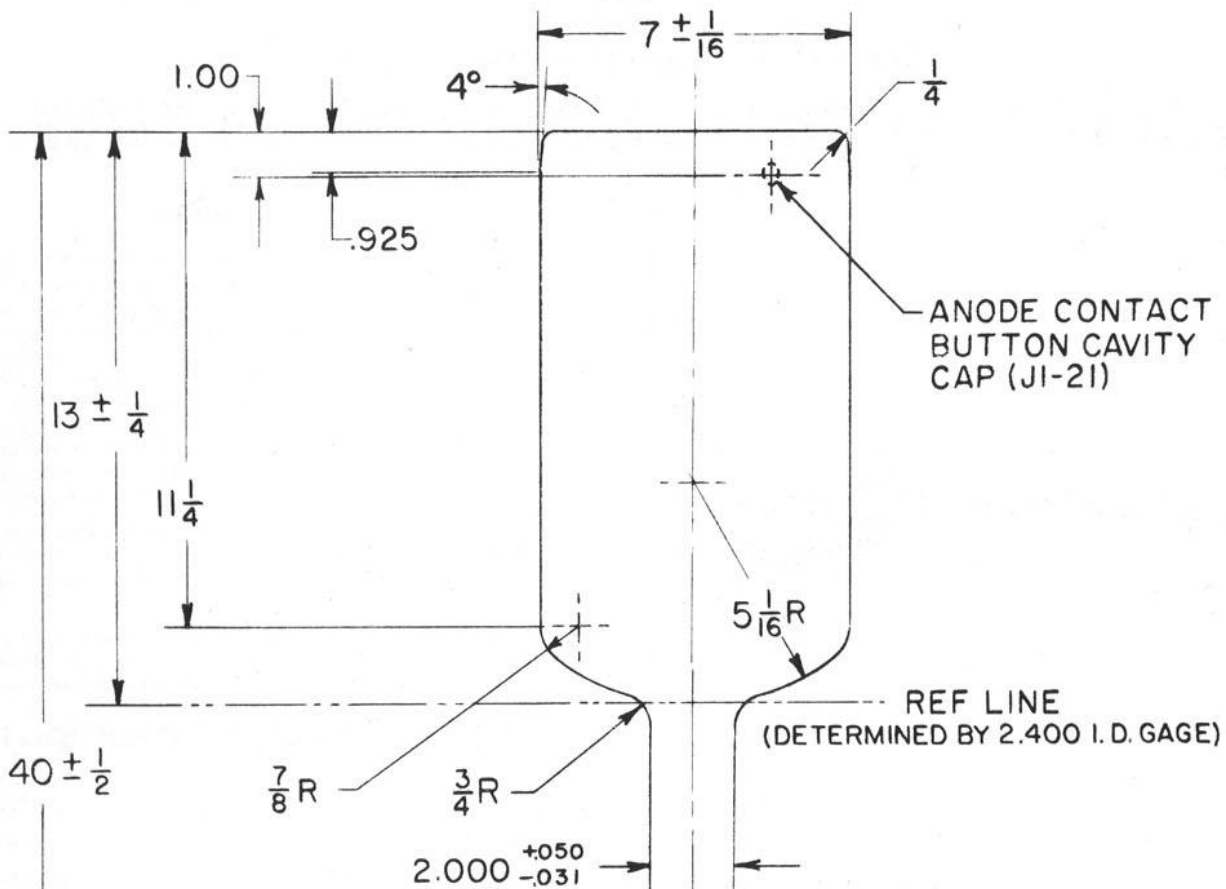
1. Correct screen orientation is indicated by the index mark on periphery of tube panel which denotes the 12 o'clock position on the panel.
2. These are typical values based on the use of a 64-character Type M63B matrix with an 8 x 8 array.
3. All voltages, except selection and reference voltages, are referenced to cathode.
4. First anode voltage adjusted so that beam diameter at matrix is equal to the character-to-character spacing.
5. Currents in selection and reference trim windings adjusted to produce correct beam orientation with respect to the selection and reference plates.
6. Squareness measured as ratio of diagonal of square pattern to height or width taken through the pattern center.

# STROMBERG-CARLSON - SAN DIEGO

A DIVISION OF GENERAL DYNAMICS CORPORATION  
1895 HANCOCK STREET - SAN DIEGO 12, CALIFORNIA

CHARACTRON IS A TRADEMARK OF GENERAL DYNAMICS CORP., STROMBERG-CARLSON DIV., SAN DIEGO, CALIF.  
REGISTERED IN THE U. S. PATENT OFFICE.

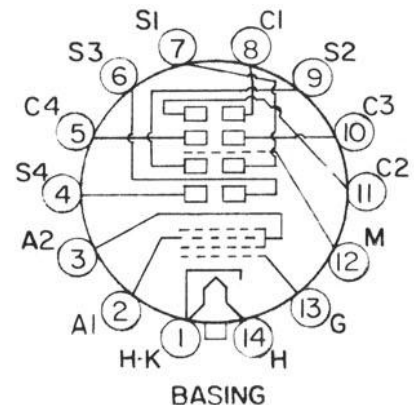
OUTLINE DRAWING



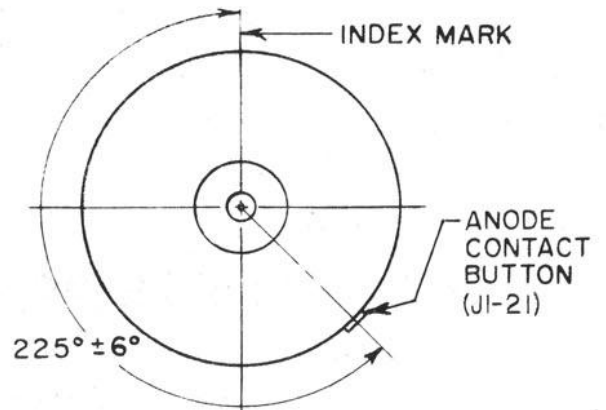
BASING

| PIN | ELEMENT                |
|-----|------------------------|
| 1   | HEATER-CATHODE (H-K)   |
| 2   | FIRST ANODE (A1)       |
| 3   | SECOND ANODE (A2)      |
| 4   | HORIZ. SEL. PLATE (S4) |
| 5   | HORIZ. REF. PLATE (C4) |
| 6   | HORIZ. SEL. PLATE (S3) |
| 7   | VERT. SEL. PLATE (S1)  |
| 8   | VERT. REF. PLATE (C1)  |
| 9   | VERT. SEL. PLATE (S2)  |
| 10  | HORIZ. REF. PLATE (C3) |
| 11  | VERT. REF. PLATE (C2)  |
| 12  | MATRIX (M)             |
| 13  | CONTROL GRID (G)       |
| 14  | HEATER (H)             |

MATRIX



BASING



BOTTOM VIEW OF TUBE

SMALL SHELL DIHEPTAL BASE  
TYPE B14-45



C19K14FD

STROMBERG-CARLSON — SAN DIEGO

# CHARACTRON® SHAPED BEAM TUBE

## APPLICATION

The CHARACTRON Shaped Beam Tube of the C-19K14FD type is a 19-inch round cathode-ray tube which was designed primarily for use as a large screen visual display. The CHARACTRON Shaped Beam Tube is capable of rapidly displaying letters, numerals, and special characters in combination with analog data on the viewing screen of the tube. The tube is especially useful in applications where simultaneous identification of radar targets is desired, along with the normal plan position indication.

Excellent display quality results from generating characters with a beam having cross sections formed into shapes of predetermined characters. In contrast to other methods of character generation, registry of the letter components is inherent.

The CHARACTRON Shaped Beam Tube can be operated at speeds in excess of 20,000 characters per second, that is, over five times faster than functionally similar mechanical devices now available.

## TYPICAL OPERATING CONDITIONS<sup>3</sup>

|  |                     |
|--|---------------------|
| Heater Voltage .....                     | 6.3 volts           |
| Heater Current .....                     | 0.6 ± 0.06 amps     |
| Third Anode Voltage .....                | +12000 volts        |
| Third Anode Current (Max.) .....         | 300 microamps       |
| Second Anode & Matrix Voltage .....      | +3300 volts         |
| First Anode Voltage <sup>4</sup> .....   | +650 to +1150 volts |
| Grid Cutoff .....                        | -60 to -110 volts   |
| Convergence-Winding Current .....        | 38 ± 2 ma           |
| Trim-Winding Currents <sup>5</sup> ..... | 0 ± 30 ma           |

### Character-Selection Factors<sup>2</sup>

|  |                        |
|--|------------------------|
| S1, S2 (Vertical) Selection Factor .....   | 25.5 ± 2.5 volts/char. |
| S3, S4 (Horizontal) Selection Factor ..... | 14.5 ± 1.5 volts/char. |

### Character-Reference Factors<sup>2</sup>

|  |                      |
|--|----------------------|
| R1, R2 (Vertical) Reference Factor .....   | 16 ± 1.6 volts/char. |
| R3, R4 (Horizontal) Reference Factor ..... | 16 ± 1.6 volts/char. |

## NOTES

1. Correct screen orientation is indicated by the index mark on periphery of tube panel which denotes the 12 o'clock position on the panel.
2. These are typical values based on the use of a 64-character Type FD matrix with an 8x8 array.
3. All voltages, except selection and reference voltages, are referenced to cathode.
4. First anode voltage adjusted so that beam diameter at matrix is equal to the character-to-character spacing.
5. Currents in selection and reference trim windings adjusted to produce correct beam orientation with respect to the selection and reference plates.



## GENERAL CHARACTERISTICS

|  |  |
|--|--|
| Dimensions .....                                 | Refer to outline drawing   |
| Base .....                                       | Small shell diheptal 14-pin  |
| Bulb contact .....                               | Cavity Type J1-21  |
| Screen .....                                     | P 14 aluminized  |
| Screen quality circle .....                      | 17 inches diameter   |
| Display orientation <sup>1</sup> .....           | By index mark  |
| Matrix .....                                     | 64 character position Type FD  |
| Selection .....                                  | Electrostatic  |
| Reference .....                                  | Electrostatic  |
| Deflection .....                                 | Magnetic   |
| Convergence .....                                | Magnetic   |
| Height of displayed character <sup>2</sup> ..... | 0.100 ± 0.010 inch   |
| Auxiliary equipment .....                        | Stromberg-Carlson Type<br>Y17-25C Yoke, C18-9C<br>Convergence Coil and Type<br>S22A Mount Assembly |

## MAXIMUM RATINGS<sup>3</sup>

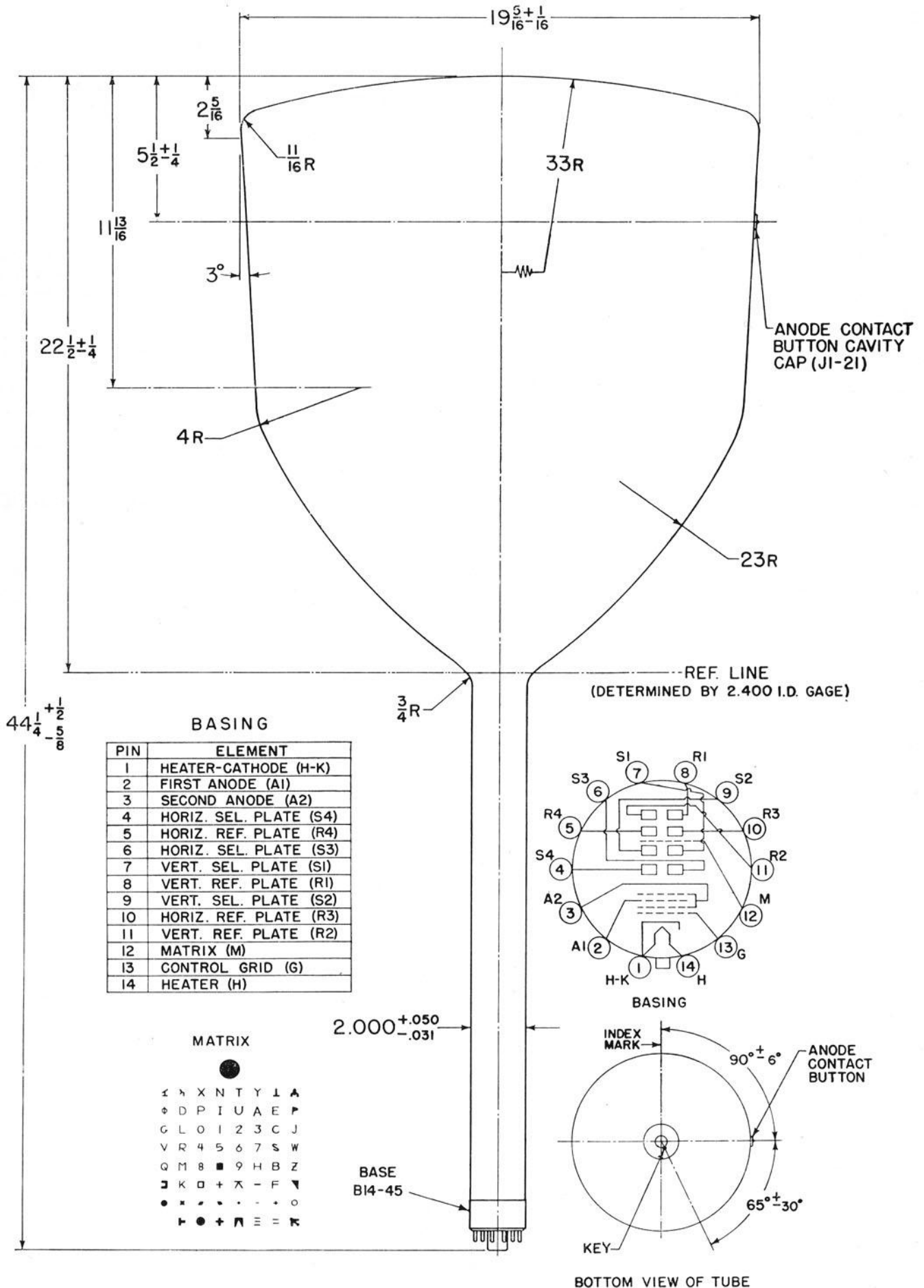
|  |               |
|--|---------------|
| Third Anode Voltage .....  | +15,000 volts |
| Second Anode & Matrix Voltage .....  | +3600 volts   |
| First Anode Voltage .....  | +1300 volts   |
| Grid Voltage   |               |
| Negative Bias Value .....  | -200 volts    |
| Positive Bias Value .....  | 0 volts       |
| Positive Peak Value .....  | +2 volts      |
| Peak Voltage Between Second Anode and<br>Matrix and any Selection or Reference Plate ..... | 500 volts     |

# STROMBERG-CARLSON - SAN DIEGO

A DIVISION OF GENERAL DYNAMICS CORPORATION  
1895 HANCOCK STREET - SAN DIEGO 12, CALIFORNIA

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REGISTERED IN THE U. S. PATENT OFFICE.

OUTLINE DRAWING



BASING

| PIN | ELEMENT                |
|-----|------------------------|
| 1   | HEATER-CATHODE (H-K)   |
| 2   | FIRST ANODE (A1)       |
| 3   | SECOND ANODE (A2)      |
| 4   | HORIZ. SEL. PLATE (S4) |
| 5   | HORIZ. REF. PLATE (R4) |
| 6   | HORIZ. SEL. PLATE (S3) |
| 7   | VERT. SEL. PLATE (S1)  |
| 8   | VERT. REF. PLATE (R1)  |
| 9   | VERT. SEL. PLATE (S2)  |
| 10  | HORIZ. REF. PLATE (R3) |
| 11  | VERT. REF. PLATE (R2)  |
| 12  | MATRIX (M)             |
| 13  | CONTROL GRID (G)       |
| 14  | HEATER (H)             |

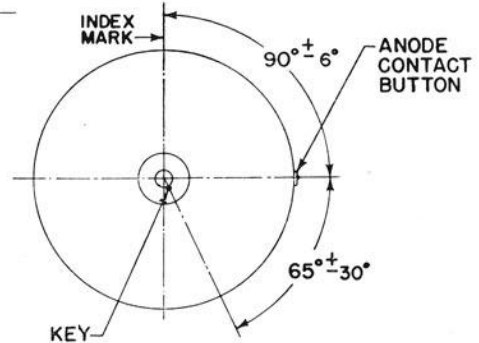
MATRIX



BASE B14-45

REF. LINE  
(DETERMINED BY 2.400 I.D. GAGE)

BASING



BOTTOM VIEW OF TUBE



STROMBERG-CARLSON

- RESEARCH
- DEVELOPMENT
- ENGINEERING
- PRODUCTION

STROMBERG-CARLSON SAN DIEGO  
A DIVISION OF GENERAL DYNAMICS

*CATHODE-RAY TUBES*

**STROMBERG-CARLSON - SAN DIEGO**

A DIVISION OF GENERAL DYNAMICS CORPORATION

Box 2449, San Diego 12, California

Special cathode-ray tube service is now available from Stromberg-Carlson's - San Diego Tube Plant. Expanded engineering and production facilities have permitted extension of the line of high-quality cathode-ray tubes.

Quality production is made possible by Stromberg-Carlson's modern dust-free tube manufacturing facilities. Tubes built by this plant have exhibited extremely long life. For example, the CHARACTERON Shaped Beam Tubes have demonstrated an average life of more than 4,000 hours, with tubes still operating in excess of 8,000 hours.

Your tube needs, whether for production quantities or for small quantities of engineering prototypes, can be met by Stromberg-Carlson's versatile facilities.

Stromberg-Carlson's 60-year reputation for reliable high-quality products is your assurance of maximum satisfaction and continued service.





**ASSEMBLY OF ELECTRON GUNS FOR CHARACTER SHAPED BEAM TUBE.** Extensive care has been taken to protect the delicate components of the electron gun from contamination during its close-tolerance assembly.

## PRODUCTION

The Tube Production facilities at Stromberg-Carlson - San Diego possess the combination of complex yet versatile production equipment, rigidly controlled materials and processes, and cleanliness of the highest order --a combination necessary for a manufacturer producing varied types of high-quality cathode-ray tubes.

Stromberg-Carlson's ability to vary processes rapidly gives it the ability to meet difficult delivery schedules, and its equipment is capable of fulfilling the demands of volume production as well as those of specialized small lots. Its 10,000 square feet of tube production area is sufficient for the manufacture of three hundred 17-inch or 21 - inch tubes a month. For tubes of small sizes, this production rate can be significantly increased.

Stromberg-Carlson's facilities and equipment available for high-quality production include the following

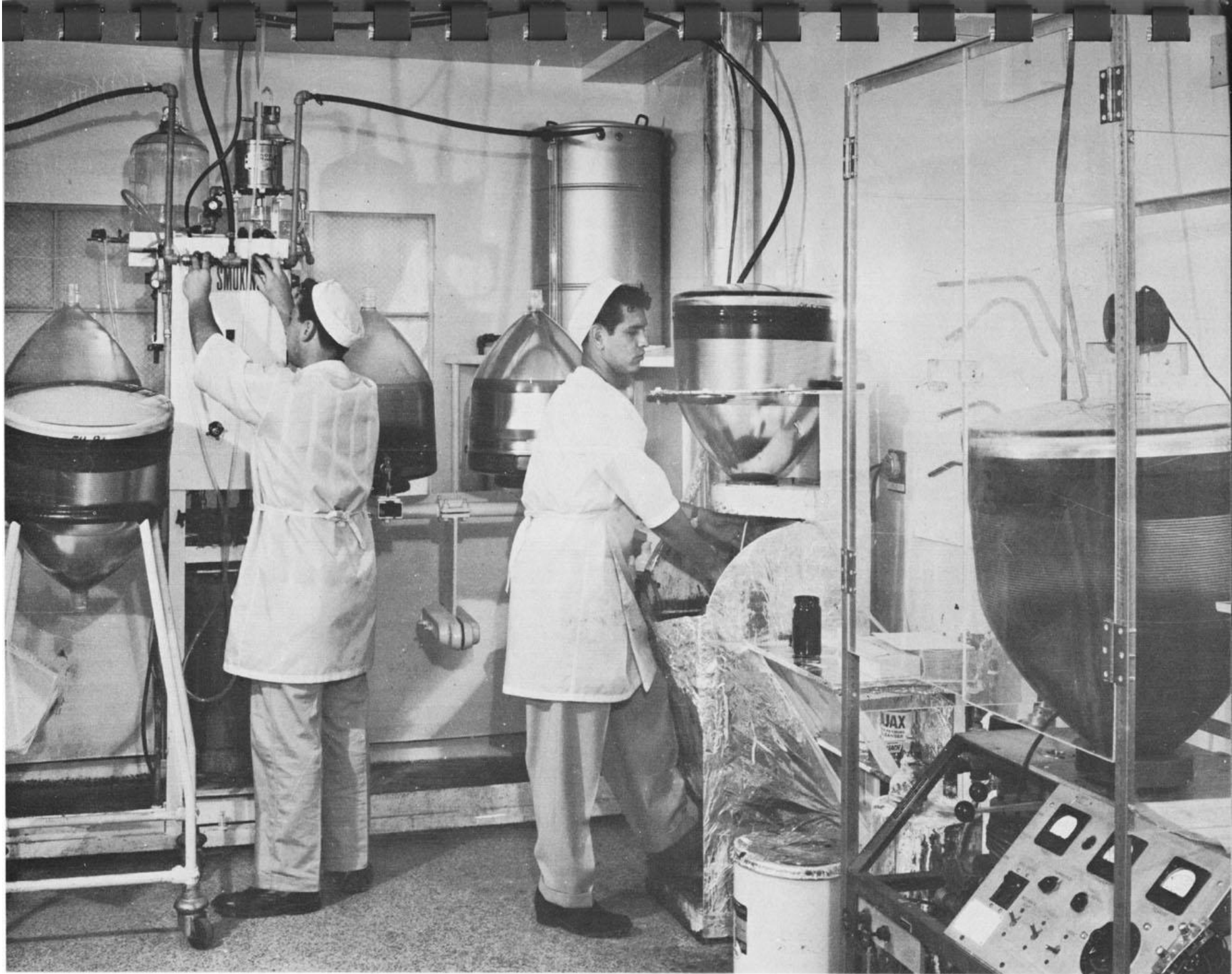




**MAIN TUBE MANUFACTURING AREA.** In the far right, technicians are applying the phosphor screen to the tube; in the left foreground, a technician is applying the helical accelerator anode to the inside of the tube. Hospital-like environmental conditions are maintained to insure perfection in finished tube products.

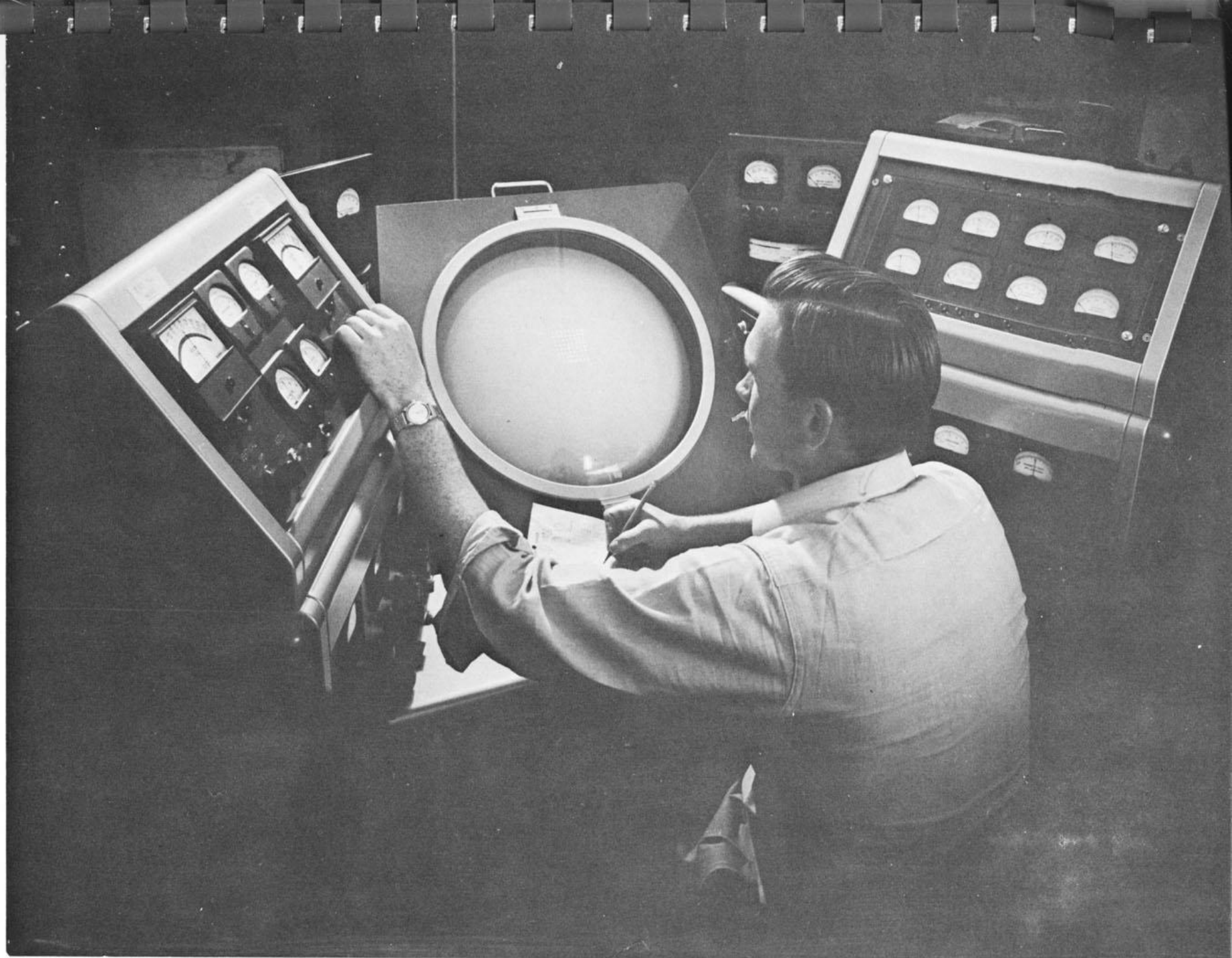
a process control laboratory insuring uniformity in the composition and quality of materials used; automatically-cycled baking ovens to provide uniform drying of internal coatings; specialized equipment for applying helices for post acceleration; accurately controlled exhaust ovens possessing all glass exhaust systems providing a vacuum below  $1 \times 10^{-6}$  mm Hg before tip-off; a surgically clean, pressurized, air conditioned electron-gun room to assure maximum tube life; and isolated areas for depositing and aluminizing screens to minimize the possibility of contamination.

Although Stromberg-Carlson's production facilities and equipment are designed for the highest quality of production, quality is additionally assured by the fact that each step in the production operation is scrutinized by well-trained quality control inspectors. Thus, reliability and a tube life in excess of 4000 hours is obtained. Quality is further guaranteed by rigid testing after manufacture.



**ALUMINIZING AND LACQUERING FACILITY.** Highly trained specialists are shown applying the protective lacquer and aluminum coatings to the phosphor screen of the CHARACTRON Shaped Beam Tube. Equipment is designed to handle a large variety of sizes of cathode-ray tubes.

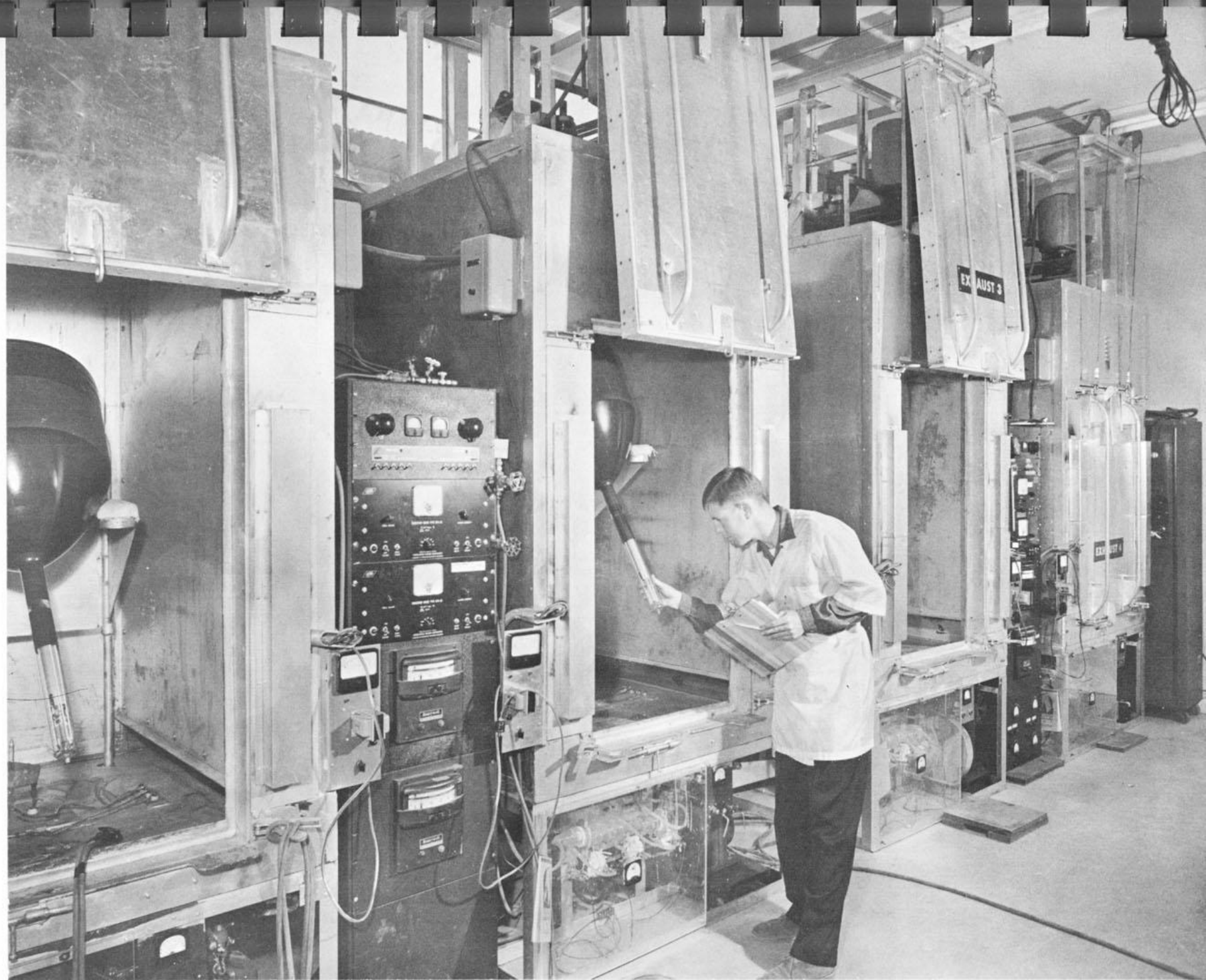




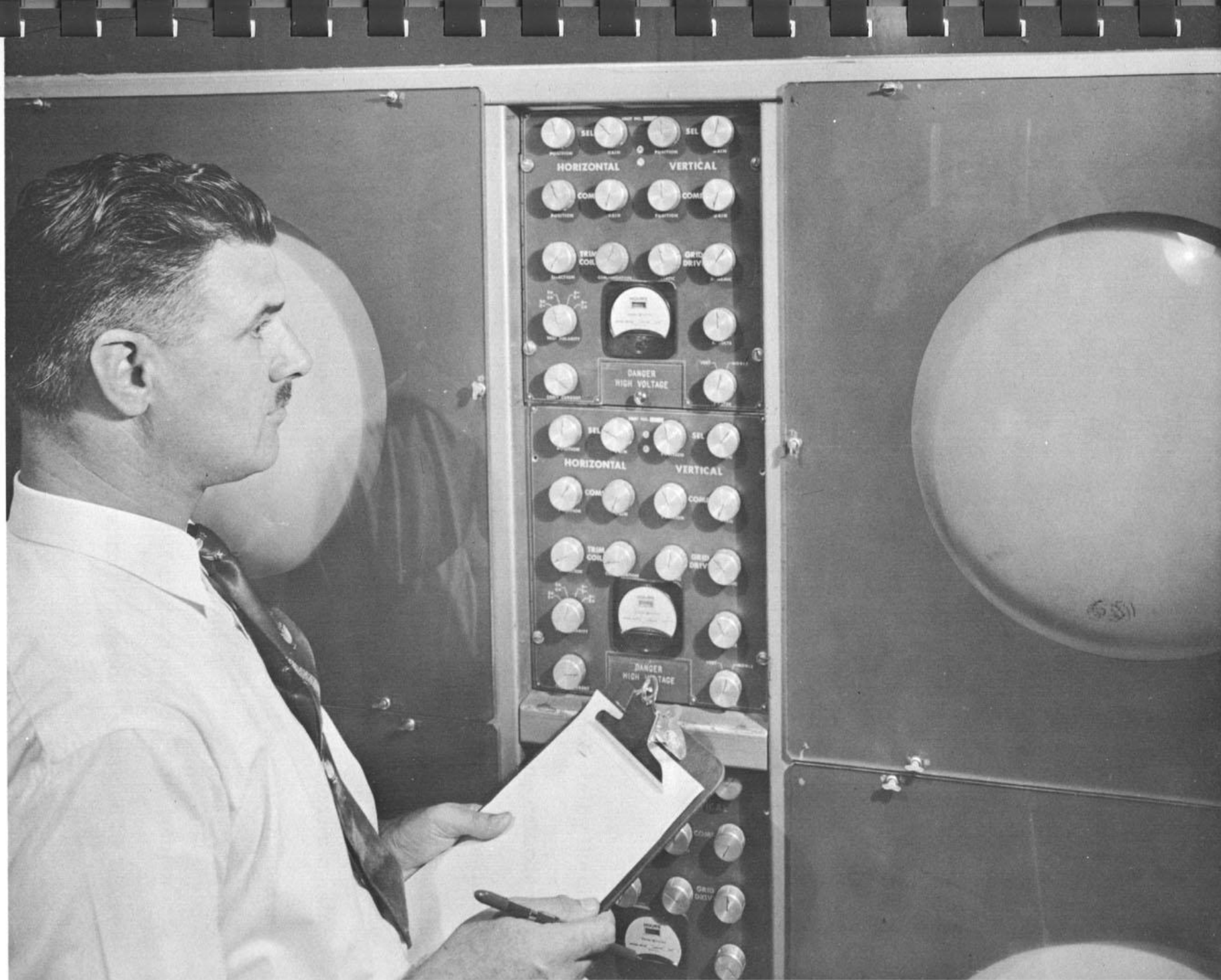
**CHARACTRON TUBE TESTER, MODEL 110A.** This tester performs complete dynamic and static tests on the CHARACTRON Shaped Beam Tube, Type C19K14FD 19-inch diameter. This particular tester was made for a tube customer, and is essentially a duplicate of the production tester designed for final acceptance testing of tubes.



Data sheets in the appendix of this brochure represent a cross section of Stromberg-Carlson's tube production capabilities. These sheets present pertinent data on tube characteristics and recommend operating conditions. New tube types are constantly being added.



**TUBE EXHAUST OVENS.** These ovens have been constructed especially to perform a dual task in final assembly. Tubes are baked at accurately controlled temperatures to boil out residual gases while tubes are evacuated by diffusion pumps. Tubes are evacuated to  $10^{-7}$  mm Hg, then sealed.



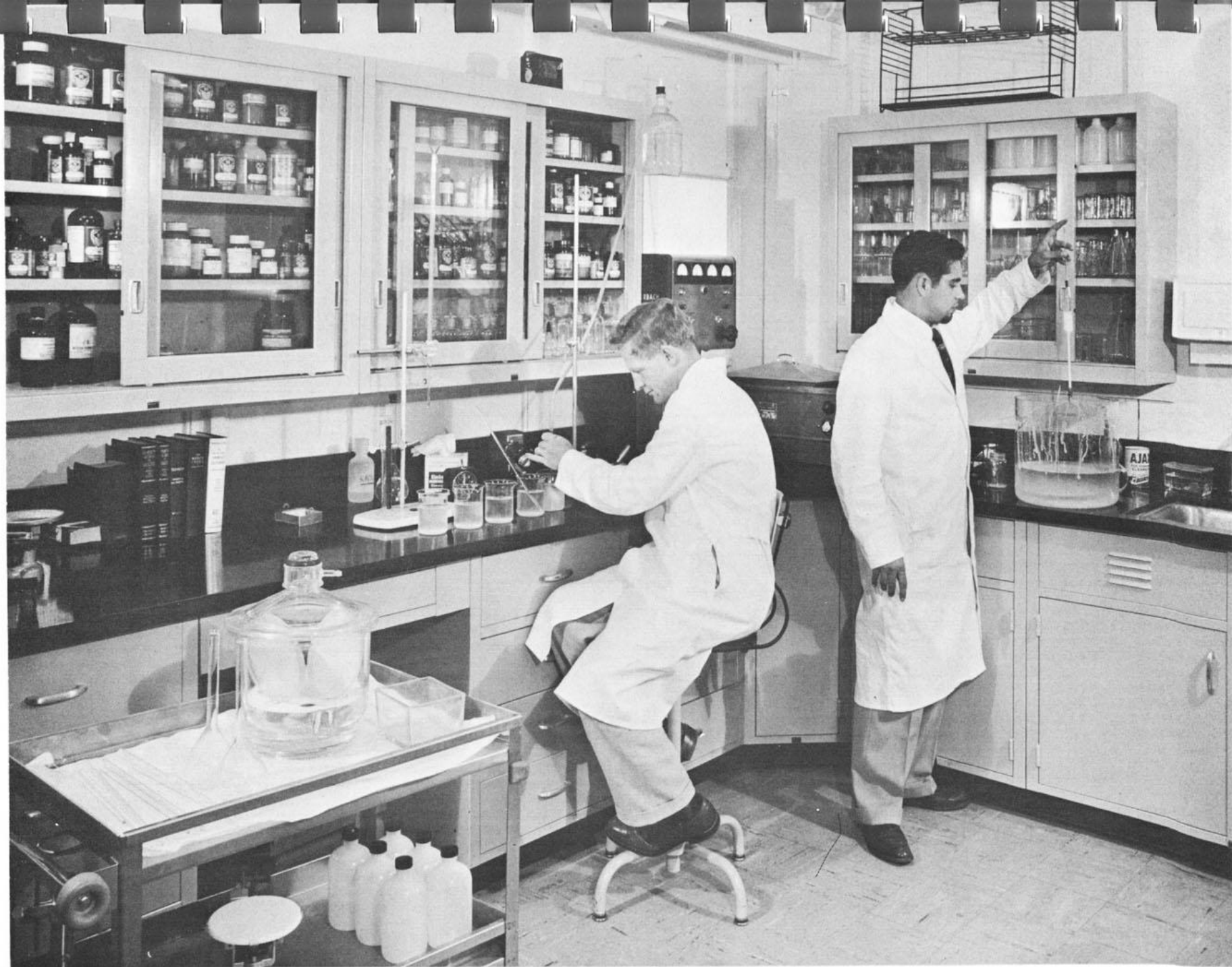
**CHARACTRON LIFE TESTER, MODEL 120.** Quality control samples of the CHARACTRON Shaped Beam Tube receive performance tests in this equipment. Tubes are tested in excess of 5000 hours under actual operating conditions to insure top performance over long tube life.

## ENGINEERING

Superior design and quality of the cathode-ray tubes produced for you is insured by Stromberg-Carlson's Tube and Component Engineering Department. Research, design, development, and specifications for each new tube originate in this department. Close liaison between the engineering and production groups materially aids in the maintenance of a high-quality product.

In addition to prescribing and supervising the materials and processes used in manufacturing cathode-ray tubes, the Engineering Department maintains a continuing research and development program to make sure that its products are compatible with the state of the art. The activities of the Engineering Department include a continuous program to improve phosphor and screen characteristics, cathode uniformity and stability, and techniques for assuring cleanness of all cathode-ray tube components used. The longer-range approach maintained by the re-

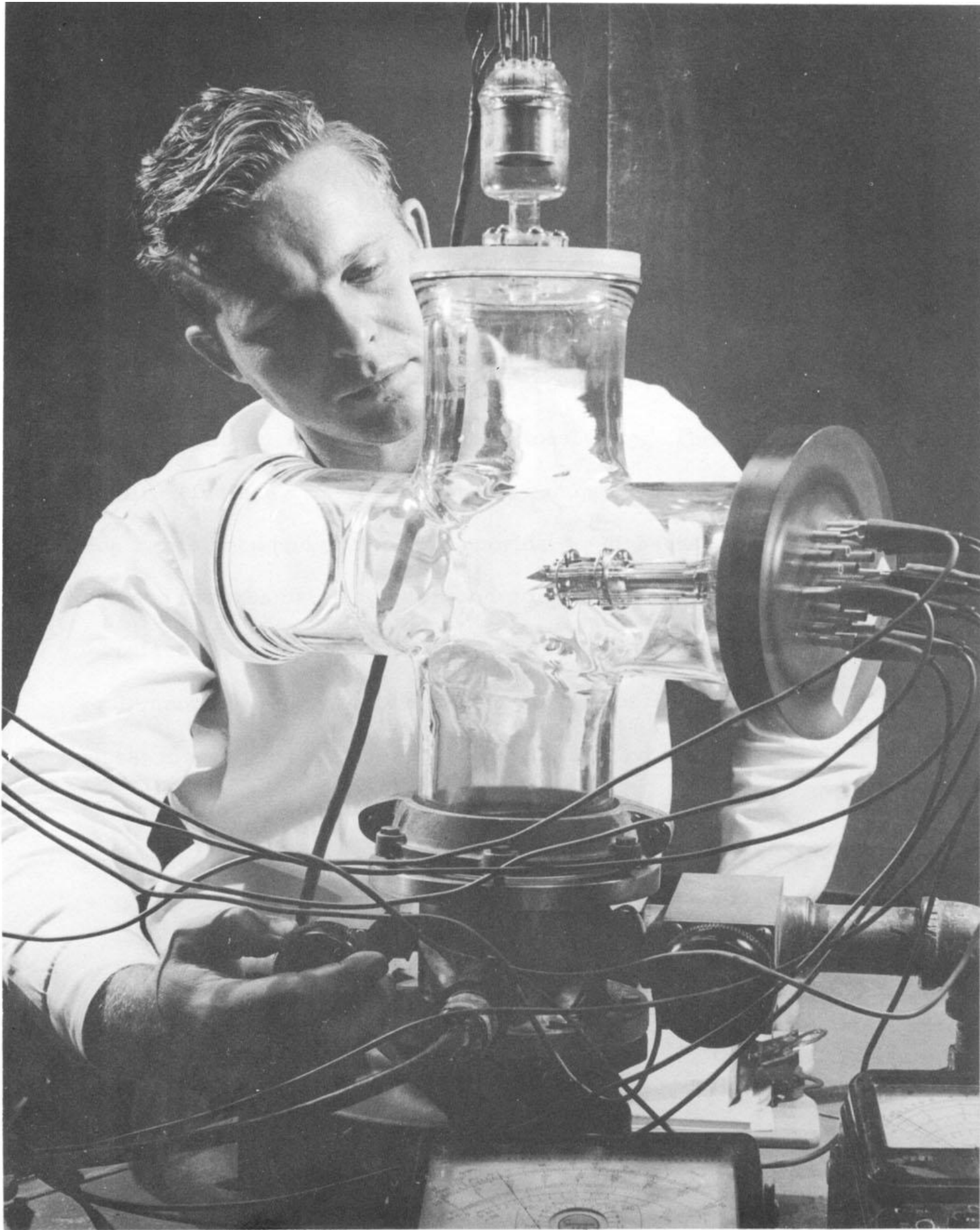




**MATERIALS RESEARCH LABORATORY.** Research and development of cathode-ray tube materials.

search and development groups is primarily to establish product superiority in cathode - ray tubes. Among the projects in progress are barrier-grid type storage-tube development, which includes extensive work in solid-state physics and chemistry; higher-speed and brighter CHARACTRON Shaped Beam Tubes; development of tubes for specialized applications; and basic electron optics studies. Each of these projects is backed by extensive experimental facilities including a complete materials and chemistry laboratory, high-vacuum demountable equipment, and extensive electronics test equipment.

The Product Engineering group is equipped for the rapid transmission of complete, accurate engineering information to the production groups. In addition to maintaining liaison between the engineering and production departments, the Product Engineering group performs liaison between the customer and the production groups, ra-

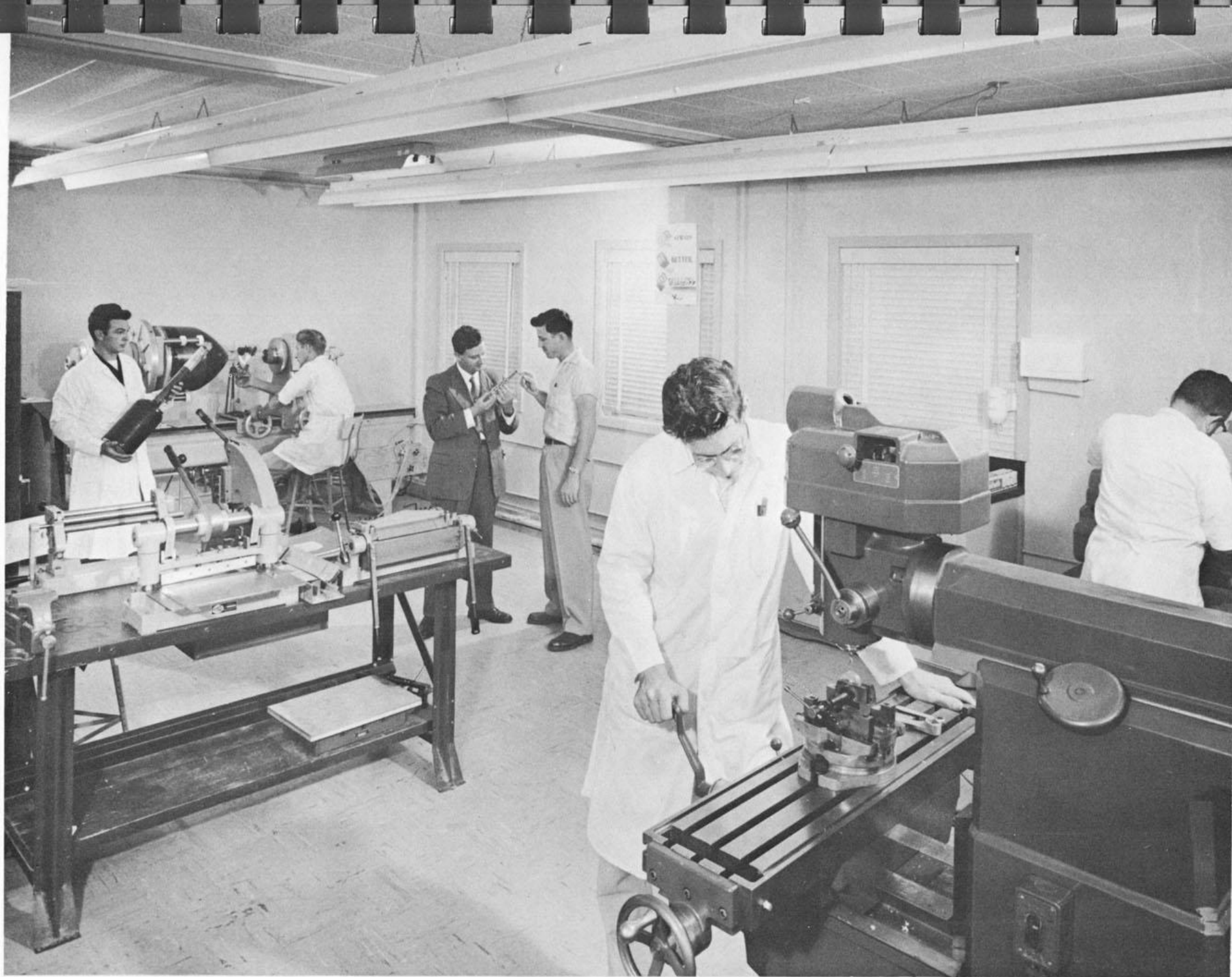


**DEMOUNTABLE VACUUM SYSTEM.** Specialized high-vacuum equipment for cathode-ray tube research and development.

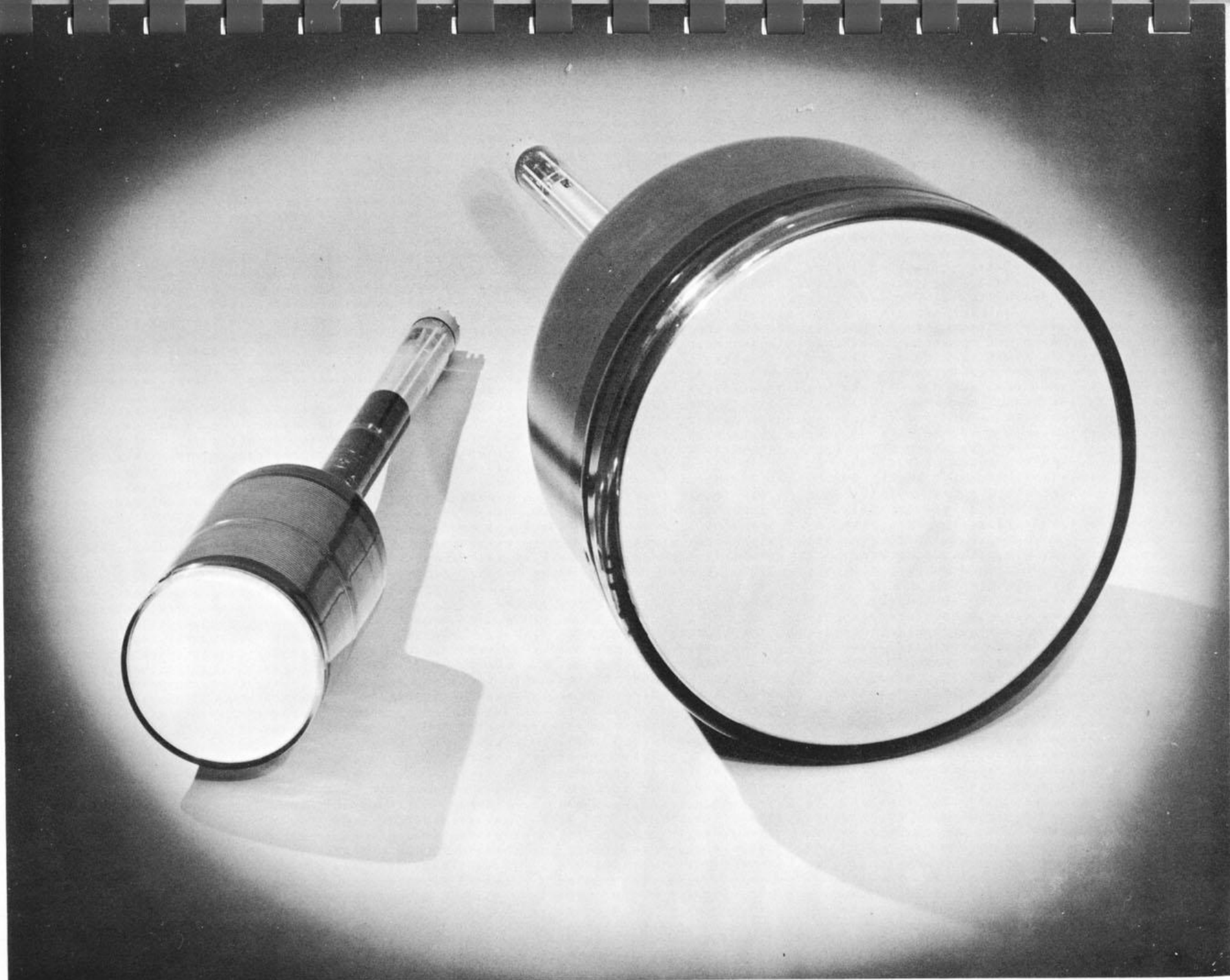
pidly transmitting customer needs to the factory and translating them into an improved product.

Additional service facilities are provided by a completely equipped Engineering Tube Model Shop. These facilities include a versatile machine shop that is specifically designed and equipped to provide the high-quality jigs and fixtures necessary for modern cathode-ray tube manufacture. The machine shop, which contains all the equipment necessary for the production of experimental tubes, makes possible the rapid construction and testing of such tubes without interference to the normal flow of production tubes.





A PORTION OF THE ENGINEERING MODEL SHOP. Development and fabrication of experimental cathode-ray tubes and components.



**CHARACTRON SHAPED BEAM TUBES, 7-INCH AND 19-INCH DIAMETERS.**

