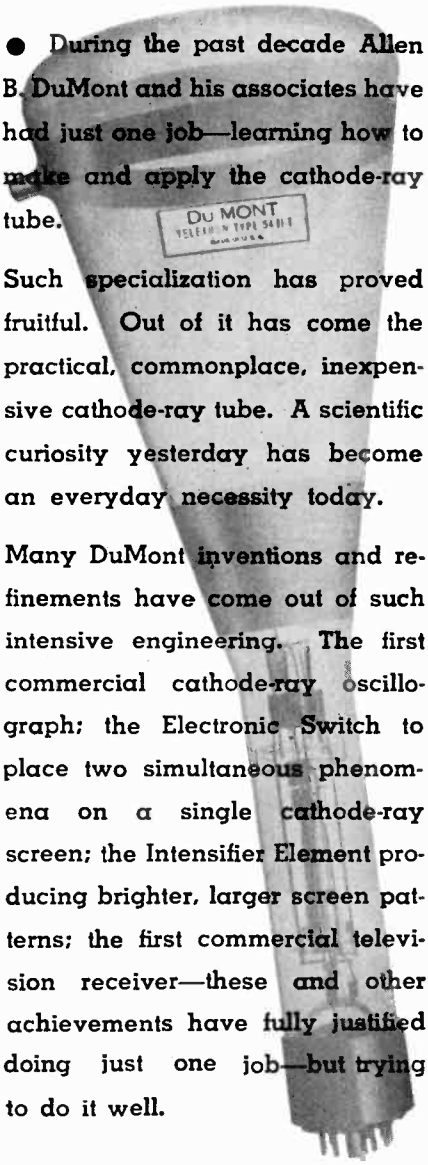
Pioneering the
CATHODE-RAY *and* TELEVISION ARTS

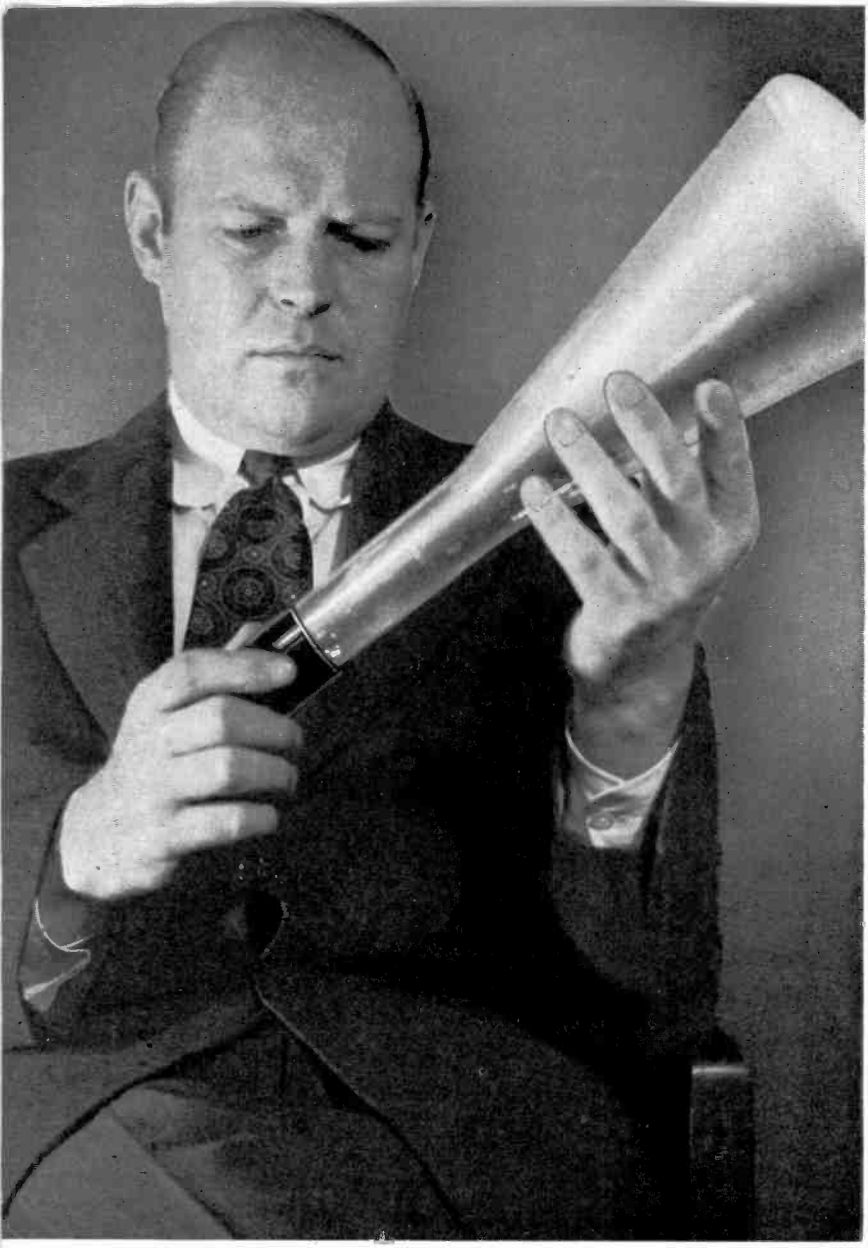
A report of the first decade of the Du Mont organization



● During the past decade Allen B. DuMont and his associates have had just one job—learning how to make and apply the cathode-ray tube.

Such specialization has proved fruitful. Out of it has come the practical, commonplace, inexpensive cathode-ray tube. A scientific curiosity yesterday has become an everyday necessity today.

Many DuMont inventions and refinements have come out of such intensive engineering. The first commercial cathode-ray oscillograph; the Electronic Switch to place two simultaneous phenomena on a single cathode-ray screen; the Intensifier Element producing brighter, larger screen patterns; the first commercial television receiver—these and other achievements have fully justified doing just one job—but trying to do it well.



★ Allen B. Du Mont—cathode-ray pioneer and specialist—examining one of his earlier 5-inch teletrons. Back in 1931 Du Mont virtually went into the seclusion of his home laboratory for the purpose of studying cathode-ray oscillography and working out a commercial solution of the cathode-ray tube, which, up till then, had been a rare laboratory curiosity. In the succeeding years he evolved commercially practical cathode-ray tubes, oscillographs and associated equipment which are in use throughout the world today. It is this man's work, his associates, his organization and his contributions to the cathode-ray and television arts that constitute the unusual story that follows.

Pioneering the CATHODE-RAY *and* TELEVISION ARTS

This is the story of the first decade of the Allen B. Du Mont Laboratories. Likewise is it a vital chapter in the general history of cathode-ray technique and its direct offshoot, the present-day television art, for the Du Mont name and the cathode-ray practice are inseparably linked together. Mention of one immediately brings the other to mind, and thus is appropriately reflected a fruitful ten years of pioneering, engineering development and production effort without which the cathode-ray tube might still be a laboratory curiosity, while television could hardly rate in commercial terms.

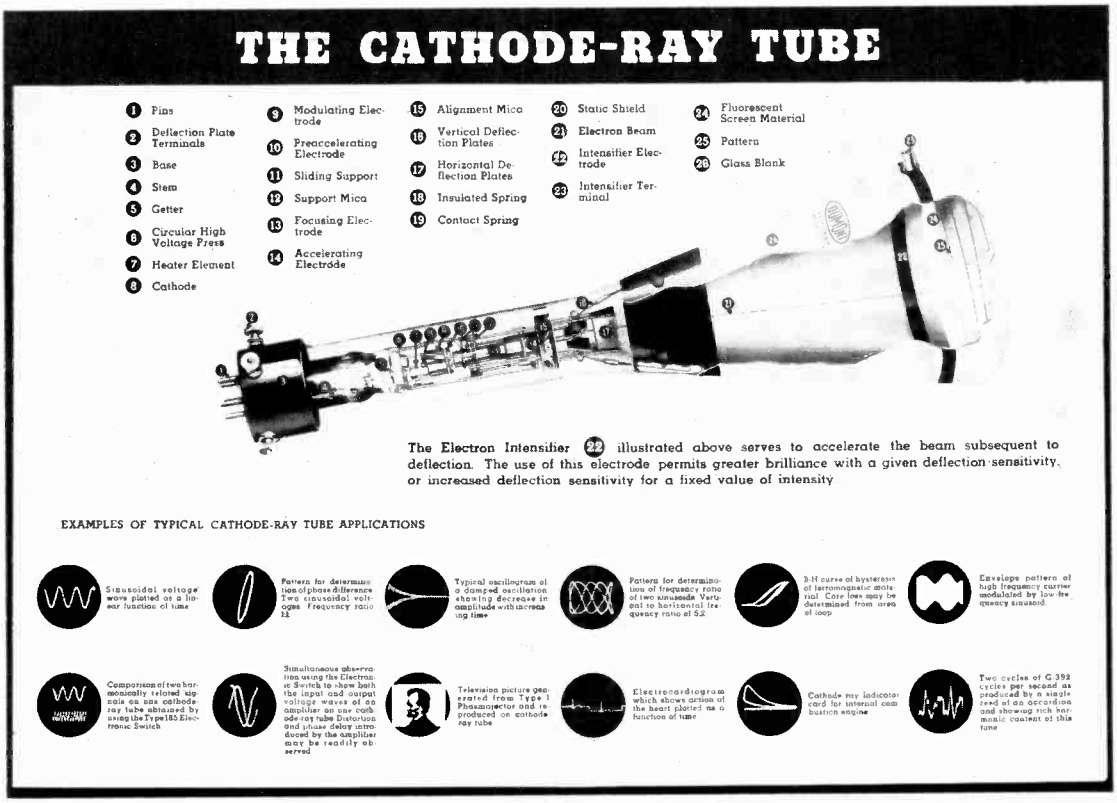
And so we enter upon a most unusual story of a man with an idea which developed into a specialized organization producing cathode-ray equipment used throughout the world, which in turn has laid the practical foundation for successful television.

The Man with the Idea

The activities and achievements about to be discussed begin with Allen B. Du Mont, the man with the original idea. In fact, the organization bearing his name is simply an extension, elaboration or just plain multiplication of this man's inventive genius, engineering skill and driving effort. The Allen B. Du Mont Laboratories today enjoy a multiple function, serving at once as an engineering and development group, a patent-holding company acting as licensors, a production plant for cathode-ray tubes and equipment as well as television transmitters and receivers, and again as a television broadcasting system ready to take its place in the field of video entertainment. But to get to the beginning of our story . . .

Back in 1931 Allen B. Du Mont conceived the idea of commercializing the cathode-ray tube and exploiting to the fullest the many possibilities of this amazing device in everyday work. At the time the cathode-ray tube was a laboratory curiosity. Prohibitive in cost, its use was limited to a handful of laboratories working with lavish budgets. To think of the cathode-ray oscillograph as a commonplace tool in industry, such as it is today, was simply fantastic and even preposterous. But not so, perhaps, when you appraise the extraordinary background brought to bear on the problem by this man Du Mont.

Born in 1901, in Brooklyn, N. Y., Du Mont had served as a commercial radio operator on coastwise and transatlantic ships. He had owned and operated amateur transmitting station W2AYR. Later came his graduation from Rensselaer Polytechnic Institute with an electrical engineering degree, followed by several years with the Westinghouse Lamp Company, first as engineer in the development laboratory, later as engineer in charge of various types of radio receiving tubes. While with Westinghouse he applied for numerous patents covering tube improvements and tube-production equipment. One of these patents made tube history as a high-speed automatic aging and testing machine oper-



Just what is a cathode-ray tube? This greatly reduced reproduction of a two-color wall chart issued several years ago by the Du Mont organization to schools, engineering departments, laboratories and other institutions, first made common knowledge out of the erstwhile mysteries of this new art.

ating at the rate of 5000 tubes per hour. For this and other contributions he was presented in 1927 with the First Award for the most outstanding accomplishment of any employee in the Westinghouse organization.

From Westinghouse, Du Mont went to the reorganized DeForest Radio Company, first as Chief Engineer and later as Vice President in charge of all engineering development work and manufacturing. There he found an abandoned plant which had not been operated for over a year. The available equipment was obsolete. The DV series of audions had already been superseded by improved tubes during the company's long inactivity. There was no personnel on hand. Nevertheless . . .

Within a few months Du Mont had gathered new machinery, trained new personnel and was turning out in excess of 30,000 receiving tubes each day. He developed much special equipment to speed up production and reduce costs, including the improved high-speed sealing machine, automatic grid winding and welding machine, high-speed base-branding machine, high-speed basing and wire-cutting machine, improved weld machine, high-speed automatic seasoning and testing machine, and various tube-characteristic test sets and life racks.

Du Mont then turned his attention to transmitting tubes. Soon a complete line of transmitting tubes was made available. Later came the designing and building of 'phone and code transmitters from 50 watts to 10 kilowatts. Under his supervision a practical facsimile system was evolved.

With the absorption of the Jenkins television interests by the DeForest organization, Du Mont was placed in direct supervision of the DeForest television developments. This work was climaxed by the in-

auguration in 1930 of scheduled sight-and-sound programs over DeForest television station W2XCD at Passaic, the very first American genuine television entertainment of record, despite the limitations of 60-line mechanical scanning so apparent to Du Mont.

Indeed, realizing the need for cathode-ray technique whereby to further the progress of television, along with a better instrumentation of industry generally, Du Mont resigned his important post at DeForest and went into virtual seclusion so as to concentrate and specialize and pioneer. Thus the extraordinary background brought to bear on the cathode-ray-tube *commercialization* problem.

The Du Mont Organization Is Born

The year: 1931. The scene: the basement, and a little later, the garage of Du Mont's home in Upper Montclair, N. J. Here Du Mont set up some second-hand tube-making machinery. Aided by a couple of skilled glassblowers, he began his quest of the *commercialized* cathode-ray tube.

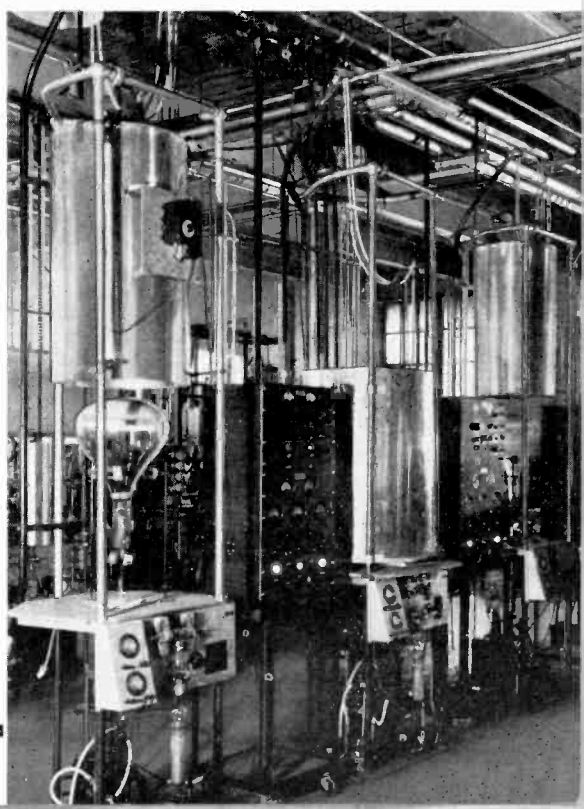
Du Mont made an exhaustive survey and study of the cathode-ray art up to then—literature, available tubes, known usages, potentialities. He designed and built many different types and variations. In a few months he had evolved practical cathode-ray tubes in several sizes, and these were produced for sale on a glorified laboratory basis. They were snapped up by anxious seekers of cathode-ray equipment. So much so that the laboratory activity now had to be stepped up to something like commercial production.

The basement and garage space soon outgrown, Du Mont moved his small organization to a store in town. A few more months and a hole was knocked through the wall, taking over the adjacent store. Then another hole and a third store, another hole and another hole, until five stores were joined together for a Topsy-style production plant and engineering laboratory. Crowded, awkward, uncomfortable from the heat of many gas flames and molten glass, the quarters were by now inadequate for the steadily mounting output of cathode-ray tubes and even complete oscillographs which, heretofore made on contract by outsiders, were now Du Mont produced.

A Plant of Its Own

And so the Du Mont organization, now well beyond adolescence, moved into its present plant building purchased early in 1938, located on the outskirts of Passaic and with ample grounds for future expansion. Here with over 30,000 square feet of floor space, and with a personnel close to two hundred, the Du Mont organization already finds itself cramped for space by a business that has exceeded the fondest expectations. Particularly in these days of National Defense activities, when Du Mont is called upon to produce radio communication equipment over and above the cathode-ray equipment required by many different industries, universities, laborato-

To produce the giant teletrons, special exhaust positions and ovens had to be built and installed in the Du Mont plant. The aluminum cylinders contain heating elements which heat the glass bulbs and drive out moisture, during pumping operations.



ries. An annex has been obtained close to the main plant, and additional personnel is now at work on Government contracts.

And all the while this man Du Mont is the directing genius. He works incessantly with his engineer-specialists. He checks, suggests, collaborates, in the design of new cathode-ray tubes and equipment. He is in close touch with production activities. He takes a keen interest in the sales and business functions of his growing organization. Engineer, inventor, production man, practical businessman—we have here that rare combination of the many elements needed to weld the growing band of specialists together.

Du Mont Cathode-Ray Tubes

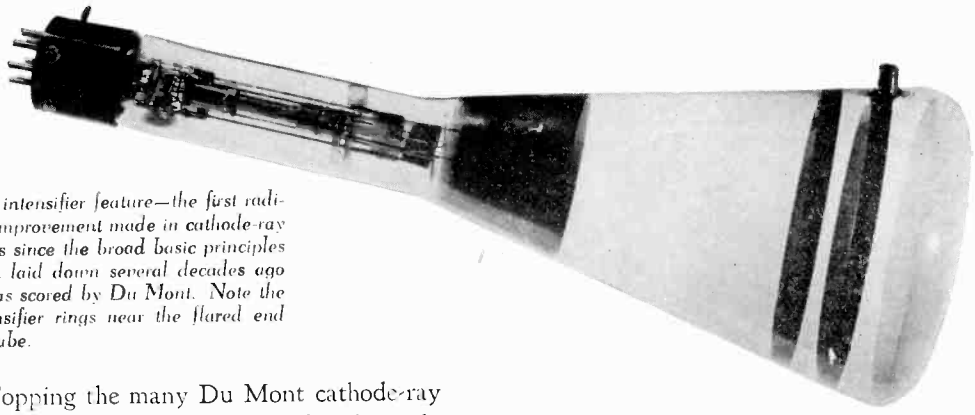
From June of 1931 until January of 1932, Du Mont designed, made and tested many experimental types of cathode-ray tubes, finally evolving the broad basis for the electrostatic deflection tubes now in general use throughout the world in the 3-inch, 5-inch and 9-inch sizes, for oscillograph and allied purposes.

The Du Mont organization has simplified the general design and production technique, whereby the cathode-ray tube, once a laboratory curiosity and indeed a rarity, has become commonplace equipment. Du Mont has pioneered the high-vacuum type with two sets of electrostatic deflection plates. After a decade of specialized experience, Du Mont engineers are confident that electrostatic deflection is more satisfactory, which point is generally conceded. Due to distortion introduced by the inductance of magnetic deflecting circuits, as well as the presence of negative ion components of the cathode-ray beam which are not deflected magnetically as they are electrostatically, electrostatic deflection is superior not only for oscillographic but also for many television applications.

Coupled with electrostatic deflection, Du Mont engineers have worked for a fine uniform trace, high intensity, high sensitivity and exceptionally long life. Intensive studies of various screen materials has resulted in a choice of medium-persistence green (for the usual run of work); short-persistence blue (for an actinic blue trace suitable for photographic recording); and long-persistence green (for the study of transient phenomena, the trace of which must be held on the screen for an appreciable period). There is also the black-and-white screen suitable for television work, including the latest "memory" screen for the minimizing of flicker at slow repetitive picture rates, as dealt with farther on.

Du Mont cathode-ray tubes are divided into two broad groups, namely, *Oscillotrons* for oscillographic application, and *Teletrons* for television work.

With the advent of commercial television, these 14-inch Du Mont teletrons became a production item rather than a laboratory masterpiece. Dozens of the 14-inch and 20-inch teletrons are produced each working day in equipping as many Du Mont television receivers.



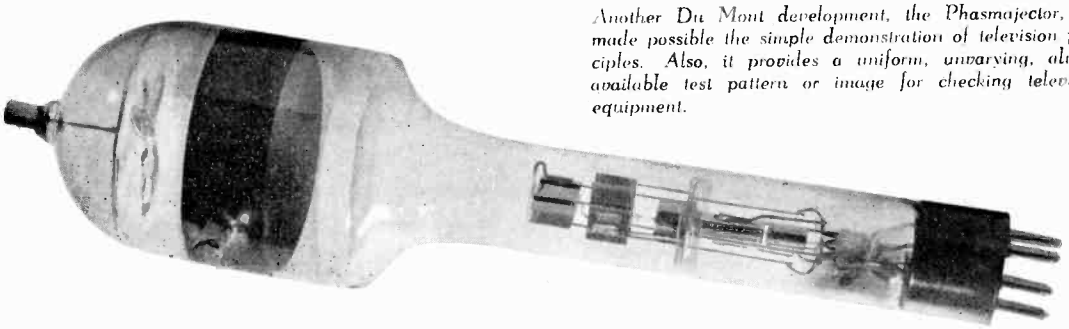
The intensifier feature—the first radical improvement made in cathode-ray tubes since the broad basic principles were laid down several decades ago —was scored by Du Mont. Note the intensifier rings near the flared end of tube.

Topping the many Du Mont cathode-ray tube developments is the intensifier electrode feature, covered by basic patents and first introduced late in December 1938. This additional electrode in the form of a metallic-deposit band on the inside wall of the tube, close to the screen end, greatly increases the brilliance without corresponding loss in deflection sensitivity. This electrode accelerates the electronic beam *after* deflection. From the practical standpoint, this feature brightens the pattern equivalent to doubling of the accelerating voltage, yet not causing so great a decrease in sensitivity as actual doubling of this voltage would produce. Or to put it another way, instead of a reduction in pattern size of 50%, as doubling the accelerating voltage would normally produce, the voltage with use of an intensifier electrode reduces the pattern size by only 18%. Thus the design of deflection amplifiers has been considerably simplified. The vivid screen traces of Du Mont oscillographs and television sets are due to the Du Mont intensifier feature. It is felt that this new improvement in cathode-ray tube design—the first fundamental improvement affecting sensitivity since the inception of these tubes over 40 years ago—is proving invaluable in multitudinous applications.

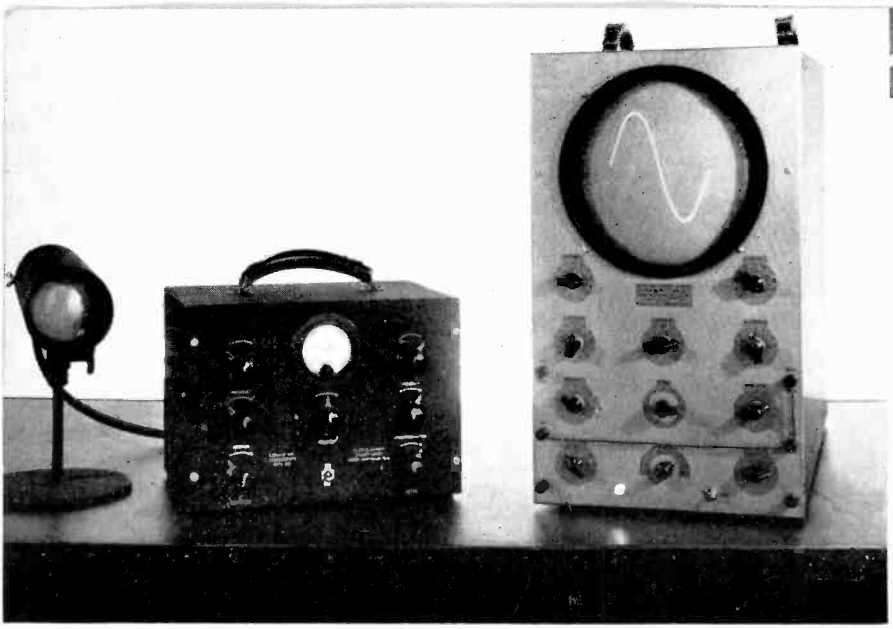
Du Mont tube developments have also included the phasmajector, which provides a uniform television test signal, as well as a simple, inexpensive demonstration of television principles. Likewise the 14-inch and 20-inch teletrons, for television reception.

Meanwhile, the Du Mont organization, as a by-product of its cathode-ray development work, did evolve the cathode-ray tube null indicator, popularly known as the "magic eye", used not only for the precise tuning of many modern super-heterodyne receivers, but also in numerous radio and industrial instruments. The radio application rights to this invention were sold to RCA, while Du Mont retained all non-radio application rights.

Today Du Mont cathode-ray tubes are available in many types and sizes and screens, ranging from the small 3-inch oscillotron for low-priced oscillographs, to the large 9-inch oscillotron, and again to the 14-inch and 20-inch teletrons. The organi-



Another Du Mont development, the Phasmajector, has made possible the simple demonstration of television principles. Also, it provides a uniform, unvarying, always available test pattern or image for checking television equipment.



How Du Mont engineers soon commercialized the cathode-ray oscillograph is graphically told here. At left, the original Du Mont oscillograph, with separate tube holder. At right the portable instrument idea of 1938, establishing the general design of today.

zation also produces a selection of half-wave high-vacuum rectifier tubes and gaseous discharge tubes for use in sweep circuits and their power supplies.

The Cathode-Ray Oscillograph Goes Commercial

Having provided the very foundation for cathode-ray oscillography, with its practical, uniform, low-cost tubes, the Du Mont organization was soon called upon to furnish complete oscillographs as well. And so the first Du Mont oscillograph, Type 127, was announced late in 1932, with the statement "The completeness and moderate price of the unit bring the art of cathode-ray oscillography within reach of present-day laboratory budgets". The instrument was classified as "portable". It consisted of two units, namely, the case containing power supply, sweep circuits and necessary controls, and the 3-inch cathode-ray tube in a separate adjustable holder. The price was $185.00.

Also in 1933, the Du Mont organization introduced the Macneil amplifier, with a current sensitivity of 4/10,000,000th ampere, for the operation of string torsion galvanometers. But the rapid strides made with the cathode-ray oscillograph soon caused all efforts to be concentrated on this technique, so further attempts to supersensitize string galvanometers were abandoned.

Always appreciating the difference in standards between precision laboratory work and general or industrial usage, the Du Mont organization as far back as July 1933, introduced its first laboratory-grade cathode-ray oscillograph. This was a rack-type instrument with a 5-inch tube, but also available in 9-inch. It had a linear-sweep range of 10 to 5000 cycles, and was hailed at the time as a marked advance in precision equipment. The first truly portable single-unit Du Mont oscillograph types, Type 137 with 5-inch tube and the 138 with 3-inch tube, were announced in January 1934. These instruments were primarily intended for broadcast modulation studies, and sold for $165.00 and $85.00, respectively. By fall of that year, came the Type 142 5-inch oscillograph which, with its four controls on the panel, bore just a faint suggestion of present-day Du Mont general-purpose types. By January of 1935, the 3-inch instrument sold for $99.50 and the 5-inch for $116.50, these models having controls for frequency adjustments, synchronization and sweep amplitude.

February 1935, saw the introduction of the Electronic Switch, described later.

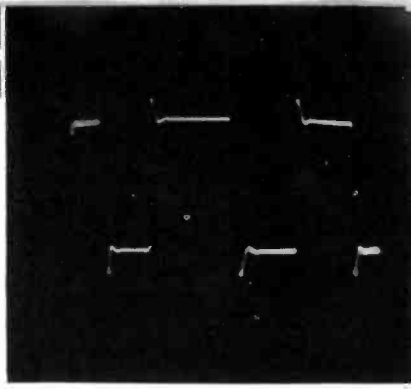
A further drop in prices occurred by fall of 1935, when Type 148 3-inch oscillograph was offered at $94.50, with a 5-

inch job at $106.50. These instruments with their nine knobs on the front panel, were getting fairly close to present-day models. A basically new sweep circuit just incorporated made possible a 10 to 30,000-cycle range, improved linearity and exceptionally fast return trace. Also, these instruments included an improved synchronizing circuit permitting the locking of the sweep with fractions as well as multiples of the wave. The cascade amplifier provided a 1-inch deflection with 0.2 volt signal. A single knob controlled all the switching. As a final touch of refinement, these instruments were provided with the patented calibration screen scale so characteristic of Du Mont oscillographs. With the adoption of the bright stainless panel featured by November 1935, the present general style of Du Mont instruments was inaugurated.

Prices still declined, in keeping with better and greater production facilities, as the Type 154 3-inch oscillograph was announced at $74.50, early in 1936.

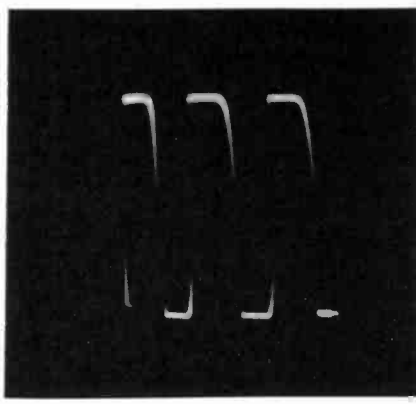
Coming to the present time, there is the current 3-inch general-purpose refined oscillograph, Type 164E (only $64.50) which leads the field in the moderate-price range, as well as the 5-inch Type 168 ($116.50). Both types have been and continue to be produced in large numbers to meet the lively demand. These popular instruments have made Du Mont a household word throughout the world in universities and technical schools, laboratories and engineering departments, repair shops and servicing organizations, and other institutions.

To meet the more exacting requirements, Du Mont engineers have developed other models such as the Type 171 with several refinements over the 168, and the 175 providing exceptionally convenient operation and flexibility in one complete instrument. But the peak in oscillograph design to date has been attained in the Type 208, which provides an amazing array of features found in no other single standard oscillograph now on the market. Such features as the use of the intensifier tube for brighter screen

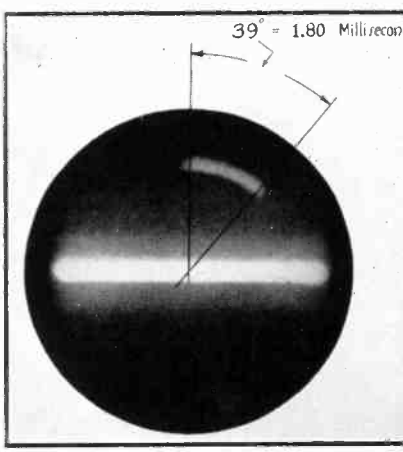


Exampes of how the cathode-ray oscillograph writes its own story . . .

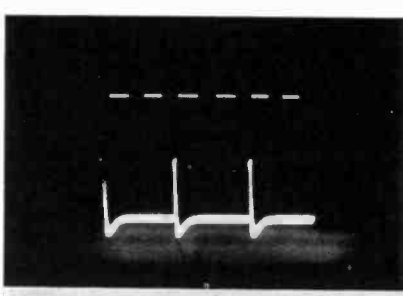
The effect of high inductance in a given circuit, showing how the damped oscillation takes place at the start of each half cycle of the square wave.



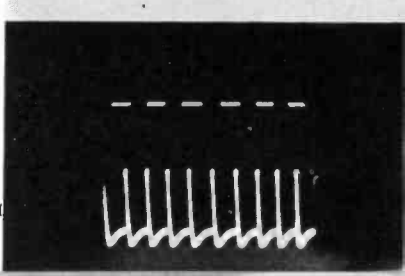
The response of a given amplifier to a 26 kilocycle square-wave signal.



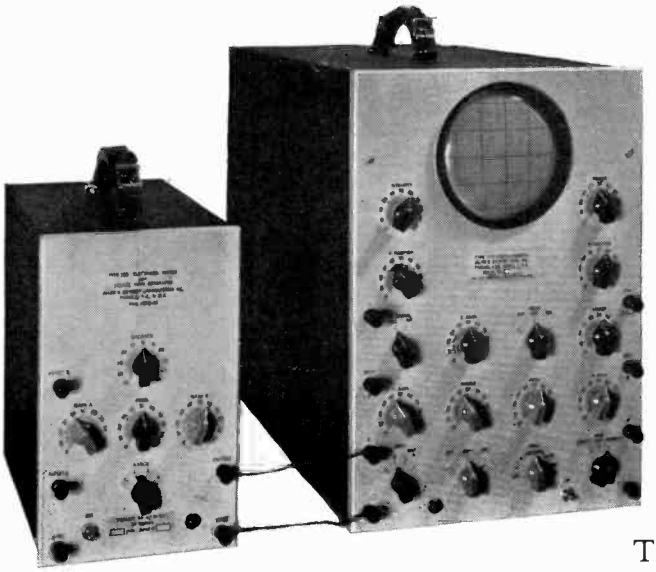
A cathode-ray stop-watch effect, showing how the operation of a two-way snapswitch is accurately timed in milliseconds.

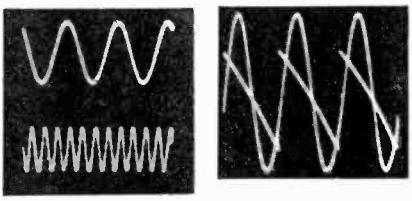


Oscillogram of stimuli showing constancy of form and amplitude obtained with the Du Mont Variable-Frequency Stimulator.



Another oscillogram of stimuli obtained with the same means. The time intervals in both instances: 1 millisecond.





Du Mont Electronic Switch (left) used in conjunction with Du Mont Oscillograph. This ingenious instrument serves to place two or more independent signals on the screen of a single cathode-ray oscillograph. Note typical examples. The independent signal traces can be displaced for individual, detailed study, or superimposed on same base line for direct comparisons.

images; constant-impedance continuously-variable input attenuator with zero frequency discrimination; four easily-accessible deflection-plate terminals; symmetrical deflection of both axes for fine focus and no distortion; a beam switch which instantly extinguishes the spot; undistorted four-cycle square-wave response; flat response to 100,000 sinusoidal cycles per second; sweep frequencies from 2 to 50,000 cycles per second; nearly 15-inch time-base with 2½ times full-scale deflection; regulated power supplies for no pattern shift; a functional panel layout; complete portability, extreme ruggedness, full dependability—these features indeed, in a standard, moderate-priced oscillograph appropriately reflect a decade of untiring specialization.

In addition to the foregoing and other standard types, the Du Mont organization has built and is constantly called upon to build special oscillographs to meet out-of-the-ordinary requirements. Some of these special jobs attain most elaborate proportions, particularly the instruments built for present National Defense requirements, for the leading laboratories, for almost every branch of industry, and for other critical users.

The Electronic Switch

Realizing the occasional but vital need for placing two voltage or current phenomena on a single cathode-ray screen for simultaneous or comparative studies, Du Mont engineers developed the Electronic Switch, first announced in February 1935, as Type 143. This was a laboratory job, as distinguished from the present Type 185 in its trim, convenient, fully portable case with carrying handle, generally matching oscillographs with which it is used.

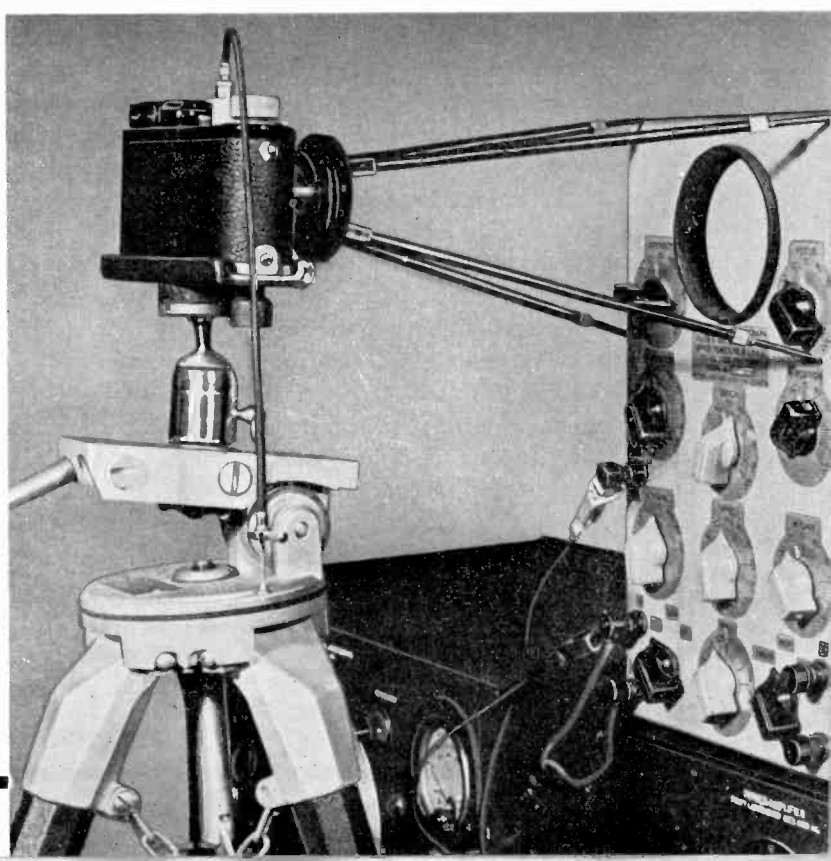
The exclusive Du Mont Electronic Switch has done more to increase the versatility and value of the cathode-ray oscillograph than has any other single development. This relatively inexpensive accessory makes possible the inspection and comparison of wave form and phase of two voltages or currents from different parts of the same circuit, or matching of wave form of a standard wave and any other wave. For example, it is possible to see the input and output wave forms and phase displacement of an amplifier. Thus in the high-fidelity amplifier the input and output waves cover one another, while even a slight distortion of phase shift will noticeably displace the two oscillograms. Another useful application is to apply a timing wave in conjunction with the wave under observation; for example, in testing switches or relays it is possible to inspect

the length of time it takes to complete the switching if switched potential and timing wave originating from an AC source of known frequency, are present on the oscillograph screen.

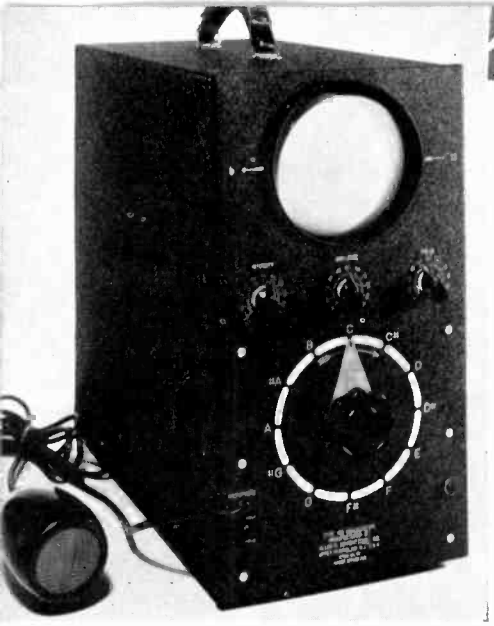
Essentially, the Electronic Switch is, as its name implies, an electronic means, devoid of mechanically moving or vibrating parts. It comprises a switching tube and two amplifiers, or one for each phenomenon applied. The switching tube operates to cut in one amplifier, then the other, at such rate that the two phenomena appear on the screen at the same time. In addition to switching, this instrument also amplifies. The original Type 143 whose design and dimensions pretty much confined it to laboratory usage, has since been superseded by the fully portable and lower priced Type 185.

The Cathautograph or Electronic Pencil

Among the many ingenious adaptations of the cathode-ray technique made by Du Mont engineers, the Cathautograph or electronic pencil attracted wide attention when it appeared on the cover of the January 1933 issue of *Electronics*. This development has far-reaching possibilities. Briefly, the Cathautograph is a means of flashing simultaneously the written word or sketch over wires or radio. A pencil, connected by levers, works across two resistors to control two sets of plates of a cathode-ray tube. The tube is provided with a "memory" type screen, or one with a very slow decay rate, so that the trace remains luminous for 30 seconds or so following the activation of its fluorescent salts. At the transmitting end the alteration of the two resistance values, following the writing pencil, correspondingly shifts the cathode-ray beam across the receiver screen. As many as ten words can be seen on the screen. As the eleventh word is being written, the first word is fading out. In 1933 Mr. Du Mont greeted his many friends with New Year's cards writ-



In addition to simultaneous observations and studies of screen patterns, the cathode-ray oscillograph may be simply employed for making permanent records with ordinary commercial photographic equipment. Here is a typical setup in the Craft Laboratory, Harvard University, using a Leica camera.



A precise means of determining whether a singer or instrument is "flat" or "sharp", or exactly on pitch, is provided by the Du Mont Resonoscope. The electrodynamic microphone serves also as a loudspeaker, and sounds the pitch of any one of the notes of a full chromatic scale, by means of the self-contained tuning forks.

ten by the Cathautograph. It was a startling innovation. The military as well as intercommunication possibilities of this development can hardly be exaggerated.

The Resonoscope Sounds the Precise Musical Pitch

Equally ingenious was the Resonoscope, introduced early in 1937. This instrument, consisting of a special cathode-ray oscillograph and a standard set of tuning forks covering the musical frequencies of the twelve notes of the chromatic musical scale, provides a precise means of checking the musical pitch of musical instruments and vocalists alike. The frequencies produced by the twelve electrically-driven tuning forks are used to synchronize an oscillator in step with them. The oscillator in turn provides the horizontal sweep circuit for the cathode-ray tube. The output of a dynamic microphone used to pick up the sound under investigation, is fed to the input of a voltage amplifier. The output of this amplifier is placed on the vertical deflection plates of the cathode-ray tube. This provides a visual indication of the wave form of the musical note under investigation. If the musical note under observation is of the same pitch (or frequency) as the predetermined standard being used, or any harmonic of it, the wave form will appear to *stand still* on the screen. If the note is flat, or lower in pitch, then the horizontal sweep standard of the wave form will appear to be *moving to the left*. If the note is higher in pitch, or sharp, so to speak, the wave form will move to the opposite direction, *going toward the right*. This indicates to musician or vocalist whether he is in tune, is sharp, or flat.

In musical circles the Resonoscope has met with exceptionally favorable reception. Many such instruments have been bought, particularly by musical instrument makers, as a simple, positive, rapid means of checking and adjusting for pitch. In addition to just the matter of pitch, the Resonoscope also permits the intricate wave form of any musical instrument or voice to be studied graphically, thereby permitting visual comparisons between different tone qualities, and appraising the overtones and harmonics that go to make either a mail-order violin or a Stradivarius.

And so from its very inception, the Du Mont organization has constantly sought new applications and ingenious adaptations of the cathode-ray technique. At this very moment, its engineers may be at work on a quantitative and qualitative means for studying automobile body noises; a checkup of airplane vibrations and stresses; an analysis of the burning rate and explosive force of given smokeless powders; the geophysical exploration of oil-bearing strata; the characteristics of a Diesel engine in actual operation; and so on and on. It is in these applications and adaptations, fully as much as in the development of the cathode-ray equipment proper, that the Du Mont name has identified itself so intimately with this fast-moving art.

Meanwhile, Television Comes Along

Of course the outstanding adaptation and indeed the very climax of the cathode-

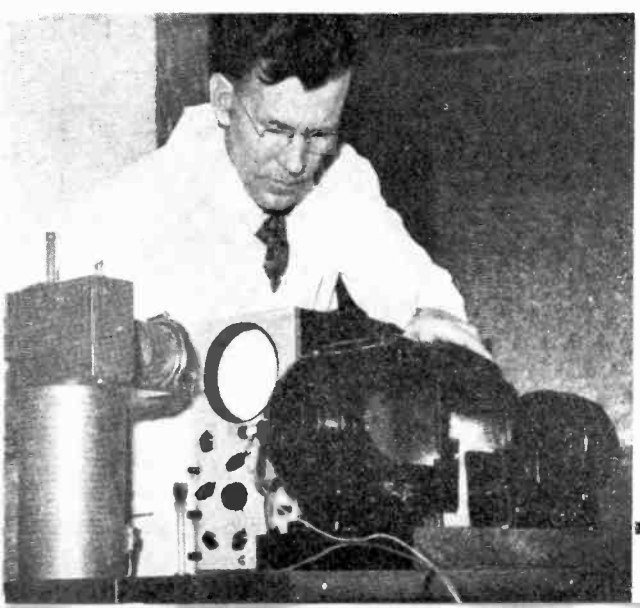
Because of its extreme versatility and ready means of graphically indicating circuit and operative conditions, the Du Mont oscillograph soon became a "must" instrument with capable radio servicemen for use either in the shop or out on the job. Its use has greatly expedited and simplified servicing today's complicated radio receivers.

ray art is television, for here the requirements are far more critical than those of industrial and scientific usages. Since present-day electronic television, as distinguished from the very limited possibilities of the whirling disc or mechanical technique of the past, is simply refined cathode-ray oscillography, it was a foregone conclusion that the Du Mont organization would enter the television field when, where and as this struggling art offered proper inducements.

Du Mont the man personally kept a weather eye on television developments both here and abroad during the early 'thirties. By the summer of 1937 he decided to check at first hand the British, German, French and Dutch television activities. A flying trip to Europe and back home again, provided the very essence of *commercially-feasible* television. He brought back data, ideas, tubes, receivers, plans.

From the beginning of its television activities the Du Mont organization laid down and has adhered to several broad fundamentals which it believes inherent to successful commercialized television. First, Du Mont televisors are *characterized by large screen size.* Despite pressure for lower prices, Du Mont has insisted on the 14-inch diameter teletron as the minimum size for satisfactory viewing. Again this organization has steadfastly adhered to the use of *the electrostatic type tube,* because of marked advantages over magnetic-deflection tubes particularly in *maintaining clean screens free of "burns" or dark spots.* Still again, Du Mont set design has favored *direct viewing,* without mirror or other intermediates. Finally, Du Mont engineers have firmly believed in *a flexible television system,* whereby scanning pattern and picture frequency rate, while adjustable to meet changing needs and program subject matter, might be confined to the transmitting end, with receivers automatically falling in step, thereby minimizing the troublesome obsolescence factor.

It was early in 1939, or just on the eve of the inauguration of scheduled television



The Du Mont oscillograph is to be found in engineering and research laboratories everywhere, for it indicates precisely what is going on in electrical circuits.

It all started this way . . . Allen B. Du Mont (right) and his associate, Dr. Goldsmith, back in the days of the string of stores in Upper Montclair, working on early cathode-ray television. The phasmajector or image-transmitting tube was developed as a means of providing a standard signal. This image of Lincoln was viewed by the engineers for hours on end, day after day, until they knew every line by heart!

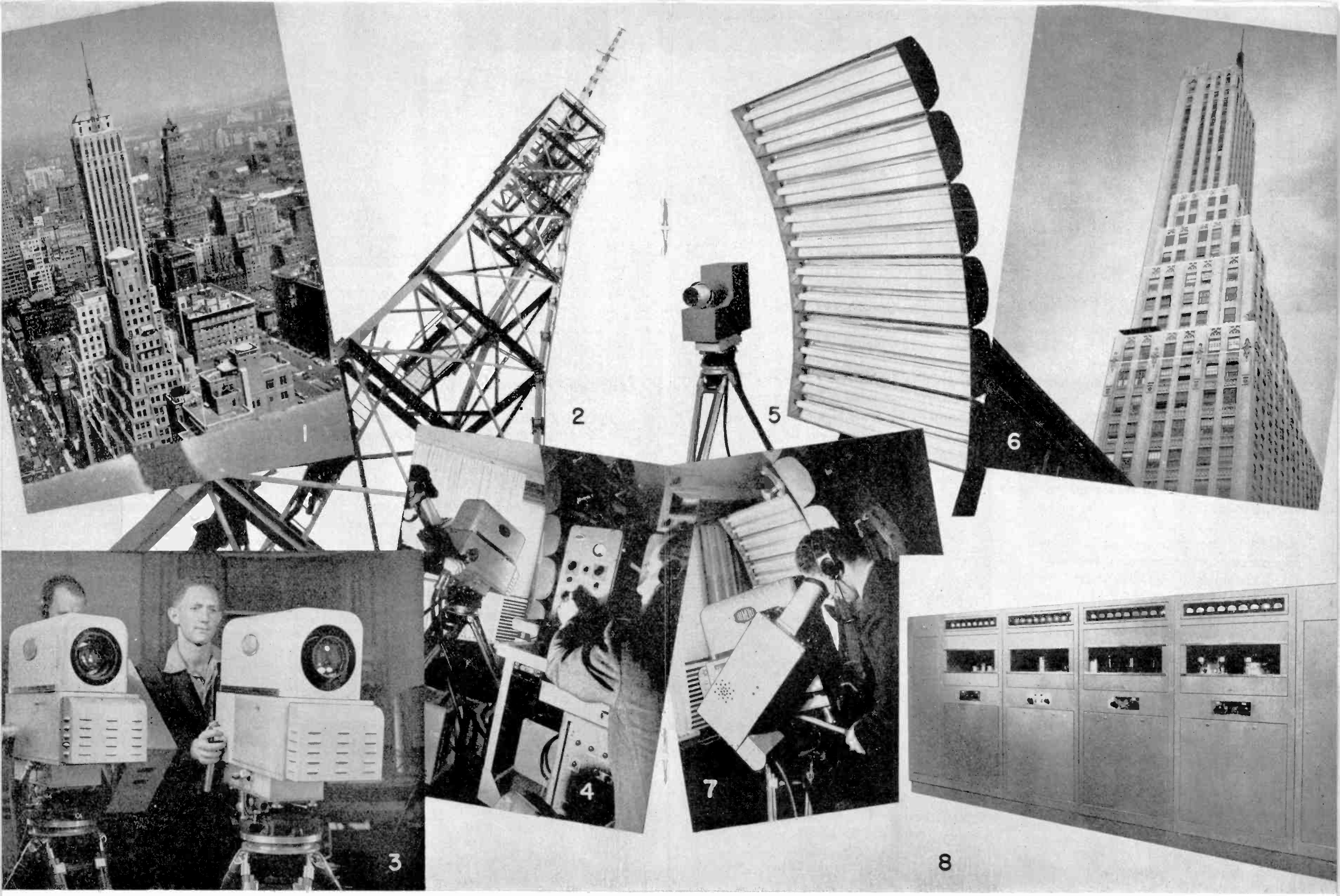
programs in the metropolitan New York area coincidental with the opening of the New York World's fair, that Du Mont television sets began rolling off the assembly line. Hundreds of sets produced ahead of any others, were eagerly snapped up by radio merchandisers anxious to be the first in their locality to show a real television receiver. As a drawing card nothing ever excelled these first sets. Traffic jams in front of show windows featuring such sets, had to be broken up by police. Stores were crowded from morning till night, and yet regular television programs were still to come! Set screens remained blank.

However, with the Spring came television programs. Hundreds of Du Mont receivers went into action. In homes, taverns and hotels, clubs, theatre lobbies, and other public places, countless folks saw real television for the first time. Du Mont officials anxiously watched these audiences. Was it just passing curiosity? Was television a new side show? Could television programs hold the public interest? The answer was a decidedly big YES. Television has a continuing, lasting, supporting interest. It is more than a mere experiment or demonstration. It can be and will be a *real* business.

Comfortable Television By Du Mont

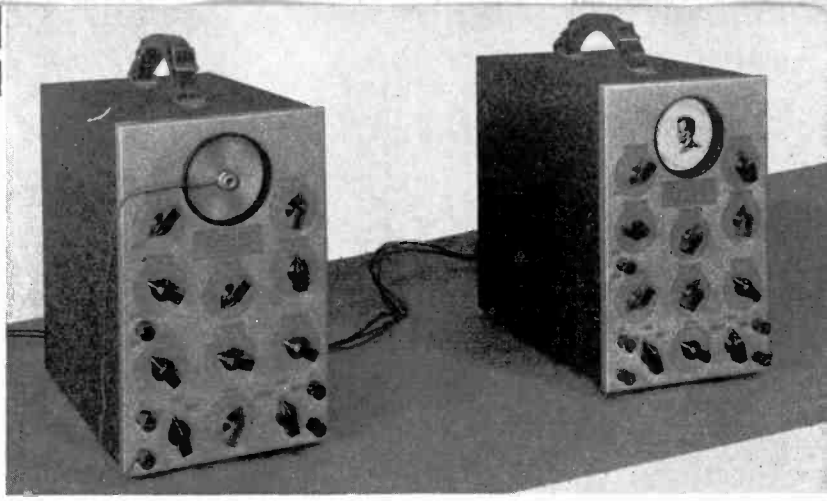
Du Mont has a distinct aversion to "peep-hole" entertainment. Perhaps in the very dim past he may have viewed baseball games through a fence knothole! Or more recently he had resented the postage-stamp images of the Jenkins televisors, which he himself squinted at hour after hour until driven to work out the larger images offered by the refined DeForest television system, under his supervision. At any rate, his instructions to co-workers are simply: large, larger and still larger television images, for the utmost comfort of television audiences.

Beginning with the 14-inch teletrons, providing 8 x 10 images that can be comfortably viewed by a dozen persons, Du Mont engineers have more recently gone to the de luxe model televisor utilizing a 20-inch teletron with a full 11 x 16 screen.



• *Television transmitter W2XWV and its studio facilities, ready to "go on the air": (1) Lofty tower and antenna at 515 Madison Avenue dominates the midtown skyline from a height of 650 feet above the sidewalks. (2) Steel tower supports the antenna mast 165 feet above the 42-story skyscraper. (3) A battery of latest model Du Mont television cameras cover studio and outside programs. (4) Careful monitoring of pickups insures uniform television images of fine pictorial quality. (5) Banks of fluorescent lamps provide cool, comfortable, non-dazzling illumination for the performers. (6) Studios are located on the 14th floor, while transmitting station is on the 42nd floor of this conveniently situated midtown skyscraper. (7) The electronic view-finder enables Du Mont cameramen precisely to check up their images in strictly television terms. (8) The powerful video and audio transmitting equipment provides strong signals throughout the metropolitan area.*

Du Mont New York Television Station W2XWV

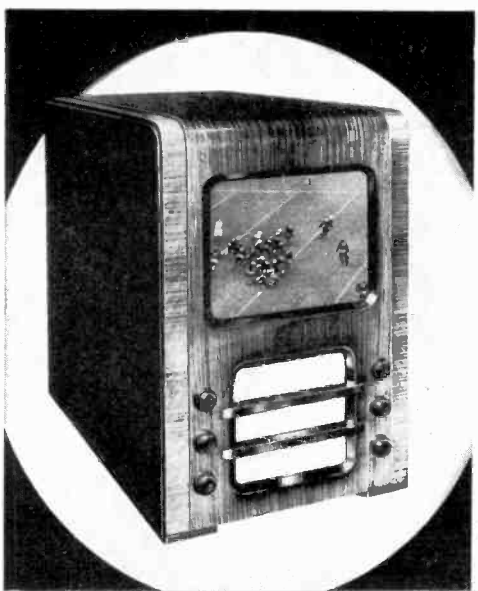


For the simple, inexpensive demonstration of television scanning principles, the phasmajector tube was introduced in conjunction with two standard Du Mont oscillographs. One, with phasmajector tube inserted in place of usual cathode-ray tube, served as transmitter. The other reproduced the image on its screen.

Meanwhile, developments have been under way on projector-type teletrons for projecting images through optical systems and on to large screens for theatre-sized audiences. The Du Mont trend is towards larger screen images. There is no interest here in smaller images, regardless of any price considerations. Yet the prices of Du Mont televisors have been consistently reduced, and may be further reduced on the basis of greater production volume with corresponding economies, rather than virtual cheating on television performance.

Du Mont television receivers are made in various models. The table model has proved by far the most popular, because of moderate price. Provided with a short-wave sound receiver in addition to the 14-inch teletron video receiver, this table model supplies complete sight-and-sound entertainment. Console models are also offered, topped by the de luxe console with 20-inch teletron for large-screen images, television sound, and a high-fidelity all-wave broadcast receiver.

And then came the first commercial television receiver in the U. S.—the Du Mont table model, providing complete sight-and-sound reception!



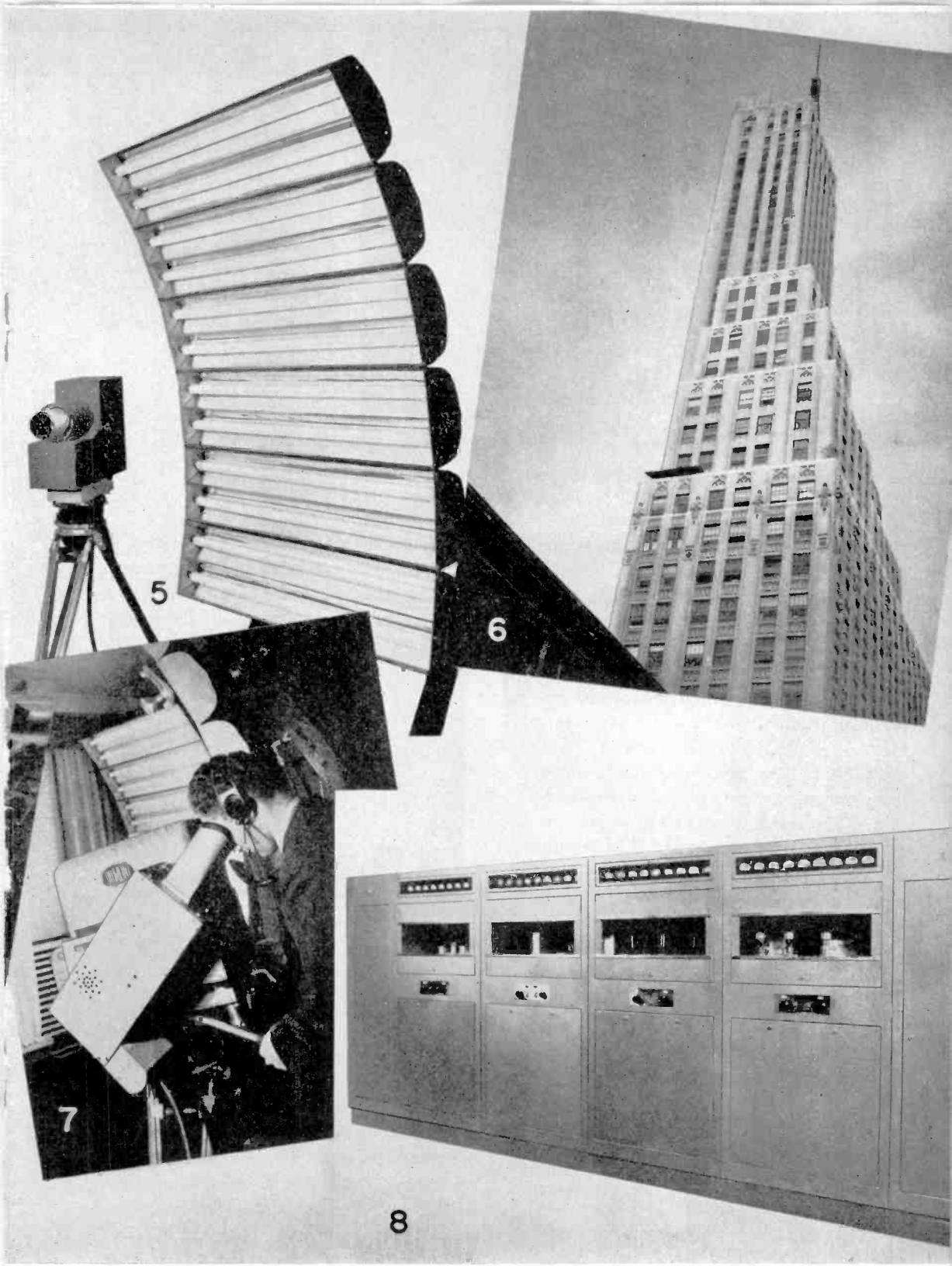
The Need for Television Flexibility

Receiver obsolescence remains bugbear No. 1 of television workers. Heretofore with every change in transmitting standards, receivers out in the field have had to be serviced if not revamped to accommodate altered signals. Obviously no manufacturer could be expected to go ahead with thousands of television sets based on today's transmitting standards, when tomorrow's might render those sets obsolete or at least subject to costly alterations. Meanwhile, no video broadcasters would brave the storm of protests, let alone immediate loss of the major portion of his lookers-in, by attempting to change transmitting standards. And yet the television art at this early date could hardly be frozen at current standards, for that would obviously limit its entertainment potentialities. What to do?

The Du Mont organization in 1939, despite the inauguration of scheduled video broadcasting of fine entertainment value particularly in the metropolitan New York area, began work on a flexible television system, whereby video broadcasters would be free to alter transmitting standards in keeping with program and audience requirements, with television receivers auto-

• *Television transmitter* W2XWV *and its studio facilities, ready to "go on the air": (1) Lofty tower and antenna at 515 Madison Avenue dominates the midtown skyline from a height of 650 feet above the sidewalks. (2) Steel tower supports the antenna mast 165 feet above the 42-story skyscraper. (3) A battery of latest model Du Mont television cameras cover studio and outside programs. (4) Careful monitoring of pickups insures uniform television images of fine pictorial quality. (5) Banks*

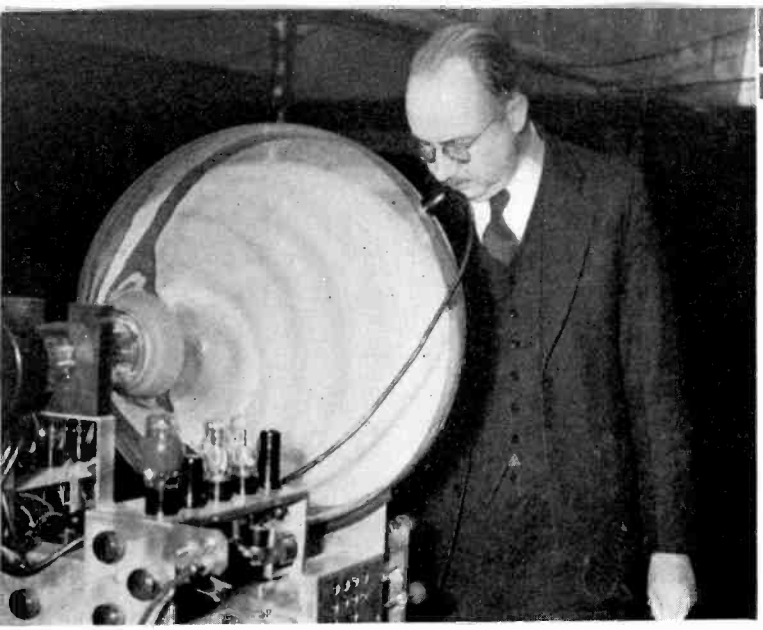
Du Mont New Y Television



ork

Station W2XWV

of fluorescent lamps provide cool, comfortable, non-dazzling illumination for the performers. (6) Studios are located on the 14th floor, while transmitting station is on the 42nd floor of this conveniently situated midtown skyscraper. (7) The electronic view-finder enables Du Mont cameramen precisely to check up their images in strictly television terms. (8) The powerful video and audio transmitting eqaipment provides strong signals throughout the metropolitan area.



Really two complete receivers in one—the television receiver and the television-sound receiver—the Du Mont chassis is thoroughly checked by capable engineers before being placed in its cabinet and made available for shipment. The components are mounted for ready testing and servicing.

matically falling in step. This in marked contrast to the inflexible system sponsored by the Radio Manufacturers Association, in which free-running sweep circuits at the receiver are available only for certain scanning and image-repetitive-rate standards. In the Du Mont Synchromatic System the transmitted signal actually drives the sweep circuits of the receiver, which must follow any scanning, interlacing or image-repetitive rate standards being transmitted. In other words, there is just that relative difference between R.M.A. and Du Mont systems as exists between a car with flanged wheels pushed along a track, and a bus that can be steered over any road according to orders.

With the Du Mont Synchromatic System all controls for the synchronization of sweep circuits are eliminated at the receiver. Such controls are usually provided for a fine frequency adjustment of the sweep

An early television image. Remarkably bright and detailed images are obtainable with today's television receivers—pictures fully comparable with those of home movies.

oscillators. Unless synchronizing action is, therefore, very positive, these controls are frequently in need of adjustment. Further, should a change in scanning standards be indicated in the light of future development, these self-oscillating sweep circuits will not provide the desired flexibility since they would require re-synchronization adjustment. The use of the Du Mont automatic type sweep circuit at the receiver eliminates this limitation of the R.M.A. television system, and in its place provides a system which will cause the television receiver to follow any scanning changes in the television transmitter without loss of syn-

Du Mont console television receiver, available at a popular price. A de luxe model includes an all-wave receiver in addition to television pictures and television sound.

chronization at the receiver and without the knowledge of the user except by an evident increase (or decrease, if desired) in picture detail.

Du Mont automatic synchronization of the television receiver is effected by utilizing a sweep circuit which is not of the self-oscillating type. In its place is substituted a discharge circuit which is always ready to operate whenever a synchronizing pulse is applied. Upon application of such synchronizing pulse, this circuit gives one, and only one, single, linear, horizontal sweep of the luminous spot across the fluorescent screen. It is obvious that, with a circuit of this type, the number of horizontal scanning lines per frame, and the number of frames per second, are both under complete control of the transmitter. Picture detail may, therefore, be increased from time to time as the state of the art permits, and this may be done at no sacrifice in receiver operation, no obsolescence of existing equipment, and without restriction at the transmitting end.

The "Memory" Screen and Its Vast Implications

In 1940 Du Mont engineers developed another startling television innovation — the "memory" screen. This is a fluorescent screen that has a relatively slow decay rate, so that one image is held over until the next appears. In the usual teletron, images appear and disappear almost in a flash, with the result that there is a noticeable flicker due to the intervening dark interval if the repetitive rate is cut considerably below the R.M.A. 30 frames per second standard.

Now if there were all the room on the air that could be wished for, television transmission would be a simple matter. Taking all the elbow room needed, there would be no need and indeed no thought of conserving on the band width. However, with 441-lines and 30-frames-per-second, the heretofore R.M.A. standards necessitated a transmission band width of 4.5 megacycles for the video signal alone. A total band width of 6 megacycles accommodates the sound component and permits of adequate separation between adjacent television channels. Each television channel represents as much ether space as would 600 sound broadcasting stations. It is immediately apparent, then, that if this band width could be materially reduced, more television stations might eventually operate to serve the public.

Cutting down on the number of scanning lines is of course a direct attack on the pictorial definition, and is generally taboo. Cutting down on the image repetitive rate can also reduce the band width, but it also introduces marked flicker when

Just a corner of the Du Mont television receiver production line which has turned out many such sets already. Despite the intricacies of the television receiver, it is simply a modified oscillograph, and is handled as such in the Du Mont plant long specializing in oscillographs.

the usual fluorescent screen is used. Therefore, Du Mont engineers recently conducted exhaustive experiments on many kinds of fluorescent screen materials, aimed at a controlled decay rate to provide the "memory" or carry-over effect from one image to the next, bridging over the dark interval that causes flicker.

The earlier Du Mont "memory" type teletrons produced rather vivid orange-and-black images, which were somewhat objectionable. Further developments and refinements gradually corrected the color until present "memory" type teletrons provide black-and-white images. With the "memory" screen, the repetitive rate is slashed in half —15 frames instead of the former 30. Yet there is no apparent flicker, even when reproducing pictures with considerable and fast animation.

Meanwhile, the halving of the repetitive rate permits transmitting pictures of a given number of lines, with a 50% reduction in band width. Thus we can get along nicely within a 2.0 megacycle band instead of the previous 4. Or cutting the scanning standards, 325-line picture may be transmitted on a 1.0 megacycle band. Either of these transmissions would prove useful in providing a nation-wide or world-wide television service on a carrier frequency between 20 and 30 megacycles. With such wider coverage, many of the hitherto economic problems of television may possibly vanish.

Or if the present band width is to be retained, the Du Mont "memory" screen permits using the extra elbow room gained by halving the repetitive rate for an increased number of scanning lines, and therefore greater pictorial definition. In Du Mont demonstrations 625 lines and 15 frames (30 fields) has been chosen as an excellent compromise.

With the Du Mont flexible Synchromatic System, together with the "memory" screen feature, it becomes possible to offer high-definition programs for the compact metro-

Recognizing the wide range of television program circumstances, the Du Mont organization decided on the unit plan of assembling required "chains". In other words, a choice of standard, portable, self-contained units is available. These are connected together to form a "chain" to meet the program needs, either for outside pickup or for studio use. This is some of the earlier equipment, prior to the electronic view finder feature.

Du Mont reported the 1940 Presidential Election returns via television. The camera picked up the election returns flashed on a translucent screen in front of it, while the operator monitored the video signals, in the Du Mont New York station, W2XWV.

politan areas, using the standard 6 megacycle band widths, or, on the other hand, medium-definition programs to the outlying areas that may best be reached if some elbow room can be squeezed out among the higher wave lengths that have greater range. Naturally, reduced band width is imperative if higher wave lengths are even to be considered.

At a time when the television art seemed ready to be "frozen" for several years on the basis of the R.M.A. standards of 441-line 30 frames, the Du Mont demonstrations of a flexible system attracted the attention and sympathetic consideration of the Federal Communications Commission. During 1940 and the first half of 1941, many demonstrations were staged for the Commission and for all television interests, including direct comparative tests between R.M.A. and Du Mont signals. On the recommendation of the F.C.C., the National Television Standards Committee was formed for the purpose of studying various television systems and formulating a set of standards to be submitted to the F.C.C. This activity has kept the television art in a state of flux, and while this may have been deemed unfortunate from the standpoint of earlier commercialization, it has served to encourage more refined television technique which in turn will prove more than worth while as television becomes a real business. Du Mont, regardless of what standards may be finally adopted, feels that its unselfish, progressive, yes, argumentive attitude if you will, has been for the best interests of all concerned.

Du Mont at the Transmitting End

Cognizant of the fact that television receivers are simply useless in the absence of video programs, and harkening to the demands of various interests throughout the country for television transmitters, the Du Mont organization has been producing transmitting as well as receiving equipment.

From the iconoscope camera to the video transmitter, including the necessary audio, Du Mont is equipping television broadcasters. Several Du Mont-equipped stations have already been set up in various parts of the country, with more equipment

Yes, television did take hold—and with a bang! Particularly in cafes and inns and clubs. Here's a typical cafe in the heart of New York City, with television entertainment on tap.

The television receiver has come to be part of the atmosphere of the tap room. This one happens to have a sound-recording outfit as well, to entertain its patrons.

on order. Such Du Mont equipment is designed for either the Du Mont Synchromatic System or any other system that may be desired, but the former is naturally recommended because of its flexibility and greater possibilities now and in the future, as already discussed.

In designing television studio and transmitting equipment, Du Mont engineers have sought to reduce the proposition to its simplest elements. Instead of the usual large assemblies confined either to studio use or to outside pickup work, Du Mont equipment comprises a "chain" or collection of separate, compact, portable, interconnecting units that go to make up any required studio or mobile facilities. In other words, the "chain" is made up of selected standard units. Each unit is complete by itself, in an attractive metal case, with leather carrying handles and removable protective cover. In the studio, the units, such as the camera control, camera control power supply, shading control, line amplifier, line amplifier power supply, synchronizing-signal generator, and the power supply and scanning unit for the synchronizing-signal generator, are simply placed on a table or metal shelving, and operated with the iconoscope camera. The self-same units and camera can be packed into a passenger car and taken outside for remote pickup work, operating either over a special coaxial line or an ultra-high-frequency radio relay transmitter, the latter calling for corresponding equipment. This dual usage of the same units is of significant importance to the smaller television stations in that the investment and maintenance are kept at a minimum.

Du Mont "chains" are also made up for film pickup work. The movie projector images are picked up by the iconoscope camera. One camera, suitably mounted on a wheeled platform which in turn permits shifting the camera from one projector to another, can handle two or more projectors of either the 35 millimeter theatre type or the 16 millimeter amateur type, the latter promising to be most popular in much local television program work.

Electronic View-Finder

As in its extensive cathode-ray pioneering, so in its television developments, the Du Mont organization has had its own ideas. Of outstanding importance, for example, has been the introduction of the Du Mont electronic view-finder for the televison camera, whereby the operator actually sees the images as picked up in *television* terms, just as the audience sees them, rather than in the usual optical terms

Even out in the sticks, as they say, television has proved a big drawing card for taverns, especially on those nights when there are sporting events.

Television has done a real sales-promotion job for hundreds of eating places throughout the metropolitan New York area. Today it is a "must".

which mean little more than aiming the camera. The electronic view-finder is actually a miniature televisor attached to the camera. With it, the cameraman must know precisely what he is picking up not only as to exact field of view, but also his lights and shadows, action and other details, translated into television terms which, after all, are what he is primarily interested in. Lenses can be changed, while the electronic view-finder automatically checks the lens. This development is held to be the most outstanding step ahead since the iconoscope camera was first introduced several years ago.

Other innovations, improvements and refinements too numerous to mention, characterize Du Mont studio and transmitting equipment, and reflect a decade of specialization in the cathode-ray art which remains the very foundation of present-day television.

Du Mont Video Programs in the Making

Meanwhile, the Du Mont organization has been on the air with experimental signals and with test video programs. For three years past it has been operating an experimental television transmitter, W2XVT at the Passaic plant. This transmitter has served as the testing ground for much of the Du Mont television engineering work on transmitting and receiving equipment, and also has served for some of the demonstrations for the F.C.C. and television interests generally.

During the past year a video broadcasting station has been under construction in the New York studios of the Du Mont organization at 515 Madison Avenue. A program staff has been gathering and organizing program material in anticipation of commercialized video broadcasting. This station, W2XWV, is located on the top floor of the 42-story skyscraper. The transmitting aerial is supported atop a pole which in turn rests on a lofty steel derrick-type tower, fully 650 feet above sea level, commanding a sweeping view of the entire metropolitan area. Recently the transmitting equipment has been completed, with the installation of the 4000-watt peak-rating video transmitter, and the 1000-watt (2000-watt F.M.) audio transmitter, for complete sight-and-sound broadcasting.

The studio facilities provide for direct pickup as well as film programs. Du Mont engineers have installed a fluorescent lighting system in the studio, so that performers are no longer subject to intense glare and uncomfortable heat experienced with usual incandescent illumination. The fluorescent

Not only receivers, but complete studio and transmitting facilities as well have been provided by Du Mont in promoting general television programs. Here is a typical instance—the Du Mont television equipment, including the earlier model of electronic view finder on the camera, used in the Balaban & Katz television studios in Chicago.

lighting closely approximates daylight and is well diffused for ideal television images. Baby spots are used for modeling and dramatizing when required.

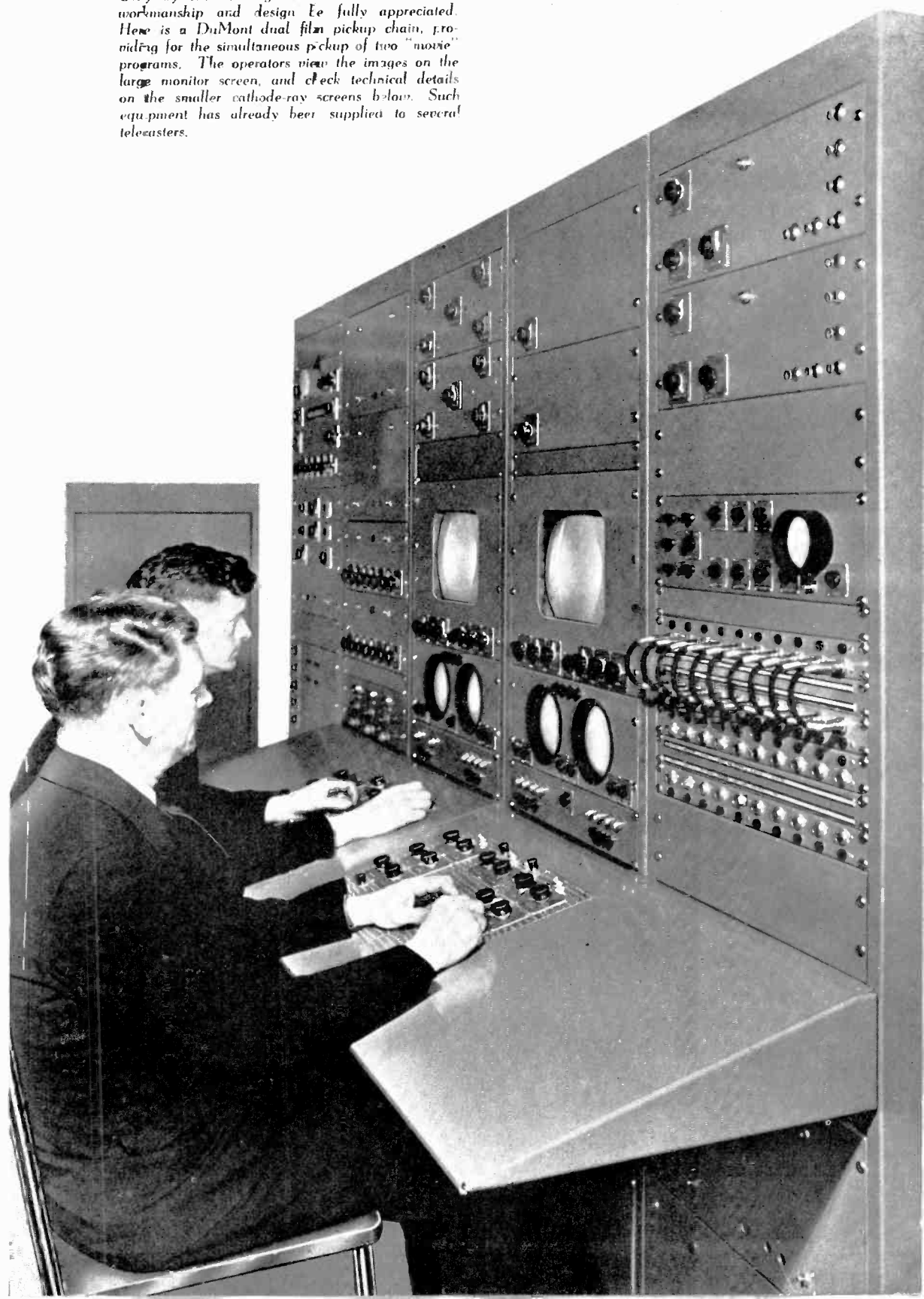
In conjunction with the New York television station, there is a mobile transmitter mounted on a truck and provided with complete pickup facilities. The ultra-short-wave relay signals from this mobile transmitter are picked up at the main station by receivers, duly amplified and monitored, and passed on to the main transmitters for rebroadcasting. It is anticipated that much of the earlier program material will be outside pickups.

A battery of 35- and 16-millimeter movie projectors are housed in a fireproof room. Movie images are projected through fireproof windows and on to the iconoscope camera which, mounted on a wheeled truck, can be brought in front of any desired projector. It is anticipated that many earlier programs will feature movies, particularly special films prepared exclusively for television requirements, which may be made available through the Paramount Pictures affiliation enjoyed by the Du Mont organization. Sound films will be used, as well as silent. Turntables are available for electrical transcriptions.

All in all, Du Mont is ready to place suitable video programs on the air. With the advent of commercial television licenses; with a completely equipped, thoroughly engineered, ready-to-operate station in the

Again Du Mont scored in radical improvements—this time with the electronic view-finder, which provides the television cameraman with a real checkup of his pickup. (Casing removed to show details.

Only by such a large illustration can DuMont workmanship and design be fully appreciated. Here is a DuMont dual film pickup chain, providing for the simultaneous pickup of two "movie" programs. The operators view the images on the large monitor screen, and check technical details on the smaller cathode-ray screens below. Such equipment has already been supplied to several telecasters.



A Du Mont dual camera chain, comprising two cameras equipped with electronic view finders, and the necessary associated equipment in handy portable unit form, for use either in studio or outside. The dual use of such equipment is particularly significant to the smaller local telecasters soon to dot this country.

very heart of the leading metropolitan area; with a program director and staff whom, during the past year, have watched, studied, analyzed video programs and have carefully formulated their own entertainment ideas and mobilized the necessary program resources; with a financial and business affiliation with the outstanding producing organization in the movie field—with all these trump cards in its hands, here and now, Du Mont is prepared to make television the outstanding entertainment in the home, club, hotel, theatre lobby, tavern, and wherever people congregate to pass the time of day.

A second television station has been built by the Du Mont organization for the Washington, D. C. area. This station is located at 726 Eleventh Street, N. W. An antenna 172 feet above the sidewalks insures a strong signal throughout the Capital district, from this transmitter operating at first on an experimental license basis as Station W3XWT.

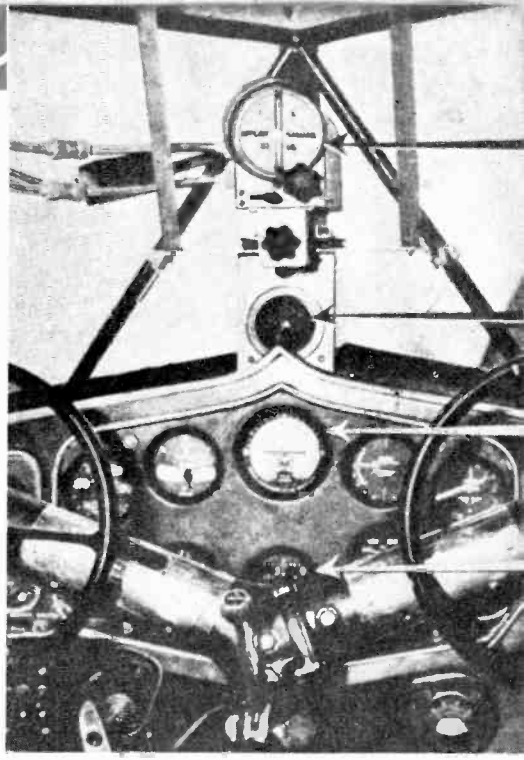
Du Mont Serves in the National Defense

When our nation was suddenly confronted by a world gone mad with war, and National Defense became a prime need, the Du Mont organization immediately enlisted in the army of production. In fact, the major portion of cathode-ray oscillographs now being produced by the Du Mont company have a more or less direct bearing on National Defense needs, for these instruments are proving indispensable in critical engineering and production activities. Du Mont engineers are constantly working with Government services, and with National Defense contractors, in fitting cathode-ray equipment to almost countless critical problems ranging from ballistics and radio technicalities, to the elimination of vibration in aircraft.

And beyond the production of its usual line of products, the Du Mont organization has geared up its facilities even to the extent of opening up a second plant building primarily for the production of television receivers, while releasing still more production capacity in the main plant for special radio transmitters and receivers called for on Government contracts. The organization is proud indeed to serve this nation to the utmost of its capabilities.

And So We Look Ahead, Confidently

All this, and much more which could not be discussed in this limited space, has been achieved in but ten short years. Du Mont has rounded out its first decade of existence as an organization. Much of the effort has been by way of foundation building. Allen B. Du Mont, the man with the idea, has surrounded himself with a staff of engineers, designers, instrument builders, sales engineers, video broadcasters. So today Du Mont means a compact, enthusiastic, loyal, hard-working group of specialists intent on exploiting cathode-ray technique to the utmost. How much easier, greater, and simply unpredictable, therefore, must future progress be under such extraordinary circumstances!



The cathode-ray compass installed in a Coast Guard plane. A special Du Mont 3-inch high-sensitivity tube is used in conjunction with a radio compass device permitting direct bearings to be taken or to be used as a homing means. Tube is above, with magnetic compass, artificial horizon, and directional gyro compass, in vertical line below.

During recent Army maneuvers Du Mont engineers and operators demonstrated to military men the potentialities of television scouting and reporting. Right up front, properly camouflaged from the "enemy", the Du Mont camera and mobile transmitter flashed vital graphic reports back to headquarters.

Du Mont Key Men

Thomas T. Goldsmith, Jr., the research coordinator for all developmental, engineering and production activities. Dr. Goldsmith conducts the technical demonstrations and discussions, such as those for the F.C.C. officials and the N.T.S.C.

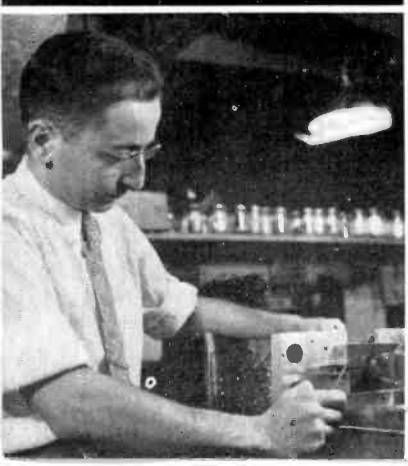
Norman Hall, in charge of the model shop and television transmitter production. He translates engineering data into commercially-feasible-equipment terms.

Paul Ware, in charge of television receiver production and defense contract production. He has also had much to do with television receiver circuit developments.

Stanley Koch, in charge of cathode-ray tube production for both television and instrument requirements. A skilled glass-blower in his own right, he carries out the ideas sent along by the engineers, and supervises all production from glass blank to final exhaust and sealing.

Richard Campbell, in charge of television transmitter development. In the field of television scanning technique, he is second to none, and has done much of the engineering work on the Du Mont Synchromatic Scanning System. He is responsible for the television units and "chains".

Charles Huffman, in charge of the engineering and operation of the Du Mont New York television transmitter, Station W2XWV. He has an enviable background in television pioneering.



P. S. Christaldi, who is directly in charge of design and development of standard and highly specialized cathode-ray instruments. Requirements and problems in this field are submitted to him for his recommendations and for special engineering when necessary.

Harry Houston, in charge of all production activities of the plant. He is the man who keeps the wheels turning, from the incoming flow of materials to the outflowing shipments of finished products.

Leonard F. Cramer, in charge of cathode-ray instruments and tubes, as well as television transmitter, sales. He heads the sales activities of Du Mont representatives throughout the country.

H. A. Clinch, who, as the purchasing agent, secures the wide array of materials and parts required for all production activities.

Mark B. Lafoie, in charge of television receiver sales. He has a background of years of merchandising experience in the radio set and accessory fields. He heads the staff of salesmen and dealers handling television receivers.

Miss Alma J. Ahrens, the capable office manager who supervises the considerable and growing paper work of the Du Mont organization, particularly the accounting.

Mortimer W. Loewi who, as assistant to the President, works with Mr. Du Mont on many of the executive and financial details of this rapidly expanding organization.

Will Baltin, Program Director of the Du Mont New York television station W2XWV. His rich background of television production experience ensures exceptional telecasting entertainment.

ALLEN B. DU MONT LABORATORIES, INC.

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BERNARD GOODWIN	HERBERT G. WELLINGTON

Where DU MONT PRODUCTS *are made . . .*

★ An attractive, modern brick building located at 2 Main Avenue in Passaic, N. J., houses the general offices, engineering laboratories and normal production activities of the Du Mont organization. The building is company-owned, having been purchased in 1938 when the organization moved from its Topsy-growth string of stores in Upper Montclair to these far more efficient and duly planned quarters.

The plant building is surrounded by spacious grounds, providing for future expansion. A side track provides for bulk shipments via the D. L. & W. Railroad, which passes at the rear of the property.

In order adequately to take care of the growing volume of National Defense orders, while maintaining the necessary production of instruments, tubes and other standard products, the Du Mont organization has recently taken over another building nearby. This annex is devoted largely to National Defense contract business, and also to television receiver production and conversions to the new transmitting standards.

The Du Mont organization also maintains a sales office in New York City, at 515 Madison Avenue, as well as its television station which occupies the entire top floor of that 42-story skyscraper. A second television station is located in Washington, D. C., to serve the Capital district.

Needless to say, you are always welcome to call at the plant or at the New York sales office and television studios. The latchstring is always out.

Du Mont Patents . . .

★ The following are but the patents issued to date and assigned to the Du Mont organization. Due to the extensive and continued research and engineering activities of the company, new patent applications are constantly being filed and issued in most instances. The following, therefore, is merely past history.

ISSUED PATENTS

Allen B. Du Mont Laboratories, has issued to it the following Patents:

Patent Number	Title	Inventor
1,844,117	Sound Operated Circuit Controller	Allen B. Du Mont
1,960,333	Cathode-Ray Instrument for Measuring Electrical Quantities	Allen B. Du Mont
*1,999,407	Electron Turbine	Allen B. Du Mont
2,000,014	Telautograph	Allen B. Du Mont
**2,014,106	Voltmeter for Vacuum Tubes	Allen B. Du Mont
*2,067,382	Synchronous Electron Motor	Allen B. Du Mont
*2,082,327	Current Generator and Converter	Allen B. Du Mont
*2,085,576	Commutating Device	Allen B. Du Mont
2,087,280	Cathode-Ray Tube	Allen B. Du Mont
2,098,231	Cathode-Ray Device	Allen B. Du Mont
****2,153,800	Musical Instrument Tuning Apparatus	Lester B. Holmes
2,157,749	Method and System for Television Communication	Allen B. Du Mont
2,162,009	Cathode-Ray Cyclographic Bridge Balance Indicator	Thomas T. Goldsmith, Jr.
2,163,256	Cathode-Ray Tube	Allen B. Du Mont
2,164,176	Method and System for Television Communication	Thomas T. Goldsmith, Jr.
2,185,705	Cathautograph	Allen B. Du Mont
2,186,634	Method and System for Television Communication	Allen B. Du Mont
2,186,635	Cathode-Ray Tube	Allen B. Du Mont Alfred J. Hinck, Jr.
2,190,020	Mosaic Screen	Thomas T. Goldsmith, Jr.
***Re. 21,326	Method and Means for Inductively Heating the Metallic Parts of Enclosed Electrical Devices	Alexander Rava
2,201,309	Method and System for Television Communication	Thomas T. Goldsmith, Jr.
2,207,048	Television Transmitting System	Richard L. Campbell
2,208,254	Amplifier	William A. Geohegan
2,209,507	Synchronizing Generator	Richard L. Campbell
2,221,398	Amplifier	William A. Geohegan
2,225,099	Cathode-Ray Tube	Peter S. Christaldi
2,227,822	System and Method for Television Communication	Richard L. Campbell
2,229,556	Cathode-Ray Tube Control Device for Television Scanning Apparatus	Allen B. Du Mont Thomas T. Goldsmith, Jr.
2,245,409	Method and System for Television Communication	Horace G. Miller
2,245,428	Television Transmitting System	Richard L. Campbell
2,249,942	Television Systems and Synchronizing means therefor	Richard L. Campbell
2,249,943	Systems and Methods for Television Reception	Richard L. Campbell

* R.C.A. licensed under these patents.

** This patent sold to R.C.A. Du Mont retains rights to manufacture and sell under this patent and also to license in non-radio field.

*** Allen B. Du Mont Laboratories licensed under this patent.

**** Du Mont has a partial interest in this patent.

The Growth in

DU MONT SALES . . .

★ Beginning its corporate existence in 1931, primarily as a research and engineering organization, the Du Mont company began actual production and merchandising activities in 1932. Its rapid sales growth, with 1932 taken as the 100% basis for comparison, is given in the following percentage figures. In its tenth year of existence this organization, due not only to National Defense contracts but also to the widespread demand for cathode-ray instruments and television equipment, is attaining fantastic gains which cannot even be estimated at this time.

SALES	
1931	3%
1932	100%
1933	662%
1934	1011%
1935	2039%
1936	3838%
1937	5602%
1938	5089%
1939	6322%
1940	9520%
1941 (1st 6 months)	41,650%

And that, in conclusion, is the climax of a decade of pioneering in a new field. To Allen B. Du Mont, to his close associates and co-workers, to customers throughout the world, must the credit, fairly divided all around, be due. Certainly the heartfelt thanks of the Du Mont organization go out to its friends and supporters and admirers, everywhere.

DUMONT

ALLEN B. DU MONT LABORATORIES, Inc.

Passaic ★ New Jersey

Cable Address: Wespexlin, New York

Form No. 155K10-9-41

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