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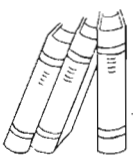

TELEVISION

BROADCASTING STATIONS

The term "television broadcast station" means a station licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public.

Group A—2000 to 2100 kc.; *Group B*—42000 to 56000 kc.; *Group C*—60000 to 86000 kc.; *Group D*—Any 6000 kc. frequency band above 110000 kc. excluding 400000 to 401000 kc.

Licensee and Location	*Call Letters*	*Frequency (kc) or Group*	*POWER Visual*	*Aural*
Columbia Broadcasting System New York, N. Y.	W2XAX	B, C	50 w	(CP only)
Don Lee Broadcasting System Los Angeles, Calif.	W6XAO	B, C	1000 w	150 w
Allen B. DuMont Laboratories, Inc. Passaic, N. J.	W2XVT	B	50 w	50 w
Farnsworth Television, Inc., of Pa. Springfield, Pa.	W3XPF	B, C	250 w	1 kw
First National Television, Inc. Kansas City, Mo.	W9XAL	B, C	300 w	150 w
General Electric Co. Albany, N. Y.	W2XB	C	100 w	3000 w
General Electric Co. Bridgeport, Conn.	W1XA	C	100 w	3000 w
General Electric Co. Schenectady, N. Y.	W2XD	B	40 w	.....
General Electric Co. Schenectady, N. Y.	W2XH	B	40 w	.....
General Television Corp. Boston, Mass.	W1XG	B, C	500 w	
Kansas State College of A. & A. S. Manhattan, Kansas	W9XAK	A	125 w	125 w
National Broadcasting Co., Inc. New York, N. Y.	W2XBS	B, C	12 kw	15 kw
National Broadcasting Co., Inc. Portable—Camden, N. J. New York, N. Y.	W2XBT	D (92000, 175000-180000)	400 w	100 w
Philco Radio & Television Corp. Philadelphia, Pa.	W3XE	B, C	10 kw	10 kw
Philco Radio & Television Corp. Philadelphia, Pa.	W3XP	D (204000-210000)	15 w	.....
Purdue University West Lafayette, Ind.	W9XG	A	1500 w	
Radio Pictures, Inc. Long Island City, N. Y.	W2XDR	B, C	1 kw	500 w
RCA Mfg. Co., Inc. (Portable) Bldg. No. 8 of Camden Plant	W3XAD	D (124000 to 130000)	500 w	500 w
RCA Mfg. Co., Inc. Camden, N. J.	W3XEP	B, C	30 kw	30 kw
RCA Mfg. Co., Inc. Portable—Mobile	W10XX	B, C	50 w	
University of Iowa Iowa City, Iowa	W9XK	A	100 w	
University of Iowa Iowa City, Iowa	W9XUI	B, C	100 w	
Zenith Radio Corp. Chicago, Ill.	W9XZV	B, C	1000 w	1000 w

(*For additional information on television stations see page* 477)

F. C. C. REGULATIONS

Applicable to Television

and

Facsimile Broadcasting Stations

As of January 1st, 1939

The term "visual broadcast service" means a service rendered by stations broadcasting images for general public reception. There are two classes of stations recognized in the visual broadcast service, namely: Television broadcast stations and Facsimile broadcast stations.

Television Broadcast Stations

The term "television broadcast station" means a station licensed for the transmission of transient visual images of moving or fixed objects for simultaneous reception and reproduction by the general public. The transmission of the synchronized sound (aural broadcast) is considered an essential phase of television broadcasting and one license will be issued for both visual and aural broadcast as hereinafter set out.

A license for a television broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and experimentation which indicates reasonable promise of substantial contribution to the development of the television broadcast art.

2. That the program of research and experimentation will be conducted by qualified engineers.

3. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.

4. That the public interest, convenience and/or necessity will be served through the operation of the proposed station.

Conditions of Licensing

(a) A licensee of a television broadcast station shall not make any charge, directly or indirectly, for the transmission of either aural or visual programs.

(b) In the case of experimental televising of the production of a commercial broadcast program, all commercial announcements not a part of the entertainment continuity shall be eliminated from the television broadcast except the mere statement of the name of the sponsor or product or the televising of the trade-mark, symbol, slogan or product of the sponsor; provided, however, that when the program transmission is incidental to the experiments being conducted and not featured, and subject to interruptions as the experiments may require, the commercial announcements may be broadcast aurally.

(b) No licensee of any other broadcast station or network shall make any additional charge, directly or indirectly, for the simultaneous transmission of the aural or visual program by a television broadcast station, nor shall commercial accounts be solicited by the licensee of another broadcast station or network, or by others acting in their behalf upon the representation that the commercial program will also be transmitted by a television broadcast station.

(d) The synchronized sound (aural) program of a television broadcast station may be broadcast by a regular broadcast station, provided:

1. That no announcements or references shall be made over the regular broadcast station regarding the operation of the television broadcast station,

except the mere statement that the program being transmitted is the sound or aural program of a television broadcast station (identify by call letters).

2. That the call letter designation when identifying the television broadcast station shall be given on its assigned frequency only.

Frequencies Allotted

(a) The following groups of frequencies are allocated by bands for assignment to television broadcast stations on an experimental basis:

Group A
2000 to 2100 kc

Group B
42,000 to 56,000 kc

Group C
60,000 to 86,000 kc

Group D
Any 6,000 kc frequency band above 110,000 kc excluding 400,000 to 401,000 kc.

(b) A licensee of a television station for Group A shall carry forward a comprehensive program of experimentation to determine the secondary or rural coverage of the station, and shall suitably locate receiving equipment and other apparatus, and shall make the necessary measurements to determine the quality and characteristics of the secondary or sky-wave service area. Television transmission only will be authorized in this band, and each license will authorize the entire band. No aural broadcast will be authorized therein.

(c) A license for a television broadcast station in groups B, C or D will specify a frequency band wherein two adjacent carrier frequencies shall be selected, one for the visual and one for the aural broadcast. The lower carrier frequency shall be for visual broadcast and the higher carrier frequency for the aural broadcast.

(d) A licensee will be granted only one station in each frequency group for operation in the same service area.

(e) An application may be made for one frequency band (to include the visual and the aural carriers) in groups B, C and D. However, if it is desired to operate in more than one group, it will be necessary to make separate applications for a station in each group.

(f) Applicants shall specify the band width of the emissions required for the proposed transmission.

(g) Carrier frequencies shall be so selected and emissions controlled that no emission from any cause will result outside the frequency band authorized by the license.

(h) An aplicant shall select a frequency band in the group which is believed best suited for the experiments to be conducted and will cause the least or no interference to established stations.

Power Limitations

The power output rating of a television broadcast station shall not be in excess of that necessary to carry forward the program of research. The operating power may be maintained at the maximum rating or less, as the conditions of operation may require.

A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following:

1. Number of hours operated for transmission of television programs.

2. Comprehensive report of research and experimntation conducted.

3. Conclusions and program for further developments of the television broadcast service.

4. All developments and major changes in equipment.

5. Any other pertinent developments.

Facsimile Broadcast Stations

The term "facsimile broadcast station" means a station licensed to transmit images of still objects for record reception by the general public.

A license for a facsimile broadcast station will be issued only after a satisfactory showing has been made in regard to the following, among others:

1. That the applicant has a program of research and experimentation which indicates reasonable promise of substantial contribution to the development of the facsimile broadcast service.

2. That the program of research and experimentation will be conducted by qualified engineers.

3. That the applicant is legally and financially qualified and possesses adequate technical facilities to carry forward the program.

4. That the public interest, convenience and/or necessity will be served through the operation of the proposed station.

Conditions of Licensing

(a) A licensee of a facsimile broadcast station shall not make any charge, directly or indirectly, for the transmission of programs.

(b) No licensee of any other broadcast station or network shall make any additional charge, directly or indirectly, for the transmission of programs by a facsimile broadcast station, nor shall commercial accounts be solicited by any licensee of another broadcast station or network, or others acting in their behalf, upon representation that images concerning that commercial program will be transmitted by a facsimile station.

Frequencies Allotted

(a) The following frequencies are allocated for assigneent to facsimile broadcast stations on an experimental basis provided no interference is caused to the television stations operating in the band 2000-2100 kilocycles:

2012 kc 2016 kc 2096 kc

(b) If the facsimile program of research and experimentation cannot be properly carried forward on the frequencies in subsection (a) of this rule due to the characteristics of these frequencies, applicants may request and be assigned any frequency specified in Rule 1073 on an experimental basis.

(c) Other frequencies under the jurisdiction of the Commission may be assigned for experimental operation of facsimile broadcast stations on an experimental basis provided a sufficient need therefor is shown and no interference will be caused to established radio stations.

(d) Each facsimile broadcast station will be licensed for only one frequency except in subsection (b) of this rule more than one frequency may be licensed to one station if need therefor is shown.

(e) Each applicant shall specify the frequency or frequencies desired and the maximum modulating frequencies proposed to be employed.

(f) The operating frequency of a facsimile broadcast station shall be maintained in accordance with the frequency assignments as shown by Rule 980, provided, however, where a more strict adherence to the assigned frequency is necessary to prevent interference, the Commission will specify the tolerance.

(g) A facsimile broadcast station authorized to operate on frequencies regularly allocated to other stations or services shall be required to abide by all rules governing the stations regularly operating thereon, which are applicable to facsimile broadcast stations and are not in conflict with Rules 980 to 986, inclusive, and Rules 1030 to 1039, inclusive, excluding Rule 1035.

Power Limitations

The power output rating of a facsimile broadcast station shall not be in excess of that necessary to carry forward the program of research. The operating power may be maintained at the maximum rating or less, as the conditions of operation may require.

A supplemental report shall be filed with and made a part of each application for renewal of license and shall include statements of the following:

1. Number of hours operated for transmission of facsimile programs.

2. Comprehensive report of research and experimentation conducted.

3. Conclusions and program for further developments of the facsimile broadcast service.

4. All developments and major changes in equipment.

5. Any other pertinent developments.

TELEVISION, 1938-39

By

E. W. ENGSTROM

RCA Research Engineer

WHILE considerable progress was made in the television field during 1938 in all phases of television research and development, it is hoped that even greater strides will be made during the current year. Work will be continued along the same comprehensive lines in 1939 as in the past year. It is desirable to not only improve the efficiency of the present television system but also increase the knowledge of the propagation characteristics of ultra-short waves.

Advanced work in television research and development has been, and will continue to be, directed toward a more complete understanding of the higher radio frequencies. The procedure is to study the propagation of ultra-short waves so that, as more knowledge of their characteristics becomes available, their usefulness may be determined. At the same time, research in the field of electronics is conducted for the purpose of finding principles which can be applied in devices that will put to work the newly discovered frequencies.

One of the more important objectives in 1939 will be the further development of a system of radio relay utilizing centimeter waves, which might eventually be used in the establishment of networks of television stations. The RCA has made progress in this field of development, and believes that further advances will be made this year.

In the following review of television activities during 1938 will be found the complete workings of engineers and concerns who may this year see the many years' work culminated in success.

Television in 1938

The past year was marked by refinement of all parts of the system in a steady advance toward commercial television. Late in the year it was announced that a limited program service would be inaugurated in New York City with the opening of the 1939 World's Fair in that city, and that receivers would be offered for sale to the public at that time. Apparatus is available for sale to broadcasters for studio and transmitter service. Splendid progress was made through industry cooperation in establishing operating standards for a television system. Emphasis was placed on comprehensive field tests.

Studio Pickup Equipment

Steady progress has been made in the electrical and mechanical design of pickup equipment for studio use. The frequency bandwidth passed by the entire system has been widened and the circuit operation made more stable. The camera preamplifier and Iconoscope coupling circuits have been improved so that the signal to noise ratio has been increased.

Operating technique has constantly improved so that more consistent performance is obtained. Much attention was given to the problems of program production.

Mobile Pickup Equipment

Mobile pickup equipment mounted in trucks has been put in experimental operation and has given satisfactory performance for preliminary tests. The equipment includes an ultra high frequency transmitter for relaying the picture signal to the television transmitter for broadcasting. Location pickups have been successfully accomplished over moderate distances and in one instance up to 27 miles.

Transmitters

Considerable improvement has been made in television transmitters. The modulating frequency characteristic has been widened. Circuits for inserting the direct current component in the transmitted signal have developed which, in addition to that function improve the overall stability of the transmitter. Experimental advances have been made in higher powers at the higher frequency television channels. A transmitter of nominal power output has been developed suitable for broadcast service.

In order to fully utilize a television frequency channel, it is desirable to attenuate most of one picture side band at the transmitter. A method for doing this was evolved and tested in laboratory and field with satisfactory results. This was suitable for carrier frequency operation at high power and included constant resistance circuits and phase correcting networks. Experimental work was also done on obtaining the same characteristic at a low level in combination with low level modulation.

Improvements were made in the mechanical designs and electrical characteristics of transmitting antennas. Antennas suitable for installation on the small space available on top of tall buildings have been designed. The directivity pattern has been improved for horizontally polarized antennas so that they have a circular pattern in the horizontal plane and directivity toward the horizon in the vertical plane, resulting in a substantial power gain. The selectivity of these structures has been improved so that they have uniform impedance over more than one 6 megacycle television channel.

Signal Propagation

Study was given to propagation characteristics of ultra short waves in the region of 40 megacycles to several hundred megacycles. Comparisons fo polarization of the radiated wave have been made indicating that a better signal to ignition interference ratio and less multipath interference is obtained with horizontal than vertical polarization.

Receivers

Advances were made in television receiver design resulting in improved performance and simplification of operation. Circuits permitting pre-set station selection have been developed, and the number of operating controls has been reduced. The frequency band width passed by the receivers has been increased to correspond with the increased effective frequency band made available by suppressing one side band at the transmitter. This results in more picture detail. Amplifier tubes of higher transconductance have been made available so that more gain and improved signal to noise ratios can be had, even with the increased band width. Screen material for Kinescopes has been developed so that pictures are bright and black and white.

Large Screen Pictures

Progress has been made in circuits and cathode ray tubes for producing large pictures by projection. Experimental apparatus of this type has been demonstrated to large groups with success.

Conclusion

Thus television entered in 1939, with hopes high. The entire world is anxiously awaiting the new phenomenon that is television. Will they be satisfied during 1939? We can only guess, but the fact remains that the work in research and development of television will continue until the correct answer is found.

TELEVISION — a brief history

(Compiled by the National Broadcasting Company)

TELEVISION, like radio, began in the nineteenth century. Not only were its scientific foundations laid, but numerous attempts were actually made to transmit pictures by electrical means.

Television demanded, first of all, some means of translating light values into corresponding electrical values. Selenium was isolated by Berzelius, a Swedish chemist, in 1817, but the photo-electric property of this element was not discovered until fifty-six years later, and then quite by accident. A telegraph operator at the Valentia Cable Station in southwestern Ireland observed that some selenium resistances he was using became better conductors of electricity when exposed to bright sunlight. His observations were given scientific confirmation a short time later.

First Tele

To scientists this discovery revealed the possibility of converting light waves into electrical impulses. A picture—that is, a pattern of lights and shadows—might be converted into an electrical pattern. The electrical impulses might thereupon be transmitted over considerable distances and then reconverted to light values which would be assembled into a reproduction of the original image. Ayrton and Perry made one of the earliest proposals (1880) for transmitting pictures by electricity. G. R. Carey advanced another scheme the same year. Shelford Bidwell actually demonstrated the sending of outlines by wire in 1881 before the Physical Society in England.

The possibility of translating light values into their electrical counterparts, however, did not constitute a complete foundation for television. Maurice Leblanc, a Frenchman, in 1880 laid down the art's fundamental necessities. To send a moving picture, he held, it would be necessary to break it into elements and transmit these one at a time in a definite order. These would be joined together at the receiver in the same order.

Scanning Disk

Four years later, in 1884, Paul Nipkow patented the famous scanning disc which bears his name. The German physicist's invention was simply a circular sheet of metal near the edge of which was a series of small holes in the form of a spiral. The arrangement was such that if the disc revolved, the outermost hole would afford a view of a strip across the top of the subject. The second hole would give a view of the strip immediately under the first, and so on until the entire subject had been scanned in a series of lines.

Leblanc advanced the idea of using two mirrors for scanning, one to vibrate at a comparatively low speed for vertical scanning, the other to vibrate at a high-frequency for the horizontal scanning of each line. Weiller proposed the use of a mirror drum in still another method of scanning. These were the fundamentals of a few of the many schemes for "seeing by telegraphy" publicized in the 1880's. In each case the light from the televised subject was to be registered by a selenium cell.

About the turn of the century Karl Braun introduced the oscilloscope, a vacuum tube showing visually the variations of an alternating current. It was demonstrated that a magnetic field from a coil placed around the tube improved the sharpness of the fluorescent spot. Obviously, the cathode ray which produced the spot of light at the end of the tube could also be deflected by the same means, since the ray itself was an electric current. This led to the next important advance in television.

Braun Tube

In 1907 Boris Rosing, a Russian, patented a system in which the Braun tube was to be the instrument for reconstructing the image at the receiver. The tube's cathode-ray beam, composed of electrons, was to be modulated by the impulses sent

from the transmitter. The modulated beam was to be made to scan the fluorescent surface placed at the end of the tube and thereby create a reproduction of the original image. Speaking before the Roentgen Society in 1911, A. A. Campbell Swinton outlined a method, publicized in a very rough form three years earlier, for television without the aid of a single moving mechanical part. Cathode ray tubes of suitable design were to be used at both transmitter and receiver.

Today all the most important television systems employ cathode ray tubes, in one form or another, at both receiver and transmitter and every moving mechanical part has been eliminated. In these respects, Campbell Swinton's scheme may be said to have been essentially the same as today's all-electronic television systems. With him, however, the method was purely theoretical. At the time neither he nor any of his contemporaries could realize their ambitions. The Braun tube was very imperfect. Besides, no means were available for strengthening the very weak impulses generated in the instrument used for registering and scanning the televised subject. A few more years and the World War put a temporary halt to experiment in television.

Mechanical Scanning

When scientists again took up the task of perfecting television in the early 1920's, radio contributed comparatively efficient amplifiers based on the three-electrode vacuum tube invented by Lee de Forest. Improvements had been made in the photo-electric cell and the scientific world was in the process of discovering photo-electric materials far more sensitive than selenium. This period—in which C. F. Jenkins, an American, John Logie Baird, an Englishman, and Denes von Mihaly, a Hungarian, played leading parts—was characterized by attempts to solve the problems of television by mechanical scanning. Jenkins gave a demonstration of his method in Washington in 1925. Baird showed his apparatus publicly in London the same year. On January 27, 1926, Baird transmitted better images in the presence of forty members of the Royal Institution in London. His television images were in 30 lines at the rate of 12½ complete pictures a second. There was, therefore, a decided flicker in the crude image. A year later the engineers of the Bell Telephone Laboratories gave a demonstration in which both sound and sight were transmitted synchronously by wire from Washington to New York. They also transmitted images by radio over a much shorter distance. Early in 1928 Baird successfully transmitted a low-definition picture across the Atlantic.

The time was one of intense activity in television experiment and confident predictions were made that the problems of the new art would soon be solved so that all might shortly see the events they were hearing about over radio. Picture definition gradually increased from 30 lines to 240 lines. Although steady advances were made in image clarity, observers still felt that none contained sufficient detail. Greater detail, of course, meant higher speeds in scanning. Reduction of the annoying flicker meant increasing the number of complete pictures per second.

In the laboratories, however, work was progressing on a new scanning method. In 1933 Dr. Vladimir K. Zworykin, of the Radio Corporation of America, announced his Iconoscope, a vacuum tube for translating a light image into electrical charges which were to be scanned by a suitably deflected cathode ray beam. About the same time Philo T. Farnsworth brought forward another scanning tube which he called the "image dissector." One or the other of these two tubes, both American in origin, is the basis of every all-electronic television system in use at the present time.

Tele Now

At the time of writing, television has reached a relatively high state of technical development and improvements are being made at a very rapid rate. Tentative standards proposed for American television stipulate an image of 441 lines at the rate of 30 complete pictures a second. Images are gaining in brilliance and, although they are still comparatively small as viewed in the home model receiver, experimenters in the field have hopes of increasing their dimensions. Dr. Zworykin and his associate, Dr. R. R. Law, last year demonstrated a tube which projected a television image approximately eight feet by ten in size.

Television broadcasting is still, in 1938, in its infancy. In the United States eighteen stations are licensed to broadcast on an experimental basis. The most important of these stations is operated in New York by the National Broadcasting Company, which maintains a small but complete staff to work on all phases of the new art. In Great Britain television has been established as a daily service to several thousand viewers in the London area by the British Broadcasting Corporation. Germany has announced a government service to begin before the end of 1938. The P. T. T. in France has newly completed a powerful transmitter in the Eiffel Tower.

—*Courtesy of the World Almanac.*

Proposed Television Transmission Standards Submitted to the FCC for Approval by the Radio Manufacturers' Association

THE long-heralded proposed television transmission standards were submitted to the Federal Communications Commission by the Radio Manufacturers Association on September 12, 1938. They were submitted to the FCC with the approval of the RMA Board of Directors and also of the special RMA Television Committee of which A. F. Murray of Philadelphia (Philco) is chairman and were approved also by the RMA membership.

The proposed standards were presented to the FCC for approval in the present experimental development of television and the RMA is prepared to demonstrate that they are practical and in the public interest. Besides RMA engineering and executive facilities, a few television interests which are not technically among RMA membership participated in the preparation of the proposed standards.

The immediate action of the FCC engineering department before presenting the proposals to the Commission in session was to ask the RMA to answer three questions concerning them:

1. The names of all the members of the RMA who are actively engaged in the development of television and the extent of their activity, including, in addition, the names of any other interests, not members of the RMA, who have participated in the formulation of the standards.

2. Why it would be in the public interest to adopt the standards proposed by the RMA at this particular time, including a statement as to whether television stations, even though licensed on an experimental basis, should be required to abide by such standards.

3. Whether or not the RMA believed that the development of television has reached the stage where the Commission might call formal hearings with respect to the adoption of standards, in which event the RMA would be expected to present evidence showing that such standards are required at this particular time.

There have been many reasons put forth from various sources concerning the need for adoption of set standards of television transmission. Such adoption would assure the industry of two results: (1) a certain amount of stability on which not only the industry but also the potential owners of television receiving sets could rely; (2) a more definite yardstick for the future activities of those engaged in television experimentation and research.

The proposed television transmission standards as presented to the FCC are as follows:

T-101 **Television Channel Width**

The standard television channel shall not be less than 6 megacycles in width.

T-102 **Television and Sound Carrier Spacing**

It shall be standard to separate the sound and picture carriers by approximately 4.5 Mc. This standard shall go into effect just as soon as "single side band" operation at the transmitter is practicable. (The previous standard of approximately 3.25 Mc. shall be superseded.)

T-103 **Sound Carrier and Television Carrier Relation**

It shall be standard in a television channel to place the sound carrier at a higher frequency than the television carrier.

T-104 **Position of Sound Carrier**

It shall be standard to locate the sound carrier for a television channel 0.25 Mc. lower than the upper frequency limit of the channel.

T-105 **Polarity of Transmission**

It shall be standard for a decrease in

initial light intensity to cause an increase in the radiated power. (See Standard M9-121.)

T-106 **Frame Frequency**

It shall be standard to use a frame frequency of 30 per second and a field frequency of 60 per second, interlaced.

T-107 **Number of Lines per Frame**

It shall be standard to use 441 lines per frame.

T-108 **Aspect Radio**

The standard picture aspect ratio shall be 4:3.

T-109 **Percentage of Television Signal Devoted to Synchronization**

If the peak amplitude of the radio frequency television signal is taken as 100 per cent, it shall be standard to use not less than 20 per cent nor more than 25 per cent of the total amplitude for synchronizing pulses.

T-110 **Method of Transmission**

It shall be standard in television transmission that black shall be represented by a definite carrier level independent of light and shade in the picture.

T-111 **Synchronizing**

The standard synchronizing signals shall be as shown on Drawing T-111.

T-112 **Transmitter Modulation Capability**

If the peak amplitude of the radio frequency television signal is taken as 100 per cent, it shall be standard for the signal amplitude to drop to 25 per cent or less of peak amplitude for maximum white.

T-113 **Transmitter Output Rating**

It shall be standard, in order to correspond as nearly as possible to equivalent rating of sound transmitters, that the power of television picture transmitters be nominally rated at the output terminals in peak power divided by four.

T-114 **Relative Radiated Power for Picture and for Sound**

It shall be standard to have the radiated power for the picture approximately the same as for sound.

CBS ENTERS TELEVISION

By

PETER C. GOLDMARK

Chief Television Engineer

NINETEEN THIRTY-NINE will find the Columbia Broadcasting System engaged in television on a major scale! That statement has been held in abeyance almost two years while CBS has been engaged in the construction and installation of a new 15-kilowatt television transmitter on the top floors of the Chrysler Building in New York City. Television studios are now nearing completion in the Grand Central Terminal, and according to the plans of the network, CBS will be presenting televised programs by early Summer.

While a great deal of supposition has been voiced by everyone as to what CBS plans to do in the television field, and how it will accomplish the same, the following account, the first authentic one, will explain the CBS set-up in its entirety.

The transmitter equipment weighs about 100,000 pounds and is to be located on the 73rd, 74th and 75th floors of the Chrysler Tower. This transmitter consumes about 300 kw. of electric power and represents the latest design in television and sound transmitters. The sound transmitter operates with a carrier of 7½ kw. on 55.75 Mgs., while the picture carrier will be between 50-55.25 Mgs.

The antenna is divided into two identical sections located one above the other just below the steel spire of the building.

The site was chosen in 1937 after careful study of the whole New York skyline had shown it to be the ideal location and capable of providing primary coverage within a radius of about 40 miles over a total area of about 4,800 square miles.

A space 280x60 feet square and 45 feet high on the third floor of the Grand Central Terminal is being reconstructed for the television studios. It is divided into a large Master Control Room, where all the equipment as well as the operators will be located, and into studio space.

There are several studio pickup and film channels available. A coaxial cable carries the picture signal from the studio to the Chrysler Building transmitter while special high fidelity lines will handle the audio signals.

The entire sound equipment, from the studio to the antenna, is capable of handling frequencies up to 10,000 cycles and more. Since high class television receivers will be equipped to reproduce such frequencies, it is hoped that not only the visual broadcasting but a much-improved sound broadcasting service will be inaugurated by the new station, which is licensed to operate under the call letters W2XAX.

When the new station goes on the air it will climax almost a decade of experimentation by CBS which, in 1931, broadcast the first regular schedule of television programs undertaken in this country, using a mechanical system with 60 lines.

CBS has been actively engaged in research and development work in the field of high definition television since the beginning of 1936. At first experiments were carried out on 343 lines, but they soon were continued on today's standard of 441 lines, 30 frames.

The new laboratories located in the CBS building at 485 Madison Avenue, have, in the last two years, developed a complete low power television transmitter suitable for the transmission of motion picture film, either 16 or 35 mm. Certain parts of this equipment will be used in connection with high power transmissions from the Chrysler Building.

Gilbert Seldes will direct the programs to be heard over the television transmitter, and it is believed that before the end of 1939, CBS will be one of the leaders in the television field.

HISTORICAL RESUME OF THE DON LEE BROADCASTING SYSTEM TELEVISION STATION W6XAO

By

HARRY R. LUBCKE

Director of Television

THE television research activities of the Don Lee Broadcasting System started in 1930. On December 23, 1931, television station W6XAO went on the air on the ultra-high frequency of 44,500 kc. on a one-hour-per-day schedule. Transmissions have been made daily, except Sundays, since that time, thereby establishing W6XAO as the oldest television broadcasting station in the United States operating on the now universally utilized ultra-high frequencies. At this early date 80-line images from motion picture film were broadcast. Scheduled transmissions were also made on 49,400 and 66,750 kc. during 1932 and 1933.

In April, 1932, a self-synchronized cathode-ray television receiver was demonstrated under home receiving conditions. In order to give this equipment an unusual test and prove that a power line connection was not required for synchronization, on May 21, 1932, the receiver was taken aloft in a tri-motored transport airplane, and images were received from W6XAO while flying above the city of Los Angeles.

In 1933 motion picture scenes of the damage caused by the Long Beach-Los Angeles earthquake were broadcast, as were scenes of the Stanford - University of Southern California football game, within a few hours after its conclusion. Altogether a total of over eleven million feet of motion picture film have been telecast by W6XAO.

Research on high-definition television was started in 1934, and in 1935 W6XAO was broadcasting 300-line images.

Starting with an initial power of 150 watts, an increase to one kilowatt was made in the early part of 1938. With this power, image reception was possible at 20 to 30 miles from the transmitter in the cities of Long Beach and Pomona.

Throughout the period of operations, incidental to the telecasts, numerous inventions have been made and patented. Because of the early entry of W6XAO into the electronic television field, some of these are of fundamental importance.

Early in 1938, live subject pickup equipment was placed in operation. Since then program activities have gone forward until there is now one twice-a-week 15-minute comedy serial, now in its 27th episode, entitled, "Vine Street," one weekly dramatic serial entitled, "The Gibbons Family," and one weekly fantasy currently depicting, "Alice in Wonderland." In addition, educational features sponsored by the University of Southern California, vocal, instrumental, and orchestral musical numbers, excerpts from circus life, fashion and home economic demonstrations, and Hollywood news commentators are telecast.

TELEVISION FOR THE HOME

By

SAMUEL M. SALTZMAN

President of the American Television Corporation

130 West 56th Street, N. Y. C.

A CHECKUP on the reams of published reports on television reveals that.

"Television Is Ready"
"Television Has a Long Way to Go"
"Video Art Just Around the Corner"
"Someone Has Moved the Corner!"
"Experts Concede Big Future for Television"
"Experts Minimize Television Progress"

and so on.

If the reader is confused he can't be blamed. But let us examine the facts. Nearly five years ago the same type of receiving set that works today was tested in Philadelphia and New York and found capable of picking up transmission from the Empire State Building.

1939 Picture

There have been few if any changes in those television receivers since 1934. At that time the best transmitted image was a 240-line picture. The present 441-line standard makes the 1939 version a clearly defined, detailed image of the televised subject. Otherwise, the only appreciable change in receiving sets for the home has been the elimination of two or three tuning knobs and the improvement of cabinet design. These two alterations have had little to do with the enjoyment of picture reception. In short, receiving sets for home use have been ready for many months.

Tele Programs

During those months broadcasters experimented with the transmission of motion pictures, live talent programs, newsreels and "spot" news events. Their show originated from studio and portable-mobile, or outdoor truck transmitters and were intended chiefly to test improvements in the process of sensitizing and synchronizing the broadcast. The size of the audience was negligible in the matter of the number of receiving sets in use. But great significance is attached to the fact that a great number of such broadcasts have been witnessed by thousands of visitors to the showrooms and laboratories of the American Television Corporation, pioneers in the job of preparing television for the average American home.

The manufacturers of Videor believes that a great audience can be built in the United States by merchandising television sets on a "Model T" basis, a plan that puts the new art within easy reach of the home instead of establishing it as a luxury.

Cathode Ray Tube

On this point, the size of the televised pictures has an important bearing. The

image is seen on the broad end of the cone-shaped cathode ray tube, or kinescope. A tube five inches in diameter gets its power and tuning support from about fifteen other smaller tubes in the receiver chassis. The larger the kinescope, the more intricate and costly the supporting circuit. The proportionate difference in the cost of a set providing a 10 or 12-inch picture is so considerable that its ultimate retail price would be prohibitive for several years to come. But the audiences attending ATC television shows have seen remarkable achievements of video engineering in the use of a 5-inch kinescope, whose image is more than two newspaper columns in width.

Imagine a better-than-two-column picture in your morning newspaper printed on good stock and covered by the finest of "dotted" screens—imagine the characters in such a picture lighting up, becoming active, moving about, talking, expressing themselves in movement and gesture equivalent in clarity to that depicted on the motion picture screen. The entire pictorial basis of your education, in school books, magazines, newspapers and periodicals is in pictures no smaller and no larger than those featured on the ATC Videor screen. By way of emphasis, it is important to repeat that such a screen size permits the virtues of clear definition, vivid detail and reasonable cost.

Picture Tuning

Next to picture size, inquiries often concern picture tuning. Videor is equipped for simple tuning to which radio users have become accustomed. One knob tunes in stations. For some time to come, this tuner will be used infrequently because two or more broadcasters will probably alternate in the use of the same wave length. A second knob achieves precision tuning, and a third functions to bring more light or shade into the subject and serves as the switch that turns the picture on and off.

Nothing will ever completely replace the theatre for amusement and entertainment away from the home, the newspaper for its reportorial account of the news of the world, or the stadium for its sports thrills. But America takes its miracles in stride. It knows television has passed the conversational stage. It is becoming better acquainted with the actual or projected contributions of RCA, General Electric, Farnsworth, Philco, Zenith and others in the preparation for living picture transmissions. It knows that over 50,000 daily marvel at television reception in London that boasts growing quality as well as frequency. It knows that millions have been spent in successful experimentation. It knows the World's Fair will signal the beginning of permanent public telecasting. It knows that the natural and wholesome competitive spirit that motivates existing radio networks and industrial sponsors will spur television progress.

Tele Sponsors

It is obvious that broadcasters need sponsors; sponsors need audiences; and audiences want programs. But which comes first? The American Television Corporation believes the audience is the first requisite. The audience can be built with reliable equipment. Videor has demonstrated its reliability to thousands of observers in the past year. Regular programs announced in advance would allow dealers to demonstrate the products of ATC and other manufacturers. The same industry-building programs would make the sets useful in the home as sight-and-sound units and in the consequent creation of an audience. With a pioneer audience thus established, sponsors would be offered the most powerful direct selling medium ever devised, and their sponsorship would provide television with its vital bloodsteam. No medium better than television will place an advertiser face to face with his customer.

By the same token, public education will be served. Satisfactory tests have been already made of blackboard lectures by a university professor, fashion display by leading designers, defense tactics by the War Department, scientific instruction by filmed demonstration, etc. Experimental audience reactions have been watched closely for some time to determine the kind of program that will be demanded. Radio broadcasters throughout the country have conducted market research to determine the extent of local interest in television and the requirements for becoming a part of the eventual network of public transmitters.

Pioneer Audience

The pioneer audience in television will be participants in one of the most far-reaching and fascinating of all scientific advances. They will witness thrilling progress in the months to come and see history in the making. They will be in at the birth of an art that someone once said had to be born full-grown.