

1758
JULY

AN INTERNATIONAL BROADCASTING SYSTEM

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IN 1925 there was installed at Bound Brook, N. J., what was, at that time, a "superpower" 40,000-watt transmitter, for WJZ. It was the natural sequel to the conviction of RCA, that the budding broadcasting industry offered great opportunities for a service to the American public which could be duplicated by no other medium. It was a notable step further to envision also an international service utilizing the new "short waves" which were beginning to show promise of reliable communication over very long distances. Accordingly, the Bound Brook plant was provided with two powerful transmitters, one dedicated to domestic service and the other to international service.

By the standards of today, the 1925 stations were crude in many respects but the short-wave broadcasting stations of that period blazed trails which have been followed all over the civilized world.

International broadcasting is conducted under far different circumstances today. Its value in promoting good will and a better understanding beyond national borders has prompted all of the leading nations of the world to provide comprehensive foreign language service over elaborate and costly facilities. The American method is to promote international friendship, not by a barrage of propaganda, but by providing the instrument by which peoples become better acquainted. Knowing your neighbor may well lead to establishing bonds of peace, trade, and international prosperity.

For many years the National Broadcasting Company, the General Electric Company, and the Westinghouse Electric and Manufacturing Company short-wave stations operated independently of each other with the exception of the exchange of special program features from time to time and the transmission of suitable NBC Red or Blue network programs.

In May, 1933, the three companies, prompted by the desire to take a part in properly representing the United States in international broadcasting, developed a generally cooperative operation of their facilities. The stations included in this American service are:

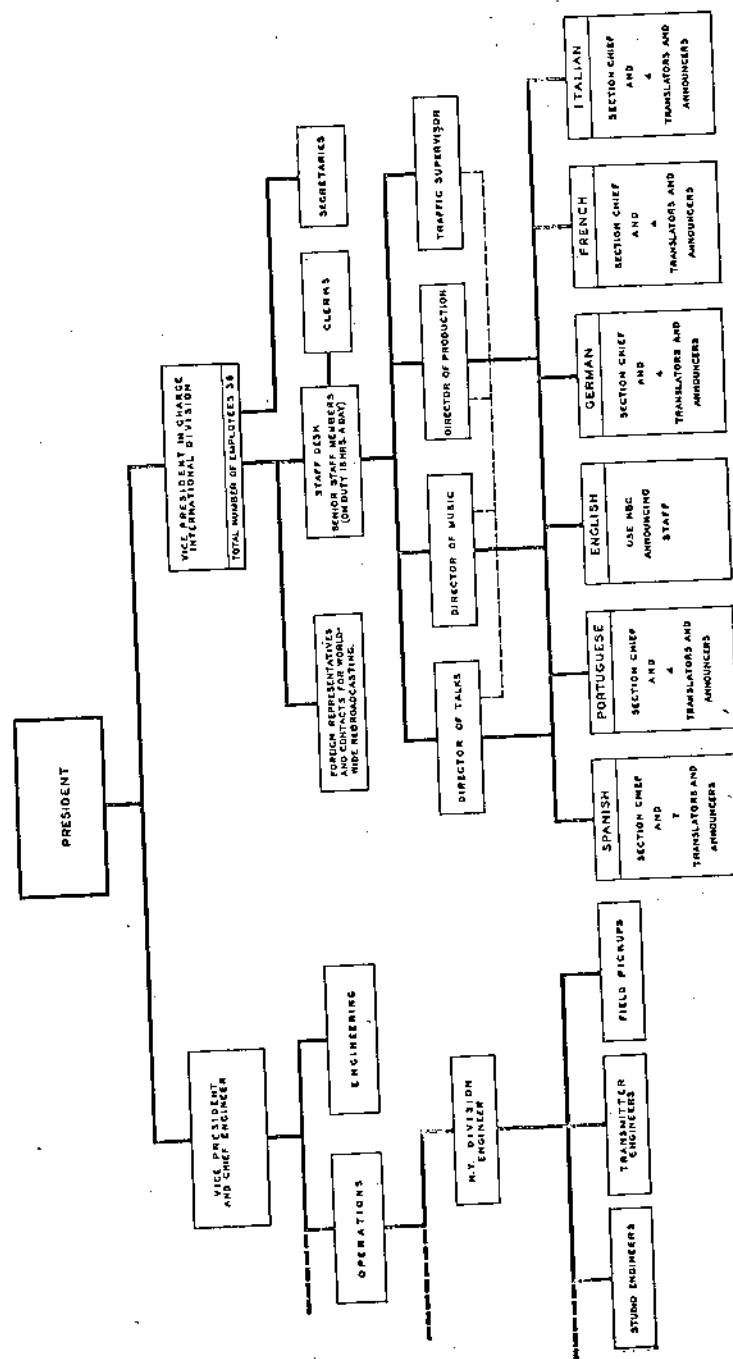


Fig. 1—Organization chart of the departments which are directly engaged in international broadcasting in NBC.

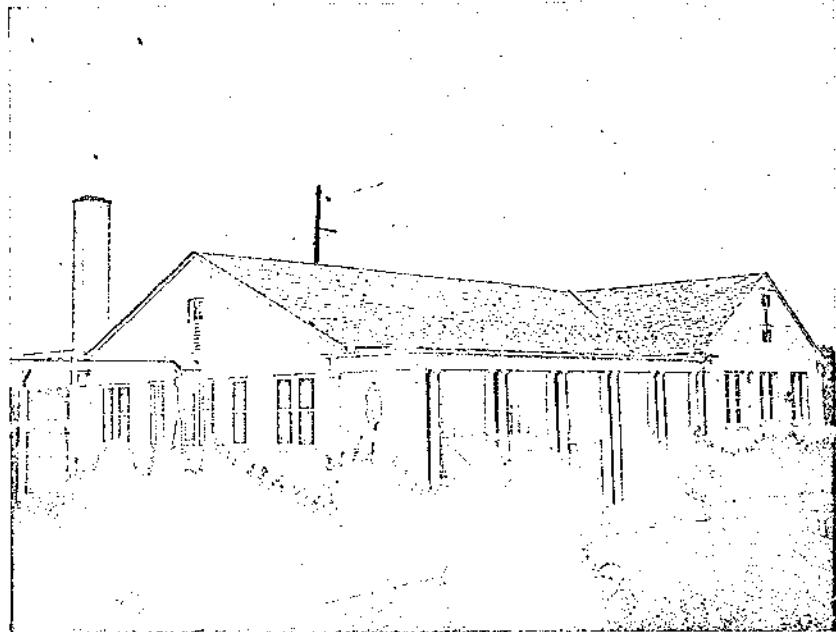


Fig. 2—Bound Brook, N. J., transmitter building which houses NBC Stations W3XAL, WJZ, WMFL, and W2XDG. The "International Wing" is at the far end.

	Licensee	Location	Frequency	Power
W3XAL	Nat. Broadcasting Co.	Bound Brook, N. J.	6100 kc	25 kw
	Nat. Broadcasting Co.	Bound Brook, N. J.	17780 kc	25 kw
W9XF	Nat. Broadcasting Co.	Chicago, Ill.	6100 kc	12 kw
W1XK	Westinghouse E. M. Co.	Millis, Mass.	9570 kc	6 kw
W8XK	Westinghouse E. M. Co.	Pittsburgh, Pa.	6140 kc	25 kw
			21540 kc	
	Westinghouse E. M. Co.	Pittsburgh, Pa.	11870 kc	20 kw
			15210 kc	25 kw
W2XAD	General Electric Co.	Schenectady, N. Y.	9530 kc	30 kw
			15330 kc	20 kw
W2XAF	*General Electric Co.	Belmont, Cal.	9530 kc	20 kw
			15330 kc	20 kw

* Denotes common transmitter.

* Under construction.

These facilities are now linked to Radio City in New York by 700 miles of special telephone circuits carrying international programs exclusively, and these lines are at times supplemented by Red and Blue network program circuits.

The cooperative operation of the international broadcasting facilities listed above makes possible a better service for several reasons:

1. The program building facilities of the NBC, which it is believed are the most complete and comprehensive in the world, have taken over the task of building a large portion of the programs.

2. The combined technical facilities have enabled a wider and more effective distribution of these programs than could be obtained by the present facilities of any individual company. It has now become possible to transmit simultaneous services to Europe, South America, Central America, South Africa, Australia, New Zealand, and the Orient.

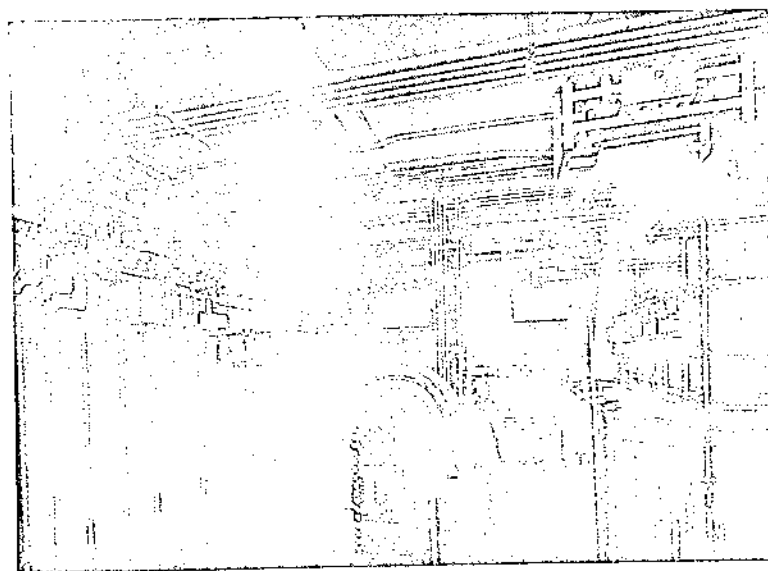


Fig. 3—Section of basement housing W3XAL apparatus.

3. Cooperative program construction results in more comprehensive program distribution without wasteful duplication of service.

EXAMPLES OF SERVICE PROVIDED

As an example of the service provided, when President Ortiz of Argentina spoke in Spanish in Buenos Aires in April, short-wave radio brought his message to the United States, together with a translation into English, which NBC carried over both Red and Blue Networks to the people of the United States and Canada. A Portuguese translation was immediately made and the message was transmitted in all three languages to the countries of Latin America. A recording of the speech and its English translation was then made and transmitted the same night by short wave to Australia, New Zealand, and Asia. The following morning another transcription of the speech was trans-

mitted to Europe with translations in French, Italian, and German. Thus, by short wave radio this important address was made available in six languages and, at a convenient time in each case, to all parts of the world.

Only a few days later, Senor Aranha, former Brazilian Ambassador to the United States, made his first international address as Minister

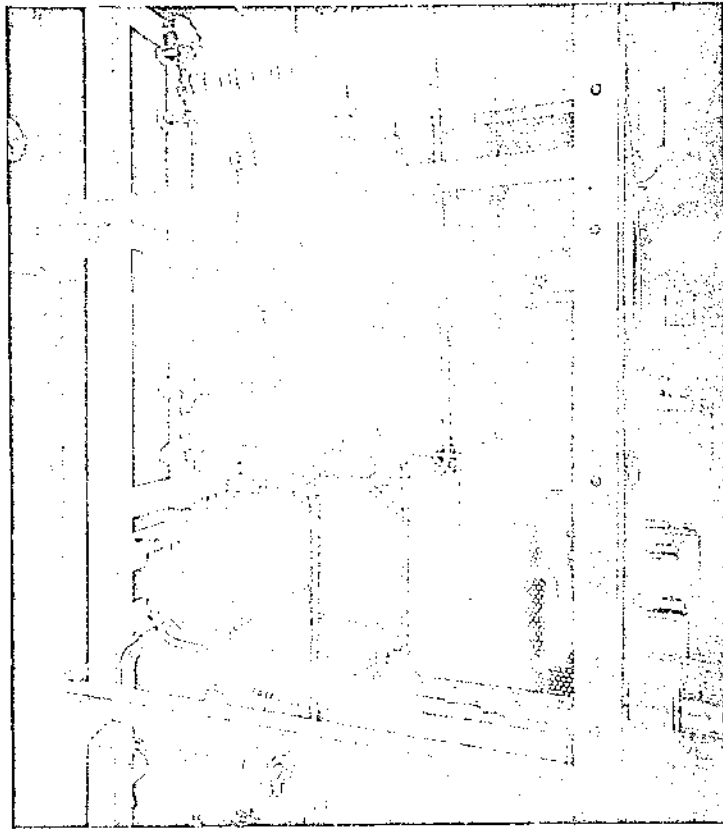


Fig. 4—One of the duplicate W3XAL 10-ampere, 12,000-volt rectifiers.

of Foreign Affairs of Brazil, in a speech transmitted to the United States. The speech, delivered in English, was translated into Spanish and Portuguese and transmitted in both languages to Latin America. It was then transmitted in English to Asia, Australia, and New Zealand. Again, the following morning, the speech was transmitted in the languages of Europe to listeners across the sea.

A few weeks later an important speech by our own Secretary of State Hull was carried to the same audiences.

President Roosevelt's 1938 Pan-American address was transmitted to an NBC world-wide audience which was probably equalled in size only by the group of listeners to the abdication speech of King Edward a year and a half ago. The President's address was carried throughout the United States over the combined NBC Red and Blue Networks of over 130 American stations. It was also broadcast to foreign listeners in Latin America, South America, and Europe

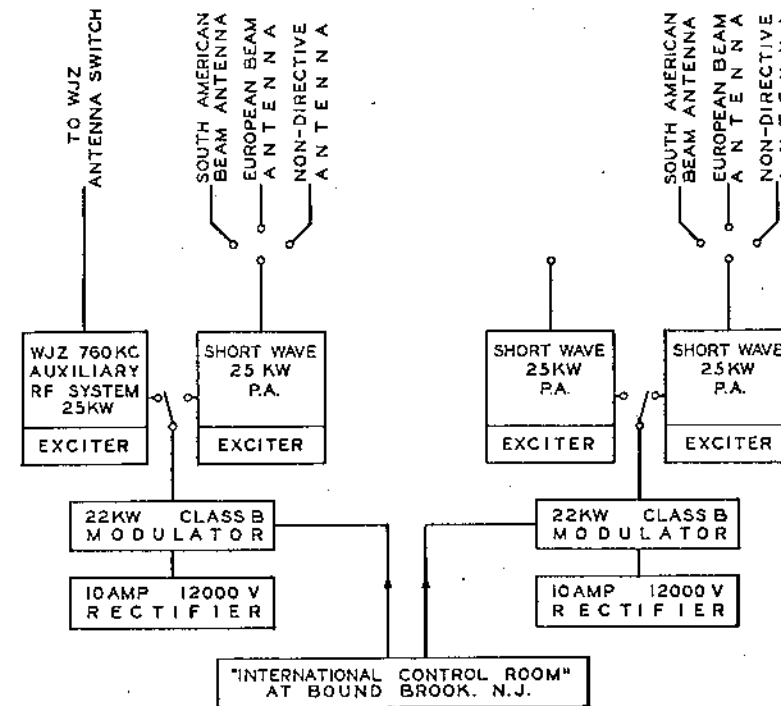


Fig. 5—Diagram illustrating the flexibility of the two 25-kw international transmitters.

through stations W3XAL, W8XK, W2XAD, and W1XK. It was relayed to foreign stations in Buenos Aires, Rio de Janeiro, Havana, Bogota, Caracas, Montevideo, the Orient, Hawaii, Australia, England, Germany, France, South Africa, and Mexico City via the facilities of R.C.A. Communications and the American Telephone and Telegraph Company. The address in English was followed by Spanish, Portuguese, and Italian translations.

FOREIGN PROGRAMS RELAYED TO AMERICA

Foreign programs play an increasingly important part in providing programs for American consumption. The comprehensive scope of

NBC endeavor in this field is indicated in the following table which tabulates only those programs brought to its networks by point-to-point international relaying through R.C.A. Communications or American Telephone and Telegraph Company facilities.

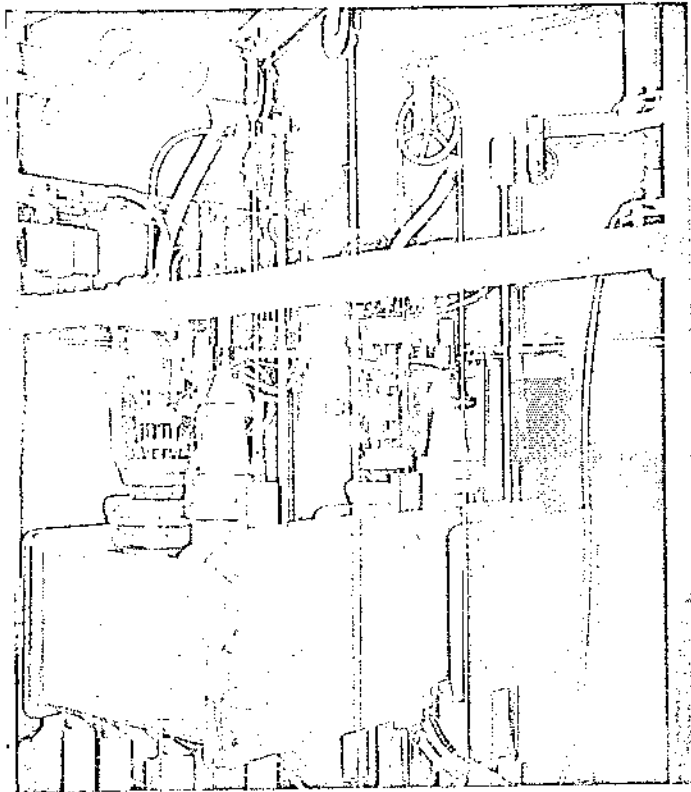


Fig. 6—One of the duplicate W3XAL 25-kw amplifier assemblies.

Year	No. of Programs	No. Program Hours	Countries of Origin
1930	95	48	
1931	142	73	
1932	149	51	
1933	143	52	
1934	278	113	36
1935	319	97	47
1936	514	146	53
1937	516	169	44

These programs bring to Americans, direct from the scene, the rise and fall of empires, events from distant battlefields, the voices of monarchs and dictators. They bring the celebration of Christmas

from the Holyland and from the lands of the Eskimo, events from the world of sports, religion, and the arts and sciences.

The interconnected facilities required, to bring such a comprehensive service to American listeners, are indeed extensive. Point-to-point relay service is required for each program. For the simplest events, the foreign facilities consist of program pickup equipment, wireline connections through repeater stations, and powerful transmitters with

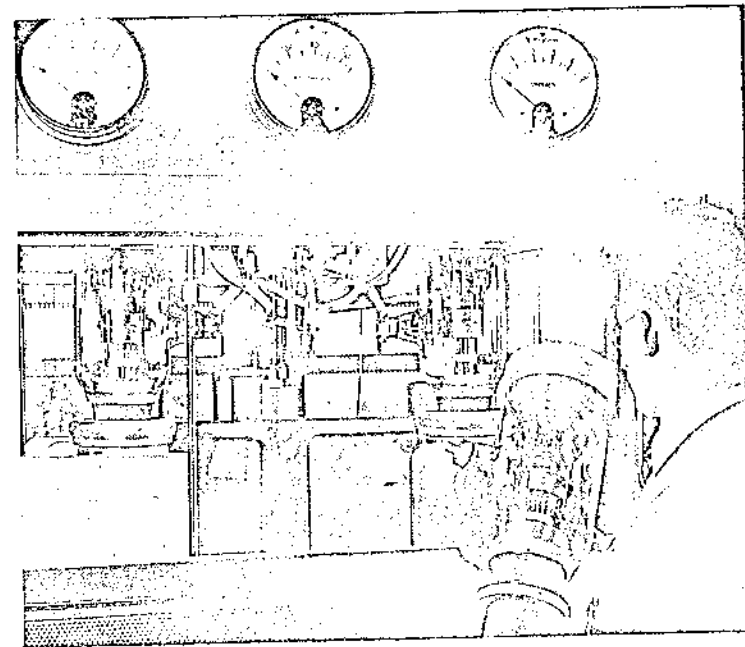


Fig. 7—25-kw amplifier assembly.

highly directive antenna systems. The domestic facilities consist of complex diversity receiving systems, wireline connections to the broadcast control point, and thousands of miles of program line connections to networks of broadcasting stations. To bring a program from London to the living room of a listener in San Francisco requires an accumulative power magnification, with minor distortion and frequency discrimination, of 400 million billion billion billion billion times! This amazing amplification has now become a commonplace procedure! If a grain of sand were increased in weight that many times it would weigh 20 thousand billion billion times as much as the earth.

International program relaying service is provided through the facilities of R.C.A. Communications and the American Telephone and Telegraph Company. Upon request a program relay channel can be

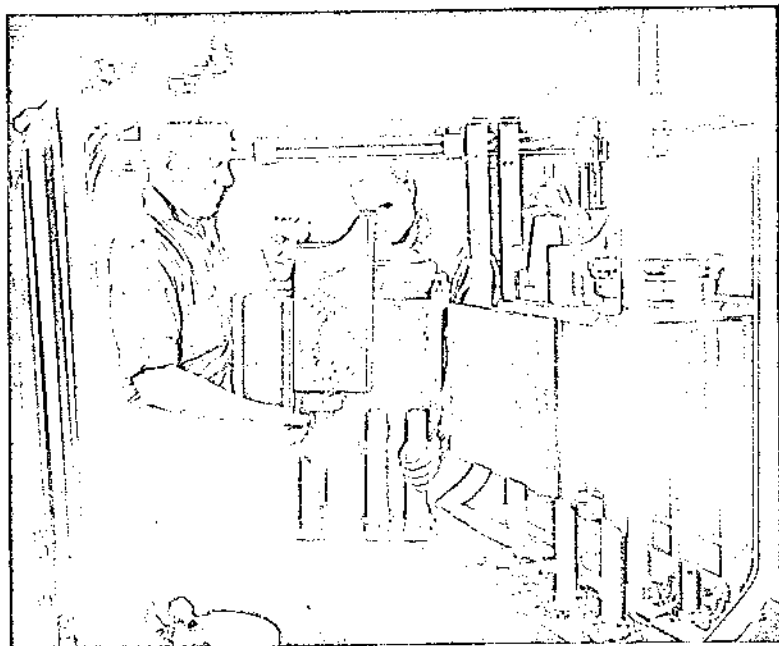


Fig. 8—One of W3XAL 25-kw high-frequency power amplifiers being assembled.

made available between the United States and any of the following countries:

Alaska	France	Newfoundland
Albania	Germany	Norway
Argentina	Greenland	Palestine
Australia	Guatemala	Peru
Austria	Hawaii	Philippines
Belgium	Hongkong	Poland
Brazil	Hungary	Russia
British Guiana	Iceland	Scotland
Chile	Ireland	Spain
China	Italy	Sweden
Colombia	Japan	Switzerland
Cuba	Java	South Africa
Czechoslovakia	Lithuania	Tripoli
Denmark	Mexico	Uruguay
England	Netherlands	Vatican City
		Venezuela

The NBC has made use of this two-way relay service in transmitting to or receiving from every one of the countries referred to. Programs may be, and have been, relayed to nearly every country in Europe, Asia, and South America, by linking local stations and relay terminal points by long wireline connections.

Fifteen years ago a New York theatre manager announced from the stage, with more enthusiasm than accuracy, that the next performance was to be broadcast to the world by radio. That over-optimistic announcement was prophetic. World-wide broadcasting is now a frequent occurrence and an excellent outcome of the American system of broadcasting. Astonishingly enough, even the matter-of-fact engineer, living by, and working with radio day by day, is no less awed by what he has wrought than the layman.

It is interesting to compare 1938 international broadcasting with the first American network rebroadcast of a foreign program. It took place in 1925 and was accomplished by stations WJZ and WRC with the assistance of the point to point facilities of RCA. Station 5XX, London, England, transmitting on 1600 meters, was received at Belfast, Maine, and relayed on 60 meters (approx. 5,000 kc.) to the writer at the RCA Research Laboratory near Van Cortlandt Park, New York City. From there it was transmitted to WJZ and WRC by wirelines. The transmissions were accompanied by so much static and interference that during an entire 20-minute broadcast there was less than one minute of intelligible music and speech—just enough to convince skeptics that for the first time the miracle of radio had brought them music from across the seas!

PROGRAMMING AN INTERNATIONAL SERVICE

The proper and thorough programming of international facilities involves certain complications encountered in only a minor degree in providing service within the borders of the United States. Europe, so to speak, goes to bed at approximately 6 P.M. New York time. Listeners in Russia turn off their radios even earlier. In addition to time differences, and of even greater importance, are language differences. A useful service to Latin America, South America, and Europe requires daily transmissions in six different languages, namely Spanish, Portuguese, English, German, French, and Italian. Transmissions in each of these languages require separate staffs of translators and announcers, each supervised by a section chief. In addition there is required a director of talks, a director of music, a director of production, and a traffic supervisor.

Matters concerning all of these groups are coordinated and supervised by a staff desk, consisting of senior staff members on relay duty sixteen hours per day. Supplementing the activities of the New York headquarters staff are foreign representatives and contacts through whom arrangements are made for transmission and reception of events of international interest.

Early in 1938, coincidental with the inauguration of the cooperative operation of the international broadcasting facilities, a new NBC department was organized, known as the International Division. Transferred to this group were those specialists who had formerly functioned in international activities as members of various domestic departments. The international division consists of 38 persons directed by a vice-president in charge.

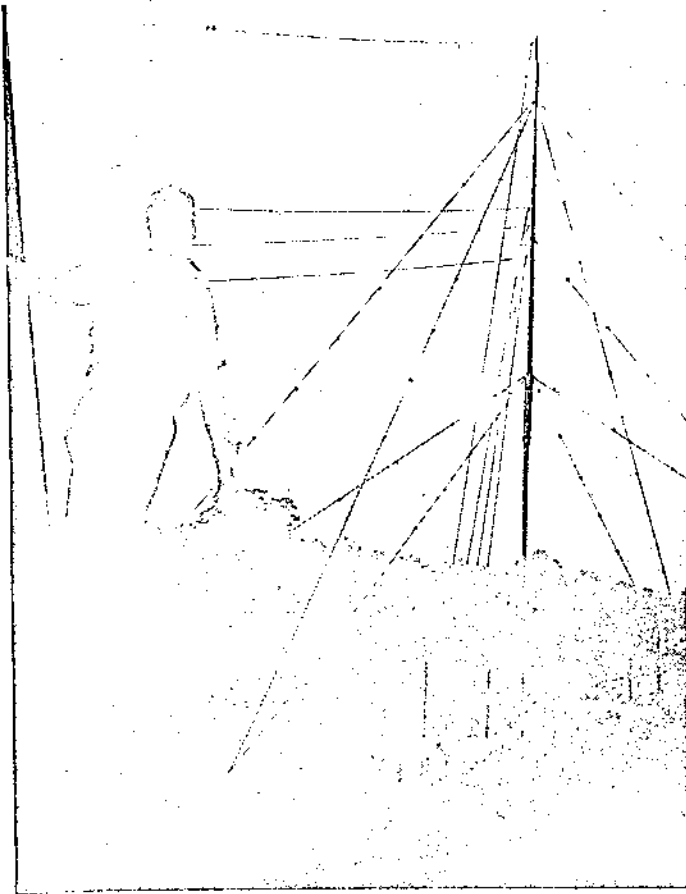


Fig. 9.—Section of W3XAL European beam antenna photographed from 50-foot level of 250-foot short-wave antenna tower.

The engineering and operating functions, the construction and operation of facilities used by NBC in international broadcasting, are directed by the vice-president and chief engineer.

Figure 1 shows the organization chart of the departments which are directly engaged in international broadcasting in NBC.

The complexity and scope of the service provided is illustrated by the following schedule which covers the programs during one representative day transmitted through station W3XAL at Bound Brook, N. J.

TUESDAY, MAY 24th — STATION W3XAL

Service on European Beam 17,780 kc, 16.8 meters. 9:00 A.M. to 5:00 P.M.

- 9:00- 9:55 Breakfast Club. Announced in English.
- 9:55-10:00 Press Radio News. Announced in English.
- 10:00-10:45 Musical Interlude. Announced in English.
- 10:45-11:00 Women in the News. Announced in English.
- 11:00-11:15 News. Announced in Italian.
- 11:15-11:30 Viennese Ensemble. Announced in English and Italian.
- 11:30-11:45 Woman's Page. Announced in Italian.
- 11:45-12:00 Melody Matinee. Announced in Italian.
- 12:00-12:15 News. Announced in English.
- 12:15-12:30 Bailey Axton, tenor. Announced in English.
- 12:30- 1:00 Carnation Program. Announced in English.
- 1:00- 1:15 News. Announced in German.
- 1:15- 1:30 Escorts and Betty, popular songs. Announced in English and German.
- 1:30- 2:00 Jerry Sears Orchestra, popular music. Announced in German.
- 2:00- 2:15 News. Announced in French.
- 2:15- 2:30 Book of Songs. Announced in English and French.
- 2:30- 2:45 Woman's Page. Announced in French.
- 2:45- 3:00 Armchair Quartet. Announced in English and French.
- 3:00- 3:15 News. Announced in German.
- 3:15- 3:30 Dance Music. Announced in German.
- 3:30- 3:45 Arts in America. Announced in German.
- 3:45- 4:00 U. S. Army Band. Announced in English and German.
- 4:00- 4:15 News. Announced in French.
- 4:15- 4:45 Dansante. Announced in French.
- 4:45- 5:00 Organ Concert. Announced in French.

Service on Latin American Beam 17,780 kc, 16.8 meters.
5:20 P.M. to 9:00 P.M.

- 5:20- 5:30 News. Announced in English.
- 5:30- 5:45 Concert. Announced in Spanish.
- 5:45- 6:00 News. Announced in Spanish.
- 6:00- 6:15 Jimmy Richards Orchestra. Announced in English and Spanish.
- 6:15- 6:25 Top Hatters Orchestra. Announced in English and Spanish.
- 6:25- 6:30 Press Radio News. Announced in English.
- 6:30- 6:45 Base Ball Scores. Announced in English.
- 6:45- 7:00 Ray Kinney and His Royal Hawaiian Orchestra. Announced in English and Spanish.
- 7:00- 7:15 News. Announced in Spanish.
- 7:15- 7:30 Carol Deis, soprano and John Guernsey, baritone. Announced in English and Spanish.
- 7:30- 7:45 Musical Revue. Announced in Spanish.
- 7:45- 8:00 Smooth and Sweet. Announced in English and Spanish.
- 8:00- 8:15 News. Announced in Portugese.
- 8:15- 8:30 Dance Orchestra. Announced in English and Portugese.
- 8:30- 8:45 Woman's Page. Priscilla Watson. Announced in Portugese.
- 8:45- 9:00 Concert Orchestra. Announced in Portugese.

Service on Latin American Beam 6100 kc, 49.1 meters.
9:25 P.M. to 1:00 A.M.

- 9:25- 9:30 Program Résumé. Announced in Spanish.
9:30-10:00 Rosario Broudon Concert. Announced in Spanish.
10:00-10:30 Man About Town, popular program. Announced in Spanish.
10:30-10:45 News. Announced in Spanish.
10:45-11:30 The Composer's Library. Announced in Spanish.
11:30- 1:00 Dance Music. Announced in English and Spanish.

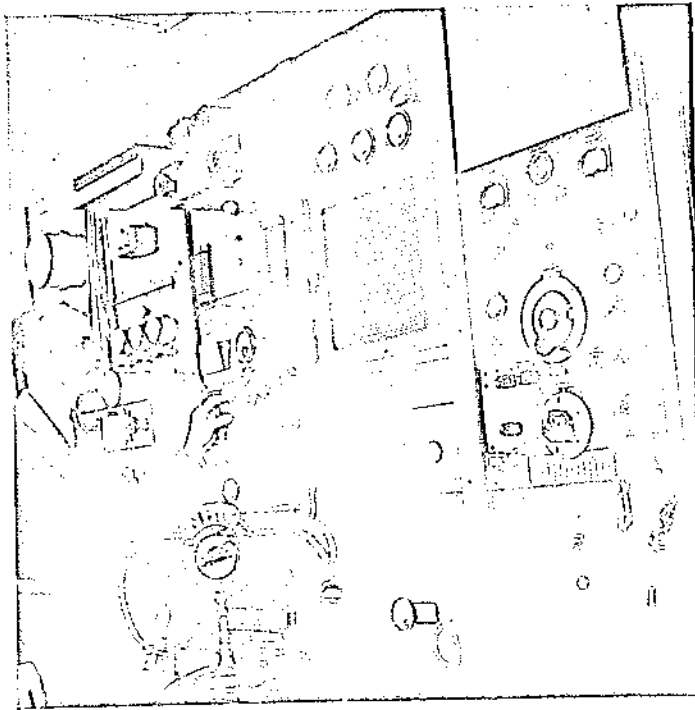


Fig. 10—W3XAL "International" control room.

A day's facilities schedule for W3XAL, W2XAD, and W8XK is shown below.

W3XAL:

- 8:55 A.M.- 5:05 P.M. EDST. European Beam, 17,780 kc, 16.8 meters.
5:15 P.M.- 9:05 P.M. EDST. Latin American Beam, 17,780 kc, 16.8 m.
9:20 P.M.- 1:00 A.M. EDST. Latin American Beam, 6100 kc, 49.1 m.

W2XAD:

- 8:00 A.M.-12:00 NOON EDST. Latin American Beam, 21,500 kc.
12:30 P.M.- 6:00 P.M. EDST. European Beam, 15,330 kc.
6:00 P.M.- 7:00 P.M. EDST. Latin American Beam, 15,330 kc.
7:15 P.M.-11:00 P.M. EDST. Latin American Beam, 9550 kc.

W8XK:

- 7:00 A.M.- 9:00 A.M. EDST. European Beam, 21,540 kc.
9:00 A.M.- 7:00 P.M. EDST. European and Latin American Beams,
15,210 kc.
7:00 P.M.-11:00 P.M. EDST. Latin American Beam, 11,870 kc.
11:00 P.M.- 1:00 A.M. EDST. Non-Directional, 6,140 kc.

A summary of transmissions during one representative week is shown below:

Station: W3XAL	Date: SUMMARY—WEEK OF MAY 8, 1938
Total number of programs broadcast on 17780 kc..... 273	Total number of hours.... 81-45
Total number of programs broadcast on 6100 kc..... 55	Total number of hours.... 25-00
Total number of programs broadcast 328	Total number of hours.... 106-45

	Number of Programs	Hrs. Min.
(1) Total RED network programs.....	54	16-40
(2) Total BLUE network programs	101	38-15
(3) Total Commercial Programs from Networks.....	14	5-45
(4) Total Special Programs carried by Int'l. Div. only	157	46-05
(a) Talks		
Total News	62	14-50
Total Other Talks	34	7-30
(b) Total Music		
(b) Total Music	59	22-43
(c) Total Special Events		
(c) Total Special Events	2	1-02

Breakdown of Programs Carried by International Division Only

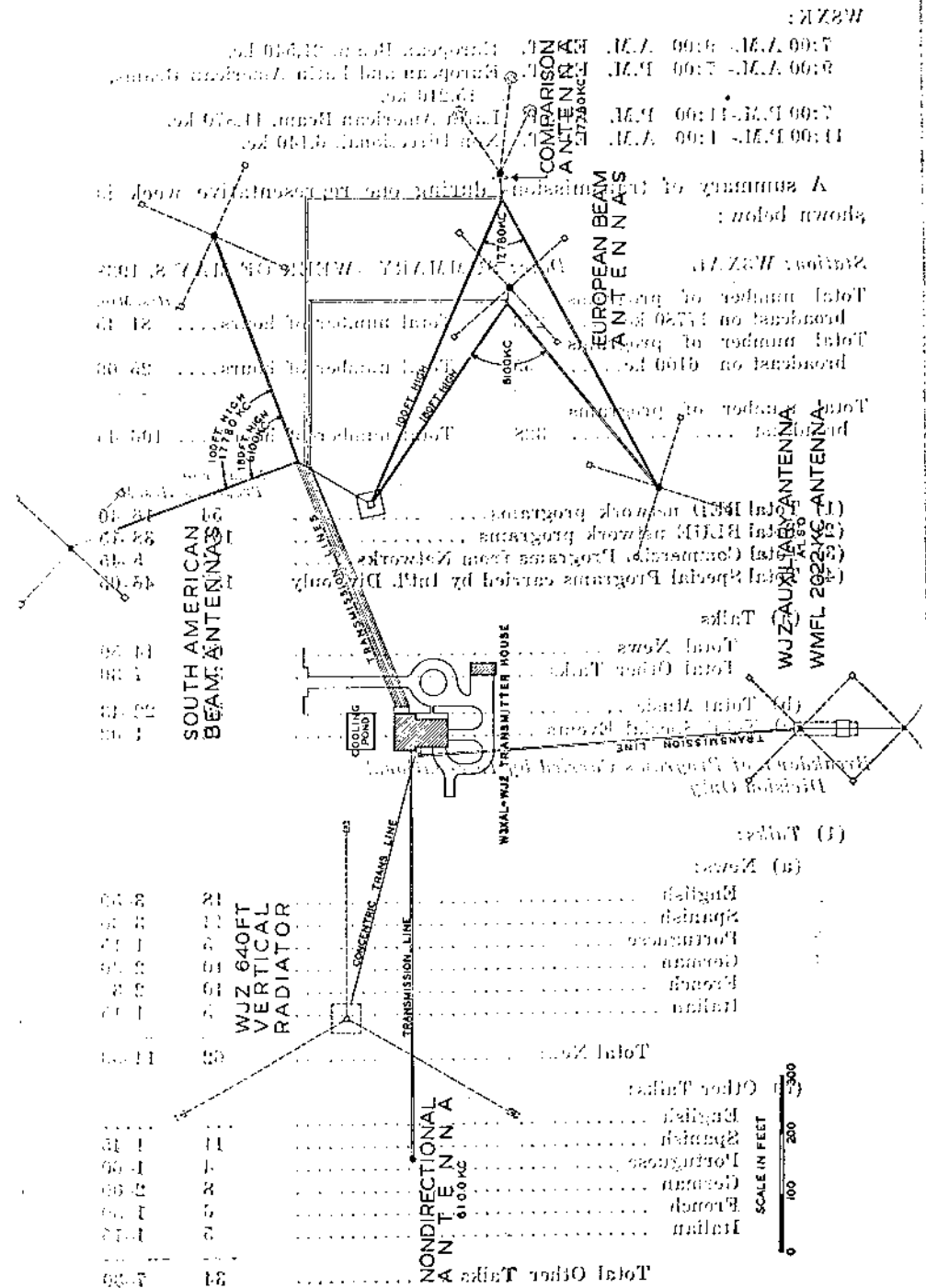
(1) Talks:

(a) News:

English	18	3-50
Spanish	14	3-30
Portuguese	5	1-15
German	10	2-30
French	10	2-30
Italian	5	1-15
Total News	62	14-50

(b) Other Talks:

English
Spanish	11	1-45
Portuguese	4	1-00
German	8	2-00
French	6	1-30
Italian	5	1-15
Total Other Talks	34	7-30



(2) Music:

	Programs	Hrs.	Mtn.
(a) Live Talent	12	4-00	
(b) Records	22	10-28	
(c) Thesaurus	24	7-45	
(d) Acetate Recordings	1	-30	
Total Live Talent	12	4-00	
Total Recordings	47	18-43	
Total Music	59	22-43	

(3) Special Events:

(a) Studio	1	1-00
(b) Outside Pick-Ups	1	2-02
(c) Acetate Recordings	1	1-02
Total Special Events	3	4-02

NOTE: Above totals do not include time for Station Sign-On and Sign-Off which amounts to 44 minutes. Total time on the air including Sign-Ons and Sign-Offs is 110-25.

NEW FACILITIES AT W3XAL
 The previously tabulated short-wave stations, NBC placed in service at W3XAL the first of two new and thoroughly modern 25,000 watt duplicate transmitters which had been under construction for eight months. These new facilities are located in the "International Wing" of the Bound Brook, N. J., Transmitter Building.

Figure 2 shows the transmitter building which contains the WJZ 50-kw Blue Network domestic broadcast transmitter, its 25-kw auxiliary transmitter, two 25-kw international transmitters, and also two lower-power domestic transmitters.

Figures 3 and 4 show views of the transmitting equipment in the "International Wing" of this building.

Figure 5 shows, by block diagram, the flexibility of the two 25-kw international transmitters.

Figures 6 and 7 show the simple and highly efficient 25-kw power amplifier construction. The white cones adjacent to the tubes are compressed-air neutralizing condensers.

Figure 8 shows one of the 25-kw amplifiers being assembled. Figure 9 shows a section of W3XAL, European beam antenna, photographed from 50-foot level of 250-foot short-wave antenna tower.