TRANSMITTER PANELS LINE BOTH SIDES OF THE CONTROL ROOM OF THE SHORT-WAVE PLANT AT DIXON, CALIFORNIA.

DESTINATION: ORIENT

Powerful Short-Wave Plant Built and Operated at Dixon, California, by RCA-NBC Engineers, Carries United Nations' Story to the Far East

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ON a square mile of flatlands near the town of Dixon, 28 miles southwest of Sacramento, California, the combined efforts of radio engineers and construction experts have erected one of the world's most powerful short-wave voices, a modern Stentor now making itself heard in all parts of the Pacific and the Far East, and to the south and southeast in Latin America and South America.

The Dixon plant is a war-born infant with the vocal power of a giant. It was started soon after this country entered the war and was rushed to completion as part of a government project to extend the use of short-waves in carrying the story of the United Nations' ideals throughout the globe.

At the beginning of the war, when European developments had top priority, the first stations in the general plan were located in the East. Notable among these installations were the six powerful transmitters at Bound Brook, New Jersey, erected and operated by NBC for the Office of War Information and the Committee on Inter-American Affairs.

Once these facilities were under way, OWI contracted for additional outlets with greater power to perform similar functions in the Orient and Pacific areas and to the south. China, Russia, Japan, the mid-Pacific islands, Australia and New Zealand were the goals in one direction. The Spanish and Portugese speaking countries below the Mexican border and in South America were objectives in the reverse direction.

Accordingly, at the request of OWI, operating through the Defense Plants Corporation, the National Broadcasting Company and the Columbia Broadcasting System pooled their engineering resources in the design and installation of two complete transmitting plants at sites to be selected by the respective networks. Further to speed the work and thereby meet the increasingly urgent calls for the new services, it was decided that the two stations would be identical in architecture and equipment. It was also part of the agreement that NBC and CBS should operate the stations after their completion, with OWI supplying program material.

NBC's first move was to conduct searches to determine the most suitable location for the plant and the extensive array of directional antennas that would be needed for the specified global coverage. The Dixon acreage on level terrain, unobstructed for many miles in all directions, was found to meet all requirements.

Larger Unit Added Later

The transmitter building at Dixon was laid out to accommodate one 200 k.w. and two 50 k.w. units, but for several months it operated with four 50 k.w. transmitters. The larger unit was put into action later as materials became available.

Built of reinforced concrete, the central structure has a floor area of more than 16,000 square feet, arranged in three sections: transmitter room, cooling room and administrative quarters.

In the main transmitter room, switchboard panels extend along both sides for a total length of 124 feet. The operator's console is placed at the far end, facing racks containing the audio-input amplifiers and test equipment. Behind each row of panels is a fireproof vault housing the power transformers.

Across one end of the building, a complete wing provides space for offices, store rooms, machine shops, laboratories and sleeping quarters for the staff.

The dual 50 k.w. units referred to, as well as the 50 k.w. driver on the 200 k.w. transmitter, were designed and built by the RCA Victor Division and are the type which has been installed at points all over the world in the prosecution of the war. Their design incorporates provisions for conveniently and quickly changing frequencies and for utilizing the type 880 tubes which are widely used in this type of equipment.

All transmitters utilize high level modulation. One modulator is connected to the 200 kilowatt transmitter. A separate modulator is connected to the two 50 kilowatt transmitters. The power supply for the 200 k.w. unit utilizes twelve 857-B tubes and the rectifier for the 50 k.w. units embodies an additional six 857-B tubes.

Many innovations were included in the design of the transmitters. Among the most interesting features are the tuning condensers mounted on motor driven carriages. When operations require a change in frequency, these condensers are moved on tracks beneath long copper pipes acting as part of the tuned circuits, until the proper point for resonance is reached. Movement of the carriages is controlled from the transmitter panel.

Adequate cooling of the huge tubes in the transmitters is a necessity. To take care of this item, an elaborate water circulating and rotating fan system is installed in the transmitter building. More than 10,000 gallons of cooling water flow through the transmitter tubes during each day's operations while a constant stream of cooled air supplied by large fans maintains an even temperature in each transmitter chamber.

Because of the high voltages involved, extreme precautions have been taken to protect the operating personnel from injury. Supplementing this protection are numerous devices to guard the apparatus against damage due to overloads or to failure of some major unit to function properly.

Lies on Great Circle Route

By a fortunate circumstance, Dixon lies on the great circle route which passes through the Far East and down the Latin American peninsula into South America. Because of this, an antenna which beams a program westward from Dixon, can perform a similar service to the south of the United States merely by reversing its direction. If this seems to be a paradox to those familiar with the common maps of school geographies, its truth becomes apparent when the surface of the globe is reduced to azimuthal projection. Then only do the continents appear in their true, great circle relation.

The antenna system comprises several groups of rhombics which are positioned to deliver the maximum signal strength to the selected sectors. Each group consists of several antennas designed for optimum efficiency on any one of three frequencies in the 6 to 21 megacycle region of the spectrum. The direction of any beam can be changed from the Far East to South America by means of a manually-operated switch located beneath each antenna.

As changes take place during the 24-hour day in the ionized layers far above the earth's surface, and as beam schedules change, it becomes necessary to shift from one frequency or antenna to another in order to obtain the best signal propagation. This adjustment is carried out at Dixon by means of an outdoor switching bay. Feed lines from each of the nine antennas are brought to the bay and attached to terminals arranged on the rims of three horizontal arcs, placed one above the other. Movable booms, connected with the transmitters through power lines, swing around the arc until contacts on the boom-ends coincide with the terminals of the antenna feedlines, thus completing the circuit.

From the transmitter building it is possible to see in the distance two separate mountain ranges. These peaks complicate the location of short-wave stations in the San Francisco area and dictated the location of this station 60 miles from that city. The directional antennas provide radio beams which are transmitted at very low angles above the earth, requiring that there be no mountain ranges within distances where they would intercept the beams.

BELOW: EXTERIOR OF DIXON, CALIF., SHORT-WAVE STATION. RIGHT: ANTENNAS ARE SELECTED IN THIS SWITCHING BAY.