WNAX

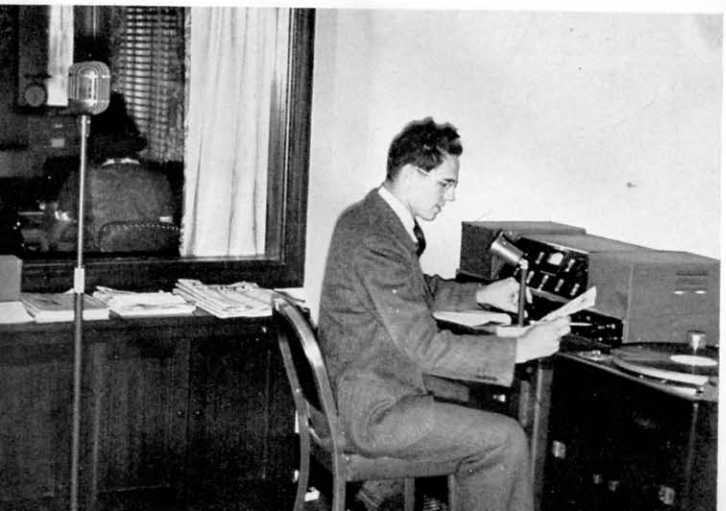
Yankton, S. Dakota

Throughout the states of North and South Dakota, Nebraska, Iowa and Minnesota farm and city folks "just naturally" listen to WNAX.

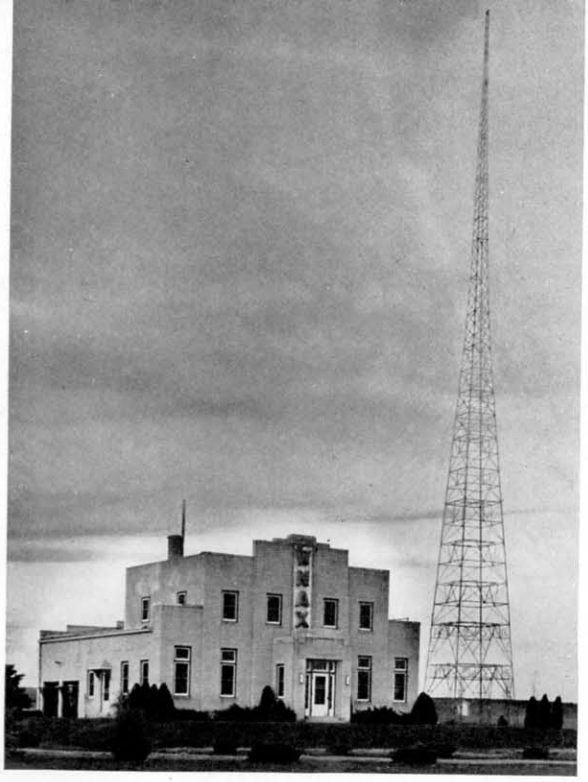
Ever since the station started operating in 1926 it has been living up to its motto: "serving the midwest farmer." Naturally the past 13 years have seen many changes in personnel, programs and equipment. But the station continues to live up to its original aim — planning programs of special interest to small-town and rural listeners.

Purchased from the House of Gurney, midwest seed firm, November 1938, by Gardner Cowles, Jr., of the Des Moines Register and Tribune, the station has been increasing its personnel and technical equipment for the past twelve months.

The transmitter building, erected in 1935, is located about five miles north-west of Yankton. A 450 foot quarter-wave self-supporting Blaw-Knox vertical radiator gives added push to the 5000 watt day and 1000 watt night-time power of WNAX on the very favorable frequency of 570 kilocycles.



Announcer Jack Chase gives a remote broadcast from one of the new supplementary studios recently opened at Sioux City.



From this attractive building the voice of WNAX travels to North and South Dakota, Nebraska, Iowa and Minnesota. Robert R. Tincher, manager; Clif Todd, chief engineer; Phil Hoffman, commercial manager, get in a huddle over new plans.

The transmitter house contains a work shop, five room apartment for the chief engineer and his family, complete auxiliary studio for use during special broadcasts as well as other equipment. A Hammarlund super-pro communications receiver is part of the standard equipment and is used daily to rebroadcast programs through WNAX.

The Western Electric transmitting equipment includes a D 94-992 transmitter and a 110A program limiting amplifier.

Three factors contribute to the remarkable five state primary coverage area of WNAX: a widening band of soil of A-1 conductivity, fanning out from the transmitter through North and South Dakota, acting as a natural path for WNAX signals; a carrier wave of 570 kilocycles; the fact that separation distances from other stations on the same frequency are greater than in most cases. Due to this splendid coverage the Columbia Broadcasting System has made WNAX its only outlet between Minneapolis and Denver. According to a recent survey it leads all CBS stations regardless of location, in rural daytime listening audience.

A recent development which makes for better service to farmers of the territory is the construction of complete supplementary studios and offices in the Orpheum Theatre building in Sioux City, Iowa. This modern layout uses Western Electric 23A studio console control equipment with Cardioid and Saltshaker microphones. A direct line connects the studios there with Yankton and programs of a special nature emanating from Sioux City add to the already extensive coverage and service.

(*Continued on page 23*)

$$I_2 = \frac{E_p X_m}{X_1 X_N - X_1 X_2 + X_m^2}. \qquad (3)$$

Now since the mutual impedance X_m is $k\sqrt{X_1 X_2}$, where k is the coefficient of coupling between the two coils, this becomes

$$I_2 = \frac{kE_p\sqrt{X_1 X_2}}{X_1 X_N - X_1 X_2 + k^2 X_1 X_2} = \frac{kE_p\sqrt{\frac{X_2}{X_1}}}{X_N - X_2(1-k^2)}. \qquad (4)$$

This is the quantity which is to be equal in magnitude and opposite in phase to the interelectrode current E_p/X_{pg}. The phase will be taken care of by proper polarity of the transformer, so we merely write, cancelling E_p,

$$\frac{k\sqrt{\frac{X_2}{X_1}}}{X_N - X_2(1-k^2)} = \frac{1}{X_{pg}}, \qquad (5)$$

or,

$$\frac{X_N}{X_{pg}} = \frac{k\sqrt{\frac{X_2}{X_1}}}{1 - \frac{X_2}{X_N}(1-k^2)}. \qquad (6)$$

It is interesting to note from expression (6) that if the coefficient of coupling k approaches unity, or if X_N is large compared with X_2, we arrive at the simple result

$$\frac{X_N}{X_{pg}} = k\sqrt{\frac{X_2}{X_1}}; \qquad (7)$$

and that if we intend to use a neutralizing capacity equal to the plate-grid capacity, so that $X_N/X_{pg} = 1$, we simply design the coils so that

$$\frac{X_2}{X_1} = \frac{1}{k^2}. \qquad (8)$$

As with all neutralizing circuits, the actual adjustment is made by applying excitation to the grid with plate voltage removed, and adjusting for minimum r.f. voltage between plate and ground or minimum current in one of the output circuit elements. This procedure simply makes use of the reciprocity principle which tells us that if excitation on the grid produces no voltage at the plate, then a voltage appearing at the plate will produce none at the grid, which is the condition we want to obtain. It just happens to be convenient to apply the voltage to the grid.

In view of this principle, the circuits of Figs. 15 and 16 are just alike, the grid and plate being merely interchanged, so that the expressions derived above will apply to either.

The method of Fig. 16 is well adapted to grid bias modulation, since the small neutralizing condenser and the tube capacity have very little shunting effect on the applied audio signal. This method is used very successfully in the new Western Electric 1-kilowatt broadcast transmitter, which employs grid bias modulation in combination with the high efficiency circuit.

The circuits that have been described, while not the only ones available, represent the basic methods for avoiding reactions between output and input circuits through the interelectrode capacity. The author believes that by keeping in mind the simplified viewpoint given in the foregoing, of imagining the grid short-circuited by an ammeter and determining what is needed to make this ammeter read zero if a voltage were to be impressed on the plate, the experimenter will be able to check the correctness or incorrectness of any proposed method of neutralization and devise new combinations to meet particular requirements.

WNAX, Yankton, S. D.

(*Continued from page 20*)

Another feature added since the Cowles interests purchased the station is the organization of a Farm Service Department which is under the capable direction of Charles Worcester, well known in midwestern agricultural circles.

Gardner Cowles, Jr., president of WNAX Broadcasting Company, is one of the busiest men in radio. Added to his duties as associate editor of the Des Moines Register and Tribune, editor and publisher of Look magazine and director of the Minneapolis Star-Journal, is the presidency of the Iowa Network.

In a few short years Cowles has set up one of the most complete radio organizations in the country. It consists of stations WNAX, KSO, Des Moines; KRNT, Des Moines; and WMT, Waterloo near Cedar Rapids.

Luther L. Hill, vice-president and treasurer of the WNAX Broadcasting Company and of the Iowa Network, with which WNAX is affiliated, has had a rapid rise in radio. Four years ago, Hill joined the Iowa Network as manager of KSO-KRNT. Previous to that time he had had no broadcasting experience.

Staff members of WNAX include Robert R. Tincher, general manager, who came to the station from the Iowa Net after its purchase by the Cowles; Arthur J. Smith, program director, also from the Iowa Network organization and Phil Hoffman, commercial manager. Clif Todd is chief engineer. Ed La Grave, director of regional sales and merchandising, is in charge of the Sioux City office ably assisted by Jack Chase, announcer.