W9XA Now On Air

Continued from page 3

various circuit components is mounted on a complete shelf by itself. Coupling between circuits is by means of low impedance link circuits. A view of the transmitter is shown in this issue of the Radio Engineer.

While conventional in many respects the high voltage power supply and modulator unit is distinctive in its mechanical construction and arrangement. It also is shown in another photo-

• *Everett L. Dillard, Owner and Technical Director of W9XA*

graph. As can be seen all transformers, tubes, and other components are mounted on extra heavy wooden shelves which can be removed from the heavy wooden rack. The heavy duty filter condensers and filter chokes for the final stage are mounted on another wooden shelf behind the main rack near the floor level. The complete assembly on the rack which represents the greater bulk and weight of the entire transmitter is located behind a heavy steel grill-work, thus fully protecting operating personnel and the public, but providing that ease of accessibility for change that is so desirable in experimental equipment.

The antenna system in use at the moment is suspended from an unguyed self-supporting 80 foot Western Cedar pole, the bottom end buried 8 feet in the ground. Two horizontal wooden cross-pieces of 4 x 6 inch Firwood support the antenna proper, the upper cross-piece being mounted at the top of the pole and the lower one 45 feet below this level. The pole, which weighs something over 3,000 pounds by itself, is adequately stepped, and it is a ... ple matter to climb it in ... antenna changes or adj...

The present W9XA antenna is a vertical J type suspended between the upper and lower cross-arms consisting of a half wave radiating section and a quarter wave impedance matching stub. This in turn is fed from a two wire 600 ohm transmission line. This antenna was chosen in view of its non-directional horizontal radiation pattern and further due to the fact in view of its high elevation above ground level (in wave length) that the vertical pattern is quite broad in the matter of energy distribution in both the ground plane and at angles slightly higher than the ground plane, the latter being mainly responsible for the long distance transmission.

W9XA is equipped to produce programs from its own studio, or recorded and transcribed programs on its own 78 and 33-1/3 RPM turntables. In addition arrangements have been made with the FCC and the respective stations to rebroadcast any or all programs of KITE of Kansas City, as well as certain stipulated programs from W L W, at Cincinnati, Ohio, and from K S L, at Salt Lake City, Utah, both of which stations are heard during the winter evenings with excellent signal strengths in Kansas City. While some static and phase distortion on these latter stations have been noticed, in the main the rebroadcast programs are of excellent quality and sometimes can hardly be told from wire transmission.

ROBERT F. WOLFSKILL

Chief Engineer of W9XA

The experimental operation of high frequency broadcast station W9XA by the Commercial Radio Equipment Company shows clearly the faith and belief which this company places in the future of the u-h-f bands, both for local and long distance communication services.

Some day soon many stations will be operating in these bands. When that day comes The Commercial Radio Equipment Company will be prepared to give engineering advice on these higher frequencies with the same background of experience that we have already acquired on the more conventional lower and medium frequency bands.

Satisfactory Service

Continued from page 1

sells service. Here it is: We work like the very devil to get new business, but we continue to work even harder to keep what business we do have fully satisfied. We believe that the job of selling service just begins when the account is normally considered as "sold."

Nowadays, you've got to deliver the goods and do so over a long time period.

This latter we feel we can do in A-1 style. . . . We have the equipment, the central location, the trained personnel, and, what is even more important, there is imbued in each of our employees the sincere desire to render YOUR station the very best service that it is possible to deliver.

Thanks, Marvin Price, for a swell account . . . we intend to keep you satisfied for many years to come.

—///—

W9XA Schedule

There will be, no doubt, a number of listeners who will be interested in tuning in the regular transmissions of W9XA.

The daily hours of operation of the station are:

Morning, from 9:30 A. M. CST to Noon, CST.

Afternoon, from 3:00 P. M. to 6:30 P. M., CST.

W9XA will also broadcast programs at other hours of the day and night — but these transmissions are not regularly scheduled at this time.

Note that all times given are in CST—EST is one hour later, and PST two hours earlier than the times mentioned above.

THE RADIO ENGINEER

Published by
THE COMMERCIAL RADIO EQUIPMENT COMPANY, KANSAS CITY, MISSOURI

Volume One 7134-36 MAIN STREET, KANSAS CITY, MISSOURI Number Five

W9XA Now in Operation

New High Frequency Broadcast Station Is Owned and Operated by Commercial Radio Equipment Co.

Designed for 1,000 Watts, W9XA Operates on 26,450 Kilocycles

Kansas City's newest broadcast station, W9XA, was introduced to shortwave listeners the afternoon of last October 13th, when modulation was applied to the carrier on the first equipment test program.

That the station will be heard well on both the east and west coasts of the United States, as well as in far off countries, was proven during the first three weeks of observation when many letters were received reporting reception of W9XA. Furthermore, reports from the S. S. Steelmaker off the coast of El Salvador and other ships in the Pacific Ocean, as well as from Sussex, England; Rotterdam, Holland; Santo Domingo, Dominican Republic; Kirkland Lake, Canada (450 miles north of Toronto); Mexico City, Mexico and many other distant points told of excellent reception of the station.

W9XA, which is experimental, is operated by the Commercial Radio Equipment Company to determine the future possibilities of providing a general broadcast and entertainment service in the 25-27 Megacycle high frequency broadcast band both to local and possibly even long distance listeners.

Even at this writing, shortly after the inauguration of the station, we feel that our local reports prove quite conclusively that this frequency band is capable of serving a large metropolitan area, provided, that sufficient power is used, that the antenna height is sufficiently great, and that the station location is near the geographical and population center of the area to be served. The programs of W9XA are heard quite well in some parts of downtown Kansas City at distances of from 8 to 10 miles from the transmitter site. "Man-made" static is particularly bad in this section of

Continued on page 2

Increased Facilities Increase Popularity of Our Service

With the winter radio season now in full swing and long distance reception conditions again at their peak for the remainder of the season, many stations, both big and little, are doing everything possible to maintain their emitted carrier frequencies as close as possible to exact assigned frequencies.

This is done not only as an interference protection to others, but as an aid to increase their own service range as far as possible. Broadcasting, Police, and other services find that in the use of frequent regularly scheduled frequency measurements, emitted carrier frequencies can be held to within almost unbelievably close limits.

The more common trend of engineering thought today is not to subscribe to a monitoring service so much to prevent off-frequency operation, but as an aid to permit

Continued on page 2

—///—

Satisfactory Service Holds Oldest Customer

It is quite a rare thing for a company to be able to boast that its very first customer is still an enthusiastic booster of a service that has exceeded its fifth birthday.

But ever since Marvin Price, chief engineer of KMMJ, and Ye Ed made arrangements over a dinner table in early 1933 for this company to make frequency measurements on his station, KMMJ has been a regular account. Since that time over five years ago each week KMMJ has been receiving its reports "on the nose" and on time, every time.

All of which brings to mind the fact that we'd like to tell you how we think service should be rendered. We feel that the theory is sound for any business that

Continued on page 4

Special Monitoring Service Proves of Invaluable Assistance in Solving Interference Problem

This is a true story, but in telling it we are going to call our client, Station A, and the Mexican station, Station B, for perhaps it's best that station identities remain a secret. But the story of our work in cleaning up this particular interference problem can be told so that others who might be suffering from the same problem can follow the example of our client, Station A, and call upon us to help them in identifying their particular source of interference.

Now Station A has been operating in these good old United States for years without any apparent heterodyne interference, despite the fact that he is on a favored regional channel. He is recognized as one of the Nation's leading regionals, and has always given extra good coverage to the advertiser, mainly because of the lack of serious interference on his channel.

Certainly, there were some foreign stations listed in the call-books as being on his channel, but they were too far away to cause any serious interference. . . at least that is what everyone thought in view of the excellent interference-free signal that the station had always had.

But, one never-to-be-forgotten night this past fall, the nicest squeal you ever heard appeared right on top of Station A. It was a heterodyne so bad that even coverage in the local service area of the transmitter was threatened. What made the matter worse was the pitch of the audio note created, approximately 1,000 CPS. Now radio sets might not respond so well to frequencies below 60 CPS or higher than 4,500 but, my oh my, how that beat-note did pound through at 1,000 cycles.

Attempts were made by the chief engineer of Station A to measure the intensity of the interfering station, but even on peaks the signal intensity was too low to read on the field measuring set. Even the bearings on the station did not always seem to agree.

So, in desperation, the chief engineer of Station A (which, by the way, is one of our regular frequency measurement accounts) gave our laboratories a call on long-distance phone and explained the situation.

Whereupon, we immediately got busy and located with our directional loop antenna the approximate direction of the interfering station. It proved to be in a direct line with Mexico City, a city in which all call-books listed a station as being on the same channel as that of our client.

Also, by a continuous monitoring and measurement of the beat-

Continued on page 2

• *Ina Curtis Martin and program mascot, "Mike," Sunday Travel Talk Feature on W9XA.*

SEC. 562, P. L. & R.

THE RADIO ENGINEER

Published by
COMMERCIAL RADIO EQUIPMENT CO.
Manufacturers and Engineering Consultants
7134-36 Main Street Kansas City, Mo.

This is our verification of your reception of W9XA. We thank you for your report which has been checked and found correct. Now that you know more about our station, we hope that you will listen to us often. The Staff of W9XA.

Kermit Geary
R.F.D. #2
Walnutport
Penna.

THE
RADIO ENGINEER
Published by
COMMERCIAL RADIO EQUIPMENT COMPANY
7134-36 Main St. Kansas City, Mo.
Long Distance Phone: JAckson 5302

VOLUME 1, NUMBER 5

Editor: EVERETT L. DILLARD
All technical articles prepared by members of the staff of the Commercial Radio Equipment Company.

Increased Facilities

Continued from page 1

operation just as close to exact frequency as human care and attention will permit. With the present high state of design in automatic frequency control equipment there is hardly any technical justification in any service operating outside of the allowable tolerance limits.

This year, more than ever before, our weekly measurement service is proving its popularity, and several stations whose engineers believe in taking absolutely no chances subscribe to our twice-a-week service.

The list of stations served by this company is greater today than ever before, and the activity of our Monitoring Division has increased considerably over that of previous periods. All of which is clearly indicative of the increased importance placed by competent radio men in regularly scheduled frequency measurements, as well as the faith and dependence placed in the monitoring service of The Commercial Radio Equipment Company by these men.

The number of outstanding and well known stations subscribing to our service on a regular basis clearly shows the high regard which better engineers place in our accuracy and dependability.

A few of the better known stations which subscribe to regularly scheduled measurements from this company are: WFAA-WBAP, KSL, KVOO, WKY, KLZ, KSD, KMA, KRNT, KSO, WOW, WNAX, KGNC, WAIR, WALA, WFBC, WREN, WAVE, WMC and others too numerous to mention here.

Centrally located in Kansas City, almost the geographical center of the nation, our monitoring laboratories can measure almost any U.S.A. station under normal reception conditions and at suitable hours.

Our laboratories are open to service all of the time and measurements can be made, if the station can be heard, at any time during the twenty-four hour day.

Facilities and equipment are available to measure radio frequencies from 180 kilocycles to 44,000 kilocycles, which covers all of the commercially useable frequencies in use today.

We feel that much of the present popularity of our monitoring service is due to our instant availability in case of need, and wide range of service offered.

The experienced commercial radio operator is careful in all technical details of operation of his station. He trusts his monitoring business only to an established firm that has been in business for years and which has proven a reputation for unexcelled accuracy, dependability, and promptness of service.

That is why the best engineers chose the Monitoring Service of the Commercial Radio Equipment Company.

Our service is no farther away than your telephone!

• Frequency Measurements are your insurance against off frequency operation and interference . . .

Herb Steinmetz Now Papa

Our Chief Kilocycle Counter, in other words, our Engineer in Charge of Frequency Measurements, genial Herb Steinmetz, has widened his grin the past few days.

HERB STEINMETZ

Engineer in Charge of Frequency Measurements

The reason:

A seven-pound, seven-ounce baby boy presented to him by Mrs. Steinmetz a few days ago at St. Mary's Hospital.

Since, Herb has been passing out generous quantities of seegars to all of his friends.

Said new boss of the Steinmetz family has been named Jerry, and 'tis said that he packs a lusty heterodyne during the wee sma' hours of the early morning . . . but Herb's a lucky papa — he spends most of his nights at the monitoring station.

He doesn't know what he is missing . . . does he?

(Written by one who knows.)

Interference Problems

Continued from page 1

note created we came to the conclusion, in view of the erratic and irregular drift of the interfering station's carrier that no crystal was controlling the emitted frequency. Either one of the amplifier stages had suddenly acquired a bad case of "Oscillationitis" or else somewhere, somehow, and for some reason some station was using a self excited oscillator without crystal to excite the transmitter amplifier stages right in the broadcast band.

Now the drift wasn't too bad. In fact, the beat-note stayed reasonably constant, but the slight irregularities of frequency change clearly indicated other than crystal control. Of all of this we informed our client, Station A.

This was the first night. The second night, by previous arrangement, Station A signed off thirty minutes ahead of the time that normally the interference stopped. We were to attempt to identify the interfering station, if his program and call-letters could be heard.

Sure enough, after eliminating the still operating other USA stations on the same channel with our loop, modulation consisting of American and Mexican music and announcements in Spanish were heard. Sometimes loud, sometimes almost below noise-level here was our interfering station. The station was identified shortly as the Mexico City station we had suspected. We then measured his frequency to make sure that Station X was actually Station B.

Our findings were immediately phoned to our client. Imagine the good news to a tired and worried Chief Engineer.

The next day our client contacted the interfering station in Mexico City, and here is what he learned: Several days before, Station B had broken its one and only crystal, and in order to keep the rig on the air the engineer of Station B switched over to a self-excited oscillator circuit to replace the defunct crystal. The Chief Engineer of Station B was very apologetic and certainly anxious to help for he even suggested switching to another frequency entirely so as to eliminate the interference on Station A. But as to buying a new crystal . . . that was out of the question . . . no money in the budget!

Now, the Chief Engineer of Station A wasn't so hot about our Mexican friend changing frequency, for after all Station B had operated for years on the same channel without one trace of interference. To have him move might make an opening for some other station much closer to the border to occupy this channel and then, perhaps, the interference would really be something.

Now this ends our part of the story. But here's what happened: We understand that Station A had an older automatic frequency control unit which had been used on the same channel in a previous transmitter, and that he gave this unit to Station B, even flying down to Mexico City to deliver and install the unit.

Once again, all is quiet and serene on Station A's channel and only a slight flutter, even here in Kansas City, tells of the other stations operating on the same channel. But we know that 'way down in the signal level on that channel oscillates an old crystal unit of Station A in the transmitter of Station B, rejuvenated from discarded equipment but still helping Station A to retain its clean-cut signal that it has always had in the past.

Again, we repeat—it IS a true story.

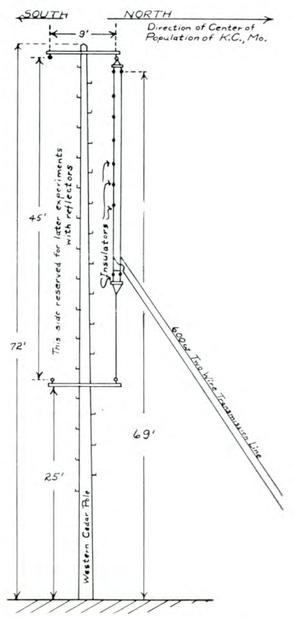
Can we be of assistance to you in your interference problem?

———///———

W9XA Now On Air

Continued from page 1

town and strangely enough, in some cases, the signal-to-noise ratio of W9XA's carrier appears to be better than that of some standard broadcast stations in the 550-1600 Kilocycle broadcast band. This is not to be taken as a general rule, but there are downtown locations where this is true.



• Details of W9XA's Vertical Radiator

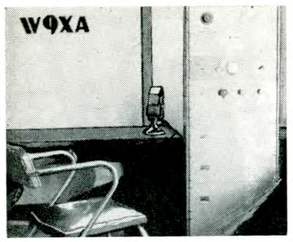
In connection with the above it is mentioned that the antenna

Continued on page 3

W9XA Now On Air

Continued from page 2

height of W9XA, measured at the center of the radiating half-wave section, is actually less than seventy feet above ground level. Unquestionably, a higher antenna system would increase the signal strength locally at all points in the greater Kansas City area. The business area referred to in the previous paragraph is at a considerably lower ground elevation than the location of the W9XA transmitter site, (one of the highest sites in town) and only the tops of the downtown taller buildings are visible from W9XA's antenna, because of high ground between the transmitter site and the lower business district elevation.



• W9XA Announcing Position Showing Microphone and Speech Input Equipment

The studios and transmitter of W9XA are located in the quarters of The Commercial Radio Equipment Company at 7134-36 Main Street, which location is at the extreme southern limits of the city. For regular broadcast service a more central location probably would improve general city-wide coverage, but in view of the experimental nature of the station operation at this time it was felt that the availability of the technical facilities of the company were most important.

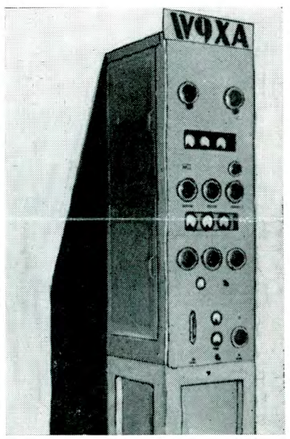
The experiments of W9XA will be centered around radiation problems for the first months of operation. The station does not have its antenna located several hundred feet above ground as do the majority of these stations. The reason for our low antenna height at the present time is to investigate and determine just what service can be expected of a u-h-f station using a modest antenna system and intended to serve smaller communities of such a size and location that extremely tall buildings or high hills are not available.

Field patterns will be plotted and intensities measured at the one, two, three, and four mile radii. Power for this particular phase of the investigation will be reduced to whatever minimum gives a satisfactory signal-to-noise ratio for good local broadcast reception. From this investigation may grow a new class of "local" station similar in service to our present day 100 watters in the standard broadcast band.

Data is also to be compiled on the long distance coverage of W9XA, which from the number and consistency of reports seems to indicate that the ultra highs (especially the 25-27 Megacycle Band which is known to have excellent sky-wave transmission characteristics at certain times) may prove of value in serving distant communities in mountainous or other isolated regions where reception on the standard broadcast band from nearby local stations sometimes less than 100 miles away is often spotty and too poor to be called entertainment value, because of selective fading, and poor signal strength.

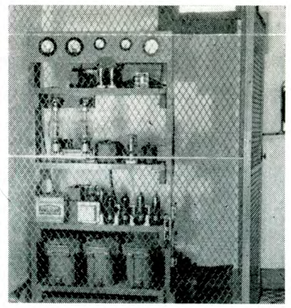
A number of letters from just such locations have stated their dependence upon other than standard broadcast signals during daytime for their radio service, and have commented upon their choice of reception from the few 26 megacycle stations now in operation for programs during daytime hours, when their own nearby broadcasting service is not reliable enough to give good reception.

It is true that such a long distance secondary coverage has not been really seriously considered for u-h-f stations. In the main, emphasis has been stressed upon their development for purely "line-of-sight" coverage. But in view of our observations, and the numerous reception reports from both coasts, reporting consistent day to day reception of W9XA as well as the minute logs of reception given by these listeners, stating all details of programming, we are of the opinion that this long distance service should be considered as an asset of these frequencies, rather than an interference liability, as is the more common engineering thought today. Certainly, with signals dropping down in all parts of the country from a station located in the center of the United States, extreme care and caution will necessarily have to be exercised in assigning these channels for multi-station operation on a given channel, in view of the interference problem which cannot help but exist.



• R. F. Section of W9XA Transmitter

It should be emphasized that merely considering these stations as "locals" does not necessarily make them such. It is entirely possible for two 26 Megacycle stations operating on a common channel to completely destroy the entertainment effectiveness of either station's signal even in the local areas of each station, despite a geographical separation of from 1,000 to 1,500 miles.



• Power Supply and Modulator Unit of W9XA

The best long distance reception of the station appears to be at distances from 1200 to 2000 miles from station location, and such transmission appears to be good over most of the daytime hours. This, of course, is the condition as we are recording it during the late fall season in what is supposed to be a very favorable sun-spot condition for high frequency transmission under the current eleven year sun-spot cycle. But whether temporary or otherwise even irregular occurances of such long-distance transmission over seasonal periods immediately raises to our mind this question: Can the 26 megacycle band be allocated on a theoretical assumption that the band will render a good local service only, or should future station allocations in this band be such that listeners at distant points can also receive these stations without heterodyne interference?

Whether or not this will ever become true remains to be seen, but should such a long distance service develop from the present experimental operation of the now operating 26 megacycle u-h-f broadcast stations, its topsy-turvy effect on broadcasting technique as we know it today is not hard to imagine. From the way signals are apt to appear at all parts of the United States (W9XA has received a report of good reception from Des Moines, Iowa less than 185 miles from Kansas City) the matter of allocation structure in this new band will be indeed a hard one to work out. But it isn't too far beyond the realm of imagination to surmise of cleared u-h-f channels (cleared for daytime operation instead of for night-time use), of the dominant station valuing its daytime hours more than its nightime operation, of duplicated channel operation allowed at night rather from sun-up to sundown as a present, of programs prepared in one locality to serve distant ones, of national advertisers securing much wider advertising distribution from a single station than now possible with a combination of stations.

If this ever does come true there is much yet to be done. High power, high frequency design technique both in tubes and apparatus will have to be considerably improved, listeners will have to be lured away from the standard broadcast band, and rapid fading will have to be improved both by better design of transmitting and receiving antennas, as well as by extending the AVC range of receivers . . . a big job, true, but one which does not seem altogether too impossible or fantastic.

W9XA is licensed to use a maximum transmitting power of 1,000 watts and the transmitter is designed for this power output, although on certain phases of the experimental program the power will be reduced to lower values.

The final stage of the transmitter employs two type 833 tubes in push-pull when operated at maximum power rating. These are operated at a maximum plate voltage of 2700 volts as Class C plate modulated R.F. amplifiers. The modulator system, capable of generating an audio power in excess of that necessary for 85% peaks, consists of 204-A's in Class B operated at the same plate voltage as the modulated Class C amplifier.

It is necessary that the station maintain a frequency tolerance of better than plus-minus .01% of its assigned frequency of 26,450 Kilocycles and to do this the transmitter incorporates one of our Type FC-2 Frequency Control Units modified for high frequency operation.

The audio characteristics of the transmitter are excellent, the frequency range extending to 15,000 CPS. Linear standard high fidelity UTC transformers are used in all audio equipment, even to the big husky one kilowatt (audio rating) oil filled modulation transformer.

The R.F. section in its entirety is enclosed in a steel rack, which stands seven feet high, is twenty inches deep and twenty-one inches wide, and finished in a gray crackle enamel. All stages prior to the final are built in relay rack panel style, but the final stage because of the larger size of the

Continued on page 4