BROADCAST INAUGURAL

(Continued from page 1)

wire lines (transmit the program to WWJ, the New York station, and WVO, Schenectady station of the General Electric company, for broadcasting at those points.)

Probable Stations to Broadcast

The usual A. T. & T. link, consisting of Stations WCMB, WSB, WJZ, WGN, WCBS, WIGI, and WFI, will undoubtedly carry the ceremony. Many other stations will be tuned in as well.

At the west coast group of WRJ, KDRL, KYW and KFKE are almost certain to broadcast as well as the larger stations in the Denver and Oakland stations respectively of the Western Electric company, are also fairly sure to be in the list.

More than sixteen of the twenty-five west coast broadcasting stations located in every part of the country are negotiating for the privilege of sharing a part of the expense and carrying the ceremonies on March 4th.

The formal opening of the contract broadcasting stations will be announced just prior to the event, and it is predicted that a public address loud speaker system at the station will be utilized at that time.

About four years ago, however, it marked an epoch in the history of voice transmission. Newspapers throughout the United States on March 4, 1919, and the following day carried the headline, "115,000 People Hear Harding's Voice," "A Telephone Achievement Rank-

Looking Ahead

"Uncle John" Daggett, KHJ Director-Announcer, and his almost equally famous staff, including "Kindness," "Happiness" and "Joy," will be pictured next weekend, together with the station of the Los Angeles Times. Read about beloved "Uncle John" and his broadcasting ideals in the next issue of Radio Digest.

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FADING RECORDER IS AID TO ECLIPSE TEST

The apparatus pictured is a fading recorder and was used by the Radio Corporation of America in the recent eclipse tests in New York City to make a complete record of the fading that had on Radio signals of various wave lengths. If signals came in always with the same strength the result would be a straight line on the tape. Note how the wave line was on the tape.

Union College, Schenectady, EXQ, recently held two-way Radiotelegraph communication with G. Macombe, England, ENM.

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LEAVES STAGE TO BROADCAST

Hear U. S. Business Meeting Put on Air

Washington—Even the United States government can have a business meeting. Radiophiles learned this recently when the annual business meeting of the government was broadcast for the first time.

The principal feature of the evening was an address of President Coolidge and the report of Gen. John C. Calhoun, director of the budget. Ten stations, including WCA, Washington; WCA, New York City; WOC, Philadelphia; WCA, Providence, R. I.; WDBB, Worcester, Mass.; KGW, Portland, Ore.; WCBS, Chicago; WWJ, Detroit, and WOC, Des Moines, Iowa, all stations reported good reception of the program.

Famed Announcers to Travel to WDAF

Meet in Kansas City for Radio-Electric Show

Hired Hand, Solenn Old Judge, Bill Hay, Lambdin Kay and Gene Autry are among the leading announcers who will be in attendance at the meeting of the National Association of Broadcasters to be held in Kansas City, March 5, when the Kansas City Electric Company inaugurates its new radio station, WDAF.

This important meeting of the broadcasting fraternity will be held during that week, the best-known announcers in the United States will be gathered together for the first time in the history of broadcasting. Announcers who have traveled to meetings of the Electrical club include the Hired Hand of WAB, who will be represented by the old Judge of WLS; Bill Hay, of KFSD; Lambdin Kay, of WOC, the Voice of Gothic; Gene Route of WOAW; and two Kansas News in America, John Schilling of WUF and Leo Fitzpatrick, the merry old chief of WJR. All these, and WDAF will be broadcast from a special stage-front studio in Congregation hall, where the show will be held, and all the announcers will take part in directing and announcing.

Famed News in America, which managed the radio show held in the Hotel Muskegon in 1923 and also observed the station's star and disc service, will be in charge of entertainment and broadcast- ing from the hall.

NAA Gets 1,000-Watt Set; Only Waiting New Wave

Washington—Plans living within a thousand years as Washington station WTOP asked the FCC to pick up a "new" and powerful broadcasting station for the city. It is known as "NAA," Arlington, Va., the pioneer radio station and govern- ment broadcaster.

A new 1,000-watt station has been granted and the station will start using it just as soon as the FCC permits. No applications for the old wave of 455 meters will be secured from the department of commerce. The old wave of 455 meters is to be set aside forever. The new wave of 800 meters will be given to the station.

Lutheran Church Plans to Broadcast Gospel Services

St. Louis, Mo.—A resolution was introduced in the Missouri legislature for the propagation of the Gospel, in the words of the proposed legislation, "the message of salvation through the person of Jesus Christ as the Saviour of the world" by every means of written and spoken word, also that the Lutheran church and schools be put on the program from time to time.

English in Drain on Oscillating Fiends

London, England—Just the most hated man in the British Radio world is Mr. Leo H. Heil, who persists in ruining the reputation of every American program in the country. The British Broadcasting Company, which is com- posed to ruthlessly destroy Mr. Heil's bowdlerizing, is putting out by the B. B. C. that is being heard in most part of the world, as the American station KDKA is not re-trans- mitted from every broadcasting relayed from Biggin Hill.
CLASS B WAVES SET FOR TIME AT LEAST

COMMERCE DEPARTMENT DESPAIRS AT PROBLEM

Announces Final Allocation of Wave Lengths—$100,000 Is Allowed for Investigation of Tangle

WASHINGTON, D. C.—Despairing at any possible chance of obtaining more wave channels for contemplated broadcasting, the department of commerce has issued an official list of the new wave lengths for class B stations. This list was effective February 4 and is the result of work of the experts of the department since the third Radio conference last fall. It will be remembered that at that time changes have been made, because several stations were found out experimentally, did not prove practicable.

New and Final Class B Assignments

<table>
<thead>
<tr>
<th>Wave Length</th>
<th>Wave Call Letters</th>
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</thead>
<tbody>
<tr>
<td>MHz</td>
<td>MHz</td>
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<tr>
<td>950</td>
<td>WQAZ</td>
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<td>955</td>
<td>WQAT</td>
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<td>990</td>
<td>WQEX</td>
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<td>995</td>
<td>WQEO</td>
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<tr>
<td>1000</td>
<td>WQER</td>
</tr>
</tbody>
</table>

$100,000 for investigation

An investigation to determine why a receiver within ten miles of a broadcasting station may fail to receive its transmission although a mere 200 miles away may be receiving good results, has been approved by the budget bureau. A $100,000 expenditure for this has been allowed.

The great trouble is caused by the present inadequate legislation giving no power to the secretary of commerce to refuse a license to any applicant who has fulfilled the easy qualifications now necessary. And many class B stations are pending.

ANNOUNCE NEW SUPER STATION FOR CHICAGO

WLS Contemplates the Erection Within the Nineteen’s Time

CHICAGO—Erection of a new 3,000-watt super-power broadcasting station to replace the 500-watt equipment now in use by WLS, Chicago, was announced here today by Charles M. Kittla, president of Sears, Roebuck and company. The new station is to be built in the upper country to avoid interference with other Chicago broadcasters, but the exact location of the antennas has not been decided. The needling towers will probably be erected within fifteen miles of Chicago.

Service from the new station will start within three months, according to the present plans of Edgar S. Hill, director of WLS. At the time of inaugurating the new plant it is hoped to have the twin studios now in preparation in the downtown district of Chicago ready for use.

Open House at WEBW

BELLOIT, Wis.—Station WEBW recently broadcast the "Open House of the Pacifica, J. Morse and company. This is held every year by the amateur.

The stars of the evening were "Put" Moosman, Eddo, Iowa, youth, who is the present world’s champion horseshoe pitcher, and George May, Akron, Ohio, pitcher, twice holder of the world’s barnyard golf championship title.
February 14, 1925

RADIO DIGEST—Illustrated

WFI—In The City of Brotherly Love

I F YOU'RE a DX hound you've no doubt heard Station WFI, one of the most powerful stations in the United States. It is not an idle boast to say it is the most powerful. Over it is heard, it is the only station in Philadelphia that was heard on the other side during the recent trans-Atlantic tests. And that's going some for the city of brotherly love boast s of five broadcasters transmitting on 500 watts.

WFI, operated by Strawbridge and Clothier, a large department store, boasts of the honor of being the first station in Philadelphia to broadcast. It just made out another "philly" station by about fifteen minutes for the coveted honor. The governor of Pennsylvania and the mayor of Philadelphia both participated in the opening exercises, and then proceeded to another station just across the street, there to also officially open that station.

When WFI "went on the air" it was only a 15-watt station. Then it got a little more power, and now, since the station has been rebuilt at a large expense, it transmits on 500 watts, its operating length is 35 meters. To give the people what is best in everything is a hard road to travel, and one on which the owners and personnel of any broadcasting station will always have to travel. But, and WFI proves it, if a station will stick to its rules, it will always be profitable. It will finally win a host of admirers, and admirers are listeners in, and that's what every station wants.

WFI is the Philadelphia station which broadcasts the Evening's hour and the Goodnight hour. Its orchestra, and its latest achievement is to be among those broadcasting the Victor concertos, which have created a furor in the musical circles. Many other features have been offered WFI, but it turned them down flat and simply because it did not think it was the kind of entertainment its clientele of listeners wanted.

The personnel is composed of people musically inclined. The director, Ednyfed Lewis, is one of the best known Welsh tenors in the eastern section of the country. He comes of a musical family. His father was an opera star, and his brothers are part of a well-known Welsh quartet. Mr. Lewis last year won the $1,000 prize in Philadelphia as director of the Welsh chorus, which competed against a number of other well-known musical organizations.

John Vanderhoe, the reputation of being one of the best announcers in the country. He is known as "J. V. " and is also an excellent bass singer. His Swiss-owned Everset program director and hostess to those who entertain from the studio, is an accomplished musician. She also comes from a musical family of Boston, and to keep up the name, Mrs. Ewer is having all the little Evers study music. Although her children are well up in music, none have ever been heard over the radio. For living up to the traditions of the station, Mrs. Ewer says they will not be heard until she thinks they are up to the mark for the best broadcasting. Harold A. Simonds, who announces as "H. A." is the possessor of a pleasing baritone voice, particularly adapted to radio broadcasting. Alisa Smith, an assistant, is a soprano with a sweet mellow voice, who hopes to be heard in the higher circles of music some day.

One of the best known entertainers from WFI is Jean Hight, better known as "Sunny Jim, the Middles' pal." Mr. Hight, who is still quite young, made "a hit over night." Previous to his coming to WFI, the station always had women bedtime story tellers. Sunny Jim came, spread a lot of sunshine among thousands of kiddies all over the country, and became so popular that one of the song hits last year, "Sunny Jim," which was played and sung at virtually every station throughout the country, was composed in his honor by a nationally known song writer.

There is one person connected with the station who is virtually unheard of over the air and he is, nevertheless, the guiding light in all things musical. It may be said that he is responsible for nearly all of the big musical events heard from this station. He is Mr. Herbert J. Tilly, general manager of the store, and a doctor of music. Mr. Tilly is one of those unusual combinations of successful business man and musician, and neither voca- tion suffers because of the other. He is a con- ductor, an organist, composer and a connoisseur of art, and was a regular entertainer some time ago over the radio.

Now, Radiophones know why WFI broadcasts such wonderful music. It is said that song pluggers on passing WFI hang a piece of crepe on their hats and go their way. They know there is no open door for them.

One of the outstanding broadcasts that this station has put across was when they broadcast the Carnegie Opera company. The members of the company, it is well known, hail from Africa, Asia, and points west. Their rendition was broadcast from their present headquarters at the Zoological Gardens in Philadelphia. Leo Africanus, a gentleman of color, with a deep bass voice, proceeded to imitate static during its worst period when he opened his mouth. At last reports, the operators of the station were well on the way to saving the microphone adjusted to its normal sensitivity.

Novel features WFI has just added are the Gold Dust Twins and the Atwater Kent radio artists. Many novel and unique features are scheduled for this station in the future. That is one of the WFI staff's beset pastimes—planning new and original features for Philadelphia and outside listeners—and they thrive on the pastime.
LICENSES FAIL WITH LISTENERS AVOIDING

ENGLISH ARE PUZZLED BY NON-PAYING LISTENERS

Believe Three Times as Many Set Owners Exist as Pay—Problem Irritates Officials

LONDON, England.—How many "pirate" listeners are there in Great Britain? That is the question that is puzzling the British Broadcasting company, which relies for its entire revenue upon a percentage of the license fees. Radio "pirates" abound in their thousands. The estimates of people who are supposed to know, place the number of persons using receiving sets without a license at no less than 2,000,000, or twice the number of persons with licensed sets. While this may perhaps be going too far it is undoubtedly a fact that there are many towns in England where for every 10 licensed listeners there are two unlicensed.

Only a few days ago a station director found out of 1,200 letters on a certain broadcast topic only about sixty were signed, indicating that they had come from license holders. Conclusions Objectors Object

It is felt that the enactment of new legislation covering this contingency is needed. Many fans are refusing on principle to pay the license fee, declaring that strictly in the law broadcast licenses are illegal under the particular act of parliament by which they were brought into being. But it is unfair that one section of the Radio public should be paying for the entertainment of another section that refuses to admit its liability to pay. One man, however, points out that he would willingly take out a license if he listened to British programs, but states that as he only listens to Continental programs, he owes the B. B. C. nothing.

(Note.—At present the annual license fee for which all British fans must pay is 30 cents, one-fourth of which is retained by the post office.)

French Lessons Swell Class

Lille, France.—Madame lde Touroldin, teacher of French at Croxley W.L.V., has a number of interested pupils. It is understood that her lessons are followed by a large part of the land who have been following her lessons.

LAST TUBE PATENT EXPIRES NEXT WEEK

THE second and last basic patent on the three electrode vacuum tube expires Wednesday, February 18. What will happen to tube as a result of competition will be the source of much delight to Radiofans. It is believed. In this competition what is believed to be the first Radio tube is shown in the above picture. It is being held by C. W. Mitman, curator of engineering at the U. S. National Museum at Washington, and was made in 1924 by E. McPharson Moore of New York City. Radio impulses from this tube ignited a bomb a city block away and blew up a miniature of the battleship Maine.

Why it is Better

"MASTER of Every Note in the Orchestral Range" is the proven claim of the Federal No. 65 Audio Frequency Transformer! Volume without distortion is the basis for the beauty of Federal Tone.

From its oversize locking nuts to its heavy brass mounting feet the Federal No. 65 Transformer incorporates the same engineering skill that has made Federal the recognized leader in electrical communication apparatus since 1890.

Insist upon Federal parts for your "pet" hook-up. There are over 130 standard parts bearing the Federal iron-clad performance guarantee.

THE B. F. GOODRICH RUBBER COMPANY
Akron, Ohio

Goodrich RUBBER RADIO PRODUCTS

"Best in the Long Run"
Train at Home for Big Money in Radio!

Thousands earning $50 to $200 a week in easy, interesting work
You can do it!

Radio just teems with money making opportunities. Every Radio set which is sold means profit in somebody's pocket. Every broadcasting station erected means high pay for Radio Engineers, Radio Mechanics, Operators, etc. Thousands are making a difference between being made almost overnight in this fascinating business. Big salaries, interesting, easy work, short hours, and a wonderful future are offered to ambitious men who get into Radio now!

One of our recent graduates is making over $400 a month in his own business. Another has increased his pay $1,300 a year. Still another writer, "I made $3,000 in one year working for myself."

Easy to Learn Radio at Home in Spare Time
Right now Radio is the fastest growing industry in the world. Thousands of Certified Radio-tricians are wanted, to design Radio sets; to make new Radio improvements; to manufacture Radio equipment and install it; to maintain and operate great broadcasting stations and home Radio sets; to repair and sell Radio apparatus; to operate aboard ships and at land stations. Employers write and telegraph us continually, seeking to employ our graduates at splendid salaries.

You, too, can easily and quickly qualify in your spare time at home through the help of the National Radio Institute—America's first and biggest correspondence Radio school. No matter how little you know about electricity or Radio, we will guarantee to prepare you thoroughly for one of the big jobs in a few months. One of our recent graduates, Bert Goodstein, writes, "I now have a license and a good job, although I did not know the difference between a volt and an amper before enrolling."

You Learn by Doing
All materials required for practical instruction are furnished you free of charge. This is an absolutely complete course now being offered which prepares you for a Government First Class Commercial License and the really "big-pay" jobs in Radio.

Send for Free Book and Special Offer

No other field today offers such great opportunities as Radio. Take your choice of the wonderful openings everywhere. Prepare now to step into the most fascinating and best paid profession today. Read about the opportunities open now—the different kinds of work—the salaries paid. Write today for our new 32-page book, "Rich Rewards in Radio," that tells how prominent Radio experts can teach you to become a Certified Radio-trician in your spare time.

Important—those who act immediately will also receive the details of our Special Reduced Rate. Mail the coupon or write a letter now. National Radio Institute, Dept. 35DB, Washington, D. C.

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**SMALL BROADCAST TRANSMITTER**

The small sound set shown above with foot rule and dry cell for size comparison is capable of broadcasting a distance of several miles. Listeners in, however, should not attempt to use amplification. This requires an expert knowledge of Radio. Radio-tricians might remember this picture as an object lesson for receiving this size and larger and often transmit disagreeable noises for miles around when improperly handled.

**Experiments in Voice amplification are being carried out at Westminster Abbey Microphones have been placed over the pelvis and the reading desk. It has not yet been decided whether the installation is to be permanent.**

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**WASHINGTON, D. C.—Thousands of eastern Radio-tricians experienced a brand new thrill at recent morning when from 7:30 to 8:30 a.m. eastern time, WAHO, A. M. Grobe station here, rebroadcast the program of KGO, General Electric station at Oakland, Calif.**

This is the first time in the history of Radio that a west coast program has been rebroadcast by an east coast station. The program at KGO, picked up and released for its second flight over the ether, was by the Harry Wahl orchestra at the St. Francis hotel, San Francisco. The rebroadcast at Richmond Hill was done through the experimental station which uses the call letters KGO, and a length of 516 meters was employed instead of the usual 314-meter wavelength of WAHO. More rebroadcasts of KGO are promised for eastern fans by WAHO. The first very successful effort was rewarded by a great response from eastern listeners. Telephone messages and telegrams flooded into the offices of the Grobe station.
AN EVENING AT HOME WITH THE LISTENER IN
(SEE INSTRUCTIONS FOR USE BELOW)

<table>
<thead>
<tr>
<th>Station and City</th>
<th>Mon.</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>WGBY  Springfield, Mass.</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
<td>6:00-12:00</td>
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<tr>
<td>WBBK  New York, N. Y.</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
<td>6:00-12:00</td>
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<tr>
<td>KOMO  Seattle, Wash.</td>
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<tr>
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<td>6:00-12:00</td>
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<td>KKPL  Phoenix, Ariz.</td>
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<td>8:00-12:00</td>
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<td>KFRC  San Francisco, Calif.</td>
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<td>KMB  Minneapolis, Minn.</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
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<td>KROK  Denver, Colo.</td>
<td>6:00-12:00</td>
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<td>6:00-12:00</td>
<td>8:00-12:00</td>
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<td>6:00-12:00</td>
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<td>8:00-12:00</td>
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<tr>
<td>WOR  New York, N. Y.</td>
<td>6:00-12:00</td>
<td>8:00-12:00</td>
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<td>6:00-12:00</td>
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</table>

It Has the Full Sweet Resonance of Our Upright Horn

THE new cabinet model has a seasoned wood horn which is "full floating"—the outer end, or bell, does not touch the cabinet. This, together with a long expansion chamber, gives it that same freedom of vibration which goes to make the Bristol horn type Loud Speaker such a resonant, sweet-toned instrument. It also has the same high-grade electromagnetic sound mechanism. It is not only a handsome piece of furniture, but a speaker worthy of the best radio set that money can buy.

There are five Bristol Loud Speakers, priced from $12.50 to $30.00. If not at your dealer's, write for Bulletin No. AV-3020.

THE BRISTOL COMPANY
Waterbury, Conn.

Send for it!
Before you build your set

E VERY RADIO FAN should have a copy of the "Shamrock Radio Builder's Guide Book." It contains carefully planned diagrams and complete instructions for building ten different circuits—at prices ranging from $15.00 to $50.00. Page 21 of this popular booklet describes a powerful little receiver—

THE SHAMROCK-HARKNESS
Two-Tube Reflex

Operates a loud speaker—Two tubes do the work of five—Cuts battery cost 60%—Does not stew, howl or radiate—Stations can be logged with utmost accuracy—Amazing clarity and volume!

Also ask to see the improved SHAMROCK-HARKNESS THREE-TUBE COUNTERFLEX
The Wonder Set 39.50

SHAMROCK FOR SELECTIVE TUNING
VALENTINE PARTY SATURDAY AT WGN

Saturday, February 14

Erna Neydel (above) is the famous Boston violinist heard regularly at WEIE. Miss Neydel will give a recital Wednesday in Europe. Gilbert Jady (right) is the violinist in the direct of the program at WREH, Kansas City.

Headliners of the Week

ONB station at least plans a major Valentine's Day performance, with all the thrill of the old school postcard. WCCO is more serious, scheduling a lecture by Captain Kipley Harris, a native Australian, who will tell all about the curi-

ous prehistoric animals and plants of his own country.

KETH is giving a Spanish-American concert Sunday complimentary to Latin-American friends of this station. The program will be made in Spanish by Leon Mur-

nainville. This varied program promises to be a musical education for the Sunday school children of Wisconsin.

President Lincoln Macmillen, who started the Radio World not long ago by giving an entire recital before the microphone, returns to KED Monday. Lovers of classical music should re-

serve this date, as Mr. Macmillen is a famous American violinist. The Radi- 

o Lighthouse Musicians of WEMC, Berrin Springs, will give this same evening that music may be both classical and popular.

A musical program in three parts will be broadcast by KGO Tuesday evening. Part one, thirty minutes long, will be supplied by Antonio Grazioli, viola player, and Maxine Cox, pianist. Part two consists of old time songs given by the Francisco mixed quartet. The Francisco quar- 

tet also in charge of the third part of the program, will sing operatic

Good band music is promised Wednesday by WLAB, Philadelphia. The famous Atlac State Railroad band will play. Thursday WAGT, Atlanta, features a "Chamber in the Old South" made by Edwin H. Fulk, Francis Wood- 

son, Raymond C. Hoag, Helen Schaal and Mrs. Mary Miller Town- 

sfield will have a certain musical appeal. Listeners in KLO, Los Angeles, will take part Friday through an Orange county, where acres of orange trees fru- 

ish and beat. Plans will take part in wild surf fishing and hear the moderate pace, the hokey-pokey, at night.

The selection of one of the oldest poems contributed to English litera-

ture, "Stowford," will be read by Prof-

essor William Eliot Leonard on Friday at WKAH, Madison.

WJSU are the new call letters of WHAA, Iowa City.

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WJSU are the new call letters of WHAA, Iowa City.
**KHJ VISITS ORANGE COUNTY FRIDAY**

**Sunday, February 15**

(Continued from page 9)

<table>
<thead>
<tr>
<th>Station</th>
<th>City</th>
<th>Time</th>
<th>Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>WADK</td>
<td>Nashville</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WCNJ</td>
<td>New York</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WJOY</td>
<td>Philadelphia</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WRTW</td>
<td>Houston</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>Wrex</td>
<td>Detroit</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WFLA</td>
<td>Orlando</td>
<td>7:00 p.m.</td>
<td>Radio City Symphony Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
</tbody>
</table>

**Monday, February 16**

**Here are the Novak's Vaudette, a Portland, Oregon, organization, pleasing both to the eye and the ear.**

<table>
<thead>
<tr>
<th>Station</th>
<th>City</th>
<th>Time</th>
<th>Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wicie</td>
<td>Chicago</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WICE</td>
<td>Cincinnati</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WREW</td>
<td>New York</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WFLW</td>
<td>Atlanta</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WWHO</td>
<td>Houston</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WBEY</td>
<td>New Orleans</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WHEL</td>
<td>Philadelphia</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
<tr>
<td>WJLA</td>
<td>Chicago</td>
<td>7:30 p.m.</td>
<td>Vaudette Orchestra, Frank Pizzarelli, conductor.</td>
</tr>
</tbody>
</table>

**Mr. Ruth Ettington is the leader of the Macon Theatre.**
SPANISH-AMERICAN MUSIC AT KTHS

Monday, February 16

(Continued from page 10)


WKY, Oklahoma City, Ok., 6:30 p.m., "The Case of Your Baby's, William A. Metzger, conductor; Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

WKD, Kansas City, Mo. (Central, 307.3), 8 p.m., "The Case of Your Baby's, William A. Metzger, conductor; Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

WKW, New York, N.Y. (Central, 307.3), 9:30 p.m., "The Case of Your Baby's, William A. Metzger, conductor; Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

WKX, Chicago, Ill. (Central, 307.3), 10:30 p.m., "The Case of Your Baby's, William A. Metzger, conductor; Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

Tuesday, February 17

(Continued from page 11)

Richard Miller (left), popular Buffalo tenor, will be featured Wednesday, February 17, at WDR. Chicago Symphony (above) is the blues singer known throughout Detroit's radio circles for her staged "Sunday evening at the Red Apple club of WDR. Little Betty Shatte, a four-year-old, broadcasts regularly from WDRB, WAB, and WDRB.

New York city.

KTHS, Hot Springs, Arkansas, 5:30 a.m., "The Case of Your Baby's, conducted by J. H. Crandall, Willard Metzger, composer."

KW, Chicago, Ill. (Central, 307.3), 7:00 p.m., children's program, Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

K indica. 10:00 p.m., "The Case of Your Baby's, William A. Metzger, conductor; Chicago Public Schools, Children's Choir of New York City, conducted by J. H. Crandall, Willard Metzger, composer."

Wednesday, February 18

(Continued on page 12)
Where to Hear Concerts

Central Standard Time

These are the stations for music lovers to dial, and you can hear, properly tuning your dial and correctly reading the programs carefully, everything from jazz to operas.

Popular

<table>
<thead>
<tr>
<th>Day</th>
<th>Station</th>
<th>Time</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday</td>
<td>KFI, WBBR</td>
<td>7:30</td>
<td>Evening concerts</td>
</tr>
<tr>
<td>Saturday</td>
<td>KFI, WBBR</td>
<td>9:30</td>
<td>Symphonic concert</td>
</tr>
<tr>
<td>Saturday</td>
<td>W脂肪, WBBR</td>
<td>11:30</td>
<td>Chamber orchestra concert</td>
</tr>
<tr>
<td>Sunday</td>
<td>W脂肪, WBBR</td>
<td>12:30</td>
<td>Recital</td>
</tr>
</tbody>
</table>

Classical

<table>
<thead>
<tr>
<th>Day</th>
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<tbody>
<tr>
<td>Saturday</td>
<td>W脂肪, WBBR</td>
<td>12:30</td>
<td>Recital</td>
</tr>
<tr>
<td>Saturday</td>
<td>W脂肪, WBBR</td>
<td>14:30</td>
<td>Recital</td>
</tr>
<tr>
<td>Saturday</td>
<td>W脂肪, WBBR</td>
<td>16:30</td>
<td>Recital</td>
</tr>
<tr>
<td>Sunday</td>
<td>W脂肪, WBBR</td>
<td>18:30</td>
<td>Recital</td>
</tr>
</tbody>
</table>

Charlie Wellman (left), "The Prince of Jazz" declares the yesterday afternoon broadcast of the New York Philharmonic Society as "a triumph of the spirit."

FRANCIS MACMILLEN, AMERICAN

President of the National Broadcast Orchestra, Inc., New York City.
Thursday, February 19

Where to Hear Talks
Central Standard Time

Saturday, February 14: 6. WADP, WEAP, WQAW: 615, WEZ: 620, WICB, WICJ, WIZ: 625 (Vanguard of Vocation orchestra, class, Dr. H. Thompson); 7:30, KCJL, KQJL, WURW, WEAP, WQAW: 630, WICB, WICJ, WIZ: 635 (Ward concert, Sam Jones); 8-8:30, WURW, KEAP, WQAW: 645, WICB, WICJ, WIZ: 650 (reading); 8:45, KQJL, WEAP, WQAW: 655, WICB, WICJ, WIZ: 700 (Reading the New Testament, Rev. Dr. A. D. N. T.); 9, WRQX, WEAP, WQAW: 715, WICB, WICJ, WIZ: 720 (reading); 10, WADP, WEAP, WQAW: 730, WICB, WICJ, WIZ: 735 (lecture, Harold G. Foster); 11, WADP, WEAP, WQAW: 745, WICB, WICJ, WIZ: 750 (music, John Williams, tenor, Mrs. John Williams, contralto). WADP is at 10-11 a.m. in Fort Bragg, Calif., and at 11 a.m. in Los Angeles, Calif. WQAW is at 6-12 noon in Los Angeles, Calif.

Tuesday, February 17: 6, WADP, WEAP, WQAW: 615, WEZ: 620, WICB, WICJ, WIZ: 625 (music, Leon Barlow, tenor); 7:30, WURW, KEAP, WQAW: 630 (reading, Dr. A. D. N. T.); 8, WADP, WEAP, WQAW: 645, WICB, WICJ, WIZ: 650 (50-minute digest of the American history, Rev. J. L. C.); 8:45, WURW, KEAP, WQAW: 655, WICB, WICJ, WIZ: 700 (music, Dr. A. D. N. T.); 9, WADP, WEAP, WQAW: 715, WICB, WICJ, WIZ: 720 (reading, Dr. A. D. N. T.); 10, WADP, WEAP, WQAW: 730, WICB, WICJ, WIZ: 735 (music, Mrs. John Williams, soprano). WADP is at 11-12 noon in Los Angeles, Calif., and WQAW is at 11 a.m. in Los Angeles, Calif.

Friday, February 20

Where to Hear Talks
Central Standard Time

Sunday, February 15: 6, WADP, WEAP, WQAW: 615, WEZ: 620, WICB, WICJ, WIZ: 625 (music, Leon Barlow, tenor); 2:15-3 p.m., KQJL, WEAP, WQAW: 330, WICB, WICJ, WIZ: 335 (reading, Dr. A. D. N. T.); 3:30, WADP, WEAP, WQAW: 345, WICB, WICJ, WIZ: 350 (50-minute digest of the American history, Rev. J. L. C.); 4, WADP, WEAP, WQAW: 355, WICB, WICJ, WIZ: 360 (reading, Dr. A. D. N. T.); 5, WADP, WEAP, WQAW: 375, WICB, WICJ, WIZ: 380 (music, Mrs. John Williams, soprano). WADP is at 11-12 noon in Los Angeles, Calif., and WQAW is at 11 a.m. in Los Angeles, Calif.
FRANCIS MACMILLLEN, AMERICAN VIOLINIST, RETURNS MONDAY TO KSD

Where to Hear Concerts
Central Standard Time

These are the stations for music lovers to dial and you can hear programs, some of which are being broadcast from coast to coast.

Popular

Wednesday, February 18

8:00: WFAA, 1500, Dallas, Tex. (WFAA)
8:15: WMAK, 1490, Knoxville, Tenn. (WMAK)
8:30: WOC, 620, Des Moines, Iowa (WOC)
8:45: WJZ, 1260, Baltimore, Md. (WJZ)
9:00: WMAK, 1490, Knoxville, Tenn. (WMAK)
9:15: WOC, 620, Des Moines, Iowa (WOC)
9:30: WJZ, 1260, Baltimore, Md. (WJZ)

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9:15: WOC, 620, Des Moines, Iowa (WOC)
9:30: WJZ, 1260, Baltimore, Md. (WJZ)
WDAV 5:20-5:20 a.m.

WYNB 5:25-5:30

WAI, 6:00-6:15

WDYF 7:30-7:45

WOED 7:30-7:45

BAV, 8:00-8:15 a.m.

a.m. WBAE 8:00-8:15

WBN 8:05-8:15 a.m.

WBN 8:15-8:30 a.m.

WBN 8:30-8:45 a.m.

WBN 9:00-9:15 a.m.

WBN 9:15-9:30 a.m.

WBN 9:30-9:45 a.m.

WBN 9:45-10:00 a.m.

WBN 10:00-10:15 a.m.

WBN 10:15-10:30 a.m.

WBN 10:30-10:45 a.m.

WBN 10:45-11:00 a.m.

WBN 11:00-11:15 a.m.

WBN 11:15-11:30 a.m.

WBN 11:30-11:45 a.m.

WBN 11:45-12:00 a.m.

WBN 12:00-12:15 a.m.

WBN 12:15-12:30 a.m.

WBN 12:30-12:45 a.m.

WBN 12:45-1:00 a.m.

WBN 1:00-1:15 a.m.

WBN 1:15-1:30 a.m.

WBN 1:30-1:45 a.m.

WBN 1:45-2:00 a.m.

WBN 2:00-2:15 a.m.

WBN 2:15-2:30 a.m.

WBN 2:30-2:45 a.m.

WBN 2:45-3:00 a.m.

WBN 3:00-3:15 a.m.

WBN 3:15-3:30 a.m.

WBN 3:30-3:45 a.m.

WBN 3:45-4:00 a.m.

WBN 4:00-4:15 a.m.

WBN 4:15-4:30 a.m.

WBN 4:30-4:45 a.m.

WBN 4:45-5:00 a.m.

WBN 5:00-5:15 a.m.

WBN 5:15-5:30 a.m.
**Experimental Reflex Circuits**

The circuit shown in figure 1 is ideal for those living more than 3000 miles from a large station. With a 45-plate condenser and a 25-turn honeycomb coil on a 190-foot aerial it will reach all wave lengths between 375 and 550 meters. A 25-plate condenser with a 35 and 40-turn coil will work well. This set is not only extremely reliable and is very easy to operate, the owner having complete control over the wave length, the varactor merely setting it as a Radio Frequency control.

Use a good crystal. The transformer may be any good make and ratio. I have tried a dozen types ranging from 10 to 30 to 1 on all work well. I have used 4 transformers, 3:45, W-D-15, WD-11 and 199 tubes, and for best results, combined with any others. 199's have given me most satisfaction.

Vernier and Shield Combined

The device shown consists of a large brass gear, a little larger than the dial you wish to use, with fine teeth, also a vernier geared on to the shaft of the larger gear. A piece of fiber tubing is fastened onto the vernier. You then put the instrument you wish to attach the vernier adjustment unto (Variorimeter, condenser, etc.). On the other end of the fiber tubing is a small piece of brass tubing complete with a complete shield. The two may be connected in this manner if necessary. You can put in any electrical connections that are necessary. The screws are used to fasten the two sheets of brass tube.

The small brass shaft extends through the panel and has the dial and knob attached onto it. Just back of the panel the large gear wheel is fastened on the same shaft. The smaller gear wheel is fastened on the same shaft. The larger gear wheel is fastened on the panel and the panel is fastened onto the small shield. The small brass shield is a shield, stationary to another smaller shaft, and is fastened onto so that it meshes with the large one. Between the two gears and the panel, is a smaller brass shield and the panel shield, which are connected by a small brass gear. The shield and the panel are connected by a small brass gear.

A small knob on the vernier adjustment when turned should make the dial vary slowly. If the pointer stays the same you have no good 25-plate condenser this set will work from 375 to 550 meters.

Any neutrodyne unit will work well. This much is true of all small 25-plate or larger condenser when used in a good 25-plate condenser. The plate will work well. This much is true of all small 25-plate condenser when used in a good 25-plate condenser.

**Crystal Set Hook-up**

In my experience with crystal sets I have obtained the best results with the hook-up shown in the illustration. The parts required are a varistor, a variable condenser and a good detector. An ordinary fixed condenser can be used across the grid circuit and you will be surprised with results from this hook-up. — Garvin Mullins, Kemp, Texas.

**A Battery Attention**

The cost of operation can be cut if the best possible type of battery is used. The battery used should be a storage battery and should be kept warm. The battery should be kept clean and should be filled with the proper solution. The solution should be kept at a temperature of 70 degrees Fahrenheit.

**Copper Wire Best Aerial**

Number 12 enamelled hard copper wire is as good as anything. Aluminum wire is not recommended.
Constitution of the Six Tube Hetrodugon
More Details About the Circuit
By C. E. Brush

FROM the letters which have come to
it is clear that the writer was not
explicit enough in describing the con-
nections to be made to the oscillator coil.
The symptoms described by the many
readers in connection with unsatisfactory
operation indicate that the oscillator has
not been wired correctly to the rest of
the set. In part two which was published in
the January 17th issue, when the oscillator
coil is screwed into the sub-panel it should be
very careful to tell readers how to bring
out the wires from the oscillator coil so that
they would be in a convenient position
when mounted as shown in figure 12 in
the January 17th issue. When the oscillator
coil is screwed into the sub-panel it should
also be rotated so that the leads from the
inductive L4 and L5 come out at the bottom
and they should be connected as follows: The
end of the coil L4 nearest the edge of the tube to
the left in figure 12 is to be connected to the
minus terminal on the oscillatortube
socket which is two or three inches to
the left of the oscillator coil. The end of L5 nearest the center of the
socket which also goes to the plate
station on the plate condenser. The
end of inductance L6 which is nearest the
diameter of the tube to the right connects to
binding post Z which is the plus B. The
end of L7 which is nearest the center connects to the P binding post on the
oscillator tube socket and also to the rotor
plates of the seven plate condenser. Con-
nected in this way the tube will oscillate easily
over the entire wave length range but
if these connections should be
versed on either coil there may be no osc-
cillation at all.

Binding Post Connection

There seems to be some doubt in the
minds of readers as to the connections
of binding posts A, V, W, X, Y and Z at
the rear of the sub-panel. Binding
post W is the negative A, X is the plus
A, Y is the plus B and Z is the plus
V are the antennas and ground connections.

Referring to figure 13 it will be noticed
that there is a lead from the P binding post
on the oscillator tube socket to the second
side of the filter transformer and that this
connection is also not clear as it possibly should have been.
It was presumed that with figure 3 and
figure 10 before them, readers would un-
derstand that this wire went to the
transformer and running through the
filter coupling, this rod is connected to the
upper segment of the semi-variable
condenser on the end of the filter second-
ary. As described under the construction of
the filter coupling this rod will only connect to one end of the
filter secondary so the coupling must go to the plate of the
second detector tube to secure regener-
ation.

A typical letter from the many coming in
is as follows: "Radio Digest, I finished
my heterodugon on Thursday last
(Jan. 22nd) and got locals fine that
evening. It was not until last evening (Jan.
24th) that I got on to the trick of tuning
in. There, oh boy! how they came in.
It has a much better tone quality than my
neutoxdyn and the third stage of radio
frequency amplification works O.K., much
to my surprise. It is surely some-thing
out of the way, but when you get it, you've
made something."-E. B., Clevedon, Ohio.

Through typographical error in this list of
issues, readers were given an outline of
how to make a 1½-inch cabinet. Several read-
ers have called the writer's attention to, and
so there must be 1½ inch depth
inside the cabinet. The list of parts spec-
cified a cabinet 1½ inches deep and it is,
therefore, impossible to place a set built
in this way in the above specifications in
such a cabinet. The list of parts should have
given the cabinet a 1½-inch depth
dimension but if readers have difficulty
in getting such a cabinet, no harm will be
done by moving the base panel ¾ inch
to ⅛ inch nearer the front panel.

Battery Consumption

A battery on a 0.25-ampere tube operat-
ing to an end point of 19 volt under usual
intermittent service will give 100
hours of service; two batteries in parallel
will give approximately 350 hours. In
other words, two batteries connected in parallel will give more than double the
service of a single battery.

Batteries are connected in parallel when
the positive terminal of one is connected
to the negative terminal of the other. This
method of connecting batteries does not
change the voltage of the combination, but
increases the energy delivered; or, in other
words, the hours of service.

Batteries are connected in series when
the positive terminal of one is connected
to the negative terminal of another.
When connected in this way the voltage
of the combination is equal to the sum of
the voltages of the individual batteries.
Thus, a 1½ volt A. battery is composed of
deep, individual cells connected in series,
each cell having a voltage of 1.5. But

Pigtail Connections

The connections to movable parts of a
radio set are made either by a pigtail or
friction contact. The latter consists of a
bearing or a spring washer that will
make contact to the shaft of the rotating
beau-mer.

Pigtail connections are made by solder-
ning a flexible wire to the movable parts
of the device. The pigtail connection is the
most efficient method of making this
type of connection because it is positive,
whereas with the friction contact the
bearing or washer begins to wear and in
time it will become loose, therefore mak-
ing a poor connection. If rotating parts
of your receiver have friction contact it
may be improved by soldering on a pig-
tail or flexible wire.

To cut a circular hole in a panel drill a
circle of holes, close, but not un-
earable; close together, with a number 27 drill, then drill out with a number 19 drill. Dress up with a half-round file.

You can give your set
this big advantage-

Amplification without Distortion
How to make sure of getting
everything loud and clear

YOU can make your set so that it will
reproduce all and distinctly without distortion. The
real pleasure in radio comes when you can under-
stand and enjoy every word you hear—
that is music that is clear in tone. In order to hear clearly and distinctly every word
you are using amplifying transformers that amplify
the sound without distorting it.

Give your set this big advantage—Amplification without Distortion. Whether you have a neutoxdyn
superhetodyne, regeneration or reflex, the addition of the
Amplifying transformer will make it better.

The Acme A-2 has be-

come famous among ra-
dio owners for increasing
the volume of sound
without distortion. If you
are bothered by dis-

tortion try an Acme A-2
and note the difference.
It has been

furnished and carries a guarantee to the effect that
you want Amplification with-
out Distortion. The Acme
Transformers in the set will
insist on them in the set you buy. That's one big
reason why the Acme
Flex-kit goes on at good receivers.

Transformers.) The Acme booklet which explains
how to use them is full of
results by proper ampli-
fication. A complete set includes a number of valuable
booklet which explains
help you build a set. Mail this coupon for full details.

ACME APPARATUS COMPANY
Transfer and Radio Engineering

Have the fun of making your own radio set

Acme is for amplification

ACME APPARATUS COMPANY,

Get Acme A-2 transformer and
semble your own radio set.

Gentlemen: I am enclosing 10 cents (10)
A-2 transformers, with instructions.
"Amplification without Distortion."

Name:

Address:

City:

State:
"The Machine Wreckers" Revised By "Steve" Trumbull, Chief Announcer of KYW ERNEST TOLLER, imprisoned German playwright, wrote a play called "The Machine Wreckers," this situation described in the novel of the alarm of the weavers when the first piece of machinery was introduced into England. Mass meetings were held in the dead of night. The machines would depopulate all of their livelihood. There were not even half a century before the first machine was strung.

"For the play of Herr Toller. But somehow, the years that followed saw readjustments. More machines came. The workers used them. The cries of alarm died away.

A 1925 version of that very same plot was staged just this winter. Last year the "Radio" was at the theater where the pro-
ducers, actors, stage hands, musicians and artists gathered in solomn assembly. The gauntlet was thrown down. An open war declared upon the ma-
chine—upon Radio.

William A. Brady arose before the alleged-to-be-enlightened audience. Prefacing his remarks with the answer, the bright, clear, the photograpphs of the Radio were in combat to the death he added: "For the play of Herr Toller, the men are the public—addresses, by means of something for nothing, the building up of a process in the business of their own destruction.

The multitude marvelled. Down with the machines!

"Who wants to hear disembodied voices playing dramatic parts," demanded Louis Wollheim. "Resist what will injure your livelihood," demanded Frank McGlynn. "That livelihood is hard enough to get now!"

Further, Mr. McGlynn pictured the men thrown from their jobs by this Radio demon, and chopping wood—and actually chopping wood.

Perhaps there are cases where that misfortune would be gladly accepted with relief by a suffering public—but this is beside the point. Let us rather on a basis of plain facts and experience, tell what has been the experience of the Westinghouse station at Chicago with the theaters.

There are two theater pieces in Chicago that are in their second season, "No, No, Nanette," and "Abie's Irish Rose." Both of these have been micro-

phoned by KYW.

Then there was the matter of the Duncan sisters, who also resorted to become as permanent in Chicago as the Art Institute. They fitted out a Radio studio for their own expense, and broadcast a regular program. There was never a hint of wood chopping around their box office.

On the stage? Hardly that. At least the managers of these shows fail to believe it.

But in the theatrical world, in New York, D. C. Smith, of the "New York Times," wrote to KYW following the broadcasting of "Abie": "Never in my twenty-five-years' experience as a theater critic have I known of a single week ofRadio bringing in such returns at the box office. In the former week the grosses of every large theater company bought tickets who had heard the play from your station."

There are just a few of the facts. There is another angle, too. The Chicago Civic opera just announces a deficit of $400,000 for the past season. The opera was on the air, and the theatrical managers, whether they want to admit it or not, have quit us.

And the deficit was nothing near as high as $400,000.

Another coincidence, perhaps?

Just the other day there was a party of downtown theater-goers in the KYW studio. Invited to return to listen to the evening broadcast they replied that they were going to write a show.

"What show?" we asked.

"An illusion," was the answer, "We heard it down home in New York last night. It was so beautiful by the total of the eclipse, didn't have time to go to the show."

"That's a mighty good idea. How about it?" we suggested.

The weavers sit down. The machines down. A show up. So a show was written.

And the show is a smash. The men who have heard the Radio have never paid them the tribute they give the show. And the name of that show is "Radio Digest."
How to Make the Two Tube Knox Reflex

Part II—Assembly of Panel and Baseboard

By W. H. H. Knox

If the first article which appeared last week the data for winding coils was given so that the reader could construct his coils while waiting for the rest of the parts if it is necessary to obtain these by mail. Assuming that the parts given in the list included in the rest of the article are now at hand, and the coils nickel-plated, we are ready to lay out the set of panels drilling layout shown in figure 4. The baseplate is shown cut out on a sheet paper to full size so that it may be traced as a drilling template. The small individual templates which accompany the figure may be used to go over the panel area to be pasted on this full-size template to air proper positions. The usual common template shows one hole for the shaft and three for mounting the instrument itself, so it will be necessary to secure the shaft holes in the small templates exactly on the shaft holes indicated the layout. The same is true of the front templates as the average reader might want a hole and two small lees for 6922 machine screws. If a board is used, the drill the room from the bottom of the panel as shown in figure 2 will be necessary, but if a solution or rubber sub-panel is used, it may be supported by angle brackets, built to have 1/4-inch drill holes to suit the holes should go for the brackets.

Identifying Panel Holes

The three 6x00s, variable condensers to be mounted behind the three holes own the horizontal line midway the gap of the panel. It will be noticed that the two holes are below and 1/4 inch from the bottom of the holes, which are for the lid of the cabinet, and the adjustable crystal detector. The detector gap is in the holes to the left. The two holes exactly above one 1/4 inch from the bottom are for the resistors. Slightly below these are two holes each centered, the other two are holes that are in the other of the filament switch and the other the phone jack to the left and the phone jack to the right.

either be pasted or clamped to the panel and the holes center punched for drilling, after which the numerous holes can be drilled with the proper size drills as indicated in the templates which accompany the apparatus.

Assembly of Baseboard

The baseboard layout is shown in figure 6, and the placing of the apparatus will be the same whether a wooden baseboard is used or one of bakelite or hard rubber. While slight deviation from the layout shown may be done on most of the apparatus the placing of the coils should be followed from that shown. Other positions for parts other than the one given in the layout are indicated in the parts and directions for building the model of the actual model for ten cents. Mail order today.

Just use ordinary tools on this panel—built to order for radio

You don't need special tools to do a good job on a Radion Panel. Just the usual tools around any house will give you clean-cut, workable, results. You need not have the slightest fear of clipping. Radion is the easiest of all to drill and saw. It was developed to order by our engineers to meet the demand of radio set builders. There is nothing quite like it for real results. Highest rating at radio-frequency insulation

Authoritative laboratory tests give Radion the highest rating as radio-frequency insulation. This means that losses from surface leakage and dielectric absorption are exceptionally low. And low losses mean clearer reception, more volume and more distance.


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Laymen: Please send me one can of KESTER RADIO SOLDER for which I enclose same in stamps. (Pentaped in U. S. A.)

Name

Address

City

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RADION

The Supreme Insulation

Panels

Dials, Sockets, Binding Post Panels, etc.
The connections to the coils are as follows: The inside end of coil L1 connects to the antenna binding post and the outside end connects to the ground binding post. The inside end of coil L2 connects to the 3 minus end of the audio frequency transformer AT2 and the outer side of coil L3 connects to the inside end of coil L4 and the binding post. The inside end of coil L5 also connects to the rotor plates of the 1905 mf. condenser C1. The outside end of L5 connects to rotor plates of L6 connects to the B binding post of the primary side of AT1 and the outside end goes to the B binding post on the socket. By following the diagram the balance of the wiring will be found easy, but the connections of the coils must be adhered to strictly. Otherwise the set will not work correctly.

When wiring the receiver it will be found an excellent plan to go over each wire on the diagram with a red or blue pencil, as that wire is placed in the set, so that no wires will be omitted or the same connection made twice, which can very easily happen. The fixed mica condenser shunted across the secondary of AT1 and labeled C2 has a capacity of 0.01 mf., the condenser across the primary of AT2 and labeled C3 has a capacity of 0.05 mf., while the condenser labeled C6 has a capacity of 0.006 mf.

In the next issue Mr. Knox will go into the adjusting and tuning of this unusual reflex so that readers can duplicate the exceptional sharp tuning and strong volume which the author obtains in Los Angeles. (In the next issue.)

See that the voltage of the charging device is higher than that of the battery.

---

O'VeR 200,000 Radio fans have<br>found the big capacity 3-am<br>GOLD SEAL HOMCHARGER<br>ideal for keeping their Radio bat<br>teries fully charged and operating at top efficiency. Can be used with any<br>lamp socket and charges all Radio "A" and "B" and Auto Storage Batteries over night for a nickel.

Simple, reliable, fool-proof. Can be<br>operated by any one. Contains no<br>bills, acids or lime wearing carbon<br>solder or any other injurious parts. Write for Free copy of—

THE AUTOMATIC ELECTRICAL DEVICES CO. 215 W. Third, St. Cincinnati, Ohio

Free<br>Write for Free copy of—

Ward's New Radio Catalogue

THIs advertisement is published to remind you three things that you are interested in Radio should know.

First, we believe Ward's is the greatest Radio store in the world—that it is the real Headquarters for Radio.

Second, that at Ward's you can buy everything in Radio without paying the usual "Radio Profit."

Third, that this big 68-page book—a genuine reference book on Radio—is yours free for the asking.

Our Radio Experts

This Catalogue is a book gotten up by experts. It shows all the latest ups, everything in parts and complete sets—so simple that you yourself can do the work.

And it shows only tested and ap<br>proved Radio equipment—and tested and traded by our experts who are up-to-the-minute in Radio.

Write for Ward's free 68-page Radio Catalogue and see the low prices.

Our 33 Year Old Policy

In buying Radio from Ward's you are buying the best to the best. That is above all. Our 33 years is above all. For 33 years we have listened to the wants of our readers, and today our house nearest you, Dept. No. 41-R

Headquarters for Radio

Satisfaction Guaranteed or Your Money Back

Montgomery Ward & Co.

The Oldest Mail Order House in the World Today, the Most Progressive

From Chicago to Kansas City and Portland, Ore. To Oakland, Calif., Fort Worth
O COURSE crystal set owners are not interested in questions such as "How much does a receiver cost?" Facts about fading? What constitutes results? The truth is, as you say. They very seldom get bother about static because the broadcast station that the broadcast station's signals are more powerful than the static. But, to the broadcast listener making use of any other type of receiver, these are vital subjects and are the things which he should know in a little about.

There is an absolute need for a clear explanation regarding the facts which determine the distance a receiving set can pick up broadcast news, music and other interesting matter. With this in mind I will endeavor to bring to light the very factors upon which good reception depends.

To begin, it might be said that a receiving set itself cannot receive any farther than the box or cabinet it is installed in. From this, it should be clear that the transmitted waves must reach the receiving station's antenna.

Sensitivity

Many have asked why it is that they could hear Pittsburgh or even Detroit several hundred miles distant and yet they could not hear another station operating but seventy-five miles away. The waves from the broadcasting station seventy-five miles away did not reach their receiving antenna, consequently there was no reception to be had.

The question came up the question often asked regarding the sensitivity of a receiving set. "Why is it," the layman asks, "the manufacturer and the better the engineering skill, the more sensitive will the receiver be?" A receiver is apt to respond to waves which barely reach the receiving antenna, while a less efficient one will not record the presence of these waves. The better the receiver is the only difference between receiving sets today.

This inherent ability to pick up broadcast stations thousands of miles away is due to the skill, workmanship, engineering ability and overall efficiency of the manufacturer or builder.

In Figure 2 two receivers of different construction are shown. The waves from the broadcasting station T barely reach the antennas (this is the point of practically zero current) no response is had at receiving station number 1 even though the same number of tubes are in operation. At station number 2 reception is being had from the broadcast station because the receiver, while using the same number of vacuum tubes has been constructed along engineering lines, and every effort was made to build an efficient receiving set.

Striking examples of the above come from inexperienced constructors who have built their own sets. They want to know why it is that they cannot receive as far as their neighbor who has in use a set manufactured by one of the large manufacturers, or a set he constructed himself along the lines mentioned.

Weather

Then, we also have the weather conditions to take into consideration. Consider that an efficient receiver is being employed for the reception of concerts being sent out by the most powerful and stationary stations in the country. We do not hear Allegheny or St. Louis as loud as we had them last night. The first thing one is apt to think is that the receiver has gone wrong. No so. A change or a weather condition will alter Radio receiving conditions and you must be governed accordingly. Then there are the fading problems when the signal walks in—and walks right out again. This condition cannot be helped at the receiving end—and as far as we know—not at the sending end either. Nothing that you can do to or with your receiver will help. It seems to be a condition due to changes of atmospheric conditions between the sender and receiver. Therefore, if you have a certain station tuned in well, do not try to resynchronize the dial when the station begins to weaken. You only make matters worse, simply because it is harder to tune in the station with diminished strength, and if the signal gets too weak you may lose the station entirely.

If "fading" is very pronounced on any particular station, try turning in some station in another direction. Conditions between you and that station may be entirely different. That accounts for the variable results obtained each night from a given number of broadcasting stations. Stats—they may be for it in not at "rest," and according to Webster. It means just a trifle too much static. Several devices have been used to good advantage in eliminating effect of this interference—and for one the author's underground system. However, the real solution is very powerful broadcasting stations permitting detuning of the receiver, that is, losing the static and still retaining the broadcasting station, because of its greater strength.

(Harmonics and Meters

Harmonics or broadcasting wave are the higher frequencies, representing exact multiples of the broadcast frequency. For example, suppose a station is sending on a wave of 500 kilocycles, that is 500,000 cycles per second. If the antenna arrangements are bad, or the radio distance great, the broadcast actually sent out may contain also a frequency of 1000 kilocycles, or 1500 kilocycles, which corresponds to 300 meters. This is the first harmonic. Similarly there might be also a frequency of 3 times 500 kilocycles, or 1500 kilocycles, corresponding to 265 meters. This would be the second harmonic. There would be a third at 1500 kilocycles or 150 meters, a fourth at 2500 kilocycles or 125 meters, and so on. Of course, all broadcasting stations try to keep their sending wave as "pure" as possible, that is, to avoid producing these harmonics.

Directional Properties of Loops

The directional properties of a loop are altered by the presence of magnetic material near it. The steel frame-work of a building has a detrimental effect. Buildings of the old design, and even modern buildings have the characteristic of east-west wires, metal stairs and other things, distracting the directional properties. This condition is particularly true of plywood or metal stairs and radiators. It is poor practice to place the loop too near the metal frame of the building. Rather, place the loop at a distance from the metal stairways and radiators. It is poor practice to place the loop too near the metal frame of the building. Then, again, placing the loop too far away from the set will also cause trouble.

Increase the Efficiency of Your Reflex by adding the Torofomer Attachment ahead of the Circuit. The diagram above illustrates the Torofomer in use as a stage of tuned Radio frequency amplification. The entire loop is fed to the amplifier as a whole. There are two types of Torofomers—single and double loops. The former is used for 500 kilocycles and below, the latter for 1000 kilocycles and above.

The Torofomer (A transformer for Tuned Radio Frequency)

Overcomes Local Interference Increased Selectivity

Vastly improves any Radio or Radio Frequency set such as Auto, High-Fidelity, or Hi-Fidelity receivers, also works well with other instruments. Does not pick up stray or unwanted signals, in any degree. It has no effect on other instruments. Works with printed diagrams.

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NAME

ADDRESS

The Silent Multi-Duty Super-Charger

Up to 120 Volts of "B" Battery Can Be Charged, Without the Usual Wire Changing!

The trouble—Just connect charger clips to battery terminals and let the charger current do the work. Super-Charger charges up to 120 volts B battery economically and quickly. It also charges 2, 4, 6 or 8 volt "A" or Auto batteries at a 5 volt and tapering as the battery is charged.

The Plate Super-Charger is as useful, and sometimes even more useful, than the present-day conventional type of charger. It is a great improvement, and it is also a considerable saving. The Plate Super-Charger is available complete for $1.00 postpaid.

Price of Super-Charger, $2.00

West of the Rockies, $3.00

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that's just a few of them

AGAIN Elgin Super-Reinartz leads all others! Every trans-Atlantic report investigated was found to be ABSOLUTELY authentic! Many happy owners of Elgin sets again tuned in the European stations.

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Order today direct. It will give you the selectivity and distance it has given others. And you can save $5.00. Let us tell you how.

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Mail this coupon to Elgin, Elgin, Ill., Chicago, 62, St. Louis, Mo., or any Elgin radio dealer and we'll send you a copy of the new Elgin Catalog, a 514-page edition, bound in cloth, with gold lettering. It contains complete descriptions and illustrations of the entire line of Elgin products at a reduced price.

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Soldered Joints
Solder should be flowed on a Joint, not brushed on. The equipment for doing a good soldering job is an electric or plain heat iron, some strip solder and a quartz lamp. This is not necessary. But in order to make a perfect joint, you need some tools which are also necessary. First, the iron must be hot, but not warm; with a semi-warm iron you can hope for nothing more than a brushed-on solder job, which will not hold. One teaspoon of powdered rosin to ten teaspoons of alcohol makes the ideal soldering flux for Radio work.

Every Question ANSWERED
for only $1

iolet Radio Handbook
JUST OUT
514 PAGES
Compiled by HARRY F. DAVE, E.E.

Technically edited by F. R. Rouse

No more need you turn to the phone directory to

To get the Marshall-Stat at radio dealers everywhere. Write us for descriptive literature.

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Better than an Outdoor Aerial
Effascée Portable Antenna--cushion shaped--solves the problem wherever it is difficult or impossible to put up an outdoor aerial. If you have an outside Antenna Effascée connected in the Antenna circuit it will greatly increase your volume. You may hang it anywhere indoors or out and install it in a minute.

It is better than an outdoor aerial because it brings in less static and noise and increases selectivity. It gives excellent volume on other long distance, and can be used on any set--from an eight tube superhetrodyne to a crystal. Dealers find it excellent for demating sets designed to work on outdoor aerials. It is much better than a loop.

TELL-A-VU Model $10.00, $15.00 and $25.00
If you need one or more, order direct. Money back if not satisfied.

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Cincinnati, O.
B Battery Read With 10-Volt Meter

High Voltage Read on Low Scale Instrument

It is a comparatively simple matter to adapt your A battery voltmeter to read your B battery voltage. All that is necessary is to add the proper resistance. A WORKSHOP KINKS EARN A DOLLAR-

THERE are many little kinks worked out at home that would add to your fellow radio worker's knowledge. If only he knew about them. There are new hook-ups, new wires of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such materials. Send them in with full details, including stamped envelopes, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINS DEPARTMENT Radio Digest,
50 North Dearborn St., Chicago

25-watt or 40-watt Mazda lamp placed in series with one meter lead will give just about the right deflection of the meter on full B voltage.

The meter and lamp may be mounted on a small piece of base, as shown in figure 1, and three binding posts provided so that either A or B voltage can be read, as desired.

To calibrate the meter, use the circuit shown in figure 2. A reasonably accurate voltmeter of phased scale can be temporarily secured to serve as the comparison voltmeter. This is connected to one side of a double-pole, double-throw switch, and the new meter connected to the other side. Leads from the blade contacts go to the B battery. The voltage of the latter is varied by changing the number of cells in the circuit and the two meters read for each value of the voltage which should cover most of the scale of the meter.

The readings taken are plotted in the form of a curve, which will be similar to that shown in figure 3. The values given there are those actually obtained in calibrating a meter such as is described here. By means of such a curve the actual voltage for any scale reading may easily be determined.—Louis L. Matson, Nola Park, Ohio.

Look for the name

Soft and Hard Tubes

A soft tube that contains a lower degree of vacuum is more sensitive as a detector in a Radio set. The hard tubes function best as amplifiers, however, while soft tubes are not as suitable for this use.

SOLVED!

The "B" Battery Problem

Throw away your "B" Batteries and install a Kellogg Trans-B-former. It gives you "B" Battery current direct from your electric light socket at the rating cost of a field of 1 cent per hour. Gives better reception—no interferences. Write for details.

KELLOGG SWITCHBOARD & SUPPLY CO.
Trans-B-Former
1006 W. Adams St., Chicago, III.

Battery Charger

Delivers 72% of Current The Quest Niles have a 4800-watt battery charger, which delivers current at 72% of 4800 watts. It is used in most cases for charging batteries of the 3000-watt class. The charging rate is 18 to 20 amp, at a nominal 110 volts. The charger is designed for 60-cycle operation, with a 50-cycle operation. The charger is rated at 1800 watts, with a 4800-watt capacity. The charger is priced at $35.95. Model 6B is for 6- and 12-volt batteries. Model 6C, $35.40. Add 11 cents for Literature.

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Dept. 43, Florissant, Mo.
Questions and Answers

Worn Telephone Cords

If you want the best, write for price list. Dudley Brothers.


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BROADCASTING

LOG BLUE BOOK of the AIR

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FREE, even to radio-phonograph dealers. Send for a copy. No money to pay for orders. TELE-OMETER

MONEY REFUNDED If Not Delighted

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New Vernor Control Potentiometer

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ALL SHOT

That's the common expression of dry cell "B" batteries. Purchase the economy way and enjoy freedom from hissing and clattering, clearer reception, and greater output from your B battery...always a surplus. Use 2 A.U.W. B battery, A.U.W. B battery, Nickel-Plated, akaline, with exclusive Carter blow-feeding. Strength of a 90 volt battery put in 90 volts. The knock-down units contain all actual battery plus the external lead wires, and are put up in 90 volts @ $8.56; 100 volts, @ $10.95; 150 volts, @ $11.75; 150 volts, @ $15.90; 200 volts, @ $19.35. Lord backers and government agencies with a 30-day trial offer of complete satisfaction, with the price cut 25%. For a 90 volt battery, call 95. Prepaid. 8-page illustrated folio of instructions showing: putting together, making charger and charging free with all orders. Complete manufactured "B" battery charger $2.75. Order direct or write for our literature, guarantees, and testimonials. Same day shipments.

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Receiving Sets

Complete line of parts. We Sell to Dealers Only.

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Corrected Every Week—Part III

FIND MISTAKES AND YOU'LL GET DOLLAR

DOLLAR will be paid to the first person submitting the most errors in this week's digest. Address the Sub-Dir-

ectory of Radio Stations, which appears weekly on the first page. Send your entries, postmarked four days later than the next to last page. Letters must be in 24-hour time, 11-12 midnight being 11-12 a.m., 1-2 p.m. being 11-12 noon, 2-3 p.m. being 1-2 p.m., and so on. Correcting one station must be verified by the stations themselves, and NOT by comparison to other lists. Do not compare nor copy lists. Do not write on the paper. Use separate sheets of paper for each station submitted and place name and address on each sheet. In case of tie, duplicate awards will be

made.

Note:—The third part of the summary of broadcast stations on the back page of this issue will appear next week.

United States (Cont'd)

WEST, Columbus, Ohio. 203.3 meters, 50 watts. Ohio State University. 10:30-12 m, Sun. 7:30-10, Sat.

WEST, St. Louis, Mo. 565.6 meters, 250 watts. St. Louis, Mo. 9-12, Sat. 7:30-10, Sat.

WEST, Indianapolis, Ind. 565.6 meters, 50 watts. Indiana University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Lexington, Ky. 565.6 meters, 100 watts. University of Kentucky. 10-3, Sun. 7:30-12, Sat.

WEST, Kansas City, Kan. 565.6 meters, 250 watts. University of Kansas. 10-3, Sat. 7:30-12, Sat.

WEST, Bob Hope, Hollywood, Calif. 203.3 meters, 500 watts. Chicago, Ill. 10-3, Sat. 7:30-12, Sat.

WEST, Minneapolis, Minn. 203.3 meters, 500 watts. University of Minnesota. 9-12, Sat. 7:30-10, Sat.

WEST, St. Paul, Minn. 565.6 meters, 100 watts. St. Paul, Minn. 9-12, Sat. 7:30-10, Sat.

WEST, Grand Rapids, Mich. 203.3 meters, 250 watts. University of Michigan. 9-12, Sat. 7:30-10, Sat.

WEST, Detroit, Mich. 565.6 meters, 50 watts. University of Detroit. 9-12, Thu. 3-4, Sun. 7:30-10, Sat.

WEST, Madison, Wis. 203.3 meters, 50 watts. University of Wisconsin. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Ayr, Ont. 565.6 meters, 50 watts. St. Jerome's. 9-12, Sat. 7:30-10, Sat.

WEST, Toronto, Ont. 565.6 meters, 50 watts. St. Jerome's. 9-12, Thu. 11-12, Sun. 7:30-10, Sat.

WEST, London, Ont. 565.6 meters, 50 watts. St. Jerome's. 9-12, Sun. 7:30-10, Sat.

WEST, Winnipeg, Man. 565.6 meters, 50 watts. St. Jerome's. 9-12, Sun. 7:30-10, Sat.

WEST, Hamilton, Ont. 565.6 meters, 50 watts. St. Jerome's. 9-12, Sat. 7:30-10, Sat.

WEST, Halifax, N. S. 203.3 meters, 50 watts. St. Jerome's. 9-12, Sat. 7:30-10, Sat.

WEST, Montreal, Que. 203.3 meters, 250 watts. St. Jerome's. 9-12, Sat. 7:30-10, Sat.

WEST, Quebec, Que. 203.3 meters, 250 watts. St. Jerome's. 9-12, Sat. 7:30-10, Sat.

WEST, Toronto, Ont. 565.6 meters, 50 watts. Toronto, Ont. 9-12, Thu. 11-12, Sun. 7:30-10, Sat.

WEST, London, Ont. 565.6 meters, 50 watts. London, Ont. 9-12, Sun. 7:30-10, Sat.

WEST, Cambridge, Mass. 203.3 meters, 50 watts. Harvard University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Cambridge, Mass. 203.3 meters, 50 watts. Harvard University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, New Haven, Conn. 203.3 meters, 50 watts. Yale University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Brooklyn, N. Y. 203.3 meters, 50 watts. Brooklyn College. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Washington, D. C. 203.3 meters, 50 watts. Catholic University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Chicago, Ill. 203.3 meters, 50 watts. Chicago, Ill. 9-12, Thu. 11-12, Sun. 7:30-10, Sat.

WEST, St. Louis, Mo. 203.3 meters, 500 watts. St. Louis, Mo. 9-12, Wed. 10-11, Sun. 7:30-10, Sat.

WEST, Buffalo, N. Y. 203.3 meters, 250 watts. Western New York College. Mon. 9-12, Tue. 10-11, Sun. 7:30-10, Sat.

WEST, Washington, D. C. 203.3 meters, 50 watts. Catholic University. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Austin, Texas. 1056.2 meters, 50 watts. University of Texas. Mon. 9-12, Thu. 1-2, Sun. 7:30-10, Sat.

WEST, Minneapolis, Minn. 520 meters, 50 watts. University of Minnesota. 9-12, Sat. 7:30-10, Sat.

WEST, St. Paul, Minn. 520 meters, 50 watts. University of Minnesota. 9-12, Sat. 7:30-10, Sat.

WEST, Omaha, Neb. 520 meters, 50 watts. University of Nebraska. 9-12, Sun. 7:30-10, Sat.

WEST, Kansas City, Mo. 520 meters, 50 watts. University of Kansas. 9-12, Sat. 7:30-10, Sat.

WEST, St. Louis, Mo. 520 meters, 50 watts. University of Missouri Southwest. 9-12, Sat. 7:30-10, Sat.

WEST, Milwaukee, Wis. 520 meters, 50 watts. University of Wisconsin Milwaukee. 9-12, Sat. 7:30-10, Sat.

WEST, Cleveland, Ohio. 520 meters, 50 watts. Western Reserve University. 9-12, Sat. 7:30-10, Sat.

WEST, Detroit, Mich. 520 meters, 50 watts. University of Detroit. 9-12, Thu. 11-12, Sun. 7:30-10, Sat.

WEST, Minneapolis, Minn. 520 meters, 50 watts. University of Minnesota. 9-12, Sat. 7:30-10, Sat.

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