

WITH DECEMBER WAVE LENGTHS

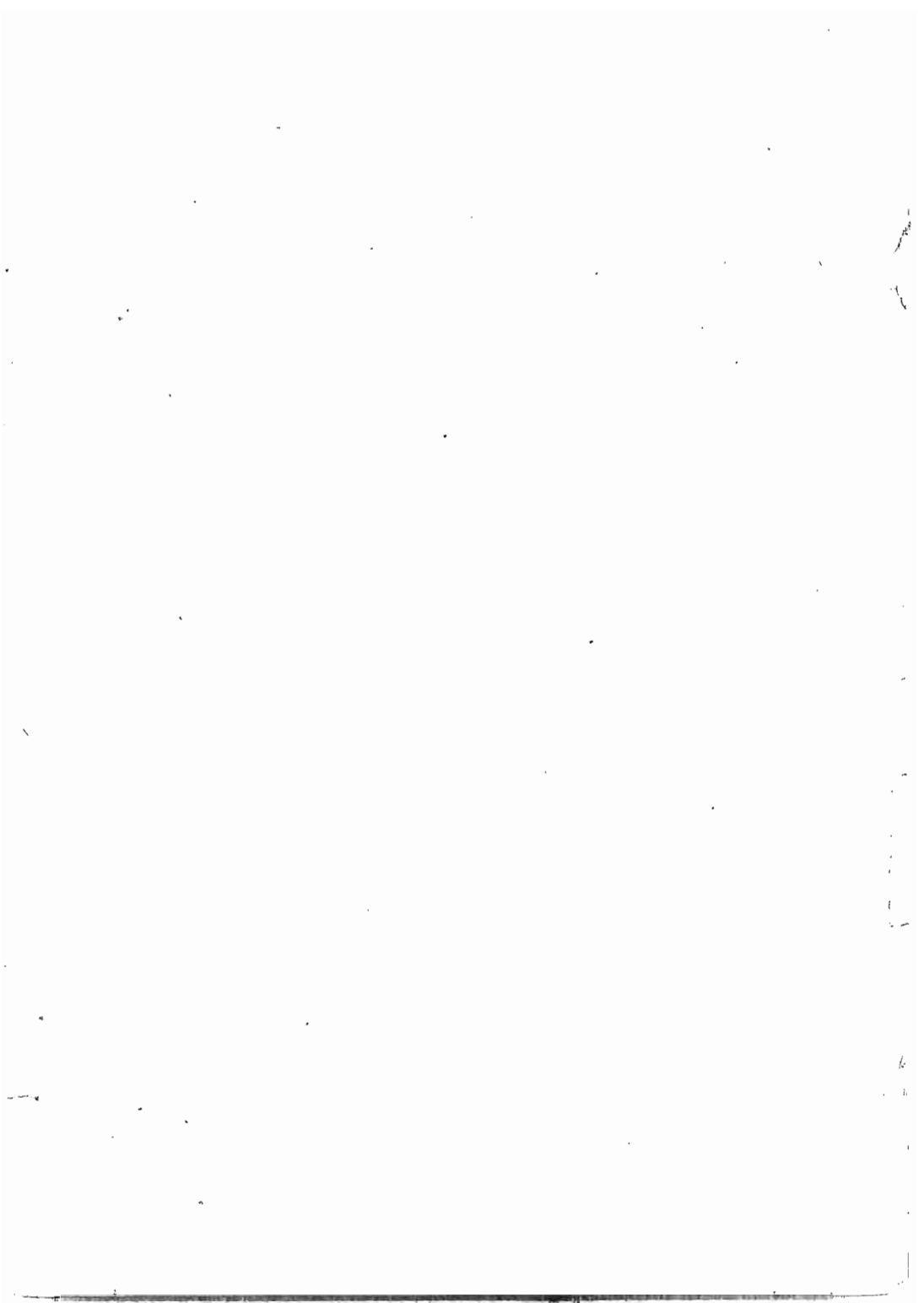
# RADIO INDEX

*"THE TUNING BOOK"*



RADEX shows the frequency to which set is tuned as dials are turned, gives exact location of dials for any station in America and identifies programs received without announcement. For any dial and any set.

**The Non-Technical Radio Magazine**



# WHAT'S ON THE AIR TONIGHT?

## A Weekly Calendar

### Leading Features of the Network Programs

Time is given by Eastern Standard. For Central Time, subtract one hour, for Mountain Time, two hours and for Pacific Time, three hours.

Station lists beginning with WFAF and WJZ are the National Broadcasting Co. Inc., while those beginning with WABC and WOR are the Columbia Broadcasting System.

#### Sunday

##### 1:30-2:00 Peerless Reproducers

WFAF	WLIT	WWJ	WOW	WTMJ
WEEI	WRC	WSAI	WDAF	WCCO
WTIC	WGY	WEBH	KVOO	WHAS
WJAR	WGR	KSD	WFAA	WSM
WTAG	WCAE	WHO	KPRC	WBT
WCSH	WTAM			

##### 3:00-4:00 Symphonic Hour

WABC	WMAK	WAU	WOW	WSPD
WNAC	WCAO	WKRC	KMOX	WMAF
WEAN	WJAS	WGHP	KMBC	WICC
WFBL	WADC	WMAQ	KOIL	WHK

##### 3:00-4:00 Young People's Conference

WJZ	WLW	KWK
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##### 4:00-4:30 Continentals

WJZ	WBAL	WHAM	KWK
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##### 4:00-5:00 Cathedral Hour

WABC	WMAK	WAU	KMOX	WMAF
WNAC	WCAO	WKRC	KMBC	WICC
WEAN	WJAS	WGHP	KOIL	WHK
WFBL	WADC	WOWO	WSPD	

##### 4:00-5:00 Dr. S. Parkes Cadman

WFAF	WEEI	WTIC	WJAR	WTAG
WHAS	WCSH	WLIT	WGY	WFAF
WGR	WCAE	WSAI	WOC	WHO
WOW	KVOO	WSM	WSB	WBT
KOA				

##### 5:30-6:30 Acousticon Hour

WFAF	WEEI	WRC	KOA	WGY
WCAE	WTAM	WWJ	WSAI	WGN
WCCO	WOC	WHO	WOW	WDAF

##### 5:30-6:00 Dr. Harry Emerson Fosdick

WJZ	WBZ	WBZA	WBAL	WLW
KWK	WREN			

##### 6:00-7:00 The Stetson Parade

WFAF	WTIC	WJAR	WTAG	WCSH
WFI	WRC	WGY	WGR	WCAE
WTAM	WWJ	WSAI	WEBH	WEEI
WHO	KSD			

##### 6:35-7:00 Arcadie Birkenholz, Concert Violinist

WFAF	WEEI	WJAR	WTIC	WFI
WRC	WLY	WGR	WCAE	KSD

##### 7:00-7:30 Old Company's Program—Reinald Werrenrath

WFAF	WEEI	WTIC	WJAR	WTAG
WCSH	WLIT	WRC	WGY	WGR

##### 6:30-7:00 Whittall Anglo-Persians

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WLW	WJR	KYW	KWK
WREN	KOA	WCCO	WTMJ	

##### 7:30-9:00 Major Bowes' Family

WFAF	WTIC	WRC	WJAR	WGY
WCAE	WWJ	KSD	WHO	WOW
WHAS	WSM	WMC	WSB	KOA
WTAM				

##### 8:00-8:15 The Enna Jettick Melodies

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WLW	WJR	KYW	KOA
WREN	WTMJ	WCCO	KWK	

##### 8:15-9:15 Colliers Radio Hour

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WJR	WLW	KYW	KWK
WREN	KOA	WCCO		

##### 8:30-9:00 La Palina Hour

WABC	WFBL	WADC	WOWO	WSPD
WFAN	WMAK	WKRC	KMOX	WMAF
WNAC	WKRC	WGHP	KMBC	WICC
WEAN	WJAS	WMAQ	KOIL	WHK

##### 9:00-9:15 "Our Government" by David Lawrence

WFAF	WTIC	WJAR	WFAA	WMC
WSB	WTAG	WCSH	WRC	WGY
WGR	WCAE	WSAI	KSD	WOC
WHO	WOW	KVOO	WHAS	WSM

##### 9:15-10:15 Atwater Kent Radio Hour

WFAF	WEEI	WRC	WGX	WGR
WCAE	WWJ	WSAI	WGN	KSD
WCCO	WOC			

##### 9:15-9:45 Utica Jubilee Singers

WJZ	WBAL	KDKA	KWK	WREN
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##### 9:30-10:00 Majestic's Two Black Crows

WABC	WMAK	WAU	KMOX	WMAF
WNAC	WCAO	WKRC	KMBC	WICC
WEAN	WJAS	WGHP	KOIL	WHK
WFBL	WADC	WOWO	WSPD	

##### 9:45-10:00 El Tango Romantico

WJZ	KDKA	KWK	WREN
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##### 10:00-10:30 De Forest Audions

WABC	WCAU	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAU
WKRC	WGHP	WBBM	WOWO	KMOX
KMBC	KOIL	WSPD	WICC	WHK
WLBW				

**10:30-11:00 Come To The Fair**

WABC	WCAU	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAIU
WKRC	WGHP	WBBM	WOWO	KMOX
KMBC	KOIL	WSPD	WICC	WHK
WLBW				

**9:30-10:00 Real Folks**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WJR	WLW	KYW	KWK
WREN				

**Monday****6:00-6:25 Waldorf-Astoria Dinner Music**

WEAF	WRC	WCAE	WWJ	WHO
WTAG				

**7:00-7:30 Savings Bank Hour**

WEAF	WEEI	WTIC	WJAR	WTAG
WCSH	WGY	WGR		

**7:30-7:45 "The World Today" by James G. MacDonald**

WEAF	WLIT	WGR	WSAI	WOC
KVOO	WFAA			

**7:45-8:00 Physical Culture Prince**

WEAF	WLIT	WGR	WWJ	KYW
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**7:30-9:00 Roxy and his Gang**

WJZ	WBZ	WBZA	WHAM	KDKA
KYW	KWK	WJR	WSM	WSB
WEBC				

**8:00-8:30 Ceco Couriers**

WOR	WFAN	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAIU
WKRC	WGHP	WMAQ	WOWO	KMOX
KMBC	KOIL			

**8:30-9:30 A. & P. Gypsies**

WEAF	WEEI	WTIC	WJAR	WCSH
WLIT	WGY	WCAE	WTAM	WWJ
WSAI	WGN	KSD	WDAF	WRC

**8:30-9:00 United Choral Singers**

WOR	WFAN	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAIU
WKRC	WGHP	WMAQ	WOWO	KMOX
KMBC	KOIL			

**9:00-9:30 Lowney Radio Hour**

WOR	WCAU	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAIU
WKRC	WGHP	WMAQ	WOWO	KMOX
KMBC	WSPD	WICC	WHK	WLBW

**9:30-10:00 General Motors Family Party**

WEAF	WEEI	WTIC	WJAR	WCSH
WLIT	WTAG	WRC	WGY	WGR
WCAE	WTAM	WWJ	WSAI	WGN
WTMJ	KSD	WCCO	WOC	WOW
WDAF	KVOO	WFAA	KPRC	WOAI
WHAS	WSM	WSB	WBT	WJAX

**9:30-10:00 Warner Bros. Vitaphone Jubilee**

WOR	WCAU	WNAC	WEAN	WFBL
WMAK	WCAO	WJAS	WADC	WAIU
WKRC	WGHP	WMAQ	WOWO	KMOX
KMBC	WSPD	WICC	WHK	WLBW

**10:30-11:00 National Grand Opera**

WEAF	WEEI	WTIC	WFI	WGY
WGR	WCAE	WWJ	WTMJ	KSD
WOC	WHAS	KOA	WMC	

**Tuesday****6:00-6:55 Waldorf-Astoria Dinner Music**

WEAF	WEEI	WTIC	WRC	WCAE
WWJ				

**7:00-7:30 Voter's Service**

WEAF	WTIC	WJAR	WTAG	WCSH
WFI	WRC	WGY	WGR	WCAE
WTMJ	KSD	WOC	WHO	WHAS
WSM	WBT	WSAI	WOC	KOA
WEBC	WMC	WSM		

**7:30-8:00 Soconyland Sketches**

WEAF	WEEI	WTIC	WJAR	WTAG
WCSH	WGY	WGR		

**7:30-8:00 In Memory's Garden**

WJZ	WJR	WBZ	WBZA	WLW
KOA				

**8:00-9:00 The Mediterraneans**

WJZ	KWK	WHAM	KDKA
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**8:00-8:30 The Sealy Air Weavers**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WJR	WLW	KYW	KWR
WREN	KVOO	WFAA	KPRC	WOAI
KOA	WRAM			

**9:00-9:30 Three-in-One Theatre**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WLW	KYW	KWK	WREN

**9:00-10:00 Eveready Hour**

WEAF	WEEI	WJAR	WFI	WRC
WGY	WGR	WCAE	WTAM	WWJ
WSAI	WGN	KSD	WCCO	WHO
WDAF	WHAS	WSM	WMC	WSB

**9:30-10:00 Dutch Masters Minstrel**

WJZ	WTMJ	WBZ	WBZA	WBAL
WHAM	KDKA	WLW	KYW	WREN

**10:00-11:00 Works of Great Composers**

WJZ	KYW	WRC
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**10:00-10:30 Clicquot Club Eskimos**

WEAF	WEEI	WTIC	WJAR	WCSH
WFI	WRC	WGY	WCAE	WTAM
WWJ	WSAI	WGN	WTMJ	KSD
WCCO	WOC	WMC	WHO	WOW
WDAF	KVOO	WFAA	KPRC	WOAI
WHAS	WSM	WSB	WBT	KOA

**11:00-12:00 Ben Bernie's Hotel Roosevelt Orchestra**

WEAF	WCAE	WWJ	WTMJ	KOA
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## Wednesday

- 6:00-6:25 Waldorf-Astoria Dinner Music**  
 WEAJ WEEI WTIC WRC WCAE
- 7:30-8:00 La Touraine Tableaux**  
 WEAJ WEEI WTIC WJAR WTAG  
 WCSH WGY WGR WCAE WWJ  
 WTAM
- 7:45-8:00 Frederic William Wile**  
 WRC WIZ WBAL KDKA WLW  
 WJR KWK
- 8:00-9:00 American Magazine—Home Companion Hour**  
 WEAJ WEEI WTIC WJAR WTAG  
 WCSH WGY WGR WCAE WLIT  
 WRC WWJ WSAI KYW KSD  
 WOC WHO WOW WDAF
- 8:30-9:00 Sylvania Foresters**  
 WJZ KDKA KYW WBZ WBZA
- 9:00-9:30 Smith Brothers**  
 WJZ WBZ WBZA WBAL WHAM  
 WLW WJR KYW KWK WREN  
 KDKA
- 9:00-9:30 Ipana Troubadours**  
 WEAJ WEEI WTIC WJAR WTAG  
 WCSH WRC WGY WGR WCAE  
 WTAM WWJ WSAI WLIB
- 9:00-9:30 NR Millionaires**  
 WOR WCAU WNAC WEAN WFBL  
 WMAK WCAO WJAS WADC WAIU  
 WKRC WGHP WMAQ WOWO KMOX  
 KMBC WSPD WICC WHK WLBW
- 9:30-10:00 La Palina Smoker**  
 WOR WCAU WNAC WEAN WFBL  
 WMAK WCAO WJAS WADC WAIU  
 WKRC WGHP WMAQ WOWO KMOX  
 KMBC WSPD WICC WHK WLB
- 9:30-10:30 Palmolive Hour**  
 WEAJ WJAX WSM WMC WSB  
 WBT WEEI WRC WSAI WTIC  
 WGY WGN WDAF WJAR WGR  
 KSD KVOO WTAG WCAE WOC  
 WFAA WCSH WTAM WHO KPRC  
 WLIT WWJ WOW WOAI KOA  
 WTMJ WCCO WHAS
- 10:00-10:30 Kolster Radio Hour**  
 WOR WFBL WADC WOWO WMAF  
 WCAU WMAK WKRC KMOX WICC  
 WNAC WCAO WGHP KMBC WHK  
 WEAN WJAS WMAQ WSPD
- 10:30-11:00 United Military Band**  
 WOR WMAK WAIU WOWO WSPD  
 WCAU WCAO WKRC KMOX WMAF  
 WNAC WJAS WGHP KMBC WICC  
 WEAN WADC WMAQ KOIL WHK  
 WFBL
- 11:00-12:00 Hal Kemp's Hotel Manger Orchestra**  
 WEAJ WHO WOC KSD

## Thursday

- 6:00-6:55 Waldorf-Astoria Dinner Music**  
 WEAJ WRC WCAE WWJ WEEI
- 7:30-8:00 Coward Comfort Hour**  
 WEAJ WEEI WTIC WJAR WTAG  
 WCSH
- 8:00-8:30 The Song Shop**  
 WEAJ WTIC WJAR WTAG WCSH  
 WFI WRC WGY WGR WCAE  
 WTAM WWJ WSAI WTMJ WRHM  
 WOC WHO WOW WDAF KOA
- 8:30-9:00 Hoover Sentinels**  
 WEAJ WEEI WTAM WFI WRC  
 WGY WCAE WWJ WSAI WBEH  
 KSD WOC WHO WOW KVOO  
 WFAA WHAS WSM WMC WSB  
 WDAF WDBC
- 8:30-9:00 Champion Sparkers with Vaughn de Heafh**  
 WJZ WBZ WBZA WBAL WHAM  
 KDKA WLW WJR KWK WREN  
 KDKA
- 9:00-9:30 Milady's Musicians**  
 WJZ WHAM KDKA KWK
- 9:00-9:30 Seiberling Singers**  
 WEAJ WEEI WTIC WJAR WTAG  
 WCSH WFI WRC WGY WGR  
 WCAE WTAM WWJ WSAI WBEH  
 KSD WCCO WOC WHO WOW  
 WDAF WFAA KPRC KVOO  
 WHAS WSM WMC WSB
- 9:00-10:00 Sonora Phonograph Hour**  
 WABC WFAN WNAC WEAN WFBL  
 WMAK WJAS WADC WKRC WBBM  
 WGHP WOWO KMOX KMBC WSPD  
 WICC WHK WLBW
- 9:30-10:00 Swanee River**  
 WEAJ WTIC WJAR WTAG WCSH  
 WFI WRC WCAE
- 9:30-10:00 Maxwell House Hour**  
 WJZ WBZ WBZA WBAL WHAM  
 KDKA WLW WJR KYW KSD  
 WRHM WOC WHO WDAF KVOO  
 WBAP KPRC WHAS WSM WSB  
 WBT KOA WOW WBEBC WJAX
- 10:00-10:30 Michelin Hour**  
 WJZ WBZ WBZA WBAL WHAM  
 KDKA WJR KYW KWK WREN  
 WLW
- 10:00-11:00 Hank Simmons' Show Boat**  
 WABC WFAN WEAN WNAC WFBL  
 WMAK WJAS WADC WKRC WGHP  
 WBBM WOWO KMOX KMBC WSPD  
 WICC WHK WLBW KOIL
- 10:30-11:00 Palais D'Or Orchestra**  
 WEAJ WFI WGY WGR  
 WWJ WHO WOW WMC

**10:00-10:30 Halsey Stuart Hour**

WEAF	WEEI	WTIC	WJAR	WTAG
WCSH	WFI	WRC	WGY	WGR
WCAE	WWJ	WTMJ	KSD	WRHM
WOC	WFO	WOW	KVOO	WFAA
KPRC	WOAI	WHAS	WMC	WSB
WBT	WDAF	KOA	WSAI	WGN

**10:30-11:00 The Wayside Inn**

WJR	WBZ	WBZA	WBAL	WHAM
KDKA	WJR	WLW	KYW	KWK

**10:30-11:30 Palais d'or Orchestra**

WEAF	WTIC	WFI	WGY	WGR
WWJ	WHO	WOW	WMC	

**Friday****6:00-6:55 Waldorf-Astoria Dinner Music**

WEAF	WEEI	WRC	WCAE	WWJ
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**6:30-7:00 Gold Spot Pals**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WJR			

**7:30-8:00 Dixies Circus**

WJZ	WBZ	WBZA	WBAL	KDKA
WJR	WLW	KYW	WBT	WSB
WMC	WSM	WHAS		

**8:00-8:30 Interwoven Entertainers**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WLW	WJR	KYW	KWK
WREN	WBT	WSB	WMC	WSM
WHAS				

**8:00-9:00 Cities Service Orchestra**

WEAF	WEEI	WLIT	WRC	WGR
WCAE	WTAM	WWJ	WSAI	WEBH
WCCO	KSD	WOC	WOW	WDAF
KVOO	WFAA	KOA		

**8:30-9:00 The Armstrong Quakers**

WJZ	WBAL	WJR	KWK	WSB
WBZ	WHAM	WLW	WREN	WMC
WBZA	KDKA	KYW	WBT	WHAS
WRHM				

**9:00-9:30 An Evening in Paris**

WEAF	WEEI	WTIC	WRC	WGR
WCAE	WTAM	WWJ	WSAI	WEBH
WDAF	KSD	WJAR	WTAG	WCSH
WFI				

**9:00-10:00 True Story Hour**

WOR	WMAK	WAIU	WOWO	WSPD
WCAU	WCAO	WKRC	KMOX	WMAF
WNAO	WIAS	WGHP	KMBC	WICC
WEAN	WADC	WMAQ	KOIL	WHK
WFBL				

**9:00-10:00 Wrigley Review**

WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WLW	WJR	KYW	WREN
WHAS	WHAS	WSM	WMC	WSB
WBT	WRVA	WJAX	WCCO	WEBC

**9:30-10:00 Larry Brier's Tuneful Troupe**

WEAF	WLIT	WRC	WCAE	KSD
WOC	WHO	WOW		

**10:00-10:30 Stromberg-Carlson**

Sextette				
WJZ	WBZ	WBZA	WBAL	WHAM
KDKA	WJR	WLW	KYW	KWK
WREN	KOA	WBT	WSB	WSM
WHAS	WOAI	KPRC	WFAA	KVOO
WCCO	WTMJ			

**10:00-11:00 Concert Bureau Hour**

WEAF	WEEI	WTIC	WTAG	WCSH
WLIT	WRC	WGY	WCAE	WWJ
WSAI	WGN	WOC	WHO	WOW
WDAF	WFAA	KOA	WTMJ	WHAS
WMC	KSD			

**10:00-10:30 United Opera Company**

WOR	WFBL	WADC	WMAO	WSPD
WCAU	WMAK	WAIU	WOWO	WMAF
WNAO	WCAO	WKRC	KMOX	WICC
WEAN	WJAS	WGHP	KMBC	WHK

**11:00-12:00 Hotel St. Regis Orchestra**

WEAF	WCAE	WWJ	WHO	WOW
KOA				

**11:00-12:00 Slumber Music**

WJZ	WLW	WRC	WTMJ
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**Saturday****6:00-6:55 Waldorf-Astoria Dinner Music**

WEAF	WEEI	WRC	WCAE	KOA
WWJ				

**7:45-8:00 A Week of the World's Business**

WJZ	WBAL	WHAM	KDKA	WLW
KYW	KWK	KOA	WMS	WHAS
WFAA	WOC	WTMJ	WRC	

**8:00-8:30 Godfrey Ludlow, Violinist**

WJZ	WBZ	WBZA	KDKA	KWK
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**8:00-8:30 Lew White Organ Recital**

WEAF	WTIC	WCAE	WSAI	KSD
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**8:30-9:00 The Park Bench**

WEAF	WEEI	WTIC	WGY	WCAE
WWJ	WSAI	KSD	WDAF	

**9:00-10:00 Philco Hour**

WJZ	KPRC	KVOO	WOW	WHO
WOC	WCCO	WTMJ	WHAM	KYW
KWK	WBAL	WHAS	WBZ	WBZA
KDKA	WJR	WREN	KOA	WBT
WSB	WMC	WSM	WOAI	KYW

**10:00-11:00 Lucky Strike Dance Orchestra Hour**

WEAF	WGY	WOC	KOA	WJAX
WEEI	WGR	WHO	WTMJ	KSL
WTIC	WCAE	WOW	WCCO	KHQ
WJAR	WTAM	WDAF	WHAS	KGO
WTAG	WWJ	KVOO	WMC	KFI
WCSH	WSAI	WFAA	WSB	KGW
WFI	WGN	KPRC	WBT	KOMO
WRC	KSD	WOAI		

**11:00-11:30 Twin Pairs of Harmony**

WEAF	WFI	WCAE	WTAM	WWJ
KSD	WHO	WOW		

# WHEN YOUR SET GOES WRONG

## Where to Look for Trouble

By E. R. HAAN

This article tells you where you can find radio troubles, and how to cure them, whether you have an old or a new-style set, and whether the fault is in the batteries, battery eliminator, tubes, the aerial and ground system, or in the wiring and instruments of the receiver.

### KEEP YOUR A-BATTERY UP

Today most radio sets are still operated on a storage battery for filament supply, and the condition of this battery is often the cause of poor reception, so that it is necessary to examine it occasionally, in order to determine whether or not it is defective in any way. If you use a storage battery for your receiver, you should provide yourself with a battery hydrometer, which is used for testing the specific gravity of the liquid or electrolyte inside, in order to determine the condition of charge. Hydrometers used for this purpose have a weighted float inside, graduated from 1100 to 1300, the former reading indicating a completely discharged, and the latter a fully charged cell. It is best to keep the battery as fully charged as possible all the time, and it should never be allowed to drop below 1200. for it is then about half empty. Also be sure that you do not spill any of the electrolyte on the floor or get it on your clothes or hands, for it consists of a solution of sulphuric acid, which will ruin rugs and clothes, and also burn the flesh. A rubber mat should be provided under the battery to protect the floor in case some of the electrolyte runs out, which it sometimes does when the battery is being charged. The first symptom of a weak battery is usually the broadening of the signal on an oth-

erwise sharp set. Reception becomes fainter and fainter until it dies out entirely, and your efforts to increase the volume by turning up the rheostats only help temporarily. The use of trickle charges is quite popular. Although they are intended to keep the battery in a fully-charged condition at all times, they may become defective, or perhaps you are using more current from the battery than the charger can compensate for. So when in doubt, remember that the only way of telling whether or not a battery is in a well charged condition, is to test it with a hydrometer. Every radio owner should have one; they cost only fifty cents or a dollar and can be had at almost any radio shop, garage or hardware store.

### EXCESSIVE BATTERY DISCHARGE

If your battery seems to discharge too rapidly, there may be an internal short circuit between the plates, and if you suspect this, take the battery to a reputable service station for examination and repair. However, before doing this, make sure that the short circuit is not in your receiver. Carefully look over the wiring and see if there is a place where two wires have been bent accidentally so that they touch each other. The cause of excessive discharge of a battery may also be due to letting the tubes burn when the set is not in use, a mistake which many radio owners make.

### NEGLECTED WATER LEVEL

While you are examining the storage battery, see if it contains enough distilled water. The water level should always be kept about  $\frac{1}{2}$  in. above the

*(Continued on page 60)*

# The Most Wonderful Lamp in the World

## *The Valve and How It Works*

By P. B. PRIOR, Sydney, Australia

A valve is really a special kind of little electric lamp, which in the case of most types, lights up and glows quite brightly when in use.

Every valve consists of three parts:—

The Filament

The Grid

The Plate

The filament is exactly the same as the filament in an ordinary small electric lamp—the tiny, thin wire which the electric current causes to glow and give out light.

We must now, for a moment, study something of what is known as the Electron Theory.

First of all, let us try and understand what the filament really consists of. It, in common with all matter, is really composed of tiny particles called atoms; these atoms are so tiny that not even the most powerful microscope could detect them. The atom is so small that it would take more than ten millions of them, placed alongside one another, to extend one inch.

Every atom consists of thousands of still smaller particles called electrons, grouped around a nucleus or proton. The electrons are so inconceivably small that two thousand of them would weigh less than the weight of the smaller atom.

The proton, or central portion of each atom, is really a charge of positive electricity, whilst the electrons are infinitely tiny charges of negative electricity.

We next come to a remarkable phenomenon — the “evaporation” of electrons. If a metal is sufficiently heated, these electrons, or little charges of negative electricity, will “evaporate” from it. It was Edison who first dis-

covered this phenomenon. In the early days of incandescent electric lamp manufacture he noticed a peculiar action that could not be satisfactorily explained at the time. In lamps that had been in use for some time it was often found that a portion of the lamp glass became blackened. Edison's investigations convinced him that this was due to the negative electrons being thrown off from the filament with such force that they could reach the glass of the lamp bulb, at the same time carrying with them tiny particles of carbon.

It was about twenty years before this “Edison Effect,” as it was called, was applied to wireless use by the British scientist, Dr. J. A. Fleming, and from Dr. Fleming's experiments has grown the thermionic valve as we know it today.

Now let us consider the function of the plate. The plate is usually a sheath of metal curved in form of a cylinder round the filament, at a little distance from it. Now, it is a fundamental law of electricity that “like charges repel each other; unlike charges attract,” that is, two negative or two positive charges would repel each other, whilst a negative charge would attract a positive charge, and a positive charge would attract a negative charge.

So you see that if we charge the plate with positive electricity by means of a battery, there will be a steady, constant stream of electrons (negative charges) from the filament to the plate. This is actually what happens in a thermionic valve; but instead of a steady stream we have a stream regulated by the grid, as I shall now explain.

The grid usually consists of a tiny spiral wire placed round the filament,

*(Continued on page 59)*



# BREAKING DOWN THE BARS

## *What Radio Means to Men in Prison*

There is a "town" in Franklin County, O., known to many of its residents as "Thomasville," that probably has more radio fans in proportion to its population of 4,000-odd than any other town in the state. The "town" is known to the general public as the Ohio Penitentiary.

Penitentiary officials estimate there are approximately 800 radio sets in the prison, or about one set to every five prisoners. These sets have made it possible for the inmates to realize to some extent what the poet meant when he wrote: "Stone walls do not a prison make."

To the prisoners radio has proved a godsend. As one long-termer put it:

"If radio had never done anything else for the world, the happiness it has brought the boys in the pen has made it worth while."

It has made for greater contentment among the prisoners, too, according to penitentiary officials, and those prisoners who are radio fans are rarely the ones who are involved in disturbances of any sort or get into any trouble. As soon as their day in the shops or the idle house is over, and they have had supper, they are locked in their cells for the night and then they begin their nightly prowls around the country via radio.

### CRYSTALS AND HEADPHONES

Most of the sets are crystal sets, but there are a number of tube sets, ones and twos predominating. Aerials are strung along the walls of the long, dark corridors, and short lead-ins run from the aerial into cells where sets are maintained.

In spite of these disadvantages — indoor aerials, sometimes very short aerials, crystal sets, and so on — and the

added fact that the majority of sets are "home-made" by the prisoners themselves in their spare time, the reception is generally satisfactory, the prisoners say.

Since loud speakers are not permitted in the penitentiary all of the sets are equipped with headphones. But even with this comparatively primitive equipment, the boys can get "distance" very satisfactorily, they say — or at least comparative distance. Havana and Canadian stations are listed on the logs of the enthusiasts, as well as broadcasters in all sections of the United States.

And they have their favorites. Many of them like particularly their home town stations and will listen to no others. Others are "air wanderers" and flit from station to station. In some cells there are two sets and each inmate can pick his own station. In other cells there may be but one set, and then the two inmates divide the earphones and compromise on the stations.

But they have a great deal of pleasure out of it. Although some of them have not been outside the walls for years, they are able to whistle and even sing the latest musical hits, and they keep up with news of the outside world, too. Most of them "listen in" on the various broadcast religious services each Sunday.

Some have special fondness for lectures and educational broadcasts, others for music, and so on, but through the medium of the radio they are not only having much solace in their confinement but are keeping up with the world, as well.

But the radio does not always bring happiness to a prisoner. The story is

*(Continued on page 53)*

## INDEX BY FREQUENCIES AND DIAL NUMBERS

### NOTICE OF COPYRIGHT

The method of logging by wave-lengths or frequencies was devised by The Radex Press in 1924 and has been copyrighted and recopyrighted each year since that time. The arrangement of stations in groups by frequencies or wave-lengths with spaces for dial readings in connection therewith is fully covered by our copyright and all infringers will be vigorously prosecuted.

### 550 kilocycles 545.1 meters

CYY	100	Merida, Mexico
KFDY	500	Brookings, S. D.
KFJM	500	Grand Forks, N. D.
KFUO	500	St. Louis, Mo.
KFYR	500	Bismarck, N. D.
KSD	500	St. Louis, Mo.
WEAO	750	Columbus, Ohio
WGR	750	Buffalo, N. Y.
WKRC	500	Cincinnati, Ohio

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Socialist Party  
S. D. State College  
University of North Dakota  
Concordia Theological Seminary  
Hoskins-Meyer  
Pulitzer Publishing Co.  
Ohio State University  
Federal Radio Corp.  
Kodel Radio Corp.

### 560 kilocycles 535.4 meters

KFDM	500	Beaumont, Texas
KFEQ	2500	St. Joseph, Mo.
KLZ	1000	Denver, Colo.
KOAC	1000	Corvallis, Ore.
WFI	500	Philadelphia, Pa.
WLIT	500	Philadelphia, Pa.
WMBF	500	Miami Beach, Fla.
WNOX	1000	Knoxville, Tenn.
WOI	3500	Ames, Iowa

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Magnolia Petroleum Co.  
Scroggin & Co. Bank  
Reynolds Radio Co., Inc.  
State Agricultural College  
Strawbridge & Clothier  
Lit Brothers  
Fleetwood Hotel Corp.  
Sterchl Bros.  
Iowa State College

### 570 kilocycles 526.0 meters

KGKO	250	Wichita Falls, Tex.
KMTR	1000	Hollywood, Calif.
KPLA	1000	Los Angeles, Calif.
KUOM	500	Missoula, Mont.
KXA	500	Seattle, Wash.
WHA	750	Madison, Wis.
WKBN	500	Youngstown, Ohio
WMCA	500	New York City
WNYC	500	New York City
WPCC	500	Chicago, Ill.
WRM	500	Urbana, Ill.
WSMK	200	Dayton, Ohio
WSYR	250	Syracuse, N. Y.
WWNC	1000	Asheville, N. C.

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Wichita Falls Brdcastg. Co.  
KMTR Radio Corp.  
Pacific Development Radio Co.  
University of Montana  
American Radio Tel. Co.  
University of Wisconsin  
W. P. Williamson, Jr.  
Greeley Square Hotel Co.  
Dept. of Plants & Structures  
North Shore Congregational Church  
University of Illinois  
Stanley M. Krohn, Jr.  
Clive B. Meredith  
Chamber of Commerce

### 580 kilocycles 516.9 meters

CFCL	500	Toronto, Ont.
CHMA	250	Edmonton, Alta.
CHNC	500	Toronto, Ont.
CJBC	500	Toronto, Ont.
CJCA	500	Edmonton, Alta.]
CJSC	500	Toronto, Ont.
CKCL	500	Toronto, Ont.
CKNC	500	Toronto, Ont.
CKUA	500	Edmonton, Alta.
CNRE	500	Edmonton, Alta.
KGFX	200	Pierre, S. D.
KSAC	500	Manhattan, Kans.
WKAQ	500	San Juan, P. R.
WOBU	250	Charleston, W. Va.
WSAZ	250	Huntington, W. Va.
WSUI	500	Iowa City, Iowa
WTAG	250	Worcester, Mass.

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Dominion Battery Co., Ltd.  
Christian and Missionary Alliance  
Radio Research Society  
Jarvis Street Baptist Church  
The Edmonton Journal  
The Evening Telegram  
The Dominion Battery Co.  
Canadian National Carbon Co.  
University of Alberta  
Canadian National Railways  
Dana McNeil  
State Agricultural College  
Radio Corp. of Porto Rico  
Charleston Radio Brdcastg. Co.  
McKellar Electric Co.  
University of Iowa  
Telegram Publishing Co.

INDEX BY FREQUENCIES AND DIAL NUMBERS

590 kilocycles 508.2 meters

KHO 1000 Spokane, Wash.  
 WCAJ 500 Lincoln, Nebr.  
 WEEI 500 Boston, Mass.  
 WOW 1000 Omaha, Nebr.  
 WEMC 1000 Berrien Springs, Mich.

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Louis Wasmer, Inc.  
 Nebraska Wesleyan University  
 Edison Elec. Illuminating Co.  
 Woodmen of the World  
 Emmanuel Missionary College

600 kilocycles 499.7 meters

CFCH 250 Iroquois Falls, Ont.  
 KFBU 500 Laramie, Wyo.  
 KFSD 500 San Diego, Calif.  
 WCAO 250 Baltimore, Md.  
 WEBW 250 Beloit, Wis.  
 WOAN 500 Lawrenceburg, Tenn.  
 WREC 500 Memphis, Tenn.  
 WTIC 250 Hartford, Conn.

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Abitibi Power & Paper Co.  
 Bishop N. S. Thomas  
 Airfan Radio Corp.  
 Monumental Radio Co., Inc.  
 Beloit College  
 Vaughan School of Music  
 WREC, Inc.  
 Travelers Insurance Co.

610 kilocycles 491.5 meters

KFRG 1000 San Francisco, Calif.  
 WDAF 1000 Kansas City, Mo.  
 WFAN 500 Philadelphia, Pa.  
 WIP 500 Philadelphia, Pa.  
 WOO 1000 Kansas City, Mo.

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Don Lee, Inc.  
 Kansas City Star Co.  
 Keystone Broadcasting Co., Inc.  
 Gimbel Bros., Inc.  
 Unity School of Christianity

620 kilocycles 483.6 meters

KPAD 500 Phoenix, Ariz.  
 KGW 1000 Portland, Ore.  
 WDAE 1000 Tampa, Fla.  
 WDBO 1000 Orlando, Fla.  
 WLBZ 500 Dover-Foxcroft, Me.  
 WTMJ 1000 Milwaukee, Wis.

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Electrical Equipment Co.  
 Oregonian Publishing Co.  
 Tampa Publishing Co.  
 Rollins College, Inc.  
 Thompson L. Guernsey  
 Milwaukee Journal

630 kilocycles 475.9 meters

CFCT 500 Victoria, B. C.  
 CJGX 500 Yorkton, Sask.  
 CNRA 500 Moncton, N. B.  
 CYR 250 Mazatlan, Mex.  
 KFRU 500 Columbia, Mo.  
 WGBF 500 Evansville, Ind.  
 WMAL 250 Washington, D. C.  
 WOS 500 Jefferson City, Mo.

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Victoria Broadcasting Ass'n.  
 Winnipeg Grain Exchange  
 Canadian National Railways  
 Casrulo Llamas  
 Stephens College  
 Evansville on the Air, Inc.  
 M. A. Leese Co.  
 State Marketing Bureau

640 kilocycles 468.5 meters

KFI 5000 Los Angeles, Calif.  
 WAIU 5000 Columbus, Ohio

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Earle C. Anthony, Inc.  
 American Insurance Union

650 kilocycles 461.3 meters

WSM 5000 Nashville, Tenn.

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National Life & Accident Ins. Co.

660 kilocycles 454.3 meters

WAAW 500 Omaha, Nebr.  
 WEAJ 50000 New York City

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Omaha Grain Exchange  
 National Broadcasting Co., Inc.

670 kilocycles 447.5 meters

WMAQ 5000 Chicago, Ill.

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Chicago Daily News, Inc.

680 kilocycles 440.9 meters

KPO 5000 San Francisco, Cal.  
 WPTF 5000 Raleigh, N. C.

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Hale Bros. & The Chronicle  
 Durham Life Insurance Co.

INDEX BY FREQUENCIES AND DIAL NUMBERS

690 kilocycles 434.5 meters

CFAC 500 Calgary, Alta.  
 CFCN 1800 Calgary, Alta.  
 CHCA 250 Calgary, Alta.  
 CJCJ 250 Calgary, Alta.  
 CKCO 100 Ottawa, Ont.  
 CNRC 500 Calgary, Alta.  
 CNRO 500 Ottawa, Ont.  
 NAA 1000 Arlington, Va.

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The Calgary Herald  
 W. W. Grant, Ltd.  
 Alvertan Publishing Co., Ltd.  
 Radio Service & Repair Shop  
 Dr. G. M. Geldert  
 Canadian National Railways  
 Canadian National Railways  
 U. S. Navy

700 kilocycles 428.3 meters

KFVD 250 Culver City, Calif.  
 WLW 50000 Cincinnati, Ohio

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W. J. & C. I. McWhinnie  
 Crosley Radio Corp.

710 kilocycles 422.3 meters

CYO 100 Mexico City  
 WOR 5000 Newark, N. J.

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M. Y. Zetina  
 L. Bamberger & Co.

720 kilocycles 416.4 meters

WGN 15000 Chicago, Ill.  
 WLIB 15000 Chicago, Ill.

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Chicago Tribune  
 Liberty Weekly, Inc.

730 kilocycles 410.7 meters

CFCF 1650 Montreal, Que.  
 CHLS 50 Vancouver, B. C.  
 CHYC 750 Montreal, Que.  
 CKAC 1200 Montreal, Que.  
 CKCD 50 Vancouver, B. C.  
 CKFC 50 Vancouver, B. C.  
 CKMO 50 Vancouver, B. C.  
 CKWX 100 Vancouver, B. C.  
 CNRM 1650 Montreal, Que.

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Canadian Marconi Co.  
 W. G. Hassell  
 Northern Electric Co.  
 La Presse Publishing Co.  
 Vancouver Daily Province  
 United Church of Canada  
 Sprott-Shaw Radio Co.  
 A. Holstead & Wm. Hanlon  
 Canadian National Railways

740 kilocycles 405.2 meters

KMMJ 1000 Clay Center, Neb.  
 WSB 10000 Atlanta, Ga.

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The M. M. Johnson Co.  
 Atlanta Journal Co.

750 kilocycles 399.8 meters

CYJ 2000 Mexico City  
 CYL 500 Mexico City  
 PWX 500 Havana, Cuba  
 WCX 5000 Detroit, Mich.  
 WJR 5000 Detroit, Mich.

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R. Ascarraga  
 Cuban Telephone Co.  
 Detroit Free Press  
 WJR, Inc.

760 kilocycles 394.5 meters

WEW 1000 St. Louis, Mo.  
 WJZ 30000 New York City

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St. Louis University  
 Radio Corp. of America, Inc.

770 kilocycles 389.4 meters

KFAB 5000 Lincoln, Nebr.  
 WBBM 25000 Chicago, Ill.

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Nebr. Buick Automobile Co.  
 Atlas Investment Co.

780 kilocycles 384.4 meters

CKY 500 Winnipeg, Manitoba  
 CNRW 500 Winnipeg, Man.  
 KELW 500 Burbank, Calif.  
 KNRC 500 Santa Monica, Calif.  
 WBSO 100 Wellesley Hills, Mass.  
 WMC 500 Memphis, Tenn.  
 WPOR 500 Norfolk, Va.  
 WSEA 500 Portsmouth, Va.  
 WTAR 500 Norfolk, Va.

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Manitoba Telephone System  
 Canadian National Railways  
 Earl L. White  
 Pickwick Brdcastg. Corp.  
 Babson's Statistical Organization.  
 Memphis Commercial-Appeal  
 Reliance Electric Co.  
 Virginia Beach Brdcastg. Co.  
 Reliance Electric Co., Inc.

INDEX BY FREQUENCIES AND DIAL NUMBERS

790 kilocycles 379.5 meters

KGO 10000 Oakland, Calif.  
WGY 50000 Schenectady, N. Y.

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General Electric Co.  
General Electric Co.

800 kilocycles 347.8 meters

CYH 100 Mexico City  
KTHS 1000 Hot Springs, Ark.  
WBAP 50000 Fort Worth, Tex.  
WSAI 5000 Cincinnati, Ohio

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C. de Tarnava  
Chamber of Commerce  
Carter Publications, Inc.  
Crosley Radio Corp., Lessee

810 kilocycles 370.2 meters

WCCO 10000 Minneapolis-St. Paul  
WPCB 500 Jersey City, N. J.

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Washburn-Crosby Co.  
Concourse Radio Corp.

820 kilocycles 365.6 meters

WHAS 10000 Louisville, Ky.

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Courier-Journal & Times

830 kilocycles 361.2 meters

HHK 1000 Port au Prince, Haiti  
KOA 12500 Denver, Colo.

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Republic of Haiti  
General Electric Co.

840 kilocycles 356.9 meters

CFCA 500 Toronto, Ont.  
CHCT 1000 Red Deer, Alta.  
CJBC 500 Toronto, Ont.  
CKLC 1000 Red Deer, Alta.  
CKOW 500 Toronto, Ont.  
CNRT 500 Toronto, Ont.

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Star Publishing & Ptg. Co.  
C. F. Tull & Ardern, Ltd.  
Jarvis Street Baptist Church  
Alberta Pacific Grain Co.  
Nestle's Food Co.  
Canadian National Railways

850 kilocycles 352.7 meters

KFOZ 1000 Hollywood, Calif.  
KWKH 20000 Shreveport, La.  
WWL 5000 New Orleans, La.

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Taft Radio & Brdcastg. Co.  
W. K. Henderson  
Loyola University

860 kilocycles 348.6 meters

CZE 500 Mexico City  
WABC 5000 New York City  
WBOQ 5000 New York City  
2OK 100 Havana, Cuba  
7SR 500 Elia, Cuba

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Department of Education  
Atlantic Broadcasting Corp.  
Atlantic Broadcasting Corp.  
Merio G. Velez  
Salvador Rionda

870 kilocycles 344.6 meters

WENR 5000 Chicago, Ill.  
WLS 5000 Chicago, Ill.

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Great Lakes Brdcastg. Co.  
Sears, Roebuck & Co.

880 kilocycles 340.7 meters

CHCS 10 Hamilton, Ont.  
CHML 50 Hamilton, Ont.  
CHRC 5 Quebec, Que.  
CKCI 22.5 Quebec, Que.  
CKCV 50 Quebec, Que.  
CKOC 100 Hamilton, Ont.  
CNRO 50 Quebec, Que.  
KFKA 500 Greeley, Colo.  
KLX 500 Oakland, Calif.  
KPOF 500 Denver, Colo.  
WCOG 500 Columbus, Miss.  
WGBI 250 Scranton, Pa.  
WQAN 250 Scranton, Pa.  
6KW 100 Tuinucu, Cuba

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The Hamilton Spectator  
Maple Leaf Radio Co.  
E. Fontaine  
LeSoleil  
G. A. Vandry  
Wentworth Radio Supply Co.  
Canadian National Railways  
State Teachers College  
Tribune Publishing Co.  
Pillar of Fire, Inc.  
Crystal Oil Co.  
Scranton Broadcasters, Inc.  
Scranton Times  
Frank H. Jones

## INDEX BY FREQUENCIES AND DIAL NUMBERS

### 890 kilocycles 336.9 meters

CFBO	50	St. John, N. B.
CYC	50	Vera Cruz, Mex.
KGJF	250	Little Rock, Ark.
WJAR	250	Providence, R. I.
WMMN	250	Fairmont, W. Va.
KPNF	500	Shenandoah, Iowa
KUSD	500	Vermillion, S. D.
WGST	250	Atlanta, Ga.
WMAZ	250	Macon, Ga.
WNAZ	1000	Yankton, S. D.

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C. A. Munro, Ltd.  
M. A. Fernandez  
Church of the Nazarene  
The Outlet Co.  
Holt Rowe Novelty Co.  
Henry Field Seed Co.  
University of South Dakota  
Georgia School of Technology  
Mercer University  
Dakota Radio Apparatus Co.

### 900 kilocycles 333.1 meters

KGBU	500	Ketchikan, Alaska
KHJ	1000	Los Angeles, Cal.
KSEI	250	Pocatello, Idaho
WFBL	750	Syracuse, N. Y.
WFLA	1000	Clearwater, Fla.
WKY	1000	Oklahoma City
WMLA	1000	Stevens Pt., Wis.
WBAK	750	Buffalo, N. Y.
WSUN	1000	St. Petersburg, Fla.

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Alaska Radio & Service Co.  
Don Lee, Inc.  
KSEI Broadcasting Assn.  
The Onondaga Co., Inc.  
Chamber of Commerce  
WKY Radiophone Co.  
Wisconsin Dept. of Markets  
WMAK Brdcstg. Station, Inc.  
Chamber of Commerce

### 910 kilocycles 329.6 meters

CFOC	500	Saskatoon, Sask.
CJGC	500	London, Ont.
CJHS	250	Saskatoon, Sask.
CNRS	500	Saskatoon, Sask.

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The Electric Shop  
Free Press Ptg. Co.  
Radio Service, Ltd.  
Canadian National Railways

### 920 kilocycles 325.9 meters

CYX	500	Mexico City
KOMO	1000	Seattle, Wash.
KPRC	1000	Houston, Texas
WAAF	500	Chicago, Ill.
WWJ	1000	Detroit, Mich.

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El Excelsior  
Fisher's Blend Station  
Houston Printing Co.  
Drovers Journal Publishing Co.  
The Detroit News

### 930 kilocycles 322.4 meters

CHNS	500	Halifax, N. S.
CYO	100	Tampico, Mex.
KFWI	500	San Francisco, Calif.
KFWM	500	Oakland, Calif.
KGBY	500	Columbus, Nebr.
KGBZ	500	York, Nebr.
KGCH	500	Wayne, Nebr.
KGDW	500	Humboldt, Nebr.
KGES	500	Grand Island, Nebr.
KMA	500	Central City, Nebr.
KMA	500	Shenandoah, Iowa
WBRC	500	Birmingham, Ala.
WDBJ	250	Roanoke, Va.
WIBG	50	Elkins Park, Pa.

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Northern Elec. Co.-Halifax Herald  
Cipriano Sagon S. en C.  
Radio Entertainments, Inc.  
Oakland Educational Society  
Ervin Taddiken  
Federal Live Stock Remedy Co.  
Farmers & Merchants Radio Corp.  
Frank J. Rist  
Hotel Yancey  
Central Radio Electric Co.  
May Seed & Nursery Co.  
Birmingham Broadcasting Co.  
Richardson-Wayland Elec. Corp.  
St. Pauls P. E. Church

### 940 kilocycles 319.0 meters

KFEL	250	Denver, Colo.
KFXF	250	Denver, Colo.
KGU	500	Honolulu, Hawaii
KOIN	1000	Portland, Ore.
WCBS	500	Portland, Maine
WFIW	1000	Hopkinsville, Ky.

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Eugene P. O'Fallon, Inc.  
Pikes Peak Brdcstg. Co.  
Marlon A. Mulrony  
KOIN, Inc.  
Congress Square Hotel Co.  
The Acme Mills, Inc.

### 950 kilocycles 315.6 meters

KFWB	1000	Los Angeles, Calif.
KGHL	500	Billings, Mont.
KLDS	1000	Independence, Mo.
KMBC	1000	Independence, Mo.
KPSN	1000	Pasadena, Calif.
WHB	1000	Kansas City, Mo.
WRC	500	Washington, D. C.
2RK	20	Havana, Cuba

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Warner Bros. Broadcasting Corp.  
Northwestern Auto Supply Co.  
Church of Latter Day Saints  
Midland Broadcasting Co.  
Pasadena Star-News  
Sweeney Automobile School  
Radio Corp. of America  
Raoul Karman



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1060 kilocycles 282.8 meters

KWJJ 500 Portland, Ore.  
 WBAL 5000 Baltimore, Md.  
 WJAG 500 Norfolk, Nebr.  
 WTIC 5000 Hartford, Conn.

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Wilbur Jerman  
 Consolidated Gas, Elec. & Pwr. Co.  
 Norfolk Daily News  
 Travelers Insurance Co.

1070 kilocycles 280.2 meters

WAAT 300 Jersey City, N. J.  
 WCAZ 100 Carthage, Ill.  
 WDZ 100 Tuscola, Ill.  
 WEAR 1000 Cleveland, Ohio  
 WTAM 3500 Cleveland, Ohio

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Bremer Broadcasting Corp.  
 Carthage College  
 James L. Bush  
 WTAM and WEAR, Inc.  
 WTAM and WEAR, Inc.

1080 kilocycles 277.6 meters

WBT 10000 Charlotte, N. C.  
 WCBD 5000 Zion, Ill.  
 WMBI 5000 Chicago, Ill.

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C. C. Coddington  
 Wilbur Glenn Voliva  
 Moody Bible Institute

1090 kilocycles 275.1 meters

CYB 500 Mexico City  
 KMOX 5000 St. Louis, Mo.  
 2UF 10 Havana, Cuba

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J. J. Reynosa  
 Voice of St. Louis  
 Benito V. Ferro

1100 kilocycles 272.6 meters

KJBS 100 San Francisco, Cal.  
 WLWL 5000 New York City  
 WPG 5000 Atlantic City, N. J.

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Julius Brunton & Sons Co.  
 Missionary Society of St. Paul  
 Municipality of Atlantic City

1110 kilocycles 270.1 meters

KSOO 1000 Sioux Falls, S. D.  
 WRVA 5000 Richmond, Va.  
 2TW 20 Havana, Cuba

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Sioux Falls Broadcast Assn.  
 Larus & Bros. Co., Inc.  
 Roberto E. Ramirez

1120 kilocycles 267.7 meters

CFJC 15 Kamloops, B. C.  
 CFMC 20 Kingston, Ont.  
 CFRC 500 Kingston, Ont.  
 CHGS 25 Summerside, P. E. I.  
 CJOC 50 Lethbridge, Alta.  
 CKPR 50 Midland, Ont.  
 KFSG 500 Los Angeles, Cal.  
 KMIC 500 Inglewood, Calif.  
 KRSC 50 Seattle, Wash.  
 KUT 500 Austin, Texas  
 WBAK 500 Harrisburg, Pa.  
 WCOA 500 Pensacola, Fla.  
 WFBR 250 Baltimore, Md.  
 WHAD 250 Milwaukee, Wis.  
 WISN 250 Milwaukee, Wis.  
 WTAW 500 College Station, Texas

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N. S. Dagleish & Sons  
 Monarch Battery Co.  
 Queen's University  
 R. T. Holman, Ltd.  
 J. E. Palmer  
 E. O. Swan  
 Echo Park Evang. Assn.  
 James R. Fouch  
 Radio Sales Corp.  
 University of Texas  
 Penna. State Police  
 City of Pensacola  
 Baltimore Radio Shop  
 Marquette University  
 Evening Wisconsin Co.  
 Agricultural & Mech. College

1130 kilocycles 265.3 meters

CYF 100 Oaxaca, Mex.  
 KFKB 5000 Milford, Kansas  
 KSL 5000 Salt Lake City  
 WOV 1000 Secaucus, N. J.

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F. Zonillo  
 Dr. J. R. Brinkley  
 Radio Service Corp. of Utah  
 International Brdcstg. Corp.

1140 kilocycles 263.0 meters

KVOO 5000 Tulsa, Okla.  
 WAPI 5000 Auburn, Ala.

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Southwestern Sales Corp.  
 Alabama Polytechnic Institute

1150 kilocycles 260.7 meters

KGDM 10 Stockton, Calif.  
 WHAM 5000 Rochester, N. Y.  
 6BY 200 Cienfuegos, Cuba

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E. F. Peffer  
 Stromberg-Carlson Tel. Mfg. Co.  
 Jose Ganduxe



INDEX BY FREQUENCIES AND DIAL NUMBERS

1160 kilocycles 258.5 meters

WEAN 500 Providence, R. I.  
 WOWO 5000 Ft. Wayne, Ind.  
 WWVA 5000 Wheeling, W. Va.

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The Shepard Stores  
 Main Auto Supply Co.  
 West Virginia Brdcastg. Corp.

1170 kilocycles 256.3 meters

KTNT 5000 Muscatine, Iowa  
 WCAU 5000 Philadelphia, Pa.  
 20L 100 Havana, Cuba

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Norman Baker  
 Universal Broadcasting Co.  
 Oscar C. Orta

1180 kilocycles 254.1 meters

KEX 5000 Portland, Ore.  
 KOB 5000 State College, N. M.  
 WGBS 500 New York City

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Western Broadcasting Co.  
 College of Agriculture  
 Gimbel Bros., Inc.

1190 kilocycles 252.0 meters

WOAI 5000 San Antonio, Texas  
 WRR 5000 Dallas, Texas

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Southern Equipment Co.  
 City of Dallas

1200 kilocycles 249.9 meters

KFHA 50 Gunnison, Colo.  
 KFJB 100 Marshalltown, Iowa  
 KFKZ 50 Kirksville, Mo.  
 KFWC 100 Ontario, Calif.  
 KFWF 100 St. Louis, Mo.  
 KGCU 100 Mandan, N. Dak.  
 KGDE 50 Barrett, Minn.  
 KGDY 15 Oldham, S. Dak.  
 KGEK 50 Yuma, Colo.  
 KGEN 100 El Centro, Calif.  
 KGEW 100 Fort Morgan, Colo.  
 KGFK 50 Hallock, Minn.  
 KGY 50 Lacey, Wash.  
 KMJ 100 Fresno, Calif.  
 KPCC 50 Pasadena, Calif.  
 KSMR 100 Santa Maria, Calif.  
 KVOS 250 Bellington, Wash.  
 KWG 100 Stockton, Calif.  
 WABI 100 Bangor, Maine  
 WABZ 50 New Orleans, La.  
 WBBW 100 Norfolk, Va.  
 WBBY 75 Charleston, S. C.  
 WBBZ 100 Ponca City, Okla.  
 WCAT 100 Rapid City, S. Dak.  
 WCAX 100 Burlington, Vt.  
 WCLO 100 Kenosha, Wis.  
 WEPS 100 Gloucester, Mass.  
 WFBC 50 Knoxville, Tenn.  
 WFBE 100 Cincinnati, Ohio  
 WHBC 10 Canton, Ohio  
 WHBY 50 West De Pere, Wis.  
 WIBX 100 Utica, N. Y.  
 WJAM 100 Waterloo, Iowa  
 WJBC 100 La Salle, Ill.  
 WJBL 100 Decatur, Ill.  
 WJBW 30 New Orleans, La.  
 WKBE 100 Webster, Mass.  
 WKJC 100 Lancaster, Pa.  
 WLAP 30 Louisville, Ky.  
 WLBG 100 Petersburg, Va.  
 WLMAY 100 St. Louis, Mo.  
 WNBO 15 Washington, Pa.  
 WNBW 5 Carbondale, Pa.  
 WNBX 10 Springfield, Vt.  
 WPRC 100 Harrisburg, Pa.  
 WQBJ 65 Clarksburg, W. Va.  
 WQBZ 60 Weirton, W. Va.  
 WRAF 100 La Porte, Ind.  
 WRBL 50 Columbus, Ga.  
 WRJN 100 Racine, Wis.  
 WWAE 100 Hammond, Ind.  
 2BB 15 Havana, Cuba

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Western College of Colorado  
 Marshall Electric Co.  
 State Teachers College  
 James R. Fouch  
 St. Louis Truth Center, Inc.  
 Mandan Radio Association  
 Jaren Drug Co.  
 J. Albert Loesch  
 Beehler Elec. Equipment Co.  
 E. R. Irely and F. M. Bowles  
 City of Fort Morgan  
 Kittson County Enterprise  
 St. Martin's College  
 The Fresno Bee  
 Pasadena Presbyterian Church  
 Santa Maria Valley R. R. Co.  
 L. Kessler  
 Portable Wireless Tel. Co.  
 First Universalist Church  
 Coliseum Place Baptist Church  
 Ruffner Junior High School  
 Washington Light Infantry  
 C. L. Carrell  
 State School of Mines  
 University of Vermont  
 C. E. Whitmore  
 Matheson Radio Co., Inc.  
 First Baptist Church  
 Park View Hotel  
 St. John's Catholic Church  
 St. Norbert's College  
 WIBX, Inc.  
 Waterloo Broadcasting Co.  
 Hummer Furniture Co.  
 Wm. Gushard Dry Goods Co.  
 Charles C. Carlson, Jr.  
 K. & B. Electric Co.  
 Kirk Johnson & Co.  
 American Brdcastg. Corp. of Ky.  
 Robert Allen Gamble  
 Kingshighway Pres. Church  
 John Brownlee Spriggs  
 Home Cut Glass & China Co.  
 First Congregational Church  
 Wilson Printing & Radio Co.  
 John Raikes  
 J. H. Thompson  
 The Radio Club, Inc.  
 R. E. Martin  
 Racine Broadcasting Corp.  
 Dr. George F. Courier  
 Bernardo Barrie

INDEX BY FREQUENCIES AND DIAL NUMBERS

1210 kilocycles 247.8 meters

CFCO	25	Chatham, Ont.
CFNB	50	Fredericton, N. B.
CHWBK	5	Chilliwack, B. C.
CKMC	5	Cobalt, Ont.
CKPC	25	Preston, Ont.
KDLR	100	Devils Lake, N. D.
KFDX	100	Shreveport, La.
KFEY	10	Kellogg, Idaho
KFOR	100	Lincoln, Nebr.
KFVS	100	Cape Girardeau, Mo.
KGCR	100	Brookings, S. D.
KGDP	10	Pueblo, Colo.
KPCB	100	Seattle, Wash.
KPO	100	Seattle, Wash.
KWEA	100	Shreveport, La.
WBAX	100	Wilkes-Barre, Pa.
WCBS	100	Springfield, Ill.
WCOH	100	Greenville, N. Y.
WCRW	100	Chicago, Ill.
WDWF	100	Cranston, R. I.
WEBE	100	Cambridge, Ohio
WEBQ	50	Harrisburg, Ill.
WEDC	100	Chicago, Ill.
WFCI	100	Pawtucket, R. I.
WGBB	100	Freeport, N. Y.
WGCM	100	Gulfport, Miss.
WHBF	100	Rock Island, Ill.
WHBU	100	Anderson, Ind.
WIBA	100	Madison, Wis.
WINR	100	Bay Shore, N. Y.
WJBI	100	Red Bank, N. J.
WJBU	100	Lewisburg, Pa.
WJBY	50	Gadsden, Ala.
WLBV	100	Mansfield, Ohio
WLCI	50	Ithaca, N. Y.
WLSI	100	Cranston, R. I.
WMAN	50	Columbus, Ohio
WMBG	100	Richmond, Va.
WMBR	100	Tampa, Fla.
WOCL	25	Jamestown, N. Y.
WOMT	100	Manitowoc, Wis.
WRBQ	100	Greenville, Miss.
WRBU	100	Gastonia, N. C.
WSBC	100	Chicago, Ill.
WSIX	100	Springfield, Tenn.
WTAX	50	Streator, Ill.
WTAZ	150	Richmond, Va.

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Western Ontario "Better Radio" club  
 James S. Neill & Sons  
 Chilliwack Brdcstg. Co., Ltd.  
 R. L. MacAdam  
 Wallace Russ  
 Radio Electric Co.  
 First Baptist Church  
 Union High School  
 Howard A. Shuman  
 Hirsch Battery & Radio Co.  
 Cutler's Radio Brdcstg. Service  
 Boy Scouts of America  
 Pacific Coast Biscuit Co.  
 Archie Taft & Louis Wasmer  
 William E. Antony  
 John H. Stenger, Jr.  
 H. L. Dewing & Chas. Messter  
 Westchester Brdcstg. Corp.  
 Clinton R. White  
 Dutee W. Flint  
 Roy W. Waller  
 Tate Radio Co.  
 Emil Denmark, Inc.  
 Frank Crook, Inc.  
 Harry H. Carman  
 Gulf Coast Music Co.  
 Bardsley Specialty Co.  
 Citizens Bank  
 Capital Times-Strand Theatre  
 Radiotel Mfg. Co., Inc.  
 Robert S. Johnson  
 Bucknell University  
 Electric Construction Co.  
 Mansfield Broadcasting Assn.  
 Lutheran Assn. of Ithaca  
 The Lincoln Studios, Inc.  
 W. E. Heskitt  
 Havens & Martin, Inc.  
 F. J. Reynolds  
 A. E. Newton  
 Mikadow Theatre  
 J. Pat Scully  
 A. J. Kirby Music Co.  
 World Battery Co., Inc.  
 638 Tire & Vulcanizing Co.  
 Williams Hardware Co.  
 W. Reynolds & T. J. McGuire

1220 kilocycles 245.8 meters

KFKU	1000	Lawrence, Kans.
WCAD	500	Canton, N. Y.
WCAE	500	Pittsburgh, Pa.
WREN	1000	Lawrence, Kans.

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University of Kansas  
 St. Lawrence University  
 Gimbel Bros., Inc.  
 Jenny Wren Co.

1230 kilocycles 243.8 meters

KFIO	100	Spokane, Wash.
KFQD	100	Anchorage, Alaska
KYA	1000	San Francisco, Cal.
WBIS	500	Boston, Mass.
WCWK	500	Ft. Wayne, Ind.
WFBM	500	Indianapolis, Ind.
WNAC	500	Boston, Mass.
WFSO	500	State College, Pa.
WSBT	500	South Bend, Ind.

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North Central High School  
 Anchorage Radio Club  
 Pacific Broadcasting Corp.  
 The Shepard Stores  
 Chester W. Keen  
 Indianapolis Power & Light Co.  
 The Shepard Stores  
 Pennsylvania State College  
 South Bend Tribune

1240 kilocycles 241.8 meters

KFQB	1000	Ft. Worth, Texas
WGHP	750	Detroit, Mich.
WIOD	1000	Miami Beach, Fla.
WJAD	1000	Waco, Texas
WQAM	750	Miami, Fla.
WRBC	500	Valparaiso, Ind.

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W. B. Fishburn, Inc.  
 George Harrison Phelps, Inc.  
 Isle of Dreams Brdcstg. Co.  
 Frank P. Jackson  
 Electrical Equipment Co.  
 Immanuel Lutheran Church

INDEX BY FREQUENCIES AND DIAL NUMBERS

1250 kilocycles 239.9 meters

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KEJK 500 Los Angeles, Cal.  
 KFAU 1000 Boise, Idaho  
 KFMX 1000 Northfield, Minn.  
 KRON 1000 Long Beach, Cal.  
 KXL 500 Portland, Ore.  
 WAAM 250 Newark, N. J.  
 WCAL 1000 Northfield, Minn.  
 WGCP 500 Newark, N. J.  
 WGMS 1000 St. Paul-Minneapolis  
 WLB 1000 Minneapolis, Minn.  
 WODA 1000 Paterson, N. J.  
 WRHM 1000 Minneapolis, Minn.

R. S. MacMillan  
 Independent School District  
 Carleton College  
 Nichols & Warinner, Inc.  
 KXL Broadcasters  
 WAAM, Inc.  
 St. Olaf College  
 May Radio Broadcast Corp.  
 Washburn-Crosby Co.  
 University of Minnesota  
 Richard E. O'Dea  
 Rosedale Hospital Co., Inc.

1260 kilocycles 238.0 meters

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KOIL 1000 Council Bluffs, Iowa  
 KRGV 500 Harlingen, Texas  
 KWWG 500 Brownsville, Texas  
 WJAX 1000 Jacksonville, Fla.  
 WLBW 500 Oil City, Pa.

Mona Motor Oil Co.  
 Harlingen Music Co.  
 Chamber of Commerce  
 City of Jacksonville  
 Petroleum Telephone Co.

1270 kilocycles 236.1 meters

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KFOA 1000 Seattle, Wash.  
 KFUM 1000 Colorado Spgs., Colo.  
 KGCA 50 Decorah, Iowa  
 KTW 1000 Seattle, Wash.  
 KWLC 50 Decorah, Iowa  
 WASH 250 Grand Rapids, Mich.  
 WDSU 1000 New Orleans, La.  
 WEAI 500 Ithaca, N. Y.  
 WOOD 500 Grand Rapids, Mich.  
 WRHF 150 Washington, D. C.

Rhodes Department Store  
 W. D. Corley  
 Charles W. Greenley  
 First Presbyterian Church.  
 Luther College  
 Baxter Laundries, Inc.  
 Joseph H. Uhalt  
 Cornell University  
 Walter B. Stiles, Inc.  
 American Broadcasting Co.

1280 kilocycles 234.2 meters

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KTAB 500 Oakland, Calif.  
 WCAM 500 Camden, N. J.  
 WCAP 500 Asbury Park, N. J.  
 WDAY 1000 Fargo, N. Dak.  
 WDOD 1000 Chattanooga, Tenn.  
 WEBC 1000 Superior, Wis.  
 WOAX 500 Trenton, N. J.  
 ZLR 50 Havana, Cuba

Associated Broadcasters  
 City of Camden  
 Radio Industries Broadcast Co.  
 WDAY, Inc.  
 Chattanooga Radio Co., Inc.  
 Head of Lakes Brdcstg. Co.  
 Franklyn J. Wolff  
 Jose Lara

1290 kilocycles 232.4 meters

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KDYL 1000 Salt Lake City  
 KFUL 500 Galveston, Texas  
 KLCN 50 Blytheville, Ark.  
 K TSA 1000 San Antonio, Texas  
 WJAS 500 Pittsburgh, Pa.  
 WNBZ 10 Saranac Lake, N. Y.

Intermountain Brdcstg. Corp.  
 Will H. Ford  
 Daily Courier-News  
 Alamo Broadcast Co.  
 Pittsburgh Radio Supply House  
 Smith & Mace

1300 kilocycles 230.6 meters

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KFH 500 Wichita, Kansas  
 KFJR 500 Portland, Ore.  
 KGEF 1000 Los Angeles, Calif.  
 KTBI 1000 Los Angeles, Calif.  
 KTBR 500 Portland, Ore.  
 WBBR 1000 Roosville, N. Y.  
 WEVD 500 Woodhaven, N. Y.  
 WHAP 1000 New York City  
 WHAZ 500 Troy, N. Y.  
 WIBW 1000 Topeka, Kansas

Hotel Lassen  
 Ashley C. Dixon & Son  
 Trinity Methodist Church  
 Bible Institute of Los Angeles  
 M. E. Brown  
 Peoples Pulpit Association  
 Eugene V. Debs Memorial Fund  
 Defenders of Truth Society, Inc.  
 Rensselaer Polytechnic Institute  
 C. L. Carrell

INDEX BY FREQUENCIES AND DIAL NUMBERS

1310 kilocycles 228.9 meters

KFBK	100	Sacramento, Calif.
KFCB	100	Phoenix, Ariz.
KFGO	10	Boone, Iowa
KFIU	10	Juneau, Alaska
KFJY	100	Ft. Dodge, Iowa
KFPL	15	Dublin, Texas
KFPM	15	Greenville, Texas
KFUP	100	Denver, Colo.
KFXJ	50	Edgewater, Colo.
KFXR	100	Oklahoma City
KGEZ	100	Kalispell, Mont.
KGFI	100	San Angelo, Texas
KGGH	50	Cedar Grove, La.
KGHG	50	McGehee, Ark.
KRMD	50	Shreveport, La.
KWCR	100	Cedar Rapids, Iowa
WABY	50	Philadelphia, Pa.
WAGM	50	Royal Oak, Mich.
WBMH	100	Detroit, Mich.
WBOW	100	Terre Haute, Ind.
WBRE	100	Wilkes-Barre, Pa.
WCLS	100	Joliet, Ill.
WDAH	100	El Paso, Texas
WEBR	100	Buffalo, N. Y.
WEHS	100	Evanston, Ill.
WFBG	100	Altoona, Pa.
WFDF	100	Flint, Mich.
WFKD	50	Philadelphia, Pa.
WGAL	15	Lancaster, Pa.
WHBP	100	Johnstown, Pa.
WHFC	100	Chicago, Ill.
WIBU	100	Poyntette, Wis.
WJAK	50	Kokomo, Ind.
WKAV	50	Laconia, N. H.
WKBB	100	Joliet, Ill.
WKBC	10	Birmingham, Ala.
WKBI	50	Chicago, Ill.
WKBS	100	Galesburg, Ill.
WLBC	50	Muncie, Ind.
WLBO	100	Galesburg, Ill.
WMBL	100	Lakeland, Fla.
WNAT	100	Philadelphia, Pa.
WNBH	250	New Bedford, Mass.
WNBJ	50	Knoxville, Tenn.
WNEW	100	Newport News, Va.
WOBT	15	Union City, Tenn.
WRAW	100	Reading, Pa.
WRBI	20	Tifton, Ga.
WRBW	15	Columbia, S. C.
WRK	100	Hamilton, Ohio
WSAJ	100	Grove City, Pa.
WSMD	100	Salisbury, Md.
WTHS	20	Atlanta, Ga.

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Kimball-Upson Co.  
 Nielson Radio Supply Co.  
 Boone Biblical College  
 Alaska Elec. Light & Power Co.  
 C. S. Tunwall  
 C. C. Baxter  
 The New Furniture Co.  
 Fitzsimmons General Hospital  
 R. G. Howell  
 Exchange Ave. Baptist Church  
 Flathead Broadcasting Assn.  
 San Angelo Broadcasting Co.  
 Bates Radio & Electric Co.  
 Chas. W. McCollum  
 Robert M. Dean  
 H. E. Paar  
 John Magaldi, Jr.  
 Robert L. Miller  
 Brauns's Music House  
 Banks of Wabash Brdctg. Assn.  
 Louis G. Baltimore  
 WCLS, Inc.  
 Trinity Methodist Church  
 H. H. Howell  
 Victor C. Carlson  
 Wm. F. Gable Co.  
 Frank D. Fallain  
 Foukrod Radio Engineering Co.  
 Lancaster Electric Supply Co.  
 Johnstown Automobile Co.  
 Goodson & Wilson, Inc.  
 William C. Forrest  
 J. A. Kautz-Kokomo Tribune  
 Laconia Radio Club  
 Sanders Bros.  
 H. I. Ansley  
 Fred L. Schoenwolf  
 Permil N. Nelson  
 Donald A. Burton  
 Fred A. Trebbe, Jr.  
 Benford's Radio Studios  
 Lennig Bros. Co.  
 New Bedford Broadcasting Co.  
 Lonsdale Baptist Church  
 Virginia Brdctg. Co., Inc.  
 Pittsworth's Radio & Music Shop  
 Avenue Radio & Electric Shop  
 Kent's Furniture & Music Store  
 Paul S. Pearce  
 S. W. Doron & J. C. Slade  
 Grove City College  
 Tom F. Little  
 Technical High School

1320 kilocycles 227.1 meters

KGHB	250	Honolulu, Hawaii
KGHF	250	Pueblo, Colo.
KGIO	250	Idaho Falls, Ida.
KGIQ	250	Twin Falls, Ida.
WADC	1000	Akron, Ohio
WSMB	750	New Orleans, La.

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Radio Sales Co.  
 C. P. Ritchie & J. E. Finch  
 Jack W. Duckworth, Jr.  
 Stanley M. Soule  
 Allen T. Simmons  
 Saenger Theatre & Maison Blanche

1330 kilocycles 225.4 meters

CYM	1500	Torreón, Mexico
KSCJ	1000	Sioux City, Iowa
WCAC	500	Storrs, Conn.
WDRC	500	New Haven, Conn.
WTAQ	1000	Eau Claire, Wisc.

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Perkins Bros. Co.  
 Conn. Agricultural College  
 Doolittle Radio Corp.  
 C. S. Van Gorden

1340 kilocycles 223.7 meters

KFPW	50	Sulphur Spgs., Ark.
KMO	500	Tacoma, Wash.
KVI	1000	Tacoma, Wash.
WSPD	500	Toledo, Ohio

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Rev. Lannie W. Stewart  
 KMO, Inc.  
 Puget Sound Brdctg. Co.  
 Toledo Broadcasting Co.

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1350 kilocycles 222.1 meters

KWK 1000 St. Louis, Mo.  
 WBNY 250 New York City  
 WCDA 250 Brooklyn, N. Y.  
 WIL 1000 St. Louis, Mo.  
 WKBQ 250 New York City  
 WMSG 250 New York City

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Greater St. Louis Brdcastg. Corp.  
 Baruchrome Corp.  
 Italian Educ. Brdcastg. Co.  
 WIL Broadcasting Corp.  
 Standard Canill Co., Inc.  
 Madison Square Garden

1360 kilocycles 220.4 meters

KFBB 250 Havre, Mont.  
 KGB 250 San Diego, Calif.  
 KGIR 250 Butte, Mont.  
 WBET 500 Boston, Mass.  
 WGES 500 Chicago, Ill.  
 WJKS 500 Gary, Ind.  
 WMAF 500 S. Dartmouth, Mass.  
 WQBC 300 Utica, Miss.

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F. A. Buttery Co.  
 Southwestern Brdcastg. Corp.  
 Symons Broadcasting Co.  
 Boston Transcript Co.  
 Oak Leaves Broadcasting Corp.  
 Johnson-Kennedy Radio Corp.  
 Round Hills Radio Corp.  
 Chamber of Commerce

1370 kilocycles 218.7 meters

KFBL 50 Everett, Wash.  
 KFEC 100 Portland, Ore.  
 KFJI 50 Astoria, Ore.  
 KFJZ 100 Ft. Worth, Texas  
 KFLL 100 Galveston, Texas  
 KFUR 50 Ogden, Utah  
 KGAR 100 Tucson, Ariz.  
 KGBX 100 St. Joseph, Mo.  
 KGCB 100 Enid, Okla.  
 KGCI 100 San Antonio, Texas  
 KGDA 15 Dell Rapids, S. D.  
 KGER 100 Long Beach, Cal.  
 KGFG 50 Oklahoma City  
 KGFL 50 Raton, N. M.  
 KGGM 100 Albuquerque, N. M.  
 KGKL 100 San Angelo, Texas  
 KGRG 100 San Antonio, Texas  
 KOH 100 Reno, Nevada  
 KRE 100 Berkeley, Calif.  
 KVL 100 Seattle, Wash.  
 KWKC 100 Kansas City, Mo.  
 KZM 100 Hayward, Calif.  
 WBBL 100 Richmond, Va.  
 WCBM 100 Baltimore, Md.  
 WEAM 100 Plainfield, N. J.  
 WFBJ 100 Collegeville, Minn.  
 WHBD 100 Bellefontaine, Ohio  
 WHBQ 100 Memphis, Tenn.  
 WIAD 100 Philadelphia, Pa.  
 WIBM 100 Jackson, Mich.  
 WJBK 50 Ypsilanti, Mich.  
 WJBO 100 New Orleans, La.  
 WMBO 100 Auburn, N. Y.  
 WRAK 30 Erie, Pa.  
 WRBT 50 Wilmington, N. C.  
 WSVS 50 Buffalo, N. Y.

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Leese Bros.  
 Meier & Frank Co.  
 George Kincaid  
 Henry C. Allison  
 George Roy Clough  
 Peery Building Co.  
 Citizens Publishing Co.  
 Foster-Hall Tire Co.  
 Wallace Radio Institute  
 Liberto Radio Sales  
 Home Auto Co.  
 C. Merwin Dobyns  
 Full Gospel Church  
 N. L. Cotter  
 Jay Peters  
 KGKL, Inc., Oper. by Ragsdale Auto Co.  
 Eugene Roth  
 Jay Peters  
 First Congregational Church  
 Arthur C. Dailey  
 Wilson Duncan Brdcastg. Co.  
 Leon P. Tenney  
 Grace Covenant Presbyterian Church  
 Hotel Chateau  
 W. J. Butterfield  
 St. John's University  
 First Presbyterian Church  
 Broadcasting Station WHBQ, Inc.  
 Howard R. Miller  
 C. L. Carrell  
 Ernest F. Goodwin  
 Valdemar Jensen  
 Radio Service Laboratories  
 C. R. Cummins  
 Wilmington Radio Association  
 Seneca Vocational School

1380 kilocycles 217.3 meters

KOV 500 Pittsburgh, Pa.  
 KSO 1000 Clarinda, Iowa  
 WCSO 500 Springfield, Ohio  
 WKBH 1000 La Crosse, Wisc.

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Doubleday-Hill Electric Co.  
 Berry Seed Co.  
 Wittenberg College  
 Callaway Music Co.

1390 kilocycles 215.7 meters

KFPY 500 Spokane, Wash.  
 KLRA 1000 Little Rock, Ark.  
 KOW 500 Denver, Colo.  
 KUOA 1000 Fayetteville, Ark.  
 KWSC 500 Pullman, Wash.  
 WHK 1000 Cleveland, Ohio

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Symons Investment Co.  
 Arkansas Broadcasting Co.  
 Associated Industries, Inc.  
 University of Arkansas  
 State College of Washington  
 Radio Air Service Corp.

INDEX BY FREQUENCIES AND DIAL NUMBERS

1400 kilocycles 214.2 meters

WBAA	500	Lafayette, Ind.
WBBC	500	Brooklyn, N. Y.
WCGU	500	Coney Island, N. Y.
WCMA	500	Culver, Ind.
WKBF	500	Indianapolis, Ind.
WLTH	250	Brooklyn, N. Y.
WSGH	500	Brooklyn, N. Y.

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Purdue University  
Brooklyn Broadcasting Corp.  
U. S. Broadcasting Corp.  
Culver Military Academy  
Noble Butler Watson  
The Voice of Brooklyn, Inc.  
Amateur Radio Specialty Co.

1410 kilocycles 212.6 meters

KFLV	500	Rockford, Ill.
KGRS	1000	Amarillo, Tex.
WDAG	1000	Amarillo, Texas
WDEL	250	Wilmington, Del.
WDGY	500	Minneapolis, Minn.
WHBL	500	Sheboygan, Wis.
WHDI	500	Minneapolis, Minn.
WSKC	500	Bay City, Mich.

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A. T. Frykman  
Gish Radio Service  
J. Laurence Martin  
WDEL, Inc.  
Dr. George W. Young  
Press Pub. Co. & C. L. Carrell  
Wm. Hood Dunwoody Indus. Institute  
World's Star Knitting Co.

1420 kilocycles 211.1 meters

KFIF	50	Portland, Ore.
KFIZ	100	Fond du Lac, Wis
KFOU	100	Holy City, Calif.
KFOW	100	Seattle, Wash.
KFXD	50	Jerome, Idaho
KFKY	100	Flagstaff, Ariz.
KFYO	100	Breckenridge, Tex.
KGCN	50	Concordia, Kansas
KGCK	10	Vida, Mont.
KGFF	100	Alva, Okla.
KGJF	100	Los Angeles, Calif.
KGFW	50	Ravenna, Nebr.
KGHD	50	Missoula, Mont.
KGTT	50	San Francisco, Cal.
KICK	100	Red Oak, Iowa
KKP	15	Seattle, Wash.
KMED	50	Medford, Ore.
KOCW	100	Chickasha, Okla.
KORE	100	Eugene, Ore.
KTAP	100	San Antonio, Tex.
KTUE	5	Houston, Texas
KXRO	25	Aberdeen, Wash.
WAAD	75	Cincinnati, Ohio
WEDH	30	Erie, Pa.
WHP	10	New York City
WIAS	100	Ottumwa, Iowa
WIBR	50	Steubenville, Ohio
WKBP	50	Battle Creek, Mich.
WLBH	100	Kansas City, Mo.
WLBH	30	Farmingdale, N. Y.
WLEX	100	Lexington, Mass.
WMBC	100	Detroit, Mich.
WMBH	100	Joplin, Mo.
WMRJ	10	Jamalca, N. Y.
WQBZ	60	Weirton, W. Va.
WSRO	100	Middletown, Ohio
WSSH	100	Boston, Mass.
WTBO	50	Cumberland, Md.

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Benson Polytechnic Institute  
Commonwealth-Reporter  
W. E. Riker  
KFOU, Inc.  
Service Radio Co.  
Mary M. Costigan  
Kirksey Bros. Battery & Elec. Co.  
Concordia Broadcasting Co.  
First State Bank  
Earl E. Hampshire  
Ben S. McGlashan  
Otto F. Sothman  
Elmore-Nash Broadcasting Corp.  
Glad Tidings Temple  
Atlantic Automobile Co.  
City of Seattle  
W. J. Virgin  
College for Women  
Eugene Broadcasting Station  
Robert B. Bridge  
Uhalt Electric  
KXRO, Inc.  
Ohio Mechanics Institute  
Erie Dispatch-Herald  
Bronx Broadcasting Co.  
Poling Electric Co.  
Thurman A. Owings  
Enquirer-News Co.  
Everett L. Dillard  
Joseph J. Lombardi  
Lexington Air Station  
Michigan Broadcasting Co., Inc.  
Edwin Dudley Aber  
Peter J. Prinz  
J. H. Thompson  
Harry W. Fahrlander  
Tremont Temple Baptist Church  
Cumberland Electric Co.

1430 kilocycles 209.7 meters

WBRL	500	Tilton, N. H.
WCAH	250	Columbus, Ohio
WGBG	500	Memphis, Tenn.
WICC	500	Bridgeport, Conn.
WMBS	250	Lemoine, Pa.
WNBR	500	Memphis, Tenn.

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Booth Radio Laboratories  
Commercial Radio Service Co.  
First Baptist Church  
Bridgeport Brdcastg. Station  
Mack's Battery Co.  
John Ulrich

1440 kilocycles 208.2 meters

KLS	250	Oakland, Calif.
WABF	250	Kingston, Pa.
WABO	500	Rochester, N. Y.
WHEC	500	Rochester, N. Y.
WMAC	500	Cazenovia, N. Y.

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Warner Bros.  
Markle Broadcasting Corp.  
Lake Ave. Baptist Church  
Hickson Electric Co.  
Clive B. Meredith

## INDEX BY FREQUENCIES AND DIAL NUMBERS

**WMBD** 500 Peoria Heights, Ill.  
**WNRC** 500 Greensboro, N. C.  
**WOKO** 500 Peekskill, N. Y.  
**WRAX** 250 Philadelphia, Pa.  
**WTAD** 500 Quincy, Ill.

Peoria Heights Radio Laboratory  
 Wayne M. Nelson  
 Harold E. Smith  
 Berachah Church, Inc.  
 Ills. Stock Medicine Brdcastg. Corp.

### 1450 kilocycles 206.8 meters

**KSBA** 1000 Shreveport, La.  
**WBMS** 250 Union City, N. J.  
**WFJC** 500 Akron, Ohio  
**WIBS** 250 Elizabeth, N. J.  
**WJAY** 500 Cleveland, Ohio  
**WKBO** 250 Jersey City, N. J.  
**WNJ** 250 Newark, N. J.  
**WSAR** 250 Fall River, Mass.  
**WTFI** 500 Toccoa, Ga.

W. G. Patterson  
 WBMS Broadcasting Corp.  
 W. F. Jones Broadcast, Inc.  
 New Jersey Broadcasting Corp.  
 Cleveland Radio Brdcastg. Corp.  
 Camith Corp.  
 Radio Investment Co.  
 Doughty & Welch Electric Co.  
 Toccoa Falls Institute

### 1460 kilocycles 205.4 meters

**KSTP** 10000 St. Paul, Minn.  
**WTFF** 10000 Washington, D. C.

National Battery Brdcastg. Co.  
 Independent Publishing Co.

### 1470 kilocycles 204.0 meters

**KFJF** 5000 Oklahoma City  
**KGA** 5000 Spokane, Wash.  
**WKBW** 5000 Buffalo, N. Y.  
**WRUF** 5000 Gainesville, Fla.

National Radio Mfg. Co.  
 Northwest Radio Service Co.  
 Churchill Evangelistic Assn.  
 University of Florida

### 1480 kilocycles 202.6 meters

**WIBO** 5000 Chicago, Ill.  
**WJAZ** 5000 Chicago, Ill.  
**WORD** 5000 Batavia, Ill.  
**WHT** 5000 Chicago, Ill.

WIBO Broadcasters, Inc.  
 Zenith Radio Corp.  
 People's Pulpit Association  
 Radiophone Brdcastg. Corp.

### 1490 kilocycles 201.2 meters

**WBAW** 5000 Nashville, Tenn.  
**WLAC** 5000 Nashville, Tenn.

Waldrum Drug Co.  
 Life & Casualty Insurance Co.

### 1500 kilocycles 199.9 meters

**KFCR** 100 Santa Barbara, Cal.  
**KFWO** 100 Avalon, Calif.  
**KGDR** 100 San Antonio, Tex.  
**KGKB** 100 Goldthwaite, Tex.  
**KGHI** 100 Little Rock, Ark.  
**KGHX** 50 Richmond, Texas  
**KPJM** 100 Prescott, Ariz.  
**KUJ** 10 Longview, Wash.  
**KWBS** 15 Portland, Ore.  
**KWTC** 100 Santa Ana, Calif.  
**WAFD** 100 Detroit, Mich.  
**WALK** 50 Willow Grove, Pa.  
**WCBA** 100 Allentown, Pa.  
**WCLB** 100 Brooklyn, N. Y.  
**WHBW** 100 Philadelphia, Pa.  
**WIBZ** 15 Montgomery, Ala.  
**WKBV** 100 Brookville, Ind.  
**WKBZ** 50 Ludington, Mich.  
**WLBX** 100 Long Island City, N. Y.  
**WLOE** 100 Chelsea, Mass.  
**WMBA** 100 Newport, R. I.  
**WMBM** 10 Memphis, Tenn.  
**WMBQ** 100 Brooklyn, N. Y.  
**WMES** 50 Boston, Mass.  
**WMPC** 30 Lapeer, Mich.  
**WBNF** 50 Endicott, N. Y.  
**WNBQ** 15 Rochester, N. Y.  
**WOO** 100 Philadelphia, Pa.  
**WPSW** 50 Philadelphia, Pa.  
**WRBJ** 10 Hattiesburg, Miss.  
**WSAN** 100 Allentown, Pa.  
**WTBO** 100 Wilmington, Del.  
**WWRL** 100 Woodside, N. Y.

Santa Barbara Brdcastg. Co.  
 Lawrence Mott  
 Joe B. McShane  
 Eagle Publishing Co.  
 Berean Bible Class  
 Ft. Bend County School Board  
 Frank Wilburn  
 Lovejoy & Kerfoot  
 Schaeffer Radio Co.  
 Pacific Broadcasting Foundation  
 Albert B. Parfet Co.  
 Albert A. Walker  
 B. B. Musselman  
 Arthur Faske  
 D. R. Kienzle  
 Alexander D. Trum  
 Knox Battery & Electric Co.  
 K. L. Ashbacher  
 John N. Brahy  
 William S. Pote  
 LeRoy Joseph Beebe  
 Seventh Day Adventist Church  
 Paul J. Gollhofer  
 Mass. Educational Society  
 First M. E. Church  
 Howitt-Wood Radio Co.  
 Gordon P. Brown  
 John Wanamaker  
 School of Wireless Telegraphy  
 Woodruff Furniture Co.  
 Allentown Call Publishing Co.  
 E. Brandt Boylan  
 Wm. H. Reuman

INDEX BY LOCATIONS WITH MAP KEY

<b>ALABAMA</b>					
Auburn K-20-b	WAPI	1140	Ontario	KFWC	1200
Birmingham K-19-a	WBRC	930	Pasadena J-4	KPPC	1200
	WKBC	1310		KPSN	950
Gadsden K-20-a	WJBY	1210	Sacramento H-2-a	KFBK	1310
Montgomery K-19-b	WIBZ	1500	San Diego K-4-b	KFSD	600
				KGB	1360
<b>ALASKA</b>			San Francisco H-1-c	KFRC	610
Anchorage	KFQD	1230		KFWI	930
Juneau	KFTU	1310		KGTT	1420
Ketchikan	KGBU	900		KJBS	1100
				KPO	680
<b>ARIZONA</b>				KYA	1230
Flagstaff J-7	KFXY	1420	San Jose I-2	KQW	1010
Phoenix K-7	KFAD	620	Santa Ana K-4	KWTC	1500
	KFCB	1310	Santa Barbara J-3	KFCR	1500
Prescott J-6	KPJM	1500	Santa Maria J-2-b	KSMR	1200
Tucson L-7	KGAR	1370	Santa Monica K-3	KNRC	780
			Stockton H-2-b	KGDM	1150
				KWG	1200
<b>ARKANSAS</b>			<b>COLORADO</b>		
Blytheville I-18	KLCN	1290	Colorado Springs H-10	KFUM	1270
Fayetteville I-16	KUOA	1390	Denver G-10-b	KFEL	940
Hot Springs J-16	KTHS	800		KFUP	1310
Little Rock J-17	KGHI	1500		KFXF	940
	KGJF	890		KLZ	560
	KLRA	1390		KOA	830
McGehee K-17	KGHG	1310		KOW	1390
Sulphur Springs I-16	KFPW	1340		KPOF	880
			Edgewater G-10	KFXJ	1310
<b>CALIFORNIA</b>			Fort Morgan G-11	KGEW	1200
Avalon K-3	KFWO	1500	Greeley F-10	KFKA	880
Berkeley H-1-a	KRE	1370	Gunnison H-9	KFHA	1200
Burbank J-4	KELW	780	Pueblo H-11	KGDP	1210
Culver City K-3	KFVD	700		KGHF	1320
El Centro K-5	KGEN	1200	Yuma G-11	KGEK	1200
Fresno I-3	KMJ	1200			
Glendale K-3	KGFH	1000	<b>CONNECTICUT</b>		
Hayward H-2	KZM	1370	Bridgeport F-26	WICC	1430
Hollywood K-3	KFQZ	850	Hartford E-26-d	WTIC	1060
	KMTR	570	Mansfield E-27-i	WCAC	1330
Holy City I-2	KFQU	1420	New Haven F-26-b	WDRC	1330
Inglewood K-4	KMIC	1120			
Long Beach K-4-a	KFON	1250	<b>DELAWARE</b>		
	KGER	1370	Wilmington G-25	WDEL	1410
Los Angeles K-3-b	KEJK	1250		WTBQ	1500
	KFI	640			
	KFSG	1120	<b>DISTRICT OF COLUMBIA</b>		
	KFWB	950	Washington G-24-c	WMAL	630
	KGEF	1300		WRC	950
	KGJF	1420		WRHF	1270
	KHJ	900		WTFF	1460
	KNX	1050	<b>FLORIDA</b>		
	KPLA	570	Clearwater N-21	WFLA	900
Oakland H-1-b	KTBI	1300	Gainesville M-21	WRUF	1470
	KFWM	930	Jacksonville M-22	WJAX	1260
	KGO	790			
	KLS	1440			
	KLX	880			
	KTAB	1280			



INDEX BY LOCATIONS WITH MAP KEY

Lakeland N-22	WMBL	1310	Decatur G-18	WJBL	1200
Miami O-23	WQAM	1240	Evanston E-19	WEHS	1390
Miami Beach O-23	WIOD	1240	Galesburg F-18-a	WKBS	1310
	WMBF	560		WLBO	1310
Orlando N-22	WDBO	620	Harrisburg H-18-b	WEBQ	1210
Pensacola L-19	WCOA	1120	Joliet E-19-f	WCLS	1310
Sarasota N-22	WJBB	1010		WKBB	1310
St. Petersburg N-21	WSUN	900	La Salle F-18-d	WJBC	1200
Tampa N-22-b	WDAE	620	Mooseheart E-18-e	WJJD	1180
	WMBR	1210	Peoria Heights G-18	WMBD	1440
			Quincy G-17	WTAD	1440
<b>GEORGIA</b>			Rockford E-18-c	KFLV	1410
Atlanta K-20-a	WGST	890	Rock Island F-17-c	WHBF	1210
	WSB	740	Springfield G-18	WCBS	1210
	WTHS	1310	Streator F-18-e	WTAX	1210
Columbus K-20	WRBL	1200	Tuscola G-19-b	WDZ	1070
Macon K-21	WMAZ	890	Urbana G-19-a	WRM	570
Tifton L-21	WRBI	1310	Zion E-19-c	WCBD	1080
Toccoa J-21	WTFI	1450			
			<b>INDIANA</b>		
<b>HAWAII</b>			Anderson G-20-a	WHBU	1210
Honolulu	KGHB	1320	Brookville G-20	WKBV	1500
	KGU	940	Culver F-19-d	WCMA	1400
<b>IDAHO</b>			Evansville H-19	WGBF	630
Boise D-4	KFAU	1250	Fort Wayne F-20-b	WCWK	1230
Idaho Falls D-7	KGIO	1320		WOWO	1160
Jerome E-5	KFXD	1420	Gary F-19	WJKS	1360
Kellogg B-5	KFEY	1210	Hammond F-19	WWAE	1200
Pocatello E-7	KSEI	900	Indianapolis G-19-c	WFBM	1230
Twin Falls E-5	KGIQ	1320		WKBF	1400
			Kokomo F-19-g	WJAK	1310
<b>ILLINOIS</b>			Lafayette F-19-f	WBAA	1400
Batavia F-18-c	WORD	1480	La Porte F-19-c	WRAF	1200
Carthage F-17-e	WCAZ	1070	Muncie G-20	WLBC	1310
Chicago E-19-g	KFKX	1020	South Bend F-20-a	WSBT	1230
	KYW	1020	Terre Haute G-19	WBOW	1310
	WAAF	920	Valparaiso F-19-b	WRBC	1240
	WBBM	770			
	WCFL	970	<b>IOWA</b>		
	WCRW	1210	Ames E-16-c	WOI	560
	WEDC	1210	Boone E-16	KFGQ	1310
	WENR	870	Cedar Rapids E-17-a	KWCR	1310
	WGES	1360	Clarinda E-15-c	KSO	1380
	WGN	720	Council Bluffs F-15-b	KOIL	1260
	WHFC	1310	Davenport F-17-a	WOC	1000
	WHT	1480	Decorah D-17	KGCA	1270
	WIBO	1480		KWLC	1270
	WJAZ	1480	Des Moines F-16-a	WHO	1000
	WKBI	1310	Fort Dodge E-16-a	KFJY	1310
	WLIB	720	Iowa City E-17-b	WSUI	580
	WLS	870	Marshalltown E-16-d	KFJB	1200
	WMAQ	670	Muscatine F-17-b	KTNT	1170
	WMBI	1080	Ottumwa F-17	WIAS	1420
	WPCC	570			
	WSBC	1210			

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Red Oak F-15	KICK	1420	Chelsea E-27	WLOE	1500
Shenandoah F-15-c	KFNF	890	Fall River E-27	WSAR	1450
	KMA	930	Gloucester E-27	WEPS	1200
Sioux City E-15	KSCJ	1330	Lexington E-27	WLEX	1420
Waterloo F-17	WJAM	1200	New Bedford E-27-g	WNBH	1310
			South Dartmouth E-27	WMAF	1360
<b>KANSAS</b>			Springfield E-26-b	WBZ	990
Concordia G-14	KGCN	1420	Webster E-27-d	WKBE	1200
Lawrence G-15-a	KFKU	1220	Wellesley Hills E-27	WBSO	780
	WREN	1220	Worcester E-27-b	WTAG	580
Manhattan G-14-a	KSAC	580			
Milford G-14	KFKB	1130	<b>MICHIGAN</b>		
Topeka G-14	WIBW	1300	Battle Creek E-20	WKBP	1420
Wichita H-14-a	KFH	1300	Bay City D-21	WSKC	1410
			Berrien Springs E-19	WEMC	590
<b>KENTUCKY</b>			Detroit E-21-g	WAFD	1500
Hopkinsville I-19	WFIW	940		WBMH	1310
Louisville H-20	WHAS	820		WCX	750
	WLAP	1200		WGHP	1240
				WJR	750
<b>LOUISIANA</b>				WMBC	1420
Cedar Grove M-17	KGGH	1310	East Lansing E-20-b	WWJ	920
New Orleans M-17	WABZ	1200	Flint E-21-a	WKAR	1040
	WDSU	1270	Grand Rapids E-20-a	WFDF	1310
	WJBO	1370		WASH	1270
	WJBW	1200		WOOD	1270
	WSMB	1320	Jackson E-20	WIBM	1370
	WWL	850	Lapeer E-21	WMPC	1500
Shreveport K-16	KFDX	1210	Ludington D-19	WKBZ	1500
	KRMD	1310	Royal Oak E-21-e	WAGM	1310
	KSBA	1450	Ypsilanti E-21-f	WJBK	1370
	KWEA	1210			
	KWKH	850	<b>MINNESOTA</b>		
<b>MAINE</b>			Barrett C-14	KGDE	1200
Bangor C-28-b	WABI	1200	Collegeville C-15	WFBJ	1370
Dover-Foxcroft C-28	WLBZ	620	Hallock A-14	KGFK	1200
Portland D-28-b	WCSH	940	Minneapolis C-16-B	WCCO	810
				WDGY	1410
<b>MARYLAND</b>				WGMS	1250
Baltimore G-24-a	WBAL	1060		WHDI	1410
	WCAO	600		WLB	1250
	WCBM	1370		WRHM	1250
	WFBR	1120	Northfield D-16	KFMX	1250
Cumberland G-23	WTBO	1420		WCAL	1250
Salisbury G-25	WSMD	1310	St. Paul C-16-c	KSTP	1460
				WCCO	810
<b>MASSACHUSETTS</b>				WGMS	1250
Boston E-27-c	WBET	1360	<b>MISSISSIPPI</b>		
	WBIS	1230	Columbus K-18	WCOC	880
	WBZA	990	Greenville K-17	WRBQ	1210
	WEEI	590	Gulfport M-18	WGCM	1210
	WMES	1500	Hattiesburg L-18	WRBJ	1500
	WNAC	1230	Utica L-17	WQBC	1360
	WSSH	1420			

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<b>MISSOURI</b>			<b>NEW HAMPSHIRE</b>		
Cape Girardeau H-18-c	KFVS	1210	Laconia D-27	WKAV	1310
Columbia G-16-b	KFRU	630	Tilton E-27	WBRL	1430
Independence G-16-c	KLDS	950	<b>NEW JERSEY</b>		
	KMBC	950	Asbury Park G-26	WCAP	1280
Jefferson City H-16-a	WOS	630	Atlantic City G-25	WPG	1100
Joplin H-16	WMBH	1420	Camden F-25-f	WCAM	1280
Kansas City G-15-b	KWKC	1370	Cliffside F-26	WPAP	1010
	WDAF	610		WQAO	1010
	WHB	950	Elizabeth F-26-h	WIBS	1450
	WLBF	1420	Jersey City F-26-d	WAAT	1070
	WOQ	610		WKBO	1450
Kirksville F-16-c	KFKZ	1200		WPCH	810
St. Joseph G-15	KFEQ	560	Newark F-25-h	WAAM	1250
	KGBX	1370		WGCP	1250
St. Louis H-18-a	KFUO	550		WNJ	1450
	KFWF	1200		WOR	710
	KMOX	1090	Paterson F-26-c	WODA	1250
	KSD	550	Plainfield F-25	WEAM	1370
	KWK	1350	Red Bank G-26	WJBI	1210
	WEW	760	Secaucus	WOV	1130
	WIL	1350	Trenton F-25	WOAX	1280
	WMAY	1200	Union City F-26	WBMS	1450
<b>MONTANA</b>			<b>NEW MEXICO</b>		
Billings C-8	KGHL	950	Albuquerque	KGGM	1370
Butte C-7	KGIR	1360	Raton I-11	KGFL	1370
Havre A-8	KFBB	1360	State College K-9	KOB	1180
Kalispell A-5	KGEZ	1310	<b>NEW YORK</b>		
Missoula B-6	KGHD	1420	Auburn E-24	WMBO	1370
	KUOM	570	Bay Shore F-26-h	WINR	1210
Vida B-10	KGCX	1420	Brooklyn F-26-f	WBBC	1400
<b>NEBRASKA</b>				WCDA	1350
Central City F-13	KGES	930		WCLB	1500
Clay Center G-14	KMMJ	740		WLTH	1400
Columbus F-14	KGBY	930		WMBQ	1500
Grand Island F-13	KGEO	930		WSGH	1400
Humboldt G-15	KGDW	930	Buffalo E-23-a	WEBR	1310
Lincoln F-14-b	KFAB	770		WGR	550
	KFOR	1210		WKBW	1470
	WCAJ	590		WKEN	1040
Norfolk E-14-c	WJAG	1060		WMAK	900
Omaha F-15-a	WAAW	660	Canton D-25	WSVS	1370
	WOW	590	Cazenovia E-25-b	WCAD	1220
Ravenna F-13	KGFW	1420	Coney Island F-26	WMAC	1440
Wayne E-14	KGCH	930	Endicott E-25	WCGU	1400
York F-13	KGBZ	930	Farmingdale F-26	WNBF	1500
			Freeport F-26-i	WLBH	1420
			Grand Island E-23	WGBB	1210
			Greenville E-26	WCOH	1210
			Ithaca E-24-d	WEAI	1270
<b>NEVADA</b>				WLCI	1210
Reno G-3	KOH	1370			

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Jamaica F-26-f	WMRJ	1420	Cincinnati G-20-e	WAAD	1420
Jamestown E-23-b	WOCL	1210		WFBE	1200
Long Island City F-26	WLBX	1500		WKRC	550
New York City F-26	WABC	860		WLW	700
	WBNY	1350		WSAI	800
	WBOQ	860	Cleveland F-22-a	WEAR	1070
	WEAF	660		WHK	1390
	WGBS	1180		WJAY	1450
	WHAP	1300		WTAM	1070
	WHN	1010	Columbus G-21-b	WAIU	640
	WHPP	1420		WCAH	1430
	WJZ	760		WEAO	550
	WKBQ	1350		WMAN	1210
	WLWL	1100	Dayton G-21-e	WSMK	570
	WMCA	570	Hamilton G-20-d	WRK	1310
	WMSG	1350	Mansfield F-21	WLBV	1210
	WNYC	570	Middletown G-20	WSRO	1420
	WRNY	1010	Springfield G-21-c	WCSO	1380
Peekskill F-26-a	WOKO	1440	Steubenville F-22	WIBR	1420
Rochester E-24-b	WABO	1440	Toledo F-21-a	WSPD	1340
	WHAM	1150	Youngstown F-22	WKBN	570
	WHEC	1440			
	WNBQ	1500	<b>OKLAHOMA</b>		
Rossville F-26	WBBR	1300	Alva I-13	KGFF	1420
Saranac Lake D-26	WNBZ	1290	Chickasha J-14-b	KOCW	1420
Schenectady E-25-c	WGY	790	Enid I-14	KGCB	1370
Syracuse E-24-c	WFBL	900	Norman J-14-a	WNAD	1010
	WSYR	570	Oklahoma City I-14-b	KFJF	1470
Troy E-21-a	WHAZ	1300		KFXR	1310
Utica E-25-a	WIBX	1200		KGFG	1370
Woodhaven F-26	WEVD	1300		WKY	900
Woodside F-26	WWRL	1500	Picher I-15	KGGF	1010
			Ponca City I-14	WBBZ	1200
			Tulsa I-15	KVOO	1140
<b>NORTH CAROLINA</b>			<b>OREGON</b>		
Asheville J-21	WWNC	570	Astoria C-1-a	KFJI	1370
Charlotte J-22	WBT	1080	Corvallis D-1	KOAC	560
Gastonia J-22	WRBU	1210	Eugene D-1	KORE	1420
Greensboro I-22	WNRG	1440	Medford E-1	KMED	1420
Raleigh I-23	WPTF	680	Portland C-1-b	KEX	1180
Wilmington J-24	WRBT	1370		KFEC	1370
				KFIF	1420
<b>NORTH DAKOTA</b>				KFJR	1300
Bismarck B-12	KFYR	550		KGW	620
Devils Lake A-13	KDLR	1210		KOIN	940
Fargo B-14	WDAY	1280		KTBR	1300
Grand Forks A-14	KFJM	550		KWBS	1500
Mandan B-12	KGCU	1200		KWJJ	1060
				KXL	1250
<b>OHIO</b>			<b>PENNSYLVANIA</b>		
Akron F-22-b	WADC	1320	Allentown F-25-c	WCBA	1500
	WFJC	1450		WSAN	1500
Bellefontaine G-21-a	WHBD	1370			
Cambridge F-22	WEBE	1210			
Canton F-22-d	WHBC	1200			

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Altoona F-24-c	WFBG	1310
Carbondale F-25	WNBW	1200
Elkins Park G-25-c	WIBG	930
Erie E-23	WEDH	1420
	WRAK	1370
Grove City F-23-b	WSAJ	1310
Harrisburg F-24-d	WBAK	1120
	WPRC	1200
Johnstown F-23-d	WHBP	1310
Kingston F-24	WABF	1440
Lancaster G-25-a	WGAL	1310
	WKJC	1200
Lemoyne G-24	WMBS	1430
Lewisburg F-24-b	WJBU	1210
Oil City F-23-a	WLBW	1260
Philadelphia G-25-d	WABY	1310
	WCAU	1170
	WFAN	610
	WFI	560
	WFKD	1310
	WHBW	1500
	WIAD	1370
	WIP	610
	WLIT	560
	WNAT	1310
	WOO	1500
	WPSW	1500
	WRAX	1440
Pittsburgh F-23-c	KDKA	980
	KQV	1380
	WCAE	1220
	WJAS	1290
Reading F-25-d	WRAW	1310
Scranton F-25-a	WGBI	880
	WQAN	880
State College F-24-a	WPSC	1230
Washington F-23	WNBO	1200
Wilkes-Barre F-25-b	WBAX	1210
	WBRE	1310
Willow Grove G-25	WALK	1500
PORTO RICO		
San Juan	WKAQ	580
RHODE ISLAND		
Cranston F-27-a	WDWF	1210
	WLSI	1210
Newport F-27	WMBA	1500
Pawtucket E-27	WFCI	1210
Providence E-27-h	WEAN	1160
	WJAR	890
SOUTH CAROLINA		
Charlestown K-23	WBBY	1200
Columbia K-22	WRBW	1310

SOUTH DAKOTA		
Brookings D-14	KFDY	550
	KGCR	1210
Dell Rapids D-14	KGDA	1370
Oldham D-14	KGDY	1200
Pierre D-12	KGFX	580
Rapid City D-11	WCAT	1200
Sioux Falls D-14	KSOO	1110
Vermillion E-14-b	KUSD	890
Yankton E-14-a	WNAX	890
TENNESSEE		
Chattanooga J-20	WDOD	1280
Knoxville I-20	WFBC	1200
	WNBJ	1310
	WNOX	560
Lawrenceburg J-19	WOAN	600
Memphis J-18-a	WGBC	1430
	WHBQ	1370
	WMBM	1500
	WMC	780
	WNBR	1430
	WREC	600
Nashville I-19	WBAW	1490
	WLAC	1490
	WSM	650
Springfield I-19	WSIX	1210
Union City I-18	WOBT	1310
TEXAS		
Amarillo J-12	KGRS	1410
	WDAG	1410
	KUT	1120
Austin L-14-b	KFDM	560
Beaumont M-16	KFYO	1420
Breckenridge K-13	KWWG	1260
Brownsville O-14-b	WTAW	1120
College Station M-13	KRLD	1040
Dallas L-15-a	WFAA	1040
	WRR	1190
Dublin K-14	KFPL	1310
El Paso L-10	WDAH	1310
Fort Worth L-14-a	KFJZ	1370
	KFQB	1240
	WBAP	800
Galveston M-15-b	KFLX	1370
	KFUL	1290
Goldthwaite L-13	KGKB	1500
Greenville K-15	KFPM	1310
Harlingen O-14	KRGV	1260
Houston M-15-a	KPRC	920
	KTUE	1420
Richmond M-15	KGHX	1500

INDEX BY LOCATIONS WITH MAP KEY

San Angelo M-12	KGFI	1310	Tacoma B-1-a	KMO	1340
	KGKL	1370		KVI	1340
San Antonio M-14-a	KGCI	1370	<b>WEST VIRGINIA</b>		
	KGDR	1500	Charleston H-22	WOBW	580
	KGRC	1370	Clarksburg G-22	WQBJ	1200
	KTAP	1420	Fairmont G-23	WMMN	890
	KTSA	1290	Huntington G-22	WSAZ	580
	WOAI	1190	Weirton G-22	WQBZ	1420
Waco L-15-b	WJAD	1240	Wheeling G-22	WWVA	1160
Wichita Falls K-14	KGKO	570	<b>WISCONSIN</b>		
<b>UTAH</b>			Beloit E-18-b	WEBW	600
Ogden F-7-b	KFUR	1370	Eau Claire D-17	WTAQ	1330
Salt Lake City F-7-c	KDYL	1290	Fond du Lac D-18-d	KFIZ	1420
	KSL	1130	Kenosha E-19	WCLO	1200
<b>VERMONT</b>			La Crosse E-17	WKBH	1380
Burlington D-26-a	WCAX	1200	Madison E-18-2	WHA	570
Springfield D-26-b	WNBX	1200		WIBA	1210
<b>VIRGINIA</b>			Manitowoc D-19	WOMT	1210
Arlington G-24-d	NAA	690	Milwaukee E-19-a	WHAD	1120
Newport News	WNEW	1310		WISN	1120
Norfolk I-24	WBBW	1200	Poynette D-18-e	WTMJ	620
	WPOR	780	Racine E-19	WIBU	1310
	WTAR	780	Sheboygan C-18	WRJN	1200
Petersburg I-24	WLBG	1200	Stevens Point D-18-b	WHBL	1410
Portsmouth I-24	WSEA	780	Superior B-17	WLBL	900
Richmond H-24	WBBL	1370	West De Pere D-19	WEBC	1280
	WMBG	1210		WHBY	1200
	WRVA	1110	<b>WYOMING</b>		
	WTAZ	1210	Laramie F-10	KFBU	600
Roanoke H-23	WDBJ	930	<b>CANADA</b>		
<b>WASHINGTON</b>			<b>ALBERTA</b>		
Aberdeen B-1	KXRO	1420	Calgary	CFAC	690
Bellingham A-1	KVOS	1200		CFCN	690
Everett A-2	KFBL	1370		CHCA	690
Lacey B-2-b	KGY	1200		CJCJ	690
Longview B-1	KUJ	1500		CNRC	690
Pullman B-4	KWSC	1390	Edmonton	CHMA	580
Seattle B-2-a	KFOA	1270		CJCA	580
	KFQW	1420		CKUA	580
	KJR	970		CNRE	580
	KKP	1420	Lethbridge	CJOC	1120
	KOMO	920	Red Deer	CHCT	840
	KPCB	1210		CKLC	840
	KPQ	1210	<b>BRITISH COLUMBIA</b>		
	KRSC	1120	Chilliwack	CHWK	1210
	KTW	1270	Kamloops	CFJC	1120
	KVL	1370			
	KXA	570			
Spokane A-4	KFIO	1230			
	KFPY	1390			
	KGA	1470			
	KHQ	590			

INDEX BY LOCATIONS WITH MAP KEY

Sea Island	CJOR	1030	QUEBEC		
Vancouver	CHLS	730	Montreal	CFCF	730
	CKCD	730		CHYC	730
	CKFC	730		CKAC	730
	CKMO	730		CNRM	730
	CKWX	730	Quebec	CHRC	880
	CNRV	1030		CKCI	880
Victoria	CFCT	630		CKCV	880
				CNRQ	880
MANITOBA			St. Hyacinthe	CKSH	1010
Winnipeg	CKY	780	SASKATCHEWAN		
	CNRW	780	Fleming	CJRW	1010
NEW BRUNSWICK			Moose Jaw	CJRM	1010
Fredericton	CFNB	1210	Regina	CHWC	960
Moncton	CNRA	630		CJBR	960
St. John	CFBO	890		CKCK	960
NOVA SCOTIA				CNRR	960
Halifax	CHNS	930	Saskatoon	CFQC	910
ONTARIO				CJHS	910
Bowmanville	CKGW	960	Yorkton	CNRS	910
Brantford	CKCR	1010		CJGX	630
Chatham	CFCO	1210	HAITI		
Cobalt	CKMC	1210	Port au Prince	HHK	830
Hamilton	CHCS	880	MEXICO		
	CHML	880	Chihuahua	CZF	970
	CKOC	880	Mazatlan	CYR	630
	CFCH	600	Merida	CYY	550
Iroquois Falls	CFRB	960	Mexico City	CYA	1000
King Twp.	CFMC	1120		CYB	1090
Kingston	CFRC	1120		CYH	800
London	CJGC	910		CYJ	750
Midland	CKPR	1120		CYL	750
Ottawa	CKCO	690		CYO	710
	CNRO	690		CYX	920
Prescott	CFLC	1010	Oaxaca	CZE	860
Preston	CKPC	1210	Puebla	CYF	1130
Toronto	CFCA	840	Tampico	CYU	960
	CFCL	580	Torreón	CYQ	930
	CHNC	580	Vera Cruz	CYM	1330
	CJBC	580		CYC	890
	CJBC	840	CUBA		
	CJBC	960	Cienfuegos	6BY	1150
	CJSC	580	Elia	7SR	860
	CKCL	580	Havana	PWX	750
	CKNC	580		2BB	1200
	CKOW	840		2LR	1280
	CNRT	840		2MG	1050
PRINCE EDWARD				2OK	860
ISLAND				2OL	1170
Charlottetown	CFCY	960		2RK	950
	CHCK	960		2TW	1110
Summerside	CHGS	1120	Tuinucu	2UF	1090
				6KW	880

# AIR-LINE DISTANCES

FROM/TO	Albuquerque, N. Mex.	Atlanta, Ga.	Baltimore, Md.	Boise, Idaho	Boston, Mass.	Brownsville, Tex.	Buffalo, N. Y.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Denver, Colo.	Des Moines, Iowa	Detroit, Mich.	El Paso, Tex.	Fargo, N. Dak.	Fort Worth, Tex.	Galveston, Tex.	Hastings, Nebr.	Hot Springs, Ark.	Houghton, Mich.	Jacksonville, Fla.	Kansas City, Mo.	Los Angeles, Calif.
Albuquerque, N. Mex.	---	1273	1670	774	1567	638	1577	1126	1248	1417	332	633	1360	228	968	561	803	588	773	1252	1492	717	6
Atlanta, Ga.	1273	---	575	1830	938	800	695	583	368	550	1208	738	595	1293	1143	750	688	901	498	947	286	675	1
Baltimore, Md.	1670	575	---	2055	358	1525	273	603	423	305	1505	913	398	1750	1143	1839	1245	1154	94	808	682	962	257
Boise, Idaho	774	1830	2055	---	2266	1610	1872	1453	1663	1754	637	1155	1871	969	975	1263	1538	934	1384	1367	2098	1158	2
Boston, Mass.	1567	938	358	2266	---	1881	398	849	737	550	1766	1159	613	2067	1304	1574	1598	1415	1302	921	1051	1250	2
Brownsville, Tex.	638	960	1525	1610	1881	---	1575	1234	1184	1402	1047	1102	1398	638	1445	471	287	1013	650	1543	1025	923	15
Buffalo, N. Y.	1577	695	273	1872	398	1575	---	454	392	175	1368	762	118	1690	923	1221	1289	1019	956	560	800	862	21
Chicago, Ill.	1126	583	603	1453	849	1234	454	---	249	307	918	310	236	1249	571	820	954	566	585	367	621	413	17
Cincinnati, Ohio	1248	368	423	1663	737	1184	392	249	---	218	1090	509	234	1333	618	839	697	742	569	589	668	517	18
Cleveland, Ohio	1417	550	305	1754	550	1402	175	307	218	---	1223	617	94	1581	836	1046	1116	871	787	518	768	700	204
Denver, Colo.	332	1208	1505	637	1766	1047	1368	918	1090	1223	---	607	1153	554	642	643	925	353	749	970	1468	555	8
Des Moines, Iowa	833	738	913	1155	1159	1102	762	310	509	617	607	---	545	980	397	640	851	256	488	458	1024	180	143
Detroit, Mich.	1360	595	398	1671	613	1398	216	236	34	94	1143	545	---	1475	745	1018	1111	800	761	427	832	643	197
El Paso, Tex.	228	1293	1750	969	2067	622	1690	1249	1333	1521	554	980	1475	---	1161	543	723	757	802	1422	1481	836	7
Fargo, N. Dak.	968	1112	1143	975	1304	1471	923	871	518	838	642	397	745	1161	---	973	1218	440	875	393	1400	548	14
Fort Worth, Tex.	561	750	1239	2266	1574	475	1221	820	839	1046	643	640	1018	543	973	---	283	544	273	1093	943	460	121
Galveston, Tex.	803	688	1345	1538	1598	287	1289	954	897	1116	925	851	1111	723	1218	283	---	808	375	1277	799	677	142
Hastings, Nebr.	588	901	1154	934	1415	1013	1019	566	742	871	353	256	800	757	440	544	808	---	513	666	1178	226	117
Hot Springs, Ark.	773	498	984	1384	1302	650	956	585	569	787	749	498	761	802	875	273	375	513	---	901	728	326	143
Houghton, Mich.	1252	947	808	1367	922	1543	560	367	589	518	970	458	427	1422	393	1093	1277	666	901	---	1216	633	178
Jacksonville, Fla.	1492	286	682	2068	1015	1025	880	861	628	768	1468	1024	832	1416	1602	943	799	1178	728	1216	---	952	21
Kansas City, Mo.	717	675	962	1158	2590	923	626	413	541	700	555	180	643	836	548	460	677	226	326	633	952	---	135
Los Angeles, Calif.	663	1935	2313	663	1250	1370	2195	1741	1892	2044	828	1433	1976	702	1426	1312	1423	1177	1437	1787	2153	1352	---
Louisville, Ky.	1174	317	496	1623	823	1039	803	483	268	92	309	1035	477	315	1253	818	751	807	693	460	636	591	480
Memphis, Tenn.	938	395	728	1806	1333	777	802	481	410	627	878	485	621	978	822	448	492	591	176	300	591	270	162
Miami, Fla.	1710	610	958	2360	1258	1100	1194	1190	957	1089	1732	1338	1146	1166	1721	1150	941	1468	983	1545	328	1247	235
Minneapolis, Minn.	980	905	948	1140	1125	1335	733	356	603	632	699	235	542	1162	212	970	1087	399	722	272	1192	413	152
Missoula, Mont.	895	1790	1947	252	2124	1706	1740	1368	1578	1640	670	1074	1552	1115	839	1312	1595	891	1385	1208	2070	1117	91
Nashville, Tenn.	1117	218	597	1631	941	952	628	394	239	456	1018	523	468	1169	900	643	666	697	370	760	502	472	177
New Orleans, La.	1090	427	1001	1713	1359	536	1067	831	708	922	1079	825	938	986	1221	470	288	870	358	1187	511	678	167
New York, N. Y.	1810	747	170	2153	188	1695	291	711	568	404	1628	1023	483	1902	1213	1398	1415	1275	1185	849	838	1097	244
Norfolk, Va.	1696	507	167	2137	467	1465	435	696	474	429	1562	983	232	1755	1258	1226	1195	1216	955	946	548	1008	835
Oklahoma, Okla.	518	753	1173	1139	1490	659	1117	689	755	946	503	469	905	578	798	188	456	357	260	928	988	893	116
Omaha, Nebr.	718	815	1026	1044	1280	1061	883	432	620	738	485	122	666	875	390	540	828	135	490	547	1098	165	131
Philadelphia, Pa.	1748	663	90	2113	268	1614	278	664	501	343	575	972	444	1834	1186	1324	1335	1222	1051	827	1758	1037	238
Phoenix, Ariz.	330	1592	2002	933	2285	1023	1904	1451	1578	1745	585	1154	1665	947	1225	858	1035	801	1094	1550	1600	1045	35
Pittsburgh, Pa.	1498	520	194	1863	478	1424	178	411	258	115	1320	718	208	1592	952	1097	1140	967	825	330	703	784	213
Portland, Me.	2015	1022	446	2282	100	1961	438	892	802	603	1803	1197	657	2126	1313	1643	1878	1454	1371	914	1213	1300	263
Portland, Oreg.	1107	2172	2367	349	2553	1944	2167	1765	1987	2063	985	1479	1975	1286	1248	1612	1885	1271	1733	1638	2442	1397	82
Richmond, Va.	1628	470	128	2060	471	1628	375	618	399	353	1468	905	445	1695	1180	1170	1154	1434	897	870	953	937	228
St. Louis, Mo.	938	467	731	1339	1036	973	662	259	308	490	793	270	452	1033	658	568	697	455	325	591	755	238	158
Salt Lake City, Utah	483	1580	1858	292	2099	1317	1701	1260	1450	1567	372	954	1490	609	865	977	1849	708	1116	1242	1840	922	57
San Francisco, Calif.	693	2133	2451	516	2696	1675	2298	1855	2037	2163	946	1547	2087	993	1447	1454	1683	1297	1648	1833	2735	1500	54
Schenectady, N. Y.	1823	840	278	2120	150	1770	249	702	605	408	1618	1012	467	1930	1157	1445	1487	1287	1175	776	960	1107	244
Seattle, Wash.	1178	2180	2441	405	2508	2015	2130	1743	1974	2035	1020	1470	1943	1393	1206	1658	1938	1888	1759	3580	2450	1505	95
Shreveport, La.	764	548	1004	1433	1410	510	1080	725	688	904	799	624	891	752	1002	209	233	615	142	1043	733	326	142
Spokane, Wash.	1028	1930	2110	290	2279	1852	1900	1514	1746	1804	827	1243	1715	1328	975	1470	1753	1061	1552	1360	2639	1286	93
Springfield, Mass.	1889	863	282	2196	79	1859	325	774	659	473	1602	1085	540	1990	1240	1454	1524	1240	1284	660	937	1713	251
Vermillion, S. Dak.	742	917	1083	973	1314	1151	916	479	694	785	468	187	705	920	284	680	938	167	605	510	1203	280	122
Washington, D. C.	1648	542	33	2045	392	1493	290	594	403	303	1490	895	397	1726	1141	1210	1214	1139	936	813	647	943	229

## HOW TO USE RADEX

If properly used RADEX will add immeasurably to the pleasure and success in tuning. In the "Index by Frequencies" note that the stations are arranged in groups according to their frequency or "beat." Each station in any of these groups must come in at exactly the same places on the dials as the others in that group. If it does not it is temporarily off its legal frequency and should not be logged.

Tune in any station and enter the dial readings in the spaces opposite the frequency or wave-length of that station as shown in the reproduction on this page. Now tune in another station and again enter the dial numbers as before. Continue doing this for as many stations as you can receive. You will notice that your dial numbers have either an ascending or

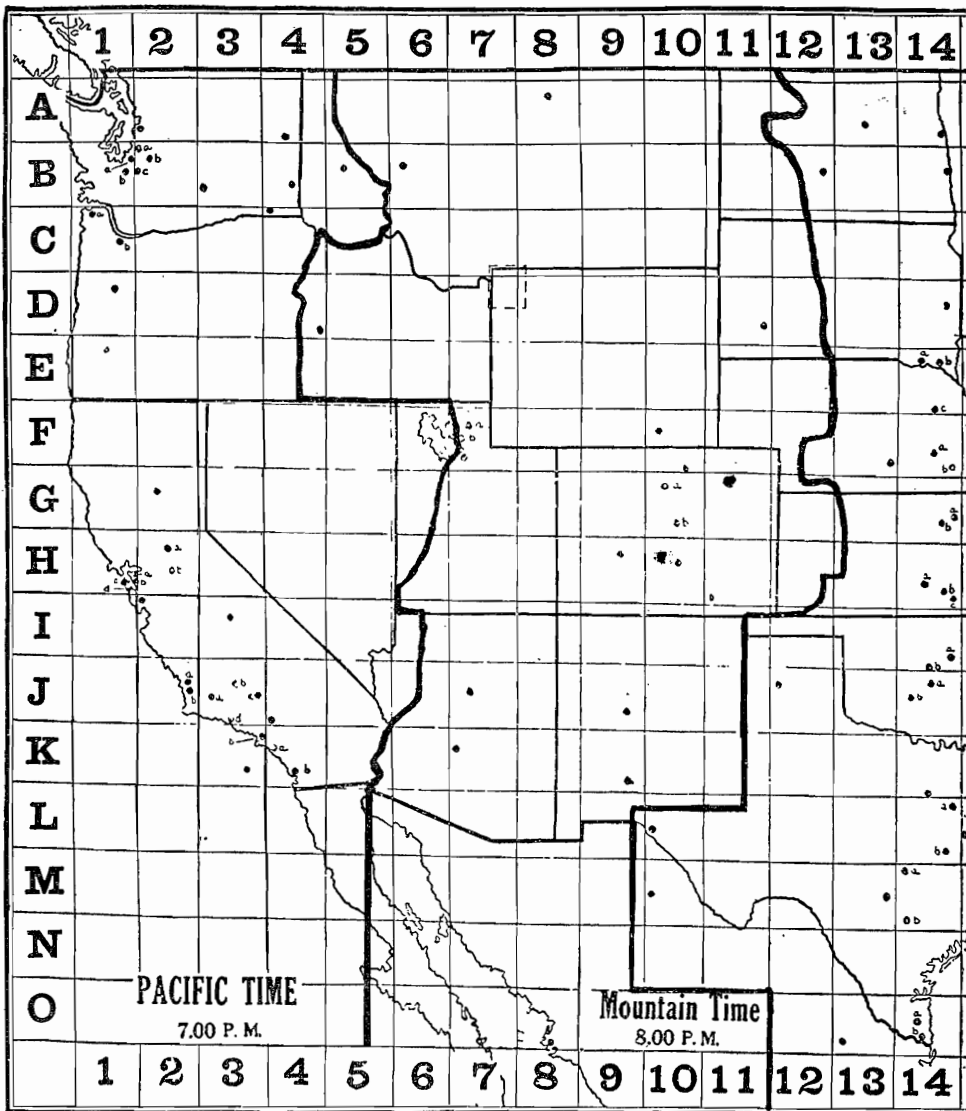
### INDEX BY FREQUENCY

640 kilocycles	468.5 meters
KFI	590 Los Angeles, Calif.
WABC	1000 New York City
W	



# IN STATUTE MILES

Louisville, Ky.	1174	938	1710	980	895	1117	1030	1810	1694	518	718	1748	330	1498	2015	1107	1628	938	483	893	1823	1178	764	1028	1889	742	1648
Memphis, Tenn.	317	335	610	905	1790	218	427	747	507	753	815	663	1592	520	1022	2172	470	467	1580	2133	840	2180	548	1960	863	917	542
Miami, Fla.	498	722	958	948	1947	597	1001	170	167	1173	1026	90	2002	194	446	2367	128	731	1858	2451	278	2310	1064	2110	282	1083	33
Minneapolis, Minn.	1623	1506	2368	1140	252	1631	1713	2153	2137	1138	1044	2113	733	1863	2282	349	2060	1389	292	516	2120	405	1633	290	2196	973	2045
Missoula, Mont.	823	1133	1258	1129	2124	941	1359	188	467	1490	1280	268	2295	478	100	2553	471	1036	2099	2696	150	2508	1410	2279	79	1314	392
Mobile, Ala.	1093	777	1100	1335	1706	952	536	1695	1465	659	1061	1614	1023	1424	1961	1944	1428	925	1317	1675	1770	2015	510	1858	1805	1161	1493
New Orleans, La.	403	802	1184	733	1740	462	1087	291	435	1117	883	278	1904	178	438	2167	375	662	1701	2298	249	2130	1080	1900	325	916	290
New York, N. Y.	268	481	1190	356	1348	394	831	711	696	689	432	669	1451	411	892	1765	618	259	1460	1855	702	1743	725	1514	774	479	594
Portland, Me.	92	410	957	603	1578	239	708	568	474	755	620	501	1578	258	802	1987	399	308	1450	2037	605	1974	688	1746	659	479	403
Portland, Ore.	309	627	1088	632	1640	456	922	404	429	946	738	343	1745	115	603	2063	353	490	1567	2163	408	2035	904	1804	478	785	308
Portland, Va.	1035	878	1732	699	670	1018	1079	1628	1562	603	482	1575	585	1320	1803	985	1488	793	372	946	1168	1020	799	827	1692	648	1690
Richmond, Va.	477	485	1338	235	1074	523	825	1023	983	569	122	972	1154	718	1197	1479	905	70	952	1547	1012	1470	624	1243	1085	187	895
St. Louis, Mo.	315	621	1156	542	1552	468	938	483	522	905	666	444	1685	208	657	1975	445	152	2490	2087	467	1945	891	1715	540	705	397
Salt Lake City, Utah	1253	978	1662	1156	1115	1169	986	1902	1755	578	875	1834	347	1592	2126	1286	1695	1033	689	993	1930	1373	752	1238	1990	920	1726
San Francisco, Calif.	818	882	1721	219	819	900	1221	1213	1258	786	390	1186	1225	952	1313	1248	1180	568	865	1447	1157	1205	202	976	1240	284	1141
San Jose, Calif.	751	448	1150	870	1312	643	470	798	1226	188	590	1324	858	1097	1642	1612	1170	568	977	1454	1445	1658	1009	1470	1495	689	1210
Seattle, Wash.	807	492	941	1087	1595	666	288	5	1195	456	828	1335	1065	1140	1678	1885	1154	697	1249	1693	1487	1938	233	1753	1534	938	1214
Shreveport, La.	693	591	1468	399	891	697	870	1275	1216	357	135	1222	901	967	1454	1271	1142	455	708	1297	1367	1288	615	1061	1340	167	1139
Spokane, Wash.	480	176	983	722	1385	700	358	1125	955	260	490	1051	1094	825	1371	1733	897	385	1116	1648	1175	1759	142	1552	1224	605	936
Springfield, Mass.	636	30	1545	272	1208	760	1187	849	946	926	547	827	1550	630	924	1638	870	591	1242	1383	776	1588	1043	1360	860	510	619
Vermillion, S. Dak.	595	591	1228	1192	2070	502	511	838	548	76	1098	756	1800	703	1113	2442	953	755	1840	2375	960	2450	733	2239	597	1303	667
Washington, D.C.	480	370	1247	413	1117	472	678	14	1009	3	165	1037	1045	784	1300	1397	93	238	922	1500	1107	1505	326	1286	1173	280	943
	1825	1602	2355	1522	910	1777	1675	2446	2352	1182	1312	2388	357	2135	2631	825	2283	1585	577	545	2445	956	1420	939	2515	1291	2925
	---	319	923	605	1550	153	623	650	528	675	579	580	1513	345	892	1953	457	242	1400	1983	695	1945	598	1720	745	663	473
	319	---	878	700	483	195	358	953	778	422	529	878	1264	660	1205	1852	722	242	1250	1860	1010	1877	299	1652	1055	642	763
	923	878	---	1516	2359	821	681	1795	802	1233	1402	1023	1998	1014	1357	2716	831	1087	2098	2603	1229	2740	950	2528	1210	1510	927
	605	700	1516	---	1010	665	1050	1919	1047	692	291	985	1279	745	1415	1435	966	464	988	1585	975	1403	859	1173	1056	238	936
	1550	1483	2359	1010	---	1582	1733	2030	2045	1162	978	1997	932	1754	2133	430	1967	1331	435	762	1978	395	1457	170	2060	887	1940
	153	195	821	695	1582	---	470	758	586	602	604	683	1445	472	1015	1970	526	533	1390	1958	820	1973	470	1752	863	704	567
	683	258	681	1050	1733	470	---	1173	322	575	845	1090	1318	923	1445	2063	899	599	1433	1923	1259	2098	280	1898	1287	960	968
	650	953	1095	1019	2030	758	1173	---	293	1324	1144	83	2142	313	277	2455	287	873	1972	2566	142	2419	1230	1910	1189	204	
	528	778	802	1407	2045	586	932	---	893	---	1186	1095	2027	316	565	2458	787	771	1925	2510	462	2458	1037	2211	411	1166	145
	675	422	1233	692	1162	602	575	1324	1186	---	405	1256	843	1013	1550	1468	1132	456	862	1386	1354	1523	297	1324	1412	502	1510
	599	529	1402	291	978	604	845	1144	1905	405	---	1044	1032	837	1318	1373	1020	552	833	1425	1133	1372	617	1149	1205	115	1012
	580	878	1023	985	1997	683	1090	83	220	1256	1094	---	2079	254	360	2419	205	808	1923	2518	805	2388	1153	2159	801	1143	122
	1512	1264	1998	1279	932	1445	1318	2142	2027	843	1032	2079	---	1829	2345	1097	1960	1270	50	652	2152	1112	1067	1020	2220	1083	1950
	345	606	1014	745	1754	472	923	31	316	1013	837	254	1829	---	545	2174	242	561	1670	2264	590	2145	939	1918	400	891	188
	892	1209	1377	1145	2133	1015	1445	277	555	1550	1318	360	2345	545	---	2563	565	1094	2127	2725	197	2513	1484	2285	159	1348	480
	1853	1852	2176	1435	430	1970	2063	2455	458	1468	1373	2419	1007	2174	2563	---	2381	1723	636	536	2405	143	1783	295	2488	1293	2360
	457	722	831	968	1967	526	899	287	79	1122	1020	205	1960	242	565	2381	---	689	1850	2436	406	2362	985	2133	407	1089	96
	842	242	1067	464	1331	253	599	673	771	456	352	808	1270	561	1094	1723	699	---	1158	1738	890	1722	466	1500	958	450	710
	1400	1250	2098	988	435	1390	1435	1972	1925	862	833	1923	564	1702	2127	636	1850	1158	---	592	1950	697	1155	548	2027	785	1445
	1983	1800	2603	1585	762	1598	1923	2568	2510	1386	1425	1518	652	2264	2725	536	2436	1738	592	---	2548	680	1655	790	2625	1983	2637
	695	1010	1229	975	1978	820	1259	1462	426	1354	1133	205	2152	350	197	2405	406	898	1950	2548	---	2363	1390	2139	86	1165	313
	594	1867	2740	1403	395	1973	2098	419	2440	1523	1372	2388	1112	2145	2153	143	2362	1722	697	680	2363	---	1820	229	2445	1282	3335
	1295	279	950	859	1457	470	280	1230	1037	297	617	1153	1067	939	1484	1793	985	466	1155	1655	1290						



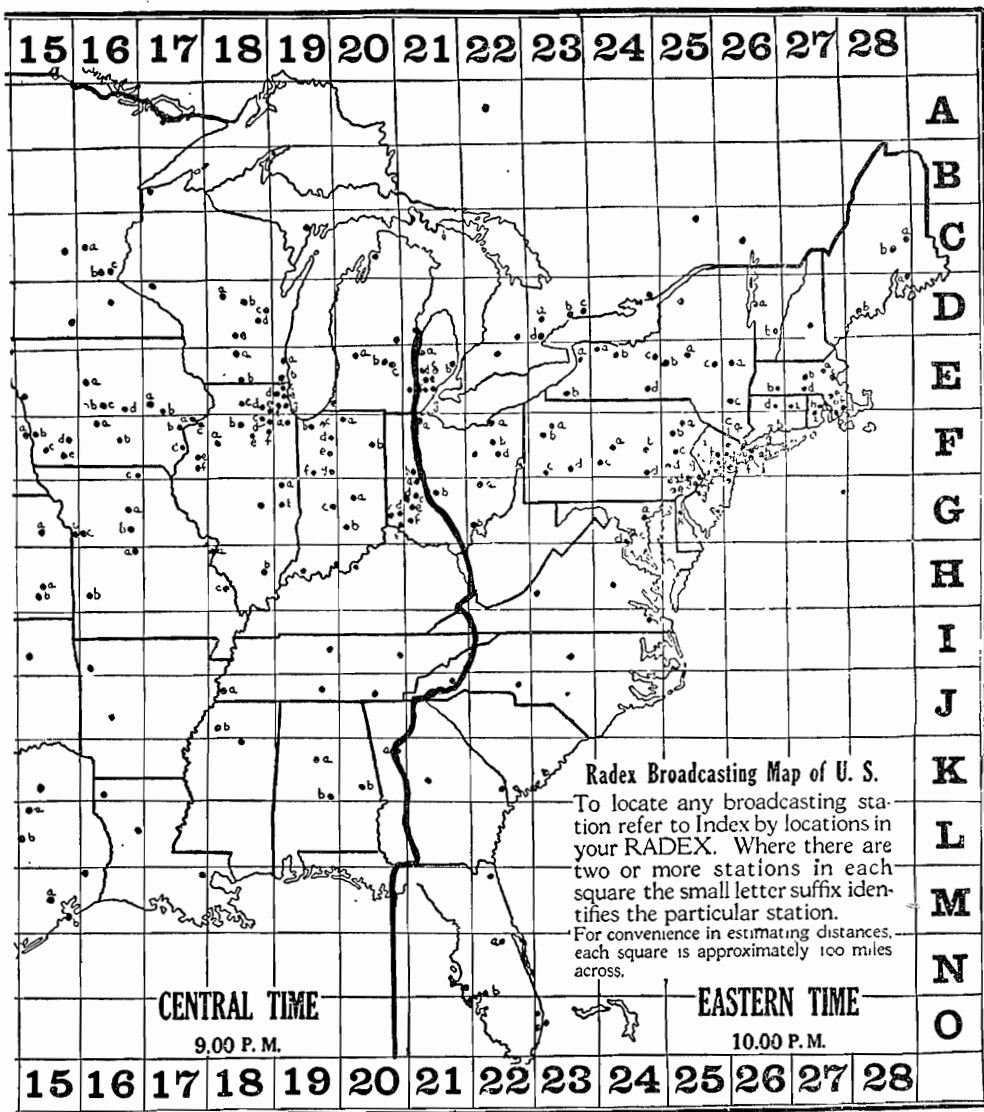
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<b>CFAC</b> 690				<b>CHYC</b> 730			
Calgary, Alta.				Montreal, Que.			
<b>CFBO</b> 890				<b>CJBC</b> 580-840-960			
St. John, N. B.				Toronto, Ont.			
<b>CFCA</b> 840				<b>CJBR</b> 960			
Toronto, Ont.				Regina, Sask.			
<b>CFCF</b> 730				<b>CJCA</b> 580			
Montreal, Que.				Edmonton, Alta.			
<b>CFCH</b> 600				<b>CJCJ</b> 690			
Iroquois Falls, Ont.				Calgary, Alta.			
<b>CFCL</b> 580				<b>CJGC</b> 910			
Toronto, Ont.				London, Ont.			
<b>CFCN</b> 690				<b>CJGX</b> 630			
Calgary, Alta.				Yorkton, Sask.			
<b>CFCO</b> 1210				<b>CJHS</b> 910			
Chatham, Ont.				Saskatoon, Sask.			
<b>CFCT</b> 630				<b>CJOC</b> 1120			
Victoria, B. C.				Lethbridge, Alta.			
<b>CFCY</b> 960				<b>CJOR</b> 1030			
Charlottetown, P.E.I.				Sea Island, B. C.			
<b>CFJC</b> 1120				<b>CJRM</b> 1010			
Kamloops, B. C.				Moose Jaw, Sask.			
<b>CFLC</b> 1010				<b>CJRW</b> 1010			
Prescott, Ont.				Fleming, Sask.			
<b>CFMC</b> 1120				<b>CJSC</b> 580			
Kingston, Ont.				Toronto, Ont.			
<b>CFNB</b> 1210				<b>CKAC</b> 730			
Fredericton, N. B.				Montreal, Que.			
<b>CFQC</b> 910				<b>CKCD</b> 730			
Saskatoon, Sask.				Vancouver, B. C.			
<b>CFRB</b> 960				<b>CKCI</b> 880			
Twp. of King, Ont.				Quebec, Que.			
<b>CFRC</b> 1120				<b>CKCK</b> 960			
Kingston, Ont.				Regina, Sask.			
<b>CHCA</b> 690				<b>CKCL</b> 580			
Calgary, Alta.				Toronto, Ont.			
<b>CHCK</b> 960				<b>CKCO</b> 690			
Charlottetown, P.E.I.				Ottawa, Ont.			
<b>CHCS</b> 880				<b>CKCR</b> 1010			
Hamilton, Ont.				Brantford, Ont.			
<b>CHCT</b> 840				<b>CKCV</b> 880			
Red Deer, Alta.				Quebec, Que.			
<b>CHGS</b> 1120				<b>CKFC</b> 730			
Summerside, P. E. I.				Vancouver, B. C.			
<b>CHLS</b> 730				<b>CKGW</b> 960			
Vancouver, B. C.				Bowmanville, Ont.			
<b>CHMA</b> 580				<b>CKLC</b> 840			
Edmonton, Alta.				Red Deer, Alta.			
<b>CHML</b> 880				<b>CKMC</b> 1210			
Hamilton, Ont.				Cobalt, Ont.			
<b>CHNC</b> 580				<b>CKMO</b> 730			
Toronto, Ont.				Vancouver, B. C.			
<b>CHNS</b> 930				<b>CKNC</b> 580			
Halifax, N. S.				Toronto, Ont.			
<b>CHRC</b> 880				<b>CKOC</b> 880			
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<b>CHWC</b> 960				<b>CKOW</b> 840			
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<b>CHWK</b> 1210				<b>CKPC</b> 1210			
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<b>CKSH</b>	1010			<b>CZF</b>	970		
St. Hyacinthe, Que.				Chihuahua, Mex.			
<b>CKUA</b>	580			<b>HHK</b>	830		
Edmonton, Alta.				Port au Prince, Haiti			
<b>CKWX</b>	730			<b>KDKA</b>	980		
Vancouver, B. C.				Pittsburgh, Pa.			
<b>CKY</b>	780			<b>KDLR</b>	1210		
Winnipeg, Man.				Devils Lake, N. D.			
<b>CNRA</b>	630			<b>KDYL</b>	1290		
Moncton, N. B.				Salt Lake City			
<b>CNRC</b>	690			<b>KEJK</b>	1250		
Calgary, Alta.				Los Angeles, Calif.			
<b>CNRE</b>	580			<b>KELW</b>	780		
Edmonton, Alta.				Burbank, Calif.			
<b>CNRM</b>	730			<b>KEX</b>	1180		
Montreal, Que.				Portland, Ore.			
<b>CNRO</b>	690			<b>KFAB</b>	770		
Ottawa, Ont.				Lincoln, Nebr.			
<b>CNRQ</b>	880			<b>KFAD</b>	620		
Quebec, Que.				Phoenix, Ariz.			
<b>CNRR</b>	960			<b>KFAU</b>	1250		
Regina, Sask.				Boise, Idaho			
<b>CNRS</b>	910			<b>KFBF</b>	1360		
Saskatoon, Sask.				Havre, Mont.			
<b>CNRT</b>	840			<b>KFBK</b>	1310		
Toronto, Ont.				Sacramento, Calif.			
<b>CNRV</b>	1030			<b>KFBL</b>	1370		
Vancouver, B. C.				Everett, Wash.			
<b>CNRW</b>	780			<b>KFBU</b>	600		
Winnipeg, Man.				Laramie, Wyo.			
<b>CYA</b>	1000			<b>KFCB</b>	1310		
Mexico City				Phoenix, Ariz.			
<b>CYB</b>	1090			<b>KFCR</b>	1500		
Mexico City				Santa Barbara, Calif.			
<b>CYC</b>	890			<b>KFDM</b>	560		
Vera Cruz, Mex.				Beaumont, Texas			
<b>CYF</b>	1130			<b>KFDX</b>	1210		
Oaxaca, Mex.				Shreveport, La.			
<b>CYH</b>	800			<b>KFDY</b>	550		
Mexico City				Brookings, S. D.			
<b>CYJ</b>	750			<b>KFEC</b>	1370		
Mexico City				Portland, Ore.			
<b>CYL</b>	750			<b>KFEL</b>	940		
Mexico City				Denver, Colo.			
<b>CYM</b>	1330			<b>KFEQ</b>	560		
Torreón, Mex.				St. Joseph, Mo.			
<b>CYO</b>	710			<b>KFEY</b>	1210		
Mexico City				Kellogg, Idaho			
<b>CYQ</b>	930			<b>KFGQ</b>	1310		
Tampico, Mex.				Boone, Iowa			
<b>CYR</b>	630			<b>KFH</b>	1300		
Mazatlan, Mex.				Wichita, Kansas			
<b>CYU</b>	960			<b>KFHA</b>	1200		
Puebla, Mex.				Gunnison, Colo.			
<b>CYX</b>	920			<b>KFI</b>	640		
Mexico City				Los Angeles, Calif.			
<b>CYY</b>	550						
Merida, Mex.							

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KFIO	1230			KFQW	1420		
Spokane, Wash.				Seattle, Wash.			
KFIU	1310			KFQZ	850		
Juneau, Alaska				Hollywood, Calif.			
KFIZ	1420			KFRC	610		
Fond du Lac, Wis.				San Francisco, Cal.			
KFJB	1200			KFRU	630		
Marshalltown, Iowa				Columbia, Mo.			
KFJF	1470			KFSD	600		
Oklahoma City				San Diego, Calif.			
KFJI	1370			KFSG	1120		
Astoria, Ore.				Los Angeles, Calif.			
KFJM	550			KFUL	1290		
Grand Forks, N. D.				Galveston, Texas			
KFJR	1300			KFUM	1270		
Portland, Ore.				Colorado Spgs., Colo.			
KFJY	1310			KFUO	550		
Fort Dodge, Iowa				St. Louis, Mo.			
KFJZ	1370			KFUP	1310		
Ft. Worth, Texas				Denver, Colo.			
KFKA	880			KFUR	1370		
Greeley, Colo.				Ogden, Utah			
KFKB	1130			KFVD	700		
Milford, Kansas				Culver City, Calif.			
KFKU	1220			KFVS	1210		
Lawrence, Kans.				Cape Girardeau, Mo.			
KFKX	1020			KFWB	950		
Chicago, Ill.				Los Angeles, Calif.			
KFKZ	1200			KFWC	1200		
Kirkville, Mo.				San Bernardino, Cal.			
KFLV	1410			KFWF	1200		
Rockford, Ill.				St. Louis, Mo.			
KFLX	1370			KFWI	930		
Galveston, Texas				San Francisco, Calif.			
KFMX	1250			KFWM	930		
Northfield, Minn.				Oakland, Calif.			
KFNF	890			KFWO	1500		
Shenandoah, Iowa				Avalon, Calif.			
KFOA	1270			KFXD	1420		
Seattle, Wash.				Jerome, Idaho			
KFON	1250			KFXF	940		
Long Beach, Calif.				Denver, Colo.			
KFOR	1210			KFXJ	1310		
Lincoln, Nebr.				Edgewater, Colo.			
KFPL	1310			KFXR	1310		
Dublin, Texas				Oklahoma City			
KFPM	1310			KFXY	1420		
Greenville, Texas				Flagstaff, Ariz.			
KFPW	1340			KFYO	1420		
Sulphur Spgs., Ark.				Breckenridge, Texas			
KFPY	1390			KFYR	550		
Spokane, Wash.				Bismarck, N. Dak.			
KFQB	1240			KGA	1470		
Ft. Worth, Texas				Spokane, Wash.			
KFQD	1230			KGAR	1370		
Anchorage, Alaska				Tucson, Ariz.			

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KGBX	1370					KGFW	1420				
St. Joseph, Mo.						Ravenna, Nebr.					
KGBY	930					KGFX	580				
Columbus, Nebr.						Pierre, S. Dak.					
KGBZ	930					KGGF	1010				
York, Nebr.						Picher, Okla.					
KGCA	1270					KGGH	1310				
Decorah, Iowa						Cedar Grove, La.					
KGCB	1370					KGGM	1370				
Oklahoma City						Albuquerque, N. M.					
KGCH	930					KGHB	1320				
Wayne, Nebr.						Honolulu, Hawaii					
KGCI	1370					KGHD	1420				
San Antonio, Texas						Missoula, Mont.					
KGCN	1420					KGHF	1320				
Concordia, Kans.						Pueblo, Colo.					
KGCR	1210					KGHG	1310				
Brookings, S. Dak.						McGehee, Ark.					
KGCU	1200					KGHI	1500				
Mandan, N. Dak.						Little Rock, Ark.					
KGCCX	1420					KGHL	950				
Vida, Mont.						Billings, Mont.					
KGDA	1370					KGHX	1500				
Dell Rapids, S. D.						Richmond, Texas					
KGDE	1200					KGIO	1320				
Barrett, Minn.						Idaho Falls, Ida.					
KGDM	1150					KGIQ	1320				
Stockton, Calif.						Twin Falls, Ida.					
KGDP	1210					KGIR	1360				
Pueblo, Colo.						Butte, Mont.					
KGDR	1500					KGJF	890				
San Antonio, Texas						Little Rock, Ark.					
KGDW	930					KGKB	1500				
Humboldt, Nebr.						Goldthwaite, Texas					
KGDY	1200					KGKL	1370				
Oldham, S. Dak.						San Angelo, Texas					
KGEF	1300					KGKO	570				
Los Angeles, Calif.						Wichita Falls, Texas					
KGEK	1200					KGO	790				
Yuma, Colo.						Oakland, Calif.					
KGEN	1200					KGRC	1370				
El Centro, Calif.						San Antonio, Texas					
KGEO	930					KGRS	1410				
Grand Island, Nebr.						Amarillo, Texas					
KGER	1370					KGTT	1420				
Long Beach, Calif.						San Francisco, Calif.					
KGES	930										
Central City, Nebr.											
KGEW	1200										
Fort Morgan, Colo.											
KGEZ	1310										
Kalispell, Mont.											
KGFF	1420										
Alva, Okla.											

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<b>KGU</b> 940				<b>KOH</b> 1370			
Honolulu, Hawaii				Reno, Nevada			
<b>KGW</b> 620				<b>KOIL</b> 1260			
Portland, Ore.				Council Bluffs, Iowa			
<b>KGY</b> 1200				<b>KOIN</b> 940			
Lacey, Wash.				Portland, Ore.			
<b>KHJ</b> 900				<b>KOMO</b> 920			
Los Angeles, Calif.				Seattle, Wash.			
<b>KHQ</b> 590				<b>KORE</b> 1420			
Spokane, Wash.				Eugene, Ore.			
<b>KICK</b> 1420				<b>KOW</b> 1390			
Red Oak, Iowa				Denver, Colo.			
<b>KJBS</b> 1100				<b>KPCB</b> 1210			
San Francisco, Calif.				Seattle, Wash.			
<b>KJR</b> 970				<b>KPJM</b> 1500			
Seattle, Wash.				Prescott, Ariz.			
<b>KKP</b> 1420				<b>KPLA</b> 570			
Seattle, Wash.				Los Angeles, Calif.			
<b>KLCN</b> 1290				<b>KPO</b> 680			
Blytheville, Ark.				San Francisco, Calif.			
<b>KLDS</b> 950				<b>KPOF</b> 880			
Independence, Mo.				Denver, Colo.			
<b>KLRA</b> 1390				<b>KPPC</b> 1200			
Little Rock, Ark.				Pasadena, Calif.			
<b>KLS</b> 1440				<b>KPQ</b> 1210			
Oakland, Calif.				Seattle, Wash.			
<b>KLX</b> 880				<b>KPRC</b> 920			
Oakland, Calif.				Houston, Texas			
<b>KLZ</b> 560				<b>KPSN</b> 950			
Denver, Colo.				Pasadena, Calif.			
<b>KMA</b> 930				<b>KQV</b> 1380			
Shenandoah, Iowa				Pittsburgh, Pa.			
<b>KMBC</b> 950				<b>KQW</b> 1010			
Independence, Mo.				San Jose, Calif.			
<b>KMED</b> 1420				<b>KRE</b> 1370			
Medford, Ore.				Berkeley, Calif.			
<b>KMIC</b> 1120				<b>KRGV</b> 1260			
Inglewood, Calif.				Harlingen, Texas			
<b>KMJ</b> 1200				<b>KRLD</b> 1040			
Fresno, Calif.				Dallas, Texas			
<b>KMMJ</b> 740				<b>KRMD</b> 1310			
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<b>KMO</b> 1340				<b>KRSC</b> 1120			
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<b>KMOX</b> 1090				<b>KSAC</b> 580			
St. Louis, Mo.				Manhattan, Kans.			
<b>KMTR</b> 570				<b>KSBA</b> 1450			
Hollywood, Calif.				Shreveport, La.			
<b>KNRC</b> 780				<b>KSCJ</b> 1330			
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<b>KNX</b> 1050				<b>KSD</b> 550			
Los Angeles, Calif.				St. Louis, Mo.			
<b>KOA</b> 830				<b>KSEI</b> 900			
Denver, Colo.				Pocatello, Idaho			
<b>KOAC</b> 560				<b>KSL</b> 1130			
Corvallis, Ore.				Salt Lake City			
<b>KOB</b> 1180				<b>KSMR</b> 1200			
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St. Paul, Minn.					Brownsville, Texas				
<b>KTAB</b> 1280					<b>KXA</b> 570				
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<b>KTAP</b> 1420					<b>KXL</b> 1250				
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<b>KTBI</b> 1300					<b>KXRO</b> 1420				
Los Angeles, Calif.					Aberdeen, Wash.				
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<b>KTHS</b> 800					<b>KYW</b> 1020				
Hot Springs, Ark.					Chicago, Ill.				
<b>KTNT</b> 1170					<b>KZM</b> 1370				
Muscataine, Iowa					Hayward, Calif.				
<b>KTSA</b> 1290					<b>NAA</b> 690				
San Antonio, Texas					Arlington, Va.				
<b>KTUE</b> 1420					<b>PWX</b> 750				
Houston, Texas					Havana, Cuba				
<b>KTW</b> 1270					<b>WAAD</b> 1420				
Seattle, Wash.					Cincinnati, Ohio				
<b>KUJ</b> 1500					<b>WAAF</b> 920				
Longview, Wash.					Chicago, Ill.				
<b>KUOA</b> 1390					<b>WAAM</b> 1250				
Fayetteville, Ark.					Newark, N. J.				
<b>KUOM</b> 570					<b>WAAT</b> 1070				
Missoula, Mont.					Jersey City, N. J.				
<b>KUSD</b> 890					<b>WAAW</b> 660				
Vermillion, S. Dak.					Omaha, Nebr.				
<b>KUT</b> 1120					<b>WABC</b> 860				
Austin, Texas					New York City				
<b>KVI</b> 1340					<b>WABF</b> 1440				
Tacoma, Wash.					Kingston, Pa.				
<b>KVL</b> 1370					<b>WABI</b> 1200				
Seattle, Wash.					Bangor, Maine				
<b>KVOO</b> 1140					<b>WABO</b> 1440				
Tulsa, Okla.					Rochester, N. Y.				
<b>KVOS</b> 1200					<b>WABY</b> 1310				
Bellingham, Wash.					Philadelphia, Pa.				
<b>KWBS</b> 1500					<b>WABZ</b> 1200				
Portland, Ore.					New Orleans, La.				
<b>KWCR</b> 1310					<b>WADC</b> 1320				
Cedar Rapids, Iowa					Akron, Ohio				
<b>KWEA</b> 1210					<b>WAFD</b> 1500				
Shreveport, La.					Detroit, Mich.				
<b>KWG</b> 1200					<b>WAGM</b> 1310				
Stockton, Calif.					Royal Oak, Mich.				
<b>KWJJ</b> 1060					<b>WAIU</b> 640				
Portland, Ore.					Columbus, Ohio				
<b>KWK</b> 1350					<b>WALK</b> 1500				
St. Louis, Mo.					Willow Grove, Pa.				
<b>KWKC</b> 1370					<b>WAPI</b> 1140				
Kansas City, Mo.					Auburn, Ala.				
<b>KWKH</b> 850					<b>WASH</b> 1270				
Shreveport, La.					Grand Rapids, Mich.				
<b>KWLC</b> 1270					<b>WBAA</b> 1400				
Decorah, Iowa					Lafayette, Ind.				
<b>KWSC</b> 1390					<b>WBAK</b> 1120				
Pullman, Wash.					Harrisburg, Pa.				

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<b>WBAL</b> 1060				<b>WCAL</b> 1250			
Baltimore, Md.				Northfield, Minn.			
<b>WBAP</b> 800				<b>WCAM</b> 1280			
Fort Worth, Texas				Camden, N. J.			
<b>WBAW</b> 1490				<b>WCAO</b> 600			
Nashville, Tenn.				Baltimore, Md.			
<b>WBAX</b> 1210				<b>WCAP</b> 1280			
Wilkes-Barre, Pa.				Asbury Park, N. J.			
<b>WBBC</b> 1400				<b>WCAT</b> 1200			
Brooklyn, N. Y.				Rapid City, S. D.			
<b>WBBL</b> 1370				<b>WCAU</b> 1170			
Richmond, Va.				Philadelphia, Pa.			
<b>WBBM</b> 770				<b>WCAX</b> 1200			
Chicago, Ill.				Burlington, Vt.			
<b>WBBR</b> 1300				<b>WCAZ</b> 1070			
Rossville, N. Y.				Carthage, Ill.			
<b>WBBW</b> 1200				<b>WCBA</b> 1500			
Norfolk, Va.				Allentown, Pa.			
<b>WBBY</b> 1200				<b>WCBD</b> 1080			
Charleston, S. C.				Zion, Ill.			
<b>WBBZ</b> 1200				<b>WCBM</b> 1370			
Ponca City, Okla.				Baltimore, Md.			
<b>WBET</b> 1360				<b>WCBS</b> 1210			
Boston, Mass.				Springfield, Ill.			
<b>WBIS</b> 1230				<b>WCCO</b> 810			
Boston, Mass.				Minneapolis-St. Paul			
<b>WBMH</b> 1310				<b>WCDA</b> 1350			
Detroit, Mich.				Brooklyn, N. Y.			
<b>WBMS</b> 1450				<b>WCFL</b> 970			
Union City, N. J.				Chicago, Ill.			
<b>WBNY</b> 1350				<b>WCGU</b> 1400			
New York City				Coney Island, N. Y.			
<b>WBOQ</b> 860				<b>WCLB</b> 1500			
New York City				Brooklyn, N. Y.			
<b>WBOW</b> 1310				<b>WCLO</b> 1200			
Terre Haute, Ind.				Kenosha, Wisc.			
<b>WBRC</b> 930				<b>WCLS</b> 1310			
Birmingham, Ala.				Joliet, Ill.			
<b>WBRE</b> 1310				<b>WCMA</b> 1400			
Wilkes-Barre, Pa.				Culver, Ind.			
<b>WBRL</b> 1430				<b>WCOA</b> 1120			
Tilton, N. H.				Pensacola, Fla.			
<b>WBSO</b> 780				<b>WCOC</b> 880			
Wellesley H'ls, Mass.				Columbus, Miss.			
<b>WBT</b> 1080				<b>WCOH</b> 1210			
Charlotte, N. C.				Greenville, N. Y.			
<b>WBZ</b> 990				<b>WCRW</b> 1210			
Springfield, Mass.				Chicago, Ill.			
<b>WBZA</b> 990				<b>WCSH</b> 940			
Boston, Mass.				Portland, Maine			
<b>WCAC</b> 1330				<b>WCSC</b> 1380			
Mansfield, Conn.				Springfield, Ohio			
<b>WCAD</b> 1220				<b>WCWK</b> 1230			
Canton, N. Y.				Fort Wayne, Ind.			
<b>WCAE</b> 1220				<b>WCX</b> 750			
Pittsburgh, Pa.				Detroit, Mich.			
<b>WCAH</b> 1430				<b>WDAE</b> 620			
Columbus, Ohio				Tampa, Fla.			
<b>WCAJ</b> 590				<b>WDAF</b> 610			
Lincoln, Nebr.				Kansas City, Mo.			

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<b>WDAG</b> 1410				<b>WEVD</b> 1300			
Amarillo, Texas				Woodhaven, N. Y.			
<b>WDAH</b> 1310				<b>WEW</b> 760			
El Paso, Texas				St. Louis, Mo.			
<b>WDAY</b> 1280				<b>WFAA</b> 1040			
Fargo, N. D.				Dallas, Texas			
<b>WDBJ</b> 930				<b>WFAN</b> 610			
Roanoke, Va.				Philadelphia, Pa.			
<b>WDBO</b> 620.				<b>WFBC</b> 1200			
Orlando, Fla.				Knoxville, Tenn.			
<b>WDEL</b> 1410				<b>WFBE</b> 1200			
Wilmington, Del.				Cincinnati, Ohio			
<b>WDGY</b> 1410				<b>WFBG</b> 1310			
Minneapolis, Minn.				Altoona, Pa.			
<b>WDOD</b> 1280				<b>WFBJ</b> 1370			
Chattanooga, Tenn.				Collegeville, Minn.			
<b>WDRC</b> 1330				<b>WFBL</b> 900			
New Haven, Conn.				Syracuse, N. Y.			
<b>WDSU</b> 1270				<b>WFBM</b> 1050-1230			
New Orleans, La.				Indianapolis, Ind.			
<b>WDWF</b> 1210				<b>WFBR</b> 1120			
Cranston, R. I.				Baltimore, Md.			
<b>WDZ</b> 1070				<b>WFCI</b> 1210			
Tuscola, Ill.				Pawtucket, R. I.			
<b>WEAI</b> 1270				<b>WFDF</b> 1310			
Ithaca, N. Y.				Flint, Mich.			
<b>WEAF</b> 660				<b>WFI</b> 560			
New York City				Philadelphia, Pa.			
<b>WEAM</b> 1370				<b>WFIW</b> 940			
Plainfield, N. J.				Hopkinsville, Ky.			
<b>WEAN</b> 1160				<b>WFJC</b> 1450			
Providence, R. I.				Akron, Ohio			
<b>WEAO</b> 550				<b>WFKD</b> 1310			
Columbus, Ohio				Philadelphia, Pa.			
<b>WEAR</b> 1070				<b>WFLA</b> 900			
Cleveland, Ohio				Clearwater, Fla.			
<b>WEBC</b> 1280				<b>WGAL</b> 1310			
Superior, Wis.				Lancaster, Pa.			
<b>WEBE</b> 1210				<b>WGBB</b> 1210			
Cambridge, Ohio				Freeport, N. Y.			
<b>WEBQ</b> 1210				<b>WGBC</b> 1430			
Harrisburg, Ill.				Memphis, Tenn.			
<b>WEBR</b> 1310				<b>WGBF</b> 630			
Buffalo, N. Y.				Evansville, Ind.			
<b>WEBW</b> 600				<b>WGBI</b> 880			
Beloit, Wisc.				Scranton, Pa.			
<b>WEDC</b> 1210				<b>WGBS</b> 1180			
Chicago, Ill.				New York City			
<b>WEDH</b> 1420				<b>WGCM</b> 1210			
Erie, Pa.				Gulfport, Miss.			
<b>WEEI</b> 590				<b>WGCP</b> 1250			
Boston, Mass.				Newark, N. J.			
<b>WEHS</b> 1310				<b>WGES</b> 1360			
Evanston, Ill.				Chicago, Ill.			
<b>WEMC</b> 590				<b>WGHP</b> 1240			
Berrien Spgs., Mich.				Detroit, Mich.			
<b>WENR</b> 870				<b>WGMS</b> 1250			
Chicago, Ill.				St. Paul-Minneapolis			
<b>WEPS</b> 1200				<b>WGN</b> 720			
Gloucester, Mass.				Chicago, Ill.			

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WGR 550					WIBG 930				
Buffalo, N. Y.					Elkins Park, Pa.				
WGST 890					WIBM 1370				
Atlanta, Ga.					Jackson, Mich.				
WGY 790					WIBO 1480				
Schenectady, N. Y.					Chicago, Ill.				
WHA 570					WIBR 1420				
Madison, Wisc.					Steubenville, Ohio				
WHAD 1120					WIBS 1450				
Milwaukee, Wisc.					Elizabeth, N. J.				
WHAM 1150					WIBU 1310				
Rochester, N. Y.					Poynette, Wisc.				
WHAP 1300					WIBW 1300				
New York City					Topeka, Kansas				
WHAS 820					WIBX 1200				
Louisville, Ky.					Utica, N. Y.				
WHAZ 1300					WIBZ 1500				
Troy, N. Y.					Montgomery, Ala.				
WHB 950					WICC 1430				
Kansas City, Mo.					Bridgeport, Conn.				
WHBC 1200					WIL 1350				
Canton, Ohio					St. Louis, Mo.				
WHBD 1370					WINR 1210				
Bellefontaine, Ohio					Bay Shore, N. Y.				
WHBF 1210					WIOD 1240				
Rock Island, Ill.					Miami Beach, Fla.				
WHBL 1410					WIP 610				
Sheboygan, Wisc.					Philadelphia, Pa.				
WHBP 1310					WISN 1120				
Johnstown, Pa.					Milwaukee, Wisc.				
WHBQ 1370					WJAD 1240				
Memphis, Tenn.					Waco, Texas				
WHBU 1210					WJAG 1060				
Anderson, Ind.					Norfolk, Nebr.				
WHBW 1500					WJAK 1310				
Philadelphia, Pa.					Kokomo, Ind.				
WHBY 1200					WJAM 1200				
West De Pere, Wisc.					Waterloo, Iowa				
WHDI 1410					WJAR 890				
Minneapolis, Minn.					Providence, R. I.				
WHEC 1440					WJAS 1290				
Rochester, N. Y.					Pittsburgh, Pa.				
WHFC 1310					WJAX 1260				
Chicago, Ill.					Jacksonville, Fla.				
WHK 1390					WJAY 1450				
Cleveland, Ohio					Cleveland, Ohio				
WHN 1010					WJAZ 1480				
New York City					Chicago, Ill.				
WHO 1000					WJBB 1010				
Des Moines, Iowa					Sarasota, Fla.				
WHPP 1420					WJBC 1200				
New York City					La Salle, Ill.				
WHT 1480					WJBI 1210				
Chicago, Ill.					Red Bank, N. J.				
WIAD 1370					WJBK 1370				
Philadelphia, Pa.					Ypsilanti, Mich.				
WIAS 1420					WJBL 1200				
Ottumwa, Iowa					Decatur, Ill.				
WIBA 1210					WJBO 1370				
Madison, Wis.					New Orleans, La.				

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<b>WJBU</b> 1210				<b>WLB</b> 1250			
Lewisburg, Pa.				Minneapolis, Minn.			
<b>WJBW</b> 1200				<b>WLBC</b> 1310			
New Orleans, La.				Muncie, Ind.			
<b>WJBY</b> 1210				<b>WLBFB</b> 1420			
Gadsden, Ala.				Kansas City, Mo.			
<b>WJJD</b> 1180				<b>WLBG</b> 1200			
Mooseheart, Ill.				Petersburg, Va.			
<b>WJKS</b> 1360				<b>WLBH</b> 1420			
Gary, Ind.				Farmingdale, N. Y.			
<b>WJR</b> 750				<b>WLBL</b> 900			
Detroit, Mich.				Stevens Point, Wisc.			
<b>WJZ</b> 760				<b>WLBO</b> 1310			
New York City				Galesburg, Ill.			
<b>WKAQ</b> 580				<b>WLBV</b> 1210			
San Juan, P. R.				Mansfield, Ohio			
<b>WKAR</b> 1040				<b>WLBW</b> 1260			
East Lansing, Mich.				Oil City, Pa.			
<b>WKAV</b> 1310				<b>WLBX</b> 1500			
Laconia, N. H.				Long Island City, N. Y.			
<b>WKBB</b> 1310				<b>WLBZ</b> 620			
Joliet, Ill.				Dover-Foxcroft, Me.			
<b>WKBC</b> 1310				<b>WLCI</b> 1210			
Birmingham, Ala.				Ithaca, N. Y.			
<b>WKBE</b> 1200				<b>WLEX</b> 1420			
Webster, Mass.				Lexington, Mass.			
<b>WKBF</b> 1400				<b>WLIB</b> 720			
Indianapolis, Ind.				Chicago, Ill.			
<b>WKBH</b> 1380				<b>WLIT</b> 560			
La Crosse, Wisc.				Philadelphia, Pa.			
<b>WKBI</b> 1310				<b>WLOE</b> 1500			
Chicago, Ill.				Chelsea, Mass.			
<b>WKBN</b> 570				<b>WLS</b> 870			
Youngstown, Ohio				Chicago, Ill.			
<b>WKBO</b> 1450				<b>WLSI</b> 1210			
Jersey City, N. J.				Cranston, R. I.			
<b>WKBP</b> 1420				<b>WLTH</b> 1400			
Battle Creek, Mich.				Brooklyn, N. Y.			
<b>WKBQ</b> 1350				<b>WLW</b> 700			
New York City				Cincinnati, Ohio			
<b>WKBS</b> 1310				<b>WLWL</b> 1100			
Galesburg, Ill.				New York City			
<b>WKBV</b> 1500				<b>WMAC</b> 1440			
Brookville, Ind.				Cazenovia, N. Y.			
<b>WKBW</b> 1470				<b>WMAF</b> 1360			
Buffalo, N. Y.				S. Dartmouth, Mass.			
<b>WKBZ</b> 1500				<b>WMAK</b> 900			
Ludington, Mich.				Buffalo, N. Y.			
<b>WKEN</b> 1040				<b>WMAL</b> 630			
Grand Island, N. Y.				Washington, D. C.			
<b>WKJC</b> 1200				<b>WMAN</b> 1210			
Lancaster, Pa.				Columbus, Ohio			
<b>WKRC</b> 550				<b>WMAQ</b> 670			
Cincinnati, Ohio				Chicago, Ill.			
<b>WKY</b> 900				<b>WMAY</b> 1200			
Oklahoma City				St. Louis, Mo.			
<b>WLAC</b> 1490				<b>WMAZ</b> 890			
Nashville, Tenn.				Macon, Ga.			
<b>WLAP</b> 1200				<b>WMBA</b> 1500			
Louisville, Ky.				Newport, R. I.			

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<b>WMBC</b> 1420				<b>WNBX</b> 1200			
Detroit, Mich.				Springfield, Vt.			
<b>WMBD</b> 1440				<b>WNBZ</b> 1290			
Peoria Heights, Ill.				Saranac Lake, N. Y.			
<b>WMBF</b> 560				<b>WNEW</b> 1310			
Miami Beach, Fla.				Newport News, Va.			
<b>WMBG</b> 1210				<b>WNJ</b> 1450			
Richmond, Va.				Newark, N. J.			
<b>WMBH</b> 1420				<b>WNOX</b> 560			
Joplin, Mo.				Knoxville, Tenn.			
<b>WMBI</b> 1080				<b>WNRC</b> 1440			
Chicago, Ill.				Greensboro, N. C.			
<b>WMBL</b> 1310				<b>WNYC</b> 570			
Lakeland, Fla.				New York City			
<b>WMBM</b> 1500				<b>WOAI</b> 1190			
Memphis, Tenn.				San Antonio, Texas			
<b>WMO</b> 1370				<b>WOAN</b> 600			
Auburn, N. Y.				Lawrenceburg, Tenn.			
<b>WMBQ</b> 1500				<b>WOAX</b> 1280			
Brooklyn, N. Y.				Trenton, N. J.			
<b>WMBR</b> 1210				<b>WOBT</b> 1310			
Tampa, Fla.				Union City, Tenn.			
<b>WMB</b> 1430				<b>WOB</b> 580			
Lemovne, Pa.				Charleston, W. Va.			
<b>WMC</b> 780				<b>WOC</b> 1000			
Memphis, Tenn.				Davenport, Iowa			
<b>WMCA</b> 570				<b>WOCL</b> 1210			
New York City				Jamestown, N. Y.			
<b>WMES</b> 1500				<b>WODA</b> 1250			
Boston, Mass.				Paterson, N. J.			
<b>WMMN</b> 890				<b>WOI</b> 560			
Fairmont, W. Va.				Ames, Iowa			
<b>WMPC</b> 1500				<b>WOKO</b> 1440			
Lapeer, Mich.				Peekskill, N. Y.			
<b>WMRJ</b> 1420				<b>WOMT</b> 1210			
Jamaica, N. Y.				Manitowoc, Wis.			
<b>WMSG</b> 1350				<b>WOO</b> 1500			
New York City				Philadelphia, Pa.			
<b>WNAC</b> 1230				<b>WOOD</b> 1270			
Boston, Mass.				Grand Rapids, Mich.			
<b>WNAD</b> 1010				<b>WOQ</b> 610			
Norman, Okla.				Kansas City, Mo.			
<b>WNAT</b> 1310				<b>WOR</b> 710			
Philadelphia, Pa.				Newark, N. J.			
<b>WNAX</b> 890				<b>WORD</b> 1480			
Yankton, S. D.				Batavia, Ill.			
<b>WNBF</b> 1500				<b>WOS</b> 630			
Endicott, N. Y.				Jefferson City, Mo.			
<b>WNBH</b> 1310				<b>WOV</b> 1130			
New Bedford, Mass.				Secaucus, N. J.			
<b>WNB</b> 1310				<b>WOW</b> 590			
Knoxville, Tenn.				Omaha, Nebr.			
<b>WNBO</b> 1200				<b>WOWO</b> 1160			
Washington, Pa.				Fort Wayne, Ind.			
<b>WNBQ</b> 1500				<b>WPAP</b> 1010			
Rochester, N. Y.				Cliffside, N. J.			
<b>WNBR</b> 1430				<b>WPCC</b> 570			
Memphis, Tenn.				Chicago, Ill.			
<b>WNBW</b> 1200				<b>WPCH</b> 810			
Carbondale, Pa.				Jersey City, N. J.			

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<b>WPG</b>	1100				<b>WRK</b>	1310			
Atlantic City, N. J.					Hamilton, Ohio				
<b>WPOR</b>	780				<b>WRM</b>	570			
Norfolk, Va.					Urbana, Ill.				
<b>WPRC</b>	1200				<b>WRNY</b>	1010			
Harrisburg, Pa.					New York City				
<b>WPSC</b>	1230				<b>WRR</b>	1190			
State College, Pa.					Dallas, Texas				
<b>WPSW</b>	1500				<b>WRUF</b>	1470			
Philadelphia, Pa.					Gainesville, Fla.				
<b>WPTF</b>	680				<b>WRVA</b>	1110			
Raleigh, N. C.					Richmond, Va.				
<b>WQAM</b>	1240				<b>WSAI</b>	800			
Miami, Fla.					Cincinnati, Ohio				
<b>WQAN</b>	880				<b>WSAJ</b>	1310			
Scranton, Pa.					Grove City, Pa.				
<b>WQAO</b>	1010				<b>WSAN</b>	1500			
Cliffside, N. J.					Allentown, Pa.				
<b>WQBC</b>	1360				<b>WSAR</b>	1450			
Utica, Miss.					Fall River, Mass.				
<b>WQBJ</b>	1200				<b>WSAZ</b>	580			
Clarksburg, W. Va.					Huntington, W. Va.				
<b>WQBZ</b>	1420				<b>WSB</b>	740			
Weirton, W. Va.					Atlanta, Ga.				
<b>WRAF</b>	1200				<b>WSBC</b>	1210			
La Porte, Ind.					Chicago, Ill.				
<b>WRAK</b>	1370				<b>WSBT</b>	1230			
Erie, Pa.					South Bend, Ind.				
<b>WRAW</b>	1310				<b>WSEA</b>	780			
Reading, Pa.					Portsmouth, Va.				
<b>WRAX</b>	1440				<b>WSGH</b>	1400			
Philadelphia, Pa.					Brooklyn, N. Y.				
<b>WRBC</b>	1240				<b>WSIX</b>	1210			
Valparaiso, Ind.					Springfield, Tenn.				
<b>WRBI</b>	1310				<b>WSKC</b>	1410			
Tifton, Ga.					Bay City, Mich.				
<b>WRBJ</b>	1500				<b>WSM</b>	650			
Hattiesburg, Miss.					Nashville, Tenn.				
<b>WRBL</b>	1200				<b>WSMB</b>	1320			
Columbus, Ga.					New Orleans, La.				
<b>WRBQ</b>	1210				<b>WSMD</b>	1310			
Greenville, Miss.					Salisbury, Md.				
<b>WRBT</b>	1370				<b>WSMK</b>	570			
Wilmington, N. C.					Dayton, Ohio				
<b>WRBU</b>	1210				<b>WSPD</b>	1340			
Gastonia, N. C.					Toledo, Ohio				
<b>WRBW</b>	1310				<b>WSRO</b>	1420			
Columbia, S. C.					Middletown, Ohio				
<b>WRC</b>	950				<b>WSSH</b>	1420			
Washington, D. C.					Boston, Mass.				
<b>WREC</b>	600				<b>WSUI</b>	580			
Memphis, Tenn.					Iowa City, Iowa				
<b>WREN</b>	1220				<b>WSUN</b>	900			
Lawrence, Kansas					St. Petersburg, Fla.				
<b>WRHF</b>	1270				<b>WSVS</b>	1370			
Washington, D. C.					Buffalo, N. Y.				
<b>WRHM</b>	1250				<b>WSYR</b>	570			
Minneapolis, Minn.					Syracuse, N. Y.				
<b>WRJN</b>	1200				<b>WTAD</b>	1440			
Racine, Wisc.					Quincy, Ill.				

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<b>WTAG</b> 580				<b>WWL</b> 850			
Worcester, Mass.				New Orleans, La.			
<b>WTAM</b> 1070				<b>WWNC</b> 570			
Cleveland, Ohio				Asheville, N. C.			
<b>WTAQ</b> 1330				<b>WWRL</b> 1500			
Eau Claire, Wis.				Woodside, N. Y.			
<b>WTAR</b> 780				<b>WWVA</b> 1160			
Norfolk, Va.				Wheeling, W. Va.			
<b>WTAW</b> 1120				<b>2BB</b> 1200			
College Station, Tex.				Havana, Cuba			
<b>WTAX</b> 1210				<b>2LR</b> 1280			
Streator, Ill.				Havana, Cuba			
<b>WTAZ</b> 1210				<b>2MG</b> 1050			
Richmond, Va.				Havana, Cuba			
<b>WTBO</b> 1420				<b>2OK</b> 860			
Cumberland, Md.				Havana, Cuba			
<b>WTBQ</b> 1500				<b>2OL</b> 1170			
Wilmington, Del.				Havana, Cuba			
<b>WTFF</b> 1460				<b>2RK</b> 950			
Washington, D. C.				Havana, Cuba			
<b>WTFI</b> 1450				<b>2TW</b> 1110			
Toccoa, Ga.				Havana, Cuba			
<b>WTHS</b> 1310				<b>2UF</b> 1090			
Atlanta, Ga.				Havana, Cuba			
<b>WTIC</b> 600-1060				<b>6BY</b> 1150			
Hartford, Conn.				Cienfuegos, Cuba			
<b>WTMJ</b> 620				<b>6KW</b> 880			
Milwaukee, Wis.				Tuinucu, Cuba			
<b>WWAE</b> 1200				<b>7SR</b> 860			
Hammond, Ind.				Elia, Cuba			
<b>WWJ</b> 920							
Detroit, Mich.							

*Are You a S. P. U. G.?*

The Society for the Prevention of Useless Giving says:

**"Give RADEX for Christmas"**

What could be nicer than to remember your friends at Christmas with a copy of RADEX with a leatherette cover or a year's subscription? Think how much pleasure and help your present would bring them.

**Make It a RADEX Christmas**

We have provided an attractive Christmas card which we will mail to your friends bearing your greetings.

For 25c .....	One Copy of RADEX
For 50c .....	One Leatherette Cover
For 75c .....	One RADEX and Cover
For \$1.00 .....	One year's Subscription
For \$1.50 .....	Subscription and Cover
For \$2.00 .....	Two subscriptions and one cover

The cover matches in beauty the finest set, protects the RADEX from wear and gives a solid writing surface for making entries. It is of imitation leather, blue, pebbled, with title stamped in gold.

Subscription Blank on Page 32



# THE BIRTH OF THE VACUUM TUBE

## *Flickering of Gas Light Gave the Idea*

From Radio Address by Dr. Lee De Forest

The birth of radio broadcasting took place in a hall bedroom in Chicago in 1900, according to a story of the invention of the vacuum tube by Dr. Lee De Forest, pioneer radio inventor, in the De Forest Audions opening broadcast given recently over the associated stations of the Columbia Broadcasting System.

In order that none of the facts in connection with this invention may be misconstrued, we are giving you the famous radio engineer's own account of how he discovered the small vacuum tube which plays such a large part in modern radio development:

"How did I come to invent the present-day vacuum tube? Was it just a lucky accident? Did I simply take the impractical two-element tube or Fleming Valve and add the grid to make that device really useful? Do I believe better vacuum tubes can be produced? What of the future of radio?

"So often are such questions asked that I shall take the five minutes allotted me on this program to answer them briefly.

"Follow me back to 1900. At that time I was engaged during the day as Associate Editor of the *Western Electrician*. Evenings found me in a hall bedroom in Chicago, experimenting with a toy called wireless telegraphy. Among proud possessions was a spark coil which gave vent to a wicked, crashing spark that never failed to thrill and spur me on to greater experimental efforts.

"Now a peculiar thing happened when I operated that spark coil in my hall bedroom. The Welsbach gas light would dim while the spark was on, only to resume full brilliancy the instant the

spark ceased. A trivial occurrence, no doubt; but then an experimenter must ever be interested in trivial things that seem out of the ordinary. I was puzzled. What caused the dimming of that light? My first thought was the electromagnetic or wireless waves given off as the result of the spark discharge had a mysterious yet positive influence on the heated gas particles of the Welsbach burner. All of which led to further experiments. It was soon proven that the startling effect I had observed was only the result of sound waves, and not at all electric.

"However I had become convinced that this phenomenon of the gas flame might nevertheless be employed in the detection of wireless signals. At that time we had only crude wireless detectors and I was experimenting with an electrolytic type of detector as an improvement on the coherer. My first attempt at producing a new wireless detector based on my observations on the flickering gas flame took the form of two platinum wires placed at different points in the blue flame of a Bunsen gas burner. The platinum wires were connected with the antenna and the ground, respectively. Also, across the two wires, was a combination of sensitive telephone receivers and a battery. The arrangement worked — worked well enough, in fact, to encourage further experiments. This first heated gas wireless detector was constructed in 1903.

"But this gas flame detector was nothing more than a laboratory set-up. It could not be employed in commercial work. On shipboard, which was then the most promising sphere of wireless, we did not have gas for a gas burner. I thought of the electric arc, but that

proved too noisy. Finally, I decided to enclose my heated gas in a glass bulb, using a filament as the source of heat.

"No simple matter was it to secure the services of a good glassblower at that time. The big lamp companies were not interested in this far-fetched experiment. Finally, after long and patient search, I secured the co-operation of one Mr. McCandless, who manufactured miniature incandescent lamps in New York City. McCandless made up some experimental tubes for me, with carbon filaments and platinum plates.

"With the antenna connected to the platinum plate, and the ground to the filament, together with telephones and battery connected across plate and filament, I was confronted with the shunting or by-passing of much of the signal energy through the telephone and battery circuit, with considerable loss of efficiency. As a solution of this difficulty, I conceived of a third element. At first this took the form of a tinfoil band wrapped around the outside of the bulb, but that had little influence on the action of the tube. Next I tried a coiled wire inside the glass bulb. After various arrangements, I decided upon a zigzag length of wire, placed directly in the path between filament and plate. Because of its shape, I named it the grid. Three sets of battery were required to operate this device, and these I named A, B and C batteries, for want of better terms. And so I worked out the first practical vacuum tube or Audion. This first three-electrode vacuum tube dates from 1906.

"Simple as this device was, with its filament, grid and plate in an evacuated glass bulb, for we had learned then that it was a vacuum and not a gaseous content that was required, it soon displayed marvelous capabilities. For one thing, it was a relay of perfectly amazing performance. The slightest impulse could be made to control a powerful current

accordingly, just as the slight tug on the lanyard of a giant gun may unleash a ton of destruction on a distant target.

"At first, I made use of the Audion as a super-detector for wireless reception. Soon its remarkable relay possibilities led me to develop the Audion Amplifier, first patented in 1907. In the fall of 1912, I demonstrated this device to the Bell System engineers, and gave permission to McCandless, my tube maker, to produce experimental Audions for the Bell System engineers. By 1915 utilizing Audions as repeaters or voice relays, these far-sighted engineers succeeded in establishing the first transcontinental telephone service between New York and San Francisco. Later in the same year, with the use of some 150 large Amplifier tubes, the Bell System engineers spoke by radio telephone from Arlington, near Washington, D. C., to the Eiffel Tower in Paris, and then to Pearl Harbor in Hawaii, almost 8000 miles away.

"Long before this, or ever since 1906, I had been undertaking wireless telephone experiments. With the troublesome and uncertain electric arc for producing the wireless or radio waves, I had succeeded in establishing wireless telephone service for the Navy, for commercial concerns and even for trains. In 1910 I undertook broadcasting on an experimental scale, from an office building near the Grand Central Terminal in New York City. Early in 1909 I essayed the broadcasting of an opera performance direct from the stage of the Metropolitan Opera House. I had the vision of broadcasting but, at that time, lacked the technical tools for practical success. It remained for the World War and the amazing mobilization of American scientific efforts to develop the Audion and its possibilities to the necessary degree for everyday purposes.

"The remainder of the story is too new and too familiar to require telling

at this time. With the advent of scheduled broadcasting, radio telephony became everybody's concern. The vacuum tube or Audion became an everyday commodity, soon found in every home. Radio programs became part and parcel of the life of the American people.

"And no one has received greater pleasure from the miraculous growth of broadcasting than myself. In the present-day achievements of this young art, I see reflected my fondest dreams come true.

"And so it is with keen and whole-hearted interest that I have returned once more to my old playmate — the Audion. During the past few months I have delved once more into the intricacies of electrons and high vacuums and gases and rare metals. In company with my staff of research workers and engineers, we are digging down deep to the very foundations of matter, which are found in the vacuum tube. From our laboratory work we have gone to improved production methods. We have developed special filaments capable of long and more sustained life. We have obtained greater rigidity and uniformity through improved mechanical structure. We have developed improved exhausting and sealing methods, resulting in high vacuums heretofore believed unattainable in economic production. All of which has formed the basis for the new Audions, to which I have gladly lent my name, for I am convinced we have scored a decided step ahead in the radio art.

"And yet — well, we have hardly scratched the surface. All we have done has been by way of refinements and greater care. Yet daily we are learning more about what goes on within the glass bulb of this simple though marvelous mechanism. We are on the eve of important developments. New

*(Continued on page 53)*

## LETTERS IN OUR MAIL BOX

A. Philip Bross of Asbury Park, N. J., writes us as follows:

"Received my RADEX this morning and within half an hour had secured two new subscriptions. Would be glad to get that leatherette slip cover you offer. RADEX cannot be beat and you may use my name freely."

\* \* \* \*

Beulah Sherwood Hagg of Little Rock, Ark., tells us "RADEX is the most complete and satisfactory method of logging radio and I am completely lost without my RADEX for constant reference while at the radio."

\* \* \* \*

From Chas. T. Phillipp of Columbus, Ohio, comes the following:

"Your publication, compact, neat, informative, correct and interesting, free from bunk and dollar-catching schemes is going to answer the question and fill a much-desired want." Evidently Mr. Phillipp likes RADEX.

\* \* \* \*

From an Ensign of the Salvation Army, Mr. Ira Frederick, comes this:

"I think RADEX is the most complete log I have ever been privileged to see — a very excellent tuning book."

\* \* \* \*

And here is a letter from a dealer, the Howard Radio Shop of Minneapolis: "We want you to know that we are very much pleased with RADEX. Our customers are enthusiastic about the very convenient arrangement."

\* \* \* \*

Here is an interesting letter from a good friend, Mrs. W. W. Alt, of Hyannis, Nebr.: "We are eagerly awaiting our next number of RADEX — it has

*(Continued on page 57)*

# THOSE CHAIN PROGRAMS

## *A Few Misunderstandings*

RADEX not long ago received a letter from a subscriber in Bath, New York which was interesting in many ways, one of which was the misunderstanding regarding chain programs which it contained and which seems to be rather wide-spread. We are reproducing this letter just as it was written:

"I received the October number of your RADEX O. K. I certainly like your RADEX. I would not be without it. Say, as I read the new ruling about kilocycles and cutting down all broadcasting stations to a lower wave length or less kilocycles, I thought by myself this new ruling is cutting out the listeners from getting far-off stations as a smaller amount of kilocycles allowed to each station, the music broadcast won't reach far enough to far-off listeners. I think this is a trick to benefit only chain stations and not the independent broadcaster. It's the same song as played by the chain-groceries to put out independent grocery stores. That's the way I understand it.

"Here let me tell you; there are different bands of chain-broadcasters, called the Red, the Blue, etc. Now if you would please explain to the RADEX subscriber what certain stations are connected with each Red or Blue station it would be a great help to listeners when they pick up some newspaper to look over the radio programs. It only tells some certain music to be played at certain times by the Red network and so on. I never could tell to save my head what network that certain stations belong to and what stations were connected with it. I think it would be very convenient to listeners to know all the stations that are connected to a chain station separately.

"I believe this short wave length is a

trick of the chain stations. We use to get mighty good music toward morning from southern states, jolly, very good music — now it's all cut out — dead — no good! Nothing but dinner music or some uninteresting music. Well this is what I happen to find out with this new ruling. I only thought I wanted to tell you how I feel about it."

Thousands of valued subscribers and readers of RADEX have almost no technical knowledge of radio and it is not strange that this modern miracle should confuse them. For this reason RADEX publishes no technical articles and endeavors to present its stories regarding radio in simple and non-technical language. Many articles have already appeared in our pages describing the operation of a radio set in elementary terms and more will follow.

In answer to our subscriber and to others who do not understand the "why" of radio, let us say: The number of kilocycles has nothing to do with the distance a program will carry except that signals seem to carry slightly better toward the middle of the dial, that is toward the center or upper parts of the broadcasting band. The distance is governed almost entirely by the *power* of the station. This is expressed in watts. Some stations use as low as five watts while others use 50,000. There are more than 600 stations in the United States and only 90 separate channels or wave-lengths. So there is a vast crowding with division of time and other make-shifts to distribute them as best we can. Just as each different key of the piano has a different frequency, so has each wave-band. Just as each piano wire must vibrate a different number of times per second (frequency) to produce a different key, so must each

broadcasting station have a different vibration or beat called frequency. Stations are each assigned a certain frequency. The faster (or higher) the frequency the less the distance between the crest or wave of one beat and the next and consequently the LOWER the wave length. The lower the frequency, the greater or higher the wave length.

Several companies have undertaken the task of providing radio programs and make them available to many stations just as some companies provide vaudeville talent and make it available to a "chain" or theatres. Usually the talent employed is of a much greater calibre than any one theatre or station could afford to furnish itself. The National Broadcasting Company or NBC as it is called, has built up two such chains.

One of these programs is released through station WEAF of New York to a group of stations who buy that particular program. The other is released through WJZ of New York to another group. These are no longer called the Red and the Blue as they were formerly. Then the Columbia Broadcasting System also releases programs some of them through station WOR of Newark and some through WABC of New York. All these programs are published each month in RADEX under the heading, "What's on the Air Tonight?" and following each feature is a list of the stations which have contracted to send out that particular feature. The first station in this list is either WEAF, WJZ, WOR or WABC and this indicates which particular program it is.

Smaller cities find it difficult to supply enough different talent to keep up a constant series of interesting and worthwhile programs. But owing to the position of New York City in the theatrical and lyceum world, this is fairly easy in the metropolis. So instead of one station trying to pay the high price demanded by Whiteman's Band for in-

stance, this is divided between as many as forty stations through the NBC or the Columbia syndicates. Independent stations may buy these programs or furnish their own — that is for each station to decide for itself. Hence there is in the chain broadcasting nothing at all resembling the competitive condition in chain groceries as our good friend fears.

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## BREAKING DOWN THE BARS

*(Continued from page 9)*

told, by his cellmate, of one Ohio young man confined there. He was of good family and was engaged to marry a vocal soloist prominent in musical circles in their home city. As they sometimes do, the young man of good family made a mistake and was sent to the "pen." Shortly after his arrival he installed a radio set to while away the monotonous hours in the evening. His favorite stations were those of his home town, and nightly he tuned them in.

Then, one night, he heard the piano play the opening bars of his favorite song — "Love's Old Sweet Song" — and the name of his former fiancee was announced as the soloist. He listened to the song, with tears streaming down his cheeks, and when it was finished he turned off his set and cried himself to sleep. He did not touch his radio again for two weeks, and when he finally did, his home town stations were carefully avoided.

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## BIRTH OF VACUUM TUBE

*(Continued from page 51)*

Audions or vacuum tubes of untold possibilities are within sight in our research laboratories. Indeed, the radio of tomorrow promises to be just as far ahead of today as today is ahead of the wireless days when my Welsbach gas lamp grew dim in that hall bedroom back in Chicago."

# ANTENNA CHARACTERISTICS

By FRANK S. SAUNDERS

No chain is stronger than its weakest link; neither is a radio set any better than its aerial and ground system. It is absolute folly to purchase an expensive set, then throw up an aerial regardless of insulative properties and hitch a ground wire either to the steam radiator or twist it around the water faucet with the fingers and expect perfect reception. Too much emphasis cannot be placed on this subject, for at its best the antenna picks up very weak impulses of electromagnetic waves. If we induce leakage in our aerial system by careless erection and resistance in our ground through leaded joints and loose contacts we certainly decrease the efficiency of our set, besides inducing needless noises.

Opinions differ somewhat as to which is the better type of antenna, the T-type or the inverted L. For general all-around reception I believe the inverted L is preferable as it is not quite as directional, although it will receive signals from the free end somewhat better than the lead-in end. The T-type receives signals equally well from either end; but is more troublesome to erect.

The loop type of inside antenna is very directional. This is one of its chief advantages as it greatly reduces static and interference from undesired stations. When one edge of the loop is pointed toward a sending station, signals are received with maximum intensity. By slowly rotating the loop the signals decrease and at right angles, practically cease. This is caused by the wave cutting both sides of the loop simultaneously. Although the amount of energy received by this type is often very small, when amplified it produces the clearest signals of any other antenna. So reliable is this device, especially on

short waves, that it is the controlling factor of the radio compass.

The electric light service wires may be utilized for a temporary antenna but care must be exercised so that direct connection will be made only on the grounded side. Otherwise a small series condenser must be used. By using a 110 volt test lamp one may easily ascertain the live from the grounded wire. I can detect no appreciable difference in signal strength in either case. This make-shift is not recommended for permanent operation.\*

Erect a good antenna in the open, insulate it well from all foreign objects and connect a ground wire to the cold water pipe with a reliable ground clamp and you have done much toward giving your set a fair chance of producing loud clear programs.

\* \* \*

\*Editor's Note: Novices are urged to make connection with the electric light system only through one of the devices for that purpose which may be obtained at any good radio store. These eliminate all danger of shock or short circuit.

*If RADEX Helps You*

*It Will Help !  
Your Friends •*

**Please tell them about it.  
Give them the coupon  
on page 34 or send  
it in for them.**

# Radio and the Religious Life

*A Statement by Dr. S. Parkes Cadman*

To relate the circumstances leading to my present relation to Radio work, I have to go back several years when the invitation was extended to me to place the morning service of the Central Congregational Church "on the air." The outcome of that (for me) memorable incident was that the Bedford Branch of the Y. M. C. A., Brooklyn, undertook to broadcast through WEAF the Men's Conference I had held there for twenty years previously. Within a few weeks I discovered the seemingly infinite possibilities of the novel venture.

It passed at a bound beyond the experimental stage, and challenged the best endeavors of all engaged in it. For a prolonged period before the National Broadcasting Company began to universalize religious privileges, church leaders had lamented the comparative failure of the normal means for the transmission of those privileges.

It was frequently said by church authorities that the vital spark was no longer kindled in the pulpit. The lessening of popular interest in institutional religion, the decreased attendance upon divine services, the increased pursuit of recreation and pleasure, the break-down of the observance of the Lord's Day, and the falling off of multitudes of young people from Bible Schools and kindred organizations troubled countless devout and sincere souls.

The cry went up from numerous quarters: "What can be done to arrest this decay in the nation's spiritual development?"

At so critical a juncture radio broadcasting was introduced and the scene was changed. That latest marvel of science showed that, rightly used, science was still the hand-maiden of religion. Never since time began, has a

more influential agency appeared than this near-miracle of invisible audition. It arouses wonder in the dullest and most inert minds, and goes beyond the highest expectations of the brightest and most alert. Through its mysterious agency the songs, prayers, readings, meditations and utterances of selected men were placed at the command of every household in the land. Sixty-three thousand letters on file, and quite as many more which have been otherwise disposed of demonstrated the deep and indeed, the passionate allegiance of the American people to what has been finely phrased as "the things of the Spirit."

At least sixty-five percent of these letters dealt with major matters which have fascinated thought from the birth-day of human consciousness. These were the being and nature of God, the mediatorship of Jesus, the immortality of the soul, the life beyond the grave, and equally grave and momentous questions.

They came as a revelation to some of us who had been living in a somewhat circumscribed world, hedged about by erroneous ideas. Moreover, they not only asserted beyond successful contradiction the widespread desire for religious instruction, but the imperative necessity for it. Without for a moment disregarding the conscientious differences existing between creeds and denominations, it was clear that outworn and superfluous barriers separated them from mutual sympathy and understanding and from that co-operative service which is the world's chief good today.

As these experiences, gained by actual radio contacts, grew from more to more, it dawned upon me that I ought to dedicate all I am or can hope

to be to so providential an opportunity. Musicians, educators, scientists, statesmen and dramatists were quick to seize its skirts. Their concerts, addresses and plays speedily won millions of constituents. Surely religion, which is the first business of a free people, should be placed where it belongs in rad'o's splendid Realm—at the front.

Thanks to the generous provisions of the broadcasting authorities, it has had an unprecedented hearing in the past decade. And its future is so radiant with promise, that moderate forecasts would sound like wild predictions. Space forbids me to quote extracts from the correspondence mentioned above. Suffice it to say that their gist can be expressed in the repetitious line of an old negro exhorter's hymn—

“Go on! go on! go on! go on!”

Had not men and women of every rank and condition thus written from near and far, I might have retreated before the solemn responsibilities which radio broadcasting imposes on those who employ its vast medium. The vision of the throings awaiting the moment for “tuning in” has often risen before me. Roman Catholics, Jews, Protestants, and those of no particular religious persuasion were ever present in one's heart. Their multiform necessities, sorrows, joys, beliefs or non-beliefs were clamant and stormy in my ears. Truly in order to reach so complex a mass the message must be basic, comprehensive, pertinent and alive with the ideals and sentiments which register humanity at its best. Anything merely peculiar or personal or eccentric or segmental was plainly out of place here.

The paramount demand evidenced by the unseen audience was for light rather than heat, conference rather than controversy, and above all, constructive helpfulness and not chronic fault finding. I therefore resolved that wherever I could fan the spark of faith to a flame,

burn on what alter it may, I was obligated so to do.

Allow me to herewith acknowledge the inexpressibly valuable help and guidance a radio audience gives. Any speaker gets back what he gives. It is returned to him pressed down and running over. If he is bitter, bigoted and denunciatory, he reaps as he has sown. If he is brotherly, magnanimous and considerate, there is no nation more hospitably inclined to reciprocate in kind than our nation.

At the same time, the American people are quick to detect sooth-saying, lack of moral courage or infirmity of purpose in a radio speaker. They require that he or she shall be bold, and again bold, and yet not too bold. Their courtesy, patience and ability to “go along” with the speaker at the microphone are nothing short of remarkable. But he must not take unfair advantage of an issue, nor blink the argument to floor the man. They like to feel that he can put himself in the other person's place, get under his skin, see life as he sees it, and then do all possible to exchange with him the conceptions which illuminate the dark path and ease the heavy load.

The famous clergyman and author, Ian Maclaren, said to me just before his death: “What people really need today is relief and succor, and if I had to recommence my ministry tomorrow I should strive to give these to them.”

I go to my new duties with his words ringing in my memory. Pursuant to a great call I shall undertake my Lord's Day Radio Addresses and Answers to Questions with those advantages the past has conferred, and by a strict observance to those principles I have briefly outlined here.

The Federal Council of the Churches of Christ in America has given its approval to this larger public service and the services themselves will be under the sponsorship of this nation-



wide organization. But I earnestly solicit the sanction and support of citizens of every faith who crave the moral ascendancy of the American Republic. Not in clever politics, nor in actual statesmanship; not in material possessions nor in scientific learning, but in the will of our beloved nation to fulfill the Highest Will, are her safety and her strength. That the tendency toward that Will is more prevalent than surface indications suggest, I for one, firmly believe.

Therefore, for these reasons I have set forth so imperfectly, I propose on and after the second Lord's Day in October (October 14) to identify my radio ministry more directly and completely with the National Broadcasting Company, and pray that God's blessing may hallow the enterprise.

## OUR MAIL BOX

*(Continued from page 51)*

helped us more than anything else to pick up stations; it has also helped wonderfully in getting acquainted with our Radiola which was rather new to us when I started my subscription to your valuable little RADEX. I wish I could get you some new subscribers but we live on a ranch in the sandhills where neighbors are few and far apart. If ever I have the opportunity I surely will introduce RADEX."

\* \* \* \*

Just one more letter this month. This is from Mr. M. A. Detter of the American Trust and Banking Co. of Chattanooga, Tenn.: "I have purchased several kinds of log-books but I like RADEX better than any other on account of the neat appearance, handy size and convenient arrangement of information."

We are always glad to hear from our readers and to furnish them any information we can. We also want to receive suggestions for the betterment of your "Tuning Book."

## MECHANICAL MUSIC

All broadcasting stations using phonograph records, piano rolls or other mechanical reproducing means will be required to announce that fact before each selection, under the terms of an order issued by the Federal Radio Commission.

The order requires that "all broadcasting stations shall announce clearly and distinctly the character of all mechanical reproductions broadcast by them, the announcement to precede each such program item. In such announcements each phonograph record used, whatever its character, shall be described as a 'phonograph' record; each piano player selection used shall be described as played by 'mechanical piano player'; every other mechanical reproduction shall be similarly described by the term generally used and understood by the public as meaning such mechanical reproduction."

There has been a somewhat amusing protest against the use of phonograph records notwithstanding the fact that it is practically impossible to tell whether the music is coming from a record or from the orchestra itself. As for us we would much rather listen to a record by a good orchestra than the original efforts of a poor or mediocre one.

The phonograph companies go to enormous expense in providing the very finest talent available for their records and RADEX can see no possible objection to their use in radio programs. As a matter of ethics the use of records ought to be announced but from the standpoint of good entertainment no possible objection within reason can be advanced. If one has already heard that particular record, he can do just what he does when he hears another radio program he doesn't care for—furn

*(Continued on page 60)*

# Pictures of Current Events by Radio

*Coming but not for a long time says R. P. Clarkson*

Not for many years will it be possible to send radio pictures of events as they happen, it is predicted by R. P. Clarkson, prominent radio author in a review of an exhaustive investigation of the television situation just completed by the Radio Manufacturers Association.

At present, four distinct methods are being employed to carry visual matter through the ether by radio communication, two of them providing permanent records at the receiving end in the form of photographic prints, the other two producing transient images lasting but the fraction of a second. The first group are utilized largely for commercial purposes by communications companies, news associations and individual newspapers or newspaper chains. The latter, or transient methods, are for public entertainment and now available in a few sections of the country for the experimental radio fan.

The transient images are produced by methods called television but should be divided into television and radio images. Television applies only where objects or scenes which are before the televisor can be observed at the receiving set. This is the hoped for development now in a very crude and unsatisfactory state.

Radio images on the other hand, are transmitted from a film at the station studio and are received as transient images at the receiver. At the present time this is done by only one station and that on short waves, but it is expected that one or more stations in the broadcast spectrum may experiment during the coming months with something of this kind. From the receiving standpoint, the method differs in no way from television receiving but at the transmitting end there is a vast difference. The films are not of the ordinary movie

variety but are made by photographing a succession of drawings especially for radio transmission. These drawings are simple cartoons, shadowgraphs, or silhouettes, in plain black and white. Direct illumination is possible by passing light beams through the film to the photo-electric cell, while in television the object must be illuminated and only the reflected light therefrom reaches the photocell. The scanning method with film is simpler, also, in that the light beam need only oscillate to and fro while the film itself is moved lengthwise.

Of the two visual broadcasting methods which produce permanent records at the receiving end, the best known is that in which an actual photograph or photographic negative is employed at the transmitter. This film or print may be scanned in numerous ways, both electrically and mechanically. It is even possible to scan the print or film long previous to the broadcast period and to record on a phonograph record the resulting electrical impulses and variations. Then at any time the phonograph record may be played before the microphone and those impulses go out over the radio channels to produce light variations at the receiver. These light variations are focused on sensitized paper which moves beneath the light source at a predetermined speed until its entire surface has been affected or "printed." The print is then developed and fixed by ordinary photographic methods. The entire action is called phototelegraphy and differs materially from any form of television, both as to the apparatus used, the system employed, and the results achieved.

Facsimile transmission most closely resembles phototelegraphy. A written or printed message or diagram, a maga-

zine cover or a fashion sketch, is sent over the wire or through the ether just as though it were a photograph, and at the receiver may be reproduced in photographic form as described above, or traced by chemical action or even by a moving pen or pencil as well known in the telautograph used in banks and railroad terminals. This is a form of visual broadcasting which lends itself largely to commercial use.

The method of scanning in facsimile transmission does not differ greatly from that employed in television, except as to the important matter of time. Where television requires a completed job in a tenth of a second or less, facsimile transmission may even take hours, if need be, and still have great value.

## MOST WONDERFUL LAMP

*(Continued from page 8)*

but insulated from it. This grid is directly in the path to the plate.

Now if we charge this grid with negative electricity it will repel the electrons passing from the filament electrons which try to pass from filament to plate—for like charges repel each other. According to the strength of the negative charge on the grid, more or less electrons will pass through it to the plate. Sometimes it will allow a lot of the electrons to pass, at other times only a few.

Now electrical oscillations—rapid changes from positive to negative and negative to positive, picked up by the receiving aerial—form into groups at the broadcasting station. Now, if we connect the grid in the aerial circuit of a valve set these oscillations will act exactly as described above, in allowing a greater or less number of electrons to pass from the filament to the plate.

This changing flow, by connecting the phones in the plate circuit, is transmitted to the phones themselves, the electric current operating tiny electro

magnets which vibrate the discs in the phones and change the electrical impulses into vibrations in the air, which we can hear.

This, briefly, is the way in which the wireless valve works. So far I have only spoken of it as a detector or “rectifier.” But a valve can also be used as an “amplifier.”

There are two kinds of amplifiers—High Frequency Amplifiers and Low Frequency Amplifiers—or Radio Frequency and Audio Frequency Amplifiers, as they are sometimes called. The difference is this: A Radio Frequency Amplifier increases the strength of the oscillations before they reach the rectifier (detector); an Audio Frequency Amplifier increases the strength of the impulses after they have been rectified. Thus you will see that Radio Frequency amplification is used in picking up distant stations or weak signals, but adds very little, if at all to the loudness of signals in the phones, whilst Audio Frequency amplification increases the loudness of signals picked up by the detector, but will not pick up any signals that the detector alone will not.

Amplifiers can be used in conjunction with both crystal and valve detectors. Where one valve is added to a crystal set it is usually as an Audio Frequency Amplifier. This is the best use to which you can put one valve if you wish to add to your crystal set.

The little explanation I have given you of Radio Frequency and Audio Frequency amplification will enable you to understand the meaning of the abbreviations often used in connection with valve sets. When you see, for instance, a four-valve set described as “Det., 1 R. F., 2 A. F.,” it simply means that one valve is used as Detector or Rectifier, one as Radio Frequency Amplifier, and two as Audio Frequency Amplifiers.

One of the most wonderful things about the Thermionic Valve is its use

for transmitting messages. It is certainly a most wonderful little thing, and the name someone has given it is a most suitable one, for they called it "The little lamp which speaks and hears."

## MECHANICAL MUSIC

*(Continued from page 57)*

the dials! There is a vast library of records available and how much better to listen to some of the masterpieces of the past than to listen over and over to "Old Man Sunshine." We for one would welcome hearing the now silent voices of Bryan and Roosevelt and Wilson as recorded during their life times as well as the songs of Caruso and others who will never sing for us in life again. Why has no broadcasting station ever tapped this reservoir of interesting and touching features for its programs?

## WHEN SET GOES WRONG

*(Continued from page 7)*

plates and you will ruin the battery if you do not observe this carefully. For, if the water level is neglected and falls below the top of the plates, they may become sulphated. If you have had this happen give the battery a slow overcharge, at a low rate, for four or five days. Furthermore, only distilled water should be added, and it should be kept in a glass or porcelain container, as a metal container gives off particles of metal in the water, and other impure water, containing salts or minerals, deposits a thin coating on the plates, and prevents them from working properly.

### FAULTY CONNECTIONS ON A-BATTERY

See that the wires connected to the storage battery are tight and make a good electrical contact. It often hap-

pens that the spray caused by charging ruins the insulation and also eats away the wire. Around the positive pole, which is marked P. pos. or +, you will often find a collection of green-colored corrosion, either in the form of a chalky substance or a paste. This soon corrodes the wire and makes renewal necessary. Often the cause of crackling and spluttering noises is found right at this point, and by cleaning the terminal, cutting off the corroded end of the wire and making a new connection, the trouble can be eliminated. Corrosion here is also apt to set up high resistance, due to the smaller diameter of the corroded wire, and then it will be impossible to pass enough current to permit the tubes to function efficiently. Less trouble of corrosion is, however, experienced with the negative post, which is marked N. neg. or —, although this one should also be gone over carefully. When wires are removed from the battery, be sure to get them on again correctly, for the proper operation of the set depends on this. However, you do not have to be afraid of blowing the tubes by having the storage-battery connections reversed. The wires from the storage battery to the receiver should preferably be No. 14 gauge, stranded, rubber-covered wire. After the wires are securely connected to the battery, cover the whole terminal, including the wire, with a coating of vaseline; this will prevent much of the corrosion which may otherwise take place.

### PRECAUTIONS FOR EXAMINING AND CHARGING

Two more points must be remembered when examining and charging a storage battery; never hold a lighted match over the cells to inspect the level of the electrolyte, for the hydrogen fumes produced by charging are highly combustible, and there may be a serious accident. Also, be sure to remove the

caps of the battery while charging for it sometimes happens that the little vent holes in these caps become clogged, and the gas inside, setting up a considerable pressure, may finally force out the obstruction, with the result that a stream of electrolyte will squirt out of the battery, causing damage to rugs and furniture. A storage battery should always be kept in a place having a moderate temperature, where there is no danger of extreme heat or cold. In case you suspect that there is serious internal trouble in your battery, take it to a competent battery-service station.

#### DRY-CELL A-BATTERIES

Many radio sets, especially those of a portable type, use dry-cell A-batteries instead of storage A-batteries. Although convenient and lighter in weight, dry cells can only be used on the small type of tubes, which do not have the amplification value that the large tubes have. Besides, a dry-cell A-battery is more expensive than a storage A-battery, for dry cells are not rechargeable, and when exhausted, they have to be replaced with new ones. The length of time they will give service depends of course, on how much the set is used. If reception gets weak you should test each cell separately. The method of doing this is to touch both terminals of a cell with the testing points of a dry-cell ammeter having a 0 to 30 reading. A good, new dry cell usually reads from 25 to 30 amperes when the ammeter is applied, which is only done for a moment and is therefore called "flashing." When the cells do not give more current than 10 to 15 amperes, they should be discarded. If they have begun to swell and a white or green-colored pulp comes out, you can be sure that they are worthless and it is not even necessary to test them. Always throw them out before they reach this condition.

#### TESTING B-BATTERIES

B-batteries provide plate voltage for the tubes, and this voltage must be kept fairly constant to permit the proper operation of the tubes. Each B-battery consists of a number of small  $1\frac{1}{2}$ -volt cells, connected in series to provide a greater voltage. An 0 to 50-reading voltmeter is the proper instrument to use for testing B-batteries. An amperage test on B-batteries is meaningless as only an extremely small current is required. One well known battery manufacturer recommends using B-batteries until they have dropped to one half of their original value, although this does not mean that the plate voltages on the tubes should be allowed to drop to one half of their normal values. To do this a number of old B-batteries of decreased voltage are connected together to obtain the proper voltage for the tubes, provided of course, none of the batteries are noisy or otherwise defective.

#### NOISY B-BATTERIES

B-batteries are, however, apt to become noisy when their voltage drops lower than two-thirds of their original value. This trouble is especially likely to occur in poorly constructed B-batteries, having no moisture-proof insulation. Irregular fluctuations in the volume of reception, sometimes accompanied by more or less noise, can often be traced to noisy B-batteries. The trouble can be detected by using a pair of headphones and holding the cord tips across the battery terminals. Be sure to hold the tips immovably and then listen for noise. Sometimes the voltage fluctuations are so violent that they can even be seen on the needle of a voltmeter.

When your receiver suddenly ceases to operate with the tubes lighting properly, the source of the trouble may be found to be a broken internal con-

nection in a B-battery. As the cells are all connected in series, such a break would render the entire battery inoperative. Even newly purchased B-batteries sometimes have this trouble. Changing weather conditions affect B-batteries so you should never keep them in an exposed place as on a window sill. Proximity to a radiator will also injure them.

#### CORRECT AND INCORRECT PLATE VOLTAGES

Be sure that the B-batteries are hooked up correctly; detectors usually have a plate voltage of 18 to 45 volts; r. f. amplifiers customarily require from 45 to 90 volts and a. f. amplifiers take from 90 to 135 volts, depending on the types of tubes used and their method of coupling. Anyway, be sure to follow the specific instructions furnished with your set when hooking up the B-batteries, and be sure to remove all the tubes first, for many radio owners have blown their tubes by accidentally short-circuiting the wires, or allowing them to drag over some of the instruments. Too much plate voltage on the detector produces harsh-toned reception and may even cause a constant whistle. Too much plate voltage on the r. f. tubes causes uncontrollable oscillations, and excessive plate voltage on the a. f. tubes will cause harshness and perhaps howling. The life of the B-battery can be prolonged and a better tone quality can be obtained by inserting a C-battery in the A-negative line to the F. posts of the a. f. transformers.

#### STORAGE B-BATTERIES

Storage B-batteries have never met with a widespread popular approval. They are clumsy and bulky; their use entails all the undesirable features connected with storage batteries in general, as for instance, fumes and spray when

charging, harmful effects of acid, inconvenience due to testing and charging. The results also are inferior to those obtained with the use of dry-cell B-batteries, as they frequently have a tendency to become noisy. Furthermore, the breakdown of one cell makes the whole bank of 24 cells useless, unless of course the defective cell is shorted out.

#### HUM OF B-ELIMINATORS

Perhaps you keep right up to date in your radio accessories and have a B-eliminator installation. Of course, this is better than bothering with batteries, but there are very few B-eliminators on the market that have overcome the hum effect of the a. c. current. Excessive hum in a B-eliminator can often be reduced by bridging by-pass condensers across the output terminals. However, it is sometimes possible to reduce the hum by reversing the plug connected to the electric-light circuit; by connecting the B-negative output terminal of the B-eliminator to the ground, or by removing the eliminator a few feet away from the receiver. Usually a B-eliminator is enclosed in a metal case, which acts as a shield and tends to reduce interference from induction.

#### ADJUSTING CONTROLS ON B-ELIMINATOR

Improper adjustment of the B-eliminator controls often produces fuzziness and distortion. These should be carefully readjusted until the trouble disappears. The resistance controlling the detector-plate voltage will be found most sensitive and both resistances, if there are two, will often exert a mutual influence on each other. No accurate voltage test of the output can be made on a B-eliminator with an ordinary voltmeter as its winding has too low a resistance. Only a high-resistance voltmeter should be used for this purpose.



