Price 25 Cents

Aug. '49

FM-TV

★ Edited by ★
Milton B. Sleeper

PRINCIPAL TELEVISION AREAS

Based on the FCC's Proposed Allocations Plan, Released July 11, 1949

VHF AND UHF ALLOCATIONS TO AREAS OF 200,000 POPULATION OR MORE

AREA	POP. thous.	VHF channels	AREA	POP. thous.	VHF channels	UHF channels	AREA	POP. thous.	UHF channels
Birmingham	408	3	Albany	432	1	2	Akron	349	3
Boston	771	4	Atlanta	302	4	2	Bridgeport	217	2
Chicago	3,397	7	Baltimore	1,047	3	2	Canton	200	2
Columbus	365	3	Buffalo	857	3	1	Easton	325	2
Dallas	377	3	Cincinnati	789	3	2	Fall River	225	3
Denver	384	5	Cleveland	1,214	4	2	Hartford	502	3
Fort Worth	208	3	Dayton	271	2	2	Lawrence	232	2
Houston	510	4	Detroit	2,296	3	2	Scranton	630	2
Los Angeles	2,904	7	Dist. of Col.	908	4	1	Youngstown	372	3
Kansas City	399	4	Grand Rapids	210	2	2	9 Areas	3,052	22
Memphis	332	5	Indianapolis	387	3	1			
Milwaukee	587	4	Louisville	434	2	2			
Minneapolis	911	6	New Haven	308	1	2			
Nashville	242	4	Philadelphia	2,899	3	1			
Newark	430	1	Pittsburgh	1,994	2	2			
New Orleans	540	5	Portland, Ore.	406	5	1			
New York	11,691	6	Providence	712	1	2			
Okla. City	221	3	Rochester	412	1	3			
Omaha	224	3	San Diego	256	3	2			
St. Louis	816	6	Seattle	453	4	2			
St. Petersburg	210	6	Toledo	341	1	2			
Salt Lake City	204	5	21 Areas	16,928	55	38			
San Antonio	319	5							
San Francisco	1,428	6							
Syracuse	258	3							
25 Areas	28,136	111							

MARKET ANALYSIS

	VHF	VHF-UHF	UHF
AREAS OF 200,000 POP. OR MORE			
Areas	25	21	9
Pop., thous.	28,136	16,928	3,052
Channels	111	55-38	22
AREAS OF 100,000 TO 200,000 POP.			
Areas	15	16	16
Pop., thous.	2,172	2,360	2,200
Channels	53	33-27	37
ALL AREAS OF 100,000 POP. OR MORE			
Areas	40	37	25
Pop., thous.	30,308	19,288	5,252
Channels	164	88-65	59

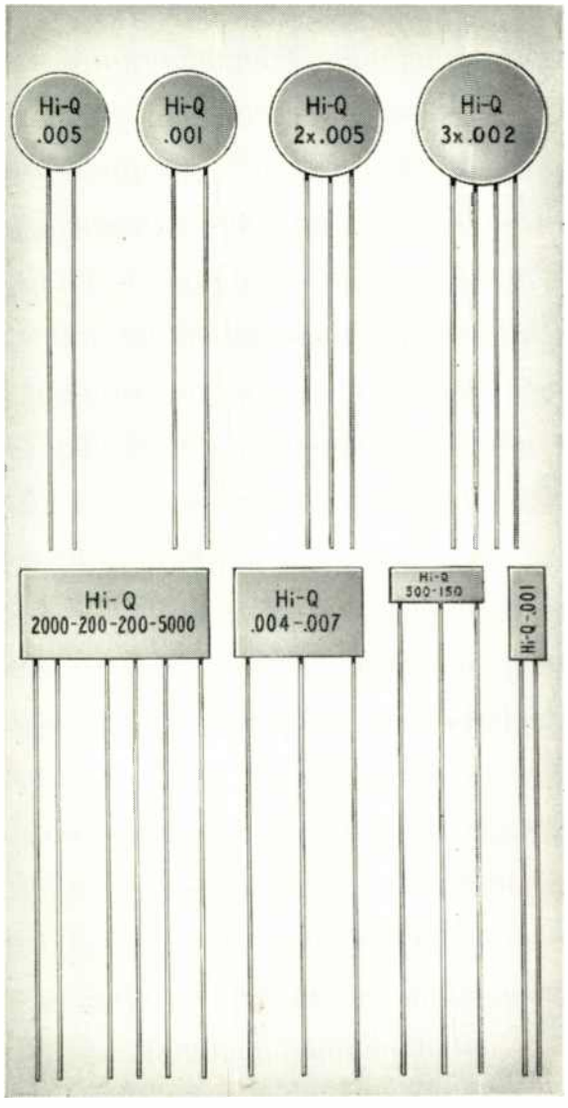
VHF AND UHF ALLOCATIONS TO AREAS OF 100,000 TO 200,000 POPULATION

AREA	POP. thous.	VHF channels	AREA	POP. thous.	VHF channels	UHF channels	AREA	POP. thous.	UHF channels
Charlotte	101	3	Binghamton	145	1	2	Altoona	114	1
Chattanooga	193	3	El Paso	116	5	2	Atlantic City	100	3
Des Moines	184	3	Erie	124	1	1	Austin	106	3
Duluth	136	5	Hamilton, O.	112	1	1	Flint	189	3
Jacksonville	173	5	Johnstown	152	2	1	Fort Wayne	118	2
Knoxville	152	3	Lancaster	132	1	2	Gary	112	1
Little Rock	127	4	Lansing	110	1	1	Harrisburg	173	2
Miami	172	4	Moline	175	2	1	Kenosha	116	3
Mobile	115	4	Norfolk	191	3	2	Reading	175	2
Portland, Me.	106	2	Peoria	105	2	1	Saginaw	153	3
Shreveport	112	3	Phoenix	121	5	2	San Jose	129	3
Spokane	141	4	Port Arthur	139	2	3	South Bend	101	2
Tacoma	156	2	Richmond	193	3	3	Sp'gfield, Mass.	150	2
Tulsa	189	3	Sacramento	159	2	2	Trenton	125	3
Wichita	115	3	Utica	197	1	1	Waterbury	145	2
15 Areas	2,172	53	Wilmington	189	1	2	Worcester	194	2
			16 Areas	2,360	33	27	16 Areas	2,200	37

Specify HI-Q COMPONENTS-

BPD's (Disks) and BPF's (Flats)

for SPACE SAVING and ECONOMY



ILLUSTRATIONS APPROXIMATELY ACTUAL SIZE

HI-Q Disk and **HI-Q** Flat Ceramic Capacitors frequently save space simply because their physical shape is more adaptable than tubular units . . . *and even more frequently* because one of them serves in place of two, three or more individual capacitors. The multiple units also simplify soldering and wiring operations and thus effect substantial production economies.

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- **HI-Q** BPF's (Flats) can be produced in an unlimited range of capacities. The number of capacities on a plate is limited only by the "K" of the material and the physical size of the unit. They do *not* necessarily have to have a common ground as is the case with the disk type.

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Plants: Franklinville, N.Y.— Jessup, Pa.— Myrtle Beach, S. C.

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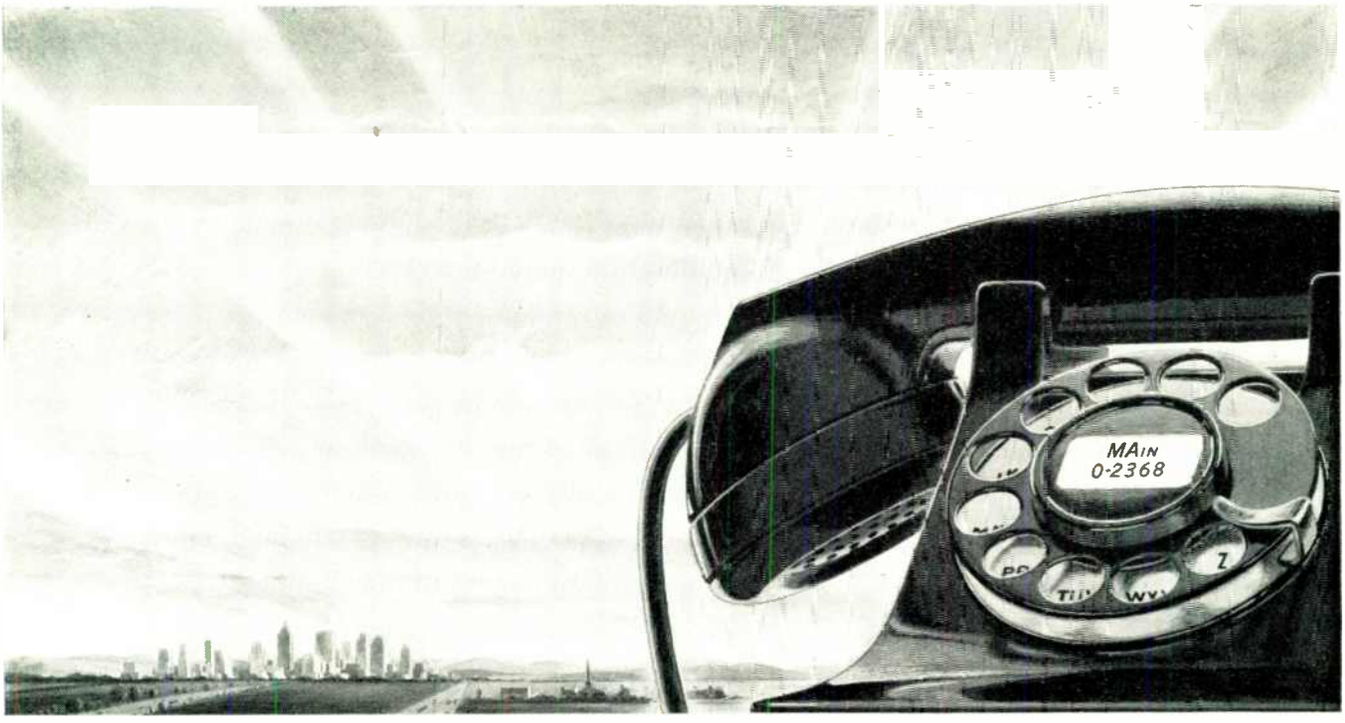


THE FUTURE HOLDS GREAT PROMISE

Neither chance nor mere good fortune has brought this nation the finest telephone service in the world. The service Americans enjoy in such abundance is directly the product of their own imagination, enterprise and common sense.

The people of America have put billions of dollars of their savings into building their telephone system. They have learned more and more ways to use the telephone to advantage, and have continuously encouraged invention and initiative to find new paths toward new horizons.

They have made the rendering of telephone service a public trust; at the same time, they have given the telephone companies, under regulation, the freedom and resources they must have to do their job as well as possible.

In this climate of freedom and responsibility, the Bell System has provided service of steadily increasing value to more and more people. Our policy, often stated, is to give the best possible service at the lowest cost consistent with financial safety and fair treatment of employees. We are organized as we are in order to carry that policy out.

Bell Telephone Laboratories lead the world in improving communication devices and techniques.

Western Electric Company provides the Bell operating companies with telephone equipment of the highest quality at reasonable prices, and can always be counted on in emergencies to deliver the goods whenever and wherever needed.

The operating telephone companies and the parent company work together so that improvements in one place may spread quickly to others. Because all units of the System have the same service goals, great benefits flow to the public.

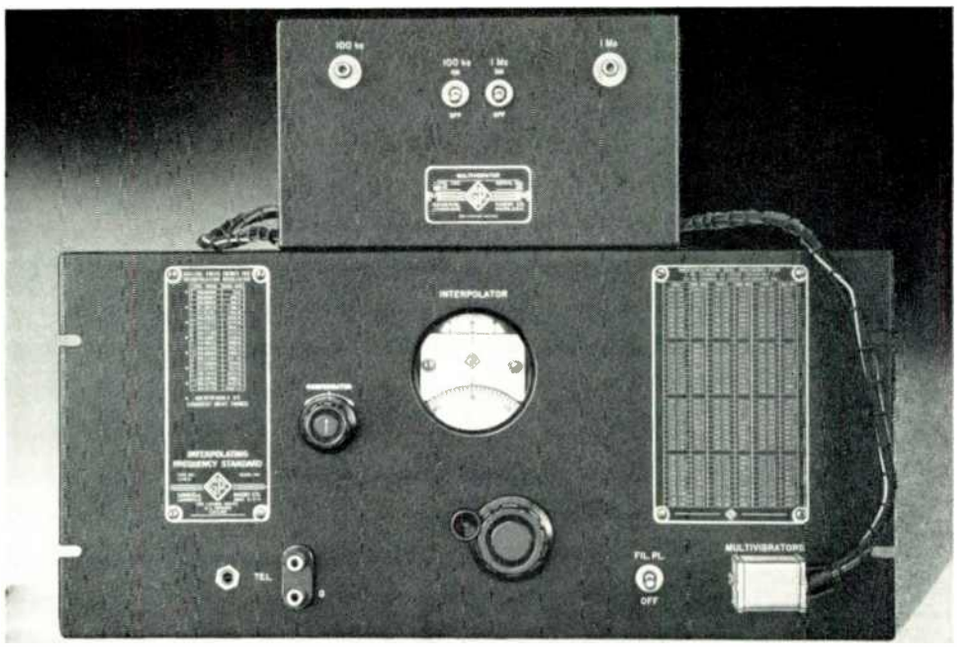
Similarly, the financial good health of the Bell System over a period of many years has been to the advantage of the public no less than the stockholders and employees.

It is equally essential and in the public interest that telephone rates and earnings now and in the future be adequate to continue to pay good wages, protect the billions of dollars of savings invested in the System, and attract the new capital needed to meet the service opportunities and responsibilities ahead.

There is a tremendous amount of work to be done in the near future and the System's technical and human resources to do it have never been better. Our physical equipment is the best in history, though still heavily loaded, and we have many new and improved facilities to incorporate in the plant. Employees are competent and courteous. The long-standing Bell System policy of making promotions from the ranks assures the continuing vigor of the organization.

With these assets, with the traditional spirit of service to get the message through, and with confidence that the American people understand the need for maintaining on a sound financial basis the essential public services performed by the Bell System, we look forward to providing a service better and more valuable in the future than at any time in the past. We pledge our utmost efforts to that end.

LEROY A. WILSON, *President*
American Telephone and Telegraph Company.
(From the 1948 Annual Report.)



FREQUENCY MEASUREMENTS UP TO 3,000 MC WITH ACCURACY OF ±25 PARTS PER MILLION

•Between 100 and several thousand megacycles, the present accuracy of heterodyne frequency meters ranges between 0.01 and 0.1 per cent. Continually increasing importance of frequencies within this range call for increased accuracy of measurements.

A reference standard and precise interpolation offer the simplest, most inexpensive and most direct method of increasing the accuracy of heterodyne frequency meters.

The Type 1110-A Interpolating Frequency Standard is composed of two units: a frequency standard variable over a range of 1000 to 1010 kc (1%), and a multivibrator unit for frequencies of 1 Mc and 100 kc. The frequency standard consists of a temperature-controlled 950 kc crystal oscillator, a highly-stable 50-60 kc bridge-type variable-frequency L-C oscillator, a modulator and a filter for selecting the sum of the two frequencies at the final output.

When the 100 kc multivibrator is used, the 100th harmonic has a range of 1% as the standard frequency is changed over the full range of the dial, covering 10.0 to 10.1 Mc. The multivibrator harmonics give complete frequency coverage from 100 Mc upward for the 1 Mc unit, and from 10 Mc upward for the 100 kc unit.

FEATURES

ACCURACY OF MEASUREMENT: over-all accuracy is ±25 parts per million using oscillator dial directly. If oscillator is carefully trimmed in terms of the crystal, the over-all accuracy is limited principally by the error of the crystal, or about ±10 parts per million at room temperatures.

SIMPLE TO CHECK ABSOLUTE ACCURACY: harmonics of multivibrators fall at all WWV standard frequencies. With suitable receiver the absolute accuracy, including that of the 950-kc crystal, may be checked readily.

ZERO BEAT ADJUSTMENTS: no need for wide-band circuits or wide-band interpolating methods.

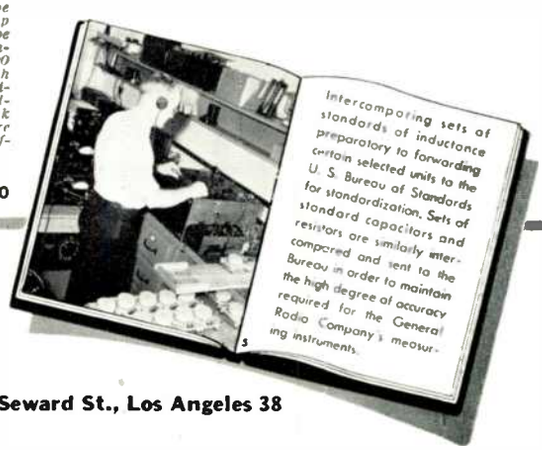
The Type 1110-A Interpolating Frequency Standard can be used for frequency measurements with high-frequency receivers provided the receiver calibrations can identify frequencies if separated by as little as 1 per cent.

TYPE 1110-A INTERPOLATING FREQUENCY STANDARD..... $725.00

TYPE 720-A HETERODYNE FREQUENCY METER

As a companion to the Type 1110-A instrument, this heterodyne frequency meter will be found to be particularly useful at frequencies up to at least 3000 Mc. It employs a butterfly-type tuning circuit, the oscillator frequency being continuously adjustable and direct-reading, from 100 to 300 Mc. A silicon crystal detector is used, with a 3-stage audio amplifier. The output of the amplifier operates a panel meter and a built in loudspeaker. For head-telephone detection of weak signals, a jack is provided on the panel. The entire unit is battery-operated and completely self-contained.

TYPE 720-A HETERODYNE FREQUENCY METER.....$360.00



GENERAL RADIO COMPANY

Cambridge 39, Massachusetts

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FM-TV

Formerly, *FM* MAGAZINE and *FM* RADIO-ELECTRONICS

VOL. 9 AUGUST, 1949 NO. 8

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INDUSTRY NEWS

TELEVISION

MOBILE RADIO

AUDIO SECTION

SPECIAL DEPARTMENTS

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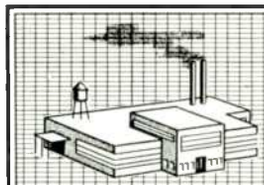
Publication Office: 264 Main St., Gt. Barrington, Mass. Tel. Gt. Barrington 500
FM-TV Magazine is issued on the 20th of each month.

Single copies 25c—Subscription rate: $6.00 for three years, $3.00 for one year in the U. S. A.—Canada, add 50c per year postage—foreign, add $1.00 per year postage.

Contributions will be neither acknowledged nor returned unless accompanied by adequate postage, packing, and directions, nor will *FM-TV* Magazine be responsible for their safe handling in its office or in transit.

Entered as second-class matter August 22, 1946, at the Post Office, Great Barrington, Mass., under the Act of March 3, 1879. Additional entry at the Post Office, Boston, Mass. Printed in the U. S. A.

MEMBER, AUDIT BUREAU OF CIRCULATIONS ABC



Set Production

SET production by RMA members to the first of June showed TV leveling off, and FM and AM down slightly below May. In any study of these figures and the trends they disclose, two qualifying factors should be borne in mind.

First, RMA figures do not include TV set production by Admiral. This concern has issued figures that show a monthly output of some 40,000 TV sets.

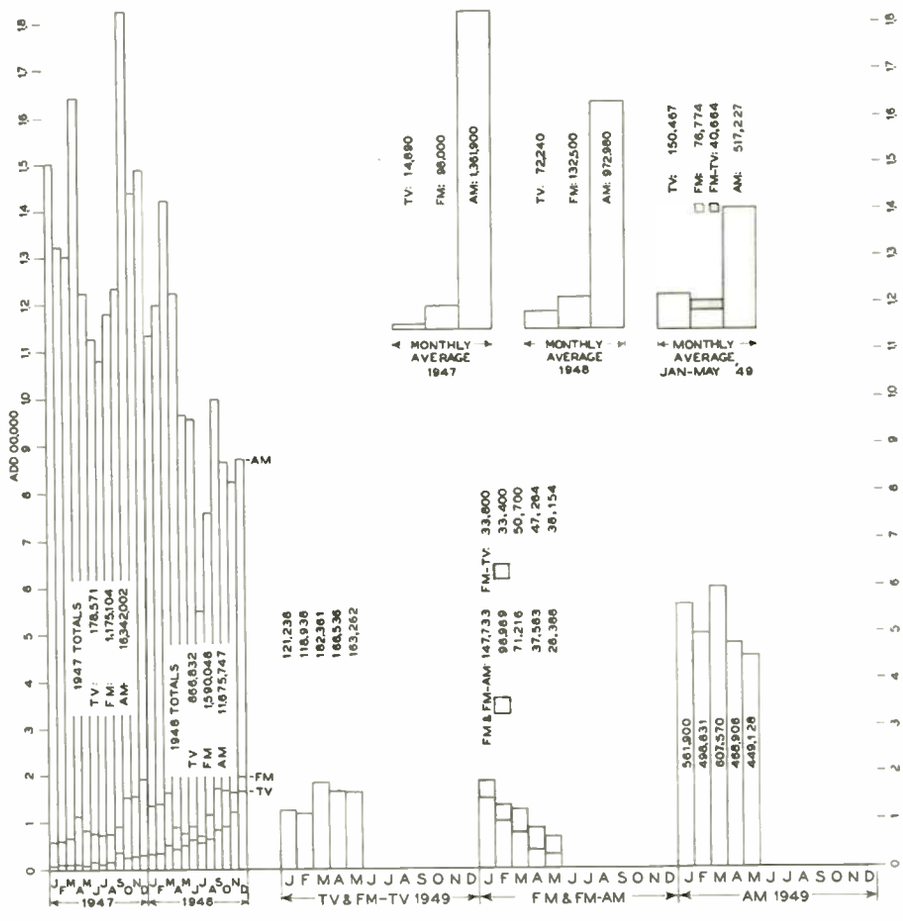
Second, in relating figures for FM sets to audience growth, an adjustment must be made for transitcasting and storecasting receivers. These sets may add little to the number of sets produced, but each one represents thousands of added FM listeners.

That is significant in any comparison with the AM audience, which is definitely on the decline. Even taking 10 years as the average useful life of an AM receiver, to maintain the postwar figure of 70,000,000 AM sets in use it would be necessary to produce 580,000 sets per month as replacements. In 1949, that figure was only reached in March. May hit a postwar record low, and June and July will certainly be lower still. And of course the RMA figures include export models.

Average AM set production for 7 months in 1949 will probably run 700,000 short of the number required as replacements, indicating a 10% drop in the total AM sets in use.

Speculation is rife as to the effect of the FCC's allocations plan on TV set production. Will VHF sets still sell in areas where it is proposed to add UHF channels? What will happen where people have expected more VHF assignments, only to learn that they may not have any added service until UHF transmitters are installed? Will the manufacturers promote TV converters? Or will they come up with other ideas?

So many factors are involved that we can only hope for the best, and wait until public reaction is expressed by its effect on production schedules.



TV, FM, and AM Set Production Barometer, prepared from RMA figures

WHAT'S NEW THIS MONTH

(Continued from page 6)

with positive, day-to-day dependability is WQXR-FM!

So some of the Commissioners would like to confine the most interesting programs to AM? Well, some of the AM broadcasters might cheer such a decision, in the hope of discouraging FM listening. That might explain a newspaper clipping and an indignant letter we received from a reader located in a suburb of Boston. The clipping was a full page from the *Boston Sunday Herald*, carrying a feature story about the coverage of the baseball games by WHDH, and a half-page advertisement headed "Hear the Red Sox, Braves games over WHDH—now 50,000 watts, 850 on your dial." There was no mention of WHDH-FM. That was what riled our reader, for he wrote: "Their high-power FM station is also carrying the ball games with greater geographical coverage than WHDH-AM!"

If the FCC is concerned about spectrum utilization to the end that the best broadcast service be made available over the largest area, listening experience indicates that the most-wanted programs should be limited to FM. The use of records, even worn-out ones, doesn't make any differene on AM, because the background noise masks the needle-scratch. The end result of such a plan would certainly benefit listeners, encourage the expansion of FM broadcasting, and give the audio receiver manufacturers a much-needed break.

2. Part 3 of the quick-reference data on frequencies and technical requirements for mobile radio systems, scheduled for this issue, was put over until September in order to accommodate the analysis of the FCC's television proposal. It was not that the mobile radio data is of less importance, but it was necessary to get the TV information to our readers before the hearing starts on August 29.

3. Watching the steady increase in values offered at lower prices by TV set manufacturers, it's clear that a sharply competitive price situation is developing in this field. Is this merely an adjustment? What about this fall, and next year when new stations will create additional markets?

Let's take a look at the basic factors, and make some comparisons with audio receiving sets. First, let's go back to the transmitters, where the signals start.

Audio stations transmit signals of very high audio quality. Thus, depending on the design (and price) of the receiver,

(Continued on page 9)

Professional Directory

WHAT'S NEW THIS MONTH

(Continued from page 8)

reproduction in the home may range from mere intelligibility to virtual recreation of the original performance as it is heard by the studio audience. Just what the individual customer spends is determined by his tastes and his pocketbook, and the skill and imagination of the salesman. Excluding cabinet cost, it may be anywhere from $10 to $1,000. Within this broad price range, each set manufacturer can find a market for the type of equipment to which his facilities are best suited.

Television presents a totally different set of conditions. The human eye sets a fairly uniform, minimum standard of optical quality. Below it, the eye tires quickly, and fails to perceive sufficient details, or information. The maximum degree of optical quality is fixed, under Government regulations, by the RF bandwidth assigned to the transmitter. This has been set at a point which is considered acceptable to the human eye, and is based to some extent on years of experience with the optical quality of motion pictures.

Now, there is only a very narrow range between the minimum acceptable quality of TV reception and the maximum of which transmitters are capable. As a result, there is very little lattitude in the design of TV receiver circuits. The eye will not accept any appreciable deterioration of optical quality, nor can it see any justification for expensive design and construction. Aside from cabinetwork, and most TV sets are table models now, the cheapest set must give about the same performance as the most expensive model with the same size of picture tube. As for the highest-priced sets, it is impossible to obtain great improvement over the most inexpensive models of accepted performance because of limitations imposed by the transmission. This is apart, of course, from the integrity of the design, the quality of the product, and the extent of the service with which the manufacturer backs up his guarantee. However, while these are factors of the retail price, they cannot be demonstrated by dealers as point-of-sale features.

Such a narrow performance range limits the price range, and a narrow price range limits competition to a matter of production cost and sales expense. This strengthens the position of the large producer, and weakens the position of the smaller concern. It's becoming increasingly clear that it is easier to get into manufacturing TV sets than to make a profit on them, and it's beginning to look as if there's room for more audio than video set manufacturers.

Special Services Directory

NATIONWIDE TV SERVICE

NEW FCC PLAN, COMBINING VHF AND UHF, IS INTENDED TO PROVIDE TELEVISION PROGRAM SERVICE TO 70,000,000 PEOPLE IN 1,421 AREAS—*By* MILTON B. SLEEPER

AFTER the most intensive and exhaustive study ever made by the FCC and co-operating consultants, the Commission has released its proposal for televison rules and frequency allocations.

From any angle of approach, it is easy to find many faults in the plan. If, however, the plan is examined in the light of its intended purpose, *viz.*, to give the best service possible to the greatest number of people, there is little to criticize except that, from a commercial point of view, the allocations are unrealistic.

Basic Allocations Plan:

The new TV plan retains the present 12 VHF channels, numbered 2 through 13, and adds forty-two 6-mc. UHF channels, to be numbered 14 through 55. Channel 14 will start at about 470 or 500 mc., depending upon the action taken with respect to a request by Bell Telephone Laboratories for space to operate a broad-band mobile communications system just below 500 mc. Of the 42 UHF television channels 32 will be for metropolitan stations and 10 for community stations. It is proposed that the same transmission standards will be used for these UHF stations as for the present VHF stations.

The balance of the UHF band, allocated to experimental TV, will be kept available for further research.

Color Television Transmission:

In its notice of the new TV proposal, the Commission announced that it will consider changes in transmission standards for channels 2 through 55 looking toward color transmission or other television systems only if it is shown that operation is possible within a 6-mc. channel, and that existing TV sets designed for present standards will be enabled, by "relatively minor modifications," to receive programs transmitted in accordance with any newly-proposed system.

This limitation seems to rule out any possibility of color transmission on channels 2 to 55. Certainly any reduction of detail below present standards would not be acceptable to viewers, and it is difficult to see how the present amount of information transmitted within a 6-mc. band could be trebled, as would be necessary to transmit three colors.

Wilmotte-deMars Polycasting:

The FCC will consider evidence with respect to the Polycasting system proposed by Raymond M. Wilmotte and Paul A. deMars in a petition filed with the Commission on November 30, 1948. The complete text of their proposal was published in *FM-TV* for December 1948.

Changes in VHF Allocations:

Only three changes in VHF allocations are contemplated. In Syracuse, N. Y., the present channel 5 assignment to WSYR-TV would be shifted to channel 3.

Channels 2, 6, and 11, now allocated to Rochester, N. Y., would be changed to 5, 22, 32, and 44. This would shift WHTM from channel 6 to 5.

Channels 2, 4, 5, 7, and 9, now allocated to Cleveland, would be changed to 8, 11, 40, and 42. This would shift WXEL from channel 9 to 11.

Under these modified assignments, Rochester, which was an all-VHF area, would become a V-UHF area, with only one VHF station. There would be a similar shift in the status of Cleveland, with VHF and UHF stations equally divided.

VHF Interference:

The Commission's proposal makes no reference to interference between stations now on the air. Presumably, it is expected that this will be corrected by synchronized operation and the offset-frequency method now being tested. Such reports as have been made public indicate that these may prove to be satisfactory solutions.

Number of Stations & Areas:

A summary of the new allocations plan shows the following totals for VHF, V-UHF, and UHF areas:

	Areas	Population	Stations
VHF	91	31,554,000	269
V-UHF	116	21,228,000	232-221
UHF	1,213	16,900,000	1,431

Thus, provisions are made for a total of 488 VHF and 1,652 UHF transmitters.

It is very deceiving to draw any conclusions from these total figures as to potential audiences and markets for transmitters and receivers. The reason is that, in drawing up the allocations, no consistent effort was made to relate the number of allocations to the population of each area.

For example, VHF-only allocations were made in areas of as few as 1,000 population. Some 60 were made to areas of less than 50,000. V-UHF allocations were made to areas as small as 4,000 population, and allocations were made to 880 areas with populations of 100 to 10,000. We cannot expect, therefore, that all the allocations will be taken up. Rather, it appears that allocations were made wherever possible, whether or not a particular area had sufficient population to support program service.

Reasoning backward, it appears that those areas, which could have stations but can't support them will only get service if and when the range of transmitters in adjacent areas is increased beyond the estimates used for the allocations plan.

UHF for Large Cities:

Some apparent inequalities may be corrected in the forthcoming hearing. To pick just one instance, Boston, with a population of 771,000, is scheduled for 4 VHF channels, but none on UHF. Miles City, Mont., population 7,000, could have 3 VHF and 3 UHF channels. While Boston may be properly limited to 4 channels in the VHF band, it seems logical that it should have some UHF assignments, also. A similar discrepancy appears to exist in Chicago and New York City. In other words, failure to relate allocations to population has resulted in allowing for an excessive number of stations in low-population areas, and a potential insufficiency in high-population areas.

Perhaps it would be better not to confuse the public in those VHF-only sections now. If on the other hand, UHF television develops rapidly and successfully, it may be found advisable to move all TV broadcasting to UHF. Then, if UHF channels up to No. 55 are not available to the VHF stations, it will be necessary to give them still higher frequencies. That would be all right except that, quite probably, the new UHF sets won't be made to tune much above channel 55.

FCC's Television Hearing:

A hearing before the Commission en banc will commence at 10:00 A. M., on Sept. 26, to hear testimony and to receive evidence regarding the allocations proposal or other proposals as have been filed by interested persons. Prevailing opinion is that the hearing may extend over two to three months.

Following the closing of the record, the Commission will adopt the final rules,

regulations, and standards. At this time, it seems probable that the green light for television will be flashed about the first of February, 1950.

Analysis of the FCC Plan:

In the following pages, the FCC's proposal, with appropriate explanations and comments, is presented in six parts:

1. List of cities showing proposed frequency assignments and population. States are grouped according to standard geographical sections. Under each state, all VHF areas are listed first, then V-UHF areas, and UHF areas last. VHF channels already in use, or for which C.P's. have been issued, are enclosed by parentheses.

2. List of channels by numbers, showing proposed areas for each channel.

3. List of cities with population of 200,000 or more, and cities of 100,000 to 200,000 population, divided as to VHF-only, V-UHF, and UHF-only allocations. The complete table prepared for this section appears on front cover.

4. List of principles, in terms of priorities, on which the allocations table was planned.

5. Specifications of power, grades of service, and antennas.

6. Specifications of separation between stations, and service radii.

1: TV AREAS

PROPOSED ASSIGNMENTS OF TELEVISION CHANNELS

To help clarify the real significance of the FCC's plan for assigning television channels 2 to 55, the following allocations table has been arranged in state groups according to the standard plan for showing national distribution.

It must be emphasized that, in analyzing allocations in terms of potential audiences and markets for equipment, total figures taken from this table have little significance. Many of the allocations are most unrealistic, as is the case of 2 VHF and 3 UHF allocations to Havre, Mont., with a population of 6,000; or 4 VHF and 2 UHF channels for Butte, Mont., of 37,000; and 2 VHF and 4 UHF channels to Ely Nev., of 4,000. Moreover, 880 of the areas to which allocations are proposed have less than 10,000 population. Thus, to obtain a clear picture of any market area, it is necessary to transfer the data from the table to a map of the area in question.

In this table, VHF frequencies now in use, or for which C.P.'s have been issued, appear within parentheses. Figures at right are for population in thousands.

NEW ENGLAND

MAINE 1 VHF 4 V-UHF 6 UHF

Portland	6 13	106
Augusta	8 10 19 21 23	19
Bangor-Old Town	5 12 36 42	37
Calais	2 7 14 16 18	5
Ft. Kent-St. Francis	8 15 17 19 21	6
Biddeford-Saco	14 16	28
Brunswick	44	7
Houlton	25 27 29	7
Lewiston-Auburn	28 30	58
Presque Isle	31 33 35	17
Waterville	32 34	16

NEW HAMPSHIRE 1 V-UHF 5 UHF

Manchester	9 29	81
Berlin	26	19
Concord	31 33	27
Laconia	35	13
Littleton-Bethlehem	40	5
Portsmouth	39 41	14

VERMONT 1 V-UHF 5 UHF

Montpelier	3 20 22	8
Brattleboro	18	10
Burlington	15 17	28
Newport	38	5
Rutland	37	17
St. Albans	24	8

MASSACHUSETTS 1 VHF 7 UHF

Boston	(2 4) 5 (7)	771
Barnstable-W. Yarmouth	37	8
Brockton	48	62
Fall River-New Bedford	19 21 23	225
Lowrence-Lowell-Haverhill	25 27	232
Pittsfield	28	50
Springfield-Holyoke	36 38	150
Worcester	43 45	194

RHODE ISLAND 1 V-UHF

Providence	(11) 15 17	712

CONNECTICUT 1 V-UHF 3 UHF

New Haven	(6) 20 22	308
Bridgeport	14 16	217
Hartford-N. Britain	30 32 34	502
Waterbury	24 26	145

MIDDLE ATLANTIC

NEW YORK 2 VHF 5 V-UHF 19 UHF

New York City-NE New Jersey	(2 4 5 7 9 11)	11,691
Syracuse	(3 8 10)	258
Albany-Schenectady-Troy	(4) 42 44	432
Binghamton	(12) 23 25	145
Buffalo-Niagara	2 (4) 7 27	857
Rochester	(5) 22 32 44	412
Utico-Rome	(13) 33	197
Auburn	18	36
Batavia	36	17
Dunkirk	31	18
Elmira-Corning	14 16	61
Hornell	39	17
Ithaca	37	20
Jamestown	17	43
Malone	30	9
Massena	21	11
Middletown	35	22
Ogdensburg	34	16
Olean	19	22
Oneonta	27	12
Oswego	20	22
Plattsburg	32	16
Poughkeepsie	40	40
Saranac Lake	39	7
Tupper Lake	19	5
Watertown	41 43	33

NEW JERSEY 1 VHF 5 UHF

Newark	(13)	413
Asbury Park	46	15
Atlantic City	23 25 27	100
New Brunswick	48	38
Trenton	15 17 41	125
Vineland	39	8

PENNSYLVANIA 5 V-UHF 16 UHF

Erie	(12) 45	134
Johnstown	6 (13) 21	152
Lancaster	(4) 26 28	132
Philadelphia	(3 6 10) 44	2,899
Pittsburgh	(3) 9 24 26	1,994
Altoona	15	114
Du Bois	43	12
Easton-Allentown-Bethelhem	19 21	325
Emporium	33	4
Greensburg	48	17
Harrisburg	22 42	173
Hazelton	38	38
Lebanon	24	27
Lewistown	40	13
Meadville	47	19
New Castle	30	48
Reading	34 36	175
Scranton-Wilkes Barre	31 45	630
Uniontown	46	22
Williamsport	29	44
York	18 20	93

SOUTH ATLANTIC

DELAWARE 1 V-UHF 1 UHF

Wilmington	(7) 30 32	189
Dover	47 c	6

MARYLAND 1 V-UHF 5 UHF

Baltimore	(2 11 13) 14 16	1,047
Annapolis	49 c	13
Cumberland	39 44	39
Frederick	37	16
Hagerstown	35	33
Solisbury	43	13

DISTRICT OF COLUMBIA 1 V-UHF

Washington	(4 5 7 9) 33	908

VIRGINIA 3 V-UHF 16 UHF

Norfolk-P'tsmouth-Newport News	4 10 12 25 29	191
Richmond	3 (6) 8 15 17 19	193
Roanoke	7 10 20 22	69
Charlottesville	32	19
Covington	29	6
Danville	37	33
Emporia	27	3
Fredericksburg	41 45	10
Harrisonburg	36	8
Lexington	42	4
Lynchburg	14 16	51
Martinsville	31	10
Norton	32	4
Petersburg	21	31
Pulaski	39	9
Staunton	34	13
Suffolk	23	11
Waynesboro	38	7
Winchester	25	12

WEST VIRGINIA 1 VHF 3 V-UHF 10 UHF

Beckley	4	13
Charleston	8 12 30 40	68
Huntington-Ashland	(5) 25	79
Wheeling	7 28 41	61
Bluefield	15	21
Clorksburg	17	31
Elkins	23	8
Fairmont	31	23
Hinton	24	6
Martinsburg	27	15
Montgomery	34	3
Parkersburg	43 45	30
Sutton	33	1
Weston	19	8

NORTH CAROLINA 1 VHF 3 V-UHF 25 UHF

Charlotte	(3) 9 11	101
Greensboro	(2) 41 43 45	59
Wilmington	5 14 16	33
Winston-Salem	6 13 17	80
Ahoski	39	2
Asheville	14 18	51
Belhaven	20	2
Durham	33 35	60
Elizabeth City	31	12
Fayetteville	38 40	17
Gastonia	42	21
Goldsboro	26	17
Greenville	36	13
Henderson	18	8
Hendersonville	20	8
Hickory	34	13
High Point	23 25	38
Jacksonville	22	1
Kannapolis	19	25
Kinston	42	15
Lenoir	36	8
Morehead City	45	4
New Bern	32	12
Raleigh	28 30	47
Rocky Mount	24	26
Salisbury	21	19
Shelby	44	14
Wilson	44	19
Washington	34	9

SOUTH CAROLINA 2 V-UHF 14 UHF

Charleston	2 8 13 28 30	71
Columbia	4 7 10 39	62
Anderson	33	19
Barnwell	25	2
Bennettsville	15	5
Florence	27	16
Georgetown	18	6
Greenville	38 40	35
Greenwood	31	13
Myrtle Beach	37	2
Orangeburg	45	11
Rockhill	29	15
Seneca	35	2
Spartanburg	22 24	32
Sumter	32	16
Walterboro	34	3

GEORGIA 3 VHF 2 V-UHF 27 UHF

Cairo	6	5
Cordele	13	8
Savannah	3 9 11	96
Atlanta	(2 5 8) 11 32 34	302
Augusta	6 12 17	66
Albany	42	19
Americus	20	9
Athens	21 23	21
Bainbridge	9	6
Brunswick	37 39	15
Cartersville	39	6
Cedartown	19	9
Columbus	36 38 40	53
Dalton	25	10
Dawson	25	4
Douglas	30	5
Dublin	43	8
Fitzgerald	27	7
Gainsville	15	10
Griffin	29	13
Jessup	35	3
La Grange	22 24	22
Macon	14 16 18	58
Milledgeville	26	7
Moultrie	15	10
Rome	42	26
Statesboro	19	5
Thomasville	32 34	13
Thomson	41	3
Toccoa	27	5
Valdosta	17	16
Waycross	21 23	17

FLORIDA 3 VHF 1 V-UHF 35 UHF

Jacksonville	2 (4) 5 8 10	173
Miami	2 (4) 5 8 10 12	172
St. Petersburg-Tampa	3 6 (7) 9 11 13	210
Tallahassee	12 28	16
Apalachicola	44	3
Belle-Glade-Chosen	26	4
Clear Water	43	10
Crestview	18	2
Cross City	24	2
Daytona Beach	32 34 36	23
Deland	19	7
Everglades	40	0.6
Fort Lauderdale	30 32	18
Fort Myers	35 37	11
Fort Pierce	39	8
Gainesville	14 16	14
Hollywood	34	6
Key West	19 21	13
Lake City	26	6
Lakeland	33	22
Lakeworth	28	7
Leesburg	27	5
Moriana	37	5
Melbourne	15	3
Ocala	38	9
Orlando	21 23 25	37

Hugo	36	1
La Junta	16	7
Lamar	19	4
Leadville	32	5
Liman	22	1
Longmant	45	7
Las Animas	14	3
Loveland	27	6
Meeker	42	1
Montrase	27	5
Oak Creek	34	2
Ouray	38	1
Pagosa Spgs.	16	2
Rocky Ford	42	3
Saguache	40	1
Salida	44	5
San Luis	23	1
Silvertown	29	1
Springfield	25	1
Steamboat Spgs.	39	2
Sterling	34	7
Trinidad	18 21	13
Walden	37	0.6
Walsenburg	26	6
Wray	38	2
Yuma	17	2

NEW MEXICO 1 VHF, 6 V-UHF 32 UHF

Albuquerque	2 (4) 5 7	35
Carlsbad	10 22 24	7
Clovis	12 14 16	10
Gallup	3 10 17 19	7
Roswell	3 6 8 34 36	13
Santa Fe	9 11 13 30 32	20
Silver City	12 18	5
Alamogordo	19 21	4
Artesia	26 28	4
Belen	22 24	3
Bernalilla	20	2
Carrizaza	42	1
Chama	43	0.7
Clayton	27	3
Dawson	41	2
Deming	23 25	4
Farmington	21	2
Ft. Sumner	43	2
Hachita	37	0.8
Hobbs	15 17	11
Hot Springs	31 33	3
Loguna	28	0.5
Lordsburg	43 45	3
Los Alamos	34	5
Las Cruces	27 29	8
Las Vegas	17	6
Lovington	30	2
Magdolena	35	1
Park View	36	5
Portales	18 20	0.8
Raton	35 37	8
Roy	44	1
San Rita	20	3
Santa Rosa	25	2
Socorro	14 16	4
Taos	15	1
Tucumcari	29 31	6
Voughn	45	1
Willard	39	0.5

ARIZONA 5 V-UHF 30 UHF

Flagstaff	9 11 14 16	5
Kingman	6 29 35	2
Phoenix	2 4 (5) 8 12 15 17	121
Tucson	3 6 7 10 14 16	37
Yuma	9 13 30 32 34	5
Ajo	19 21	1
Bisbee	19 21	6
Buckeye	39	1
Casa Grande	24	1
Clarkdale	43 45	3
Clifton	30	3
Coolidge	35 37	2
Douglas	15 17	9
Ft. Huachuca	38	1
Granada	15	1
Grand Canyon	40	0.6
Globe	22	6
Halbrook	27 29	1
Hayden	28 44	2
Jerome	36	2
Mesa	31 33	7
Miami	26	5
Morenci	32	3
McNary	34	2
Nogales	23 25	5
Parker	38	1
Prescott	23 25	6
Safford	36	2
St. Johns	38	1
San Simon	40	0.7
Superior	42	4
Tombstone	29	0.8
Wickenburg	41	1
Williams	30	3
Winslow	18 20	5

UTAH 2 VHF 2 V-UHF 27 UHF

Price	11 13	5
Salt Lake City	2 (4 5) 7 9	204
Cedar City	5 17	5
Ogden	12 34 38 40	44
Beaver	19	2
Brigham	42	6
Castle Dale	14	1
Duchesne	31	1
Ephraim	28	2
Escolante	25	1
Fillmare	37	2
Green River	43	0.5
Heber	16	3
Hurricane	21	2
Hyrum	20	2
Kanab	44	1
Lehi	44	3
Laa	45	0.4
Lagan	30 32	12
Milford	32	1
Maab	20	1
Monticello	23	0.7
Nephi	18	3
Ponquitch	42	2
Parowan	15	1
Provo	21 24	18
Richfield	22	4
St. George	38	4
Salino	35	2
Tooele	27	5
Vernal	33	2

NEVADA 4 V-UHF 23 UHF

Elko	10 15 17 19	4
Ely	3 6 14 16 20	4
Las Vegas	8 10 12 14 16 41 45	8
Reno	3 13 14 16	21
Austin	29	0.5
Battle Mountain	42	0.8
Boulder City	18 22	3
Caliente	28 30 43	1
Carson City	30	2
Eureka	40	0.6
Fallon	35	2
Gerloch	28	0.1
Goldfield	44	0.6
Henderson	27 32	7
Lovelock	25	1
McDermitt	26	0.2
McGill	23 25	3
Mina	39	0.4
Mountain City	34	0.9
Overton	34 36	1
Palisade	45	0.1
Pioche	24 26	1
Sparks	37	5
Tonopah	18 21	2
Wells	41	0.8
Winnemucca	18 21	2
Yerington	23	1

PACIFIC

WASHINGTON 2 VHF 2 V-UHF 32 UHF

Spokane	2 4 5 7	141
Tacoma	9 13	156
Seattle	4 (5) 7 11, 14 16	453
Walla Walla	6 8 10 38	18
Aberdeen	22	19
Bellingham	21 23	29
Bremerton	39 41	15
Centralia	24	7
Chehalis	28	5
Colville	45	2
Colfax	28	3
Ellensburg	42	6
Ephrata	17	1
Everett	43 45	30
Goldendale	29	2
Grand Coulee	27	4
Kennewick	26	2
Longview	40	12
Metaline Falls	29	0.5
Moses Lake	44	0.3
Mt. Vernon	19	4
Olympia	18	13
Omak	25	3
Oroville	32	1
Pasco	19	4
Port Angeles	32 34	9
Pullman	30	4
Puyallup	20	8
Republic	40	0.9
Ritzville	23	2
Sheldon	30	4
Sunnyside	15	2
Vancouver	38	19
Waterville	35	0.9
Wenatchee	37	12
Yakima	31 33	27

OREGON 1 VHF 3 V-UHF 33 UHF

La Grande	3 13	8
Klamath Falls	2 4 32 34	16
Medford	5 7 15 17	11
Portland	(3) 6 8 10 12 17	406
Albany	25	6
Ashland	19 21	5
Astaria	26	10
Baker	16	9
Bend	28 35	10
Burns	21 42	3
Canyon City	14	0.3
Coquille	24 26	3
Condon	22	1
Corvallis	23	8
Enterprise	40	2
Eugene	14 16	21
Gold Beach	40	0.5
Grants Pass	36 38	6
Heppner	41 43	1
Hood River	36	3
Kinzua	18	0.8
Lakeview	20 27 29	2
McMinnville	44	4
Madras	29	0.4
Marshfield (Caas Bay)	22 29	5
Newport	42	2
Ontario	20	4
Pendletan	24	9
Pineville	30	2
Redmand	45	2
Reedspart	18	1
Raseburg	31 33	5
Salem	32 34	31
Sprague River	41 43	6
The Dalles	27	6
Tillamook	19 21	3
Westfir	37	0.8

CALIFORNIA 3 VHF 5 V-UHF 81 UHF

Los Angeles	2 (4 5 7 9 11 13)	2,904
San Francisco-Oakland	2 (4 5 7) 9 11	1,428
Yreka	11 13	2
Bakersfield	10 14 16	29
Chico	12 36	9
Fresno	8 12 15 17	98
Sacramento	6 10 38 40	159
San Diego	3 6 (8) 14 16	256
Alturas	24	2
Arcata	30	2
Arroyo Grande	32	1
Banning	23	4
Barstow	25	2
Blythe	26	2
Brawley	20	12
Bridgeport	43	0.4
Calipatria	28	2
Calexico	22	5
Coalinga	41	5
Colton	39	10
Corona	35	9
Crescent City	45	1
Delano	38	5
Dinuba	29	4
El Centro	18	10
Escondido	41	5
Eureka	14 16 28	17
Fillmore	28	3
Ft. Brogg	24	3
Grass Valley	19	6
Hanford	19	8
Hollister	20	4
Indio	31	2
Independence	33	0.3
Inyokern	43	5
Laguna Beach	33	4
Lakeport	33	1
Lancaster	45	2
Lodi	21	11
Lompoc	42	3
Merced	24	10
Modesto	26	16
Mojave	20	2
Monterey	18	10
Mt. Shasta	23	2
Napa	29	8
Needles	24	4
Oceanside	27	5
Oroville	27	4
Oxnard	22	9
Placerville	34	3
Pacific Grove	45	6
Palm Springs	44	3
Paso Robles	25	3
Petaluma	23	8
Porterville	31	6
Portola	41	2
Red Bluff	25	4
Redding	18 42	8
Redlands	29	14
Riverside	19 21	31
Salinas	30	12
San Bernardino	15 17	44
San Luis Obispo	21	9
San Jose	35 37 39	129
Santa Barbora	24 26	35
Santa Cruz	14 16	17
Santa Maria	44	9
Santa Paula	18	9
Santa Rosa	17	13
Scatia	37	1
Sonora	32	2
Stockton	42 44	79
Susanville	22	2
Taft	36	3
Trona	40	2
Tulare	23	8
Turlock	28	5
Ukiah	20	3
Ventura	30	13
Victorville	37	3
Visalia	27	9
Wasco	34	5
Watsonville	22	9
Weaverville	39	0.7
Westwood	45	5
Willits	43	2
Willows	31	2
Yuba City	15	5

U. S. TERRITORIES

ALASKA

Anchorage	2 7 11 13	3
Fairbanks	2 4 7 9 11 13	3
Juneau	3 8 10	6
Ketchikan	2 4 9	5
Seward	4 9	1

PUERTO RICO

Mayaguez	2 4	50
San Juan	7 9 11 13	169

VIRGIN ISLANDS

	3	25

HAWAIIAN ISLANDS

Hila Hawaii	2 4 7 9 11 13	23
Honalulu, Oahu	2 4 7 9 11 13	179
Lihue, Kauai	3 8 10 12	4
Wailuku, Maui	3 8 10 12	7

CANADA

ALBERTA

Calgary	2 4 10 12 14 16 18 27	80
Lacombe	8 29	2
Lethbridge	7 20 24	15
Medicine Hat	5 15 17	11
Red Deer	25	3

BRITISH COLUMBIA

Chilliwack	12 38	4
Cranbrook	17	3
Fernie	21	3
Kamioops	4 42	5
Kelowna	13 36	5
Nelson	6 38	6
Penticton	18	5
Port Alberni	42	5
Prince Rupert	3 7	
Trail	11 14	9
Vancouver-New Westminster	6 8 10 15 17 29 40 44	297
Vernon	2 42	5
Victoria	2 27 36	44

MANITOBA

Brandon	5 9 11 37 40	17
Portage la Prairie	14	
Winnipeg-St. Boniface	3 6 7 13 16 18 34 36 38	222

NEW BRUNSWICK

Cambellton	12 18	7
Edmundton	10 37	7
Fredericton	9 20	10
Moncton	17	23
New Castle	38	4
St. John	4 6 26 28	52
St. Stephen	22	3
Sackville	8 19	2
Woodstock	40	4

NOVA SCOTIA

Amherst	36	9
Antigonish	9 16	2
Bridgewater	10 33	3
Halifax	3 5 12 27 29 31 39	70
Kentville	15	4
Sydney	18 20	28
Truro	25	10
Windsor	23	3
Yarmouth	13 24	8

ONTARIO

Belleville	28	16
Brantford-Simcae	20	38
Brockville	45	11
Chatham	19	17
Cornwall	36	14
Ft. Frances	5 28	6
Guelph-Kitchener-Galt	37	74
Haileybury	21	2
Hamilton	6 29 15	166
Kenora	9 19	8
Kingston	26	30
Kirkland Lake	3 16	20
London-St. Thomas	10 35	95
North Bay	2 27	16
Oshawa	24	29
Orillia Jnc.	3 14	20
Ottawa-Hull	7 9 11 14 16	155
Owen Sound	8 30	14
Pembrooke	4 31	11
Peterborough	38	25
Port Arthur-Ft. William	2 4 19 22 24	24
St. Catherine-Niagara Falls	34	51
Sarnia	44	19
Sault Ste. Marie	2 12 22	26
Stratford	23	17
Sudbury	5 7 23 25	32
Timmons	6 19	29
Toronto	9 11 13 42 40	667
Windsor	9 31 41	105
Wingham	33	2
Woodstock	26	12

PRINCE EDWARD ISLAND

Charlottetown	13 14	15
Summerside	11 21	5

QUEBEC

Amos	20	3
Chicoutimi	2 12 20	16
Granby	27	14
Hull Ottawa	14 16	33
Jonquiere	22	14
Matane	14	5

Montreal	2 5 8 10 12 42 44	903
New Carlisle	2 16	
Quebec	4 6 7 9 11 14 16	151
Riviere duLoup	5 26	9
Rimouski	3 23	7
Roberval	27	3
Rouyn	14	4
St. Hyacinthe-Drummondville	29	18
Ste. Anne de la Pocatiere	13 24	1
Shawinigan Flls.	25	20
Sherbrooke	43 45	36
Sorel	18	12
Three Rivers	23	42
Val d' Or	18	

SASKATCHEWAN

Moose Jaw	4 7 14 16	21
No. Battleford	12 22	5
Prince Albert	25	13
Regina	2 5 9 21 24 26 35	58
Saskatoon	6 8 15 20	43
Swift Current	28	16
Waterous	11 18	1
Yorkton	12 17	6

MEXICO

BAJA CALIFORNIA

Tijuana	10 12
Mexicali	11 7

SONORA

Nogales	13
Hermosilla	2
Ciudad Obregan	3
Navaja	5

CHIHUAHUA

Chihuahua	2
Hidalgo del Parral	3
Juarez	11 13

COAHUILA

Manclava	5
Saltilla	4

NUEVO LEON

Monterrey	2 6 10 12

TAMPAULIPAS

Nueva Laredo	11 13
Matamaras	7

CUBA

Havana, Matanzas, Las Villas } Provinces 3 6 7 9 11 13

2: CHANNELS

LIST OF THE CITIES PROPOSED FOR EACH ONE

In considering the channels assigned to a specific area, it is necessary to know where the same channel or channels have been assigned also. Therefore, the FCC proposal was rearranged in order to list each channel number with the areas to which that channel has been assigned.

Here, again, it is advisable to transfer the data to a map, particularly for studying possible co-channel and adjacent-channel interference.

CHANNEL 2 (42)

Calais, Me.
Boston, Mass.
N. Y. City
Buffalo, N. Y.
Baltimore, Md.
Greensboro, N. C.
Charlestan, S. C.
Atlanta, Ga.
Jacksonville, Fla.
Miami, Fla.
Hamilton, Ohio
Chicago, Ill.
Detroit, Mich.
Nashville, Tenn.
Macon, Ga.
Minneapolis, Minn.
Iowa City, Iowa
Sioux City, Iowa
De Sota, Mo.
Kansas City, Mo.
Dickinson, N. D.
Grand Forks, N. D.
North Platte, Neb.
Little Rock, Ark.
New Orleans, La.
Tulsa, Okla.
Amarillo, Tex.
El Paso, Tex.
Ft. Worth, Tex.
Houston, Tex.
San Angelo, Tex.
Billings, Mont.
Butte, Mont.
Boise, Idaho
Denver, Colo.
Albuquerque, N. M.
Phoenix, Ariz.
Salt Lake City, Utah
Spokane, Wash.
Klamath Falls, Ore.
Las Angeles, Cal.
San Francisco, Cal.

CHANNEL 3 (40)

Montpelier, Vt.
Syracuse, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Richmond, Va.
Charlotte, N. C.
Savannah, Ga.
Tampa, Fla.
Columbus, Ohio
Tell City, Ind.
Springfield, Ill.
Kalamazoo, Mich.
Marquette, Mich.
Milwaukee, Wis.
Duluth, Wis.
Chattanooga, Tenn.
Eufaula, Ala.
Jackson, Miss.
Decarah, Iowa
Springfield, Mo.
Minot, N. D.
Aberdeen, S. D.
Omaha, Neb.
Wichita, Kans.
Shrevepart, La.
Laredo, Tex.
Wichita Falls, Tex.
Great Falls, Mont.
Miles City, Mont.
Idaho Falls, Idaho
Casper, Wyo.
Pueblo, Colo.
Gallup, N. M.
Roswell, N. M.
Tucson, Ariz.
Ely, Nev.
Reno, Nev.
La Grande, Ore.
Portland, Ore.
San Diego, Cal.

CHANNEL 4 (49)

Boston, Mass.
N. Y. City
Albany-Schenectady-Troy, N. Y.
Buffalo, N. Y.
Lancaster, Pa.
Washington, D. C.
Norfolk, W. Va.
Beckley, W. Va.
Columbia, S. C.
Jacksonville, Fla.
Miami, Fla.
Cincinnati, Ohio
Cleveland, Ohio
Chicago Ill.
Maline, Ill.
Chebaygan, Mich.
Detroit, Mich.
Memphis, Tenn.
Nashville Tenn.
Birmingham, Ala.
Minneapolis, Minn.
Ames, Iowa
Kansas City, Mo.
St. Louis, Mo.
Dickinson, N. D.
Grand Forks, N. D.
Mitchell, S. D.
Hastings, Neb.
New Orleans, La.
Okla. City, Okla.
Amarilla, Tex.
Beaumont, Tex.
Brownsville, Tex.
Dallas, Tex.
El Paso, Tex.
Manahans, Tex.
San Antonia, Tex.
Billings, Mont.
Butte, Mont.
Boise, Idaho
Denver, Colo.
Albuquerque, N. M.
Phoenix, Ariz.
Salt Lake City, Utah
Seattle, Wash.
Spokane, Wash.
Klamath Falls, Ore.
Las Angeles, Cal.
San Francisco, Cal.

CHANNEL 5 (45)

Bangar, Me.
Boston, Mass.
N. Y. City
Rochester, N. Y.
Washington, D. C.
Huntington, W. Va.
Wilmington N. C.
Atlanta, Ga.
Jacksonville, Fla.
Miami, Fla.
Cleveland, Ohio
Dayton, Ohio
Chicago, Ill.
Maline, Ill.
Marquette, Mich.
Louisville, Ky.
Lexington, Tenn.
Mobile, Ala.
Minneapolis, Minn.
Sioux City, Iowa
Kansas City, Mo.
St. Louis, Mo.
Bismarck, N. D.
No. Platte, Neb.
Great Bend, Kans
Little Rock, Ark.
Alexandria, La.
Amarilla, Tex.
Brownsville, Tex.
El Paso, Tex.
Ft. Worth, Tex.
San Antonia, Tex.
Billings, Mont.
Butte, Mont.
Boise, Idaho
Denver, Colo.
Albuquerque, N. M.
Phoenix, Ariz.
Cedar City, Utah
Salt Lake City, Utah
Seattle, Wash.
Spokane, Wash.
Medford, Ore.
Las Angeles, Cal.
San Francisco, Cal.

CHANNEL 6 (42)

Portland, Me.
New Haven, Conn.
Johnston, Pa.
Philadelphia, Pa.
Richmond, Va.
Winston-Salem, N. C.
Augusta, Ga.
Cairo, Ga.
Tampa, Fla.
Columbus, Ohio
Indianapolis, Ind.
Pearia, Ill.
Lansing, Mich.
Milwaukee, Wis.
Duluth, Wis.
Knoxville, Tenn.
Memphis, Tenn.
Birmingham, Ala.
Jefferson City, Mo.
Fargo, N. D.
Minot, N. D.
Pierre, S. D.
Omaha, Neb.
New Orleans, La.
Tulsa, Okla.
Beaumont, Tex.
Corpus Christi, Tex.
San Angela, Tex.
Wichita Falls, Tex.
Great Falls, Mont.
Miles City, Mont.
Idaho Falls, Idaho
Casper, Wyo.
Pueblo, Colo.
Raswell, N. M.
Kingman, Ariz.
Tucson, Ariz.
Ely, Nev.
Walla Walla, Wash.
Portland, Ore.
Sacramento, Cal.
San Diego, Cal.

CHANNEL 7 (43)

Calais, Me.
Boston, Mass.
N. Y. City
Buffalo, N. Y.
Wilmington, Dela.
Washington, D. C.
Roanoke, Va.
Wheeling, W. Va.
Columbia, S. C.
Tampa, Fla.
Cincinnati, Ohio
Chicago, Ill.
Detroit, Mich.
Grand Rapids, Mich.
Iron Mtn. Mich.
Nashville, Tenn.
Montgomery, Ala.
Minneapolis, Minn.
Cedar Rapids, Iowa
St. Louis, Mo.
Bismarck, N. D.
Rapid City, S. C.
Omaha, Neb.
Little Rock, Ark.
New Orleans, La.
Okla. City, Okla.
Amarilla Tex.
El Pasa, Tex.
Odessa, Tex.
Palestine, Tex.
San Antonia, Tex.
Billings, Mont.
Butte, Mont.
Boise, Idaho
Denver, Colo.
Albuquerque, N. M.
Tuscan, Ariz.
Salt Lake City, Utah
Seattle, Wash.
Spokane, Wash.
Medford, Ore.
Las Angeles, Cal.
San Francisco, Cal.

CHANNEL 8 (37)

Augusta, Me.
Ft. Kent, Me.
Syracuse, N. Y.
Richmond, Va.
Charlestan, W. Va.
Charlestan, S. C.
Atlanta, Ga.
Jacksonville, Fla.
Miami, Fla.
Cleveland, Ohio
Indianapolis, Ind.
St. Ste. Marie, Mich.
Milwaukee, Wis.
Duluth, Wis.
Memphis, Tenn.
Mobile, Ala.
Des Moines, Iowa
Grand Forks, N. D.
Willistan, N. D.
Mitchell, S. D.
McCook, Neb.
Junction City, Kans.
Muskagee, Okla.
Dallas, Tex.
Houston, Tex.
Laredo, Tex.
Great Falls, Mont.
Pacatella, Idaho
Casper, Wyo.
Pueblo, Colo.
Raswell, N. M.
Phoenix, Ariz.
Las Vegas, Nev.
Walla Walla, Wash.
Portland, Ore.
Fresno, Cal.
San Diego, Cal.

CHANNEL 9 (39)

Manchester, N. H.
N. Y. City
Pittsburgh, Pa.
Washington, D. C.
Charlotte, N. C.
Bainbridge, Ga.
Savannah, Ga.
Tampa, Fla.
Chicago, Ill.
Iron Mtn., Mich.
Louisville, Ky.
Chattanooga, Tenn.
Jackson, Miss.
Minneapolis, Minn.
Cedar Rapids, Iowa
Sioux City, Iowa
Kansas City, Mo.
St. Louis, Mo.
Dickinson, N. D.
Aberdeen, S. D.
Garden City, Kans.
Okla. City, Okla.
Abilene, Tex.
Brownsville, Tex.
El Pasa, Tex.
Jasper, Tex.
San Antonia, Tex.
Havre, Mont.
Coeur D'Alene, Idahc
Nampa, Idaho
Denver, Col.
Sheridan, Wyo.
Santa Fe, N. M.
Flagstaff, Ariz.
Yuma, Ariz.
Salt Lake City, Utah
Takama, Wash.
Las Angeles, Cal.
San Francisco, Cal.

CHANNEL 10 (45)

Augusta, Me.
Syracuse, N. Y.
Philadelphia, Pa
Norfolk, Va.
Roanoke, Va.
Columbia, S. C.
Jacksonville, Fla.
Miami, Fla.
Columbus, Ohio
Bloamington, Ind.
Carthage, Ill.
S. St. Marie, Mich.
Milwaukee, Wis.
Duluth, Wis.
Knoxville, Tenn.
Memphis, Tenn.
Montgomery, Ala.
Algona, Iowa
Springfield, Mo.
Fargo, N. D.
Minot, N. D.
Pierre, S. D.
Lincoln, Neb.
Wichita, Kans.
New Orleans, La.
Shrevepart, La.
Amarilla, Tex.
Corpus Christi, Tex.
Ft. Worth, Tex.
Helena, Mont.
Miles City, Mont.
Pacatella, Idaho
Rivertan, Wyo.
Puebla, Colo.
Carlsbad, N. M.
Gallup, N. M.
Tucsan, Ariz.
Elxa, Nev.
Las Vegas, Nev.
Walla Walla, Wash.
Portland, Ore.
Bakersfield, Cal.
Sacramento, Cal.

CHANNEL 11 (36)

Providence, R. I.
N. Y. City
Baltimore, Md.
Charlotte, N. C.
Atlanta, Ga.
Savannah, Ga.
Tampa, Fla.
Cincinnati, Ohio
Columbus, Ohio
Chicago, Ill.
Marquette, Mich.
Nashville Tenn.
Mobile, Ala.
Minneapolis, Minn.
Des Moines, Iowa
St. Louis, Mo.
Willistan, N. D,
Sioux Falls, S. D.
Garden City, Kans.
Tapeka, Kans.
Little Rock, Ark.
Alexandria, La.
Tulsa, Okla.
Houstan, Tex.
Lubback, Tex.
Havre, Mont.
Missoula, Mont.
Twin Falls, Idaho
Cheyenne, Wyo.
Sheridan, Wyo.
Santa Fe, N. M.
Flagstaff, Ariz.
Price, Utah
Seattle, Wash.
Las Angeles, Cal.
San Francisco, Cal.
Yreka, Cal.

CHANNEL 12 (38)

Bangar, Me.
Binghamptan, N. Y.
Erie, Pa.
Norfolk, Va.
Charlestan, W. Va.
Augusta, Ga.
Miami, Fla.
Tallahassee, Fla.
Indianapolis, Ind.
Pearia, Ill.
Grand Rapids, Ill.
Duluth, Wis.
Paducah, Ky.
Chattanooga, Tenn.
Jackson, Miss.
Charles City, Iowa
Springfield, Mo.
Bismarck, N. D.
Rapid City, S. D.
Lincaln, Neb.
Wichita, Kans.
Alpine, Tex.
Dallas, Tex.
San Antonia, Tex.
Sweetwater, Tex.
Helena, Mont.
Coeur D'Alene, Idaho
Nampa, Idaho
Alamasa, Colo.
Clavis, N. M.
Silver City, N. M.
Phoenix, Ariz.
Ogden, Utah
La Vegas, Nev.
Portland, Ore.
Chico, Cal.
Fresno, Cal.

CHANNEL 13 (42)

Portland, Me.
Utica, N. Y.
Newark, N. J.
Johnstown, Pa.
Baltimare, Md.
Lynchburg, Va.
Asheville, N. C.
Winstan-Salem, N. C.
Charlestan, S. C.
Cardele, Ga.
Tampa, Fla.
Daytan, Ohia
Taleda, Ohio
Chicaga, Ill.
Gladstane, Mich.
Knaxville, Tenn.
Memphis, Tenn.
Birmingham, Ala.
Mabile, Ala.
Minneapalis, Minn.
Des Maines, Iawa
St. Louis, Ma.
Farga, N. D.
Sioux Falls, S. D.
McCaak, Neb.
Tapeka, Kans.
Shrevepart, La.
Alexandria, La.
Enid, Okla.
Haustan, Tex.
Lubback, Tex.
Missaula, Mant.
Twin Falls, Idaha
Cheyenne, Wya.
Sheridan, Wya.
Santa Fe, N. M.
Yuma, Ariz.
Price, Utah
Rena, Nev.
Tacama, Wash.
LaGrande, Ore.
Las Angeles, Cal.
Yreka, Cal.

CHANNEL 14 (66)

Calais, Me.
Biddefard, Me.
Bridgepart, Conn.
Elmira, N. Y.
Baltimare, Md.
Richmand, Va.
Bluefield, W. Va.
Wilmington, N. C.
Macan, Ga.
Gainsville, Fla.
Panama City, Fla.
W. Palm Beach, Fla.
Daytan, Ohia
Youngstown, Ohio
Vincennes, Ind.
Flint, Mich.
Iran River, Mich.
S. Ste. Marie, Mich.
Madisan, Wis.
Murfreesbaro, Tenn.
Demapalis, Ala.
International Falls, Minn.
Northfield, Minn.
Ft. Madisan, Iowa
Salem, Ma.
Farga, N. D.
Stantan, N. D.
Phillip, S. D.
Sioux Falls, S. D.
Gothenburg, Neb.
Nebraska City, Neb.
Great Bend, Kans.
Helena, Ark.
Hammand, La.
Minden, La.
Bartlesv'le, Okla.
Elk City, Okla.
Bryan, Tex.
Ft. Davis, Tex.
Harlingen, Tex.
Sherman, Tex.
Sweetwater, Tex.
Uvalde, Tex.
Bazeman, Mant.
Miles City, Mant.
Shelby, Mant.
Shashane, Idaho
Cheyenne, Wyo.
Pinedale, Wyo.
Duranga, Calo.
Las Animas, Calo.
Clavis, N. M.
Sacarra, N. M.
Flagstaff, Ariz.
Tucsan, Ariz.
Castle Dale, Utah
Ely, Nev.
Las Vegas, Nev.
Rena, Nev.
Seattle, Wash.
Canyan City, Ore.
Eugene, Ore.
Bakersfield, Cal.
Eureka, Cal.
San Diega, Cal.
Santa Cruz, Cal.

CHANNEL 15 (55)

Ft. Kent, Me.
Burlington, Vt.
Providence, R. I.
Trentan, N. J.
Altaana, Pa.
Bennettsville, S. C.
Gainsville, Ga.
Maultrie, Ga.
Melbaurne, Fla.
Zanesville, Ohia
Cairo, Ill.

Champaign,
Kalamazoo, Ill.
Manistee, Mich.
Medford, Mich.
Frankfort Wis.
Brew, Ky.
Abeton, Ala.
Wilrdeen, Miss.
Mimar, Minn.
Carshalltown, Io.
Columbia, Mo.
New Rockford, N. D.
Miller, S. D.
Alliance, Neb.
Norfolk, Neb.
Manhatten, Kans.
Arkadelphia, Ark.
Opelousas, La.
Enid, Okla.
Borger, Tex.
Graham, Tex.
Gonzales, Tex.
Jacksonville, Tex.
Sonora, Tex.
Kalpellis, Mont.
Sidney, Mont.
Stanford, Mont.
Preston, Idaho
Salmon, Idaho
Hanna, Wyo.
Sheridan, Wyo.
Burlington, Colo.
Grand Jnc., Colo.
Habbs, N. M.
Taas, N. M.
Douglas, Ariz.
Granado, Ariz.
Phoenix, Ariz.
Parowan, Utah
Elko, Nev.
Sunnyside, Wash.
Medford, Ore.
Fresno, Ca'.
San Bernardino, Cal.
Yuba City, Cal.

CHANNEL 16 (64)

Calais, Me.
Biddeford, Me.
Bridgeport, Conn.
Emira, N. Y.
Baltimore, Md.
Lynchburg, Va.
Wilmington, N. C.
Macon, Ga.
Gainsville, Fla.
Panama City, Fla.
W. Palm Beach, Fla.
Dayton, Ohio
Youngstown, Ohio
Evansville, Ind.
Kewanee, Ill.
Flint, Mich.
Hancock, Mich.
S. Ste. Marie Mich.
Oshkosh, Wis.
Fayettesville, Tenn.
Johnson City, Tenn.
Laurel, Miss.
Austin, Minn.
International Falls, Minn.
Shenandaah, Iowa
Fargo, N. D.
Minot, N. D.
Custer, S. D.
Sioux Falls, S. D.
Broken Bow, Neb.
El Dorado, Kans.
Forrest City, Ark.
Ft. Smith, Ark.
Ruston, La.
A tus, Okla.
Bay City, Tex
Eagle Pass, Tex.
Presido, Tex.
Sterling City, Tex.
Waco, Tex.
Bozeman, Mont.
Miles City, Mont.
Shelby, Mont.
Kellogg Wardner, Id.
Twin Falls, Idaho
Cheyenne, Wyo.
Lander, Wyo.
La Junta, Colo.
Pagosa Springs, Colo.
Clovis, N. M.
Socorro, N. M.
Flagstaff, Ariz.
Tucson, Ariz.
Heber, Utah
Ely, Nev.
Las Vegas, Nev.
Reno, Nev.
Seattle, Wash.
Baker, Ore.
Eugene, Ore.
Bakersfield, Cal.
Eureka, Cal.
San Diego, Cal.
Santa Cruz, Cal.

CHANNEL 17 (56)

Ft. Kent, Me.
Burlington, Vt.
Providence, R. I.
Jamestown, N. Y.
Trenton, N J.
Richmond, Va.
Clarksburg, W. Va.
Winstan-Salem, N. C.
Augusta, Ga.
Valdosta, Ga.
Sebring, Fla.
Sandusky, Ohio
Seymaur, Ind.
Springfield, Ill.
Muskegon, Mich.
Sparta, Wis.
Moyfield, Ky.
Harriman, Tenn.
Alexander City, Alo.
Grenada, Miss.
St Cloud, Minn.
Ft Dodge, Iowa
Marshall, Mo.
Carrington, N. D.
Dupree, S. D.
Neligh, Neb.
Osborne, Kans.
Morrilton, Ark.
Crowley, La.
Stillwater, Okla.
Breckenridge, Tex.
Huntsville, Tex.
Kingsville, Tex.
Kerrville, Tex.
Pampa, Tex.
Lewistown, Mont.
Missoula, Mont.
Sidney, Mont.
Preston, Idaho
Rawlins, Wyo.
Sheridan, Wyo.
Grand Jnc., Colo.
Yuma, Colo.
Gallup, N. M.
Hobbs, N. M.
Las Vegas, N. M.
Douglas, Ariz.
Phoenix, Ariz.
Cedar City, Utah
Elko, Nev.
Ephrata, Wash.
Medford, Ore.
Portland, Ore.
Fresno, Cal.
San Bernardino, Cal.
Santa Rosa, Cal.

CHANNEL 18 (59)

Calais, Me.
Brattleboro, Vt.
Auburn, N. Y.
York, Pa.
Asheville, N. C.
Henderson, N. C.
Georgetown, S. C.
Macon, Ga.
Crestview, Fla.
W. Palm Beach, Fla.
Portsmouth, Ohio
Youngstown, Ohio
Evansville, Ind.
Marion, Ind.
Quincy, Ill.
Marquette, Mich.
Saginaw, Mich.
Beloit, Wis.
Winchester, Tenn.
Brookshaven, Miss.
Ely, Minn.
Red Wing, Minn.
Farga, N. D.
Minot, N. D.
Sioux Falls, S. D.
Lexington, Neb.
Scotts Bluff, Neb.
Atchison, Kans.
Pratt, Kans.
Ft. Smith, Ark.
Paragould, Ark.
Lawton, Okla.
Colo. City, Tex.
Del Rio, Tex.
Orange, Tex.
Van Horn Tex.
Victoria, Tex.
Waco, Tex.
Chouteau, Mont.
Glasgow, Mont.
Cascade, Idaho
St. Maries, Idaho
Riverton, Wya.
Cortez, Colo.
Trinidad, Colo.
Portales, N. M.
Silver City, N. M.
Winslow, Ariz.
Nephi, Utah
Boulder City, Nev.
Tonopah, Nev.
Winnemucca, Nev.
Olympia, Wash.
Kinzua, Ore.
Reedsport, Ore.
El Centro, Cal.
Monterey, Cal.
Redding, Cal.
Santa Paula, Cal.

CHANNEL 19 (55)

Augusta, Me.
Ft Kent, Me.
Fall River, Mass.
Olean, N. Y.
Tupper Lake, N. Y.
Easton, Pa.
Richmond, Va.
Weston, W. Va.
Konnapolis, N. C.
Cedartown, Ga.
Statesboro, Ga.
Deland, Flo.
Key West, Fla.
Quincy, Fla.
Donville, Ill.
Muskegan, Ill.
Merrill, Wis.
Lexington, Ky.
Paris, Tenn.
Kosciusko, Miss.
St. Cloud, Minn.
Webster City, Iowa
Joplin, Mo.
Washington, Mo.
Devils Lake, N. D.
Gettysburg, S. D.
York, Neb.
Oakdale, La.
Alice, Tex.
Brady, Tex.
Brenham, Tex.
Childress, Tex.
Monahans, Tex.
Paris, Tex.
Baker, Mont.
Billings, Mont.
Havre, Mont.
Missoula, Mont.
Idaho Falls, Idaho
Laramie, Wyo.
Gunnison, Colo.
Lamar, Colo.
Alamogordo, N. M.
Gallup, N. M.
Aja, Ariz.
Bisbee, Ariz.
Beaver, Utah
Elko, Nev.
Mt. Vernon, Wash.
Pasco, Wash.
Ashland, Ore.
Tillamook, Ore.
Grass Valley, Cal.
Hanford, Cal..
Riverside, Cal

CHANNEL 20 (53)

Montpelier, Vt.
New Haven, Conn.
Oswego, N. Y.
York, Pa.
Roanoke, Va.
Belhaven, N. C.
Hendersonville, N. C
Americus, Ga.
Pensacala, Fla.
Portsmouth, Ohio
Evansville, Ind.
Elgin, Ill.
Ishpeming, Mich.
Jackson, Mich.
Whitehall, Wis.
Jasper, Ala.
McComb, Miss.
Crookston, Minn.
Marshall, Minn.
Ottumwa, Iowa
Clinton, Mo.
Bismarck, N. D.
Belle Fourche, S. D.
O'Neill, Neb.
Scotts Bluff, Neb.
Hutchinson, Kans.
Batesville, Ark.
Magnolia, Ark.
Ada, Okla.
Guymon, Okla.
Cuero, Tex.
Marfa, Tex.
Rock Springs, Tex.
Stanford, Tex.
Glasgow, Mont.
White Sul. Spgs., Mont.
Sandpoint, Idaho
Riverton, Wyo.
Colo. Spgs., Colo.
Bernalillo, N. M.
Portales, N. M.
San Rita, N. M.
Winslow, Ariz.
Hyrum, Utah
Moab, Utah
Ely, Nev.
Puyallup, Wash.
Lakeview, Ore.
On ario, Ore.
Brawley, Cal.
Hollister, Cal.
Mojave, Cal.
Ukiah, Cal.

CHANNEL 21 (61)

Augusta, Me.
Ft. Kent, Me.
Fall River, Mass.
Massena, N. Y.
Easton, Pa.
Johnstown, Pa.
Petersburg, Va.
Salisbury, N. C.
Athens, Ga.
Waycross, Ga.
Key West, Fla.
Orlando, Fla.
Mansfield, Ohio
Logansport, Ohio
Gailsburg, Ill.
Saginaw, Mich.
Fand du Lac, Wis.
Richmond, Ky.
Calumbia, Tenn.
Tray, Ala.
Greenwood, Miss.
Gulfport, Miss.
Faribault, Minn.
Virginia, Minn.
Creston, Iowa
Poplor Bluff, Mo.
Rugby, N. D.
White River, S. D.
Kearney, Neb.
Emporia, Kans.
Sharon Spgs., Ka-s.
Russelville, Ark.
Pineville, La.
Brownwood, Tex.
Edinburg, Tex.
Galveston, Tex.
Mineola, Tex.
Odessa, Tex.
Shamrock, Tex.
Billings, Mont.
Glendive, Mont.
Havre, Mont.
Idaho Falls, Idaho
Moscow, Idaho
Laramie, Wyo.
Trinidad, Colo.
Alamogordo, N. M.
Farmington, N. M.
Ajo, Ariz.
Bisbee, Ariz.
Hurricane, Utah
Provo, Utah
Tonopah, Nev.
Winnemucca, Nev.
Bellingham, Wosh.
Ashland, Ore.
Burns, Ore.
Tillamook, Ore.
Lodi, Cal.
Riverside, Cal.
San Luis, Ob., Cal.

CHANNEL 22 (52)

Montpelier, Vt.
New Haven, Conn.
Rochester, N. Y.
Harrisburg, Pa.
Roanoke, Va.
Jacksonville, N. C.
Spartanburg, S. C.
La Grange, Ga.
Pensacola, Fla.
Perry, Fla.
W. Palm Bch., Fla.
Cincinnati, Ohio
Steubenville, O.
Metropolis, Ill.
Urbana, Ill.
Jackson, Mich.
Antigo, Wis.
McCamb, Miss.
Tupelo, Miss.
Bemidji, Minn.
Cedar Falls, Iowa
Joplin, Ma.
Mexico, Ma.
Bismark, N. D.
Watertown, S. D.
Crawford, Neb.
Stanton, Neb.
Hays, Kans.
Hope, Ark.
El Reno, Okla.
Crockett, Tex.
Dalhart, Tex.
Fredericksb'g, Tex.
Snyder, Tex.
Glasgow, Mont.
Whitehall, Mont.
Gooding, Idaho
Sandpoint, Idaho
Buffalo, Wyo.
Limon, Colo.
Belen, N. M.
Carlsbad, N. M.
Globe, Ariz.
Richfield, Utah
Boulder City, Nev.
Aberdeen, Wash.
Condon, Ore.
Marshfield, Ore.
Calexico, Cal.
Ocnard, Cal.
Susanville, Cal.
Watsonville, Cal.

CHANNEL 23 (56)

Augusta, Me.
Fall River, Mass.
Binghamton, N. Y.
Atlantic City, N. J.
Suffolk, Va.
Elkins, W. Va.
High Point, N. C.
Athens, Ga.
Waycross, Ga.
Orlando, Fla.
Mansfield, Ohio
Kakomo, Ind.
Jacksonville, Ill.
Cadillac, Mich.
Madison, Wi .
Rice Lake, Wis.
Hazard, Ky.
Springfield, Tenn.
Tuscaloosa, Ala.
Gulfport, Miss.
Worthington, Minn.
Clorinda, Iowa
Hermitage, Mo.
Rolla, N. D.
Williston, N. D.
Chamberlin, S. C.
Keorney, Neb.
Jonesboro, Ark.
Bastrop, La.
Lake Charles, La.
Alva, Okla.
Muskogee, Okla.
Falfurrias, Tex.
Henrietta, Tex.
Plainview, Tex.
Sanderson, Tex.
Taylor, Tex.
Havre, Mont.
Nampa, Idaho
Cody, Wyo.
Kemmerer, Wyo.
Newcastle, Wyo.
San Luis, Colo.
Deming, N. M.
Nogales, Ariz.
Prescott, Ariz.
Monticello, Utah
McGill, Nev.
Yerington, Nev.
Bellingham, Wash.
Ritzville, Wash.
Corvallis, Ore.
Banning, Cal.
Mt. Shasta, Cal.
Petaluma, Cal.
Tulare, Cal.

CHANNEL 24 (53)

St. Albans, Vt.
Waterbury, Conn.
Pittsburgh, Pa.
Lebanon, Pa.
Hinton, W. Va.
Rocky Mount, N. C.
Spartanburg, S. C.
La Grange, Ga.
Cross City, Fla.
Palm Beach, Fla.
Pensacola, Fla.
Cincinnati, Ohio
Centralia, Ill.
Jaliet, Ill.
Detroit, Mich.
Stevens Pt., Wis.
Jackson, Tenn.
Canton, Miss.
Albert Lea, Minn.
Thief Run Falls, Minn.
Fairfield, Iowa
McIntosh, S. D.
Watertown, S. D.
Ogallala, Neb.
Seward, Neb.
Dodge City, Kans.
Osawatomie, Kans.
Conway, Ark.
Houma, La.
Natchitoches, La.
Guthrie, Okla.
Abilene, Tex.
Crystal City, Tex.
Galveston, Tex.
Greenville, Tex.
Big Timber, Mont.
Miles City, Mont.
Burley, Idaho
Casper, Wyo.
Colo. Springs, Colo.
Belen, N. M.
Carlsbad, N. M.
Casa Grande, Ariz.
Provo, Utah
Pioche, Nev.
Centralia, Wash.
Coquille, Ore.
Pendleton, Ore.
Alturas, Cal.
Ft. Bragg, Cal.
Merced, Cal.
Needles, Cal.
Santa Barbara, Cal.

CHANNEL 25 (56)

Houlton, Me.
Lawrence, Mass.
Binghamton, N. Y.
Atlantic City, N. J.
Norfolk, Va.
Winchester, Va.
Huntington, W. Va.
High Point, N. C.
Barnwell, S. C.
Dawson, Ga.
Dolton, Ga.
Orlando, Fla.
Akron, Ohio
Ft. Wayne, Ind.
Escanaba, Mich.
Tawas City, Mich.
Madison, Wis.
Madisonville, Ky.
Columbus, Miss.
Natchez, Miss.
Little Falls, Minn.
Boone, Iowa
Corthage, Mo.
Hannibal, Mo.
Jamestown, N. D.
Williston, N. D.
Yankton, S. D.
Holdridge, Neb.
Jonesboro, Ark.
Texarkana, Ark.
Hobart, Okla.
Beeville, Tex.
Big Spring, Tex.
Hillsboro, Tex.
Marfa, Tex.
Chinook, Mont.
Thompson Falls, Mont.
Nampa, Idaho
Cody, Wyo.
Rock Springs, Wyo.
Sudance, Wyo.
Delta, Colo.
Ft. Morgan, Colo.
Springfield, Colo.
Deming, N. M.
Santa Rosa, N. M.
Nogales, Ariz.
Prescott, Ariz.
Escalante, Utah
Lovelock, Nev.
McGill, Nev.
Omak, Wash.
Albany, Ore.
Barstow, Cal.
Paso Robles, Cal.
Red Bluff, Cal.

CHANNEL 26 (50)

Berlin, N. H.
Waterbury, Conn.
Lancaster, Pa.
Pittsburgh, Pa.
Goldsboro, N. C.
Milledgeville, Ga.
Belle-Glade, Fla.
Lake City, Fla.
Springfield, Ohio
Bloomington, Ill.
Holland, Mich.
Stevens Pt., Wis.
Bristol, Tenn.
Andalusia, Ala.
Huntsville, Ala.
Fairmount, Minn.
Grand Rapids, Minn.
Centerville, Iowa.
Cedar Falls, Iowa
Sikeston, Mo.
Grafton, N. D.
Aberdeen, S. D.
Columbus, Neb.
Colby, Kans.
Ottawa, Kans.
Crossett, Ark.
Harrison, Ark.
Bogalusa, La.
Austin, Tex.
Beaumont, Tex.
Clarendon, Tex.
McAllen, Tex.
Sulphur Springs, Tex.
Ekalaka, Mont.
Great Falls, Mont.
Challis, Idaho
Montpelier, Idaho
Lusk, Wyo.
Craig, Colo.
Walsenburg, Colo.
Artesia, N. M.
Miami, Ariz.
McDermitt, Nev.
Pioche, Nev.
Kennewick, Wash.
Astoria, Ore.
Coquille, Ore.
Blythe, Cal.
Modesto, Cal.
Santa Barbaro, Cal.

CHANNEL 27 (54)

Houlton, Me.
Lawrence, Mass.
Buffalo, N. Y.
Oneonta, N. Y.
Atlantic City, N. J.
Emporia, Va.
Martinsburg, W. Va.
Florence, S. C.
Fitzgerald, Ga.
Toccoa, Ga.
Leesburg, Fla.
Gallipolis, Ohio
Anderson, Ind.
Mt. Vernon, Ill.
Rockford, Ill.
Detroit. Mich.
Haughton, Mich.
Manistee, Mich.
Eau Clair, Wis.
Lebanon, Tenn.
Clantan, Ala.
Natchez, Miss.
Det. Lakes, Minn.
Lebanon, Ma.
Napoleon, N. D.
Williston, N. D.
Lake Andes, S. C.
Lead, S. D.
Belleville, Kans.
Texarkana, Ark.
W. Helena, Ark.
Frederick, Oklo.
Ponca City, Okla.
Junctian, Tex.
Pecos, Tex.
Robstown, Tex.
Dillion, Mant.
Malta, Mont.
Polsan, Mont.
Weiser, Idaho
Powell, Wyo.
Montrose, Colo.
Loveland, Colo.
Clayton, N. M.
Las Cruces, N. M.
Halbrook, Ariz.
Tooele, Utah
Henderson, Nev.
G'nd Coulee, Wash.
Lakeview, Ore.
The Dalles, Ore.
Oceanside, Cal.
Oroville, Cal.
Visalia, Cal.

CHANNEL 28 (47)

Lewiston, Me.
Pittsfield, Mass.
Lancaster, Pa.
Wheeling, W. Va.
Raleigh, N. C.
Charleston, S. C.
Lakeworth, Fla.
Tallahassee, Fla.
Lima, Ohio
Terre Haute, Ind.
Midland, Mich.
Appleton, Wis.
Van Cleve, Ky.
Union City, Tenn.
Pascagoula, Miss.
Starkville, Miss.
New Ulm, Minn.
Burlington, Iowa
Glenwood, Iowa
Cooperstown, N. D.
Valentine, Neb.
Goodland, Kans.
McPherson, Kans.
Malvern, Ark.
Abbeville, La.
Okmulgee, Okla.
Austin, Tex.
Canadian, Tex.
Hamlin, Tex.
Nacogdoches, Tex.
Circle, Mont.
Great Falls, Mant.
Arco, Idaho
Wheatland, Wyo.
Canon City, Calo.
Artesia, N. M.
Laguna, N. M.
Hayden, Ariz.
Ephraim, Utah
Caliente, Nev.
Gerloch, Nev.
Chehalis, Wash.
Colfax, Wash.
Bend, Ore.
Calipatria, Cal.
Fillmore, Cal.
Turlock, Cal.

CHANNEL 29 (56)

Houltan, Me.
Manchester, N. H.
Williamspart, Pa.
Covington, Va.
Norfolk, Va.
Rockhill, S. C.
Griffin, Ga.
Sanford, Fla.
Newark, Ohia
Litchfield, Ill.
Rockford, Ill.
Battle Creek, Mich.
Petoskey, Mich.
Eau Clair, Wis.
Louisville, Ky.
Lewisburg, Tenn.
Clarksdale, Miss.
Columbia, Miss.
Alexandria, Minn.
Newton, Iowa
Sedalia, Mo.
Fart Yates, N. D.
Buffalo S. D.
Yankton, S. D.
Superior, Neb.
Syracuse, Kans.
DeRidder, La.
Hugo, Okla.
Okeene, Okla.
Brackittville, Tex.
Eagle Lake, Tex.
Midland, Tex.
Rio Grande, Tex.
Stephenville, Tex.
Broadus, Mont.
Philipsburg Mont.
Plentywood, Mont.
Red Lodge, Mont.
Weiser, Idaho
Superior, Wyo.
Greely, Colo.
Silvertown, Cola.
Las Cruces, N. M.
Tucumcari, N. M.

Halbraak, Ariz.
Kingman, Ariz.
Tambstane, Ariz.
Austin, Nev.
Galdendale, Wash.
Metaline Falls, Wast.
Lakeview, Ore.
Madras, Ore.
Marshfield, Ore.
Dinuba, Cal.
Napa, Cal.
Redlands, Cal.

CHANNEL 30 (50)

Lewiston, Me.
Hartford, Conn.
Malane, N. Y.
Newcastle, Pa.
Wilmington, Dela.
Charleston, W. Va.
Raleigh, N. C.
Charlestan, S. C.
Douglas, Ga.
Ft. Lauderdale Fla.
Lima, Ohio
Kankakee, Ill.
Quincy, Ill.
Ironwood, Mich.
Ludington, Mich.
Pr. du Chien, Wis.
Cleveland, Tenn.
Dyersburg, Tenn.
Selma, Ala.
Maryville, Mo.
Grafton, N. D.
Kenmore, N. D.
Aberdeen, S. D.
Ord, Neb.
Lorned, Kans.
Pittsburg, Kons.
Tallulah, La.
Boise City, Okla.
Shawnee, Okla.
Austin, Tex.
Haskell, Tex.
Longview, Tex.
Chester, Mont.
Jordon, Mont.
Wheatland, Wyo.
Glenw'd Spgs., Calo.
Lovington, N. M.
Santa Fe, N. M.
Clifton, Ariz.
Williams, Ariz.
Yuma, Ariz.
Logan, Utah
Carson City, Nev.
Coliente, Nev.
Pullman, Wash.
Sheldon, Wash.
Pineville, Ore.
Arcata, Cal.
Salinas, Cal.
Ventura, Cal.

CHANNEL 31 (48)

Presque Isle, Me.
Concord, N. H.
Dunkirk, N. Y.
Scrantan, Pa.
Martinsville, Va.
Fairmont, W. Va.
Elizabeth C., N. C.
Greenwood, S. C.
Plant City, Fla.
Peoria, Ill.
Petoskey, Mich.
Oshkosh, Wis.
Louisville, Ky.
Shelbyville, Tenn.
Opelika, Ala.
Biloxi, Miss.
Clarksdale, Miss.
Pine City, Minn.
Flat River, Mo.
Lexington, Mo.
Valley City, N. D.
Martin, S. D.
Vermillion, S. D.
Newton, Kans.
Scott City, Kans.
Fayetteville, Ark.
Jennings, La.
Clinton, Okla.
Cor. Christi, Tex.
Ft. Stockton, Tex.
Kerrville, Tex.
Waxachachie, Tex.
Plentywood, Mont.
Bonners Ferry, Ida.
Council, Idaho
Dubois, Idaho
Warland, Wyo.
Alamosa, Calo.
Greely, Colo.
Hot Springs, N. M.
Tucumcori, N. M.
Mesa, Ariz.
Duchesne, Utah
Yakima, Wash.
Roseburg, Ore.
Indio, Cal.
Porterville, Cal.
Willows, Cal.

CHANNEL 32 (54)

Waterville, Me.
Hartford, Conn.
Rochester, N. Y.
Plattsburg, N. Y.
Wilmington, Dela.
Charlottesville, Va.
Nartan, Va.
New Bern, N. C.
Sumter, S. C.
Atlanta, Ga.
Thomasville, Ga.
Daytona Bch., Fla.
Ft. Lauderdale, Fla.
Cantan, Ohio
Muncie, Ind.
Harrisburg, Ill.
Iron Mtn., Mich.
Saginaw, Mich.
Racine, Wis.
West Point, Miss.
Rochester, Minn.
Wadena, Minn.
Atlantic, Iowa
Keokuk, Iowa
Boltenav, N. D.
Hettinger, N. D.
Huron, S. D.
Sidney, Neb.
Ft. Scott, Kans.
Russell, Kans.
Monroe, La.
Thibadaux, La.
Ardmore, Okla.
Cameron, Tex.
Canyon, Tex.
Cotulla, Tex.
Sierra Blanca, Tex.
Sweetwater, Tex.
Forsyth, Mont.
Livingston, Mont.
Lewiston, Idaho
Midwest, Wyo.
Leadville, Colo.
Santa Fe, N. M.
Morenci, Ariz.
Yuma, Ariz.
Logan, Utah
Milford, Utah
Oraville, Wash.
Pt. Angeles, Wash.
Klamath Falls, Ore.
Salem, Ore.
Arroyo Grande, Cal.
Sonora, Cal.

CHANNEL 33 (48)

Presque Isle, Me.
Concord, N. H.
Utica, N. Y.
Emporium, Pa.
Woshington, D. C.
Sutton, W. Va.
Durham, N. C.
Anderson, S. C.
Lakeland, Fla.
Marion, Ohio
Bedford, Ind.
La Salle, Ill.
Gr. Rapids, Mich.
Wis. Rapids, Wis.
Tullahoma, Tenn.
Auburn, Ala.
Biloxi, Miss.
Iowa Falls, Iowa
Fulton, Mo.
Grand Forks, N. D.
Mondan, N. D.
Hot Springs, S. D.
Vermillion, S. D.
Falls City, Neb.
Oberlin, Kans.
Wellington, Kans.
Rogers, Ark.
Stuttgart, Ark.
Beaumont, Tex.
Cor. Christi, Tex.
Eldorado, Tex.
Lubbock, Tex.
Mt. Pleasant, Tex.
Butte, Mont.
Wolf Point, Mont.
Blackfaat, Idaho
Bonners F'ry, Ida.
Worland, Wyo.
Del Norte, Colo.
Ft. Collins, Colo.
Hot Springs, N. M.
Mesa, Ariz.
Vernal, Utah
Yokima, Wash.
Roseburg, Ore.
Independence, Cal.
Laguno Beach, Cal.
Lakeport, Cal.

CHANNEL 34 (54)

Waterville, Me.
Hartford, Conn.
Ogdensburg, N. Y.
Reading, Po.
Staunton, Va.
Montgomery, W. Va.
Hickory, N. C.
Washington, N. C.
Walterboro, S. C.
Atlanta, Ga.
Thomasville, Ga.
Daytona Bch., Fla.
Hollywood, Fla.
Canton, Ohio
Hamilton, Ohio
Decatur, Ill.
Flint, Mich.
Iran Mtn., Mich.
Racine, Wis.
Bowling Green, Ky.
Phila., Miss.
Rochester, Minn.
Albia, Iowa
Nevada, Mo.
Hettinger, N. D.
Wahpetan, N. D.
Atkinsan, Neb.
Cancardia, Kans.
El Darada, Ark.
Pacahontas, Ark.
New Iberia, La.
McAlester, Okla.
Mexia, Tex.
Pearsall, Tex.
Perryton, Tex.
San Benito, Tex.
Seymour, Tex.
Livingston, Mont.
Lewiston, Idaho
Midwest, Wyo.
Oak Creek, Colo.
Sterling, Colo.
Las Alomos, N. M.
Roswell, N. M.
McNary, Ariz.
Yuma, Ariz.
Ogden, Utah
Mountain C., Nev.
Overton, Nev.
Pt. Angeles, Wash.
Klamath Falls, Ore.
Salem, Ore.
Placerville, Cal.
Wasco, Cal.

CHANNEL 35 (46)

Presque Isle, Me.
Laconia, N. H.
Middletown, N. Y.
Hagerstown, Md.
Durham, N. C.
Seneca S. C.
Jessup, Ga.
Ft. Myers, Fla.
Marion, Ohio
Mt Carmel, Ill.
Sterling Ill.
Gr Rapids, Mich.
Marshfield, Wis.
Somerset, Ky
Humboldt, Tenn.
Talladega, Ala.
Vicksburg, Miss.
Storm Lake, Iowa
Rolla, Mo
St. Joseph, Mo.
Grand Forks, N. D.
Mandan, N. D.
Deadwood, S. D.
Huran S. D
Grand Island, Neb.
Winfield, Kans.
Duncan, Okla.
Lampassas, Tex.
Lubbock, Tex.
Lufkin Tex.
Anaconda Mont.
Libby, Mont.
Roundup, Mont.
Caldwell, Idaho
Pocatello, Idaho
Ft Collins Colo
Magdalena, N. M.
Raton, N M.
Coolidge, Ariz.
Kingman, Ariz.
Salina, Utah
Fallon Nev.
Waterville, Wash.
Bend. Ore.
Corona, Cal.
San Jose, Cal.

CHANNEL 36 (42)

Bangor Me.
Springfield, Mass.
Batavia, N. Y.
Reading, Pa
Harrisonburg, Va.
Greenville, N. C.
Lenoir, N. C.
Columbus, Ga.
Daytona Bch., Fla.
Akron Ohio
Decatur, Ill
West Branch, Mich.
Hayward, Wis.
Racine, Wis.
Hopkinsville, Ky.
Meridian, Miss.
Moberly, Mo.
Ashley N. D.
Crosby, N. D.
Fremont, Neb.
Narton, Kans.
Winnfield, La.
Beaver, Okla.
Miami, Okla.
Ballinger, Tex.
Denton, Tex.
Rasenberg, Tex.
Fort Benton, Mont.
Ketchum, Idaho
Orafino, Idaho
Douglas, Wya.
Evanstan Wyo.
Glen. Spgs., Cola.
Huga, Cala.
Park View, N. M.
Raswell, N. M.
Jerame, Ariz.
Saffard Ariz.
Overtan, Nev.
Grants Pass, Ore.
Hood River. Ore.
Taft, Cal.

CHANNEL 37 (43)

Rutland, Vt.
Barnstable, Mass.
Ithaca N Y.
Frederick, Md.
Danville Va.
Myrtle Beach, S. C.
Brunswick Ga.
Ft. Myers Fla.
Mariana, Fla.
Chillicothe Ohio
Lafayette, Ind.
Herrin Ill
Ann Arbor, Mich.
Warsaw, Wis.
Cookeville, Tenn.
Eveleth, Minn.
Clinton, Iowa
St. Joseph, Mo.
Mandan, N. D.
Madison, S. D
Grand Island, Neb.
Ark. City, Kans.
Newport, Ark
Brownfield, Tex.
Marshall Tex.
San Diego, Tex.
Temple, Tex
Anaconda, Mont.
Hysham, Mont.
Libby, Mont.
Caldwell. Idaho
Sodo Spgs., Ida.
Walden Colo.
Hachita, N. M.
Raton, N. M.
Coolidge, Ariz.
Fillmare, Utah
Sparks, Nev.
Wenatchee, Wash.
Westfir, Ore.
San Jose, Cal.
Scotia, Cal.
Victorville, CaL

CHANNEL 38 (47)

Newport, Vt.
Springfield, Mass.
Hazelton Pa.
Waynesboro, Va.
Fayetteville, N. C.
Greenville, S. C.
Columbus, Ga.
Ocala Fla.
Akron, Ohio
Ft Wayne, Inc.
Clinton Ill.
Harbor Bch., Mich.
Sheboygan, Wis.
Danville, Ky.
Pulaski, Tenn.
Meridian Miss.
Fergus Falls, Minn.
Winona, Minn.
Cherokee, Iowa
Ottumwa, Iowa
Van Buren. Ma.
Crosby, N. D.
Ainsworth, Neb.
Baxter Spgs., Kans.
Clay Center, Kans.
Liberal, Kans.
Pine Bluff, Ark.
Eunice, La
El Campo, Tex.
Kermit, Tex.
Terrell. Tex.
Vernon, Tex.
Ft. Benton, Mont.
MocKay, Idahe
Basin, Wya.
Ouray, Colo
Wray Colo
Ft. Huachuco, Ariz.
Parker, Ariz.
St Johns, Ariz.
Ogden, Utah
St George Utah
Vancouver, Wash.
Walla Walla, Wash.
Grants Pass, Ore.
Delano, Cal.
Sacramento, Cal.

CHANNEL 39 (46)

Portsmouth, N. H.
Hornell, N. Y.
Saranac Lake, N. Y.
Vineland, N. J.
Cumberland, Md.
Pulaski, Va.
Ahoski, N. C.
Columbia, S. C.
Brunswick, Ga.
Cartersville, Ga.
Ft. Pierce, Flo.
Terre Haute, Ind.
Alpena, Mich.
Janesville, Wis.
Rhinelander, Wis.
Maysville, Ky.
Murray, Ky.
Enterprise, Ala.
Hibbing, Minn.
Masan City, Iawa
Lauisiana, Mo.
Grand Farks, N. D.
Edgemant, S. D.
Madisan, S. D.
Mabridge, S. D.
Hastings, Neb.
Anthony, Kans.
Lowrence, Kans.
Paris, Ark.
Monrae, La.
Beaumont, Tex.
Hamilton, Tex.
Littlefield, Tex.
Forsyth, Mont.
Diggs, Idaho
Mtn. Home, Idaho
Wallace, Idaho
Chey. Wells, Colo.
Steam. Spgs., Colo.
Willard, N. M.
Buckeye, Ariz.
Mina, Nev.
Bremerton, Wash.
Calton, Cal.
San Jose, Cal.
Weaverville, Cal.

CHANNEL 40 (42)

Littleton, N. H.
Poughkeepsie, N. Y.
Lewiston, Pa.
Charleston, W. Va.
Fayetteville, N. C.
Greenville, S. C.
Columbus, Ga.
Everglades, Fla.
Platka, Fla.
Cleveland, Ohio
South Bend, Ind.
Vandalia, Ill.
Green Bay, Wis.
Glasgow, Ky.
Hattiesburg, Miss.
Hastings, Minn.
Carral, Iowa
Muscatine, Iowa
Carrollton, Mo.
Oakes, N. D.
Bridgepart, Neb.
Salina, Kans.
Pine Bluff, Ark.
Durant, Okla.
Shattuck Junc., Okla.
Bay City, Tex.
Center, Tex.
Stanford, Tex.
Butte, Mont.
Wibaux, Mont.
Gillette, Wyo.
Saguache, Colo.
Grand Canyon, Ariz.
San Simon, Ariz.
Ogden, Utah
Eureka, Nev.
Langview, Wash.
Republic, Wash.
Enterprise, Ore.
Gold Beach, Ore.
Sacramento, Cal.
Trona, Cal.

CHANNEL 41 (48)

Portsmouth, N. H.
Watertawn, N. Y.
Trentan, N. J.
Fredericksburg, Va.
Wheeling, W. Va.
Greensboro, N. C.
Thomson, Ga.
Winter Haven, Fla.
Richmond, Ind.
Aurora, Ill.
Traverse City, Mich.
La Crosse, Wis.
Henderson, Ky.
Middlesboro, Ky.
Decatur, Ala.
Yazoo City, Mich.
Charlton, Iowa
West Plains, Mo.
Langdon, N. D.
Brookings, S. D.
Edgemont, S. D.
Mobridge, S. D.
Hastings, Neb.
Iola, Kans.
Kinsley, Kans.
Lafayette, La.
Norman, Okla.
Athens, Tex.
El Paso, Tex.
Lomesa, Tex.
Sequin, Tex.
Hardin, Mont.
Scabey, Mont.
Winifred, Mont.
Caeur D'Alene, Ida.
St. Anthony, Ida.
Green River, Wyo.
Boulder, Cala.
Dawson, N. M.
Wickenburg, Ariz.
Las Vegas, Nev.
Wells, Nev.
Bremerton, Wash.
Heppner, Ore.
Sprague River, Ore.
Caalinga, Cal.
Escandida, Cal.
Partala, Cal.

CHANNEL 42 (48)

Bangar, Me.
Albany-Schenectady-Troy, N. Y.
Harrisburg, Pa.
Lexingtan, Va.
Gastonia, N. C.
Kinston, N. C.
Albany, Ga.
Rome, Ga.
St. Augustine, Fla.
Cleveland, Ohio
South Bend, Ind.
Maline, Ill.
Rogers City, Mich.
Ashlond, Wis.
Green Bay, Wis.
Winchester, Ky.
Clarkesville, Tenn.
Hottiesburg, Miss.
Hibbing, Minn.
Owatonna, Minn.
Red Oak, Iowa
Ookes, N. D.
Stanley, N. D.
Winner, S. D.
Bayard, Neb.
Lindsborg, Kans.
Camden, Ark.
Siloam Spgs., Ark.
Hereford, Tex.
Livingston, Tex.
Mineral Wells, Tex.
Rankin, Tex.
Weslaca, Tex.
Poradise, Mont.
Winnett, Mont.
Meeker, Colo.
Racky Ford, Cala.
Carrizoza, N. M.
Superior, Ariz.
Brighom, Utah
Ponquitch, Utah
Battle Mtn., Nev.
Ellensburg, Wash.
Burns, Ore.
Newport, Ore.
Lompoc, Col.
Redding, Col.
Stockton, Cal.

CHANNEL 43 (48)

Worcester, Mass.
Watertown, N. Y.
Du3ois, Pa.
Salisbury, Md.
Parkersburg, W. Va.
Greensboro, N. C.
Dublin, Ga.
Clearwater, Fla.
Toledo, Ohia
Columbus, Ind.
Aurora, Ill.
Traverse City, Mich.
La Crosse, Wis.
Morristown, Tenn.
Florence, Ala.
Greenville, Ala.
Greenville, Miss.
Brainerd, Minn.
Knoxville, Iowa
Jefferson City, Mo.
Bowman, N. D.
Longdon, N. D.
Brookings, S. D.
Pine Ridge, S. D.
Fairbury, Neb.
Dodge City, Kans.
Boton Rouge, La.
Seminale, Okla.
Coleman, Tex.
Kilgore, Tex.
La Grange, Tex.
Cut Bank, Mont.
Hardin, Mont.
Aberdeen, Idaho
Cover D'Alene, Ida.
Boulder, Colo.
Chama, N. M.
Ft. Sumner, N. M.
Lardsburg, N. M.
Clarkdale, Ariz.
Green River, Utah
Caliente, Nev.
Everett, Wash.
Heppner, Ore.
Sprague River, Ore.
Bridgeport, Cal.
nyokern, Cal.
Willits, Cal.

CHANNEL 44 (49)

Brunswick, Me.
Albany-Schenectady-Troy, N. Y.
Rochester, N. Y.
Philadelphia, Pa.
Cumberland, Md.
Shelby, N. C.
Wilsan, N. C.
Apalachicala, Fla.
St. Augustine, Fla.
Springfield, Ohia
Lincaln, Ill.
Bentan Har., Mich.
Shawana, Wis.
Owensbara, Ky.
Gadsden, Ala.
Picayune, Miss.
Chishalm, Minn.
Mankata, Minn.
Chillicathe, Ma.
Harvey, N. D.
Sissiton, S. D.
Winner, S. D.
West Point, Neb.
Coffeyville, Kans.
Phillipsburg, Kans.
Blytheville, Ark.
Hat Springs, Ark.
Cleburne, Tex.
El Pasa, Tex.
Liberty, Tex.
Sabinol, Tex.
Spur, Tex.
Hamilton, Mont.
Harlowton, Mont.
Plentywood, Mont.
Buhl, Idaho
Jackson, Wyo.
Torington, Wya.
Salida, Colo.
Roy, N. M.
Hayden, Ariz.
Kanob, Utah
Lehi, Utah
Goldfield, Nev.
Moses Lake, Wash.
McMinnville, Ore.
Palm Springs, Cal.
Santa Maria, Cal.
Stockton, Ca.

CHANNEL 45 (51)

Worcester, Mass.
Erie, Pa.
Scranton, Pa.
Fredericksburg, Va.
Porkersburg, W. Va.
Greensboro, N. C.
Morehead City, N. C.
Orangeburg, S. C.
Sulphur Spgs., Flo.
Indionapolis, Ind.
Ladysmith, Wis.
Corbin, Ky.
Dothan Ala.
Sheffield, Ala.
Greenville, Miss.
Dubuque, Iowa
Cape Girardeau, Mo.
Bowman, N. D.
Larimore, N. D.
Brookings, S. D.
Pine Ridge, S. D.
Beatrice, Neb.
Kinsley, Kans.
Springdale, Ark.
Baton Rauge, La.
Chickasha, Okla.
Woodward, Okla.
Dumas, Tex.
Ozona, Tex.
San Marcos, Tex.
Tyler, Tex.
Cut Bank, Mont.
Saco, Mant.
Virginio City, Mont.
Grangerville, Ido.
Malad City, Ida.
Thermapolis, Wyo.
Longmont, Colo.
Lordsburg, N. M.
Vaughn, N. M.
Clarkdale, Ariz.
Loa, Utah
Las Vegas, Nev.
Palisade, Nev.
Colville, Wash.
Everett, Wash.
Redmond, Ore.
Crescent City, Cal.
Lancaster, Cal.
Pacific Grove, Cal.
Westwood, Cal.

CHANNEL 46 (4)

Asbury Park, N. J.
Uniontown, Pa.
Waukegan, Ill.
Port Huron, Mich.

CHANNEL 47 (2)

Meadville, Pa.
Dover, Dela.

CHANNEL 48 (5)

Brockton, Mass.
New Brunswick, N. J.
Greensburg, Pa.
Gary, Ind.
Pontiac, Mich.

CHANNEL 49 (1)

Annapolis, Md.

CHANNEL 50-55

No allocations

3: TV MARKETS VHF & UHF ALLOCATIONS IN TRADE CENTERS

To manufacturers of transmitters and receivers, the areas of greatest immediate interest are those with a population in excess of 200,000 and the secondary markets with 100,000 to 200,000 population. There are 54 of the former and 47 of the latter listed by the FCC.

At this time, the importance of any market depends upon the channel assignments. Areas where only VHF allocations are proposed are markets for equipment of current design. Conditions are quite different where both VHF and UHF transmission can be expected. As for those where only UHF allocations will be made, they will hardly represent immediate markets for VHF equipment.

Accordingly, the cities listed have been grouped in columns headed VHF-only, V-UHF, and UHF-only. The population of each area is shown, together with the number of channel assignments proposed. This table appears on the front cover. In the V-UHF areas, the first figure indicates the number of VHF channels, and the second, the number of UHF channels.

Totals of these figures show 40 VHF areas, 37 V-UHF areas, and 25 UHF areas with respective populations of 30.3, 19.3, and 5.3 millions. Channel allocations provide for a total of 252 VHF transmitters and 124 UHF transmitters.

Total figures are significant in this case. They break down in this way:

200,000 POPULATION OR MORE

	Areas	Chan.	Population
VHF-Only	25	111	28,136,000
V-UHF	21	55-38	16,928,000
UHF-Only	9	22	3,052,000
	54	166-60	48,116,000

100,000 TO 200,000 POPULATION

	Areas	Chan.	Population
VHF-Only	15	53	2,172,000
V-UHF	16	33-27	2,360,000
UHF-Only	16	37	2,200,000
	47	86-64	6,732,000

4: PRIORITIES HOW THE FCC ALLOCATIONS WERE PLANNED

The FCC's plan of television channel allocations was worked out to meet two primary objectives. These were to provide program service, as far as possible, to all people in the U. S. A., and to afford a fair, efficient, and equitable distribution of stations to all states and communities. To accomplish this result, six priorities were set up:

1. To provide at least one television service to all parts of the United States.

2. To provide each community with at least one television broadcast station.

3. To provide a choice of at least two television services to all parts of the United States.

4. To provide each community with at least two broadcast stations.

5. Any channels which remain unassigned under the foregoing priorities will be assigned to the various communities depending on the size of the population of such community, the geographical location of such community, and the number of television services available to such community from television stations located in other communities.

The word "community," as used above, includes only those communities which had at least one AM, FM, or TV authorization on July 1, 1949. No provision has been made for some of these communities in the allocations table, however, because it is expected that they will use the community channels 46 to 55.

The paragraph above, taken from the FCC proposal, would indicate that there is an AM, FM, or TV authorization for every city or town listed in the allocations table. There is some confusion on that point, for the statement is not in accordance with the facts.

5: TRANSMITTERS SERVICE AND FIELD INTENSITIES

The FCC has proposed certain standards of service which should contribute toward protecting TV audiences from deterioration of program service. Whether or not this would be so, would depend upon the number and extent of future exceptions allowed.

Grades of Service:

Three grades of service are specified, and defined as follows:

PERMISSIBLE INTERFERENCE RATIOS

Grade of Service	Co-Channel Desired to Undesired	Adj.-Channel Desired to Undesired
A	55 db	20 db
B	46	12
C	40	6

SERVICE AVAILABILITY

Grade	% Time	% Locations
A	90%	90%
B	90%	70%
C	90%	50%

The FCC recognizes that synchronized and offset-carrier operation may effect an improvement in these interference ratios, and will encourage such operation. However, the plan specifies that these methods will not be used as a means to reduce the separation between stations, but to extend service areas and improve the quality of reception.

Field Intensities:

Median field intensities to provide standard grades of service are set forth in the following table in terms of db above 1 microvolt per meter. Figues in parentheses are field intensities in microvolts per meter.

FIELD INTENSITY

DB Above 1 Microvolt Per Meter

Grade	ch. 2 to 6	ch. 7 to 13	ch. 14 to 55
A	74 (5,000)	77 (7,000)	80 (10,000)
B	68 (2,500)	71 (3,500)	74 (5,000)
C	47 (220)	56 (632)	62 (1,264)

The use of iso-service (or equal-service) contours are proposed to express service in terms of the ratio between desired and undesired signals in db, or the minimum required signal levels in db above 1 microvolt per meter. This is to facilitate computation of service and interference field-intensities. The same terms can be applied to transmitter output, transmission line loss, and antenna gain. A kilowatt of power added at the transmitter represents a decibel of increased field intensity.

Field intensity is expressed either in db above an undesired signal or above a reference level which has been chosen as 1 microvolt per meter. A convenient reference level of transmitter power is 1 kw. The propagation curves in the Report of the Ad Hoc Committee, Vol. 1, are based on the radiation in the equatorial plane of a half-wave dipole antenna having an effective radiated power

of 1 kw. Antenna gain is expressed as the ratio in db of the maximum radiation from the antenna to the radiation in the equatorial plane of a half-wave dipole, with equal power input.

Classes of Stations & Power:

Channels 46 to 55 are for community stations only in those communities which are not part of a metropolitan district, and to which, except for special cases, no assignment has been made in the allocations table. Effective radiated peak power of not less than 7 db (5 kw.) and not more than 13 db (20 kw.) will be authorized, with an antenna 500 ft. above average terrain, as prescribed in the Engineering Standards. Co-channel assignments will not be less than 140 miles apart, and adjacent-channel assignments not less than 60 miles apart.

Metropolitan stations are intended primarily to render service to a single metropolitan district or a principal city and to the surrounding rural area. Except for wide-coverage stations located at high elevations, metropolitan stations will be authorized to use effective radiated peak power as set forth below, with an antenna 500 ft. above average terrain.

Chan.	Min. Power		Max. Power	
2-6	10 db	(10 kw.)	20 db	(100 kw.)
7-13	10 db	(10 kw.)	20 db	(100 kw.)
14-55	10 db	(10 kw.)	23 db	(200 kw.)

Notes on Antennas:

Antennas higher than 500 ft. should be used if available, but a reduction in effective radiated peak power will be required so that interference caused to Grade A service on the same and adjacent channels will not be increased by the height above 500 ft. Where a height of 500 ft. is not available, a lower antenna will be authorized, but power will be limited in accordance with the preceding table.

The Commission intends, from time to time, to consider horizontal power increases for all community and metropolitan stations.

Directional Antennas:

No provision has been made in the allocations for the use of directional antennas, with the exception of WGAL-TV on channel 4 in Lancaster, Pa., and WDEL-TV on channel 7 in Wilmington, Del., where it is planned to authorize the use of directional antennas to permit the use of increased power. The Commission does not propose to make changes in the plan based on the use of such antennas. However, the Commission does recognize that a directional antenna may be useful in certain situations, and their use will be permitted in appropriate cases. The best available information, according to the Commission, indicates that nulls deeper than -10 db, as compared to the maximum radiation in any direction, may not be practical because of reflecting surfaces which may be in the vicinity of the transmitter.

6: COVERAGE TRANSMITTING RANGE & CHANNEL SEPARATION

A very thorough study of service radii and separation of co-channel and adjacent-channel alocations has been made by the Ad Hoc Committee. On the basis of their findings the FCC has worked out the tables presented here for frequencies of 63, 195, and 600 mc.

In working out estimates of field intensities required at the antenna of a television receiver, it was considered that half-wave dipoles, connected to the set by 50 ft. of RG59U cable, would be typical for 63 and 195 mc. A small rhombic, with a 300-ohm line as the lead-in, was assumed to be typical for the 600-mc. frequency range.

63-MC. TRANSMISSION

Grade of Service	10 db (10 kw.)	20 db (100 kw.)
Service Radii, in Miles		
A	12	20
B	16	27
C	43	57
Co-Channel Separation, Miles		
A	148	215
B	134	205
C	252	328
Adj.-Channel Separation, Miles		
A	50	75
B	50	78
C	105	141

195-MC. TRANSMISSION

Grade of Service	10 db (10 kw.)	20 db (100 kw.)
Service Radii, in Miles		
A	13	21
B	17	29
C	36	46
Co-Channel Separation, Miles		
A	111	172
B	108	162
C	164	232
Adj.-Channel Separation, Miles		
A	50	73
B	51	78
C	84	109

600-MC. TRANSMISSION

Grade of Service	7 db (5 kw.)	10 db (10 kw.)	13 db (20 kw.)	23 db (200 kw.)
Service Radii, in Miles				
A	7	10	12	21
B	12	14	17	29
C	24	27	31	43
Co-Channel Separation, Miles				
A	92	103	125	172
B	92	99	108	162
C	115	125	141	212
Adj.-Channel Separation, Miles				
A	36	43	49	73
B	33	40	46	78
C	58	62	75	102

The service radii at 600 mc. apply to relatively smooth terrain. For relatively rough terrain, as in the vicinity of Washington, D. C., and New York City, an increase in power of about 10 db may be required to provide the same grades of service and radii indicated in the table.

It should be noted that these are conservative figures, and are based on the use of conventional receiving antennas. At any given point, reception may be considerably better or worse than indicated by the tables. Signal strength level will be more consistent near a transmitter, tending to fluctuate more widely from hour to hour, day to day, and month to month, as the fringe of the service area is approached. Also, at the fringe, co-channel and adjacent-channel interference will vary more noticeably with the time of day and the time of year.

Undoubtedly types of antennas will be developed which, by offering greater gain and directional selection, will offset variations in propagation effects. Knowledge of receiving conditions is still theoretical, but there is every reason to expect that improvement will be made as practical experience is gained in the UHF band.

Summary:

Altogether, The FCC plan is a real challenge to the industry. By the time the new plan is finalized, the Commission and the Ad Hoc Committee will have spent nearly a year and a half on the frequency allocations. Then, the engineering of equipment and the construction of new stations will be only in the initial stages.

There's no use thinking back and wishing that the TV allocations had been settled sooner. The truth is that research had not progressed far enough. Basic data was not available. Many problems are still unanswered. But the answers will come. The whole story of radio progress is a record of doing tomorrow what seems impossible today.

SPOT NEWS NOTES

NOTES AND COMMENTS ABOUT SIGNIFICANT ACTIVITIES OF PEOPLE & COMPANIES

Even Worse by Radio:

"Have a good lunch?" "Yes, indeed, it was just packed with delicious, flavorsome goodness, and every bite was chockfull of wholesome nourishment, too, including energy minerals, vitamins, and protein, the food elements so vital to robust good health." If anyone talked like this, you'd consider him a grade-A bore. At least that's what advertising agency Young & Rubicam states in a recent piece of advertising. "You can't always ignore a boring acquaintance," the copy continues. "But most people can, and do, ignore boring advertising." Now, there's a glimmer of progress. Can we hope that agencies will some day learn that that sort of drivel sounds still worse by radio, and that people can, and do, ignore it by switching off their sets?

Newspaper Program Schedules:

Since newspapers and broadcast stations compete for advertising dollars, publishers have generally begrudged and some have refused space required for carrying program schedules. DuMont station WDTV Pittsburgh has found a smart way to win the goodwill of the newspapers. Each night, before the station signs off, the announcer concludes with: "The program schedule for WDTV can be found in the following newspapers. . . ." Then he names 25 papers published in Pittsburgh and the surrounding area.

J. Clifford Durr:

Former FCC Commissioner was principal speaker at the recent Bill of Rights Congress in New York. Sponsors of this Communist-front sound-off on the FBI included Vito Marcantonio, Henry Wallace, Beanie Baldwin, and Harry Bridges.

TV Interference on 27 Mc.:

Complaints of TV interference, addressed to the FCC, have brought to light the fact that some sets are using an IF frequency of 27 mc., disregarding FCC allocations which provide for the use of 27.12 mc. by type-approved or certified diathermy and industrial heating equipment. Looks as if the most practical way to lick this trouble is for manufacturers to use a different IF frequency.

Price Reductions:

Announced by Westinghouse on 16 audio receivers, including 2 FM-AM table models, 1 FM-AM console, and 7 FM-AM phono combinations. Cuts on these models range from $20 to $200.

Stamps Show Microphones:

We learn from philatelist S. N. Shure, president of Shure Brothers, Inc., 225 W. Huron Street, Chicago, that his company's model 55 mike appears on three anniversary and commemorative stamps just issued by the Philippines. He might send you a set if you ask him.

"An American, Excellency, a Mr. Coy, seeks advice on amicable cohabitation of divers elements of a common identity."

Frequency Range Extended:

We have been advised by Howard Carlson, author of "Portable FM Equipment" which appeared last month, that the frequency range of the Doolittle model PJZ-11 has been extended to cover 152 to 174 mc.

16-in. TV at New Low Price:

Lowest price tag we've seen on a 16-in. TV set is $279, carried by Meck's new table model.

Railroad Radio Conference:

Annual meeting of the Communications Section of the Association of American Railroads will be held at Portsmouth, N. H., from September 27 to 29. Details can be obtained from secretary A. H. Grothmann, 30 Vesey Street, New York 7, N. Y.

New TV Set Line:

Sylvania will market a full line of 10- and 12½-in. TV sets this fall. Models will include table and console cabinets, with FM and automatic phonographs. They will be made in the Colonial plant.

South Africa Tests FM:

Concerning FM tests being conducted by the South African Broadcasting Company, the *Johannesburg Star* reports: "This is of first-class importance in South Africa, which suffers from worse electric storms than any other country in the world. . . . If and when FM transmitters are provided for general use, our people will enjoy much truer reception than ever before."

Better Business Bureau:

Complains irregular practices are being used to promote TV set sales. Among examples cited were "$200 trade allowance" which was an authorized price reduction, and which could be obtained without a trade-in, mis-description of cabinet woods, misleading terms, and exaggerated tube counts.

Railroad Radio:

Motorola president Paul Galvin reports that the use of 2-way FM at the Union Pacific's North Platte terminal has raised the 70% record of delivery promises to 98%. Moreover, cost of the radio system in that yard was amortized in six months.

Survey of Chicago FM Listeners:

FM Broadcasters of Chicagoland is making a coincidental telephone survey to determine percentage of FM homes in Chicago service area, and amount of FM listening time. Also, monthly surveys will be made on increase in number of sets and hours of listening. Participating stations are WEFM, WMOR, WOAK, WILA, WJIZ, WXRT, WRGK, and WEAW.

Numbers on C-R Tubes:

All Sylvania picture tubes and their respective cartons now carry serial numbers. Purpose is to enable jobbers and dealers to keep sales records for warranty purposes.

Mobile FM for Signal Corps:

A contract for FM ground and vehicular equipment, amounting to more than $1.8 million, has been awarded to Federal Telephone & Radio Corporation.

NAB Says "Audio-Video"

Under a newly-planned reorganization, NAB will set up an Audio Department and a Video Department. The former will be devoted to matters concerned with FM and AM broadcasting, and the latter with television broadcasting. We're relieved that they didn't call them the Radio and Television departments.

More FM Interest:

Item from WBEN-FM tells that, "because of added interest in FM in the Buffalo area," four hours have been added to the station's daily schedule. Now WBEN-FM operates on 106.5 mc. from 1:00 P. M. to midnight.

NEWS PICTURES

TOP: Installation at WGN-TV's studio A. In the foreground is the G. E. program control console, with film camera console beyond. Sponsor's room is at left.

Twelve of the notables who attended RCA's Carfone demonstration of adjacent-channel operation, are left to right: W. E. Darnell, Daniel H. Arnold, W. S. Grenfell, Jeremiah Courtney, Ray E. Simonds, Franklin Smith, William Rothman, Frank DeBrouse, R. W. Malcolm, H. Gwilym, J. C. Fields, and R. Welsh.

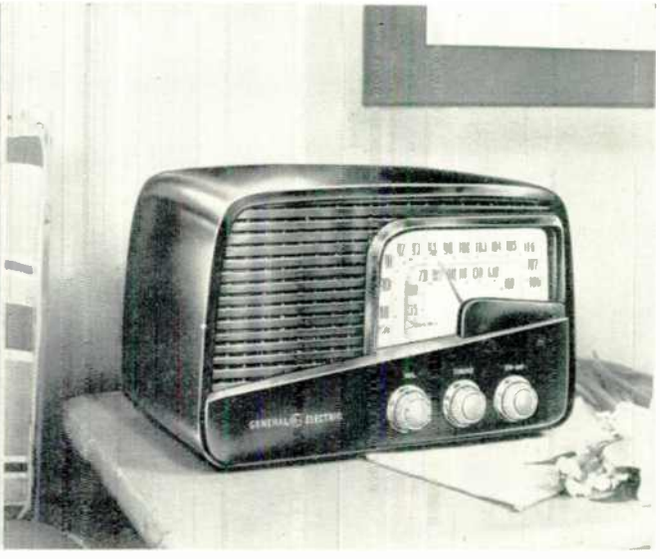
CENTER: This 16-in. cathode-ray tube is the one-millionth produced by RCA. Here it is being examined admiringly by RCA president Frank Folsom, left, L. W. Teegarden, vice president in charge of technical products, and J. G. Wilson, executive vice-president in charge of the

RCA Victor division, at the right.

Organizers of Chicagoland FM Association, formed to promote the sale of sets and time, are, left to right: Walter F. Myers, chief engineer of WFMF and WJJD; Ralph J. Wood, Jr., WMOR; Bernard Jacobs, WOAK; Ted Leitzell, WEFM; and Ed Wheeler of WEAW.

BOTTOM: Here's a window used by W. Wendell Budrow, manager of WBEC-FM, to promote his station at Pittsfield, Mass., by promoting Zenith's high-sensitivity receivers.

General Electric has started deliveries on this $49.95 FM-AM set, using the Armstrong limiter-discriminator circuit for FM. The set has six tubes and a selenium rectifier.



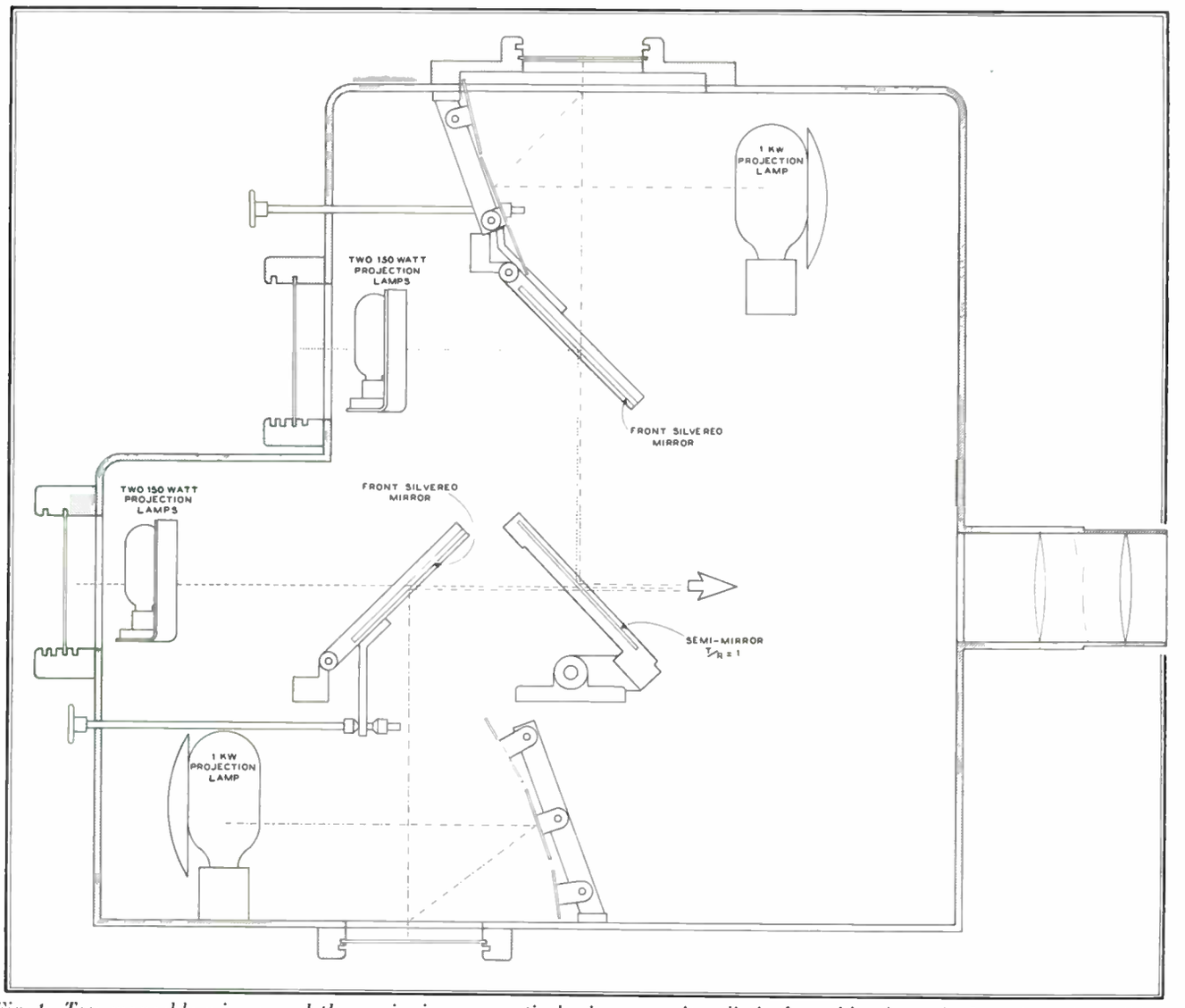


Fig. 1. Two moveable mirrors and the semi-mirror, or optical mixer, permit unlimited combinations of effects from four slides

LOCAL TV COMMERCIALS

A VERSATILE OPTICAL SYSTEM, CARRYING FOUR SLIDES, PROVIDES CONTINUOUS ANIMATION AND ATTENTION-COMPELLING EFFECTS — *By* CHESTER A. SNOW*

TELEVISION stations are rapidly learning that while it's easy to sell local advertisers the idea of using television, the high cost of producing effective commercials is a serious stumbling block.

A national advertiser can afford the expense of trick movie shots and animated cartoons for, once produced, a large number of copies brings the cost per showing to a very reasonable figure. The local advertiser, on the other hand, must charge the entire cost of a commercial against a showing over only one station. And he's very liable to balk when he finds that the preparation runs up to perhaps as much, or more, than the cost of the time he would like to buy. Also, because national advertisers have set high standard of eye-catching ingenuity in devising their commercials, something as over-simplified as a plain, lettered card or an inanimate slide picture has little chance to compete for audience attention.

The Gray Telop was developed as a means for making highly effective use of inexpensive commercial copy. Credit for initiating this project is due to Howard Chinn's engineering group at CBS. Essentially, it is a versatile, 4-channel optical system with such flexibility of control that it can produce an unlimited variety of effects with the simplest copy forms.

Moreover, the focal length of the Telop lens is great enough to permit its use with a diplexer, so that only one TV camera is needed when the Telop is added to an installation of two film projectors. At the smaller stations, programmed largely from film, and equipped with only one film projector, the Telop is the least expensive means of producing added revenue.

Animating Still Pictures:

The accompanying photographs show the general design of the machine, while the drawing in Fig. 1 discloses the details of the optical system. Openings at the top, rear, and bottom permit as many as four slides to be set up at one time.

Efforts to produce commercials for local sponsors at a price reasonably related to the cost of time have shown that their inadequacy is not necessarily due to limitations of simple slides. Rather, they are ineffective because, lacking animation, they fail to make use of the very feature that makes television such a po-

*Project Engineer, Gray Research and Development Company, Inc., 16 Arbor Street, Hartford 1, Conn.

Fig. 2. Top and bottom slide-holders can be seen in this view of the projector

tentially powerful advertising medium.

Therein lies the importance of the Telop's optical system. That is, it provides animated effects from the simplest and least expensive slides. The only limit to the use of this device is the imagination of the individual who plans the commercials and sets up the sequence of operations for the controls. There are 5 basic adjustments:

1. The use of 1 to 4 different slides in any setup.

2. Variable brilliance for any 2 of the 4 light sources.

3. Reversing switches on the light controls.

4. Settings and changes of the two adjustable mirrors.

5. The use of the semi-mirror as an optical mixer.

Details of Design:

As Fig. 1 shows, up to 4 slides can be inserted at one time. The mounting at the top can be turned on a vertical axis, if desired. This can be seen in Fig. 2. The opening at the bottom accommodates small objects such as a watch, package of cigarettes or pills, or a piece of jewelry. Special slots in both rear positions are intended to take American Optical Company slide holders.

All the light controls are located at convenient height on the panel at the left, Fig. 2. There are two large handles to operate separate 2-kw. faders. They can be switched to control any 2 of the 4 light sources.

In addition, there are reversing switches for the faders, so that the lights under control can be dimmed by pushing the related handle either up or down. If, for example, one lamp is to be dimmed while the other is turned up, the reversing switches enable operator to accomplish that result with one hand, since the handles can be moved together, in the same direction, and the transition can be accomplished smoothly.

The selection of slides in their proper sequence is a function of the mirror settings as well as the light controls. Each mirror is positioned accurately to assure perfect register and focus. Rather than leave the precise setting of the mirrors to the operator, small permanent magnets are used to take each mirror to the final position of travel.

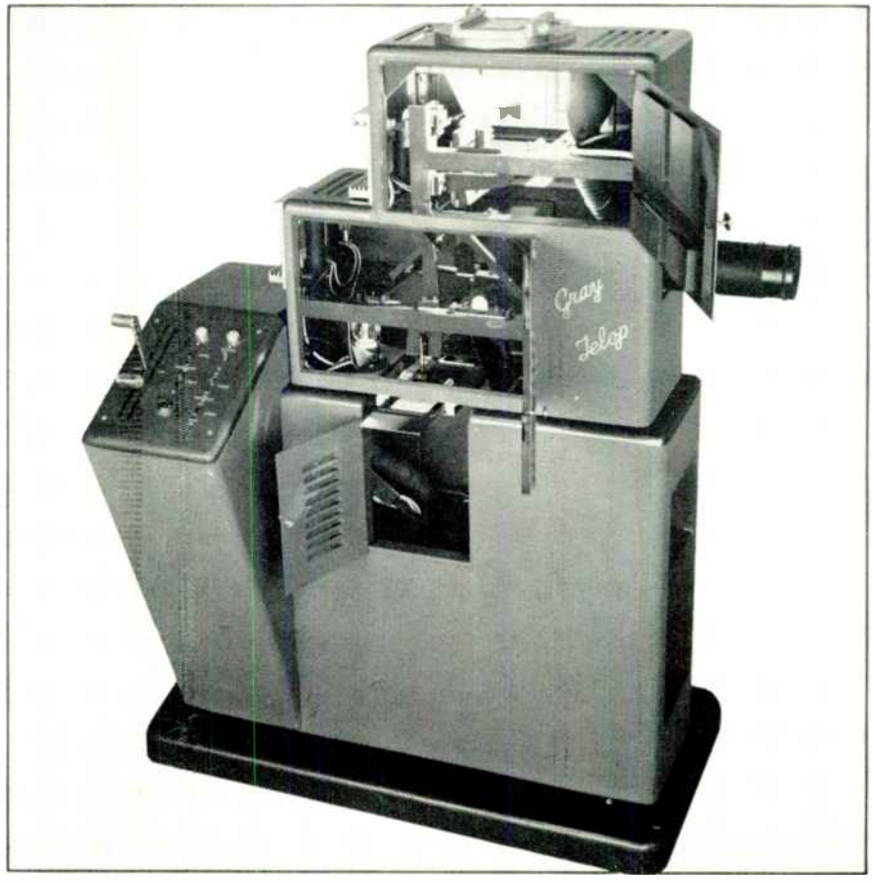
Optical mixing is accomplished with the semi-mirror. This reflects light from one side, projecting images from the top or upper rear slides into the lens, but it is transparent to images from the lower rear and bottom locations. Thus, either upper slide can be combined with either lower slide.

The use of the controls is explained most readily by typical examples of setups for commercial announcements.

Example A, No. 1: A slide showing a house is faded in from the top position. No. 2: The words "Any way you look at it" are faded in from the lower rear position and superimposed on the house while the slide of the house is turned upside down and back again. No. 3: Those words are switched off and, from the upper rear slide, the words "It's cheaper to buy than rent" are faded in on the picture of the house. No. 4: Those words are switched off, and finally, from the bottom position, the name and phone number of a real estate office are faded in as the house picture is faded out.

(Continued on page 29)

Fig. 3. Three doors give free access for replacing lights and cleaning mirrors



JEREMIAH COURTNEY'S* MOBILE RADIO NEWS and FORECASTS

CAUGHT in the middle between opposing a Senate bill that would give the Interstate Commerce Commission power to order railroads to install radio equipment for safety purposes, and at the same time asking the FCC for more frequencies, the Association of American Railroads and six individual roads withdrew their petition for a hearing and reconsideration of an FCC action which reduced the number of channels assigned to railroad radio service.

At the same time, the FCC denied a petition for reconsideration and rehearing filed by Aeronautical Radio, Inc. They wanted 12 pairs of channels below 500 mc. for public correspondence with aircraft. Interference considerations required exclusive frequency assignments for this purpose, which the FCC found impossible to grant. These were the only two petitions filed against the new land mobile radio service rules. Withdrawal of one and denial of other now permits all new land mobile freqency assignments to become fully effective.

The FCC staff promptly began grinding out new authorizations, badly backlogged while railroad and airline petitions hung fire. The current transitional period is also marked by no little confusion. Many problems found the staff torn between requiring immediate conformance with the new Rules, in the long-range interest of new services, and not imposing hasty frequency changes on particular applicants. It would seem that, in the absence of special circumstances, frequency modifications should be voluntarily assumed by all applicants, to accord with new Rules.

National Coordination Plans:

Power, petroleum and forest products services have filed their suggested national plans for frequency assignments with FCC. Coordinating frequency selections by applicants with industry area committees should reduce the possibility of future interference.

Taxicab Systems:

Taxi applications were being granted on all four channels without any showing of area frequency-coordination wherever there was no possibility of interference to telephone companies still using channels now assigned to taxi service. Taxi operators are still worrying about adjacent 60-kc. channels in the same area. As one taxi leader said in commenting on the subject: "We pass from Experiment No. 1 to Experiment No. 2."

Motorola's recent Chicago demonstration of 60-kc. adjacent channel operation to a lay group, with vice-president D. E. Noble explaining the highly technical aspects of the problem, produced this press relations gem:

"All representatives were in a position upon returning home to explain the various problems attendant to adjacent-channel systems operation."

Another sector of confusion in the taxi field is the base-station power limitation of 120 watts input. Taxi stations can continue to use greater power than that, if previously authorized, until the present experimental licenses expire November 1, 1949. But when they apply for regular licenses prior to that date, as required, a showing must be made that the power has been reduced to conform to the new rules. Otherwise, regular license applications will be returned or delayed in processing. Object of the power limitation is to reduce unnecessary interference to other distant stations, and to minimize adjacent-channel interference to stations of lower power.

Maritime Mobile Service:

There are still no definitive Rules for maritime mobile radio service. Frequency allocations have been finalized, but the use of particular frequencies is still not resolved. Proposed Rules should be out soon, and probably will be final by November 1. That's target date, at least, for all experimental authorizations expire then. To be on the safe side, renewals of experimental maritime mobile licenses should be filed sixty days in advance of November 1.

Rules and Allocations:

The May 6th issue of Federal Register, containing all land mobile service Rules, is now exhausted.[1] However, separate copies of the Rules can be obtained from Superintendent of Documents, Government Printing Office (not from the FCC).

Common Carriers:

The recent formation of a national association by the limited common carriers, known as the National Mobile Radio System, should be a boon to intercity truckers. Cost of erecting and operating private intercity systems is so great that most long-distance truckers will look to common carriers for their mobile communication needs. The national association should facilitate a satisfactory solution to the truckers' coverage requirements in different cities.

Existing limited common carrier licensees and permittees must file applications for modification of their permits or licenses in order to operate in regular service. Applications must be supported by current balance sheets and descriptions of technical qualifications.

Applicants entering this field must file new construction permit applications. All experimental applications pending when the new Rules were adopted were dismissed July 1, without prejudice. Refilings in regular service are now in order, although no regular grants will be made before September 1.

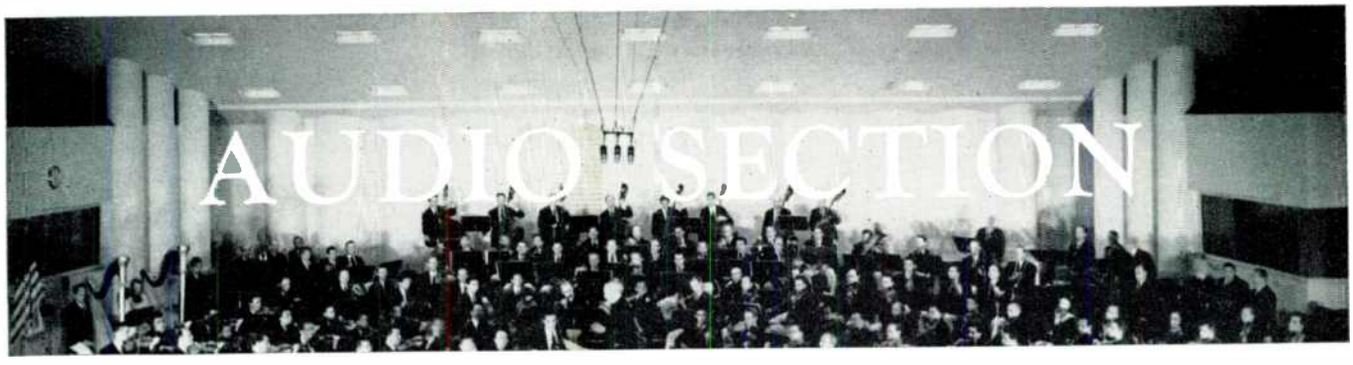
The American Telephone and Telegraph Company has objected to the priority categories which the FCC proposes to establish for rendering mobile communications service to present subscribers and new applicants. The priorities proposed would require the Company to drop lower-priority subscribers in favor of higher-priority applicants. A T & T objected to this proposal on the ground that it would cause inconvenience and expense to existing subscribers as well as particular hardship to those who had modified their methods of doing business as a result of having mobile telephone service. A T & T indicated that same results could be obtained through voluntary discontinuance of existing services and the normal growth of facilities. Their petition indicated that the discontinuance rate of mobile telephone service in congested areas is approximately 30% per annum.

Forecast:

Long-range: compulsory radio for railroads within next five years. Short-range: some changes in present 72- to 76-mc. fixed-circuit limitations that will redeem this present desert area of the radio spectrum.

*Courtney, Krieger, and Jorgensen, Washington 6, District of Columbia.

[1] Complete tables of frequency allocations with footnote references, and a resume of technical requirements for common carriers and safety services were presented in *FM-TV* for June and July. Industrial and transportation services will be covered in September and October.



NEW NOTES ON CORNER SPEAKERS

FURTHER REFINEMENTS HAVE ADDED TO THE RANGE OF REPRODUCTION, AND IMPROVED THE APPEARANCE OF THIS FAMOUS DESIGN—*By* PAUL W. KLIPSCH*

CONTINUING effort has brought the corner-speaker system of sound reproduction to a high degree of development. In its present state, it offers a longer wavelength-handling capacity than any other contemporary type, and from 2 to 4 times the wavelength capacity per unit of occupied space than any other system. Various stages in the development have been reported in *FM-TV*, the *Journal of the Acoustical Society of America*, and *Electronics*.

The first experimental design, predicated on a selection of major dimensions that would permit the woofer to go through an average dwelling door, delivered a range from 80 to 250 cycles. This range was subsequently increased to 55 to 400 cycles at full efficiency, with usable efficiency down to 40 cycles.

Since 1946, further research has led to the design of the K-3-B, C, and D series, the latest models offering full efficiency down to 36 cycles and a considerably improved remaining efficiency at the 32.7-cycle low-C note of the pipe organ.

Some special woofer horn designs have been completed. Most noteworthy of these is the T-6, a tentative design which has been under study for a couple of years. This unit, owned by Dr. Brickenkamp of St. Louis, is a scale-up of the X-3 with altered taper and throat to accommodate an 18-in. driver. A comparison between this T-6 and the standard K-3-C indicates that the standard model offers all the performance of the scaled-up model, with about half the total bulk.

Experiments with Woofer Horns:

The latest development has been in drivers for the woofer horn. Preservation of full bass range of the woofer with improved efficiency in the middle- and high-frequency woofer range has been brought about by some very ingenious technology on the part of the Stephens Manufacturing Company.

The Brickenkamp T-6 woofer was developed especially for the electric organ. Experiments on placement and drivers were continued until it offered appreciable efficiency down to 24 cycles per second. Consideration was given to making this a standard for organ tone generation and reproduction, but meanwhile the K-3-C was developed to the point that it offered full efficiency down to D above low-C with relatively little loss at the lowest organ note. A direct comparison was made with the T-6 in one corner and the K-3-C in an adjacent corner, both operating from the same output amplifier. The most skeptical of the critics observed that there was only a slight difference in efficiency, within limits capable of equalization. As this test was conducted before introduction of the latest woofer driving motor, it would appear that the test favored the standard K-3-C on an absolute basis, and that the performance-per-cubic-foot and per-dollar is definitely in favor of the standard model over the special T-6.

Another special design is the Owendorff speaker. This consists of a woofer scaled up approximately 10% from the X-3 and using the Bostwick middle- and high-range components as a 3-way system. The taper was kept about the same as the X-3, but the larger size permitted performance down to an estimated 40 or 50. This writer heard the unit in Mr. Owendorff's New Jersey home in 1946 and noted the improvement over the X-3 performance, but no comparison has been conducted between it and a late model of the production series.

The T-12 and T-13 designs were developed for very large power handling capacity, such as organ-tone generation in large churches and auditoria. The size of these designs approximately trebled the bulk of the K-3-C. They were built by a group which has been experimenting with electric organ-tone generation. It can be said that these special units offer the extra output capacity that several additional 15-in. drivers afford, since the power output is of the same order as the output of large pipe organs. Their high efficiency and low distortion are typical of all the writer's horn-loaded woofers, and the amplifier capacity need be only a fraction of that required for direct radiators of similar rated output. Their application would be limited to large installations, the smaller standard designs sufficing in power rating for medium auditoria and living rooms.

In other words, the standard model now offers full bass range, and any redesign would result in a considerable cost increase with, at best, only marginal or subliminal improvement in performance.

Experiments on Drivers:

An improvement in bass response, afforded by a treatment of driver cone rims, was reported in *FM* AND TELEVISION, November, 1948. Even as that article was going to press, it began to appear that this advance was not an unmixed blessing. The plasticizer was suspected of increasing the dissipation, which suspicion was confirmed as a result of work with a group in St. Louis. Still, the extended bass range was considered to be of sufficient importance as to justify the small sacrifice in middle-range efficiency. It was recognized, however, that recovery of this efficiency loss would be desirable.

Through the very cooperative efforts of the Stephens Manufacturing Corporation and the personal efforts of Mr. Howard Souther, a new driver was developed which offers the same high compliance as the treated drivers, the same full extension of the bass range without the

* Klipsch and Associates, Hope, Ark.

edge dissipation, and a higher average efficiency. In addition, the new driver is wound to optimum impedance for use in the late model horns.

Dissipation in a cone can be detected by impedance measurement of the driver in free space. The old driver, untreated, exhibited an impedance of approximately 30 times the DC resistance at 43 cycles. Treated, it showed a resonant frequency of 28 cycles and an impedance of 13 times the resistance. As the resistive component is lower at the lower frequency, and since the relation of resistive to reactive load would dictate a higher resonant impedance, it is evident that dissipation existed. The new driver exhibits 120 times the DC resistance at 29 cycles, indicating that the dissipation is lower even than the old cone untreated.

One series of tests was conducted involving 6 drivers of 4 types from 3 manufacturers, all mounted in identical horns in the 4 corners of the same room, alternating the drivers in the various horns. Instantaneous switching between units was provided. Drivers ranged in net price from $48 to $90. Observers were the writer, an assistant, and numerous members of the lay public. The treated drivers were unanimously acknowledged to exhibit the greatest range in the extreme bass, but they lacked a trifle in efficiency at the middle range.

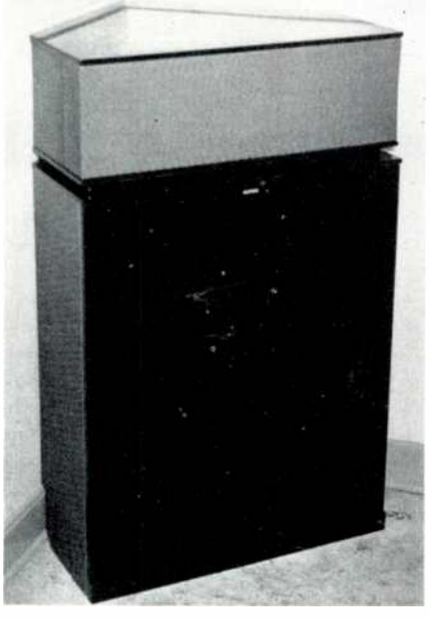
Later, a similar test between the new type driver and the treated drivers was conducted, with the finding that the new driver was equal to the treated driver in the extreme bass range, and even better in middle-range efficiency than the best of the other drivers tested. A highly gratifying finding, this, in view of the fact that this best driver is by no means the most expensive.

An impedance run of the new driver in the K-3-C and D series of horns shows that the trough efficiency at around 60 cycles is approximately 57%, compared to about 30% for the treated driver. The higher efficiency measured in the new driver is more valid than the lower efficiency of the treated driver, because the efficiency measurement is representative of the electro-mechanical transfer, and cannot recognize losses due to dissipation. A determination of relative efficiency by inserting enough loss in the more efficient driver with a calibrated attenuator indicates about 2 to 3 db better output with the new driver.

Built-in Installations:

From time to time, the writer has received inquiries as to feasibility of building the bass speaker into the construction of a new house, instead of installing it as a physically independent unit. It is recognized that this is possible, if the work is carried out by workers skilled in both architecture and acoustics, particularly in acoustics as related to the speaker system. But even then it would appear that the results would not offer advantages over the existing production models, and would be expensive. The problem of transferring technical knowledge resulting from many years of acoustical experience to the mind and hand of the architect would also be formidable.

However, many acoustical improvements available in architectural design are applicable to sound reproduction in general, and to the use of the corner speaker in particular. These relate to desirable room proportions, provision of at least one unbroken corner, design with respect to reverberation, limitation



Latest designs are attractively styled

of abrupt breaks in columns, non-parallel walls, and certain irregularity of wall surfaces.

Room size and proportion bear more relation to the resultant sound in the room than is generally realized. A room less than about 16 ft. long reduces sound pressure at the ear in the frequency range below 50 cycles. An L-shaped room with one leg about 8 ft. width and 14 ft. long was found to be particularly poor for organ reproduction. With the speaker at the angle of the L, deemed necessary for high frequency coverage, there was substantially no bass below 60 cycles, yet the speaker had been tested with good results clear down to the 32.7 bottom of the pipe organ in another location.

The writer's living room (actually 2 rooms joined by a 7-ft. square opening) offers an effective width of 13 ft. and length of about 28 ft. The lowest organ notes produce standing waves, with best listening at the far corner opposite the speaker. Opening the kitchen door at the end remote from the speaker tends to reduce the standing waves.

The Brickenkamp T-6 is installed in a living room about 25 ft. wide, 40 ft. long, and 13 ft. high, with acoustic side chambers represented by large doors to the main hall and dining room. Standing waves exist here but not as bad as in the writer's living room. Organ notes tend to "pile up" in the corners, but observers agree that any part in the room is a good place to listen.

The Seifert installation is in a room about 30 ft. long, 18 ft. wide, and 9 ft. high, with doors at the ends. The end of the room opposite the speaker is lined with record albums except for about 10% area occupied by a window. Ceiling beams 9 ins. deep and spaced 2 ft. apart cross the room transverse to the direction of sound propagation. This room has less standing waves than any room of corresponding size that this writer has observed. The ceiling beams and the sound absorption at the back of the room appear to be responsible for this.

The Fairchild living room is probably the best this writer has ever observed. It was designed with acoustic performance definitely in mind. The ceiling consists of zig-zag surfaces concealed above acoustically transparent cloth. The north wall is glass, the west wall hardwood against brick, the east wall a sort of pressed fiber coarser than Celotex, and the south wall of glass at an angle to the north wall, and with about a third of the area opening into a hallway. Standing waves are not noticeable. Reverberation appears to be optimum. In spite of having to add a portion of a wall to produce a corner for the speaker, the corner horn system renders an excellent account of itself in this room. Details of this room were presented in *FM* AND TELEVISION for October, 1944.

This discussion of room acoustics has necessarily been qualitative. The final test of any audio system must necessarily be referred to the ear.

Functional Cabinet Design:

The prototype of the K-3-C and D woofers was the T-3-B-1 reported in the September, 1947 issue of *FM* AND TELEVISION. That was standardized as the K-3-B, built of $^3/_8$-in. fir plywood. The C and D series are built of ½-in. hardwood plywood, with all other dimensions substantially unchanged. Yet the new model offers full efficiency down to 36 cycles compared to 42 cycles for the T-3-B-1. Much armchair philosophy has been expended trying to explain this improvement. The best opinion appears to be that the increased rigidity of the ma-

(Continued on page 28)

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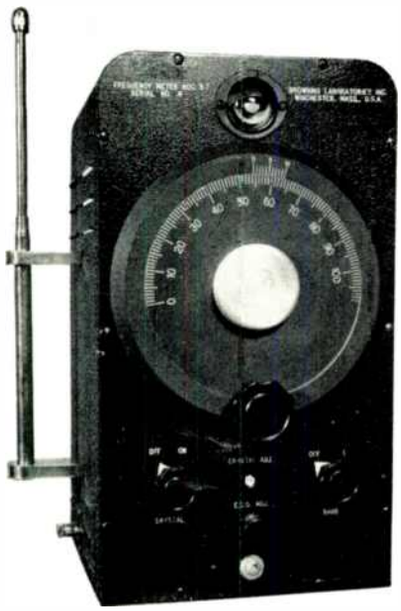

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CORNER SPEAKERS

(Continued from page 26)

terial permits less acoustic absorption, but this explanation is far from satisfactory. The fact remains that there is a difference, even transferring identical drivers from one horn to the other.

This difference in the two horns, representing a mere 6 cycles at the extreme bass end, may appear to be marginal. But on certain pipe organ records there is a difference of 3 or 4 bass notes at the bottom of the pedal range, and this turns out to be more than marginal. The new design offers full efficiency at D above low-C, whereas the old unit begins to droop below F. These low notes are felt as much as heard, and the pressure against the chest is definitely lacking in the old model.

It was pointed out in earlier articles that the woofer horn structure must be air tight. Violation of this requirement in home-constructed woofers has resulted in very poor performance.

Air tightness is measured by using an imperforate motor board and special door. The door is fitted with 2 tubes, one of which is connected to a water manometer and the other to a mouthpiece. The pressure is blown up to 2 ins. of water pressure and held while the time required for the pressure to drop to one inch is observed. This time exceeds 6 seconds, representing a time-constant of around 9 seconds. Such a long time-constant may not be strictly necessary, but it is felt that no relaxation of standards of quality can be permitted.

Early models were built starting with one of the inner members, the front going on last. Inverting the assembly order has permitted the front to remain unbroken by any visible fastenings, whereby finishes can be applied directly to the woofer front.

The top housing of the styled models is made up of the same material as the corresponding woofer front. The top housing has been aimed at functional design for several reasons: shadowing of the high frequency horn mouth must be avoided, and rigidity and absence of vibration and rattles is paramount.

Studies in functional styling have been in progress since production started. Several styles regarded as attractive on paper have been discarded as being too bulky in appearance. Other styles which seem hardly worth taking past the drawing board stage have proved attractive and apparently less bulky even though the actual occupied space was reduced a mere 2%.

In a system as expensive as the corner 2-horn system, long life expectancy is important, as well as low obsolescence of styling.

In this 20-second spot, continuous animation is supplied by the projector, but the preparation calls only for 4 simple slides. To obtain variation, the slogan and the picture of the house can be changed from time to time.

EXAMPLE B. No. 1: The words "It's later than you think" are faded in from the top. No. 2: The face of a clock, fitted in the bottom position, is faded in as the letters are faded out. No. 3: The words "Tomorrow is the last bargain day at —" are faded in and held while the clock face is faded out.

Only two slides are required for this spot, but the commercial is animated for the entire 20-second period.

EXAMPLE C. No. 1: A sketch of a boy is faded in from the top. No. 2: While

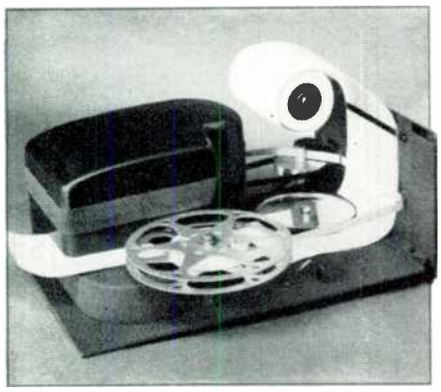

Fig. 4. Stage No. 1 fits the slide-holders

that is held, the word "Mother," enclosed in a balloon, is faded in from the bottom. No. 3: Those slides are switched off and the words "School starts September 7," are switched on from the upper rear. No. 4: As that slide is faded out, the words "— has a complete line of school supplies on hand now" are faded in.

This indicates a method of holding one slide while it is supplemented by another.

The foregoing examples illustrated indicate the endless possibilities of the Telop. But the machine is not limited to the use of slides. A special unit, called Stage No. 1, can be used at one of the rear positions. This device, Fig. 3, provides 3 kinds of animation: 1) lettering on the roll of paper can be fed down continuously by the motor drive, 2) news, announcements, and weather reports on tape can be drawn across the opening from the reel, and 3) small objects can be revolved slowly on the turntable disc. These functions can be combined with slides in the other three positions, if desired. For example, tape announcements from Stage No. 1, at the lower rear position can be shown with a test pattern inserted at the top.

Structural Design:

Fig. 2 shows the high degree of accessibility to the optical system. This is essential because the mirrors and reflectors must be cleaned from time to time. The bottom section contains two blower systems which maintain a constant flow of air to carry off heat from the lamps. Interlocking switches permit the lamps to be turned on only if the blowers are operating.

Extremely rigid construction is used to prevent vibration when the switching controls are shifted, or when the operator walks around the machine. This is essential for, otherwise, the slides would appear to wiggle at the receiving sets just as they do when slides are changed in the portable projectors used for lectures. A heavy cast iron base plate brings the total weight up to 600 lbs.

The f/5 lens, 4 ins. in diameter, has a focal length of 18 ins. and an optical throw of 33 ins. Light intensity projected on the mosaic of the television camera is 12 to 15 foot-candles.

Operation of the machine calls for a reasonable amount of ingenious thinking, a little manual skill at the controls, and 3 kw. of power from a 115-volt, 60-cycle source.

NEW CATALOGS & DESIGN DATA

THE products listed here are described in new catalogs and bulletins now available. Unless otherwise noted, they will be sent on request, without charge.

BROADCAST EQUIPMENT

Slide & Tape Projector:

Compact, low-cost projector handles wide paper roll, narrow tape, or one slide. Mounts on stand or table. *INS-INP Television Dept., 235 E. 45th St., New York 17.*

HOME RECEIVERS

TV Tube Sizes:

Sets will not be listed in this section unless the diameter of the picture-tube is given. Rating of tube in square inches is not considered adequately descriptive.

TV Receivers:

Four new models are 12½-inch Rumson table model, 15-inch Sussex console, 12½-inch Sheffield console, and Bradford set with the new 19-inch short-neck tube. *Du Mont Laboratories, Inc., 654 Madison Ave., N. Y.*

Two 16-Inch Consoles:

Two cabinet designs, both listing at $479.50, have 29 tubes, and high-fidelity audio system with 12-inch speaker. *Freed Radio Corp., 200 Hudson St., New York 13.*

Portable TV Receiver:

Model weighing 38 lbs. has 7-inch tube, cabinet antenna, tunes all VHF channels. Priced at $179.50. Model 9-425. *Crosley Division, Avco Mfg. Corp., Cincinnati.*

GENERAL COMPONENTS

High-Voltage Resistors:

Molded resistors, intended as voltage dividers, are rated at 4 watts, 100 to 100,000 megohms, at 10,000 volts DC with 75°F. temperature and 50% relative humidity. Tolerance plus and minus 10%. Length 7/8 inches, diameter 5/16 inch. Type 80X. *S. S. White, 10 E. 40th St., New York 16.*

Small Relays:

Aircraft-type relays 2¼ inches high, 21/16 inches wide, 1⅞ inches deep have contact combinations up to 4-pole, double-throw. For operation up to 230 volts, 60 cycles AC or 115 volts DC. Type DO. *Amer. Relay & Controls, Inc., 4925 W. Flourney St., Chicago 44.*

Saturable-Core Reactors:

Two types are available, built to customer specifications, for control circuits to provide automatic line-voltage regulation and for DC power supplies. *Sorenson & Co., Inc., Stamford, Conn.*

Plugs, Jacks, Switches:

Catalog of 12 pages gives specifications and mechanical drawings of plugs, jacks, and switches of many types for low-power circuits. Catalog S49. *Switchcraft, Inc., 1328 N. Halstead St., Chicago 22.*

Dust Caps for Connectors:

Screw-on caps protect male or female connectors when open, excluding dust, dirt, moisture, and mechanical damage. Available for all AN connectors. *Amer. Phenolic Corp., Chicago 50.*

Video-Circuit Trap:

A permeability-tuned, 4.5-mc. trap comprising a coil and shunt capacitor. Operates in the first video amplifier, attenuating the 4.5-mc. beat which exists in IF stages handling both picture and sound IF carriers. Type 203L5. *RCA Victor Div., Harrison, N. J.*

Heat-Dissipating Connectors:

To make connections to plate and grid terminals of Eimac tubes. Their use aids in keeping seal temperatures at safe values, and increases effectiveness of forced-air cooling. *Eitel-McCullogh, Inc., San Bruno, Calif.*

Blocking & Stabilizing Coil:

A horizontal-blocking oscillator coil and shock-excited frequency-stabilizing coil for use in TV receivers employing the 6SN7-GT as a combination horizontal blocking-oscillator and sync-control tube. Type 203R2. *RCA Victor Div., Harrison, N. J.*

COMMUNICATIONS EQUIPMENT

25- to 50-Mc. Mobile Units:

Circuits are designed for 20- or 40-kc. modulation band. The former is intended to permit adjacent-channel operation. Mobile transmitters have 30 or 50 watts output; associated fixed transmitters are rated at 50 and 250 watts. *General Electric Co., Communications Section, Electronics Park, Syracuse, N. Y.*

Bench Power Supply:

For bench-testing mobile radio equipment. Operates from 115 volts AC. DC output is variable from 0 to 8 volts. Can be used to deliver 10 amps. continuously, 30 amps. intermittently. *P. R. Mallory & Co., 3029 E. Washington St., Indianapolis 6.*

7-Channel Carrier Equipment:

Units designed for rack mounting provide up to 7 talking circuits with associated ring-down or dial-signaling channels from a 2-way radio link. Spectrum of 0 to 35 kc. is utilized. *Lenkurt Electric Co., 1126 County Rd., San Carlos, Calif.*

TEST & MEASURING INSTRUMENTS

Transmission Measuring Set:

Moderately-priced unit on rack panel for checking frequency response, impedance matching, and gain measurements. Accuracy plus or minus 1%, 20 to 20,000 cycles, attenuation to 111 db in 1-db steps. Model 11A. *Daven Co., 191 Central Ave., Newark 4, N. J.*

VHF Analyzer:

Oscilloscope with coaxial, wide-band mixer operates on 30 to 500 mc. Signals can be studied within a 30-mc. range at one time. High sensitivity permits use of signals down to 100 microvolts. Price $895. *Kay Electric Co., Pine Brook, N. J.*

Measuring Instruments

Three new instruments include null detector and vacuum-tube voltmeter for AC bridge measurements; universal bridge for measuring inductors and capacitors; AC power supply with continuously variable output. *Freed Transformer Co., 1718-36 Weirfield St., Brooklyn 27.*

Ultrasonic Analyzer:

Panoramic type of oscilloscope shows presence of all frequencies between 2 kc. and 300 kc. at one time. For analyzing ultrasonic vibrations from any source. Full scale deflection from 1 millivolt input. *Panoramic Radio Products, Inc., 10 S. 2nd Ave., Mt. Vernon, N. Y.*

Microwave Test Equipment:

Units for 2,700 to 3,200 mc. include a transition for coaxial cable to wave-guide, variable attenuator, standing-wave dector, and a termination. *Varian Assoc., 81 Washington St., San Carlos, Calif.*

VACUUM TUBES

19-Inch Short-Neck Tube:

New 19-inch cathode-ray tube is 21½ inches long. Designed to reduce cabinet depth of TV receivers. Shorter beam throw is described as giving sharper picture. *Du Mont Laboratories, Inc., Passaic, N. J.*

Transmitter Triode:

Type 304TL is a low-mu power triode for use as an amplifier, oscillator, or modulator. Plate dissipation is 300 watts. Operates at maximum ratings at frequencies up to 40 mc. *Eitel-McCullough, Inc., San Bruno, Calif.*

3-Inch Cathode-Ray Tube:

Type 3KP11 is intended for oscillograph use. Blue radiation, of short duration, is highly actinic and suitable for moving-film recording. High deflection sensitivity, with electrostatic deflection and focus. *RCA Victor Div., Harrison, N. J.*

ANTENNAS

VHF TV Antennas:

Combination high-band and low-band design, with separate orientation, is pre-assembled to reduce working time for installation. *Ward Products Corp., 1523 E. 45th St., Cleveland.*

Antenna Data:

Performance curves and field patterns of TV and FM antennas show results to be expected from each type of antenna. Catalog 30. *Technical Appl. Co., Sherburne, N. Y.*

BOOKS

Papers on UHF:

RADIO AT ULTRA-HIGH FREQUENCIES, Vol. 2, 1940-1947, a compilation of papers written by RCA engineers, 485 pages, 6 by 9 inches, cloth bound. Papers are grouped as follows: antennas and transmission lines, propagation, reception, relays, micro-waves, measurements and components, aids to navigation. Included in each section are summaries of related papers. A bibliography lists 330 papers on UHF by RCA authors, published from 1925 to 1940. Price $2.50. *RCA Laboratories Division, Princeton, N. J.*

Television Simplified:

UNDERSTANDING TELEVISION, by Orrin E. Dunlap, Jr., RCA vice-president in charge of advertising and publicity, 128 pages, 5½ by 8 inches, cloth bound. A non-technical explanation of television in which the text is supplemented by the generous use of interesting photographs and drawings, and a glossary of terms. An excellent book for those who want to acquire a general knowledge of television without going into technical details. Price $2.50. Published by *Greenburg, 201 E. 57th St., New York 22.*

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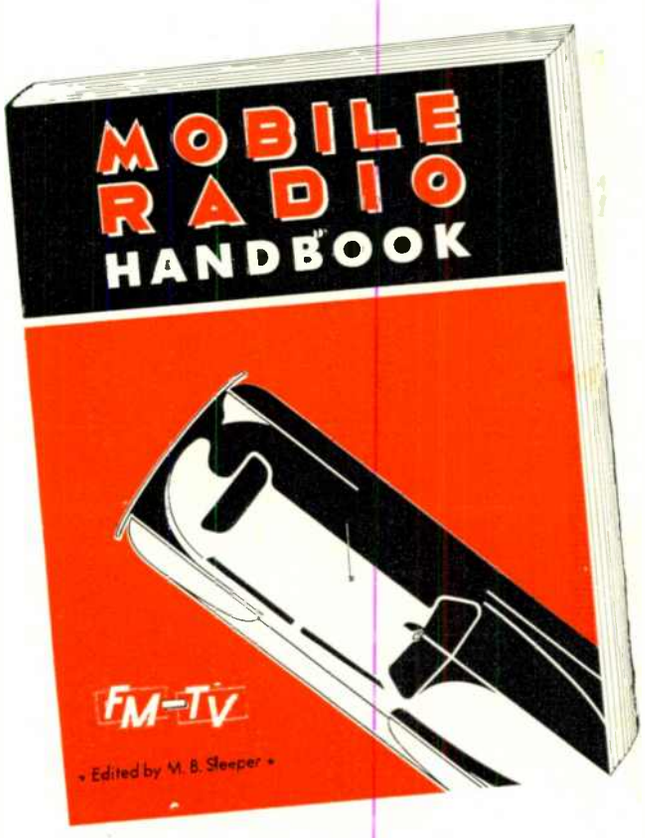

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Many of America's important manufacturers of TV receivers will presently announce *to your customers* a wider variety of screen sizes in PROTELGRAM-equipped receivers.

These manufacturers have already introduced to the trade their sets featuring the popular 192-square-inch picture (16″ x 12″, 20″ diagonal, square corners).

Look to them for early news about these two companion sizes—130 square inches with 16″ diagonal and rounded corners, and 234 square inches with 20″ diagonal and rounded corners.

And the latest version of PROTELGRAM for the projection of a giant 3′ x 4′ picture on a home-movie type screen is now available from several well-known makers, with others soon to be announced.

PROTELGRAM is the result of nearly *fifteen years* of development by the world's greatest electronic laboratories. It is an entirely new conception of quality television picture reproduction—a big *life-size*, more *life-like* image free from glare and easier on the eyes—at the lowest cost per square inch of viewing area.

PROTELGRAM has been adopted by leading TV manufacturers because it is the perfect answer to *your customers'* demand for bigger, better, more true-to-life television. It is *your best bet* for *bigger television profits* in 1949. Get the facts *today* on the profit-making opportunities in PROTELGRAM-equipped receivers. North American Philips Company, Inc., Dept. PC-8, 100 East 42nd Street, New York 17, N. Y.

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