

FMM-TV

★ Edited by ★
Milton B. Sleeper

**COMMUNICATIONS
DIRECTORY — Part 2**
PUBLIC UTILITIES
GEOPHYSICAL
TAXICABS
BUSES
TRUCKS
OIL PIPELINES
HIGHWAY MAINTENANCE

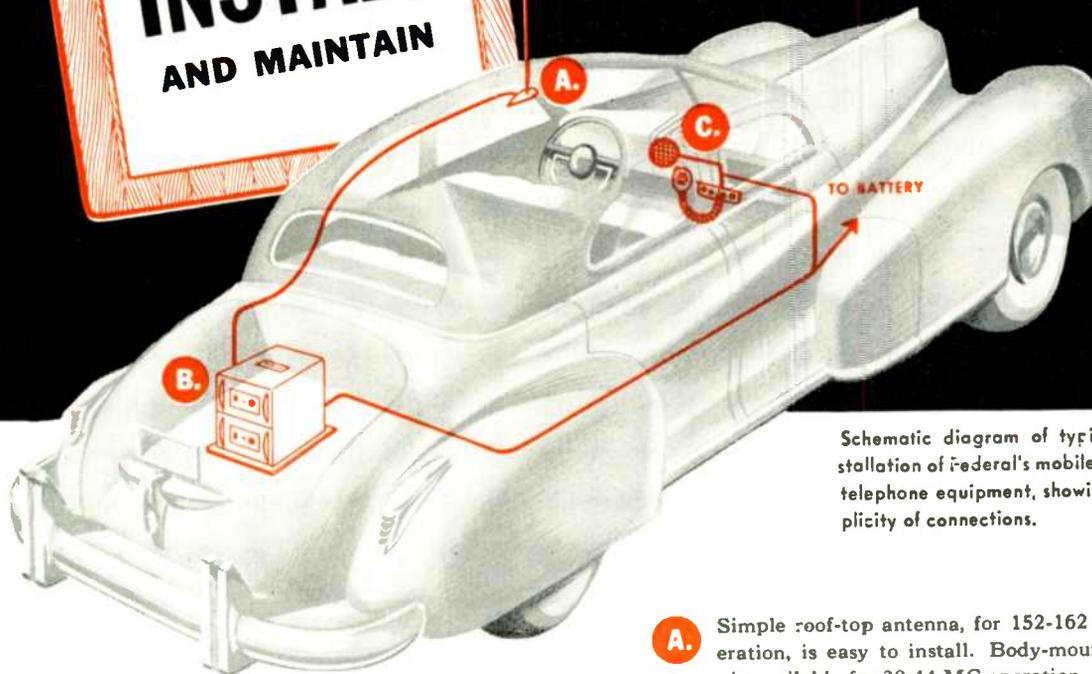
LISTINGS REVISED TO
JANUARY 1, 1949



9th Year of Service to Management and Engineering



Federal's Mobile 2-Way FM Radiotelephone offers time-saving simplicity of installation, maintenance and inspection



Schematic diagram of typical installation of Federal's mobile radiotelephone equipment, showing simplicity of connections.

The outstanding **FUNCTIONAL DESIGN** of Federal's mobile radiotelephone equipment means time and money saved — from initial installation to routine inspection and maintenance.

This equipment has been especially designed to meet the severe service requirements for *all types* of fleet operations — from taxis and police cars, to fire departments, bus lines, Utility repair services, and truck fleets. Its sturdy mechanical construction, simplicity of installation and maintenance, and exceptional *performance* make Federal the first choice of fleet operators who insist on getting the maximum return on their investment.

- A.** Simple roof-top antenna, for 152-162 MC operation, is easy to install. Body-mounted antenna is available for 30-44 MC operation. Antenna lead requires only *one* connection to the combined transmitter-receiver unit.
- B.** Compact transmitter-receiver unit is completely wired internally—requires no external connections between sections. Antenna, power, and control connections are at the rear — keeps wiring out of the way—prevents accidental damage. Transmitter and receiver sections have automatic plug-in connectors — units can be removed and replaced in a few seconds.
- C.** Simple dash-board control unit is connected for operation by plugging in the *single cable harness* which comes already wired to the transmitter-receiver unit. Eliminates the usual maze of connecting cables which are possible sources of trouble.



WRITE TODAY FOR COMPLETE INFORMATION — DEPT. 1920

Federal Telephone and Radio Corporation

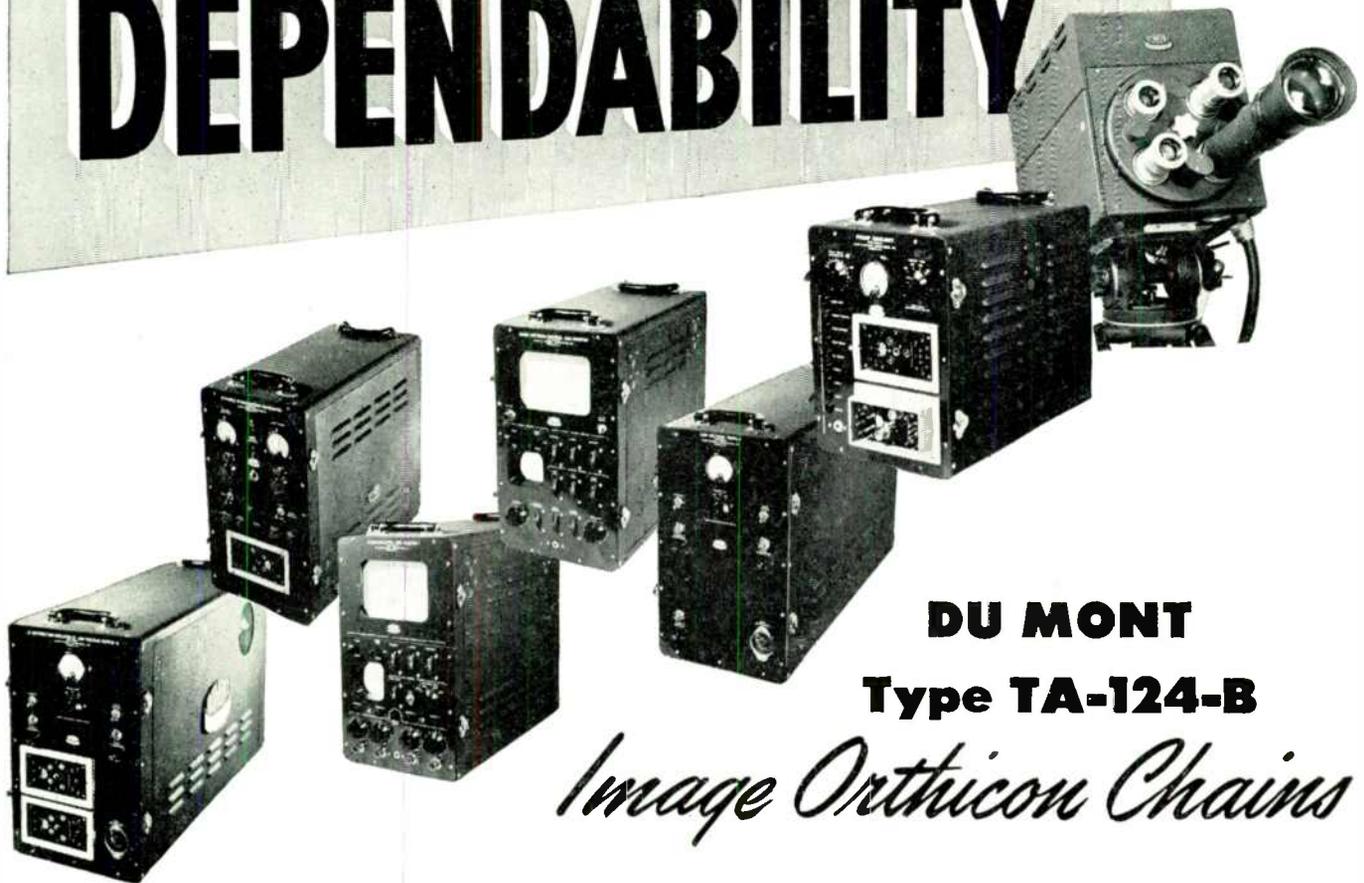
100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

KEEPING FEDERAL YEARS AHEAD... is IT&T's world-wide research and engineering organization, of which the Federal Telecommunication Laboratories, Nutley, N. J., is a unit.

In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp. 67 Broad St., N. Y.

With more and still more telecasters it's Du Mont
TV camera equipment because of outstanding

DEPENDABILITY



DU MONT Type TA-124-B

Image Orthicon Chains

▶ Many TV stations either on the air or under construction, are Du Mont-equipped throughout. That means the Du Mont Type TA-124-B Image Orthicon Chain for studio and remote pickups, alike.

But of even greater significance is the growing use of Du Mont cameras and auxiliary equipment by TV stations originally using other makes of equipment; by intra-store television demonstrations; by wired television installations; by movie producers experimenting with television production possibilities; by TV training schools; by government

agencies both here and abroad.

The Du Mont advantages are many: Split-second action through quick set-

up; finger-tip controls; superlative image pickup with precise electronic viewfinder checkup; accessibility for time-saving inspection and immediate maintenance; handy matched units, jiffy-connected, for all required power, synchronizing, amplifying and monitoring functions, plus the latest camera effects.

But the outstanding characteristic of this popular Du Mont Type TA-124-B Image Orthicon Chain is **DEPENDABILITY**. That, in the final analysis, is the all-important consideration. For "The show must go on," regardless,

$$SD+QW = \frac{D}{FWFT}$$

(Simple Translation)

**SUPERIOR DESIGN plus
QUALITY WORKMANSHIP equals
DU MONT**

First With the Finest in Television

▶ Consult us on your TV plans and requirements. Literature on request.

© ALLEN B. DU MONT LABORATORIES, INC.



ALLEN B. DU MONT LABORATORIES, INC. • TELEVISION EQUIPMENT DIVISION, 42 HARDING AVE., CLIFTON, N. J. • DU MONT NETWORK AND STATION WABD, 515 MADISON AVE., NEW YORK 22, N. Y. • DUMONT'S JOHN WANAMAKER TELEVISION STUDIOS, WANAMAKER PLACE, NEW YORK 3, N. Y. • STATION WTTG, WASHINGTON, D. C. • HOME OFFICES AND PLANTS, PASSAIC, N. J.

January 1949—formerly *FM*, and *FM* RADIO-ELECTRONICS

What you have been waiting for



TELEVISION
is so Sensationally
Different it Defies
Description

We cannot give you a word picture
of the important Zenith developments which are
FOUND IN NO OTHER TELEVISION SET
You must see it for yourself... Operate it yourself

See It at the Chicago Furniture Mart, Space 544-B
or at Your Zenith Distributors

ZENITH RADIO CORPORATION
Chicago 39, Illinois



Formerly, FM MAGAZINE and FM RADIO-ELECTRONICS

VOL. 9 January, 1949 NO. 1

COPYRIGHT 1949, by Milton B. Sleeper

CONTENTS

INDUSTRY NEWS

FM-AM-TV Set Production Barometer
Compiled from figures released by the RMA 4

What's New This Month

1. Prevue of events to come
2. FMA has a job to be done
3. Inauguration of extended TV network 10

FM BUSINESS

FM Business in 1949
What the industry can expect this year 15

A Simplified Modulator for FM
James R. Day 16

TV BUSINESS

TV Business in 1949
Presenting a cross-section of industry opinion 19

16-Mm. Film for TV Programs
J. A. Maurer 20

AUDIO SECTION

Audio Developments
H. H. Scott 23

Record Standards Are Scuttled
Lawrence Olds 24

FM COMMUNICATIONS

Communications in 1949
Review of progress in this field 25

Communication Directory, Part 2
Taxi, Public Utility, and Special Services 26

SPECIAL DEPARTMENTS

Telenotes 6

Special Services Directory 4

Professional Directory 12

Spot News Notes 22

Classified Advertising 46

THE COVER DESIGN AND CONTENTS OF FM AND TELEVISION MAGAZINE ARE FULLY PROTECTED BY U. S. COPYRIGHTS, AND MUST NOT BE REPRODUCED IN ANY MANNER OR IN ANY FORM WITHOUT WRITTEN PERMISSION

MILTON B. SLEEPER, *Editor and Publisher*

CHARLES FOWLER, *Business Manager* RICHARD H. LEE, *Advertising Manager*
STELLA DUGGAN, *Production Manager* LILLIAN BENDROSS, *Circulation Manager*

Published by: FM COMPANY

Publication Office: 264 Main St., Great Barrington, Mass. Tel. Great Barrington 500
Advertising Department: 511 Fifth Avenue, New York 17, Tel. VA 6-2483

FM Magazine is issued on the 20th of each month.
Single copies 25¢ — Yearly subscription in the U. S. A. \$3.00; foreign \$4.00. Subscriptions should be sent to FM Company, Great Barrington, Mass., or 511 Fifth Avenue, New York 17, N. Y.

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

Entered as second-class matter August 22, 1945, at the Post Office, Great Barrington, Mass., under the Act of March 3, 1879. Application for additional entry at the Post Office, Boston, Mass., pending. Printed in the U. S. A.

MEMBER,
AUDIT
BUREAU OF
CIRCULATIONS

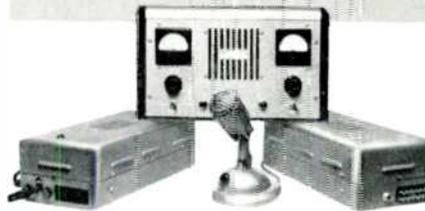


Announcing our new...

25-50 Megacycle FM 2-Way Radio Communication Systems



RADIOPHONE



(above)
VS 50-1—50 watt
Fixed Station. Oper-
ates on 117v60 cycles
A.C. (25-50 mega-
cycles). Remote control
optional.



(below)
VM 30-1 (25-50 mega-
cycles)—30 watt. Compact
Mobile Station.

(not illustrated)
UM 15-1 (152-162 meg-
acycles)—15 watt (local
reception). Compact Mo-
bile Station.

Now Raytheon Radiophone offers dependable 2-way communication systems in both 25-50 megacycle and 152-162 megacycle. Whatever your needs, you can be sure that there is a Raytheon Radiophone to meet your requirements *exactly*—manufactured to Raytheon's high standard of excellence in electronics.

COMPARE RAYTHEON'S ADVANTAGES

NOISE-FREE RECEPTION
COMPACT—OUT OF SIGHT
OUT OF THE WAY
SIMPLIFIED INSTALLATION

COMPARE RAYTHEON'S PERFORMANCE

LOWEST BATTERY DRAIN
LOW MAINTENANCE
LONG LIFE

COMPARE RAYTHEON'S PRICE

LOWEST PRICE IN THE INDUSTRY

BELMONT RADIO CORPORATION

A Subsidiary of Raytheon Manufacturing Company

5939 W. DICKENS AVENUE • CHICAGO 39, ILLINOIS

Mail Coupon for Quotations and Information

Belmont Radio Corporation

5939 W. Dickens Avenue, Chicago 39, Illinois

I'd like to have full information on Raytheon Radiophone—

25-50 megacycle 152-162 megacycle

NAME _____

ORGANIZATION _____

ADDRESS _____

CITY _____ STATE _____

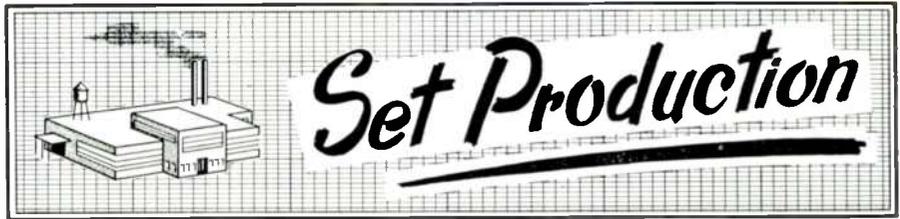


**THE NEW NC-108
FM TUNER-RECEIVER**

Now...National offers an 88-108 Mc. band FM tuner-receiver designed to meet the most exacting demands of high-fidelity enthusiasts! Flat from 50 to 18,000 cps, ± 2 db, the new NC-108 may be connected to your amplifier or the phono input of your radio. Built-in speaker, audio output stage and tone control also permit use as separate monitoring receiver. Built to National's famous standards of quality, the NC-108 is worthy of the finest in amplifiers and speakers. Nine tubes plus rectifier and tuning eye.

\$99.50
Amateur Net

For complete specifications see the National dealer listed in the classified section of your 'phone book, or write direct to



NOVEMBER set production continued the trend already indicated by our monthly Production Barometer. TV receivers showed their largest gain in any single month. FM sets dropped slightly, although the addition of TV sets equipped with FM tuning gives a larger increase in the potential FM audience than for October. AM models continued their decline, with a drop of 611,170 below November, 1947.

Thus the November RMA figures are note-worthy because they indicate the establishment of a trend, rather than any spectacular change.

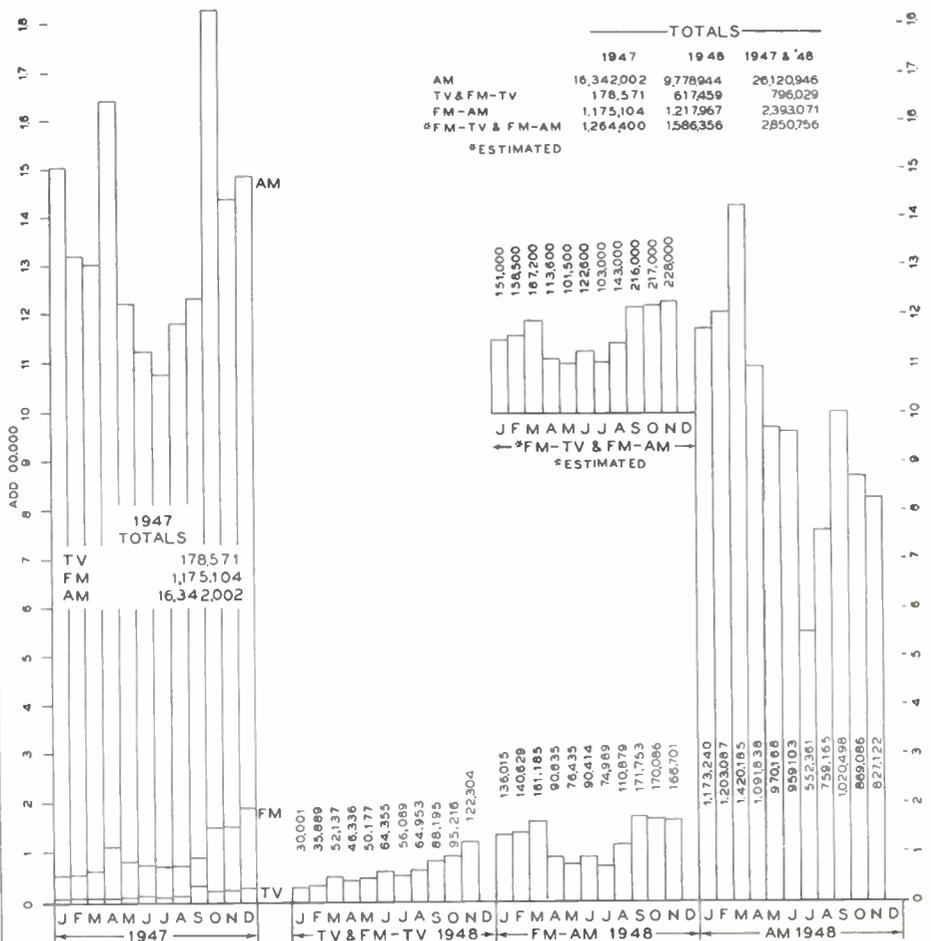
Recalling predictions on TV sets that were tossed out so freely a year ago, it is interesting to check actual accomplishments against '47 and '48 estimates made by Gen. Sarnoff at the NAB convention on September 13, 1947. He said at that time: "Between 150,000 and 175,000 receivers will be in use by the end of 1947. By the end of 1948, I foresee a total of 750,000."

That statement must have been based on intimate knowledge of facts, and not wishful thinking. As our Barometer shows, 1947 TV production totaled 178,000, with a total through November, 1948 of 796,000.

It's hardly more than 10 years since U. S. cathode-ray tube production was virtually limited to those made by Allen Du Mont in the basement of his home.

From that small beginning, the use of cathode-ray tubes has grown to the point where, in the 3rd quarter of this year, 327,044 tubes were manufactured, valued at \$8,088,600, an all-time record.

Sale of all transmitting equipment by RMA members totaled \$34,021,278 in the third quarter, of which 64% or \$21,936,129 went to the Government. TV transmitters, studio equipment, and antennas amounted to \$5,256,465. FM transmitters came to \$833,897; AM transmitters \$681,912; FM and AM antennas \$255,236; FM and AM studio equipment \$923,800.



NEW ELECTROLYTICS
fully dependable
TO 450 VOLTS AT 85°C



ILLUSTRATIONS
 ACTUAL SIZE

for TELEVISION'S exacting applications

Designed for dependable operation up to 450 volts at 85°C. these new Sprague electrolytics are a good match for television's severest capacitor assignments. An extremely high stability characteristic is assured, even after extended shelf life, thanks to a special Sprague processing technique. Greatly increased manufacturing facilities are now available.

Your inquiries concerning these new units are invited.

DEPENDABILITY TO MATCH THESE NEW ELECTROLYTICS! SPRAGUE PHENOLIC MOLDED TUBULARS...

- Highly heat- and moisture-resistant—
- Non-inflammable—Moderately priced
- Conservatively rated for —40°C.
- to +85°C. operation—Small in size
- Completely insulated—Mechanically rugged—Thoroughly field-tested

Write for Engineering Bulletin 210A

SPRAGUE ELECTRIC COMPANY • NORTH ADAMS, MASS.

SPRAGUE

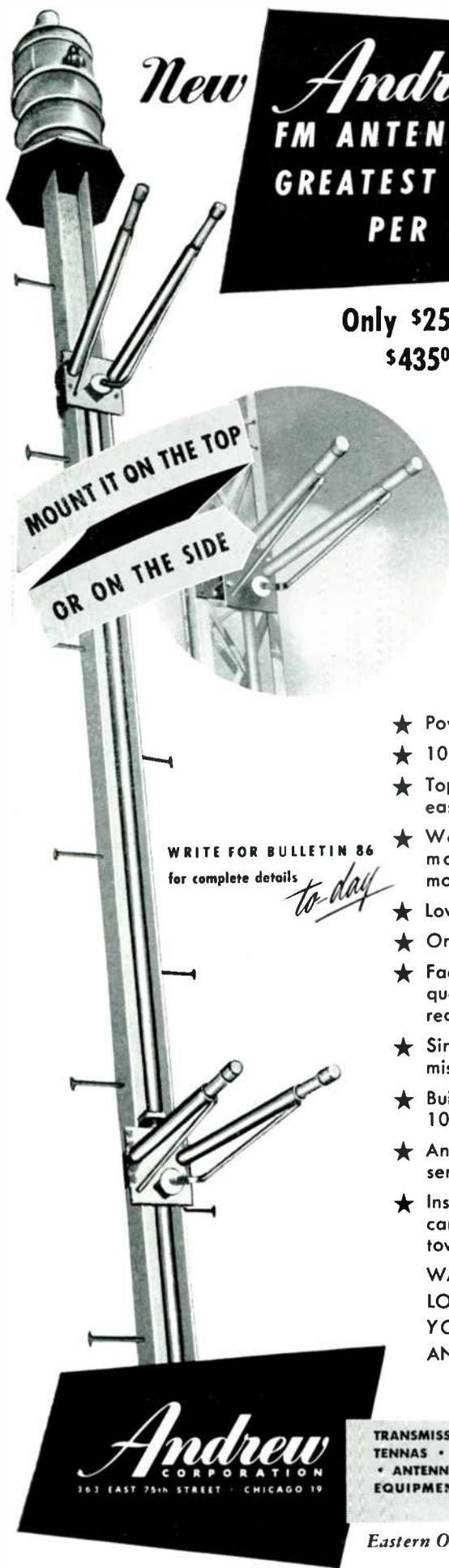
Capacitors

* Koolohm Resistors

PIONEERS OF

ELECTRIC AND ELECTRONIC PROGRESS

* T.M. Reg. U. S. Pat. Off.



New **Andrew MULTI-V**
FM ANTENNA GIVES YOU
GREATEST POWER GAIN
PER DOLLAR!

Only \$250⁰⁰ side-mounted;
\$435⁰⁰ top-mounted



Here is why the new
ANDREW Multi-V is your
best FM antenna buy:

WRITE FOR BULLETIN 86
 for complete details

to-day

- ★ Power Gain of 1.6
- ★ 10 KW Power Capacity
- ★ Top or side mounting with equal ease
- ★ Weighs only 70 pounds side mounted; 450 pounds top mounted
- ★ Low initial cost—low maintenance
- ★ Omnidirectional pattern
- ★ Factory tuned to required frequency — no further adjustments required
- ★ Single feed point — single transmission line
- ★ Built to withstand winds of over 100 MPH
- ★ Antenna can be completely assembled on the ground
- ★ Insulation resistance of feed line can be tested without climbing tower

WANT THE MOST EFFICIENT
LOW-COST FM ANTENNA FOR
YOUR STATION? BUY THE
ANDREW MULTI-V!

Andrew
 CORPORATION
 363 EAST 75th STREET - CHICAGO 19

TRANSMISSION LINES FOR AM-FM-TV • AN-
 TENNAS • DIRECTIONAL ANTENNA EQUIPMENT
 • ANTENNA TUNING UNITS • TOWER LIGHTING
 EQUIPMENT • CONSULTING ENGINEERING
 SERVICE

Eastern Office: 421 Seventh Ave., N.Y.C.



Portable TV Receiver:

Motorola has introduced a 7-in. set in a luggage-type cabinet. Top of the case contains a dipole that can be set up indoors, and connected to the set with a 9-ft. lead. Use is probably limited to strong-signal areas.

Sales in Milwaukee:

According to a check of dealers' sales made by WTMJ-TV, 2,892 sets were installed in the Milwaukee area during the month of December. Total count at year end was 14,187.

Picture Control Device:

Garod has a new control, called the Tele-Zoom, with a push-button control that enlarges the conventional rectangular TV image to the maximum possible area of the picture tube.

Chin-on-Chest Viewing

A campaign should be started to give TV console designers some practical experience at viewing television. That seems to be the only way we're going to have consoles with the tubes high enough that they can be seen without acquiring a crick in the neck.

Better Antenna Construction:

Some of the best ideas on TV antennas and lead-in arrangements are detailed in a pamphlet just issued by Americal Phenolic Corporation, 1830 South 54th St., Chicago 50. We suspect that reception on a great many sets can be improved by following the suggestions offered.

WOIC, Washington:

Bamberger station at the Capital was officially inaugurated on January 19. It is operating on channel 9, 186 to 192 mc.

More Coaxial Cable Service:

Bell Telephone Laboratories, Western Electric, and AT & T are working intensively to have additional TV network facilities ready by next July. At that time, two more west-bound channels will be available, plus one channel each way that can be used for TV after 6:00 p.m.

New TBA Officers:

Elected for 1949 are J. R. Poppele, president for a fifth term; G. Emerson Markham, vice president; Will Baltin, secretary and treasurer. Directors are J. R. Poppele, G. E. Markham, Lawrence W. Lowman, Robert E. Kintner, Norman E. Kersta, Ernest B. Loveman, Allen B. DuMont, C. W. Mason, and Paul Raibourn.

FM AND TELEVISION

PRODUCTS & LITERATURE

Better Recordings:

Ninth revised edition of "How to Make Better Recordings" contains 144 pages of information on recording equipment, materials, and techniques. Price \$2.00. Published by Audio Devices, 444 Madison Ave., New York 22.

Small Coaxial Relays:

New series for low-power mobile and fixed transmitters is only 2 15/16 ins. long. They are designed to maintain a voltage-standing wave ratio of 1.04 at 80 mc. to 1.4 at 300 mc. Other types are rated up to 880 watts. Catalog 7011. Advance Electric & Relay Co., 1260 W. 2nd St., Los Angeles 26.

Communications Unit:

Two-way mobile transmitter-receiver is contained in a small single case. To meet the requirements of the 152- to 174-mc. band, extreme selectivity has been provided. Automatic input level control gives constant level at receiver. Bulletin D149. RCA Engineering Products Division, Camden, N. J.

All-Triode Amplifier:

A 15-watt unit designed for response within 1 db from 10 to 17,000 cycles; hum level 65 db below maximum rated output. Can be used for systems employing supersonic control signals. Outlet is provided for voltages to operate noise suppressors or reluctance pickup preamplifiers. Catalog 23. Browning Laboratories, Winchester, Mass.

Antenna Rotator:

Non-interfering drive covers 370° in 80 seconds. Locks antenna against the wind. Mechanism is designed to carry up to 160 lbs. Bulletin 521. Lyte Aerosweep Corp., 12 Washington Ave., Plainfield, N. J.

3-Channel Carrier Phone:

Wire-line or radio link equipment permits the installation of a single channel, and the subsequent addition of one or two more channels. For operation from 10 to 250 miles. Bulletin 68. Lenkurt Electric Co., San Carlos, Calif.

FM-TV Antenna Accessories:

Detailed information on antennas for video and audio reception, 152-162 mc. communications antennas, terminal strips, and lightning arrestors. Bulletin 112. L. S. Brach Mfg. Co., Newark, N. J.

Shock-Proof Mike Stand:

Desk-type stand designed particularly
(Continued on page 46)



Model 260 in all-bakelite roll top carrying case

There are more
Simpson 260
high sensitivity
Volt-Ohm-Milliammeters
in use today than all others
combined! Your Parts Jobber
can tell you why

SIMPSON ELECTRIC COMPANY

5200-5218 W. Kinzie St., Chicago 44, Ill. In Canada: Bach-Simpson, Ltd., London, Ont.

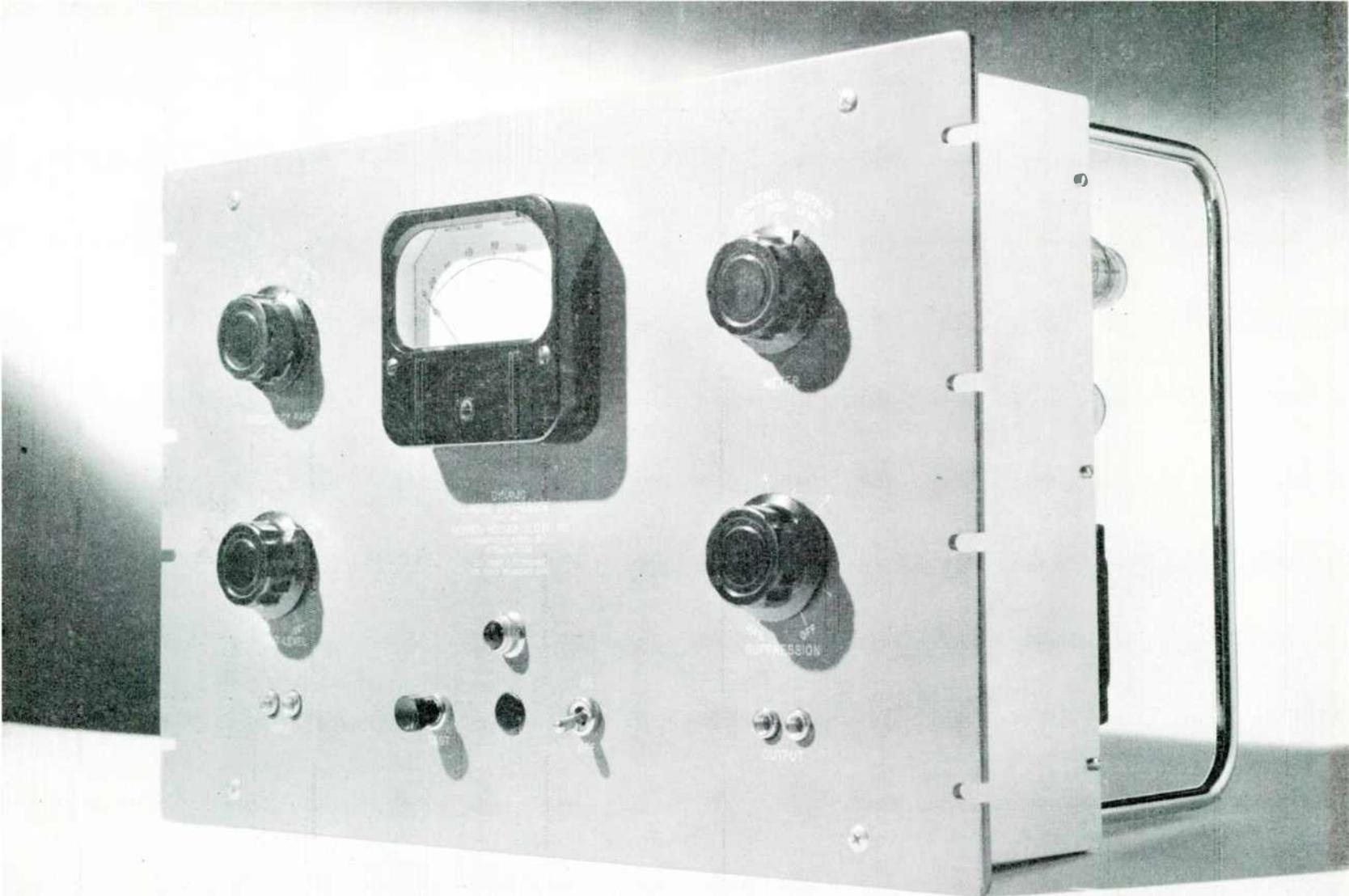
RANGES at 20,000 ohms per volt DC, 1000 ohms per volt AC

VOLTS: AC & DC—2.5, 10, 50, 250, 1,000, 5,000

DC CURRENT: 10, 100, 500 MA—10 AMP—100 MICRO AMP

OHMS: 0-2,000 (12 center), 0-200,000 (1200 center), 0-20 MEGOHMS (120,000 ohms center)

DECIBELS: (5 ranges) -10 to +52 DB



D.N.S. *for* FM-AM-TV STATIONS

Gives amazing realism to all types of recorded program material

The broadcast station model of the H. H. Scott Dynamic Noise Suppressor literally gives listeners live-talent entertainment from recorded and transcribed programs.

At your station, model 910-C will minimize background noise made up of record scratch, hiss, and rumble *without* fixed loss of tone quality.

Your listeners will get the impression of realism such as they have been hearing *only* on live-talent shows. Their greater enjoyment of your programs will increase your audience again, and again, and *again!*

There is no limit to your use of the Dynamic Noise Suppressor, for it is equally effective on all types

of recordings—shellac, vinylite, tape, wire, transcriptions, and sound-on-film. All are improved by the use of the 910-C broadcast station model. It cannot become obsolete. It will even enable you to use records which you now consider worn out.

The Dynamic Noise Suppressor is easy to install. Engineering advice is available without charge. Each 910-C is fully covered by a one-year guarantee. Bulletin 83, giving complete technical data, will be mailed promptly on request. *Get the details at once.*



Hermon Hosmer Scott, Inc.
333 Putnam Ave., Cambridge, Mass.
Representatives in all principal cities

In every type of home radio
SYLVANIA tubes speak for themselves

Admiral

ARVIN

Bendix
 THE REAL VOICE OF
Radio

CROSLLEY

Emerson
Radio

ESPEY

FADA
Radio

Farnsworth

GLOBE

hallicrafters



Miniaturs, standard types, and famous
 Lock-Ins are all included in the Sylvania line.

In the leading makes of home radios—from portable models to console combinations—you'll find Sylvania tubes helping to assure fine reception and lasting service. The quality of Sylvania tubes has made them famous throughout the world.

For information on Sylvania tubes, see Sylvania Distributors, or write Radio Tube Division, Emporium, Pa.

SYLVANIA

ELECTRIC

RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES; FLUORESCENT LAMPS,
 FIXTURES, WIRING DEVICES; ELECTRIC LIGHT BULBS; PHOTOFLASH BULBS

Motorola

Olympic
 Radio and Television

PHILCO
Regal

Silvertone

Spartan

STROMBERG-CARLSON

Temple

TRAV-LER

Westinghouse

ZENITH
 "LOW DISTANCE" RADIO



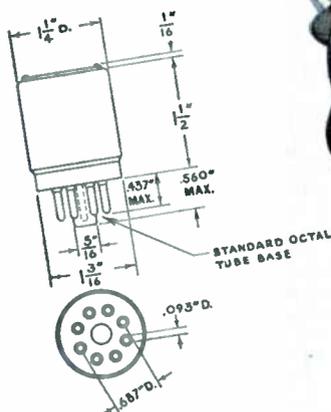
TCO-1...
A new form factor in temperature stabilization

Space limitations in communications equipment call for a new form factor in crystal temperature stabilizers. Again, Bliley is first with the answer. The new TCO-1 is a miniaturized crystal oven which provides the high temperature stability necessary for precision performance. The TCO-1 employs a Bliley type BH6 crystal unit which is mounted internally. With this combination, frequency stability may be maintained within .0001% over a wide ambient temperature range. This crystal oven, with type BH6 crystal unit, is supplied at any frequency in the range 1—100 mc.

OPERATING CHARACTERISTICS

1. Temperature stability $\pm 2^{\circ}\text{C}$ from minus 50°C to plus 70°C .
2. Operating temperature: 75°C .
3. Rating: 6.3 volts, 5.5 watts.

DIMENSIONAL DATA



Bliley
CRYSTALS

BLILEY ELECTRIC COMPANY
UNION STATION BLDG., ERIE, PA.

THIS MONTH'S COVER

Crowded conditions on the mobile communications bands call for constant improvement and refinement of transmitter and receiver designs. Changes are being brought about also by demands for smaller mobile units and simplification of installation and service.

This month's cover shows the first production of new mobile units at the Kaar Engineering plant, Palo Alto, Calif. Boss man John M. Kaar, left, walked in with General Manager Norman Helwig just as the photographer was ready to shoot this picture. Both are old-timers in the communications business.



WHAT'S NEW THIS MONTH

1. PREVIEW OF EVENTS TO COME
2. FMA HAS A JOB TO BE DONE
3. INAUGURATION OF EXTENDED TV NETWORK

1. The year 1949 will be remembered as a year of change in the radio industry. During the three years following the war, peacetime radio not only caught up with its interrupted progress but went far beyond—so far beyond that it broke down the prewar structure of the industry and set the stage for something completely new to all of us.

To be realistic, we must admit that '48 was a year of disorganization. Now, to be constructive, '49 must be made the year of reorientation.

Many publications devote their New Year issues to presenting opinions, predictions, and year-end statements from well-known individuals. Generally, however, signed statements are diluted and distorted by company policies, with the result that they are more window-dressing than frank expressions of individual thinking.

For that reason, we undertook personal interviews with a cross-section of industry leaders not for the purpose of presenting direct quotations, but to get a composite picture of current thinking at management and policy level.

You will find, in the pages of this issue, the results of those interviews. You may disagree with some of the opinions and predictions presented. Frankly, we found widely divergent views held on some subjects by leading figures in the industry. Still, there was a common pattern of attitudes and plans.

It is this overall pattern that we have tried to present in the discussion of what's ahead in FM broadcasting and communications, television, and audio developments. And we can add, from personal knowledge, that much of the thinking for the future, as presented in

this issue, will be disclosed in detail in this Magazine during the coming months.

2. It is most unfortunate that, after the highly successful and constructive FMA conference in Chicago, Bill Bailey did not make a more gracious departure from his post as executive director. Bill tackled a tough job when he took charge of FMA headquarters two years ago. It was probably tougher than he expected. Many of the problems which confronted him called for a deeper understanding of FM's past and a clearer view of FM's future than he possessed. Nor was the wisest counsel always available to him.

Looking back over the two-year history of FMA, it seems as if this organization has ridden along with the progress of FM, without making much of a contribution of its own.

In our October, 1946 issue, anticipating that FM Broadcasters, Inc. would be dissolved at the NAB's Chicago conference of that month, we discussed the formation of a new association, and offered a 10-point program of cooperation between broadcasters and manufacturers. Joint effort by these groups was emphasized because neither can build FM service without the other.

Now that we can look upon those points with two-year hindsight, it is worthwhile to review them:

1. Plan for FM set production and deliveries to assure the availability of receivers in each area served by FM broadcasting.

2. Work out FM promotion which can be used in any area by broadcasters, and manufacturers, distributors, and dealers to assure maximum effectiveness. These

FM AND TELEVISION

Special Services Directory

METHODS ENGINEERS

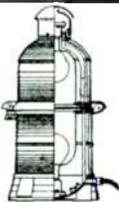
Materials & Methods engineers in America's leading manufacturing plants use Topflight's Printed Cellophane, Self - Adhesive Tape to meet A-N specs. - assembly line - follow through - instruction labels. Easy to Apply.
TOPFLIGHT TAPE CO. YORK PA.

RATES FOR PROFESSIONAL CARDS IN THIS DIRECTORY

\$12 Per Month for This Standard Space. Orders Are Accepted for 12 Insertions Only.

Custom - Built SPEECH INPUT EQUIPMENT U. S. Recording Co.

1121 Vermont Avenue
 Washington 5, D. C.
 District 1640



"Guardian"
 300 MM. Code Beacons
 Obstruction Lights
 Code Flashers
 Packaged Lighting Kits
 Send for Catalogue

HUGHEY & PHILLIPS
 326 North La Cienega Blvd.
 Los Angeles 36, Calif.

HIGH QUALITY REPRODUCTION

by **Brociner**

ENGINEERING and PRODUCTION The KLIPSCH SPEAKER SYSTEM

Standard & Custom Built Types for Private Homes, Auditoriums, Hotels, Theatres

BROCINER ELECTRONICS LABORATORY
 REgent 7-6704
 1546-F SECOND AVENUE, NEW YORK 28

KAY ELECTRIC CO. INCORPORATED

Manufacturers of:
 Television Test Equipment
 Laboratory Instruments
 Electronic Devices

14 Maple Avenue Pine Brook, N. J.
 Tel. CALdwell 6-3710

WHAT'S NEW THIS MONTH

(Continued from page 10)

would cover cooperative demonstrations of all kinds.

3. Plan methods whereby broadcasters and manufacturers can work together to educate distributors, dealers, and servicemen in the problems of demonstrating, installing, and servicing FM sets, to assure satisfactory performance.

4. Set up standards of FM performance as to fidelity and sensitivity, to protect purchasers against misrepresentation and substandard reception.

5. Explore the problems and possibilities of facsimile as an added public service, a means of additional revenue for broadcasters, and a new market for manufacturers. Also, consider methods of multiplexing sound and facsimile, and system standards.

6. Represent the industry before the FCC in matters pertaining to engineering standards and regulations.

7. Hold an annual conference for the discussion of program, operation, engineering, and policy problems.

8. Organize seminars for advertising executives and program directors, with discussions and demonstrations of FM program techniques.

9. Look into methods of 15,000-cycle FM program distribution by wire or relay systems, or by the use of recordings.

10. Finally, act as a clearing house for the exchange of information among FM broadcasters, set manufacturers, and contributing services, for the purpose of improving the standards of service rendered to radio listeners.

As we see it now, that was a very sound program for FMA. But checking off the items one by one, it is surprising to see how much essential work the Association has never attempted. We don't know why it wasn't done. We don't know that much about the management of FMA in the past.

Lack of funds has undoubtedly been a severe handicap. Apparently, there was barely money enough to meet the headquarters payroll and the executive director's traveling expenses. Thus, little was done to promote the interests of the members.

FMA president Bill Ware can get adequate financial support for a constructive, aggressive program. The cost of some activities can be covered on a pay-as-you-go basis, and even show a profit. In fact, we do not hesitate to predict that if FMA meets the obligations outlined in the 10 points enumerated here, the Association will grow and prosper in 1949.

3. The inauguration of AT & T television service between Chicago and
 (Continued on page 12)

Special Services Directory

FREQUENCY MEASURING SERVICE

Exact Measurements at any time



RCA COMMUNICATIONS, INC.
 Riverhead, N. Y. - Riverhead 2280
 Point Reyes, Cal. - Inverness 82

THE WORKSHOP ASSOCIATES

INCORPORATED

Specialists in
 High-Frequency Antennas

66 Needham St., Newton Highlands, Mass.
 Bigelow 3330

ELECTRONIC ENGINEERING MASTER INDEX

CONTAINS the most complete bibliography available on Frequency Modulation, Television, UHF, Broadcasting, Radar, and over 400 other topics.

1925-1945 edition \$17.50
 1935-1945 edition \$ 7.50

Descriptive literature on request
ELECTRONICS RESEARCH PUBLISHING CO.
 Dept. A 161 West 18th St., N. Y. 11

Collins Custom Components

The Very Finest

FM TUNERS FM/AM TUNERS
 FM RECEIVERS

Custom Matched Components

Collins

Audio Products Co., Inc.
 P. O. Box 368 Westfield, N.J.

RADIO-MUSIC CORP.

REPRODUCERS **R** TURNTABLES

M

AMPLIFIERS **C** SPEAKERS

F. M. broadcast quality for custom sound installations for the studio and the home.

PORT CHESTER, NEW YORK

AMY, ACEVES & KING, INC.

Specialists in the
 Design and Installation of

**HIGH-GAIN
 AM, FM, and TELEVISION
 ANTENNA SYSTEMS**

LONGacre 5-6622
 11 West 42nd St., New York 18, N. Y.

Professional Directory

Jansky & Bailey

AN ORGANIZATION OF
Qualified Radio Engineers
DEDICATED TO THE
SERVICE OF BROADCASTING

National Press Bldg., Washington, D. C.



Andrew Corporation

Consulting Radio Engineers

363 EAST 75th STREET, CHICAGO 19

Triangle 4400

NEW HEADQUARTERS

GARO W. RAY

CONSULTING RADIO ENGINEERS

Standard, FM and Television Services

HILLTOP DRIVE
STRATFORD, CONN.

Tel. 7-2465

ANDREW ALFORD

Consulting Engineers

ANTENNAS & RF CIRCUITS

Laboratory and Plant:
299 Atlantic Ave., Boston 10, Mass.
Phone: HAncock 6-2339

DALE POLLACK

FREQUENCY MODULATION

development and research
transmitters, receivers
communications systems

352 Pequot Avenue New London, Conn.
New London, 2-4824

Preliminary surveys, management and operational consulting service based on practical experience with AM, FM and Facsimile.



Phone: Executive 3929

RADIO CONSULTANTS, Inc.
1010 VERMONT AVE., WASHINGTON 5, D. C.

WHAT'S NEW THIS MONTH

(Continued from page 11)

the east coast, on January 11, was a very thrilling affair. Although the mid-west and eastern coaxial cables were actually joined at Pittsburgh, the ceremonies were staged at Radio City, in New York.

For an hour and a half, the program clicked with precision timing from studio to studio at Radio City, down to the Du Mont studio at Wanamaker's, out to Chicago, and back to New York again. Not a man or a machine faltered.

We expected that some sort of a gallery would be provided for the press, where the studio operations could be seen. But, to our dismay, the press room set up in a 3rd floor studio was merely a darkened area with many seats and several projection receivers. That wasn't what we wanted. We could look at television any time, but this would be the only chance to see the initial programming of the world's first long-distance coaxial cable TV network. (Russian papers please note)

Inquiry brought the information that AT & T president Leroy Wilson would be televised in studio 8G. Up we went to an enormous room where, at the far end, four cameras and a microphone boom were gathered in front of three sets to be used in the program.

The whole ceiling seemed cluttered with lights and gear. The floor was crowded with groups of also-curious men and women, mostly broadcasters and agency people, who frequently backed into miscellaneous props, or tripped over them. In one island of space, Dr. Stanton of CBS sat motionless while a young woman, makeup kit in hand, retouched his blond eyebrows, in preparation for his appearance on the program. Around the studio walls there were unrelated sections of kitchens, living rooms, and a huge window opening onto a painted night scene of New York.

We walked into this strangely disordered room just before 9:30, in time to be greeted by the call, "All out. Everybody out!" So we moved along with the others toward the door, but only as far as the back of a wide screen. And there we stayed, out of sight, until someone closed the door firmly behind the last visitor.

Silence descended on the studio—that acoustic-treatment kind of silence—so that when someone took out his fountain pen the clip made a click that sounded like the snap of a cap pistol. Then we knew we wouldn't be put out, for the door couldn't be opened again.

No one paid any attention to us, for all eyes were on Bill Garden, the director, except when one of the cameramen

(Concluded on page 13)

Professional Directory

RAYMOND M. WILMOTTE Inc.

Paul A. deMars

Associate

Consulting Engineers
Radio & Electronics

1169 Church St., N. W. Decatur 1234
Washington 5, D. C.

RUSSELL P. MAY

CONSULTING RADIO ENGINEERS

★ ★ ★

1422 F Street, N. W. Wash. 4, D. C.
Kellogg Building Republic 3984

LYNNE C. SMEBY

Consulting
Radio Engineers

820 13th St., N.W. EX 8073
WASHINGTON 5, D. C.

CONSULTING
RADIO ENGINEERS

DIXIE B. McKEY
&
ASSOCIATES

1820 JEFFERSON PL., N.W. REpublic 7236
WASHINGTON 6, D. C. REpublic 8296

RATES FOR
PROFESSIONAL CARDS
IN THIS DIRECTORY

\$12 Per Month for This Standard
Space. Orders Are Accepted
for 12 Insertions Only

NATHAN
WILLIAMS
FM TV AM
Consulting Engineer



20 Algoma Blvd.
Oshkosh, Wis.

Phone: Bl'kbawk 22

Professional Directory

**FRANK H.
McINTOSH**

Consulting Radio Engineers
710 14th St. N.W., Wash. 5, D. C.
MEtropolitan 4477

WELDON & CARR CONSULTING RADIO ENGINEERS

Washington, D. C.
1605 Connecticut Ave. MI. 4151
Dallas, Texas
1728 Wood St. Riverside 3611

COMMUNICATIONS RESEARCH CORPORATION

System Planning—Engineering
Research & Development
FM—TV—Facsimile
VHF—Communications
60 E. 42nd St., New York 17, N. Y.
Mu 2-7259

REFERENCE DATA

Bound volumes of *FM* and *TELEVISION* contain a wealth of engineering and patent material. Each volume contains 6 issues, starting with January or July. They are available back to July 1941. Price \$5.50. By mail, 25c extra.



Radio Engineering Consultants,
Frequency Monitoring

Commercial Radio Equip. Co.

International Building • Washington, D. C.
603 Porter Building • Kansas City, Mo.

Winfield Scott McCachren AND ASSOCIATES

Consulting Radio Engineers
TELEVISION SPECIALISTS

2404 Columbia Pike 410 Bond Bldg.
Arlington, Va. Washington, D.C.
District 6923

WHAT'S NEW THIS MONTH

(Continued from page 12)

took an extra squint at the left hand set where the announcer, a piece of cable in his hand, waited for the signal that would start the show.

We were almost disappointed that it went so smoothly. Each man carried out his part without apparent effort, seemingly oblivious to the importance of the event. If there was any tension it must have been absorbed, along with the low-spoken voices of those who appeared before the cameras, by the deadness of the studio.

Whatever Leroy Wilson may have been thinking, he was as much at ease as if he had been in his own office. The only concern he showed was when, watching the monitor receiver at the conclusion of the program in studio 8G, the screen went blank. But that was not a failure. Someone had turned off the set!

While we watched the proceedings, our thoughts turned back some twenty years to the time when we assisted in staging a demonstration at Columbia University of whirling-disk television reception from the old WRNY station, using equipment built at Pilot Radio. The apparatus of 1928 was built by just two men—John Geloso, Pilot's chief engineer, and Kurt Krolme, a very able instrument-maker.

The system we saw in operation at Radio City was the product of several thousand individuals, working as a perfectly co-ordinated team and supported by unlimited capital and facilities.

Yes, the progress of television has been great indeed. But even beyond that, we were impressed by this occasion as an accomplishment of organized scientific effort and business administration. This is a dynamic force which may, in the next twenty years, prove to be the greatest resource of our United States.

We probably owe an apology to some of our readers for the amount of space occupied by the Communications Directory in this issue. Frankly, we had not anticipated that the number of systems had increased to such an extent during the past year. Last January, the Directory was made up in three columns. Now, although we compressed it to four columns, a 50% increase in number of pages is required for the listings of stations and the equipment specifications.

So as not to cut in on regular editorial space in this way again, we are planning that the future semi-annual Communications Directories will be issued as supplements to our July and January issues. All the details of the new arrangement have not been worked out yet, but they will be settled shortly and will be announced in April.

Professional Directory

McNARY & WRATHALL CONSULTING RADIO ENGINEERS

▼ ▼ ▼
906 National Press Bldg. DI. 1205
Washington, D. C.
1407 Pacific Ave. Phone 5040
Santa Cruz, California

KEAR & KENNEDY

Consulting Radio Engineers

1703 K St., N.W. STerling 7932
Washington, D. C.

GEORGE P. ADAIR

Consulting Engineers

Radio, Communications, Electronics
1833 M St., N.W., Washington 6, D.C.
EXecutive 1230

GEORGE C. DAVIS

Consulting Radio Engineers

501-514 Munsey Bldg.—Sterling 0111
Washington 4, D. C.

WATKINS 9-9117-8-9

S. A. Barone Co.

Consulting Engineers

MECHANICAL—RADIO—ELECTRONIC
PRODUCT DEVELOPMENT & RESEARCH
Development Specialists in Circuits, Part
Lists, Models, Manufacturing Drawings.
143-145 W. 22nd ST., NEW YORK 11

RATES FOR PROFESSIONAL CARDS IN THIS DIRECTORY

\$12 Per Month for This Standard
Space. Orders Are Accepted
for 12 Insertions Only

**was
our
face
red!**



With pardonable pride, we hope, we have made our Karp Blueprint Man pretty well and widely known as a symbol of our services in sheet metal fabrication.

One of the greatest assets of our animated trade mark, we think, is the striking blue color and ease of identity.

Imagine our chagrin and embarrassment

when he appeared in the December issue of FM and TV in a blistering satanic red!

We assure you it was without intent on the part of any one concerned—it was simply an unfortunate mechanical error.

Excuse it, please. We're blue again. And do you need any superfine workmanship in sheet metal cabinets or housings?

KARP METAL PRODUCTS CO., INC.

217 - 63rd STREET, BROOKLYN 20, NEW YORK

Custom Craftsmen in Sheet Metal

FM BUSINESS IN 1949

WINNING PUBLIC FAVOR ON ITS MERITS, FM IS GOING TO BE THE SAFEST BET PROFIT-WISE FOR THE CONSERVATIVE-MINDED MANUFACTURERS AND RETAILERS

THE new conditions faced by the radio industry in 1949 will bring about many changes among the audio broadcasters, home set manufacturers, and the retail trade. It is logical to consider these three groups in the order listed.

FM Broadcasting:

There are two schools of thought about the future of FM broadcasting. One holds that its competitor is AM broadcasting; the other, that TV is the competitor of both FM and AM.

As to the first, AM stations have been very busy selling against FM. In every way, they have made the most of such weaknesses as the smaller number of FM sets, the poor programming of some independent stations, and the economic uncertainties which have beset some FM operators.

None of these arguments is very impressive because FM is definitely gaining on the strength of its superior service to listeners, while the AM situation is deteriorating at an even faster rate. That this does not show up clearly yet is due to the place of eminence that AM occupied up to the end of the war; while FM started from scratch less than three years ago!

There's no question but what the FM audience is increasing steadily. In addition to the normal audience growth as the number of FM sets in use goes up from month to month, transistancing and storecasting are encouraging FM listening at home. These two exclusively FM developments will contribute substantial promotion in 1949.

Meanwhile, the crowded conditions on the AM band, rendering reception unsatisfactory if not impossible outside shrunken primary service areas, is losing to AM an increasing part of the audience it once held. This is doubly serious because AM reception is poorest during evening hours when sponsors pay premium rates. Time buyers have been assiduously wooed away from FM, but with FM sets definitely headed toward the 4 million mark by the end of 1949, it is inevitable that recognition will be shown to FM's ability to give consistent, interference-free, night-and-day coverage, and far greater coverage than AM stations can deliver.

As for the economic aspects: make no mistake on that point. The AM stations are the ones that are having financial troubles! FM operators talk loudly about their red-ink figures, and they have

plenty of them, but their position is improving from month to month. AM owners are the ones who are trying to get out from under by listing their stations for sale!

In large metropolitan areas, high-power AM stations are threatened by TV competition. In small cities, the low-power AM stations are in trouble because, operating in the crowded, upper end of the band, they have no nighttime coverage to compete with FM.

Outside the primary AM service areas, listeners are turning to FM for interference-free reception of duplicated network programs. Independent FM stations are offering improved programs over regional radio nets. The low cost of such operations is attracting new sponsors. Also contributing to FM program quality are the new techniques being developed around the use of tape recorders.

Set Manufacturers:

The set manufacturers are faced with many problems in 1949. There is a definite trend for this business to pass into the hands of a few very large concerns. The war set the stage for this shift. Some companies expanded their plant facilities and their engineering and research departments during the war. They gained in financial strength. Come peace, they were able to offset increased labor costs by more efficient production methods.

Others, having made no effort to grow beyond the assembly-bench-and-soldering-iron status, now find they have no place in the industry. Suppliers, accordingly, are watching credits more closely now than ever before.

Several of the concerns formerly manufacturing cheap AM sets, many of them under brand names, have tried to get into television, only to dig themselves in deeper than before. It appeared that they would do better to produce good FM receivers, but these companies, always having depended on RCA or Hazeltine for their AM engineering, were not organized to meet the requirements of precision production control on either FM or TV sets. A few were badly burned with Hazeltine's Fremodyne circuit.

Some of the larger concerns specializing in high-quality FM-AM phonograph combinations took a licking after Columbia brought out the long-playing records. This change almost stopped the sale of sets with standard changers. The situation was considerably aggravated when

Phileo, with characteristic agility, snapped out with powerful promotion behind a low-priced player for LP records.

Now, with Columbia's announcement of 7-in. LP records, and RCA's introduction of a new 45-RPM series to compete with Columbia, we can forget phono combinations until there is assurance that standardization will be restored.

The only set manufacturers who have gained by all this confusion are those selling chassis for custom installations. Their tuners and amplifiers cannot be made obsolete, whatever the record companies choose to do.

All this confusion over records will divert some business to FM sets. Prospects at this time are for a steady, though not spectacular increase in FM set production. The \$59.95 Zenith FM-AM table model is still tops for FM performance below \$60. Emerson's straight FM set at \$29.95 leaves much to be desired. Both construction and operation are cheap, even for its price class.

There is still a huge market for a straight FM model at \$39.95 or \$44.50 but, as we have said before, it must equal Zenith performance.

All factors considered, FM receiver sales will be the most stable segment of the set business in 1949, and offer the greatest assurance of profits to manufacturers who produce high-sensitivity FM models affording the full advantages of interference-free reception.

The Retail Trade:

The positions of the radio jobbers and dealers has always been difficult, if not precarious. This will become increasingly so in 1949. The reasons: 1) video publicity is upsetting audio business, 2) new varieties of records are upsetting the record and phonograph business, 3) sales of AM receivers are down to the vanishing point in dollar volume, 4) much of the promotion of AM and TV has been directed toward selling the trade away from FM, with the result that dealers are not making up for the loss of other business by pushing FM receivers.

No further generalization can be made on sales conditions because they will vary widely in accordance with local conditions, and individual skill in merchandising and handling the technical problems of installation and service. For example, in an area where AM reception is poor but FM offers a choice of programs, the dealer who sells a good, non-

(Concluded on page 18)

A SIMPLIFIED MODULATOR FOR FM

REL'S FOUR-TUBE SERRASOID UNIT REDUCES NOISE AND DISTORTION, AFFORDING SUBSTANTIAL IMPROVEMENT IN NETWORK OPERATION—By JAMES R. DAY*

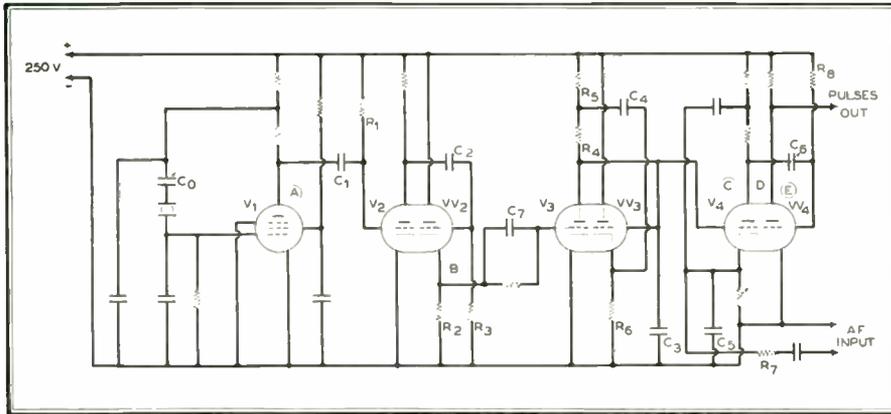


FIG. 1. Schematic diagram of the basic 4-tube Serrasoid FM modulator circuit

THE development of the Serrasoid FM Modulator was directed at the central problem of all phase-shift type modulators, namely, to secure linearly as large an initial phase shift as possible. To the extent that the shift can be increased in a practical way, the entire associated transmitter becomes simpler, quieter, and more straightforward in design and operation. A concrete example of the need for such an improvement is afforded in the problems of FM broadcast chain relaying. By pushing noise and distortion down by a substantial factor, the use of extensive chains becomes practical, and cumulative unwanted products are held to tolerable limits. Improvement in the noise and distortion features, while adhering to the general Armstrong phase-shift principles, would have warranted a certain amount of elaboration. But, as it finally turned out, the development resulted in a remarkably simple and reliable basic unit of wider application than had been foreseen. Perseverance in this instance entirely vindicated the soundness of the direct crystal-controlled phase-shift approach.

The Serrasoid, without cascading, produces a maximum initial peak phase shift of a little more than plus and minus $2\frac{1}{2}$ radians. For practical considerations, a figure of plus and minus $1\frac{1}{2}$ radians is used for 100% modulation. At 50 cycles, this means a peak frequency deviation of plus and minus 75 cycles. For the standard FM broadcast ease, a multiplication of about 1,000 is therefore required to reach a final deviation of plus and minus 75 kc. Because it represents a convenient combination

of doublers and triplers, the factor 972 is used in commercial transmitters. This multiplication is obtained in 7 saturated, low-level stages employing receiver-type tubes. By cascading the modulation process, the peak phase-shift can be increased without frequency multiplication. The circuit lends itself to differential modulation, *i.e.*, wherein two outputs are secured which are equally and oppositely frequency-deviated. Thus the Armstrong dual channel system can be employed for increasing deviation and

decreasing noise. These elaborations naturally extend the range of application well beyond the field of broadcasting discussed here.

The general idea in the Serrasoid is to produce from a crystal-controlled source at the carrier sub-multiple a train of short pulses, and to so shift their phase or timing in accordance with the modulation that instantaneous deviations in their recurrence rate or frequency are therefore produced. As in other phase-shift modulators, the functions of average carrier-frequency control and modulation are entirely separate.

Fig. 1 is a schematic of the sub-carrier generator and modulator. V_1 is the crystal-controlled oscillator. It operates at a frequency very near the series resonant frequency of the crystal. Variable capacitor C_0 provides for a vernier adjustment of frequency of about plus or minus .005%. The crystal unit is temperature-controlled, with a net stability of the order of plus or minus .0002%. Constants of the oscillator are so chosen that the crystal current is very small, and so that the tube plate current flows for a small fraction of the cycle. Negative-going voltage pulses, corresponding to plate current flow, are produced at the plate. These are shortened and shaped by C_1 , R_1 , and the grid conductance of V_2 , so that the effective voltage applied to the latter is a steep negative pulse several times in amplitude the cutoff voltage, and of duration less than one-tenth the oscillation period. Corresponding to these short cutoff periods, short positive-going voltage pulses are produced at the plate of V_2 . These are clipped at the base by the overdriven cathode follower VV_2 . The output voltage of this latter is a train of steep positive-going pulses occurring once per oscillation cycle, and of uniform duration less than one-tenth of the period.

When applied to the grid of V_3 , grid current is drawn and the relatively long time constant of C_7 and its shunt resistor maintains a cutoff bias between pulses. While V_3 is cut off, C_3 accumulates a positive charge via R_4 . When V_3 conducts during the short driving pulse, C_3 is abruptly discharged via the plate-cathode path of the tube. During the charging period, the increase of voltage on C_3 would be exponential were it not for the bootstrap cathode follower VV_3 . This tube, by adding to the charging supply voltage via C_4 a duplicate of the voltage on C_3 , maintains constant cur-

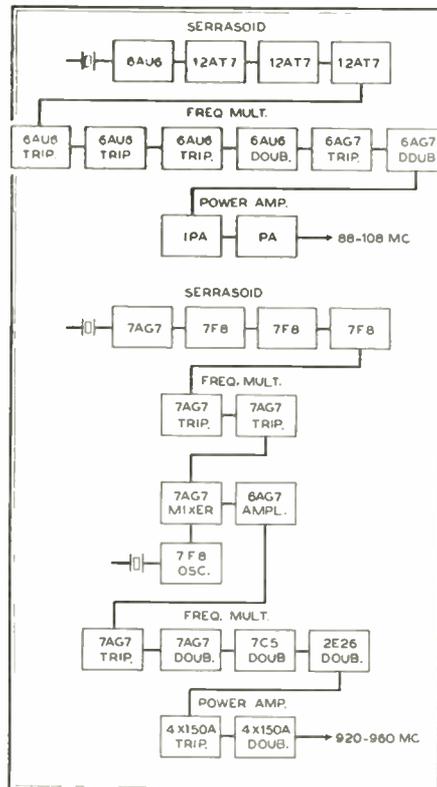


FIG. 2, above: FM broadcast transmitter Below: arrangement for STL equipment

*Director of Research, Radio Engineering Laboratories, Inc., Long Island City, N. Y.

rent in R_4 and hence in C_3 , so that the voltage rise on the latter is linear rather than exponential. In practice, this linearity is of the order of .1% of the instantaneous amplitude. Without V_4 connected to C_3 , the voltage on the latter would continue to rise linearly until the next ensuing discharge pulse, resulting in a conventional, but very linear, sawtooth wave. However, the cathode self-bias, held constant by the large capacitor C_5 from cycle to cycle, is so adjusted that grid current is drawn about half way through the charging period. Grid current stops the charging and maintains the voltage on C_3 at the cathode potential until discharge occurs, and the process is repeated. The wave at the grid of V_4 is, therefore, a truncated sawtooth. Plate current begins about 1 volt before grid current. The voltage at the plate drops steeply from the supply value to that corresponding to zero grid-cathode voltage and remains there until the next discharge pulse,

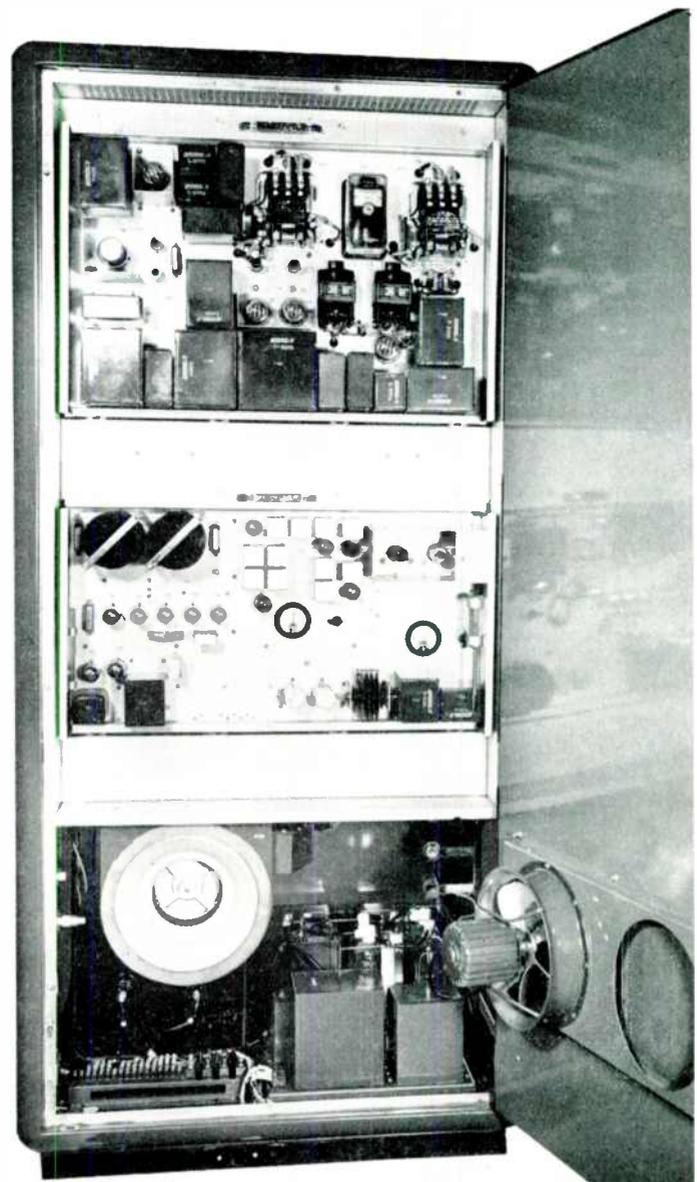
when it rises steeply again to the supply value. This voltage wave is therefore an approximately symmetrical square wave of constant amplitude.

Modulation is effected by varying the voltage at the cathode of V_4 , so that the time or phase of the start of conduction in the tube is advanced and retarded, causing a corresponding change in the time of the voltage drop at the plate. R_7 and C_5 are proportioned so that the modulating voltage delivered to the cathode is inversely proportional to frequency over the desired range of modulating frequencies. This is the familiar corrector function and network common to all phase shift type modulators. In the square wave at the plate of V_4 only the negative-going edges will have been shifted by the modulation. By differentiation in C_6 and R_8 , and by the snubbing action of the grid conductance of VV_4 , these negative-going edges are separated from the unmodulated positive-going edges. For a short time at each

negative pulse VV_4 is cut off, producing short positive pulses at the plate of constant amplitude and duration. Because the phase of these pulses has been shifted in accordance with the modulation, via the corrector, they comprise a frequency-modulated wave. By applying them to a harmonic amplifier or multiplier, a CW harmonic is produced bearing the correspondingly increased frequency deviation. At this point there are added conventional frequency multipliers to bring the signal up to the final carrier frequency.

In the version of this modulator developed for FM broadcast transmitters, the inherent noise is 80 db or more below 100% modulation in the band from 50 to 15,000 cycles, and the distortion throughout this range is less than .25% at 100% modulation. There are not the limits of performance, but correspond to a practical stage of development. The combination of ingredients essential for securing low noise and distortion in a simple

FIG. 3. Ten-watt campus transmitter, 88 to 92 mc., showing modulator in second panel from the top FIG. 4. Rear view of 1-kw. broadcast transmitter. Modulator panel is at the center of the frame



and non-critical circuit include: low-impedance circuits (including the sawtooth-straightener) throughout; exclusion of the sawtooth wave-shape as such from plate-loaded stages during conduction; termination of the sawtooth rise; maintenance of constant pulse-amplitude during modulation; avoidance of audio amplification between the corrector and modulator proper; and conversion to CW at a harmonic rather than directly at the sub-carrier frequency.

The tube types used in the circuit arrangement shown are not critical. Excellent performance has been secured with many types of sharp-cutoff pentodes for the oscillator, ranging from the 6SJ7 to the 6AK5. Double triodes used with very small performance differences in-

frequency of the modulator at a value near that for broadcast transmitters, thereby using the same design details.

Fig. 3 shows the modulator in a complete 10-watt transmitter designed mainly for the educational and campus broadcasting band of 88 to 92-mc. The Serrasoid and frequency multipliers up to 1/6 carrier frequency are in the second panel from the top, the four miniature tubes in the Serrasoid proper being in the upper right corner. In this particular case, the absence of adjustments is particularly attractive because of the likelihood of operation and maintenance by persons of limited experience, particularly in frequency modulation. Obviously, the saving in cost resulting from the use of this modulator affects the price of a small

Fig. 6 is a view of the exciter unit in the model 694 STL transmitter. The chassis comprises the modulator, some of the multipliers, the heterodyne indicated in the block diagram, and comes out at 1/48 the carrier frequency, in the order of 20 mc.

The virtual absence of distortion in the phase-shifting process points directly to use where freedom from intermodulation is important as, for example, in multiplex or multi-channel systems. This is particularly true where it is necessary to demodulate and remodulate at repeaters in point-to-point communication systems. Direct crystal control of average output frequency rounds out the picture and, in itself, insures wide use of this method of modulation.

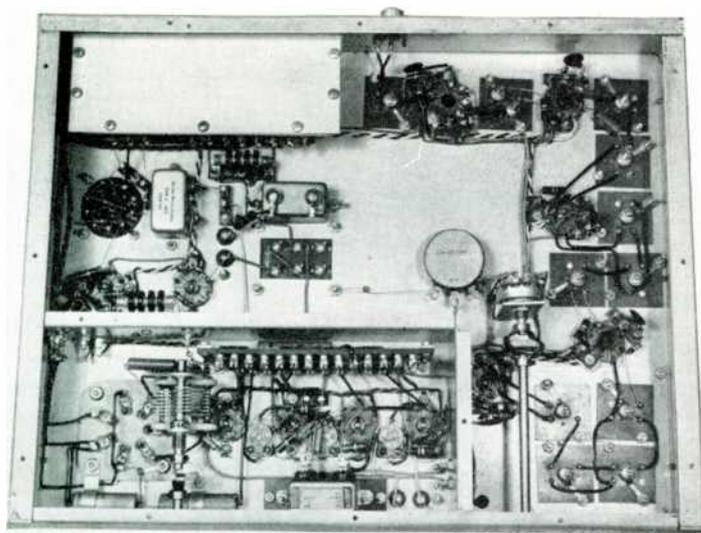


FIG. 5. Bottom view of the modulator of the 1-kw. assembly

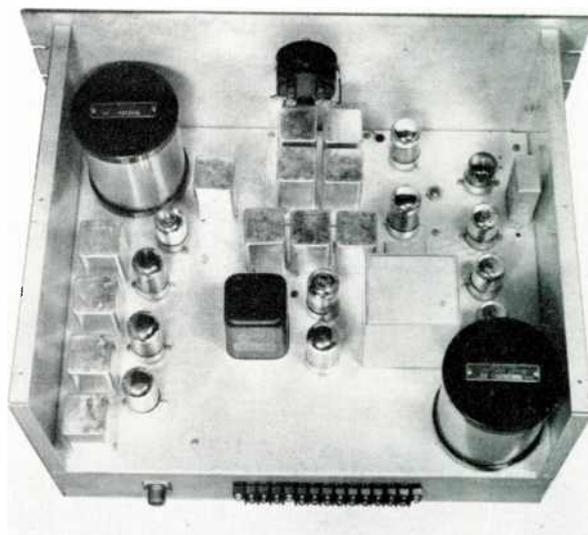


FIG. 6. Modulator section of the transmitter for STL service

clude the 7F8, 12AT7 and 2C51. The low-impedance requirement mentioned above calls for tube types of moderately high transconductance. As the result of their mode of operation, tube ageing and replacement have virtually no effect on performance. Excepting the fine control of frequency, the adjustable elements shown in the schematic are mainly used in the initial factory adjustment.

The conjunction here of simplicity with high performance indicates wide application. Block diagrams in Fig. 2 show the application of the modulator in two general classes of equipment. The upper diagram shows the arrangement in commercial FM broadcast equipment. Here the frequency multiplication is 972, and the peak phase-shift for 100% modulation is about 90°. The lower diagram illustrates the arrangement of the REL Model 694 STL transmitter for the 920- to 960-mc. band. This employs a total multiplication of 1,296 times, and a peak phase-shift of about 95° for full modulation. The heterodyne puts the starting

equipment such as this to a greater degree than that of higher-power units.

Fig. 4 is a rear view of the REL model 701 1 kw. broadcast transmitter. Here the Serrasoid and all frequency multiplication to the carrier frequency is on the hinged panel across the center of the frame. The five tubes in a row near the two crystal ovens are those of the modulator proper, including a complete standby oscillator circuit which can be switched on by a control at the front of the transmitter. In such a unit, the share of the modulator in the total cost is smaller than in the 10-watt equipment, but there is a saving due to reduced size and mechanical detail of the transmitter made possible by the modulator.

Fig. 5 is a bottom view of the model 700 modulator used as an exciter for broadcast transmitters. This panel comes out at 1/6 carrier frequency. The four tubes of the modulator section are in the shield enclosure at the lower left. The variable air capacitor is the fine frequency control.

FM BUSINESS IN 1949

(Continued from page 15)

directional antenna with every FM receiver, and who equips himself to align FM sets accurately, can do a handsome volume compared to a local competitor who limits himself to AM models. Again, the dealer located on the fringe of television service, if he drops his audio business to go all out for video, may wind up behind the 8-ball. Even the dealer who has built a substantial backlog of record business will have to watch his step, for the investment called for by three different turntable speeds makes his profit a veritable pea in a shell game. The odds may be two to one against his making the right choice. It's a safe guess that some dealers will end the year in a stronger position than they occupy now, but an even larger number won't last out the year. Much depends upon the individual dealer's ability to understand the increasing complexity of home radio equipment.

TV BUSINESS IN 1949

THIS WILL BE TELEVISION'S YEAR OF PROGRESS, WHEN TECHNICAL ADVANCES SHOULD SET THE PATTERN FOR FUTURE EXPANSION ON A NATIONAL SCALE

TELEVISION receivers, perhaps a million of them to take a conservative figure, will add enormously to the industry's total volume of sales this year. There's no assurance that they will make a proportionately large contribution to net profits except those of the components manufacturers. However, profit or no, the major manufacturers can't stay out of television. Neither can the broadcasters—if they can get CP's.

Yes, 1949 will be the television year. It will also be remembered as the year of headaches. The progress of the art has been continuous but, as a business, radio moves forward in waves, carrying some companies forward to new success, washing out others in the undertow.

Video vs. Audio Broadcasting:

No. 1 industry question of the future is the relative positions of video and audio broadcasting. Will the availability of sight and sound eliminate audio programs as an entertainment service?

Well, let's get at that question in this way: We are going to have television on a national scale. In the large cities, there will be at least four or five TV stations. It appears that that many are needed to build a sufficient audience to support metropolitan television broadcasting. These cities have varying numbers of FM and AM stations, also. Not one of those stations, TV, FM, or AM, will go off the air if it can continue to operate at a profit.

This brings the video vs. audio question down to a matter of 1) the dollars that will be spent by sponsors in a given metropolitan area, and 2) the program service rendered the public by each individual station.

If an independent AM station performs a service that holds a substantial audience, and if the station can get enough time-buyers' money to permit profitable operation, it will continue to operate. If a station duplicating programs on FM and AM can stand the expense of such an operation, there is no reason for shutting down either transmitter. The need of economy may, however, make it necessary to choose between FM and AM.

Since conditions vary widely between the large cities, it seems impossible to make any general prediction as to the future of the three types of service. The only certainties are that 1) with the added TV competition for sponsors, some audio stations will be eliminated over the

next few years, 2) all the audio stations cannot meet video competition by shifting to TV even if it should develop that channels become available, 3) a certain percentage of listeners will not be able to afford video receivers, and 4) some radio services require audio programs only.

What has been said of metropolitan broadcasting as being determined by specific local conditions applied to smaller cities and rural areas, too, but the changes will come much more slowly.

Expanded Network Operation:

Extension of AT & T's coaxial line to 1,740 route miles, plus the 370 route miles of radio relays, will eventually effect an improvement in TV programs, and a reduction in operating costs.

Effective on January 11, one circuit each way was opened between New York and Chicago. The four TV nets, ABC, CBS, Du Mont, and NBC are sharing the facilities. Original plans included cable time for WPIX, but this station withdrew for the reason that it is concerned primarily with local service.

Opinions vary as to the coaxial rates, some holding that they are excessive, and put an unreasonable burden on TV networking, and others that, although they are very high, network operations can be carried out at a good profit.

16-Mm. Film for Programs:

Here again, opinions are widely divergent. One school of thought is inclined to ignore the use of film for TV, preferring to use live talent over networks. Another favors film as a means of facilitating production, and eliminating cable costs. It has been pointed out that some programs, notably plays, will bear repeating, and that this can be done most economically with film. Also, film is necessary in the case of events having special news and documentary value.

Indifference toward film is probably due to the cost of 35-mm. equipment and film, past dissatisfaction with 16-mm. film, and the complications of adding movie techniques to production problems.

Nevertheless, 16-mm. film, with improved cameras, processing, projectors, and high-quality audio reproduction, will become an integral part of TV broadcast operations.

Upper-Band Television:

The expansion of TV to something approaching nation-wide service has run aground on the shoals of insufficient

channels, and is now awaiting arrival of UHF to get afloat again.

The need for additional channels is not a recent discovery. The inadequacy of the low band has been recognized for years, but manufacturers closed their eyes to it. They needed to make a start in TV on a scale that would justify the huge investment in research, development, design, tooling, and sales promotion. They were not prepared to tackle the upper band. So they have been doing business on the low band, trying to reach the point of profitable operation before going into the new field of upper-band broadcasting.

If manufacturers are forced into building upper-band equipment too soon, it will be a major catastrophe for some. There is a limit to capital investment in research and development. Beyond that point, further efforts must be financed from earnings. It could happen the receiver business would wind up in the hands of just a few companies. That is the case now in transmitters, and logically so, because of the high ratio of development cost to sales volume.

Various estimates have been made as to the time required before UHF television broadcasting will start, and receivers can be marketed. These estimates probably reflect company policies, and are not altogether realistic.

Here are the major problems to be determined:

How will upper and low channels be distributed geographically? RMA recommendations to the FCC follow the Du Mont plan¹ which calls for assigning low-band channels to large population centers, and giving upper-band channels to small cities and rural areas.

The new Wilmette-deMars Polycasting system² is designed for upper-band service in large cities. Although the authors of this plan have not suggested it, this might mean the use of low-band transmission in rural areas. High power and high gain from mountain-top stations could provide coverage over large areas.

Should FM or AM be used for UHF video transmitters? Wilmette and de Mars have suggested that FM should be considered. Others have rejected the idea, quoting reported results from FM-

(Concluded on page 45)

¹ "Du Mont Plan for Upper-Band TV," by Dr. Allen B. Du Mont, *FM and TELEVISION*, October, 1948.

² "Polycasting for Upper-Band TV," by Raymond Wilmette and Paul A. deMars, *FM-TV*, December, 1948.

16-MM FILM SUITABLE FOR TV

USE OF 16-MM. FILM WILL REDUCE TV PRODUCTION COSTS. THE DIFFICULTIES THAT HAVE BEEN EXPERIENCED CAN BE ELIMINATED READILY—By J. A. MAURER*

THE importance of film to the television broadcasting industry has been established beyond any question. The factor of economy represented by 16-mm. film over 35-mm. film is also of great importance, particularly at the present time when TV operators are using every means to reduce the amplitude of their red-ink operations-expense curve.

At the same time, there has been a great deal of legitimate criticism of the results obtained in practice in transmitting pictures and sound from 16-mm. film. Some have even gone so far as to question its suitability for television use. However, its abandonment now, and standardization on 35-mm. film would saddle television with great, unnecessary expense in the future if it is possible to accomplish the desired results with the smaller film.

The saving is not only in capital investment in camera equipment and TV projectors, but also in the continuing extra expense for 35-mm. negative film, prints, and processing. Also to be considered are such items as the advantages of portability, non-inflammability, reduced air express shipping weight, and reduced space requirements for equipment and film storage.

The attainment of these advantages is possible since, as will be shown in this paper, the quality obtainable with proper use of 16-mm. film is more than adequate for the needs of television. The poor results that have been experienced are the product of faulty procedures and trade conditions which can be corrected within a reasonable time and at no great expense. Most of the pertinent facts are well-known to technicians in the film industry and, if their intelligent cooperation is sought, it will prove a simple matter to effect a great improvement in the quality of broadcasts from film.

Rental Prints, Amateur Projectors:

Neither the 16-mm. prints for the rental trade nor the conventional projectors were ever intended to meet the needs of television. Both are definitely unsuited to it. Business in 16-mm. rental prints is highly competitive, with emphasis on price and not quality. Added to this is the prevailing belief that the amateur user of such prints prefers high contrast or snap in his screen results, rather than soft images which contain well-graded

detail all the way from the extreme highlights to the shadows. Optical reduction printing tends to increase contrast in any case. But many 16-mm. prints from 35-mm. originals are not made by the desirable method of optical reduction; they are printed by contact from 16-mm. duplicate negatives, and these are likely to be made from 35-mm. projection positives rather than from properly made master positives. The result, at every step, is loss of highlight detail, loss of sharpness, and the building up of contrast until even on the film that goes into the television projector the image is little better than soot-and-whitewash.

It is common practice in the 16-mm. rental-film trade to print both pictures and sound on high-speed, continuous printers, many of which are in a dubious state of adjustment and repair. As for developer control, it is liable to be almost non-existent.

But that is not the worst of the situation. Film such as has been described is used at TV studios in converted amateur projectors. The features that have been added in adapting these machines to television service enable them to produce steady pictures when the image on the film is steady, but the lens equipment is inadequate, and the sound-reproducing mechanisms cannot deliver the desired audio quality. Without sufficiently large flywheels and other mechanical filtering parts, the flutter is no better than 0.2%, and is usually worse.

Attainable 16-Mm. Quality:

All of the shortcomings listed above, both as to picture and sound quality, can be eliminated. Probably the most important single step will be the making of special prints for television showings. It must be recognized that the picture quality that gives best results in the TV projector is not what is generally considered desirable quality for screen projection. The Iconoscope tube used in the TV projection system has a relatively short tone scale. If the range of tones in the film image is greater than about 10 to 1, the higher highlights become indistinguishable from white, and the larger shadows go completely black, which is just the result we are all accustomed to seeing on TV receivers. Fig. 1 is an example of a high-contrast print which produces the almost black-and-white type of image illustrated in Fig. 2. No matter how the controls of the receiver are adjusted, an actor's face remains a blob

of white or gray, completely without modeling, while his clothes, equally lacking in detail, are black or gray.

If, as indicated in Fig. 3, the film print has a soft, well-graded image, even tending toward excessive overall grayness or flatness as judged on the motion picture screen, the tones of the picture will all come within the range that can be accepted by the iconoscope, and the image on the screen of the home receiver will have the quality of live transmission. If the set owner likes high contrast in his TV pictures, he can obtain it very easily by adjusting the contrast control of his receiver, but he still has detail available in all the tones from highlight to shadow.

This desirable result is more often obtained with 35-mm. film simply because it is the practice in the 35-mm. industry to keep the screen image somewhat less contrasty than is done in the 16-mm. amateur trade. Obviously, with proper printing facilities and controls found in the well-equipped 16-mm. film laboratory, it is easy to meet the requirements of contrast and image-density for optimum results in TV transmission.

It is now generally realized that the ability of 16-mm. film to render detail when properly handled exceeds the present requirements of television. Even when prints are made on continuous printers, assuming that they are in proper adjustment, it is easy to obtain an overall resolving power of 40 lines per millimeter in 16-mm. prints. This would correspond to a television system of 560 lines operating perfectly. But with step printers, in which the picture negative and the print are held stationary during the printing of each individual frame, the detail of the 16-mm. image would correspond more nearly to an 800-line television image.

Why, then, are images transmitted from 16-mm. film often unsharp? Principally because the projectors are still equipped with the inadequate, low-cost lenses made for sale in the mass market. These lenses, without exception, have the defect of severe curvature of field, which makes it impossible to focus the center and the edges of the picture at the same time. Usually the best that can be done is to compromise by focusing somewhere between the two extremes. Under this condition, the sharpness of the image may be degraded to the point where it is equivalent only to about 300-line television.

Fortunately, very much better 16-mm.

*President and Chief Engineer, J. A. Maurer, Inc., 37-01 31st Street, Long Island, City 1, N. Y.

Fig. 1. A 16-mm. print with typically excessive contrast produces this appearance on a motion picture screen. Fig. 2. Same print used for TV gives this type of image, with almost complete loss of highlight and shadow detail. Fig. 3. Appearance on a motion picture screen of a print having the soft quality required for TV transmission. Received image will retain a full scale of tones

projection lenses are just becoming available.¹ These lenses are well designed adaptations of the types used in good motion picture theatre projectors. They cost several times as much as ordinary lenses, but they are more than worth the difference. Installation of these lenses in existing TV projectors is an easy and comparatively inexpensive way of obtaining a major improvement in transmitted picture quality.

Sound Track Reproduction:

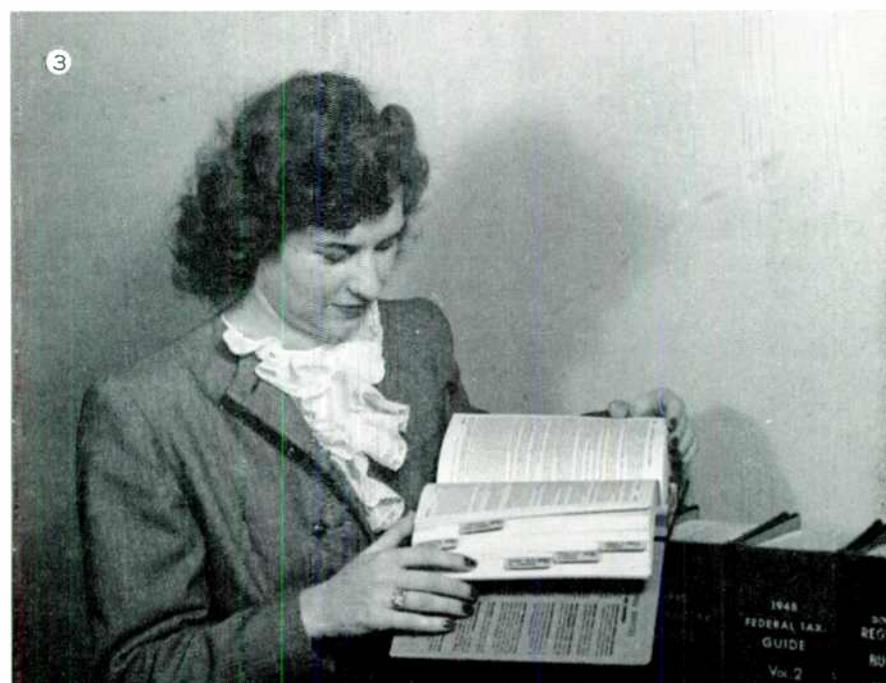
As the writer has explained,² 16-mm. motion picture film is not limited to low- or even medium-fidelity sound, but can handle a flat frequency range of at least 10,000 cycles. As a matter of fact, the equipment now being used by one of the major broadcasting networks for tele-transcription recording is down only 6 to 7 db. at 12,000 cycles! Noise and distortion are low enough to fully justify the use of this wide frequency band.

Those who have not heard this type of 16-mm. record will probably find it hard to understand that such performance is possible, in view of the fact that practically all 35-mm. motion picture sound is limited to an 8,000-cycle range. This limitation, however, is a matter of established practice and standardization in the motion picture industry, and is in no way a physical or technological limitation. It would be no great feat today to record 20,000 to 25,000 cycles on 35-mm. film traveling at the standard speed of 90 ft. per minute. The motion picture industry standardized the frequency response of theater equipment some 14 years ago at the 8,000-cycle level of quality, and the leaders of the industry today are still convinced that there is no public demand for a wider range in the theaters.

Because of the same economic factors which have tended to hold down the quality of 16-mm. rental prints, the engineering of 16-mm. amateur projectors has tended to aim at approximately a 5,000-cycle standard of quality. This situation, in turn, has tended to discourage efforts to produce films capable of delivering higher quality. Nevertheless there are many 16-mm. films available

(Concluded on page 25)

¹The new lenses referred to are made by Bausch & Lomb Optical Co., Rochester, New York; Kollmorgen Optical Corp., Brooklyn, New York; and The Perkin-Elmer Corp., Glenbrook, Connecticut. ²"30-10,000 Cycles on 16-Mm. Film" by J. A. Maurer, *FM AND TELEVISION*, October, 1948.



SPOT NEWS NOTES

NOTES AND COMMENTS ABOUT SIGNIFICANT ACTIVITIES OF PEOPLE & COMPANIES

TV Sound Reception:

Watching TV programs, we become increasingly critical of the audio end of most receivers. We are unhappy when the image shows that a human being is singing, but the sound doesn't confirm what we see. Also, the picture shows perspective, but the sound doesn't follow the movement. Maybe, when we go to the upper band, provision should be made for binaural audio reception. It would certainly add a dimension of realism now lacking.

Spring IRE-RMA Meeting:

Fourth annual Spring Meeting will be held at the Benjamin Franklin Hotel, Philadelphia, April 25 to 27. Annual banquet will be on the evening of the 26th. Virgil M. Graham, director of technical relations for Sylvania, is the chairman.

Radio Noise Locator:

Small portable unit has been brought out by Eltron, Inc., Jackson, Mich. Using a hand-held loop, interference can be located readily from such sources as power lines, fluorescent lights, insulation leakage, and electrical appliances.

FM Transmission Quality:

All FM transmitters are designed to meet the same performance standards, but there is a surprising difference in signal quality. This is noticeable in areas where two stations can be heard with the same network program. Either some transmitters are basically defective, or the operators are indifferent to distortion and excessive noise level.

New Radio Plant:

DuMont is setting up operations in the former Wright plant at East Paterson, N. J. The one-story structure, of 500,000 square feet, will be used for TV set production, general offices, and engineering laboratories. About 4,000 people will be employed in this building when operations are in full swing.

Future of Campus Broadcasting:

Franklin Dunham, U. S. Office of Education, writing on FM in *Nation's Schools*: "I have said constantly that a school without a radio receiver is an educational tragedy. Might I not be able to say five years hence that a school without a broadcasting system is, to put it mildly, out of step with progress?"

Vitreous Enamel Capacitors:

Following negotiations with DuPont and the Signal Corps, Sprague Electric has

acquired an automatic machine for the production of vitreous enamel capacitors. This machine, under development by DuPont and Remington Arms, was completed during the war for the Signal Corps, when mica was in such short supply. It will be used by Herlec Corporation, a wholly-owned Sprague subsidiary.

It's All Different Now:

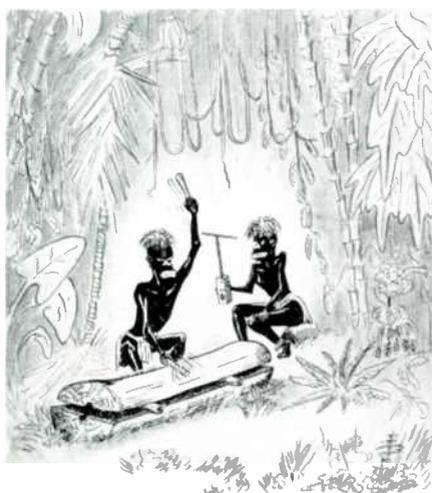
Ross Siragusa, president of Admiral Corporation: "Entry into television is much different than it was years ago in audio receiver manufacturing, when all one needed were some parts, a few small tools, and a skill to put things together. For instance, back in 1934 the forerunner of the present Admiral Corporation was started in the radio business on a capital of \$3,400, and a tooling cost of less than \$1,000. To become a television manufacturer was a different story. Over a million dollars were spent on special testing and electronic equipment before Admiral stepped into television with its technique of mass production in February, 1948. In less than a year's time, Admiral has become one of the nation's top three producers."

2-Way Radio for Trolley Cars:

Tests of 2-way radio for trolley cars are under way by the Philadelphia Suburban Transportation Company. Operating with 12 supervisory and emergency vehicles, results in eliminating traffic jams and expediting service have been so successful that new trolleys now on order will be equipped for radio communication.

Sets in Use in England:

British Broadcasting Company figures as of last August show 11,234,500 licensed audio receivers and 58,250 TV sets.



New Plant in Brooklyn:

Polytechnic Research & Development Company, formerly at 66 Court Street, has moved to larger quarters at 202 Tillary Street, Brooklyn. Head of this concern is Dr. H. S. Rogers, president of the Polytechnic Institute of Brooklyn. F. J. Gaffney is technical director.

Edward L. Sellers:

Appointed executive director of FMA. Since 1937, he has been engaged in public relations work, with time out for service as a lieutenant in Navy aviation. For the past year and a half, he was AP radio editor, and representative for the AP Washington City News Report. One of his first undertakings will be to set up plans for the 1949 FMA conference at Hotel Sheraton, Chicago.

New TV Receiver Models:

A definite change in TV receiver designs and prices is indicated by three models just announced by RCA. First, they all have 16-in. picture tubes, giving a direct image $13\frac{5}{8}$ by $10\frac{1}{4}$ ins. Second, two of the cabinets are mounted on legs, thereby raising the tube to a more comfortable viewing level. Finally, the prices reflect the trend toward making big-tube receivers available at lower prices. Recommended price of the table model is \$495, while the other two are listed at \$550 and \$595.

Reorganization:

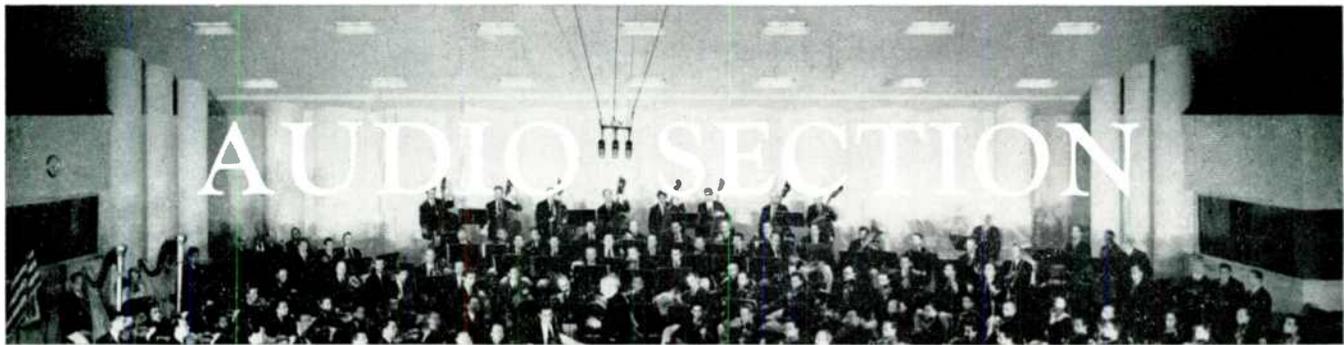
Isolantite, Inc., one of the pioneer manufacturers of steatite and porcelain insulators and components, has been reorganized and is now operating at Warren Street, Lyndhurst, N. J. Officers are Frank J. Stevens, president; Paul H. Mouraud, vice president and treasurer, and John Sisons, secretary.

Col. Grant A. Williams:

Has joined IT & T and will be in charge of the Company's interests in the Middle East, making his headquarters at Cairo. Col. Williams came up through the cavalry to become Signal Officer of the 1st Armored Division. A strong advocate of the use of FM, he contributed much to the development of communications equipment for the tanks. He had an active part in the invasions of North Africa, Sicily, and Normandy.

More Glass-Metal TV Tubes:

Rauland Corporation, tube manufacturing subsidiary of Zenith Radio, has started production on big-picture tubes of the glass-metal design. These will be used for Zenith type C sets.



AUDIO DEVELOPMENTS

OBSERVATIONS ON THE QUALITY OF RECORDS MADE
HERE AND OVERSEAS—By HERMON HOSMER SCOTT*

AMONG people who enjoy fine recorded music, English phonograph discs have always held a degree of popularity incomprehensible to the average American dealer or manufacturer. This is not due merely to the appeal of something which is rare or imported. It is the end result of the attitude and policies of the English phonograph industry, which are notably different from those prevailing in the United States.¹

One reason for this difference is the fact that the phonograph itself has always been taken much more seriously as a cultural medium in England. Another is perhaps the natural British conservatism. While American companies, since the development of electrical recording, have experimented widely with various turnover frequencies, pre-emphasis, and other variations of recording characteristics, principally in an effort to minimize surface noise, the English have attacked the problem in another manner. Relying mainly on manufacturing techniques and materials to keep surface noise at a minimum, their recording engineers have concentrated on clarity, smoothness, and naturalness of reproduction.

The quality of British recordings, therefore, have improved gradually but consistently, while the products of our domestic companies have varied widely in the course of experimenting with different recording characteristics. This explains the necessity for altering tone adjustments from one record to another, particularly when using records of different U. S. manufacturers.

As a practical matter, the phonograph industry outside of the U. S. A. is largely dominated by Electric & Musical Industries, Ltd. of England, and its many subsidiaries. Together, they have

many of the characteristics of a monopoly. The most famous of these subsidiaries are the Gramophone Company Ltd., which manufactures under the trade name "His Master's Voice" and is allied with the domestic RCA Victor Company; and the Columbia Graphophone Company, Ltd., which is similarly associated with the domestic Columbia Company. Others are Parlophone, Odeon, Regal-Zonophone, Pathe of France, and Electrola of Germany. Through exports and subsidiaries, this group of companies dominate the world phonograph markets outside of the U. S. A.

Some excellent disc recording has been done in America and has been demonstrated many times. It remained for the British, however, to produce the first consistently high-quality, home-type phonograph discs on a commercial scale. The so called Extended-Range recording of the E. M. I. group is a relatively new development, having been announced just after the war. In this process, frequencies up to 20,000 cycles are now engraved upon the records. While commercial pickups, speakers, and other components do not reproduce such a wide range satisfactorily, the presence of this range on the records affords a noticeable improvement even in narrower-range systems, particularly with regard to the reproduction of transients. It is interesting to note, incidentally, that the general type of recording characteristics, now practically standard in England, coincide very closely with those determined upon entirely independently by some of the leading authorities in America, but not yet used commercially here.

Unfortunately, imported phonograph records are not widely distributed in the U. S. A., with the exception of the Decca FFRR and the London discs. In many cases, these were the first records to give American listeners any idea of what can be accomplished with ordinary home-style discs. Generally, the trade setup

operates to discourage exportation of records to this country.

Since records and phonographs must be designed to work together, the engineering policy on one must necessarily be reflected in the other. The average British phonographs are more conservatively designed, and more carefully manufactured than the comparable American products. In spite of lower dealer discounts, they sell for higher prices, but the owners expect to use them for a longer time. The British phonograph industry is also working against tremendous odds in the form of high purchase taxes (as much as 100% on some items) and the requirement that a large proportion of the products must be exported.

British records have less pre-emphasis than American records, although the actual recorded frequency range is greater. The result is that the inherent noise level is higher if a wide frequency range is properly reproduced, and this is only partially offset by the use of better record materials. In this connection, it is interesting to note that Electric & Musical Industries, Ltd. and their affiliated companies in the British Empire have recently adopted the Dynamic Noise Suppressor as a means of reducing background noise.

Since the pickup stylus can track the recorded high frequencies more cleanly without excessive pre-emphasis, the high frequency reproduction from such records is notable for its clarity. Furthermore, the absence of extreme amplitudes at high frequencies reduces the destructive vibratory forces set up between the stylus and the groove, thus increasing record life. To take full advantage of the quality of these records, exceptionally good reproducing equipment is required.

English manufacturers are producing excellent pickups and speakers. They design their amplifiers and associated equipment on a very conservative basis, aiming at long life and freedom from obsolescence.

British companies are still the most consistent source of the high-grade phonograph discs. If you haven't heard the best English records, you will be well rewarded for any trouble you may have getting them.

*President, H. H. Scott, Inc., 385 Putnam Ave., Cambridge 39, Mass.
¹EDITOR'S NOTE: Mr. Scott writes from personal observations made during a recent trip to England and the Continent.

RECORD STANDARDS ARE SCUTTLED

INTRODUCTION OF RCA'S 45-RPM RECORD SERIES CALLS FOR PROMPT ADOPTION OF UNIVERSAL STANDARDS TO HEAD OFF UTTER CHAOS— *By* LAWRENCE OLDS*

IF you had any idea that 10- and 12-in. records, turning at 33 1/3 RPM, would be the new industry standard, you can forget about it. As of now, there isn't any standard disc diameter, speed, or spindle size.

The signals were called in this way: Following Columbia's introduction of 10- and 12-in. long-playing records, it became known that RCA was readying something new, as the writer reported last month. Before RCA was prepared to make any official announcement, however, Columbia released a new series of 7-in. L.P. records. This must have forced RCA's hand for a week later, on January 11, RCA invited the press to see and hear what was described as "not only a new phonograph and record, but an entirely new system of reproducing recorded music."

Elements of the "new system" are pictured here. One is a series of very thin 7-in. vinylite records with a 1 1/2-in. spindle hole and a thick center collar that keeps the playing surfaces from rubbing one another when the records are stacked. Playing time is up to 5 1/4 minutes on each side. Second element of the system is a small, fast-action changer that holds eight records. Tone-arm pressure is 5 grams.

Said Edward Wallerstein, board chairman of Columbia Records: "We are unable to fathom the purpose of the records revolving at 45 revolutions per minute. . . . We do not see what additional advantages a 45-RPM record can offer to compensate for the unfortunate conflict it appears to be creating in the minds of both the public and the industry."

To this observer, it appears that this most unfortunate conflict and confusion is the result of failure on the part of the two leading record manufacturers to join forces and, in the public interest, arrive at a new universal standard. This assumes, of course, that there are genuine advantages to be gained by abandoning the old standard which has been in use for 50 years.

Unquestionably, there is an advantage in putting more playing-minutes on a record. There's even much to be said for the 7-in. size. The idea of coordinating the physical dimensions of the records with record-changer design merits universal approval. The best changers have been pretty makeshift affairs.

But what could have proved a boon

to everyone has wound up as a dog-fight between RCA and Columbia, with the public, the dealers, and the equipment manufacturers caught in the cross-fire.

It's the writer's personal opinion that the 7-in., 45-RPM discs aren't the last word from RCA. They will have to add 10- and 12-in. records. Increased spindle size should simplify the design of changers for the larger records, also. In that case, the public may be won over to 45-RPM operation, and this could become a universal standard, eventually. Time may show that Columbia was right in going to longer playing time, but short-sighted in not relating that project to the improvement of changer design.

Performance of the new RCA records, as far as could be judged from a single demonstration, was really excellent. It seemed that the material and the method of recording, or both, contributed to improved reproduction. That is difficult to judge critically in a few minutes' listening. Accurate comparison requires familiar surroundings. Needle scratch seemed practically non-existent, but this may

have been due in part to high ambient noise.

J. G. Wilson, executive vice president of RCA, in charge of the RCA Victor Division, called the small 45-RPM records an "evolutionary advance," adding, "We firmly believe that the market for conventional 78-RPM records will not be seriously affected immediately, but will continue strong for many years to come." On that point, the writer has found sharp disagreement in the limited time that there has been to make inquiries. Introduction of a third playing speed is nothing less than a revolution to radio-phonograph manufacturers. It may be a signal for dealers to dump their stocks of 78-RPM records. As for the high speed turntables and changers, who will make or buy any more of them? Altogether, it looks as if a business that hasn't been doing any too well is going to do very much worse. If it ever recovers, it will be some time after the industry has settled down again to a single standard not only of physical dimensions but of recording techniques.



RCA's 45-RPM records with 1 1/2 in. hole and the new changer to play them

16-MM FILM FOR TV

(Continued from page 21)

at the present time which can be reproduced at a quality standard practically equal to that of normal 35-mm. film. Such films can be produced either by direct 16-mm. recording or by optical reduction from 35-mm. negatives, provided the latest types of equipment are used. Earlier equipment, much of which is still in use, will in general give unsatisfactory performance.

Wide Range Equipment:

In order to obtain high-quality reproduction of 16-mm. sound tracks in TV studios, the projectors now in use must be modified in several fairly obvious respects. The use of larger flywheels, careful attention to the quality of sound-shaft bearings, close limits as to concentricity of all rollers over which the film passes, and the addition, in some cases, of damping mechanisms to prevent the building up of oscillatory motions in tension idler arms are measures which can reduce the projector's contribution to flutter to less than 0.1%.

Optical reproducing systems which now give scanning images about .00075-in. wide must be replaced with systems designed to give .0004-in. images. This involves no new technical development; it is simply a matter of appropriate optical engineering. The necessity of this change can be judged by the fact that the .00075-in. image fails completely to reproduce a recorded frequency of 9,500 cycles, at which point the attenuation is substantially infinite, while the narrower image will reproduce satisfactorily to at least 12,000 cycles. In most cases, this change of optical system will make it necessary to replace the exciter lamp with one requiring more current than the conventional type. A satisfactory power supply for the larger lamp can be constructed easily by the use of a dry-disc rectifier and a straightforward choke and condenser filter. The final change required is to connect the photocell to the audio amplifying system by the type of coupling circuit used in 35-mm. film reproducers.

In order that the television audience will not be aware of deterioration in sound reproduction when the program changes from live talent to film, it is essential that sound-on-film transmission approximate live-talent quality. If the new techniques are employed for preparing the film,³ and if the sound reproducing mechanism of projector is improved as outlined here, such performance can be obtained from 16-mm. film.

³See "Optical Sound Track Printing" by J. A. Maurer, *Journal of the Society of Motion Picture Engineers*, May, 1948.

FM COMMUNICATIONS

FIGURES ON SYSTEMS NOW OPERATING EMPHASIZE THE URGENT NEED OF MORE FREQUENCY CHANNELS

DURING 1948, mobile communications outgrew its postwar pants, and is now struggling along in a state of restriction and discomfort. This situation was predicted freely in 1945, but warnings from communications engineers did not make much of an impression on the FCC Commissioners. That seems a long time ago as radio moves, but we still remember that talk outside the hearings indicated that some of the witnesses were asking for channels they hoped they would need.

That the FCC was not more generous in providing channels is probably explained by the fact that there has been a tendency among many of the services, including the Government, to claim the need for more than is actually required.

We hoped to report the final decisions on new allocations, rules, and standards proposed by the FCC on June 11, 1948. However, no official announcement has been released. The urgent need for revisions is indicated by the following figures on the number of mobile units in operation on June 30, 1948:

Police	32,166
Fire	1,283
Forestry	4,757
Special Emergency	378
Highway Maintenance	345
Railroad	1,056
Transit Utility	796
Power Utility	10,210
Petroleum Pipeline	340
Taxis, Common Carriers.....	46,216
	<hr/>
	97,547

Since last June, this total has climbed far beyond the 100,000 mark. If, as expected, a substantial number of additional channels are provided for the safety and special services, the number of mobile units in operation should total more than 150,000 by the end of 1949.

The largest growth last year was in the taxicab group. A substantial further increase is indicated by FCC plans to increase the two present channels to eight. Next in rate of expansion are the public utilities. Systems in this group nearly doubled in '48 over 1947.

Figures given here do not include common carrier mobile service provided by the Telephone Company. Here, too, great progress has been made. The Bell System, at the end of August 1948, was providing urban service in 60 cities to about 4,000 mobile units, making some 117,000 calls per month. Six 2-frequency channels in the 152- to 162-mc. band are used.

Bell System highway service has 85 fixed stations handling about 36,000 calls a month with 1,900 mobile units. These cover highways from New York to Boston, Washington, and Albany-Buffalo, and many highways in Michigan, Illinois, Wisconsin, Kansas, Oklahoma, Texas, Arkansas, Missouri, and Minnesota. Also, 3 stations are being operated in Oregon, and 9 are under construction in California.

The most accurate picture of what is taking place can be obtained by comparing the listings in the Communications Directory Part 2 which appeared in our January, 1948 issue with the listings for the same services on the pages following.

INFORMATION ABOUT THE DIRECTORY

By permission of the Federal Communications Commission, this Communications Directory is revised and new listings are added once a year. The work is done directly from the FCC files, thus assuring the maximum degree of accuracy.

As far as possible, we have shown the mail addresses for the control point of each fixed or headquarters station. Where the name of the state does not appear after the name of the city in lists of fixed stations comprising one system, the state is the same as is listed above.

The number preceding the call letters shows the number of mobile units operated by the entire system.

Call letters are given for each fixed station. In many cases, different call letters are assigned to the mobile units. These are omitted because of space limitations.

Similarly, the frequency, in megacycles, is only shown for the fixed stations.

Unless the frequency numbers are followed by an asterisk, the system operates on FM. An asterisk indicates AM operation. So few now employ AM that we have discontinued the practice of indicating the method of modulation of each system.

SPECIFICATIONS

An added feature of the Directory section is the specifications data on all types of fixed and mobile communications equipment. Arranged in alphabetical order by manufacturers' names, this information covers all essential features of transmitters and receivers of current designs.

COMMUNICATIONS DIRECTORY, Part 2

LISTINGS OF SYSTEMS OPERATED BY TAXICABS, PUBLIC UTILITIES, LIMITED COMMON CARRIERS, AND SPECIAL SERVICES. CORRECTED TO JANUARY 1, 1949

TAXICABS

A & A Cab Co Scottsbluff Neb 17th & 1st Av 15 WXPC 152.27	AA Radio Taxi Mt Vernon NY 39 Prospect Av W2KKC 152.27	AA Taxi Inc Highland Park NJ 80 Hartian Av 10 W2XXG 152.27	A & A Cab Co Oklahoma City Okla 706 NW 2nd St 100 W5XDG 152.27	AA Cab Co Oshkosh Wisc 238 1/2 Main St 8 W9XCS 152.27	A-1 Cab Independence Mo 40 W Lexington Av 10 WKKL 152.27	A-1 Taxi Co Mt Vernon NY 428 Highland Av 25 W2XCV 152.27	Abbey Taxi Service Ridgefield NJ 1155 Hendrks Causway 5 W2XEU 152.27	ABC Taxi Co Allen Texas 1414 Austin Av 15 K5SBV 152.27	Ace Cab Co Fort Collins Colo Northern Hotel 8 WKKL 152.27	Ace Checker Cab Santa Barbara Calif 27 1/2 E Victoria 10 W6XPC 152.27	Ace Taxi Co Oxnard Calif 231 S Oxnard Blvd 12 W6XUK 152.27	Ace Cab Co Bremerton Wash 3002 Preble St 15 W7XLY 152.27	Ace Cab Co Calumet City Ill 19 W State St 8 W9XTC 152.27	Acly's Hack Beloit Wisc 702 W Grand Av 6 W9XCW 152.27	Acme Cab Co Kennett Mo 308 First St 7 WXSJ 152.27	Acme Cab & Baggage Co W Palm Beach Fla 100 First St 16 W4XNF 152.27	Acme Cab Blackwell Okla 122 W Bridge St 10 W5XVU 152.27	Ada Cab Co Ada Okla 409 E Main 10 K5XBQ 152.27	Adam's Taxi Randolph Maine 39 Central St 5 W1XNU 152.27	Aero Cab Co Waterloo Ia 911 Sycamore St 10 WXEW 152.27	Aero Enterprises Cedar City Utah 120 N Main Box 270 4 W7XSM 152.27	Airline Cab Co Raleigh NC 216 W Morgan St 30 W4XHY 152.27	Alaska Cab Co Ketchikan Alaska P O Box 78 8 W7XPE 152.27	Juneau Alaska 25 K7XPS 152.27	Alexandria Ind Taxi Owners Corp Alexandria Va 111 Daingerfield Rd 50 W4XRP 152.27	Alhambra City Taxi Alhambra Calif 36 N Garfield 15 W6XDP 152.27	Allen's Taxi Ocean NY 109 E Sullivan St 8 W2KWZ 152.27	Allen's Taxi Bartow Fla 365 E Main St 12 W4XWY 152.27	Allied Cab Co Springfield Ill 923 E Washington 45 W9XOW 152.27	Al's Taxi Lacomia NH 54 Walker St 3 W1XNL 152.27	Al's Taxi Kittery Maine 138 State Rd 5 W1XOB 152.27	Al's Taxi Gardner Mass 1 Oak St 10 W1XQJ 152.27	Al's Taxi Hudson Falls NY 190 Main St 5 W2XWU 152.27	Al's Taxi Auburn Wash 319 J St SE 5 W7XQO 152.27	Altoona Cab Co Altoona Pa 1828 Union Av 5 W3XPH 152.27	Altoona Yellow Cab Co Altoona Pa Pa RR Station 10 W3XLD 152.27	Amboy Taxi Co Perth Amboy NJ 285 Elm St 5 W2XND 152.27	Ambridge Taxicab Co Ambridge Pa 397 Maplewood Av 8 W3XSX 152.27	810 Glenwood Av 10 W3XQV 152.27	American Taxi Inc Perth Amboy NJ 174 New Brunswick 10 W2XCX 152.27	Anderson Taxicabs Sharon Pa 35 S Main 8 W3XZU 152.27	Andrews Taxi & U-Drive-It Co Inc Rome Ga 527 Broad St 20 W4XDU 152.27	Andy's Taxi Linden NJ 2 No Wood Av 4 W2XOC 152.27	Anna Cab Anna Ill 112 E Vienna 15 K9XAC 152.27	Ann Arbor Taxi & Trans Co Ann Arbor Mich 203 Frite Bldg 25 W6XBC 152.27	Ann Arbor Veterans Cabs Ann Arbor Mich 314 Detroit St 30 W8XGM 152.27	Antioch Cab Co Antioch Calif 3rd & H Sts 8 W6XYU 152.27	Appleton Yellow Cab Co Appleton Wisc 212 N Appleton St 20 W9XYW 152.27	Arcade Taxi Inc W Palm Beach Fla 100 First St 10 W4XPM 152.27	Arlington Yellow Cab Co Inc Arlington Va 3108 10th Rd N 25 W4XWA 152.27	Arpa Cab Co Pasadena Calif 753 E Green St 10 W6XYO 152.27	Arrow Cab Co Kirkwood 22 Mo 140 Saratoga Av 10 W3XJ 152.27	Arrow Cab Inc Eau Claire Wisc 316 Wisconsin St 14 W9XBP 152.27	Arrow Taxi Chippewa Falls Wisc 13 Bay St 5 W9XGB 152.27	Arrow Taxi Ambulance & Wrecker Service Puyallup Wash 201 W Main 7 W7XBS 152.27	Arrow Taxi Co Lowell Mass 405 Middlesex 8 W1XNW 152.27	Ashland Taxi Co Ashland Ohio 280 E Main St 10 W8XKN 152.27	Ass'n of Independent Taxi Operators Inc Baltimore Md 2825-35 Greenmount Av 302 W3XCE 152.27	Astor Cab Co Cumberland Md 129 S Mechanic 30 W3XJB 152.27	Atlanta Vets Trans Inc Atlanta Ga 166 Garnett St SW 50 W4XYP 152.27	Auburn Cab Co Auburn Ala 112 Tichnor Av 15 WXRN 152.27	Austin Cab Co Austin Minn 405 1/2 N Chatham 15 WXRN 152.27	Austin's Taxi Service Wayne Mich 3505 Mich Av 30 W8XVS 152.27	Babe's Taxi Ft Lee NJ 106 S Bedford St 10 W2XKB 152.27	Badger Cab Co Madison Wisc 16 S Bedford St 28 W9XFG 152.27	Bailey's Taxi Co Thomaston Ga 106 S Church 20 W4XGL 152.27	Banty's Cab Co Jacksonville Texas 838 Brown 3 K5XZD 152.27	Barbeton Cab Co Barbeton Ohio 108 Thrd St 8 W8XKF 152.27	Barnes-Dwice Co Eldorado Kans 120 N Main St 4 WXES 152.27	Baron's Taxi Marshall Mo 123 N Salt Pond St 15 WKKN 152.27	Barnett Taxi Service Salem Va 312 E Main 8 W5XHM 152.27	Barnette & Barnette Minden La 112 N Broadway 15 W5XQJ 152.27	Batchelor Taxi McRae Ga 8 W4XWJ 152.27	Bay City Taxicab Co Bay City Mich 306 Saginaw St 40 W8XYC 152.27	Bay Motor Service Inc Bay City Mich 623 Saginaw St 10 W8XWB 152.27	Bay Shore Taxi Service Bay Shore NY 90 Park Av 10 K2XAS 152.27	Beachel Taxi Service Milton Pa 49A Bway 10 W3XJP 152.27	Beaumont Hotel Co Inc Green Bay Wisc 201 Main 14 W9XVE 152.27	Bedford Taxi Service Bedford Ohio 656 Broadway Av 15 W8XSA 152.27	Bel Cab Chester Pa 18 E 8th St 10 W3XHQ 152.27	Bell Cab Service Hickory NC Rte 2 12 W4XID 152.27	Bell Cab Co Gulfport Miss 1320 27th Av 10 W5XKU 152.27	Belleville Cab Co Belleville Ill 102 N Illinois 8 W9XQT 152.27	Bellevue Taxi Roslindale Boston Mass 329A Belgrade Av 6 W1XRF 152.27	Bellingham City Taxi Bellingham Wash 900 Cooper Av 8 W7XPM 152.27	Belmore Taxi Service Marquette Mich 215 S Front 8 W8XPG 152.27	Peter Edward Bender Saginaw Mich 217 S Wash Av 20 W8XWJ 152.27	Benwood Taxi Co Effingham Ill Hotel Benwood 6 W9XTY 152.27	Berry Cab Co Salem Ohio 140 N Elsworth Av 4 W8XNJ 152.27	Better Cabs of Evanston Evanston Ill 1812 Hartrey Av 20 W9XQJ 152.27	Beverly Taxi Co Beverly Mass 254 Cabot St 8 W1XKA 152.27	Bill's City Taxi & Sightseeing Co Boulder Colo 8 WXIK 152.27	Bill's Taxi Lake Placid NY 111 Main 6 W2XKZ 152.27	Bill's Taxi Moscow Idaho 515 S Main 7 W7XQC 152.27	Billy's Cab Co Lexington Mo 4th & Main 20 WKXH 152.27	Binghamton Taxi Co Inc Binghamton NY 164 State 50 W2XDG 152.27	Birmingham Vets Cab Co Birmingham Mich 1351 Ruffner 8 W8XRT 152.27	BKW Coach Line Sunbury Pa 24 South 4th 10 W3XJR 152.27	Black & White Duluth Cab Co Duluth Minn 14 E 1st 17 WFXC 152.27	Black & White Cab Jefferson City Mo 220 1/2 Madison 20 WXOT 152.27	Black & White Taxi Service Utica NY 321 Main 20 W2XTB 152.27	Black & White Cab Co Lakeland Fla 201 S Tennessee 20 K4XAM 152.27	Black & White Cab Co Dalton Ga 124 Gordon 20 W4XCU 152.27	Black & White Cab Co Texarkana Tex 317 Main 25 W5XJD 152.27	Black & White Cab Co Ft Smith Ark 23 N 9th 41 W5XLC 152.27	Black & White Inc Little Rock Ark 113 N Main 20 W5XPJ 152.27	Black & White Cab Co Spokane Wash W 304 Sprague Av 51 W7XJE 152.27	Black & White Cab Co Boise Idaho Hotel Boise 20 W7XLW 152.27	Black & White Cab Co Port Townsend Wash PO Box 193 10 W7XSE 152.27	Black & White Cab Co Pendleton Ore 21 SW Emigrant 4 W7XUW 152.27	Black & White Cab Co Bellingham Wash 100 E Chestnut 11 W7XWA 152.27	Black & White Cab Co Inc Parkersburg W Va 328 7th 10 W6XHG 152.27	Black & White Cab Co Highwood Ill 313 Waukegan Av 10 W9XBG 152.27	Black & White Cab Co Terre Haute Ind 434 N 7th 30 W9XFU 152.27	Black & White Cab Co Merrill Wis 609 Chippewa 5 W9XGM 152.27	Black & White Cab Co Lake Forest Ill 780 Bank Lane 6 W9XQM 152.27	Black & White Cab Co East St Louis Ill 417 Ill Av 14 W9XZZ 152.27	Blackstone Taxi Co Marquette Mich 903 N 3rd 10 W8XUS 152.27	Blair Taxi Co Hollidaysburg Pa 119 Allegheny 4 W3XMH 152.27	B-Line Taxi Oneonta NY 41 Chestnut St 7 W2XXC 152.27	B-Line Taxi Prairie Du Chien Wis 100 S Beaumont Rd 4 W9XXS 152.27	Bloomfield Cab Co Bloomfield NJ 555 Bloomfield Av 15 W2XQH 152.27	Blue-Bird Taxicab Corp New Rochelle NY 281 North Av 40 W2XDY 152.27	Blue Bird Cab Co Ocean Ny 112 N Barry 10 W2XYA 152.27	Blue Bird Taxi Co Inc Asheville NC 64 S Lexington Av 30 W4XQK 152.27	Blue Bird Taxi Inc Greensboro NC 229 E Sycamore 30 W4XQY 152.27	Blue Bird Cab Co Inc Winston-Salem NC 225 N Trade 100 W4XRR 152.27	Blue Bird Cab Co Inc Lynchburg Va 402 Victoria Av 30 W4XVL 152.27	Blue Bird Cab Co Inc Beloit Wis 159 1/2 W Grand 6 W9XIF 152.27	Blue Grass Taxi Garage Co Danville Ky 212 Main 20 W4XEF 152.27	Blue & Gray Cab Co Miami Fla 31 NW 8th 128 W4XHV 152.27	Blue & Gray Cab Co Corpus Christi Tex 2001 N Water 55 W5XIR 152.27	Blue Line Taxi Casper Wyo 28 S Center 7 W7XPB 152.27	Blue Line Cab Service Wis Rapids Wis 920 W Grand Av 7 W9XTQ 152.27	Bob's Checker Cab Co Pensacola Fla 240 N Palafox 16 W4XDH 152.27	Boo's Taxi Co Morgan City La Laurel & Levee Rd 10 K5XAN 152.27	Boss Taxi Service Gowanda NY 97 E Main 4 W2XDR 152.27	Boston Cab Co Boston Mass 51 Symphony Rd 90 W1XDG 152.27	Boulder Cab Co Burlington Wis 558 Washington 3 W9XUV 152.27	M J Bowen Newport Vt 160 Lake 3 W1XEO 152.27	C W Boyce Monroe La 200 Hall 10 W5XQQ 152.27	Boynott Cab Co Milwaukee 2 Wis 1232 N Edison 275 WOXNA 152.27	Brand's Cab Service Houghton Mich 206 Sheldon Av 6 W8XIA 152.27	Brawley Cab Co Brawley Calif Box 928 10 W6XPH 152.27	Briggs Service Cabs Corinth Miss Jackson & Waldron 8 W6XXI 152.27	Brighton Taxi Co Rochester 10 NY 45 Village Lane 4 W2XUD 152.27	Bro Taxi Service Pawtucket RI 15 Bayley 12 W1XAR 152.27	Broadway De-Luxe Cab Co Portland Ore 115 NW Broadway 100 W7XIC 152.27	Broadway Yellow Cab Co Inc Billings Mont 2713 1st Av North 14 W7XLC 152.27	Broadway Cab Centralia Ill 215 E 2nd 15 W9XTT 152.27	Brookfield Cab Brookfield Ill 6921 Fairview Av 8 K9XBJ 152.27	Brooks Suburban Inc East Orange NJ 11 Holstead 25 W2XHW 152.27	Brown & White Cab Co St Paul Minn 171 University Av 48 WXSP 152.27	Brown Cab Co Madison Wis 924 G 5 W1XHK 152.27	Brown's Taxi Service Coatesville Pa 656 Merchant 3 W3X3C 152.27	Bruce Red Top Taxi Mattoon Ill 312 N 16th 6 W1XOY 152.27	Bryant's Taxi Lubbock Texas 1206 13th 27 W6XRP 152.27	Bryn Mawr Cab Bryn Mawr Pa 23 W3XUA 152.27	Budnar Taxi Service South River NJ 67 Causeway 5 W2XDK 152.27	Bud's Taxi Boothbay Harbor Maine 68 Atlantic Av 5 W1XDY 152.27	Bud's Garage Pawtucket RI 5 Quincy Av 8 W1XOJ 152.27	Bullock's Taxi Co Mayfield Ky 120 N 7th 10 W4XYD 152.27	Burlington Cab Co Burlington NC 1009 Mebane 8 W4XTC 152.27	Busic's Cabs N Wilkesboro NC 909 D St 15 W4XGJ 152.27	Bussard Taxi & Bus Serv Englewood Colo 3395 S Lincoln 50 WXBA 152.27	Busters Taxi Wewoka Okla 228 5th Cedar 5 W5XKS 152.27	Cab Broadcasting Corp Chicago 13 Ill 3354 N Paulina 325 W9XGT 152.27	Cab Services Inc Minneapolis Minn 1645 Hennepin Av 50 WXML 152.27	Checker Cab Co Minot ND 13-B 1st St SW 10 WXNV 152.27	Cabs Inc Denver Colo 2254 LaFayette 135 WXFE 152.27	Caldwell Cab Co Thomaston Ga 315 S Church 20 W4XDI 152.27	Calexico Taxi Co Calexico Calif 205 Hefferman 5 W6XDL 152.27	Callahan Taxi Service Brattleboro Vt 193 Western Av 6 W1XMU 152.27	Callaway Cabs Fulton Mo 6th & Market 10 WXRS 152.27	Campus Cab Co Champaign Ill 601 S Wright 30 W9XZR 152.27	Cape Bdway Cab Co Inc Cape Girardeau Mo Harris Bldg Rm 201 35 WXMT 152.27	Capitol Taxi Co Sanford Maine 124 Main 4 W1XOW 152.27	Capitol Taxi Co Frankfort Ky 211 Ann 30 W4XND 152.27	Carbondale Trans Co Carbondale Pa 45 N Main 10 W3XIC 152.27	Carl's Taxi Massena NY 4 Center 8 K2XBF 152.27	Carl's Cabs Sheffield Ala 422 Montgomery Av 10 W4XVY 152.27	Carl's Taxi Petaluma Calif 152 Kentucky 8 W6XXH 152.27	Carlsons Taxi Stillwater Minn 128 North St 10 WXSI 152.27	Carolina Cab Co Charleston SC 104 Market 23 W4XQW 152.27	Carpenter's Cabs Lincolnton NC S Academy St 4 W4XUF 152.27	Carroll's Taxi Malvern Ark 105 Cedar Box 269A 5 W5XGX 152.27	Carter's Taxi Littleton NH 18 Redington 3 W1XSC 152.27	Norman Carver Wausau Wis 128 North St 8 W9XJW 152.27	Cecil & Russels Cab Co Dyersburg Ten 218 W Court 5 W4XIL 152.27	Cedar Rapids City Cab Co Cedar Rapids Ia 105 2nd NE 30 WXRA 152.27	Central Taxi Co Northampton Mass 2 Jackson 15 W1XEQ 152.27	Central Cab & Coach Co Worcester Mass 103 Murray Av 41 WDXFH 152.27	Central Cab Co Boston Mass 415 Harrison Av 6 W1XHI 152.27	Central Cab Co Inc & Yellow Cab Co Inc Portland Me 532 Forrest Av 21 W1XJA 152.27	The Central Cab Trenton NJ 450 Brunswick Av 15 K2XAH 152.27	Central Taxi Co Vineland NJ 12 S West Blvd 12 W2XBM 152.27	Central Taxi Ossining NY 213 Main 10 K2XBQ 152.27	Central Taxi Co Auburn NY 128 North St 5 W2XOG 152.27	Central-Taxi-Blue Cab Co Washington Pa 78 E Maiden 15 W8XHS 152.27	Central Cab Reidsville NC 130 N Scales 10 W4XZO 152.27	Central Cab Co Reno Nevada 216 N Center 15 W7XWI 152.27	Central Taxi Negaunee Mich 216 Jackson 5 W8XSL 152.27	Central Cab Co Cedar Rapids Ia 3rd St & 3rd Av WXEM 152.27	Century Taxi Corp Syracuse NY 200 E Jefferson 18 W2XZC 152.27	C & G Transportation Inc Reading Mass 33 High St 10 WDXUR 152.27	Chapman Cab Co Newport News Va 3308 Washington Av 10 W4XPX 152.27	Charleroi Taxi Co Charleroi Pa 639 Washington Av 10 K3XAE 152.27	Charlie's Taxi Service Manville NJ 10 Hooks Blvd 5 W2XCL 152.27	Chattanooga Trans Co Chattanooga Tenn 119 E 9th 30 W4XVF 152.27	Checker Cab Co Bismarck NDak 323 4th St 10 WXHA 152.27	Checker Cab Co Denver Colo 1415 Tremont 50 WXJO 152.27	Checker Cab Co Minot ND 13-B 1st St SW WXNV 152.27	Checker Cab Co Boston Mass 10 Gainsboro 42 W1XPS 152.27	Checker Cab Co Inc Manchester NH 25 Start 15 W6XNM 152.27	Checker Cab Inc Pittsfield Mass 128 South St 20 W1XUJ 152.27	Checker Cab Co of Camder. City Inc 3901 11 W2XTF 152.27	Checker Cab Co Erie Pa 117 E 10th 40 W3XGH 152.27	Checker Cab Norristown Pa Main & Swede Sts 6 W3XMJ 152.27	Checker Cab Co Hazleton Pa 16 W Juniper 7 W3XOD 152.27	Checker Cab & Yellow Cab Bethlehem Pa 209 Northampton Av 15 W3XSJ 152.27	Checker Cab Inc Miami Beach Fla 630 5th St 35 W4XDS 152.27	Checker Cab Co Columbia SC 705 Saluda Av 56 W4XNW 152.27	Checker Cab Co Tampa Fla 402 S Morgan 46 W4XUH 152.27	Checker Cab Co Anderson SC 200 I St 18 W4XWF 152.27	Checker Cab Co Louisville Ky 611 Winkler Av 65 W4XEZ 152.27	Checker Cab Co Port Arthur Texas 300 Gilham Circle 4 W5XHV 152.27	Checker Cab Co Inc Hot Springs Ark 330 Central Av 40 W5XNY 152.27	Checker Cab & Trans Co Baton Rouge La 265 Lafayette 25 W6XOU 152.27	Checker Cab Co Odessa Texas 115 N Grant 40 W5XQK 152.27	Checker & Blue Cab Co and White & Blue Cab Co San Antonio Texas 502 Dolorosa 100 W5XSJ 152.27	Checker Cab Co Temple Texas 14 S 1st St 40 W5XTR 152.27	Checker Cab Co New Orleans La PO Box 423 450 W6XWM 152.27	Checker Cab Co Midland Texas 222 N Colorado 15 W5XYP 152.27
---	--	--	--	---	--	--	--	--	---	---	--	--	--	---	---	---	---	--	---	--	--	---	--	----------------------------------	---	---	--	---	--	--	---	---	--	--	--	--	--	---	------------------------------------	--	--	---	---	--	---	---	---	--	---	---	---	--	--	---	---	--	--	---	---	---	--	--	---	--	--	--	--	--	---	--	---	--	---	--	--	--	---	---	---	--	---	--	--	--	---	--	--	--	--	--	--	--	--	--	---	--	--	--	---	--	--	---	---	---	--	--	--	--	--	--	---	---	---	--	--	---	---	---	---	--	---	---	---	---	--	---	--	---	--	--	---	--	--	--	--	--	---	--	---	--	--	---	---	--	---	---	---	---	--	--	---	--	--	---	---	--	---	---	---	--	--	---	--	---	--	---	--	---	---	---	---	--	--	---	--	---	---	--	---	--	---	--	---	--	--	--	--	--	---	--	--	---	---	---	---	--	---	---	--	--	---	---	--	---	--	---	--	---	---	--	--	--	---	---	--	--	---	---	--	--	--	--	---	---	---	---	---	---	---	--	---	---	---

NEW FD-12 FM FREQUENCY and MODULATION MONITOR

by *Doolittle*

HANDLES UP TO 4 FREQUENCIES

Anywhere between 25mc. and 170mc.

... and with .0015% accuracy!

Another first
by Doolittle
**ONE Monitor for All
FM Emergency Services!**

Now you can stop worrying about a frequency change. With this *one* direct-reading Monitor, you can handle one, two, three or four frequencies... or any combination up to four... on the same or different bands... anywhere between 25 Mc. and 170 Mc. And you can check not only frequency deviation, *but also your percentage of modulation!* Ideal for today's FM Emergency Services. Based on years of experience in the design and manufacture of frequency monitors, the FD-12 gives you all the features you've wanted... in *one* instrument. Meets *all* FCC requirements. Assures utmost convenience, accuracy and reliability.



Doolittle
RADIO, INC.

Builders of Precision Communication Equipment • 7421 South Loomis Blvd., Chicago 36, Ill.

TAXICABS

Checker Cab Co Napa Calif 701 Main 8 W6XAH 152.27	City Cab Co Inc Wilmington Del Del & Dupont Aves 25 W3XRN 152.27	City Cab Co Port Huron Mich 411 Broad 15 W8XOT 152.27	Co-op Cab Co Inc Columbus Ga 1318 Bway 100 W4XAH 152.27
Checker Cab Co Chico Calif 122 W 4th St 10 W6XMV 152.27	City Cab Dover Del 227 S Governors Av 3 W3XSK 152.27	City Cab Co Findlay Ohio 124 E Crawford 12 W8XPK 152.27	Corwall's Taxi Serv Corvallis Ore 213 N 4th 12 W7XMR 152.27
Checker Cab Co Safeway Cab Co & Turner Cab Co Cheyenne Who 1808 O'Neil 30 W7XRP 152.27	City Cab Cartersville Ga 130 W Main 15 K4XAP 152.27	City Cab Co Troy Ohio Public Sq No 315 6 W8XPV 152.27	County Line Cab Barrington Ill 507 Grove Av 3 W9XZS 152.27
Checker Cab Co Twin Falls Idaho 859 Main av West 4 W7XUI 152.27	City Taxi Newport News Va 3604 Washington Av 10 W4XBK 152.27	City Taxi Service Defiance Ohio 618 W 2nd 8 W8XRH 152.27	Courtesy Cab Corp Rapid City SD 512 St Joe St 6 WXHH 152.27
Checker Cab Co Sault Ste Marie Mich 100 Ridge 10 W8XLC 152.27	City Taxi Richmond Ky 196 S 2nd 10 W4XBN 152.27	City Cab Co Niles Mich 207 N 4th 8 W8XRJ 152.27	Courtesy Cab Co Pittsfield Mass 46 Columbus Av 15 W1XJH 152.27
Checker Cab Co Steubenville Ohio 331 Adams 13 W9XKQ 152.27	City Cab Co Ocala Fla 116 E Oklawaha Av 12 W4XCP 152.27	City Cab Co Menominee Mich 3100 N State 6 W8XUB 152.27	Courtesy Cab Co Mayfield Ky 515 N 6th 5 W4XZL 152.27
Checker Cab & Young Cab Co Pontiac Mich 25 W8XYL 152.27	City Cab Co Sandersville Ga 207 E McCarty 5 W4XIS 152.27	City Cab Inc Elkins W Va 100 4th 10 W8XYB 152.27	City Cab Co Laguna Beach Calif 219 Ocean Av 5 W6XWM 152.27
Checker Cab Co Beloit Wisc 405 St Paul Av 7 W9XHJ 152.27	The City Cab Co Leesburg Fla 106-1/2 Johnson 2 W4XJE 152.27	City Cab Co Centralia Ill 105 S Poplar 15 K9XAB 152.27	Courtesy Cabs Santa Barbara Calif 111 San Marcus Cr 20 W6XYE 152.27
Checker Cab Co Carbondale Ill 103 W Monroe 12 W9XIV 152.27	City Cab Co Tusculumba Ala 107 W 5th 15 W4XLE 152.27	City Cab Co Fond du Lac Wis 6 Division S 10 K9XAG 152.27	Courtesy Cab Co Ironton Ohio 112 Park Av 5 W8XQA 152.27
Checker Cab Co Corp Michigan City Ind 114-1/2 E 11th 15 W9XJY 152.27	City Cab Co Greenville Ala 115 Bolling 10 W4XJX 152.27	City Taxi Service Rushville Ind 123 W 3rd 10 W9XAG 152.27	Courtesy Cab Co West Frankfort Ill 227 W Main 10 W9XDS 152.27
Checker Cab Co Kokomo Ind 621 N Main 13 W9XKQ 152.27	City Cab Co Thomasville NC Chester Box 809 30 W4XLI 152.27	City Cab Co Beaver Dam Wisc 122 S Spring 6 K9XAQ 152.27	Cozy Cab Newport RI 134 Belleville Av 20 W1XSV 152.27
Checker & Yellow Cab Champaign Ill 511 E Green 25 W9XKZ 152.27	City Cabs Elkin NC 204 W Main 20 W4XLQ 152.27	City Cab Co Tomah Wisc 805 Superior 6 K9XBE 152.27	Craig Cab Co Muncie Ind 934 S Mulberry 40 W9XOC 152.27
Checker Cab Co Milwaukee Wisc 1655 N Water 155 W9XNH 152.27	City Cabs & Rainbow Cabs Pulaski Va PO Box 1098 15 W4XRP 152.27	City Cab Co Effingham Ill 205 S Henretta 6 K9XBI 152.27	Cralle Frank E Farmville Va 113 N Main 6 W4XHO 152.27
Checker Cab Co Aurora Ill 34 N Bway 13 W9XPA 152.27	City Cab Front Royal Va 215 E Main 22 W4XSI 152.27	City Cab Co Murphysboro Ill 13 S 13th 6 W9XDX 152.27	Creedmore's Cab Co Statesville NC 107 W Front 15 W4XBP 152.27
Checker-Yellow Cab Co Green Bay Wisc 359 Pine 15 W9XPG 152.27	City Cab Co Henderson Ky 329 2nd 20 W4XSV 152.27	City Cab Co Platteville Wisc 405 E Main 3 W9XGJ 152.27	Crescent Motors Inc Anniston Ala 920 Wilmer Av 18 W4XRA 152.27
Checker Taxi Co Madison Wisc 148 S Blair 41 W9XTS 152.27	City Cab Arlington Va 128 N Hudson 20 W4XTS 152.27	City Cab Co Marion Ind 215 E Main 13 W9XIT 152.27	Crescent Motors Inc Huntsville Ala 507 W Clinton 18 W4XRC 152.27
Checker Cab Co E St Louis Ill 801 State 50 W9XZA 152.27	City Cab Staunton Va 115 S Augusta 15 W4XTT 152.27	City Car Co Madison Wisc 531 State 50 W9XJO 152.27	Crescent Motors Inc Gadsden Ala 710 Forrest Av 18 W4XRE 152.27
Cheviot Cabs Cheviot Ohio 3733-1/2 Glenmore Av 10 W9XZS 152.27	City Cab Co Gainesville Fla 116 S Arrendonda 12 W4XZC 152.27	City Cab Co Oshkosh Wisc 60 N Main 14 W9XKU 152.27	Cromwell Railroad Taxi Serv Middletown NY 14-16 Railroad Av 35 W2XVK 152.27
Chippewa Yellow Cabs Chippewa Falls Wisc 19 E Spring 10 K9XAW 152.27	City Cab Co Leaksville NC 703 Hamilton 6 W4XZK 152.27	City Cab Co Streator Ill 116 N Bloomington 10 W9XNC 152.27	Crowley Yellow Cab Co Inc Crowley La 122 Parkison Av 10 W5XWA 152.27
Christie Cab Co Waterbury Conn 6 Bank St 13 W1XEB 152.27	City Cab Co Anadarko Okla 105 E Main 20 K5XAI 152.27	City Cab Co Janesville Wisc 14 N Locust 13 W9XVR 152.27	Cubby's Taxi Ogdensburg NY 336 State 9 W2XKE 152.27
Cubby's Taxi Ogdensburg NY 336 State 9 W2XKE 152.27	City Cab Co Ft Worth Tex 110 Commerce St 40 W5XBD 152.27	City Cab Co Ashland Wisc 202 Prentice Av 5 W9XWB 152.27	Cunningham Taxi Co Berger Texas 404 Weatherly 20 W5XTE 152.27
Circle Cab Co Springfield Ohio 118 E Wash St 48 W8XHJ 152.27	City Cab Co Yazoo City Miss 201 W Jefferson 7 K5XCV 152.27	City Cab Co Vandalia 1 Ill 421 W Gallatin 6 W9XWV 152.27	Curtesy Cab Co Saratoga Springs NY 39 Railroad Pl 8 K2XDE 152.27
Circle Cab Co Terre Haute Ind 8 S 5th 30 W9XPX 152.27	City Cab Co Pryor Okla 109 E Main 10 W5XEH 152.27	City Cab Oconto Wisc 117 Huron Av 4 W9XYZ 152.27	Curtis Taxi Serv Athens Ia 434 S Main 10 W3XVO 152.27
Citizens Red Line Taxi Tucson Ariz 44 N 5th Av 20 W7XP1 152.27	City Cab Co Midland Tex 323 N Colo St 10 W5XEN 152.27	City Yellow Cab Flora Ill 201 W North Av 5 W9XZL 152.27	C & Y Cab Co Ft Atkinson Wisc 522 Robert 2 W9XCU 152.27
Citizens Cab Co Petersburg Va 19 Halifax 17 W4XYS 152.27	City Cab Co Paragould Ark 223 S Pruitt 10 W5XHX 152.27	Clark Cab Co Belvidere Ill 120 N State 6 W9XRP 152.27	Daisy Cab Co New Albany Ind 234-1/2 Vincennes 8 K9XAT 152.27
City Cab Bismarck ND 214 6th 10 WXA1 152.27	City Cab Co Greenville Miss 109 S Theobald 20 W5XLE 152.27	Clark's Taxi Dover NJ 52 E Blackwell 4 W2XUG 152.27	Dalles Taxi Co The Dalles Ore 407 Washington 10 W7XLS 152.27
City Cab Co Bemidji Minn 306 Beltrami Av 5 WXIE 152.27	City Cab Co Odessa Tex 107 E 4th 7 W5XOK 152.27	Cleary's Taxi Lawrence Mass 77 Jackson 2 W1XVZ 152.27	D & C Cab Co Hornell NY 44 Bway 5 W2XVY 152.27
City Cab Co Farmington Mo 205 W Liberty 6 W9XNP 152.27	City Transportation Co Dallas Tex 610 S Akard 250 W5XOM 152.27	Clemson Motor Co State College Pa 1101 N Atherton 15 W3XML 152.27	Dan's Taxi Service San Rafael Calif 828 4th 10 W9XCP 152.27
City Cab Co Storm Lake Ia 500 Erie 5 WXPFP 152.27	City Cab Co Tyler Tex 401 N Spring 10 W5XPL 152.27	Click's Taxi Ada Okla 214 S Townsend 10 W5XFI 152.27	Danville Veterans Cab Co Danville Ill 39 S Vermilion 10 W9XQA 152.27
City Cab Little Falls Minn 67 E Bway 10 WXPQ 152.27	City Cab Co Sapulpa Okla 4 S Main 12 W5XRE 152.27	Clipper Cab Co Sherman Tex 109 W Pvean 7 W5XVH 152.27	Darby Cab Co Inc Darby Pa Springfield Rd 15 W3XXE 152.27
City Cab & Trans Co Grand Island Neb 323 N Cedar 8 WXKT 152.27	City Cab Co Lubbock Tex 1308 Bway 20 W5XRU 152.27	Clipper Cab Co Frankfort Ind 251 W Washington 5 W9XRD 152.27	DeLuxe Cab Co Quincy Ill 625 Hampshire 25 W9XQE 152.27
City Cab Co Newton Kans 422 E 5th 10 WXSC 152.27	City Cab Co Denton Tex 118 Austin 10 W5XSN 152.27	Clovis Cab Co Clovis N Mex 110 W 2nd 5 W5XFS 152.27	Davis Taxi Gloucester Mass 19 Perkins 10 W1XFO 152.27
City Cab Co Detroit Lakes Minn 119 Pioneer 10 WXSZ 152.27	City Cab Co Berger Tex 609 Deahl 15 W5XUX 152.27	Clovis Transit Co Clovis N Mex 117 E Grand Av 12 W5XQY 152.27	Davis Tire & Battery Serv Elk City Okla 124 W 3rd 8 K5XCI 152.27
City Taxi Marlboro Mass 14 Huntington Av 4 W1XEX 152.27	City Cab Co Pawhuska Okla 517 Leahy 5 W5XVC 152.27	C & M Taxi Co Inc Albemarle NC 150 S 2nd 20 W4XWT 152.27	Day & Night Taxi Corp Syracuse NY 112 W Jefferson 15 W7XMR 152.27
City Cab Co Inc Fitchburg Mass 253 Main 12 W1XGU 152.27	City Cab Co Inc Amarillo Tex 609 Tyler 15 W5XWC 152.27	Coach Corp of Freeport Freeport Ill State & Douglas 12 W9XDD 152.27	Day & Night Taxi Monrovia Calif 162 Poinsetta 10 W6XIN 152.27
City Cab Berlin NH 15 Main 10 W1XJT 152.27	City Cab Co Athens Tex 510 W Larkin 10 W5XYA 152.27	Coit Taxi Bristol RI 513-1/2 Wood St 3 WDXVH 152.27	Day & Night Checker Taxi Bremerton Wash 1536 Wycoff N 10 W7XVB 152.27
City Cab Co & Checker Cab Co Taunton Mass; PO Sq 12 W1XMB 152.27	City Taxi Serv Visalia Calif 700 S Court 12 W6XHP 152.27	Collingswood Taxi Serv Collingswood NJ 160 Collinge Av 15 W2XHB 152.27	Day's Quarter Taxi Co Columbus Ga 418 15th 50 W4XZA 152.27
City Cab Co Pawtucket RI 85 Dexter 25 W1XMY 152.27	City Cab Corona Calif 712 Ramond 10 W6XCP 152.27	Colonial Taxi Co Library Pa Rte 1 12 W3XWJ 152.27	Day's Cab Athens Ohio 19 E Washington 8 W8XZJ 152.27
City Cab Co Lewiston Me 383 Lisbon St 10 W1XNC 152.27	City Cab Co Bakersfield Calif 1031 19th 10 W6XDJ 152.27	Columbia Yellow Cab Co Inc Columbia Mo 801 Cherry 30 WXEZ 152.27	Decatur Checker Cab Co Decatur Ill 562 N Front 20 W9XII 152.27
City Cab Co Inc Providence RI 1229 Westminster 50 W1XNQ 152.27	City Taxi Service Tulare Calif 130 South L St 17 W6XLL 152.27	Columbus Green Cabs Inc Columbus Ohio 307 S 6th 56 W8XHQ 152.27	Decatur Transit Decatur Ala 301 1st Av 28 W4XMD 152.27
City Cab Co Woonsocket RI 17 All Saints St 8 WDXQ 152.27	City Taxi Service Delano Calif 1117 High 5 W6XZG 152.27	Combined Cab Serv Inc Washington DC 418 4th St NW 250 W3XDI 152.27	Delaware Cab Co Inc Delaware Ohio 23 E Williams 10 W8XKT 152.27
City Cab Co & Concord Cab Co Concord NH 16-1/2 S Main 6 W1XQX 152.27	City Cab & Independent Cabs Ellensburg Wash 325 N Main 10 W7XGZ 152.27	Combs, Elmer Glenn Walnut Creek Calif 1-0 Box 144 3rd St 3 W9XER 152.27	Della Cab Co Escanaba Mich 107 S 10th 6 W8XNE 152.27
City Taxi Dover NH 373 Central Av 8 W1XGT 152.27	City Cab Co Pasco Wash 115 N 2nd 25 W7XJA 152.27	Commercial Cab Co Inc Chicago Ill 2923 E 95th 53 W9XVK 152.27	DeLuxe Taxi Co Salina Kans 616 Highland 25 WXCN 152.27
City Service Cab Co Englewood NJ Erie RR Sta 5 WQXFT 152.27	City Cab Co & Checker Cab Co Yakima Wash 424 E Yakima Av 25 W7XVU 152.27	Community Transit Co Helena Mont 15 N Main 6 W7XIL 152.27	DeLuxe Cab Co Ottumwa Ia 120 S Green 15 WXEQ 152.27
City Serv Taxicab Buffalo NY 430 Genessee 35 W2XOV 152.27	City Taxi Butte Mont 12 E Park 8 W7XXH 152.27	Conshohocken Vets Taxi Conshohocken Pa 12 E 1st 6 W3XUN 152.27	The DeLuxe Cab Co Albany Ga 305 Broad Av 35 W4XBA 152.27
City Cab Co Jamestown NY 23 Fenton Pl 12 WEXSV 152.27	City Yellow Cab Co Akron Ohio 356 W Bowery 43 W8XAD 152.27	Consolidated Cabs Inc Idaho Falls Idaho 425 B St 10 W7XRU 152.27	DeLuxe Cab Co Chattanooga Tenn 914 Houston 45 W4XOM 152.27
City Cab of Ocean City Inc Ocean City NJ 8th & West Av 10 W2XTR 152.27	City Taxi South Haven Mich Phoenix & Kalamazoo 5 W8XFP 152.27	Cook's Cab Serv Salisbury Md 170 S Small 20 W3XHA 152.27	DeLuxe Cab Co Jackson Tenn 107 W Main 15 W4XSE 152.27
City Cab Tyrone Pa 1050 Blair Av 2 W3KIT 152.27	City Cab Co Benton Harbor Mich 160 Water 12 W8XJJ 152.27	Cooks Taxi Whittier Calif 114-1/2 Comstock Av 6 W8XDW 152.27	DeLuxe Cab Co LaGrange Ga 222 Main 30 W4XUB 152.27

BELMONT RADIO CORP.
Sudsiory, Roytheon Mfg. Co.
Chicago 39, Illinois
Fixed: No. VS50-1, 25-50 Mc.
Transmitter: 50 w. to 52-ohm line;
AC input 120 w. Tubes: 6J6 osc;
2) 6AK6 mod; 6BA6 doub; 6AK6
trip; 2) 6AQ5 doub; 2) 2E26 amp.
Notes: Shure desk mike 48M-
16287; Biley crystal MC9; 2-fre-
quency operation available.
Mobile: No. VM30-1, 25-50 Mc.
Transmitter: 30 w. to RG58U line;
6.3 v. input, 9 a. rec.; 25 a. trans.
Tubes: Same as VS50-1. Notes: vi-

brator high-voltage supply; Elec-
tro-Voice mike or N201-13512
handset; 2-freq. operation avail-
able. Receiver: Single superhet.; 2
mc. IF; Biley crystal MC9; Oak
vibrator. Tubes: 6AK5 RF; 6AK5
RF; 6BE6 conv; 6BA6 inj amp;
6J6 osc; 6BA6 IF; 6BA6 IF; 6AU6
lim; 6AL5 disc; 6AU6 sq amp;
6AQ6 AF & sq; 6AK6 output.
Fixed: No. US20-1, 152-162 Mc.
Transmitter: 20 w. to 52-ohm line;
AC input 120 w. Tubes: 6J6 osc;
2) 6AK6 mod; 6BA6 trip; 6AK6
trip; 6AQ5 doub; 892A amp. Notes:

Shure desk mike 48M-16287; Biley
crystal MC9.
Mobile: No. UM15-1,
152-162 Mc.
Transmitter: 15 w. to RG58U line;
6 v. input, 5 a. rec.; 18 a. trans.
Tubes: same as US20-1. Notes: vi-
brator high-voltage supply; Elec-
tro-Voice mike or N201-13512
handset; 2-freq. operation avail-
able. Receiver: single superhet.; 3
mc. IF; Biley crystal MC9, 2 Oak
vibrators. Tubes: 6AK5 RF; 6AK5
RF; 6BE6 conv; 6AK5 trip; 6J6
osc; 6BA6 IF; 6BA6 IF; 6AU6

lim; 6AL5 disc; 6AU6 sq amp;
6AQ6 AF & sq; 6AK6 output.
Fixed: No. US85-1, 152-162 Mc.
Transmitter: 85 w. to 52-ohm line;
AC input 440 w. Tubes: same as
US20-1 plus 829B output; 4)
5Y3GT/G rect.
Fixed: No. US400-1,
152-162 Mc.
Transmitter: 400 w. to 52-ohm line;
AC input 1 kw. Tubes: same as
US20-1 plus 2) 832A output; 2) 866
rect.

BENDIX RADIO DIVISION
Baltimore 4, Maryland
Fixed: No. MRT-3, 152-162 Mc.
Transmitter: 25 or 50 w. to 52-ohm
line; AC input 375 or 458 w.
Tubes: 12SG7 osc; 6AG7 quad;

6AG7 trip; 829B trip; 829B out-
put; 12SG7 speech amp; 2) 6V6 AF
amp; 12H6 compressor. Notes:
Telephonics desk mike MT135A;
Bendix crystal.
Mobile: 152-162 Mc.

Transmitter: 25 w. to RG58U line;
6 v. input, 9.5 a. rec.; 16.5 a. trans.
Tubes: 6BJ6 osc; 6BJ6 quad; 6AK6
trip; 2E30 doub; 2E30 out.
Notes: Oak vibrator; Conn. Tel. &
Elec. handset. Receiver: Single

superhet.; 8.5 mc. IF; Bendix crys-
tal; Oak vibrator. Tubes: 6AK5
RF amp; 6J6 osc; 6AK5 mix; 6BJ6
IF; 6AK5 IF doub; 6AK5 lim;
6AL5 disc; 6AQ6 AF; 6AK6 out-
put.

TAXICABS

Egler's Taxi: Thomasville NC 7 Trade 25 W4XWE 152.27	Joe's Taxi Corning NY 114 E Market 6 W2XVG 152.27	Lansdown Cab Co Lansdowne Pa 19 E Baltimore Av 2 W3XFV 152.27	Mather's Taxi Bridgeton NJ 78 E Commerce 6 W2XOY 152.27
Henderson Donald J Tillamook Ore 502 E 7th 5 W7XQJ 152.27	Joe's Taxi Augusta Ga 13th & Green 20 W4XWI 152.27	Lansing Cab Co Lansing Mich 917 W St Joseph 8 W8XFH 152.27	Matteson George E Greenfield Mass 368 Main 9 WDXHA 152.27
Henderson Frank J So Orange NJ 12 Sloan 8 K2XCV 152.27	Joe's Taxi Cle Elum Wash 120 Penn Av 10 W7XAK 152.27	Larchmont Radio Taxi Larchmont NY 99 Laurel Av 10 K2XCY 152.27	Matty's Taxi Serv Westbrook Me 529 Main 5 WIXQG 152.27
Hennessey Taxi Serv Inc Elizabeth NJ 244 Westfield Av 14 W2XJM 152.27	Johnnie's Taxi Serv Farmingdale LI NY 35 Cedar 5 K2XDX 152.27	Laurel Line Taxi Co Inc Scranton Pa 109 Cedar Av 20 W3XHH 152.27	McDonald & Sons Cab Co Cartersville Ga 17 Noble 12 K4XAX 152.27
Herbert's Taxi St Albans Vt 15 Stowell 4 WDXNG 152.27	Johnny's Cabs Inc Cumberland MD 327 S Center 10 W3XTA 152.27	Lawson Taxi Co Frankfort Ind 557 N Columbia 7 W9XUE 152.27	McConnell's Taxi Serv Stroudsburg Pa 213 N 9th 23 W3XFPQ 152.27
H & H Cab Co Sapulpa Okla 11 N Park 10 W5XUS 152.27	Jolly Cab Co Memphis Tenn 110 S 2nd 70 W4XLS 152.27	Lees Taxi Ellerica Mass PO Box 245 2 WIXTM 152.27	McGill's Taxi Co Asheboro Nc 240 Sunset Av 9 W4XNK 152.27
Higgins Bros Taxi Serv Waxahatche Tex 113 N College 8 W5XKA 152.27	Jolly Cabs Greenville Miss 300 Yerger 30 W5XZZ 152.27	Legard's Taxi Service Bath Me 245 North St 9 WDXDW 152.27	McGoon Taxi Taxi Rochester Minn 1121 1st St SE 10 WXRMM 152.27
Hills Cab Co Columbus Ohio 171 N 4th 68 W8XFC 152.27	Jones Taxi Great Neck LI NY 23 Station Plaza 10 W2XRB 152.27	Legion Cab Co Ypsilanti Mich 2049 E Mich 10 W8XTI 152.27	McKees Rocks Taxi Co McKees Rocks Pa 521 Broadway 6 W3XCG 152.27
Hillside Cab Medford Mass 47 Orchard 4 WDXRY 152.27	Jones Taxi Benton Ill 207 N Main 8 W9XGK 152.27	Lexington Yellow Cab Co Inc Lexington Ky 152 N Limestone 75 W4XUN 152.27	McPherson Cab Co McPherson Kans 123 E Euclid 6 WXMU 152.27
Hillside Term Cabs Inc Union City NJ 509-48th 10 W2XIC 152.27	June Taxi Serv Inc Mt Vernon NY 422 S 7th Av 10 W2XZI 152.27	Liberal Taxi Co Liberal Kans 1 S Lincoln 10 WXLH 152.27	Medford Cab Serv Medford Mass 5 Playstead Rd 15 WDXVX 152.27
Hilltop Cab Co Daly City Calif 5 W6XWJ 152.27	Kalamazoo Taxi Co Inc Kalamazoo Mich 247 W Water 22 W8XMD 152.27	Liberty Cab Co Faribault Minn 533 N Central Av 5 W5XO 152.27	Medford Cab Serv Medford Ore 5 So Front St 7 W7XRR 152.27
Hodson Virgil North Bend Ore 2135 Sherman Av 4 W7XPO 152.27	Kaufmann's Taxi Mankato Minn 102 N 2nd 15 WXNH 152.27	Liberty Cab Co Fort Dodge Ia 821 1st Av 12 WXHG 152.27	Media Taxi Serv Media Pa 312 Baker 15 W3XLL 152.27
Holmes Taxi Catskill NY 85 North St 5 W2XBO 152.27	Keck's Taxi Service South Norwalk Conn 2 Raymond 2 WDXRR 152.27	Liberty Cab Co Tupelo Miss So Spring 20 K5XBD 152.27	Melrose Cab Co Melrose Park Ill 705 Broadway 12 K9XBD 152.27
Holt Harold Hudson NH Melendy Rd 10 WDXJI 152.27	Kellogg Taxi Kellogg Idaho 129 Kellogg Av 6 W7XLA 152.27	Liberty Cab Co Montgomery Ala 111 Lee 50 W4XWS 152.27	Merced Taxi Service Merced Calif 1735 K St 10 152.27
Holyoke Yellow Cab Inc Holyoke Mass 276 High 10 WDXLD 152.27	Kelly Taxi Co So Gate Calif 8035 Seville Av 10 W8XJZ 152.27	Liberty Cabs Inc Dayton Ohio 220 W 3rd 40 W8XVG 152.27	Meridian Yellow Cab Co Meridian Miss PO Box 118A 30 K5XAP 152.27
Hoos Cab Co Chillicothe Mo 800 Webster 10 WXLN 152.27	Kelly Cab Roseville Calif 231 Vernon 1 W6XPZ 152.27	Liberty Cab Corp Evansville Ind 612 E Franklin 60 W9XLA 152.27	Metro Cab Co Alliance Ohio 711 E Main 4 W8XTP 152.27
Hopkinsville Yellow Cab Hopkinsville Ky 7th & Virginia 40 W2XUP 152.27	Kelley Taxi Service Xenia Ohio 27 S Detroit 10 W8XYG 152.27	Liberty Cab Co Vincennes Ind 624 Vigo 10 W9XSA 152.27	Michigan Cab & State Cab Co Lansing Mich 715 River St 45 W8XMI 152.27
Hotel Boise Cab Co Boise Idaho 821 Bannock 16 W7XIE 152.27	Kenosha Checker Cab Co Kenosha Wis 2120 52nd 25 W9XTL 152.27	Light Top Cab Co Poplar Bluff Mo Bridgway & Cedar 20 WXNT 152.27	Middletown Taxi Serv Middletown NY 16 King 11 W2XUM 152.27
Hot Shot Taxi Carthage Mo 210 S Main 10 WXLA 152.27	Kenosha Yellow Cab & Trans Co Kenosha Wis 2907 63rd 30 W9XYE 152.27	Limbaugh Cab Co Sikeston Mo 205 E Malone Av 15 WXRK 152.27	Midland Taxi Co Midland Mich 143 Gordon 15 W8XSC 152.27
Hoyt's Taxi Serv Saranac Lake NY 10 Bloomingdale Av 10 W2XLK 152.27	Ken's Taxi Mechanicville NY 62-1/2 N Main 10 W2XNH 152.27	Limited Cab Co Iowa City Ia 119-1/2 E College 20 WXCR 152.27	Miles-Way Cab Corp Poughkeepsie NY 10-1/2 Wash 15 W2XNE 152.27
Hub City Taxi Jackson Tenn 107 W Main 20 W4XRI 152.27	Kenton Cab Co Kenton Ohio 133 S Detroit 5 W8XOX 152.27	Limousine Ass'n Spokane Wash North 3 Lincoln 40 W7XKP 152.27	Mid-City Cab Co Miles City Mont 614-1/2 Main 10 W7XVJ 152.27
Hudson Taxi Co Bayonne NJ 648 Bway 5 W2XKW 152.27	Kents Cab Chillicothe Ill 809 S 2nd 5 WOXKA 152.27	Lincoln Cab Co Scottsbluff Neb 1422 Bway 20 WXPD 152.27	Millburn Cab Inc Millburn NJ 2 Essex 10 W2XGT 152.27
Hughes Cecil D Fairmont Minn 411 N North Av 6 WXRV 152.27	Kentucky Cab Richmond Ky 135 Big Hill Av 6 W4XZX 152.27	Lincoln Park Taxi Co Lincoln Park Mich 1070 Fort St 8 W8XTE 152.27	Miller's City Taxi Fairmont Minn 515 E 1st 10 WXPK 152.27
Huntington Cab Co Inc Huntington W Va 1800 Commerce Av 50 W6XMN 152.27	Keystone Taxi Lockhaven Pa 310 N Grove 7 W3XCD 152.27	Lincoln Cabs Springfield Ill 130 N 6th 13 W9XHA 152.27	Miller Taxi Serv Springfield Mass 112 State 30 WDXJK 152.27
Hunt's Taxi Woodstock Ill 14 Washington 4 K9XKB 152.27	Kimball's Taxi Co Ludington Mich 224 S James 12 W8XSE 152.27	Lincoln Cab Lincoln Ill 217 N Chicago 10 W9XRR 152.27	Miller's Taxi Serv Amherst Pa Reading Rf Sta 5 W3XTC 152.27
Hurry Cab Klamath Falls Ore 127 N 7th 18 W7XKR 152.27	Kimble Taxi Service Boonton NJ 404 Main 12 W2XOM 152.27	Linville Radio Taxi Co Columbia Tenn 906 S Main 15 K4XPA 152.27	Minot Cab Co Minot ND LIB N Main 10 WXHK 152.27
Hutchinson Bus & Cab Co Hutchinson Kans 16 E A St 45 W2XFG 152.27	King Taxi Co Columbus Ind 402 Jackson 10 W9XRS 152.27	Little Cabs Gettysburg Pa 207 N Stratton 4 W3XCV 152.27	Minute Man Cab West Warwick RI 110 Wash 10 WIXMF 152.27
Ideal Taxi Co Willimantic Conn 787 Main 7 WIXJK 152.27	Kingston Taxi Cab Co Kingston Pa 220-1/2 Wyo Av 6 W3XUF 152.27	Little Pullman Taxi Co Hugo Okla 120 N 2nd 6 W5XBB 152.27	Mission Cab Co Pittsburg Calif 134 E 10th 6 W6XZF 152.27
Ideal Taxi Inc Keene NH 40 Central Sq 6 WIXVH 152.27	Knoxville Airport Trans Serv Knoxville Tenn 521 E Cumberland Av 15 W4XKL 152.27	Little's Red Cab Co Crawfordsville Ind 205 W Wash 4 W9XTO 152.27	Mission Taxi Co Inc San Jose Calif 151 W San Fernando 50 W6XMT 152.27
Ideal Cab Co West Warwick RI 1244 Main 25 WDXVU 152.27	Knoxville Cab Knoxville Ia 1232 Main 6 WXRQ 152.27	Local Cab Co Hagerstown Md 82 W Wash 15 W3XOY 152.27	M & M Taxi Hobbs N M-x 207 W Taylor 20 W5XYV 152.27
Ideal Cab Co Jamestown NY 409 N Main 10 K2XAT 152.27	Konen Cab Co Fargo ND 405 N 5th 15 WXJE 152.27	Logan Cab Co Logansport Ind 130 N Pearl 15 W9XMR 152.27	M & M Taxi Co Tacoma Wash 2405 Pacific Av 10 W7XVA 152.27
Independent Cab Elizabeth NJ 361 Elizabeth Av 10 W2XME 152.27	Kramp's Taxi Newburgh NY 183 Broadway 30 W2XMH 152.27	Long Beach Ind Taxi Corp Long Beach NY 44 W Park Av 20 W2XHA 152.27	M & O Taxi Service Vandalia Ill 114 S 5th 2 K9XKB 152.27
Independent Taxi Co Metuchen NJ 7 Penn Av 6 W2XTZ 152.27	Kresge Taxi Service Ithaca NY 204 Spencer 4 W2XTU 152.27	Long's Baggage Trans Co Inc Lynchburg Va 600 Church 60 W4XOR 152.27	Mobile Taxi Call Serv Detroit 19 Mich 19977 Woodward 30 W3XQE 152.27
Independent Cab Ass'n Inc Richmond Va 804 Broad St 75 W4XKT 152.27	Krueger City Cab Watertown Wis 102 So 1st 5 W9XET 152.27	Longhorn Taxi Co Port Arthur Tex 348 Proctor 10 W5XJN 152.27	Model Taxi Co Syracuse NY 115 S State 51 W2XVA 152.27
Indiana Deluxe Cab Co South Bend Ind 710 Niles Av 45 W9XMU 152.27	Krueger Taxi Serv Black River Falls Wisc 36 Water 7 W9XXL 152.27	Louisville Taxi & Trans Co Louisville Ky 9th & Liberty 128 W4XNU 152.27	Monroe Cab Co Monroe La 211 Grammont 5 W5XWJ 152.27
Indio Yellow Cab Indio Calif 705 Tingman 5 W6XXC 152.27	Kupper Cab & Rental Co Inc Poria Ill 207 Franklin 35 W9XAY 152.27	Luxor Cabs San Francisco 9 Calif 1461 Pine 50 W6XCP 152.27	Monroe Taxi Service Monroe NY Rte 17 4 W2XDC 152.27
Intermountain Transportation Salt Lake City Utah 2134 Wyo 20 W7XNG 152.27	Kyle Elam Taxi Port Arthur Tex 323 Austin Av 14 W5XQM 152.27	Luxor-Green Top Cab Co Sacramento Calif 907 4th 15 W6XEX 152.27	Monticello Cab Co Monticello Ind 8 E Edway 8 W3XCC 152.27
Ivey Henry W Houlton Me Military St 6 WDXEZ 152.27	Labar's Taxi Hackettstown NJ 208 Main 10 W2XKJ 152.27	Lynhurst Cab Co Lynhurst NJ 576 Valley Brook Av 5 W2XNK 152.27	Mooey & Son Cab Co Vinita Okla 118 W Canadian 8 K5XBT 152.27
Jackson City Cab Co Jackson Mich 212 E Courtland 20 W8XSN 152.27	Lackawanna Taxicab Co Scranton Pa 101 S Wash Av 5 W3XEL 152.27	Lynn Cab Co Lynn Mass 1 Almont 18 WXDD 152.27	Moore's Taxi Service Middletown Pa Emaus & Astor 10 K3XAA 152.27
Jackson Yellow Cab Co Jackson Miss 1321 Terry Rd 35 W5XAX 152.27	Laclede Gas Co Inc St Louis Mo 315 Euclid Av 75 WXII 152.27	Macomb Cab Co Macomb Ill 121 E Carroll 4 W9XVW 152.27	Morgan Cab Co Laurel Miss 445 N Magnolia 20 W5XZC 152.27
Jacobs Taxi White River Junction Vt Mountain Av 10 W1XTH 152.27	LaCrosse City Car Co LaCrosse Wisc 309 Rivoli Bldg 24 W9XTU 152.27	Mac's Taxi Cortland NY 3 Church 7 W2XEI 152.27	Myers Gus' Middletown NY 48 James 10 W2XFA 152.27
Jacobs Taxi Service Phoenixville Pa 184 Bridge 10 W3XPB 152.27	Lafayette Taxi Serv Meadville Pa 147 Chestnut 10 W3XDN 152.27	Madisonville Transit Co Madisonville Ky 119 S Main 8 W4XHF 152.27	Nash Taxi Service Brockton Mass 507 Warren Av 10 W1XCH 152.27
Jared Checker Cab Co Kingsport Tenn 402 E Sullivan 10 W4XUZ 152.27	LaGrange Cab Co La Grange Ill 108 W Burlington Av 15 W9XPE 152.27	Magie Valley Cab Burley Idaho 121 S Hansen 1 W7XGE 152.27	Natchez City Lines Inc Natchez Miss Natchez Bldg 20 W5XTO 152.27
Jasielski Adam Chicago Ill 1243 N Avers Av 10 W9XFC 152.27	Laird C Riffer Taxi Greenville Pa 79 Clinton 6 W3XBM 152.27	Main-Courtesy Cab Co Valparaiso Ind 52 Lafayette 10 W9XFH 152.27	Neely's Taxi Service Moscow Idaho 524 S Main 10 W7XUU 152.27
Jayhawk Cab Co Lawrence Kans 1012 Mass St 10 WXOL 152.27	Lake Cabs Inc Painesville Ohio 119 Richmond 10 W8XMF 152.27	Manchester Taxi Co Manchester Conn 893 Main 5 W1XAD 152.27	New Brunswick Taxi Radio Ass'n New Brunswick NJ 15 K2XDC 152.27
Jerry's Taxi Co Traverse City Mich 115 W Front 8 W8XHI 152.27	Lake Delton Cab Co Lake Delton Wisc PO Box J 4 K9XAJ 152.27	Manitowoc Checker Cab Co Manitowoc Wisc 714 Wash 20 W9XWL 152.27	New Cab Co Marietta Ohio 213 Putnam 8 W8XVA 152.27
Jiggetts Taxi Service Paterson NJ 28 Governor 6 W2XJA 152.27	Lake City Cab Co Coeur d'Alene Idaho 317-1/2 Sherman Av 5 W7XJN 152.27	Maple City Taxi Serv Inc Honesdale Pa 933 Main 7 W3XLD 152.27	Newburgh Taxi Center Newburgh NY 199 Bday 10 W2XSF 152.27
Joe's Elmont Taxi Service Elmont NY Elmont & Hempstead 5 K2XBI 152.27	Lakeview Cab Battle Creek Mich 43 N McCamly 12 W8XPI 152.27	Marion Radio Red Cab Inc Marion Ohio 479 W Center 10 W8XLV 152.27	Newport Ace Cab Co Newport Ky 107 E 8th 20 W4XQM 152.27
Joe's Taxi Salamanca NY 130 Main 5 K2XCG 152.27	Landers Taxi Service Johnstown NY 14 S Market 10 W2XJO 152.27	Martin's Cab Co Ionia Mich 123 N Depot 15 W8XWQ 152.27	Newton's Central Taxi Endicott NY 1202 Monroe 10 W2XVC 152.27

**FEDERAL TEL. & RADIO CORP.
Clifton, N. J.**

Fixed: No. 101A50, 30-40 Mc.
Transmitter: 50 w. to 70-ohm line;
AC input 360 w. Tubes: 6BH6 osc;
6BH6 mod; 6BH6 doub; 6BH6
quad; 6BH6 doub; 2E30 doub;
2) 5516 output. Notes: Astatic mike
FRN-3166-2; crystal FT-110A.
Fixed: No. 101A250, 30-40 Mc.
Transmitter: 250 w. to 70-ohm line;
AC input 360 w. Tubes: same as
101A50-A output.
Fixed: No. 110-50AZ,

6BH6 doub; 2E30 doub; 2) 5516
output. Notes: also available with
25 w. output; Shure mike RA-9119-
2, or Telephonics handset FRA-
11084-2-1; Carter dynamotor; 2-
freq. operation available. Receiver:
double superhet.; 10.7 & 1.7 mc. IF;
crystal CR-1; Mallory vibrator 659.
Tubes: 6AK5 RF; 6BE6 mix;
6AK5 osc; 6BH6 1st IF; 6BE6
conv; 6BH6 2nd IF; 6BH6 lim;
6BH6 lim; 6AL5 disc; 6J6 noise
amp; 6AQ6 AF; 6V6 output; 6X5
rect.
Fixed: No. 103B25, 152-162 Mc.
Transmitter: 25 w. to 50-ohm line;
AC input 300 w. Tubes: 6BH6 osc;
6BH6 mod; 6BH6 doub; 6BH6
trip; 6BH6 trip; 2E30 amp; 2) 2E30
trip; 2) 5516 output. Notes: Asta-

tic mike FRN-3166-2; crystal
CR-1.
Fixed: No. 103B250,
152-162 Mc.
Transmitter: 250 w. to 50-ohm line;
AC input 1,100 w. Tubes: same as
103B50 plus 2) 4-125A output.
Fixed: No. FT-12525CY,
152-162 Mc.
Transmitter-receiver similar to
103B25, with desk console mount-
ing.
Fixed: No. 106B25Y,
152-162 Mc.
Transmitter-receiver similar to
103B25, in small cabinet.
Fixed: No. 144AZ, 30-40 Mc.
Receiver only, similar to that in
FT-110-50AZ, in table cabinet.
Fixed: No. 144BX, 152-162 Mc.

Receiver only, similar to that in
FT-125-B25AZ, in table cabinet.
Mobile: FT-125-B25AZ,
152-162 Mc.
Transmitter: 25 w. to RG58U line;
6 v. input, 1.12 a. rec.; 47.1 a.
trans. Tubes: same as 103B25.
Shure mike RA9119-2 or Tele-
phonics handset FRA-11084-2-1;
Carter dynamotor; 2-freq. opera-
tion available. Receiver: double
superhet.; 10.7 & 1.7 mc. IF; crys-
tal CR-1; Mallory vibrator 659.
Tubes: 6AK5 RF; 6AK5 RF; 6AK5
mix; 6BH6 1st IF; 6AK5 osc;
6AK5 mult; 6BE6 conv; 6BH6 2nd
IF; 6J6 noise amp; 6BH6 lim;
6BH6 lim; 6AL5 disc; 6AQ6 AF;
6V6 output.

RG8 line;
osc.; 50.5 a.
osc.; 6BH6
6BH6 quad;



Model S-4: Calibrated at any 1 to 5 points, 1.5 to 70 mc.

Crystal-controlled frequency meter, hand-calibrated to an accuracy of .0025%, as required by FCC. so easy to use that any fixed or mobile transmitter can be checked in 60 seconds. Rugged construction will withstand years of use. Built-in, regulated power supply operates on 110-115 volts, AC or DC.

Model S-7: 1 or 2 points, 72 to 76 and/or 152 to 162 mc.

For systems operating on either or both of the bands indicated. Hand-calibrated to an accuracy of .005% as required by FCC. Similar in design and ease of operation to the model S-4. Built-in, regulated power supply operates on 110-115 volts, AC or DC. Will keep your system at peak efficiency.

For Ten Years, Browning Frequency Meters Have Been Standard Equipment for All the Communications Services

Model S-5: 1, 2, or 3 points between 30 and 500 mc.

Accuracy of .0025% maintained by temperature-controlled crystal and temperature-compensated electron-coupled oscillator. Transmitter signals can be checked with a receiver to which the meter is coupled. Can be supplied on rack panel 8 3/4 by 19 ins. Operates on 105-115 volts AC.



IMPORTANT: The accuracy of any BROWNING frequency meter can be checked by the user against WWV standard frequency signals because the crystal frequencies employed are sub-multiples of WWV. This essential feature is not found in other communications-type meters. **NOTE:** Use the BROWNING WWV Calibrator for precision checking.



**IN CANADA, ADDRESS:
MEASUREMENT ENGINEERING, LTD.,
ARNPRIOR, ONT.**

**BROWNING LABORATORIES, Inc.
750 Main St., Winchester, Mass.**

Please send me technical details and prices on the following Browning precision products:

- S-4 Frequency Meter S-7 Frequency Meter
 S-5 Frequency Meter WWV Frequency Calibrator

Name

Address

Company Connection

TAXICABS

Newton Cab's Newton NC
11 S Main 25 W4VX 152.27
Nixon Baggage & Cab Co Anniston Ala
1210 Noble 20 W4XDN 152.27
Norristown Yellow Cab Co Norristown Pa
Penn RR Sta 8 W3XDY 152.27
North Arlington Taxi North Arlington NJ
2 Ridge Rd 10 W2XXY 152.27
N Chicago Cab Co Inc N Chicago Ill
1742 Sheridan Rd 9 W9XLF 152.27
N Hills Cab Co Pittsburgh Pa (Millvale)
Lawrence Av 15 W3XGG 152.27
N Kansas City Cab Co N Kansas City Mo
1900 Erie 15 W2ZJI 152.27
N Little Rock Trans Co Little Rock Ark
523 W Markham 65 W5XAD 152.27
N Reading Taxi Serv N Reading Mass
Main St Rt 62-28 1 W1ESJ 152.27
N Shore Black & White Cab Winnetka Ill
1010 Tower Rd 5 W9XMA 152.27
North Taxi Service Augusta Me
Hotel North Bldg 8 WDXGO 152.27
Northampton Cab Serv Northampton Pa
971 Main 5 W3XMV 152.27
Northland Lines Isheming Mich
118 S 1st 8 W9XQG 152.27
Northway Cab Co Columbus Ohio
1233 N High 50 W8XCR 152.27
Norwood Auto Livery Norwood Ohio
2092 Sherman Av 10 W6STR 152.27
Norwood Taxi & Town Taxi Norwood Mass
713 Wash 10 W1XUG 152.27
Number One Cab Co Traverse City Mich
925 State 15 W8XOM 152.27
Number 9 Taxi Nevada Mo
120 W Walnut 10 WXOH 152.27
Number 6 Cab Booneville Mo
413 E Morgan 10 W2XYJ 152.27
Nyack Taxi Tappan NY
Old Tappan Rd 10 W2XYJ 152.27
Oakland Taxi Oakland Calif
1243 33rd Av 50 W6XRD 157.53
Oakland Yellow Cab Co Ferndale 20 Mich
621 Vester 60 W8XKS 152.27
Oak Park Taxi Sacramento Calif
3125 Sacramento Bl. 15 W6XJK 152.27
Oak Ridge Taxi & Trans Co Oak Ridge Tenn
Oak Ridge Turnpike 20 W4XAT 152.27
Oakwood Taxi Co Grand Rapids Mich
116 LaGrave SE 40 W8XNF 152.27
Odle Taxi Co McKinney Tex
218 N Tennessee 15 W5XKF 152.27
Ogden Cab & Trans Co Ogden Utah
2508 Ogden Av 25 W7XKT 152.27
Ohio Yellow Cab Co Dayton 2 Ohio
321 W 4th 105 W8XMB 152.27
Ohio Taxi Hamilton Ohio
168 High 12 W8XUX 152.27
O J Taxi Mexia Texas
Box 89 8 K5XAZ 152.27
O K Cab Inc Kansas City 14 Kans
1032 Minnesota Av 30 WXHV 152.27
Oliver Taxi & Amb Serv Takoma Wash
14th & Pacific 35 W7XIT 152.27
O'Malley & Son Taxi Co Iowa Falls Ia
813 Hickory 3 WXNG 152.27
121 Cab Line Cairo Ill
600 Commercial Av 12 W9XVC 152.27
134 Taxi Dalhart Texas
420 Denrock Av 5 W5XCP 152.27
The 159 Taxi Santa Fe New Mex
129 E Water 10 W5XUC 152.27
O'Neil Taxi Co Elmira NY
109 State 25 W2XFF 152.27
Orange Taxi Co Burbank Calif
548 S San Fernando 10 W6XFP 152.27
Orange Checker Cab Salt Lake City Utah
418 S W Temple 75 W7XMV 152.27

Oregon City Taxi Serv Oregon City Ore
802 5th 5 W7XQE 152.27
Original Taxi Co San Fernando Calif
209 Chatsworth Dr 12 W6XIU 152.27
Orndorff Taxi Martinsburg W Va
Boyd Bldg 4 W8XMR 152.27
Orr Transportation Co Indiana Pa
38 S 7th 10 W3XEQ 152.27
Owenstoro Yellow Cab Co Owensboro Ky
320 St Ann St 40 W4XDG 152.27
Owl Taxi Binghamton NY
124 Court 10 W2XPA 152.27
Owl Taxi Co San Luis Obispo Calif
974 Monterey 4 W6XMA 152.27
Own Taxi Checker Cab Co Black & White
San Bernardino Calif 468 E Street
60 W6XPQ 152.27
Owl Taxi Santa Cruz Calif
88 Lincoln St 7 W6XUI 152.27
Owl Taxi Casper Wyo
114 N Center 5 W7XOM 152.27
Owl Taxi Serv Bend Ore
1056 Bond 8 W7XQU 152.27
Owl Taxi Co Wallace Idaho
601 Cedar 3 W6XVT 152.27
Owl Cab Dixon Ill
107-1/2 Hennepin Av 9 W9XUJ 152.27
Owyhee Cab Co Boise Idaho
105 S 9th 9 W7XIW 157.53
Pace's Taxi Inc Charlottesville Va
421 W Main 20 W4XRT 152.27
Packard Auto Taxi Co Easton Pa
919 Church 20 W3XEG 152.27
Paducah's Cons Taxi Lines Paducah Ky
201 S 5th 30 W4XSC 152.27
Painted Post Taxi Painted Post NY
103 S Hamilton 5 W2XWH 152.27
Palisi Taxi Beacon NY
308 Main 15 W2XRJ 152.27
Pana Cab Co Pana Ill
2nd & Locust 8 K9XBM 152.27
Paramount Taxi Mamaroneck NY
213 Halstead Av 10 K2XCO 152.27
Paramount Taxi Mechanicville NY
87 North Main 5 K2XDB 152.27
Paramount Taxi Stapleton SI NY
32 Water 10 W2XQJ 152.27
Paramount Taxi Peekskill NY
8 S Division 15 W2XUK 152.27
Park Taxi Stamford Conn
389 Main 6 W1XQP 152.27
Park Cab Butte Mont
9 E Broadway 6 W7XRN 152.27
Parker Taxi Co Pendleton Ore
12 S Main 10 W7XSI 152.27
Parks Inc Chicago Ill
5919 S State 5 W9XYD 157.53
Park's Taxi Serv Pontiac Ill
420 N Mill 4 W9XZD 152.27
Parson Ray K Santa Marla Calif
515 N Bdway 5 W6XEL 152.27
Pastore's Taxi Serv Reading Pa
908 N 8th 25 W3XTW 152.27
Patton's Inc Austin Texas
116-1/2 E 7th 35 W5XJL 152.27
Paul's Taxi Pomona Calif
265 S Garey Av 10 W6XOC 152.27
Pearson's Taxi Lewistown Pa
22 W Market 15 W3XXI 152.27
Peg's Cab Pampa Tex
221 N Cuyler 12 W5XBJ 152.27
Pekin Service Cab Co Pekin Ill
219-1/2 Court 10 K9XBP 152.27
Pelura's Taxi Penns Grove NJ
13 E Main 6 W2XWX 152.27
People's Cab Co Inc Pittsburgh Pa
921 Saw Mill Run 50 W3XHG 152.27

Peoples Cab E Peoria Ill
115 S Main 6 K9XAA 152.27
Peoples Cab & Mt Morris Cab Flint Mich
627 Detroit 35 W8XRO 152.27
Peoples Cab & Baggage Co Ft Smith Ark
1208 Garrison Av 50 W5XWL 152.27
Peoples Central Cab Co Lafayette Ind
423 Ferry 18 W9XQX 152.27
Peoria Black & White Cab Peoria Ill
304 Walnut 12 W9XVN 152.27
Peoria Yellow Cab Co Peoria Ill
607 Franklin 20 W9XKC 152.27
Perry's Taxi Inc Kingston NY
509 Broadway 10 W2XFN 152.27
P & E Taxi Carrollton Mo
108 W Wash 6 WXDP 152.27
Peters Taxi Service Coatesville Pa
15 E Lincoln Hwy 8 W3XZV 152.27
Pete's Taxi Sheridan Wyo
30 N Brooks 5 W7XOY 152.27
Pete's Cab Co Torrington Wyo
1909 E "B" St 6 W7XVQ 152.27
Pete's Safe-Way Cab Richmond Ind
19 E 5th 30 W9XLR 152.27
Phelps Lester O Wooster Ohio
141 N Buckeye 4 W8XWT 152.27
Phelps Radio Cab Co Sterling Ill
108 W 4th 10 W9XWP 152.27
Phoenix Radio Taxi Phoenixville Pa
Paradise & Chester 15 W3XHK 152.27
Piney Branch Cab Co Silver Springs Md
Piney Branch Rd 20 W3XFW 152.27
Pioneer Holding Co Minneapolis Minn
717 6th Av So 65 W2XGQ 152.27
Pittsfield Yellow Cab Pittsfield Mass
99 New West St 20 W1XTB 152.27
Plainfield Cab Co Mississ Kansas
5701 Johnson Rd 10 WXMR 152.27
Plainfield Taxi Inc Plainfield NJ
207 North Av 10 W2XOA 152.27
Plymouth Taxi Co Plymouth Pa
34 E Main 4 W3XCH 152.27
Port Taxi Service Portchester NY
110 Westchester Av 15 W2XVC 152.27
Portege Cab Co Kent Ohio
101 W Main 12 W8XWN 152.27
Portege Cab Co Portage Wisc
623 E Cook 5 W9XXR 152.27
Posten Taxi Co Wilkes-Barre Pa
62-86 N State 35 W3XGM 152.27
Powell Taxi Service Prichard Ala
80 Walsen Av 8 W4XGR 152.27
Public Cabs Gouverneur NY
14 William 5 K2XBP 152.27
Public Service Taxi Nyack NY
62 Burd St 9 W2XKE 152.27
Public Taxi Co Anderson Ind
5 E 13th 11 W9XGY 152.27
Public Cab Co Denver Colo
1285 Acoma St 80 WXMJ 152.27
Pyramid Cab Co Herrin Ill
118 W Monroe 10 W9XUH 152.27
Quick Service Cab Co Bloomington Ill
302 N Madison 20 W9XOI 152.27
Quick Service Taxi Co Allentown Pa
741 N New St 20 W3XLT 152.27
Radio Cab Co Stillwater Minn
Union Bus Depot 6 WXPFA 152.27
Radio Cab Co St Cloud Minn
1007 1st St So 15 WXHC 152.27
Radio Cab Caruthersville Mo
206 Ward Av 6 WOXMN 152.27
Radio Cabs Turners Falls Mass
61 Av A 4 W1XLN 152.27
Radio Cab Co Atlantic City NJ
131 N Arkansas Av 20 W2XGU 152.27
Radio Cab Co Asbury Park NJ
343 Cookman Av 18 W2XOD 152.27

Radio Taxi Service W Hempstead LI NY
612 Nassau Blvd 10 W2XWA 152.27
Radio Taxi Service Norristown Pa
Main & Montgomery 10 W3XZP 152.27
Radio Cab Co Paducah Ky
220 S 5th 18 W4XIN 152.27
Radio Cab Co Lynchburg Va
800 Church 20 W4XMV 152.27
Radio Cab Co Chester SC
Baldwin St 25 W4XJY 152.27
RadioTone Inc Little Rock Ark
523 W Markham W5XAC 152.27
Radio Cab Co Oxford Miss
929 Van Buren Av 10 K4XDP 152.27
Radio Cab Co Detroit Mich
50 W7XYE 152.27 180 W8XGA 152.27
Radio Cab Co Beckley W Va
117 S Fayette 15 W8XZL 152.27
Radio Cab Co Ironwood Mich
118 W Aurora 6 W8XQC 152.27
Radio Cab Co LaSalle Ill
737 7th 6 W9XFP 152.27
Radio Flash Corp Chicago Ill
4607 N Sheridan Rd 250 W9XLD 152.27
Radio Cab Champaign Ill
45 E Chester 22 W9XMC 152.27
Radio Safety Cab Co Peru Ind
63 S Edway 20 W9XXY 152.27
Radio Tuxedo Cab Co Portland Ore
1715 SW Salmon 37 W7XLR 152.27
Rainbow Cab Co Jasper Ind
503 Main 3 W9XDK 152.27
Rainbow Cab Co Lombard Ill
8 S Park 10 W9XVY 152.27
Range Cab Co Wakefield Mich
912 Putnam St 5 W8XYF 152.27
Ravenna Cab Co Ravenna Ohio
209 S Chestnut 4 W8XWJ 152.27
Raymond's Taxi Fort Myers Fla
1212 Main 5 K4XAH 152.27
Ray's Cab Service Norwalk Ohio
28-1/2 E Main 5 W8XYP 152.27
Ray's Victory Cab Gloversville NY
64 Main 6 W2XAO 152.27
R & B Taxi Co Fenton Mich
610 Hickory 10 W8XWY 152.27
Ready Taxi Co Tyrone Pa
1100 Blair Av 10 W3XHX 152.27
Rectors Yellow Top Cab Mt Vernon Ill
200 N 9th 12 W9XZQ 152.27
Red Cab Co Aberdeen S Dak
615-1/2 S Main 10 WXBN 152.27
Red Cab Co Brookline Mass
1318 Beacon St 50 WDXFE 152.27
Red Top Taxi Service Shamokin Pa
54 E Sunbury 10 W3XWH 152.27
Red Top Cabs Inc Norfolk Va
147 W Olney Rd 60 W4XEM 152.27
Red Top Taxi Dothan Ala
304 N Foster 15 W4XGC 152.27
Red Top Cab Co Nashville Tenn
711 Commerce 25 W4XHG 152.27
Redbird Cab Co Columbus Ga
910 6th Av 30 W4XJA 152.27
Red Cab Taxi Co Somerset Ky
300 E Mt Vernon 15 W4XLO 152.27
Red Top & Hill Top Cabs Petersburg Va
9 E Bank 30 W4XWL 152.27
Red & White Cab Pulaski Tenn
104 1st 6 W4XZV 152.27
Red Bird Taxi Co Cushing Okla
205 W Edway 6 K5XAM 152.27
Red Ball Taxi & Baggage Co Austin Tex
301 Riverside Dr 100 K5XEM 152.27
Red Top Cabs & Taxi Galveston Tex
2427 Postoffice St 25 W5XJR 152.27
Red Top Cab Co Tyler Texas
390 W Locust 20 W5XOB 152.27

HARVEY RADIO LABS., INC.
Cambridge, Mass.

Fixed: 70 or 250 W., 30-44 Mc.
Transmitter: 70 or 250 w. to 72-ohm line. Tubes: 7C7 osc; 7A8 mod; 7C7 quad; 7C7 doub; 7C5 doub; 7C5 (doub); 2)807 output, plus 2)100th for 250 w. Notes: W.E. handset F3WE3; crystal HPB.
Mobile: 40 W., 30-44 Mc.
Transmitter: 40 w. to RG8U line;

GENERAL ELECTRIC CO.
Syracuse, N. Y.

Fixed: 25-50 Mc.
Transmitter: 50 w. to 50-70 ohm line; AC input 200 w. Tubes: 6BJ6 osc; 12AU7 mod & mult; 6BH6 mult; 6AQ5 mult; 2)807 output; 2)5R4GY rect; 12AX7 mod lim. Notes: mike or handset; G.E. crystal G50, G52.
Mobile: 25-50 Mc.
Transmitter: 30 or 50 w. to RG8U line; 6 v. input, 2.25 or 3.15 a. rec.; 31 or 50 a. trans. Tubes: Same as 50-w. fixed transmitter above, with 1)807 for 30 w. or 2)807 for 50 w. Notes: G. E. dynamotor; Shure military mike or

6 v. input, 2.4 a. rec.; 35.5 a. trans. Tubes: same as 70 w. fixed transmitter, but with one 807 output. Notes: W.E. military mike or F3WE3 handset; Carter dynamotor 620-VS; 2-freq. operation available. Receiver: double superhet.; 4.5 & 1.6 mc. IF; Radiart vibrator 5515. Tubes: 7AG7 RF; 7AG7 1st mix; 7AG7 1st IF; 7A8 2nd mix; 7AG7 2nd IF; 7AG7 lim; 7AG7 lim; 7A6 det; 7AG7 osc; 7AG7 noise amp; 7N7 AF & noise rect;

W.E. handset 4MKH1A3; 2-freq. operation available. Receiver: Double superhet.; 6 mc. & 455 kc. IF; G.E. crystal G64A; Mallory 534C vibrator. Tubes: 6BH6 RF; 12AT7 1st osc, 1st conv; 6BH6 high IF; 12AT7 2nd osc, 2nd conv; 6BH6 low IF; 6BH6 lim; 6BH6 lim; 6AQ7 disc & noise amp; 12AX7 sq amp & AF; 6AQ5 output; 6AL5 noise rect.
Fixed: 25-50 Mc.
Transmitter: 250 w. to 50-70 ohm line; AC input 1,300 w. Tubes: 6BJ6 osc; 12AU7 mod & mult; 6BH6 mult; 6AQ5 mult; 2)807 output; 2)5R4GY rect; 2)866A or 3B23 rect; 2)GL4D21/4; 12AX7

7F7 AF & control; 7C5 output. **Fixed: 30 or 250 W., 152-162 Mc.**
Transmitter: 30 or 250 w. to 72-ohm line. Tubes: 6AQ6 osc; 6AQ6 speech amp; 6AQ6 mod; 6AK5 trip; 6AQ5 quad; 6AQ5 doub; 2E26 doub; 2)2E26 output, plus 2)WL4D21-4-125A for 250 w. Notes: W.E. handset F3WE3; Crystal HPB.
Mobile: 30 W., 152-162 Mc.
Transmitter: 30 w. to RG58U line;

mod lim. Notes: mike or handset; G.E. crystal G50 or G52. **Fixed: 152-162 Mc.**
Transmitter: 50 w. to 50-70 ohm line; AC input 390 w. Tubes: 6AG5 osc; 6AG5 quad; 2E30 doub; 2E30 trip; 2E30 doub; 6AG5 mod; 2)2E24 amp; 829B amp; 3)5R4GY rect. Notes: mike or handset; G.E. thermocell crystal G66A.
Fixed: 152-162 Mc.
Transmitter: 250 w. to 50-70 ohm line; AC input 1,300 w. Tubes: 6AG5 osc; 6AG5 quad; 2E30 doub; 2E30 trip; 2E30 doub; 6AG5 mod; 2)2E24 amp; 829B amp; 6AG5 mod; 2)GL4D21/4; 3)5R4GY rect. Notes: mike or handset; G.E. thermocell crystal G66A.

6 v. input, 1 a. rec.; 35 a. trans. Tubes: same as 30 w. fixed transmitter, but with 2)5516 output. Notes: Shure mike 101B or W.E. F3WE3 handset; Carter dynamotor 620-VS. Receiver: single superhet.; 5.8 mc. IF; Radiart vibrator 5515; FT-243 crystal. Tubes: 6AK5 RF; 6AK5 RF; 6AK5 mix; 6AK5 IF; 6AK5 IF; 6AK5 lim; 6AK5 lim; 6AK5 mult; 6AK5 osc; 6AK5 noise amp; 6C4 AF cath fol; 6AQ6 control; 6AQ6 AF; 6AQ5 output.

Mobile: 152-162 Mc.
Transmitter: 20 w. to RG58U line; 6 v. input, 9 a. rec.; 45 a. trans. Tubes: 6AG5 osc; 6AG5 quad; 2E30 doub; 2E30 trip; 2E30 doub; 2)2E24 amp; 6AG5 mod. Notes: G.E. dynamotor; Shure military mike or W.E. handset 4MKH1A3; 2-freq. operation available. Receiver: Double superhet.; 6.1-6.7 & 2 mc. IF; G.E. crystal G64A; Mallory vibrator VP401. Tubes: 6AK5 RF; 6AK5 RF; 6BH6 1st mix; 2)6BJ6 high IF; 6BH6 2nd mix; 6BJ6 low IF; 6BH6 lim; 6BH6 lim; 6AQ7 disc & noise amp; 6BJ6 osc & trip; 6J6 trip & doub; 6AL5 noise rect; 6SL7 DC amp & AF; 6AQ5 output.

TAXICABS

Red Star Taxi Co Paris Texas	1914 3rd Av	25 W9XVI	152.27	Seegar Cab Co Ashland Wisc	601 Vaughn Av	7 W9XVV	152.27	South Bend Cab Co Inc South Bend Ind	710 N Niles	15 W6XMX	152.27
Red Top Cab Co Inc Little Rock Ark	523 W Markham	32 W6XTI	157.52	Sequin Taxi Co Marinette Wisc	3047 Hall Av	10 W9XUS	152.27	South Orange Radio Cab Orange NJ	72 3rd	5 K2XAG	152.27
Red Top Taxi Marysville Calif	120 D St	4 W6XDR	152.27	Service Cabs Knoxville Tenn	321 W Depot	40 W4XOI	152.27	Sparta Cabs Inc Sparta Wisc	124 E Oak	5 W9XHP	152.27
Red & White Cab Co Monterey Park Calif	265 W Garvey Blvd	6 W6XKD	152.27	Service Cabs Midwest City Okla	209 N Rickenbacker	6 W5XFE	152.27	Spaulding's Taxi Montpelier Vt	89 Barre	6 W1XJR	152.27
Red's Taxi Co Aberdeen Wash	408 E Wishkah	15 W7XHK	152.27	Service Taxi Co Ashland Ohio	58 W South St	8 W8XTG	152.27	Sperano's Taxi Ossining NY	17 Spring	15 W2XWC	152.27
Red Top Taxi Olympia Wash	113 W 4th	10 W7XLM	152.27	Service Cab Inc Dayton 7 Ohio	805 W 5th	25 W8XYI	152.27	Sprague Bradbury E Meredith NH	Main & Dover	3 W1XMW	152.27
Red's Taxi Co Great Falls Mont	15 3rd St So	10 W7XSC	152.27	Service Cab Glen Ellyn Ill	Main St	12 W9XFA	152.27	Sprague's Taxi Coshocton Ohio	519 Main	10 W8XKQ	152.27
Red & White Cab Ogden Utah	1810 Wall Av	15 W7XUQ	152.27	Service Cab Co Antigio Wisc	720 Superior	5 W9XGR	152.27	Squires' Taxi Waverly NY	27 Garfield	6 W2XWP	152.27
Red Cab Co Toledo Ohio	213 14th	150 W8XMT	152.27	Service Cab Co Savannah Ill	113 Madison	6 W9XWE	152.27	St Clair Cab Co St Clairsville Ohio	111 E Main	8 W8XZC	152.27
Red's Taxi Monro-Ohio	2504 10th	5 W9XFI	152.27	Serv-U-Cab Co Herrin Ill	1 No Park	10 W9XXN	152.27	St Louis City Cab Co Clayton Mo	8655 Maryland Av	21 WXCL	152.27
Red Cab Inc Indianapolis Ind	2020 N Ill St	288 W9XKP	152.27	777 Cab Co Grand Forks ND	Ryan Hotel	4 W4XBY	152.27	Standard Cab Co Woonsocket RI	864 Front	50 W1XBC	152.27
Red Top Cab Co Springfield Ill	400 E Jefferson	15 W9XMH	152.27	707 Cab & Bus Co Red Wing Minn	315 Plum	10 WXIS	152.27	Standard Taxi New Bedford Mass	2 Wing St	15 W1XUW	152.27
Red Top & Yellow Cab Co Waukegan Ill	133 E Merchant	20 W9XQR	152.27	79 Cab Co Hopkinsville Ky	802 S Virginia	15 W4XON	152.27	Star Taxi Rumford Maine	Congress St	6 W1XGY	152.27
Red Cab Co Elwood Ind	1524 So A St	6 W8XTE	152.27	77 Taxi Co Middletown Ohio	3 No Verity Pkwy	17 W8XGQ	152.27	Star Cab Co Lockport NY	49 Pine	5 W2XGA	152.27
Red Top Cab Co Inc Appleton Wisc	209 N Oneida	10 W9XWN	152.27	76 Taxi Harlingen Texas	118 W Van Buren	50 W5XEV	152.27	Star Cab Co Watertown NY	121 Stone	25 W2XOK	152.27
Reliable Cab Yakima Wash	7 North 1st	12 W7XIG	152.27	Shawnee Cab Co Shawnee Okla	109 S Bdway	10 K5XCU	152.27	Star Cab Alexandria Va	1117 Queen	35 W4XHT	152.27
Reliable Cab Gary Ind	1804 Mass	12 W9XHF	152.27	Sheboygan Cab Co Sheboygan Wisc	936 No 8th	5 W9XYI	152.27	Star Economy Cabs Inc Gainesville Fla	129 North Garden	20 W4XIA	152.27
Remnes Taxi Franklin NH	323 Central	13 W1XUK	152.27	Shelby Yellow Cab Co Shelbyville Ind	19 W Jackson	10 K9XBS	152.27	Star Cab Co Sumter SC	10 Virginia Dr	30 W4XTP	152.27
R F Bauder Taxi Serv Bethlehem Pa	335 Bdway	10 W3XVQ	152.27	Shore Yellow Cab Atlantic City NJ	2336 Pacific Av	25 W2XTX	152.27	Star Cab Co Moultrie Ga	128 1st St SW	15 W4XYV	152.27
Ridgewood Taxi Co Inc Ridgewood NJ	28 N Broad	25 W2XNV	152.27	Shore Cab Co Euclid Ohio	18701 Lake Shore	20 W8XOG	152.27	Star Taxi Co Houston Texas	PO Box 1248	275 W5XIV	152.27
Rite Rate Cab Co St Petersburg Fla	100 Central Av	80 W4XOL	157.52	Shorts Delaware Taxi Dover Del	Bank Lane & Gov Av	6 W3XXC	152.27	Star Taxi Co Beaumont Texas	636 Park	40 W5XJX	152.27
Robert's Cab Co Trenton Mo	1401 N Main	10 WXPY	152.27	Silver Top Cab Co Selma Ala	22 Church	15 W4XZG	152.27	Star Taxi Updell Calif	336 N 2nd	10 W6XJA	152.27
Robinson Taxi Co Brackenridge Pa	1st & Cherry	12 W3XAE	152.27	Silver Cab Co Silver City New Mex	217 Main	10 W7XNN	152.27	Star Cab Co Pocatello Idaho	226 W Bonnevillie	6 W7XOI	152.27
Rochelle Cab Co Rochelle Ill	233 N Main	5 W9XTA	152.27	Silver Streak Cab Co Lewiston Idaho	217 Main	10 W7XNN	152.27	Star Cab Co Birmingham Mich	970 Ruffner	12 W8XWT	152.27
Rochester Yellow Cab Rochester Minn	16 1st Av SW	50 WDXD	152.27	Silverton Cabs Silverton Ohio	7134 Montgomery Av	6 W8XFD	152.27	State Cab Co Peoria Ill	316 Hamilton Blvd	25 W9XSE	152.27
Rockland Taxi Service Nyack NY	12 Park	3 W2XRX	152.27	Sirmat Taxi Service Leominster Mass	175 Mechanic	3 W1XEV	152.27	Station Wagon Taxi Minneapolis Minn	4201 W 25th	3 W9XW	152.27
Roofner Taxi Kittanning Pa	879 Johnston Av	6 W3XQM	152.27	600 Cab Serv Inc Burlington Vt	121 St Paul St	15 WDKRT	152.27	Stedman's Taxi Service Waterville Me	Elmwood Hotel	6 W1XBV	152.27
Rose City Taxi Co Madison NJ	14 Lincoln Pl	10 W2XKA	152.27	6400 Cabs Inc Geneva NY	6400 Cabs Inc Geneva NY	7 W2XVI	152.27	Steel City Taxi Co Youngstown Ohio	478 W Federal	44 W8XNO	152.27
Roseville Cab Co Roseville Mich	26561 Gratiot Av	6 W8XQM	152.27	678 Cab Co Columbia Tenn	710 N Garden	16 W4XFN	152.27	Town Cab Co Conshocken Pa	6 Wash St	6 W3XKA	152.27
Roselindale Taxi Inc Roselindale Mass	775 South St	6 W1XHM	152.27	606 Taxi Checker Cab Hattiesburg Miss	120-1/2 Front	25 W5XIT	152.27	Stephenson Taxi Serv Pottsville Pa	115 E Norwegian	15 W3XUS	152.27
Rousseau's Taxi Waterville Me	105 Water	5 W1XUL	152.27	600 Cab Co Columbus Miss	403 2nd Av North	12 W5XSU	152.27	Sherman Taxi Co Beverly Mass	35 Bow St	7 W1XMM	152.27
Royal Cab Co Davenport Ia	1823 W High	20 WXHL	152.27	600 Taxi Co Coos Bay Ore	337 S Bdway	5 W7XOK	152.27	Stevens Auto Cab Co New Canaan Conn	49 Elm	12 W1XQL	152.27
Royal Cab Winona Minn	125 Main	12 W1XFL	152.27	61 Cab Co Cleveland Miss	North St & Hwy 81	12 W5XMM	152.27	Stewart Doyle Inc Fargo ND	20 7th St South	15 W1XTW	152.27
Royal Cab Co Central Falls RI	500 Roosevelt Av	15 W1XRD	152.27	Skipwith Quintin Newburgh NY	28 Smith	15 W2XPW	152.27	Stewart Manor Taxi Co Franklin Sq NY	15 Court St	5 K2XBC	152.27
Royal Cab Co Monticello NY	309 Bdway	20 K2XCZ	157.53	Skylite Taxi Co Sacramento Calif	520 Calif St	3 W6XUN	152.27	Stidman Roy Centralia Wash	215 N Pearl	3 W7XPK	152.27
Royal Taxi Serv Peekskill NY	696 Central Av	10 W2XJQ	152.27	Smallwood Cabs Lanett Ala	98 Jennings	10 W4XKI	152.27	Stoner Cab Co Greencastle Ind	100 W Berry	2 W9XMA	152.27
Royal Cab Co West Chester Pa	114 N High	12 W3XCT	152.27	Smith Taxi Co Cape May NJ	513 Wash St	10 K2XAN	152.27	Stout Taxi Sellersville Pa	63 N Main	5 W3XKW	152.27
Royal Cab Co Aberdeen Wash	316 E Wishkah	6 K7XAJ	152.27	Smith Taxi Portland Me	187 High	4 W1XLT	152.27	Streamline Cab Co Washington NJ	101 W Wash Av	5 W2XHX	152.27
Royal Cab Co Astoria Ore	604 Bond	10 W7XOO	152.27	Smith Taxi Corp Norwich Ny	2-4 Fair St	10 W2XEZ	152.27	Stringer's Vet Cab Co Ames Ia	316 Lincoln Way	10 WXXZ	152.27
Royal Cab Co Pasco Wash	323-1/2 W Lewis	10 W7XSG	152.27	Smith Taxi Co Coeur D'Arleide Idaho	224 Sherman Av	2 W7XRX	152.27	Stuart Gardens Cabs Newport News Va	1835 Wickham Av	5 W4XYJ	152.27
Royal Blue Cab Juneau	102 Franklin	25 K7XUE	152.27	Smith's Yellow Cab Sweetwater Texas	306 Elm	7 K5XBP	152.27	Suburban Cab Co Ardmore Pa	Pa R R Station	15 W3XAK	152.27
Royal Cabs Wheaton Ill	101 E Liberty Dr	15 W9XDG	152.27	Smitty's Cab Co Framingham Mass	44 Proctor	5 W1XJV	152.27	Suburban Taxi Co Wilmington Del	302 W 8th	7 W3XSQ	152.27
Royal Cab Co Warsaw Ind	Center & High	8 W9XDY	152.27	Somerset Taxi Serv Somerset Pa	145 W Main	6 W3XVQ	152.27	Summit Argo Cab Co Argo Ill	7701 63rd	3 W9XZK	152.27
Royal Cab Co Connersville Ind	130 W 8th	8 W9XLJ	152.27	Southeast Taxi Co Compton Calif	1121 E Rosecrans	22 W6XML	152.27	Sun Cab Co Auburn Me	34 Court	5 W1XNS	152.27

**KAAR ENGINEERING CO.
Palo Alto, Calif.**

Fixed: No. FM-50A, 30-44 Mc.
Transmitter: 50 w. to 30-70 ohm line; AC input 350 w. Tubes: 6V6GT osc; 6V6GT mod; 6V6GT mod; 6V6GT ampl mod; 6V6GT trip; 6V6GT quad; 6V6GT quad; 2)807 output; 3)5R4GY rect. Notes: Kaar mike G-635; Kaar crystal E.

Fixed: No. FM-100A, 30-40 Mc.
Transmitter: 100 w. to 30-70 ohm line. Same as FM-50A, but with 4D22 instead of 2)807 output tubes.

Fixed: No. FM-250A, 30-40 Mc.
Transmitter: 250 w. to 30-70 ohm line. Same as FM-50A, but with 4-250A output tube.

Mobile: No. FM-50X, 30-44 Mc.
Transmitter: 50 w. output; 6 v. input, 4 a. rec.; 40 a. trans. Tubes: 5618 osc; 5618 mod; 5618 mod; 5618 ampl mod; 6518 quad; 6518

quad; 2E25 trip; 2)11Y69 output. Notes: Kaar mike 4C or Conn. handset 2060-W; Carter dynamotor; 2-freq. operation available. Receiver: double superhet.; 5.1-5.9 mc. & 455 kc. IF; Oak vibrator; Kaar crystal E. Tubes: 68S7 RF; 68S7 RF; 68S7 1st conv; 6G6G osc; 68S7 high IF; 68S7 2nd conv; 68J7 lim; 68J7 lim; 61H6 455-kc. disc; 68Z7 noise amp & rect; 68Z7 AF & sq; 6G6G output.

Mobile: No. FM-100X, 30-44 Mc.
Transmitter: 100 w. output; 6 v. input, 4 a. rec.; 70 a. trans. Tubes: same as FM-50X except 2)11Y-1269 tubes in output.

Fixed: No. FM-70A, 72-76 Mc.
Transmitter: 25 w. to 50-70 ohm line; AC input 350 w. Tubes: 6V6GT osc; 6V6GT mod; 6V6GT mod; 6V6GT ampl mod; 6V6GT quad; 6V6GT quad; 2E26 doub; 2)807 output. Notes: Kaar mike G-635; Kaar crystal E.

Mobile: No. FM-70X, 72-76 Mc.
Transmitter: 20 w. output; 6 v. input, 4 a. rec.; 40 a. trans. Tubes: 5618 osc; 5618 mod; 5618 mod; 5618 ampl mod; 5618 quad; 2E25 trip; 2)807 doub-out-put. Notes: Kaar mike 4C or Conn. 2060-W handset; Carter dynamotor; 2-freq. operation available. Receiver: double superhet.; 5.1-5.9 & 455 kc. IF; Oak vibrator; Kaar crystal E. Tubes: Same as 30-44 mc. receiver.

Fixed: No. FM-176A, 152-162 Mc.
Transmitter: 50 w. to 50-70 ohm line; AC input 350 w. Tubes: 6V6GT osc; 6V6GT mod; 6V6GT mod; 6V6GT ampl mod; 6V6GT quad; 6V6GT trip; 6V6GT doub; 2E26 doub; 829B output. Notes: Kaar mike G-635; Kaar crystal E.

Fixed: No. FM-252A, 152-162 Mc.
Transmitter: 250 w. to 50-70 ohm line. Same as FM-176A, plus GL-

591 output tube.

Mobile: No. FM-177X, 152-162 Mc.
Transmitter: 15 w. output; 6 v. input, 4 a. rec.; 25 a. trans. Tubes: 3A4 osc-mod; 3A4 quad; 3A4 trip; 3A4 doub; 2E24 doub; 2E24 out-put. Notes: Kaar mike 4C or Conn. handset 2060-W; Kaar vibrator 653X; 2-freq. operation available. Receiver: double superhet.; 5.3-5.7 & 455 kc.; Oak vibrator; Kaar crystal E or II. Tubes: 6AK5 RF; 6AK5 RF; 6AK5 1st mix; 6AK6 osc; 6B16 mult; 6B16 high IF; 6B16 2nd mix; 6B16 low IF & lim; 6B16 lim; 6AL5 disc; 6B16 noise amp; 6AQ6 AF & noise rect; 2)6AK6 output.

Mobile: No. FM-179X, 152-162 Mc.
Transmitter: 50 w. output; 6 v. input, 4 a. rec.; 55 a. trans. Tubes: same as FM-177X except 4-65A output, and Westinghouse dynamotor.

TAXICABS

Superior Taxi Middleboro Mass 160 Center St 6 WIXAL 152.27	Town Taxi Brockton Mass 226 Green 18 WIXKZ 152.27	United Taxi Serv Inc Syracuse NY 221 E Genesee 20 W2XGL 152.27	Veteran's Cab Co Carmel Ill 130 Main 8 W9XUA 152.27
Swan Taxi Service Butler Pa 222 New Castle St 10 W3XOV 152.27	Town Taxi Johnsbury Vt 71 Pearl 5 WIXJD 152.27	United Radio Cabs Fresno Calif 159 E Tulare 21 W6XQW 152.27	Vet & Lawrenceville Taxi 813 10th St Lawrenceville Ill 6 W9XUY 152.27
Swissvale Cab Pittsburgh Pa 1917 Hradaddock Av 5 W3XNC 152.27	Town Taxi Inc Boston Mass 160 Ipswich 10 WIXJC 152.27	United Taxi Co Clarksburg W Va 329 Hewes 10 W4XJF 152.27	Veteran's Cab Co Mauston Wisc 335 E State 4 W9XXF 152.27
Tacoma Taxi Co Tacoma Wash 1324 Market 50 W7XWU 152.27	Town Taxi Haverhill Mass 117 Winter 15 WIXPY 152.27	United Cab & Drivers-If Inc Rockford Ill 217 Church 46 W9XJL 152.27	Veteran's Cab Co DeKalb Ill 173 W Lincoln Hwy 6 W9XXH 152.27
Takoma Park Taxi Serv Takoma Park Md East & Laurel Av 22 W3XW0 152.27	Town Taxi Milford Mass 1 Jefferson 8 WDXVC 152.27	United Cab Co Anderson Ind 9 East 12th 18 W9XKW 152.27	Vets Cab Inc Wichita Kans 1102 E Douglas 40 WXFTE 152.27
Tamaqua Taxi Serv Tamaqua Pa 403 E Broad 10 W3XXU 152.27	Town's Taxi Winthrop Me Highland Av 5 WDXVD 152.27	United Yellow Cab Crawfordsville Ind 132 W Main 10 W9XRS 152.27	Vet's Taxi Cameron Mo 3rd & Walnut 8 WXPB 152.27
Tampa Cab Co Tampa Fla 109 W Cass 90 W4XWC 152.27	Town Taxi Hudson Mass 140 Main 10 WIXYA 152.27	United Cab Co LaPorte Ind 621 Monroe 6 W9XTW 152.27	Vets Border Taxi Int'l National Falls Minn 34 3rd 1 WXL 152.27
Tanner Motor Livery Santa Monica Calif 114C Santa Monica 25 W6XTA 152.27	Town Taxi Palisades Park NJ 418 Roff Av 12 W2XCF 152.27	University Cab Co Cambridge Mass 233 Mt Auburn 10 WIXDI 152.27	Vet's Stone Mill Cab Newport RI 5 West Bdway 15 W1XFN 152.27
Tanner Motor Livery Ltd San Diego Calif 910 Front 24 W6XTE 152.27	Town Cab Wellsville NY 33 Clark 10 K2XDL 152.27	Upton Cab Co Whiting Ind 1204 119th 8 W9XUN 152.27	Vet's Saf - T - Cab Ass'n Fall River Mass 58 Pleasant 30 W1XLC 152.27
Tanner Motor Livery Ltd Los Angeles Cal 320 S Beaudry 76 W6XNG 152.27	Town Taxi Ithaca NY 218 E State 4 W2XRD 152.27	Victory Taxi Service Tomkinsville NY 182 Bay 8 W2XVN 152.27	Vets Taxi Service Gowanda NY 152 Commercial 10 K2XAZ 152.27
Tanner Motor Livery Ltd Tucson Ariz 39 Driscoll 24 W7XJX 152.27	Town Cab Co Fond du Lac Wisc 8-1/2 N Main 6 W9XPI 152.27	V...-Cab Lompoc Calif 114 E Ocean Av 5 W6XU0 152.27	Vet's Cab Marcus Hook Pa 606 Market 5 W3XJW 152.27
Task V G Portsmouth NH 338 Middle St 12 WIXCH 152.27	Towner's Taxi Elmira NY 408 Maple Av 25 W2XJI 152.27	Valley Cottage Taxi Valley Cottage NY Kings Highway 5 W2XNP 152.27	Vets Cab Co Massillon Ohio 35 Lincoln Way W St 11 W8XEF 152.27
Tatman Taxi Service Lockland Ohio 211 E Wyoming Av 8 W1XYN 152.27	Transit Cab Co Watertown SD 112 4th Av SW 10 WXRH 152.27	Valley Coaches Inc Augusta Ga 14 Ninth St 40 W4XUV 152.27	Vet's Cab Lin Stevens Point Wisc 319 Normal Av 7 K9XBN 152.27
Taxi Service Inc Brunswick Ga 201 Gloucester 8 W4XNZ 152.27	Trenum's Taxi Westport Md 64 Main 15 W3XSA 152.27	Valley Taxi Grass Valley Calif 208 Mill St 6 W6XAN 152.27	Vet Cab Co Baraboo Wisc 142 4th Av 7 W9XDE 152.27
Taxi No 9 Las Cruces New Mex 131 W 5th 10 W5XGJ 152.27	Triangle Cab Co Inc El Paso Texas 701 N Willow 35 W5XJA 152.27	Vandever Taxi Serv Mt Carmel Ill 117 W 4th 6 W9XON 152.27	Vets Cab Co Janesville Wisc 209 Laurel Av 7 W9XEE 152.27
Taxicabs of Cincinnati Inc Cincinnati 431 W May 76 W6XNG 152.27	Tri-Boro Cab Co Munhall Pa 132 E 18th Av 20 W4XCL 152.27	Vaniska Inc Linden NJ 124 North Wood Av 10 W2XSK 152.27	Victory Cab Co Kirkwood Mo 14 W Argonne Dr 10 W0XII 152.27
Taxi Serv Inc Huntington W Va 501 4th Av 37 W8XNS 152.27	Tri-City Cab Co Troy NY 185 4th 10 W2XMQ 152.27	Van's Taxi Co Coldwater Mich 14 N Monroe 10 W8XGN 152.27	Village Taxi Richland Wash 500 G Wash Way 5 W8XVV 152.27
Taylor Taxi & Transfer Helena Mont 317 N Main 5 W7XNP 152.27	Trlo Cab Monroe Mich 9 Cass 15 W8XQV 152.27	Vernon Transit Co Vernon Texas 1731 Wilbarger 10 W5XEL 152.27	Village Cab Co Oak Park Ill 32 Lake 42 W9HOX 152.27
Teddy's Taxi Serv Saugatuck Conn New Haven Station 15 W1XRV 152.27	Triple 9 Cab Co Great Bend Kans 1827 Laklin 10 W1XMM 152.27	Veterans & Radio Cab Co Dubuque Ia 973 Main 15 W5XFK 152.27	Virginia Cab Co Martinsville Va 23 Church 23 W4XKJ 152.27
Terminal Cab Co St Charles Mo 401 N 2nd 20 W1XJG 152.27	Triple Six Taxicab Co Logan Ohio 48-1/2 W Main 4 W8XJH 152.27	Veteran's Cab Co Fort Scott Kans 849 State 10 W1XNA 152.27	Volsinsky's Spring Valley NY 14 Funston Row 10 W2XVH 152.27
Terminal Taxi Co of Framingham Mass 44 Dow 2 W1XLA 152.27	Tube City Taxi & Transfer McKeesport Pa 208 Hurrell Way 25 W3XUV 152.27	Veteran Cab Co Clinton Ia 142 6th Av South 10 W1XNN 152.27	W... Taxi Cab Service Harmon NY Wayne & Benedict Rv 6 W2XIR 152.27
Terminal Taxi New Bedford Mass 145 Middle St 20 W1XUI 152.27	Tucker Taxi Inc Pensacola Fla 216 N Alcaniz 40 W4XUT 152.27	Veteran Taxi Co Amherst Mass 6 Main 4 W1XJP 152.27	Wagner Cab Co Sandusky Ohio 135 Columbus Av 10 W8XVY 152.27
Terminal Taxi Co New Haven Conn 87 Putnam 100 WDXVL 152.27	Tunnel Taxi Anderson Ind 17 E 12th 12 W9XPQ 152.27	Veteran's Taxi Serv Olean NY 725 Front 15 W2XCH 152.27	Walley's Taxi Service Shenandoah Pa Ringtown Blvd 10 W3XRI 152.27
Terminal Taxi Jamestown NY 401 Prendergast 8 W2XJF 152.27	29 Taxi Cab Union City Tenn 2nd & Main 10 K4XAI 152.27	Veteran's Black & White Cab Wildwood NJ 207 East Taylor 4 W2XVU 152.27	Walker's Taxi Service Anityville LI NY 21 Sterling Pl 5 K2XBG 152.27
Terminal Taxi Ithaca NY 406 E Tompkins 13 W2XLF 152.27	1200 Cab Co Ruston La 103 S Trenton 12 W5XTT 152.27	Veteran's Car Service Buffalo NY 120 William 22 W2XZX 152.27	Walsh's Taxi Co Lindenhurst LI NY 171 S 14th 4 W2XHQ 152.27
Terminal Cars Inc Norfolk Va 335 W York 50 W4XIC 152.27	Twin City Taxi Service Biddleford Me 8 Cross 6 W1XTA 152.27	Veterans Cab Co Latrobe Pa 207 Depot 5 K3XAB 152.27	Wall's Cab Co Sandusky Ohio 2930 Venice Rd 5 W8XPC 152.27
Terminal Cab Greensville Tenn 313 Loretta 10 W4XKF 152.27	Twin City Taxi & White Spot Taxi Longview Wash 1966 3rd Av 15 W7XPG 152.27	Veterans Taxi Co Silver Springs Md 8 Old P O Rd 10 W3XLN 152.27	Waphton Cab Co Waphton ND 312 6th St North 10 W1XMX 152.27
Terminal Taxi Serv Eugene Ore 450 Willamette 19 W7XMX 152.27	Twin City Cab Co Ironwood Mich 116 S Lowell 12 W8XNU 152.27	Veterans Cab Ass'n Rockland Md 116 Commerce Land 27 W3XNE 152.27	Ware's Taxi Service Clearwater Fla 615 Park 19 W4XYR 152.27
Theodore Sek Cab Co Dunkirk NY 315-1/2 Main 15 W2XGJ 152.27	210 Cab Co Selma Ala PO Box 174 10 W4XQG 152.27	Veterans Dixie & 47 Cab Bessemer Ala 318 N 18th 15 W4XHE 152.27	Warren Twp Taxi Centerline Mich 25046 Van Dyke 15 W8XPG 152.27
318 Cab Co Maryville Mo 501 N Market 10 W1XNU 152.27	200 Cab Co Paragould Ark 100 E Main 10 W5XRY 152.27	Veterans Taxi Service Naval Base SC 22 Reynolds Av 10 W4XMZ 152.27	Warren Vets Cab Ass'n Ltd Warron Ohio 187 E Market 12 W8XFP 152.27
37-Service Taxi Mooresville NC 135 N Main 15 W4XSB 152.27	205 Cab Co Kirksville Mo 202 E Harrison 20 W1XRI 152.27	Veterans Cab Co Rock Hill SC 418 S Oakland Av 20 W4XPP 152.27	Watts Taxi Service Boothbay Harbor Me 47 Commercial 5 W1XGK 152.27
3333 Cab Co Wichita Falls Tex 705 Scott Av 20 W5XBH 152.27	Uber's Taxi Atoka Okla 107 E Court 5 W5XXU 152.27	Veterans Cab Co Guyton Okla 709 N Academy 5 K5XDW 152.27	Waukegan Yellow Cab Co Waukegan Ill 216 Wash St 20 W9XQJ 152.27
383 Cab Co Altus Okla 124 W Walnut 6 W5XRF 152.27	U-Need-A Cab Co Union SC 77 Main 20 W4XXW 152.27	Veterans Cab Co San Pablo Calif 2080 23rd 10 W6XXI 152.27	Wausau Cab Co Wausau Wisc 311 S 7th Av 12 W9XGI 152.27
318 Cab Co Taylorville Ill Hotel Frisina 5 W9XBM 152.27	Union Taxi Co International Falls Minn 240 3rd 5 W1XQD 152.27	Veterans Cab Co Sacramento Calif 547 Cherry St 15 W8XEZ 152.27	WE Cab Chevy Chase Md Wisc & Western Avs 45 W3XNG 152.27
Thrift Cabs Inc Jacksonville Fla 516 Washington 115 W4XKC 152.27	Union Square Taxi Co Lewiston Me 116 Middle 18 W1XDB 152.27	Veterans Cab Co Kalamazoo Mich 170 Portage 20 W8XGD 152.27	Weikie's Taxi Roncoverte W Va Frankford Rd 19 W4XTC 152.27
Tiedemann Service Westwood NJ 2 Westwood Av 11 W2XHU 152.27	Union Taxicab Co New London Conn 64 Brainard 14 W1XNE 152.27	Veterans Cab Co Okmulgee Okla 228 N 4th 30 W5XOD 152.27	Welsh Cab Co St Clair Shores Mich 22325 Nine Mile Rd 5 W8XLL 152.27
Tiller's Cars Norfolk Va 3021 Davis 20 W4XLW 152.27	Union Taxi Union NJ 1982 Morris Av 10 W2XES 152.27	Veterans Cab Co Port Huron Mich 1091 Military 6 W8XGS 152.27	L L Welsh Morrilton NJ 16 Dumont Pl 21 W2XIG 152.27
Tobey Taxi Passaic NJ 6 Peach 8 W2XKY 152.27	Union Cab Co Inc Dothan Ala 513 N St Andrews 20 W4XST 152.27	Veteran Town Cab Co Pasadena Calif 274 N Hill Av 4 W6XUS 152.27	W Allis Cab Co West Allis 14 Wisc 7300 W Greenfield 20 W9XGP 152.27
Tommy's Taxi Framingham Mass 532 Old Conn Path 8 W1XMI 152.27	Union Cab Co Columbus Ga 1048 Linwood Blvd 75 W4XZQ 152.27	Veterans Cab Co San Pablo Calif 2080 23rd 10 W6XXI 152.27	West Chicago Cab West Chicago Ill 222 Main 3 W9XWV 152.27
Tom Fords Red Top Cabs Scranton Pa 243-1/2 Who Av 12 W3XQD 152.27	Union & Club Taxi Co Sacramento Calif 1131 7th 30 W6XLG 152.27	Veteran's Coop Taxi Grand Rapids Mich 547 Cherry St 15 W8XEZ 152.27	West Shore Taxi New Cumberland Pa Box 152 Old York Rd 10 W3XHY 152.27
Tony's Taxi Haverstraw NY 5 W Broad 6 W2XNC 152.27	Union Cab Co Portland Ore 205 SW Jefferson 41 W7XIK 152.27	Veterans Cab Co Kalamazoo Mich 170 Portage 20 W8XGD 152.27	Whalen's Taxi Binghamton NY 145 Water 15 K2XDJ 152.27
Top's Taxi Elmira NY 420 N Main 15 K2XNB 152.27	Union Cab & Airlines Anchorage Alaska 520 Fifth Av 12 K7XPK 152.27	Veteran's Cab Co Flint Mich 604 Garland 30 W8XQK 152.27	Wheeler & Nutting Taxi Nacha, Ill 2 Lock 7 W1XET 152.27
Topper Taxi Co Bakersfield Calif 1925 K St 12 W6XSQ 152.27	Union Taxi Co Tacoma Wash 1348-1/2 Bdway 25 W7XPZ 157.53	Veteran's Cab Co Pontiac Mich 608 Auburn 30 W8XUI 152.27	White Top Cab Co Titon Ga 1st Ct 10 W4XJD 152.27
Tower Taxi Serv Inc Mt Clemens Mich 60 Court 10 W8XFA 152.27	Union Day & Night Taxi Bickley W Va 118 N Heber 15 W8XNH 152.27	Veterans Cabs Moundsville W Va 713 7th 10 W8XVC 152.27	White Top Cabs Griffin Ga Rte A 8 W4XVJ 152.27
Town Taxi St Cloud Minn 22-19-1/2 Av North 10 W1XLL 152.27	Union Cab Co Mt Pleasant Mich 517 S Wash St 8 W8XVV 152.27	Veteran's Cab Co East Liverpool Ohio 313 Market 10 W8XVI 152.27	White Cab Co Graham Texas 423 Oak 10 W5XDQ 152.27
Town Taxi Co Portland Me 151 High 28 W1XGC 152.27	United Cab Co Omaha Neb 7712 Erskine 10 W1XIG 152.27	Veterans Cab Ashland Wisc 218 2nd Av West 6 W9XSM 152.27	White Cab Co Brownwood Texas 309 Lee 15 W5XPN 152.27
Town Taxi Brunswick Me 7 Town Hall Pl 10 W1XGJ 152.27			White Top Cab Co Houston Texas 7506 Av - P 25 W5XRJ 152.27
Town Taxi Lawrence Mass 229 Howard 8 W1XGS 152.27			White Cab Co Woodward Okla 1019 N 9th 10 W5XRQ 152.27

LINK RADIO CORP.

New York City

Fixed: No. 2365, 25-50 Mc.

Transmitter: 30 w. to 50-70 ohm line; AC input 245 w. Tubes: 12AT7 osc & mod; 6BJ6 doub; 6BJ6 quad; 2E30 doub; 2E30 doub; 2E24 output.

Mobile: 25-50 Mc.

Transmitter: 30 w. output; 6 v. input, 6.3 a. rec.; 25 a. trans. Tubes: same as 30 w. transmitter above. Receiver: double superhet.; 5 mc.

& 456 kc. IF. Tubes: 6BJ6 RF; 12AT7 osc & mix; 6BJ6 high IF; 6BE6 conv; 6BJ6 low IF; 6BJ6 lim; 6BJ6 lim; 12AX7 noise amp & rect; 12AX7 AF & sq; 6AQ5 output

Pack Set: No. 1810, 30-40 Mc.

Transmitter: 1/2 w. output; 2 Eveready 742 batteries, 1.5 v.; 2 type 482, 45 v.; 1 type 467, 67.5 v. Tubes: 1L4 osc; 1R5 mod; 1R5 mod; 1L4 quad; 1L4 doub; 1L4 doub; 3Q4 doub; 3A4 output. Re-

ceiver: double superhet.; 5 mc. & 456 kc. IF. Tubes: 1L4 RF; 1L4 RF; 1L4 osc & mult; 1L4 mix; 1L4 high IF; 1R5 conv; 1L4 low IF; 1L4 IF; 1L4 lim; 1L4 lim; 1S5 sq amp & rect; 1L4 AF; 1L4 output. Weight: total weight with batteries & 37-in. whip antenna, 15 1/2 lbs.; with 12 1/2-ft. whip antenna, 18 lbs. **Fixed: No. 2210, 152-162 Mc.** Transmitter: 10 w. to 50-70 ohm line; AC input 110 w. Tubes: 7P7 osc & mod; 6AK5 quad; 6AK5

trip; 2E30 doub; 2E30 doub; 2E24 output.

Mobile: 152-162 Mc.

Transmitter: 10 w. output; 6.8 v. input, 7 a. rec.; 14 a. trans. Tubes: same as 10 w. fixed transmitter above. Receiver: double superhet.; 10.7 mc. & 456 kc. IF; Tubes: 6AK5 RF; 6AK5 mix; 6AH6 osc; 7AG7 high IF; 7AG7 high IF; 7A8 conv; 7AG7 lim; 7C7 lim; 7A6 disc; 7F7 noise amp & rect; 7F7 AF & sq; 7B5 output.

MOBILE

COMMUNICATIONS CO.

Long Beach 2, Calif.

Fixed: 152-162 Mc.

Transmitter: 50 w. to 52-ohm line; AC input 440 w. Tubes: 6AK6 osc; 6BJ6 mod; 6BJ6 speech amp;

6J6 quad & trip; 6AK6 doub; 6AK6 doub; 6AK6 doub; 832 amp; 829 output. Notes: W.C.E. dynamic or W.E. carbon mike; Mon. Prod. temperature-controlled crystal.

Mobile: 152-162 Mc.

Transmitter: 15 or 25 w. to RG8U

or RG58U line; 6 v. input, 3.5 or 3 a. rec.; 21 or 30 a. trans. Tubes: same as 50 w. fixed transmitter above. Notes: W.E.C. vibrator or Carter dynamotor; Shure mike CB-12A or Amer. handset TS-13; 2-freq. operation available. Receiver: Double superhet.; 23.5 & 2.1 mc.

IF; Mallory vibrator 1501; Mon. Prod. temperature-controlled crystal. Tubes: 6AK5 RF; 6AK5 1st mix; 6AK5 IF; 6BE6 2nd mix; 6BJ6 IF; 6BJ6 IF; 6BH6 lim; 6BH6 lim; 12AX7 AF & sq; 6BH6 noise amp; 6J6 osc & trip; 6AK6 doub; 6AK6 output.

25-50 mc-

**FIXED STATION - MOBILE
RADIO COMMUNICATION
EQUIPMENT TYPE 2365**

TOP PERFORMANCE!

Link

RADIO

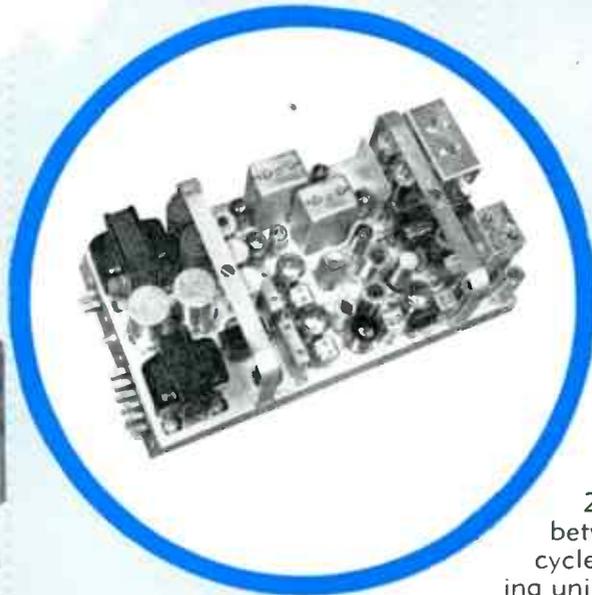
TRANSMITTER-RECEIVER

FOR

FIXED STATION

AND

MOBILE SERVICE



Link

Radio Transmitter - Receiver Type 2365 for any frequency between 25 and 50 megacycles is the one outstanding unit in the field today for both mobile and fixed station service. The transmitter has a full 30 watts output and the receiver gives a whole new conception of sensitivity and selectivity. The maximum battery drain is only 25 amps. at 6.0 V. dc and the standby drain including the 11 tube receiver, is only 6.3 amps. at 6.0 V. dc. The single transmitter-receiver chassis is equally at home in either the mobile housing or in the deluxe table console Type 2442 with 115 V. ac supply. The mobile unit for 12 V. dc supply is ideal for fire equipment, planes, boats and trucks. Write today for full descriptive details.

Link **RADIO CORPORATION • 125 WEST 17TH ST., NEW YORK 11, N. Y.**

TAXICABS

White Top Cab Co Jackson Miss 555 Auto Hotel 3 W5XTJ 152.27	White Cab Co Madison 30 W5XZG 152.27	White Top Cab Co Fairbanks Alaska 414 2nd Av 4 K7XOA 152.27	White Top Cab Co Cincinnati Ohio 847 Blair Av 5 W8XKY 152.27	White Tip Cabs Nelsonville Ohio 39 W Wash St 10 W8XSF 152.27	White Cab Co Washington Ind 801 McCormick Av 6 W9XDI 152.27	White Line Cab Co Freeport Ill 121 S Galena 13 W9XJJ 152.27	White Cab Service Lake Geneva Wisc 910 Madison 3 W9XHU 152.27	White Top Cab Marion Ill 102 S VanBuren 15 W9XEX 152.27	Wichita Cab Co Inc Wichita Kans 728 W Douglas 85 WXLK 152.27	Wilde & Wilde Inc Fresno Calif 1881 Bdway 50 W8XQP 152.27	Wildt Cab Co Princeton Ind 123 S Main 8 K9XBF 152.27	Williamsport Yellow Cab Williamsport Pa 837 Penn 30 W3XSV 152.27	Willie's Taxi Milledgeville Ga 213 S Wayne 5 W4XCA 152.27	Willoughby Cab Co Willoughby Ohio Eric St 13 W5XTU 152.27	Winder Taxi Co Winder Pa 12th & Graham Av 5 W3XGK 152.27	Winona Cab Co Winona Minn 126 E 3rd 5 WKKX 152.27	Winslow's Taxi Elizabeth City NC 507 Parsonage Ext 15 W4XRZ 152.27	Winter Park Taxi Winter Park Fla 204 Park Av 2 W4XLL 152.27	Wood's Taxi Serv Rockland Me 4 Winter 10 W1XTK 152.27	Wyandotte Cab Co Wyandotte Mich 3259 Elddie 5 W8XKL 152.27	Wychwood Cab Co Westfield Nj 605 South Av 12 W2XPH 152.27	Yale Taxi Co Cleburne Texas 111 E James 10 W5XFG 152.27	Yank's Inc Lansing Mich 1024 E Mich Av 20 W8XKP 152.27	Yell-O Cab Monessen Pa 614 Donner Av 15 W3XBT 152.27	Yellow Cab Co of Mo Kansas City 6 Mo 201 W 14th 275 WXAA 152.27	Yellow Cab Co Sioux Falls SD 319 S 1st Av 25 WXAG 152.27	Yellow Cab & Baggage Co Topeka Kans 121 N Kans Av 46 WXAT 152.27	Yellow Cab Co Marshalltown Ia 7 N 2nd Av 15 WXBW 152.27	Yellow Cab Co Lincoln Neb 206 N 7th 32 WXCT 152.27	Yellow Cab Co Des Moines Ia 550 7th 100 WDXF 152.27	Yellow Cab Co Rapid City SD 611 8th 15 WXGU 152.27	Yellow Cab Co Ottumwa Ia 105 N Court 13 WXGY 152.27	Yellow Cab & Baggage Co Joplin Mo 313-1/2 Joplin 30 WXHRQ 152.27	Yellow Cab Co Inc Jamestown ND 210 1st Av North 10 WXJS 152.27	Yellow Cab Co Fort Dodge Ia 10 N 7th 10 WXJY 152.27	Yellow Cab Co North Platte Neb 518 N Pine 25 WXPX 152.27	Yellow Cab Co Inc Springfield Mo 220 N Jefferson 40 WXLJ 152.27	Yellow Cab Co Jefferson City Mo 109-1/2 High St W 15 WXLPL 152.27	Yellow Cab Co Owatonna Minn 339 N Cedar 10 WXLX 152.27	Yellow Cab Co Cherokee Ia 212 Main 12 WXMV 152.27	Yellow Cab Co Newton Ia 212 1st Av 6 WXNE 152.27	Yellow Top Taxi Co Huron SD 49 2nd St SW 10 WXNL 152.27	Yellow Cab & Del Serv Greeley Colo 712 8th 10 WXNR 152.27	Yellow Cab Co Muscatine Ia 211 Cedar 10 WXNK 152.27	Yellow Cab Co Mason City Ia 29 1st St SW 20 WXQJ 152.27	Yellow Cab Co Inc Clinton Ia 213 7th Av South 14 WXQJ 152.27	Yellow-Checker Cab Co Iowa City Ia 105 S Dubuque 20 WXRB 152.27	Yellow Cab Co Grand Island Neb 333 N Cedar 12 WXRU 152.27	Yellow Cab Co Sedalia Mo 306 S Lamine 15 WXSA 152.27	Yellow Cab Co Hartford Conn 8 Jewel Court 50 WIXEG 152.27	Yellow Cab Co Fitchburg Mass 231 Main 5 WIXQV 152.27	Yellow Cab Co Salamanca NY 137 Main 4 W2XDP 152.27	Yellow Cab Corp of Passaic & Clifton NJ Passaic NJ Erie St 9 W2XDP 152.27	Yellow Cab Co Monticello NY 291 Bdway 11 W2XQM 152.27	Yellow Cab Co Niagara Falls NY 982 Ontario Av 10 W2XRE 152.27	Yellow Cab Co Pittsburgh Pa 2 Ross 50 W3XAG 152.27	Yellow Cab Co York Pa Clark & Cherry 50 W3XEL 152.27	The Yellow Cab Co Baltimore Md 508 E Preston 100 W3XBN 152.27	Yellow Cab Co Allentown Pa 517 Court 40 W3XDX 152.27	Yellow Cab Co Lansdale Pa 810 N Broad 8 W3XED 152.27	Yellow Cab of Del Co Chester Pa Pa R R Station 30 W3XEI 152.27	Yellow Taxi Inc Wilmington 50 Del 302 Penna Bldg 40 W3XIE 152.27	Yellow Cab Philadelphia Pa 1505 Race 50 W3XNO 152.27	Yellow Cab Johnstown Pa 315 Bedford 15 W3XPY 152.27	Yellow Cab Co Philadelphia 1505 Race 50 W3XRP 152.27	Yellow Cab Inc Washington DC 1801 N Y Av NE 231 W3XWM 152.27	Yellow Cab Co Philadelphia Pa 1505 Race 25 W3XWV 152.27	Yellow Cab Co Cleveland Tenn 509 Inman 20 W4XAX 152.27	Yellow Cab Co Plant City Fla 218 N Collins 15 W4XBC 152.27	Yellow Diamond Cab Co Charleston SC 77 Wentworth 35 W4XDC 152.27	Yellow Cab Co of Va Inc Richmond Va 7 S Granby 105 W4XDM 152.27	Yellow Cab Co Thomasville Ga 115 N Crawford 15 W4XGP 152.27	Yellow Cab Co Jackson Tenn 403 S Liberty 15 W4XHK 152.27	Yellow Top Cab Co & City Cabs Opelika Ala 804 Railroad Av 20 W4XIU 152.27	Yellow Cab Co Rock Hill SC Black & Oakland 20 W4XIY 152.27	Yellow Cab Co Atlanta Ga 20 Houston St NE 56 W4XLY 152.27	Yellow Cab Co Inc Raleigh Nc 233 Fayetteville 70 W4XMS 152.27	Yellow Cab Co Inc Greenville SC 126 West Court 24 W4XNG 152.27	Yellow Cab Co Inc Charlotte Nc 317 S Poplar 112 W4XNT 152.27	Yellow Operating Co Miami Beach Fla 1048 5th 50 W4XNQ 152.27	Yellow Cab Co Memphis Tenn 306 Jefferson Av 110 W4XNS 152.27	Yellow Taxi & Trans Co Tampa Fla 1011 E Lafayette 51 W4XPA 152.27	Yellow Cab Co Newport News Va 3914 Jefferson Av 20 W4XQR 152.27	Yellow Cab Co Inc Lakeland Fla 132 Lake Beulah Dr 10 W4XQT 152.27	Yellow Cab Winchester Va 11 W Piccadilly 6 W4XRN 152.27	Yellow Dot Cab Co Albany Ga 304 W Broad Av 16 W4XRV 152.27	Yellow Cab Co Hopkinsville Ky 7th & Virginia W4XUP 152.27	Yellow Cab Co Bowling Green Ky 817 State 35 W4XWV 152.27	Yellow Cab Co Winston-Salem NC 91 Burke 25 W4XYA 152.27	Yellow Cab Co Savannah Ga 315 E Congress 100 W4XYK 152.27	Yellow Cab Co Ashland Ky 328 13th 20 W4XYT 152.27	Yellow Cab Co Inc St Petersburg Fla 100 4th St South 80 W4XZS 152.27	Yellow Cab Co Wewoka Okla 104 N Meeksuka 10 K5XAF 152.27	Yellow Cab Co Lubbock Texas 1110 Av K 10 W5XAN 152.27	Yellow Cab Co Durand Okla 407 W Main 10 W5XAR 152.27	Yellow Cab Co Seminole Okla 406 Market 10 W5XAS 152.27	Yellow Cab Co Norman Okla 110 Comanche 20 W5XAV 152.27	Yellow Cab Co Palestine Texas 407 W Spring 10 K5XBG 152.27	Yellow Cab Co Clarksville Texas 201 E Bdway 10 K5XBU 152.27	Yellow Cab & Safeway Cab Mt Pleasant Tex 101 S Jefferson 12 W5XBU 152.27	Yellow Cab Co Inc Brookhaven Miss 103 N Whitworth Av 10 K5XDO 152.27	Yellow Cab Co Wichita Falls Tex 901 8th 15 W5XEF 152.27	Yellow Cab Co Fayetteville Ark 109 Block St 10 W5XER 152.27	Yellow Cab Co New Iberia La 152 W Main 10 W5XEV 152.27	Yellow Cab Co Magnolia Ark 123 N Wash 10 W5XFQ 152.27	Yellow Cab Co Pampa Texas 311 S Cuyler 15 W5XFX 152.27	Yellow Top Cab Co Houma La 806 E Main 9 W5XFY 152.27	Yellow Cab Co Kerrville Texas 102 Sidney Baker St 10 W5XGS 152.27	Yellow Cab Co Shawnee Okla 30 E Union 10 W5XGT 152.27	Yellow Cab Co McAlester Okla 30 E Cherokee 10 W5XGZ 152.27	Yellow Cab Co Hattiesburg Miss Box 255 15 W5XHH 152.27	Yellow Cab Co Alexandria La 524 Murray 20 W5XIX 152.27	Yellow Cab Co of Gulfport Miss 1420 28th Av 45 W5XJJ 152.27	Yellow Cab Co of Beaumont Beaumont Tex 641 Pearl 27 W5XLO 152.27	Yellow Cab Co & Capt Amos Taxi Co Bldg 1117 E Howard 10 W5XME 152.27	Yellow Cab Co Carlsbad N Mex 323 S Canyon 20 W5XMF 152.27	Yellow Cab & Checker Cab Albuquerque NM 112-1/2 W Central Av 43 W5XNQ 152.27	Yellow Cab Co Little Rock Ark 301 W Markham 31 W5XOR 152.27	Yellow Cab Safety Cab & Black & White Cab Co Abilene Texas 428 Cypress 65 W5XOW 152.27	Yellow Cab Co Stillwater Okla 220 E 8th 12 W5XOX 152.27	Yellow Cab Co El Dorado Ark 304-1/2 S Wash 25 W5XOY 152.27	Yellow Cab Co Inc Shreveport La 718 Crockett 129 W5XPA 152.27	Yellow Cab & Baggage Co Enid Okla 216 W Maple 20 W5XPC 152.27	Yellow Cab Co Corpus Christi Texas 824 S Staples 50 W5XPQ 152.27	Yellow Cab Co Marshall Texas 17 W5XQG 152.27	Yellow Cab Co Inc Galveston Tex 511 Tremont 50 W5XQS 152.27	Yellow Cab Co Greenville Tex 2405 Oak 20 W5XQT 152.27	Yellow & Deluxe Cabs Bartlesville Okla 410 S Dewey 10 W5XRG 152.27	Yellow Cab Co Killeen Tex Ave B 24 W5XSL 152.27	Yellow Cab Co Opelousas La 701 E Landry 15 W5XSO 152.27	Yellow Cab & Baggage Co Amarillo Texas 306 S Fillmore 40 W5XSW 152.27	Yellow Cab Co Paris Texas 29 E Kaufman 25 W5XSX 152.27	Yellow Cab Co San Angelo Texas 32 W Twohigh 25 W5XUV 152.27	Yellow Cab Co Inc Texarkana Texas 111 State Line Av 20 W5XVJ 152.27	Yellow Cab Co Longview Texas 403 E Whaley 20 W5XVS 152.27	Yellow Cab Co Big Spring Texas 313 Runnels 15 W5XZE 152.27	Yellow Cab Co Midland Texas 107 N Colorado 10 W5XZR 152.27	Yellow Cab Service Anahelm Calif 1817 E Center 10 W5XDC 152.27	Yellow Cab Co Ventura Calif 175 E Main 10 W6XBW 152.27	Yellow Cab Co Eureka Calif 300 E St 20 W6XCH 152.27	Yellow Cab Sequoia Cab & Redwood Cab 15 W6XES 152.27	Yellow & Checker Cab Co Santa Rosa Calif 240 Main 10 W6XEV 152.27	Yellow Cab Co Santa Rosa Calif 10 W6XFR 152.27	Yellow Cab Co of Calif Los Angeles Calif 1408 W 3rd St 50 W6XHF 152.27	Yellow Cab Co San Rafael Calif 923 Tamalpais Av 10 W6XIV 152.27	Yellow Cab Co Oroville Calif 1923 Montgomery 10 W6XIW 152.27	Yellow Cab Co San Clemente Calif Motel 7 Palms 3 W6XIX 152.27	Yellow Arrow & Acme Cab Santa Cruz Cal 1330 Pacific Av 10 W6XJU 152.27	Yell-O Cab Oxnard Calif 519 Oxnard Blvd 10 W6XKQ 152.27	Yellow Cab Co Petaluma Calif 128 Kentucky 6 W6XLF 152.27	Yellow Cab Co Oceanside Calif 101-1/2 S Hill 25 W6XHN 152.27	Yellow Cab Co National City Calif 37 W 7th 20 W6XOG 152.27	Yellow Cab Co Los Angeles Calif 408 W 3rd 1003 W6XPA 152.27	Yellow Cab Co Richmond Calif 251 24th 20 W6XQU 152.27	Yellow Cab Service Mountain View Calif 157 Castro 8 W6XRL 152.27	Yellow & Red Top Cab San Bernardino Cal 266 F St 43 W6XSK 152.27	Yellow Cab Co Taft Calif Fox Hotel 3 W6XTW 152.27	Yellow and Blue & White Cab 3755 Market Riverside Calif 15 W6XXA 152.27	Yellow Cab Co Bakersfield Calif 1101 18th 45 W6XYI 152.27	Yellow Cab Co Salinas Calif 16 E Market 30 W6XYQ 152.27	Yellow Cab Co Marysville Calif 424 5th 10 W6XZF 152.27	Yellow Cab Co Twin Falls Idaho Main & Shoshone 9 W7XHM 152.27	Yellow Cab Co Anchorage Alaska PO Box 2428 10 K7XKH 152.27	Yellow Cab Co Klamath Falls Ore 11-1/2 S 8th 15 W7XLO 152.27	Yellow Cab Co Astoria Ore 13th & Duane 5 W7XOQ 152.27	Yellow Cab Co Medford Ore 105 E 8th 6 W7XOT 152.27	Yellow Cab Co Missoula Mont 116 W Front 15 W7XRV 152.27	Yellow Cab Co Bellingham Wash 100 E Chestnut 17 W7XUL 152.27	Yellow Cab Co Inc Cleveland Ohio 2020 W 3rd 98 W8XAI 152.27	Yellow Cab & US Cab Muskegon Mich 503 W Western Av 15 W8XBW 152.27	Yellow & Checker Cab & Trans Co Flint Mich 301 Beach St 75 W8XGX 152.27	Yellow Cab Co Marion Ohio 178 E Center 30 W8XIY 152.27	Yellow Cab Co Adrian Mich 132 N Winter 13 W8XJD 152.27	Yellow Stripe Cab Co Mansfield Ohio 79 N Walnut 12 W8XMY 152.27
--	--------------------------------------	--	---	---	--	--	--	--	---	--	---	---	--	--	---	--	---	--	--	---	--	--	---	---	--	---	---	--	---	--	---	--	---	---	--	---	--	--	---	--	---	--	--	--	--	---	--	--	---	--	---	---	--	--	--	---	---	--	---	---	---	---	---	--	---	---	--	---	---	---	--	--	---	--	---	--	--	---	---	---	---	--	--	--	--	---	--	---	--	--	--	---	---	--	---	---	---	---	--	---	---	--	--	---	--	---	---	--	--	---	---	---	--	---	---	--	---	--	---	--	---	--	--	---	---	--	--	---	--	--	--	---	--	--	--	---	---	---	---	--	---	--	---	---	--	---	--	---	--	---	---	---	--	--	---	---	--	--	--	--	---	--	---	---	--	---	--	---	--	---	--	---	---	--

MOTOROLA, INC.

Chicago 51, Illinois
Fixed: FSATR-50BR(A),
25-50 Mc.

Transmitter: 50 w. to 50-ohm line;
AC input 340 w. Tubes: 7C7 osc;
7A8 mod; 7A8 mod; 7C7 quad;
7C7 quad; 6V6 doub; 2)807 out-
put; 2)5Z3 rect. Notes: Shure
military mike; Motorola tempera-
ture-controlled crystal; 2-freq.
operation available.

Fixed: FSATR-250BR(A),
25-50 Mc.

Transmitter: 250 w. to 50-ohm line;
AC input 1,350 w. Tubes: same as
50-w. transmitter above, plus 2)
100TH output tubes.

Mobile: FMATR-30D(B),
25-50 Mc.

Transmitter: 30 w. output; 6 v. in-
put, 11.5 a. rec.; 40 a. trans. Tubes:
Same as 50 w. fixed transmitter,
with only one 807 output. Notes:
Carter dynamotor; Shure mike or
W.E. handset; Motorola tempera-
ture-controlled crystal; 2-freq.

operation available. Receiver:
double superhet.; 2.7 & 2 mc. IF;
Motorola temperature-controlled
crystal. Tubes: 7AG7 RF; 7C7 1st
mix; 7AG7 1st IF; 7A8 2nd mix;
7AG7 2nd IF; 7C7 1st; 7C7 1st;
7A6 disc; 7C7 noise amp; 7A6
noise rect; 7F7 AF & sq; 7C5 out-
put.

Mobile: Handie-Talkie,
25-50 Mc.

Transmitter: 5 w. output; 6 v. in-
put, .01 a. rec.; .05 a. trans. Tubes:
5672 osc; 2E36 mod; 2E36 buffer;
5672 mult; 2)2E36 mult; 1S4 mult;
3B4 output. Notes: 3 miniature
67 1/2 v. B bat.; W.E. handset. Re-
ceiver: single superhet.; 2.1 mc. IF;
Motorola crystal 802. Tubes:
CK569AX RF; 2E32 RF; 2E36
mix; 2E32 IF; 2E32 IF; 2E32 IF;
2E32 1st; 2E32 1st; 2E36 AF
5672 osc & mult; 5672 mult.

Fixed: FSTRU-50-BR(B),
152-170 Mc.

Transmitter: 30 w. to 50-ohm line;
AC input 300 w. Tubes: 7C7 osc;

2)7A8 balanced mod; 7C5 quad;
7C5 trip; 7C5 doub; 2E26 doub;
2)2E26 output; 2)5Z3 rect. Notes:
Shure mike; Motorola temperature
compensated crystal.

Fixed: FSTRU-250-BR(B),
152-170 Mc.

Transmitter: 250 w. to 50-ohm line;
AC input 1,350 w. Tubes: same as
30 w. transmitter above, plus 2)4-
125 output.

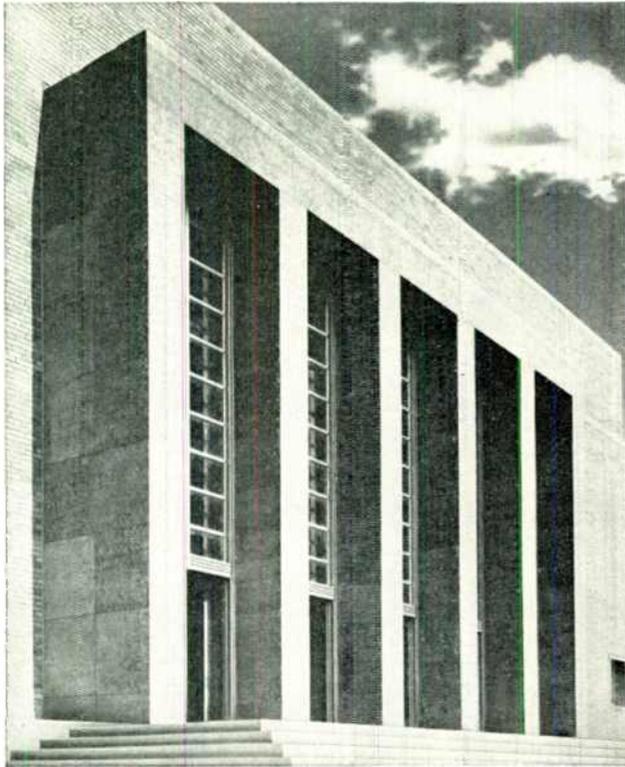
Mobile: FMTRU-5V,
152-170 Mc.

Transmitter: 7-10 w. to RG58U
line; 6 v. input, 5.5 a. rec.; 20 a.
trans. Tubes: 6AK5 osc; 6BE6
mod; 6BE6 mod; 6AK5 quad;
6AK5 trip; 6AK5 doub; 2E26
doub; 2E26 output; choice of
CK1003-OZ1A-6X5 rect. Notes:
Mallory or Oak vibrator; Shure
mike or W.E. handset; Motorola
temperature-controlled crystal; 2-
freq. operation available. Receiver:
double superhet.; 7.3-8 & 1.7 mc.
IF; Motorola temperature-control-
led crystal; Mallory or Oak vi-

brator. Tubes: 6B16 RF; 6B16
RF; 6BJ6 1st mix; 6BJ6 quad &
osc; 6BJ6 quad; 6BJ6 IF; 6BJ6 IF;
6BJ6 2nd mix; 6BJ6 IF; 6BJ6 1st;
6BJ6 1st; 6AL5 disc; 6B16 noise
amp; 6AL5 noise rect; 12AU7 AF
& sq; 6AQ5 output.

Mobile: FMTRU-30D(E)&(F),
152-170 Mc.

Transmitter: 30 w. to RG58U line;
6 v. input, 10 a. rec.; 40-50 a. trans.
Tubes: 7C7 osc; 2)7A8 balanced
mod; 7C5 quad; 7C5 trip; 7C5
doub; 2E26 or 5516 doub; 2)2E26
or 2)5516 output. Notes: Carter
dynamotor; Shure mike or W.E.
handset; 2-freq. operation avail-
able. Receiver: double superhet.;
7.2-8 & 1.7 mc. IF; Motorola tem-
perature-controlled crystal; Oak or
Mallory vibrator. Tubes: 6AK5
RF; 6AK5 RF; 6AK5 1st mix;
6AK5 osc mult; 7C7 osc; 7C7 IF;
7C7 IF; 7C7 2nd mix; 7AG7 IF;
7C7 1st; 7C7 1st; 7A6 disc; 7C7
noise amp; 7A6 noise rect; 7F7 AF
& sq; 7C5 output.



*Entrance to new
Reception Building
at Electronics Park,
Syracuse, New York.*

ELECTRONICS PARK—WHERE THEY MAKE GOOD THINGS BETTER

TWO-way radio is not news to organizations that require rapid communication between land stations and vehicles in motion. But the way General Electric makes 2-way radio at Electronics Park is important to you.

Behind the "university atmosphere" of the Park are the most modern laboratories and production lines in the radio industry. Here General Electric applies its finest engineering and manufacturing talent to the task of making radio communication equipment that is dependable in every way.

Thousands of General Electric mo-

bile units are in service in the United States and Canada with municipal departments, taxicab fleets, public service companies—wherever speed and mobility are important. In the complete General Electric line—25-50 mc, 152-162 mc, and 920-960 mc—there's an answer to your communication problems—just ask us.

Offices in all principal cities. Call the G-E representative nearest you—or write today for free bulletin "Saves Time—Saves Money": *General Electric Company, Room 102, Bldg. 3, Electronics Park, Syracuse, New York.*

You can put your confidence in—

GENERAL  **ELECTRIC**

TAXICABS

Yellow & Checker Cab Co Tiffin Ohio 68 N Monroe 8 W6XNA	152.27
Yellow Cab Co Battle Creek Mich 22 W Jackson 30 W6XPR	152.27
Yellow-Checker Cab & Veterans Cab Co Holland Mich 210 Central Av	152.27
Yellow Cab Co & Red Star City Cab Zanesville Ohio 521 South St	152.27
Yellow-Way Cab Co Owosso Mich 302 S Wash St 8 W8XRL	152.27
Yellow Cab Co Fostoria Ohio 130 W Center 5 W9XVM	152.27
Yellow Cab Taxi Serv Murphysboro Ill 1327 Walnut 15 K9XAX	152.27
Yellow Cab Co Rhinelander Wisc 43 W Rives 10 W9XBC	152.27
Yellow Taxi Cabs Carbondale Ill 217 S Illinois 12 W9XFE	152.27
Yellow Cab Co Vincennes Ind 1108 Wash Av 6 W9XFY	152.27
Yellow Cab Co Beloit Wisc 315 Pleasant 22 W9XHW	152.27
Yellow-White Cab Waukesha Wisc 103 N Greenfield 25 W9XJS	152.27
Yellow Cab Co Evansville Ind 522 NW 1st Av 70 W9XMP	152.27
Yellow Cab Co Racine Wisc 412 Wisc Av 60 W9XOF	152.27
Yellow Cab Co Granite City Ill 1920 State 8 W9XOS	152.27
Yellow Cab Co Bloomington Ind 217 W 6th 25 W9XPS	152.27
Yellow Cab Co Lincoln Ill 208 S Chicago 10 W9XRL	152.27
Yellow Cab Co Danville Ill 751 E North St 25 W9XSH	152.27
Yellow Cab & Trans Co Madison Wisc 843 E Wilson 25 W9XSY	152.27
Yellow Cab Co Valparaiso Ind 120 Lincolnway 10 W9XTM	152.27
Yellow Cab Co Baraboo Wisc 627 Oak 10 W9XUC	152.27
Yellow Cab Co Decatur Ill 303 S Water 25 W9XXQ	152.27
Young's Taxi Claremont NH 18 Sullivan 10 W1XHP	152.27
Youngstown Radió Cab Youngstown Ohio Realty Bldg 36 W9XPM	152.27
Your Cab Service Oregon City Ore 213 6th 5 W7XPC	152.27
Y & V Cab Co Inc Oklahoma City Okla 1414 W Main 10 W5XWO	152.27
Zero Cab Co Iron Mountain Mich 115 West B St 4 W8XTA	152.27
Zion Taxi Zion Ill 2715 Sheridan Rd 6 W9XWJ	152.27
Zone Cab Co Warren Ohio 317 E Market 18 W8XJG	152.27
Zone Cab Co Mt Vernon Ohio 2 E Gambler 15 W8XTV	152.27
Zone Cab Lorain Ohio 1782 Bdway 6 W8XVP	152.27
Zurn Taxi Co Alliance Neb 170 Box Butte Av 4 WXPJ	152.27

PUBLIC UTILITIES

Adams Elec Coop Inc Gettysburg NY N Stratton St 7 WGEJ	37.62
Adams Elec Lt Co 34 Spring St Adams NY 3 WJSP	39.66
Adams-Marquette Elec Coop Friendship Wis WOCU	158.25

**PHILCO CORP.
Philadelphia 34, Pa.**

Fixed: 30-44 Mc.

Transmitter: 30 w. to 50-72 ohm line; AC input 325 w. Tubes: 6C4 osc; 9003 mod; 6BJ6 trip; 6L7 AF comp; 7F7 voltage amp; 7A6 control; 7N7 mix amp; 2)5R4GY rect; 2)VR150 reg. Notes: Philco crystal 34-8009.

Fixed: 30-44 Mc.

Transmitter: 50 w. to 50-72 ohm line. Tubes: same as 30 w. transmitter above, plus 807 output.

Fixed: 30-44 Mc.

RCA

Comden, N. J.

Fixed: No. CT-2A, 30-44 Mc.

Transmitter: 60 w. to 50-70 ohm line; AC input 265 w. Tubes: 6SG7 speech amp; 6SJ7 mod; 6SL7GT lim; 6SJ7 mult; 6SJ7 mult; 6V6 mult; 6SJ7 osc; 2)807 output; 2)5R4Y rect. Notes: Desk mike or handset; RCA crystal RC-1.

Fixed: No. CT-4A, 30-44 Mc.

Transmitter: 250 w. to 50-70 ohm line; AC input 880 w. Tubes: same as 60 w. transmitter above, but with 2) 8005 output tubes plus 2) 866A rect.

Alken Elec Coop Alken SC 10	
Alabama Elec Coop Andalusia Ala 231 S Cotton St 5 WE0U	31.46
Alabama Gas Co Montgomery Ala 209 Montgomery St 30 WSXJ	158.25
Alabama Pr Co Montgomery Ala 111 Dexter Av 50 WDPE	37.86
Tenn & Dexter Sts WFUB	37.86
628 Broad St Gadsden WMGO	37.86
1201 Noble St Anniston WMGS	37.86
2230 Broad Talscoosa WNTD	37.86
Alameda City of Alameda Calif 10 KSHW	158.01
Alcorn City Elec Pr Assn Corinth Miss Cruise & Jackson 5 WNTVQ	30.86
Allamakee-Clayton Elec Coop Postville Ia 7 KSWV	39.86
Altamaha Elec Memb Corp Lyons Ga 6 WUAB	37.62
Anoka Cty Coop L & P Assn Anoka Minn 6 KGVV	33.34
Appalachian Elec Pr Co Charleston W Va Virginia St 208 WMOD	39.86
Logan W Va WATI	31.46
110 Poplar Bluefield WCQL	31.46
1002 3rd Av Huntington WHTY	31.46
301 Virginia Charleston WMOF	31.46
308 S Kanawha Beckley WNPJ	31.46
328 Walnut Av Roanoke WRIS	31.46
St Rt 57 nr Fieldale Va WEVX	39.86
523 Main Lynchburg Va WEVZ	31.46
Main St Stuart Va WMRH	39.86
App Elec Coop Jefferson City Tenn Main St 8 WXOD	153.71
Arkansas P & L Co Little Rock Ark 800 Garland Av KHQL	31.46
4th & La Sts 72 KHQM	37.18
411 Main Pine Bluff KHQY	31.46
602 Main Stuttgart KJST	31.46
Atlanta Gas Lt Co 220 2nd St Macon Ga 1240 Caroline Atlanta 50 WKAJ	33.02
235 W 1st St Rome 20 WKAH	33.02
Atlantic City Elec Co Bridgeton Nj Cohansey St WDEH	39.86
Mo Av Atlantic City WMWQ	39.86
Spicer & NJ Av Wildw'd 8 WMWR	31.46
1600 Pacific Av At City WGUG	31.46
Barron City Elec Coop Barron Wis 6 WUAD	39.86
Bartholomew Cnty Rural Elec Memb Corp 1136 2 St Columbus Inc 5 WKQU	37.54
Barton Cnty Elec Coop Lamar Mo 12 KIWY	153.59
Beaumont City of Beaumont Tex Walnut & Mulberry Sts 36 KETX	31.46
Belmont Elec Coop Clairsville Ohio State Rt 40 4 WQZD	37.54
Birmingham Gas Co Birmingham Ala 2501 N 29 St 51 WBXH	31.46*
1200 6th Av WBXI	31.46*
Blackstone Valley G & E Co Pawtucket RI Jenks Lane St 19 WQHG	39.86
Villa Nova St Woonsocket WQHI	39.86
Boone Cty Rural Elec Memb Corp Lebanon Inc 5 WQBW	39.86
Boston Cons Gas Co Boston Mass 144 McBride St 16 WDDE	39.86
Boston Edison Co Boston Mass 175 Alfred St 50 WAAE	39.86
1205 Commonwealth Av WAZC	39.86
776 Summer St WAZD	39.86
669 South St WAZE	39.86
182 Tremont St WAZI	39.86
325 Cambridge St WAZK	39.86

Transmitter: 250 w. to 50-72 ohm line. Tubes: same as 30 w. transmitter above, plus 6X5; 7A6; 2) 4D21.

Mobile: 30-44 Mc.

Transmitter: 50 w. to RG58U line; 6 v. input, 2.1 a. rec.; 50 a. trans. Tubes: 3A4 osc; 9003 mod; 6BJ6 buf amp; 3A4 trip; 3A4 trip; 2E30 doub; 2)807 output. Notes: military mike or Kellogg handset; dynamotor power supply. Receiver: double superhet; 4.3 mc. & 4.5 kc. IF; Philco crystal 34-8010; Philco vibrator. Tubes: 6AK5 RF; 6C4 osc; 6BE6 1st mix; 6BJ6 IF; 7A8 2nd mix; 6AK5 IF; 6AK5 IF;

Mobile: 30-44 Mc.

Transmitter: 30 or 60 w. output; 6 v. input, 3.1 or 4 a. rec.; 34 or 50 a. trans. Tubes: 6SJ7 osc; 6SJ7 mod; 6SJ7 mult; 6SJ7 mult; 6V6 mult; 6SJ7 AF; 6SL7GT lim; 807 output for 30 w.; 2)807 for 60 w. Notes: Dynamotor power supply; military mike or handset; 2-freq. operation available. Receiver: double superhet.; 7-8 mc. & 4.5 kc. IF; RCA crystal RC-2; Mallory vibrator. Tubes: 6SH7 RF; 6SH7 1st det; 6SH7 2nd det; 6SH7 IF; 6SH7 IF; 6SH7 lim; 6SH7 lim; 6H6 disc; 6H6 noise rect; 6SH7 osc; 6SL7GT AF; 6SH7 AF; 1635

1165 Mass Av WRU	39.86
87 Bridge St Weymouth WAZB	39.86
19 South St Framingham WLDT	39.86
Cove St Woburn WQWP	39.86
Brockton Edison Co Brockton Mass 36 Main St 30 WEKS	31.46
Brockton Gas Lt Co Brockton Mass 196 Grove St 20 WXKH	33.22
Brooklyn Union Gas Co Brooklyn N Y 8322 Diltmars Av 100 WNVG	39.98
Buckeye Rural Elec Coop Gallipolis Ohio 143 - 3rd St 10 WNIJ	37.54
Buena Vista Cnty Elec Corp Storm Lake Ia 725 Lake St 10 K3VD	37.86
Buffalo City of Buffalo NY Intake Crib WBQH	39.86*
Filter Plant Jersey St WBQO	39.86*
Buffalo Niagara Elec Corp Buffalo NY 93 Dewey Av 85 WALL	37.62
14th & Henley Olean WJRY	37.62
31 Franklin Batavia WMFN	37.62
Butler City Elec Coop Alliston Ia 521 Main St 8 KWEV	37.86
Caddo Elec Coop Binger Okla Main & Caddo Sts 10 KVDC	153.71
Calhoun Cnty Elec Coop Rockwell City Ia 331 Court St 10 K3VQ	37.86
Calif Elec Pr Co Nr Bishop Calif Contr Station 10 KABM	37.70
Sub Station Leevining KAEI	37.70
Callipatria KGFJ	37.70
Blythe KGFJ	37.70
Toponah Nevada KGYB	37.70
Calif Ore Power Co Grants Pass Ore 209 N 6th St KCVY	39.86
Mills St Klamath Falls KKLK	39.86
Lakeview KKLH	39.86
Dixonville KKUC	37.58
Roseburg KKUF	37.58
270 1 St Crescent City Calif Main St Alturas Calif KCVZ	39.86
Callaway Elec Co Fulton Miss 10 E 4th St 4 KAWQ	153.85
Cambridge Elec Lt Co Cambridge Mass 46 Blackstone St 20 WUGR	158.25
Canadian R Gas Co Amarillo Texas 3rd & Polk Sts 6 KCRP	39.98
Elvins Camp KCRY	39.98
Dalhath Camp Dalhath KCRX	39.98
Caprook Elec Coop Stanton Texas 409 Peters St 5 KWEP	37.74
Cape & Vineyard Elec Co Hyannis Mass 396 Main St 19 WKKN	39.86
Capital Elec Power Assn Clinton Mass EPA Office 12 WMQB	33.34
Carroll Co & Lt Co Sumpter SC 3 Manning Av 21 WJSQ	37.62
110 W Darlingdon Florence WUGH	37.62
Hwy 621 Greeleyville WUGI	37.62
Asheville NC WUGA	37.62
513 W Jones Raleigh WHNH	37.62
133 Garrett Henderson WAKP	37.62
13 N Steel Sanford WJIG	37.62
134 W Walnut Goldsboro WJJP	37.62
Carroll Cnty Elec Memb Corp Delphi Ind 109 E Franklin 16 WCJQ	37.54
S Lisbon Carrollton Ohio WGOH	37.54
Central Ala Elec Coop Prattville Ala 117 2nd Av 15 WTVB	37.70
Central Ariz Lt & Pr Co Phoenix Ariz 3rd Av & Buchanan 60 KIOT	153.59
Service Bldg Phoenix KIOY	153.59
Central Elec Power Assn Carthage Miss 15 WHMN	37.78

PM1000 det; 7F7 AF & sq; 7F7 noise amp & rect; 7C5 output.

Fixed: 152-162 Mc.

Transmitter: 40 w. to 50-72 ohm line; AC input 500 w. Tubes: 6C4 osc; 9003 mod; 6BJ6 buf amp; 6C4 trip; 6C4 trip; 6AQ5 doub; 2E26 doub; 2)6L7 AF; 829 output; 2) 5R4GY rect; 7F7 volt amp; 7A6 control; 7N7 mix amp; VR150 reg. Notes: Philco crystal 34-8012.

Fixed: 152-162 Mc.

Transmitter: 250 w. to 50-72 ohm line. Tubes: same as 40 w. transmitter above, plus 2)4D21; 6X5;

Fixed: No. CT-5A, 152-162 Mc.

Transmitter: 45 w. to 50-70 ohm line; AC input 390 w. Tubes: 6SG7 speech amp; 6SL7 lim; 6SJ7 osc; 6SJ7 mod; 6SJ7 mult; 6SJ7 mult; 6V6 mult; 1614 mult; 829B mult; 829B output; 2)5R4 rect. Notes: desk mike or handset; RCA crystal TWV-129.

Fixed: No. CT-6A, 152-162 Mc.

Transmitter: 250 w. to 50-70 ohm line; AC input 1,000 w. Tubes: same as 45 w. transmitter above, but with 2)4D21 output tubes, plus 2)866 rect.

Mobile: 152-162 Mc.

Central Elec Coop Parkers Landing Pa 10 WBUB	37.62
Central Hudson G & E Corp Catskill NY 4th Av 161 WAUN	75.66
28 E O'Reilly Kingston WAUZ	75.66
284 So Av Poughkeepsie WAVS	75.66
256 Bway Newburgh WAVV	75.66
Central La Elec Co Villa Platte La Main St 16 KCOQ	39.98
Landry KCOT	39.98
Bunkle KCOU	39.98
Colfax KCOV	39.98
Mansura KCOX	39.98
Pineville KCOZ	39.98
Central Mass Elec Co Palmer Mass 465 N Main 16 WFBP	31.46
Central Mo Elec Coop Sedalia Mo 120 W 5th 8 KFDB	37.86
Central NY Power Corp Otisco NY 725 Oswego Blvd Syracuse WPAE	31.46
Central P & L Co San Benito Texas LaPalma Power Plt 53 KIBP	39.66
Corpus Christi KIBQ	39.66
KRMV	39.66
Central Valley Elec Coop Artesia N Mex 1109 W Merchant 3 KVQB	39.98
Central Vt Pub Serv Corp Rutland Vt 121 West St 27 WCUR	37.54
Brattleboro Vt WPKJ	37.54
Royalton Vt WJEU	37.54
Bennington Vt WKTE	37.54
Claremont NH WJTF	37.54
Central Va Elec Coop Lovingson Va Power Co Bldg 11 WMLV	37.70
Chattanooga City of Chattanooga Tenn Oak & Greenwood Sts 17 WBMM	37.78
Cherokee Cnty Elec Coop Rusk Texas 120 W 5th 7 KAKL	37.62
Chicopee City of Chicopee Mass 725 Front 10 WJPI	30.86
Clabornes Elec Coop Homer La Central Highway 8 KBXE	31.46
Farmerville La KBXF	31.46
Clark Elec Coop Greenwood Wisc 118 Main 8 WOAA	39.66
Clay Cnty Elec Coop Corning Ark City Water Tower 10 KAXE	37.58
Clay Elec Coop Keystone Hghts Fla Thrush St 15 WKRA	37.86
Clay-Union Elec Coop Vermillion SD Central Va Elec Coop Lovingson Va	6 KTHF
Clearfield Elec Coop Clearfield Pa 15 WXVG	37.62
Cleveland Elec Illum Co Cleveland Ohio 75 Public Sq 150 WJTT	35.14
Clinton Power Commission Clinton Tenn 310 Broad 15 WRZB	37.86
Coahoma Elec Power Assn Clarksdale Miss 317 Delta Av 12 WEJL	37.78
Coast Cntys G & E Co Santa Cruz Calif Blaine St 14 KAEY	39.86
Watsonville Calif KAEY	39.86
Gilroy Calif KFBF	39.86
Hollister Calif KFIL	39.86
Coles-Moultrie Elec Coop Matoon Ill 212 N 20th 10 WTWQ	37.62
Colo Central Power Co Englewood Colo 3470 S Bdway 20 KRYD	33.30
Colo Int'l State Gas Co Colo Spgs Co National Bank Bldg 50 KHGF	39.98
Canyon Comp Station KHGI	39.98
Devine Comp Sta Pueblo KHHF	39.98
Cimarron Comp Station Guy New Mex KHHG	39.98

6A1.5. Mobile: 152-162 Mc.

Transmitter: 25 w. to RG58U line; 6 v. input, .325 a. rec.; 35 a. trans. Tubes: 3A4 osc; 9003 mod; 6BJ6 buf amp; 3A4 trip; 3A4 trip; 2E30 doub; 2E24 doub; 2)2E24 output. Notes: Military mike or Kellogg handset; dynamotor supply; 2-freq. operation available. Receiver: double superhet.; 15 & 1 mc. IF; Philco crystal 34-8001; Philco vibrator. Tubes: 6AK5 RF; 6AK5 quad; 6BJ6 1st osc; 6AK5 1st mix; 6BJ6 IF; 7A8 2nd mix; 6BJ6 IF; 6BJ6 IF; FM1000 det; 7F7 AF & sq; 6AQ6 noise amp; 6AQ5 output.

Transmitter: 20 w. output; 6 v. input, 1.8 a. rec.; 40 a. trans. Tubes: 6SG7 speech amp; 6SL7 lim; 6SJ7 osc; 6SJ7 mod; 6SJ7 mult; 6SJ7 mult; 2E24 mult; 2E24 mult; 2E24 mult; 2)2E24 output. Notes: dynamotor power supply; mike or handset; 2-freq. operation available. Receiver: double superhet.; 16-17 & 2 mc. IF; Mallory vibrator; RCA crystal RC-2. Tubes: 6AK5 RF; 6AK5 1st det; 6SH7 2nd det; 6SH7 IF; 6SH7 IF; 6SH7 lim; 6H6 disc; 6AG5 mult; 6AG5 mult; 6AG5 mult; 6H6 noise rect; 6SL7GT AF & sq; 6AQ6 AF; 6G6 output.

PHILCO

F-M RADIOPHONE 30 to 50 mc. 152 to 162 mc.
COMMUNICATIONS SYSTEMS



Clear, crisp, two-way voice communications under all conditions with proven reliability, new operating efficiency and economy . . . backed by the facilities of the world's largest radio manufacturer and serviced by a nation wide service organization.

Free Engineering Consultation Service

for :

POLICE

FIRE

TAXICABS

UTILITIES

BUSES

TRUCKING

Write Today For Details

PHILCO

INDUSTRIAL DIVISION

PHILADELPHIA 34 • PENNSYLVANIA

Industrial Division Dept OU 5
Philco Corporation
C and Tioga Streets
Philadelphia 34, Penna.

Gentlemen:

Please send me information about the new
PHILCO FM Radiophone Communications
Systems.

NAME _____

ADDRESS _____

CITY _____

WATCH



IN 1949!

Out of the West is coming the most sensational announcement of new two-way mobile radiotelephone instant-heating equipment ever!

See your KAAR dealer for details . . .

SOON TO BE RELEASED!

READY TO GO... INSTANTLY!

KAAR ENGINEERING CO.

Middlefield Road

PALO ALTO ● CALIFORNIA

FM **COMCO** Mobile 2-Way **RADIO** Systems

**Police -- Fire -- Taxi -- Railroad
Marine -- Petroleum -- Truckers
Forestry -- Detective -- Ambulances**



FEATURING

- Low Drain — Compact Size.
- Super-Selectivity — for "Adjacent" Channel Operation.
- Rugged Construction.
- Mounts on "Firewall" of any Car.
- Economical to Own and Operate.
- Easily Accessible for Service.
- Works on any Battery Polarity.

Write **COMCO** Today

Manufacturers of Radio and Electronic Equipment
COMMUNICATIONS COMPANY, Inc.
CORAL GABLES, MIAMI 34, FLORIDA

PUBLIC UTILITIES

Clayton Comp Station Clayton N Mex	KHIJ	39.98	Jackson	WAYD	37.86
Columbia City of Columbia Tenn	9 WDDW	37.54	Edgar Elec Coop Assn Paris Ill	10 WJGA	37.82
212 W 7th	20 WKOR	158.13	Egyptian Elec Coop Steedville Ill	23 WCYH	37.82
Columbus City of Columbus Ohio	112 WJGK	31.46	Hwy 3 & MPRR	30 WCYN	37.82
589 Dublin Av	WNCR	31.46	N Ill Av Carbondale	3 CKJY	39.86
Columbus & S Ohio Elec Columbus Ohio	WJGN	31.46	Empire Dist Elec Co Aurora Mo	3 KFLC	39.86
100 Hickory	WJGR	31.46	Church & Elliott Sis	3 KSWJ	39.86
215 N Front			925 E 4th Joplin	KAUP	39.86
N Col Quad Madison			115 N Jefferson Neosha	KWTF	39.86
E Col Quad Harrison			Forsyth	KWOJ	39.86
Comanche Cnty Elec Coop Comanche Texas			Nichols St Springfield	KWVO	39.86
Box 152	12 KHIZ	37.54	Pierce City	KYDA	39.86
Commonwealth Edison Co Chicago Ill	97 WBYU	39.86	522 College Greenfield	KTWN	39.86
72 W Adams	WKGG	39.86	Baxter Springs Kans	4 KSGD	33.58
3400 N Calif Av	WKGR	39.86	Gravette Ark	20 WHYQ	37.54
2413 W Thomas St	WKGS	39.86	Empire Elec Assn Inc Cortez Mo	12 KWGT	37.70
3501 S Pulaski Rd	WKGT	39.86	127 N Market		
1111 Cermak Rd	WKBH	39.86	Empire Gas & Fuel Co Wellsville NY		
3200 E 100th St	WBIA	39.86	80 N Main		
US Rt 34 Kewanee	WMSJ	39.86	Brath Cnty Elec Coop Inc Stephenville Tex		
St Aid Rt 10 Pekin			131 S Graham		
US Rt 51 Oglesby			Eugene City of Eugene Ore		
Concordia Elec Coop Concordia La			City Hall	20 KEPI	75.62
PO Box 348	9 KWDU	31.46	Rt 2 Leaburg	KEPJ	75.62
Conn Lt & Pr Co Waterbury Conn			Everett City of Everett Wash		
Clough Rd	12 WAWT	39.86	3102 Cedar	8 KFQB	31.46
Conn Rt 34 Stevenson	WAWN	39.86	Lake Chaplain	KHGN	31.46
Montville	WAWY	39.86	Parlier Creek	KHGP	31.46
Naugatuck Av Devon	WAWF	39.86	Excelsior Elec Memb Corp Metter Ga		
250 Freight St Waterbury	WAVX	39.86	30 S Broad	8 WKWE	39.86
Belleview Av Southington	WKMC	39.86	Exeter & Hampton Elec Co Exeter NH		
Conn River Power Co Pittsborough NH			South St	10 WAXA	31.46
1st Conn Lake Dam	20 WIVV	37.86	Farmers Rural Elec Coop Glasgow Ky		
65 Main Littleton	WIVX	37.86	138 N Race	10 WIVO	37.82
Consolidated Edison Co of NY New York City	2 WBJJ	31.74*	Fitchburg G & E Lt Co Fitchburg Mass		
4 Irving Pl	9 KSHD	37.86	Sawyer Passway	14 WFSZ	31.46
Consolidated Elec Coop Mexico Mo			Fleming-Mason Ru Elec Co Flemingsburg Ky		
217 W Jackson	9 KSHD	37.86	225 Water	24 WRXI	37.82
Cons Gas Elec Lt & Pr Co Baltimore Md			US Rt 60 Grayson	WKJA	37.82
501 E Madison	200 WCAN	39.34	Stanton	WRVA	37.82
Ridout St Annapolis	WLPK	153.71	Florence City of Florence Ala		
114 S Main Bel Air	WNBL	39.86	Pine & Tenn	6 WFLF	37.82
Westminster	WSTT	39.86	Florida Pr Corp St Petersburg Fla		
Consumers Power Co Jackson Mich			16th Sub-Sta	66 WJTL	31.46
212 W Michigan Av	1000 WRYN	37.82	1300 3rd St So	WJTR	31.46
Pontiac	WRVY	37.82	Florida Pr & Lt Co Sarasota Fla		
Cooke Elec Coop Assn Muenster Texas	8 KAGX	158.13	Orange Av & 18th St	130 WNF	39.86
City Water Tower	4 KRKT	39.86	Charlotte Av W Palm Bch	WNG	39.86
Coop Elec Co St Ansgar Iowa			314 SW 1st Ct Miami	WNN	39.86
Pleasant & 4th St			Green I & Twigg Palatka	WNP	39.86
Corn Belt Elec Coop Bloomington Ill			Broward Rd Ft Lauderdale	WNQ	39.86
315 E Front	20 WKXN	37.82	Nesbitt St Punta Gorda	WNIS	39.86
Corn Belt Power Coop Algona Iowa			Factory St Cocoa	WNY	39.86
Dickens	9 KTMR	37.86	Seagrave St Ft Pierce	WNX	39.86
Rockwell City	KSTM	37.86	Orange Av Ft Pierce	WNZ	39.86
Colton Elec Coop Walters Okla	KSTQ	37.86	318 NW 3rd Ft Lauderdale	WAYK	39.86
Bway & Okl Sis	15 KQMT	153.71	8 Bacon Pt Rd Pahokee	WDOX	39.86
Cumbe-land Elec Corp Springfield Mo			Hotel Annie MacClenny	WKTL	39.86
Public Sq	20 WFGJ	37.54	USH 17 Lake Monroe	WKTO	39.86
99 Franklin Clarksville Tenn			118 Ribera St Augustine	WKTQ	39.86
Main St Portland Tenn	WJPX	37.54	9th St & W 2nd Hialeah	WQUG	39.86
Dairyland Pr Coop Chippewa Falls Wis	WMTJ	37.54	523 NW 11th St Miami	WQUH	39.86
LaCrosse	10 WDPD	39.86	St Clair St Lake City	WTUB	39.86
Baldwin	WGEG	39.86	2010 Lee St Ft Myers	WUEA	39.86
DPC Pr Plant Genoa	WKXB	39.86	Fontana Union Water Co Fontana Calif		
Alma	WETV	39.86	160 E Spring	4 KSPM	31.98
Dallas Pr & Lt Co Dallas Texas			Forked Deer Elec Coop Inc Halls Tenn		
515 Park Av	37 KJVV	39.98	111 S Front	6 WUAJ	37.70
Davies Martin Cnty Ru Elec Corp			Forsyth Cty Elec Memb Corp Cumming Ga		
Washington Ind 217 SE 3rd St	10 WVKR	37.54	REA Office	10 WMDV	158.25
Dayton Pr & Lt Co Dayton Ohio			4-County Elec Pr Assn Ackerman Miss		
3 River Rd	50 WAMZ	39.86	EPA Office	20 WJKZ	37.78
503 N Columbus Wilmington			5th St Columbus	WJMA	37.78
101 E St Washington CH	WBNH	39.86	Franklin Rural Elec Coop Hampton Ia		
215 Sycamore Xenia	WBNJ	39.86	City Water Tower	10 KRQJ	153.71
12 S Main W Alexandria	WBNI	39.86	French Broad Elec Corp Burnsville NC		
409 E Monument Av Dayton	WBR	39.86	French Broad Elec Off	10 WNTD	158.25
115-117 S-Wayne Plqua	WPDJ	39.86	Freeborn-Mower Coop Lt & Pr Assn		
US Hwy 36 W Urbana	WJTO	39.86	Albert Lea Minn	5 KIAQ	39.86
Campbell Rd Sidney	WJTQ	39.86	Fulton Cty Ru Elec Mem Corp Rochester Ind	6 WHMX	37.54
State Rt 219 Coldwater	WJTX	39.86	Georgia Power Co Tallulah Falls Ga		
113 S Main Marysville	WJTY	39.86	T F Hydro Plant	3 WCKJ	37.82
Orchard Isl Rd Russells Pt			40 Oak St Gainesville	WCKN	37.82
Dayton Pr & Lt Co Miami Twp Ohio			Sub-Sta Lindale	WKEM	37.82
Chesapeake Rd Rt 25	WMSC	39.86	849 Main Thomson	WKFP	37.82
Deep East Tex Elec Coop			15th & Greene Augusta	WKGA	37.82
San Augustine Texas	10 KRYB	153.71	1301 N Blvd NE Atlanta	WRXQ	37.82
Delaware Pr & Lt Co Wilmington Del			1004 Blvd Athens	WRXR	31.46
SE Read & S Madison	19 WQHT	39.86	Georgia Pr & Lt Co Valdosta Ga		
Detroit Edison Co Birmingham Mich	25 WCGZ	153.59	Daniel Ashley Hotel	15 WBXB	158.25
2000 2nd Av Detroit	WDAX	3.19*	Pr Sub-Sta Commerce	WVFM	37.82
600 Gd River Av Pt Huron	WEBO	39.98	100 Turpin St Macon	WVMJ	37.82
198 N State Caro	WFGY	39.86	127 N Jackson Albany	WVMK	37.82
679 Ledyard Detroit	WKEQ	156.13	14 Adamson Sq Carrollton	WVMN	37.82
308 E Huron Bad Axe	WGYF	39.86	Love Av Tifton	WVMQ	37.82
315 Cedar Lapeer	WGYH	39.86	19th & 2nd Av Columbus	WVMT	37.82
19 S Elk Sandusky	WGYK	39.86	4 E Main Statesboro	WVMV	37.82
Gratoit Rd Marysville	WMAV	3.19*	Hartwell	WVMW	37.82
2000 2nd Av Detroit	WQFL	31.46	124 Broad Louisville	WVMX	37.82
401 S Main Superior	145 WQQK	31.46	134 W Lamar Americus	WVMY	37.82
Dickson Town of Dickson Tenn	WRQV	39.86	290 Main Canton	WVMZ	37.82
101 N Main	WSUP	3.19*	Electric Bldg Atlanta	WYMS	37.82
Dixie Elec Memb Corp Baton Rouge La			Gibson Cty Elec Memb Corp Obion Tenn		
2900 North St			Broadway	10 WUDY	37.54
Douglas Cnty Coop Lt & Pr Assn			W Trenton	WUEC	37.54
Alexandria Minn	15 KRGD	31.46	Godfrey L Cabot Inc Baileysville W Va		
Duquesne Lt Co Springdale Pa			Bradley Comp Sta	2 WDDJ	39.86
435 6th Av Pittsburgh	47 WCBV	31.46	Pineville	WDDK	39.86
Brunot Isle Pittsburgh	WETC	31.46	224 1/2 Main Beckley	WDDO	39.86
435 6th Av Pittsburgh	WETD	31.46	723 Kanawha Charleston	WKJI	39.86
Wierton	WFOL	31.46	Grand River Dam Authority Langley Okla		
W Mifflin Boro	WQHO	31.46	Pryor	14 KCHP	31.46
Rochester	WQHR	31.46	Tulsa	KCHX	31.46
Eastern Iowa Lt & Pr Corp Wapello Ia			Grand Valley Rural Power Lines	KTUS	31.46
Wash & S R 61	20 KOCC	33.34	Grand Junction Colo	KOAJ	37.70
1505 6th Av DeWitt	KOGV	33.34	Orin Elec Coop Lancaster Wisc	12 WBXU	39.86
Eas Shore Pub Serv Co Salisbury Md			103 N Madison		
114 N Division	35 WKUN	37.78	Guernsey Muskingum Elec New Concord O		
East Ohio Gas Co Cleveland Ohio			27 E Main	4 WCSY	31.98
1201 E 55th	100 WAXF	158.25	Gulf Pr Co Panama City Fla		
			Harrison Av	58 WJPM	153.59
			Jackson St Pensacola	WJPZ	153.59
			290 Main Crestview	WSWS	153.59
			14 Baldwin Av DeFuniak	WSWT	153.59
			Chipley	WSWU	153.59
			Gulf States Utilities Baton Rouge La		
			1593 Govt St	204 WBRG	39.86
			Lafayette	KGKO	39.86
			Lake Charles	3 KCFL	39.86

PUBLIC UTILITIES

GSU Bldg Navasota Tex	KCFA	39.86	Johnson Cty Elec Coop Cleburne Tex	10 KSB0	37.62
15th & Ave 1 Huntsville	KCFB	39.86	114 W Chambers	10 KSB0	37.62
129 S Chambers Conroe	KKFC	39.86	Jump River Elec Coop Ladysmith Wisc	6 WJRW	39.66
Main St Calvert	KCFD	39.86	Voss Bldg	6 WJRW	39.66
336 1/2 Liberty Beaumont	KGSI	39.86	Kandyohi Coop Pr Assn Willmar Minn	10 KJNL	33.34
Houston Av Port Arthur	KGBT	39.86	325 5th St West	10 KJNL	33.34
Front & 1st Port Arthur	KGTK	39.86	Kankakee Valley REMC Wanatah Ind	10 WKAV	33.58
Neches Pr Pl Beaumont	KGTT	39.86	Kansas City Pr & Lt Co Sweet Springs Mo	196 KAWX	39.66
Hancock-Wood Elec Coop N Baltimore Ohio	10 WLCJ	158.13	117 S Miller	KCGK	39.34
116 S Main	6 KCLV	158.25	Broadway Brunswick	KAWY	39.66
Harmon Elec Assn Inc Hollis Okla	12 WFAC	37.62	Main St Higginsville	KAXH	39.66
Harrison Cty Ru Elec Coop Cynthiana Ky	8 WKLE	37.70	1330 Balt Av Kans Cty	KQJG	153.71
Hart Cty Elec Memb Corp Hartwell Ga	12 WHDD	39.66	410 S Main Ottawa Kans	KBVX	39.66
Depot & Carolina	10 KSXD	39.66	Kansas G & E Co Wichita Kans	92 KAQC	37.82
Hartford Elec Lt Co Hartford Conn	12 WKVO	33.58	1900 E Grand Av	10 KXIW	37.82
288 Pearl	16 KCNS	37.74	900 N 2nd Independence	KQXO	37.82
Hawkeye Tri-Cty Elec Coop Cresco Iowa	8 WOGI	30.86	Strauss	KAIK	37.82
Henderson-Union Ru Elec Henderson Ky	6 KTIB	31.46	Kansas Nebraska Nat Gas Hastings Neb	KAHJ	37.82
US Hwy 41 & 60	12 KQOG	37.78	300 N St Joseph	16 KCNS	37.74
Hickman-Fulton Ru Elec Coop Hickman Ky	6 KQOG	37.78	Cozad	KSHP	37.74
220 S Clinton	10 WLFQ	158.13	Holdredge	KSGH	37.74
Hill City Elec Coop Itasca Texas	7 WBXV	39.66	Scott	KICU	37.74
212 Main	12 KHUG	37.86	Colby	KSHQ	37.74
Hill City Elec Coop Inc Havre Mont	2 WFDU	39.34	Phillipsburg	KICV	37.74
W 2nd St	6 WDGJ	37.86	Deerfield	KRKO	37.74
Holston Elec Coop Rogersville Tenn	10 KXAG	39.66	Palco	KRXP	37.74
108 S Church	10 KXAF	39.66	Otis	KVPW	37.74
Holyoke Water Pr Co Holyoke Mass	12 KHUG	37.86	Kay Elec Coop Inc Blackwell Okla	3 KRZF	75.42
Water St	6 WDXL	39.66	201 E Blackwell	3 KRZF	75.42
Home Gas & Elec Co Greeley Colo	6 WDXL	39.66	Ky & W Va Pr Co Inc Lothair Ky	3 WAOF	39.66
810 9th St	6 WDXL	39.66	Ashland Ky	WBWV	31.46
Hope Natural Gas Co Clayton W Va	10 KXAG	39.66	Ky Utilities Co Lexington Ky	6 WCLI	31.46
63 WDGJ	10 KXAG	39.66	Limestone & Short Sts	6 WCLI	31.46
Hastings	10 KXAG	39.66	City of Knoxville Knoxville Tenn	28 WAWJ	31.46
Mariann	10 KXAG	39.66	Wash & 8th Av	28 WAWJ	31.46
Mr Corton	10 KXAG	39.66	Kootenai Eu Elec Assn Coeur d'Alene Ida	5 KIGN	39.66
Clarksburg	10 KXAG	39.66	117 Coeur d'Alene	5 KIGN	39.66
Koppenstein	10 KXAG	39.66	Kosciusko Cty REMC Warsaw Indiana	4 WLTJ	37.54
Houston City Elec Coop Crockett Tex	10 KXAG	39.66	102 1/2 E Market	4 WLTJ	37.54
Water Tower on Lamar	10 KXAG	39.66	Acadied Elec Coop Inc Lebanon Mo	15 KBPJ	153.71
Houston Industrial Gas Co Houston Tex	10 KXAG	39.66	119 N Jefferson	15 KBPJ	153.71
215 N Roberts	10 KXAG	39.66	LaFollette City of LaFollette Tenn	10 WDRT	37.78
Houston Lt & Tr Co Galveston Tex	10 KXAG	39.66	102 E Central	10 WDRT	37.78
2114 Church	10 KXAG	39.66	Lafayette Elec Coop Darlington Wisc	6 WJRW	39.66
828 3rd St Rosenberg	10 KXAG	39.66	Lamar City of Lamar Colo	5 KRJY	31.98
214 W Park Frerport	10 KXAG	39.66	108 W Elm	5 KRJY	31.98
301 Texas Goose Creek	10 KXAG	39.66	Lamar City Elec Coop Paris Tex	10 KXRD	37.50
1016 Walker Goose Creek	10 KXAG	39.66	Laurens Elec Coop Inc Laurens S.C	10 WJMI	37.70
6200 Canal Houston	10 KXAG	39.66	725 Irby Av	10 WJMI	37.70
Substa LaMarque	10 KXAG	39.66	Lawrence G & E Co Lawrence Mass	26 WMVU	31.46
4200 Richmond B. Haire	10 KXAG	39.66	173 Methuen	26 WMVU	31.46
Electric Bldg Houston	10 KXAG	39.66	Linnola Elec Coop Inc Davenport Wash	4 KCMa	39.66
Humboldt Cty Ru Elec Coop Humboldt Iowa	10 KXAG	39.66	10th & Jefferson	4 KCMa	39.66
419 Sumner	10 KXAG	39.66	Linnola City Ru Elec Coop M. M. O. Alamo G.	10 WEXE	158.13
Huntington Cty Ru Elec Huntington Ind	10 KXAG	39.66	323 RR Av	10 WEXE	158.13
419 Poplar	10 KXAG	39.66	Little Rock Mun Wtr Wks Little Rock Ark	KQCK	158.13
Ida Cty Ru Elec Coop Ida Gro. Idaho	10 KXAG	39.66	Suline	KQCK	158.13
401 Court St	10 KXAG	39.66	Lodi Village of Lodi Ohio	5 WJMZ	39.34
Idaho Pr Co Boise Idaho	10 KXAG	39.66	L I Lighting Co Northport NY	75 WQGY	39.66
621 S 17th	10 KXAG	39.66	Woodbine Av	75 WQGY	39.66
Ill Elec & Gas Co Herrin Ill	10 KXAG	39.66	Greenwood Lta Ing	WQGG	39.66
111 N 16th	10 KXAG	39.66	Riv. View	WQGG	39.66
Du Quoi	10 KXAG	39.66	90 E Main Bry Shore	WQHC	39.66
Murphysboro	10 KXAG	39.66	94 Pr House Rd Roslyn	WQHD	39.66
Marion	10 KXAG	39.66	Lorain-Medina Ru Elec Coop W. Willington O	15 WKYG	158.13
Illinois Ru Elec Co Inc Winchester Ill	10 KXAG	39.66	224 N Main	15 WKYG	158.13
151 Nat'l Bank Bldg	10 KXAG	39.66	Los Angeles City of Independence Calif	2 KQS	3.19
Illinois Valley Elec Coop Princeton Ill	10 KXAG	39.66	246 W Market	2 KQS	3.19
420 S Main	10 KXAG	39.66	316 W 2nd Los Angeles	300 KFMQ	39.66
Ind & Mich Elec Co Allen City Ind	10 KXAG	39.66	207 W Bway Los Angeles	KQT	3.19
RR 2 Leo Rd	10 KXAG	39.66	Victorville	KIIE	3.19
110 W L-x Av Elkhart	10 KXAG	39.66	Silver Lake Camp	KICG	3.19
Power Plt Mishawaka	10 KXAG	39.66	Boulder City Nevada	KIKH	2.728
401 E Colfax So Bend	10 KXAG	39.66	Louisiana Pr & Lt Co New Orleans La	KIAL	39.66
112 Days Av So Bend	10 KXAG	39.66	Grtna	KIAL	39.66
600 E Water Hartford City	10 KXAG	39.66	Hway 51 Amite	KICB	39.66
Elwood	10 KXAG	39.66	Main St Hammond	KICC	39.66
238 S Bwy Butler	10 KXAG	39.66	Main St Ponchatoula	KICE	39.66
419 N Walnut Muncie	10 KXAG	39.66	Main St Lockport	KICF	39.66
120 Branson Marion	10 KXAG	39.66	Miss St Donaldsonville	KICH	39.66
Indiana Service Corp Bluffton Ind	10 KXAG	39.66	Hway 50 & 1st	KICL	39.66
Horton & Johnson Sts	10 KXAG	39.66	Pine & Main Winnsboro	KICX	39.66
1704 S Webster Ft Wayne	10 KXAG	39.66	613 N Front Olla	KICZ	39.66
2101 Spy Run Av Ft Wayne	10 KXAG	39.66	500-2 E Green Tallulah	KIDP	39.66
Indianapolis Pr & Lt Co Indianapolis Ind	10 KXAG	39.66	514 2nd St Ferriday	KIDY	39.66
1230 W Norris	10 KXAG	39.66	703 S 1st Gibsland	KIEI	39.66
Inland Empire REA Corp Spokane Wash	10 KXAG	39.66	225 E Jefferson Bastrop	KIEJ	39.66
325 Sprague	10 KXAG	39.66	203 E Main Springhill	KXDB	39.66
Inter-City Ru Elec Coop Hillsboro O	10 KXAG	39.66	Jonesboro	KXDC	39.66
135 S High	10 KXAG	39.66	Rayville	KXLY	39.66
102 S Walnut Chillicothe	10 KXAG	39.66	Dubach	KCEB	39.66
Interstate Power Co Dubuque Ia	10 KXAG	39.66	Haynesville	KCEI	39.66
Service Bldg	10 KXAG	39.66	Oak Grove	KXEK	39.66
Iowa Elec Lt & Pr Co Cedar Rapids Ia	10 KXAG	39.66	Luling	KXEP	39.66
213 2nd St NE	10 KXAG	39.66	Kentwood	KXET	39.66
Adel	10 KXAG	39.66	LaPlace	KXEU	39.66
Knoxville	10 KXAG	39.66	Montegut	KXEV	39.66
Colfax	10 KXAG	39.66	Sorrento	KXEW	39.66
118 SE 5th Des Moines	10 KXAG	39.66	Lutcher	KXFA	39.66
1st Av & A Oskaloosa	10 KXAG	39.66	Kenner	KYJT	39.66
Clarinda	10 KXAG	39.66	Sterlington	KEBW	39.66
Avoca	10 KXAG	39.66	Minden	KIAM	39.66
Shenandoah	10 KXAG	39.66	West Monroe	KIAN	39.66
Malvern	10 KXAG	39.66	Louisville G & E Co Louisville Ky	WRHD	31.46
Iowa Pr & Lt Co Missouri Valley Iowa	10 KXAG	39.66	731 Ormsby	WRHD	31.46
Erie St	10 KXAG	39.66	Muldraugh Comp Sta	29 WCZG	31.46
Re. Oak	10 KXAG	39.66	Lowell Elec Lt Corp Lowell Mass	25 WMBE	158.13
Iowa-Illinois Gas & Elec Moline Ill	10 KXAG	39.66	107 Perry	25 WMBE	158.13
1400 5th Av	10 KXAG	39.66	22 Shattuck	25 WMBE	158.13
Ironquois Gas Corp Buffalo NY	10 KXAG	39.66	Lower Colo River Elec Coop Giddings Tex	11 KCMJ	39.98
249 W Genesee	10 KXAG	39.66	Coop Office San Marcos	KIMD	39.98
338 Bailey Av Buffalo	10 KXAG	39.66	307 Church St Branham	58 KWMZ	39.98
301 Union Harburg	10 KXAG	39.66	Fuchanan Dam	KWNP	39.98
Gowanda Village	10 KXAG	39.66	Marshall Fcrd Dam	KWNU	39.98
38 Main Salamanca	10 KXAG	39.66	Peters	KWNX	39.98
Irwin Cty Elec Memb Corp Ocella Ga	10 KXAG	39.66	Lower Colo River Authority Austin Tex	KWNZ	39.98
PO Box 125	10 KXAG	39.66	3601 Lake Austin Blvd	KWNZ	39.98
Jackson Elec Coop Inc LaWard Texas	10 KXAG	39.66			
Black River Falls Wis	10 KXAG	39.66			
Jackson Cty Ru Elec Memb Brownstone Ind	10 KXAG	39.66			
101 W Walnut	10 KXAG	39.66			
Jacksonville City of Jacksonville Fla	10 KXAG	39.66			
1050 Laura	10 KXAG	39.66			
Jefferson Davis Elec Coop Jennings La	10 KXAG	39.66			
Peterson Bldg	10 KXAG	39.66			
Jersey Centr Pr & Lt Co Allenhurst NJ	10 KXAG	39.66			
521-5 Main	10 KXAG	39.66			

MODEL 114-010
Deluxe FM
All-Direction
Double Folded
Dipole

AMPHENOL

FOR PERFECT FM RECEPTION—USE AMPHENOL

Rural and suburban FM reception calls for extra fine antenna equipment. Amphenol antennas meet all requirements and are mechanically and electrically constructed to give long, trouble-free service; they are built to withstand ice and snow, wind and rain.

Antenna No. 114-010 receives FM signals from all directions, requires no rotation, gives crystal clear reception all over the FM band.

Antenna No. 114-008 gives brilliant reception all across the band. It's specially designed for one general direction, long distance FM reception.

Amphenol FM Antennas improve reception at every location, often bringing in many stations previously out of range.

MODEL 114-008
Deluxe FM
Folded Dipole
With Reflector

AMERICAN PHENOLIC CORPORATION
1830 SO. 54TH AVENUE • CHICAGO 50, ILLINOIS

PUBLIC UTILITIES

Lynn Gas & Elec Co Lynn Mass	25 WUAQ	158.13	Dwyer Rd	WWBD	152.59	Ozarks Ru Elec Coop Fayetteville Ark	10 KCLM	39.98	Public Serv Elec & Gas Hacksack NJ	1 Newmam	191 WCHC	37.18	
788 Broad	25 WUAQ	158.13	Valence St	WWBG	153.59	17 N Bloss	10 KCLM	39.98	900 W Grand Elizabeth	WCIA	37.18		
Lynntegar Elec Coop Inc Sundown Texas	10 KBGW	37.82	Polymania St	WWBH	153.59	Pacific G & E Co San Francisco Calif	245 Market St (Mail)		31 Van Houten Paterson	WCID	37.18		
Tahoka	KRLU	37.82	Dryades St	WWBJ	153.59	18th & Shotwell	115 KHUL	158.25	225 N Warren Trenton	WCIE	37.18		
Macon Elec Coop Macon Mo	10 KHZ5	153.59	Elysville St	WWBK	153.59	17th & Clay Oakland	KPGE	158.13	17th St Camden	WCIH	37.18		
Martin Bldg	10 KHZ5	153.59	N Y State Elec & Gas Binghamton NY	WWBO	153.59	San Rafael	KHKU	153.71	938 Clinton Irvington	WCIK	37.18		
Magic Valley Elec Coop Inc Mercedes Tex	KMAJ	31.46	62 Henry St (Mail)			Pacific Pr & Lt Co Walla Walla Wash	85 KSXE	153.59	Sub-Sta Princeton	WCIP	37.18		
838 S Tex Av	12 KMHO	39.88	15 Eldredge St	8 WPIH	31.98	Union Gap Sub-Station	KTLU	153.59	268 Baldwin Jersey City	WCJY	37.18		
Magnolia Elec Pr Assn McComb Miss	15 WMFK	31.46	Wellsville NY	14 WBKK	37.88	Panhandle Eastern Pipe Line Mexico Mo	206 KDGO	39.88	107 N Y Av Jersey City	WCND	37.18		
213 Canal	15 WMFK	31.46	Caledonia NY	WBKM	37.88	314 W Love St	KLAH	39.88	Public Util Dist 1 Chehalis Wash	4 KAAU	39.88		
Malden Elec Co Malden Mass	15 WVJU	153.71	Otisco NY	WBKU	37.88	Houstonia	KNHJ	39.88	981 Pacific	4 KAAU	39.88		
81 Center	15 WVJU	153.71	Lawrence Twp Pa	WKQF	37.88	Boonville	KPHD	39.88	Morton	4 KAAU	39.88		
Malden & Melrose Gas Lt Co Malden Mass	10 WVVW	153.71	Taylor Farm Waynesburg Pa	WKRJ	37.88	1221 Balt Av Kansas Cty	KPHD	39.88	Public Util Dist 1 Vancouver Wash	40 KACH	158.13		
157 Pleasant	10 WVVW	153.71	Niagara Fls Power Co Niagara Falls NY	WSTZ	37.88	Centralia	KPHF	39.88	Pub Util Dist 1 Longview Wash	20 KRDS	37.88		
Marshall City Ru Elec Memb Plymouth Ind	8 KJUL	37.54	Schoellkopf Gen Sta	10 WKKA	158.13	3700 Greenfield Rd Detroit Mich	WFFY	39.88	L B Mill Site	12 KRDS	37.88		
Marshall City Coop Marshalltown Ia	5 KVLB	37.88	Noble City Ru Elec Mem Corp Albion Ind	5 WNZF	37.54	Bluffton Indiana	WVVU	39.88	Public Util Dist 2 Ephrata Wash	12 KJHM	158.13		
19 S Center	5 KVLB	37.88	North Arkansas Elec Coop Salem Ark	12 KQKL	37.88	Montezuma	WPHW	39.88	PR Water Res Authority Rio Piedras PR	10 WFTT	39.88		
Marshallfield City of Marshallfield Wisc	4 WPAZ	39.88	County Bldg	8 WATJ	158.13	Zionsville	WQEB	39.88		10 WFTT	39.88		
112 E 2nd	4 WPAZ	39.88	N Cent Elec Coop New Washington Ohio	8 WATJ	158.13	Liberal Kansas	KCKX	39.88	Hostos Av Ponce PR	KAOM	2.728*		
McDonough Pr Coop Inc Macomb Ill	10 WRWY	37.62	Kibler St	WWSQ	158.13	Olpe	KFOH	39.88	Guayama Pr	WAJU	2.728*		
US Rt 1	10 WRWY	37.62	US Rte 224 Attica	WWSQ	158.13	Louisburg	KLAY	39.88	Mayaguez PR	WAWY	2.728*		
McLeod Coop Pr Assn Glencoe Minn	5 KRTG	39.88	N Indiana Pub Serv Co Goshen Ind	96 WDBV	39.88	Arkansaw	KPHE	39.88	Dog Bocas H-E Pl Arecibo WQUL	2.728*			
808 Franklin	5 KRTG	39.88	W Wash St	WDBV	39.88	Greensburg	KPHG	39.88	Puget Sound Pr & Lt Co Seattle Wash	55 KXIO	75.42		
Memphis City of Memphis Tenn	104 WMJV	39.88	Wash St Valparaiso	WKVF	39.88	Haven	KPHP	39.88	7th Av & Olive	55 KXIO	75.42		
179 Madison Av	104 WMJV	39.88	701 Wash St LaPorte	WKYQ	39.88	Hugoton	KTSQ	39.88	Queens Boro G & E Co Far Rockaway NY	15 WRDI	39.88		
Meade City Ru Elec Coop Brandenburg Ky	12 WHUQ	37.62	Sub-Sta Angola	WMRB	39.88	Satara	KUBQ	39.88	Brunswick Av	15 WRDI	39.88		
US Highway 60	12 WHUQ	37.62	340 N Buffalo Warsaw	WMRG	39.88	Sunray Texas	KJUG	39.88	Red Lake Elec Coop Red Lake Falls Minn	10 KUAS	37.82		
Metropolitan Edison Co Reading Pa	29 WFAZ	37.18	Lake Av Plymouth	WMRM	39.88	Dumas	KPHK	39.88	Skala Bldg	10 KUAS	37.82		
141 S 7th	29 WFAZ	37.18	Hanswale St Monticello	WKXZ	39.88	Hardesty	KPLH	39.88	Rochester Gas & Elec Corp Rochester NY	80 WGAE	39.88		
160 Ferry St Easton	WMZL	37.18	W 108 Goss Kentland	WJRB	39.88	Pleasant Hill Illinois	KPLH	39.88	174 Front	80 WGAE	39.88		
Miami-Cass Cty Ru Elec Memb Peru Ind	7 WGIC	37.54	8th St Fowler	WSRG	39.88	Gleason	WPZY	39.88	Rockland Lt & Pr Co Central Nyack NY	8 WCVP	31.48		
58 E Main	7 WGIC	37.54	4621 Elm Av Hammond	WUDK	39.88	Tuscola	WPZZ	39.88	Bway & Ivy	8 WCVP	31.48		
Michigan Con Gas Co Freeman Tn Mich	11 WJLI	37.78	Northern Natural Gas Co Omaha Neb	Aquila Court Bldg (Mail)		Mauce Ohio	WQGF	39.88	Middleton	WCWQ	31.48		
Austin Tn Mich	WJLR	37.78	Ogden Ia	190 KAXG	33.18	Parke Cty Ru Elec Memb Corp Rockville Ind	8 WDSJ	37.54	Roosevelt City Elec Coop Portales N Mex	202 SF Main	10 KXDL	37.70	
Goodwell Tn	WVJS	37.78	Paullina Ia	KAXI	33.18	119 West High	8 WDSJ	37.54	202 SF Main	10 KXDL	37.70		
Middle Georgia Elec Corp Vienna Ga	10 WSHIE	158.25	Oakland Ia	KYDR	33.18	Pasadena City of Pasadena Calif	100 N Garfield Av	15 KAVF	153.71	Rosslyn Gas Co Arlington Va	2700 Shirley Mem Hwy	5 WRKA	33.06
REA Office	10 WSHIE	158.25	Ventura Ia	KYDR	33.18	Pauding Putnam Elec Coop Paulding Ohio	101 N Main	12 KAVF	158.13	Rural Coop Pr Assn Pine City Minn	4 KXGS	33.34	
Middle Tenn Elec Corp Franklin Tenn	14 WAIH	37.78	Welcome Minn	KKCF	33.18	Pee Dee Elec Memb Corp Wadesboro NC	49 S Rutherford	8 WSHA	158.13	Milaca	KGKT	33.34	
220 E Main Lebanon	WAIH	37.78	Minneapolis Minn	KKYD	33.18	Pella Co Elec Assn Pella Iowa	W Wash St	7 KGI	153.71	Hawick	KQWY	33.34	
Murfreesboro	WJSI	37.78	Beaver Okla	KTYD	33.18	Pedernales Elec Coop Inc Bertram Texas	32 KPEF	39.88	Cambridge	KQWY	33.34		
Midwest Elec Co St Marys Ohio	10 WNIH	158.13	Skellytown Texas	KTOZ	33.18	Fredericksburg	KPED	39.88	Rural Elec Conv Coop Diverston Ill	8 WLBT	37.82		
E Spring St	10 WNIH	158.13	St Louis City Nebr	KWJR	33.18	Liano	KPEE	39.88	REA Office	8 WLBT	37.82		
Greenlawn Av Elida	WNHJ	158.13	Hooper Nebr	KXRC	33.18	Johnson City	KPEG	39.88	Rush City Ru Elec Memb Coop Rushville Ind	4 WDHG	31.48		
Mid-Yellowstone Elec Coop Hysman Mont	4 KSKK	37.78	Beatrice Nebr	KYDC	33.18	Pemiscot-Dunklin Elec Coop Hayti Mo	325 S 3rd St	20 KAMY	153.65	Rutherford Elec Memb Forest City NC	1 Main	5 WSXT	37.78
Minneapolis Gas Lt Co Minneapolis Minn	43 KIDJ	31.46	Palmyra Nebr	KYDC	33.18	Pennsylvania Elec Co Johnstown Pa	222 Levergood (Mail)	23 WIUT	39.88	Sac City Ru Elec Coop Sac City Ia	10 KSTX	37.88	
700 Linden Av	43 KIDJ	31.46	Omaha Nebr	KYGL	33.18	535 Vine	23 WIUT	39.88	Sac & Main	10 KSTX	37.88		
Minnkota Pr Coop Harwood Nc	20 KUKC	37.82	Hugoton Kans	KXWT	33.18	Erle Pa Sub-Station	WMYV	39.88	Sacr Munic Util Dist Sacramento Cal	11 KHRD	153.59		
US Hwy 81	20 KUKC	37.82	Sublette Kans	KYDH	33.18	9th Pa Sub-Station	WMYV	39.88	Safe Harbor Wtr Pr Safe Harbor	5 WNFH	30.88		
Grand Forks	KUKG	37.82	Millville Kans	KYDI	33.18	Pennsylvania Pr & Lt Co Allentown Pa	9th & Hamilton (Mail)	237 WBMH	37.82	St Croix Cty Elec Coop Baldwin Wisc	4 WEXR	39.88	
Minnesota Pr & Lt Co Duluth Minn	36 KCKH	37.54	Bushton Kans	KYDL	33.18	117 E Broad Hazelton	WFGF	39.88	Bacon & Hewes Palo Alto	WJK	39.88		
30 W Superior	36 KCKH	37.54	Clifton Kans	KYDN	33.18	Ma Pocono	WFAD	39.88	9th St Allentown	WFAD	39.88		
Mississippi Power Co Gulfport Miss	100 WKMG	158.13	Northern Piedmont Elec Culppeper Va	175 E Davis	153.59	10th St Harrisburg	WFAF	39.88	Lancaster	WHTO	39.88		
PO Box 1039 (Mail)	100 WKMG	158.13	1600 Chestnut Av	100 KTN5	37.82	Lancaster	WHTO	39.88	Hawley	WHTP	39.88		
Pascagoula	100 WKMG	158.13	15 S 5th	WLP	3.190	WilliamSPORT	WPH	3.19*	Hamilton St Allentown	WPPF	3.19*		
Hway 49 Gulfport	WGMQ	158.13	St Croix Falls Wisc	WPL	3.190	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Legion Bldg Poplarville	WGHQ	158.13	Nueces Elec Coop Inc Robstown Texas	4 KBMM	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
721 Main Columbia	WGSQ	158.13	O & A Elec Coop Newaygo Mich	15 WPDU	37.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Waynesboro	WGSU	158.13	26 State St	WRXL	37.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Hattlesburg	WGRF	158.13	Burnips Mich	WRXL	37.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Blount	WMTA	158.13	Oakdale Coop Elec Assn Oakdale Wisc	12 Hwy 12-16	7 WNPE	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*	
Gulfport	WMTA	158.13	Occoee Elec Memb Corp Dudley Ga	REA Office	10 WDLT	158.25	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*	
Mississippi Pr & Lt Co Jackson Miss	68 WAPG	39.88	Ohio Edison Co Springfield Ohio	94 WLTZ	39.88	Pennyrile Ru Elec Coop Russellville Ky	Hway 100	28 WUEE	37.88	WilliamSPORT	WPPF	3.19*	
414 S Commerce	68 WAPG	39.88	Mad River Gen Plt	WQEA	39.88	Hway 100	28 WUEE	37.88	WilliamSPORT	WPPF	3.19*		
Byhalia	WAGD	37.62	Akron	WQEM	31.46	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Tunica	WASZ	37.62	Youngstown	WQUM	31.46	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Marks	WATX	37.62	121 E High Springfield	WRPS	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Sardis	WAUL	37.62	Sugar Grove	WNTQ	33.34	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Senatobia	WAUP	37.62	Ohio Fuel Gas Co S Point Ohio	25 WNXV	33.34	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Hernando	WAUU	37.62	S P Comp Station	25 WNXV	33.34	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Greenville	WAWA	37.62	Ohio-Midland Lt & Pr Canal Winchester O	10 S High St	6 WEUX	37.54	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*	
Indianola	WBCD	37.62	Ohio Power Co Bellair Ohio	34th & Monroe	271 WABO	29.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*	
McComb	WBFS	37.62	34th & Monroe	271 WABO	29.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Mitchell City Elec Mem Corp Camilla Ga	10 WVJX	37.54	Vernon Junction	WAFJ	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
109 S Scott	10 WVJX	37.54	Kenton	WAGS	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Modesto Irrigation Dist Modesto Calif	KQRB	2.728*	Zanesville	WAGN	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
13 KQCV	13 KQCV	31.74*	Crooksville	WAOS	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Monongahela Pr Co Fairmont W Va	55 WJBJ	37.18	Waco	WCEG	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
314 Jefferson	55 WJBJ	37.18	Lima	WCLL	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
5th & RR Elkins	WJBU	37.18	Van Wert	WCLS	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Sub-Sta Howesville	WJBX	37.18	Lepisc	WCRE	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Cl Sq Webster Sprgs	WJHZ	37.18	Thiff	WCRT	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Monroe Cty Elec Coop Inc Waterloo Ill	10 WVCE	158.25	Newcomerstown	WCRT	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
111-113 W Mill	10 WVCE	158.25	Newark	WGMZ	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Montana Power Co Butte Mont	40 E Broadway	158.13	Hicksville	WOPG	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
40 E Broadway	KQJ	158.13	Boscoe	WOIM	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Missoula	KOBH	158.13	Ohio Pub Serv Co Alliance Ohio	WAHI	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Lewiston	KDQQ	158.13	Bluebell Sub-Station	WAWH	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Bozeman	KQHC	158.13	Vermillion	WAWM	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Billings	21 KQIA	158.13	Marion	WBEW	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
34 N Main Helena	18 KQIA	158.13	Lorain	WIYQ	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Hauser Lk Helena	KQPA	158.13	Ashland	WIJP	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Cut Bank	KQBQ	158.13	Belleuve	WKBJ	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
Morgan Cnty Ru El Memb Martinsville Ind	5 WFPG	39.88	Colleville	WKPO	39.88	WilliamSPORT	WPH	3.19*	WilliamSPORT	WPPF	3.19*		
169 Main	5 WFPG	39.88	Rittman	WKVU	39.88	WilliamSPORT							

PUBLIC UTILITIES

Sub-Station Glendale	KAMC	2.2924	T W Phillips Gas & Oil Punksutawney Pa	Ewa Plantation Co Honolulu Hawaii	153.71	Phila Suburban Trans Co Upper Darby Pa	87 WTSE	30.98
Sub-Station Anabelm	KQDZ	158.13	125 S Gilpin	PO Box 2990	20 K6XTU	80th St Garret Rd Terminal	84 WIVN	31.14
Chino	KQER	158.13	Tarentum	G E Kadane & Sons Wichita Falls Texas	22 W5XWS	1405 Locust	23 WDRO	30.9
515 W State Long Beach	KQES	158.13	Home	Hamilton Bldg	24 W4XTP	Pittsburgh Ry Co Pittsburgh Pa	12 KOHW	30.98
Redondo Av Torrance	KQET	158.13	Marwood	Gulf Pr Co Pensacola Fla	2 W4XTP	435 6th Av	12 KQHW	30.98
Satcoque	KQEU	158.13	Butler	Hawaiian Commerical & Sugar Co	2 W4XTP	2801 N St	25 KEHG	30.98
Vernon	KQEV	158.25	Uncompahgre Valley Wtr Users Assn	Honolulu HI	12 K6XAL	3889 Park Av	8 KPKM	39.66
Marine St Santa Monica	KQEW	2.2924	Taylor Pk Dam Colo	Hudson Paint & Dec Co Inc New York NY	41 Lexington Av	602 E 5th South St	15 KSAA	39.86
Colton	KQEX	158.13	Montrose Colo	441 Lexington Av	11 W2XUI	310 So St Mary's	15 KSAA	39.86
Dalton	KQFV	158.13	Union Elec Pr Co St Louis Mo	Intestate Pet Commn New York NY	30 Rockefeller Pl	S F City & County of San Francisco Calif	30 KCRJ	31.46
Vestal Sub-Station Delano	KQGW	158.13	315 N 12th	Kansas Gas & Elec Co Wichita Kans	201 N Market (Mail)	San Diego Elec Ry San Diego Calif	10 KSDR	39.86
Rector Sub Sta Visalia	KQHX	158.13	1513 W Maple	201 N Market (Mail)	Cheney	Spokane City Lines Spokane Wash	11 W3XDB	33.98
Santa Barbara	KQHY	158.13	United Illuminating Co New Haven Conn	Atlanta	WXIB	1229 Boone Av	10 KSKC	33.98
Santa Fe Springs	KQHZ	158.13	80 Temple	Strauss	WXID	1959 Purchase	8 WJGZ	39.02
Lancaster	KQIB	158.13	185 E Main Bridgeport	Pittsburg	WXIP	24 Exchange Pl	12 WJWF	31.46
Nr Saugus	KQIC	158.13	United Natural Gas Co Lewis Run Pa	Independence	WXAI	Virginia Transit Co Richmond Va	12 WVBX	30.90
Southern Ill Elec Coop Metropolis Ill	KQID	37.70	115 N 11th	Nr Moline	WXIC	2500 Idlewood Av	12 WVBX	30.90
Rt 145	23 WSPN	37.70	Raymlton	King Farms Co Morrisville Pa	11 W3XDB	Wash Marlboro & Annap Motor Lines	5 WMNA	35.14
Dongola	WSPQ	37.70	Sigel	Latex Construction Co Houston Texas	2707 Ferndale	707 N Randolph	7 WMVC	39.66
Southern Ind Ru Elec Coop Tell City Ind	5 WMNT	158.25	Oil City	Los Angeles Transit Lines Los Angeles Cal	1060 S Bway	Worcester St Ry Worcester Mass	8 WMOS	31.46
Southern Natural Gas Co Wetumpka Ala	39.86	Upper Cumberland El Co Carriage Tenn	109 Main	Macon Electric Coop Macon Mo	2 WXFI			
Montgomery Hwy	48 WBYO	39.86	117 S Church Livingston	National Steel Corp Weirton W Va	8 W8XJI			
2008 3rd Av Birmingham	WKHT	39.86	Utilities Dist Bloomfield Ind	Oklahoma Railway Co Oklahoma City Okla	5 W5XKF			
Rte 1 Perryville	WQVY	39.86	37 S Franklin	Panhandle East Pipe Line Kansas City Mo	1221 Balt Av			
Sewell Rd Atlanta Ga	WKHE	39.86	Valley Ru Elec Coop Huntingdon Pa	Panhandle Pipe Line Co Jackson City Mich	Prospect Hill			
Holton Rd Macon	WVNA	39.86	Box 397	Pemiscot-Dunkin Elec, Coop Hayti Mo	8 WJXO			
South Plains Elec Coop Lubbock Texas	7 KNFQ	37.82	115 N 11th	Phillips Petroleum Co Sweeney Texas	100 W5XCA			
305 Ave W	7 KNFQ	37.82	Vernon Elec Coop Westby Wis	Phillips	W5XCB			
Southside Elec Coop Inc Crewe Va	25 WBUJ	37.78	State St	Hansford	W5XCC			
Rte 460	WKPQ	37.78	Volunteer Elec Coop Spring City Tenn	14th & Klein Dumas	W5XCD			
Southwest Cent Ru Elec Coop Indiana Pa	10 WWBX	39.98	Decatur Tenr. (Mail)	City Natl Bank Houston	W5XCV			
21 N 5th	10 WWBX	39.98	Jamestown	Placid Oil Co Shreveport La	25 W5XVN			
Southwest Miss Elec Pr Lorman Miss	15 WHPX	37.78	Washington Cty El Memb Sanderville Ga	1107 City Bank Bldg	25 W5XVN			
REA Office	15 WHPX	37.78	Pub-Sq	Potlatch Forests Inc Lewiston Idaho	8 W7XMI			
Southwest Tenn Elec Brownsville Tenn	20 WVQR	153.59	Washington Elec Coop Inc Marietta Ohio	Potomac Elec Pr Co Washington DC	10th & E Sts NW			
115 E Main	20 WVQR	153.59	185 Front	Pullman-Standard Car Mfg Michigan City Ind	719 Wabash			
217 Liberty Jackson	WVQU	153.59	Washington Gas Lt Co Washington DC	Riverview Farms Oxford NY	9 W9XLN			
20 E Pleasant Covington	WVWQ	153.59	25th & H Sts NW	258 Wash Av	10 W2XTN			
109 Main Henderson	WVWZ	153.59	12th & N Sts SE	Robertson-Matheny Oil Co Wichita Falls Tex	PO Box 3097			
Southwestern Fed Pr Coop Creston Ia	10 KIZV	158.25	1100 29th St NW	PO Box 3097	9 W5XYJ			
PO Box 437	10 KIZV	158.25	Chillum Md	Roosevelt Irrigation Dist Buckeye Ariz	2 W7XJG			
Southwestern G & E Co Longview Tex	19 KAKU	39.88	Westmore Md	PO Box 1089	2 W7XJG			
515 E Cotton	19 KAKU	39.88	Edmonst. Md	Seaside Lumber Co Berkeley Calif	1208 Amer Trust Bldg			
Southwestern Pub Serv Plainview Tex	114 W 7th (Mail)	37.78	Washington St Tammany El Franklinton La	So California Edison Co Los Angeles Cal	601 W 5th (Mail)			
Amarillo	KFQZ	31.46	3 WAUO	Santa Monica	W6XSZ			
Borger	KCTQ	31.46	Washington Water Power Co Spokane Wash	Santa Paula	W6XTK			
Lubbock	KCTS	31.46	825 W Trent	Nr Corona City	W6XTL			
Abernathy	KQCB	31.46	17 S 10th	Nr San Fernando	W6XTO			
Stearns Coop Elec Assn Melrose Minn	6 KSLV	30.88	Western Mass El Co Springfield Mass	Nr Ventura	W6XTR			
344 N Main	4 KCVQ	39.86	210 Alden	Exeter	W6XTM			
Suburban Nat Gas Corp Dewey Okla	30 K3NE	158.01	West Florida El Coop Graceville Fla	Alpine	W6XTQ			
400 E 8th	30 K3NE	158.01	REA Office	Southside Electric Coop Inc Crewe Va	W4XXF			
Sumter Elec Coop Sumterville Fla	8 WSUW	33.28	W Kentucky Ru Elec Coop Mayfield Ky	T B Tripp & Sons Odessa Texas	1804 W 2nd			
Sullivan City Ru Elec Memb Sullivan Ind	8 WLTQ	37.54	30E E Bway	Union Bag & Paper Co Savannah Ga	20 W5XYN			
106 W Wash	8 WLTQ	37.54	W Oregon El Coop Inc Vernonia Ore	United Gas Pipe Line Co Shreveport La	1 W4XRX			
Suwannee Valley Elec Coop Live Oak Fla	5 WRIN	37.78	622 Bridge	1525 Fairfield Av	W5XLL			
Tacoma City of Tacoma Wash	106 KBOJ	158.25	Jewell	Virginia Gas Transp Corp Charleston W Va	1093 Quarrier			
1171 E Taylor Way	106 KBOJ	158.25	W Penn Power Co Charleroi Pa	Weldon & Carr Washington DC	1805 Conn Av NW			
3110 So I St	KRAA	153.71	Hazelirk Rd Sub Sta	West Pennsylvanla Pr Co Charleroi Pa	6 WIOXXL			
Alford Wash Pr House	KHCD	158.25	301 Main	West Texas Util Co Childress Texas	1619 Wash			
LaGrande	KHCE	158.25	Wheeling Elec Co Wheeling W Va	301 Main	KGHE			
Potlatch	KHCF	158.25	White City Ru El Corp Monticello Ind	Wheeling Elec Co Wheeling W Va	12 WMOK			
Green River Purification Plant	KIAB	153.71	Oberchain Bldg	White City Ru El Corp Monticello Ind	4 WPQQ			
Nr Kanaskat Wash	KIAB	153.71	Whitley City Ru El Columbia City Ind	115 S Main	6 WIAL			
Tallahatchie Elec Pr Batesville Miss	12 WNKP	33.34	Wild Rice El Coop Inc Mahanomen Minn	Winnipeg Ru El Coop Assn Thompson Ia	10 KCRW			
REA Office	12 WNKP	33.34	115 S Main	Main St	10 KKCVC			
Tampa Elec Co Tampa Fla	WTWC	153.59	Winnconsin El Pr Co Milwaukee Wis	231 W Mich Av	49 WQHL			
Power Pit	WTWC	153.59	Wisconsin G & E Co Ft Atkinson Wis	Milwaukee Av	48 WBQM			
PO Box 111	WTWB	153.59	W End	W End	WQHK			
Tampa Elec Co Plant City Fla	50 WTWD	153.59	Wisconsin Micanpr Pr Appleton Wis	Wisconsin Micanpr Pr Appleton Wis	12 WBMN			
E Haines St	50 WTWD	153.59	137 W Mill	Oconto Falls	WQWR			
Winter Haven	WTWL	153.59	1st Av Iron River Mich	1st Av Iron River Mich	WIUI			
Mulberry	WTWL	153.59	Wisconsin Pr 1 Lt Co Madison Wis	122 W Wash Av (Mail)	80 WETG			
11th Av Substa Tampa	WTWZ	153.59	Clintonville	Withlacoochee Rlv El Dade City Fla	6 WUYQ			
Taylor Elec Coop Inc Market Texas	20 KKLW	37.82	PO Box 177	Woodruff Elec Coop Forest City Ark	15 KFHP			
304 Front	20 KKLW	37.82	Woodruff Elec Coop Forest City Ark	Hway 1	15 KFHP			
Taylor City Elec Coop Medford Wisc	6 WBFZ	39.66	Wright-Hennepin Coop El Assn	Maple Lake Minn	35 KRZB			
8th & Calhoun	17 KTES	39.66	Maple Lake Minn					
Whitchita Falls	KUKR	39.66						
Texas Pr & Lt Co Tyler Texas	30 KRZL	33.02						
1001 W Erwin	30 KRZL	33.02						
Gainesville	KRKS	33.02						
Gen Sta Palestine	KRZO	33.02						
Sub Sta Athens	KRZP	33.02						
Gen Sta Trinidad	KRZR	33.02						
Texoma Natural Gas Co Fritch Texas	30 KQWK	33.28						
Three Notch El Corp Donalsonville Ga	8 WVPW	158.13						
112 W 2nd	8 WVPW	158.13						
Tipton Ru El Memb Corp Linden Ind	7 WTQH	39.66						
Bank Bldg	7 WTQH	39.66						
Tishomingo City Elec Pr Assn luka Miss	WBOV	31.46						
EPA Office Fulton St	10 WGRS	158.25						
Toledo City of Toledo Ohio	WBOU	31.46						
Intake Crib	WBOU	31.46						
Low Ser Pump Sta	WBOU	31.46						
Collins Pk	WKYK	31.46						
Toledo Edison Co Toledo Ohio	39 WBYT	39.86						
1001 W Delaware	39 WBYT	39.86						
134 S 5th Fremont	WCOJ	39.86						
Pr Dam Rd Defiance	WKJO	29.86						
134 N Fulton Wauseon	WKJP	39.86						
Trompeau El Coop Arcadia Wisc	4 WBMZ	39.66						
315 E Main	4 WBMZ	39.66						
Tri-City Elec Mem Corp Lafayette Tenn	12 WAXD	75.50						
Walnut St	12 WAXD	75.50						
Tompkinsville Ky	WAXK	75.50						
Scottsville Ky	WAXM	75.50						
Tri-City Elec Coop Vestaburg Mich	5 WSCZ	31.46						
Rushford Minn	7 KHPU	39.66						
Portland Mich	WKNH	31.46						
Tri-City Elec Coop Assn Inc Lancaster Mo	12 KWYE	153.71						
Tulsa City of Spavinaw Okla	15 KNHN	37.86						
Wtr Dept Office	15 KNHN	37.86						
405 E 4th Tulsa	KNHR	37.86						
Twin City Elec Pr Assn Rolling Fork Miss	15 WBGX	37.78						
REA Office	15 WBGX	37.78						
Belzoni	WBGY	37.78						
Hollandale	WRWX	37.78						

The Original Carter Genemotor



Carter Genemotor 7-1 16" long, 4-1 8" wide, 3-1 2" high. Weight only 10 lbs.

for TAXICAB, MARINE
and Police
Mobile Radios

Unequaled performance and dependability are assured when you specify Carter Genemotor Power Supplies. The favorite for over 15 years.

***** SPECIFICATIONS *****
Frame capacity 80 watts cont. 150 watts int. (up to 400 watts, on Marine models only.)

Input volts DC—5.5 to 115
Input current DC—up to 50 amps.
Output volts DC—up to 800 volts
Output current DC—up to 500 MA.
AC ripple content—1% or less
Overall efficiency—50-75% average
Output regulation—20% no load to full load
Starting time—300 milliseconds average



2641 N. MAPLEWOOD AVE., CABLE: GENEMOTOR

Check These features

Small size—Can be mounted on its side.

Reliable—100,000 transmissions without servicing.

Armature triple insulated. Transformer grade laminations. Static and dynamically balanced. Precision ball bearings require NO lubrication.

Super Precision—Frames line reamed to .0001 accuracy.

WRITE

Bulletin No. 447-J illustrates the Genemotor and many other Carter Rotary Products. Write today.



A WORKSHOP HIGH-GAIN ANTENNA

will . . .

More than triple the effective power of the transmitter.

Increase the effective power of the mobile transmitter.

Increase the operating area.

Permit the use of low power, low cost equipment.

Workshop High-Gain Beacon Antennas are designed specifically for the 152-162 megacycle band—taxicab, fire, police, and private fleet communications.

Design Features

- Low angle of radiation concentrates energy on the horizon.
- Symmetrical design makes azimuth pattern circular.
- Can be fed with various types of transmission lines. Special fittings are available for special applications.
- Enclosed in non-metallic housing for maximum weather protection.

Available for immediate delivery through authorized distributors or your equipment manufacturer.

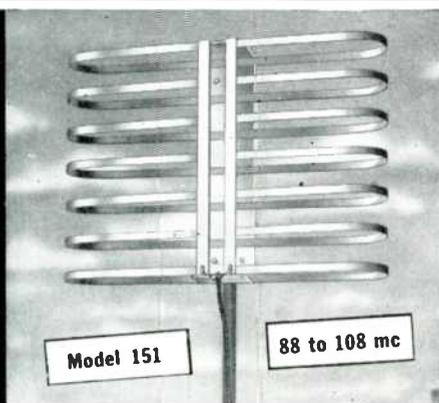
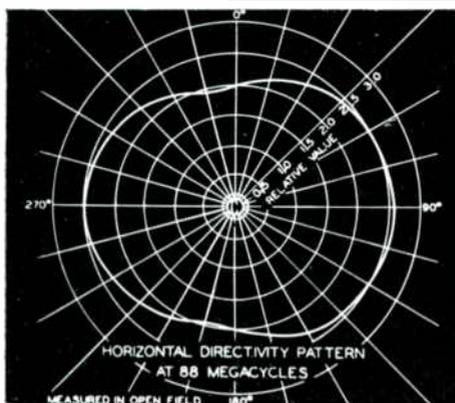
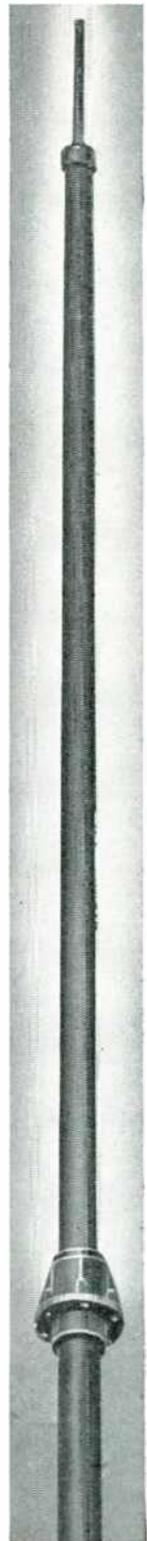
—THE— WORKSHOP ASSOCIATES

INCORPORATED

PAT. APP. FOR

Specialists in High-Frequency Antennas
65 NEEDHAM STREET
Newton Highlands 61, Mass.

FM AND TELEVISION



The Rauland Omni-directional FM ANTENNA!

- No Special Orientation Required
- High Sensitivity & Signal Strength
- Low Standing Wave Ratio
- All-Aluminum Construction

NON-DIRECTIONAL DESIGN!

Graph above shows virtually circular horizontal directivity pattern at 88 mc, only slight elongation appears at 108 mc. Vertical directivity shows no response to automobile ignition and other man-made noises, gives maximum noise-reducing benefits.

Here is the *first and only* FM receiving antenna with *all* these features: 1. Non-Directional Pickup over the *entire* FM band—for satisfactory reception from all stations in any location—regardless of direction or signal. 2. Higher gain improves reception at outlying sections of the effective station area. 3. Stable Omni-directional characteristics—unaffected by rain, sleet, or age. 4. Can be permanently grounded for protection against lightning. 5. Direct match to standard 300 ohm receivers. 6. Complete with 5-foot mounting mast, adjustable base and hardware. (Also available less mounting mast and base, as Model 150—ideal for use in pairs for increased signal strength and lower noise.) No other conventional antenna offers all the FM receiving advantages obtained from the exclusive design of the RAULAND 151 FM Receiving Antenna.

Rauland

Write for interesting descriptive bulletin . . .

THE RAULAND CORPORATION

4263 N. Knox Avenue, Chicago 41, Illinois

LIMITED COMMON CARRIERS

Tri-City Comm System Phoenix City Ala	152.03
601 Broad	50 W4XGH
Tri-City Rad Disp San Bernardino Calif	152.03
226 F St	100 W6XNA
Tulane City Rad Disp Visalia Calif	152.03
1500 College Av	200 W8XLK
Twin City Rad Disp Minneapolis Minn	152.03
1201 Met Life Bld	100 WXNC
U-Dryvit Auto Rental Co Cambridge Mass	152.03
120 Potter	100 W1XZX
United Radio Comm SanDiego 1 Calif	152.03
831 "C" St	150 W6XKB
Universal Comm Co Toledo Ohio	152.03
2009-11 Monroe	50 W8XTK
Utah Radio Disp Salt Lake City Utah	152.03
20 West So Temple	10 W7XTJ
Westchester Mobilphone Co White Plains NY	152.03
150 Main	22 W2XMY
Wolpert N Z Minneapolis 2 Minn	152.03
225 S 5th	100 W6XMH

HIGHWAY MAINTENANCE, EXP.

State of Calif Dept of Pub Wks Box 1499	
Sacramento Calif	48 KRNF 37.98
Norden	KAON 2.72*
1675 Riverside Redding	KASN 2.72*
S H Maint Quincy	KATQ 2.72*
US H 99 Mt Shasta	KATR 2.72*
H Maint Susanville	KATS 2.72*
US H 99 Maint Yreka	KATT 2.72*
S H 29 Mineral	KATU 2.72*
US H 395 Alturas	KATW 2.72*
US H 299 Burney	KATY 2.72*
US H 395 Conway Summit	KBTC 2.72*
US H 395 Sonora Jct	KBTD 2.72*
703 B St Marysville	KQGC 2.72*
US 40 Maint Truckee	KQGD 2.72*
SH 18 Maint Lk Arrowhd	KQGI 2.72*
Main St S Bernardino	KQJG 2.72*
247 8th St	KQJN 2.72*
US H 395 Crestview	KQK 2.72*
US H 395 Bishop	KQGM 2.72*
US 50 Maint Sta Vade	KRMA 2.72*
US 40 Maint Emigrant Gap	KQGB 2.72*
SH Maint Independence	KRYH 2.72*
SH Maint Mojave	KRYN 2.72*
SH Maint Crestview	KRYR 2.72*
SH Maint Placerville	KRYT 2.72*
SH Maint Red Bluff	KRYU 2.72*
SH Maint Douglas City	KRYV 2.72*
US H 199 Crescent City	KRYZ 2.72*
US H 299 Trinity	KRZC 2.72*
Main St Sta Crescent City	KRZE 2.72*
Main St Willow Creek	KRZS 2.72*
US H 101 Ukiah	KRZT 2.72*
US H 101 Garberville	KRZU 2.72*
Main St Pulga	KATV 2.72*
State of California Mt Pierce Calif	
Mountain Top	W6XGS 72.10
	3 W6XYD 2.45*
Dist of Columbia Washington DC	
300 Indiana Av	13 W3XOE 37.98
State of Mississippi Jackson Miss	
Highway Main Dept	1 W6XWG 2.46*
State of Ohio Ashtabula Ohio	
511 W 51 St	1000 W7XJA 31.54
Ravenna	W8XJB 31.54
Town of Brookhaven NY	
Old Town Rd	20 WAHL 37.98
Onondaga Cnty NY Jamesville NY	
Hwy Dept Shops	10 W6XOT 37.98
Commonwealth of Penn Harrisburg Pa	
No PO Bldg (Mail)	33 W6PE 37.98
11 N 4th St	W6PWW 33.02*
Edenburg	W6PHY 37.98
Glenwood Pk Av Erie	W6PGC 37.98

W Port BM Tunnel BlueMt W3XRC	37.98
W Port BM	Shippensburg
W Port LH	Laurel Hill W8XKD 78.82
E Port SH	Wells Tan W8XXK 78.38*
W Port Stony Creek	W8XXF 37.98
E Port Dublin Tn	W8XXG 77.06*
W Port LH Tun Somerset	W8XXH 77.94*
W Port Brush Creek Tn	W8XXJ 77.50*
E Port Wells Tannery	W8XXE 37.98
Willow Hill Interchange	WBJ 33.02*
Irwin	WBJM 33.02*
New Stanton	WBJN 33.02*
Donegal	WBJO 33.02*
Somerset	WBJP 33.02*
Bedford	WBJU 33.02*
Breezewood	WBJV 33.02*
Ft Littleton	WBJX 33.02*
Blue Mountain	WBJY 33.02*
Carlisle	WBJZ 33.02*
Somerset Maint Shed	WBJQ 33.02*
Kegg	WBJR 33.02*
Everett	WBJS 33.02*
Newville	WBJT 33.02*

State of Washington Olympia Wash	
Dept of Highways Transportation Bldg	
212 W7XJH	37.98
Snoqualmie	W7XJO 37.98
Chelan City Elewett Pass	W7ZJN 39.14
Chelan City Stevens Pass	W7XJS 37.98
Ellensburg	W7XJP 37.98
Union Gap	W7XJR 37.98
Wenatchee	W7XJT 37.98
4200 Main Vancouver	W7XJG 37.98
	KKEC 37.98
	KKEF 7.20*
Ritzville	KAGB 37.98
Union Gap	KKBQ 72.06
Bellingham	KKBT 72.06
Yakima City	KOLX 75.74
Moran State Park	KQBL 75.74
	KRSJ 37.98
Ephrata	KRGU 37.98
Raymond	KRSJ 37.98
Chehalis	KSNZ 37.98
Tacoma	KSPZ 37.98
Erur-claw	KSQX 37.98
Goldendale	KSKS 37.98
NE of Goldendale	KSXT 37.98
West of Old Blewett	KSV 37.98
Walla Walla	KVIM 37.98
Okarogan	KVMN 37.98
Seattle	KVLU 37.98
Crystal Creek	KVLU 37.98
Shuksan	KVMY 37.98
Colville	KVNG 37.98
State Highway Commission of Wisconsin	
1 Wilson St Madison	6 W6XUE 37.98
	3 W6XYQ 2.45*
Wycena Wis	26 W6XVT 72.34
City of Worcester Worcester Mass	
166 Salem St	18 W1XJN 37.98

GEOPHYSICAL

Amerada Petrol Corp New York NY	
120 Edway	6 KBA 1.70*
American Exploration Co Houston Texas	
1108 Van Buren	10 KCJW 1.67*
Apache Exploration Co Houston Texas	
1452 Esperson Bldg	2 KCHI 31.06
Arkansas Fuel Oil Co Shreveport La	
Slatery Bldg	4 KHTU 1.67*
Atlantic Refining Co Philadelphia Pa	
260 S Broad	26 KAUA 1.65*
Atlas Exploration Co Houston Texas	
M Esperson Bldg	2 KRQD 1.67*

Wm M Barrett Inc Shreveport La	
Giddens-Lane Bldg	8 KFYH 1.67*
	2 KRYJ 35.06*
Sol Grossstein Evansville Ind	
1820 W Franklin	2 KEKA 1.60*
Carr Geophysical Co Houston Texas	
Commerce Bldg	4 KKOP 1.65*
Cities Service Oil Co Bartlesville Okla	
Masonic Bldg	5 KQMF 1.67*
J O Clark Jr Oil Explorations Mission Tex	
PO Box 585	2 KKO 1.67*
Continental Oil Co Ponca City Okla	
	9 KAAG 1.67*
	4 KBVA 35.54
Crowell & Steel Inc Houston Texas	
3418 Ella Lee Lane	4 KGKY 35.06
Geophysical Development Corp Tulsa Okla	
1242 S Boston	2 KRRT 35.54*
Geophysical Eng Corp Pasadena Calif	
199 S Fair Oaks Av	3 KBIK 1.67*
Geophysical Exploration Co Denver Colo	
104 Bdway	3 KCSL 1.65*
Geophysical Research Corp New York NY	
120 Bdway	4 WRFI 1.65*
Geophysical Service Inc Dallas Tex	
1511 Republic Bank	8 KIFW 1.67*
Geotechnical Corp Dallas Texas	
3712 Haggard Dr	23 KAQN 1.67*
Gulf Research & Dev Co Pittsburgh Pa	
PO Drawer 2038	79 KAOU 35.54
Humble Oil & Refining Co Houston Tex	
1216 Main	25 KIYK 1.70*
	23 KJAB 153.11*
	8 KJAE 35.54*
Independent Exploration Co Houston Tex	
Esperon Bldg	8 KIWN 35.54*
	20 KRFX 1.70*
	10 KKKV 152.75*
Interstate Petrol Comm Inc New York NY	
30 Rockefeller Pl	47 KBJE 1.70*
	10 KNAR 35.54*
Keystone Exploration Co Houston Texas	
2813 Westheimer Rd	2 KSGE 31.06
Magnolia Petroleum Co Dallas Texas	
Magnolia Bldg	14 KHBN 1.70*
McCullum Exploration Co Houston Texas	
Esperon Bldg	23 KBPH 1.70*
	1 KCFG 1.60*
Nat'l Geophysical Co Dallas Texas	
Tower Petrol Bldg	21 KAUB 31.06*
	4 KNFU 1.67*
New York Trap Rock Corp Newburgh NY	
252 Water	2 WKNT 152.75*
Offshore Navigation Inc New Orleans La	
1402 Hibernia Bldg	10 KONI 1.70*
Petty Geophysical Eng San Antonio Tex	
317 6th	22 KBQH 1.70*
Phillips Petrol Co Bartlesville Okla	
Phillips Bldg	12 KHJR 35.54*
Pure Oil Co Houston Texas	
Dept of Geology	2 KOGE 1.70*
V T Reynolds Houston Texas	
3805 Inverness	2 KFAV 1.65*
R H Ray Houston Texas	
Nat'l Standard Bldg	21 KBXQ 1.70*
Ray Rogers Inc Houston Texas	
Nat'l Standard Bldg	4 KWDD 1.70*
	4 KRPH 35.54*
Selsic Eng Co Dallas Texas	
1125 Kirby Bldg	2 KBTF 1.65*
	30 KAIN 1.70*
Selsmograph Service Corp Chaldrn Neb	
828 Main	54 KAHV 1.70*
Socony-Vacuum Oil Co Inc Brooklyn NY	
412 Greenpoint Av	2 WCSM 1.65*
Sohio Petroleum Co Houston Texas	
Esperon Bldg	8 KTXG 1.70*
Southern Geophysical Co Fort Worth Tex	

Sinclair Bldg	4 KRWX 1.70*
	2 KWFJ 1.62*
	2 KAJJ 31.06
Stanford Univ Palo Alto Calif	
Dept of Physics	3 KUJK 35.06
Stanolind Oil & Gas Co Tulsa Okla	
5th & Boston	33 KAJJ 31.06*
	3 KHCI 153.47*
	9 KVRU 35.54
Sun Oil Co Beaumont Texas	
PO Box 2831	25 KAVC 153.47*
	4 KTJG 35.14
Superior Oil Co Houston Texas	
Oil & Gas Bldg	26 KSOQ 35.54
	3 KFBJ 152.76
	3 KCKZ 1.700*
Texas Co New York NY	
135 E 42nd	38 KAVS 1.700*
	6 KRMN 35.54
Towninson Geophys Serv Shreveport La	
Union Oil Co Los Angeles Cal	
617 W 7th	6 KUUCO 33.54
United Geophysical Co Pasadena Calif	
595 E Colorado	99 KAOK 43.18*
Universal Exploration Co Houston Texas	
2044 Richmond Rd	4 KUEH 1.700*
Western Geophys Co Los Angeles Calif	
1335 S Hope	4 KAJM 1.700*
Yegua Corp Houston Texas	
Experson Bldg	6 KRWT 31.06

INTERCITY BUSES & TRUCKS

Inter-City Buses & Trucks	
Almeida's Bus Service New Bedford Mass	
17 Swift St	50 W1XMZ 43.94
Fletcher Aviation Corp Pasadena Calif	
190 W Colorado	7 W6XGA 35.70
Granite Stages Peterborough NH	
64 Union	20 W1XCU 43.94
Highway Radio Inc Washington D C	
1424 16th NW	20 W6XIP 43.70
	100 W9XJP 152.15
National Bus Communications Inc	
141 W Jackson Blvd Chicago 4 Ill	
	237 W8XIO 43.98
112 S Grand Av Lansing Mich	
	W8XIP 43.98
318 W Mich Av Kalamazoo Mich	
	W8XIQ 43.98
72 Ionia Av SW Grand Rapids Mich	
	W8XIR 43.98
Wash Blvd & Grand River Detroit Mich	
	W8XIS 43.98
833 N 1st Muskegon Mich	
275 W Cortland Jackson Mich	
	W8XJG 43.98
Willow Run Airport Willow Run Mich	
	W8XJL 43.98
1010 Saginaw Bay City Mich	
	W8XKG 43.98
109 E Comstock Owosso Mich	
	W8XNW 43.98
216 W Main Benton Harbor Mich	
	W8XOW 43.98
231 W Mich St Milwaukee Wis	
	W8XGU 43.98
141 W Jackson Blvd Chicago Ill	
	W8XIR 43.98
122 Wash Av Madison Wis	
	W8XOX 43.98
133 S Lafayette Blvd South Bend Ind	
	W8XPN 43.98
122 Chestnut Rockford Ill	
	W8XUM 43.98

TV BUSINESS IN 1949

(Continued from page 19)

AM comparison tests made before the war. Those tests, we are told, showed much superior results on AM, but we do not know whether this was due to FM transmission or the particular FM equipment used.

Should the standards be the same for UHF as for VHF? Industry feeling is almost unanimously in favor of setting the same standards. This limits TV service for theatres, but there is not much inclination to complicate home television by any adjustment to meet theatre requirements. As for color, while there is some interest in this development, the prevailing opinion is that in television, as in the movies, black-and-white can perform an adequate public service.

Will it be practical to design receivers to cover both the upper and lower bands? While no final answer can be given at this time, it appears that it will be difficult to design an antenna structure and lead-in suitable for both VHF and UHF. This seems to be a limiting factor in the design of 2-band receivers.

Changes in TV Sets:

The public has evinced a strong preference for sets with picture tubes 12 inches in diameter or larger. This was not apparent at first, because most of the sets produced so far had 7- or 10-inch tubes. The trend in 1949 will be toward designing sets for 12- and 16-inch tubes, but in simplified models that will make the larger tubes available at lower retail prices than prevailed last year.

More sets will have only TV and FM circuits, on the assumption that purchasers have AM receivers already. Omitting AM tuning is one way of making a substantial reduction in the retail price.

A general criticism of current models concerns the height of the tube from the floor. It seems to be difficult to design console cabinets with the tubes high enough for comfortable viewing. This condition may result in an increasing demand for table models, aside from the advantage of lower cost.

TV Set Service and Sales:

TV audience surveys show that receivers have been remarkably free of service

troubles in locations covered by good signals. Difficulties from uncertain reception in fringe areas must be blamed on owners who want TV where they aren't supposed to get it, or on dealers whose enthusiasm outruns their experience, and judgment. It is bad business to sell poor TV performance.

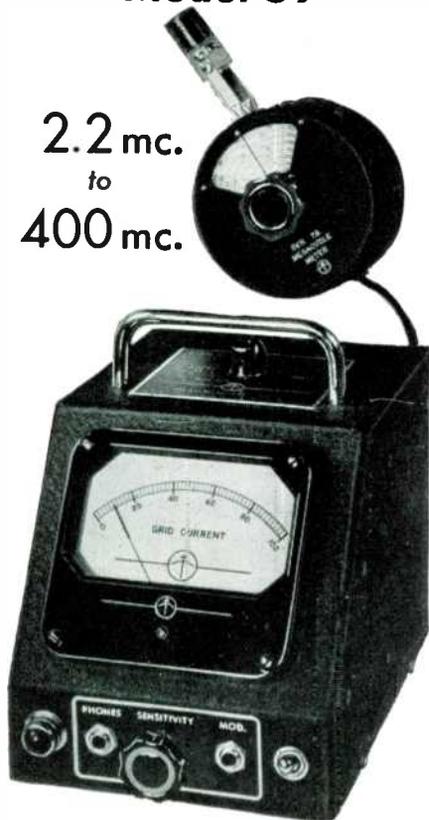
We haven't seen any promotion of the annual-service idea, but we think it is a good one. There is bound to be a certain amount of drift in TV sets, and performance after a year's temperature and humidity cycle can probably be improved substantially by a skillfully-executed alignment job.

To do expert TV service work, a substantial investment in equipment is necessary. On the other hand, the returns are large, particularly now when so few dealers are prepared to handle this work.

It appears that there has been more prestige than profit in selling TV sets. Maybe the major returns will have to come from the service end. In any case, television is a logical part of a total retail operation in any area of good signal coverage, but concentration to the neglect of audio receiver sales will be dangerous in 1949.

MEASUREMENTS CORPORATION Model 59

2.2 mc.
to
400 mc.



MEGACYCLE METER

Radio's newest, multi-purpose instrument consisting of a grid-dip oscillator connected to its power supply by a flexible cord.

Check these applications:

- For determining the resonant frequency of tuned circuits, antennas, transmission lines, by-pass condensers, chokes, coils.
- For measuring capacitance, inductance, Q, mutual inductance.
- For preliminary tracking and alignment of receivers.
- As an auxiliary signal generator; modulated or unmodulated.
- For antenna tuning and transmitter neutralizing, power off.
- For locating parasitic circuits and spurious resonances.
- As a low sensitivity receiver for signal tracing.

MANUFACTURERS OF
Standard Signal Generators
Pulse Generators
FM Signal Generators
Square Wave Generators
Vacuum Tube Voltmeters
UHF Radio Noise & Field Strength Meters
Capacity Bridges
Megohm Meters
Phase Sequence Indicators
Television and FM Test Equipment

SPECIFICATIONS:
Power Unit: 5 1/4" wide; 6 1/4" high; 7 1/2" deep.
Oscillator Unit: 3 3/4" diameter; 2" deep.

FREQUENCY:
2.2 mc. to 400 mc.; seven plug-in coils.

MODULATION:
CW or 120 cycles; or external.

POWER SUPPLY:
110-120 volts, 50-60 cycles; 20 watts.

MEASUREMENTS CORPORATION
BOONTON  NEW JERSEY

NEW PRODUCTS

(Continued from page 7)

to protect communications microphones from heavy-handed operators. Fits all mikes with 3/8-27 thread. Base has waffle-type non-skid rubber shoe. Bulletin 194. Electro-voice, Inc., Buchanan, Mich.

Subminiature Triode:

Heater-type high-mu triode for general radio application and use as high-frequency mixer in receivers employing separate oscillator. Type CK 5744/CK 619C. Bulletin 17. Raytheon Mfg. Co., Newton, Mass.

TV Projection Lens:

F1.9 lens for 5 TP 4 projection tube as corrective lens in barrel which can be removed for use with flat-type tubes. For projected pictures up to 7 by 9 st. Bulletin 24. Spellman Television Co., Inc., 130 W. 24th St., New York 11.

CLASSIFIED ADVERTISEMENTS

Positions Wanted: No charge. Use either your own name and address or FM and TELEVISION box number.

Other Advertisements: 20¢ per word, minimum \$2.00. One-inch advertisements in ruled box, \$10.

Copy received up to the 20th of the month will be published on the 15th of the month following.

Address replies to box numbers: FM and TELEVISION, Savings Bank Building, Great Barrington, Mass.

FOR SALE: Two 15-in. Television Assembly chassis, Dumont tube and radio console model; also 10-in. and 12-in. table model. FM-TV, Box 101.

WANTED: REL FM receiver. Must be in perfect operating condition. FM-TV, Box 109.

WANTED: November 1940 and February 1941 copies of FM Magazine. Will pay premium price to obtain promptly. FM-TV, Box 102.

CHIEF ENGINEER or technical supervisor. Twenty years' radio experience background, including chief. Will consider any location, but prefer middle-west. FM-TV, Box 103.

MANAGER-ENGINEER: All-around man, well versed in all phases of broadcasting. Very best references. Have put 3 stations in operation in the past year, 2 of them FM. Now want to settle down, preferably near New York or other eastcoast city. Can build your new FM station and manage it soundly. Donald C. Hoefler, 14882 Coyle Ave., Detroit 27, Mich.

BROADCAST ENGINEER: Now working in a television station, would like employment in Connecticut or Massachusetts. Prefer broadcasting, but will look into any electronic project. FM-TV, Box 108.

CHIEF ENGINEER: Desires position with progressive new or existing station, 1 to 5 kw. AM-FM with plans for immediate or future TV expansion. Age 38, dependable family man, college trained, 13 years' experience includes supervision, construction, operation, maintenance, DA systems, and FM. Minimum salary \$5200. FM-TV, Box 106.

ZOPHAR



WAXES COMPOUNDS and EMULSIONS

FOR
INSULATING and WATERPROOFING
of ELECTRICAL and
RADIO COMPONENTS

Also for
CONTAINERS and PAPER
IMPREGNATION

FUNGUS RESISTANT WAXES

ZOPHAR WAXES and COMPOUNDS

Meet all army and navy
specifications if required

Inquiries Invited

ZOPHAR MILLS, INC.
FOUNDED 1846
122-26th ST., BROOKLYN, N. Y.

A PRACTICAL REFERENCE ON BASIC PRINCIPLES AND PROCEDURES

New guide book covers acoustical and electrical principles and procedures.

Here's a book that stresses the all-important fundamentals of radio. It starts with acoustics and explains basic principles right through to receivers—availability, uses, and construction. It not only analyzes theoretical principles but shows you HOW to apply them to every-day radio work.

Radio Fundamentals

By Arthur L. Albert

Twenty-five years in charge of the Communication Courses at Oregon State College.

583 pages, 335 illustrations, \$4.50

This book supplies you with practical aids ready to do your trouble shooting for you. It helps you know and understand the theories behind acoustics, radio circuits, transmission lines, cables, vacuum tube rectifiers, amplifiers, oscillators, amplitudes, frequency modulation and detection, radio transmitters and receivers, antennas, television, etc. Up-to-date developments in the field are covered, in clear, every-day language.

These 14 chapters can help insure your success in radio:

• Fundamentals of Acoustics • Electrical Fundamentals • Series and Parallel Resonant Circuits • Power Transfers and Impedance Matching • Transmission Lines, Cables, and Networks • Vacuum Tubes • Rectifiers • Voltage Amplifiers • Power Amplifiers • Oscillators • Modulation and Demodulation • Radio Transmitters • Antennas and Radio Transmission • Radio Receivers.

Order direct from FM-TV,
Great Barrington, Mass.

FM AND TELEVISION

It's Alden — for . . . facsimile dispatching equipment

designed for your specific purposes. It may be for wire or for radio circuit. A pilot operation — or in quantity production

Our engineering provides for messages to be automatically picked up at scanner with recorder starting, stopping, and framing automatically, controlled by transmitter.

Alden Engineering experience covers the range of operations from low speed for narrow bandwidth wire lines to high speed large area equipment.

So whether you are dispatching a memo from office to office — or a full size weather map across the country — Alden has the system and will make to special order equipment that fits your needs.

For instance —

200 cycle bandwidth	15KC bandwidth
Memo	Newspaper
with 4" width—50 LPI	Map
2 in/min.	with 18" width—100 LPI
	9 in/min.



Alden engineering opens new fields in impulse recording

Filling the gap between indicating instruments and the Cathode Ray Oscilloscope.

Giving a permanent record directly without photographic processes.

Alden Recording Equipment operates with Alfax Electrosensitive Recording Paper producing permanent recordings. Alfax is a sensitive high speed paper that does not require special packaging. It is stable in storage, and is permanent in its recording.

To solve that facsimile or impulse recording problem — write now to

ALDEN PRODUCTS CO.
Brockton 64FD, Massachusetts

IRE
NATIONAL CONVENTION



**Spotlight
the new!**



at the
Radio Engineering Show
March 7-10, 1949
Grand Central Palace, New York

SEE The latest equipment and components of 192 organizations in the engineering exhibits

HEAR 170 Technical Papers on the latest advances of radio science, nucleonics, engineering.

ENJOY The fellowship of 12,000 engineers in electronics and radio

Registration \$3.00 non-members
\$1.00 to members

**The
Institute of Radio
Engineers**

Wm. C. Copp, Exhibits Manager
303 West 42nd St., New York 18, N.Y.

Advertisers' Index

Adair, George P.....	13
Alden Products Company.....	47
Alford, Andrew.....	12
American Phenolic Co.....	41
Amy, Aeeves & King, Inc.....	11
Andrew Corporation.....	6, 12
Barone, S. A. Company.....	13
Bell Telephone Labs.....	Inside Back Cover
Belmont Radio Corp.....	3
Biley Electric Co.....	10
Brociner Elec. Lab.....	11
Browning Laboratories, Inc.....	31
Carter Radio Co.....	44
Collins Audio Products.....	11
Commercial Radio Equip. Co.....	13
Communications Co.....	40
Communications Research Corp.....	13
Davis, George C.....	13
Doolittle Radio, Inc.....	27
Du Mont Laboratories.....	1
Eitel-McCullough, Inc.....	48
Electronics Research Pub. Co.....	11
Federal Tel. & Radio Corp.....	Inside Front Cover
General Electric Co.....	37
Hughey & Phillips Co.....	11
Inst. of Radio Engineers.....	47
Jansky & Bailey.....	12
Kaar Engineering Co.....	40
Karp Metal Pdts. Co., Inc.....	14
Kay Electric Co.....	11
Kear and Kennedy.....	13
Link Radio Corp.....	35
Lansing Sound, Inc., James B.....	47
May, Russell P.....	12
McCahren, Winfield, Scott.....	13
McIntosh, Frank H.....	13
McKey, Dixie B. & Assoc.....	12
McNary and Wrathall.....	13
Measurements Corp.....	46
Motorola, Inc.....	Back Cover
National Co.....	4
Phileo Radio Corp.....	30
Pollack, Dale.....	12
Radio Consultants, Inc.....	12
RCA Communications, Inc.....	11
Radio Music Corp.....	11
Rauland Corp.....	44
Ray, Garo W.....	12
Scott, Inc., H. H.....	8
Simpson Electric Inst. Co.....	7
Smeby, Lynne C.....	12
Sprague Electric Co.....	5
Sylvania Electric.....	9
Topflight Tape Co.....	11
U. S. Recording Co.....	11
Weldon & Carr.....	13
Williams, Nathan.....	12
Wilmotte, Raymond M.....	12
Workshop Associates, Inc.....	11, 44
Zenith Radio Corp.....	2
Zophar Mills.....	46



for MAXIMUM PERFORMANCE

Jim Lansing Signature Speakers will provide a most unbelievable realism. The experience gained through a quarter of a century of leadership in the sound reproduction field has gone into their development and design. For maximum dynamic range and frequency response compare Jim Lansing Signature Speakers before you buy.



**MODEL
D-130**

Designed especially for music systems and public address use. Has exceptionally high efficiency. Recommended for operation and frequencies from 60 to 6500 C.P.S. with a maximum useable range of 40 to 15000 C.P.S.



**MODEL
D-1002**

Two-Way System

Designed especially for F.M. Monitoring and high quality home sound reproduction. Housed in a beautiful console type cabinet.

Write for
Descriptive Catalog
Containing Complete
Specifications

**SEE YOUR JOBBER
OR SEND DIRECT**



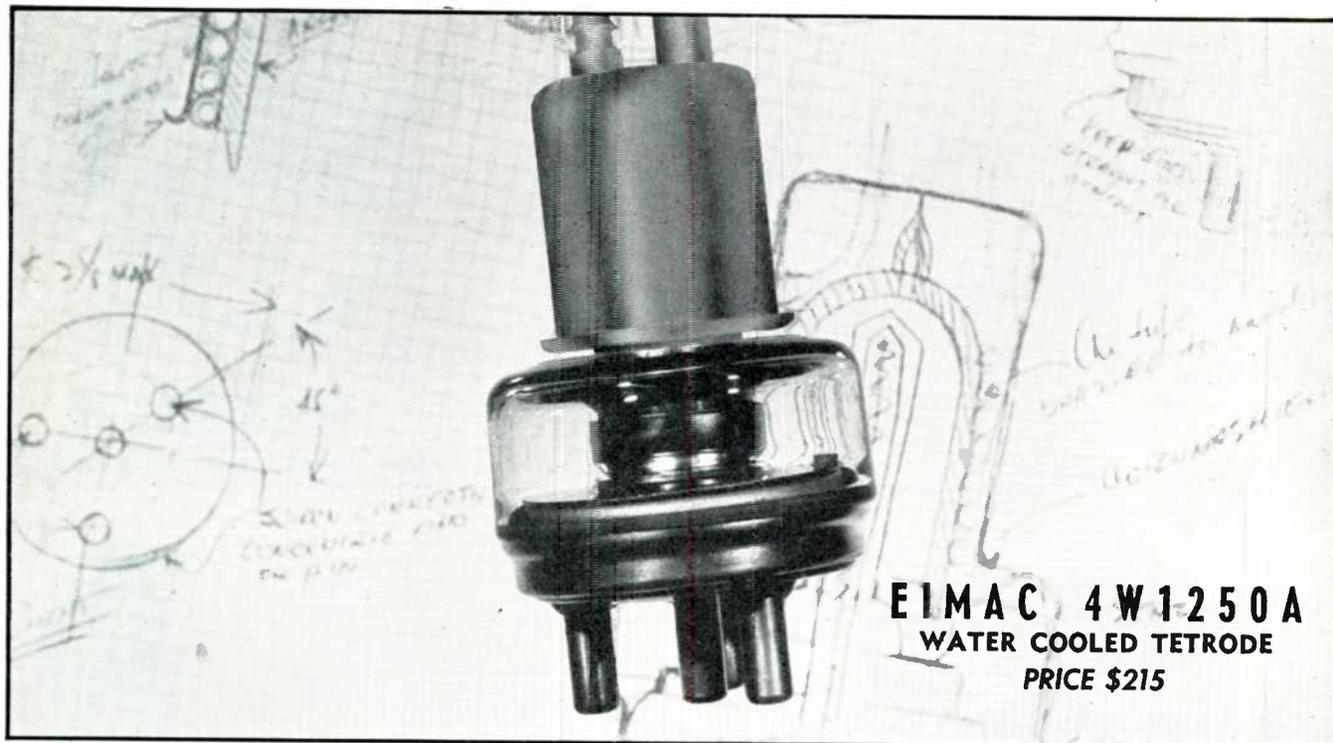
**JAMES B. LANSING
SOUND INC.**
7801 HAYVENHURST AVENUE
VAN NUYS, CALIFORNIA

Follow the Leaders to

Eimac
TUBES

The Power for R-F

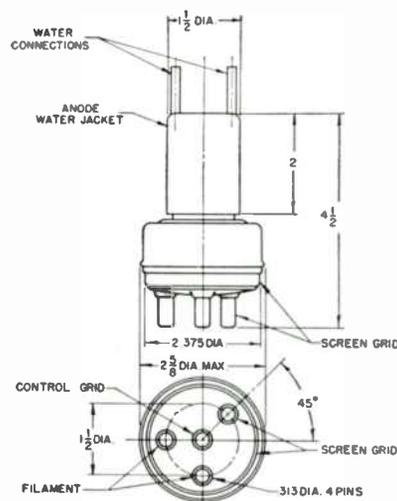
A NEW TUBE FOR TV



A new tetrode ... the forerunner of more Eimac developments providing higher power in the upper frequency brackets.

GENERAL CHARACTERISTICS EIMAC 4W1250A TETRODE

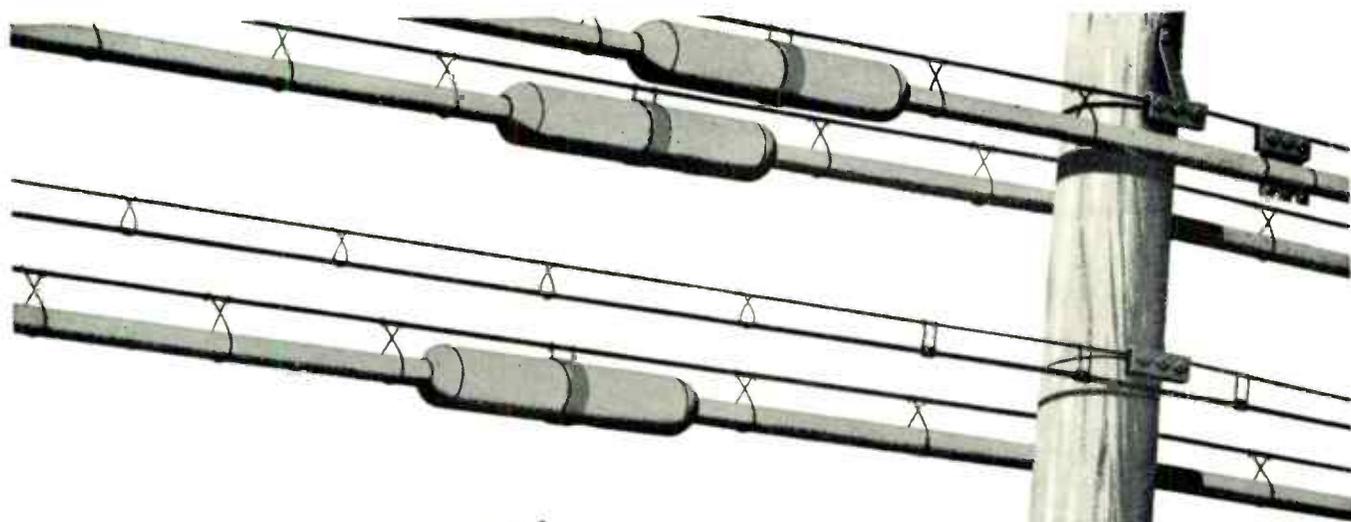
Filament: Thoriated Tungsten	
Voltage	5.0 volts
Current	13.5 amperes
Screen Grid Amplification Factor (Average)	6.2
Direct Interelectrode Capacitances (Average)	
Grid-Plate	0.05 μ fd
Input	12.8 μ fd
Output	5.6 μ fd
Transconductance ($i_b=200\text{ma.}$, $e_b=2500\text{v.}$, $E_{c2}=500\text{v.}$)	5200 umhos
RADIO FREQUENCY POWER AMPLIFIER	
Television Class-B Linear or Grid-Modulated Amplifier.	
MAXIMUM RATINGS (Frequencies up to 216 Mc.)	
D-C PLATE VOLTAGE	3500 VOLTS
D-C SCREEN VOLTAGE	750 VOLTS
D-C GRID VOLTAGE	-500 VOLTS
D-C PLATE CURRENT	750 MA.
PLATE DISSIPATION	1250 WATTS
SCREEN DISSIPATION	30 WATTS
GRID DISSIPATION	10 WATTS



For further information on the 4W1250A, write direct

E I T E L - M c C U L L O U G H , I N C .
207 SAN MATEO AVENUE, SAN BRUNO, CALIFORNIA

Export Agents: Frazar & Hansen, 301 Clay St., San Francisco, California



The **case** of the Creeping Sleeve

Lead sheathing on telephone cable meets many stresses — the tug of its own weight, wind pressure, contraction and expansion from cold and heat. Then, too, there's the pressure of nitrogen gas put in Long Distance cable to warn of sheath breaks and keep out moisture.

And, sometimes, lead is subject to "creep"—a permanent stretching—even when the stress is but a fraction of the normal tensile strength. Creep is especially likely at the lead sleeves used where two lengths of cable are joined. The sleeve may stretch and break open exposing telephone circuits to the elements.

So Bell Laboratories scientists have developed methods to test and control creep. In a special testing room, weights are applied to scores of samples of lead, under controlled conditions. Exact records of the amount of creep are obtained with a precision instrument.

Years of careful study have produced a lead composition which resists creep and yet has all the other properties required of sleeves. This means better telephone service for you and helps give that service at lowest possible cost. It is an example of the way Bell Telephone Laboratories scientists study and improve every part of the great telephone plant.

BELL TELEPHONE LABORATORIES

*PIONEERS IN THE RESEARCH OF FM RADIO AND TELEVISION,
AND ACTIVE IN DEVELOPING IMPROVEMENTS IN BOTH FIELDS TODAY.*



a NEW and SENSATIONAL *Motorola* "FIRST" that makes
2-WAY RADIO more valuable than ever before!

**NOW...Your cars
hear only your
calls!**



Motorola
"QUIK-CALL"

**SELECTIVE
SIGNALING
EQUIPMENT**

**Just press a button to call your
cars—individually, or by groups**

Now you can control and direct calls to your fleet, or to any one car in your fleet with the new Motorola "QUIK-CALL" selective signaling equipment! Your cars can be called only by *your* base station. Another "FIRST"—Motorola "Quik-Call" prevents your cars from receiving calls sent by other transmitters on the same or adjacent channels...they need not hear any calls except those coded from your station alone. Interference from diathermy is completely locked out during standby and, most important, skip interference false calling and squelch opening is eliminated.

Motorola "QUIK-CALL" prevents nuisance interference from stations in nearby communities, reducing driver fatigue and increasing the utility of any radio system.

Developed after two and one half years of exacting research, Motorola "QUIK-CALL" is based upon the use of a pure tone generator of instrument precision, called the Vibrasender, and a responding resonant responder—called the Vibrasponder. These "electro-mechanisms" in various combinations, are capable of calling your fleet (with the single-key system) or of selectivity calling up to 1,350 individual units (with the 24-key system) with the precision and speed of adding machine operation.

A product of Motorola Research Laboratories

*Motorola "QUIK-CALL" can be added
to your present Motorola equipment*

It doesn't matter whether you're installing a whole new communications system, or if you already have 2-way radio...the Motorola "QUIK-CALL" can be adapted to your system in bringing it up to date. Enjoy the advantages of this new kind of 2-way radio.

FREE!

**GET THE COMPLETE DETAILS
DESCRIPTIVE BOOKLET
MAIL THIS COUPON TODAY**



**COMMUNICATIONS DIVISION
4545 West Augusta Boulevard
Chicago 51, Ill. Dept. FM & T.**

Please mail me a FREE copy of the descriptive booklet on
Motorola "QUIK-CALL" selective signaling equipment.

Name Position

Address

City Zone State