PRICE—TWENTY-FIVE CENTS

FM RADIO-ELECTRONICS

AUGUST 1943

YANKEE NETWORK'S W43B
AT PAXTON, MASS.

Roster of B.C. Chief Engineers

NGINEERING • MANUFACTURING • OPERATION

★ ★ Edited by M. B. Sleeper ★ ★

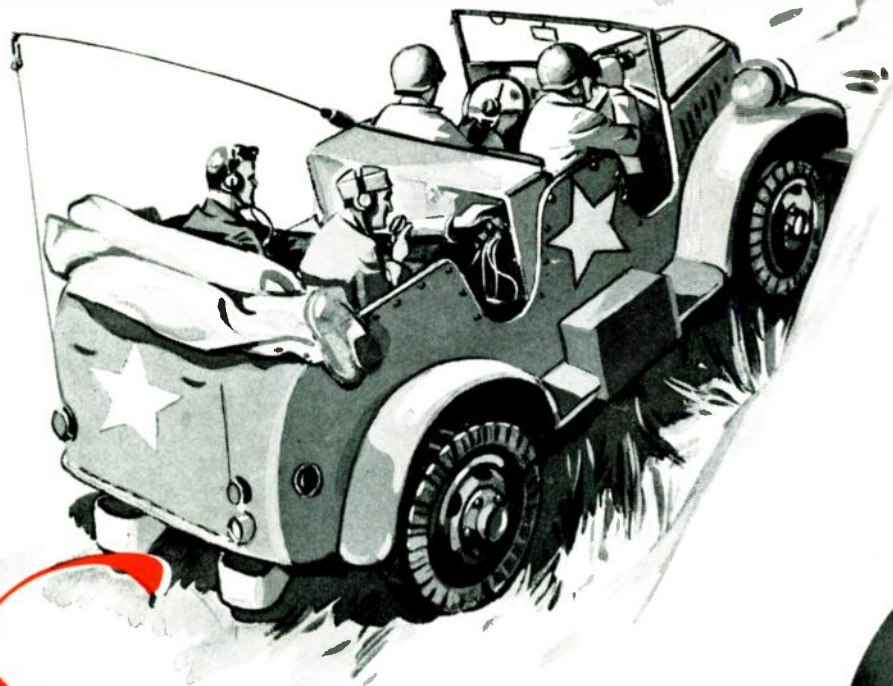
KEEPING THINGS UNDER CONTROL

A WAR MACHINE is an intricate and complicated mechanism, with all its planes, tanks, ships and guns. To keep it functioning smoothly and efficiently requires split-second timing, and precise coordination.

In this vital task of keeping things under control, Simpson Instruments and testing equipment are playing an important part. So our part, here at Simpson, is to produce all the instruments we can, and to make them the best that skill and ingenuity can devise. This we are doing wholeheartedly.

Our only aim is the common cause that today unites all industry and all American workers. If we can make our weapons as good, and as tough, as the men who wield them, victory will be well in hand.

SIMPSON ELECTRIC COMPANY
5200-5218 Kinzie Street, Chicago 44, Illinois



Simpson

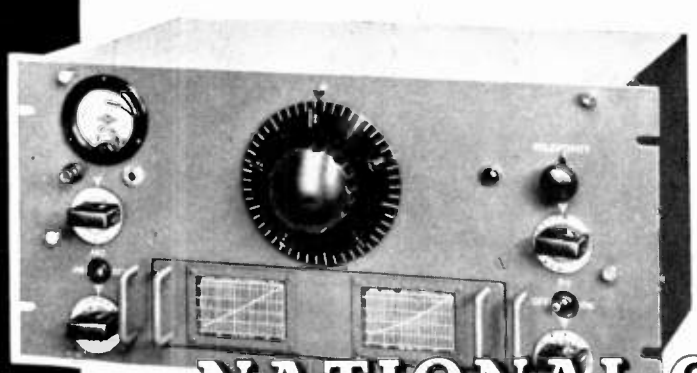
INSTRUMENTS THAT STAY ACCURATE

Buy War Bonds and Stamps for Victory

REPUBLIC P-47

OFFICIAL PHOTOGRAPH,
U. S. ARMY AIR FORCE.

In receivers as in airplanes, it is the margin of superiority that wins victory. Almost good enough is no good at all.



NATIONAL COMPANY

MALDEN, MASS., U. S. A.

Designs for War...

Hermetic Sealing

The hermetic sealing of transformers covers a wide range of problems, and an equally wide range of applications. The two units illustrated at the left, for example, represent a high voltage transformer for high altitude operation, and an audio unit weighing approximately one ounce.

There is more to hermetic sealing than meets the eye. The illustrations below show some of the factors contributing to the high quality of UTC hermetically sealed units.

May we design a war unit to your application?

For obvious reasons, the units illustrated are not actual war items.

Engineering . . . PRODUCT

Engineering starts with research, continues through the conference table, and then goes through the proving of electrical design, sealing methods, vibration test, etc.

ENGINEERING CONFERENCE

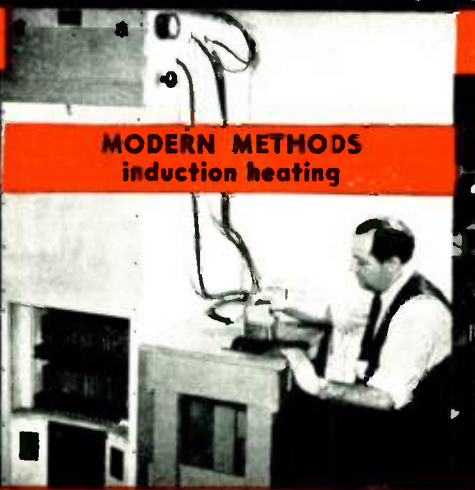
DESIGN PROVING . . . AUDIO

DESIGN PROVING . . . POWER

Engineering . . . PRODUCTION

The production of war units generally requires precise control. This requires the scientific choice of workers for specific operations . . . the use of modern methods throughout . . . and continuous control of quality and production flow.

APTITUDE TESTING assures worker suited to operation



MODERN METHODS induction heating

CONTINUOUS CONTROL for uniformity of production

UNITED TRANSFORMER CO.

150 VARICK STREET ★ NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"

FM RADIO-ELECTRONICS

FORMERLY: FM RADIO-ELECTRONIC ENGINEERING & DESIGN
COMBINED WITH: APPLIED ELECTRONIC ENGINEERING

VOL. 3 AUGUST, 1943 NO. 9

CONTENTS

★ ★ ★ ★ ★ ★

M. B. SLEEPER, *Editor and Publisher*

JEROME J. BROOKMAN, *Advertising Manager*

GORDON CROTHERS, *Circulation Manager*

Published by: FM COMPANY

Editorial and Advertising Office: 240 Madison Avenue, New York City, Tel. LE 2-8070

Chicago Advertising Representative:
MARIAN FLEISCHMAN, 360 N. Michigan Ave., Tel. STAte 4439

FM Magazine is issued on the 30th of each month. Single copies 25c — Yearly subscription in the U. S. A. $3.00; foreign $4.00. Subscriptions should be sent to FM Company, 240 Madison Avenue, New York City.

A charge of 25c each will be made for duplicating copies returned because of subscriber's failure to give change of address.

The publishers will be pleased to receive articles, particularly those well illustrated with photos and drawings, concerning radio-electronic developments. Manuscripts should be sent to the publication office, at New York City. 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.

Advertising correspondence, copy, and cuts should be addressed to the advertising office at New York City.

THIS MONTH'S COVER

Paxton will always be known in the history of the radio art as the first commercial FM broadcasting station. Here is dramatic proof of the progress fostered by free enterprise in our United States. This station stands as a monument to the everlasting credit of John Shepard, 3rd, who financed it, to Paul de Mars who engineered it, and to Major Armstrong who, successfully overcoming static and eliminating inter-station interference by the use of Frequency Modulation, employed a system which mathematical physicists had previously proved to be inoperable.

WHAT'S NEW THIS MONTH

BEFORE the second part of W. S. Halstead's article was set in type, newspapers were publishing the list of men, women, and children killed or injured in one of the greatest catastrophes in railroad history, a wreck which, according to subsequent testimony, could have been avoided by a mere telephone call, had the facilities described by Mr. Hastead been available.

Evidence of a hot-box on one of the cars of the Congressional Limited was seen by the engineer of another locomotive. However, the slow and ponderous methods of communication provided by the railroad were outstripped by the speed at which the train rushed its passengers to their death. The warning was too late.

For all its modern electrification of the New York to Washington route, the Pennsylvania Railroad still relied on methods which, judged by radio engineers, are as awkward, inadequate, and antique as the old gas lamps which trainmen used to turn on and light by a key and a wax taper mounted on a wooden stick.

It is surprising that no one from our industry was lost on this wreck, for it is a favorite train with radio engineers and executives in these times.

THE data presented this month by Burt Zinet on the design of aircraft racks indicates further progress in the standardization of aircraft radio equipment.

The adoption of these standards will contribute in two ways. First, such standardization is necessary in order to allow enough space for radio equipment, without waste, when planes are designed. Second, if improved equipment is made available, it will be interchangeable with the model which preceded it, and no alteration in the construction of aircraft will be necessary. It should be noted that certain sizes of racks have been adopted by the Joint Radio Board.

To supplement the data given this month on chassis and dust covers, photographs and drawings of the mounting racks will be presented next month.

THE roster of chief engineers of broadcasting stations, published this month for the first time, will be a semi-annual feature hereafter. At many stations, the chief engineer is on leave with the Armed Forces. In such cases, because of space limitations, only the name of the acting chief engineer is listed.

SERVICES OF RCA WHICH HAVE WON OUR COUNTRY'S HIGHEST WARTIME AWARDS

Army-Navy "E" flags awarded to:

RCA Victor Division, Camden, N. J., January, 1942—with two stars for continued excellence.

RCA Victor Division, Harrison, N. J., August, 1942—with one star for continued excellence.

Radiomarine Corporation of America, New York City, September, 1942—with one star for continued excellence.

RCA Laboratories, Princeton, N. J., May, 1943.

Maritime Commission "M" Pennant and Victory Fleet Flag awarded to:

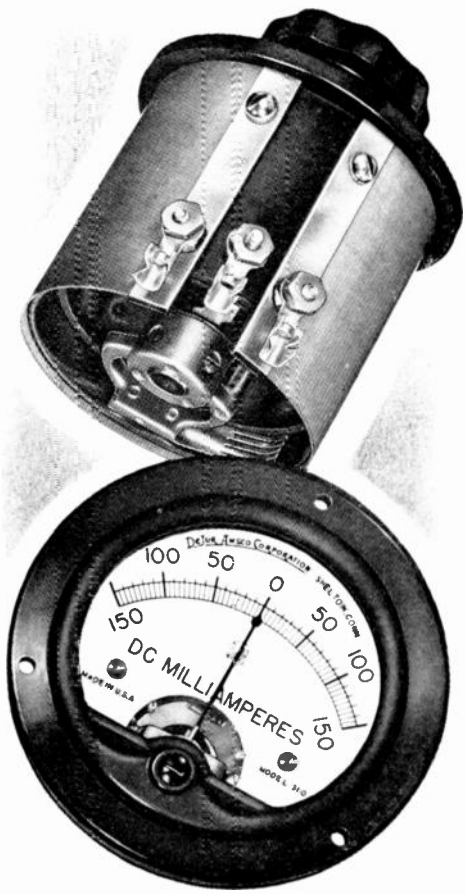
Radiomarine Corporation of America, New York City, February, 1943.

These, too, are fighting flags of freedom . . . In ever-increasing numbers, flags like these fly over America at war. They are symbols of the strength of a free people, aroused in spirit, united in purpose. Battle flags of Victory today . . . they are won by the energy and skill that will build a better world tomorrow.

RCA Radio Corporation of America

ONE OF A SERIES OF ADVERTISEMENTS SHOWING DeJUR PRECISION PRODUCTS IN ACTION ON THE HOME FRONT

THEY LISTEN...



Around the clock, from Monday to Monday, America's "monitors of the air" sit at their posts—and listen. Serving in a thousand different ways, they check foreign news and propaganda, send and receive weather reports, keep air channels clear, ferret out renegade radio stations. Of prime importance in the apparatus used by monitors are meters and rheostats which assure absolute control and give accurate indications of volume, power, modulation and recording. In many instances the components chosen for dependability are products of DeJur laboratories. Built of the finest materials to exacting precision standards, DeJur instruments are backed by a tradition of twenty-five years of outstanding electrical accomplishment.

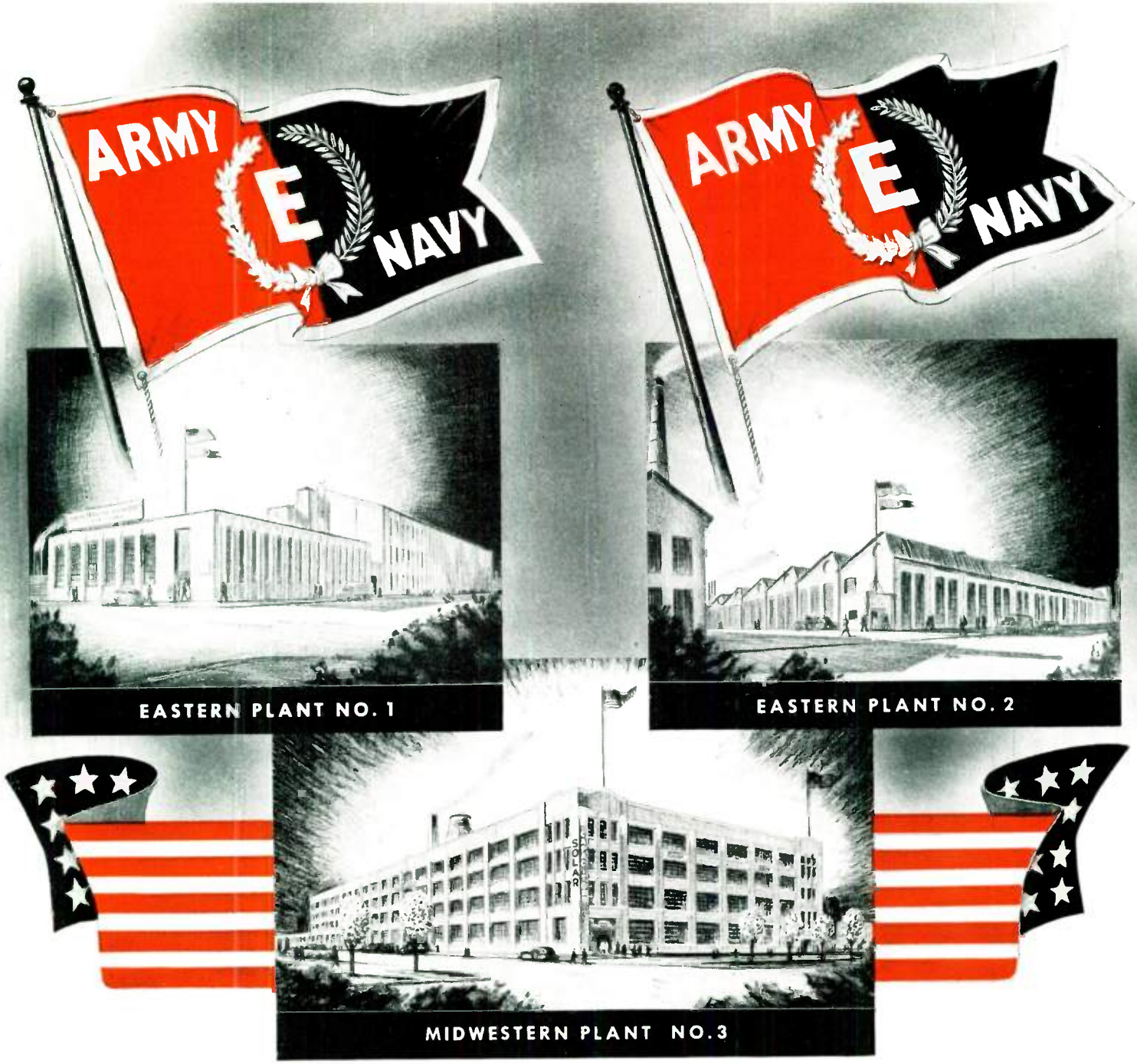
BACK THE ATTACK . . . SUPPORT THE THIRD WAR LOAN DRIVE

Awarded for Excellence in Production and Quality of Material

DeJUR-AMSCO CORPORATION

SHELTON, CONNECTICUT

NEW YORK PLANT: 99 Hudson Street, New York City • **CANADIAN SALES OFFICE:** 560 King Street West, Toronto



3 Plants... 2 Flags... ONE PURPOSE

To beat the band of Axis bandits, three Solar factories are now operating "round the clock". The men and women of Eastern Plants 1 and 2 were told "Well Done" by the Army and Navy; they proudly wear the Army-Navy "E".

The Midwestern Plant has just started production; the men and women of this modern air-conditioned factory are ready to help you speed the day of Victory.

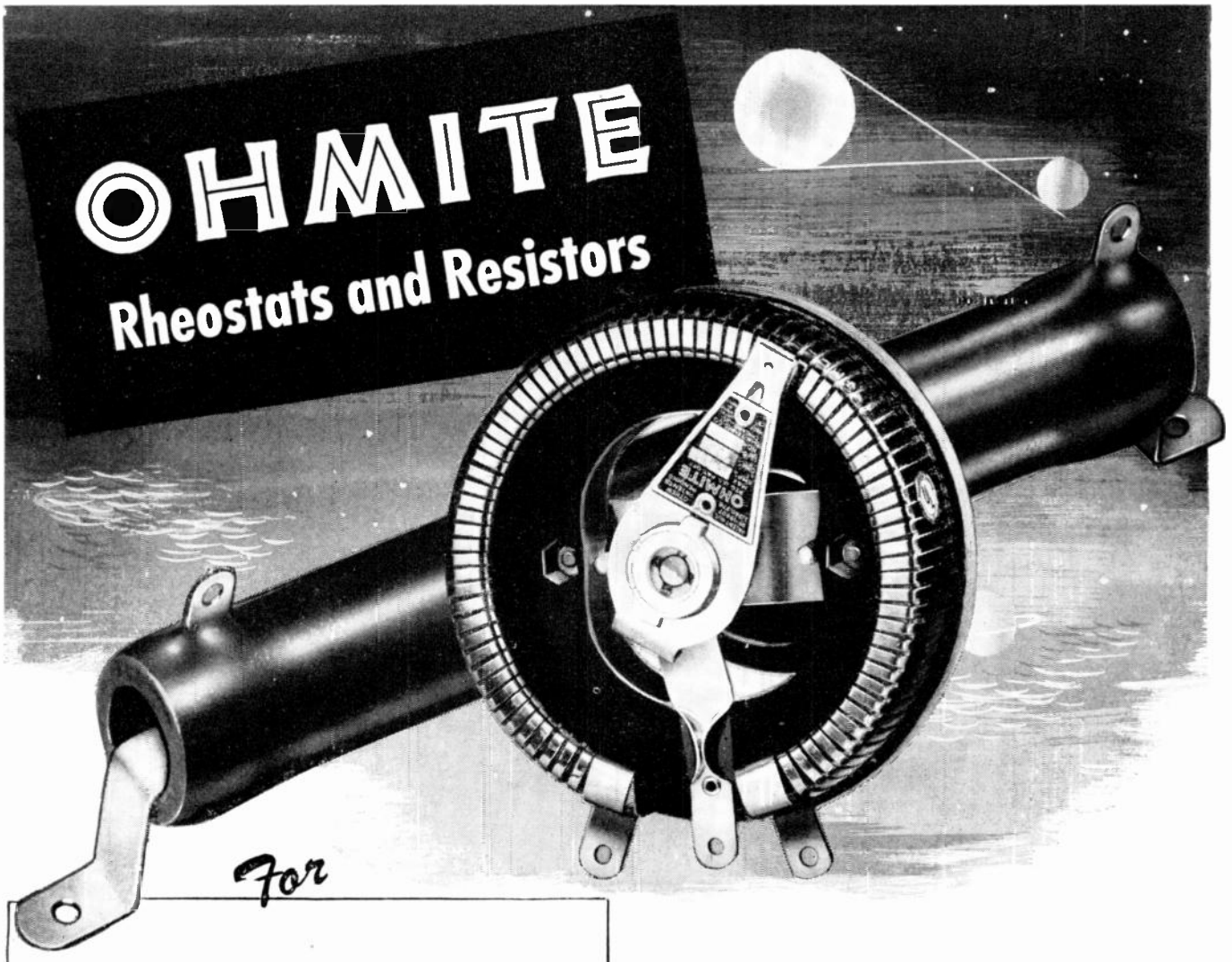
If your capacitor or filter problem is made ours, you can be certain of "Quality Above All".

Solar Manufacturing Corporation, General Offices: Bayonne, New Jersey.

Solar SOLAR — CAPACITORS —

CAPACITORS and RADIO NOISE-SUPPRESSION FILTERS

WRH



The advancement of electronics has meant wider use of Ohmite Rheostats and Resistors . . . in science and industry, in laboratories, products and production. Engineers, scientists and manufacturers have come to know and rely on them for accurate, dependable control of electronic tubes and devices . . . from x-ray to radio and television, from instruments and machines to airplanes. These time-proved resistance units insure *permanent performance.*

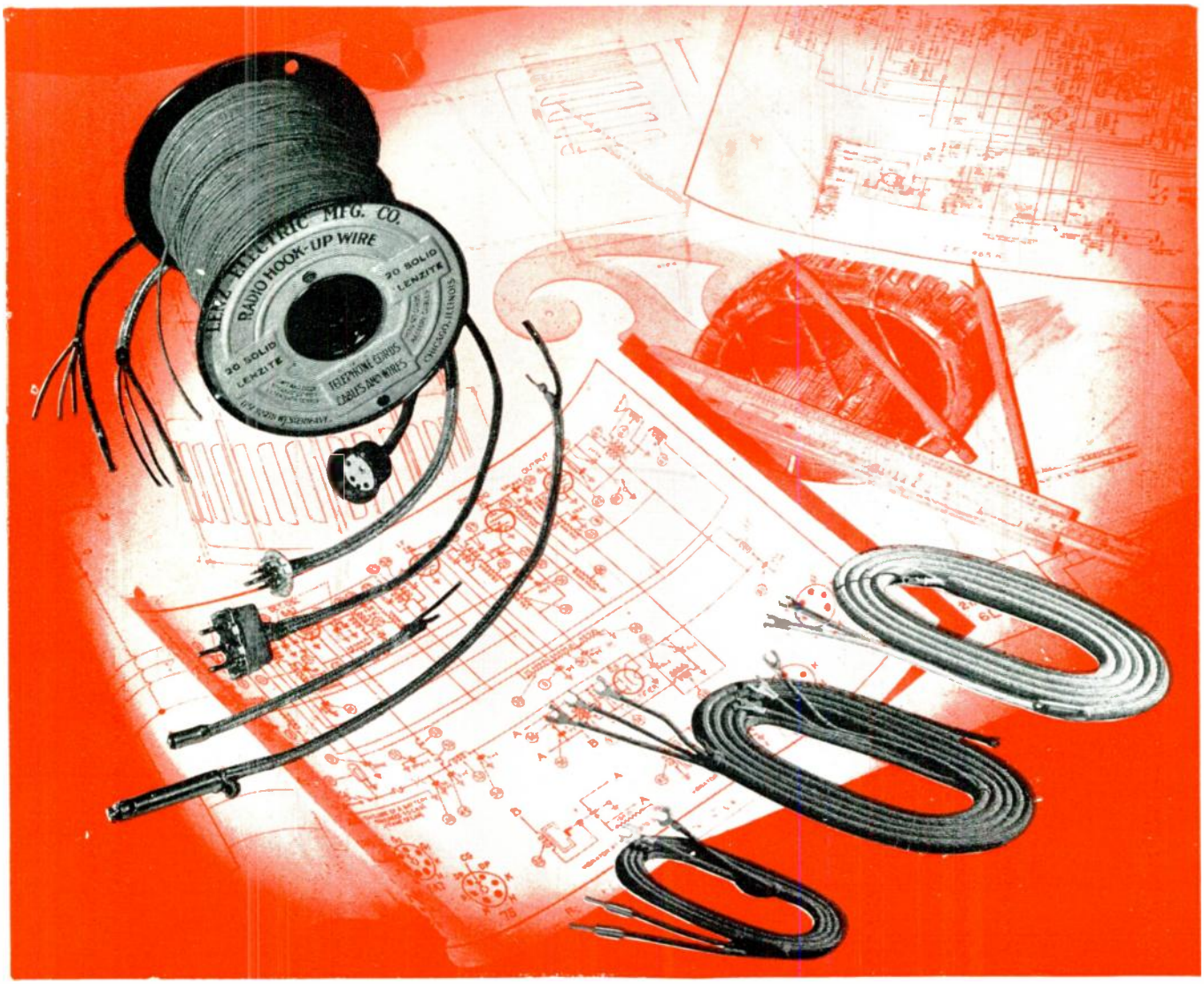
Today, of course, Ohmite Rheostats and Resistors serve the Armed Forces and Industry in combat, production and research in an all-out effort to speed Victory. The electronic world of tomorrow will find Ohmite units ready to meet new requirements and Ohmite Engineers ready to help you on any problem.

Write on company letterhead for helpful 96-page Catalog and Engineering Manual No. 40—an invaluable guide in the selection and application of Rheostats, Resistors and Tap Switches.

BE RIGHT WITH OHMITE
RHEOSTATS • RESISTORS • TAP SWITCHES

OHMITE MANUFACTURING CO., 4854 Flournoy St., Chicago, U.S.A.

Foremost Manufacturer of Power Rheostats, Resistors, Tap Switches.



to the designers of ELECTRONIC EQUIPMENT

LENZ is an organization of specialists in design of wires and cables for electronic equipment. You'll find millions of feet of Lenz standard and specially designed Wires, Cables and Cords in military radio and wire communications—in all types of electronic equipment.

This specialized experience and the facilities of the LENZ organization are at your disposal for the solution of your wire problems. Call in a Lenz Wire and Cable Technician—with no obligation.

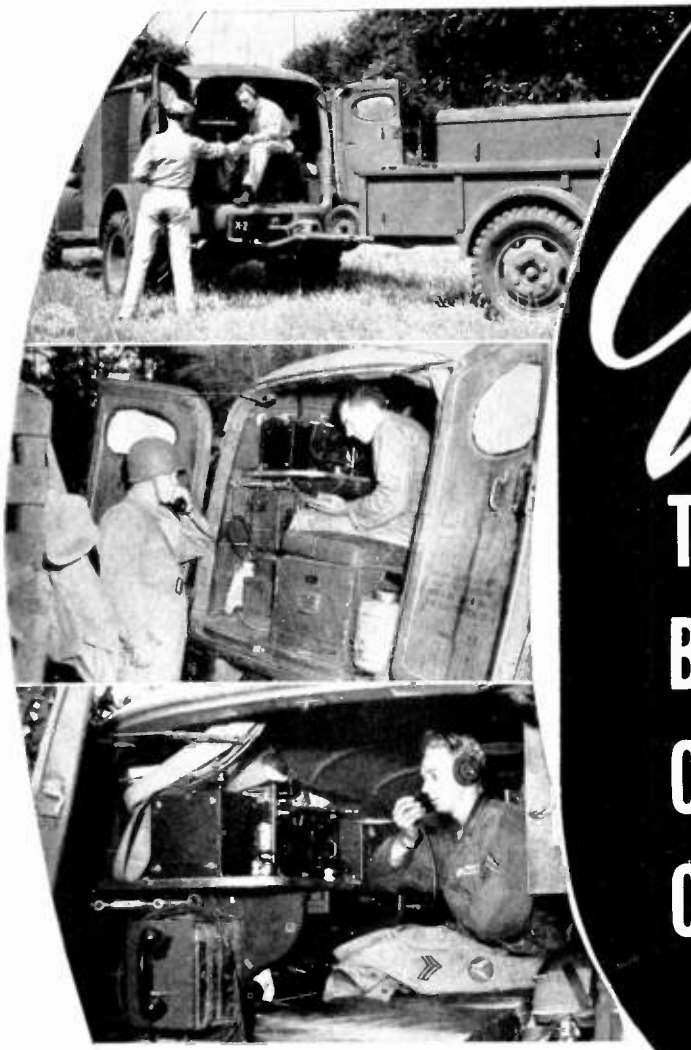
ELECTRICAL CORDS, WIRES AND CABLES

LENZ

LENZ ELECTRIC MANUFACTURING CO.

1751 No. Western Avenue Chicago, Illinois

IN BUSINESS SINCE 1904



Winning THE BATTLE OF COMMUNICATIONS

Mobile communications units assembled by Hallicrafters are helping to win the battle of communications on every fighting front. They are built to endure the rigors of modern warfare . . . The consistent performance of SCR-299 has been highly praised by leading members of our armed forces for its adaptability in meeting all the requirements of combat duty . . . A phrase best describing the SCR-299 was given when a leading military authority said, "It is to communications what the jeep is to transportation."

hallicrafters

CHICAGO, U. S. A.

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF SHORT WAVE RADIO COMMUNICATIONS EQUIPMENT

BUY MORE BONDS!

NEEDED—BETTER RECEIVING ANTENNAS

A Discussion Which Takes Issue with the No-Antenna School of Salesmanship

BY M. B. SLEEPER

UP TO the time when the production of home radio sets was stopped, receiver manufacturers had come to treat antenna systems as a not-particularly-necessary evil — a sort of vermiform appendix to a receiving set about which the less said the better unless, in the atrophied form to which it had degenerated, its failure to perform usefully gave rise to complaint.

Why should that have been so? Every radio engineer knows that reception becomes progressively poorer as the ratio of signal input to the pick-up of local interference is reduced, and that increased sensitivity cannot improve the condition, but only makes it worse.

Undoubtedly the will of the sales departments prevailed over the judgment of the engineers in promoting the no-antenna, works-wherever-you-put-it claims for convenience and ease of installation.

Of course, that is a feature that lends itself to advertising and fast-talking salesmanship. However, engineers and servicemen know that the "no-antenna" promotion is responsible for more poor reception than any other design feature, and has consistently offset the improvements and progress of broadcast station equipment.

It is surprising, therefore, that G.E.'s Dr. Baker would be so inconsistent as to say, at the Milwaukee conference of the FMBI: "It is of paramount importance that the FM receiving sets produced after the war be of a high-performance type," and then, in the next breath, he told the FM broadcasters: "To satisfy the public, they must be able to bring in programs loud and consistently, without the use of special antennas. The set owner of today has become used to a radio with a built-in antenna, and the best salesman in the world is not going to be able to make him climb up on the roof and string a lot of wire around. Good sets, of eight tubes or more, and a strong station signal must be provided."

Again switching to the opposite position, he concluded: "That means the engineers must be permitted to produce the best transmitting equipment and receiving sets. Unless FM lives up to its highest standards, its great promise will be blighted."

No one can take issue with what Dr. Baker said about the importance of providing listeners with the best quality of transmission and reception, but why improve transmitters and receivers and then limit the effectiveness of both by the handicap of poor signal pick-up? Why improve automobile gasoline and engines and then connect them with a length of undersize feed pipe?

Even Major Armstrong has, on various occasions, discounted the importance of the antenna of FM reception, stating that practically any kind of a wire is adequate. On the other hand, he has urged the use of a stage of tuned RF to assure a signal adequate to operate the limiter.

Dr. Baker and Major Armstrong may be too far away from the practical problems of giving radio listeners satisfactory reception to know the headaches that "no-antenna" sets have given listeners and dealers alike. The fact is that while some listeners in favorable urban and rural districts are fortunate enough to have good reception from built-in antennas, they are the exception, and not the rule.

This statement is based on the personal experience of calling on dealers and talking to servicemen in all parts of the country. This may not agree with the reports of salesmen in different territories, but that is because salesmen's reports on any subject can be relied upon only for their consistent inaccuracy.

The theory is that the performance of sets operating on loop antennas in urban districts is good because they are within the primary service areas of powerful local stations, and in urban districts, even though they are in secondary service areas, there is less interference.

Perhaps that should be so, but it isn't. Thunder storms visit cities, and man-made static from motors, circuit-breakers, defective neon signs, power installations, and electrical appliances in adjacent apartments provide interference sources of high level compared to broadcast signals when loop antennas are employed. This is as true of large sets as small ones, for the bigger the loop, the greater the noise pickup. The public has been allowed to believe that loops distinguish, in some mysterious way, between noise and signals, which is entirely false.

That built-in antennas are not adequate even in metropolitan areas is shown by the rapidly growing number of apartment-house antenna installations, using the Amy, Aceves & King system, which were being put in up to the time of Pearl Harbor.

Out in the suburbs and rural districts, where signal strength is greatly reduced, there are such adversities to be met as low line voltage, poor daytime reception, and leaky power lines and transformers.

One of the poorest spots for radio reception in the East is Saratoga, New York, not far from Dr. Baker's Schenectady. From that section north into Vermont and Maine, down through New Hampshire and Massachusetts and in parts of Connecticut, loop-operated sets have never been satisfactory.

Another section where loop sets have proved equally unsatisfactory runs from Western Pennsylvania through West Virginia, and spreads out over the Carolinas, Tennessee, Georgia, and Alabama.

Salesmen have explained glibly: "If it doesn't work just right on the loop, hook on an antenna." That's no answer. Loop sets do not have antenna circuits suitable for antenna operation. Adding an antenna to such sets does little to increase the daytime AM receiving range, and at night the interference from distant stations is increased because the antenna broadens the tuning.

As for FM reception, results depend directly on the signal fed to the set by the antenna. If the signals are adequate to saturate the limiter, results are perfect. If they aren't, interference rides in. An outside antenna can be improved by increasing the height or changing the construction, but a loop must remain just as the manufacturer made it.

If listeners don't want to put up outside antennas it is (1) because the manufacturers have told them in advertising that it is not necessary, or (2), because servicemen have been honest enough to tell them that loop-operated sets aren't designed to work with outside antennas.

As for the actual erection of outside antennas — this is a job for servicemen, and one which was a source of considerable extra income until the public was told that loops could do the same job better.

Radio set manufacturers can contribute much to the enjoyment and satisfaction of the listeners if they will take a more realistic attitude toward the importance of receiving antennas, and face squarely the competition, if it arises, from those who continue to capitalize on the immediate point-of-sale advantage of "no-antenna" designs.

For those who are interested in making a study of this subject, here is a suggestion: Discuss the subject with the chief engineers of some of the broadcasting stations. You will probably find that they feel very keenly on this matter because built-in antennas are the chief cause of complaints from listeners about weak reception, and interference from static, and dissatisfaction with program quality.

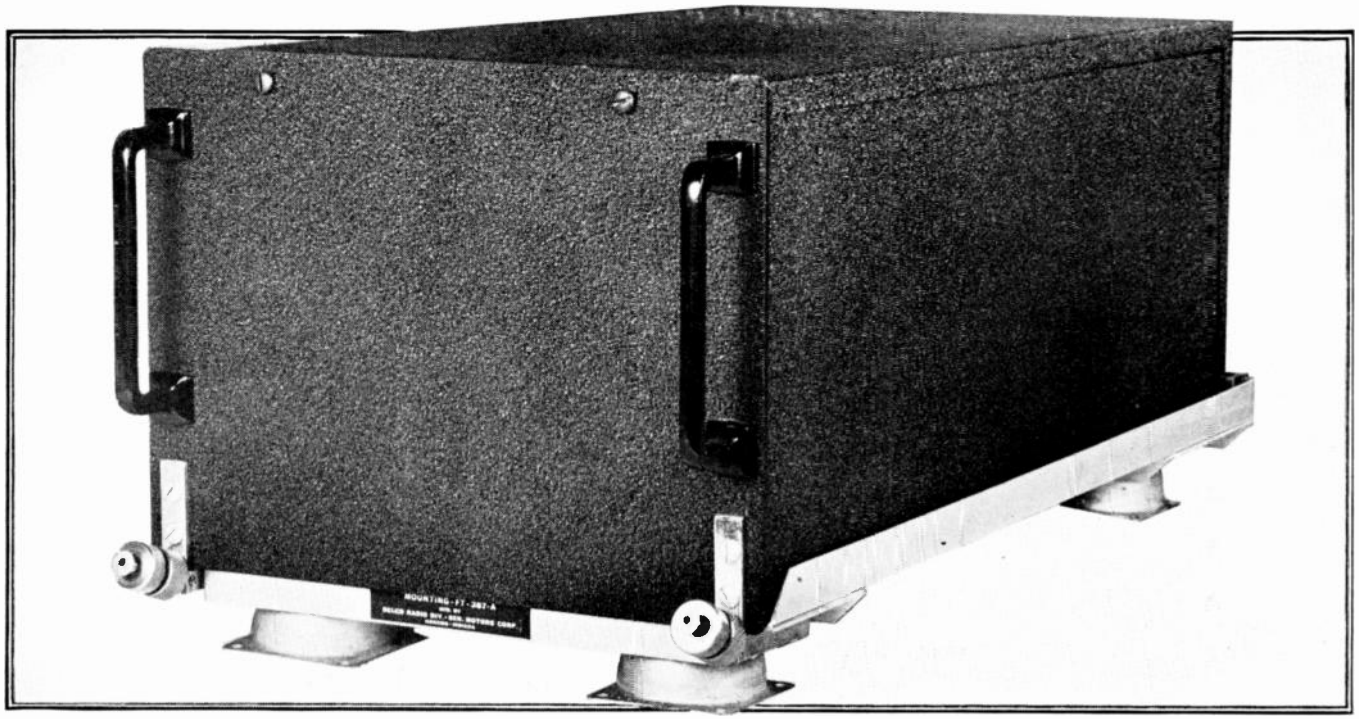


FIG. 1. NEW STANDARDIZED CONSTRUCTION FOR A-N AIRCRAFT RADIO. THIS PARTICULAR ASSEMBLY WAS FABRICATED BY DELCO

DESIGN PLANNING FOR AIRCRAFT RADIO

Part 3 — Standard A-N Type of Chassis and Dust Covers, with Notes on the Details of Materials and Construction

BY BURT L. ZIMET *

AIRCRAFT manufacturers and those in charge of aircraft radio installation work have suffered many a headache because of the variety of types, sizes, and shapes of radio sets, and the methods of mounting them.

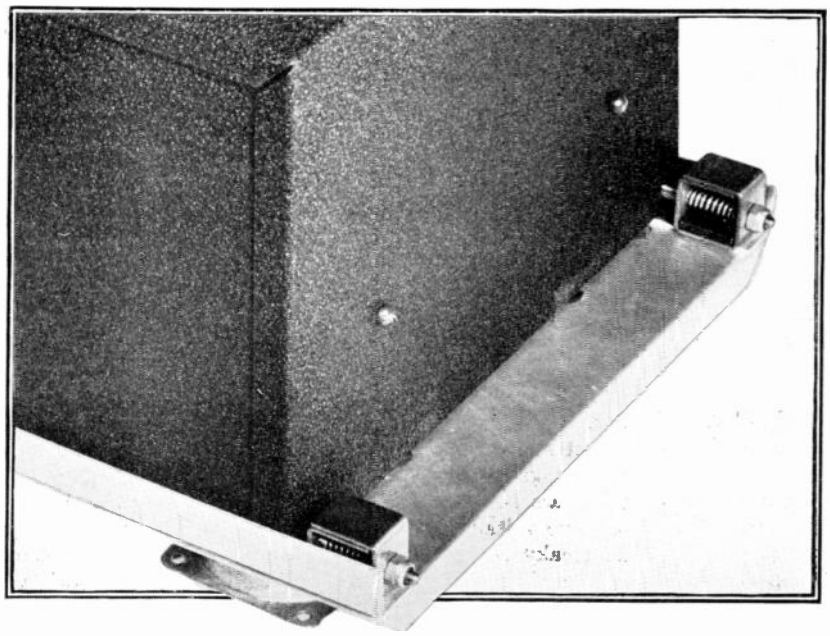
Space is at a premium on aircraft, large or small. Supports for mounting equipment must be secured to structural parts capable not only of carrying the load of apparatus in the air, but of withstanding the shocks of rough landings. Extra construction and brazing must be kept at a minimum because they add weight but do not perform any useful work.

Because space is so limited, it is often difficult or impossible to make special provisions for units different from what were originally contemplated at the time a plane was designed.

In some cases, improved equipment cannot be used because the designer, expressing his own ideas rather than carrying out a standard of practice, employed an odd shape, arrangement of connections, or mounting and release mechanism.

Thus it came about recently that standard Army-Navy designs and dimensions were established for radio equipment chassis, dust covers, and shock-mounted racks. Of these, certain units have been approved by the Joint Radio Board and are, therefore, considered preferred sizes. Figs. 1, 2, and 5 illustrate a typical dust cover and chassis. Tables of dimensions are given in Figs. 3 and 4, with the corresponding A-N numbers. Those marked with an asterisk are the preferred sizes designated by JRB.

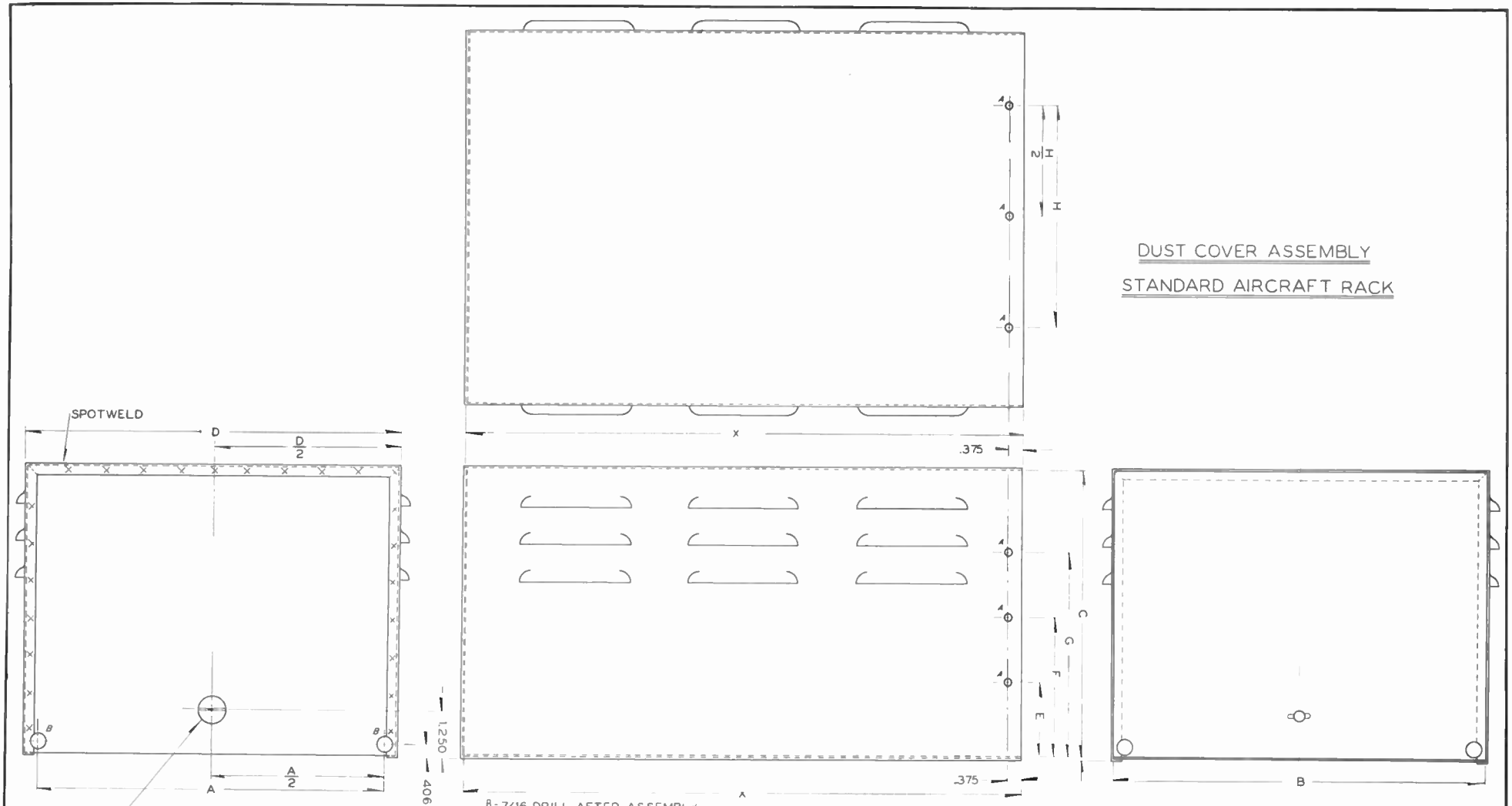
FIG. 2. METHOD OF FASTENING THE CHASSIS TO THE RACK AT THE REAR



Values of "X", for the length of the chassis and dust covers, are given in Figs. 3 and 4 at the right of the tables of dimensions. Thus ample latitude is provided as to the length.

These standards do not freeze the design details. Actually, they give designers ample freedom to accommodate construction to the particular load it must carry. However, the standards to fix the overall dimensions of the units, the locations

* Design Engineer, Freed Radio Corp., 200 Hudson St., New York City.

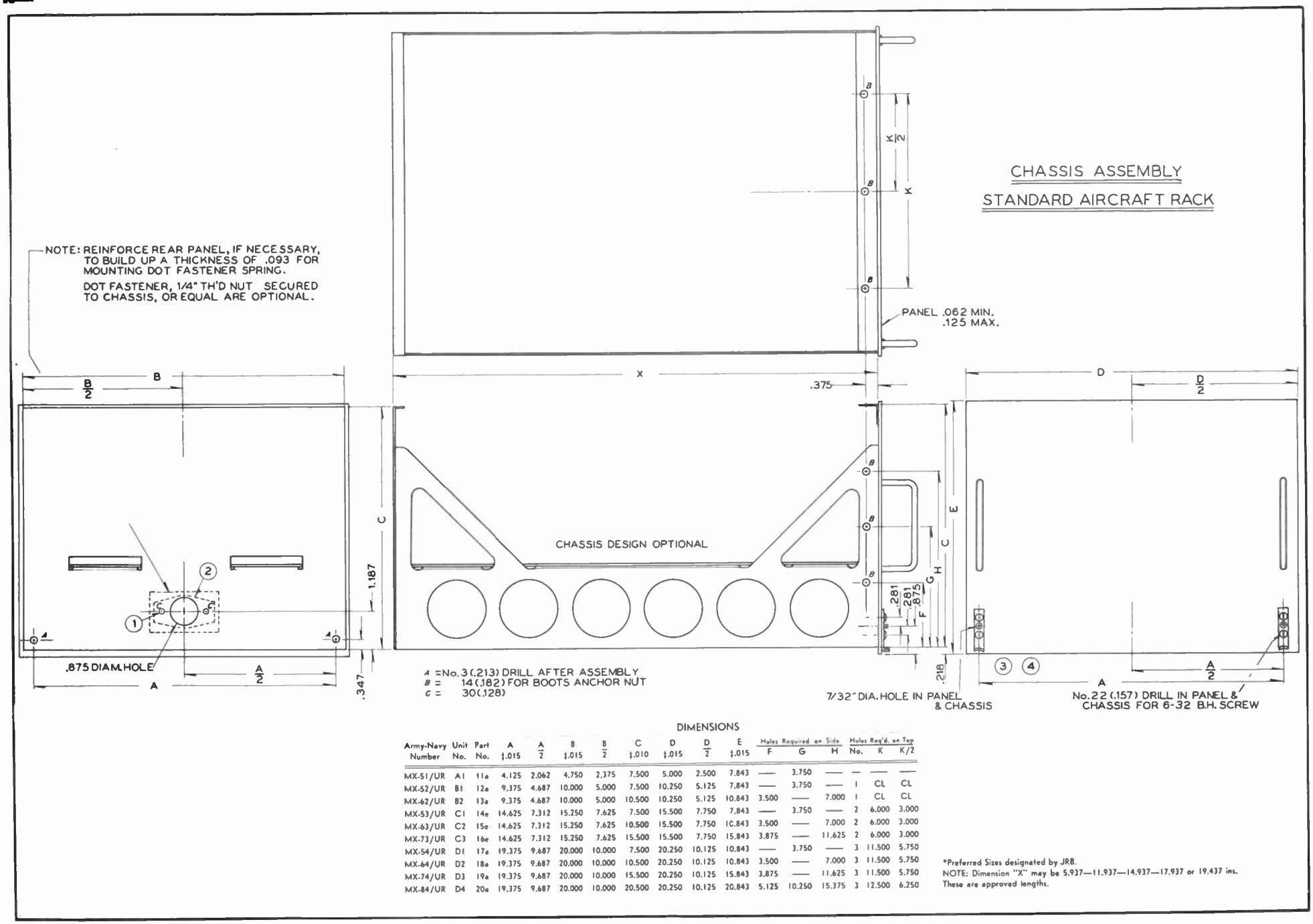


DIMENSIONS

Army Navy Number	Unit No.	Part No.	A ±.015	A/2	B ±.015	C ±.010	D ±.015	D/2	Holes Required on Side E	Holes Required on Side F	Holes Required on Side G	Holes Req'd on Top No.	Holes Req'd on Top H	Holes Req'd on Top H/2
*CW-51/UR	A1	1a	4.125	2.062	4.812	7.531	4.875	2.437	—	3.750	—	—	—	—
*CW-52/UR	B1	2a	9.375	4.687	10.062	7.531	10.125	5.062	—	3.750	—	1	CL	CL
CW-62/UR	B2	3a	9.375	4.687	10.062	10.531	10.125	5.062	3.500	—	7.000	1	CL	CL
*CW-53/UR	C1	4c	14.625	7.312	15.312	7.531	15.375	7.687	—	3.750	—	2	6.000	3.000
CW-63/UR	C2	5e	14.625	7.312	15.312	10.531	15.375	7.687	3.500	—	7.000	2	6.000	3.000
*CW-73/UR	C3	6c	14.625	7.312	15.312	15.531	15.375	7.687	3.875	—	11.625	2	6.000	3.000
CW-54/UR	D1	7a	19.375	9.687	20.062	7.531	20.125	10.062	—	3.750	—	3	11.500	5.750
CW-64/UR	D2	8a	19.375	9.687	20.062	10.531	20.125	10.062	3.500	—	7.000	3	11.500	5.750
*CW-74/UR	D3	9a	19.375	9.687	20.062	15.531	20.125	10.062	3.875	—	11.625	3	11.500	5.750
CW-84/UR	D4	10a	19.375	9.687	20.062	20.531	20.125	10.062	5.125	10.250	15.375	3	12.500	6.250

*Preferred Sizes designated by JRB.
NOTE Dimension "X" may be 6 12 15 18 or 19.5 ins. These are approved lengths.

FIG. 3. ONE-FOURTH SIZE DRAWING OF THE STANDARD DUST COVER ASSEMBLY. MATERIAL IS STEEL OR ALUMINUM. USE AND DESIGN OF LOUVRES IS OPTIONAL



DIMENSIONS

Army-Navy Number	Unit No.	Part No.	A ±.015	A/2	B ±.015	B/2	C ±.010	D ±.015	D/2	E ±.015	Holes Required on Side F	G	H	Holes Req'd. on Top No.	K	K/2
MX-51/UR	A1	11a	4.125	2.062	4.750	2.375	7.500	5.000	2.500	7.843	—	3.750	—	—	—	—
MX-52/UR	B1	12a	9.375	4.687	10.000	5.000	7.500	10.250	5.125	7.843	—	3.750	—	1	CL	CL
MX-62/UR	B2	13a	9.375	4.687	10.000	5.000	10.500	10.250	5.125	10.843	3.500	—	7.000	1	CL	CL
MX-53/UR	C1	14a	14.625	7.312	15.250	7.625	7.500	15.500	7.750	7.843	—	3.750	—	2	6.000	3.000
MX-63/UR	C2	15a	14.625	7.312	15.250	7.625	10.500	15.500	7.750	10.843	3.500	—	7.000	2	6.000	3.000
MX-73/UR	C3	16a	14.625	7.312	15.250	7.625	15.500	15.500	7.750	15.843	3.875	—	11.625	2	6.000	3.000
MX-54/UR	D1	17a	19.375	9.687	20.000	10.000	7.500	20.250	10.125	10.843	—	3.750	—	3	11.500	5.750
MX-64/UR	D2	18a	19.375	9.687	20.000	10.000	10.500	20.250	10.125	10.843	3.500	—	7.000	3	11.500	5.750
MX-74/UR	D3	19a	19.375	9.687	20.000	10.000	15.500	20.250	10.125	15.843	3.875	—	11.625	3	11.500	5.750
MX-84/UR	D4	20a	19.375	9.687	20.000	10.000	20.500	20.250	10.125	20.843	5.125	10.250	15.375	3	12.500	6.250

*Preferred Sizes designated by JRB.
NOTE: Dimension "X" may be 5.937—11.937—14.937—17.937 or 19.437 ins. These are approved lengths.

FIG. 3. ONE-FOURTH SCALE DRAWING OF THE STANDARD CHASSIS ASSEMBLY. EXCEPT FOR SPECIFIED DIMENSIONS, THE CHASSIS CAN BE MODIFIED AS REQUIRED

of mounting holes, and the method of securing the chassis to the rack.

As the drawings show, the standard length dimension X of the chassis is 19.437 ins. ± .031. For the dust cover it is 19.500 ins. ± .031. However, other lengths can be used, as pointed out in the preceding paragraph, so that weight can be kept to a minimum.

A study of the tables of dimensions will reveal that there are 10 basic sizes of front panels, varying in height and width to a degree sufficient to suit all types of equipment. These sizes are:

Unit No.	Height, ins.	Width, ins.
A1	7.843	5.000
B1	7.843	10.250
B2	10.843	10.250
C1	7.843	15.500
C2	10.843	15.500
C3	15.843	15.500
D1	7.843	20.250
D2	10.843	20.250
D3	15.843	20.250
D4	20.843	20.250

These, with nominal lengths of 19.5, 18, 15, 12, and 6 ins. offer ample choice in size to permit economy of weight. A thickness of .062 is specified for all sheet metal, except that the front panel may be .062 to .125 in. The original drawings call for cold rolled steel for all sheet metal parts, although substitutes may be used with permission of the contracting officer.

Figs. 1 and 2 show the extreme simplicity of the assembly and mounting. The chassis is first slipped into the dust cover. Screws at the front and a screw or a Dot fastener at the rear hold the cover to the chassis.

The chassis, in turn, is held to the rack at the rear by two cone-pointed, spring-mounted pins, and at the front by counterbored thumb nuts which ride over hooks secured to the front panel. Details of these parts are shown in Figs. 2 and 1 respectively.

NOTE: *Dimensions of the rack will appear next month.*

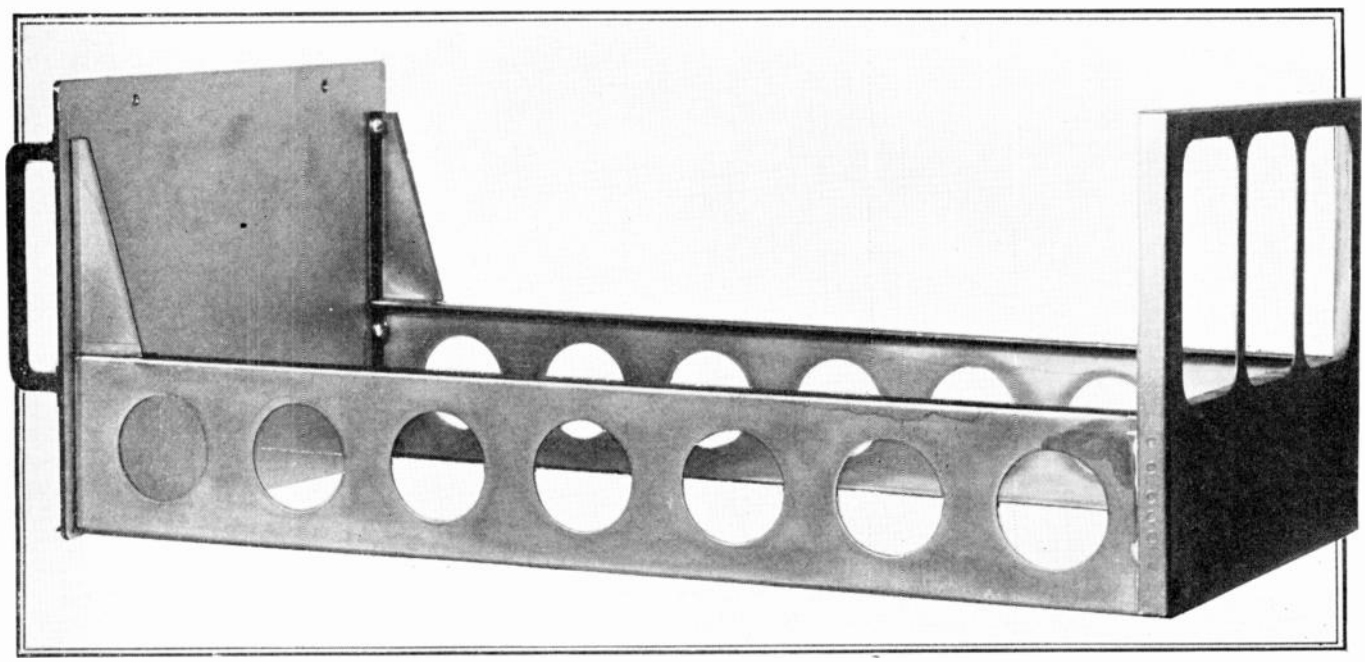


FIG. 5. THIS IS A DELCO CHASSIS, AVAILABLE FROM TOOLS ALREADY IN USE. 17 CONFORMS WITH THE NEW STANDARD DESIGN

W. D. TERRELL RETIRES FROM FCC

ON August 31st, W. D. Terrell, Chief of the Field Division of the FCC retired after 40 years of Government service, at the age of 72.

At a dinner attended by sixty-eight of his co-workers, associates, and friends, Mr. Terrell was presented with a letter from the President of the United States, expressing gratitude and thanks for his work in the field of governmental radio services, concluding with the words, "You can well be proud of the record you have made."

In a letter from the Commission, Chairman James Lawrence Fly said, in part:

"On the occasion of your voluntary retirement from government service August 31, 1943, may I convey to you on behalf of the Commission and its staff, as well as personally, our sincere best wishes and our hope that you will continue to enjoy for many years to come health, happiness, and the satisfaction of important work well done.

"In 1911, when you became the first United States Radio Inspector, you had already had twenty-two years of pioneer communications experience including eight years of government service. Thereafter, as Chief of the Radio Division of the Department of Commerce, you contributed more than any other government official toward the early growth of broadcasting and of high-frequency communication.

"We especially wish to thank you for your last two years on active duty, undertaken at our request and with the approval of the President after you had passed seventy, the statutory age of retirement for Federal employees, thus giving us the benefit of your expert advice and assistance during the most difficult period of adjustment to war conditions when your help was urgently needed.

"You have represented this Government with distinction at many national and international meetings, including the International Radiotelegraph Conference, London, 1912; National Broadcast Conferences called by the Secretary of Commerce, 1922, 1923, 1924, and 1925; International Telegraph Conference, Paris, 1925; International Radio Conference, Washington, 1927; Safety of Life at Sea Conference, London, and European Broadcasting Conference, Prague, 1929. In all these lines of duty, you have brought credit to yourself and the government."

Mr. Terrell's home is at 4764 24th Road North, Arlington, Va.

CORRECTION

IN W. H. Hammond's article on Solder-seal ceramic bushings, page 35 of the June issue, the statement was made that the heat of the soldering iron must be controlled in the neighborhood of 650° C.

The reference should have been made to Fahrenheit rather than Centigrade. Using 58-42 solder, for example, the temperature should be 585° to 600° F.

SPOT NEWS NOTES

Items and comments, personal and otherwise, about manufacturing, broadcasting, communications, and television activities

New FM Calls: Effective November 1st, all FM broadcast stations will replace their present frequency-indicating call letters with standard 4-letter calls. This decision, announced by the FCC on August 24th, is in response to a formal petition from FMBI, submitted by Walter J. Damm, president of the association, through the offices of Philip G. Loucks, Washington Counsel. About 45 stations will be affected. In the case of an FM station operated by an AM licensee, when both transmitters are in the same city, the call letters of the AM station, followed by "FM," may be requested for the FM station.

Call to Arms: Heard at Schenectady: "Up, electrons, and atom!"

New FMBI Members: Total membership is now 61, including the latest additions: Federated Publications, Inc., Battle Creek, Mich.; The Houston Printing Corp., Houston, Texas; Cherry & Webb Broadcasting Company, Providence, R. I.; and the Outlet Company, Providence, R. I.

Chicago: An additional plant of 100,000 sq. ft. has been taken over by Hallicrafters. It will be used for the final assembly of heavy military equipment.

Dr. A. H. Rosenthal: Appointed director of research and development for Scophony Corporation of America, 527 Fifth Avenue, New York City. This Company is associated with Television Productions, Inc., which is a Paramount subsidiary, and General Precision Equipment Corporation.

Resistance Charts: Direct-reading EIRW and parallel-resistance charts for wall mounting have just been published for the use of engineers, designers, and training schools. The former shows the voltage, current, resistance, or wattage when any two of these factors are known. The latter shows the effective resistance of two resistors in parallel, or the value required for two resistors in parallel to produce a required effective resistance. The charts measure 26 by 36 ins. They are available from Ohmite Manufacturing Company, 4835 Flournoy Street, Chicago 44.

President's First Radio: To Joseph Donnelly, now test engineer at the Hicksville, N. Y. plant of Press Wireless, Inc., belongs the honor of having sold President Roosevelt his first radio receiver. It was installed at his Hyde Park home even before the time he was elected Governor of New York.

W6XYZ: FCC has granted a license to cover construction permit for an experimental television station to be operated by Television Productions, Inc., Los Angeles.

David Grimes: Killed in action when a plane in which he was flying with Commodore James Logan over Northern Ireland crashed against a mountainside.

Although not in uniform, he was engaged in carrying out an assignment from the U. S. Navy. David Grimes was born in Minneapolis on May 28, 1896. After graduation from the University of Minnesota with a B.S. degree, he enlisted in the U. S. Air Force, and was sent to England to carry on radio research work. After the war he entered the Bell Telephone Laboratories, leaving in 1923 to become chief engineer of Sleeper Radio Corporation, where his Inverse Duplex circuit was first used for home radio receivers.

When the RCA License Laboratory was organized in 1930, he joined that group and continued there until 1934, when he went to Philco as engineer in charge of home radio research and engineering. In 1939 he was named chief engineer, and in 1942, vice president in charge of engineering. A tireless worker and a tremendous enthusiast, many of us will remember him as a fine friend and an admirable associate.

New Address: General offices of Solar Manufacturing Corporation and Solar Capacitor Sales Corporation have been moved from Bayonne, N. J. to 285 Madison Avenue, New York City 17. Departments occupying the new quarters are accounts, credits, sales, and export.

Endurance: A Carter Magmotor, of the type used for mobile radio equipment to supply B voltage from a 6-volt car battery, was put on a continuous-duty life test, with 50% overload on both input and output, on August 12, 1942. When last reported, it was still going strong after 5,000 hours of operation, interrupted only once for replacement of brushes.

Walter A. Coogan: Director of Sylvania's international division has been reappointed chairman of the RMA Export Committee. Discussing postwar radio exports, Mr. Coogan said: "In Latin America, the potential market will far exceed the most enthusiastic prospects now current." Present difficulty is not in obtaining orders or shipping space, but in getting licenses from OEW and priority ratings from WPB.

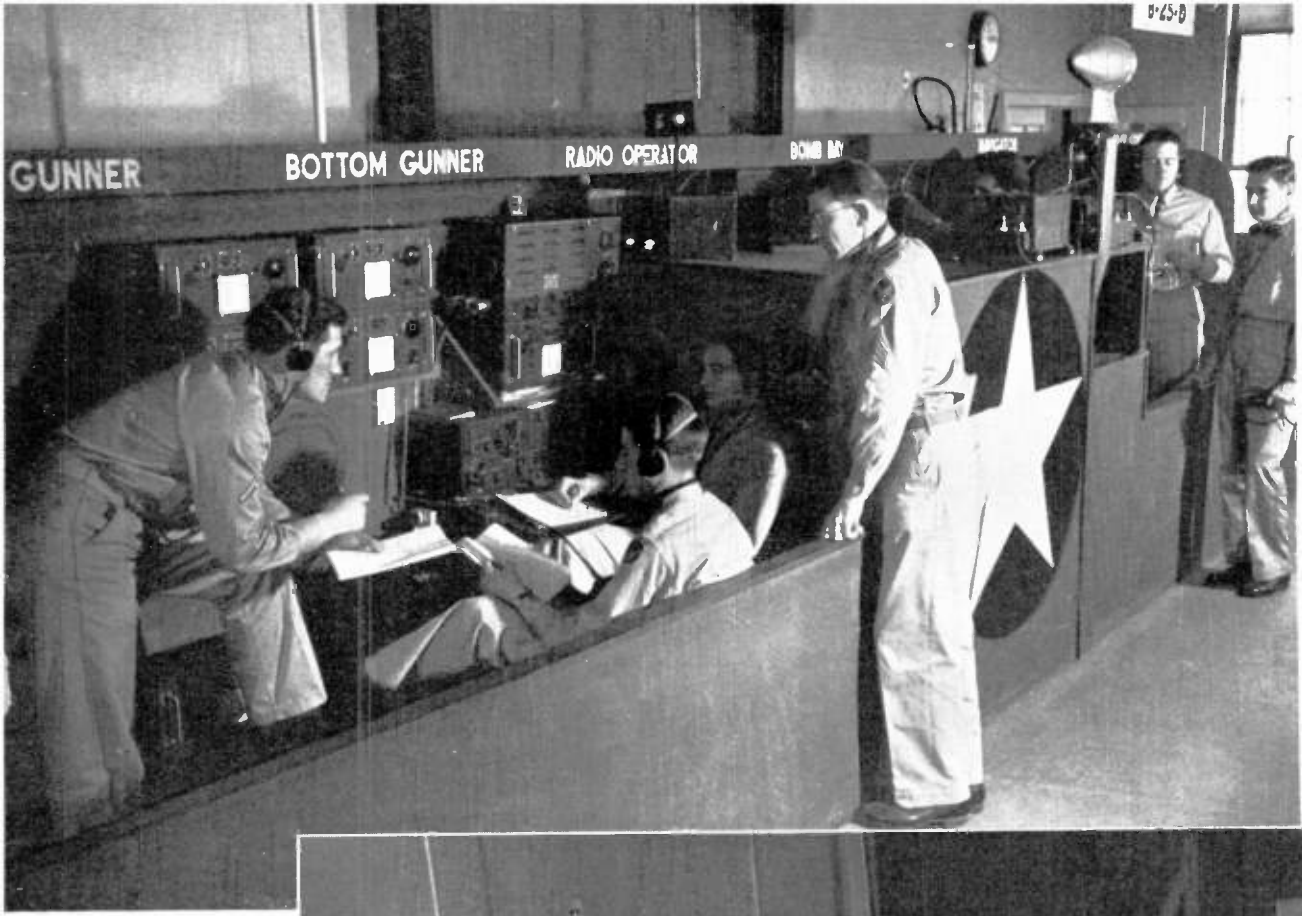
Direct-Reading Frequency Meter: Now available from North American Philips Company, Dobbs Ferry, N. Y. Its rated accuracy is 2% over the entire range of 0 to 50,000 cycles. Frequency is indicated by a meter or by a separate recorder. A range switch is used to cover 0-100, 0-500, 0-1,000, 0-5,000, 0-10,000, or 0-50,000 cycles. Input impedance is 100,000 ohms or more. Accuracy is unaffected by input signal variation from .5 to 200 volts, or power supply variation between 105 and 125 volts. Furnished for relay rack or cabinet mounting.

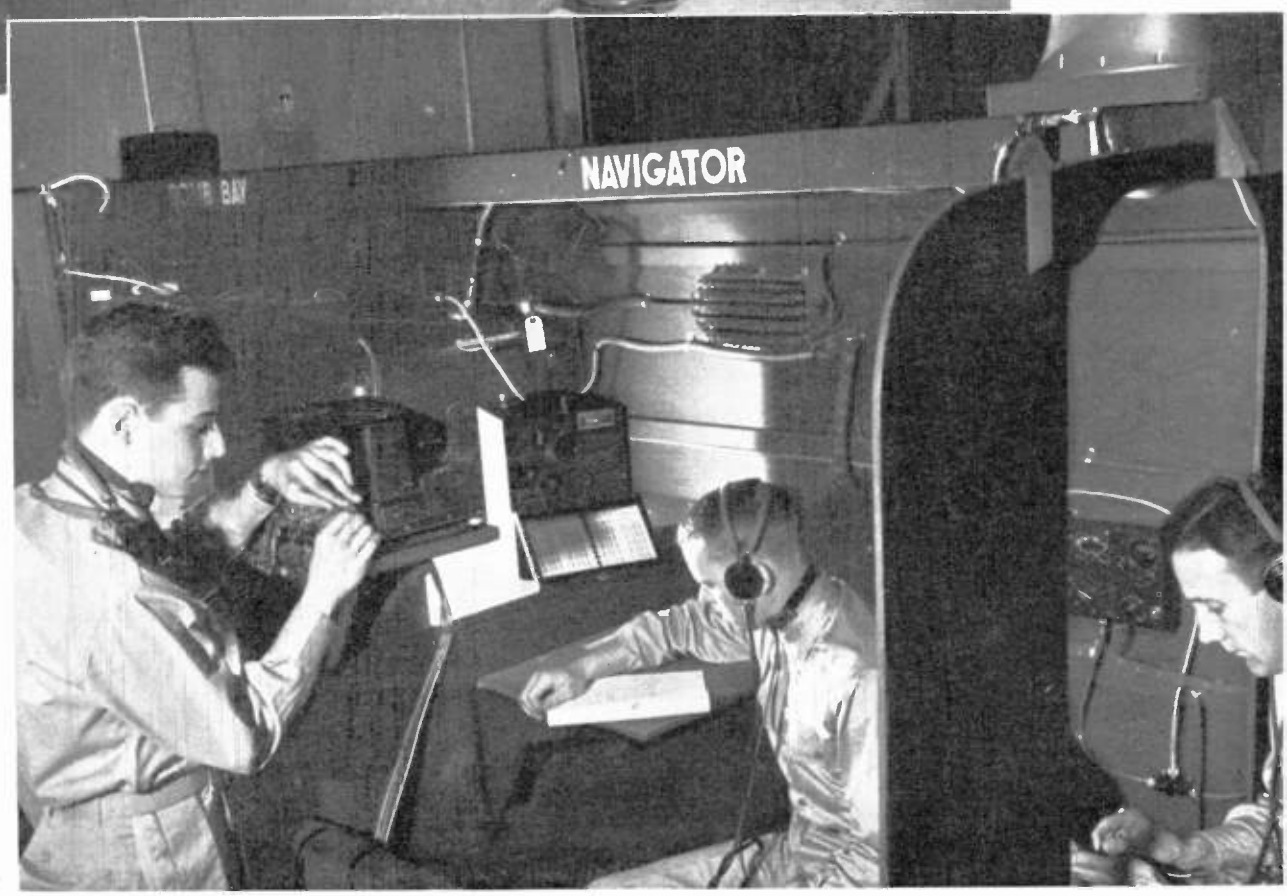
Ray Zender: Chief engineer and sales manager of Lenz Electric Mfg. Company, Chicago, has been appointed Wire Consultant to WPB's Radio and Radar section.

Plug Research: Station W45CM, Columbus, is planning to try out new ideas for commercial announcements, in preparation for postwar expansion of FM broadcasting. Members of the staff have ideas, and Lester Nafzger says they will give time to advertisers free, in order to try them out.

Walter J. Damm: President of FMBI and general manager of W55M and WTMJ,

(CONTINUED ON PAGE 46)





NEWS PICTURE

OUR Army and Navy is building up a tremendous future market for amateur communications equipment by training thousands upon thousands of highly skilled radio operators and service experts.

Every conceivable means is being put to use in developing the ability of these men before they are sent on to the battle fronts. These pictures show how actual operating conditions on the big bombers are simulated at Scott Field, Ill., the parent radio school of the Army Air Forces Training Command.

The particular "semi-mockup" shown reproduces the exact arrangement of a Mitchell B-25-D medium bomber, fitted with the complete radio and interphone equipment used in flight.

With this installation, instruction is given in all the problems encountered in the air, and the students acquire the "feel" of handling communications under battle conditions in preparation for their real work which follows.

FM AIDS BATTLE OF TRANSPORTATION

Use of Frequency Modulation in War Emergency Promises to Revolutionize Railway Traffic Control and Communications Technique—Part 2

BY W. S. HALSTEAD *

AS OUTLINED in Part 1 of this paper, the FM railway radiotelephone equipment employed in the Halstead RTC-10-UF system incorporates 1) central-station equipment, including transmitter and receiver, coaxial antenna, remote-control and automatic pulsing unit, handset, and accessories, 2) the locomotive equipment, comprising the transmitter and receiver, receiver power supply, remote-control unit and handset, check-light, loud-speaker, and whip antenna and 3) secondary-station equipment, including transmitter and receiver, coaxial antenna, handset, and accessories.

*President, Halstead Traffic Communications Corporation, 155 East Forty-fourth Street, New York City.

Central-Station Equipment ★ The central-station radiotelephone transmitter is designed for operation with a primary

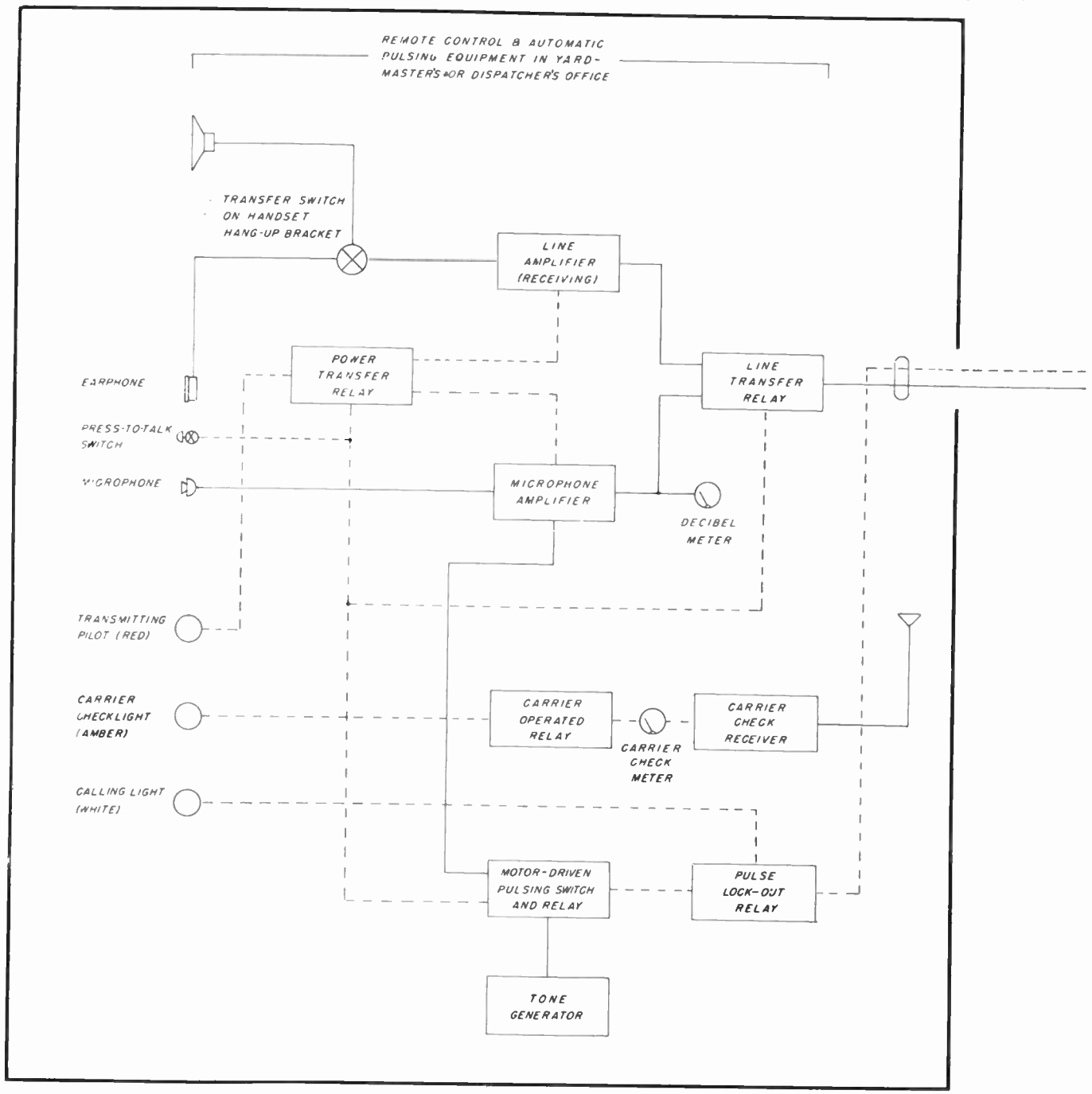


FIG. 13. THIS EQUIPMENT IS INSTALLED AT THE YARDMASTER'S OFFICE. IT IS USED TO CONTROL THE CENTRAL STATION

power source of 115 volts, 60 cycles. The equipment is intended for operation in the 156- to 162-mc. band, with nominal power output of 10 watts. Its operation is coördinated with automatic pulsing circuits which operate check lights and speakers in the locomotive cabs, and indicating lights at the yardmaster's or dispatcher's control point. This is shown in Figs. 13 and 14. By these means, the proper functioning of the system is made evident.

Phase modulation of a radio-frequency signal generated by a crystal oscillator is employed. A frequency swing of plus or minus 50 kc. with respect to the mean carrier frequency is obtained at voice frequencies between 300 and 3,000 cycles when the transmitter is modulated.

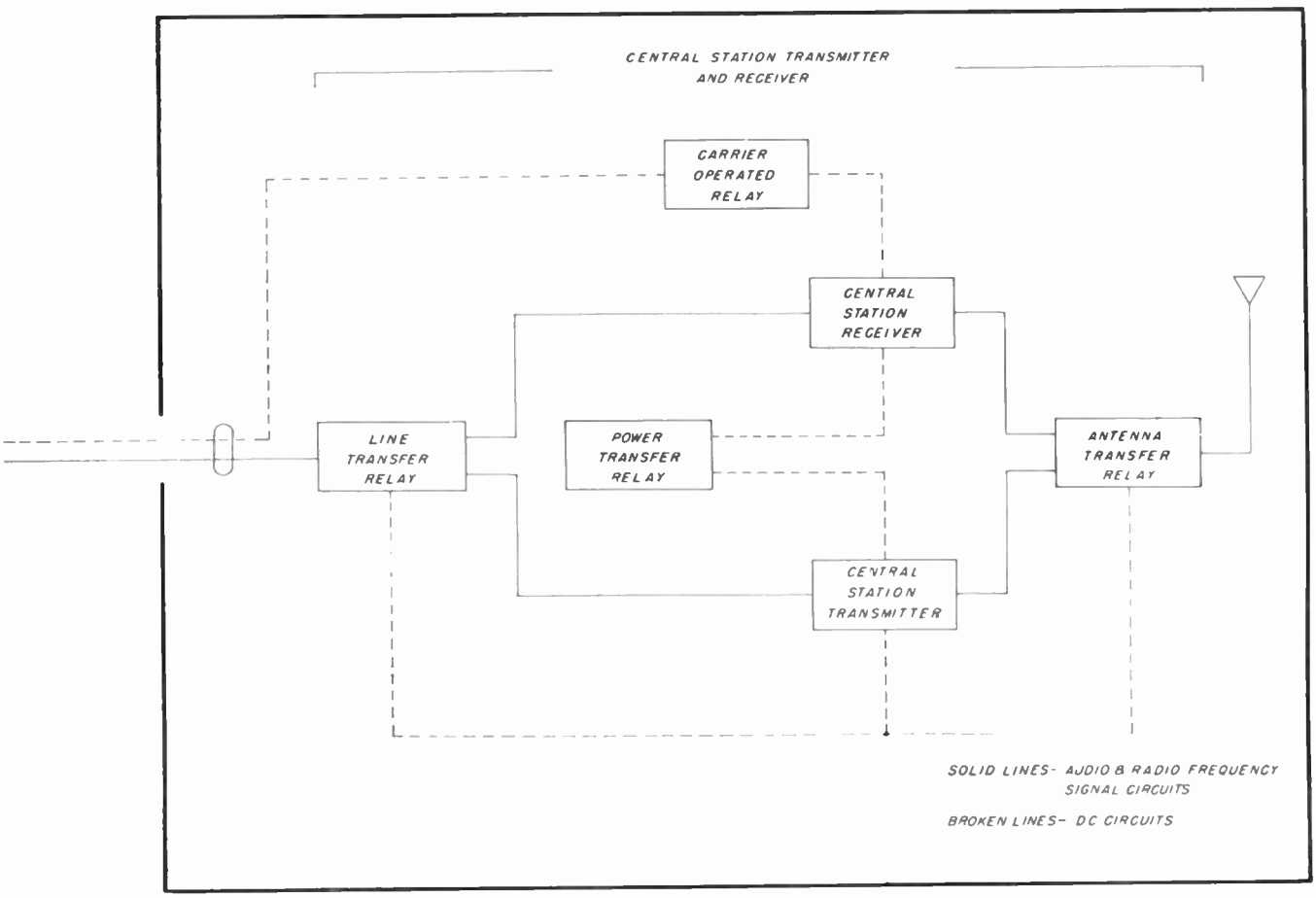
is mounted on the side of the cabinet to facilitate routine tests, or for use in emergencies.

The central-station receiver designed for operation with the transmitter incorporates two crystal control circuits to provide maximum stability of operation at the assigned frequency in the 156–162 megacycle band. It operates on 115 volts, 60 cycles. A squelch circuit in the output section of the receiver, similar to that employed in mobile FM units, limits the effective operation of the audio output circuit to periods during which a carrier signal is being received from one of the transmitters in the communications network.

In order to suspend operation of the automatic pulsing circuit employed in the

and secondary-station equipment may be operated on a common carrier frequency without mutual interference, while the recurrent pulse signal, at five-second intervals, serves as a check on all cooperating receiving equipment without affecting normal two-way operation.

The same carrier-operated relay may also be utilized in wayside repeater installations of the system. In this function, the contacts are in series with the line relay of the transmitter, thereby putting the transmitter in operation when a carrier signal from a coöperating station is being received. It should be pointed out, in this connection, that operation of the carrier-controlled relay by the squelch circuit is limited to periods during which a relatively strong carrier is present. The selec-



THE TRANSMITTER AND RECEIVER, OPERATED OVER WIRES FROM THE YARDMASTER'S OFFICE, ARE INSTALLED AT THE CENTRAL STATION. THIS POINT IS SELECTED WHERE IT WILL COVER THE ENTIRE AREA OF OPERATIONS DEPENDABLY

Pre-emphasis of the higher speech frequencies is incorporated in the transmitter, while a filter circuit is employed to attenuate the frequencies above this range in order that excessive frequency deviation will not be obtained. The normal signal level required during modulation on the 500-ohm audio input circuit is 0 db at 500 cycles.

The remotely-controlled transmitter, with associated control relays and central-station receiver, is rack-mounted in a steel cabinet approximately 30 ins. high, 21 ins. wide, and 12 ins. deep. This is shown in Figs. 3 and 4, Part 1. A handset

central-station transmitter during reception of signals from a locomotive or the secondary-station transmitter, a carrier-operated relay is connected in the squelch circuit of the receiver in such manner that the relay contacts are closed whenever a carrier is being received. This operation controls a secondary, or pulse lock-out relay at the remote-control point which opens the pulsing circuit and concurrently energizes a "calling" light on the remote-control unit, as shown in Fig. 13.

In this manner, pulse and voice signaling circuits of central-station, mobile,

tive control of the squelch circuit, in addition to the high degree of discrimination against static or other electrical noise afforded by FM receiver circuits, precludes operation of the relay by transients or strong bursts of static which occur during local thunderstorms.

The arrangement of remote-control and automatic pulsing equipment employed in the RTC-10-UF system are illustrated in the block diagram of Fig. 13. Signals from the central-station receiver are impressed on the telephone line joining the control at the yardmaster's office and the remote transmitter-receiver installation.

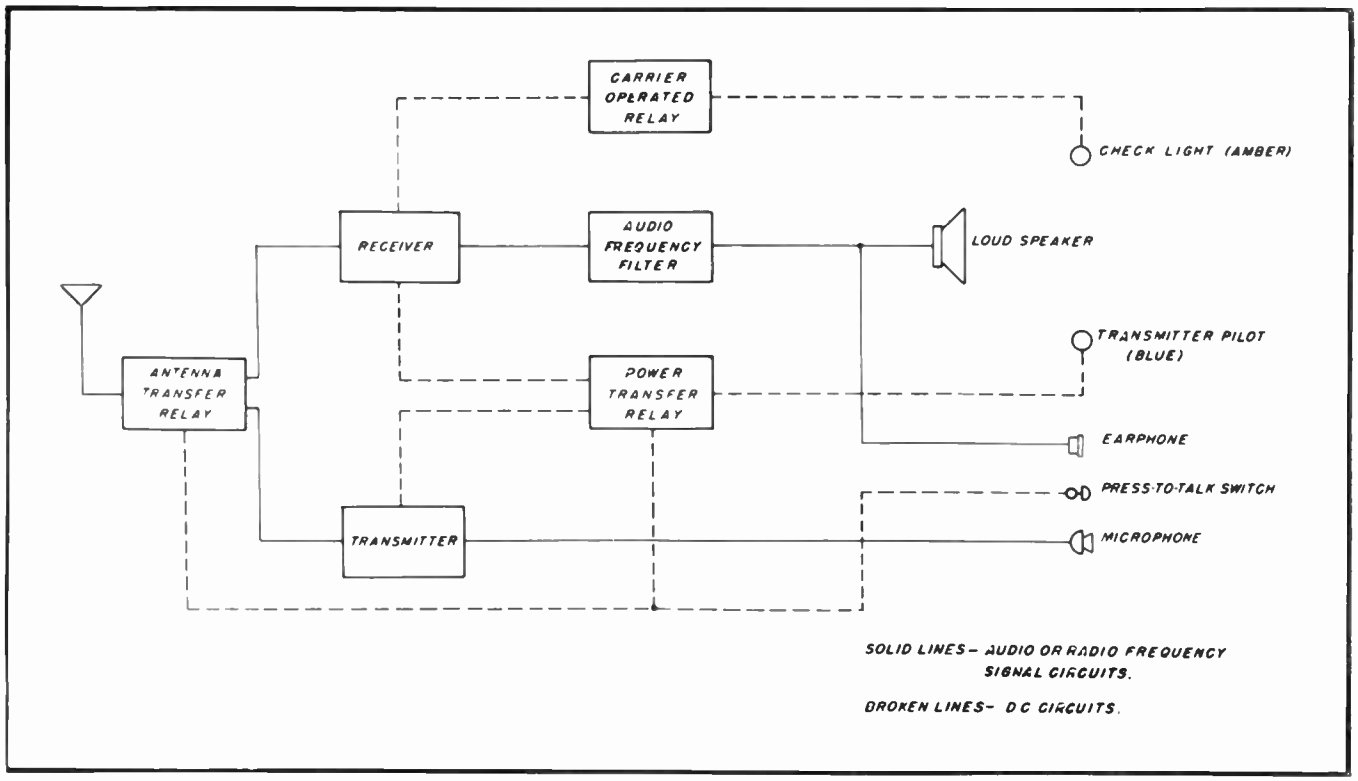


FIG. 14. BLOCK DIAGRAM OF THE RADIO APPARATUS, SIGNAL LIGHTS, SPEAKER, AND MICROPHONE ON THE LOCOMOTIVE

At the yardmaster's office, these signals are supplied to a line amplifier in the remote-control unit, Fig. 5, and loud-speaker. When the dispatcher picks up the handset, a switch in the hang-up box is operated and transfers the incoming signals from the loud-speaker to the ear-phone of the handset during two-way operating periods.

DC voltage, impressed by phantom connection on the telephone circuit when the carrier-operated relay of the central-station receiver is energized, is applied to the winding of the pulse lock-out relay in the control unit. The contacts of this relay, opened when the carrier-wave energy is being received, open a circuit between a motor-driven pulsing switch and a pulsing relay, thereby suspending the automatic pulse keying as long as a carrier signal is being received by the central-station equipment.

The lock-out relay, when closed, also opens a circuit connection between the microphone amplifier input and the out-put circuit of an audio-frequency signal generator which provides an audible check-ing signal during pulse transmission.

In transmitting voice signals from the remote-control point, a press-to-talk switch on the handset, or a foot-switch, is actuated by the yardmaster or dis-patcher. This connects the power supply and telephone line circuits to the micro-phone amplifier, and applies DC voltage to the telephone line to actuate control relays in the central-station transmitter, thereby connecting the transmitter to the antenna and applying plate voltage to all transmitting tubes.

A receiver of limited sensitivity is in-cluded in the remote-control unit, Fig. 5, to check on emission of signals by the transmitter. Two visual indicators, ac-tuated by received signal energy, are utilized to check on the emitted radio signal. A meter is employed as a qualita-tive check, while an amber pilot light provides a general check on over-all op-eration. The flashing light signal is par-ticularly useful as a monitor during pulse transmission, when the operator may be engaged in other work and cannot observe meter indications conveniently. The in-termittent check-light, however, can be seen at a glance from any part of the dispatcher's office.

In terminal communications, where tracks may be spread in many directions over a large area, a vertical coaxial an-tenna is employed to provide a substan-tially uniform radiation pattern in all directions, as indicated in Fig. 2. This antenna is connected to the central-sta-tion receiver and transmitter by means of a coaxial cable. In yards where trackage is concentrated in a single direction, or in main-line installations, directional an-tenna systems can be utilized advanta-geously. In these instances, the directional array is installed in such manner that the major propagation extends through the center of the yard area or along the railroad right-of-way.

Locomotive Equipment ★ Locomotive radio-telephone equipment employed in this system, shown by the block diagram in Fig. 14, incorporates a 10-watt FM trans-mitter having electrical characteristics similar to those of the central-station equipment, with the exception that the primary power supply is derived from a 12-volt storage battery, or the 32-volt lighting circuit of the locomotive. In diesel-electric equipment, the voltage sup-plied by the locomotive battery in many instances is 64 volts or more. In this event, a 12-volt storage battery is em-ployed to operate the radio equipment. On steam locomotives, a turbo-generator commonly supplies 32 volts DC. Radio equipment for 32-volt operation is sup-plied in this case.

Plate voltage for transmitting tubes employed in locomotive equipment is de-rived from a dynamotor, operated only during transmitting periods. The dyna-motor is mounted on the chassis of the transmitter.

The receiver is similar to that employed in the central-station unit, except for dif-ference in primary power supply. A car-rier-operated relay, Fig. 14, is connected in the squelch circuit of the receiver to operate a check-light located in the en-gineer's field of vision. This light, illus-trated in Fig. 9, is energized momentarily at five-second intervals by the impulses sent out from the central-station trans-mitter. The light is also energized steadily during periods in which the dispatcher is talking from the control point. In event of failure of the central-station transmitter or locomotive receiver, the check-light will fail to operate, thus informing the engineer that he should not rely on his radio equipment for subsequent direction of movement until he has observed regu-lation precautionary measures.

Locomotive transmitting and receiving units are normally installed in a steel case, mounted on the wall of a diesel-electric locomotive cab. The arrangement of the vertical whip antenna, on the roof of the cab, is shown in Figs. 10 and 11.

On steam locomotives, extraordinary precautions must be taken to provide suitable location and mounting of the radio transmitter, receiver, and antenna. Double shock-mounting, to guard against severe horizontal as well as vertical shock and vibration, must be incorporated. The equipment must also be protected against damage from water, coal dust, and oxidizing gases generated by coal-burning locomotives.

To meet these conditions, the transmitter and receiver are shock mounted on rubber and spring steel in a manner similar to that used for tank radio equipment. This assembly is then installed in a heavy steel case, also equipped with shock mountings to absorb coupling shock and running vibration of large amplitude. The equipment case is then mounted in a weathertight housing, fabricated of heavy steel, which is securely bolted to the body of the locomotive tender, usually on a steel deck extending over the water tank, as in Fig. 12. The antenna, of spring-base type, is mounted on a steel bracket at the side of the equipment housing. In this manner, the antenna is located at an optimum electrical location with maximum spacing between electrical equipment and the elevated metal surfaces of the locomotive, and with minimum spacing between the antenna and radio unit.

The remote-control unit for use in locomotive cabs consists of a steel case on which are mounted the off-on power supply switch, squelch control switch, loud-speaker volume control, and pilot lights. The handset, for use by the locomotive engineer or conductor, is of conventional type, and is equipped with press-to-talk switch.

Cab loud-speakers are of the double re-entrant type, illustrated in Fig. 8, to provide maximum protection against damage from water or mechanical shock. Speakers of this type are also favored for the reason that they are capable of projecting a crisp, highly intelligible voice signal to all parts of the cab with sufficient volume to over-ride the high noise levels common to diesel-electric and steam locomotive operation.

Supplementary remote-control units and loud-speakers are desirable, in some instances, at the front and rear of locomotives, as indicated in Figs. 11 and 12. In terminal areas, conductors or other personnel often ride on platforms at the front or rear of locomotives during certain yard operations. In other cases, the engineman and conductor may be on the ground in the vicinity of the locomotive, particularly during summer months where steam locomotives are employed. With the supplementary speakers, these men can be reached at distances of several hundred feet from the locomotive, or the conductor who may be riding on the front or rear platform can be given instructions in spite of the extremely high noise levels caused by adjacent locomotives or rolling cars.

By means of the remote-control units, these men are able to talk back to the yardmaster or dispatcher, or to the engineman of locomotives on the same or adjoining tracks without leaving their posts. Inasmuch as safety and efficiency in yard operation requires maximum collaboration between trainmen and other personnel, it has been determined that the communicating system should be extended to these men where they are working, rather than for them to move into the cab when two-way communications are to be established.

Secondary-Station Equipment ★ Secondary-station equipment employed in the RTC-10-UF system consists of a 10-watt FM transmitter and receiver of a type similar to that employed at the central station. This equipment, operating from 115 volts, 60 cycles, is set up at selected wayside points. The antenna is a simple coaxial type. Usually, these secondary stations are located at yard intersections where local traffic control problems exist, or at the entrances and exits of terminal areas. Local control facilities are provided in a weatherproof control box, mounted conveniently near the tracks. Operation of the secondary-station transmitters and receivers is on a common yard frequency as an integrated part of the communications network.

Repeater Installations ★ At frequencies above

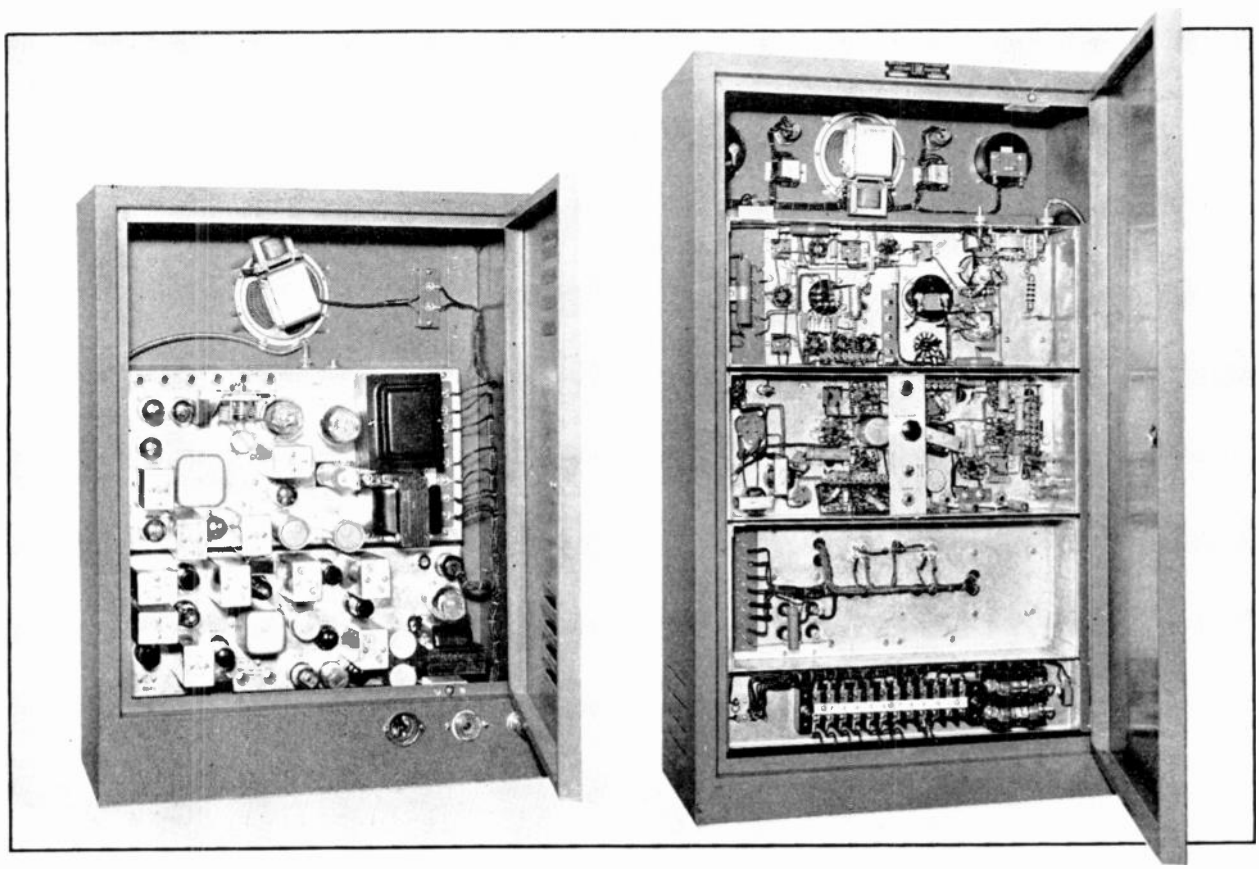


FIG. 15. LINK 25-WATT AND 50-WATT FM TRANSMITTERS FOR USE AT CENTRAL STATIONS AND FOR VARIOUS SECONDARY SERVICES

100 mc., radio wave propagation characteristics are of quasi-optical nature, and the small physical size of directional antenna systems for such frequencies provides a convenient and practical means for concentrating radiation in a desired direction. These two factors, in addition to the discriminatory effect of FM with regard to complete rejection of weak, unwanted signals in favor of stronger operating signals, and the elimination of heterodyne squeals, offer new railway communicating techniques which will permit duplication of railway radio facilities in different localities with a minimum number of frequencies.

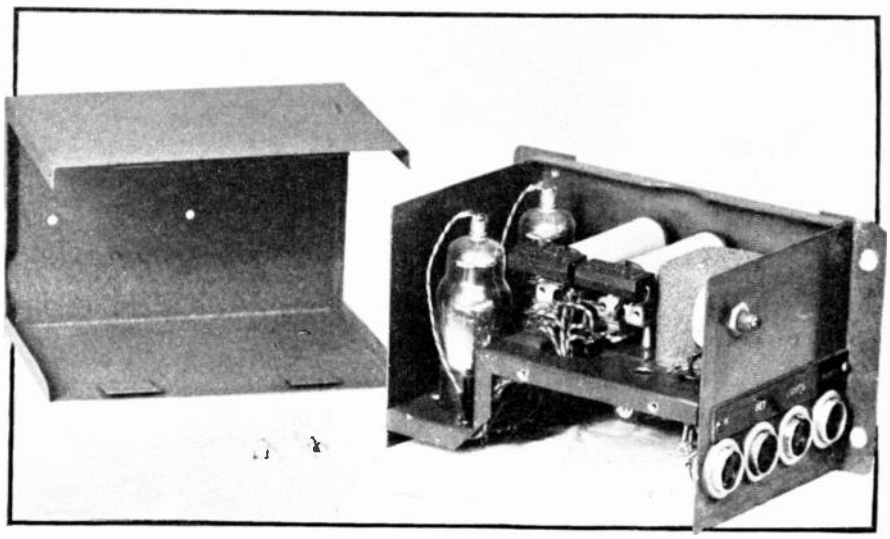


FIG. 16. SIGNAL SELECTOR UNIT WHICH CONTROLS TONE-OPERATED SIGNAL LIGHTS

However, the limited, quasi-optical operating range of equipment of this type, and the shielding effect of elevations in terrain, presents a technical problem in instances where trackage may wind for many miles through industrial areas, pass around hills, or extend through tunnels. Fortunately, technical means have been developed for solving this problem in a comparatively simple and practical manner. This consists in the application of automatic repeater stations at points where radio-signals need reinforcement and re-direction.

Directional antennas, having high front-to-back ratios, such as the Kraus or Yagi types, are utilized at the repeater points, with transmitters and receivers of the type employed at secondary stations. The same equipment can be used with cable wave-guides at tunnel entrances and exits to provide uninterrupted radio communication. In each instance, the repeater transmitter is in operation only when a carrier-wave signal from a coöperating transmitter is being received, but the associated receiver is in operation continuously. Actuation of the squelch relay by an incoming signal energizes the transmitter. Then the voice and checking signals are relayed by the transmitter to the next wayside point. This operation is automatic and unattended, and the loss in quality at the repeat point is negligible.

Radio Traffic Signals ★ These techniques are also suitable for radio traffic control by selectively-actuated visual and audible cab signals. With locomotive equipment as employed in this system, an audio amplifier and signal selector unit can be connected to the output circuit of the receiver. A unit of this type, developed by the Halstead Corporation is illustrated in Fig. 16.

Two audio-frequency amplifiers, filter sections, and relays are utilized in this equipment to control red, green, and amber cab signals, as determined by the transmission of tone signals of pre-determined audio frequency. By using control impulses of different frequencies, cab signals can be actuated concurrently with reception of voice signals without any interference. Inasmuch as the actual control signal can be reproduced by the cab loud-speaker, the engineman has an audible as well as visual indication of a type which cannot cause misoperation. Equipment of this type may prove to be of particular value on smaller railroads in providing supplementary traffic control signals on trackage not served by conventional cab signaling systems, particularly where visual wayside signals may be obscured by fog or other weather conditions.

Whether or not FM railway radio traffic control and communications techniques will be developed and expanded into wide usefulness depends, in large measure, on the vision, foresight, and common-sense of engineers and administrators in the railroad industry. From the radio communications viewpoint, it can be said that the door has been opened, for the technique has been tested and has proved itself of value under the stress of war emergency conditions.

EDITOR'S NOTE: Another article on this subject by W. S. Halstead is scheduled for an early issue.

POSTWAR PARTS DUMPING

THE Sales Managers Club is already giving thought to the problems which will be created by the dumping of components and materials immediately following "C" day, the day when the first cancellations of military contracts are sent out by the Army and Navy.

According to Charles Golenpaul, chairman of the Eastern Group and sales manager of the jobber division at Aerovox, conditions are such that the dumping of surplus goods will not disturb the manufacturers who will be swinging over into the production of components for civilian equipment and for servicing home radios.

To begin with, although parts are now being turned out in fantastic quantities, the surplus created by cancellations may be much smaller than many expect because our Armed Forces will require a much larger reserve of equipment than was the case after the last war.

Very little completed military equipment is suited for civilian use, and the surplus in this category will very likely be taken up by the purchases of foreign governments.

However, it is inevitable that manufacturers of military equipment will have substantial quantities of components on their hands as a result of war contract cancellations. What is become of them?

In the first place, set manufacturers disposed of their normal reserves of small parts soon after Pearl Harbor. They were purchased by parts jobbers who, by this time, have turned them over for civilian set service and replacements. Such surplus parts as are on hand when "C" day comes will be divided into two classes: 1) those that are suitable for use in home radios, and 2) those of special design suitable only for military equipment.

The former may be no more than the manufacturers need for normal stock reserves.

What remainder exists will not be packaged. Furthermore, many of these parts are unbranded or carry the purchaser's name and not the manufacturer's.

Parts sold in bulk to manufacturers are covered by a blanket guarantee to the initial buyer only. The protection is not extended to a subsequent purchaser into whose hands they may finally pass.

Those who will benefit most when surplus stocks are dumped will be the experimenters, amateurs, and new, small companies which will spring up after the War. Much of that business will come into being as a result of the surplus market, and will have little effect upon the normal market.

Meanwhile, thousands of dealers and servicemen, released from the Armed Forces, will be clamoring for standard parts with which to stock their shelves.

Adding up these various factors, it appears that surplus parts will be absorbed and that new orders will cushion the shock of "C" day conversion.

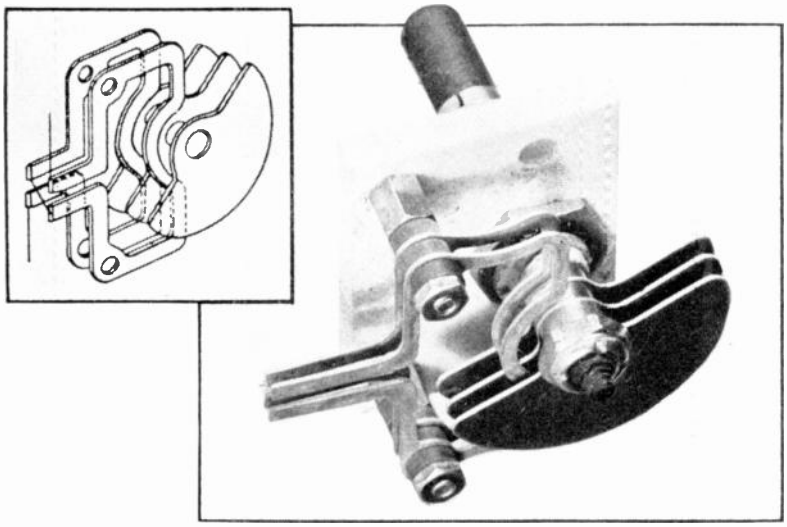


FIG. 1. THE VARIABLE INDUCTANCE USED IN THE G.E. FM MONITOR CONVERTER

DESIGNERS' ITEMS

Notes on Products and Methods of Importance to Design Engineers

UHF Variable Inductance: Because of the interest shown in the variable inductances used by General Electric in their 260- to 350-mc. monitor converter, described in our June issue, we asked for a photograph of this device.

It appears above, in Fig. 1. This variable inductance was actually made from a variable condenser. The rotor plates were not altered, but the stator plates were removed and replaced with what, in effect, are two single loops, cross-connected as shown in the diagram.

It is interesting to examine the reason for the use of these unusual components, as they are useful in other, related applications. The problem was to mix incoming RF signals in the 260-to 350- mc.b and with a crystal oscillator differing in frequency by 5.4 mc., and to couple them to a detector. Added to the low input resistance of a 955 detector tube was the difficulty of tuning the combined capacitances of the tubes involved in the mixing process, i.e., the output capacitances of the multiplier and RF tubes and input capacitance of the detector tube.

The sum of these capacitances, with some additional allowance for the wiring was approximately 9 mmf. This shows a reactance of only 50 ohms at 350 mc. The shunt inductance required to tune this capacitance is .023 microhenry. Since a single turn of No. 18 wire, ½ in. in diameter has this much inductance, the difficulty of obtaining resonance is obvious.

No such single-turn coil could tune all three tube elements since the tubes are separated sufficiently that inductive loop impedances would be created of the same order of magnitude as that of the single-turn coil itself.

However, in spite of these limitations, it appeared that it would be much easier to accomplish the mixing by simply connecting the tube elements together than by employing a tuned mixing transformer or a tuned line.

Analysis and experiment indicated that this could be accomplished only by tuning each tube capacitance separately with a variable shunt inductance capable of covering the required tuning range.

The type of variable inductance illustrated was worked out for this purpose, connected from each tube element involved, and thence through a tiny blocking condenser to the metal chassis.

This method proved highly successful, due to the extremely low minimum inductance and the simplicity of design. Each of the cut-away stator plates forms a one-turn coil. The inductance can be progressively reduced by turning the rotor plates to increase the coupling, thereby introducing, in effect, a short-circuited secondary turn on each side of the stator inductance turn. Several stator turns can be connected in parallel to reduce the inductance, or in series to increase it.

A considerable number of applications for this very novel device will undoubtedly occur to those who are engaged in the design of circuits operated at similar frequency ranges.

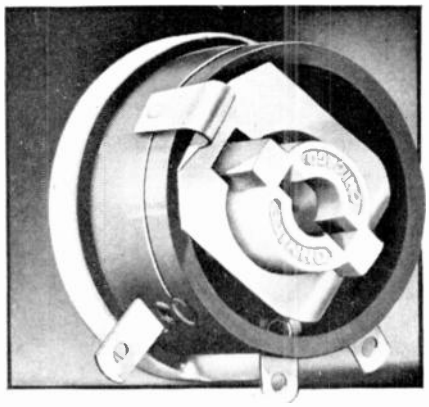


FIG. 2. SLIDE-WIRE RHEOSTAT OR POTENTIOMETER OF .1 TO 1. OHMS

Lignum-Vitae: The hardest, heaviest, and closest-grained wood known, lignum-vitae is coming into use for a variety of purposes in mechanical construction and for model work.

It is admirable for self-lubricating bearings, and can be used on experimental models for parts which will be subsequently die-cast or molded. It can be machined accurately.

The specific gravity of lignum-vitae is 1.3, its modulus of rupture is 11,200 lbs., and its maximum crushing strength 10,480.

Samples of this material and further details of its characteristics can be obtained from Lignum-Vitae Products Corporation, 96 Boyd Avenue, Jersey City, N. J.

Ultra High-Speed Movies: Trained photographers, operating cameras taking up to 3,000 frames per second, are now available for making motion studies of impact and vibration, failures at high speeds, relay operation, and spring oscillations. This service is available from McLarty Business Films, Buffalo, N. Y. Many subjects can be photographed in Kodachrome. Film exposed in 1½ seconds takes 4½ minutes to run off at normal speed.

Slide-Wire Resistor: A new standard type of slide-wire rheostat-potentiometer, suitable for numerous equipment and instrument applications, is shown in Fig. 2. It is a product of Ohmite Manufacturing Company, Chicago.

The single wire is stretched tightly around a core which is bonded to a ceramic base. This wire is anchored to the two outer terminals, while the phosphor bronze contact arm is connected to the center terminal. Since the contact arm travels over the full length of the wire, the variation of resistance is stepless.

These units are made to order, and are

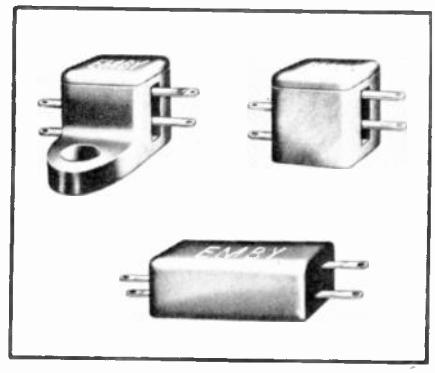


FIG. 3. THESE MINIATURE SELENIUM CELLS ARE SHOWN HERE IN ACTUAL SIZE

supplied with any required resistance value between .1 and 1. ohm. They are equipped with shafts to be rotated by knobs, or slotted for screwdriver adjustment.

Waterproof Coating: A method of forming a water-repellent coating on cloth, paper, ceramics, and other materials has been perfected by Dr. Winton I. Patnode, working at the G.E. research laboratories at Schenectady, N. Y.

Called Dri-Film, one of its most important applications is for treating ceramic insulators. For this purpose, it is nine times more effective than wax now used as a water repellent, and its results are permanent.

Dri-Film is a clear liquid composed of chemicals which vaporize at a temperature below 100° C. Articles to be treated are placed in a closed cabinet and exposed to the vapors for a few minutes. Then, if necessary, they are exposed to ammonia vapor to neutralize corrosive acids which may collect during the treatment.

Dr. Patnode is not able to explain exactly what happens in this process, but the result is the formation of an extremely thin film on the material. This coating is so thin that its structure cannot be determined by chemical analysis. In fact, it cannot be seen under a high-power microscope. However, it does prevent water from spreading to form a continuous coating. If moisture does collect, it is in the form of small, isolated drops.

This discovery is of great significance to radio design engineers, particularly in connection with ceramic forms, insulators, and bushings used for low-loss, high-frequency circuits. Such components lose their normal resistance characteristics when they are subjected to service conditions under which moisture condenses on the surfaces. Once a film of moisture has formed, excessive leakage may render the equipment in which they are used entirely inoperative.

For that reason, A-N specifications generally call for the wax impregnation of ceramic parts, particularly on air-borne equipment.

Comparative tests between similar parts treated with wax and with Dri-Film are reported by the G.E. laboratories. The tests were made under controlled conditions of temperature and humidity simulating those which are encountered by our Armed Forces in the tropics. Surface resistivity was measured on ceramic parts which had been subjected to 100% relative humidity at 25° C., with the parts pre-cooled below the dew point.

A value of 100 was arbitrarily assigned to the surface resistivity of unglazed ceramic parts that had been treated with wax. Similar parts, treated with Dri-Film, were found to have a surface resistivity of 870 on the same basis of evaluation.

Further investigation, according to Dr. Patnode, showed that the Dri-Film treatment is not affected by heat up to 300° C. for short intervals. It is not susceptible to abrasion as a result of handling during assembly operations or field maintenance. Fingerprints or dirt smudges can be removed from ceramics treated with Dri-Film by the application of a cloth or brush moistened with solvent.

Another interesting application of this process is to glass measuring cylinders and hydrometers. Usually the surface of water in such glassware is curved, low in the center and high on the sides, because the liquid wets the walls and tries to climb up them. The curved surface, or meniscus, is prevented if the inside of the glass is waterproofed with Dri-Film. Then the surface of the water is flat and its height can be read more accurately.

Instrument Rectifiers: Miniature instrument type selenium rectifiers are finding many new applications for operating DC meters, indicators, relays, and the magnets of electro-mechanical devices from AC current sources. Fig. 3 illustrates a series of such rectifiers, manufactured by the Selenium Corporation of America, Los Angeles.

These units are shown approximately full size. There are four types available, containing one rectifier cell, two in parallel, two in series, or four in a full-wave bridge circuit.

Various models are designed for 5 or 10 volts input, rated as follows:

Continuous service, 8 up to 35 mils
Intermittent service, 15 up to 70 mils
Instantaneous overload, 30 up to 120 mils

Satisfactory operation is obtained at frequencies up to 100 kc. These rectifiers are rated as having unlimited life, and permanent characteristics. Rectification is instantaneous, requiring no time for warming up. Operation is unaffected by temperatures as high as 70° C. Mounting lugs are provided on some types although, since the weight is less than $\frac{1}{4}$ oz., they can be supported by short connecting leads.

Silver Plating for UHF: Those who have not had a reason for digging into the subject of electro-plating generally considered it to be a simple matter. In this connection, the experience of one engineering group is interesting.

A piece of equipment designed to operate at 156 mc. failed to function satisfactorily, showing unreasonably high losses in a very simple circuit. Insulating bushings, condenser end-plates, mica condensers, and Bakelite sockets were checked with the greatest thoroughness, but the fault could not be located.

Adding to the puzzle was the fact that every unit out of more than twenty-five which had been assembled showed the same low output. Since every other part had been brought under scrutiny, someone suggested that the silver plating on the brass plates of the variable condensers must be at fault. Just how silver plating could be defective in any way that would introduce RF losses was not clear. The only apparent defect in the plating was that it did not cover the solder where the fixed plates were soldered to the spacers, but the connections at these points were no less perfect. Also, the plating was not of uniform color, being somewhat brownish in parts.

Inquiry disclosed the fact that the best practice followed by manufacturers of variable condensers using soldered brass plates is to give the rotor and stator assemblies a copper flash first, followed by nickel flash, and then to apply the silver plating to a thickness of .0003 in.

The brass plates used in the UHF equipment that was giving so much trouble, however, had been silver plated without any initial preparation.

When new condensers were made up with plates that had been given the copper-nickel-silver finish, and substituted for those having the silver deposited directly on the brass, the excessive RF losses disappeared, and all the units showed the required output consistently.

No explanation of these results has been made, but these are the facts of the case. Incidentally, the discoloration originally experienced with the silver plating was overcome, and the new method produced a uniform, flat color of very attractive appearance, covering the soldered joints as well as the brass parts.

NUMERICAL CHECK LIST

THE series of numbers, from 1 to 1000, on the page opposite is of the greatest usefulness in making records and checks of serial numbers, drawing numbers, parts lists, and other items which have numerical identifications.

When numbers above 1,000 are to be checked, other numbers can be put in front of those appearing on the list. For example, if a series of numbers starting with 5,001 is required, the list can be modified in this manner:

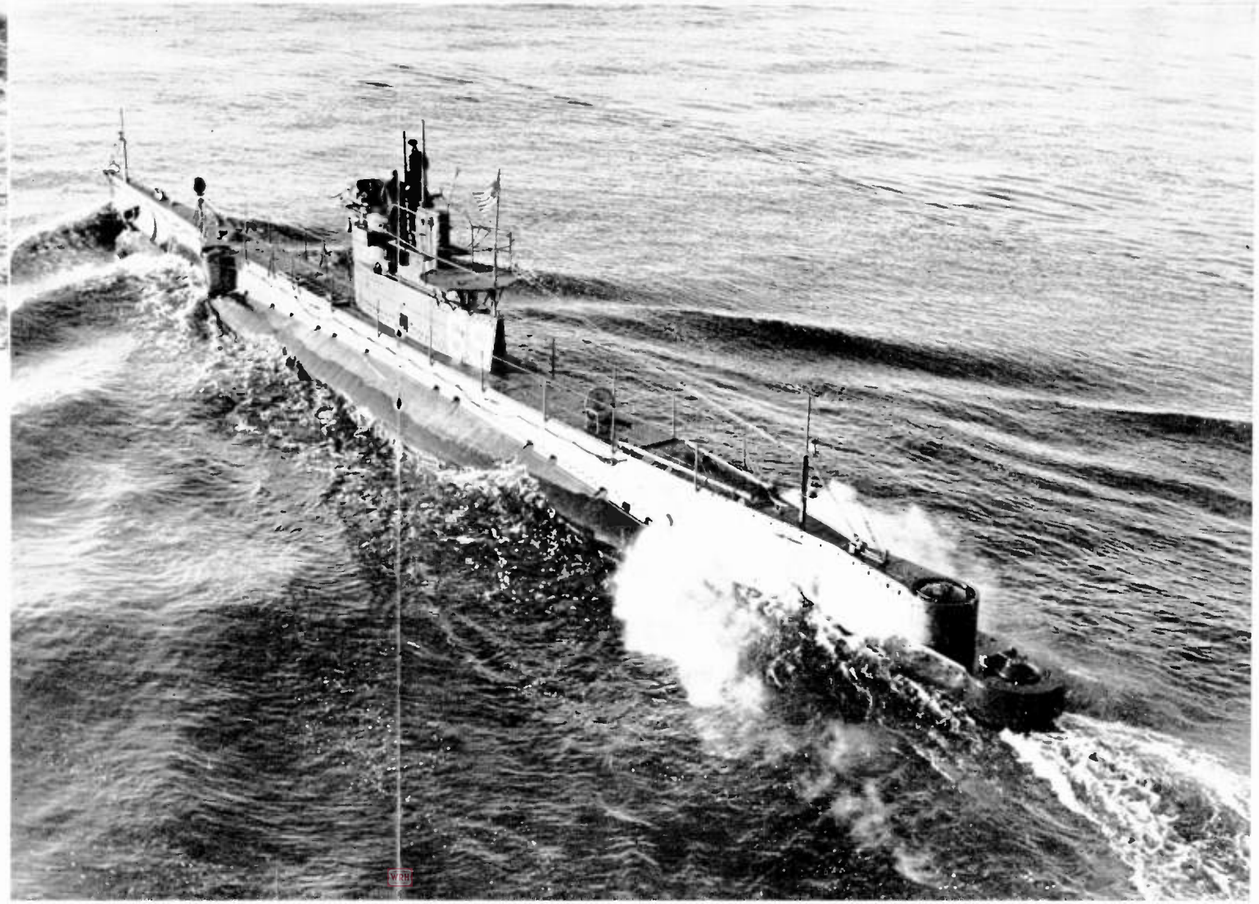
500	1
500	2
500	3
500	4
500	5
500	6
500	7
500	8
500	9
50	10 etc.

Since the usefulness of this list lies in reproducing it by photostat or offset printing methods, permission is extended to our readers to reproduce it without the usual formality of requesting a release under the copyright.

The mechanical dimensions of the list are such as to be accommodated on a standard 8½- by 11-in. sheet.

Navy Specs Have to Be Tough!

Dependability The ever-present danger of attack from submarines and planes at sea requires split-second action from every man and every piece of gear at any moment, night or day! To attain this speed, crews are drilled until commands bring automatic response. This is particularly true on the destroyers, for they are called upon to execute manoeuvres at the speed of racing craft. At such times, a radio failure might mean not only the loss of the ship and its crew, but the exposure of other vessels to destruction by the enemy.



Vibration It is difficult for those who have never been to sea to realize the devastating effects which slight but continuous vibration have upon any equipment that is not specifically designed to withstand it.

We are inclined to think that the greater amplitude of vibration to which mobile equipment is subjected is more severe than service at sea, but experience shows that that is not the case. The reason may be that the former is intermittent, while the latter goes on day after day.

The real test of marine radio equipment comes during the storms at sea, particularly on the smaller craft when to the pounding from the waves is added the shivering that rattles everything aboard each time the propellers come out of the water.

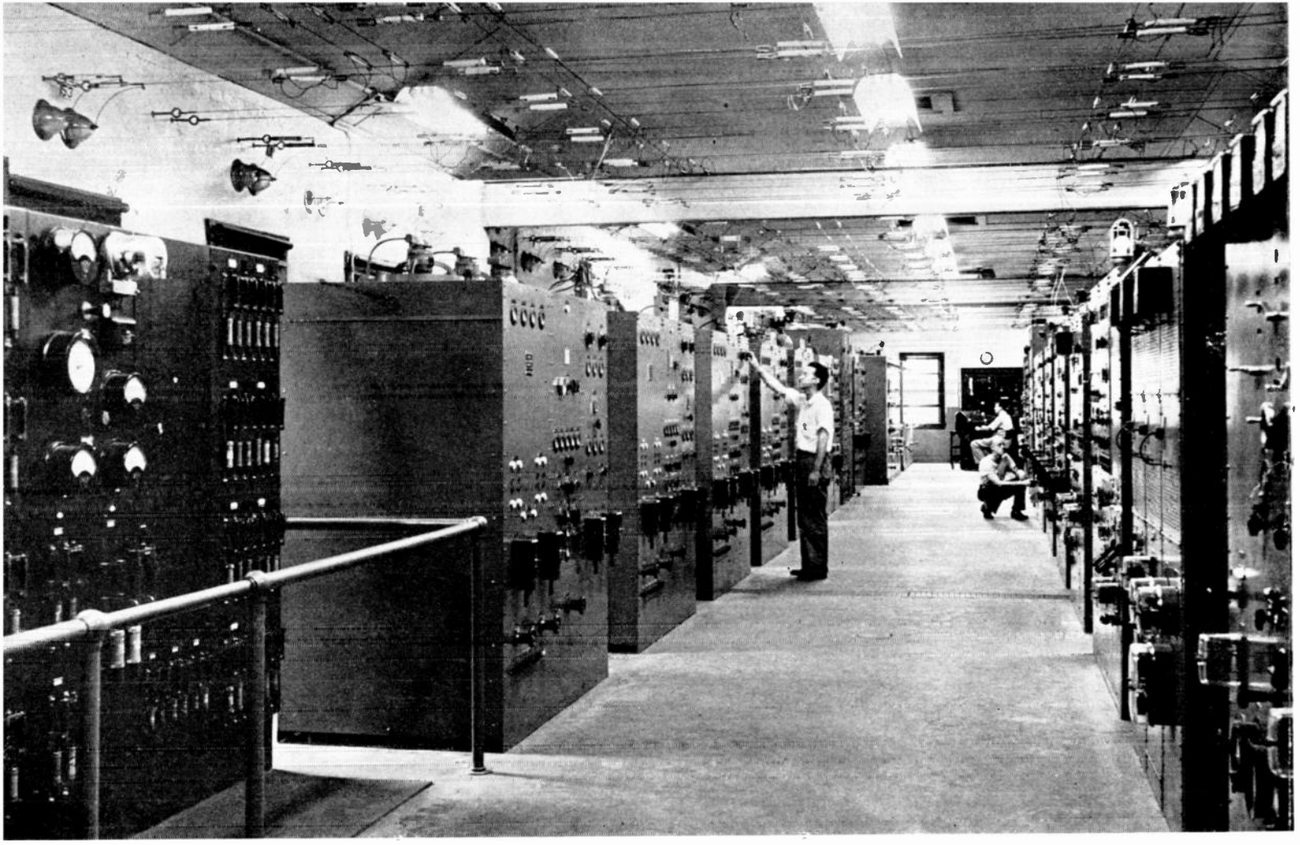
If the vibration tests to which Navy Inspectors subject apparatus for marine use seem unreasonably rigorous, the truth of the matter is that it is a mere token of the punishment it will have to withstand under conditions of actual use. Many of the special methods of construction specified for Navy equipment are dictated by years of experience in overcoming the tendency of radio apparatus to literally fall apart from vibration.

Serviceability If repairs are not effected quickly, disaster may result from minor damage.

For this reason, radio equipment must be so designed that it can be serviced quickly. That is why Navy radio engineers are insistent upon construction which puts every part within easy access for replacement. Trick designs that introduce service delays and difficulties have no place in Navy radio equipment.

An extreme example is apparatus for submarines. Lack of space, limited facilities, and long periods at sea call for equipment requiring the minimum of service, and the maximum of facility if the need for servicing should arise.

Note: *Three more official Navy photographs, illustrating other special requirements, will be published in an early issue.*



HIGH-POWER TRANSMITTERS INSTALLED AT HICKSVILLE, LONG ISLAND, CARRY INTERNATIONAL PRESS RADIO TRAFFIC

WORLD-WIDE NEWS TRANSMISSION

An Account of the Establishment and International Expansion of Press Wireless, Inc.

BY PAUL DARROW PADDOCK*

IN ORDER to understand Press Wireless it is necessary to understand the relation of the press to the wireless field. The restless headhunting editors of more than thirty years ago first dabbled in the art of radio communications. It was largely a plaything. The press depended on the cables through the World War I, but by the end of that war the great importing editors were feeling most grim about it. Twenty to forty hours' delay between Paris and New York. Moreover, the cables were presenting bills for thousands of dollars in tolls for stories which were not delivered, the cables said, because they were held up by the censor, but since the messages were filed, tolls were demanded anyway.

There was so much of a stir about these abuses that it reached the Department of State in Washington. A Committee was formed in 1920 of the newspapers and press associations which import news. This later was sponsored by the American Newspaper Publishers Association. It was known as the American Publishers Committee on Cable and Radio Communications. The object of this Committee was to improve existing facilities. No thought was given at the start to the establishment of new means of communication, least of all to their operation by the press.

Improvements Sought ★ The Committee sent a representative to Europe to see if improvements could be made in overseas communications by reforms at that end. Several improvements were suggested, but the cable companies would use them only for a short time, slipping back into their old methods. Meanwhile individual newspapers were dabbling in radio communications with stations owned by the French government wireless administration. The Committee representatives in Europe found England with an excess of radio stations set up for military reasons during the war, but then standing idle. These were under the administration of the British Postoffice and under the direct supervision of F. J. Brown, chief of postoffice electrical communications. Mr. Brown proved agreeable to the proposal of using the postoffice transmitting stations for the purpose of sending news to the American press. A rate was agreed on. The receiving station was to be set up at Halifax, Nova Scotia.

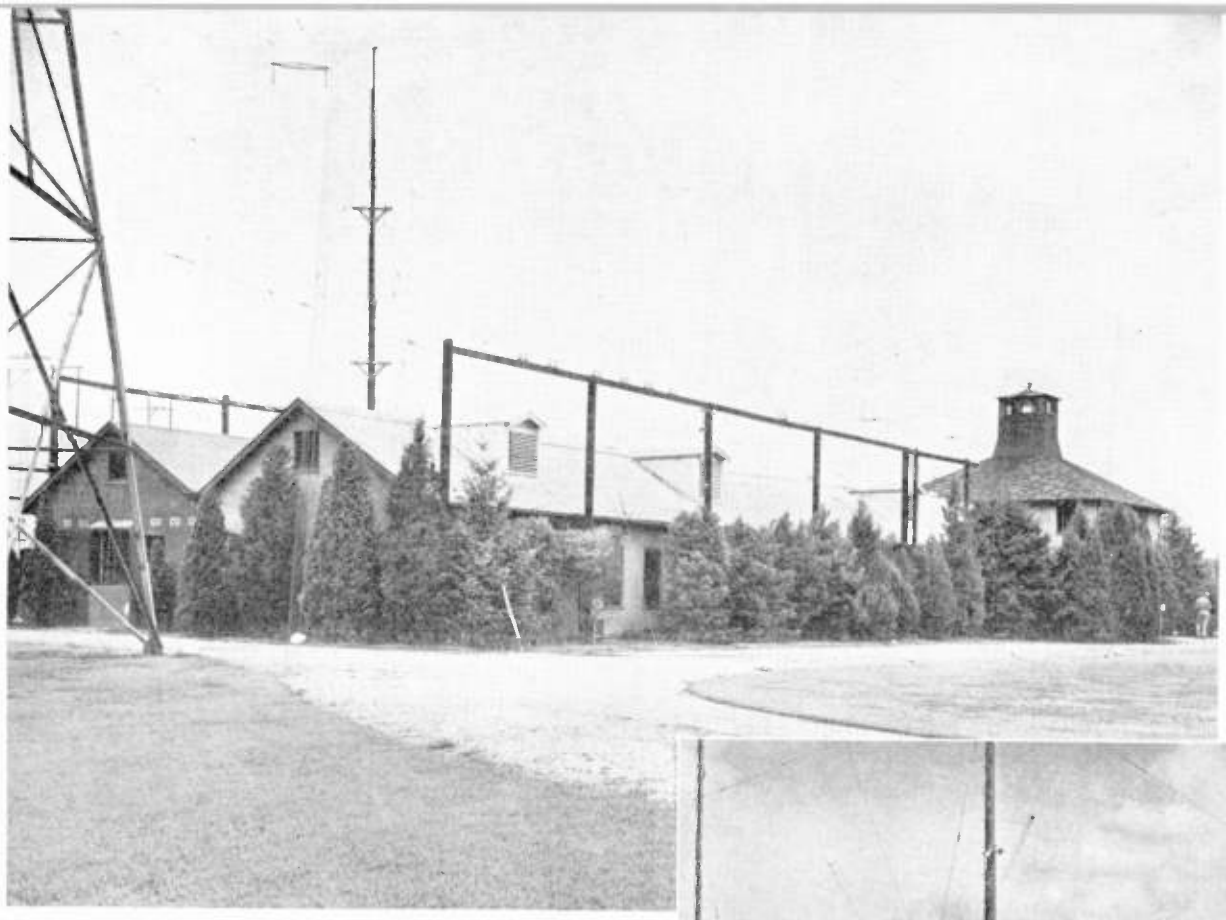
The First Station ★ When this project was discussed in America not all members of the Committee were in favor of it. However, three newspapers agreed to finance it, *The Philadelphia Public Ledger*, *The Chicago Tribune*, and *The New York Times*.

Mr. Frederick E. Meinholtz of *The New York Times* supplied the equipment for the establishment of the Halifax station, and also sent along Mr. Reginald

*Press Wireless, Inc., Hicksville, Long Island, N. Y.

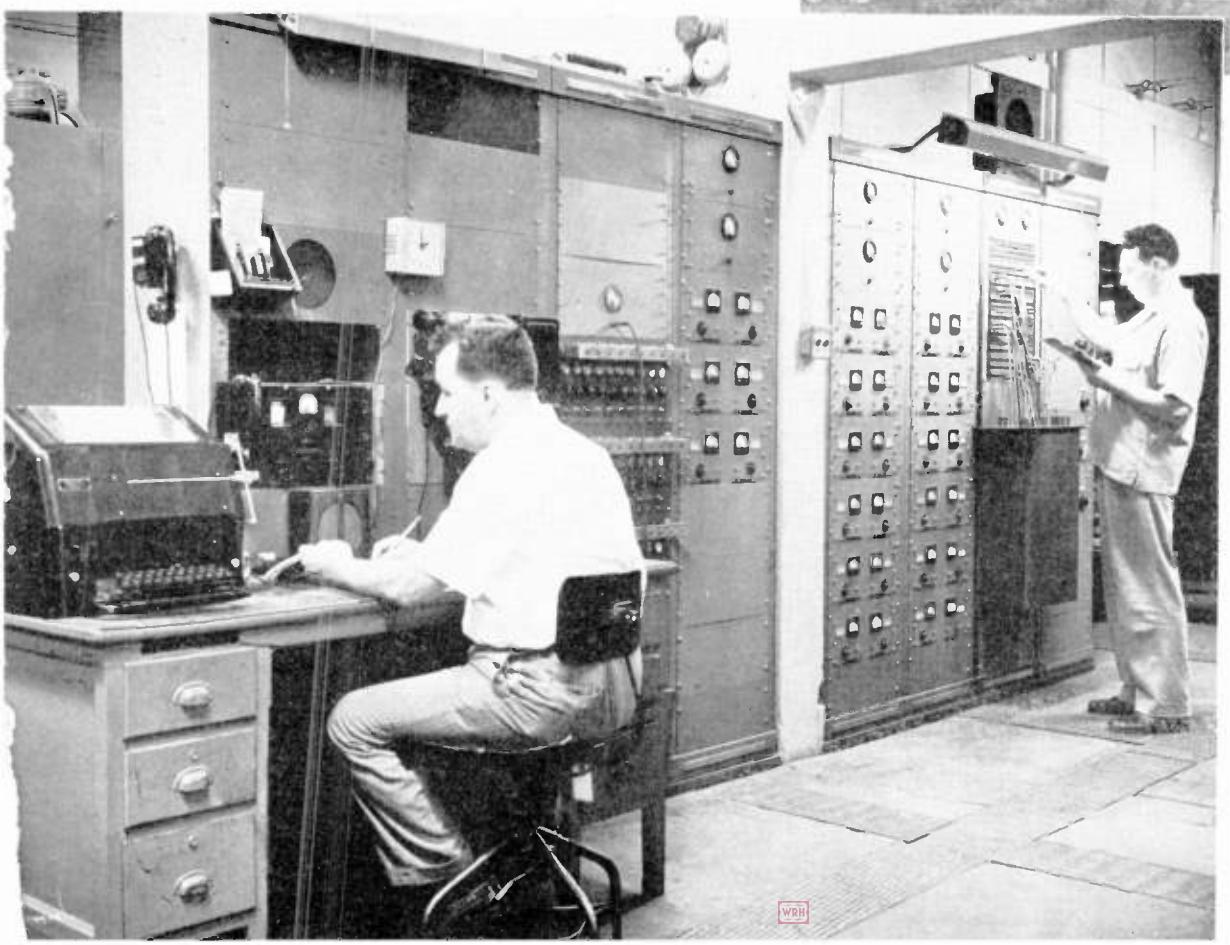
Numerical Check Sheet

1	51	101	151	201	251	301	351	401	451	501	551	601	651	701	751	801	851	901	951		
2	52	102	152	202	252	302	352	402	452	502	552	602	652	702	752	802	852	902	952		
3	53	103	153	203	253	303	353	403	453	503	553	603	653	703	753	803	853	903	953		
4	54	104	154	204	254	304	354	404	454	504	554	604	654	704	754	804	854	904	954		
5	55	105	155	205	255	305	355	405	455	505	555	605	655	705	755	805	855	905	955		
6	56	106	156	206	256	306	356	406	456	506	556	606	656	706	756	806	856	906	956		
7	57	107	157	207	257	307	357	407	457	507	557	607	657	707	757	807	857	907	957		
8	58	108	158	208	258	308	358	408	458	508	558	608	658	708	758	808	858	908	958		
9	59	109	159	209	259	309	359	409	459	509	559	609	659	709	759	809	859	909	959		
10	60	110	160	210	260	310	360	410	460	510	560	610	660	710	760	810	860	910	960		
11	61	111	161	211	261	311	361	411	461	511	561	611	661	711	761	811	861	911	961		
12	62	112	162	212	262	312	362	412	462	512	562	612	662	712	762	812	862	912	962		
13	63	113	163	213	263	313	363	413	463	513	563	613	663	713	763	813	863	913	963		
14	64	114	164	214	264	314	364	414	464	514	564	614	664	714	764	814	864	914	964		
15	65	115	165	215	265	315	365	415	465	515	565	615	665	715	765	815	865	915	965		
16	66	116	166	216	266	316	366	416	466	516	566	616	666	716	766	816	866	916	966		
17	67	117	167	217	267	317	367	417	467	517	567	617	667	717	767	817	867	917	967		
18	68	118	168	218	268	318	368	418	468	518	568	618	668	718	768	818	868	918	968		
19	69	119	169	219	269	319	369	419	469	519	569	619	669	719	769	819	969	919	969		
20	70	120	170	220	270	320	370	420	470	520	570	620	670	720	770	820	870	920	970		
21	71	121	171	221	271	321	371	421	471	521	571	621	671	721	771	821	871	921	971		
22	72	122	172	222	272	322	372	422	472	522	572	622	672	722	772	822	872	922	972		
23	73	123	173	223	273	323	373	423	473	523	573	623	673	723	773	823	873	923	973		
24	74	124	174	224	274	324	374	424	474	524	574	624	674	724	774	824	874	924	974		
25	75	125	175	225	275	325	375	425	475	525	575	625	675	725	775	825	875	925	975		
26	76	126	176	226	276	326	376	426	476	526	576	626	676	726	776	826	876	926	976		
27	77	127	177	227	277	327	377	427	477	527	577	627	677	727	777	827	877	927	977		
28	78	128	178	228	278	328	378	428	478	528	578	628	678	728	778	828	878	928	978		
29	79	129	179	229	279	329	379	429	479	529	579	629	679	729	779	829	879	929	979		
30	80	130	180	230	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980		
31	81	131	181	231	281	331	381	431	481	531	581	631	681	731	781	831	881	931	981		
32	82	132	182	232	282	332	382	432	482	532	582	632	682	732	782	832	882	932	982		
33	83	133	183	233	283	333	383	433	483	533	583	633	683	733	783	833	883	933	983		
34	84	134	184	234	284	334	384	434	484	534	584	634	684	734	784	834	884	934	984		
35	85	135	185	235	285	335	385	435	485	535	585	635	685	735	785	835	885	935	985		
36	86	136	186	236	286	336	386	436	486	536	586	636	686	736	786	836	886	936	986		
37	87	137	187	237	287	337	387	437	487	537	587	637	687	737	787	837	887	937	987		
38	87	138	188	238	288	338	388	438	488	538	588	638	688	738	788	838	888	939	988		
39	89	139	189	239	289	339	389	439	489	539	589	639	689	739	789	839	889	939	989		
40	90	140	190	240	290	340	390	440	490	540	590	640	690	740	790	840	890	940	990		
41	91	141	191	241	291	341	391	441	491	541	591	641	691	741	791	841	891	941	991		
42	92	142	192	242	292	342	392	442	492	542	592	642	692	742	792	842	892	942	992		
43	93	143	193	243	293	343	393	443	493	543	593	643	693	743	783	843	893	943	993		
44	94	144	194	244	294	344	394	444	494	544	594	644	694	744	794	844	894	944	994		
45	95	145	195	245	295	345	395	445	495	545	595	645	695	745	795	845	895	945	995		
46	96	146	196	246	296	346	396	446	496	546	596	646	696	746	796	846	896	946	996		
47	97	147	197	247	297	347	397	447	497	547	597	647	697	747	797	847	897	947	997		
48	98	148	198	248	298	348	398	448	498	548	598	648	698	748	798	848	898	948	998		
49	99	149	199	249	299	349	399	449	499	549	599	649	699	749	799	849	899	949	999		
50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000		



ABOVE: THE HICKSVILLE STATION IS SURROUNDED BY A FOREST OF TRANSMITTING AND RECEIVING ANTENNAS. PRESS WIRELESS, INC. HANDLES THE BULK OF WORLD-WIDE RADIO PRESS TRAFFIC

RIGHT: IN THE REAR OF THIS BUILDING AT LITTLE NECK, LONG ISLAND, PRESS WIRELESS, INC. WAS ESTABLISHED SOME 14 YEARS AGO. THIS STATION IS NOW USED CHIEFLY FOR RESEARCH

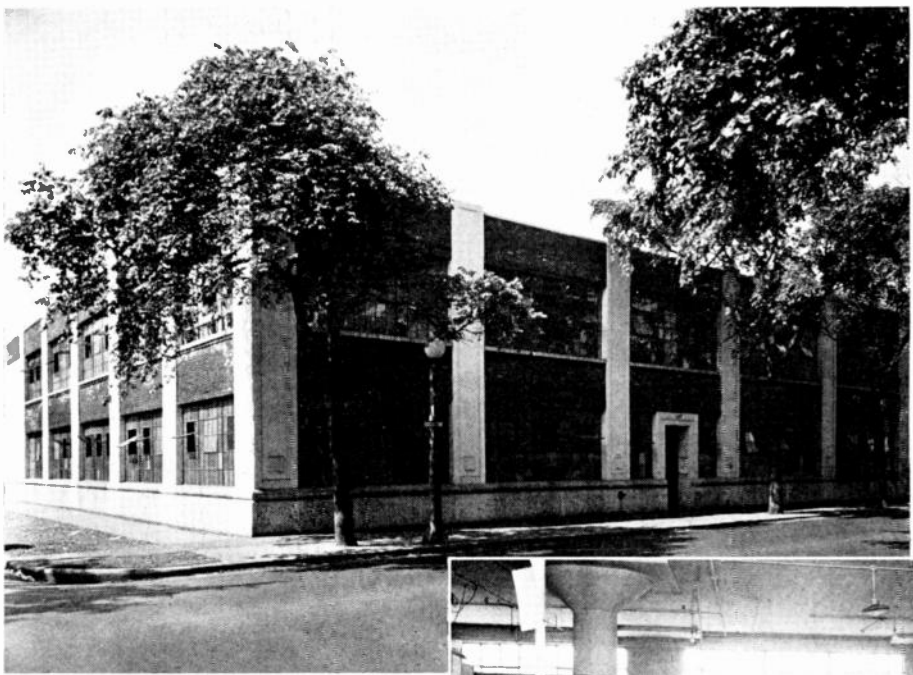


CONTROL BOARD AT HICKSVILLE TRANSMITTING STATION. CONTACTS ARE MADE HERE WITH THE NEW YORK CITY CONTROL OFFICE, AND WITH THE BALDWIN RECEIVING STATION

SINCE THIS CONTROL BOARD WAS PUT INTO OPERATION IN 1930, IT HAS BEEN IN SERVICE TWENTY-FOUR HOURS EVERY DAY

Iversen as manager and operator. Mr. Iversen arrived in Halifax on the morning of February 22, 1922, and by evening was receiving press from Leafields transmitter, in England, at a station he established at the Dennis Building in the heart of Halifax. Control of the English transmitters was accomplished by means of the cable of the Pacific Cable Board, which had its offices on the ground floor of the Dennis Building. The received traffic was relayed to the newspapers in the United States over the regular land lines. Soon other newspapers and press associations joined the Halifax company, called News Traffic Board, Limited, and it built a transmitting station.

The Halifax station flourished. By 1925, the Halifax stations were relaying traffic from French and Italian transmitters. The Halifax stations suspended operations only last year for the duration of the War, in order that the Canadian Army, to which the station is leased, might use the facilities and the frequencies.



EXTERIOR OF THE PRESS WIRELESS MANUFACTURING PLANT AT CHICAGO

Formation of Press Wireless, Inc. ★ The experience and the improvements in press communications which the American press had acquired in its Halifax operations were directly responsible for the applications of several newspapers and press associations for radio station licenses in the United States in 1928 when the first Federal Radio Commission was in power.

Some seventeen press applications were filed with the Commission. After hearings over a period of more than six months, the Commission decided that licenses would not be granted to individual newspaper and press associations, but that a single corporation should be formed, open to all the press, to which forty frequencies would be allocated. Accordingly, Press Wireless, Inc., of Delaware, was organized in Washington, D. C., on June 5, 1929. The corporation, having been formed in accordance with the suggestions of the Commission, was formally licensed to use the forty frequencies up to that time held in trust for the press.

APPARATUS ASSEMBLY AT THE CHICAGO PLANT. PRESS WIRELESS, INC. ALSO OPERATES FACTORIES AT HICKSVILLE, N. Y. AND AT MOUNTAIN GROVE, MO.

First Men Hired ★ The Company then had neither facilities, a site on which to put them, nor anyone on its payroll. The first men engaged were Messrs. Philip D. Zurian, who had started to build a transmitter for Press Wireless in his Chicago basement, and Anthony E. Gerhard, who had been in charge of the transmitters at Halifax, but had returned to other employment on the Pacific Coast.

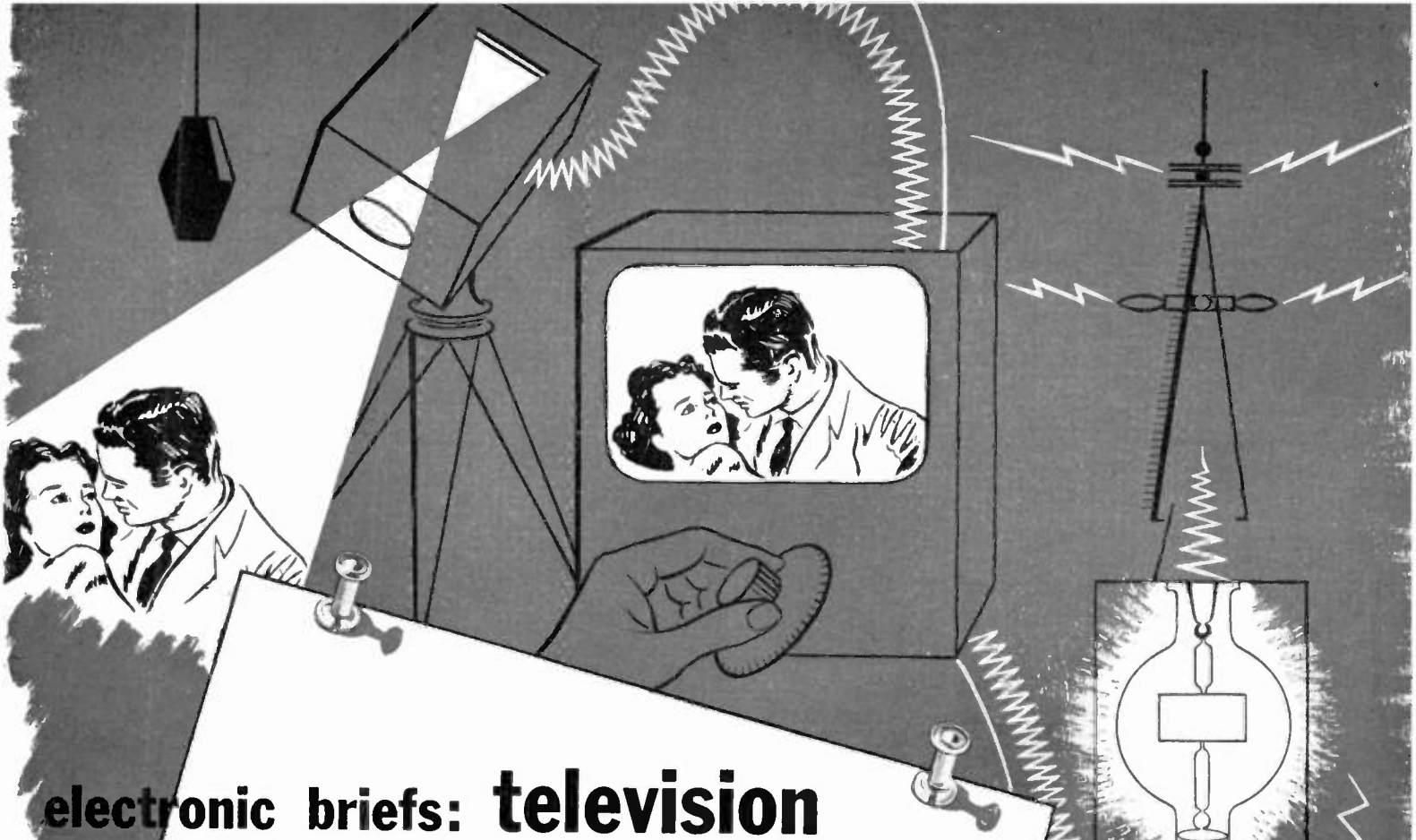
The first operation of the Company was between Chicago and Los Angeles. The Company then operated between Los Angeles and San Francisco. The first land purchase was of three lots with a two-room radio shack on the Company's present research laboratory site in the south end of Little Neck, Long Island. Operation first was set up between Little Neck and our transmitter at the Furniture Mart on the lake front in Chicago. The first international radio circuit of the Company was established between New York and Mexico City.

The Hicksville Site ★ On July 7, 1930, the first property in Hicksville was purchased — the lot on which the present transmitting building is located. The lot contains about one and one-half acres.

That was a difficult period. The large radio parts and apparatus companies refused to sell their products to Press Wireless, and it was necessary to resort to a thousand expedients to develop the Company. Tube engineers were employed to make some tubes, other tubes were bought in England, and substitutes had to be planned and built for the other elements of radio equipment.

The period from 1929 to 1934 is referred to as the "Iron Age" of the Company. The members of the staff in those trying days are now called the "Iron Men." They put up with a thousand inconveniences and took on prodigious loads of traffic. The bitter economic depression which was sweeping the entire world caught the Company in its weakest financial period. It took men of unlimited resourcefulness, energy, and courage to pull it through. The shareholders caught the spirit and loyalty of the staff, and with their help, that stormy period was weathered successfully.

(CONTINUED ON PAGE 50)



electronic briefs: television

To produce a moving picture it becomes necessary to break down the action into a series of still pictures. Each still scene is flashed on the screen individually but done so rapidly that the human eye sees a smooth action. If the motion picture projector is slowed down the action becomes jerky. Each still picture is called a frame. The conventional movie projector flashes between 24 and 30 frames per second on the screen. Television is based upon the same principle but the problems involved are much more complex.

Television, using the same basis for creating picture action as the movies, breaks down the picture or scene to be broadcast into a series of still pictures called frames. But each frame must also be broken down into approximately 200,000 tiny segments, each segment being broadcast separately and reassembled at the receiving end so rapidly that 30 frames can be flashed on the screen every second. Thus some 6,000,000 separate signals must be transmitted per second. Furthermore each of these signals starts as light, is converted into an electrical impulse, broadcast and then reconverted to light again. To make television talk, a conventional sound transmitter must be coordinated and synchronized with the picture broadcast.

As with all things in the field of electronics, vacuum tubes are what make television possible. Remember; Eimac tubes enjoy the enviable distinction of being first choice among leading electronic engineers throughout the world.

BROADCASTING STATION CHIEF ENGINEERS

Roster of Chief Engineers at FM, AM, Television and Short-Wave Stations in North and South America

THIS is the most complete roster of Broadcast Station Chief Engineers ever published. We made every effort to include all the South American countries, but in some cases no replies were received to our requests for information. However, a revised roster will be published in February, 1944, and we hope to include all the countries not represented in this first listing.

UNITED STATES

FM Broadcasting Stations

K45LA, Hollywood, Calif. Frank M. Kennedy
K5LL, St. Louis, Mo. George Rueppel
W1XTG, Worcester, Mass. E. A. Browning
W8XFM, Cincinnati, Ohio. R. J. Rockwell
W9XYH, Duluth, Minn. William Lounsberry
W39NY, New York, N. Y. John De Prospo
W43B, Paxton, Mass. Joseph E. Grahn
W45BR, Baton Rouge, La. Wilbur T. Golson
W45CM, Columbus, Ohio. Lester H. Nafzger
W45D, Detroit, Mich. C. H. Wesser
W47A, Schenectady, N. Y. Dwelle S. Hoag
W47NV, Nashville, Tenn. George A. Reynolds
W47NY, New York, N. Y. Harvey Anhalt
W47P, Pittsburgh, Pa. John R. Harlow
W47R, Rochester, N. Y. Bernard C. O'Brien
W49D, Detroit, Mich. E. H. Clark
W49FW, Fort Wayne, Ind. Bruce H. Ratts
W49PH, Philadelphia, Pa. Clifford C. Harris
W51C, Chicago, Ill. Ross Utter
W51R, Rochester, N. Y. Kenneth J. Gardner
W55M, Milwaukee, Wis. Phil Laeser
W57PH, Philadelphia, Pa. E. H. Gager
W59NY, New York, N. Y. Russell D. Valentine
W63C, Chicago, Ill. Howard C. Luttgens
W67B, Boston, Mass. F. M. Sloan
W71NY, New York, N. Y. J. R. Poppele
W71SB, S. Bend, Ind. Paul R. Mangus
W73PH, Philadelphia, Pa. Charles W. Burtis
W75C, Chicago, Ill. A. P. Frye
W75NY, New York, N. Y. Theodore B. Grenier
W75PH, Philadelphia, Pa. E. H. Gager
W8XSP, Springfield, Mass. Harold E. Randol
W85A, Schenectady, N. Y. W. J. Purcell

AM Broadcasting Stations

— KA —

KAST, Astoria, Ore. James M. Titus
KATE, Albert Lea, Minn. Harry Lawson
KADA, Ada, Okla. Harold Walker
KALB, Alexandria, La. Jesse R. Sexton
KAND, Corsicana, Texas. E. R. Hellums
KARK, Little Rock, Ark. Dan L. Winn
KASA, Elk City, Okla. F. E. Mayhew

— KB —

KBIX, Muskogee, Okla. Duane W. Hoisington
KBIZ, Ottumwa, Iowa. August P. Wendt
KBKR, Baker, Ore. Sidney Williams
KBND, Bend, Ore. Bob Dickson
KBON, Omaha, Nebr. Richard Wina
KBUR, Burlington, Iowa. G. Robert Busch
KBWD, Brownwood, Texas. Alton W. Stewart

— KC —

KCKN, Kansas City, Kans. Bernard Maltby
KCMO, Kansas City, Mo. Elza G. Runkle, Jr.
KCRC, Enid, Okla. Paul E. Snell
KCRJ, Jerome, Ariz. Wayne Fernyhough

— KD —

KDAL, Duluth, Minn. R. A. Dettman
KDB, Santa Barbara, Calif. William C. Buckley
KDFN, Casper, Wyo. Donald L. Hathaway
KDON, Monterey, Calif. E. C. Duty, Jr.
KDKA, Pittsburgh, Pa. T. C. Kenney
KDRO, Sedalia, Mo. Herbert D. Young
KDTH, Dubuque, Iowa. Stanley A. Beck
KDYL, Salt Lake City, Utah. John M. Baldwin

— KE —

KECA, Los Angeles, Calif. H. L. Blattermann, C. W. Mason
KELA, Centralia, Wash. Ellwood W. Lippincott
KELD, El Dorado, Ark. A. W. Hearin
KELO, Sioux Falls, S. Dak. Max F. Staley
KERN, Bakersfield, Calif. Luverne Shatto
KEYS, Corpus Christi, Texas. Earl C. Dunn
KEVR, Seattle, Wash. John L. Kelley
KEX, Portland, Ore. Harold C. Singleton

— KF —

KFAB, Lincoln, Nebr. Mark W. Bullock
KFAR, Fairbanks, Alaska. August G. Hiebert
KFBB, Great Falls, Mont. Wilbur L. Myhre
KFBC, Cheyenne, Wyo. Gaal Barrett
KFBI, Wichita, Kans. K. W. Pyle
KFDM, Beaumont, Texas. Lawrence M. Sanders
KFEQ, St. Joseph, Mo. Fred Damm
KFFA, Helena, Ark. J. C. Warren
KFH, Wichita, Kans. Amos C. Dadisman
KFI, Los Angeles, Calif. C. W. Mason, H. L. Blatterman
KFIO, Spokane, Wash. Dee Waymire
KFJI, Klamath Falls, Ore. Lon D. Hunt
KFJM, Grand Forks, N. Dak. Elwin J. O'Brien
KFMB, San Diego, Calif. Charles A. Cooper
KFOR, Lincoln, Nebr. Mark W. Bullock
KFOX, Long Beach, Calif. Lawrence W. McDowell
KFQD, Anchorage, Alaska. William J. Wagner
KFRC, San Francisco, Calif. J. J. McArdle
KFRE, Fresno, Calif. Sheldon W. Anderson
KFRO, Longview, Texas. James R. Curtis
KFSG, Los Angeles, Calif. Myron E. Kluge
KFRU, Columbia, Mo. Robert H. Haigh
KFUN, Las Vegas, N. M. A. N. Steinberg
KFUO, Clayton, Mo. Carl H. Meyer
KFVS, Cape Girardeau, Mo. Oscar C. Hirsch
KFWB, Hollywood, Calif. Harry Myers
KFXD, Nampa, Idaho. Frank E. Hurt
KFXM, San Bernardino, Calif. Richard T. Sampson
KFYO, Lubbock, Texas. W. S. Bledsoe
KFYR, Bismarck, N. Dak. Ivar Nelson

— KG —

KGA, Spokane, Wash. George E. Grady
KGB, San Diego, Calif. William G. Collins
KGBS, Harlingen, Texas. Marvin D. Myers
KGBX, Springfield, Mo. Fritz Bauer
KGCX, Sidney, Mont. Frank A. Toomey
KGDM, Stockton, Calif. E. Y. Peffer
KGER, Long Beach, Calif. Ronald E. Oakley
KGEF, Shawnee, Okla. Salvatore Ricciotti
KGFJ, Los Angeles, Calif. H. Duke Hancock
KGFL, Roswell, N. M. Melvin E. Unger
KGFX, Pierre, S. Dak. Robert H. Dye
KGFW, Kearney, Nebr. John B. Lewis
KGGF, Coffeyville, Kans. J. Sarto Jammet
KGGM, Albuquerque, N. M. Leonard F. Dodds
KGHL, Billings, Mont. Jeff Kiehll
KGHI, Little Rock, Ark. Kermit F. Tracy
WGIR, Butte, Mont. Jack Provis
KGKB, Tyler, Texas. John B. Sheppard
KGKO, Fort Worth, Texas. R. C. Stinson
KGLO, Mason City, Iowa. R. E. Sawyer
KGLC, Safford, Ariz. W. Herbert Hartman
KGNF, N. Platte, Nebr. James Beuford Eaves
KGO, San Francisco, Calif. T. B. Palmer
KGVO, Missoula, Mont. Fred U. Wamble
KGW, Portland, Ore. Harold C. Singleton
KGY, Olympia, Wash. Walter M. McGoffin

— KH —

KHAS, Hastings, Nebr. Fred Hiraoka
KHMO, Hannibal, Mo. Raymond O. Schildknecht
KHQ, Spokane, Wash. George E. Grady
KHSL, Chico, Calif. Russell B. Pope
KHUB, Watsonville, Calif. Harvey Degering

— KI —

KICA, Clovis, N. M. Vernon N. Hughes
KIDO, Boise, Idaho. James A. Johnitz, Jr.
KIEM, Eureka, Calif. Alvor E. Olson
KIEV, Glendale, Calif. Leland A. Gustafson
KIRO, Seattle, Wash. J. B. Hatfield
KIT, Yakima, Wash. H. B. Murphy
KIUL, Garden City, Kans. Leslie James Pyatt
KIUP, Durango, Colo. John L. Antle

— KJ —

KJBS, San Francisco, Calif. E. J. Doel
KJR, Seattle, Wash. F. J. Brott

— KL —

KLO, Ogden, Utah. W. D'Orr Cozzens
KLPM, Minot, N. Dak. C. W. Baker
KLRA, Little Rock, Ark. Kermit F. Tracy
KLX, Oakland, Calif. Roswell S. Smith
KLZ, Denver, Colo. Harvey E. Wehrman

— KM —

KMA, Shenandoah, Iowa. R. J. Schroeder
KMBC, Kansas City, Mo. A. R. Moler
KMED, Medford, Ore. Dave H. Rees
KMJ, Fresno, Calif. Bill Wallace
KMLB, Monroe, La. O. L. Morgan
KMOX, St. Louis, Mo. Harry Harvey
KMPC, Beverly Hills, Calif. Loyd Sigmon
KMYR, Denver, Colo. Glen James
KMO, Tacoma, Wash. J. D. Kolesar

— KN —

KNET, Palestine, Texas. Frank Goodson
KNOW, Austin, Texas. James E. Lewis
KNX, Los Angeles, Calif. L. H. Bowman

— KO —

KOA, Denver, Colo. R. H. Owen
KOAC, Corvallis, Ore. Grant S. Felkert
KOAM Pittsburg, Kans. Leo S. Stafford
KOB, Albuquerque, N. M. George S. Johnson
KOCA, Kilgore, Texas. Albert F. Mason, Jr.
KOCY, Oklahoma City, Okla. Harold D. Durham
KODL, The Dalles, Ore. Don Jones
KOH, Reno, Nev. Tom Baland
KOIL, Omaha, Nebr. Arthur Stewart
KOL, Seattle, Wash. Perry C. Lind
KOMA, Oklahoma City, Okla. Morris W. Thomas
KOMO, Seattle, Wash. F. J. Brott
KONO, San Antonio, Texas. George Ing
KORE, Eugene, Ore. Harold Maurice Gander
KORN, Fremont, Nebr. Chester L. Doll
KOVC, Valley City, N. Dak. Charles J. Sjostrom
KOVO, Provo, Utah. Gerald W. Peterson
KOWH, Omaha, Nebr. Orville Welmer
KOY, Phoenix, Ariz. F. A. Higgins

— KP —

KPAB, Laredo, Texas. Hulan Smith
KPAC, Port Arthur, Texas. R. C. Hamilton, Jr.
KPAS, Pasadena, Calif. Jack M. Reeder
KPDN, Pampa, Texas. H. E. Kreiger
KPLC, Lake Charles, La. B. H. Bailey, Jr.
KPO, San Francisco, Calif. George Greaves
KPOW, Powell, Wyo. Del Brandt
KPPC, Pasadena, Calif. N. Vincent Parsons
KPQ, Wenatchee, Wash. R. B. Sutton

— KQ —

KQV, Pittsburgh, Pa. Walter W. McCoty
KQW, San Jose, Calif. Robert F. Davis

— KR —

KRBA, Lufkin, Texas. Glenn Perry
KRBC, Abilene, Texas. John B. Casey
KRE, Berkeley, Calif. Phil McKernan
KRGV, Weslaco, Texas. Lewis Hartwig
KRIC, Beaumont, Texas. Ben F. Hughes
KRIS, Corpus Christi, Texas. R. S. Bush
KRJF, Miles City, Mont. Harry W. Panchot
KRKD, Los Angeles, Calif. Willis O. Freitag
KRKO, Everett, Wash. Roy C. Towne, Sr.
KRLH, Midland, Texas. Jack Cecil
KRLC, Lewiston, Wash. M. L. MacLafferty
KRMD, Shreveport, La. W. J. Wilkinson, Jr.
KRNR, Roseburg, Ore. H. J. Chandler, Jr.
KROC, Rochester, Minn. Boynton G. Hagaman
KROS, Clinton, Iowa. Gilbert S. Andrew
KRRV, Sherman, Texas. J. C. Irby, Jr.
KROD, El Paso, Texas. Edwart P. Talbott
KRSC, Seattle, Wash. George A. Freeman

— KS —

KSAC, Manhattan, Kans. Bernard Holbert
KSEI, Pocatello, Idaho. Henry H. Fletcher
KSCJ, Sioux City, Iowa. Alvin H. Smith
KSJB, Jamestown, N. Dak. Kenneth L. Rich
KSL, Salt Lake City, Utah. Eugene G. Pack
KSKY, Dallas, Texas. Morris M. Ming
KSLM, Salem, Ore. Clyde R. Carlton
KSO, St. Louis, Mo. C. R. Yarger
KSOO, Sioux Falls, S. Dak. Max F. Staley
KSRO, Santa Rosa, Calif. Howard S. McCauley
KSTP, St. Paul, Minn. B. Ross Hilker
KSUB, Cedar City, Utah. Hurschell Urie

— KT —

KTAR, Phoenix, Ariz. J. H. Haughawout
KTCK, Visalia, Calif. Bert Williamson
KTEI, Twin Falls, Idaho, Franklyn V. Cox
KTHS, Hot Springs, Ark. Cecil L. Suitt
KTBC, Austin, Texas. B. C. Farmer
KTBI, Tacoma, Wash. Jos. P. Ernst
KTBS, Shreveport, La. C. H. Maddox
KTEM, Temple, Texas. Paul Shaw
KTMS, Santa Barbara, Calif. Winfred H. Wileman
KTOH, Lihue, Hawaii. Jack C. Wada
KTOK, Oklahoma City, Okla. Clifford M. Easum
KTRI, Sioux City, Iowa. Earl J. Huss
KTRH, Houston, Texas. King H. Robinson
KTSA, San Antonio, Texas. W. G. Egerton
KTSM, El Paso, Texas. E. L. Gemoets
KTSW, Emporia, Kans. Harold C. Davis
KTUC, Tucson, Ariz. Clifford Livingston
KTW, Seattle, Wash. James S. Ross

— KU —

KUIN, Grants Pass, Ore. Edward A. Malone
KUJ, Walla Walla, Wash. M. L. MacLafferty
KUOA, Siloam Springs, Ark. Loren C. Watkins, Jr.
KUOS, Bellingham, Wash. Melville W. Featherkile
KUTA, Salt Lake City, Utah. Lyle O. Wahlquist

— KV —

KVAK, Atchison, Kans. Charles Giles
KVAN, Vancouver, Wash. S. W. McCready
KVCV, Redding, Calif. Russell Pope
KVEC, San Luis Obispo, Calif. Earle Travis
KVFD, Fort Dodge, Iowa. David G. Sinclair
KVIC, Victoria, Texas. Robert L. McGown
KVNU, Logan, Utah. C. N. Layne
KVOE, Santa Ana, Calif. Wallace S. Wiggins
KVOL, Lafayette, La. Raymond E. Wheeler
KVOR, Colorado Springs, Colo. H. C. Strang
KVOS, Bellingham, Wash. M. W. Featherkile
KVP, Dallas, Texas. Durward J. Tucker
KVPA, Dallas, Texas. Durward J. Tucker
KVRS, Rock Springs, Wyo. Archie W. Buchanan
KVSF, Santa Fe, N. M. R. C. Porter
KVSO, Ardmore, Okla. C. M. Milner
KVWC, Vernon, Texas. Herman F. Ridgway

— KW —

KWAL, Wallace, Idaho. C. J. Crane
KWBW, Hutchinson, Kans. Millard H. Clary
KWEW, Hobbs, N. M. Roy T. Evans
KWFC, Hot Springs, Ark. Melvin P. Spann
KWFT, Wichita Falls, Texas. John Adams
KWG, Stockton, Calif. J. L. Berryhill
KWIL, Albany, Ore. Herbert A. Dahlson
KWK, St. Louis, Mo. Nicholas J. Zehr
KWKW, Pasadena, Calif. Paul W. Spargo
KWLC, Decorah, Iowa. O. M. Ellstrelm
KWLK, Longview, Wash. J. Barry Watkinson
KWLM, Willmar, Minn. Vernon E. Baumgartner
KWNO, Winona, Minn. R. A. Johnson
KWOC, Poplar Bluff, Mo. Don M. Lidenton
KWOS, Jefferson City, Mo. J. Harold White
KWRC, Pendleton, Ore. Paul E. Walden
KWSC, Pullman, Wash. George M. Frese
KWTO, Springfield, Mo. Fritz Bauer
KWYO, Sheridan, Wyo. Robert F. Crossthwaite

— KX —

KXA, Seattle, Wash. John Dubuque
KXEL, Waterloo, Iowa. Don E. Kassner
KXOK, St. Louis, Mo. Arthur F. Rekart
KXL, Portland, Ore. Lou Ballinger
KXOX, Sweetwater, Texas. George W. Dotson
KXRO, Aberdeen, Wash. Kenneth W. Grinde

— KY —

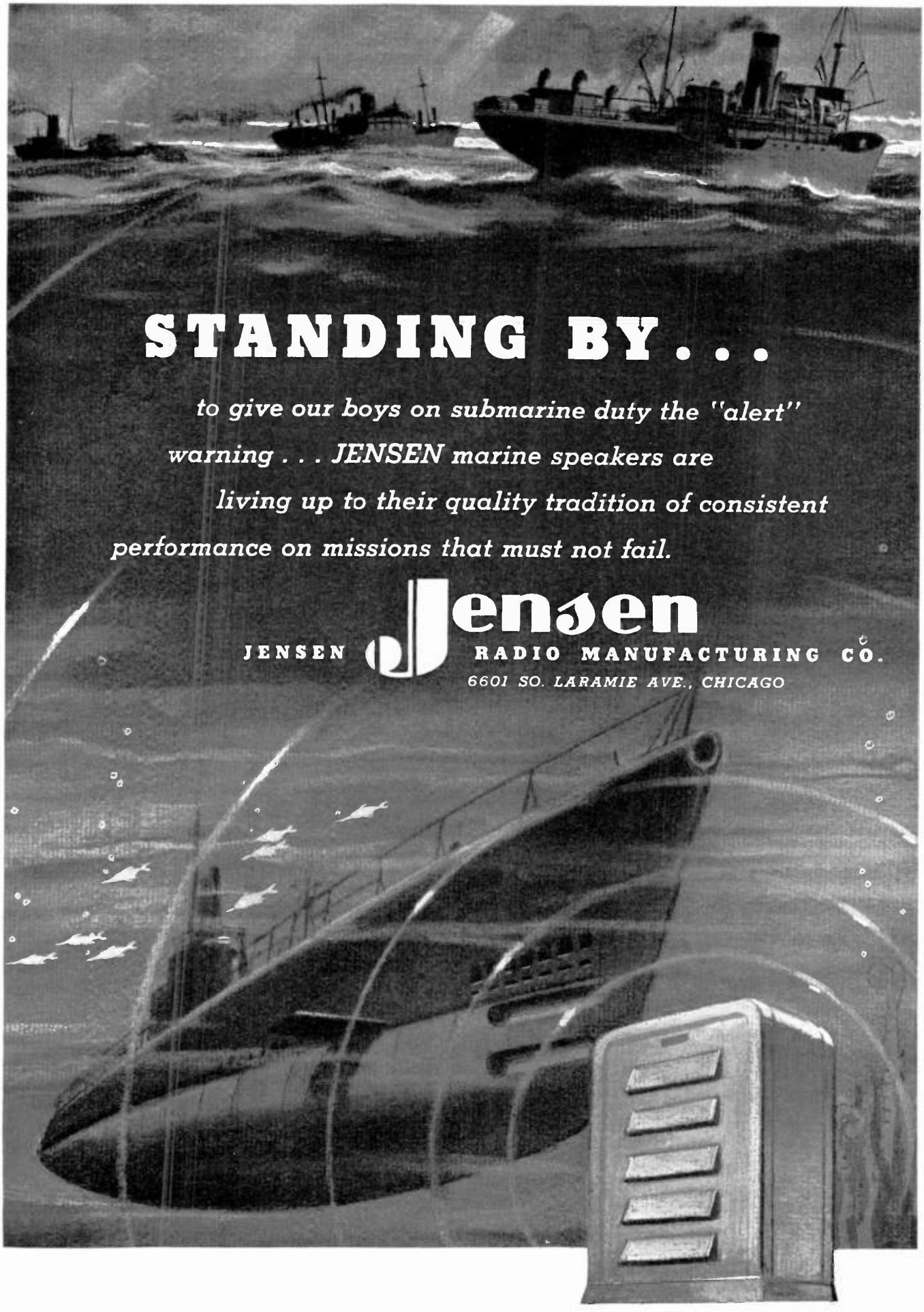
KYA, San Francisco, Calif. Paul C. Schulz
KYCN, Prescott, Ariz. Fred R. Blackburn
KYOS, Merced, Calif. John E. Boren
KYSM, Mankato, Minn. James Houts
KYUM, Yuma, Ariz. Leavenworth Wheeler
KYW, Philadelphia, Pa. E. H. Gager

— WA —

WAAB, Worcester, Mass. Joseph E. Grahn
WAAC, Ft. Myers, Fla. Harold E. Ritchey
WAAT, Newark, N. J. Frank V. Bremer
WABC, New York, N. Y. Henry Grossman
WABI, Bangor, Me. Walter L. Dickson
WABY, Albany, N. Y. James N. Corey
WAGE, Syracuse, N. Y. Charles W. Brannen
WAGF, Dothan, Ala. John Hubbard
WAIM, Anderson, S. C. Harold C. Spengler
WAIR, Winston-Salem, N. C. Lee C. King
WAIT, Chicago, Ill. E. W. Jacker
WAJR, Morgantown, W. Va. Ray C. Spence
WAKE, Akron, Ohio. W. W. Robertson
WAKN, York, Pa. Willis N. Weaver
WAML, Laurel, Miss. Bruce Dennis
WAOV, Vincennes, Ind. A. W. Kramer
WAPI, Birmingham, Ala. Norman Sinclair Hurley
WAPO, Chattanooga, Tenn. Bertram B. Barnes
WARM, Scranton, Pa. Adolph W. Oschmann
WATL, Atlanta, Ga. Robert W. Minton
WATR, Waterbury, Conn. Harold Thomas
WATW, Ashland, Wis. Hine Dahlbacka
WAVE, Louisville, Ky. Wilbur E. Hudson
WAWZ, Zarephath, N. J. N. L. Wilson
WAYX, Waycross, Ga. John J. Tobola
WAZL, Hazleton, Pa. J. W. Eckenrode

— WB —

WBAA, West Lafayette, Ind. J. W. Ditamore
WBAB, Atlantic City, N. J. Earle Godfrey
WBAL, Baltimore, Md. Gerald W. Cooke
WBAP, Fort Worth, Texas. R. C. Stinson
WBAX, Wilkes-Barre, Pa. John H. Stenger, Jr.
WBBB, Burlington, N. C. James S. Beaty, Jr.
WBBM, Chicago, Ill. J. J. Belounzy
WBBZ, Ponca City, Okla. Lewis E. Brown
WBCM, Bay City, Mich. Ralph H. Carpenter
WBEN, Buffalo, N. Y. Ralph J. Kingsley
WBHP, Huntsville, Ala. John Garrison
WBIR, Knoxville, Tenn. J. R. Horton
WBIG, Greensboro, N. C. Earl F. Allison
WBKB, Chicago, Ill. A. H. Brolly


STANDING BY . . .
to give our boys on submarine duty the "alert" warning . . . JENSEN marine speakers are living up to their quality tradition of consistent performance on missions that must not fail.
Jensen
JENSEN RADIO MANUFACTURING CO.
6601 SO. LARAMIE AVE., CHICAGO

BROADCASTING STATION CHIEF ENGINEERS

WBLJ, Dalton, Ga. W. C. Roberts
WBLK, Clarksburg, W. Va. Jos. A. Wright
WBML, Macon, Ga. H. S. Goodrich
WBNS, Columbus, Ohio. Lester H. Nafzger
WBNY, Buffalo, N. Y. Thomas L. Vines
WBOW, Terre Haute, Ind. Donald D. Aldrich
WBRC, Birmingham, Ala. John C. Bell
WBRK, Pittsfield, Mass. Leonard L. Lavendol
WBRW, Welch, W. Va. John E. Timberlake
WBRY, Waterbury, Conn. Frank B. Hales
WBTA, Batavia, N. Y. Howard D. Cochran
WBTH, Williamson, W. Va. Robert Brown Ward
WBWV, Bluefield, W. Va. P. T. Flanagan
WBYN, Brooklyn, N. Y. Peter Testan
WBZ, Boston, Mass. F. M. Sloan
WBZA, Springfield, Mass. Harold E. Randol

— WC —

WCAE, Pittsburgh, Pa. James Schultz
WCAO, Baltimore, Md. Martin L. Jones
WCAR, Pontiac, Mich. Wayne N. Cook
WCAT, Rapid City, S. Dak. E. E. Clark
WCAU, Philadelphia, Pa. George Lewis
WCAX, Burlington, Vt. John C. Quill
WCBI, Columbus, Miss. Maxell Williams
WCBM, Baltimore, Md. A. E. Eckels
WCBS, Springfield, Ill. Harold L. Dewing
WCBT, Roanoke Rapids, N. C. Claude W. Meares
WCCO, Minneapolis, Minn. Hugh S. McCartney
WCED, Du Bois, Pa. Vernon Stahl
WCFL, Chicago, Ill. Maynard Marquardt
WCHS, Charleston, W. Va. Odes E. Robinson
WCKY, Cincinnati, Ohio. C. H. Topmiller
WCLE, Cleveland, Ohio. Ralph H. DeLany
WCLO, Janesville, Wis. W. T. Havens
WCLS, Joliet, Ill. Lester L. De Costa
WCMI, Ashland, Ky. L. J. Rolfe
WCOA, Pensacola, Fla. G. E. Mead
WCOC, Meridian, Miss. D. W. Gavin
WCOL, Columbus, Ohio. J. E. Lowe
WCOP, Boston, Mass. Roland C. Hale
WCOS, Columbia, S. C. Harry L. Clippard
WCOU, Lewiston, Me. John T. Duty
WCOV, Montgomery, Ala. W. D. Weatherly
WCPO, Cincinnati, Ohio. Roger H. Wetz
WCRS, Greenwood, S. C. E. C. Niemann
WCSC, Charleston, S. C. Wilbur R. Albee
WCSH, Portland, Me. George F. Crandon

— WD —

WDAE, Tampa, Fla. William Pharr Moore
WDAF, Kansa City, Mo. Joseph A. Flaherty
WDAK, West Point, Ga. J. Dige Bishop
WDAN, Danville, Ill. Ted Magin
WDAS, Philadelphia, Pa. Frank W. Unterberger
WDAY, Fargo, N. Dak. Harold Smithson
WDBC, Escanaba, Mich. Martin W. Sells
WDBJ, Roanoke, Va. Jim W. Robertson
WDEF, Chattanooga, Tenn. B. C. Baker
WDGY, Minneapolis, Minn. George K. Jacobsen
WDLP, Panama City, Fla. Alberta McKenzie
WDMJ, Marquette, Mich. Gordon H. Brozek
WDNC, Durham, N. C. Walter S. Hill
WDOD, Chattanooga, Tenn. Julius C. Vessels
WDRC, Hartford, Conn. Italo A. Martino
WDSU, New Orleans, La. Charles L. Whitney
WDWS, Champaign, Ill. Jack R. Baum
WDZ, Tuscola, Ill. Gerald P. Foster

— WE —

WEAF, New York, N. Y. F. A. Wankel
WEAN, Providence, R. I. Harry H. Tilley
WEBC, Duluth, Minn. William Lounsberry
WEAU, Eu Claire, Wis. Thorwald O. Jorgenson
WEBQ, Harrisburg, Ill. Jos. R. Tate
WEBR, Buffalo, N. Y. Raymond H. Lamy
WEDC, Chicago, Ill. Chester T. Lewicki
WEED, Rocky Mount, N. C. I. G. Murphrey
WEEU, Reading, Pa. Harold O. Landis
WEIM, Fitchburg, Mass. Theodore Kalin
WELI, New Haven, Conn. J. Gordon Keyworth
WEMP, Milwaukee, Wis. Raymond H. Host
WENR, Chicago, Ill. E. C. Horstman
WENY, Elmira, N. Y. Thurlow A. Greene
WERC, Erie, Pa. Charles J. Jenks
WEST, Easton, Pa. S. H. Heil
WEW, St. Louis, Mo. George Rueppel
WEXL, Royal Oak, Mich. J. F. Steadley

— WF —

WFAA, Dallas, Texas. Olin S. Brown
WFAS, White Plains, N. Y. Harry C. Laubenstein
WFBC, Greenville, S. C. W. C. Etheredge
WFBG, Altoona, Pa. George R. Burgoon
WFBL, Syracuse, N. Y. Harold J. Mabes
WFBM, Indianapolis, Ind. H. S. Holland
WFBR, Baltimore, Md. William Q. Ranft
WFDF, Flint, Mich. F. D. Falkin
WFEA, Manchester, N. H. Reginald A. B. Schow
WFHR, Wisconsin Rapids, Wis. Garth N. Bowker
WFIL, Philadelphia, Pa. Louis E. Littlejohn
WFIN, Findlay, Ohio. Edgar C. Smith
WFLA, Tampa, Fla. Joseph H. Mitchell
WFMD, Frederick, Md. A. V. Tidmore
WFMJ, Youngstown, Ohio. Frank A. Dieringer
WFNC, Fayetteville, N. C. Howard Harrell
WFOR, Hattiesburg, Miss. James Glore
WFPG, Atlantic City, N. J. Blair K. Thron
WFTC, Kinston, N. C. Earl Gibbs
WFVA, Fredericksburg, Va. Phil Whitney

— WG —

WGAA, Cedartown, Ga. Clarence R. Landress
WGAC, Augusta, Ga. John Lyon
WGAN, Portland, Me. Roger W. Hodgkins
WGAR, Cleveland, Ohio. R. M. Pierce
WGBF, Evansville, Ind. F. A. Gehres
WGBG, Greensboro, N. C. Clyde C. Penny
WGBI, Scranton, Pa. K. R. Cooke
WGBR, Goldsboro, N. C. Daniel B. Trueblood, Jr.
WGCM, Gulfport, Miss. Donovan Murphy
WGES, Chicago, Ill. E. W. Jacker
WGGA, Gainesville, Ga. David S. Traer
WGIL, Galesburg, Ill. Dale L. King
WGL, Fort Wayne, Ind. Bruce H. Ratts
WGN, Chicago, Ill. G. William Lang
WGNC, Gastonia, N. C. W. C. Groves, Jr.
WGNY, Newburgh, N. Y. Marvin Selmes
WGOV, Valdosta, Ga. C. E. Watkins
WGPC, Albany, Ga. Charles Monroe Kinnett
WGR, Buffalo, N. Y. Karl B. Huffman
WGRC, Louisville, Ky. Perry W. Esten
WGST, Atlanta, Ga. Ben Akerman
WGTC, Greenville, N. C. Hank Tribley
WGTM, Wilson, N. C. H. W. Wooten
WGY, Schenectady, N. Y. W. J. Purcell

— WH —

WHA, Madison, Wis. John H. Stiehl
WHAM, Rochester, N. Y. Kenneth J. Gardner
WHAI, Greenfield, Mass. Leland Wheeler
WHAS, Louisville, Ky. D. C. Summerford
WHAZ, Troy, N. Y. Hiram D. Harris
WHB, Kansas City, Mo. Henry E. Goldenberg
WHBL, Sheboygan, Wis. Herbert J. Mayer
WHBY, Appleton, Wis. George E. Merkl
WHCU, Ithaca, N. Y. True McLean
WHDF, Calumet, Mich. William Jackson
WHDL, Olean, N. Y. Thomas J. Gill
WHEC, Rochester, N. Y. Bernard C. O'Brien
WHES, Rochester, N. Y. Bernard C. O'Brien
WHFC, Cicero, Ill. George M. Ives, Jr.
WHIO, Dayton, Ohio. Ernest L. Adams
WHIS, Bluefield, W. Va. P. T. Flanagan
WHIT, New Bern, N. C. Glen Neuville
WHJB, Greensburg, Pa. Walter W. McCoy
WHK, Cleveland, Ohio. Ralph H. DeLany
WHLD, Niagara Falls, N. Y. Robert J. Wilson
WHLN, Harlan, Ky. J. Francke Fox
WHLS, Port Huron, Mich. L. C. Conant
WHMA, Anniston, Ala. James Hudson
WHO, Des Moines, Ia. Paul A. Loyet
WHOM, Wood Ridge, N. J. Thedore Gempp
WHOP, Hopkinsville, Ky. Lynton R. Lemond
WHP, Harrisburg, Pa. R. S. Duncan
WHUB, Cookeville, Tenn. Charles E. Burch
WHYN, Holyoke, Mass. Thomas R. Humphrey

— WI —

WIAR, Norfolk, Va. J. L. Grether
WIBA, Madison, Wis. Norman G. Hahn
WIBC, Indianapolis, Ind. Harry E. Adams
WIBG, Philadelphia, Pa. John H. Heninger
WIBM, Jackson, Mich. Charles W. Wirtanen
WIBX, Utica, N. Y. John T. Dowdell
WICA, Ashtabula, Ohio. G. E. Gauthey
WICC, Bridgeport, Conn. George P. Keich
WIGM, Medford, Wis. Gerald J. Bees
WIL, St. Louis, Mo. C. H. Stoup
WINC, Winchester, Va. Phil Whitney
WING, Dayton, Ohio. Paul F. Braden
WINN, Louisville, Ky. Wayne J. Hatchett
WINS, New York, N. Y. Jack McNally
WINX, Washington, D. C. Ralph E. Cannon, Jr.
WIOD, Miami, Fla. Morris N. Barwick
WIRE, Indianapolis, Ind. Eugene E. Alden
WIS, Columbia, S. C. Scott Helt
WISE, Asheville, N. C. Paul Lawrence
WISH, Indianapolis, Ind. Stokes Gresham, Jr.
WISR, Butler, Pa. Paul F. Rex
WITH, Baltimore, Md. James S. Duff
WILL, Urbana, Ill. A. James Ebel
WITC, Urbana, Ill. A. James Ebel
WIZE, Springfield, Ohio. Arthur L. Martin

— WJ —

WJAC, Johnstown, Pa. N. L. Straub
WJAR, Providence, R. I. Thomas C. J. Prior
WJAS, Pittsburgh, Pa. Walter W. McCoy
WJBO, Baton Rouge, La. Wilbur T. Golson
WJDX, Jackson, Miss. P. G. Root
WJEJ, Hagerstown, Md. George W. McIntire
WJHL, Johnson City, Tenn. O. K. Garland
WJJD, Chicago, Ill. Walter F. Myers
WJLB, Detroit, Mich. E. H. Clark
WJLD, Bessemer, Ala. Calloway M. Callicott
WJNO, W. Palm Beach, Fla. E. Whitt MacDowell
WJPR, Greenville, Miss. George W. Wilson
WJR, Detroit, Mich. M. R. Mitchell
WJTN, Jamestown, N. Y. Harold J. Kratzert
WJZM, Clarksville, Tenn. John H. Bailey

— WK —

WKBB, Dubuque, Iowa. Leonard Carlson
WKBH, La Crosse, Wis. Alvin Leeman
WKBN, Youngstown, Ohio. Bernard T. Wilkens
WKBW, Buffalo, N. Y. Karl B. Huffman
WKEY, Covington, Va. James Garber
WKIP, Poughkeepsie, N. Y. John P. Burke
WKNE, Keene, N. H. Howard C. Ayer
WKNY, Kingston, N. Y. Francis H. Bolsuert
WKOK, Sunbury, Pa. John Keller
WKPT, Kingsport, Tenn. Gladman W. Upchurch
WKRO, Cairo, Ill. Oscar C. Hirsch
WKST, New Castle, Pa. R. S. Emch
WKZO, Kalamazoo, Mich. Carl E. Lee
WKWK, Wheeling, W. Va. Fred A. Baker

— WL —

WLAC, Nashville, Tenn. F. D. Binns
WLAG, La Grange, Ga. J. M. McKay
WLAK, Lakeland, Fla. William P. Lee
WLAC, Grand Rapids, Mich. R. A. Plank
WLAW, Lawrence, Mass. George A. Hinckley
WLBL, Stevens Point, Wis. Walter C. Ninneman
WLDS, Jacksonville, Ill. Gerald J. Cassens
WLEU, Erie, Pa. Clarence A. Baker
WLNH, Laconia, N. H. Louis C. Steady
WLOG, Logan, W. Va. Robert Bullio
WLOK, Lima, Ohio. Jack E. Bannon
WLOL, Minneapolis, Minn. Gene Brautigam
WLS, Chicago, Ill. Thomas L. Rowe
WLVA, Lynchburg, Va. John T. Orth
WLW, Cincinnati, Ohio. R. J. Rockwell
WLWK, Cincinnati, Ohio. R. J. Rockwell
WLWO, Cincinnati, Ohio. R. J. Rockwell

— WM —

WMAL, Washington, D. C. Dan Hunter
WMAN, Mansfield, Ohio. Perry L. Wilson
WMAQ, Bloomingdale, Ill. H. C. Luttgens
WMAS, Springfield, Mass. Earle G. Hewinson
WMBG, Richmond, Va. Wilfred H. Wood
WMBH, Joplin, Mo. Richard Meek
WMBI, Chicago, Ill. A. P. Frye
WMBS, Uniontown, Pa. William J. Henzly
WMC, Memphis, Tenn. E. C. Frase, Jr.
WMCA, New York, N. Y. Frank L. Marx
WMFD, Wilmington, N. C. Richard Austin Dunlea
WMFF, Plattsburg, N. Y. John M. Nazak
WMGA, Moultrie, Ga. James M. Wilder
WMIN, St. Paul, Minn. Warren B. Fritze
WMIS, Natchez, Miss. Thomas W. Patterson
WMJM, Cordele, Ga. Clayton Lee
WMMN, Fairmont, W. Va. Robert D. Hough
WMOG, Brunswick, Ga. K. E. White
WMRC, Greenville, S. C. George D. Tate
WMRF, Lewistown, Pa. Bernard H. Bopp
WMRN, Marion, Ohio. S. Robert Morrison
WMSL, Decatur, Ala. Garlan G. Sandlin
WMT, Cedar Rapids, Iowa. Chas. F. Quentin
WMUR, Manchester, N. H. Vincent H. Chandler
WMVA, Martinsville, Va. William R. Harmon

— WN —

WNAB, Bridgeport, Conn. Vin De Laurentis
WNAC, Boston, Mass. I. B. Robinson
WNAD, Norman, Okla. Alfred B. Ashley
WNAX, Yankton, S. D. Cliff Todd
WNBC, Hartford, Conn. Rogers B. Holt
WNBF, Binghamton, N. Y. Lester H. Gilbert
WNBH, New Bedford, Mass. Irving Vermilya
WNBZ, Saranac Lake, N. Y. H. Berwind Williams
WNEW, New York, N. Y. M. J. Weiner.
WNLC, New London, Conn. Gerald J. Morey
WNOE, New Orleans, La. Ellis E. Trepagnier
WNOX, Knoxville, Tenn. George B. Smith

— WO —

WOAI, San Antonio, Texas. Fred Sterling
WOAR, Parkersburg, W. Va. Cecil R. Knowles
WOC, Davenport, Iowa. Charles D. Rayburn
WOI, Ames, Iowa. L. L. Lewis
WOLF, Syracuse, N. Y. David F. Foote
WOL, Washington, D. C. Henry H. Lyon
WOLS, Florence, S. C. Herman L. Hanks
WOKO, Albany, N. Y. O. A. Sardi
WOMI, Owensboro, Ky. Leslie B. Goodaker
WOMT, Manitowoc, Wis. W. F. Dubey
WOOD, Grand Rapids, Mich. Fred W. Russell
WOR, New York, N. Y. J. R. Poppele
WORD, Spartanburg, S. C. Murray D. Coleman
WOSH, Oshkosh, Wis. Nathan Williams
WOSU, Columbus, Ohio. R. C. Higgy
WOW, Omaha, Nebr. W. J. Kotera
WOWO, Fort Wayne, Ind. Bruce H. Ratts

— WP —

WPAT, Paterson, N. J. Earl F. Lucas
WPAY, Portsmouth, Ohio. Maurice L. Myers
WPEN, Philadelphia, Pa. Charles W. Burtis
WPIC, Sharon, Pa. A. C. Heck
WPOQ, Jacksonville, Fla. James R. Donovan
WPTF, Raleigh, N. C. Henry Hullek, Jr.

— WQ —

WQBC, Vicksburg, Miss. C. E. Drake
WQXR, New York, N. Y. Russell D. Valentine

— WR —

WRAK, Williamsport, Pa. Louis N. Persio
WRAL, Raleigh, N. C. Stanley H. Brown
WRAW, Reading, Pa. Harold D. Landis
WRBL, Columbus, Ga. Wilfred T. Siddle
WRDW, Augusta, Ga. Harvey J. Aderhold
WREN, Lawrence, Kans. Carl B. Bliesner
WRGA, Rome, Ga. C. C. Williams
WRLC, Toccod, Ga. F. K. Brown
WRNL, Richmond, Va. R. W. Raabe
WROK, Rockford, Ill. Thomas C. Cameron
WRR, Dallas, Texas. Durward J. Tucker
WRRF, Washington, N. C. George P. Martin
WRRN, Warren, Ohio. Charles J. Hurton
WRUF, Gainesville, Fla. Dr. P. H. Craig

— WS —

WSAI, Cincinnati, Ohio. R. J. Rockwell
WSAN, Allentown, Pa. R. H. Musselman
WSAP, Portsmouth, Va. Denzil Pulley
WSAJ, Grove City, Pa. H. W. Harmon
WSAM, Saginaw, Mich. Simon Maruszan
WSAU, Wausau, Wis. Roland W. Richardt
WSAV, Savannah, Ga. Meredith E. Thompson
WSAZ, Huntington, W. Va. John E. Csensich
WSB, Atlanta, Ga. C. F. Daugherty
WSBA, York, Pa. Willis N. Weaver
WSBC, Chicago, Ill. E. W. Jacker
WSBT, S. Bend, Ind. Paul R. Mangus
WSGN, Birmingham, Ala. G. F. Bishop
WSIX, Inc., Nashville, Tenn. Bascom E. Porter
WSJS, Winston-Salem, N. C. Philip Franklin Hedrick
WSLB, Ogdensburg, N. Y. Clifford W Moore
WSM, Nashville, Tenn. George A. Reynolds
WSNJ, Bridgeton, N. J. Francis C. Fekel
WSNY, Schenectady, N. Y. Irving P. Beck
WSOC, Charlotte, N. C. L. L. Caudle, Jr.
WSOO, Sault Ste. Marie, Mich. Eugene Kaari
WSOY, Decatur, Ill. Paul A. Whorowski
WSPA, Spartanburg, S. C. H. R. Beckholt
WSPB, Sarasota, Fla. Bill Sheetz & John Bunting
WSPD, Toledo, Ohio. William Stringfellow
WSPR, Springfield, Mass. Lawrence A. Reilly
WSRR, Stamford, Conn. Edward L. Markman
WSTP, Salisbury, N. C. Carl Watson
WSTV, Steubenville, Ohio. Joseph M. Troesch
WSVA, Harrisonburg, Va. W. L. Braun
WSYR, Syracuse, N. Y. A. G. Belle Isle

— WT —

WTAG, Worcester, Mass. E. A. Browning
WTAL, Tallahassee, Fla. Claude B. Green, Jr.
WTAQ, Green Bay, Wis. Wallace J. Stangel
WTHT, Hartford, Conn. Charles S. Masini
WTIC, Hartford, Conn. Herman D. Taylor
WTOC, Savannah, Ga. Claude M. Gray
WTJS, Jackson, Tenn. Carey Brummel
WTMA, Charleston, S. C. Douglass M. Bradham
WTMC, Ocala, Fla. Miss Joyce Dlee
WTMJ, Milwaukee, Wis. William Hebal
WTNJ, Trenton, N. J. E. J. Wolff
WTOP, Washington, D. C. Clyde M. Hunt
WTRY, Troy, N. Y. Waldo P. Whitman
WTSP, St. Petersburg, Fla. William D. Mangold
WTTM, Trenton, N. J. William R. Betz

— WW —

WWL, New Orleans, La. J. D. Bloom, Jr.
WWNC, Asheville, N. C. Cecil B. Haskins
WWNY, Watertown, N. Y. Maynard B. Davis
WWRL, Woodside, N. Y. William H. Reuman
WWVA, Wheeling, W. Va. Edwin L. Kelm
WWSW, Pittsburgh, Pa. John R. Harlow

International S.W. Stations

KGEI, Schenectady, N. Y. W. J. Purcell
WBOS, Boston, Mass. F. M. Sloan
WGEA, Schenectady, N. Y. W. J. Purcell
WGEO, Schenectady, N. Y. W. J. Purcell
WRUL, Scituate, Mass. Ernest Edwards
WRUS, Scituate, Mass. Ernest Edwards
WRUW, Scituate, Mass. Ernest Edwards

Television Stations

W2XMT, New York, N. Y. Theodore B. Grenler
W3XE, Wyndmoor, Pa. Walter W. Merkle
W6XAO, Hollywood, Calif. Harry R. Lubcke
W9XBK, Chicago, Ill. A. H. Brolly
W9XBT, Chicago, Ill. A. H. Brolly
W9XPR, Chicago, Ill. A. H. Brolly
W9XBH, Chicago, Ill. A. H. Brolly
W9XMB, Chicago, Ill. A. P. Frye
WPTZ, Philadelphia, Pa. Walter W. Merkle
WRGB, Schenectady, N. Y. W. J. Purcell
W6XLA, Hollywood, Calif. Klaus Landsberg
W6XYZ, Hollywood, Calif. Klaus Landsberg
W2XWV, New York, N. Y. Walter J. Swenson

CANADA

CBK, Watrous, Sask. J. L. Marshall
CBR, Vancouver, B. C. N. R. Olding
S.W. CBRX, Vancouver, B. C. N. R. Olding
CFAR, Flin Flon, Man. Ray Tate
CFCH, North Bay, Ont. J. W. Barnaby
CFCY, Charlottetown, P. E. I. Robert F. Lange
CFLC, Brockville, Ont. G. W. Andrews
CFNB, Fredericton, N. B. S. B. Cassidy
CFNC, Calgary, Alta. Walter V. McLaughlin
CFOS, Owen Sound, Ont. William Vallins
CFPL, London, Ont. Cecil J. Yorke
CFRB, Toronto, Ont. J. Sharpe
CFRN, Edmonton, Alberta, F. Makepeace
CHEX, Peterborough, Ont. A. E. Crump
CHLN, Trois Rivieres. Leon Trepanier
CHLT, Sherbrooke, Que. Romeo Frechette
CHML, Hamilton, Ont. Bill Crawford
CHNC, New Carlisle, Que. J. R. McGough
CHNS, Halifax, N. S. A. W. Greig
CHOV, Pembroke, Ont. Sam Panke
CHPS, Parry Sound, Ont. Gordon E. Smith
CHRC, Quebec, P. Q. Arsène Nadeau
CHSJ, St. John, N. B. John G. Bishop
CHWK, Chilliwack, B. C. Jack Pilling
CJAT, Trail, B. C. Eric C. Aylen
CJBR, Remonski, P. Q. F. C. Doak
CJCB, Sydney, N. S. A. Vernon
CJCS, Stratford, Ont. George Hildebrand
CJCX, Sydney, N. S. A. Vernon
CJKL, Kirkland Lake, Ont. T. G. Watson
CJOR, Vancouver, B. C. A. H. Chandler
CJRC, Winnipeg, Man. A. W. Hooper
CJRM, Regina, Sask. W. McDonald
CJRO, Winnipeg, Man. A. W. Hooper
CJRX, Winnipeg, Man. A. W. Hooper
CJVI, Victoria, B. C. Joseph Sommers

ANSWERS*

FROM OUR FILES

* By the application of radio-electronics technique to mechanical problems

EVERY basic project in radio-electronics research undertaken by the BROWNING LABORATORIES has produced a great volume of by-product data and information. Some of this has been applied to surprisingly remote and unrelated problems. Frequently, when we are asked to undertake projects described as extremely baffling, we are able to produce the answers from our files.

The research and development facilities of the BROWNING LABORATORIES are fortified by a unique accumulation of the broadest experience over many years with the mathematical theory and the practical application of radio-electronics technique to the operation and control of mechanisms and methods.

Repeatedly, through the use of such devices as selective filters, special amplifiers, photo-electric cells, oscillators, cathode-ray tubes, and ultra-sensitive balanced circuits, we have improved the accuracy and speed of conventional equipment, with corresponding cost reductions, even beyond what our clients hoped to attain.

From time to time, our facilities are open for new projects. We invite inquiries from those who may have need of our services.

BROWNING LABORATORIES, Inc.

751 MAIN STREET WINCHESTER, MASS.

BROADCASTING STATION CHIEF ENGINEERS

CKAC, Montreal, P. Q. Leonard Spencer
CKBI, Prince Albert, Sask. Thomas Van Ness
CKCH, Hull, Quebec, Canada, M. Gebhardt
CKCK, Regina, Sask. E. A. Strong
CKCL, Toronto, Can. Ernest O. Swan
CKCO, Ottawa, Ont. William McLellan
CKCR, Kitchener, Ont. Ion Hartman
CKCV, Quebec, P. Q. Albert DuBerger
CKCW, Moncton, N. B. James A. White
CKGB, Timmins, Ont. Ernest D. Mott
CKLN, Nelson, B. C. Hume A. Lethbridge
CKLW, Windsor, Ont. W. J. Carter
CKMO, Vancouver, B. C. Ross L. Whiteside
CKNB, Campbellton, N. B. L. P. Paquet
CKNX, Wingham, Ont. Scott Reid
CKOC, Hamilton, Ont. Leslie Horton
CKOV, Kelowna, B. C. James H. B. Browne
CKPC, Brantford, Ont. Alfred Teague
CKPR, Fort William, Ont. Ralph H. Parker
CKTB, St. Catharines, Ont. W. H. Allen
CKWS, Kingston, Ont. G. E. McCurdy
CKX, Brandon, Man. C. E. R. Collins
CKY, Winnipeg, Man. W. A. Duffield

CUBA

CMAC, Guanajay, José M. Alvarez Valdés
CMBA, Santiago de las Vegas, Rafael Prieto
CMBF, Havana, Humberto Anderes Pena
CMHM, Cienfuegos, Jose R. Femenias, Jr.
CMJK, Camagüey, Mario Rivero
CMJW, Camaguey, Manuel Manen Olmo
CMK, Havana, Liberto Cao Alarcón
CMKF, Holguin, Manuel J. de Góngora Mason
CMKY, Puerto Padre, Ote. Pedro Zacca
CMOX, Havana, Edward E. Chisholm
CORF, Havana, Humberto Anderes Pena
COJK, Camaguey, Vincent P. Jones

HONDURAS

HRP1, San Pedro Sula, Jorge Monterrosa

MEXICO

XEAC, Tijuana, B. C. Manuel Aguna Vareia
XEB, Mexico City, Juan Cross Buchanan
XEBG, Tijuana, B. C. Manuel Rojo L.
XEBH, Hermosillo, Son. Jose Remigio Agraz
XEBR, Hermosillo, Son. Jose Remigio Agraz
XEBW, Chihuahua, Enrique Ricart Corts
XECF, Los Mochis Sin. Francisco Perez, Jr.
XEH, Monterrey, N. L. Constantino de Tarnava, Jr. E.E.
XEFW, Tampico, Tan. J. E. Martinez
XEHR, Puebla, Pue. Angel Valera Gonzalez
XEIW, Chihuahua, Enrique Ricart Corts
XELO, Juarez, W. E. Branch
XELZ, Mexico City, Manuel Zetina
XEMO, Tijuana, Lower Calif, Fred Ferreira
XEN, Mexico City, S. Del Conde
XENX, Mexico City, S. Del Conde
XEP, C. Juarez, Chih. Esteban Parra
XERC, Mexico, D. F. M. M. Huerta
XESM, Mexico City, Salvador San Martin
XETS, Tapachula, Chis. Napoleon Correa
XETM, Naco, Son. Hector Campoy

NICARAGUA

Gilfillan, Leon, Dionisio E. Gallo
La Voz de los Lagos, Managua, R. Ernesto Gutierrez
La Voz de la America Central, Mangua, Mendoza y Hnos
La Voz de la Sultana, Granada, Jose F. Tercero Z.
La Voz del Mombacho, Granada, Leonidas A. Tenorio

PERU

OAX4C, Bellavista, Lima, Alvarado y Urteaga
OAX4E, Ocona 58, Lima, Juan P. Goycochea
OAX4K, Lima, Juan P. Goycochea

PORTO RICO

WKAQ, San Juan, A. P. del Valle

VENEZUELA

YV1RA, Maracaibo, Manuel Arraez
YV1RC, Maracaibo, Hermilio Cabrera
YV1RF, Maracaibo, G. Nouel Debrot
YV1RK, Maracaibo, Manuel Belisario
YV1RL, Maracaibo, Manuel Belisario
YV1RT, Maracaibo, Hermilio Cabrera
YV1RV, Maracaibo, Manuel Arraez
YV1RW, Coro, Victor Jaime R.
YV1RX, Maracaibo, G. Nouel Debrot
YV1RY, Coro, Victor Jaime R.
YV2RB, San Cristobal, Diaz Gonzalez
YV2RN, San Cristobal, Diaz Gonzalez
YV3RE, Barquisimeto, Amilcar Segura
YV3RN, Barquisimeto, Amilcar Segura
YV4RA, Valencia, Ramon Nunez, h.
YV4RL, Maracay, Atilio Ormezzano
YV4RK, Maracay, Atilio Ormezzano
YV4RO, Valencia, Ramon Nunez, h.
YV5RA, Caracas, J. Marcano C.
YV5RB, Caracas, G. Siblesz
YV5RH, Caracas, P. Castillo Rey
YB5RG, Caracas, Ramon T. Barrios
YV5RI, Caracas, Rivero, Armando
YV5RL, Caracas, M. Rodriquez B.
YV5RM, Caracas, G. Siblesz
YV5RN, Caracas, J. Marcano C.
YV5RQ, Caracas, H. Degwitz
YV5RS, Caracas, H. Degwitz
YB5RU, Caracas, Ramon T. Barrios
YV5RV, La Guaira, M. Cisneros S.
YV5RW, Caracas, M. Rodriquez B.
YV5RX, Caracas, P. Castillo Rey
YV5RY, Caracas, Rivero, Armando
YV5RZ, La Guaira, M. Cisneros S.
YV6RC, Barcelona, Areaza Almenar
YV6RE, Barcelona, Arreaza Almenar

UNITED STATES

Chief Engineers at All Stations

— A —

Adams, Ernest L., Miami Valley Broadcasting Corp., Dayton, Ohio. WHIO
Adams, Harry E., 350 N. Meridian St., Indianapolis, Ind. WIBC
Adams, John, Kemp Hotel, Wichita Falls, Texas. KWFT
Aderhold, Harvey J., 10 & Broad St., Augusta, Ga. WRDW
Akerman, Ben, Box 674, Atlanta, Ga. WGST
Albee, Wilbur R., 7 Logan, Charleston, S. C. WCSC
Alden, Eugene E., c/o WIRE, Indianapolis, Ind. WIRE
Aldrich, Donald D., Route 4, Terre Haute, Ind. WBOW
Allison, Earl F., Box 48, Route 2, Greensboro, N. C. WBIG
Anderson, Sheldon W., 330 T. W. Patterson Bldg., Fresno, Calif. KFRE
Andrew, Gilbert S., c/o KROS, Clinton, Iowa. KROS
Anhalt, Harvey, 70 Pine St., New York, N. Y. W47NY
Antic, John L., Box 253, Durango, Colo. KIUP
Ashley, Alfred B., Union Tower, Norman, Okla. WNAD
Ayer, Howard C., Dunbar St., Keene, N. H. WKNE

— B —

Bailey, B. H., Jr., P. O. Box 1521, Lake Charles, La. KPLC
Bailey, John H., c/o WJZM, Clarksville, Tenn. WJZM
Baker, B. C., State Life Ins. Bldg., Chattanooga, Tenn. WDEF
Baker, Clarence A., Milner Hotel, Erie, Pa. WLEU
Baker, C. W., 118A South Main St., Minot, N. Dak. KLPM
Baker, Fred A., c/o WKWK, Wheeling, W. Va. WKWK
Baland, Tom, Box 2271, Reno, Nev. KOH
Baldwin, John M., Tribune Bldg., Salt Lake City, Utah. KDYL
Ballinger, Lou, c/o KXL Broadcasters, Portland, Ore. KXL
Bannon, Jack E., c/o WLOK, Lima, Ohio.
Barnes, Bertram B., 124 Alden Ave., Chattanooga, Tenn. WAPO
Barrett, Gaal, c/o KFBC, Cheyenne, Wyo.
Barwick, Morris N., 600 Biscayne Blvd., Miami, Fla. WIOD
Bauer Fritz, 508 St. Louis St., Springfield, Mo. KGBX, KWTO
Baum, Jack R., c/o WDWS, Champaign, Ill. WDWS
Baumgartner, Vernon E., c/o KWLM, Willmar, Minn. KWLM
Beaty, James S., Jr., c/o WB,ulling-B BB, ton, N. Dak. WBBB
Beck, Irving P., 115 Mohawk Ave., Scotia, N. Y. WSNY
Beck, Stanley A., 8th & Bluff, Dubuque, Iowa. KDTH
Beckholt, H. R., Route 5, Spartanburg, S. C. WSPA
Bees, Gerald J., c/o WIGM, Medford, Wis.
Belle Isle, A. G., Syracuse-Kemper Bldg., Syracuse, N. Y. WSYR
Bell, John C., c/o WBRC, Birmingham, Ala. WBRC
Belounsy, J. J., Wrigley Bldg., Chicago, Ill. WBBM
Berryhill, J. L., Hotel Wolf, Stockton, Calif. KWG
Betz, William R., 35 W. State St., Trenton, N. J. WTTM
Binns, F. D., 3rd Nat'l Bank Bldg., Nashville, Tenn. WLAC
Bishop, G. F., c/o WSGN, Birmingham, Ala. WSGN
Bishop, J. Dige, West Point, Ga. WDAK
Blackburn, Fred R., c/o KYCA, Prescott, Ariz. KYCA
Blatterman, H. L., 141 N. Vermont Ave., Los Angeles, Calif. KFI, KECA
Bledsoe, W. S., P. O. Box 192, Lubbock, Texas. KFYO
Bliesner, Carl B., c/o WREN, Lawrence, Kans. WREN
Bloom, J. D., Jr., Roosevelt Hotel, New Orleans, La. WWL
Bolsuert, Francis H., Gov. Clinton Hotel, Kingston, N. Y. WKNY
Bopp, Bernard H., c/o WMRF, Lewistown, Pa. WMRF
Boren, John E., Route 1, Box 552, Merced, Calif. KYOS
Bowker, Garth N., c/o WFHR, Wisconsin Rapids, Wis. WFHR
Bowman, L. H., c/o KNX, Los Angeles, Calif. KNX
Braden, Paul F., 121 N. Main St., Dayton, Ohio. WING
Bradham, Douglass M., P. O. Box 297, Charleston, S. C. WTMA
Brannen, Charles W., 511 Loew Bldg., Syracuse, N. Y. WAGF
Braun, W. L., Route 1, Harrisonburg, Va. WSVA
Brautigam, Gene, 1730 Hennepin Ave., Minneapolis, Minn. WLOL
Brandt, Del, c/o KPOW, Powell, Wyo.
Brolly, A. H., 190 N. State St., Chicago, Ill. WBKB, W9XBK, W9XBT, W9XBB, W9XPR
Brott, F. J., c/o KJR, Seattle, Wash. KJR
Brott, F. J., Skinner Bldg., Seattle, Wash. KOMO
Bremer, Frank V., 11 Hill St., Newark, N. J. WAAT
Brown, F. K., c/o WRLC, Toccod, Ga.
Brown, Lewis E., c/o WBBZ, Ponca City, Okla.
Brown, Olin S., Santa Fe Bldg., No. 2, Dallas, Texas. WFAA
Brown, Stanley H., c/o WRAL, Raleigh, N. C. WRAL
Browning, E. A., 18 Franklin St., Worcester, Mass. WIXTG, WTAG
Brozek, Gordon H., c/o WDMJ, Marquette, Mich. WDMJ
Brummet, Carey, c/o WTJS, Jackson, Tenn. WTJS
Buchanan, Archie W., 1126 Wyoming St., Rock Springs, Wyo. KVRS
Buckley, William C., 15 17 E. Haley St., Santa Barbara, Calif. KDB
Bullio, Robert, c/o WLOG, Logan, W. Va.
Bullock, Mark W., Hotel Lincoln, Lincoln, Nebr. KFAB, KFOR
Bunting, John, c/o WSPB, Sarasota, Fla.
Burch, Charles E., Algood, Tenn. WHUB
Burgoon, George R., c/o WFBG, Altoona, Pa. WFBG
Burke, John P., c/o WKIP, Poughkeepsie, N. Y. WKIP
Burtis, Charles W., 1528 Walnut St., Philadelphia, Pa. WPEN, W73PH
Busch, G. Robert, Burlington, Iowa. KBUR
Bush, R. S., P. O. Box 840, Corpus Christi, Texas. KRIS

— C —

Callicott, Calloway M., c/o WJLD, Bessemer, Ala. WJLD
Cameron, Thomas C., 109 S. Water St., Rockford, Ill. WROK
Cannon, Ralph E., Jr., 8th & Eye Sts., N. W., Washington, D. C. WINX
Carlson, Leonard, Hotel Julien, Dubuque, Iowa. WKBB
Carlton, Clyde R., 633 N. Front St., Salem, Ore. KSLM
Carpenter, Ralph H., c/o WBCM, Center Ave., Bay City, Mich. WBCM
Casey, John B., Abilene, Texas. KRBC
Cassens, Gerald J., 612 W. Lafayette Ave., Jacksonville, Ill. WLDS
Caudle, L. L., Jr., 1925 N. Tryon St., Charlotte, N. C. WSOC
Cecil, Jack, c/o KRLH, Midland, Texas.
Chandler, H. J., Jr., Kelley's Corner, Roseburg, Ore. KRNR
Chandler, Vincent H., 1819 Elm St., Manchester, N. H. WMUR
Clark, E. E., State School of Mines, Rapid City, S. Dak. WCAT
Clark, E. H., 3100 Eaton Tower Bldg., Detroit, Mich. W49D, WJLB
Clary Millard H., c/o KWBW, Hutchinson, Kans. KWBW
Clippard, Harry L., RFD 3, Columbia, S. C. WCOS
Cochran, Howard D., 90 Main St., Batavia, N. Y. WBTA
Coleman, Murray D., c/o WORD, Spartanburg, S. C. WORD
Collins, William G., 1017 1st Ave., San Diego, Calif. KGB
Conant, L. C., 580 32nd St., Port Huron, Mich. WHLS
Cooke, Gerald W., 660 Lexington Bldg., Baltimore, Md. WBAL
Cooke, K. R., c/o WGBI, Scranton, Pa.
Cook, Wayne N., c/o WCAR, Pontiac, Mich. WCAR
Cooper, Charles A., Rm. 607, Spreckels Bldg., San Diego, Calif. KFMB
Corey, James N., 8 Elk St., Albany, N. Y. WABY
Cox, Franklyn V., c/o KTFI, Twin Falls, Idaho. KTFI
Cozzens, W. D'orr, Hotel Ben Lomond, Ogden, Utah. KLO
Craig, Dr. P. H., c/o WRUF, Gainesville, Fla. WRUF
Crandon, George F., c/o WCSH, Congress Sq. Hotel, Portland, Me. WCSH
Crane, C. J., Silverton, Idaho. KWAL
Crossthwaite, Robert E., c/o KWYO, Sheridan, Wyo. KWYO
Csensich, John E., 92934 Fourth Ave., Huntington, W. Va. WSAZ
Curtis, James R., Box 607, Longview, Texas. KFRO

— D —

Dadisman, Amos C., York Rite Bldg., Wichita, Kans. KFH
Dahlbacka, Hine, c/o WATW, Ashland, Wis. WATW
Damm, Fred, c/o KFEQ, St. Joseph, Mo.
Daugherty C. F., Biltmore Hotel, Atlanta, Ga. WSB
Davis, Harold C., 613 Merchant, Emporia, Kans. KTSW
Davis, Maynard B., Hotel Woodruff, Watertown, N. Y. WWNY
Davis, Robert E., 87 E. San Antonio St., San Jose, Calif. KQW
Davidson, Herbert A., c/o KWIL, Albany, Ore. KWIL
De Costa, Lester L., 601 Walnut St., Joliet, Ill. WCLS
Degering, Harvey, c/o KHUB, Watsonville, Calif. KHUB
DeLany, Ralph H., 1311 Terminal Tower, Cleveland, Ohio. WCLE, WHK
De Laurentis, Vin, 991 Broad St., Bridgeport, Conn. WNAB
Dennis, Bruce, Route 5, Box 67, Laurel, Miss. WAML
De Prospo, John, Municipal Bldg., New York, N. Y. W39NY
Dettman, R. A., 218 Bradley Bldg., Duluth, Minn. KDAL
Dewing, Harold L., c/o WCBS, Springfield, Ill. WCBS
Dice, Miss Joyce, c. o WTMC, Ocala, Fla.
Dickson, Bob, c/o KBND, Bend, Ore.
Dickson, Walter L., 57 State St., Bangor, Me. WABI
Dieringer, Frank A., 101 West Boardman St., Youngstown, Ohio. WFMJ
Ditamore, J. W., Hall of Music, West Lafayette, Ind. WBAA
Dodds, Leonard F., P. O. Box 326, Albuquerque, N. M. KGGM
Dold, E. J., 1470 Pine St., San Francisco, Calif. KJBS
Doll, Chester L., c/o KORN, Fremont, Nebr. KORN
Donovan, Jas. R., c/o WPDQ, Jacksonville, Fla. WPDQ
Dotson, George W., P. O. Box 696, Sweetwater, Texas. KXOX
Dowdell, John T., c/o WIBX, Inc., 1st Nat'l Bank Bldg., Utica, N. Y. WIBX
Dubey, W. P., P. O. Box 326, Manitowoc, Wis. WOMP
Dubuque, John, 312 Bigelow Bldg., Seattle, Wash. KNA
Duff, James S., 7 E. Lexington St., Baltimore, Md. WITH
Duncan, R. S., 216 Locust St., Harrisburg, Pa. WHP
Durham, Harold D., 1108 Classen, Oklahoma City, Okla. KOCY
Duty, E. C., Jr., c/o KDON, Monterey, Calif. KDON
Duty, John T., 223 Lisbon St., Lewiston, Me. WCOU
Drake, C. E., c/o WQBC, Vicksburg, Miss.
Dumlea, Richard Austin, c/o WMFD, Box 696, Wilmington, N. C.
Dunn, Earl C., Box 1460, Corpus Christi, Texas. KEYS
Dye, Robert H., 334 N. Grand Ave., Pierre, S. Dak. KGFX

— E —

Easum, Clifford M., 2004 Apco Tower, Oklahoma City, Okla. KTOK
Eaves, James Beuford, 415 W. 11th St., N. Platte, Nebr. KGNF
Ebel, A. James, University of Ill., Urbana, Ill. WILL
Eckels, A. E., Hasford & North Ave., Baltimore, Md. WCBM
Eckenrode, J. W., c/o WAZL, Hazleton, Pa. WAZL
Edwards, Ernest, Box 247, Scituate, Mass. WRIL, WRUW, WRUS
Egerton, W. G., Gunter Hotel, San Antonio, Texas. KTSA
Ehtrein, O. M., 205 Center St., Decorah, Iowa. KWLC
Emch, R. S., Cathedral Bldg., New Castle, Pa. WKST
Ernest, Joseph P., c/o KTBI, Tacoma, Wash. KTBI
Esten, Perry W., Kentucky Home Life Bldg., Louisville, Ky. WGRC
Etheredge, W. C., Box 600, c/o WFBC, Greenville, S. C. WFBC
Evans, Roy T., Box QQ, Hobbs, N. M. KWEW

— F —

Fallaln, F. D., Union Industrial Bldg., Flint, Mich. WFDF
Farmer, B. C., c/o KTBC, Austin, Texas.
Featherkile, M. W., 2319 Jaeger St., Bellingham, Wash. KVOS
Felkert, Grant S., Oregon State College, Corvallis, Ore. KOAC
Fekel, Francis C., c o WSNJ, Radio Centre Bldg., Bridgeton, N. J. WSNJ
Fernyhough, Wayne, c/o KCRJ, Jerome, Ariz. KCRJ
Flaherty, Joseph A., 1729 Grand Ave., Kansas City, Mo. WDAF
Flanagan, P. T., c/o WHIS, Bluefield, W. Va., WHIS, WBWV
Fletcher, Henry H., c/o KSEI, Pocatello, Idaho. KSEI
Foote, David E., Chimes Bldg., Syracuse, N. Y. WOLF
Foster, Gerald P., c/o WDZ, Tuscola, Ill. WDZ
Fox, J. Francke, Harlan, Ky. WHLN
Frase, E. C., Jr., 3rd & Madison Ave., Memphis, Tenn. WMC
Freeman, George A., 2939 4th Ave., South, Seattle, Wash. KRSC
Freitag, Willis O., 312 Spring Arcade Bldg., Los Angeles, Calif. KRKD
Frese George M., c/o KWSC, Pullman, Wash. KWSC
Fritze, Warren B., 1287 St. Anthony St., St. Paul, Minn. WMIN
Frye, A. P., Route 1, Elmhurst, Ill. WMBI, W9XMB

— G —

Gager, E. H., 1619 Walnut St., Philadelphia, Pa. KYW, W57PH
Gander, Harold Maurice, Route 3, Eugene, Ore. KORE
Garber, James, 218 Main St., Covington, Va. WKEY
Gardner, Kenneth J., 111 E. Ave., Rochester, N. Y. W51R, WHAM
Garland, O. K., c/o WJHL, Inc., Johnson City, Tenn. WJHL
Garrison, John, c/o WBHP, Huntsville, Ala. WBHP
Gautney, G. E., 1609 E. 44th St., Ashtabula, Ohio. WICA
Gayle, D. W., Box 591, Meridian, Miss. WCOC
Gehres, F. A., 519 Vine St., Evansville, Ind. WGBF
Gempp, Thedore, 2830 Hudson Blvd., Wood Ridge, N. J. WHOM
Gibbs, Earl, c o EFTC, Kinston, N. C. WFTC
Gilbert, Lester H., Arlington Hotel, Binghamton, N. Y. WNBF
Giles, Charles, Atchison, Kans. KVAK
Gill, Thomas J., c/o WHDL, Inc., Olean, N. Y. WHDL
Glore, James, Box 312, Hattiesburg, Miss. WFOR
Godfrey, Earle, Press-Union Publishing Co., Atlantic City, N. J. WBAB
Goemets, E. L., P. O. Box 1976, El Paso, Texas. KTSM
Goldenberg, Henry E., Scarritt Bldg., Kansas City, Mo. WHB
Golson, Wilbur T., c/o WJBO, Baton Rouge, La. WJBO, W45BR
Goodaker, Leslie B., 2506 W. Cloverdale Dr., Owensboro, Ky. WOMI
Goodrich, H. S., c/o WBML, First Nat'l Bank Bldg., Macon, Ga. WBML

TESTED ON AN ATOLL

ON a tiny strip of coral . . . an observation post pierces the dawn with cryptic messages that may spell the difference between victory and defeat. Duty on this speck on your map calls for iron men and dependable equipment.

Under the toughest of conditions . . . under the roughest of handling . . . far from sources of replacement . . . parts must work—for men's lives hang in the balance. Utah Parts are passing this final test on tiny atolls, in steaming jungles, on burning sands in all parts of the world—from pole to pole.

A shooting war is also a talking war. The weapons of communications must have the same dependability and non-failing action as weapons of destruction. These qualities are built into Utah Parts at the factory where soldiers of production are working 100% for Victory. In Utah laboratories, engineers and technicians are working far into the night developing new answers to communication problems—making improvements on devices now in action.

But "tomorrow" all this activity, all this research, all this experience learned in the hard school of war, will be devoted to the pursuits of peace. Thanks to the things now going on at Utah—there will be greater convenience and enjoyment in American homes . . . greater efficiency in the nation's factories. UTAH RADIO PRODUCTS COMPANY, 860 Orleans Street, Chicago, Ill. Canadian Office: 560 King Street West, Toronto. In Argentine: UCOA Radio Products Co., SRL., Buenos Aires. Cable Address: UTARADIO, Chicago.

PARTS FOR RADIO, ELECTRICAL AND ELECTRONIC DEVICES, INCLUDING SPEAKERS, TRANSFORMERS, VIBRATORS, VITREOUS ENAMELED RESISTORS, WIREWOUND CONTROLS, PLUGS, JACKS, SWITCHES, ELECTRIC MOTORS

Utah

BROADCASTING STATION CHIEF ENGINEERS

Goodson, Frank, c/o KNET, Palestine, Texas, KNET
Grady, George E., Radio Central Bldg., Spokane, Wash. KHQ, KGA
Grahn, Joseph E., 33 Navasota Ave., Worcester, Mass. W43B, WAAB
Gray, Claude M., 614 E. 53rd St., Savannah, Ga. WTOC
Greaves, George, NBC, Taylor & O'Farrell Sts., San Francisco, Calif. KPO
Green, Claude B., Jr., c/o WTAL, Tallahassee, Fla. WTAL
Greene, Thurlow A., 31 Dininny Pl., Elmira, N. Y. WENY
Grenier, Theodore B., 310 Prospect Ave., Dumont, N. J. W75NY, W2NMT
Gresham, Stokes, Jr., Board of Trade Bldg., Indianapolis, Ind. WISH
Grether, J. L., Nat'l Bank of Commerce Bldg., Norfolk, Va. WIAR
Grinde, Kenneth W., Box 1120, Aberdeen, Wash. KXRO
Grossman, Henry, 485 Madison Ave., New York, N. Y. WABC
Groves, W. C., Jr., c/o WGNC, Gastonia, N. C. WGNC
Gustafson, Leland A., 6454 N. Kingsley Dr., Los Angeles, Calif. KIEV

— H —

Hagaman, Boynton G., Route 3, Rochester, Minn. KROC
Hahn, Norman G., 110 E. Main St., Madison, Wis. WIBA
Haigh, Robert H., c/o KFRU, Columbia, Mo. KFRU
Hale, Roland C., Copley Plaza Hotel, Boston, Mass. WCOP
Hales, Frank B., 136 Grand St., Waterbury, Conn. WBRY
Hamilton, R. C., Jr., c/o KPAC, Port Arthur, Texas, KPAC
Hancock, H. Duke, 1417 S. Figueroa St., Los Angeles, Calif. KGFJ
Hanks, Herman L., c/o WOLS, Sanborn Hotel, Florence, S. C. WOLS
Harlow, John R., Hotel Keystone, Pittsburgh, Pa. W47P, WWSW
Harmon, H. W., Hall of Science, Grove City College, Grove City, Pa. WSAJ
Harmon, William R., c/o WMVA, Martinsville, Va. WMVA
Harrell, Howard, c/o WFNC, Fayetteville, N. C. WFNC
Harris, Clifford C., 35 S. 9th St., Philadelphia 7, Pa. W49PH
Harris, Hiram D., Rensselaer Polytechnic Institute, Troy, N. Y. WHAZ
Hartman, W. Herbert, c/o KGLU, Safford, Ariz. KGLU
Harvey, Harry, 401 S. 12th St., St. Louis, Mo. KMOX
Hartwig, Lewis, Box 294, Weslaco, Texas. KRGV
Haskins, Cecil B., 14 O'Henry Ave., Asheville, N. C. WWNC
Hatchett, Wayne J., Tyler Hotel, Louisville, Ky. WINN
Hatfield, J. B., c/o KIRO, Seattle, Wash.
Hathaway, Donald L., Box 930, Casper, Wyo. KDFN
Haughawout, J. H., c/o KTAR, Phoenix, Ariz. KTAR
Havens, W. T., 200-204 E. Milwaukee St., Janesville, Wis. WCLO
Hearin, A. W., c/o KELD, El Dorado, Ark.
Hebal, William, c/o WTMJ, Milwaukee, Wis. WTMJ
Heck, A. C., P. O. Box 541, Sharon, Pa. WPIC
Hedrick, Philip Franklin, c/o WSJS, Winston-Salem, N. C. WSJS
Hiebert, August G., Box 910, Fairbanks, Alaska
Heil, S. H., 516 Northampton St., Easton, Pa. WEST
Hellums, E. R., Corsicana, Texas. KAND
Helt, Scott, c/o WIS, Columbia, S. C.
Henninger, John H., 1425 Walnut St., Philadelphia, Pa. WIBG
Henzly, William J., W. Main St., Uniontown, Pa. WMBS
Hewinson, Earle G., Hotel Charles, Springfield, Mass. WMAS
Higgins, F. A., 836 N. Central Ave., Phoenix, Ariz. KOY
Higgy, T. C., c/o WOSU, University of Ohio, Columbus, Ohio. WOSU
Hilker, B. Ross, 12th Fl., St. Paul Hotel, St. Paul, Minn. KSTP
Hill, Walter S., 138 E. Chapel Hill St., Durham, N. C. WDNC
Hinckley, George A., 278 Essex St., Lawrence, Mass. WLAW
Hiraoka, Fred, c/o KHAS, Hastings, Nebr.
Hirsch, Oscar C., Box 275, Cape Girardeau, Mo. KFVS, WKRO
Hoag, Dwelle S., Route 1, Voorheesville, N. Y. W4TA
Hodgkins, Roger W., 654 A Congress St., Portland, Me. WGAN
Holbert, Bernard, Kansas State College, Manhattan, Kans. KSAC
Holland, H. S., 48 Monument Circle, Indianapolis, Ind. WFBM
Holt, Rogers B., 54 Pratt St., Hartford, Conn. WNBC
Holsington, Duane W., Barnes Bldg., Muskogee, Okla. KBIX
Horstman, E. C., The Blue Network, Mdse Mart, Chicago, Ill. WENR
Horton, J. R., 1001 Hiawassee Ave., Knoxville, Tenn., WBIR
Host, Raymond H., 710 N. Plankington Ave., Milwaukee, Wis. WEMP
Hough, Robert, 208 Adams St., Fairmont, W. Va., WMMN
Houts, James, c/o KYSM, Mankato, Minn. KYSM
Hubbard, John, P. O. Box 25, Dothan, Ala. WAGF
Hudson, James, Anniston, Ala. WHMA
Hudson, Wilbur E., 334 E. Broadway, Louisville, Ky. WAVE
Huffman, Karl B., c/o WKBW, Buffalo, N. Y. WKBW, WGR
Hughes, Ben F., c/o KRIC, Beaumont, Texas. KRIC
Hughes, Vernon N., 811 Prince St., Clovis, N. M. KICA
Hullck, Henry, Jr., Insurance Bldg., Raleigh, N. C. WPTF
Humphrey, Thomas R., 180 High St., Holyoke, Mass. WHYN
Hunt, Clyde M., CBS, Earle Bldg., Washington, D. C. WTOP
Hunter, Dan, Cedar Lane, Bethesda, Md., Washington, D. C. WMAL
Hunt, Lon D., P. O. Box 703, Klamath Falls, Ore. KFJI
Hurley, Norman Sinclair, Protective Life Bldg., Birmingham, Ala. WAPI
Hurt, Frank E., 1024 12th Ave., South, Nampa, Idaho. KFXD
Hurton, Charles J., Second Nat'l Bank Bldg., Warren, Ohio. WRRN
Huss, Earl J., 1510 Nebraska St., Sioux City, Iowa. KTRI

— I —

Ing, George, 317 Arden Grove, San Antonio, Texas. KONO
Irby, J. C., Jr., Elkhart, Texas. KRRV
Ives, George M., Jr., 6138 W. Cermak Rd., Cicero, Ill. WHFC

— J —

Jacker, E. W., 2400 Madison St., Chicago, Ill. WSBC
Jacker, E. W., 360 N. Michigan Ave., Chicago, Ill. WAIT, WGES
Jackson, William, c/o WHDF, Calumet, Mich. WHDF
Jacobsen, George K., 3844 Upton Ave., S., Minneapolis, Minn. WDGY
James, Glen, 1626 Stout St., Denver, Colo. KMYR
Jammet, J. Sarto, Coffeyville, Kans. KGGF
Jenks, Charles J., 121 W. 10th St., Erie, Pa. WERC
Johnson, George S., Box 1319, Albuquerque, N. M. KOB
Johnson, R. A., 216 Center St., Winona, Minn. KWNO
Johntz, James A., Jr., c/o KIDO, Boise, Idaho. KIDO
Jones, Don, c/o KODL, The Dalles, Ore.
Jones, Martin L., 811 W. Lanvale St., Baltimore, Md. WCAO
Jorgenson, Thorwald O., c/o WEAU, Route 1, Highway Q, Eau Clair, Wis.

— K —

Kaarl, Eugene, c/o WSOO, Sault Ste. Marie, Mich. WSOO
Kalin, Theodore, 717 Main St., Fitchburg, Mass. WEIM
Kassner, Don E., Insc. Bldg., Waterloo, Iowa. KXEL
Keich, George P., c/o WICC, Bridgeport, Conn. WICC
Keim, Edwin L., W. Va. Broadcasting Corp., Hawley Bldg., Wheeling, W. Va. WWVA
Keller, John, c/o WKOK, Sunbury, Pa.
Kelley, John L., 2120 Smith Tower, Seattle, Wash. KEVR
Kennedy, Frank M., 5515 Melrose Ave., Hollywood, 38, Calif. K45LA
Kenney, T. C., Grant Bldg., Pittsburgh, Pa. KDKA
Keyworth, J. Gordon, 221 Orange St., New Haven, Conn. WELI
Kliehl, Jeff, c/o KGHL, Billings, Mont.
King, Dale L., c/o WGIL, Galesburg, Ill.
King, Lee C., Pepper Bldg., Winston-Salem, N. C. WAIR
Kingsley, Ralph J., Hotel Statler, Buffalo N. Y. WBEN
Kinnett, Charles Monroe, 409 Residence, Albany, Ga. WGPC
Klug, Myron E., 1913 Montrose St., Los Angeles, Calif. KFSG
Knowles, Cecil R., 301 Walnut St., Belpre, Ohio. WPAR
Kolesar, J. D., 717 S. Proctor, Tacoma, Wash. KMO
Kotera, W. J., c/o WOW, Inc., Omaha, Nebr. WOW
Kramer, A. W., 2001 N. 6th St., Vincennes, Ind. WAOV
Kratzert, Harold J., c/o WJTN, Jamestown, N. Y. WJTN
Kreiger, H. E., Pampa, Texas. KPDN

— L —

Laeser, Philip, 333 West State St., Milwaukee 1, Wis. W55M
Lamy, Raymond, 23 North St., Buffalo, N. Y. WEBR
Landis, Harold D., 533 Penn St., Reading, Pa. WRAW, WEEU
Landress, Clarence R., c/o WGAA, Cedartown, Ga. WGAA
Landsberg, Klaus, 5451 Marathon St., Hollywood, Calif. W6NYZ, W6NLA
Lang, G. William, 441 N. Michigan Ave., Chicago, Ill. WGN
Laubenstein, Harry C., c/o WFAS, White Plains, N. Y. WFAS
Lavendol, Leonard L., 8 Bank Row, Pittsfield, Mass. WBRK
Lawrence, Paul, 8 Arborvale Rd., Asheville, N. C. WISE
Lawson, Harry, 122 Court St., Albert Lea, Minn. KATE
Layne, C. N., 181 W. 4th South, Logan, Utah. KVNU
Lee, Carl E., c/o WKZO, Burdick Hotel, Kalamazoo, Mich. WKZO
Lee, Clayton, c/o WMJM, Cordele, Ga.
Lee, William P., c/o WLAK, Lakeland, Fla. WLAK
Leeman, Alvin, P. O. Box 499, La Crosse, Wis. WKBH
Lemond, Lynton R., c/o WHOP, Hopkinsville, Ky. WHOP
Lewicki, Chester T., 3860 W. Ogden Ave., Chicago, Ill. WEDC
Lewis, George, 1622 Chestnut St., Philadelphia, Pa. WCAU
Lewis, James E., c/o KNOW, Austin, Texas. KNOW
Lewis, John B., c/o KGFW, Kearney, Nebr.
Lewis, L. L., c/o WOI, Ames, Iowa. WOI

In the OCTOBER ISSUE

a Roster of Chief Engineers at plants producing radio and associated equipment, components, and materials

Who are the men who head up the engineering departments of plants where some $4,000,000,000 in radio and associated equipment will be produced this year for our Armed Forces?

A great many are newcomers in this field. Others have been moved up in company organizations. A considerable number have made changes, many going to concerns which started since the beginning of the War.

Their names, their company connections, and their addresses will be published in a Roster of Chief Engineers, appearing in the October issue of *FM* RADIO-ELECTRONICS.

Because such a roster has so many different uses, and because this information is available in no other publication, it will be carried in the future as a semi-annual feature of *FM* RADIO-ELECTRONICS, kept up to date by corrections and additions.

NOTE: Our December issue will carry a roster of officials in charge of police and public utility radio systems.

FM RADIO-ELECTRONICS

BROADCASTING STATION CHIEF ENGINEERS

Lidenton, Don M., 701 Poplar St., Poplar Bluff, Mo. KWOC
Lind, Perry C., Northern Life Tower, Seattle, Wash. KOL
Lippincott, Ellwood W., 411 West Plum, Centralia, Wash. KELA
Littlejohn, Louis E., Widener Bldg., Philadelphia, Pa. WFIL
Livingston, Clifford, 2850 E. Lee, Tucson, Ariz. KTUC
Lounsberry, William, c/o WEBC, Superior, Wis. W9XYH, WEBC
Lowe, J. E., 33 N. High St., Columbus, Ohio, WCOL
Loyet, Paul A., 914-16 Walnut St., Des Moines, Iowa, WHO
Lucas, Earl F., 293 19th Ave., Paterson N. J. WPAT
Luttgens, H. C., NBC Merchandise Mart, Chicago, Ill. WMAQ, W63C
Lubcke, Harry R., 3800 Mount Lee Dr., Hollywood, Calif. W6XAO
Lyon, Henry H., 1627 K St., Washington, D. C. WOL
Lyon, John, c/o WGAC, Augusta, Ga.

— M —

Mabes, Harold J., 433 S. Warren St., Syracuse, N. Y. WFBL
MacDowell, E. Whitt, 509 48th St., West Palm Beach, Fla. WJNO
MacLafferty, M. L., c/o KUJ, Walla Walla, Wash. KUJ, KRLC
Maddox, C. H., c/o KTBS, Shreveport, La.
Magin, Ted, Hotel Wolford, Danville, Ill. WDAN
Malone, Edward A., P. O. Box 148, Grants Pass, Ore. KUIN
Maltby, Bernard, 901 North 8th Street, Kansas City, Kans. KCKN
Mangold, William D., c/o WTSP, St. Petersburg, Fla. WTSP
Mangus, Paul R., Route 6, Box 32, South Bend, Ind. W7SB, W8BT
Markman, Edward L., Box 1393, Stamford, Conn. WSRR
Marquardt, Maynard, 666 Lake Shore Dr., Chicago, Ill. WCFL
Martin, Arthur L., c/o WIZE, Springfield, Ohio, WIZE
Martin, George P., Box 328, Washington, N. C. WRRF
Martino, Itlao A., 750 Main St., Hartford, Conn. WDRC
Maruszan, Simon, 2745 Bay St., Saginaw, Mich. WSAM
Marx, Frank L., 1657 Broadway, New York, N. Y. WMCA
Masini, Charles S., 983 Main St., Hartford, Conn. WTHT
Mason, Albert F., Jr., 510 Ross Ave., Kilgore, Texas, KOCA
Mason, C. W., 141 N. Vermont Ave., Los Angeles, Calif. KECA, KFI
Mayer, Herbert J., 805 Bluff Ave., Sheboygan, Wis. WHBL
Mayhew, P. E., Ell City, Okla. KASA
McArdle, J. J., 1000 Van Nes Ave., San Francisco, Calif. KFRC
McCartney, Hugh S., 625 Second Ave., S., Minneapolis, Minn. WCCO
McCauley, Howard S., c/o KSRO, Santa Rosa, Calif. KSRO
McCoy, Walter W., Chamber of Commerce Bldg., Pittsburgh, Pa. WJAS, KQV
McCoy, Walter W., Penn Albert Hotel, Greensburg, Pa. WHJB
McCready, S. W., c/o KVAN, Vancouver, Wash. KVAN
McDowell, Lawrence W., 220 E. Anaheim, Long Beach, Calif. KFOX
McGoffin, Walter M., c/o KGY, Olympia, Wash. KGY
McGown, Robert L., c/o KVIC, Victoria, Texas, KVIC
McIntire, George W., Franklin Ct., Hagerstown, Md. WJEJ
McKay, J. M., c/o WLAG, Lagrange, Ga.
McKenzie, Alberta, First & Mercer St., Panama City, Fla. WDLP
McKernan, Phil, 601 Ashby Ave., Berkeley, Calif. KRE
McLean, True, Savings Bank Bldg., Ithaca, N. Y. WHCU
McNally, Jack, 28 W. 44th St., New York, N. Y. WINS
Mead, G. E., c/o WCOA, Pensacola, Fla.
Meares, Claude W., Crew Apt. 7, Roanoke Rapids, N. C. WCBT
Meek, Richard, Frisco Bldg., Joplin, Mo. WMBH
Merkl, George E., 600 S. Lawe St., Appleton, Wis. WHBY
Merkle, Walter W., 1300 Mermaid Lane, Philadelphia 18, Pa. WPTZ, W3XE
Meyer, Carl H., 801 Demun Ave., St. Louis, Mo. KFTO
Milner, C. M., c/o KVSO, Ardmore, Okla.
Milne, Morris M., Route 3, Mesquite, Texas, KSKY
Minton, Robert W., 26 Cain St., Atlanta, Ga. WATL
Mitchell, Joseph H., Route 4, Box 1254-H, Tampa, Fla. WFLA
Mitchell, M. R., Route 1, Wyandotte, Mich. WJR
Moler, A. R., Midland Broadcasting Co., 10th & McGee Sts., Pickwick Hotel, Kansas City, Mo. KMBC
Moore, Clifford W., 2315 Knox St., Ogdensburg, N. Y. WSLB
Moore, William Pharr, Tampa Terrace Hotel, Tampa, Fla. WDAE
Morey, Gerald J., Mohican Hotel, New London, Conn. WNLC
Morgan, O. L., 300 Columbia Ave., Monroe, La. KMLB
Morrison, S. Robert, c/o WMRN, Marion, Ohio, WMRN
Murphrey, I. G., Box 391, Rocky Mount, N. C. WEED
Murphy, Donovan, c/o WGCM, Gulfport, Miss. WGCM
Murphy, H. R., c/o KIT, Yakima, Wash.
Musselman, R. H., 39-41 North 10th St., Allentown, Pa. WSAN
Myers, Harry, 5833 Fernwood Ave., Hollywood, Calif. KFWB
Myers, Marvin D., c/o KGBS, Harlingen, Texas, KGBS
Myers, Maurice L., 1009 Gallia St., Portsmouth, Ohio, WPAY
Myers, Walter F., 230 N. Michigan Ave., Chicago, Ill. WJJD
Myhre, Wilbur L., P. O. Box 829, Great Falls, Mont. KFBB

— N —

Nafzger, Lester H., 33 N. High St., Columbus, Ohio, W45CM, WBNS
Nazak, John M., Plattsburg, N. Y. WMFF
Nelson, Ivar, Bismark, N. Dak. KFYR
Neuville, Glen, 28 Eden St., New Bern, N. C. WHIT
Niemann, E. C., Wilson St., Greenwood, S. C. WCRS
Ninneman, Walter C., c/o WLBL, Auburndale, Wis. WLBL

— O —

Oakley, Ronald E., 435 Pine Ave., Long Beach, Calif. KGER
O'Brien, Bernard C., 40 Franklin St., Rochester, N. Y. W47R, WHEC
O'Brien, Elwin J., University Station, Grand Forks, N. Dak. KFJM
Olson, Alvor E., c/o KIEM, Vance Hotel, Eureka, Calif. KIEM
Orth, John T., c/o WLVA, Allied Arts Bldg., Lynchburg, Va. WLVA
Oschmann, Adolph W., Select Bldg., Scranton, Pa. WARM
Owen, R. H., 1625 California St., Denver, Colo. KOA

— P —

Pack, Eugene G., 10 S. Main St., Salt Lake City, Utah. KSL
Palmer, T. B., c/o KGO, San Francisco, Calif. KGO
Panchot, Harry W., 1703 Fort St., Miles City, Mont. KRJF
Parsons, N. Vincent, 585 E. Colorado St., Pasadena, Calif. KPPC
Peffer, E. Y., c/o KGDM, Stockton, Calif. KGDM
Penny, Clyde C., c/o WGBG, P. O. Box 2280, Greensboro, N. C. WGPG
Perry, Glenn, c/o KRBA, Lufkin, Texas.
Persio, Louis N., 343 W. 4th St., Williamsport, Pa. WRAK
Patterson, Thomas W., Highway 61-N, Natchez, Miss. WMIS
Peterson, Gerald W., 201 S. 17th West, Provo, Utah. KOVO
Pierce, R. M., Statler Hotel, Cleveland, Ohio, WGAR
Plank, R. A., 6 Fountain St., Keller Bldg., Grand Rapids, Mich. WLAV
Pope, Russell, c/o KHSL, Chico, Calif. KVCV, KYOS, KHSL
Poppele, J. R., 1440 Broadway, New York, N. Y. W7NY, WOR
Porcell, W. J., c/o Gen. Elec. Co., Schenectady, N. Y. WGY
Porter, R. C., c/o KVSF, Santa Fe, N. M.
Porter, Bascom E., Nashville Trust Bldg., Nashville, Tenn. WSIX.
Prior, Thomas C. J., The Outlet Co., 176 Weybosset St., Providence, R. I. WJAR
Provis, Jack, c/o KGIR, Butte, Mont.
Pulley, Denzil, 1318 Spratley St., Portsmouth, Va. WSAP
Purcell, W. J., Gen. Elec. Co., Schenectady, N. Y. W85A, WRGB, WGY, WGEA, WGEO, KGEI
Pyatt, Leslie James, Garden City, Kans. KIUL
Pyle, K. W., 42nd & Broadway, Wichita, Kans. KFBI

— Q —

Quentin, Charles F., c/o WMT, Cedar Rapids, Iowa, WMT
Quill, John C., 203 College St., Burlington, Vt. WCAX

— R —

Raabe, R. W., 323 E. Grace St., Richmond, Va. WRNL
Randol, Harold E., Hotel Kimball, Springfield, Mass. WBZA, WSSP
Ranft, William Q., Radio Centre, Baltimore, Md. WFBR
Ratts, Bruce H., 925 S. Harrison St., Fort Wayne, Ind. WOWO, WGL, SW49EW
Rayburn, Charles D., c/o WOC, Davenport, Iowa, WOC
Reeder, Jack M., 1401 S. Oak Knoll, Pasadena 15, Calif. KPAS
Rees, Dave H., 1705 E. Main St., Medford, Ore. KMED
Reilly, Lawrence A., 63 Chestnut St., Springfield, Mass. WSPR
Rekart, Arthur F., 12th & Delmar Blvds., St. Louis, Mo. KNOK
Reuman, William H., 41-30 58th St., Woodside, N. Y. WWRL
Reynolds, George A., 301 7th Ave., N., Nashville, Tenn. WSM, W47NV
Rex, Paul F., 357 N. Main St., Butler, Pa. WISR
Ricciotti, Salvatore, c/o KGFF, Shawnee, Okla. KGFF
Rich, Kenneth J., c/o KSJB, Jamestown, N. Dak. KSJB
Richardt, Roland W., 125 Third St., Wausau, Wis. WSAU
Ridgway, Herman F., c/o KVWC, Vernon, Texas, KVWC
Ritchey, Harold E., c/o WAAC, Ft. Myers, Fla. WAAC
Roberts, W. C., c/o WBLJ, Dalton, Ga.
Robertson, Jim W., P. O. Box 150, Roanoke, Va. WDBJ
Robertson, W. W., 1st Central Tower, c/o WAKR, Akron, Ohio, WAKR
Robinson, I. B., 21 Brookline Ave., Boston Mass. WNAC
Robinson, King H., 630 Rice Hotel, Houston, Texas, KTRH
Robinson, Odes E., 1016 Lee St., Charleston, W. Va. WCHS
Rockwell, R. J., 9th & Elm, Cincinnati, Ohio, WLW, WSAI, WLWO, WLWK, W8XFM

BROADCASTING STATION CHIEF ENGINEERS

Rolfe, L. J., c/o WCMI, Box 949, Ashland, Ky. WCMI
Root, P. G., Route 3, Jackson, Miss. WJDX
Ross, James S., 7th Ave. & Spring St., Seattle, Wash. KTW
Rowe, Thomas L., 1230 Washington Blvd., Chicago, Ill. WLS
Rueppel, George, 3642 Lindell Blvd., St. Louis, Mo. WEW, KSIL
Runkle, Elza G., Jr., 1515 Commerce Trust Bldg., c o KCMO Broadcasting Co., Kansas City, Mo.
Russell, Fred W., c/o WOOD, Grand Rapids, Mich. WOOD

— S —

Sampson, Richard T., 512 5th St., San Bernardino, Calif. KFXM
Sanders, Lawrence M., P. O. Box 2950, Beaumont, Texas. KFDM
Sandlin, Garlan G., c/o WMSL, Decatur, Ala. WMSL
Sardi, O. A., 8 Elk St., Albany, N. Y. WOKO
Sawyer, R. E., c/o KGLO, Mason City, Iowa. KGLO
Schildknecht, Raymond O., c o KHMO, Hannibal, Mo. KHMO
Schow, Reginald A. B., 51 Pleasant St., Manchester, N. H. WFEA
Schroeder, R. J., Lowell & Elm St., Shenandoah, Iowa. KMA
Schultz, James, c o WCAE-Inc., William Penn Hotel, Pittsburgh, Pa. WCAE
Schulz, Paul C., Hearst Bldg., San Francisco, Calif. KYA
Sells, Martin W., 1813 9th Ave., S., Escanaba, Mich. WDBC
Selmes, Marvin, 161 Broadway, Newburgh, N. Y. WGNY
Sexton, Jesse R., Alexandria, La. KALB
Shatto, Luverne, Elks Bldg., 17th & I Sts., Bakersfield, Calif. KERN
Shaw, Paul, Kyle Hotel, Temple, Texas. KTEM
Sheetz, Bill, c/o WSPB, Sarasota, Fla.
Sheppard, John B., 527 S. Fannin, Tyler, Texas. KGKB
Siddle, Wilfred T., 3009 Howard Ave., Columbus, Ga. WRBL
Sigmon, Loyd, c/o KMPC, Beverly Hills, Calif. KMPC
Sinclair, David G., c/o KVFD, Fort Dodge, Iowa. KVFD
Singleton, Harold C., 2005 N. E. 28th Ave., Portland, Ore. KGW, KEX
Sjostrom, Charles J., 312 5th Ave., Valley City, N. Dak. KQVC
Sloan, F. M., 275 Tremont St., Boston, Mass. WBZ, WBOS, W67B
Smith, Alvin H., 415 Douglas St., Sioux City, Iowa. KSCJ
Smith, Edgar C., c/o WFIN, Findlay, Ohio. WFIN
Smith, George B., 3806 N. Broadway, Knoxville, Tenn. WNOX
Smith, Hulan, Box 1120, Laredo, Texas. KPAB
Smith, Roswell S., c/o KLX, 13th & Franklin Sts., Oakland, Calif. KLX
Smithson, Harold, Black Bldg., Fargo, N. Dak. WDAY
Snell, Paul E., Willow & Kennedy Sts., Enid, Okla. KCRC
Spann, Melvin P., P. O. Box 1038, Hot Springs, Ark. KWFC
Spargo, Paul W., 924 North Vista, San Gabriel, Calif. KWKW
Spence, Ray C., 440 Spruce St., Morgantown, W. Va. WAJR
Spengler, Harold C., c/o WAIM, Anderson, S. C. WAIM
Stafford, Leo S., c/o KOAM, Pittsburg, Kans. KOAM
Stahl, Vernon, 80 Park Pl., Du Bois, Pa. WCED
Staley, Max F., 317 S. Phillips Ave., Sioux Falls, S. Dak. KELO, KSOO
Stanget, Wallace J., Bellin Bldg., Green Bay, Wis. WTAQ
Standley, J. F., 212 W. Sixth St., Royal Oak, Mich. WEXL
Steady, Louis C., Northern Broadcasting Co., 653 Main St., Laconia, N. H. WLNH
Steinberg, A. N., P. O. Box 710, Las Vegas, N. M. KFUN
Stenger, John H., Jr., c/o WBAX, Wilkes-Barre, Pa. WBAX
Sterling, Fred, c/o WOAI, San Antonio, Texas. WOAI
Stewart, Alton W., Box 372, Brownwood, Texas. KBWD
Stewart, Arthur, c/o KOIL, Omaha, Nebr.
Stiehl, John H., Radio Hall, University of Wis. Campus, Madison, Wis. WHA
Stinson, R. C., c/o WBAP, Fort Worth, Texas. WBAP, KGKO
Stoup, C. H., c/o WIL, Melbourne Hotel, St. Louis, Mo. WIL
Strang, H. C., Outwest Broadcasting Co., Antlers Hotel, Colorado Springs, Colo. KVOR
Straub, N. L., c/o WJAC, Johnstown, Pa.
Stringfellow, William, Broadcast Bldg., 136 Huron St., Toledo, Ohio. WSPD
Suitt, Cecil L., 307 Archer St., Hot Springs, Ark. KTHS
Summerford, D. C., 300 W. Liberty St., Louisville, Ky. WHAS
Sutton, R. B., Wenatchee, Wash. KPQ
Swenson, Walter, 515 Madison Ave., New York, N. Y. W2NWV

— T —

Talbott, Edward P., 2201 Wyoming St., El Paso, Texas. KROD
Tate, George D., c/o WMRC, Greenville, S. C. WMRC
Tate, Jos. R., 16 S. Mill St., Harrisburg, Ill. WEBQ
Taylor, Herman D., c/o WTIC, 26 Grove St., Hartford, Conn. WTIC
Testan, Peter, 132 W. 43rd St., New York, N. Y. WBYN
Thomas, Morris W., 3304 N. Broadway, Oklahoma City, Okla. KOMA
Thomas, Harold, 71 Grand St., Waterbury, Conn. WATR
Thompson, Meredith E., c/o WSAV, Savannah, Ga. WSAV
Thron, Blair K., Steel Pier, Atlantic City, N. J. WFPG
Tidmore, A. V., 406 Carroll Parkway, Frederick, Md. WFMD
Tilley, Harry H., Crown Hotel, Providence, R. I. WEAN
Timberlake, John E., c/o WBRW, Welch, W. Va. WBRW
Titus, James M., c/o KAST, Astoria, Ore.
Todd, Clif, c o WNAX, Yankton, S. Dak.
Tobola, John J., Box 528, Waycross, Ga. WAYX
Toomey, Frank A., c/o KGCX, Sidney, Mont. KGCX
Topmiller, C. H., Hotel Gibson, Cincinnati, Ohio. WCKY
Towne, Roy C., Sr., 300 Clark Bldg., Everett, Wash. KRKO
Trae, David S., c/o WGGA, Gainesville, Ga. WGGA
Tracy, Kermit F., Gazette Bldg., Little Rock, Ark. KGHI, KLRA
Travis, Earle, 93 Broad St., San Luis Obispo, Calif. KVEC
Trepagnier, Ellis E., St. Charles Hotel, New Orleans, La. WNOE
Tribley, Hank, c/o WGTC, Greenville, N. C. WGTC
Troesch, Joseph M., Exchange Realty Bldg., Market St., Steubenville, Ohio. WSTV
Trueblood, Daniel B., Jr., Box 1024, c/o WGBR, Goldsboro, N. C. WGBR
Tucker, Durward J., c/o WRR, Dallas, Texas. WRR, KVP, KVPA

— U —

Unger, Melvin E., 411 W. 16th St., Roswell, N. M. KGFL
Unterberger, Frank W., 1211 Chestnut St., Philadelphia, Pa. WDAS
Upchurch, Fladman W., c/o WKPT, Kingsport, Tenn. WKPT
Urie, Hurschell, Box 811, Cedar City, Utah. KSUB
Utter, Ross, 135 S. LaSalle St., Chicago, Ill. WSIC

— V —

Valentine, Russell D., 201 13 38th Ave., Bayside, N. Y. WQXR, W59NY
Vermilya, Irving, 588 Pleasant St., New Bedford, Mass. WNBH
Vessels, Julius C., Hamilton Nat'l Bank Bldg., Chattanooga, Tenn. WDOD
Vines, Thomas L., 485 Main St., Buffalo, N. Y. WBNY

— W —

Wada, Jack C., Lihue, Hawaii. KTOH
Wagner, William J., Box 1040, Anchorage, Alaska. KFQD
Wahlquist, Lyle O., Belvedere Apt. Hotel, Salt Lake City, Utah. KUTA
Walden, Paul E., c/o KWRC, Pendleton, Ore. KWRC
Walker, Harold, Ada, Okla. KADA
Wallace, Bill, c/o KMJ, Fresno, Calif.
Wamble, Fred C., 132 W. Front St., Missoula, Mont. KGVO
Wankel, F. A., NBC, 30 Rockefeller Plaza, New York, N. Y. WEAF
Ward, Robert Brown, Williamson Broadcasting Corp., Williamson, W. Va. WBTH
Warren, J. C., 215 York St., Helena, Ark. KFFA
Watkins, C. E., c/o WGOV Transmitter, Lakeland Rd., Valdosta, Ga. WGOV
Watkins, Loren C., Jr., c/o KUOA, Siloam Springs, Ark. KUOA
Watkinson, J. Barry, c/o KWLK, Longview, Wash. KWLK
Watson, Carl, c/o WSFP, Salisbury, N. C.
Waymire, Dee, 526 Riverside Ave., Spokane, Wash. KFIO
Weatherly, W. D., c/o WCOV, Montgomery, Ala. WCOV
Weaver, Willis N., c/o WSBA, York, Pa. WSBA, WAKN
Wehrman, Harvey E., Shirley Savoy Hotel, Denver, Colo. KLZ
Weimer, Orville, 15th & Farnam Sts., Omaha, Nebr. KOWH
Weiner, M. J., 501 Madison Ave., New York, N. Y. WNEW
Wendt, August P., 524 West 4th St., Ottumwa, Iowa. KBIZ
Wesser, C. H., 4500 Penobscot Bldg., Detroit, Mich. W45D
Wetz, Roger H., 659 E. 6th St., Cincinnati, Ohio. WCPO
Wheeler, Leavenworth, P. O. Box 352, Yuma, Ariz. KYUM
Wheeler, Leland, Manslon House, Greenfield, Mass. WHAI
Wheeler, Raymond E., c/o KVOL, Lafayette, La. KVOL
White, J. Harold, News & Tribune Bldg., Jefferson City, Mo. KWOS
White, K. E., c/o WMOG, Brunswick, Ga. WMOG
Whitman, Waldo P., 92 Fourth St., Troy, N. Y. WTRY
Whitney, Charles L., Monte Leone Hotel, New Orleans, La. WDSU
Whitney, Phil, c/o WFVA, Fredericksburg, Va. WINC, WFVA
Wilder, James M., P. O. Box 310, Moultrie, Ga. WMGA
Wiggins, Wallace S., c/o KVOE, Santa Ana, Calif. KVOE
Wileman, Winfred H., c/o KTMS, Santa Barbara, Calif. KTMS
Wilkens, Bernard T., WKBN, Broadcasting Corp., Youngstown, Ohio. WKBN
Wilkinson, W. J., P. O. Box 1712-R, Shreveport, La. KRMD
Williams, C. C., 1107 E. Second Ave., Rome, Ga. WRGA
Williams, H. Berwind, 21 Franklin Ave., Saranac Lake, N. Y. WNBZ
Williams, Maxell, c/o WCBI, Columbus, Miss. WCBI
Williams, Nathan, 150 High St., Oshkosh, Wis. WOSH
Williams, Sidney, 2315 Second St., Baker, Ore. KBKR
Williamson, Bert, P. O. Box 511, Vasalia, Calif. WTKC
Wilson, George W., c/o WJPR, Box 558, Greenville, Miss. WJPR
Wilson, N. L., Box 14, Zarephath, N. J. WAWZ
Wilson, Perry L., 1443½ Park Ave., West Mansfield, Ohio. WMAN
Wilson, Robert J., Hotel Niagara, Niagara Falls, N. Y. WHLD
Winn, Dan L., 114 E. Capitol Ave., Little Rock, Ark. KARK
Wirtanen, Charles W., 185 W. Prospect St., Jackson, Mich. WIBM
Wina, Richard, 2027 Dodge St., Omaha, Nebr. KBON
Wnorowski, Paul A., 2274 N. Union, Decatur, Ill. WSOY
Wolff, F. J., 416 Bellevue Ave., Trenton, N. J. WTNJ
Wood, Wilfred R., c/o WMBG, P. O. Box 5229, Richmond, Va. WMBG
Wooten, H. W., c/o WGTM, Wilson, N. C.
Wright, Jos. A., c/o WBLK, Clarksburg, W. Va., WBLK

— Y —

Yarger, C. R., 12th & Olive Sts., St. Louis, Mo. KSO
Young, Herbert D., c/o KDRO, Sedalia, Mo. KDRO

— Z —

Zehr, Nicholas, Hotel Chase, St. Louis, Mo. KWK

CANADA

Allen, W. H., Route 2, St. Catharine's, Ont. CKTB
Andrews, G. W., P. O. Box 126, Brockville, Ont. CFLC
Aylen, Eric C., 815 Victoria St., Trail, B. C. CJAT
Barnaby, J. W., Sunset Park, Ferris, Ont. CFCH
Bishop, John G., 14 Church St., St. John, N. B. CHSJ
Browne, James H. B., Box 1515, Kelowna, B. C. CKOV
Carter, W. J., Guaranty Trust Bldg., Windsor, Ont. CKLW
Cassidy, S. B., Lincoln, N. B. CFNB
Chandler, A. H., 846 Howe St., Vancouver, B. C. CJOR
Collins, C. E. R., Manitoba Telephone System, Brandon, Man. CKX
Crawford, Bill, 41 King William St., Hamilton, Ont. CHML
Crump, A. E., Peterborough Broadcasting Co., Peterborough, Ont. CHEX
Doak, F. C., Remonski, P.Q. CJBR
DuBerger, Albert, 142 St., John St., Quebec, P. Q. CKCV
Duffield, W. A., c/o CKY, Winnipeg, Man.
Frechette, Romeo, c o CHLT, Sherbrooke, Que. CHLT
Gebhardt, M., 620 Blvd. St. Joseph, Hull Quebec, P. Q. CKCH
Greig, A. W., 13 Newton Ave., Halifax, N. S. CHNS
Hartman, Ion, 31 Ontario St., S., Kitchener, Ont. CKCR
Hildebrand, George, Windsor Hotel, Stratford, Ont. CJCS
Hooper, A. W., Free Press Bldg., Winnipeg, Man. CJRX, CJRO, CJRC
Horton, Leslie, 32 John St., N., Hamilton, Ont. CKOC
Large, Robert F., Island Radio Broadcasting Co., Ltd., 85 Kent St., Charlottetown, P. E. I. CFCY
Lethbridge, Hume A., P. O. Box 250, Nelson, B. C. CKLN
Makepeace, F., CPR Bldg., Edmonton, Alberta. CFRN
Marshall, J. L., c/o CBK, Watrous, Sask.
McCurdy, G. E., Allied Broadcasting Corp., Ltd., Kingston, Ont. CKWS
McDonald, W., c o CJRM, Regina, Sask.
McGough, J. R., New Carlisle, P. Q. CHNC
McLaughlin, Walter V., c/o CFCN, Calgary, Alta. CFCN
McLellan, William, c/o CKCO, Ottawa, Ont. CKCO
Mott, Ernest D., Northern Broadcasting & Publishing, Ltd., Timmins, Ont. CKGB
Nadeau, Arsène, 11 Buade St., Quebec, P. Q. CHRC
Olding, N. R., 701 Hornby St., Vancouver, B. C. CBR, S.W. CBRX
Panke, Sam, Pembroke, Ont. CHOV
Paquet, L. P., c/o CKNB, Maple Green, N. B. CKNB
Parker, Ralph H., c/o CKPR, Fort William, Ont. CKPR
Pilling, Jack, Box 507, Chilliwack, B. C. CHWK
Reid, Scott, c/o CKNX, Wingham, Ont.
Sharpe, J., 37 Bloor St., W., Toronto, Ont. CFRB
Smith, Gordon E., Box 1105, Parry Sound, Ont. CHPS
Sommers, Joseph, c/o CJVI, Central Blvd., Victoria, B. C. CJVI
Spencer, Leonard, 980 St. Catherine St., W., Montreal, P. Q. CKAC
Strong, E. A., c/o CKCK, Regina, Sask.
Swan, Ernest O., 444 University Ave., Toronto, Canada. CKCL
Tate, Ray, Box 806, Flin Flon, Man. CFAR
Teague, Alfred, 49-51 Colborne St., Brantford, Ont. CKPC
Trepanier, Léon, c/o CHLN, Trois-Rivières, P. Q. CHLN
Vallins, W. Ilam, Grey & Bruce Broadcasting Co., Inc., Owen Sound, Ont. CFOS
Van Ness, Thomas, c/o CKBI, Prince Albert, Sask. CKBI
Vernon, A., Sydney, N. S. CJCB, CJCX
Watson, T. G., c/o CJKL, Kirkland Lake, Ont. CJKL
White, James A., K. of P. Bldg., Moncton, N. B. CKCW

Whiteside, Ross L., 812 Robson St., Vancouver, B. C. CKMO
Yorke, Cecil J., 24 Rattle St., London, Ont. CFPL

CUBA

Alarcón, Liberto Cao, Monzana de Gómez 508, Havana. CMK
Chisholm, Edward E., 10 N 423, Vedada, Havana. CMOX
Femenias, Jose R., Jr., Prado 190, Cienfuegos. CMHM
Góngora Mason, Manuel J. de, P. O. Box 152, Holguin. CMKF
Jones, Vincent P., P. O. Box 320, Camaguey. COJK
Olmo, Manuel Manen, Lope Recio 8, Camaguey. CMJW
Pena, Humberto Anderes, Radio Universal, Havana. CMBF, COBF
Prieto, Rafael, 40 CMBA, Santiago de las Vegas. CMBA
Rivero, Mario, c/o CMJK, Camaguey. CMJK
Voldéz, José M. Alvaréz, Agramonte 62, Guanajay. CMAC
Zacca, Pedro, P. O. Box 39, Puerto Padre, Ote. CMKY

HONDURAS

Monterrosa, Jorge, San Pedro Sula. HRPI

MEXICO

Agraz, Jose Remigio, P. O. Box 68, Serdan 144, Hermosillo, Son. XEBH, XEBR
Branch, W. E., Box 188, El Paso, Texas. XELO
Buchanan, Juan Cross, Apartado Postal 7944, Mexico City. XEB
Campoy, Hector, P. O. Box 3, Naco, Son. XETM
Correa, Napoleon, Apartado Postal 57, Tapachula, Chis. XETS
Corts, Enrique Ricart, Apartado 273, Chihuahua. XEIW, XEBW
Del Conde, S., V. Carranza 30, Mexico City. XEN, XENN
Ferreira, Fred, P. O. Box 117, San Ysidro, Calif. XEMO
Gonzalez, Angel Valera, Apartado Postal 282, Puebla, Pue. XEHR
Huerta, M. M., Oriente 63, 269 Col. Iztacelhualt, Mexico, D. F. XERC
Martinez, J. E., Apartado 797, Tampico, Tam. XEFW
Parra, Esteban, Apartado Postal 89, C. Juarez, Chih. XEP
Perez, Francisco, Jr., P. O. Box 37, Los Mochis Sin. XECF
Rojo L., Manuel, c/o XEBG, Tijuana, B. C.
San Martin, Salvador, Enrique Rebsamen 241, Mexico City. XESM
Tarnava, Constantino de, Jr., E. E., Apartado P. O. Box 147, Monterrey, N. L. XEH
Varela, Manuel Aguna, P. O. Box 111, Tijuana, B. C.
Zetina, Manuel, Delegacion de Ixtacalco, Mexico City. XELZ

NICARAGUA

Gallo, Dionisio E. Leon Gilfillan
Gutierrez, R. Ernesto, Managua, La Voz de los Lagos
Hnos. Mendoza y, Managua, La Voz de la America Central
Tenorio, Leonidas A., Granada, La Voz del Mombacho
Tercero Z., Jose F., Granada, La Voz de la Sultana

PERU

Goycochea, Juan P., Ocana 58, Lima. OAX4E, OAX4K
Urteaga, Alvarado y, Saenz Pena 1488, Bellavista, Lima. OAX4C

PORTO RICO

del Valle, A. P., Telephone Bldg., San Juan WKAQ

VENEZUELA

Almenar, Arreaza, Barcelona. YV6RC, YV6RE
Arraez, Manuel, c/o YV1RV, Maracaibo. YV1RV, YV1RA
Barrios, Ramon T., c/o YB5RG, Caracas. YB5RG, YB5RI
Belisario, Manuel, c/o YV1RK, Maracaibo. YV1RK, YV1RL
Cabrera, Hermilio, c/o YV1RT, Maracaibo. YV1RT, YV1RC
Cisneros S., M., c/o YV5RV, La Guaira. YV5RV, YV5RZ
Debrot, G. Nouel, c/o YV1RX, Maracaibo. YV1RX, YV1RF
Degwitz, H., c/o YV5RV, Caracas. YV5RS, YV5RQ
Gonzalez, Diaz, c/o YV2RB, San Cristobal. YV2RB, YV2RN
Marcano C., J., c/o YV5RA, Caracas YV5RA, YV5RN
Nunez, Ramon h., c/o YV4RA, Valencia. YV4RA, YV4RO
Ormezzano, Atilio, c/o YV4RL, Maracay. YV4RL, YV4RK
Rey, P. Castillo, c/o YV5RX, Caracas. YV5RX, YV5RH
Rivero, Armando, c/o YV5RW, Caracas. YV5RY, YV5RI
Rodriquez B., M., c/o YV5RL, Caracas. YV5RL, YV5RW
Segura, Amilcar, c/o YV3RN, Barquisimeto. YV3RN, YV3RE
Siblesz, G., c/o YV5RM, Caracas. YV5RM, YV5RB
Victor, Jaime R., c/o YV1RY, Coro. YV1RY, YV1RW

R.M.A.-I.R.E. ROCHESTER MEETING

The special fall Rochester meeting of the Institute of Radio Engineers and Radio Manufacturers Association will be held at Hotel Sagamore on November 8th and 9th. The extremely interesting program of papers to be presented augurs a substantially large attendance, and an opportunity to meet friends encountered all too infrequently in these busy times.

The following schedule was received from Virgil M. Graham:

(Continued on page 44)

MONDAY, NOVEMBER 8

8:30 A.M. Registration
9:30 A.M. Technical Session
Review of the problem:
Demountable Versus Sealed-off Tubes
I. E. Mouromtseff
Westinghouse Electric & Manufacturing Company
Recent Advances in Klystron Theory
W. W. Hansen
Sperry Gyroscope Company
12:30 P.M. Luncheon
2:00 P.M. Technical Session
The Design of I.F. Transformers for Frequency Modulation Receivers
William H. Parker, Jr.
Stromberg-Carlson Company
Vacuum Capacitors
George H. Floyd
General Electric Company
4:00 P.M. Committee Meetings
6:30 P.M. Dinner
8:15 P.M. Technical Session
The Signal Corps Looks to the Engineer
Lt. Col. Kenneth D. Johnson
U. S. Army Signal Corps

TUESDAY, NOVEMBER 9

8:30 A.M. Registration
9:30 A.M. Technical Session
Message of RMA Director of Engineering
Dr. W. R. G. Baker
Operating Characteristics of Ceramic Dielectrics with Constants over 1000
R. B. Gray
Erie Resistor Corporation
A Chamber of Commerce War Research Committee
K. C. D. Hickman
Distillation Products, Inc.
12:30 P.M. Luncheon
2:00 P.M. Technical Session
Report of RMA Data Bureau
L. C. F. Horle
New Low Loss Ceramic Insulation
Ralston Russell, Jr. and L. J. Berberich
Westinghouse Electric & Manufacturing Company
Design of I.F. Systems
J. E. Maynard
General Electric Company
4:00 P.M. Committee Meetings
6:30 P.M. Stag Banquet
Toastmaster — R. M. Wise
(Subject and Speaker to be announced later)

An exhibit of the U. S. Army Signal Corps equipment will be a feature of both days.

SPOT NEWS

(CONTINUED FROM PAGE 16)

Milwaukee, will represent the FM broadcasters in the Radio Technical Planning Agency.

New Address: With three factories now in operation, the offices of Clarostat Manufacturing Company, Inc. have been set up in new and larger quarters at 130 Clinton Street, Brooklyn, near Borough Hall. This address should be used for all correspondence. Phone is Main 4-1190.

Dr. W. R. G. Baker: Speaking at the FMBI conference: "It is of paramount importance that the FM receiving sets produced after the War be of a high-per-

(CONTINUED ON PAGE 46)

Precision Electrodes

for Quartz Crystals

We are now producing precision electrodes for crystal holders. We feature strict adherence to tolerances of thickness, flatness, parallelism and complete uniformity of production.

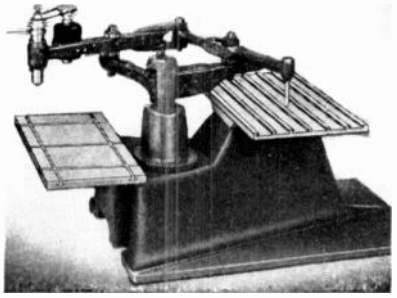
Tools are available for the following sizes:

.765 x .735
.750 x .750
.725 x .725
.600 x .500
.500 x .500

Your inquiry will receive our prompt attention

Etched Products Corporation

39-01 Queens Boulevard
Long Island City, 4, N. Y.
Stillwell 4-5900



At Last!

an engraver, duplicator, profiler for radio-electronic manufacturers. Cut corners—Cut costs—Cut time! with this new bench type equipment that engraves: Cast Iron, Steel, Copper, Brass, Aluminum and Plastics. The Auto-Engraver has:

- **Larger engraving area**
- **More ratios, 1:1 to 2:1**
- **Variable spindle speed**
- **Easily operated by women**

Priced from $225.00 — write for details

AUTO-ENGRAVER COMPANY
1776 Broadway, New York, N. Y.

"how quickly can we get Radio Parts?"

Lafayette Radio Corp. is strategically located to give you *quick* deliveries on radio and electronic parts and equipment, especially on priority, to industrials, training schools and all branches of the armed services. Lafayette's procurement and expediting service has helped to prevent work stoppages on many vital war production lines.

Many instances are on record wherein Lafayette has made immediate delivery on hard-to-find key items, eliminating costly delays in giant armament programs. This is because Lafayette handles the products of every known manufacturer in the radio and electronic field. A single order to Lafayette Radio Corp., no matter how large or how small, will bring prompt delivery of *your* requirements.

Lafayette Radio Register—Free to responsible executives. This 400 page technical and buying aid describes practically every known make of radio parts and electronic equipment. Address Dept. BT1.

LAFAYETTE RADIO CORP.
901 W. JACKSON BLVD. CHICAGO 7, ILLINOIS
265 PEACHTREE ST. ATLANTA 3, GEORGIA

SPOT NEWS

(CONTINUED FROM PAGE 44)

formance type. . . . The broadcasting industry must size up the postwar picture and make some sort of a report on the prospects to help guide the government in regulating the new ultra-short wave field. . . . FM is so much better technically than the present regular broadcast system that it can't fail of acceptance."

Robert T. Bartley: Vice president of the Yankee Network, and active proponent of FM broadcasting, has resigned his post in Boston to serve in an executive capacity with the National Association of Broadcasters as coördinator of NAB war activities, under president Neville Miller.

Interstation AM Interference: In discussions of the relative merits of FM and AM broadcasting, the elimination of heterodyne squeals on FM transmission is sure to be mentioned, and then someone usually asks: "Granted that no squeals are set up when a receiver is within range of two FM stations operating on the same frequency, is such interference so serious on AM that it is important to eliminate it by going to FM broadcasting?"

The four-year battle between WNYC and WCCO is a specific answer to that question. Ever since 1939, WCCO, operating a 50-kw. AM station in Minneapolis, has successfully opposed the continued efforts of New York City's 1-kw. station WNYC to operate in the evening because, sharing the 830-kc. channel, the heterodyne squeal from WNYC interferes with the local reception of WCCO.

Haverhill, Mass.: About 2,000 people will be employed in Western Electric's new plant for the production of telephone equipment.

KINY: At Juneau, Alaska, a new 5-kw. transmitter is scheduled to go on the air October 1st. A 16-hour program will be maintained under the direction of chief engineer Vincent I. Kraft, assisted by resident engineer David Jeffries.

His Own Medicine: Discussing the Cox Committee and its investigation of the FCC, Chairman Fly recently complained that conclusions were being arrived at before the hearings were over, of the impropriety of trying cases in the newspapers, and of the "harshness and low-level quality" of the proceedings carried out by the Cox Committee. The investigation, he said, was a "severe tax" on those doing mostly war work in the FCC, and is "very discouraging" to these people.

His bitter complaining takes us back exactly two years, to the August 1941 issue of *FM*, when Chairman Fly was sitting in the driver's seat of the newspa-

(CONTINUED ON PAGE 48)

MR. RADIOMAN—
The Future Is NOW!
Where will you fit in radio after the war?

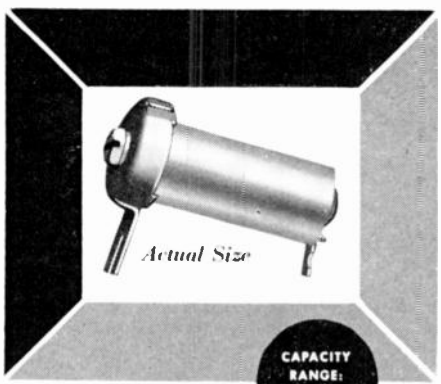
If you are wise, you will realize that the secure future you desire can only be gained by preparing now. You will not wait for a "lucky break" . . . you will analyze your capabilities — decide where you will fit into the postwar world of radio and industrial electronics. You won't wait very long, for you will realize that time is short — that your future is **NOW!** Our planned program of home study can prepare you for the opportunities available to every professional radioman who wants to take advantage of them. A postcard or letter now will bring you complete information.

Write for Details
about CREI Home Study Courses

If you are a professional radio man and want to make more money — let us prove to you we have something you need to qualify for the BETTER career job opportunities that can be yours. To help us intelligently answer your inquiry—PLEASE STATE BRIEFLY YOUR EDUCATION, RADIO EXPERIENCE AND PRESENT POSITION.

Free Booklet Sent

CAPITOL RADIO ENGINEERING INSTITUTE
Dept. F-8, 3224-16TH ST. N. W., WASHINGTON 10, D. C.



Improved
LOW LOSS
Align-Aire Trimmer!

Meissner improved, low loss, low drift, Align-Aire Trimmers are ideally suited for operation under high humidity...and in critical R.F. circuits...3200 degrees rotation...less than 1 mmf per 180 degrees!

Dissipation factor at 1000 kc: .064%...Q-1570 ...dissipation factor at 10 mc: 3.7% ...insulation resistance: greater than 1500 megohms...breakdown over 350 volts, 60 cycles...700 volt AC breakdown available on special order. Meissner Align-Aires are encased in the newly developed Type 10444 Bakelite...compact in size: 7/16" in diameter by 1 1/8" long.

Samples sent upon request.

ARMY NAVY

Meissner
MT. CARMEL, ILLINOIS

"PRECISION-BUILT ELECTRONIC PRODUCTS"

ANTS in his PLANTS!

E. M. SHIDELER W9IFI

TINY CRYSTALS
ARE HELPING TO DO IT

Every time a Nazi factory of war is blown sky high—every time that Hitler's tools of destruction are themselves reduced to scraps of rubble—tiny radio crystals had something to do with the job.

For communication is a vital part of warfare . . . and crystals ride with the raiders. To fulfill their responsibility, they must be perfect. Here at Scientific Radio Products Co., we're turning out perfect crystals . . . rapidly, skillfully, steadily for Hitler's destruction.

Our facilities are such that we may be able to serve you, too, in your efforts to bring destruction to the enemy. *Write us!*

LEO MEYERSON W9GFQ

Scientific RADIO PRODUCTS CO.
738 W. Bdwy. Council Bluffs, Iowa
LEO MEYERSON W9GFQ
E. M. SHIDELER W9IFI
MANUFACTURERS OF PIEZO ELECTRIC CRYSTALS AND ASSOCIATED EQUIPMENT

SPOT NEWS

(CONTINUED FROM PAGE 46)

per-radio investigation, lustily cracking the whip himself. At that time, 109 FM applications were being held up because, as we read on page 5: "The pat on the back that was given to Schenectady's W47A, and his remark that 'the possibilities of FM for conveying good music to the public are unsurpassed by any other media,' becomes a pedantic gesture when it is merely an aside to his feature act of giving the industry a kick in the pants every time a station official turns his back to give attention to his business of serving the public.

"If Commissioner Fly were concerned with public interest, convenience, and necessity, he would have no time for his Cops and Robbers game which, however entertaining it is to him, it is a serious matter to the broadcasters whom he has forced to spend sums now mounting into the millions for self-defense.

"Where it will all wind up, and what further disservice will be done by our Chairman to the radio listeners we do not know at this time, but we do know that no good and much harm comes when a man in public office permits his egotism and self-importance to control his official actions."

Judging from his complaints and virulent characterization of the Cox Committee members and their methods, Chairman Fly is being given an opportunity to gauge the bitterness of the pills with which he has repeatedly dosed the broadcasting industry — and he finds his own medicine highly distasteful.

Radio Engineering Courses: Registration for free courses in radio and electrical engineering at Chicago's Illinois Institute of Technology will be held September 20 to 24. Courses cover the fields of radio, electrical, and power engineering, electronics, power systems, telephony, and mathematics. Primarily a program of night courses, some classes will be offered during the day for the benefit of night workers. Special refresher course for graduate electrical engineers will be given Saturday mornings and one night a week.

W39NY: New York City's municipal FM station, after seven months of test operation, is now on regular schedule from 5 P.M. to 10 P.M. daily. Part of the programs will duplicate WNYC, but W39NY will continue to feature live programs from the concert halls. Reports indicate that the contour of dependable coverage runs through Ossining, N. Y., Princeton, Bloomfield, Elizabeth, East Orange, and Sea Girt, N. J., and Riverhead, L. I. The last-mentioned point is significant because, long before Riverhead, reception of most New York AM stations is weak, and badly cut up by heterodyne whistles.

(CONTINUED ON PAGE 49)

SPOT NEWS

(CONTINUED FROM PAGE 48)

Tower Marking Rules: Revised in new edition of CAA's Obstruction Marking Manual. Copy can be obtained from Civil Aeronautics Administration, Department of Commerce, Washington, D. C.

Profits: With sales of $15,153,000 for the year ending April 30th, after deduction of $6,995,000 in voluntary refunds and reductions prior to renegotiation, Zenith Radio Corporation paid $8,600,000 under renegotiation settlement and $2,853,000 Federal and Capital stock taxes. From net profit of $1,508,000, a dividend of $1.00 per share was paid on 492,464 shares.

FM Reinstatement: The Constitution Publishing Company, Atlanta, Ga., has applied for reinstatement of their FM application. One of the first FM applicants, and the pioneer in the State of Georgia, they were bogged down in the FCC's newspaper inquiry. If it had not been for this delay, their station would have been on the air long before Pearl Harbor, and listeners in their area, where AM receiving conditions are poor, and static is very bad, would be enjoying FM reception now. Incidentally, The Atlanta Constitution was one of our first subscribers.

Radio Kits for Instruction: One- and two-tube receiver construction kits are being supplied for student training courses by Lafayette Radio Corporation, Atlanta and Chicago. Maybe the War will revive the kitchen table workshops and home set-building!

FM for Blue Network: According to Mark Woods, president of the new Blue Network, plans for future activities include FM outlets in New York, Chicago, Washington, San Francisco, and Los Angeles. Under present FCC rules, the Company is limited to the ownership of six FM stations.

Gilbert Seldes: Head of CBS television program department predicts that television may come right after the War, or it may take a year or two longer. "When it comes, it will include color. The price of a good radio set will give you the price of a medium television set." Mr. Seldes did not explain, however, just how we shall know when television has "come," nor the approximate price of a "good" radio.

That's About It: From Press Wireless: "You are either young enough in radio and full of drive and vision or you are out; there is plenty of room for experienced personnel but little for creaking joints or rusty prejudices!"

Daniel W. Gellerup: Columbia University Division of N.D.R.C. has acquired the

(CONTINUED ON PAGE 50)

SPOT NEWS

(CONTINUED FROM PAGE 49)

services of an outstanding FM expert, and a broadcast engineer of exceptional ability. Now on leave from WTMJ and W55M, he has been technical supervisor for *The Milwaukee Journal* during the past 18 years.

WORLD-WIDE NEWS TRANSMISSION

(CONTINUED FROM PAGE 30)

Function of the Company ★ The prime function of Press Wireless is not that of a news-gathering and disseminating agency. It is a common carrier serving newspapers, press associations, and broadcasting stations. It does not originate news items, but supplies the communications facilities to organizations who do gather and disseminate news.

Messages are received, for example, from a newspaper or correspondent at New York operations office either over teletypewriter circuit or by other means. There the message goes through processes of being checked and is sent to the circuit operating position. There an operator punches the message for transmission on a code perforator.

This tape is fed through an automatic transmitting device connected through the control room and wire lines to the actual transmitter at Hicksville, where the message is beamed to its destination.

In receiving a message from a foreign point, the signals are picked up at Baldwin on beam receiving antenna where they are fed into receivers and put on wire lines to New York. There they are fed to the receiving circuit operator's head phones and tape recorders. These tape recorders mark the dots and dashes in ink on paper tape. The tape passes over the keyboard of a typewriter, on which the operator transcribes the dots and dashes into typewritten copy.

After a message has been received on an incoming circuit, it is routed to the addressee.

The Company also operates facsimile circuits, some of which are being redesigned at the present moment. One type of facsimile now operating in South America is known as "telefax". At the receiving end of the telefax circuit, instead of dots and dashes being recorded, actual Roman characters are recorded on tape, eliminating the necessity of transcription.

Present Facilities ★ Two-way radio circuits are now in operation from both American coasts for Government as well as press traffic. From New York, these circuits serve Moscow, London, Berne, Montevideo, Havana, and Mexico City. Radio photo circuits are maintained with London, Berne, Moscow and New York City. From Los Angeles two-way circuits, in-

(CONTINUED ON PAGE 51)

WORLD-WIDE NEWS TRANSMISSION

(CONTINUED FROM PAGE 50)

cluding phototransmission, are operated between Chungking, Khabarovsk and New York.

In addition to these two-way radio circuits, a large amount of traffic is handled over what is known as STS (Schedule Transmission Service). This is a one-way blind transmission circuit, with no return. New York and Los Angeles STS transmissions are now serving practically all the countries of the world. A great many points, where no transmitting facilities are available, rely completely on these transmissions as a source of news. Combining these services, Press Wireless is able to provide tremendously wide coverage.

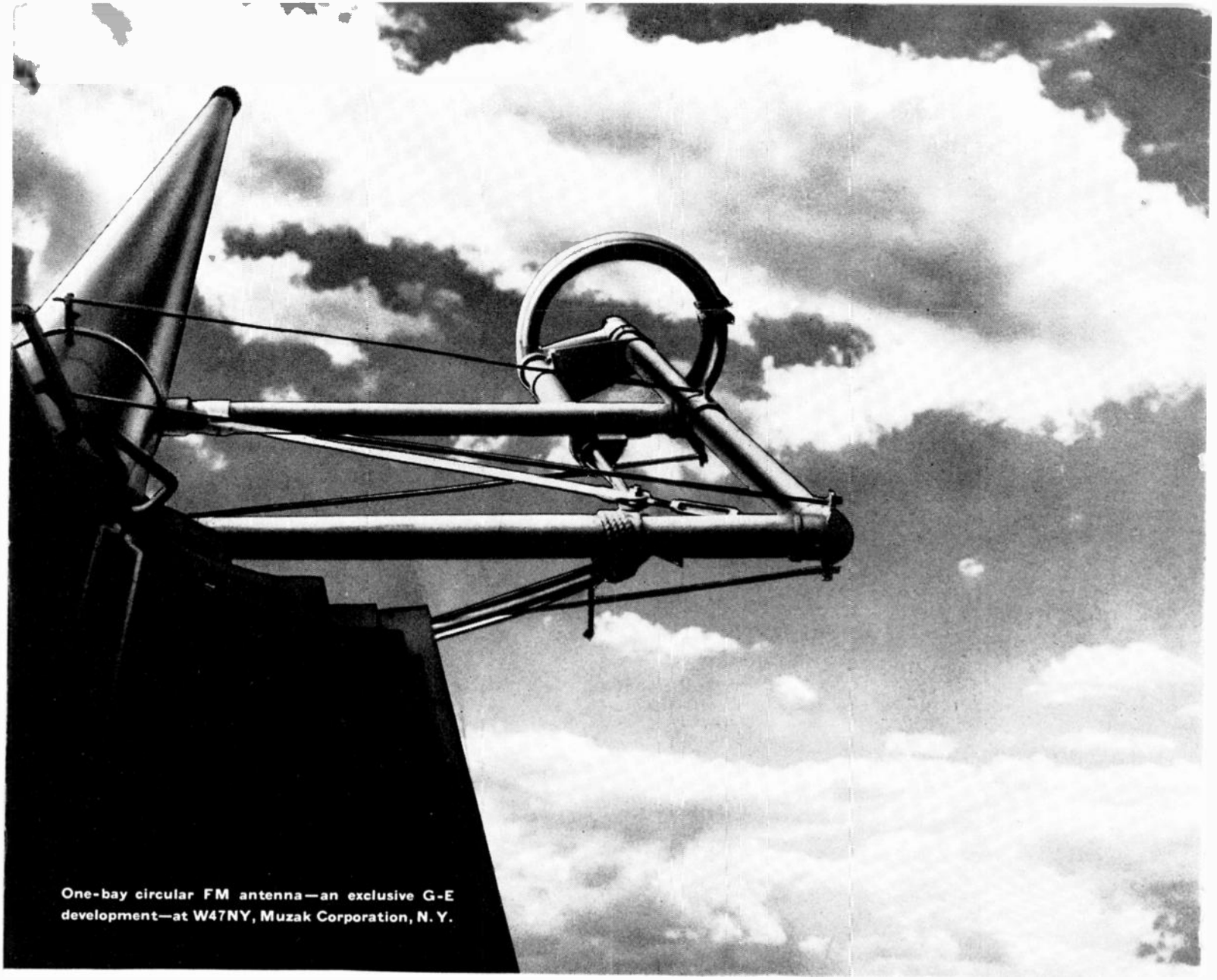
Additional two-way circuits to Press Wireless stations at Rio de Janeiro and Santiago de Chile, are scheduled for operation in the near future, and expansion of communications headquarters in the Times Square Building, 1475 Broadway, New York City, will afford still greater capacity for news traffic.

It has been estimated that the Press Wireless system of newscasting has increased the quantity of news distributed in the communities it serves by four times.

Manufacturing Facilities ★ When the present world war broke out, a drastic readjustment of radio communications facilities throughout the world became necessary. Naturally, this affected Press Wireless and, at the same time, brought to the attention of Army and other officials the Company's activities in radio apparatus manufacturing. Since its founding in 1929, Press Wireless has made high-power radio transmitters and other equipment for itself and a few clients, but it had never engaged in manufacturing on a commercial scale. When officers of the Company were asked if Press Wireless could supply the Signal Corps with certain equipment, an affirmative answer was immediately forthcoming. Specifications set up by the Signal Corps were met promptly, and the Company was soon awarded a number of contracts.

Largely as a result of this development, Press Wireless is now operating factories at Hicksville, N. Y., at Chicago, and at Mountain Grove, Missouri. During this period, its communications and research facilities are being expanded, and plans have already been made for an extensive continuation of these manufacturing activities after the war. In view of the fact that the Company has conceived, developed, and produced practically all the transmitting equipment now being used on its world-wide circuits, the manufacturing development now under way is both logical and timely.

WHEN YOU SEND IN A CHANGE OF ADDRESS, BE SURE TO GIVE THE OLD ONE, ALSO.



One-bay circular FM antenna—an exclusive G-E development—at W47NY, Muzak Corporation, N. Y.

To 144* broadcasters planning FM stations right after the war

No other manufacturer offers so much FM equipment and experience.

From helping you select the best transmitter site to providing a full line of FM equipment, G. E. offers you complete service.

For instance, G. E. can supply its exclusive S-T relay equipment to bridge the gap between studio and transmitter *without wires*. You locate the station for maximum coverage, the studio for maximum convenience.

General Electric has built more FM broadcast transmitters than any other manufacturer . . . more than a third of existing stations.

General Electric is the only manufacturer that has built both FM transmitters and FM home receivers.

General Electric's line of FM equipment includes: Broadcast apparatus, studio equipment, police radio, military radio, complete S-T FM relay equipment, monitoring equipment, high-gain antennas, home receivers.

General Electric is the only manufacturer who offers a complete promotional plan and local promotional effort on the day your General Electric FM station opens its doors. In newspapers, over local radio, with publicity releases and through every General Electric dealer in your vicinity, the sale of FM home receivers is pushed in a determined drive to help you establish your station and FM in your area.

It's not too soon now to start detailed plans for the years following Victory. We invite your inquiries. Write to *Electronics Department, General Electric, Schenectady, New York.*

Tune in "THE WORLD TODAY" and hear the news direct from the men who see it happen, every evening except Sunday at 6:45 E.W.T. over CBS. On Sunday evenings listen to the G-E "Hour of Charm" over NBC network.

**According to a recent G-E survey of broadcasters.*

GENERAL ELECTRIC FM · TELEVISION · AM

160-87-6912

1939

First Commercial FM Station

WHEN John Shepard, 3rd pioneered the world's first commercial FM broadcasting installation at Paxton, REL supplied the FM transmitting equipment.

At that time, Frequency Modulation was so new that the Yankee Network fitted out a trailer for public demonstrations of FM's superior quality and its ability to eliminate static. Programs from the Paxton station were picked up for this purpose.

While other manufacturers of broadcasting station equipment were still questioning the significance of Major Armstrong's invention, REL was already prepared to deliver not only the first Paxton transmitter, of 4 kw. output, but the subsequent 50-kw. equipment which has been in use since 1940.

In fact, every 50-kw. FM transmitter now operating in the U.S.A. is of REL manufacture. Today, in combined power output of FM broadcasting stations, REL leads all other manufacturers by a substantial margin.

REL is prepared to maintain this leadership in the FM field when new construction is again permitted.

LOOK TO REL FOR PEACETIME LEADERSHIP

Engineering improved equipment for War today, REL is planning further improvements for Peace tomorrow. Among these will be REL "packaged" FM broadcast stations, low in cost and easy to erect, for communities which now lack adequate, enjoyable, static-free radio entertainment.

REL

RADIO ENGINEERING LABS., Inc.
Long Island City 1 New York

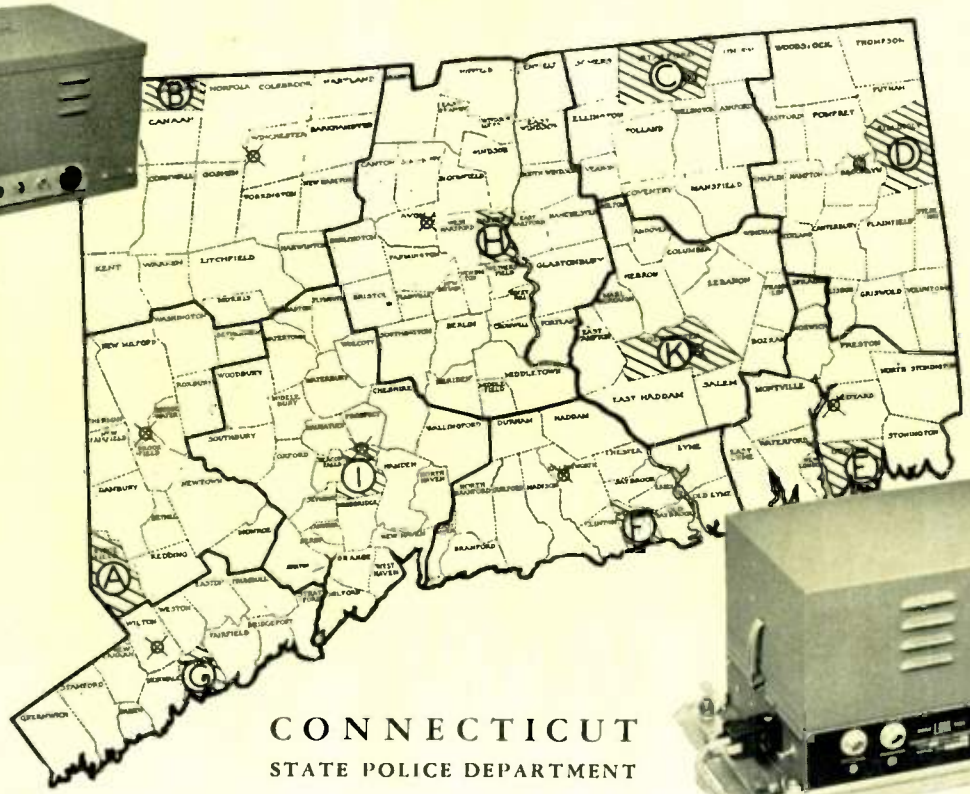
Sales Offices:

5334 Hollywood Blvd., Hollywood, California
2040 Grand River Ave. W., Detroit, Michigan
310 Fifteenth St., Denver, Colorado

RUMFORD PRESS
CONCORD, N. H.

WRH

LINK MODEL 11UF
MOBILE FM RECEIVER



139

Link Men
in Service

LINK MODEL 35UFM
MOBILE FM TRANSMITTER

"The First is still the Best"

4th Year of Continuous, Efficient Service

THE State of Connecticut installed the first two-way State Wide FM police radio system, purchasing Fred M. Link equipment exclusively.

There are 11 main stations on the same frequency with 300 State Police cars on a second frequency. All main stations are remotely controlled. Complete coverage is readily obtained over the 4,965 square miles of the State's irregular terrain.

This system has proved to be so flexible and foolproof that it has served as a model for numerous other states but most important it has yielded new concepts of maintenance and service. Mr. Sydney E. Warner, Radio Supervisor under Commissioner E. J. Hickey, has been in continuous charge of the system, and now in the 4th year of its operation, he reports as follows:

"As to maintenance, the following factors are outstanding: The original maintenance department consisted of 5 men and later was reduced to 4 men. At present it is reduced to 3 and has continued to function efficiently. The ability to maintain 11 main stations and 300 two-way cars with a staff of 4 men to cover the entire state seems impossible at first thought. It is done efficiently however and the explanation as to how it is done is simple — regular maintenance schedule on rugged trouble-free equipment that will operate without adjustment between maintenance periods. Normally 4 men provide the first half of this combination while the Link Corporation supplies the second."

To those who do not want to experiment, the experience of the Connecticut State Police may be taken as a criterion of LINK radio performance.

ARMY E NAVY

The best-equipped police and fire departments use F. M. Link equipment exclusively

FM BY Link

Fred M. Link

Engineer • Manufacturer

125 WEST 17th ST., NEW YORK, N.Y.

Telephone: CHELSEA 2-3838