

"THE ETERNAL ROAD" INTRODUCES A NEW ERA IN THEATRE "SOUND"

This spectacular "music-drama" introduces to the theatre the use of talk-back direction; and a high-fidelity, "perspective" sound system as the major source of music, choral and sound effects.

ANDREW HALBRAN

MAX REINHARDT'S stage spectacle, "The Eternal Road," introduces two electronic developments—(1) nearly all-sound performance and, (2) talk-back direction—that open new vistas in theatre technique.

In an audience of thousands watching this amazing presentation, only a few know that this production has a background of the greatest scientific importance; for the music, sound effects, chorals, lighting and, as well, the entire direction, are handled and produced electrically through the medium of a radically-new type of sound system secretly developed, by RCA Photophone, for this new "music-drama" at the Manhattan Opera House, New York City. Innumerable difficulties were surmounted by an installation crew under the expert direction of G. A. Toepperwein; while credit goes to W. A. ("Woodie") Woodfin for perfect coordination of the entire sound system during the performances.

An acre-size stage of concrete-and-steel accommodates a cast of nearly 250 persons; and majestic scenery (designed by Norman Bel Geddes) that cascades downward, in 5 steps, right down to floor-level with the audience! Old Testament scenes with modern connotations are depicted; passages from the Bible are reenacted, on the 4 upper levels, as worshipers in a modern synagogue exhibit religious fervor during reading of the Bible, under conditions of oppression,

on the first or lowest level.

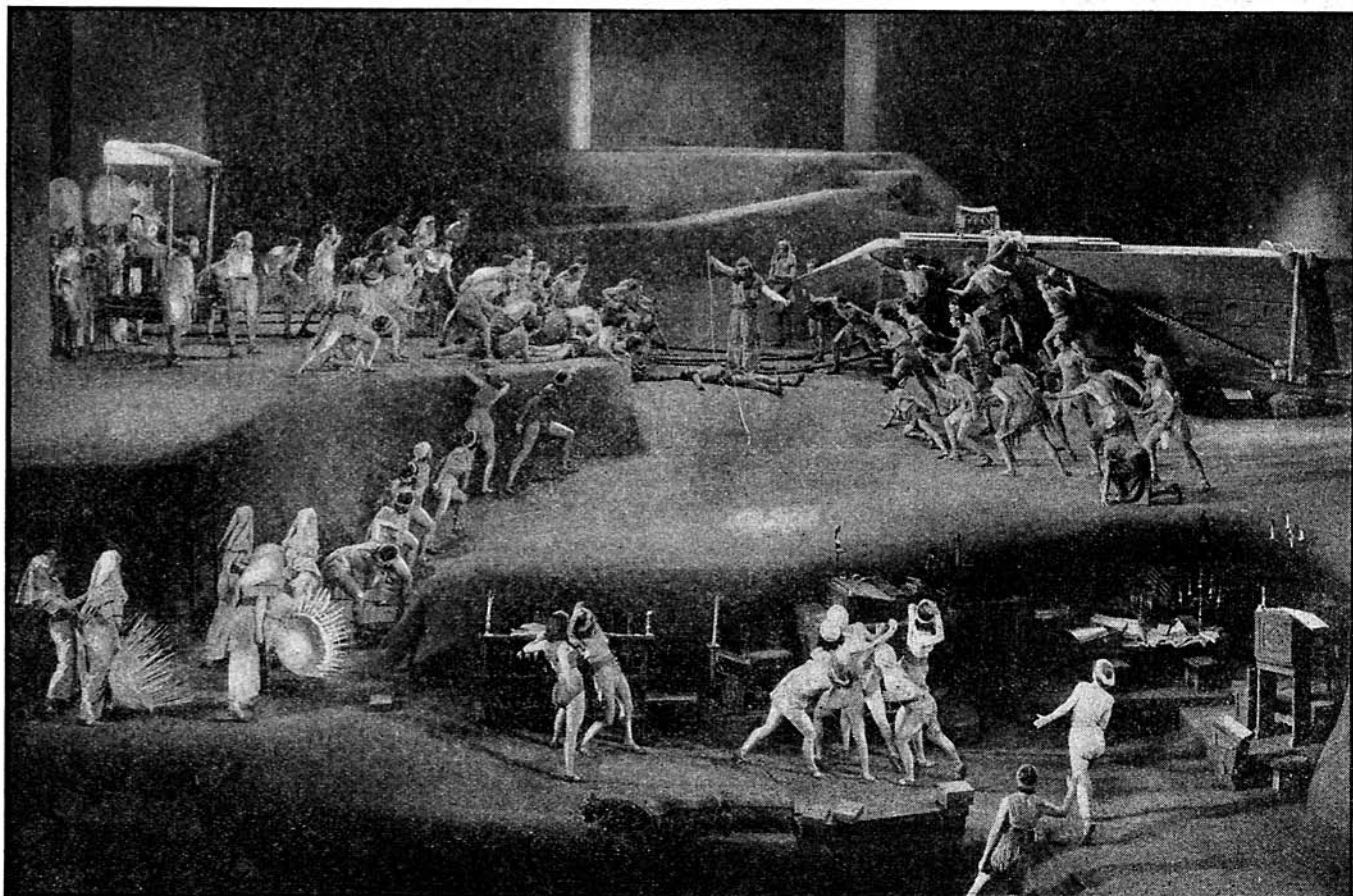
Viewed from "back stage," however, a scientific spectacle even more amazing is visible, the features of which are entirely new, involving the use of a large orchestra housed in a concealed soundproof chamber backstage, an electric organ, sound-film machines the recordings of which have been made by a new method, sound-effect gallery, and 28 giant loudspeaking units so placed that the sound is sprayed and bounced all over the stage and theatre in such a manner that the audience can be made to believe practically anything.

Supplementing this is a "whispering" loudspeaker system using 28 small speakers which go to every part of the stage—underneath the stage, dressing rooms, electrical switchboards, sound-film room, amplifier room, light bridges and towers, etc. All of this is coordinated through the controls in (1) the prompter's box immediately in front of the stage, (2) the orchestra leader's desk, and (3) the main console located in a box in the second balcony.

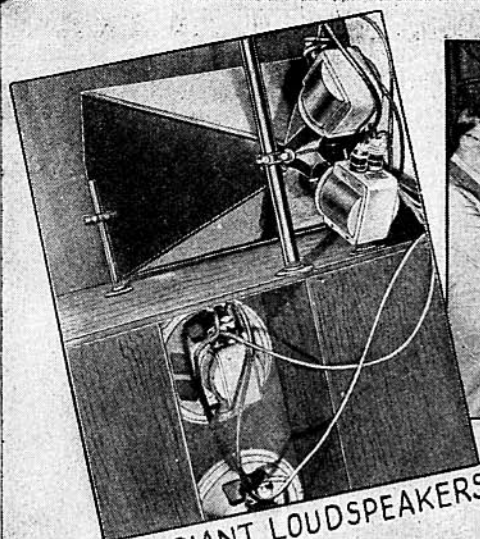
ORCHESTRA LEADER IS KEY MAN

The orchestra is concealed in a soundproofed chamber backstage. The audience hears the orchestra through the sound system alone.

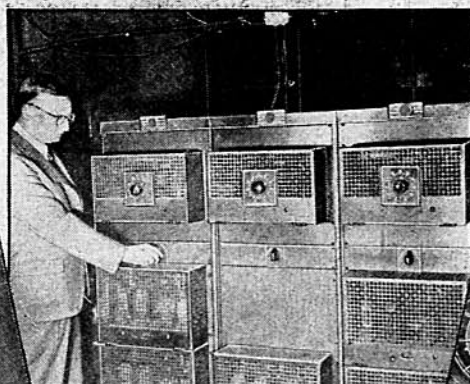
(Continued on page 677)



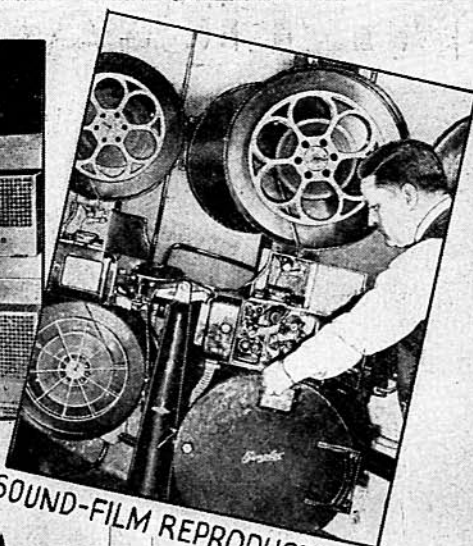
Scene: Moses in Egypt. Elaborate scenery conceals the many loudspeaker units. Continuity is controlled by a "whispering" or private-address system.



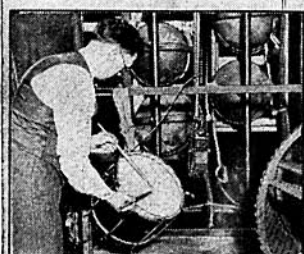
GIANT LOUDSPEAKERS



80-WATT AMPLIFIERS



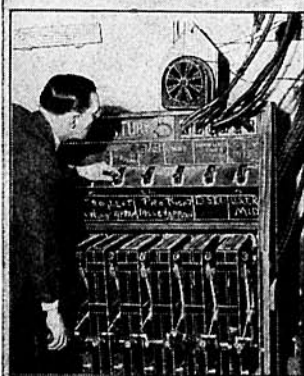
SOUND-FILM REPRODUCERS



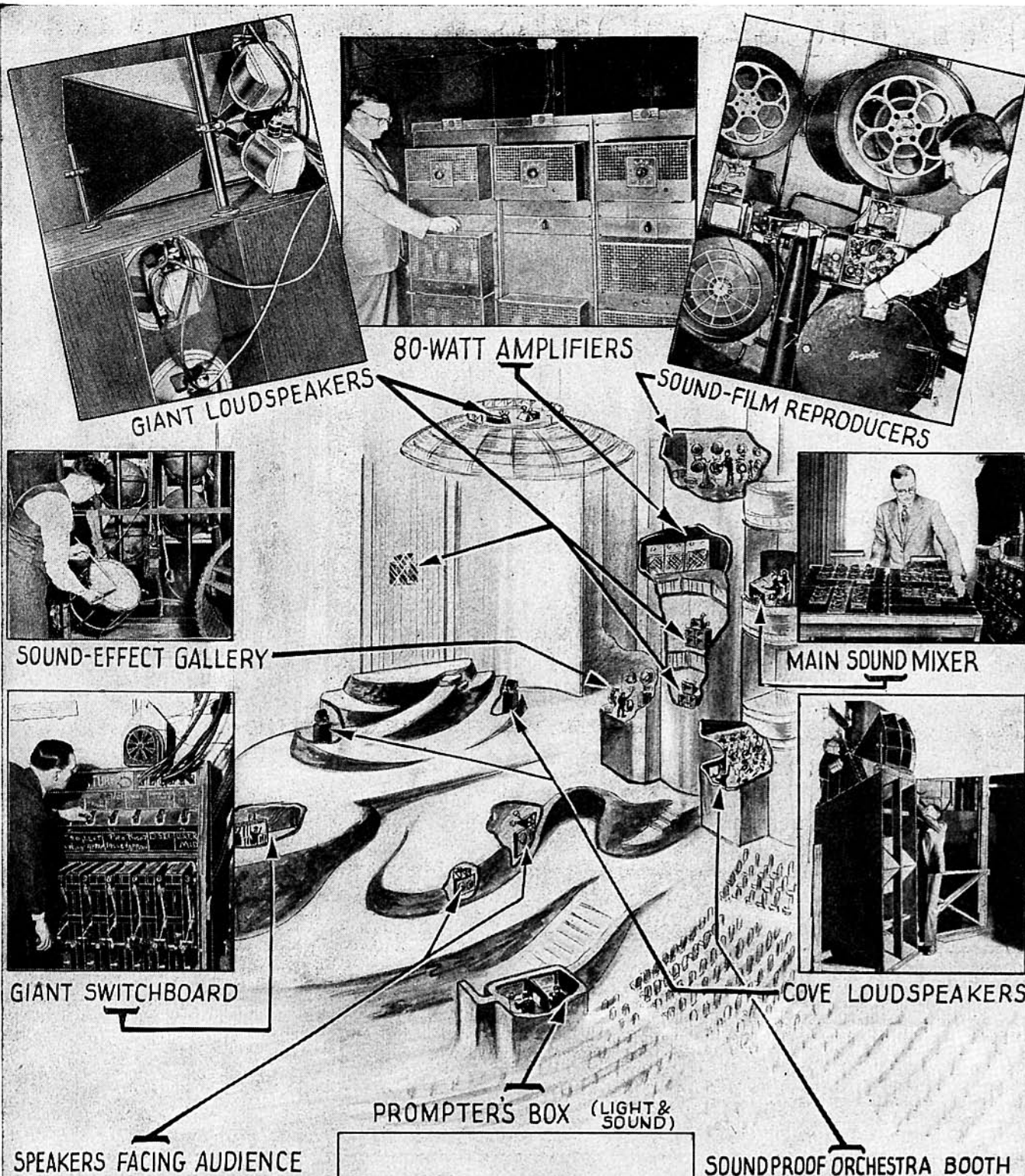
SOUND-EFFECT GALLERY



MAIN SOUND MIXER



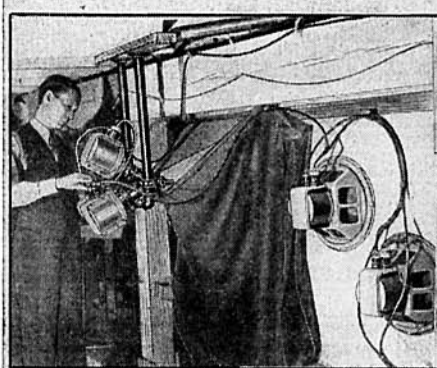
GIANT SWITCHBOARD



SPEAKERS FACING AUDIENCE

PROMPTER'S BOX (LIGHT & SOUND)

COVE LOUDSPEAKERS



SOUNDPROOF ORCHESTRA BOOTH

"THE ETERNAL ROAD" INTRODUCES A NEW ERA IN THEATRE "SOUND"

(Continued from page 648)

The musicians see nothing of the performance but the orchestra leader observes the presentation through a desk-side window.

Instead of this "live" orchestra, a second orchestra, recorded on sound film, may be used where greater volume (and "color") is required; simultaneously, a second sound-film recording, consisting of choral and sound effects, may be superimposed on the first. Also available, but as "live" pickups, are an electric organ and the sounds created in a special sound-effects gallery.

Both the alive, and recorded, sound portions of the program are molded as to volume and other characteristics to suit the mood of the action, and then projected through the theatre-address system to the audience.

The director starts everything by pressing a button; and then monitors the combined output by means of headphones connected through a small amplifier to a microphone located above the audience.

The heart of the new sound system—the control console—is located in one of the boxes on the side of the second balcony. Seemingly magical results are secured through the manipulation of the controls of this console. In one part of the play, for instance, Moses supposedly talks with God. God seemingly replies to him, in a voice of stentorian proportions, through the medium of giant loudspeakers installed in the ceiling of the theatre thus creating the illusion that the voice is coming from Heaven. The dimensional and perspective effects of the sound system are also controlled from this console.

HIGH-FIDELITY SOUND SYSTEM

Four sound-film machines are located in an enclosed chamber above the stage. They are operated by remote control. Using a new system of recording, known as "push-pull ultra-violet," the music reproduced from this sound film is superior to anything heard heretofore; too, this is the first installation of its kind. (See *Radio-Craft*, May 1936, pg. 646.—Editor). One machine substitutes a 60-piece symphony orchestra for the theatre's regular orchestra; a second sound-film unit contributes the requisite choral and sound effects.

RCA Photophone advises *Radio-Craft* that the frequency range is about 40 to 10,000 cycles, ± 5 db., at 32 acoustic watts output!

In the background of the stage, located on either side, are 2 semi-circular "coves" extending to a height of 80 ft. At the base of these concavities and facing them are 2 groups of loudspeakers each containing 4 units. Each group consists of a multi-cellular or honeycomb-like high-frequency trumpet and a giant medium- and low-frequency exponential horn. The sound system is so designed that the output of these loudspeakers is made to strike the coves which thereby conduct the sound upward and outward to the audience.

This effect is extremely valuable, for instance, in reproducing the music of the electric organ which, of course, has no reverberation as in the case of a real pipe organ. These coves help to provide a lag to make up this deficiency. They are not, however, used for the organ alone but also for certain sound effects as well.

Several banks of reproducers are concealed in structural parts of the scenery and are trained straight at the audience. Large baffle-type reproducers also occupy the boxes, which were formerly graced by jewel-bedecked women, and crown the dome of the theatre.

The "sound" for this gigantic theatrical performance, including the voices, music and sound effects, is provided by 2 high-fidelity, 80-W. amplifiers (though an output of 40 W. has been found adequate), and a 40-W. (reserve) amplifier. Occasionally, this 40-W. panel may be used for supplementary services.

The control of the giant electrical switchboard located in the basement under stage is, like other activities in this theatre, accomplished through the "whispering" ("private address") loudspeaker system. Its operators, guided entirely by commands from the prompter's box and by careful timing, see nothing of the show.

The dual prompter's box is hidden in a recess that faces and offers a clear view of the stage. The operator in the left-hand compartment con-

(Continued on page 678)

restaurants theatres
dance halls
nite clubs

Lafayette

CO-ORDINATED
SOUND SYSTEMS

P.A. is Big Business
... **Lafayette**
WILL HELP YOU GET A PROFITABLE SHARE OF IT!

P. A. is Big Business today! LAFAYETTE Co-ordinated Sound Systems have met this fact, with modernized equipment to reflect the increased scope of the field. Completely assembled—in the newest, most modern dress—the trim exteriors of these splendidly packaged units are typical of the fitness and efficiency of their well-planned engineering make-up. They are most simple to install—ready for instant and faultless operation. We invite your inspection of the line of LAFAYETTE Co-ordinated Sound Systems.

15 WATT PORTABLE SYSTEM!

This Lafayette 15 Watt portable COORDINATED SOUND SYSTEM incorporates the following modern features: All-metal tubes, mixing and fading facilities, three input channels, crystal, velocity, soundcell, velophone, electro-static or velotron mike operation, tone control, shielded plug-in input and output connections, variable output impedances, all terminals on rear of chassis, fused power line, triple filtered plate supply, Class "A" amplification, electronic mixing. Two 12" electro-dynamic speakers housed in attractive airplane luggage type case. Case splits into two separate sections, with speaker in each.

B378-P—15 watt portable sound system, less tubes, microphone and mike stand. **\$39.50**

B855-P—Same as above, but with tubes, Lafayette velocity microphone and heavy base floor stand. Ready to operate. Nothing else to buy. **\$59.50**

WHOLESALE RADIO SERVICE CO. INC.
NEW YORK, N.Y., CHICAGO, ILL., ATLANTA, GA.
100 SIXTH AVENUE 901 W. JACKSON BLVD. 430 W. PEACHTREE ST., N.W.
BRONX, N.Y. NEWARK, N.J. JAMAICA, L.I.
542 E. FORDHAM RD. 219 CENTRAL AVE. 90-08 164TH STREET
4 WISCONSIN ROAD

FREE CATALOG!
Send for this new "smash-hit"
116 page FREE Spring Catalog
—Everything that's new in
sound and radios. See the pop-
ular trailer set and thousands
of bargains in parts. Get your
copy today.

WHOLESALE RADIO SERVICE CO., Inc.
100 SIXTH AVE., NEW YORK, N.Y.

Please send FREE catalog No. 68-3E7. ☐
Enclosed find check ☐ money order ☐
merchandise listed on attached sheet.

Name _____
Address _____
City _____ State _____

Be a RADIO EXPERT—Learn AT HOME

RADIO SPECIALISTS NEEDED

Modern receivers with their complicated circuit systems have knocked out the old time cut-and-try radio fixer. Trained men with up-to-the-minute knowledge are needed to service these new sets.

HERE IS YOUR OPPORTUNITY

Your possibilities of making money and getting ahead are limited only by your ability and skill—but you must know more than the other fellow. You must be a radio service specialist, as R.T.A. can train you.



FREE OF EXTRA COST

To start you making money without delay we equip you with this Circuit Analyzer and Point to Point Resistance Tester.

PRACTICAL TRAINING AT HOME

Our home study course is practical "shop and bench" training combined with a thorough set of practical lessons prepared by an experienced radio service engineer. Four working outfits are also furnished.

MAKE SPARE TIME MONEY

Our training is complete and practical. We show you how to make money almost from the start. The course can easily be made to pay its own way. Investigate now, write for free book of details.

RADIO TRAINING ASS'N OF AMERICA
Dept RC-75, 4525 RAVENSWOOD AVE., CHICAGO

WHAT R.T.A. STUDENTS SAY

Norwood, Ohio
I have connected with a large firm as Radio Service Manager and wish to extend my thanks for your help.

Joseph Radpin, Jr.

Yorkville, Ohio
From Aug. 1 to Dec. 7, 1936, I repaired 163 radios and put up 43 aerials which is very good for part time work while studying your course.

Chas. Koerber.

...for AMBITIOUS MEN ONLY!

SPRAYBERRY ACADEMY OF RADIO

F. L. Sprayberry, President
2545 University Pl., N.W., Washington, D.C.

Sure! Let me have the Facts! Without obligation on my part, please send me your Free book, "MORE MONEY IN RADIO," and other details of famous Sprayberry Training.

Name

Address

RC 5-37

PASTE COUPON ON PENNY POSTCARD AND MAIL TODAY.

THE MOST IMPORTANT COUPON YOU'LL EVER CLIP

I Will Show You How My 2-WAY MONEY-MAKING RADIO TRAINING PLAN

★ Can Prepare You at Home for a Good-Paying RADIO Job ... at a Cost of Less than 17c a Day!

Whether you've got a job or are looking for one—whether you're looking for a profitable lifetime profession or a part-time money maker... and whether or not you've ever had previous Radio experience, you owe it to yourself to investigate my success Radio Training method at once. I'll show you how to make spare time profits while you learn. I'll fit you out with Professional Radio Equipment, teach you to use it on all kinds of work and teach you modern business methods.

I ACTUALLY SET YOU UP READY FOR BUSINESS

It can be done! I am already doing it for ambitious fellows like you. I know I can do it for you. ... You'll learn at home in spare time—and you'll be pleasantly surprised how quickly you are ready for a real future in a growing industry with unlimited possibilities for well-trained men.

RADIO — ELECTRONICS — TELEVISION — SOUND, ETC.

Sprayberry Training covers EVERY branch of Radio in a way that is interesting and easy to understand. Get MY new booklet! Learn what it has meant to ambitious students—read the glowing records of praise from leaders of the Radio Industry. GET THE FACTS!

DON'T WISH FOR A GOOD JOB START TRAINING FOR ONE...

NOW!



Mail the above Coupon Today. ... Prepare for a Job that Pays Real Money!

TECHNICIANS' DATA SERVICE

JOSEPH CALCATERRA

DIRECTOR

A special arrangement between RADIO-CRAFT magazine and the publishers of this literature, which permits bulk mailings to interested RADIO-CRAFT readers, eliminates the trouble and expense of writing to each individual organization represented in this department.

2. HAMMARLUND CATALOG. Contains complete specifications, illustrations and prices on the Hammarlund line of variable and adjustable condensers; intermediate frequency transformers, coils and coil forms; sockets; shields; chokes and miscellaneous parts for broadcast, short wave and ultra-short wave reception and transmission. Also contains description and prices of the Hammarlund line of "Comet Pro" and "Super Pro" receivers.

5. ELECTRAD 1936 VOLUME CONTROL AND RESISTOR CATALOG. Contains 12 pages of data on Electrad standard and replacement volume controls. Truvalt adjustable resistors, vitreous wire-wound fixed and adjustable resistors and voltage dividers, precision wire-wound non-inductive resistors, center-tapped filament resistors, high-quality attenuators, power (50- and 150-watt) rheostats and other Electrad resistor specialties.

29. THE KEY TO SUCCESSFUL SERVICING. Four different types of combinations of courses on Radio Servicing, Public Address Work, and Television, developed by the Radio Service Institute, are described in this 24-page booklet. Complete information, including outlines of the courses and costs, is given. Two of the courses are designed for the more advanced and more ambitious Service Men who are anxious to get to the top of their profession. The other two courses are for less-experienced Service Men who want to advance more rapidly in the Radio Servicing Field. Please do not ask for this booklet unless you are interested in taking a course in these subjects.

53. POLYIRON COIL DATA SHEET 536. This folder contains complete catalog descriptions, specifications, prices, performance curves and circuits showing applications of the complete line of Polyiron radio components made by the Aladdin Radio Industries, Inc.

57. RIBBON MICROPHONES AND HOW TO USE THEM. Describes the principles and operating characteristics of the Amperite velocity microphones. Also gives a diagram of an excellent humless A.C. and battery-operated preamplifier.

65. THE 1937 LINE OF SUPREME TESTING INSTRUMENTS. This 24-page catalog gives complete information on the entire Supreme line of testing instruments, including the Model 585 Diagonometer; the Model 540 and 550 Radio Testers; the Model 500 Automatic; the Model 505 Tube Tester; the Model 555 Diagonoscope and other Supreme oscilloscopes, tube testers, signal generators and multimeters. Complete details of the Supreme Easy Payment Plan for purchasing testing equipment on the installment plan are also given.

66. SUPREME DESIGN MANUAL "A" OF TUBE AND RADIO TESTING CIRCUITS. This interesting and useful 60-page handbook covers the fundamental principles of meters, measuring instruments and test circuits and illustrates, with detailed explanations, the basic circuits used in Supreme Testing Instruments. Every Service Man who is interested in the "why" of testing circuits should have a copy of this handbook in his kit.

73. HOW TO ELIMINATE RADIO INTERFERENCE. A handy folder which gives very complete information on how to determine and locate the sources of radio noise by means of the Sprague Interference Analyzer. A description of the

Radio-Craft Technicians' Data Service
99 Hudson Street,
New York City, N. Y.

RC-537

Please send to me, without charge or obligation, the catalog, booklets, etc. the numbers of which I have circled below.

2	5	29	53	57	65	73
74	75	76				

My radio connection is checked below:

- ☐ Service Man operating own business.
☐ Service Man for manufacturer.
☐ Service Man for jobber.
☐ Service Man for dealer.
☐ Service Man for servicing company.
☐ Dealer.
☐ Jobber.
☐ Experimenter.
☐ Professional Set Builder.
☐ Amateur Set Builder.
☐ Short Wave Worker.
☐ Licensed Amateur.
☐ Station Operator.
☐ Radio Engineer.
☐ Laboratory Technician.
☐ Public Address Worker.
☐ Manufacturer's Executive.
☐ Student.

I am a:

☐ Subscriber ☐ Newsstand reader
 I buy approximately \$..... of radio material a month. (Please answer without exaggeration or not at all.)

Name

Address

City State
 (Please print name and address)

Avoid delay. The catalogs and booklets listed are now in stock and will be sent promptly as long as the supply lasts. Please use this coupon in ordering. The use of a letter causes delay.

analyzer and method of using it is included, together with data on how to eliminate interference of various kinds once the source is located.

74. SPRAGUE 1936 ELECTROLYTIC AND PAPER CONDENSER CATALOG. Gives specifications, with list and net prices on a complete line of wet and dry electrolytic, and paper condensers made by the Sprague Products Co. for radio Service Men, set builders, experimenters and engineers. Information on the Sprague Capacity Indicator, for making capacity tests on condensers and in servicing receivers, is included.

75. SPRAGUE TEL-U-HOW CONDENSER GUIDE. A valuable chart, compiled by the Sprague Products Co. which tells the proper types, capacity values and voltages of condensers required in the various circuits of radio receivers and amplifiers, and how to locate radio troubles due to defective condensers. Includes data on condenser calculations.

76. FACTS YOU SHOULD KNOW ABOUT CONDENSERS. A folder, prepared by the Sprague Products Co., which explains the importance of various characteristics of condensers, such as power-factor, leakage, capacity and voltage in determining the efficiency or suitability of a given condenser to provide maximum filtering and safety in operation.

"THE ETERNAL ROAD" INTRODUCES A NEW ERA IN THEATRE "SOUND"

(Continued from page 677)

trols the sound effects while the operator in the right-hand compartment supervises the lighting. Both accomplish this through the "whispering" loudspeaker system and manual control. Loudspeakers become "mikes" at the flip of a switch.

Altogether, this unusual collection of "new" P.A. devices opens up a new era in sound work.

The unusual type of film recording: the talk-back communicating system which permits instantaneous control of lighting, cueing and

scene shifting; the unusual acoustical devices resorted to, in producing the difficult effects required for this extraordinary theatrical performance; the combined use of alive and recorded orchestras, voices and sound, projected through an unusual high-fidelity system; and the careful engineering in permitting complete flexibility in all controls, make possible this classic example of neo-theatre technique—which everyone should make it a point to see.

Please Say That You Saw It in RADIO-CRAFT