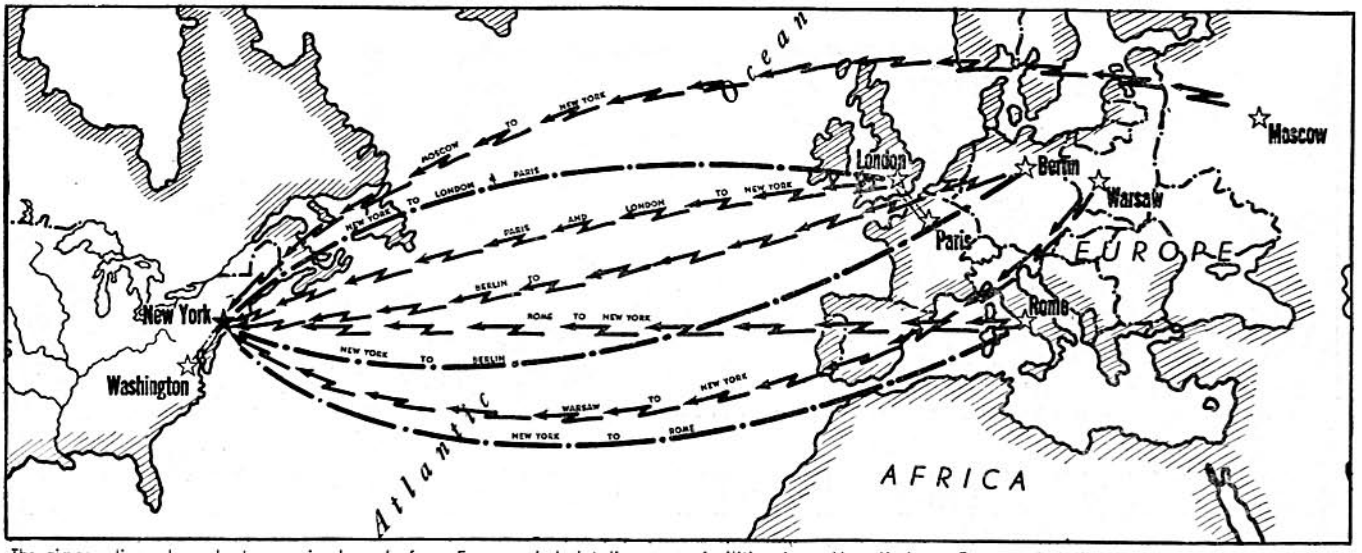


The zig-zag lines show shortwave air channels from Europe; dash-dot lines, cue facilities from New York to Europe; dash lines, communications facilities. A 4-way conversation may be held with London, Paris, New York and Washington; only 2 radio channels—one East-bound and one West-bound—are utilized between Europe and America. International talk-fest may include other foci of war news for broadcast listeners as C.B.S. shows in this map.

WAR NEWS Via RADIO

Modern radio broadcast coverage of war news utilizes many technical innovations. Several, including "4-way conversations", are described in this article on how C.B.S. is set up for feeding news to its network.

IN a glass-enclosed studio on the 17th floor of the Columbia Broadcasting System, a modern miracle of radio is taking place.

Seated at a desk before a microphone is the veteran news analyst, H. V. Kaltenborn. Strapped to his head is a set of earphones. He is delivering an analysis of the latest war bulletin. As he speaks, his words are being heard by millions of American radio listeners. They are also being heard by 3 other men—one seated at a microphone in Washington, D. C., another at a microphone in Paris, a third in a radio studio in London. As we shall see, the result is a transoceanic "radio party-wire"!

MULTI-POINT CONTACT PROBLEMS

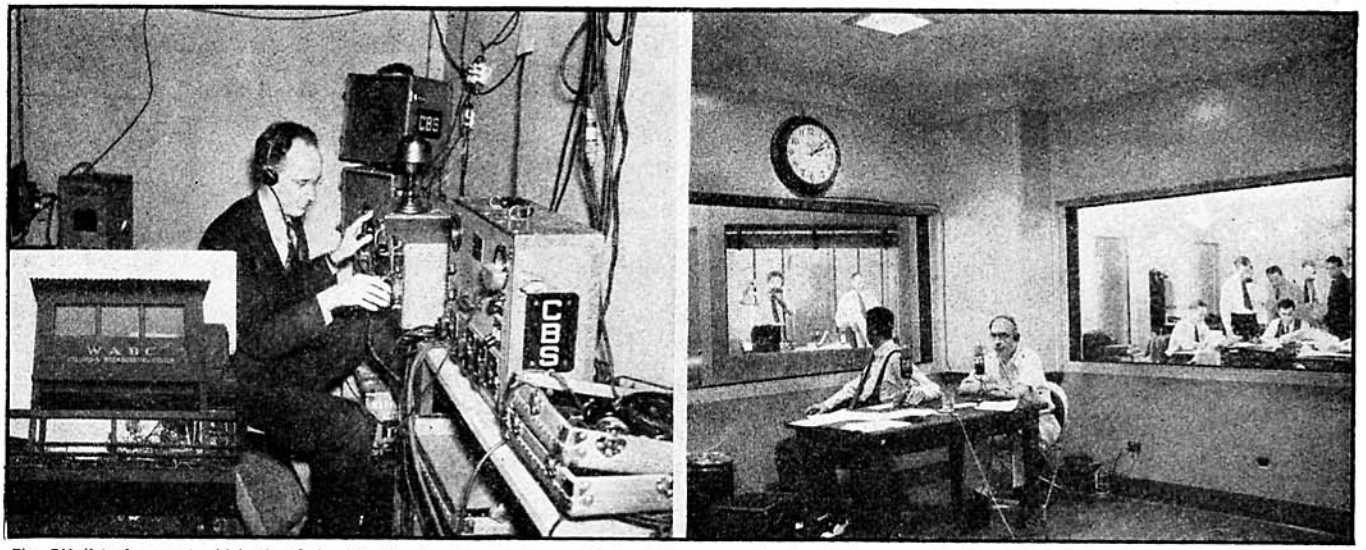
In 2 minutes, Kaltenborn's analysis will end. He will lean forward into the microphone, and with no change in his tone of voice, will say:—"Come in, London." And without a pause in the even flow of broadcasting, the man in London will reply. In due course, the voice from London will give way to the voice in Paris, and that voice to the voice in Washington, D. C.—as smoothly as though all the men were seated in a single living-room, chatting about the news.

Such is Columbia's latest technical innovation for the coverage of war news —the "4-way conversation" as it has been called by the engineers and traffic men who worked it out and made it possible.

The need for the multi-point conversation was first felt at C.B.S. in March, 1938, when the Austrian *Anschluss* began. At that time, Paul W. White, Director of Public Affairs, realized that straight broadcasts from abroad were not enough. In time of crisis the foreign countries were liable to impose censorship on all broadcasts delivered from their studios. To counteract such propaganda, it was necessary to have not one but several foreign pick-ups at a time.

White did arrange several such multi-

(Continued on page 374)



The DX listening post which the Columbia Broadcasting System maintains 24 hours per day to aid its news-gathering staff includes the super-sensitive receiving equipment here shown, left, being operated by Mr. William Whitford; the exterior of this station, at an ideal location in Forest Hills, Long Island (N.Y.), is shown in inset. Studio 9 (photo at right), 17th floor, 485 Madison Ave. (N.Y.C.), is a special news-broadcasting unit built this year by C.B.S.; the side at left faces public affairs director White's glass-enclosed office, the side at right faces the news-room, while straight ahead is the control room. At the studio mikes are announcer Bob Trout and news analyst Elmer Davis.

EMISSION VS. MUTUAL CONDUCTANCE TEST

(Continued from page 335)

expected. With hundreds of different types of tubes now available it is extremely difficult to get an instrument flexible enough to meet such a wide latitude of requirements. It is therefore usually necessary to use a reasonable number of different potentials and loads representing as near as possible the average of all of the necessary conditions.

One objection is found in the mutual conductance type—that is its limited flexibility. Any changes in the base connections of the various tubes are likely to result in difficulty as far as changes or additions to the instrument are concerned. Likewise the use of some odd combinations of operating voltages will sometimes be difficult to obtain. The probable life of the mutual conductance tester is therefore somewhat lower than with other types, while the price of an accurate instrument is necessarily higher than testers of less complicated design.

Output Tester

A true output test (See Fig. 3.) is one which determines the power output which a tube is capable of developing without excessive distortion. Its greatest accuracy is in checking power amplifier tubes. This test must also be made under conditions very closely approximating actual operation and is practically a laboratory job. The design is rather difficult to produce at a reasonable price. For that reason most so-called output testers are in reality modified emission types. Obsolescence is likewise apt to occur toward the introduction of new types of tubes. Such additions take place quite frequently and are therefore a condition worthy of consideration.

Emission Tester

The emission tester is perhaps the simplest and oldest type of tester available. (See Fig. 4.) Probably one of the first methods of tube testing was the measurement of plate current under actual operating conditions. (It was later found that it was not essential to adhere closely to tube specifications in making emission tests.) The filament or cathode is the principal factor determining the condition of a tube, provided the space and size of the element are always the same, with each type of tube.

The only important factor in determining emission is the *load* applied to the tube. If only a small load is applied to certain types, such as rectifiers, the filament or cathode may be capable of handling that load, and the tube will read "good" although under actual operating load it will fail. Likewise certain battery types and diodes are only capable of good operation under very light loads. If a heavy load is applied to such tubes a perfectly good tube may be damaged. Recent work in conjunction with various tube manufacturers has resulted in the establishment of recommended loads for various types of tubes. These recommendations have been followed closely in the production of certain emission types now on the market. The loading of the tube is all that must be watched for proper emission. With variable loads the test voltages can be kept constant resulting in a relatively simple design in keeping with the space and price limitations existing in dealer requirements.

Early emission tests were found to be somewhat inaccurate due to variations in the structural design of tubes. If the element spacing or position varies, artificial emission readings may be obtained. With present production on precision automatic machines and improved factory inspection, the chance of irregular design is reduced to a minimum, and it is possible to rely upon indications obtained with a well-designed emission tester.

This article has been prepared from data supplied by courtesy of Weston Electrical Instrument Corp.

Referring to the typical diagrams, on pg. 335, commercial tube checkers employing the mutual conductance principle do not use all of the meters shown in the circuit. Instead, a meter is placed only in the plate circuit; either a D.C. instrument for the grid-shift type or a dynamometer type of A.C. milliammeter for the dynamic mutual circuit. The remaining instruments designated by the letter E, are omitted because it is assumed the voltages are set up properly by controls provided on the panel for that purpose. The output type of circuit is very rarely used because it is limited in its application to certain types of power tubes. In all these circuits the supply voltages and parts values are purely arbitrary, and will vary with the particular type of tube selected as V. The representative tube tester illustrated on the same page is the Weston model 773 portable unit.—*Editor*

WAR NEWS VIA RADIO

(Continued from page 329)

point pick-ups during the Austrian Anschluss, from Paris, London, Washington, and New York, but at that time the requirement was restricted to "3-way conversations." During the recent crisis the requirement called for "4-way conversations." Normal arrangements to avoid feedbacks and confusion to the respective commentators would require 8 trans-Atlantic radiotelephone channels to carry 4 voices back and forth. In addition to these, separate cue channels were required for testing and co-ordinating the program. Obviously such a complex and expensive set-up could not be used very often, nor could it be arranged at a moment's notice in an emergency. White turned the problem over to the C.B.S. Traffic and Engineering Departments, and asked them to work out a simpler arrangement of facilities that would produce the same results.

4-WAY TALK-FEST

The present "4-way conversation" takes place on only 2 trans-Atlantic point-to-point shortwave channels—one East-bound to Europe, the other West-bound to America. As a usual thing these channels are secured from A.T.&T. The receiving station in Europe relays the East-bound voice from the broadcasting station in America to the European capitals by land wire. The European broadcasters' voices are in turn sent by land-line to the European shortwave transmitter for the West-bound broadcast to America. Here they are received and transmitted to New York and Washington by land-line—making a continuous loop of facilities. (See map.)

Each city on the great trans-Atlantic loop is set up on a conversational basis—that is, the microphones in London, Paris, New York and Washington remain open throughout the duration of the broadcast, as though each were listening in on a "party line." Each broadcaster takes his cue during the program from the preceding speaker, and gives the go-ahead to the man who follows him. With all microphones open, the cities can follow each other in any order desired,

or all could speak together as in conversation, if need be.

Every effort has been made, in setting up the circuits and amplifiers, to eliminate program interference and feedback. In fact, the circuits are so arranged that though every speaker can hear the voices of his colleagues, he can never hear his own voice—unless he happens to have a set tuned to Columbia's shortwave station WCBX in the studio.

"Cue channels" on direct shortwave between New York and the European capitals are always available in conjunction with these conversations. Over these the traffic department and Paul White generally speak for 5 minutes or so before each broadcast—the traffic department to make certain of transmission results and Paul White to give each speaker the latest war bulletins so that his analysis of news will be up-to-date. The only important European capitals which have no shortwave cue channels are Moscow and Warsaw. On the rare occasions when broadcasts have come from these cities their time schedules have been arranged by cable beforehand and they have come in on an exact time basis.

Striking as the "4-way conversation" may seem to the average radio listener, it is only one of many technical triumphs achieved by the C.B.S. Traffic and Engineering Departments for Columbia's present war coverage. In New York alone the entire set-up of news operations has been changed during the past year, thanks to a number of special devices designed to facilitate the broadcasting of every aspect a news program can include.

A WAR NEWS STUDIO!

Columbia's brand new Studio 9 is in itself a major achievement; designed by engineers, and completed just before the war began, *it is the only studio in the United States planned exclusively for news broadcasting.* Glass-enclosed, so that its staff may be immediately apprised by hand signals of last-minute news bulletins, it is set on the 17th floor in the very heart of the News Department.

Facing one of its glass walls is the glass-enclosed office of Paul W. White, who often directs special news broadcasts from his desk. Another wall faces the glassed-in "news room," where press tickers grind out news bulletins. The news room is equipped with pneumatic tubes through which messages and telegrams can be sent quickly to other departments in the building.

A 3rd wall—also made largely of glass—faces a sound-proof "listening room," where translators listen 24 hours a day to shortwave programs coming from government shortwave broadcast stations in Europe, and jot down news items of importance.

The 4th glass wall of Studio 9 faces a control-booth through which, in time of emergency, all network programs are routed. Thus, when a news bulletin of importance comes through, the technician on duty has only to flip a key switch on his complex control-panel—and instantly all broadcasts on the network are cut off the air, leaving Columbia's roster of 117 stations entirely set up for the news flash.

The studio itself contains the most up-to-date equipment for news broadcasting, with the addition of a very useful gadget invented this year by Columbia engineers—the so-called "Automatic Cue Flash," designed to warn announcers and news analysts at the end of their speaking time.

THE "AUTOMATIC CUE FLASH"

The device resembles a battery set on a tray. On either side are 2 red ship's lan-

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WAR NEWS VIA RADIO

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terns. In the middle of the battery-like box is a dial calibrated in *minutes*, a center knob marked in *seconds*, and a red hand which starts moving the moment the device is set into operation. When the red hand stops at zero (placed where the "12" is on the ordinary clock face) it indicates that all the allotted time has been consumed. At this, 2 photoflood bulbs set in the 2 red lanterns flash—so swiftly and brightly that even if the announcer's back is turned, he cannot miss the signal. (See photo, pg. 327.)

To eliminate the necessity for opening and closing the door of Studio 9 when special bulletins of importance come in during air-time, a unique "news-slit" has been constructed in the studio wall through which bulletins can be slipped to the announcer inside.

Paul White's office and the adjoining news ticker and cable rooms are all designed so that, in an emergency, they can be placed instantly in contact with every department of C.B.S. Mr. White's telephone, for example, is no ordinary telephone, but the focal point for desk telephones all over the building. When he picks it up to make an emergency call, the telephones of executives in at least a dozen departments ring instantly, and a red light flashes on at their respective desks. This simple factor is of the utmost importance during a crisis, when at a moment's notice, Mr. White must clear network time, arrange for the rerouting of programs, and accomplish a half-dozen other details connected with a sudden change in schedule.

WORLD-WIDE "LISTENING ROOM"

Probably the most interesting room during the present war is the "listening room" adjoining Studio 9. Here shortwave broadcasts are received from 24 foreign countries for translation by a group of linguists.

These broadcasts are never heard on the C.B.S. network, but they are important to Columbia's war coverage as background material, inasmuch as they often contain news bulletins and official statements issued by foreign governments, which are indicative of news trends. Of course a good many also contain propaganda, atrocity stories, and the like, but it is up to the broadcasters to check on such information and make sure that it is reliable before using it.

DX RECEIVING STATION

Columbia maintains its own receiving station for these shortwave programs. It is a 10 x 12 foot shack out at Forest Hills, in a spot which was selected after long search by the C.B.S. engineers, as being satisfactory for clear reception from abroad.

Equipment inside consists of commercial receivers, modified by the engineering department for extreme sensitivity. They are capable of tuning-in on shortwave programs not only directed to the United States from Europe, but on European shortwave broadcasts which have been beamed to such remote places as South Africa, China, and India.

News, as one can see from the foregoing descriptions, is coming in to C.B.S. from many sources. Technically, the set-up for getting it speedily on the air is practically perfect. The only problems still left to the broadcasters are those of accuracy, foreign censorship, and neutrality. And these are matters outside the realm of traffic and engineering operations.

Radio-Craft extends its thanks to C.B.S.'s Miss Lucille Fletcher for her cooperation in making this article and its illustrations available.

WIDE-RANGE LOUDSPEAKER

(Continued from page 339)

out to a limit of 12,000 to 15,000 cycles by means of the new reproducer design.

In other words the electrical signal to the voice coil may be "flat" (without any serious drop) out to about 18,000 cycles but this limit is not reached in the acoustical reproduction. In general the effective frequency response range of the new loudspeaker design described here may be taken as about 12,000 to 13,000 cycles.

The practical limit of the high-frequency response of this loudspeaker, as with any reproducer, is partly a function of the signal intensity at these high frequencies. In other words if means are provided for making the limits of the high-frequency range disproportionately strong these frequencies may be reproduced where otherwise they would not be heard. The essential difference between this "Single-Unit Wide-Range Loudspeaker" (now standard equipment in one G.E. frequency-modulated receiver) and preceding types is that, in addition to the response being more uniform throughout the entire audio range, the response limit is reached at a new high frequency.—*Editor*

RADIO-CRAFT

Gentlemen:

We wish to call to your attention, a statement in the June issue of *Radio-Craft*, and which we think is entitled to some discussion. This appears in the article headed "The Radio Month in Review" and is the first paragraph on page 748 which reads as follows:

"Another outstanding achievement brought to light at this meeting was the G.E. high-fidelity loudspeaker now standard in the new 'F.M.' receivers of the same make. A smoothly-graded range in the thickness of the loudspeaker diaphragm serves to maintain uniform compliance right out to the carpinchoe edge of the cone. The result is a unit readily capable of handling over 9 W. with a frequency range plus or minus 1 db., of 30 to 18,000 cycles."

We wish to challenge these facts and render very serious objections to the printing of such statements in your magazine. This speaker in question comes nowhere near this performance and we feel that such exaggerated statements in connection with speaker characteristics do serious damage in the industry by establishing false impressions in the minds of the public and misleading them in their demands in connection with speaker results. We doubt very much if the speaker in question has a response covering half the frequency range mentioned, with less than a 10 db. total variation from uniform response.

The principle involved in this case is a very serious one and we feel that more attention is going to have to be paid to

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