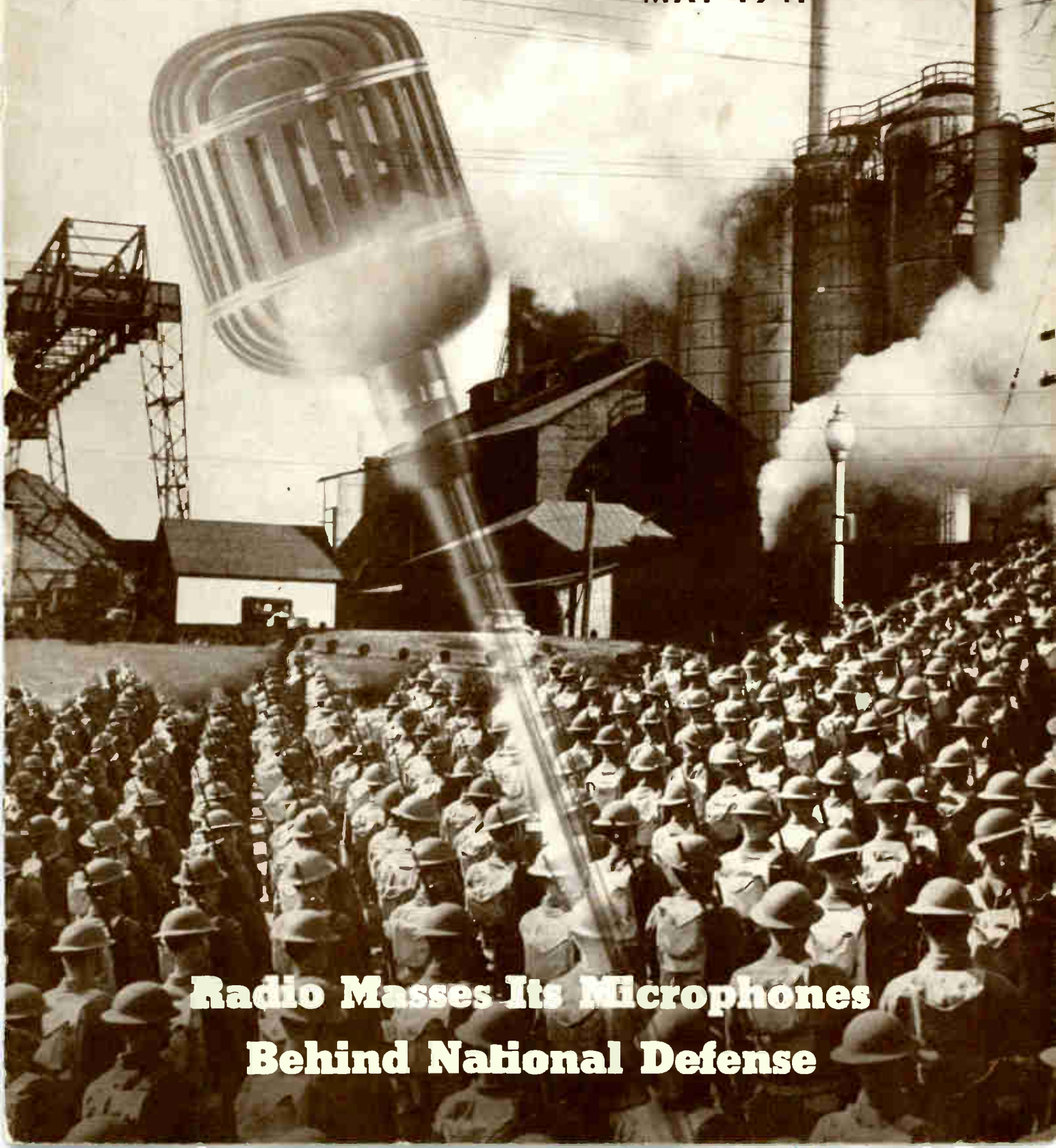


PICK-UPS

MAY 1941



**Radio Masses Its Microphones
Behind National Defense**

PICK-UPS

MAY, 1941

BEING A PERIODICAL DEVOTED TO DEVELOPMENT IN SOUND TRANSMISSION. PUBLISHED BY THE

Western Electric

C O M P A N Y

195 Broadway : New York, N. Y.

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Above photograph—Ewing-Galloway



Broadcasting was born of the first World War. It cut its teeth on the strenuous, delirious post-war years; then came the depression when progress slackened and everyone fought to hold his own and keep alive. But broadcasting in its adolescence used these years to grow, to consolidate its strength, to take on sinews of a man.

And now broadcasting, in the full vigor of maturity is confronted with another war. In the year that has passed broadcasting has demonstrated its ability to do a man's job.

Today every citizen is grateful to you, America's broadcasters, for the tremendous job you have done in helping to mobilize the industrial and military might of the nation. Anxious mothers are grateful for the news you bring them of their boys in camp—soldiers for the cheer and entertainment you give them. Industry thanks you for rallying men to man its machines. Uncle Sam has relied on you — and you have come through.

To do this you had to cancel programs, disrupt schedules, extend staffs and facilities, work day and night. But you know it's your Number One job and you have accepted it wholeheartedly. Under the American System of Broadcasting you stand ready for the crucial days ahead.

NAB

CONVENTION

St. Louis, Mo.

May 12-15

1941



Neville Miller, President, National Association of Broadcasters.

Radio, United behind NAB, Spurs All National Defense Activities

By NEVILLE MILLER

As members of the National Association of Broadcasters gather in St. Louis for their annual convention the question of National Defense looms up as one of the major jobs before the industry. Never before has the nation leaned so heavily on broadcasting to disseminate important information to its millions of listeners. In the more crucial days to come the industry will face increasing responsibilities as the defense movement gains greater momentum. Judging the future from the past year's efforts broadcasters will shoulder the job ahead in that spirit of service and cooperation which has become a radio tradition.

Broadcasting's accomplishments in helping to mobilize the country's industrial and military forces deserve the thanks of a nation. Stations from one end of the country to the other are behind the defense program 100 per cent. Through the medium of radio alone thousands upon thousands of skilled and unskilled workers have been placed in vital de-

fense industries—army, navy, marine and air corps enlistments have been vastly increased. When the Selective Service Act became a law radio proved to be a most effective medium for spreading necessary information concerning registration.

Both the broadcasting industry and the NAB are fully able to handle such emergencies as they arise. Like broadcasting, the NAB has grown tremendously during the past year. At the time of our San Francisco convention we had 460 members. Today we have 545. The services of the association have grown to keep pace with the growth of membership. Our sales promotion departments have been expanded. Our research, circulation, public and labor relations departments have enlarged their activities. We will be able to report to the membership in St. Louis that we think we have done a good job in 1940-41, and that we fully expect to do a much better one in 1941-42.



"Soldier's Quiz" staged by WAAB (Colonial) at Camp Edwards. This type of broadcast not only entertains the boys at camp and keeps them on their toes but also has helped considerably to acquaint the public with military life and terminology.

Radio Masses Its Microphones Behind National Defense

By M. M. BEARD

Broadcasting is tackling the biggest job in its history. It has mustered its microphones behind the National Defense Program.

A nation of 130 million people is being rallied to the cause of Democracy. An aroused—united America must roll up its sleeves and *work* to defend this priceless possession. The call of National Defense rings out. Men needed for the army, navy, marines, air corps. Men needed for factories, shipyards, arsenals, munition plants, oil refineries, farms, mines, laboratories, transportation. Subversive propaganda must be combatted—sabotage crushed. Morale of boys in camp—folks back home—workers must be sustained. Health must be guarded.

This, briefly, is the defense message. It must reach every citizen in the United States. It must penetrate three million square miles of territory. It must go on day after day—week after week—to keep pace with the shifting national and international scenes. It must travel with speed. And as never before the nation turns to radio—the speediest voice in the

land—to tell the people why, how and where to do the job.

How are broadcasters meeting the challenge?

Seeking an answer Pick-Ups contacted the National Association of Broadcasters, the networks and over 600 stations. As gleaned from voluminous reports flowing in, here is the story.

Actually the big push over the air started last July after President Roosevelt and Congress initiated the preparedness program. To the Civil Service Commission fell the immediate task of locating thousands of skilled workers for the army and navy departments. Since such a program could not be carried on with necessary speed by ordinary procedures the Commission turned to Radio. Posters placed in post offices and police stations played their part but, broadcasters, says the Commission, handled the bulk of the work.

By November 15, 150,000 workers had been placed in army and navy jobs. On January 1st,

the quota had risen to 200,000. March 1st saw it shoot up over the 300,000 mark. These figures do not include the thousands of employees who had been placed on vital defense jobs in factories and other establishments at that time.

According to an NAB report issued in February, 654 stations had recorded their cooperation—more undoubtedly have since fallen in line.

Here are other examples of radio's speed during the early days of the emergency when the industry was just getting into its stride. Late in 1940 the war department needed telephone construction men at the Canal Zone. The Commission explained the need to broadcasters. Within a week the jobs had been filled. During February the NAB prepared bulletins to assist the navy in securing embryo pilots for service with the fleet. The first announcements hit the studios on February 17. Two days later letters were pouring into Washington saying requests were on the air and applicants began popping up all over the country to fill the gap. Similarly, 13,000 men reported for border patrol duty a week after radio had broadcast the call.

Hardly had the preparedness program swung into action than along came the Selective Service bill and the subsequent task of registering 16,400,000 men for military training. Bewildered eligibles were in a quandary. Just what did selective service mean? Why, where and when did one register? "District draft board", "R-Day", "Numbers" whirled around in many a confused brain.

Again the administration turned to Radio as one of the chief mediums for spreading necessary information. Networks promptly turned over their wires—stations their microphones to government officials, recruiting officers and news correspondents assigned the job of clarifying the bill. Studios suddenly went all aglitter with gold braid and brass buttons as brigadier generals, colonels, majors, captains took command of the mikes to smooth out perplexing problems over the air. Station scouts combed their areas to locate first drawees. Typical of many stations, KDKA (Pittsburgh) rounded up the "lucky" 158's in their territory—had the men talking over the microphone two hours after Washington had announced the first capsule drawn from the big bowl.

Mobile units sent out from Columbia and Mutual kept abreast of the first contingent of selectees as they arrived at Fort Dix, New Jersey. Mutual's Dave Driscoll, director of news and special events, spent three days at the Fort living the life of a draftee before he started an intensive series of descriptive broadcasts which went over the air six times a day—from reveille to taps. Rookies, themselves were interviewed—giving first impressions of the military settings in which they will live for the coming year. Bunks, uniforms, utensils, arms—all the paraphernalia which transforms a civilian into a soldier—were discussed.

Uncle Sam Comes First!

Defense orders totaling many millions of dollars for communications equipment have been given the Specialty Products Division of Western Electric. Much equipment has already gone to Uncle Sam's services and more and more leaves the Kearny Works daily under a program which makes defense work Specialty Products' Number One job. Vast quantities of radio and sound equipment, which will see service in Army and Navy airplanes, in the Army's mechanized units, naval fighting ships, ground stations and with the Coast Guard, are scheduled for production. We are proud and glad that our people and facilities have been called upon to play this important role in the nation's defense.

The work of turning out this specialized communications equipment by Specialty Products Division is just a small phase of the tremendous defense activities in which the entire company is engaged.

Because Western Electric is the source of supply for the Bell System, the greatest part of this total effort goes to meet the demands for telephone apparatus brought about by the defense program and mounting industrial needs.

In supplying equipment for Uncle Sam, Specialty Products is not unmindful of the fact that its regular customers may at times suffer delivery delays. This will be avoided wherever possible. But Uncle Sam Comes First!

WAAB (Colonial Network) did a similar job from Fort Devens, when the first quota of selectees were inducted into service at that location. Appearing on the program was John E. Lawton of Everett, Mass., first draftee in the country accepted by Uncle Sam. Like many stations WGNV (Newburgh, N. Y.) continues cooperation with local draft boards by broadcasting registration numbers called to compose each quota. Numbers go on the air as soon as the lists are compiled. Residents of the area like the feature—say it gives them up-to-the-minute information about local men who will leave for training.

For months past hundreds of stations have been broadcasting army, navy, marine, aviation recruiting programs and NAB spots. Publicizing the government's mobile recruiting unit passing through Greenville, Miss., WJPR recently urged citizens to see the unit and register. Since last May, five days a week, WCKY's "Morn Patrol" pilot has visited recruiting units around Cincinnati to broadcast interviews with recruits and officers. Backed by statements from recruiting men KVOO (Tulsa, Oklahoma)



No morale fatigue for Uncle Sam's boys with "Dr. Broadcasting" on the job to cheer them up. WOR (top) started something when the station rounded up six truck loads of radio sets for Fort Dix. Above: At Camp Ord show KDON (Don Lee) picks the young soldiers, not the brass hats, to entertain.

claims that the station has played a signal role in helping to make the district one of the largest per capita percentages of enlistments in the country.

WBAP-KGKO (Fort Worth) says its "Uncle Sam's Flying Cadets" has reaped rich rewards in aviation recruits. During the series a two-way conversation between Major Jack Jaynes, flying 5000 feet above Dallas, and the commander of Hensley Field, went on the air. Some 500 prospective eaglets wrote in for further information on Uncle Sam's air arm. Another KGKO offering "Letters from a Hicks Field Cadet" has brought in over 5000 letters from possible army air corps material. Mail came from 20 states besides Texas. Several enlisted cadets in the show report that their parents, 1000 miles back home, listen in regularly to the program.

Broadcasting from Floyd Bennett Field, Mutual has been following the colorful life of pilots in training from the time they are sworn in to the proud day when they get their wings and are sent to join their squadron.

KGHL (Billings, Montana) sends along this letter from a navy substation as evidence of their efforts. "Our district for the Western recruiting division is the only one that has consistently filled its ever increasing quotas each month. This is largely due

to the assistance received from KGHL."

True to the good old Yankee tradition the Colonial Network has been pepping up recruiting throughout the New England territory. Periodically Major General James A. Woodruff appears before the microphone urging New England boys to fill up the army ranks. The network's "Radio Visits the Army and Navy" likewise has helped considerably in boosting enlistments. One of the series staged this program—at the New London Naval Base, announcer Bob Martineau donned a bathing suit, tucked a mike under his arm and descended into a submarine escape tower. Officers and navy diver Conrad Zibitzky (first to reach the ill-fated Squalus) took part in broadcast interviews.

WTAR (Norfolk, Va.) with army and navy officers at the microphone, has been presenting imaginary interviews in answer to the thousand and one questions cropping up in the minds of men considering signing-up.

Working with the Flying Cadet Aviation Board WFDF (Flint, Mich.) has been contacting air minded boys at remote points. WTMJ (Milwaukee) performs a similar service with their serial "Johnny Gets His Wings." KOA (Denver) likewise airs the air corps with broadcasts direct from Lowery Field, aviation center in Denver. Sound effects from hangars and flying field form a realistic background. Thus, radio searches the byways for men to guard the airways.

Eyeing future needs for signal corps radio operators WCOP (Boston) conducts a code school via the air. The station claims that instruction offered will save as much as two or three months of training for those interested in pounding brass for Uncle Sam's defense. The first three broadcasts brought in 116 letters and 61 enrollments in the course.

Don Lee is giving those two-fisted, hard hitting marines a boost in a dramatic series "The Marines Tell It To You." WMMN (Fairmont, West Va.) sums up the station's recruiting efforts by saying, "We've been shoving publicity over the air for all we're worth in our coverage area." Other stations reporting cooperation with draft boards and recruiting offices are: WSAU (Wausau, Wis.); KPQ (Wenatchee, Wash.); WDGY (Minneapolis); WIBG (Glenside, Pa.); KIEM (Eureka, Cal.); WCLS (Joliet, Ill.); KFNF (Shenandoah, Iowa); WLAP (Lexington, Ky.); WORC (Worcester, Mass.); WMT (Cedar Rapids, Iowa); KFDA (Amarillo, Texas); KBIX (Muskogee, Okla.); KFAC (Los Angeles, Cal.); WJDX (Jackson, Miss.); KTRB (Modesto, Cal.); KOAC (Corvallis, Ore.); WBLK (Clarksburg, W. Va.); WTEL (Philadelphia); KHAS (Hastings, Nebraska); WMAZ (Macon, Ga.).

With the passage of the Lease-Lend

Bill came the President's trumpet call to the nation to fall in line behind an industrial effort to win the war. "No part time job this—no business as usual." And the cry for civilian workers swept the country with unprecedented vehemence. Federal, state and local employment groups from coast to coast organized drives. New establishments opened. Others expanded. And from millions of receivers into millions of living rooms the message boomed out as fresh batches of NAB man power announcements flooded the stations.

Here is one spot distributed to station executives about the middle of March.

"Skilled aircraft workers, attention!"

"The national defense program has urgent need for inspectors of aeronautical engineering material, airways traffic controllers, aircraft factory inspectors, air carrier maintenance inspectors.

"Loyal Americans who believe they can qualify are urged to see the Civil Service secretary at any first or second class post office for application blanks.

"Do it now! America must arm quickly!"

Reports from NBC, Columbia, Mutual, Colonial, Don Lee show that the networks are backing the gigantic industrial drive with every watt of power at their command.

In "Defense for America" NBC is taking the nation behind the scenes—showing industry actually at work on defense projects. Presented in collaboration with the National Association of Manufacturers, the series covers machine tools, aircraft, oil, tanks, ship building, chemicals, arms, cotton, steel, rubber, automobiles. On the magic carpet of radio the audience is transported into humming plants. The narrative script is supplemented by microphone interviews with workmen at their lathes and machines.

First industry visited was one of the world's largest machine tool factories. In the layman's language interviews explained why tools are of such vital significance in the defense effort. Large listening groups are being organized in every state through the cooperation of teachers, women's organizations, clergymen, American Legion and other service groups.

A second NBC offering "This, Our America", describes the resources of the United States and the part they will play in arming the country. The network's "National Farm and Home Hour" gives a rounded picture of day-to-day developments in defense activities.

According to Columbia—it's almost impossible to put anything on the air these days which does not directly or indirectly tie in with defense. Their "Jobs for Defense", a weekly serial, gets right down to the business of channeling a flow of skilled and unskilled labor for industrial plants. Columbia built the program in cooperation with federal and



KYW takes a mike into the steam division works of a Westinghouse plant to interview workmen on the job. Wilson Miller, welder; Vice-president R. A. McCarty and Announcer Stuart Finley tell listeners of progress made in this vital industry.

state employment agencies; the National Defense Advisory Commission; Department of Labor; National Youth Administration; Civilian Conservation Corps and educational groups. National leaders appearing before the microphone are telling Columbia's vast audience of defense needs—where workers can apply for jobs or training, etc. The program is timed to tie in with nationwide employment drives. The idea is to put the right men in the right jobs and eliminate bottlenecks in industry. Columbia is enthusiastic about "Jobs for Defense"—says it is one of the most practical projects on the air for recruiting industrial man power.

Mutual's mikes have been hopping all over the country to pick up the story of plane and tank manufacture and to depict how workers are being absorbed in these vital defense industries. One broadcast conducted listeners on a veritable employment tour. First scene took place in a large New York employment agency to describe interviews and registration. From here the program switched to a Buffalo vocational school where special courses are in process to train unskilled workers. Final sequences were staged at the Wright Aeronautical Corporation to show the men taking their places at the machines. Interviews over the air explained how workers can

(Continued on page 26)

1126A AMPLIFIER

Wars on Splash, F M Overswing, Other Instantaneous Overload Effects; Has Attack Time of One-Tenth Millisecond

By W. L. BLACK and N. C. NORMAN

Commercial Products Development, Bell Telephone Laboratories

The 1126A Amplifier is the successor to the pioneer limiter—the widely used Western Electric 110A Program Amplifier. The 110A and 1126A are mechanically and electrically interchangeable. The new amplifier not only gives the increased coverage that the 110A does, but also, when properly operated, provides complete freedom from over-modulation and better overall transmission characteristics.

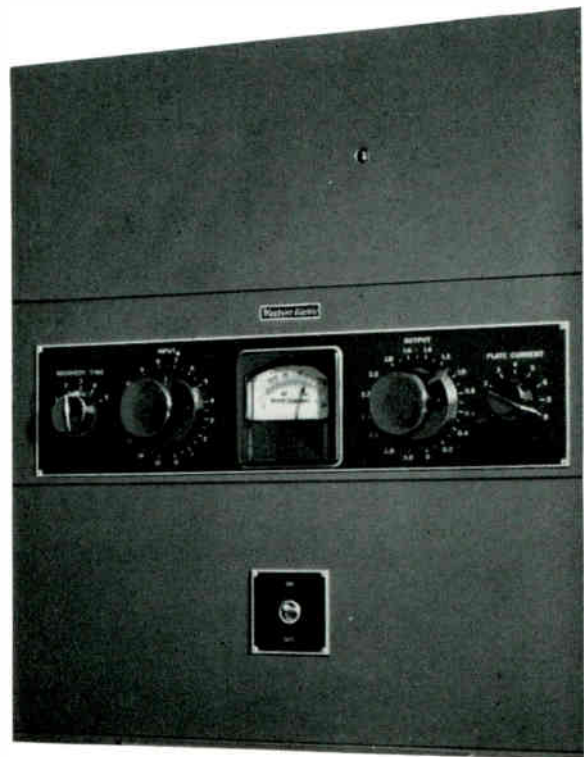
The 1126A is capable of eliminating even instantaneous overload of an efficiently operated transmission channel. These sudden bursts of overload can and do produce certain detrimental results of which the following are representative:

1. "Splash" or short interval adjacent channel interference due to "instantaneous" over-modulation of AM transmitter, (example: The rhythmic tattoo of noise produced in adjacent standard broadcast channels by a "hot brass" orchestra).
2. Over-swing in FM transmission which results in distortion at the receiver.
3. Instantaneous overload effects in other transmission systems.

The 1126A has an entirely new limiting circuit with far faster operation. It has an extremely short attack time and a high compression ratio. This makes possible transmission at higher average program levels, with consequent increased coverage, but without risking the detrimental effects caused by peak levels of program exceeding the load capacity of the transmission channel. It is entirely suitable for either AM or FM transmitters. Its signal to noise ratio is in excess of 70db and distortion is less than 1 per cent for all operating conditions, even during compression.

In an amplitude-modulated ratio transmitter, the introduction of excessive harmonics due to the departure from linearity of circuit characteristics imposes a definite upper limit on the amount of power input level which may be applied. Nevertheless, it is desirable to maintain the highest possible average

modulation in order to use the available facilities most effectively and to avoid degrading effects caused by extraneous factors such as inherent noise level. Figure 1 shows percentage of modulation versus input level



Western Electric 1126A Amplifier.

of the modulating voltage in db for a theoretical radio transmitter which would be fully modulated at an input of 0 db. Thus, a change from 100 per cent modulation to approximately 80 per cent modulation corresponds to a change of 2 db in input voltage.

When the modulating voltage is furnished by speech and music, the peak factor (ratio of peak to rms values) of the audio-frequency input may

be 8 to 10 db or more. Therefore, if over-modulation is to be prevented, the peak voltage must be kept below that required for 100 per cent modulation but at the same time approaching as close to that point as possible in order to maintain optimum average signal level in the receiver. Occasional over-modulation by such peaks may be infrequent enough to cause only spasmodic harmonic distortion which may not be perceptible even to critical observers and therefore is of no immediate concern. More frequent over-modulation may result in distortion which can be observed, or, because of limitations in the transmitting device such as breakdown voltage of circuit elements of a radio transmitter, may cause interruption of transmission. Furthermore, there may well be interference in adjacent transmission channels, particularly if a number of such peaks occur in fairly rapid succession. This effect has been observed with an amplitude-modulated radio broadcasting transmitter, especially when transmitting the music of dance orchestras characterized by brass instruments such as trombones which have relatively high peak powers at high frequencies¹. This type of program material has caused sufficient extra band radiation in a channel 30 kilocycles removed from that of the interfering station to make possible identification of the interfering station by a correspondence between the rhythm of the dance music and the interfering noise spurts occurring when complete modulation was exceeded.

Thus it may be seen that in a practical transmission system it is necessary first to control the level of the modulating speech or music to maintain as high an average degree of modulation as possible. Also, it is essential to prevent the occurrence of over-modulation sufficiently to avoid its accompanying undesirable effects, particularly those which are audible either as noise disturbance in adjacent transmission channels or as distortion in the system under control.

Over quite a period of time the input level control of broadcast transmitters was adjusted manually by a control operator. This method has been relatively successful in the hands of sufficiently skilled operators, but only at the expense of a compromise in which the level of the program, as indicated by a typical volume indicator has been held at least 8 to 10 db below the single-frequency level required for 100 per cent modulation in order to allow for the peak factor of the program material. The practicability of this method is limited by the reaction time of the control operator and by his familiarity with the program material. A much more satisfactory solution is the use of a peak limiter.

The 110A program amplifier,² a peak controlling device of a type which has already been

¹Absolute Amplitudes and Spectra of Certain Musical Instruments and Orchestras—Sivian, Dunn and White—Journal of the Acoustical Society of America, Volume II, January, 1931.

²A Volume Limiting Amplifier—Hoogaard-Bell Laboratories Record, Volume XVI, January, 1938.

in service for several years in radio broadcasting is really a peak limiter. This term is, in accordance with Norwine's definition, applied to, "A device whose gain will be quickly reduced and slowly restored when the instantaneous peak power of the input exceeds a predetermined value. The amount of gain reduction is a function of the peak amplitude and in practice is usually intended to be small to prevent material reduction in the range of intensity of the signal."³ A comprehensive study of the application of such a device in modulation systems indicates several fundamental requirements for satisfactory operation in a high-quality signal transmission system.

The most important of these considerations is the slope of the input-output characteristic beyond the point where gain reduction (compression) starts as shown in Figure 2. Curve No. 1 shows the load characteristic of a typical 110A amplifier. Point A on this curve corresponds to the output level necessary for 100 per cent modulation as indicated by a volume indicator. Curve 3 is then the input-output characteristic of a corresponding amplifier without the peak limiting feature which would be necessary to maintain the same output level at point A for corresponding input levels, and shows that a 3 db increase in average input signal level is made possible by the use of a peak limiter having the load characteristic of curve 1. This increase in input level is the effective limit of the increased received signal strength which can be obtained using a peak limiter having the characteristics shown.

It should be noted, however, that any peaks exceeding point A will result in over-modulation of an associated radio transmitter. Curve No. 2 shows a peak limiter load characteristic having a flatter slope above the point where compression starts. With this flatter load characteristic, it is possible to increase the average received signal level still further without risk of over-modulation. Point C on this curve is arbitrarily chosen as the place where 5 db of gain reduction occurs. If the average signal level input is set so that the peaks indicated by a volume indicator just reach point C, the average received signal level may be increased as much as 5 db, as compared with an increase of only 3 db made possible by the peak limiter of Curve 1. The point of greatest interest in connection with Curve 2 is the fact that a range of nearly 7 db exists between point C and point D, the point where 100 per cent modulation would occur with a peak limiter having the characteristic of Curve 2. This margin insures that a much greater degree of protection against over-modulation is afforded by a peak limiter having the load characteristic of Curve 2 than by that of Curve 1, in spite of the accompanying higher average modulation.

The time required to reduce the gain

³Devices for Controlling Amplitude Characteristics of Telephonic Signals—Norwine-Bell System Technical Journal, October, 1938.

(operating time) of a peak limiter is another important characteristic. The input-output characteristics shown on Figure 2 are obviously steady-state characteristics. If the duration of a peak is short compared to the operating time some portion of it will escape the limiting action. Thus the higher the input frequency, the more the danger of over-modulation, assuming a given operating time. Or, assuming a top frequency to be transmitted, the faster the operating time the fewer the cycles which will be transmitted with amplitudes higher than the point where 100 per cent modulation occurs.

The time required for the gain to be restored to normal after a peak has reduced the gain momentarily is a third important peak limiter characteristic. In current devices of this type, a wide range of recovery time values has been used. As a result of observations of peak limiters during actual program transmission, several conclusions may be drawn. First, of course, this release time must not be so short as to allow an appreciable change in gain during one half cycle of the lowest signal frequency transmitted, as this change would produce odd harmonic distortion. Second, this time must not be so short that it results in an increase in background noise in quiet periods such as pauses between syllables or words of speech following the program peak which causes the gain reduction. Third, the longer this time is, the less will be the frequency of occurrence of peaks causing over-modulation, assuming a given operating setting. Fourth, the longer this time is made the less will be the effective increase in signal volume, since reduced gain will be in effect a larger proportion of the total time. Fifth, the optimum recovery time may well be different for different types of program material. For example, piano music sounds unnatural when the recovery time is too short, because the effect is similar to inadequate damping of the strings after they are struck or to holding the sustaining pedal too long on the loud notes.

These factors lead to the conclusion that the compression ratio beyond the knee of the load characteristic, the time required for gain reduction, and the time required for restoration of gain appear to be the three primary considerations in the design of an ideal peak limiter. However, the problem of designing a physically realizable peak limiter is complicated by the fact that all three of these considerations are interrelated in such a way that in the limiting case, where the compression ratio is made large and the two time intervals are made small, one cannot be further modified without changing at least one of the other two. This relationship is fundamental, as the stability of the device is dependent upon the freedom from longitudinal transmission around the loop containing the vario-losser and the control circuit for all frequencies in the signal band. While infinite amplification around this loop would make possible an absolutely flat input-output characteristic

above the point where gain reduction starts, it would necessitate infinite loss in the longitudinal transmission path, which is obviously an impractical condition. Furthermore, since the condenser charging and discharging circuits usually employed in a peak limiter to determine the attack and recovery time perform the function of a low-pass filter, the loss is a function of the product of the attack and recovery time, and varies in magnitude directly with this product for signal frequencies.

In addition to the primary requirements, a number of secondary requirements must also be considered. The point at which compression starts should be extremely stable particularly with respect to changes in power supply conditions. This stability is of particular importance when such a unit is used at a high-power radio transmitter where sudden changes in power demand occur due to the associated radio transmitter. In addition, the stability of this point simplifies practical operation of the system in which the unit is included, since it serves as a reference point with respect to which both input and output levels may readily be adjusted. Transmission characteristics (gain frequency response, harmonic distortion and output noise level) should be comparable to a high quality speech input amplifier so that the presence of the device cannot be detected by broadcast listeners. A visual indication of its operation should be incorporated to facilitate observation of its performance. Independent control of both input and output levels is necessary. Each of these controls should be in sufficiently small steps to realize fully the capabilities of the device as a means of maintaining high average modulation without overloading the transmitter on peaks. Finally, the mechanical form should be such that it is adaptable for use under widely varying conditions of physical location, exposure to adverse climatic conditions and exposure to both electrostatic and electromagnetic fields, while at the same time maintaining an appearance standard.

The Western Electric 1126A program-operated, level-governing amplifier was designed by Bell Telephone Laboratories to meet these requirements. Figures 3 and 4 show its load characteristic and harmonic distortion for steady-state conditions at 1000 cycles per second and at 100 cycles per second, respectively. It should be noted that a compression ratio of 10 to 1 is obtained; that is, a change of 10 db in input results in a change of only 1 db in output level above the point where compression starts. Figure 5 shows the gain-frequency response of this device both with no compression and with 10 db of compression. The noise is at least 70 db below the maximum single-frequency output level. The photograph of an oscillogram, on page 34, shows the extremely fast attack time. It should be noted that no observable overshoot occurs even with 5000 cycle single-frequency input. The release time

(Continued on page 34)

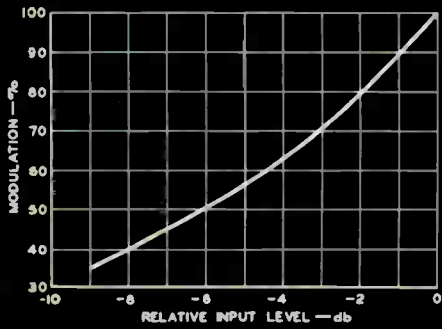


Fig. 1—Input level versus percentage modulation.

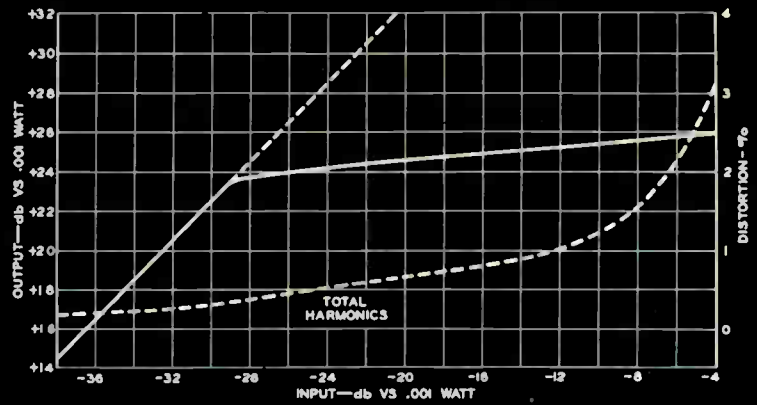


Fig. 4—Input-output characteristics and harmonic distortion of 1126A Amplifier at 100 cycles per second.

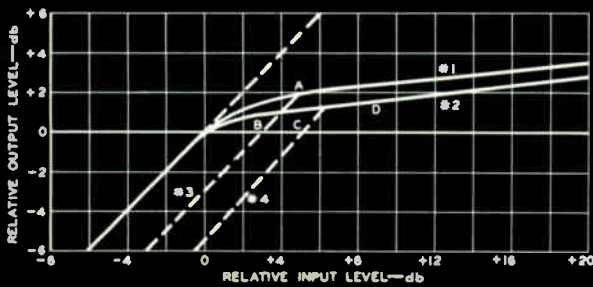


Fig. 2—Typical input-output characteristics of peak limiters.

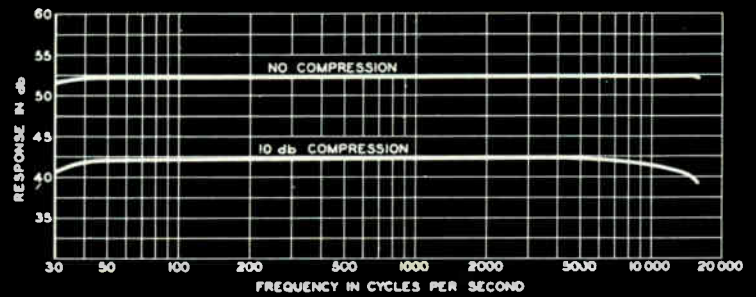


Fig. 5—Gain-frequency response of 1126A Amplifier without compression and with compression.

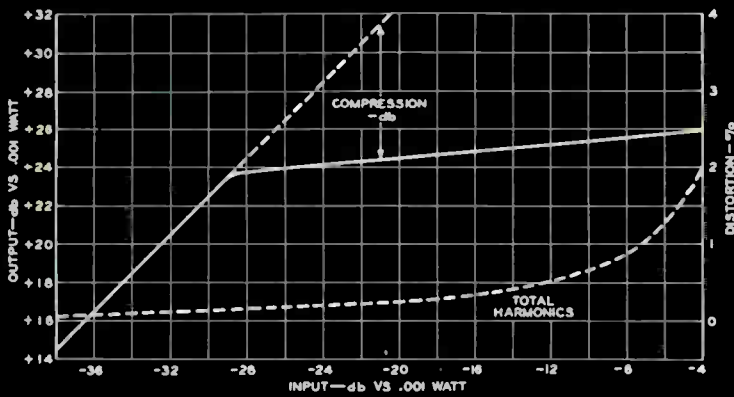


Fig. 3—Input-output characteristics and harmonic distortion of 1126A Amplifier at 1000 cycles per second.

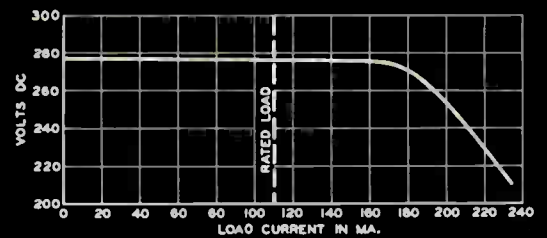


Fig. 6—Voltage regulation characteristic of the 20A rectifier.

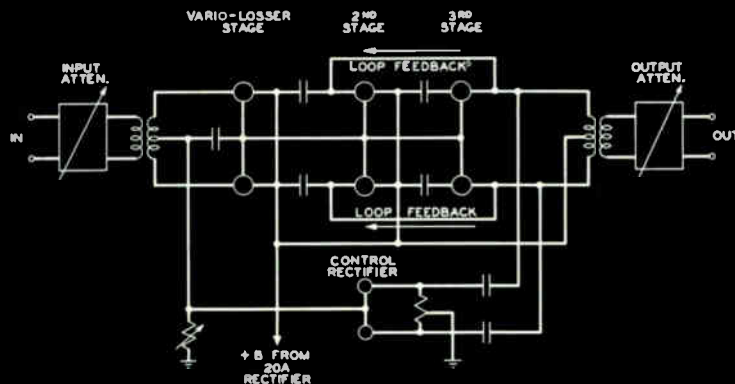


Fig. 7—Functional schematic of the 1126A Amplifier.

Sound System Plays Vital Role at New York Airlines Terminal

Step into the recently opened five million dollar Airlines Terminal, facing Grand Central Station, New York City, and you will witness a new link in the magic chain of air transportation. From this decorative Union Station passengers are conveyed in luxurious limousine coaches to the various airlines operating in and out of LaGuardia Field. The whole thing runs as smoothly as the escalator which carries the traveler from street to waiting room.

Never for a moment does one have the sensation of being directed with scientific efficiency through the routine of ticket buying, weighing-in and boarding coaches. Relieved of your baggage by a smiling, dark skinned "sky cap," akin to the red caps in the Grand Central Terminal, you are pleasantly but mysteriously wafted through the station and on out to the plane. Unseen, but playing an important role in the whole procedure of transferring passengers and baggage from city to field, is a Western Electric sound system, engineered and installed by the C. C. Langevin Company.

Employing two channels, the equipment consists of 22 microphone stations, seven loudspeakers, two 50 watt amplifiers. Two microphones are located on the information desk in the main waiting room; one in the dispatcher's booth, and the remainder in back of the ticket sellers' counters associated with the six airlines using the terminal. Four loudspeakers are installed in the ceiling of the waiting room, one in each rest room, and the seventh in Basement A, the unloading platform for passengers arriving from the airport.

Even to the non-technically minded visitor operating procedures seem unusually easy to understand and equally as easy to set in motion. Announcements of bus departures take precedent over all other calls. Five minutes before each streamlined limousine rolls smoothly through the gates the dispatcher announces the time and connecting plane destination to those in rotunda and rest rooms. Hidden away in his snug booth above the six loading platforms he controls the system—a lord of all he does not survey.

With a schedule of 226 flights a day, his is a busy job. Quietly, but clearly, he will tell you that the coach for Albuquerque, Lisbon, Chicago or Memphis leaves in five minutes from platform A, B, C or D, as the case may be. He may follow up this information with the disturbing news that Mr. Jones has not boarded his bus. If Mr. Jones does not put in a prompt appearance, he will learn to his regret that plane buses like tides wait for no man. The dispatcher

receives word of the missing passenger from the agent loading the bus, who speaks to him through a tele-talk system. It is this same master voice which gives the "go ahead" signal to bus drivers.

When a ticket agent, stationed at an airline counter, or a clerk at the center information booth, wishes to use the equipment he may select either of two channels. Channel A carries his voice to the speakers in the waiting room; channel B to the unloading platform speaker. This latter connection enables the clerk to page a passenger who is just arriving from the airport without the call being heard in the waiting room. These are brief announcements, such as, "Mr. Brown has not called for his ticket," "Mrs. Smith has not weighed-in," "Will Mr. Green report at the information desk." Trained in the art of air travel these men know their sky maps from pole to pole.

The microphone positions employ signal lights—a red light indicating that the system in the waiting room is in operation—a green, showing that the unloading platform speaker is in use. As a double precaution, all microphone stations are interlocked so that one announcer cannot interrupt another until the first has completed his call.

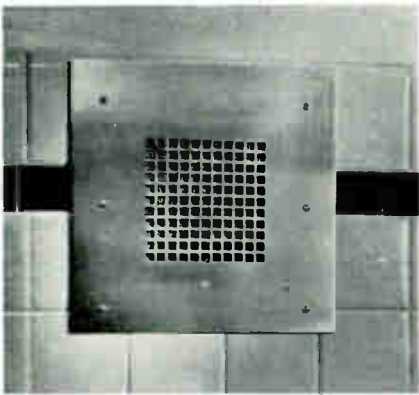
If anything could entice air-shy travelers to venture forth in the sky, it is a visit to this terminal. Soft organ music intermittently drifting through the rotunda—harmonious decorations—the quiet efficiency with which all business is conducted—creates an atmosphere of assurance and tranquility. It is all so nonchalant, so matter of fact, that one might think mankind had been flying the airways for centuries past.

On entering the building one gets the impression of space, sky and wings. The ceiling, a grey-blue elongated dome, is insulated against sound reverberations. This, together with the quality of loudspeaker reproduction, gives a soft clarity to the announcer's voice. Black and silver trimmed ticket booths make a striking contrast to the circular gold stainless steel walls. Raised figures of symbolic man and an eagle in flight, against a swirl of terra-cotta are prominently displayed on the upper wall ends. On the information booth, located in the center of the rotunda, a four-faced clock is mounted at the intersection of right-angled wings composed of light-transmitting plastic, 11 feet high. These are said to be the largest sheets of this magic material ever produced.

Once the passenger has seen his bag-
(Continued on page 31)



Rotunda of New York's Airlines Terminal at 42nd St. opposite Grand Central Station. Four loudspeakers are installed in the ceiling.

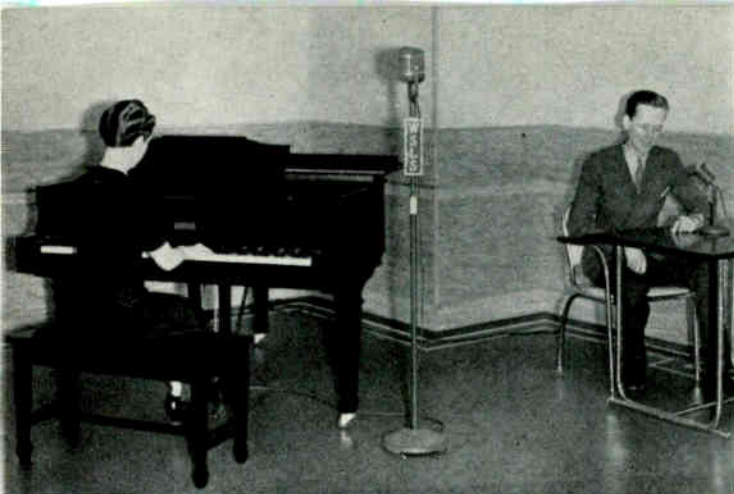


Loudspeaker paneled in wall of the rest room.

Right: Dispatcher's booth, focal point of sound system. Announcements of bus departures take precedent over all other calls.

Below: Two 50 watt amplifiers compactly installed in manager's office. Right: Microphone station back of a ticket seller's booth.





Above: View of entrance to studios and control room of WSLS, Roanoke, seen through a "porthole" from the outside corridor.

Left: Operator at the master control position for the Tri-City network at key station WLVA, Lynchburg. Equipment includes a 23 type speech input console, cardioid microphone, 9A reproducer and 271A output switching panel, adapted for complete interchangeability of programs within the network. Above, a corner of studios of WSLS, newest Tri-City station.

TRI-CITY

The Allen Brothers' Three-Way Network in Virginia's Piedmont. They've Licked Bad Luck and They're Going Ahead—Fast.

By ALVIN VON AUW

It was Christmas of 1928 when the tall, lanky Allen brothers of Lynchburg, Virginia, allowed as how they'd get themselves a radio station. Mister Ed was running a heads-up little advertising agency in Lynchburg and Mister Phil was a partner in a hardware firm at that time doing a land-office business in Bremmer-Tully receivers retailing at about \$400. With the neighbors putting that amount of money into radios, the brothers reasoned, a profitable local market was ready to be tapped.

Today the Allen brothers frankly admit that 10 years ago they were babes in the wood as far as broadcasting was concerned. To set up in radio, they surmised, would cost them about \$600 and they weren't quite sure whether they should hire a tobacco warehouse or a suitcase to house their transmitter. A license to broadcast, they figured shouldn't be any harder to get than a dog license. They were wrong, all around, except in their determination to go into radio, for it was

14 months and several thousands dollars later before the Allens found themselves the proud possessors of a half-time operating license for 100-watt WLVA, Lynchburg.

In this year of grace 1941 the Allen brothers operate three 250 watt outlets, WLVA in Lynchburg, WBTM in Danville, and WSLS in Roanoke, a combination which serves the Piedmont region of western Virginia.

Latest addition to the Allen string is WSLS, "the Shenandoah Life Station." Ten years of broadcasting experience have gone into the construction of this Roanoke outlet and the Allens are rightly proud of their new baby. A few weeks ago I visited WSLS and followed in the wake of Mister Ed's pipe and Mister Phil's cigar through as compact and efficient a small broadcasting plant as exists in this broad land. Credit for the plan and the design features of the handsome modern studios goes to Lynchburg ar-

chitect Walter Rogers Crowe. In an area slightly in excess of 2,000 square feet he has packed office space, reception room, a large studio, an announcing and transcription studio, the transmitter housing and a workshop — all with an effect of spaciousness that is little short of architectural wizardry.

Snugly installed in WSL's engineering nerve center is a Western Electric 250 watt transmitter, the first of the new 451A-1 series to leave the Kearny assembly line. This clean-cut transmission bay installation belies the speed at which it was put in — 12 days from the date the equipment was delivered until the station hit the air! Responsible for this record-threatening accomplishment were innumerable cups of strong black coffee and the supervision of Alfred "Skipper" Heiser, chief engineer of the Tri-City stations, a Jerseyite who has been associated with the Allens since their Lynchburg 100-watter made its initial bow a decade ago.

When WSL finally hit the air in the fall of '40, the event climaxed a nerve-wracking last minute scramble to fulfill F.C.C. information requirements. In the final rush to the technical tape, some of the legal prerequisites had been forgotten until the very eve of the day on which advertising commitments demanded that the station go on the air with the first game of the 1940 World Series. Swinging into high gear, the Allens' chartered a plane and rushed the required information to Washington where it was found to be incomplete. Thereupon the little network's firm of consulting engineers was called into action and in a matter of minutes a field representative was winging his way to Charlotte, N. C., where his test car was operating at the moment. Arriving in Roanoke on the stroke of midnight, the engineer made his measurements through the wee sma' hours, phoning them to Washington when he had finished. It was still dark when a telegram from Washington let down the barriers. At Tri-City offices a collective sigh of relief approaching hurricane proportions went up when the



Tri-City's chief engineer, Alfred "Skipper" Heiser, operating speech input console, while WSL's engineer Phil Briggs takes a reading from the Roanoke station's new 451A-1 transmitter.

voice of WSL's began to pour into thousands of Virginia homes at 8:45 on the appointed day.

But the hectic days before the opening of WSL's were not the first in which the Allen organization had been called upon to think clearly and act quickly. Back in 1934, at the very bottom of the depression, the brothers, bent on boosting the service WLVA was giving the Lynchburg area, rebuilt the station from top to bottom. Two weeks later a midnight fire completely destroyed the studios, transmitting equipment, advertising contracts and every piece of commercial copy. The Allens, however, no trusters to chance, had installed duplicate transmitting equipment in a cabin two miles from the gutted station. Into this tiny shack the complete staff of WLVA packed themselves like Marx brothers in a clothes closet and there, without missing a minute of air time, they wrote copy and produced their regular schedule of programs. Meantime, the engineering department worked feverishly on the installation of new equipment to replace that destroyed by the blaze. On New Year's Day of 1935 WLVA moved into a complete new suite of studios. Perhaps as a New Year's present, the F.C.C.

(Continued on page 31)



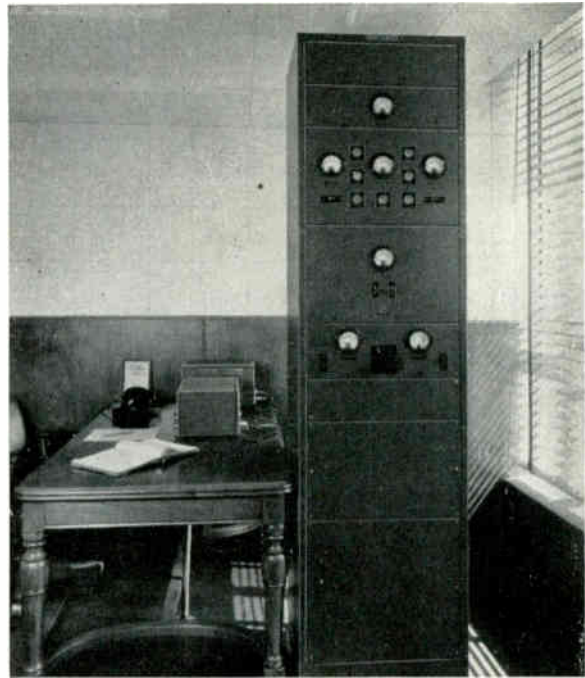
Left: Edward A. Allen, president of the Tri-City Stations, on the left, and Philip Allen, general manager, on the right. Photo was taken in the attractive reception room at WSL's.

Below: At the left, James A. "Happy" Howe, manager of WBTM, signs his mail. At the right, WSL's Manager James H. Moore concentrates on the design of a new promotion piece.





Reaching above Linden's City Hall is the 135 foot antenna of WAJQ, new police radio station. From the radiator at the top, messages flash to radio cars in every nook and corner of the city. All transmitting and receiving equipment, shown at the right, is installed in a sound-proofed room.



Two-Way Radio Rides with Linden Police

Linden, New Jersey, has adopted lightning methods in its war on crime. The tactical change took place on February 20th, for on that day the city's new two-way police radio system flashed into action and the first orders from headquarters were received—and acknowledged—by the eight scout, patrol and detective cars in this hard-hitting force.

Linden, an industrially important city of 25,000 located just within the greater New York area, is equally proud of its attractive residential sections and its large manufacturing and processing plants. One of the nation's primary oil refineries is located there, as are chemical factories, automobile assembly plants and other industries important to defense. Two of the main traffic arteries leading to New York cut through the city — the main line of the Pennsylvania Railroad and U. S. Highway No. 1, as busy as any in the country.

Designated by the call letters WAJQ, the new ultra-high frequency radio system is completely Western Electric. It consists of a 50 watt 214A type transmitter on the band at 31.1 megacycles, a 28B headquarters receiver and nine 15 watt 228A mobile

units. Eight of these are installed in cars and the other, a spare, can be set up and operated anywhere in the city should an emergency arise. Four cars are used by detectives and except for the longer antenna look no different from other automobiles on the road. The four used for scout and patrol work are painted white and manned by uniformed officers.

The transmitter is located on the ground floor at City Hall in a sound-proofed room, separated from the headquarters desk room by a glass partition. The dispatcher directs the activities of the radio cars by means of a handset telephone while incoming reports are received by a speaker mounted on the wall. Radio equipment, call box controls, an inside paging system and three telephone lines are all within easy reach of the dispatcher on duty. A coaxial cable connects the transmitter with the antenna which rises above the roof to a height of 167 feet. That WAJQ throws a powerful signal can be seen from the fact that not a single dead spot has been found anywhere in the city.

The new equipment had a baptism
(Continued on page 33)

Left, Chief of Police Frank J. Hickey. Eight scout, patrol and detective's cars make up the Linden mobile force. Standing at the left, below, are Detective McKane and Chief Hickey. Standing at the extreme right are Detectives Buckeyser and Koeller.





Chief Engineer Earl F. Downey and General Manager George Walker.

WAIR

Winston-Salem, N. C.

Twenty-two exhausted gridders flopped to the turf. A long Army cheer went up and died away in the hills around West Point. Taking advantage of the time-out, Ted Husing in crisp, staccato phrases went into a quick "recap" of the game. At the controls of the remote pick-up equipment, engineer George Walker fed Husing's comment to the Columbia network and the ears of attentive millions.

That's the setting for Scene One in the Story of WAIR, for at that West Point football game, engineer Walker met his future partners in broadcasting, C. G. Hill and his sister Susan Hill. Today George Walker is general manager of thriving WAIR in Winston-Salem, N. C., while C. G. Hill holds down the post of commercial manager. Susan Hill is an inactive partner to the venture. But that's not quite the whole story, for in 1933 Miss Hill became Mrs. Walker.

The brainstorm which eventually launched WAIR came to the Walker-Hill partnership in 1935. Winston-Salem, they reasoned, was a metropolis in its own right, one of the capitals of tobacco-land. Industrial payrolls—Winston-Salem is the home of Camels, the world's largest cigarette factory—were high. Every day in season more than 2,000 farmers trekked into town, selling a \$25,000,000 annual local tobacco crop. There was but one radio station in the area—with plenty of room for another. So—why not?

License to broadcast with 250 watts of power came early in 1937 and on March 24 of the same year WAIR began to purvey comment and

comedy, news and music to one of the richest markets in the South. In but four years of broadcasting, WAIR has established itself in the loyalties of Winston-Salem listeners, while putting on record an enviable log of sales success stories—all as a result of imaginative local program planning and energetic management.

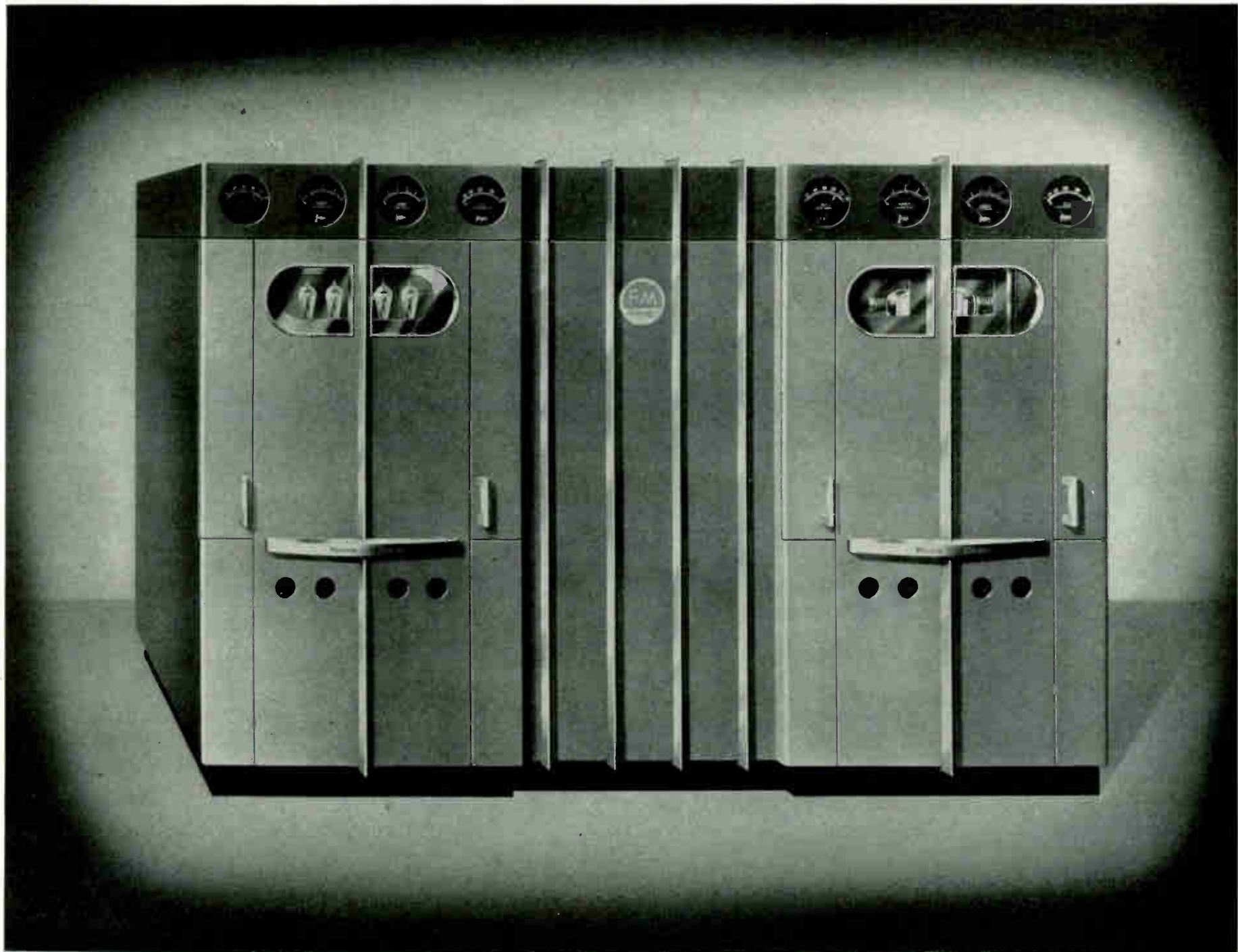
Notable among WAIR-originated programs is a series of short-wave pick-ups from cruising police cars. The program, which features the actual arrest of motor law violators, stresses traffic safety and has been credited with putting a dent in the city's annual accident toll. Every day a WAIR police reporter broadcasts from headquarters with general police news and interviews with apprehended criminals. A March of Time style program of dramatized news, locally produced, has built up a large following, while "Fun in the Street," an interview show which leans hard on the funny bone, has provided North Carolinians with many an inpromptu chuckle.

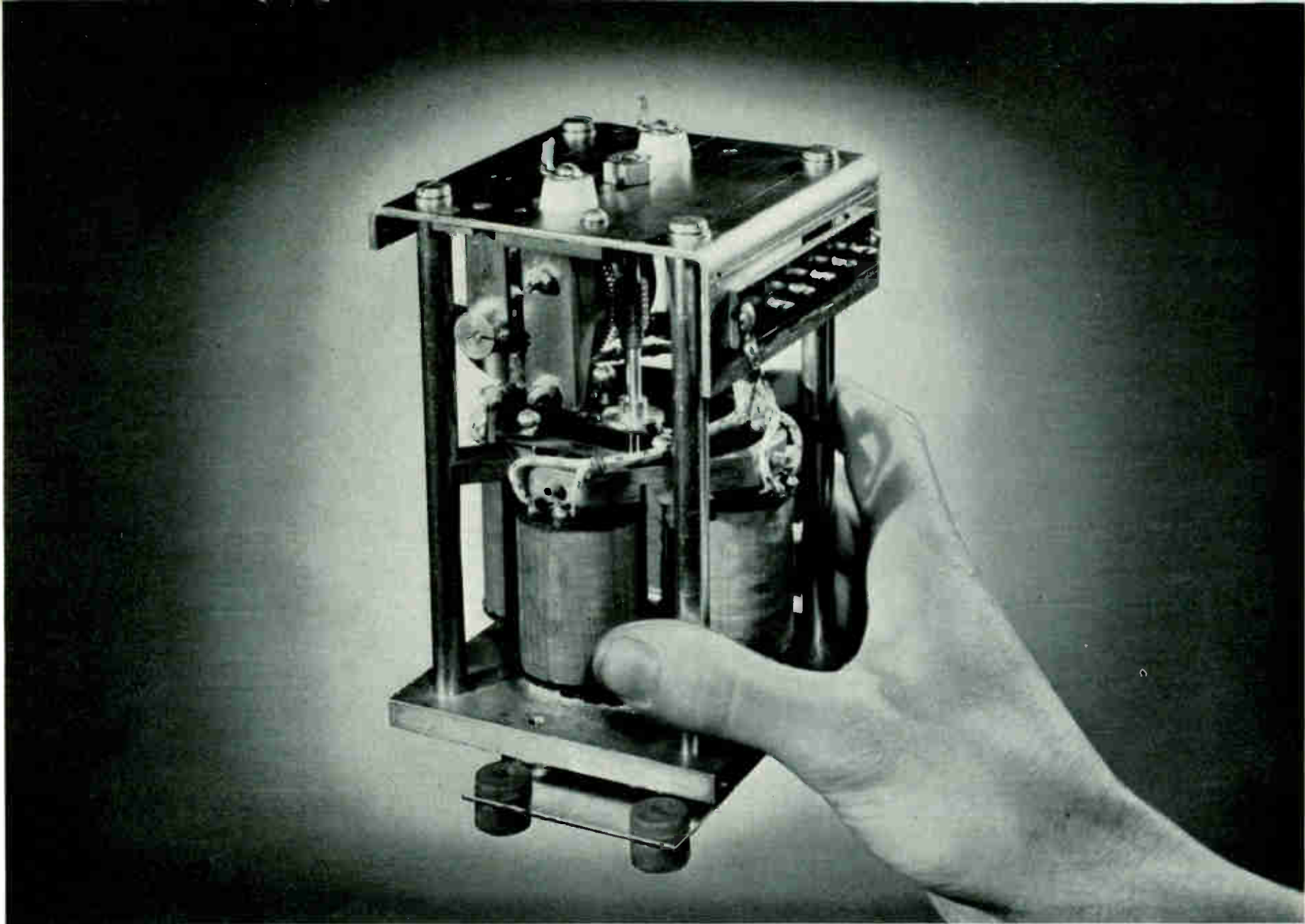
Manager George Walker's radio biography is a full one. A full fledged "ham" before he had entered his teens, Walker's professional career shows terms of service as engineer-announcer in a
(Continued on Page 33)



Western Electric speech input equipment handles the programs of WAIR which reach out to the tobacco country beyond industrial areas. The main studio (upper right).

PICK-UPS





WESTERN ELECTRIC 10KW FM transmitter. The three units are, from left to right, high and low power supply and control; 10KW power amplifier; and one KW driver and synchronized frequency control.

HEART OF ALL WESTERN ELECTRIC FM transmitters is the SYNCHRONIZER. The mean carrier frequency is continuously and precisely maintained by a single low temperature coefficient crystal. The Synchronizer compensates *immediately and automatically* for a change in the mean frequency of the modulated oscillator arising from any cause such as temperature changes or even violent disturbances that might arise if tube failures should occur. It eliminates completely the need for frequent checking of the transmitter circuits and manual readjustment of frequency controlling elements.

WDNC

Durham, N. C.

A point in programming is discussed by General Manager J. Frank Jarman and Program Director Clay Daniel. The shunt-excited Blaw-Knox tower and transmitter building stand on marshy land on city outskirts.



“W e’ve got lots of these,” J. Frank Jarman, manager of WDNC told me and handed me a picture of an ear, and another and another. It’s a favorite gag, but effectively symbolizes the high Crossley the station boasts in the Durham, N. C., area. Jarman, by his own account, worries about the present and the future, not the past—a habit of mind that has had more than a little to do with his station’s steady progress since he took the helm eight or nine years ago.

Prodded with a few questions as to his own background, Jarman will tell you that he has served a term at nearly every job in the world of broadcasting. He’s been a continuity writer, a time salesman, a radio actor, program director and now station manager of one of the liveliest little stations in the nation. But radio was far from Jarman’s thoughts when he left the University of North Carolina in 1929 with a sheepskin in architecture tucked under his arm. There being no market for architects at the time, Jarman headed into newspaper work as a cartoonist. But both architecture and cartooning serve

Chief Engineer R. R. Dalton welcomes this visitor—the crew’s mascot. That’s a Western Electric 310B in background.



him in good stead today, for he is largely responsible for the design of WDNC’s studios and the station’s promotional pieces are highlighted with amusing products of the Jarman drawing board.

Jarman has never been an engineer. He leaves that end of the business to R. H. “Red” Dalton, chief engineer, whose “baby” is a Western Electric 310B transmitter, housed in a handsome little “shack” on the outskirts of Durham, overshadowed by a 350-foot Blaw-Knox tower. Dalton has been with WDNC from the beginning. In fact, it was on the engineer’s 21st birthday that he piled all the equipment of defunct WRAM (Wilmington, N. C.) into a truck and moved it to Durham where he set it up in the city’s principal hotel, a transmitter location which served its purpose until 1939 when the present transmitter building was built and the studios were removed to new and more spacious quarters in mid-town.

WDNC’s tag-line is “Carolina’s Leading Sports Station” and it’s a title rightly come by, for Manager Jarman employs a crew of sportscasters which a nation-wide network might envy. For sports-minded Durhamites, WDNC covers all the principal athletic contests of five neighboring colleges, Duke University, the University of North Carolina, North Carolina State, Wake Forest, and Davidson. Commentators of WDNC are accustomed to traveling far from home to cover important “away” games, but some sort of record for local station remotes was set when the station’s basketball expert followed Durham’s champion high-school five all the way to Glens Falls, N. Y., to bring listeners back home a play-by-play description of a national tournament play-off.

When Manager Jarman married Miss Frances Moss in 1937, he didn’t know that he had added a budding radio star to his station’s roster. Although Mrs. Jarman had never appeared on the air
(Continued on page 29)

Screen Hit "A Modern Aladdin's Lamp" Stars Western Electric Tubes

Backstage in many of the country's broadcasting stations and in repeater stations throughout the telephone networks is a family of performers carrying on highly important roles in radio's big show. Although generally unrecognized by the audience the engineers know these performers intimately, depend upon them constantly and quite frequently applaud them for their remarkable ability to work thousands of hours, year by year, without a let-up. These veteran troupers are Western Electric Vacuum Tubes.

A short time ago they rose to stardom in a motion picture called "A Modern Aladdin's Lamp." Assisting the stars is an excellent cast including Lowell Thomas, as actor and narrator; a group of Bell Laboratories engineers, making their first appearance on the screen; and an attractive ensemble of Western Electric Tube Shop artisans. Half way through the film a vigilant traffic cop halting an on-rush of electrons inside a tube, and a troupe of impish monkeys tossing pebbles at a grid, very nearly steal the show.

Opening with Lowell Thomas seated before a microphone in a broadcasting station, "A Modern Aladdin's Lamp" traces the development of the vacuum tube from the first crude bulbs of Edison and DeForest to the efficient and powerful products of today's Bell Telephone Laboratories engineers.

The film shows how modern broadcasting and telephone repeater tubes are made, and pictures the many applications of the vacuum tube in everyday life. "From this product," says Mr. Thomas, "four great new industries have sprung—long distance telephony, radio, the modern phonograph and sound motion pictures."

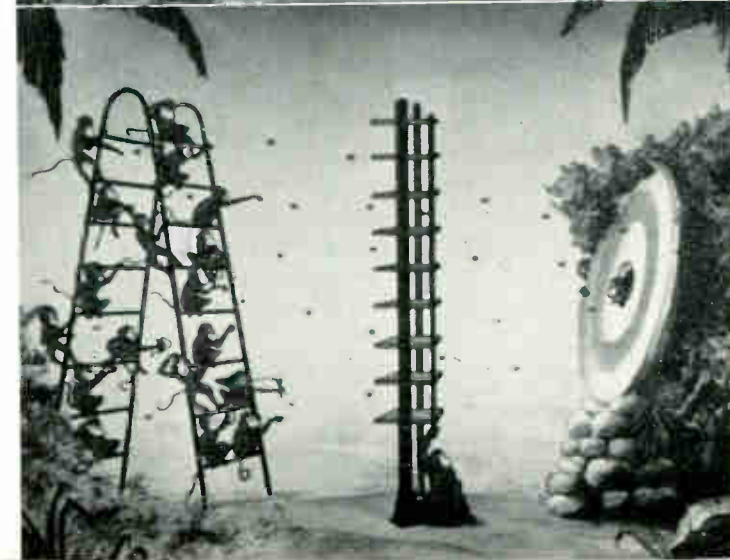
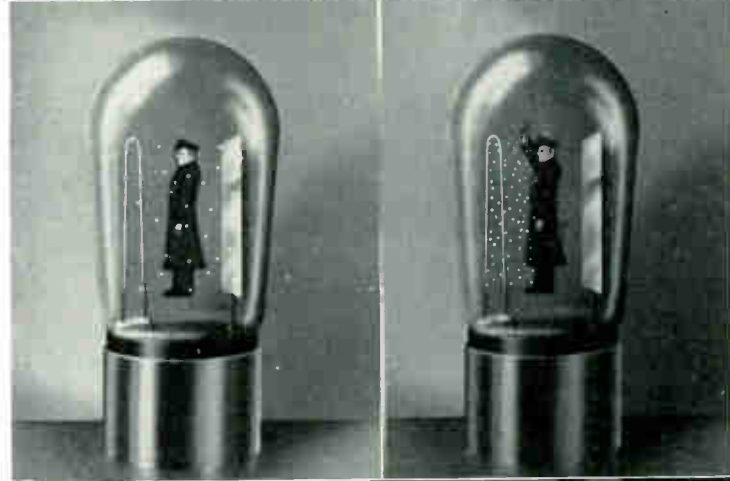
An interesting sequence explains the operation of the three-element tube so clearly by animation that even a lay-minded audience will understand. It is this sequence which brings to the screen the above mentioned traffic cop and the monkey troupe, the later vigorously hurling their pebbles as they impersonate the filament tossing millions of electrons through the vacuum.

Scenes photographed in the Western Electric Tube Shop depict the delicacy, the care, and the precision of workmanship that go into the making of these electronic bottles. The camera moves from one intricate operation to another while skilled crafts-

(Continued on page 32)

Down the panel: Western Electric engineers confer with cameraman before shooting 250 kilowatt vacuum tube. Animated sequences showing traffic cop halting on-rush of electrons and a lively troupe of monkeys tossing their pebbles at a grid.

PICK-UPS



THEY DO IT THIS WAY

How do you do it? Pick-Ups invites engineers throughout the country to send in items for this page.

Light Bulbs Serve Double Purpose

Our electric power company is owned by the city and at the time is very heavily loaded, therefore, offering very poor regulation. Our exciter unit (not Western Electric—Ed.) is very critical when it comes to voltage regulation, as the oscillator will "kick out" with a small drop in voltage. During the day, we are unable to get voltage higher than 100 and, of course, late at night it is much higher. To keep from going off the air all through the day due to line voltage drops and without the trouble of a rheostat, I am using two light bulbs, one a 100 and the other a 50 watt light exciter. This proves very effective as even large variations cause us no trouble. Using the light bulbs for a double purpose, I use the 50 watt lamp behind the transmitting equipment and the 100 watt lamp in the ceiling of the operating room for illumination.

GLEN NEUVILLE, *Chief Engineer,*
WFTC, Kinston, N. C.

Removing Dust — Smoothing Commutator Surface

It is a matter of common knowledge that the removal of dust from high voltage rotating equipment greatly reduces the possibility of armature failures.

At WIS, Columbia, S. C., we brush the high voltage commutators with a stiff toothbrush of the dime store variety each night after sign-off, brushing from the armature to the outer edge of the commutator along the axis of the shaft. While the brushing is in progress the armature is slowly turned over by hand. The machine is, of course, also cleaned with an air bellows of the hand type.

By religiously following this procedure, we have not had a high voltage armature failure for more than five years.

For periodically sanding high voltage commutators, we have a three foot board planed down to exactly the width of the commutators, and about a half inch thick. At one end of this board a piece of No. 00 sandpaper is firmly glued to one face of the board. At the other end a length of hard, smooth cloth is wound firmly around the board and tied tightly with heavy twine at the ends.

When it becomes necessary to "smooth" down the commutator surfaces, the field and armature switches to the machine are opened, and with the motor turning the generator over, the operator holds

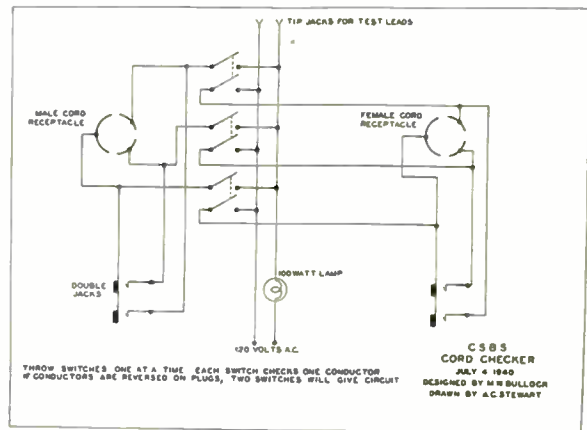
the sandpaper against the commutator surface. When the surface appears clean and "shiny" the sandpaper is withdrawn, and the other end of the board, with the cloth attached, is applied. This polishes the surface. The machine is then stopped and the segments brushed out with a toothbrush.

It is a good idea to make the board of kiln dried hardwood so that it will not warp, and will not readily absorb moisture. As an added protection, wear rubber gloves with protective gauntlets over them while handling the "stick." The periodic use of this "stick" has kept our commutators in excellent condition—it has been unnecessary to remove an armature for a trip to the machine shop for "turning" on a lathe for more than five years.

SCOTT HELT, *Chief Engineer,*
WIS, Columbia, S. C.

Cord Checker

We have made up a cord checker which we find very useful. It checks each conductor of a microphone extension cord, or a patch cord, individually. It shows instantly if there are any high resistance connections, or if any connections have



been transposed. In using it we plug in both ends of the cord, throw one of the three switches, and, if the light shows continuity, we twist and shake the cord to make sure that there are no bad places in it. We use it on a monthly maintenance schedule, and it is surprising how many defective cords it locates before they cause us trouble.

MARK W. BULLOCK, *Technical Supervisor,*
Central States Broadcasting System



Jesse Swicegood,
General Manager

WKPT

Kingsport, Tenn.

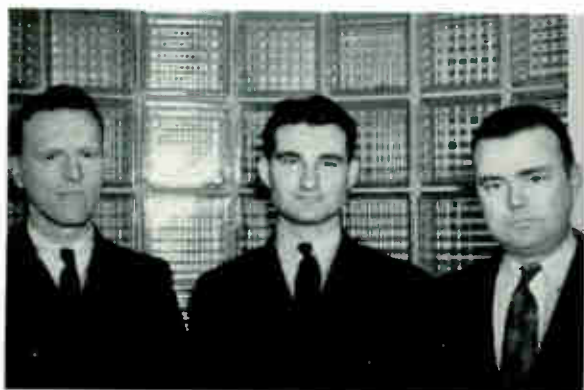
In equipment, physical layout, quality of program and personnel, many 250 watt stations can compare favorably with the larger stations in the country. One such up and coming youngster is WKPT, Kingsport, Tennessee, which has adopted for its slogan "The Nation's Model Station."

One hundred per cent Western Electric equipped, the station houses its 250 watt transmitter and associate equipment in an attractive, modernistic building one and one-quarter miles from the heart of Kingsport.

WKPT operates 17 hours daily with approximately 10 hours of NBC commercial and sustaining service. General Manager Jess Swicegood heads a staff of 12 members most of whom have had several years experience with larger stations.



Control room showing Western Electric speech input console, turntables and audition controls. Left: Engineering staff — Carl Delay, Chief Engineer Gladman Upchurch, Donald Brooks.



WHOM

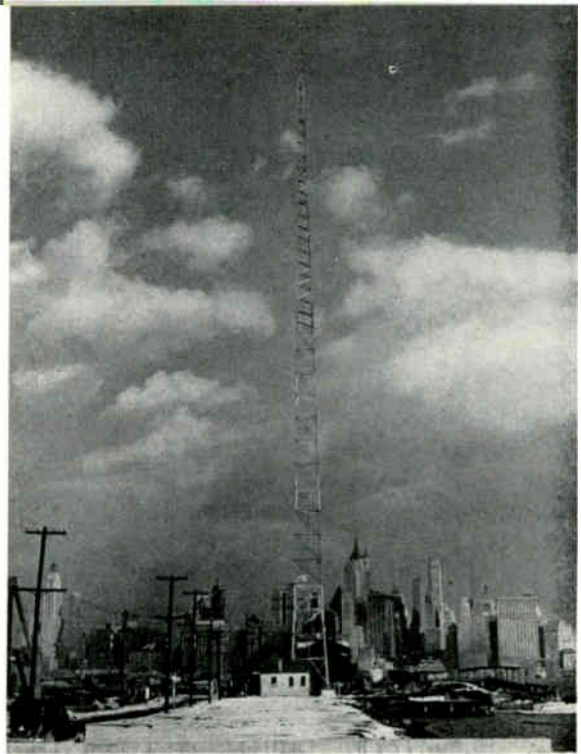
Jersey City, N. J.

No broadcasting station transmitter works harder than the eight months old 1000 watt at WHOM, Jersey City, New Jersey. Listeners may tune in any hour of the 24, seven days out of seven, and there's the voice of WHOM going strong. Seeking a "back to fit the burden" station officials chose Western Electric equipment incorporating the Doherty Circuit.

Besides being one of the few stations in the country never off the air, WHOM claims to be one of the most versatile outlets in the metropolitan area. Poles, Jews, Germans, Italians, Spaniards, Greeks, Lithuanians and Ukrainians may hear programs in the mother tongue transmitted throughout the day and early evening. At 10:30 p.m. WHOM switches to an all night session of English broadcasts.

According to station officials WHOM reaches an enormous buying power — 5,000,000 foreign born in the world's largest market. Each of these foreign language groups equals in population some of the major cities of the United States. The largest of these national blocs would rank within the first ten cities in the country.

Amercanization is the keynote of WHOM's program building for its vast audience of foreign language listeners. The advantages of citizenship are stressed, and aliens are encouraged to take out their papers. Paul F. Harron, president, and Joseph Lang, vice-president and general manager, feel that it is the particular duty of a foreign language station to use its influence with listeners to maintain the institu-



New York's famous skyline backs WHOM's 387-foot radiator.

tions of this country and to instill in newcomers to these shores the principles of democracy.

WHOM's new all night show, from midnight to 6:30 a.m., introduces a novelty that has early morning listeners calling the station nightly by the hundreds requesting favorite recorded tunes.

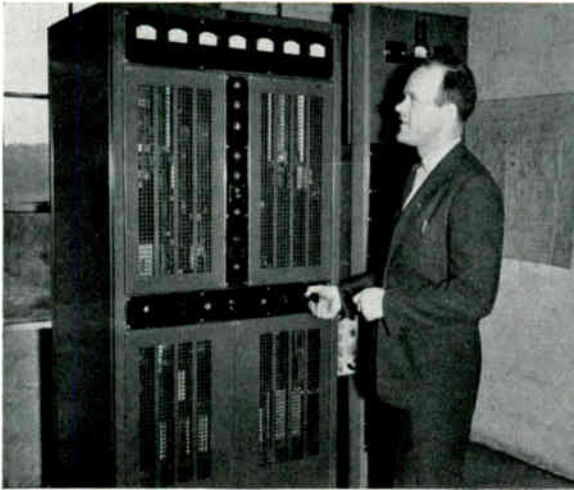
The station's new position on the dial is now 1480 kilocycles, three channels higher than previously. Daytime WHOM uses 1,000 watts, at night 500.

The station claims to have the tallest self-supporting radiator in the New York district. It is a 387-foot mast standing at the foot of Washington Street in Jersey City, where an old canal once met the Hudson. Its aerial beacon is clearly visible in the New York financial district and is one of the landmarks that thousands of visitors to New York see when they make the trip to the Battery at the tip of Manhattan Island to view the Statue of Liberty, Ellis and Governor's Islands and the Aquarium.

(Continued on page 29)

Engineer Graver Wiseman communicates with WHOM's New York studios by Morse code. The 1000 watt transmitter is on the job 24 hours a day. Below: Chief Engineer A. W. Burnham (left) and Vice-president and General Manager Joseph Lang.





General Manager John Shultz

WSTP

Salisbury, N. C.

Theme song for WSTP is the nightly frog chorus which rises from the marshlands around its transmitter tower. WSTP engineers are very proud of their frogs and have learned to recognize some of the leading soloists at first croak, especially the old basso profundo who has been a consistent performer ever since the station made its first bow to North Carolina listeners early in 1939. The old town of Salisbury is not likely to forget the frog pond frolic WSTP offered one night last year. "Frogs, frogs, nothing but frogs," station manager Johnny Shultz will tell you with a reminiscent smile, "even in the announcer's voice." Shultz plans to repeat the feature annually from now on out.

WSTP's call letters—"We serve the Piedmont"—are no idle boast, for the station's signal packs plenty of punch in the cotton growing, textile manufacturing areas around Salisbury. WSTP also serves Kannapolis, "the world's largest unincorporated town" and the home of Cannon towels. A remote studio in Kannapolis caters exclusively to the towel town's entertainment and social service program needs.

There's a hot time in old Salisbury town every time WSTP stages its popular "Saturday nite barn dance" in the local American Legion Hall. On this occasion Manager Shultz corrals a genuine hill-billy band and takes the microphone himself.

Manager Johnny Shultz (with pipe) drops in to the recording and announcing studio to hear a new recorded tune broadcast. Left: Chief Engineer Jimmy Yost puts the station on the air.

"And now," he drawls, "the radio audience is at the mercy of any man, woman or child who has a great talent to give to the people of No'th Ca'lina." The local baritone strides to the microphone to give with "You are My Sunshine." Ellie May, prodded toward the platform by family and friends, unburdens herself of a plaintive ballad, blushing all the while. And so on—zither players, gee-tarists, yodelers—ad infinitum and the wee sma' hours. WSTP stays on the air till it's drained the last bit of amateur talent from the people of Salisbury and environs.

WSTP is a community station, as much an indispensable part of Salisbury life as the local paper, the county court house, or the Civil War Monument. Every year the station's infantile paralysis drive has netted more than the President's Ball. As befits a community service, WSTP is locally owned by a group of progressive Salisbury business men who call themselves the Piedmont Broadcasting Corporation. Prexy is Bryce P. Beard, local civic leader.

Jimmy Yost is WSTP's chief engineer and the tender nurse of the station's Western Electric 310B transmitter and 350-foot shunt-excited Blaw-Knox tower. Yost, when he isn't grooming his completely Western Electric station, spends his time "frog-gigging" in the swamplands back of the transmitter house. By the way, both Yost and Manager Shultz will tell you, if you're in the market for a program novelty, that their frogs are available for sponsorship.

Recent Western Electric Transmitter Sales.

Among the orders received recently for Western Electric 5 KW transmitters are the following WGES, Chicago; KGGF, Coffeyville, Kansas; WSFS, Winston-Salem, N. C.; WSAN, Allentown, Pa.; and two for Pretoria, South Africa. In addition a number of orders for FM transmitters are now on the books, including the 50 KW FM transmitter for the Don Lee Network to be installed on Mt. Lee.



KGKO's "Letters from a Hicks Field Cadet" has brought in 5000 inquiries from prospective eaglets. Lined up are: Bill Arms, letter reader; Gene Reynolds, production chief; Ted Casper, announcer; Major B. S. Graham, Codet "Speedy" Scott.

Radio behind Defense

(Continued from page 7)

step into supervisory jobs by attending night courses.

In addition to carrying chain broadcasts many stations have inaugurated programs of their own to stimulate interest in the defense program; to keep the public informed of its progress and to speed up employment in defense industries.

KYW (Philadelphia) has taken listeners into the Steam Division works of a Westinghouse plant, giving them a first hand picture of the manufacture of huge steam turbines. KDKA (Pittsburgh) placed microphones in the aisles of another Westinghouse Plant turning out defense orders. The station says practically all defense broadcasts have been recorded for films.

KSFO (San Francisco) has covered ship building, diesel engines, camouflage paint, high speed motors for torpedo boats and ski patrol garments. KVOO (Tulsa) carries a series "Business and National Defense" which shows how various important industries fit into the national program.

KGW-KEX (Portland, Ore.) visits local plants with a portable transcription outfit recording programs for its series "Frontiers of Industry." WBBM has been trailing its mobile air theatre around Chicago's industrial area. WDOD (Chattanooga, Tenn.) in "The Voice of the Industry" brings workers from surrounding factories into the studio to tell of their jobs.

WHAZ (Troy, N. Y.) speaking for Rensselaer Polytechnic Institute, brings faculty members to the mike to outline the role of science in the Defense Program. Subjects so far discussed include transportation, power requirements, optical instruments, chemical production.

WFDF (Flint, Michigan) in a semi-weekly "Help Wanted" feature typifies how stations throughout the country are cooperating with employment agencies—urging workers to register for jobs. Recently the call went out for tool and die sinkers, machinists and mechanics.

KNX (Los Angeles) provides up-to-the minute news on aviation activities in "Air Views". Speakers describe new planes, spot new inventions and analyze new production systems.

WELI (New Haven) has been presenting an important series called "New Haven at Work." Interviews explain how local industries switch from peace to war-time production. For example, a clock factory is now turning out anti-aircraft fuses. The series has also brought Richard C. Carroll, assistant dean of Yale to the microphone to tell of the University's contribution to the defense project. More than 600 men employed in New Haven industries have enrolled in the free engineering courses, 725 undergraduates are taking the ROTC and civilian pilot training course; a number of Yale scientists have been called to Washington for research work. Furthermore, the University has made an extensive survey of its laboratory facilities to determine how it can help industrial research. A committee on industrial medicine and hygiene has been appointed to organize services for protecting the health of workers in big, humming plants. Special courses also are scheduled for physicians, nurses, chemists and engineers.

Feeding those very necessary sugar coated pills labelled "Morale" to bewildered youngsters suddenly whisked off to camp is another important defense angle right down broadcasting's alley. Incidentally, the tonic being served over the air is helping home folks as well to digest the defense pro-

Sergeant Jesse Tucker strums for the gang at Camp Lee during the popular "Okoy America" series broadcast over WRVA.



gram with a minimum amount of discomfort. In fact, it has wiped away many a tear and replaced many a worry wrinkle with a smile.

Outstanding "Morale Builder" is NBC's elaborate mobile unit which recently completed a three months' transcontinental tour covering 13 training centers. Feeding the network's affiliated stations, the rolling studio spread the whole panorama of camp life before radio listeners. Broadcasts revealed how the problems of whipping into shape the nation's



In Columbia's "Dear Mom" John Walsh and Dolph Nelson relate the gay adventures of two rookies with a top sergeant.

greatest peace-time army are being solved. Announcers interviewed high ranking officers, medical men, mess officers, orderlies, cooks, cobblers and conscripts themselves. The audience learned how and when the trainees eat, sleep, work, play and are entertained. Such human interest episodes as "Blue Monday", "Army Wash Day", amateur shows and boxing bouts were aired.

The specially built five-ton car carried its own power plant and four separate transmitters. Capable of high speed it hitherto had been used chiefly for emergency coverage of disasters and special events. NBC officials estimate that the unit traveled over 10,000 miles in its swing from coast to coast and back again.

WAAB (Colonial) claims it was among the first in the country to invade an army encampment with the idea of a soldiers' program direct from the premises. Their "Soldier's Quiz" had its initial broadcast last October and is still going strong.

Through KDON (Monterey, Cal.) Don Lee is presenting a popular army variety show direct from Camp Ord where over 10,000 troops are stationed. The show includes a large male chorus, soloists, drama spots, orchestra. The cast is com-

posed entirely of soldiers—the young ones—not the brass hats, says Don Lee.

WRVA (Richmond, Va.) surrounded by naval bases, puts on "Okay America" once a week to amuse the boys. Station entertainers, visiting the various bases, present a full hour variety show. Following the professionals, the boys themselves take over the microphone. Some sing, others play instruments, do impersonations or mimicry. The whole thing is completely informal, the only written part being the opening and closing remarks.

WFNC (Fayetteville, N. C.) has gained the name of "headquarters" among the boys at Fort Bragg. Over 67,000 soldiers are stationed at the post and some 20,000 civilians are working on a huge construction project there. The station runs a "Fort Bragg Hour" each afternoon. Soldiers write in or drop in requesting favorite tunes which WFNC promptly puts on the air.

WPTF (Raleigh, N. C.) also is serving the Fort Bragg area. In addition to entertainment features the station has broadcast direct from the army hospital, kitchen and classroom.

WSPA (Spartenburg, S. C.) invaded the scene of the big construction project at Camp Croft when the first shovel broke ground. Their daily "News from Camp Croft" is keeping the public informed of just what is happening at the huge infantry replacement center where 16,500 selectees will be housed. The station is doing some construction work of its own—putting up studios at the camp—for airing programs concerning and featuring trainees.

Columbia's "Dear Mom", one of the most popular of "You're in the Army Now" brands of entertainment, features the gay adventures of two fictitious army selectees in their comic encounters with a tough top sergeant.

WGNY's "For the Boys at Camp" is a sidewalk program focusing attention on draftees at Fort Dix. Conspicuously displayed at the scene of the broadcast is a large box in which letters and packages for the soldiers may be deposited as well as general contributions of cigarettes and candy.

"Life in the Army" presented by WTMJ features transcribed interviews with Wisconsin boys at Camp Beauregard, La. Recordings made at the camp are flown back to the station where names and addresses of the boys are noted. Friendly letters to the parents inform them of the broadcasts and invite them to tune in and hear their sons.

WKST (New Castle, Pa.) acts as a kind of clearing house for home folks and the local National Guard battery sent to Camp Shelby, Miss. Incidents at camp are recorded and broadcast daily. The plan eventually will bring the voices of all the boys directly to families and friends. Not long ago the guardsmen notified the station that many of them had left their rubber boots at home and wanted their families to send them "pdq." An-

nouncement of the boot shortage went over the air—along with directions for properly addressing packages. Studio phones soon started buzzing as grateful mothers called to say they were shipping boots immediately.

WGBF-WEOA (Evansville, Ind.) and WAKR (Akron, Ohio) have also invaded Camp Shelby. Similarly activities at Camp Edwards are being aired by WTAG (Worcester, Mass.), at Camp Hulen, Texas, by KWTO (Springfield, Missouri) and at Camp Blanding, Florida, by WDEV (Waterbury, Vermont). All of these broadcasts have to do with National Guardsmen who are serving far from their home towns.

WCOA (Pensacola, Fla.) puts on an "Early Riser's Club" which is encouraging local organizations to sponsor entertainment for defense workers. Through the station's efforts plans have been laid for a naval recreation center and admission prices for the coming baseball season have been lowered for army and navy fans. Numerous stations are rounding up radios, books, magazines and athletic equipment to cheer up enlisted men. WOR's appeals resulted in six army truck loads of radio sets which were reconditioned by the "Radio Service Men of America" and sent off to Fort Dix. KGW-KEX reaped a reward of 2,787 books for Camp Murray. WIBW (Topeka, Kansas), WRBL (Columbus, Ga.), WDZ (Tuscola, Ill.) report similar drives with splendid results in reading matter for Uncle Sam's soldiers and sailors.

Branching off from the cheery note of morale building, the survey switches to more serious aspects of the defense program which stations are keeping in mind.

Here, for example, is a report from Colonial Network describing an air defense test recently staged at WAAB. In cooperation with military authorities the station dramatized an imaginary air raid over Boston. Lt. James L. Whitcomb explained how his headquarters received warning of the raid from civilian observers, and the steps taken to set in motion the squadron of pursuit planes awaiting the attack. This is all a part of the Civilian Air Defense System being organized in New England.

Mutual carried one of the first blackouts to be staged in the country when inhabitants of Seattle, Washington, pulled their blinds, turned off street lamps and signs to test the air raid defenses.

WFDF, warns of the dangers of saboteurs and other Fifth Column activities in short broadcasts presented three times a week under the auspices of the Michigan State Police. Listeners, however, are reassured that the police are fully organized to meet all such emergencies.

KNX (Los Angeles) has prepared for possible future emergencies with a carefully planned system of keeping the station on the air at all costs. Two power lines lead into the studios in Columbia Square. If both were wrecked the station could still

fall back on a standby generator. The same setup is used at the transmitter. If necessary KNX can resort to short wave broadcasting. Any employee can re-open the station during off-the-air hours. Should a national emergency occur KNX is all set to notify other Pacific Coast stations as well as the entire CBS network.

WCMI (Ashland, Kentucky) reports that its new transmitter building and tower, located on the banks of the Ohio River, are well protected against possible sabotage. The operator on duty has full view of the transmission line from house to tower. A powerful light mounted on the roof brightly illuminates the outside equipment at night. Since the property adjoins the Ashland Refining Company plant it is subject to double guard duty.

Despite the tremendous responsibilities shouldered by broadcasters in their defense activities the country can still tune in and hear a free flow of jazz and symphony, sketch and quiz, opera, drama and comedy. This is as it should be, says the industry. For relaxation and laughter, during periods of tension, may be as important to the national security and morale as more tangible defensive weapons.

To tell the whole story of radio's contribution to National Defense would require volumes. However, this cross-section is representative of what is happening over the air throughout the length and breadth of the United States. Perhaps the best way to judge what radio already has accomplished would be to visualize launching this gigantic defense movement without broadcasting's help. Surely, when the final chapter of the great emergency is written special tribute will be due the men who manned America's microphones to safeguard democracy.

Sherman Police Get Two-Way Radio.

The police department of Sherman, Texas, gained a powerful ally when a two-way radio system recently went into action at Headquarters Station WQIS. The Western Electric equipment consists



of a transmitter and receiver installed at headquarters; and transmitters and receivers used in the patrol cars.

Upon receipt of a police bulletin or message transmitted over the air, patrolmen in the squad cars can switch on their car transmitters and either answer the sergeant's call immediately by a brief acknowledgment or if necessary carry on a conversation with headquarters.

Rotating Cardioid Aids in Imitating 22 Voices



John M. Tiffany, Chief Engineer of WKRC, Cincinnati.

Up until a short time back visitors witnessing a performance of the "Johnson Family" broadcast from WKRC, Cincinnati, would have seen Jimmy Scribner, who is the whole act rolled in one, going through strange gyrations before the script stand as he simulated 22 voices over the air. With the movements of his body, he was producing the various fading and sound effects that he uses in the act.

Then one day Jimmy decided it was enough of a job for one man to create 22 voices without doing a contortionist act as well. Seeking a way out of the dilemma, he hit upon the happy idea that a Cardioid microphone mounted on a revolving stand would take care of the fading and sound effects for him. Chief Engineer John M. Tiffany talked it over with Lee Bernhardt, a member of the engineering staff, who designed and built the stand.

Mounted on ball bearings, both top and bottom, with felt cushions to brake the motion and to insulate it from bearing noises, the Cardioid rotates noiselessly by hand over 180 degrees.

Now Jimmy plays the "Johnson Family" comfortably seated at his desk while the mike takes care of the fading and sound effects as he turns it to the various positions.

Scribner not only enacts the 22 characters which take part in his show but he also writes the radio script. Listeners can hardly believe that the voices of Lucy Johnson and Pee Wee, her ne'er-do-well husband, come from the same set of vocal organs.

WHOM, Jersey City, N. J.

(Continued from page 24)

The main studios in the Jersey Observer Building at Journal Square, Jersey City, have been completely redecorated and doubled in size. Auxiliary studios in New York City are in the Aeolian Building on fashionable 57th Street, near Fifth Avenue. Up to the minute in efficiency and compactness, they are the result of careful selection and planning. Western Electric equipment is used throughout. Speech Input consists of 23A consoles; microphones are eight ball and the new cardioid types.

The diversity of studio space at the New York City location provides for mass programs, concerts and orchestral groups, and for limited group programs and single speakers. The organ console and tone chamber are separate. All studios are provided with sound locks and the larger studios are supplied with observation windows for sponsors and the public.

Hung ceilings and special sound absorption treatment have been applied to the working layout, with a concealed ventilation system equipped with deadening cells to prevent carriage of sound from one studio to another.

WHOM was founded in 1930 — the amalgamation of four outlets on the same band, WIBS, WKBO, WBMS and WNJ.

The engineering staff headed by Allison W. Burnham, chief engineer, includes Grover Wiseman, T. A. Gempp, Rocco Albanese, Harold Ducore and Eric Potts — transmitter crew; and George Ellis, Lenne Ohl, Harold MacCambridge, Charles Hurlburt, William Fairclough and Francis Cotterpin — studio operators.

WDNC, Durham, N. C.

(Continued from page 20)

before she "married" into the WDNC family, she steps up to the microphone as "Women's Page" editor five afternoons a week and appears as style commentator on an evening show sponsored by a Durham dress shop. At unpredictable intervals Jarman, himself dusts off a hill-billy accent and appears as Uncle Ez for special occasions. The station is affiliated with the Columbia Broadcasting System.

Asked the secret of WDNC's success, Manager Jarman 'fessed up as follows: "Well balanced programs are the secret of any broadcasting station's success. Better broadcasting," he went on, "starts the minute these programs start on their merry way through Western Electric speech input and transmitting equipment. We're proud of the fact that we can stamp on all of our promotional material the six words that mean so much to clients seeking the best facilities through which to transmit their messages—'Western Electric Equipped for Better Broadcasting'."



L. L. Hendrick, manager; G. H. Wilcox, president of Red River Valley Broadcasting Corporation and T. E. Spellman, chief engineer.

KRRV

Sherman, Texas

Little less than a year ago KRRV, serving Sherman, Denison and the rich Red River Valley area of Texas, was granted a construction permit from the Federal Communications Commission to increase its power from 250 to 1,000 watts on the 880 kilocycle regional frequency. Better broadcasting was in demand for one of the state's richest agricultural and manufacturing sections. KRRV determined to meet this demand by installing a completely new system, ultra-modern from microphone to antenna.

Accordingly, the management put in an order for the latest Western Electric 1,000 watt transmitter, a 110A program amplifier, a 2A phase monitor, a 94D amplifier for program monitoring. Meanwhile a modern white brick building to house the transmitting equipment went under construction.

Two 280 foot Lehigh self-supporting, tapered, shunt-fed towers comprise the directive an-

tenna system. Below: The location of this 23 type speech input equipment provides the operator with close control. Right: KRRV's new voice—a Western Electric 1000 watt transmitter and auxiliary equipment including the 110A amplifier seen at the left.



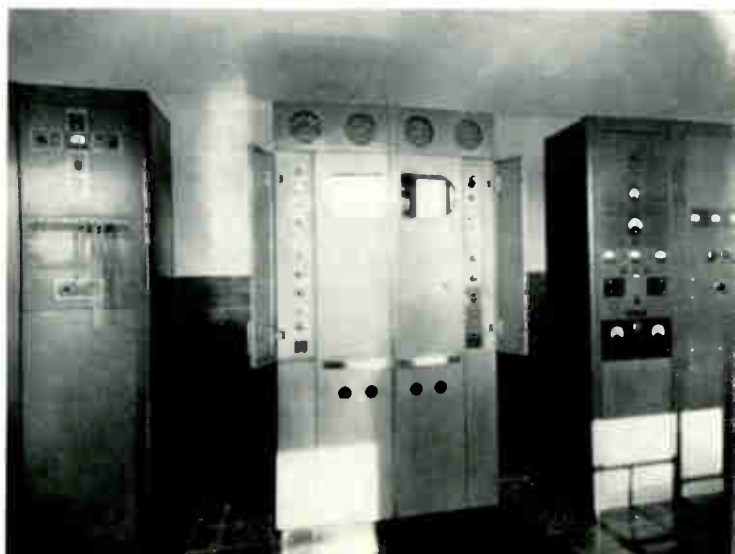
These towers comprise the directive antenna system.

tenna system. About each element local engineers installed a radial ground system, consisting of 120 equally spaced radials 280 feet long, with exception of the over-lap between the towers. About the base of each element a ground screen was installed consisting of 120 short radials, each 42 feet long. For a radius of approximately 42 feet, the ground wires are buried only one to two inches, while the remainder of the ground system is buried approximately eight inches deep.

As KRRV visitors face the new transmitter, the cabinet to the immediate left mounts the 110A program amplifier, the 94D monitoring amplifier, and the closed circuit jack strip which provides flexibility of all equipment and telephone circuits. Twin cabinets to the right of the transmitter provide space for the frequency monitor and deviation meter, the 2A phase monitor, the modulation monitor, and the antenna phasing equipment.

Stealing the show with its beauty of design and outstanding technical performance is the

(Continued on page 32)



Tri-City Network, Virginia

(Continued from page 15)

had granted WLVA a new frequency and permission to broadcast full time with 250 watts power.

Dividing the job of station manager of WLVA between them, the Allen brothers have called to the helms of their associated stations men experienced in serving the entertainment needs of the Virginia Piedmont. In the manager's office at WSLs they have ensconced James H. Moore, formerly program director at WLVA. When the brothers took over the operation of WBTM in Danville, "*The World's Best Tobacco Market*," they named James A. "Happy" Howe as manager, another ex-WLVA man. When we visited WBTM recently, the first sound that assailed our ears was the twangy intonations of a hill-billy trio. This reporter's complacent cynicism received quite a jolt when he discovered that these mountain musicians came, not from Brooklyn, but from the back-country around Danville. Howe, we understand, has dug a lot of local talent out of them thar' hills. Ever on the alert for new program ideas, he cannot pass a pitchman on the street without wondering how he could fit the sidewalk salesman's spiel into a seven o'clock spot.

All three of the Tri-City stations have become in the course of the years or months of their operation civic institutions of considerable local prestige. Each station has a dozen remote lines and no event of general or local interest takes place in Roanoke, Lynchburg or Danville, that is not covered by all or one of the stations. No important speaker visits any one of the communities or neighboring educational institutions whose message is not carried into the homes of Tri-City's growing audience.

All three Allen stations head the vanguard of local charity drives. Perhaps the most conspicuously successful of these efforts has been WLVA's annual Christmas Party for the relief of Lynchburg's poor. Eight years or so ago the Salvation Army, thwarted in its Christmas collection efforts, persuaded local merchants to buy time on WLVA to promote the drive. The Allens fell in with the plan enthusiastically, tossed the check they had received for air time into the Salvation Army jackpot. The first year's program made all advance estimates pale by comparison, raised \$720 and quantities of food and clothing. The 1940 program, six hours long and employing a variety of local amateur talent featuring the genial "mc'ing" of Lynchburg Commissioner of Revenues Charles C. McLeod, required the services of 125 volunteer workers to collect and sort the \$3550 in cash and the tons of food and clothing offered by enthusiastic listeners.

Although "Skipper" Heiser, Tri-City's chief engineer, is now on active duty with the Navy after several years as a Reserve Officer, the network's technical activities are now ably supervised by Philip Briggs, engineer of WSLs, Harry Spencer, engineer of WBTM, and John Orth, engineer of WLVA, top

men in an engineering staff of 14. Navy man Heiser's special pet in the equipment line is a Western Electric 271A output switching panel which he has adapted to serve as the master control element for the three-station network. With this set-up the flick of a switch provides for complete and instantaneous interchangeability of programs between any combination of the three stations and the Mutual Broadcasting System, the national network with which Tri-City has been associated since November, 1940.

The Allen brothers are devotees of the eternal triangle. As a symbol of the geographical triangle formed by Lynchburg, Roanoke and Danville, every Tri-City employee sports in his lapel a triangular pin inscribed with the call letters of the member stations. Carrying this "three-in-one" idea into practical action, the Allens, in order to peddle Tri-City time to national advertisers, have established a national sales office with Carl B. Ogilvie, another ex-WLVA man, at its head. The sales literature emanating from this office claims that the Tri-City Stations, which separately serve the third, fifth and eighth markets of Virginia, become, when purchased in a single package, an unbearable medium for national advertisers who wish to top the second largest market in the Old Dominion. The Tri-City Stations, taking a leaf from "The Three Musketeers," have carried the slogan "All for one and one for all" into the sphere of time-salesmanship. It's good business, too, the Allens will tell you.

Sound System at Air Depot

(Continued from page 12)

gage weighed-in he says "goodby" to it until he reaches his destination. Off it goes on a conveyor belt to the baggage station and from there to the loading platform. Passengers' manifests likewise travel speedily via a pneumatic tube route to a checking room.

In addition to sound system, teletalk, conveyor and pneumatic tube systems, important telephone and teletype communication connections are centered here, with thousands of miles of wire converging on reservation offices on the upper floors. For the comfort and convenience of patrons and the general public, the depot also houses a newsreel theatre, smart restaurant and cocktail lounge. Airline companies estimate that one million passengers will be conveyed to and from LaGuardia Field during 1941.

This, the country's first airways union station, solves many vexing problems which have confronted the transport companies using New York as a main Eastern terminus. It gives access to the subways, to the new Queens-Midtown vehicular tunnel and proximity to various well patronized hotels. It transfers passengers from the heart of the metropolis to the Long Island port with speed and comfort. And it demonstrates once again that properly designed and engineered sound systems have become vital factors in the ever expanding air travel business.

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KRRV, Sherman, Texas

(Continued from page 30)

443A-1 transmitter. KRRV engineers are proud of this equipment consisting of a single unit containing the radio- and audio-frequency circuits, complete power supply, and all the necessary control and protective circuits. Radio frequency is supplied from the phasing unit to the towers through gas filled concentric lines that have proven highly efficient.

The towers have been painted and lighted in exact accord with specifications issued by the Federal Communications Commission. This includes a 1,000 watt flasher beacon and associated marker lamps which are turned off and on with un-failing accuracy by an illumination control operated by a photo-electric cell.

High quality local and network programs are fed the transmitter from Western Electric 23A studio equipment and 22C remote speech input apparatus.

Excellent equipment correctly adjusted, a fine antenna system with remarkable soil conditions, and an alert staff—all combine to make KRRV one of Texas' outstanding stations.

PICK-UPS

Tubes Burn 27,990 Hours



Ted Giles, Chief Engineer of WMBD, Peoria, Ill.

When these mercury vapor rectifier tubes chalked up a service life of 27,990 hours, it was enough to bring a smile of satisfaction to the face of Ted Giles, chief engineer of WMBD, Peoria, Illinois. The 258B veterans have been operating in the oscillator modulator unit of a Western Electric 355E-1 transmitter since it was first installed, July, 1936.

Giles, quite justly, gives his own organization as well as the manufacturer a pat on the back when he says, "The unusually long life of these tubes may be attributed in part to the excellent voltage regulation and careful maintenance of control circuits by WMBD's engineering staff." When one of the tubes recently became somewhat erratic in operation, all of them were at last honorably retired from their long and active service.

Screen Hit Stars Tubes

(Continued from page 21)

men, using specially designed machines, transform coils of wire and varied shapes of glass bulbs into vacuum tubes.

"This magic lamp of today," says Mr. Thomas in the final sequence, "has created a million jobs—in every city and town and village in the country. Jobs in service and manufacture—jobs in entertainment and education. It has built a thousand factories — opened ten thousand stores and shops — created vast demands for the raw materials of farms and mines and forests. All these things happened because of a single product of individual enterprise and the American way of life.

Since its first presentation on the screen, "A Modern Aladdin's Lamp" has been shown all over the country. It is available to broadcasters or other groups interested in the subject in either 16 or 35 millimeter width, and may be borrowed free of charge from the Motion Picture Bureau, Western Electric Company, 195 Broadway, New York, N. Y.

Thirty-two

Linden Police 2-Way Radio

(Continued from page 16)

under fire shortly after going on the air, when it was called upon to aid in the solution of a major crime. A brawl developed in the galley of an oil tanker tied up at the waterfront which forms one of the boundaries of the city. During the fight a knife was drawn and one of the participants killed. A telephone call to the police went to headquarters, the nearest scout car was ordered to the scene by radio and the officer arrived at the spot, all in the space of a few minutes. Thus the crime was solved with a speed which would have been impossible before radio went on the job.

Since Linden is predominately an industrial city, there are large non-residential areas and seldom-used streets in the industrial section which must be patrolled constantly to forestall fire, theft and sabotage. Typical of emergencies the police must always guard against, was the disastrous \$300,000 fire which swept through an oil refinery a few years ago before radio went on the job. Soon after the alarm was given communication to and from the area was completely disrupted, hampering the efforts of firemen and police. The refinery stood on a dead-end road and curious sightseers congested traffic for miles around. The Linden force was cited for its efficiency in handling the situation, but its work would have been doubly effective had two-way radio been available.

A few years ago Chief of Police Frank J. Hickey recommended the installation of police radio



Sergeant Pickel at the dispatcher's desk in Linden City Hall.

in the annual report of his department. With Linden's Mayor Myles J. McManus squarely behind him in his contention that radio was a necessary part of police equipment, the city fathers were convinced, and after thorough investigation the Western Electric system was selected. The complete installation job was handled by Garden Electric Company of Elizabeth, N. J.

"We investigated all types of equipment," says Chief Hickey, "but we're mighty glad we picked Western Electric. We have had no trouble and reception has been perfect everywhere in the city."

PICK-UPS

WAIR, Winston-Salem, N. C.

(Continued from page 17)

half-dozen western and mid-western stations. Into two years with CBS' field engineering department he crammed as exciting a collection of chores as most engineers meet up with in a lifetime. He handled the controls at air races, stunt broadcasts, World Series games, football and polo games, the Olympics, as well as at symphony concerts and "name" band pickups. He has fed special events from airplanes, blimps, ships and speed boats. He was the engineer on the world's first broadcast from a moving train.

Air-minded in more ways than broadcasting is WAIR's commercial manager C. G. Hill, a native of Winston-Salem. One of the South's foremost private flyers, he still holds a transport license. He left a post as Winston-Salem sales manager for Eastern Airlines to enter the insurance field. Then came his providential sidelines meeting with George Walker and radio has been on his mind ever since.

Chief engineer for WAIR is radio veteran Earl F. Downey who presides over the Western Electric 250-watter located on the links of the Old Town golf course on the Reynolds estate about two miles from the station's studios. To Downey's ears the cry of "fore!" is a familiar one, for golfers are wont to sight on the transmitter tower on a number of holes. He'll see top-flight golf in his front yard soon, for several championship matches have been booked.

Downey has spent 23 years in radio, mostly in the south. Experience tells, for WAIR's antenna radiation characteristics result in an exceptionally good signal which blankets Winston-Salem's industrial areas and reaches out into the tobacco country beyond. Downey and George Walker, whose combined stretch in radio totals 48 years, have standardized on Western Electric equipment both at the transmitter building and in the station's handsome new studios where cardioid microphones, 23C speech-inputs, 9A reproducers, together with the latest in acoustic design, combine for better broadcasting.

WAIR is North Carolina's key station for the Southern Broadcasting System. The station's management has also organized the extension of Mutual Broadcasting System programs to the Tarheel State, having signed with the network for state service and effected individual contracts with other local stations. The entire state is now wired on a reversible circuit to facilitate instantaneous switches and reverses for exchange programs within the state. Too, WAIR maintains repeater service for MBS to the east and south.

Born of a chance gridiron meeting, WAIR in the short space of four years has attained All-American stature in the roster of the nation's local stations.

Thirty-three

Don Lee Signs up for First Western Electric 50KW FM

Strong Pacific Coast move in commercial frequency modulation was made when Lewis Allen Weiss, vice president and general manager of the Don Lee Broadcasting System, placed an order for Western Electric's first high power FM transmitter, which will be erected atop Mt. Lee in Hollywood.

Pending production of the 50 KW, Weiss ordered a 1,000 watt FM transmitter, which it is expected will be placed in operation within 60 days from the time ground is broken atop the 1,700 foot mountain, where already is located the new \$100,000 Don Lee television studio-transmitter, W6XAO.

Frank Kennedy, Don Lee chief engineer, will supervise installation of the FM station. The new station will originate and broadcast special programs of music and drama which will incorporate all of the advances in high fidelity made possible by frequency modulation.

But as an auxiliary service some of the regular KHJ and Mutual Don Lee programs will be simultaneously broadcast through the new FM unit. This will be accomplished by installation of a special new program line from KHJ to the FM base on Mt. Lee.

The call letters will be K45LA and the unit will operate on 44.5 megacycles. Atop a 230 foot steel tower will be erected a six-bay turnstile antenna 70 additional feet in height, bringing the total altitude of the antenna to 300 feet. Special flashers will be installed on top for aviation safety.

The larger unit will service 2,600,000 people within a 7,000 square mile area, or roughly the region extending from San Diego to Santa Barbara.

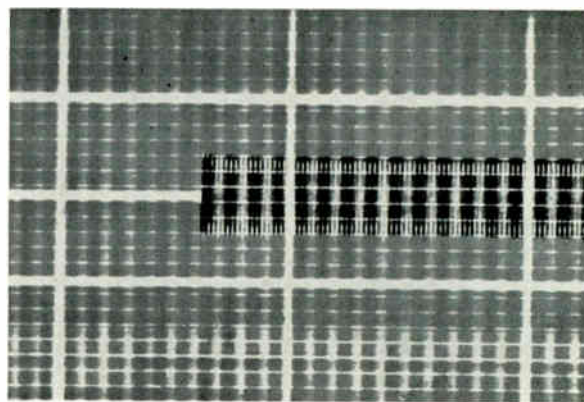
Already there are several factory-made frequency modulation receivers on the market which retail from \$80 to \$150 and converters for present-type receivers sell for about \$50.

1126A Amplifier

(Continued from page 10)

is adjustable in five .2 second steps from .2 of a second to 1.0 second.

The 20A rectifier, a vacuum tube voltage regulated type of plate supply rectifier, is used to supply power so that excellent stability of operating performance is obtained. In addition, this type of plate supply has the further advantage that it is effectively an extremely low internal impedance source of plate supply voltage so that satisfactory operation of the peak limiter is obtained with the use of a minimum of filter circuit elements. Figure 6 shows



Enlarged oscillogram of a 5000 cycle tone input applied at a level 10 db above the knee of the load curve.

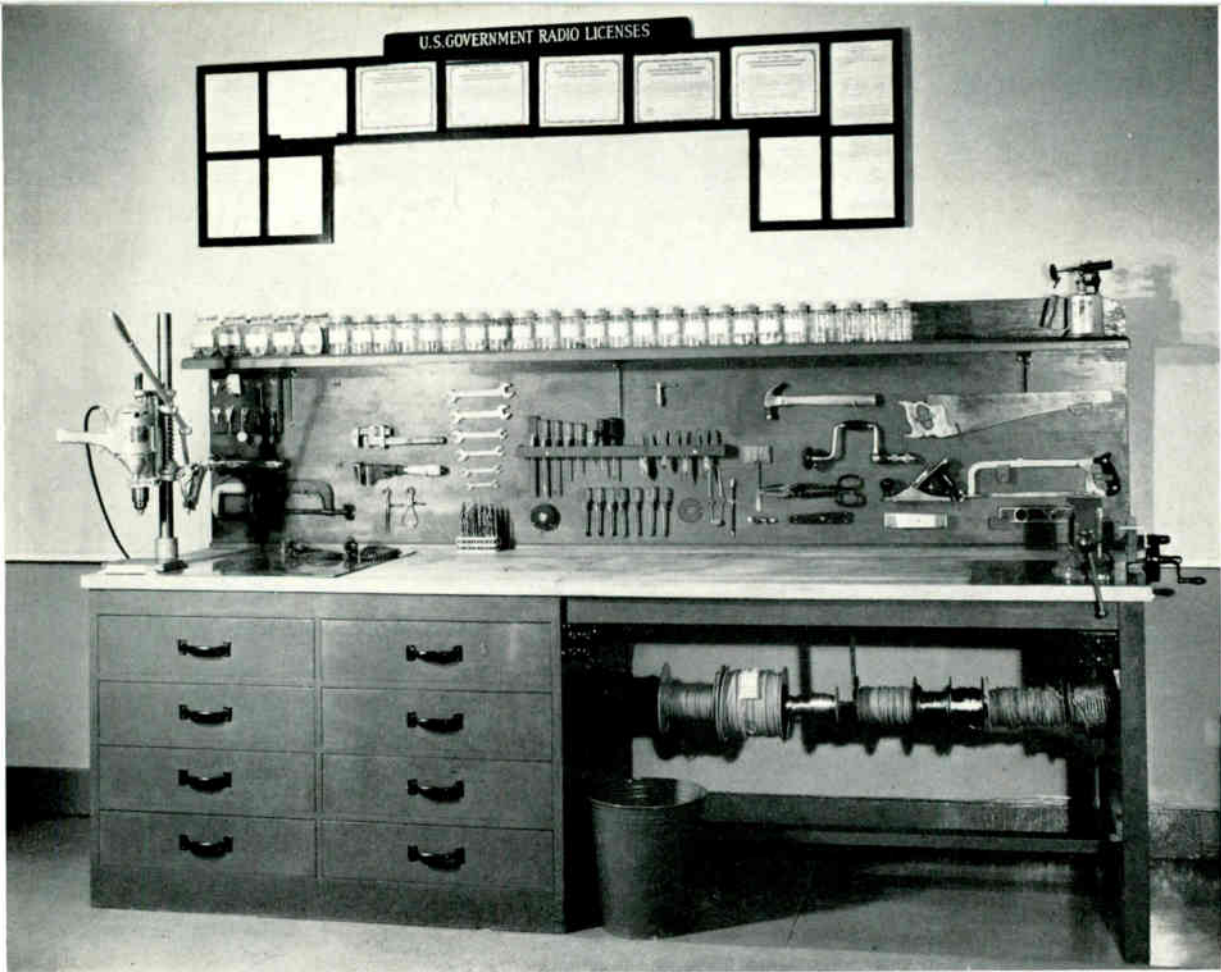
the output voltage regulation of this unit with variation in load. The variation in output voltage with plus or minus 10 per cent variation in input line voltage is only a few volts.

A functional schematic of the unit is shown in Figure 7. In the photograph on page 8 the compression indicator meter is obvious. In addition, it will be noted that the equipment is arranged in three panels so that the power supply unit, the amplifier unit, and the control panel may be mounted separately. For example, the control panel may be mounted in a transmitter control console or desk. In this application, the control panel occupies only 5¼ inches of mounting space at a location where it is desirable to keep the panel area at a minimum.

Observations made during field trials in both amplitude and frequency modulated broadcasting stations for some time past indicate that the application of the principles outlined has resulted in a device inherently capable of maintaining a high average signal strength while at the same time very effectively eliminating any extra band radiation in AM systems or appreciable excursion into the guard band in FM systems. These field trials have included the operation of the equipment where the avoidance of over-modulation has been stressed. In addition, they have included operation where the maximum obtainable increased coverage consistent with avoidance of disturbing over-modulation has been the principal criterion. In all instances, except for initial lining-up to insure satisfactory service over relatively long periods, little or no operating adjustment has been necessary.

Controlled listening tests in the laboratory indicate that when using circuits and loudspeakers flat to 15,000 cycles per second and comparing direct transmission with transmission through the limiter,* differences in quality of program could be discerned only when the limiting action was 5 db or more.

*Tests made with 0.6 second recovery time.



W71NY Work Bench Eases Maintenance Job

The above work bench at W71NY—WOR's FM station in New York City—has proved to be an essential part of the maintenance operations of the station, providing as it does a place for every tool and a tool for every place. Supervisor Charles H. Singer contends that small pieces of equipment, and particularly tools, are a definite part of the transmitter equipment, and thus deserve a place in the transmitting layout instead of being poked away any old place.

WOR maintains a group called the Technical Facilities Division and these engineers use this work bench in connection with the design and construction of FM equipment. The bench is also used to great advantage in testing operations.

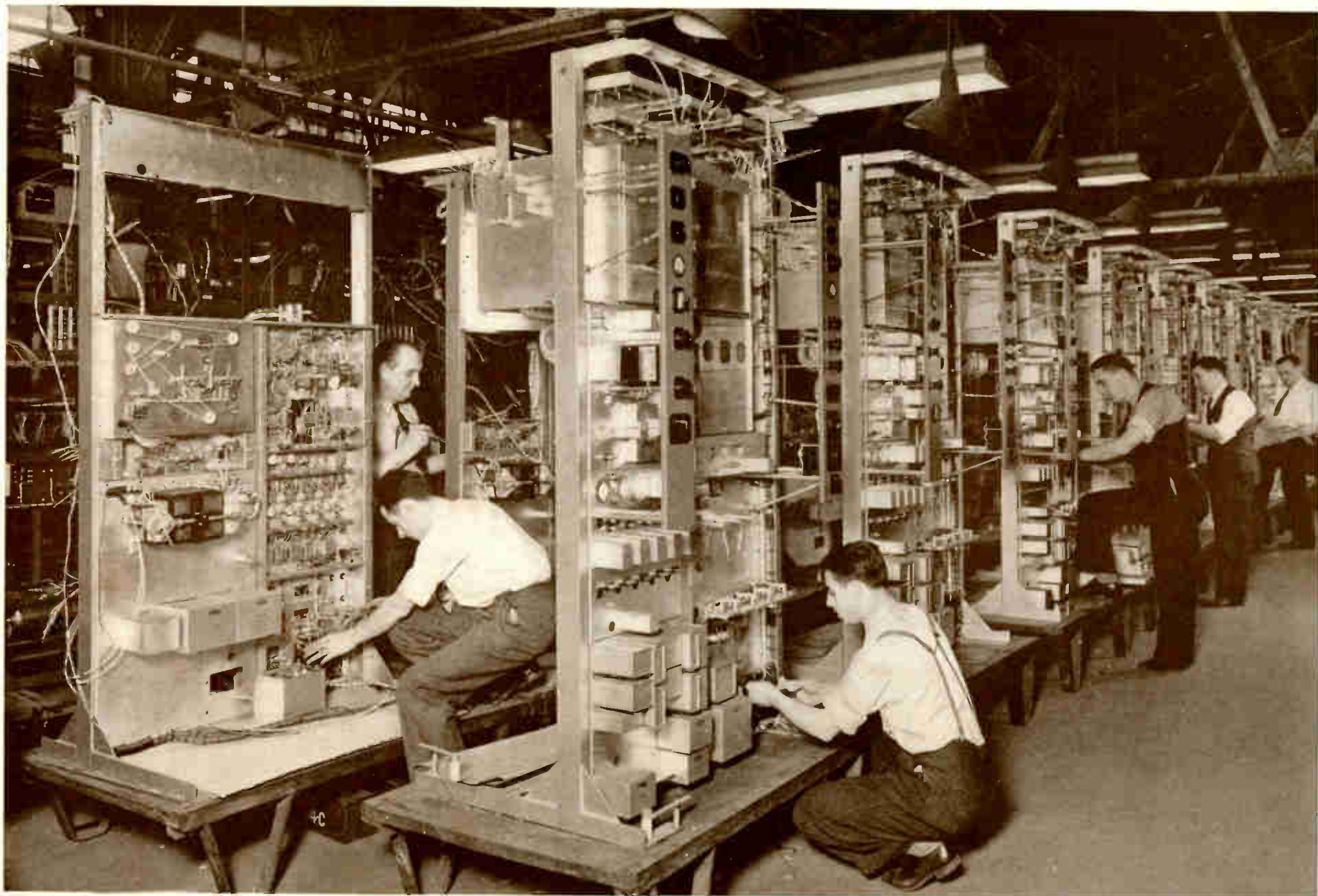
The bench with its 1½ inch maple surface stands 38 inches high, is 33 inches wide and 10 feet long. Tools most often used are mounted on the 30-inch high back. The jars contain small parts and hardware such as screws, nuts, bolts, hooks, lock washers, soldering lugs, nails and insulated staples.

The drawers hold files, punches, scribers, spare drills, circle cutter, carborundum stones, fuses, fuse tester, solder, work gloves, flashlight cells, spare bulbs, sandpaper, crocus cloth, battery clips, spare AC fittings, friction and rubber tape, rubber

stencil set, wax lacing cord, spare halyard rope, lacquer, coil dope, spare transmission line fittings, copper and brass in strip, sheet and rod forms, condensers, resistors, sockets, switches, jacks, plugs, stand-off insulators, dials, etc.

The wire rack contains switchboard wire, rubber covered shielded wire, stranded antenna wire and high voltage alpha wire. Mounted at extreme left is a combination drill press and portable electric drill. The portable unit which has jaws for drill sizes up to ½ inch may be used anywhere in the station.

The tools visible on the bench are, left to right: key rack, flashlight, C-clamps small (2), large (1), pipe-wrench, Stillson-wrench, inside and outside calipers, set of end-wrenches (6), set of drills, drill-tap wire-gauge, screwdrivers (set of 8), measuring tape, set of socket-wrenches, American Standard wire gauge, torch lighter (flint), pencil, pliers (1 gas, 2 long nose, 1 cutter), tap brace, variable protractor, hammer, drill brace, tin shears, fuse puller, plane, folding rule (6 ft.), wood saw, hacksaw, spirit level, blow torch, drill press, vise, hand grindstone, soldering iron (2), dust pan and brush, center punch, resistor color code chart, rubber gloves, gauge (drill).



WESTERN ELECTRIC ONE KW FM transmitters in final assembly stage, Specialty Products Division, Kearny, N. J.