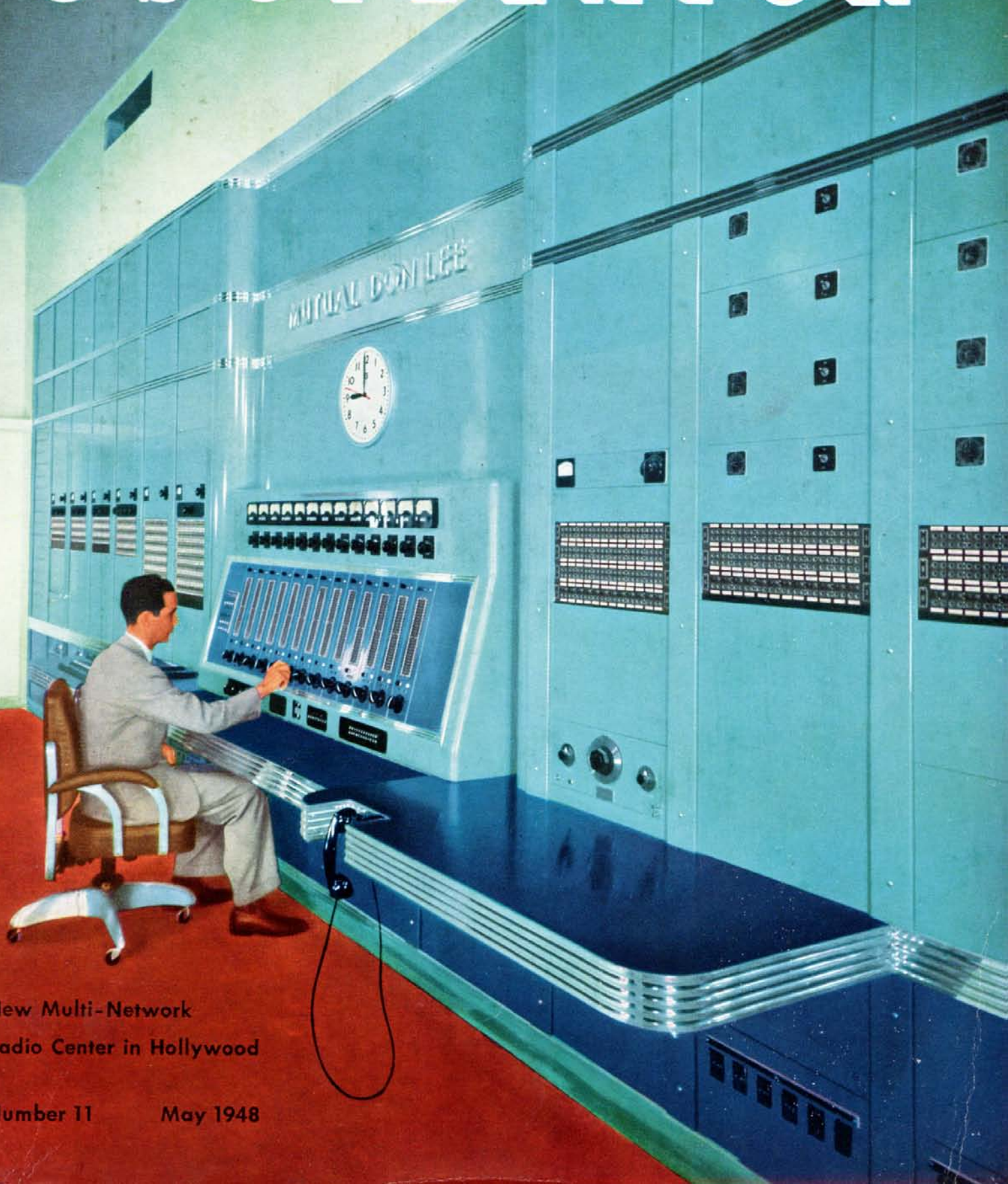


Western Electric

OSCILLATOR



New Multi-Network
Radio Center in Hollywood

Number 11 May 1948



Mutual-Don Lee's New Hollywood Home

A NEW BUILDING has gone up in Hollywood . . . a new home for the West Coast operations of the Mutual and Don Lee Broadcasting Systems, which we believe to be one of the finest and most complete installations of its kind ever to be erected. The steady growth of Mutual and Don Lee has required repeated expansion of the program production and studio facilities in use at the Hollywood headquarters. However, when our present requirements became clear, we decided to make a complete break with the past and design a new network center from the ground up, with completely new equipment designed specifically to provide the most efficient facilities for our existing and future needs.

The new, 3 million dollar, block-square building that resulted from this determination to have the finest facilities is now going into service and is proving to be a splendid realization of our hopes and plans.

Description of the building divides naturally into two parts which will be taken up in the order given: (1) Studio complement and acoustic design; (2) Program control equipment, including program routing to the various networks associated with Don Lee and Mutual.

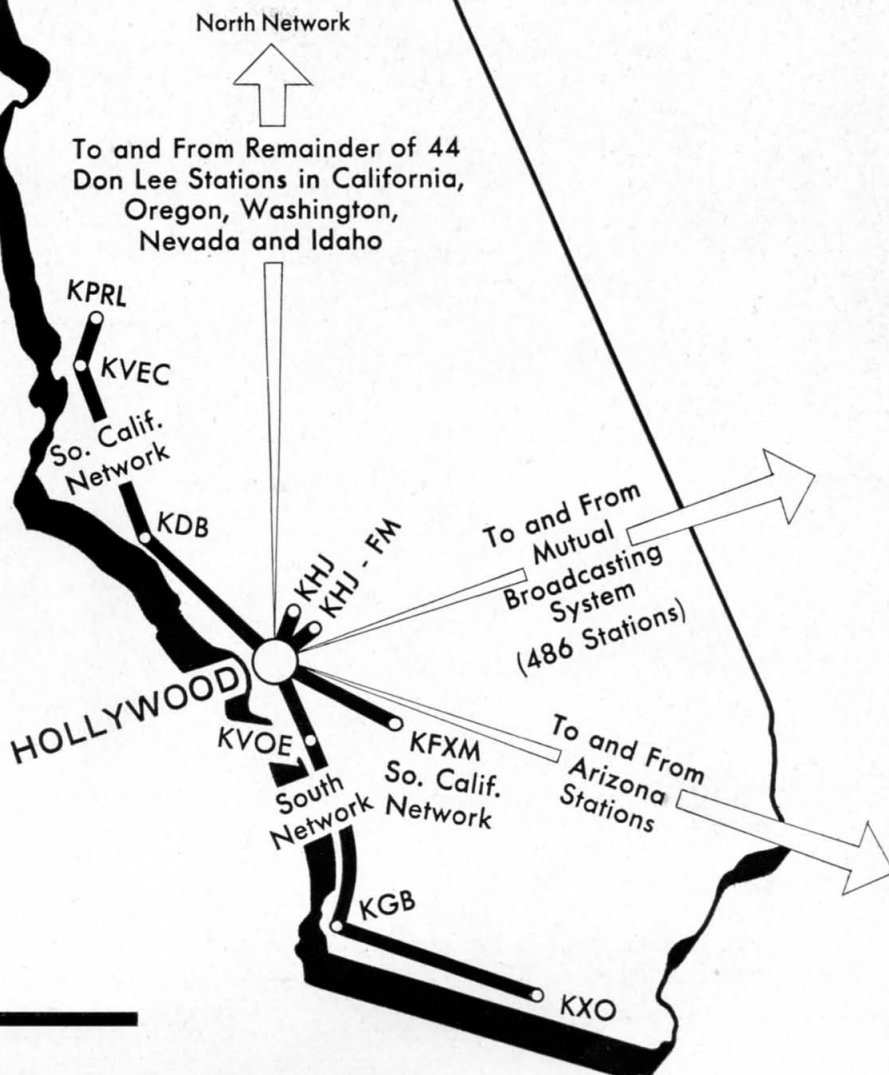
The complement of studios included in the new building is based on our need to develop not only the Hollywood-originated programs for Don Lee and Mutual, but in addition, to provide facilities that would allow complete flexibility in originating programs for the various affiliated networks on the West Coast. In order to take care of our present needs and any foreseeable demands in the future, we decided on the following studio setup:

- (a) Four large "Auditorium" type sound stages which would allow production of the audience participation or symphony orchestra shows with stage room for more than 100 musicians and an audience of 350 people.
- (b) Four large "Dramatic" type studios in which a great variety of shows requiring fewer people than the types referred to above could be produced.
- (c) Three small studios allowing for production of commentary, group discussion or similar shows involving one to ten people grouped around a table, with convenient transcription equipment in the control rooms allowing for production of disc-jockey shows.
- (d) Three announce booths which include not only microphone input equipment, but complete transcription equipment, allowing the announcer to insert announcements in any program as desired, or play recordings for program fills.

These requirements are embodied in the ground floor of our new building as shown on the simplified floor plan and isometric drawing on pages 8 and 9. The four large auditorium sound stages which can be seen at the four corners of the building are each in mean dimensions approximately 110 feet long, 55 feet wide and 28 feet high . . . one of the largest sound stages ever built for radio use, with a volume of 170,000 cubic feet. The four dramatic studios, two of which are 51,000 cubic feet and the other two 24,500 cubic feet, are disposed in a line across the center of the floor as shown. The three smaller studios,



Multi-network operation at Don Lee complicates their switching problems. Two transmitters and five network lines are fed from their new Hollywood radio center.



by Walter Carruthers

Chief Engineer, Studio Division,
Don Lee Broadcasting System

which average about 1800 cubic feet, and the three announce booths can be seen conveniently arranged in the front center of the building.

Acoustical Research for Finest Tone Quality

In contemplating the design and acoustical treatment of the new Don Lee Broadcasting System auditoriums, consideration was first given to the optimum reverberation characteristic. That is, the determination of the length of time that tones, upon being interrupted, will persist. The curve, produced by graphically plotting the reverberation time and frequency, is the objective criterion which is compared with the subjective enjoyment of the sounds produced.

In the growing art of broadcasting the optimum re-

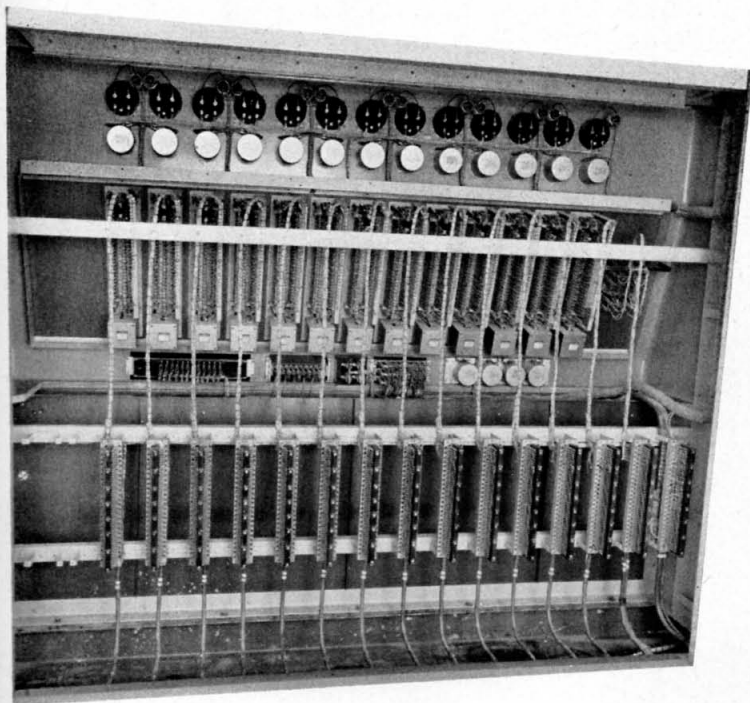
verberation characteristic for a given room size has been controversial, like most things dealing with the aesthetic. However, in pooling our listening experiences, programs emanating from certain music halls seemed to score a unanimity of opinion as to the sound excellence. Equipment capable of producing tones and graphically recording the time of sound decay was moved into these favorite places and the resulting curves were compared. There was an unmistakable similarity about all of them. An average of these measurements became our optimum reverberation characteristic. The music hall which had a sound characteristic nearest to our selected standard was chosen as a place to produce a series of musical programs, so that a more careful study could be made in listening tests.

The next problem was to design an auditorium which would conform to the optimum sound characteristic. In earlier building history, such an undertaking would be difficult. However, today, with the science of acoustical engineering, it is possible with mathematical formulae known to the art to calculate the sound treatment for a given volume enclosure so that the desired reverberation characteristic can be obtained.

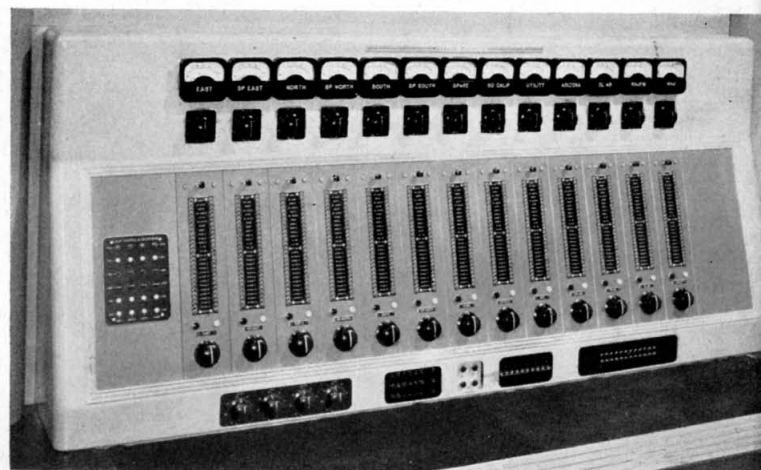
Many subtle factors must be considered in the sound treatment in order to enhance the enjoyable quality of



The four auditorium sound stages — each 110' x 55' — are among the largest ever built for radio. Here a reverberation test is being made.



Close-up of the control turret on the Master Control is shown below, with rear view on the left. The thirteen outgoing lines are designated on the VU meters at the tops of the relay selector strips. Inputs are indicated by the lamps in the vertical rows. Relay selector knob is at bottom of each strip. Master switching buttons are in lower center panel.



sound. However, we will consider only the optimum reverberation characteristic. The audible spectrum was divided into three regions—high, middle and low frequencies. Each group was studied separately and given a different type of treatment in an effort to gain the desired results.

Convex Splays for Low Frequency Control

Low frequency reverberation is usually excessive in auditorium design because materials found there do not absorb the lower tones with a consequent tendency for them to persist after the higher tones have died away. Through use of diaphragmatic areas, control can be exercised in the dissipation of low frequency energy. That is to say, if we have areas which are free to vibrate, the low frequency sound energy will be spent in setting these members in motion. A "polycylindrical diffuser" is a form which has been used as a low frequency reverberation control element. It is constructed with a thin sheet of veneer wood bent over a convex form. In so doing the wood is at a tension and by virtue of the ribs which are spaced at random, many diaphragms are created which vibrate at different frequencies. By use of many convex splays the multiplicity effect in the vibrating diaphragms causes an evenness in the attenuation of the low frequency reverberation. The curved shape and number of "polycylindrical diffusers" have a qualitative effect; however, our discussion is quantitative.

The absorption of middle frequency sound is controlled by the amount of exposed area of such common materials found in the auditorium as—(1) upholstered seats, (2) carpet, (3) drapes and (4) wall treatment. Each material has a different coefficient of absorption and all surfaces in the room must be taken into account. It is relatively simple to multiply the coefficient by the exposed area of

each material and enter the total units of absorption into a mathematical equation and derive the reverberation time for the mid-band frequencies. Usually more absorption is needed for these frequencies than that provided by the seats, carpet and drapes. In our case the wall area between the "polycylindrical diffusers" was treated with a carefully calculated amount of Acousti Celotex. This material is ineffective at the low frequencies, which are controlled by the convex splays.

High frequencies are usually absorbed to a greater degree by the same material affecting the mid-band frequencies and to further exaggerate the condition, sound travel through the air acts as high frequency absorption. To help compensate for this natural attenuation the convex surface was painted with hard enamel so that while it was acting as a low frequency control it could be highly reflective in maintaining high frequency persistence.

Needed—Multi-Network Master Switching

The program control requirements in this network center are among the most complex to be found anywhere in the country. As shown on the map on page 5, programs to and from five different network sources are received and redistributed regularly at this location: (a) Mutual network, (b) Northern branch of Don Lee, (c) Southern branch of Don Lee, (d) Southern California network leg "A", (e) Southern California network leg "B". In addition distribution to Arizona stations is occasionally made, for which provision must be included in the program control system.

Besides the incoming and outgoing network lines, there are lines to the eleven studios and three announce booths of the Hollywood center itself; the KHJ and KHJ-FM transmitters; the 96 remote lines, of which four may be used simultaneously; and the recording channels and tech-

nical and managerial monitoring. All are parts of the program switching problem. A central design requirement of the installation was, therefore, a program dispatching unit which would allow the recombination of any or all of these incoming and outgoing lines, at the "station break," in an efficient and fool-proof manner.

The present Don Lee Broadcasting System Master Control equipment, probably the largest in the world, is a result of a vast amount of collective study over a period of many years and is a system that evolved from the engineering ingenuity in fulfilling the needs of a growing network. The needs were unique to the Don Lee system of operation.

From Patch Cords to Interlocking Relays

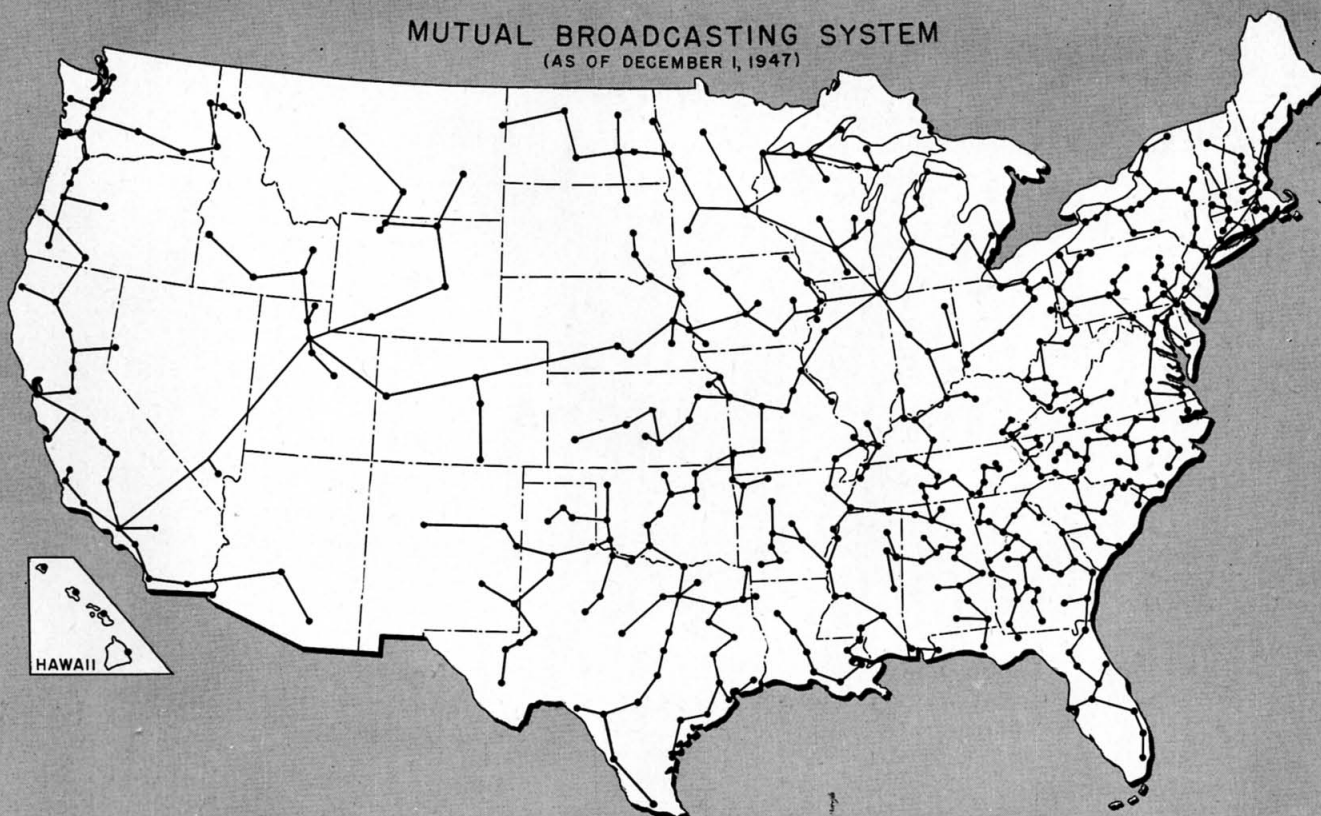
In the early days of the network the switching was done by patch cords in which the line from the originating studios was manually patched into the telephone lines. The "patch up—bridging bus system" of program distribution proved inadequate as it became common for a number of programs to stop and others to start at the same time.

There grew a need for a coordinating center in program switching. Relays were substituted for patch cords. A system of preset selection followed, allowing the operator to anticipate forthcoming programs rather than acting under the pressure of time.

With the rapid advance in the scope of Don Lee Broadcasting System network activities, the installation became overloaded and obsolete. In 1934 a Master Control switching panel was set up using Western Electric locking 92-type keys to activate the relays. One hundred and forty-four program switching possibilities were represented by 144 keys. There were twelve incoming and twelve outgoing lines.

In 1940 a move to the Melrose Avenue location gave rise to a larger and more complex Master Control system. The switching panel was expanded to a 17 x 20 board with 340 possible connections. For presetting, 92-type keys were replaced with rotary switches at the bottom of strips of green and red lights. Above each strip was located a volume indicator. It was then only necessary to rotate the switch until a green light stopped opposite the

(Continued on page 10)



The Men Behind Don Lee



LEWIS ALLEN WEISS

*Chairman of the Board of Directors
Mutual Broadcasting System*

"Our pride in the beautifully utilitarian equipment, pictured and described in this issue of the 'Oscillator', is coupled with a profound sense of gratitude to the executives and technicians of the Western Electric Company who made possible this outstanding achievement in broadcasting engineering. We are especially indebted to Mr. F. L. Hopper for his sympathetic and enthusiastic interpretation of our needs as outlined by our Chief Studio Engineer, Walter Carruthers, and his assistant, Robert Arne."



WILLET H. BROWN

*Vice President,
Don Lee Broadcasting System*

"In viewing the technical equipment in our new broadcasting center, in Hollywood, one cannot fail to sense and appreciate the new and effective designs as well as the utility of the Master Control and streamlined consoles designed and fabricated for us by Western Electric. While we have standardized our studio equipment for twenty years with Western Electric products, this company has reached a new 'high' in design and efficiency in the equipment proudly portrayed in this issue of the 'Oscillator', which provides the arteries of our modern studios."

(Continued from page 7)

desired switch to be made. Then by pushbutton, a red light would be lighted opposite the green showing the switch had been completed.

Switching 800 Program Combinations

In 1948 a system was evolved which was a far cry from the early days of patch and cord switching. Western Electric engineers were invited to survey the traffic problem and equipment need of the expanding Don Lee Broadcasting System network. The outgrowth of many round table discussions between Western and Don Lee engineers was a Master Control equipment with a switching system of over 800 possible program combinations requiring 821 relays, 49 amplifiers, 850 indicator lamps, 2,500 jacks, and 13 volume indicators.

This massive unit, occupying a wall 33 by 10 feet, is installed in a room just to the left of the main lobby as shown on the isometric drawing and floor plan on pages

8 and 9. One entire wall of this room is a plate glass window giving a dramatic view to visitors in the entrance lobby. All incoming and outgoing lines from the studios, networks, KHJ and KHJ-FM transmitters, remotes, etc., are brought into this unit, which contains the 41 repeater amplifiers and the rack of 821 interlocking relays which allow switching connections between any of the incoming-outgoing lines in any desired combination.

The control operation is carried out at the desk section which can be seen in the center of the panel, at which all controls are concentrated for the single operator required for the switching operations. The thirteen vertical relay selector strips represent the thirteen outgoing lines which are built into the unit. Each one of these thirteen outgoing trunks can be connected to any one of 27 regular inputs, which are chosen by the knob at the bottom of the strip and indicated by one of the signal lamps in the vertical row.

In order to allow the operator to perform the necessary multi-switching recombination which will occur at the sta-

tion break, the preset functions of the switching system are called upon. These allow the operator, during any program period, to preset his switching combinations for the ensuing set of program conditions. At the station break he can drop all existing connections and simultaneously establish all the preset connections merely by pushing a single button, or by switching individually or in two groups, as desired. In addition, he can insert a predetermined amount of delay, up to 30 seconds, into the actual switching operation which allows him to push the control button and proceed with other requirements, and the switch to the new program condition will take place automatically at the end of the delay period.

In addition to the switching combinations represented by the relay selector strips, the jack panels on the front of the unit allow patching of any of the 96 remote lines to one of the four remote inputs represented on the relay selector strips. Other controls on the unit are the buttons in the lower left of the turret which allow for reversing the telephone company repeaters on the Mutual line toward the East and on the Don Lee North and South networks.

Monitoring of each of the outgoing trunks is provided by the VU meters at the top of the relay selector strips. In addition four separate loudspeaker monitoring circuits are provided which can be connected to any of the incoming or outgoing lines.

Complex switching operations of all types are readily handled by this system. Such switching problems involve the supply of programs to local KHJ AM and FM, and various Mutual networks. Connections to remote pickup points, substitution of local announcements, and circuit reversals are all a part of the system's functions.

Studio Consoles Designed for Adaptability

For several years prior to the new building, Don Lee engineers were compiling information relative to a mixing console which would incorporate facilities necessary to the needs of radio production. Many schematics were drawn and revised in an effort to satisfy the ever-changing art. It was desired to have the greatest amount of flexibility, and facilities for fulfilling the demands of all types of programs and yet, in attempting to do this, the mixing console became excessively complicated. Often it has been said that an engineer's job is that of making the best compromise and here a compromise was necessary.

With this in mind, less frequently used special effects equipment was deleted with the idea of housing such equipment in a separate cabinet so that it could be wheeled to the side of any console when the occasion demanded. The desk circuits were treated to gain maximum flexibility through the use of jack bays. The eight channel mixer, operationally speaking, was simplified by keys, which by choice of the technician, split the board into channel groupings controllable by sub-masters. On certain types of

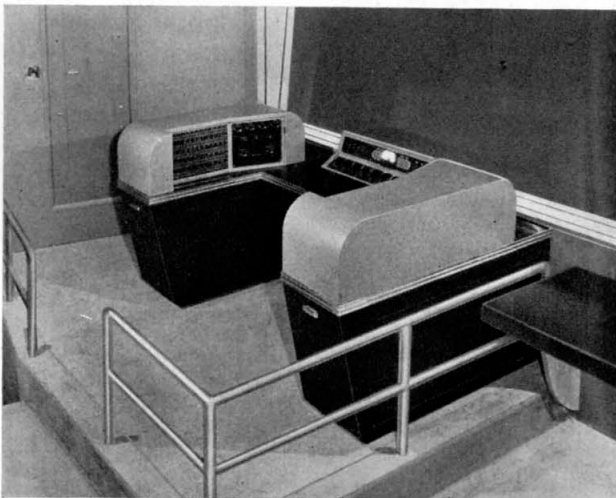
(Continued on page 36)

At right is the announce type transcription console, used for inserting announcements and playing recorded material for program fills.

May 1948



View of the Master Control above shows the operator adjusting signal level on an outgoing line, with VU meter above gain control as guide.



Above, interior of control room for "auditorium" studio, with one of the eight studio type audio consoles custom built for the system.



Studio type transcription console, above, controls studio for discussion or commentary program, and allows production of disc-jockey shows.



Mutual-Don Lee

(Continued from page 11)

programs this greatly facilitates mixing. For example: the multi-microphone pickup of an orchestra, controlled by one hand can be balanced against the instrumental solos or vocal microphones controlled by the other hand. The sound microphones can be balanced against the cast microphone in the case of the dramatic program.

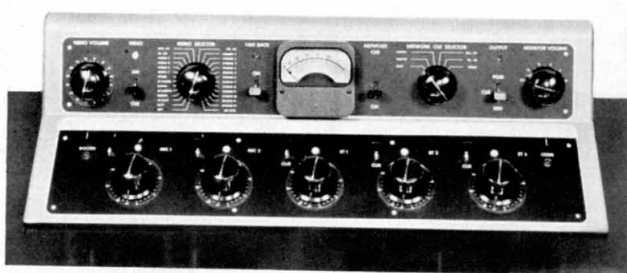
Through the continual exchange of ideas with the Western Electric Company, there emerged a control desk with design beauty, which in one year of trial installation, has proven very satisfactory and seemingly the answer to our need. The readily accessible plug-in amplifiers have made our occasional service requirements very simple.

In addition to the consoles for the eight large studios, six electrical transcription desks were required, three of one type for the small studios, and three of another type for the announce booths.

Consoles for Discussion, Disc-Jockey Programs

The first of these has been designated "Studio Type Transcription Console." It allows for: (1) commentary and round table discussion type of programs, (2) preparation and playback of delayed broadcasts with facility for cut-in announcements and (3) assembly of record shows with the announcer (disc jockey) working in the control room, or in the studio with a technician at the controls. Discussions with Western Electric's engineers emphasized the design philosophy of simplicity, ease of operation, and dependability.

With an intent to minimize operational errors resulting from poorly placed and excessive numbers of controls and switches, a careful study was made to determine the most frequently used controls and the most convenient location for each with the least hazard to smooth operation. It was



The two types of electrical transcription desks are similar in appearance, but have slightly different circuits and controls. Above is the control panel for the "studio" type and at right are the controls for the type used in the three announce booths.

desired to satisfy program production demands with a minimum number of controls in order to facilitate fast and accurate operation. To insure greater dependability, each part was studied as a potential trouble maker. For ease of operation, the two turntables were built into one side of the desk and a third was placed in a separate cabinet on the other side of the operator as optional equipment. The mixer panel is shown in the left-hand photograph reproduced below.

The physical shape and color of the control desk were worked out with Western Electric designers to give eye appeal and modern lines rather than just the "technical look," as can be seen in the photograph on page 11.

Control Desks for Announce Booths

The second type of transcription desk is known as the "Announce" type and allows the announce booth operator to: (1) fade live or transcribed announcements into or out of programs; (2) give identification and spot announcements; (3) play transcribed commercial spots or recorded fills in case of program failure; and (4) cue and monitor as necessary.

The number of controls appearing on the equipment was held to a minimum to avoid confusion and the placement was based on frequency of use. This resulted from a study made with the Don Lee production department and announcing staff. Consideration was given to the slope of the control panel and the location of the volume indicator to further facilitate operation. In a series of conferences with Western Electric engineers it was decided that a control desk similar in shape to that developed for the small studios would be ideal, with circuit and control modification for use in the announce booths. The finished unit includes space for two integrally mounted transcription tables. The mixer panel resulting from the considerations outlined, can be seen in the photograph below.

Mutual-Don Lee is thoroughly convinced that the care and effort expended in the design and construction of this network center have produced the ideal home for its operations in Hollywood. The acoustic characteristics of the studios will, we feel sure, add measurably to the enjoyment of our listeners. The provisions in the building for technical services and the careful planning of the layout for storage, for entrance and exit of the public, and for the managerial functions of the networks will be of the greatest value in our operations, and finally, the audio system will bring marvelous simplicity and efficiency to our program production and dispatching.



DON LEE

Western Chain Covers Coast, Pioneers in Television, Plans Two City FM Coverage

By WILL WHITMORE

And so we bought a mountain." These words spoken by Lewis Allen Weiss, executive vice-president and general manager of the Don Lee Broadcasting System, somehow typify the thrust and enterprise of the network and of the people of the West as a whole.

Perhaps it is, after all, the sun, the climate and the scenery that has made them that way. An expansive country produces expansive thoughts in the minds of men. The sun, chiefly responsible for one of America's great industries being in Southern California, is not just an ordinary sun. It shines with a brilliance which at first blinds the visiting Easterner. But it also warms and cheers. Its rays sink deep into one's being, and makes men want to do big things in a spectacular way, and it gives them the strength, vision and courage to carry through with their bold adventures.

But what about that mountain? For 10 years the Don Lee Broadcasting System had been pumping out television images from the top of its eight story building in downtown Los Angeles. However, the image-carrying waves didn't get very far. Mountains intervened and absorbed the waves, yet television's greatest enthusiasts and much of Southern California's population lived on the other side of the mountains. Then along came Frequency Modulation offering all sorts of advantages, but possessing the same disadvantage of being no match for mountains. Something had to be done.

The Bible says, "I will lift mine eyes to the hills from whence cometh my help," and that's exactly what the network did. They looked to the hills and bought one. Two miles from Hollywood projects the highest mountain accessible by road in the Hollywoodland range. Mack Sennett, who made millions acting and directing pie operas for the movies, once owned this mountain, built a road to its top and lopped off its peak for a place to call home. Sennett changed his mind and for years the mountain had remained there, a lovers' retreat and a solid barrier against those television waves. Now the road has been reconstructed and a modern television studio, television and FM transmitter plant are being rushed to completion on that mountain, now called Mount Lee.

The mountain, the cost of reconstructing the road, and the television and FM plant and studios

will set the Don Lee Broadcasting System back a cool \$100,000. Besides that, another 50,000 watt FM station is planned for San Francisco, and KHJ, 5 kilowatt home radio station of the network, is being moved to a more favorable spot, 5515 Melrose Ave., Hollywood, six and one-half miles distant from its present downtown location.

"We'll serve one and three-quarters million people, practically the entire population of Southern California, with television and FM programs," says Weiss. "Sure, we know it will cost us a lot of money, and that international affairs are scrambled, but in spite of that we can find no excuse for not going ahead. We still have faith in the fundamental strength and health of this country. And we have faith in broadcasting. Our business is growing bigger every month. Gross billings for the network of 32 stations in 1939 amounted to \$1,800,000, and we estimate that this year's business will outdistance 1939 by 25 per cent."

Weiss will talk about anything if he has the time, but he will talk about television whether he has the time or not. "We started television out here with last year's underwear and a roll of bailing wire," says Weiss, "but since that start we have telecast more than 2,800 programs, 11 million feet of motion picture film, made more than 70 outside pick-ups and been on the air more than 6,000 hours."

Television actually began at W6XAO when a young man, fresh out of the University of California at Berkeley, made a call on the Senior Lee back in November, 1930. The young man talked persuasively, and when he walked out of the office an hour later he had talked himself into the title of Television Director and a laboratory in which to putter around. The young man was Harry R. Lubcke, and he is still director of television. The first telecast was made December 23, 1931, just a little more than a year after Lubcke's memorable visit. It has been on the air daily except Sundays without notable exception. Each Monday night wrestling bouts, and each Friday night boxing matches are telecast from the Hollywood American Legion stadium. All home games of the local baseball team are telecast. Many other interesting remote pick-ups are made from time to time. It is estimated that there are

(Continued on page 6)



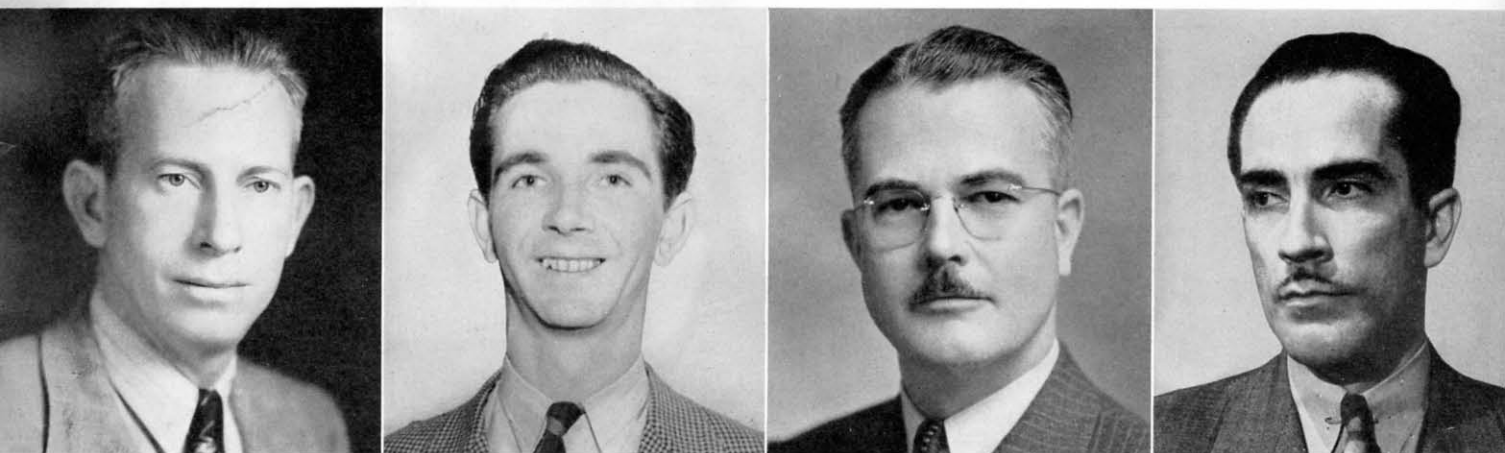
Executive Officers of Don Lee Broadcasting System and KHJ—Lewis Allen Weiss, vice president and general manager; Thomas S. Lee, president; Willet H. Brown, vice president and assistant general manager.

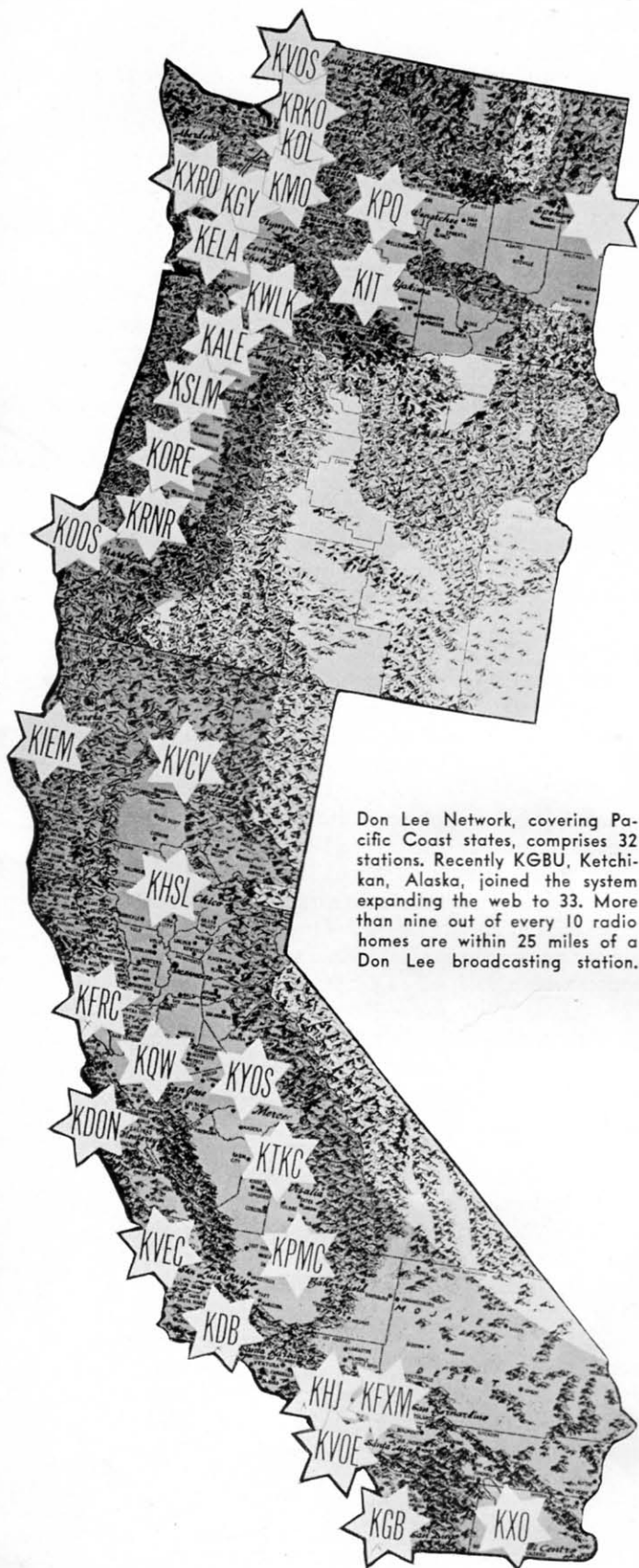
Officials of the Don Lee Broadcasting System



Managers—S. W. Fuller, KGB; William D. Pabst, KFRC; Earl Pollock, KDB.

Chief Engineers—Milam D. Cater, KGB; Robert Arne, KDB; Ernest Underwood, KFRC; Frank Kennedy, Don Lee Broadcasting System and KHJ.





Don Lee Network, covering Pacific Coast states, comprises 32 stations. Recently KGBU, Ketchikan, Alaska, joined the system expanding the web to 33. More than nine out of every 10 radio homes are within 25 miles of a Don Lee broadcasting station.



Top: Breaking ground on top of Mt. Lee for new television and FM studio-station building. Above: From its towering height Mt. Lee overlooks the famous movie colony and Los Angeles.



Children's chorus and Easter lilies telvised from Hollywood bowl. Below: Portable television equipment on way to baseball game—Director Harry R. Lubcke (pointing), Assistant Director Wilbur Thorpe (seated atop truck), Technician Harold Jury.



Don Lee Chain Covers Coast

(Continued from page 3)

more than 400 television receivers in the area, and this number is expected to increase greatly when the new station goes on the air.

The Don Lee Broadcasting System is the natural outgrowth of a need for a network that would do a good job of covering completely the three Pacific Coast states. To begin at the beginning, the history of the network starts with the Cadillac distributor for the State of California by the name of Don Lee. The automobile business was good in California, and particularly in Los Angeles. In those days movie stars gave physical evidence to their popularity and prosperity by attempting to outdo each other with the cars in which they rode. To meet their extravagant demands Don Lee sold them Cadillacs with special bodies and ornate trimmings which he added in his own special body factory. It was a prosperous business, and Lee looked around for places to invest his money. His eye fell on radio, and his interest for radio developed. On November 1, 1926, Don Lee purchased station KFRC in San Francisco. A year and 10 days later he purchased KHJ in Los Angeles, and whether or not he realized it, the network was born. It naturally occurred to him that a greater diversity of entertainment would be afforded the listeners of the two cities if the programs of the two stations could be interchanged. Lines between the two stations were installed on December 13, 1928, and have been maintained ever since. Four days later the McClatchy stations at Fresno, Stockton, and Sacramento made arrangements with Don Lee to release his programs in these three areas. A year later the transcontinental facilities of the Columbia Broadcasting System were extended to the Pacific Coast and the five stations became the Pacific Coast outlet for Columbia. Soon after KOIN, Portland, KOL, Seattle, KVI, Tacoma, and KFPY, Spokane, became affiliated with the budding network.

In 1931 Don Lee purchased Station KDB at Santa Barbara, and KGB at San Diego, making four stations which he owned outright. Arrangements between Columbia and the Don Lee network were terminated in 1936, leaving the four owned stations and four others which had recently become affiliated. The network immediately entered these eight stations into an affiliation with the Mutual Broadcasting System. Knowing that advertisers would want full Coast coverage, an affiliation was effected with 15 stations of the Pacific Broadcasting Company, and later five more stations were added. Today there are 33 stations in the Don Lee Broadcasting System, made up of the four owned stations and 29 affiliated stations. As a network these stations are affiliated with the Mutual Broadcasting System. These 32 stations stretch from the Canadian Border to Mexico, a distance of 1171 air miles. Recently KGBU, Ketchikan, Alaska, joined the Don Lee network expanding the web to 33 stations.

Within these three states of California, Washington and Oregon live 8,000,000 people with an estimated 2,385,690 radio homes, and, claims Don Lee, nine out of every 10 radio homes are within 25 miles of a Don Lee station!

Don Lee died in 1934 and all of his holdings passed to his son, Thomas S. Lee, now president of the network. Young Tommy got his start as grease monkey in his father's automobile agency, and as a part of his training has held jobs in almost every capacity in both the automobile and the radio business. Perhaps there was a time, for a while, when he showed more interest in demonstrating his unusual ability as a dancer than for the business of radio, but he has long since found his true love in television. Its promotion on the West Coast is dependent upon his able leadership. Through his efforts the celebrities of the nation appear before the television camera of W6XAO in a never ending stream. His friends call him "Television Tommy," and he's proud of the name, because he deserves it.

When you visit the home office of the Don Lee Broadcasting System in Los Angeles, you wonder which is more important, automobiles or radio. The building which houses both appears to be a typical automobile agency, at least the first floor does with its rows of shining Cadillacs on display. Then you take the elevator, and although it lifts you only to the second floor, it deposits you in an entirely different world where a cowboy strums a guitar, loud-speakers, pianos, singers and newscasters make a jumble in your ears. Here it's all radio and television. Upper floors show you automobiles again and mechanics, and the eighth floor turns again into radio with its television transmitter and five kilowatt Western Electric transmitter for KHJ. And radio wins the final honors with a roof full of antennas.

"It's a swell combination," says Willet H. Brown, vice-president and assistant general manager. "Both radio and the automobile business have their ups and downs, but never at the same time, and thus we manage to keep an even keel." Brown's father was general manager of the automobile business in the old days, and Willet had the same sort of training in both radio and automobiles that Tommy Lee obtained. The same holds true for Bill Pabst, manager of the San Francisco station, KFRC. His father Fred is manager of the car agency in the Golden Gate City.

Radio in the West seems to move at a swifter clip. One feels the heightened tempo of the men who direct its destinies. You feel and see the evidence of competition everywhere. Radio stations use the billboards, the newspapers, show windows, taxicabs, sky-writers, and what have you, to advertise the stations and their programs. "It's the competition," says Weiss. "Right here in Los Angeles we have 18 stations. When I was with WJR in Detroit

(Continued on page 31)

One of the final assembly processes is the fitting and sealing of the "rat's nest" onto the lower casing of the microphone. If a perfect seal is not obtained all the necessary breathing done by the pressure unit will not take place through the breather tube, provided for this purpose, and frequency characteristics of the mike will be impaired.

Now the Cardioid, fully assembled on its base, but still not enclosed in the grilled housing, is put to the crucial test. Will it work? And by work Kearny means 100 per cent perfect.

Out it goes to a testing room patterned after Bell Telephone Laboratories' famous sound proof room. Walls and ceiling are composed of layer upon layer of sound absorbant cloth. Steel gratings form the floor which rests upon large steel springs. In fact the room is practically suspended in space.

As the door swings closed the soft, drab walls envelop you with a strange stillness. You speak—and the sound of your voice startles you—it has such a weird, dead quality. It seems to float away from your lips into endless space. If you close your eyes you have the illusion of standing in the middle of a desert. No reverberation, no reflection, no friendly little echo breaks the spell of aloneness. It's depressing. Even the engineers feel a bit sunk if they stay long in that room.

They explain that this eerie sensation is merely due to the fact that your voice refuses to play ball with you under these extraordinary conditions. In other words it will not bounce back at you from walls, ceiling and floor as happens in an ordinary room. Not only is sound from inside completely deadened but, since the room hangs in space, sounds and reverberations from outside sources cannot enter.

If the Cardioid does not pass muster in these dead surroundings it must be taken apart—the trouble diagnosed and corrected and again it is put through the preliminary test. After the outer casing has been fitted and sealed a final test takes place in the sound proof room. Thus the mike completes the last lap of the journey through the Kearny Plant. To date approximately 3000 instruments have been shipped to the field.

Were those predictions made back in 1935 correct? Did Radio need the Cardioid? Well—the broadcasters can answer that.

Don Lee Chain Covers Coast

(Continued from page 6)

we had only five stations. But competition naturally raises the standards of program quality and we welcome it."

You feel the pressure of competition when you talk to Henry A. Gerstenkorn, merchandising director, and learn how his department goes to town in promoting the programs and products of sponsors. You feel it again when you talk to Wilbur Eickelberg and examine his charts, curves, surveys, and

promotions with which he lures more and more sponsors. Syd Gaynor, KHJ commercial manager, is a young man with his eye on the business ball too.

You feel it again when you talk to Van C. Newkirk, program director, and learn how his microphones go roaming all over the Pacific Coast in search of new and better programs. You learn something more, too, and that's how KHJ and the Don Lee Broadcasting System is serving its public with programs in the public interest. "Eighty per cent of the classrooms in Los Angeles County are equipped for radio reception, and all schools built in the last year have radio," according to Newkirk. Surely, with such a record, radio must be giving the schools programs of educational merit.

For instance: There's the Don Lee School of the Air which aims five and one-half hours of program material directly into those classrooms. Material for these programs is prepared in cooperation with school authorities.

There is the quarter-hour program, presented by Mrs. Elizabeth Goudy, Director of Radio for Los Angeles County Schools. It is called "Young America Presents," and is originated by and for the schools of the county. There is the program, "Dramas of Youth," now in its eighth year, written, directed and presented by young people in radio and the movies. There are 15 minute weekly programs presented by Mrs. Walter H. Boyd, California Federation of Women's Clubs and Bruce Merman, American Legion. There is the program called "Nobody's Children," which originates in a California orphan home where Walter White, Jr., interviews orphans. There's the historical presentation called "This Day in History," a quarter-hour weekly show; there's the weekly half-hour, 12 piece musical program called "The Hancock Ensemble," personally directed by Dr. G. Allan Hancock, noted philanthropist.

The coverage of municipal affairs is just as complete, and then there are California's sports to cover. KHJ averages 25 remotes a week. These often call for the coordination of pick-ups from yachts, planes, cars and permanent remotes.

The programs of the Don Lee Broadcasting System are coming more and more into prominence through the Mutual Broadcasting System affiliation. The 32 stations of Don Lee cover the Pacific states, and soon television programs will be painting pictures in the air over the homes of almost two million people in Southern California. Frequency Modulation programs soon will be reaching out to the same audience, and also to the San Francisco audience. Yes, that California sun is not just an ordinary sun.

New Vacuum Tube Hearing Aid

Western Electric has introduced a new vacuum tube hearing aid known as the Ortho-tronic Audiphone in which stabilized feedback is used.